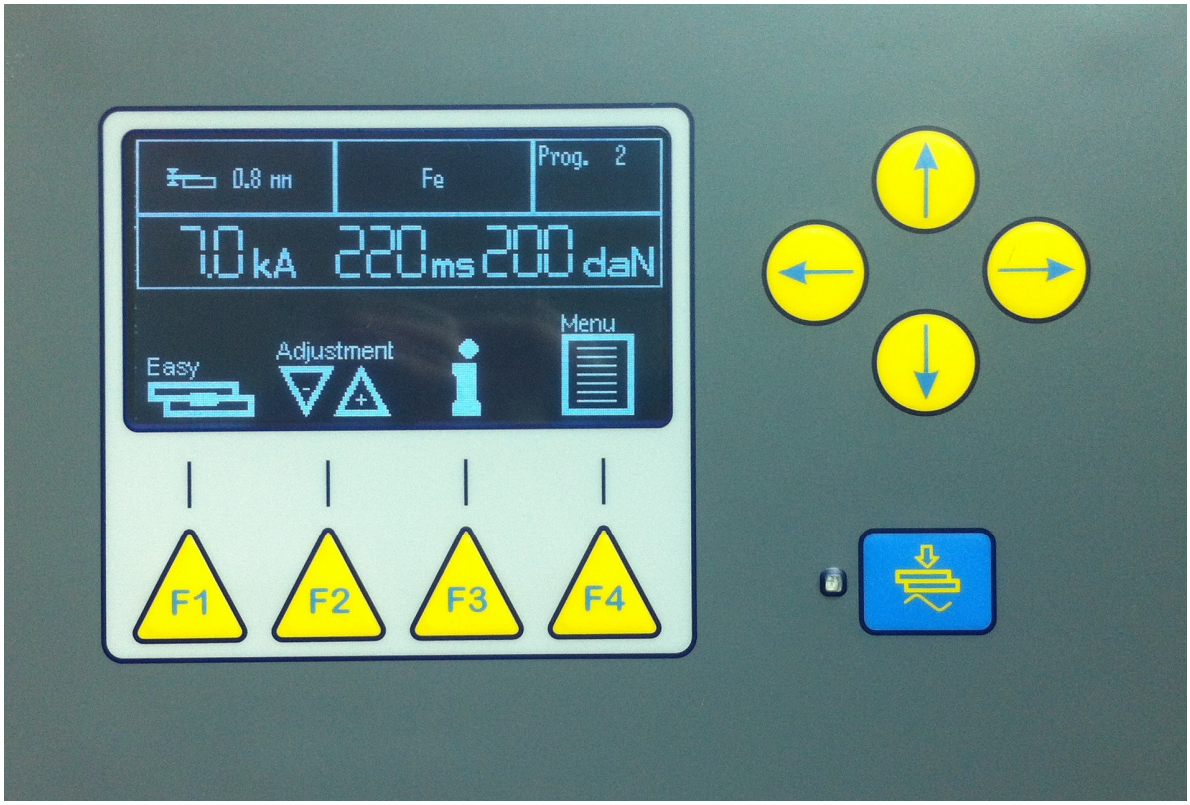
WELDING CONTROL PY-800



PROGRAMMING INSTRUCTIONS

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1 INTRODUCTION

Spot welding control PY-800 applied to medium frequency systems(inverter), concurs to produce welding of constant quality in a simple and fast way.

2 FEATURES

PY-800 has a graphical display, four functions keys, four keys of navigation (arrows) and a button with special function (not active) and relative led.

The function keys (F1, F2, F3, F4) assume a meaning that depends by the icons visualized in the lower part of the display.

Arrow keys  are used also in order to increase or to decrease the numerical values.

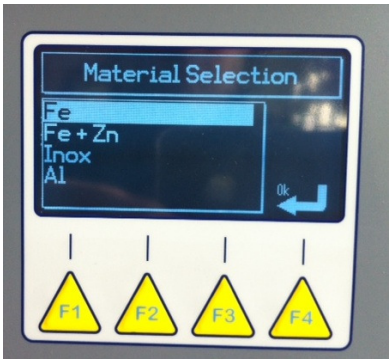
3 INITIAL OPERATION

At the switch-on, PY-800 gets ready in order to execute the last job carried out before switch-off. If it has to be continued with the same type of working, it is not necessary to execute any operation. Just control that the green led "READY" is ON so that the weld current flow is enabled For the complete description of the visualization of the display see par.5.

Warning: before beginning the job, make sure that settings (top part of the display) coincide with the type of job to do.

4 WELD SETTING WITH THE “EASY” MENU

In order to begin the welding operation, it is necessary to make some choices about the type of job.
The “Easy” menu could appears or not according to the setting of the configuration menu.

	Press key F1 (Easy) to access the menu “tool selection”
	Select the thickness of the thinnest layer with the keys  Confirm with F4 F3 (Home) enables to come back to the main menu without choices.
	Select the type of material with keys  Confirm with F4
	Warning: check the thickness of sheets to be weld correspond to the choice has been done.

Preset materials are the following:

Fe	Mild steel
Fe+Zn	Coated steel
Inox	Stainless steel
Al	Aluminium

5 WELD SETTING WITH THE PROGRAM SELECTION

In order to begin the welding operation, it is necessary to select the suitable welding program.
The “Program Number” menu could appears or not according to the setting of the configuration menu.

		Press key F1 (Program Number) to enable the program selection
		When the image “Program Number” becomes negative, program selection is enabled then select the welding program with keys 
		Press key F1 (Program Number) to disable the program selection

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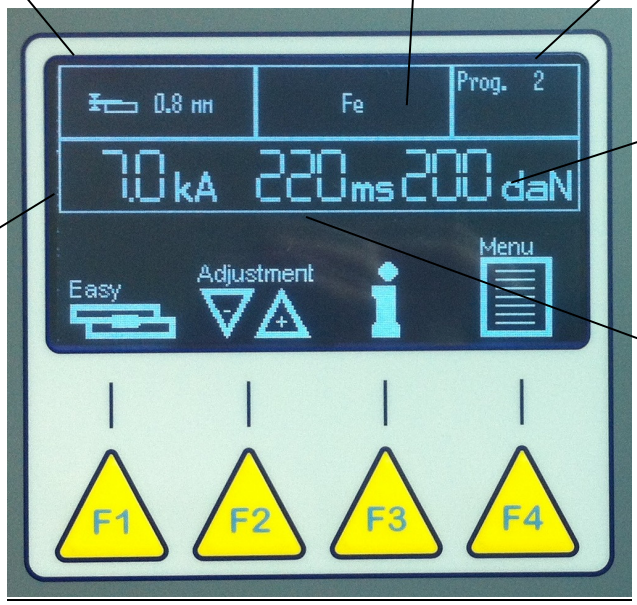
6 BEGINNING TO WELD

Next picture shows the main settings of the welding job



Type of job: Welding of two or more sheets (thinner thickness displayed with “easy menu” mode only

Type of material to weld

Welding Program Number

Weld force of the selected program (if enabled by setup)

Weld current of the selected program (prog. 1)

Weld time of the selected program

At the switch-on, PY-800 gets ready in order to execute the last job carried out before switch-off

Warning: before beginning the job, make sure that settings (top part of the display) are in accord with the type of job to do.

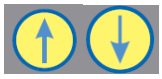
6.1 Modifying Standard Settings

After the first spot weld, if spot weld is not satisfactory, it is possible to adjust the main welding parameters: current (kA) and time (milliseconds or Seconds according to the configuration of the PY-800 control).
Altering these parameter, will not modify the welding program. At the next switch on of the welder, parameters will keep
the standard values. The same happens when the job is changed to a new one.

	From main menu, press the key F2 (Adjustment).
	Select the parameter to modify with the keys  Change value with keys  In this phase, it is possible to test welding without escaping the menu. When the adjustment is done, leave the menu with F4 (Home)
	Warning: when the current or the weld time are modified, proceed with little step in case of increasing. An excessive current can cause expulsion of melted material. An excessive time can cause overheating of the machine with activation of the emergency thermostats.

7 WELD REPORT

All welds are recorded to obtain a report. This report can be saved on a file on a USB key from the menu "INFO".

	From the main screen press F3 key i
	The list of the welding is performed. At this stage you can weld without exit the menu. When starting a new job, you should reset the report by pressing the F1 key (clear) twice. With the keys  you can scroll the report.
	To save the report on a USB key, insert key on the appropriate port on the front of the welder. <u>Manual Mode:</u> Ensure above the key F3 there appears “MAN” Press the F2 key (SAVE). During saving appears “WAIT” blinking, wait until returns the message SAVE above F2 key, than remove the USB key. Once saved, the report is not deleted. To eliminate it press twice the F1 key (CLEAR). <u>Automatic Mode:</u> Ensure the USB key is inserted on its port. Press the key F3, it turns from “MAN” to “AUTO” From now, every fifty welds, report is saved on a file. During saving appears “WAIT” blinking but welder can perform incoming welds without problems. At the end of saving phase, “WAIT” will disappear, recorded welds are deleted automatically on display. ***Please note that automatic mode is only working within* INFO *menu.***

Each line of text is displayed the following data:

WELD No.	Date	Hour	Prg No.	Measured current (kA)	Weld time (ms)	Weld Force (daN)	Welding result
0000001	23.11.11	11:28:52	1	6.5	200	200	OK

The positive result is indicated by the word **OK**.
In the case of different signals, the word OK is replaced by an error message (E1, E2, E3, etc..).
The complete list of error messages is described in Chapter 10

8 ADVANCED PROGRAMMING

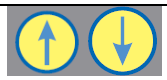
Expert users can modify in permanent way the parameters of standard settings or create new programs to bind together to new materials. Each program is identified by a number according to the following table

Welding programs (double sided gun)

Program Number	Material	Metal sheet thickness (mm)	Program Number	Material
1	Fe	0,6	8	Fe+Zn
2	Fe	0,8	9	Fe+Zn
3	Fe	1	10	Fe+Zn
4	Fe	1,5	11	Fe+Zn
5	Fe	2	12	Fe+Zn
6	Fe	2,5	13	Fe+Zn
7	Fe	3	14	Fe+Zn

Program Number	Material	Metal sheet thickness (mm)	Program Number	Material
15	Inox	0,6	22	Aluminium
16	Inox	0,8	23	Aluminium
17	Inox	1	24	Aluminium
18	Inox	1,5	25	Aluminium
19	Inox	2	26	Aluminium
20	Inox	2,5	27	Aluminium
21	Inox	3	28	Aluminium

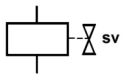
8.1 Edit program example

	Press F4 Menu
	Press F4 (Program Edit)
	Type Password (F1 F3 F2 F4 F2)
	The actual program number is blinking; to select different program number press keys  until the correct number is displayed
	Select the parameters to modify with the keys  Change setting with keys  New value is automatically stored. It is not necessary to confirm. Note: in this phase it is possible to test the weld cycle without escaping the programming phase. When parameters are tested exit with F4 (Home).

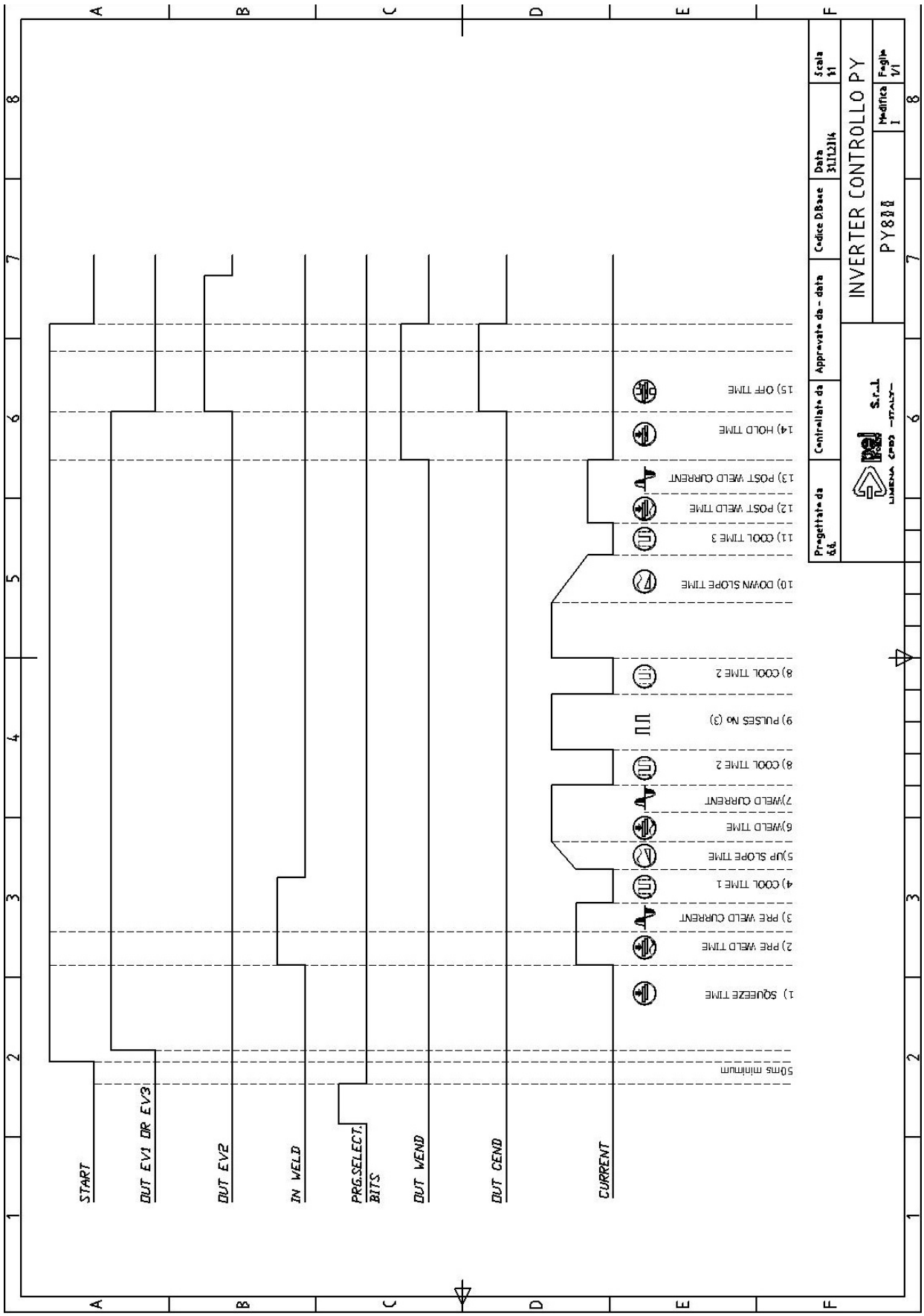
8.2 Welding parameters

Welding parameters of each program are displayed in the following sequence from No.1 to No. 18
The welding cycle begins with parameter No.1 and finish with parameter No.16

Parameter No.	Icon	Description	Unit	Range	Note
1		Squeeze time it is the time needed by the pneumatic clamp's electrodes to come into contact with the piece to be welded and to exert the welding pressure Melted material will squirt if this time is too short	Second msec.	0-2 0-2000	Time unit depends on control configuration
2		Pre weld time First current pulse duration	Second msec	0-2 0-2000	
3		Pre weld current First current pulse value	% kA	0-100% 1- Max	Unit depends on parameters No.17 (RC current regulation)
4		Cool time 1 Pause time between Pre weld and weld time.	Second msec.	0-2 0-2000	
5		Up Slope Weld time with increasing of current	Second msec.	0-0.5 0-500	Up slope time is added to the weld time.
6		Weld time Second current pulse duration (main weld time)	Second msec	0-2 0-2000	This is the weld time displayed in the main menu
7		Weld Current Second current pulse value (main weld current)	% kA	0-100% 1- Max	Unit depends on parameters No.17 (RC current regulation)
8		Cool time 2 Pause time between weld time pulses (repetition of the weld time)	Second msec.	0-2 0-2000	
9		Number of pulses Number of repetition of weld time		1-Max	The Max value depend on setup parameter. If No. Of pulses=1 Cool time 2 is ignored by the weld cycle
10		Down slope time Weld time with current decreasing	Second msec.	0-0.5 0-500	Down slope time is added to the weld time.
11		Cool time 3 Pause time between weld and post weld time	Second msec.	0-2 0-2000	

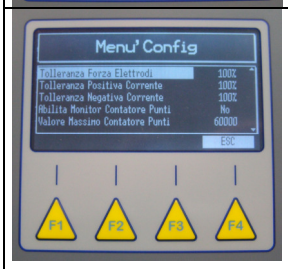
Parameter No.	Icon	Description	Unit	Range	Note
12		Post weld time Third current pulse duration	Second msec	0-2 0-2000	
13		Post weld current Third current pulse value	% kA	0-100% 1- Max	Unit depends on parameters No.17 (RC current regulation)
14		Hold time time during which the electrodes stay closed after weld time	Second msec	0-2 0-2000	
15		OFF time if this time is 0, the welding gun will carry out a single welding cycle even if the START signal persist. If this time is not 0 the welding cycle will be repeated automatically. In such a case, off time determines the interval between one cycle and another.	Second msec	0-2 0-2000	Can be enabled or disabled by Setup
16		Electrodes force	daN / %	0-2000 / 0-100%	Control of proportional valve Display of pressure level announcement according to the setup parameter
17	**RC**	Constant Current Regulation		ON-OFF	If RC=ON current setting in kA If RC=OFF current setting in %
18		Solenoid valve activated during weld cycle		EV1 EV3	Default valve EV1

8.3 Weld cycle diagram



9 CONFIGURATION

With the configuration menu, it is possible to change some system settings.

	Press F4 Menu.
	Press F3 (Config)
	Type Password (F1 F3 F2 F4 F2)
	Change settings with navigation buttons  Warning: changing of settings must be done by expert personnel. Wrong setting could damage the welding unit or generate hazards to the user during welding operation.

Configuration parameters

Electrodes force tolerance	0-100%	If the pressure sensor or proportional valve are fitted, verify that the compressed air pressure to the pneumatic clamp is within the tolerance.
Upper current tolerance	0-100%	Positive tolerance of welding current for pneumatic clamp.
Lower current tolerance	0-100%	Negative tolerance of welding current for pneumatic clamp.
Weld counter monitor	Yes/No	Enabling monitoring of spot weld number limit before electrodes replacement. If this is enabled, the actual counter value is displayed on the main menu.
Weld counter limit	0-60000	Setting of weld counter limit
Weld counter actual	0-Max	Setting of actual value of spot weld counter
X Gun opening time	0-1000 ms	Opening time of pneumatic gun
OFF time enable	Yes/No	Enable OFF time for the automatic repetition of weld cycle
Current adjust. value	0-90%	Adjustment range. Maximum welding current allowed with the "Adjustment" button of main menu
Time adjust. value	0-90%	Adjustment range. Maximum weld time allowed with the "Adjustment" button of main menu
Force adjust. value	0-90%	Adjustment range. Maximum weld Force allowed with the "Adjustment" button of main menu
Language	Italiano/English/Deutsch/ Trk/Espagnol/Svenska/ Hungarian	Language choice
LCD contrast	20-63%	Adjusting display brightness
Menu Easy Enable	Yes/No	Enabling Easy menu. If disabled, the “Program Selection” menu is enabled.
Password Enable	Yes/No	Enabling password request entering sub-menu
Date - time		Clock programming
Reboot		Performs firmware update after inserting the USB stick containing the current program (press the right arrow to confirm. Green Led start blinking. Wait for the automatic restart of control
System Info		Display of Hardware and firmware version. It is also possible to get it from the main menu pressing the right arrow once.

10 SETUP

With the Setup menu, it is possible to change some system calibrations.

	Press F4 Menu
	Press F2 (Setting)
	Type Password (F1 F3 F2 F4 F2)
	Change setup parameters with navigation keys.  Warning: changing of settings must be done by expert personnel. Wrong setting could damage the welding unit or generate hazards to the user during welding operation

Setup parameters list

Electrode Force enable	Yes/No	Enabling display of electrode force weld parameter for pneumatic clamp.
Arms length display enable	Yes/No	Enabling display of arm length input
Force at 6 Bar	0-2000 daN	Electrodes force calibration 1st point
Force at 2 Bar	0-2000 daN	Electrodes force calibration 2nd point
10V Max Pressure	0-10 bar	Max. output of pressure regulator with 10V input control voltage.
Max Pulses Number	1-100	Max weld time repetition number
Time unit	ms- S	Setting of time unit to display (Second or milliseconds).
No current enable	Yes / No	Enables the display of the alarm E3, see Chapter 11 for the meaning
EV2 mode	Fixed/Gun	The output EV2 will be monostable (gun) or bistable (fixed) depending on this choice In fixed mode, the status of EV2 is controlled by input PSQZ. In Gun mode, EV2 is controlled by input PSQZ and also activated for a period after HOLD time. This period is programmable in the configuration menu.
Unit Measure Force	%-daN	Choice of welding force announcement in the main menu of display. % shows the set percentage of max pressure.
Enable interlock EV2	Yes/No	If yes, cycle can start only if EV2 is on. If no, cycle can start with EV2 both ON and OFF
Adjustment Menu		Sub menu for welder calibration
Restore Default	Program Setting Calibration Config All	Enabling restore of initial parameters, partial or complete depending on sub menu choice
Import/Export	Yes/No	Export to the USB port: backup of welding programs, setting and configuration parameter. Import from USB port: total or partial import of welding programs, setting and configuration parameters. The Export backup will be completed in about 13 minutes.

Adjustment parameters list (calibration)

Current Adjustment	+/- 5000A	Modify current reading value (menu Info)
Rogowski coil adjustment	10-200 mV/kA	Adjusting the reading of amperometer
Maximum Current	1/60 kA	Setting the maximum current of welder
Controller	0-5V / 0-10V	0-5V control voltage for HP400 inverter 0-10V control voltage for HP600-HP800 inverter
Kp	0-250	Closed loop control parameter
Ki	0-250	Closed loop control parameter
Kd	0-250	Closed loop control parameter

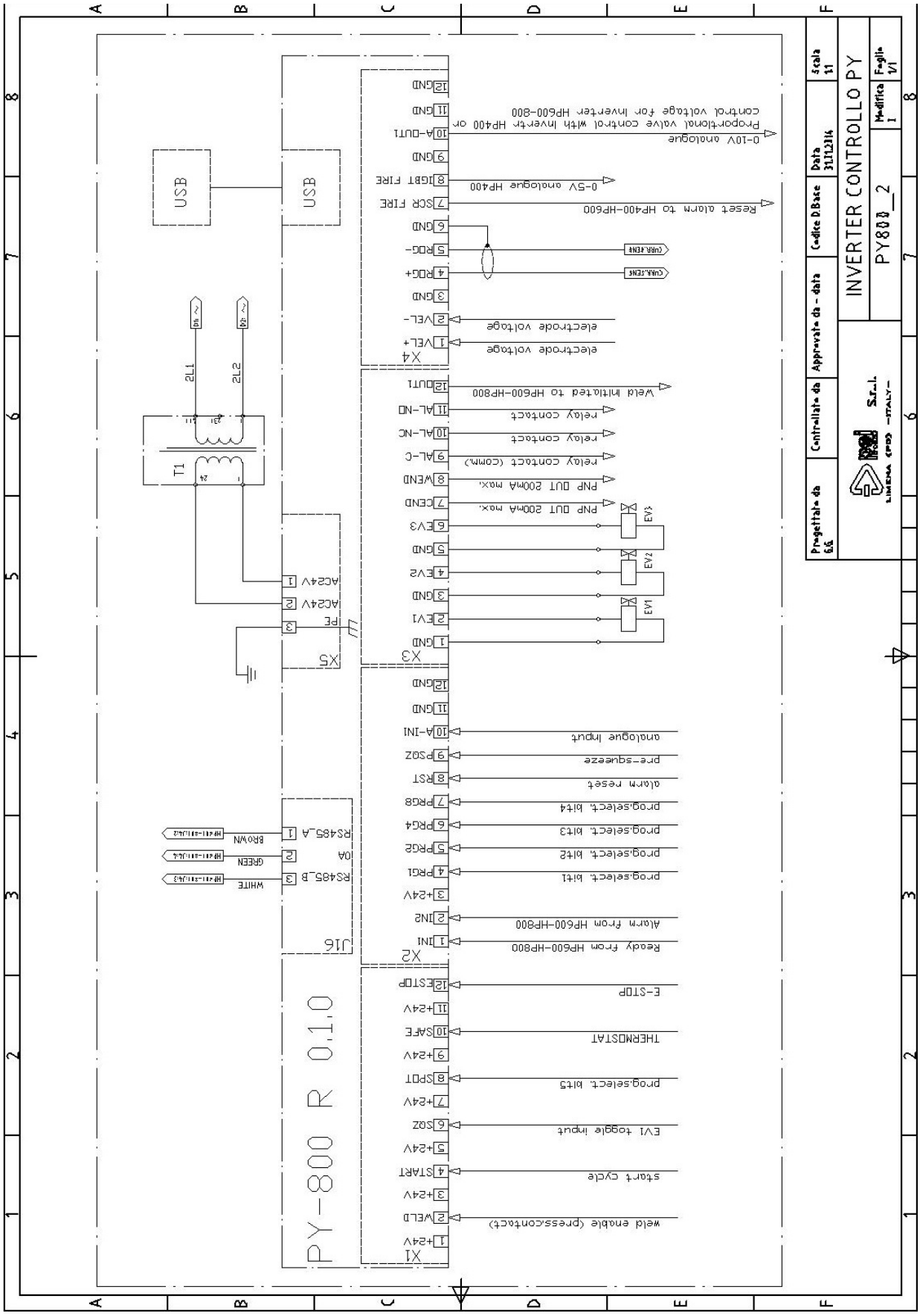
11 ALARMS

When an alarm occurs, the display turns red to indicate the fault.

To continue working, press the F4 key reset. If the problem persists, refer to the following table to correct the cause of the alarm

ERROR CODE	MESSAGE	REMEDY
E1	Over temperature	Check the coolant circulation
E2	Emergency stop	E-stop button pressed
E3	No current	Oxidized sheets or isolated - isolated secondary circuit (clean contact electrodes arms etc..)
E4	Negative current limit	Welding out of negative tolerance
E5	Positive current limit	Welding out of positive tolerance
E6	End life of electrodes	Replace electrodes
E7	Switch off START	Start button (spotter or welding gun) already pressed. Release button.
E8	Rogowski coil reversed	Reverse polarity of the measuring coil
E9	Communication Link	Communication between PY800 and inverter source HP800 fails. Check the communication cable.
E10	Thermal	Over temperature inverter source HP800
E11	Preload lost	Capacitors charging failed on inverter source HP800
E12	IGBT	IGBT error on inverter source HP800
E13	Lost phase	One phase missing on inverter source HP800 supply line
E14	Low voltage	Voltage too low on inverter source HP800 supply line
E15	Over current	Output current of inverter source HP800 exceeds the limit
E16	Over voltage	Voltage too high on inverter source HP800 supply line
E17	Program data error	Total weld time of selected program exceeds 7000ms. Please check and reduce weld time parameters.

12 Wiring diagram



13 Description of signals and connectors

Connector	No.	Name on control cover plate	Description
X1	1	+24V	24 V d.c. common line for all the inputs
	2	WELD (in)	Welding time enable (input for pressure switch or other devices to stop cycle after squeeze time with squeeze solenoid valve driven).
	3	+24V	24 V d.c. common line for all the inputs
	4	START (in)	Start cycle, it must be held activated at least until the weld time initiates (manual machines). For PLC interfaced machines, keepstart signal “ON” for the whole cycle.
	5	+24V	24 V d.c. common line for all the inputs
	6	SQZ (in)	When active, change status of output EV1
	7	+24V	24 V d.c. common line for all the inputs
	8	SPOT (in)	Binary code weight 16 for external program selection
	9	+24V	24 V d.c. common line for all the inputs
	10	SAFE (in)	Safety input: low, cycle is not possible and display shows over temperature alarm (E1)
	11	+24V	24 V d.c. common line for all the inputs
	12	E-STOP (in)	Emergency stop if low alarm E2 displayed

Connector	No.	Name on control cover plate	Description
X2	1	IN1 (in)	READY from HP600 or HP800 inverter source
	2	IN2 (in)	ALARM from HP600 or HP800 inverter source
	3	+24V	24 V d.c. common line for all the inputs
	4	PRG1 (in)	Binary code weight 1 for external program selection
	5	PRG2 (in)	Binary code weight 2 for external program selection
	6	PRG4 (in)	Binary code weight 4 for external program selection
	7	PRG8 (in)	Binary code weight 8 for external program selection
	8	RESET (in)	Reset alarm from external device
	9	PSQZ (in)	When active, change status of output EV2 (first squeeze valve)
	10	A-IN1 (in)	Analogue input
	11	GND	0V d.c. common line for all outputs
	12	GND	0V d.c. common line for all outputs

Connector	No.	Name on control cover plate	Description
X3	1	GND	0V d.c. common line for all outputs
	2	EV1 (out)	EV1 supply (welding stroke) 24V / 3.5W
	3	GND	0V d.c. common line for all outputs
	4	EV2 (out)	EV2 supply (pre-stroke) 24V / 3.5W
	5	GND	0V d.c. common line for all outputs
	6	EV3 (out)	EV3 supply (welding stroke) 24V / 3.5W
	7	CEND (out)	End cycle: become active after the holding time; it will be active till the start signal (START) is activated (pnp 200mA max)
	8	WEND (out)	End weld: become active after the weld time; it will be active till the start signal (START) is activated (pnp 200mA max)
	9	AL-C	Alarm relay contact – common-
	10	AL-NC	Alarm relay contact – normally closed-
	11	AL-NO	Alarm relay contact – normally open-
	12	OUT1 (out)	WELD INITIATED to HP600 or HP800 inverter source

Connector	No.	Name on control cover plate	Description
X4	1	VEL+	Tip voltage positive
	2	VEL-	Tip voltage negative
	3	GND	0V d.c. common line for all outputs
	4	ROG+	Current sensor (rogowski coil 150mV/kA) input 1
	5	ROG-	Current sensor (rogowski coil 150mV/kA) input 2
	6	GND	Shield of current sensor cable
	7	SCR FIRE (out)	RESET ALARM to HP600 or HP800 inverter source
	8	IGBT FIRE	Analogue control voltage to HP400 (0-5V)
	9	GND	0V d.c. common line for all outputs
	10	A-OUT1	-Analogue control voltage for proportional valve (0-10V) -Analogue control voltage for HP600-HP800 inverter (0-10V)
	11	GND	0V d.c. common line for all outputs
	12	GND	0V d.c. common line for all outputs

Connector	No.	Name on control cover plate	Description
X5	1	AC24V	24V AC supply voltage
	2	AC24V	24V AC supply voltage
	3	PE	Protection earth connection

14 External program selection table

For the external program selections the inputs PRG1, PRG2, PRG4, PRG8, SPOT are used. Program is selected as described in the following table.
PY800 accepts external program selection if it will be stable for at least 50ms before START signal is given.
External program selection works both in “Easy” menu and in standard program selecting menu.
If standard menu is activated (program selection button on panel), it will be disabled while a selection bit is present on related inputs.

Selection bits					
PRG1	PRG2	PRG4	PRG8	SPOT	PROGRAM SELECTED
0	0	0	0	0	-
1	0	0	0	0	1
0	1	0	0	0	2
1	1	0	0	0	3
0	0	1	0	0	4
1	0	1	0	0	5
0	1	1	0	0	6
1	1	1	0	0	7
0	0	0	1	0	8
1	0	0	1	0	9
0	1	0	1	0	10
1	1	0	1	0	11
0	0	1	1	0	12
1	0	1	1	0	13
0	1	1	1	0	14
1	1	1	1	0	15
0	0	0	0	1	16
1	0	0	0	1	17
0	1	0	0	1	18
1	1	0	0	1	19
0	0	1	0	1	20
1	0	1	0	1	21
0	1	1	0	1	22
1	1	1	0	1	23
0	0	0	1	1	24
1	0	0	1	1	25
0	1	0	1	1	26
1	1	0	1	1	27
0	0	1	1	1	28
1	0	1	1	1	29
0	1	1	1	1	30
1	1	1	1	1	31

15 Mounting holes