CARLO GAVAZZI
Automation Components

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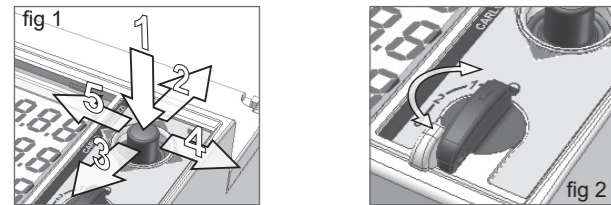Fax +39 0437 355880

PIDIN IM ENG 8021887 150419

PIDIN0126HI2R2S1XX

VDE-AR-N 4105 2018-11; G98 Issue 1 – Amendment 1 16 May 2018 / G99 Issue 1 – Amendment 3
16 May 2018; Dansk Energi - Tekniske betingelser LV produktion 1.1

fig 1

fig 2

INSTALLATION

The PI-DIN 0126 conforms to Norm VDE-AR-N 4105 2018-11; G98 Issue 1 – Amendment 1 16 May 2018; G99 Issue 1 – Amendment 3 16 May 2018; Dansk Energi - Tekniske betingelser LV produktion 1.1. The installation, in order to comply to the Norms, shall be carried out following this instruction manual. This device can exclusively be used as interface protection relay for LV plants. Before wiring the device it is necessary to mechanically install it on a DIN Rail.

WIRING

PI-DIN central NS protection is used to drive the interface switch between generating devices and the utility grid. The interface switch consists of two circuit breakers connected in series, hence in a redundant configuration. Each one of the two breakers shall be equipped with at least one NC auxiliary contact to be used as feedback for the Breaker operation.
The wiring of the device shall be carried out taking care of the following information:
1. Install the device on a DIN Rail
2. Carry out the device wiring following the diagram shown of Fig.3 in case of Three Phase Grid connection or the diagram in Fig.4 in case of Single phase grid connection.
NOTICE: EXCLUSIVELY on single phase installations connect terminals 53 to 57 by a wire jumper.

Notes: • On all Voltage Input terminals (from #51 to # 57) use solid or stranded core wire with 0.2 to 4mm2 section 750V insulation, on all other terminals (From #1 to #43) use solid or stranded core wire 0.2 to 4mm2 section 250V insulation.

• Screw terminals must be tightened with a recommended torque between 0.4 to 0.8Nm (maximum terminal torque 1.0Nm).

• All terminals must be equipped with insulated crimped terminals before connecting

3. Connect digital input cables (interface switch feedback)
Note: use shielded cable if length exceeds 10 m.
4. Bundle the interface switch feedback wires together and then put the Ferrite, provided together with the PI-DIN, around them in order to prevent possible interferences.
5. Connect RS485 communication line using shielded cable connected to ground on the user side.

POWER SUPPLY

PIDIN0126 is available with 2 different auxiliary power supplies:
• PINDIN0126HI2R2S1XX: input voltage 115Vac to 230Vac -20% / +15% . Consumption 7VA. Recommended fuse* 2 x T 0.16A L 250V
• PINDIN0126LI2R2S1XX: input voltage 24Vdc -20% / +20%. Consumption 2W. Recommended fuse* 2 x T 0.25A L 250V
* Both supply poles must be fused.

GENERAL DATA

• Protection degree: IP20.
• Pollution degree: 2.
• Overvoltage category: III.
• Insulation class: II.
• Operating temperature: -20 to +55°C.
• Storage temperature: -30 to +70°C.
• Relative Humidity: 10 to 90%.
• Maximum altitude: 2000m.
Note: Environmental conditions different from those above listed adequate measures shall be put in place before commissioning (air conditioning).

NOTICE: When pollutants are present (corrosive substances or dusts) proper filters or countermeasures shall be adopted in order to protect the unit.

SAFETY NOTES

Read carefully the present document. In case the device is used in an unspecified way, the protection might be impaired with consequent damages to personnel and / or device and installation.

General
By nature, the device is usually permanently installed. Follow these instructions to properly install the device:
• Install a protection switch or a fuse before power supply input;
• Position a protection in a proper, dry protected and easily accessible site
• Mark the protection and identify it as "breaker for interface protection"
• Check the integrity of any conductor protection before any other action
• Check equipment ratings, operating and installation instructions before commissioning or maintenance.
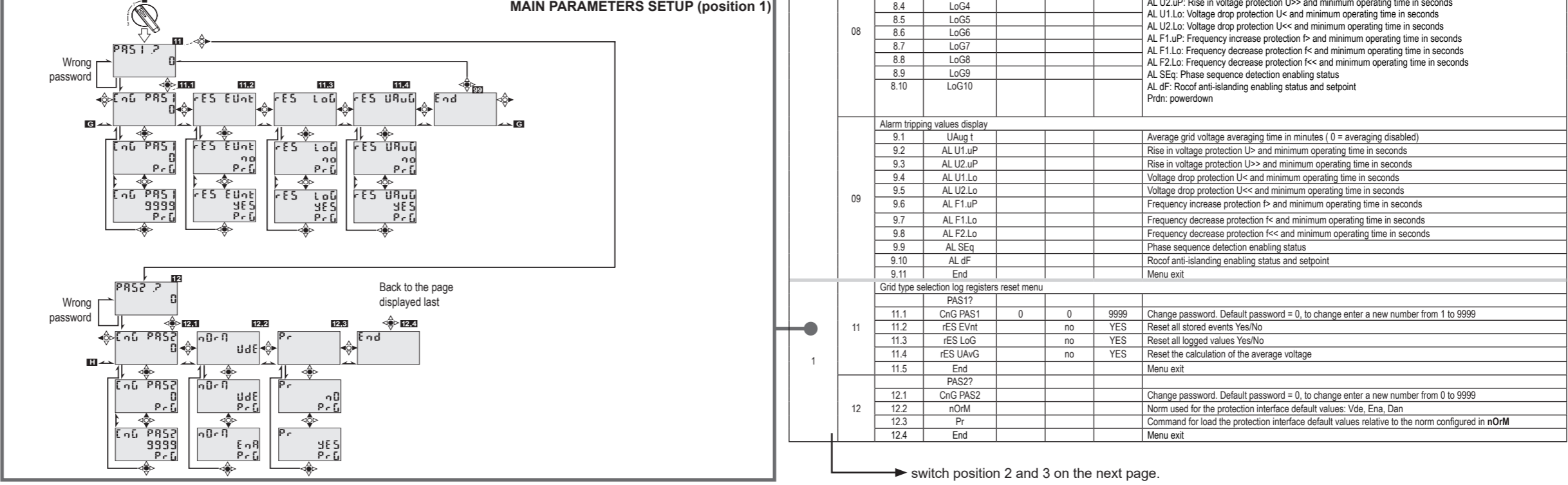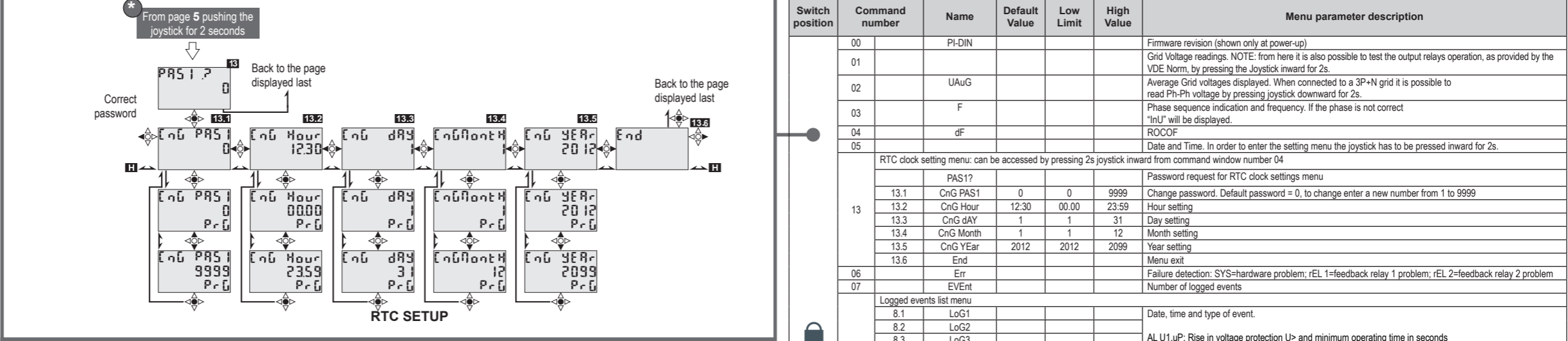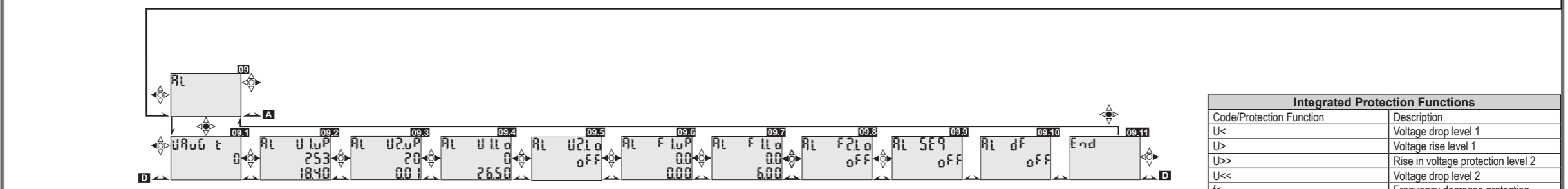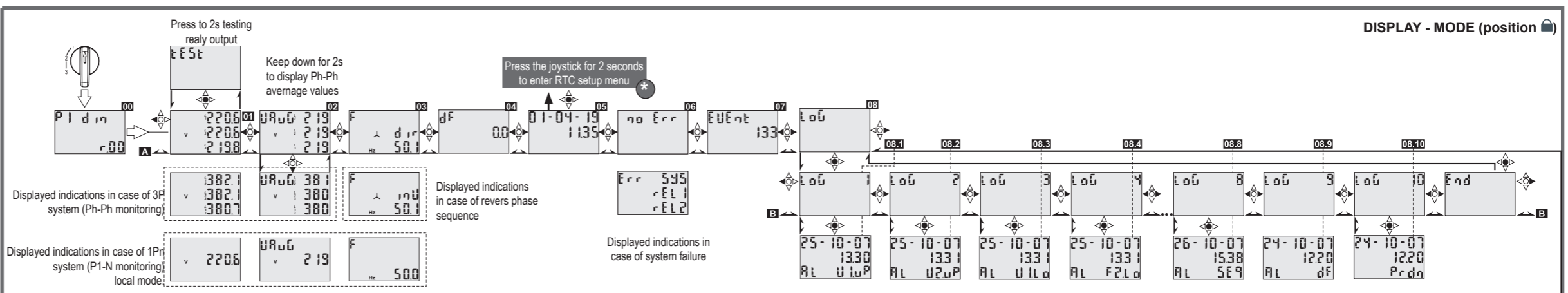Note: The PI-DIN is designed for DIN Rail installation in distribution panels or cabinets.

Installation
NOTICE: PI-DIN shall be installed by skilled and qualified personnel; Carlo Gavazzi cannot be liable for damages arising from improper use or without following the hereby listed recommendations.
• Disconnect power before performing any operation on the device. Verify terminals are all voltage free. Be careful when touching metallic parts.
• Servicing, in case of failure, shall not be carried out. In case of evident malfunction, the device shall be returned for repair, recalibrating or replacement.

Maintenance
Note: PI-DIN does not require a particular maintenance program.
Make sure that all connections are properly made in order to avoid any malfunction or damage. To clean the device, use a damp cloth, do not use alcohol, abrasive or solvents.

DISPLAY - MODE (position 🔓)

Press to 2s testing realy output

Keep down for 2s to display Ph-Ph average values

Press the joystick for 2 seconds to enter RTC setup menu *

Displayed indications in case of 3P system (Ph-Ph monitoring)

Displayed indications in case of 1Ph system (P1-N monitoring) local mode:

Displayed indications in case of revers phase sequence

Displayed indications in case of system failure

Displayed indications in case of enabled function

Integrated Protection Functions

Code/Protection Function	Description
U<	Voltage drop level 1
U>	Voltage rise level 1
U>>	Rise in voltage protection level 2
U<<	Voltage drop level 2
f<	Frequency decrease protection
f>	Frequency increase protection
f<<	Frequency decrease protection
Al Seq	Incorrect phase sequence

* From page 5 pushing the joystick for 2 seconds

Correct password

Back to the page displayed last

Back to the page displayed last

RTC SETUP

MAIN PARAMETERS SETUP (position 1)

Wrong password

Back to the page displayed last

Wrong password

Back to the page displayed last

Switch position	Command number	Name	Default Value	Low Limit	High Value	Menu parameter description
🔓	00	PI-DIN				Firmware revision (shown only at power-up)
	01					Grid Voltage readings. NOTE: from here it is also possible to test the output relays operation, as provided by the VDE Norm, by pressing the Joystick inward for 2s.
	02	UAuG				Average Grid voltages displayed. When connected to a 3P+N grid it is possible to read Ph-Ph voltage by pressing joystick downward for 2s.
	03	F				Phase sequence indication and frequency. If the phase is not correct "InU" will be displayed.
	04	dF				ROCOF
	05					Date and Time. In order to enter the setting menu the joystick has to be pressed inward for 2s.
						RTC clock setting menu: can be accessed by pressing 2s joystick inward from command window number 04
		PAS1?				Password request for RTC clock settings menu
	13.1	CnG PAS1	0	0	9999	Change password. Default password = 0, to change enter a new number from 1 to 9999
13	13.2	CnG Hour	12:30	00.00	23:59	Hour setting
	13.3	CnG dAY	1	1	31	Day setting
	13.4	CnG Month	1	1	12	Month setting
	13.5	CnG YEar	2012	2012	2099	Year setting
	13.6	End				Menu exit
	06	Err				Failure detection: SYS=hardware problem; rEL 1=feedback relay 1 problem; rEL 2=feedback relay 2 problem
	07	EVEnt				Number of logged events
						Logged events list menu
	8.1	LoG1				Date, time and type of event.
	8.2	LoG2				
	8.3	LoG3				AL U1.uP: Rise in voltage protection U> and minimum operating time in seconds
	8.4	LoG4				AL U2.uP: Rise in voltage protection U>> and minimum operating time in seconds
08	8.5	LoG5				AL U1.Lo: Voltage drop protection U< and minimum operating time in seconds
	8.6	LoG6				AL U2.Lo: Voltage drop protection U<< and minimum operating time in seconds
	8.7	LoG7				AL F1.uP: Frequency increase protection f> and minimum operating time in seconds
	8.8	LoG8				AL F1.Lo: Frequency decrease protection f< and minimum operating time in seconds
	8.9	LoG9				AL F2.Lo: Frequency decrease protection f<< and minimum operating time in seconds
	8.10	LoG10				AL SEq: Phase sequence detection enabling status
						AL dF: Rocof anti-islanding enabling status and setpoint
						Prdn: powerdown
						Alarm tripping values display
	9.1	UAug t				Average grid voltage averaging time in minutes (0 = averaging disabled)
	9.2	AL U1.uP				Rise in voltage protection U> and minimum operating time in seconds
	9.3	AL U2.uP				Rise in voltage protection U>> and minimum operating time in seconds
	9.4	AL U1.Lo				Voltage drop protection U< and minimum operating time in seconds
09	9.5	AL U2.Lo				Voltage drop protection U<< and minimum operating time in seconds
	9.6	AL F1.uP				Frequency increase protection f> and minimum operating time in seconds
	9.7	AL F1.Lo				Frequency decrease protection f< and minimum operating time in seconds
	9.8	AL F2.Lo				Frequency decrease protection f<< and minimum operating time in seconds
	9.9	AL SEq				Phase sequence detection enabling status
	9.10	AL dF				Rocof anti-islanding enabling status and setpoint
	9.11	End				Menu exit
						Grid type selection log registers reset menu
		PAS1?				
11	11.1	CnG PAS1	0	0	9999	Change password. Default password = 0, to change enter a new number from 1 to 9999
	11.2	rES EVnt	no	no	YES	Reset all stored events Yes/No
1	11.3	rES LoG	no	no	YES	Reset all logged values Yes/No
	11.4	rES UAvG	no	no	YES	Reset the calculation of the average voltage
	11.5	End				Menu exit
		PAS2?				
12	12.1	CnG PAS2				Change password. Default password = 0, to change enter a new number from 0 to 9999
	12.2	nOrM				Norm used for the protection interface default values: Vde, Ena, Dan
	12.3	Pr				Command for load the protection interface default values relative to the norm configured in nOrM
	12.4	End				Menu exit

→ switch position 2 and 3 on the next page.
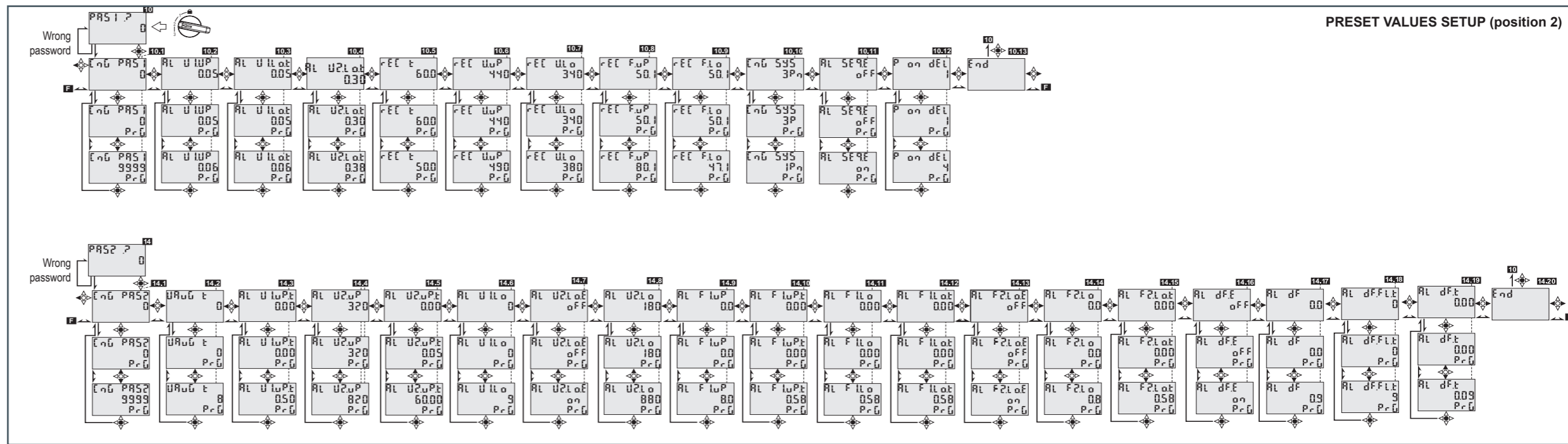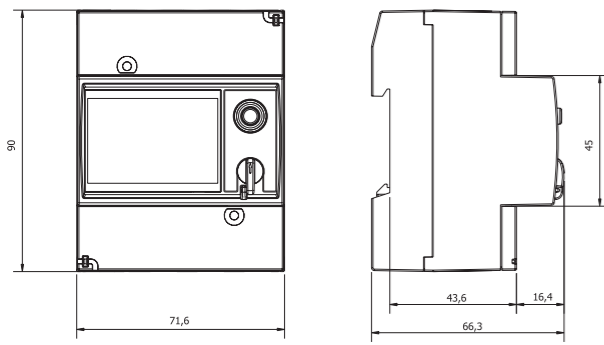
PROGRAM SETTINGS

On the PI-DIN front panel there are a joystick (fig. 1) and a 4 positions rotary switch (fig. 2) to be used for the navigation in the menu and for data selection or modification. The rotary switch allows, password protected, the access to different menus with different functions according to the position on which is set. The joystick provides 4 positions: Up, down, left and right. If pressed in the central position the settings are confirmed (ENTER). In order to properly navigate the menus, look at the flow charts.

Position of switch and functions

The different positions of the rotary switch allow to read and/or modify the device parameters. Positions 1, 2 and 3 can only be accessed by removing the seal if present, furthermore they are password protected. Default password is 0, once accessed it is possible to change the password with any value up to 9999 (make sure of keeping record of the entered password, if password is lost it is not possible to enter the programming menu anymore. If restoring is necessary the device has to be sent to Carlo Gavazzi assistance service).

Position: LOCK

This is the normal operating position. In this position the joystick is used to scroll the instantaneous values, date and time, events, errors and alarms. It is also possible to set the date/time and modify *PAS1*.

Position: 1

In this position the joystick is used to
- Reset events, data log and average voltage
- Select the approval to comply with.
- Modify *PAS1* and *PAS2*

Position 2:

In this position the joystick is used to
- Modify the preset values for the interface protection function
- Activate or deactivate the phase sequence detection.
- Modify *PAS1* and *PAS2*

Position 3:

In this position the joystick is used to
- Change serial communication parameters setting
- Modify *PAS1*

HOW TO PROGRAM THE PIDIN

1. Set the rotary switch in position 1
2. Select *PAS2?* and set a new password to avoid unauthorized modifications
3. Select the approval to comply with (page *nOrM*)
4. Select *YES* in the page *Pr* to apply the defaults to all parameters available in position 2
5. Set the rotary switch in position 2
6. Adjust the parameters according to the installation (e.g. System) and other requirements.
7. Select End to apply changes
8. Set the rotary switch in position 3 to set the communication parameters

OUTPUT RELAYS TEST: In order to perform the output relays test, the joystick has to be pressed for 2 seconds (see figure). when page 01 is shown in the LOCK position. The output relays will trigger. In case of failure of one of the relays, the LED will turn on.

MAINTENANCE AND DISPOSAL

Responsibility for disposal

The product must be disposed of at the relative recycling centers specified by the government or local public authorities. Correct disposal and recycling will contribute to the prevention of potentially harmful consequences to the environment and persons

TERMINALS POSITION AND FERRITE MOUNTING

Fig. 1

PINOUT

Fig. 2

Integrated Protection Functions

| Code/Protection Function	Description
U<	Voltage drop level 1
U>	Voltage rise level 1
U>>	Rise in voltage protection level 2
U<<	Voltage drop level 2
f<	Frequency decrease protection
f>	Frequency increase protection
f<<	Frequency decrease protection
AI Seq	Incorrect phase sequence
ROCOF	Derivative frequency
rEC	Recovery

THREE PHASE SYSTEM DIAGRAM 3P+N, 3P

Fig. 3

SINGLE PHASE SYSTEM DIAGRAM

Fig. 4

Command number	Name	Default Value	Low Limit	High Value	Menu parameter description
10	PAS1?				
	10.1 CnG PAS1				Change password. Default password = 0. To change it, enter a new number from 1 to 9999
	10.2 AL U1.Up		253	265	Voltage increase protection U> setpoint absolute VAC value
			440	460	
	10.3 AL U1.Lo.t		0.05	60	Voltage decrease protection U< minimum operating time in seconds
	10.4 AL U2.Lo.t		0.05	60	Voltage decrease protection U<< minimum operating time in seconds
	10.5 rEC t		0.1	600	Recovery time in seconds
	10.6 rEC U.Up		230	265	Recovery condition for voltage, upper limit in VAC
			400	460	
	10.7 rEC U.Lo		184	230	Recovery condition for voltage, lower limit in VAC
			320	400	
	10.8 rEC F.Up		50.0	55.0	Recovery condition for frequency, upper limit in Hz
	10.9 rEC F.Lo		45.0	50.0	Recovery condition for frequency, lower limit in Hz
	10.10 CnG SYS				Type of grid connection to be monitored: 3P+N ; 3P ; 1P. Once it has been changed, the default values will be loaded
	10.11 AL SEq.E				Phase sequence detection Enabling
	10.12 P on dEL		1	600	Power Up delay in seconds
	10.13 End				Exit and save
14	PAS2?				
	14.1 CnG PAS2	0	0	9999	Change password. Default password = 0, to change enter a new number from 1 to 9999
	14.2 UAuG t	0	0	10	
	14.3 AL U1.uP.t		0.05	60	Voltage increase protection U> minimum operating time in seconds
	14.4 AL U2.uP		230	299	Voltage increase protection U>> setpoint absolute VAC value
			400	520	
	14.5 AL U2.uP.t		0.05	60	Voltage increase protection U>> minimum operating time in seconds
	14.6 AL U1.Lo		184	230	Voltage decrease protection U< setpoint absolute VAC value
			320	400	
	14.7 AL U2.Lo.E				Voltage decrease protection U<< enable Yes/no
	14.8 AL U2.Lo		92	230	Voltage decrease protection U<< setpoint absolute VAC value
			160	400	
	14.9 AL F1.uP		50.0	55.0	Frequency increase protection f> setpoint in Hz
	14.10 AL F1.uP.t		0.05	60	Frequency increase protection f> minimum operating time in seconds
	14.11 AL F1.Lo		45.0	50.0	Frequency decrease protection f< setpoint in Hz
	14.12 AL F1.Lo.t		0.05	60	Frequency decrease protection f< minimum operating time in seconds
	14.13 AL F2.Lo.E				Frequency decrease protection f<< enable Yes/no
	14.14 AL F2.Lo		45.5	50.5	Frequency decrease protection f<< setpoint in Hz
	14.15 AL F2.Lo.t		0.05	60	Frequency decrease protection f<< minimum operating time in seconds
	14.16 AL dF.E				ROCOF passive anti-islanding detection, enable Yes/No
	14.17 AL dF		0.2	10	ROCOF passive anti-islanding detection, setpoint expressed in Hz
	14.18 AL dF.FLt		1	16	ROCOF passive anti-islanding detection, measure filter coefficient
	14.19 AL dF.t		0.05	60	ROCOF passive anti-islanding detection, minimum operating time in seconds
	14.20 End				Exit and save
	Communication port settings				
12	PAS1?				Password request for communication port settings
	12.1 CnG PAS1	0	0	9999	Change password. Default password = 0, to change enter a new number from 1 to 9999
	12.2 bAudrAtE	1920	1920	4800	RS485 communication Baudrate. 1920 stands for 19200 baud.
	12.3 AddrESS	1	1	255	Device address on the RS485 communication line.
	12.4 PArItY	nonE	EvEn	odd	Even/Odd communication parity
	12.5 End				Menu exit
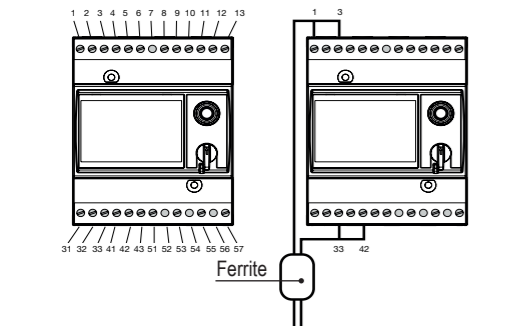
Switch position **2**

Switch position **3**
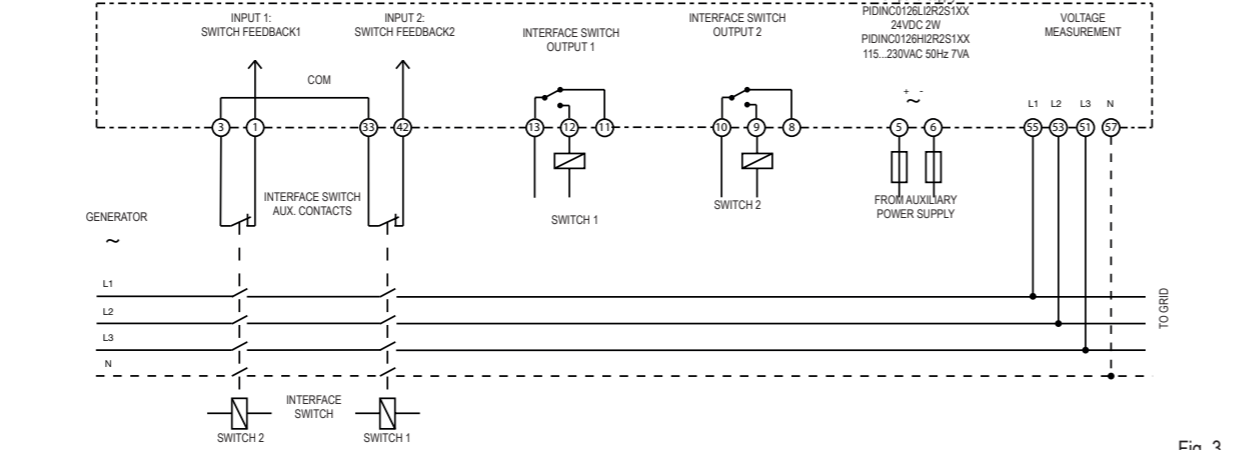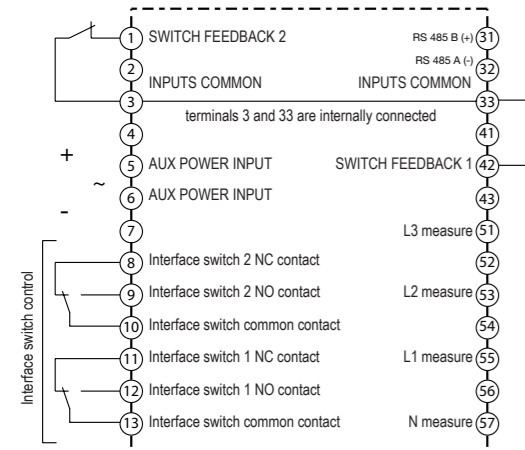
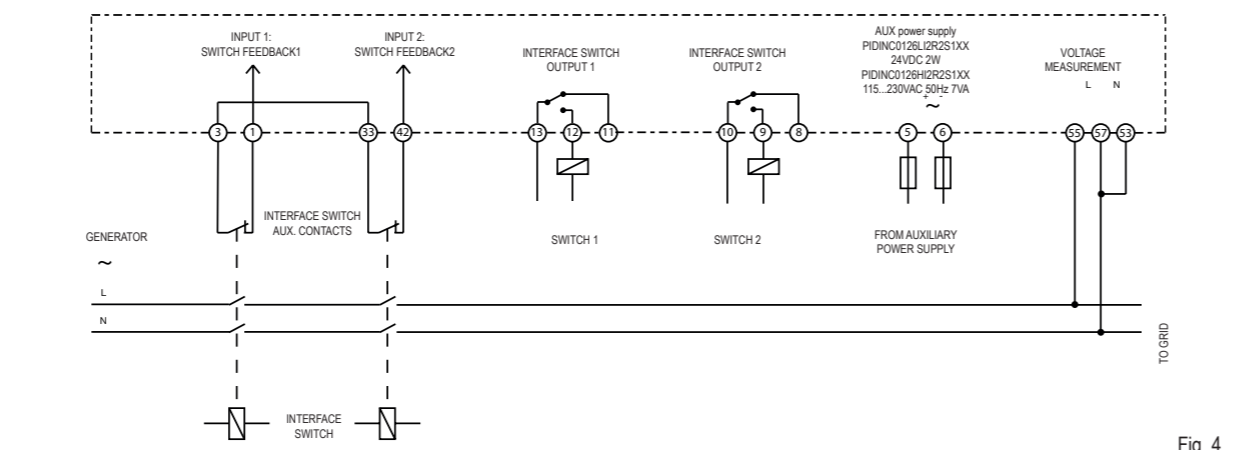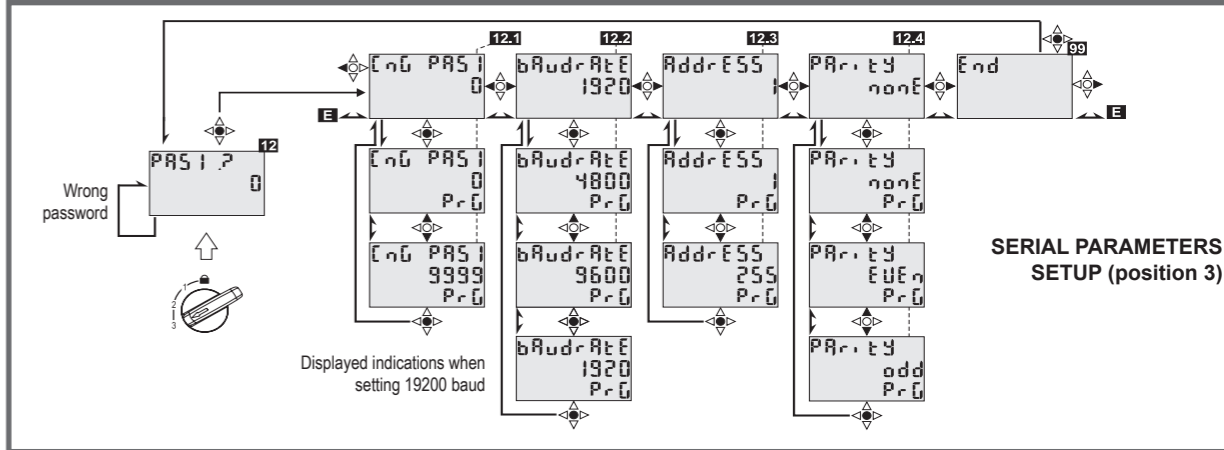## SERIAL PARAMETERS SETUP (position 3)

Displayed indications when setting 19200 baud