EMERSON ™
Industrial Automation

User Guide

SM-Keypad Plus
CGP-Keypad Plus

Unidrive SP
Commander SK
Commander GP20

Part Number: 0471-0093-01
Issue Number: 1

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.

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Drive software version

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

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 and maintenance.

1.2 Information

Through this User Guide the SM-Keypad Plus/CGP-Keypad Plus will be referred to as "Keypad Plus" as functionally the two keypads are identical.

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

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 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.

The STOP and SECURE DISABLE functions of the drive do not isolate dangerous voltages from the output of the drive or from any external option unit. The supply must be disconnected by an approved electrical isolation device before gaining access to the electrical connections.

With the sole exception of the SECURE DISABLE function, none of the drive functions must be used to ensure safety of personnel, i.e. they must not be used for safety-related functions.

Careful consideration must be given to the functions of the drive which might result in a hazard, either through their intended behaviour 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.

The SECURE DISABLE function has been approved[1] as meeting the requirements of EN954-1 category 3 for the prevention of unexpected starting of the drive. It may be used in a safety-related application. **The system designer is responsible for ensuring that the complete system is safe and designed correctly according to the relevant safety standards.**

[1]Independent approval by BGIA has been given.

2.4 Environmental limits

Instructions in the *Unidrive SP User Guide, Commander SK Technical Data* or *Commander GP20 User Guide* 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 *Unidrive SP User Guide, Commander SK Technical Data* or *Commander GP20 User Guide* contains 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:

98/37/EC: Safety of machinery.

89/336/EEC: 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 fitted 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: Pr **0.46** for Unidrive SP and Commander GP20 and Pr **06** for Commander SK. 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.

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3   Introduction

3.1   Features

The Keypad Plus can be used on the following products:
*   Unidrive SP
*   Commander SK
*   Commander GP20

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 Keypad Plus

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

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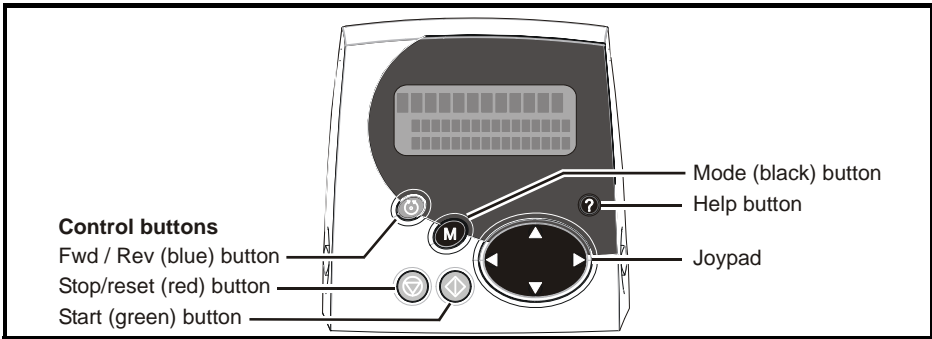
The Keypad Plus can be identified by:

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

Figure 3-2 Keypad Plus label

Keypad name

Issue number

Issue: 0   STDJ41

SM-Keypad Plus

Ser No : 3000005001

Customer and date code

Serial number
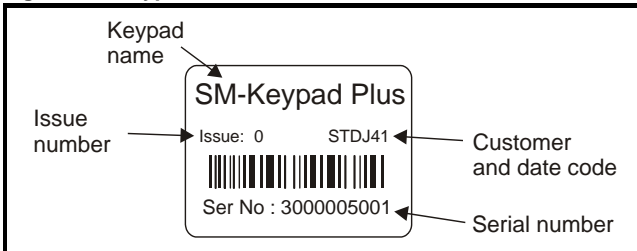
3.2.1 Date code format

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 / Commander GP20

On Unidrive SP / Commander GP20 the Keypad Plus can either be connected to the drive (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
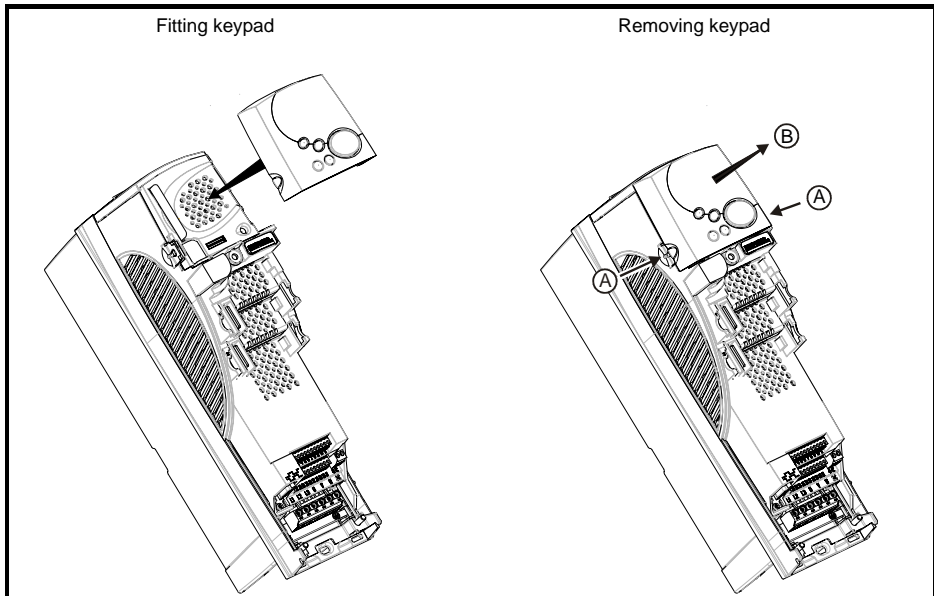
To fit, align the Keypad Plus and press gently in the direction shown until it clicks into position.

To remove, whilst 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.

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Figure 4-2 Fitment of Keypad Plus (RJ45 port connection on Unidrive SP / Commander GP20)

RJ45 cable

Cabinet / Panel
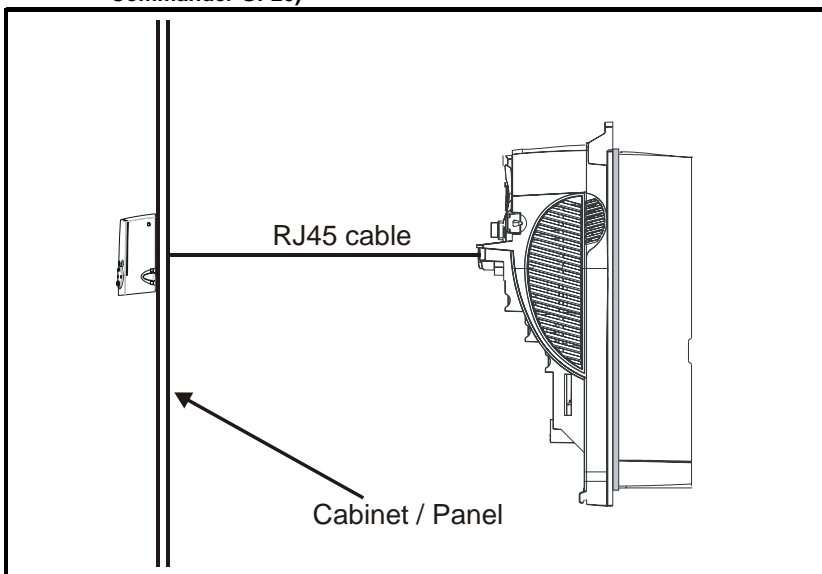
4.1.2   Installation on Commander SK

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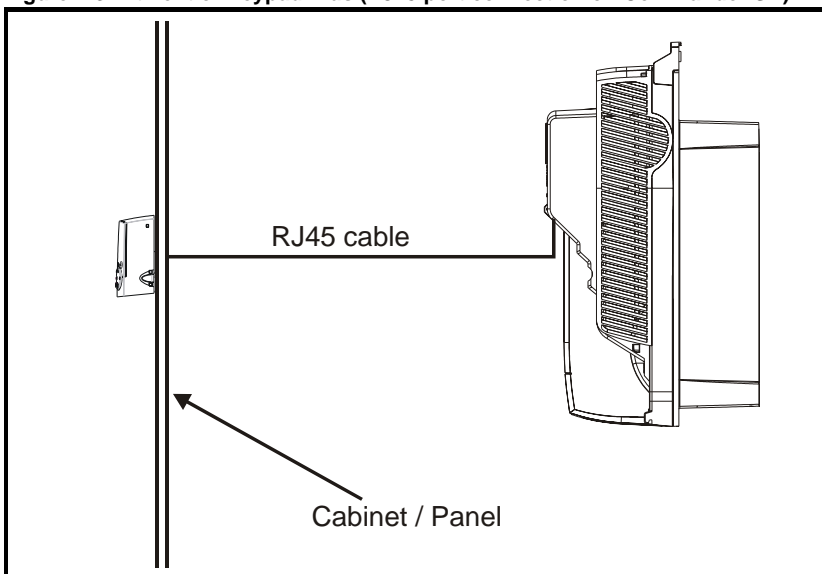
NOTE   The Keypad Plus can be fitted / removed whilst the drive is powered up and running a motor, providing that the drive is not operating in keypad mode.

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 4-4 Keypad Plus terminals

```
┌──────────────────────────────────────────┐
│                   PL1                      │
│   ┌──┐ ┌──┐ ┌──┐ ┌──┐ ┌──┐ ┌──┐ ┌──┐ ┌──┐  │
│   │1 │ │2 │ │3 │ │4 │ │5 │ │6 │ │7 │ │8 │  │
│   └──┘ └──┘ └──┘ └──┘ └──┘ └──┘ └──┘ └──┘  │
└──────────────────────────────────────────┘
```
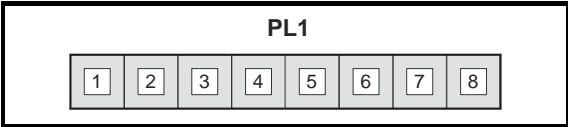
Table 4-1 Keypad Plus terminal descriptions

Pin number	Functions
1	
2	TXRX
3	0VSELV
4	+24VSELV
5	
6	TX_Enable
7	TX\RX\
8	

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.

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Figure 4-5 IP54 Installation diagram

Only use the two M3 x 14 screws supplied
Maximum screw torque of 0.8Nm

Screws

'O' ring seal

RJ45 connector

Square rubber seal

6 pin header

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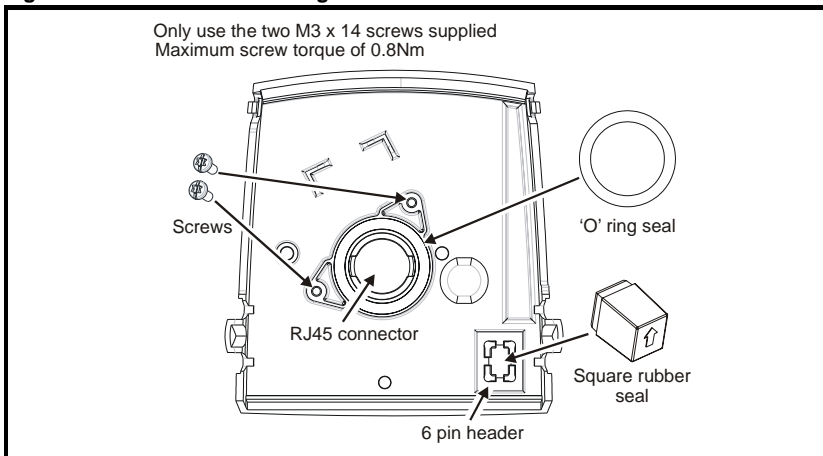
5   Power-up stage

5.1   Initialisation

When the Keypad Plus is connected to the drive, the display background will be illuminated and will show the text "initialising". See Figure 5-1.

Figure 5-1 Display initialisation


```
Keypad  Plus
Initialising
Ver:  04.02.00
```

During the initialisation 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 Solution Module parameters. (See section 6.7 *Parameter attribute databases* on page 19)
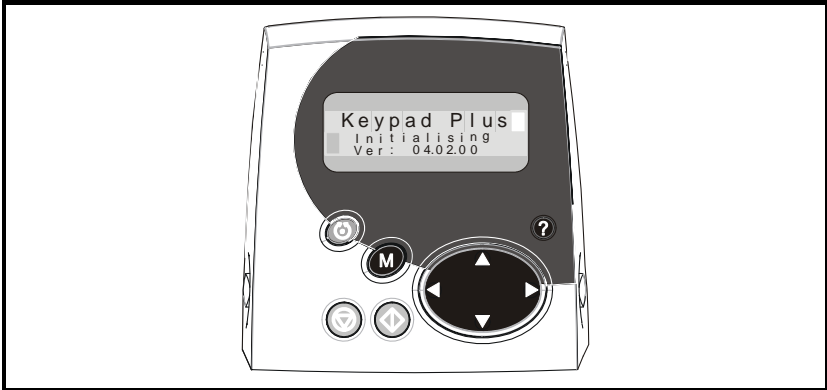
5.2   RJ45 Port communications set-up

5.2.1   Serial mode

The serial mode for the Keypad Plus is Modbus RTU. The Keypad Plus does not allow the serial mode (Pr **0.35** on the Unidrive SP / Commander GP20) 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 for Unidrive SP and Commander GP20, and 19,200 only on Commander SK. The baud rate can only be changed using a keypad which is connected to the (6-pin SSI) port on Unidrive SP / Commander GP20, 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 can be 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.

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 communications is lost during or after the initialisation 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 fitted to the RJ45 port matches the value set in Pr **0.37** *Serial address* on the keypad fitted to 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 fitted to the 6-pin SSI port has a value of either 19,200 or 57,600 for Unidrive SP and Commander GP20. For Commander SK 19,200 should be set in Pr **43**.

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 (Pr **0.37** for Unidrive SP / Commander GP20 or Pr **0.44** with Commander SK). 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.

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6 Getting started

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

6.1 Keypad Plus display
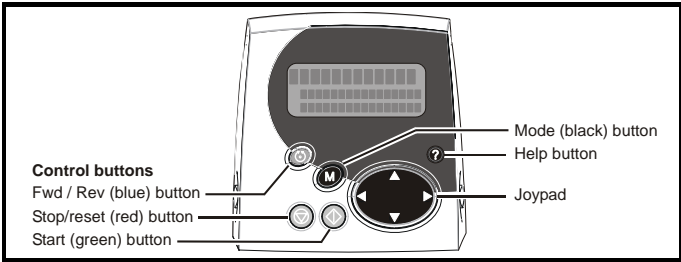
The display consists of three lines of text.

The top line comprises of 12 large characters, the left-hand side of the line will display the current menu and parameter whilst 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 option 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 Keypad Plus

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

Mode (black) button
Help button
Joypad

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 6-1 Display modes
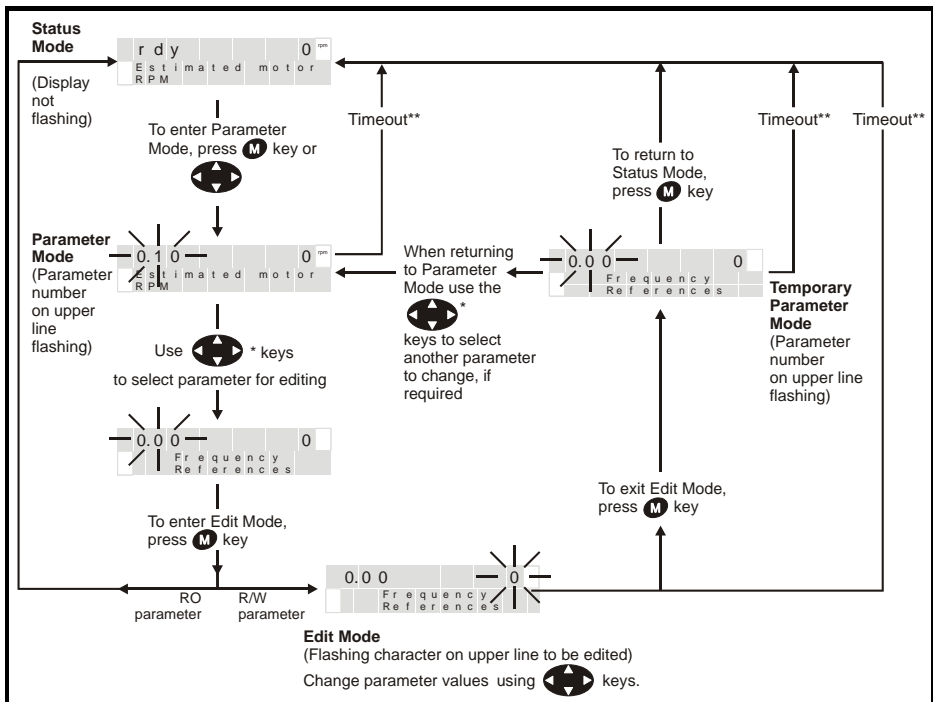
* can only be used to move between menus if L2 access has been enabled (Pr **0.49** or Pr **0.10** with Commander SK).

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

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Figure 6-2 Mode examples

Parameter
View Mode

5.05   5 3 7
DC Bus Vol tage

Menu 5. Parameter 5
Pr **5.05** value

Status Mode

Healthy Status   Alarm Status   Trip Status

r d y   0 rpm
Estimated motor
RPM

r u n   1000.0 rpm
Motor
Overload

t r i p   UU
Under Voltage
TriP
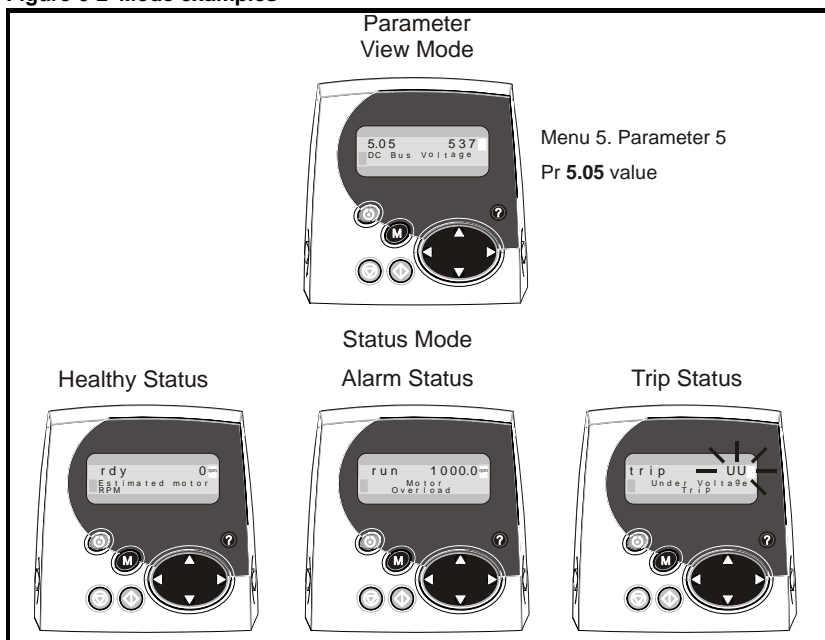
| NOTE | The examples illustrated in Figure 6-2 relate to Unidrive SP and Commander GP20. |

⚠️ **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 6-3 Parameter navigation
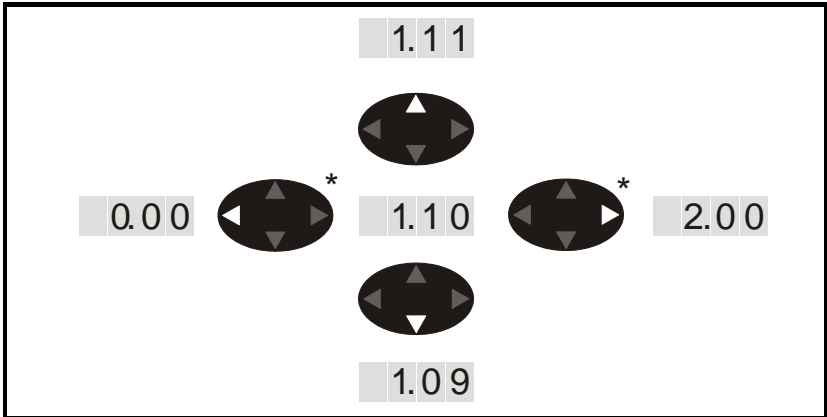
* can only be used to move between menus if L2 access has been enabled (Pr **0.49** or Pr **0.10** with Commander SK).

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 initialised, 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 fitted. 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 fitted inside the drive (only on Unidrive SP / Commander GP20). 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 fitted (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 overlaid 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 fitted 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.

If the databases are corrupt or wrong they are downloaded from the drive and option 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 (Unidrive SP/Commander GP20)

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 $\textcircled{M}$ 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**.

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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. 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 unauthorised 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

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internal menus (Menu 40 and 41) with the specific keypad still fitted. 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.

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 ⓜ 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 Favourite filters

A custom list of drive and option menu parameters may be compiled by entering the required favourite 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 favourite filter mode if the Keypad Plus internal menu security is active. All non-existent or non-defined parameters are skipped.

6.9.4 User defined screen saver

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 bypassed, the display will blink once as it is re-synchronised 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 25)

6.9.5 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.

6.9.6 User defined strings

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

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

To customise the text the user must use a Control Techniques programme called SM-Keypad + editor, this is available from www.controltechniques.com in the downloads section.

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, whilst menu 41 will house the "Browsing Favourites". 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 favourites 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 cloned: 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.

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7.2   Single line descriptions

Table 7-2 Menu 40 parameter descriptions

Parameter		Range(⇕)	Default(⇨)	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	999999	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 favourites 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
40.18	Assistance on action threshold parameter	0 to 499.99	0.00	RW	Uni				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 600	120	RW	Uni				US
40.22	Turbo browse time interval	0 to 200ms	50ms	RW	Uni				US

Table 7-3 Menu 41 parameter descriptions

Parameter		Range(⇕)	Default(⇨)	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 favourites 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 cloned	RA	Rating dependent	PT	Protected	US	User save
PS	Power down save						

7.3 Menu 40

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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 4Mbit in size.

40.02		**Software version**							
RO	Uni							PT	
⇕		999999			⇨		0		
Update rate: Update on power up									

Keypad Plus software version

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

xxyyzz.

- xx 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

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 initialisation										

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 bypassed by the user.

NOTE The data used will be out of date if Bypass (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 favourite 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

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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 option 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 fitted in the Keypad Plus.

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

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	Screen saver 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 screen saver will not run, but the display will blink while resetting every screen saver interval.

Default (1): The original Unidrive SP, Commander SK and Commander GP20 screensavers will be used.

User (2): The first three lines of the help associated with the parameter are used as the three lines in the screen saver. 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	Screen saver interval								
RW	Uni							US	
⇕	0 to 600			⇨	120				
Update rate: Update on exit from edit									

Interval in seconds of button inactivity between screen saver 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.

7.4 Menu 41

The "browsing favourites" 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 favourites" 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 unauthorised users from exiting out of the favourite filter.

The routing of parameters "F1" to "F50" is controlled by the values in Pr **41.01** to Pr **41.50**. If a routing has not be defined or is invalid the parameter will be skipped during filter browsing.

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 Commander GP20, 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 in Table 8-1 is the value transmitted.

Figure 8-1 Keypad Plus status modes

Parameter
View Mode

5.05   537
DC Bus Voltage

Menu 5. Parameter 5
Pr **5.05** value

Status Mode

Healthy Status

rdy   0rpm
Estimated motor
RPM

Alarm Status

run   1000.0rpm
Motor
Overload

Trip Status

trip   UU
Under Voltage
Trip
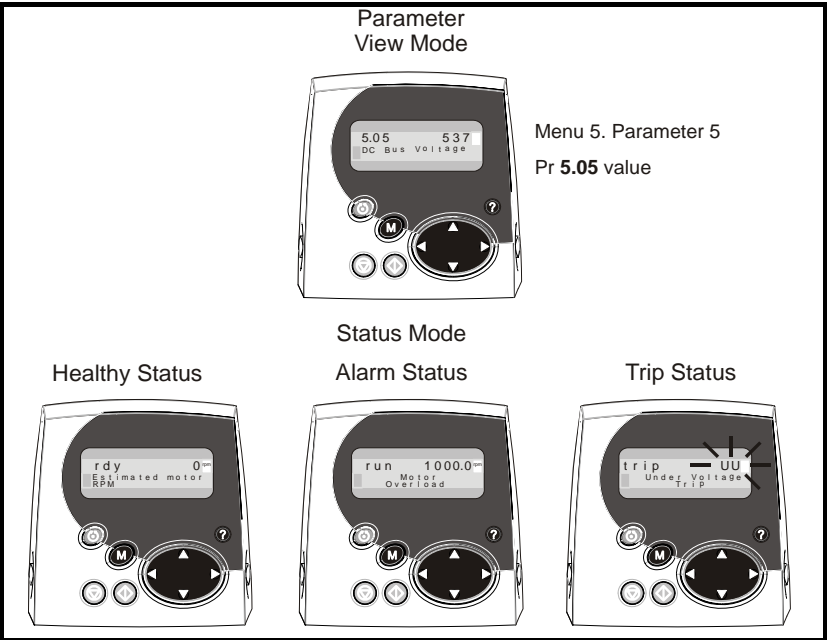
NOTE The examples illustrated in Figure 8-1 relate to Unidrive SP and Commander GP20.

Figure 8-2 Location of the status LED on Unidrive SP / Commander GP20

Status LED

Non flashing:
Normal status

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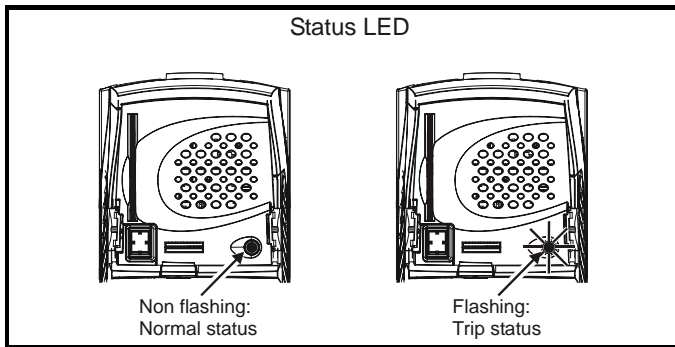
Any trip can be initiated by writing the relevant trip number to Pr **10.38**. If any trips shown as user trips are initiated the trip string is "txxx", where xxx is the trip number.

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 *Unidrive SP User Guide*, *Commander SK Advanced User Guide* or *Commander GP20 User Guide*.

8.2   No comms available through the 6-pin port

A field bus 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.

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