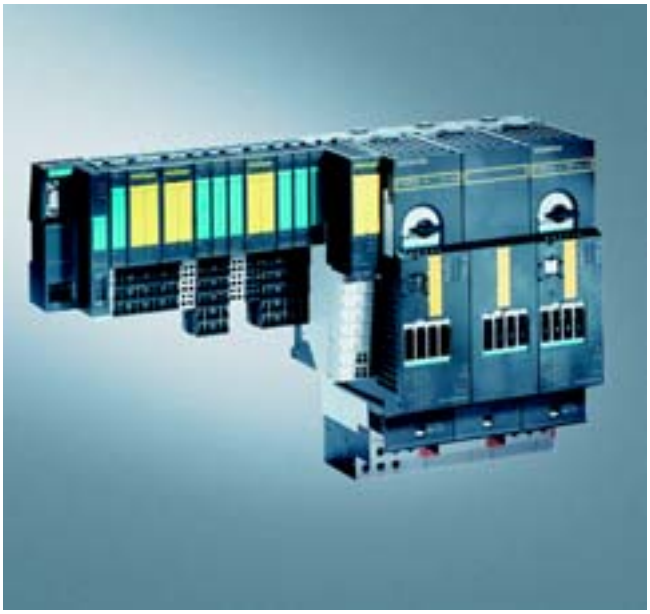
# Distributed I/Os
## SIMATIC ET 200

6



## Introduction

### Overview



- Distributed I/O system with degree of protection IP20
- Bit-modular design for precise adaptation to the automation task
- Consists of input/output modules, process-oriented modules, frequency converters, and motor starters
- Can also be used for extremely time-critical tasks
- Self-assembly voltage bus/energy bus
- Integration of safety technology with SIGUARD or PROFIsafe
- Replacement of electronic modules and motor starters during operation (hot swapping) even when live
- Channel precision diagnostics for high availability
- With integrated CPU as miniature controller for use on the PROFIBUS DP
- Slot reservation using special modules
- PROFIsafe components support the reading in, processing and output of safety data through PROFIBUS DP in the same way as standard data. "Safe" and "unsafe" modules can be installed together and their data can be exchanged via a common PROFIBUS DP bus line with the control unit. PROFIsafe offers safety up to Category 4 to EN 954-1.
- ET 200S configurator software (see Catalog CA 01 on CD/DVD, SIMATIC selection assistance)

## Technical specifications – general

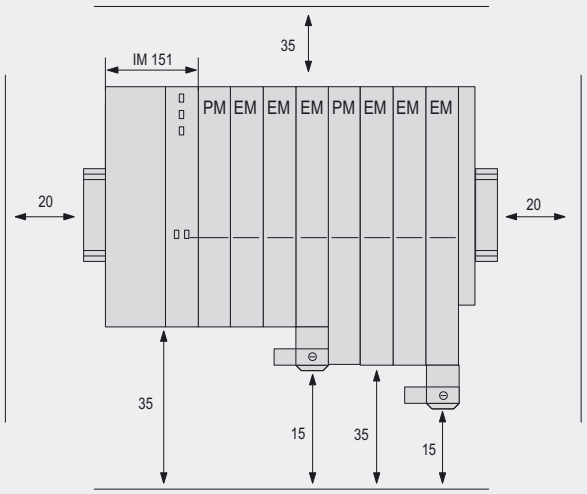
| | |
|---|---|
| Degree of protection | IP20 |
| Ambient temperature | 0 °C to +60 °C |
| Vibration resistance | 2 *g* continuous,<br>5 *g* temporarily<br>(motor starter max. 2 *g*) |
| Maximum configuration<br>(none of the limits listed below must be exceeded) | |
| • Number of modules per IM 151, max. | IM151-1 BASIC: up to 12 modules<br>IM151-1 STANDARD:<br>up to 63 modules<br>IM151-1 HIGH FEATURE:<br>up to 63 modules<br>IM151-7 CPU: up to 63 modules<br>IM151-3 PN: up to 63 modules |
| • Line width, max. | IM151-1 BASIC: up to 2 m<br>IM151-1 STANDARD: up to 2 m<br>IM151-1 HIGH FEATURE:<br>up to 1 m<br>IM151-7 CPU: up to 1 m<br>IM151-3 PN: up to 2 m |
| • Parameter length depending on the number and type of modules used | IM151-1 BASIC: not relevant<br>IM151-1 STANDARD:<br>up to 244 byte<br>IM151-1 HIGH FEATURE:<br>up to 244 byte<br>IM151-7 CPU: not relevant<br>IM151-3 PN: not relevant |
| • User data length depending on the number and type of modules used | IM151-1 BASIC: up to 88 byte for inputs and outputs<br>IM151-1 STANDARD: up to 128 byte for inputs and outputs<br>IM151-1 HIGH FEATURE: up to 244 byte for inputs and outputs<br>IM151-7 CPU: not relevant<br>IM151-3 PN: not relevant |

| | |
|---|---|
| Requests to DP master system | |
| • PROFIBUS DP master | Corresponding to EN 50170 |
| • Parameter length | > 32 byte, according to the number and type of modules plugged in |
| • User data length | according to the number and type of modules plugged in |
| • Diagnostics length | 17 to 64 byte (configurable) |
| **Standards and approvals** | |
| • PROFIBUS | EN 50170, Volume 2 |
| • IEC 1131 | IEC 1131, Part 2 |
| • UL | to standard UL508, file no. E 116536/E 75310 (AC modules) |
| • C-tick | AS/NZS 2064 (Class A) |
| • CSA | to standard C22.2 No. 142, file no. LR 48323/LR 44226 (AC module) |
| • cULus for hazardous locations | to Standard UL 508, File No. E 116536<br>to hazardous locations UL 1604, File No. E 222109<br>to Standard CSA C22.2, No. 142 |
| • FMs | Standard Class No. 3611, Class I, Division 2, Group A, B, C, D, Class I, Zone 2, Group IIC, (without motor starter) |
| • Marine engineering; | American Bureau of Shipping<br>Bureau Veritas<br>Det Norske Veritas<br>Germanischer Lloyd<br>Lloyds Register of Shipping<br>Nippon Kaiji Kyokai |
| • Ex approval Cat. 3 (for Zone 2 acc. to ATEX–100a) | EN 50 021 |

Within the context of converting SIMATIC from UL / CSA to cULus, the ET 200S modules were also converted

## Dimension drawings

Dimensions in mm




G_IK10_XX_50071

# IM 151-1 interface modules

## Overview

- Interface module for connecting the ET 200S to PROFIBUS DP
- Handles all data exchange with the PROFIBUS DP master
- 3 versions:
  - IM 151 Standard (RS 485 and FO)
  - IM 151 High Feature (RS 485)
  - IM 151 BASIC (RS 485)
- IM 151-1 STANDARD interface module with options handling



## Technical specifications

| | IM 151-1 STANDARD | IM 151-1 HIGH-FEATURE | IM 151-1 BASIC |
|---|---|---|---|
| Transmission protocol | PROFIBUS DP to EN 50170 | | |
| Data transmission rate | 9.6, 19.2, 45.45, 93.75, 187.5, 500, 1500, 12000 kbit/s; IM 151 also 3000/ 6000 kbit/s; self-adjusting | | |
| Internode communication support | Yes, transmitter | | |
| SYNC/FREEZE capability | Yes | | |
| Address capacity, max. | 128 byte for inputs, 128 byte for outputs | 244 byte for inputs, 244 byte for outputs | 88 byte for inputs, 88 byte for outputs |
| Backup during power failure | 20 ms | | |
| Insulation voltage | 500 V | | |
| Supply voltage | | | |
| • Rated value | 24 V DC | | |
| • Permissible range (including ripple) | 20.4 to 28.8 V | | |
| • Polarity reversal protection | Yes | | |
| Power consumption at 24 V DC, approx. | 200 mA | | 70 mA |
| Output current, max. | 700 mA for backplane bus | | Not relevant |
| Status and diagnostic LEDs | BF, SF and ON | | |
| Feldbus terminal | | | |
| • IM 151-1 | 9-pin Sub-D connector | | |
| • IM 151-1 FO | 4 x Simplex socket | | |
| - Distance between 2 stations, max. | Plastic: 50 m, PCF: 300 m | | |

## Technical specifications (continued)

| | IM 151-1 STANDARD | IM 151-1 HIGH-FEATURE | IM 151-1 BASIC |
|---|---|---|---|
| Parameter[1] | 27 byte | 27 (56)[2]byte | 19 byte |
| DP V1 mode | - | Disable/ enable | - |
| • Operation for setpoint not equal to actual config. | Disable/ enable | Disable/ enable | Disable/ enable |
| • Diagnostics interrupt [2] | - | Disable/ enable | - |
| • Process interrupt [2] | - | Disable/ enable | - |
| • Module replacement alarm [1] | - | Disable/ enable | - |
| • Identifier-related diagnostic data | - | Disable/ enable | Disable/ enable |
| • Module status | - | Disable/ enable | Disable/ enable |
| • Channel-related diagnostics | - | Disable/ enable | Disable/ enable |
| • Format for analog values | SIMATIC S7/SIMATIC S5 | SIMATIC S7/SIMATIC S5 | SIMATIC S7/SIMATIC S5 |
| • Interference frequency suppression | 50 Hz / 60 Hz | 50 Hz / 60 Hz | 50 Hz / 60 Hz |
| • Slot reference point | None / 2 to 63 | None / 2 to 63 | None / 2 to 12 |
| • Input reference point | RTD to channel 0/ RTD to channel 1 | RTD to channel 0/ RTD to channel 1 | - |
| • Bus length | ≤ 1m / > 1m | - | - |
| • General option handling | Disable/ enable | - | - |
| • Option handling slots 2 to 63 | Disable/ enable | - | - |
| Degree of protection | IP20 | | |
| Ambient temperature | | | |
| • Operation | 0 °C to +60 °C | | |
| • Storage | -40 to +70 °C | | |
| Dimensions (W x H x D) in mm | 45 x 119.5 x 75 (when mounted on 7.5 mm DIN rail) | | |

1) Default values are underlined, for PROFIBUS DP max. 244 byte per station
2) With isochrone mode activated

| IM 151; High Feature | Range of values |
|---|---|
| Synchronize slave with DP cycle[1] | Disable/ enable |
| Time Ti (read in process values) | (values are specified by STEP 7) |
| Time To (read out process values) | (values are specified by STEP 7) |

1) Default values are underscored

## IM 151-1 interface modules

### Ordering data

| | Order No. |
|---|---|
| **IM 151-1 BASIC Interface module** [1)]<br>For ET 200S; transmission rate up to 12 Mbit/s; max. 12 power modules, electronic modules and motorstarter modules can be connected; bus connection over 9-pin Sub-D including termination module | **6ES7 151-1CA00-0AB0** |
| **IM 151-1 Standard Interface module**<br>For ET 200S; transmission rate up to 12 Mbit/s; data volumes per 128 byte for inputs and outputs; max. 63 power modules, electronic modules or motorstarter modules can be connected; bus connection over 9-pin Sub-D including termination module | **6ES7 151-1AA03-0AB0** |
| **IM 151-1 FO Standard Interface module**<br>For ET 200S; transmission rate up to 12 Mbit/s; data volume 128 byte each for inputs and outputs; max. 63 power modules, electronic modules or motorstarter modules can be connected; bus connection over integral fiber-optic cable including termination module | **6ES7 151-1AB02-0AB0** |
| **IM 151-1 High Feature Interface module**<br>For ET 200S; transmission rate up to 12 Mbit/s; data volume 244 byte each for I/O, up to 63 modules can be connected; connection of PROFIsafe modules, isochrone mode; bus connection over 9-pin Sub-D including termination module | **6ES7 151-1BA00-0AB0** |
| ***Accessories*** | |
| **ET 200S manual**<br>Printed version in English and German, available as a pdf file on the Internet in French, Italian and Spanish | |
| • Part 1 "System manual", Part 2 "Motor starter" | |
| - German | **6ES7 151-1AA10-8AA0** |
| - English | **6ES7 151-1AA10-8BA0** |
| • IM151-7 CPU | |
| - German | **6ES7 151-1AB00-8AA0** |
| - English | **6ES7 151-1AB00-8BA0** |
| • Technology modules | |
| - German | **6ES7 151-1AC00-8AA0** |
| - English | **6ES7 151-1AC00-8BA0** |
| • Positioning modules | |
| - German | **6ES7 151-1AD00-8AA0** |
| - English | **6ES7 151-1AD00-8BA0** |
| • Serial interfaces | |
| - German | **6ES7 151-1AE00-8AA0** |
| - English | **6ES7 151-1AE00-8BA0** |

1) On request

| | Order No. |
|---|---|
| ***Accessories*** (continued) | |
| **SIMATIC Manual Collection**<br>Electronic manuals on CD, multilanguage: S7-200, TD 200, S7-300, M7-300, C7, S7-400, M7-400, STEP 7, Engineering Tools, Runtime Software, SIMATIC DP (Distributed I/O), SIMATIC HMI (Human Machine Interface), SIMATIC NET (Industrial Communication) | **6ES7 998-8XC01-8YE0** |
| **SIMATIC Manual Collection – Update service for one year**<br>Scope of supply: Up-to-date CD S7 Manual Collection as well as the three subsequent updates | **6ES7 998-8XC01-8YE2** |
| **100 Simplex plugs**<br>For plastic fiber optic cable incl. 5 polishing sets | **6GK1 901-0FB00-0AA0** |
| **50 plug adapters**<br>Each for 2 Simplex plugs | **6ES7 195-1BE00-0XA0** |
| **Labeling sheet DIN A4, perforated**<br>Ordering unit: 1 set of 10 sheets of 60 strips, can be used for electronics and power modules and motor starters + 20 strips that can be used for IM 151 | |
| • Petrol | **6ES7 193-4BH00-0AA0** |
| • Red | **6ES7 193-4BD00-0AA0** |
| • Yellow | **6ES7 193-4BB00-0AA0** |
| • Light beige | **6ES7 193-4BA00-0AA0** |
| **Terminating module**<br>For ET 200S | **6ES7 193-4JA00-0AA0** |
| **SIMATIC S5, standard DIN rail 35 mm, length 483 mm for 19" cabinets** | **6ES5 710-8MA11** |
| **SIMATIC S5, standard DIN rail 35 mm, length 530 mm for 600 mm cabinets** | **6ES5 710-8MA21** |
| **SIMATIC S5, standard DIN rail 35 mm, length 830 mm for 900 mm cabinets** | **6ES5 710-8MA31** |
| **SIMATIC S5, standard DIN rail 35 mm, length 2 m** | **6ES5 710-8MA41** |

## Overview

- Interface module for connecting the ET 200S to PROFINET
- Performs all data communication with the PROFINET I/O Controller

## Technical specifications

| | IM 151-3 PN |
|---|---|
| Transmission protocol | PROFINET |
| Data transmission rate | 10/100 Mbit/s |
| Internode communication support | - |
| SYNC/FREEZE capability | - |
| Address capacity, max. | 128 byte for inputs,<br>128 byte for outputs |
| Backup during power failure | 20 ms |
| Insulation voltage | 500 V |
| Supply voltage | |
| • Rated value | 24 V DC |
| • Permissible range (including ripple) | 20.4 to 28.8 V |
| Polarity reversal protection | Yes |
| Power consumption at 24 V DC, approx. | 200 mA |
| Output current, max. | 700 mA for backplane bus |
| Status and diagnostic LEDs | BF, SF and ON |
| Feldbus terminal | RJ45 female connector |
| Ambient temperature | |
| • Operation | 0°C to +60 °C |
| • Storage | -40 to +70 °C |
| Dimensions (W x H x D) in mm | 45 x 119.5 x 75 (when mounted on 7.5 mm DIN rail) |

## IM 151-3 PN interface modules

| Ordering data | Order No. |
|---|---|
| **IM 151-3 PN Interface module**<br>For ET 200S; transmission rate up to 100 Mbit/s; data volume depend on number of modules plugged in, max. 63 modules can be connected, bus connection over RJ45 | **6ES7 151-3AA00-0AB0** |
| **Accessories** | |
| **MMC 64 KB** [1]<br>For saving the equipment name | **6ES7 953-8LF11-0AA0** |
| **MMC 128 KB** [1]<br>For saving the equipment name | **6ES7 953-8LG11-0AA0** |
| **MMC 512 KB** [1]<br>For saving the equipment name | **6ES7 953-8LJ11-0AA0** |
| **MMC 2 MB** [1]<br>For saving the equipment name and/or firmware update | **6ES7 953-8LL11-0AA0** |
| **MMC 4 MB** [1]<br>For saving the equipment name and/or firmware update | **6ES7 953-8LM11-0AA0** |
| **MMC 8 MB** [1]<br>For saving the equipment name and/or firmware update | **6ES7 953-8LP11-0AA0** |
| **ET 200S manual**<br>Printed version in English and German, available as a pdf file on the Internet in French, Italian and Spanish | |
| • Part 1 "System manual", Part 2 "Motorstarter" | |
| - German | **6ES7 151-1AA10-8AA0** |
| - English | **6ES7 151-1AA10-8BA0** |
| • IM151-7 CPU | |
| - German | **6ES7 151-1AB00-8AA0** |
| - English | **6ES7 151-1AB00-8BA0** |
| • Technology modules | |
| - German | **6ES7 151-1AC00-8AA0** |
| - English | **6ES7 151-1AC00-8BA0** |
| • Positioning modules | |
| - German | **6ES7 151-1AD00-8AA0** |
| - English | **6ES7 151-1AD00-8BA0** |
| • Serial interfaces | |
| - German | **6ES7 151-1AE00-8AA0** |
| - English | **6ES7 151-1AE00-8BA0** |

1) An MMC is absolutely essential for operating the CPU

| | Order No. |
|---|---|
| ***Accessories*** (continued) | |
| **SIMATIC Manual Collection**<br>Electronic manuals on CD, multi-language:<br>S7-200, TD 200, S7-300, M7-300, C7, S7-400, M7-400, STEP 7, Engineering Tools, Runtime Software, SIMATIC DP (Distributed I/O), SIMATIC HMI (Human Machine Interface), SIMATIC NET (Industrial Communication) | **6ES7 998-8XC01-8YE0** |
| **SIMATIC Manual Collection – Update service for one year**<br>Scope of supply: Up-to-date CD S7 Manual Collection as well as the three subsequent updates | **6ES7 998-8XC01-8YE2** |
| **100 Simplex plugs**<br>For plastic fiber optic cable incl. 5 polishing sets | **6GK1 901-0FB00-0AA0** |
| **50 plug adapters**<br>Each for 2 Simplex plugs | **6ES7 195-1BE00-0XA0** |
| **Labeling sheet DIN A4, perforated**<br>Ordering unit: 1 set of 10 sheets of 60 strips, can be used for electronics and power modules and motor starters + 20 strips that can be used for IM 151 | |
| • Petrol | **6ES7 193-4BH00-0AA0** |
| • Red | **6ES7 193-4BD00-0AA0** |
| • Yellow | **6ES7 193-4BB00-0AA0** |
| • Light beige | **6ES7 193-4BA00-0AA0** |
| **Terminating module**<br>For ET 200S | **6ES7 193-4JA00-0AA0** |
| **SIMATIC S5, standard DIN rail 35 mm, length 483 mm for 19" cabinets** | **6ES5 710-8MA11** |
| **SIMATIC S5, standard DIN rail 35 mm, length 530 mm for 600 mm cabinets** | **6ES5 710-8MA21** |
| **SIMATIC S5, standard DIN rail 35 mm, length 830 mm for 900 mm cabinets** | **6ES5 710-8MA31** |
| **SIMATIC S5, standard DIN rail 35 mm, length 2 m** | **6ES5 710-8MA41** |

## Overview

- Interface module with integrated CPU for SIMATIC ET 200S
- For high-performance control solutions in ET 200S
- Enhances the effective system availability of plants and machines
- Programming through PROFIBUS DP
- Features the new SIMATIC Micro Memory Card (MMC)
- Maintenance-free because no battery
- Integrated 12 Mbit/s PROFIBUS DP slave/MPI interface for Cu conductors
- Integrated CPU based on the CPU S7-314
- IM 151-7 CPU FO available
- Failsafe IM 151-7 F-CPU PROFIsafe available

## Technical specifications

| MLFB | 6ES7 151-7AA10-.... |
|---|---|
| Associated programming package | STEP 7 V 5.1 + SP 6 and newer<br>Optional:<br>• S7-SCL<br>• S7-GRAPH<br>• STEP 7 V5.2 + SP1 and higher<br>• Master functionality (with master interface 6ES7 138-4HA00-0AB0) |
| Memory | |
| Working memory | |
| • Integrated | 48 kbyte |
| • Expandable | No |
| Load memory | Plug-in through MMC (max. 8 MB) |
| Backup | Realized by MMC (maintenance-free) |
| Execution times | |
| Execution times for | |
| • Bit operation, min. | 0.1 µs |
| • Word operation, min. | 0.2 µs |
| • Fixed-point arithmetic, min. | 2 µs |
| • Floating-point arithmetic, min. | 6 µs |
| Timers/counters and their retentivity | |
| S7 counter | 256 |
| • Retentivity | Adjustable |
| • Preset | From Z 0 to Z 7 |
| • Counting range | 0 to 999 |
| IEC counter | Yes |
| • Type | SFB |
| • Number | Unlimited (limited by working memory only) |
| S7 timers | 256 |
| • Retentivity | Adjustable |
| • Preset | No retentivity |
| • Range | 10 ms to 9990 s |

| MLFB | 6ES7 151-7AA10-.... |
|---|---|
| IEC timer | Yes |
| • Type | SFB |
| • Number | Unlimited (limited by working memory only) |
| Data areas and their retentivity | |
| Total retentive data area (incl. flags; timers; counters) | All |
| Bit memories | 256 byte |
| • Retentivity | Yes |
| • Preset retentivity | MB0 to MB15 |
| Clock memory | 8 (1 memory byte) |
| Data blocks | |
| • Number | 511 |
| • Size | 16 kbyte |
| Local data for each priority class, max. | 510 byte |
| Modules | |
| Total | 1024 (DBs, FCs, FBs) |
| OBs | See operation list |
| • Size | 16 kbyte |
| Nesting depth | |
| • For each priority class | 8 |
| • Plus, within an error OB | 4 |
| FBs | See operation list |
| • Number | 512 |
| • Size | 16 kbyte |
| FCs | See operation list |
| • Number | 512 |
| • Size | 16 kbyte |
| Address areas (inputs/outputs) | |
| I/O address area, max. | 2048 byte |

## IM 151-7 CPU interface modules

### Technical specifications (continued)

| MLFB | 6ES7 151-7AA10-.... |
|---|---|
| I/O process image | 128 byte/128 byte |
| Max. number of digital I/O channels | 16136 bit |
| Of which centralized I/O max. | 248 byte |
| Number of analog channels (distributed + centralized) | 1024 (words) |
| Of which centralized I/O max. | 124 words |
| Configuring rules | • Max. 63 I/O modules per station<br>• Station width <1m or <2m<br>• Max. 10 A per load group (power module)<br>• Master interface right alongside IM 151 CPU (X2 interface) |
| Time of day | |
| Clock | Yes (HW clock) |
| • Battery-backed | Yes |
| • Back-up time | Typ. 6 weeks (at 40 °C ambient air temperature |
| • Accuracy | Deviation per day: < 10 s |
| Operating hours counter | 1 |
| • Number | 0 |
| • Range of values | $2^{31}$ hours (when using the SFC 101) |
| • Selectivity | 1 hour |
| • Retentive | Yes; must be restarted on every restart. |
| Clock synchronization | Yes |
| • Centrally in PLC | No |
| • On MPI | Master/slave |
| S7 message function | |
| Number of stations that can be registered for message functions (e.g. OS) | 12 (depends on the links configured for PG/OP and S7 standard communication) |
| Process diagnostic alarms | Yes |
| • Simultaneously active alarm S blocks, max. | 40 |
| Test and startup function | |
| Status/modify variable | Yes |
| • Variable | Inputs, outputs, bit memories, DB, timers, counters |
| • Number of variables | 30 |
| - Of which status variables | 30 |
| - Of which modify variables | 14 |
| Forcing | Yes |
| • Variable | Inputs/outputs |
| • Number of variables, max. | 10 |
| Status module | Yes |
| Single step | Yes |
| Breakpoint | 2 |
| Diagnostic buffer | Yes |
| • Number of entries (not adjustable), max. | 100 |
| Communication functions | |
| PG/OP communication | Yes |

| MLFB | 6ES7 151-7AA10-.... |
|---|---|
| Global data communication | Yes |
| • Number of GD packages, max. | 4 |
| - Transmitter, max. | 4 |
| - Receiver, max. | 4 |
| • Size of GD packages, max. | 22 byte |
| - Of which consistent | 22 byte |
| S7 standard communication | Yes |
| • Useful data per request, max. | 76 byte |
| - Of which consistent | 76 byte (for X_SEND or X_RCV)<br>64 byte (for X_PUT or X_GET as a server) |
| S7 communication | Yes |
| • As a server | Yes |
| • As a client | No |
| • Useful data per request, max. | 180 byte |
| - Of which consistent | 64 byte |
| S5-compatible communication | No |
| Standard communication | No |
| Number of connections | 12 |
| Can be used for | |
| • PG communication | |
| - Spare (default) | 1 |
| - Adjustable | 1 to 11 |
| • OP communication | |
| - Spare (default) | 1 |
| - Adjustable | 1 to 11 |
| • S7 standard communication | |
| - Spare (default) | 0 |
| - Adjustable | 0 to 10 |
| Interfaces | |
| 1st (integrated) interface | |
| Type | Integrated, coexistent RS 485 interface |
| Physical characteristics | RS 485 |
| Isolated | Yes |
| Power supply on interface (15 to 30 V DC), max. | 80 mA |
| Functionality | |
| • MPI | Yes |
| • PROFIBUS DP | Yes, DP slave (active/passive) |
| • Point-to-point coupling | No |
| MPI mode | |
| Number of connections (also with DP master module plugged in) | 12 (per CPU) |
| Utilities | |
| • PG/OP communication | Yes |
| • Routing | Yes (with master module) |
| • Global data communication | Yes |
| • S7 standard communication | Yes |
| • S7 communication | Yes |
| - As a server | Yes |
| - As a client | No |
| • Transmission rates | Max. 12 Mbit/s |
| DP slave mode | |
| Number of connections | 12 (per CPU) |

## Technical specifications (continued)

| MLFB | 6ES7 151-7AA10-.... |
|---|---|
| Utilities | |
| • PG/OP communication | Yes |
| • Routing | Yes (only with active interface and with master mode) |
| • Global data communication | No |
| • S7 standard communication | No |
| • S7 communication | No |
| • Transmission rate | Up to 12 Mbit/s |
| • Transfer memory | 244 I byte/244 O byte |
| • Address area, max. | 32 with max. 32 byte each |
| • DPV1 | No |
| 2nd interface | |
| Type | External interface over master module 6ES71384HA00-0AB0 |
| Physical characteristics | RS 485 |
| Isolated | Yes |
| Power supply on interface (DC 15 to 30 V), max. | None |
| Functionality | |
| • MPI | No |
| • PROFIBUS DP | Yes, DP master |
| • Point-to-point coupling | No |
| Number of connections | 12 (per CPU) |
| Utilities | |
| • PG/OP communication | Yes |
| • Routing | Yes |
| • Global data communication | No |
| • S7 standard communication | No |
| • S7 communication | Yes (server only) |
| • Direct data exchange | Yes |
| • Isochronicity | Yes |
| • Sync/Freeze | Yes |
| • Activate/disable DP slaves | Yes |
| • DPV1 | Yes |
| Transmission rates | Up to 12 Mbaud |
| Number of DP slaves per station | 32 |
| Address area, max. | 2 kbyte I / 2 KB O |
| Useful data per DP slave | Max. 244 I byte/244 O byte |

## Ordering data

| | Order No. |
|---|---|
| **IM 151/CPU Interface module (48 K)** | **6ES7 151-7AA10-0AB0** |
| Including termination module | |
| **Interface module IM 151/CPU FO (48 K)** | **6ES7 151-7AB00-0AB0** |
| Including termination module | |
| ***Accessories*** | |
| **MMC 64 KB** [1] | **6ES7 953-8LF11-0AA0** |
| For program backup | |
| **MMC 128 KB** [1] | **6ES7 953-8LG11-0AA0** |
| For program backup | |
| **MMC 512 KB** [1] | **6ES7 953-8LJ11-0AA0** |
| For program backup | |
| **MMC 2 MB** [1] | **6ES7 953-8LL11-0AA0** |
| For program backup and/or firmware update | |
| **MMC 4 MB** [1] | **6ES7 953-8LM11-0AA0** |
| For program backup | |
| **MMC 8 MB** [1] | **6ES7 953-8LP11-0AA0** |
| For program backup | |
| **MMC adapter** | **6ES7 798-0BA00-0AA0** |
| For PG memory card slot | |
| **External PROM programmer** | **6ES7 792-0AA00-0XA0** |
| For MMC with USB interface | |
| **PG** | **On request** |
| with integral MMC interface | |
| **DIN A4 sheets of labels** | |
| • Petrol | **6ES7 193-4BH00-0AA0** |
| • Red | **6ES7 193-4BD00-0AA0** |
| • Yellow | **6ES7 193-4BB00-0AA0** |
| • Light beige | **6ES7 193-4BA00-0AA0** |
| **Manual for ET 200S** | |
| • German | **6ES7 151-1AB00-8AA0** |
| • English | **6ES7 151-1AB00-8BA0** |
| **Terminating module** | **6ES7 193-4JA00-0AA0** |
| For ET 200S | |
| **SIMATIC S5, standard DIN rail 35 mm, length 483 mm for 19" cabinets** | **6ES5 710-8MA11** |
| **SIMATIC S5, standard DIN rail 35 mm, length 530 mm for 600 mm cabinets** | **6ES5 710-8MA21** |
| **SIMATIC S5, standard DIN rail 35 mm, length 830 mm for 900 mm cabinets** | **6ES5 710-8MA31** |
| **SIMATIC S5, standard DIN rail 35 mm, length 2 m** | **6ES5 710-8MA41** |

1) An MMC is absolutely essential for operating the CPU

# Master interface module for IM 151-7 CPU interface module

## Overview

PROFIBUS DP master interface module for interface module IM 151-7 CPU with MLFB 6ES7151-7AA10-0AB0 and firmware version 2.1 or newer

- Integrated 12 Mbit/s PROFIBUS DP master interface for Cu conductors
- Enables parallel operation of two PROFIBUS DP interfaces on one IM 151-7 CPU
- Enhances the effective system availability of plants and machines
- Functionality corresponds to the interface configured as DP master on an S7-314 CPU

Programming is carried out with STEP 7 using a version not lower than V5.2 with Service Pack 1

## Technical specifications

| | |
|---|---|
| Data transmission rate | Max. 9.6/19.2/45.45/93.75/187.5/500 kbit/s; 1.5/3/6/12 Mbit/s |
| Distance between 2 adjacent stations, max. | 100 m to 1000 m (depending on the transmission rate), without repeater |
| Dimensions (W x H x D) in mm | 35 x 119.5 x 75 |
| Weight | 100 g |
| Suitable modules | one per CPU |

## Ordering data

| | Order No. |
|---|---|
| **Master interface module for IM151-7 CPU interface module** | **6ES7 138-4HA00-0AB0** |
| ***Accessories*** | |
| **DIN A4 sheets of labels** | |
| • Petrol | **6ES7 193-4BH00-0AA0** |
| • Red | **6ES7 193-4BD00-0AA0** |
| • Yellow | **6ES7 193-4BB00-0AA0** |
| • Light beige | **6ES7 193-4BA00-0AA0** |
| **Manual for ET 200S** | |
| • German | **6ES7 151-1AB00-8AA0** |
| • English | **6ES7 151-1AB00-8BA0** |

## Overview

- Interface module for SIMATIC ET 200S with integrated fail-safe CPU
- With DP/MPI interface
- For setting up a fail-safe automation system for plants with strict safety requirements
- Fulfills safety requirements up to SIL 3 according to IEC 61508, AK6 according to DIN V 19250 and Cat. 4 according to EN 954-1
- The fail-safe I/O modules on the ET200S PROFIsafe can be centrally connected
- Standard modules for non-safety related applications are supported

Note:
Micro memory card is required to operate the CPU.

## Technical specifications

| | |
|---|---|
| RAM (1 statement corresponds to an average of 3 byte) | 64 KB / approx. 10 K statements[1] |
| Load memory | |
| • Pluggable as MMC, max. | 8 MB |
| Retentive data | 4 KB; Bit memory, counters, timers, data; 100 diagnostic buffer entries |
| Clock | Hardware clock |
| Programming language | STEP 7 V5.2 + SP1 and higher, Distributed Safety V5.2 + SP1 and higher |
| Program organization | Linear, structured |
| Types of blocks | • Organization blocks (OBs)<br>• Function blocks (FBs)<br>• Functions (FC)<br>• Data blocks (DBs)<br>• System functions (SFBs, SFCs) |
| Number of blocks, max. | 128 FC, 128 FB, 127 DB |
| Program execution | • Free cycle (OB 1)<br>• Delay alarm (OB 20)<br>• Time-controlled (OB 35)<br>• Real-time controlled (OB 10)<br>• Interrupt-driven (OB 40)<br>• Restart (OB 100)<br>• Error interrupt (OB 80, OB 82, OB 83, OB 85, OB 86) |
| Block nesting depth | 8 for each program execution level |
| Nesting levels | 8 |
| Operation set | Binary logic, parenthesis commands, result assignment, save, count, load, transfer, compare, shift, rotate, generate complement, call up blocks, fixed-point and floating-point arithmetic functions, jump functions |

| | |
|---|---|
| User program protection | Password protection |
| System functions (SFCs) | Alarm and error processing, data copying, clock functions, diagnostic functions, module parameterization, operating state transitions |
| Execution times | |
| • Bit operations | Min. 0.1 µs |
| • Word operations | Min. 0.2 µs |
| • Fixed-point addition | Min. 2 µs |
| • Floating point additions | Min. 6 µs |
| Cycle monitoring | 150 ms (preset), selectable from 1 to 6000 ms |
| Bit memories | 2048 |
| • Of these retentive | 0 to 2048 (M0.0 to M255.7, selectable) |
| Counter | 256 |
| • Of these retentive | 0 to 63, programmable |
| • Counting range | 1 to 999 |
| Timers | 256 |
| • Of these retentive | 0 to 127, adjustable |
| • Range | 10 ms to 9990 s |
| PROFIBUS DP interface | |
| • Node address | 1 to 125 |
| • Communications functions | • PG/OP communication<br>• DP slave<br>• Send and receive capability for internode communication<br>• S7 communication |
| • Data transmission rate | Max. 9.6/19,2/45,45/93,75/187.5/500 kbit/s; 1.5/3/6/12 Mbit/s |
| • Distance between 2 adjacent stations, max. | 100 m to 1000 m (depending on the transmission rate), without repeater |
| PG/OPs with STEP 7 | Can be connected PROFIBUS interface |

1) The number of F statements compared to a standard program is limited because of the F-specific overheads.

## IM 151-7 F-CPU interface modules

### Technical specifications (continued)

| | |
|---|---|
| Onboard I/Os | - |
| No. of modules per system | 63 |
| Address volume on PROFIBUS DP, max. | 244 byte for inputs and 244 byte for outputs |
| Number of connections | 11 |
| Supply voltage | |
| • Rated value | 24 V DC |
| • Permitted range | 20.4 to 28.8 V |
| Current consumption typ. | 0.25 A |
| Starting current, typ. | 3.5 A |
| Power loss | 3.3 W |
| Dimensions (W x H x D) in mm | 60 x 119.5 x 75 |
| Weight | 200 g |
| Suitable modules (recommendation) | Without restrictions |
| Suitable software | |
| • Software controllers | Dependent on required storage space and resulting runtime |
| • Process diagnostics | Yes |
| • S7-GRAPH | - |
| • S7-HiGraph | - |
| • S7-SCL | Yes |
| • CFC | - |
| Configuring rules | • Max. 63 I/O modules per station<br>• Max. 1 m station width<br>• Max. 10 A per load group (power module) |

### Ordering data

| Ordering data | Order No. |
|---|---|
| **IM 151-7 F-CPU Interface module**<br>For constructing a failsafe automation system | **6ES7 151-7FA00-0AB0** |
| ***Accessories*** | |
| **MMC 64 KB** [1]<br>For program backup | **6ES7 953-8LF11-0AA0** |
| **MMC 128 KB** [1]<br>For program backup | **6ES7 953-8LG11-0AA0** |
| **MMC 512 KB** [1]<br>For program backup | **6ES7 953-8LJ11-0AA0** |
| **MMC 2 MB** [1]<br>For program backup and/or firmware update | **6ES7 953-8LL11-0AA0** |
| **MMC 4 MB** [1]<br>For program backup | **6ES7 953-8LM11-0AA0** |
| **MMC adapter**<br>For PG memory card slot | **6ES7 798-0BA00-0AA0** |
| **External PROM programmer**<br>For MMC with USB interface | **6ES7 792-0AA00-0XA0** |
| **DIN A4 sheets of labels** | |
| • Petrol | **6ES7 193-4BH00-0AA0** |
| • Red | **6ES7 193-4BD00-0AA0** |
| • Yellow | **6ES7 193-4BB00-0AA0** |
| • Light beige | **6ES7 193-4BA00-0AA0** |
| **Terminating module**<br>For ET 200S | **6ES7 193-4JA00-0AA0** |
| **SIMATIC S5, standard DIN rail 35 mm, length 483 mm for 19“ cabinets** | **6ES5 710-8MA11** |
| **SIMATIC S5, standard DIN rail 35 mm, length 530 mm for 600 mm cabinets** | **6ES5 710-8MA21** |
| **SIMATIC S5, standard DIN rail 35 mm, length 830 mm for 900 mm cabinets** | **6ES5 710-8MA31** |
| **SIMATIC S5, standard DIN rail 35 mm, length 2 m** | **6ES5 710-8MA41** |
| **Documentation for S7-300F**<br>System description for configuring and programming PROFIsafe fail-safe modules | |
| • German | **6ES7 988-8FB10-8AA0** |
| • English | **6ES7 988-8FB10-8BA0** |
| • French | **6ES7 988-8FB10-8CA0** |

## Overview

- For monitoring and, depending on the variant, fusing the load and sensor supply voltage
- Can be connected to TM-P terminal modules with automatic coding
- Diagnostic message of voltage and fuse drop (can be switched off through configuration)
- Failsafe power module PM-E F PROFIsafe for safe tripping of series-connected digital output modules 24 V DC up to 10 A or external loads; 3 additional integrated failsafe outputs 24 V DC / 2 A
- PM-E DC 24 to 48 V

## Design

### *Possible combinations of TM-E terminal modules and power modules*

| **Power modules** | | **TM-P terminal modules for power modules** | | | | |
|---|---|---|---|---|---|---|
| Screw-type terminal | → | **15S23-A1** | **15S23-A0** | **15S22-01** | **30S44-A0** | **F30S47-F0** |
| Order No. 6ES7 193… | → | …4CC20-0AA0 | …4CD20-0AA0 | …4CE00-0AA0 | …4CK20-0AA0 | 3RK1903-3AA0 |
| Spring-loaded terminal | → | **15C23-A1** | **15C23-A0** | **15C22-01** | **30C44-A0** | – |
| Order No. 6ES7 193… | → | …4CC30-0AA0 | …4CD30-0AA0 | …4CE10-0AA0 | …4CK30-0AA0 | |
| Fast Connect | → | **15N23-A1** | **15N23-A0** | **15N22-01** | – | – |
| Order No. 6ES7 193… | → | …4CC70-0AA0 | …4CD70-0AA0 | …4CE60-0AA0 | | |
| PM-E DC 24 V | | ● | ● | ● | | |
| PM-E DC 24 ... 48 V | | ● | ● | ● | | |
| PM-E 24 ... 48 V DC/ 24 ... 230 V AC | | ● | ● | ● | | |
| PM-E F 24 V DC PROFIsafe | | | | | ● | |
| PM-D F 24 V DC PROFIsafe | | | | | | ● |

### *Possible combinations of electronic modules and power modules*

| **Power modules** | **Electronic modules** |
|---|---|
| PM-E DC 24 V | Can be used for all electronic modules, except for 2 DI 120 V AC ST, 2 DI 230 V AC ST and 2 DO 120/230 V AC |
| PM-E DC 24 ... 48 V | Can be used for all electronic modules, except for 2 DI 120 V AC ST, 2 DI 230 V AC ST and 2 DO 120/230 V AC |
| PM-E 24 ... 48 V DC/ 24 ... 230 V AC | Can be used for all electronic modules |
| PM-E F 24 V DC PROFIsafe | For failsafe modules |
| PM-D F 24 V DC PROFIsafe | See the manual "ET 200S failsafe modules" in the "S7 F Systems" and "S7 Distributed Safety" documentation packages |

## Power modules for PM-E electronic modules

### Technical specifications

| | PM-E 24 V DC with diagnostics | PM-E 24 to 48 V DC with diagnostics | PM-E 24 V DC / 120/230 V AC with diagnostics and fuse |
|---|---|---|---|
| Rated load voltage | 24 V DC | 24 V DC / 48 V DC | 24 V DC, 48 V DC, 48 V AC, 120 V AC, 230 V AC |
| Polarity reversal protection | Yes | | |
| Short-circuit protection | External (e.g. automatic circuit breaker) | | Internal with fuse (5 x 20 mm), 250 V, 10 A, quick-blow |
| Current carrying capacity | max. 10 A (up to 60 °C) | | |
| • Up to 30 °C, max. | - | | 10 A (24 V DC), 8 A (120/230 V AC) |
| • Up to 60 °C, max. | - | | 7 A (24 V DC), 5 A (120/230 V AC) |
| Galvanic isolation | between process and backplane bus | | between process and backplane bus |
| Isolation tested at | 500 V DC | | 1500 V AC |
| Diagnostics indicator | Group error “SF”, red LED | | Group error “SF”, red LED |
| Status display | Rated load voltage "PWR", green LED | | Rated load voltage "PWR", green LED fuse O.K.: "FSG", green LED |
| Status bit for load voltage and fuse tripping (if available) | - | Yes | Yes |
| Diagnostics message | Load voltage out | | Load voltage out; fuse rupture |
| Address space required per module | - | | - |
| Module width | 15 mm | | |
| Weight, approx. | 35 g | | 45 g |
| Parameter [1] | 3 byte | | 3 byte |
| • Load voltage out | Disable/ enable | | Disable/ enable |
| • Diagnostics fuse tripped | - | | Disable/ enable |
| • Load voltage | - | | DC/AC |
| • Options handling | No | Yes | No |

1) Default values are underscored

### Ordering data

| | Order No. |
|---|---|
| **Power module PM-E 24 V DC[1)]**<br>for electronic modules;<br>With diagnostics | **6ES7 138-4CA00-0AA0** |
| **Power module PM-E 24 V DC to 48 V AC;**<br>For electronic modules,<br>with diagnostics | **6ES7 138-4CA50-0AB0** |
| **Power module PM-E 24 to 48 V DC, 42 to 230 V AC2**<br>for electronic modules;<br>With diagnostics and back-up | **6ES7 138-4CB10-0AB0** |
| **Power module PM-E F PROFIsafe 24 V DC**<br>for safe tripping of digital output modules | **6ES7 138-4CF01-0AB0** |

1) For all electronic and process-oriented modules except 2 DI 120 V AC / 2 DI 230 V AC / 2 DO 120/230 V AC

| | Order No. |
|---|---|
| ***Accessories*** | |
| **DIN A4 sheets of labels** | |
| • Petrol | **6ES7 193-4BH00-0AA0** |
| • Red | **6ES7 193-4BD00-0AA0** |
| • Yellow | **6ES7 193-4BB00-0AA0** |
| • Light beige | **6ES7 193-4BA00-0AA0** |

## Overview

- Suitable for all TM-E terminal modules (overall width 15 mm and 30 mm)
- Reserves one slot for any type of electronic module. The reserve module is plugged into the reserved slot of the ET 200S configuration
- The terminal module can be wired up in accordance with the functions to be used later
- The reserve module does not have a connection to the terminals of the TM-E terminal module. In this manner, the TM-E terminal module can be completely wired and prepared for the future application
- Programmable diagnostics behavior with IM 151-1 Standard

## Technical specifications

| | |
|---|---|
| **Dimensions and weight** | |
| Dimensions | |
| • W x H x D (mm) | 15 x 81 x 52<br>30 x 81 x 52 |
| • Weight | approx. 33 g<br>approx. 55 g |
| **Voltage, currents, potentials** | |
| • Power loss of the module | typ. 0.025 W |
| **Status, interrupts, diagnostics** | |
| • Status display | No |
| • Diagnostic functions | No |
| • Parameters | In accordance with configured module |
| • Assigned address range | In accordance with configured module |

## Ordering data

| | Order No. |
|---|---|
| **Reserve modules for ET 200S** | |
| Unused slots for space reservation | |
| • 15 mm width (5 pcs) | **6ES7 138-4AA00-0AA0** |
| • 30 mm width (1 piece) | **6ES7 138-4AA10-0AA0** |

## Digital electronic modules

### Overview

- 2- and 4-channel digital inputs and outputs for ET 200S
- New electronic module
  - 2DO 24 to 48 V DC, 230 V AC/5 A relay (two floating changeover contacts)
- Can be connected to the TM-E terminal module with automatic coding
- High-feature variants for enhanced plant availability, additional functions and comprehensive diagnostics
- Module replacement during operation and when live (hot swapping)



### Design

***Possible combinations for TM-E terminal modules and digital modules***

| **Electronic modules** | | **TM-E terminal modules for electronic modules** | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Screw-type terminal | → | **15S26-A1** | **15S24-A1** | **15S24-01** | **15S23-01** | **15S24-AT** | **30S44-01** | **30S46-A1** |
| Order No. 6ES7 193… | → | …4CA40-0AA0 | …4CA20-0AA0 | …4CB20-0AA0 | …4CB00-0AA0 | …4CL20-0AA0 | …4CG20-0AA0 | …4CF40-0AA0 |
| Spring-loaded terminal | → | **15C26-A1** | **15C24-A1** | **15C24-01** | **15C23-01** | **15C24-AT** | **30C44-01** | **30C46-A1** |
| Order No. 6ES7 193… | → | …4CA50-0AA0 | …4CA30-0AA0 | …4CB30-0AA0 | …4CB10-0AA0 | …4CL30-0AA0 | …4CG30-0AA0 | …4CF50-0AA0 |
| Fast Connect | → | **15N26-A1** | **15N24-A1** | **15N24-01** | **15N23-01** | – | – | – |
| Order No. 6ES7 193… | → | …4CA80-0AA0 | …4CA70-0AA0 | …4CB70-0AA0 | …4CB60-0AA0 | | | |
| 2DI 24 V DC, Standard<br>2DI 24 V DC HF<br>4DI 24 V DC, Standard<br>4DI 24 V DC HF<br>4DI 24 V DC, SRC ST | | ● | ● | ● | ● | | | |
| 4 DI, UC 24 to 48 V HF | | ● | ● | ● | ● | | | |
| 4DI NAMUR | | ● | ● | ● | ● | | | |
| 2DI 120 V AC, ST | | ● | ● | ● | ● | | | |
| 2DI 230 V AC, ST | | ● | ● | ● | ● | | | |
| 2 DO 24 V DC/ 0.5 A ST<br>2 DO 24 V DC/ 0.5 A HF<br>4 DO 24 V DC/ 0.5 A ST | | ● | ● | ● | ● | | | |
| 2 DO 24 V DC/ 2 A ST<br>2 DO 24 V DC/ 2 A HF<br>4 DO 24 V DC/ 2 A ST | | ● | ● | ● | ● | | | |
| 2 DO 24 to 230 V AC/ 2 A | | ● | ● | ● | ● | | | |
| 2RO NO<br>24 … 120 V DC/5 A<br>24 … 230 V AC/5 A<br>2RO NO/NC<br>24 … 48 V DC/5 A<br>24 … 230 V AC/5 A | | ● | ● | ● | ● | | | |

## Technical specifications

| **Digital input modules** | **2 DI 24 V DC High Feature**<br>**2 DI 24 V DC standard** | **4 DI 24 V DC High Feature**<br>**4 DI 24 V DC standard** |
|---|---|---|
| Number of inputs | 2 | 4 |
| Supports isochronous operation | Yes | Yes |
| Address space required per module | | |
| • with packing[1)] | 2-bit | 4-bit |
| • without packing | 1 byte | 1 byte |
| Cable length | | |
| • Unshielded | 600 m | 600 m |
| • Shielded | 1000 m | 1000 m |
| Rated supply voltage from the power module | 24 V DC | 24 V DC |
| Galvanic isolation | | |
| • Between channels | No | No |
| • Between channels and backplane bus | Yes | Yes |
| Permissible potential difference | | |
| • Between various electrical circuits | 75 V DC, 60 V AC | 75 V DC, 60 V AC |
| Isolation tested at | 500 V DC | 500 V DC |
| Power losses, typically | 0.4 W | 0.8 W |
| Current consumption | | |
| • From backplane bus, max. | 10 mA | 10 mA |
| • from supply voltage | dependent on sensor | dependent on sensor |
| Input voltage | | |
| • Rated value | 24 V DC | 24 V DC |
| • For "1" signal | 11 to 30 V | 11 to 30 V |
| • For signal "0" | -30 to +5 V | -30 to +5 V |
| Input current | | |
| • for "1" signal, typ. | **High Feature:** 8 mA<br>**Standard:** 7 mA | **High Feature:** 8 mA<br>**Standard:** 7 mA |
| Input delay | **High Feature**:<br>0.1 to 15 ms, programmable<br>**Standard**: fixed | **High Feature**:<br>0.1 to 15 ms, programmable<br>**Standard**: 3 ms |
| • "0" to "1" | **High Feature**:<br>0.1 to 15 ms, programmable<br>**Standard**: 3 ms | **High Feature**:<br>0.1 to 15 ms, programmable<br>**Standard**: 3 ms |
| • "1" after "0" | **High Feature**:<br>0.1 to 10 ms<br>**Standard**: 3 ms | 3 ms |
| Input characteristic to IEC 1131 | **High Feature:** Type 2<br>**Standard:** Type 1 | **High Feature:** Type 2<br>**Standard:** Type 1 |
| Connection of two-wire BEROs | Possible | Possible |
| • Permissible quiescent current, max. | 1.5 mA | 1.5 mA |
| Diagnostic display (red LED "group error SF") | **High Feature**: Yes<br>**Standard**: - | **High Feature**: Yes<br>**Standard**: - |
| Status display | Yes | Yes |
| Process diagnostics | | |
| • Short-circuit after M | **High Feature**: Yes, per module<br>**Standard**: - | **High Feature**: Yes, per module<br>**Standard**: - |
| Parameters (default value underscored) | **High Feature**: 3 byte<br>**Standard**: 1 byte | **High Feature**: 3 byte<br>**Standard**: 1 byte |
| • Input delay, by channel | **High Feature**: 0.1 / 0.5 / 3 / 15 ms<br>**Standard**: - | **High Feature**: 0.1 / 0.5 / 3 / 15 ms<br>**Standard**: - |
| • Short-circuit after M, by module | **High Feature**: Disable/ enable<br>**Standard**: - | **High Feature**: Disable/ enable<br>**Standard**: - |
| Module width | 15 mm | 15 mm |
| Weight, approx. | 35 g | 35 g |

1) Only for IM 151 and IM 151 FO

## Digital electronic modules

### Technical specifications (continued)

| Digital input modules | 2 DI 120 V AC | 2DI 230 V AC |
|---|---|---|
| Number of inputs | 2 | 2 |
| Supports isochronous operation | Yes | Yes |
| Address space required per module | | |
| • with packing | 2-bit | 2-bit |
| • without packing | 1 byte | 1 byte |
| Cable length | | |
| • Unshielded | 600 m | 600 m |
| • Shielded | 1000 m | 1000 m |
| Rated supply voltage from the power module | 120 V AC | 230 V AC |
| Galvanic isolation | | |
| • Between channels | No | No |
| • Between channels and backplane bus | Yes | Yes |
| Permissible potential difference | | |
| • Between various electrical circuits | - | - |
| • Between ground and input | 1500 V AC | 1500 V AC |
| Isolation tested at | 1500 V AC | 1500 V AC |
| Power losses, typically | 0.2 W | 0.5 W |
| Current consumption | | |
| • From backplane bus, max. | 6 mA | 6 mA |
| • from supply voltage | dependent on sensor | dependent on sensor |
| Input voltage | | |
| • Rated value | 120 V AC | 230 V AC |
| • For "1" signal | 79 to 132 V AC | 164 to 264 V AC |
| • For signal "0" | 0 to 20 V AC | 0 to 20 V AC |
| Input current | | |
| • for "1" signal, typ. | 3.3 mA to 8.2 mA | 4.0 mA to 16.5 mA |
| Input delay | | |
| • "0" to "1" | 15 ms | 15 ms |
| • "1" after "0" | 20 ms | 20 ms |
| Input characteristic to IEC 1131 | Type 1 | Type 1 |
| Connection of two-wire BEROs | No | No |
| Diagnostic display (red LED "group error" SF) | - | - |
| Status display | Yes | Yes |
| Process diagnostics | | |
| • Short-circuit after M | No | No |
| Parameters (default value underscored) | 3 byte | 3 byte |
| • Input delay, by channel | - | - |
| • Short-circuit after M, by module | - | - |
| Module width | 15 mm | 15 mm |
| Weight, approx. | 35 g | 35 g |

**Technical specifications** (continued)

| Digital input modules | 4 DI, 24 to 48 V UC | 4 DI 24 V DC SOURCE INPUT | 4DI NAMUR |
|---|---|---|---|
| Number of inputs | 4 | 4 | 4 |
| Supports isochronous operation | Yes | Yes | No |
| Cable length | | | |
| • Unshielded | 600 m | 600 m | |
| • Shielded | 1000 m | 1000 m | 200 m |
| Rated supply voltage from the power module | 24 to 48 V AC/DC | 24 V DC | 24 V DC |
| Polarity reversal protection | AC or DC automatically | Yes | Yes |
| Galvanic isolation | | | |
| • Between channels | No | No | No |
| • Between channels and backplane bus | Yes | Yes | Yes |
| Permissible potential difference | | | |
| • Between various electrical circuits | 75 V DC, 60 V AC | 75 V DC, 60 V AC | 75 V DC, 60 V AC |
| Isolation tested at | 2500 V DC | 500 V DC | 500 V DC |
| Power losses, typically | 0.7 W | 0.7 W | 1.6 W |
| Current consumption | | | |
| • From backplane bus, max. | 10 mA | 10 mA | 10 mA |
| • from supply voltage | dependent on sensor | dependent on sensor | dependent on sensor |
| Input voltage | | | in compliance with NAMUR |
| • Rated value | UC 24 to 48 V | 24 V DC | |
| • For "1" signal | -15 to -57.6 V DC<br>15 to 57.6 V DC<br>15 to 48 V AC | -15 to -30 V DC<br>(reference potential is L+) | |
| • For signal "0" | -6 to 6 V DC<br>0 to 5 V AC | 30 to -5 V DC<br>(reference potential is L+) | |
| Input current | | | in compliance with NAMUR |
| • for "1" signal, typ. | 4 to 10 mA | 7 mA (at 24 V) | 2.1mA to 7mA |
| Input delay | | | |
| • "0" to "1" | max. 15 ms | Typ. 3 ms (2.0 to 4.5 ms) | 4.6 ms |
| • "1" after "0" | max. 15 ms | Typ. 3 ms (2.0 to 4.5 ms) | 4.6 ms |
| Input characteristic to IEC 61131 | IEC 61131 not applicable to UC modules. Values, however, have been adapted | Type 1 | - |
| Connection of two-wire BEROs | Possible | Possible | - |
| Status display | Green LED per channel | Green LED per channel | Green LED per channel |
| Diagnostic functions | Configurable | No | Yes |
| • Group error display | red LEDs | No | Yes |
| Parameters | 3 byte | 3 byte | 12 byte |
| Sensor supply outputs | - | - | in compliance with NAMUR |
| • Output voltage loaded | min. L+ (-0.5 V) | max. M +0.5 V | |
| • Rated value for output current (valid range) | 500 mA (0 to 500 mA) | 500 mA (0 to 500 mA) | |
| • Short-circuit protection | per module | No | Yes, by channel |
| Module width | 15 mm | 15 mm | 15 mm |
| Weight, approx. | 35 g | 35 g | 35 g |

## Digital electronic modules

### Technical specifications (continued)

| Digital Output Modules | 2 DO 24 V DC/ 0.5 A High Feature<br>2 DO 24 V DC/ 0.5 A Standard | 2 DO 24 V DC/ 2 A High Feature<br>2 DO 24 V DC/ 2 A Standard |
|---|---|---|
| Number of outputs | 2 | 2 |
| Supports isochronous operation | Yes | Yes |
| Address space required per module | | |
| • with packing | 2-bit | 2-bit |
| • without packing | 1 byte | 1 byte |
| Cable length | | |
| • Unshielded, max. | 600 m | 600 m |
| • Shielded, max. | 1000 m | 1000 m |
| Rated load voltage $L_+$ from power module | 24 V DC | 24 V DC |
| Polarity reversal protection | Yes | Yes |
| Aggregate current for outputs | 1 A (up to 60 °C) | 4 A (up to 60 °C) |
| Current per cable | - | - |
| Galvanic isolation | | |
| • Between channels | No | No |
| • Between channels and backplane bus | Yes | Yes |
| • Between channels and supply voltage | - | - |
| • Between supply voltage and backplane bus | - | - |
| Isolation tested at | | |
| • Between channels and backplane bus | 500 V DC | 500 V DC |
| • Between supply voltage and backplane bus | - | - |
| • Between supply voltage and backplane bus | - | - |
| Power losses, typically | 0.4 W | 1.4 W |
| Current consumption | | |
| • From backplane bus, max. | 10 mA | 10 mA |
| • from supply voltage | 5 mA per channel | 5 mA per channel |
| Output voltage | | |
| • At "1" signal, min. | L+( - 1 V) | L+( - 1 V) |
| Output current | | |
| • For "1" signal | | |
| - Rated value | 0.5 A | 2 A |
| - Permitted range | 7mA to 600mA | 7mA to 2400mA |
| • At "0" signal (residual current), max. | 0.3 mA | 0.3 mA |
| • Thermal constant current, max. | - | - |
| • minimum load current | - | - |
| Output delay with resistive load | | |
| • "0" after "1", max. | 100 µs | 100 µs |
| • "1" after "0", max. | 100 µs | 100 µs |
| Load resistance range | 48 to 3400 Ω | 12 to 3400 Ω |

## Technical specifications (continued)

| Digital Output Modules | 2 DO 24 V DC/ 0.5 A High Feature<br>2 DO 24 V DC/ 0.5 A Standard | 2 DO 24 V DC/ 2 A High Feature<br>2 DO 24 V DC/ 2 A Standard |
|---|---|---|
| Switch 2 outputs in parallel | | |
| • For redundant load control | Yes, for each module | Yes, for each module |
| • for increasing performance | No | No |
| Control a digital input | Yes | Yes |
| Lamp load, max. | 2.5 W | **High Feature**: 5 W<br>**Standard**: 10 W |
| Switching frequency | | |
| • For resistive load | 100 Hz | 100 Hz |
| • For inductive load | 2 Hz | 2 Hz |
| • For lamp load | 10 Hz | 10 Hz |
| Voltage induced on circuit interruption limited to | -55 to - 60 V | -55 to - 60 V |
| Reverse voltage resistance | Yes, when using the same voltage source as the power module | Yes, when using the same voltage source as the power module |
| Short-circuit protection | Yes | Yes |
| • Response threshold | typ. 1.5 A | typ. 4 A |
| Diagnostic display red LED group error "SF" | **High Feature**: Yes<br>**Standard**: - | **High Feature**: Yes<br>**Standard**: - |
| Status display Green LED per channel | Yes | Yes |
| Process diagnostics | | |
| • Short-circuit after M | **High Feature**: Yes, by channel<br>**Standard**: - | **High Feature**: Yes, by channel<br>**Standard**: - |
| • Wire break | **High Feature**: Yes, by channel<br>**Standard**: - | **High Feature**: Yes, by channel<br>**Standard**: - |
| Parameters<br>(default value underscored) | **High Feature**: 3 byte<br>**Standard**: 1 byte | **High Feature**: 3 byte<br>**Standard**: 1 byte |
| • Short-circuit after M, by channel | **High Feature**: Disable/ enable<br>**Standard**: - | **High Feature**: Disable/ enable<br>**Standard**: - |
| • Wire break, by channel | **High Feature**: Disable/ enable<br>**Standard**: - | **High Feature**: Disable/ enable<br>**Standard**: - |
| • Behavior at CPU/ master STOP, by channel | **High Feature**: switch substitute value / retain last value<br>**Standard**: - | **High Feature**: switch substitute value / retain last value<br>**Standard**: - |
| • Substitute value, channel-wise | **High Feature**: "0"/"1"<br>**Standard**: - | **High Feature**: "0"/"1"<br>**Standard**: - |
| Module width | 15 mm | 15 mm |
| Weight, approx. | 40 g | 40 g |

| Digital Output Modules | 4 DO 24 V DC/0.5 A Standard | 4 DO 24 V DC/ 2 A Standard |
|---|---|---|
| Number of outputs | 4 | 4 |
| Supports isochronous operation | Yes | Yes |
| Address space required per module | | |
| • with packing | 2-bit | 2-bit |
| • without packing | 1 byte | 1 byte |
| Cable length | | |
| • Unshielded, max. | 600 m | 600 m |
| • Shielded, max. | 1000 m | 1000 m |
| Rated load voltage $L_+$ from power module | 24 V DC | 24 V DC |
| Rated supply voltage from the power module | - | - |
| Polarity reversal protection | Yes | Yes |
| Aggregate current for outputs | 2 A (up to 60 °C) | - |
| • At 40 °C | - | - |
| • At 50 °C | - | - |
| • At 60 °C | - | 4 A |

## Technical specifications (continued)

| Digital Output Modules | 4 DO 24 V DC/0.5 A Standard | 4 DO 24 V DC/ 2 A Standard |
|---|---|---|
| Current per channel | - | - |
| • At 40 °C | - | - |
| • At 50 °C | - | - |
| Galvanic isolation | | |
| • Between channels | No | No |
| • Between channels and backplane bus | Yes | Yes |
| • Between channels and supply voltage | - | - |
| • Between supply voltage and backplane bus | - | - |
| Isolation tested at | | |
| • Between channels and backplane bus | 500 V DC | 500 V DC |
| • Between channels and supply voltage | - | - |
| • Between supply voltage and backplane bus | - | - |
| Power losses, typically | 0.8 W | 2.8 W |
| Current consumption | | |
| • From backplane bus, max. | 10 mA | 10 mA |
| • from supply voltage | 5 mA per channel | 5 mA per channel |
| Output voltage | | |
| • At "1" signal, min. | L+( - 1 V) | L+( - 1 V) |
| Output current | | |
| • For "1" signal | | |
| - Rated value | 0.5 A | 2 A |
| - Permitted range | 7mA to 600mA | 7mA to 2400mA |
| • At "0" signal (residual current), max. | 0.3 mA | 0.3 mA |
| • Thermal constant current, max. | - | - |
| • minimum load current | - | - |
| Output delay with resistive load | | |
| • "0" after "1", max. | 100 µs | 100 µs |
| • "1" after "0", max. | 100 µs | 100 µs |
| Load resistance range | 48 to 3400 Ω | 12 to 3400 Ω |
| Switch 2 outputs in parallel | | |
| • For redundant load control | Yes, for each module | Yes, for each module |
| • For increasing performance | No | No |
| Control a digital input | Yes | Yes |
| Lamp load, max. | 2.5 W | 10 W |
| Switching frequency | | |
| • For resistive load | 100 Hz | 100 Hz |
| • For inductive load | 2 Hz | 2 Hz |
| • For lamp load | 10 Hz | 10 Hz |
| Voltage induced on circuit interruption limited to | -55 to - 60 V | -55 to - 60 V |
| Reverse voltage resistance | Yes, when using the same voltage source as the power module | Yes, when using the same voltage source as the power module |
| Short-circuit protection | Yes | Yes |
| • Operating threshold, typ. | 1.5 A | 4 A |
| Status display Green LED per channel | Yes | Yes |
| Process diagnostics | No | No |
| Parameters | 1 byte | 1 byte |
| Module width | 15 mm | 15 mm |
| Weight, approx. | 40 g | 40 g |

## Technical specifications (continued)

| Digital Output Modules | 2 DO 24 to 230 V AC | 2 Ro 24 to 230 V DC / 5 A relay, NO contact | 2 RO 24 to 230 V DC / 5 A, changeover contact |
|---|---|---|---|
| Number of outputs | 2 | 2 | 2 |
| Supports isochronous operation | Yes | Yes | Yes |
| Address space required per module | | | |
| • with packing | 2-bit | 2-bit | 2-bit |
| • without packing | 1 byte | 1 byte | 1 byte |
| Cable length | | | |
| • Unshielded, max. | 600 m | 600 m | 600 m |
| • Shielded, max. | 1000 m | 1000 m | 1000 m |
| Rated load voltage $L_+$ from power module | 24 to 230 V AC | - | - |
| Rated supply voltage from the power module | 24 to 230 V AC | 24 V DC | 24 V DC |
| Polarity reversal protection | Yes | Yes | Yes |
| Aggregate current for outputs | - | - | - |
| • At 40 °C | 1 A | - | - |
| • At 50 °C | 0.75 A | - | - |
| • At 60 °C | 0.5 A | - | - |
| Current per channel | | | |
| • Up to 50 °C | - | 5 A | 5 A |
| • Up to 60 °C | - | 4 A | 4 A |
| Galvanic isolation | | | |
| • Between channels | No | Yes | Yes |
| • Between channels and backplane bus | Yes | Yes | Yes |
| • Between channels and supply voltage | - | Yes | Yes |
| • Between supply voltage and backplane bus | - | Yes | Yes |
| Isolation tested at | | | |
| • Between channels and backplane bus | 1500 V AC | 500 V DC | 2500 V DC |
| • Between channels and supply voltage | - | 1500 V AC | 240 V AC |
| • Between supply voltage and backplane bus | - | 1500 V AC | 500 V DC |
| Power losses, typically | 4 W | 0.6 W | 0.6 W |
| Current consumption | | | |
| • From backplane bus, max. | 18 mA | 10 mA | 10 mA |
| • from supply voltage | 15 mA per channel | 30 mA per channel | 30 mA |
| Output voltage | | | |
| • At "1" signal, min. | L+ (-1.5 V) | - | - |
| Output current | | | |
| • For "1" signal | | | |
| - Rated value | 1 A | - | - |
| - Permitted range | 0.1mA to 1100mA | - | - |
| • At "0" signal (residual current), max. | 3 mA | - | - |
| • Thermal constant current, max. | - | 5 A | 5 A |
| • minimum load current | - | 1 mA | 8 mA |
| Output delay with resistive load | | | |
| • "0" after "1", max. | 15 ms | - | - |
| • "1" after "0", max. | 15 ms | - | - |
| Load resistance range | - | - | - |
| Switch 2 outputs in parallel | | | |
| • For redundant load control | Yes, for each module | No | No |
| • for increasing performance | No | No | No |

## Digital electronic modules

### Technical specifications (continued)

| Digital Output Modules | 2 DO 24 to 230 V AC | 2 Ro 24 to 230 V DC / 5 A relay, NO contact | 2 RO 24 to 230 V DC / 5 A, changeover contact |
|---|---|---|---|
| Control a digital input | Yes | Yes | Yes |
| Lamp load, max. | 100 W | - | - |
| Switching frequency | | | |
| • For resistive load | 10 Hz | 2 Hz | 2 Hz |
| • For inductive load | 0.5 Hz | 0.5 Hz | 0.5 Hz |
| • For lamp load | 1 Hz | 2 Hz | 2 Hz |
| Voltage induced on circuit interruption limited to | -55 to - 60 V | -55 to - 60 V | No |
| Reverse voltage resistance | Yes, when using the same voltage source as the power module | - | - |
| Short-circuit protection<br>• Response threshold | Yes, through fuse in power module | External fuse required (max. 6 A, quick) | External fuse required (max. 6 A, quick) |
| Status display Green LED per channel | Yes | Yes | Yes |
| Process diagnostics | No | No | No |
| Parameters (default value under-scored) | 3 byte | 3 byte | 3 byte |
| • Behavior at CPU/ master STOP, by channel | switch substitute value / retain last value | switch substitute value / retain last value | switch substitute value / retain last value |
| • Substitute value, channel-wise | 0 / 1 | 0 / 1 | 0 / 1 |
| Module width | 15 mm | 15 mm | 15 mm |
| Weight, approx. | 40 g | 40 g | 50 g |

### Ordering data

| | Order No. |
|---|---|
| **Digital input modules** | |
| Ordering quantity 5 parts | |
| • 2 DI 24 V DC standard | **6ES7 131-4BB00-0AA0** |
| • 2 DI 24 V DC High Feature | **6ES7 131-4BB00-0AB0** |
| • 4 DI 24 V DC standard | **6ES7 131-4BD00-0AA0** |
| • 4 DI 24 V DC High Feature | **6ES7 131-4BD00-0AB0** |
| • 2 DI 120 V AC | **6ES7 131-4EB00-0AB0** |
| • 2DI 230 V AC | **6ES7 131-4FB00-0AB0** |
| • 4 DI 24 ... 48 V UC | **6ES7 131-4CD00-0AB0** |
| • 4 DI 24 V DC NAMUR | **6ES7 131-4RD00-0AB0** |
| • 4 DI 24 V DC SOURCE INPUT | **6ES7 131-4BD50-0AA0** |
| **Digital output modules** | |
| Ordering quantity 5 parts | |
| • 2 DO 24 V DC / 0.5 A Standard | **6ES7 132-4BB00-0AA0** |
| • 2 DO 24 V DC / 0.5 A High Feature | **6ES7 132-4BB00-0AB0** |
| • 2 DO 24 V DC / 2 A Standard | **6ES7 132-4BB30-0AA0** |
| • 2 DO 24 V DC / 2 A High Feature | **6ES7 132-4BB30-0AB0** |
| • 4 DO 24 V DC / 0.5 A Standard | **6ES7 132-4BD00-0AA0** |
| • 4 DO 24 V DC / 2 A Standard | **6ES7 132-4BD30-0AA0** |
| • 2 DO 24 to 230 V AC/1 A | **6ES7 132-4FB00-0AB0** |
| • 2 DO 24 V DC to 230 V AC / 5 A relay, NO contact | **6ES7 132-4HB00-0AB0** |
| • 2 DO 24...48 V DC to 230 V AC/ 5 A relay, NO contact | **6ES7 132-4HB10-0AB0** |
| ***Accessories*** | |
| **Sheets of labels DIN A4** | |
| • Petrol | **6ES7 193-4BH00-0AA0** |
| • Red | **6ES7 193-4BD00-0AA0** |
| • Yellow | **6ES7 193-4BB00-0AA0** |
| • Light beige | **6ES7 193-4BA00-0AA0** |

## Overview

- Analog inputs and outputs for the ET 200S
- Can be connected to the TM-E terminal module with automatic coding
- High-feature variants with enhanced accuracy and resolution - 2 AI RTD High Feature
- High-speed variants for high-speed analog value acquisition - 2 AI High Speed with enhanced characteristics
- Module replacement during operation and when live (hot swapping)

## Design

### *Possible combinations for TM-E terminal modules and analog modules*

| Electronic modules → | TM-E terminal modules for electronic modules | | | | | | |
|---|---|---|---|---|---|---|---|
| Screw-type terminal → | **15S26-A1** | **15S24-A1** | **15S24-01** | **15S23-01** | **15S24-AT** | **30S44-01** | **30S46-A1** |
| Order No. 6ES7 193-… → | 4CA40-0AA0 | 4CA20-0AA0 | 4CB20-0AA0 | 4CB00-0AA0 | 4CL20-0AA0 | 4CG20-0AA0 | 4CF40-0AA0 |
| Spring-loaded terminal → | **15C26-A1** | **15C24-A1** | **15C24-01** | **15C23-01** | **15C24-AT** | **30C44-01** | **30C46-A1** |
| Order No. 6ES7 193-… → | 4CA50-0AA0 | 4CA30-0AA0 | 4CB30-0AA0 | 4CB10-0AA0 | 4CL30-0AA0 | 4CG30-0AA0 | 4CF50-0AA0 |
| FastConnect → | **15N26-A1** | **15N24-A1** | **15N24-01** | **15N23-01** | - | - | - |
| Order No. 6ES7 193-… → | 4CA80-0AA0 | 4CA70-0AA0 | 4CB70-0AA0 | 4CB60-0AA0 | | | |
| 2AI U ST<br>2AI U HF<br>2AI U HS | ● | ● | ● | ● | | | |
| 2AI I 2WIRE ST<br>2AI I 2WIRE HS | ● | ● | ● | ● | | | |
| 2AI I 2/4WIRE HF | ● | | ● | | | | |
| 2 AI I 4WIRE ST<br>2AI I 4WIRE HS | ● | | ● | | | | |
| 2AI RTD ST | ● | | ● | | | | |
| 2AI RTD HF | ● | ● | ● | ● | | | |
| 2 AI TC ST | ● | ● | ● | ● | | | |
| 2 AI TC HF | | | | | ● | | |
| 2AO U ST<br>2AO U HF | ● | | ● | | | | |
| 2 AO I ST<br>2AO I HF | ● | ● | ● | ● | | | |
| 4 IQ-Sense | ● | | ● | | | | |

6

## Analog electronic modules

### Technical specifications

| Analog input modules | 2 AI, U, standard | 2 AI, U, High Speed | 2 AI, U, High Feature |
|---|---|---|---|
| Number of inputs | 2 | 2 | 2 |
| Supports isochronous operation | No | Yes | under development |
| Address space required per module | 4 byte | 4 byte | 4 byte |
| Cable length | | | |
| • Shielded, max. | 200 m | 200 m | 200 m |
| Supply voltage from power module | 24 V DC | 24 V DC | 24 V DC |
| Galvanic isolation | | | |
| • Between channels and backplane bus | Yes | Yes | Yes |
| • Between channels and load voltage L+ | Yes | Yes | Yes |
| • Between channels | No | No | No |
| Permissible potential difference | | | |
| • Between input and $M_{ANA}$ ($U_{CM}$) | 2 $V_{pp}$ AC | 100 $V_{pp}$ AC | - |
| • Between $M_{ANA}$ and the central grounding point ($U_{ISO}$) | 75 V DC/60 V AC | 75 V DC/60 V AC | - |
| • Between channels | - | - | 100 V AC/140 V DC |
| Power losses, typically | 0.6 W | 0.8 W | 0.85 W |
| Current consumption | | | |
| • From load voltage L+, max. | 30 mA | 35 mA | 53 mA |
| • From backplane bus, max. | 10 mA | 10 mA | 10 mA |
| Diagnostics indicator | red LED, "group error SF" | red LED, "group error SF" | red LED, "group error SF" |
| Diagnostics | | | |
| • Group error (parameterization or internal error) | Yes | Yes | Yes |
| • Overflow/ underflow | Yes | Yes | Yes |
| • Wire break | Yes [1)] | No | No |
| Measuring principle | Integrating | Instantaneous value encryption | Integrating |
| Integration time | 16.67/20 ms | - | 16.67/20 ms |
| Conversion time per channel (max. 2) | 55/65 ms | 0.1 ms | 25/30 ms |
| Cycle time (both channels) | 110/130 ms | 1 ms | 58.3/70 ms |
| Interference frequency suppression | 60/50 Hz | - | 60/50 Hz |
| Resolution (incl. Overrange) | | | |
| • ±10 V | 13 bit + sign | 13 bit + sign | 15 bit + sign |
| • ±5 V | 13 bit + sign | - | 15 bit + sign |
| • 1 to 5 V | 13 bit | - | 15 bit |
| Interference voltage suppression | | | |
| • Common-mode interference ($u_{pp}$), min. | 90 dB | 90 dB | 100 dB |
| • Series mode interference (peak value of interference < rated value of input range), min. | 70 dB | 70 dB | 90 dB |
| • Crosstalk between the inputs, min. | -50 dB | -50 dB | -110 dB |
| Operational limit (in the entire temperature range, by reference to input range) | ± 0.6% | ± 0.3% | ± 0.1 % |
| Basic error limit (operating error limit at 25 °C, referred to the input range) | ± 0.4 % | ± 0.2% | ± 0.05% |
| Temperature error (relative to input range) | ± 0.01 % / K | ± 0.01 % / K | ± 0.003%/K |
| Linearity error (relative to input range) | ± 0.01% | ± 0.01% | ± 0.03% |
| Repeatability (in the steady-state condition at 25 °C, referred to input range) | ± 0.05% | ± 0.05% | ± 0.01% |

## Technical specifications (continued)

| Analog input modules | 2 AI, U, standard | 2 AI, U, High Speed | 2 AI, U, High Feature |
|---|---|---|---|
| Permissible input voltage (destruction limit) | 35 V continuous, 75 V for max. 1 ms | 35 V continuous, 75 V for max. 1 ms | 35 V continuous, 75 V for max. 1 ms |
| Permissible input current (destruction limit) | - | - | - |
| Load on 2-wire transducer, max. | - | - | - |
| Parameters (default value underscored) | 4 byte | 4 byte | 4 byte |
| • Group diagnostics | Disable/enable | Disable/enable | Disable/enable |
| • Overflow/ underflow | Disable/enable | Disable/enable | Disable/enable |
| • Diagnostics: Wire break | Disable/enable 1) | - | - |
| • Wire break test | - | - | - |
| • Smoothing | None/weak/average/strong | None/weak/average/strong | None/weak/average/strong |
| • Reference point | - | - | - |
| • Reference point number | - | - | - |
| • Measuring type/ range | Deactivated/ ±5 V / 1 to 5 V / ±10 V | Deactivated/ ±10 V/±5 V/±2.5 V/1.5 V | Deactivated/ ±5 V / 1 to 5 V / ±10 V |
| Module width | 15 mm | 15 mm | 15 mm |
| Weight, approx. | 40 g | 40 g | 40 g |

1) Only in measuring range 1 to 5 V

| Analog input modules | 2 AI I 2-wire Standard | 2 AI I 2-wire, High Speed | 2 AI I 2-wire High Feature 3) |
|---|---|---|---|
| Number of inputs | 2 | 2 | 2 |
| Supports isochronous operation | No | Yes | under development |
| Address space required per module | 4 byte | 4 byte | 4 byte |
| Cable length | | | |
| • Shielded, max. | 200 m | 200 m | 200 m |
| Supply voltage from power module, rated value | 24 V DC | 24 V DC | 24 V DC |
| Galvanic isolation | | | |
| • Between channels and backplane bus | Yes | Yes | Yes |
| • Between channels and load voltage L+ | No | No | No |
| • Between channels | No | No | No |
| Permissible potential difference | | | |
| • Between input and $M_{ANA}$ ($U_{CM}$) | - | - | - |
| • Between $M_{ANA}$ and the central grounding point ($U_{ISO}$) | 75 V DC/60 V AC | 75 V DC/60 V AC | - |
| • Between channels | - | - | 100 V AC/140 V DC |
| Power losses, typically | 0.6 W | 0.8 W | 0.85 W |
| Current consumption | | | |
| • From load voltage L+, max. | 80 mA | 35 mA | 53 mA |
| • From backplane bus, max. | 10 mA | 10 mA | 10 mA |
| Diagnostic display red LED "group error SF" | Yes | Yes | Yes |
| Diagnostics | | | |
| • Group error (parameterization or internal error) | Yes | Yes | Yes |
| • Overflow/ underflow | Yes | Yes | Yes |
| • Wire break | Yes 1) | Yes 1) | Yes 1) |
| • Wire break test 2) | - | - | - |
| Measuring principle | Integrating | Current value encoding | Integrating |
| Integration time | 16.67/20 ms | - | 16.67/20 ms |
| Conversion time per channel (max. 2) | 55/65 ms | 0.1 ms | 25/30 ms |
| Cycle time (both channels) | 110/130 ms | 1 ms | 58.3/70 ms |
| Interference frequency suppression | 60/50 Hz | - | 60/50 Hz |

1) Only in measuring range 4 to 20 mA
2) Only in measuring ranges of the thermocouples
3) The high feature analog input module can be used for 2 and 4 wire transducers

## Analog electronic modules

### Technical specifications (continued)

| Analog input modules | 2 AI I 2-wire Standard | 2 AI I 2-wire, High Speed | 2 AI I 2-wire High Feature [3] |
|---|---|---|---|
| Resolution (incl. Overrange) | | | |
| • ± 20 mA | - | - | 15 bit + sign |
| • 4mA to 20mA | 13 bit | 13 bit | 15 bit |
| Noise suppression for noise frequency | | | |
| • Common-mode interference, min. | - | - | 100 dB |
| • Series-mode interference (peak value of interference < rated value of input range), min. | 70 dB | 70 dB | 90 dB |
| • Crosstalk between the inputs, min. | -50 dB | -50 dB | -110 dB |
| Operational limit (for the whole temperature range with reference to the input range) | ± 0.6% | ± 0.3% | ± 0.1 % |
| Basic error limit (operational limit at 25 °C with reference to input range) | ± 0.4 % | ± 0.7% | ± 0.05% |
| Temperature error (with reference to input range) | ± 0.005%/K | ± 0.01 % / K | ± 0.003%/K |
| Linearity error (referred to input range) | ± 0.01% | ± 0.01% | ± 0.03% |
| Repeatability (in the steady-state condition at 25 °C, referred to input range) | ± 0.05% | ± 0.10% | ± 0.01% |
| Permissible input voltage (destruction limit) | - | - | - |
| Permissible input current (destruction limit) | 40 mA | 35 mA | 40 mA |
| Load on 2-wire measuring transducer, max. | 750 Ω | 670 Ω | 750 Ω |
| Parameters (default value underscored) | 4 byte | 4 byte | 4 byte |
| • Group diagnostics | Disable/enable | Disable/enable | Disable/enable |
| • Overflow/underflow | Disable/enable | Disable/enable | Disable/enable |
| • Wire break | Disable/enable [1] | Disable/enable [1] | Disable/enable [1] |
| • Wire break test | - | - | - |
| • Smoothing | None/weak/average/strong | None/weak/average/strong | None/weak/average/strong |
| • Reference point | - | - | - |
| • Reference point number | - | - | - |
| • Measuring type/ range | Deactivated/ 4 to 20 mA | Deactivated/ 4 to 20 mA | Deactivated/ ± 20mA 4 to 20 mA |
| Module width | 15 mm | 15 mm | 15 mm |
| Weight, approx. | 40 g | 40 g | 40 g |

1) Only in measuring range 4 to 20 mA
2) Only in measuring ranges of the thermocouples
3) The high feature analog input module can be used for 2 and 4 wire transducers

## Technical specifications (continued)

| Analog input modules | 2 AI I 4-wire Standard | 2 AI I 4-wire, High Speed | 2 AI I 4-wire High Feature [3] |
|---|---|---|---|
| Number of inputs | 2 | 2 | 2 |
| Supports isochronous operation | No | Yes | under development |
| Address space required per module | 4 byte | 4 byte | 4 byte |
| Cable length | | | |
| • Shielded, max. | 200 m | 200 m | 200 m |
| Supply voltage from power module, rated value | 24 V DC | 24 V DC | 24 V DC |
| Galvanic isolation | | | |
| • Between channels and backplane bus | Yes | Yes | Yes |
| • Between channels and load voltage L+ | No | No | No |
| • Between channels | No | No | No |
| Permissible potential difference | | | |
| • Between input and $M_{ANA}$ ($U_{CM}$) | - | - | - |
| • Between $M_{ANA}$ and the central grounding point ($U_{ISO}$) | 75 V DC/60 V AC | 75 V DC/60 V AC | - |
| • Between channels | - | - | 100 V AC/140 V DC |
| Power losses, typically | 0.6 W | 0.8 W | 0.85 W |
| Current consumption | | | |
| • From load voltage L+, max. | 30 mA | 35 mA | 53 mA |
| • From backplane bus, max. | 10 mA | 10 mA | 10 mA |
| Diagnostic display red LED, "group error" SF | Yes | Yes | Yes |
| Diagnostics | | | |
| • Group error (parameterization or internal error) | Yes | Yes | Yes |
| • Overflow/ underflow | Yes | Yes | Yes |
| • Wire break | Yes [1] | Yes [1] | Yes [1] |
| • Wire break test [2] | - | - | - |
| Measuring principle | Integrating | Instantaneous value encryption | Integrating |
| Integration time | 16.67/20 ms | - | 16.67/20 ms |
| Conversion time per channel (max. 2) | 55/65 ms | 0.1 ms | 25/30 ms |
| Cycle time (both channels) | 110/130 ms | 1 ms | 58.3/70 ms |
| Interference frequency suppression | 60/50 Hz | - | 60/50 Hz |
| Resolution (incl. Overrange) | | | |
| • ± 20 mA | 13 bit + sign | - | 15 bit + sign |
| • 4mA to 20mA | 13 bit | 13 bit | 15 bit |
| Noise suppression for noise frequency | | | |
| • Common-mode interference, min. | - | - | 100 dB |
| • Series-mode interference (peak value of interference < rated value of input range), min. | 70 dB | 70 dB | 90 dB |
| • Crosstalk between the inputs, min. | -50 dB | -50 dB | -110 dB |
| Operational limit (for the whole temperature range with reference to the input range) | ± 0.6% | ± 0.3% | ± 0.1 % |
| Basic error limit (operational limit at 25 °C with reference to input range) | ± 0.4 % | ± 0.2% | ± 0.05% |
| Temperature error (with reference to input range) | ± 0.005%/K | ± 0.01 % / K | ± 0.003%/K |
| Linearity error (referred to input range) | ± 0.01% | ± 0.01% | ± 0.03% |
| Repeatability (in the steady-state condition at 25 °C, referred to input range) | ± 0.05% | ± 0.05% | ± 0.01% |
| Permissible input voltage (destruction limit) | - | - | - |

## Analog electronic modules

### Technical specifications (continued)

| Analog input modules | 2 AI I 4-wire Standard | 2 AI I 4-wire, High Speed | 2 AI I 4-wire High Feature [3] |
|---|---|---|---|
| Permissible input current (destruction limit) | 40 mA | 35 mA | 40 mA |
| Load on 2-wire measuring transducer, max. | 750 Ω | 670 Ω | 750 Ω |
| Parameters (default values are underscored) | 4 byte | 4 byte | 4 byte |
| • Group diagnostics | Disable/enable | Disable/enable | Disable/enable |
| • Overflow/ underflow | Disable/enable | Disable/enable | Disable/enable |
| • Diagnostics: Wire break | Disable/enable [1] | Disable/enable [1] | Disable/enable [1] |
| • Wire break test | - | - | - |
| • Smoothing | None/weak/average/strong | None/weak/average/strong | None/weak/average/strong |
| • Reference point | - | - | - |
| • Reference point number | - | - | - |
| • Measuring type/ range | Deactivated/ 4 to 20 mA | Deactivated/ 4 to 20 mA | Deactivated/ ± 20mA/ 4 to 20 mA |
| Module width | 15 mm | 15 mm | 15 mm |
| Weight, approx. | 40 g | 40 g | 40 g |

1) Only in measuring range 4 to 20 mA
2) Only in measuring range of the thermocouples
3) The high feature analog input module can be used for 2 and 4 wire transducers

| Analog input modules | 2 AI RTD High Feature | 2 AI RTD Standard[1] | 2 AI TC Standard | 2 AI TC High Feature with integr. temperature compensation |
|---|---|---|---|---|
| Number of inputs | 2<br>2-, 3- and 4-wire sensors | 2<br>4-wire sensors | 2 | 2 |
| Supports isochronous operation | No | No | No | No |
| Address space required per module | 4 byte | 4 byte | 4 byte | 4 byte |
| Cable length | | | | |
| • Shielded, max. | 50 m | 50 m | 50 m | 50 m |
| Supply voltage from power module, rated value | – | 24 V DC | 24 V DC | 24 V DC |
| Galvanic isolation | | | | |
| • Between channels and backplane bus | Yes | Yes | Yes | Yes |
| • Between channels and load voltage L+ | Yes | – | – | Yes |
| • Between channels and 24 V supply voltage | | Yes | Yes | Yes |
| • Between channels | No | No | No | No |
| Permissible potential difference | | | | |
| • Between input and $M_{ANA}$ ($U_{CM}$) | – | – | 75 V DC/60 V AC | 75 V DC/60 V AC |
| • Between $M_{ANA}$ and the central grounding point ($U_{ISO}$) | 75 V DC/60 V AC | 75 V DC/60 V AC | – | 100 V AC/140 V DC |
| Power losses, typically | 0.6 W | 0.6 W | 0.6 W | 0.6 W |
| Insulation tested | 500 V DC | – | – | 500 V DC |
| Current consumption | | | | |
| • From load voltage L+, max. | 30 mA | 30 mA | 30 mA | 30 mA |
| • From backplane bus, max. | 10 mA | 10 mA | 10 mA | 10 mA |
| Diagnostics indicator | red LED, "group error SF" | red LED, "group error SF" | red LED, "group error SF" | red LED, "group error SF" |
| Diagnostics | | | | |
| • Group error (parameterization or internal error) | Yes | Yes | Yes | Yes |
| • Overflow/underflow | Yes | Yes | Yes | Yes |
| • Wire break | Yes | Yes[1] | Yes | Yes |
| • Wire break test[2] | – | – | – | – |

1) Accuracy data is valid for 4-wire connection Increased accuracy with 2 AI RTD High Feature
2) 20 ms extra for activated wirebreak test, 5 ms extra for High Feature

## Technical specifications (continued)

| Analog input modules | 2 AI RTD High Feature | 2 AI RTD Standard[1)] | 2 AI TC Standard | 2 AI TC High Feature with integr. temperature compensation |
|---|---|---|---|---|
| Measuring principle | Integrating | Integrating | Integrating | Integrating |
| Integration time | 16.67/20 ms | 16.67/20 ms | 16.67/20 ms | 66.67/20 ms |
| Conversion time per channel (max. 2) | 50/60 ms | 110/130 ms | 55/65 ms[6)] | 66/80 ms |
| Cycle time (both channels) | 100/120 ms | 220/260 ms | – | – |
| Interference frequency suppression | 60/50 Hz | 60/50 Hz | 60/50 Hz | 60/50 Hz |
| Resolution (incl. Overrange) | | | | |
| • +/- 80 mV | | | 15 bit + sign | 15 bit + sign |
| • +/- 10 V | | – | | |
| | Pt100; Ni100; Ni120; Pt200; Ni200; Pt500; Ni500; Pt1000; Ni1000; Cu10 / 15 bit + sign | Pt100; Ni100 / 15 bit + VZ | – | – |
| | 150 Ω; 300 Ω; 600 Ω; 3000 Ω / 15 bit | 150 Ω / 14 bit<br>300 Ω; 600 Ω / 15 bit | – | – |
| | PTC[1] / 1 bit | | – | – |
| Input range (rated value)/ input resistor | | | | |
| • Resistance | 150 Ω / min. 10 MΩ<br>300 Ω / min. 10 MΩ<br>600 Ω / min. 10 MΩ<br>3000 Ω / min. 10 MΩ<br>PTC / min 10 MΩ | 150 Ω / min. 100 kΩ<br>300 Ω / min. 100 kΩ<br>600 Ω / min. 100 kΩ | – | – |
| • Resistance thermometer | Pt100 / min. 10 MΩ<br>Ni100 / min. 10 MΩ<br>Ni120 / min. 10 MΩ<br>Pt200 / min. 10 MΩ<br>Ni200 / min. 10 MΩ<br>Pt500 / min. 10 MΩ<br>Ni500 / min. 10 MΩ<br>Pt1000 / min. 10 MΩ<br>Ni1000 / min. 10 MΩ<br>Cu10 / min 10 MΩ | Pt100 / min. 100kΩ<br>Ni100 / min. 100 kΩ | – | – |
| • Voltage | – | – | ±80 mV/min. 1 MΩ | ±80 mV/min. 1 MΩ |
| • Thermocouple | – | – | Type E, N, J, K, L, S, R, B, T, C/min. 1 MΩ | Type E, N, J, K, L, S, R, B, T, C/min. 1 MΩ |
| Permissible input voltage (destruction limit) | – | – | – | ± 20 V, continuous |
| Connection of signal sensors | | | | |
| • For voltage measurement | – | – | – | Possible |
| Temperature compensation | – | – | – | |
| Internal temperature compensation | – | – | – | Possible with TM-E15S24-AT TM-E15C24-AT |
| External temperature compensation by connecting a compensating box into the measuring circuit | – | – | – | Possible, one external compensation socket per channel |
| Filtering of the measured values | – | – | – | Yes, configurable in 4 stages by means of digital filtering |
| Stage | – | – | – | Time constant |
| • None | – | – | – | 1 x cycle time |
| • Weak | – | – | – | 4 x cycle time |
| • Average | – | – | – | 32 x cycle time |
| • Strong | – | – | – | 64 x cycle time |
| Noise suppression for noise frequency | – | | | |
| • Common-mode interference ($U_{SS}$), min. | 90 dB | 90 dB | 90 dB | 90 dB |
| • Series-mode interference (peak value of interference < rated value of input range), min. | 70 dB | 70 dB | 70 dB | 70 dB |
| • Crosstalk between the inputs, min. | –50 dB | –50 dB | –50 dB | –50 dB |

## Technical specifications (continued)

| Analog input modules | 2 AI RTD High Feature | 2 AI RTD Standard[1)] | 2 AI TC Standard | 2 AI TC High Feature with integr. temperature compensation |
|---|---|---|---|---|
| Operational limit (for the whole temperature range with reference to the input range) | • Resistance-type sensor: ± 0.1 %<br>• Pt100, Pt200, Pt500, Pt1000 Standard: ± 1.0 K<br>• Pt100, Pt200, Pt500, Pt1000 climate: ± 0.25 K<br>• Ni100, Ni120, Ni200, Ni500, NI1000, standard and climate: ± 0.4 K<br>• Cu10: ± 1.5 K | ± 0.6% | ± 0.6% | ± 0.1% |
| Operational limit for thermocouples (for the whole temperature range with reference to input range)[3)] | – | – | – | ± 1.5 K |
| Operational limit for type C thermocouples (for the whole temperature range with reference to input range)[3)] | – | – | – | ± 7 K |
| Basic error limit (operational limit at 25 °C with reference to input range) | • Resistance-type sensor: ± 0.05%<br>• Pt100, Pt200, Pt500, Pt1000 Standard: ± 0.6 K<br>• Pt100, Pt200, Pt500, Pt1000 climate: ± 0.13 K<br>• Ni100, Ni120, Ni200, Ni500, NI1000, standard and climate: ± 0.2 K<br>• Cu10: ± 1.0 K | ± 0.4% | ± 0.4% | ± 0.05% |
| Temperature error (with reference to input range) | ± 0.0009%/K | ± 0.6%/K | ±0.005%/K | ±0.005%/K |
| Linearity error (referred to input range) | ± 0.01% | ± 0.01% | ± 0.01% | ± 0.01% |
| Repeatability (in the steady-state condition at 25 °C, relative to input range) | ± 0.05% | ± 0.05% | ± 0.05% | ± 0.05% |
| Permissible input voltage (destruction limit) | 9 V | 9 V | ± 10 V | ± 10 V |
| Permissible input current (destruction limit) | – | – | – | – |
| Load on 2-wire measuring transducer, max. | – | 750 Ω | – | – |
| Characteristic curve linearization, parameterizable | – | Pt100, Ni100, both standard and climate | Type E, N, J, K, L, S, R, B, T to IEC 584 | Type E, N, J, K, L, S, R, B, T to IEC 584 |

## Technical specifications (continued)

| Analog input modules | 2 AI RTD High Feature | 2 AI RTD Standard[1)] | 2 AI TC Standard | 2 AI TC High Feature with integr. temperature compensation |
|---|---|---|---|---|
| Parameters (default value underscored) | – | 4 byte | 4 byte | 4 byte |
| • Group diagnostics | Disable/enable | Disable/enable | Disable/enable | Disable/enable |
| • Overflow/ underflow | Disable/enable | Disable/enable | Disable/enable | Disable/enable |
| • Diagnostics for wirebreak[4)] | Disable/enable | Disable/enable | Disable/enable | Disable/enable |
| • Wire break test | – | – | Disable/enable | Disable/enable |
| • Smoothing | None/weak/average/ strong | None/weak/average/ strong | None/weak/average/ strong | None/weak/average/ strong |
| • Temperature units | – | – | Celsius | Celsius/Fahrenheit |
| • Reference point | – | – | None/RTD | None/yes, internal |
| • Reference point number | – | – | None/1/2/3/4/5/6/7/8 | |
| • Measuring type/range | deactivated / 4-wire resistor / 3-wire resistor / 2-wire resistor / 4-wire temperature sensor / 3-wire temperature sensor / 2-wire temperature sensor<br>• 150 Ω<br>• 300 Ω<br>• 600 Ω<br>• 3000 Ω<br>• PTC<br>• Pt100 climate range<br>• Ni100 climate range<br>• Pt100 standard range<br>• Ni100 standard range<br>• Pt500 standard range<br>• Pt1000 standard range<br>• Ni1000 standard range<br>• Pt200 climate range<br>• Pt500 climate range<br>• Pt1000 climate range<br>• Ni1000 climate range<br>• Pt200 standard range<br>• Ni120 standard range<br>• Ni120 climate range<br>• Cu10 standard range<br>• Cu10 climate range<br>• Ni200 standard range<br>• Ni200 climate range<br>• Ni500 standard range<br>• Ni500 climate range | Deactivated/ 150 Ω/300 Ω/600 Ω/ Pt100 Climatic/ Pt100 Standard Ni100 Standard / Ni100 Climatic | Deactivated/ ± 80 mV/ ± 250 mV /± 500 mV / ± 1 V / TC-EL Type T (Cu-CuNi)/ TC-EL Type K (NiCr-Ni)/ TC-EL Type B (PtRh-PtRh)/ TC-EL Type N (NiCrSi-NiSi)/ TC-EL Type E (NiCr-CuNi)/ TC-EL Type R (PtRh-Pt)/ TC-EL Type S (PtRh-Pt)/ TC-EL Type J (Fe-Cu-Ni)/ TC-EL Type L (Fe-Cu-Ni) | Deactivated/ ± 80 mV/ TC-EL Type T (Cu-CuNi)/ TC-EL Type K (NiCr-Ni)/ TC-EL Type B (PtRh-PtRh)/ TC-EL Type c (Wer-Wer) TC-EL Type N (NiCrSi-NiSi)/ TC-EL Type E (NiCr-CuNi)/ TC-EL Type R (PtRh-Pt)/ TC-EL Type S (PtRh-Pt)/ TC-EL Type J (Fe-Cu-Ni)/ TC-EL Type L (Fe-Cu-Ni) |
| Temperature coefficient | • Pt 0.003850<br>• Pt 0.003916<br>• Pt 0.003902<br>• Pt 0.003920<br>• Pt 0.003851<br>• Ni 0,006180<br>• Ni 0.006720<br>• Ni 0.005000<br>• Cu 0,00427 | – | – | – |
| Module width | 15 mm | 15 mm | 15 mm | 15 mm |
| Weight, approx. | 40 g | 40 g | 40 g | 40 g |

1) Accuracy data is valid for 4-wire connection Increased accuracy with 2 AI RTD High Feature

2) 20 ms extra for activated wirebreak test, 5 ms extra for High Feature

3) Only for thermocouples. On enable signal for diagnostic wirebreak and measuring range voltage, a parameter assignment error occurred. The module does not start up.

4) 4) Wire break is only detected on constant current lines

The specified limit errors of the 2 AI TC High Feature are valid for the following temperatures:
Type T thermocouple:-200 °C
Type K thermocouple:-100 °C
Type B thermocouple:+700 °C
Type N thermocouple:-150 °C
Type E thermocouple:-150 °C
Type R thermocouple:+200 °C
Type S thermocouple:+100 °C

The following applies to Type C thermocouple: ± 8 K

## Analog electronic modules

### Technical specifications (continued)

| Analog output modules | 2 AO, U, standard | 2 AO, U, High Feature | 2 AO, I, standard | 2 AO, I, High Feature |
|---|---|---|---|---|
| Number of outputs | 2 | 2 | 2 | 2 |
| Supports isochronous operation | No | Yes | No | Yes |
| Address space required per module | 4 byte | 4 byte | 4 byte | 4 byte |
| Cable length | | | | |
| • Shielded, max. | 200 m | 200 m | 200 m | 200 m |
| Rated supply voltage from the power module | 24 V DC | 24 V DC | 24 V DC | 24 V DC |
| Polarity reversal protection | Yes | Yes | Yes | Yes |
| Galvanic isolation | | | | |
| • Between channels and b ackplane bus | Yes | Yes | Yes | Yes |
| • Between channels and load voltage L+ | Yes | Yes | Yes | Yes |
| • Between channels | No | No | No | No |
| Permissible potential difference | | | | |
| • Between input and $M_{ANA}$ ($U_{CM}$) | - | - | - | - |
| • Between $M_{ANA}$ and the central grounding point | 75 V DC/60 V AC | 75 V DC/60 V AC | 75 V DC/60 V AC | 75 V DC/60 V AC |
| • Between channels | - | - | - | - |
| Power loss | 2 W | 2.5 W | 2 W | 3 W |
| Current consumption | | | | |
| • From load voltage L+, max. | 130 mA | 130 mA | 150 mA | 150 mA |
| • From backplane bus, max. | 10 mA | 10 mA | 10 mA | 10 mA |
| Diagnostic display red LED group error "SF", | Yes | | Yes | |
| Diagnostics | | | | |
| • Group error (parameterization or internal error) | Yes | Yes | Yes | Yes |
| • Short-circuit after M | Yes | Yes | - | - |
| • Wire break | - | - | Yes | Yes |
| Cycle time (both channels) | 1.5 ms | 2.5 ms | 1.5 ms | 2.5 ms |
| Transient recovery time | | | | |
| • For resistive load | 0.1 ms | 0.1 ms | 0.1 ms | 0.25 ms |
| • Capacitive loads | 0.5 ms | 0.5 ms | 0.5 ms | 1.0 ms |
| • For inductive load | 0.5 ms | 0.5 ms | 0.5 ms | 0.5 ms |
| Resolution (incl. Overrange) | | | | |
| • ±10 V | 13 bit + sign | 15 bit + sign | - | - |
| • 1 to 5 V | 12-bit | 14-bit | - | - |
| • ± 20 mA | - | - | 13 bit + sign | 15 bit + sign |
| • 4 mA to 20 mA | - | - | 13 bit | 15 bit |
| Operational limit (over entire temperature range, relative to output range) | ± 0.4 % | ± 0.05% | ± 0.5% | ± 0.05% |
| Basic error limit (operational limit at 25 °C with reference to input range) | ± 0.2% | ± 0.01% | ± 0.3% | ± 0.01% |
| Temperature error (with reference to input range) | ± 0.01 % / K | ± 0.001%/K | ± 0.01 % / K | ± 0.001%/K |
| Linearity error (referred to input range) | ± 0.02% | ± 0.02% | ± 0.02% | ± 0.02% |
| Repeatability (in the steady-state condition at 25 °C, referred to input range) | ± 0.05% | ± 0.01% | ± 0.05% | ± 0.01% |
| Output ripple (with reference to output range, bandwidth 0 to 50 kHz) | ± 0.02% | ± 0.02% | ± 0.02% | ± 0.02% |

## Technical specifications (continued)

| Analog output modules | 2 AO, U, standard | 2 AO, U, High Feature | 2 AO, I, standard | 2 AO, I, High Feature |
|---|---|---|---|---|
| Destruction limit against external voltages and currents | | | | |
| • Voltages at outputs against $M_{ANA}$ | Max. 15 V continuous, 75 V for max. 1 s (mark-space ratio 1:20) | | Max. 15 V continuous, 75 V for max. 1 s (mark-space ratio 1:20) | |
| • Current, max. | 50 mA DC | | 50 mA DC | |
| Load resistor | min. 1 kΩ | | max. 500 Ω | |
| • For capacitive load, max. | 1 µF | | - | |
| • Short-circuit protection | Yes | | - | |
| • Short-circuit current, approx. | 25 mA | | - | |
| • For inductive load | - | | 1 mH | |
| • Open-circuit voltage, max. | - | | 18 V | |
| Connection of actuators | | | | |
| • 2-conductor connection | possible, without compensation of conductor resistance | | Yes | |
| • 4-lead connection | Yes | | No | |
| Parameters (default values are underscored) | 7 byte | | 7 byte | |
| • Group diagnostics | Disable/ enable | | Disable/ enable | |
| • Diagnostics: short-circuit after M | Disable/ enable | | - | |
| • Diagnostics: Wire break | - | | Disable/ enable | |
| • Performance characteristics for CPU/master STOP | Switch off output current and voltage/ substitute value/retain last value | | Switch off output current and voltage/ substitute value/retain last value | |
| • Substitute value | 0 to 65535 (value range must lie within the rated range) | | 0 to 65535 (value range must lie within the rated range) | |
| • Output type/range | Deactivated/1 to 5 V/ ±10 V | | Deactivated/4 to 20 mA/ ±20 mA | |
| Module width | 15 mm | | 15 mm | |
| Weight, approx. | 40 g | | 40 g | |

## Ordering data

| | Order No. |
|---|---|
| **Analog input modules** | |
| Ordering quantity 1 part | |
| • 2 AI U Standard | **6ES7 134-4FB00-0AB0** |
| • 2 AI U High Speed | **6ES7 134-4FB51-0AB0** |
| • 2 AI U High Feature | **6ES7 134-4LB00-0AB0** |
| • 2 AI I 2-wire Standard | **6ES7 134-4GB00-0AB0** |
| • 2 AI I 2-wire High Speed | **6ES7 134-4GB51-0AB0** |
| • 2 AI I 4-wire Standard | **6ES7 134-4GB10-0AB0** |
| • 2 AI I 4-wire High Speed | **6ES7 134-4GB61-0AB0** |
| • 2 AI I High Feature 2-/4-wire (15 bit + sign) | **6ES7 134-4MB00-0AB0** |
| • 2 AI RTD Standard | **6ES7 134-4JB50-0AB0** |
| • 2 AI TC Standard | **6ES7 134-4JB00-0AB0** |
| • 2 AI RTD High Feature | **6ES7 134-4NB50-0AB0** |
| • 2 AI TC High Feature | **6ES7 134-4NB00-0AB0** |
| **Analog output modules** | |
| Ordering quantity 1 part | |
| • 2 AO U Standard | **6ES7 135-4FB00-0AB0** |
| • 2 AO U High Feature | **6ES7 135-4LB01-0AB0** |
| • 2 AO I Standard | **6ES7 135-4GB00-0AB0** |
| • 2 AO I High Feature | **6ES7 135-4MB01-0AB0** |

| | Order No. |
|---|---|
| ***Accessories for labeling*** | |
| **DIN A4 sheets of labels** | |
| • Petrol | **6ES7 193-4BH00-0AA0** |
| • Red | **6ES7 193-4BD00-0AA0** |
| • Yellow | **6ES7 193-4BB00-0AA0** |
| • Light beige | **6ES7 193-4BA00-0AA0** |
| ***Accessories for system-integrated shield connection*** | |
| **Shield connecting element** ordering quantity 5 parts can be plugged onto TM-E and TM-P | **6ES7 193-4GA00-0AA0** |
| **Shield terminals** ordering quantity 5 parts for 3 × 10 mm busbar | **6ES7 193-4GB00-0AA0** |
| **Earth terminal** Ordering quantity 1 part for cable cross-sections up to 25 $mm^2$ | **8WA2 868** |
| **Contact rails 3 × 10 mm** Ordering quantity 1 part | **8WA2 842** |

## F power modules

### Overview


- For monitoring and, depending on the version, fusing the load and sensor supply voltage
- Can be connected to TM-P terminal modules with automatic coding
- Diagnosis of voltage and blown fuse (can be disables in configuration)
- Fail-safe power module PM-E F PROFIsafe for safe shutdown of digital output modules



### Technical specifications

| | PM-E 24 V DC with diagnostics | PM-E 24 V DC / 120/230 V AC with diagnostics and fuse | PM-E 24 V DC PROFIsafe with diagnostics |
|---|---|---|---|
| Rated load voltage | 24 V DC | 24 V DC, 120 V AC, 230 V AC | 24 V DC |
| Polarity reversal protection | Yes | Yes | No |
| Short-circuit protection | External (e.g. automatic circuit breaker) | Internal with fuse (5 x 20 mm), 250 V, 10 A, quick-blow | Yes, electronic |
| Current carrying capacity | max. 10 A (up to 60 °C) | | Max. 10 A (up to 40 °)<br>Max. 6 A for vertical mounting (up to 40 °) |
| • Up to 30 °C, max. | - | 10 A (24 V DC),<br>8 A (120/230 V AC) | - |
| • Up to 60 °C, max. | - | 7 A (24 V DC),<br>5 A (120/230 V AC) | 6 A |
| Galvanic isolation | Between process and backplane bus | Between process and backplane bus | |
| Isolation tested at | 500 V DC | 1500 V AC | |
| Diagnostics indicator | Group error “SF”, red LED | Group error “SF”, red LED | Group error “SF”, red LED |
| Status display | Rated load voltage "PWR", green LED | Rated load voltage "PWR", green LED fuse O.K.: "FSG", green LED | Green LED per channel<br>green LED for the load voltage |
| Diagnostics message | Load voltage out | Load voltage out; fuse rupture | Possible |
| Address space required per module | - | - | |
| Module width | 15 mm | 15 mm | 30 mm |
| Weight, approx. | 35 g | 45 g | 88 g |
| Parameter [1] | 3 byte | 3 byte | 20 byte |
| • Load voltage out | Disable/enable | Disable/enable | Disable/enable |
| • Diagnostics fuse tripped | - | Disable/enable | - |
| • Load voltage | - | DC/AC | DC |

1) Default values are underscored

| Ordering data | Order No. |
|---|---|
| **PM-E DC 24 V**<br>With diagnostics | **6ES7 138-4CA00-0AA0** |
| **PM-E DC 24-48 V, 24-230 V AC**<br>With diagnostics and back-up | **6ES7 138-4CB10-0AB0** |
| **PM-E F PROFIsafe**<br>DC 24 up to Category 4 (EN 954-1) | **6ES7 138-4CF00-0AB0** |
| ***Accessories*** | |
| **Terminal module for power module** | See F terminal modules |
| **DIN A4 sheets of labels** | |
| • Petrol | **6ES7 193-4BH00-0AA0** |
| • Red | **6ES7 193-4BD00-0AA0** |
| • Yellow | **6ES7 193-4BB00-0AA0** |
| • Light beige | **6ES7 193-4BA00-0AA0** |
| **Programming tool Distributed Safety V5.2**<br>*Task*:<br>Configuring software for configuring failsafe application programs for SIMATIC S7-300F<br>*Prerequisite*:<br>STEP 7 from V5.1 SP6 | **6ES7 833-1FC00-0YX0** |
| **Documentation for S7-300F**<br>System description for configuring and programming PROFIsafe fail-safe modules | |
| • German | **6ES7 988-8FB10-8AA0** |
| • English | **6ES7 988-8FB10-8BA0** |
| • French | **6ES7 988-8FB10-8CA0** |

## F electronic modules

### Overview


- Digital inputs/outputs for SIMATIC S7-300
- Double-width digital inputs/outputs for SIMATIC S7-300 for fail-safe signals
- For flexible adaptation of PLC to respective task
- For connection of digital sensors and actuators



### Ordering data

| | Order No. |
|---|---|
| **4/8 F-DI electronics modules PROFIsafe DC 24 V**<br>30 mm overall width, up to Category 4 (EN 954-1) | **6ES7 138-4FA00-0AB0** |
| **4 F-DO electronics modules PROFIsafe DC 24 V/2A**<br>30 mm overall width, up to Category 4 (EN 954-1) | **6ES7 138-4FB00-0AB0** |

| | Order No. |
|---|---|
| ***Accessories*** | |
| **Terminal modules for electronics modules** | See F terminal modules |
| **Programming tool Distributed Safety V5.2**<br>*Task*:<br>Configuring software for configuring failsafe application programs for SIMATIC S7-300F<br>*Prerequisite*:<br>STEP 7 from V5.1 SP6 | **6ES7 833-1FC00-0YX0** |
| **Documentation for S7-300F**<br>System description for configuring and programming PROFIsafe fail-safe modules | |
| • German | **6ES7 988-8FB10-8AA0** |
| • English | **6ES7 988-8FB10-8BA0** |
| • French | **6ES7 988-8FB10-8CA0** |

## Overview

- Mechanical modules as receptacles for the electronic modules
- For setting up permanent wiring through self-configuring voltage buses
- Keyed connection technology to ensure an enhanced vibration resistance of up to 5 g
- Different versions to accommodate power modules and electronic modules
- Replaceable terminal box (even within the station network)
- Automatic coding of the electronic modules
- Self-shielding of the backplane bus for high data security
- Color coding facility for the terminals and for identifying the slot numbers
- Alternatively available with screw-type or spring-loaded terminals
- For up to 60 % faster process wiring also with FastConnect connection method (av. soon)

## Ordering data

| | Order No. |
|---|---|
| ***Terminal modules for power modules*** | |
| **TM-P15S23-A1**<br>Order quantity 1 unit<br>2 × 3 terminals, terminal access on AUX1 rail, AUX1 connected through to the left, screw-type connection | **6ES7 193-4CC20-0AA0** |
| **TM-P15C23-A1**<br>Order quantity 1 unit<br>2 × 3 terminals, terminal access on AUX1 rail, AUX1 connected through to the left, spring-type connection | **6ES7 193-4CC30-0AA0** |
| **TM-P15S23-A0**<br>Order quantity 1 unit<br>2 × 3 terminals, terminal access on AUX1 rail, AUX1 disconnected to the left, screw-type connection | **6ES7 193-4CD20-0AA0** |
| **TM-P15C23-A0**<br>Order quantity 1 unit<br>2 × 3 terminals, terminal access on AUX1 rail, AUX1 disconnected to the left, spring-loaded terminals | **6ES7 193-4CD30-0AA0** |
| **TM-P15S22-01**<br>Order quantity 1 unit<br>2 × 2 terminals, no terminal access on AUX1 rail, AUX1 connected through to the left, screw-type connection | **6ES7 193-4CE00-0AA0** |
| **TM-P15C22-01**<br>Order quantity 1 unit<br>2 × 2 terminals, no terminal access on AUX1 rail, AUX1 connected through to the left, spring-loaded terminals | **6ES7 193-4CE10-0AA0** |
| **TM-P30S44-A0**<br>Order quantity 1 unit<br>7 × 2 terminals, terminal access on AUX1 rail, AUX1 disconnected to the left, screw-type terminals for PM-E F PROFIsafe | **6ES7 193-4CK20-0AA0** |
| **TM-P30C44-A0**<br>Order quantity 1 unit<br>7 × 2 terminals, terminal access on AUX1 rail, AUX1 disconnected to the left, spring-loaded terminals for PM-E F PROFIsafe | **6ES7 193-4CK30-0AA0** |
| ***Terminal modules for electronics modules*** | |
| **TM-E30S44-01**<br>Order quantity 1 unit<br>4 × 4 terminals, no terminal access on AUX1 rail, AUX1 connected through to the left, screw-type connection | **6ES7 193-4CG20-0AA0** |
| **TM-E30C44-01**<br>Order quantity 1 unit<br>4 × 4 terminals, no terminal access on AUX1 rail, AUX1 connected through to the left, spring-loaded terminals | **6ES7 193-4CG30-0AA0** |
| **TM-E30S46-A1**<br>Order quantity 1 unit<br>4 × 6 terminals, terminal access on AUX1 rail, AUX1 connected through to the left, screw-type connection | **6ES7 193-4CF40-0AA0** |
| **TM-E30C46-A1**<br>Order quantity 1 unit<br>4 × 6 terminals, terminal access on AUX1 rail, AUX1 connected through to the left, spring-type connection | **6ES7 193-4CF50-0AA0** |

## F terminal modules

### Ordering data (continued)

| | Order No. |
|---|---|
| ***Accessories*** | |
| **Color-coded labels** | |
| Order quantity 1 set of 200 of each color, | |
| • Yellow | **6ES7 193-4LB10-0AA0** |
| • Yellow-green | **6ES7 193-4LC10-0AA0** |
| **DIN A4 sheets of labels** | |
| • Petrol | **6ES7 193-4BH00-0AA0** |
| • Red | **6ES7 193-4BD00-0AA0** |
| • Yellow | **6ES7 193-4BB00-0AA0** |
| • Light beige | **6ES7 193-4BA00-0AA0** |
| **Programming tool Distributed Safety V5.2** | **6ES7 833-1FC00-0YX0** |
| *Task*: Configuring software for configuring failsafe application programs for SIMATIC S7-300F *Prerequisite*: STEP 7 from V5.1 SP6 | |
| **Documentation for S7-300F** | |
| System description for configuring and programming PROFIsafe fail-safe modules | |
| • German | **6ES7 988-8FB10-8AA0** |
| • English | **6ES7 988-8FB10-8BA0** |
| • French | **6ES7 988-8FB10-8CA0** |

| | Order No. |
|---|---|
| **Earth terminal** | **8WA2 868** |
| Ordering quantity 1 unit | |
| For cable cross-sections up to 25 $mm^2$ | |
| **Contact rails 3 × 10 mm** | **8WA2 842** |
| Order quantity 1 unit | |
| **Identification labels, inscribed** | |
| Order quantity 1 set | |
| • 200 units for slot numbering (1 to 20) 10 × | **8WA8 861-0AB** |
| • 200 units for slot numbering (1 to 40) 5 × | **8WA8 861-0AC** |
| • 200 units for slot numbering (1 to 64) 1 ×, (1 to 68) 2 × | **8WA8 861-0DA** |
| **Identification labels, blank** | **8WA8 848-2AY** |
| 200 units for slot numbering | |

## Overview

The IQ-Sense sensor module is an intelligent 4-channel electronic module for the ET 200S. It serves to connect the IQ-Sense sensors. The ET 200S makes all functions available to any PROFIBUS DP master module.

Standard function blocks are available for simplified handling of a SIMATIC S7. Conventional sensors cannot be operated on this module.

Features:

- 4-channel intelligent electronic module for connecting up to 4 sensors of the IQ-Sense type
- Low wiring overhead (2 wires, non-polarized)
- Fast commissioning through IntelliTeach:
  - Default setting of sensor parameters or copying of parameters set through Teach-In to other modules/ sensors
  - Dynamic modification of parameters (e.g. setting the sensing range via a PLC program
  - Integral alignment tool through LED display
- High plant availability through
  - Alarm and display for preventive maintenance (e.g. surplus light emission warning comes on if optical sensors are dirty or maladjusted)
  - No mutual influencing of sensors (anti-interference function)
- Channel-discrete system diagnostics (e.g. wire-break, short-circuit, module/sensor failure, etc.)
- Fast sensor replacement through automatic re-parameterization – no need for new Teach-In (adjustment)
- Module replacement possible during operation and when live (hot swapping)
- Can be connected to the TM-E terminal module with automatic coding

The main applications of the IQ-Sense system are found in installations and machines:

- with high demands on availability
- with high likelihood of mutual influencing of sensors
- with sensor parameters with high flexibility and dynamic adjustment requirements

### IQ-Sense sensors

Sensors for connecting to the sensor module 4 IQ-Sense.

Features:

- Diffuse sensor (energetic)
- Retroreflective sensors
- Designs: K80 IQ-Sense and C40 IQ-Sense
- IntelliTeach functionality
- Integrated anti-interference function
- Pre-failure alarm (fouling/misalignment)

## 4IQ-Sense sensor module

### Technical specifications

| | |
|---|---|
| **Sensor module** | **4 IQ-Sense** |
| Number of inputs | 4 |
| Cable length | |
| • Unshielded | Max. 50 m |
| • Shielded | Max. 50 m |
| **Voltages, currents. Potentials** | |
| Rated supply voltage (from the power module) | 24 V DC |
| • Polarity reversal protection | Yes |
| Galvanic isolation | |
| • Between channels | No |
| • Between channels and backplane bus | Yes |
| Permissible potential difference | |
| • Between various electrical circuits | 75 V DC, 60 V AC |
| Isolation tested at | 500 V DC |
| Current consumption | |
| • from supply voltage | 0.3 A |
| Power loss of the module | Typ. 0.85 W |
| **Status, interrupts, diagnostics** | |
| Status display | Green LED per channel |
| Diagnostic functions | |
| • Group error | Red LED "SF" |
| • Diagnostic information selectable | Yes |
| **Data for selection of a sensor** | |
| Connectable sensors | Photoelectronic proximity switches with IQ-SENSE |
| **Reaction times** | |
| Cycle time | Max. 3.24 ms |
| Design | |
| • Dimensions W x H x D (mm) | 15 x 81 x 52 |
| • Weight | approx. 35 g |

### Ordering data

| | Order No. |
|---|---|
| **4 IQ-Sense sensor module** | **6ES7 138-4GA00-0AB0** |
| **Sensors** | |
| for connecting to the 4 IQ-Sense sensor module | |
| • Diffuse sensor, model C40 IQ-Sense | **3SF7 240-3JQ00** |
| • Diffuse sensor, model K80 IQ-Sense | **3SF7 210-3JQ00** |
| • Reflex sensor, model C40 IQ-Sense | **3SF7 241-3JQ00** |
| • Reflex sensor, model K80 IQ-Sense | **3SF7 211-3JQ00** |
| • Diffuse sensor with background fading, model K80 IQ-Sense | **3SF7 214-3JQ00** |

## IQ-Sense photoelectric sensors

### More information

Additional information can be found under SIMATIC ET 200M, page 6/240.

## Design

### *Possible combinations of TM-E terminal modules and electronic modules*

| **Electronic modules** | | **TM-E terminal modules for electronic modules** | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Screw-type terminal | → | **15S26-A1** | **15S24-A1** | **15S24-01** | **15S23-01** | **15S24-AT** | **30S44-01** | **30S46-A1** |
| Order No. 6ES7 193… | → | …4CA40-0AA0 | …4CA20-0AA0 | …4CB20-0AA0 | …4CB00-0AA0 | …4CL20-0AA0 | …4CG20-0AA0 | …4CF40-0AA0 |
| Spring-loaded terminal | → | **15C26-A1** | **15C24-A1** | **15C24-01** | **15C23-01** | **15C24-AT** | **30C44-01** | **30C46-A1** |
| Order No. 6ES7 193… | → | …4CA50-0AA0 | …4CA30-0AA0 | …4CB30-0AA0 | …4CB10-0AA0 | …4CL30-0AA0 | …4CG30-0AA0 | …4CF50-0AA0 |
| Fast Connect | → | **15N26-A1** | **15N24-A1** | **15N24-01** | **15N23-01** | – | – | – |
| Order No. 6ES7 193… | → | …4CA80-0AA0 | …4CA70-0AA0 | …4CB70-0AA0 | …4CB60-0AA0 | | | |
| 1 COUNT 24 V/100 kHz | | ● | | ● | | | | |
| 1 COUNT 5 V/500 kHz | | | | | | | ● | |
| 1 SSI | | ● | | ● | | | | |
| 1 STEP 5 V/204 kHz | | ● | | ● | | | | |
| 2 PULSE | | ● | | ● | | | | |
| 1 POS INC/Digital | | | | | | | ● | |
| 1 POS SSI/Digital | | | | | | | ● | |
| 1 POS INC/Analog | | | | | | | ● | |
| 1 POS SSI/Analog | | | | | | | ● | |
| 1 SI 3964/ASCII | | ● | | ● | | | | |
| 1 SI Modbus/USS | | ● | | ● | | | | |
| 4/8 F-DI 24 V DC [1] | | | | | | | ● | ● |
| 4 F-DO 24 V DC/2 A [1] | | | | | | | ● | ● |
| RESERVE (overall width 15 mm) | | ● | ● | ● | ● | ● | | |
| RESERVE (overall width 30 mm) | | | | | | | ● | ● |

1) See the manual "ET 200S failsafe modules" in the "S7 F Systems" and "S7 Distributed Safety" documentation packages

# SSI module

## Overview

- 1-channel module for connecting SSI sensors to the ET 200S
- For position decoding and simple positioning tasks
- With two comparison operations with specifiable comparison values (standard mode)
- With a digital input for latching actual values (standard mode)
- Can be plugged into TM-E terminal module with automatic coding
- Fast mode for high-speed acquisition of encoder values (e.g. for drive controls)
- Module replacement possible during operation and when live (hot swapping)
- Simple parameterization without additional software

Note:
We supply positioning systems and prepared connection cables for counting and positioning functions as SIMODRIVE Sensors or Motion Connect 500

Additional information can be found in the Internet under:

http://www.siemens.com/simatic-technology

## Technical specifications

| | |
|---|---|
| Number of channels | 1 |
| Encoders that can be connected | • SSI sensors 13, 21, 25 bit<br>• Gray code, binary code |
| Monoflop time | Selectable: 16/32/48/64 µs |
| Power supply for encoder | Through SSI module:<br>L+ –0.8 V, 500 mA,<br>short-circuit-proof |
| Cable length for encoder | Cable length<br>(shielded, twisted-pair cable) |
| • 125 kHz, max. | 320 m |
| • 250 kHz, max. | 160 m |
| • 500 kHz, max. | 60 m |
| • 1 MHz, max. | 20 m |
| • 2 MHz, max. | 8 m |
| **Digital inputs** | |
| Number | 1 |
| Position | Trigger for latching the actual value, e.g. for length measurement |
| Input voltage | 24 V DC -15% to +20% |
| • At "1" signal | -30 ... +5 V DC |
| • At "0" signal | 11 ... +30 V DC |
| Input current | |
| • At "1" signal | 9 mA |
| • At "0" signal | Quiescent current ≤ 2 mA |
| Input delay, max. | 300 µs |
| Input characteristic | According to IEC 1131, Part 2, type 2 |
| Cable length | |
| • Unshielded | 32 m |
| • Shielded | 600 m |

| **Function/performance specifications** | |
|---|---|
| Actual value detection | Cyclic transfer of the current value to the master |
| Comparison function, for example, for simple positioning tasks | Comparison of the actual value with up to two comparison values. Comparison value transfer from the master. Indication of the comparison result to the master |
| Freeze function, e.g. for length measurement, distance measurement | Unlatching the actual value in case of:<br>• positive edge<br>• negative edge<br>• positive and negative edge<br>of the digital input. Transfer of the frozen actual value to the master |
| Direction of rotation adaptation permits the use of economical, non-programmable sensors | Adaptation of the sensor's counting direction and the SSI module's counting direction<br>• synchronous counting<br>• asynchronous counting |
| Actual value scaling | Automatic masking out of irrelevant bit |
| Monitor function | Indication of short-circuit in the encoder supply; transmission error; wire break |
| Parameters | 8 byte |
| Dimensions (W x H x D) in mm | 15 x 81 x 52 |
| Weight | 40 g |

| Ordering data | Order No. |
|---|---|
| **SSI module**<br>for connection of absolute value encoders with SSI interface | **6ES7 138-4DB01-0AB0** |
| ***Accessories*** | |
| **Sheets of labels DIN A4** | |
| • Petrol | **6ES7 193-4BH00-0AA0** |
| • Red | **6ES7 193-4BD00-0AA0** |
| • Yellow | **6ES7 193-4BB00-0AA0** |
| • Light beige | **6ES7 193-4BA00-0AA0** |

# 2 PULSE pulse generator

## Overview

- 2-channel pulse generator and timer module for ET 200S
- For controlling final control elements, valves, heater elements, etc.
- Pulse width modulation (PWM)
- Pulse sequences
- Pulse trains
- Accurately timed switching signals to 24 V DC output



## Technical specifications

| | |
|---|---|
| **Dimensions and weight** | |
| Dimensions W x H x D in mm | 15 x 81 x 52 |
| Weight, approx. | 40 g |
| **Number of channels** | 2 |
| **Voltages, currents, potentials** | |
| Rated load voltage L+ (from power module) | 24 V DC |
| • Polarity reversal protection | Yes |
| Galvanic isolation | |
| • Between channels | No |
| • Between channels and backplane bus | Yes |
| Permissible potential difference | |
| • Between various electrical circuits | 75 V DC, 60 V AC |
| Isolation tested at | 500 V DC |
| Encoder supply | |
| • Output voltage | L+ -0.8 V |
| • Output current | Max. 500 mA, current limited |
| Current consumption | |
| • From backplane bus, max. | 10 mA |
| • From load voltage L (without load), max. | 40 mA |
| Power losses, typically | 1.8 W |
| **Digital inputs** | |
| Input voltage | |
| • Rated value | 24 V DC |
| • For "1" signal | 11 to 30 V |
| • For "0" signal | -30 to 5 V |
| Input current | |
| • for "1" signal, typ. | 9 mA |
| Minimum pulse duration/break | 25 µs |
| Response time, max. | 100 µs |
| Input characteristic | According to IEC 1131, Part 2, type 2 |
| Connection of two-wire BEROs | Possible |
| • Permissible residual current, max. | 2 mA |
| Screened cable lengths, max. | 100 m |

| | |
|---|---|
| **Digital outputs** | |
| Output voltage | |
| • At "1" signal, min. | L+ -1 V |
| Output current | |
| • For "1" signal | |
| - Rated value | 2 A |
| - Permissible range | 7 mA to 2 A |
| • At "0" signal (residual current), max. | 0.5 mA |
| Minimum pulse duration | 200 µs |
| Accuracy | ± (pulse duration x 100 ppm) ± 100 µs |
| Output delay (with resistive load) | |
| • For "0" to "1", max. | 100 µs |
| • At "1" to "0", max. | 200 µs |
| Lamp load, max. | 10 W |
| Control a digital input | Yes |
| Switching frequency | |
| • For resistive load | 2.5 kHz |
| • For inductive load | Max. 2 Hz |
| • For lamp load | Max. 10 Hz |
| Restriction (internal) of inductive cutoff voltage | L+ (-50 V to 65 V) |
| Short-circuit protection of output | Yes |
| • Operating threshold, typ. | 10 A |
| Cable lengths | |
| • Unshielded | 600 m |
| • Shielded | 1000 m |

| Ordering data | Order No. |
|---|---|
| **2 PULSE pulse generator and timer module** | **6ES7 138-4DD00-0AB0** |
| For ET 200S | |
| ***Accessories*** | |
| **Sheets of labels DIN A4** | |
| • Petrol | **6ES7 193-4BH00-0AA0** |
| • Red | **6ES7 193-4BD00-0AA0** |
| • Yellow | **6ES7 193-4BB00-0AA0** |
| • Light beige | **6ES7 193-4BA00-0AA0** |

# 1 STEP stepper module

## Overview

- Single channel module for ET 200S for the controlled positioning of a stepper motor
- Reference point or incremental operating modes
- Connection of power circuits with pulse/ direction interface using 5 V differential signals
- External stop with/without ramp through digital input
- Status display and error display by LED:
  positioning errors and status errors in the digital inputs are displayed on LEDs and indicated to the interface to the master

## Technical specifications

| | |
|---|---|
| Nominal input voltage | 24 V DC |
| **Number of stepper motor channels** | **1** |
| Power loss | 1.5 W |
| Dimensions (W x H x D) in mm | 15 x 81 x 52 |
| Weight, approx. | 40 g |
| **Interface to motor power circuit** | |
| Differential signals for pulses (PULSE, notPULSE) and direction (DIR, notDIR) | Acc. to RS 422 |
| Screened cable lengths, max. | 100 m, twisted pair |
| **Number of digital inputs** | **2** |
| Function | |
| • REF input | Reference cam |
| • DI input | Pulse lock or external stop |
| Input voltage | |
| • rated value | 24 V DC, -15% / + 20% |
| • for “1" signal | 11 to 30 V DC |
| • for “0" signal | -30 to +5 V DC |
| Input current | |
| • for "1" signal, typ. | 9 mA |
| • for “0" signal | Quiescent current ≤ 2 mA |
| Input delay | |
| • "0" after "1", max. | 300 µs |
| • "1" after "0" | 300 µs |
| Repeat frequency, max. | 1 kHz |
| Connection of two-wire BEROs | Yes |
| Input characteristic | According to IEC 1131, Part 2, type 2 |
| Cable length | |
| • Unshielded | 600 m |
| • Shielded | 1000 |

## Ordering data

| | Order No. |
|---|---|
| **1 STEP stepper module**<br>For simple positioning tasks with stepper motor axle | **6ES7 138-4DC00-0AB0** |
| ***Accessories*** | |
| **Sheets of labels DIN A4** | |
| • Petrol | **6ES7 193-4BH00-0AA0** |
| • Red | **6ES7 193-4BD00-0AA0** |
| • Yellow | **6ES7 193-4BB00-0AA0** |
| • Light beige | **6ES7 193-4BA00-0AA0** |
| **SIMOSTEP stepper motors** | See Catalog ST 70 |
| **FM STEPDRIVE Power circuit for stepper motors** | See Catalog ST 70 |

# 1 POS SSI/digital positioning module

## Overview

- 1-channel positioning module for ET 200S
- For controlled positioning using digital outputs according to the rapid/creep feed principle
- With actual position sensing for SSI encoders
- Parameter change during operation
  - Reversing difference
  - Shutdown difference
  - Encoder adjustment
- Functions
  - Inching
    direct application of control signals by the master
  - Travel
    absolute or relative
  - Linear and rotary axes
  - Latch function:
    Saves the current value by setting a digital input

Note:
We supply position encoders and prepared connection cables for counting and positioning functions as SIMODRIVE Sensors or Motion Connect 500

Additional information can be found in the Internet under:

http://www.siemens.com/simatic-technology

## Ordering data

| | Order No. |
|---|---|
| **1 POS SSI/digital positioning module**<br>for controlled positioning for absolute value encoder with SSI interface | **6ES7 138-4DH00-0AB0** |

## 1 POS SSI/digital positioning module

### Technical specifications

| | |
|---|---|
| Nominal input voltage | 24 V DC |
| Dimensions and weight | |
| Dimensions W x H x D in mm | 30 x 81 x 52 |
| Weight, approx. | approx. 65 g |
| Voltages, currents and potentials | |
| Rated load voltage L+ | 24 V DC |
| • Range | 20.4 to 28.8 V |
| • Polarity reversal protection | Yes |
| Galvanic isolation | |
| • Between bus and I/O | Yes |
| **Encoder supply** | |
| Output voltage | L+ -0.8 V |
| Output current | Max. 500 mA, current limited |
| Current consumption | |
| • From backplane bus | max. 10 mA |
| • From load voltage L+ (without load) | max. 50 mA |
| Power loss | Typ. 1 W |
| **Digital inputs** | |
| Input voltage | |
| Rated value | 24 V DC |
| • 0 signal | -30 V to 5 V |
| • 1 signal | 11 to 30 V |
| Input current | |
| • 0 signal | <= 2 mA (perm. residual current) |
| • 1 signal | 9 mA (typ.) |
| Minimum pulse width | 500 µs |
| Connection of a two-wire BERO Type 2 | Possible |
| Input characteristic | According to IEC 1131, Part 2, type 2 |
| Cable length | 32 m |
| **Digital outputs** | |
| Output voltage | |
| • Rated value | 24 V DC |
| • 0 signal | ≤ 3 V |
| • 1 signal | ≥ L+ -1V |
| Output current | |
| • 0 signal (residual current) | ≤ 3 mA |
| • 1 signal (perm. range) | 7 mA to 0.6 A |
| Switching frequency | |
| • For resistive load | 100 Hz |
| • For inductive load | 2 Hz |
| • Lamp load | <= 5 W |
| Output delay (resistive load) | |
| • 0 signal | max. 200 µs |
| • 1 signal | Max. 1.3 ms |
| Short-circuit protection for the output | Yes |
| Response threshold | 0.7 A to 1.8 A |
| Inductive deletion | Yes; L+ -(55 to 60 V) |
| Digital input control | Yes |
| Cable lengths | |
| • Unshielded | 600 m |
| • Shielded | 1000 m |

| | |
|---|---|
| **Transmitter signals SSI** | |
| Position detection | absolute |
| Connectable sensor | • SSI sensors 13, 21, 25 bit<br>• Gray code, binary code |
| Error signal for SSI data and SSI clock | to RS 422 |
| Data transmission rate (adjustable) | Cable length (shielded, twisted-pair cable) |
| • 125 kHz, max. | 320 m |
| • 250 kHz, max. | 160 m |
| • 500 kHz, max. | 60 m |
| • 1 MHz, max. | 20 m |
| • 2 MHz, max. | 8 m |
| **Status, interrupts, diagnostics** | |
| Status display actual value rising | LED UP (green) |
| Status display actual value falling | LED DN (green) |
| Status display positioning mode | LED POS (green) |
| Status display DI | LED 9 (green) |
| Status display DI | LED 13 (green) |
| Status display DI | LED 14 (green) |
| Diagnostic functions | LED SF (red) |
| Fault indication on the module | Yes |
| Update rate of checkback signals | 2 ms |
| **Module exchange** | |
| • During IM-DP operation | Yes |
| • Under process voltage | Yes |
| Parameters | 16 byte |

# 1 POS SSI/analog positioning module

## Overview

- 1-channel positioning module for ET 200S
- For controlled positioning using one analog output according to the rapid/ creep feed principle
- With actual position sensing for SSI encoders
- Parameter change during operation
  - Reversing difference
  - Shutdown difference
  - Encoder adjustment
  - Speed
  - Acceleration
  - Delay
- Functions
  - Inching
    direct application of control signals by the master
  - Travel
    absolute or relative
  - Linear and rotary axes
  - Latch function:
    Saves the current value by setting a digital input

Note:
Siemens is now able to offer distance measuring systems and pre-assembled connecting cables for counting and positioning functions in the product ranges SIMODRIVE Sensor and Motion Connect 500.

Additional information can be found in the Internet under:

http://www.siemens.com/simatic-technology

## Ordering data

| | Order No. |
|---|---|
| **1 POS SSI/analog positioning module**<br>For controlled positioning with analog output for SSI encoder, 30 mm overall width | **6ES7 138-4DK00-0AB0** |

## 1 POS SSI/analog positioning module

### Technical specifications

| | |
|---|---|
| Dimensions and weights | |
| Dimensions W x H x D in mm | 30 x 81 x 52 |
| Weight, approx. | 65 g |
| **Module-specific data** | |
| No. of channels (axes) | 1 |
| Fault indication on the module | Yes |
| Update rate of checkback signals | 2 ms |
| Response time at reversing or shutdown point | 30 µs + output delay |
| Response time for Latch | 400 µs |
| Module exchange | |
| • during IM-DP operation | Yes |
| • under process voltage | Yes |
| **Voltage, currents, potentials** | |
| Rated load voltage L+ | 24 V DC |
| • range | 20.4 V to 28.8 V |
| • polarity reversal protection | Yes |
| Isolation between backplane bus and peripherals | Yes |
| Encoder supply | |
| • output voltage | L+ -0.8 V |
| • output current | Max. 500 mA, current limited |
| Current consumption | |
| • from backplane bus | max. 10 mA |
| • from load voltage L+ (without load) | max. 50 mA |
| Power loss | Typ. 2 W |
| **Data for the analog output** | |
| Resolution (incl. Overrange) | |
| • +/- 10 V | 13 bit + sign |
| • 0 to 10 V | 13 bit |
| Transient recovery time | |
| • for resistive load | 0.1 ms |
| • capacitive loads | 0.5 ms |
| • for inductive load | 0.5 ms |
| Operational limit over entire temperature range (relative to output range) | +/- 0.4 % |
| Basic error threshold (operating error threshold at 25 °C, with reference to output range) | ± 0.2% |
| Temperature error (referred to output range) | ± 0.01 % / K |
| Linearity error (referred to output range) | ± 0.02% |
| Repeatability (in the steady-state condition at 25 °C, with reference to output range) | ± 0.05% |
| Output ripple (with reference to output range, bandwidth 0 to 50 kHz) | ± 0.02% |
| Load resistor | at least 1 kW |
| • Capacitive loads | max. 1 µF |

| | |
|---|---|
| **Data for the digital inputs** | |
| Input voltage | |
| • Rated value | 24 V DC |
| • 0 signal | -30 V ... 5 V |
| • 1 signal | 11 V to 30 V |
| Input current | |
| • 0 signal | ≤ 2 mA (permitted residual current) |
| • 1 signal | 9 mA (typ.) |
| Minimum pulse width | 500 µs |
| Connection of a two-wire BERO Type 2 | Possible |
| Input characteristic | According to IEC 1131, Part 2, type 2 |
| Cable length | 32 m |
| **Data for the digital output** | |
| Output voltage | |
| • Rated value | 24 V DC |
| • 0 signal | ≤ 3 V |
| • 1 signal | ≥ L+ -1V |
| Output current | |
| • 0 signal (residual current) | ≤ 0.3 mA |
| • 1 signal (perm. range) | 7 mA ... 0.6 A |
| Switching frequency | |
| • for resistive load | 100 Hz |
| • for inductive load | 2 Hz |
| • lamps | ≤ 10 Hz |
| Lamp load | ≤ 5 W |
| Output delay (resistive load) | |
| • 0 signal | max. 200 µs |
| • 1 signal | Max. 1.3 ms |
| Short-circuit protection for the output | Yes |
| Digital input control | Yes |
| Cable lengths | |
| • unshielded | 600 m |
| • shielded | 1000 m |
| **Encoder signals** | |
| Position detection | absolute |
| Error signal for SSI data and SSI clock | to RS 422 |
| Data transmission rate (adjustable) | Cable length (shielded, twisted-pair cable) |
| • 125 kHz, max. | 320 m |
| • 250 kHz, max. | 160 m |
| • 500 kHz, max. | 60 m |
| • 1 MHz, max. | 20 m |
| • 2 MHz, max. | 8 m |
| Parameters | 16 byte |

# 1 POS Inc/digital positioning module

## Overview

- 1-channel positioning module for ET 200S
- For controlled positioning using digital outputs according to the rapid/creep feed principle
- With actual position determining for incremental encoder according to RS 422
- Reference-point approach, actual value setting
- Parameter change during operation
  - Reversing difference
  - Shutdown difference
- Functions
  - Inching
    direct application of control signals by the master
  - Travel
    absolute or relative
  - Linear and rotary axes
  - Latch function:
    Saves the current value by setting a digital input

Note:
We supply positioning systems and prepared connection cables for counting and positioning functions as SIMODRIVE Sensors or Motion Connect 500

Additional information can be found in the Internet under:

http://www.siemens.com/simatic-technology

## Ordering data

| | Order No. |
|---|---|
| **1 POS Inc/digital positioning module**<br>for controlled positioning for incremental encoders according to RS 422 | **6ES7 138-4DG00-0AB0** |

## 1 POS Inc/digital positioning module

### Technical specifications

| | |
|---|---|
| Nominal input voltage | 24 V DC |
| **Dimensions and weight** | |
| Dimensions W x H x D in mm | 30 x 81 x 52 |
| Weight, approx. | 65 g |
| **Voltages, currents, potentials** | |
| Rated load voltage L+ | 24 V DC |
| • Range | 20.4 to 28.8 V |
| • Polarity reversal protection | Yes |
| Electrical isolation | |
| • Between bus and I/O | Yes |
| **Encoder supply** | |
| Output voltage | L+ -0.8 V |
| Output current | Max. 500 mA, current limited |
| Current consumption | |
| • From backplane bus | max. 10 mA |
| • From load voltage L+ (without load) | max. 50 mA |
| Power loss | Typ. 1 W |
| **Digital inputs** | |
| Input voltage | |
| • Rated value | 24 V DC |
| • 0 signal | -30 V to 5 V |
| • 1 signal | 11 to 30 V |
| Input current | |
| • 0 signal | <= 2 mA (perm. residual current) |
| • 1 signal | 9 mA (typ.) |
| Minimum pulse width | 500 µs |
| Connection of a two-wire BERO Type 2 | Possible |
| Input characteristic | According to IEC 1131, Part 2, type 2 |
| Cable length | 32 m |
| **Digital outputs** | |
| Output voltage | |
| • Rated value | 24 V DC |
| • 0 signal | ≤ 3 V |
| • 1 signal | ≥ L+ -1V |
| Output current | |
| • 0 signal (residual current) | ≤ 3 mA |
| • 1 signal (perm. range) | 7 mA to 0.6 A |
| Switching frequency | |
| • For resistive load | 100 Hz |
| • For inductive load | 2 Hz |
| • Lamp load | <= 5 W |
| Output delay (resistive load) | Possible |
| • 0 signal | max. 200 µs |
| • 1 signal | Max. 1.3 ms |
| Short-circuit protection for the output | Yes |
| Digital input control | Yes |
| Cable lengths | |
| • Unshielded | 600 m |
| • Shielded | 1000 m |

| | |
|---|---|
| **Encoder signals** | |
| Position detection | **absolute** |
| Error signals for SSI data and SSI clock | to RS 422 |
| Data transmission rate (adjustable) | Cable length (shielded, twisted-pair cable) |
| • 125 kHz | max. 320 m |
| • 250 kHz | Max. 160 m |
| • 500 kHz | Max. 60 m |
| • 1 MHz | Max. 20 m |
| • 2 MHz | Max. 8 m |
| **Status, interrupts, diagnostics** | |
| Status display actual value rising | LED UP (green) |
| Status display actual value falling | LED DN (green) |
| Status display positioning mode | LED POS (green) |
| Status display DI | LED 9 (green) |
| Status display DI | LED 13 (green) |
| Status display DI | LED 14 (green) |
| Diagnostic functions | LED SF (red) |
| Fault indication on the module | Yes |
| Update rate of checkback signals | 2 ms |
| Module exchange | |
| • During IM-DP operation | Yes |
| • Under process voltage | Yes |
| Parameters | 16 byte |

# 1 POS Inc/analog positioning module

## Overview

- 1-channel positioning module for ET 200S
- For controlled positioning using digital outputs according to the rapid/creep feed principle
- With actual position determining for incremental encoder according to RS 422
- Reference-point approach, actual value setting
- Parameter change during operation
  - Reversing difference
  - Shutdown difference
- Functions
  - Inching:
    Direct application of control signals by the master
  - Traversing:
    Absolute or relative
  - Linear and rotary axes
  - Latch function:
    Saves the current value by setting a digital input

Note:
Siemens is now able to offer distance measuring systems and pre-assembled connecting cables for counting and positioning functions in the product ranges SIMODRIVE Sensor and Motion Connect 500.

Additional information can be found in the Internet under:

http://www.siemens.com/simatic-technology

## Ordering data

| | Order No. |
|---|---|
| **1 POS Inc/analog positioning module**<br>for controlled positioning with analog output for 5 V incremental encoder, 30 mm wide | **6ES7 138-4DJ00-0AB0** |

## 1 POS Inc/analog positioning module

### Technical specifications

| | |
|---|---|
| Dimensions and weights | |
| Dimensions W x H x D in mm | 30 x 81 x 52 |
| Weight, approx. | 65 g |
| **Module-specific data** | |
| No. of channels (axes) | 1 |
| Fault indication on the module | Yes |
| Update rate of checkback signals | 2 ms |
| Response time at reversing or shut-down point | 30 µs + output delay |
| Response time for Latch | 400 µs |
| Module exchange | |
| • During IM-DP operation | Yes |
| • At process voltage | Yes |
| **Voltage, currents, potentials** | |
| Rated load voltage L+ | 24 V DC |
| • Range | 20.4 V to 28.8 V |
| • Polarity reversal protection | Yes |
| Galvanic isolation between back-plane bus and I/O | Yes |
| Encoder supply | |
| • Output voltage | L+ -0.8V |
| • Output current | Max. 500 mA, current limited |
| Current consumption | |
| • From backplane bus | Max. 10 mA |
| • From load voltage L+ (without load) | Max. 50 mA |
| Power loss | Typ. 2 W |
| **Data for the analog output** | |
| Resolution (incl. overrange) | |
| • +/- 10 V | 13 bit + sign |
| • 0 to 10 V | 13 bit |
| Transient recovery time | |
| • For resistive load | 0.1 ms |
| • For capacitive load | 0.5 ms |
| • For inductive load | 0.5 ms |
| Operational limit over entire temperature range (relative to output range) | +/- 0.4 % |
| **Data for the digital inputs** | |
| Input voltage | |
| • Rated value | 24 V DC |
| • 0 signal | -30 V to 5 V |
| • 1 signal | 11 V to 30 V |
| Input current | |
| • 0 signal | ≤ 2 mA (perm. residual current) |
| • 1 signal | 9 mA (typ.) |
| Minimum pulse width | 500 µs |
| Connection of a two-wire BERO Type 2 | Possible |
| Input characteristic | According to IEC 1131, Part 2, type 2 |
| Cable length | 32 m |

| | |
|---|---|
| **Data for the digital output** | |
| Output voltage | |
| • Rated value | 24 V DC |
| • 0 signal | ≤ 3 V |
| • 1 signal | ≥ L+ -1V |
| Output current | |
| • 0 signal (residual current) | ≤ 0.3 mA |
| • 1 signal (perm. range) | 7 mA to 0.6 A |
| Switching frequency | |
| • For resistive load | 100 Hz |
| • For inductive load | 2 Hz |
| • Lamps | ≤ 10 Hz |
| Lamp load | ≤ 5 W |
| Output delay (resistive load) | |
| • 0 signal | max. 200 µs |
| • 1 signal | max. 1.3 ms |
| Short-circuit protection for the output | Yes |
| Digital input control | Yes |
| Cable lengths | |
| • unshielded | 600 m |
| • shielded | 1000 m |
| **Transmitter signals** | |
| Level | to RS 422 |
| Terminating resistor | 330 Ohm |
| Error input voltage | min. 1 V |
| Max. frequency | 500 kHz |
| Galvanic isolation to ET 200S bus | Yes |
| Parameters | 16 byte |

# 1 COUNT 24 V/100 kHz counter module

## Overview

- 1-channel 32-bit intelligent counter module for universal count tasks and time-based measuring tasks
- For the direct connection of 24 V incremental sensors or initiators
- Comparison function with predefinable comparison values
- Integrated digital output to output the reaction when the comparison value is attained
- Can be plugged into TM-E terminal module with automatic coding
- Module replacement possible during operation and under power (hot swapping)
- Simple parameterization without additional software

Note:
Siemens is now able to offer distance measuring systems and pre-assembled connecting cables for counting and positioning functions in the product ranges SIMODRIVE Sensor and Motion Connect 500.

Additional information can be found in the Internet under:


http://www.siemens.com/simatic-technology

## Technical specifications

| | |
|---|---|
| **Module-specific data** | |
| Number of channels | 1 |
| Width of counter register | 32 bit |
| Parameter length | 16 byte |
| Rated load voltage L+ | 24 V DC |
| • Range | 20.4 to 28.8 V |
| • Polarity reversal protection | Yes |
| Galvanic isolation | |
| • Between channels and backplane bus | Yes |
| • Between counter function and load voltage | No |
| Encoder supply (24 V) | |
| • Output voltage | L+(-0.8 V) |
| • Output current, max. | 500 mA, short-circuit-proof |
| Current consumption | |
| • From backplane bus | max. 10 mA |
| • From load voltage L+ (without load) | max. 42 mA |
| • Electronic module's power loss, typ. | 1 V |
| **Counting signals and digital input** | |
| Number | 1 |
| Galvanic isolation | No, only from shield |
| Input voltage | |
| • Rated value | 24 V DC |
| • 0 signal | -30 V to 5 V |
| • 1 signal | 11 to 30 V |
| Input current | |
| • 0 signal | ≤ 2 mA (quiescent current) |
| • 1 signal, typ. | 9 mA |
| Minimum pulse width (max. counting frequency) | |
| • Filter on | ≥ 25 µs (20 kHz) |
| • Filter off | ≥ 2.5 µs (200 kHz) |

| | |
|---|---|
| Connection of a two-wire BERO Type 2 | Possible |
| Input characteristic | Acc. to IEC 1131, Part 2, Type 2 |
| Cable length, shielded | |
| • Filter 200 kHz | 50 m |
| • Filter 20 kHz | 100 m |
| **Digital output** | |
| Number | 1 |
| Output voltage | |
| • Rated value | 24 V DC |
| • 0 signal | ≤ 3 V |
| • 1 signal | ≥ L+ (-1 V) |
| Output current | |
| • 0 signal (residual current) | ≤ 0.5 mA |
| • 1 signal | |
| - Permitted range | 5 mA to 2 A |
| - Rated value | 2 A (40 °C); 1 A (50 °C); 0.5 A (60 °C) |
| Switching frequency | |
| • For resistive load | 100 Hz |
| • For inductive load | 2 Hz |
| • For lamp load | ≤ 10 Hz |
| Lamp load | ≤ 10 W |
| Output delay (resistive load) | 100 µs |
| Short-circuit protection for the output | Yes |
| Response threshold | 2.6 A to 4 A |
| Inductive deletion | Yes; L+ (50 to 60 V) |
| Digital input control | Yes |
| Cable lengths | |
| • Unshielded | 600 m |
| • Shielded | 1000 m |

## 1 COUNT 24 V/100 kHz counter module

### Technical specifications (continued)

| | |
|---|---|
| **Status and diagnostics** | |
| Status indicator digital input DI | LED 8 (green) |
| Status indicator digital output DO | LED 4 (green) |
| Count value change Up | LED UP (green) |
| Count value change Down | LED DN (green) |
| Malfunction indication on the electronic module | LED SF (red) |
| Diagnostic information | Yes |
| **Measuring ranges** | |
| Max. measuring range | |
| • Frequency measurement | 0.1 Hz to 100 kHz |
| • Speed measurement | 1 R/min to 25000 R/min |
| • Period measurement | 10 µs to 120 s |
| Electronic module exchange | |
| • During IM-DP operation | Possible |
| • Under process voltage | Possible |
| **Parameters for counter modes** 1) | |
| Group diagnostics | Disable/enable |
| Characteristics during a CPU/master STOP | Switch off DO1/continue processing operating mode/switch on DO1 substitute value/retain last DO1 value |
| Sensor parameters | |
| Signal evaluation A*, B* | Pulse and direction/rotary transducer simple/double/quadruple |
| Sensor and input filter | |
| • For count input (track A*) | 2.5 µs (200 kHz)/25 µs (20 kHz) |
| • For directional input (track B*) | 2.5 µs (200 kHz)/25 µs (20 kHz) |
| • For digital input | 2.5 µs (200 kHz)/25 µs (20 kHz) |
| Sensor A*, B*, DI | 24 V current sourcing switch, series-mode/24 V M switch |
| Directional input B* | Normal/inverted |
| Output parameters | |
| DO1 function | Output/<br>Switch on at counter value ≥ comparison value/<br>Switch on at counter value ≤ comparison value/<br>Pulse on reaching the comparison value/<br>Switch over at the comparison values |
| DO2 function | Output/<br>Switch on at counter value ≥ comparison value/<br>Switch on at counter value ≤ comparison value/<br>Pulse on reaching the comparison value |
| DO1 substitute value | 0/1 |
| DO1 diagnostics | Off/on |
| DO1, DO2 hysteresis | 0 to 255 |
| Pulse duration [2 ms] DO1, DO2 | 0 to 255 |

1) The "default setting" is underlined.

| | |
|---|---|
| Operating mode | |
| Counting operating mode | Continuous counting/one-shot counting/ periodic counting |
| Gate function | Abort counting procedure/interrupt counting procedure |
| Digital input | Normal/inverted |
| DI function | Input/ HW gate/latch and retrigger for a positive edge/synchronization for a positive edge |
| Synchronization | one-shot/periodic |
| Main counting direction | None/up/down |
| Upper counting limit | 2 to 7FFF FFFF |
| **Parameters for measuring modes** 1) | |
| Group diagnostics | Disable/enable |
| Characteristics during a CPU/master STOP | Switch off DO1/continue processing operating mode/switch on DO1 substitute value/retain last DO1 value |
| Sensor parameters | |
| Signal evaluation A*, B* | Pulse and direction/rotary transducer simple |
| Sensor and input filter | |
| • For count input (track A*) | 2.5 µs (200 kHz)/25 µs (20 kHz) |
| • For directional input (track B*) | 2.5 µs (200 kHz)/25 µs (20 kHz) |
| • For digital input | 2.5 µs (200 kHz)/25 µs (20 kHz) |
| Sensor A*, B*, DI | 24 V current sourcing switch, series-mode/24 V M switch |
| Directional input B* | Normal/inverted |
| Output parameters | |
| DO1 diagnostics | Off/on |
| DO1 function | Output/outside the limits/ below the lower limit/ above the upper limit |
| DO1 substitute value | 0/1 |
| Operating mode | |
| Measuring mode | Frequency measurement/ rotational speed measurement/ period measurement |
| DI function | Input/HW gate |
| DI digital input | Normal/inverted |
| Lower limit | 0 to $f_{max}$ –1 or $T_{max}$-1 or $n_{max}$ –1 |
| Upper limit | 1 to $f_{max}$ or $T_{max}$ or /$n_{max}$ |
| Integration time [10 ms] | 1 to1000/12000 (frequency, speed, period measurement) |
| Sensor pulses per revolution | 1 to 65535 |
| Parameter length | 16 byte |
| Module width | 15 mm |
| Weight, approx. | 40 g |

| Ordering data | Order No. |
|---|---|
| **1 COUNT 24 V/100 kHz counter module**<br>For universal counting and measuring tasks with ET 200S | **6ES7 138-4DA03-0AB0** |
| ***Accessories*** | |
| **DIN A4 sheets of labels** | |
| • Petrol | **6ES7 193-4BH00-0AA0** |
| • Red | **6ES7 193-4BD00-0AA0** |
| • Yellow | **6ES7 193-4BB00-0AA0** |
| • Light beige | **6ES7 193-4BA00-0AA0** |
| **Shield connecting element**<br>5 parts | **6ES7 193-4GA00-0AA0** |
| **Shield terminals**<br>5 parts | **6ES7 193-4GB00-0AA0** |
| **SIMODRIVE sensor for incremental encoder** | **6FX2 001-4...** |

# 1 COUNT 5 V/500 kHz counter module

## Overview

- 1-channel 32-bit intelligent counter module for universal count tasks and time-based measuring tasks
- For direct connection of 5 V incremental encoders (RS 422)
- Comparison function with predefinable comparison values
- 2 integrated digital outputs to output the response upon reaching the comparison value
- Can be plugged into TM-E terminal module with automatic coding
- Module replacement possible during operation and under power (hot swapping)
- Simple parameterization without additional software

Note:
Siemens is now able to offer distance measuring systems and pre-assembled connecting cables for counting and positioning functions in the product ranges SIMODRIVE Sensor and Motion Connect 500.

Additional information can be found in the Internet under:

http://www.siemens.com/simatic-technology

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## Technical specifications

| | |
|---|---|
| **Module-specific data** | |
| Number of channels | 1 |
| Width of counter register | 32 bit |
| Parameter length | 16 byte |
| Rated load voltage L+ | 24 V DC |
| • Range | 20.4 V to 28.8 V |
| • Polarity reversal protection | Yes |
| Galvanic isolation | |
| • Between backplane bus and counter function | Yes |
| • Between counter function and load voltage | No |
| Encoder supply (24 V) | |
| • Output voltage | L+(-0.8 V) |
| • Output current, max. | 500 mA, short-circuit-proof |
| Current consumption | |
| • From backplane bus | Max. 10 mA |
| • From load voltage L+ (without load) | Max. 42 mA |
| • Power loss of the electronic module, typ. | 2 W |
| **Type of encoder connection** | |
| Track signals | A; not A; B; not B (RS422)<br>A and B offset by 90° |
| Zero mark signal | N; not N (RS422) |
| Input signal | |
| • Error input voltage | 1 to 10 V |
| • Input frequency, max. | 500 kHz |
| Encoder supply | 24 V DC through module |
| Cable length, max. | 100 m |

| | |
|---|---|
| **Digital input** | |
| Number | 1 |
| Galvanic isolation | No, only from shield |
| Input voltage | |
| • Rated value | 24 V DC |
| • 0 signal | -30 to 5 V |
| • 1 signal | 11 to 30 V |
| Input current | |
| • 0 signal | ≤ 2 mA (quiescent current) |
| • 1 signal, typ. | 9 mA |
| Minimum pulse width | 2.5 µs |
| Connection of a two-wire BERO Type 2 | Possible |
| Input characteristic | Acc. to IEC 1131, Part 2, Type 2 |
| Cable length, shielded | 50 m |
| **Digital outputs** | |
| Number | 2 |
| Output voltage | |
| • Rated value | 24 V DC |
| • 0 signal | ≤ 3 V |
| • 1 signal | ≥ L+ (-1 V) |
| Output current | |
| • 0 signal (residual current) | ≤ 0.5 mA |
| • 1 signal | |
| - Permitted range | 5 mA to 2.4 A |
| - Rated value | 2 A |
| Switching frequency | |
| • For resistive load | 100 Hz |
| • For inductive load | 2 Hz |
| • For lamp load | ≤ 10 Hz |

## Technical specifications (continued)

| | |
|---|---|
| Lamp load | ≤ 10 W |
| Output delay (resistive load) | 100 µs |
| Short-circuit protection of output | Yes |
| Response threshold | 2.6 A to 4 A |
| Inductive deletion | Yes; L+ -(50 to 60 V) |
| Digital input control | Yes |
| Cable lengths | |
| • unshielded | 600 m |
| • shielded | 1000 m |
| **Status, diagnostics** | |
| Status indicator digital input DI | LED 16 (green) |
| Status indicator digital output DO1 | LED 9 (green) |
| Status indicator digital output DO2 | LED 13 (green) |
| Count value change Up | LED UP (green) |
| Count value change Down | LED DN (green) |
| Synchronization | LED SYN (green) |
| Fault indication on the electronic module | LED SF (red) |
| Diagnostic information | Yes |
| **Measuring ranges** | |
| Max. measuring range | |
| • Frequency measurement | 0.1 Hz to 500 kHz |
| • Speed measurement | 1 rpm to 25000 rpm |
| • Period measurement | 10 µs to 120 s |
| Electronic module exchange | |
| • During IM-DP operation | Possible |
| • Under process voltage | Possible |
| **Parameters for counter modes** 1) | |
| Group diagnostics | disable/enable |
| Characteristics during a CPU/master STOP | Switch off DO/ continue processing operating mode/ switch on DO substitute value/retain last DO value |
| Sensor parameters | |
| Signal evaluation A, B | Single rotary encoder/ two-fold/four-fold |
| Sensor and input filter | |
| Diagnostics A and B | Off/on |
| Diagnostics N | Off/on |
| Directional input B* | Normal/inverted |
| Output parameters | |
| DO1 function | Output/ Switch on at counter value ≥ comparison value/ Switch on at counter value ≤ comparison value/ Pulse on reaching the comparison value/ Switch over at the comparison values |
| DO2 function | Output/ Switch on at counter value ≥ comparison value/ Switch on at counter value ≤ comparison value/ Pulse on reaching the comparison value |
| DO1 substitute value | 0/1 |
| Substitute value DO2 | 0/1 |
| DO1 diagnostics | Off/on |
| DO2 diagnostics | Off/on |
| DO1, DO2 hysteresis | 0 to 255 |
| Pulse duration [2 ms] DO1, DO2 | 0 to 255 |
| Operating mode | |
| Counting operating mode | Continuous counting/one-shot counting/ periodic counting |
| Gate function | Abort counting procedure/ interrupt counting procedure |
| Digital input | Normal/inverted |
| DI function | Input/HW gate/latch and retrigger when positive pulse edge/ synchronization when positive pulse edge/latch when positive pulse edge/ HW enable for synchronization |
| Synchronization | one-shot/periodic |
| Main counting direction | None/up/down |
| Upper counting limit | 2 to 7FFF FFFF |
| **Parameters for measuring modes** 1) | |
| Group diagnostics | disable/enable |
| Characteristics during a CPU/master STOP | Switch off DO/ continue processing operating mode/ switch on DO substitute value/retain last DO value |
| Encoder parameters Encoder and input filter | |
| Diagnostics A and B | Off/on |
| Diagnostics N | Off/on |
| Directional input B | Normal/inverted |
| Output parameters | |
| DO1 diagnostics | Off/on |
| DO2 diagnostics | Off/on |
| DO1 function | Output/outside the limits/ below the lower limit/ above the upper limit |
| DO1 substitute value | 0/1 |
| Operating mode | |
| Measuring mode | Frequency measurement/ speed measurement/ period measurement |
| DI function | Input/HW gate |
| DI digital input | Normal/inverted |
| Lower limit | 0 to $f_{max}$ –1 or $T_{max}$ -1 or $n_{max}$ -1 |
| Upper limit | 1 to $f_{max}$ or $T_{max}$ or $n_{max}$ |
| Integration time [n* 10 ms] | 1 to 10 to 1000/12000 (frequency, speed, period measurement) |
| Sensor pulses per revolution | 1 to 65535 |
| Parameter length | 16 byte |
| Module width | 30 mm |
| Weight, approx. | 65 g |

1) The "default setting" for the parameter is underscored.

## 1 COUNT 5 V/500 kHz counter module

| Ordering data | Order No. |
|---|---|
| **1 COUNT 5 V/ 500 kHz counter module**<br>For universal counting and measuring tasks with ET 200S | **6ES7 138-4DE01-0AB0** |
| ***Accessories*** | |
| **DIN A4 sheets of labels** | |
| • Petrol | **6ES7 193-4BH00-0AA0** |
| • Red | **6ES7 193-4BD00-0AA0** |
| • Yellow | **6ES7 193-4BB00-0AA0** |
| • Light beige | **6ES7 193-4BA00-0AA0** |
| **Shield connecting element**<br>5 units | **6ES7 193-4GA00-0AA0** |
| **Shield terminals**<br>5 units | **6ES7 193-4GB00-0AA0** |
| **SIMODRIVE incremental encoder with RS 422 (TTL)** | **6FX2 001-4...** |

## 1SI interface submodule

### Overview

- 1-channel module for serial data exchange through point-to-point connection
- For message frames max. 200 byte long
- RS 232C, RS 422, RS 485
- 2 versions
  - ASCII and 3964(R) protocol
  - Modbus and USS protocol
- Parameter assignment through GSD file or STEP 7 (V5.1 and newer)



### Technical specifications

| General specifications | | |
|---|---|---|
| Number of interfaces | 1 | |
| Nominal input voltage | 24 V DC | |
| Power consumption from backplane bus | | |
| • At 24 V, typ. | 40 mA | |
| • At 3.3 V, max. | 10 mA | |
| Power losses, typically | 0.85 W | |
| LEDs | | |
| • Green | TxD (transmitting)<br>RxD (receiving) | |
| • Red | SF (system fault) | |
| Integrated protocols | ASCII, 3964 (R) | MODBUS, USS |
| Transfer rates (parameterizable) | | |
| • ASCII, full duplex | 110, 300, 600, 1200, 2400, 4800, 9600, 19200 bit/s | - |
| • 3964 (R), half duplex | 110, 300, 600, 1200, 2400, 4800, 9600, 19200 bit/s | - |
| • MODBUS, half-duplex | - | 110, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400 bit/s |
| • USS, half-duplex | - | 110, 300, 600, 1200, 2400, 4800, 9600, 19200, 38400 bit/s |
| Character frame (parameterizable) | | |
| • Bits per character frame | 10 or | 10 or 11 (USS only 11 bit) |
| • Bits per character | 7 or 8 | 8 |
| • Number of start/stop bits | 1 or 2 | 1 or 2 (USS only 1 bit) |
| • Parity bits | none, odd, even, any | None, uneven, even (USS only even) |
| Number of bytes per PLC program cycle | | |
| • On receipt | 7 byte | 7 byte |
| • On sending | 7 byte | 7 byte |
| Memory that is required by the standard blocks | | |
| • Modbus: P_SEND, S_RCV, S_MODB | 11900 byte | |
| • USS: S_SEND, S_RCV, S_MUSST, S_USSR, S_USSI | 11900 byte | |
| • P_SEND, P_RCV in S7-CPU | 2700 byte | |

## 1SI interface submodule

### Technical specifications (continued)

| | |
|---|---|
| **RS 232 C interface** | |
| • RS 232C signals | 8: TxD, RxD, TRS, CTS, DTR, DSR, DCD, PE |
| • Galvanic isolation from internal ET 200S power supply | Yes |
| • Max. cable length (shielded) | 15 m |
| **RS 422/485 interface** | |
| • RS 422 signals | 5: TxD(A), RxD(A), TxD(B), RxD(B), PE |
| • RS 485 signals | 3: R/T(A), R/T(B), PE |
| • Galvanic isolation from internal ET 200S power supply | Yes |
| • Max. cable length (shielded) | 1200 m |
| Permissible ambient conditions | |
| • Operating temperature | 0 to + 60 °C |
| • Transport/storage temperature | -40 to +70 °C |
| Dimensions (W x H x D) in mm | 15 x 81 x 52 |
| Weight approx. | 40 g |

### Ordering data

| | Order No. |
|---|---|
| **1SI interface submodule** | |
| • ASCII and 3964(R) protocol | **6ES7 138-4DF00-0AB0** |
| • MODBUS and USS protocol | **6ES7 138-4DF10-0AB0** |
| ***Accessories*** | |
| **TM-E15S 26-A1 terminal module** Consignment 5 pcs. | **6ES7 193-4CA40-0AA0** |
| **TM-E15C26-A1 terminal module** Consignment 5 pcs. | **6ES7 193-4CA50-0AA0** |
| **TM-E15N24-A1 terminal module** Consignment 5 pcs. | **6ES7 193-4CA70-0AA0** |
| **TM-E15S24-01 terminal module** Consignment 5 pcs. | **6ES7 193-4CB20-0AA0** |
| **TM-E15C24-01 terminal module** Consignment 5 pcs. | **6ES7 193-4CB30-0AA0** |
| **TM-E15N24-01 terminal module** Consignment 5 pcs. | **6ES7 193-4CB70-0AA0** |

## Overview

- Mechanical modules as receptacles for the electronic modules
- For setting up permanent wiring through self-configuring voltage buses
- Keyed connection technology to ensure an enhanced vibration resistance of up to 5 g
- Different versions to accommodate power modules and electronic modules
- Replaceable terminal box (even within the station network)
- Automatic coding of the electronic modules
- Self-shielding of the backplane bus for high data security
- Color coding facility for the terminals and for identifying the slot numbers
- Alternatively with screw/spring-loaded terminals and "FastConnect" wiring technology
- Also available in FastConnect wiring technology for up to 60% faster process wiring

## Ordering data

| | Order No. |
|---|---|
| ***TM-P terminal modules for PM-E power modules*** | |
| **TM-P15S23-A1**<br>Consignment 1 piece<br>2 × 3 terminals, terminal access to AUX1 bus, AUX1 interconnected to the left, screw connection | **6ES7 193-4CC20-0AA0** |
| **TM-P15C23-A1**<br>Consignment 1 piece<br>2 × 3 terminals, terminal access to AUX1 bus, AUX1 interconnected to the left, spring-loaded terminals | **6ES7 193-4CC30-0AA0** |
| **TM-P15S23-A0**<br>Consignment 1 piece<br>2 × 3 terminals, terminal access to AUX1 bus, AUX1 interrupted to the left, screw connection | **6ES7 193-4CD20-0AA0** |
| **TM-P15C23-A0**<br>Consignment 1 piece<br>2 × 3 terminals, terminal access to AUX1 bus, AUX1 interrupted to the left, spring-loaded terminals | **6ES7 193-4CD30-0AA0** |
| **TM-P15S22-01**<br>Consignment 1 piece<br>2 × 2 terminals, no terminal access to AUX1 bus, AUX1 interconnected to the left, screw connection | **6ES7 193-4CE00-0AA0** |
| **TM-P15C22-01**<br>Consignment 1 piece<br>2 × 2 terminals, no terminal access to AUX1 bus, AUX1 interconnected to the left, spring-loaded terminals | **6ES7 193-4CE10-0AA0** |
| **TM-P30S44-A0**<br>Consignment 1 piece<br>7 × 2 terminals, terminal access to AUX1 bus, AUX1 interrupted to the left, screw-type terminals for PM-E F PROFIsafe | **6ES7 193-4CK20-0AA0** |
| **TM-P30C44-A0**<br>Consignment 1 piece<br>7 × 2 terminals, terminal access to AUX1 bus, AUX1 interrupted to the left, spring-loaded terminals for PM-E F PROFIsafe | **6ES7 193-4CK30-0AA0** |
| ***Terminal modules TM-E for electronic modules*** [1] | |
| **TM-E15S24-A1**<br>Consignment 5 pcs.<br>2 × 4 terminals, terminal access to AUX1 bus, AUX1 interconnected to the left, screw connection | **6ES7 193-4CA20-0AA0** |
| **TM-E15C24-A1**<br>Consignment 5 pcs.<br>2 × 4 terminals, terminal access to AUX1 bus, AUX1 interconnected to the left, spring-loaded terminals | **6ES7 193-4CA30-0AA0** |
| **TM-E15S24-01**<br>Consignment 5 pcs.<br>2 × 4 terminals, no terminal access to AUX1 bus, AUX1 interconnected to the left, screw connection | **6ES7 193-4CB20-0AA0** |
| **TM-E15C24-01**<br>Consignment 5 pcs.<br>2 × 4 terminals, no terminal access to AUX1 bus, AUX1 interconnected to the left, spring-loaded terminals | **6ES7 193-4CB30-0AA0** |

1) Observe the configuring tools for selecting the suitable TM-E and TM-P

## Terminal modules for power and electronic modules

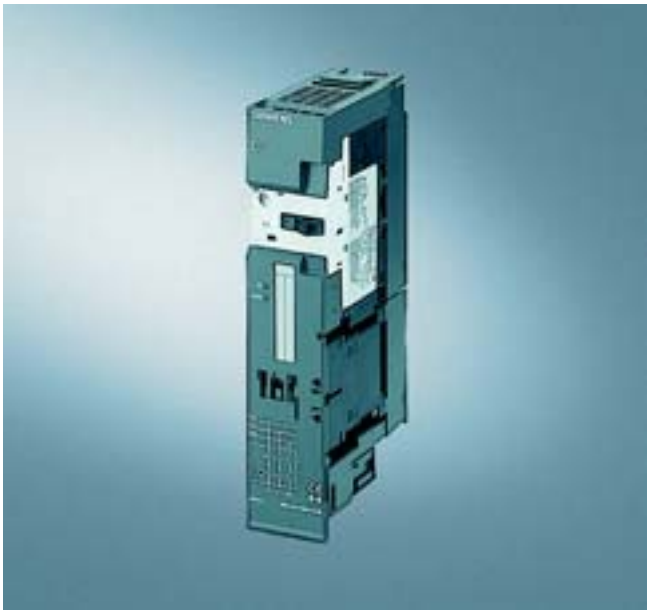
### Ordering data (continued)

| | |
|---|---|
| **TM-E15S23-01**<br>Consignment 5 pcs.<br>2 × 3 terminals, no terminal access to AUX1 bus, AUX1 interconnected to the left, screw connection | **6ES7 193-4CB00-0AA0** |
| **TM-E15C23-01**<br>Consignment 5 pcs.<br>2 × 3 terminals, no terminal access to AUX1 bus, AUX1 interconnected to the left, spring-loaded terminals | **6ES7 193-4CB10-0AA0** |
| **TM-E15S26-A1**<br>Consignment 5 pcs.<br>2 × 6 terminals, terminal access to AUX1 bus, AUX1 interconnected to the left, screw connection | **6ES7 193-4CA40-0AA0** |
| **TM-E15C26-A1**<br>Consignment 5 pcs.<br>2 × 6 terminals, terminal access to AUX1 bus, AUX1 interconnected to the left, spring-loaded terminals | **6ES7 193-4CA50-0AA0** |
| **TM-E30S44-01**<br>Consignment 1 piece<br>4 × 4 terminals, no terminal access to AUX1 bus, AUX1 interconnected to the left, screw connection | **6ES7 193-4CG20-0AA0** |
| **TM-E30C44-01**<br>Consignment 1 piece<br>4 × 4 terminals, no terminal access to AUX1 bus, AUX1 interconnected to the left, spring-loaded terminals | **6ES7 193-4CG30-0AA0** |
| **TM-E30S46-A1**<br>Consignment 1 piece<br>4 × 6 terminals, terminal access to AUX1 bus, AUX1 interconnected to the left, screw connection | **6ES7 193-4CF40-0AA0** |
| **TM-E30C46-A1**<br>Consignment 1 piece<br>4 × 6 terminals, terminal access to AUX1 bus, AUX1 interconnected to the left, spring-loaded terminals | **6ES7 193-4CF50-0AA0** |
| **TM-E15S24-AT**<br>Consignment 1 piece<br>for internal temperature compensation on 2 AI TC High Feature, screw connection | **6ES7 193-4CL20-0AA0** |
| **TM-E15C24-AT**<br>Consignment 1 piece<br>for internal temperature compensation on 2 AI TC High Feature, spring-loaded terminals | **6ES7 193-4CL30-0AA0** |

1) Observe the configuring tools for selecting the suitable TM-E and TM-P

| | |
|---|---|
| ***Accessories for shield connection*** | |
| **Shield connecting element**<br>Consignment 5 pcs.<br>pluggable on TM-E and TM-P | **6ES7 193-4GA00-0AA0** |
| **Shield terminals**<br>Consignment 5 pcs.<br>for power rail 3 × 10 mm | **6ES7 193-4GB00-0AA0** |
| **Ground terminal**<br>Consignment 1 piece<br>for cable cross sections up to 25 $mm^2$ | **8WA2 868** |
| **Power rails 3 × 10 mm**<br>Consignment 1 piece | **8WA2 842** |
| ***Labeling accessories*** | |
| **Labeling sheet DIN A4, perforated**<br>Consignment 1 set<br>10 sheets, each with 60 strips to be used for electronics and power modules and motor starters, and 20 strips for IM 151 | |
| • petrol | **6ES7 193-4BH00-0AA0** |
| • red | **6ES7 193-4BD00-0AA0** |
| • yellow | **6ES7 193-4BB00-0AA0** |
| • light beige | **6ES7 193-4BA00-0AA0** |
| ***Coding accessories*** | |
| **Color coding labels**<br>Consignment 1200 pcs., for TM-P, TM-E | |
| • white | **6ES7 193-4LA10-0AA0** |
| • yellow | **6ES7 193-4LB10-0AA0** |
| • yellow -green | **6ES7 193-4LC10-0AA0** |
| • red | **6ES7 193-4LD10-0AA0** |
| • blue | **6ES7 193-4LF10-0AA0** |
| • brown | **6ES7 193-4LG10-0AA0** |
| • petrol | **6ES7 193-4LH10-0AA0** |
| **Printed labels**<br>Consignment 1 set | |
| 200 pcs. for slot numbering (1 to 20) 10 x | **8WA8 861-0AB** |
| 200 pcs. for slot numbering (1 to 40) 5 x | **8WA8 861-0AC** |
| 200 pcs. for slot numbering (1 to 64) 1 x, (1 to 68) 2 x | **8WA8 861-0DA** |
| **Name labels, unmarked** | |
| 200 pcs. for slot numbering | **8WA8 848-2AY** |

## Overview



Standard motor starters, DS1-x direct-on-line starter

ET 200S FC frequency converter

High Feature motor starters, DS1e-x direct-on-line starter

### *Motor starters*

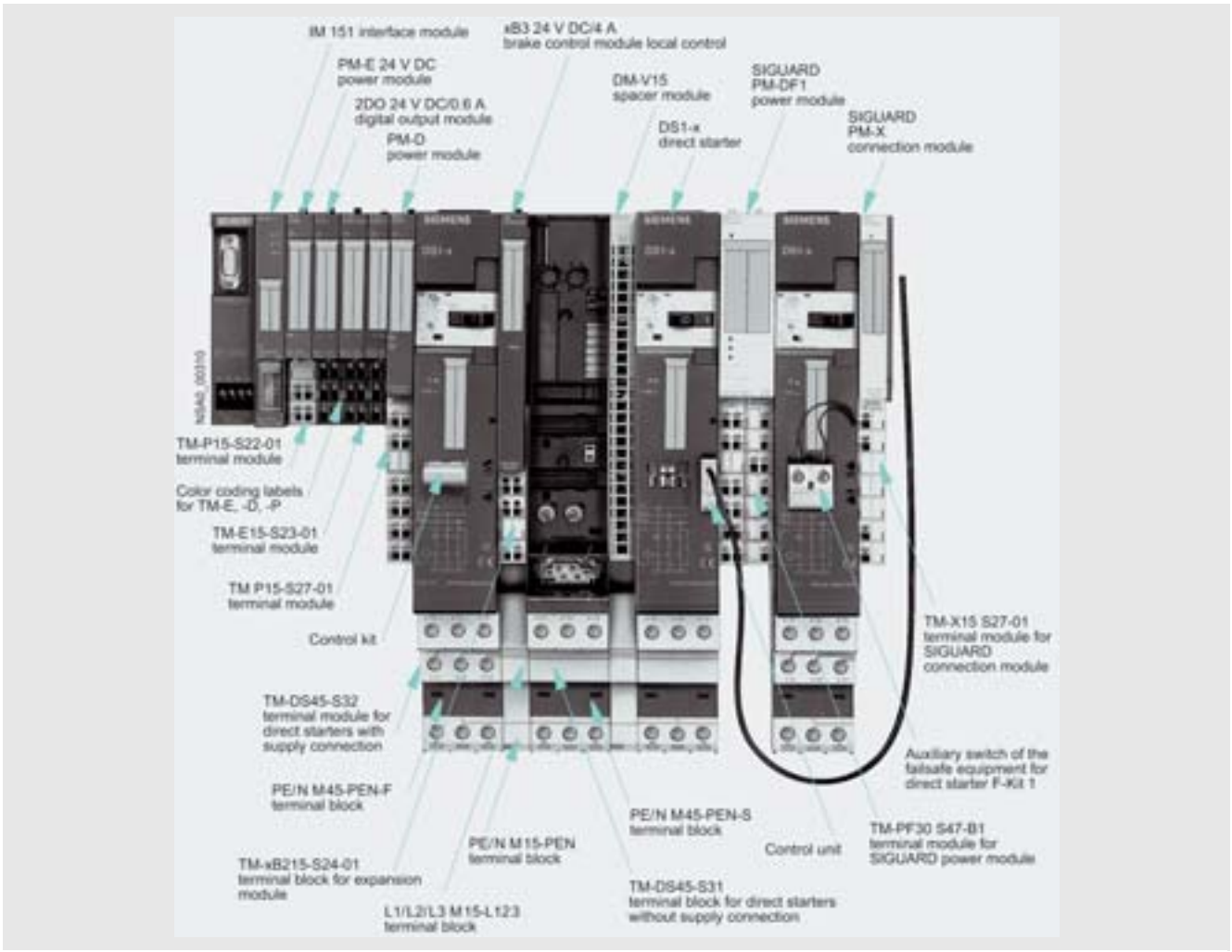
- Completely factory-wired motor starters for switching and protecting any three-phase loads
- Can be used as a direct-on-line, reversing or soft starter
- Standard motor starter with circuit-breaker contactor combination up to 5.5 kW
- High Feature motor starter with a combination comprising starter circuit-breaker, solid-state overload protection and contactor or soft starter up to 7.5 kW
- With self-assembling 40/50 A power bus, i.e. the load voltage is only supplied once for a group of motor starters
- Hot swapping is permissible
- Inputs and outputs for activating and signaling the statistics have been integrated
- Diagnostics capability for active monitoring of the switching and protection functions
- Can be combined with expansion modules: Brake control module for controlling electromechanical brakes in induction motors and with two optional inputs for special functions (for quick stop with the Standard motor starter and for parameterizable special functions with the High Feature motor starter)
- For combining with SIGUARD safety systems for use in safety-related subsystems (EN 954-1)

### *Frequency converter*

- For stepless speed control of asynchronous motors
- Consisting of the modules for control module ICU24 and power supply IPM25 up to 4.0 kW
- Hot swapping of control module and power supply permitted
- Operation without line commutating reactor
- Active braking with line-commutated energy recovery
- Can be combined with brake control module for controlling an electromechanical holding brake
- For achieving EMC Class A (acc. to EN 55011)
  Connection of an EMC filter before the power bus

## ET 200S motor starters

### Overview




Interaction of the ET 200S motor starter components

### Application

The ET 200S motor starters can be used to protect and switch any three-phase load. The communication interface makes them ideal for use in distributed switchgear cabinets or control boxes.

Since the motor starters are fully factory-wired, the installation of power switchgear cabinets requires far less time and space. The bit-modular design makes engineering much simpler. When the ET 200S is used, the parts list is reduced to two essential items per load feeder circuit: the passive terminal module and the motor starter. For this reason, ET 200S is also perfectly suited for modular machine concepts.

Expansions can be easily implemented by subsequent connection of additional terminal modules. The new terminal block design (10 $mm^2$) also replaces the previously required distribution wiring. The permanent wiring and the hot-swapping function (connection and disconnection permitted when energized) makes it possible to replace a motor starter in a few seconds, if necessary. This makes the motor starters especially suitable for applications which require a high level of availability.

Since the motor starters can be expanded with xB1-xB4 brake control modules, they can be used for motors with DC-24-V brakes (xB1, xB3) and with DC-500-V brakes (xB2, xB4). The DC-24-V brakes are supplied externally and can be released independent of the switching status of the motor starter. The DC-500-V brakes, on the other hand, are generally supplied direct from the junction plate of the motor via a rectifier module and can therefore not be released if the motor starter is switched off. These brakes cannot be used in conjunction with the DSS1e-x motor starter (soft starter).

The outputs of the brake control modules can also be used for other purposes e.g. for controlling DC valves. Independent special functions can be implemented with the help of the two optional local inputs on the brake control modules (xB3, xB4) and two additional inputs on the control module of the High Feature motor starter. These operate independently of the bus and higher-level control, e.g. to implement rapid stop functions for slide controls. The status of these inputs is also signaled to the control.

## Application (continued)

The selective protection concept with electronic overload evaluation and the use of the SIRIUS switchgear – frame size S0 – achieves a number of additional advantages for the High Feature motor starters which quickly pay off, especially for manufacturing processes that have high plant downtime costs:

- Only two variants up to 7.5 kW
- All settings can be configured via the bus
- Separate signals for overloads and short-circuits
- Overload can be acknowledged via remote reset
- Current asymmetry monitoring
- Rotor locking protection
- Emergency start function in the event of overload
- Current value transfer via bus
- Current limit value monitoring
- Class 10 or Class 20 configurable
- Type of coordination 2 (remains functional after a short-circuit of 50 kA)
- Very long contract service life

### *Accessories*

The following accessories are available:

**DM-V15 distance module**

The distance module is available for applications with high motor currents or high ambient temperatures for standard motor starters. It can be used on the right and left side of a DS1-x direct starter or on the right side of a xB1-4 brake module to improve lateral heat dissipation. The distance module is a completely passive module and does not have to be taken into account when engineering the control. More details on the distance module can be found in the "SIMATIC ET 200S" manual. If you have further queries about the distance module, please contact Technical Support for Siemens low-voltage controlgear, switchgear and systems (fax: +49 (0)9131/7-42899).

**Jumper module PE/N**

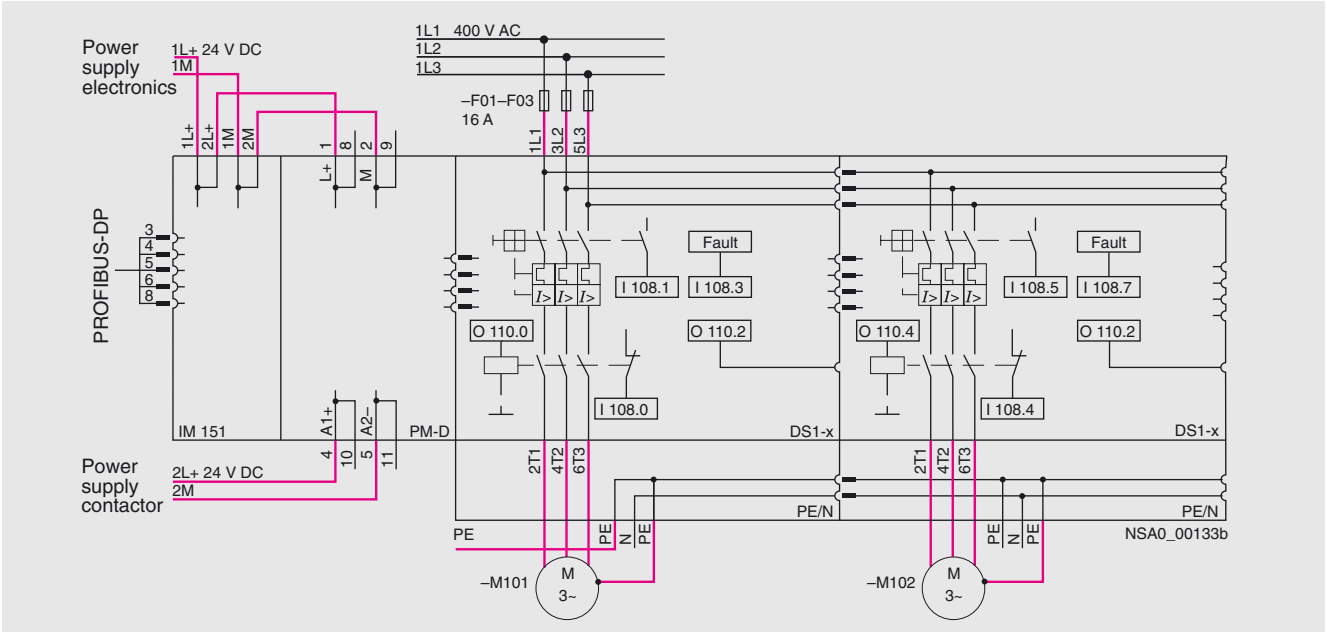
The PE/N jumper modules are used to bridge gaps in the PE/N bus e.g. caused by the use of a brake control module, PM-D(F) power module, or PM-X connection module. No additional power is required if jumper modules are used. They are available in 15 mm and 30 mm width.

**Jumper module L1/L2/L3**

The L1/L2/L3 jumper modules are used to bridge a gap in the energy bus (see above). They are available in 15 mm and 30 mm width.

## Design

Power is supplied via the terminal modules for the motor starter. Whereas the auxiliary voltages are to be fed in once via the PM-D or PM-DFx power module, which is plugged into the left of the first motor starter, the load voltage must be fed in at the first (left-hand) TM-xxxxS32 terminal module of a motor starter. Subsequent TM-xxxxS31 terminals are then automatically supplied via the integrated power bus. If the power bus is fully loaded with 40 A (Standard motor starter) or 50 A (High Feature motor starter), another infeed is connected via another TM-xxxxS32 terminal module. This also applies in the case of a transition from a Standard motor starter to a High Feature motor starter or vice-versa. In this case, however, it is not necessary to insert a PM-D power module between the two.




Example showing an ET 200S station with a PM-D power module and two Standard motor starters

## ET 200S motor starters

### Design (continued)

#### *Accessories for Standard motor starters*

**Control Unit**

The control unit is used to activate the contactor coil of the Standard motor starter directly with 24 V DC. The motor starter can also be started without a PLC or bus by means of a local control point.

Note:
The control unit cannot be used in combination with the SIGUARD Safety System or a brake control module.

**Control Kit**

When using the Standard motor starter, the control kit allows the motor to be tested during commissioning or maintenance by triggering the circuit-breaker. When the circuit-breaker is open, the control kit also ensures that the contactor is mechanically locked in the ON position.

#### *Accessories for the High Feature motor starter*

**2DI control module**

The 2DI control module is plugged into the interface on the front of the motor starter. The module offers two inputs that receive signals directly from the process and that can be directly assigned to the starter.

The functionality can be specified from a list of different control functions by means of PROFIBUS parameterization. For example, the functions Local Control Point, Emergency Start and Quick Stop are available. The signal levels can also be parameterized (NO/NC). In the case of comprehensive control functions, the two inputs of an xB3 or xB4 brake control module connected on the right can also be integrated. The signal states of all inputs are transferred to the higher-level PLC as well as being used internally.

When a motor starter is replaced, the set parameters are automatically downloaded to the new starter. The inputs on the motor starter can be used on the one hand to safeguard stand-alone operation, e.g. on failure of the PLC, and on the other hand to safeguard the response times by immediate processing in the starter. A further advantage is the direct assignment of functions to modular machine concepts.

**2DI COM control module**

The 2DI COM control module also has a PC interface for linking to the parameterization and diagnostics software Switch ES Motorstarter (Version 2.0 upwards). The module only functions on a High Feature motor starter with a Switch ES interface (3RK1301-.....-0AA3). The Logo! PC cable is used as the connecting cable between the 2 DI COM control module and the High Feature motor starter.

**DM-V15**

- Only significant in combination with a Standard motor starter
- Passive module without bus connection and terminals
- Does not require a separate terminal module
- It can follow a TM-DS45, TM-RS90 or a TM-xB if necessary
- It does not have to be considered when configuring the GSD file

### Function

All motor starters of the ET 200S are fuseless. The contactor or soft starter are controlled with the integrated outputs. If a brake control module is positioned next to a motor starter, its electronic brake switch is also operated from a motor starter output. This module has to be always positioned to the right of the motor starter. The motor starter inputs evaluate the signal states of the protective devices (short circuit or overload), the output state of the contactor(s) or soft starter(s) as well as system errors.

## Technical specifications

| | Motor starters | | |
|---|---|---|---|
| | Standard | High Feature | |
| | DS1-x, RS1-x | DS1e-x, RS1e-x | DSS1e-x |
| Number of motor starters that can be connected to ET 200S | Max. 20 (including power module) | | |
| Mounting dimensions W × H × D (in mm) | | | |
| • Direct on-line starter | 45 x (265 + 45) x (125 + 27); (45: PE/N module; 27: Auxiliary switch contactor from F kit) | 65 x (290 + 45) x (150 + 23); (45: PE/N module; 23: Control module) | |
| • Reversing starter | 90 x (265 + 45) x (125 + 27); (45: PE/N module; 27: Auxiliary switch contactor from F kit) | 130 x (290 + 45) x (150 + 23); (45: PE/N module; 23: Control module) | |
| Permissible ambient temperature in °C | | | |
| • In operation | 0 ... +60, from +40 with derating | 0 ... +60, for horizontal mounting up to +40 | |
| • When stored | -40 ... +70 | -40 ... +70 | |
| • Permissible service position | Vertical, horizontal with derating | Vertical, horizontal | |
| Vibration proof acc. to IEC 60 068, Part 2-6, in g | 2 | | |
| Shock proof acc. to IEC 60068, Part 2-27, in g/ms | Rectangular 5/11 | | |
| Supply current in mA | | | |
| • From auxiliary circuit L+/M ($U_1$) | Approx. 20 | Approx. 40 | Approx. 40 |
| • From auxiliary circuit A1/A2 ($U_2$) | Approx. 100 | Approx. 1700 (80 ms long) Approx. 350 (after 80 ms) | Approx. 30 |
| Rated operational current for TM-D terminal modules $I_e$ in A | 40 | 50 | 50 |
| Rated operational voltage $U_e$ in V | 400 | | |
| • Approval DIN VDE 0106, Part 101 | Yes, up to 500 | Yes, up to 500 | Yes, up to 480 |
| • CSA and $U_L$ approvals | Yes, up to 600 | Yes, up to 600 | Yes, up to 480 |
| Conductor cross-section in $mm^2$ | | | |
| • Solid | 2 x (1 ... 2.5); 2 x (2.5 ... 6) | | |
| • Solid with end sleeve | 2 x (1 ... 2.5); 2 x (2.5 ... 6), acc. to IEC 60947: max. 1 x 10 | | |
| • AWG conductor connections, single-wire or multi-wire | 2 x (14 ... 19) AWG | | |
| Protection | IP20 | | |
| Shock protection | Safe from finger touch (also applies to terminal module with disassembled motor starter) | | |
| Pollution degree | | | |
| • at 400 V | 3, IEC 60 664 (IEC 61 131) | | |
| • at 500 V | 2, IEC 60 664 (IEC 61 131) | | |
| Rated impulse withstand voltage $U_{imp}$ in kV | 6 | | |
| Rated insulation voltage $U_i$ in V | 500 | | |
| Rated operational current $I_e$ for motor starters in A | | | |
| • AC-1/2/3 at 60 °C | | | |
| - At 400 V | 12 | 16 | 3 / 8 / 16 |
| - At 500 V | 9 | 11 | -- |
| • AC-4 at 60 °C | | | |
| - At 400 V | 4.1 | 9 | -- |
| Rated short-circuit breaking capacity in kA | 50 at 400 V | | |
| Output of three-phase induction motors at 500 V in kW | 5.5 | 7.5 | -- |
| Utilization categories | AC-1, AC-2, AC-3, AC-4 | | |
| Safe isolation between main and auxiliary circuits in V | 400, acc. to DIN VDE 0106, Part 101 | | |
| Positively driven auxiliary contact of contactor (NC) | Yes | Yes | -- |

## Technical specifications (continued)

| | Motor starters | | |
|---|---|---|---|
| | Standard | High Feature | |
| | DS1-x, RS1-x | DS1e-x, RS1e-x | DSS1e-x |
| Tripping class | Class 10 | Class 10/20, can be parameterized | 0.3 ... 3 A: Class 10/10 A, can be parameterized<br>2.4 ... 8 A: Class 10 A<br>2.4 ... 16 A: Class 10 A |
| Blocking protection | No | Yes, 8 x $I_e$ / 1 s | |
| Overload warning | No, only tripping | Yes | |
| Emergency start function | No | Yes | |
| Type of coordination | Up to 1.6 A: 2 ... 12 A: 1 | Up to 16 A: 2 | Up to 16 A: 1 |
| Mechanical endurance in ON-OFF operations | | | |
| • Circuit-breaker | 100,000 | | |
| • Contactor | 30 million | 10 million | -- |
| • Contactor with safety functionality (F kit) | 10 million | -- | -- |
| Electrical service life in h | | | |
| • Circuit-breaker | 100,000 | | |
| • Contactor | See manual | See manual | -- |
| Permissible switching frequency for a starting time $t_A$ = 0.1 s and relative ON time $t_{ED}$ = 50% in 1/h | < 80 | See manual | See manual |
| • Inductive interference protection | Built-in | | |
| Operating times in ms (total operating time = opening delay + arcing time) | | | |
| • Operating times at 0.85 ... 1.1 x $U_e$ | | | |
| - Closing delay | 25 ... 100 | 25 ... 100 | -- |
| - Opening delay | 7 ... 10 | 20 ... 50 | -- |
| • Operating times at 1.0 x $U_e$ | | | |
| - Closing delay | 30 ... 50 | Typ. 25 | -- |
| - Opening delay | 7 ... 9 | Typ. 20 | -- |
| • Arcing time | 10 ... 15 | 10 ... 15 | -- |
| Number of outputs | 4 | 16 | 16 |
| Number of inputs | 4 | 16 | 16 |
| Address space required per module | | | |
| • With summary | 4 bit | -- | -- |
| • Without summary | 1 byte | 2 byte | 2 byte |
| Diagnostic functions | | | |
| • Group error "SF" | Red LED | | |
| • Switching state "C-STAT" | Red/green/yellow LED | | |
| • Device status "DEVICE" | - | Red/green/yellow LED | |
| Configuration via PROFIBUS DP | Yes | | |
| Built-in auxiliary switch for enabling circuit of ET 200S safety systems (up to Category 4 of EN 954-1) | No, F-Kit is required | Yes | No (max. Category 1 achievable) |
| Possible settings for the soft starter (locally on the unit) | | | |
| • Start-up time in s | -- | -- | 0 ... 20 |
| • Starting voltage in % | -- | -- | 30 ... 100 of $U_e$ |
| • Start-up time in s | -- | -- | 0 ... 20 |

## Technical specifications (continued)

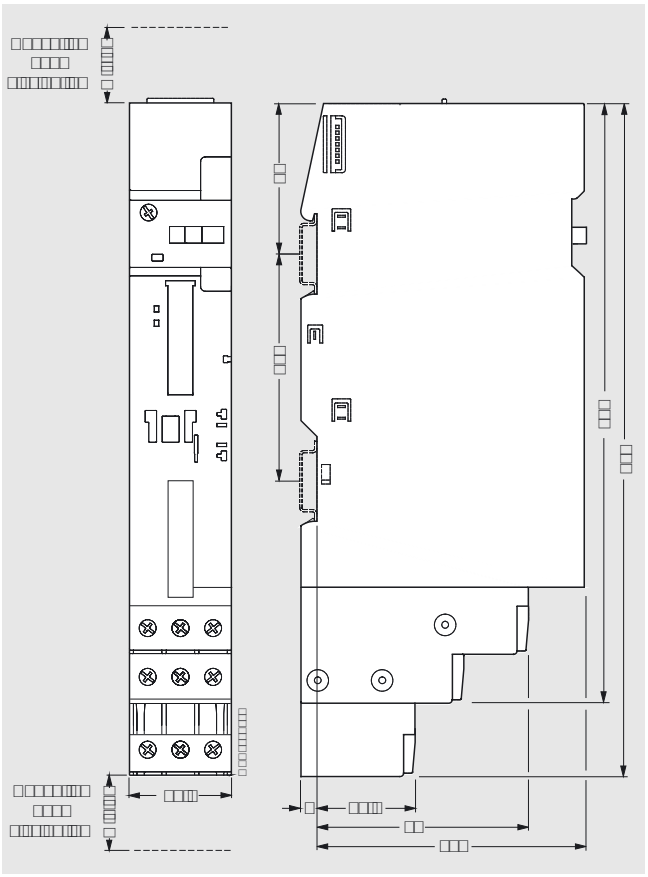
| | Motor starters | | |
|---|---|---|---|
| | **Standard** | **High Feature** | |
| | **DS1-x, RS1-x** | **DS1e-x, RS1e-x** | **DSS1e-x** |
| Input/output bit | | | |
| • DO 0 | Motor On (clockwise rotation) | | |
| • DO 1 | Motor Off (counterclockwise rotation) | | |
| • 2 DO | Brake control (1 = released, motor not braked) | | |
| • DO 3 | Spare | Remote reset (e.g. on overload) | |
| • DO 4 | Spare | Emergency start | |
| • DO 5-8 | Spare | | |
| • DI 0 | Ready | Ready | |
| • DI 1 | Motor On (checkback from contactor) | Motor On (checkback current flowing) | |
| • 2 DI | Circuit-breaker tripped | Actuator switch-off (short-circuit, overload) / device fault | |
| • DI 3 | Spare | Overload group warning | |
| • DI 4 | Spare | Input 1 (from brake control module) | |
| • DI 5 | Spare | Input 2 (from brake control module) | |
| • DI 6 | Spare | Input 3 (from 2DI control module) | |
| • DI 7 | Spare | Input 4 (from 2DI control module) | |
| • DI 8 ... DI 13 | Not available | Motor current $I_{Act}$ | |
| • 14 DI | Not available | Spare | |
| • DI 15 | Not available | -- | Ramp operation |
| • Fault type (PROFIBUS diagnostics) | | | |
| • 00001: Short-circuit | -- | Starter circuit-breaker has tripped | |
| • 00100: Overload | -- | Thermal motor model overload | |
| • 00111: Upper limit value exceeded | -- | $I_e$ limit overshot | |
| • 01000: Lower limit value exceeded | -- | $I_e$ limit undershot | |
| • 01001: Fault | Internal fault, device fault, error on self-test | | |
| • 10000: Parameterization error | -- | Incorrect parameter value | |
| • 11000: Actuator shutdown | All designated faults / imbalance / motor blocking (another fault may be indicated for a more detailed description of the fault) | | |
| • 11010: External errors | -- | Input switch-off / Input switch-off final position / Process image error | |

## ET 200S motor starters

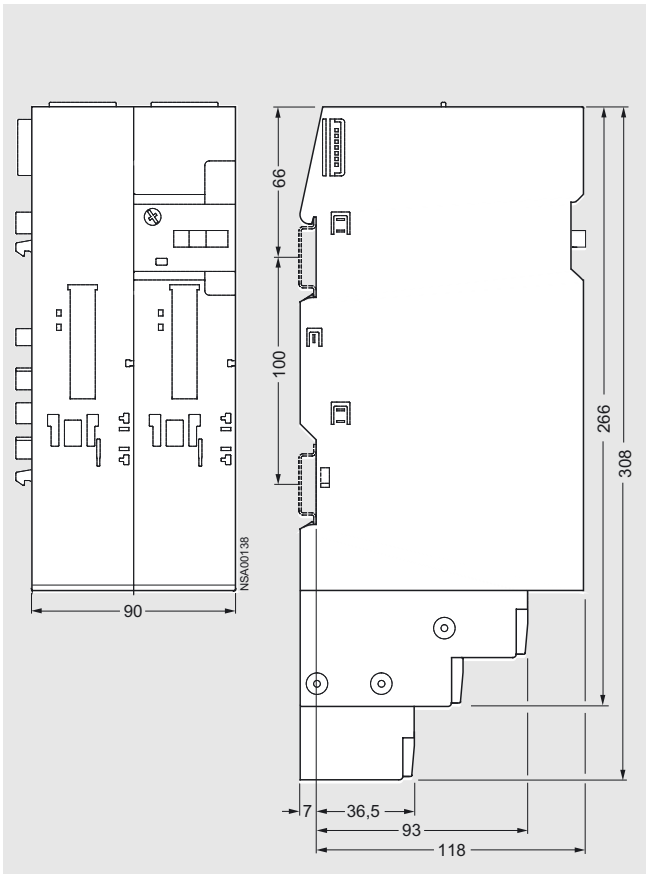
### Selection and Ordering data

| | Version | | Order No. |
|---|---|---|---|
|  DS1-x | ***Standard motor starter*** **with diagnostics, electromechanical, fuseless, expandable with brake control module** | | |
| | **DS1-x direct-on-line starters** | | **3RK1 301-■■B00-0AA2** |
| | **RS1-x reversing starters** | | **3RK1 301-■■B00-1AA2** |
| | *Motor rating, standard induction motor in kW* | *Setting range of the overcurrent release in A* | ↑↑ |
| | < 0.06 | 0.14 to 0.20 | **0 B** |
| | 0.06 | 0.18 to 0.25 | **0 C** |
| | 0.09 | 0.22 to 0.32 | **0 D** |
| | 0.10 | 0.28 to 0.40 | **0 E** |
|  RS1-x | 0.12 | 0.35 to 0.50 | **0 F** |
| | 0.18 | 0.45 to 0.63 | **0 G** |
| | 0.21 | 0.55 to 0.80 | **0 H** |
| | 0.35 | 0.70 to 1.00 | **0 J** |
| | 0.37 | 0.90 to 1.25 | **0 K** |
| | 0.55 | 1.1 to 1.6 | **1 A** |
| | 0.75 | 1.4 to 2.0 | **1 B** |
| | 0.90 | 1.8 to 2.5 | **1 C** |
| | 1.1 | 2.2 to 3.2 | **1 D** |
| | 1.5 | 2.8 to 4.0 | **1 E** |
| | 1.9 | 3.5 to 5.0 | **1 F** |
| | 2.2 | 4.5 to 6.3 | **1 G** |
| | 3.0 | 5.5 to 8.0 | **1 H** |
| | 4.0 | 7 to 10 | **1 J** |
| | 5.5 | 9 to 12 | **1 K** |
|  DS1e-x | ***High Feature motor starter*** **with diagnostics, electronic overload protection, fuseless, expandable with brake control module** | | |
| | **DS1e-x direct on-line starter** with switch interface | | **3RK1 301-■■B10-0AA3** |
| | *Setting range of the overcurrent release in A* | | ↑↑ |
| | • 0.3 to 3 | | **0 A** |
| | • 2.4 to 8 | | **0 B** |
| | • 2.4 to 16 | | **0 C** |
| | **RS1e-x reversing starters** | | **3RK1 301-■■B10-1AA3** |
| | *Setting range of the overcurrent release in A* | | ↑↑ |
| | • 0.3 to 3 | | **0 A** |
| | • 2.4 to 8 | | **0 B** |
| | • 2.4 to 16 | | **0 C** |
| | **DSS1e-x soft starters** | | **3RK1 301-■■B20-0AA3** |
| | *Setting range of the overcurrent release in A* | | ↑↑ |
| | • 0.3 to 3 | | **0 A** |
| | • 2.4 to 8 | | **0 B** |
| | • 2.4 to 16 | | **0 C** |

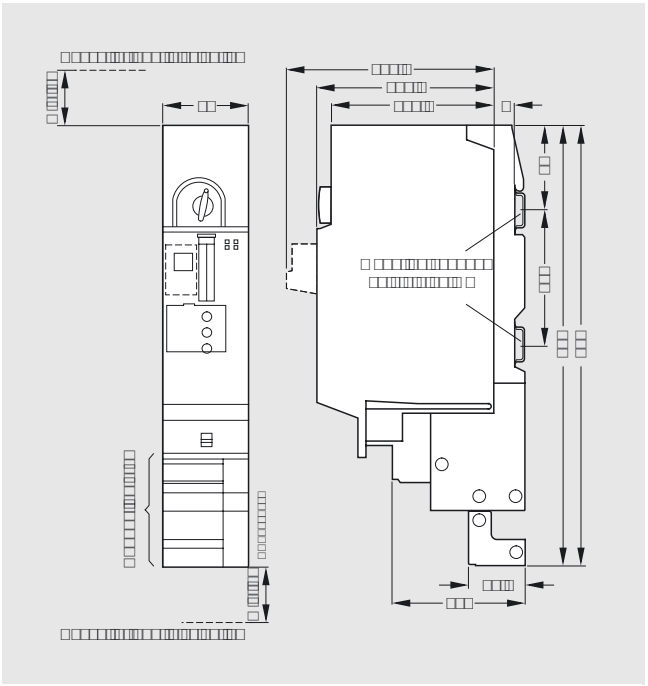
## Dimension drawings



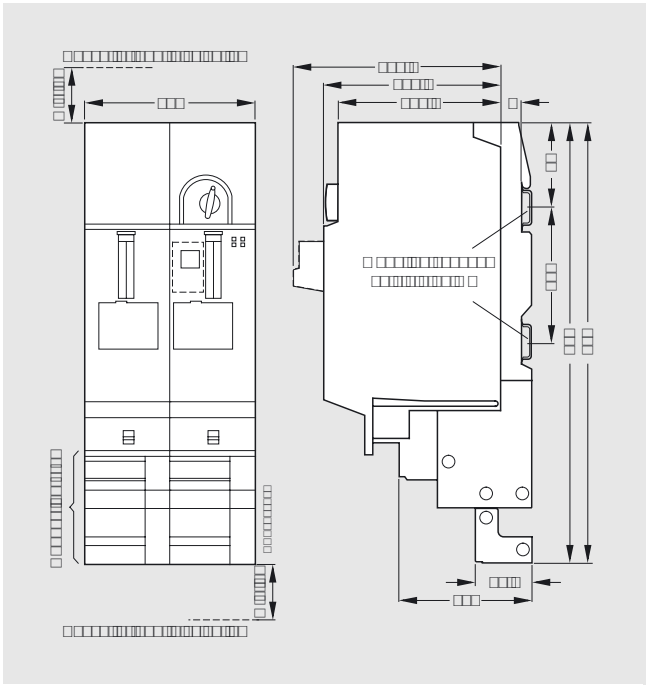
DS1-x direct on-line starter with TM-DS 45 terminal module




Rs1-x reversing starter with TM-RS 90 terminal module



DS1e-x direct on-line starter, DSS1e-x soft starter and TM-DS65 terminal module



RS1e-x reversing starter and TM-RS130 terminal module

## ET 200S FC frequency converter

### Overview

Components of the ET 200S FC frequency converter

### Benefits

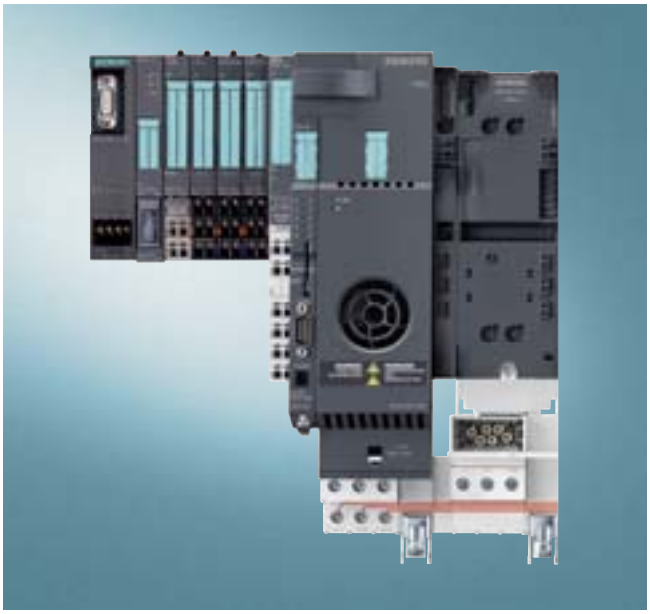
get Designed for Industry

- The frequency converter is completely integrated into the ET 200S system and offers all system advantages, such as high availability thanks to the hot swapping function, modular expansion, or reduction of the wiring overhead resulting from the self-assembling terminal module wiring.
- With self-assembling 50 A power bus, i.e. the load voltage is only supplied once for a group of frequency converters
- Comprehensive diagnostics facilities for high availability
- Input for motor encoder for precise speed control
- Input for PTC/KTY encoder for comprehensive motor protection
- Slot for optional memory card (MMC) to save the parameter settings for fast replacement of modules without tools
- All common control modes are available: Frequency control, sensor-less vector control or torque control, closed-loop control with motor encoder
- Parameters are set using STARTER, the graphic parameterization tool for SIEMENS drives
- Active braking is possible without additional overhead. The line-commutated energy recovery of the frequency converter for the power supply network means that chopper modules or brake resistors are superfluous.

### Application

- New application possibilities are opened up for the ET 200S system where continuous control of the speed of asynchronous motors is required.
- The frequency converter handles simple drive tasks (frequency control) or even more complex drive tasks (vector control). In addition to simple drive tasks, the converter also supports torque control for conveyor applications, winding and unwinding drives, as well as hoisting gear. Together with a motor encoder, the range extends up to closed-loop controls for exact control of speeds and torques.
- The advantages of line-commutated power regeneration are primarily evident in continuous regenerative operation. Examples include unwinding units, lowering of loads with hoisting gear, or electric braking of large centrifugal masses.
- Together with an intelligent header module (IM 151 CPU) and the ET 200S FC frequency converter, the I/O station is expanded to become a complete automation solution for machine modules.

## Design



Design of an ET 200S station with two ET 200S FC frequency converters (only terminal modules on the right)

The ET 200S FC consists of the following components:

- ICU24 closed-loop control module
- IPM25 power section
- Terminal modules to accommodate closed-loop control module and power section

Following insertion of the modules, the closed-loop control module and the power section of the frequency converter are interconnected.

The PMD power module provides the power supply for one or more closed-loop control modules.

### *Accessories*

The following accessories are available:

- The labeling strips and color coding labels of the ET 200S system can also be used for the frequency converter.
- **Jumper block L1/L2/L3**
  The jumper blocks L1/L2/L2 are used to bridge a gap in the power bus. 15 mm wide jumper blocks are used to bridge the closed-loop control module of the subsequent frequency converter. If a brake control module is connected, a 30 mm wide jumper block is required in order to pass on the power bus via the brake control module and ICU24 to the subsequent IPM25 power section.
- **Jumper block PE/N**
  The Jumper blocks PE/N are used to bridge a gap in the PE/N bus, e.g. caused by use of a brake control module, a PM-D(F) power module or the closed-loop control module of the frequency converter.
- **EMC filter**
  An EMC filter must be externally connected to the supply of the power bus in order to achieve EMC Class A (according to EN 55011). Shielded motor cables must be used in addition. It must be ensured that the shield is connected correctly. The terminal modules for the power section of the frequency converter are equipped for this with an integral shield connecting element.
- **Shield clamps**
  To connect the shield of motor cables
- **Grounding terminal**
  To ground the 3 x 10 mm busbar for the shield connection
- **Busbar 3 x 10 mm**
  To accommodate the shield clamps and the grounding terminal
- **Brake control module**
  xB1 or xB2 to control an external electromechanical brake

## Function

The ET 200S FC is capable of dynamic control procedures such as sensorless vector control or torque control. Where particular speed accuracy and dynamic response requirements exist, a motor encoder can be connected to the control module.

The ET 200S FC is operated without a line reactor.

A PTC or KTY encoder can be connected to the control module to evaluate the motor temperature.

### *Accessories*

The following accessories are available:

- **MMC parameter memory**
  If required, the complete parameter settings of the frequency converter can be saved on a memory card (MMC). When servicing, the plant is immediately ready for use again after replacing the frequency converter and inserting the memory card.

## ET 200S FC frequency converter

### Technical specifications

| | Closed-loop control module | Power units | | |
|---|---|---|---|---|
| | ICU24 | IPM25, FS A Housing size A | IPM25, FS B Housing size B | |
| **Selection features** | | | | |
| Integral safety functions according to Category 3 of EN 954-1 or according to SIL2 of IEC 61508 | – | – | – | |
| Power | – | 0.75 kW | 2.2 kW | 4.0 kW |
| Rated input current (at 50 °C ambient temperature) | – | 1.9 A | 5.0 A | 8.5 A |
| Rated output current (at 50 °C ambient temperature) | – | 2.1 A | 5.9 A | 10.2 A |
| Mounting dimensions (W x H x D) in mm (including terminal module) | 15 x 220 x 154 | 65 x 290 x 150 | 130 x 290 x 150 | |
| **Electrical specifications** | | | | |
| Mains voltage | 3 AC 380 V to 480 V ± 10% | | | |
| Power frequency | 47 Hz to 63 Hz | | | |
| Overload capability | • Overload current 1.5 x rated output current (i.e. 150% overload capability) for 60 s, cycle time 300 s<br>• Overload current 2 x rated output current (i.e. 200 % overload capability) for 3 s, cycle time 300 s | | | |
| Output frequency | 0 Hz to 650 Hz | | | |
| Pulse frequency | 8 kHz (standard), 2 kHz to 16 kHz (in 2 kHz increments) | | | |
| Line reaction | Low loading of power supply network by network harmonics (guide values: 5: 20%, 7: 14%, 11: 9%, 13: 8%) | | | |
| Skipped frequency range | 1, programmable | | | |
| Inverter efficiency | ≥ 96 % | | | |
| Interfaces | • PROFIBUS or PROFINET interface via the ET 200S backplane bus<br>• RS232 interface with USS protocol for commissioning on the PC using the STARTER commissioning software<br>• Slot for an optional memory card (MMC) for uploading or downloading parameter settings<br>• PTC/KTY84 interface for motor temperature monitoring<br>• Speed sensor interface (Sub-D connector) for unipolar HTL incremental position encoder<br>• Diag-IF diagnostics interface for servicing purposes | | | |
| **Functions** | | | | |
| Control method | • V/f control – linear (M~n) with/without flux current control (FCC), quadratic (M~$n^2$) or parameterizable<br>• Vector control – with or without encoder<br>• Torque control | | | |
| Operating functions | Jogging mode, free function blocks (FFB), positioning deceleration ramp, automatic restart following interruption due to power failure, bumpless connection of converter to rotating motor | | | |
| Braking functions | • Regenerative braking mode without braking chopper and pulse resistor<br>• Control of an electrical holding brake via an optional brake control module | | | |
| Protection features for | Undervoltage, overvoltage, ground faults, short circuits, stall prevention, thermal motor protection $I^2t$, inverter overtemperature, motor blocking protection | | | |
| Connectable motors | Low-voltage asynchronous motors (motor cable length max. 50 m shielded, max. 100 m unshielded) | | | |
| **Mechanical data** | | | | |
| Degree of protection | IP20 | | | |
| Operating temperature | • With vertical design of station 0 °C to +40 °C<br>• With horizontal design of station 0 °C to + 50 °C/to +60 °C with derating | | | |
| **Standards** | | | | |
| Compliance with standards | UL, cUL ,CE, c-tick, according to low-voltage directive 73/23/EEC, EMC directive 89/336/EEC | | | |

### *Derating data – Pulse frequency*

| Power | Rated output current in A at a pulse frequency of | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| kW | 2 kHz | 4 kHz | 6 kHz | 8 kHz | 10 kHz | 12 kHz | 14 kHz | 16 kHz |
| 0.75 | Avail. soon | Avail. soon | Avail. soon | Avail. soon | Avail. soon | Avail. soon | Avail. soon | Avail. soon |
| 2.2 | Avail. soon | Avail. soon | Avail. soon | Avail. soon | Avail. soon | Avail. soon | Avail. soon | Avail. soon |
| 4.0 | Avail. soon | Avail. soon | Avail. soon | Avail. soon | Avail. soon | Avail. soon | Avail. soon | Avail. soon |

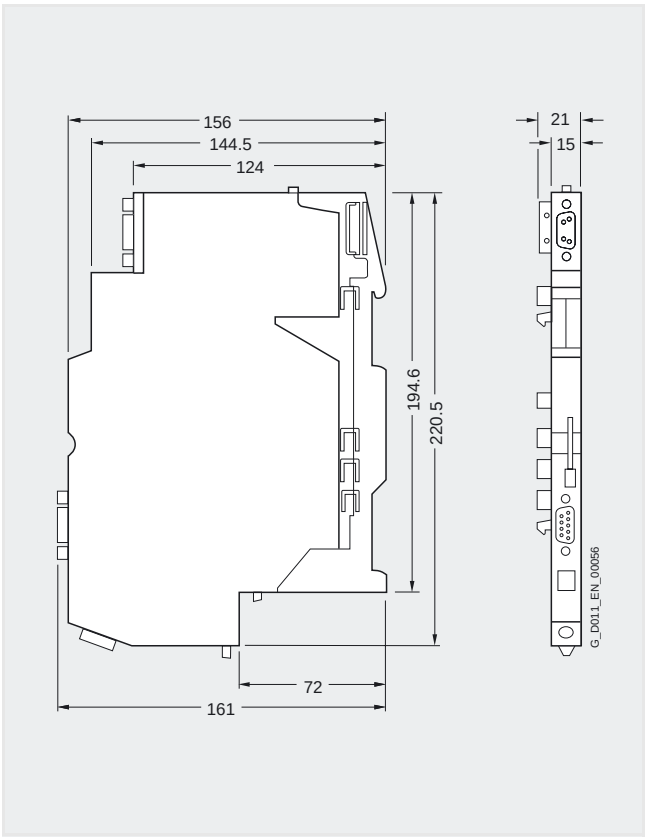
The current data apply to an ambient temperature of 50 °C unless specified otherwise.

## Selection and Ordering data

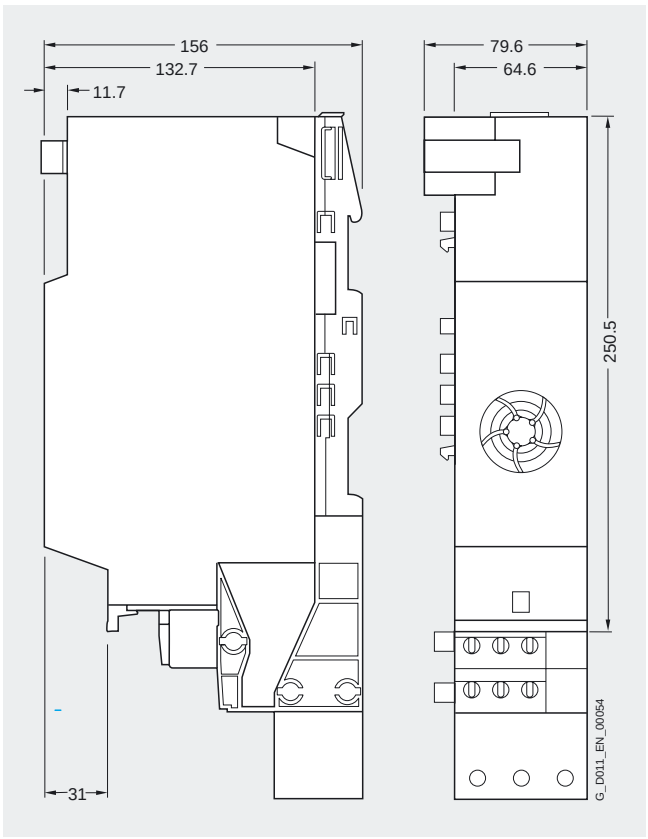
| | Version | Order No. |
|---|---|---|
|  | **ICU24 closed-loop control module**<br>• Control modes: *V/f*, FCC, SLVC, VC with encoder, torque control<br>• Motor encoder input: HTL unipolar<br>• Motor temperature input: PTC/KTY | **6SL3 244-0SA00-1AA0** |
|  | **IPM25 power section**<br>380 V – 480 V 3 AC +10/-10%<br>47 Hz - 63 Hz<br>Overload:<br>150% 60 s<br>200% 3 s<br>Power:<br>0.75 kW | **6SL3 225-0SE17-5UA0** |
|  | **IPM25 power section**<br>380 V – 480 V 3 AC +10/-10%<br>47 Hz - 63 Hz<br>Overload:<br>150% 60 s<br>200% 3 s<br>Power:<br>2.2 kW<br>4.0 kW | **6SL3 225-0SE22-2UA0**<br>**6SL3 225-0SE24-0UA0** |

## ET 200S FC frequency converter

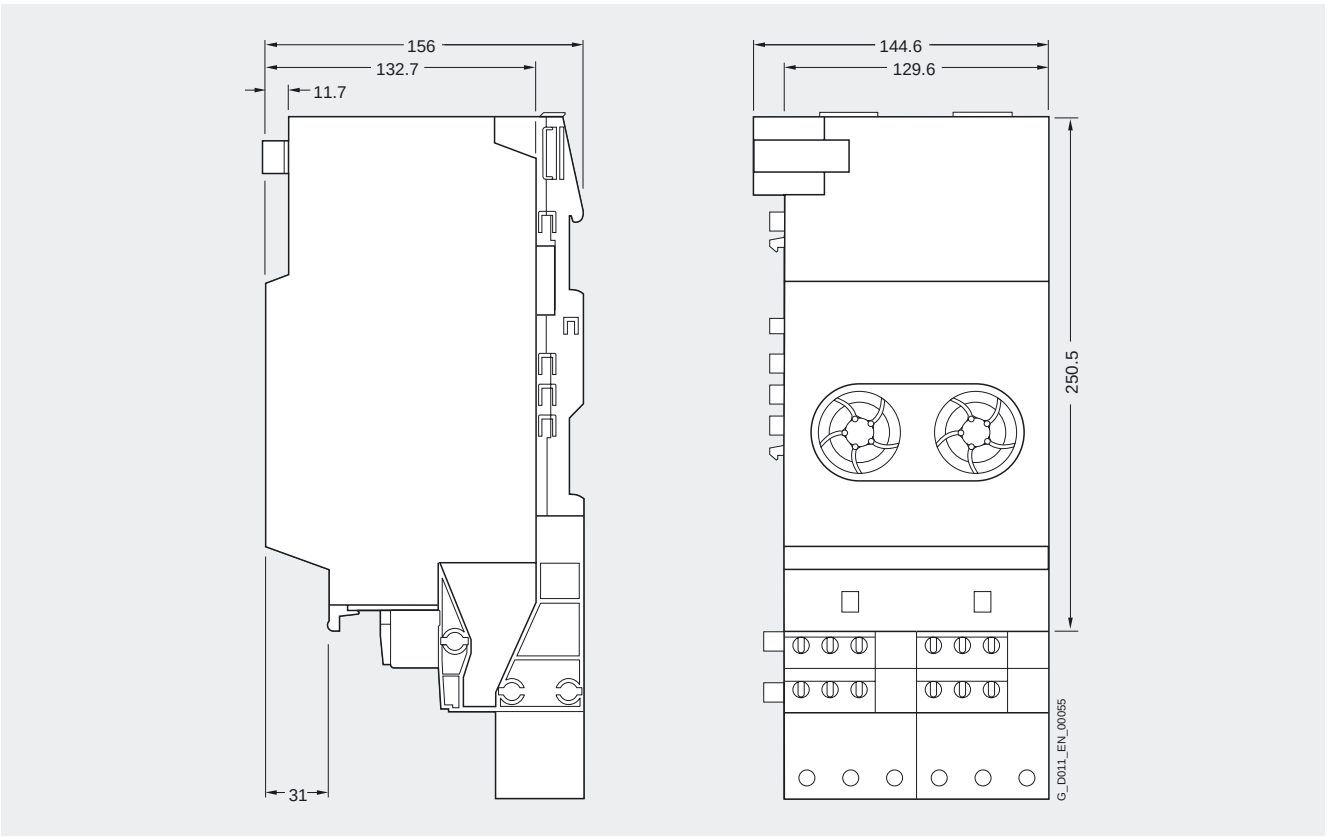
### Dimension drawings




ICU24 closed-loop control module




IPM25 power section, 0.75 kW




IPM25 power section, 2.2 kW and 4.0 kW

## Overview

- For supplying and monitoring the auxiliary voltages for motor starters
- A whole group of motor starters can be shut down without additional overhead (Safety Category 1 acc. to EN 954-1).
- For plugging into TM-P15 terminal module
- For supplying and monitoring the power supply for the ET 200S FC frequency converter

## Application

PM-D power modules are used to monitor the two 24 V DC auxiliary voltages for the group of motor starters on the right-hand side or to supply the group of frequency converters on the right-hand side. The voltage is applied to the self-assembling voltage buses via TM-D terminal modules.

Voltage failures are signaled to the higher-level master via PROFIBUS diagnostics. Additional LEDs on site indicate the status of the auxiliary voltages.

Since the auxiliary voltages for signal feedback and power module control are separate, the whole group can be shutdown while diagnostics can still be performed.

## Design

PM-D power modules are plugged onto TM-P15 terminal modules.

A PM-D power module must be followed by at least one motor starter or one frequency converter.

## Technical specifications

| | PM-D power module 3RK1 903-0BA00 |
|---|---|
| Rated control supply voltage $U_s$ up to 60 °C in V | 20,4 ... 28 |
| Rated operating current $I_e$ | |
| • Recommended short-circuit protection in A | 10 |
| • Fuse in A | 10 |
| • Miniature circuit-breaker in A | 10, release characteristic B |
| Power consumption from backplane bus in mA | ≤ 10 |
| Supply of | |
| • Motor starters | yes |
| • Frequency converters | yes |
| • Motor starters for SIGUARD safety technology | no |
| • Electronics modules | no |
| • Ex(i) modules | no |

| | PM-D power module 3RK1 903-0BA00 |
|---|---|
| Interrupts | none |
| Diagnostics functions | yes |
| • System fault/device fault | Red LED "SF" |
| • Monitoring of the supply voltage for the electronics $U_1$ | Green LED "PWR" |
| • Monitoring of the supply voltage for contactors $U_2$ | Green LED "CON" |
| • Read out of diagnostics information | yes |
| Conductor cross-sections in $mm^2$ | |
| • Flexible with connector sleeve | 1.5 |
| • Rigid | 2.5 |
| Mounting dimensions (W x H x D) in mm | 15 x 195.5 x 117.5 |

## Power modules for ET 200S motor starters and frequency converters

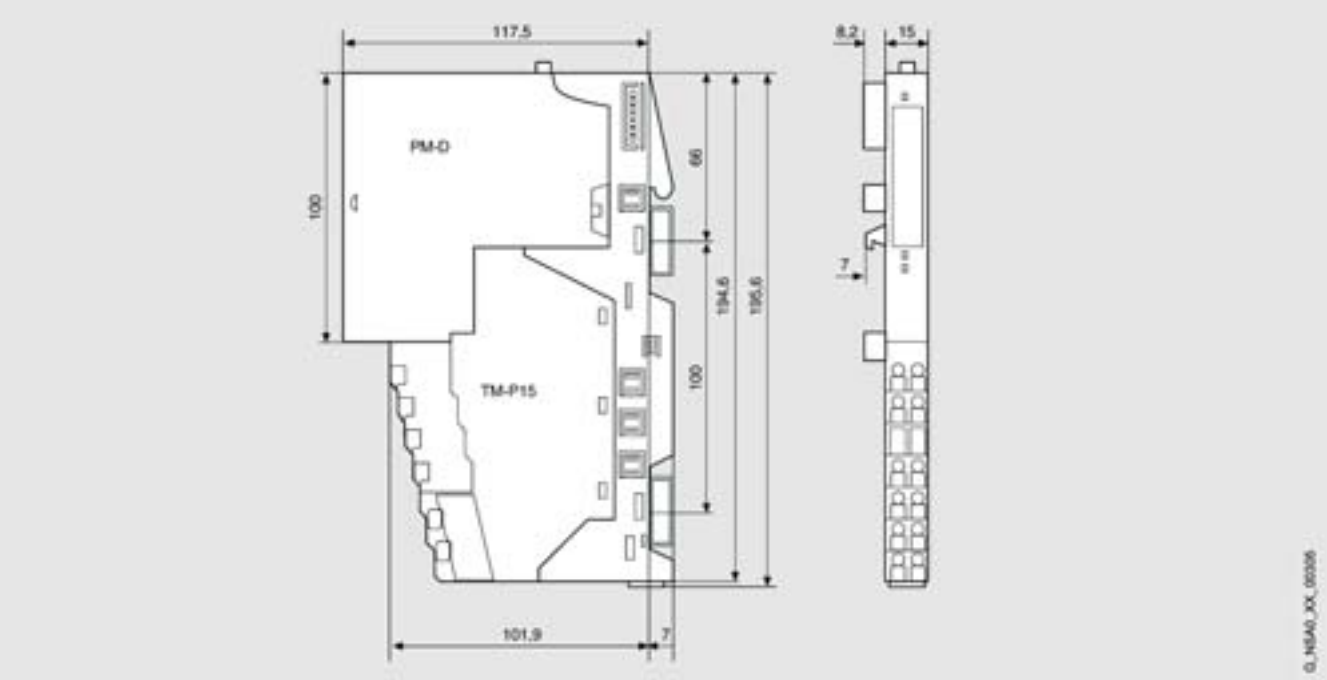
### Selection and Ordering data

| | Version | Order No. |
|---|---|---|
|  3RK1 903-0BA00 | **PM-D power module**<br>for 24 V DC with diagnostics | **3RK1 903-0BA00** |

***Accessories***

| | |
|---|---|
| **Color-coding plates**<br>6 x 200 color-coding plates for terminal modules<br>One set contains 10 strips per color with 20 color-coding plates each | |
| • white | **6ES7 193-4LA10-0AA0** |
| • yellow | **6ES7 193-4LB10-0AA0** |
| • yellow/green | **6ES7 193-4LC10-0AA0** |
| • red | **6ES7 193-4LD10-0AA0** |
| • blue | **6ES7 193-4LF10-0AA0** |
| • brown | **6ES7 193-4LG10-0AA0** |
| • petrol | **6ES7 193-4LH10-0AA0** |

### Dimension drawings




PM-D power module and TM-P15 terminal module

## Overview

- For the use of motor starters in systems with Safety Categories 2 to 4 (EN 954-1)
- No complex wiring for conventional safety systems
- Can also be used in combination with external safety relays
- Can also be used to activate external safety systems
- SIGUARD power modules for function-monitored and automatic starting
- SIGUARD power modules are available for Stop Category 0 and 1
- SIGUARD power modules for monitoring the auxiliary voltages for motor starters
- SIGUARD power modules can be plugged into the TM-PF30 terminal modules.

## Application

With the SIGUARD safety technology, the ET 200S motor starters can achieve the highest Safety Category 4 (acc. to EN 954-1). This means that they can be used for evaluating emergency-off circuits or for protective door monitoring as well as time-delayed tripping.

The costs that would previously have been incurred for time-consuming engineering and wiring of conventional safety technology can be saved. All alarms of the SIGUARD power modules are forwarded automatically via the bus, e.g. in the event of a short-circuit in the EMERGENCY STOP circuit.

The contact multiplier can be used to make the safety-related signals available to external systems.

All common safety applications can be covered by combining different PM-PF30 terminal modules. Many application examples are described in the ET 200S Manual.

## Design

### *SIGUARD PM-D F1/F2/F3/F4/F5 power modules*

- SIGUARD PM-D F1/F2/F3/F4 power modules monitor auxiliary voltages and provide all the functions of a safety relay.
  - *PM-D F1* For evaluating emergency-off circuits with the function "monitored start".
  - *PM-D F2* For monitoring safety doors with the function "automatic start".
  - *PM-D F3* Expansion for PM-D F1/F2 for time-delayed tripping.
  - *PM-D F4* For expanding safety circuits with other ET200S motor starters, e.g. on a different tier.
  - *PM-D F5* Transmits the status of PM-D F1...4 to external safety equipment (contact multiplier) via four floating release circuits.
- The modules PM-D F1 and PM-D F2 can be combined with the modules PM-D F3 or PM-D F4.
- A PM-D F5 can be placed anywhere between a PM-D F1...4 and PM-X.
- SIGUARD power modules monitor the auxiliary voltages U1 and U2. A power failure is signaled via the bus as an error message.
- No additional PM-D power module is required if SIGUARD power modules are used.
- Each safety circuit that begins with a PM-DF1 ... 4 must end with one PM-X each.

### *Failsafe kit*

Each Standard motor starter in a safety segment must be expanded with the failsafe kit (F kit) to monitor the switching function.

F kit 1 expands the DS1-x direct starter, F kit 2 the RS1-x reversing starter.

The F kits comprise

- contact carriers for the terminal modules,
- one or two auxiliary switch blocks for the contactor / the contactors of the motor starter and
- connecting lines.

The High Feature motor starter and its terminal modules already have the function of the F kits built in as standard.

### *Examples*

The different applications of the SIGUARD safety technology are described in the ET 200S Manual with the help of typical application examples.

## SIGUARD safety systems for ET 200S motor starters

### Design (continued)

***Components required for applications with safety requirements***

| Components required | Safety category acc. to EN 954-1 | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| PM-D | ● | | | |
| TM-P15 S27-01 | ● | | | |
| PM-D F1...5 | | ● | ● | ● 1) |
| TM-PF30 S47-.. | | ● | ● | ● |
| F kit 1/2 | | ● 2) | ● 2) | ● 2) |
| PM-X | | ● | ● | ● |
| TM-X15 S27-01 | | ● | ● | ● |
| Redundantly switching, external incoming-feeder contactor | | | ● | ● |

1) PM-D F3 power module only approved up to Category 3

2) F kit required for Standard motor starter only; already integrated into High Feature motor starter

***Possible combinations of power and terminal modules***

| | PM-D | PM-D F1 | PM-D F2 | PM-D F3 | PM-D F4 | PM-D F5 | PM-X |
|---|---|---|---|---|---|---|---|
| TM-P15 S27-01 | ● | | | | | | |
| TM-PF30 S47-B1 1) | | ● | ● | | | | |
| TM-PF30 S47-B0 2) | | ● | ● | | | | |
| TM-PF30 S47-C1 3) | | | | ● | ● | | |
| TM-PF30 S47-C0 4) | | | | ● | ● | | |
| TM-PF30 S47-D0 | | | | | | ● | |
| TM-X15 S27-01 | | | | | | | ● |

1) For F1 or F2 in higher-level or individual safety group (voltage group)

2) For F1 or F2 in lower-level cascaded safety group (partial voltage group)

3) For expansion with F3 or F4 in separate ET 200S station (voltage group)

4) For expansion with F3 or F4 in the same ET 200S station (partial voltage group)

### Function

The SIGUARD power module evaluates the signal status of the connected safety encoder and switches off the groups of the following motor starters by means of the integrated safety relay. The switch-off function is monitored by the module in the same way as the auxiliary voltages.

Safety-related system messages caused, for example, by operation of an EMERGENCY STOP switch or failure of an auxiliary voltage are generated automatically and signaled to the interface module. The interface module assigns a unique identifier to the fault. Faults of this type can be identified and localized using the PROFIBUS DP diagnostics block without a large programming overhead.

## Technical specifications

### *PM-D F1, F2, F3, F4 and F5*

| | |
|---|---|
| Mechanical endurance in ON-OFF operations | 10 x $10^6$ |
| Electrical endurance in ON-OFF operations | 200,000 at $I_e$ |
| Utilization category | DC-13 |
| Operating times | |
| • Minimum command duration in ms | 200 |
| • Recovery time in s | "1" |
| • Reset delay in ms | 30 |
| Control circuit $U_1$ | |
| • Rated control supply voltage $U_S$ in V | 24 DC |
| • Operating range DC to 60 °C | 0.85 ... 1.2 x Us |
| • Power consumption in W | 2.4 |
| • Recommended short-circuit protection | (gG) gL 2 A |
| • Output OUT+/OUT- for controlling expansion modules | 24 V DC / < 50 mA (PTC fuse) |
| Switched auxiliary circuit $U_2$ | |
| • Rated control supply voltage $U_S$ in V | 24 DC |
| • Operating range DC to 60 °C | 0.85 ... 1.2 x Us |
| • Rated operational current $I_e$ (DC-13 to 24 V ) in A | 4 |
| • Conventional thermal current $I_{th}$ in A | 5 |
| Recommended short-circuit protection for release circuits and signaling circuits | Fuse links:<br>LV HRC Type 3NA<br>DIAZED Type 5SB<br>NEOZED Type 5SE<br>utilization category (gG) gL 6 A |
| Supply of | |
| • Motor starters | Yes |
| • Electronic modules | No |
| • Ex(i) modules | No |
| • BG certification | Yes |
| • UL, CSA certificates | Yes |
| Cable lengths for emergency OFF and ON button in m | Max. 1000 |
| Mounting dimensions (incl. terminal modules) (W x H x D) in mm | 30 x 196.5 x 117.5 |
| Enabling circuits for PM-D F5 | 4 (floating) |

### *PM-X connection module*

| | |
|---|---|
| Control circuit $U_1$ | |
| • Rated control supply voltage $U_S$ in V | 24 DC |
| Mounting dimensions W × H × D (in mm) | 15 x 196.5 x 117.5 (incl. terminal module) |

### *Diagnostics messages for SIGUARD Power Modules*

| Error type | Meaning | PM-D power modules | | | | |
|---|---|---|---|---|---|---|
| | | F1 | F2 | F3 | F4 | F5 |
| 01001:<br>Fault | Module error has occurred | ● | ● | ● | ● | ● |
| 10001:<br>Encoder or load voltage missing | $U_1$ or $U_2$ not available or too low | ● | ● | ● | ● | ● |
| 11000:<br>Actuator switch-off | Safety relay tripped | ● | ● | ● | ● | ● |
| 11001:<br>Safety-related disconnection | Emergency OFF was operated; crossover between the emergency OFF wires has occurred | ● | ● | | | |

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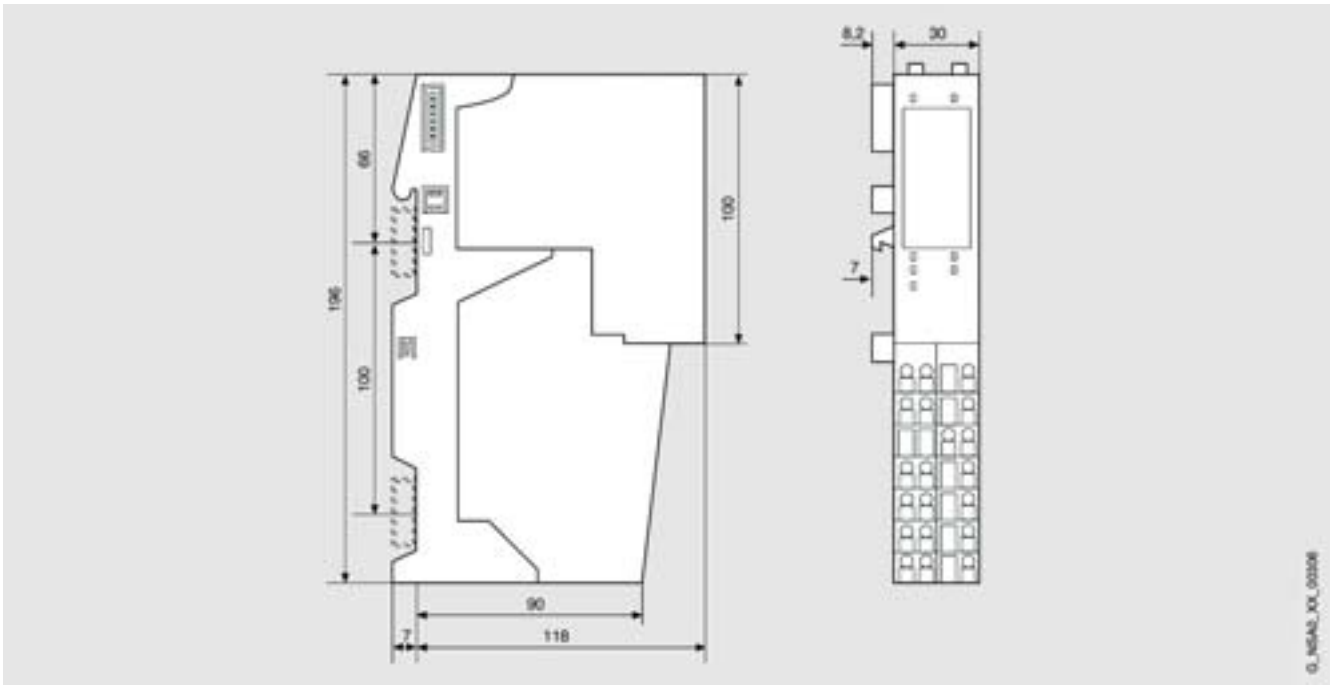
## SIGUARD safety systems for ET 200S motor starters

### Selection and Ordering data

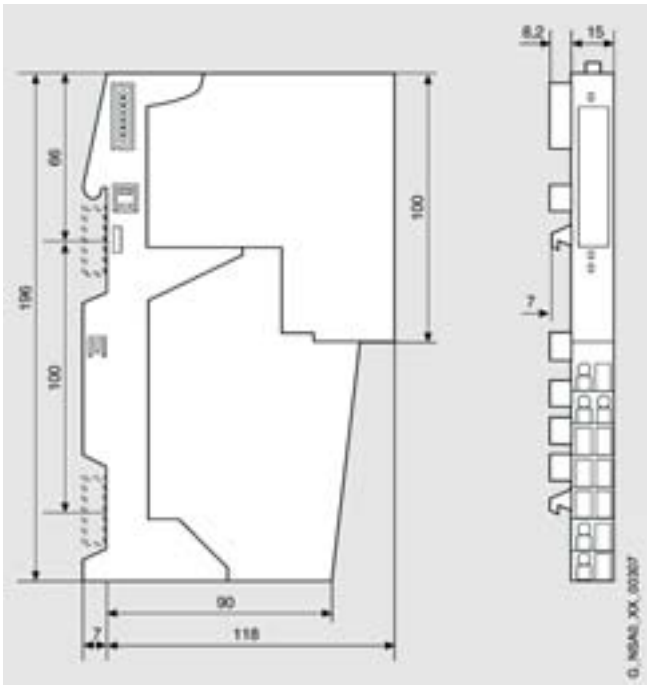
| | Version | Order No. |
|---|---|---|
| ***SIGUARD power modules*** | | |
|  3RK1 903-1BB00 | **PM-D F1 SIGUARD**<br>with diagnostics<br>Power module for emergency-off application<br>Monitored start | **3RK1 903-1BA00** |
| | **PM-D F2 SIGUARD**<br>with diagnostics<br>Power module for protective door monitoring<br>Automatic start | **3RK1 903-1BB00** |
| | **PM-D F3 SIGUARD**<br>with diagnostics<br>Power module for the expansion of PM-D F1/2<br>for an additional voltage group<br>Time-delayed (0 to 15 s) | **3RK1 903-1BD00** |
|  3RK1 903-1BD00 | **PM-D F4 SIGUARD**<br>with diagnostics<br>Power module for the expansion of PM-D F1/2<br>for an additional voltage group | **3RK1 903-1BC00** |
| | **PM-D F5 SIGUARD**<br>with diagnostics<br>Power module for the expansion of PM-D F1 ... 4<br>with four floating release circuits<br>Contact multipliers | **3RK1 903-1BE00** |
| ***Accessories*** | | |
| | **PM-X SIGUARD connection module**<br>with diagnostics<br>Module for connecting a safety group<br>and for connecting an external infeed contactor<br>or for connecting to an external safety circuit | **3RK1 903-1CB00** |
|  3RK1 903-1CA00 | **F kit 1**<br>Failsafe equipment for DS1-x Standard motor starter[1)] | **3RK1 903-1CA00** |
|  3RK1 903-1CA01 | **F kit 2**<br>Failsafe equipment for RS1-x standard motor starter [1)] | **3RK1 903-1CA01** |

1) The function of the failsafe kit is already integrated into High Feature motor starters.

## Dimension drawings




PM-D F1 ... 4 power module and TM-PF30 terminal module




PM-X connection module and TM-X15 terminal module

## Overview

### Overview

ET 200S Failsafe motor starters

ET 200S FC failsafe frequency converter



#### *Failsafe motor starter*

The Failsafe motor starter has been developed on the basis of the High Feature motor starter. It differs in that, in addition to a circuit-breaker/contactor assembly, a safe solid-state evaluation circuit is installed for error detection purposes which makes the motor starter Failsafe.

If the contactor to be switched fails in an EMERGENCY STOP case, the evaluation solid-states detects a fault and opens the circuit-breaker in the motor starter through a shunt release in a fail-safe manner. The second redundant shutdown components is therefore no longer a main contactor, as is generally the case, but the circuit-breaker installed in the motor.

#### *New to the world market: Failsafe frequency converters*

- For stepless speed control of asynchronous motors
- Consisting of the modules for control module ICU24F and power section IPM25 up to 4.0 kW
- Hot swapping of control module and power supply permitted
- Operation without line commutating reactor
- Active braking with line-commutated energy recovery
- Can be combined with brake control module for controlling an electromechanical holding brake
- For achieving EMC Class A (acc. to EN 55011) Connection of an EMC filter before the power bus

The failsafe ET 200S FC offers comprehensive integrated safety functions (certified acc. to EN 954-1, Category 3 or IEC 61508, SIL 2)

- Safe standstill:
  Startup of the drive is prevented.
- Safely reduced speed:
  A specified motor speed is monitored to make sure it is not exceeded. Can be used without motor encoder.
- Safe brake ramp:
  Braking to standstill or to safely reduced speed is monitored. Can be used without motor encoder.

## Overview

***All functions of the High Feature starter are already integrated***

The new failsafe motor starters are characterized by easy, space-saving assembly as well as minimal wiring outlay. Like the High Feature starters, the failsafe motor starters have a switching capacity of up to 7.5 kW (16 A) which is achieved with just two motor starter versions. Another important feature is the high availability due to the high short-circuit withstand capability (type of coordination 2).

## Benefits

get Designed for Industry

***Advantages over conventional safety systems***

- Significant savings in components (less hardware)
- Less mounting and installation work
- Motor starters are failsafe and offer high availability

## Application

The Failsafe motor starter is predestined for use in combination with PROFISAFE (see Figure *Failsafemotor starter with ET 200S PROFISAFE*). Another field of application is in combination with AS-i Safety at Work or safety relays (see Figure *Failsafe motor starters with AS-i Safety at Work and 3TK28*).

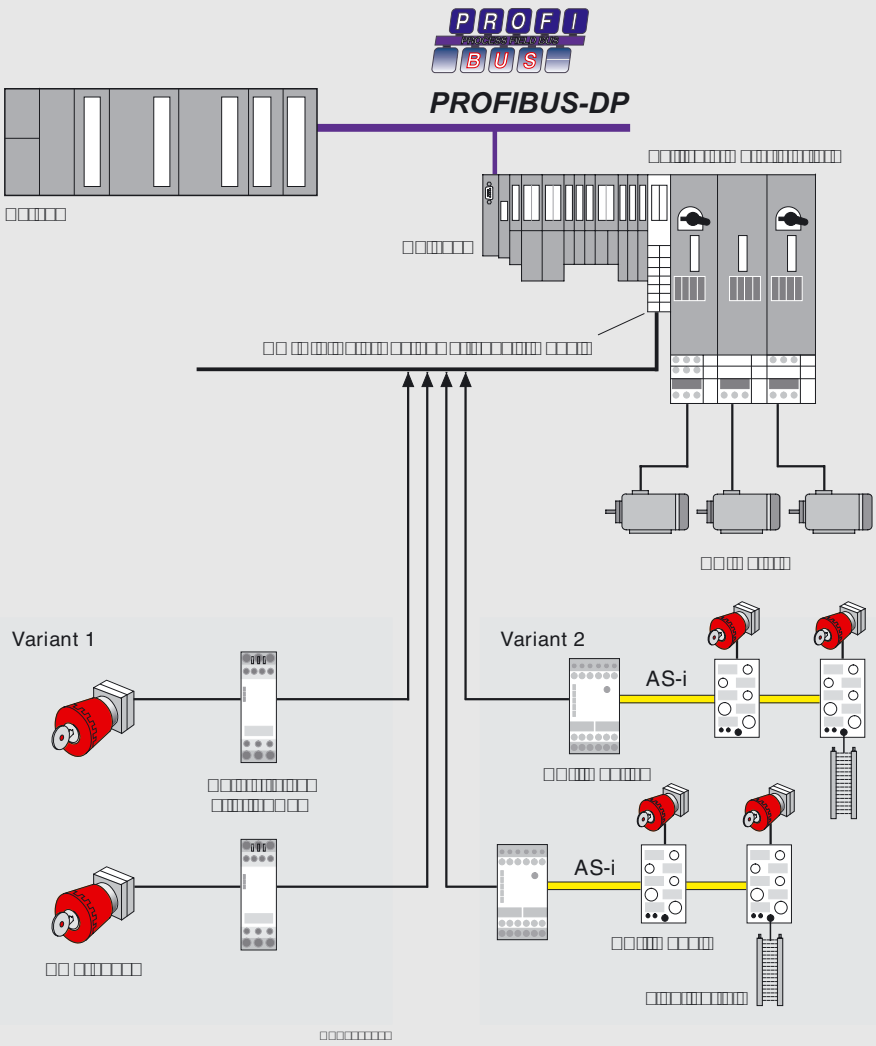
## Design

***High degree of flexibility with safety engineering***

*Failsafe motor starter for PROFISAFE:*
In EMERGENCY STOP applications, the Failsafe motor starters are selectively switched off through the upstream power module PM-D F PROFISAFE. For each power module, six switch-off groups can be formed. In the first delivery stage, the Failsafe freely-programmable logic of the SIMATIC controller is used to interface with the relevant Failsafe sensors. The interface between PROFISAFE and installations that use conventional safety systems is implemented through the Failsafe Contact Multiplier F-CM with four floating contacts.

*Failsafe motor starter with safety relay (Variant 1) or AS-i Safety at Work (Variant 2):*
Signals with relevance for safety can be input to ET 200S through a PM-D F X1 infeed terminal module through the release circuits of the AS-i Safety Monitor or the safety relay to control the Failsafe motor starters which then selectively switch off the downstream motors.

**Design** (continued)




Failsafe motor starter with AS-i Safety at Work and 3TK28

## Technical specifications

### *F-DS1e-x direct on-line starter / F-RS1e-x reversing starter*

| | Direct-on-line starters | Reversing starter |
|---|---|---|
| **Dimensions** | | |
| Dimensions in mm (W x H x D) | 65 x 290 x 150 (incl. terminal module) | 130 x 290 x 150 (incl. terminal module) |
| Height with PE/N block in mm | 332 | |
| Depth with 2DI control module (not safe) in mm | 173 | |
| **Module-specific data** | | |
| Type of coordination | Type 2 to $I_e \leq 16$ A at 400 V | |
| Internal power supply | $U_1$ (from PM-D F / PM-DF X1) | |
| Maximum achievable safety class | | |
| • acc. to IEC 61508 | SIL3 | |
| • to DIN VDE 0801 | AK 6 | |
| • acc. to EN 954 | Cat. 4 | |
| **Voltages, currents, potentials** | | |
| Switching capacity | Up to 7.5 kW at AC 400 V in three setting ranges: 0.3 ... 3 A 2.4 ... 8 A 2.4 ... 16 A | |
| **Status, alarms, diagnostics** | | |
| Status display | SF, DEVICE and C-STAT, SG1 ... SG6 | |
| Diagnostics functions | | |
| • Group fault display | Red LED (SF) | |
| • Reading of diagnostics information | possible | |
| **Control circuit** | | |
| Rated operating voltage for electronics $U_1$ in V | 24 DC (20.4 ... 28,8) | 24 DC (21.6 ... 26,4) |
| Reverse voltage protection for electronics $U_1$ | yes | |
| Rated operating voltage for contactor $U_2$ in V | 24 DC (20.4 ... 28.8 V DC) | |
| Reverse voltage protection for contactor $U_2$ | yes | |
| Current input | | |
| • From electronics supply $U_1$ in mA | approx. 40 | approx. 100 |
| • From contactor supply $U_2$ | | |
| - Starting in A | 1.7 (for 80 ms) | -- |
| - Stopping in mA | max. 350 | -- |
| • from SG1 to 6 | | |
| - Starting in mA | 250 (for 200 ms) | |
| - Stopping in mA | max. 55 | |
| • Test function of the shunt release/starter circuit-breaker (50 ms) from $U_1$ in A | approx. 1.5 | |
| • from backplane bus in mA | approx. 20 | |
| **Main circuit** | | |
| Rated operational voltage $U_e$ in V | | |
| • acc. to DIN VDE 0106, Part 1014, IEC 60947-1, EN 60947-1 | 500 AC | |
| • Safe isolation between main and auxiliary conducting path | 400 | |
| UL, CSA in V | 600 AC | |
| Rated insulation voltage $U_i$ in V | 500 AC | |
| Rated impulse withstand voltage $U_{imp}$ in kV | 6 | |
| Rated frequency in Hz | 50/60 | |

## Ordering data

| | Order No. |
|---|---|
| **F-DS1e-x direct on-line starter**<br>Failsafe direct on-line starter<br>for up to 7.5 kW<br>Mechanical switching<br>Electronic overload protection | |
| • 0.3 to 3 A | **3RK1 301-0AB13-0AA2** |
| • 2.4 to 8 A | **3RK1 301-0BB13-0AA2** |
| • 2.4 to 16 A | **3RK1 301-0CB13-0AA2** |
| **F-DS1e-x reversing starter**<br>Failsafe reversing starter<br>for up to 7.5 kW<br>Mechanical switching<br>Electronic overload protection<br>Fuseless | |
| • 0.3 to 3 A | **3RK1 301-0AB13-1AA2** |
| • 2.4 to 8 A | **3RK1 301-0BB13-1AA2** |
| • 2.4 to 16 A | **3RK1 301-0CB13-1AA2** |

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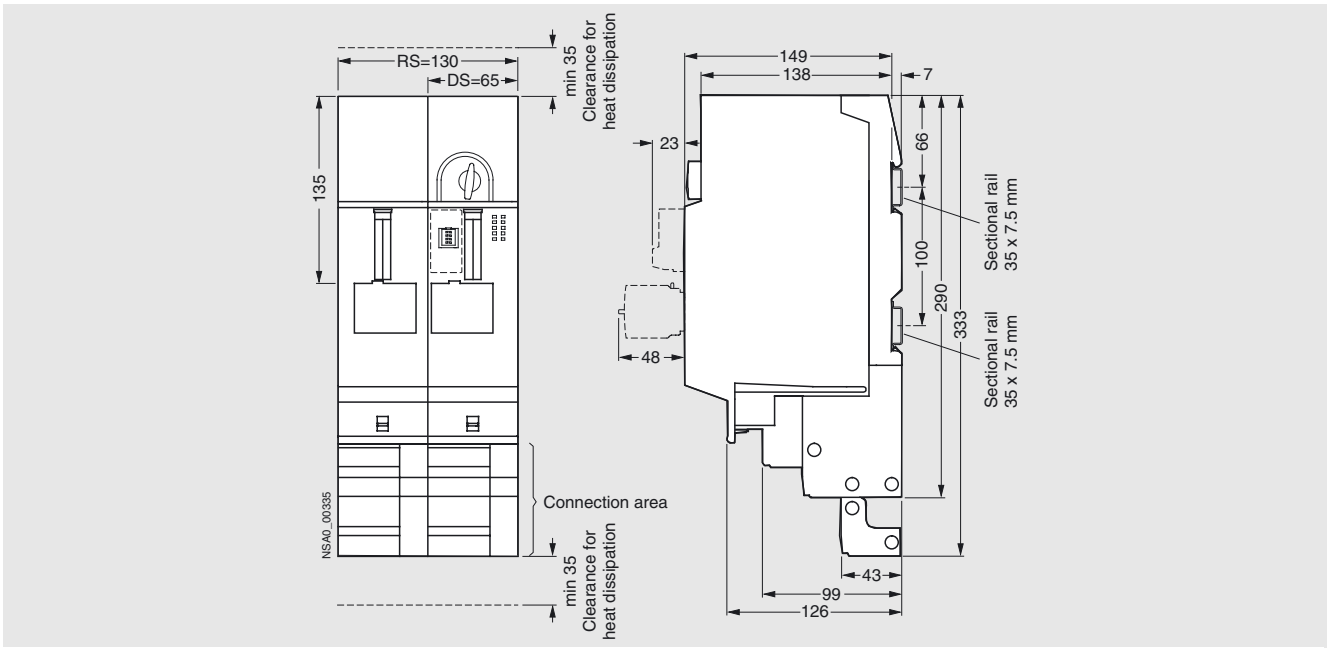
## Dimension drawings




F-DS1e-x direct on-line starter / F-RS1e-x reversing starter

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## Overview

Components of the ET 200S FC failsafe frequency converter

## Benefits

get Designed for Industry

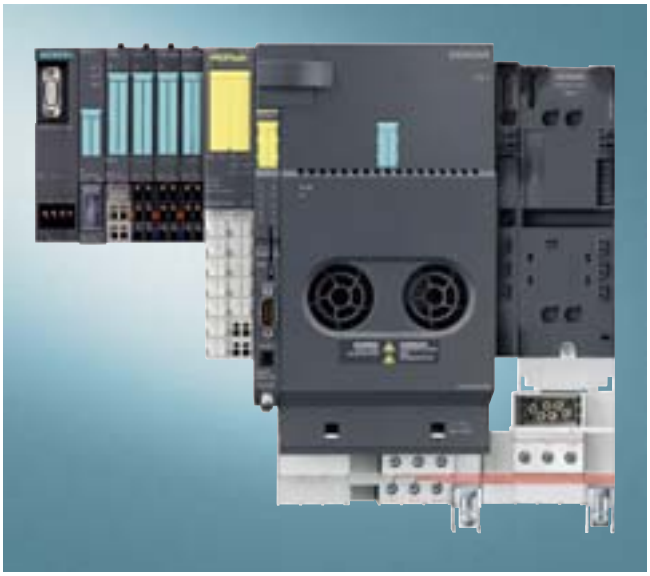
- The frequency converter is completely integrated into the ET 200S system and offers all system advantages, such as high availability thanks to the hot swapping function, modular expansion, or reduction of the wiring overhead resulting from the self-assembling terminal module wiring.
- With self-assembling 50 A power bus, i.e. the load voltage is only supplied once for a group of frequency converters
- Comprehensive diagnostics facilities for high availability
- Input for motor encoder for precise speed control
- Input for PTC/KTY encoder for comprehensive motor protection
- Slot for optional memory card (MMC) to save the parameter settings for fast replacement of modules without tools
- All common control modes are available: Frequency control, sensor-less vector control or torque control, closed-loop control with motor encoder
- Parameters are set using STARTER, the graphic parameterization tool for SIEMENS drives
- Active braking is possible without additional overhead. The line-commutated energy recovery of the frequency converter for the power supply network means that chopper modules or brake resistors are superfluous
- The "safe standstill" is completely electronic and therefore without contacts. This provides reliable and extremely short response times.
- Unique is that the "safe reduced speed" and the "safe braking ramp" do not require a motor encoder or other encoder. These functions can therefore be implemented with minimum overhead.

## Application

- New application possibilities are opened up for the ET 200S system where continuous control of the speed of asynchronous motors is required.
- The frequency converter handles simple drive tasks (frequency control) or even more complex drive tasks (vector control). In addition to simple drive tasks, the converter also supports torque control for conveyor applications, winding and unwinding drives, as well as hoisting gear. Together with a motor encoder, the range extends up to closed-loop controls for exact control of speeds and torques.
- The advantages of line-commutated power regeneration are primarily evident in continuous regenerative operation. Examples include unwinding units, lowering of loads with hoisting gear, or electric braking of large centrifugal masses.
- Together with an intelligent header module (IM 151 CPU) and the ET 200S FC frequency converter, the I/O station is expanded to become a complete automation solution for machine modules.
- The integral safety functions significantly reduce the overhead for drive solutions in plant components where there is a hazard potential. Monitoring of the safely reduced speed in sensorless standard asynchronous motors is unique in drive engineering.

## ET 200S FC Failsafe frequency converter

### Design



Design of an ET 200S station with two ET 200S FC failsafe frequency converters (only terminal modules on the right)

The ET 200S FC consists of the following components:

- ICU24F closed-loop control module (F = with integral safety technology)
- IPM25 power section
- Terminal modules to accommodate closed-loop control module and power section

Following insertion of the modules, the closed-loop control module and the power section of the frequency converter are interconnected.

The PM-D F PROFIsafe or PM-D F X1 power modules provide the power supply for one or more closed-loop control modules.

### *Accessories*

The following accessories are available:

- The labeling strips and color coding labels of the ET 200S system can also be used for the frequency converter.
- **Jumper block L1/L2/L3**
  The jumper blocks L1/L2/L2 are used to bridge a gap in the power bus. 15 mm wide jumper blocks are used to bridge the closed-loop control module of the subsequent frequency converter. If a brake control module is connected, a 30mm wide jumper block is required in order to pass on the power bus via the brake control module and ICU24 to the subsequent IPM25 power section.
- **Jumper block PE/N**
  The Jumper blocks PE/N are used to bridge a gap in the PE/N bus, e.g. caused by use of a brake control module, a PM-D(F) power module or the closed-loop control module of the frequency converter.
- **EMC filter**
  An EMC filter must be externally connected to the supply of the power bus in order to achieve EMC Class A (according to EN 55011). Shielded motor cables must be used in addition. It must be ensured that the shield is connected correctly. The terminal modules for the power section of the frequency converter are equipped for this with an integral shield connecting element.
- **Shield clamps**
  To connect the shield of motor cables
- **Grounding terminal**
  To ground the 3 x 10 mm busbar for the shield connection
- **Busbar 3 x 10 mm**
  To accommodate the shield clamps and the grounding terminal
- **Brake control module**
  xB1 or xB2 to control an external electromechanical brake

### Function

The ET 200S FC is capable of dynamic control procedures such as sensorless vector control or torque control. Where particular speed accuracy and dynamic response requirements exist, a motor encoder can be connected to the control module.

The ET 200S FC is operated without a line reactor.

A PTC or KTY encoder in the motor can be evaluated by the control module to evaluate the motor temperature.

Integral safety functions are selected via the switch-off modules of a series-connected PM-D F:

- Safe standstill (the drive is prevented from starting up)
- Safely reduced speed (the preset motor speed is monitored for correct speed)
- Safe braking ramp (monitoring of braking to standstill or safe reduced speed)

The safety functions of the ET 200S FC are certified according to Category 3 of EN 954-1 and to SIL 2 of IEC 61508.

### *Accessories*

The following accessories are available:

- **MMC parameter memory**
  If required, the complete parameter settings of the frequency converter can be saved on a memory card (MMC). When servicing, the plant is immediately ready for use again after replacing the frequency converter and inserting the memory card.

## Technical specifications

| | Closed-loop control module ICU24F | Power units IPM25, FS A Housing size A | IPM25, FS A Housing size B | |
|---|---|---|---|---|
| **Selection features** | | | | |
| Integral safety functions according to Category 3 of EN 954-1 or according to SIL2 of IEC 61508 | • Safe standstill<br>• Safely reduced speed (sensorless)<br>• Safe braking ramp (sensorless) | – | – | |
| Power | – | 0.75 kW | 2.2 kW | 4.0 kW |
| Rated input current (at 50 °C ambient temperature) | – | 1.9 A | 5.0 A | 8.5 A |
| Rated output current (at 50 °C ambient temperature) | – | 2.1 A | 5.9 A | 10.2 A |
| Mounting dimensions (W x H x D) in mm (including terminal module) | 15 x 220 x 154 | 65 x 290 x 150 | 130 x 290 x 150 | |
| **Electrical specifications** | | | | |
| Mains voltage | 3-ph. 380 V to 480 V AC ± 10% | | | |
| Power frequency | 47 Hz to 63 Hz | | | |
| Overload capability | • Overload current 1.5 x rated output current (i.e. 150% overload capability) for 60 s, cycle time 300 s<br>• Overload current 2 x rated output current (i.e. 200 % overload capability) for 3 s, cycle time 300 s | | | |
| Output frequency | 0 Hz to 650 Hz | | | |
| Pulse frequency | 8 kHz (standard), 2 kHz to 16 kHz (in 2 kHz increments) | | | |
| Line reaction | Low loading of power supply network by network harmonics (guide values: 5: 20%, 7: 14%, 11: 9%, 13: 8%) | | | |
| Skipped frequency range | 1, programmable | | | |
| Inverter efficiency | ≥ 96 % | | | |
| Interfaces | • PROFIBUS or PROFINET interface via the ET 200S backplane bus<br>• RS232 interface with USS protocol for commissioning on the PC using the STARTER commissioning software<br>• Slot for an optional memory card (MMC) for uploading or downloading parameter settings<br>• PTC/KTY84 interface for motor temperature monitoring<br>• Speed sensor interface (Sub-D connector) for unipolar HTL incremental position encoder<br>• Diag-IF diagnostics interface for servicing purposes | | | |
| **Functions** | | | | |
| Control method | • V/f control – linear (M~n) with/without flux current control (FCC), quadratic (M~$n^2$) or parameterizable<br>• Vector control – with or without encoder<br>• Torque control | | | |
| Operating functions | Jogging mode, free function blocks (FFB), positioning deceleration ramp, automatic restart following interruption due to power failure, bumpless connection of converter to rotating motor | | | |
| Braking functions | • Regenerative braking mode without braking chopper and pulse resistor<br>• Control of an electrical holding brake via an optional brake control module | | | |
| Protection features for | Undervoltage, overvoltage, ground faults, short circuits, stall prevention, thermal motor protection $I^2t$, inverter overtemperature, motor blocking protection | | | |
| Connectable motors | Low-voltage asynchronous motors (motor cable length max. 50 m shielded, max. 100 m unshielded) | | | |
| **Mechanical data** | | | | |
| Degree of protection | IP20 | | | |
| Operating temperature | • With vertical design of station<br>• With horizontal design of station | 0 °C to +40 °C<br>0 °C to + 50 °C/to +60 °C with derating | | |
| **Standards** | | | | |
| Compliance with standards | UL, cUL ,CE, c-tick, according to low-voltage directive 73/23/EEC, EMC directive 89/336/EEC | | | |

### *Derating data – Pulse frequency*

| Power | Rated output current in A at a pulse frequency of | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| kW | 2 kHz | 4 kHz | 6 kHz | 8 kHz | 10 kHz | 12 kHz | 14 kHz | 16 kHz |
| 0.75 | Avail. soon | Avail. soon | Avail. soon | Avail. soon | Avail. soon | Avail. soon | Avail. soon | Avail. soon |
| 2.2 | Avail. soon | Avail. soon | Avail. soon | Avail. soon | Avail. soon | Avail. soon | Avail. soon | Avail. soon |
| 4.0 | Avail. soon | Avail. soon | Avail. soon | Avail. soon | Avail. soon | Avail. soon | Avail. soon | Avail. soon |

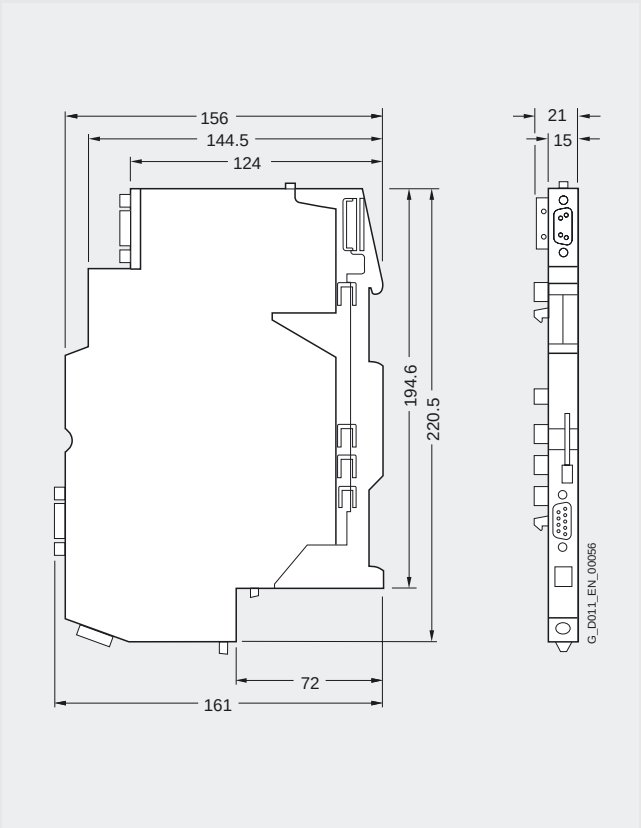
The current data apply to an ambient temperature of 50 °C unless specified otherwise.

## ET 200S FC Failsafe frequency converter

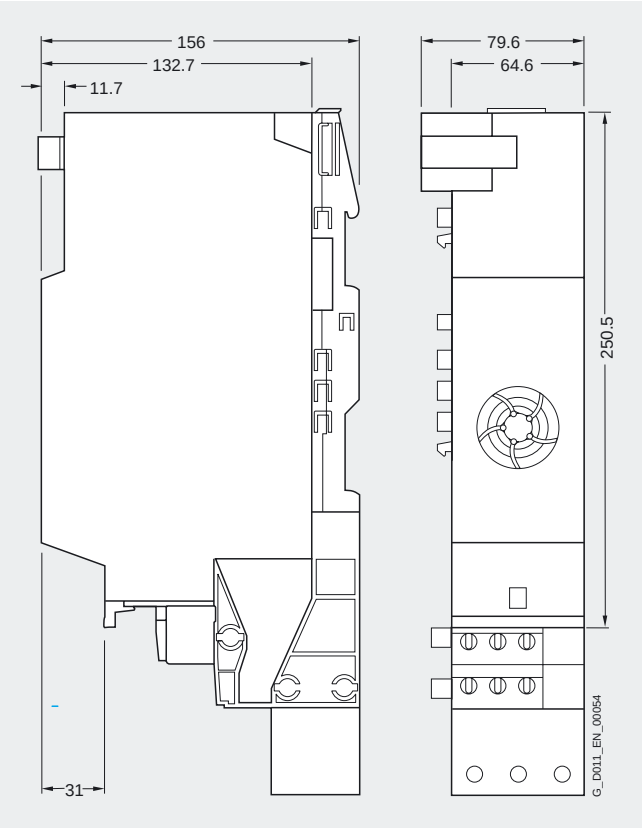
### Selection and Ordering data

| | Version | Order No. |
|---|---|---|
|  | **ICU24F closed-loop control module**<br>• Control modes: *V/f*, FCC, SLVC, VC with encoder, torque control<br>• Motor encoder input: HTL unipolar<br>• Motor temperature input: PTC/KTY<br>• Integrated safety functions | **6SL3 244-0SA01-1AA0** |
|  | **IPM25 power supply unit**<br>380 V – 480 V 3 AC +10/-10%<br>47 Hz - 63 Hz<br>Overload:<br>150% 60 s<br>200% 3 s<br>Power:<br>0.75 kW | **6SL3 225-0AE17-5UA0** |
|  | **IPM25 power supply unit**<br>380 V – 480 V 3 AC +10/-10%<br>47 Hz - 63 Hz<br>Overload:<br>150% 60 s<br>200% 3 s<br>Power:<br>2.2 kW<br>4.0 kW | **6SL3 225-0SE22-2UA0**<br>**6SL3 225-0SE24-0UA0** |

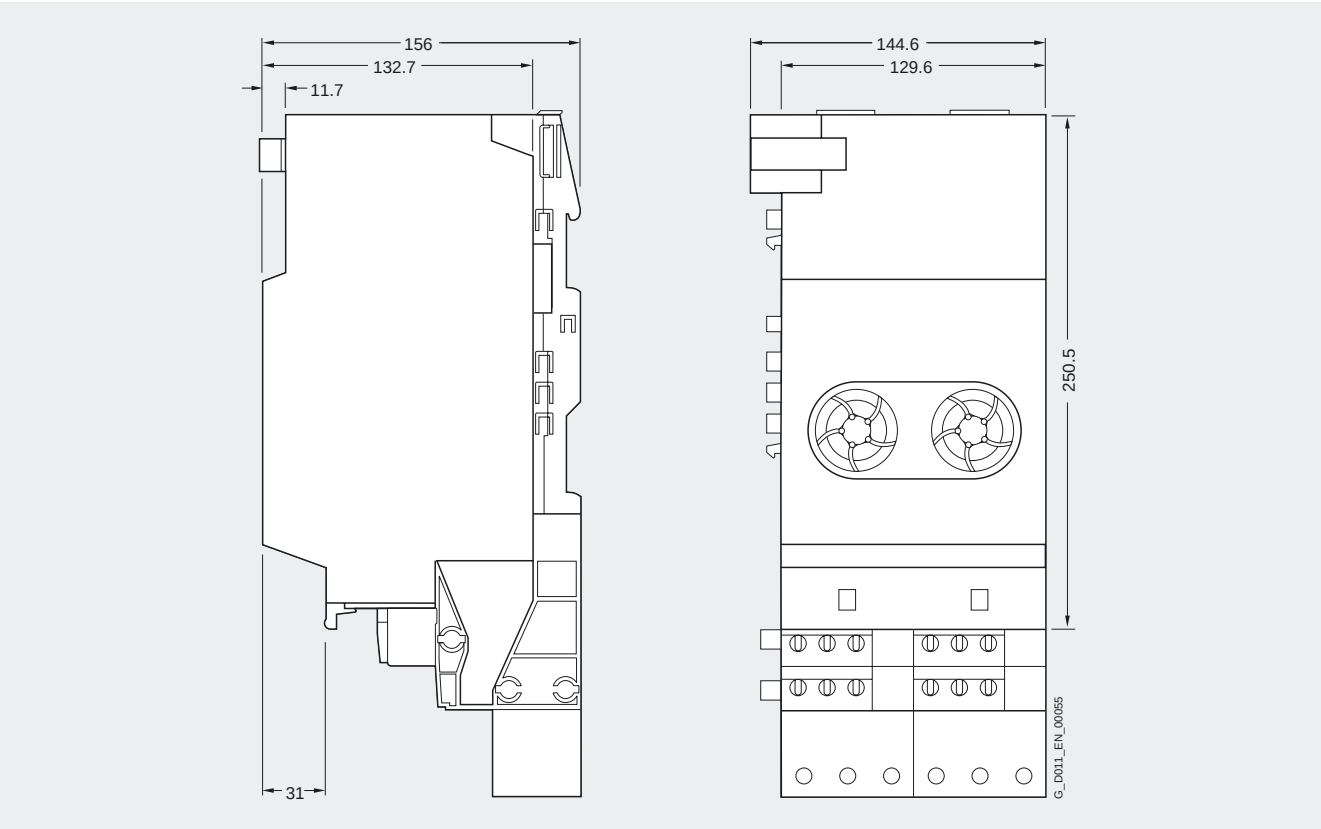
## Dimension drawings




ICU24F closed-loop control module




IPM25 power supply unit, 0.75 kW




IPM25 power supply unit, 2.2 kW and 4.0 kW

## Power modules for ET 200S Failsafe motor starters and frequency converters

### Application

Each power module switches up to 6 tripping groups for failsafe motor starters/frequency converters.

The **PM-D F PROFISAFE power module** receives the tripping signal from the interface module of the ET 200S and safely shuts down 1 to 6 tripping groups. This power module is used by PROFISAFE applications for selective safety shutdown of fail-safe motor starters/frequency converters.

The **PM-D F X1 power module** is used to supply 1 to 6 tripping groups. The incoming supply can be switched via 1 to 6 safety shutdown devices (either AS-Interface safety monitor or 3TK28 safety combination). This power module is used by PROFISAFE applications with external safety shutdown devices for selective safety shutdown of Failsafe motor starters/frequency converters.

### Technical specifications

***PM-D F PROFISAFE power module***

| | |
|---|---|
| **Dimensions** | |
| Dimensions (W x H x D) in mm | 30 x 196.5 x 117.5 (incl. terminal module) |
| **Module-specific data** | |
| Number of outputs that switch to P potential | 6 tripping groups (safety group 1 ... 6) |
| Internal power supply for busbar | $U_1$ |
| Occupied address range | |
| • in the PII | 5 byte |
| • in the POI | 5 byte |
| Maximum achievable safety class | |
| • acc. to IEC 61508 | SIL3 |
| • to DIN VDE 0801 | AK 6 |
| • acc. to EN 954 | Cat. 4 |
| **Voltages, currents, potentials** | |
| Supply voltage in V | 24 DC |
| Electrical isolation | |
| • between outputs and backplane bus | yes |
| • between outputs and power supply | no |
| • between outputs | no |
| • between outputs/power supply and shield | yes |
| **Status, alarms, diagnostics** | |
| Status display | Green LED per SG<br>Green LED for solid-state supply<br>Green LED for load voltage |
| Alarms: Diagnostic alarm | "ON" |
| Diagnostics functions | |
| • Group fault display | Red LED "SF" |
| • Reading of diagnostics information | possible |
| **Settings** | |
| Module address | Diverse:<br>1. Via a safety-related parameter in the parameter message via the backplane bus<br>2. Via the 10-pole DIL switch (binary coded) on the left side of the module<br>The received address is then compared with the DIL switch position |

## Technical specifications (continued)

### PM-D F X1 power module (infeed terminal module)

| | |
|---|---|
| **Dimensions** | |
| Mounting dimensions (W x H x D) in mm | 30 x 196.5 x 117.5 (incl. terminal module) |
| **Module-specific data** | |
| Ambient temperature in °C | 0 ... +60 |
| Degree of protection | IP20 |
| Maximum achievable safety classes | |
| • IEC 62508 | SIL 3 |
| • DIN V 19250 | Tripping class 5 and 6 |
| • EN 954-1 | Category 4 |
| Safety characteristic variables | |
| • Proof test interval | 10 years |
| **Voltages, currents, potentials** | |
| Rated control supply voltage $U_s$ | 21.6 ... 26.4 V DC up to 60 °C |
| Rated operating current $I_e$ | 6 A<br>Internal protection by means of 7 A fuse (quick) |
| Recommended upstream short-circuit protection | gL/gG 6.3 A fuse |
| Supply of | |
| • Failsafe motor starters | yes |
| • Failsafe frequency converters | yes |
| • Motor starters for SIGUARD safety technology | no |
| • Electronics modules | no |
| • Ex(i) modules | no |
| Current input | |
| • From the backplane bus | ≤ 10 mA |
| • From $U_1$ | ≤ 35 mA |
| • From SGx | ≤ 15 mA |
| **Status, alarms, diagnostics** | |
| Interrupts | none |
| Diagnostics functions | |
| • Group fault/device fault | Red LED "SF" |
| • Monitoring of the supply voltage for electronics $U_1$ (PWR) | Green LED "PWR" |
| • Monitoring of the six tripping groups | Green LED SG1 ... SG6 |
| • Reading of diagnostics information | yes |
| **Standards, approvals** | |
| TÜV | yes |
| UL, CSA certification | yes |

### F-CM contact multiplier

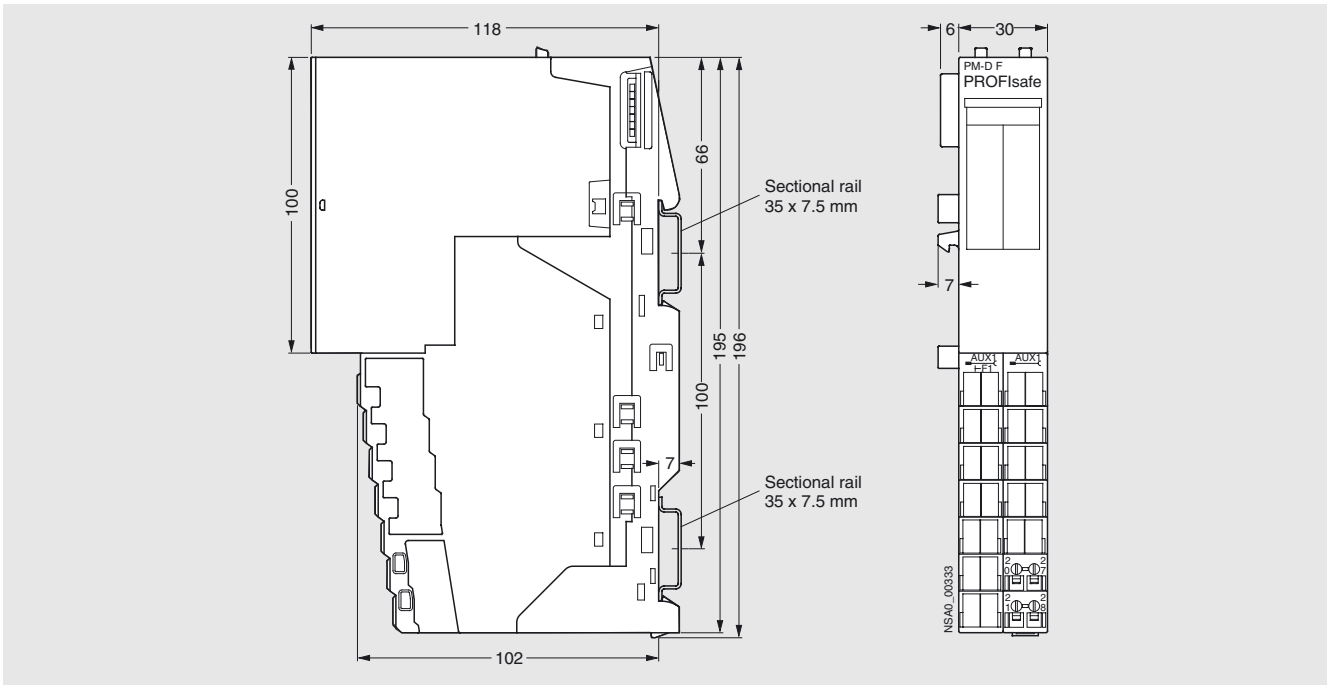
| | |
|---|---|
| **Dimensions** | |
| Dimensions in mm (W x H x D) | 30 x 196.5 x 117.5 (incl. terminal module) |
| **Module-specific data** | |
| Number of relay outputs | 4 (4 x 1-channel or 2 x 2-channel safe coupling/contact multiplier) |
| Internal power supply for busbar | $U_1$ (from PM-D F / PM-DF X1) |
| Maximum achievable safety class | |
| • acc. to IEC 61508 | SIL3 |
| • to DIN VDE 0801 | AK 6 |
| • acc. to EN 954 | Cat. 4 |
| **Voltages, currents, potentials** | |
| Switching capacity of the relay outputs | Utilization category DC-13 ($I_e$ / $U_e$):<br>1.5 A, 24 V |
| Electrical isolation | |
| • between outputs and backplane bus | yes |
| • between outputs and power supply | yes |
| • between outputs | yes |
| • between outputs/power supply and shield | yes |
| **Status, alarms, diagnostics** | |
| Status display | PWR and STAT |
| Alarms: Diagnostic alarm | none |
| Diagnostics functions | yes |
| • Group fault display | Red LED "SF" |
| • Reading of diagnostics information | possible |
| • Monitoring of the supply voltage for the electronics $U_1$ (PWR) | Green LED "PWR" |
| • Monitoring of the switching status of the release circuit | Green LED / red LED STAT |

## Power modules for ET 200S Failsafe motor starters and frequency converters

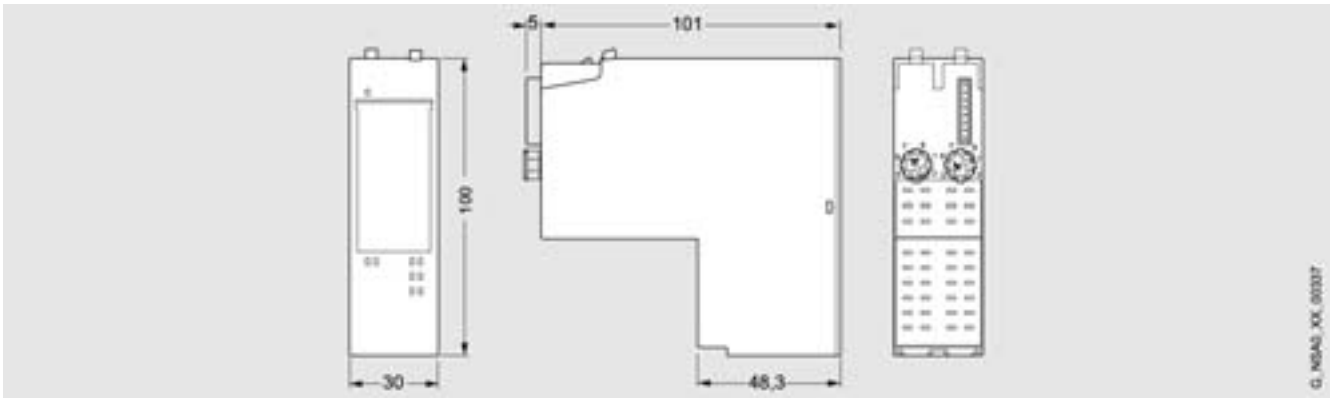
### Ordering data

| | Order No. |
|---|---|
| **PM-D F PROFISAFE power module**<br>For six tripping groups (SG1 to SG6) | **3RK1 903-3BA00** |
| **PM-D F X1 power module (infeed terminal module)** | **3RK1 903-3DA00** |
| **F-CM contact multiplier** | **3RK1 903-3CA00** |

### Dimension drawings

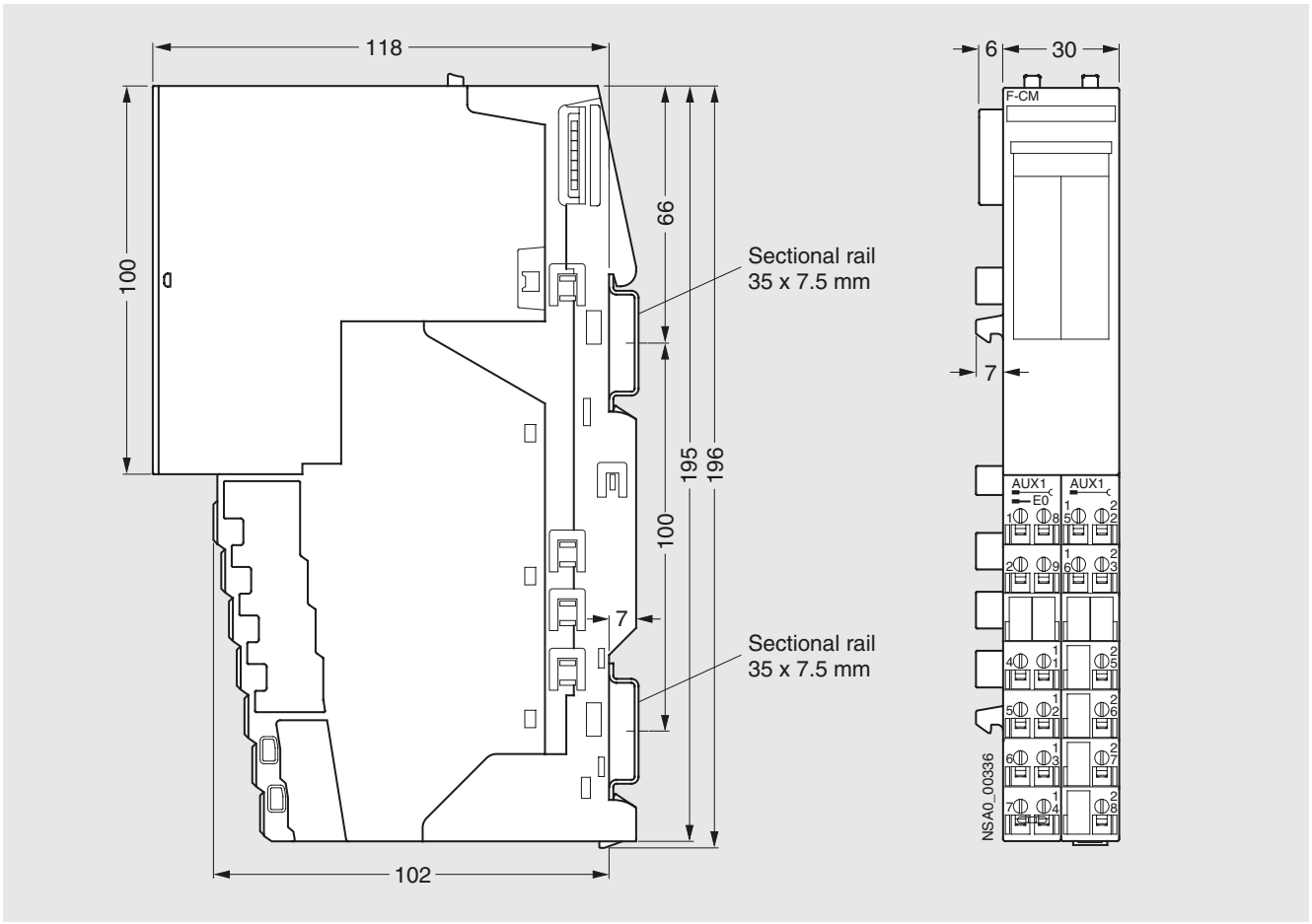



PM-D F PROFISAFE power module




PM-D F X1 power module
(infeed terminal module)

## Dimension drawings (continued)




F-CM contact multiplier

# Terminal modules for ET 200S motor starters and frequency converters

## Overview

### *Terminal modules for motor starters*

- Mechanical modules in which the motor starter and expansion modules are inserted
- For constructing the permanent wiring and self-assembling voltage bus
- For connecting the motor connection cables
- Positive-locking connection to ensure enhanced vibration resistance

### *Terminal modules for frequency converters*

- Mechanical modules in which the components of the frequency converter are inserted
- For constructing the permanent wiring and self-assembling voltage bus
- For connecting the motor cables
- Integral shield connecting elements for the 3 x 10 mm busbar

### *Terminal module for SIGUARD (TM-X) Connection Module*

- Connection via screw-type terminals
- Light-colored enclosure for visual distinction

### *Terminal module for SIGUARD (TM-PF30) Power Module*

- Connection via screw-type terminal
- Light-colored enclosure for visual distinction

### *Terminal module for power module*

- Connection via screw-type terminals
- Light-colored enclosure for visual distinction
- Always before the first TM-DS/TM-RS

## Application

### *Terminal modules for motor starters and frequency converters*

Terminal modules are completely mechanical components for accommodating the ET 200S I/O modules. The integral self-configuring voltage buses in the terminal modules reduce wiring overhead to the single power supply. All modules following on the right are automatically powered when plugging the terminal modules together. The rugged design and keyed connections permit use in harsh industrial environments.

Several versions of the terminal modules are available for motor starters and frequency converters:

- Terminal modules for TM-DS and TM-RS motor starters
- Terminal modules for frequency converters:
  - TM-ICU for the closed-loop control module
  - TM-IPM for the power section
- Terminal modules for expansion modules (TM-xB)

### Terminal modules for TM-DS and TM-RS motor starters

Several versions of the TM-DS and TM-RS terminal modules are available for the Standard and High Feature motor starters. The terminal modules with the suffix "-S32" have terminals for feeding to the integral 40A/50A power bus and terminals for the motor connection cable. They are fitted at the beginning (left) of a power bus segment.

The terminal modules with the suffix "–S31" only have the terminals for the motor connection cable. These terminal modules follow on the right after a terminal module "–S32". In order to design a new load group, another terminal module "–S32" is attached. All terminals of the modules for motor starters are equipped with strong 10-mm$^2$ terminals. The delivery of the terminal modules "–S32" includes three caps to close the power bus contacts on the last terminal module of a segment.

### Terminal modules for frequency converters

The TM-ICU terminal module is used for both versions of the ICU24 / ICU24F closed-loop control module. A TM-IPM is always subsequently attached to a TM-ICU. The 65-mm wide TM-IPM is used to accommodate the IPM25 power section, 0.75 kW. A 130-mm wide terminal module is required for power sections of 2.2 and 4.0 kW.

Each TM-IPM terminal module has a shield connecting element for a shield bus. Shielded motor cables can then be grounded using shield terminals.

The terminal modules with the suffix "-S32" have terminals for feeding to the integral 50A power bus and terminals for the motor connection cable. They are fitted at the beginning (left) of a power bus segment.

The terminal modules with the suffix "–S31" only have the terminals for the motor connection cable. These terminal modules follow on the right after a terminal module "–S32". In order to design a new load group, another terminal module "–S32" is attached. All terminals of the modules for frequency converters are equipped with strong 10-mm$^2$ terminals. The delivery of the terminal modules "–S32" includes three caps to close the power bus contacts on the last terminal module of a segment.

## Application (continued)

### Terminal modules for expansion modules (TM-xB)

The TM-xB terminal modules are used to accommodate the xB1, xB2, xB3 and xB4 brake control modules. The TM-xB terminal module must always follow a terminal module for Standard motor starters, High Feature motor starters or frequency converters since control of the electronic brake switch takes place via an output of the motor starter / frequency converter. The xB215 terminal modules for the brake control modules have the connections of the two local inputs in addition to the terminals for connecting die motor brake. These local inputs are not evaluated by a frequency converter, and therefore the xB215 terminal module must only be attached following a motor starter (for technical data, selection and ordering data, see Section "Accessories for motor starters and frequency converters").

### Terminal block PE/N

The PE/N terminal block is required for direct connection of the motor cables without intermediate terminals. This is connected together with the terminal module for motor starter / frequency converter before attaching in sequence on the standard mounting rail. The "-F" version with two PE terminals and one N terminal is available together with the terminal modules for motor starter / frequency converter "-S32", the "-S" version is combined with the terminal module "-S31". The delivery of the terminal blocks "–S32" includes two caps to close the PE/N bus contacts on the last terminal block of a segment. The modules for the Standard motor starters have a width of 45 mm, and those for the High Feature motor starters / frequency converters a width of 65 mm.

### *Terminal modules for SIGUARD (TM-PF30) Power Module*

For supply of load and sensor voltages to the voltage buses of the motor starters, and for connection of the 2-channel sensor circuit (e.g. emergency stop pushbutton) and a reset pushbutton. Various terminal modules are available for configuring separate safety circuits or for cascading safety circuits, as well as for applications with delayed switch-off.

### *Terminal module for SIGUARD (TM-X) Connection Module*

For connection of an external supply contactor (second switch-off possibility). With terminals for contactor coil and checkback contact. Is always required at the end of a group of safety-related motor starters.

## Design

### *TM-DS, TM-RS*

- Version "–S32" with supply cable connection: 2 x 3 x 10 mm² screw terminals for power bus and motor outgoing feeder
- Version "–S32" without supply cable connection: 1 x 3 x 10 mm² screw terminals for motor outgoing feeder
- Optional expansion using PE/N blocks (see accessories)
- Only applies to Standard motor starters: For applications with high motor currents (> 6.3 A) or high ambient temperatures (> 40 °C), it is recommendable to use the DM-V15 distance module (see accessories) between two DS1-x motor starters

### *TM-ICU*

- For ICU24 und ICU24F closed-loop control modules of the frequency converter

### *TM-IPM*

- Version "TM-IPM65" for IPM25 power supply unit of frequency converter with 0.75 kW
- Version "TM-IPM130" for IPM25 power supply unit of frequency converter with 2.2 or 4.0 kW
- Version "–S32" with supply cable connection: 2 x 3 x 10 mm² screw terminals for power bus and motor outgoing feeder
- Version "–S32" without supply cable connection: 1 x 3 x 10 mm² screw terminals for motor outgoing feeder
- All TM-IPMs have an integral shield connecting element
- Optional expansion using PE/N blocks (see accessories)

### *TM-xB*

- Can be combined with Standard motor starters, High Feature motor starters and frequency converters
- Connection via screw-type terminals
- Always on the right of the TM-DS/TM-RS

### *Terminal module for power module*

For supply of load and sensor voltages to the self-configuring voltage buses of the Standard motor starters, High Feature motor starters and frequency converters. Power modules are plugged onto TM-P modules for voltage monitoring. TM-P modules can be used any number of times within the ET 200S.
A power module must always be inserted before the first motor starter/frequency converter.

### *Terminal modules for SIGUARD power module*

To accommodate the SIGUARD power module. Different safety circuits can be functionally separated or cascaded using different terminal modules. Each group of this type must be terminated by a SIGUARD PM-X connection module.

- **TM-PF30 S47-B1**
  The terminal module is always located at the beginning of a safety segment, and accommodates the PM-DF1 power module for EMERGENCY STOP applications or the PM-DF2 power module for contactor monitoring. The 24-V voltages for the electronics ($V_1$) and for the contactor supply ($V_2$) of the motor starters must be connected to this terminal module in addition to the 2-channel connection of the safety sensors (e.g. EMERGENCY STOP pushbutton). Furthermore, connections are available for the ON pushbutton (release) and the safe output of the power module.

## Terminal modules for ET 200S motor starters and frequency converters

**Design** (continued)

- **TM-PF30 S47-B0**
  The terminal module is used for cascading subordinate safety segments, and accommodates the PM-DF1 power module for EMERGENCY STOP applications or the PM-DF2 power module for contactor monitoring. No further power supply is connected to this terminal module. The supply is from the previous PM-DF1 or PM-DF2 power module via the voltage buses of the terminal modules. The power is also missing for this partial voltage as soon as the voltage of the previous power module is switched off.
- **TM-PF30 S47-C1**
  The terminal module is always positioned at the beginning of an expansion of a safety segment in a new station, e.g. with a change in tier. It accommodates the PM-D F3 power module for delayed switching-off or the PM-D F4 power module for direct switching-off in remote ET 200S stations. The 24-V voltages for the electronics ($V_1$) and for the contactor supply ($V_2$) are provided again. The switch-off command of a back-up ET 200S station is recorded via a safe input. Separate terminals are available for connecting the feedback circuit with the back-up ET 200S station. Safety sensors cannot be connected to this terminal module.
- **TM-PF30 S47-C0**
  The terminal module is used to cascade subordinate safety segments, and accommodates the PM-D F3 power module for delayed switching-off or the PM-D F4 power module. Only the supply voltage $V_2$ for the contactor supply need be connected on this terminal module. The supply with $V_1$ is via the voltage buses of the terminal modules of the previous power modules (partial voltage group). Safety sensors cannot be connected to this terminal module.
- **TM-PF30 S47-D0**
  The terminal module is used to accommodate the PM-D F5 power module. Safe signals can be passed on to external systems on the terminal module via four groups with two redundant safety relay contacts each. The terminal module must always be located between one of the above-mentioned terminal modules and a terminal module for the TM-X connection module. Safety sensors cannot be connected to this terminal module.

### *Terminal module for SIGUARD (TM-X) Connection Module*

For connection of an external infeed contactor (second switch-off possibility) with categories 3 and 4. The SIGUARD connection module is attached on the right next to the last motor starter of a safety segment. The terminals for connecting the positive-action NC contact of the contactor are also present on the TM-X terminal module next to the terminals for connection of the contactor coil. If a contactor with redundant switching is not required, e.g. with category 2 (EN 954-1), the feedback circuit must be closed on these terminals using a jumper. When using external safety relays, it is also used as the interface to the external safety relay instead of the SIGUARD power module.

### *Components required for applications with safety requirements*

| Components required | Safety category acc. to EN 954-1 | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| PM-D | ● | | | |
| TM-P15 S27-01 | ● | | | |
| PM-D F1...5 | | ● | ● | ● 1) |
| TM-PF30 S47-.. | | ● | ● | ● |
| F kit 1/2 | | ● 2) | ● 2) | ● 2) |
| PM-X | | ● | ● | ● |
| TM-X15 S27-01 | | ● | ● | ● |
| Redundantly switching, external infeed contactor | | | ● | ● |

1) PM-D F3 power module only approved up to Category 3

2) F kit required for Standard motor starter only; already integrated into High Feature motor starter

### *Possible combinations of power and terminal modules*

| | PM-D | PM-D F1 | PM-D F2 | PM-D F3 | PM-D F4 | PM-D F5 | PM-X |
|---|---|---|---|---|---|---|---|
| TM-P15 S27-01 | ● | | | | | | |
| TM-PF30 S47-B1 [1)] | | ● | ● | | | | |
| TM-PF30 S47-B0 [2)] | | ● | ● | | | | |
| TM-PF30 S47-C1 [3)] | | | | ● | ● | | |
| TM-PF30 S47-C0 [4)] | | | | ● | ● | | |
| TM-PF30 S47-D0 | | | | | | ● | |
| TM-X15 S27-01 | | | | | | | ● |

1) For F1 or F2 in higher-level or individual safety group (voltage group)

2) For F1 or F2 in lower-level cascaded safety group (partial voltage group)

3) For expansion with F3 or F4 in separate ET 200S station (voltage group)

4) For expansion with F3 or F4 in the same ET 200S station (partial voltage group)

## Technical specifications

### TM-PFX30 S47 terminal module

| | |
|---|---|
| **Dimensions** | |
| Mounting dimensions (W x H x D) in mm | 30 x 196.5 x 102 |
| Depth with power module in mm | 117,5 |
| **Insulation voltages and rated currents** | |
| Insulation voltage in V | 500 |
| Rated operational voltage in V | DC 24 |
| Rated operating current in A | 10 |
| **For conductor cross-sections** | |
| Solid in $mm^2$ | 1 x (0.14 ... 2.5), acc. to IEC 60947<br>1 x 2.5 |
| Finely stranded with end sleeve in $mm^2$ | 1 x (0.14 ... 1.5) acc. to IEC 60947 |
| AWG conductors, solid or stranded | 1 x (18 ... 22) |
| **Wiring** | |
| Tools required | Standard screwdriver size 1 |
| Tightening torque in Nm | 0.4 ... 0.7 |

### TM-P15 S27-01 terminal module

| | |
|---|---|
| **Dimensions** | |
| Mounting dimensions (W x H x D) in mm | 15 x 196.5 x 102 |
| Depth with power module in mm | 117.5 |
| **Insulation voltages and rated currents** | |
| Insulation voltage in V | 500 |
| Rated operational voltage in V | DC 24 |
| Rated operating current in A | 10 |
| **For conductor cross-sections** | |
| Solid in $mm^2$ | 1 x (0.14 ... 2.5), acc. to IEC 60947<br>1 x 2.5 |
| Finely stranded with end sleeve in $mm^2$ | 1 x (0.14 ... 1.5) acc. to IEC 60947 |
| AWG conductor, solid or stranded in $mm^2$ | AWG 1 x (18 ... 22) |
| **Wiring** | |
| Tools required | Standard screwdriver size 1 |
| Tightening torque in Nm | 0.4 ... 0.7 |

### TM-DS45 and TM-DS65/TM-FDS65 terminal modules

| | TM-DS45 | TM-DS65/ TM-FDS65 |
|---|---|---|
| **Dimensions** | | |
| Mounting dimensions (W x H x D) in mm | 45 x 264 x 100 | 65 x 290 x 100 |
| Height with PE/N terminal block in mm | 306 | 332 |
| Depth with motor starter in mm | 127 | 150 |
| Depth with motor starter and F kit (SIGUARD safety system) in mm | 152 | -- |
| Depth with motor starter and 2DI control module in mm | -- | 173 |
| **Rated voltages, currents and frequencies for the power bus** | | |
| Rated insulation voltage $U_i$ in V | 690 | |
| Rated operating voltage $V_{in}$ in V | 500 AC | |
| Rated impulse withstand voltage $U_{imp}$ in kV | 6 | |
| Rated operating current $I_{in}$ in A | 40 | 50 |
| Rated frequency in Hz | 50/60 | |
| **For conductor cross-sections** | | |
| Solid in $mm^2$ | 2 x (1 ... 2.5) or<br>2 x (2.5 ... 6) | |
| Finely stranded with end sleeve in $mm^2$ | 1 x 10 or<br>2 x (1 ... 2.5) or<br>2 x (2.5 ... 6)<br>according to IEC 60947 | |
| AWG conductors, solid or stranded in $mm^2$ | 2 x (14 ... 10) | |
| With additional 3-phase supply terminal if required | | |
| • Solid or stranded in $mm^2$ | 1 x 2.5 ... 25 | |
| • Finely stranded with end sleeve in $mm^2$ | 1 x 2.5 ... 25 | |
| • AWG conductors, solid or stranded in $mm^2$ | 1 x 12 ... 4 | |
| **Wiring** | | |
| Tools required | Standard screwdriver size 2 and Pozidrive 2 | |
| Tightening torque in Nm | 2.0 ... 2.5 | |

## Terminal modules for ET 200S motor starters and frequency converters

### Technical specifications (continued)

#### TM-RS90 and TM-RS130/TM-FRS130 terminal modules

| | TM-RS90 | TM-RS130/TM-FRS130 |
|---|---|---|
| **Dimensions** | | |
| Mounting dimensions (W x H x D) in mm | 90 x 264 x 100 | 130 x 290 x 100 |
| Height with PE/N in mm | 306 | 332 |
| Depth with motor starter in mm | 127 | 150 |
| Depth with motor starter and F kit (SIGUARD safety system) in mm | 152 | -- |
| Depth with motor starter and 2DI control module in mm | -- | 173 |
| **Rated voltages, currents and frequencies for the power bus** | | |
| Rated insulation voltage $U_i$ in V | 690 | |
| Rated operational voltage $V_{in}$ in V | 500 AC | |
| Rated impulse withstand voltage $V_{imp}$ in kV | 6 | |
| Rated operating current $I_{in}$ in A | 40 | 50 |
| Rated frequency in Hz | 50/60 | |
| **For conductor cross-sections** | | |
| Solid in $mm^2$ | 2 x (1 ... 2.5) or 2 x (2.5 ... 6) | |
| Finely stranded with end sleeve in $mm^2$ | 1 x 10 or 2 x (1 to 2.5 ) or 2 x (2.5 to 6) acc. to IEC 60947 | |
| AWG conductors, solid or stranded | 2 x (14 ... 10) | |
| With additional 3-phase supply terminal if required | | |
| • Solid or stranded in $mm^2$ | | |
| • Finely stranded with end sleeve in $mm^2$ | | |
| • AWG conductors, solid or stranded | 1 x 2.5 ... 25<br>1 x 2.5 ... 25<br>1 x 12 ... 4 | |
| **Wiring** | | |
| Tools required | Standard screwdriver size 2 and Pozidrive 2 | |
| Tightening torque in Nm | 2.0 ... 2.5 | |

#### TM-ICU15 terminal module

| | TM-ICU15 terminal module |
|---|---|
| **Dimensions** | |
| Mounting dimensions ( W x H x D) in mm | 15 x 195 x 52 (depth with closed-loop control module 154 mm) |
| **Rated voltages and currents** | |
| Rated insulation voltage $U_i$ in V | 500 AC |
| Rated operating voltage $V_{in}$ in V | 24 DC |
| Rated operating current $I_{in}$ in A | 10 |

#### TM-IPM65 and TM-IPM130 terminal modules

| | TM-IPM65 terminal module | TM-IPM130 terminal module |
|---|---|---|
| **Dimensions** | | |
| Mounting dimensions (W x H x D) in mm | 65 x 290 x 100 | 130 x 290 x 100 |
| Height with PE/N terminal block in mm | 332 | |
| Depth with frequency converter power section in mm | 150 | |
| **Rated voltages, currents and frequencies for the power bus** | | |
| Rated insulation voltage $U_i$ in V | 690 | |
| Rated operating voltage $V_{in}$ in V | 500 AC | |
| Rated impulse withstand voltage $V_{imp}$ in kV | 6 | |
| Rated operating current $I_{in}$ in A | 50 | |
| Rated frequency in Hz | 50/60 | |
| **For conductor cross-sections** | | |
| Solid in $mm^2$ | 2 x (1 ... 2.5) or 2 x (2.5 ... 6) | |
| Finely stranded with end sleeve in $mm^2$ | 1 x 10 or 2 x (1 to 2.5 ) or 2 x (2.5 to 6) acc. to IEC 60947 | |
| AWG conductors, solid or stranded | 2 x (14 ... 10) | |
| With additional 3-phase supply terminal if required | | |
| • Solid or stranded in $mm^2$ | 1 x 2.5 ... 25 | |
| • Finely stranded with end sleeve in $mm^2$ | 1 x 2.5 ... 25 | |
| • AWG conductors, solid or stranded | 1 x 12 ... 4 | |
| **Wiring** | | |
| Tools required | Standard screwdriver size 2 and Pozidrive 2 | |
| Tightening torque in Nm | 2.0 ... 2.5 | |

## Selection and Ordering data

| | Version | Order No. |
|---|---|---|
| | ***Components for standard motor starters*** | |
|  3RK1 903-0AB00 | **Terminal modules**<br>• **TM-DS45-S32**<br>**for DS1-x direct on-line starter**<br>with incoming-feeder connection for power bus<br>incl. three caps for terminating the power bus. | **3RK1 903-0AB00** |
|  3RK1 903-0AB10 | • **TM-DS45-S31**<br>**for DS1-x direct on-line starter,**<br>without supply cable connection for power bus | **3RK1 903-0AB10** |
|  3RK1 903-0AC00 | • **TM-RS90-S32**<br>**for RS1-x reversing starter**<br>with supply cable connection for power bus<br>incl. three caps for terminating the power bus | **3RK1 903-0AC00** |
| | • **TM-RS90-S31**<br>**for RS1-x reversing starter**<br>without supply cable connection for power bus | **3RK1 903-0AC10** |
|  3RK1 903-2AA00 | **PE/N M45-PEN-F terminal block**<br>45 mm wide<br>incl. two caps<br>in conjunction with TM-DS45-S32 / TM-RS90-S32 | **3RK1 903-2AA00** |
|  3RK1 903-2AA10 | **PE/N M45-PEN-S terminal block**<br>45 mm wide<br>in conjunction with TM-DS45-S31 / TM-RS90-S31 | **3RK1 903-2AA10** |

## Terminal modules for ET 200S motor starters and frequency converters

### Selection and Ordering data (continued)

| | Version | Order No. |
|---|---|---|
| | ***Components for High Feature motor starters*** | |
|  3RK1 903-0AK00 | **Terminal modules** | |
| | • **TM-DS65-S32**<br>**for direct on-line starters DS1e-x, DSS1e-x**<br>with supply cable connection for power bus<br>incl. three caps for terminating the power bus | **3RK1 903-0AK00** |
| | • **TM-DS65-S31**<br>**for direct on-line starters DS1e-x, DSS1e-x**<br>without supply cable connection for power bus | **3RK1 903-0AK10** |
| | • **TM-RS130-S32**<br>**for RS1e-x reversing starter**<br>with supply cable connection for power bus<br>incl. three caps for terminating the power bus | **3RK1 903-0AL00** |
| | • **TM-RS130-S31**<br>**for RS1e-x reversing starter**<br>without supply cable connection for power bus | **3RK1 903-0AL10** |
| | **M65-PEN-F power & control module**<br>65 mm wide<br>incl. two caps<br>in conjunction with TM-DS65-S32 / TM-RS130-S32 | **3RK1 903-2AC00** |
| | **M65-PEN-S connection module**<br>65 mm wide<br>in conjunction with TM-DS65-S31 / TM-RS130-S31 | **3RK1 903-2AC10** |
| | ***Components for Failsafe motor starters*** | |
| | **TM-FDS65-S32/S31-01 terminal module**<br>for F-DS1e-x direct on-line starter<br>with coding | |
| | • With supply terminals for power bus (TM-FDS65-S32-01) | **3RK1 903-3AC00** |
| | • Without supply terminals for power bus (TM-FDS65-S31-01) | **3RK1 903-3AC10** |
| | **TM-FRS130-S32/S31-01 terminal module**<br>for F-RS1e-x reversing starter<br>with coding | |
| | • With supply terminals for power bus (TM-FRS130-S32-01) | **3RK1 903-3AD00** |
| | • Without supply terminals for power bus (TM-FRS130-S31-01) | **3RK1 903-3AD10** |
| | **M65-PEN-F infeed module** | **3RK1 903-2AC00** |
| | **M65-PEN-S connection module** | **3RK1 903-2AC10** |

## Selection and Ordering data (continued)

### *Components for frequency converters and Failsafe frequency converters*

| | |
|---|---|
| **TM-ICU15 terminal module**<br>for ICU24 / ICU24F closed-loop control module of the frequency converter | **3RK1 903-3EA10** |
| **TM-IPM65 terminal module**<br>for IPM25 power section, 0.75 kW of frequency converter• | |
| • With supply terminals for power bus (TM-IPM65-S32) | **3RK1 903-3EC00** |
| • Without supply terminals for power bus (TM-IPM65-S31) | **3RK1 903-3EC10** |
| **TM-IPM130 terminal module**<br>for IPM25 power section, 2.2 kW and 4.0 kW of frequency converter | |
| • With supply terminal for power bus (TM-IPM130-S32) | **3RK1 903-3ED00** |
| • Without supply terminal for power bus (TM-IPM130-S31) | **3RK1 903-3ED10** |
| **M65-PEN-F infeed module** | **3RK1 903-2AC00** |
| **M65-PEN-S connection module** | **3RK1 903-2AC10** |

### *Components for SIGUARD safety system for ET 200S motor starters*

3RK1 903-1AA00

| | |
|---|---|
| **Terminal modules** | |
| • **TM-PF30 S47-B1**<br>for PM-D F1/2 power modules<br>with infeed $U_1/U_2$ and sensor connection | **3RK1 903-1AA00** |
| • **TM-PF30 S47-B0**<br>for PM-D F1/2 power modules<br>with sensor connection | **3RK1 903-1AA10** |
| • **TM-PF30 S47-C1**<br>for PM-D F3/4 power modules<br>with infeed $U_1/U_2$ and control input IN+/IN- | **3RK1 903-1AC00** |
| • **TM-PF30 S47-C0**<br>for PM-D F3/4 power modules<br>with infeed $U_2$ | **3RK1 903-1AC10** |
| • **TM-PF30 S47-D0**<br>with PM-D F5 power modules | **3RK1 903-1AD10** |
| • **TM-X15 S27-01**<br>for SIGUARD connection module | **3RK1 903-1AB00** |

### *Components for power modules*

3RK1 903-0AA00

| | |
|---|---|
| **TM-P15 S27-01 terminal module**<br>for PM-D power module | **3RK1 903-0AA00** |
| **TM-PF30 S47-FO terminal module**<br>for PM-D F PROFISAFE power module | **3RK1 903-3AA00** |
| **TM-PFX30 S47-G0/G1 terminal module**<br>for PM-D F X1 power module (infeed terminal module) | |
| • Infeed left (TM-PFX30 S47-G0) | **3RK1 903-3AE10** |
| • Infeed center (TM-PFX30 S47-G1) | **3RK1 903-3AE00** |
| **TM-FCM30 S47-F01 terminal module**<br>for F-CM contact multiplier | **3RK1 903-3AB10** |

## Terminal modules for ET 200S motor starters and frequency converters

### Schematics

#### *Terminal assignment for TM-PF30 S47-F0 Terminal Module (for PM-DF PROFIsafe)*

| Terminal | Short name | Meaning |
|---|---|---|
| 20, 27 | 24 V DC | 24 V DC incoming supply (terminals jumpered internally) |
| 21, 28 | M | Earth for incoming supply (terminals jumpered internally) |

#### *Terminal assignments for TM-PFX30 S47-G0/G1 Terminal Modules (for PM-D F X1)*

| Terminal | Short name | Meaning |
|---|---|---|
| 1, 8 | + IN/OUT | $U_1$ protected 24 V DC, restricted to SIMATIC |
| 2, 9 | M IN/OUT | |
| 3, 10 | -- | Unused |
| 4, 11 | -- | Unused |
| 5, 12 | -- | Unused |
| 6, 13 | L+ | $U_{in}$: for connecting an external power-supply unit |
| 7, 14 | M | DC 24 V SELP/PELV |
| -- | AUX1 | Implemented without a terminal |
| 15, 22 | SG1 | |
| 16, 23 | SG2 | |
| 17, 24 | -- | unused |
| 18, 25 | SG3 | |
| 19, 26 | SG4 | |
| 20, 27 | SG5 | |
| 21, 28 | SG6 | |

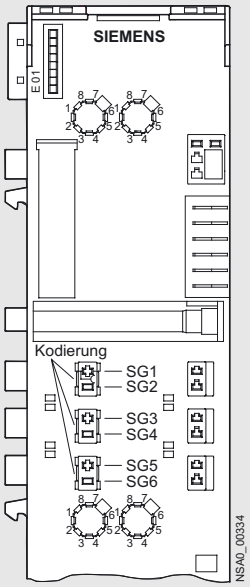
#### *Terminal assignments for TM-FCM30 S47-F0 Terminal module (for F-CM)*

The table shows the terminal assignment for the TM-FCM30 S47-F01 for the F-CM contact multiplier. The left half of the terminal module is used to assign the contact multiplication outputs to the desired failsafe safety group. Only one safety group can be coded. Multiple coding will be detected as a cross-circuit by the PM-D F. The F-CM can also be installed in conjunction with the PM-D F X1 Power Module.

| Terminal | Short name | Meaning |
|---|---|---|
| 1, 8 | SG1 | Jumper for coding safety group 1 |
| 2, 9 | SG2 | Jumper for coding safety group 2 |
| 4, 11 | SG3 | Jumper for coding safety group 3 |
| 5, 12 | SG4 | Jumper for coding safety group 4 |
| 6, 13 | SG5 | Jumper for coding safety group 5 |
| 7, 14 | SG6 | Jumper for coding safety group 6 |
| 15 | OUT1.1 | Floating relay output 1.1 |
| 16 | OUT1.2 | Floating relay output 1.2 |
| 22 | OUT2.1 | Floating relay output 2.1 |
| 23 | OUT2.2 | Floating relay output 2.2 |
| 25 | OUT3.1 | Floating relay output 3.1 |
| 26 | OUT3.2 | Floating relay output 3.2 |
| 27 | OUT4.1 | Floating relay output 4.1 |
| 28 | OUT4.2 | Floating relay output 4.2 |

## Schematics (continued)

### *Terminal assignments for TM-FDS65-S32/S31-01 / TM-FDS130-S32/S31-01 Terminal Module (for F-DS1e-x / F-RS1e-x)*




The terminal assignments of the terminal modules for safe motor starters correspond to the terminal assignments of the 45 mm and 65 mm terminal modules. The terminal modules for safe motor starters have, in addition, a coding module. The coding module makes it possible to assign the failsafe motor starter to one of the six safety groups.

The terminal module contains three coding keys which completely cover the three coding openings in the terminal module. The labelled coding key contains the tap to the busbar in the chamber labelled with the line; the coding keys that are not labelled only serve to cover the coding openings. When the module is delivered, safety group 1 (AG1 or SG1) is coded. By removing the coding key and rotating it by 180°, safety group 2 can be coded. Safety group 3 can be coded by swapping the labelled and unlabelled coding keys. The oblique line on the labelled coding key must be aligned with the line of the desired safety group (busbar symbol).

## Accessories for motor starters and frequency converters

### Technical specifications

| | Brake control module | | | |
|---|---|---|---|---|
| | **xB1** | **xB3** | **xB2** | **xB4** |
| Dimensions (W x H x D) in mm | 15 x 196.5 x 125.5<br>incl. terminal module on 7.5-mm DIN rail | | | |
| Number of occupied outputs of (left) motor starter | 1 | | | |
| Rated operational voltage in V | 24 DC | | 500 DC (min. 100) | |
| Power supply | External via terminal module | | From brake rectifier via terminal module | |
| Rated operating current in A | 4 | | 0.7 | |
| Reverse polarity protection | No, the brake is triggered by a reverse polarity, and the overload/short-circuit protection is ineffective | | | |
| Overload/short-circuit protection | Yes, electronic | | | |
| Conductor cross-section of terminal module for brake control module in $mm^2$ | 1 x 2.5 without connector sleeve<br>1 x 1.5 with connector sleeve | | | |
| Number of outputs | 0 | 1 (used internally) | 0 | 1 (used internally) |
| Number of inputs | 0 | 2 | 0 | 2 |
| Address space required per module | | | | |
| • With summary | 0 | 2 bit | 0 | 2 bit |
| • Without summary | 0 | 1 byte | 0 | 1 byte |
| Diagnostics functions | | | | |
| • Group fault SF | red LED | | | |
| • Switching status of brake STAT | Yellow LED | | | |
| • Inputs 1 and 5 | -- | Green LED | -- | Green LED |
| Parameter (default value underlined) | | | | |
| • Diagnostics of brake overload | -- | Lock/<br>release | -- | Lock/<br>release |
| • Input delay in ms | -- | 0 / 0,1 / 0,5 / 3 / 15 | -- | 0 / 0,1 / 0,5 / 3 / 15 |
| Module width in mm | 15 | | | |

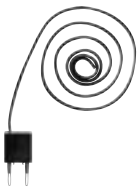
### Selection and Ordering data

***Accessories for Standard motor starters***

3RK1 903-0CA00

**Control kit**
for manually operating the contactor contacts during start-up and servicing
(one set contains five control kits)

**3RK1 903-0CA00**



3RK1 903-0CG00

**Control unit**
for direct control of contactor (manual control)
24 V DC

**3RK1 903-0CG00**

3RK1 903-0CD00

**DM-V15 distance module**
**for DS1-x direct-on-line starters with high temperature or current load**
15 mm wide

**3RK1 903-0CD00**

## Selection and Ordering data (continued)

### *Accessories for High Feature motor starters*


3RK1 903-0CH20

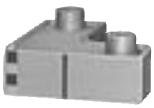
**Control module 2DI 24 V DC COM** — **3RK1 903-0CH20**
Digital input module with two inputs for local motor starter functions
For mounting on front of motor starter
Operating voltage 24 V DC (fed from $V_1$),
short-circuit-proof, floating contact with serial interface
for connection of Switch ES
Connection via LOGO! PC cable,
max. permissible cable length (forward and return) 50 m

**LOGO PC cable** — **6ED1 057-1AA00-0BA0**
For connecting the High Feature motor starter
with Switch ES interface to a PC

### *Accessories for Standard / High Feature motor starters and frequency converters*


3RK1 903-0AH00

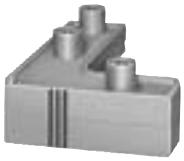
**M15-PEN15 bridge block** — **3RK1 903-0AH00**
15 mm wide
For bridging a 15 mm module


3RK1 903-0AJ00

**M30-PEN bridge block** — **3RK1 903-0AJ00**
30 mm wide
For bridging a 30 mm module


3RK1 903-0AE00

**M15-L123 bridge block** — **3RK1 903-0AE00**
15 mm wide
For bridging a 15 mm module


3RK1 903-0AF00

**M30-L123 bridge block** — **3RK1 903-0AF00**
30 mm wide
For bridging a 30 mm module


3RK1 903-0CB00

**Brake control modules**
For motors with a mechanical brake

- **xB1 for motor starters and frequency converters** — **3RK1 903-0CB00**
  24 V DC / 4 A
- **xB2 for motor starters and frequency converters** — **3RK1 903-0CC00**
  500 V DC / 0.7 A
- **xB3 for motor starters** — **3RK1 903-0CE00**
  24 V DC / 4 A / 2 DI 24 V DC local control
  With diagnostics
  With two inputs
- **xB4 for motor starters** — **3RK1 903-0CF00**
  500 V DC / 0.7 A / 2 DI 24 V DC local control
  With diagnostics
  With two inputs


3RK1 903-0AG00

**Terminal module for brake control module**

- **TM-xB15 S24-01** — **3RK1 903-0AG00**
  for xB1 or xB2
- **TM-xB215 S24-01** — **3RK1 903-0AG01**
  for xB1 ... 4

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## Accessories for motor starters and frequency converters

### Selection and Ordering data (continued)

*Accessories for Standard / High Feature motor starters and frequency converters* (continued)

| | |
|---|---|
| **EMC filter for frequency converter**<br>For achieving EMC Class A; is connected before shared power bus of frequency converters, installation must comply with EMC guidelines (shielded motor cables) | |
| • 25 A rated current | **6SL3 203-0BE22-5AA0** |
| • 50 A rated current | **6SL3 203-0BE25-0AA0** |
| **MMC parameter memory for frequency converter**<br>Matches the MMC slot of the ICU24 / ICU24F closed-loop control module; other memory cards are not accepted | **6SL3 254-0AM00-0AA0** |
| **RS 232/zero modem cable (5 m)**<br>Cable for commissioning the ET 200S FC frequency converter using the PC tool "STARTER" | **6ES7 901-1BF00-0XA0** |

*ET 200S FC frequency converter documentation*

| | |
|---|---|
| **Instruction Manual + Lists Manual for ET 200S FC frequency converter** | |
| • German | **6SL3 298-0CA12-0AP0** |
| • English | **6SL3 298-0CA12-0BP0** |
| **Instruction Manual + Lists Manual for ET 200S FC frequency converter + ET 200S Manual** | |
| • German | **6SL3 298-0CA12-1AP0** |
| • English | **6SL3 298-0CA12-1BP0** |
| **CD-ROM with documentation (STARTER etc.) Multilanguage** | **6SL3 298-0CA11-1MG0** |

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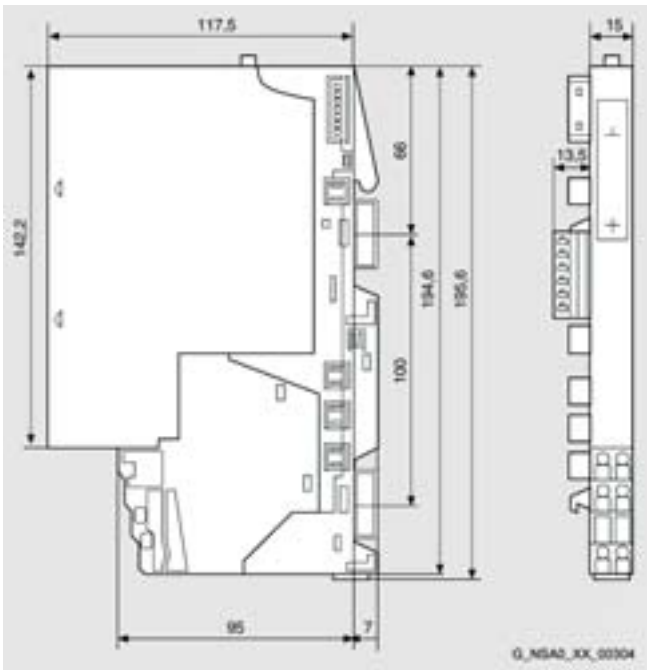
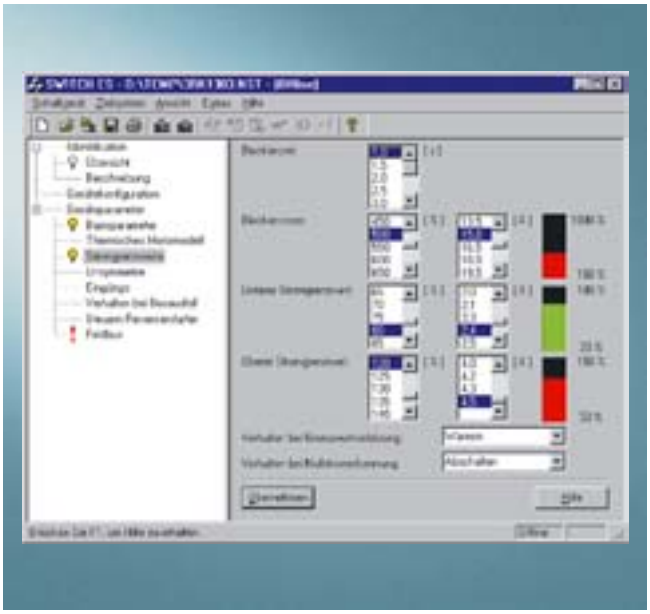
### Dimension drawings




xB1 Brake control module ... 4 with TM-xB215 terminal module

## Overview



Switch ES motor starter is used for start-up, parameterization, diagnostics, documentation and for preventative maintenance of the High Feature motor starters of the SIMATIC ET 200S and ECOFAST product families.

Interfacing is performed

- either via the serial device interface (applies to ET 200S / ECOFAST) or
- with PROFIBUS DP V1 capable motor starters from any point in Profibus (for ECOFAST).

Using Switch ES motor starter, the communication capable motor starters are easily parameterized during start-up, monitored during normal operation and successfully diagnosed for service purposes. Preventative maintenance is supported by a function for reading out diverse statistical data (e.g. operating hours, operating cycles, cut-off currents, etc.). The user is supported during these procedures with comprehensive Help functions and plain text displays.

Switch ES motor starter can either be used as a stand-alone program or it can be integrated into STEP 7 V5.1 SP3 upwards via an object manager.

The following components are required for a serial connection:

ET200S High Feature motor starters:

- 2DI 24V COM control module 3RK1903-0CH10
- LOGO PC cable 6ED1057-1AA00-0BA

ECOFAST High Feature motor starters (interface line):

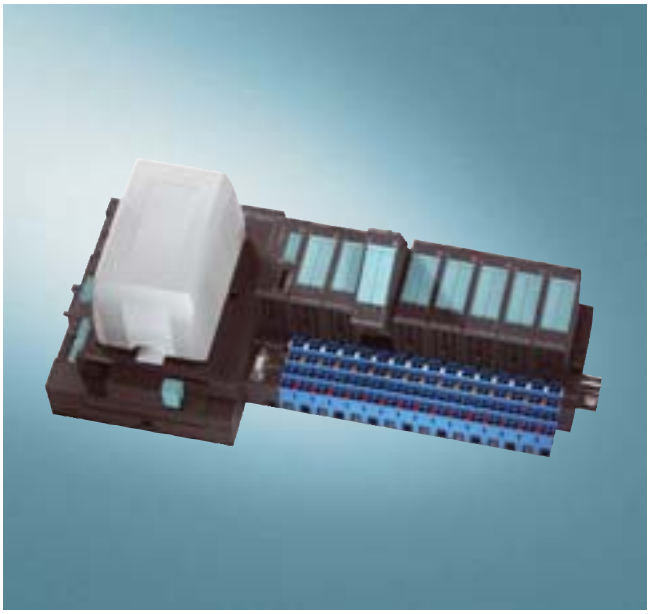
- PC cable 3RK1911-0BN20

## Ordering data

| | Order No. |
|---|---|
| **Switch ES motor starter** consisting of: | **3ZS1 310-0CC20-0YA0** |
| • Switch ES motor starter for parameterizing, monitoring, diagnosing and testing the ECOFAST motor starters and SIMATIC ET200S High Feature starters via PROFIBUS DP with online help German/English switchable Runs on Windows 2000/XP System requirements: PROFIBUS DP interface: CP 5411 (ISA), CP 5412 (ISA), CP 5511 (PCMCIA), CP 5611 (PCI), Smart Cable for serial communication through a serial interface and teleservice, CP 5613 and CP 5614 (new CP card) and MPI interface on PG7xx and its driver software, CD-ROM drive | |
| • STEP 7 object manager For integrating the ECOFAST starters as S7 slaves into SIMATIC S7 For calling Switch ES from STEP 7 System requirements: SIMATIC S7/M7/C7/PCS7, STEP 7 (Version 5.0 or higher), CD-ROM drive | |

## General

### Overview



- Highly modular distributed I/O system with degree of protection IP30
- Suitable for operation in hazardous zone 1
- Increased-safety type according to CENELEC: EEx de ib [ia/ib] IIB/IIC T4 or FM Class I Division 2 Group A-D T4 (Division 1 Zone 1)
- Design and version according to ATEX 100 a
- Connection of intrinsically safe signals for gas (from Zone 2, 1 or 0)
- Connection of intrinsically safe signals for dust (from Zone 20, 21 or 22)
- Intrinsically safe design of electronic modules
- Intrinsically safe PROFIBUS connection
- Replacement of all electronic modules (as well as power supply and bus connection modules) when live during runtime and under hazardous conditions in zone 1 (hot swapping)
- Function orientated station design with up to 32 electronic modules per station
- Optimum integration of HART field devices (HART transparency)
- Powerfail-proof storage of manufacturer and user data on the electronic modules
- All information/data required for operation/ startup run(s) through PROFIBUS, no service bus required
- Better diagnosis options and shorter commissioning times in comparison to conventional design
- Optimized for operation with PCS 7, open for operation with other process control systems
- No tools required to replace modules
- Hard-wired
- Spring-loaded or screw-type connection system for connection of sensors available
- Mechanically coded electronic modules

### Application

The ET 200iS distributed I/O system has degree of protection IP30.

It is used wherever explosion protection for gases and dusts is required in compliance with

- CENELEC II 2 G EEx de ib [ib/ia] IIC/IIB T4 or
- FM Class I, II Division 2 Group A-D T4 or
- FM Class I, II Zone 1, Aex de [ib/ia] IIC T4

The ET 200iS system has been designed in accordance with the new ATEX 100A guideline which must be complied with when new devices for potentially explosive atmospheres are introduced onto the European market.

The design of the system allows it to be used under high mechanical loads i.e. on oil platforms.

The system consists of terminal modules to which the corresponding functional units such as the power supply, interface module and electronic modules are connected.

This modular design ensures optimal adaptation to the plant-specific installation requirements in potentially explosive atmospheres. This ensures fast hot-swapping of individual functional units. In the case of a fault, only small parts of the plant are affected since only a few channels are processed in a module.

Using a ET 200iS station can save significant costs compared with a conventional design. Isolating transformers and sub-distribution boards are no longer required and the cabling outlay is reduced since the station functions in a similar way to a local modular terminal. Commissioning and troubleshooting are simplified by the comprehensive diagnosis options.

In addition to the analog input modules and analog output modules with and without HART functionality, the existing product range of I/O modules also includes digital I/O modules whose functionalities are configurable.

The system has been designed to function optimally with SIMATIC S7 and SIMATIC PCS 7. It can also be used with other process control systems and SIMATIC S5 via an interface using a GSD file.

## Design

An ET 200iS distributed I/O station (= remote I/O) comprises:

- One terminal module for the power supply unit and corresponding power supply module, degree of protection EX d (flameproof enclosure)
- One terminal module for PROFIBUS interface connection and corresponding IM 151-2 interface module
- Up to 32 terminal modules for the electronic modules, as well as plug-in digital and analog electronic modules
- One terminating module, included in the scope of supply of the IM 151-2.

In accordance with the above list, the station is assembled on a 35 x 15 mm standard rail, starting with the terminal module of the power supply unit, followed by the terminal module for the PROFIBUS interface, followed by the selected terminal modules for the electronic submodules.

The configured terminal modules support implementation and testing of the wiring without any electronic modules.

The relevant electronic modules are plugged in the terminal modules.

On initial installation, the implemented electronic modules are uniquely coded mechanically.

No tools required for assembly of the terminal and electronic modules.

The maximum configuration is limited by the 32 electronic modules, which corresponds to a maximum station length of 117 cm.

The maximum possible number of modules can be limited through the current consumption of the implemented modules. Up to 17 modules can be implemented without restrictions, configuration rules must be heeded in the case of greater degrees of expansion.

PROFIBUS must be run intrinsically safely in hazardous areas through installation of a suitable field bus isolating transformer.

The 24 V connection to the power supply terminal is implemented using increased-safety type terminals. This connection must not be disconnected under potentially explosive conditions. The incoming power supply must be installed in a safe area.

Installation in increased-safety type housing is required for operation in potentially explosive environments.

**Accessories:**

The following accessories are available for the ET 200iS:

- Shield connecting element for connection of cable shielding
- Perforated DIN A4 labeling sheets in various colors, for labeling electronic modules, machine-printable
- Color-coded signs to customize coding of the process terminals
- Slot number plates for identifying the terminal modules

## Function

### *Operating mode*

Through PROFIBUS DP (up to 1.5 Mbit/s), a central PLC can access the electronic modules of the ET 200iS station like a central I/O module. Communication is handled by the master interface in the central PLC and the interface module of the ET 200iS (= IM 151-2). The diagnostics integrated in the system reduce startup and debugging times.

The physical bus setup for devices in hazardous areas requires special protective measures. The method of the intrinsically safe PROFIBUS has been selected for ET 200iS. This requires the splitting and current limiting of the bus in the safe area.

A commercially available "field bus isolating transformer" is used for this purpose and must be installed in the safe area. This converts the PROFIBUS DP to an intrinsically safe PROFIBUS DP, which allows modules to be plugged and pulled – even under potentially explosive conditions.

### *Configuration*

An ET 200iS station can be connected to higher level PLCs as a DP-V0 or DP-V1 slave.

In an S7/ PCS7 environment, configuration of an ET 200iS station is executed using SIMATIC STEP7 hardware manager. This defines the station design (which module where).

The properties of the implemented modules are defined through PDM (Process Device Manager).

This software is opened by double-clicking one of the implemented modules/stations. The parameters of this module can then be defined in the PDM mask, such as alarm limits for analog modules, sensor selection for digital modules, settings for the release of analog values and the output of HART commands for analog HART modules.

A comparison is then carried out between S7 hardware manager and PDM on the configured modules.

### *Software requirements*

- SIMATIC STEP 7,
  Version 5.1 + SP2/HF1 and PDM V5.1 + SP1

In all other applications, the configuration of the station must be relayed to the PROFIBUS DP network through the GSD file.

In this case, parameterization is also carried out through PDM, whereby a comparison of the configuration between PDM and GSD file is not possible. It is not possible to commission a ET 200iS without the PDM configuration software.

So that the necessary components for starting the project are available, the user is offered a ET 200iS starter package. This package contains a power supply and Profibus interface module, each with a terminal module, a RS 485-iS transceiver with terminator, and the required PDM packages for configuring the ET 200iS.

## Technical specifications – general

| | |
|---|---|
| Degree of protection | IP30 |
| Ambient temperature | - 20 °C to + 60 °C |
| Vibration-proof | 2 *g*, continuous,<br>5 *g* part time |
| **Standards and approvals** | |
| • PROFIBUS | EN 50170, Volume 2 |
| • EU directive | 94/9/EC (ATEX 100a) |
| • CENELEC | II 2 G EEx d e[ib/ia] IIC/IIB T4 |
| • UL and CSA | Class I, Zone 1, AEx de [ib/ia] IIC T4, Ex de [ib/ia] IIC T4<br>Class I, Division 2, Groups A, B, C and D T4 Hazardous Locations |
| • FMs | Class I, Zone 1, AEx de [ib/ia] IIC T4, Ex de [ib/ia] IIC T4<br>Class I, Division 2, Groups A, B, C and D Hazardous Locations |
| • IEC | IEC61131, Part 2 |
| • CE | According to 89/336/EEC<br>According to 73/23/EEC |

# IM 151-2 interface module and terminal module

## Overview

- The IM 151-2 interface module is plugged into the corresponding terminal module TM-IM-iS (to be ordered separately).
- The IM 151-2 interface module has the following properties:
  - Connects the ET 200iS to PROFIBUS DP
  - Prepares data for the fitted electronic modules
  - The PROFIBUS address of ET 200iS can be adjusted by switch
- Shutting down the 24 V DC supply voltage at the terminal module TM-PS also shuts down the IM 151-2 interface module.
- The maximum address size is 128 byte inputs and 128 byte outputs.



## Technical specifications

| | |
|---|---|
| Baud rates | 9.6; 19.2; 45.45; 93.75; 187.5; 500 kbit/s, 1.5 Mbit/s |
| Bus driver | PROFIBUS DP |
| interface | RS 485 (with barrier) |
| SYNC capability | Yes |
| FREEZ capability | Yes |
| PROFIBUS addresses | 1 to 125 permissible |
| Direct data exchange | Yes, slave-to-slave as publisher |
| Isochronicity | No |
| Time stamping | |
| • Accuracy class | 10 ms |
| • Time resolution | 1 ms |
| • Number of digital input signals, max. | 128 |
| • Message buffer | 15 message buffers each with max. 20 messages |
| • Time interval for sending to message buffer if a message has arrived | 1 s |
| • Time stamp | Per digital input<br>Per digital input module<br>Overall ET 200iS |
| • Time stamp for | Rising/falling pulse edge as incoming or outgoing signal |
| • Clock format | RFC 1119 Internet (ISP) |

| | |
|---|---|
| Acyclic function | |
| • Interrupts | Yes |
| • Parameters | Yes |
| Redundancy IM 151-2 | Available soon |
| Type of protection of module | |
| • CENELEC | II2G EEx ib IIC T4, $T_U$ = -20 °C to +60 °C ($T_U$ = +40° for vertical mounting) |
| • UL and CSA | Class I, Zone 1, Aex ib IIC T4, Ex ib IIC T4<br>Class I, Division 2, Groups A, B, C and D T4 |
| • FMs | Class I, Division 2 Group A-D T4<br>or<br>Class I, Zone 1, Aex ib IIC T4 $T_U$ = -20 °C to +60 °C |
| **Status, interrupts, diagnostics** | |
| Diagnostic functions | Yes |
| Group error | Red LED SF |
| Bus monitoring | Red LED BF |
| Monitoring the supply voltage for the electronics | Green LED ON |

## IM 151-2 interface module and terminal module

| Ordering data | Order No. |
|---|---|
| **ET200iS-IM151-2** | **6ES7 151-2AA00-0AB0** |
| IM151-2 including terminal module | |
| **TM-IM-iS** | **6ES7 193-5DB00-0AA0** |
| Terminal module for IM151-2 | |
| ***Accessories*** | |
| **Equipment Manual ET 200iS** | |
| • German | **6ES7 151-2AA00-8AA0** |
| • English | **6ES7 151-2AA00-8BA0** |
| • French | **6ES7 151-2AA00-8CA0** |
| **Plug connector** | |
| PROFIBUS connector with passive terminating resistance<br>For RS 485-IS circuit; 1.5 Mbit/s | **6ES7 972-0DA30-0XA0** |
| PROFIBUS plug connector<br>For the intrinsically safe PROFIBUS, 1.5 Mbit/s | **6ES7 972-0BA30-0XA0** |
| **RS 485-IS segment**<br>Isolating transition for coupling PROFIBUS DP to PROFIBUS RS 485-IS | **6ES7 972-0AC80-0XA0** |
| **Shield connecting elements**<br>Ordering quantity: 5 units, can be plugged onto TM-E | **6ES7 193-4GA00-0AA0** |
| **Sheet of labels**<br>DIN A4, perforated, consisting of 10 sheets each with 30 labels for electronic modules and 20 labels for IM 151 | |
| • Petrol | **6ES7 193-4BH00-0AA0** |
| • Red | **6ES7 193-4BD00-0AA0** |
| • Yellow | **6ES7 193-4BB00-0AA0** |
| • Light beige | **6ES7 193-4BA00-0AA0** |
| **Color-coded labels**<br>Order quantity 1 set of 200 labels of each color. Colors: light beige, yellow/green, red, brown, blue, turquoise for TM-E | **6ES7 193-4LA10-0AA0** |

| | Order No. |
|---|---|
| **Identification labels, inscribed**<br>Order quantity 1 set of 200 of each color for slot numbering | |
| • 10 x Slot 1 to 2 | **8WA8 861-0AB** |
| • 5 x Slot 1 to 40 | **8WA8 861-0AC** |
| • 1 x Slot 1 to 64<br>2 x Slot 1 to 68 | **8WA8 861-0DA** |
| **Identification labels, blank**<br>Order quantity 1 set of 200 of each color for slot numbering | **8WA8 848-2AY** |
| **Stainless steel casing IP66 for hazardous Zone 1 with safety class EEx e**<br>Empty casing without mounted modules | |
| • 600 x 400 x 230 wall box for mounting up to 10 ET 200iS modules | **6DL2 804-0AA00** |
| • 800 x 400 x 230 wall box for mounting up to 16 ET 200iS modules | **6DL2 804-0AB00** |
| • 1050 x 400 x 230 wall box for mounting up to 25 ET 200iS modules | **6DL2 804-0AC00** |
| Box for mounting an ET 200iS systems | |
| • 600 x 400 x 230 wall box for mounting an ET 200iS [1] with up to 10 I/O modules | **6DL2 804-1AA00** |
| • 800 x 400 x 230 wall box for mounting an ET 200iS [1] with up to 10 I/O modules | **6DL2 804-1AB00** |
| • 1050 x 400 x 230 wall box for mounting an ET 200iS [1] with up to 10 I/O modules | **6DL2 804-1AC00** |

1) The ET 200iS components must be ordered separately.

## Digital electronic modules and terminal modules

### Overview

- The electronic modules are plugged into the corresponding terminal modules TM-E30S-44iS (screw-type terminal) or TM-E30C-44iS (cage-clamp method) (to be ordered separately).
- When plugged in, the modules are mechanically given a unique code automatically.
- Modules can be replaced under potentially explosive conditions during runtime.



### Technical specifications

| | Digital input 4 x DI Namur | Digital output 2 x 25 V/25 mA |
|---|---|---|
| Number of inputs | 4 | 2 |
| Type of protection | | |
| • CENELEC | II2 (1) G EEx ib [ia] IIC T4;<br>$T_U$ = -20 °C to +60 °C<br>($T_U$ = +40 °C for vertical mounting) | II2 (1) G EEx ib [ia] IIC T4;<br>$T_U$ = -20 °C to +60 °C<br>($T_U$ = +40 °C for vertical mounting) |
| • UL and CSA | Class I, Zone 1, AEx ib [ia] IIC T4, Ex ib [ia] IIC T4<br>Class I, Division 2, Groups A, B, C and D T4<br>Providing intrinsically safe circuits for use in<br>Class I, Division 1, Groups A, B, C and D<br>Class II, Division 1, Groups E, F and G | Class I, Zone 1, AEx ib [ia] IIC T4, Ex ib [ia] IIC T4<br>Class I, Division 2, Groups A, B, C and D T4<br>Providing intrinsically safe circuits for use in<br>Class I, Division 1, Groups A, B, C and D<br>Class II, Division 1, Groups E, F and G |
| • FMs | Class I, Division 2, Group A-D T4<br>or<br>Class I, Zone 1, AEx ib [ia] IIC T4<br>Providing intrinsically safe circuits for use in<br>Class I, II, III, Division 1, Groups A, B, C, D, E, F, G<br>$T_U$ = -20 °C to +60 °C | Class I, Division 2, Group A-D T4<br>or<br>Class I, Zone 1, AEx ib [ia] IIC T4<br>Providing intrinsically safe circuits for use in<br>Class I, II, III, Division 1, Groups A, B, C, D, E, F, G<br>$T_U$ = -20 °C to +60 °C |
| **Voltages, currents and potentials** | | |
| Number of inputs/outputs which can be used simultaneously | 4 | 2 |
| • horizontal mounting up to 60 °C | 4 | 2 |
| • all other mounting positions up to 40 °C | 4 | – |
| Electrical isolation | | |
| • Between channels and backplane bus | Yes | Yes |
| • Between channels | No | No |
| • Between the channels and the load voltage (Powerbus) | Yes | Yes |
| • Between the load voltage (Powerbus) and the backplane bus | Yes | Yes |
| Permissible potential difference | | |
| • Between various electrical circuits | 60 V DC; 30 V AC | 60 V DC; 30 V AC |
| Isolation tested at | | |
| • Channels against backplane bus and load voltage (Powerbus) | 500 V AC | 500 V AC |
| • Load voltage (Powerbus) against backplane bus | 500 V AC | 500 V AC |

## Technical specifications (continued)

| | Digital input 4 x DI Namur | Digital output 2 x 25 V/25 mA |
|---|---|---|
| Status display | | |
| • Inputs/outputs | Green LED per channel | Green LED per channel |
| Interrupts | | |
| • Process interrupt | No | No |
| • Diagnostics interrupt | yes, configurable | yes, configurable |
| Diagnostic function | | |
| • Group fault display | Red LED "SF" | Red LED "SF" |
| • Diagnostics information | Yes | Yes |
| **Data for selecting an encoder** | | |
| Input current for NAMUR encoder | acc. to NAMUR or EN 50227 | |
| • For "1" signal | 2.1 mA to 7 mA | |
| • For "0" signal | 0.35 mA to 1.2 mA | |
| Input current for a contact connected to 10 kΩ | | |
| • For "1" signal | 2.1 mA to 7 mA | |
| • For "0" signal | 0.35 mA to 1.2 mA | |
| Input current for an unconnected contact | | |
| • For "1" signal | Typ. 8.2 mA | |
| • Acceptable quiescent current | 0.5 mA | |
| Input delay | | |
| • For "0" after "1" | 2.8 to 3.5 ms | |
| • For "1" after "0" | 2.8 to 3.5 ms | |
| Tolerated switching time for changeover contacts | 300 ms | |
| Parallel connection of inputs | No | |

## Digital electronic modules and terminal modules

| Ordering data | Order No. |
|---|---|
| **4 DI NAMUR digital input module**<br>4 x DI Namur | **6ES7 131-5RD00-0AB0** |
| **2 DO 25 V DC/25 mA digital output module**<br>2 x DO 25 V DC/25 mA | **6ES7 132-5SB00-0AB0** |
| **TM-E30S-44iS**<br>Terminal module E30S (screw-type terminal) | **6ES7 193-5CB00-0AA0** |
| **TM-E30C-44iS**<br>Terminal module E30C (spring-loaded terminal) | **6ES7 193-5CB10-0AA0** |
| ***Accessories*** | |
| **Equipment Manual ET 200iS** | |
| • German | **6ES7 151-2AA00-8AA0** |
| • English | **6ES7 151-2AA00-8BA0** |
| • French | **6ES7 151-2AA00-8CA0** |
| **Plug connector** | |
| **PROFIBUS connector with passive terminating resistance**<br>For RS 485-IS circuit; 1.5 Mbit/s | **6ES7 972-0DA30-0XA0** |
| **PROFIBUS plug connector**<br>For the intrinsically safe PROFIBUS, 1.5 Mbit/s | **6ES7 972-0BA30-0XA0** |
| **RS 485-IS segment**<br>Isolating transition for coupling PROFIBUS DP to PROFIBUS RS 485-IS | **6ES7 972-0AC80-0XA0** |
| **Shield connecting elements** | On request |
| **Sheet of labels**<br>DIN A4, perforated, consisting of 10 sheets each with 30 labels for electronic modules and 20 labels for IM 151 | |
| • Petrol | **6ES7 193-4BH00-0AA0** |
| • Red | **6ES7 193-4BD00-0AA0** |
| • Yellow | **6ES7 193-4BB00-0AA0** |
| • Light beige | **6ES7 193-4BA00-0AA0** |

| | Order No. |
|---|---|
| **Color-coded labels**<br>Order quantity 1 set of 200 labels of each color. Colors: light beige, yellow/green, red, brown, blue, turquoise for TM-E | **6ES7 193-4LA10-0AA0** |
| **Identification labels, inscribed**<br>Order quantity 1 set of 200 of each color for slot numbering | |
| • 10 x Slot 1 to 2 | **8WA8 861-0AB** |
| • 5 x Slot 1 to 40 | **8WA8 861-0AC** |
| **Identification labels, blank**<br>Order quantity 1 set of 200 of each color for slot numbering | **8WA8 848-2AY** |
| **Stainless steel casing IP66 for hazardous Zone 1 with safety class EEx e**<br>Empty casing without mounted modules | |
| • 600 x 400 x 230 wall box for mounting up to 10 ET 200iS modules | **6DL2 804-0AA00** |
| • 800 x 400 x 230 wall box for mounting up to 16 ET 200iS modules | **6DL2 804-0AB00** |
| • 1050 x 400 x 230 wall box for mounting up to 25 ET 200iS modules | **6DL2 804-0AC00** |
| Box for mounting an ET 200iS systems | |
| • 600 x 400 x 230 wall box for mounting an ET 200iS [1] with up to 10 I/O modules | **6DL2 804-1AA00** |
| • 800 x 400 x 230 wall box for mounting an ET 200iS [1] with up to 10 I/O modules | **6DL2 804-1AB00** |
| • 1050 x 400 x 230 wall box for mounting an ET 200iS [1] with up to 10 I/O modules | **6DL2 804-1AC00** |

1) The ET 200iS components must be ordered separately.

## Overview

- The electronic modules are plugged into the corresponding terminal modules TM-E30S-44iS (screw-type terminal) or TM-E30C-44iS (cage-clamp method) (to be ordered separately).
- When plugged in, the modules are automatically uniquely coded mechanically.
- Modules can be replaced under potentially explosive conditions during runtime.

## Technical specifications

| | **Analog input 2 AI 2DMU/ analog input 2 AI, 4DMU** |
|---|---|
| Number of inputs | 2 |
| **Type of protection** | |
| • CENELEC | II 2 G (1) GD EEx ib [ia] IIC T4; $T_U$ = -20 °C to +60 °C ($T_U$ = +40 °C for vertical mounting) |
| • UL and CSA | Class I, Zone 1, AEx ib [ia] IIC T4, Ex ib [ia] IIC T4<br>Class I, Division 2, Groups A, B, C and D T4<br>Providing intrinsically safe circuits for use in Class I, Division 1, Groups A, B, C and D<br>Class II, Division 1, Groups E, F and G |
| • FMs | Class I, Division 2, Group A-D T4 or Class I, Zone 1, AEx ib [ia] IIC T4<br>Providing intrinsically safe circuits for use in Class I, II, III, Division 1, Groups A, B, C, D, E, F, G<br>$T_U$ = -20 °C to +60 °C |
| Galvanic isolation | |
| • Between channels and backplane bus | Yes |
| • Between channels | No |
| • Between the channels and the load voltage (Powerbus) | Yes |
| • Between the load voltage (Powerbus) and the backplane bus | Yes |
| Permissible potential difference | |
| • Between the inputs ($U_{CM}$) | 60 V DC; 30 V AC |
| Isolation tested at | 500 V AC |

| | **Analog input 2 AI 2DMU/ analog input 2 AI, 4DMU** |
|---|---|
| **Analog value generation** | |
| Measuring principle | Integrating |
| Integration and conversion time/resolution (per channel) | |
| • Configurable | Yes |
| • Integration time | 16.7 ms; 20 ms |
| • Basic conversion time incl. integration time (per channel) | 22 ms 25 ms |
| • Additional conversion time for open-circuit monitoring | 5 ms |
| • Resolution (incl. overrange) | 12-bit |
| • Interference frequency suppression | 60 Hz 50 Hz |
| Filtering of the measured values | yes, configurable in 4 steps (step of the time constant):<br>• none, 1 x cycle time<br>• weak, 4 x cycle time<br>• medium, 32 x cycle time<br>• strong, 64 x cycle time |
| Basic execution time of the module | = basic conversion time x number of activated channels of the module |
| **Interference suppression, error limits** | |
| Interference voltage suppression for f = n x (f1 ±1%), (f1 = interference frequency) | |
| • Series-mode interference (peak value of disturbance < rated value of input range) | min. 70 dB |
| Crosstalk between the inputs | min. –50 dB |
| Operational limit (for the whole temperature range with reference to the input range) | ±0.15% |
| Basic error limit for 25 °C with reference to the input range) | ±0.1% |

## Technical specifications (continued)

| | Analog input 2 AI 2DMU/ analog input 2 AI, 4DMU |
|---|---|
| **Status, interrupts, diagnostics** | |
| Interrupts | |
| • Limit value alarm | yes, configurable |
| • Diagnostics interrupt | yes, configurable |
| Diagnostic functions | |
| • Group error display | Red LED "SF" |
| • Diagnostics information can be read out | Yes |
| **Data for selecting an encoder** | |
| Input ranges (rated values) / input resistance | |
| • Current | 0 to 20 mA; 4 to 20 mA |

| | Analog input 2 AI, RTD |
|---|---|
| Number of inputs | 2 |
| **Type of protection** | |
| • CENELEC | II 2 G (1) GD EEx ib [ia] IIC T4; $T_U$ = -20 °C to +60 °C ($T_U$ = +40 °C for vertical mounting) |
| • UL and CSA | Class I, Zone 1, AEx ib [ia] IIC T4, Ex ib [ia] IIC T4<br>Class I, Division 2, Groups A, B, C and D T4<br>Providing intrinsically safe circuits for use in Class I, Division 1, Groups A, B, C and D<br>Class II, Division 1, Groups E, F and G |
| • FMs | Class I, Division 2, Group A-D T4 or Class I, Zone 1, AEx ib [ia] IIC T4<br>Providing intrinsically safe circuits for use in Class I, II, III, Division 1, Groups A, B, C, D, E, F, G<br>$T_U$ = -20 °C to +60 °C |
| Galvanic isolation | |
| • Between channels and backplane bus | Yes |
| • Between channels | No |
| • Between the channels and the load voltage (Powerbus) | Yes |
| • Between the load voltage (Powerbus) and the backplane bus | Yes |
| Permissible potential difference | |
| • Between the inputs ($U_{CM}$) | 60 V DC; 30 V AC |
| Isolation tested at | 500 V AC |
| **Analog value generation** | |
| Measuring principle | Integrating |
| Integration and conversion time/resolution (per channel) | |
| • Configurable | Yes |
| • Integration time | 66 ms; 80 ms |
| • Basic conversion time incl. integration time (per channel) | min. 66 ms; Min. 80 ms |
| • Additional conversion time for open-circuit monitoring | 5 ms |
| • Resolution (incl. overrange) | 15 bit + sign |
| • Interference frequency suppression | 60 Hz 50 Hz |

| | Analog input 2 AI, RTD |
|---|---|
| Filtering of the measured values | yes, configurable in 4 steps (step of the time constant):<br>• none, 1 x cycle time<br>• weak, 4 x cycle time<br>• medium, 32 x cycle time<br>• strong, 64 x cycle time |
| Basic execution time of the module | = basic conversion time x number of activated channels of the module |
| **Interference suppression, error limits** | |
| Interference voltage suppression for f = n x (f1 ±1%), (f1 = interference frequency) | |
| • Common-mode interference ($U_{CM}$ < 60 V) | min. 90 dB |
| • Series-mode interference (peak value of disturbance < rated value of input range) | min. 70 dB |
| Crosstalk between the inputs | 0.3% |
| Operational limit (for the whole temperature range with reference to the input range) | ±0.8 K standard range<br>±0.3 K climate range |
| Basic error limit for 25 °C (with reference to the input range) | ±0.5 K standard range<br>±0.2 K climate range |
| **Status, interrupts, diagnostics** | |
| Interrupts | |
| • Limit value alarm | yes, configurable |
| • Diagnostics interrupt | yes, configurable |
| Diagnostic functions | |
| • Group error display | Red LED "SF" |
| • Diagnostics information can be read out | Yes |
| **Data for selecting an encoder** | |
| Input ranges (rated values) / input resistance | |
| • Resistance | 600 W / min. 2 MΩ |
| • Resistance thermometer | Pt100 / min. 2 MΩ<br>Ni100 / min. 2 MΩ |
| Connection of signal sensors | |
| • For impedance measurement | |
| - 4-wire connection | Possible |
| - 3-wire connection | Possible |
| - 3-conductor terminal for remote resistance sensor | Possible |
| - 2-wire connection | Possible |
| Characteristic linearization | Configurable |
| • For resistor | Rated range linearized from 0 to 100% for remote resistance sensor (600 Ω) |
| • For resistance thermometer | Pt100; Ni100 |
| Temperature compensation | No |
| Technical unit for data formats | Configurable |

## Technical specifications (continued)

| | Analog input 2 AI, TC |
|---|---|
| Number of inputs | 2 |
| **Type of protection** | |
| • CENELEC | II 2 G (1) GD EEx ib [ia] IIC T4; $T_U$ = -20 °C to +60 °C ($T_U$ = +40 °C for vertical mounting) |
| • UL and CSA | Class I, Zone 1, AEx ib [ia] IIC T4, Ex ib [ia] IIC T4<br>Class I, Division 2, Groups A, B, C and D T4<br>Providing intrinsically safe circuits for use in Class I, Division 1, Groups A, B, C and D<br>Class II, Division 1, Groups E, F and G |
| • FMs | Class I, Division 2, Group A-D T4 or Class I, Zone 1, AEx ib [ia] IIC T4<br>Providing intrinsically safe circuits for use in Class I, II, III, Division 1, Groups A, B, C, D, E, F, G<br>$T_U$ = -20 °C to +60 °C |
| Galvanic isolation | |
| • Between channels and backplane bus | Yes |
| • Between channels | No |
| • Between the channels and the load voltage (Powerbus) | Yes |
| • Between the load voltage (Powerbus) and the backplane bus | Yes |
| Permissible potential difference | |
| • Between the inputs ($U_{CM}$) | 60 V DC; 30 V AC |
| Isolation tested at | 500 V AC |
| **Analog value generation** | |
| Measuring principle | Integrating |
| Integration and conversion time/resolution (per channel) | |
| • Configurable | Yes |
| • Integration time | 66 ms; 80 ms |
| • Basic conversion time incl. integration time (per channel) | min. 66 ms; Min. 80 ms |
| • Additional conversion time for open-circuit monitoring | 5 ms |
| • Resolution (incl. overrange) | 15 bit + sign |
| • Interference frequency suppression | 60 Hz 50 Hz |
| Filtering of the measured values | yes, configurable in 4 steps (step of the time constant):<br>• none, 1 x cycle time<br>• weak, 4 x cycle time<br>• medium, 32 x cycle time<br>• strong, 64 x cycle time |
| Basic execution time of the module | = basic conversion time x number of activated channels of the module |

| | Analog input 2 AI, TC |
|---|---|
| **Interference suppression, error limits** | |
| Interference voltage suppression for f = n x (f1 ±1%), (f1 = interference frequency) | |
| • Common-mode interference ($U_{CM}$ < 60 V) | min. 90 dB |
| • Series-mode interference (peak value of disturbance < rated value of input range) | min. 70 dB |
| Crosstalk between the inputs | 0.3% |
| Operational limit (for the whole temperature range with reference to the input range) | ± 1.5 K |
| Basic error limit for 25 °C with reference to the input range) | ± 1 K |
| **Status, interrupts, diagnostics** | |
| Interrupts | |
| • Limit value alarm | yes, configurable |
| • Diagnostics interrupt | yes, configurable |
| Diagnostic functions | |
| • Group error display | Red LED "SF" |
| • Diagnostics information can be read out | Yes |
| **Data for selecting an encoder** | |
| Input ranges (rated values) / input resistance | |
| • Voltage | ±80 mV/min. 1 MΩ |
| • Thermocouple | Type E, N, J, K, L, S, R, B, T, U /min. 1 MΩ |
| Connection of signal sensors | |
| • For voltage measurement | Possible |
| Characteristic linearization | Configurable |
| • For thermocouples | Type E, N, J, K, L, S, R, B, T, U |
| • For voltage measurement | Rated range, linear |
| Temperature compensation | |
| • Internal temperature compensation | Not possible |
| • External temperature compensation with compensation box | possible (one compensation box per channel, must be intrinsically safe) |
| • External temperature compensation via temperature value acquired from an analog module of the same ET 200iS station | Possible |
| Technical unit for data formats | Configurable |

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## Analog electronic modules and terminal modules

### Technical specifications (continued)

| | Analog output 2 AO, 0...20 mA / 4...40 mA |
|---|---|
| Number of inputs | 2 |
| **Type of protection** | |
| • CENELEC | II 2 G (1) GD EEx ib [ia] IIC T4; $T_U$ = -20 °C to +60 °C ($T_U$ = +40 °C for vertical mounting) |
| • UL and CSA | Class I, Zone 1, AEx ib [ia] IIC T4, Ex ib [ia] IIC T4<br>Class I, Division 2, Groups A, B, C and D T4 |
| | Providing intrinsically safe circuits for use in Class I, Division 1, Groups A, B, C and D Class II, Division 1, Groups E, F and G |
| • FMs | Class I, Division 2, Group A-D T4 or Class I, Zone 1, AEx ib [ia] IIC T4 |
| | Providing intrinsically safe circuits for use in Class I, II, III, Division 1, Groups A, B, C, D, E, F, G $T_U$ = -20 °C to +60 °C |
| **Voltages, currents and potentials** | |
| Galvanic isolation | |
| • Between channels and backplane bus | yes (clearance for 60 V to EN 50 020) |
| • Between channels | no (clearance for positive outputs for 30 V) |
| • Between the channels and the load voltage (Powerbus) | yes (clearance for 60 V to EN 50 020) |
| • Between the load voltage (Powerbus) and the backplane bus | yes (clearance for 30 V to EN 50 020) |
| Permissible potential difference | |
| • Between the outputs ($U_{CM}$) | 60 V DC; 30 V AC |
| Isolation tested at | 500 V AC |

| | Analog output 2 AO, 0...20 mA / 4...40 mA |
|---|---|
| **Analog value generation** | |
| Resolution (incl. overrange) | 12-bit |
| Conversion time (per channel) | 2.5 ms |
| **Interference suppression, error limits** | |
| Crosstalk between outputs | min. –50 dB |
| Operational limit (for the whole temperature range with reference to the output range) | ±0.2% |
| Basic error limit (operational limit for 25 °C with reference to the output range) | ±0.1% |
| **Status, interrupts, diagnostics** | |
| Interrupts | |
| • Diagnostics interrupt | yes, configurable |
| Diagnostic functions | |
| • Group error display | Red LED "SF" |
| • Diagnostics information can be read out | Yes |
| Monitored for | |
| • Short-circuit | |
| - from output value | min. 1 mA |
| - short-circuit alarm for | max. 30 to 60 W |
| • Wire break | |
| - from output value | min. 1 mA |
| - wire break alarm for | max. 20 kΩ |
| Substitute values connectable | yes, configurable |
| **Data for selecting an encoder** | |
| Output ranges (rated values) | |
| • Current | 0 mA to 20 mA; 4mA to 20mA |
| Load resistance (for the rated range of the output) | |
| • for current outputs | max. 750 Ω |

## Technical specifications (continued)

| | Analog input 2 AI HART, 2DMU |
|---|---|
| Number of inputs | 2 |
| **Type of protection** | |
| • CENELEC | II 2 G (1) GD EEx ib [ia] IIC T4; $T_U$ = -20 °C to +60 °C ($T_U$ = +40 °C for vertical mounting) |
| • UL and CSA | Class I, Zone 1, AEx ib [ia] IIC T4, Ex ib [ia] IIC T4<br>Class I, Division 2, Groups A, B, C and D T4<br>Providing intrinsically safe circuits for use in Class I, Division 1, Groups A, B, C and D<br>Class II, Division 1, Groups E, F and G |
| • FMs | Class I, Division 2, Group A-D T4 or Class I, Zone 1, AEx ib [ia] IIC T4<br>Providing intrinsically safe circuits for use in Class I, II, III, Division 1, Groups A, B, C, D, E, F, G<br>$T_U$ = -20 °C to +60 °C |
| **Voltages, currents and potentials** | |
| Power supply for the measuring transducers | Yes |
| • Supply current | 22 mA |
| • short-circuit resistant | Yes |
| Galvanic isolation | |
| • Between channels and backplane bus | Yes |
| • Between channels | No |
| • Between the channels and the load voltage (Powerbus) | Yes |
| • Between the load voltage (Powerbus) and the backplane bus | Yes |
| Permissible potential difference | |
| • Between the inputs ($U_{CM}$) | 60 V DC; 30 V AC |
| Isolation tested at | 500 V AC |
| **Analog value generation** | |
| Measuring principle | Integrating |
| Integration and conversion time/ resolution (per channel) | |
| • Integration time configurable | Yes |
| • Integration time | 16.7 ms; 20 ms |
| • Basic conversion time incl. integration time (per channel) | 22 ms 25 ms |
| • Additional conversion time for open-circuit monitoring | 5 ms |
| • Resolution (incl. overrange) | 12-bit |
| • Interference frequency suppression | 60 Hz 50 Hz |
| Filtering of the measured values | yes, configurable in 4 steps (step of the time constant):<br>• none, 1 x cycle time<br>• weak, 4 x cycle time<br>• medium, 32 x cycle time<br>• strong, 64 x cycle time |
| Basic execution time of the module | = basic conversion time x number of activated channels of the module |

| | Analog input 2 AI HART, 2DMU |
|---|---|
| **Interference suppression, error limits** | |
| Interference voltage suppression for f = n x (f1 ± 1 %), (f1 = interference frequency) | |
| • Series-mode interference (peak value of disturbance < rated value of input range) | min. 70 dB |
| Crosstalk between the inputs | min. –50 dB |
| Operational limit (for the whole temperature range with reference to the input range) | ±0.15% |
| Basic error limit (operational limit at 25 °C with reference to the input range) | ±0.1% |
| **Status, interrupts, diagnostics** | |
| Interrupts | |
| • Limit value alarm | yes, configurable |
| • Diagnostics interrupt | yes, configurable |
| Diagnostic functions | |
| • Group error display | Red LED "SF" |
| • Diagnostics information can be read out | Yes |
| **Data for selecting an encoder** | |
| Input ranges (rated values) / input resistance | |
| • Current | 0 to 20 mA<br>4 to 20 mA |
| Terminal for sensor | |
| • For current metering as 2-wire measuring transducer | Possible |
| • Load of the 2-wire measuring transducer | max. 750 Ω |

## Technical specifications (continued)

| | Analog input 2 AI HART, 4DMU |
|---|---|
| Number of inputs | 2 |
| **Type of protection** | |
| • CENELEC | II 2 G (1) GD EEx ib [ia] IIC T4; $T_U$ = -20 °C to +60 °C ($T_U$ = +40 °C for vertical mounting) |
| • UL and CSA | Class I, Zone 1, AEx ib [ia] IIC T4, Ex ib [ia] IIC T4<br>Class I, Division 2, Groups A, B, C and D T4<br>Providing intrinsically safe circuits for use in Class I, Division 1, Groups A, B, C and D<br>Class II, Division 1, Groups E, F and G |
| • FMs | Class I, Division 2, Group A-D T4 or Class I, Zone 1, AEx ib [ia] IIC T4<br>Providing intrinsically safe circuits for use in Class I, II, III, Division 1, Groups A, B, C, D, E, F, G<br>$T_U$ = -20 °C to +60 °C |
| **Voltages, currents and potentials** | |
| Power supply for the measuring transducers | No |
| Galvanic isolation | |
| • Between channels and backplane bus | Yes |
| • Between channels | No |
| • Between the channels and the load voltage (Powerbus) | Yes |
| • Between the load voltage (Powerbus) and the backplane bus | Yes |
| Permissible potential difference | |
| • Between the inputs ($U_{CM}$) | 60 V DC; 30 V AC |
| Isolation tested at | 500 V AC |
| **Analog value generation** | |
| Measuring principle | Integrating |
| Integration and conversion time/ resolution (per channel) | |
| • Integration time configurable | Yes |
| • Integration time | 16.7 ms; 20 ms |
| • Basic conversion time incl. integration time (per channel) | 22 ms 25 ms |
| • Additional conversion time for open-circuit monitoring | 5 ms |
| • Resolution (incl. overrange) | 12-bit |
| • Interference frequency suppression | 60 Hz 50 Hz |
| Filtering of the measured values | yes, configurable in 4 steps (step of the time constant):<br>• none, 1 x cycle time<br>• weak, 4 x cycle time<br>• medium, 32 x cycle time<br>• strong, 64 x cycle time |
| Basic execution time of the module | = basic conversion time x number of activated channels of the module |

| | Analog input 2 AI HART, 4DMU |
|---|---|
| **Interference suppression, error limits** | |
| Interference voltage suppression for f = n x (f1 ± 1 %), (f1 = interference frequency) | |
| • Series-mode interference (peak value of disturbance < rated value of input range) | min. 70 dB |
| Crosstalk between the inputs | min. –50 dB |
| Operational limit (for the whole temperature range with reference to the input range) | ±0.15% |
| Basic error limit (operational limit at 25 °C with reference to the input range) | ±0.1% |
| **Status, interrupts, diagnostics** | |
| Interrupts | |
| • Limit value alarm | yes, configurable |
| • Diagnostics interrupt | yes, configurable |
| Diagnostic functions | |
| • Group error display | Red LED "SF" |
| • Diagnostics information can be read out | Yes |
| **Data for selecting an encoder** | |
| Input ranges (rated values) / input resistance | |
| • Current | 4mA to 20mA |
| Terminal for sensor | |
| • For current metering as 4-wire measuring transducer | Possible |
| • Inner flow resistance of the input for 4DMU | min. 250 Ω, max. 300 Ω |

## Technical specifications (continued)

| | Analog output 2 AO HART |
|---|---|
| Number of outputs | 2 |
| **Type of protection** | |
| • CENELEC | II 2 G (1) GD EEx ib [ia] IIC T4; $T_U$ = -20 °C to +60 °C ($T_U$ = +40 °C for vertical mounting) |
| • UL and CSA | Class I, Zone 1, AEx ib [ia] IIC T4, Ex ib [ia] IIC T4<br>Class I, Division 2, Groups A, B, C and D T4<br>Providing intrinsically safe circuits for use in Class I, Division 1, Groups A, B, C and D<br>Class II, Division 1, Groups E, F and G |
| • FMs | Class I, Division 2, Group A-D T4 or Class I, Zone 1, AEx ib [ia] IIC T4<br>Providing intrinsically safe circuits for use in Class I, II, III, Division 1, Groups A, B, C, D, E, F, G<br>$T_U$ = -20 °C to +60 °C |
| **Voltages, currents and potentials** | |
| Galvanic isolation | |
| • Between channels and backplane bus | yes (clearance for 60 V to EN 50 020) |
| • Between channels | no (clearance for positive outputs for 30 V) |
| • Between the channels and the load voltage (Powerbus) | yes (clearance for 60 V to EN 50 020) |
| • Between the load voltage (Powerbus) and the backplane bus | yes (clearance for 30 V to EN 50 020) |
| Permissible potential difference | |
| • between the outputs ($U_{CM}$) | 60 V DC; 30 V AC |
| Isolation tested at | 500 V AC |
| **Analog value generation** | |
| Resolution (incl. overrange) | 12-bit |
| Conversion time (per channel) | 2.5 ms |
| **Interference suppression, error limits** | |
| Crosstalk between the inputs | min. –50 dB |
| Operational limit (for the whole temperature range with reference to the input range) | ±0.2% |
| Basic error limit (operational limit at 25 °C with reference to the input range) | ±0.1% |

| | Analog output 2 AO HART |
|---|---|
| **Status, interrupts, diagnostics** | |
| Interrupts | |
| • Diagnostics interrupt | yes, configurable |
| Diagnostic functions | |
| • Group error display | Red LED "SF" |
| • Diagnostics information can be read out | Yes |
| Monitored for | |
| • Short-circuit | |
| - from output value | min. 1 mA |
| - short-circuit alarm for | max. 30 to 60 Ω |
| • Wire break | |
| - from output value | min. 1 mA |
| - wire break alarm for | max. 20 kΩ |
| Substitute values connectable | yes, configurable |
| **Data for selecting an encoder** | |
| Output ranges (rated values) | |
| • Current | 4mA to 20mA |
| Load resistance (in the nominal range of the output) | |
| • For current outputs | 750 Ω |
| Connection of actuators | |
| • For 2-conductor wire output | Possible |

## Analog electronic modules and terminal modules

| Ordering data | Order No. |
|---|---|
| ***Analog input modules*** | |
| **2 AI 0/4-20 mA, 2DMU** | **6ES7 134-5RB00-0AB0** |
| **2 AI 0/4-20 mA, 4DMU** | **6ES7 134-5RB50-0AB0** |
| **2 AI RTD** | **6ES7 134-5SB50-0AB0** |
| **2 AI TC** | **6ES7 134-5SB00-0AB0** |
| **2 AI HART, 2DMU** | **6ES7 134-5TB00-0AB0** |
| **2 AI HART, 4DMU** | **6ES7 134-5TB50-0AB0** |
| ***Analog output modules*** | |
| **2 AO 0/4-20 mA** | **6ES7 135-5RB00-0AB0** |
| **2 AO HART** | **6ES7 135-5TB00-0AB0** |
| ***Terminal modules*** | |
| **TM-E30S-44iS** | **6ES7 193-5CB00-0AA0** |
| Terminal module E30S (screw-type terminal) | |
| **TM-E30C-44iS** | **6ES7 193-5CB10-0AA0** |
| Terminal module E30C (spring-loaded terminal) | |
| ***Accessories*** | |
| **Equipment Manual ET 200iS** | |
| • German | **6ES7 151-2AA00-8AA0** |
| • English | **6ES7 151-2AA00-8BA0** |
| • French | **6ES7 151-2AA00-8CA0** |
| **PROFIBUS connector with passive terminating resistance** | **6ES7 972-0DA30-0XA0** |
| For RS 485-IS circuit; 1.5 Mbit/s | |
| **PROFIBUS plug connector** | **6ES7 972-0BA30-0XA0** |
| For the intrinsically safe PROFIBUS, 1.5 Mbit/s | |
| **RS 485-IS segment** | **6ES7 972-0AC80-0XA0** |
| Isolating transition for coupling PROFIBUS DP to PROFIBUS RS 485-IS | |
| **Sheet of labels** | |
| DIN A4, perforated, consisting of 10 sheets each with 30 labels for electronic modules and 20 labels for IM 151 | |
| • Petrol | **6ES7 193-4BH00-0AA0** |
| • Red | **6ES7 193-4BD00-0AA0** |
| • Yellow | **6ES7 193-4BB00-0AA0** |
| • Light beige | **6ES7 193-4BA00-0AA0** |

| | Order No. |
|---|---|
| ***Accessories*** (continued) | |
| **Color-coded labels** | **6ES7 193-4LA10-0AA0** |
| Order quantity 1 set of 200 labels of each color. Colors: light beige, yellow/green, red, brown, blue, turquoise for TM-E | |
| **Identification labels, inscribed** | |
| Order quantity 1 set of 200 of each color for slot numbering | |
| • 10 x Slot 1 to 2 | **8WA8 861-0AB** |
| • 5 x Slot 1 to 40 | **8WA8 861-0AC** |
| **Identification labels, blank** | **8WA8 848-2AY** |
| Order quantity 1 set of 200 of each color for slot numbering | |
| **Stainless steel casing IP66 for hazardous Zone 1 with safety class EEx e** | |
| Empty casing without mounted modules | |
| • 600 x 400 x 230 wall box for mounting up to 10 ET 200iS modules | **6DL2 804-0AA00** |
| • 800 x 400 x 230 wall box for mounting up to 16 ET 200iS modules | **6DL2 804-0AB00** |
| • 1050 x 400 x 230 wall box for mounting up to 25 ET 200iS modules | **6DL2 804-0AC00** |
| Box for mounting an ET 200iS systems | |
| • 600 x 400 x 230 wall box for mounting an ET 200iS [1] with up to 10 I/O modules | **6DL2 804-1AA00** |
| • 800 x 400 x 230 wall box for mounting an ET 200iS [1] with up to 10 I/O modules | **6DL2 804-1AB00** |
| • 1050 x 400 x 230 wall box for mounting an ET 200iS [1] with up to 10 I/O modules | **6DL2 804-1AC00** |

1) The ET 200iS components must be ordered separately.

## Overview

The PS module is plugged onto the corresponding PS terminal module TM-PS-iS (to be ordered separately).

The power supply unit

- Provides reliable isolated power supply for the ET 200iS with the necessary operating voltages for:
  - Logic (through the backplane bus)
  - PROFIBUS DP interface of IM 151-2
  - Power bus
- Takes over the safety limit of the output voltage
- Has an explosion-proof plastic enclosure (explosion protection EX d)

## Technical specifications

| | |
|---|---|
| Type of protection | |
| • CENELEC | II 2 G EEx de [ia/ib] IIC/IIB T4<br>$T_U$ = –20 °C to +60 °C<br>($T_U$ = +40 °C for vertical mounting) |
| • UL and CSA | Class I, Zone 1, Aex de [ib/ia] IIC T4, Ex de [ib/ia] IIC T4<br>Class I, Division 2,<br>Groups A, B, C and D |
| • FMs | Class I, Zone 1, AEx de [ib/ia] IIC T4<br>Class I, II, III, Division 2<br>Group A, B, C, D, F, G T4<br>Providing intrinsically safe circuits for use in<br>Class I, II, III, Division 1,<br>Groups A, B, C, D, E, F, G<br>Zone 1, [Aex ib] IIC and Zone 0, [Aex ia] IIC<br>$T_U$ = -20 °C to +60 °C |
| Galvanic isolation | |
| • Between supply voltage and Powerbus | Yes |
| • Between supply voltage and backplane bus as well as PROFIBUS DP interface | Yes |
| • Between Powerbus and backplane bus as well as PROFIBUS DP interface | Yes |
| • Between backplane bus and PROFIBUS DP interface | Yes |
| Permissible potential difference | |
| • Between supply voltage and all output voltages | 375 V |
| • Between all output voltages | 60 V |
| Isolation tested at | |
| • Between supply voltage and all secondary voltages | 1500 V AC |
| • Between all output voltages | 500 V AC |
| Dimensions (W x H x D) in mm | 96.5 x 150 x 150 |

## Ordering data

| | Order No. |
|---|---|
| **PS power supply module** | **6ES7 138-5EA00-0AA0** |
| **TM-PS-iS terminal module**<br>For power supply | **6ES7 193-5DA00-0AA0** |

6

# RS 485-IS coupler

## Overview

- Coupler for conversion from PROFIBUS DP to PROFIBUS RS485-IS intrinsically safe (Intrinsically Safe i type of protection)
- Required to connect intrinsically safe PROFIBUS DP stations (e.g. ET 200iS, ET 200iSP) and all third party devices which have an Ex i DP interface
- Can also be implemented as a repeater in hazardous areas
- Acts as a safety barrier
- Passive bus stations, configuration is not necessary

## Technical specifications

| | |
|---|---|
| **Dimensions and weight** | |
| Dimensions W x H x D (mm) | 80 x 125 x 130 |
| Weight | Approx. 500 g |
| **Technical specifications – general** | |
| Degree of protection | IP20 |
| Ambient temperature | - 20 °C to + 60 °C |
| **Standards and approvals** | |
| • PROFIBUS | IEC 61784-1:2002 Ed1 CP 3/1 |
| • EU directive | 94/9/EC (ATEX 100a) |
| • CENELEC | II 3 (2) G EEx nA[ib] IIC T4 |
| • UL and CSA | Class I, Division2, Group A, B, C, D T4 Class I Zone 2, Group IIC T4 AIS Class I, Divison 1, Group A, B, C, D [Aexib] IIC, Class I, Zone1, 2, Group IIC |
| • FMs | Class I, Division2, Group A, B, C, D T4 Class I Zone 2, Group IIC T4 AIS Class I, Divison 1, Group A, B, C, D [Aexib] IIC, Class I, Zone1, 2, Group IIC |
| • IEC | IEC61131-2, Part 2 |
| • CE | According to 89/336/EEC According to 73/23/EEC |
| • Approved for use in marine vessels | Classification agencies • ABS (American Bureau of Shipping) • BV (Bureau Veritas) • DNV (Det Norske Veritas) • GL (Germanischer Lloyd) • LRD (Lloyds Register of Shipping) • Class NK (Nippon Kaiji Kyokai) |
| **Module-specific data** | |
| Data transmission rate on PROFIBUS DP, PROFIBUS RS 485-IS | 9.6; 19.2; 45.45; 93.75; 187.5; 500 kbit/s 1.5 Mbit/s |
| Bus driver | PROFIBUS DP |
| **Voltage, currents, potentials** | |
| Rated supply voltage of the RS 485-IS coupler | 24 V DC (20.4 to 28.8 V) |
| • Polarity reversal protection | Yes |
| • Bridging of power outages | Min. 5 ms |
| Electrical isolation of the 24 V power supply | |
| • To PROFIBUS DP | Yes |
| - Tested with | 500 V DC |
| • Against PROFIBUS RS 485-IS | Yes |
| - Tested with | 500 V AC |
| Current input for RS 485-IS coupler (DC 24 V), max. | 150 mA |
| Power loss of the module, typ. | 3 W |

| | | |
|---|---|---|
| **Status, interrupts, diagnostics** | | |
| Status display | No | |
| Interrupts | None | |
| Diagnostic functions | Yes | |
| • Bus monitoring for PROFIBUS DP (primary) | Yellow LED "DP1" | |
| • Bus monitoring for PROFIBUS RS 485-IS (secondary) | Yellow LED "DP2" | |
| • 24 V power supply monitoring | Green LED "ON" | |
| **Safety-related guidelines** | | |
| • $V_{DC}$ | ±4.2 V | |
| • $I_{SC}$ | ±93 mA | |
| • $P_0$ | 0.1 W | |
| • $V_{max}$ | ±4.2 V | |
| • $L_i$ | 0 | |
| • $C_i$ | 0 | |
| • $U_m$ | AC 250 V | |
| • $T_a$ | 25 to +60 °C | |
| **RS 485-IS segment** | | |
| Permissible cable lengths on one line | *RS 485-IS* | *DP Ex i* |
| • 9.6 to 187.5 kbit/s | 1000 m | 200 m |
| • 500 kbit/s | 400 m | 200 m |
| • 1.5 Mbit/s | 200 m | 200 m |
| Number of PROFIBUS DP stations that can be connected, max. | 31 | 16 |
| PROFIBUS RS 485-IS bus terminating switch | Integrated, reversible | |

| Ordering data | Order No. |
|---|---|
| **RS 485-IS segment**<br>Isolating transition for coupling PROFIBUS DP to PROFIBUS RS 485-IS | **6ES7 972-0AC80-0XA0** |
| ***Accessories*** | |
| **PROFIBUS connector with passive terminating resistance** | **6ES7 972-0DA30-0XA0** |
| **PROFIBUS connector with active terminating resistor**<br>For RS 485-IS circuit; 1.5 Mbit/s | **6ES7 972-0DA60-0XA0** |
| **PROFIBUS plug connector**<br>For the intrinsically safe PROFIBUS, 1.5 Mbit/s | **6ES7 972-0BA30-0XA0** |
| **Sectional rail** | |
| • 160 m | **6ES7 390-1AB60-0AA0** |
| • 482 m | **6ES7 390-1AE80-0AA0** |
| • 530 m | **6ES7 390-1AF30-0AA0** |
| • 830 m | **6ES7 390-1AJ30-0AA0** |
| • 2000 m | **6ES7 390-1BC00-0AA0** |
| **PROFIBUS Fast Connect bus line**<br>Standard type specially designed for snap-on mounting, 2-core, shielded, sold by the meter; maximum length supplied 1000 m, minimum order 20 m | **6XV1 830-0EH10** |

## General

### Overview

- Distributed I/O station with degree of protection IP65/67 for use in cabinet-less applications in the machine environment
- Modular design adapts to the automation task
- I/O modules, motor starters, pneumatic modules and signal processing modules (CPU), frequency converters
- Can also be used for extremely time-critical tasks
- Separate auxiliary power supply for easy implementation of load groups
- DESINA-compliant modules

### Application

The SIMATIC ET 200X is a distributed I/O station with degree of protection IP65/IP67.

Due to the high degree of protection and its rugged design, the ET 200X is particularly suitable for implementation in the machine environment.

Its modular design, high degree of protection, sole use of plug-in wiring and integration of pneumatic and drive components permit fast and optimum adaptation to a machine's technological function units.

Even when requirements change frequently, replacement or combining of different basic and expansion modules can noticeably reduce setting-up times.

With a data signalling rate of up to 12 Mbit/s on the PROFIBUS DP, the ET 200S is also eminently suitable for extremely time-critical applications.

By supplying separate auxiliary voltages (load supplies) from the power module it is possible to selectively deactivate individual modules or module groups.

### Design

The ET 200X distributed I/O station comprises:

- one basic module, alternatively
  - digital inputs
  - digital outputs
  - PLC functionality
  - ECOFAST-konform
  - DESINA-compliant with parameterizable inputs and outputs
- Up to 7 expansion modules.

The following expansion modules are available:

- Digital inputs/ outputs
- Digital input/ output modules, DESINA-compliant
- Analog input/ output modules
- Modules with and without channel diagnostics
- CP 142-2 communications processors for connection to AS-Interface
- Moby Ident System
- Pneumatic module with integrated valves
- Pneumatic interface for adapting a CPV valve terminal from FESTO; up to 6 interfaces per ET 200X station
- Motor starters (electromechanical or electronic) to drive any 3-phase AC load (up to 5.5 kW at 400 V AC); up to 6 motor starters per ET 200X station
- Frequency converter (max. 1.5 kW, 400 V AC)
- up to 6 motor starters or frequency inverters per ET 200X station
- SITOP power current supply (24 V DC optional)

The expansion modules are installed side by side using integrated connectors. This means that all the signal leads and auxiliary voltages for the inputs and outputs are connected through. The modules can be replaced for service purposes without the need to disassemble the entire station.

#### *Connection to PROFIBUS DP*

An ET 200X occupies only one node address on the PROFIBUS DP installed on the basic module. A separate I/O address can be assigned to each basic and expansion module.

In the basic module with PLC functionality, the addresses of the expansion modules are already determined by the slot.

The ET 200X is compliant with EN 50170 for PROFIBUS DP and can be used with all standardized master stations. The fast data transfer rate of 12 Mbit/s also allows implementation of fast machine functions.

## Function

### *Operating mode*

The addressing of the inputs and outputs of the ET 200X differs depending on the type of the basic module:

- Basic module without PLC functionality:
  Access via the user program in the central programmable controller, in the same way as central I/Os
- Basic module with PLC functionality:
  Access via the user program of the basic module

The slave interface in the basic module is entirely responsible for communications through PROFIBUS DP.

There are diagnostics functions to monitor the functionality of the ET 200X. The ET 200X diagnoses:

- Internal station/ configuration fault
- Short-circuit, wire breakage (for specific modules)
- Bus error (erroneous data transmission)
- Module fault, 24 V DC load power supply

The diagnostic data is analyzed as follows:

- Decentrally with diagnostic LEDs on the basic module
- With programming devices or PC with the COM PROFIBUS or STEP 7 parameterization software
- Centrally through the CPU in the automation system

### *Parameter assignment*

When the station is connected to master modules which were not parameterized with COM PROFIBUS or STEP 7 (operation on third-party master modules), a fixed preassigned GSD file can be created with COM PROFIBUS from Version 3.1. This file is then loaded into the configuration tool of the third-party manufacturer and can be used for simple parameter assignment of the station. This allows the use of the user-friendly plain-text parameterization feature of COM PROFIBUS; there is no need for hexadecimal code inputs in the third-party configuring tool.

## Technical specifications – general

| | |
|---|---|
| Plug-in electronic modules | • AS-Interface CP<br>• Digital inputs/outputs<br>• Analog inputs/outputs<br>• Motor starters/Frequency converters<br>• Pneumatic module/interface |
| Connection method | M12 round connector with standard pinout or DESINA assignment for actuators/sensors<br>HAN Q8 for power supply, forwarding and motor feeder in motor starters and frequency converters |
| Data transmission rate, max. | 12 Mbit/s |
| Galvanic isolation | Yes, between PROFIBUS DP and internal electronics and partly between outputs and internal electronics |
| Supply voltage | 24 V DC |
| Supply current (internal electronics and encoder supply) for overall configuration | |
| • Up to 40 °C, max. | 6 A |
| • Up to 55 °C, max. | 4 A |
| Current consumption of an ET 200X (internal and sensor supply, non-switched voltage) | |
| • Up to 40 °C, max. | ≤ 1 A |
| • Up to 55 °C, max. | ≤ 0.8 A |
| with DESINA | |
| • Up to 40 °C, max. | 10 A |
| • Up to 55 °C, max. | 8 A |

| | |
|---|---|
| Load current for ET 200X per incoming supply ( BM, PM, switched voltage) | |
| • Up to 40 °C, max. | 10 A |
| • Up to 55 °C, max. | 8 A |
| For overall configuration with further looping (several ET 200Xs) | |
| • Up to 40 °C, max. | 16 A |
| • Up to 55 °C, max. | 12 A |
| Supply voltage for loads for total assembly (several motor starters or frequency converters) | |
| • For core cross-section of 1.5 $mm^2$, max. | 12 A |
| • For core cross-section of 2.5 $mm^2$, max. | 20 A |
| Degree of protection | IP65 for ET 200X with motor starters, frequency converters or pneumatic modules; IP66/IP67 for digital and analog modules |
| Material | Thermoplastic (fiber-glass reinforced) |
| **Ambient conditions** | |
| Temperature | From 0 to 55 °C |
| Temperature gradient | From 15 to 95% |
| Relative humidity | RH severity level 2 in accordance with IEC 1131-2 |
| Atmospheric pressure | From 795 to 1080 hPa |
| **Mechanical strength** | |
| • Vibration | Vibration tested in acc. with IEC 68 Part 2-6 (sine)<br>• 10 Hz ≤ f ≤ 58 Hz (const. amplitude 0.075 mm);<br>• 58 Hz ≤ f ≤ 150 Hz (const. acceleration 5 g, tested with 10 g) motor starters (const. acceleration 2 g) |
| • Shock | Shock tested in acc. with IEC 68 Part 2- 27, half-sine, 15 g, 11 ms |
| Approvals | UL, CSA |

6

# BM 147/CPU intelligent basic modules

## Overview

- Basic modules for exchanging preprocessed I/O data between an ET 200X and a higher level master through PROFIBUS DP
- Two versions:
  - BM147-1 with DP slave functionality and
  - BM147-2 with additional DP master functionality
- CPU for PLC functionality equivalent to S7-314, in other words, distributed intelligence for preprocessing
- For reducing the overhead on the central PLC and PROFIBUS
- With greatly reduced response times to critical signals locally
- Standalone operation, for example it is still possible to operate even if the DP master fails
- Fast, simple and integrated programming of a system with modular programs through STEP 7



## Technical specifications

| | BM147-1 and BM 147-2 CPU |
|---|---|
| Dimensions W x H x D (in mm) | |
| • Individual device | 175 x 110 x 86 |
| MLFB | 6ES7 147-2AA00-0XB0 (BM 147-2)<br>6ES7 147-1AA10-0XB0 (BM 147-1) |
| Associated programming package | STEP 7 V5.2 + SP1 |
| Memory | |
| Working memory | |
| • Integrated | 48 KB |
| • Expandable | No |
| Load memory | Plug-in through MMC (max. 8 MB) |
| Backup | Realized by MMC (maintenance-free) |
| Execution times | |
| Execution times for | |
| • Bit operation, min. | 0.1 µs |
| • Word operation, min. | 0.2 µs |
| • Fixed-point arithmetic, min. | 2.0 µs |
| • Floating-point arithmetic, min. | 6 µs |
| Timers/counters and their retentivity | |
| S7 counter | 256 |
| • Retentivity | Adjustable |
| • Preset | From Z 0 to Z 7 |
| • Counting range | 0 to 999 |
| IEC counter | Yes |
| • Type | SFB |
| • Number | Unlimited (limited by working memory only) |
| S7 timers | 256 |
| • Retentivity | Adjustable |
| • Preset | No retentivity |
| • Range | 10 ms to 9990 s |

| | BM147-1 and BM 147-2 CPU |
|---|---|
| IEC timer | Yes |
| • Type | SFB |
| • Number | Unlimited (limited by working memory only) |
| Data areas and their retentivity | |
| Total retentive data area (incl. flags; timers; counters) | All |
| Bit memories | 256 byte |
| • Retentivity | Yes |
| • Preset retentivity | MB0 to MB15 |
| Clock memory | 8 (1 memory byte) |
| Data blocks | |
| • Number | 511 |
| • Size | 16 KB |
| Local data for each priority class, max. | 510 |
| Modules | |
| Total | 1024 (DBs, FCs, FBs) |
| OBs | See operation list |
| • Size | 16 KB |
| Nesting depth | |
| • For each priority class | 8 |
| • Plus, within an error OB | 4 |
| FBs | See operation list |
| • Number | 512 |
| • Size | 16 KB |
| FCs | See operation list |
| • Number | 512 |
| • Size | 16 KB |
| Address areas (inputs/outputs) | |
| I/O address area, max. | 1024 byte |

## Technical specifications (continued)

| | BM147-1 and BM 147-2 CPU |
|---|---|
| I/O process image | 128 byte/128 byte |
| Digital channels, I/O max. | 8192 bit |
| Of which centralized I/O max. | 56 byte |
| Analog channels (distributed + centralized) | 512 words |
| Of which centralized I/O max. | 14 words |
| Configuring rules | |
| Time of day | |
| Clock | Yes (HW clock) |
| • Battery-backed | Yes |
| • Back-up time | Typ. 6 weeks (at 40 °C ambient air temperature) |
| • Accuracy | Deviation per day: < 10 s |
| Operating hours counter | 1 |
| • Number | 0 |
| • Range of values | 2 31 hours (when using the SFC 101) |
| • Selectivity | 1 hour |
| • Retentive | Yes; must be restarted on every restart. |
| Clock synchronization | Yes |
| • In the PLC | Master/slave |
| • On MPI | Slave |
| S7 message function | |
| Number of stations that can be registered for message functions (e.g. OS) | 12 (depends on the links configured for PG/OP and S7 standard communication) |
| Process diagnostic alarms | Yes |
| • Simultaneously active alarm S blocks, max. | 40 |
| Test and startup function | |
| Status/modify variable | Yes |
| • Variable | Inputs, outputs, bit memories, DB, timers, counters |
| • Number of variables | 30 |
| - Of which status variables | 30 |
| - Of which modify variables | 14 |
| Forcing | Yes |
| • Variable | Inputs/outputs |
| • Number of variables, max. | 10 |
| Status module | Yes |
| Single step | Yes |
| Breakpoint | 2 |
| Diagnostic buffer | Yes |
| • Number of entries (not adjustable), max. | 100 |
| Communication functions | |
| PG/OP communication | Yes |
| Global data communication | Yes |
| • Number of GD packages, max. | 4 |
| - Transmitter, max. | 4 |
| - Receiver, max. | 4 |
| • Size of GD packages, max. | 22 byte |
| - Of which consistent | 22 byte |

| | BM147-1 and BM 147-2 CPU |
|---|---|
| S7 standard communication | Yes |
| • Useful data per request, max. | 76 byte |
| - Of which consistent | 76 byte (for X_SEND or X_RCV)<br>64 byte (for X_PUT or X_GET as a server) |
| S7 communication | Yes |
| • As a server | Yes |
| • As a client | No |
| • Useful data per request, max. | 180 (with PUT/GET) |
| - Of which consistent | 64 byte |
| S5-compatible communication | No |
| Number of connections | 12 |
| Can be used for | |
| • PG communication | |
| - Spare (default) | 1 |
| - Adjustable | 1 to 11 |
| • OP communication | |
| - Spare (default) | 1 |
| - Adjustable | 1 to 11 |
| • S7 standard communication | |
| - Spare (default) | 10 |
| - Adjustable | 0 to 10 |
| **Interfaces** | |
| Slave interface | |
| • Type | Coexistent, integrated RS 485 interface |
| Master interface (BM147-2 only) | |
| • Type | Integrated RS 485 interface |
| Physical characteristics | RS 485 |
| Isolated | Yes |
| Functionality | |
| Number of connections | 12 |
| • MPI | Yes |
| • PROFIBUS DP | DP slave active/passive |
| • Point-to-point coupling | No |
| **MPI mode** | |
| Utilities | |
| • PG/OP communication | Yes |
| • Routing (BM 147-2 only) | Yes |
| • Global data communication | Yes |
| • S7 standard communication | Yes |
| • S7 communication | Yes |
| - As a server | Yes |
| • Transmission rates | Max. 12 Mbit/s |
| **DP slave mode** | |
| Utilities | |
| • PG/OP communication | Yes |
| • Routing (BM 147-2 only) | Yes (only with active interface) |
| • Global data communication | No |
| • S7 standard communication | No |
| • S7 communication | No |
| • Transmission rates | Up to 12 Mbit/s |
| • Transfer memory | 244 I byte/244 O byte |
| • Address area, max. | 32 with max. 32 byte each |
| • DPV1 | No |

## BM 147/CPU intelligent basic modules

### Technical specifications (continued)

| | BM147-1 and BM 147-2 CPU |
|---|---|
| **DP master mode** | |
| Utilities | |
| • PG/OP communication | Yes |
| • Routing | Yes |
| • Global data communication | No |
| • S7 standard communication | No |
| • S7 communication | Yes (server only) |
| • Direct data exchange | Yes |
| • Isochrone mode | No |
| • Isochronicity | Yes |
| • SYNC/FREEZE | Yes |
| • Activation/disabling of DP slaves | Yes |
| • Transmission rates | Up to 12 Mbaud |
| • Transfer memory | 244 I byte/244 O byte |
| • Address area, max. | Max.1 KB I/1 KB O |
| • DPV1 | Yes |

### Ordering data

| | Order No. |
|---|---|
| **BM 147-1 CPU basic module**<br>With integral PLC functionality | **6ES7 147-1AA10-0XB0** |
| **BM 147-2 CPU basic module**<br>With integral PLC functionality and additional PROFIBUS master interface | **6ES7 147-2AA00-0XB0** |
| ***Accessories*** | |
| **Manual for ET 200X distributed I/O station** | |
| • German | **6ES7 198-8FA01-8AA0** |
| • English | **6ES7 198-8FA01-8BA0** |
| • French | **6ES7 198-8FA01-8CA0** |
| **Cover plates for ET 200X basic module**<br>Protective cover for bus terminals and power supply terminals (pack of 10) | **6ES7 194-1JB00-0XA0** |
| **Simple mounting rails for SIMATIC ET 200X (narrow)** | |
| • 400 mm long for basic module + 3 expansion modules (60 mm) | **6ES7 194-1GA00-0XA0** |
| • 640 mm long for basic module + 7 expansion modules (60 mm) | **6ES7 194-1GA10-0XA0** |
| • 2000 mm long for customized lengths | **6ES7 194-1GA20-0XA0** |
| **Double mounting rails for SIMATIC ET 200X (wide)** | |
| • 520 mm long for basic module + 1 expansion module (60 mm) + 2 motor starter/frequency converter/pneumatic interfaces | **6ES7 194-1GB00-0XA0** |
| • 1000 mm long for basic module + 1 expansion module (60 mm) + 6 motor starter/frequency converter | **6ES7 194-1GB10-0XA0** |
| **Fixing screws**<br>M5 x 20, 1 package = 100 parts | **6ES7 194-1KC00-0XA0** |
| **Connecting cable for PROFIBUS**<br>12 Mbaud, for PG connection to PROFIBUS DP, assembled with 2 x 9-pin Sub-D connector, 3.0 m | **6ES7 901-4BD00-0XA0** |
| **ECOFAST hybrid cable**<br>Assembled with ECOFAST connector plugs | |
| • 1.5 | **6XV1 830-7BH15** |
| • 3.0 | **6XV1 830-7BH30** |
| • 5.0 | **6XV1 830-7BH50** |
| • 10.0 | **6XV1 830-7BN10** |
| • 15.0 | **6XV1 830-7BN15** |
| **ECOFAST terminating resistor** | |
| • Ordering quantity 1 part | **6GK1 905-0DA10** |
| • Ordering quantity 5 parts | **6GK1 905-0DA00** |
| **ECOFAST plug connector, can be prepared**<br>Male contacts; ordering quantity 5 parts | **6GK1 905-0CA00** |
| **ECOFAST plug connector, can be prepared**<br>Female contacts; ordering quantity 5 parts | **6GK1 905-0CB00** |
| MMC memory cards up to 8 MB (as for S7-314) | |

## Overview

- Basic modules to process communications between ET 200X and higher level masters through PROFIBUS DP
- With additional integrated inputs or outputs

## Technical specifications

| BM 141 Basic module | DI 8 x 24 V DC |
|---|---|
| Dimensions W x H x D (in mm) | |
| • Individual device | 134 x 110 x 55 |
| • Hole pitch | 107 x 110 x 55 |
| Transmission rates | 9.6/19.2/93.75/187.5/500 kbit/s, 1.5/3/6/12 Mbit/s |
| Direct data exchange | Sender |
| Number of inputs | 8 |
| Cable length, unshielded | max. 30 m |
| Number of suitable expansion modules, max. | 7 |
| • of which motor starters/ frequency converters, max. | 6 |
| • of which pneumatic interfaces, max. | 6 |
| Rated supply voltage for the electronics 1L+ | 24 V DC |
| • Polarity reversal protection | Yes |
| • Short-circuit protection | Yes, electronic |
| Rated load voltage 2L+ | 24 V DC |
| • Polarity reversal protection | No |
| Current consumption from supply voltage 1L+ | Max. 180 mA |
| Power loss of the module, typ. | 3.5 W |
| Input voltage | |
| • Rated value | 24 V DC |
| • At "1" signal | 13 to 30 V |
| • At "0" signal | -3 to 5 V |
| Input delay | 1.2 to 4.8 ms |
| Input characteristic | In acc. with IEC 61131, type 1 |
| Connection of two-wire BEROs | Possible |
| Permissible quiescent current, max. | 1.5 mA |

| BM 142 Basic module | DO 4 x 24V DC/2A |
|---|---|
| Dimensions W x H x D (in mm) | |
| • Individual device | 134 x 110 x 55 |
| • Hole pitch | 107 x 110 x 55 |
| Transmission rates | 9.6/19.2/93.75/187.5/500 kbit/s, 1.5/3/6/12 Mbit/s |
| Direct data exchange | Sender |
| Number of outputs | 4 |
| Cable length, unshielded | max. 30 m |
| Number of suitable expansion modules, max. | 7 |
| • of which motor starters, max. | 6 |
| • of which pneumatic interfaces, max. | 6 |
| Rated supply voltage for the electronics 1L+ | 24 V DC |
| • Polarity reversal protection | Yes |
| • Short-circuit protection | Yes, electronic |
| Rated load voltage 2L+ | 24 V DC |
| • Polarity reversal protection | No |
| Total current for outputs (per group) | |
| • Up to 20 °C, max. | 6 A |
| • Up to 55 °C, max. | 4 O |
| Current consumption from supply voltage 1L+ | Max. 180 mA |
| Current consumption from load voltage 2L+ (without load ) | Max. 12 A |
| Power loss of the module, typ. | 4 W |
| Short-circuit protection of output | Yes, electronic |
| Output current | |
| • At "1" signal | 2 A at 24 V DC |
| • At "0" signal, max. | 0.5 mA |
| Switching frequency | |
| • for resistive load, max. | 100 Hz |
| • for inductive load, max. | 0.5 Hz |
| • for lamp load, max. | 1 Hz |

## BM 141, BM 142 Basic modules

| Ordering data | Order No. |
|---|---|
| **BM 141 Basic module**<br>8 DI × 24 V DC | **6ES7 141-1BF12-0XB0** |
| **BM 142 Basic module**<br>4 DO × 24 V DC /2 A | **6ES7 142-1BD22-0XB0** |
| ***Accessories*** | |
| **Manual for ET 200X distributed I/O station** | |
| • German | **6ES7 198-8FA01-8AA0** |
| • English | **6ES7 198-8FA01-8BA0** |
| • French | **6ES7 198-8FA01-8CA0** |
| **Simple mounting rails for SIMATIC ET 200X (narrow)** | |
| • 400 mm long for basic module + 3 expansion modules (60 mm) | **6ES7 194-1GA00-0XA0** |
| • 640 mm long for basic module + 7 expansion modules (60 mm) | **6ES7 194-1GA10-0XA0** |
| • 2000 mm long for customized lengths | **6ES7 194-1GA20-0XA0** |
| **Double mounting rails for SIMATIC ET 200X (wide)** | |
| • 520 mm long for basic module + 1 expansion module (60 mm) + 2 motor starter/frequency converter/pneumatic interfaces | **6ES7 194-1GB00-0XA0** |
| • 1000 mm long for basic module + 1 expansion module (60 mm) + 6 motor starter/frequency converter | **6ES7 194-1GB10-0XA0** |
| **Fixing screws**<br>M5 x 20, 1 package = 100 parts | **6ES7 194-1KC00-0XA0** |
| **Plug-in plate for BM 141, BM 142**<br>T functionality for PROFIBUS DP (spare part) | **6ES7 194-1FC00-0XA0** |
| **Plug connector for PROFIBUS DP**<br>Control and auxiliary voltage (incl. 2 cable glands and 1 blanking plug); 3 connectors are required for each basic module | **6ES7 194-1AA01-0XA0** |

| | Order No. |
|---|---|
| **Cable**<br>5-core, for bus signals, power supply, sold by the meter, minimum order quantity: 10 m | |
| • PVC sheath (standard) | **6ES7 194-1LY00-0AA0**<br>Specify length in m<br>Minimum order quantity 10 m |
| • PUR sheath (can be trailed, oil-resistant, partially weld-resistant) | **6ES7 194-1LY10-0AA0**<br>Specify length in m<br>Minimum order quantity 10 m |
| **Cover plates**<br>For protecting the bus terminals and power supply terminals on BM 141, BM 142, BM 147 (10 parts per packaging unit) | **6ES7 194-1JB00-0XA0** |
| **M12 connector**<br>For connecting actuators or sensors, 5-pin | **3RX1 667** |
| **M12 angular circular connector**<br>For connecting actuators or sensors, 5-pin | **3RX1 668** |
| **M12 Y circular connector**<br>For the double connection of sensors by means of single cable, 5-pin | **6ES7 194-1KA01-0XA0** |
| **Prepared Y cable**<br>For actuators/sensors | Available from:<br>Franz Binder GmbH & Co.<br>P.O. Box 1152<br>74148 Neckarsulm,<br>Federal Republic of Germany<br>Connector Catalog |
| **M12 sealing caps**<br>For sealing unused input or output sockets | **3RX9 802-0AA00** |
| **S7 manual collection**<br>Electronic manuals on CD, multi-language: S7-200, TD 200, S7-300, M7-300, C7, S7-400, M7-400, STEP 7, Engineering Tools, Runtime Software, SIMATIC DP (Distributed I/O), SIMATIC HMI (Human Machine Interface), SIMATIC NET (Industrial Communication) | **6ES7 998-8XC01-8YE0** |
| **S7 manual collection update service for 1 year**<br>Scope of supply: Up-to-date CD S7 manual collection as well as the three subsequent updates | **6ES7 998-8XC01-8YE2** |

## Overview

- BM 141 and BM 143 basic modules handle communication between ET 200X and higher level master through PROFIBUS DP
- ECOFAST-compatible connection method
- Can be combined with all available expansion modules of the ET 200X

## Technical specifications

| ECOFAST Basic module | BM 143 - DESINA | BM 141 – 8 DI | BM 141 – 8 DI diag |
|---|---|---|---|
| Dimensions (W x H x D) in mm | 175 x 180 x 110 | 175 x 180 x 110 | 175 x 180 x 110 |
| • With screw-type attachment | 180 x 174 x 90 | 180 x 174 x 90 | 180 x 174 x 90 |
| Transmission rates | 9.6/19.2/45.45/93.75/187.5/ 500/1500/12000 kbit/s | 9.6/19.2/45.45/93.75/187.5/ 500/1500/12000 kbit/s | 9.6/19.2/45.45/93.75/187.5/ 500/1500/12000 kbit/s |
| Internode communication support | Yes, transmitter | Yes, transmitter | Yes, transmitter |
| Number of channels | 8 process channels; parameterized as DI/DO 8 function channels; parameterized as diagnostic/NC input | 8 DI process channels; single channel connection | 8 DI process channels; single channel connection |
| Cable length unshielded | 30 m (for signal cables) | 30 m (for signal cables) | 30 m (for signal cables) |
| Number of suitable expansion modules, max. | 7 | 7 | 7 |
| • Of which motor starters, frequency converters, max. | 6 | 6 | 6 |
| • Of which pneumatic interfaces, max. | 6 | 6 | 6 |
| Supply voltage for electronics and load circuit 1L+ (non-switched voltage); Rated value | 24 V DC | 24 V DC | 24 V DC |
| Max. permissible power consumption from load circuit 1 (unswitched voltage /supply voltage) | | | |
| • Up to 40 °C | 10 A | 10 A | 10 A |
| • Up to 55 °C | 8 A | 8 A | 8 A |
| Polarity reversal protection | No | No | No |
| Supply voltage for load circuit 2L+ (switched voltage); Rated value | 24 V DC | 24 V DC | 24 V DC |
| Max. permissible power consumption from load circuit 2 (switched voltage) | | | |
| • Up to 40 °C | 10 A | 10 A | 10 A |
| • Up to 55 °C | 8 A | 8 A | 8 A |
| Polarity reversal protection | No | No | No |
| Power loss of the module | 3.5 W | 3.5 W | 3.5 W |
| Power consumption from 1L+ (unswitched voltage) | 180 mA | 180 mA | 180 mA |
| Galvanic isolation between the load voltages and all other circuit parts | No | No | No |

## ECOFAST Basic modules

### Technical specifications (continued)

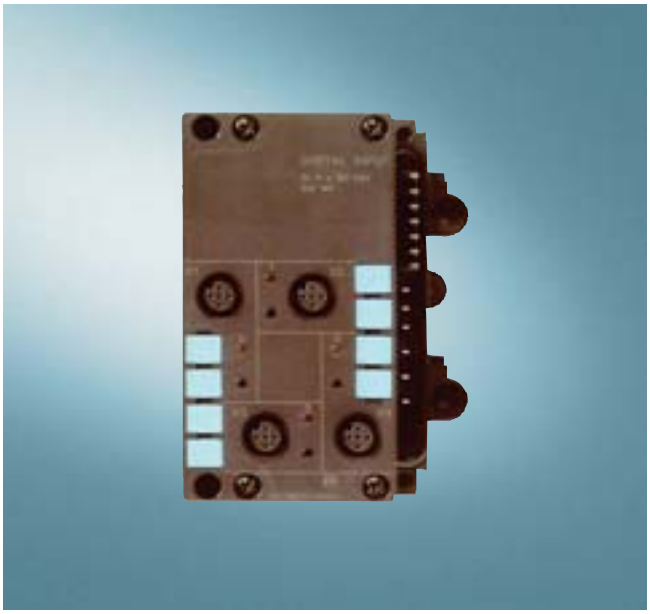
| ECOFAST Basic module | BM 143 - DESINA | BM 141 – 8 DI | BM 141 – 8 DI diag |
|---|---|---|---|
| **Parameterization of the channel as DI** | | | |
| Input voltage | | | |
| • Rated value | 24 V DC | 24 V DC | 24 V DC |
| • For “1” signal | 13 to 30 V | 13 to 30 V | 13 to 30 V |
| • For “0” signal | -3 to +5 V | -3 to +5 V | -3 to +5 V |
| Input current | | | |
| • For "1" signal, typ. | 5 mA | 7 mA | 7 mA |
| Input characteristic | Acc. to IEC 61131, type 2 | Acc. to IEC 61131, type 1 | Acc. to IEC 61131, type 2 |
| Connection of two-wire BEROs | | | |
| • Acceptable quiescent current | ≤ 1.5 mA | ≤ 1.5 mA | ≤ 1.5 mA |
| Input delay | 1.2 to 4.8 ms | 1.2 to 4.8 ms | 0.5; 3; 15; 20 ms parameterizable |
| **Parameterization of the channel as DO** | | | |
| Output current | | | |
| • For "1" signal | | | |
| - Rated value | 1.2 A | | |
| - Permitted range | 5 mA to 1.3 A | | |
| • At "0" signal (residual current), max. | 0.5 mA | | |
| Switching frequency | | | |
| • For resistive load | 100 Hz | | |
| • With inductive load to IEC 947-5-1, DC 13 | 2 Hz | | |
| • For lamp load | 1 Hz | | |
| Short-circuit protection of output | Yes, electronic | | |
| • Response threshold | ≥ 1.4 A | | |
| Number of simultaneously settable channels | 8 | | |
| Simultaneity factor of the outputs | 50 % | | |
| Diagnostics | Acc. to DESINA | | **Each channel: Short-circuit, wire break** |

| Ordering data | Order No. |
|---|---|
| **BM 141/ECOFAST Basic module**<br>8 DI, DC 24 V, 5-pin, M12 with single-channel connection, hybrid fieldbus interface (copper), identification plug, IP67 | **6ES7 141-1BF00-0AB0** |
| **BM 141/ECOFAST RS 485 Basic module**<br>8 DI, DC 24 V, 5-pin, M12 channel diagnostics, short circuit and wire break, hardware interrupts input delay time: 0.5 ms/3 ms/15 ms/ 20 ms | **6ES7 141-1BF40-0AB0** |
| **BM 143/DESINA Basic module**<br>8 DI/DO, parameterizable, additional diagnostic inputs, hybrid fieldbus interface (copper), identification connector, IP67 | **6ES7 143-1BF00-0AB0** |
| **BM 143/DESINA Basic module**<br>8 DI/DO, parameterizable, additional diagnostic inputs, hybrid fieldbus interface (FOC), identification connector, IP67 | **6ES7 143-1BF00-0XB0** |
| ***Accessories*** | |
| **Manual for ET 200X distributed I/O station** | |
| • German | **6ES7 198-8FA01-8AA0** |
| • English | **6ES7 198-8FA01-8BA0** |
| • French | **6ES7 198-8FA01-8CA0** |
| **Simple mounting rails for SIMATIC ET 200X (narrow)** | |
| • 400 mm long for basic module + 3 expansion modules (60 mm) | **6ES7 194-1GA00-0XA0** |
| • 640 mm long for basic module + 7 expansion modules (60 mm) | **6ES7 194-1GA10-0XA0** |
| • 2000 mm long for customized lengths | **6ES7 194-1GA20-0XA0** |
| **Double mounting rails for SIMATIC ET 200X (wide)** | |
| • 520 mm long for basic module + 1 expansion module (60 mm) + 2 motor starter/frequency converter/pneumatic interfaces | **6ES7 194-1GB00-0XA0** |
| • 1000 mm long for basic module + 1 expansion module (60 mm) + 6 motor starter/frequency converter | **6ES7 194-1GB10-0XA0** |
| **Fixing screws**<br>M5 x 20, 1 package = 100 parts | **6ES7 194-1KC00-0XA0** |
| **PROFIBUS ECOFAST Hybrid Cable – Copper**<br>Cable for trailing with 4 copper cores, 1.5 mm$^2$ and 2 copper cores, shielded | See page 5/34 |
| **PROFIBUS ECOFAST Hybrid Cable – FOC**<br>Cable for trailing with two plastic FOCs for PROFIBUS DP and four copper cores 1.5 mm$^2$ for use in DESINA-compatible equipment only | See page 5/34 |

| | Order No. |
|---|---|
| **Identification connector**<br>For setting the PROFIBUS station address (included in the scope of supply of BM 143/DESINA) | **6ES7 194-1KB00-0XA0** |
| **M12 connector**<br>For connecting actuators or sensors, 5-pin | **3RX1 667** |
| **M12 angular circular connector**<br>For connecting actuators or sensors, 5-pin | **3RX1 668** |
| **Prepared Y cable**<br>For actuators/sensors | Available from:<br>Franz Binder GmbH & Co.<br>P.O. Box 1152<br>74148 Neckarsulm,<br>Federal Republic of Germany<br>Connector Catalog |
| **M12 sealing caps**<br>For sealing unused input or output sockets | **3RX9 802-0AA00** |
| **Crimping tool**<br>For male and female contacts | |
| • 1.5 to 2.5 mm2 | **3RK1 902-0AH00** |
| • 1.5 to 4 mm2 | **3RK1 902-0CT00** |
| **Disassembly tool**<br>For male and female contacts for 9-pin inserts/copper | **3RK1 902-0AJ00** |
| **S7 Manual collection**<br>Electronic manuals on CD, multi-language:<br>S7-200, TD 200, S7-300, M7-300, C7, S7-400, M7-400, STEP 7, Engineering Tools, Runtime Software, SIMATIC DP (Distributed I/O), SIMATIC HMI (Human Machine Interface), SIMATIC NET (Industrial Communication) | **6ES7 998-8XC01-8YE0** |
| **S7 Manual collection update service for 1 year**<br>Scope of supply: Up-to-date CD S7 manual collection as well as the three subsequent updates | **6ES7 998-8XC01-8YE2** |
| **PROFIBUS ECOFAST Hybrid Plug 180 (ECOFAST copper)**<br>2 x copper; 4 x 1.5 mm$^2$ copper<br>Tool required:<br>Crimping tool | |
| • With male insert (Hanbrid connector) | **6GK1 905-0CA00** |
| • With female insert (Hanbrid connector) | **6GK1 905-0CB00** |
| **ECOFAST Fiber Optic Hybrid Plug 180, DESINA-compatible (ECOFAST FOC)**<br>2 x FO; 4 x 1.5 mm$^2$ copper<br>Tool required: Crimping tool, polishing set, 5 parts | |
| • With male insert (Hanbrid connector) | **6GK1 905-0CA00** |
| • With female insert (Hanbrid connector) | **6GK1 905-0CB00** |
| **PROFIBUS ECOFAST Terminating Plug (ECOFAST copper)**<br>2 x copper; 4 x 1.5 mm$^2$ copper; male insert, integral terminating resistors | |
| • 5 units | **6GK1 905-0DA00** |
| • 1 unit | **6GK1 905-0DA10** |

# EM 141, EM 142 digital expansion modules

## Overview



- Expansion modules with digital inputs/ outputs for connection of actuators/ sensors
- Optionally with diagnostic functions (single-channel diagnostics)
  - Parameterizable input delay
  - Process alarms (available soon)
  - Short and long designs
  - Double or single assignment for each M12
- Optional additional auxiliary voltage supply (load supply)



## Technical specifications

| Expansion module EM 141 | DI 4 x 24 V DC |
|---|---|
| Dimensions W x H x D (in mm) | |
| • Individual device | 87 x 110 x 55 |
| • Hole pitch | 60 x 110 x 55 |
| Number of inputs | 4 |
| Cable length, unshielded, max. | 30 m |
| Power loss of the module, typ. | 1.5 W |
| Current consumption from backplane bus (1L+), max. | 16 mA |

| Expansion module EM 141 | DI 4 x 24 V DC |
|---|---|
| Input voltage | |
| • Rated value | 24 V DC |
| • For "1" signal | 13 to 30 V |
| • For signal "0" | -3 to 5 V |
| Input delay | 1.2 to 4.8 ms |
| Input characteristic | To IEC 61131, type 1 |
| Connection of two-wire BEROs | Possible |
| • Permissible quiescent current, max. | 1.5 mA |

| Expansion module EM 141 | DI 8 x 24 V DC with diagnostics double assignment | DI 8 x 24 V DC with diagnostics single assignment |
|---|---|---|
| Dimensions W x H x D (in mm) | | |
| • Individual device | 87 x 110 x 55 | 87 x 180 x 55 |
| • Hole pitch | 60 x 110 x 55 | 60 x 180 x 55 |
| Number of inputs | 8 | |
| Cable length, unshielded, max. | 30 m | |
| Power loss of the module, typ. | 1.5 W | |
| Current consumption from backplane bus (1L+), max. | 16 mA | 10 mA |
| Input voltage | | |
| • Rated value | 24 V DC | |
| • For "1" signal | 13 to 30 V | |
| • For signal "0" | -3 to 5 V | |
| Input delay | 1.2 to 4.8 ms<br>0.5; 3; 15; 20 parameterizable | |
| Input characteristic | To IEC 61131, type 2 | |
| Connection of two-wire BEROs | Possible | |
| • Permissible quiescent current, max. | 1.5 mA | 2 mA |
| Diagnostics | Each channel: Short-circuit, wire break | |

## Technical specifications (continued)

| EM142 expansion modules | DO 4 x DC 24V/2A without diagnostics<br>DO 4 x DC 24V/2A with diagnostics | DO 4 x DC 24V |
|---|---|---|
| Dimensions W x H x D (in mm) | | |
| • Individual device | 87 x 110 x 55 | |
| • Hole pitch | 60 x 110 x 55 | |
| Number of inputs | 4 | |
| Cable length, unshielded, max. | 30 m | |
| Total current of the outputs (per group) | | |
| • Up to 20 °C, max. | 6 A | 2 A |
| • Up to 55 °C, max. | 4 A | 2 A |
| Power loss of the module, typ. | | |
| • Without diagnostics | 2.1 W | 2.1 W |
| • With diagnostics | 2.5 W | - |
| Current consumption from back-plane bus (1L+), max. | | |
| • Without diagnostics | 28.5 mA | 28.5 mA |
| • With diagnostics | 40 mA | - |
| Short-circuit protection for the output | Yes, electronic | |
| Output current | | |
| • For "1" signal | 2 A at 24 V DC | 0.5 A at 24 V DC |
| • Signal "0", max. | 0.5 mA | 0.1 mA |
| Switching frequency | | |
| • Resistive load, max. | 100 Hz | |
| • Inductive loads, max. | 0.5 Hz | |
| • With lamp load, max. | 1 Hz | |
| Diagnostics | | |
| • Wire break | | |
| - Without diagnostics | - | - |
| - With diagnostics | Yes, by channel | - |
| • Short-circuit | | |
| - Without diagnostics | - | - |
| - With diagnostics | Yes, by channel | - |
| Rated load voltage 2L+ (Power module) | | |
| • Polarity reversal protection | - | - |
| • Short-circuit protection | - | - |

| EM 142 expansion modules | DO 8 x DC 24 V/1.2 A |
|---|---|
| Dimensions W x H x D (in mm) | |
| • Individual device | 87 x 180 x 55 |
| • Hole pitch | 60 x 180 x 55 |
| Number of outputs | 8 |
| Cable length, unshielded, max. | 30 m |
| Total current of the outputs (per group) | |
| • Up to 20 °C, max. | 6 A |
| • Up to 55 °C, max. | 4 A |
| Power loss of the module, typ. | 2.5 W |
| Current consumption | |
| • From backplane bus (L1+), max. | 28.5 mA |
| Short-circuit protection of output | Yes, electronic |

| EM 142 expansion modules | DO 8 x DC 24 V/1.2 A |
|---|---|
| Output current | |
| • For "1" signal | 1.2 A at 24 V DC |
| • Signal "0", max. | 0.5 mA |
| Switching frequency | |
| • Resistive load, max. | 100 Hz |
| • Inductive loads, max. | 0.5 Hz |
| • With lamp load, max. | 1 Hz |
| Diagnostics | |
| • Wire break | - |
| • Short-circuit | - |
| Rated load voltage 2L+ (Power module) | |
| • Polarity reversal protection | - |
| • Short-circuit protection | Yes, electronic cycle |

## EM 141, EM 142 digital expansion modules

| Ordering data | Order No. |
|---|---|
| **EM 141 expansion modules** | |
| • 8 DI × 24 V DC, dual assignment | **6ES7 141-1BF31-0XA0** |
| • 8 DI × 24 V DC, dual assignment with single-channel diagnostics | **6ES7 141-1BF30-0XB0** |
| • 4 DI × 24 V DC | **6ES7 141-1BD31-0XA0** |
| • 8 DI × 24 V DC, single assignment | **6ES7 141-1BF41-0XA0** |
| • 8 DI × 24 V DC, single assignment with single-channel diagnostics | **6ES7 141-1BF40-0XB0** |
| **EM 142 expansion modules** | |
| • 4 DO × 24 V DC, 2 A without diagnosis | **6ES7 142-1BD40-0XA0** |
| • 4 DO × 24 V DC, 2 A with diagnosis | **6ES7 142-1BD40-0XB0** |
| • 4 DO × 24 V DC; 0.5 A | **6ES7 142-1BD30-0XA0** |
| • 8 DO × 24 V DC/1.2 A single assignment | **6ES7 142-1BF30-0XA0** |

| | Order No. |
|---|---|
| ***Accessories*** | |
| **Manual for ET 200X distributed I/O station** | |
| • German | **6ES7 198-8FA01-8AA0** |
| • English | **6ES7 198-8FA01-8BA0** |
| • French | **6ES7 198-8FA01-8CA0** |
| **M12 connector**<br>For connecting actuators or sensors, 5-pin | **3RX1 667** |
| **M12 angular circular connector**<br>For connecting actuators or sensors, 5-pin | **3RX1 668** |
| **M12 Y circular connector**<br>For the double connection of sensors by means of single cable, 5-pin | **6ES7 194-1KA01-0XA0** |
| **Prepared Y cable**<br>For actuators/sensors | Available from:<br>Franz Binder GmbH & Co.<br>PO Box 1152<br>74148 Neckarsulm, Germany<br>Connector Catalog |
| **M12 sealing caps**<br>For sealing unused input or output sockets | **3RX9 802-0AA00** |
| **S7 Manual Collection**<br>Electronic manuals on CD, multi-language:<br>S7-200, TD 200, S7-300, M7-300, C7, S7-400, M7-400, STEP 7, Engineering Tools, Runtime Software, SIMATIC DP (Distributed I/O), SIMATIC HMI (Human Machine Interface), SIMATIC NET (Industrial Communication) | **6ES7 998-8XC01-8YE0** |
| **S7 Manual Collection update service for 1 year**<br>Scope of supply: Up-to-date CD S7 Manual Collection as well as the three subsequent updates | **6ES7 998-8XC01-8YE2** |

## Overview

- Expansion module with digital outputs for connecting actuators
- With diagnostics functionality
- With additional auxiliary voltage supply (load supply)

## Technical specifications

| PM148 power module | DO 4 x 24 V DC/2A |
|---|---|
| Dimensions W x H x D (in mm) | |
| • Individual device | 87 x 193 x 67 (inc. plug) |
| • Hole pitch | 60 x 193 x 67 (inc. plug) |
| Number of inputs | 4 |
| Cable length, unshielded, max. | 30 m |
| Total current for outputs (per group) | |
| • Up to 20 °C, max. | 2 O |
| • Up to 55 °C, max. | 4 O |
| Power loss of the module, typ. | 2.5 W |
| Current consumption | |
| • From backplane bus (1L+), max. | 40 mA |
| • From load voltage (2L+, without load) | 60 mA |

| PM148 power module | DO 4 x 24 V DC/2A |
|---|---|
| Short-circuit protection of output | Yes, electronic |
| Output current | |
| • At "1" signal | 2 A at 24 V DC |
| • At "0" signal, max. | 0.5 mA |
| Switching frequency | |
| • For resistive load, max. | 100 Hz |
| • For inductive load, max. | 0.5 Hz |
| • For lamp load, max. | 1 Hz |
| Diagnostics | |
| • Wire break | Yes, by channel |
| • Short-circuit | Yes, by channel |
| Rated load voltage 2L+ | 24 V DC |
| Polarity reversal protection | No |
| Short-circuit protection | Yes |

## PM 148 power module

| Ordering data | Order No. |
|---|---|
| **PM 148 power module**<br>DO 4 x 24 V DC/2A, with diagnostics and supply for auxiliary voltage (load) | **6ES7 148-1CA00-0XB0** |
| ***Accessories*** | |
| **Manual ET 200X distributed I/O device** | |
| • German | **6ES7 198-8FA01-8AA0** |
| • English | **6ES7 198-8FA01-8BA0** |
| • French | **6ES7 198-8FA01-8CA0** |
| **Circular connector M12**<br>For connecting actuators or sensors, 5-pin | **3RX1 667** |
| **Angular circular connector M12**<br>For connecting actuators or sensors, 5-pin | **3RX1 668** |
| **Prepared Y cable**<br>For actuators/sensors | Available from:<br>Franz Binder GmbH & Co.<br>P.O. Box 1152<br>74148 Neckarsulm, Germany<br>Connector Catalog |

| | Order No. |
|---|---|
| **M12 covers**<br>For covering unused input or output sockets | **3RX9 802-0AA00** |
| **Connector for PROFIBUS DP**<br>Control and auxiliary power (incl. 2 heavy gauge threaded joints and 1 blanking plug); 3 connectors required per basic module | **6ES7 194-1AA01-0XA0** |
| **S7 Manual Collection**<br>Electronic manuals on CD, multilingual:<br>S7-200, TD 200, S7-300, M7-300, C7, S7-400, M7-400, STEP 7, Engineering Tools, Runtime Software, SIMATIC DP (Distributed I/O), SIMATIC HMI (Human Machine Interface), SIMATIC NET (Industrial Communication) | **6ES7 998-8XC01-8YE0** |
| **S7 Manual Collection - Maintenance service for 1 year**<br>Scope of supply: CD containing the current S7 Manual Collection and the three subsequent updates | **6ES7 998-8XC01-8YE2** |

# EM 143/DESINA digital expansion module

## Overview

- Desina-compliant expansion module with user-parameterizable digital inputs/outputs for the connection of actuators/sensors
- Also with diagnostics input/ NC input per channel
- Can be connected to BM 143/DESINA

## Technical specifications

| | |
|---|---|
| Dimensions (W x H x D) in mm | |
| • Individual device | 87 x 180 x 55 |
| • Hole pitch | 60 x 180 x 55 |
| Number of channels | • 8 process channels; parameterized as DI/DO<br>• 8 function channels; parameterized as diagnostic/NO input |
| Cable length unshielded | 30 m (for signal cables) |
| Connectable to | BM 143/DESINA |
| Power loss of the module | 2.5 W |
| Power consumption max. | 40 mA |
| **Parameterization of the channel as DI** | |
| Input voltage | |
| • Rated value | 24 V DC |
| • For “1” signal | 20.4 to 28.8 V |
| • For “0” signal | -3 to 5 V |
| Input current | |
| • For "1" signal, typ. | 5 mA |
| Input characteristic | To IEC 61131, type 2 |
| Connection of two-wire BEROs | Possible |
| • Acceptable quiescent current | ≤ 1.5 mA |
| Input delay time | 1.2 to 4.8 ms |

| | |
|---|---|
| **Parameterization of the channel as DO** | |
| Output current | |
| • For "1" signal | |
| - Rated value | 1.2 A |
| - Permitted range | 5 mA to 1.3 A |
| • At "0" signal (residual current), max. | 0.5 mA |
| Switching frequency | |
| • For resistive load | 100 Hz |
| • With inductive load in accordance with IEC 947-5-1, DC13 | 2 Hz |
| • For lamp load | 1 Hz |
| Short-circuit protection of the output | Yes, electronic |
| Response threshold | ≤ 1.4 A |
| Number of simultaneously settable channels | 8 |
| Simultaneity factor of the outputs | 50% |
| Galvanic isolation | No |

## EM 143/DESINA digital expansion module

| Ordering data | Order No. |
|---|---|
| **EM 143/DESINA expansion module**<br>8 I/O DESINA | **6ES7 143-1BF30-0XB0** |
| ***Accessories*** | |
| **Manual ET 200X distributed I/O device** | |
| • German | **6ES7 198-8FA01-8AA0** |
| • English | **6ES7 198-8FA01-8BA0** |
| • French | **6ES7 198-8FA01-8CA0** |
| **Circular connector M12**<br>For connecting actuators or sensors, 5-pin | **3RX1 667** |
| **Angular circular connector M12**<br>For connecting actuators or sensors, 5-pin | **3RX1 668** |
| **Prepared Y cable**<br>For actuators/sensors | Available from:<br>Franz Binder GmbH & Co.<br>P.O. Box 1152<br>74148 Neckarsulm, Germany<br>Connector Catalog |
| **M12 covers**<br>For covering unused input or output sockets | **3RX9 802-0AA00** |
| **S7 Manual Collection**<br>Electronic manuals on CD, multilingual:<br>S7-200, TD 200, S7-300, M7-300, C7, S7-400, M7-400, STEP 7, Engineering Tools, Runtime Software, SIMATIC DP (Distributed I/O), SIMATIC HMI (Human Machine Interface), SIMATIC NET (Industrial Communication) | **6ES7 998-8XC01-8YE0** |
| **S7 Manual Collection - Maintenance service for 1 year**<br>Scope of supply: CD containing the current S7 Manual Collection and the three subsequent updates | **6ES7 998-8XC01-8YE2** |

## Overview

- Expansion modules with analog inputs/ outputs for connection of actuators/ sensors
- With diagnostics functionality, limit values and substitute values

## Technical specifications

| EM 144 expansion modules | General data (analog inputs) |
|---|---|
| Analog value format | S7 format |
| (parameterizable) | S5 format |
| Dimensions W x H x D (in mm) | |
| • Individual device | 87 x 110 x 55 |
| • Hole pitch | 60 x 110 x 55 |
| Connection of inputs / outputs | 4/5-pin M12 circular connectors |
| Weight, approx. | 250 g |
| Interrupts | |
| • Process interrupt | Yes |
| • Diagnostics interrupt | Yes |
| Number of differential inputs | 2 |
| Cable length, shielded | 30 m |
| Galvanic isolation | No |
| Measurement and conversion principle | Integrating |
| Conversion time per channel (parameterizable) | 20 ms, 16.67 ms |
| Resolution (including overrange) | 12 bit + sign |
| Overrange | 17.5% |
| Operating error limit (in the entire temperature range of the modules, relative to input range) | +/- 1.2 % |
| Diagnostics | Underflow, by channel / Overflow, by channel |
| Diagnostics LED | Yes |
| Limit | Lower limit values, by channel/upper limit values, by channel |

## EM 144, EM 145 analog expansion modules

### Technical specifications (continued)

| EM 144 expansion modules | AI 2 x ± 10 V | AI 2 x ± 20 mA, 4 to 20 mA, 4DMU |
|---|---|---|
| Input range (rated value) | ±10 V | ±20 mA, 4...20 mA |
| Input resistance | 100 kΩ | 25 Ω |
| Characteristic linearization | - | - |
| Permissible input voltage (destruction limit) | 30 V | - |
| Permissible input current (destruction limit) | - | 40 mA |
| Short-circuit protection | Yes, sensor supply | Yes, sensor supply |
| Short-circuit current | - | - |
| Transducer load | - | - |
| Measurement current | - | - |
| Connection of sensors for voltage measurement | Possible | - |
| Connection of sensors for current measurement | | |
| • As a 2-conductor transducer | - | Not possible |
| • As 4-wire transmitter | - | Possible |
| Connection of signal sensors | | |
| • 2-wire connection | - | - |
| • 3-wire connection | - | - |
| • 4-wire connection | - | - |
| Diagnostics | | |
| • Short-circuit | - | Yes, by channel |
| • Wire break | - | Yes, by channel |
| Power losses, typically | 0.9 W | 0.9 W |
| Current consumption from backplane bus, max. | 40 mA | 40 mA |

| EM 144 expansion modules | AI 2 x 4 to 20 mA | AI 2 x RTD (Pt100) |
|---|---|---|
| Input range (rated value) | 4mA to 20mA | PT 100 (Standard) |
| Input resistance | 25 Ω | 10 MΩ |
| Characteristic linearization | - | Yes |
| Permissible input voltage (destruction limit) | - | 30 V |
| Permissible input current (destruction limit) | 40 mA | - |
| Short-circuit protection | Yes | - |
| Short-circuit current | ca. 45 mA | - |
| Transducer load | max. 750 Ω | - |
| Measurement current | - | 1.5 mA |
| Connection of sensors for voltage measurement | - | - |
| Connection of sensors for current measurement | | |
| • As 2-wire transducer | Possible | - |
| • As 4-wire transducer | Possible | - |
| Connection of signal sensors | | |
| • 2-wire connection | - | Possible |
| • 3-wire connection | - | Possible |
| • 4-wire connection | - | Possible |
| Diagnostics | | |
| • Short-circuit | Yes, by channel | - |
| • Wire break | - | Yes, by channel |
| Power losses, typically | 1 V | 0.9 W |
| Current consumption from backplane bus, max. | 80 mA | 40 mA |

## Technical specifications (continued)

| EM 145 expansion modules | General data (analog outputs) |
|---|---|
| Analog value format | S7 format |
| (parameterizable) | S5 format |
| Dimensions (W x H x D) in mm | |
| • Individual device | 87 x 110 x 55 |
| • Hole pitch | 60 x 110 x 55 |
| Connection of inputs / outputs | 4/5-pin M12 circular connectors |
| Weight, approx. | 250 g |
| Interrupts | |
| • Diagnostics interrupt | Yes |
| Number of outputs | 2 |
| Cable length, shielded | 30 m |
| Galvanic isolation | No |
| Resolution (including overrange) | 11 bit + sign |
| Conversion time of the analog loop | max. 1 ms |
| Transient recovery time | |
| • For resistive load | 0.6 ms |
| • Capacitive loads | 6.0 ms |
| Operational limit (over entire temperature range, relative to output range) | +/- 1% |
| Replacement value (last value or power-less) | Yes, by channel |
| Diagnostics LED | Yes |

| EM 145 expansion modules | AO 2 x ± 10 V | AO 2 x ± 20 mA, 4 to 20 mA |
|---|---|---|
| Output ranges (rated values) | - 10 to 10 V | - 20 to 20 mA; 4 mA to 20 mA |
| Load resistor | | |
| For capacitive load | min. 1.0 kΩ, max. 0.1 µF | - |
| For inductive load | - | Max. 500 Ω, max. 0.1 mH |
| Short-circuit protection | Yes | - |
| Short-circuit current | max. 30 mA | - |
| Current output idle voltage | - | max. 15 V |
| Permissible input voltage (destruction limit) | 30 V | - |
| Permissible input current (destruction limit) | - | - |
| Connection of signal sensors | | |
| • As 2-wire transducer | - | Not possible |
| • As 4-wire transducer | - | Possible |
| Connection of actuators | | |
| • 2-conductor connection | Possible | Possible |
| • 4-conductor connection (measuring circuit) | Possible | - |
| Diagnostics | | |
| • Short-circuit | Yes, by channel | - |
| • Wire break | - | Yes, by channel |
| Power losses, typically | 1.5 W | 2.3 W |
| Current consumption from backplane bus, max. | 75 mA | 110 mA |

## EM 144, EM 145 analog expansion modules

| Ordering data | Order No. |
|---|---|
| **EM 144 expansion modules** | |
| With diagnostics / limit values | |
| • AI 2 × ±10 V | **6ES7 144-1FB31-0XB0** |
| • AI 2 × ±20 mA, 4DMU | **6ES7 144-1GB31-0XB0** |
| • AI 2 × 4 to 20 mA, 2DMU | **6ES7 144-1GB41-0XB0** |
| • AI 2 × RTD (Pt100)10 V | **6ES7 144-1JB31-0XB0** |
| **EM 145 expansion modules** | |
| With diagnostics / replacement values | |
| • AO 2 × ±10 V | **6ES7 145-1FB31-0XB0** |
| • AO 2 × ± 20 mA, 4 to 20 mA | **6ES7 145-1GB31-0XB0** |

| | Order No. |
|---|---|
| ***Accessories*** | |
| **Manual ET 200X distributed I/O device** | |
| • German | **6ES7 198-8FA01-8AA0** |
| • English | **6ES7 198-8FA01-8BA0** |
| • French | **6ES7 198-8FA01-8CA0** |
| **S7 Manual Collection** | **6ES7 998-8XC01-8YE0** |
| Electronic manuals on CD, multilingual: S7-200, TD 200, S7-300, M7-300, C7, S7-400, M7-400, STEP 7, Engineering Tools, Runtime Software, SIMATIC DP (Distributed I/O), SIMATIC HMI (Human Machine Interface), SIMATIC NET (Industrial Communication) | |
| **S7 Manual Collection - Maintenance service for 1 year** | **6ES7 998-8XC01-8YE2** |
| Scope of supply: CD containing the current S7 Manual Collection and the three subsequent updates | |

## Overview

The ASM 473 is a low-cost ET200X expansion module for connecting the MOBYD/F/E/I/U identification systems via the ET 200X to the PROFIBUS DP-V1.

## Application

One write/read device (SLG x) can be connected for each ASM 473, but no more than 7 expansion modules can be connected to a basic module BM141/142/143/147 in connection, for example, with digital input/output modules. On all connected SLGs, the mobile data memories can be securely operated in the **dynamic mode** (for max. MDS speed, see SLG-MDS combination).

The following can be used as PROFIBUS DP-V1 masters:

- SIMATIC S7 (FC45, FC55 and FC56 available)
- SINUMERIK
- SICOMP IMC and PC, any PLC

Thanks to its high degree of protection and ruggedness, it is particularly suitable for machine-level use.

## Design

The ASM 473 interface module is an ET 200X expansion module for the BM 141/142/143/147 header module.

The relevant configuration and installation guidelines must be taken from the ET 200X Manual.

## Function

With the available software function FC45/FC55/FC56 (MOBY I/U file handler) for the SIMATIC S7-300/400, the ASM operates in acyclic mode via PROFIBUS DP-V1. In this mode a very large amount of data can be transferred to/from the ASM without overloading the PROFIBUS cycle. This has advantages when transferring large volumes of data. In addition, the ASM can process concatenated MDS commands very quickly in this mode. The MDS data is accessed direct by means of physical addressing of the MDS.
Error messages and operating states (MDS in the field, transmission, etc.) are indicated additionally by means of LEDs and simplify commissioning and service.
The hardware of the ASM 473 is configured with an object manager (OM) that is integrated in the SIMATIC Manager. Depending on the PROFIBUS master, as many as 126 ET 200X modules can be operated on one PROFIBUS line.

## Ordering data

| | Order No. |
|---|---|
| **MOBY interface module ASM 473**<br>ET 200X expansion module for BM 141/142/143/147, one SLG connectable per ASM 473 | **6GT2 002-0HA10** |
| ***Accessories*** | |
| **MOBY Software Package**<br>on CD, FB/FC for SIMATIC, MOBY Demo for PC | **6GT2 080-2AA10** |
| **MOBY connector for ASM 450/452/473**<br>Without cable | **6GT1 090-0BC00** |

| | Order No. |
|---|---|
| **MOBY D, E, I, U connecting cable**<br>Preassembled, between ASM 450/452/473 and SLG, in the following lengths: | |
| • 2 m (preferred length) | **6GT2 091-1CH20** |
| • 5 m | **6GT2 091-1CH50** |
| • 10 m | **6GT2 091-1CN10** |
| • 20 m | **6GT2 091-1CN20** |
| • 50 m | **6GT2 091-1CN50** |
| **MOBY F connecting cable**<br>Preassembled, between ASM 450/452/473 and SLG 8x, IP65 in the following lengths: | |
| • 2 m (preferred length) | **6GT2 491-1CH20** |
| • 5 m | **6GT2 491-1CH50** |
| • 10 m | **6GT2 491-1CN10** |

## CP 142-2

### Overview

- Master connection for the ET 200X distributed I/O station to AS-Interface over a 12-pin connector
- Easy operation in the I/O address area of SIMATIC ET 200X
- No CP configuration required for AS-Interface
- Activation of up to 31 AS-Interface slaves in accordance with the AS-Interface specification V2.0
- Monitoring of the supply voltage on the AS-Interface shaped cable
- Significant increase in the number of inputs and outputs of ET 200X

### Benefits

get Designed for Industry

- In connection with the BM 147, the ET 200X enables PLC functionality in degree of protection IP65
- Can also be used in a rugged industrial environment without additional casing due to the high degree of protection IP67
- More flexible and extended application options of the ET 200X thanks to considerable increase in available inputs/outputs
- Shorter startup times due to easy configuration at the press of a button
- Reduction of standstill or service times in the event of a fault through LED displays:
  - status of the AS-Interface network
  - connected slaves and their operational readiness
  - monitoring of the AS-Interface voltage level

### Application

The CP 142-2 enables the connection of the distributed I/O system ET 200X to AS-Interface.

This module can be used to activate up to 31 AS-Interface slaves and, if bi-directional slaves are implemented, up to 248 binary components.

Up to 6 CP 142-2 can be operated on the ET 200X.

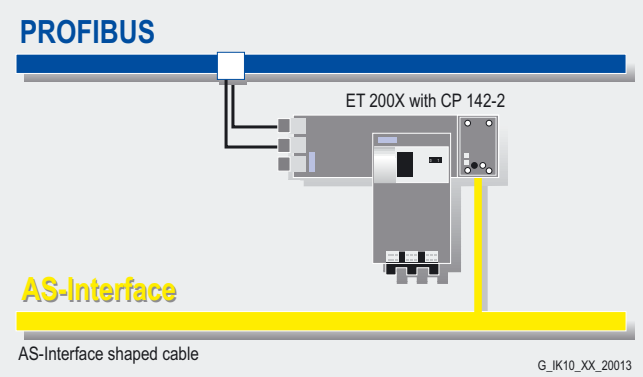
### Design

- 16 byte inputs and 16 byte outputs are used in the address space of the ET 200X
- Operating statuses displayed by LEDs in the frontplate
- Display of the connected and activated slaves and their operational readiness by LEDs
- One pushbutton for switching the operating status, entering the existing configuration and switching the display
- Connection of the AS-Interface cable to M12 connector
- Monitoring of the supply voltage on the AS-Interface cable

### Function

The CP 142-2 can be used in two operating modes:

- Standard mode with BM 141/BM 142/BM 147
- A maximum of 124 input bits and output bits of the AS-Interface slaves can be addressed.
- Extended mode with BM 147
  An FC (Function Call) enables master calls to be used in accordance with the AS-Interface specification V2.0 (e.g. write parameters). The calls are described in the manual. Program examples are supplied with the manual.




System configuration

### Configuring

Parameterization of the CP 142-2 is performed with the STEP® 7 basic package V2.1 and higher. No additional configuration is required for AS-Interface.

## Technical specifications

| | |
|---|---|
| Bus cycle time | 5 ms with 31 slaves |
| Configuration | |
| • AS-Interface | Using pushbutton on front plate |
| • PROFIBUS | The CP 142-2 occupies 16 byte inputs and 16 byte outputs in the PROFIBUS configuration of the ET 200X |
| AS-Interface Specification | V 2.0 |
| • With BM 141/BM 142 | Only IO transmission |
| • With BM 147 and FC, ASI-3422 | All functions |
| Connection of the AS-Interface cable | Through M12 connector on the front plate |
| Address range | 16 input byte<br>16 output byte |
| Supply voltage | |
| • Through backplane bus | 24 V DC |
| • From the AS-Interface shaped cable | According to the AS-Interface Specification V2.0 |
| Power loss | 2 W |
| Current consumption | |
| • Through backplane bus | Typ. 50 mA at 24 V DC |
| • Through AS-Interface from the AS-Interface shaped cables | According to the AS-Interface specification V 2.0 |
| Perm. environmental conditions | |
| • Operating temperature | 0 °C to +55 °C |
| • Transport/storage temperature | -40 °C to +70 °C |
| • Relative humidity | 95% at +25 °C |
| Design | ET 200X design |
| • Module format | Expansion module |
| • Dimensions (W x H x D) in mm | 87 x 110 x 63 |
| • Weight | Approx. 310 g |
| • Space required | 1 slot |
| Degree of protection | IP66/67 |

## Ordering data

| | Order No. |
|---|---|
| **CP 142-2 communications processor**<br>For connecting SIMATIC ET 200X to AS-Interface | **6GK7 142-2AH00-0XA0** |
| **Manual CP 142-2**<br>• German | **6GK7 142-2AH00-8AA0** |
| **Electronic manuals**<br>Communications systems, protocols, products on CD-ROM German/English | **6GK1 975-1AA00-3AA0** |

# EM 148-P pneumatic module

## Overview

- The module for standard applications in pneumatics
- For controlling two simple or double-action pneumatic cylinders
- Electronics and pneumatics on one module
- With integrated digital inputs for recording the cylinder positions

Note:
Cannot be used with DESINA/ECOFAST basic modules



## Technical specifications

| EM 148-P pneumatic module | DI 4 x 24 V DC / DO 2 x P |
|---|---|
| Dimensions W x H x D (in mm) | |
| • Individual device | 87 x 173 x 88 |
| • Hole pitch | 60 x 173 x 88 |
| Number of inputs | 4 |
| Input voltage | |
| • Rated value | 24 V DC |
| • For "1" signal | 11 to 30 V |
| • For signal "0" | -3 to 5 V |
| Input current for "1" signal, typ. | 7 mA |
| Input delay | 1.2 to 4.8 ms |
| Input characteristic | To IEC 61131, type 1 |
| Connection of two-wire BEROs | Possible |
| Permissible quiescent current, max. | 1.5 mA |
| Cable length, unshielded | Max. 30 m |
| Number of outputs | 2 (to the valve controller) |
| Valve type | 2 x monostable 4/2-way valve with spring return |
| Controllable pneumatic cylinder | Double-action cylinder; single-action cylinder |
| Manual operation | Yes, touch |

| EM 148-P pneumatic module | DI 4 x 24 V DC / DO 2 x P |
|---|---|
| Pneumatic connection | |
| • Supply/exhaust air | Quickstar QS 8 |
| • Switch outputs | Quickstar QS 6 |
| Medium | Compressed air<br>• Filtered (40 µm)<br>• Lubricated (Oil: VG 32)<br>• Unlubricated |
| Pressure range | 3 to 8 bar |
| Rated flow | 300 l/min |
| Supply/exhaust air | Joint for both valves |
| Valve switching time | |
| • On, over | 20 ms |
| • Off | 20 ms |
| Current consumption | |
| • From backplane bus (L1+), max. | 40 mA |
| • From load voltage (L2+), max. (inc. valves) | 130 mA |
| Power losses, typically | 3 W |
| Power consumption per valve | 20 mA |

## Ordering data

| | Order No. |
|---|---|
| **EM 148-P pneumatic module DI 4 x 24 V DC/DO 2 x P**<br>With 2 integrated 4/2-way valves | **6ES7 148-1DA00-0XA0** |
| ***Accessories*** | |
| **Silencer for pneumatic module** | **6ES7 194-1EA00-0XA0** |
| **Sealing plugs for pneumatic module**<br>For using 4/2-way valves as 3/2-way valves, to protect the connections | **6ES7 194-1JA00-0XA0** |

## Overview

- Interface to accept an original FESTO valve terminal CPV 10 compact performance valve terminal or CPV 14
- For use of the ET 200X for applications with flexible pneumatics
- High level of flexibility in pneumatics thanks to the different valve functions and different flow rate volumes

## Technical specifications

| **EM 148-P pneumatic interface, general data** | | |
|---|---|---|
| Dimensions W x H x D (in mm) without valve terminal | | |
| • Individual device | 147 x 152 x 53 | |
| • Hole pitch | 120 x 152 x 53 | |
| Galvanic isolation | No | |
| Number of outputs to valve controls | 16 | |
| Isolation of the outputs | Yes, optocouplers | |
| • In groups of | 16 | |
| **Pneumatic Interface EM 148-P** [1] | **DO 16 x P** | **DO 16 x P** |
| **FESTO valve terminal** | **CPV10** | **CPV14** |
| Connectable valves | CPV 10 standard spectrum | CPV 14 standard spectrum |
| • Max. number | 8 valve discs (up to 16 valve functions) | |
| • Medium | Compressed air<br>Filtered (40 µm)<br>Lubricated (Oil: VG 32)<br>Unlubricated | |
| Pressure range | 3 to 8 bar | |
| Rated flow | 400 l/min | 800 l/min |
| Current consumption | | |
| • From backplane bus (L1+), max. | 35 mA | 45 mA |
| • From load voltage (L2+), max. (incl. valves CPV10/CPV14) | 370 mA | 520 mA |
| Power losses, typically | 6 W | 9 W |
| Max. current consumption per valve | 20 mA | 32 mA |

1) For detailed information, please refer to the FESTO documentation

Note:
Detailed information on technical specifications can be obtained from the FESTO order documents.

## Ordering data

| | Order No. |
|---|---|
| **EM 148-P pneumatic interface** | |
| • DO 16 × P/CPV 10 for directly adapting the FESTO valve terminal CPV 10 16 DO × P | **6ES7 148-1EH01-0XA0** |
| • DO 16 × P/CPV 14 for directly adapting the FESTO valve terminal CPV 14 16 DO × P | **6ES7 148-1EH11-0XA0** |
| **FESTO CPV 10 valve terminal** | Available from FESTO |
| **FESTO CPV 14 valve terminal** | Available from FESTO<br>FESTO AG & Co<br>Ruiterstr. 82<br>73732 Esslingen, Germany<br>Further addresses can be found on the Internet at:<br>http://www.festo.de |

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# EM 148-FC frequency converter

## Overview

- Expansion module with integrated frequency converter for ET 200X
- For driving three-phase AC motors (380 to 500 V AC) up to 1.5 kW
- Integral component of ECOFAST within the framework of ET 200X DESINA
- Degree of protection IP65
- Can be combined with all ET 200X modules without any restrictions
- Simple configuring and parameterization through PROFIBUS DP using STEP 7 and configuring tools in compliance with standards



## Technical specifications

| | | |
|---|---|---|
| Input voltage range | 380 to 500 V AC | |
| Recommended rated motor output, max. | 1.5 kW | |
| Output current | Up to 55 °C: | Up to 40 °C: |
| • Continuous current, max. | 1.2 A | 3.8 A |
| • Overload current, max. | 1.3 A | 5.4 A |
| Mains frequency | 47 Hz to 63 Hz | |
| Power factor | > 0.7 | |
| Output frequency | 0 Hz to 300 Hz | |
| Resolution | 0.01 Hz | |
| Overload capability | 150% for 60s, with reference to rated current | |
| Galvanic isolation | Yes, between logic and power section | |
| Protective measures against: | • Overtemperature of converter<br>• Overtemperature of motor<br>• Over- and undervoltage<br>• Short-circuit and ground-fault protection<br>• Motor stalling protection<br>• Protection against idling (operation termination) | |
| Mode/Control | 4 quadrants/V/Hz characteristic | |
| Relay output | 400 V AC/ 1 A | |
| Ambient temperature | 0°C to +55 °C | |
| Converter efficiency | 97% | |
| Weight, approx. | 3 kg | |
| Permissible cable length max. | 10 m | |
| Interrupts | Diagnostics interrupt | |
| Diagnostics | Yes | |
| Power input through expansion interface from electronics/encoder power supply for logic (without sensors), max. | 50 mA | |
| Dimensions (HxWxD) in mm, approx. | 265 x 120 x 181 | |

## Ordering data

| | Order No. |
|---|---|
| **EM 148-FC frequency converter**<br>For driving three-phase AC motors (380 to 500 V AC) up to 0.75 kW with integrated network filter | **6ES7 148-1FA10-0XB0** |
| ***Accessories*** | |
| **Connector for motor outlet**<br>HAN Q8 shielded, assignment compliant with DESINA specification | **6ES7 194-1AB01-0XA0** |
| **HAN Q8 connector set** | |
| For incoming energy supply | |
| • 2.5 $mm^2$, 9-pin | **3RK1 902-0CA00** |
| • 4 $mm^2$, 9-pin | **3RK1 902-0CB00** |
| For power forwarding | |
| • 2.5 $mm^2$, 9-pin | **3RK1 902-0CC00** |
| • 4 $mm^2$, 9-pin | **3RK1 902-0CD00** |
| **Motor connecting lead**<br>preassembled, shielded, HAN Q8 at open end | |
| • 1.5 m | **6ES7 194-1LA01-0AA0** |
| • 3 m | **6ES7 194-1LB01-0AA0** |
| • 5 m | **6ES7 194-1LC01-0AA0** |
| • 10 m | **6ES7 194-1LD01-0AA0** |
| **Cover**<br>For 9-pin power socket, 1 pack. = 10 pcs | **3RK1 902-0CJ00** |
| **Disassembly tool**<br>To undo contact pins and contact sockets in 6-pin sets | **3RK1 902-0AJ00** |
| **Manual control unit**<br>With 0.5 m connecting cable and plug | **3RK1 902-0AM00** |
| **Description label**<br>For labeling the inputs and outputs, as equipment identifiers; 20 frames with 40 labels each, 8 x 10 mm, petrol colored | **6ES7 194-1BA00-0XA0** |
| **Manual ET 200X distributed I/O device** | |
| • German | **6ES7 198-8FA01-8AA0** |
| • English | **6ES7 198-8FA01-8BA0** |
| • French | **6ES7 198-8FA01-8CA0** |
| **S7 Manual Collection**<br>Electronic manuals on CD, multilingual: S7-200, TD 200, S7-300, M7-300, C7, S7-400, M7-400, STEP 7, Engineering Tools, Runtime Software, SIMATIC DP (Distributed I/O), SIMATIC HMI (Human Machine Interface), SIMATIC NET (Industrial Communication) | **6ES7 998-8XC01-8YE0** |
| **S7 Manual Collection - Maintenance service for 1 year**<br>Scope of supply: CD containing the current S7 Manual Collection and the three subsequent updates | **6ES7 998-8XC01-8YE2** |

# ET 200X motor starter

## Overview

- For switching and protecting any three-phase load
- Direct-on-line or reversing starters
- Electromechanical or solid-state
- Power bus can be plugged in using the new HAN Q8 plug-in connectors
- Conductor cross-sections up to 4 $mm^2$
- 35 A per segment
- Supplied with different brake contacts as an option

## Application

Any three-phase load, e.g. three-phase motors, can be switched and protected with the ET 200X via motor starters.

Motor starters are available in two variants:

- *Electromechanical motor starters*
  for electrical isolation of loads from the supply
- *Electronic motor starters*
  - can be used for high starting frequency
  - the response in the event of overload can be specifically configured, e.g. emergency operation on overload, remote reset via bus following overload tripping

Motor starters can be operated with a handheld operator panel which makes start-up easier.

## Design

Motor starters generally contain:

- Digital outputs for controlling the motor starter
- Digital inputs for acknowledgement of operating states and faults
- Integrated power connectors for voltage supply and looping through. This allows a power bus system to be constructed in which several motor starters are connected to one power cable.
- A starter combination comprising circuit-breakers and contactor(s) from the SIRIUS switchgear range for electromechanical motor starters (electronic motor starters allow parameters to be set for overload protection and overload response).

### *Mounting*

The motor starters are electrically connected to the adjacent modules via the integrated plug connector. Special mounting rails (6ES7 194-1GB.0-0XA0) must be used to screw the ET 200X station in place (see Section *Accessories / Mounting Accessories*). The motor starters must be attached to the mounting rail with all three screws tightened and must also be attached to the upstream module by means of the three screws supplied. Note: Compliance with the permissible maximum electrical and mechanical load limits is essential.

## Design (continued)

### *Accessories*

The following accessories are required for each ET 200X configuration:

| Basic and expansion modules with inputs and outputs | EM 300 DS/RS and EM 300 EDS/ERS motor starters | | | Tools |
|---|---|---|---|---|
| | For incoming power supply (-X1) | For feeder connection (-X2) | For power loop-through (-X3) | |
| For each base station:<br>Three connectors for PROFIBUS DP, control and auxiliary voltage<br>For each digital input and output used:<br>One 5-pole M12 coupler plug<br>For each analog input and output used:<br>One 4-pole screened M 12 coupler plug<br>For each unused digital or analog input and output:<br>One M 12 sealing cap | For each electromechanical or electronic motor starter:<br>9-pole power connector set for incoming supply:<br>• 6 x 4 $mm^2$ or<br>• 6 x 2.5 $mm^2$ | For each electromechanical or electronic motor starter:<br>• 9-pole connector set for feeder connection (1.5 $mm^2$) or<br>• Preassembled feeder connection cable:<br>- 4 x 1.5 $mm^2$ or<br>- 6 x 1.5 $mm^2$ with 9-pole power connector | For each electromechanical or electronic motor starter:<br>• 9-pole connector set for power loop-through:<br>- 6 x 4 $mm^2$ or<br>- 6 x 2.5 $mm^2$ or<br>• Power supply line:<br>- 4 x 4 $mm^2$ or<br>- 6 x 4 $mm^2$ with 9-pole power connectors<br>For each unused socket:<br>• One sealing cap | Depending on requirement:<br>• Crimping tool<br>• Dismantling tool for 9-pole power connector<br>• Hand-held terminal [1]) |

1) The hand-held terminal enables the motor starter to be operated locally and autonomously, providing that the auxiliary voltage supply is connected. Thus, assuming that the automation level is functioning correctly, local switching operations can be carried out in addition to normal manual operations in the event of a programmable controller / bus system failure (emergency mode) or during test runs before commissioning, e.g. for testing the direction of rotation of the motor. The hand-held terminal can be connected to the motor starter by means of a connecting cable via a socket underneath the transparent cover.

## Technical specifications

| | DS/RS | EDS/ERS |
|---|---|---|
| Rated operational voltage in V | | |
| • acc. to DIN VDE 0106, Part 1014 | 500 AC | |
| • acc. to CSA and UL | 600 AC | |
| Safe isolation between the main and auxiliary circuit in V (acc. to DIN VDE 0106, Part 101) | up to 400 | -- |
| Rated power in kW | 5.5 | 2.2 |
| Permissible operating modes | Continuous operation, temporary duty, periodic duty, intermittent duty (50% rel. ED at 80 1/h at 5.5 kW) | |
| Permissible number of switching operations/h for starting time $t_A$ = 0.1 s and rel. make time $t_{EP}$ = 50 % | ≤ 80 | ≤ 600 |
| Trip class | Class 10 | |
| Conductor cross-sections for power connectors Power supply/routing/branch 9-pole | ≤ 4 $mm^2$ AWG (15-11) | |
| Max. permissible current via the power connector (depends on the cable cross-sectional area) | | |
| • $T_U$ = 60 °C | 30 A (4 $mm^2$), AWG (11)<br>20 A (2.5 $mm^2$), AWG (15)<br>12 A (1.5 $mm^2$), AWG (13) | |
| • $T_U$ = 40 °C | 35 A (4 $mm^2$), AWG (11)<br>25 A (2.5 $mm^2$), AWG (15)<br>15 A (1.5 $mm^2$), AWG (13) | |
| Resistance to short-circuiting of the starter combination in kA | 50 (type of coordination "1") | 100 |
| Electrical durability of the circuit-breaker element under load $I_a$ (AC-3) in operating cycles | see service life characteristic curve of the 3RT10 contactors | ≤ 10 million |

## ET 200X motor starter

### Selection and Ordering data

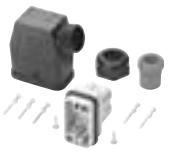
| Version | | Order No. |
|---|---|---|
| ***Expansion modules for electromechanical motor starters*** | | |
|  **Expansion module EM 300 DS**<br>Electromechanical direct-on-line starter | | **3RK1 300-■■S01-0AA■** |
| **Expansion module EM 300 RS**<br>Electromechanical reversing starter | | **3RK1 300-■■S01-1AA■** |
| *Three-phase motor 4-pole at 400 V AC standard output P in kW* | *Setting range of the overcurrent release in A* | |
| < 0.06 | 0.14 to 0.20 | **0 B** |
| 0.06 | 0.18 to 0.25 | **0 C** |
| 0.09 | 0.22 to 0.32 | **0 D** |
| 0.10 | 0.28 to 0.40 | **0 E** |
| 0.12 | 0.35 to 0.50 | **0 F** |
| 0.18 | 0.45 to 0.63 | **0 G** |
| 0.21 | 0.55 to 0.80 | **0 H** |
| 0.25 | 0.70 to 1.00 | **0 J** |
| 0.37 | 0.90 to 1.25 | **0 K** |
| 0.55 | 1.1 to 1.6 | **1 A** |
| 0.75 | 1.4 to 2.0 | **1 B** |
| 0.90 | 1.8 to 2.5 | **1 C** |
| 1.1 | 2.2 to 3.2 | **1 D** |
| 1.5 | 2.8 to 4.0 | **1 E** |
| 1.9 | 3.5 to 5.0 | **1 F** |
| 2.2 | 4.5 to 6.3 | **1 G** |
| 3.0 | 5.5 to 8.0 | **1 H** |
| 4.0 | 7 to 10 | **1 J** |
| 5.5 | 9 to 12 | **1 K** |
| Standard version | | **0** |
| Version with brake contact for DC 24 V/3 A externally-fed brakes | | **1** |
| Design with brake contact for AC 400 V/0.5 A infeed for brake rectifier | | **3** |
| Version with brake contact for DC-side switching of the brake with DC 500 V/0.2 A | | **4** |
| ***Expansion module for solid-state motor starter*** | | |
|  **Expansion module EM 300 EDS**<br>Solid-state direct-on-line starter | | **3RK1 300-■■S10-0AA■** |
| **Expansion module EM 300 ERS**<br>Solid-state reversing starter | | **3RK1 300-■■S10-1AA■** |
| *Three-phase motor 4-pole at 400 V AC standard output P in kW* | *Setting range of the overcurrent release in A* | |
| 0.18 to 0.80 | 0.60 to 2.18 | **0A** |
| 0.75 to 2.20 | 2.00 to 5.95 | **0B** |
| Standard version | | **0** |
| Version with brake contact for DC 24 V/3 A externally-fed brakes | | **1** |
| Design with brake contact for AC 400 V/0.5 A infeed for brake rectifier | | **3** |
| Version with brake contact for DC-side switching of the brake with DC 500 V/0.2 A | | **4** |

## Selection and Ordering data (continued)

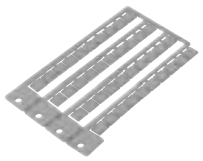
| | Version | Order No. |
|---|---|---|
| ***Accessories for 24 V DC*** | | |
|  6ES7 194-1AA00-0XA0 | **Manual** | |
| | • German | **6ES7 198-8FA01-8AA0** |
| | • English | **6ES7 198-8FA01-8BA0** |
| | • French | **6ES7 198-8FA01-8CA0** |
| | **Connecting plug**<br>for PROFIBUS DP, control and auxiliary voltage<br>(including two conduit threads) | **6ES7 194-1AA00-0XA0** |
| | **Cable**<br>for bus and control voltage<br>5-core<br>Unprepared<br>Any length [1]) | |
| | • PVC | **6ES7 194-1LY00-0AA0** |
| | • PUR<br>Can be trailed<br>Oil-resistant<br>Partially weld-resistant | **6ES7 194-1LY10-0AA0** |
|  6ES7 194-1KA01-0XA0 | **M12 coupler plug** | |
| | • 5-pole<br>for connecting actuators and sensors | **3RX1 667** |
| | • 4-pole<br>shielded<br>for connecting the analog expansion modules | Available from:<br>Franz Binder GmbH & Co,<br>PO BOX 11 52D,<br>74148 Neckarsulm, Germany |
| | **M12 angular coupler plug** | |
| | • 5-pole<br>for connecting actuators and sensors | **3RX1 668** |
| | • 4-pole<br>shielded<br>for connecting the analog expansion modules | Available from:<br>Franz Binder GmbH & Co,<br>PO BOX 11 52D,<br>74148 Neckarsulm, Germany |
| | **M12 Y-coupling connector**<br>5-pole<br>for connecting two sensors with a single cable | **6ES7 194-1KA01-0XA0** |
| | **M12 sealing caps**<br>for closing unused input or output sockets<br>(each set contains ten sealing caps) | **3RK1 901-1KA00** |

## ET 200X motor starter

### Selection and Ordering data (continued)

| | Version | Order No. |
|---|---|---|
| | ***Accessories for motor starter EM 300, 9-pole connector (Han Q8/0)*** | |
|  3RK1 902-0CA00 | **Connector set for power supply**<br>9-pole<br>Comprising:<br>one connector housing with Pg 16 screw connection<br>one socket holder, 9-pole<br>six contact sockets, suitable for cable | |
| | • 4 x 2.5 $mm^2$, 6 x 2.5 $mm^2$ | **3RK1 902-0CA00** |
| | • 4 x 4 $mm^2$, 6 x 4 $mm^2$ | **3RK1 902-0CB00** |
|  3RK1 902-0CC00 | **Connector set for power transmission**<br>9-pole<br>Comprising:<br>one connector housing with Pg 16 screw connection<br>one pin holder, 9-pole<br>six contact pins, suitable for cable | |
| | • 6 x 2.5 $mm^2$ | **3RK1 902-0CC00** |
| | • 4 x 4 $mm^2$, 6 x 4 $mm^2$ | **3RK1 902-0CD00** |
|  3RK1 902-0CH00 | **Connector set for motor connection**<br>1.5 $mm^2$<br>9-pole<br>Comprising:<br>one connector housing with Pg 16 screw connection<br>one pin holder, 9-pole<br>eight contact pins 1.5 $mm^2$ | **3RK1 902-0CE00** |
| | **Sealing cap**<br>for 9-pole power socket (-X3) | |
| | • One set comprises ten sealing caps | **3RK1 902-0CJ00** |
| | • One set comprises one sealing cap | **3RK1 902-0CK00** |
| | **Power connecting cable**<br>0.12 m long | |
| | • From the motor starter to the frequency converter, DESINA | |
| | - 5 x 4 $mm^2$ , without brake lead | **3RK1 902-0CF00** |
| | - 7 x 4 $mm^2$ , with brake lead | **3RK1 902-0CU00** |
| | • From motor starter to motor starter | |
| | - 4 x 4 $mm^2$ | **3RK1 902-0CG00** |
| | - 6 x 4 $mm^2$ | **3RK1 902-0CH00** |
| | **Motor connection cable, 4 x 1.5 $mm^2$**<br>with power connector<br>9-pole | |
| | • 1.5 m | **3RK1 902-0CL00** |
| | • 3 m | **3RK1 902-0CM00** |
| | • 5 m | **3RK1 902-0CP00** |
| | • 10 m | **3RK1 902-0CQ00** |
| | **Motor connection cable, 6 x 1.5 $mm^2$**<br>with power connector<br>9-pole | |
| | • 3 m | **3RK1 902-0CN00** |
| | • 5 m | **3RK1 902-0CR00** |
| | • 10 m | **3RK1 902-0CS00** |

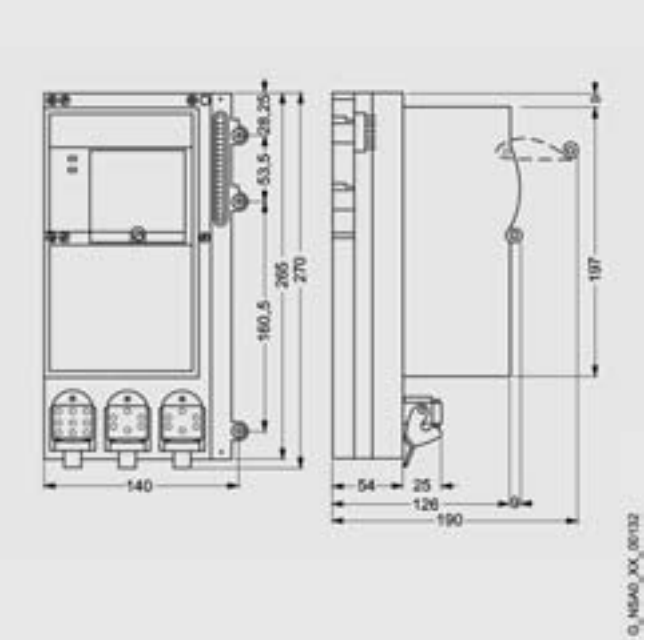
## Selection and Ordering data (continued)

| | Version | Order No. |
|---|---|---|
| ***Mounting accessories*** | | |
|  3RK1 194-1GA.0-0XA0 | **Single mounting rails for SIMATIC ET 200X (narrow)** | |
| | • 400 mm long for basic module + three expansion modules (60 mm) | **6ES7 194-1GA00-0XA0** |
| | • 640 mm long for basic module + seven expansion modules (60 mm) | **6ES7 194-1GA10-0XA0** |
| | • 2000 mm long for customer-specific lengths | **6ES7 194-1GA20-0XA0** |
|  3RK1 902-0AH00 | **Double mounting rails for SIMATIC ET 200X (wide)** | |
| | • 520 mm long for basic module + one expansion module (60 mm) + two motor starters/frequency converters | **6ES7 194-1GB00-0XA0** |
| | • 1,000 mm long for basic module + one expansion module (60 mm) + six motor starters/frequency converters | **6ES7 194-1GB10-0XA0** |
| | **Fastening screws** M5 x 20 One set contains 100 fastening screws | **6ES7 194-1KC00-0XA0** |
| | **Crimping tool** for contact pins and contact sockets in one size from | |
| | • 1.5 to 2.5 $mm^2$ | **3RK1 902-0AH00** |
| | • 1.5 to 4 $mm^2$ | **3RK1 902-0CT00** |
| | **Disassembly tool** for disassembling male and female contacts in 9-pole inserts | **3RK1 902-0AJ00** |
| ***Miscellaneous accessories*** | | |
|  3RK1 902-0AM00 | **Handheld operator panel for startup** with 0.5 m connecting cable and plug connector | **3RK1 902-0AM00** |
|  6ES7 194-1BA00-0XA0 | **Identification plate** for labeling the inputs and outputs as well as item code One set contains 20 frames with 40 labels each, 8 x 10 mm, petrol color | **6ES7 194-1BA00-0XA0** |

1) The suffix "-Z" must be appended to the order number and the length must be specified in plain text.
Example of a cable with a PVC sheath and a length of 35 m:
**6ES7 194-1LY00-0AA0-Z**
**Y01 35 m**

## ET 200X motor starter

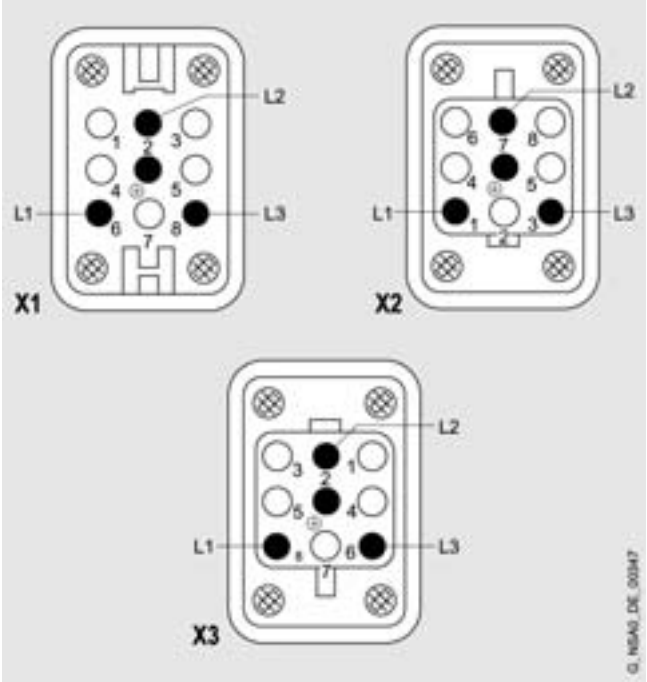
### Dimension drawings




Expansion modules EM 300
3RK1 300-..S..-.AA

### Schematics

***Pin assignment for the power connector of the EM 300 expansion module***



# SITOP power 24 V/10 A power supply

## Overview

- Primary clocked power supply for the ET 200X
- Adapted in terms of design and functionality
- Can be installed without expensive wiring
- The separate screw terminals to tap voltage mean that it can also be used for other applications

Note:
For further information on SITOP power supplies see Catalog KT 10.1

## Application

Power supply with degree of protection IP65; design and functionality optimally adapted to ET 200X distributed I/O stations. If used without ET 200X, the connector seal accessory is required.

## Ordering data

| | |
|---|---|
| **SITOP power 24 V/10 A power supply for ET 200X**<br>120/230 V AC; 24 V DC, 10 A | **6EP1 334-2CA00** |
| **SITOP power accessories connector seal IP65**<br>required for the power supply to operate in standalone mode | **6EP1 971-2CA00** |

## SITOP power 24 V/10 A power supply

### Technical specifications

| Order No. | 6EP1 334-2CA00 |
|---|---|
| **Input** | Single-phase AC |
| Rated voltage $V_{in\ rated}$ | **120/230 V AC**<br>Settable using wire jumper |
| Voltage range | 93 to 132 V/187 to 264 V AC |
| Overvoltage strength | 2.3 x $V_{in\ rated}$, 1.3 ms |
| Mains buffering $I_{out\ rated}$ | > 20 ms at $V_{in}$ = 93/187 V |
| Rated line frequency; range | 50/60 Hz, 47 to 63 Hz |
| Rated current $I_{in\ rated}$ | 4.3/2.6 A |
| Inrush current limitation (+25 °C) | < 65 A, typ. 3 ms |
| $I^2t$ | < 2.5 $A^2s$ |
| Integrated line-side fuse | T 6.3 A/250 V (not accessible) |
| Required circuit-breaker (IEC 898) in mains supply line | From 16 A, Characteristic C |
| **Output** | Stabilized, floating direct voltage |
| Rated voltage $V_{out\ rated}$ | **24 V DC** |
| Total tolerance | ± 3 % |
| • Stat. mains compensation | Approx. 0.2 % |
| • Stat. load compensation | Approx. 1 % |
| Residual ripple (clock frequency: approx. 50 kHz) | < 150 $mV_{pp}$ |
| Spikes (bandwidth: 20 MHz) | < 240 $mV_{pp}$ |
| Setting range | 22.8 to 25.2 V |
| Status display | Green LED for 24 V O.K. |
| Power ON/OFF behavior | No overshoot of $V_{out}$ (soft start) |
| Starting delay/voltage rise | < 3 s/typ. 80 ms |
| Rated current $I_{out\ rated}$ | **10 A** |
| Current range | |
| • Up to +45 °C | 0 A to 10 A (up to +40 °C) |
| • Up to +60 °C | 0 A to 8 A (up to +55 °C) |
| Dyn. V/$I$ with | |
| • Starting on short circuit | - |
| • Short-circuit in operation | typ. 38 A for 200 ms |
| Parallel connection for increased output | Yes, 2 |
| **Efficiency** | |
| Efficiency at $V_{out\ rated}$, $I_{out\ rated}$ | Approx. 87 % |
| Power loss at $V_{out\ rated}$, $I_{out\ rated}$ | Approx. 36 W |
| **Control** | |
| Dyn. mains compensation ($V_{in\ rated}$ ±15 %) | ± 0.3 % $V_{out}$ |
| Dyn. load compensation ($I_{out}$: 50/100/50 %) | ± 5 % $V_{out}$ |
| Settling time | |
| • Load step from 50 to 100% | typ. 0.2 ms |
| • Load step from 100 to 50% | typ. 0.2 ms |

| Order No. | 6EP1 334-2CA00 |
|---|---|
| **Protection and monitoring** | |
| Output overvoltage protection | Yes, acc. to EN 60950 |
| Current limitation type | typ. 9 to 11 A |
| Short-circuit protection | Either automatic restart or latching shutdown |
| RMS sustained short-circuit current | < 21 A |
| Overload/short-circuit indicator | Red LED for overtemperature switch-off |
| **Safety** | |
| Galvanic isolation primary/secondary | Yes, SELV output voltage $V_{out}$ acc. to EN 60950 |
| Protective class (IEC 536) | Class I |
| Discharge current | < 3.5 mA (typ. 0.9 mA) |
| TÜV test | Yes |
| CE-marking | Yes |
| UL/cUL (CSA), approval | Yes, UL listed (UL 508)<br>File E143289,<br>CSA (CSA 22.2 No. 14-95) |
| FM approval | - |
| Appr. for use in marine vessels | - |
| Degree of protection (EN 60 529) | IP65 |
| **EMC** | |
| Interference emission | EN 55011 Class A |
| Line harmonics limitation | - |
| Interference immunity | EN 61000-6-2 |
| **Operating specifications** | |
| Ambient temperature range | -25 °C to +55 °C<br>(power derating above +40 °C) |
| Transportation and storage temperature range | -40 °C to +70 °C |
| Humidity rating | Climatic class 3K3 acc. to EN 60721, no condensation |
| **Mechanical specifications** | |
| Connections | |
| • Mains input L, N, PE | Screw-type terminals 0.5 to 2.5 $mm^2$ (PG11 screwed gland) |
| • Output L+ | Screw terminals, or connection via expansion interface on the backplane bus of the ET 200X |
| • Output M | Screw terminals, or connection via expansion interface on the backplane bus of the ET 200X |
| Dimensions (W x H x D) in mm | 140 x 270 x 126 |
| Weight approx. | 1.7 kg |
| Mounting | Wall mounting, any mounting position |
| **Accessories** | IP65 connector seal |

## Overview

ET 200L block I/O (with 16 channels)

The SIMATIC ET 200L compact I/O station comprises
- one terminal block and
- one electronic module

Connection to the PROFIBUS DP field bus is through the interface integrated in the electronic module.

The ET 200L block I/O is not expandable.

### *Terminal block*

The terminal block accommodates the electronic module. It carries the wiring, so that no cables need to be separated when the electronic module is replaced. The terminal block can be mounted on a standard rail.

In addition to horizontal mounting all other mounting positions are permissible.

A total of 4 terminal blocks are available for SIMATIC ET 200L:
- 16 channels with screw-type terminals or spring-type terminals
- 32 channels with screw-type terminals or spring-type terminals

### *Electronic module*

The electronic modules contain the digital input and output channels.

The following digital electronic modules are available for DC 24 V:
- 16 DI; with 16 digital inputs
- 16 DO; with 16 digital outputs, 0.5 A
- 32 DI; with 32 digital inputs
- 32 DO; with 32 digital outputs, 0.5 A
- 16 DI/16 DO; with 16 digital inputs and outputs, 0.5 A.

Blocks for AC:
- 16 DO/1 A
- 16 DO/ 2 A
- 16 DI
- 8 DI/8 RO/2 A

### *PROFIBUS DP station address*

The address of the compact ET 200L I/O station is set on the electronic module by way of a rotary coding switch.

Bus line termination:
If the ET 200L is used at the end of a bus segment, it requires a bus connector with terminating resistance.

### *Accessories*

Perforated labeling sheets (DIN A4) suitable for machine printing are available as accessories.

The terminal blocks come with 2-wire connection as standard. Optional supplementary terminals enable the use of 3-wire or 4-wire connections.

## Technical specifications – general

| | |
|---|---|
| Connection method | Screw-type terminals and spring-loaded terminals, fixed wiring; Standard: 2-wire method Optional: 3-wire and 4-wire connection |
| Data transmission rate, max. | 1.5 Mbit/s |
| Direct data exchange | Sender (for digital outputs and ET 200L mixed modules; not for L-SC or IM-SC) |
| Galvanic isolation | Yes, between PROFIBUS DP and internal electronics |
| Supply voltage | 24 V DC, reverse polarity protection |
| Degree of protection | IP20 |

| | |
|---|---|
| Ambient temperature on vertical wall (preferred installation position) | |
| • With horizontal installation | 0 °C to +60 °C |
| • With other installation | 0 to 40 °C |
| Relative humidity | 5 to 95 % (RH severity level 2 in accordance with IEC 1131-2) |
| Atmospheric pressure | 795 to 1080 hPa |
| Mechanical rating: | |
| • Vibration | IEC 68, Part 2 – 6<br>10 - 57 Hz<br>(const. amplitude 0.075 mm)<br>57 - 150 Hz<br>(constant acceleration 1 g) |
| • Shock | IEC 68, Part 2–27 Half-sine, 15 g, 11 ms |

## Technical specifications (continued)

### Terminal blocks for ET 200L block I/O

| Terminal block | TB 16L | TB 32L | TB16 L AC |
|---|---|---|---|
| Dimensions (W x H x D) in mm | 145 x 100 x 40.5 | 191 x 100 x 40.5 | 191 x 100 x 40.5 |
| Weight (total), approx. | 120 g | 350 g | 283 g |
| Current carrying capacity, max. | – | – | – |

### Electronic modules ET 200L

| Electronic modules (digital inputs) | 6ES7 131-1BH01-0XB0 | 6ES7 131-1BL01-0XB0 | 6ES7 131-1EH00-0XB0 |
|---|---|---|---|
| Number of inputs | **16** | **32** | **16** |
| Galvanic isolation | | | |
| • Between channels | No | No | Yes |
| • Between channels and PROFIBUS DP | Yes | Yes | – |
| • Between L1 and PROFIBUS DB | – | – | Yes |
| • Between L1 and PROFIBUS DP | – | – | Yes |
| Input voltage $U_I$ | | | |
| • Rated value | **24 V DC** | **24 V DC** | **120 V AC** |
| • For “0” signal | -30 to +5 V | -30 to +5 V | 0 to 20 V |
| • For “1” signal | +13 to 30 V | +13 to 30 V | 74 to 132 V |
| Input current for "1" signal, typ. | 5 mA | 5 mA | 9 to 27 mA |
| Delay of the inputs | 2 to 4.5 ms | 2 to 4.5 ms | 2 to 25 ms |
| Data transmission rate | Max. 1.5 Mbit/s | Max. 1.5 Mbit/s | Max. 1.5 Mbit/s |
| Cable length, max. | 1000 m | 1000 m | 1000 m |
| Terminal block | TB 16L | TB 32L | TB 16L AC |

| Electronics modules (digital outputs) | 6ES7 132-1BH01-0XB0 | 6ES7 132-1BL01-0XB0 | 6ES7 132-1EH00-0XB0 |
|---|---|---|---|
| Number of outputs | **16** | **32** | **16** |
| Galvanic isolation | | | |
| • Between channels | No | No | Yes |
| • Between channels and PROFIBUS DP | Yes | Yes | Yes |
| • Between L1 and PROFIBUS DP | – | – | Yes |
| Output voltage $U_O$ | | | |
| • Rated value | **24 V DC** | **24 V DC** | **120 V AC** |
| • For “1” signal | $U_O$- 3 V | $U_O$- 3 V | $U_O$- 1,5 V |
| Output current | | | |
| • At signal “0”, max. | 1 mA | 1 mA | 2,6 mA |
| • At signal “1”, max. | 0.5 A | 0.5 A | – |
| Summation current per byte, max. | 4 A | 4 A | 1 A |
| Short-circuit protection | Electronic | Electronic | No |
| Data transmission rate, max. | 1.5 Mbit/s | 1.5 Mbit/s | 1.5 Mbit/s |
| Cable length, max. | 1000 m | 1000 m | 1000 m |
| Switching frequency | | | |
| • Resistive load, max. | 100 Hz | 100 Hz | 10 Hz |
| • Inductive loads, max. | 0.5 Hz | 0.5 Hz | 0.5 Hz |
| • With lamp load, max. | 8 Hz | 8 Hz | 1 Hz |
| Terminal block | TB 16L | TB 32L | TB 16L AC |

## Technical specifications (continued)

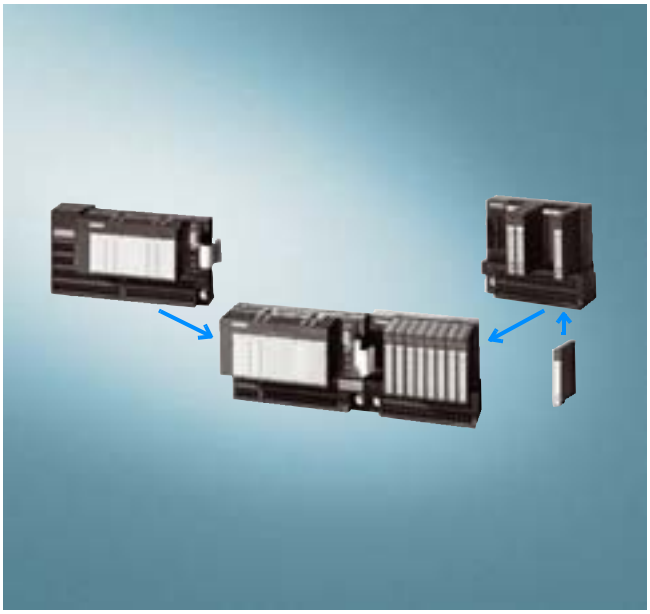
| Electronic modules (mixed module) | 6ES7 133-1BL01-0XB0 | 6ES7 133-1EH00-0XB0 | 6ES7 132-1JH00-0XB0 |
|---|---|---|---|
| Number of inputs | **16** | **8** | **8** |
| Galvanic isolation | | | |
| • Between channels | No | Yes | Yes |
| • Between channels and PROFIBUS DP | Yes | Yes | Yes |
| • Between L1 and PROFIBUS DP | – | – | Yes |
| Input voltage $U_I$ | | | |
| • Rated value | **24 V DC** | **120 V AC** | **–** |
| • For “0” signal | -30 to +5 V | – | – |
| • For “1” signal | +13 to 30 V | 74 to 132 V | – |
| Input current for "1" signal, typ. | 5 mA | 9 to 27 mA | – |
| Delay of the inputs | 2 to 4.5 ms | 2 to 25 ms | – |
| Data transmission rate, max. | 1.5 Mbit/s | 1.5 Mbit/s | – |
| Cable length, max. | 1000 m | 1000 m | – |
| Number of outputs | **16** | **8** | **16** |
| Output voltage $U_O$ | | | |
| • Rated value | **24 V DC** | **120 V AC** | **120 V AC** |
| • For “1” signal | $U_O$- 3 V | $U_O$– 1.5 V | $U_O$– 1 V |
| Output current | | | |
| • At signal “0”, max. | 1 mA | 2.6 mA | – |
| • At signal “1”, max. | 0.5 mA | 1 A | 2 A |
| Total current per group, max. | 4 A | 1 A | 2 A |
| Short-circuit protection | Electronic | No | No |
| Data transmission rate, max. | 1.5 Mbit/s | 1.5 Mbit/s | 1.5 Mbit/s |
| Cable length, max. | 1000 m | 1000 m | 1000 m |
| Switching frequency | | | |
| • Resistive load, max. | 100 Hz | 10 Hz | 10 Hz |
| • Inductive loads, max. | 0.5 Hz | 0.5 Hz | 0.5 Hz |
| • With lamp load, max. | 8 Hz | 1 Hz | 1 Hz |
| Terminal block | TB 32L | TB 16L AC | TB 16L AC |

## ET 200L block I/O

| Ordering data | Order No. |
|---|---|
| **Electronic block for ET 200L** | |
| With digital inputs/outputs for 24 V DC | |
| • 16 DI | **6ES7 131-1BH01-0XB0** |
| • 32 DI | **6ES7 131-1BL01-0XB0** |
| • 16 DO; 0.5 A | **6ES7 132-1BH00-0XB0** |
| • 32 DO; 0.5 A | **6ES7 132-1BL00-0XB0** |
| • 16 DI/16 DO; 0.5 A | **6ES7 133-1BL01-0XB0** |
| for 120 V AC | |
| • 16 DI | **6ES7 131-1EH00-0XB0** |
| • 16 DO; 1 A | **6ES7 132-1EH00-0XB0** |
| • 16 DO; 2 A, Relais | **6ES7 132-1JH00-0XB0** |
| • 8 DI/8 DO; 1 A | **6ES7 133-1EH00-0XB0** |
| • 8 DI/8 DO; 2 A, Relais | **6ES7 133-1JH00-0XB0** |
| **Terminal block for ET 200L and ET 200L-SC** | |
| For mounting the electronic blocks | |
| **TB 16L** | |
| • 16 channels, screw-type connection | **6ES7 193-1CH00-0XA0** |
| • 16 channels, spring-loaded terminals | **6ES7 193-1CH10-0XA0** |
| **TB 32L** | |
| • 32 channels, screw-type connection | **6ES7 193-1CL00-0XA0** |
| • 32 channels, spring-loaded terminals | **6ES7 193-1CL10-0XA0** |
| **TB 16L AC** | |
| • 16 channels, screw-type connection | **6ES7 193-1CH20-0XA0** |
| **Additional terminal for ET 200L and ET 200L-SC** | |
| 16 channels; 1 series | |
| • Screw-type connection | **6ES7 193-1FH20-0XA0** |
| • spring-loaded terminals | **6ES7 193-1FH50-0XA0** |
| 16 channels; 2 rows | |
| • Screw-type connection | **6ES7 193-1FH30-0XA0** |
| • spring-loaded terminals | **6ES7 193-1FH60-0XA0** |
| 32 channels; 1 series | |
| • Screw-type connection | **6ES7 193-1FL20-0XA0** |
| • spring-loaded terminals | **6ES7 193-1FL50-0XA0** |
| 32 channels; 2 rows | |
| • Screw-type connection | **6ES7 193-1FL30-0XA0** |
| • spring-loaded terminals | **6ES7 193-1FL60-0XA0** |

| | Order No. |
|---|---|
| ***Accessories*** | |
| **Manual for ET 200L and ET 200L-SC distributed I/O stations** | |
| • German | **6ES7 130-1AA00-8AA0** |
| • English | **6ES7 130-1AA00-8BA0** |
| • French | **6ES7 130-1AA00-8CA0** |
| • Spanish | **6ES7 130-1AA00-8DA0** |
| • Italian | **6ES7 130-1AA00-8EA0** |
| **Labeling sheet with strips for 10 electronic blocks for** | |
| • 16 channel electronic blocks incl. additional terminals | **6ES7 193-1BH00-0XA0** |
| • 32 channel electronic blocks incl. additional terminals | **6ES7 193-1BL00-0XA0** |
| **Bus plug connector for PROFIBUS** | |
| • 90° cable feeder, FastConnect terminating resistance with isolating function, without PG socket, up to 12 Mbit/s | **6ES7 972-0BA50-0XA0** |
| • diagonal cable feeder, piercing terminals, without bus terminal resistance, without PG socket, up to 1.5 Mbit/s | **6ES7 972-0BA30-0XA0** |
| • 90° cable feeder, FastConnect terminating resistance with isolating function, with PG socket, up to 12 Mbit/s | **6ES7 972-0BB50-0XA0** |

## Overview



ET 200L-SC compact I/O station (ET 200L with 32 channels)

In basic design the ET 200L-SC corresponds to the ET 200L, i.e. it consists of a terminal block and an electronics block. In contrast to the ET 200L, it can be expanded with a Smart Connect terminal block (TB 16SC).

Connection to the PROFIBUS DP field bus is through the interface integrated in the electronic module.

### *SIMATIC SC (TB 16 SC) terminal block*

Through the 8 electronic modules of the SIMATIC SC which can be plugged onto the TB 16SC, the ET 200L-SC can be freely combined with up to 16 digital and analog input/output channels.

Digital and analog modules can be plugged into the TB 16 SC in a mixed arrangement.

This allows a fine-modular adaptation of the ET 200L-SC to the automation task.

The connecting cable between ET 200L-SC and TB 16SC is supplied with the TB 16SC terminal block.

### *Electronic module*

The electronic block contains the digital input and output channels.

The following digital electronic modules are available:

- 16 DI; with 16 digital inputs
- 16 DO; with 16 digital outputs, 0.5 A
- 32 DI; with 32 digital inputs
- 16 DI/16 DO; with 16 digital inputs and outputs, 0.5 A.

The connection diagram for wiring is printed on the electronic module.

### *Accessories*

Perforated labeling sheets (DIN A4) suitable for machine printing are available as accessories.

The terminal blocks come with 2-wire connection as standard. Optional supplementary terminals enable the use of 3-wire or 4-wire connections.

As additional accessories for the TB 16 SC, shield connection terminals for termination of the shield for analog signals are available.

### *Parameter assignment*

When the station is connected to master modules which were not parameterized with COM PROFIBUS or STEP 7 (operation on non-Siemens master modules), a fixed preassigned GSD file can be created with COM PROFIBUS from Version 3.1. This file is then loaded into the configuration tool of the third-party manufacturer and can be used for simple parameter assignment of the station.

This allows use of the user-friendly plain text parameterization of COM PROFIBUS. There is no need for hexadecimal code inputs in the manufacturer's configuration tool.

## ET 200L-SC modular I/O

### Technical specifications

*ET 200L-SC (Smart Connect) electronic modules*

| Electronics blocks (digital outputs) | 6ES7 131-1BH12-0XB0 | 6ES7 131-1BL12-0XB0 |
|---|---|---|
| Number of inputs | **16** | **32** |
| Galvanic isolation | | |
| • Between channels | No | No |
| • Between channels and PROFIBUS DP | Yes | Yes |
| Input voltage $U_I$ | | |
| • Rated value | **24 V DC** | **24 V DC** |
| • For “0” signal | -30 to +5 V | -30 to +5 V |
| • For “1” signal | +13 to 30 V | +13 to 30 V |
| Input current for "1" signal, typ. | 5 mA | 5 mA |
| Delay of the inputs | 2 to 4.5 ms | 2 to 4.5 ms |
| Data transmission rate | Max. 1.5 Mbit/s | Max. 1.5 Mbit/s |
| Cable length, max. | 1000 m | 1000 m |
| Terminal block | TB 16L | TB 32L |
| Expansion | Digital and analog with SIMATIC SC | Digital and analog with SIMATIC SC |

| Electronics blocks (digital outputs) | 6ES7 132-1BH11-0XB0 |
|---|---|
| Number of outputs | **16** |
| Galvanic isolation | |
| • Between channels | No |
| • Between channels and PROFIBUS DP | Yes |
| Output voltage $U_O$ | |
| • Rated value | **24 V DC** |
| • For “1” signal | $U_O$- 3 V |
| Output current | |
| • At signal “0”, max. | 1 mA |
| • At signal “1”, max. | 0.5 A |
| Total current per group, max. | 4 A |
| Short-circuit protection | Electronic |
| Data transmission rate, max. | 1.5 Mbit/s |
| Cable length, max. | 1000 m |
| Switching frequency | |
| • Resistive load, max. | 10 Hz |
| • Inductive loads, max. | 0.5 Hz |
| • With lamps, max. | 8 Hz |
| Terminal block | TB 16L |
| Expansion | Digital and analog with SIMATIC SC |

| Electronic modules (mixed module) | 6ES7 133-1BL11-0XB0 |
|---|---|
| Number of inputs | **16** |
| Galvanic isolation | |
| • Between channels | No |
| • Between channels and PROFIBUS DP | Yes |
| Input voltage $U_I$ | |
| • Rated value | **24 V DC** |
| • For “0” signal | -30 to +5 V |
| • For “1” signal | +13 to 30 V |
| Input current for "1" signal, typ. | 5 mA |
| Delay of the inputs | 2 to 4.5 ms |
| Cable length, max. | 1000 m |
| Data transmission rate, max. | 1.5 Mbit/s |
| Number of outputs | **16** |
| Galvanic isolation | No |
| Output voltage $U_O$ | |
| • Rated value | **24 V DC** |
| • For “1” signal | $U_O$- 3 V |
| Output current | |
| • At signal “0”, max. | 1 mA |
| • At signal “1”, max. | 0.5 mA |
| Total current per group, max. | 4 A |
| Short-circuit protection | Electronic |
| Data transmission rate, max. | 1.5 Mbit/s |
| Cable length, max. | 1000 m |
| Switching frequency | |
| • Resistive load, max. | 100 Hz |
| • Inductive loads, max. | 0.5 Hz |
| • With lamps, max. | 8 Hz |
| Terminal block | TB 32L |
| Expansion | Digital and analog with SIMATIC SC |

## Technical specifications (continued)

### ET 200L-SC terminal block

| Terminal block | TB 16L | TB 32L | TB 16SC |
|---|---|---|---|
| Dimensions (W x H x D) in mm | 145 x 100 x 40.5 | 191 x 100 x 40.5 | 115 x 100 x 40.5 |
| Weight (complete) | 120 g | 350 g | 283 g |
| Current carrying capacity, max. | – | – | – |

### SIMATIC Smart Connect electronic modules

| Electronic modules (digital input modules) | 6ES7 121-1BB00-0AA0 | 6ES7 121-1FA00-0AA0 |
|---|---|---|
| Number of inputs | **2** | **1** |
| Cable length | | |
| • Shielded, max. | 1000 m | 1000 m |
| Galvanic isolation | | |
| • Between channels and SC bus | Yes, optocouplers | Yes |
| Permissible potential difference | | |
| • Between various electrical circuits | 75 V DC/60 V AC | - |
| • Between ground and input | - | 240 V AC |
| Isolation tested at | 1500 V AC | 2500 V DC |
| Power losses for module, typ. | 0.4 W | 0.6 W |
| Status display | Green LED per channel | green LED |
| Input voltage $U_I$ | | |
| • Rated value | 24 V DC | 120 / 230V AC |
| • For "1" signal | 13 to 30 V | 74 to 264 V AC |
| • For signal "0" | -3 to 5 V | 0 to 40 V AC |
| • Frequency range | - | 47 to 63 Hz |
| Input current | | |
| • For "1" signal typ. | 7 mA | 3.7 mA [1)] |
| • For "0" signal typ. | - | 2.2 mA [1)] |
| Input delay | | |
| • For "0" after "1" | 1.2 to 4.8 ms | Max. 30 ms |
| • For "1" to "0 | 1.2 to 4.8 ms | Max. 30 ms |
| • input characteristic to | IEC 1131, Type 1 | IEC 1131, Type 1 [1)] |
| Connection of two-wire BEROs | Possible | Possible |
| • Permissible quiescent current, max. | 1.5 mA | 1.5 mA |
| Slot requirement on TB 16SC | 1 of 8 | 1 of 8 |
| Terminal block | TB 16SC | TB 16SC |
| Dimensions (W x H x D) in mm | 10 x 64 x 51 | 10 x 64 x 51 |
| Weight, approx. | 15 g | 15 g |

1) When 2 electronic modules are switched in parallel, IEC 1131-2/type 2 is achieved for 120 V AC.

## ET 200L-SC modular I/O

### Technical specifications (continued)

| Electronic modules (digital output modules) | 6ES7 122-1BB00-0AA0 | 6ES7 122-1BB10-0AA0 |
|---|---|---|
| Number of outputs | **2** | **2** |
| Cable length | | |
| • Shielded, max. | 1000 m | 1000 m |
| Rated supply voltage for the L+ relay | - | - |
| • Polarity reversal protection | - | - |
| Rated load voltage L+/L1 | 24 V DC | 24 V DC |
| • Permissible frequency range | - | - |
| Galvanic isolation | | |
| • Between channels and SC bus | Yes, optocoupler | Yes, optocoupler |
| • Between channel and the power supply for the relay | - | - |
| Permissible potential difference | | |
| • Between various electrical circuits | 75 V DC/60 V AC | 75 V DC/60 V AC |
| • Between ground and input | - | - |
| • Between ground and supply voltage for the relay | - | - |
| • Between ground and supply voltage for the relay and the output | - | - |
| Isolation tested at | 1500 V AC | 1500 V AC |
| • Between ground and supply voltage for the relay | - | - |
| • Between ground and supply voltage for the relay and the output | - | - |
| Current consumption from supply voltage L+ | 3 mA | 6 mA |
| Power losses for module, typ. | 0.4 W | 0.9 W |
| Status display | Green LED per channel | Green LED per channel |
| Output voltage | | |
| • At "1" signal, min. | L+ (-0.5 V) | L+ (-0.5 V) |
| Output current | | |
| • For "1" signal | | |
| - Rated value | 0.5 A | 2 A |
| - Permitted range | 5 mA to 0.6 A | - |
| - From 0 to 40 °C | - | 5 mA to 2.4 A |
| - From 40 to 60 °C | - | 5 mA to 1.8 A |
| - Permissible impulse voltage, max. | - | - |
| • At "0" signal (residual current), max. | 0.3 mA | 0.6 mA |
| Output delay (with resistive load) | | |
| • For "0" to "1", max. | 200 µs | 200 µs |
| • At "1" to "0", max. | 1.3 ms | 1.3 ms |
| Size of the motor starter, max. | - | - |
| Zero crossing | - | - |
| Lamp load, max. | 2.5 W | 10 W |
| Thermal uninterrupted current | - | - |
| Minimum load current | - | - |
| Contact wiring, internal | - | - |
| Switching frequency | | |
| • Mechanical | | - |
| • For resistive load | Max. 100 Hz | Max. 100 Hz |
| • For inductive load in accordance with IEC 947-5-1 | max. 2 Hz at 0.3 A | max. 0.2 Hz at 1 A |
| - DC 13/AC 15 | max. 0.5 Hz at 0.5 A | max. 0.1 Hz at 2 A |
| • For lamp load | Max. 1 Hz | Max. 1 Hz |
| Short-circuit protection for the output | Yes, electronic | Yes, electronic |
| Slot requirement | 1 of 8 | 1 of 8 |
| Terminal block | TB 16SC | TB 16SC |
| Dimensions (W x H x D) in mm | 10 x 64 x 51 | 10 x 64 x 51 |
| Weight, approx. | 15 g | 15 g |

## Technical specifications (continued)

| Electronic modules (digital outputs) (continued) | 6ES7 122-1FA00-0AA0 | 6ES7 122-1HA01-0AA0 |
|---|---|---|
| Number of outputs | **1** | **1** |
| Cable length | | |
| • Shielded, max. | 1000 m | 1000 m |
| Rated supply voltage for the L+ relay | - | 24 V DC |
| • Polarity reversal protection | - | Yes |
| Rated load voltage L+/L1 | 120 / 230V AC | - |
| • Permissible frequency range | 47 to 63 Hz | - |
| Galvanic isolation | | |
| • Between channels and SC bus | Yes | Yes |
| • Between channel and the power supply for the relay | - | Yes |
| Permissible potential difference | | |
| • Between various electrical circuits | - | - |
| • Between ground and input | 240 V AC | - |
| • Between ground and supply voltage for the relay | - | 75 V DC, 60 V AC |
| • Between ground and supply voltage for the relay and the output | - | 240 V AC |
| Isolation tested at | 2500 V DC | - |
| • Between ground and supply voltage for the relay | - | 1500 V AC |
| • Between ground and supply voltage for the relay and the output | - | 2500 V DC |
| Current consumption from supply voltage L+ | - | max. 15 mA |
| Power losses for module, typ. | 0.7 W | 0.7 W |
| Status display | green LED | green LED |
| Output voltage | | |
| • At "1" signal, min. | L (-1 V) | - |
| Output current | | |
| • For "1" signal | | - |
| - Rated value | 1 A | - |
| - Permitted range | - | - |
| - From 0 to 40 °C | -40 mA to 1.1 A | - |
| - From 40 to 60 °C | -40 mA to 0.6 A | - |
| - Permissible impulse voltage, max. | 10 A (for 2 half-waves) | - |
| • For "0" signal (residual current) max. | 3 mA | - |
| Output delay (with resistive load) | | |
| • For "0" to "1", max. | 20 ms | - |
| • At "1" to "0", max. | 20 ms | - |
| Size of the motor starter, max. | Size 8 | - |
| Zero crossing | with voltage crossover switch | - |
| Lamp load, max. | For 230 V AC: 100 W<br>at 120 V AC: 50 W | - |
| Thermal uninterrupted current | - | Max. 5 A |
| minimum load current | - | 1 mA |
| Contact wiring, internal | - | Varistor, rated voltage 275 V |
| Switching frequency | | |
| • Mechanical | - | Max. 10 Hz |
| • For resistive load | Max. 50 Hz | Max. 1 Hz |
| • For inductive load in accordance with IEC 947-5-1<br>- DC 13/AC 15 | Max. 10 Hz | Max. 0.1 Hz |
| • For lamp load | Max. 1 Hz | Max. 1 Hz |
| Short-circuit protection for the output | No | - |
| Slot requirement | 1 of 8 | 1 of 8 |
| Terminal block | TB 16SC | TB 16SC |
| Dimensions (W x H x D) in mm | 10 x 64 x 51 | 10 x 64 x 51 |
| Weight, approx. | 15 g | 30 g |

## ET 200L-SC modular I/O

### Technical specifications (continued)

| Electronic modules (analog input modules) | 6ES7 123-1GB00-0AB0 | | 6ES7 123-1FB00-0AB0 | | 6ES7 123-1JB00-0AB0 | |
|---|---|---|---|---|---|---|
| Number of inputs | **2** | | **2** | | **2** | |
| Cable length | | | | | | |
| • Shielded, max. | 200 m | | 200 m | | 200 m | |
| Rated supply voltage of the electronics L+ | 24 V DC | | 24 V DC | | 24 V DC | |
| • Polarity reversal protection | Yes | | Yes | | Yes | |
| Galvanic isolation | | | | | | |
| • Between channels and SC bus | Yes, optocouplers | | Yes, optocouplers | | Yes, optocouplers | |
| Isolation tested at | 1500 V AC | | 1500 V AC | | 1500 V AC | |
| Permissible potential difference | | | | | | |
| • between inputs and M ($U_{CM}$) | 2 V DC/ 2 $V_{PP}$AC | | 2 V DC/ 2 $V_{PP}$AC | | 2 V DC/ 2 $V_{PP}$AC | |
| Constant current for resistance type transmitter | - | | - | | - | |
| Current consumption from supply voltage L+ | max. 30 mA | | max. 30 mA | | max. 30 mA | |
| Power losses for module, typ. | 0.6 W | | 0.6 W | | 0.6 W | |
| Noise suppression for | | | | | | |
| • Common mode noise | > 90 dB | | > 90 dB | | > 90 dB | |
| • Series-mode interference, (peak value of disturbance < rated value of input range) | > 70 dB | | > 70 dB | | > 70 dB | |
| Crosstalk between the inputs | | | | | | |
| • At 50 Hz/60 Hz | > 50 dB | | > 50 dB | | > 50 dB | |
| Operational limit (in the entire temperature range, relative to rated input range) | ± 1.0% | | ± 1.0% | | ± 1.0% | |
| Basic error limit (operating error limit at 25 °C, referred to rated input range) | +/-0.8% | | ± 0.7% | | +/-0.8% | |
| Temperature error (with reference to the rated input range) | ± 0.01%/K | | ± 0.01%/K | | ± 0.01%/K | |
| Linearity error (with reference to the rated input range) | ± 0.05 % | | ± 0.05 % | | ±0.05% | |
| Repeatability in settled state at 25 °C (with reference to rated input range) | ± 0.1% | | ± 0.1% | | ± 0.1% | |
| Measuring principle | Integrating | | Integrating | | Integrating | |
| Integration and conversion time/ resolution per channel | | | | | | |
| • Configurable | Yes | | - | | Yes | |
| • Integral action time, ms | 50 | 60 | 60 | 50 | 50 | 60 |
| • Conversion time, ms | 55 | 65 | 65 | 55 | 55 | 65 |
| • Noise rejection for interference frequency f1, Hz | 60 | 50 | 50 | 60 | 60 | 50 |
| • Resolution (incl. overrange/ representation in two's complement) | | | | | | |
| - ± 20 mA | 13 bit | | - | | - | |
| - 4mA to 20mA | 12-bit | | - | | - | |
| S7 format / S5 format | | | | | | |
| • +/- 10 V | - | | 13 bit | | - | |
| • 1 to 5 V | - | | 12-bit | | - | |
| • ± 80 mV, type J/K/R, °C/digit | - | | - | | 14 bit: 0.1 °C/digit / 13 bit: 1.0 °C/digit | |
| Input ranges (Rated values)/ input resistance | +/- 20 mA/50 Ω<br>4 to 20 mA/50 Ω | | ± 10 V/100 kΩ<br>1 to 5 V/100k Ω | | ± 80 mV/>1 MΩ<br>Type J/1200 °C/>1 M Ω<br>Type K/1372 °C/>1 M Ω<br>Type R/1769 °C/>1 M Ω | |

## Technical specifications (continued)

| Electronic modules (analog input modules) (continued) | 6ES7 123-1GB00-0AB0 | 6ES7 123-1FB00-0AB0 | 6ES7 123-1JB00-0AB0 |
|---|---|---|---|
| Permissible input current (destruction limit) | 40 mA, continuous | - | - |
| Permissible input voltage for voltage input (destruction limit) | - | Max. 20 V continuous; 75 V for max. 1 s (mark-space ratio 1:20) | Max. 20 V continuous; 75 V for max. 1 s (mark-space ratio 1:20) |
| Permissible input voltage for resistance measuring input and constant current inputs/outputs (destruction limit) | - | - | - |
| Connection of signal sensors | | | |
| • For voltage measurement | | | |
| - As a 2-conductor transducer | Possible With external transducer infeed | Possible | Possible |
| - As a 4-conductor transducer | Possible | | |
| • For resistance measurement | | | |
| - With 4-wire connection | - | - | - |
| Characteristic linearization | - | No | - |
| Temperature compensation | - | No | Yes; parameterizable Type J; K, R acc. to IEC 584 |
| Filtering of the measured values | Yes; parameterizable in 4 stages by means of digital filtering | Yes; parameterizable in 4 stages by means of digital filtering | Yes; parameterizable in 4 stages by means of digital filtering |
| Stage | Time constant | Time constant | Time constant |
| None | 1 x cycle time | 1 x cycle time | 1 x cycle time |
| Weak | 8 x cycle time | 8 x cycle time | 8 x cycle time |
| Average | 64 x cycle time | 64 x cycle time | 64 x cycle time |
| Strong | 128 x cycle time | 128 x cycle time | 128 x cycle time |
| Slot requirement | 1 of 8 | 1 of 8 | 1 of 8 |
| Terminal block | TB 16SC | TB 16SC | TB 16SC |
| Dimensions (W x H x D) in mm | 10 x 64 x 51 | 10 x 64 x 51 | 10 x 64 x 51 |
| Weight, approx. | 20 g | 20 g | 20 g |

| Electronic modules (analog input modules) | 6ES7 123-1JA00-0AB0 | 6ES7 123-1GB10-0AB0 |
|---|---|---|
| Number of inputs | **1** | **2** |
| Cable length | | |
| • Shielded, max. | 50 m | 200 m |
| Rated supply voltage of the electronics L+ | 24 V DC | 24 V DC |
| • Polarity reversal protection | Yes | Yes |
| Galvanic isolation | | |
| • Between channels and SC bus | Yes, optocoupler | Yes, optocoupler |
| Isolation tested at | 1500 V AC | 1500 V AC |
| Permissible potential difference | | |
| • between inputs and M ($U_{CM}$) | 2 V DC/ 2 $V_{PP}$ AC | 2 V DC/ 2 $V_{PP}$ AC |
| Constant current for resistance type transmitter | Approx. 1.5 mA | Approx. 1.5 mA |
| Current consumption from supply voltage L+ | max. 30 mA | max. 30 mA |
| Power losses for module, typ. | 0.6 W | 0.6 W |
| Interference rejection for | | |
| • Common mode noise | > 90 dB | > 90 dB |
| • Series-mode interference, (peak value of disturbance < rated value of input range) | > 70 dB | > 70 dB |
| Crosstalk between the inputs | | |
| • At 50 Hz/60 Hz | > 50 dB | > 50 dB |

## ET 200L-SC modular I/O

### Technical specifications (continued)

| Electronic modules (analog input modules) | 6ES7 123-1JA00-0AB0 | | 6ES7 123-1GB10-0AB0 | |
|---|---|---|---|---|
| Operational limit (in the entire temperature range, relative to rated input range) | 0 to 600 Ω<br>Pt 100 (climatic)<br>Pt 100 (standard)<br>Ni 100 (standard) | +/- 1.0%<br>4 °C<br>8 °C<br>4 °C | +/- 0.3% | |
| Basic error limit (operating error limit at 25 °C, referred to rated input range) | 0 to 600 Ω<br>Pt 100 (climatic)<br>Pt 100 (standard)<br>Ni 100 (standard) | +/- 0,7%<br>1 °C<br>4 °C<br>2 °C | +/- 0.1% | |
| Temperature error (with reference to the rated input range) | +/- 0.03%/K | | +/- 0.01%/K | |
| Linearity error (with reference to the rated input range) | +/- 0.05% | | +/- 0.05% | |
| Repeatability in settled state at 25 °C (with reference to rated input range) | +/- 0.1% | | +/- 0.1% | |
| Measuring principle | Integrating | | Integrating | |
| Integration and conversion time/ resolution per channel | | | | |
| • Configurable | Yes | Yes | Yes | |
| • Integral action time, ms | 110 | 130 | 50 | 60 |
| • Conversion time, ms | 110 | 130 | 55 | 65 |
| • Cycle time, ms | 110 | 130 | – | |
| • Interference rejection for Interference frequency f1, in Hz | 50 | 60 | >90/70 dB (common mode/series-mode noise) | |
| • Resolution (incl. overrange/ representation in two's complement) | S7 format<br>0 to 600 Ω: 14 Bit<br>Pt 100 climatic 0.1 °C/ digit | | | |
| - +/- 20 mA | Pt 100 Stand.0.1 °C/digit | | 13 bit | |
| - 4 to 20 mA | Ni100 std.: 0.1 °C/digit | | 12 bit | |
| S7 format/S5 format | S5 format | | | |
| • +/- 10 V | 0 to 600 Ω: 13 bit | | – | |
| • 1 to 5 V | Pt 100 Climatic: 0.05 °C/digit | | – | |
| • ± 80 mV, type J/K/R, °C/digit | Pt 100 Stand.: 0.5 °C/digit,<br>Ni100 Stand. 0.5 °C/digit | | – | |
| Input ranges | | | | |
| (Rate values)/ input resistance | -120 to +130 °C)/>1 MΩ Pt100 /Standard;<br>-200 to +850 °C)/> 1 MΩ Ni100 /Standard; | | +/- 20 mA/50 Ω<br>4 to 20 mA/ 50 Ω | |
| Permissible input current (destruction limit) | (-60 to +250 °C)/ >1 MΩ | | – | |
| Permissible input voltage for voltage input (destruction limit) | - | | – | |
| Permissible input voltage for resistance measuring input and constant current inputs/outputs (destruction limit) | Max. 10 V continuous;<br>25 V for max. 1 s | | – | |
| Connection of signal sensors | | | | |
| • For voltage measurement | - | | | |
| - As a 2-conductor transducer | - | | Possible | |
| - As a 4-conductor transducer | - | | With external transducer infeed | |
| • For impedance measurement | - | | - | |
| - With 4-wire connection | Yes; with compensation for line resistances | | - | |
| Characteristic linearization | Yes; Configurable | | No | |
| Temperature compensation | for Pt100 n. DIN IEC 751 for Ni100 n. DIN 43760 | | No | |
| Filtering of the measured values | Yes; parameterizable in 4 stages by means of digital filtering | | Yes; parameterizable in 4 stages by means of digital filtering | |
| Stage | Time constant | | Time constant | |
| None | 1 x cycle time | | 1 x cycle time | |
| Weak | 8 x cycle time | | 8 x cycle time | |
| Average | 64 x cycle time | | 64 x cycle time | |
| Strong | 128 x cycle time | | 128 x cycle time | |
| Slot requirement | 1 of 8 | | 1 of 8 | |
| Terminal block | TB 16SC | | TB 16SC | |
| Dimensions (W x H x D) in mm | 10 x 64 x 51 | | 10 x 64 x 51 | |
| Weight, approx. | 20 g | | 20 g | |

## Technical specifications (continued)

| Electronic modules (analog outputs) | 6ES7 124-1GA00-0AB0 | | 6ES7 124-1FA00-0AB0 | |
|---|---|---|---|---|
| Number of outputs | **1** | | **1** | |
| Cable length | | | | |
| • Shielded, max. | 200 m | | 200 m | |
| Rated supply voltage for the L+ relay | 24 V DC | | 24 V DC | |
| • Polarity reversal protection | Yes | | Yes | |
| Galvanic isolation | | | | |
| • Between output channel and SC-Bus | Yes, optocoupler | | Yes, optocoupler | |
| Isolation tested at | 1500 V AC | | 1500 V AC | |
| Permissible potential difference | | | | |
| • Between reference point for the load and QV-($U_{CM}$) | Max. 2 V DC/2 V ACpp | | - | |
| • Between S and QV-($U_{CM}$) | - | | Max. 2 V DC/2 V ACpp | |
| Current consumption from supply voltage L+ | max. 50 mA | | max. 50 mA | |
| Power losses of the module, max. | 1 V | | 1 V | |
| • Resolution (incl. overflow range) | S7 format:<br>0 to 20 mA<br>4 to 20 mA | S5 format:<br>12-bit<br>12-bit | S7 format:<br>+/- 10 V<br>1 to 5 V | S5 format:<br>12-bit<br>11-bit |
| Conversion time, max. | 5 ms | | 5 ms | |
| Transient recovery time | | | | |
| • For resistive load, ms | 0,1 | | 0,1 | |
| • For inductive load, ms | 0,5 | | - | |
| • For capacitive load, ms | - | | 3,3 | |
| Assignment values connectable | No | | No | |
| • Common mode interference $U_{CM}$ $V_{PP}$ AC (50 Hz) | > 30 dB | | > 30 dB | |
| Operational limit (in the entire temperature range, relative to rated output range) | ± 1.0% | | ± 0.9% | |
| Basic error limit (operating error limit at 25 °C, relative to rated output range) | ± 0.7% | | ± 0.6% | |
| Temperature error (with reference to the rated output range) | ± 0.01%/K | | ± 0.01%/K | |
| Linearity error (with reference to the rated output range) | ± 0.06% | | ± 0.06% | |
| Repeatability in settled state at 25 °C (with reference to rated output range) | ± 0.1% | | ± 0.1% | |
| Output ranges (rated values) | 0 to 20 mA,<br>4 to 20 mA | | +/- 10 V<br>1 to 5 V | |

## Technical specifications (continued)

| Electronic modules (analog outputs) (continued) | 6ES7 124-1GA00-0AB0 | 6ES7 124-1FA00-0AB0 |
|---|---|---|
| Load resistance (in the nominal range of the output) | | |
| • Common-mode voltage 2 V, max. | 500 Ω | - |
| • For common-mode voltage 0 V, max. | 600 Ω | - |
| • Stable at no-load | Yes | - |
| • No-load voltage, approx. | 16 V | - |
| • Inductive load max. | 1 mH | - |
| Load impedance (in the rated range for the output) | | |
| • Short-circuit protection | - | Yes |
| • Short-circuit current, approx. | - | 30 mA |
| • Capacitive load, max. | - | 1 µF |
| Destruction limit against externally applied voltages / currents | | |
| • Voltage at the outputs to M; QV- | Max. 15 V continuous; 75 V for max. 1 s (mark-space ratio 1:20) | Max. 15 V continuous; 75 V for max. 1 s (mark-space ratio 1:20) |
| • Current, max. | 50 mA DC | 50 mA DC |
| Connection of actuators | | |
| - 2-conductor connection | Possible | Possible |
| - 4-conductor connection (measuring circuit) | - | Possible |
| Slot requirement | 2 of 8 | 2 of 8 |
| Terminal block | TB 16SC | TB 16SC |
| Dimensions (W x H x D) in mm | 10 x 64 x 51 | 10 x 64 x 51 |
| Weight, approx. | 15 g | 15 g |

| Ordering data | Order No. |
|---|---|
| **Electronic block for ET 200L-SC** | |
| (digital and analog expansion possibility), with digital inputs/outputs | |
| • 16 DI | **6ES7 131-1BH12-0XB0** |
| • 32 DI | **6ES7 131-1BL12-0XB0** |
| • 16 DO | **6ES7 132-1BH11-0XB0** |
| • 16 DI/16 DO | **6ES7 133-1BL11-0XB0** |
| **Terminal block for ET 200L and ET 200L-SC** | |
| For mounting the electronic blocks | |
| **TB 16L** | |
| • 16 channels, screw-type connection | **6ES7 193-1CH00-0XA0** |
| • 16 channels, spring-loaded terminals | **6ES7 193-1CH10-0XA0** |
| **TB 32L** | |
| • 32 channels, screw-type connection | **6ES7 193-1CL00-0XA0** |
| • 32 channels, spring-loaded terminals | **6ES7 193-1CL10-0XA0** |
| **Additional terminal for ET 200L and ET 200L-SC** | |
| 16 channels; 1 series | |
| • screw-type connection | **6ES7 193-1FH20-0XA0** |
| • spring-loaded terminals | **6ES7 193-1FH50-0XA0** |
| 16 channels; 2 rows | |
| • screw-type connection | **6ES7 193-1FH30-0XA0** |
| • spring-loaded terminals | **6ES7 193-1FH60-0XA0** |
| 32 channels; 1 series | |
| • screw-type connection | **6ES7 193-1FL20-0XA0** |
| • spring-loaded terminals | **6ES7 193-1FL50-0XA0** |
| 32 channels; 2 rows | |
| • screw-type connection | **6ES7 193-1FL30-0XA0** |
| • spring-loaded terminals | **6ES7 193-1FL60-0XA0** |
| **SIMATIC SC electronic modules** | |
| For TB 16SC terminal block | |
| • 2 DI, 24 V DC (8 items) | **6ES7 121-1BB00-0AA0** |
| • 2 DO, 24 V DC; 0.5 A (8 items) | **6ES7 122-1BB00-0AA0** |
| • 2 DO, 24 V DC; 2 A (2 items) | **6ES7 122-1BB10-0AA0** |
| • 1 DI, 115/230 V AC | **6ES7 121-1FA00-0AA0** |
| • 1 DO, 115/230 V AC; 1 A | **6ES7 122-1FA00-0AA0** |
| • 1 DO, relay | **6ES7 122-1HA01-0AA0** |
| • 2 AI ,±10 V , 1 to 5 V | **6ES7 123-1FB00-0AB0** |
| • 1 AI, RTD | **6ES7 123-1JA00-0AB0** |
| • 2 AI, 4 to 20 mA, ±20 mA | **6ES7 123-1GB00-0AB0** |
| • 2 AI, TC | **6ES7 123-1JB00-0AB0** |
| • 1 AO, ±10 V, 1 to 5 V | **6ES7 124-1FA00-0AB0** |
| • 1 AO, 4 to 20 mA, ±20 mA | **6ES7 124-1GA00-0AB0** |
| • 2 AI HA, 4 to 20 mA, ±20 mA | **6ES7 123-1GB10-0AB0** |
| **Terminal block for SIMATIC SC** | |
| For expanding an ET 200L-SC to mount up to 8 electronic modules from the SIMATIC SC range incl. connecting cable to ET 200L-SC or TB 16IM-SC | |

| | Order No. |
|---|---|
| **TB 16SC** | |
| • 8 SC slots, screw-type connection | **6ES7 120-0AH01-0AA0** |
| • 8 SC slots, spring-loaded terminals | **6ES7 120-0BH01-0AA0** |
| **Additional terminal for TB 16SC and TB 16IM-SC of SIMATIC SC** | |
| 1 series | |
| • screw-type connection | **6ES7 120-1AH00-0AA0** |
| • spring-loaded terminals | **6ES7 120-1BH00-0AA0** |
| 2 rows | |
| • screw-type connection | **6ES7 120-2AH00-0AA0** |
| • spring-loaded terminals | **6ES7 120-2BH00-0AA0** |
| ***Accessories*** | |
| **Manual for ET 200L and ET 200L-SC distributed I/O stations** | |
| • German | **6ES7 130-1AA00-8AA0** |
| • English | **6ES7 130-1AA00-8BA0** |
| • French | **6ES7 130-1AA00-8CA0** |
| • Spanish | **6ES7 130-1AA00-8DA0** |
| • Italian | **6ES7 130-1AA00-8EA0** |
| **Sheet of labels** | **6ES7 192-2XX00-0AA0** |
| For electronic modules of the SIMATIC SC range, DIN A4; per sheet: 72 single-width and 12 double-width strips with 0, 1 and 2 LED windows as well as 6 sets of different strips for additional terminals | |
| **Labeling sheet with strips for 10 electronic blocks for** | |
| • 16 channel electronic blocks incl. additional terminals | **6ES7 193-1BH00-0XA0** |
| • 32 channel electronic blocks incl. additional terminals | **6ES7 193-1BL00-0XA0** |
| **Shield connection terminal for SIMATIC SC** | **6ES7 192-0AA00-0AA0** |
| For connecting cable to shield termination element (8 items in each case); shield diameter 4 to 6 mm | |
| **Bus plug connector for PROFIBUS** | |
| • 90° cable feeder, FastConnect terminating resistance with isolating function, without PG socket, up to 12 Mbit/s | **6ES7 972-0BA50-0XA0** |
| • diagonal cable feeder, piercing terminals, without bus terminal resistance, without PG socket, up to 1.5 Mbit/s | **6ES7 972-0BA30-0XA0** |
| • 90° cable feeder, FastConnect terminating resistance with isolating function, with PG socket, up to 12 Mbit/s | **6ES7 972-0BB50-0XA0** |
| **Connecting cable for PROFIBUS** | **6ES7 901-4BD00-0XA0** |
| 12 Mbit/s, for PG connection to PROFIBUS DP, assembled with 2 x 9-pin Sub-D connector, 3.0 m | |

## General

### Overview

ET 200M modular I/O station

- The ET 200M is a modular I/O station with IP20 degree of protection.
- It can be expanded with the signal and function modules of the S7-300 automation system.
- Due to the wide range of modules available, the ET 200M is especially suitable for individual and complex automation tasks.
- With the high feature button of the ET 200M and corresponding modules from the S7-300 range, fast and clock-synchronized applications are possible.
- With the explosion-proof analog HART input and output modules, the ET 200M is ideal for use in process engineering. Can also be used in connection with redundant systems (e.g. S7-400H).
- The ET 200M station is a passive station (slave) on the fieldbus PROFIBUS DP and can be operated as a DP V1 slave.
- The maximum data transfer rate is 12 Mbit/s.
- The ET 200M can also be configured with active bus modules. This allows changing of S7-300 I/O modules during operation under power. The remaining modules continue to operate.



### Technical specifications

| | |
|---|---|
| Connection method | Screw-type and spring-loaded method, hard-wired |
| Degree of protection | IP20 |
| Ambient temperature on vertical wall (preferred installation position) | |
| • With horizontal installation | 0 to + 60°C |
| • With other installation | 0 to + 40 °C |
| Relative humidity | 5 to 95 % (RH severity level 2 in accordance with IEC 1131-2) |

| | |
|---|---|
| Atmospheric pressure | 795 to 1080 hPa |
| Mechanical strength | |
| • Vibration | IEC 68, Part 2 — 6:<br>10 - 57 Hz<br>(const. amplitude 0.075 mm)<br>57 - 150 Hz<br>(constant acceleration 1 g) |
| • Shock | IEC 68, Part 2–27<br>Half-sine, 15 g, 11 ms |

### Ordering data

| | Order No. |
|---|---|
| **I/O modules, profile rail, accessories** [1] | See Catalog ST 70 |
| **PROFIBUS bus connector** | |
| • 90° cable outlet, terminating resistor with isolating function, without programming port, up to 12 Mbit/s | **6ES7 972-0BA11-0XA0** |
| • Angular cable outlet, insulation displacement connectors, without bus connecting resistor, without PG port, up to 1.5 Mbit/s | **6ES7 972-0BA30-0XA0** |
| • 90° cable outlet, terminating resistor with isolating function, with programming port, up to 12 Mbit/s | **6ES7 972-0BB11-0XA0** |
| ***Accessories*** | |
| **Manual for ET 200M Distributed I/O Station**<br>With description of the S7-300 signal modules | |
| • German | **6ES7 153-1AA00-8AA0** |
| • English | **6ES7 153-1AA00-8BA0** |
| • French | **6ES7 153-1AA00-8CA0** |

| | Order No. |
|---|---|
| **DIN rail for active bus modules**<br>For up to 5 active bus modules | |
| • Length 19″ | **6ES7 195-1GA00-0XA0** |
| • Length 530 mm | **6ES7 195-1GF30-0XA0** |
| **Active bus modules** | |
| • BM PS/IM for power supply and IM 153, incl. 1 bus module cover | **6ES7 195-7HA00-0XA0** |
| • BM IM 153/IM 153 bus module for 2 x IM 153-2/FO redundant | **6ES7 195-7HD00-0XA0** |
| • BM 2 x 40 for 2 modules with 40 mm width | **6ES7 195-7HB00-0XA0** |
| • BM 1 x 80 for 1 module with 80 mm width | **6ES7 195-7HC00-0XA0** |
| **Covers**<br>Pack of 4 backplane bus covers and 1 bus module cover | **6ES7 195-7JA00-0XA0** |
| **Ex barrier** | **6ES7 195-7KA00-0XA0** |

## Overview

- For connecting ET 200M as slave to PROFIBUS DP (via copper conductors)
- IM 153-2 can also be used in redundant PROFIBUS DP systems with the S7-400H, software redundancy and the S5-155H
- With time stamp functionality and time-of-day synchronization
- Suitable for synchronous operation
- SIPLUS IM 153-1 for extended temperature range and unusual atmospheric demands (e.g. chlorine/sulphurous environments).

## Technical specifications

| | |
|---|---|
| Transmission protocol | PROFIBUS DP to EN 50 170 |
| Data transmission rate, max. | 12 Mbit/s<br>automatically recognizes the bus system transfer rate |
| Internode communication support | Yes, transmitter |
| Address space, max. | 128 byte for inputs<br>128 byte for outputs |
| Number of modules, max. | 8 |
| Interfaces | |
| • Insulation voltage | 500 V |
| • Connection to PROFIBUS | 9-pin Sub-D connector |
| Output current, max. | 90 mA (for PROFIBUS DP interface) |
| Supply voltage | |
| • Rated value | 24 V DC |
| • Permissible range (including ripple) | 20.4 to 28.8 V |
| Backup during power failure | 5 ms |
| Current consumption 24 V DC | 625 mA |
| Output voltage | 5 V DC |
| Output current (at 5 V DC), max. | 1 A (for backplane bus) |
| Degree of protection | IP20 |
| Ambient temperature | 0 to 60 °C,<br>outdoor: -25 to 60 °C<br>SIPLUS IM 153-1:<br>-25 to 60 °C;<br>condensation permissible |
| Dimensions (W x H x D) in mm | 40 x 125 x 120 |
| Weight, approx. | 0.35 kg |

## IM 153-1/153-2

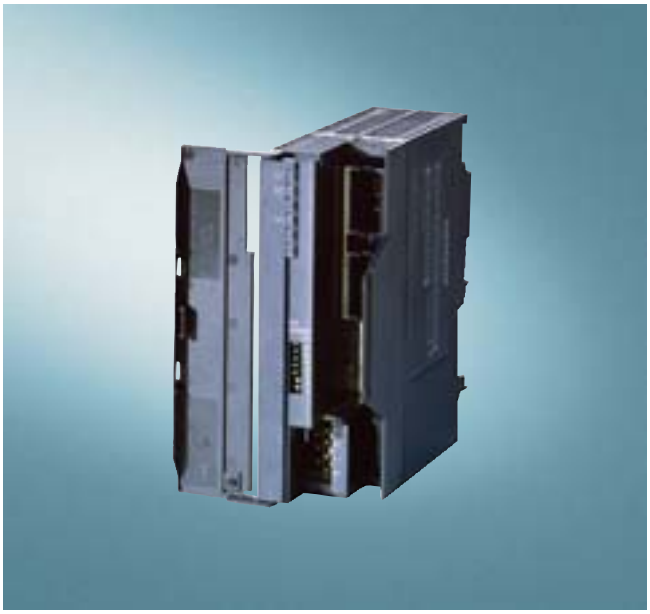
### Ordering data

| | Order No. |
|---|---|
| **IM 153-1 interface module** | |
| Slave interface for connecting an ET 200M to PROFIBUS DP | |
| • Standard temperature range | **6ES7 153-1AA03-0XB0** |
| • Amplified temperature range (SIPLUS) | **6AG1 153-1AA03-2XB0** |
| **IM 153-2 interface module** | |
| Slave interface for connecting an ET 200M to PROFIBUS DP also for use in redundant systems | |
| • High Feature | **6ES7 153-2BA00-0XB0** |
| **Active bus module IM 153/IM 153** | **6ES7 195-7HD10-0XA0** |
| for 2 IM 153-2 High Feature for configuring redundant systems | |
| **Bus module for ET 200M** | |
| • For mounting a power supply and an IM 153 for the hot swapping function during RUN incl. bus module cover | **6ES7 195-7HA00-0XA0** |
| • For installing two 40 mm wide I/O modules for the hot swapping function | **6ES7 195-7HB00-0XA0** |
| • For installing one 80 mm wide I/O module for the hot swapping function | **6ES7 195-7HC00-0XA0** |
| **ET 200M redundancy bundle** | **6ES7 153-2AR01-0XA0** |
| consisting of 2 IM 153-2 High Feature and a bus module IM 153/IM 153 | |

### Accessories

| | Order No. |
|---|---|
| **Manual for ET 200M distributed I/O station** | |
| with a description of the signal modules for the S7-300 | |
| • German | **6ES7 153-1AA00-8AA0** |
| • English | **6ES7 153-1AA00-8BA0** |
| • French | **6ES7 153-1AA00-8CA0** |
| **Bus plug connector for PROFIBUS** | |
| • 90° cable feeder, terminating resistance with isolating function, without PG socket, up to 12 Mbit/s | **6ES7 972-0BA12-0XA0** |
| • diagonal cable feeder, piercing terminals, without bus terminal resistance, without PG socket, up to 1.5 Mbit/s | **6ES7 972-0BA30-0XA0** |
| • 90° cable feeder, terminating resistance with isolating function, with PG socket, up to 12 Mbit/s | **6ES7 972-0BB12-0XA0** |
| **SIMATIC DP standard mounting rail for ET200M** | |
| For installing up to 5 bus modules for | |
| • 483 mm long | **6ES7 195-1GA00-0XA0** |
| • 530 mm long | **6ES7 195-1GF30-0XA0** |
| **SIMATIC S7-300 standard mounting rail** | |
| • 160 mm long | **6ES7 390-1AB60-0AA0** |
| • 480 mm long | **6ES7 390-1AE80-0AA0** |
| • 530 mm long | **6ES7 390-1AF30-0AA0** |
| • 830 mm long | **6ES7 390-1AJ30-0AA0** |
| • 2000 mm long | **6ES7 390-1BC00-0AA0** |
| **S7 manual collection** | **6ES7 998-8XC01-8YE0** |
| Electronic manuals on CD, multi-language: S7-200, TD 200, S7-300, M7-300, C7, S7-400, M7-400, STEP 7, Engineering Tools, Runtime Software, SIMATIC DP (Distributed I/O), SIMATIC HMI (Human Machine Interface), SIMATIC NET (Industrial Communication) | |
| **S7 Manual Collection update service for 1 year** | **6ES7 998-8XC01-8YE2** |
| Scope of supply: Up-to-date CD S7 Manual Collection as well as the three subsequent updates | |

## Overview



- For connecting the ET 200M as a slave to the optical PROFIBUS
- Optical expansion to IM 153-2 (High Feature) (RS 485)
- Integral fiber-optic interface for plastic and PCF cables
- Redundancy capability
- With time stamping functionality and time synchronization

## Technical specifications

| | |
|---|---|
| Data transmission rate | 9.6 kbit/s to 12 Mbit/s (not 3 and 6 Mbit/s) |
| Transmission technology | FOC; Wavelength λ = 660 nm |
| Internode communication support | Yes, transmitter (from 6ES7 153-2AB0**1**-0XB0) |
| Interfaces | |
| • Connection to optical PROFIBUS | 2 x duplex sockets |
| Supply voltage | 24 V DC through screw terminals |
| • Permissible range (including ripple) | 20.4 to 28.8 V |
| • Current consumption at 24 V DC, typical | 625 mA |
| Output voltage | 5 V DC |
| Output current (at 5 V DC), max. | 1 A (for backplane bus) |
| Configuring software | STEP 7/ COM PROFIBUS/ third-party tools using GSD file |
| Degree of protection | IP20 |
| Ambient temperature | 0 °C to +60 °C |
| Operating altitude, max. | 3000 m above mean sea level |
| Dimensions (W x H x D) in mm | 40 x 125 x 120 |
| Weight, approx. | 350 g |

## IM 153-2 FO

| Ordering data | Order No. |
|---|---|
| **IM 153-2 FO interface module**<br>High Feature for max. 8 S7-300 modules, redundancy capable, with integrated FOC interface for assembling an optical line | **6ES7 153-2BB00-0XB0** |
| **IM 153/IM 153 active bus module**<br>For 2 IM 153-2 FO for assembling redundant systems | **6ES7 195-7HD10-0XA0** |
| **Bus module for ET 200M** | |
| • For accommodating an SV and an IM 153 for hot swapping incl. bus module cover | **6ES7 195-7HA00-0XA0** |
| • For accommodating two 40 mm wide I/O modules for hot swapping | **6ES7 195-7HB00-0XA0** |
| • For accommodating one 80 mm wide I/O module for hot swapping | **6ES7 195-7HC00-0XA0** |

| | Order No. |
|---|---|
| ***Accessories*** | |
| **PROFIBUS plastic fiber-optic connector / polishing kit**<br>100 Simplex plugs and 5 polishing kits, for assembling PROFIBUS plastic fiber-optic cables for the optical PROFIBUS DP; for 25 modules | **6GK1 901-0FB00-0AA0** |
| **PROFIBUS plastic fiber-optic stripping tool set**<br>To remove the external or core sleeve of plastic fiber-optic cables | **6GK1 905-6PA10** |
| **Connection adapters**<br>Packet of 50 for using Simplex plugs in integrated FO interfaces; for 25 modules | **6ES7 195-1BE00-0XA0** |
| **SIMATIC DP profile rail for ET 200M**<br>For accommodating max. 5 bus modules for | |
| • Length 483 mm | **6ES7 195-1GA00-0XA0** |
| • Length 530 mm | **6ES7 195-1GF30-0XA0** |
| **SIMATIC S7-300 profile rail** | |
| • Length 160 mm | **6ES7 390-1AB60-0AA0** |
| • Length 480 mm | **6ES7 390-1AE80-0AA0** |
| • Length 530 mm | **6ES7 390-1AF30-0AA0** |
| • Length 830 mm | **6ES7 390-1AJ30-0AA0** |
| • Length 2000 mm | **6ES7 390-1BC00-0AA0** |
| **S7 Manual Collection**<br>Electronic manuals on CD, multilingual:<br>S7-200, TD 200, S7-300, M7-300, C7, S7-400, M7-400, STEP 7, Engineering Tools, Runtime Software, SIMATIC DP (Distributed I/O), SIMATIC HMI (Human Machine Interface), SIMATIC NET (Industrial Communication) | **6ES7 998-8XC01-8YE0** |
| **S7 Manual Collection - Maintenance service for 1 year**<br>Scope of supply: CD containing the current S7 Manual Collection and the three subsequent updates | **6ES7 998-8XC01-8YE2** |

## Overview

The ASM 475 is a low-cost module for connecting the MOBY D/F/E/I/U identification systems via the ET 200M to PROFIBUS DP-V1.

### *Application*

The interface module ASM 475 integrate the MOBY identification systems into the following systems:

- SIMATIC S7-300
- S7-400, PC (CP 5412 (A2)) via ET 200M
- SINUMERIK 840D/810D

A maximum of two SLGs can be connected and operated in parallel mode.

### *Design*

The MOBY ASM 475 interface module can be connected directly or indirectly to the SIMATIC S7-300 via ET 200M.

### *Function*

With the available SW function FC45/FC56 (MOBY I/U filehandler) for the SIMATIC S7-300/400, the ASM 475 operates acyclically via PROFIBUS DP-V1. In this mode, a large amount of data can be transmitted to/from the ASM without overloading the PROFIBUS cycle. This is advantageous when transmitting large volumes of data. In addition, the ASM can process chained MDS commands very quickly in this mode. The MDS data are accessed directly using the physical addressing of the MDS (FC 45) or the filehandler functionality (FC56). Error messages and operating states (MDS in the field, transmission, etc.) are also displayed with LEDs and simplify startup and servicing.

An object manager (OM), which is integrated into the SIMATIC manager, is used to configure the hardware of the ASM 475. Up to 126 ET 200X modules can be operated on a single PROFIBUS line (depends on PROFIBUS master).

| Ordering data | Order No. |
|---|---|
| **MOBY interface module ASM 475** | **6GT2 002-0GA10** |
| ***Accessories*** | |
| **MOBY software package**<br>On CD-ROM, FB/FC for SIMATIC, MOBY demo for PC | **6GT2 080-2AA10** |
| **Front connector (1 x per ASM)** | **6ES7 392-1AJ00-0AA0** |
| **MOBY D, E, I, U connecting cable**<br>Preassembled, between ASM 475 and SLG, in the following lengths: | |
| • 2 m | **6GT2 091-0EH20** |
| • 5 m | **6GT2 091-0EH50** |
| • 10 m | **6GT2 091-0EN10** |
| • 20 m | **6GT2 091-0EN20** |
| • 50 m | **6GT2 091-0EN50** |
| **MOBY F connecting cable**<br>Preassembled, between ASM 475 and SLG 8x, in the following lengths: | |
| • 5 m | **6GT2 491-0EH50** |
| • 20 m | **6GT2 491-0EN20** |
| • 50 m | **6GT2 491-0EN50** |

# Ex analog input module with HART

## Overview

- Enables the utilization of HART (**H**ighway **A**ddressable **R**emote **T**ransducer) in the ET 200M (with the IM 153-2 interface module) in the SIMATIC S5/S7 and PCS 7 automation systems for the connection of HART devices from hazardous areas.
- All transducers or HART sensors can be connected which have been certified for digital communication using the HART protocol.
- In addition, conventional measurement transducers with 4 to 20 mA technology can also be connected without the HART protocol.
- Can only be plugged into ET 200M



## Technical specifications

| Ex analog input module: 6ES7 331- | 7TB00-0AB0 |
|---|---|
| Input range (rated value) | 0 mA to 20 mA; 4 mA to 20 mA |
| Number of inputs | 2 |
| Galvanic isolation | Yes |
| Input resistance | 50 Ω |
| Connection type of the sensors | 2-wire; 4-wire |
| Digital representation of the input signal | 10 to 15 bit + sign |
| Measuring principle | SIGMA-DELTA |
| Integration time (programmable for optimum interference voltage suppression) | 2.5; 16$^2/_3$; 20; 100 ms |
| Permissible voltage | |
| • Between inputs, max. | 60 V DC; 30 V AC |
| • Permissible input voltage (destruction limit), max. | 40 mA |
| Fault indication | Red LED, message |
| Fault message in case of | |
| • Overrange | Red LED, message |
| • Open circuit in signal sensor cable, 4 to 20 mA | Red LED, message |
| • Short-circuit of the sensor line | Red LED, message |
| Noise suppression for noise frequency | 10; 50; 60; 400 Hz |
| • Common mode interference, min. | 130 dB |
| • Series-mode interference, min. (peak value of disturbance < rated value of range) | 60 dB |

| Ex analog input module: 6ES7 331- | 7TB00-0AB0 |
|---|---|
| Basic error limits, at 25 °C | ± 0.1 % |
| Operational limits (0 °C to 60 °C) | ± 0.45% |
| Type of protection | [EEx ib] IIC |
| KEMA No. | KEMA 97; ATEX3039 X |
| FMs | Available soon |
| Input circuit maximum values | |
| • $U_0$ | 29.6V |
| • $I_0$ | 99 mA |
| • $P_0$ | 553 mW |
| • Permissible ext. inductance $L_a$, max. | 3 mH |
| • Permissible external capacitance $C_a$, max. | 62 nF |
| Ambient air temperature, max. perm. | 60 °C |
| Cable length (shielded), max. | 400 m |
| Supply voltage from module (for 2-wire transducer) | |
| • No-load voltage | 29.6 V DC |
| • Rated value | 15 V at 22 mA |
| Current consumption | |
| • Internal (backplane bus), max. | 100 mA |
| • External (24 V DC), max. | 180 mA |
| Power losses, typically | 4.5 W |
| Weight, approx. | 260 g |

## Ordering data

| | Order No. |
|---|---|
| **SM 331 HART analog input module**<br>2 inputs, 0/4 – 20 mA, HART for ET 200M with IM 153-2 interface module | **6ES7 331-7TB00-0AB0** |
| ***Accessories*** | |
| **Front connector** [1] (1 piece)<br>20-pin, with screw contacts | **6ES7 392-1AJ00-0AA0** |
| **LK 393 cable chamber**<br>Essential for use in hazardous areas | **6ES7 393-4AA00-0AA0** |
| **SIMATIC DP profile rail for ET 200M**<br>For accommodating max. 5 bus modules for | |
| • Length 483 mm | **6ES7 195-1GA00-0XA0** |
| • Length 530 mm | **6ES7 195-1GF30-0XA0** |
| **SIMATIC S7-300 profile rail** | |
| • Length 160 mm | **6ES7 390-1AB60-0AA0** |
| • Length 480 mm | **6ES7 390-1AE80-0AA0** |
| • Length 530 mm | **6ES7 390-1AF30-0AA0** |
| • Length 830 mm | **6ES7 390-1AJ30-0AA0** |
| • Length 2000 mm | **6ES7 390-1BC00-0AA0** |

1) When using the cable chamber, connectors with spring terminals cannot be used.

| | Order No. |
|---|---|
| **Reference manual EX I/O station S7-300U, M7-300, ET 200M** | |
| • German | **6ES7 398-8RA00-8AA0** |
| • English | **6ES7 398-8RA00-8BA0** |
| **Label cover**<br>(10 pcs, spare part) for signal modules (no 32-channel types), function modules and CPU 312 IFM | **6ES7 392-2XY00-0AA0** |
| **Labeling strip**<br>(10 pcs, spare part) for signal modules (no 32-channel types), function modules and CPU 312 IFM | **6ES7 392-2XX00-0AA0** |

# Ex analog output module with HART

## Overview

- Allows the use of HART (**H**ighway **A**ddressable **R**emote **T**ransducer) in the ET 200M (with interface module IM 153-2) in the SIMATIC S5/S7 and PCS 7 automation systems, for the implementation of HART devices in hazardous areas.
- All transducers or HART actuators which are certified for digital communication using the HART protocol can be connected.
- In addition, traditional transducers with 4 to 20 mA technology without HART protocol can also be connected.
- Can only be plugged into ET 200M



## Technical specifications

| Ex analog output module: 6ES7 332- | 5TB00-0AB0 |
|---|---|
| Output range (nominal value) | 0 mA to 20 mA; 4mA to 20mA |
| Number of outputs | 2 |
| Galvanic isolation | Yes |
| Load resistance (in the rated range of the output), max. | 650 Ω |
| Connection method for actuators | 2-wire connection |
| Digital representation of output signal | 12-bit |
| Fault message in case of | |
| • Cycle time | 0.5 ms |
| • Short-circuit protection | Yes |
| • Idle voltage, approx. | 19 V |
| Permissible voltage | |
| • Between the outputs, max. | 60 V DC; 30 V AC |
| • Outputs against ground current, max. | 60 V DC; 30 V AC |
| Basic error limits, at 25 °C | ± 0.15% |
| Operational limits (0 °C to 60 °C) | ± 0.55% |
| Cable length (shielded), max. | 400 m |
| Fault indication | Group signal, additionally per channel |

| Ex analog output module: 6ES7 332- | 5TB00-0AB0 |
|---|---|
| Fault message in case of | |
| • Wire break on the actuator line | Yes |
| • Overrange | Yes |
| • Group error display | message, red LED |
| • HART communication | active, green LED |
| Type of protection | [EEx ib] IIC |
| KEMA No. | 98; ATEX 2359 X |
| FMs | Available soon |
| Input circuit maximum values | |
| • $U_0$, max. | 19 V |
| • $I_0$ | 66 mA DC |
| • $P_0$ | 506 mW |
| • Permissible ext. inductance $L_0$, max. | 7.5 mH |
| • Permissible ext. capacitance $C_0$, max. | 230 nF |
| Ambient air temperature, max. perm. | 60 °C |
| Current consumption | |
| • Internal (backplane bus), max. | 100 mA |
| • External (24 V DC), max. | 150 mA |
| Power losses, typically | 3.5 W |
| Weight, approx. | 280 g |

## Ex analog output module with HART

### Ordering data

| | Order No. |
|---|---|
| **SM 332 HART analog output module**<br>HART analog output, 2 outputs, 0/4 – 20 mA, HART for ET 200M, with IM 153-2 | **6ES7 332-5TB00-0AB0** |
| ***Accessories*** | |
| **Front connector** (1 piece)<br>20-pin, with screw contacts | **6ES7 392-1AJ00-0AA0** |
| **LK 393 cable chamber**<br>Essential for use in hazardous areas | **6ES7 393-4AA00-0AA0** |
| **SIMATIC DP profile rail for ET 200M**<br>For accommodating max. 5 bus modules for | |
| • Length 483 mm | **6ES7 195-1GA00-0XA0** |
| • Length 530 mm | **6ES7 195-1GF30-0XA0** |
| **SIMATIC S7-300 profile rail** | |
| • Length 160 mm | **6ES7 390-1AB60-0AA0** |
| • Length 480 mm | **6ES7 390-1AE80-0AA0** |
| • Length 530 mm | **6ES7 390-1AF30-0AA0** |
| • Length 830 mm | **6ES7 390-1AJ30-0AA0** |
| • Length 2000 mm | **6ES7 390-1BC00-0AA0** |

| | Order No. |
|---|---|
| **Reference manual EX I/O station S7-300U, M7-300, ET 200M** | |
| • German | **6ES7 398-8RA00-8AA0** |
| • English | **6ES7 398-8RA00-8BA0** |
| **Label cover**<br>(10 pcs, spare part) for signal modules (no 32-channels), function modules and CPU 312 IFM | **6ES7 392-2XY00-0AA0** |
| **Labeling strip**<br>(10 pcs, spare part) for signal modules (no 32-channels), function modules and CPU 312 IFM | **6ES7 392-2XX00-0AA0** |
| **S7 Manual Collection**<br>Electronic manuals on CD, multilingual:<br>S7-200, TD 200, S7-300, M7-300, C7, S7-400, M7-400, STEP 7, Engineering Tools, Runtime Software, SIMATIC DP (Distributed I/O), SIMATIC HMI (Human Machine Interface), SIMATIC NET (Industrial Communication) | **6ES7 998-8XC01-8YE0** |
| **S7 Manual Collection - Maintenance service for 1 year**<br>Scope of supply: CD containing the current S7 Manual Collection and the three subsequent updates | **6ES7 998-8XC01-8YE2** |

# SM 326 F digital input module - Safety Integrated

## Overview

- Digital inputs for the failsafe SIMATIC S7 systems
- They are suitable for connecting:
  - Switches and two-wire proximity switches (BERO)
  - Sensors according to NAMUR and connected mechanical contacts, also for signals from hazardous areas
- With integrated safety functions for failsafe operation
- Can be used in failsafe mode
  - Centrally: with S7-31xF-2DP (applies only to 6ES7 326-1BK00-0AB0)
  - Distributed in ET 200M: with SIMATIC S7-31xF-2DP, S7-416F-2 and S7-400F/FH
- Suitable for use in standard operation in the same way as S7-300 modules



## Technical specifications

| SM 326 fail-safe digital input module | 6ES7 326-1BK00-0AB0 |
|---|---|
| Number of inputs | 24 |
| Interrupts | Diagnostic interrupt |
| Diagnostics | Group error display, fail-safe operation indication; Diagnostic information selectable |
| Maximum achievable safety class during safety operation | |
| • According to IEC 61508 | SIL 3 |
| • According to DIN VDE 0801 | AK 6 |
| • According to EN 954 | Cat. 4 |
| Type of protection | - |
| Test number KEMA | - |
| Nominal supply voltage of electronics and sensors 1L+/2L+ | 24 V DC |
| Input voltage | |
| • Rated value | 24 V DC |
| • For "1" signal | 11 to 30 V |
| • Or signal "0" | -30 to +5V |
| • Frequency | - |
| Galvanic isolation | |
| • To backplane bus | Yes |
| - in groups of | 12 |
| - input current for "1" signal, typ. | 10 mA |
| • Between channels and backplane bus | Yes |
| • Between channels | 75 V DC, 60 V AC |
| Input current | |
| • For "1" signal, min. | 10 mA |
| • For "0" signal , max.. | 2 mA |
| Input delay | |
| • For "0" to "1", typ. | 3 ms |
| • For "1" to "0", typ. | 3 ms |

| SM 326 fail-safe digital input module | 6ES7 326-1BK00-0AB0 |
|---|---|
| No. of simultaneously controllable inputs | |
| • Horizontal arrangement | |
| - up to 40 °C | 24 |
| - up to 60 °C | 24 (at 24 V)<br>18 (at 28.8 V) |
| • Vertical arrangement | |
| - up to 40 °C | 24 |
| Highest values of input circuits (per channel) | (per circuit) |
| • $U_0$, max. | - |
| • $I_0$, max. | - |
| • $P_0$, max. | - |
| • Permissible external inductance $L_0$, max. | - |
| • Permissible external capacitance $C_0$, max. | - |
| • Fault voltage $U_m$, max. | - |
| • Permiss. ambient temp. $T_a$, max. | 60 °C |
| Connection of 2-wire BERO | Possible |
| • Permiss. quiescent current, max. | 2 mA |
| Encoder supply | 400 mA |
| • Number of outputs | 4, isolated |
| Cable length | |
| • Unshielded | 100 m |
| • Shielded | 200 m |
| Current consumption | |
| • From backplane bus, typ. | 90 mA |
| • From 1L+, 2L+ (no load), typ. | 350 mA |
| Power losses, typ. | 9.0 W |
| Isolation tested at | 75 V DC |
| • Channels to backplane bus and load voltage L+ | - |
| • Load voltage L+ against backplane bus | - |
| • Channels horizontally | - |
| Dimensions (W x H x D) in mm | 80 x 125 x 120 |
| Required front connector | 40-pin |
| Weight | 442 g |

## Technical specifications (continued)

| SM 326 NAMUR<br>Fail-safe Ex Digital Input Module | 6ES7 326-1RF00-0AB0 |
|---|---|
| Number of inputs | 8 (single-channel)<br>4 (two-channel) |
| Interrupts | Diagnostic interrupt |
| Diagnostics | Group error display,<br>fail-safe operation indication;<br>diagnostic information selectable |
| Maximum achievable safety class during safety operation | |
| • According to IEC 61508 | SIL 2 (single-channel)<br>SIL 3 (two-channel) |
| • According to DIN VDE 0801 | AK 4 (single-channel)<br>AK 5 and 6 (two-channel) |
| • According to EN 954 | Cat. 3 (single-channel)<br>Cat. 4 (two-channel) |
| Rated supply voltage for electronics and encoder 1L+/2L+ | 24 V DC |
| Input voltage | According to DIN 19234 or NAMUR |
| Galvanic isolation | |
| Between channels and backplane bus | Yes |
| Between channels and power supply of the electronics | Yes |
| Between channels | Yes |
| Input current | |
| • At “1” signal, min. | 2.1 mA to 7 mA |
| • At “0” signal, max. | 0.35 mA to 1.2 mA |
| Input delay | |
| • For "0" after "1" | 1.2 to 3 ms |
| • For "1" to "0 | 1.2 to 3 ms |
| No. of simultaneously controllable inputs | |
| • Horizontal arrangement, to 60 °C | 8 |
| • Vertical arrangement, to 40 °C | 9 |

| SM 326 NAMUR<br>Fail-safe Ex Digital Input Module | 6ES7 326-1RF00-0AB0 |
|---|---|
| Connection type of the sensors | Two-wire connection |
| Type of protection | II(2)G [EEx ib] IIC<br>according to EN 50020 |
| Test number KEMA | 99 ATEX 2671 X |
| Highest values of input circuits (per channel) | (per circuit) |
| • $U_0$, max. | 10.0 V |
| • $I_0$, max. | 13.9 mA |
| • $P_0$, max. | 33.1 mW |
| • Permissible external inductance $L_0$, max. | 80 mH |
| • Permissible external capacitance $C_0$, max. | 3 µF |
| • Fault voltage $U_m$, max. | 60 V DC<br>30 V AC |
| • Permissible ambient temperature $T_a$, max. | 60 °C |
| Encoder supply | 8.2 V DC |
| • Number of outputs | 8 |
| Isolation tested at | |
| • Channels to backplane bus and load voltage L+ | 1500 V AC |
| • Load voltage L+ against backplane bus | 500 V DC or 350 V AC |
| • Channels horizontally | 1500 V AC |
| Cable length | |
| • Unshielded, max. | 200 m |
| • Shielded, max. | 100 m |
| Current consumption | |
| • From backplane bus, max. | 90 mA |
| • From L+ (no load), max. | 160 mA |
| Power losses, typ. | 4.5 W |
| Dimensions (W x H x D) in mm | 80 x 125 x 120 |
| Front connector required | 40-pin |
| Weight, approx. | 482 g |

## SM 326 F digital input module - Safety Integrated

### Ordering data

| | Order No. |
|---|---|
| **SM 326 fail-safe digital input modules** | |
| 24 inputs, 24 V DC | **6ES7 326-1BK00-0AB0** |
| 8 inputs, 24 V DC, NAMUR | **6ES7 326-1RF00-0AB0** |
| **Labeling sheet with strips for 10 electronic modules** | |
| • for 16-channel electronic modules incl. supplementary terminals | **6ES7 193-1BH00-0XA0** |
| • for 32-channel electronic modules incl. supplementary terminals | **6ES7 193-1BL00-0XA0** |
| **Connecting cable for PROFIBUS**<br>12 Mbit/s, for PG connection to PROFIBUS DP, preassembled with 2x9-pin Sub-D plug, 3 m long | **6ES7 901-4BD00-0XA0** |
| **PROFIBUS bus connector** | |
| • 90° cable outlet, terminating resistor with isolating function, without programming port, up to 12 Mbit/s | **6ES7 972-0BA12-0XA0** |
| • Slanting outgoing feeder cable, barrel contacts, without bus terminating resistor, without PG socket, up to 1.5 Mbit/s | **6ES7 972-0BA30-0XA0** |
| • 90° cable outlet, terminating resistor with isolating function, with programming port, up to 12 Mbit/s | **6ES7 972-0BB12-0XA0** |
| **DIN rail for active bus modules**<br>for max. 5 active bus modules for hot swapping function | |
| • Length 483 mm | **6ES7 195-1GA00-0XA0** |
| • Length 530 mm | **6ES7 195-1GF30-0XA0** |
| • Length 620 mm | **6ES7 195-1GG30-0XA0** |
| • Length 2000 mm | **6ES7 195-1GC00-0XA0** |
| **Active bus module**<br>BM 1 x 80 for 1 module with 80 mm width | **6ES7 195-7HC00-0XA0** |
| **SITOP power supply module**<br>for ET 200M<br>120/230 V AC, 24 V DC, 5 A<br>Type PS 307-1E | **6ES7 307-1EA00-0AA0** |
| **Front connector**<br>40-pin, with screw-type terminals | |
| • 1 item | **6ES7 392-1AM00-0AA0** |
| • 100 units | **6ES7 392-1AM00-1AB0** |

| | Order No. |
|---|---|
| **Labeling strips**<br>for fail-safe modules (spare part); 10 units | **6ES7 392-2XX20-0AA0** |
| **Label covers**<br>for fail-safe modules (spare part); 10 units | **6ES7 392-2XY20-0AA0** |
| **LK 393 cable chamber**<br>for fail-safe modules; L+ and M connections; 5 units | **6ES7 393-4AA10-0AA0** |
| **S7-300 manual**<br>Design, CPU data, module data, operation list | |
| • German | **6ES7 398-8FA10-8AA0** |
| • English | **6ES7 398-8FA10-8BA0** |
| • French | **6ES7 398-8FA10-8CA0** |
| • Spanish | **6ES7 398-8FA10-8DA0** |
| • Italian | **6ES7 398-8FA10-8EA0** |
| **Documentation for S7-300F**<br>System description, configuring and programming, PROFIsafe fail-safe modules | |
| • German | **6ES7 988-8FB10-8AA0** |
| • English | **6ES7 988-8FB10-8BA0** |
| • French | **6ES7 988-8FB10-8CA0** |
| **Manual S7-400F/FH programmable controller**<br>Paper version | |
| • German | **6ES7 988-8FA10-8AA0** |
| • English | **6ES7 988-8FA10-8BA0** |
| **SIMATIC Manual Collection**<br>Electronic manuals on CD-ROM, multi-language: S7-200, TD 200, S7-300, C7, S7-400, STEP 7, engineering tools, runtime software, SIMATIC DP (distributed I/O), SIMATIC HMI (human machine interface), SIMATIC NET (industrial communication) | **6ES7 998-8XC01-8YE0** |
| **SIMATIC Manual Collection Maintenance service for 1 year**<br>Current S7 Manual Collection CD as well as the three following updates | **6ES7 998-8XC01-8YE2** |

## Overview

- Digital outputs for the failsafe SIMATIC S7 systems
- For connection of solenoid valves, DC contactors and signaling lamps
- With integrated safety functions for failsafe operation
- Can be used in failsafe mode
  - Centrally: with S7-31xF-2 DP
  - Distributed in ET 200M: with SIMATIC S7-31xF-2DP, S7-416F-2 and S7-400F/FH
- Suitable for use in standard operation in the same way as S7-300 modules

## Technical specifications

| **SM 326<br>fail-safe digital output module** | **6ES7 326-2BF01-0AB0** |
|---|---|
| **Number of outputs** | **10** |
| Interrupts | Diagnostics interrupt |
| Diagnostics | Group error display, display of fail-safe mode; diagnostic info can be read out |
| Maximum achievable safety class in safety mode | |
| • According to IEC 61508 | SIL 3 |
| • According to DIN VDE 0801 | AK 5 and 6 |
| • According to EN 954 | Cat. 4 |
| Load voltage 1L+, 2L+, 3L+ | 24 V DC |
| Output voltage | |
| • For "1" signal | |
| - without series diode, min. | L+ -1.0 V |
| - with series diode, min. | L+ -1.8 V |
| Galvanic isolation | |
| • Between channels and backplane bus | Yes |
| • Between channels and electronics power supply | Yes |
| • Between the channels | Yes |
| • In groups of | 5 |
| Output current | |
| • For "1" signal | |
| - rated value | 2 A |
| - permissible range up to 40 °C, horizontal mounting | 7 mA to 2 A |
| - permissible range up to 40 °C, vertical mounting | 7 mA to 1 A |
| - permissible range up to 60 °C, horizontal mounting | 7 mA to 1 A |
| • For "0" signal, max. | 0.5 mA |

| **SM 326<br>fail-safe digital output module** | **6ES7 326-2BF01-0AB0** |
|---|---|
| Total current of the outputs (per group) | |
| • Horizontal mounting | |
| - up to 40 °C, max. | 7.5 A (without series diode)<br>5 A (with series diode) |
| - up to 60 °C | 5 A (without series diode)<br>4 A (with series diode) |
| • Vertical mounting | |
| - up to 40 °C | 5 A (without series diode)<br>4 A (with series diode) |
| Lamp load, max. | 5 W |
| Switching frequency of outputs | |
| • Ohmic load, max. | 100 Hz |
| • Inductive loads, max. | 0.5 Hz |
| • With lamp load, max. | 100 Hz |
| • Mechanical, max. | - |
| Switching capacity of contacts | |
| • Ohmic load, max. | 30 Hz |
| • Inductive loads, max. | 2 Hz |
| • With lamp load, max. | 10 Hz |
| Voltage induced on circuit interruption limited to typically | L+ - 53 V (without series diode)<br>L+ - 33 V (with series diode) |
| Short-circuit protection | Electronic |
| Cable length | |
| • Non-shielded, max. | 600 m |
| • Shielded, max. | 1000 m |
| • With SIL 3, AK 5 and 6, Cat. 4, max. | 200 m |
| Current consumption | |
| • From backplane bus, max. | 100 mA |
| • From 1L+, max. | 70 mA |
| • From 2L+, 3L+, max. (without load) | 100 mA |
| Power losses, typically | 12 W |
| Isolation tested at | 75 V DC |
| Dimensions (W x H x D) in mm | 80 x 125 x 120 |
| Required front connector | 40-pin |
| Weight, approx. | 465 g |

## SM 326 F digital output modules - Safety Integrated

| Ordering data | Order No. |
|---|---|
| **SM 326 fail-safe digital output module** | |
| 10 inputs, 24 V DC, 2 A | **6ES7 326-2BF01-0AB0** |
| **Labeling sheet with strips for 10 electronic modules** | |
| • for 16-channel electronic modules incl. supplementary terminals | **6ES7 193-1BH00-0XA0** |
| • for 32-channel electronic modules incl. supplementary terminals | **6ES7 193-1BL00-0XA0** |
| **Connecting cable for PROFIBUS** | **6ES7 901-4BD00-0XA0** |
| 12 Mbit/s, for PG connection to PROFIBUS DP, preassembled with 2x9-pin Sub-D plug, 3 m long | |
| **PROFIBUS bus connector** | |
| • 90° cable outlet, terminating resistor with isolating function, without programming port, up to 12 Mbit/s | **6ES7 972-0BA12-0XA0** |
| • Slanting outgoing feeder cable, barrel contacts, without bus terminating resistor, without PG socket, up to 1.5 Mbit/s | **6ES7 972-0BA30-0XA0** |
| • 90° cable outlet, terminating resistor with isolating function, with programming port, up to 12 Mbit/s | **6ES7 972-0BB12-0XA0** |
| **DIN rail for active bus modules** | |
| for max. 5 active bus modules for hot swapping function | |
| • Length 483 mm | **6ES7 195-1GA00-0XA0** |
| • Length 530 mm | **6ES7 195-1GF30-0XA0** |
| • Length 620 mm | **6ES7 195-1GG30-0XA0** |
| • Length 2000 mm | **6ES7 195-1GC00-0XA0** |
| **Active bus module** | **6ES7 195-7HC00-0XA0** |
| BM 1 x 80 for 1 module with 80 mm width | |
| **SITOP power supply module** | **6ES7 307-1EA00-0AA0** |
| for ET 200M 120/230 V AC, 24 V DC, 5 A Type PS 307-1E | |
| **Front connector** | |
| 40-pin, with screw-type terminals | |
| • 1 item | **6ES7 392-1AM00-0AA0** |
| • 100 units | **6ES7 392-1AM00-1AB0** |

| | Order No. |
|---|---|
| **Labeling strip** | **6ES7 392-2XX20-0AA0** |
| for fail-safe modules (spare part) 10 units | |
| **Label cover** | **6ES7 392-2XY20-0AA0** |
| for fail-safe modules (spare part) 10 units | |
| **LK 393 cable chamber** | **6ES7 393-4AA10-0AA0** |
| for fail-safe modules; L+ and M connections, 5 units | |
| **S7-300 Manual** | |
| Design, CPU data, module data, operation list | |
| • German | **6ES7 398-8FA10-8AA0** |
| • English | **6ES7 398-8FA10-8BA0** |
| • French | **6ES7 398-8FA10-8CA0** |
| • Spanish | **6ES7 398-8FA10-8DA0** |
| • Italian | **6ES7 398-8FA10-8EA0** |
| **Documentation for S7-300F** | |
| System description, configuring and programming, PROFIsafe fail-safe modules | |
| • German | **6ES7 988-8FB10-8AA0** |
| • English | **6ES7 988-8FB10-8BA0** |
| • French | **6ES7 988-8FB10-8CA0** |
| **Manual S7-400F/FH programmable controller** | |
| Paper version | |
| • German | **6ES7 988-8FA10-8AA0** |
| • English | **6ES7 988-8FA10-8BA0** |
| **SIMATIC Manual Collection** | **6ES7 998-8XC01-8YE0** |
| Electronic manuals on CD-ROM, multi-language: S7-200, TD 200, S7-300, C7, S7-400, STEP 7, engineering tools, runtime software, SIMATIC DP (distributed I/O), SIMATIC HMI (human machine interface), SIMATIC NET (industrial communication) | |
| **SIMATIC Manual Collection Maintenance service for 1 year** | **6ES7 998-8XC01-8YE2** |
| Current S7 Manual Collection CD as well as the three following updates | |

## SM 336 F analog input modules - Safety Integrated

### Overview

- Analog inputs for the failsafe SIMATIC S7 systems
- For connection of analog sensors with voltage and current signals
- With integrated safety functions for failsafe operation
- Can be used in the ET 200M distributed I/O station with SIMATIC S7-31xF-2 DP, S7-416F-2 and S7-400F/FH
- Suitable for use in standard operation in the same way as S7-300 modules

### Technical specifications

| SM 336<br>fail-safe analog input module | 6ES7 336-1HE00-0AB0 |
|---|---|
| Number of inputs | 6 |
| • For voltage measurement, max. | 4 |
| Interrupts | |
| • Diagnostic interrupt | Programmable |
| Diagnostics | Green LED for indicating fail-safe operation,<br>green LED for monitoring sensor power supply,<br>red LED for group error display;<br>diagnostic information selectable |
| Maximum achievable safety class during safety operation | |
| • According to IEC 61508 | Max. SIL 3 |
| • According to IEC 19250 | Max. 6 mA |
| • According to EN 954-1 | Max. cat. 4 |
| Rated load voltage L+ | 24 V DC |
| • Polarity reversal protection | Yes |
| Input impedance/<br>input ranges in standard operation | |
| • Voltage | 0 to 10 V/59 kΩ |
| • Current | 0 to 20 mA/107 Ω<br>4 to 20 mA/107 Ω |
| Input impedance/<br>input ranges in safety operation | |
| • Current | 4 to 20 mA/107 Ω |
| Permissible input voltage for voltage input, max. | 30 V |
| Permissible input current for current input, max. | 40 mA |
| Connection of signal sensors | |
| • For current measurement | |
| - as 2-wire transmitter | Yes |
| - as 4-wire transducer | Yes |

| SM 336<br>fail-safe analog input module | 6ES7 336-1HE00-0AB0 |
|---|---|
| Galvanic isolation | |
| • Between channels and backplane bus | Yes |
| • Between channels and power supply of the electronics | Yes (only with external supply of sensors) |
| • Between channels | No |
| Conversion time[2]/resolution (per channel) | |
| • Integration time | 20 ms at 50 Hz<br>16.66 ms at 60 Hz |
| • Resolution (VZ = sign) | 13 bit + sign |
| • Noise suppression, min. | 38 dB |
| Operational limit<br>(in the entire temperature range, referred to input range), max. | |
| • Current input | ±0.45% |
| • Voltage input | ±0.45% |
| Basic error (operational limits at 25 °C, referred to input range), max. | |
| • Current input | ±0.35% |
| • Voltage input | ±0.35% |
| Cable length (shielded), max. | 200 m |
| Current consumption | |
| • From backplane bus, max. | 90 mA |
| • From L+, typ. | 160 mA |
| Power losses, typ. | 4.25 W |
| Isolation tested at | 600 V DC |
| Dimensions (W x H x D) in mm | 80 x 125 x 120 |
| Required front connector | 40-pin |
| Weight | 480 g |

## SM 336 F analog input modules - Safety Integrated

| Ordering data | Order No. |
|---|---|
| **SM 326 fail-safe analog input module** | |
| 6 inputs, 14 bit | **6ES7 336-1HE00-0AB0** |
| **Labeling sheet with strips for 10 electronic modules** | |
| • for 16-channel electronic modules incl. supplementary terminals | **6ES7 193-1BH00-0XA0** |
| • for 32-channel electronic modules incl. supplementary terminals | **6ES7 193-1BL00-0XA0** |
| **Connecting cable for PROFIBUS** | **6ES7 901-4BD00-0XA0** |
| 12 Mbit/s, for PG connection to PROFIBUS DP, preassembled with 2x9-pin Sub-D plug, 3 m long | |
| **PROFIBUS bus connector** | |
| • 90° cable outlet, terminating resistor with isolating function, without programming port, up to 12 Mbit/s | **6ES7 972-0BA12-0XA0** |
| • Slanting outgoing feeder cable, barrel contacts, without bus terminating resistor, without PG socket, up to 1.5 Mbit/s | **6ES7 972-0BA30-0XA0** |
| • 90° cable outlet, terminating resistor with isolating function, with programming port, up to 12 Mbit/s | **6ES7 972-0BB12-0XA0** |
| **DIN rail for active bus modules** | |
| for max. 5 active bus modules for hot swapping function | |
| • Length 483 mm | **6ES7 195-1GA00-0XA0** |
| • Length 530 mm | **6ES7 195-1GF30-0XA0** |
| • Length 620 mm | **6ES7 195-1GG30-0XA0** |
| • Length 2000 mm | **6ES7 195-1GC00-0XA0** |
| **Active bus module** | **6ES7 195-7HC00-0XA0** |
| BM 1 x 80 for 1 module with 80 mm width | |
| **SITOP power supply module** | **6ES7 307-1EA00-0AA0** |
| for ET 200M; 120/230V AC, 24 V DC, 5 A; type PS 307-1E | |
| **Front connector** | |
| 40-pin, with screw-type terminals | |
| • 1 item | **6ES7 392-1AM00-0AA0** |
| • 100 units | **6ES7 392-1AM00-1AB0** |

| | Order No. |
|---|---|
| **Labeling strips** | **6ES7 392-2XX20-0AA0** |
| for fail-safe modules (spare part), 10 units | |
| **Label covers** | **6ES7 392-2XY20-0AA0** |
| for fail-safe modules (spare part), 10 units | |
| **LK 393 cable chamber** | **6ES7 393-4AA10-0AA0** |
| for fail-safe modules; L+ and M connections, 5 units | |
| **S7-300 manual** | |
| Design, CPU data, module data, operation list | |
| • German | **6ES7 398-8FA10-8AA0** |
| • English | **6ES7 398-8FA10-8BA0** |
| • French | **6ES7 398-8FA10-8CA0** |
| • Spanish | **6ES7 398-8FA10-8DA0** |
| • Italian | **6ES7 398-8FA10-8EA0** |
| **Documentation for S7-300F** | |
| System description, configuring and programming, PROFIsafe fail-safe modules | |
| • German | **6ES7 988-8FB10-8AA0** |
| • English | **6ES7 988-8FB10-8BA0** |
| • French | **6ES7 988-8FB10-8CA0** |
| **Manual S7-400F/FH programmable controller** | |
| Paper version | |
| • German | **6ES7 988-8FA10-8AA0** |
| • English | **6ES7 988-8FA10-8BA0** |
| **SIMATIC Manual Collection** | **6ES7 998-8XC01-8YE0** |
| Electronic manuals on CD-ROM, multi-language: S7-200, TD 200, S7-300, C7, S7-400, STEP 7, engineering tools, runtime software, SIMATIC DP (distributed I/O), SIMATIC HMI (human machine interface), SIMATIC NET (industrial communication) | |
| **SIMATIC Manual Collection Maintenance service for 1 year** | **6ES7 998-8XC01-8YE2** |
| Current S7 Manual Collection CD as well as the three following updates | |

## Overview

- Digital inputs
- For connecting standard switches and two-wire proximity switches (BERO)

## Technical specifications

| | 6ES7 321-1BH0.-... | 6ES7 321-1BH5.-... | 6ES7 321-1BL.-... | 6ES7 321-1BH10-... | 6ES7 321-7BH01-... |
|---|---|---|---|---|---|
| Supports synchronous operation | – | – | – | Yes | Yes |
| Number of inputs | 16 | 16; source input | 32 | 16 | 16 |
| Interrupts | - | - | - | - | Process interrupt, diagnostics interrupt |
| Diagnostics | - | - | - | - | internal/external error |
| Rated load voltage L+/L1 | | | | | |
| • Rated value | 24 V DC | 24 V DC | 24 V DC | 24 V DC | 24 V DC |
| • Permissible range | 20.4 to 28.8 V | | | 20.4 to 28.8 V | 20.4 V to 28.8 V |
| Input voltage | | | | | |
| • Rated value | 24 V DC | 24 V DC | 24 V DC | 24 V DC | 24 V DC |
| • For "1" signal | 13 to 30 V | -13 to -30 V | 13 to 30 V | 13 to 30 V | 13 to 30 V |
| • For signal "0" | -30 to +5 V | -5 to +30 V | -30 to +5 V | -30 to +5 V | -30 to +5 V |
| • Frequency | - | - | - | - | - |
| Isolation (to backplane bus) | Optocoupler | | | Optocoupler | Optocoupler |
| • In groups of | 16 | 16 | 16 | 16 | 16 |
| Input current | | | | | |
| • For "1" signal, typ. | 9.0 mA | 7.0 mA | 7.0 mA | typ. 7 mA | 7.0 mA |
| Input delay time | | | | | |
| • Configurable | - | - | - | - | Yes |
| • At rated input voltage | 1.2 to 4.8 ms | 1.2 to 4.8 ms | 1.2 to 4.8 ms | 0.025 to 0.075 ms | 0.1/0.5/3/15/20 ms[1)] |
| No. of simultaneously controllable inputs | | | | | |
| • Up to 40 °C | 16 | 16 | 32 | 16 | 16 |
| • Up to 60 °C | 16 | 16 | 16 | 16 | 16 |
| • up to 70 °C | - | - | - | - | - |
| Connection of two-wire BEROs | Possible | Possible | Possible | Possible | Possible |
| • Permissible quiescent current, max. | 1.5 mA | 1.5 mA | 1.5 mA | 1.5 mA | 1.5 mA |
| Cable length | | | | | |
| • Unshielded | 600 m | 600 m | 600 m | 600 m | 600 m |
| • Shielded | 1000 m | 1000 m | 1000 m | 1000 m | 1000 m |

1) In addition, a regeneration time of 0.25 ms must be added before the signal can be forwarded on the backplane bus.

## SM 321 digital input modules

**Technical specifications** (continued)

| | 6ES7 321-1BH0.-... | 6ES7 321-1BH5.-... | 6ES7 321-1BL.-... | 6ES7 321-1BH10-... | 6ES7 321-7BH01-... |
|---|---|---|---|---|---|
| Current consumption | | | | | |
| • From backplane bus, max. | 10 mA | 10 mA | 15 mA | max. 110 mA | 110 mA |
| • from L+, max. | 25 mA | - | - | - | 90 mA |
| Power losses, typically | 3,5 W | 3,5 W | 6.5 W | 3.8 W | 4 W |
| Isolation tested at | 500 V DC | 500 V DC | 500 V DC | 500 V DC | 500 V DC |
| Dimensions (W x H x D) in mm | 40 x 125 x 120 | | | 40 x 125 x 120 | 40 x 125 x 120 |
| Required front connector | 20-pin | 20-pin | 40-pin | 20-pin | 20-pin |
| Weight, approx. | 200 g | 200 g | 260 g | 200 g | 200 g |

| | 6ES7-1CH0 . - . . . . | 6ES7-1CH20- . . . . | 6ES7-1FH . . - . . . . |
|---|---|---|---|
| Number of inputs | 16 | 16 | 16 |
| Interrupts | - | - | - |
| Diagnostics | - | - | - |
| Rated load voltage L+/L1 | | | |
| • Rated value | 24 to 48 V AC/DC | 48 to 125 V DC | - |
| • Permissible range | - | - | - |
| Input voltage | | | |
| • Rated value | 24 to 48 V DC<br>24 to 48 V AC | 48 to 125 V DC | 120/230 V AC |
| • For "1" signal | 14 to 60 V AC | 30 to 146 V DC | 79 to 264 V |
| • For signal "0" | -5 to 5 V AC | -30 to 15 V DC | 0 to 40 V |
| • Frequency | 0 to 63 Hz | - | 47 to 63 Hz |
| Isolation (to backplane bus) | Optocoupler | Optocoupler | Optocoupler |
| • In groups of | 1 | 8 | 4 |
| Input current | | | |
| • For "1" signal, typ. | 2.7 mA | 2.6 mA | 17.3 mA at AC 264 V |
| Input delay time | | | |
| • Configurable | - | - | - |
| • At rated input voltage | max. 15 ms | 1 to 3 ms | 25 ms |
| No. of simultaneously controllable inputs | | | |
| • Up to 40°C | 16<br>(horizontal and vertical mounting) | 16<br>(at 120 V DC) | 16 |
| • Up to 60°C | 16<br>(vertical mounting) | 16<br>(at 60 V DC) or 10 (at 140 V DC) | 16 |
| • up to 70°C | - | 16<br>(at 60 V DC) or 6 (at 140 V DC) | - |
| Connection of two-wire BEROs | Possible | Possible | Possible |
| • Permissible quiescent current, max. | 1.0 mA | 1.0 mA | 2 mA |
| Cable length | | | |
| • Unshielded | 600 m | 600 m | 600 m |
| • Shielded | 1000 m | 1000 m | 1000 m |
| Current consumption | | | |
| • From backplane bus, max. | 100 mA | 40 mA | 43 mA |
| • from L+, max. | - | - | - |
| Power losses, typically | 1.5 W at 24 V<br>2.8 W at 48 V | 4.3 W | 4.1 W |
| Isolation tested at | 2500 V DC | 1500 V DC | 1500 V AC |
| Dimensions (W x H x D) in mm | 40 x 125 x 120 mm | 40 x 125 x 120 | 40 x 125 x 120 mm |
| Required front connector | 20-pin | 20-pin | 20-pin |
| Weight, approx. | 260 g | 200 g | 275 g |

**Technical specifications** (continued)

| | 6ES7 321-1EL . . - . . . . | 6ES7 321-1FF0 . - . . . . | 6ES7 321-1FF1 . - . . . . |
|---|---|---|---|
| Number of inputs | 32 | 8 | 8 |
| Interrupts | - | - | - |
| Diagnostics | - | - | - |
| Rated load voltage L+/L1 | | | |
| • Rated value | - | - | - |
| • Permissible range | - | - | - |
| Input voltage | | | |
| • Rated value | 120 V AC | 120/230V AC | 120/230V AC |
| • For "1" signal | 74 to 132 V | 79 to 264 V | 79 to 264 V |
| • For signal "0" | 0 to 20 V | 0 to 40 V | 0 to 40 V |
| • Frequency | 47 to 63 Hz | 47 to 63 Hz | 47 to 63 Hz |
| Isolation (to backplane bus) | Optocoupler | Optocoupler | Optocoupler |
| • In groups of | 8 | 2 | 1 |
| • Input current for "1" signal | 21 mA | 6.5 mA (120 V);<br>11 mA (230V) | 7.5 mA (120 V)<br>17.3 mA (230 V) |
| Input delay time | | | |
| • Configurable | - | - | - |
| • At rated input voltage | 25 ms | 25 ms | 25 ms |
| No. of simultaneously controllable inputs | | | |
| • Up to 40°C | 32 | 8 | 8 |
| • Up to 60°C | 24 | 8 | 8 |
| Connection of two-wire BEROs | Possible | Possible | Possible |
| • Permissible quiescent current, max. | 4 mA | 2 mA | 2 mA |
| Cable length | | | |
| • Unshielded | 600 m | 600 m | 600 m |
| • Shielded | 1000 m | 1000 m | 1000 m |
| Current consumption | | | |
| • From backplane bus, max. | 16 mA | 29 mA | 100 mA |
| • from L+, max. | - | - | - |
| Power loss | 4.0 W | 4.9 W | 4.9 W |
| Isolation tested at | 1500 V AC | 1500 V AC | 1500 V AC |
| Dimensions (W x H x D) in mm | 40 x 125 x 120 | 40 x 125 x 120 | 40 x 125 x 120 |
| Required front connector | 40-pin | 20-pin | 40-pin |
| Weight | 300 g | 240 g | 240 g |

1) In addition, a regeneration time of 0.25 ms must be added before the signal can be forwarded on the backplane bus.

## SM 321 digital input modules

| Ordering data | Order No. |
|---|---|
| **SM 321 digital input modules** | |
| incl. labeling strips, bus connectors | |
| • 16 inputs, 24 V DC | **6ES7 321-1BH02-0AA0** |
| • 16 inputs, 24 V DC, active low | **6ES7 321-1BH50-0AA0** |
| • 32 inputs, 24 V DC | **6ES7 321-1BL00-0AA0** |
| • 16 inputs, 24 to 48 V DC | **6ES7 321-1CH00-0AA0** |
| • 16 inputs, 48 to 125 V DC | **6ES7 321-1CH20-0AA0** |
| • 16 inputs, 24 V DC, with diagnostics capability | **6ES7 321-1BH10-0AA0** |
| • 32 inputs, 120 V AC | **6ES7 321-1EL00-0AA0** |
| • 8 inputs, 120/230 V AC | **6ES7 321-1FF01-0AA0** |
| • 8 inputs, 120/230 V AC, single connection to common potential | **6ES7 321-1FF10-0AA0** |
| • 16 inputs, 120/230 V AC | **6ES7 321-1FH00-0AA0** |
| • 16 inputs, 24 V DC, for operation in isochrone mode | **6ES7 321-7BH01-0AB0** |
| **SIPLUS SM 321 digital input modules for amplified temperature range** | |
| incl. labeling strips, bus connectors | |
| • 16 inputs, 24 V DC | **6AG1 321-1BH02-2AA0** |
| • 32 inputs, 24 V DC | **6AG1 321-1BL00-2AA0** |
| • 16 inputs, 48 to 125 V DC | **6AG1 321-1CH20-2AA0** |
| • 8 inputs, 120/230 V AC | **6AG1 321-1FF01-2AA0** |
| • 16 inputs, 24 V DC, for operation in isochrone mode | **6AG1 321-7BH01-2AB0** |
| **Front connector** | |
| 20-pin, with screw-type terminals | |
| • 1 item | **6ES7 392-1AJ00-0AA0** |
| • 100 items | **6ES7 392-1AJ00-1AB0** |
| 20-pin, with spring-clamp contacts | **6ES7 392-1BJ00-0AA0** |
| 40-pin, screw-type contacts | |
| • 1 item | **6ES7 392-1AM00-0AA0** |
| • 100 items | **6ES7 392-1AM00-1AB0** |
| 40-pin with cage clamp contacts | **6ES7 392-1BM01-0AA0** |
| **Front door, enhanced version** | **6ES7 328-0AA00-7AA0** |
| e.g. for 32-channel modules; supports the connection of 1.3 mm2/16 AWG wires | |
| **SIMATIC TOP connect** | See Catalog ST 70 |
| **Bus connectors** | **6ES7 390-0AA00-0AA0** |
| 1 item (spare part) | |
| **Labeling strips.** | |
| 10 items (spare part) | |
| For signal modules (not 32-channel), function modules | **6ES7 392-2XX00-0AA0** |
| For 32-channel signal modules | **6ES7 392-2XX10-0AA0** |

| | Order No. |
|---|---|
| **Label cover** | |
| 10 items (spare part) | |
| For signal modules (not 32-channel), function modules | **6ES7 392-2XY00-0AA0** |
| For 32-channel signal modules | **6ES7 392-2XY10-0AA0** |
| **S7 SmartLabel** | |
| Software for labeling modules mechanically directly in the STEP 7 project | **2XV9 450-1SL01-0YX0** |
| **Sheets of labels for machine inscription** | |
| For 16-channel signal modules, DIN A4, for printing using a laser printer; 10 items | |
| • Petrol | **6ES7 392-2AX00-0AA0** |
| • Light beige | **6ES7 392-2BX00-0AA0** |
| • Yellow | **6ES7 392-2CX00-0AA0** |
| • Red | **6ES7 392-2DX00-0AA0** |
| For 32-channel signal modules, DIN A4, for printing using a laser printer; 10 items | |
| • Petrol | **6ES7 392-2AX10-0AA0** |
| • Light beige | **6ES7 392-2BX10-0AA0** |
| • Yellow | **6ES7 392-2CX10-0AA0** |
| • Red | **6ES7 392-2DX10-0AA0** |
| **SIMATIC Manual Collection** | **6ES7 998-8XC01-8YE0** |
| Electronic manuals on CD-ROM, multilingual: S7-200, TD 200, S7-300, C7, S7-400, STEP 7, Engineering Tools, Runtime Software, SIMATIC DP (Distributed I/O), SIMATIC HMI (Human Machine Interface), SIMATIC NET (Industrial Communication) | |
| **SIMATIC Manual Collection update service for 1 year** | **6ES7 998-8XC01-8YE2** |
| Up-to-date Manual Collection CD as well as the three subsequent updates | |
| **S7-300 Manual** | |
| Configuration, CPU data, module data, command list | |
| • German | **6ES7 398-8FA10-8AA0** |
| • English | **6ES7 398-8FA10-8BA0** |
| • French | **6ES7 398-8FA10-8CA0** |
| • Spanish | **6ES7 398-8FA10-8DA0** |
| • Italian | **6ES7 398-8FA10-8EA0** |

## Overview

- Digital outputs
- For connecting solenoid valves, contactors, low-power motors, lamps and motor starters

## SM 322 digital output modules

### Technical specifications

| | 6ES7 322-1BH0 . - . . . . | 6ES7 322-1BH1 . - . . . . | 6ES7 322-1BL . . - . . . . | 6ES7 322-8BF . . - . . . . [2] |
|---|---|---|---|---|
| Supports synchronous operation | - | Yes | - | - |
| Number of outputs | 16 | 16 | 32 | 8 |
| Interrupts | - | - | - | Yes |
| Diagnostics | - | - | - | Parameterizable: Channel-specific diagnostic alarm, short-circuit, wire break, loss of load voltage |
| Load voltage L+/L1 | 24 V DC | 24 V DC | 24 V DC | 24 V DC |
| • Permissible range | 20.4 to 28.8 V | 20.4 to 28.8 V | 20.4 to 28.8 V | 20.4 to 28.8 V |
| Output voltage | | | | |
| • For "1" signal | L+ -0.8 V | L+ -0.8 V | L+ -0.8 V | L+ -0.8 to -1.6 V |
| Isolation to backplane bus | Optocoupler | Yes | Optocoupler | Optocoupler |
| • In groups of | 8 | 8 | 8 | 8 |
| Output current | | | | |
| • For "1" signal | | | | |
| - rated value at 40°C | - | - | - | - |
| - rated value at 60 °C | 0.5 A | 0.5 A | 0.5 A | 0.5 A |
| - minimum current | 5 mA | - | 5 mA | 10 mA |
| • For "0" signal | 0.5 mA | 0.5 mA | 0.5 mA | 0.5 mA |
| Total current of the outputs (per group) | | | | |
| • Up to 40°C | 4 A | 4 A | 4 A | 2 A |
| • Up to 60°C (horiz. mounting) | 3 A | 3 A | 3 A | 2 A |
| Lamp load, max. | 5 W | 5 W | 5 W | 5 W |
| Switching frequency of outputs | | | | |
| • Ohmic load, max. | 100 Hz | 100 Hz | 100 Hz | 100 Hz |
| • Inductive loads, max. | 0.5 Hz | 0.5 Hz | 0.5 Hz | 2 Hz |
| • With lamp load, max. | 100 Hz | 10 Hz | 100 Hz | 100 Hz |
| • Mechanical, max. | - | - | - | - |
| Switching capacity of contacts | | | | |
| • Ohmic load, max. | - | - | - | - |
| • Inductive loads, max. | - | - | - | |
| • Lamp load, max. | - | - | - | - |
| Service life of contacts to VDE 0660, Part 200 | | | | |
| • AC 15 | - | - | - | - |
| • DC 13 | - | - | - | - |
| Voltage induced on circuit interruption limited to | L+ - 48 V | L+ - 53 V | L+ - 48 V | L+ - 45 V |
| Short-circuit protection | Electronic | Electronic | Electronic | Electronic |
| Cable length | | | | |
| • Unshielded | 600 m | 600 m | 600 m | 600 m |
| • Shielded | 1000 m | 1000 m | 1000 m | 1000 m |
| Current consumption | | | | |
| • From backplane bus, max. | 80 mA | 70 mA | 110 mA | 70 mA |
| • from L+/L1, max. (without load) | 120 mA | 110 mA | 200 mA | 90 mA |
| Supply voltage L+/Current consumption of relays | - | - | - | - |
| Power losses, typically | 4.9 W | 5 W | 6.6 W | 5 W |
| Electrical isolation tested at | 500 V DC | 500 V DC | 500 V DC | 500 V DC |
| Dimensions (W x H x D) in mm | 40 x 125 x 120 | 40 x 125 x 120 | 40x125x120 | 40x125x120 |
| Required front connector | 20-pin | 20-pin | 40-pin | 20-pin |
| Weight, approx. | 190 g | 200 g | 210 g | 210 g |

1) SIMATIC Outdoor with expanded temperature range -25 to +60 °C

2) The module can maintain the last value when the CPU stops or switch off a substitute value on the outputs. Diagnostics via CPU analysis and red LED per channel.

## Technical specifications (continued)

| | 6ES7 322-5GH . . - . . . . | 6ES7 322-1CF . . - . . . . | 6ES7 322-1BF . . - . . . . | 6ES7 322-1FF . . - . . . . |
|---|---|---|---|---|
| Supports synchronous operation | - | - | - | - |
| Number of outputs | 16 | 8 | 8 | 8 |
| Interrupts | - | - | - | - |
| Diagnostics | Parameters can be assigned | - | - | red LED for fuse or no L1/N |
| Load voltage L+/L1 | 24/48 V DC | 48 to 125 V DC | 24 V DC | 120 V/230 V AC |
| • Permissible range | - | 40 to 140 V DC | 20.4 to 28.8 V | 93 to 132 V/187 to 264 V |
| Output voltage | | | | |
| • For "1" signal | L+ (-0.25 V) | L-1.1 V | L+ -0.8 V | L1 - 1.5 V |
| Isolation to backplane bus | Optocoupler | Optocoupler | Optocoupler | Optocoupler |
| • In groups of | 1 | 4 | 4 | 4 |
| Output current | | | | |
| • For "1" signal | | | | |
| - rated value at 40°C | - | 1.5 A | - | - |
| - rated value at 60 °C | 0.5 A | - | 2 A | 1 A |
| - minimum current | | 10 mA | 5 mA | 10 mA |
| - max. permissible range | 1.5 A (for 50 ms)<br>1 A2s (once only) | 10 mA | - | - |
| • For "0" signal | 10 µA | 10 mA | 0.5 mA | 2 mA |
| Total current of the outputs (per group) | | | | |
| • Up to 40°C | - | 4.0 A | - | - |
| • Up to 60°C (horiz. mounting) | 0.5 A | 4.0 A | 4 A | 2 A |
| Lamp load, max. | 5 W | 15 W (48 V) or<br>40 W (120 V) | 10 W | 50 W |
| Switching frequency of outputs | | | | |
| • Ohmic load, max. | 0.5 Hz | 20 Hz | 100 Hz | 10 Hz |
| • Inductive loads, max. | - | 0.5 Hz | 0.5 Hz | 0.5 Hz |
| • Lamp load, max. | - | 10 Hz | 100 Hz | 1 Hz |
| • Mechanical, max. | - | - | - | - |
| Switching capacity of contacts | | | | |
| • Ohmic load, max. | - | - | - | - |
| • Inductive loads, max. | - | - | - | - |
| • Lamp load, max. | - | - | - | - |
| Service life of contacts to VDE 0660, Part 200 | | | | |
| • AC 15 | - | - | - | - |
| • DC 13 | - | - | - | - |
| Voltage induced on current interruption limited to | - | - | L+ - 48 V | - |
| Short-circuit protection | Provide externally | Electronic | Electronic | Fuse |
| Cable length | | | | |
| • Unshielded | 600 m | 600 m | 600 m | 600 m |
| • Shielded | 1000 m | 1000 m | 1000 m | 1000 m |
| Current consumption | | | | |
| • From backplane bus, max. | 100 mA | 100 mA | 40 mA | 100 mA |
| • from L+/L1, max. (without load) | 200 mA | 40 mA | 60 mA | 2 mA |
| Supply voltage L+/Current consumption of relays | - | - | - | - |
| Power losses, typically | 2.8 W | 6.5 W | 6.8 W | 8.6 W |
| Electrical isolation tested at | | 1500 V DC | 500 V DC | 1500 V AC |
| Dimensions (W x H x D) in mm | 40 x 125 x 120 | 40 x 125 x 120 | 40 x 125 x 120 | 40 x 125 x 120 |
| Required front connector | 40-pin | 20-pin | 20-pin | 20-pin |
| Weight, approx. | 260 g | 250 g | 190 g | 275 g |

## SM 322 digital output modules

**Technical specifications** (continued)

| | 6ES7 322-1FH . . - . . . . | 6ES7 322-5FF . . - . . . . | 6ES7 322-1FL . . - . . . . | 6ES7 322-1HF0 . - . . . . |
|---|---|---|---|---|
| Supports synchronous operation | - | - | - | - |
| Number of outputs | 16 | 8 | 32 | 8 (relay) |
| Interrupts | - | - | - | - |
| Diagnostics | red LED for fuse | Off, last value/ substitute value | red LED for fuse | - |
| Load voltage L+/L1 | 120/230 V AC | 120/230 V AC | 120 V AC | up to 230 V AC 24 V DC |
| • Permissible range | 79 to 264 V | 79 to 264 V | 93 to 132 V | - |
| Output voltage | | | | |
| • For "1" signal | - | - | L1 - 1.5 V | - |
| Isolation to backplane bus | Optocoupler | Optocoupler | Optocoupler | Optocoupler |
| • In groups of | 8 | 1 | 8 | 2 |
| Output current | | | | |
| • For "1" signal | | | | |
| - rated value at 60 °C | 1 A | 1 A | 1 A | - |
| - minimum current | 10 mA | 10 mA | 10 mA | - |
| • For "0" signal | 3 mA at 264 V | 3 mA at 264 V | 3 mA | - |
| Total current of the outputs (per group) | | | | |
| • Up to 60°C (horiz. mounting) | 2 A | 1 A | 3 A | - |
| Lamp load, max. | 25 W | 50 W | 25 W | - |
| Switching frequency of outputs | | | | |
| • Ohmic load, max. | 10 Hz | 10 Hz | 10 Hz | 2 Hz |
| • Inductive loads, max. | 0.5 Hz | 0.5 Hz | 0.5 Hz | 0.5 Hz |
| • With lamp load, max. | 1 Hz | 1 Hz | 1 Hz | 2 Hz |
| • Mechanical, max. | - | - | - | 10 Hz |
| Switching capacity of contacts | | | | |
| • Ohmic load, max. | - | - | - | 2 A (230 V AC), 2 A (24 V DC) |
| • For inductive load | - | - | - | 2 A (230 V AC), 2 A (24 V DC) |
| • Lamp load, max. | - | - | - | - |
| Life of the contacts to IEC 947-5-1 DC 13/AC 15 | | | | |
| • 24 V DC | - | - | - | at 2 A: 0.3 x $10^6$ |
| • 120 V AC | - | - | - | at 2 A: 0.2 x $10^6$ |
| • 230 V AC | - | - | - | at 2 A: 0.1 x $10^6$ |
| Voltage induced on circuit interruption limited to | - | - | - | - |
| Short-circuit protection | Backup in groups to 8 | Provide externally | Fuse | - |
| Cable length | | | | |
| • Unshielded | 600 m | 600 m | 600 m | 600 m |
| • Shielded | 1000 m | 1000 m | 1000 m | 1000 m |
| Current consumption | | | | |
| • From backplane bus, max. | 184 mA | 100 mA | 100 mA | 40 mA |
| • from L+/L1, max. (without load) | 3 mA | 3 mA | 275 mA | 110 mA |
| Supply voltage L+/Current consumption of relays | - | - | - | 24 V DC/110 mA |
| Power losses, typically | 8.6 W | 8.6 W | 25 W | 2.2 W |
| Isolation tested at | 1500 V AC | | 1500 V AC | 1500 V AC |
| Dimensions (W x H x D) in mm | 40 x 125 x 120 | 40 x 125 x 120 | 80 x 125 x 120 | 40 x 125 x 120 |
| Required front connector | 20-pin | 40-pin | 20-pin | 20-pin |
| Weight, approx. | 275 g | 275 g | 500 g | 190 g |

**Technical specifications** (continued)

| | 6ES7 322-1HF1 . - . . . . | 6ES7 322-5HF . . - . . . . | 6ES7 322-1HH . . - . . . . |
|---|---|---|---|
| Supports synchronous operation | - | - | - |
| Number of outputs | 8 (relay) | 8 (relay) | 16 (relay) |
| Interrupts | - | - | - |
| Diagnostics | - | Off, last value/ substitute value | - |
| Load voltage L+/L1 | AC to 230 V<br>DC to 120 V | 24 to 230 V AC<br>24 to 120 V DC | 24 to 230 V AC<br>24 to 120 V DC |
| • Permissible range | - | - | - |
| Output voltage | | | |
| • For "1" signal | - | - | - |
| Isolation to backplane bus | Optocoupler | Optocoupler | Optocoupler |
| • In groups of | 1 | 1 | 8 |
| Total current of the outputs (per group) | | | |
| • Up to 60°C (horiz. mounting) | max. 5 A | 5 A | max. 8 mA |
| Lamp load, max. | - | 1500 W (230 V AC) | - |
| Switching frequency of outputs | | | |
| • Ohmic load, max. | 2 Hz | 2 Hz | 1 Hz |
| • Inductive loads, max. | 0.5 Hz | 0.5 Hz | 0.5 Hz |
| • With lamp load, max. | 2 Hz | 2 Hz | 1 Hz |
| • Mechanical, max. | 10 Hz | 10 Hz | 10 Hz |
| Switching capacity of contacts | | | |
| • Ohmic load, max. | 8 A (230 V AC),<br>5 A (24 V DC) | 5 A | 2 A (230 V AC),<br>2 A (24 V DC) |
| • For inductive load | 3 A (230 V AC),<br>2 A (24 V DC) | 5 A | 2 A (230 V AC),<br>2 A (24 V DC) |
| • Lamp load, max. | - | - | - |
| Life of the contacts to IEC 947-5-1 DC 13/AC 15 | | | |
| • 24 V DC | at 2 A: 0.3 x $10^6$ | at 5 A[1]: 0.1 x $10^6$ | at 2 A: 0.05 x $10^6$ |
| • 120 V AC | at 3 A: 0.2 x $10^6$ | - | at 2 A: 0.7 x $10^6$ |
| • 230 V AC | at 3 A: 0.1 x $10^6$ | at 5 A[1]: 0.1 x $10^6$ | at 2 A: 0.7 x $10^6$ |
| Voltage induced on current interruption limited to | - | - | - |
| Short-circuit protection | - | Provide externally | - |
| Cable length | | | |
| • Unshielded | 600 m | 600 m | 600 m |
| • Shielded | 1000 m | 1000 m | 1000 m |
| Current consumption | | | |
| • From backplane bus, max. | 40 mA | 100 mA | 100 mA |
| • from L+/L1, max. (without load) | 125 mA | 160 mA | 250 mA |
| Supply voltage L+/Current consumption of relays | - | - | - |
| Power losses, typically | 4.2 W | 3,5 W | 4.5 W |
| Isolation tested at | 2000 V AC | 1500 V AC | 1500 V AC |
| Dimensions (W x H x D) in mm | 40 x 125 x 120 | 40 x 125 x 120 | 40 x 125 x 120 |
| Required front connector | 40-pin | 40-pin | 20-pin |
| Weight, approx. | 320 g | 320 g | 250 g |

1) Increase in the life of the contacts with selected RC attenuation network

## SM 322 digital output modules

| Ordering data | Order No. |
|---|---|
| **SM 322 digital output modules** | |
| including labeling strips, bus connector | |
| • 8 outputs, 24 V DC, 2 A | **6ES7 322-1BF01-0AA0** |
| • 16 outputs, 24 V DC, 0.5 A | **6ES7 322-1BH01-0AA0** |
| • 16 outputs, 24 V DC, 0.5 A, high speed | **6ES7 322-1BH10-0AA0** |
| • 32 outputs, 24 V DC, 0.5 A | **6ES7 322-1BL00-0AA0** |
| • 8 outputs, 24 V DC, 0.5 A, diagnostics capability | **6ES7 322-8BF00-0AB0** |
| • 16 outputs, 24/48 V DC, 0.5 A | **6ES7 322-5GH00-0AB0** |
| • 8 outputs, 48 to 125 V DC, 1.5 A | **6ES7 322-1CF00-0AA0** |
| • 8 outputs, 120/230 V AC, 1 A | **6ES7 322-1FF01-0AA0** |
| • 8 outputs, 120/230 V AC, 2 A | **6ES7 322-5FF00-0AB0** |
| • 16 outputs, 120/230 V AC, 0.5 A | **6ES7 322-1FH00-0AA0** |
| • 32 outputs, 120 V AC, 1 A | **6ES7 322-1FL00-0AA0** |
| • 8 outputs, relay contacts, 2 A | **6ES7 322-1HF01-0AA0** |
| • 8 outputs, relay contacts, 5 A | **6ES7 322-1HF10-0AA0** |
| • 8 outputs, relay contacts, 5 A, with RC filter for overvoltage protection | **6ES7 322-5HF00-0AB0** |
| • 16 outputs, relay contacts, 8 A | **6ES7 322-1HH01-0AA0** |
| **SIPLUS SM 322 digital output modules for amplified temperature range** | |
| including labeling strips, bus connector | |
| • 16 outputs, 24 V DC, 0.5 A | **6AG1 322-1BH01-2AA0** |
| • 8 outputs, 24 V DC, 0.5 A, diagnostics capability | **6AG1 322-8BF00-2AB0** |
| • 8 outputs, 48 to 125 V DC, 1.5 A | **6AG1 322-1CF00-2AA0** |
| • 8 outputs, 120/230 V AC, 1 A | **6AG1 322-1FF01-2AA0** |
| • 8 outputs, relay contacts, 2 A | **6AG1 322-1HF01-2AA0** |
| **Front connector** | |
| 20-pin, with screw-type terminals | |
| • 1 item | **6ES7 392-1AJ00-0AA0** |
| • 100 units | **6ES7 392-1AJ00-1AB0** |
| 20-pin, with spring-loaded terminals | **6ES7 392-1BJ00-0AA0** |
| 40-pin, with screw-type terminals | |
| • 1 item | **6ES7 392-1AM00-0AA0** |
| • 100 units | **6ES7 392-1AM00-1AB0** |
| 40-pin, with spring-loaded terminals | **6ES7 392-1BM01-0AA0** |
| **Front door, elevated design** | **6ES7 328-0AA00-7AA0** |
| e.g. for 32-channel modules; permits connection of 1.3 mm2/16 AWG conductors | |
| **SIMATIC TOP connect** | See Catalog ST 70 |
| **Bus connector** | **6ES7 390-0AA00-0AA0** |
| 1 unit (spare part) | |
| **Fuse set for SM 322** | **6ES7 973-1HD00-0AA0** |
| 10 fuses, 8 A fast-action, 2 fuse holders | |

| | Order No. |
|---|---|
| **Labeling strip** | |
| 10 units (spare part) | |
| • for signal modules (not 32-channel modules), function modules | **6ES7 392-2XX00-0AA0** |
| • for 32-channel signal modules | **6ES7 392-2XX10-0AA0** |
| **Label cover** | |
| 10 units (spare part) | |
| • for signal modules (not 32-channel modules), function modules | **6ES7 392-2XY00-0AA0** |
| • for 32-channel signal modules | **6ES7 392-2XY10-0AA0** |
| **S7-SmartLabel** | |
| Software for machine labeling of modules directly from the STEP 7 project | **2XV9 450-1SL01-0YX0** |
| **Labeling sheets for machine labeling** | |
| for 16-channel signal module, DIN A4, for printing using laser printer; 10 units | |
| • Petrol | **6ES7 392-2AX00-0AA0** |
| • Light beige | **6ES7 392-2BX00-0AA0** |
| • Yellow | **6ES7 392-2CX00-0AA0** |
| • Red | **6ES7 392-2DX00-0AA0** |
| for 32-channel signal module, DIN A4, for printing using laser printer; 10 units | |
| • Petrol | **6ES7 392-2AX10-0AA0** |
| • Light beige | **6ES7 392-2BX10-0AA0** |
| • Yellow | **6ES7 392-2CX10-0AA0** |
| • Red | **6ES7 392-2DX10-0AA0** |
| **SIMATIC Manual Collection** | **6ES7 998-8XC01-8YE0** |
| Electronic manuals on CD-ROM, multi-language: S7-200, TD 200, S7-300, C7, S7-400, STEP 7, engineering tools, runtime software, SIMATIC DP (distributed I/O), SIMATIC HMI (human machine interface), SIMATIC NET (industrial communication) | |
| **SIMATIC Manual Collection Maintenance service for 1 year** | **6ES7 998-8XC01-8YE2** |
| Current S7 Manual Collection CD as well as the three following updates | |
| **S7-300 manual** | |
| Design, CPU data, module data, operation list | |
| • German | **6ES7 398-8FA10-8AA0** |
| • English | **6ES7 398-8FA10-8BA0** |
| • French | **6ES7 398-8FA10-8CA0** |
| • Spanish | **6ES7 398-8FA10-8DA0** |
| • Italian | **6ES7 398-8FA10-8EA0** |

## Overview

- Digital inputs and outputs
- For connecting standard switches, two-wire proximity switches (BERO), solenoid valves, contactors, low-power motors, lamps and motor starters

## Technical specifications

| SM 323 | 6ES7 323-1BH01-0AA0 | 6ES7 323-1BL00-0AA0 |
|---|---|---|
| **Inputs** | | |
| • Number | 8 | 16 |
| Interrupts | - | - |
| Diagnostics | - | - |
| Rated load voltage | | |
| • Rated value | 24 V DC | 24 V DC |
| • Permissible range | 20.4 to 28.8 V | 20.4 to 28.8 V |
| Input voltage | | |
| • Rated value | 24 V DC | 24 V DC |
| • For "1" signal | 13 to 30 V | 13 to 30 V |
| • For "0" signal | -30 to + 5 V | -30 to + 5 V |
| • Frequency | - | - |
| Electrical isolation to backplane bus | Optocoupler | Optocoupler |
| • In groups of | 8 | 16 |
| Input current | | |
| • For "1" signal, typ. | 7 mA | 7 mA |
| Input delay time | | |
| • Configurable | - | - |
| • At rated input voltage, typ. | 1.2 to 4.8 ms | 1.2 to 4.8 ms |
| No. of simultaneously controllable inputs | | |
| • Up to 40°C | 8 | 16 |
| • Up to 60°C | 8 | 8 |
| Connection of 2-wire BERO | Possible | Possible |
| • Permissible quiescent current, max. | 2 mA | 1.5 mA |

## Technical specifications (continued)

| SM 323 | 6ES7 323-1BH01-0AA0 | 6ES7 323-1BL00-0AA0 |
|---|---|---|
| **Outputs** | | |
| • Number | 8 | 16 |
| Interrupts | - | - |
| Diagnostics | - | - |
| Rated load voltage L+/L1 | 24 V DC | 24 V DC |
| • Permissible range | 20.4 to 28.8 V | 20.4 to 28.8 V |
| Output voltage | | |
| • For "1" signal | L+ - 0.8 V | L+ - 0.8 V |
| Electrical isolation | Optocoupler | Optocoupler |
| • In groups of | 8 | 8 |
| Maximum output current | | |
| • For "1" signal | | |
| - rated value at 60 °C | 0.5 A | 0.5 A |
| - minimum current | 5 mA | 5 mA |
| • For "0" signal, max. | 0.5 mA | 0.5 mA |
| Total current of the outputs (per group) | | |
| • Up to 40°C | 4 A | 4 A |
| • Up to 60°C (horiz. mounting) | 4 A | 3 A |
| Lamp load, max. | 5 W | 5 W |
| Switching frequency of outputs | | |
| • Ohmic load, max. | 100 Hz | 100 Hz |
| • Inductive loads, max. | 0.5 Hz | 0.5 Hz |
| • For a lamp load | 100 Hz | 100 Hz |
| Voltage induced on circuit interruption limited to | L+ - 48 V | L+ - 48 V |
| Short-circuit protection | Electronic | Electronic |
| **General** | | |
| Cable length | 600 m | 600 m |
| • Unshielded | 1000 m | 1000 m |
| • Shielded | | |
| Current consumption | | |
| • From backplane bus, max. | 40 mA | 80 mA |
| • From L+/L1 (without load) | 20 mA | 100 mA |
| Power losses, typically | 4.5 W | 6.5 W |
| Electrical isolation tested at | 500 V DC | 600 V DC |
| Dimensions (W x H x D) in mm | 40 x 125 x 120 | 40 x 125 x 120 |
| Required front connector | 20-pin | 40-pin |
| Weight, approx. | 220 g | 260 g |

## Technical specifications (continued)

| SM 327 | 6ES7 327-1BH0 . - . . . . |
|---|---|
| **Voltages and currents** | |
| Load voltage L+ | |
| • Rated value (DC) | 24 V |
| • Permissible range, lower limit (DC) | 20.4 V |
| • Permissible range, upper limit (DC) | 28.8V |
| **Current input/power losses** | |
| Power losses, typically | 3 W |
| Current consumption | |
| • From load voltage L+ (without load), max. | 20 mA |
| • From backplane bus 5V DC, max. | 40 mA |
| **Connection** | |
| Required front connector | 20-pin |
| **Isochrone mode** | |
| Isochrone mode | Yes |
| **Digital inputs** | |
| Number of digital inputs | 16;<br>8 permanently-wired, and 8 others can be configured individually |
| Number of inputs which can be addressed simultaneously, up to 40 °C | 16 |
| Number of inputs which can be addressed simultaneously, up to 60 °C | 16 |
| Screened cable lengths, max. | 1000 m |
| Max. cable length, unshielded | 600 m |
| Input characteristic to IEC 1131, type 1 | Yes |
| Input voltage | |
| • Rated value DC | 24 V |
| • For signal "0" | -30 to +5 V |
| • For "1" signal | 15 to 30 V |
| Input current | |
| • For signal "1", typ. | 6 mA |
| Input delay (at rated value of the input voltage) | |
| • For standard inputs | |
| - for "0" to "1", min. | 1.2 ms |
| - for "0" to "1", max. | 4.8 ms |
| - for "1" to "0", min. | 1.2 ms |
| - for "1" to "0", max. | 4.8 ms |
| **Digital outputs** | |
| Number of digital outputs | 8; Can also be configured individually as DI |
| Screened cable lengths, max. | 1000 m |
| Max. cable length, unshielded | 600 m |
| Short-circuit protection of output | Yes, electronic |
| Operating threshold, typ. | 1 A |
| Voltage induced on circuit interruption limited to | typ. L+ (-54 V) |
| Lamp load, max. | 5 W |
| Setting a digital input | Yes |
| Output voltage | |
| • For "1" signal, min. | L+ (-1.5 V) |

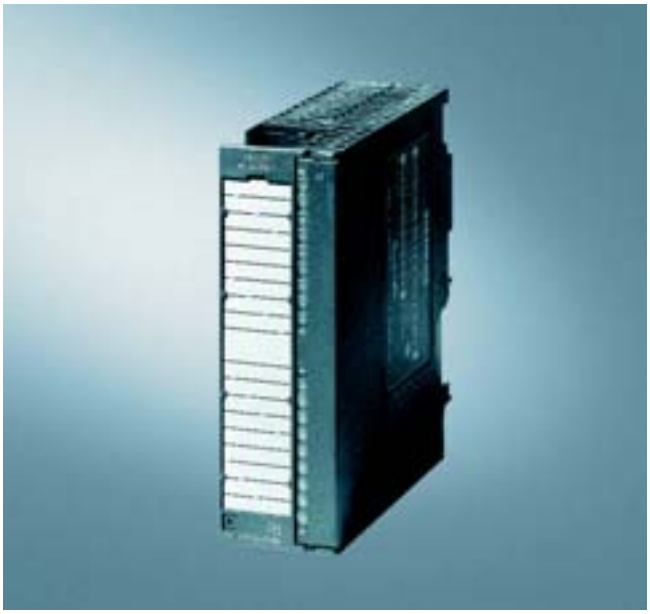
| SM 327 | 6ES7 327-1BH0 . - . . . . |
|---|---|
| Output current | |
| • Residual current at "0" signal, max. | 0.5 mA |
| • Rated value at "1" signal | 0.5 A |
| • Permissible range for 0 to 60 °C at "1" signal, min. | 5 mA |
| • Permissible range for 0 to 60 °C at "1" signal, max. | 0.6 A |
| Output delay for resistive load | |
| • 0 to "1", max. | 350 µs |
| • 1 to "0", max. | 500 µs |
| Switch 2 outputs in parallel | |
| • For increasing performance | No |
| • For redundant load control | Yes; Only outputs of the same group |
| Switching frequency | |
| • Inductive loads, max. | 0.5 Hz |
| • With lamp load, max. | 10 Hz |
| • Ohmic load, max. | 100 Hz |
| Total current of the outputs (per group) | |
| • Vertical arrangement, up to 40 °C | 2 mA |
| • Horizontal arrangement, up to 40 °C | 4 mA |
| • Horizontal arrangement, up to 60 °C | 3 A |
| Load resistance range | |
| • Upper limit | 4 kOhms |
| • Lower limit | 48 Ohms |
| **Encoders** | |
| Accepts encoder types | |
| • 2-wire BEROS | Yes |
| • Permissible standby current (2-wire BEROS), max. | 1.5 mA |
| **Status information/interrupts/ diagnostics** | |
| Interrupts | No |
| Diagnostics functions | No |
| LED diagnostics indicator | |
| • Digital output status indicator (green) | Yes |
| • Status indicator for digital input (green) | Yes |
| Isolation | |
| • Isolation tested at | 500 V DC |
| **Electrical isolation** | |
| Electrical isolation for digital outputs | |
| • Between the channels | No |
| • Between the channels and backplane bus | Yes; optocoupler |
| Electrical isolation for digital inputs | |
| • Between the channels | No |
| • Between the channels and backplane bus | Yes; optocoupler |
| **Permissible potential difference** | |
| Between different circuits | 75 V DC/60 V AC |
| **Dimensions and weight** | |
| Weight approx. | 200 g |
| Dimensions (W x H x D) in mm | 40 x 125 x 120 |

## SM 323/SM 327 digital input/output modules

| Ordering data | Order No. |
|---|---|
| **SM 323 digital I/O modules** | |
| incl. labeling strips, bus connectors | |
| • 8 inputs, 8 outputs | **6ES7 323-1BH01-0AA0** |
| • 16 inputs, 16 outputs | **6ES7 323-1BL00-0AA0** |
| **SIPLUS SM 323 digital I/O modules for amplified temperature range** | |
| incl. labeling strips, bus connectors | |
| • 8 inputs, 8 outputs | **6AG1 323-1BH01-2AA0** |
| **SM 327 digital I/O modules** | |
| incl. labeling strips, bus connectors | |
| 8 inputs, 8 inputs or outputs (configurable) | **6ES7 327-1BH00-0AB0** |
| **Front connector** | |
| 20-pin, screw-type terminals | |
| • 1 item | **6ES7 392-1AJ00-0AA0** |
| • 100 items | **6ES7 392-1AJ00-1AB0** |
| 20-pin, with spring-clamp terminals | **6ES7 392-1BJ00-0AA0** |
| 40-pin, screw-type contacts | |
| • 1 item | **6ES7 392-1AM00-0AA0** |
| • 100 items | **6ES7 392-1AM00-1AB0** |
| 40-pin with cage clamp contacts | **6ES7 392-1BM01-0AA0** |
| **Front door, enhanced version** | **6ES7 328-0AA00-7AA0** |
| e.g., for 32-channel modules; supports the connection of 1.3 $mm^2$/16 AWG wires | |
| **SIMATIC TOP connect** | See Catalog ST 70 |
| **Bus connectors** | **6ES7 390-0AA00-0AA0** |
| 1 item (spare part) | |
| **Labeling strips.** | |
| 10 items (spare part) | |
| • For signal modules (not 32-channel), function modules | **6ES7 392-2XX00-0AA0** |
| • For 32-channel signal modules | **6ES7 392-2XX10-0AA0** |
| **Label cover** | |
| 10 items (spare part) | |
| • For signal modules (not 32-channel), function modules | **6ES7 392-2XY00-0AA0** |
| • For 32-channel signal modules | **6ES7 392-2XY10-0AA0** |

| | Order No. |
|---|---|
| **S7 SmartLabel** | |
| Software for labeling modules mechanically directly in the STEP 7 project | **2XV9 450-1SL01-0YX0** |
| **Sheets of labels for machine inscription** | |
| For 16-channel signal modules, DIN A4, for printing using a laser printer; 10 items | |
| • Petrol | **6ES7 392-2AX00-0AA0** |
| • Light beige | **6ES7 392-2BX00-0AA0** |
| • Yellow | **6ES7 392-2CX00-0AA0** |
| • Red | **6ES7 392-2DX00-0AA0** |
| For 32-channel signal modules, DIN A4, for printing using a laser printer; 10 items | |
| • Petrol | **6ES7 392-2AX10-0AA0** |
| • Light beige | **6ES7 392-2BX10-0AA0** |
| • Yellow | **6ES7 392-2CX10-0AA0** |
| • Red | **6ES7 392-2DX10-0AA0** |
| **SIMATIC Manual Collection** | **6ES7 998-8XC01-8YE0** |
| Electronic manuals on CD-ROM, multilingual: S7-200, TD 200, S7-300, C7, S7-400, STEP 7, Engineering Tools, Runtime Software, SIMATIC DP (Distributed I/O), SIMATIC HMI (Human Machine Interface), SIMATIC NET (Industrial Communication) | |
| **SIMATIC Manual Collection update service for 1 year** | **6ES7 998-8XC01-8YE2** |
| Up-to-date Manual Collection CD as well as the three subsequent updates | |
| **S7-300 Manual** | |
| Configuration, CPU data, module data, command list | |
| • German | **6ES7 398-8FA10-8AA0** |
| • English | **6ES7 398-8FA10-8BA0** |
| • French | **6ES7 398-8FA10-8CA0** |
| • Spanish | **6ES7 398-8FA10-8DA0** |
| • Italian | **6ES7 398-8FA10-8EA0** |

## Overview



- Analog inputs
- For connection of voltage and current sensors, thermocouples, resistors and resistance thermometers

## Technical specifications

| SM 331 | 6ES7 331-7KF02-0AB0 | 6ES7 331-1KF01-0AB0 | 6ES7 331-7KB02-0AB0 |
|---|---|---|---|
| Number of inputs | 8 | 8 | 2 |
| • For resistance measurement | 4 | 8 | 1 |
| Interrupts | | | |
| • Limit value interrupt | Configurable | No | Configurable |
| • Diagnostics interrupt | Configurable channels 0 and 2 | No | Configurable channel 0 |
| Diagnostics | Red group fault LED; diagnostic info can be read out | No | Red group fault LED; diagnostic info can be read out |
| Rated load voltage L+ | 24 V DC | - | 24 V DC |
| • Polarity reversal protection | Yes | - | Yes |
| Input ranges/ input resistance | | | |
| • Voltage | +/- 80 mV/10 MΩ, +/- 250 mV/10 MΩ +/- 500 mV/10 MΩ +/- 1 V/10 MΩ +/- 2,5 V/100 kΩ +/- 5 V/100 kΩ1 to 5 V/100 kΩ +/- 10 V/100 kΩ | +/- 50 mV/10 MΩ +/- 500 mV/10 MΩ +/- 1 V/10 MΩ +/- 5 V/100 kΩ 1 to 5 V/100 kΩ +/- 10 V/100 kΩ 0 to 10 V/100 kΩ | +/- 80 mV/10 MΩ, +/- 250 mV/10 MΩ +/- 500 mV/10 MΩ +/- 1 V/10 MΩ +/- 2,5 V/100 kΩ +/- 5 V/100 kΩ1 to 5 V/100 kΩ +/- 10 V/100 kΩ |
| • Current | +/- 10 mA/25 Ω +/- 3.2 mA/25 Ω +/- 20 mA/25 Ω0 to 20 mA/25 Ω 4 to 20 mA/25 Ω | +/- 20 mA/50 Ω 0 to 20 mA/50 Ω 4 to 20 mA/50 Ω | +/- 10 mA/25 Ω +/- 3.2 mA/25 Ω +/- 20 mA/25 Ω0 to 20 mA/25 Ω 4 to 20 mA/25 Ω |
| • Resistance | 150 Ω/10 MΩ 300 Ω/10 MΩ 600 Ω/10 MΩ | 0 to 6 kΩ/10 MΩ 0 to 600Ω/10 MΩ | 150 Ω/10 MΩ 300 Ω/10 MΩ 600 Ω/10 MΩ |
| • Thermocouples | Type E, N, J, K/10 MΩ | - | Type E, N, J, K/10 MΩ |
| • Resistance thermometer | Pt 100 standard/10 MΩ Ni 100 standard | Pt 100 standard/10 MΩ Ni 100/10 MΩ Ni 1000/10 MΩ LG-Ni 1000/10 MΩ (standard and air-conditioning applications respectively) | Pt 100 standard/ 10 MΩNi 100 standard |
| Permissible input range for voltage input, max. | 20 V | 30 V | 20 V |
| Permissible input range for current input, max. | 40 mA | 40 mA Delete protection available | 40 mA |

## SM 331 analog input modules

### Technical specifications (continued)

| SM 331 | 6ES7 331-7KF02-0AB0 | 6ES7 331-1KF01-0AB0 | 6ES7 331-7KB02-0AB0 |
|---|---|---|---|
| Connection of transducers | | | |
| • For current measurement | | | |
| - as two-wire transmitter | Yes | yes, with external supply | Yes |
| - as four-wire transmitter | Yes | Yes | Yes |
| • For resistance measurement | | | |
| - with 2 conductor connections | Yes | Yes | Yes |
| - with 3 conductor connections | Yes | Yes, with 3-line compensation | Yes |
| - with 4 conductor connections | Yes | Yes | Yes |
| Electrical isolation to backplane bus | Yes | Yes | Yes |
| Characteristic curve linearization | | | |
| • For thermocouples | Type N, E, J, K | - | Type N, E, J, K |
| • For resistance thermometers | Pt 100 (standard range)<br>Ni 100 (standard range) | Pt 100 standard<br>Ni 100<br>Ni 1000<br>LG-Ni 1000<br>(standard and air-conditioning applications respectively) | Pt 100 (standard range)<br>Ni 100 (standard range) |
| Temperature compensation | Configurable | No | Configurable |
| • Internal | Possible | - | Possible |
| • External with compensation socket | Possible | - | Possible |
| • External with Pt 100 | - | - | - |
| Conversion time[1]/resolution (per channel) | | | |
| • Integration time (per channel) | 2.5/16 $^2/_3$/20/100 ms | 16 $^2/_3$/20 ms | 2.5/16 $^2/_3$/20/100 ms |
| • Resolution | | | |
| - unipolar | 9/12/12/14 bit | 13/13 bit | 9/12/12/14 bit |
| - bipolar | 9+sign/12+sign/12+sign/14+sign bit | 12+sign/12+sign | 9+sign/12+sign/12+sign/14+sign bit |
| • Interference voltage suppression for interference frequency | 400/60/50/10 Hz | 60/50 Hz | 400/60/50/10 Hz |
| Operational limit (in the entire temperature range, referred to input range), max. | +/-1% | +/-0.6% +/-1.2 K | +/-1% |
| Basic error (operational limits at 25°C, referred to input range), max. | +/-0.6% | +/-0.4% +/-1 K | +/-0.6% |
| Cable length (shielded), max. | 200 m (50 m at 80 mV) | 200 m (50 m at 50 mV) | 200 m (50 m at 80 mV) |
| Current consumption | | | |
| • From backplane bus, max. | 50 mA | 90 mA | 50 mA |
| • from L+, max. | 200 mA | - | 80 mA |
| Power losses, typically | 1.3 W | 0.4 W | 1.3 W |
| Electrical isolation tested at | 600 V DC | 600 V DC | 500 V DC |
| Dimensions (W x H x D) in mm | 40 x 125 x 120 | 40 x 125 x 120 | 40 x 125 x 120 |
| Required front connector | 20-pin | 40-pin | 20-pin |
| Weight | 250 g | 250 g | 250 g |

## Technical specifications (continued)

| SM 331 | 6ES7 331-7PF00-0AB0 | 6ES7 331-7PF10-0AB0 |
|---|---|---|
| Number of inputs | 8 | 8 |
| • For resistance measurement | 8 | - |
| Interrupts | | |
| • Limit value interrupt | Configurable | Configurable |
| • Diagnostics interrupt | Configurable per group | Configurable per group |
| Diagnostics | Red group fault LED; diagnostic info can be read out | Red group fault LED; diagnostic info can be read out |
| Rated load voltage L+ | 24 V DC | 24 V DC |
| • Polarity reversal protection | Yes | Yes |
| Input ranges | | |
| • Voltage | - | - |
| • Current | - | - |
| • Resistance | 0 to 150 Ω; 0 to 300 Ω; 0 to 600 Ω | - |
| • Thermocouples | - | Type B, E, J, K, L, N, R, S. T, U |
| • Resistance thermometer | Pt 100, Pt 200, Pt 500, Pt 1000, Ni 100, Ni 120, Ni 200, Ni 500, Ni 1000, Cu 10 | - |
| Permissible input range for voltage input, max. | 50 V | 50 V |
| Permissible input range for current input, max. | - | - |
| Connection of transducers | | |
| • For current measurement | | |
| - as two-wire transmitter | - | - |
| - as four-wire transmitter | - | - |
| • For resistance measurement | | |
| - with 2 conductor connections | Yes | - |
| - with 3 conductor connections | Yes | - |
| - with 4 conductor connections | Yes | - |
| Electrical isolation to backplane bus | Yes (4 groups of 2 channels each) | Yes (4 groups of 2 channels each) |
| Characteristic linearization | | |
| • For thermocouples | - | Type B, E, J, K, L, N, R, S. T, U |
| • For resistance thermometers | Pt 100, Pt 200, Pt 500, Pt 1000, Ni 100, Ni 120, Ni 200, Ni 500, Ni 1000, Cu 10 (standard and air-conditioning applications) | - |
| Temperature compensation | Internal | Configurable |
| • internal | - | Possible |
| • external with compensation socket | - | Possible |
| • External with Pt 100 | - | Yes |
| Conversion time[1]/resolution (per channel) | | |
| • Basic conversion time | | |
| - up to 4 channels (1 channel per group) | 10 ms per module | 10 ms per module |
| - 5 channels or more (> 1 channel per group) | 190 ms per module | 190 ms per module |
| • Interference voltage suppression | 400/60/50 Hz | 400/60/50 Hz |
| • Resolution in bit | 16, two's complement | 16, two's complement |
| • Resolution in bit (internal) | 24, Sigma-Delta-principle | 24, Sigma-Delta-principle |
| Operational limit (in the entire temperature range, referred to input range), max. | +/- 0.1 %<br>+/-1 K | +/- 0.1 %<br>+/-1 K |
| Basic error (operational limits at 25°C, referred to input range), max. | +/-0.05 %<br>+/-0.5 K | +/-0.05 %<br>+/-0.5 K |
| Cable length (shielded), max. | 200 m | 200 m |
| Current consumption | | |
| • From backplane bus, max. | 100 mA | 100 mA |
| • from L+, approx. | 200 mA | 200 mA |
| Power losses, typically | 4 W | 4 W |
| Electrical isolation tested at | 500 V AC | 1500 V AC |
| Dimensions (W x H x D) in mm | 40 x 125 x 120 | 40 x 125 x 120 |
| Required front connector | 40-pin | 40-pin |
| Weight, approx. | 260 g | 270 g |

## SM 331 analog input modules

### Technical specifications (continued)

| SM 331 | 6ES7 331-7NF00-0AB0 | 6ES7 331-7NF10-0AB0 | 6ES7 331-7HF01-0AB0 |
|---|---|---|---|
| Supports synchronous operation | – | – | Yes |
| Number of inputs | 8 | 8 | 8 |
| • For resistance measurement | – | – | – |
| Interrupts | | | |
| • Limit value interrupt | Configurable channels 0 and 2 | Configurable all channels[2] | Configurable channels 0 and 2 |
| • Diagnostics interrupt | Configurable | Configurable | Configurable |
| Diagnostics | Red group fault LED; diagnostic info can be read out | Red group fault LED; diagnostic info can be read out | Red group fault LED; diagnostic info can be read out |
| Rated load voltage L+ | – | – | – |
| • Polarity reversal protection | – | – | – |
| Input ranges/input resistance | | | |
| • Voltage | ± 5 V/2 MΩ<br>1 to 5 V/2 MΩ<br>± 10 V/2 MΩ | ± 5 V/10 MΩ<br>1 to 5 V/10 MΩ<br>± 10 V/10 MΩ | ±1 V / 10 MΩ<br>±5 V / 100 kΩ<br>±10 V / 100 kΩ<br>1 to 10 V / 100 kΩ<br>1 to 5 V / 100 kΩ |
| • Current | ±20 mA/250 Ω<br>0 to 20 mA/ 250 Ω<br>4 to 20 mA/ 250 Ω | ±20 mA/250 Ω<br>0 to 20 mA/ 250 Ω<br>4 to 20 mA/ 250 Ω | ±20 mA / 50 Ω<br>0 to 20 mA / 50 Ω<br>4 to 20 mA / 50 Ω |
| • Resistance | – | – | – |
| • Thermocouples | – | – | – |
| • Resistance thermometer | – | – | – |
| Permissible input range for voltage input, max. | 50 V | 75 V | 20 V continuous;<br>75 V for max. 1 s (duty cycle 1:20) |
| Permissible input current for current input, max. | 32 mA | 40 mA | max. 40 mA |
| Electrical isolation to backplane bus | Yes | Yes | Yes |
| Connection of transducers | | | |
| • For current measurement | | | |
| - as 2-wire transmitter | Yes, with external transmitter | Yes, with external transducer, power pack | Possible |
| - as 4-wire transmitter | Yes | Yes | Possible |
| • For impedance measurement | | | |
| - with 2 conductor connections | – | – | – |
| - with 3 conductor connections | – | – | – |
| - with 4 conductor connections | – | – | – |
| Characteristic linearization | | | |
| • For thermocouples | – | – | – |
| • For resistance thermometers | – | – | – |
| Temperature compensation | | | |
| • Internal | – | – | – |
| • External with compensation socket | – | – | – |
| • External with Pt 100 | – | – | – |
| Conversion time[1]/resolution (per channel) | | | 52 µs |
| • Integration time | 2.5/16 2/3/20/100 ms | 23/72/83/95 ms for all 8 channels of the module. For more information see manual [3] | – |
| • Resolution | | | |
| - unipolar | 15/15/15/15 bit | 15/15/15/15 bit | 14 bit |
| - bipolar | 15+sign/15+sign/15+sign/ 15+sign bit | 15+sign/15+sign/15+sign/ 15+sign bit | 13 bit + sign |
| • Interference voltage suppression for interference frequency | 400/60/50/10 Hz | 400/60/50 Hz, combinations from 400, 60, 50 Hz | 400/60/50/10 Hz |

1) Additional data must be taken into account when calculating the scan time. These can be found in the manual "S7-300 Hardware and Installation".

2) Clock alarms are also supported in the modules.

3) In 4-channel mode, the basic execution time for all channels is 10 ms.

**Technical specifications** (continued)

| SM 331 | 6ES7 331-7NF00-0AB0 | 6ES7 331-7NF10-0AB0 | 6ES7 331-7HF01-0AB0 |
|---|---|---|---|
| Operational limit (in the entire temperature range, referred to input range), max. | ± 0.1 % (voltage)<br>± 0.3 % (current) | ± 0.1 % (voltage)<br>± 0.1 % (current) | ± 0.4% (voltage)<br>± 0.3% (current) |
| Basic error (operational limits at 25°C, referred to input range), max. | ± 0.05 % (voltage)<br>± 0.05 % (current) | ± 0.05 % (voltage)<br>± 0.05 % (current) | ± 0.25% (voltage)<br>± 0.20% (current) |
| Cable length (shielded), max. | 200 m | 200 m | 200 m |
| Current consumption | | | |
| • From backplane bus, max. | 130 mA | 100 mA | max. 60 mA |
| • From L+, max. | - | - | - |
| Power losses, typically | 0.6 W | 3.0 W | 1.5 W |
| Electrical isolation tested at | 500 V AC | 500 V AC | 500 V DC |
| Dimensions (W x H x D) in mm | 40 x 125 x 120 | 40 x 125 x 120 | 40 x 125 x 120 |
| Required front connector | 40-pin | 40-pin | 20-pin |
| Weight | 270 g | 270 g | Approx. 200 g |

## SM 331 analog input modules

| Ordering data | Order No. |
|---|---|
| **SM 331 analog input modules** | |
| incl. labeling strips, bus connector, measuring range modules | |
| • 8 inputs, 13-bit resolution | **6ES7 331-1KF01-0AB0** |
| • 8 inputs, 9/12/14-bit resolution | **6ES7 331-7KF02-0AB0** |
| • 2 inputs, 9/12/14-bit resolution | **6ES7 331-7KB02-0AB0** |
| • 8 inputs, enhanced 16-bit resolution | **6ES7 331-7NF00-0AB0** |
| • 8 inputs, enhanced 16-bit resolution, 4-channel mode | **6ES7 331-7NF10-0AB0** |
| • 8 inputs, 14-bit resolution, for operation in isochrone mode | **6ES7 331-7HF00-0AB0** |
| • 8 inputs for resistance thermometers | **6ES7 331-7PF00-0AB0** |
| • 8 inputs for thermocouples | **6ES7 331-7PF10-0AB0** |
| **SIPLUS SM 331 analog input modules for amplified temperature range** | |
| incl. labeling strips, bus connector, measuring range modules | |
| • 2 inputs, 9/12/14-bit resolution | **6AG1 331-7KB02-2AB0** |
| **Measuring range module for analog inputs** | **6ES7 974-0AA00-0AA0** |
| 1 module for 2 analog inputs; 2 items (spare part) | |
| **Front connectors** | |
| 1 item | |
| 20-pin, with screw-type terminals | |
| • 1 item | **6ES7 392-1AJ00-0AA0** |
| • 100 items | **6ES7 392-1AJ00-1AB0** |
| 20-pin, with spring-loaded terminals | **6ES7 392-1BJ00-0AA0** |
| 40-pin, screw-type contacts | |
| • 1 item | **6ES7 392-1AM00-0AA0** |
| • 100 items | **6ES7 392-1AM00-1AB0** |
| 40-pin, with spring-loaded terminals | **6ES7 392-1BM01-0AA0** |
| **Front door, enhanced version** | **6ES7 328-0AA00-7AA0** |
| e.g. for 32-channel modules; for connecting 1.3 $mm^2$ / 16 AWG conductors | |
| **SIMATIC TOP connect** | See Catalog ST 70 |
| **Bus connectors** | **6ES7 390-0AA00-0AA0** |
| 1 item (spare part) | |
| **Shield attachment** | **6ES7 390-5AA00-0AA0** |
| 80 mm wide, with 2 rows each for 4 shield connection terminals | |
| **Terminal elements** | |
| 2 items | |
| • For 2 cables 2 to 6 mm in diameter | **6ES7 390-5AB00-0AA0** |
| • For 1 cable 3 to 8 mm in diameter | **6ES7 390-5BA00-0AA0** |
| • For 1 cable 4 to 13 mm in diameter | **6ES7 390-5CA00-0AA0** |

| | Order No. |
|---|---|
| **Label cover** | **6ES7 392-2XY00-0AA0** |
| 10 items for signal modules (not 32-channel), function modules | |
| **Labeling strips.** | **6ES7 392-2XX00-0AA0** |
| 10 items for signal modules (not 32-channel), function modules | |
| **S7 SmartLabel** | **2XV9 450-1SL01-0YX0** |
| Software for labeling modules mechanically directly in the STEP 7 project | |
| **Sheets of labels for machine inscription** | |
| For 16-channel signal modules, DIN A4, for printing using a laser printer; 10 items | |
| • Petrol | **6ES7 392-2AX00-0AA0** |
| • Light beige | **6ES7 392-2BX00-0AA0** |
| • Yellow | **6ES7 392-2CX00-0AA0** |
| • Red | **6ES7 392-2DX00-0AA0** |
| For 32-channel signal modules, DIN A4, for printing using a laser printer; 10 items | |
| • Petrol | **6ES7 392-2AX10-0AA0** |
| • Light beige | **6ES7 392-2BX10-0AA0** |
| • Yellow | **6ES7 392-2CX10-0AA0** |
| • Red | **6ES7 392-2DX10-0AA0** |
| **SIMATIC Manual Collection** | **6ES7 998-8XC01-8YE0** |
| Electronic manuals on CD-ROM, multilingual: S7-200, TD 200, S7-300, C7, S7-400, STEP 7, Engineering Tools, Runtime Software, SIMATIC DP (Distributed I/O), SIMATIC HMI (Human Machine Interface), SIMATIC NET (Industrial Communication) | |
| **SIMATIC Manual Collection update service for 1 year** | **6ES7 998-8XC01-8YE2** |
| Up-to-date Manual Collection CD as well as the three subsequent updates | |
| **S7-300 Manual** | |
| Configuration, CPU data, module data, command list | |
| • German | **6ES7 398-8FA10-8AA0** |
| • English | **6ES7 398-8FA10-8BA0** |
| • French | **6ES7 398-8FA10-8CA0** |
| • Spanish | **6ES7 398-8FA10-8DA0** |
| • Italian | **6ES7 398-8FA10-8EA0** |

## Overview

- Analog outputs
- For the connection of analog actuators

## Technical specifications

| SM 332 | 6ES7 332-5HB01-0AB0 | 6ES7 332-5HD01-0AB0 | 6ES7 332-5HF00-0AB0 | 6ES7 332-7ND01-0AB0 |
|---|---|---|---|---|
| Supports isochrone mode | - | - | - | Yes |
| Number of outputs | 2 | 4 | 8 | 4 |
| Interrupts | | | | |
| • Diagnostics interrupt | Yes | Yes | Yes | Yes |
| Diagnostics | Red LED for indicating group errors; diagnostic info can be read out | Red LED for indicating group errors; diagnostic info can be read out | Red LED for indicating group errors; diagnostic info can be read out | Red LED for indicating group errors; diagnostic info can be read out |
| Rated load voltage | 24 V DC | 24 V DC | 24 V DC | 24 V DC |
| Output ranges | | | | |
| • Voltage outputs | 0 to 10 V;<br>+/- 10 V; 1 to 5 V | 0 to 10 V;<br>+/- 10 V; 1 to 5 V | 0 to 10 V;<br>+/- 10 V; 1 to 5 V | 0 to 10 V;<br>+/- 10 V; 1 to 5 V |
| • Current outputs | 4 to 20 mA;<br>+/- 20 mA; 0 to 20 mA | 4 to 20 mA;<br>+/- 20 mA; 0 to 20 mA | 4 to 20 mA;<br>+/- 20 mA; 0 to 20 mA | 4 to 20 mA;<br>+/- 20 mA; 0 to 20 mA |
| Load impedance | | | | |
| • Voltage outputs, min. | 1 kΩ | 1 kΩ | 1 kΩ | 1 kΩ |
| • Current outputs, max. | 500 Ω | 500 Ω | 500 Ω | 500 Ω |
| • For capacitive load, max. | 1 µF | 1 µF | 1 µF | 1 µF |
| • Inductive loads, max. | 10 mH | 10 mH | 10 mH | 1 mH |
| Voltage output | | | | |
| • Short-circuit protection | Yes | Yes | Yes | Yes |
| • Short-circuit current, max. | 25 mA | 25 mA | 25 mA | 40 mA |
| Current output | | | | |
| • Open-circuit voltage, max. | 18 V | 18 V | 18 V | 18 V |
| Isolation to backplane bus | Yes | Yes | Yes | Yes |
| Resolution | 11 bit + sign<br>(at +/- 10 V; +/- 20 mA)<br>12 bit<br>(at 0 to 10 V; 0 to 20 mA) ,<br>4 to 20 mA, 1 to 5 V | 11 bit + sign<br>(at +/- 10 V; +/- 20 mA)<br>12 bit<br>(at 0 to 10 V; 0 to 20 mA) ,<br>4 to 20 mA, 1 to 5 V | 11 bit + sign<br>(at +/- 10 V; +/- 20 mA)<br>12 bit<br>(at 0 to 10 V; 0 to 20 mA) ,<br>4 to 20 mA, 1 to 5 V | 15 bit + sign |
| Conversion time per channel, max. | 0.8 ms | 0.8 ms | 0.8 ms | 1.5 ms |
| Transient recovery time | | | | |
| • For resistive load | 0.2 ms | 0.2 ms | 0.2 ms | 0.2 ms |
| • Capacitive loads | 3.3 ms | 3.3 ms | 3.3 ms | 0.5 ms |
| • Inductive loads | 0.5 ms | 0.5 ms | 0.5 ms | 0.5 ms |

## SM 332 analog output modules

### Technical specifications (continued)

| SM 332 | 6ES7 332-5HB01-0AB0 | 6ES7 332-5HD01-0AB0 | 6ES7 332-5HF00-0AB0 | 6ES7 332-7ND01-0AB0 |
|---|---|---|---|---|
| Substitute values injectable | Configurable | Configurable | - | Configurable |
| Operating error limit (0 to 60 °C, referred to the output range) | | | | |
| • Voltage | +/- 0.5 % | +/- 0.5 % | +/- 0.5 % | +/- 0.12 % |
| • Current | ± 0.6% | ± 0.6% | ± 0.6% | +/- 0.18 % |
| Basic error threshold (operating error threshold at 25 °C, with reference to output range) | | | | |
| • Voltage | ± 0.4% | ± 0.4% | ± 0.4% | ± 0.01% |
| • Current | +/- 0.5 % | +/- 0.5 % | +/- 0.5 % | ± 0.01% |
| Cable length (shielded), max. | 200 m | 200 m | 200 m | 200 m |
| Current consumption | | | | |
| • From backplane bus, max. | 60 mA | 60 mA | 100 mA | 60 mA |
| • From L+, max. | 240 mA | 240 mA | 340 mA | 240 mA |
| Power loss typ. | 3 W | 3 W | 6 W | 3 W |
| Electrical isolation tested at | 500 V DC | 500 V DC | 500 V DC | 500 V DC |
| Dimensions (W x H x D) in mm | 40 x 125 x 120 | 40 x 125 x 120 | 40 x 125 x 120 | 40 x 125 x 120 |
| Required front connector | 20-pin | 20-pin | 40-pin | 20-pin |
| Weight, approx. | 220 g | 220 g | 272 g | 220 g |

| Ordering data | Order No. |
|---|---|
| **SM 332 analog output modules** | |
| including labeling strips, bus connector | |
| • 4 outputs | **6ES7 332-5HD01-0AB0** |
| • 4 outputs, 15 bit | **6ES7 332-7ND01-0AB0** |
| • 2 outputs | **6ES7 332-5HB01-0AB0** |
| • 8 outputs | **6ES7 332-5HF00-0AB0** |
| **SIPLUS SM 332 analog output modules for amplified temperature range** | |
| including labeling strips, bus connector | |
| • 2 outputs | **6AG1 332-5HB01-2AB0** |
| **Front connector** | |
| 1 item | |
| 20-pin, with screw-type terminals | |
| • 1 item | **6ES7 392-1AJ00-0AA0** |
| • 100 units | **6ES7 392-1AJ00-1AB0** |
| 20-pin, with spring-loaded terminals | **6ES7 392-1BJ00-0AA0** |
| 40-pin, with screw-type terminals | |
| • 1 item | **6ES7 392-1AM00-0AA0** |
| • 100 units | **6ES7 392-1AM00-1AB0** |
| 40-pin, with spring-loaded terminals | **6ES7 392-1BM01-0AA0** |
| **Front door, elevated design** | **6ES7 328-0AA00-7AA0** |
| e.g. for 32-channel modules; permits connection of 1.3 $mm^2$/ 16 AWG conductors | |
| **SIMATIC TOP connect** | See Catalog ST 70 |
| **Bus connector** | |
| 1 unit (spare part) | **6ES7 390-0AA00-0AA0** |
| **Shield connecting element** | **6ES7 390-5AA00-0AA0** |
| 80 mm wide, with 2 rows for 4 terminal elements each | |
| **Terminal elements** | |
| 2 units | |
| • For 2 cables with 2 to 6 mm diameter | **6ES7 390-5AB00-0AA0** |
| • For 1 cable with 3 to 8 mm diameter | **6ES7 390-5BA00-0AA0** |
| • For 1 cable with 4 to 13 mm diameter | **6ES7 390-5CA00-0AA0** |
| **Label covers** | **6ES7 392-2XY00-0AA0** |
| 10 units for signal modules (not 32-channel modules), function modules | |
| **Labeling strips** | **6ES7 392-2XX00-0AA0** |
| 10 units for signal modules (not 32-channel modules), function modules | |

| | Order No. |
|---|---|
| **S7-SmartLabel** | **2XV9 450-1SL01-0YX0** |
| Software for machine labeling of modules directly from the STEP 7 project | |
| **Labeling sheets for machine labeling** | |
| for 16-channel signal module, DIN A4, for printing using laser printer; 10 units | |
| • Petrol | **6ES7 392-2AX00-0AA0** |
| • Light beige | **6ES7 392-2BX00-0AA0** |
| • Yellow | **6ES7 392-2CX00-0AA0** |
| • Red | **6ES7 392-2DX00-0AA0** |
| for 32-channel signal module, DIN A4, for printing by laser printer; 10 units | |
| • Petrol | **6ES7 392-2AX10-0AA0** |
| • Light beige | **6ES7 392-2BX10-0AA0** |
| • Yellow | **6ES7 392-2CX10-0AA0** |
| • Red | **6ES7 392-2DX10-0AA0** |
| **SIMATIC Manual Collection** | **6ES7 998-8XC01-8YE0** |
| Electronic manuals on CD-ROM, multi-language: S7-200, TD 200, S7-300, C7, S7-400, STEP 7, engineering tools, runtime software, SIMATIC DP (distributed I/O), SIMATIC HMI (human machine interface), SIMATIC NET (industrial communication) | |
| **SIMATIC Manual Collection Maintenance service for 1 year** | **6ES7 998-8XC01-8YE2** |
| Current S7 Manual Collection CD as well as the three following updates | |
| **S7-300 manual** | |
| Design, CPU data, module data, operation list | |
| • German | **6ES7 398-8FA10-8AA0** |
| • English | **6ES7 398-8FA10-8BA0** |
| • French | **6ES7 398-8FA10-8CA0** |
| • Spanish | **6ES7 398-8FA10-8DA0** |
| • Italian | **6ES7 398-8FA10-8EA0** |

# SM 334 analog input/output modules

## Overview

- Analog inputs and outputs
- For the connection of analog sensors and actuators



## Technical specifications

| SM 334 | 6ES7 334-0CE01-0AA0 | 6ES7 334-0KE00-0AB0 |
|---|---|---|
| **Inputs** | **4** | **4** |
| • For voltage measurement | 4 | 2 |
| • For resistance measurement | - | 4 |
| Interrupts | | |
| • Limit value interrupt | - | - |
| • Diagnostics interrupt | - | - |
| Diagnostics | - | - |
| Rated load voltage L+ | 24 V DC | 24 V DC |
| Input resistance/input ranges | 0 to 10 V / 100 kΩ; 0 to 20 mA / 50 Ω | 0 to 10 V / 100 kΩ; resistance 10 kΩ; Pt 100 (only air conditioning sector) |
| Permissible input range for voltage input, max. | 20 V | - |
| Permissible input range for current input, max. | 20 mA | - |
| Connection of signal sensors | | |
| • For current measurement | | |
| - as two-wire transmitter | - | - |
| - as four-wire transmitter | Yes | - |
| • For resistance measurement | | |
| - with two-wire connection | - | Yes |
| - with three-wire connection | - | Yes |
| - with four-wire connection | - | Yes |
| Isolation to backplane bus | No | Yes |
| Conversion time/ resolution per channel | | |
| • Integration time (all channels) | | 85 ms |
| • Resolution | 8-bit | 12-bit |
| Operational limit (in the entire temperature range, referred to input range) | | |
| • Voltage | ± 0.9% | ± 0.7% |
| • Current | +/-0.8% | - |
| • 10 kΩ | - | ± 3.5% |
| • Pt 100 | - | ± 1.0% |

## Technical specifications (continued)

| SM 334 | 6ES7 334-0CE01-0AA0 | 6ES7 334-0KE00-0AB0 |
|---|---|---|
| Basic error (operational error at 25 °C, referred to output range) | | |
| • Voltage | ± 0.7% | +/- 0.5 % |
| • Current | ± 0.6% | - |
| • 10 kΩ | - | ± 2.8% |
| • Pt 100 | - | +/-0.8% |
| **Outputs** | **2** | **2** |
| Interrupts | | |
| • Diagnostics interrupt | - | - |
| Diagnostics | - | - |
| Output ranges | | |
| • Voltage outputs | 0 to 10 V | 0 to 10 V |
| • Current outputs | 0 to 20 mA | - |
| Load resistor | | |
| • With voltage outputs, min. | 5 kΩ | 2.5 kΩ |
| • With current outputs, max. | 300 Ω | - |
| • For capacitive load, max. | 1 µF | 1 µF |
| • Inductive loads, max. | 1 mH | - |
| Voltage output | | |
| • Short-circuit protection | Yes | Yes |
| • Short-circuit current, max. | 11 mA | 10 mA |
| Current output | | |
| • Open-circuit voltage, max. | 15 V | - |
| Isolation to backplane bus | No | Yes |
| Resolution | 8-bit | 12-bit |
| Cycle time (all channels/AI + AO) | 5 ms | 85 ms |
| Transient recovery time | | |
| • For resistive load, max. | 0.3 m | 0.8 ms |
| • For capacitive load, max. | 3 ms | 0.8 ms |
| • For inductive load, max. | 0.3 ms | - |
| Substitute values injectable | - | - |
| Operating error limit (referred to output range) | | |
| • Voltage | ± 0.6% | ± 1.0% |
| • Current | ± 1.0% | - |
| Basic error limit (operating error limit at 25 °C, referred to the output range) | | |
| • Voltage | ± 0.4% | ± 0.85% |
| • Current | +/- 0.8% | - |
| **General** | | |
| Cable length (shielded), max. | 200 m | 100 m |
| Current consumption | | |
| • From backplane bus, max. | 55 mA | 60 mA |
| • From L+ | 110 mA | 80 mA |
| Isolation | | 500 V DC |
| Power losses, typically | 2.6 W | 2 W |
| Dimensions (W x H x D) in mm | 40 x 125 x 120 | 40 x 125 x 120 |
| Required front connector | 20-pin | 20-pin |
| Weight | 285 g | 200 g |

## SM 334 analog input/output modules

| Ordering data | Order No. |
|---|---|
| **SM 334 analog input/output modules** | |
| incl. labeling strips, bus connector | |
| • 4 inputs, 2 outputs | **6ES7 334-0CE01-0AA0** |
| • 4 inputs, 2 outputs; resistance measurement, Pt 100 | **6ES7 334-0KE00-0AB0** |
| **SIPLUS SM 334 analog input/output modules for amplified temperature range** | |
| incl. labeling strips, bus connector | |
| • 4 inputs, 2 outputs; resistance measurement, Pt 100 | **6AG1 334-0KE00-2AB0** |
| **Front connector** | |
| 1 item | |
| 20-pin, with screw-type terminals | |
| • 1 item | **6ES7 392-1AJ00-0AA0** |
| • 100 units | **6ES7 392-1AJ00-1AB0** |
| 20-pin, with spring-loaded terminals | **6ES7 392-1BJ00-0AA0** |
| **Front door, elevated design** | **6ES7 328-0AA00-7AA0** |
| e.g. for 32-channel modules; permits connection of 1.3 $mm^2$/ 16 AWG conductors | |
| **SIMATIC TOP connect** | See Catalog ST 70 |
| **Bus connector** | **6ES7 390-0AA00-0AA0** |
| 1 unit (spare part) | |
| **Shield connecting element** | **6ES7 390-5AA00-0AA0** |
| 80 mm wide, with 2 rows for 4 terminal elements each | |
| **Terminal elements** | |
| 2 units | |
| • For 2 cables with 2 to 6 mm diameter | **6ES7 390-5AB00-0AA0** |
| • For 1 cable with 3 to 8 mm diameter | **6ES7 390-5BA00-0AA0** |
| • For 1 cable with 4 to 13 mm diameter | **6ES7 390-5CA00-0AA0** |
| **Label covers** | **6ES7 392-2XY00-0AA0** |
| 10 units for signal modules (not 32-channel modules), function modules | |
| **Labeling strips** | **6ES7 392-2XX00-0AA0** |
| 10 units for signal modules (not 32-channel modules), function modules | |

| | Order No. |
|---|---|
| **S7-SmartLabel** | **2XV9 450-1SL01-0YX0** |
| Software for machine labeling of modules directly from the STEP 7 project | |
| **Labeling sheets for machine labeling** | |
| for 16-channel signal module, DIN A4, for printing using laser printer; 10 units | |
| • Petrol | **6ES7 392-2AX00-0AA0** |
| • Light beige | **6ES7 392-2BX00-0AA0** |
| • Yellow | **6ES7 392-2CX00-0AA0** |
| • Red | **6ES7 392-2DX00-0AA0** |
| for 32-channel signal module, DIN A4, for printing by laser printer; 10 units | |
| • Petrol | **6ES7 392-2AX10-0AA0** |
| • Light beige | **6ES7 392-2BX10-0AA0** |
| • Yellow | **6ES7 392-2CX10-0AA0** |
| • Red | **6ES7 392-2DX10-0AA0** |
| **SIMATIC Manual Collection** | **6ES7 998-8XC01-8YE0** |
| Electronic manuals on CD-ROM, multi-language: S7-200, TD 200, S7-300, C7, S7-400, STEP 7, engineering tools, runtime software, SIMATIC DP (distributed I/O), SIMATIC HMI (human machine interface), SIMATIC NET (industrial communication) | |
| **SIMATIC Manual Collection Maintenance service for 1 year** | **6ES7 998-8XC01-8YE2** |
| Current S7 Manual Collection CD as well as the three following updates | |
| **S7-300 manual** | |
| Design, CPU data, module data, operation list | |
| • German | **6ES7 398-8FA10-8AA0** |
| • English | **6ES7 398-8FA10-8BA0** |
| • French | **6ES7 398-8FA10-8CA0** |
| • Spanish | **6ES7 398-8FA10-8DA0** |
| • Italian | **6ES7 398-8FA10-8EA0** |

## Overview

- Digital inputs for signals from the Ex field
- For connecting intrinsically-safe digital equipment from the Ex field

## Technical specifications

| Ex digital input module | 6ES7 321-7RD00-0AB0 |
|---|---|
| Number of inputs | 4 (NAMUR) |
| Galvanic isolation | Yes |
| • in groups of | 1 |
| • Load voltage | 24 V DC |
| Input voltage | |
| • rated value | 8.2 V DC (from internal circuit supply) |
| Input current | |
| • At signal “1”, min. | 2.1 mA to 7 mA |
| • At signal “0”, max. | 0.35 to 1.2 mA |
| • on short-circuit, min. | 8.5 mA |
| • At wirebreak, max. | 0.1 µA |
| Delay time | |
| • At “0” following “1”, typ. | 0.1/0.5/3/15/20 ms (configurable, plus 0.25 ms conditioning time) |
| Input frequency, max. | 2 kHz |
| Connection type for signal encoders | Two-wire connection |
| Cable length (unshielded), max. | 200 m |
| Encoder supply | Via the inputs |
| Fault message ”Short-circuit” | Red LED (group error indicator), red LED per channel |

| Ex digital input module | 6ES7 321-7RD00-0AB0 |
|---|---|
| Type of protection | [EEx ib] IIC |
| PTB no. | Ex-96.D.2094X |
| FMs | CL.2, DIV 2, GP A,B,C,D T4 |
| Input circuit maximum values | (per circuits) |
| • $U_0$ | 10.0 V |
| • $I_K$ | 14.1 mA |
| • $P$ | 33.7 mW |
| • permissible ext. inductance $L_a$, max. | 100 mH |
| • permissible ext. capacitance $C_a$, max. | 3 µF |
| Ambient temperature, max. | 60 °C |
| Current consumption | |
| • internal (backplane bus), max. | 80 mA |
| • External (load voltage), max. | 50 mA |
| Power loss | 1.1 W |
| Required front connector | 20-pin |
| Weight, approx. | 230 g |

## Ex digital input modules

| Ordering data | Order No. |
|---|---|
| **Ex digital input modules**<br>4 inputs, electrically isolated, NAMUR | **6ES7 321-7RD00-0AB0** |
| **Front connector**<br>20-pin, with screw-type terminals | |
| • 1 piece | **6ES7 392-1AJ00-0AA0** |
| • 100 pieces | **6ES7 392-1AJ00-1AB0** |
| **Front door, elevated design**<br>e.g. for 32-channel modules; permits connection of 1.3 $mm^2$/ 16 AWG conductors | **6ES7 328-0AA00-7AA0** |
| **LK 393 cable chamber**<br>essential for Ex operation | **6ES7 393-4AA00-0AA0** |
| **Labeling strips**<br>10 units (spare part) for signal modules (not 32-channel modules), function modules | **6ES7 392-2XX00-0AA0** |
| **Label covers**<br>10 units for signal modules (not 32-channel modules), function modules | **6ES7 392-2XY00-0AA0** |
| **S7-SmartLabel**<br>Software for machine labeling of modules directly from the STEP 7 project | **2XV9 450-1SL01-0YX0** |

| | Order No. |
|---|---|
| **Labeling sheets for machine labeling**<br>for 16-channel signal module, DIN A4, for printing using laser printer; 10 units | |
| • Petrol | **6ES7 392-2AX00-0AA0** |
| • Light beige | **6ES7 392-2BX00-0AA0** |
| • Yellow | **6ES7 392-2CX00-0AA0** |
| • Red | **6ES7 392-2DX00-0AA0** |
| for 32-channel signal module, DIN A4, for printing by laser printer; 10 units | |
| • Petrol | **6ES7 392-2AX10-0AA0** |
| • Light beige | **6ES7 392-2BX10-0AA0** |
| • Yellow | **6ES7 392-2CX10-0AA0** |
| • Red | **6ES7 392-2DX10-0AA0** |
| **SIMATIC Manual Collection** | **6ES7 998-8XC01-8YE0** |
| **SIMATIC Manual Collection Maintenance service for 1 year** | **6ES7 998-8XC01-8YE2** |
| **Reference manual: S7-300 Ex I/O modules, ET 200M** | |
| • German | **6ES7 398-8RA00-8AA0** |
| • English | **6ES7 398-8RA00-8BA0** |

## Overview

- Digital outputs for signals from the Ex field
- For connecting intrinsically-safe digital equipment from the Ex field

## Technical specifications

| Ex digital outputs | 6ES7 322-5SD00-0AB0 | 6ES7 322-5RD00-0AB0 |
|---|---|---|
| Number of inputs | 4 | 4 |
| Galvanic isolation | Yes | Yes |
| • In groups of | 1 | 1 |
| Supply voltage $U_P$ (for load) | | |
| • Rated value | 24 V DC | 15 V DC |
| Output current | | |
| • At signal "1", max. | 10 mA ± 10% | 20 mA ± 10% |
| • On short-circuit, min. | 10 mA + 10 % | 20.5 mA + 10 % |
| Short-circuit protection | Electronic | Electronic |
| Fault diagnostics | Yes | Yes |
| • Switching frequency, max. | 100 Hz | 100 Hz |
| Load | 390 Ω | 200 Ω |
| Connection type for load | Two-wire connection | Two-wire connection |
| Cable length (unshielded), max. | 200 m | 200 m |
| Fault message "Short-circuit" (group fault message, additionally per channel) | Red LED, CPU message | Red LED, CPU message |
| Type of protection | [EEx ib] IIC | [EEx ib] IIC |
| PTB no. | Ex-96.D.2093X | Ex-96.D.2102X |
| FMs | CL I, DIV 2, GP A,B,C,D T4 | AIS CL.1, DIV 1, GP A,B,C,D<br>CL.I, DIV 2, GP A,B,C,D T4 |
| Highest values of the output circuits | (per circuits) | |
| • $U_0$ | 25.2 V | 15.75 V |
| • $I_K$ | 70 mA | 85 mA |
| • $P$ | 440 mW | 335 mW |
| • Permissible ext. inductance $L_a$, max. | 6.7 mH | 5 mH |
| • Permissible ext. capacitance $C_a$, max. | 90 nF | 500 nF |
| Ambient temperature, max. | 60 °C | 60 °C |
| Current consumption | | |
| • Internal (backplane bus), max. | 70 mA | 70 mA |
| • External (load voltage), max. | 160 mA | 160 mA |
| Power losses, typ. | 3 W | 3 W |
| Required front connector | 20-pin | 20-pin |
| Weight, approx. | 230 g | 230 g |

## Ex digital output modules

| Ordering data | Order No. |
|---|---|
| **Ex digital output modules** | |
| • 4 outputs, electrically isolated, 24 V DC, 10 mA | **6ES7 322-5SD00-0AB0** |
| • 4 outputs, electrically isolated, 15 V DC, 20 mA | **6ES7 322-5RD00-0AB0** |
| **Front connector** | |
| 20-pin, with screw-type terminals | |
| • 1 item | **6ES7 392-1AJ00-0AA0** |
| • 100 units | **6ES7 392-1AJ00-1AB0** |
| **Front door, elevated design** | |
| e.g. for 32-channel modules; permits connection of 1.3 $mm^2$/ 16 AWG conductors | **6ES7 328-0AA00-7AA0** |
| **LK 393 cable chamber** | **6ES7 393-4AA00-0AA0** |
| essential for Ex operation | |
| **Labeling strips** | **6ES7 392-2XX00-0AA0** |
| 10 units (spare part) for signal modules (not 32-channel modules), function modules | |
| **Label covers** | **6ES7 392-2XY00-0AA0** |
| 10 units for signal modules (not 32-channel modules), function modules | |
| **S7-SmartLabel** | **2XV9 450-1SL01-0YX0** |
| Software for machine labeling of modules directly from the STEP 7 project | |

| | Order No. |
|---|---|
| **Labeling sheets for machine labeling** | |
| for 16-channel signal module, DIN A4, for printing using laser printer; 10 units | |
| • Petrol | **6ES7 392-2AX00-0AA0** |
| • Light beige | **6ES7 392-2BX00-0AA0** |
| • Yellow | **6ES7 392-2CX00-0AA0** |
| • Red | **6ES7 392-2DX00-0AA0** |
| for 32-channel signal module, DIN A4, for printing using laser printer; 10 units | |
| • Petrol | **6ES7 392-2AX10-0AA0** |
| • Light beige | **6ES7 392-2BX10-0AA0** |
| • Yellow | **6ES7 392-2CX10-0AA0** |
| • Red | **6ES7 392-2DX10-0AA0** |
| **SIMATIC Manual Collection** | **6ES7 998-8XC01-8YE0** |
| **SIMATIC Manual Collection Maintenance service for 1 year** | **6ES7 998-8XC01-8YE2** |
| **Reference manual: S7-300 Ex I/O modules, ET 200M** | |
| • German | **6ES7 398-8RA00-8AA0** |
| • English | **6ES7 398-8RA00-8BA0** |

## Overview

- Analog inputs for signals from the Ex area
- For connecting intrinsically-safe analog equipment from the Ex field

## Technical specifications

| **Ex analog inputs** | **6ES7 331-7RD00-0AB0** | **6ES7 331-7SF00-0AB0** |
|---|---|---|
| Input range | 0 to 20 mA<br>4 to 20 mA | 8 x thermocouples,<br>4 x RTD resistance thermometers. |
| **Number of inputs** | **4** | **8/4** |
| Galvanic isolation | Yes | Yes |
| Input resistance | 50 Ω | 10 MΩ |
| Connection of signal sensors | 2-core<br>4-wire | 2-core,<br>4-core; thermocouples type T, U, E, J, L, K, N, R, S, B; resistance thermometers Pt 100, Pt 200, Ni 100 |
| Digital representation of the input signal | 10 to 15 bit + sign | 10 to 15 bit + sign |
| Principle of measurement | SIGMA-DELTA | SIGMA-DELTA |
| Integration time (adjustable for optimum noise voltage suppression) | 2.5 to 100 ms | 2.5 to 100 ms |
| Permissible voltage | | |
| • Between the inputs, max. | 60 V DC | 60 V DC |
| • Inputs to grounding point, (destruction limit), max. | 60 V DC | 30 V DC |
| Permissible input current, max. (destruction limit) | 40 mA | - |
| Fault indication | Message, red LED | Message, red LED |
| Fault message at | | |
| • Overflow | Message, red LED | Message, red LED |
| • Wirebreak on the signal encoder line | Message | Message |
| • Short-circuit of the signal encoder line | Message | Message |
| Noise suppression for noise frequency | 10 to 400 Hz | 10 to 400 Hz |
| • Common-mode noise, min. | 130 dB | 130 dB |
| • Series-mode noise, min. (peak value of the noise < rated value of the range) | 60 dB | 60 dB |
| Basic error limits, at 25 °C | ± 0.1% | 0.1 % |
| Operating error limits | ± 0.45 % | 0.09 to 0.04 %; temperature error: 0.001 to 0.002 %/K |
| Type of protection | [EEx ib] IIC | [EEx ib] IIC |

## Ex analog input modules

### Technical specifications (continued)

| Ex analog inputs | 6ES7 331-7RD00-0AB0 | 6ES7 331-7SF00-0AB0 |
|---|---|---|
| PTB no. | Ex-96.D.2092X | Ex-96.D.2108X |
| FMs | CL.I, DIV 2, GP A,B,C,D T4 | CL.I, DIV 2, GP A,B,C,D T4 |
| Input circuit maximum values | (per circuit) | |
| • $U_0$ | 25.2 V | 5.9 V |
| • $I_K$ | 68.5 mA | 28.8 mA |
| • $P$ | 431 mW | 41.4 mW |
| • $R_i$ | 50 Ω | |
| • Permissible ext. inductance $L_a$, max. | 7.5 mH | 40 mH |
| • Permissible ext. capacitance $C_a$, max. | 90 nF | 60 µF |
| Ambient temperature, max. | 60 °C | 60 °C |
| Cable length (shielded), max. | 200 m | 200 m, HTC:50 m |
| Supply voltage from module (for 2-wire transducer) | | |
| • No-load voltage | 25.2 V DC | - |
| • Rated value | 13 V at 22 mA | - |
| Current consumption | | |
| • Internal (backplane bus), max. | 60 mA | 120 mA |
| • External (24 V DC), max. | 150 mA | - |
| Power losses, typ. | 3 W | 0.6 W |
| Required front connector | 20-pin | 20-pin |
| Weight, approx. | 290 g | 210 g |

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### Ordering data

| | Order No. |
|---|---|
| **Ex analog input modules** | |
| • 4 inputs, electrically isolated, 0/4 to 20 mA, 15 bit | **6ES7 331-7RD00-0AB0** |
| • 8/4 inputs, electrically isolated, for thermocouples and Pt100, Pt200, Ni100 | **6ES7 331-7SF00-0AB0** |
| **Front connector** | |
| 20-pin, with screw-type terminals | |
| • 1 item | **6ES7 392-1AJ00-0AA0** |
| • 100 units | **6ES7 392-1AJ00-1AB0** |
| **Front door, elevated design** | **6ES7 328-0AA00-7AA0** |
| e.g. for 32-channel modules; permits connection of 1.3 $mm^2$/ 16 AWG conductors | |
| **LK 393 cable chamber** | **6ES7 393-4AA00-0AA0** |
| essential for Ex operation | |
| **Labeling strips** | **6ES7 392-2XX00-0AA0** |
| 10 units (spare part) for signal modules (not 32-channel modules), function modules | |
| **Label covers** | **6ES7 392-2XY00-0AA0** |
| 10 units for signal modules (not 32-channel modules), function modules | |

| | Order No. |
|---|---|
| **S7-SmartLabel** | **2XV9 450-1SL01-0YX0** |
| Software for machine labeling of modules directly from the STEP 7 project | |
| **Labeling sheets for machine labeling** | |
| for 16-channel signal module, DIN A4, for printing using laser printer; 10 units | |
| • Petrol | **6ES7 392-2AX00-0AA0** |
| • Light beige | **6ES7 392-2BX00-0AA0** |
| • Yellow | **6ES7 392-2CX00-0AA0** |
| • Red | **6ES7 392-2DX00-0AA0** |
| for 32-channel signal module, DIN A4, for printing using laser printer; 10 units | |
| • Petrol | **6ES7 392-2AX10-0AA0** |
| • Light beige | **6ES7 392-2BX10-0AA0** |
| • Yellow | **6ES7 392-2CX10-0AA0** |
| • Red | **6ES7 392-2DX10-0AA0** |
| **SIMATIC Manual Collection** | **6ES7 998-8XC01-8YE0** |
| **SIMATIC Manual Collection Maintenance service for 1 year** | **6ES7 998-8XC01-8YE2** |
| **Reference manual: S7-300 Ex I/O modules, ET 200M** | |
| • German | **6ES7 398-8RA00-8AA0** |
| • English | **6ES7 398-8RA00-8BA0** |

## Overview

- Analog outputs for signals from the Ex area
- For connecting intrinsically-safe analog equipment from the Ex field

## Technical specifications

| Ex analog output module | 6ES7 332-5RD00-0AB0 |
|---|---|
| Output range (nominal value) | 0/4 to 20 mA |
| **Number of outputs** | **4** |
| Galvanic isolation | Yes |
| Load resistance, min. | 500 MΩ |
| Connection of signal sensors | Two-wire connection |
| Digital representation of output signal | 15 bit |
| Conversion time | 2.5 ms |
| Short-circuit protection | Yes |
| Short-circuit current, e.g. | 70 mA |
| Idle voltage, approx. | 14 V |
| Permissible voltage | |
| • Between the outputs, max. | 30 V AC/60 V DC |
| • Outputs to grounding point, max. | 30 V AC/60 V DC |
| Basic error limits at 25 °C | ± 0.2 % |
| Operating error limits (0° C to 60 °C) | ± 0.55 % |
| Cable length (shielded), max. | 200 m |
| Fault message "Short-circuit" | Group fault message, additionally per channel |

| Ex analog output module | 6ES7 332-5RD00-0AB0 |
|---|---|
| Fault message at | |
| • Wirebreak on the actuator line | Yes |
| • Overflow | Yes |
| Type of protection | [EEx ib] IIC |
| PTB no. | Ex-96.D.2026X |
| FMs | CL.I, DIV 2, GP A,B,C,D T4 |
| Highest values of the input circuits (per channel) | |
| • $U_0$, max. | 14 V |
| • $I_K$ | 70 mA |
| • $P$ | 440 mW |
| • Permissible ext. inductance $L_a$, max. | 6.6 mH |
| • Permissible ext. capacitance $C_a$, max. | 850 nF |
| Ambient temperature, max. | 60 °C |
| Current consumption | |
| • Internal (backplane bus), max. | 80 mA |
| • External, max. | 180 mA |
| Power losses, typ. | 4 W |
| Required front connector | 20-pin |
| Weight, approx. | 280 g |

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## Ex analog output modules

| Ordering data | Order No. |
|---|---|
| **Ex analog output module**<br>4 outputs, electrically isolated, for thermocouples and Pt100, Pt200, Ni100 | **6ES7 332-5RD00-0AB0** |
| **Front connector**<br>20-pin, with screw-type terminals | |
| • 1 item | **6ES7 392-1AJ00-0AA0** |
| • 100 units | **6ES7 392-1AJ00-1AB0** |
| **Front door, elevated design**<br>e.g. for 32-channel modules; permits connection of 1.3 $mm^2$/16 AWG conductors | **6ES7 328-0AA00-7AA0** |
| **LK 393 cable chamber**<br>essential for Ex operation | **6ES7 393-4AA00-0AA0** |
| **Labeling strips**<br>10 units (spare part) for signal modules (not 32-channel modules), function modules | **6ES7 392-2XX00-0AA0** |
| **Label covers**<br>10 units for signal modules (not 32-channel modules), function modules | **6ES7 392-2XY00-0AA0** |
| **S7-SmartLabel**<br>Software for machine labeling of modules directly from the STEP 7 project | **2XV9 450-1SL01-0YX0** |

| | Order No. |
|---|---|
| **Labeling sheets for machine labeling**<br>for 16-channel signal module, DIN A4, for printing using laser printer; 10 units | |
| • Petrol | **6ES7 392-2AX00-0AA0** |
| • Light beige | **6ES7 392-2BX00-0AA0** |
| • Yellow | **6ES7 392-2CX00-0AA0** |
| • Red | **6ES7 392-2DX00-0AA0** |
| for 32-channel signal module, DIN A4, for printing using laser printer; 10 units | |
| • Petrol | **6ES7 392-2AX10-0AA0** |
| • Light beige | **6ES7 392-2BX10-0AA0** |
| • Yellow | **6ES7 392-2CX10-0AA0** |
| • Red | **6ES7 392-2DX10-0AA0** |
| **SIMATIC Manual Collection** | **6ES7 998-8XC01-8YE0** |
| **SIMATIC Manual Collection Maintenance service for 1 year** | **6ES7 998-8XC01-8YE2** |
| **Reference manual: S7-300 Ex I/O modules, ET 200M** | |
| • German | **6ES7 398-8RA00-8AA0** |
| • English | **6ES7 398-8RA00-8BA0** |

## Overview

- Intelligent 8-channel electronics module for S7-300/ET 200M
- For the connection of up to 8 IQ-Sense sensors:
  - Optoelectronic sensors
  - Ultrasound sensors
- With standard function blocks for the various sensor technologies for simplified handling on a SIMATIC S7
- Conventional sensors cannot be operated.

## Technical specifications

| **Sensor module** | **8xIQ-Sense** |
|---|---|
| Number of channels | 8 |
| Cable length | 50 m |
| Rated supply voltage | 24 V DC |
| Galvanic isolation | |
| • Between channels | No |
| • Between channels and backplane bus | Yes |
| Permissible potential difference | |
| • Between various electrical circuits | 75 V DC, 60 V AC |
| Isolation tested at | 500 V DC |
| Current consumption | |
| • From backplane bus, typ. | 150 mA |
| • From L+, max. | 1 A |
| Diagnostics indicator | Red LED "SF" |
| Status display | Green LED per channel |
| Connectable sensors | Photoelectronic proximity switches and ultrasound sensors with IQ-Sense |
| Cycle time | 2.88 – 6 ms |
| Dimensions (WxHxD) in mm | 40 x 125 x 120 |
| Weight, approx. | 250 g |
| Required front connector | 20-pin |

## Ordering data

| | **Order No.** |
|---|---|
| **8x IQ-Sense sensor module** | **6ES7 338-7XF00-0AB0** |
| ***Sensors for connecting to the sensor module*** | |
| **Diffuse sensors** | |
| • Model C40 IQ-Sense | **3SF7 240-3JQ00** |
| • Model K80 IQ-Sense | **3SF7 210-3JQ00** |
| • with background fading, model K80 IQ-Sense | **3SF7 214-3JQ00** |
| **Diffuse barrier** | |
| • Model C40 IQ-Sense | **3SF7 241-3JQ00** |
| • Model K80 IQ-Sense | **3SF7 211-3JQ00** |
| **Ultrasound sensor** | |
| • Model M18 IQ-Sense; Range 6-30 cm | **3SF6 232-3JA00** |
| • Model M18 IQ-Sense; Range 15-100 cm | **3SF6 233-3JA00** |

# IQ-Sense photoelectric sensors

## Overview

Opto BERO with IQ-Sense, C40 design IQ-Sense

Opto BERO with IQ-Sense, K80 design IQ-Sense

The photoelectric proximity switches react to changes in the received quantity of light. The light beam emitted from the emitter diode is interrupted or reflected by the object to be detected.

These sensors detect all objects regardless of their composition, whether metal, wood or plastic.

Depending on the typ of BERO, the interruption or reflection of the light beam is evaluated. The following operating modes are possible with IQ-Sense:

- Diffuse sensors (energetic)
- Diffuse sensor (with background suppression)
- Reflex sensors

Features:

- Designs K80 IQ-Sense and C40 IQ-Sense
- IntelliTeach functionality
- Integrated anti-interference function
- Pre-failure warning (fouling/misalignment)

## Technical specifications

| Design | | C40 design IQ-Sense | K80 design IQ-Sense |
|---|---|---|---|
| ***Diffuse sensor (energetic)*** | | | |
| Sensing range | m | 0.7 | 2 |
| Standard test object | mm | 200 × 200 (white) | |
| Transmitter (type of light) | nm | Red LED, 660 | IR LED, 880 |
| Supply current | mA | 50 | |
| Response time | ms | 1 | |
| LEDs | | Switching status (yellow), surplus light (green) | |
| Enclosure material | | ABS + PBTP | PBTP |
| Protection | | IP67 | |
| Dimensions | mm | 40 × 40 × 53 | 83 × 65 × 25 |
| ***Diffuse sensor with background suppression*** | | | |
| Sensing range | m | – | 0.2 ... 1 |
| Standard test object | mm | – | 200 × 200 (white) |
| Transmitter (type of light) | nm | – | IR-LED, 880 |
| Supply current | mA | – | 50 |
| Response time | ms | – | 2 |
| LEDs | | – | Switching status (yellow), surplus light (green) |
| Enclosure material | | – | PBTP |
| Protection | | – | IP67 |
| Dimensions | mm | – | 83 × 65 × 25 |

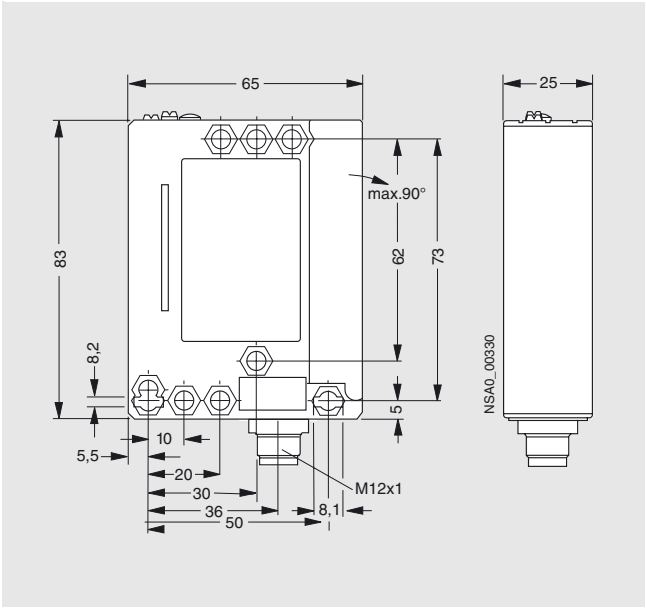
## Technical specifications (continued)

| Design | | C40 IQ-Sense | K80 IQ-Sense |
|---|---|---|---|
| ***Reflex sensor*** | | | |
| Sensing range | m | 6 | 8 |
| Standard test object | | Reflector D84, 3RX7916 | |
| Transmitter (type of light) | nm | Red LED 660 nm, polarized | |
| Supply current | mA | 50 | |
| Response time | ms | 1 | |
| LEDs | | Switching status (yellow), surplus light (green) | |
| Enclosure material | | ABS + PBTP | PBTP |
| Protection | | IP67 | |
| Dimensions | mm | 40 × 40 × 53 | 83 × 65 × 25 |

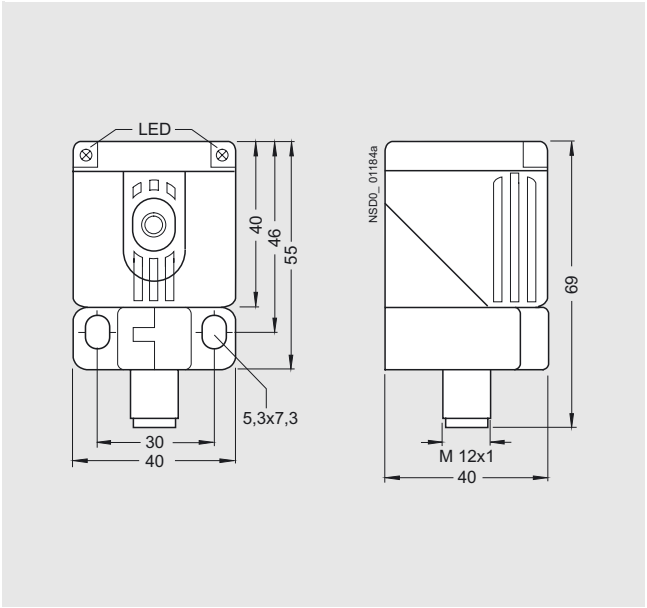
## Selection and Ordering data

| Version | Design | Type | Order No. |
|---|---|---|---|
| **Photoelectric sensors** for connection to the 4 IQ-Sense sensor module | C40 IQ-Sense | Diffuse sensor | **3SF7 240-3JQ00** |
| | | Reflex sensor | **3SF7 241-3JQ00** |
| | K80 IQ-Sense | Diffuse sensor | **3SF7 210-3JQ00** |
| | | Diffuse sensor (with background suppression) | **3SF7 214-3JQ00** |
| | | Reflex sensor | **3SF7 211-3JQ00** |

## Dimension drawings




Opto BERO with IQ-Sense, K80 IQ-Sense design




Opto BERO with IQ-Sense, C40 IQ-Sense design

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# IQ-Sense ultrasonic sensors

## Overview

The sonar BEROs of the M18 IQ compact series are ready-to-use complete units with a cylindrical M18 housing for connection to the S7-300/ET 200M IQ-Sense module SM338, 8×IQ-Sense.

- Five operating modes:
  – Operation as measuring sensor (“analog signal“)
  – Diffuse sensor with background blanking
  – Diffuse sensor with differential travel
  – Diffuse sensor with foreground and background blanking
  – Retroreflective sensor.
- Statically configurable using STEP 7,
- Dynamically configurable using an S7 function block
- Measured distance to object is always transmitted
- Synchronizable, multiplex operation
- Temperature compensation,
- Connection with M12 connector
- Non-polarized 2-conductor connection (protected against polarity reversal),
- Channel-specific system diagnosis (e.g. wire-break, short-circuit, parameterization error).

## Technical specifications

| Type | | 3SF62 32–3JA00 | 3SF62 33–3JA00 |
|---|---|---|---|
| Sensing range | | | |
| • Rated value | cm | 5 ... 30 | 15 ... 100 |
| • Maximum value | cm | 5 ... 50 | 15 ... 150 |
| Standard test object | mm | 10 × 10 | 20 × 20 |
| Differential travel *H* (adjustable) | mm | 3 ... 30 | 10 ... 100 |
| Repeat accuracy *R* | mm | 1 | 2 |
| Operating voltage (DC) | | of IQ-Sense | |
| Rated operational current $I_e$ | | of IQ-Sense | |
| No-load current $I_0$ | | of IQ-Sense | |
| Adjustment / configuration | | Beginning and end of switching range via IQ-Sense (IntelliTeach) or local teach-in via potentiometer | |
| Ultra-sound frequency | kHz | 400 | 200 |
| Switching frequency *f* | Hz | 8 | 4 |
| Response time | ms | 54 | 110 |
| Measuring rate | ms | 13.44 | 26.88 |
| Status display | | yellow LED | |
| Casing material | | nickel-plated brass, Transformer cover CRASTIN, Transformer surface epoxy resin | |
| Degree of protection | | IP67 | |
| Ambient temperature | | | |
| • Operation | °C | –25 ... +70 | |
| • Storage | °C | –40 ... +85 | |

## Selection and Ordering data

| Version | Type | Sensing range | Order No. |
|---|---|---|---|
| **Ultrasonic sensors** For connection to IQ-Sense | M18 IQ-Sense | 5 ... 30 | **3SF62 32–3JA00** |
| | | 15 ... 100 | **3SF62 33–3JA00** |

# SM 374 simulator module

## Overview

- Simulator module for testing programs during startup and operation
- For simulation of sensor signals using switches
- For indicating signal statuses at the outputs using LEDs

## Technical specifications

| | |
|---|---|
| Inputs | 16 switches |
| Outputs | 16 LEDs |
| Galvanic isolation | No |
| Power consumption max. | 80 mA |
| Power losses, typ. | 0.35 W |
| Dimensions (W x H x D) in mm | 40 x 125 x 120 |
| Weight, approx. | 190 g |

## Ordering data

| Ordering data | Order No. |
|---|---|
| **SM 374 simulator module**<br>Including bus connector and labeling strip | **6ES7 374-2XH01-0AA0** |
| **Bus connector**<br>1 unit (spare part) | **6ES7 390-0AA00-0AA0** |
| **Labeling strip**<br>10 units (spare part) | **6ES7 392-2XX00-0AA0** |
| **S7-SmartLabel**<br>Software for machine labeling of modules directly from the STEP 7 project | **2XV9 450-1SL01-0YX0** |
| **Labeling sheets for machine labeling**<br>for 16-channel signal modules, DIN A4, for printing using laser printer; 10 units | |
| • Petrol | **6ES7 392-2AX00-0AA0** |
| • Light beige | **6ES7 392-2BX00-0AA0** |
| • Yellow | **6ES7 392-2CX00-0AA0** |
| • Red | **6ES7 392-2DX00-0AA0** |
| **Label cover**<br>10 units (spare part) | **6ES7 392-2XY00-0AA0** |

# DM 370 dummy modules

## Overview

- Dummy module for reserving slots for non-parameterized signal modules
- Structure and address allocation is retained when replaced with a signal module

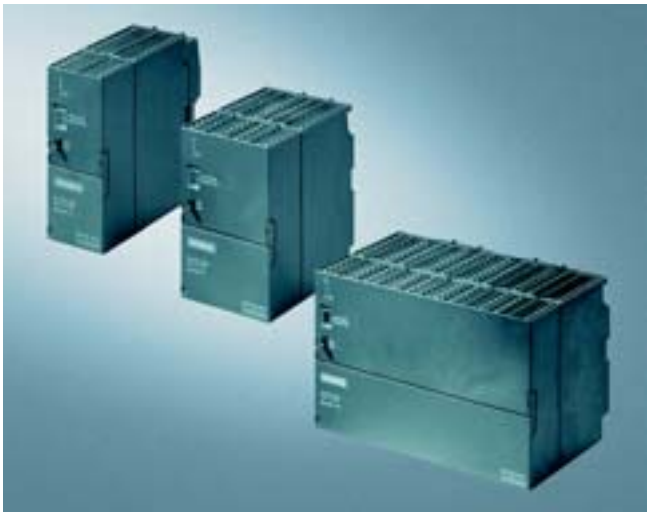
## Technical specifications

| | |
|---|---|
| Current consumption | |
| • from backplane bus, max. | 5 mA |
| Power losses, typ. | 0.03 W |
| Dimensions (W x H x D) in mm | 40 x 125 x 120 |
| Weight | 180 g |

## Ordering data

| | Order No. |
|---|---|
| **DM 370 dummy module**<br>Including bus connector and labeling strip | **6ES7 370-0AA01-0AA0** |
| **Bus connector**<br>1 unit (spare part) | **6ES7 390-0AA00-0AA0** |
| **Labeling strip**<br>10 units (spare part) | **6ES7 392-2XX00-0AA0** |
| **S7-SmartLabel**<br>Software for machine labeling of modules directly from the STEP 7 project | **2XV9 450-1SL01-0YX0** |
| **Labeling sheets for machine labeling**<br>for 16-channel signal modules, DIN A4, for printing using laser printer; 10 units | |
| • Petrol | **6ES7 392-2AX00-0AA0** |
| • Light beige | **6ES7 392-2BX00-0AA0** |
| • Yellow | **6ES7 392-2CX00-0AA0** |
| • Red | **6ES7 392-2DX00-0AA0** |
| **Label cover**<br>10 units (spare part) | **6ES7 392-2XY00-0AA0** |

## Overview



The proven power supply in the SIMATIC S7-300 design; alternatively with PS-CPU connection comb and for snap-mounting on S7 busbar (Order No. 6ES7307-1BA00-0AA0) or without PC-CPU connection comb for snap-mounting on DIN rail EN 500022-35x15 via mounting adapter (Order No. 6EP1 331-1SL11).

For further details about SITOP power pour supplies, see Catalog KT 10.1.

## Technical specifications

| **Power supply type**<br>**Order No.** | **2 A**<br>**6ES7 307-1BA00-0AA0** | **5 A**<br>**6ES7 307-1EA00-0AA0** | **10 A**<br>**6ES7 307-1KA01-0AA0** |
|---|---|---|---|
| **Input** | Single-phase AC | Single-phase AC | Single-phase AC |
| Rated voltage $V_{in\ rated}$ | **120/230 V AC**<br>Settable via selector switch on device | **120/230 V AC**<br>Settable via switch on device | **120/230 V AC**<br>Settable via switch on device |
| Voltage range | 85 to 132 V/170 to 264 V AC | 85 to 132 V/170 to 264 V AC | 85 to 132 V/170 to 264 V AC |
| Overvoltage strength | 2.3 x $V_{in\ rated}$, 1.3 ms | 2.3 x $V_{in\ rated}$, 1.3 ms | 2.3 x $V_{in\ rated}$, 1.3 ms |
| Mains buffering $I_{out\ rated}$ | > 20 ms at $V_{in}$ = 93/187 V | > 20 ms at $V_{in}$ = 93/187 V | > 20 ms at $V_{in}$ = 93/187 V |
| Rated line frequency; range | 50/60 Hz, 47 to 63 Hz | 50/60 Hz; 47 to 63 Hz | 50/60 Hz; 47 to 63 Hz |
| Rated current $I_{in\ rated}$ | 0.9/0.6 A | 2.1/1, 3 A | 4.1/1.8 A |
| Inrush current limitation (+25 °C) | < 20 A, < 3 ms | < 45 A, < 3 ms | < 55 A, < 3 ms |
| $I^2t$ | < 1.0 $A^2s$ | < 1.2 $A^2s$ | < 3.3 $A^2s$ |
| Integrated line-side fuse | T 1.6 A/250 V (not accessible) | F 4 A/250 V (not accessible) | T 6.3 A/250 V (not accessible) |
| Required circuit-breaker (IEC 898) in mains supply line | 3 A, Characteristic C | From 6 A, Characteristic C | From 10 A, Characteristic C |
| **Output** | Stabilized, floating direct voltage | Stabilized, floating direct voltage | Stabilized, floating direct voltage |
| Rated voltage $V_{out\ rated}$ | **24 V DC** | **24 V DC** | **24 V DC** |
| Total tolerance | ± 3 % | ± 3 % | ± 3 % |
| • Stat. mains compensation | approx. 0.1 | Approx. 0.1 % | Approx. 0.1 % |
| • Stat. load compensation | Approx. 0.2 % | Approx. 0.2 % | Approx. 0.5 % |
| Residual ripple (clock frequency: approx. 70 kHz) | < 150 $mV_{pp}$ (typ. < 20 $mV_{pp}$) | < 150 $mV_{pp}$ (typ. 40 $mV_{pp}$) | < 150 $mV_{pp}$ (typ. 40 $mV_{pp}$) |
| Spikes (bandwidth: 20 MHz) | < 240 $mV_{pp}$ (typ. < 150 $mV_{pp}$) | < 240 $mV_{pp}$ (typ. 90 $mV_{pp}$) | < 240 $mV_{pp}$ (typ. 100 $mV_{pp}$) |
| Setting range | - | - | - |
| Status display | Green LED for 24 V O.K. | Green LED for 24 V O.K. | Green LED for 24 V O.K. |
| Power ON/OFF behavior | No overshoot of $V_{out}$ (soft start) | No overshoot of $V_{out}$ (soft start) | No overshoot of $V_{out}$ (soft start) |
| Starting delay/ voltage rise | < 3 s/typ. 60 ms | < 2 s (60 ms typ.) | < 1.5 s 80 ms typ. |
| Rated current $I_{out\ rated}$ | **2 A** | **5 A** | **10 A** |
| Current range | | | |
| • Up to +45 °C | 0 to 2 A | 0 to 5 A | 0 to 10 A |
| • Up to +60 °C | 0 to 2 A | 0 to 5 A | 0 to 10 A |
| Dyn. V/I with | | | |
| • Starting on short circuit | typ. 10 A for 90 ms | typ. 20 A for 75 ms | typ. 35 A for 80 ms |
| • Short-circuit in operation | typ. 10 A for 90 ms | typ. 20 A for 75 ms | typ. 35 A for 150 ms |
| Parallel connection for increased output | Not permissible | Not permissible | Not permissible |

## Technical specifications (continued)

| Power supply type<br>Order No. | 2 A<br>6ES7 307-1BA00-0AA0 | 5 A<br>6ES7 307-1EA00-0AA0 | 10 A<br>6ES7 307-1KA01-0AA0 |
|---|---|---|---|
| **Efficiency** | | | |
| Efficiency at $V_{out\ rated}$, $I_{out\ rated}$ | Approx. 83 % | Approx. 87 % | Approx. 87 % |
| Power loss at $V_{out\ rated}$, $I_{out\ rated}$ | Approx. 10 W | Approx. 18 W | Approx. 34 W |
| **Control** | | | |
| Dyn. mains compensation ($V_{in\ rated}$ ±15 %) | ± 0.3 % $V_{out}$ | ± 0.3 % $V_{out}$ | ± 0.3 % $V_{out}$ |
| Dyn. load compensation ($I_{out}$: 50/100/50 %) | ± 0.8 % $V_{out}$ | ± 2.5 % $V_{out}$ | ± 2.5 % $V_{out}$ |
| Settling time | | | |
| • Load step from 50 to 100% | < 5 ms (typ. 2.5 ms) | typ. 0.1 ms | < 5 ms |
| • Load step from 100 to 50% | < 5 ms (typ. 2.5 ms) | typ. 0.1 ms | < 5 ms |
| **Protection and monitoring** | | | |
| Output overvoltage protection | Additional control loop, shutdown at approx. 30 V, automatic restart | Additional control loop, shutdown at approx. 30 V, automatic restart | Additional control loop, shutdown at approx. 30 V, automatic restart |
| Current limitation | 2.2 to 2.6 A | 5.5 to 6.5 A | 11 to 12 A |
| Short-circuit protection | Electronic shutdown, automatic restart | Electronic shutdown, automatic restart | Electronic shutdown, automatic restart |
| RMS sustained short-circuit current | < 4 A | < 9 A | < 10 A |
| Overload/short-circuit indicator | - | - | - |
| **Safety** | | | |
| Electrical isolation primary/secondary | Yes, SELV output voltage $V_{out}$ acc. to EN 60950 and EN 50178 | Yes, SELV output voltage $V_{out}$ acc. to EN 60950 and EN 50178 | Yes, SELV output voltage $V_{out}$ acc. to EN 60950 and EN 50178 |
| Protective class | Class I | Class I | Class I |
| Discharge current | < 3.5 mA (typ. 0.7 mA) | < 3.5 mA (typ. 0.3 mA) | < 3.5 mA (typ. 0.5 mA) |
| TÜV test | Yes | Yes | Yes |
| CE-marking | Yes | Yes | Yes |
| UL/cUL (CSA), approval | Yes, UL listed (UL 508) File E143289, CSA (CSA22.2 No. 14-95) | Yes, UL listed (UL 508) File E143289, CSA (CSA 22.2 No. 14-95) | Yes, UL listed (UL 508) File E143289, CSA (CSA 22.2 No. 14-95) |
| FM approval | Yes, Class I Div. 2 Group A, B, C, D T4 | Yes, Class I Div. 2 Group A, B, C, D, T 4 | Yes, Class I Div. 2, A, B, C, D, T4 |
| Appr. for use in marine vessels | in the S7-300 system | in the S7-300 system | in the S7-300 system |
| Degree of protection (EN 60 529) | IP20 | IP20 | IP20 |
| **EMC** | | | |
| Interference emission | EN 55022 Class B | EN 55022 Class B | EN 55022 Class B |
| Line harmonics limitation | Not applicable | EN 61000-3-2 | EN 61000-3-2 |
| Interference immunity | EN 61000-6-2 | EN 61000-6-2 | EN 61000-6-2 |
| **Operating specifications** | | | |
| Ambient temperature range | 0 to +60°C with natural convection | 0 to +60°C with natural convection | 0 to +60°C with natural convection |
| Transportation and storage temperature range | -40 to +85 °C | -40 to +85 °C | -40 to +85 °C |
| Humidity rating | Climatic class 3K3 acc. to EN 60721, no condensation | Climatic class 3K3 acc. to EN 60721, no condensation | Climatic class 3K3 acc. to EN 60721, no condensation |
| **Mechanical specifications** | | | |
| Connections | | | |
| • Mains input L, N, PE (DC input: L+1, M1, PE) | One screw-type terminal each for 0.5 to 2.5 $mm^2$ single-core/finely stranded | One screw-type terminal each for 0.5 to 2.5 $mm^2$ single-core/finely stranded | One screw-type terminal each for 0.5 to 2.5 $mm^2$ single-core/finely stranded |
| • Output L+ | 2 screw-type terminals for 0.5 to 2.5 $mm^2$ | 3 screw-type terminals for 0.5 to 2.5 $mm^2$ | 4 screw-type terminals for 0.5 to 2.5 $mm^2$ |
| • Output M | 2 screw-type terminals for 0.5 to 2.5 $mm^2$ | 3 screw-type terminals for 0.5 to 2.5 $mm^2$ | 4 screw-type terminals for 0.5 to 2.5 $mm^2$ |
| Dimensions (W x H x D) in mm | 50 x 125 x 120 | 80 x 125 x 120 | 120 x 125 x 120 |
| Weight approx. | 0.42 kg | 0.74 kg | 1.1 kg |
| Mounting | Snap-mounting on S7 rail | Snap-mounting on S7 rail | Snap-mounting on S7 rail |
| **Accessories** | Mounting adapter for DIN rail and PS-CPU connection comb | Mounting adaptor for DIN rail and connection comb | Mounting adapter for DIN rail and PS-CPU connection comb |

## Overview

The ET 200B is a small, compact I/O device with small mounting depth and degree of protection IP20.

A wide range of analog and digital input/output modules are available.

The ET 200B is used primarily in areas that require few inputs/outputs or where only a shallow mounting depth is available.

The ET 200B is a passive station (slave) on the PROFIBUS DP field bus.

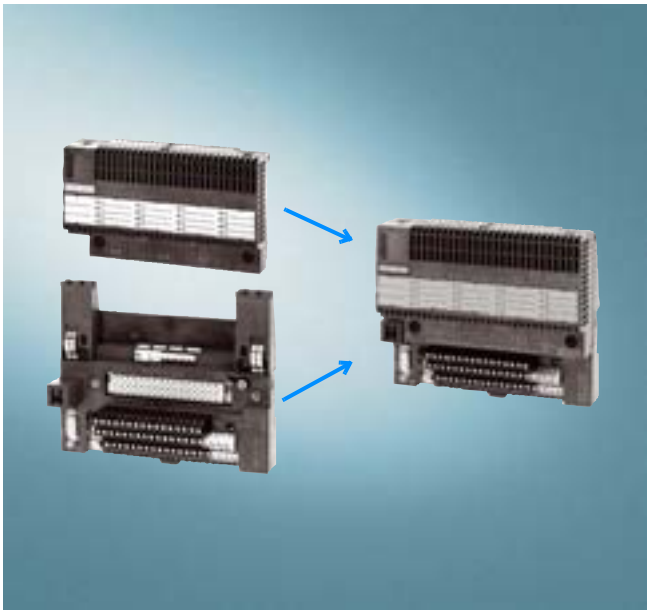
The maximum data transmission rate is 12 Mbit/s.

## Technical specifications – general

| | |
|---|---|
| Data transmission rate | max. 12 Mbit/s |
| Plug-in electronic modules | • Digital inputs<br>• Digital outputs<br>• Digital inputs/outputs<br>• Analog inputs<br>• Analog outputs |
| Connection method | Screw-type terminals and spring-loaded terminals, fixed wiring; 3-core and 4-core connections |
| Galvanic isolation | Yes, between PROFIBUS DP and internal electronics |
| Supply voltage | 24 V DC; 120 / 230V AC |
| Degree of protection | IP20 |
| Ambient temperature on vertical wall (preferred installation position) | |
| • With horizontal installation | 0 to + 60 °C |
| • With other installation | 0 to + 40 °C |
| Relative humidity | 15 to 95% (RH severity level 2 according to IEC 1131-2) |
| Atmospheric pressure | 795 to 1080 hPa |
| Mechanical rating | |
| • Vibration | IEC 68, Part 2 – 6 10 Hz (const. amplitude 0.075 mm) 57 - 150 Hz (constant acceleration 1 g) |
| • Shock | IEC 68, Part 2 - 27 half-sine, 15 g, 11 ms |

## Terminal blocks and electronic modules

### Overview



ET 200B compact I/O devices

#### Terminal blocks

The terminal block accommodates the electronic module. It carries the wiring, so that no cables need to be separated when the electronic module is replaced. The terminal block can be mounted on flat surfaces or on a standard rail.

The unit can be mounted horizontally or vertically.

The following terminal blocks are available:

- Terminal blocks for 24 V DC; with screw-type terminals:
  TB1/DC, TB1-4/DC,
  TB2/DC, TB2-4/DC
- Terminal blocks for 24 V DC; with spring-type terminals:
  TB3/DC, TB4/DC;
  TB3-4/DC, TB4-4/DC
- Terminal block for 120/230 V AC; with screw-type terminals:
  TB6/AC
- Terminal block for analog electronics blocks; with spring-type terminals:
  TB8

Terminal blocks are available for 3-wire and 4-wire connection. In the case of 3-wire connection, the input/output signals are assigned to one terminal strip. The 24 V supply voltage (24 V DC, chassis ground) is applied to the second and third row of terminals.

Terminal blocks with 4-tier terminals also feature channel-specific PE connection in the fourth terminal row terminal strip.

#### Electronic modules

The electronic modules contain the digital and analog input and output channels.

The following digital electronic modules are available for 2 4 V DC:

- 16 DI; with 16 inputs
- 32 DI; with 32 inputs,
  input delay 3 ms or 0.2 ms
- 16 DO; with 16 outputs 2 A/0.5 A or 2 A
- 32 DO; with 32 outputs, 0.5 A
- 24 DI/8 DO; with 24 inputs and 8 outputs 0.5 A,
  input delay 3 ms or 0.2 ms
- 16 DI/16 DO; with 16 inputs and 16 outputs 0.5 A
- 8 RO; DC 24 V to 60 V with 8 relay contacts
- 8 DI/8 DO; with 8 inputs and 8 outputs for 0.5 A
- 8 DI/8 DO; with integrated hardware shutdown

The following digital electronic modules are available for AC 120/230 V:

- 16 DI; with 16 inputs
- 16 DO; with 16 outputs for 0.5 A
- 16 RO; with 16 relay outputs
- 8 DI/8 DO; with 8 inputs and 8 relay outputs

The following analog electronic modules are available:

- 4/8 AI; with 4/8 inputs
  ± 80 mV; ± 250 mV;
  ± 500 mV; ± 1000 mV;
  Pt 100, Ni100, thermocouple
- 4 AI; with 4 inputs;
  ± 1.25 V; ± 2.5 V; ± 10 V;
  0 (4) to 20 mA
- 4 AO; with 4 outputs;
  ± 10 V; ± 10 V; ± 20 mA;
  0 (4) to 20 mA

A compensation box is also required to connect thermocouples to analog electronic modules.

## Technical specifications

### *ET 200B electronic modules*

| **Electronic modules (digital inputs)** | **6ES7 131- 0BH00-0XB0** | **6ES7 131- 0BL00-0XB0** | **6ES7 131- 0BL10-0XB0** | **6ES7 131- 0HF00-0XB0** |
|---|---|---|---|---|
| Number of inputs | **16** | **32** | **32** | **16** |
| Isolation | No | No | No | Yes |
| Input voltage $U_I$ | | | | |
| • Rated value | **24 V DC** | **24 V DC** | **24 V DC** | **120/230 V AC** |
| • For “0” signal | -30 to +5 V | -30 to +5 V | -30 to +5 V | 0 to 40 V |
| • For “1” signal | -13 to 30 V | -13 to 30 V | -13 to 30 V | +85 to 264 V |
| Input current for "1" signal | 4 mA | 4 mA | 4 mA | 3 to 16 mA |
| Delay of the inputs | 2 to 3.5 ms | 3 ms | 0.2 ms | 0 to 25 ms |
| Data transmission rate, max. | 12 Mbit/s | 12 Mbit/s | 12 Mbit/s | 12 Mbit/s |
| Line length, max. | 100 m | 100 m | 100 m | 600 m |
| Encoder supply | | | | |
| • Voltage | 18.5 to 30 V | 18.5 to 30 V | 18.5 to 30 V | - |
| • Current | 0.5 A | 1 A | 1 A | - |
| Terminal module | TB1/DC, TB1-4/DC, TB3/DC TB3-4/DC | TB2/DC, TB2-4/DC, TB4/DC TB4-4/DC | TB2/DC, TB2-4/DC, TB4/DC TB4-4/DC | TB6/AC |

| **Electronic modules (digital outputs)** | **6ES7 132- 0BH01-0XB0** | **6ES7 132- 0BH11-0XB0** | **6ES7 132- 0BL01-0XB0** | **6ES7 132- 0HF00-0XB0** |
|---|---|---|---|---|
| Number of outputs | **16** | **16** | **32** | **16** |
| Isolation | No | Yes | Yes | Yes |
| Output voltage $U_O$ | | | | |
| • Rated value | **24 V DC** | **24 V DC** | **24 V DC** | **120/230 V AC** |
| • For "0" signal, max. | 2 V (idle) | 2 V (idle) | 2 V (idle) | - |
| • For "1" signal, min. | $V_I$ -3 V | $V_I$ -3 V | $V_I$ -3 V | - |
| Output current | | | | |
| • At signal “0”, max. | 1 mA | 1 mA | 1 mA | 1.3 mA |
| • Signal "1", min. | 12 x 0.5 A and 4 x 2 A | 2 A; in groups of 4 | 0.5 A; in groups of 8 | 0.5 A; in groups of 4 |
| Total current per group, max. | 4 A | 4 A | 2 A | - |
| Shortcircuit protection | Electronic | Electronic | Electronic | Electronic |
| Data transmission rate, max. | 12 Mbit/s | 12 Mbit/s | 12 Mbit/s | 12 Mbit/s |
| Line length, max. | 100 m | 100 m | 100 m | 600 m |
| Switching frequency | | | | |
| • With resistive load, max. | 100 Hz | 100 Hz | 100 Hz | 10 Hz |
| • With inductive load, max. | 0.5 Hz | 0.5 Hz | 0.5 Hz | 0.5 Hz |
| • With lamps, max. | 8 Hz | 8 Hz | 8 Hz | 1 Hz |
| Terminal module | TB1/DC, TB1-4/DC, TB3/DC TB3-4/DC | TB2/DC, TB2-4/DC, TB4/DC TB4-4/DC | TB2/DC, TB2-4/DC, TB4/DC TB4-4/DC | TB6/AC |

## Terminal blocks and electronic modules

### Technical specifications

| Electronic modules (mixed) | 6ES7 133- 0BN01-0XB0 | 6ES7 133- 0BN11-0XB0 | 6ES7 133- 0BH01-0XB0 | 6ES7 133- 0HH01-0XB0 | 6ES7 133-0BL00-0XB0 |
|---|---|---|---|---|---|
| Number of inputs | **24** | **24** | **8** | **8** | **16** |
| Isolation | No | No | No | Yes | No |
| Input voltage $U_I$ | | | | | |
| • Rated value | **24 V DC** | **24 V DC** | **24 V DC** | **120/230 V AC** | **24 V DC** |
| • For “0” signal | -30 to +5 V | -30 to +5 V | -30 to +5 V | 0 to 40 V | -30 to +5 V |
| • For “1” signal | +13 to 30 V | +13 to 30 V | +13 to 30 V | +13 to 30 V | +13 to 30 V |
| Input current for "1" signal | 4 mA | 4 mA | 4 mA | 3 to 16 mA | 4 mA |
| Delay of the inputs | 3 ms | 0.2 ms | 2 to 3.5 ms | 0 to 25 ms | 3 ms |
| Line length, max. | 100 m | 100 m | 100 m | 600 m | 100 m |
| Data transmission rate, max. | 12 Mbit/s | 12 Mbit/s | 12 Mbit/s | 12 Mbit/s | 12 Mbit/s |
| Number of outputs | **8** | **8** | **8** | **8** (relays; 2 high-current and 6 low-current) | **16** |
| Isolation | Yes | Yes | No | Yes | Yes |
| Output voltage $U_O$ | | | | | |
| • Rated value | **24 V DC** | **24 V DC** | **24 V DC** | **120/230 V AC 24 to 150 V DC** | **24 V DC** |
| • For "0" signal, max. | 2 V (idle) | 2 V (idle) | 2 V (idle) | - | - |
| • For "1" signal, min. | $V_I$ -3 V | $V_I$ -3 V | $V_I$ -3 V | - | - |
| Output current | | | | | |
| • At signal “0”, max. | 1 mA | 1 mA | 1 mA | - | 1 mA |
| • Signal "1", min. | 0.5 A in one group | 0.5 A in one group | 0.5 A in one group | 4 A (2 connections) 2 A (6 connections) | 0.5 A, in groups of 8 per group 8 x 0.5 A |
| • Total current per group, max. | 2 A | 2 A | 2 A | 2 A | 2 A |
| • Total switching current | - | - | - | - | - |
| Shortcircuit protection | Electronic | Electronic | Electronic | Electronic | Electronic |
| Switching frequency | | | | | |
| • With resistive load, max. | 100 Hz | 100 Hz | 100 Hz | 10 Hz | 100 Hz |
| • With inductive load, max. | 0.5 Hz | 0.5 Hz | 0.5 Hz | 2 Hz | 0.5 Hz |
| • For lamp load; max. | 8 Hz | 8 Hz | 8 Hz | - | 8 Hz |
| Line length | 100 m | 100 m | 100 m | 100 m | 100 m |
| Terminal module | TB2/DC, TB2-4/DC, TB4/DC TB4-4/DC | TB2/DC, TB2-4/DC, TB4/DC TB4-4/DC | TB1/DC, TB1-4/DC, TB3/DC TB3-4/DC | TB6/AC | TB2/DC, TB2-4/DC, TB4/DC TB4-4/DC |

| Electronic modules (relay modules) | 6ES7 132-0GF00-0XB0 | 6ES7 132-0HH01-0XB0 |
|---|---|---|
| Number of outputs | **8** (relay) | **16 (relays;** 4 high-current and 12 low-current) |
| Galvanic isolation | Yes; in groups of 1 | Yes; in groups of 1 |
| Output voltage $U_O$ | | |
| • Rated value | **24 to 60 V DC** | **120/230 V AC; 61 to 150 V DC** |
| Output current | | |
| • At signal “0”, max. | - | - |
| • Signal "1", min. | 2 A at 24 V DC | 4 A (2 connections) 2 A (12 connections) |
| Short-circuit protection | No | No |
| Data transmission rate, max. | 12 Mbit/s | 12 Mbit/s |
| Cable length, max. | 100 m | 600 m |
| Switching frequency | | |
| • For resistive load, max. | 10 Hz | 10 Hz |
| • For inductive load, max. | 2 Hz | 2 Hz |
| Terminal block | TB1/DC, TB1-4/DC, TB3/DC TB3-4/DC | TB6/AC |

## Technical specifications (continued)

| Electronic modules (analog input/output modules) | 6ES7 134-0KH01-0XB0 | 6ES7 134-0HF01-0XB0 | 6ES7 135-0HF01-0XB0 |
|---|---|---|---|
| Number of inputs | **8** (voltage/ thermocouple) or **4** (Pt 100, Ni 100) | **4** | - |
| Input ranges | +/- 80 mV; +/- 250 mV +/- 500 mV +/- 1000 mV; Ni 100, Pt 100, thermocouple types J, K, L, E, N, T, U, R measurement | +/- 1.25 V; +/- 2.5 V, +/- 5 V; +/- 10 V;<br>0 (4) to 20 mA; ± 20 mA | - |
| Galvanic isolation | No | No | - |
| Input resistance | | | |
| Voltage measurement, min. | 10 Ω | 100 Ω | - |
| Current measurement | - | 125 Ω | - |
| Resolution | 11 bit amount + sign 12 bit two's complement | 11 bit amount + sign 12 bit two's complement | - |
| Measurement and conversion principle | Integrating Voltage/time conversion | Successive Approximation | |
| Encoding time | 2.5/16.7/20/100 ms parameterizable | max. 0.1 ms/channel | |
| Overrange | 17.5% | - | - |
| Data transmission rate, max. | 12 Mbit/s | 12 Mbit/s | 12 Mbit/s |
| Cable length, max. | 100 m | 100 m | 100 m |
| Number of outputs | - | - | **4** |
| Output ranges | - | - | ± 10 V; + 10 V;<br>±20 mA; 0 (4) to 20 mA |
| Galvanic isolation | - | - | No |
| Load resistance, max. | - | - | 300 Ω |
| Resolution | - | - | 11 bit two's complement |
| Conversion time | - | - | 1 ms/channel |
| Overrange | - | - | 17.5% |
| Short-circuit protection | - | - | Electronic |
| Type of connection | 2-wire and 4-wire connection | 2-wire connection | 2-wire and 4-wire connection |
| Terminal block | TB8 | TB8 | TB8 |

| Terminal blocks | TB1/DC,TB1-4/DC TB3/DC,TB3-4/DC | TB2/DC,TB2-4/DC TB4/DC,TB4-4/DC | TB6/AC | TB8 |
|---|---|---|---|---|
| Supply voltage | | | | |
| • Rated value | 24 V DC | 24 V DC | **120/230 V AC** | **24 V DC** |
| • Permissible range (including ripple) | 18.5 to 30 V | 18.5 to 30 V | 85 to 264 V | 18.5 to 30 V |
| Connection method | TB1:<br>Screw-type terminals<br>TB3:<br>spring-loaded terminals | TB2:<br>Screw-type terminals<br>TB4:<br>spring-loaded terminals | Screw-type-terminals | spring-loaded terminals |
| Galvanic isolation | | | | |
| Between electronic block and PROFIBUS DP | Yes | Yes | Yes | Yes |
| Current consumption 24 V DC | | | | |
| • Internal (logic), approx. | 100 to 170 mA | 100 to 200 mA | 60 to 210 mA | 70 to 100 mA |
| Ambient temperature | 0 °C to +60 °C | 0 °C to +60 °C | 0 °C to +60 °C | 0 °C to +60 °C |
| Degree of protection | IP20 | IP20 | IP20 | |
| Dimensions (W x H x D) in mm | 160 x 130 x 59 | 235 x 130 x 59 | 235 x 130 x 59 | 160 x 130 x 59 |
| Weight (total), approx. | 0.6 kg | 0.8 kg | 0.8 kg | 0.6 kg |

## Terminal blocks and electronic modules

### Ordering data

| | Order No. |
|---|---|
| **Terminal blocks** | |
| **TB1/DC** with 3-tier screw-type terminals[1] for digital 24 V DC electronic blocks with a width of 160 mm (e.g. 16 DI) | **6ES7 193-0CA10-0XA0** |
| **TB1-4/DC** with 4-tier screw-type terminals[2] for digital 24 V DC electronic blocks with a width of 160 mm (e.g. 16 DI) | **6ES7 193-0CA20-0XA0** |
| **TB2/DC** with 3-tier screw-type terminals[1] for digital 24 V DC electronic blocks with a width of 235 mm (e.g. 32 DI) | **6ES7 193-0CB10-0XA0** |
| **TB2-4/DC** with 4-tier screw-type terminals[2] for digital 24 V DC electronic blocks with a width of 235 mm (e.g. 32 DI) | **6ES7 193-0CB20-0XA0** |
| **TB3/DC** with 3-tier spring-loaded terminals[1] for digital 24 V DC electronic blocks with a width of 160 mm (e.g. 16 DI) | **6ES7 193-0CA30-0XA0** |
| **TB3-4/DC** with 4-tier spring-loaded terminals[2] for digital 24 V DC electronic blocks with a width of 160 mm (e.g. 16 DI) | **6ES7 193-0CA40-0XA0** |
| **TB4/DC** with 3-tier spring-loaded terminals[1] for digital 24 V DC electronic blocks with a width of 235 mm (e.g. 32 DI) | **6ES7 193-0CB30-0XA0** |
| **TB4-4/DC** with 4-tier spring-loaded terminals[2] for digital 24 V DC electronic blocks with a width of 235 mm (e.g. 32 DI) | **6ES7 193-0CB40-0XA0** |
| **TB4-M/DC** with 3-wire spring-loaded terminals for digital electronic modules with additional mass terminals with a width of 235 mm | **6ES7 193-0CE30-0XA0** |
| **TB6/AC** with 3-tier screw terminals for digital 120/230 V AC electronic blocks with a width of 235 mm | **6ES7 193-0CC10-0XA0** |
| **TB8** with spring-loaded termianls for electronic blocks with analog inputs/outputs (analog terminal block) | **6ES7 193-0CD40-0XA0** |

1) Input/output signals: 24V DC, ground

2) Input/output signals: 24V DC, ground; PE

| | Order No. |
|---|---|
| **Electronic modules** | |
| With digital I/O for 24 V DC | |
| **16 DI**; 160 mm wide | **6ES7 131-0BH00-0XB0** |
| **32 DI**; 235 mm wide | |
| • Input delay 3 ms | **6ES7 131-0BL00-0XB0** |
| • Input delay 0.2 ms | **6ES7 131-0BL10-0XB0** |
| **32 DO**; 235 mm wide | **6ES7 132-0BL01-0XB0** |
| **16 DO** | |
| • Output current 0.5 A/2 A, width 160 mm | **6ES7 132-0BH01-0XB0** |
| • Output current 2 A, width 235 mm | **6ES7 132-0BH11-0XB0** |
| **24 DI/8 DO**; 235 mm wide | |
| • Input delay 3 ms | **6ES7 133-0BN01-0XB0** |
| • Input delay 0.2 ms | **6ES7 133-0BN11-0XB0** |
| **8 DI/8 DO**; 160 mm wide | **6ES7 133-0BH01-0XB0** |
| **8 DI/8 DO**; with integrated hardware disable of the outputs, 160 mm wide | **6ES7 133-0BH10-0XB0** |
| **16 DI/16 DO**; 235 mm wide | **6ES7 133-0BL00-0XB0** |
| **8 RO**; with 8 relay outputs 24 to 60 V DC, 160 mm wide | **6ES7 132-0GF00-0XB0** |
| **Electronic module** | |
| With digital inputs/outputs for 120/230 V AC, width 235 mm | |
| • **16 DI**; 235 mm wide | **6ES7 131-0HF00-0XB0** |
| • **16 DO**; 235 mm wide | **6ES7 132-0HF00-0XB0** |
| • **16 RO**; 235 mm wide | **6ES7 132-0HH01-0XB0** |
| • **8 DI/8 RO**; 235 mm wide | **6ES7 133-0HH01-0XB0** |
| **Electronic module** | |
| With analog inputs/outputs, width 160 mm | |
| • **4/8 AI**; ±80 mV; ±250 mV; ±500 mV; ±1000 mV Pt100, Ni100, thermocouples Type J, K, L, E, N, T, V | **6ES7 134-0KH01-0XB0** |
| • **4 AI**; ±1,25 V; ±2,5 V; ±5 V; ± 10 V; 0 (4) to 20 mA | **6ES7 134-0HF01-0XB0** |
| • **4 AO**; ± 10 V; + 10 V; ±20 mA; 0 (4) to 20 mA | **6ES7 135-0HF01-0XB0** |

## Ordering data

*Accessories*

| | Order No. |
|---|---|
| **Bus plug connector for PROFIBUS** | |
| max. transmission rate 12 Mbit/s to IP20 degree of protection; with swivelled cable outlet | |
| • without PG connection socket | **6ES7 972-0BA50-0XA0** |
| • with PG connection socket | **6ES7 972-0BB50-0XA0** |
| **Mini fuse** | |
| For terminal blocks (10 items in each case) | |
| • TR5-T; 1.6 A/125 V for TB1/DC, TBI-4/DC, TB3/DC,TB8 | **6ES7 193-0DA00-0XA0** |
| • TR5-T; 2.5 A/250 V for TB2/DC, TB2-4/DC, TB4/DC | **6ES7 193-0DB00-0XA0** |
| • TR5-T; 1.0 A/250 V for TB6/AC | **6ES7 193-0DC00-0XA0** |
| **Shield termination element** | **6ES7 193-0CD40-7XA0** |
| Add-on part for TB8 terminal block; allows the shield to be connected over a large surface area for analog signals | |
| **Shield connection terminal** | |
| For connecting cable to shield termination element (2 items in each case); Shield diameter: | |
| • 2 × 2 to 6 mm | **6ES7 390-5AB00-0AA0** |
| • 1 × 3 to 8 mm | **6ES7 390-5BA00-0AA0** |
| • 1 × 4 to 13 mm | **6ES7 390-5CA00-0AA0** |

| | Order No. |
|---|---|
| **Labeling strips (DIN A4)** | |
| • For 8DI/8DO, 16DI and 16DO electronic modules (10 items) | **6ES7 193-0BB00-0XA0** |
| • For 32DI, 24DI/8DO, 32DO and 16DI/16DO electronic modules (7 items) | **6ES7 193-0BD00-0XA0** |
| • For 8RO electronic modules (10 items) | **6ES7 193-0BA00-0XA0** |
| • For 8RO electronic modules (10 items) | **6ES7 193-0BC00-0XA0** |
| • For 120/230 V AC electronic modules (7 items) | **6ES7 193-0BF00-0XA0** |
| • For analog electronic modules (10 items) | **6ES7 193-0BE00-0XA0** |
| **Hardware manual for ET 200B distributed I/O station** | |
| • German | **6ES5 998-4ET11** |
| • English | **6ES5 998-4ET21** |
| • French | **6ES5 998-4ET31** |
| **24 V power supply** | |
| SITOP power in slimline design | |
| • 120/230V AC, width 160 mm, 24 V, 5 A | **6EP1 333-1AL11** |
| • 120/230V AC, width 220 mm, 24 V, 10 A | **6EP1 334-1AL11** |

## SITOP power supplies
## The flat design

### Overview

The flat design which is of great advantage where only low mounting depths are available, e.g. for use with distributed IO, in machine benches or alcoves; design matched to SIMATIC ET 200B.

For further details about SITOP power supplies, see Catalog KT 10.1.

### Technical specifications

| **Power supply type**<br>**Order No.** | **5 A**<br>**6EP1 333-1AL12** | **10 A**<br>**6EP1 334-1AL12** |
|---|---|---|
| **Input** | Single-phase AC | Single-phase AC |
| Rated voltage $V_{in\ rated}$ | **120/230 V AC**<br>Settable via switch on device | **120/230 V AC**<br>Settable via switch on device |
| Voltage range | 85 to 132 V/170 to 264 V AC | 85 to 132 V/170 to 264 V AC |
| Overvoltage strength | 2.3 x $V_{in\ rated}$, 1.3 ms | 2.3 x $V_{in\ rated}$, 1.3 ms |
| Mains buffering $I_{out\ rated}$ | > 20 ms at $V_{in}$ = 93/187 V | > 20 ms at $V_{in}$ = 93/187 V |
| Rated line frequency; range | 50/60 Hz; 47 to 63 Hz | 50/60 Hz, 47 to 63 Hz |
| Rated current $I_{in\ rated}$ | 2.2/1.2 A | 4/2.5 A |
| Inrush current limitation (+25 °C) | < 32 A, < 3 ms | < 65 A, < 3 ms |
| $I^2t$ | < 0.8 $A^2s$ | < 3.3 $A^2s$ |
| Integrated line-side fuse | T 3.15 A/250 V (not accessible) | T 6.3 A/250 V (not accessible) |
| Required circuit-breaker (IEC 898) in mains supply line | From 6 A, Characteristic C | From 10 A, Characteristic C |
| **Output** | Stabilized, floating direct voltage | Stabilized, floating direct voltage |
| Rated voltage $V_{out\ rated}$ | **24 V DC** | **24 V DC** |
| Total tolerance | ± 1 % | ± 1 % |
| • Stat. mains compensation | Approx. 0.1 % | Approx. 0.1 % |
| • Stat. load compensation | Approx. 0.5 % | Approx. 0.5 % |
| Residual ripple (clock frequency: approx. 40 kHz) | < 150 $mV_{pp}$ (typ. 40 $mV_{pp}$) | < 150 $mV_{pp}$ (typ. 50 $mV_{pp}$) |
| Spikes (bandwidth: 20 MHz) | < 240 $mV_{pp}$ (typ. 100 $mV_{pp}$) | < 240 $mV_{pp}$ (typ. 200 $mV_{pp}$) |
| Setting range | 22 to 29 V | 22-29 V |
| Status display | Green LED for 24 V O.K. | Green LED for 24 V O.K. |
| Power ON/OFF behavior | No overshoot of $V_{out}$<br>(soft start) | No overshoot of $V_{out}$<br>(soft start) |
| Starting delay/voltage rise | < 2 s/typ. 40 ms | < 2 s/typ. 40 ms |
| Rated current $I_{out\ rated}$ | **5 A** | **10 A** |
| Current range | | |
| • Up to +45 °C | 0 to 5 A | 0 A to 10 A |
| • Up to +60 °C | 0 to 5 A | 0 A to 10 A |
| Dyn. *V*/*I* with | | |
| • Starting on short circuit | typ. 20 A for 500 ms | typ. 35 A for 700 ms |
| • Short-circuit in operation | typ. 20 A for 500 ms | typ. 35 A for 700 ms |
| Parallel connection for increased output | Yes, 2 | Yes, 2 |

## Technical specifications (continued)

| Power supply, type<br>Order No. | 5 A<br>6EP1 333-1AL12 | 10 A<br>6EP1 334-1AL12 |
|---|---|---|
| **Efficiency** | | |
| Efficiency at $V_{out\ rated}$, $I_{out\ rated}$ | Approx. 88 % | Approx. 89 % |
| Power loss at $V_{out\ rated}$, $I_{out\ rated}$ | Approx. 17 W | Approx. 30 W |
| **Control** | | |
| Dyn. mains compensation ($V_{in\ rated}$ ±15 %) | ± 0.3 % $V_{out}$ | ± 0.3 % $V_{out}$ |
| Dyn. load compensation ($I_{out}$: 50/100/50 %) | ± 0.5 % $V_{out}$ | ± 0.6 % $V_{out}$ |
| Settling time | | |
| • Load step from 50 to 100% | < 5 ms (typ. 0.1 ms) | < 5 ms (typ. 0.1 ms) |
| • Load step from 100 to 50% | < 5 ms (typ. 0.1 ms) | < 5 ms (typ. 0.2 ms) |
| **Protection and monitoring** | | |
| Output overvoltage protection | Additional control loop, shutdown at approx. 33 V, automatic restart | Additional control loop, shutdown at approx. 33 V, automatic restart |
| Current limitation | 5.5 to 6.5 A | 11 to 13 A |
| Short-circuit protection | Electronic shutdown, automatic restart | Electronic shutdown, automatic restart |
| RMS sustained short-circuit current | < 5 A | < 10 A |
| Overload/short-circuit indicator | - | - |
| **Safety** | | |
| Galvanic isolation primary/secondary | Yes, SELV output voltage $V_{out}$ acc. to EN 60950 and EN 50178 | Yes, SELV output voltage $V_{out}$ acc. to EN 60950 and EN 50178 |
| Protective class | Class I | Class I |
| Discharge current | < 3.5 mA (typ. 0.26 mA) | < 3.5 mA (typ. 0.27 mA) |
| TÜV test | Yes | Yes |
| CE-marking | Yes | Yes |
| UL/cUL (CSA), approval | Yes, cULus listed (UL 508, CSA 22.2 No. 14-M91), File E197259 | Yes, cULus listed (UL 508, CSA 22.2 No. 14-M91), File E197259 |
| FM approval | - | - |
| Appr. for use in marine vessels | - | - |
| Degree of protection (EN 60 529) | IP20 | IP20 |
| **EMC** | | |
| Interference emission | EN 55022 Class B | EN 55022 Class B |
| Line harmonics limitation | - | - |
| Interference immunity | EN 61000-6-2 | EN 61000-6-2 |
| **Operating specifications** | | |
| Ambient temperature range | 0 to +60°C with natural convection | 0 °C to +60°C with natural convection |
| Transportation and storage temperature range | -25 to +85 °C | -25 to +85 °C |
| Humidity rating | Climatic class 3K3 acc. to EN 60721, no condensation | Climatic class 3K3 acc. to EN 60721, no condensation |
| **Mechanical specifications** | | |
| Connections | | |
| • Mains input L, N, PE | One screw-type terminal each for 0.5 to 2.5 $mm^2$ single-core/finely stranded | One screw-type terminal each for 0.5 to 2.5 $mm^2$ single-core/finely stranded |
| • Output L+ | 3 screw-type terminals for 0.5 to 2.5 $mm^2$ | 3 screw-type terminals for 0.5 to 2.5 $mm^2$ |
| • Output M | 3 screw-type terminals for 0.5 to 2.5 $mm^2$ | 3 screw-type terminals for 0.5 to 2.5 $mm^2$ |
| Dimensions (W x H x D) in mm | 160 x 130 x 60 | 160 x 130 x 60 |
| Weight approx. | 0.6 kg | 0.72 kg |
| Mounting | Snap-mounting on DIN rail EN 50022-35x15/7.5 | Snap-mounting on DIN rail EN 50022-35x15/7.5 |
| **Accessories** | Mounting bracket | Mounting bracket |

## ET 200eco

### Overview

- Compact, low-cost I/O for processing digital signals
- Installation outside the control cabinet to IP67 degree of protection with flexible, fast connection method
- Comprising a basic module and different connection blocks for solutions adapted to the application
  - ECOFAST: 2 x hybrid fieldbus interface RS 485 with identification plug for setting the PROFIBUS address
  - M12: 2 x M12 and 2 x 7/8" with 2 rotary coding switches for PROFIBUS address assignment
- Connection block contains T functionality for PROFIBUS DP and power supply, so that for startup and servicing, the modules can be disconnected from PROFIBUS without interruption and connected again
- Module types:
  8DI, 16DI, 8DI/DO (1,3 A), 8DI/8DO (2,0 A), 8DO, 16DO, 4/8F-DI
- Transmission rate up to 12 Mbit/s



### Technical specifications

| | |
|---|---|
| Dimensions (W x H x D) in mm | |
| • Basic submodule | 210 x 60 x 28 |
| • Basic submodule with ECOFAST | 210 x 60 x 54 |
| • Basic submodule with M12, 7/8" | 210 x 60 x 53 |
| Baud rates | 9.6/19.2/45.45/93.75/187.5/500 kbit/s; 1.5/3/6/12 Mbit/s |
| Supply voltage | 24 V DC |
| Max. permissible power consumption from load circuit 1 (unswitched voltage) | Up to 55 °C up to 1 A (depending on the variant) |
| Outputs: Current carrying capacity per channel | 0.5/1.3 or 2.0 A (depending on the variant) |
| Polarity reversal protection | Yes |
| Diagnostic functions | |
| • Group error display | Yes |
| • Short-circuit vibration supply | per module |
| • Load power supply failed | per module |

| **Pin assignments for actuators/ sensors on M12 connector** | | | | | |
|---|---|---|---|---|---|
| • Module/pin | 1 | 2 | 3 | 4 | 5 |
| • 8 DI | 24 V DC | NC | GND | DI | PE |
| • 16 DI | 24 V DC | DI | GND | DI | PE |
| • 8 DO | NC | NC | GND | DO | PE |
| • 16 DO | NC | DO | GND | DO | PE |
| • 8DI/8DO (1,3 A) X1, X3, X5, X7 | 24 V DC | DI | GND | DI | PE |
| • 8DI/8DO (1,3 A) X2, X4, X6, X8 | NC | DO | GND | DO | PE |
| • 8 DI / 8 DO (2.0 A) | 24 V DC | DI | GND | DO | PE |
| • 4/8F DI X1–X4 | 24 V DC | DI | GND | DI | 24 V DC |
| • 4/8F DI X3–X8 | 24 V DC | – | GND | DI | – |

| Ordering data | Order No. |
|---|---|
| **ET 200eco BM 141 basic modules** | |
| • 8 DI 24 V DC 8 x M12, single assignment, IP65/67 connection block 6ES7194-3AA00-0.A0 to be ordered separately | **6ES7 141-3BF00-0XA0** |
| • 16 DI 24 V DC 8 x M12, dual assignment, IP65/67 connection block 6ES7194-3AA00-0.A0 to be ordered separately | **6ES7 141-3BH00-0XA0** |
| **ET 200eco BM 142 basic modules** | |
| • 8 DO 24 V DC/1.2 A 8 x M12, single assignment, IP65/67 connection block 6ES7194-3AA00-0.A0 to be ordered separately | **6ES7 142-3BF00-0XA0** |
| • 16 DO DC 24 V/0.5 A 8 x M12, dual assignment, IP65/67 degree of protection; connection block 6ES7 194-3AA00-0.A0 to be ordered separately | **6ES7 142-3BH00-0XA0** |
| **ET 200eco BM 143 basic modules** | |
| • 8 DI/8 DO, 2 A; 8 x M12, IP65/67 connection block 6ES7194-3AA00-0.A0 to be ordered separately | **6ES7 143-3BH00-0XA0** |
| • 8 DI/8 DO, 1.3 A; 8 x M12, dual assignment, IP65/67 connection block 6ES7 194-3AA00-0.A0 to be ordered separately | **6ES7 143-3BH10-0XA0** |
| **ET 200eco BM 148 basic modules** | |
| • 4/8 F-DI, 8 x M12, connection block 6ES7194-3AA00-0.A0 to be ordered separately | **6ES7 148-3FA00-0XB0** |
| **ECOFAST connection block** For ET 200eco, 2 x ECOFAST connection RS485 identification connectors for PROFIBUS DP, address setting | **6ES7 194-3AA00-0AA0** |
| **M12 connection block, 7/8"** For ET 200eco, 2 x M12 and 2 x 7/8" 2 rotary coding switch for PROFIBUS DP, address setting | **6ES7 194-3AA00-0BA0** |
| ***Accessories*** | |
| **Labels for inscription** | **3RT1 900-1SB20** |
| **Module description "ET 200eco distributed I/O station" except for F-DI** Paper version | |
| • German | **6ES7 198-8GA00-8AA0** |
| • English | **6ES7 198-8GA00-8BA0** |
| • French | **6ES7 198-8GA00-8CA0** |
| **PROFIBUS ECOFAST Hybrid Cable – Copper** | See ECOFAST bus cables |
| **M12 sealing caps** For sealing unused input or output sockets | **3RX9 802-0AA00** |

| | Order No. |
|---|---|
| ***Accessories for M12 connection block 7/8"*** | |
| **PROFIBUS M12 connecting cables** 2-core (coded inversely) preassembled with M12 connectors in various lengths: | |
| • 0,5 m | **6XV1 830-3DE50** |
| • 1.0 m | **6XV1 830-3DH10** |
| • 1.5 m | **6XV1 830-3DH15** |
| • 2.0 m | **6XV1 830-3DH20** |
| • 3.0 m | **6XV1 830-3DH30** |
| • 5.0 m | **6XV1 830-3DH50** |
| • 10.0 m | **6XV1 830-3DN10** |
| • 15.0 m | **6XV1 830-3DN15** |
| **SIMATIC NET Energy Cable** 5-core power line, stranded 5 x 1.5 $mm^2$, can be trailed | |
| • Sold by the meter, minimum order = 20 m | **6XV1830-8AH10** |
| **PROFIBUS M12 bus termination plugs** For PROFIBUS DP, 1 package = 5 parts | **6GK1 905-0EC00** |
| **7/8" connecting cables for power supply** 5-core, preassembled with 7/8" connectors in various lengths: | |
| • 0,5 m | **6XV1 822-5BE50** |
| • 1.0 m | **6XV1 822-5BH10** |
| • 1.5 m | **6XV1 822-5BH15** |
| • 2.0 m | **6XV1 822-5BH20** |
| • 3.0 m | **6XV1 822-5BH30** |
| • 5.0 m | **6XV1 822-5BH50** |
| • 10.0 m | **6XV1 822-5BN10** |
| • 15.0 m | **6XV1 822-5BN15** |
| **PROFIBUS M12 plug connectors** 1 package = 5 parts | |
| • Male inserts | **6GK1 905-0EA00** |
| • Female inserts | **6GK1 905-0EB00** |
| **7/8" plug-in connectors** 1 package = 5 parts | |
| • Male inserts | **6GK1 905-0FA00** |
| • Female inserts | **6GK1 905-0FB00** |
| **7/8" sealing caps** 1 package = 10 parts | **6ES7 194-3JA00-0AA0** |
| **M12 Y circular connectors** For the double connection of sensors by means of single cables, 5-pole; cannot be used for F-DI4/8 | **6ES7 194-1KA01-0XA0** |
| **M12 connectors** For connecting actuators or sensors, 5-pin | **3RX1 667** |
| **M12 angular circular connectors** For connecting actuators or sensors, 5-pin | **3RX1 668** |
| **S7 Manual Collection** Electronic manuals on CD, multi-language: S7-200/300/400, TD 200, M7-300/400, C7, STEP 7, Engineering Tools, Runtime Software, SIMATIC DP (Distributed I/O), SIMATIC HMI (Human Machine Interface), SIMATIC NET (Industrial Communication) | **6ES7 998-8XC01-8YE0** |
| **S7 Manual Collection update service for 1 year** Scope of supply: Up-to-date CD S7 Manual Collection as well as the three subsequent updates | **6ES7 998-8XC01-8YE2** |

## ET 200R

### Overview

- Distributed I/O to the degree of protection IP65
- Die-cast aluminum housing
- Integrated repeater
- Parameterizable inputs/ outputs: 8 DI/8 DO up to 16 DI
- Terminal strip at rear for connecting up analog signals for welding transformers
- Connection through hybrid line to 17-pin M23 connector



### Technical specifications

| | |
|---|---|
| Dimensions (W x L x H) in mm | 54 x 150 x 55 (64) |
| Degree of protection | IP65 |
| Housing material | Cast aluminum |
| Number of channels | 16 process channels<br>8 permanently DI<br>8 parameterizable DI/DO |
| Connection of channels | 8x 5-pin circular connector M12x1 |
| Ambient temperature | 55° |
| Rated supply voltage | 24 V DC |
| Polarity reversal protection for supply voltage | Yes |
| Power-up time at 12 Mbaud | approx. 80ms |
| **Digital inputs** | |
| Encoder supply per 8 channels | Max. 0.5A |
| Input characteristic curve | Acc. to IEC 1131,<br>Type 2 2-wire BEROs can also be connected |
| **Digital outputs** | |
| Number of channels | Max. 8 |
| Output current per channel | Max. 0.5A |
| Total output current | Max. 2A up to 55° |
| Capable of withstanding short-circuits | Yes, electronic |
| **Bus and voltage connections** | |
| X01/X02 | 2 x M23 (17-pin) |
| **Diagnostics** | |
| Missing load voltage | Yes |
| Short-circuit in encoder supply | Each group<br>X0 to X3 or<br>X4 to X7 |
| Short-circuit in digital outputs | Each group<br>X0 to X1 or<br>X2 to X3 |

| **Pin assignments** | | |
|---|---|---|
| Pin assignment X01/X02 M23 | Pin 1 | 0V US1 |
| | Pin 2 | 0V US2 |
| | Pin 3 | 24V US2 |
| | Pin 4 | 24V US1 |
| | Pin 5 | FE (nc) |
| | Pin 6 | PROFIBUS B |
| | Pin 7 | nc |
| | Pin 8 | nc |
| | Pin 9 | SKÜ 1 |
| | Pin 10 | SKÜ 2 |
| | Pin 11 | PROFIBUS A |
| | Pin 12 | KSR 1 |
| | Pin 13 | nc |
| | Pin 14 | nc |
| | Pin 15 | nc |
| | Pin 16 | nc |
| | Pin 17 | KSR 2 |
| Pin assignment for rear terminal block X03 | Pin 1 | Encoder supply |
| | Pin 2 | 24V US1 |
| | Pin 3 | DI (X07 Pin 2) |
| | Pin 4 | 0V US1 |
| | Pin 5 | KSR 1 |
| | Pin 6 | KSR 2 |
| | Pin 7 | SKÜ 1 |
| | | SKÜ 2 |
| **Pin assignments for sensors/actuators** | | |
| Actuator / sensor channels 0 to 7 Connector X0 to X3 | Pin 1 | 24V US1 |
| | Pin 2 | DI/DO |
| | Pin 3 | 0V US1 |
| | Pin 4 | DI/DO |
| | Pin 5 | FE/Shield |
| Actuator / sensor channels 8 to 15 Connector X4 to X7 | Pin 1 | 24V US1 |
| | Pin 2 | DI |
| | Pin 3 | 0V US1 |
| | Pin 4 | DI |
| | Pin 5 | FE/Shield |

| Ordering data | Order No. |
|---|---|
| **ET 200R handling module IP65**<br>metal casing 8 DI + 8 DI/DO, configurable; 24 V DC, 5-pole, 8 x M12, 2 x M23 (DP, PS, analog) | **6ES7 143-2BH00-0AB0** |
| **ET 200R welded module IP65**<br>metal casing 8 DI + 8 DI/DO, configurable; 24 V DC, 5-pole, 8 x M12, 2 x M23 (DP, PS, analog) | **6ES7 143-2BH50-0AB0** |
| ***Accessories*** | |
| **ELOCAB cables** | Can be ordered at:<br>ELOCAB Sonderkabel<br>Obere Lerch 34<br>D-91166 Georgensmünd,<br>Germany<br>Tel.: ++49 (0) 91 72 69 80-0<br>Fax: ++49 (0) 91 72 20 29 |
| **Interconnectron M23 connector** | Can be ordered at:<br>Hypertac GmbH<br>Auwiesenstr. 5, PO Box 14 65<br>D-94454 Deggendorf,<br>Germany |
| **S7 manual collection**<br>Electronic manuals on CD, multi-language:<br>S7-200, TD 200, S7-300, M7-300, C7, S7-400, M7-400, STEP 7, Engineering Tools, Runtime Software, SIMATIC DP (Distributed I/O), SIMATIC HMI (Human Machine Interface), SIMATIC NET (Industrial Communication) | **6ES7 998-8XC01-8YE0** |
| **S7 Manual Collection update service for 1 year**<br>Scope of supply: Up-to-date CD S7 Manual Collection as well as the three subsequent updates | **6ES7 998-8XC01-8YE2** |