



Advanced User Guide

Universal Keypad

Part Number: 0400-0038

Issue Number: 2



SAFETY INFORMATION

The Control Techniques Universal Keypad is intended only for use as an accessory for Control Techniques variable speed drives. Any other attempted use invalidates the warranty and may be hazardous.

The variable speed drives with which this keypad is used contain high power, high voltage parts, which can cause severe electric shock and burns and could be lethal. Refer to the drive installation guide before working on the drive system.

Close attention is required to the drive system design to avoid safety hazards either in normal operation or in the case of faults. To ensure mechanical safety, additional safety devices such as electro-mechanical interlocks may be required. The keypad must not be used in a safety-critical application without additional high-integrity protection against hazards arising from a malfunction. In any application where a malfunction could cause damage, loss or injury a risk assessment must be carried out and, where necessary, measures taken to reduce the risk.

System design, installation, commissioning and maintenance must be carried out by personnel who have the necessary training and experience, and they must pay close attention to this safety information and the contents of the installation guide.

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Declaration of Conformity

Control Techniques Plc, The Gro, Newtown, Powys, UK. SY16 3BE

Product	Universal Keypad
Control Techniques Part No.	8550-0000

The Universal Keypad has been designed and manufactured in accordance with the following European harmonised, national and international standards:

EN61010-1	Safety requirements for electrical equipment for measurement, control, and laboratory use – general requirements.
EN50081-2	Generic emission standard for the industrial environment
EN50082-2	Generic immunity standard for the industrial environment
EN61800-3	Adjustable speed electrical power drive systems – Part 3: EMC product standard including specific test methods.

This product complies with the Low Voltage Directive 73/23/EEC, the Electromagnetic Compatibility (EMC) Directive 89/336/EEC and the CE Marking Directive 93/68/EEC.



W. Drury

Technical Director

Date: 2 July 1999.

Compliance with safety and EMC regulations depends upon installing and configuring the keypad correctly. The assembler is responsible for ensuring that the end product or system complies with all the relevant laws in the country where it is to be used. Refer to the User Guide. An EMC Data Sheet is also available giving detailed EMC information

1 Introduction

Many applications consist of a small number of Drives mounted inside a cubicle or cabinet. A front panel mounted Universal Keypad will allow plant maintenance and commissioning.

1.1 Overview

The Universal Keypad is a display and keyboard that communicates to the Unidrive, VTC, GP, Commander SE and Mentor II range of Drives using standard EIA-RS485 serial communications, with the CT-ANSI protocol.

The keypad can access any Drive connected to the EIA-RS485 network and scroll through the parameter set providing native language descriptions.

NOTE

The Unidrive must be fitted with a basic serial communications option (UD71) or applications module (UD70).

The onboard two-line LCD display shows the menu number, parameter number and value on the top line and the 16-character parameter description on the bottom line. After 10 seconds of inactivity, two custom Human-machine Interface lines may be displayed. These HMI lines are programmed to read a parameter on any drive, apply a scale and offset and then display this data with descriptive text.

The keypad is intended to be used in the following modes:

- Hand-held, for programming drives, including down-loading stored parameter sets
- Panel mounted, for service access to the parameters of one or more drives
- Panel-mounted, for operation of plant

1.2 Front Panel Layout

The front panel design was purposely styled to match the Unidrive family of products. Eight of the eleven membrane buttons have exactly the same function as the Unidrive's front panel keypad. These keys include the colored **run**, **stop/reset** and **direction** buttons, the arrow keys and the modify button.

The three buttons labeled F1, F2 and F3 directly below the 2-line LCD display are the macro keys. These keys may be programmed by the user to send one or two stored values to any parameter on any drive that is on the EIA-RS485 network.

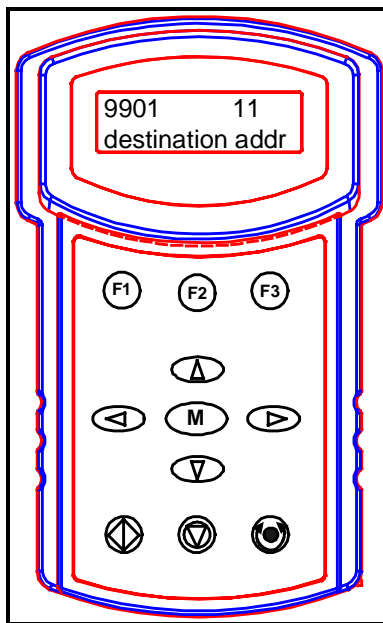


Figure 1.1 Universal Keypad Front Panel Layout

1.3 Technical Specifications

Specification	Value
EIA-RS485:	2-wire or EIA-RS485 4-wire interconnection
Supply voltage:	24V DC $\pm 20\%$
Rated current:	150mA
Maximum current:	200mA when supplied from a Control Techniques drive. When used with a separate DC supply use a fast-acting 250mA fuse rated at 24V DC with breaking capacity to suit supply.
Dimensions (W x H x D):	115mm x 188mm x 50mm (4.53" x 7.40" x 1.97")
Ambient Temperature:	0°C to +50°C
Altitude:	The Universal Keypad is capable of operation at altitudes of 4000m above sea level.

Humidity:	Maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C
EMC:	Complies with EN50081-2 (emission), EN50082-2 (immunity) and IEC61800-3 (power drive systems)
Panel Mounting:	Standard DIN 96mm X 96mm panel meter punch – 92mm x 92mm cutout
Environment:	Enclosure ingress protection when correctly assembled to a panel is IP65 for the outside (front) and IP30 for the inside (rear) surface.

1.4 Compatibility

The following table shows a list of Drive versions that the Universal Keypad is compatible with:

Drive	Drive option	4 wire	2 wire	Drive firmware version
Unidrive	UD71 or UD70	Yes	Yes	All
Commander SE	None	No	Yes	All
Mentor II	None	Yes	No	All
Mentor II	MD29 or MD29AN	Yes	Yes	All
Unidrive VTC	UD71	Yes	Yes	≥ 3.0.0
Unidrive VTC	UD70*	Yes	Yes	≥ 3.0.0
Commander GP	UD71	Yes	Yes	≥ 3.1.7

- UD70 system file V2.7.6 and later. Earlier versions identify the drive as Unidrive open loop with menu 0 invalid.

2 Installation

The Universal Keypad is intended to be used in two ways:

- As a panel-mounted control unit for a drive or drive system. When used in this mode it may be used by plant operators and other staff with no specific skills or training.
- As a hand-held drive programming device. Since this requires access to the drive connections, it is intended for use in this mode only by trained and experienced technical personnel, who must carefully observe the safety precautions given in this guide and the drive installation guide.

For mounting and dimensions refer to Appendix B

2.1 Power Supply

Supply voltage 24V DC nominal $\pm 20\%$.

The supply must either be current limited at 150mA nominal or else provided with a fast-acting 250mA fuse rated at 24V DC with a breaking capacity to suit supply. When used with the specified Control Techniques drive this protection is provided automatically

The power supply required by the Universal Keypad is 24 volts ($\pm 20\%$) at 150 mA maximum. As Figures 2.1, 2.2 and 2.3 suggest, we recommend a good quality 4-conductor shielded, twisted pair cable for the communications channel. The rear panel housing has cable strain-relief built into the plastic molding.

The Unidrive has 24 volts, 200 mA available on the signal connector, sufficient to power the Universal Keypad. Pin 22 is +24 volts while pin 23 is the digital ground. A popular method is to use 6-conductor shielded cable and bring the power and ground leads out of the 9-pin connector's boot for attachment to the Unidrive's signal connector.

The drive control terminals are separated from live circuits in the drive by basic insulation only. Accessible wiring between the keypad and drive must be insulated with at least one layer of insulation rated for the supply voltage in use.

This also applies to all other circuits fed from any DC supply used for this purpose. The same supply must not be used for operator accessible circuits or SELV circuits.

2.2 Rear panel layout and interconnections

The rear panel plastic molding is designed to push through a 92mm x 92mm aperture cut-out in the cabinet or cubicle. There are four tapped screw holes provided to secure the fitting. Removing the two screws securing the cable hatch cover can expose the rear terminal connector.

Figure 2.1 shows the required power and signal interconnections for EIA-RS485 4-wire operation.

Please note that the Commander SE drive does not support EIA-RS485 4-wire communications.

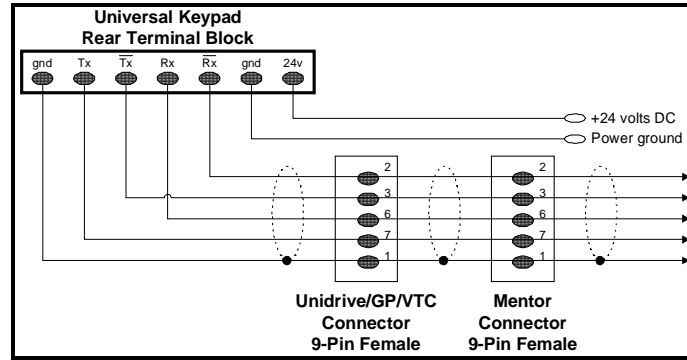


Figure 2.1 EIA-RS485 4-wire Interconnection Diagram

Please note that a Commander SE Drive only supports 2-wire communications whilst the Mentor Drive does not unless an MD29 card is fitted.

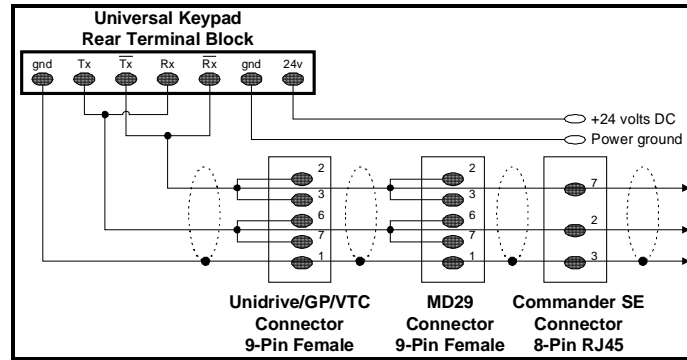


Figure 2.2 EIA-RS485 2-wire Interconnection Diagram

The Universal Keypad works in both 4-wire and 2-wire mode with no user intervention or set-up required.

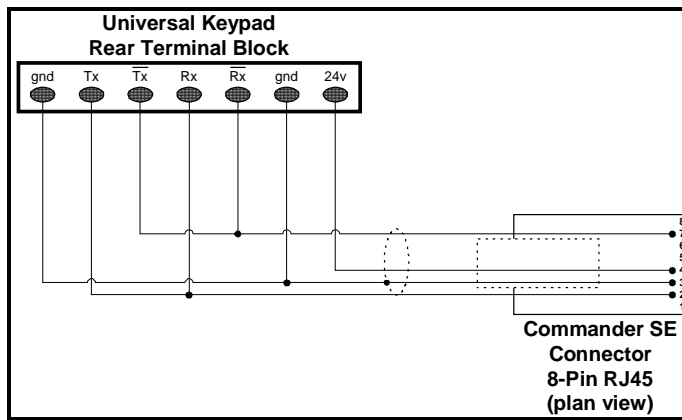


Figure 2.3 EIA-RS485 2-wire Commander SE interconnection with power connection.

2.3 Serial Communications

2.3.1 Routing the serial communications cable

A data communications cable should not run parallel to any power cables, especially ones that connect Drives to motors. If parallel runs are unavoidable, ensure a minimum spacing of 300mm (1 foot) between the communications cable and the power cable.

Cables crossing one another at right-angles are unlikely to give trouble.

The maximum cable length for a EIA-RS485 link is 1200 meters (4000 feet).

2.3.2 Network limitations

The host controller can operate up to thirty-two EIA-RS485 devices with the use of line repeaters. Each transmitter or receiver of Control Techniques devices loads the line by two unit-loads. Therefore in 2-wire mode, each Control Techniques device loads the line by four unit loads. This means that no more than a total of seven such devices can be connected in a single group, allowing up to four unit-loads for the line repeater. Up to 15 devices can be connected if 4-wire mode is used.

2.3.3 Terminating the cable

When a multi-drop EIA-RS485 system is used, connect a 120Ω resistor between the two receive lines of the last unit* in the chain (i.e. the farthest away from the host). Care must be taken to ensure that other units in the system do not have the resistor already fitted. Excessive signal loss will occur if termination resistors are connected to units other than the last one.

*If the last unit is a Commander SE connect pin 1 to pin 8 (TX/RX) to activate the termination.

2.4 Connecting to a Drive

For the Universal Keypad to operate, a connection must be established between the keypad and a drive. The Universal Keypad will communicate with all supported CT drives (see 1.4. Compatibility), with the exception of Mentor II, without the need for any parameter alterations on the drive or keypad from the default values.

After wiring the keypad connect to the EIA-RS485 port on the drive and applying power:

- Select the baud rate parameter (**99.04**) and change to the correct baud rate for the drive.
- Select the drive address parameter (**99.01**) and change to the appropriate value (exiting Modify mode will execute a 'reconnection').
- When the Universal Keypad has established communications with the drive a "**RS485 Init OK**" message is displayed briefly on the bottom LCD display line and the keypad jumps to the specified power-up parameter (defined in parameter 99.45).

The table below shows the Node communications parameters:

Node	Baud Rate Parameter	RS485 Address Parameter	RS485 Mode Parameter	RS485 Mode Value
Universal Keypad	99.04	99.01	N/A	N/A
Unidrive, VTC, GP	0.36 (11.25)	0.37 (11.23)	0.32 (11.24)	=1 (4 wire) =0 (2 wire)
Commander SE	0.42 (11.25)	0.43 (11.23)	0.41 (11.24)	=0 (2 wire)
Mentor	11.12	11.11	11.13	=1 (4 wire)
UD70	17.07	17.05	17.06	=1 (4 wire) =5 (2 wire)
MD29	14.03	14.01	14.02	=1 (4 wire) =5 (2 wire)

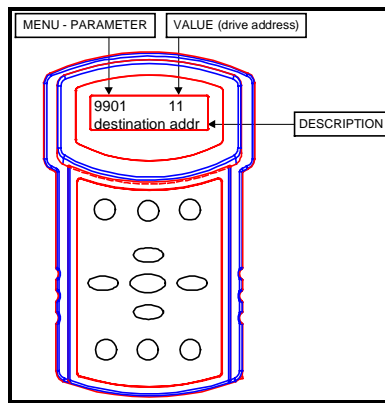


Figure 2.4 Selecting a Drive Address

You can scroll at any time to local parameter **99.01** to change the destination drive address. There is a useful shortcut wherein pressing the LEFT and RIGHT ARROW buttons simultaneously will jump directly to local parameter **99.01**.

There are some limitations on drive addresses: no drive addresses less than 11 are permitted and you should avoid drive addresses in which the least significant digit is zero (e.g. 20, 30, 40, etc.).

If the entered drive address does not exist, a "**Comm Failure**" message will be displayed briefly and you will be locked into local menu 99 until a valid drive is selected.

3 Keypad Operations

3.1 Basic Operation

The Universal Keypad operates in two modes. The M button (modify) is used to switch the Keypad between these modes:

3.1.1 Browse mode

In this mode, the left and right arrow keys are used to rapidly scroll through the Drive's menus and the up and down arrows are used to scroll through the current menu's parameter numbers.

3.1.2 Modify mode

In this mode, the left and right arrow keys are used to move the cursor along the numeric position within the value display. The up and down arrow keys are used to increment and decrement the value stored in this position. Pressing the up and down arrow keys together will clear the value of the parameter to zero (for a multi-choice parameter the value will be to the first choice available).

The Universal Keypad has an "auto-repeat" feature that speeds up finding or modifying parameters. If any key is held down for longer than one second, the keystroke will be repeated ten times a second until the key is released. This feature applies to all buttons.

For as long as the auto-repeat feature is functioning the block cursor will move one position to the left every 4 seconds. This is useful for incrementing parameter values quickly. e.g. If the block cursor is positioned on the units part of a value and the UP key is pressed and held down the display will start incrementing in 1s. After 4 seconds the cursor will move to the 10s part of the value and it will continue incrementing, this time in tens.

3.1.3 Shortcut combinations

- Pressing the up and down arrow keys simultaneously will return to parameter zero of the current menu in **Browse** mode, and clear the value to zero in **Modify** mode.
- Pressing the left and right arrow keys simultaneously, in **Browse** mode, will jump to parameter **99.01**. This is a quick way to log on to another drive.
- Pressing the left arrow and M keys simultaneously in either **Browse** or **Modify** mode will jump to parameter **99.44** (Password) and enter **Modify** mode.
- Pressing the right arrow and M keys simultaneously in either **Browse** or **Modify** mode will cause the keypad to immediately display both HMI lines.

When modifying a value, the drive will return a status reflecting the success of the operation. The value field will display XXXXXX if the parameter does not exist, is out of range and so forth. The 16-character lower LCD display line will also display a reminder about what's wrong. If the Universal Keypad loses communications with the drive, the value field will display _ _ _ _ _ (underscores) to indicate this condition.

3.2 Keypad Security features

To prevent unauthorized tampering with the Universal Keypad, the user may establish a security password. Definition of a new password will set the keypad into “**locked**” mode which limits keypad users to viewing the HMI displays and read-only browsing of menu zero, or in the case of the Mentor, all parameters.. To return the keypad to “**unlocked**” mode, giving full access to all parameters, the user must re-enter the previously defined password.

3.2.1 Enabling/Disabling security

- Access parameter **99.44** (pressing left and right arrows together will take you straight to the parameter)
- Enter your numeric password (zero is not a valid password)
- Press the M (modify) button.
- If the keypad was unlocked it will jump to menu 00 and briefly display a “**Keypad Locked**” message. You will be able to browse parameters but not alter any values. Security is now enabled.
- If the keypad was locked and the password was correct it will jump to parameter **99.01** and briefly display a “**Keypad Unlocked**” message. You may now view any parameter and modify it's value if it is a read-write parameter. Security is now disabled. If the password was incorrect the keypad jumps to menu 00, briefly displays “**Invalid Password**” and remains Locked.

The Universal Keypad is shipped with the password set to 0 and the operational mode is “**unlocked**”, thus giving full access to all parameters.

Any changes made to the password and operational mode are automatically stored in the onboard non-volatile memory. If the power is temporarily interrupted, the password and operational mode will be restored when the keypad re-boots.

If you forget the saved password, contact your Supplier.

3.3 Run, Stop/Reset and Direction buttons

The Run, Stop/Reset and Direction buttons are designed to emulate the Unidrive onboard keypad. To implement this function correctly, the Control keys (#99.05) parameter in the keypad will need to be set to Enabled, in conjunction with the following settings:

Drive	Enable link	Parameter	Parameter value
Unidrive UD71 VTC UD71 Commander GP	Terminals 30 to 31	6.04 1.14 6.13	=3 (PLC) =4 (Keypad) =1 (enable forward/reverse)
Unidrive UD70 VTC UD70	Terminals 30 to 31	6.04 1.14 Menu 8 destinations	=3 (PLC) =Any reference except keypad (4) =Any parameter other than 6.30 and 6.32
Commander SE	Terminals 7 to 9	0.05	=Any reference except keypad
Mentor	Terminals 21 & 31 to 40	8.21	=1 (disable normal logic functions)

The STOP button has 3 purposes:

- If the Drive is tripped, the STOP button will first stop the Drive then RESET it.
- If the Drive is running, the STOP button will stop the Drive.
- If the Drive is stopped, the STOP button will RESET the Drive.

For those drives that support the virtual Drive Key Control parameter, simulating the STOP button works fine for stopping and resetting the drive. In all other cases, the "user trip" parameters are used to reset the drive (parameters **10.38** on the Unidrive and Commander SE and **10.35** on the Mentor).

3.4 Programmable function keys

The Universal Keypad has three Function Keys, labelled **F1**, **F2** and **F3**. Each of these keys can be programmed by the user to send pre-determined values to any parameter on any attached drive. To do this, just five parameters in local menu 99 must be set up for each key.

For example, to set up the **F1** key to send a one followed by a zero to drive 15's sequencing bit (**6.30**), set parameters **99.23** through **99.27** as shown in the table below (parameters shown in italics are for descriptive purposes and do not require setting up for this example to work):

F1 Button Set-up Parameters		
Set-up parameter	Value	Description
99.23	2 values	F1 key assign disabled 1 value 2 values
99.24	15	F1 destination address
99.25	630	F1 destination parameter
99.26	1	F1 destination value #1
99.27	0	F1 destination value #2
99.28	2 values	F2 key assign disabled 1 value 2 values
99.29	15	F2 destination address
99.30	631	F2 destination parameter
99.31	1	F2 destination value #1
99.32	0	F2 destination value #2
99.33	2 values	F3 key assign disabled 1 value 2 values
99.34	15	F3 destination address
99.35	632	F3 destination parameter
99.36	1	F3 destination value #1
99.37	0	F3 destination value #2

Hint: The above example allows only 2 values to be written to the specified parameter. However, if you wish to write more values to a parameter (maximum of 6), you could set up the F2 and F3 function keys in the same way as F1

Once the F1 parameters have been configured, the first time you push the F1 button, a "one" will be sent to drive 15, parameter #06.30. Being the sequencing bit zero, this should start the drive. The next time you push the F1 button, a "zero" will be sent which should stop the drive. This toggling action will operate ad infinitum. Unfortunately, there is no way to tell which value goes next.

NOTE

The value that the drive displays after the function key has been pressed depends on the value(s) that are being sent and the format of the drive parameter. The table below shows how to set up the function key values correctly:

Parameter format	Keypad value	Value indicated on drive
n.nn	215 2150 5	2.15 21.50 0.05
n.n	215 2150 5	21.5 215.0 0.5
nnnn	215 2150 5	215 2150 5

3.5 Human – machine interface lines

Human-machine Interface lines, referred hereafter as HMI lines, are custom parametric displays that appear after 10 seconds of keypad inactivity or when the user presses the Right and M keys simultaneously. Figure 3.1 below shows a couple of representative HMI lines that might be used in a winder system. This is a dynamic display - the roll diameter and line speed are being measured and calculated about five times a second.

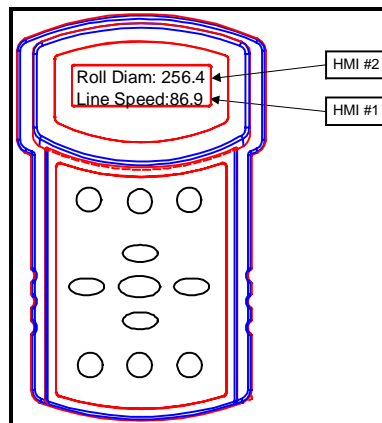


Figure 3.1 Typical HMI Line Display

A HMI line consists of a drive parameter that is read, a scaling calculation, a custom string and some formatting. Seven local menu 99 parameters are required to set up a HMI line. The top HMI line is called HMI #2 while the bottom HMI line is called HMI #1.

HMI lines start displaying after ten seconds of keypad inactivity. Striking certain editing keys (right and left arrows and the M button) cancels the HMI displays and reverts to the BROWSE or MODIFY mode you were

in. The Function keys, UP and DOWN and the run, stop/reset and direction keys will not cancel the HMI display.

Each HMI line displays a value based on a calculation:

$$\text{Value} = \text{Parameter} * \text{Scale} + \text{Offset}$$

This is useful if you want to convert a drive parameter from one unit to another and display the new unit value on the keypad.

3.5.1 HMI Example 1

Assume for the moment that the Roll diameter is defined by the following equation:

$$\text{Roll_diameter} = \#01.21 * 3.525 + 1.217$$

Where: #01.21 = Drive 35, Menu 1, Parameter 21

We'll need a display text string where we've left some room for the digits (digits start at position 11 in the text string and are formatted below as **XXX.X**):

Char	R	o	l	l		D	i	a	m	:		2	5	6	.	4
Pos	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Thus, we'd like to display the calculated value with a field width of 5 and one digit to the right of the decimal point.

Roll Diam: 256.4

Assuming the drive serial address is 11, the parameters required to setup the bottom HMI #1 line are shown in the table below. You will need to set parameter **99.09** to the appropriate address if this is not the case.

HMI Line #1 Setup Parameters (bottom line)		
Setup parameter	Value	Description
99.09	11	HMI1 source address Note: zero disables the HMI line
99.10	118	HMI1 source menu/parameter e.g. 118 means menu 01, parameter 18
99.11	3865	HMI1 scale (x1000 motif) e.g. 3865 means multiply value in 118 by 3.865
99.12	16	HMI1 offset (x1000 motif) e.g. 16 means .016
99.13	Line Speed:	HMI1 text string
99.14	11	HMI1 value starting position (0 .. 15)
99.15	41	HMI1 value format width / decimal places e.g. width = 4, 1 decimal place
Note: set parameter 1.18 to 22.5 to get the result shown in Figure 3.1		

The only unusual feature in the HMI setup is the string entry. Whenever you scroll to parameter **99.13** (or parameter **99.20** for HMI line #2), the top LCD display line is erased and the entire 16-character string is presented. If you enter **MODIFY** mode, the **LEFT** and **RIGHT ARROW** buttons move the cursor to adjoining characters while the **UP** and **DOWN ARROWS** scroll the character at the cursor position through all the printable ASCII characters.

Assuming the drive serial address is 11, the parameters required to setup the top HMI #2 line are shown in the table below. You will need to set parameter **99.16** to the appropriate address if this is not the case.

HMI Line #2 Setup Parameters (top line)		
Setup parameter	Value	Description
99.16	11	HMI2 source address Note: zero disables the HMI line
99.17	121	HMI2 source menu/parameter e.g. 121 means menu 01, parameter 21
99.18	3525	HMI2 scale (x1000 motif) e.g. 3525 means multiply value in 121 by 3525
99.19	1217	HMI2 offset (x1000 motif) e.g. 1217 means 1.217
99.20	Roll Diam:	HMI2 text string
99.21	11	HMI2 value starting position (0 .. 15)
99.22	51	HMI2 value format width / decimal places e.g. width = 5, 1 decimal place
Note: set parameter 1.21 to 72.4 to get the result shown in Figure 3.1		

3.5.2 HMI Example 2

Assume you want to display the motor speed from a drive. To get a true reflection of the speed you would need to set the parameters shown in the table below. If the drive serial address is not 11 then set parameter **99.09** appropriately.

HMI Line #1 Setup Parameters (bottom line)		
Setup parameter	Value	Description
99.09	11	HMI1 source address Note: zero disables the HMI line
99.10	504	HMI1 source menu/parameter e.g. 504 means menu 05, parameter 04
99.11	1000	HMI1 scale (x1000 motif) e.g. 1000 means multiply value in 504 by 1
99.12	0	HMI1 offset (x1000 motif) e.g. 0 means no offset
99.13	Motor Spd:	HMI1 text string
99.14	11	HMI1 value starting position (0 .. 15)
99.15	50	HMI1 value format width / decimal places e.g. width = 5, 0 decimal place

Setting the HMI scale (**99.11**) to 1000 and HMI offset (**99.12**) to zero will ensure that the value of parameter 5.04 in the drive is the value that will

be displayed on the keypad. If you enter a value of zero into **99.11** the value displayed will be the same as the value specified in **99.12**.

Parameters **99.13** and **99.20** can contain any character from the following character set:

Dec	Chr	Dec	Chr	Dec	Chr	Dec	Chr	Dec	Chr	Dec	Chr
32	[space]	48	0	64	@	80	P	96	`	112	p
33	!	49	1	65	A	81	Q	97	a	113	q
34	"	50	2	66	B	82	R	98	b	114	r
35	#	51	3	67	C	83	S	99	c	115	s
36	\$	52	4	68	D	84	T	100	d	116	t
37	%	53	5	69	E	85	U	101	e	117	u
38	&	54	6	70	F	86	V	102	f	118	v
39	'	55	7	71	G	87	W	103	g	119	w
40	(	56	8	72	H	88	X	104	h	120	x
41	)	57	9	73	I	89	Y	105	i	121	y
42	*	58	:	74	J	90	Z	106	j	122	z
43	+	59	;	75	K	91	[	107	k	123	{
44	,	60	<	76	L	92	\	108	l	124	|
45	-	61	=	77	M	93	]	109	m	125	}
46	.	62	>	78	N	94	^	110	n	126	~
47	/	63	?	79	O	95	_	111	o		

The display scrolls through the characters in the order shown above.

Setting the HMI value format field to zero will cancel the HMI numeric display but will leave the string on the LCD line. This is a handy way to create a label for the function keys (use HMI1 to do this). Setting the HMI source address parameter to zero will cancel the entire HMI line.

3.5.3 HMI Increment

The top line's value can be incremented and decremented by the **UP** and **DOWN** arrows while the HMI display is on-screen. This feature is controlled by three local menu 99 parameters (see Appendix A).

The increment value (**99.41**) determines the amount added to or subtracted from the display when the **UP** and **DOWN** arrow is struck. Entering a zero in parameter **99.41** effectively disables the user edit feature and the **UP** and **DOWN** arrows will be rendered inoperative. The feature works by solving the scaling equation for the original parameter value given the modified display value and the scaling constants. If a value is set in parameter **99.46** then this value will be the increment/decrement value after approximately 4 seconds of auto-repeat of the **UP** or **DOWN** arrow keys.

The user may specify a range of operation for this feature by providing an upper and lower limit in parameters **99.42** and **99.43** respectively.

3.5.4 HMI Increment example

Assume the keypad needs to increment and decrement a preset speed within 50% of a given value. Set the HMI to display the relevant text and parameter (e.g. 1.21) as explained in the previous examples.

The Unidrive is set in Open Loop mode, and the value we are basing the settings on is 25 Hz. Therefore our upper limit will be 37.5 and our lower limit will be 12.5. Set the keypad parameters as shown in the table below:

Setup parameter	Value	Description
99.41	100	HMI2 increment (x1000 motif) 100 = 0.10 Note: zero disables the increment feature
99.42	375	HMI2 Upper limit (x10 motif) 375 = 37.5 Hz
99.43	125	HMI2 Lower limit (x10 motif) 125 = 12.5 Hz
99.46	1000	HMI2 increment2 1000 = 1 Hz

Pressing the UP or DOWN key when the HMI line is displayed will result in an increase or decrease by 0.1 in the value displayed. If the auto-repeat feature is active for approximately 4 seconds the displayed value will start increasing or decreasing by 1.

The keypad will not allow a value of greater than 37.5 Hz or less than 12.5 Hz to be reached. It will stop at these values.

If the value of the parameter is initially lower than the Lower Limit then using the UP button will increment normally. If the DOWN key is pressed at any time while the parameter value is less the Lower Limit then the display will jump to the Lower Limit value

NOTE

Care must be taken when setting up the HMI increments.

The calculation used for the HMI value may mean that the UP key appears not to work but the DOWN key does.

e.g. Assume the target parameter is Unidrive #5.07. This parameter has two decimal places on the drive (x100 format)

$$\#5.07 = \frac{\text{increment} - \text{offset}}{\text{scale}} = \frac{.005 - 0}{1.0} = 0.005$$

Assuming a value in the drive of 1.00, the keypad will display 1.00 also.

Pressing the DOWN key will cause 0.005 to be subtracted from the value in the keypad giving 0.995. This is then sent to the drive. Because #5.07 has only 2 decimal places the value is truncated (0.99) and read back from the drive so both drive and keypad display 0.99.

Pressing the UP key will cause 0.005 to be added to the value in the keypad giving 1.005. This is then sent to the drive. Because #5.07 has only 2 decimal places the value is truncated (1.00) and read back from the drive so both drive and keypad display 1.00 giving the impression that nothing has happened.

Adhere to the following rule and you should not encounter any problems:

increment – offset = value

Scale

x1 parameters (no decimal places)	value must be >= 1
x10 parameters (1 decimal places)	value must be >= 0.1
x100 parameters (2 decimal places)	value must be >= 0.01
x1000 parameters (3 decimal places)	value must be >= 0.001

3.6 Unidrive AutoStart with the Keypad

The following set-up and associated UD70 DPL code, allow the Universal Keypad and the Unidrive to be used in Power Down Dependant Auto Start mode. The Universal Keypad is also used to control the speed of the Unidrive and also displays frequency reference applied and the actual speed of the motor.

This set-up requires a UD70 large option module to be fitted to the Unidrive with the following DPL program loaded.

```
Initial {
#6.30 = #20.21 // drive running
#6.32 = #20.22 // direction
}

Background {
top:

#20.21 = #6.30
#20.22 = #6.32

goto top: // main background loop
}
```

The following parameter lists need to be entered in to the Unidrive and Universal Keypad.

Unidrive Parameter set-up

Parameter	Description	Value
01.14	Reference Selector	3
06.04	Sequencing Mode	3
08.16	Digital Input/Output F3 Source/Destination	0
08.19	Digital Input F4 Destination	0
08.21	Digital Input F5 Destination	0
17.20	Non-volatile Data Power Down Save	1

Universal Keypad Parameter Set-up

Parameter	Description	Value
9904	Baud Rate	4800
9909	HMI 1 Source Address	11
9910	HMI 1 Source Parameter	504
9913	HMI 1 Text String	<i>Speed: rpm</i>
9914	HMI 1 Value Position	7
9915	HMI 1 Value Format	50
9916	HMI 2 Source Address	11
9917	HMI 2 Source Parameter	121
9920	HMI 2 Text String	<i>Freq.: Hz</i>
9921	HMI 2 Value Position	9
9941	HMI 2 Increment	500
9942	HMI 2 Upper Limit	50000
9943	HMI 2 Lower Limit	0

The Run, Stop and Reverse buttons on the Universal Keypad can be used, when the Unidrive is powered up, to control the Unidrive. The Drive remembers at power up whether the Drive was running and which direction it was running when the power was removed. The Drive does not remember the speed at which it was running when the power was removed. The speed at which the Unidrive is required to run at should be entered in parameter **01.21** and a parameter save performed. If it is required that the Drive should continue to run at the last applied reference, the following DPL program should be loaded into the UD70 Applications module.

```
Initial {  
#6.30 = #20.21 // drive running  
#6.32 = #20.22 // direction
```

```

#1.21 = #20.23 // frequency reference
}

Background {
top:

#20.21 = #6.30
#20.22 = #6.32
#20.23 = #1.21

goto top: // main background loop
}

```

The speed can be adjusted by the up and down arrow keys on the Universal Keypad, but only when the HMI text strings are present on the display. The text strings are displayed after approximately 10 seconds when no buttons have been pressed on the Universal Keypad.



CAUTION

Unlike using the UD71 Basic Serial Communications large option module, the drive will not trip SCL if RS485 communication is lost between the UD70 and the Universal Keypad.

3.7 Notification of Drive Trips

The Universal Keypad monitors the “drive healthy” parameter once a second. If the drive trips, the bottom LCD line displays “**Drive Tripped**” for approximately one second followed by a one second display of the nature of the trip. The display will then revert to showing the parameter and it’s value as normal. This “**Drive Tripped**” indicator will show every ten seconds for as long as the drive is in the tripped state.

The trip is cleared by hitting the **Stop/Reset** button.

3.8 Auto-Restart

The Universal Keypad provides a rudimentary Auto-Restart feature. If the auto-restart parameter **#99.47** is set to a one, the Keypad will attempt to restart the drive if communications was interrupted or power was lost while the drive was running. It is assumed that the control keys are enabled (**#99.05 = Enable**) and the drive is configured to permit the Universal Keypad’s RUN and STOP buttons to operate the drive.

When the Universal Keypad commands the drive to start, this fact is remembered in the onboard non-volatile storage. If power is interrupted, the start command will be re-submitted when power is restored only if the Keypad had previously commanded the drive to start.

Appendix A Local Menu 99

The Universal Keypad has an onboard non-volatile memory that is used to save/restore the local set-up menu 99. This local menu works exactly like the drive menus except that no serial communications are involved in accessing this menu. When the keypad arrives from the factory, the local menu 99 will be set to standard factory defaults (4800 baud, drive 11, etc.). If you make changes to menu 99, you can save these changes in non-volatile memory so that these settings are automatically restored when you power up the Universal Keypad.

See below for Menu 99 usage:

<p>#99.00 Save/Restore Local parameters</p> <p>1000 = save Menu 99 in serial EEROM 1244 = restore Menu 99 defaults 1255 = restore Menu 99 from serial EEROM</p> <p>Default: 0</p> <p>Note : Activate the action by pressing the STOP/RESET button</p>																		
<p>#99.01 Destination Node Address</p> <p>nn = EIA-RS485 serial address of the drive you wish to query (11..99)</p> <p>Default: 11</p> <p>Note: Using the shortcut of simultaneously pressing the LEFT and RIGHT arrow keys in BROWSE mode allows you to directly enter this parameter Exiting modify mode in this parameter will execute a 'reconnection' to the drive.</p>																		
<p>#99.02 Drive Type (read-only)</p> <p>nn = drive model, operational mode and coprocessor</p> <table><tr><td>0 = No Drive</td><td>6 = Uni CI UD70</td><td>12 = Mentor</td></tr><tr><td>1 = Uni Open</td><td>7 = Uni Sv UD70</td><td>13 = Mentor MD29</td></tr><tr><td>2 = Uni Closed</td><td>8 = Uni Rg UD70</td><td>14 = Cmdr SE Mot1</td></tr><tr><td>3 = Uni Servo</td><td>9 = Uni VTC</td><td>15 = Cmdr SE Mot2</td></tr><tr><td>4 = Uni Regen</td><td>10 = Uni Vt UD70</td><td></td></tr><tr><td>5 = Uni Op UD70</td><td>11 = UnidriveGP</td><td></td></tr></table>	0 = No Drive	6 = Uni CI UD70	12 = Mentor	1 = Uni Open	7 = Uni Sv UD70	13 = Mentor MD29	2 = Uni Closed	8 = Uni Rg UD70	14 = Cmdr SE Mot1	3 = Uni Servo	9 = Uni VTC	15 = Cmdr SE Mot2	4 = Uni Regen	10 = Uni Vt UD70		5 = Uni Op UD70	11 = UnidriveGP	
0 = No Drive	6 = Uni CI UD70	12 = Mentor																
1 = Uni Open	7 = Uni Sv UD70	13 = Mentor MD29																
2 = Uni Closed	8 = Uni Rg UD70	14 = Cmdr SE Mot1																
3 = Uni Servo	9 = Uni VTC	15 = Cmdr SE Mot2																
4 = Uni Regen	10 = Uni Vt UD70																	
5 = Uni Op UD70	11 = UnidriveGP																	

<p>#99.03 Keypad Address</p> <p>nn = EIA-RS485 serial address of the keypad (11..99)</p> <p>Default: 99</p>
<p>#99.04 Keypad Baud Rate</p> <p>0 = 4800, 1 = 9600, 2 = 19200, 3 = 38400</p> <p>Default: 9600</p>
<p>#99.05 Control Keys (Run, Stop/Reset and Direction)</p> <p>0 = Disable 1 = Enable</p> <p>Default: Disable</p>
<p>#99.09 HMI Display #1 Source Address</p> <p>nnn = network address of desired parameter</p> <p>Default: 0</p> <p>Note: 11 .. 99 for RS485 systems Hint: zero suppresses this HMI line</p>
<p>#99.10 HMI Display #1 Source Parameter</p> <p>mmp = menu/parameter of the desired parameter for this display. (e.g. 1224 refers to menu 12, parameter 24)</p> <p>Default: 121</p>
<p>#99.11 HMI Display #1 Scale factor</p> <p>nnnn = scale factor in x1000 motif (e.g. 24629 means 24.629)</p> <p>Default: 1000</p>

#99.12 HMI Display #1 Offset

nnnn = offset in x1000 motif
(e.g. 1206 means 1.206)

Default: 0

#99.13 HMI Display #1 Display String

TAPER = % (16 chars max)

Default: Roll Dia:

Note: Modifying this parameter brings up the new Label maker System

The LEFT and RIGHT arrows position the LCD cursor.

The UP and DOWN arrows scroll through the alphabet.

Leave some blank spaces to display the parameter value

#99.14 HMI Display #1 Numeric Value Location

nn = starting cursor position for numeric value (0 .. 15)

Default: 11

#99.15 HMI Display #1 Numeric Value Format

wd = width, decimal places

w = 0 .. 8 (field width); d = 0 .. 3 (# digits to right of decimal place)

e.g. to display a value in the format 123.45 use the format specifier 62

Default: 41

#99.16 HMI Display #2 Source Address

nnn = network address of desired parameter

Default: 0

Note: 11 .. 99 for RS485 systems

Hint: zero suppresses this HMI line

#99.17 HMI Display #2 Source Parameter

mmp = menu/parameter of the desired parameter for this display.
(e.g. 1224 refers to menu 12, parameter 24)

Default: 118

#99.18 HMI Display #2 Scale factor

nnnn = scale factor in x1000 motif
(e.g. 24629 means 24.629)

Default: 1000

#99.19 HMI Display #2 Offset

nnnn = offset in x1000 motif
(e.g. 1206 means 1.206)

Default: 0

#99.20 HMI Display #2 Display String

TAPER = % (16 chars max)

Default: Line Speed:

Note: Modifying this parameter brings up the new Label maker System

The LEFT and RIGHT arrows position the LCD cursor.

The UP and DOWN arrows scroll through the alphabet.

Note: Leave some blank spaces to display the parameter value

#99.21 HMI Display #2 Numeric Value Location

nn = starting cursor position for numeric value (0 .. 15)

Default: 11

#99.22 HMI Display #2 Numeric Value Format

wd = width, decimal places

w = 0 .. 8 (field width); d = 0 .. 3 (# digits to right of decimal place)

e.g. to display a value in the format 123.45 use the format specifier 62

Default: 41

<p>#99.23 F1 Key Assignment</p> <p>Disabled, 1 value, 2 values</p> <p>Default: Disabled</p>
<p>#99.24 F1 Destination Address</p> <p>nnn = network address of the destination parameter (11 .. 99 for RS485 systems)</p> <p>Default: 11</p>
<p>#99.25 F1 Destination Menu / Parameter</p> <p>mmpp = menu / parameter of the destination parameter. (e.g. 1224 refers to menu 12, parameter 24)</p> <p>Default: 0</p>
<p>#99.26 F1 Destination Value 1</p> <p>nnnnnn = value</p> <p>Default: 0</p>
<p>#99.27 F1 Destination Value 2</p> <p>nnnnnn = value</p> <p>Default: 1</p>
<p>#99.28 F2 Key Assignment</p> <p>Disabled, 1 value, 2 values</p> <p>Default: Disabled</p>
<p>#99.29 F2 Destination Address</p> <p>nnn = network address of the destination parameter (11 .. 99 for RS485 systems)</p> <p>Default: 11</p>

<p>#99.30 F2 Destination Menu / Parameter</p> <p>mmp = menu / parameter of the destination parameter. (e.g. 1224 refers to menu 12, parameter 24)</p> <p>Default: 0</p>
<p>#99.31 F2 Destination Value 1</p> <p>nnnnn = value</p> <p>Default: 0</p>
<p>#99.32 F2 Destination Value 2</p> <p>nnnnn = value</p> <p>Default: 1</p>
<p>#99.33 F3 Key Assignment</p> <p>Disabled, 1 value, 2 values</p> <p>Default: Disabled</p>
<p>#99.34 F3 Destination Address</p> <p>nnn = network address of the destination parameter (11 .. 99 for RS485 systems)</p> <p>Default: 11</p>
<p>#99.35 F3 Destination Menu / Parameter</p> <p>mmp = menu / parameter of the destination parameter. (e.g. 1224 refers to menu 12, parameter 24)</p> <p>Default: 0</p>
<p>#99.36 F3 Destination Value 1</p> <p>nnnnn = value</p> <p>Default: 0</p>

<p>#99.37 F3 Destination Value 2</p> <p>nnnnnn = value Default: 1</p>
<p>#99.40 Software version</p> <p>nnnnn = software revision number hard coded in the Keypad's EPROM e.g. 10105 = Software version 01.01.05</p>
<p>#99.41 HMI #2 Increment Value</p> <p>nnnnnn = increment value for HMI #2 display field (x1000 motif) (e.g. 1500 = 1.5 added/subtracted from display each time UP ARROW or DOWN ARROW is struck)</p> <p>Default: 0</p> <p>Note: entering a zero value disables this feature</p>
<p>#99.42 HMI #2 Increment Upper Limit</p> <p>nnnnnn = max value for HMI #2 display field (x10 motif) (e.g. 800 = 80.0 (Increment button cannot exceed this))</p> <p>Default: 999999</p>
<p>#99.43 HMI #2 Decrement Lower Limit</p> <p>nnnnnn = min value for HMI #2 display field (x10 motif) (e.g. 500 = 50.0 (Decrement button cannot exceed this))</p> <p>Default: -999999</p>
<p>#99.44 Password</p> <p>nnnnn = user-entered password (digits)</p> <p>Default: 0</p>
<p>#99.45 Power-on Display Parameter</p> <p>mmpp = parameter to be displayed after power-up (e.g. 1224 refers to menu 12, parameter 24)</p> <p>Default: 10 (menu zero, parameter 10)</p>

#99.46 HMI2 Alternate Increment Value

nnnnnn = second increment value for HMI #2 display field (x1000 motif)
This value is used after ten seconds of auto-repeat.
(e.g. 4500 = 4.5 added/subtracted from display)

Default: 0

Note: entering a zero value disables this feature

#99.47 Auto-Restart Enable

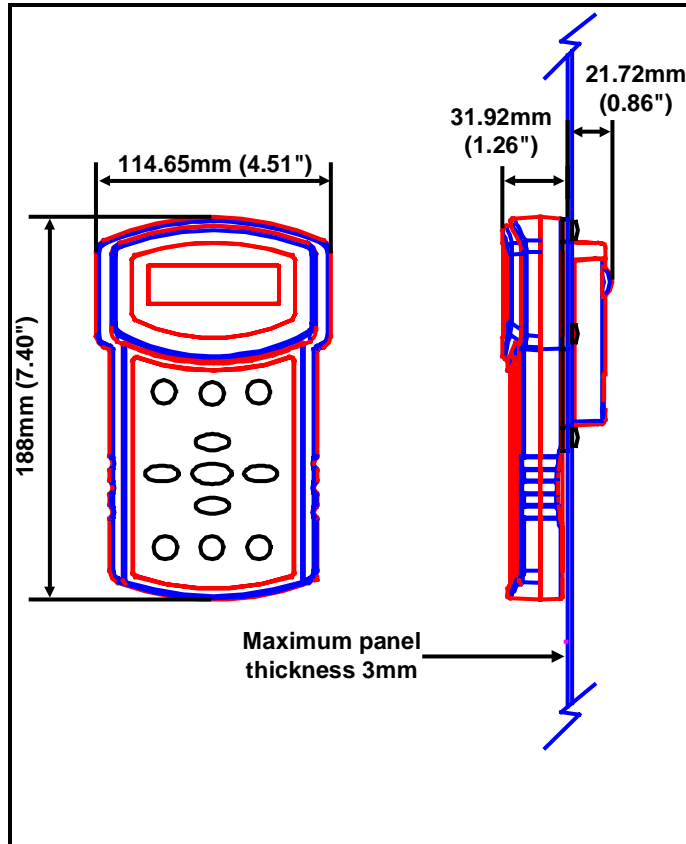
0 = disabled
1 = enabled

Note: Keypad Control Keys must be enabled (#99.05 = enabled).
The Keypad will resubmit the START command after the power-fail only if it previously commanded the drive to start.

Default: 0 (disabled)

Appendix B Keypad Dimensions

B.1 Front and Side view dimensions



Appendix C UL Listing Information

These devices are for use in the secondary of a Class 2 circuit, or for use only with Drive Models as shown below when additionally fitted with a Listed Current limiting type fuse rated max 1A on the supply input to the device:

- Unidrive size 1,2,3,4 and 5 Drives
- Mentor II Drives
- Commander SE size 1 Drives

UL enclosure Type 1.