EMERSON™
Industrial Automation

User Guide

SM-Keypad Plus
BA-Keypad
MP-Keypad

Unidrive SP, Commander SK
Affinity, Mentor MP, Digitax ST

CONTROL TECHNIQUES

www.controltechniques.com

General Information

The manufacturer accepts no liability for any consequences resulting from inappropriate, negligent or incorrect installation or adjustment of the optional operating parameters of the equipment or from mismatching the variable speed drive with the motor.

The contents of this guide are believed to be correct at the time of printing. In the interests of a commitment to a policy of continuous development and improvement, the manufacturer reserves the right to change the specification of the product or its performance, or the contents of this guide, without notice.

All rights reserved. No parts of this guide may be reproduced or transmitted in any form or by any means, electrical or mechanical including photocopying, recording or by an information storage or retrieval system, without permission in writing from the publisher.

Module software version

The information contained within this User Guide applies to an SM-Keypad Plus, BA-Keypad and MP-Keypad with software version ≥04.04.00.

Environmental statement

Control Techniques is committed to minimising the environmental impacts of its manufacturing operations and of its products throughout their life cycle. To this end, we operate an Environmental Management System (EMS) which is certified to the International Standard ISO 14001. Further information on the EMS, our Environmental Policy and other relevant information is available on request, or can be found at www.greendrives.com.

The electronic variable-speed drives manufactured by Control Techniques have the potential to save energy and (through increased machine/process efficiency) reduce raw material consumption and scrap throughout their long working lifetime. In typical applications, these positive environmental effects far outweigh the negative impacts of product manufacture and end-of-life disposal.

Nevertheless, when the products eventually reach the end of their useful life, they must not be discarded but should instead be recycled by a specialist recycler of electronic equipment. Recyclers will find the products easy to dismantle into their major component parts for efficient recycling. Many parts snap together and can be separated without the use of tools, while other parts are secured with conventional fasteners. Virtually all parts of the product are suitable for recycling.

Product packaging is of good quality and can be re-used. Large products are packed in wooden crates, while smaller products come in strong cardboard cartons which themselves have a high recycled fibre content. If not re-used, these containers can be recycled. Polythene, used on the protective film and bags for wrapping product, can be recycled in the same way. Control Techniques' packaging strategy prefers easily-recyclable materials of low environmental impact, and regular reviews identify opportunities for improvement. When preparing to recycle or dispose of any product or packaging, please observe local legislation and best practice.

REACH legislation

EC Regulation 1907/2006 on the Registration, Evaluation, Authorisation and restriction of Chemicals (REACH) requires the supplier of an article to inform the recipient if it contains more than a specified proportion of any substance which is considered by the European Chemicals Agency (ECHA) to be a Substance of Very High Concern (SVHC) and is therefore listed by them as a candidate for compulsory authorisation.

For current information on how this requirement applies in relation to specific Control Techniques products, please approach your usual contact in the first instance. Control Techniques position statement can be viewed at:
http://www.controltechniques.com/REACH

Contents

1 How to use this guide

1.1 Intended personnel

This guide is intended for personnel who have the necessary training and experience in system design, installation, commissioning / start up and maintenance.

1.2 Information

In this User Guide the SM-Keypad Plus, MP-Keypad and BA-Keypad will be referred to collectively as "Keypad Plus" as all three keypads are functionally identical.

This User Guide contains information covering the identification of the Keypad Plus, installation, parameter details, customization, and diagnostic information.

NOTE The BA-Keypad is only compatible with the Affinity drive

How to use this guide

Safety information

Introduction

Installing the Keypad Plus

Power-up stage

Getting started

Parameters

Diagnostics

Index

2 Safety information

2.1 Warnings, Cautions and Notes

⚠️ **WARNING** A **Warning** contains information, which is essential for avoiding a safety hazard.

⚠️ **CAUTION** A **Caution** contains information, which is necessary for avoiding a risk of damage to the product or other equipment.

NOTE A **Note** contains information, which helps to ensure correct operation of the product.

2.2 Electrical safety - general warning

The voltages used in the drive can cause severe electrical shock and/or burns, and could be lethal. Extreme care is necessary at all times when working with or adjacent to the drive.

Specific warnings are given at the relevant places in this User Guide.

2.3 System design and safety of personnel

The drive is intended as a component for professional incorporation into complete equipment or a system. If installed incorrectly, the drive may present a safety hazard.

The drive uses high voltages and currents, carries a high level of stored electrical energy, and is used to control equipment which can cause injury.

Close attention is required to the electrical installation and the system design to avoid hazards either in normal operation or in the event of equipment malfunction. System design, installation, commissioning/start up and maintenance must be carried out by personnel who have the necessary training and experience. They must read this safety information and this User Guide carefully.

For Safe Torque Off information, please refer to the relevant product *User Guide*.

Careful consideration must be given to the functions of the drive which might result in a hazard, either through their intended behavior or through incorrect operation due to a fault. In any application where a malfunction of the drive or its control system could lead to or allow damage, loss or injury, a risk analysis must be carried out, and where necessary, further measures taken to reduce the risk - for example, an over-speed protection device in case of failure of the speed control, or a fail-safe mechanical brake in case of loss of motor braking.

2.4 Environmental limits

Instructions in the *Drive User Guides* regarding transport, storage, installation and use of the drive must be complied with, including the specified environmental limits. Drives must not be subjected to excessive physical force.

2.5 Compliance with regulations

The installer is responsible for complying with all relevant regulations, such as national wiring regulations, accident prevention regulations and electromagnetic compatibility (EMC) regulations. Particular attention must be given to the cross-sectional areas of conductors, the selection of fuses or other protection, and protective earth (ground) connections.

The *Drive User Guides,* contain instruction for achieving compliance with specific EMC standards.

Within the European Union, all machinery in which this product is used must comply with the following directives:

2006/42/EC: Safety of machinery.

2004/108/EC: Electromagnetic Compatibility.

2.6 Motor

Ensure the motor is installed in accordance with the manufacturer's recommendations. Ensure the motor shaft is not exposed.

Standard squirrel cage induction motors are designed for single speed operation. If it is intended to use the capability of the drive to run a motor at speeds above its designed maximum, it is strongly recommended that the manufacturer is consulted first.

Low speeds may cause the motor to overheat because the cooling fan becomes less effective. The motor should be installed with a protection thermistor. If necessary, an electric forced vent fan should be used.

The values of the motor parameters set in the drive affect the protection of the motor. The default values in the drive should not be relied upon.

It is essential that the correct value is entered in the *Motor rated current* parameter. This affects the thermal protection of the motor.

2.7 Adjusting parameters

Some parameters have a profound effect on the operation of the drive. They must not be altered without careful consideration of the impact on the controlled system. Measures must be taken to prevent unwanted changes due to error or tampering.

3 Introduction

3.1 Features

The Keypad Plus can be used on the following products:
- Unidrive SP
- Commander SK
- Digitax ST
- Mentor MP
- Affinity

The main features of the Keypad Plus are as follows:
- Remote mountable.
- Parameter description displayed.
- Parameter help displayed.
- Application module parameter browsing.
- Fast editing/scrolling of parameters.
- Additional drive security.
- Customisable Favourites filter.
- User defined screensaver.
- Customisable parameter/help text strings.
- Various languages support.

3.2 Keypad Plus identification

Figure 3-1 SM-Keypad Plus

Control buttons
Fwd / Rev (blue) button
Stop/reset (red) button
Start (green) button

Mode (black) button
Help button
Joypad
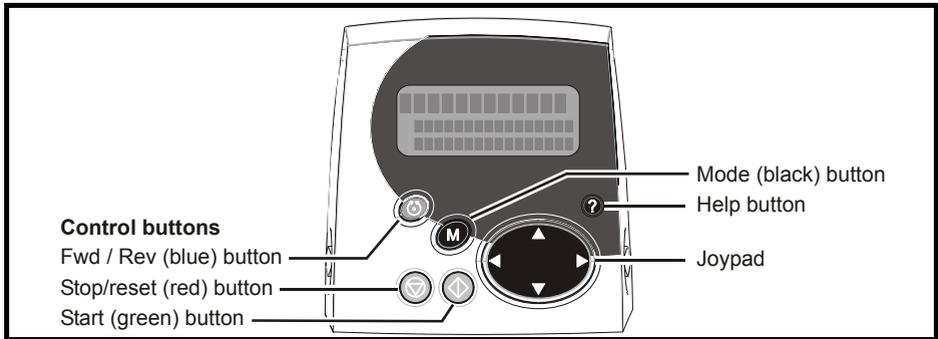
The Keypad Plus can be identified by:

1. The label located on the underside of the Keypad Plus.
2. The help button is installed as shown in Figure 3-1 above.

How to use this guide

Safety information

Introduction

Installing the Keypad Plus

Power-up stage

Getting started

Parameters

Diagnostics

Index

Figure 3-2 Keypad Plus label
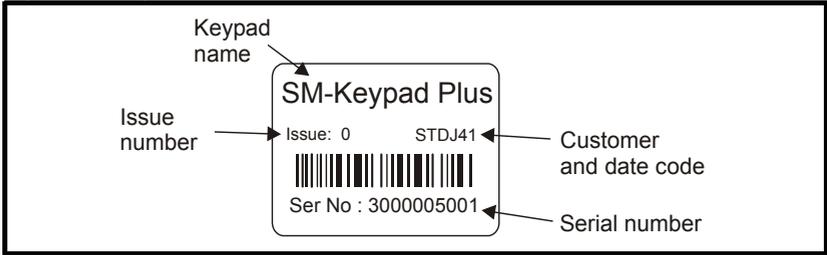
3.2.1 Date code format

The date code is split into two sections: a letter followed by a number.

The letter indicates the year, and the number indicates the week number (within the year) in which the Keypad Plus was built.

The letters go in alphabetical order, starting with A in 1990 (B in 1991, C in 1992 etc.).

Example:
A date code of L35 would correspond to week 35 of year 2002.

3.3 Set-up parameters

All parameters associated to the Keypad Plus can be found in menus 40 and 41.

4 Installing the Keypad Plus

4.1 General installation

4.1.1 Installation on Unidrive SP and Affinity

On Unidrive SP and IP20 Affinity drives, the Keypad Plus can either be connected to the (6-pin SSI) port directly on the drive, or through the RJ45 (RS485) port (when remote mounting is required).

Figure 4-1 Fitting and removal of a Keypad Plus (6-pin SSI) port
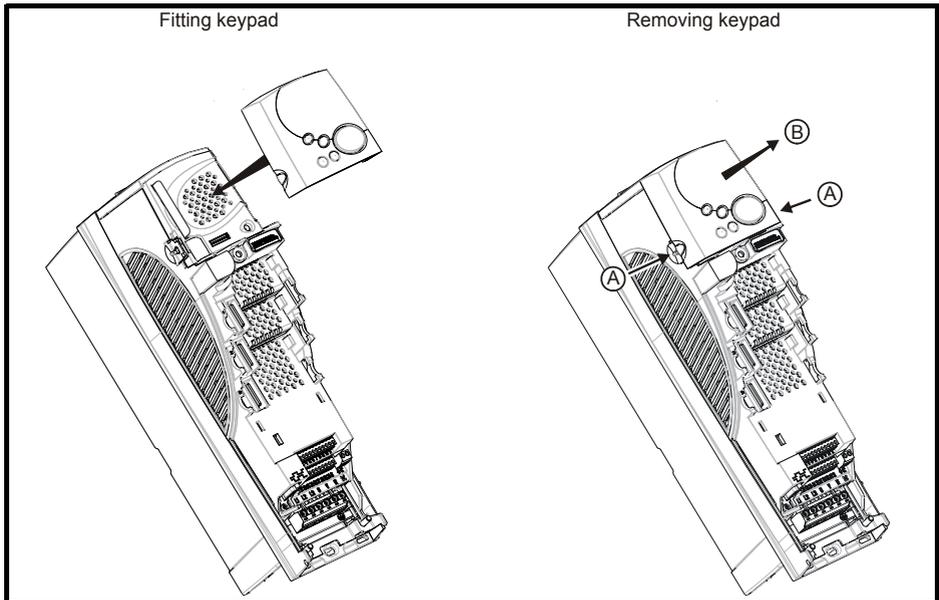
To fit, align the Keypad Plus and press gently in the direction shown until it clicks into position.

To remove, while pressing the tabs inwards (A), gently lift the Keypad Plus in the direction indicated (B).

NOTE   The Keypad Plus should not be remotely mounted on the (6-pin SSI) port.

NOTE   The Affinity IP54 drives are supplied with the keypad installed to the outer cover and connected to the RJ45 port.

How to use this guide

Safety information

Introduction

Installing the Keypad Plus

Power-up stage

Getting started

Parameters

Diagnostics

Index

Figure 4-2 Fitment of Keypad Plus (RJ45 port connection on Unidrive SP / Affinity)

RJ45 cable

Cabinet / Panel
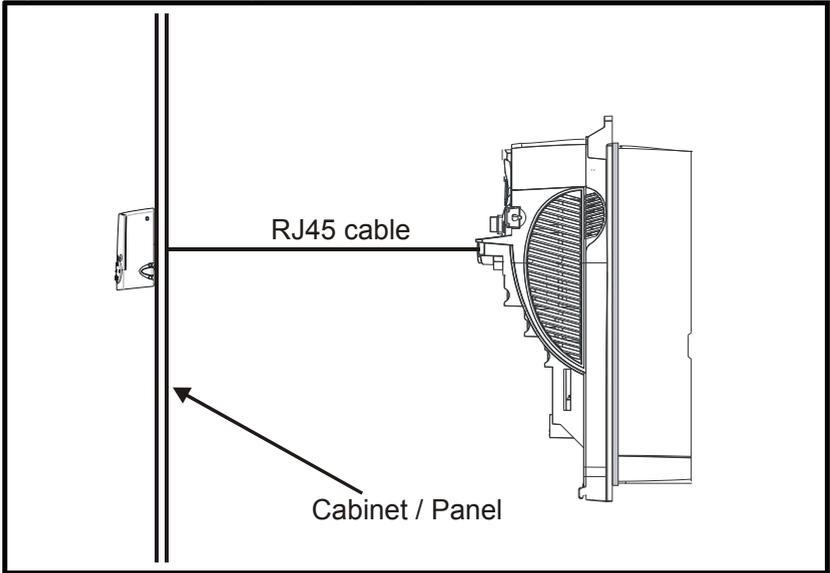
4.1.2   Installation on Commander SK

As Commander SK does not have a (6-pin SSI) port, the Keypad Plus must be connected through the RJ45 (RS485) port.

Figure 4-3 Fitment of Keypad Plus (RJ45 port connection on Commander SK)

RJ45 cable

Cabinet / Panel
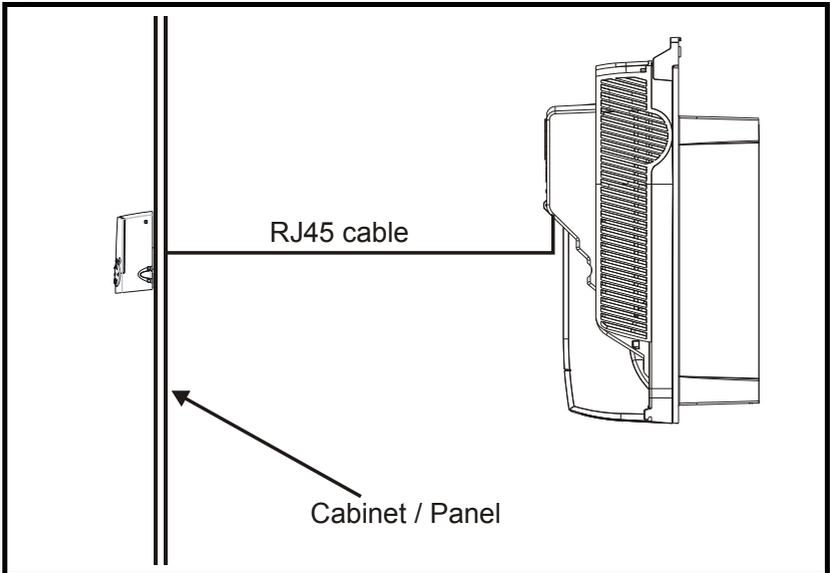
NOTE   The Keypad Plus can be installed / removed while the drive is powered up and running a motor, providing that the drive is not operating in keypad mode.

4.1.3 Installation on Mentor MP

Figure 4-4 Fitting and removal of a Keypad Plus

How to use this guide

Safety information

Introduction

Installing the Keypad Plus

Power-up stage

Getting started

Parameters

Diagnostics

Index
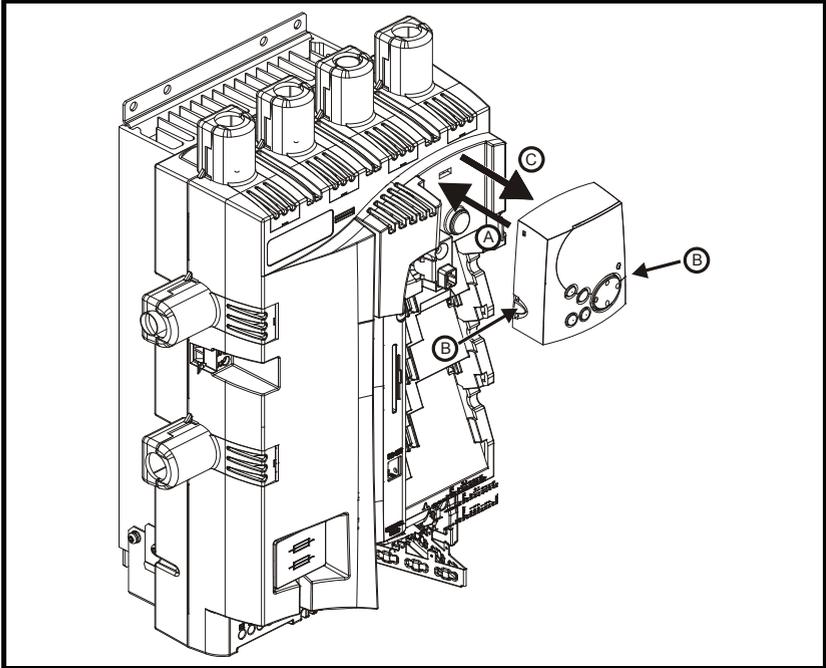
4.1.4   Installation on Digitax ST

Figure 4-5 Fitment of Keypad Plus (RJ45 port connection on Digitax ST)

RJ45 cable

Cabinet / Panel
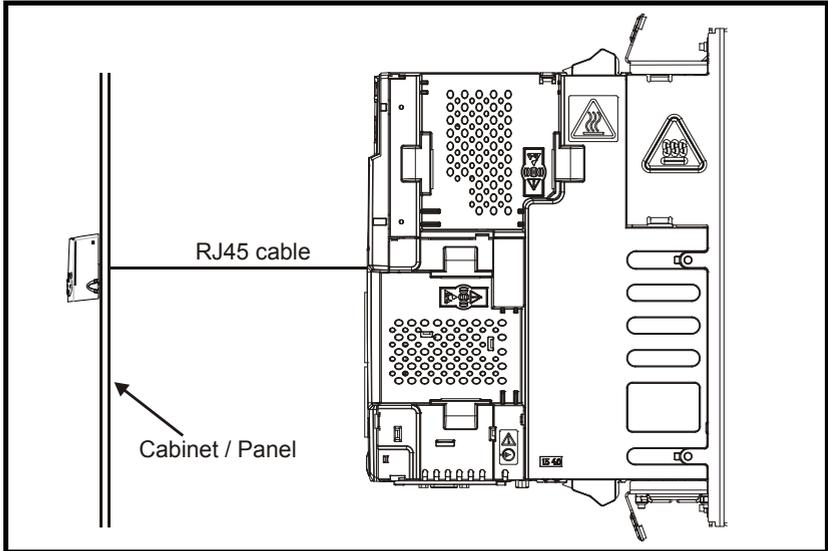
4.2   RJ45 (RS485) port connections

The Keypad Plus must be connected to the drive by a straight-through shielded RJ45 to RJ45 cable, from the socket on the rear of the Keypad Plus to the RJ45 serial communications connection on the drive. For EMC compliance the cable shield should be clamped to the panel upon which the Keypad Plus is mounted so that it makes a good electrical connection. The maximum cable length allowed is 30m.

4.2.1   Mounted on a panel

Figure 4-6 Keypad Plus terminals
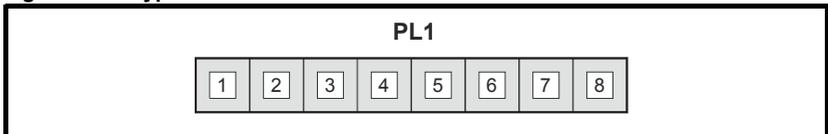
Table 4-1 Keypad Plus terminal descriptions

Pin number	Functions
1	Not connected
2	TXRX
3	0VSELV
4	+24VSELV
5	Not connected
6	TX_Enable
7	TX\RX\
8	Not connected

4.2.2 Panel hole

The hole required for mounting the Keypad Plus to the outside of an enclosure should be a standard control panel dimension, such as ⌀22mm (from DIN standards).

4.2.3 IP54

When mounted on a panel the Keypad Plus requires protection against harmful build up of dust, and water ingress from splashes.

NOTE   When the Keypad Plus is mounted on a panel it will not be possible to access the rear of the Keypad Plus. An 'O' ring will seal the Keypad Plus against the panel. A separate rubber 'bung' will seal the 6-pin header used when the drive is mounted directly on a panel.

Figure 4-7 IP54 Installation diagram

How to use this guide

Safety information

Introduction

Installing the Keypad Plus

Power-up stage

Getting started

Parameters

Diagnostics

Index
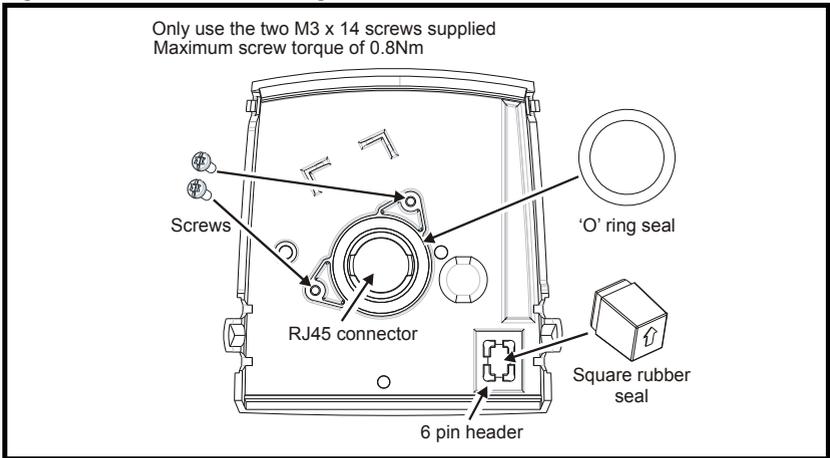
5 Power-up stage

5.1 Initialization

When the Keypad Plus is connected to the drive, the display background will be illuminated and will show the text "Initialising" as shown in Figure 5-1.

Figure 5-1 Display Initialization
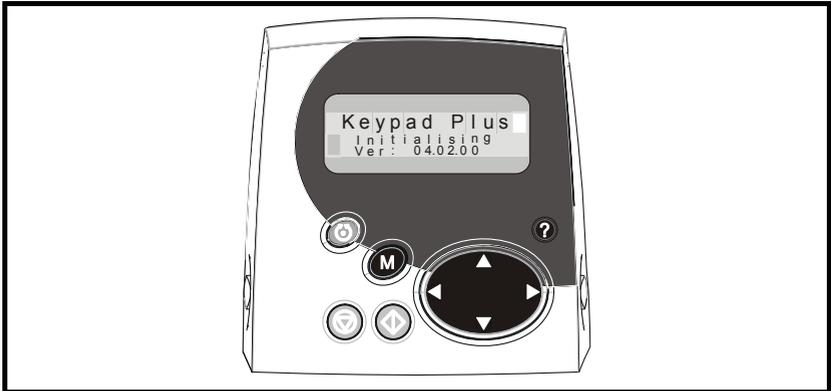
During the Initialization phase the following tasks are carried out:

- The keypad establishes communication with the drive
- The keypad baud rate is matched to the baud rate set within the drive (see section 5.2 *RJ45 Port communications set-up*)
- A comparison of the parameter database versions is carried out and updated where necessary for both the drive and Solutions Module parameters. (See section 6.7 *Parameter attribute databases* on page 20)

5.2 RJ45 Port communications set-up

5.2.1 Serial mode

The serial mode for the Keypad Plus is Modbus RTU. The Keypad Plus does not allow the serial mode to be changed to ANSI mode.

5.2.2 Baud rate

When connected to the RJ45 port, the Keypad Plus supports both 19,200 and 57,600 baud rates (19,200 for Commander SK). The baud rate can only be changed using a keypad which is connected to the (6-pin SSI) port or via the main built-in keypad on Commander SK. The Keypad Plus will automatically change to the new baud rate.

5.2.3 Serial address

When the drive serial address Pr **11.23** is changed using the Keypad Plus, the drive node address (Pr **40.10**) also changes so as to maintain communication.

If communication is lost between the keypad and an option module, the option module menu will have blank values and not permit editing until communication is re-established. The browsing speed through the option menus will be slower as the link is tested each cycle. Browsing of the drive menus will be unaffected.

How to use this guide

Safety information

Introduction

Installing the Keypad Plus

Power-up stage

Getting started

Parameters

Diagnostics

Index

5.2.4 Communications watchdog

Two communication watchdogs are used to protect the keypad to drive communication link:

- On the SSI 6-pin header the "Pad" trip will occur if the keypad is removed while in keypad reference mode
- On the Modbus RS-485 RJ45 connecter the "SCL" trip will occur if the keypad is removed while in keypad reference mode

5.2.5 Communications problems

If communication is lost during or after the Initialization phase, the alert message "NO LINK TO DRIVE" is displayed on the bottom line of the display every 4 seconds.

In this case the user needs to ensure that the value set in Pr **40.10** *Drive node ID* on the Keypad Plus installed to the RJ45 port matches the value set in Pr **0.37** *Serial address* on the keypad installed in the 6-pin SSI port (on Commander SK, Pr **0.44** *Serial address* on the drive's keypad).

In the above case the user also needs to ensure that the value set in Pr **0.36** *Serial comms baud rate* on the keypad installed in the 6-pin SSI port has a value of either 19,200 or 57,600. For Commander SK 19,200 should be set in Pr **43**.

5.2.6 Node hunting

Under some conditions the drive node number may not be known, so Pr **40.10** cannot be set to this directly. Instead, after the comms ports (6-pin and RJ45) have been tried using the current node address, the Keypad Plus should hunt for a drive node on the RJ45 (Modbus) port. This should start from address 1 using 19k2 baud which is the default drive baud rate.

When the node is found, the user can accept it or continue searching up the nodes to the node address maximum (247). If accepted, the node address will be automatically saved in Pr **40.10** and the keypad will re-initialize to this drive.

- After searching up to 247 without acceptance the Keypad Plus will display Pr **40.10** and the last found node will be used (or node 1 if no node was found).
- If the user escapes from the hunting (by pressing any button while hunting), the node address will be returned to the last found node (or node 1 if no node was found).

To check all 247 nodes requires 40 seconds.

⚠️ **CAUTION**

Unplugging the keypad while Pr **40.10** is being saved could cause the keypad flash memory to become corrupted.

5.3 Connection to multiple drives or a PC

The keypad is the master which permits one keypad to be connected to many drives using the RJ45 port, as long as each drive has a unique drive node address. The drive address to be communicated with is selected through Pr **40.10**.

If the user has changed the drive node address they should set the new address in Pr **40.10**. On exiting from the parameter value edit state, the keypad will restart with this new drive node address.

6   Getting started

This chapter introduces the user interfaces, menu structure and security level of the drive.

6.1   Keypad Plus display

The display consists of three lines of text.

The top line comprises 12 large characters, the left-hand side of the line will display the current menu and parameter while the right hand side will display the parameter contents. The second and third lines are both 16 characters long and are used to display parameter descriptions or help comments.

The unit icons are in the top right hand corner of the display and are selected dependent on the parameter currently viewed. The icons on the bottom left hand side of the Keypad Plus provide indication of which Solutions Module slot is being used and whether a SMARTCARD transfer is in progress (CC) or if the second motor map is active (Mot2).

All parameters that are required to be monitored for the key controller and the alarm display that are currently not being displayed on the Keypad Plus display are updated every four seconds. These values are checked to control:

*   the second motor map and SMARTCARD active icons
*   the trip and alarm status
*   the drive mode
*   and the reference selector

Figure 6-1 SM-Keypad Plus

Figure 6-2 MP-Keypad

How to use this guide

Safety information

Introduction

Installing the Keypad Plus

Power-up stage

Getting started

Parameters

Diagnostics

Index

Figure 6-3 BA-Keypad

Mode (black) button

Help button

Joypad

Control buttons
Auto (blue) button
Off/reset (red) button
Hand (green) button

Auto

Off
Reset
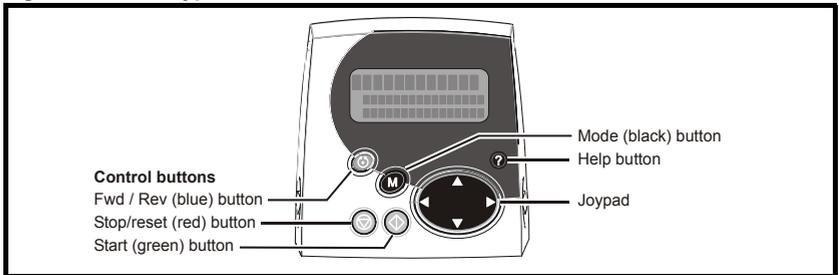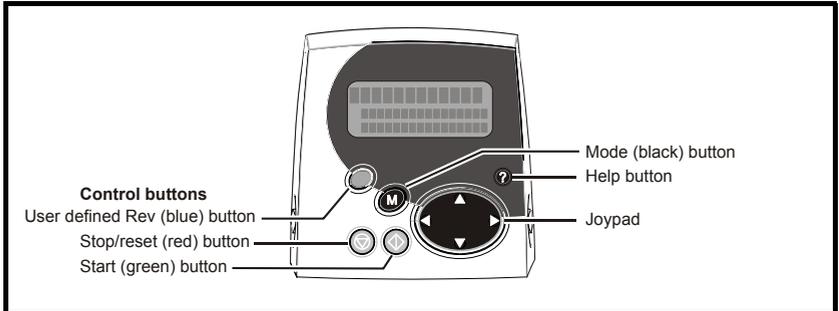
Hand
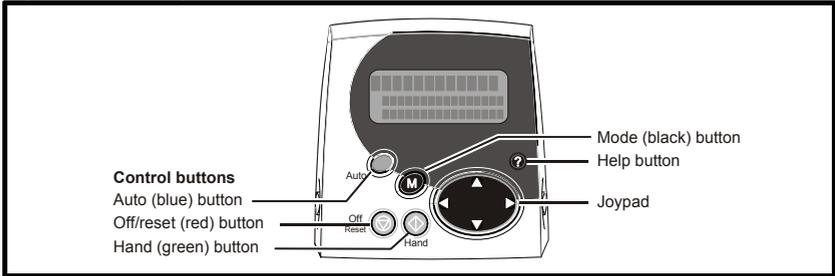
NOTE   The red stop ⊘ button is also used to reset the drive.

The Keypad Plus can indicate when a SMARTCARD access is taking place or when the second motor map is active (menu 21). These are indicated on the display as follows.

SMARTCARD access taking place	The symbol 'CC' will appear in the lower left hand corner of the display
Second motor map active	The symbol 'Mot2' will appear in the lower left hand corner of the display
Solutions Module parameters being accessed	The symbols 'Op1', 'Op2' and 'Op3' will appear when a parameter within a Solutions Module is being accessed

NOTE   The symbol 'CC' will not appear when used with Commander SK as the SMARTCARD option is not available for this product.

6.2   Keypad Plus operation

6.2.1   Control buttons

The Keypad Plus consists of:
1.   Joypad - used to navigate the parameter structure and change parameter values.
2.   Mode button - used to change between the display modes – parameter view, parameter edit, status.
3.   Three control buttons - used to control the drive if keypad mode is selected.
4.   Help button - displays text briefly describing the selected parameter.

The Help button toggles between other display modes and parameter help mode. The up and down functions on the joypad scroll the help text to allow the whole string to be viewed. The right and left functions on the joypad have no function when help text is being viewed.

Figure 6-4 Display modes
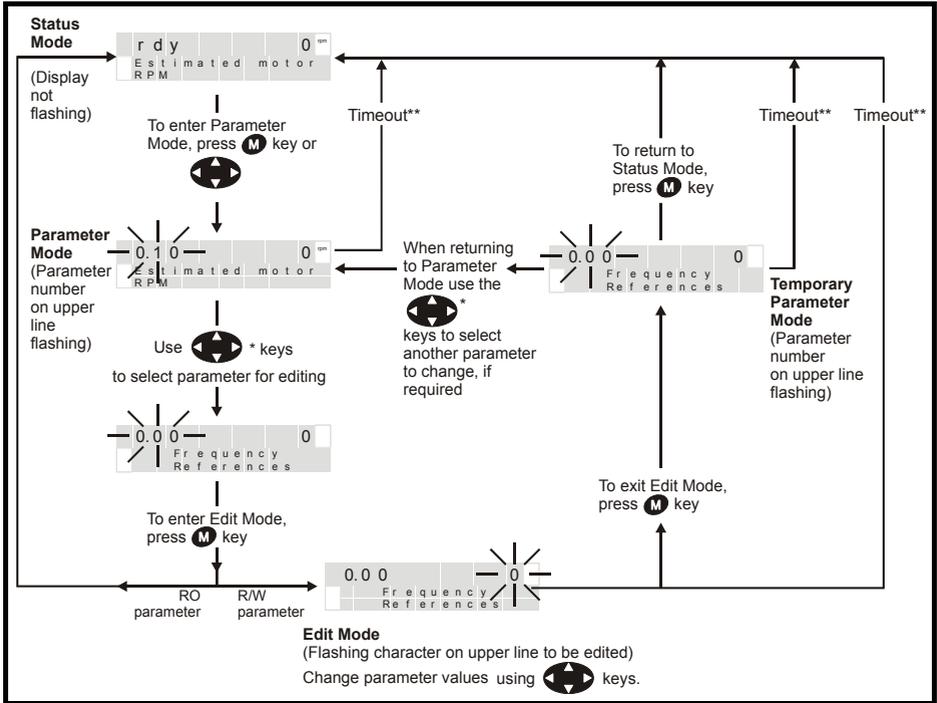
* Can only be used to move between menus if L2 access has been enabled
(Pr **0.49** or Pr **0.10** with Commander SK).

Timeout defined by Pr **11.41 (default value = 240s).

Figure 6-5 Mode examples

How to use this guide

Safety information

Introduction

Installing the Keypad Plus

Power-up stage

Getting started

Parameters

Diagnostics

Index
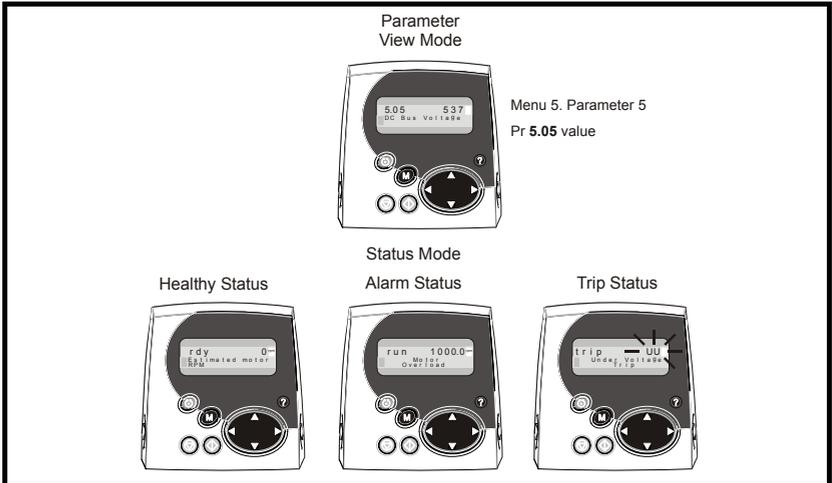
NOTE The examples illustrated in Figure 6-5 relate to Unidrive SP, Affinity and Digitax ST.

⚠️ **WARNING**

Do not change parameter values without careful consideration; incorrect values may cause damage or a safety hazard.

NOTE When changing the values of parameters, make a note of the new values in case they need to be entered again.

NOTE For new parameter-values to apply after the AC supply to the drive is interrupted, new values must be saved.

6.3 Menu structure

The drive parameter structure consists of menus and parameters.

The drive initially powers up so that only menu 0 can be viewed. The up and down arrow buttons are used to navigate between parameters and once level 2 access (L2) has been enabled (see Pr **0.49**, Pr **0.10** with Commander SK) the left and right buttons are used to navigate between menus.

Figure 6-6 Parameter navigation
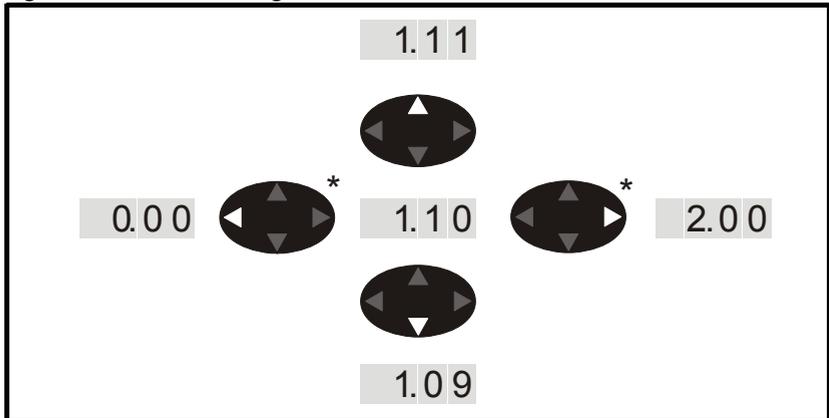
* can only be used to move between menus if L2 access has been enabled (Pr **0.49** or Pr **0.10** with Commander SK).

The menus and parameters roll over in both directions.

i.e. if the last parameter is displayed, a further press will cause the display to rollover and show the first parameter.

When changing between menus the drive remembers which parameter was last viewed in a particular menu and thus displays that parameter.

6.4 Parameter browsing compared to SM-Keypad (LED)

During normal operation the Keypad Plus key controller will operate in the same fashion as the SM-Keypad (LED) version with certain enhancements. After the Keypad Plus has initialized, the user can browse not only the drive menu parameter structure but also the internal menus of the Keypad Plus and any application option modules installed. The Keypad Plus also prints a description of the currently browsed parameter on the bottom two lines of the display.

The Keypad Plus supports the parameter browse and view modes of the SM-Keypad (LED) and also has a direct parameter selection mode which is invoked by quickly double clicking the mode button while the user is in the parameter browsing state (drive menu's only). It allows the user to directly change the menu or parameter digits. The mode is exited by pressing the mode button which puts the Keypad Plus in edit mode if the parameter is writable or returns the user to the status state if the parameter is read only. Direct browsing mode is only available in drive menus.

The browsing speed is the same as the SM-Keypad (LED) over all menus for single press, held scroll and multiple fast pressing. The Keypad Plus has an extra fast scroll mode called "Turbo scroll" that can be invoked by double clicking then holding the direction button while in browse mode. This mode scrolls through the menus or parameters at a repeat interval rate defined by Pr **40.22** in ms (default 50ms). The mode is restricted to the Up and Down direction keys.

When a drive trip occurs the Keypad Plus will automatically jump straight back to STATUS mode, where the relevant trip code will be displayed. The trip will continue to be displayed each time the user returns to STATUS mode until the trip has been cleared.

6.5 Drive trips

When a trip occurs the Keypad Plus backlight will flash on and off at a similar rate to the status LED installed inside the drive (not available on Commander SK). The backlight will continue to flash until the user presses a button, at which point the backlight will return to being continuously lit.

6.6 PLC program status

If a PLC program is running "PLC program running" will appear on the screen every 10 seconds.

6.7 Parameter attribute databases

The parameters browsed by the Keypad Plus are controlled using the parameter attribute databases. There are databases for the drive (menus 0 to 22), one for each application module installed (menus 70 to 91) and one for the Keypad Plus' internal menus (menus 40 and 41). Copies are stored on the Keypad Plus.

The Keypad Plus checks the internal menus (Pr **40.xx** and Pr **41.xx**) stored data and if corrupt it is overwritten with the factory defaults.

The drive and option module databases could become out of date or refer to the wrong drive or option type so on power up the Keypad Plus asks the drive what options are installed and then requests their version numbers. The databases themselves are checked for corruption that could be caused by interrupting a write of the databases to the flash memory.

How to use this guide

Safety information

Introduction

Installing the Keypad Plus

Power-up stage

Getting started

Parameters

Diagnostics

Index

If the databases are corrupt or wrong they are downloaded from the drive and Solutions Modules before being written to the flash memory on the Keypad Plus. This process may be bypassed by pressing any button during the download phase unless any of the databases were corrupt. If the update is bypassed Pr **40.05** will be set to "Bypass" else if the entire updating procedure was successful it will be set to "Updated".

6.8 Parameter help

The Keypad Plus has a help function that prints parameter help text on the bottom two rows of the display if the user presses the "?" button. If the text is longer than the bottom two rows it can be scrolled using the up and down direction buttons. The user leaves help by pressing the "?" button once more.

6.9 Advanced features

6.9.1 Drive security

User security

The user security, when set, prevents write access to any of the parameters (other than Pr **0.49** and Pr **11.44** Access Level) in any menu. (Including Keypad Plus internal menus 40 and 41).

Setting user security

Enter a value between 1 and 999 in Pr **0.34** and press the (M) button; the security code has now been set to this value. In order to activate the security, the *Access level* must be set to Loc in Pr **0.49**. When the drive is reset, the security code will have been activated and the drive returns to *Access Level L1*. The value of Pr **0.34** will return to 0 in order to hide the security code. At this point, the only parameter that can be changed by the user is the *Access Level* Pr **0.49**.

NOTE

Setting the user security on any one keypad will set the security on all keypads connected to the drive.

Unlocking user security

Select a read write parameter to be edited and press the (M) button. The upper display will now show Code. Use the arrow buttons to set the security code and press the (M) button.

With the correct security code entered, the display will revert to the parameter selected in edit mode.

If an incorrect security code is entered the display will revert to parameter view mode.

To lock the user security again, set Pr **0.49** to Loc and press the (⊽) reset button.

Disabling user security.

Unlock the previously set security code as detailed above. Set Pr **0.34** to 0 and press the (M) button. The user security has now been disabled, and will not have to be unlocked each time the drive is powered up to allow read / write access to the parameters.

Keypad Plus internal menus security.

The keypad Plus internal menus 40 and 41 can be locked independently to the drive menus.

Setting Keypad Plus internal menus security

Enter a non-zero value in Pr **40.07**. A message will appear on the screen for two seconds stating 'Activated Keypad Security'. The security is now set and all menu 40 and 41 parameters will be read only.

Unlocking Keypad Plus internal menus security.

Enter the correct security code in either Pr **40.00** or Pr **41.00** and exit the edit mode by pressing mode. A message will appear on the screen for two seconds stating 'Unlocked Keypad Security'. The security has now been disabled and menus 40 and 41 will allow read/write access.

Hardware key mode

This feature can be used to prevent unauthorized modification of the drive parameters via the user interfaces (keypad or serial comms) of the drive unless the user has the mating Keypad Plus with the correct code programmed.

Setting Hardware Key mode

Pr **40.09** *Hardware key code*

Procedure for setting through Keypad Plus on RJ45(RS485) port:

- Set up drive security code in Pr **0.34** / Pr **11.30**
- Set hardware key code in Pr **40.09** to the same value as the security code (Pr **0.34** / Pr **11.30** becomes hidden value)
- Save the Keypad Plus internal menu by setting Pr **40.03** to save (Pr **40.03** will return to idle once save is complete)
- Set Keypad Plus internal menu security by writing a code to Pr **40.07** (Pr **40.09** becomes hidden value)
- Lock the drive by setting Pr **0.49** / Pr **11.44** to LOC and pressing STOP/RESET (will return to L1)

The user will have read/write access to the drive parameters but not the Keypad Plus internal menus (Menu 40 and 41) with the specific keypad still installed. Any other keypad (Keypad Plus or SM-Keypad without the correct code programmed) will provide read only access to all parameters.

Procedure for preventing user access via the RJ45(RS485) port on the drive:

- Connect PC to RJ45 port and change Pr **11.24** to LCD (this will now prevent access via a PC), (Timeout error will show on CTsoft, this is normal)
- Without powering the drive off place the Keypad Plus with correct hardware key into the RJ45 port and carry out a drive parameter save.

The user will have read/write access to the drive parameters but not the Keypad Plus internal menus (menu 40 and 41), and the comms port will be disabled.

NOTE This is not available with Commander SK

Procedure for resetting hardware key and comms access.

- Unlock the Keypad Plus internal menu security to make Pr **40.09** visible. (See Pr **40.07**)
- Zero Pr **40.09**
- Unlock drive security by entering the correct code in Pr **0.34** / Pr **11.30**.
- Save the internal Keypad Plus menu (see Pr **40.03** above)

If the comms port lock is on (i.e.Pr **11.24** set to LCD) put a Keypad Plus onto the front of the drive and change Pr **11.24** to RTU mode and carry out a drive save.

The user will now have read/write access to the drive parameters and the Keypad Plus internal menus (menu 40 and 41).

6.9.2 Drive security (Commander SK)

User security

The user security, when set, prevents write access to any of the parameters (other than Pr **0.10** and Pr **11.44** Access Level) in any menu. (Including Keypad Plus menus 40 and 41).

Setting user security

Enter a value between 1 and 999 in Pr **0.25** and press the (**M**) button; the security code has now been set to this value. In order to activate the security, the Access level must be set to LoC in Pr **0.10**. When the drive is reset, the security code will have been activated and the drive returns to Access Level L1. The value of Pr **0.25** will return to 0 in order to hide the security code. At this point, the only parameter that can be changed by the user is the Access Level Pr **0.10**.

NOTE Setting the user security on any one keypad will set the security on the other keypad connected to the drive.

Unlocking user security

Select a read-write parameter to be edited and press the (**M**) button. The upper display will now show Code. Use the arrow buttons to set the security code and press the (**M**) button.

With the correct security code entered, the display will revert to the parameter selected in edit mode.

If an incorrect security code is entered, the display will revert to parameter view mode.

To lock the user security again, set Pr **0.10** to LoC and press the (⊘) reset button.

NOTE Unlocking the user security on the Keypad Plus does not unlock the user security on Commander SK.

Disabling user security

Unlock the previously set security code as detailed above. Set Pr **0.25** to 0 and press the (**M**) button. The user security has now been disabled, and will not have to be unlocked each time the drive is powered up to allow read/write access to the parameters.

6.9.3 Setting Hardware Key mode (Commander SK)

Pr **40.09** Hardware key code

Procedure for setting through Keypad Plus on RJ45 (RS485) port:

• Set up drive security code in Pr **0.25** / Pr **11.30**
• Set hardware key code in Pr **40.09** to the same value as the security code (Pr **0.25** / Pr **11.30** becomes hidden value)
• Save the Keypad Plus internal menu by setting Pr **40.03** to Save (Pr **40.03** will return to idle once save is complete)
• Set Keypad Plus internal menu security by writing a code to Pr **40.07** (Pr **40.09** becomes hidden value)
• Lock the drive by setting Pr **0.10** / Pr **11.44** to LoC and pressing STOP/RESET (will return to L1)

How to use this guide

Safety information

Introduction

Installing the Keypad Plus

Power-up stage

Getting started

Parameters

Diagnostics

Index

The user will have read/write access to the drive parameters but not the Keypad Plus internal menus (Menu 40 and 41) with the specific keypad still installed. Any other keypad (Keypad Plus without the correct code programmed) will provide read only access to all parameters.

Procedure for resetting hardware key

- Unlock the Keypad Plus internal menu security to make Pr **40.09** visible. (Set keypad security code in Pr **40.00** or Pr **41.00**).
- Zero Pr **40.09**
- Unlock drive security by entering the correct code in Pr **0.25** / Pr **11.30**.
- Save the internal Keypad Plus menu (set Pr **40.03** to Save).

The user will now have read/write access to the drive parameters and the Keypad Plus internal menus (Menu 40 and 41).

6.9.4   Favorite filters

A custom list of drive and option menu parameters may be compiled by entering the required favorite parameters into Pr **41.01** to Pr **41.50**. When Pr **40.06** or Pr **41.51** are set to "Filter" this list of parameters will be browsed by using the Up and Down buttons on the Keypad Plus. Left and right will do nothing while in view mode. The parameters are denote by "F" and the parameter number so the user is not presented with the slot.menu.parameter. Pr **41.00** is always accessible as "F0" and Pr **41.51** as "F51". The user could be prevented from leaving the favorite filter mode if the Keypad Plus internal menu security is active. All non-existent or non-defined parameters are skipped.

6.9.5   User defined screensaver

Pr **40.20** controls whether there is no screensaver ("None"), the standard drive dependent screensaver text is used ("Default") or a user defined string is to be used ("User"). In all cases Pr **40.21** controls the length of time without button pressing required before the screensaver is activated. When the drive is in the key reference mode the screensaver is bypassed. When "None" is selected, or the screensaver has been by-passed, the display will blink once as it is re-synchronized when the screensaver would normally be activated. If Pr **40.20** is set to "User", the first three lines of the help associated with the parameter are used as the three lines in the screen saver. These can be changed using the string editor tool. If there is no help defined for this parameter, Pr **40.20** will be changed to "None" at the start of the next screensaver.

NOTE   Any menu 40 and 41 parameter changes should be saved to the Keypad Plus FLASH by setting Pr **40.03** to save and pressing mode (also see Pr *40.03* on page 28)

6.9.6   Displaying parameters with non-default values only

By entering 12000 in Pr **xx.00**, the only parameters that will be visible to the user will be those containing a non-default value. This function does not require a drive reset to become active. In order to deactivate this function, return to Pr **xx.00** and enter a value of 0.

Please note that this function can be affected by the access level enabled, refer to the relevant Drive User Guide for further information regarding access level.

NOTE   Motor rated current parameters (Pr **5.07**, Pr **21.07**) will be shown even if they are default values.

6.9.7 User defined strings

The text strings that appear on the Keypad Plus display can be customized to show text defined by the user.

The user can customize the parameter descriptions, parameter help, and the screensaver text.

To customize the text, the user must use the appropriate Control Techniques keypad string editor which is available from www.controltechniques.com in the downloads section.

Table 6-1 String editor tools

Keypad	String editor tool
SM-Keypad plus	SM-Keypad plus string editor tool
BA-Keypad	BA-Keypad string editor tool
MP-Keypad	MP-Keypad string editor tool

How to use this guide

Safety information

Introduction

Installing the Keypad Plus

Power-up stage

Getting started

Parameters

Diagnostics

Index

7 Parameters

7.1 Parameter descriptions

The Keypad Plus has two onboard menus, menus 40 and 41. Menu 40 will contain the Keypad Plus configuration parameters, while menu 41 will house the "Browsing Favorites". The menus are copied to RAM at boot-up, changes made will be to the copy held in RAM until a flash write operation is requested. The user may save changes to the configuration or browsing favorites to the FLASH by browsing to the configuration menu's Pr **40.04** and executing a "save" operation.

Table 7-1 Key to parameter coding

Coding	Attribute
RW	Read/write: can be written by the user
RO	Read only: can only be read by the user
Bit	1 bit parameter
Bi	Bipolar parameter
Uni	Unipolar parameter
Txt	Text: the parameter uses text strings instead of numbers.
FI	Filtered: some parameters which can have rapidly changing values are filtered when displayed on the drive keypad for easy viewing.
DE	Destination: indicates that this parameter can be a destination parameter.
RA	Rating dependant: this parameter is likely to have different values and ranges with drives of different voltage and current ratings. This parameters is not transferred by SMARTCARD/SmartStick when the rating of the destination drive is different from the source drive.
NC	Not copied: not transferred to or from SMARTCARD/SmartStick during cloning.
PT	Protected: cannot be used as a destination.
US	User save: saved in drive EEPROM when the user initiates a parameter save.
PS	Power-down save: automatically saved in drive EEPROM at power-down.

7.2   Single line descriptions

Table 7-2 Menu 40 parameter descriptions

Parameter		Range($\updownarrow$)	Default($\Rightarrow$)	Type					
40.00	Parameter 0	0 to 32767	0	RW	Uni				
40.01	Language selection	English (0), Custom (1), French (2), German (3), Spanish (4), Italian (5)	English (0)	RW	Txt				US
40.02	Software version	99999	0	RO	Uni			PT	
40.03	Save to flash	Idle (0), Save (1), Restore (2), Default (3)	Idle (0)	RW	Txt				
40.04	LCD contrast	0 to 31	16	RW	Uni				US
40.05	Drive and attribute database upload was bypassed	Updated (0), Bypass (1)	Updated (0)	RO	Txt			PT	
40.06	Browsing favorites control	Normal (0), Filter (1)	Normal (0)	RW	Txt				
40.07	Keypad security code	0 to 999	0	RW	Uni				US
40.08	Communication channel selection	Disable (0), Slot1 (1), Slot2 (2), Slot3 (3), Slave (4), Direct (5)	Disable (0)	RW	Txt				US
40.09	Hardware key code	0 to 999	0	RW	Uni				US
40.10	Drive node ID (Address)	0 to 255	1	RW	Uni				US
40.11	Flash ROM memory size	4Mbit (0), 8Mbit (1)	4Mbit (0), 8Mbit (1)	RO	Txt			PT	US
40.19	String database version number	0 to 999999	0	RO	Uni			PT	
40.20	Screen saver strings and enable	None (0), Default (1), User (2)	Default (1)	RW	Txt				US
40.21	Screen saver interval	0 to 600s	120s	RW	Uni				US
40.22	Turbo browse time interval	0 to 200ms	50ms	RW	Uni				US
40.23	Product identification	0 to 5		RO	Txt				

Table 7-3 Menu 41 parameter descriptions

Parameter		Range($\updownarrow$)	Default($\Rightarrow$)	Type					
41.00	Parameter 0	0 to 32767	0	RW	Uni				
41.01 to 41.50	Browsing filter source F01 to F50	Pr **0.00** to Pr **391.51**	0	RW	Uni				
41.51	Browsing favorites control	Normal (0), Filter (1)	Normal (0)	RW	Txt				

RW	Read / Write	RO	Read only	Uni	Unipolar	Bi	Bi-polar
Bit	Bit parameter	Txt	Text string	FI	Filtered	DE	Destination
NC	Not copied	RA	Rating dependent	PT	Protected	US	User save
PS	Power down save						

How to use this guide

Safety information

Introduction

Installing the Keypad Plus

Power-up stage

Getting started

Parameters

Diagnostics

Index

7.3 Menu 40

40.00		Parameter 0							
RW	Uni								
⇕	0 to 32767			⇨			0		
Update rate: Background read									

Routed to the drive parameter zero. Can also be used to unlock the Keypad Plus internal security (see Pr **40.07**).

40.01		Language selection							
RW	Txt							US	
⇕	English (0), Custom (1), French (2), German (3), Spanish (4), Italian (5)			⇨		English (0)			
Update rate: Update on exit from edit									

Selects the parameter string database language. This is limited to English or Custom if the flash is 4MB in size.

40.02		Software version							
RO	Uni						PT		
⇕	99999			⇨			0		
Update rate: Update on power up									

Keypad Plus software version

This parameter should be read as three groups of two numbers :-

xyyzz.

- x is the hardware version number on which the code will operate.
- yy is the software version a change of which means a significant functional change.
- zz is the software sub-version a change of which should not require an updated manual.

40.03		Save to flash							
RW	Txt								
⇕	Idle (0), Save (1), Restore (2), Default (3)			⇨		Idle (0)			
Update rate: Update on exit from edit									

The Keypad Plus internal menus (Pr **40** and Pr **41**) require saving to the Keypad Plus FLASH ROM. This system is independent of the drive parameter **x.0** saving routine and is controlled instead by this parameter. The parameter has four levels of operation which are implemented on leaving the edit mode.

Each operation will return to the Idle (0) state on completion.
- Save (1) takes the current values and places them into ROM
- Restore (2) overlays the current values with those stored in ROM
- Default (3) overlays the current values with their default values

How to use this guide

Safety information

Introduction

Installing the Keypad Plus

Power-up stage

Getting started

Parameters

Diagnostics

Index

40.04		**LCD contrast**							
RW	Uni							US	
↕		0 to 31		⇨		16			
Update rate: Action on edit									

Changes the contrast level of the LCD where 0 is the darkest and 31 is the lightest.

40.05		**Drive and attribute database upload was bypassed**							
RO	Txt							PT	
↕		Updated (0), Bypass (1)		⇨		Updated (0)			
Update rate: On Initialization									

Updated (0): The parameter attribute databases were checked and updated as required on last power-up.

Bypass (1): At least one of the databases required uploading but the process was by-passed by the user.

NOTE The data used will be out of date if By-pass (1) is used.

40.06		**Browsing favourites control**							
RW	Txt								
↕		Normal (0), Filter (1)		⇨		Normal (0)			
Update rate: Action on edit									

Normal (0): Normal key controller browsing

Filter (1): Invokes the list of favorite parameters defined through menu 41.

40.07		**Keypad security code**							
RW	Uni							US	
↕		0 to 999		⇨		0			
Update rate: Update on exit from edit									

The Keypad Plus internal menus (Pr **40.xx** and Pr **41.xx**) may be protected by a security code which is entered through this parameter. If the user exits the edit mode while leaving a valid value in this parameter the Keypad Plus internal menus will become read only. When this occurs, this parameter will read zero. The menus can be unlocked by placing the correct value into Pr **40.00** or Pr **41.00**.

40.08		**Communication channel selection**							
RW	Txt							US	
↕		Disable (0), Slot1 (1), Slot2 (2), Slot3 (3), Slave (4), Direct (5)		⇨		Disable (0)			
Update rate: Action on edit									

The Keypad Plus can support communications from sources other than the drive. This parameter allows the user to select a channel to be polled while the Keypad Plus continues to provide specified functionality.

Disable (0): Normal key control parameter browsing on its own

Slot1(1): Normal key control and polling of the UT70 in slot 1 for commands and display data

Slot2 (2): Normal key control and polling of the UT70 in slot 2 for commands and display data

Slot3 (3) Normal key control and polling of the UT70 in slot 3 for commands and display data

Slave (4) Normal key control parameter browsing and the comms slave port is polled through the drive or an Ethernet Solutions Module. This enables a PC to communicate with the Keypad Plus. NB The "SCL" trip watchdog is not serviced.

Direct (5) The key controller is suspended while the Keypad Plus is a comms slave waiting to service messages directly from the PC.

40.09	Hardware key code								
RW	Uni							US	
⇕	0 to 999			⇨		0			
Update rate: Update on exit from edit									

If the drive is locked and the correct drive security code has been placed in Pr **40.09**, the drive security will be ignored by the Keypad Plus but not unlocked. To prevent a user from seeing the code, the Keypad Plus security must be activated. When the hardware key is being used to bypass the drive security, Pr **11.30** will read zero and prevent editing.

40.10	Drive node ID (Address)								
RW	Uni							US	
⇕	0 to 255			⇨		1			
Update rate: Action on edit									

The drive node address used when communicating through the RJ45 using the Modbus RTU protocol. The Keypad Plus will restart with the address defined by Pr **40.10** when the user exits from the edit mode. In this case the new mode has a different attribute database.

40.11	Flash ROM memory size								
RO	Txt						PT	US	
⇕	4Mbit (0), 8Mbit (1)			⇨		4Mbit (0)			
Update rate: Updated on power-up									

Shows the size of the FLASH ROM installed in the Keypad Plus.

NOTE Only English and custom string databases available on 4Mbit FLASH ROM size.

How to use this guide

Safety information

Introduction

Installing the Keypad Plus

Power-up stage

Getting started

Parameters

Diagnostics

Index

40.19	**String database version number**								
RO	Uni						PT		
⇕	0 to 999999			⇨	0				
Update rate: On language change									

The version number of the language or custom string database that is currently selected by Pr **40.01**.

40.20	**Screensaver strings and enable**								
RW	Txt						US		
⇕	None (0), Default (1), User (2)			⇨	Default (1)				
Update rate: Compiled by the string database editor tool									

None (0): The screensaver will not run, but the display will blink while resetting every screensaver interval.

Default (1): The original drive screensaver will be used.

User (2): The first three lines of the help associated with this parameter are used as the three lines in the screensaver. If there is no help defined for this parameter, Pr **40.20** will be changed to "None" at the start of the next screensaver.

40.21	**Screensaver interval**								
RW	Uni						US		
⇕	0 to 600s			⇨	120s				
Update rate: Update on exit from edit									

Interval in seconds of button inactivity between screensaver splash screen.

NOTE The lower limit is clamped to 10 seconds internally.

40.22	**Turbo browse time interval**								
RW	Uni						US		
⇕	0 to 200ms			⇨	50ms				
Update rate: Read as required									

Time interval between direction command repeats when the direction is double pressed with the second press held. The normal scroll time interval is 120ms. Turbo scroll is only available for the up and down directions.

40.23	Product identification								
RO	Txt								
⇕		0 to 5			⇨				
	0 = Unidrive SP								
	1 = Commander SK								
	2 = Mentor MP								
	4 = Affinity								
	5 = Digitax ST								
Update rate: Read as required									

7.4   Menu 41

The "browsing favorites" function allows the range of accessible parameters to be limited, this will simplify operation or group regularly monitored parameters in a logical sequence.

When the "browsing favorites" has been activated using Pr **40.06**, the only parameters accessible to the user are those specified in the list. The user will scroll through the parameters using the up and down buttons, the left and right buttons will not be used.

Pr **41.00** is the same as Pr **40.00** and becomes "F0" when filtering has been enabled. This parameter can be used to unlock the Keypad Plus internal menu security.

Pr **41.51** is the same as Pr **40.06** and becomes "F51" when filtering has been enabled. This parameter can be locked by the Keypad Plus internal security to prevent unauthorized users from exiting out of the favorite filter.

The routing of parameters "F01" to "F50" is controlled by the values in Pr **41.01** to Pr **41.50**. If a routing has not been defined or is invalid, the parameter will be skipped during filter browsing.

How to use this guide

Safety information

Introduction

Installing the Keypad Plus

Power-up stage

Getting started

Parameters

Diagnostics

Index

8 Diagnostics

If the drive trips, the output is disabled so that the drive stops controlling the motor. The lower display indicates that a trip has occurred and the upper display shows the trip.

If a display is not used on Unidrive SP and Affinity, the drive LED Status indicator will flash if the drive has tripped. Refer to Figure 8-2. On Commander SK, the drive's display will show the trip.

The trip indication can be read in Pr **10.20** providing a trip number.

8.1 Displaying the trip history

The drive retains a log of the last 10 trips that have occurred in Pr **10.20** to Pr **10.29** and the corresponding time for each trip in Pr **10.43** to Pr **10.51**. The time of the trip is recorded from the powered-up clock (if Pr **6.28** = 0) or from the run time clock (if Pr **6.28** = 1).

NOTE Pr **6.28** is not available on Commander SK.

Pr **10.20** is the most recent trip, or the current trip if the drive is in a trip condition (with the time of the trip stored in Pr **10.43**). Pr **10.29** is the oldest trip (with the time of the trip stored in Pr **10.51**). Each time a new trip occurs, all the parameters move down one, such that the current trip (and time) is stored in Pr **10.20** (and Pr **10.43**) and the oldest trip (and time) is lost out of the bottom of the log.

If any parameter between Pr **10.20** and Pr **10.29** inclusive is read by serial communications, then the trip number is transmitted.

Figure 8-1 Keypad Plus status modes

Parameter
View Mode

5.05   5 3 7
DC Bus Voltage

Menu 5. Parameter 5

Pr **5.05** value

Status Mode

Healthy Status   Alarm Status   Trip Status

r d y   0
Estimated motor
RPM

r u n   1000.0
Motor
Overload

t r i p ——— UU
Under Voltage
Trip
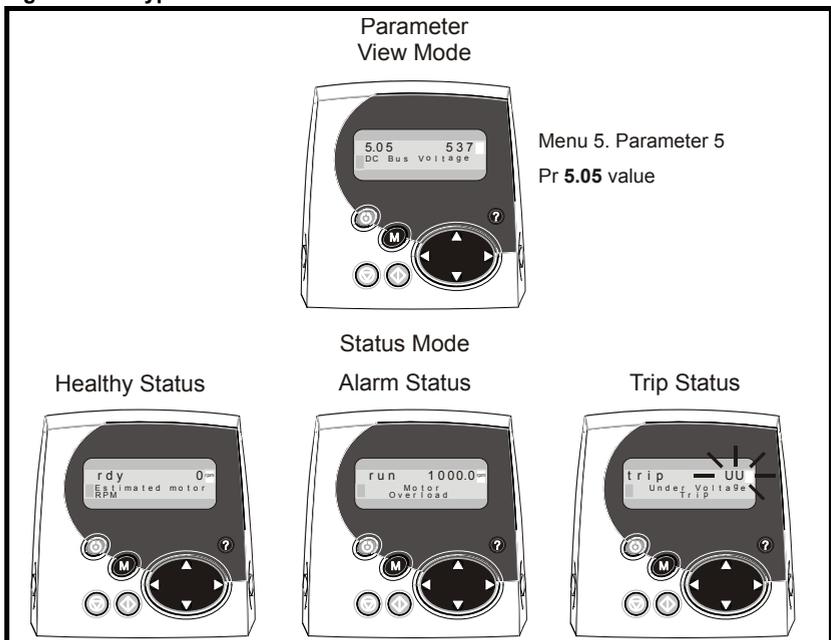
NOTE The examples illustrated in Figure 8-1 relate to Unidrive SP and Affinity.

Figure 8-2 Location of the status LED on Unidrive SP / Affinity

Status LED

Non flashing:
Normal status

Flashing:
Trip status
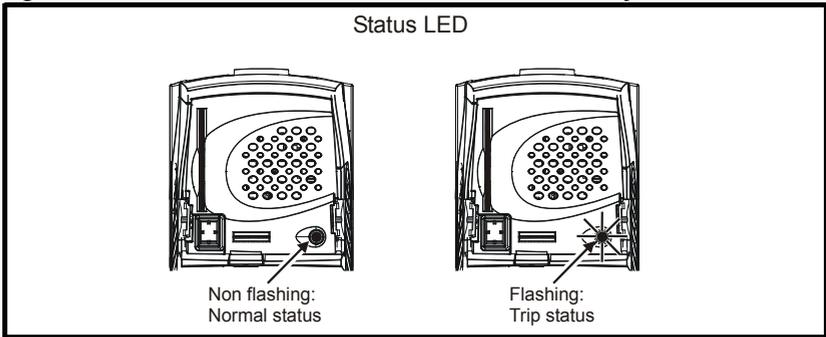
Any trip can be initiated by writing the relevant trip number to Pr **10.38**. If any trips shown as user trips are initiated the trip string is "txxx", where xxx is the trip number.

Trips can be reset after 1.0s if the cause of the trip has been rectified.

A full list of drive trips can be found in the relevant drive *User Guide*.

8.2 No comms available through the 6-pin port

A fieldbus module such as the SM-Ethernet may have control of the comms buffer preventing the drive from servicing messages from the Keypad Plus. The Keypad Plus will recover when the buffer becomes free.

8.3 No comms available through the RJ45 port

The serial port is controlled using Pr **11.23** to select the address, Pr **11.24** to select the mode and Pr **11.25** to select the baud rate. Make sure that the drive serial address in the Keypad Plus (Pr **40.10**) is equal to the drive address (Pr **11.23**). The Keypad Plus will not communicate with the drive if the serial mode (Pr **11.24**) is set to "ANSI" or if the baud rate (Pr **11.25**) is not set to 19,200 or 57,600.

NOTE   The baud rate of 57,600 is not available on the Commander SK.

Index

How to use this guide

Safety information

Introduction

Installing the Keypad Plus

Power-up stage

Getting started

Parameters

Diagnostics

Index

U

W

0471-0093-02