

Remote Keypad

User's Manual



INDEX

1	INTRODUCTION	2
2	SPECIFICATIONS	2
3	ENVIRONMENTAL SPECIFICATIONS	3
4	DIMENSION DRAWINGS	3
5	ORDERING INFORMATION	4
6	CONNECTIONS	4
7	INTERFACE ADAPTERS	6
8	PANEL MOUNTING.....	7
9	OPERATIONS	7
9.1	BEYOND LEGACY DISPLAY LIMITATIONS	8
9.2	RUN SIGNALLING LED	8
9.3	MENU LOC (local parameters)	8
9.4	MENU FLB (fieldbus parameters)	9
9.5	EXTENSION OF MENU APP	11
9.6	ADDITIONAL CUSTOM KEYS AND LEDS	12

1 INTRODUCTION

The 374T000600V is a remotable display/keypad for OPD EXP and mini-OPD EXP drives.

The reliable RS485 industrial standard interface allow the keypad to be remotated up to several hundred meters.

It implements a **Modbus RTU protocol and behaves like a master on the RS485 bus** with the possibility to connect to several slave drives selecting the active drive (one at a time) by node address and bitrate.

The operator interface is the same available on the display/keypad integrated into the drive and extended to manage the unique features, like the additional function keys and signalling leds or the built in storage memory for drive's parameter recipes and firmware (under development).

A brand new menù, LOC, is provided to manage LOCAl (keypad) parameters and functions.

Also, the original operator interface has been updated in order to manage the new FLB menù, to access to FieLdBus parameters, and the APP menù now allows access to up 500 words of application's extended parameters (from E.100 up to E.599).

Optional interface adapter can be used in order to save the main RS485 interface of the drive (that then can be used to connect with a controller for process automation or to a PC for configuring and monitoring by OPDExplorer). In this case the connection between drive and remote keypad is limited just to point-to-point (not multidrop).

2 SPECIFICATIONS

Power supply

Voltage	5 ÷ 30 Vdc (reversed polarity protected) to dedicated 3-poles connector on the back side
Current	< 200 mA (overall power supply < 1000 mW for any voltage within the range)

Communication

Data link interface	RS-485, half duplex, DB9 male connector on back side with OPD EXP / mini-OPD EXP standard pinout for direct "short" connection, inside polarization-termination network available on connector for multidrop and/or "long" connection
Data link protocol	Modbus RTU 8N1, master
Connection capabilities	point-to-point or point-to-multipoint (multidrop) up to 128 devices with slave address and bitrate selection (from 19.2 up to 115.2 kbps)

Standard operator interface

Display	7 segment, 5 digits + sign (red)
Standard keys	3 keys: select, increase, reduce
Standard indicators	RUN led (green)
Access to fieldbus parameters	by FLB menù, for Profibus and AnyBus configuration, status and data mapping
Access to application extended parameters	by extension of APP menù (parameters E100 up to E599)
Remote keypad management	by LOC menù, for configuration parameters and functions

Custom/extended operator interface (available for direct management by drive's application)

Application custom keys	3 keys
Application custom indicators	4 + 2 leds (3 yellow, 2 green, 1 red)

Advanced features

Non Volatile storage memory	flash type, 2 MByte
NV memory functions	<ul style="list-style-type: none"> • save/load local configuration parameters • upload/download of drive parameter recipes (under development) • upload/download of drive firmware Core and Application (under development) • access to the stored data from PC via RS485 interface (under development)

3 ENVIRONMENTAL SPECIFICATIONS

Operating temperature: -10 ÷ 50 °C

Storage temperature: -20 ÷ 70 °C

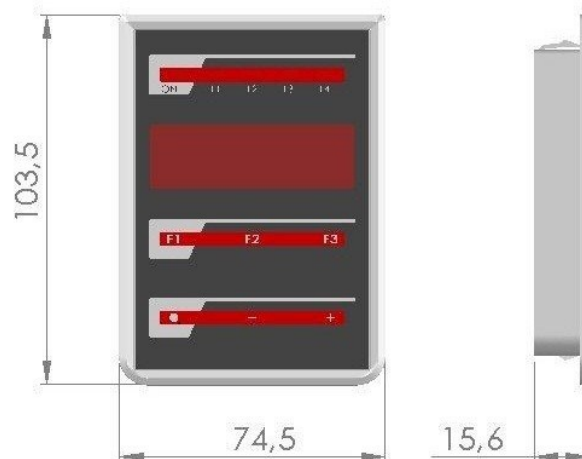
Relative humidity: 10% ÷ 90% non condensing

Shock (operation): 10 to 25 Hz (X, Y, Z direction 2G 30 minutes)

CE/FCC: complies with EN 61000-4-4, EN 61000-6

Plastic enclosure case meets protection degree IP40. Front panel is already IP64 compliant then, when mounted on panel, sealing gasket can be used to enhance the protection degree of overall installation up to IP64.

4 DIMENSION DRAWINGS

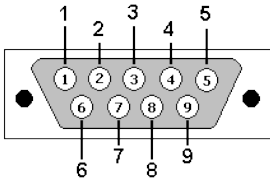


5 ORDERING INFORMATION

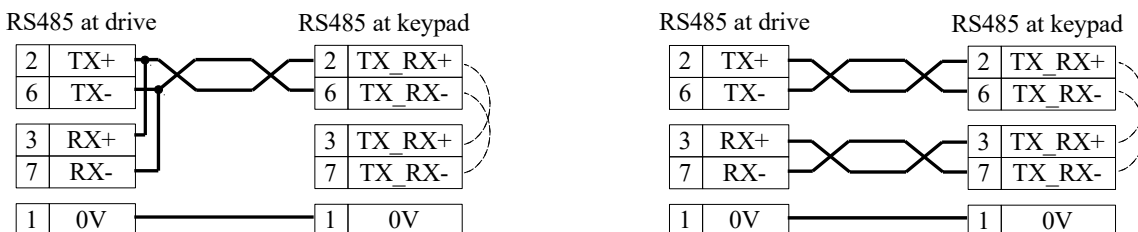
374T000600V	remote keypad + 1.8m serial cable (DB9F-DB9M)
374I00100V	external adapter for OPD EXP remote keypad interface (to free drive's main RS485 interface)
374I00090V	dummy keypad board adapter for mini-OPD EXP (to free drive's main RS485 interface)
1KT4T0006A1	panel mounting kit (stirrup and screws for steady mounting on switchboard front panel, gasket for IP65 sealing)

6 CONNECTIONS

CN1 is the data link connector: a DB9 male connector that hosts the RS485 signals with a pinout compatible with OPD EXP and mini-OPD EXP RS485 interface for direct connection using a 1-to-1 serial cable.

CN1	Pin #	Name	Description
	1	0V	signal reference voltage
	2	TX_RX +	RS485 half duplex non inverting signal (Tx / Rx) 2 -3 internally shorted
	3	TX_RX +	
	4		
	5	Term +	positive polarization/termination
	6	TX_RX -	RS485 half duplex inverting signal (Tx / Rx) 6 – 7 internally shorted
	7	TX_RX -	
	8		
	9	Term -	negative polarization/termination

Please notice that the **remote keypad RS485 interface is HALF DUPLEX** so only 3 wires/signals (TX_RX+, TX_RX-, 0V) can be connected between devices. Pins 2 and 3 are internally shortened and so also pins 6 and 7. In order to successfully communicate with OPD EXP or mini-OPD EXP, that have FULL DUPLEX RS485 interface, you have to shorten the same pins also at drive side or connect both pins 2, 3 and 6, 7 (the supplied serial cable use the latter).



The first cabling scheme is always recommended and it is mandatory in case of “long” and/or multidrop connection.

For “long” and/or multidrop connection is also mandatory to **connect the polarization/termination networks both on the first and last device on the bus** chain: to do so, the pin 5 have to be tied with pin 2 (2 and 3 if the device is a drive) and the pin 9 have to be tied with pin 6 (6 and 7 if the device is a drive).

Shielded cable with twisted pairs (min AWG 22) is also recommended

To enhance EMI noise immunity, when remote keypad is used with mini-OPD EXP, it is also recommended to connect the communication cable shield to ground using the PE bar of the drive.



Also some level of noise reduction can be achieved using a ferrite core (like FairRite 0431178281)



or, better, winding some turns of cable on toroid (like Vacuumshmelze W516-03).



CN2 is the power supply connector.

CN1	Pin #	Name	Description
	1	0V	supply voltage reference
	2	+V	positive supply voltage
	3	PE	ground

Supply voltage has very wide input range (see specifications) and the keypad is protected against polarity reversal. The builtin DC-DC regulator (switching type) assures high efficiency and almost constant power consumption over the whole voltage range.

Please notice that **THERE IS NOT ISOLATION between power supply and the RS485 interface**, so take care during installation to avoid voltage contentions and ground loops.



7 INTERFACE ADAPTERS

The remote keypad was originally developed to directly connect to the RS485 interface (DB9F) available both on OPD EXP and mini-OPD EXP, either in point-to-point or multipoint configuration. Usually the RS485 interface of the drive is also used for connection to a PC and OPD Explorer configurator/monitor utility in order to easily execute parametrization and commissioning. Sometimes the RS485 interface is also used as main system fieldbus to connect to an automation controller (where more powerful fieldbus is not required or the tradeoff between performances and cost is anyway satisfied).

In these cases, the main RS485 of the drive can't be used anymore to connect the remote keypad as there can be only one active Modbus master present on the bus (in order to avoid bus contentions).

The remote keypad can be configured (by param) to be "idle" (not active) on the bus, so it is possible to physically connect the keypad and another master device on the same bus without conflicts but this setting is intended to be temporary: i.e. to connect with OPD Explorer just the time to commissioning the slaves, then disconnecting the PC with OPD Explorer and re-enabling the remote keypad.

For all other cases, where the remote keypad had to be permanently operative while the RS485 of the drives is used by another master, the only solution is to use a different interface: for OPD EXP and mini-OPD EXP are optionally available specific **interface adapters that add a 2nd RS485 interface to the drive**.



For mini-OPD EXP it is a "dummy keypad" board that have to be mounted replacing the standard integrated keypad (so there will be no more integrated keypad on the drive: there is just a single led to signal that the drive has power supply). Insertion and removing of internal keypad and dummy keypad have to be done only when drive is power off.



For OPD EXP it is an external adapter that connects to the “remote keypad” interface in the front panel of the drive (the integrated keypad is switched off when the adapter is inserted: only one segment will remain lit up to signal that the drive has power supply).

The external adapter can be plugged/unplugged when the drive is power on.

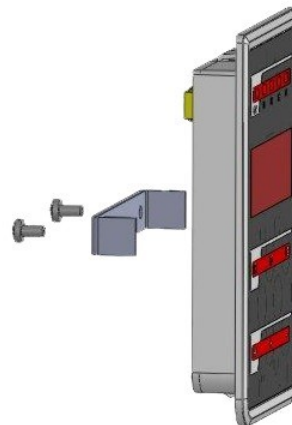
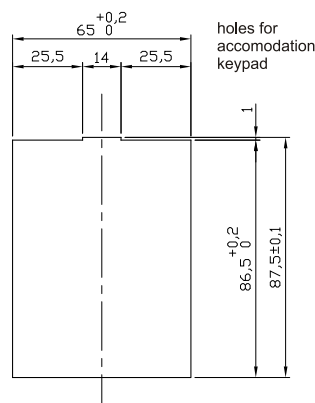
In both cases the adapter adds a new RS485 interface, half duplex, with DB9F connector, suitable for a direct connection to a remote keypad.

Please notice that the **added interface has constant (non changeable) slave address (1) and bitrate (38.4kbps)** and it is not isolated from the drive regulation board, so are possible only short point-to-point (no multidrop) connections. Of course, the 2nd RS485 interface can be used also to connect to a different master: you can for example connect an automation controller on the main interface and use 2nd interface to connect to OPD Explorer for commissioning (keep in mind address and bitrate limitation).

8 PANEL MOUNTING

Follow these steps to mount the remote keypad on a switchboard front panel, using the optional kit:

1. remove the 2 screws from the backside of remote keypad
2. apply the sealing gasket to the channel presents along the side of the keypad frame
3. position the remote keypad on the panel
4. apply the stirrup to the backside of remote keypad securing it by the supplied screws
5. fasten the remote keypad to the panel using the screws on the wings of the stirrup till the sealing gasket is fully pressed between keypad frame and panel



9 OPERATIONS

At power on all digit segments and signalling leds are briefly lit up to for checking. Then the remote keypad try to communicate with the selected slave at the selected bitrate: if the slave replies the display show $\square OIII\Delta$ ” during the downloading of format tables and then the keypad goes “on-line” allowing access to the remote drive.

The Operator Interface is almost the same available by the keypad integrated into the OPD EXP or mini-OPD EXP drives, with same menus and navigation/editation key sequences and combinations (please refer to the drive User Manual for further information about the standard operator interface).

Note that the operator Interface of the drive is available only when there is communication between remote keypad and the drive.

If the physical connection is broken or the drive is powered off or Modbus node address and bitrate are mismatched then the keypad can't successfully communicate with a slave drive and then only the local menu (LOC) is available.

As soon as the communication is re-establish and the remote keypad has completed the download of the format tables (displaying \square OIIA ") all other features of drive operator interface become available. Relevant differences from standard operator interface are described in following sections.

BEYOND LEGACY DISPLAY LIMITATIONS

In the keypad integrated into the drive, for compatibility with the old hardware devices that have only 4 $\frac{3}{4}$ digits, the name of parameters from P100 up to P199 is represented inserting the "P" between the hundreds and the rest of the index: ie P100 is displayed as "1PI00" and P199 is displayed like "1PI99".

The remote keypad has a display with 5 full digits plus sign and doesn't have to grant compatibility with legacy devices so the parameter name representation is more user friendly: now the whole parameter index (either 2 or 3 digits) follows the parameter letter. So, using the same examples as before, P100 is displayed as "PI100" and P199 is displayed as "PI199".

For the same reason, the keypad integrated into the drive can't manage parameters with index greater than 199 (it can't be represented at all) while with the remote keypad can show indexes up to 999. This is useful in the managing of the extension of APP menu with the access to application extra parameters: E100 up to E600.

Again, in the integrated keypad, values greater than "9999" or less than "-9999" can't be displayed so "TOII" and "BOT" are displayed in their place. With remote keypad this limitation is removed and then values up to 99999 and down to -99999 can be displayed.

RUN SIGNALLING LED

The leftmost signalling led (green color), above the display, is provided to indicate the RUN status of the connected drive, as the remote keypad could be far away from the drive or related motor and so this status could be not manifest. This is also useful if the remote keypad is showing one of internal sizes values or a digital input or output status: in this cases the operator interface doesn't automatically come back to the stop/run status displaying (status of rest) but continues to show the selected value and so, again, the run status could be not manifest.

MENU LOC (LOCAL PARAMETERS)

LOC menu refers to parameters and functions related to the remote keypad itself: they are managed locally and normally don't affect the connected drive. They are also saved locally (when applicable) to a **built in Non Volatile Memory (NVM)** in order to keep parametrization when power supply is switched off. LOC menu is always accessible by remote keypad operator interface, even when connection to a slave is missing.

Name	Description	Min	Max	Default	Notes
L.00	slave address to query	0	247	1	0 → BUS IDLE
L.01	bitrate	0	3	0	0 = 19.2kbps, 1 = 38.4kbps, 2 = 57.6kbps, 3 = 115.2kbps
L.02	save to NVM	0	1	0 ⁽¹⁾	
L.03	reload from NVM	0	1	0 ⁽¹⁾	
L.04	load defaults	0	1	0 ⁽¹⁾	
L.05	setup for drive 2nd RS485 interface	0	1	0 ⁽¹⁾	equal to set L.00 = 1, L.01 = 1

Notes: (1) – parameter value auto reverts to 0 and is not saved to NVM

MENU FLB (FIELDBUS PARAMETERS)

FLB menu refers to parameters related to Fieldbuses management that was previously accessible only by OPD Explorer as they weren't associated to any "standard" parameter, connection or extra parameter and so not accessible by keypad. Now they are grouped in this new menu, as listed in following tables, and so they can be viewed and changed (if not read-only) by keypad.

As there are no format tables for these parameter, an arbitrary format was assigned to each parameter based on the use/meaning. For many of them, also, a HEX a decimal representation was chosen to show and edit raw 16bit data value.

Notice that all parameters in FLB menu are not protected by any key nor by run status so they can be changed at any time. Also, be aware that some parameter related to the configuration of fieldbuses take effect only at power on so changes become effective only after saving and cycling the power supply.

Parameters related to configuration of Profibus DP and Anybus CC

Name	OPD Explorer name	OPD Explorer description	Min	Max	Default	UM
F.00	NODE_SLAVE_ADDR	Slave address	0	255	0	
F.01	NODE_BAUD_RATE	Node baudrate	0000	FFFF	0000	HEX
F.02	DATA_CONSISTANCE	Data consistence	0	1	0	
F.03	EN_ACYCLIC_DATA	Enable acyclic data	0	1	1	
F.04	EN_BIG_ENDIAN	Most significant bytes in multi-byte data types	0	1	1	
F.05	PDP_SETUP_DATA	Old Profibus DP setup data	0000	FFFF	0000	HEX
F.06	FLDB_ERROR_CODE	Fieldbus error code	0000	FFFF	⁽¹⁾	HEX
F.07	FLDB_STATE	Fieldbus state	0000	FFFF	⁽¹⁾	HEX

Notes: (1) - read only

Parameters related to configuration of Anybus CC only

Name	OPD Explorer name	OPD Explorer description	Min	Max	Default	UM
F.08	IP_ADDR_00	Anybus IP Address 00	0	255	192	
F.09	IP_ADDR_01	Anybus IP Address 01	0	255	168	
F.10	IP_ADDR_02	Anybus IP Address 02	0	255	0	

F.11	IP_ADDR_03	Anybus IP Address 03	0	255	0	
F.12	SUBNET_MASK_00	Anybus Subnet Mask 00	0	255	255	
F.13	SUBNET_MASK_01	Anybus Subnet Mask 01	0	255	255	
F.14	SUBNET_MASK_02	Anybus Subnet Mask 02	0	255	255	
F.15	SUBNET_MASK_03	Anybus Subnet Mask 03	0	255	0	
F.16	GATEWAY_00	Anybus Gateway 00	0	255	0	
F.17	GATEWAY_01	Anybus Gateway 01	0	255	0	
F.18	GATEWAY_02	Anybus Gateway 02	0	255	0	
F.19	GATEWAY_03	Anybus Gateway 03	0	255	0	
F.20	DHCP	Anybus DHCP	0	1	1	
F.21	ANYBUS_EN	Anybus module enabled	0000	FFFF	(1)	HEX
F.22	ANYBUS_STATE	Anybus module state	0000	FFFF	(1)	HEX

Notes: (1) - read only

Parameters related to data exchange mapping of Profibus DP and Anybus CC

Name	OPD Explorer name	OPD Explorer description	Min	Max	Default	UM
F.23	MAP_ERROR_CODE	Mapping Error Code	0000	FFFF	(1)	HEX
F.24	MAP_ERROR_OBJ	Mapping Error Object	0000	FFFF	(1)	HEX
F.25	RX0_INDEX	Receive Object0 Index	0000	FFFF	0000	HEX
F.26	RX0_SUB_INDEX	Receive Object0 Sub-Index	0000	FFFF	0000	HEX
F.27	RX1_INDEX	Receive Object1 Index	0000	FFFF	0000	HEX
F.28	RX1_SUB_INDEX	Receive Object1 Sub-Index	0000	FFFF	0000	HEX
F.29	RX2_INDEX	Receive Object2 Index	0000	FFFF	0000	HEX
F.30	RX2_SUB_INDEX	Receive Object2 Sub-Index	0000	FFFF	0000	HEX
F.31	RX3_INDEX	Receive Object3 Index	0000	FFFF	0000	HEX
F.32	RX3_SUB_INDEX	Receive Object3 Sub-Index	0000	FFFF	0000	HEX
F.33	RX4_INDEX	Receive Object4 Index	0000	FFFF	0000	HEX
F.34	RX4_SUB_INDEX	Receive Object4 Sub-Index	0000	FFFF	0000	HEX
F.35	RX5_INDEX	Receive Object5 Index	0000	FFFF	0000	HEX
F.36	RX5_SUB_INDEX	Receive Object5 Sub-Index	0000	FFFF	0000	HEX
F.37	RX6_INDEX	Receive Object6 Index	0000	FFFF	0000	HEX
F.38	RX6_SUB_INDEX	Receive Object6 Sub-Index	0000	FFFF	0000	HEX
F.39	RX7_INDEX	Receive Object7 Index	0000	FFFF	0000	HEX
F.40	RX7_SUB_INDEX	Receive Object7 Sub-Index	0000	FFFF	0000	HEX
F.41	RX8_INDEX	Receive Object8 Index	0000	FFFF	0000	HEX
F.42	RX8_SUB_INDEX	Receive Object8 Sub-Index	0000	FFFF	0000	HEX
F.43	RX9_INDEX	Receive Object9 Index	0000	FFFF	0000	HEX
F.44	RX9_SUB_INDEX	Receive Object9 Sub-Index	0000	FFFF	0000	HEX
F.45	TX0_INDEX	Transmit Object0 Index	0000	FFFF	0000	HEX

F.46	TX0_SUB_INDEX	Transmit Object0 Sub-Index	0000	FFFF	0000	HEX
F.47	TX1_INDEX	Transmit Object1 Index	0000	FFFF	0000	HEX
F.48	TX1_SUB_INDEX	Transmit Object1 Sub-Index	0000	FFFF	0000	HEX
F.49	TX2_INDEX	Transmit Object2 Index	0000	FFFF	0000	HEX
F.50	TX2_SUB_INDEX	Transmit Object2 Sub-Index	0000	FFFF	0000	HEX
F.51	TX3_INDEX	Transmit Object3 Index	0000	FFFF	0000	HEX
F.52	TX3_SUB_INDEX	Transmit Object3 Sub-Index	0000	FFFF	0000	HEX
F.53	TX4_INDEX	Transmit Object4 Index	0000	FFFF	0000	HEX
F.54	TX4_SUB_INDEX	Transmit Object4 Sub-Index	0000	FFFF	0000	HEX
F.55	TX5_INDEX	Transmit Object5 Index	0000	FFFF	0000	HEX
F.56	TX5_SUB_INDEX	Transmit Object5 Sub-Index	0000	FFFF	0000	HEX
F.57	TX6_INDEX	Transmit Object6 Index	0000	FFFF	0000	HEX
F.58	TX6_SUB_INDEX	Transmit Object6 Sub-Index	0000	FFFF	0000	HEX
F.59	TX7_INDEX	Transmit Object7 Index	0000	FFFF	0000	HEX
F.60	TX7_SUB_INDEX	Transmit Object7 Sub-Index	0000	FFFF	0000	HEX
F.61	TX8_INDEX	Transmit Object8 Index	0000	FFFF	0000	HEX
F.62	TX8_SUB_INDEX	Transmit Object8 Sub-Index	0000	FFFF	0000	HEX
F.63	TX9_INDEX	Transmit Object9 Index	0000	FFFF	0000	HEX
F.64	TX9_SUB_INDEX	Transmit Object9 Sub-Index	0000	FFFF	0000	HEX

Notes: (1) - read only

EXTENSION OF MENU APP

The menu APP (APPLication parameters) allows access to the parameters that every application defines: parameters from E00 up to E99 that often in the documentation and also in OPD Explorer are referred as parameters from P200 up to P299. That's enough for almost all the applications but some ones need to define more parameters and data. For this purpose the drive supply a specific memory area that till now was accessible only by OPD Explorer.

In the remote keypad the APP menu has been extended in order to allow access to this data: parameters E100 up to E599 now refers to the first 500 16bit words data of application extra parameters.

Often an application need to define 32bit wide values: in this cases the keypad split the value and accesses as 2 separate parameters (each 16bit wide). Conventionally, a 32bit value takes two parameters with sequential indexes, starting from a even index: the parameter with the lower index (even) contains the least significant word while the parameter with higher index (odd) contains the most significant word.

As no format information are available for these extra parameters, all values are represented in HEX a decimal format. Also, for these parameters there is no key or run protection so they can be changed at any time: refer to the application documentation to know if the modified values take action immediately or need a power cycling.

Note that in the range E00 – E99 (application parameters) the remote keypad shows only parameters really existing and managed by the application, while parameters in the range E100 – E599 (application extra parameters) are always present, even if the installed application don't define and use them all or part of.

Menu APP: application parameters

Name	OPD Explorer name	OPD Explorer description	Min	Max	Default	UM
E.00	(1)	(1)	(1)	(1)	(1)	(1)
...	(1)	(1)	(1)	(1)	(1)	(1)
E.99	(1)	(1)	(1)	(1)	(1)	(1)

Notes: (1) – depends on installed application


Menu APP: application extra parameters

Name	OPD Explorer name	OPD Explorer description	Min	Max	Default	UM
E.100	(1)	(1)	0000	FFFF	(1)	HEX
...	(1)	(1)	0000	FFFF	(1)	HEX
E.599	(1)	(1)	0000	FFFF	(1)	HEX

Notes: (1) – depends on installed application

ADDITIONAL CUSTOM KEYS AND LEDS

The remote keypad provide 3 additional keys referred as “F1” to “F3” and 4 additional signalling leds referred as “L1” to “L4” (up to 2 more keys and leds can be added on request).

	<p>The colour of the leds are:</p> <ul style="list-style-type: none"> • L1 – yellow • L2 – yellow • L3 – yellow • L4 – green
---	--

These keys and leds aren't used by the operator interface so no functions and meanings are normally associated with. They are available for direct management by the drive application and so can be assigned to application customized actions and signalling.

The remote keypad simply notify the status of the additional keys to the drive and retrieve the status of the leds from the drive.

Please refer to the installed application documentation for the assigned actions and signalling (if any).



Via dell'Oreficeria, 41
36100 Vicenza - Italy
Tel +39 0444 343555
Fax +39 0444 343509
www.bdfdigital.com