VVDED397047US R8/01
August 2001
Raleigh, NC, USA

Instruction Bulletin

ALTIVAR® 58 Adjustable Speed Drive Controllers

Keypad Display
VW3A58101

Retain for future use.

Telemecanique

SQUARE D

⚠ DANGER

HAZARDOUS VOLTAGE

- Read and understand this bulletin in its entirety before installing or operating ALTIVAR 58 drive controllers. Installation, adjustment, repair, and maintenance of the drive controllers must be performed by qualified personnel.
- Disconnect all power including external control power that may be present before servicing the drive controller. WAIT THREE MINUTES for the DC bus capacitors to discharge. Then follow the DC bus voltage measurement procedure on page 87 to verify that the DC voltage is less than 45 V. The drive controller LEDs are not accurate indicators of the absence of DC bus voltage.
- DO NOT short across DC bus capacitors or touch unshielded components or terminal strip screw connections with voltage present.
- Install and close all covers before applying power or starting and stopping the drive controller.
- User is responsible for conforming to all applicable code requirements with respect to grounding all equipment.
- Many parts in this drive controller, including printed wiring boards, operate at line voltage. DO NOT TOUCH. Use only electrically insulated tools.

Before servicing the drive controller:

- Disconnect all power.
- Place a “DO NOT TURN ON” label on the drive controller disconnect.
- Lock disconnect in open position.

Electrical shock will result in death or serious injury.

CHAPTER 1—OVERVIEW

INTRODUCTION

The ALTIVAR 58 (ATV58) family of adjustable frequency AC drive controllers is used for controlling three-phase asynchronous motors. The controllers range from:

- 1–75 hp (0.75–55 kW) constant torque (100 hp variable torque), 400/460 V, three-phase input
- 0.5–7.5 hp (0.37–5.5 kW) constant torque, 208/230 V, single-phase input
- 0.5–30 hp (0.37–22 kW) variable torque, 208/230 V, single-phase input
- 2–40 hp (1.5–30 kW) constant torque (50 hp variable torque), 208/230 V, three-phase input

This bulletin covers the programming, monitoring, diagnostics, and operation of the ALTIVAR 58 drive controllers with the keypad display, part number VW3A58101U. Additional functionality can be obtained by installing the analog I/O option card (part no. VW3A58201U) or the digital I/O card (part no. VW3A58202U). The additional functionality provided by these option cards is documented in this bulletin.

For other I/O option cards and communication option cards and for information on programming the additional parameters available with those cards installed, refer to the manual provided with the card.

Certain modes, menus, and operations can be modified if the drive controller is equipped with these options. Consult the documentation pertaining to each of these options.

See Appendix B for a complete list of options and accessories.

This keypad display is used on the drive controllers found in Table 1 on page 8. For installation, wiring, start-up, and maintenance, consult Table 1 for the applicable drive controller instruction bulletin. Also consult the instruction bulletin provided with the I/O extension card or communication card if applicable.

Table 1: Drive Controller Instruction Bulletins

Drive Controller	Instruction Bulletin
ATV58 Type E	VVDED397052US
ECONO-FLEX	30072-450-01
ATV58 Type F	VVDED300011US
FLEX58 Chassis	30072-450-47
ATV58 Type H	VVDED397048US
ATV58 Type N	30072-450-10

This bulletin provides information on how to configure the ATV58 drive controller. Additional explanation of parameters and application information on how the parameters can be utilized can be found in the ALTIVAR 58 AC Drives Catalog, 8806CT9901, available on-line at www.SquareD.com.

REVISION LEVEL

This document replaces VVDED397047US dated July 2000. Over time, the functionality of the ATV58 drive controller has been upgraded to broaden the applications on which the ATV58 drive controller can be applied. This document can be used with earlier drive controllers, but not all the parameters detailed in this manual will be accessible if a drive controller is not equipped with the most recent firmware. Keypad displays are backward compatible. Older keypad displays used on newer drive controllers will not display the new parameters.

The drive controller firmware revision label is located adjacent to the integrated MODBUS port on the front of the drive controller. The keypad display firmware revision label is located on the back of the keypad display. The firmware on the drive controller may be upgraded by installing a new control board, part number VX4A581U and a new keypad display, part number VW3A58101U.

The following table details the major product upgrades with approximate date of release, drive controller firmware, associated keypad display firmware, and comments for the major function upgrade details.

Table 2: Product Upgrade and Revision Level History

Date	Drive Controller Firmware Revision	Associated Keypad Display Firmware Revision	Comments or Major Function Upgrade Details
1Q 1998	V2.1 IE 06	V1.0 IE 04	Initial release of the ATV58 product
2Q 1999	V3.1 IE 14	V2.0 IE 07	The following functions were added: Display machine speed, *USP*, based on scalor coefficient, *USC*. Display Motor power, *OPr*,. Ability to define DC injection current level, *SdC*. Ability to invert response to the PI regulator speed reference signal, *PIC*. Current limit adaptation as function of speed in VT mode, *Fdb*. Ability to inhibit reverse operation, *rIn*. Ability to define drive controller response to speed reference signal below low speed setting, *bSP*. U shaped acceleration and decel ramp type, *rPt*. Motor thermal overload protection (Ith) range increased from 45%–105% to 25%–136%
3Q 2000	V3.1 IE 16	V3.0 IE 08	Began production of 5–25 hp, 460 Vac variable torque rated drive controllers without the integrated EMC filter for 460 Vac installations where the filter is not required. Removing this filter allowed the product to be rated for additional horsepower at 460 Vac. These drive controllers have the ability to be configured for VT plus as described on page 24.

Table 2: Product Upgrade and Revision Level History (Continued)

Date	Drive Controller Firmware Revision	Associated Keypad Display Firmware Revision	Comments or Major Function Upgrade Details
3Q 2001	V4.1 IE 25	V4.1 IE 13	Relay R2 is no longer factory set for an output contactor. The factory setting is “not assigned.” The following functions were added: Run time meter function, *rth*, and watt-hour meter function, *APH*. Both meters can be reset, *rpr*. Two additional jump frequencies, *JF2* & *JF3*. A second programmable frequency threshold with logic output configuration, *F2d, F2A*. Ability to configure a freewheel stop below a programmable frequency, *Stt* & *FFT*. PID regulator enhanced to work with Auto/Manual (reference switching) *PAU, PIF, PIM*. PID regulator enhanced to accept programmable setpoints through the keypad display with the use of logic inputs, *PR2, PR4*. PID regulator enhanced with low pass filter on feedback, *PSP*. Selectable baud rate on integrated MODBUS port, *tbr*. Operation of an extremely undersized motor and the ability to configure an output voltage test mode by configuring *PSM*. Ability to configure loss of follower fault to run at pre-set speed, *LFF*, and signal loss of follower with logic output, *APL*. Additional assignments possible to an analog output on an option card: Signed ramp output, ORS; Motor power, OPR; PID setpoint, OPS; PID feedback, OPF; PID error, OPE; PID integral, OPI; Motor thermal state, THR; Drive thermal state, THD. Compatible with Ethernet, MODBUS®, TCP/IP communication card, and Forced local function The ability to provide torque limit via analog input AI3, activated by a logic input. *TLA, ATL*

KEYPAD DISPLAY

The keypad display allows:

- Display of the drive controller part number, electrical values, parameters, and faults
- Adjustment and configuration of the drive controller
- Local command
- Storage of four controller configurations which can be read or downloaded to multiple drive controllers of the same horsepower and same firmware revision

Mounting

To mount the keypad display, first remove the protective cover. Insert the keypad display into the SUB–D connector and tighten the finger-tight retaining screw by turning clockwise.

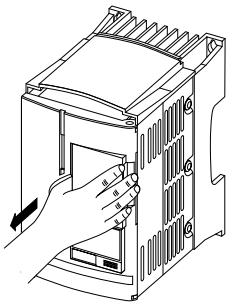


Figure 1: Removal of Protective Cover

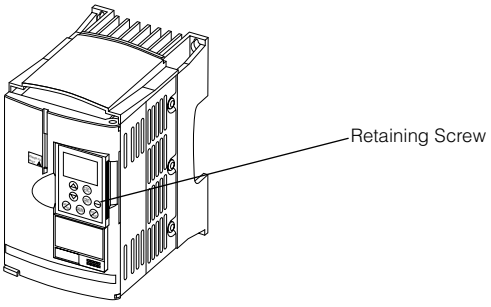


Figure 2: Drive Controller with Keypad Display Mounted

The keypad display can be mounted and removed while there is power to the drive controller. If the keypad display is removed while command of the drive controller from the keypad display is active, the drive controller will trip on the serial link fault. See SLF in Table 25 beginning on page 91.

Remote Mounting

To remotely mount the keypad display, use the keypad display remote mounting kit, part number VW3A58103. This kit has an IP65 rating. This kit contains a three meter (9.8 ft.) cable with connectors, parts for mounting the keypad display on the cover of an enclosure, and an instruction sheet.

Setting the 50/60 Hz Switch

⚠ DANGER

HAZARDOUS VOLTAGE

- Read and understand this bulletin in its entirety before installing or operating ALTIVAR 58 drive controllers. Installation, adjustment, repair, and maintenance of these drive controllers must be performed by qualified personnel.
- Disconnect all power before servicing the drive controller. WAIT THREE MINUTES until the DC bus capacitors discharge, then measure DC bus capacitor voltage between J2-4 (+) and J2-5 (-) for drive controllers ATV58U09M2 and U18M2, or between J2-5 (PA) and J18-7 for drive controllers ATV58U29M2 to U72M2 and ATV58U18N4 to D79N4, to verify that the DC voltage is less than 45 V. Refer to the Bus Voltage Measurement Procedure page 87.
- DO NOT short across DC bus capacitors or touch unshielded components or terminal strip screw connections with voltage present.
- User is responsible for conforming to all applicable code requirements with respect to grounding all equipment.
- Many parts in this drive controller, including printed wiring boards, operate at line voltage. DO NOT TOUCH. Use only electrically insulated tools.

Electrical shock will result in death or serious injury.

Figure 3 (page 13) shows the location of the 50/60 Hz switch on the drive controller. **Before powering up the drive controller and using the keypad display, you must set the 50/60 Hz switch to correspond with the frequency of the incoming AC power.**

Unlock and open the cover to access the 50/60 Hz switch on the control board. If an option card is present, the switch may not be accessible through the card. Set the switch to the position corresponding to the frequency of the incoming AC power.

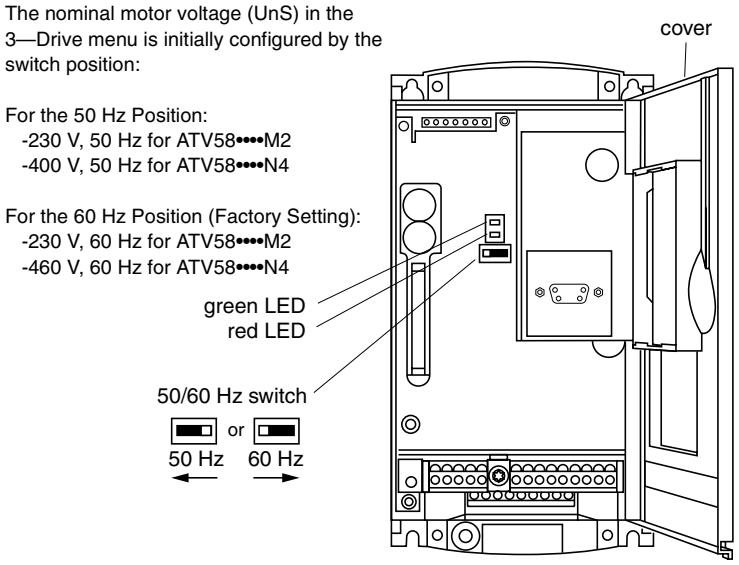
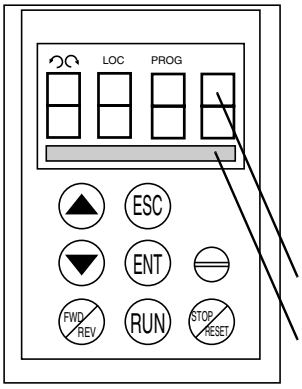


Figure 3: Location of 50/60 Hz Switch

Function of Keys and Meaning of Displays

Figure 4 shows the front of the keypad display. The LCD display is backlit. The keys and displays are explained below.



Flashing display: indicates the selected direction of motor rotation.
Fixed display: indicates the actual direction of motor rotation.

LOC — Indicates the keypad display command mode.

PROG — Appears in setup and programming mode. Flashing display indicates that a parameter has been modified but not saved.

Four 7-segment backlit LCD: displays numerical values and codes

16-character backlit LCD display: display of messages in plain language

Figure 4: Front View of Keypad Display

Press to move within the menus or among the parameters, and to scroll a numeric value up or down.

ESC — Press to return to the previous menu, or abandon an adjustment in progress and return to the original value.

ENT — Press to select a menu, or to validate and save a choice or an adjustment parameter.

If command by the keypad display has been selected:

FWD/REV — Press to change the direction of motor rotation

RUN — Press to start the motor

STOP/RESET — Press to stop the motor or reset a fault. The STOP function can also stop the drive controller in terminal command mode if so configured (see page 49).

Configuration Recommendations

⚠ WARNING

UNINTENDED EQUIPMENT ACTION

- Parameter changes affect drive controller operation.
- Most parameter changes require pressing ENT. Some parameter changes, such as reference frequency, take effect as soon as you press the up or down arrow keys.
- Read and understand this manual before using the keypad display.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

First prepare your program settings using the form in Appendix A at the back of this manual.

Programming of the ALTIVAR 58 is facilitated by internal checks. In order to understand and become comfortable with the keypad display, we recommend that you access the menus and program in the following order. All of the steps are not obligatory in all cases.

1. Set the 50/60 Hz switch.
2. Select the language.
3. Select the macro-configuration.
4. Select 2 or 3-wire control (4—Control menu).
5. Configure parameters in the 3—Drive Configuration menu.
6. Assign the I/O (5—I/O menu).
7. Configure parameters in the 4—Control menu.
8. Configure switching frequency type in the 3—Drive Configuration menu.
9. Configure fault management parameters in the 6—Fault menu.
10. Make Communication or Application configurations (if one of these options is used).
11. Make settings in the 2—Adjust menu.

NOTE: You must ensure that the functions which are programmed are compatible with the control scheme used.

If the Freewheel Stop / Run Permissive function is assigned to a logic input, the drive controller will not start the motor unless that logic input is connected to +24 V.

Minimum Start-Up

This procedure can be used as a minimum start-up:

- In simple applications where the drive controller factory settings are sufficient
- In installation when it is necessary to turn the motor before fully completing the start-up sequence

Procedure:

1. Make sure that the **50/60 Hz switch** is in the correct position, corresponding to the frequency of the incoming AC power, as shown on page 13.
2. Ensure that the **macro-configuration** factory setting is suitable for the application. Refer to Table 3 on page 22. If not, change the configuration **MACRO-CONFIG** menu as shown on page 21.
3. Verify that the **control scheme is compatible** with the macro-configuration, ensuring that the necessary safety precautions have been taken.
4. Verify in the **3—DRIVE** menu that the factory settings are compatible with the **motor nameplate values**. Refer to Table 11 on page 39. Modify them to match the nameplate values.
5. If necessary, **adjust the parameters** in the **2—ADJUST** menu (ramps, motor thermal protection, etc.). See Table 6 on page 28.

If the Freewheel Stop/Run Permissive function is assigned to a logic input, the drive controller will not start that motor unless the logic input is connected to +24 V.

ACCESS LEVELS

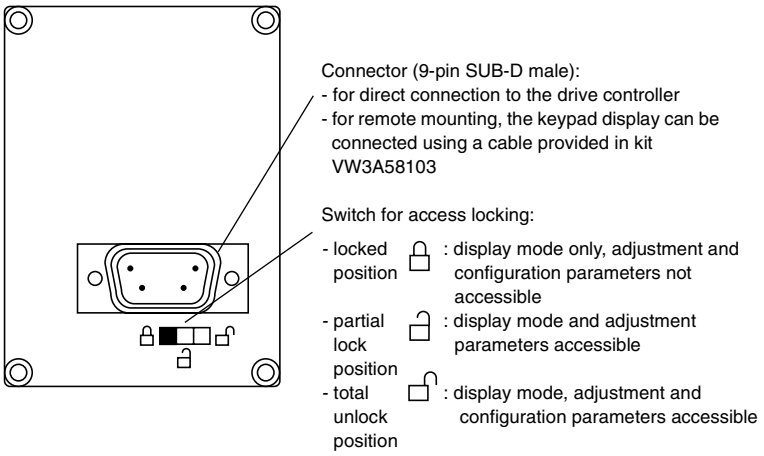


Figure 5: Rear View of Keypad Display

The position of the access locking switch on the back of the programming keypad display allows three levels of access to the menus. Access to the menus can also be prevented by using an access code (see the 7—File menu on page 79).

Locked Position – **Display Mode:** use when the motor is running to prevent modifications to the drive controller programming.

- You can select the dialog language in the **LANGUAGE** menu.
- You can display the macro-configuration or the pre-programmed values for the selected application in the **MACRO-CONFIG** menu.
- You can display the voltage and power rating of your drive controller in the **IDENTIFICATION** menu.
- You can display the electrical values, the operational status, or fault in the **1—DISPLAY** menu.

Partial Lock Position – **Display and Adjustment Modes:** this level is used during startup for access to basic setup parameters.

- You can do everything listed above.
- You can use the **2—ADJUST** menu to adjust parameters which are accessible when the motor is running.

Total Unlock Position 🔓 **– All modes:** this level is used during startup for access to advanced setup parameters.

- You can do everything listed in both access levels above.
- You can also select a different macro-configuration in the **MACRO-CONFIG** menu.
- You can adjust the performance of the motor-drive controller system, in the **3—DRIVE** menu.
- You can configure the drive controller command to be either from the terminal strip, the keypad display, or the integrated serial link using the **4—CONTROL** menu.
- You can change the assignments of the inputs and outputs in the **5—I/O** menu.
- You can configure motor protection, drive controller protection, and response after a fault has occurred in the **6—FAULT** menu.
- You can save the drive controller configurations, recall them from memory, return to factory settings, or protect your configuration in the **7—FILES** menu.
- You can adjust the parameters pertaining to communication in the **8—COMMUNICATION** menu, if a communication card is installed.
- You can access the **8—APPLICATION** menu, if a customer application card is installed.

Access To Menus

The number of menus which can be accessed depends on the position of the access locking switch. Each menu contains parameters to be adjusted or configured. Figure 6 shows the menus as they appear on the display when the access locking switch is in the **Total Unlock Position.** 🔓

NOTE: If an access code (password) has already been programmed, certain menus may not be modifiable, or may not be visible. In this case refer to “Access Code” on page 81 for how to enter the access code.

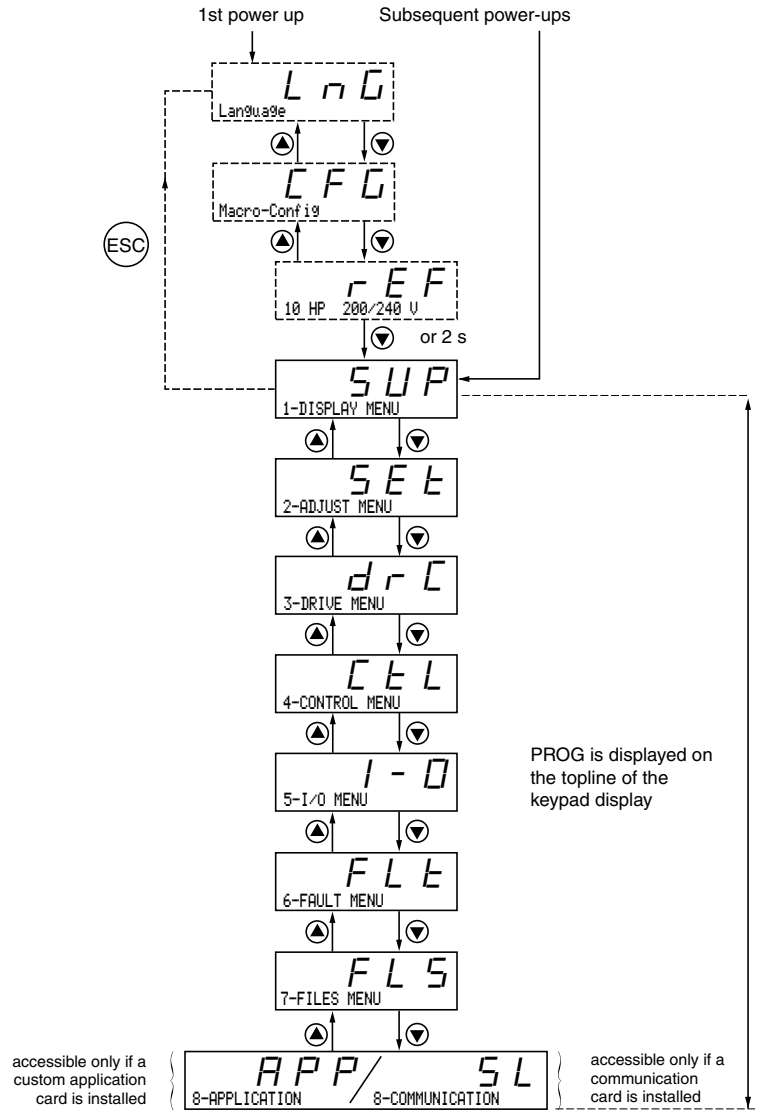


Figure 6: Menus

Principles of Programming

The principle of programming is always the same, regardless of the access locking switch. Figures 7 and 8 show examples of programming steps.

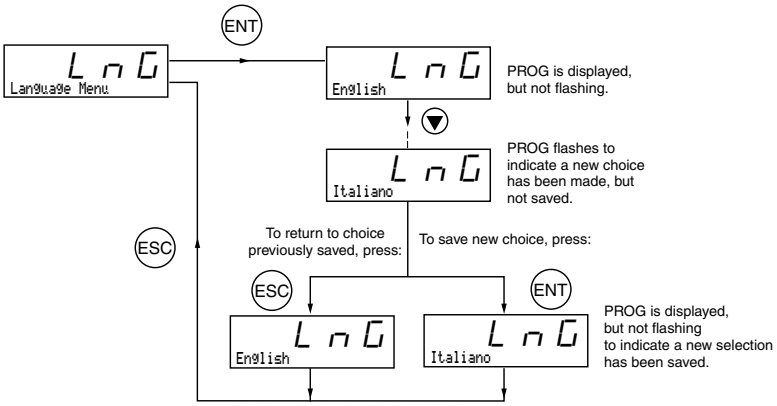


Figure 7: Language Selection Programming Example

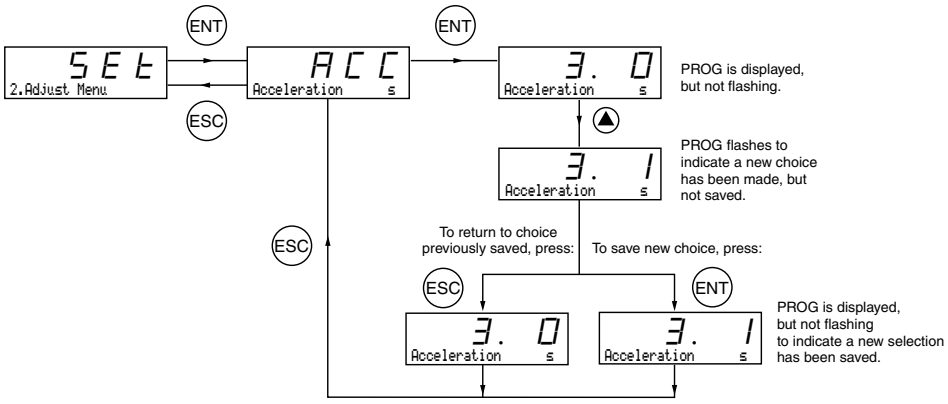


Figure 8: Acceleration Time Programming Example

CHAPTER 2—MENUS

This chapter explains menus and parameter functions.

LANGUAGE MENU

The Language menu (see Figure 7 on page 20) is accessible no matter how the access locking switch is set. The languages that can be selected are English (factory setting), French, German, Spanish, or Italian. The language can be modified with the motor stopped or running.

MACRO-CONFIGURATION MENU

Selecting a macro-configuration automatically configures the drive controller for an application. The Macro-Configuration menu can always be displayed, but can only be modified when the access level switch is in the position and when the motor is stopped. There are three application types available:

- Material handling (Hdg)
- Variable torque for pump and fan applications (VT)
- General use (GEn)

The macro-configuration automatically assigns the inputs and outputs to functions suitable for the application. The parameters related to these functions are then available. **The factory-set macro-configuration is Material Handling**. Table 3 shows the drive controller I/O assignments as a function of the macro-configuration selected when the drive controller is set for 2-wire control. For the logic input assignments when the drive controller is set for 3-wire control, refer to Table 12 on page 45.

Table 3: Drive Controller I/O Assignments

Note: LI1, AI1, and R1 assignments are not visible in the 5—I/O menu. LI1 and R1 cannot be reassigned.

	Hdg: Material Handling [1]	GEn: General Use	VT: Variable Torque
Logic Input LI1	Forward	Forward	Forward
Logic Input LI2	Reverse	Reverse	Reverse
Logic Input LI3	2 Preset speeds	Jog	Auto/manual
Logic Input LI4	4 Preset speeds	Freewheel stop [2]	DC injection braking
Analog Input AI1	Reference summing	Reference summing	Speed reference 1
Analog Input AI2	Reference summing	Reference summing	Speed reference 2
Relay R1	Drive fault relay	Drive fault relay	Drive fault relay
Relay R2	Not assigned	Not assigned	Not assigned

[1] Factory default setting.

[2] If the Freewheel Stop/Run Permissive function is configured, the drive controller will not start the motor unless the logic input is connected to +24 V.

Table 4: I/O Extension Card Factory Presets

Note: You must ensure that the functions which are programmed are compatible with the control scheme used.

	Hdg: Material Handling	GEn: General Use	VT: Variable Torque
Logic Input LI5	8 preset speeds	Fault reset	Freewheel stop [1]
Logic Input LI6	Fault reset	Current limit [2] or Torque limit 2 [3]	Ramp switching
Analog Input AI3 [2] or Logic Inputs A, A-, B, B- [3]	Reference summing [2]	Reference summing [2]	PI regulator feedback [2]
	Speed feedback	Speed feedback	Speed feedback
Logic Output LO	Current level attained	Output contactor command	High speed attained
Analog Output AO	Motor frequency	Motor frequency	Motor frequency

[1] If the Freewheel Stop / Run Permissive function is configured, the drive controller will not start the motor unless the logic input is connected to +24 V.

[2] With analog I/O extension card (VW3A58201U).

[3] With digital I/O extension card (VW3A58202U).

Transferring a file created for a drive controller without an I/O extension card to a drive controller with an I/O extension card may result in unexpected I/O assignment. Verify all I/O assignments. It is recommended that I/O functions not used in the application be un-assigned.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

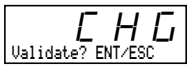
LI1 has priority:

- If LI1 is closed while LI2 is active, the controller will respond to LI1.
- If the LI1 input is lost while LI2 is active, the controller will respond to LI2 and reverse directions.

The logic inputs must be programmed appropriately for the application to prevent the motor from spinning in an unintended direction.

Failure to follow this instruction can result in death or serious injury.

Modification of the macro-configuration requires two confirmations since it automatically changes the function assignments. When a change to the macro-configuration is requested the following screen is displayed:



Press ENT to proceed with change
Press ESC to return to the previous configuration

Figure 9: Macro-Configuration Validation

⚠ WARNING

MACRO-CONFIGURATION OR PROGRAMMING RESET CAN CAUSE AN UNINTENDED EQUIPMENT ACTION

- Factory default settings will be substituted for present settings when the macro-configuration is changed and confirmed.
- Factory default settings may not be compatible with the application. After changing the macro-configuration, verify that the factory settings are compatible with application requirements.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Customizing the Configuration

The drive controller configuration can be customized by changing the assignment of the inputs and outputs in the 5—I/O menu when the access locking switch is in the position. When an I/O assignment is modified, the macro-configuration screen displays the following:

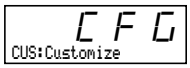


Figure 10: Customized Macro-Configuration

DRIVE CONTROLLER IDENTIFICATION SCREEN

This screen can always be displayed. Refer to Figure 11 for the access path. This screen shows the power rating and the voltage indicated on the drive controller nameplate.

Increasing the Power Rating for Variable Torque Applications

The power rating can be increased for variable torque applications on the drive controller identification screen for the following products:

- 208/230 Vac drive controllers 15 hp and larger (ATV58HD16M2–D46M2)
- 400/460 Vac drive controllers 25 hp and larger (ATV58HD28N4–D79N4)
- 460 Vac drive controllers 5 hp to 25 hp that do not have an integrated EMC filter (ATV58HU54N4X–D23N4X)

To increase the horsepower rating, begin at the rEF screen and follow this procedure:

1. Press ENT. rEF begins flashing.
2. Press ▲. A higher horsepower rating is displayed with a “+” sign indicating that the rating has been increased.
3. Press ENT then ESC. The drive controller is now configured for the higher horsepower rating.

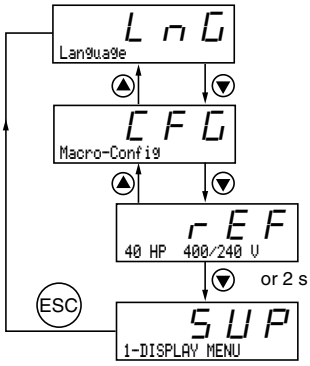


Figure 11: Drive Controller Identification Screen

1—DISPLAY MENU

Menu 1

Display parameters can be viewed in any access level. You can scroll through these parameters with the motor running.

Table 5: 1—Display Menu Parameters

Parameter	Code	Function	Units
Drive. state Use this parameter to monitor drive controller status.		Drive controller status: indicates a fault or the state of the drive controller:	_
	rdY	rdY = drive controller is ready	
	rUn	rUn = motor in steady state	
	ACC	ACC = accelerating	
	dEC	dEC = decelerating	
	CLI	CLI = in current limit	
	dCb	dCb = DC injection braking	
	nSt	nSt = commanded to freewheel stop	
	Obr	Obr = braking with deceleration ramp adaptation	
Freq. Ref. - Hz	FrH	Reference frequency	Hz
Output Freq. - Hz	rFr	Output frequency applied to the motor	Hz
Motor Speed - RPM	SPd	Motor speed estimated by the drive controller. Based on nominal motor speed (nSP) entry. See Table 11 on page 39.	RPM
Motor Current - A	LCr	Motor current	A
Machine SPd.	USP	Machine speed estimated by the drive controller. USP is proportional to rFr scaled by the coefficient, USC, which is adjustable in the 2—Adjust menu.	—
Output Power - %	OPr	Output power estimated by the drive controller. 100% corresponds to nominal power.	%
Mains Voltage V	ULn	Mains voltage	V
Motor Thermal - %	tHr	Thermal state: 100% corresponds to the nominal motor thermal state. Above 118%, the controller trips on OLF (motor overload fault).	%
Drive Thermal - %	tHd	Thermal state of the drive controller: 100% corresponds to the nominal drive controller thermal state. Above 118%, the controller trips on OHF (drive overheating fault). It resets when the thermal state goes below 70%.	%
Last Fault	LFt	Displays the last fault which occurred	_
Freq. Ref	LFr	This adjustment parameter appears in place of the FrH parameter when command of the drive controller by the keypad display has been activated with the LCC parameter in the 4—Control menu (see page 49).	Hz
Consumption	APH	Energy consumed	kWh or MWh
Run time	rtH	Operating time (motor powered up) in hours.	hrs

Note: If USP is greater than 9999, the display value is USP/1000.

2—ADJUST MENU

The Adjust menu is accessible when the access locking switch is set to either  or  . Adjustment parameters can be modified whether the drive controller is commanding the motor to run or not, however, it is recommended that you make all adjustments with the motor stopped.

⚠ WARNING

PARAMETER CHANGES WHILE MOTOR IS RUNNING

Changes made to adjustment parameters while the motor is running may cause unintended equipment action. When changing adjustment parameters, ensure that the motor is stopped.

Failure to follow this instruction can result in death, serious injury, or equipment damage.

There are two types of adjustment parameters: parameters which are always accessible (fixed adjustment parameters), and parameters which may be accessible depending on:

- The macro-configuration selected
- The presence of an I/O extension card
- The input and output reassignments

The fixed set of adjustment parameters, shown in Table 6 beginning on page 28, are accessible in every macro-configuration.

Menu 2

Table 6: 2—Fixed Set of Adjustment Parameters

Parameter	Code	Description	Adjustment Range	Factory Setting
Freq. Ref. - Hz	LFr	Appears when drive controller command from the keypad display has been activated using the LCC parameter in the 4—Control menu (see page 49).	LSP to HSP	
Acceleration -s Deceleration -s	ACC dEC	Acceleration and deceleration ramp times. Defined as time between 0 and FRS.	0.05 to 999.9 0.05 to 999.9	3 s 3 s
Low SPeed - Hz	LSP	Low speed	0 to HSP	0 Hz
High SPeed - Hz	HSP	High speed. Ensure that this adjustment is suitable for the motor and the application.	LSP to tFr	50/60 Hz depending on switch setting
Gain - %	FLG	Frequency loop gain. This parameter allows adjustment of the response time of the drive controller to sudden changes in the motor load. Decreasing the gain parameter slows the response time of the drive controller. Increasing the gain parameter makes the drive controller respond more quickly. This parameter should be increased in applications where the undesirable changes in motor speed occur due to changes in motor load. Applications that have fast cycle times or high torque requirements may require an increase in gain.	0 to 100	20
Stability - %	StA	Frequency loop stability. This parameter allows adjustment of speed overshoot of the drive controller to sudden changes in the motor load. Increasing the stability setting dampens the overshoot. This parameter should be adjusted with the gain setting to tune the drive controller response to meet the desired performance on applications that have fast cycle times or high torque requirements.	0 to 100	20

[1] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

Menu 2

Table 6: 2—Fixed Set of Adjustment Parameters (Continued)

Parameter	Code	Description	Adjustment Range	Factory Setting
ThermCurrent - A	ItH	Current setting used for the motor thermal protection. Adjust ItH to the nominal current which appears on the motor nameplate. This provides Class 20 motor overload protection.	0.25 to 1.36 of I_n [1]	Varies according to drive controller size.

⚠ CAUTION

MOTOR OVERHEATING

- This drive controller does not provide direct thermal protection for the motor.
- Use of a thermal sensor in the motor may be required for protection at all speeds or loading conditions.
- Consult the motor manufacturer for thermal capability of the motor when operated over the desired speed range.

Failure to follow these instructions can result in injury or equipment damage.

NOTE: DC Inj. Time is only available if automatic DC injection (AdC) is set to Yes.

DC Inj. Time- s	tdC	DC injection braking time. If tdC = Cont, DC injection is continuous.	0 to 30 s Cont	0.5 s

[1] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

Menu 2

Table 6: 2—Fixed Set of Adjustment Parameters (Continued)

Parameter	Code	Description	Adjustment Range	Factory Setting
dc I at rest - A	SdC	DC injection braking current level if tdC is set to continuous.	0.1 to 1.36 of I_n [1]	Varies according to drive controller size.

NOTE: DC Inj. Current Level is only available if tdC is set to continuous.

⚠ WARNING

NO HOLDING TORQUE

- DC injection braking does not provide holding torque at zero speed.
- DC injection braking does not function during loss of power or drive controller fault.
- When required, use separate brake for holding torque.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠ CAUTION

EXCESSIVE DC INJECTION BRAKING

Application of DC injection braking for long periods of time can cause motor overheating and damage. Protect the motor from extended periods of DC injection braking.

Failure to follow this instruction can result in injury or equipment damage.

NST Thresh-Hz	FFt	Freewheel stop trip threshold: when a stop on ramp or fast stop is requested, the type of stop selected is activated until the speed falls below this threshold. Below this threshold, freewheel stop is activated. This parameter can only be accessed if the R2 relay is not assigned to the "BLC: Brake Logic" function, and if an "on ramp" or "fast" type stop has been selected in the 3—Drive menu under type of stop (Stt).	0 to HSP	0 Hz
Jump Freq. - Hz	JPF	Jump frequency with a bandwidth of +/- 2.5 Hz around JPF. This function is used to suppress speeds which cause mechanical resonance.	0 to HSP	0 Hz

[1] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

NOTE: Additional parameters appear in this menu if certain Macro-Configurations are selected. See Tables 7–9.

Menu 2

Table 6: 2—Fixed Set of Adjustment Parameters (Continued)

Parameter	Code	Description	Adjustment Range	Factory Setting
Jump Freq.2- Hz	JF2	Second skip frequency: same function as JPF, for a second frequency value.	0 to HSP	0 Hz
Jump Freq.3- Hz	JF3	Third skip frequency: same function as JPF, for a third frequency value.	0 to HSP	0 Hz
Machine Coef.	USC	Machine Speed Coefficient. Coefficient applied to rFr permitting the display of machine speed by the parameter USP. USP = rFr x USC	0.01 to 100.0	1.00
LSP Time - s	tLS	Low speed run time. Following operation at LSP for the amount of time defined by tLS, the motor is automatically commanded to stop. The motor restarts if the frequency reference is greater than LSP, if a run command continues to be present. “0” means that no time period is set.	0.0 to 999.9 s	0

[1] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

Additional Adjustment Parameters for Material Handling

Table 7 lists the additional parameters that are accessible when the macro-configuration is set to Material Handling.

Menu 2

NOTE: UFr and SLP are unitless values. The percent value is only to provide a range of numbers.

Table 7: 2—Additional Adjustment Parameters with Material Handling Macro-Configuration

Parameter	Code	Description	Adjustment Range	Factory Setting
IR Compens. - %	UFr	IR Compensation. Allows adjustment of the default value of IR Compensation or the value measured during auto-tuning. The adjustment range is extended to 800% if the SPC parameter (special motor) is set to Yes in the 3—Drive menu (see page 44). This parameter is used to adjust low speed torque for optimal performance. Adjust this parameter to compensate for the resistive voltage drop of the motor stator windings and the conductors connecting the motor and drive controller. (If using special motors such as synchronous permanent magnet motors, synchronous wound field motors, or synchronous reluctance motors, the adjustment range is 0 to 800%.) This parameter is typically used to boost torque performance at low speed operation. If an autotune is performed, adjustment of this parameter is usually not required.	0 to 150% or 0 to 800%	100%
Slip Comp. - %	SLP	Slip Compensation Allows adjustment of the slip compensation around a fixed value set by the nSP parameter (motor nominal speed) in the 3—Drive menu (see page 39). This parameter is used to adjust the slip compensation to improve speed regulation. Induction motors develop torque based on the slip, which is the difference between the speed of the rotating magnetic field in the rotor and the speed of the stator. As the load increases, the slip increases to produce the necessary torque. In applications where the change in speed due to slip is undesirable, the slip compensation should be increased. When this parameter is increased, the drive controller will automatically increase the output frequency. The amount of increase is proportional to the increase of the load, allowing one setting for the entire speed range.	0 to 150%	100%

[1] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

★ Parameters appear if an I/O extension card is installed.

Menu 2

Table 7: 2—Additional Adjustment Parameters with Material Handling Macro-Configuration

Parameter	Code	Description	Adjustment Range	Factory Setting
Preset Sp.2- Hz	SP2	Second preset speed	LSP to HSP	10 Hz
Preset Sp.3- Hz	SP3	Third preset speed	LSP to HSP	15 Hz
Preset Sp.4- Hz ★	SP4	Fourth preset speed	LSP to HSP	20 Hz
Preset Sp.5- Hz ★	SP5	Fifth preset speed	LSP to HSP	25 Hz
Preset Sp.6- Hz ★	SP6	Sixth preset speed	LSP to HSP	30 Hz
Preset Sp.7- Hz ★	SP7	Seventh preset speed	LSP to HSP	35 Hz
Curr.Lev.Att: A ★	Ctd	Current threshold above which the logic output or the relay changes to 1	0.25 to 1.36 of I_n [1]	1.36 of I_n [1]

[1] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

★ Parameters appear if an I/O extension card is installed.

Additional Adjustment Parameters for General Use

Table 8 lists the additional parameters that are accessible when the macro-configuration is set to General Use.

Menu 2

Table 8: 2—Additional Adjustment Parameters with General Use Macro-Configuration

Parameter	Code	Description	Adjustment Range	Factory Setting
IR Compens. - %	UFr	IR Compensation Allows adjustment of the default value of IR Compensation or the value measured during auto-tuning. The adjustment range is extended to 800% if the parameter SPC (special motor) is set to Yes in the 3—Drive menu (see page 44). This parameter is used to adjust low speed torque for optimal performance. Adjust this parameter to compensate for the resistive voltage drop of the motor stator windings and the conductors connecting the motor and drive controller. (If using special motors such as synchronous permanent magnet motors, synchronous wound field motors, or synchronous reluctance motors, the adjustment range is 0 to 800%.) This parameter is typically used to boost torque performance at low speed operation. If an autotune is performed, adjustment of this parameter is usually not required.	0 to 150% or 0 to 800%	100%
SlIP Comp. - %	SLP	Slip Compensation Allows adjustment of the slip compensation around a fixed value set by the motor nominal speed. This parameter is used to adjust the slip compensation to improve speed regulation. Induction motors develop torque based on the slip, which is the difference between the speed of the rotating magnetic field in the rotor and the speed of the stator. As the load increases the slip increases to produce the necessary torque. In applications where the change in speed due to slip is undesirable, the slip compensation should be increased. When this parameter is increased, the drive controller will automatically increase the output frequency. The amount of increase is proportional to the increase of the load, allowing one setting for the entire speed range.	0 to 150%	100%
Jog Freq. -Hz	JOG	Frequency when operating in Jog	0 to 10 Hz	10 Hz
Jog Delay - s	JGt	Delay between two consecutive jog operations	0 to 2 s	0.5 s

NOTE: UFr and SLP are unitless values. The percent value is only to provide a range of numbers.

Additional Adjustment Parameters for Variable Torque

Table 9 lists the additional parameters that are accessible when the macro-configuration is set to Variable Torque.

Menu 2

Table 9: 2—Additional Adjustment Parameters with Variable Torque Macro-Configuration

Parameter	Code	Description	Adjustment Range	Factory Setting
DC Inj.Curr.- A	IdC	DC injection braking current level.[1] This parameter is accessible if a logic input is assigned to DC injection braking. After 30 seconds, IdC is automatically set to 0.5 ItH if previously set to a higher value.	0.10 to 1.36 of I_n [1]	Varies according to drive controller size.
V/f Profile - %	PFL	Volts/Hertz Adjustment This function is available in variable torque mode and if the Energy Economizer (Energy Savings) function (nld) is disabled. This parameter is useful in applications where the user wishes to define the volts/hertz profile manually instead of having the drive controller perform this function with the Energy Economizer function.	0 to 100%	20%

NOTE: V/f Profile is available only if the energy savings function (nld) is set to No.

[1] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

Additional Adjustment Parameters After I/O Reassignment

Table 10 on the following page lists the additional parameters that may be accessible after the base product inputs or outputs have been reassigned.

Menu 2

Table 10: 2—Additional Adjustment Parameters After I/O Reassignment

Parameter	Code	Description	Adjustment Range	Factory Setting
Preset SP.2-Hz	SP2	Second preset speed	LSP to HSP	10 Hz
Preset SP.3-Hz	SP3	Third preset speed	LSP to HSP	15 Hz
Preset SP.4-Hz	SP4	Fourth preset speed	LSP to HSP	20 Hz
Preset SP.5-Hz	SP5	Fifth preset speed	LSP to HSP	25 Hz
Preset SP.6-Hz	SP6	Sixth preset speed	LSP to HSP	30 Hz
Preset SP.7-Hz	SP7	Seventh preset speed	LSP to HSP	35 Hz
Jog Freq. - Hz	JOG	Frequency when operating in jog	0 to 10 Hz	10 Hz
Jog Delay - s	JGt	Delay between two consecutive jog operations.	0 to 2 s	0.5 s
BrReleaseLev-Hz	brL	Brake release frequency	0 to 10 Hz	0 Hz
BrReleaseI -A	Ibr	Brake release current	0 to 1.36 of I_n [3]	0 A
BrReleasTime -s	brt	Brake release time	0 to 5 s	0 s
BrEngageLev- Hz	bEn	Brake engage frequency	0 to LSP	0 Hz
BrEngageTime -s	bEt	Brake engage time	0 to 5 s	0 s
PI Prop. Gain	rPG	Proportional gain for PID regulator	0.01 to 100	1
PI Int. Gain-/s	rIG	Integral gain for PID regulator	0.01 to 100 /s	1 /s
PI Coeff.	FbS	Feedback scaling factor for PI regulator	1 to 100	1
PI Inversion	PIC	Inverts the PI feedback signal No: Normal Yes: Inverted	Yes - No	No
PID Filter -s	PSP	Used to adjust the low-pass filter time constant on the PID feedback signal.	0 to 10 s	0 s
Freq. Detect-Hz	Ftd	Motor frequency threshold above which the logic output goes to state 1.	LSP to HSP	50/60 Hz [1]
Freq.Lev.2- Hz	F2d	Same function as Ftd for a second frequency value	LSP to HSP	50/60 Hz [1]

★ These parameters are available only with the I/O extension card installed.

[1] Depending on the position of the 50/60 Hz switch.

[2] 100% corresponds to the nominal torque of a motor with horsepower size equal to that of the drive controller at its constant torque rating.

[3] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

Menu 2

Table 10: 2—Additional Adjustment Parameters After I/O Reassignment (Continued)

Parameter	Code	Description	Adjustment Range	Factory Setting
Curr.Lev.Att- A	CtdA	Current threshold above which the logic output or relay goes to state 1.	0.25 to 1.36 of I_n [3]	1.36 of I_n [3]
ThermLevAtt - %	ttdA	Motor thermal state threshold above which the logic output or relay goes to state 1 (high).	0 to 118%	100%
Torque lim2 -A	tL2	Second torque limit, activated by a logic input.	0% to 200% [2]	200%
DC Inj. Curr. -A	IdC	DC injection braking current level. Accessible if a logic input is assigned to DC injection braking. After 30 s, IdC is automatically set to 0.5 ItH if previously set to a higher value.	0.10 to 1.36 of I_n [3]	0.7 ItH
Accelerate 2- s Decelerate 2- s	AC2 dE2	Second acceleration and deceleration ramp times. These parameters are accessible if a logic input is assigned to ramp switching or if Frt is not 0.	0.05 to 999.9	5 s
TachFBCoeff ★	dtS	Tachometer scaling factor associated with the tachometer feedback function: $dtS = \frac{9}{\text{tachometer voltage at HSP}}$	1 to 2	1

★ These parameters are available only with the I/O extension card installed.

[1] Depending on the position of the 50/60 Hz switch.

[2] 100% corresponds to the nominal torque of a motor with horsepower size equal to that of the drive controller at its constant torque rating.

[3] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

3—DRIVE MENU

This menu is accessible when the access locking switch is in the position. The parameters can only be modified when the motor is stopped.

Optimal performance is obtained:

- By ensuring the input frequency selection switch is properly set (see page 13)
- By entering the motor nameplate values into the Drive menu parameters
- By initiating an autotune (on a standard asynchronous motor). See page 40 for more information concerning the autotune function (tUn).

Parallel, Undersized, and Special Motor Applications

The ATV58 drive controller can be used in motor applications with multiple motors wired in parallel, undersized motors, or with special motors. Follow the configuration steps below.

1. Select either the “Hdg: Material Handling” or “GEn: General Use” macro-configuration (see page 21).
2. Configure the Special Motor parameter (SPC) in the Drive menu to Yes or PSM (see page 44).
3. Adjust the IR Compensation parameter (UFr) in the 2—Adjust menu to obtain satisfactory performance (see pages 32 and 34).

Parallel motor applications contain multiple motors wired in parallel to the output of one drive controller. Refer to the Square D Application Guide, *Product Data Bulletin SC100R5/95*, for additional application information on properly sizing the drive controller for parallel motor applications.

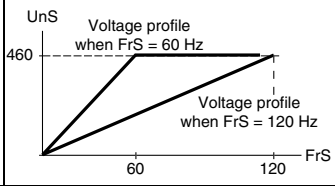
An undersized motor is defined as a motor with a full current rating is less than 25% of the ATV58 drive controller rating. Select *PSM* in the Special Motor menu.

Synchronous permanent magnet, synchronous would field, and synchronous reluctance motors are examples of special motors.

Table 11 on page 39 shows the parameters accessed in the Drive menu.

Menu 3

Table 11: 3—Drive Menu Parameters

Parameter	Code	Description	Adjustment Range	Factory Setting
Nom.Mot.Volt- V	UnS	Nominal motor voltage given on the motor nameplate label. ATV58••••M2 ATV58••••N4	 200 to 240 V 200 to 500 V	 230 V or 400/460 V [1]
Nom.Mot.Freq - Hz	FrS	Nominal motor frequency given on the motor nameplate label. The FrS setting defines the frequency at which nominal motor voltage (UnS) is applied to the motor. FrS cannot be set above the maximum output frequency setting tFr. 	40 to tFr	50/60 Hz [1]
NomMotCurr.- A	nCr	Nominal motor current given on the motor nameplate label.	0.25 to 1.36 of I_n [2]	0.9 of I_n [2]
Nom.MotSpeed -rPm	nSP	Nominal motor speed given on the motor nameplate label. This should be the value that incorporates slip (i.e. this value should be the rpm of the motor when it is fully loaded).	0 to 9999 rpm	depends on drive controller rating

[1] Depending on the position of the 50/60 Hz switch. Ensure that the switch setting matches the input frequency (see page 13).

[2] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

[3] The factory setting depends on the macro-configuration used: No for Material Handling, Yes for General Use and Variable torque.

[4] Refer to the drive controller instruction bulletin, VVDED397048US, for duty cycle ratings of the drive controllers.

★ These parameters are available only with the I/O extension card installed.

Menu 3

Table 11: 3—Drive Menu Parameters (Continued)

Parameter	Code	Description	Adjustment Range	Factory Setting
Mot.CosPhi	CoS	Motor CosPhi , motor power factor Set the *CoS* parameter as provided on the motor nameplate label. If the power factor is not provided, or for high performance applications, the following procedure can be used to optimize the motor power factor setting, *CoS*. Operate the motor with no load at a frequency equal to nominal frequency / 2. Then adjust the *CoS* parameter such that the measured motor voltage equals nominal motor voltage / 2. For example: For a 460 Vac motor operating at 60 Hz, adjust the *CoS* parameter to have 230 V at 30 Hz. If motor voltage is less than 230 V, decrease *CoS* parameter. If motor voltage is more than 230 V, increase the *CoS* parameter.	0.5 to 1	depends on drive controller rating
Auto Tuning	tUn	Initiates an autotune when the tUn parameter is set to Yes. After the autotune is complete, the display will show “done”. No is displayed if the autotune was not successful or completed. No is also displayed if the motor rating is less than 25% of drive controller I_n rating or if multiple motors are connected. The CoS parameter may need to be manually adjusted for optimum performance. This feature will not work if any logic inputs are activated. If freewheel stop or fast stop are assigned to a logic input, they must be in the high state to autotune. When initiated, the drive controller pulses the connected motor, measures, and stores specific motor stator resistance and resistance of the conductors. This allows the drive controller to provide better current regulation for better motor torque performance. This can be initiated from the keypad display or by a logic input assigned to this function.	No - Yes	No

[1] Depending on the position of the 50/60 Hz switch. Ensure that the switch setting matches the input frequency (see page 13).

[2] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

[3] The factory setting depends on the macro-configuration used: No for Material Handling, Yes for General Use and Variable torque.

[4] Refer to the drive controller instruction bulletin, VVDED397048US, for duty cycle ratings of the drive controllers.

★ These parameters are available only with the I/O extension card installed.

Menu 3

Table 11: 3—Drive Menu Parameters (Continued)

Parameter	Code	Description	Adjustment Range	Factory Setting
Max.Freq. - Hz	tFr	Maximum output frequency. The maximum value is a function of the switching frequency (SFr, see page 43).	10 to 500 Hz	60/72 Hz [1]

⚠ CAUTION

MACHINERY OVERSPEED

Some motors and/or loads may not be suited for operation above nameplate motor speed and frequency. Consult motor manufacturer before operating motor above rated speed.

Failure to follow this instruction can result in injury or equipment damage.

NOTE: Energy Eco. is available only in variable torque mode.

NOTE: I Limit is available only in variable torque mode.

NOTE: Switch Ramp 2 is not available if LI is assigned to ramp switching.

Energy Eco	nLd	Optimizes the motor efficiency by automatically adjusting the Volts/Hz ratio.	No - Yes	Yes
I Limit adapt.	Fdb	Current limit adaptation. When configured for Yes, the current limit setting will increase as a function of output frequency.	No - Yes	No
DecRampAdapt	brA	Activation allows the deceleration ramp time to be automatically increased, avoiding an overbraking fault (ObF) if the ramp time was too short. This function may be incompatible with ramp positioning and with dynamic braking. If relay R2 is assigned to Brake Logic, brA can only be set to No.	No - Yes	No [3]
SwitchRamp2- Hz	Frt	Frequency for ramp switching. When the output frequency is greater than Frt, the ramp times will be AC2 and dE2.	0 to HSP	0 Hz

[1] Depending on the position of the 50/60 Hz switch. Ensure that the switch setting matches the input frequency (see page 13).

[2] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

[3] The factory setting depends on the macro-configuration used: No for Material Handling, Yes for General Use and Variable torque.

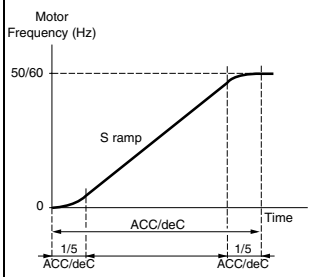
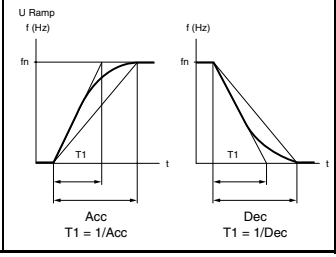
[4] Refer to the drive controller instruction bulletin, VVDED397048US, for duty cycle ratings of the drive controllers.

★ These parameters are available only with the I/O extension card installed.

Menu 3

NOTE: This parameter, Stt, cannot be accessed if the R2 relay or a logic output is assigned to the "BLC: Brake Logic" function.

Table 11: 3—Drive Menu Parameters (Continued)

Parameter	Code	Description	Adjustment Range	Factory Setting
Type of stop	StT	Type of stop: When a stop is requested, the type of stop is activated until the FFt threshold (2—Adjust menu) is reached. Below this threshold, freewheel stop is activated. Stn: On decel ramp Fst: Fast stop Nst: Freewheel stop Dci: DC injection stop	STN–FST NST–DCI	STN
Ramp Type	rPt	Defines the type of acceleration and deceleration ramps. LIN: linear S: S ramp U: U ramp  	LIN - S - U	LIN

[1] Depending on the position of the 50/60 Hz switch. Ensure that the switch setting matches the input frequency (see page 13).

[2] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

[3] The factory setting depends on the macro-configuration used: No for Material Handling, Yes for General Use and Variable torque.

[4] Refer to the drive controller instruction bulletin, VVDED397048US, for duty cycle ratings of the drive controllers.

★ These parameters are available only with the I/O extension card installed.

Menu 3

NOTE: DecRamp Coeff is only available if fast stop is enabled.

NOTE: Mot P Coef. is only available if motor switching is enabled.

NOTE: Modifying SFt causes the following parameters to revert to factory settings:
3—Drive Menu: nCr, CLI, SFr, nrd

2—Adjust Menu: itH, IdC, Ibr, Ctd

Table 11: 3—Drive Menu Parameters (Continued)

Parameter	Code	Description	Adjustment Range	Factory Setting
DecRamP Coeff	dCF	Coefficient for reducing the deceleration ramp time when a logic input has been assigned to the Fast Stop function. For example: If dec=20 s, setting dCF to 2 results in a 10 s dec ramp setting.	1 to 10	4
Trq.Limit1 -%	tLI	Torque limit allows limitation of the maximum motor torque.	0 to 200% torque	200%
Int.I Lim -A	CLI	Current limit used to limit the maximum motor heating.	0 to 1.36 of I_n [2]	1.36 of I_n [2]
Auto DC Inj.	AdC	Allows deactivation of automatic DC injection at stop.	No - Yes	Yes
Mot P Coef.	PCC	Defines the ratio between the nominal drive controller power and the motor with the lowest power rating when a logic input is assigned to the motor switching function (see page 62).	0.2 to 1	1
Sw. Freq. TyPe	SFt	Allows selection of the type of switching frequency. • LF allows adjustment between 0.5 and 4 kHz using the SFr parameter. • HF1 and HF2 allow adjustment between 4 and 16 kHz: — HF1 is for applications with a low duty cycle, without derating the drive controller. If the drive controller thermal state goes above 95%, the switching frequency automatically goes to 2 or 4 kHz (depending on rating). When the thermal state returns to 70%, the switching frequency returns to the set value. — HF2 is for machines with a high duty cycle with derating of the drive controller by one power rating. The drive parameters (current limit, thermal current, etc.) are automatically scaled.	LF - HF1 - HF2 [4]	LF
Sw Freq -kHz	SFr	Selection of switching frequency. The range depends on the SFt parameter. The maximum operational frequency (tFr) is limited depending on the switching frequency:	LF: 0.5-1-2-4 kHz HF1 or HF2: 4- 8-12-16 kHz [4]	LF: 4 kHz HF1 or HF2: (depending on controller rating)

[1] Depending on the position of the 50/60 Hz switch. Ensure that the switch setting matches the input frequency (see page 13).

[2] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

[3] The factory setting depends on the macro-configuration used: No for Material Handling, Yes for General Use and Variable torque.

[4] Refer to the drive controller instruction bulletin, VVDED397048US, for duty cycle ratings of the drive controllers.

★ These parameters are available only with the I/O extension card installed.

Menu 3

Table 11: 3—Drive Menu Parameters (Continued)

Parameter	Code	Description	Adjustment Range	Factory Setting
		SFr (kHZ) 0.5 1 2 4 8 12 16 tFr (Hz) 62 125 250 500 500 500 500		
Noise Reduct	nrd	This function randomly modulates the switching frequency in order to reduce audible motor noise.	No - Yes	Yes if SFt = LF No if SFt = HF1 or HF2
Special Mot.	SPC	Special Motor Adaptation	No - Yes - PSM	No
		This parameter should be set to Yes when using special motors such as synchronous permanent magnet motors, synchronous wound field motors, or synchronous reluctance motors. This parameter should also be enabled if using one drive controller to control multiple motors in parallel. Installation of individual motor thermal protection is required when using the drive controller to control multiple motors in parallel. The PSM parameter is intended to be used when the motor connected to the drive controller is less than 25% of the drive controller's nominal current rating. It may be necessary to disable output phase loss protection, OPL. Installation of motor thermal protection is required in this type of application. Also, the PSM parameter can be enabled to allow for open circuit output voltage testing. Enabling this parameter increases the IR compensation adjustment range from 0 to 800%.		
PG Type ★	PGt	Defines the type of sensor used when an encoder feedback I/O card is installed. INC: incremental encoder (A, A+, B, B+ are wired). DET Detector (only A is wired).	INC-DET	DET
Num. Pulses ★	PLS	Defines the number of pulses for each revolution of the sensor.	1 to 1024	1

NOTE: Special Mot. is not available in variable torque mode. Enabling the PSM parameter while in the material handling macro and then selecting the variable torque macro will leave the PSM parameter enabled.

[1] Depending on the position of the 50/60 Hz switch. Ensure that the switch setting matches the input frequency (see page 13).

[2] I_n = drive controller constant torque output current rating shown on the drive controller nameplate.

[3] The factory setting depends on the macro-configuration used: No for Material Handling, Yes for General Use and Variable torque.

[4] Refer to the drive controller instruction bulletin, VVDED397048US, for duty cycle ratings of the drive controllers.

★ These parameters are available only with the I/O extension card installed.

4—CONTROL MENU

The Control Menu is accessible when the access locking switch is in the position. The parameters can only be modified when the motor is stopped.

Menu 4

Table 12: 4—Control Menu: Keypad Display or 2- and 3-Wire Control

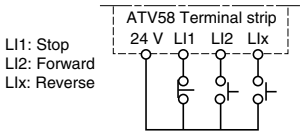
Parameter	Code	Description	Adjustment Range	Factory Setting
TermStripCon.	tCC	Configuration of the terminal strip command: 2- or 3-wire control.	2W - 3W	2W

Note: modification of this parameter requires two confirmations since it causes a reassignment of the logic inputs. Shown below are the LI assignments when 3-wire control is selected. When 2-wire control is selected, the assignments are those shown in Table 3 on page 22. In 3-wire control, LI1 and LI2 cannot be reassigned.

I/O	Material Handling	General Use	Variable Torque
LI1	STOP	STOP	STOP
LI2	Run forward	Run forward	Run forward
LI3	Run reverse	Run reverse	Run reverse
LI4	2 Preset speeds	Jog	Reference switching
LI5★	4 Preset speeds	Freewheel stop	Injection braking
LI6★	8 Preset speeds	Clear faults	Freewheel stop

Selecting 3-wire control inhibits the automatic restart function.

3-wire control wiring example:

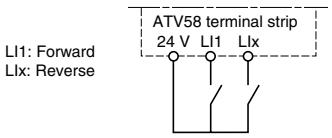


★ These I/O can be accessed if an I/O extension card has been installed.

Menu 4

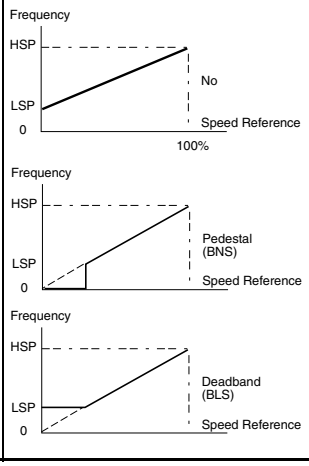
NOTE: Type 2 Wire appears if 2-wire control is selected.

Table 13: 4—Control Menu: 2-Wire Control Type

Parameter	Code	Description	Adjustment Range	Factory Setting
Type 2 Wire	tCt	Defines the type of 2-wire control: • LEL: If the forward or reverse input is high when the drive controller is powered up, the drive controller will start the motor. If both inputs are high on power up, the controller will run forward. • TrN: The drive controller must see a transition from low to high of the forward or reverse input before it will start the motor. Therefore, if the forward or reverse input is high when the drive controller is powered up, the input must be cycled before the drive controller will start the motor. • PFW: Forward input has priority over reverse input with this control. If forward is activated while the controller is running in reverse, the controller will run forward. 2-wire control wiring example:  	LEL-TrN-PFW	LEL
RV inhibit	rIn	When configured for Yes, this function inhibits reverse operation even if reverse operation is requested by a summing or PI regulator function. This parameter is not available if a logic input is configured for reverse. A logic input cannot be configured for reverse if this parameter is configured for Yes.	Yes - No	No

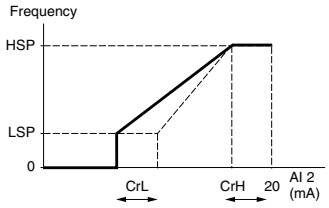
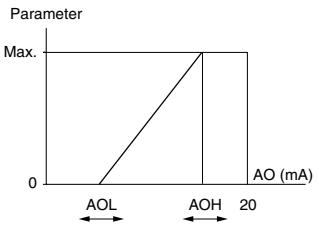
Menu 4

Table 13: 4—Control Menu: 2-Wire Control Type

Parameter	Code	Description	Adjustment Range	Factory Setting
deadb./Pedst	bSP	This function can be used to manage low speed operation. 	No BLS BnS	No

Menu 4

Table 14: 4—Control Menu: Other Parameters

Parameter	Code	Description	Adjustment Range	Factory Setting
AI2 min Ref.-mA AI2 Max. Ref-mA	CrL CrH	• CrL: Minimum value of the signal on analog input AI2 • CrH: Maximum value of the signal on analog input AI2 These two parameters allow definition of the signal at AI2. The input can be configured for 0–20 mA, 4–20 mA, 20–4 mA, among other possibilities.  	CrL: 0–20 mA CrH: 4–20 mA	CrL: 4 mA CrH: 20 mA
AO min Val-mA ★ AO Max. Val-mA ★	AOL AOH	Min. value of the signal on output AO Max. value of the signal output on AO These two parameters are used to define the output signal on AO. Eg. : 0–20 mA, 4–20 mA, 20–4 mA, etc.  	0–20 mA 0–20 mA	0 mA 20 mA
Save Ref	SAr	This function allows saving the reference, either when the run command is removed (RAM) or when mains power is removed (EEP). When the motor is next started, the reference speed will be the last saved reference. In order for speed reference to be saved in EEP mode, the run command should not be present when re-applying power.	NO-RAM-EEP	NO

★ These parameters are available only with the I/O extension card installed.

Note: If CRL is set higher than CRH, reverse sense operation will result (i.e., 20 mA will equal low speed and 4 mA will equal high speed).

NOTE: Save Reference is only available if LIs are assigned to +Speed/-Speed.

Menu 4

Table 14: 4—Control Menu: Other Parameters

Parameter	Code	Description	Adjustment Range	Factory Setting
KeyPadCom.	LCC	Allows command of the drive controller via the keypad display. The STOP/ RESET, RUN, and FWD/REV keys are active. The reference speed is given by the LFr parameter (see page 28). **Only the freewheel stop, fast stop, and stop by DC injection commands remain active at the terminal strip.** If the link between the drive controller and keypad display is lost, the drive controller will trip on the SLF fault (serial link fault).	No - Yes	No
Stop Priorit.	PSt	This function gives priority to the STOP key on the keypad display no matter what the command source (terminal strip, keypad display, or serial link). To change the PSt parameter to No: 1. Display no. 2. Press ENT. 3. The drive controller displays “See manual”. 4. Press the up arrow key, then the down arrow key, then ENT, then ESC. **When set to No, the stop key on the keypad display will be inactive**. To return to Yes, display Yes then press enter.	No - Yes	Yes

⚠ WARNING

DISABLED STOP COMMAND

Disabling the stop key on the keypad display will prevent the drive controller from stopping when the stop key is pressed. An external stop command must be installed to stop the motor.

Failure to follow this instruction can result in death, serious injury, or equipment damage.

DriveAddress	Add	Drive controller address controlled through the RS-485 port by a MODBUS device (i.e., without the programming or operating keypad display).	0 to 31	0
BdRate RS485	tbr	Transmission speed on the RS-485 MODBUS port on the front of the drive controller. 4800 Bits / second 9600 Bits / second 19200 Bits / second	4800– 9600– 19200–	19200

★ These parameters are available only with the I/O extension card installed.

Menu 4

Table 14: 4—Control Menu: Other Parameters

Parameter	Code	Description	Adjustment Range	Factory Setting
Reset counters	rPr	KWh or operating time reset to 0 No: Ready to accept a reset command. APH: KWh reset to 0 RTH: Operating time reset to 0 Press “ENT” to confirm the reset to 0 command. APH and RTH are active immediately. The parameter then automatically returns to No.	No-APH-RTH	No

★ These parameters are available only with the I/O extension card installed.

5—I/O MENU

This menu allows you to assign functions to the inputs and outputs. It is accessible when the access locking switch is in the position. The I/O assignments can only be modified if the motor is not running.

The inputs and outputs displayed in the I/O menu vary depending on selections made in the 4—Control menu and whether or not an I/O extension card is installed. The default settings depend on the macro-configuration selected (see Table 3 on page 22 for factory settings).

Table 15 shows which functions can be assigned to the analog input and which can be assigned to a logic input. Additional inputs are available and can be assigned when an I/O extension card is installed. *LI1 and R1 cannot be reassigned. AI1, LI1, and R1 are not displayed in the I/O menu.*

Menu 5

NOTE: When reassigning inputs from +Speed and -Speed, reassign -Speed first.

When reassigning inputs from preset speeds, reassign PS8 first then PS4, then PS2.

Table 15: Possible Assignments for Configurable Inputs

I/O Extension Card			2 Logic Inputs LI5-LI6	Analog Input AI3	Logic Input [1] A, A-, B, B-
Drive Controller without an I/O Extension Card		**Analog Input AI2**	**3 Logic Inputs LI2–LI4**		
Code and Parameter	**Description**				
NO: Not assigned	Not assigned	X	X	X	X
RV: Reverse	Run reverse		X		
RP2: Switch ramP2	Ramp switching		X		
JOG	Jog		X		
+SP: + SPeed	+Speed		X		
-SP: - SPeed	-Speed		X		
PS2: 2 Preset SP	2 preset speeds		X		
PS4: 4 Preset SP	4 preset speeds		X		
PS8: 8 Preset SP	8 preset speeds		X		
NST: Freewhl Stop	Freewheel stop/Run permissive		X		
DCI: DC inject	DC injection braking		X		
FST: Fast stop	Fast stop		X		
CHP: Multi.Motor	Switching between two motors		X		
TL2: Torque Lim2	Second torque limit		X		

[1] The menu for assigning encoder input A, A-, B, B- is called “Assign AI3”.

[2] To configure an AI for PIF: PI regulator, RFC: Auto/manual must not be assigned to a logic input.

Menu 5

Table 15: Possible Assignments for Configurable Inputs

I/O Extension Card			2 Logic Inputs LI5-LI6	Analog Input AI3	Logic Input [1] A, A-, B, B-
Drive Controller without an I/O Extension Card		Analog Input AI2	3 Logic Inputs LI2–LI4		
Code and Parameter	**Description**				
FLO: Forced Local	Force to local		X		
RST: Fault Reset	Fault reset		X		
RFC: Auto/manu	Reference switching		X		
ATN: Autotune	Auto-tuning		X		
PIF: PI regulator	PI regulator feedback	X [2]		X [2]	
PAU:PID Auto/Manu	PID Auto/Manu if one AI = PIF		X		
PIM:PID Man.ref.	Manual PID speed reference if one AI = PIF			X	
PR2:PID 2 Preset	2 preset PID setpoints if one AI = PIF			X	
PR4:PID 4 Preset	4 preset PID setpoints if one AI = PIF			X	
TLA:Torque limit	torque limitation by AI if one AI = ATL			X	
FR2: Speed Ref2	Speed reference 2	X			
SAI: Summed Ref.	Reference summing	X		X	
SFB: Tacho feedbk	Tachogenerator			X	
PTC: Therm. Sensor	PTC probes			X	
ATL: Torque Lim.	Torque limit			X	
RGI: PG feedbk	Encoder or sensor feedback				X

[1] The menu for assigning encoder input A, A-, B, B- is called “Assign AI3”.

[2] To configure an AI for PIF: PI regulator, RFC: Auto/manual must not be assigned to a logic input.

Table 16 shows which functions can be assigned to relay output R2, logic output LO, and analog output AO.

Menu 5

Table 16: Possible Assignments for Configurable Outputs

I/O Extension Card			Logic Output LO	Analog Output AO
Drive Controller without an I/O Extension Module		**Relay R2**		
NO: Not assigned	No assigned	X	X	X
RUN: DriveRunning	Drive controller running	X	X	
OCC: Output Cont.	Output contactor command	X	X	
FTA: Freq Attain.	Frequency threshold attained	X	X	
FLA: HSP Attained	High speed attained	X	X	
CTA: I Attained	Current level attained	X	X	
SRA: FRH Attained	Reference speed attained	X	X	
TSA: Mtr Therm Lvl	Motor thermal level attained	X	X	
APL:4-20 mA loss	Loss of 4–20 mA signal	X	X	
F2A:F2 Attained	Second frequency threshold reached	X	X	
BLC: Brk Logic	Brake logic	X		
OCR: Motor current	Motor current			X
OFR: Motor Frequency	Motor speed			X
ORP: Output Ramp	Ramp output			X
OPS:PID ref.	PID setpoint output, If one AI = PIF			X
OPF:PID Feedback	PID feedback output, If one AI = PIF			X
OPE:PID Error	PID error output, If one AI = PIF			X
OPI:PID Integral	PID integral output, If one AI = PIF			X
OPR:Motor power	Motor power			X
THR: Motor Thermal	Motor thermal state			X
THD: Drive Thermal	Drive thermal state			X
TRQ: Motor torque	Motor torque			X
STQ: Signed Torq.	Signed motor torque			X

After the I/O have been assigned, additional parameters related to the functions automatically appear in the menus, and the macro-configuration is CUS: Customized. The additional parameters are listed in Tables 17 and 18.

Menu 2

Table 17: New Parameters in 2—Adjust Menu After I/O Reassignment

I/O	Assignment		New Parameters to Adjust
LI	RP2	Ramp switching	AC2 dE2
LI	JOG	Jog	JOG JGt
LI	PS4	4 preset speeds	SP2 SP3
LI	PS8	8 preset speeds	SP4 SP5 SP6 SP7
LI	DCI	DC injection braking	IdC
LI	TL2	Second torque limit	tL2
LI	PR4	4 preset PID setpoints	P I2 - P I3
AI	PIF	PI regulator	rPG rIG FbS PIC
AI	SFB	Tachogenerator	dtS
R2	BLC	Brake logic	brL Ibr brt bEn bEt Stt
R2, LO	FTA	Frequency threshold attained	Ftd
R2, LO	CTA	Current threshold attained	Ctd
R2, LO	TSA	Thermal threshold attained	ttd
R2, LO	F2A	2nd frequency threshold reached	F2d

Table 18: Other New Parameters After I/O Reassignment

I/O	Assignment		Parameters to Adjust
LI	-SP	- Speed	Str (4—Control menu)
LI	FST	Fast stop	dCF (3—Drive menu)
LI	CHP	Motor switching	PCC (3—Drive menu)
LI	RST	Fault reset	rSt (6—Fault menu)
AI	SFB	Tachogenerator	Sdd (6—Fault menu)
A+, A-, B+, B-	RGI	Summing reference	PGt, PLS (3—Drive menu)
A+, A-, B+, B-	SAI	Encoder feedback	PGt, PLS (3—Drive menu)

Function Compatibility

The compatibility of certain functions can limit the application functions which can be assigned. Figure 12 shows the incompatibilities between functions. The functions not listed in Figure 12 are compatible with all other functions.

	Automatic DC injection braking	Summing inputs	PID Regulator	+Speed/-Speed	Reference switching (Auto/manual)	PID regulator with Auto/manual	Freewheel stop	Fast stop	Jog	Preset Speeds	Reverse operation	Inhibit reverse operation	Speed regulation with tachogenerator or encoder	Torque limitation via AI3	Torque limitation via LI
Automatic DC injection braking							↑								
Summing inputs					●	●									
PID Regulator					●				●	●			●		
+Speed/-Speed					●	●			↑	●					
Reference switching (Auto/manual)		●	●	●						●					
PID regulator with Auto/manual		●		●											
Freewheel stop	←							←							
Fast stop							↑								
Jog			●	←						←					
Preset Speeds			●	●	●				↑						
Reverse operation												●			
Inhibit reverse operation											●				
Speed regulation with tachogenerator or encoder			●											●	
Torque limitation via AI3													●		
Torque limitation via LI															

● Incompatible functions

Compatible functions

No significance

Function priority (functions which cannot be active at the same time):

← ↑ The arrow points to the function that has priority.

The stop functions have priority over run commands.
The speed references from a logic command have priority over analog references.

Note: An incompatible function must be deselected before the desired function can be programmed. For example, if preset speeds is programmed, it must be cleared before the +/- speed parameter can be selected.

Figure 12: Function Compatibility Chart

Using the Logic Inputs

Run Forward and Run Reverse

The logic input used for run reverse can be reassigned if the application has only one rotation direction.

2-wire Control

In 2-wire control, run (forward or reverse) and stop are commanded by the same logic input. When the logic input is closed (set to state 1), run is commanded; when it is opened (set to state 0), stop is commanded. See tCt on page 46 for more information.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

LI1 has priority:

- If LI1 is closed while LI2 is active, the controller will respond to LI1.
- If the LI1 input is lost while LI2 is active, the controller will respond to LI2 and reverse directions.

The logic inputs must be programmed appropriately for the application to prevent the motor from spinning in an unintended direction.

Failure to follow this instruction can result in death, serious injury, or equipment damage.

3-wire Control

In 3-wire control, run (forward or reverse) and stop are commanded by two different logic inputs. LI1 is always assigned to stop which is obtained by opening LI1 (setting it to state 0). A pulse on the run input is saved until the stop input is opened.

Whenever the drive controller is powered up or reset, the motor will only run after resetting the Forward, Reverse, and DC injection inputs.

Ramp Switching

This function allows switching between the first and second ramps. The first ramps are ACC and dEC, the second ramps are AC2 and dE2. There are two ways to activate the function:

- Assign a logic input to RP2 and close the assigned input (set it to state 1).
- By detection of a frequency threshold. This must be configured with the Frt parameter.

If a logic input is assigned to the function, ramp switching can only be initiated by the assigned input.

Jog

A logic input can be assigned to the Jog function to define a motor speed from 0 to 10 Hz. A run command (FWD or REV) is also required.

If the Jog contact is closed (set to state 1) and then a run command is given, the acceleration ramp is 0.1 s. The deceleration ramp will be 0.1 s when the run command is removed.

If a run command is given and then the Jog contact is closed (set to state 1):

- The acceleration ramp (ACC) is 0.1 s if the motor speed is less than the programmed Jog speed.
- The deceleration ramp (dEC) is followed if the motor speed is higher than the programmed Jog speed.

When the Jog contact is opened (set to state 0), the ACC and dEC settings are used to adjust the motor speed.

The following Jog parameters can be modified in the 2—Adjust menu:

- Jog speed (JOG)
- Delay between jog pulses (JGt)

+Speed/-Speed

There are two types of operation for +Speed/-Speed. In both, the maximum speed is set by the reference speeds at the analog inputs. For example, if 60 Hz is the desired maximum speed, a jumper can be installed from +10 Vdc to AI1.

1. Use of pushbuttons. Two logic inputs are required in addition to the run direction inputs. The +Speed input increases the speed and the -Speed input decreases the speed. If logic inputs are assigned to +Speed/-Speed, the Str parameter appears in the 4—Control menu allowing the reference speed to be saved (see page 48).

NOTE: When 3-wire control is selected, -Speed is automatically assigned to the next input after the one assigned to +Speed.

2. Use of selector switches. Only one logic input, assigned to +Speed, is required. When using selector switches, there is one position for each rotation direction.

   NOTE: This type of operation is not compatible with 3-wire control.

   The Save Reference (Str) parameter can be used to save the last speed reference when the run command is removed or when the power is removed.

Figures 13 and 14 illustrate wiring and timing for +Speed/-Speed.

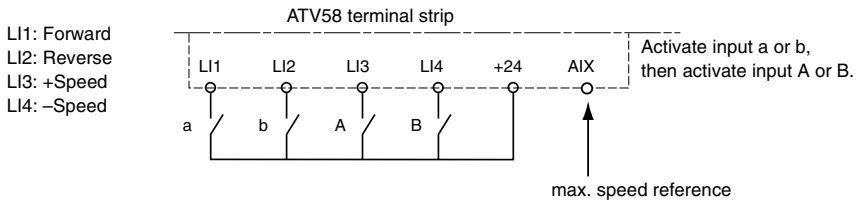
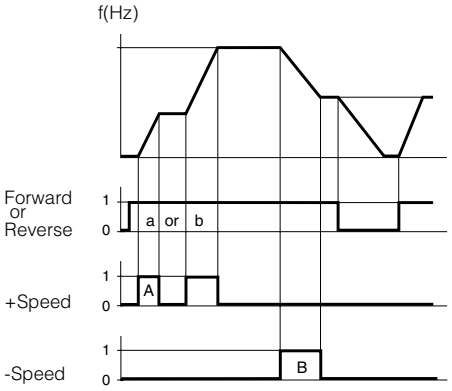


Figure 13: +Speed / -Speed Wiring Diagram



NOTE: To reassign the logic inputs to a function other than +Speed/-Speed, -Speed must be cleared first.

Figure 14: +Speed/-Speed Timing Diagram

Figures 15 and 16 show a wiring example and timing diagram for +Speed using selector switches. This function requires maximum speed reference input. For example, if 60 Hz is the desired maximum speed, a jumper can be installed from +10 Vdc to AI1.

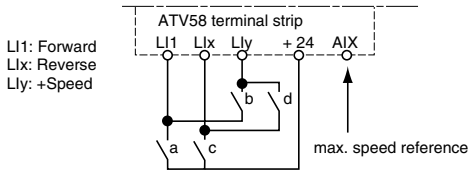


Figure 15: Wiring Example for +Speed (Selector Switches)

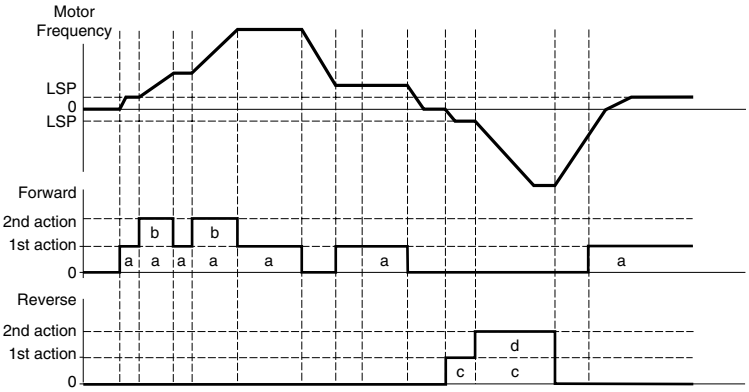


Figure 16: +Speed Timing Diagram (Selector Switches)

Preset Speeds

2, 4, or 8 speeds can be preset, requiring 1, 2, or 3 logic inputs, respectively.

Table 19 shows how the logic inputs are configured for Preset Speeds and the input states that activate them.

Table 19: Preset Speed Logic

2 Preset Speeds		4 Preset Speeds			8 Preset Speeds			
Assign LIx to PS2.		Assign LIx to PS2, then LIy to PS4.			Assign LIx to PS2, then LIy to PS4, then LIz to PS8.			
LIx	**Speed reference**	**LIy**	**LIx**	**Speed reference**	**LIz**	**LIy**	**LIx**	**Speed reference**
0	LSP + AI reference	0	0	LSP + AI reference	0	0	0	LSP + AI reference
1	HSP	0	1	SP2	0	0	1	SP2
		1	0	SP3	0	1	0	SP3
		1	1	HSP	0	1	1	SP4
					1	0	0	SP5
					1	0	1	SP6
					1	1	0	SP7
					1	1	1	HSP

NOTE: To reassign the logic inputs to a function other than Preset Speeds, PS8 (LIz) must be cleared, then PS4 (LIy), then PS2 (LIx).

Reference Switching (Auto/Manual)

Switching between two references (at AI1 and AI2) by a logic input command. When the logic input is closed (set to state 1), AI1 is enabled. This function automatically assigns AI2 to Speed Reference 2.

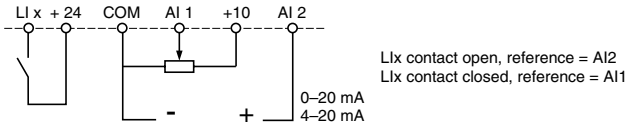


Figure 17: Reference Switching Wiring Diagram

Freewheel Stop (Coast to Stop) / Run Permissive

A logic input can be assigned to the Freewheel Stop / Run Permissive (NST) function. *The drive controller will not run until the logic input is closed.* Opening the logic input assigned to the function (setting it to state 0) causes the drive controller to stop applying power to the motor and the motor to coast to a stop. When the logic input is open, NST is displayed in the Drive state screen on the keypad display to indicate that a freewheel stop has been requested. The drive controller will not run until the logic input is closed. This can be used with the Forced Local function for drive controllers on communication networks.

A freewheel stop can be used with a stop command and by setting the FFt parameter. When a stop command is given and the frequency drops below the frequency set with the FFt parameter, the drive controller will freewheel stop.

DC Injection Braking

DC injection braking can be activated at the end of each stop cycle (Adc = Yes) or DC injection braking can be obtained by closing the logic input assigned to the DC Injection Braking function (setting it to state 1).

Fast Stop

⚠ WARNING

EXTENDED STOPPING TIME

- Deceleration time during fast stop may be automatically extended depending on braking ability of the drive controller.
- A dynamic brake or mechanical stopping/holding brake may be required for consistent stopping times independent of motor load conditions.
- Fast stop does not function during loss of power or drive controller fault.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Fast stop is a braked stop with the deceleration ramp time reduced by a programmable coefficient (see dCF on page 43). Fast stop is obtained by opening the logic input assigned to the function (setting it to state 0), or by configuring fast stop under type of stop (Frt on page 41).

Motor Switching

This function allows a single drive controller to control two motors with different power ratings, one at a time. The ratio between the motor power ratings is set with the PCC parameter in the 3—Drive menu (see page 43).

If the two motors have different power ratings, enclosure types, or speed ratings, then separate motor contactors, thermal protection, and short circuit protection will be required for each motor. **This function automatically inhibits motor thermal protection of the second motor.**

The motor switching command will not be taken into account unless the motor is stopped. If the output contactor opens while the motor is running, the drive controller may trip on overcurrent or overvoltage which may result in damage to the drive controller. The following parameters are automatically scaled by the command from the logic input:

- DC injection current
- Brake release current
- Nominal motor current

Second Torque Limit

Second Torque Limit reduces the maximum motor torque when the logic input is closed (state set to 1). Use the 2—Adjust menu to configure the percentage of torque.

Fault Reset

Fault reset erases a saved fault and resets the drive controller if the cause of the fault has disappeared. Two types of reset are possible: partial or total. This is set by the rSt parameter in the 6—Fault menu. For a partial reset (rSt = RSP), the following faults are reset and cleared from the display:

- mains overvoltage
- communication fault
- motor overheating
- DC bus overvoltage
- motor overload
- serial link fault
- output phase loss
- loss of 4–20 mA
- drive controller overheating
- ramp not followed
- external fault
- overspeed

For a Total reset (rSt = RSG), all faults except SCF (Motor Short Circuit) are overridden as long as the logic input assigned to Fault Reset is closed.

CAUTION

MOTOR OVERHEATING

- Repeated reset of the thermal state after a thermal overload can result in thermal stress to the motor.
- When faults occur, promptly inspect the motor and driven equipment for problems (locked shaft, mechanical overload, etc.) before restarting. Also check the power supplied to the motor for abnormal conditions (phase loss, phase imbalance, etc.).

Failure to follow these instructions can result in equipment damage.

Force to Local

Permits going from serial link command to local command using the keypad display or terminal strip, depending on the setting of the LCC parameter in the 4—Control menu. Assigning this parameter selects a local command when the logic input is closed (state 1).

Auto-tuning

When the assigned logic input changes to 1 an auto-tuning operation is triggered, in the same way as parameter TUN in the 3—Drive menu.

Auto tuning is only performed if no command has been activated. If a Freewheel Stop or Fast Stop function is assigned to a logic input, this input must be set to 1 (active at 0).

Encoder Inputs

(Only with an I/O extension card with encoder input, VW3A58202U)

Speed Regulation

The inputs can be used to connect an encoder for improving speed regulation in applications where the load is changing. To program the encoder speed feedback, configure AI3 in the 5—I/O menu for RGI: Encoder Feedback. Then configure the encoder type and number of pulses in the 3—Drive menu.

The A, A-, B, and B- inputs on the I/O option card are for use in forward and reverse directions.

The A input can also be used with an inductive sensor of a photoelectric detector for simplified, but less accurate regulation.

Summing Speed Reference

The setpoint from the encoder input is summed with AI1.

Using the Analog Inputs

The AI1 input is set for speed reference unless the PI Regulator function is enabled. In this case, AI1 is used for the set point reference. The possible assignments of AI2 and AI3 are Speed Reference Summing and PI Regulator.

Speed Reference Summing

The frequency references at AI2 and AI3 can be summed with that at AI1.

PID Regulator

This function is used to regulate a process with a setpoint input and a feedback signal from the process. This function is enabled by assigning an analog input (AI) to PID feedback in the 5—I/O menu. This function is available after enabling the Variable Torque Macro and ensuring that the RFC: Auto/man parameter is not assigned to a logic input. The acceleration (ACC) and deceleration (dEC) ramps default to linear ramp type even if the ramps had been configured for S ramp or U ramp with the *rPt* parameter.

The PID regulator can be used with a logic input configured for Auto / Manual mode of operation (also referred to as Reference Switching) when the Analog option card is used. (Catalog number VW3A58201U) When the PID regulator is configured and a logic input is configured for PAU: PID Auto/man, the PID regulator function is active in Auto mode and AI3 is used for speed input in manual mode.

Logic inputs can be used with the PID regulator to command the drive controller to run from the analog reference, run at process maximum, or operate with two other definable pre-set setpoints. The configurable setpoints can be use to provide two different setpoints for two different processes, or they can be used in place of using AI1 for setpoint input. For example, providing a setpoint via the logic inputs can eliminate the need for a potentiometer.

Four analog outputs are available to monitor various aspects of the PID regulator function. See pages 73–74 for more information.

PID setpoint	OPS	PID feedback	OPF
PID error	OPE	PID integral error	OPI

Figure 18 shows a diagram of the PID Regulator inputs, calculation points, and outputs.

Table 20 on page 67 provides a description of the inputs to the PID Regulator.

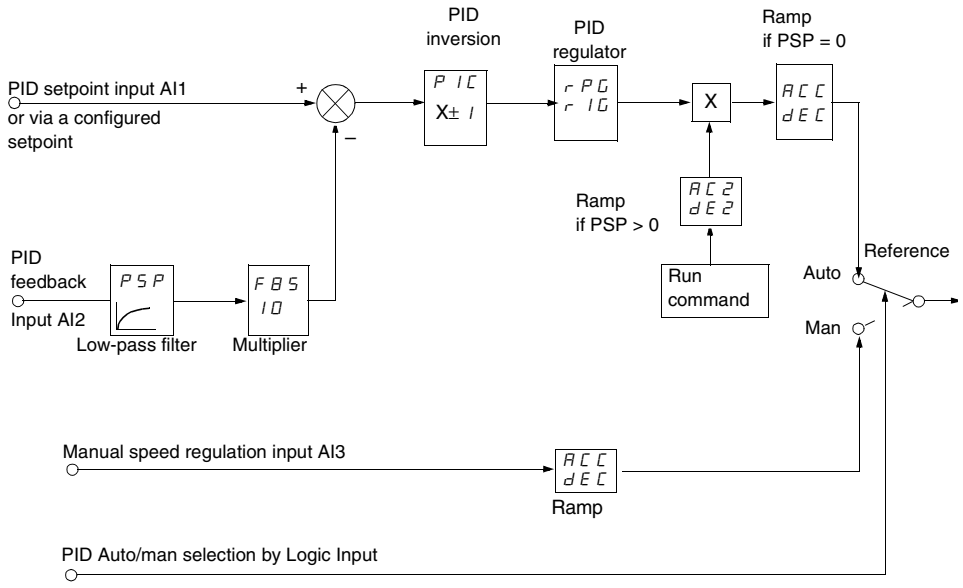


Figure 18: Diagram of PID Regulator

Table 20: Definition of PID Regulator Inputs and Adjustments

<table>
<tr><th>Input</th><th>Code</th><th>Range</th><th>Description</th></tr>
<tr><td>PID setpoint</td><td>—</td><td></td><td>The setpoint to the PID regulator can be provided from one of three sources:
— via analog input, AI1 (AI2 and AI3 can be set to sum with AI1)
— via preset setpoints defined by logic inputs (as explained in the table below)
— over a communication network</td></tr>
<tr><td>PID feedback</td><td>—</td><td></td><td>The feedback to the PID regulator can be provided from AI2 (0–20 mA signal) or AI3 (0–10 Vdc voltage signal).</td></tr>
<tr><td>Auto / Manual with Manual Speed Input</td><td>PAU, PIM</td><td></td><td>When the PID regulator is configured and a logic input is configured for Auto / Manual, AI3 is the speed input in manual mode. The PID regulator function is active in Auto mode. When the logic input is open, (set to state 0), Auto mode is active and the PID regulator is active.
Manual mode is active when the logic input is closed, (set to state 1). In manual mode AI3 is enabled and the drive controller responds proportionally to the speed reference at AI3.</td></tr>
<tr><td>Preset setpoints</td><td>Pr2, Pr4</td><td>0–100% of process maximum</td><td>Logic inputs can also be used to provide programmable setpoints. Two or four preset setpoints require the use of one or two logic inputs respectively.
<table>
<tr><th colspan="2">2 preset setpoints</th><th colspan="3">4 preset setpoints</th></tr>
<tr><td colspan="2">Assign: LIx to Pr2</td><td colspan="3">Assign: LIx to Pr2, then LIy to Pr4</td></tr>
<tr><td>LIx</td><td>Reference</td><td>LIy</td><td>LIx</td><td>Reference</td></tr>
<tr><td>0</td><td>Analog reference</td><td>0</td><td>0</td><td>Analog reference</td></tr>
<tr><td>1</td><td>Process max.</td><td>0</td><td>1</td><td>PI2 (adjustable)</td></tr>
<tr><td></td><td></td><td>1</td><td>0</td><td>PI3 (adjustable)</td></tr>
<tr><td></td><td></td><td>1</td><td>1</td><td>Process max.</td></tr>
</table></td></tr>
<tr><td>PID Inversion</td><td>PIC</td><td>Yes/No</td><td>PID inversion permits an inverted response to the PID setpoint signal. (This is also referred to as reverse-acting.) If PIC = No, the motor speed increases when the error is positive. If PIC = Yes, the motor speed decreases when the error is positive.</td></tr>
<tr><td>PID proportional gain</td><td>rPG</td><td>0.01–100</td><td>PID regulator proportional gain adjusts the scaling of the PID setpoint signal.</td></tr>
<tr><td>PID integral gain</td><td>rIG</td><td>0.01–100 s</td><td>PID regulator integral gain adjustment.</td></tr>
<tr><td>Low pass feedback filter</td><td>PSP</td><td>0–10 s</td><td>PSP can be used to dampen the feedback signal. If PSP is set to zero, the ACC and dEC ramps are active. If PSP is > 0, the AC2 ramp is active. Adjustment of AC2 can be used to refine the response of the PID loop. The dEC ramp is used on deceleration.</td></tr>
<tr><td>PID Feedback scaling</td><td>FbS</td><td>1.0–100</td><td>PID feedback scaling allows adjustment of the maximum value of the PID feedback signal so that it corresponds to the maximum value of the PID regulator speed reference.</td></tr>
</table>

Assignment of AI2 and AI3

Summing Speed Reference: The frequency setpoints given by AI2 and AI3 can be summed with AI1.

Speed Regulation with Tachogenerator: (Assignment on AI3 only with an I/O extension card, VW3A58201U)

An external divider bridge is required to adapt the voltage of the tachogenerator. The maximum voltage must be between 5 and 9 V. A precise setting is then obtained by setting the dtS parameter available in the 2—Adjust menu.

PTC Probe Processing: (only with an I/O extension card using the analog input). Used for the direct thermal protection of the motor by connecting the PTC probes in the motor windings to analog input AI3.

Total resistance of the probe circuit at 20 °C = 750 Ω.

Torque Limit: (Assignment on AI3 only with an I/O extension card VW3A58201U). This function can only be accessed if an analog input has been assigned to the torque limit. If the logic input is at 0, the torque is limited by setting tL1 or tL2. If the logic input is at 1, the torque is limited by the analog input assigned to this function.

The signal applied at AI3 operates in a linear fashion on the internal torque limit (parameter TLI in the 3—Drive menu):

— If AI3 = 0 V: limit = TLI x 0 = 0

— If AI3 = 10 V: limit = TLI

Using the Controller Relay and Logic Outputs

The relay R2 on the drive controller or the logic output (LO) on an option card can be configured as follows:

Output Contactor Command (OCC)

The Output Contactor Command function allows the drive controller to command a contactor between the controller and the motor. The controller closes the contactor when a run command is given. When there is no longer any current in the motor, the controller opens the contactor. When using an output contactor, set outphase loss (OPL) to No.

NOTE: If the braking by DC injection function is configured, do not exceed contactor rating, because the contactor will not open until the end of braking.

Drive Running (RUN)

The logic output is at state 1 if the motor is being fed by the drive controller (current present) or if a run command is generated with a zero speed reference.

Frequency Threshold Attained (FtA)

The logic output is at state 1 if the motor frequency is greater than or equal to the frequency threshold set by the Ftd parameter in the 2—Adjust menu.

Frequency Reference Attained (SrA)

The logic output is at state 1 if the motor frequency is equal to the speed reference value.

High Speed Attained (FLA)

The logic output is at state 1 if the motor frequency is equal to the high speed value (HSP).

Current Threshold Attained (CtA)

The logic output is at state 1 if the motor current meets or exceeds the current threshold set by the Ctd parameter in the 2—Adjust menu.

Thermal State Attained (tSA)

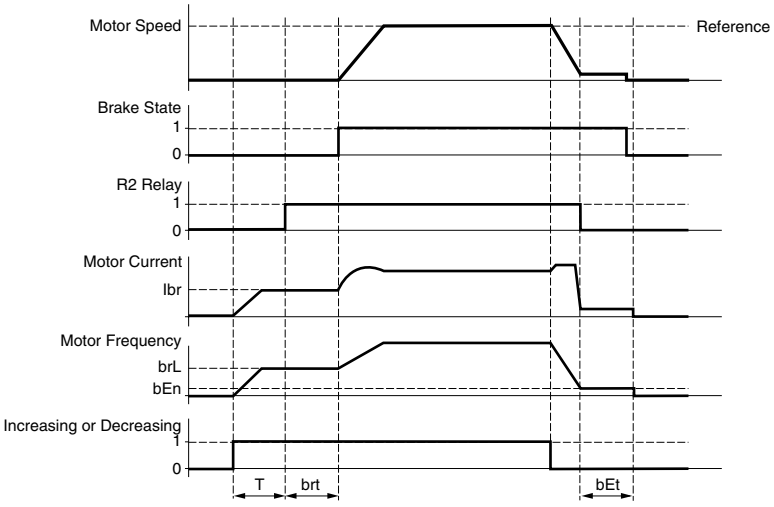
The logic output is at state 1 if the motor thermal state ismeets or exceeds the thermal state set by the ttd parameter in the 2—Adjust menu.

Loss of 4–20 mA signal (APL)

The logic output is at state 1 if the signal on the 4–20 mA speed reference input is less than 2 mA.

Brake Logic Command (bLC) (This parameter is only assignable to R2)

Brake Logic Command allows management of a mechanical brake by the drive controller. Figure 19 on page 70 shows a timing diagram for Brake Logic.



T = non-adjustable delay

Figure 19: Brake Logic Timing Diagram

Parameters accessible in the 2—Adjust menu:

- brake release frequency (brL)
- brake release current (Ibr)
- brake release time (brt)
- brake engage frequency (bEn)
- brake engage time (bEt)

Recommendations for configuring the Brake Logic control parameters:

- Brake release frequency (brL):

  Set the brake release frequency to the value of the nominal slip (g) multiplied by the nominal frequency (FS) in Hz.

  brL = g x FS

  g = nominal motor slip

  FS = nominal motor frequency (indicated on the motor nameplate)

  Example Calculation: nominal slip (g) = (Ns – Nr) / Ns

  Ns = synchronous speed in rpm

  Nr = nominal speed at nominal torque in rpm, use the speed indicated on the motor nameplate

(For a 50 Hz supply: Ns = 3000 rpm for a motor with two poles, 1500 rpm for a motor with four poles, 1000 rpm for a motor with six poles, and 750 rpm for a motor with eight poles.

For a 60 Hz supply: Ns = 3600 rpm for a motor with two poles, 1800 rpm for a motor with four poles, 1200 rpm for a motor with six poles, and 900 rpm for a motor with eight poles.)

Example calculation: for a motor with four poles, 1430 rpm given on the rating plate, and a 50 Hz supply

g = (1500 – 1430) / 1500 = 0.0466

Brake release frequency = 0.0466 x 50 = 2.4 Hz

- Brake release current (Ibr):

  Adjust the brake release current to the nominal current indicated on the motor.

  NOTE: The values indicated (release current and release frequency) correspond to theoretical values. If during testing, the torque is insufficient using these theoretical values, retain the brake release current at the nominal motor current and lower the brake release frequency (up to 2/3 of the nominal slip). If the result is still not satisfactory, return to the theoretical values and then increase the brake release current (the maximum value is imposed by the speed controller) and increase the brake release frequency gradually.

- Acceleration time:

  It is advisable to set the acceleration ramps to more than 0.5 seconds. Ensure that the drive controller does not exceed the current limit.

  The same recommendation applies for deceleration. A braking resistor should be used on overhauling loads.

- Brake release delay (brt):

  Adjust according to the time required for the mechanical brake to open.

- Brake engage frequency (bEN):

  Set to twice the nominal slip (in our example 2 x 2.4 = 4.8 Hz). Then adjust according to observed results.

- Brake engage delay (bEt):

  Adjust according to the time required for the mechanical brake to close.

Using the Analog Outputs on the I/O Extension Cards

The analog outputs on the Analog I/O and Digital I/O extension cards are current outputs. The minimum and maximum values (AOL and AOH parameters) are configurable, each with a range of 0–20 mA.

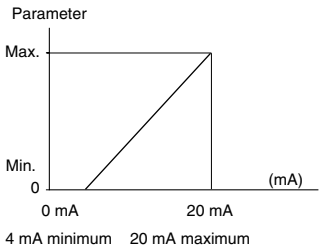


Figure 20: I/O Extension Card Minimums and Maximums

Motor Current

When configured for motor current (OCr), the analog output provides a signal proportional to motor current. The minimum configured value corresponds to zero while the maximum configured value of the analog output corresponds to 200% of the drive controller's constant torque rating.

Output Frequency

When configured for output frequency (OFr), the analog output provides a signal proportional to the motor frequency estimated by the drive controller. The minimum configured value corresponds to zero while the maximum configured value of the analog output corresponds to the maximum frequency setting, not the high speed setting.

Ramp Output

When configured for ramp output (OrP), the analog output provides a signal proportional to the frequency the drive controller is commanding the motor to run. The minimum configured value (AOL) corresponds to zero while the maximum configured value of the analog output (AOH) corresponds to the maximum frequency setting (tFr), not the high speed setting.

Motor Torque

When configured for motor torque (trq), the analog output provides a signal proportional to motor torque as an absolute value. The minimum configured value (AOL) corresponds to zero while the maximum configured value of the analog output (AOH) corresponds to 200% of the nominal motor torque.

Signed Motor Torque

When configured for signed motor torque (Stq), the analog output provides a signal proportional to motor torque and gives an indication of braking torque or motoring torque. The minimum configured value (AOL) corresponds to 200% braking torque while the maximum value of the analog output (AOH) corresponds to 200% of the nominal torque. Zero torque corresponds to (minimum value + maximum value)/2, (AOL + AOH)/2.

Signed Ramp

When configured for signed ramp output, ORS, the analog output provides a signal proportional to the frequency the drive controller is commanding the motor run and gives an indication of reverse or forward direction. The minimum configured value, AOL, corresponds to the maximum frequency (Fr) in the reverse direction, while the maximum configured value, AOH, corresponds to the maximum frequency (Fr) in the forward direction. Zero frequency corresponds to (minimum value + maximum value) / 2, (AOL+AOH) / 2.

PID Setpoint

When configured for PID setpoint, OPS, the analog output provides a signal proportional to the PID setpoint being provided to the drive controller. The minimum configured value, AOL, corresponds to the minimum setpoint, while the maximum configured value, AOH, corresponds to the maximum setpoint.

PID Feedback

When configured for PID feedback, OPF, the analog output provides a signal proportional to the PID feedback being provided to the drive controller. The minimum configured value, AOL, corresponds to the minimum feedback, while the maximum configured value, AOH, corresponds to the maximum feedback.

PID Error

When configured for PID error, OPE, the analog output provides a signal proportional to the PID regulator error as a percentage of the sensor range being used for the PID feedback, (maximum feedback minus minimum feedback). The minimum configured value, AOL, corresponds to – 5%, while the maximum configured value, AOH, corresponds to +5%. Zero corresponds to (minimum value + maximum value) / 2, (AOL+AOH) / 2.

PID Integral Error

When configured for PID integral error, OPI, the analog output provides a signal proportional to the PID integral error. The minimum configured value, AOL, corresponds to the low speed setting, LSP, while the maximum configured value, AOH, corresponds to the high-speed setting, HSP.

Motor Power

When configured for motor power, OPR, the analog output provides a signal proportional to power drawn by the motor. The minimum configured value, AOL, corresponds to 0% of the motor nominal motor power, while the maximum configured value, AOH, corresponds to 200% of the motor nominal motor power.

Motor Thermal State

When configured for motor thermal state, THR, the analog output provides a signal proportional to the thermal state of the motor calculated by the drive controller. The minimum configured value, AOL, corresponds to 0% of the motor thermal state, while the maximum configured value, AOH, corresponds to 200% of the motor thermal state.

Drive Thermal State

When configured for drive thermal state, THD, the analog output provides a signal proportional to the thermal state of the drive controller. The minimum configured value, AOL, corresponds to 0% of the drive controller thermal state, while the maximum configured value, AOH, corresponds to 200% of the drive controller thermal state.

6—FAULT MENU

This menu is only accessible when the access locking switch is in the position. Modifications can only be made when the motor is stopped.

Menu 6

Table 21: 6—Fault Menu

Parameter	Code	Description	Adjustment Range	Factory Setting
Auto Restart	AEr	This function allows an automatic restart of the drive controller if the cause of the fault has disappeared and a run command is maintained. An automatic restart is possible after the following faults: • Input overvoltage • DC bus overvoltage • External fault • Serial link fault • Loss of 4–20 mA follower • Motor phase loss • Motor overload (after the thermal state has decreased below 100%) • Drive controller overheating (when the thermal state has decreased below 70%) • Motor overheating (when the thermal sensor resistance is less than 1500 ohms) • Communication fault. When the Auto restart is active, the fault relay remains energized. If the fault has disappeared, the drive controller will attempt to restart the motor after a delay of 30 s. If the drive controller remains faulted after 6 attempts, the fault relay de-energizes and the drive controller must be reset by cycling power.	Yes - No	No

⚠ WARNING

AUTOMATIC RESTART

- Automatic restart can only be used for machines or installations that present no danger in the event of automatic restarting, either for personnel or equipment.
- Equipment operation must conform with national and local safety regulations.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Menu 6

NOTE: Reset Type is accessible if the Reset Fault function is assigned to a logic input.

Table 21: 6—Fault Menu

Parameter	Code	Description	Adjustment Range	Factory Setting
Reset Type	rSt	Faults reset by a partial reset (rSt = RSP) are: • OSF line overvoltage • ObF overbraking • OtF motor overheating • LFF loss of 4–20 mA • OLF motor overload • RnF ramp not followed • SOF overspeed • OPF motor phase loss • OHF drive overheating • SLF loss of RS-485 port communication • EPF external fault • CnF network communication fault Faults reset by a total reset (rSt = RSG) are all faults except motor short circuit fault. Total reset overrides all other faults. To configure rSt to RSG: 1. Display RSG 2. Press the ENT key. 3. The drive controller displays “See manual”. 4. Press the up arrow key, then the down arrow key, then ENT twice.	RSP (partial reset) RSG (total reset)	RSP

CAUTION

MOTOR OVERHEATING

- Repeated reset of the thermal state after a thermal overload can result in thermal stress to the motor.
- When faults occur, promptly inspect the motor and driven equipment for problems (locked shaft, mechanical overload, etc.) before restarting. Also check the power supplied to the motor for abnormal conditions (phase loss, phase imbalance, etc.).

Failure to follow these instructions can result in equipment damage.

OutPhaseLoss	OPL	Use to enable the output phase loss protection. **This parameter should be set to No if there is a contactor between the drive controller and the motor, or if multiple motors are used on the output of the drive controller.** It may be necessary to set to No if the moto load is less than 25% of the drive controller current rating (I_n).	Yes - No	Yes

Menu 6

Table 21: 6—Fault Menu

Parameter	Code	Description	Adjustment Range	Factory Setting
Input Phase Loss	IPL	Allows activation of the Input Phase Loss fault. This fault is not configurable on the single phase input only drive controllers ATV58•U09M2 and ATV58•U18M2. Disable when operating the 208/230 Vac drive controllers with single phase input.	Yes - No	Yes
ThermalProTyPe	tHt	This function defines the type of thermal protection carried out by the drive controller. Choices: • No: No motor thermal protection. • ACL: Self-cooled motor. The drive controller takes into account a derating as a function of the rotation frequency. •FCL: Force-cooled motor. The drive controller does not take into account a derating as a function of the rotation frequency.	No - ACL - FCL	ACL
LossFollower	LFL	Allows activation of a loss of 4–20 mA follower fault. This fault can only be configured if the minimum and maximum reference parameters for AI2 (CrL and CrH) are greater than 3 mA. If CrL > CrH, LFL is automatically set to Yes. –No: Disabled –Yes: Immediate fault –STT: Stop without fault, restart on return of signal –LSF: Stop followed by fault signal from R1 and LFF display on the keypad –LFF: Run at the preset speed set by the LFF parameter	No	No
Flt. Speed 4-20	LFF	Pre-set speed in the event of the loss of the 4–20 mA signal.	0–HSP	0

Menu 6

Table 21: 6—Fault Menu

Parameter	Code	Description	Adjustment Range	Factory Setting
Catch On Fly	FLr	Allows a smooth restart after: • Brief loss of input power • Fault reset or automatic restart • Freewheel stop or DC injection braking with a logic input • Momentary interruption of the drive controller output If relay R2 is assigned to the Brake Logic function, FLr will always be set to No.	Yes - No	No

⚠ WARNING

AUTOMATIC RESTART

- Automatic catch on the fly must only be used on machines or installations where automatic restarting will not endanger personnel or equipment.
- Equipment operation must conform with national and local safety regulations.

Failure to follow this instruction can result in death, serious injury, or equipment damage.

Cont. Stop	StP	Controlled stop upon loss of input phase. This function is only operational if the IPL parameter (Input Phase Loss) is set to No. If IPL is set to Yes, leave StP set to No. Possible choices: • No: loss of input phase causes drive controller to trip • NMS: Maintenance of DC bus: the DC bus is kept energized by regenerating the kinetic energy from the machine inertia, until the USF (Undervoltage) fault appears. • FRP: Following a ramp: deceleration following the programmed ramp, either dEC or dE2 until the motor stops or the USF (Undervoltage) fault appears. This operation is not available on the ATV58•U09M2, U18M2, U29M2 and U41M2.	No - NMS - FRP	No
RampNotFoll	Sdd	This function can be accessed if feedback via tachogenerator or pulse generator is programmed. When enabled, it is used to lock the speed controller if a speed error is detected (difference between the stator frequency and the measured speed). Yes / No options.		No

7—FILES MENU

The Files menu is accessible when the access locking switch is set to the position. Changes can only be made when the motor is stopped.

The keypad display can store four drive controller configuration files.

Menu 7

Table 22: 7—File Menu

Parameter	Code	Description	Factory Setting
File 1 State File 2 State File 3 State File 4 State	F 1 S F 2 S F 3 S F 4 S	Displays the state of the corresponding file. Possible states: FRE: File free EnG: A configuration has already been saved in this file	FRE FRE FRE FRE
Operat. Type	F O t	Allows selection of the operation concerning a file. Possible operations: • NO: no operation requested (value by default each time the keypad display is reconnected to the drive controller). • STR: save the configuration in a keypad display file. • REC: transfer a file to the drive controller. • Ini: return the drive controller to factory settings.	NO

NOTE: The stored program will be substituted for present settings when a file is transferred to the drive controller.

NOTE: Factory default settings will be substituted for present settings when Ini is selected and confirmed by pressing ENT twice when prompted.

⚠ WARNING

UNINTENDED EQUIPMENT ACTION

- Verify factory default or transferred file settings are compatible with the application requirements.
- If a stored file is downloaded with the stop key disabled, this file will be transferred. To stop the motor, an external stop command must be installed.

Failure to follow these instructions can result in death, serious injury or equipment damage.

Password	COd	See “Access Code” on page 81.	

Reinitializing the Drive Controller

Figure 21 shows the process of storing and recalling files to reinitialize the drive controller. Follow the path indicated by the bold lines.

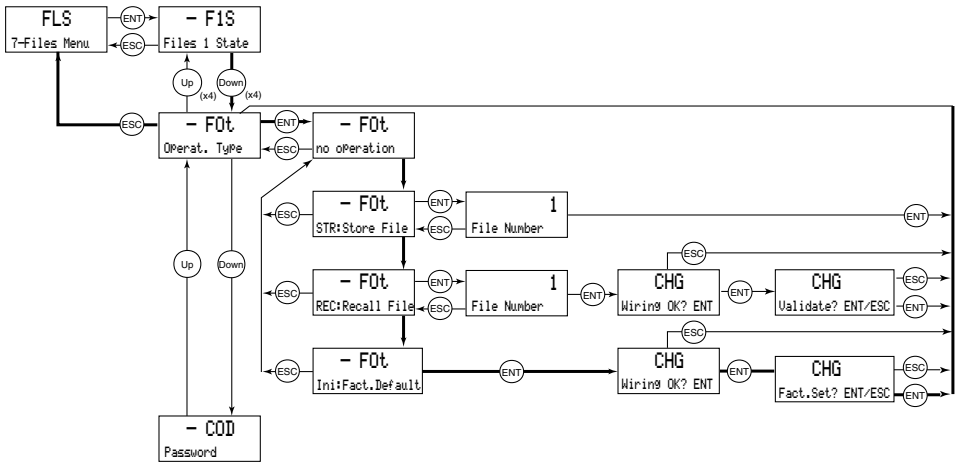


Figure 21: Reinitializing the Drive Controller

File Operation

To store or recall a file:

- Select STR to store a file or REC to recall a file.
- Select FILE number to specify the file.
- If Operation = STR: the display automatically returns to the Operation parameter, set to No.
- If Operation = REC, a second confirmation must be made:

  The display indicates:

  Press ENT to confirm.

  The display then indicates:

  Press ENT to confirm.

  The display automatically returns to the Operation parameter, set to No.

Access Code

The drive controller configuration can be protected by an access code (password).

Table 23: Access Code

Parameter	Code	Description	Factory setting
Config. Code	COd	Configuration code used as an access code.	0000

NOTE: This parameter should be used with caution. It can prohibit access to parameters. Any modification of the value of this parameter must be carefully noted and saved.

The access code is expressed with four digits. The first three are user-assigned and do not affect access to the menus. The fourth digit can range from 0 to 9 and determines which menus can be accessed. See Table 24 for an explanation of the last digit codes.

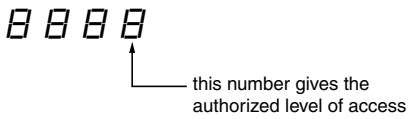


Figure 22: Access Code

NOTE: Menu access allowed by the locking switch setting can be limited by the access code.

Table 24: Significance of Access Code Last Digit

Menus Affected:	***Access is locked*** **if last digit of code is:**	***Display is allowed*** **if last digit of code is:**	***Modification is allowed*** **if last digit of code is:**
2	0 [1] or 9	1	2
2, 3, 4, 5, 6, 7, 8, and Macro-Configuration	0 [1] or 9	3	4
8	0 [1] or 9	5	6
2, 3, 4, 5, 6, 7, 8	0 [1] or 9	7	8

[1] Unless the factory setting, 0000, is used in which case access to the menus is completely unlimited.

For example, if the access code is “2337”, display of the menus 2, 3, 4, 5, 6, 7, and 8 is allowed, but modification is not allowed.

The access code is modified by using the ▲ and ▼ keys. If an incorrect code is entered, it is refused, with the following message displayed:

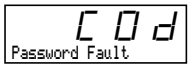


Figure 23: Incorrect Code Display

After pressing ENT or ESC on the keypad display, the value displayed by the Code parameter becomes 0000, however the level of accessibility remains unchanged. The user can then try again to enter the correct code.

To access the menus protected by the access code, the correct code must first be entered in the File menu. The File menu is always accessible.

Menu 8 will only appear on the keypad display if an option card has been installed in the drive controller. There are two types of option cards, Communication option cards and Application option cards. Communication option cards contains drivers and connection points for integration into various industrial and building automation networks. Application option cards expand the I/O functionality of the drive controller. See Appendix B for a list of option cards available from Schneider Electric/Square D Company.

8—COMMUNICATION MENU

Menu 8

The Communication menu is displayed only if a communication card is installed. It is accessible when the access locking switch on the back of the keypad display is set to the position. Configuration can only be done while the motor is stopped.

For information on the Communication Option Cards, refer to the manual for that card.

8—APPLICATION MENU

Menu 8

The Application menu is only displayed if a Custom Application card is installed. It is accessible when the access locking switch on the back of the keypad display is set to the position. Configuration can only be done while the motor is stopped.

For more information concerning the Custom Application card, see the document provided with the card.

Several custom Application option cards have been produced for specific OEM accounts. See Appendix B for a list of option cards available from Schneider Electric/Square D Company.

The General Purpose Option Card is considered a custom application card. For information on programming the GPO (General Purpose Option Card, part number VW3A58253U) see instruction bulletin 30072-450-03.

CHAPTER 3—DIAGNOSTICS AND TROUBLESHOOTING

KEYPAD DISPLAY AND INDICATING LEDS

When a fault condition is detected, a fault code and a plain language message will be displayed as long as power is maintained. See Table 25 on page 91 for fault codes and messages. In addition, the LEDs on the front of the drive controller indicate several states:

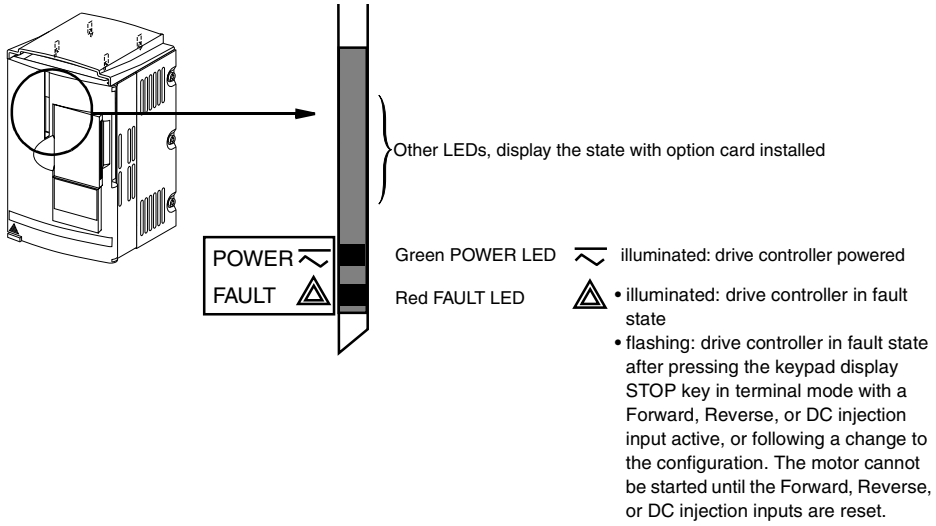


Figure 24: Location and Description of LEDs

FAULT STORAGE

The first fault detected is saved and displayed on the keypad display if power is maintained. The drive controller trips, the red fault LED illuminates, and the fault relay de-energizes. To reset the fault:

1. Remove power from the drive controller.
2. Before restoring power, identify and correct the cause of the fault.
3. Restore power. This will reset the fault if it has been corrected.

In certain cases, if automatic restart has been enabled, the drive controller can be automatically restarted after the cause of the fault has disappeared. See page 75.

USING FAULT CODES AND MESSAGES TO SOLVE PROBLEMS

The fault messages displayed on the keypad display can be used to troubleshoot problems. The fault messages can be divided into three categories:

- Protective faults: These faults are displayed when the drive controller detects conditions that, if left uncorrected, may result in damage to the drive controller and/or motor. The drive controller shuts down to prevent further damage from occurring.
- Drive faults: These faults are displayed when a problem is detected in the drive controller.
- Process faults: These faults are displayed when a process feedback or communication signal used by the drive controller is interrupted momentarily or completely.

Table 23: Fault Messages

Protective Faults	Drive Faults	Process Faults
Input phase loss	Precharge fault	Loss of 4–20 mA signal
Undervoltage	EEPROM fault	Loss of RS-485
Overvoltage	Internal fault	External fault
Drive overheating	Internal communication fault	Speed feedback fault
Motor overload	Power rating error	Communication network fault
Overbraking	Option error	
Motor phase loss	Option removed	
Overcurrent	EEPROM checks	
Motor short circuit		
Motor overheating		
Thermal sensor fault		
Overspeed		
Ramp not followed		

MAINTENANCE

Read the safety statements on page 87 before proceeding with any maintenance or troubleshooting procedures.

The following steps should be done at regular intervals:

- Check the condition and tightness of the connections.
- Make sure ventilation is effective and temperature around the drive controller remains within specified levels.
- Remove dust and debris from the drive controller, if necessary.

PRECAUTIONS

Table 25 on page 91 lists faults, associated codes, the probable causes of the faults, and the associated corrective action. When taking corrective action, follow the procedures outlined on pages 87-90.

⚠ DANGER

HAZARDOUS VOLTAGE

Read and understand these procedures before servicing ALTIVAR 58 drive controllers. Installation, adjustment, and maintenance of these drive controllers must be performed by qualified personnel.

Electrical shock will result in death or serious injury.

The following procedures are intended for use by qualified electrical maintenance personnel and should not be viewed as sufficient instruction for those who are not otherwise qualified to operate, service, or maintain the equipment discussed.

PROCEDURE 1: BUS VOLTAGE MEASUREMENT

⚠ DANGER

HAZARDOUS VOLTAGE

- Read and understand the bus voltage measurement procedure before performing the procedure. Measurement of bus capacitor voltage must be performed by qualified personnel.
- DO NOT short across DC bus capacitors or touch unshielded components or terminal strip screw connections with voltage present.
- Many parts in this drive controller, including printed wiring boards, operate at line voltage. DO NOT TOUCH. Use only electrically insulated tools.

Electrical shock will result in death or serious injury.

The DC bus voltage level is determined by monitoring the (+) and (–) measurement points. Their location varies by drive controller model number as listed in Table 24 and shown in Figure 25. The drive controller model number is listed on its nameplate.

Table 24: ATV58 Type H(+) and (–) Measurement Points

Drive Controller ATV58H••••••	(+) Measurement Point		(–) Measurement Point	
	Terminal Block or Connector	Terminal Designation	Terminal Block or Connector	Terminal Designation
U09M2• and U18M2•	J2	(+)	J2	(–)
U29M2• to D12M2•	J2	PA	J18	7
U18N4• to D23N4•				
D16M2• to D46M2•	J2	(+)	J2	(–)
D28N4• to D79N4•				

To measure the DC bus capacitor voltage:

1. Disconnect all power from the drive controller including external control power that may be present on the control board and the option board terminals.
2. Wait three minutes for the DC bus capacitors to discharge.
3. Read the model number of the drive controller from the nameplate and identify the corresponding (+) and (–) measurement points from Table 24 and Figure 25.
4. Open the door or cover of the drive controller.
5. Set the voltmeter to the 1000 Vdc scale. Measure the voltage between the (+) and (–) measurement points identified in step 3. Verify that the DC bus voltage has discharged below 45 V before servicing the drive controller.
6. If the DC bus capacitors will not discharge below 45 V, contact your local Square D representative. **Do not operate the drive controller.**
7. Replace all of the covers after servicing the drive controller.

The J18 connector is in the upper left hand corner of the main control board behind the flexible shield. Use a thin probe to access the connector pin.

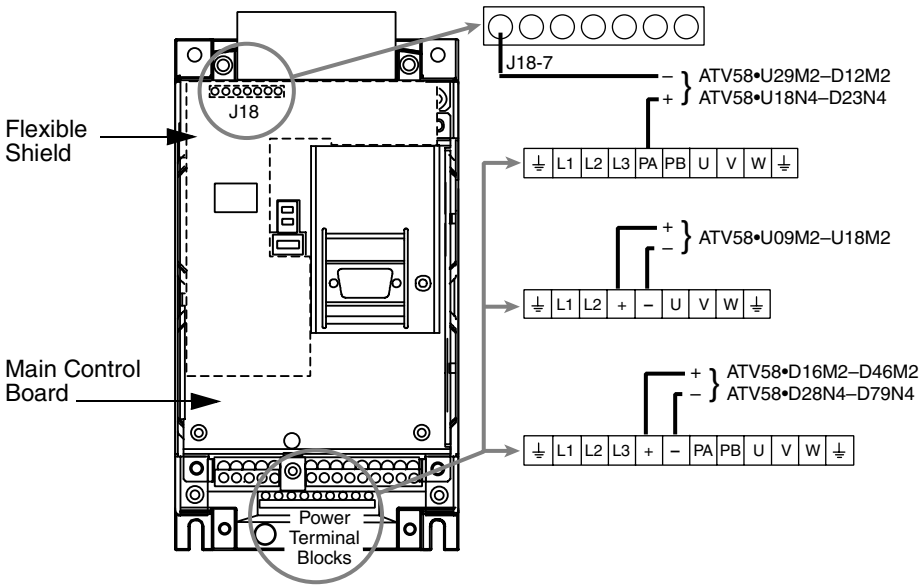


Figure 25: DC Bus Measurement Terminals

PROCEDURE 2: CHECKING SUPPLY VOLTAGE

Measure the input line voltage to determine if the voltage is within the drive controller tolerance.

1. Perform the Bus Voltage Measurement procedure on page 87.
2. Attach meter leads to L1 and L2. Set the voltmeter to the 600 Vac scale.
3. Reapply power and check for the correct line voltage, shown on the drive controller nameplate rating.
4. Remove power and repeat the procedure for L2 and L3, and L1 and L3.
5. When all phases have been measured, remove power. Remove leads and replace all covers.

PROCEDURE 3: CHECKING THE PERIPHERAL EQUIPMENT

The following equipment may need to be checked. Follow the manufacturers' procedures when checking this equipment.

1. A protective device, such as a circuit breaker, may have tripped or a fuse may have blown.
2. A switching device, such as a contactor, may not be closing at the correct time.
3. Conductors may require repair or replacement.
4. Connection cables to the motor or high resistance connections to ground may need to be checked. Follow NEMA standard procedure WC-53.
5. Motor insulation may need to be checked. Follow NEMA standard procedure MG-1. *Do not apply high voltage to U, V, or W.* Do not connect the high potential dielectric test equipment or insulation resistance tester to the drive controller since the test voltages used may damage the drive controller. Always disconnect the drive controller from the conductors or motor while performing such tests.

⚠ CAUTION

DIELECTRIC TESTS WHILE CONNECTED CAN CAUSE EQUIPMENT DAMAGE

- Do not perform high potential dielectric tests on circuits while the circuits are connected to the drive controller.
- Any circuit requiring high potential dielectric tests must be disconnected from the drive controller prior to performing the test.

Failure to follow these instructions can result in injury or equipment damage.

FAULT CODES AND MESSAGES

Table 25: Fault Codes and Messages

Fault/Message	Probable Causes	Corrective Actions
CFF	Error probably caused by changing a card.	
PWR RATE ERR-ENT	- Change of the power rating on the power board	1. Check the configuration of the power board and other boards.
OPTION ERR.-ENT	- Change of the type of option card or installation of an option card if one had not been installed before and the macro-configuration was CUS	2. Reset by cycling power.
OPT. REMOVED-ENT	- Option card removed	3. Save the configuration in a file on the keypad display.
EEP CKS.-ENT	- Saved configuration cannot be read. Pressing ENT causes the message: “Fact.Setting? ENT/ESC” to appear.	4. Press ENT to return to factory settings.
CFI CONFIG FAULT	The configuration sent to the drive controller via the serial link cannot be read.	1. Verify the configuration sent. 2. Send a configuration which can be read.
CnF COMM. NETWORK FAULT	Fault on the communication network.	1. Check the connection of the communication network to the drive controller. 2. Check the time-out.
CrF PRECHARGE FAULT	1. Precharge relay closure command fault. 2. Failed precharge resistor.	Perform Bus Voltage Measurement Procedure (Procedure 1 on page 87). Check connections in drive controller.
EEF EEPROM FAULT	Memory error.	Remove power from the drive controller and reset.
EPF EXTERNAL FAULT	Fault caused by an external source such as a PLC or GPO card. An EPF fault is generated whenever a GPO (General Purpose Option Card, part number VW3A58253U) is installed.	Verify the external source which caused the fault and reset. If the drive controller has a GPO installed, see instruction bulletin 30072-450-03 for programming and troubleshooting instructions.
ERR 1	Internal error in the keypad display	Cycle power on the drive controller. If the problem persists, replace the keypad display with part number VW3A58101U.
ERR 2	Serial link error due to incorrect address	Verify address setting. Cycle power on drive controller

Table 25: Fault Codes and Messages (Continued)

Fault/Message	Probable Causes	Corrective Actions
ERR 3	Serial link error due to incorrect value. If the keypad display is remotely mounted, electrical noise may be present.	Cycle power on the drive controller. If keypad display is remotely mounted, verify the cable is properly shielded. Ensure the cable is routed away from motor leads. If the problem persists, replace the keypad display with part number VW3A58101U. Reprogram any parameters that are not at factory default settings.
ERR 4	Internal error in the keypad display software. If the keypad display is remotely mounted, electrical noise may be present.	Cycle power on the drive controller. If the keypad display is remotely mounted, verify the cable is properly shielded. Ensure the cable is routed away from motor leads. If the problem persists, replace the keypad display with part number VW3A58101U. Reprogram any parameters that are not at factory default settings.
ERR 5	Serial link error. If the keypad display is remotely mounted, electrical noise may be present.	Cycle power on the drive controller. If the keypad display is remotely mounted, verify the cable is properly shielded. Ensure the cable is routed away from motor leads. If the problem persists, replace the keypad display with part number VW3A58101U. Reprogram any parameters that are not at factory default settings.
ERR 6	Internal error in the keypad display hardware	Cycle power on thedrive controller. If the problem persists, replace the keypad display with part number VW3A58101U.
ERR 7	Serial link time out error, the keypad display is not getting a response from the drive controller. If the keypad display is remotely mounted, electrical noise may be present.	Cycle power on the drive controller. If keypad display is remotely mounted, verify the cable is properly shielded. Ensure the cable is routed away from motor leads. If the problem persists, replace the control board on the drive controller with part number VX4A581U. An Ini fault may be displayed if the problem persists.
ERR 8 ERR 9	Internal error in the keypad display software. If the keypad display is remotely mounted, electrical noise may be present.	Cycle power on thedrive controller. If the keypad display is remotely mounted, verify the cable is properly shielded. Ensure the cable is routed away from motor leads. Re-program any parameters that are not at factory default settings. If the problem persists, replace the keypad display with part number VW3A58101U.
ERR10	Serial link error due to incorrect length of frame. If the keypad display is remotely mounted, electrical noise may be present.	Cycle power on the drive controller. If the keypad display is remotely mounted, verify the cable is properly shielded. Ensure the cable is routed away from motor leads. If the problem persists, replace the keypad display with part number VW3A58101U. Re-program any parameters that are not at factory default settings.

Table 25: Fault Codes and Messages (Continued)

Fault/Message	Probable Causes	Corrective Actions
ILF INTERNAL COMM. FAULT	Communication fault between the control board and the option card.	Perform Bus Voltage Measurement procedure (Procedure 1 on page 87). Check the connection between the option card and the control board. If the drive controller has a GPO (General Purpose Option Card, part number VW3A58253U) installed, see instruction bulletin 30072-450-03 for troubleshooting instructions.
InF INTERNAL FAULT	1. Internal fault. 2. Internal connection fault.	Perform Bus Voltage Measurement procedure (Procedure 1 on page 87), then check internal connections.
Ini	Attempting to download an incompatible file from the keypad display to the drive controller. Incompatibility can be caused by dissimilar drive controller part numbers. Also, incompatibility can occur when files are created on a drive controller with new firmware and then attached to a controller with older firmware that does not recognize the new features. The error may appear after ERR7 is dislayed.	1.Ensure the file being downloaded was created for the correct drive controller part. 2. Verify drive controller firmware. Reconfigure the new features used in the newer firmware. Like configurations are transferable independent of firmware revision. Another option is to upgrade the firmware by ordering part number VX4A581U. Cycle power on the drive controller.
LFF LOSS OF 4-20 mA	Loss of 4–20 mA follower signal on AI2 input. See Table 27	1. Verify signal connections. 2. Check signal.
NST Freewheel Stop	The logic input assigned to NST (Freewheel stop/Run permissive) is open.	The drive controller will not run until the logic input assigned to Freewheel stop / Run permissive is closed.
ObF OVERBRAKING	Overvoltage or overcurrent due to excessive braking or an overhauling load. See Table 26.	Increase deceleration time. Add dynamic braking option if necessary, or verify the dynamic braking option is working properly.
OCF OVERCURRENT	1. Ramp too short. 2. Inertia too high, or load too large 3. Mechanical blockage.	1. Check the parameter adjustments 2. Check the sizing of the drive controller, motor, and load. 3. Remove all power. With drive controller disconnected, check for mechanical blockage.
OHF DRIVE OVERHEATING	Heatsink temperature too high.	Check motor load, fan, and ambient temperature around drive controller. Wait for drive controller to cool down before resetting.
OLF MOTOR OVERLOAD	1. If thermal trip setting meets or exceeds 118% of the normal thermal state, thermal trip is due to prolonged overload or output phase failure. 2. Motor power rating too low for application.	1. Check setting of Thermal Current (ItH, see page 29) and compare with motor I_n (nameplate current rating). Check load and compare with operating speed. Check braking conditions (possibility of single-phase operation). Wait approximately seven minutes before resetting. 2. Verify that motor and drive controller selection are correct for application.

Table 25: Fault Codes and Messages (Continued)

Fault/Message	Probable Causes	Corrective Actions
OPF MOTOR PHASE LOSS	1. Loss of a phase on the output of the drive controller. 2. Drive controller oversized for motor.	1. Check the wiring to the motor (Procedure 3 on page 90). 2. Disable OPL and provide external overload protection.
OSF OVERVOLTAGE	Supply too high. See Table 26.	1. Check input line voltage (Procedure 2 on page 89). 2. Reset the drive controller.
OtF MOTOR OVERHEATING	Motor temperature too high.	1. Check the motor ventilation, ambient temperature, and motor load. 2. Check the type of thermal sensors used.
PHF INPUT PHASE LOSS	1. Input phase loss. 2. Power fuses blown. 3. Input line failure (t > 1s).	1. Check input line voltage (Procedure 2 on page 89). 2. Check fuses and circuit breaker (Procedure 3 on page 90). 3. Reset.
rnF RAMP NOT FOLLOWED	1. Ramp not followed. 2. Speed opposite from reference.	1. Check the adjustment and wiring of the speed feedback. 2. Check the adjustments against the load. 3. Check the sizing of the motor/drive controller combination. Dynamic Braking may be necessary.
SCF MOT SHORT CKT	Short circuit or grounding on drive controller output.	1. Remove all power. With drive controller disconnected, check connecting cables and motor insulation. 2. Check the drive controller transistors.
SLF LOSS OF RS485	Bad connection between the drive controller and the programming keypad display.	Check the connection between the drive controller and the programming keypad display.
SOF OVERSPEED	1. Instability. 2. Overhauling load.	1. Check parameter adjustments. 2. Add Dynamic Braking. 3. Verify the sizing of the motor, drive controller, and load.
SPF SPEED FEEDBACK FAULT	Loss of speed feedback.	Check the wiring of the sensor.
tSF THERMAL SENSOR FAULT	Bad connection between the motor thermal sensors and the drive controller.	1. Check the connection between the thermal sensors and the drive controller. 2. Check the thermal sensors.
USF UNDERVOLTAGE	1. Supply is too low. 2. Temporary voltage drop (t ≥ 200 ms).	Check input line voltage (Procedure 2 on page 89).

Table 26: Overvoltage/Overbraking Trip and Reset Points

	Overvoltage Trip Point	Overbraking Trip Point	Reset Point
ATV58••••M2	395 Vdc	415 Vdc	385 Vdc
ATV58••••N4	800 Vdc	840 Vdc	785 Vdc

Table 27: Trip and Reset Points when Loss of 4–20 mA

	Trip Point	Reset Point
ATV58••••M2	AI2 < 2 mA	AI2 > 2.5 mA
ATV58••••N4		

APPENDIX A—DRIVE CONTROLLER CONFIGURATION

Use these pages to note the configuration and adjustments of the ATV58 drive controller.

Drive catalog number: ATV58.....

Customer identification number: .....

Option card: No Yes Catalog number: .....

Access code: No Yes: .....

Configuration is in file number ..... of the programming terminal.

Macro-configuration: .....

For customized configuration (CUS), record assignments of inputs/ outputs in Tables 24 to 28.

For a menu overview, see page 101.

The following tables list the factory setting for each parameter. The new customer setting can be noted in the Customer Setting column. If no change has been made to the factory setting, the customer can note “no change” in the Customer Setting column.

Table 28: Menu 2—Adjustment Parameters

Code	Fact. Setting	Cust. Setting	Code	Fact. Setting	Cust. Setting
ACC	3 s	s	SP5	25 Hz	Hz
dEC	3 s	s	SP6	30 Hz	Hz
LSP	0 Hz	Hz	SP7	35 Hz	Hz
HSP	50 / 60 Hz	Hz	JOG	10 Hz	Hz
FLG	20%	%	JGt	0.5 s	s
StA	20%	%	brL	0 Hz	Hz
ItH	0.9 of I_n	A	Ibr	0 A	A
IdC	0.7 ItH	A	brt	0 s	s
tdC	0.5 s	s	bEn	0 Hz	Hz
SdC	Varies	A	bEt	0 s	s
JPF	0 Hz	Hz	FFt	50/60 Hz	Hz
JF2	0 Hz	Hz	rPG	1	
JF3	0 Hz	Hz	r IG	1 / s	/ s
AC2	5 s	s	PSP	0.0 s	s
dE2	5 s	s	Fb5	0.1	
tLS	no	no or s	PIC	no	
USC	1		dtS	1	
UFr	100%	%	Ctd	1.36 of I_n	A
SLP	100%	%	ttd	100%	%
PFL	20%	%	tL2	200%	%
SP2	10 Hz	Hz	Ftd	50/60 Hz	Hz
SP3	15 Hz	Hz	F2d	50/60 Hz	Hz
SP4	20 Hz	Hz			

Table 29: Menu 3—Drive Menu Parameters

Code	Fact. Setting	Cust. Setting	Code	Fact. Setting	Cust. Setting
UnS	depends on catalog number	V	Stt	STN	
FrS	50 / 60 Hz	Hz	dCF	4	
nCr	0.9 of I_n	A	tLI	200 %	%
nSP	depends on catalog number	rpm	CLI	1.3 6 of I_n	
COS	depends on catalog number		AdC	yes	
tUn	no		PCC	1	
tFr	60 / 72 Hz	Hz	SFt	LF	
nLd	no		SFr	depends on catalog number	kHz
Fdb	no		nrd	yes	
Frt	0 Hz	Hz	SPC	no	
rPt	LIN		PGt	DET	
brA	no		PLS	1	

Table 30: Menu 4—Command Menu Parameters

Code	Factory Setting	Customer Setting	Code	Factory Setting	Customer Setting
tCC	2 W		AOH	20 mA	mA
tCt	LEL		Str	no	
rIn	no		LCC	no	
bSP	no		PSt	yes	
CrL	4 mA	mA	Add	0	
CrH	20 mA	mA	tbr	19200	
AOL	0 mA	mA	rPr	no	

Table 31: Menu 5—I/O Assignment

Code	Factory Setting	Customer Setting	Code	Factory Setting	Customer Setting
AI1	Factory settings depend on the macro-configuration . See page 21.		LI5	Factory settings depend on the macro-configuration . See page 21.	
AI2			LI6		
AI3			r1		Fault
LI1			r2		
LI2			LO		
LI3			AO		
LI4					

Table 32: Menu 6—Fault Menu Parameters

Code	Factory Setting	Customer Setting	Code	Factory Setting	Customer Setting
Atr	no		LFL	no	
rSt	RSP		LFF	0	
OPL	yes		FLr	no	
IPL	yes		StP	no	
tHt	ACL		Sdd	no	

Use the table below to note what drive controller configuration is stored in a file.

Table 33: Menu 7—File Menu

Code	Factory Setting	Customer Notes (e.g. File stored for HVAC Drive #11)
FI5	Free	
F25	Free	
F35	Free	
F45	Free	

MENU OVERVIEW

Menu 1 – DISPLAY Menu (page 26)

Parameter	Code
Drive State	rdY
Steady State	rUn
Accelerating	ACC
Decelerating	dEc
I_n Current Limit	CLI
DC Injection Braking	dCb
Freewheel Stop	nSt
Braking with Ramp Mod	Obr
Frequency Reference	FrH
Output Frequency	rFr
Motor Speed	SPd
Motor Current	LCr
Machine Speed	USP
Output Power	OPr
Mains Voltage	ULn
Motor Thermal	tHr
Drive Thermal	tHd
Last Fault	LFt
Consumption (wH)	APH
Run Time (Hours)	rtH

Menu 2 – ADJUST Menu (page 28)

Parameter		Code	Factory Setting
Frequency Reference		LFr	
Acceleration	-s	ACC	3 s
Deceleration	-s	dEC	3 s
Accelerate 2	-s	AC2	5 s
Decelerate 2	-s	dE2	5 s
Low Speed	-Hz	LSP	0 Hz
High Speed	-Hz	HSP	50 / 60 Hz
Gain	-%	FLG	20%
Stability	-%	StA	20%
Thermal Current	-A	ItH	0.9 in
DC Injection Time	-s	tdC	0.5 s
DC Injection Curr	-A	IdC	0.7 ItH
DC Injection Curr	-A	SdC	Varies
Jump Freq.	-Hz	JPF	0 Hz
Jump Freq. 2	-Hz	JF2	0 Hz
Jump Freq. 3	-Hz	JF3	0 Hz
LSP Time	-s	tLS	no
Machine Speed Coeff.		USC	1
IR Compensation	-%	UFr	100%
Slip Comp.	-%	SLP	100%
Preset Sp.2	-Hz	SP2	10 Hz
Preset Sp.3	-Hz	SP3	15 Hz
Preset Sp.4	-Hz	SP4	20 Hz
Preset Sp.5	-Hz	SP5	25 Hz
Preset Sp.6	-Hz	SP6	30 Hz
Preset Sp.7	-Hz	SP7	35 Hz
Frequency Lev.Att	-Hz	Ftd	50 / 60 Hz
Frequency Lev2.Att	-Hz	F2d	
Torque Limit 2	-%	tL2	200%
Current Level Att.	-A	Ctd	1.36 of I_n
Brake Release Lev	-Hz	brL	0 Hz
Brake Release I	-A	Ibr	0 A
Brake ReleaseTime	-s	brt	0 s
Brake Engage Lev	-Hz	bEn	0 Hz
Brake EngageTime	-s	bEt	0 s
Trip Threshold NST	-Hz	FFt	
Tachometer Coeff. *		dtS	1

* Requires addition of I/O option card VW3A58201U (analog) or VW3A58202U (digital)

Menu 2 – ADJUST Menu (page 28) (Continued)

Parameter		Code	Factory Setting
Jog Freq.	-Hz	JOG	10 Hz
Jog Delay	-s	JGt	0.5 s
V/f Profile	-%	PFL	20%
Thermal Level Att.	-%	ttd	100%
PID Prop. Gain		rPG	1
PID Int. Gain	-/s	rIG	1/s
PID Filter		PSP	0.0
PID Coeff		FbS	0.1
PID Inversion		PIC	no

Menu 3 – DRIVE Menu (page 39)

Parameter		Code	Factory Setting
Nom. Motor Volt	-V	UnS	depends on cat. #
Nom. Motor Freq.	-Hz	FrS	50 / 60 Hz
Nom. Motor Curr	-A	nCr	0.9 of I_n
Nom. Motor Speed	-rpm	nSP	depends on cat. #
Motor CosPhi (power fact.)		CoS	depends on cat. #
Auto Tuning		tUn	no
Max. Frequency	-Hz	tFr	60 / 72 Hz
Energy Economy		nLd	no
I Limit Adapt.		Fdb	no
Dec Ramp Adapt		brA	no
Switch Ramp 2	-Hz	Frt	0 Hz
Type of Stop		Stt	Stn
Standard Stop		Stn	
Fast Stop		FSt	
Freewheel		nSt	
DC Injection		DCI	
Ramp Type		rPt	LIn
Linear Ramp		LIn	
S Ramp		S	
U Ramp		U	
Dec Ramp Coef.		dCF	4
Torque Limit	-%	tLI	200 %
Int. I Limit	-%	CLI	1.36 of I_n
Auto DC Inj.		AdC	yes
Mot. Power Coef.		PCC	1
Switching Freq. Type		SFT	LF
Range of 0.5 to 4 kHz		LF	depends on cat. #
Range of 4 to 16 kHz		HF1	depends on cat. #
High Duty Cycle w/ derat.		HF2	depends on cat. #
Sw. Freq 0.5 to16	-kHz	SFr	0.5 to 16 kHz
Noise Reduction		nrd	yes
Special Motor		SPC	no
no			
yes			
PSM (small motor)			
PG (feedback sensor)Type *		PGt	dEt
Incremental Encoder		InC	
Detector (pulse or edge)		dEt	
Num. Pulses *		PLS	1

These diagrams include all parameters that may appear in the designated menu. The parameters that are actually visible on your drive controller depends on its configuration and the options installed.

Menu 4 – CONTROL Menu (page 45)

Parameter		Code	Factory Setting
Terminal Strip Con		tCC	2 W
Two Wire 2W		2 W	
Three Wire 3W		3 W	
Type 2 Wire		tCt	LEL
No Transition		LEL	
Low to High Trans.		trn	
Forward Input Pri.		PFW	
Inhibit Reverse		rIn	
Low Speed Magmt		bSP	
Linear LSP to HSP		no	no
Pedestal Start		BLS	no
Deadband Start		BnS	
AI2 Min. Ref.	-mA	CrL	
AI2 Max. Ref.	-mA	CrH	
Min. Val. AO *	mA	AOL	4 mA
Max. Val. AO *	mA	AOH	20 mA
Reference Memory		Str	0 mA
No memory		no	20 mA
Run Com. removed		RAM	no
Power removed		EEP	
Keypad Com.		LCC	
Stop Priority		PSt	
Drive Address		Add	no
Bd Rate RS485		tbr	yes
Reset Counters		rPr	0

Menu 5– I/O Menu (page 51)

Parameter	Code	Factory Setting
LI2 Assign	LI2	
LI3 Assign	LI3	
LI4 Assign	LI4	
LI5 Assign *	LI5	
LI6 Assign *	LI6	
Not assigned	no	
RV: Reverse	RV	
Switch Ramp2	RP2	
JOG	JOG	
+SP: +Speed	SP	
-Speed	-SP	
2 preset Sp	PS2	
4 preset SP	PS4	
8 preset Sp	PS8	
Freewheel Stop	nSt	
DC inject	DCI	
Fast stop	FSt	
Multi. Motor	CHP	
TorqueLim2	tL2	
Forced Local	FLO	
Fault Reset	rSt	
Auto/manu	rFC	
Auto-tune	Atn	
PID Auto/Man	PAU	
PID 2 Preset	Pr2	
PID 4 Preset	Pr4	
Torque Limit by AI	tLA	
AI2 Assign	AI2	
AI3 Assign *	AI3	
Not assigned	no	
Speed ref 2	Fr2	
Summed ref.	SAI	
PID regulator	PIF	
PID Manual Ref.*	PIM	
Tacho feedback *	SFb	
Therm. Sensor *	PtC	
Torque Limit *	AtL	
Encoder feedback *	rGI	

Menu 5– I/O Menu (page 51) (Continued)

Parameter	Code	Factory Setting
R2 Assign / LO assign	r2 / LO	
Not assigned	no	
Drive running	rUn	
Output contactor	OCC	
Freq reference attain.	FtA	
HSP attained	FLA	
Current level attained	CtA	
Reference Freq. Attain.	SrA	
Motor thermal lvl (Attain)	tSA	
Brake logic	bLC	
4-20mA loss	APL	no
F2 attained	F2A	
AO Assign *	AO	
Not assigned *	no	
Motor current *	OCr	
Motor frequency *	OFr	
Output ramp *	OrP	
Motor torque *	trq	
Signed Torque *	Stq	
Signed Ramp *	OrS	
PID Reference *	OPS	
PID Feedback *	OPF	
PID Error *	OPE	
PID Integral *	OPI	
Motor Power *	OPr	
Motor Thermal *	tHr	
Drive Thermal *	tHd	

Menu 6 – FAULT Menu (page 75)

Parameter	Code	Factory Setting
Auto Restart	Atr	no
Reset Type	rSt	RSP
Partial Reset	rSP	
Total Reset	rSG	
Output Phase Loss	OPL	yes
Input Phase Loss	IPL	yes
Thermal Protection	tHt	ACL
No motor protection	no	
Self Cooled motor	ACL	
Force Cooled motor	FCL	
Loss Follower	LFL	no
Immediate Fault	yes	
Restart on Signal Return	Stt	
Stop and Fault	LSF	
Run at Preset Speed	LFF	
Catch On Fly	FLr	no
Controlled Stop	StP	no
Phase loss drive trip	no	
Regen w/dc Bus	rnS	
Follow dc bus	FrP	
Ramp not Followed *	Sdd	no

Menu 7 – FILES Menu (page 79)

Parameter	Code	Factory Setting
File 1 State	F1S	FREE
File 2 State	F2S	FREE
File 3 State	F3S	FREE
File 4 State	F4S	FREE
Operation Type	FOt	no
No Operation Req.	no	
Save Configuration	Str	
Transfer File to Drive	rEC	
Return to Factory Set	InI	
File Number	FLn	
Password	Cod	0000

* Requires addition of I/O option card VW3A58201U (analog) or VW3A58202U (digital)

APPENDIX B—OPTIONS AND ACCESSORIES

The following table shows the accessories available for ALTIVAR 58 drive controllers.

Catalog No.	Description
VW3A8104	PowerSuite Test & Commissioning Software on CD for use with Microsoft® Windows 95, 98, and NT™ and Windows CE v3.0 for Pocket PCs
VW3A8106	Cable and RS-232 to RS-485 Adapter for Connection of PC to an ATV58 controller
VW3A8108US	PowerSuite Pak includes: HP JORNADA 525, PowerSuite CD VW3A8104, and connection cable VW3A8111
VW3A8110	Compact flash module loaded with PowerSuite software for use with an HP Jornada 525
VW3A8111	Cable and RS-232 to RS-485 adaptor for connection of an HP JORNADA 525 Pocket PC to an ATV58 controller
VW3A58101U	Keypad Display
VW3A58103	Remote Mounting Kit for Keypad (IP65 rated)
VW3A58201U	Analog I/O Option Card
VW3A58202U	Digital I/O Option Card
VW3A58210U	Pump Switching Card
VW3A58253U	General Purpose Option Card
VW3A58301U	FIPIO® Communication Card
VW3A58302U	MODBUS® Plus Communication Card
VW3A58303U	MODBUS/UNITELWAY™ Communication Card
VW3A58304EU	Interbus S Communication Card. Requires external power supply.
VW3A58306U	RS-485 Cable w/ MODBUS Mapping Guide
VW3A58307U	Profibus DP Communication Card
VW3A58309U	DeviceNet™ Communication Card
VW3A58310U	Ethernet MODBUS TCP/IP Communication Card
VW3A58312PU	LONWORKS® to MODBUS DIN Rail Mount Gateway
VW3A58354U	JOHNSON CONTROLS® N2 Communication Card
VW3A58701	DB Transistor for ATV58HU09M2 and U18M2
VW3A58821	Fan Kit for ATV58HU09M2 and U18M2
VW3A58822	Fan Kit for ATV58HU29M2, U41M2, and U18N4 to U41N4
VW3A58823	Fan Kit for ATV58HU54M2, U72M2, and U54N4 to U90N4
VW3A58824	Fan Kit for ATV58HU90M2, D12M2, and D12N4 to D23N4
VW3A58825	Fan Kit for ATV58HD16M2, D23M2, and D28N4 to D46N4

Continued on next page.

Catalog No.	Description
VW3A58826	Fan Kit for ATV58HD28M2 to D46M2 and D54N4 to D79N4
VW3A58831	EMC Kit for ATV58HU09M2 and U18M2
VW3A58832	EMC Kit for ATV58HU29M2, U41M2, and U18N4 to U41N4
VW3A58833	EMC Kit for ATV58HU54M2, U72M2, and U54N4 to U90N4
VW3A58834	EMC Kit for ATV58HU90M2, D12M2, and D12N4 to D23N4
VW3A58842	Conduit Box Kit for ATV58HU09M2 and U18M2
VW3A58843	Conduit Box Kit for ATV58HU29M2, U41M2, and U18N4 to U41N4
VW3A58844	Conduit Box Kit for ATV58HU54M2, U72M2, and U54N4 to U90N4
VW3A58845	Conduit Box Kit for ATV58HU90M2, D12M2, and D12N4 to D23N4
VW3A58846	Conduit Box for ATV58HD16M2, D23M2, and D28N4 to D46N4
VW3A58847	Conduit Box for ATV58HD28M2 to D46M2 and D54N4 to D79N4
VW3A66711	DB Resistor Kit for ATV58HU09M2, U18M2, U18N4 to U72N4
VW3A66712	DB Resistor Kit for ATV58HU29M2, U41M2, U90N4, D12N4
VW3A66713	DB Resistor Kit for ATV58HU54M2, U72M2, D16N4, D23N4
VW3A66714	DB Resistor Kit for ATV58HU90M2, D12M2, and D28N4 to D46N4
VW3A66715	DB Resistor Kit for ATV58HD16M2, D23M2, D54N4
VW3A66716	DB Resistor Kit for ATV58HD28M2, D33M2, D46M2, D64N4, and D79N4

SPARE PART LIST FOR ATV58 DRIVE CONTROLLERS

	Description	For Use on Drives	Catalog Number
	ATV58 Control Board Kit	ATV58 Type E, F, H, and N	VX4A581U
Internal Fan Kit	Frames 2 and 3 (two fans)	ATV58 ..U29M2, U41M2, U54M2, U72M2, U18N4, U29N4, U41N4 U54N4, U72N4, U90N4	VZ3V58223U
	Frames 4 and 5 (three fans)	ATV58 ..U90M2, D12M2, D12N4, D16N4, D23N4	VZ3V58245U
	Frame 6 (four fans)	ATV58 ..D16M2, D23M2, D28N4, D33N4, D46N4	VZ3V58260U
	Frame 7 (four fans)	ATV58 ..D28M2, D33M2, D46M2 D54N4, D64N4, D79N4	VZ3V58270U
Terminals	Removable Control Board Terminal Strips	ATV58 Type E, F, H, and N	VZ3N581U
	Power Terminal Block for Frame 6	ATV58 ..D16M2, D28N4, D33N4	VZ3N58160U
		ATV58 ..D23M2, D46N4	VZ3N58165U
	Power Terminal Block for Frame 7	ATV58 ..D28M2, D33M2, D46M2 D54N4, D64N4, D79N4	VZ3N58170U
Internal EMC Filter Kit	Internal RFI filter kits for Frame 6	ATV58 ..D16M2	VX4A58861U
		ATV58 ..D23M2, D28N4	VX4A58862U
		ATV58 ..D33N4, D46N4	VX4A58863U
	Internal RFI filter kits for Frame 7	ATV58 ..D28M2, D54N4	VX4A58871U
		ATV58 ..D33M2, D64N4 D79N4	VX4A58872U
		ATV58 ..D46M2	VX4A58873U
Power Boards for Frames 6 and 7		ATV58HD16M2	VX5A58D16M2U
		ATV58HD23M2	VX5A58D23M2U
		ATV58HD28M2	VX5A58D28M2U
		ATV58HD33M2	VX5A58D33M2U
		ATV58HD46M2	VX5A58D46M2U
		ATV58HD28N4	VX5A58D28N4U
		ATV58HD33N4	VX5A58D33N4U
		ATV58HD46N4	VX5A58D46N4U
		ATV58HD54N4	VX5A58D54N4U
		ATV58HD64N4	VX5A58D64N4U
		ATV58HD79N4	VX5A58D79N4U

Factory repaired ATV58 drive controllers are available within 24 hours from a factory exchange pool, or your ATV58 drive controller can be factory repaired and returned. Contact your local Square D distributor or Square D Customer Service Representative at 919-266-8666 for availablity.

Symbols

Numerics

A

B

C

D

E

F

G

H

I

J

K

L

M

N

O

P

R

S

T

U

V

ALTIVAR® 58 Adjustable Speed Drive Controllers Keypad Display VW3A58101

W9159810601111A04

9159810601104

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