

**OPERATING,
PROGRAMMING AND
MAINTENANCE MANUAL
POWER SOURCE PS 254**

LIMITS OF WARRANTY

Original features of the equipment and maintenance

The liability of the Polysoude company for delivered welding equipment is ending immediately if:

- One or several components have been removed, distorted or altered without permission in writing from the manufacturer, especially concerning safety facilities, electronic circuit design or fluid systems...
- The essential maintenance procedures necessary for the faultless operation of the machine have not been carried out.

Transformation of the original designation of the equipment

If approved equipment is used by the purchaser or a third party as part of a special machine or an assembly line, instead of an examination part after part the responsible party has to prove the conformity of the entire unit.

Consequently in this case the liability of Polysoude is released; the purchaser or the third party has to take the engagements of a builder and to satisfy all applicable legal requirements.

Stability of the machines

The stability of the machines has to be assured by strictly respecting the handling and transport procedures specified by Polysoude (refer particularly to the specific chapter in the Operating and Maintenance Manual).

Handling conditions

To move or displace equipment, the lifting eyebolts or integrated connection rods have to be used.

In order not to overcharge lifting equipment, the operator must know the weight of the equipment.

2002 Polysoude

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Index

1.	INTRODUCTION	5
1.1.	The PS power sources	5
1.2.	The orbital welding heads	6
1.2.1.	The open welding heads	6
1.3.	The tube to tubesheet welding heads	6
1.3.1.	The closed chamber weld heads	7
1.4.	Technical specifications of the power source PS 254	8
1.4.1.	Design features	8
1.4.2.	The remote control pendant	9
1.4.3.	Technical characteristics	10
1.4.3.	Technical characteristics	10
1.5.	Safety precautions	11
1.5.1.	General rules	11
1.5.2.	Training of the operators	11
1.5.3.	Maintenance and adjustments	11
1.5.4.	Ergonomics	11
1.5.5.	Protection during breakdown or incidents	11
1.5.6.	Electric disconnect or shut off devices	11
1.5.7.	Fire prevention and explosion protection	11
1.5.8.	Protection against burns	11
1.5.9.	Gases and vapors	11
1.5.10.	Failure elimination	12
2.	INSTALLATION	13
2.1.	Preparation of the PS 16	13
2.2.	Installation	14
2.2.1.	Handling	14
2.2.2.	Installation	14
2.2.3.	Input power connection	14
2.2.4.	Connection with gas supply	15
2.3.	Preparation for work	15
2.3.1.	Connection of the remote control pendant	15
2.3.2.	Connection of an MU welding head or a TP or TS tube/tubeplate welding head	15
2.3.3.	Connection of an air cooled closed chamber welding head	16
2.3.4.	Connection of a liquid cooled closed chamber welding head	17
2.3.5.	Connection of a wire feed unit	17
2.3.6.	Connection of a manual torch with double command	18
2.3.7.	Connection of a liquid cooled closed chamber welding head with tachometry (optional)	18
2.4.	Controls	19
2.4.1.	Front panel	19
2.4.2.	Synopsis	20
2.4.3.	The remote control pendant	21
3.	OPERATION OF THE PS 254	22
3.1.	Fundamental procedures	22
3.1.1.	Switching on	22
3.1.2.	Positioning the welding head on the workpiece	22
3.1.3.	Wire setting	22
3.1.4.	Adjustment of the gas flow	22
3.1.5.	Manual cooling system start	22
3.2.	Programmation surface	23
3.3.	Programming	24
3.3.1.	Entering the program name	25
3.3.2.	Modifying the program name	25
3.3.3.	Choice of a built-in program	26
3.3.4.	Programming and modifying the welding parameters	27
3.3.5.	Programming of sectors	43
3.3.6.	Deleting a program from the source memory	46
3.3.7.	Entering the time and date	47
3.3.8.	Entering / modifying the company name	47

3.3.9.	Saving, loading a program	48
3.3.10.	Printing a program	49
3.3.11.	Programmable parameters.....	50
3.4.	Execution of a weld program	52
3.4.1.	Safety precautions.....	52
3.4.2.	Choosing the program to be executed	52
3.4.3.	Simulation	52
3.4.4.	Weld cycle.....	52
3.4.5.	End of welding cycle.....	53
3.4.6.	Manual weld cycle stop.....	53
4.	SERVICING, MAINTENANCE AND TROUBLESHOOTING	55
4.1.	Servicing	55
4.1.1.	Adjustments	55
4.1.2.	Adjustment of the inverter unit	57
4.1.3.	Adjusting the rotation speed of welding heads with tachometry (optional).....	61
4.1.4.	Coolant	62
4.1.5.	Printer	62
4.2.	Maintenance and troubleshooting.....	63
4.2.1.	Replacing fuses.....	63
	Fig. 4.14: Location of the fuses.....	63
4.2.2.	Trouble shooting.....	64
4.2.3.	Spare parts (See "summary spare parts" pages 84/85)	69
4.2.4.	Circuit description.....	70
5.	APPENDIX	76
5.1.	Built-in programs	76
5.1.1.	Closed chamber welding heads or MU heads without filler wire.....	77
5.1.2.	MU open welding heads with filler wire	79
5.1.3.	TS/TP welding heads for welding of tubes to tubesheet	80
5.2.	Error codes	81
	CONFIGURATION OF THE DIPS FOR PS 254.....	82
	SUMMARY SPARE PARTS	85

1. INTRODUCTION

1.1. The PS power sources

The power source PS 254 belongs to a versatile new family of universal and easy to use orbital TIG power sources. Special features are:

- Welding sequences entirely programmable in the language of the welder.
- Ease of use due to an intuitive programming.
- Integrated program library for quick welding parameter research.
- Real time monitoring system.
- Integrated printer for documentation of welds according to the ISO 9000 standard.
- Possibility of storing programs in the memory of the power source or on 3,5" disk.
- Modern inverter based power source technology.
- Mechanised welding with the ease and comfort of PS power sources.

With a weld current range between 1 A and 350 A and up to six programmable axes the PS power sources respond to a wide field of applications:

- Pulsed or continuous weld current.
- Travel speed and wire speed continuous or with pulsation synchronised to the weld current.
- With Arc Voltage Control AVC, the welding of several passes without interruption is possible.
- Oscillation.
- Programmable mass flowmeter for the shielding gas.

PS 204

Portable 200 A, single phase input power source. Ideal for on site use.



PS 254

Power source 250 A. Ideal for shop, site and sub-assembly work.



PS 256

Portable power source 250 A. Comes with AVC and oscillation.



PS 356

Power source 350 A. Programming like PS 256. Universality for all welding needs.



1.2. The orbital welding heads

The PS power sources support most of the Polysoude orbital welding heads.

1.2.1. The open welding heads

- MU IV type for standard applications and all weld problems where AVC and oscillation is required.
- Polycar welding carriage to weld large diameter pipes.



MU IV AVC/BL with AVC and oscillation.

Modular design. Microprocessor controlled AVC and oscillation slides, driven by precision stepper motors.



POLYCAR welding carriage to weld large diameter pipes.

Microprocessor controlled AVC and oscillation. Integrated wire feeder. Possibility to adapt equipment for distance controlled or mechanised welding processes.

1.3. The tube to tubesheet welding heads

- TS heads with different productivity to meet all requirements.



TS 73 the standard welding head for tube to tubesheet applications.

Open welding head for protruding, flush or recessed tubes.



POLYFIL external wire feeder.

Wire feeder with four roll linear drive system to minimise wire deformation and surface distortion.

External wire feeder.

1.3.1. The closed chamber weld heads

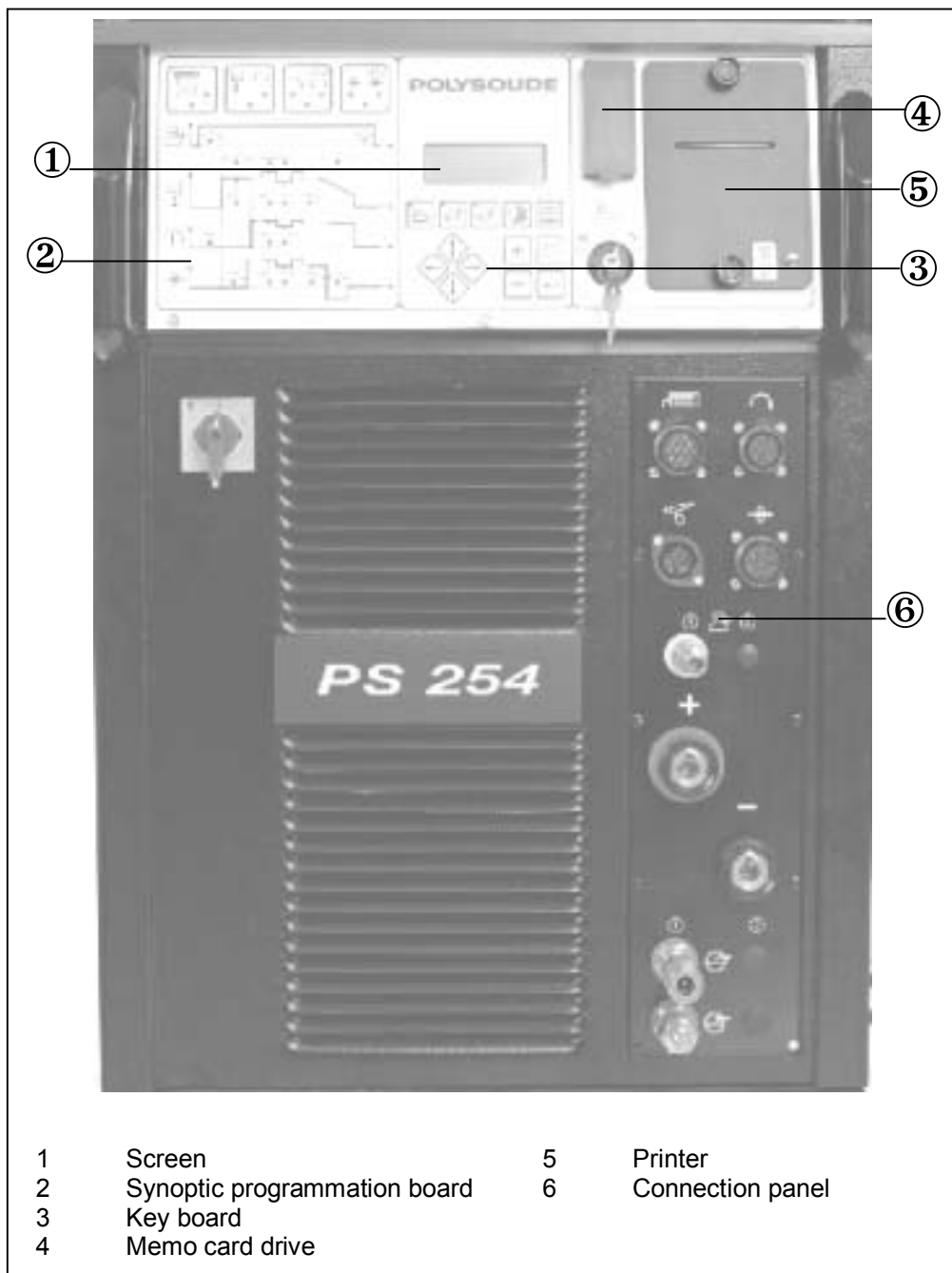
- Sentry UHP for the demands of high purity industries.
- HD when the access to the weld area is reduced.
- MW for high production rates.
- K to answer the demand of a very reliable shielding gas protection.



1.4. Technical specifications of the power source PS 254

1.4.1. Design features

The PS 254 was designed especially for automatic TIG (GTAW) welding. It works with H type enclosed welding heads and it is compatible with all standard Polysoude MU III or IV open welding heads, TS and TP heads for welding tube to tube plates and K, H, MW and UHP enclosed heads of the Astro Arc Polysoude range. The Polyturn positioner and the Polyfil wire feed unit can be used. Welding with a manual TIG (GTAW) torch is also possible.



1.4.2. The remote control pendant

This allows:

- The positioning of welding heads and wire feed units
- The starting and stopping of weld cycles
- The selection of the program to be executed
- The simulation of a cycle without welding
- Modifications to be made during a cycle
- The shielding gas to be tested
- The manual start of the cooling pump
- The stopping of a cycle in the case of an emergency.



1.4.3. Technical characteristics

Power input	Three phase +ground 400V - (as an option : multi voltage ; 200 – 460 V) ± 10 % 50 or 60 Hz
Open circuit voltage	105 V
Insulation class	F
Protection class	IP 21 IK04
Welding current range	4 - 250 A D.C.
Duty cycle	250 A / 60 % - 190 A / 100 %
Current resolution	1 % when I ≥ 100 A - 1 A when I ≤ 100 A
Pulse frequency	from 10 to 9999 ms
Movement controls	Direct or pulsed current Constant or pulsed command of torch rotation Constant or pulsed wire feed, wire-retract at the end of the weld
Precision on movements	± 1 %
Gas control	Gas torch with security second gas (option)
Power source cooling	Forced ventilation
Torch cooling	By water in closed circuit with flow safety valve
Display of real values during cycle	Continuous display: . of arc voltage . of welding current . of impulses of movements
Programs in user memory	16
Display	4 lines of 20 characters, with 8 characters reserved to the designation of programs
Program sectors	10 maximum
Program library	60
Program storage	On memory card
Auto-diagnostic system	Display of code number
Immediate exploitation	with welding heads : . tube/plate . tube/tube MU* - MW - H - K, UHP . direct use of wire feeder Polyfil . PO motor mechanised application
Specific functions	Possibility of connecting a manual TIG torch As an option : possibility of controlling welding heads with tachometer feedback
Size L x W x H (mm)	890 x 500 x 890
Weight	100 kg
Standard	EN 60974-1/EN 50199

1.5. Safety precautions

1.5.1. General rules

All aspects of work should be planned with caution. To carry it out, safety related actions are continuously required.

All hook up or maintenance operations described in this manual, which may be harmful, are always indicated by the ATTENTION symbol.

Warning



Situation with the risk to injure persons or even danger of life

Procedures to avoid malfunction or damage of equipment are indicated by the mention **Note**.

1.5.2. Training of the operators

One copy of the operating and maintenance manual is always delivered with the equipment. The different operators (welder, controller, maintenance people, ...) must always have at their disposal at least one spare copy (respect the copy right). The qualification they need for their work depends on the level of responsibility they carry during their mission.

1.5.3. Maintenance and adjustments

If maintenance or adjustment work has to be carried out on the upper parts of the equipment, a scaffold has to be erected.

It is strictly forbidden to pull on cables or hoses to move welding heads or the power source or to push on consoles or panels.

1.5.4. Ergonomics

□ Identification

Identification by means of colours, especially on safety relevant elements like buttons or pilot lamps, must not be altered or changed. Components with worn out colours have to be replaced.

□ Lighting of the work area

Lighting equipment should give regular light without spots or too much light concentration.

Glare-free light without deep shadows can help to avoid fatigue of the operators.

1.5.5. Protection during breakdown or incidents

Before taking action in the case of a breakdown or incident, the machines must be disconnected from the power supply.

1.5.6. Electric disconnect or shut off devices

□ Disposition of equipment isolators

The presence of electric disconnect or shut off devices is imposed by law. In case of mobile equipment or when Polysoude supplies only a part of the entire machine, the customer is responsible to install the necessary missing devices.

□ Operation of electric disconnect or shut off devices

Before electric disconnect or shut off devices are operated, it has to be checked that this action is of no danger for operators or visitors.

1.5.7. Fire prevention and explosion protection

The working environment for the welding machines must be free of combustible material and solvents.

The PS 254 should never be used for the purpose of defrosting.

1.5.8. Protection against burns

Operators and visitors must wear protection against sparks.

1.5.9. Gases and vapors

A sufficient ventilation has to be installed in the workshop to avoid health hazards caused by gases or vapors generated during the weld process. A protection against the radiation emitted from the arc has to be worn.

1.5.10. Failure elimination

Only qualified electricians are allowed to work on electric or electronic equipment of the welding machines and their connection to the power supply.

Directly before beginning any work, the isolation from the power supply has to be controlled.

Warning



Electric or electronic devices may be under high voltage even when disconnected from the power supply. Capacitors keep their charge during a long period of time.

It is forbidden to alter or remove safety devices from the machines.

Working on electric devices is only allowed when standing on a dry floor. Avoid the penetration of liquids to electric devices.

In the area around welding machines, solvents and combustible liquids are not allowed.

Watches, jewelry and bracelets may not be worn during interventions on electric devices.

2. INSTALLATION

2.1. Preparation of the PS 254

The PS 254 is delivered in a transport protection case. You will find:

- The remote control pendant BP 1436 or BP 1737(1).
- A ground cable 9 m (30') in length (2).
- A gas connection (two other ones in case of an optional second gas) (3).
- This operating and maintenance manual (4).
- One memo card (5).

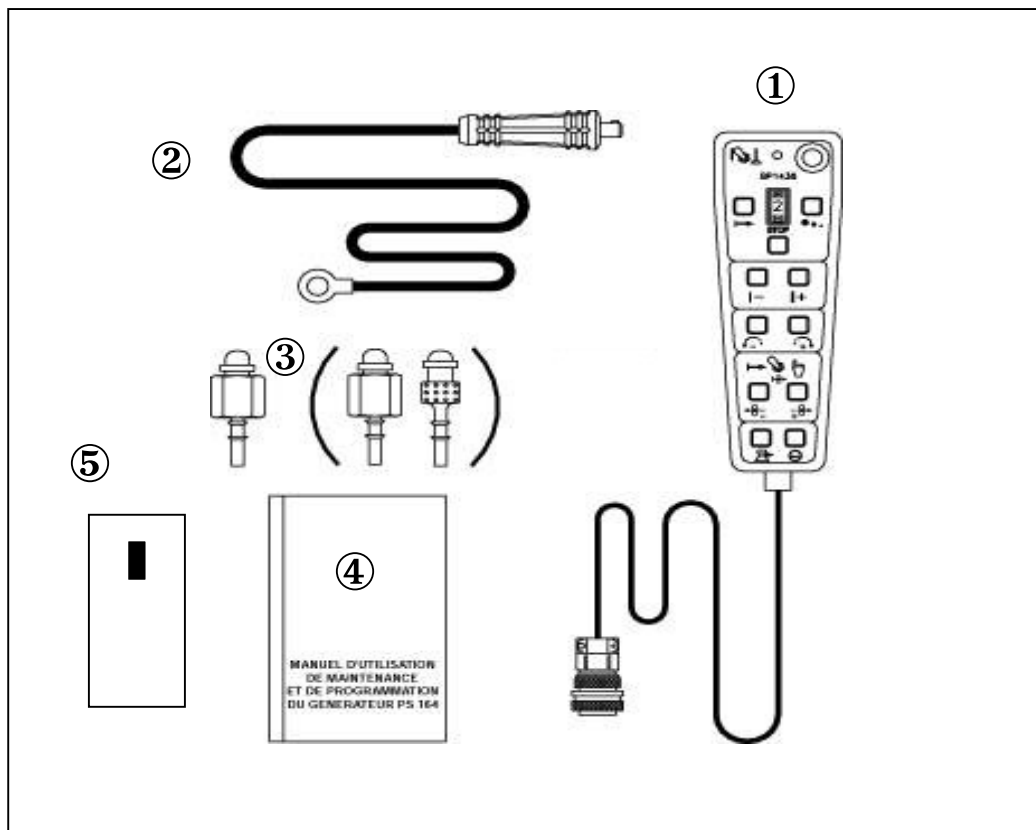


Fig. 2.1 : Accessories of the PS 254

Warning



Do not move the PS 254 with a fork-lift truck if it is not place on its original pallet.

2.2.2. Installation

For safe work the PS 254 has to be placed horizontally, on a firm surface. In this case a shaft system ensures the stability of the machines.

Openings are provided for ventilation of the power source. To ensure effective cooling of the system, a minimum distance of 30 cm (12") should be maintained between these openings and any surface.

2.2.3. Input power connection

Warning



All connections must be made by a qualified technician respecting the safety rules given by law or quoted in this manual.

General

The PS 254 is connected to the main power supply with a cable of 3 conductors + ground, which comes with the machine (length 3,5 m). It is essential to connect the ground cable correctly in order to ensure the safety of the operators.

Refer to the name plate of your power source for input power requirements. For example, to work with an input voltage of 230 V, a 21 A fuse is required.

Warning



It is essential to connect the ground cable in order to ensure the safety of the operators.

POLYSOUDE Z.I. DU BOIS BRIAND 2 rue P.BEAUPERE 44316 NANTES CEDEX 03 FRANCE				POLYSOUDE	
TYPE: PS 254		N°:			
		EN 60974-1			
	4A / 10V - 250A / 20V				
		X	60%	100%	
	U ₀ =106V		I ₂	250A	190A
			U ₂	20V	17.6V
	U1	I1			
	200V		24.2A	18A	
	208V		23.2A	17.3A	
	220V		22A	16.3A	
	230V		21A	15.6A	
	240V		20.2A	15A	
	380V		12.7A	9.5A	
	400V		12.1A	9A	
		11.7A	8.7A		
440V		11A	8.2A		
		10.5A	7.8A		
480V		10A	7.5A		
IP 21		IK 04			

Fig. 2.2 : Name plate of the PS 254 multivoltage

POLYSOUDE Z.I. DU BOIS BRIAND 2 rue P.BEAUPERE 44316 NANTES CEDEX 03 FRANCE				POLYSOUDE	
TYPE: PS 254		N°:			
		EN 60974-1			
	4A / 10V - 250A / 20V				
		X	60%	100%	
	U ₀ =106V		I ₂	250A	190A
			U ₂	20V	17.6V
	U1	I1			
	400V		12.1A	9A	
IP 21		IK 04			

Fig. 2.3 : Name plate of the PS 254 single voltage

□ Input voltage taps

Do not consider this paragraph if the PS 254 has to be connected in 400 V only.

In the case of a PS 254 fitted out with the multivoltage kit, the input power jumpers must be set correctly before it is switched on. The input power of the power source is 500 V when it is delivered to you.

Coupling is made on the terminal connection of the power transformer. Unscrew the four shackles on the top of the power source and remove the roof in order to get access. Before proceeding on any electrical part, make sure the machine is not connected to the electrical mains supply.

The power transformer being three-phase, coupling has to be made in these three different points.

wire to the “+” terminal if your voltage is too high or to the “-“ terminal if it is too low.

Refer to the following table to know the acceptable variations depending on connections and nominal voltage (Un).

MAXIMUM CONNECTION	MAXIMUM VOLTAGE	MINIMUM VOLTAGE
U	Un + 10 %	Un – 10%
-	Un + 5 %	Un – 15 %
+	Un + 20 %	Un

U1	Up			Us		
	L1 ↓	L2 ↓	L3 ↓	U1 ↑	V1 ↑	W1 ↑
200V	A	A	A	Z	Z	Z
208V	A	A	A	Y	Y	Y
220V	B	B	B	Z	Z	Z
230V	B	B	B	Y	Y	Y
240V	B	B	B	X	X	X
380V	C	C	C	Z	Z	Z
400V	C	C	C	Y	Y	Y
415V	C	C	C	X	X	X
440V	D	D	D	Z	Z	Z
460V	D	D	D	Y	Y	Y
480V	D	D	D	X	X	X

Fig. 2.4 : Input voltage taps

The value of the mains voltage is beyond standards.

The PS 254 is designed to work with a mains voltage which can fluctuate by ± 10 % from the nominal value. If the mains voltage of your equipment is not comprised within this range, you can intervene. In the connection terminal situated near the transformer, move the "U"

2.2.4. Connection with gas supply

Connection with the gas supply is made at the rearside of the power source with the appropriate fittings. Flow regulators should be used to adjust the power source inlet gas stream to the correct value (see appendix 4 - Spare parts). Before making any connections, briefly open the valves to drive out any impurities.

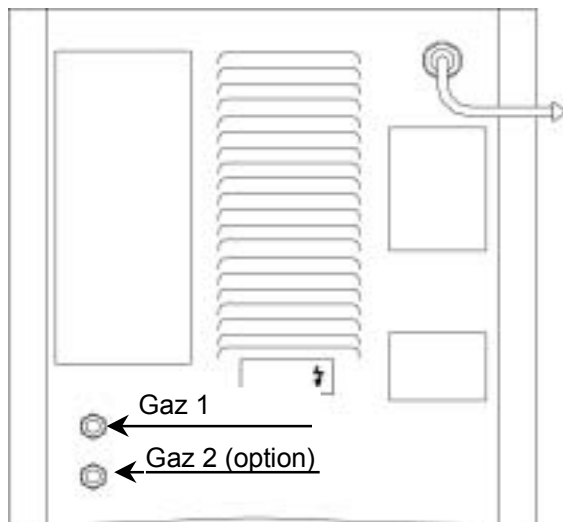


Fig. 2.4 : Gas connections at the right side of the PS 254

2.3. Preparation for work

2.3.1. Connection of the remote control pendant

Connection of the remote control pendant is made with the plug on the right side of the PS 254 on the screw connector. Make sure the securing ring is tightened properly, otherwise the system may not function correctly. Warning: the power source will not work if the remote control pendant is not properly connected.

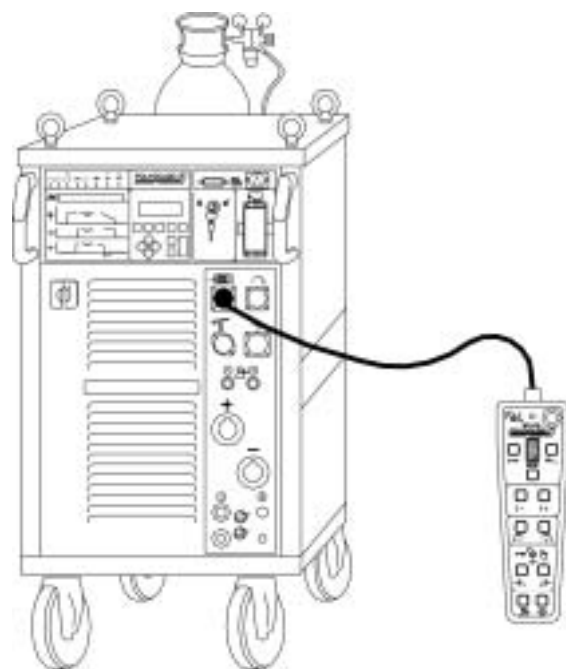


Fig. 2.5 : Connection of the remote control pendant with the PS 254

2.3.2. Connection of an MU welding head or a TP or TS tube/tubeplate welding head

Liquid cooled welding heads of these types need to be used with the integral cooling unit.


□ Connection of the electrode current cable

Connect the current cable on the "-" terminal with the quick connector, locking it by a short rotation to the right.


❑ **Connection of the current return cable**

Connect the current return conductor cable onto the "+" terminal marked by a red ring. Connection is made with a quick connector, by a short rotation to the right. Connect the other end of the cable to the workpiece, as close as possible to the joint to be welded, in an area free from grease and oxide.



❑ **Connection of the rotation motor cable**

Join the cable on the "Rotation" connector (symbol ). Make sure that the securing ring is properly tightened, otherwise the system may not function correctly.

❑ **Connection of the torch shielding gas hose**

Connection is made with a quick push-type self sealing coupling situated at the connection plate of the power source (symbol ).

❑ **Connection of the coolant circuit**

Connection is made by 2 quick push type self sealing couplings on the front view (symbols  and ).

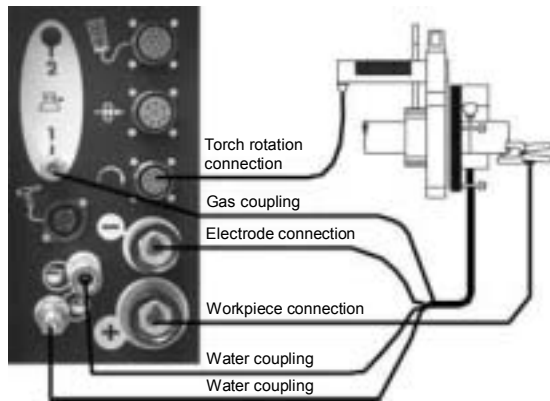


Fig. 2.6 : Connection of an MU welding head or a TP/TS welding head

2.3.3. Connection of an air cooled closed chamber welding head

Connection of an air cooled closed chamber welding head


❑ **Connection of the electrode current cable**

Connect the current cable on the "-" terminal with the quick connector, locking it by a short rotation to the right. This cable is not indicated.


❑ **Connection of the current return cable**

Connect the current return conductor cable onto the "+" terminal marked by a red ring. Connection is made with a quick connector by a short rotation to the right. This cable is indicated red.

❑ **Connection of the rotation motor cable**

Connect the cable on the "Rotation" module connector (symbol ). Make sure that the securing ring is properly tightened, otherwise the system may not function correctly

❑ **Connection of the torch shielding gas hose**

Connection is made with a quickpush type self sealing coupling disconnect fitting situated at the bottom left hand corner of the front panel of the PS 254 (symbol ).

❑ **Connection of a bypass plug for the coolant circuit security for use with air cooled welding heads.**

It is necessary to introduce the bypass plug to isolate the cooling circuit security in order to avoid a continuously detected fault.

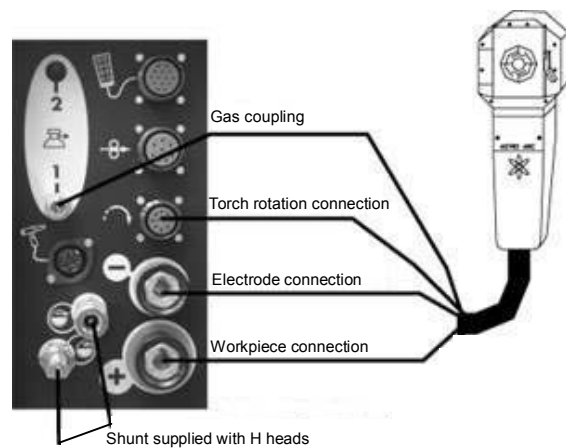


Fig. 2.7 : Connection of an air cooled closed chamber welding head

2.3.4. Connection of a liquid cooled closed chamber welding head

This is the case for type K and MW Astro Arc Polysoude closed welding heads.


❑ **Connection of the electrode current cable**

Connect the current cable on the "-" terminal with the quick connector, locking it by a short rotation to the right.

❑ **Connection of the current return cable**

Connect the current return conductor cable to the "+" terminal with the quick connector, locking it by a short rotation to the right. This cable is indicated red.


❑ **Connection of the rotation motor cable**

Join the cable to the "Rotation" connector (symbol ). Make sure that the securing ring is tight otherwise the system may not function correctly.


❑ **Connection of the manual command cable on the head (MW heads)**

Connect the manual commands cable on the FA 5 terminal (Fig. 2.12) on the connection plate.

❑ **Connection of the coolant circuit**

Connection is made by 2 quick push type self sealing couplings on the cooling unit RC 200 (symbols .

❑ **Connection of the torch shielding gas**

Connection is made with a quick disconnect fitting situated at the connection panel of the PS 254 (symbol  ①).

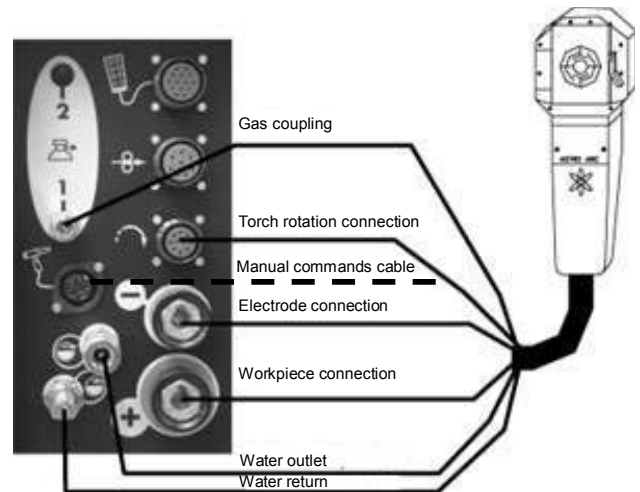



Fig. 2.8 : Connection of a liquid cooled closed chamber welding head (_ _ .for heads with integrated commands)

2.3.5. Connection of a wire feed unit

The wire feed unit is connected at the connection panel of the PS 254 (symbol ). Make sure that the securing ring is tight otherwise the system may not function correctly.

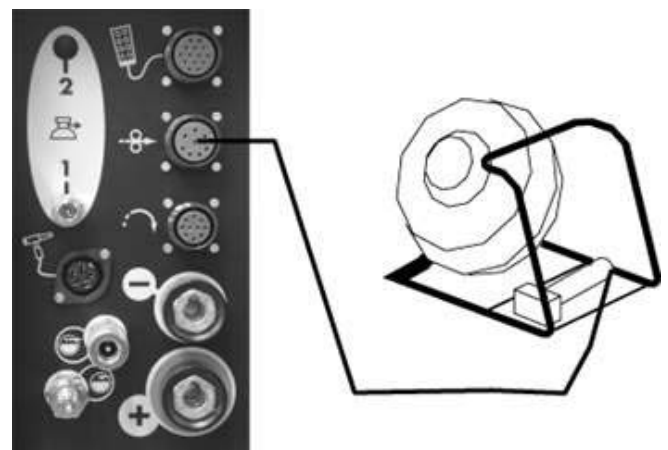


Fig. 2.9 : Connection of a wire feed unit

2.3.6. Connection of a manual torch with double command

❑ **Connection of the electrode current cable**

Connect the current cable on the "-" terminal with the quick connector, locking it by a short rotation to the right.


❑ **Connection of the ground cable**

Connect the ground cable to the "+" terminal surrounded by a red ring. Connection is made with a quick connector, with right hand locking. Connect the other end of the cable to the workpiece, as close as possible to the joint to be welded, in an area free from grease and oxide.


❑ **Connection of the command cable**

The command cable of the manual torch has to be joined to the socket FA 5 (Fig. 2.12).

❑ **Connection of the coolant circuit**

Connection is made by 2 quick push type self sealing couplings on the front panel (symbols and ).

❑ **Connection of the torch shielding gas hose**

Connection is made with a quick push-type coupling located on the connection plate of the power source (symbol  ①).

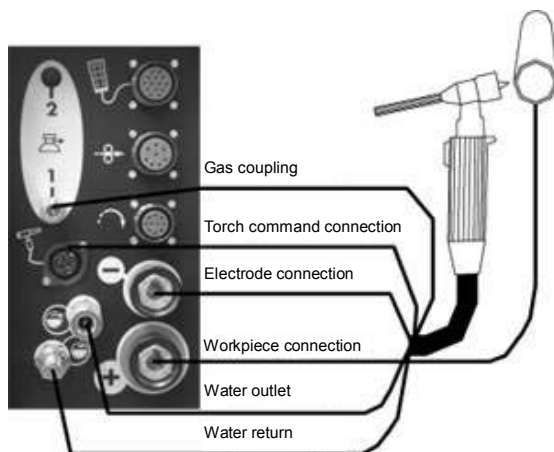


Fig. 2.10 : Connection of a manual torch

2.3.7. Connection of a liquid cooled closed chamber welding head with tachometry (optional)

Adapters are mounted between every circuit from welding head and connections on power source :

- Gas circuit.
- Torch rotation.
- Electrode connection and water return.
- Workpiece connection and water outlet.

Connections of these adapters on the power source are identical with those of a liquid cooled closed chamber welding head.

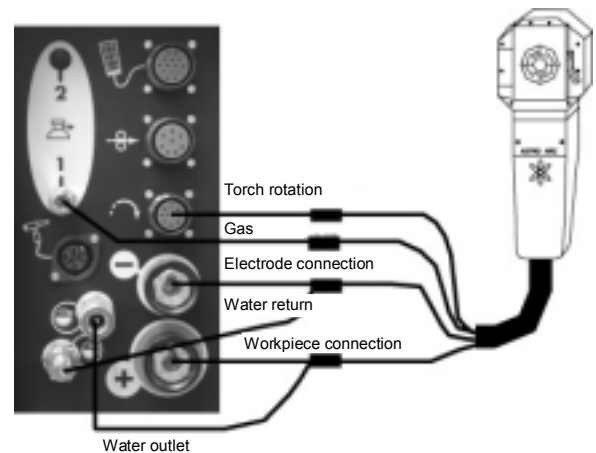


Fig. 2.11 : Connection of a liquid cooled closed chamber welding head with tachometry

2.4. Controls

2.4.1. Front panel

- | | | | |
|-------------|---|--------------|--|
| FA 1 | On/off switch. | FA 8 | Connection of the torch shielding gas inlet. |
| FA 2 | Connection for the remote control pendant cable. | FA 9 | Connection for the torch shielding gas. |
| FA 3 | Connection for the rotation motor cable. | FA 10 | Connection for the ground cable. |
| FA 4 | Connection for the wire feed unit cable. | FA 11 | Connection for the electrode cable. |
| FA 5 | Connection for manual torch commands or for manual commands for MW heads. | FA 12 | Coolant outlet. |
| FA 6 | Connection of a second gas inlet [backing gas] (option). | FA 13 | Coolant return. |
| FA 7 | Connection for a second gas [backing gas] (option). | | |

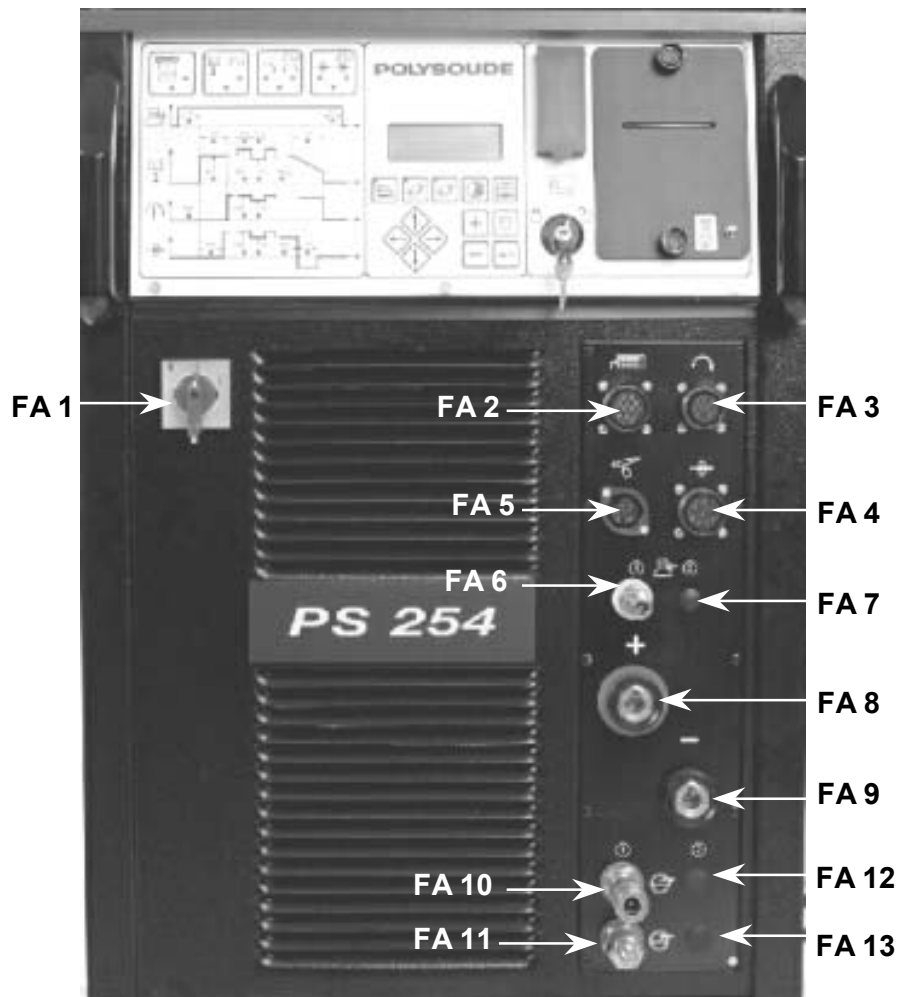


Fig. 2.12 : Front panel

2.4.2.Synopsis

- SY 1** Indicator "Printer mode".
- SY 2** Indicator "Print report when weld cycle is finished".
- SY 3** Indicator "Current mode".
- SY 4** Indicator "With pulsed current".
- SY 5** Indicator "Forward rotation".
- SY 6** Indicator "Rotation mode".
- SY 7** Indicator "Pulsed rotation speed".
- SY 8** Indicator "With wire ".
- SY 9** Indicator "Wire pushing mode".
- SY 10** Indicator "Pulsed wire speed".
- SY 11** Print a program key and indicator "Printing in process".
- SY 12** Loading a program from the memo card key and indicator "Loading in process".
- SY 13** Saving a program on the memo card key and indicator "Saving in process".
- SY 14** Key to program sector positioning or for entering the date, time and name of your company.
- SY 15** Key to choose built-in programs from the machine memory.
- SY 16** Keys for moving inside the synoptic.
- SY 17** Keys for moving inside the synoptic.
- SY 18** Keys for moving inside the synoptic.
- SY 19** Keys for moving inside the synoptic.
- SY 20** Key for increasing parameter values.
- SY 21** Key for decreasing parameter values.
- SY 22** Enter key.
- SY 23** Key for deleting programs or sectors (trash can).
- SY 24** Screen
- SY 25** Key operated switch "Modification permitted or not".
- SY 26** Port for memo card.
- SY 27** Printer.
- SY 28** Paper advance / reprint weld cycle report.

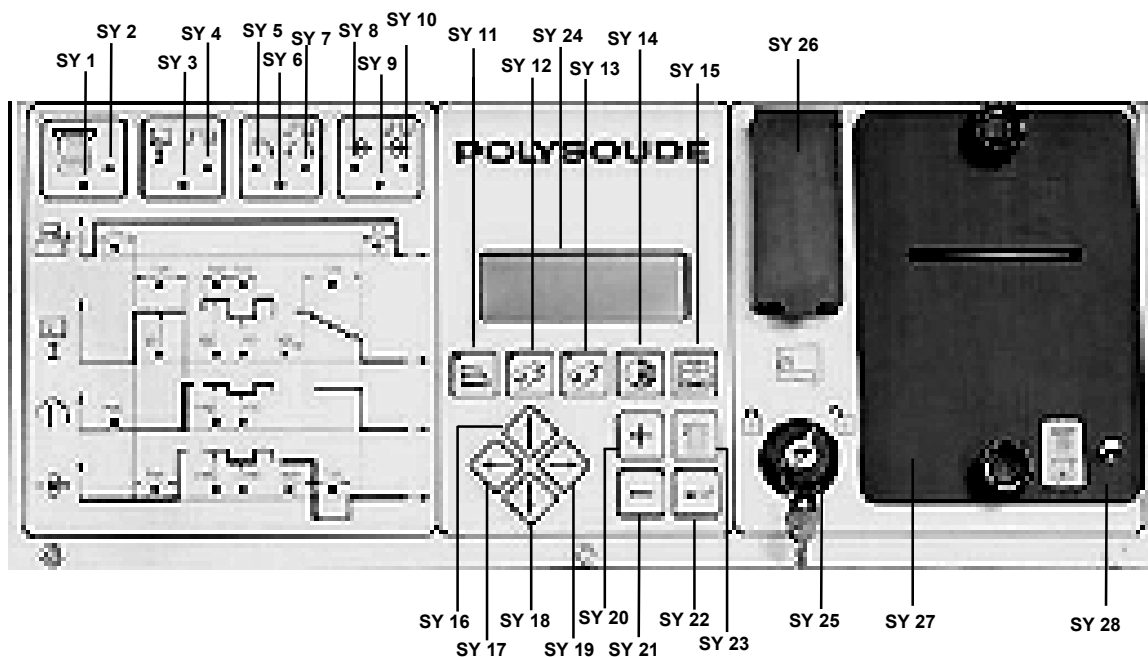


Fig. 2.14 : Synopsis

2.4.3. The remote control pendant

- BT 1** Selection switch - "Set up / weld".
- BT 2** Emergency stop button.
- BT 3** Indicator
Illuminated : Cycle in process.
Flashing : Fault detected.
- BT 4** Switch for selecting the number of a user program.
- BT 5** Push button "Start cycle".
- BT 6** Push button "Stop cycle with downslope".
- BT 7** Push button "Stop cycle immediately".
- BT 8** Push button "Increase current (+)".
- BT 9** Push button "Decrease current (-)".
- BT 10** Push button with two functions:
Out of weld cycle: Forward rotation.
During weld cycle: Increase rotation speed.
- BT 11** Push button with two functions:
Out of weld cycle: Backward rotation.
During weld cycle: Decrease rotation speed.
- BT 12** Wire start "Automatic / Manual".
- BT 13** Push button with two functions:
Out of weld cycle: Wire forward.
During weld cycle: Increase wire speed..
- BT 14** Push button with two functions:
Out of weld cycle: Wire reverse.
During weld cycle: Decrease wire speed.
- BT 15** Push button to start the cooling pump "Test cooling circuit".
- BT 16** Push button "Gas test".

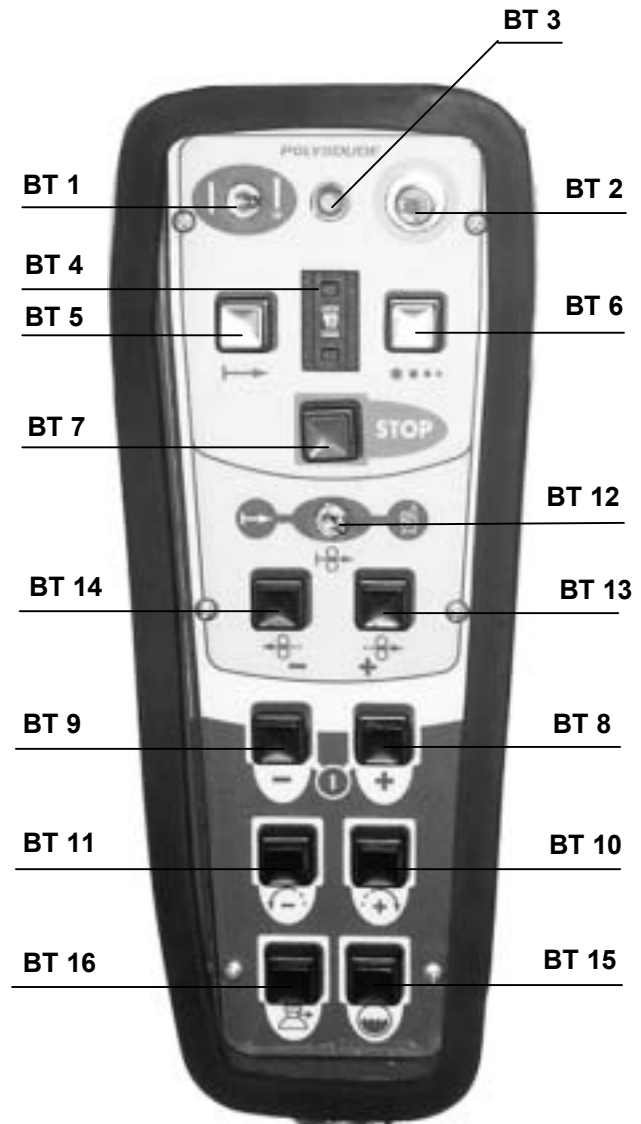


Fig. 2.15 : The remote control pendant

3. OPERATION OF THE PS 254

3.1. Fundamental procedures

3.1.1. Switching on

With the installation properly connected (see chapter 2), turn the switch FA 1 to the position 1. After a short period the power source is ready to be used, the screen should be lit.

Note: The remote control must be connected to the PS 254 in order to make the power source work.

If a problem should occur, please refer to Chapter 4.2.2 "Maintenance and Troubleshooting".

3.1.2. Positioning the welding head on the workpiece

Please read the manual supplied with each welding head before positioning a POLYSOUDE or ASTRO ARC POLYSOUDE welding head on a workpiece. Once the welding head is positioned, you can drive the electrode exactly where you want the cycle to start by using the head rotation buttons **BT 13** and **BT 14** on the remote control pendant. Warning : with some enclosed welding heads, the cycle can only be started with the electrode in home position.



Fig. 3.1 : Buttons for manual rotation of the welding head on the remote control pendant

This action is comprised of two stages: during the first two seconds the rotation speed is reduced to 20 % of the maximum speed, afterwards the rotation speed becomes 100 %. This allows both quick and accurate positioning of the electrode.

In the case of welding heads fitted with a home position contact, the manual rotation stops when the head is in the "open" position. By releasing the button and pressing it again the rotation can be continued. This command is very useful because a closed welding head **can only start in the open position.**

3.1.3. Wire setting

Combined with the "Auto / Manual Wire" switch (BT 12), the two buttons **BT 9** and **BT 8** on the remote control pendant permit precise positioning of the wire.

If the switch **BT 12** is in the "Auto" position, pressing one of these buttons advances (**BT 8**) or retracts (**BT 9**) the wire. This action is comprised of 2 speeds: during the first 2 seconds the wire moves at a reduced speed of 20 % of the maximum speed, afterwards it moves at 100 %. This allows both rapid and precise positioning of the wire.

If the switch is in the "Manual" position, the function of the wire retract button **BT 9** remains as stated above. However, by pressing the wire advance button for a first time the wire is advanced at a high speed, a second pressing of the button causes the wire to stop. This function is particularly useful when loading the wire into the wire guide sheath.



Fig. 3.2 : Remote control pendant buttons for wire positioning

3.1.4. Adjustment of the gas flow

The gas flow has to be adjusted with a flowmeter at the gas source. The push button **BT 16** energises the gas valve.



Fig. 3.3 : Gas test button

3.1.5. Manual cooling system start

After changing a welding head, and particularly if you use an extension cable, it is possible that the coolant system contains some air. After the start of a cycle a fault in the cooling system can be detected (11 is the number of this error code). With the button **BT 15** you can switch on the cooling circuit pump to replenish the system before starting the next cycle.



Fig. 3.4 : Push button "cooling circuit"- Start pump "cooling circuit"

3.2. Programmation surface

General explanation of the functions

□ Updating the date and time

The time and date can be entered into the memory of the PS 254. Both the time and the date then appear on any printed weld cycle report.

□ Entering your company name

The name of the company can be stored in the PS 254. This name also appears on any printed weld cycle report. However, it is not stored on the memo card.

□ Entering the program name

The switch BT 4 on the remote control pendant is used to select a program allocation. Furthermore, each time a program is created it can be given a name. This makes it easier later on to look for a specific program.

Warning



Before the name of a program is input, the range of current must be chosen with the SY 30 selector

The name of the program can consist of up to 8 characters. A character can be any letter of the alphabet, any number, a space, a full stop or a comma. The name is shown on the display of the power source after a program is selected, it is printed on the program lists and the weld cycle reports, and it is saved on the corresponding memo card.

□ Making a program

There are two different ways to make a welding program. You can make a copy of a built-in program which already exists in the machine memory and modify it, or you can create a completely new program.

□ Copy and modification of an existing program

The power source PS 254 comes with more than 60 built-in programs already stored in the machine memory. These programs correspond to the most often faced orbital welding problems. Knowing the tube material, diameter and wall thickness, you can choose a program which is similar to your application, copy it in one of the 16 user programs and modify it exactly to your requirements. A list of the 60 stored built-in programs is given in Appendix 5.1.

□ Creating a new program

When creating a program, the dialogue will guide you by indicating when to introduce parameter values. Proposed values correspond to most regularly encountered ones in orbital welding. For a program to be created, the proposed parameters are for example:

- Forward rotation without pulsation.
- Pulsed current.
- Wire without pulsation, if the selected range of current is 160 A.
- Without wire, if the selected range of current is 50 A

For a list of the proposed parameter values, please refer to chapter 3.3.11. You are not obliged to enter all the choices if some of the parameters and conditions already correspond to what you require.

□ Modifying a program

Outside of a weld cycle you can modify every program present in the power source's memory using the synopsis. The operating mode is the same as that for creating a program.

□ Saving a program in the power source memory

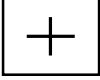
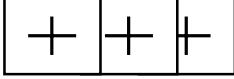
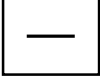
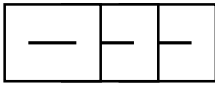





The creation and modification of programs in the memory of a PS 254 is only possible if the key operated switch «Modification authorised or not» is in the position «Modification authorised» (symbol). You can protect your programs by positioning the key operated switch in the "Modification not authorised" position (symbol) and remove the key.

3.3. Programming

The titles of the following chapters are:

- 3.3.1 Entering the program name.
- 3.3.2 Modifying the program name.
- 3.3.3 Choice of a built-in program.
- 3.3.4 Programming and modifying the welding parameters:
 - Configuration.
 - Gas.
 - Current.
 - Rotation.
 - Wire.
- 3.3.5 Programming of sectors:
 - Creation of a sector.
 - Modification of sector start position.
 - Deleting a sector.
- 3.3.6 Deleting a program from the source memory.
- 3.3.7 Entering the time and date.
- 3.3.8 Entering/modifying the company name.
- 3.3.9 Saving, loading a program
 - Saving a program.
 - Loading a program.
- 3.3.10 Printing a program.
- 3.3.11 Programmable parameters

Explanation of symbols used

SYMBOL	MEANING
	Press once to increase
	Press and hold to increase
	Press once to decrease
	Press and hold to decrease
	Press once
	Press and hold for at least 2 seconds
	Indicator not illuminated
	Indicator flashing
	Indicator illuminated

□ Characteristics of the welding heads

Open welding heads MU III and MU IV

Weld head type	Minimum diameter (mm)	Maximum diameter (mm)	Reference number (R30)	Number of impulses per revolution	Factor C (VP=C*VL/D)
MU III 16	4	16	A014	357	24
MU III 25	8	26	A028	357	48
MU III 34	20	34	A033	364	58
MU III 8/34	8	34	A033	364	58
MU III 51	25	51	A086	361	150
MU III 20/80	20	80	A073	360	127
MU III 80	32	80	A073	360	127
MU III S 80	32	80	A073	360	127
MU III 114	70	114	A100	360	174
MU III 30/114	30	114	A100	360	174
MU III S 115	17	114	A100	360	174
MU III 170	76	170	A183	359	317
MU III S 170	60	170	A183	359	317
MU III 220	102	220	A322	360	559
MU III 370	150	370	A360	360	625
MU IV 28	8	28	A024	358	41
MU IV 38	8	38	A028	357	48
MU IV 64	14	64	A040	360	69
MU IV 80	19	80	A051	361	89
MU IV 104	19	104	A062	361	108
MU IV 115	10	115	A069	362	120
MU IV 128	25	128	A082	360	142
MU IV 195	76	195	A137	360	238
MU IV 245	101.6	245	A200	360	347
MU IV 275	114	275	A197	360	342

Positioners Polyturn

Weld head type	Minimum diameter (mm)	Maximum diameter (mm)	Reference number (R30)	Number of impulses per revolution	Factor C (VP=C*VL/D)
Polyturn 11	3	180	A017	354	29
Polyturn 50	10	600	A038	356	65
Polyturn 175	35	1000	A132	360	229

Closed chamber welding heads with impulse generator

Weld head type	Minimum diameter (mm)	Maximum diameter (mm)	Reference number (R30)	Number of impulses per revolution	Factor C (VP=C*VL/D)
H 500A	3.17	12.7	B007	366	12
HD 500 P	3.17	12.7	B007	366	12
HD 750 P	4.75	19.05	B009	369	16
HD 1500 P	6	38.1	B015	364	26
K 375 a	1.6	9.5	B009	341	15
K 375 n	1.6	9.5	A016	367	28
K 875 a	3.17	22.2	B010	355	17
K 875 n	3.17	22.2	A018	367	32
K 1500	6.35	38.1	B025	362	44
K 2000	12.7	50.8	B025	356	43
K 2500	12.7	63.5	B028	360	49
K 3000	25.4	76.2	B031	363	54
K 4000	38.1	101.6	B038	359	66
K 6000-T	50.8	152.4	A110	362	190
K 7000	76.2	177.8	A200	360	347
MW40	6	40	D023 C	360	40
MW65	10	65	D034 C	365	60
MW115	10	115	D073 C	358	126
MW170	10	170	C103 C	359	178
MW1250	6	33.4	C017	369	30
MW2500	9.5	63.5	C047	358	81
MW4500	25	114.3	A119	359	206
UHP 250	1.6	6.35	D006	384	11
UHP 500	3.0	12.7	D009	360	16
UHP 1500	6.0	38.1	D023	360	40

* a : previous
n : new

Tachometer controlled closed chamber welding heads

Weld head type	Minimum diameter (mm)	Maximum diameter (mm)	Reference number (R30)	Number of impulses per revolution	Factor C (VP=C*VL/D)
K 375	1/16	3/8	G018	367	32
K 875	1/8	7/8	G018	367	32
K 875 (option)	1/8	7/8	G009	367	16
K 1500	1/4	1 1/2	G018	367	32
K 2000	1/2	2	F037	357	64
K 2500	1/2	2 1/2	F037	357	64
K 300	1	3	F037	357	64
K 4000	1 1/2	4	F037	357	64
K 6000	2	6	G183	361	318
K 7000	3	7	G183	361	318
H 500	1/8	1/2	G018	367	32
H 750	1/8	1/4	G018	367	32
H 1500	3/16	1 1/2	G018	367	32
MW 1250	1/8	1 5/16	G018	367	32
MW 2500	1/2	2 1/2	F037	357	64
MW 4500	2	4 1/2	F073	362	127
UHP 250 A	1/16	1/4	G006	367	11
UHP 500 A	1/8	1/2	G009	367	16
UHP 1500 A	1/2	1 1/2	G018	367	32

Welding heads TS-TP for tube to tubesheet welding

Reference number R30 :

- Axxx → Welding heads without switch to detect the home position.
- Hxxx → Welding heads with switch to return to the home position after the end of the weld cycle, using the shortest way.
- Jxxx → Welding heads return to the home position after the end of the weld cycle, in the opposite direction of the welding.

Weld head type	Minimum diameter (mm)	Maximum diameter (mm)	Reference number (R30)	Number of impulses per revolution	Factor C (VP=C*VL/D)
TS 25	6	25	A014 (H014, J014)	359	24
TS 73	8,5	60	A044 (H044, J014)	364	77
TS – TP 60	8,5	60	A044 (H044, J014)	364	77
TS 2000	10	60	A032 (H032, J032)	357	55
SCK	20	20	C021	365	37

Tachometer controlled closed chamber welding heads

It is possible to adjust the rotation speed of closed chamber welding heads with tachometer. Find out the code of the reference R30 for the closed chamber welding head in the table hereabove. Enter this reference code into the power source and validate. To start one revolution of the head, push the sector key SY 14. The rotation speed can be calculated by the time the weld head needs for one revolution.

Welding heads with home position switch

If the measured speed is included in a range of 9 % of the theoretical speed, the speed will be automatically adjusted during weld cycles. If the speed difference is more than $\pm 9\%$, an arrow \rightarrow or \leftarrow will appear on the screen to indicate the correction to be applied on the welding head.

- In the case of an arrow \rightarrow showing to the right, increase the rotation speed by turning the potentiometer inside the welding head clockwise.
- In the case of an arrow \leftarrow showing to the left, decrease the rotation speed by turning the potentiometer in the welding head counterclockwise.
- Push the sector key SY 15 again and repeat adjustments, if necessary, until no arrow will appear on the screen. The speed difference is now less than $\pm 9\%$ and corrections will be made automatically.

Welding heads without home position switch

After a push on the sector key SY 15, the welding head should do a whole revolution. If not the speed must be adjusted by turning the potentiometer inside the weldhead:

- If the rotation of the welding head is less than one revolution, its speed must be increased by turning the potentiometer clockwise.
- If the rotation of the welding head is more than one revolution, its speed must be decreased by turning the potentiometer counterclockwise.

Push the sector key SY 15 again and repeat adjustments, if necessary, until the rotation stops exactly after one revolution.

Control of an external speed variator

It is possible to control an external speed variator. There are two possibilities to program the reference number R30:

- For a time base of 1/10 seconds the letter I followed by 0,1 s has to be introduced (R30 = I0,1s).
- For a time base of seconds the letter I followed by 1 s has to be introduced (R30 = I1s).

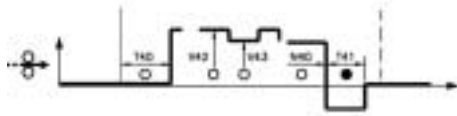
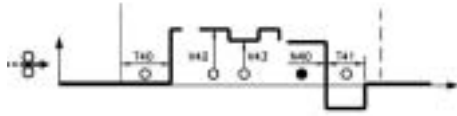
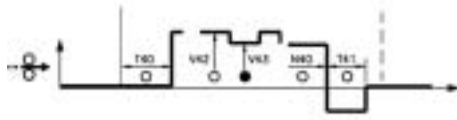
The weld cycle is now controlled by time (1/10 seconds or seconds) and not by the position of the welding head (impulse control). The internal clock of the power source is generating the impulse signals.

To command the external speed variator, an interface (signal generation for start and direction of rotation) has to be connected to the rotation plug **FA 3** of the power source.

Control of the power source by prise manual welding head

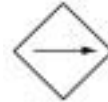
- Use of a manual torch
 - R30=yyyy
 - Working cycle without movements and pulsing
 - Downslope
 - End of cycle
- Use of a welding head
 - ◆ R30=yyyy C (MW40, MW65, MW115 and MW170)
 - Forward rotation of the head
 - Test gas and cooling agent
 - Working cycle without considering the open position of the weld head but with the head going back to the open position at the end of the cycle
 - Downslope
 - End of cycle
- Use of a welding head
 - ◆ R30=yyyy X (other heads)
 - Forward rotation of the head
 - Test gas and cooling agent
 - Working cycle considering the open position of the head and with the head going back to the open position at the end of the cycle
 - Downslope
 - End of cycle

V43 = Wire speed during background current period.
N40 = Wire stop.
T41 = Wire retract.

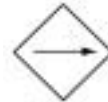


17

0	1	-	N	A	N	T	E	S															
S	1		V	4	3	=	0	5	0	%	a												



0	1	-	N	A	N	T	E	S															
N	4	0	=	3	6	0		D															



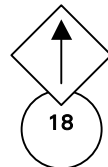
0	1	-	N	A	N	T	E	S															
T	4	1	=	2	.	0		s															

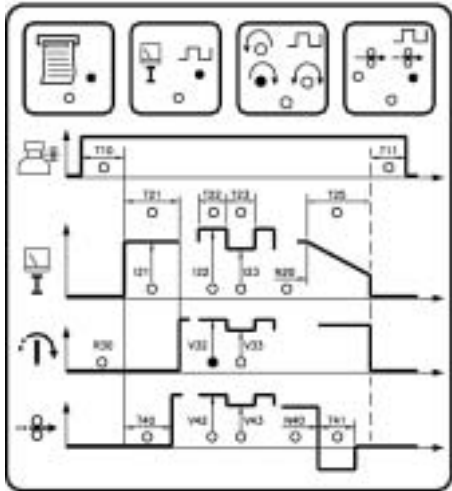


0	1	-	N	A	N	T	E	S															
T	4	1	=	2	.	5		s															



0	1	-	N	A	N	T	E	S															
T	4	1	=	2	.	5		s															





18

0	1	-	N	A	N	T	E	S			N=	0	1	0	0	D
S	1	V	3	2	=	2	0	0	%	oc						
S	2	V	3	2	=	1	8	0	%	oc						



0	1	-	N	A	N	T	E	S			N=	0	1	0	0	D
S	1	V	3	2	=	2	0	0	%	oc						
S	2	V	3	2	=	1	8	0	%	oc						



0	1	-	N	A	N	T	E	S			N=	0	1	0	0	D
S	1	V	3	2	=	2	0	0	%	oc						
S	2	V	3	2	=	1	8	0	%	oc						
S	3	?														



0	1	-	N	A	N	T	E	S			N=	0	1	0	0	D
S	1	V	3	2	=	2	0	0	%	oc						
S	2	V	3	2	=	1	8	0	%	oc						
S	3	V	3	2	=	1	8	0	%	oc						



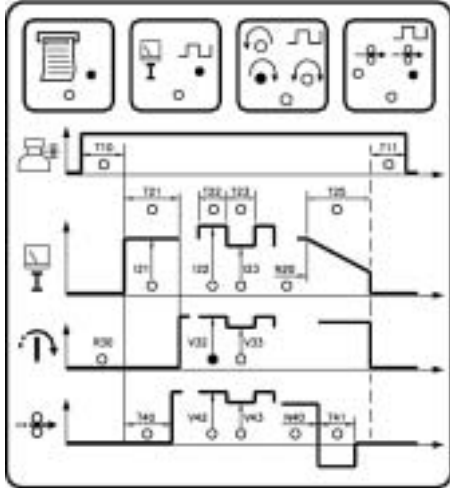
0	1	-	N	A	N	T	E	S			N=	0	1	5	0	D
S	1	V	3	2	=	2	0	0	%	oc						
S	2	V	3	2	=	1	8	0	%	oc						
S	3	V	3	2	=	1	8	0	%	oc						



19

3.3.5.2. Modification of sector start position

During modification, the value of parameter "N" must be between the values of the preceding and the following sector. If this is not the case, the value will not be accepted.



19

0	1	-	N	A	N	T	E	S												
■	S	1	V	3	2	=	2	0	0	%	o									
	S	2	V	3	2	=	1	8	0	%	o									
	S	3	V	3	2	=	1	8	0	%	o									



0	1	-	N	A	N	T	E	S			N	=	0	1	0	0				D
■	S	1	V	3	2	=	2	0	0	%	o									
	S	2	V	3	2	=	1	8	0	%	o									
	S	3	V	3	2	=	1	8	0	%	o									



0	1	-	N	A	N	T	E	S			N	=	0	1	0	0				D
■	S	1	V	3	2	=	2	0	0	%	o									
	S	2	V	3	2	=	1	8	0	%	o									
	S	3	V	3	2	=	1	8	0	%	o									



0	1	-	N	A	N	T	E	S			N	=	0	1	3	0				D
■	S	1	V	3	2	=	2	0	0	%	o									
	S	2	V	3	2	=	1	8	0	%	o									
	S	3	V	3	2	=	1	8	0	%	o									



0	1	-	N	A	N	T	E	S			N	=	0	1	3	0				D
■	S	1	V	3	2	=	2	0	0	%	o									
	S	2	V	3	2	=	1	8	0	%	o									
	S	3	V	3	2	=	1	8	0	%	o									

3.3.5.3. Deleting a sector

C	1	-	N	A	N	T	E	S			N	=	0	1	3	0	D
S	1		I	2	2	=	1	0	0	A							
S	2		I	2	2	=	1	0	5	A							
S	3		I	2	2	=	1	2	0	A							



0	1	-	N	A	N	T	E	S			N	=	0	1	3	0	D
S	1		I	2	2	=	1	0	0	A							
S	2		I	2	2	=	1	0	5	A?							
S	3		I	2	2	=	1	2	0	A							



Other button

0	1	-	N	A	N	T	E	S			N	=	0	1	5	0	D
S	1		I	2	2	=	1	0	0	A							
S	2		I	2	2	=	1	2	0	A							
S	3		I	2	2	=	1	2	5	A							

0	1		N	A	N	T	E	S			N	=	0	1	3	0	D
S	1		I	2	2	=	1	0	0	A							
S	2		I	2	2	=	1	0	5	A							
S	3		I	2	2	=	1	2	0	A							

3.3.6. Deleting a program from the source memory

To select the program to be deleted, enter the program number with the remote control pendant.

0	0		P	A	R	I	S										



0	0		P	A	R	I	S		?								



0	0																
			P	O	L	Y	S	O	U	D	E						
			P	S		2	5	4									

3.3.7.Entering the time and date

With the key switch in the open position, and when creating or modifying the name of a program, you can also access the mode for entering or modifying the time, the date and the company name by pressing the "sector" key.

By pressing the "enter" key you can change between the displays for the time, the date and the company name. You can exit this mode by pressing the "sector" key.

0	1	N	A	N	T	E	S													



				PS	2	5	4													
				0	-	>	1	2	H											
		2	0	:	3	0	:	2	0			0	8	-	0	8	-	9	6	



				PS	2	5	4													
				0	-	>	1	2	H											
		0	8	:	3	0	:	2	0			0	8	-	0	4	-	9	6	



				PS	2	5	4													
				0	-	>	1	2	H											
		0	8	:	3	0	:	2	0			0	8	-	0	4	-	9	6	



				PS	2	5	4													
				0	-	>	1	2	H											
		1	0	:	3	0	:	2	0			0	8	-	0	4	-	9	6	



c				PS	2	5	4													
				0	-	>	1	2	H											
		1	0	:	3	0	:	2	0			0	8	-	0	4	-	9	6	



				PS	2	5	4													
				0	-	>	1	2	H											
		1	0	:	3	1	:	2	0			0	8	-	2	5	-	9	6	



3.3.8.Entering / modifying the company name



				PS	2	5	4													
				0	-	>	1	2	H											
		1	0	:	3	1	:	2	0			0	8	-	2	4	-	9	6	



				PS	2	5	4													
				0	-	>	1	2	H											
		1	0	:	3	1	:	2	0			0	8	-	2	5	-	9	6	



				PS	2	5	4													
				0	-	>	1	2	H											
		1	0	:	3	1	:	2	0			0	8	-	2	5	-	9	6	



				PS	2	5	4													
				0	-	>	1	2	H											
		1	0	:	3	1	:	2	0			0	8	-	2	5	-	9	6	



				PS	2	5	4													
				0	-	>	1	2	H											
		1	0	:	3	1	:	2	0			0	8	-	2	5	-	9	6	



				PS	2	5	4													
				0	-	>	1	2	H											
		1	0	:	3	1	:	2	0			0	8	-	2	5	-	9	6	



0	1	N	A	N	T	E	S														


3.3.9. Saving, loading a program

□ Saving a program on a memo card




Each program can be saved on a memo card, 16 programs per card is possible. The procedure is described in the programming manual. A brief summary is given below.

2 possibilities :

* Saving a single program

- Check that the key switch SY 26 is in the position "Modification authorised".
- Insert the memo card.
- Choose the number of the program to be saved with the switch BT 4 on the remote control pendant.
- Press the transfer button to save the information on the memo card (symbol ).
- If the name of the program to be saved already exists on the memo card, the name of this program is displayed with a question mark.
- If you validate the saving with the button SY 23, the program which has been stored on the memo card will be replaced by the new one. The indicator corresponding to the saving function will illuminate. Wait for the indicator to extinguish before removing the memo card.
- If the memo card is full, the error code !77 ! is shown on the display SY 25.

* Saving several programs

- Check that the key switch SY 26 is in the position "Modification authorised".
- Insert the memo card.
- Press the transfer button to save the information on the memo card (symbol ).
- Press the button « plus » (symbol ) , the characters 0 -> 15 ? are shown on the display. The button «minus » (symbol ) enables to come back to the loading function of a single program.
- If you validate the saving with the button SY 23, all the programs which are in the memory of the power source

will be saved and the indicator corresponding to the saving will illuminate. Wait for the indicator to extinguish before removing the memo card.

If, during the transfer, a fault is detected, the operation is stopped and an error code is shown on the display of the PS 254. Refer to Appendix 3 and Chapter 8.5 for the error codes and corrections to be made.



The program name is stored on the memo card together with the program. However, the number under which it is stored in the PS 254 is not saved. You can load the program under a new number or in another power source. A label on each card allows you to write manually any information which you deem to be useful.

□ Loading a program from a memo card

To load a program from a memo card, the procedure is as follows:

*2 possibilities :

* Loading of a single program





- Insert the memo card.
- Choose the number you wish to give to the program with the switch BT 4 on the remote control pendant. This number cannot already be attributed to another program, but can correspond to a program that you wish to replace.
- Press the button to load a program from the memo card (symbol ).
- The first program stored on the memo card is indicated on the display SY25.
- The keys SY 17 and SY 19 are used to scroll up or down the programs.
- Validate the transfer by pressing . The corresponding indicator will illuminate.
- Wait for the indicator to extinguish before removing the card.

Warning





If the program that is registered in the card is not compatible with the SY 30 selected range of current, it will not be loaded up and !75! error code is displayed on the screen.

* Loading of all the programs


- Insert the memo card.
- Press the button to load a program from the memo card (symbol ).
- Press the button « plus » (symbol ) , the characters 0 -> 15 ? are shown on the display. The button « minus » (symbol ) enables to come back to the loading function of a single program.
- Validate by pressing the button  . The corresponding indicator will illuminate.
- Wait for the indicator to extinguish before removing the memo card.

□ Deleting a program from the memo card


- Check that the key switch SY 26 is in the position « Modification authorised ».
- Insert the memo card.
- Press the button « trash » (symbol ) , the name of the first program stored on the memo card is shown on the display.
- The keys SY 17 and SY 19 are used to scroll up and down the program you wish to delete.
- Validate the transfer by pressing  . The corresponding indicator will illuminate.
- You can cancel the suppression of a programme by pressing again the button « trash ».

3.3.10. Printing a program

To print a program from a memo card, the procedure is as follows:

- With the switch BT 4 on the remote control pendant, choose the number of the program to print.
- Press the print button (symbol ) .
- Validate. The printing indicator is illuminated.
- After the printing is finished, this indicator will extinguish.
- Modifications of the values of weld parameters can be done in two different modes, one during development of a weld procedure and the second in production.

□ Modifying the parameters before starting a program

To select this mode, turn the key operated switch SY 26 to the "Modification authorised" position (symbol ). The key can be removed afterwards.

In this mode you can increase (+) or decrease (-) during the weld cycle the values of the I22, V32 (for no-pulsed speed rotation), V33 (for

pulsed speed rotation) or V42 parameters with the "Delta" buttons.

The modification values of the delta buttons cannot be changed by the user. It depends on the value of the parameter which is being acted upon. The table below gives the relationship between the parameter value and the correction made by each press of the delta button.


When a delta button is used, the value of the parameter concerned is displayed during 5 seconds on the front face of the PS 254.

Wire feeder rotation speed :

Value of parameter	Delta
<= 99	1
100 - 199	2
200 - 299	3
300 - 399	4
400 - 499	5
500 - 599	6
600 - 699	7
700 - 799	8
800 - 899	9
900 - 999	10

All actions on the delta buttons are taken into account (within the parameter limits) and stored in the memory of the relevant sector. After moving from one sector to another, the corrections made in the preceding one are carried through to the next. The modifications are not forgotten or lost. The number of deltas in this mode is not limited.

□ Modifications made during the weld cycle

To access the production mode, the key operated switch SY 26 has to be turned to the "Program modification not authorised" position (symbol ). The key can be removed afterwards to avoid unauthorised modifications being made to the programs.

This mode includes two differences:

- The number of deltas per parameter is limited to 10 (10 increments or 10 decrements)
- The modifications are not stored in the memory.

For program version L633 5.0 onwards, if the last character (the eighth) of the program name consists of a dollar symbol (\$), no modification of the welding parameters by the remote control pendant is possible.

□ **Fault detecting during cycle**

During every welding cycle, important parameter values are monitored periodically at different delicate points. When a fault is detected, an immediate stop or a stop with downslope is initiated depending on the seriousness of the fault. The fault is indicated by a flashing light on the remote control pendant. An error code will also appear on the display of the PS 254. Appendix 5.2 gives the error codes, their meaning and their consequences. We advise you to take careful notice as to which error code is shown. This can make maintenance or repair work easier and highly efficient.

3.3.11. Programmable parameters

For each parameter, the following table shows:

- The synoptic reference (Ref.).
- The corresponding name.
- The maximum value programmable.
- The minimum value programmable.
- The increment value that will be added or taken away when the buttons « + » or « - » are pressed on the synoptic.
- The default value proposed during the creation of a new program.
- The units used. In each column, the abbreviations stand for:

A	Amperage.
V	Voltage.
D	Movement.
/M	A thousandth of the maximum value.
s	A second.
ms	A millisecond.

	REF	DESIGNATION	MAX.	MIN.	OUTPUT	INCREMENT	DEFAULT VALUE	
Gas	T10	Pre-gas time	320	1	s	1	5	
	T11	Post-gas time	320	1	s	1	10 15	
Current	I21	Prefusion current	200 100	2	A	1	90	
	T21	Prefusion time	30	0,1	S	0,1	3	
	I22	Pulse current	200 100	2	A	1	90	
	T22	Pulse time	9999	10	Ms	1	100	
	I23	Background current	200 100	2	A	1	45	
	T23	Background time	9999	10	Ms	1	100	
	N20	Downslope	9999	1	D	1	365	
	T25	Downslope time	60	1	S	1	5	
Rotation	R30	Welding head reference	See pages 35 to 39					
	V32	Rotation speed (high)	999	50 then 0	/M	1	70	
	V33	Rotation speed (base)	999	50 then 0	/M	1	50	
Wire	T40	Delay for wire start	40	0	S	1	3	
	V42	Wire feed speed (high)	999	50 then 0	/M	1	200	
	V43	Wire feed speed (base)	999	50 then 0	/M	1	200	
	N40	Wire stop	9999	1	D	1	360	
	T41	Delay for wire retract	9,9	0	S	0,1	2	

3.4. Execution of a weld program

3.4.1. Safety precautions

Warning Before starting any manipulation on the equipment please refer to chapter 1.2 "Safety precautions".



3.4.2. Choosing the program to be executed

The program to be executed is selected with the switch BT 4 on the remote control pendant. You can check the name of the program on the display of the PS 254. If only "POLYSOUDE PS 254" appears, you have selected the number of a user program place where nothing is stored in the memory of the PS 254. If !75! is displayed on the screen, the right range of current is not selected.

3.4.3. Simulation

After the correct program has been selected, you can run a simulation without affecting the workpiece to be welded. In this case, all the functions of the selected program are carried out except those concerning the arc and the coolant circuit.

The gas controls are executed but the flow rates are not considered. So it is possible to check flow adjustment or reduce gas consumption during the simulation.

The choice between a simulated or a real weld cycle is made with the switch **BT 1** on the remote control pendant.



Fig. 3.6 : "Set up / weld" selector switch

3.4.4. Weld cycle

□ Starting the weld cycle

The weld cycle is initiated by pressing the button BT 5 on the remote control pendant. The indicator **BT 3** becomes illuminated when the cycle starts. If for the selected number a program does not exist in the memory of the PS 254, no cycle will be started and the indicator will flash. The flashing can be turned off by pressing any button on the remote control pendant.

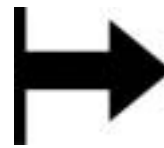


Fig. 3.7 : "Start cycle" button

□ Modification of a weld cycle

Parameter values can be modified during the weld cycle with the remote control pendant. The values of the modifiable parameters in each sector are:

- The current or maximum current in the case of pulsed current (I22).
- The rotation speed (V32) or low rotation speed in case of pulsed rotation (V33).
- The wire speed or the high wire speed in the case of pulsed wire (V42).

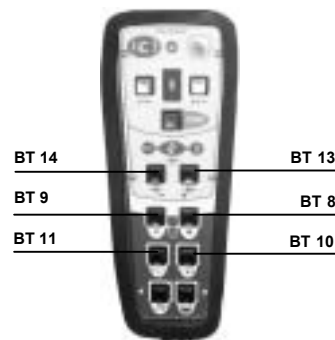


Fig. 3.8 : "Delta" buttons for modifications of parameter values

```

POLYSOUDE
PS 284
CUSTOMER
*****
MINUTES
*****
U 121 U42
(U) (A) (CL) (CL)
*****
12.1 000 0000
*****
U 122 U32 U42
(U) (A) (CL) (CL)
*****
S1 = 0000 D
12.4 171 0171 0451
12.3 171 0170 0452
12.2 171 0170 0451
12.1 171 0171 0452
11.8 136 0171 0000
11.8 058 0172 0000
>>>>> ! S1 ! <<<<<<
I-> 16:19:12 06-02-96
HM-> 00'34" H=0065 D
ASTRO ARC
POLYSOUDE
    
```

Fig. 3.9

Fig. 3.9 : Example of a weld cycle report with manual downslope, denoted by error code >>>> ! 52 ! <<<<<

```

POLYSOUDE
PS 284
CUSTOMER
*****
MINUTES
*****
U 121 U42
(U) (A) (CL) (CL)
*****
11.9 002 0000
*****
U 122 U32 U42
(U) (A) (CL) (CL)
*****
S1 = 0000 D
12.2 171 0170 0451
12.1 171 0170 0452
12.0 171 0171 0452
12.0 171 0170 0452
11.9 171 0169 0451
11.9 170 0170 0450
11.9 171 0170 0451
11.9 171 0171 0450
11.9 171 0168 0450
11.9 171 0170 0450
12.2 171 0170 0450
12.1 171 0170 0449
11.9 170 0170 0450
11.9 171 0170 0450
11.9 171 0171 0450
11.9 171 0171 0451
11.9 171 0170 0451
11.9 171 0171 0453
11.9 171 0170 0451
11.9 171 0170 0449
11.9 171 0170 0440
11.9 171 0170 0451
11.9 171 0171 0451
11.9 171 0170 0450
11.9 171 0172 0450
11.9 171 0171 0452
11.9 171 0170 0451
11.8 171 0171 0451
11.8 171 0171 0450
11.7 171 0170 0452
11.7 171 0171 0451
11.7 171 0169 0450
11.7 171 0171 0448
11.9 171 0171 0450
12.0 171 0171 0451
11.8 159 0170 0000
10.9 079 0170 0000
>>>>> ! Ok ! <<<<<<
I-> 16:15:40 06-02-96
HM-> 01'49" H=0306 D
ASTRO ARC
POLYSOUDE
    
```

Fig. 3.10

Fig. 3.10 : Example of a weld cycle report with a normal cycle end, denoted by >>>> ! OK ! <<<<<

3.4.5. End of welding cycle

Normal end of welding cycle

In the case of a normal end of the welding cycle, the indicator on the remote control pendant extinguishes. The power source is now ready to start a new cycle.

N.B.: welding head that is fitted out with an "open head" position sensor will be automatically positioned in this way at the regular end of a cycle.

Weld cycle report

At the end of every weld, you can print a weld cycle report indicating periodically the real values of the main weld parameters. This listing is provided automatically if preprogrammed. After a weld cycle in simulation mode, no weld report can be given. The weld cycle report consists of:

- The name of your company.
- The program name.
- Values of periodically taken measurements of the voltage, amperage, rotation speed and wire speed during the cycle.
- Reason for stop ("OK" for a normal cycle end, if not, error code).
- Time of cycle start.
- Date of weld.
- Length of cycle.
- Tungsten location.

Reprint of a weld cycle report

If the printout of a weld cycle report fails, for example because of a lack of paper, it is possible to restart it by pushing the switch SY 29 situated at the right of the printer upwards.



Fig. 3.11 : Printer switch

3.4.6. Manual weld cycle stop

Manual weld cycle stop with downslope

The manual downslope button **BT 6** on the remote control pendant starts the programmed

downslope sequence. This function provides the workpiece as much as possible from being damaged. The indicator will flash because this is not a regular cycle end.



Fig. 3.12 : Manual downslope button

□ Immediate cycle stop

When the stop button **BT 7** of the remote control pendant is pressed, the arc and all movements are stopped immediately. The shielding gas is maintained during the programmed post gas period T25. The indicator will flash because this is not a regular cycle end.



Fig. 3.13 : Immediate manual stop button

□ Emergency stop

The remote control pendant is fitted with an emergency button **BT 2**. By pressing this button, the PS 254 is immediately disconnected from the mains power supply. The weld, the movements and the gas flow are stopped suddenly.

This function may cause serious damages to the workpiece and equipment. Polysoude advises you, if possible, to choose a stop with the downslope button or with the immediate stop button.



Fig. 3.14 : Emergency stop button

□ Using a manual welding torch

You should introduce a short program with both a high and a low current when welding with a manual torch as described in paragraph 2.3.6.

The arc is struck by pressing the manual command button. The weld current value is equal to the programmed ignition current. If you release this button, the high current value I22 is applied. If you press this button again, the low current I23 will be used. The next release restarts the high current and so on. The cycle stop is made either by pressing on the downslope button, or for an immediate cycle stop, by pressing on both ends of the manual command button.

4. SERVICING, MAINTENANCE AND TROUBLESHOOTING

4.1. Servicing

4.1.1. Adjustments

□ General

The expression calibration is defined by regulating standards and is used when the generator has to meet special requirements, for example Quality Assurance or ISO 9000 quality system. Calibration needs specific testing equipment and procedures: we can perform it on special request, in your company or in our workshop.

Following informations concern routine adjustment that you can perform, outside these cases, as frequently as you think it advisable, for example as it is said further.

□ Necessary equipment

To be able to make adjustments, it is recommended to have at your disposal:

- A voltmeter.
- A shunt or any other means of measuring continuous current of a current at least equal to 200 A and of the class 0.2.
- A TIG (GTAW) welding torch of a sufficient capacity.
- A resistance of 2 Ω /200 W.

□ When to adjust?

A drift may occur with time ; it results from ageing of components. So we recommend you to check power source adjustments on an average of one year.

□ Exchange of cards or the inverter unit

The 21700633 sequencer card and the 21700634 synoptic card are pre-adjusted in the factory. In case of a standard exchange of these cards, no further adjustments are necessary. However, further adjustments are necessary in case of replacement of the 21700690 card or the source.

□ How to adjust?

Before carrying out a regulation check, leave the generator switched on for approximately 15 minutes. This will allow the generator to reach its normal working temperature. If this is not done, the adjustments that you make will be altered because of the rise in temperature during a normal cycle. To access the cards, remove the front panel of the generator. It will also be necessary to bypass the short circuit security of the inverter unit. To do this, put the switch S3/2 of the 21700633 card and the switch S1/4 of the 21700634 synoptic card to the CLOSED position.

Warning



After the adjustments have been made put the switches to the "OPEN" position, otherwise the short circuit security system of the generator will not work properly.

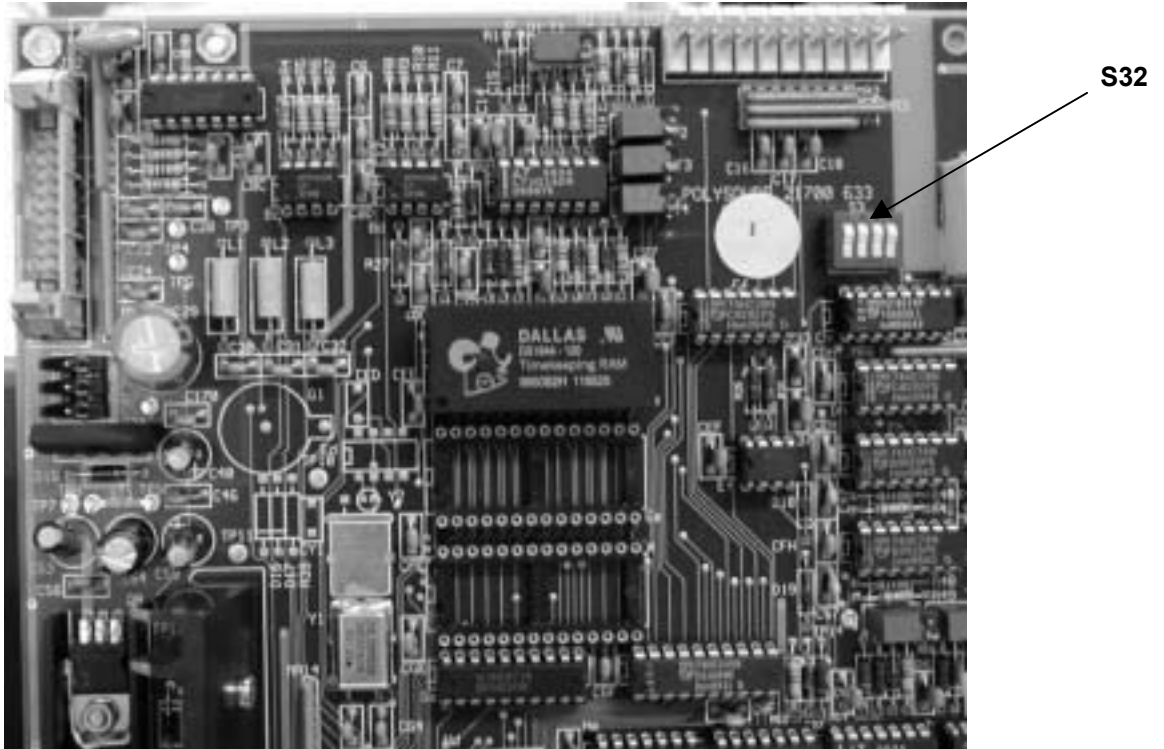


Fig. 4.1 : Inverter switch S3/2 for shunt circuit security system of monitoring welding current in « CLOSED » position for adjustments (sequencer card)

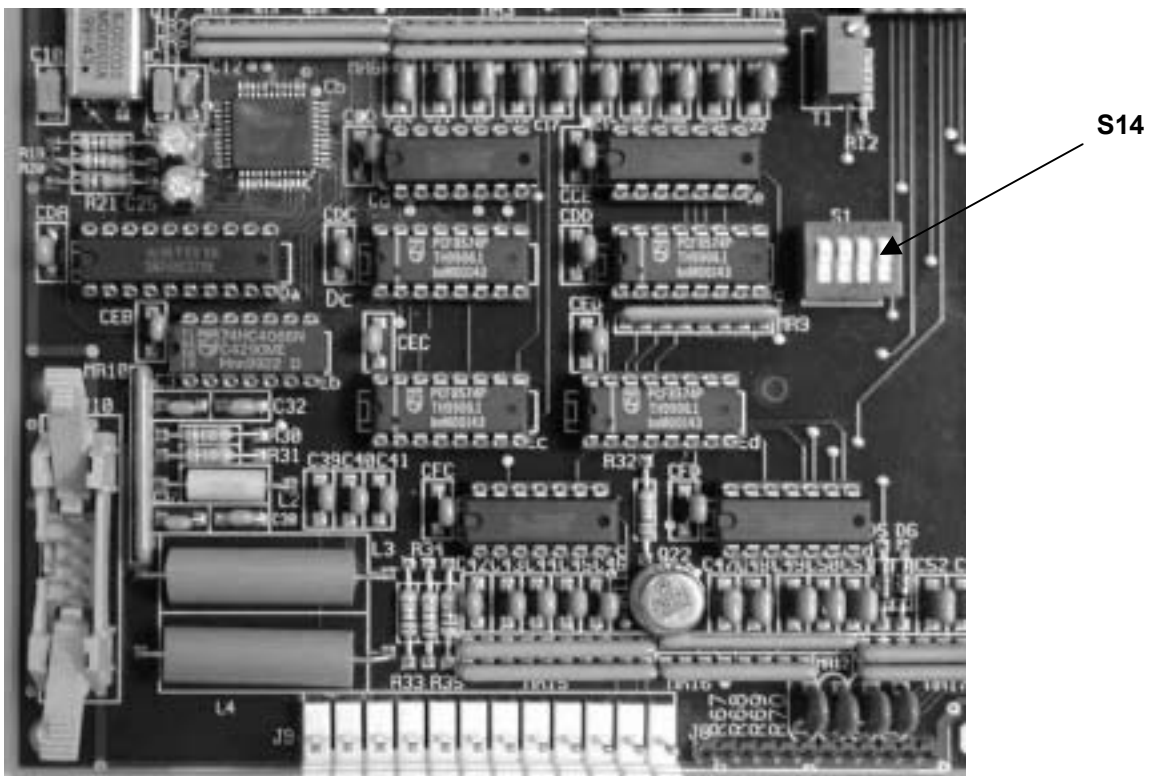


Fig. 4.2 : Inverter switch S1/4 in « CLOSED » position (21700634 synoptic card)

4.1.2.Adjustment of the inverter unit

□ **Verification of the current reference signal**

The current reference signal is generated on the sequencer card (217 00 633). The signal is adjusted in the factory, for readjustment please contact the Polysoude after-sales service.

- A Move the key-operated switch on the programming board at the front side to the 160 A position.
- B Connect a voltmeter between TP21 0 V analog and the test point TP27.
- C Introduce a program without pulsation with a current of 160 A.

- D Start a weld cycle with the switch "Set up/Weld" in the "Set up" position. The voltage read must be 10 V. If not, use the potentiometer T9.
- E Start a new cycle with a current programmed at 4 A. Now the voltage read must be 0,25 V. If not, use the potentiometer T10.
- F Repeat operations D and E until the set-up is correct.

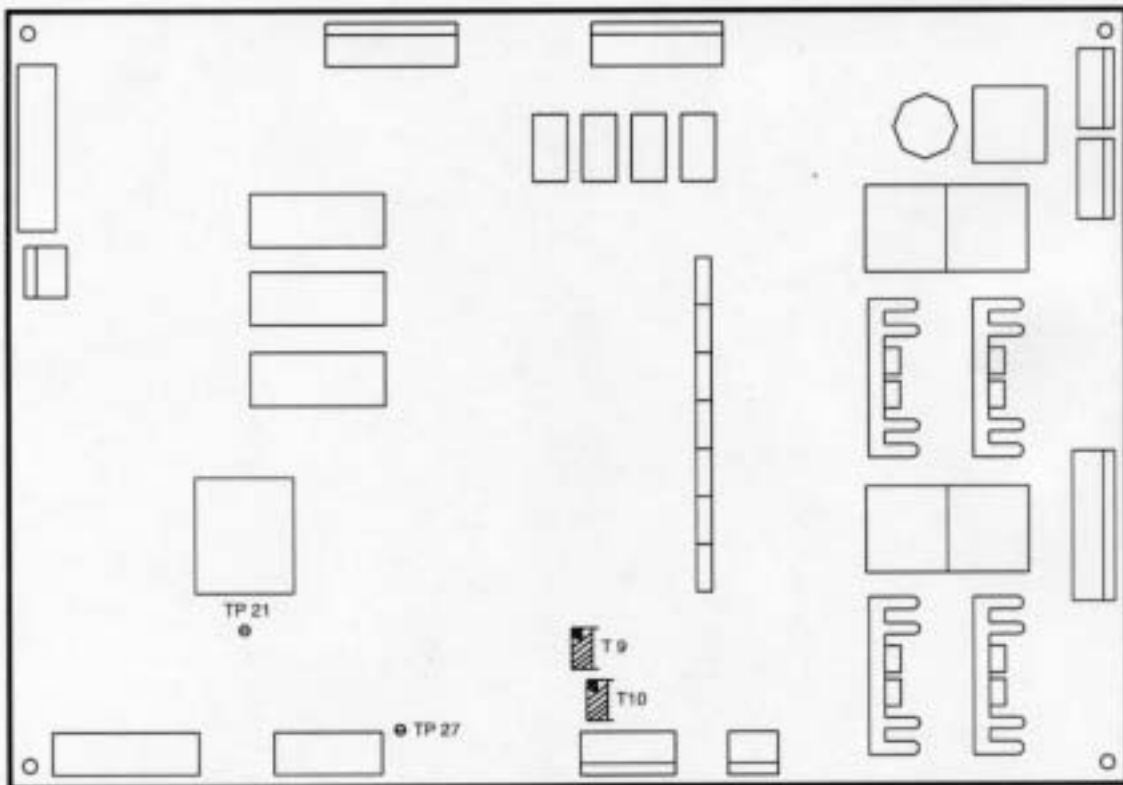


Fig. 4.3 : Potentiometers and test points for the regulation of the current reference on the 21700633 sequencer card

□ **Regulation of the current**

As long as the settings are correct, the current is rated by the TRDC2 card of the generator.

To gain access, remove the panel on the right side of the generator. To measure the current, use a shunt of 300 A / 300 mV class 0.2. The values given below correspond to this type of shunt.

- A Insert the shunt into the ground cable and connect a root mean square voltmeter. Use a torch capable of supporting 200 A.
- B Start a cycle "with arc" without pulsation, with a programmed current of 200 A. The value read must be 200 mV, if not, use the potentiometer P5 to adjust it.
- C Start another cycle with a current of 10 A. The value read must be 10 mV. If not, use the potentiometer P4 to adjust it.

- D Repeat operations B and C until the setup is correct.

The other potentiometers of the generator are factory regulated. Please do not modify them.

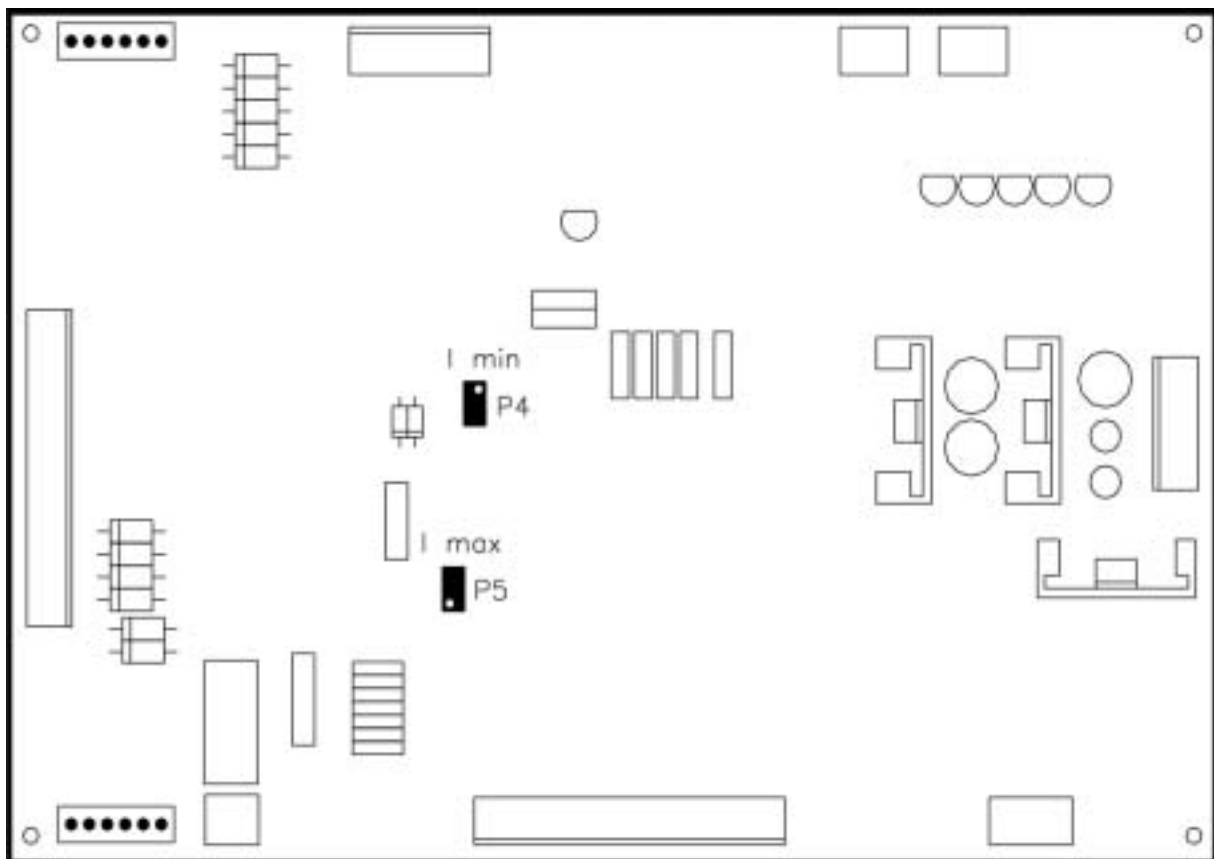


Fig. 4.4 :Potentiometers for the regulation of the current (interface card 2170069)

□ **Regulation of the measured current voltage**

The adjustment of the measured current voltage is done on the card 217 00 636 after a correct setup of the inverter unit. In order to verify the supplied current, you can insert a shunt between the power source and the torch.

- A Connect a voltmeter between the test points TP3 (0 V) and TP1.
- B Connect a torch capable of supporting 200 A.
- C Start a "with arc" cycle without pulsation, with a current of 200 A. The value read must be 4 V. If not, adjust it with the potentiometer T3.
- D Start another cycle with a current of 10 A. The value read must be 0.2 V. If not, adjust it with the potentiometer T4.
- E Repeat operations C and D until the setup is correct.

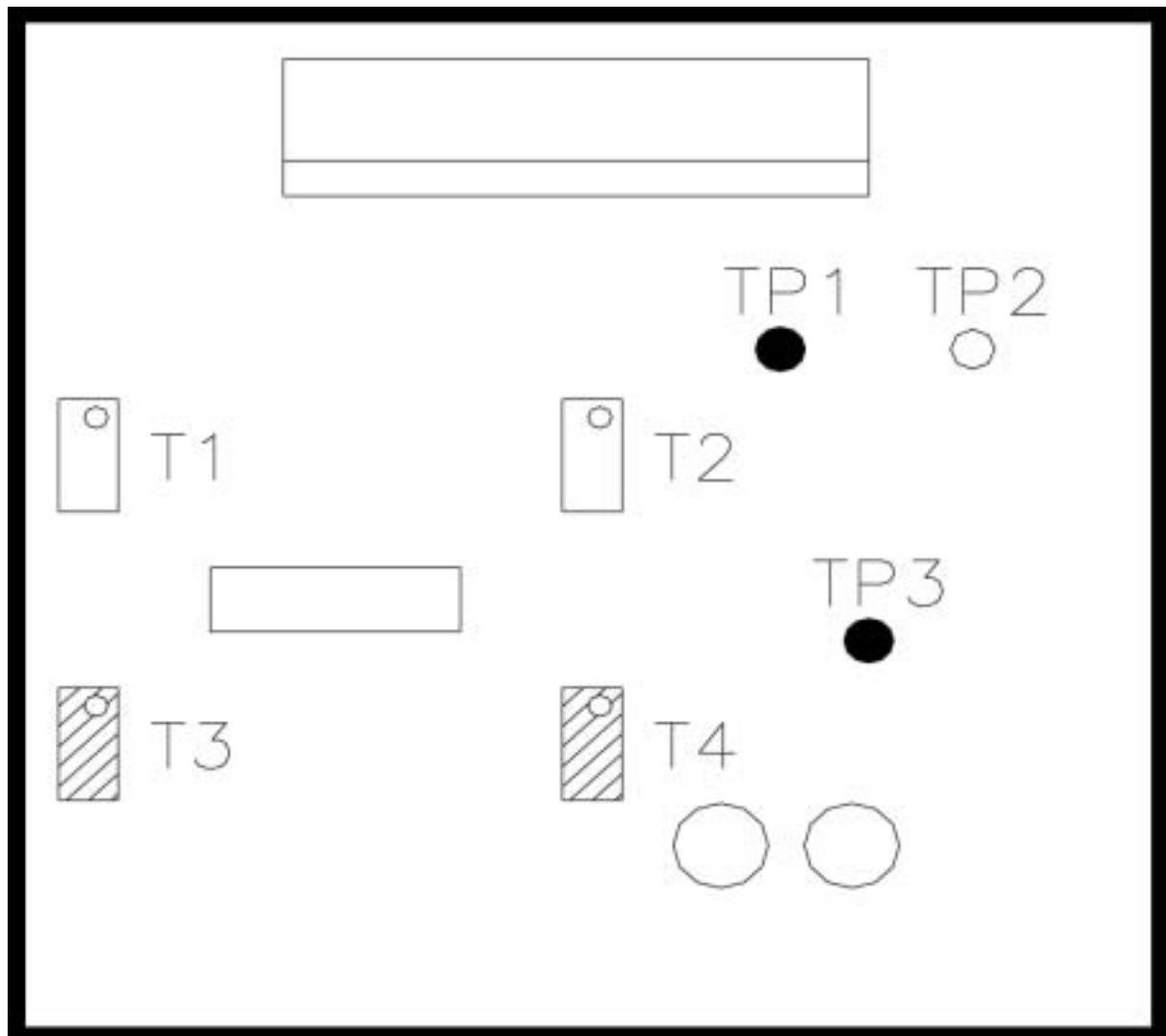


Fig. 4.4: Potentiometer for adjusting the current voltage measurement

□ **Adjusting the contrast and brightness of the display**

These adjustments are made on the 21700634 synoptic card.

The contrast adjustment is made with potentiometer T1, and the brightness adjustment with potentiometer T2.

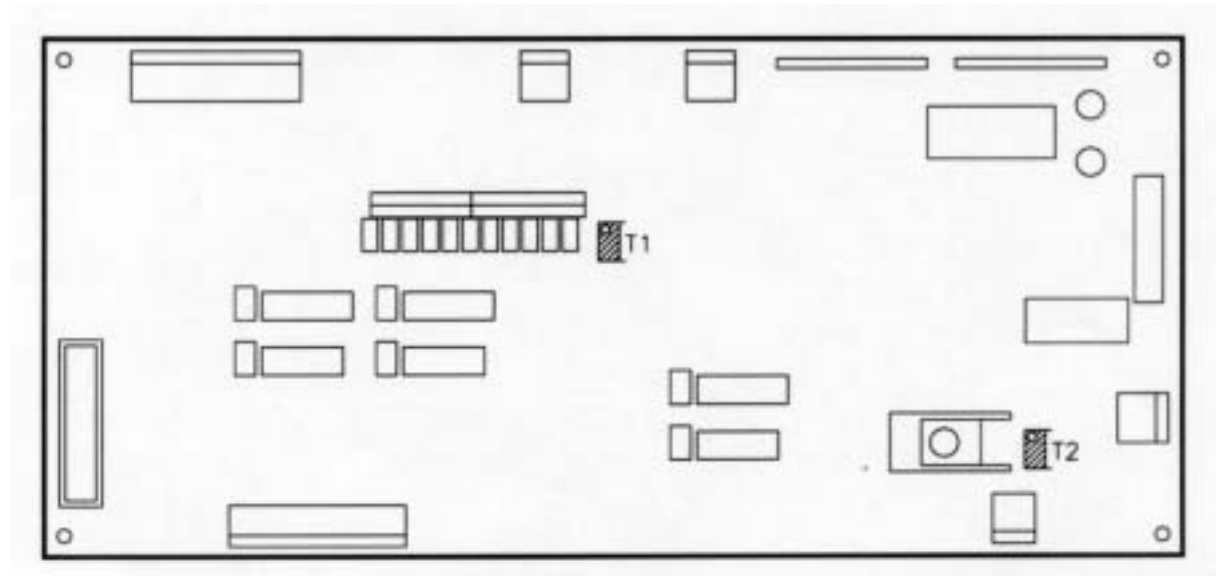


Fig. 4.5 : Adjusting the contrast and brightness of the display (synoptic card 21700634)

4.1.3. Adjusting the rotation speed of welding heads with tachometry (optional)

□ **Regulation of tacho card 21700647**

- A Select the G009 factor of R30 parameter.
- B Connect a power supply adjustable from 0 V to 10 V between pins J (+ of the power supply) and F (0 V of the power supply) of rotation plug FA3.
- C Connect a frequency measurer between the test points TP5 and TP8.
- D With 10 V from power supply, adjust potentiometer T4 to read a frequency of 1100 Hz.
- E With 1 V from power supply, adjust potentiometer T1 to read a frequency of 110 Hz.
- F Repeat operations D and E until the set-up is correct.
- G Connect a power supply adjustable from 0 V to 10 V between pins J (0 V of the power supply) and F (+ of the power supply) of rotation plug FA3.
- H Connect a frequency measurer between the test points TP5 and TP8.
- I With 10 V from power supply, adjust potentiometer T2 to read a frequency of 1100 Hz.
- J With 1 V from power supply, adjust potentiometer T3 to read a frequency of 110 Hz.
- K Repeat operations I and J until the set-up is correct.

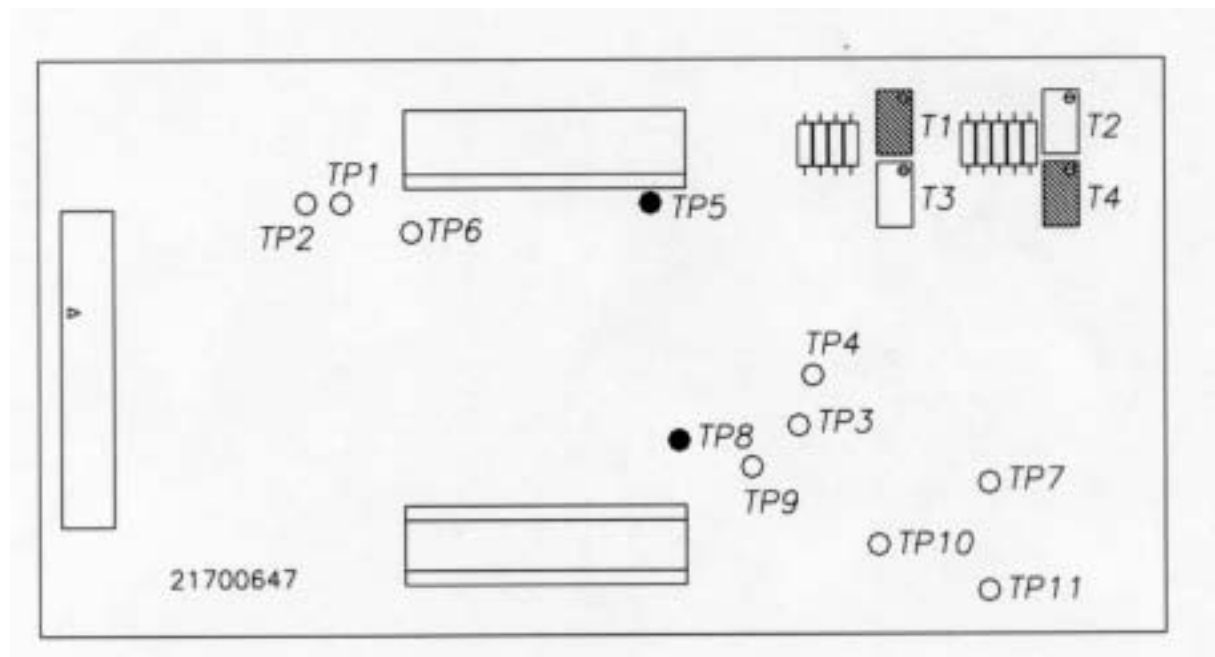




Fig. 4.6 : Potentiometers to adjust the speed of welding heads with tachometry

4.1.4. Coolant

Please make sure that the coolant level in the reservoir of the power source is always maintained. We advise you to change the coolant once a year. Pump out the used liquid by connecting a hose to the coolant outlet (symbol ) and press the button **BT 15** (symbol ) on the remote control pendant. Pure, clean water should be used for rinsing the cooling circuit. The refilling of the coolant reservoir is made by the top of the power source. **NOTE :** Only use coolant recommended by Polysoude. The use of any other coolant will void any warranty commitment.

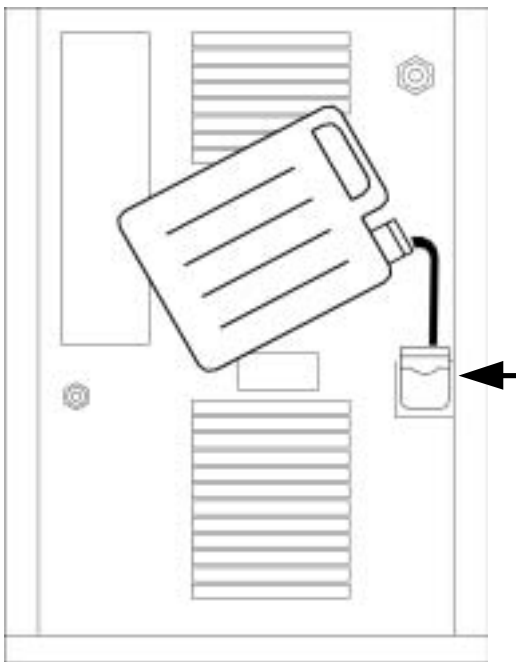


Fig. 4.7 : Coolant inlet

4.1.5. Printer

❑ Loading paper to the printer

The paper has to be loaded with the power source turned on. To change the paper roll, you have to open the cover (unscrew the 2 screws). Take out the empty roll and insert the end of the new paper roll into the printer. The paper advances by pushing the printer switch **SY 29** downwards. Insert the paper into the slot of the cover before closing it.

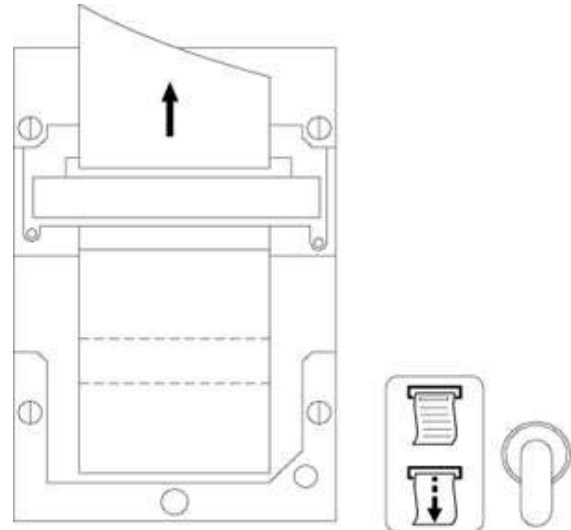


Fig. 4.8 : Change of paper roll

❑ Change of ribbon

To change the ribbon in the printer, you have to open the cover (unscrew the 2 screws). The ribbon is situated below the printer block. Press on «PUSH» to take it out. To insert a new ribbon, push it slightly to the top when inserting it. Insert the paper into the slot of the cover before closing it.

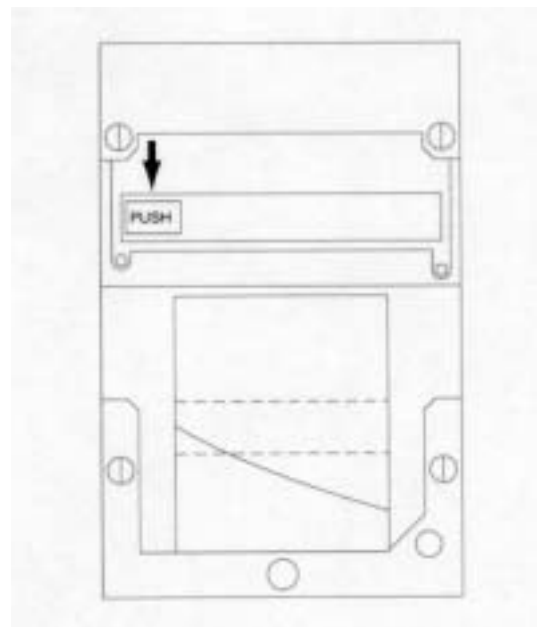


Fig. 4.9 : Change of ribbon cartridge

4.2. Maintenance and troubleshooting

4.2.1. Replacing fuses

Warning



A fuse blowing out indicates in most cases a problem somewhere in the electrical installation. You must resolve the problem before replacing the fuse. Be careful when switching on the machine after you change a fuse.

You will find the fuses in four areas:

- The sector fuses F1, F2, F3 are situated in the main divider. To access this, you need to remove the left side plate of the generator, after having already removed the roof.
- The fuses protecting the secondary transformer (FU1 - FU7) can be found on the top level and are accessible just by removing the roof of the generator.
- Two fuses RF1 and RF2 are situated on the relay card WK-3 A2 and another one is located on the +12V/ +5V power supply card.

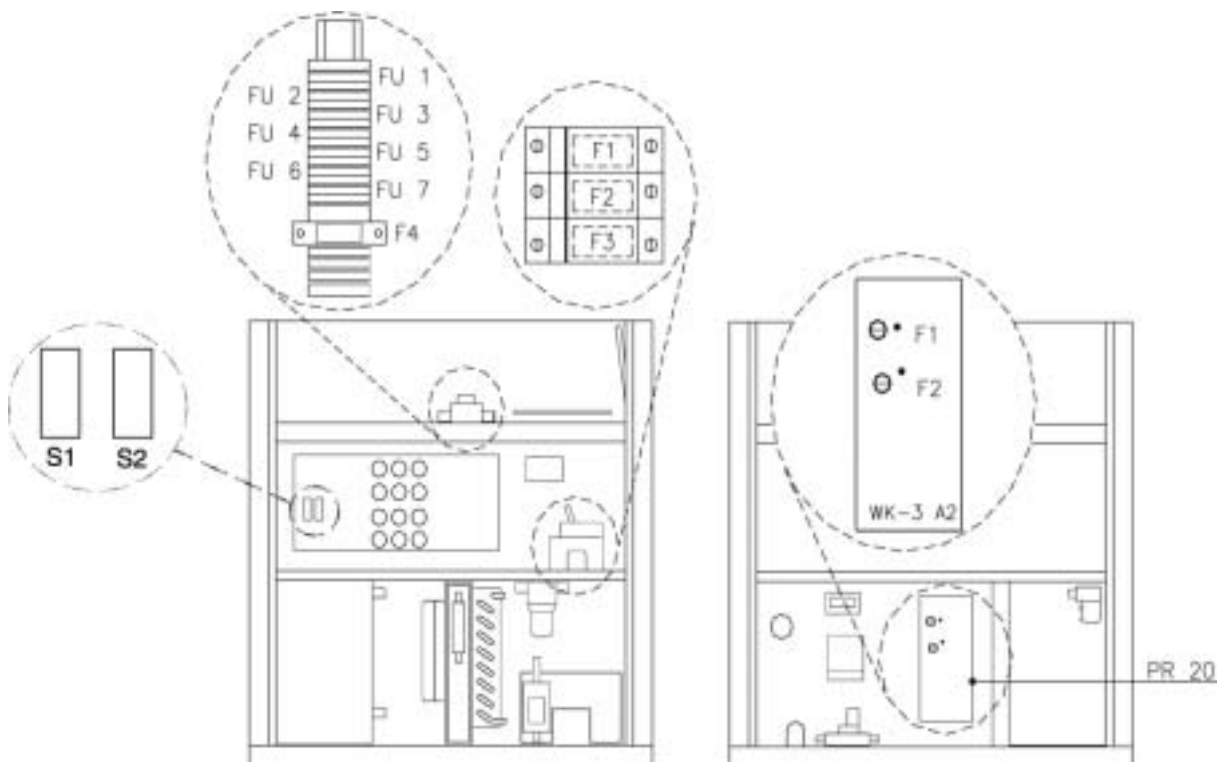


Fig. 4.14: Location of the fuses

4.2.2. Trouble shooting

□ **Noted defect when operating**

defect	cause	What to do
Impossible to switch the power source on	<ul style="list-style-type: none"> - Fuses F1, F2, F3, F4 or FU 3 defect - Mains supply interrupted - Plug, cables or connections defect - Remote control pendant BP 1436 defect (emergency stop button pushed) or not connected - Relay K1 defect or not connected - Main switch defect - Wrong choice of input voltage - +12 V modul defect - Card 217 00 634 defect 	<ul style="list-style-type: none"> - Change (§. 4.2.1) - Check - Check and repair - Check and change or repair - Check and change or repair - Check and change - Check and correct (§ 2.2.3). - Replace - Replace
The power source is working while the main switch is in the Off-position	<ul style="list-style-type: none"> - The mains supply cable is connected to the wrong contact 	<ul style="list-style-type: none"> - Check and correct
The power source is switche off when the weld starts	<ul style="list-style-type: none"> One phase of the mains supply is interrupted 	<ul style="list-style-type: none"> - Check and correct
The weld cycle or an axis (rotation, wire, gas, cooling circuit) start by themselves	<ul style="list-style-type: none"> - The power source is not connected to the ground - Remote control pendant BP 1436 defect - Shielding of the remote control pendant cable is damaged - Card 217 00 634 defect 	<ul style="list-style-type: none"> - Make a connection - Check and change or repair - Replace cable - Replace
Some of the buttons on the remote control pendant don't work	<ul style="list-style-type: none"> - Remote control pendant defect - Synoptic card 21700634 defect 	<ul style="list-style-type: none"> - Check and repair or change - Replace
The program number on the display does not correspond with the number chosen on the remote control pendant	<ul style="list-style-type: none"> - Remote control pendant BP 1436 defect - Card 217 00 634 defect 	<ul style="list-style-type: none"> - Check and change or repair - Replace
Some programs are deleted from the memory of the power source	<ul style="list-style-type: none"> - Wrong action (programs deleted with the button SY 23) - Card 217 00 633 has been replaced - RAM memory on card 217 00 633 defect 	<ul style="list-style-type: none"> - Reload the programs - Reload the programs - Replace RAM memory

defect	cause	What to do
Some parameters stored on the memocard have been altered	- Memocard defect	- Use new memocard to store programs
Impossible to modify values of weld parameters (buttons ""+"" and ""-"" are not working)	- - Key-operated switch SY 25 in position ""modification not allowed""	- Put the switch in the ""modifications allowed"" position
Some buttons of the programming keyboard don't answer	- keyboard defect - card 217 00 634 defect	- can only be checked by a qualified electrician - change card
Display dark	- electric supply card + 5 V defect - RAM memory on the card 217 00 633 defect - Fuse FU 1 or FU 2 defect	- check fuse and change - change card or RAM memory - Check and change
Impossible to start a weld cycle (the indicator LED on the remote control pendant is flashing)	- wrong wiring of the cable connection of the manual torch - card 217 00 633 defect	- check program number (§ 3.3.1)
Impossible to start a weld cycle with a manual torch	- wrong wiring of the cable connection of the manual torch - card 217 00 633 defect	- check and change - change card
Distortion of the display during ignition of the arc	- electric supply card + 5 V defect	- check fuse and change
Poor gas flow	- gas conduit inside the welding head clogged - gas flowmeter defect - solenoid gas valve defect	- check and clean - can be checked only by a qualified specialist - can be checked only by a qualified specialist
Any rotation movement (welding head) or wire feeding, any error message appears	- shear pin broken	- replace shear pin (see operation manual of the welding head or wire feeder for details)

□ **Display of an error code**

Error code	Possible causes	What to do
10	<ul style="list-style-type: none"> - Shielding gas cylinder empty or valve closed. - Poor connection of the shielding gas coupling. - Fuse F 1 on card WK-3 defect. - Solenoid valve defect. 	<ul style="list-style-type: none"> - Check and change or open. - Check and connect properly. - Check and change (§ 4.2.1). - Can be checked only by a qualified specialist.
11 or 12	<ul style="list-style-type: none"> - Level of cooling liquid low. - Hoses of the cooling circuit buckled or knotted, filter clogge. - Fuse F 2 on card WK-3 defect. - Shunt for cooling circuit security not mounted (use of air cooled welding heads only). - Quick gas coupling of the welding head not fastened. - Pump defect. - Hose bundle defect (welding heads MU). 	<ul style="list-style-type: none"> - Check and correct. - Keep in proper conditions. - Check and change (§ 4.2.1). - Refer to §2.3.3 to make connections properly. - Check and connect properly. - Can be checked only by a qualified specialist. - Change.
22	<ul style="list-style-type: none"> - Weld current cable poorly connected or interrupted. - Bad position of the ground cable. - Wrong gas flow adjustment. - Electrode polluted or distance workpiece / electrode too high. - Hose bundle defect (welding head MU). - Ignition aid defect or in wrong position (welding heads MU, TP, TS...). - Wrong shielding gas (He). - Power source poorly adjusted. 	<ul style="list-style-type: none"> - Check and change. - Deplace ground cable (refer to § 3.2.3 or 2.3.7). - Check. - For correct electrode settings, refer to operating manual of the welding head. - Change. - Position ignition aid correctly. - Try argon. - Can be checked only by a qualified specialist.
23	<ul style="list-style-type: none"> - Electrode tip poorly ground or worn out. - Distance workpiece / elektrode wrong. - Poor shielding gas protection. - Programmed weld current too low, when the arc starts. - Ignition aid defect or in wrong position (welding MU, TP, TS...). 	<ul style="list-style-type: none"> - Refer to operating manual of the weld head for correct set up and change of the electrode. - Correct. - Check gas flow, clean or change gas lens. - Correct. - Change or correct position.
24	<ul style="list-style-type: none"> - Electrode has touched the workpiece. - Electrode has touched the filler wire. - Ignition aid defect or in wrong position (welding MU, TP, TS...). - Lack of insulation between welding head and wire guide support. - Card 217 00 633 defect. - Inverter unit defect (card TRDC2). 	<ul style="list-style-type: none"> - Correct - Change the position of the wire inlet move - Move - Check and correct - Replace - Call After Sales Service

Error code	Possible causes	What to do
25	<ul style="list-style-type: none"> - Mains input voltage too high. - Phase failure of the mains input. - Settings of input power jumpers wrong. - Fuse S1 or S2 of the inverter unit defect. - Inverter unit defect (Karte TRDC2). - Card 217 00 633 or card 217 00 636 defect. 	<ul style="list-style-type: none"> - Check and modify the connection cable position of the transformer inside the power source. - Check and correct. - Correct. - Check and correct. - Can be checked only by a qualified specialist. - Change.
26	<ul style="list-style-type: none"> - Mains voltage too low - Phase failure of the mains input. - Settings of input power jumpers wrong. - Fuse S1 or S2 of the inverter unit defect. - Inverter unit defect (Karte TRDC2). - Card 217 00 633 or card 217 00 636 defect. 	<ul style="list-style-type: none"> - Check and modify the connection cable position of the transformer inside the power source. - Check and correct. - Correct. - Check and correct. - Can be checked only by a qualified specialist. - Change.
27	<ul style="list-style-type: none"> - Too much power required from the power source. - Constricted air circulation. - Settings of input power jumpers wrong. - Phase failure of the mains input. - Fuse S1 or S2 of the inverter unit defect. - Inverter unit defect (Karte TRDC2). - Card 217 00 633 or card 217 00 636 defect. - Fan defect. 	<ul style="list-style-type: none"> - Respect duty cycle of the power source (§ 1.3.2). - Watch for minimal distance between the power source and surrounds (§ 2.2.2). - Correct. - Check and correct. - Check and correct. - Can be checked only by a qualified specialist. - Change. - Check. The fan can be changed only by a qualified specialist.
28	<ul style="list-style-type: none"> - Phase failure of the mains input. - Settings of input power jumpers wrong. - Fuse S1 or S2 of the inverter unit defect. - Inverter unit defect (Karte TRDC2). - Card 217 00 633 or card 217 00 636 defect. 	<ul style="list-style-type: none"> - Check and correct. - Correct. - Check and correct. - Can be checked only by a qualified specialist. - Change.
29	<ul style="list-style-type: none"> - Phase failure of the mains input. - Settings of input power jumpers wrong. - Fuse S1 or S2 of the inverter unit defect. - Polygaine hose bundle defect (welding heads MU). - Wrong position of switch S3/1 on the card 217 00 633. - Poor adjustment of the power source. 	<ul style="list-style-type: none"> - Check and correct. - Correct. - Check and correct. - Change. - Check and correct. - Adjustments can be carried out only by a qualified specialist.
30	Wrong reference number R30 for the identification of the welding head programmed.	- Correct.
30 or 40	- Problems caused by friction or jamming of the weldinghead or wire feeder.	- Check and remove dirt and foreign parts.
31 or 41	<ul style="list-style-type: none"> - Problems caused by friction or jamming of the weldinghead or wire feeder. - Fuse FU 4 defect. - Card 217 00 633 defect. 	<ul style="list-style-type: none"> - Check and remove dirt and foreign parts. - Change. - Change.
32 or 42	<ul style="list-style-type: none"> - Fuse FU 7 defect - Impulse generator of the welding head or wire feeder defect. - Bad cable connection between the power source and the motor. - Card 217 00 633 defect. - Transformer T1 defect. 	<ul style="list-style-type: none"> - Change. - Check and change. - Can be checked only by a qualified specialist. - Change. - Can be checked only by a qualified specialist.

Error code	Possible causes	What to do
51	<ul style="list-style-type: none"> - No ground connection of the power source. - Remote control pendant BP 1436 defect. - Shielding of the cable of the remote control pendant BP 1436 defect. - Card 217 00 634 defect. 	<ul style="list-style-type: none"> - Correct. - Check. - Replace cable. - Change.
52	<ul style="list-style-type: none"> - Phase failure of the mains input. - Fuse S1 or S2 of the inverter unit defect. - Remote control pendant BP 1436 defect. - Card 217 00 633 or card 217 00 634 defect. 	<ul style="list-style-type: none"> - Check and correct. - Check and correct. - Check. - Change.
53	<ul style="list-style-type: none"> - Kurzzeitiger Netzspannungseinbruch. - Karte 217 00 633 defect. 	<ul style="list-style-type: none"> - Prüfen und Schweißstromquelle erneut einschalten. - Austauschen.
54	<p>a) Closed welding heads of the MW, H or UHP type:</p> <ul style="list-style-type: none"> - Welding head is not in the home-position. <p>b) Limit switch of the welding head defect or badly adjusted.</p> <p>b) Welding heads of other types (without tacho):</p> <ul style="list-style-type: none"> - The pins D and E of the rotation motor cable are not short-circuited in the plug connector. <p>c) All types of welding heads:</p> <ul style="list-style-type: none"> - Card 217 00 633 defect. - Wrong reference number R30 for the identification of the welding head programmed. 	<ul style="list-style-type: none"> - Turn welding head in the home-position. - Check and change or correct. - Correct. - Change. - Correct.
56	<ul style="list-style-type: none"> - Memo card upside down in the card reader. - Flat cable for the connection between card 217 00 633 and card 217 00 634 defect or loose. - Switch S1/1 on the card 217 00 634 in the wrong position. 	<ul style="list-style-type: none"> - Watch for right position if you introduce a memo card. - Change or correct. - Check and call for maintenance.
60	<ul style="list-style-type: none"> - Printer defect - 21700634 card defect 	<ul style="list-style-type: none"> - Replace - Change
62	<ul style="list-style-type: none"> - After the end of the last weld cycle, the power source has been turned off and on again. - The program number (YY) used for the weld cycle is different from the program number (XX), which is actually chosen. 	<ul style="list-style-type: none"> - Operate a new weld cycle. - Choose program number YY and restart printing of the weld cycle report with the switch SY 28.
70	<ul style="list-style-type: none"> - Memo card is not introduced into the card reader SY 26. - Memo card is not introduced correctly into the card reader SY 26. 	<ul style="list-style-type: none"> - Introduce memo card. - Remove the memo card and introduce it correctly.
71	Memo card has been removed from the card reader before the end of the storage.	Repeat storage (before removing the memocard, wait until indicator SY 13 becomes dark).
72	- The card 217 00 633 has been changed.	- Choose with the switch BT 4 for selecting the program number all numbers from 0 to 15 one after another.
73	<ul style="list-style-type: none"> - Any program stored on the memo card. - Memo card introduced in the wrong way into the card reader SY 26. 	<ul style="list-style-type: none"> - Use memo card with a program stored on it. - Remove card and introduce it correctly into the card reader SY 26.
74	- Load from a memo card that has been removed from the card reader before the end of the storage.	- Use a new memocard.
75	<ul style="list-style-type: none"> - The program stored on the memo card comes from a different type of power source. - The position of the switch S3/1 or S3/4 on the card 217 00 633 is wrong. 	<ul style="list-style-type: none"> - Use only programs made for a power source PS 254. - Set switches to the ""OPEN"" position.

4.2.3. Spare parts (See “summary spare parts” pages 84/85)

Désignation	Repère	Référence
Ribbon for printer	25	00590064
Printer	26	00629078
Paper for printer	27	00590066



Fig. 4.16 : Front view

Désignation	Repère	Référence
Remote control pendant		14360000
Remote control pendant plug	28	00563085
Câble télécommande complet	29	14369999
Toggle switch for pendant	30	00542006
Grey remote control pendant button	31	00549067
Red remote control pendant button	32	00549065
Black remote control pendant button	33	00549066
Emergency stop button	34	00542070
Red cover for emergency stop button	35	00542071
Coding wheel	36	00543016
Interconnection card	37	21700627
Coque caoutchouc pour télécommande	38	17375299



Fig. 4.17 : Remote control

Désignation	Référence
Ground cable	64599801
Flowmeter Argon	75501002
Flowmeter Argon/Hydrogen	71701421
Cooling liquid	75110071
Fuses	75501207

4.2.4.Circuit description

□ **Remark**

The following information refers to the wiring scheme of the PS 254 (Ref. 1700 xx xx) and the remote control pendant (Ref. 1436 xx xx or 1737 xx xx) as well as to the sequencer card (Ref. 217 00 633), the synoptic card (Ref. 217 00 634), the source interface card 217 00 690, the memory circuit interface card (Ref. 217 00 680), and the interface tacho-impulses (Ref. 217 00 647).

The signals are described by an abbreviated name corresponding to their function. It is useful to recognise that a signal preceded by a bar " / " signifies that it is active at the low level (0 V).

The numbers inscribed at the bottom right of the synoptic blocks relate to the folio numbers of the corresponding dossiers. For example, the number 08 in the block "Gas control" of the sequencer card corresponds to folio 08 of dossier number 21700633.

□ **The power switch**

The power switch consists of a self holding switch K2. When the power is turned on, the K2 switch is activated. It then remains in this state until the power is turned off (K1 is activated). K1 is directly linked to the emergency stop button via the synoptic card (folio 21700634). The loss of voltage or the pressing of the emergency stop button activates K1, which immediately cuts off the power supply. To restart the weld cycle you must turn on the machine again with the power switch. This system has been designed for safety reasons.

□ **General presentation and wiring scheme**

The functioning of the PS 254 is principally controlled by 2 cards: the 21700633 sequencer card and the 21700634 synoptic card. These two cards are linked together by a data bus I²C. This connection is built up via the memory circuit interface card 217 00 680.

The sequencer card ensures the correct follow up of weld cycles by the power source. It is linked to the power supply, the rotation motor, the wire feed motor, and watches for the correct functioning of the gas valves and the cooling circuit. The microchip is also found on this card.

The synoptic card, controlled by the sequencer card, controls the peripheral units (keyboard, indicators and display screen), the memo card, the remote control pendant and the printer.

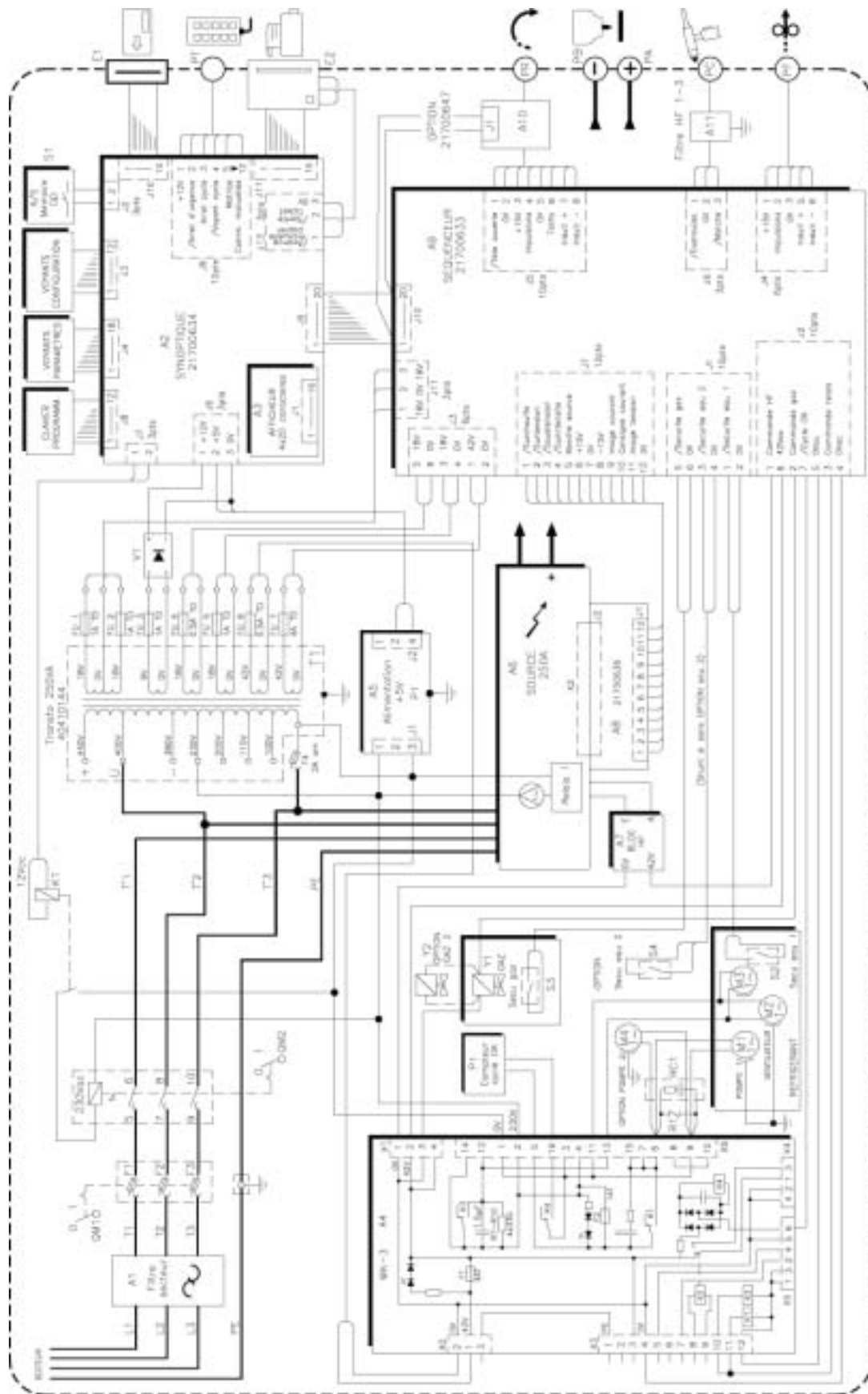


Fig. 4.18 : Wiring scheme of PS 254

□ **The sequencer card (21700633)**

The sequencer card includes several block functions:

- Central program unit (CPU) composed principally of the microchip and the memory.
- Power control.
- Rotation motor control, based on the principle of PWM (Pulse Width Modulation).
- Wire motor control, identical to the control of the rotation motor.
- Shielding gas control.
- Coolant control.
- Interface with the manual torch
- Interface with the I²C bus for the external links and especially with the synoptic card.
- Power supplies.

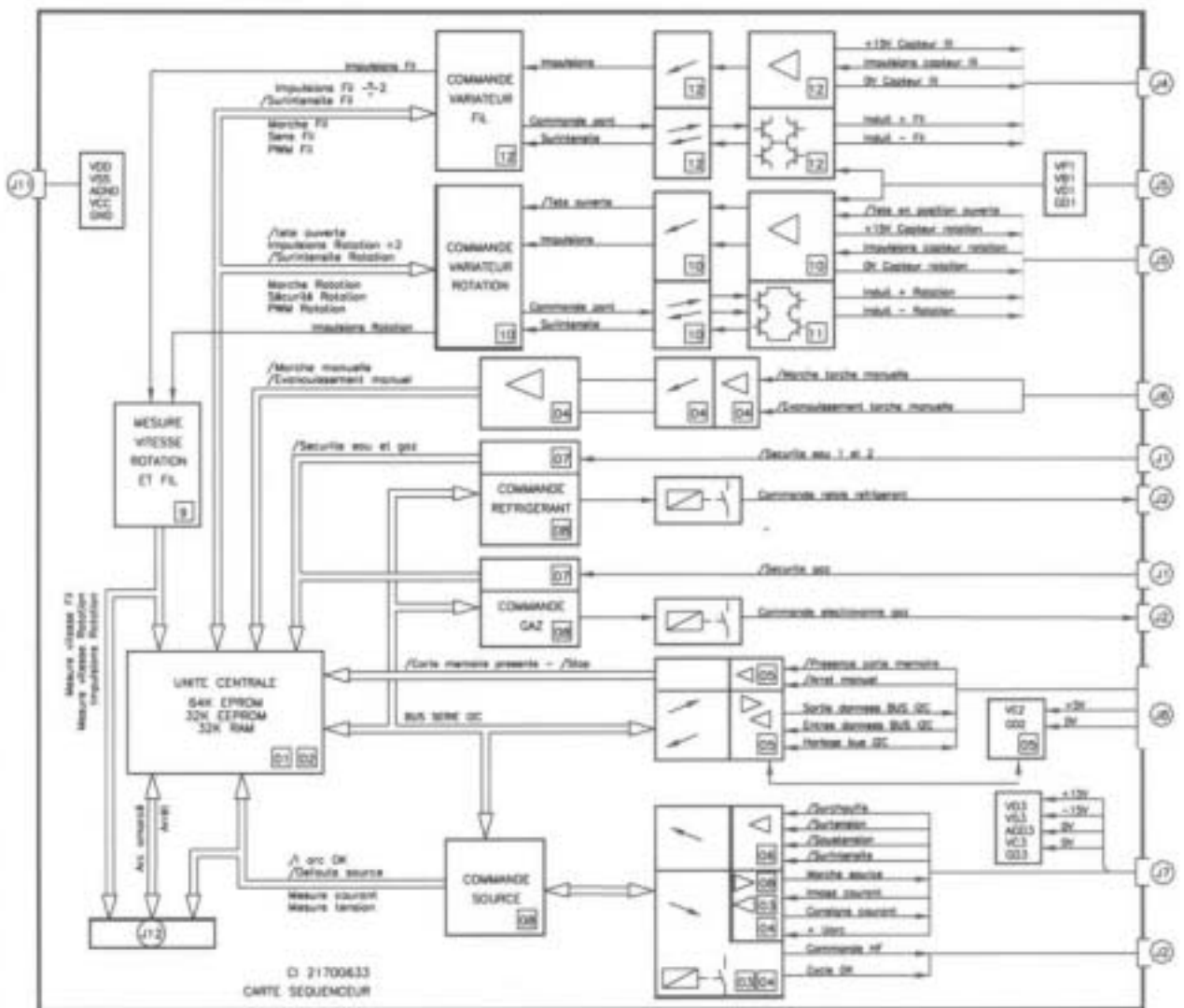


Fig. 4.19 : Sequencer card

□ The synoptic card (21700634)

The synoptic card interfaces with the following peripheral units:

- Remote control pendant.
- Programming keyboard.
- Synoptic on the front panel.
- Display on the front panel.
- Printer.
- Memo card.

It is controlled by the sequencer card via an I²C link.

The interface with the remote control pendant is made by constantly checking the state of the buttons with a line and column system. By successively activating the different lines and testing the columns it is determined which buttons or switches have been activated.

The stop command BT 7 is linked directly to the sequencer card, without passing via the I²C bus. The emergency stop button BT 2 on the remote control pendant is linked also to the power on/off switch. This ensures the safety of the users in the case of a cycle stop or an emergency stop.

The programming keyboard is based on the same principle. Only the key switch "Modification authorised or not" has a direct link.

The interface with the synoptic indicators is made by multiplexing. The indicators are not permanently supplied with power, but instead by a signal (multiplexing supply) which has a frequency of several hundred Hertz.

The contrast and brightness of the screen is controlled by the synoptic card. The procedure for their adjustment is given in paragraph 9.2.6.

The memo cards used with the PS 254 are compatible with the databus I²C. The presence of a signal "Memo card engaged", resulting from a contact in the connector, authorises all other connections, including the 5 V power supply. The card is thus protected from overloads during its insertion and its removal.

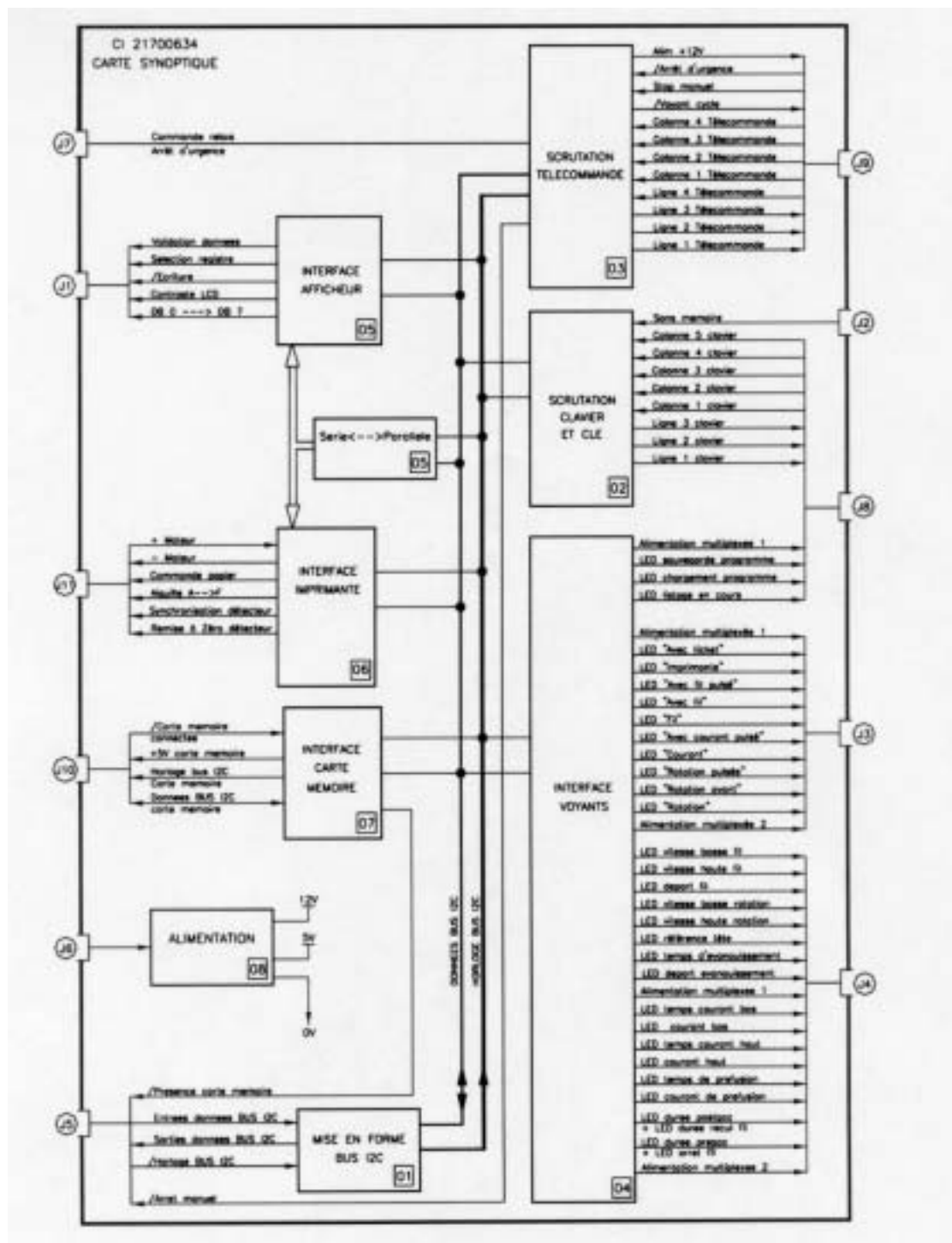


Fig. 4.20 : Synoptic card

□ **The source**

The power command, generated by the sequencer card, is an analogical signal 0 to 10 V. At 10 V, it corresponds to 160 A, and at 0 V it corresponds to the minimum current of the source, 4 A, for the 160A range; at 10 V it corresponds 50 A, and at 0 V it corresponds 4 A, for the 50 A range.

A logic order active at high level (15 V) controls the running of the source.

The source sends a signal indicating that it is overheated. The signal is released by the sequencer card to stop the weld cycle and display the code of the detected fault (27).

The high frequency generator is controlled by a signal emitted from the sequencer card. A relay contact ensures that this action occurs. The other pole of contact is linked to an alternative voltage of 42 V.

□ **The remote control pendant**

The buttons on the control pendant are controlled by the synoptic card (21700634). Most of the buttons are tested by the line and column method: A high level signal is placed on a line and the columns are tested. If a column is at a high level, this shows that the button associated with this line and column has been pressed. The next line is tested afterwards, and so on. Only the two safety buttons are directly linked.

The «In cycle» indicator is a light emitting diode LED.

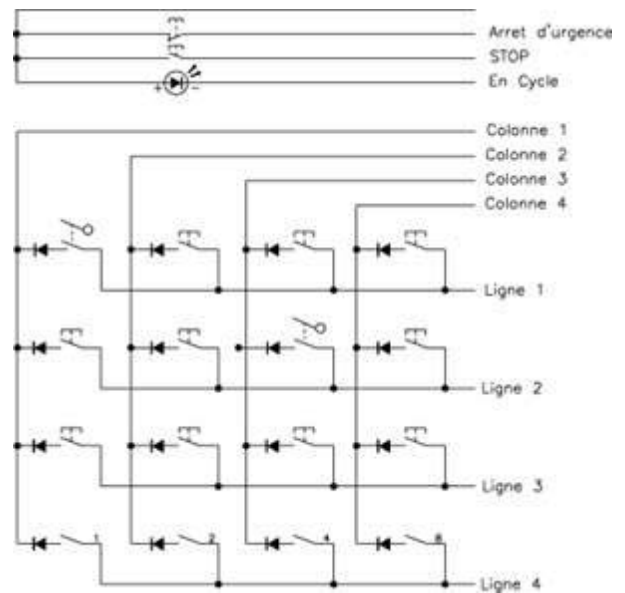


Fig. 4.21 : Remote control pendant logic

LINE	COLUMN	BUTTON
1	1	BT 1
1	2	BT 16
1	3	BT 11
1	4	BT 14
2	1	BT 5
2	2	BT 15
2	3	BT 12
2	4	BT 9
3	1	BT 6
3	2	BT 10
3	3	BT 13
3	4	BT 8
4	1	BT 4 (1)
4	2	BT 4 (2)
4	3	BT 4 (4)
4	4	BT 4 (8)

5. APPENDIX

5.1. Built-in programs

The Polysoude weld lab developed these programs for mild steel and stainless steel tubes. Starting from frequent applications they represent the base to work out rapidly your own weld programs. Please look for a program close to your application in order to modify it. Before you can use such a built-in program you have to copy it in one of the 16 user program places in the memory of the power source (for detailed information, see Programming Manual). Afterwards you can modify the program to fit your special application.

For all applications, Argon is used as shielding gas. The programs are listed in function of the welding head (closed chamber, MU III, or TS/TP), the material (mild steel or stainless steel), the diameter and the wall thickness of the tubes to be welded. In case of tube to tube-plate welds, a difference is made between "flush" and "protruding" tubes.

Warning



If multipass welding is necessary, the parameter values for the passes are given in the tables without repeating diameter and thickness of the tubes.

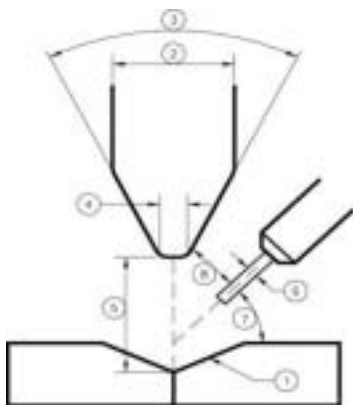


Fig. 5.1 : Weld set-up

If filler wire is used, its diameter is always 0.8 mm.

The set-up of a weld may influence considerably its result. The set-up is explained below and, whenever necessary, added to the programs.

- 1: Tube end preparation.
- 2: Electrode diameter.
- 3: Tip angle.
- 4: Flat.
- 5: Distance electrode-workpiece.
- 6: Diameter of filler wire.
- 7: Angle between wire and workpiece.
- 8: Start position of the weld.
- 9: Start position of the weld.
- 10: Weld preparation angle.
- 11: Thickness of land.
- 12: Length of the land (for J preparation).

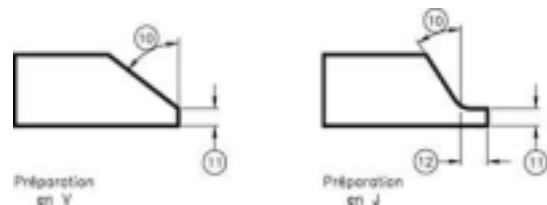


Fig. 5.2 : Weld preparation

5.1.1. Closed chamber welding heads or MU heads without filler wire

To use these programs for enclosed welding heads, a square-butt preparation is necessary. The programs which are valid for MU III welding heads are indicated by a star in the appropriate column.

Tubes to be welded			Set-up before welding						Range
Material	Ø OD	Wall thickness	Ø electrode	Tip angle	Nose	Distance electrode/w orkpiece	Number of built-in program	Also valid for MU III welding heads	PS 254
	mm	mm	mm	degree	mm	mm			
Stainless	5	1	1.6	20	0.2	0.8	1		X
Stainless	6	0.6	1.6	20	0.1	0.8	2		X
Stainless	6.35	0.9	1.6	20	0.2	0.8	3	*	X
Stainless	8	1	1	20	01	0.8	4	*	X
Stainless	9.52	1.65	1.6	15	0.1	0.8	5		X
Stainless	10	1.55	1.6	20	0.1	1	6	*	X
Stainless	10.5	0.4	1.6	20	0.1	0.8	7	*	X
Stainless	11	0.2	1.6	15	/	0.35	8		
Stainless	12	1	1.6	20	0.1	0.8	9	*	X
Stainless	12.7	0.8	1.6	20	0.1	0.8	10	*	X
Stainless	15.8	0.2	1.6	15	/	0.4	11		
Stainless	16	0.8	1.6	20	0.1	0.8	12		X
Stainless	16	2.25	2.4	20	0.2	0.8	13	*	X
Stainless	17.2	2.3	2.4	30	0.2	0.8	14	*	X
Stainless	22	1.25	2.4	30	0.2	1	15	*	X
Stainless	25	1	2.4	30	0.2	1	16	*	X

Tubes to be welded			Set-up before welding						Range	
Material	Ø OD	Wall thickness	Ø electrode	Tip angle	Nose	Distance electrode workpiece	Number of built-in program	Also valid for MU III welding heads	PS 254	
	mm	mm	mm	degrés	mm	mm				
Stainless	25	1.2	2.4	30	0.2	1	17	*		X
Stainless	25	2.5	2.4	30	0.2	1.2	18	*		X
Stainless	26.9	3.6	2.4	30	0.2	1.2	19	*		X
Stainless	38	1.2	2.4	30	0.2	1	20	*		X
Stainless	40.5	0.4	2.4	20	0.1	0.6	21	*		X
Stainless	48.7	2	2.4	30	0.2	1.2	22	*		X
Stainless	51	1.2	2.4	30	0.2	1	23	*		X
Stainless	51	1.8	2.4	30	0.2	1.2	24	*		X
Stainless	63.5	0.7	2.4	20	0.2	0.9	25	*		X
Stainless	63.5	1.5	2.4	30	0.2	1.2	26	*		X
Stainless	88.9	1.6	2.4	30	0.2	1.2	27	*		X
Stainless	88.9	2	2.4	30	0.2	1.4	28	*		X
Stainless	88.9	3	2.4	30	0.2	1.6	29	*		X
Stainless	114.3	3	2.4	30	0.2	1.6	30	*		X

5.1.2.MU open welding heads with filler wire

Warning



For some welds the distance electrode-workpiece has to be modified at the end of the cycle when the beginning of the seam is overwelded. These programs are marked with a star in the last column of the set-up before welding.

Tubes to be welded			Set-up before welding											Range
Material	Ø OD	Wall thickness	Preparation	Ø Electrode	Tip angle	Nose	Distance electrode/work piece	Wire angle	Distance electrode/wire	Start position	Layer	Built-in program number	Adjust at the end of cycle	PS 254
	mm	mm		mm	degrees	mm	mm	degrees	mm					
Stainless	33.7	32	V 37.5° 0.4 mm nose	2.4	40	0.3	2.5	25	3	12 H		41	*	X
Stainless	51	18	Square-butt	2.4	40	0.3	2.5	20	3	12 H		43		X
Stainless	51	3	V 37.5° 0.2 mm nose	2.4	40	0.3	2.5	25	3	10H30		44	*	X
Stainless	60.3	25	Square-butt	2.4	40	0.3	2	20	2.5	10H30		46	*	X
Stainless	60.3	4	J 30° 0.9 mm nose 1.5 mm land	2.4	40	0.3	2	25	3	10H30		47	*	X
				2.4	40	0.3	3	20	3.5	12 H	2	48		X
Stainless	114.3	25	Square-butt	2.4	40	0.3	2.5	20	3	12 H		51	*	X
Stainless	114.3	3	Square-butt	2.4	30	0.3	2	25	2.5	10H30		52	*	X
Stainless	168	4									1	53		X
											2	54		X
Mild steel	25	32	V 37.5° 0.2 mm nose	2.4	40	0.2	2	25	2	10H30		56	*	X
Mild steel	38	3	V 37.5° 0.2 mm nose	2.4	40	0.2	2	20	2.5	10H30	1	57	*	X
				2.4	40	0.2	2.5	20	3	12 H	2	58		X
Mild steel	51	3	V 37.5° 0.2 mm nose	2.4	40	0.2	2	15	2.5	10H30		59	*	X
Mild steel	51	4	J 30° 1.4 mm nose 1.5mm land	2.4	40	0.2	2	30	2	10H30	1	61	*	X
				2.4	40	0.2	2.5	20	3	12 H	2	62		X
Mild steel	60.3	3	V 37.5° 0.2 mm nose	2.4	40	0.2	1.5	25	2.5	10H30	1	63	*	X
				2.4	40	0.2	2.5	20	3	12 H	2	64		X
Mild steel	88.9	4	J 30° 1 mm nose 1.5 mm land	2.4	40	0.4	2	35	1.5	10H30	1	65		X
				2.4	40	0.2	2	10	2.5	12H	2	66		X
Mild steel	114.3	39	V 37.5° 0.2 mm nose	2.4	40	0.2	1.5	25	2	10H30	1	67	*	X
				2.4	40	0.2	3	10	3.5	12 H	2	68		X

5.1.3.TS/TP welding heads for welding of tubes to tubesheet

Tube to tubesheet welds may have two geometrical shapes : flushing or protruding tubes. For welds of flushing tubes, one pass is required. For welds of protruding tubes, make two passes (one with wire and one without wire). In this case a welding bevel is needed on the workpiece (angle = 45°, height: 1.5 mm). For leak resistant welds of protruding tubes, make one pass (without a bevel) and then a second pass corresponding to the tube to be welded.

Tubes to be welded			Set-up before welding											Range
Material	Ø OD	Wall thickness	Tube protruding/flushing	Angle of torch	Distance electrode/plaque	Distance electrode/work piece	Distance electrode/wire	Ø Electrode	Tip angle	Nose	Ø wire	N° of layer	Built-in program number	PS 254
	mm	mm			mm	mm	mm	mm	mm	degrees				
Stainless	25	2	Flushing	0°	2.5	1	2	2.4	30°	0.2	0.8	1/1	81	X
Stainless	25	2	Protruding	15°	0.5	1.2		2.4	30°	0.2		1/2	83	X
				15°	2	2	1.2	2.4	30°	0.2	0.8	2/2	84	X
Stainless	26.7	1.5	Flushing	0°	3	1	2.2	2.4	30°	0.2	0.8	1/1	85	X
Stainless	26.7	1.5	Protruding	15°	0.5	1.2		2.4	30°	0.2		1/2	87	X
				15°	2	2	1.2	2.4	30°	0.2	0.8	2/2	88	X
Mild steel	25	2.5	Flushing	30°	2	2	1.2	2.4	30°	0.2	0.8	1/1	90	X
Mild steel	25	2.5	Protruding	30°	0.5	1.2	0.5	2.4	30°	0.2		1/2	91	X
				30°	2	2.2	1.2	2.4	30°	0.2	0.8	2/2	92	X
Mild steel	25	3	Flushing	0°	2	1	1.2	2.4	30°	0.2	0.8	1/1	93	X
Mild steel	25	3	Protruding	15°	0.5	1.2		2.4	30°	0.2	0.8	1/2	95	X
				15°	2	2	1.2	2.4	30°	0.2	0.8	2/2	96	X

5.2. Error codes

N°	ORIGIN	FAULT	CONSEQUENCE
10	Gas	Lack of gas	Immediate stop
11	Coolant	Coolant circuit n°1 failure	Forced downslope
12	Coolant	Coolant circuit N° 2 failure	Forced downslope
22	Power	No ignition	Immediate stop
23	Power	Loss of arc	Immediate stop
24	Power	Short circuit electrode workpiece	Immediate stop
27	Power	Over heating	Immediate stop
29	Power	Source regulation fault	Immediate stop
30	Rotation	Rotation speed regulation fault	Immediate stop
31	Rotation	Speed regulation fault	Immediate stop
32	Rotation	Rotation pulse emitter fault	Immediate stop
40	Wire	Wirefeeder speed regulation fault	Forced downslope
41	Wire	Wirefeeder motor blocked	Immediate stop
42	Wire	Wirefeeder pulse emitter fault	Immediate stop
51	Sequencer	Manual downslope	Forced downslope
52	Sequencer	Manual stop	Immediate stop
53	Sequencer	Processor fault	Reboot
54	Sequencer	Start position fault	Immediate stop
56	Sequencer	Electrical fault	Immediate stop
60	Printer	Printer fault	No printout
61	Printer	Program absent	No printout
62	Printer	No corresponding data	No printout
70	Saving	Memo card absent	No saving
70	Saving	Memo card absent	No loading
71	Saving	Error during saving of program	No saving
72	Saving	Saving fault	No saving
73	Loading	Card empty	No loading
74	Loading	Loading fault	No loading
75	Loading	Max. or min. current of the source exceeded	No loading

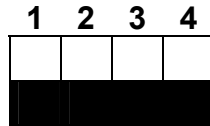
N°	ORIGIN	FAULT	CONSEQUENCE
25	Power	Overvoltage	Immediate stop
26	Power	Voltage too low	Immediate stop
88	Power	Overcurrent	Immediate stop

CONFIGURATION OF DIPS FOR PS 254

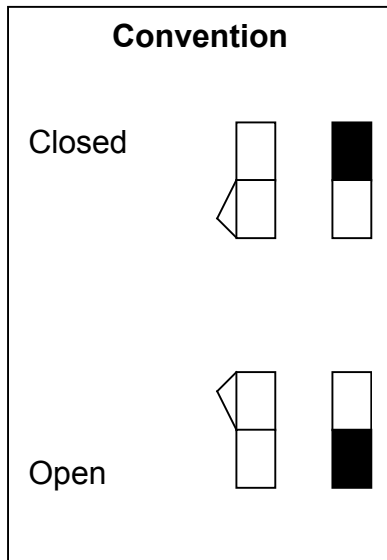
Card

21700633

S3



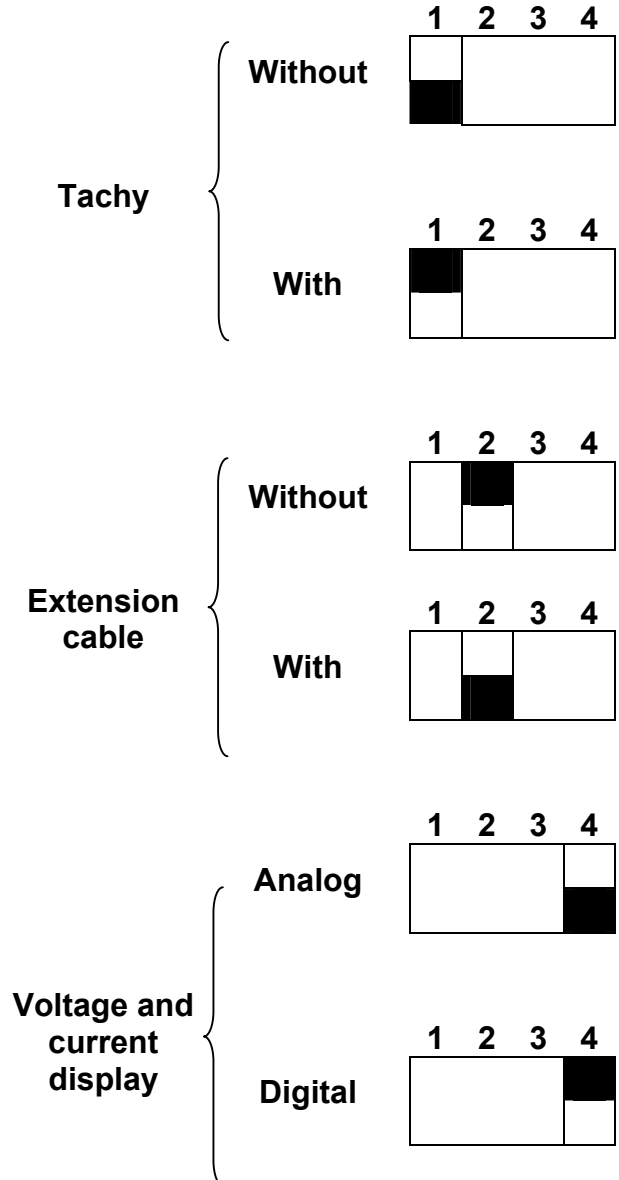
PS 254



Function

21700634

S1



RETURN OF MATERIAL
Please fill out and join this sheet when returning materiel to
POLYSOUDE
Z.I du Bois Briand
2 rue Paul Beaupère
BP 41606
44606 Nantes Cedex 3

Reseller / Person in charge :
 Customer / Person in charge / Tel. :

EQUIPMENT RETURNED :

<input type="checkbox"/> Power source	Type :	Serial number :
<input type="checkbox"/> Welding head	Type :	Serial number :
<input type="checkbox"/> Coolant	Type :	Serial number :

Other (specify designation) :

↳ taken from :

<input type="checkbox"/> Power source	Type :	Serial number :
<input type="checkbox"/> Welding head	Type :	Serial number :
<input type="checkbox"/> Coolant	Type :	Serial number :
<input type="checkbox"/> Other(to be specified) :	Serial number :

REASON FOR RETURN :

- Return after loan / of demonstration material
- Return of hired equipment
- Deficient delivery / incorrect order
- Return for modification (to be specified) :
- Return for revision
- Return for calibration

- Return for repair
 - please specify the type of the error : systematically
 - occasionally
- Description of breakdown :

- Other (please specify) :

Date : Signature:

SUMMARY SPARE PARTS

PARTN°	DESIGNATION	QTY
00503026	Display remote control pendant	1
00629079	Memory card (1 programme)	10
00629087	Relay-PC board	1
14360000	Remote control pendant	1
21700633	Sequencer PC board	1
21700634	Synoptic PC board	1
21700627	PC board interface for remote control pendant	1
00629086	H.F. striking unit	1
00545111	Main switch	1
00545112	Key locking switch	1
00629076	Current supply (+5 V)	1
14909804	Programming keyboard	1
17375299	Protection box for remote control pendant	1
71701418	Flowmeter Argon (Export)	1
00629078	Printer	1
75501002	Flowmeter Argon (France)	1
71701421	Flowmeter Argon/Hydrogen	1
14369999	Cable complet for remote control pendant	1
21700636	Current/voltage interface	1
21700647	Interface tacho impulse	1
00629080	Power unit 250 A	1
75501207	Set of fuses	1
64599801	Return cable 9 m	1
75301335	Electrovalve 42VAC	1
00629085	Gas flow detection	1
00629084	Water security	1
00699017	Housing water filter	2
00699018	Element for water filter	3
75110071	Coolant	10 L
00629073	Cooling pump 230V 50Hz	1
00629074	Cooling pump 230V 60Hz	1
15545401	Quick coupling water connectors (inlet+outlet)	1
01514008	Quick coupling connector gas female	1
00542071	Red cap for emergency stop	1
00542070	Emergency stop button (without red cap)	1
00549067	Remote pendant button grey	1
00549066	Remote pendant button black	3
00549065	Remote pendant button red	1
00542006	Switch remote pendant 2 positions	1

PARTN°	DESIGNATION	QTY
00543016	Digit coding wheel	2
00563085	Plug remote control pendant	1
00320042	Supply unit + 12 V	1
00544031	Relay 12 VDC	1
41410144	Transformer	1
00590065	Printer paper	10
00590064	Ribbon	3