



# Pioneer 321 MKS



GB

Instruction manual



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## 1 INTRODUCTION

## 2 FRONT PANEL

**IMPORTANT!**

This handbook must be consigned to the user prior to installation and commissioning of the unit.

Read the "General prescriptions for use" handbook supplied separately from this handbook before installing and commissioning the unit.

The meaning of the symbols in this manual and the associated precautionary information are given in the "General prescriptions for use".

If the "General prescriptions for use" are not present, it is mandatory to request a replacement copy from the manufacturer or from your dealer.

Retain these documents for future consultation.

### KEY

- This symbol identifies an action that occurs automatically as a result of a previous action.
- This symbol identifies additional information or a reference to a different section of the manual containing the associated information.
- This symbol identifies a reference to a chapter of the manual.
- This symbol accompanies important information concerning the execution of the relevant operations.

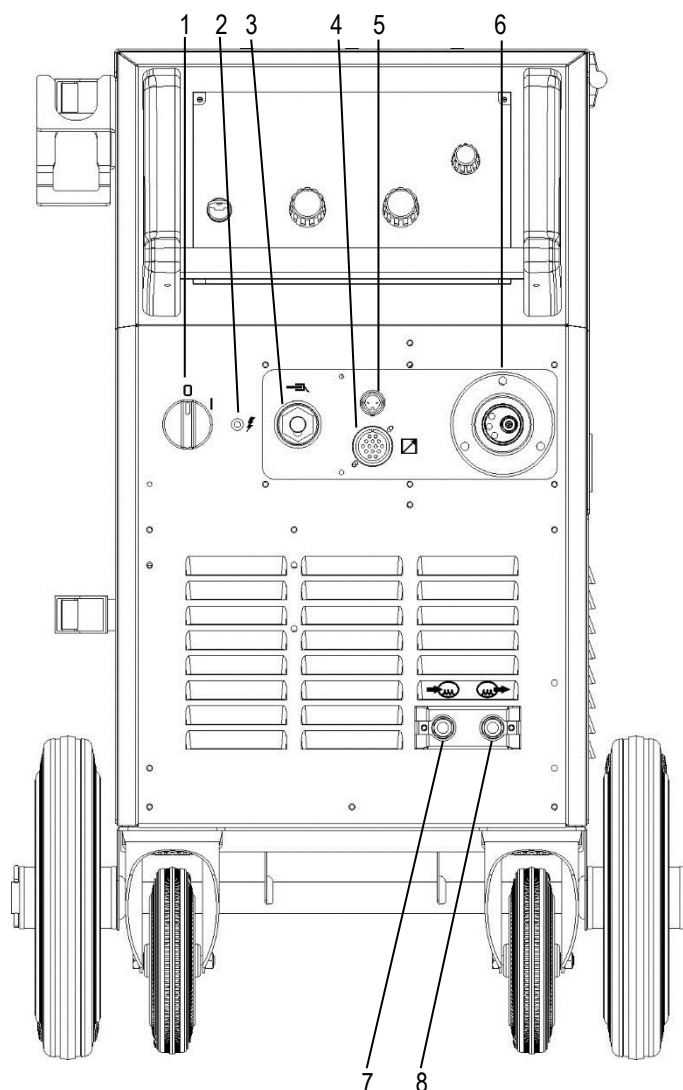
Pioneer 321 MKS is a synergic three-phase inverter suitable for workshops, car body repairs, light to medium carpentry and welding on positioners.

Accessories that can be connected to the unit:

- liquid cooler for torches.

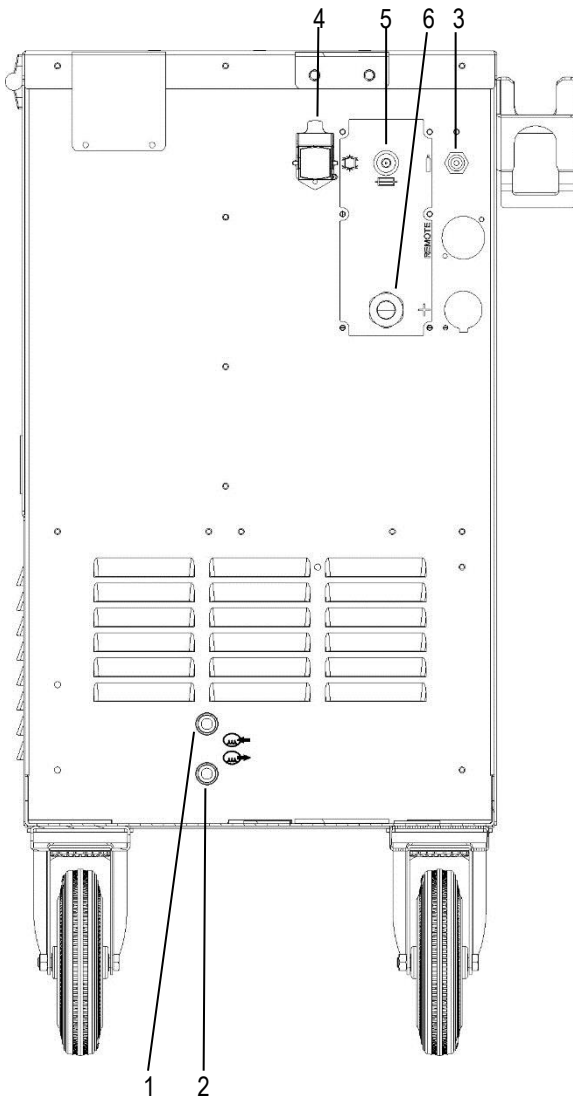
The available procedures in the MIG/MAG modality are:

PROCEDURE
TWO STEP (2T)
FOUR STEP (4T)
THREE LEVEL (3T)



- 1: Welding power source ON/OFF switch.
- 2: Mains protection ON LED.  
This LED illuminates if an incorrect operating condition occurs:  
– absence of a phase in the power supply line.
- 3: Earth welding socket.
- 4: Remote controller connector.
- 5: Provision for connection of the push pull torch (purchasing and installing the relative kit).
- 6: MIG/MAG torch connector.
- 4: Connector for coolant hose.  
Torch → Power source
- 5: Connector for coolant hose.  
Power source → Torch

### 3 REAR PANEL



- 1: Connector for coolant hose.  
Cooler → Power source
- 2: Connector for coolant hose.  
Power source → Cooler
- 3: Gas rear connector. This is for the connection of the gas pipe coming from the bundle of cables.
- 4: Cooler power feeding connector.

Voltage	230 V~
Current output	0.8 A
IP protection rating	IP20 (cap open) IP66 (cap closed)

**WARNING!**  
High voltage!

If the socket is not connected to any devices always close the cap: presence of hazardous voltage levels!

- 5: Power supply transformer fuse.

Type	Delayed acting (T)
Amperage	2 A
Voltage	500 V

- 6: Power cable.

Total length (including internal part)	4.5 m
Number and cross section of wires	4 x 4.0 mm <sup>2</sup>
Power plug type	Not supplied

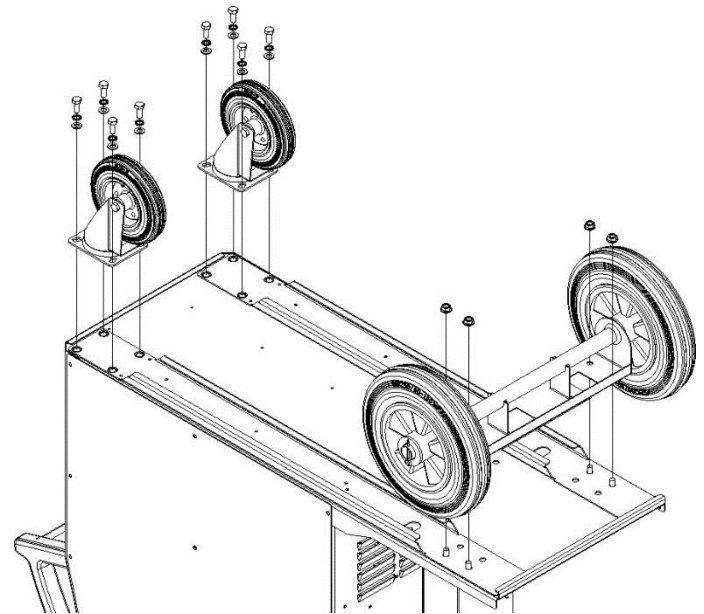
### 4 INSTALLATION

**WARNING!**  
Lifting and positioning

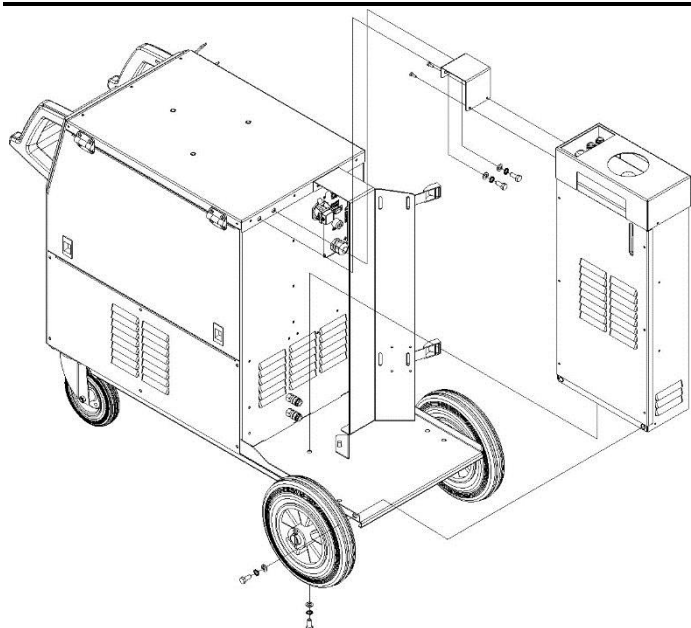
Read the warnings highlighted by the following symbols in the "General prescriptions for use".

#### 4.1 UNIT ASSEMBLY

1. Fit the front swivel wheels with the supplied screws.
2. Screw the fixed rear wheels to the studs in the base of the unit and secure them with the supplied nuts.



3. Mount the cooler in the relevant location.
4. Screw the cooler fixing bracket to the welding power source chassis using the supplied screws.
5. Screw the base of the cooler to the unit base using the supplied screws.
6. Connect the plug of the cooler power cable to the cooler power socket on the rear panel of the welding power source.



## 4.2 CONNECTIONS TO THE ELECTRICAL MAINS NETWORK

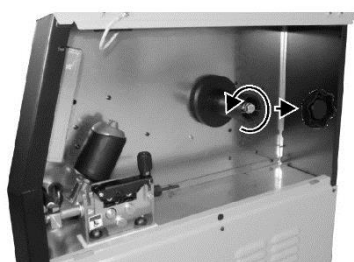
The characteristics of the mains power supply to which the equipment shall be connected are given in the section entitled "technical data" on page 21.

The machine can be connected to motorgenerators provided their voltage is stabilised.

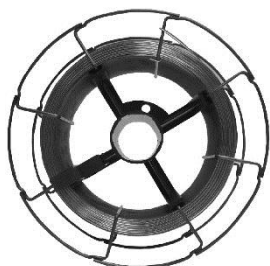
Connect/disconnect the various devices with the machine switched off.

## 4.3 WIRE SPOOL POSITIONING

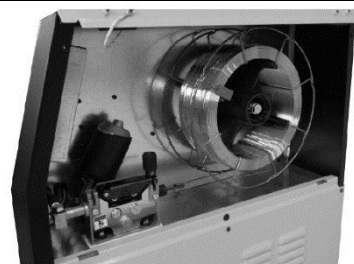
1. Open the unit side door to gain access to the spool compartment.
2. Unscrew the cap of the spool holder.



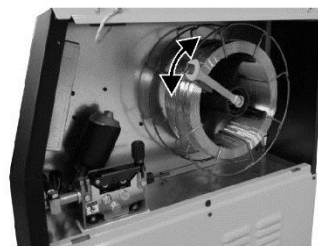
3. If necessary, fit an adapter for the wire spool.



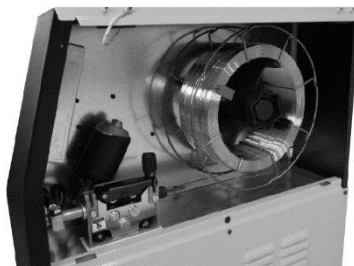
4. Fit the spool in the spool holder, ensuring it is located correctly.



5. Adjust the spool holder braking system by tightening/loosening the screw in such a way that the wire feed force is not excessive and when the spool stops rotating no excess wire is released.

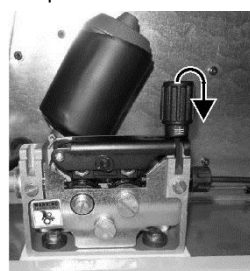


6. Refit the plug.

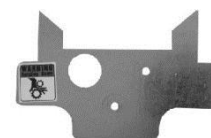
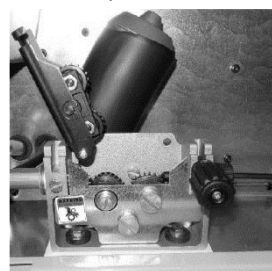


## 4.4 POSITIONING THE WIRE IN THE WIRE FEEDER

1. Lower the wire feeder pressure devices.



2. Raise the wire feeder pressure arms.
3. Remove the protective cover.

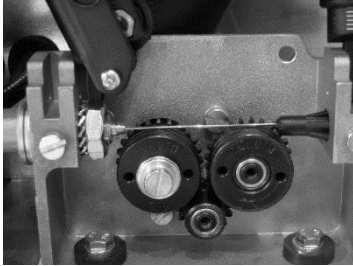


4. Check that the feed rolls are suitable for the wire gauge.

### ⓘ § 15.3 WIRE FEEDER ROLLS


- The diameter of the roll groove must be compatible with the diameter of the welding wire.
- The roll must be of suitable shape in relation to the composition of the wire material.

- The groove must feature a "U" profile for soft materials (Aluminium and its alloys, CuSi3).
  - The groove must be "V" shaped for harder materials (SG2-SG3, stainless steels).
  - Rolls with a knurled groove profile are available for flux-cored wire.
5. Feed the wire between the wire feeder rolls and insert it into the MIG/MAG TORCH connector plug.
  6. Make sure the wire is located correctly in the roll grooves.




7. Close the wire feeder pressure arms.
8. Adjust the pressure system so that the arms press the wire with a force that does not deform it while also ensuring constant feed rate without slipping.



9. Refit the protective cover.
10. Set the welding power source ON/OFF switch to "I" (unit powered).
11. Feed the wire through the torch until it protrudes from the tip, pressing button  on the unit front panel.

powered).

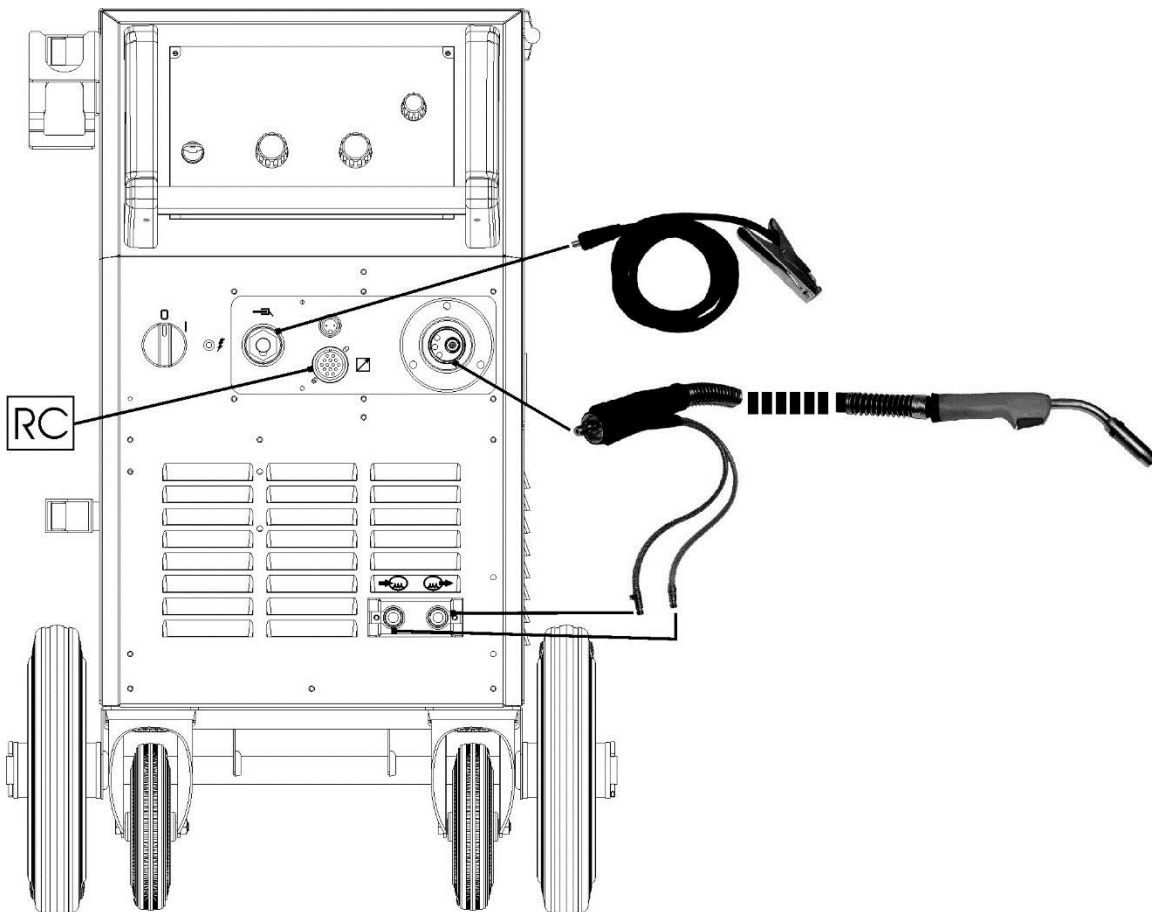
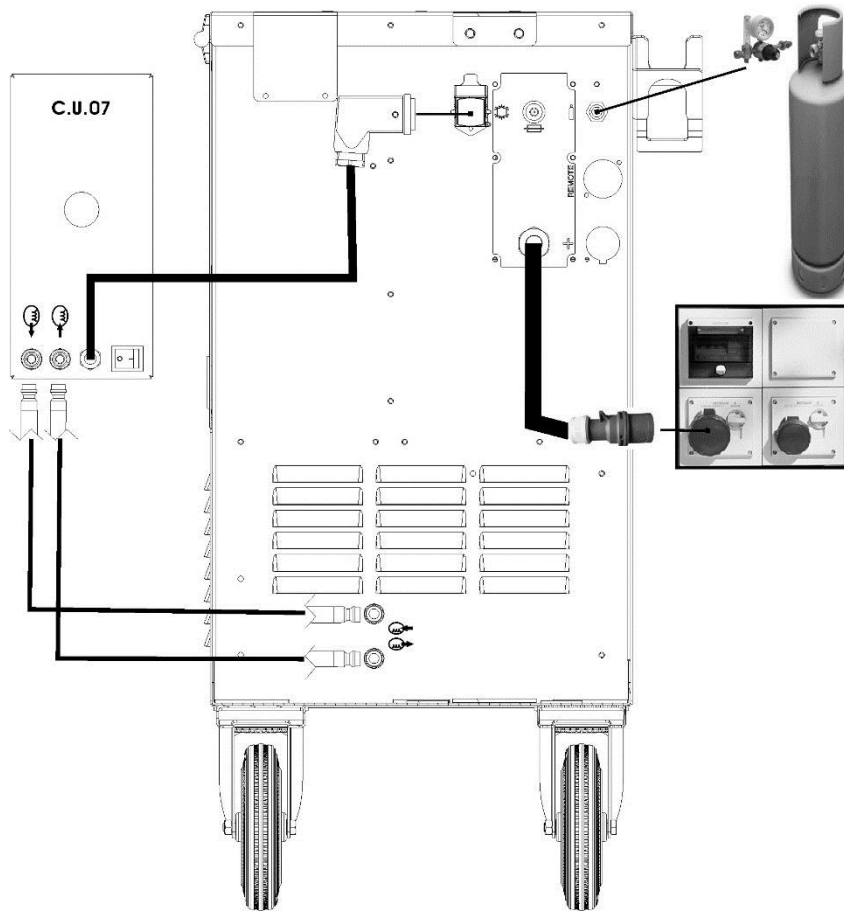
12. Feed the wire through the torch until it protrudes from the tip, pressing button  on the unit front panel.
13. Select the torch trigger procedure on the user interface.
14. Press the torch trigger with the torch well clear of any metal parts. This serves to open the gas solenoid valve without striking the welding arc.
15. Use the flow control valve to adjust the flow of gas as required while the gas is flowing out.
16. Set the required welding parameter values on the user interface.
17. On connecting and enabling a remote controller [RC] certain settings can be modified from said controller without having to take action on the user interface of the welding power source.

The system is ready to start welding.

#### 4.5 CONNECTIONS TO SOCKETS

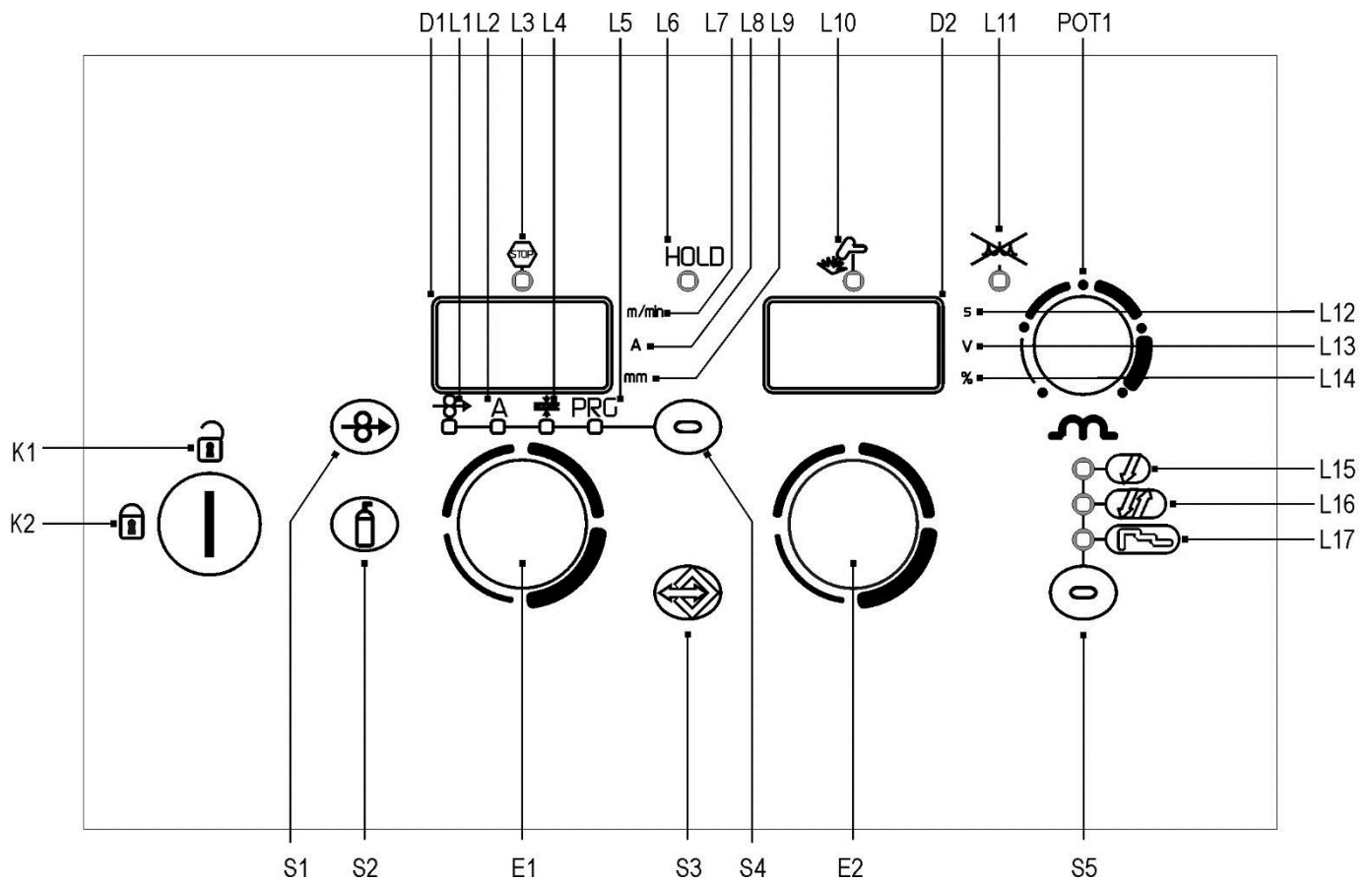
1. Set the welding power source ON/OFF switch to "O" (unit de-energized).
2. Plug the power cable plug into a mains socket outlet.
3. Connect the gas hose from the welding gas cylinder to the rear gas socket.
4. Open the cylinder gas valve.
5. Connect the power supply cable of the cooling unit to the auxiliary power socket on the power source.
6. Attach the coolant hoses to the relevant connectors on the cooler and on the power source rear panel.
7. Connect the MIG/MAG torch plug to the EURO TORCH welding socket.
8. Attach the coolant hoses of the MIG/MAG torch to the relevant connectors on the power source front panel.
9. Connect the plug of the ground clamp to the welding socket on the basis of the polarity required.
10. Connect the earth clamp to the workpiece being processed.
11. Set the welding power source ON/OFF switch to "I" (unit

#### MIG/MAG installation
























## 5 USER INTERFACE



CODE	SYMBOL	DESCRIPTION
L1		When this LED illuminates the following parameter can be set: WIRE FEED RATE The value appears on the following display: D1
L2	<b>A</b>	When this LED illuminates the following parameter can be set: WELDING CURRENT The value appears on the following display: D1
L3		This LED illuminates to show an anomaly in the operating conditions. An alarm message appears on the following display: D1-D2 ① § 9 ALARMS MANAGEMENT
L4		When this LED illuminates the following parameter can be set: WELDING THICKNESS (Reference is made to "T" fillet welds on identical thicknesses. The relative value is purely guideline). The value appears on the following display: D1
L5	<b>PRG</b>	When this LED illuminates the following parameter can be set: WELDING PROGRAM The value appears on the following display: D1
L6	<b>HOLD</b>	Illuminates to show the last voltage and current values measured during welding. The LED switches off when a new welding procedure is started, or when any of the welding settings is modified. The value appears on the following displays: D1-D2
L7	<b>m/min</b>	Illuminates to show a value in the following unit of measurement: METRES PER MINUTE Illuminates together with the following LED: The value appears on the following display: D1
L8	<b>A</b>	Illuminates to show a value in the following unit of measurement: AMPERES The value appears on the following display: D1
L9	<b>mm</b>	Illuminates to show a value in the following unit of measurement: MILLIMETRES Illuminates together with the following LED: The value appears on the following display: D1
L10		This LED illuminates to confirm the presence of power on the output sockets.
L11		Illuminates to show that the cooling unit pressure switch does not detect any pressure.
L12	<b>S</b>	Illuminates to show a value in the following unit of measurement: SECONDS The value appears on the following display: D2
L13	<b>V</b>	Illuminates to show a value in the following unit of measurement: VOLTS The value appears on the following display: D2
L14	<b>%</b>	Illuminates to show a value in the following unit of measurement: PERCENTAGE The value appears on the following display: D2
L15		Illumination shows that the following function has been activated: 2 times procedure ① § 13.1 2T MIG/MAG WELDING

L16		<p>Illumination shows that the following function has been activated: 4 times procedure ① § 13.2 4T MIG/MAG WELDING</p>
L17		<p>Illumination shows that the following function has been activated: 3 levels procedure ① § 13.3 3 LEVEL MIG/MAG WELDING</p>
D1		<p><b>During illumination of the following LEDs:</b>  / <b>A</b> /  / <b>PRG</b> The display shows the value of the selected parameter.</p> <p><b>Welding:</b> The display shows the effective amperes value during welding.</p> <p><b>HOLD function (at welding end):</b> The display shows the latest measured current value.</p> <p><b>Menu function:</b> The display shows the acronym of the parameter or function to be adjusted.</p> <p><b>Programs setting:</b> The display shows the message P "program no."</p>
D2		<p><b>Data setting:</b> The display shows the value, in Volts, of the selected welding voltage.</p> <p><b>Welding:</b> The display shows the effective voltage value during welding.</p> <p><b>HOLD function (at welding end):</b> The display shows the latest measured voltage value.</p> <p><b>Menu function:</b> The display shows the value of the parameter or function to be adjusted.</p> <p><b>Programs setting:</b> The display shows the acronym of the material to be welded on the basis of the selected synergic curve.</p>
S1		<p>This button activates wire feed to insert it through the MIG/MAG torch. The insertion speed is 2 m/min for 3 seconds, subsequently increasing to 10 m/min. This function produces a slower feed rate and hence greater precision when inserting the wire when it enters the torch nozzle.</p>
S2		<p>This button opens the gas solenoid valve to fill the circuit and calibrate the pressure with the regulator on the gas cylinder.</p>
S3		<p>Press the button once to open the JOB upload menu. Hold down the button for 3 seconds to gain access to the JOB save/delete menu. ① § 11 WELDING SETTINGS</p>
S4		<p><b>Manual MIG/MAG mode:</b> The button cycles through the following LEDs in sequence, selecting only one:  / <b>PRG</b></p> <p><b>Synergic MIG/MAG mode:</b> The button cycles through the following LEDs in sequence, selecting only one:  / <b>A</b> /  / <b>PRG</b></p> <p><b>Data setting:</b> Hold down the button for 3 seconds to gain access to the second level menu. ① § 11.1.2 MIG/MAG PARAMETERS SETTING (2ND LEVEL)</p>
S5		<p>This button selects the torch trigger procedure.</p>
E1		<p><b>Data setting:</b> The encoder adjusts the main welding (and synergy) parameter, shown on the following display: D1</p> <p><b>Menu function:</b> The encoder selects the function or parameter to be adjusted.</p>
E2		<p><b>Manual MIG/MAG mode:</b> The encoder adjusts the welding voltage, and the relative value is shown, in volts, on the following display: D2</p> <p><b>Synergic MIG/MAG mode:</b> The encoder is used to correct the factory-set value of the selected synergic curve, the value of which is shown on the following display: D2</p>
POT1		<p><b>Manual MIG/MAG mode:</b> The potentiometer sets the inductance value.</p> <p><b>Synergic MIG/MAG mode:</b> The potentiometer sets the inductance value from the minimum to the maximum permissible value in accordance with the selected synergic curve.</p>
K1		<p><b>Control release:</b> When the key is in this position all the functions of the machine can be changed.</p>
K2		<p><b>Control lock:</b> When the key is in this position, some functions of the panel are disabled. The functions disabled depend on the blocking status selected. ① § 8.1 LOCKING PROCEDURE</p>

## 6 UNIT POWER-UP

Set the welding power source ON/OFF switch to "I" to switch on the unit.

- ➡ **AL. HEA.** The message appears on the following displays: D1-D2

### First power-up or power-ups following a RESET procedure

- ➡ The welding power source sets up for welding with the factory presets.

### Subsequent power-ups

- ➡ The welding power source sets up for welding in the latest stable welding configuration that was active at the time of power-off.

## 7 RESET (LOAD FACTORY SETTINGS)

### 7.1 PARTIAL RESET

The reset procedure involves restoration of the parameter values and settings, except the following settings:

- settings of the SETUP menu.
- saved JOBS.

Set the welding power source ON/OFF switch to "O" to switch the unit off.

- S2  S5  Hold down both buttons simultaneously.

Set the welding power source ON/OFF switch to "I" to switch on the unit.

- ➡ **rEC FAC** The message appears on the following displays: D1-D2


- E2  Select the following setting with the encoder: **rEC PAR**



#### Exit without confirmation

- ➡ Press any button (except S3).
- ➡ This action will automatically close the menu.

#### Exit with confirmation

- S3  Press the button.
- ➡ This action will automatically close the menu.
- Wait for the memory clear procedure to terminate.

### 7.2 TOTAL RESET



The reset procedure involves complete restoration of the default values, parameters and memory settings set in the factory.

All memory locations will be reset and hence all your personal welding settings will be lost!

The reset procedure is useful in the following cases:

- too many changes made to the welding parameters so user finds it difficult to restore defaults.
- unidentified software problems that prevent the welding power source from functioning correctly.

Set the welding power source ON/OFF switch to "O" to switch the unit off.

- S2  S5  Hold down both buttons simultaneously.


Set the welding power source ON/OFF switch to "I" to switch on the unit.

- ➡ **rEC FAC** The message appears on the following displays: D1-D2

#### Exit without confirmation

- ➡ Press any button (except S3).
- ➡ This action will automatically close the menu.

#### Exit with confirmation

- S3  Press the button.
- ➡ This action will automatically close the menu.
- Wait for the memory clear procedure to terminate.



## 8 SET-UP (INITIAL SET-UP OF THE WELDING POWER SOURCE)



With locked status active it is not possible to access this function.  
① § 8.1 LOCKING PROCEDURE

Set the welding power source ON/OFF switch to "O" to switch the unit off.

S4 Hold down the button.

Set the welding power source ON/OFF switch to "I" to switch on the unit.



- Set UP** The message appears for a few seconds on the following displays: D1-D2
- The acronym relative to the setting to be edited appears on the following displays: D1
- The value relative to the selected setting appears on the following displays: D2

E1 Using the encoder, select the setting to be changed.

E2 Using the encoder, edit the value of the selected setting.

E1 Select the following setting with the encoder: **ESC**

S4 Press any button to save the setting and quit the menu.

**Tab. 1 - Setup settings**

ACRONYM	SETTING	MIN	DEFAULT	MAX	
Coo	COOLER ACTIVATION	Aut	Aut	on	
rC	REMOTE CONTROLLER SELECTION	oFF	oFF	06	{ oFF No control 03 n°1 potentiometer 04 n°2 potentiometers 05 n°1 UP/DOWN 06 n°2 UP/DOWN
LoC	ADJUSTMENTS BLOCK SELECTION	oFF	oFF	3	
PP	PUSH PULL	on	oFF	oFF	
bb	SELECTION OF BURN TYPE	SPc (*1)	Std	Std (*2)	
					{ oFF All adjustments enabled. 1 All adjustments are disabled with the exceptions shown in Tab. 2 page 13. 2 All adjustments are disabled with the exceptions shown in Tab. 2 page 13. 3 All adjustments are disabled with the exceptions shown in Tab. 2 page 13.

\*1: Anti-sticking function present to prevent the wire from sticking.

\*2: No wire sticking control, just final wire cut.

### Cooler activation

- ON= The cooler is always running when the power source is switched on. This mode is preferable for heavy duty and automatic welding procedures.
- OFF= The cooler is always disabled because an air-cooled torch is in use.
- AUT= When the unit is switched on the cooler is switched on for 15 s. During welding procedures the cooler runs constantly. When welding is terminated the cooler continues to run for 90 s + a number of seconds equivalent to the average current value shown using the HOLD function.

## 8.1 LOCKING PROCEDURE


The procedure inhibits unit adjustments, allowing the user to modify only certain settings depending on the selected lock status.

The procedure is used to prevent accidental alteration of the unit settings and welding settings by the operator.


### Enabling


If no locking status is selected (LOC = OFF) and if you wish to set up a limitation on use of the power source, display the LOC function in the SETUP menu.


Open the Setup menu.


 The acronym relative to the setting to be edited appears on the following displays: D1

 The value relative to the selected setting appears on the following displays: D2

E1  Select the following setting with the encoder: **LoC**

E2  Use the encoder to select the required lock status.

E1  Select the following setting with the encoder: **ESC**

S4  Press any button to save the setting and quit the menu.

**Tab. 2 - Functions not disabled by Locks**


LOC	USER INTERFACE	RC03	RC04	RC05	RC06
oFF	All adjustments enabled. Key K1 disabled.	All adjustments enabled.	All adjustments enabled.	All adjustments enabled.	All adjustments enabled.
1	Selection of torch trigger procedure (button S5) Display of main welding parameters (button S4) Arc correction (encoder E2) Wire insertion (button S1) Gas test (button S2)		Arc correction (Potentiometer Pot2)		Arc correction (UP/DOWN lever 2)
2	Selection of torch trigger procedure (button S5) Display of main welding parameters (button S4) Arc correction (encoder E2) Synergy (encoder E1) Wire insertion (button S1) Gas test (button S2)	All adjustments enabled.	All adjustments enabled.	All adjustments enabled.	All adjustments enabled.
3 (*1)	Selection of torch trigger procedure (button S5) Display of main welding parameters (button S4) JOB selection (encoder E2) Wire insertion (button S1) Gas test (button S2)			Scroll JOBS (UP/DOWN lever 1)	Scroll JOBS (UP/DOWN lever 1)

\*1: The LOC 3 setting becomes active only when a JOB is loaded. When no JOB is loaded, the user interface is completely unlocked.


### Disabling


If a lock status is selected, you can only edit parameters permitted by the currently active lock status.


Open the Setup menu.


 The acronym relative to the setting to be edited appears on the following displays: D1

 The value relative to the selected setting appears on the following displays: D2

E1  Select the following setting with the encoder: **LoC**

E2  Select the following setting with the encoder: **oFF**

E1  Select the following setting with the encoder: **ESC**

S4  Press any button to save the setting and quit the menu.

## 8.2 TORCH LOADING



### WARNING!

Make sure the torch in use is correctly sized in relation to the welding current required and for the available and selected cooling type. This prevents the risk of burns to which the operator is potentially exposed, potential faults, and irreversible damage to the torch and the system. If a torch is installed or replaced while the unit is running, the circuit of the newly installed must be filled with coolant to avoid the risk of damage to the torch in the case of high voltage arc strikes without any liquid in the circuit.

### Power-up with operation of the cooler set to "ON" or "AUTO" mode

- ➡ **AL. COO.** The message appears on the following displays: D1-D2
  - (any) Ⓞ Press the button or torch trigger to repeat the checking procedure for an additional 15 seconds.
- If the problem persists rectify the cause of the alarm.

### Power-up with operation of the cooler set to "OFF"

- ➡ Operation of the cooler and the cooler alarm are disabled.
- ➡ Welding is performed without liquid cooling of the torch.

### Torch change-over with operation of the cooler set to "AUTO"

Press and release the torch trigger.

- ➡ This serves to start the cooler for 15 seconds to fill the torch cooling circuit.

## 9 ALARMS MANAGEMENT

- ⏹ This LED illuminates if an incorrect operating condition occurs.
- ➡ An alarm message appears on the following display: D2

Tab. 3 - Alarm messages

MESSAGE	MEANING	EVENT	CHECKS
AL. HEA.	<p><b>Overheating alarm</b></p> <p>Indicates tripping of the welding power source thermal protection.</p> <p>Leave the unit running so that the overheated components cool as rapidly as possible.</p> <p>When the unit has cooled, the welding power source will reset automatically.</p>	<p>All functions disabled.</p> <p>Exceptions:</p> <ul style="list-style-type: none"> <li>- cooling fan.</li> <li>- cooler (if switched on).</li> </ul>	<ul style="list-style-type: none"> <li>- Make sure that the power required by the welding process is lower than the maximum rated power output.</li> <li>- Check that the operating conditions are in compliance with the welding power source data plate specifications.</li> <li>- Check for the presence of adequate air circulation around the welding power source.</li> </ul>
AL. COO.	<p><b>Cooler alarm</b></p> <p>Indicates insufficient pressure in the torch liquid cooling circuit.</p>	<p>All functions disabled.</p> <p>Exceptions:</p> <ul style="list-style-type: none"> <li>- cooling fan.</li> </ul> <p>The alarm message persists on the display until the first operation is performed on the user interface.</p> <p><b>Cooler ON:</b> the alarm is signalled as long as the unit alarm is active and the cooler presence signal persists.</p> <p><b>Cooler OFF:</b> the alarm is never signalled, irrespective of the circumstances.</p> <p><b>Cooler AUTO:</b> the alarm is signalled at the times in which the unit is running; the alarm signal occurs as long as the unit presence signal persists.</p>	<ul style="list-style-type: none"> <li>- Check that the connection to the cooler is correct.</li> <li>- Check that the O/I switch is set to I and that it illuminates when the pump is running.</li> <li>- Check that the cooler is filled with coolant.</li> <li>- Check that the cooling circuit is liquid tight, notably the torch hoses and the internal connections of the cooler.</li> </ul>
Err. C0 Err. C1 Err. C2 Err. C4 Err. C11 Err. C12	<p><b>CAN BUS Communication Alarm</b></p> <p>Indicates the presence of problems in data communication between the power source and wire feeder.</p> <p>When the unit has cooled, the welding power source will reset automatically.</p> <p>Exit the alarm state by performing one of the following actions:</p> <ul style="list-style-type: none"> <li>- Switch the power source off.</li> </ul>	<p>All functions disabled.</p> <p>Exceptions:</p> <ul style="list-style-type: none"> <li>- cooling fan.</li> <li>- cooler (if switched on).</li> </ul>	<ul style="list-style-type: none"> <li>- Check that the connecting cable between power source and wire feeder is intact and make sure the connectors are securely tightened.</li> </ul>




## 10 PARAMETERS ACTIVATION

The welding parameters are available in accordance with the selected welding mode and procedure.  
 Certain parameters are available only after other parameters or functions of the unit have been enabled or set.  
 The table shows the settings required to enable each parameter.

### LEGEND:

✓: always available

1: not enabled with manual program P0.

MENU ↓	PROCEDURE →			
	PARAMETER ↓			
-	Working voltage	✓	✓	1
-	Welding inductance	✓	✓	1
1°	Wire feed rate	✓	✓	1
1°	Welding current	1	1	1
1°	Thickness	1	1	1
1°	Programs	✓	✓	1
2°	Hot Start			1
2°	Crater Filler			1
2°	3 Levels Slope			1
2°	Soft Start	✓	✓	1
2°	Motor Slope	✓	✓	1
2°	Bourn Back	✓	✓	1
2°	Post gas time	✓	✓	1
2°	Pre gas time	✓	✓	1



## 10.1 WELDING PARAMETERS

### Welding inductance

Consequences of a higher value:

- "Softer welding".
- Less spatter.
- Less positive starting.

Consequences of a lower value:

- "Harder welding".
- More spatter.
- More reliable starting.

### Hot Start

This function is useful when using aluminium alloy welding wire.

Consequences of a higher value:

- Greater heat output.
- Greater penetration.

Consequences of a lower value:

- "Cold" weld bead.

### Crater Filler

This parameter serves to obtain a uniform deposit at the end of the welding process to fill the crater with a reduced wire feed rate to facilitate the deposition of filler material.

By keeping the torch trigger pressed during the 3rd time, the wire feed rate is reduced (crater filler speed) thereby ensuring optimal crater filling, until the POST GAS time is started by releasing the torch trigger (4th time).

Consequences of a higher value:

- Difficult crater filling (values greater than 100%).

Consequences of a lower value:

- Cold welding (values close to 1%).

### 3 Levels Slope

Establishes the duration of the slope between the 1st and 2nd time and between the 3rd and 4th time.

### Soft Start

Determines the wire feed rate before the arc strike.

Calculated as a percentage of the programmed wire feed rate.

In Synergic welding the optimal soft start value (indicated with SYN) varies in general with variations of the synergic parameters.

In Synergic welding, if the value soft start = SYN is selected the welding power source will always have the optimal soft start value set when the main welding parameter changes.

If you set a value other than SYN, this value is stored and fixed.

Consequences of a lower value:

- The start of welding is "softer".

Consequences of a higher value:

- The welding start may prove difficult.

### Motor Slope

Time required to switch from SOFT START speed to welding speed.

### Bourn Back

The burn back value is associated with the quantity of wire that is burnt at the end of the welding procedure.

In Synergic welding the optimal burn back value (indicated with SYN) varies in general with variations of the synergic parameters.

In Synergic welding, if the value burn back = SYN is selected the welding power source will always have the optimal burn back value set when the main welding parameter changes.

If you set a value other than SYN, this value is stored and fixed.

Consequences of a higher value:

- Wire significantly retracted into the torch nozzle.

Consequences of a lower value:

- Stick-out at welding start is longer.

### Post gas time

Time of post gas delivery when the welding arc is extinguished.

This is useful when welding at high current values or with materials that oxidise readily to cool the weld pool in an uncontaminated atmosphere.

In the absence of specific requirements the value should generally be kept low.

Consequences of a higher value:

- More effective pickling (improved appearance of workpiece at the end of the welding pass).
- Higher gas consumption.

Consequences of a lower value:

- Lower gas consumption.
- Oxidation of electrode tip (more difficult arc strike).

### Pre gas time

Time of gas delivery before the arc strike.

Consequences of a higher value:

- This parameter allows a shielded environment to be created, thereby eliminating contaminants at the start of the welding pass.



# 11 WELDING SETTINGS

## 11.1 MIG/MAG WELDING

S5 Use this button to select one of the following torch trigger procedures: 2 STEP | 4 STEP | 3 LEVEL

### 11.1.1 SETTING MIG/MAG PARAMETERS (MAIN WELDING PARAMETERS)

- S4 Press this button to scroll the list of settings to edit.
- The LED associated with the selected setting will illuminate.
  - The value relative to the selected setting appears on the following displays: D1
  - The following settings are available: WIRE FEED RATE | AMPERES | THICKNESS | PROGRAMS
- E1 Using the encoder, edit the value of the selected setting.  
The value is saved automatically.
- E2 Using the encoder, edit the value of the following setting: WORKING VOLTAGE  
The value is saved automatically.
- POT1 Using the potentiometer, edit the value of the following setting: WELDING INDUCTANCE

**Tab. 4 - Main welding parameters in MIG/MAG mode**

	PARAMETER	MIN	DEFAULT	MAX	
	WIRE FEED RATE	1.5 m/min	5.0 m/min	22.0 m/min	
	MIG/MAG WELDING CURRENT	-	Syn	-	*1
	THICKNESS	-	Syn	-	*1
	PROGRAMS	P0	P0	P34	
	WORKING VOLTAGE	10.0 V	20.0 V	40.0 V	
	WELDING INDUCTANCE	0	-	255	

**Tab. 5 - Programmed synergic curves**

	WIRE DIAMETER				ACRONYM	WIRE MATERIAL (GAS MIXTURE)
	0.8	1.0	1.2	1.4		
PROGRAMS	P0	P0	P0	P0	MA <sub>n</sub>	MANUAL
	P1	P2	P3	--	FE	SG2/SG3 (80%Ar-20%CO <sub>2</sub> )
	P4	P5	P6	--	FE	SG2/SG3 (92%Ar- 8%CO <sub>2</sub> )
	P7	P8	P9	--	FE	SG2/SG3 (100%CO <sub>2</sub> )
	P10	P11	P12	--	S.S.	INOX 308 (98%Ar-2%CO <sub>2</sub> )
	P13	P14	P15	--	S.S.	INOX 316 (98%Ar-2%CO <sub>2</sub> )
	P16	P17	P18	--	AL	AlMg5 (100%Ar)
	P19	P20	P21	--	AL	AlSi5 (100%Ar)
	P22	P23	P24	--	CU.S.	CuSi3 (100%Ar)
	P25	P26	P27	--	CU.A.	CuAl8 (100%Ar)
	--	--	P28	P29	rFC	RFCW (80%Ar-20%CO <sub>2</sub> )
	--	--	P30	P31	bFC	BFCW (80%Ar-20%CO <sub>2</sub> )
	--	--	P32	P33	MFC	MFCW (80%Ar-20%CO <sub>2</sub> )
	P34	--	--	--	nPr	FREE PROGRAMS

\*1: SYN= By synergy we mean a simple and fast way to regulate the generator. Through this function, an optimum balancing of all the welding parameters in every position can be granted, thus helping the user.

This is the reason why the synergic curves of most of the wire types have been introduced, however these curves can be easily modified so as to allow the user to optimise his own welding procedure.

NOTE: The synergic curves were created with reference to a fillet weld in position PB (horizontal-vertical) with 10 mm stick-out (distance from torch to workpiece).



### 11.1.2 MIG/MAG PARAMETERS SETTING (2ND LEVEL)

- S4 Hold down the button for 3 seconds to gain access to the 2nd level menu.
- The acronym relative to the setting to be edited appears on the following displays: D1
  - The value relative to the selected setting appears on the following displays: D2
- E1 Use the encoder to scroll the list of settings to edit.
- E2 Using the encoder, edit the value of the selected setting.
- Press any button to save the setting and quit the menu.

**Tab. 6 - 2nd level menu parameters in MIG/MAG mode**

ACRONYM	PARAMETER	MIN	DEFAULT	MAX	
H.-S.	HOT START	1 %	130 %	200 %	
C.-F.	CRATER FILLER	1 %	130 %	200 %	
S.3L.	3 LEVELS SLOPE	0.1 s	0.5 s	10.0 s	
S.-S.	SOFT START	10 %	30 %	100 %	*1
SLO.	MOTOR SLOPE	0 ms	40 ms	200 ms	*1
b.-b.	BOURN BACK	0 ms	16 ms	200 ms	*1

### 11.1.3 MIG/MAG PARAMETERS SETTING (GAS MENU)

- S2 Hold down the button for 3 seconds to gain access to the 2nd level menu.
- The acronym relative to the setting to be edited appears on the following displays: D1
  - The value relative to the selected setting appears on the following displays: D2
- E1 Use the encoder to scroll the list of settings to edit.
- E2 Using the encoder, edit the value of the selected setting.
- Press any button to save the setting and quit the menu.

**Tab. 7 - Gas menu parameters in MIG/MAG mode**

ACRONYM	PARAMETER	MIN	DEFAULT	MAX	
Po.G.	POST GAS TIME	0.0 s	0.3 s	10.0 s	*1
Pr.G.	PRE GAS TIME	0.0 s	0 s	10.0 s	*1

\*1: When a synergic program is loaded the default value of the parameter is defined automatically by the software and the message "SYN" will be shown on the display.

## 12 JOBS MANAGEMENT




Personalised welding settings, or JOBS, can be saved in memory locations and subsequently uploaded.

Up to 99 jobs can be saved (j01-j99).



The settings of the SETUP menu are not saved.

### 12.1 SAVING A JOB



This function is available when welding mode is not active.

- S3  Hold down the button for 3 seconds.
  -  **SA. J.xx** The message appears on the following displays: D1-D2  
xx= number of the first free job.
- E2  Select the position in which to save the job with the encoder.  
On selecting a currently occupied memory location, the job number flashes.  
If you confirm at this point, the new job will overwrite the previously saved settings.

#### Exit without confirmation





-  Press any button (except S3).
-  This action will automatically close the menu.

#### Exit with confirmation



- S3  Press the button.
-  This action will automatically close the menu.

### 12.2 LOADING A USER JOB OF FACTORY SET JOB




This function is available when welding mode is not active.

- S3  Press and release the button.
  -  **LO. J.xx** Only when the jobs have been uploaded, the message is shown on the following displays: D1-D2  
xx= number of the latest job used.
  -  **nO Job** If there are no jobs in the memory the message is shown on the following displays: D1-D2
- E2  Use the encoder to select the number of the job to be uploaded.

#### Exit without confirmation






-  Press any button (except S3).
-  This action will automatically close the menu.

#### Exit with confirmation



- S3  Press the button.
  -  **J.xx** The number of the loaded job remains shown on display D2.  
xx= number of loaded job.
  -  This action will automatically close the menu.

### 12.3 DELETING A JOB

This function is available when welding mode is not active.

- S3  Hold down the button for 3 seconds.
  -  **SA. J.xx** The message appears on the following displays: D1-D2
- E1  Select the following setting with the encoder:
  -  **Er. J.xx** The message appears on the following displays: D1-D2  
xx= number of the latest job used.
- E2  Use the encoder to select the number of the job to be deleted.

#### Exit without confirmation

-  Press any button (except S3).
-  This action will automatically close the menu.



## Exit with confirmation

- S3 Press the button.  
 This action will automatically close the menu.

## 13 TORCH TRIGGER MODES

### 13.1 2T MIG/MAG WELDING

1. Bring the torch up to the workpiece.
2. Press (1T) and keep the torch trigger pressed.  
 The wire advances at the approach speed until making contact with the work.
3. The arc strikes and the wire feeder accelerates to the set feed rate value.
4. Release (2T) the trigger to start the weld completion procedure.  
 Gas flow continues for the time set in the post gas parameter (adjustable time).


### 13.2 4T MIG/MAG WELDING

1. Bring the torch up to the workpiece.
2. Press (1T) and release (2T) the torch trigger.  
 The wire advances at the approach speed until making contact with the work.
3. The arc strikes and the wire feeder accelerates to the set feed rate value.
4. Press (3T) the trigger to start the weld completion procedure.  
 Gas flow continues until the torch trigger is released.
5. Release (4T) the torch trigger to start the post gas procedure (adjustable time).

### 13.3 3 LEVEL MIG/MAG WELDING

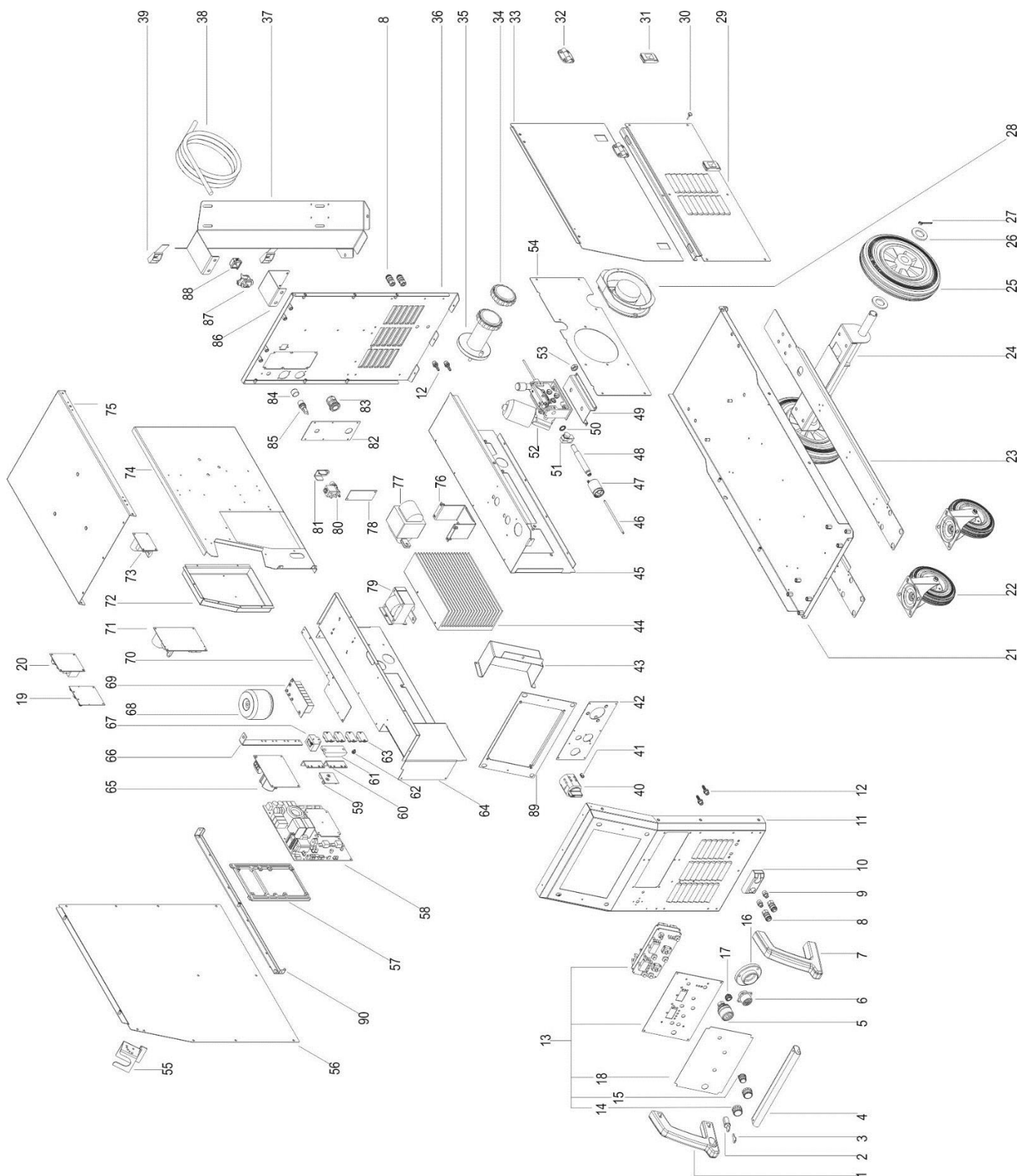
1. Bring the torch up to the workpiece.
2. Press (Level 1) the torch trigger.  
 The wire advances at the approach speed until making contact with the work.
3. The welding arc strikes and the wire feed rate changes to the first welding level, which is set as a percentage of the normal welding feed rate.  
 This first level is used to create the weld pool: for example, when welding aluminium a value of 130% is recommended.
4. Release (Level 2) the torch trigger to switch to the normal welding feed rate.
5. Press the torch trigger again (Level 3) to switch to the third welding level, which is set as a percentage of the normal welding feed rate.  
 This third level is used to complete the weld and fill the final crater (CRATER FILLER) in the weld pool: for example, when welding aluminium a value of 80% is recommended.
6. Release the torch trigger a second time to close the weld and run the post gas procedure.

## 14 TECHNICAL DATA

Model	Pioneer 321 MKS		
Construction standards	EN 60974-1 EN 60974-5 EN 60974-10 Class A		
Supply voltage	3 x 400 V $\pm$ 15 % / 50-60 Hz		
Z <sub>max</sub>	This equipment complies with IEC 61000-3-12 provided that the maximum permissible system impedance Z <sub>MAX</sub> is less than or equal to 78 mΩ at the interface point between the user's supply and the public system. It is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator if necessary, that the equipment is connected only to a supply with maximum permissible system impedance Z <sub>MAX</sub> less than or equal to 78 mΩ.		
Mains protection	20 A Delayed		
Dimensions ( L x D x H )	1110 x 530 x 750 mm		
Weight	61 kg		
Insulation class	H		
Protection rating	IP23		
Cooling	AF		
Maximum gas pressure	0.5 MPa (5 bar)		
MIG/MAG welding voltage	15.5 - 30.0 V		
Motor speed	1.0 - 20.0 m/min		
Wire spool: (dimensions/weight)	300 mm / 15 kg		
Temperature of the environment	40°C		
Welding mode	MIG/MAG		
Static characteristic			
Work cycle	45 %	60 %	100 %
Welding current	320 A	280 A	230 A
Working voltage	30.0 V	28.0 V	25.5 V
Maximum input power	11.6 KVA	9.5 KVA	7.1 KVA
	11.1 KW	9.0 KW	6.7 KW
Maximum supply current	17.0 A	13.1 A	10.3 A
Maximum Effective Supply Current	11.4 A	10.5 A	10.3 A
Open-circuit voltage (U <sub>0</sub> )	53 V		
Reduced no-load voltage (U <sub>r</sub> )	10 V		

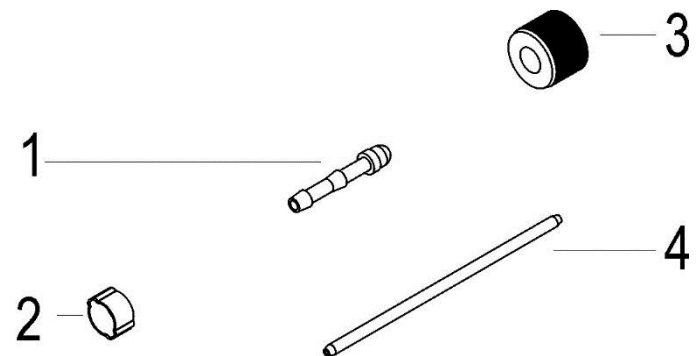
## 15 SPARE PARTS

### 15.1 PIONEER 321 MKS



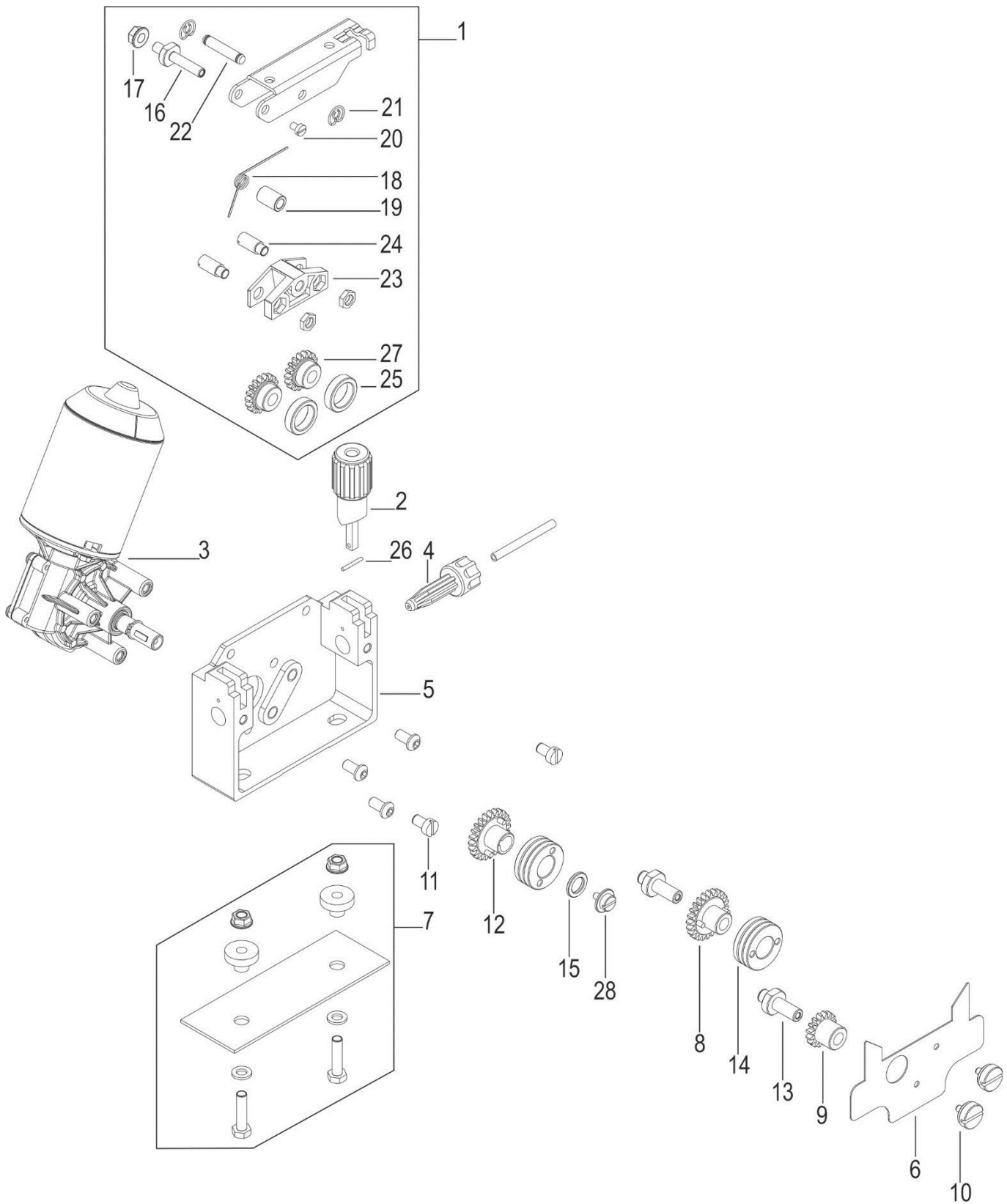
N°	CODE	DESCRIPTION
1	011.0006.0030	RIGHT HANDLE
2	040.0001.0151	KEY
3	040.0001.0150	KEY SWITCH
4	011.0016.0128	FRONT HANDLE
5	021.0001.0259	FIXED SOCKET 400 A
6	022.0002.0177	REMOTE LOGIC CABLE
7	011.0006.0029	LEFT HANDLE
8	018.0002.0004	QUICK CLUTCH
9	017.0003.0055	NIPPLE CONNECTOR
10	011.0016.0156	QUICK CLUTCH COVER PLATE
11	011.0016.0134	FRONT PLATE (1)
12	016.5001.3041	SLEEVE HOSE ADAPTER FOR RUBBER HOSE Ø= 10 mm F= 1/8 M
13	050.5071.0000	COMPLETE FRONT LOGIC PANEL
14	014.0002.0010	KNOB WITHOUT POINTER
15	014.0002.0008	KNOB WITHOUT POINTER
16	021.0001.2005	PLASTIC HOUSING
17	016.0011.0011	CAP Ø=18
18	013.0021.0501	FRONT PANEL LABEL
19	050.0002.0057	POWER SUPPLY CONTROL BOARD
20	050.0001.0086	FAN-CU BOARD
21	011.0016.0136	LOWER COVER
22	004.0001.0013	CASTOR
23	011.0016.0138	BASE SLIDE METAL PLATE
24	011.0016.0129	WHEEL FIXING PLATE
25	004.0001.0014	FIXED WHEEL
26	016.1000.1002	WASHER M27
27	016.0002.0005	SPLIT PIN
28	003.0002.0016	FAN
29	011.0000.0961	RIGHT COVER PANEL
30	016.0009.0005	PVC FOOT
31	011.0006.0002	PLATE SLIDE CLOSURE
32	011.0006.0008	PLASTIC HINGE
33	011.0000.0971	DOOR PLATE
34	002.0000.0287	PRESSURE CAP
35	011.0006.0062	SPOOL SUPPORT
36	011.0016.0135	REAR PLATE (1)
37	011.0016.0139	GAS BOTTLE SUPPORT PLATE
38	045.0002.0014	NEOPRENE CABLE
39	005.0001.0012	BELT FOR GAS BOTTLE
40	040.0001.0017	THREE-POLE SWITCH
41	022.0002.0190	LED WIRING
42	011.0016.0144	FRONT PLATE (2)
43	011.0016.0151	FRONT LOGIC BOARD COVER PLATE
44	015.0001.0019	HEAT SINK
45	011.0016.0147	MOTOR SUPPORT PLATE (1)
46	021.0001.2027	CAPILLARY TUBE FOR EURO CONNECTOR
47	021.0001.2000	AXIAL EURO BODY
48	021.0001.2014	BRASS GUIDE FOR EURO CONNECTOR
49	011.0016.0150	MOTOR SUPPORT PLATE (2)
50	016.1100.1200	KNURLED WASHER M12
51	021.0001.2010	CURRENT CLAMP FOR BRASS GUIDE
52	010.0008.0002	WIRE FEEDER MOTOR
53	016.2000.1219	NUT M19
54	011.0016.0153	FANS SUPPORT
55	011.0015.0029	TORCH HOLDER
56	011.0000.0931	LEFT COVER PANEL
57	012.0003.0000	INTERNAL FRAMEWORKS
58	050.0013.0091	POWER BOARD
59	050.0003.0044	SNUBBER BOARD
60	045.0006.0081	DIODE-DIODE BRACKET
61	032.0001.8215	THREE PHASE BRIDGE RECTIFIER
62	040.0003.1002	THERMAL CUT-OUT 75°C
63	032.0002.2003	ISOTOP DIODE
64	011.0016.0146	TUNNEL HOUSING (1)
65	050.0001.0147	MAINS FILTER BOARD
66	045.0006.0082	DIODES-SOCKET COPPER BRACKET
67	041.0004.0301	HALL EFFECT SENSOR
68	041.0006.0007	AUXILIARY TRANSFORMER
69	050.0001.0119	PRIMARY CAPACITOR BOARD
70	011.0016.0152	BOARDS SUPPORT
71	050.0001.0041	MOTOR BOARD
72	011.0016.0149	WIRE FEEDER COVER PLATE
73	050.0002.0024	PUSH-PULL BOARD (OPTIONAL)
74	011.0016.0148	INTERNAL PLATE

75	011.0016.0140	UPPER COVER
76	011.0009.0121	TRANSFORMER SUPPORT PLATE
77	042.0003.0004	POWER TRANSFORMER
78	011.0016.0117	CABLE BUNDLE CONNECTION COVER PLATE
79	044.0004.0014	OUTPUT INDUCTOR
80	017.0001.5542	SOLENOID VALVE
81	011.0002.0018	SOLENOID VALVE PLATE
82	013.0000.7001	REAR PLATE (2)
83	045.0000.0017	CABLE CLAMP
84	016.0011.0004	FUSE HOLDER CAP
85	040.0006.1880	FUSE HOLDER
86	011.0012.0058	COOLING UNIT SUPPORT PLATE
87	022.0002.0132	C.U. POWER SUPPLY WIRING
88	021.0013.0007	C.U. POWER CONNECTOR CAP
89	011.0016.0109	PANEL SUPPORT PLATE
90	011.0016.0143	COVER PANEL SUPPORT PLATE



N°	CODE	DESCRIPTION
1	016.5001.0822	SLEEVE HOSE ADAPTER FOR RUBBER HOSE
2	016.0007.0001	HOSE CLAMP Ø=11-13
3	016.5001.0823	NUT 1/4
4	021.0001.2027	CAPILLARY TUBE

## 15.2 WIRE FEEDER MOTOR

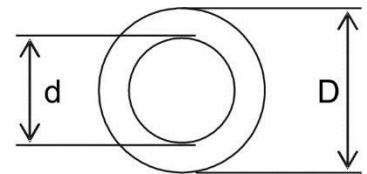




N°	CODE	DESCRIPTION
1	002.0000.0205	COMPLETE PRESSURE ARM
2	002.0000.0203	COMPLETE PRESSURE DEVICE
3	002.0000.0201	MOTOR COIL
4	002.0000.0259	INLET GUIDE WITH SOFT LINER
5	002.0000.0202	FEED PLATE
6	002.0000.0266	GUARD SAFETY KIT
7	002.0000.0212	INSULATION MOUNTING KIT
8	002.0000.0209	GEAR ADAPTOR FEED ROLL
9	002.0000.0210	MAIN GEAR DRIVE
10	002.0000.0207	SCREW
11	002.0000.0208	SCREW
12	002.0000.0211	GEAR ADAPTOR FEED ROLL
13	002.0000.0255	SHAFT
14	002.0000.0121	FEED ROLL
15	002.0000.0270	WASHER
16	002.0000.0269	PRESSURE ARM HOLDER AXIS
17	002.0000.0271	SCREW
18	002.0000.0272	SPRING PRESSURE ARM AUTO LIFT
19	002.0000.0273	SPACE TUBE PRESSURE ARM AUTO-LIFT
20	002.0000.0274	SCREW
21	002.0000.0275	CIRCLIP
22	002.0000.0276	LOCATING PIN PRESSURE ARM
23	002.0000.0277	HOLDER
24	002.0000.0278	AXLE GAUGE
25	002.0000.0279	PRESSURE ROLL
26	002.0000.0280	LOCATING PIN PRESSURE DEVICE
27	002.0000.0281	GEAR ADAPTOR
28	002.0000.0282	DRIVING ROLL SCREW

**15.3 WIRE FEEDER ROLLS**

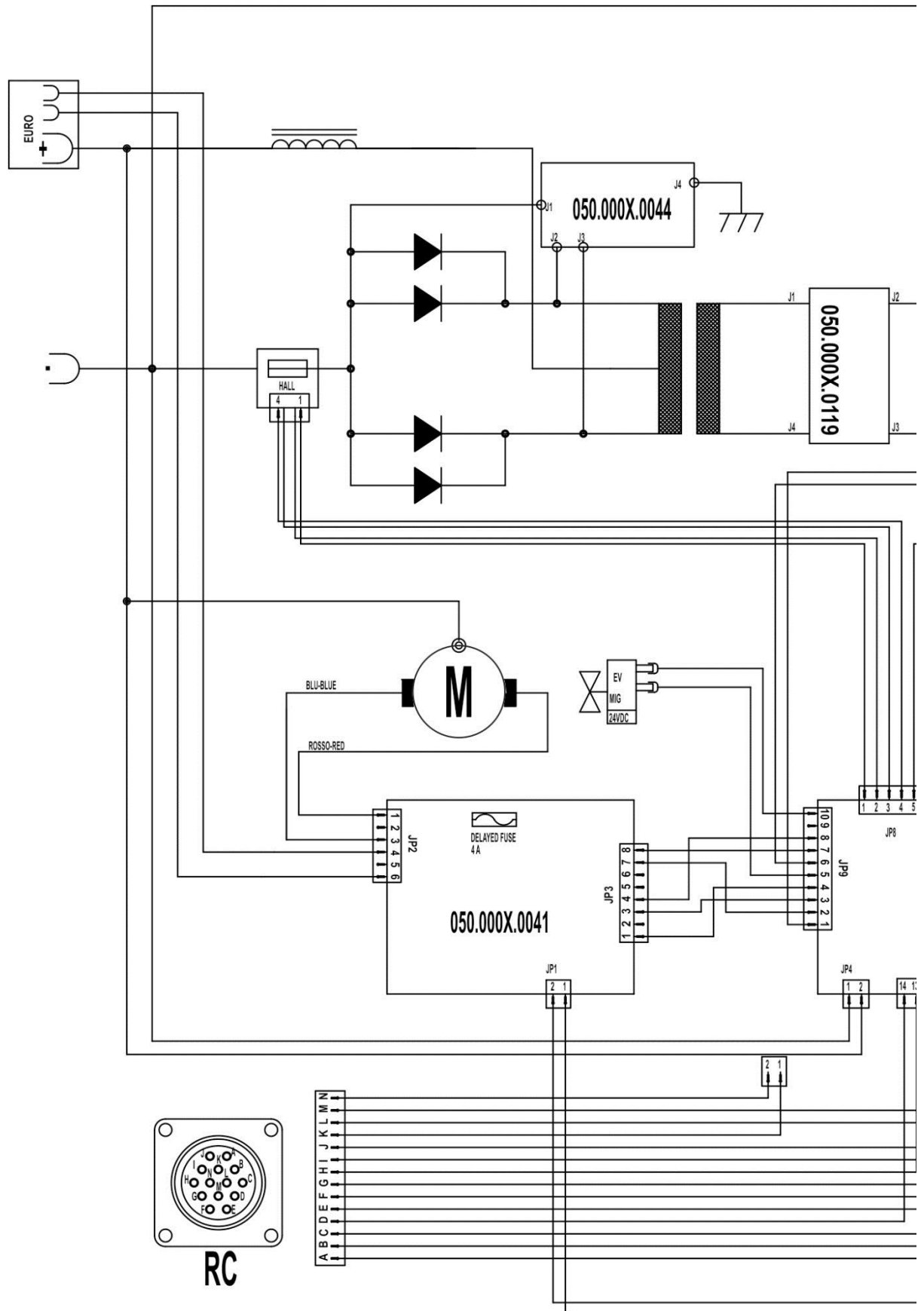
D = 30 mm  
d = 14 mm

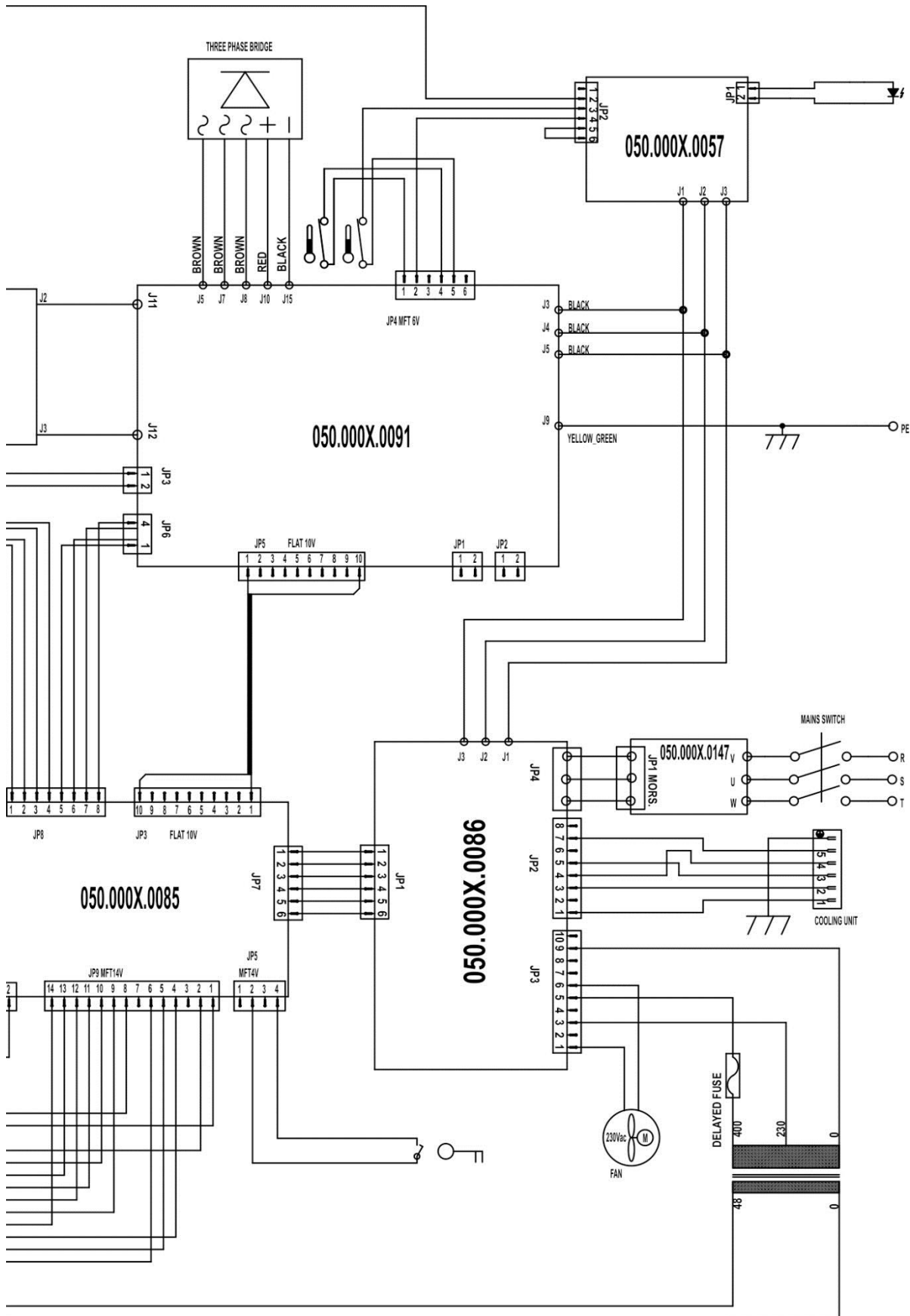


N°	CODE	WIRE DIAMETER	GROOVE TYPE
	0.6 - 0.8	002.0000.0119	
	0.8 - 1.0	002.0000.0120	V groove Solid wire
	1.0 - 1.2	002.0000.0121	
	1.2 - 1.6	002.0000.0125	
14	1.0 - 1.2	002.0000.0124	VK shape Flux-cored wire
	1.2 - 1.6	002.0000.0127	
	0.8 - 1.0	002.0000.0122	U shape Aluminium wire
	1.0 - 1.2	002.0000.0123	
	1.2 - 1.6	002.0000.0126	

# 16 ELECTRICAL DIAGRAM

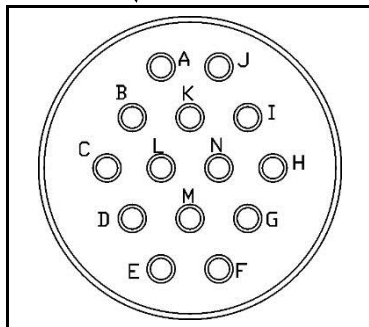
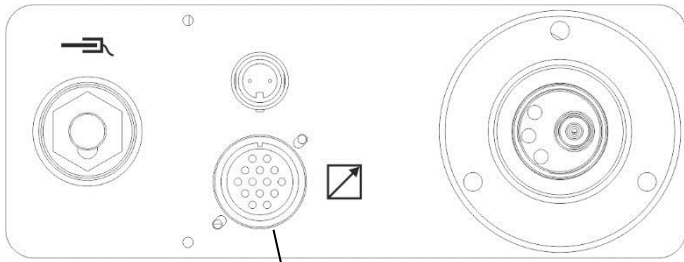
## 16.1 PIONEER 321 MKS



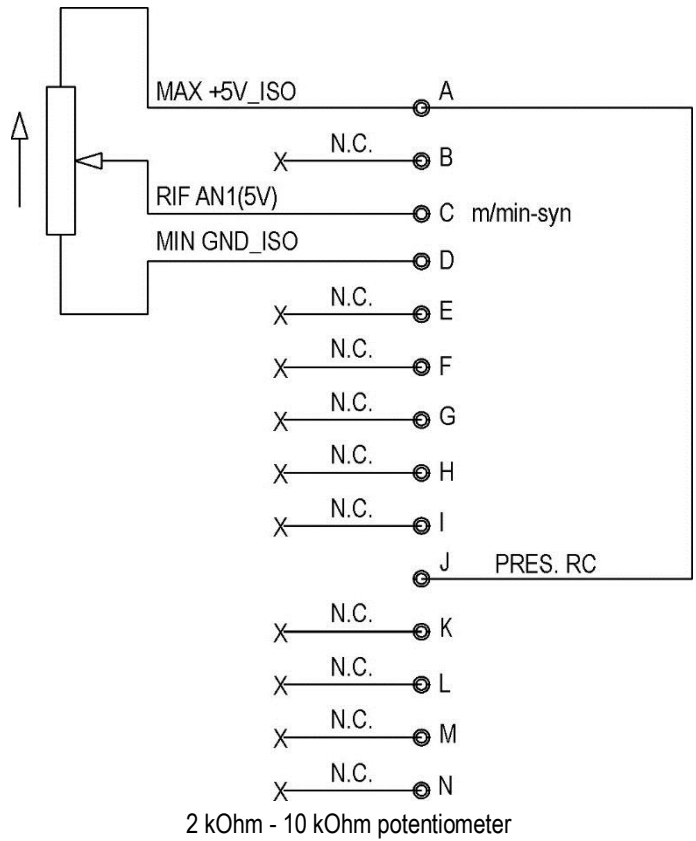


**16.2 REMOTE CONTROLLER**

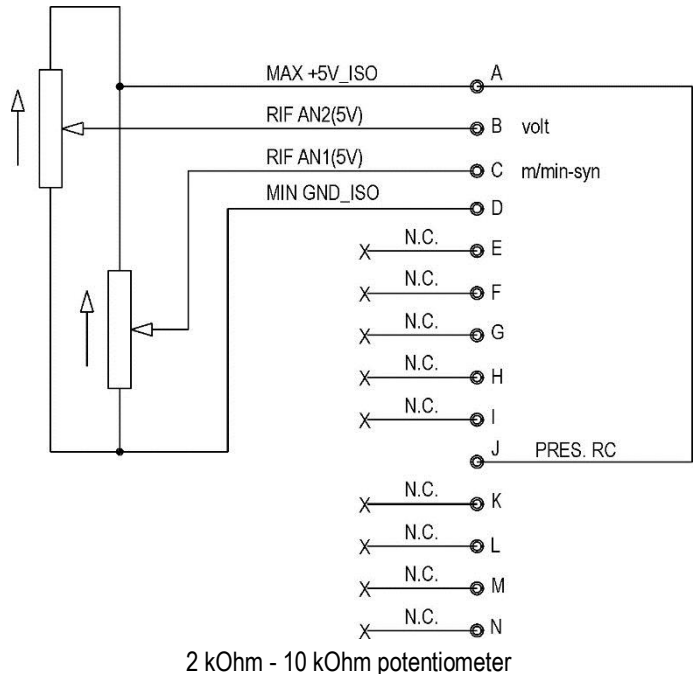
**16.2.1 RC03: ELECTRICAL DIAGRAM**



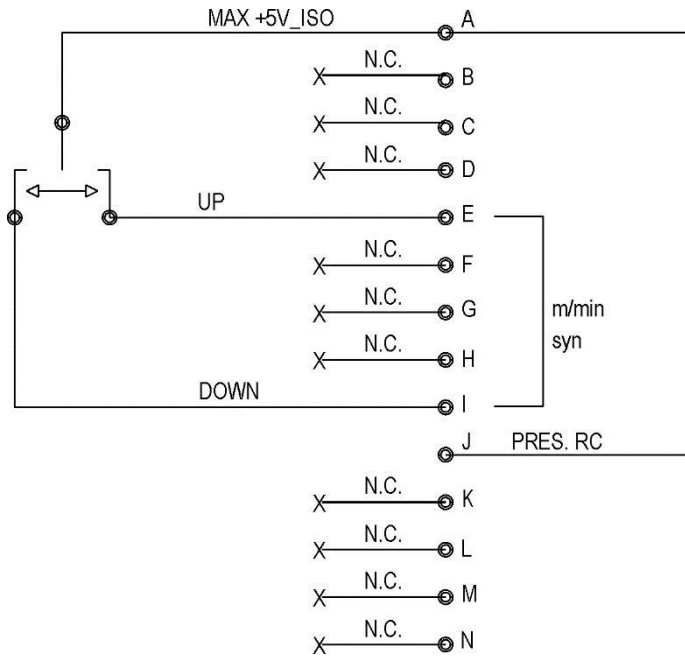
Pin	Name	Voltage	Input/Output
A	+5 V	5 V d.c.	Out
B	AN2 (5 V)	~ 0-5 V	In
C	AN1 (5 V)	~ 0-5 V	In
D	GND	GND	Out
E	D1-IN	⏏ 0-5 V	In
F	AN2 (10 V)	~ 0-10 V	In
G	D3-OUT	⏏ 0-5 V	Out
H	AN1 (10 V)	~ 0-10 V	In
I	D2-IN	⏏ 0-5 V	In
J	RC	-	Not used
K	-	-	Not used
L	-	-	Not used
M	-	-	Not used
N	-	-	Not used



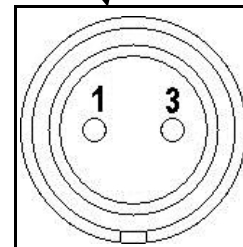
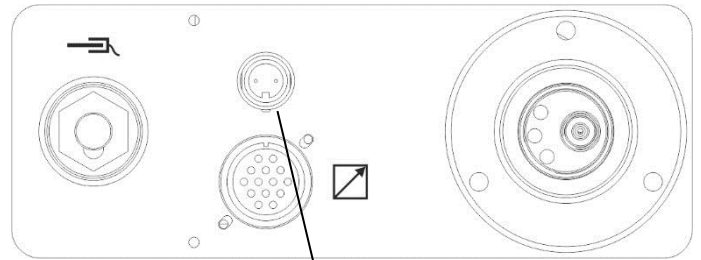
**16.2.2 RC04: ELECTRICAL DIAGRAM**



16.2.3 RC05: ELECTRICAL DIAGRAM



16.3 PUSH-PULL (OPTIONAL)



Pin	Name	Voltage
1	-	0 V
3	+	42 V d.c.

16.2.4 RC06: ELECTRICAL DIAGRAM

