THERMAL ARC®

THERMAL ARC 400 GMS C/W W.F.U & COOLER

USER'S MANUAL

The machine you have just acquired has taken advantages, in its production, of THERMADYNE INDUSTRIES 's wide experience in the manufacturing of welding machines, along with the latest technology strides in power electronics.

It will give you entire satisfaction for years if you respect all the operating and maintenance instructions given in this manual.

We strongly suggest you read very carefully chapters concerning security and individual protection before using this machine.

We thank you in advance for your co-operation.

In accordance with the warranty periods stated below, Thermadyne guarantees the proposed product to be free from defects in material or workmanship when operated in accordance with the written instructions as defined in this operating manual.

Thermadyne welding products are manufactured for use by commercial and industrial users and trained personnel with experience in the use and maintenance of electrical welding and cutting equipment.

Thermadyne will repair or replace, at its discretion, any warranted parts or components that fail due to defects in material or workmanship within the warranty period. The warranty period begins on the date of sale to the end user.

Thermal Arc 400GMS	
Component	Warranty Period
Power Source	2 Years
Wire Feed Unit	2 Years
Optional Cooler	2 Years

If warranty is being sought, Please contact your Thermadyne product supplier for the warranty repair procedure.

Thermadyne warranty will not apply to:

- Equipment that has been modified by any other party other than Thermadyne's own service personnel or with prior written consent obtained from Thermadyne Service Department.
- Equipment that has been used beyond the specifications established in the operating manual.
- Installation not in accordance with the installation/operating manual.
- Any product that has been subjected to abuse, misuse, negligence or accident.
- Failure to clean and maintain (including lack of lubrication, maintenance and protection), the machine as set forth in the operating, installation or service manual.

Within this operating manual are details regarding the maintenance necessary to ensure trouble free operation.

This manual also offers basic troubleshooting, operational and technical details including application usage.

You may also wish to visit our web site www.thermadyne.com select your product class and then select literature. Here you will find documentation including:

- Operator manuals
- Service manuals
- Product guides

Alternatively please contact your Thermadyne distributor and speak with a technical representative.

NOTE

Warranty repairs must be performed by either a Thermadyne Service Centre, a Thermadyne distributor or an Authorised Service Agent approved by the Company.

The equipment you have just acquired will give you entire satisfaction if you respect the operating and maintenance instructions.

Its design, the specification of the components and its manufacture are in accordance with the existing rules, French standards (NF), ISO and CEI international injunctions, EEC general lines and CEN / CENELEC standards.

In this chapter, you will find safety rules in the use of electric arc welding power sources with coated electrodes.
We give you hereunder a list of recommendations and obligations you have to respect.

Safety rules must be observed, and particularly those relating to Decree 88.1056 dated November 14., 1988 concerning protective measures against electric currents.

1. ELECTROMAGNETIC COMPATIBILITY

1.1. DECLARATION OF CONFORMITY

THERMADYNE hereby declares that the machine object of this manual complies with the following European regulation:

Electromagnetic compatibility:
Rule 89/336-EEC of 3/05/89 modified by rules 92/31-EEC of 28/04/1992 and 93/68-EEC of 22/07/1993.

Low voltage:
Rule 73/23-EEC of 19/02/1973 modified by rule 93/68-EEC of 22/07/1993.

and with the national legislation transposing them.

THERMADYNE also declares that following harmonised standards have been applied :

EN 60974-10: Electromagnetic compatibility (CEM) – Product norm for arc welding material.

EN 50060 (1990): Current source for arc manual welding with limited service.

EN 60974-1: Security rules for electric welding material.
Part 1: welding current sources.

EN 50192 (1995): Arc welding material – plasma cutting systems.

1.2. INSTALLATION AND USE

The machine object of this manual complies with the European rules about electromagnetic compatibility 89/336 CEE. It also complies with EN 50199 standard: Electromagnetic compatibility, product standard for welding machines.

The user is responsible for installing and using the arc welding equipment according to the manufacturer's instructions.

If electromagnetic disturbances are detected, then it shall be the responsibility of the user of the arc welding equipment to resolve the situation with the technical assistance of the manufacturer. In some cases this remedial action may be as simple as earthing the welding circuit, see Note. In other cases it could involve constructing an electromagnetic screen enclosing the welding power source and the work complete with associated input filters. In all cases electromagnetic disturbances shall be reduced to the point, where they are no longer troublesome.

NOTE - The welding circuit may or may not be earthed for safety reasons. Changing the earthing arrangements should only be authorised by a person who is competent to assess whether the changes will increase the risk of injury, e.g. by allowing parallel welding current return paths, which may damage the earth circuits of other equipment.
Further guidance is given in IEC 62081 "Arc welding equipment - Installation and use" (under consideration).

1.2.1. ASSESSMENT OF AREA

Before installing arc welding equipment the user shall make an assessment of potential electromagnetic problems in the surrounding area. The following shall be taken into account:

a) Other supply cables, control cables, signalling and telephone cables, above, below and adjacent to the arc welding equipment;

b) Radio and television transmitters and receivers;
c) computer and other control equipment;

d) Safety critical equipment, e.g. guarding of industrial equipment,

e) The health of the people around, e.g. the use of pacemakers and hearing aids;

f) Equipment used for calibration or measurement;
g) The immunity of other equipment in the environment. The user shall ensure that other equipment being used in the environment is compatible. This may require additional protection measures;
h) The time of day that welding or other activities are to be carried out.

The size of the surrounding area to be considered will depend on the structure of the building and other activities that are taking place. The surrounding area may extend beyond the boundaries of the premises.

1.2.2. METHODS OF REDUCING EMISSIONS

1.2.2.1. Public supply system

Arc welding equipment should be connected to the public supply system according to the manufacturer's recommendations. If interference occurs, it may be necessary to take additional precautions such as filtering of the public supply system. Consideration should be given to shielding the supply cable of permanently installed arc welding equipment, in metallic conduit or equivalent. Shielding should be electrically continuous throughout its time. The shielding should be connected to the welding power source so that good electrical contact is maintained between the conduit and the welding power source enclosure.

1.2.2.2. Maintenance of the arc welding equipment

The arc welding equipment should be routinely maintained according to the manufacturers recommendations. All access and service doors and covers should be closed and properly fastened when the arc welding equipment is in operation. The arc welding equipment should not be modified in any way, except for those changes and adjustments covered in the manufacturer's instructions. In particular, the spark gaps of arc striking and stabilising devices should be adjusted and maintained according to the manufacturer's recommendations.

1.2.2.3. Welding cables

The welding cables should be kept as short as possible and should be positioned close together, running at or close to the floor level.

1.2.2.4. Equipotential bonding

Bonding of all metallic components in the welding installation and adjacent to it should be considered.

However, metallic components bonded to the work piece will increase the risk that the operator could receive an electric shock by touching these metallic components and the electrode at the same time. The operator should be insulated from all such bonded metallic components.

1.2.2.5. Earthing of the workpiece

Where the work piece is not bonded to earth for electrical safety, nor connected to earth because of its size and position, e.g. ships hull or building steelwork, a connection bonding the work piece to earth may reduce emissions in some, but not all instances. Care should be taken to prevent the earthling of the work piece increasing the risk of injury to users, or damage to other electrical equipment. Where necessary, the connection of the work piece to earth should be made by a direct connection to the work piece, but in some countries where direct connection is not permitted, the bonding should be achieved by suitable capacitance, selected according to national regulations.

1.2.2.6. Screening and shielding

Selective screening and shielding of other cables and equipment in the surrounding area may alleviate problems of interference. Screening of the entire welding installation may be considered for special applications.

2. ELECTRIC SAFETY

2.1. CONNECTION OF THE WELDING POWER SOURCE TO THE NETWORK

Before connecting your equipment, you must check that:

- The meter, the safety device against over-currents, and the electric installation are compatible with the maximum power and the supply voltage of the welding power source (refer to the instructions plates).
-The connection, either single-phase, or three-phase with earth can be effected on a socket compatible with the welding power source cable plug.
If the cable is connected to a fixed post, the earth, if provided, will never be cut by the safety device against electric shocks.
-The ON/OFF switch (if exists) situated on the welding power source, is turned off.

2.2. WORKING AREA

The use of arc welding implies a strict respect of safety conditions with regard to electric currents (Decree dated 14.12.1988).

It is necessary to check that no metal piece accessible to the operators and to their assistants can come into direct contact with a phase conductor and the neutral of the network. In case of uncertainty, this metal part will be connected to the earth with a conductor of at least equivalent section to the largest phase conductor.

Make sure that all metal pieces that the operator could touch with a non insulated part of his body (head, hands without gloves on, naked arms ...) is properly grounded with a conductor of at least equivalent section to the biggest supply cable of the ground clamp or welding torch. If more than one metal ground are concerned, they need to be all interlinked in one, which must be grounded in the same conditions.

Unless very special care have been taken, do not proceed to any arc welding or cutting in
conductive enclosures, whether it is a confined space or the welding machine has to be left outside. Be even more prudent when welding in humid or not ventilated areas, and if the power source is placed inside (Decree dated 14.12.1988, Art. 4).

2.3. INTERVENING

-Before carrying out any internal checking or repair work, check that the power source has been separated from the electrical installation by locking and guard devices.

-The current plug has to be taken out. Provisions have to be taken to prevent an accidental connection of the plug to a socket.

-Cut-off through a fixed connecting device has to be omnipolar (phases and neutral). It is in the "OFF" position and cannot be accidentally put into operation.

-Maintenance works of electrical equipment must be entrusted to qualified people (Section VI, Art. 46).

2.4. MAINTENANCE

Check the good state, insulation and connection of all the equipment and electrical accessories: plugs and flexible supply cables, cables (NF A 32-510), conduits, connectors, extension cables (NF A 85-610 and CENELEC HD 433), sockets on the power source, ground and electrode-holder clamps (NF A 85-600).
These connections and mobile accessories are marked according to standards, if consistent with the safety rules. They can either be controlled by you or by accredited firms.

- Maintenance and repair works of conduits and liners have to be properly carried out (Section VI, Art. 47).

-Repair or replace all defective accessories

-Check periodically that the electrical connections are tightened and do not heat.

2.5. RISKS OF FIRE AND EXPLOSION

Welding can occur risks of fire or explosion. You have to pay attention to fire safety regulation :

- Remove flammable or explosive materials from welding area.

- Always have sufficient fire fighting equipment

- Fire can break out from sparks even several hours after the welding work has been finished.

3. INDIVIDUAL PROTECTION

3.1. RISK OF EXTERNAL INJURIES

3.1.1. THE WHOLE BODY

Arc rays produce very bright ultra violet and infra red light. They will damage yours eyes and burn your skin if you are not properly protected

-The welder is dressed and protected according to the constraints his works impose him.

-Insulate yourself from the workpiece and the ground. Make sure that no metal piece, especially those connected to the network, can come into contact with the operator.

-The welder must always wear an individual insulating protection (decree of 14/12/1988, article 3-3).

Protective clothing : gloves, aprons, safety shoes offer the additional advantage to protect the operator against burns caused by hot pieces, spatters ...

Check the good state of these equipment and replace them before you are not protected any more.

3.1.2. FACE AND EYES

- It is absolutely necessary to protect your eyes against arc rays

- Protect your hair and your face against sparks

The welding shield, with or without headset, is always equipped with a proper filter according to the arc welding current (NS S 77-104 / A 88-221 / A 88.222 standards).

In order to protect shaded filter from impacts and sparks, you have to add a plain glass in front of the shield.

The helmet provided with your equipment (if requested) is equipped with a protective filter. When you want to replace it, precise the reference and number of opacity degree of the filter. Use the shade of lens as recommended in the instruction manual (opacity graduation number)

Protect others in the work area from arc rays by using protective booths, UV protective goggles, and if necessary, a welding shield with appropriate protective filter on (NF S 77-104 - by A 1.5).

Opacity gradation numbers and recommended use for arc welding

Welding process or connected techniques	Current intensity in Amps 0.5 1 2.5 5 10 15 20 30 40 60 80 100 125 150 175 200 225 250 275 300 350 400 450 500
Coated electrodes	9 10 11 12 13 14
MIG on heavy metals	10 11 12 13 14
MIG on light alloys	10 11 12 13 14 15
TIG on all metals	9 10 11 12 13 14
MAG	10 11 12 13 14 15
Air/Arc gouging	10 11 12 13 14 15
Plasma cutting	9 10 11 12 13

Depending on the conditions of use, the next highest or lowest category number may be used.
The expression “heavy metals” covers steels, alloyed steels, copper and its alloys.
The shaded areas represent applications where the welding processes are not normally used at present.

CARE : Use a higher degree of filters if welding is performed in premises which are not well lighted.

3.2. RISK OF INTERNAL INJURIES GASES AND FUMES

Gases fumes produced during the welding process can be dangerous and hazardous to your health. Arc welding works have to be carried out in suitable ventilated areas.

Ventilation must be adequate to remove gases and fumes during operation. All fumes produced during welding have to be removed as soon as they are given off, and as close as possible from the place they are produced to be the most efficient.

Vapors of chlorinated solvents can form the toxic gas phosgene when exposed to ultraviolet radiation from an electric arc.

3.3. SAFETY IN THE USE OF GASES (WELDING WITH TIG OR MIG INERT GASES)

3.3.1. COMPRESSED GAS CYLINDERS

Compressed gas cylinders are potentially dangerous. Refer to suppliers for proper handling procedures.
- No impact: secure the cylinders and keep them away from impacts.
- No excess heat (over 50°C)

3.3.2. PRESSURE RELIEF VALVE

Check that the pressure relief screw is slackened off before connecting to the cylinder.
Check that the union is tight before opening the valve of the cylinder. Open it slowly a fraction of a turn.
If there is a leak, NEVER tighten a union which is under pressure, but first close the valve on the cylinder.
Always check that hoses are in good condition.

3.3.3. DETAILS ABOUT GASES

Gas and gaseous mixtures containing less than 20% of CO_2:
If these gases or mixtures take the place of the oxygen in the air, there is a danger of asphyxia. An atmosphere containing less than 17% oxygen is dangerous.

hydrogen and hydrogen-based combustible gaseous mixtures
These are very light gases. In the case of leaks, they collect under the ceiling.
Provide for ventilation at ceiling level.

These are also inflammable gases. The flame of hydrogen is almost invisible. There is therefore a risk of burns.

Air/hydrogen and oxygen/hydrogen mixtures are explosive in the following proportions:
- 4 to 74.5 % of hydrogen in air.
- 4 to 94 % of hydrogen in oxygen.

Store the bottles in the open or in a well-ventilated place.
Avoid any leakage by limiting the number of connections or couplings to a minimum.

4. GENERAL CHARACTERISTICS

The 3 phases power source THERMAL ARC 400 GMS is one of the 3rd generation THERMADYNE's welding inverters. This generator has been designed as integrated and portable units using the latest techniques in power electronics, based on an IGBT controlled **inverter process**, which enables the following :

- a considerable reduction of weight and volume
- the dynamic control of the welding current
- a high power in a small space at a very low power consumption

With his innovative design, this machine is both **robust** (plastic front and back panel, new internal conception) and **ergonomic**.

The THERMAL ARC 400 GMS unit is a multi-process DC inverter which allows:

- **MMA welding** (stick welding) : with coated electrodes till 6mm

- **TIG welding** : with infusible electrodes . Ignition made with PAE (« lift arc ») process.
  2 strokes or 4 strokes mode
  Post gas adjustment
  Down-slope time adjustment
  Gas purge

- **MIG welding** : separate wire feeder built in
  15 kg spools
  Steel wire, stainless steel wire aluminium from 0.6 mm to 1.2 mm diameter
  Direct or reverse current polarity
  2 strokes or 4 strokes mode
  Post gas adjustment
  Cold wire supply
  Burn-back adjustment
  Inductor linear adjustment

  Spot MIG welding :
  with adjustment of the spot's time

  Intermittent MIG welding :
  With adjustment of the spot's time and the frequency.

  Program : Possibility to save and load welding parameters

This power source offers exceptional arc stability.

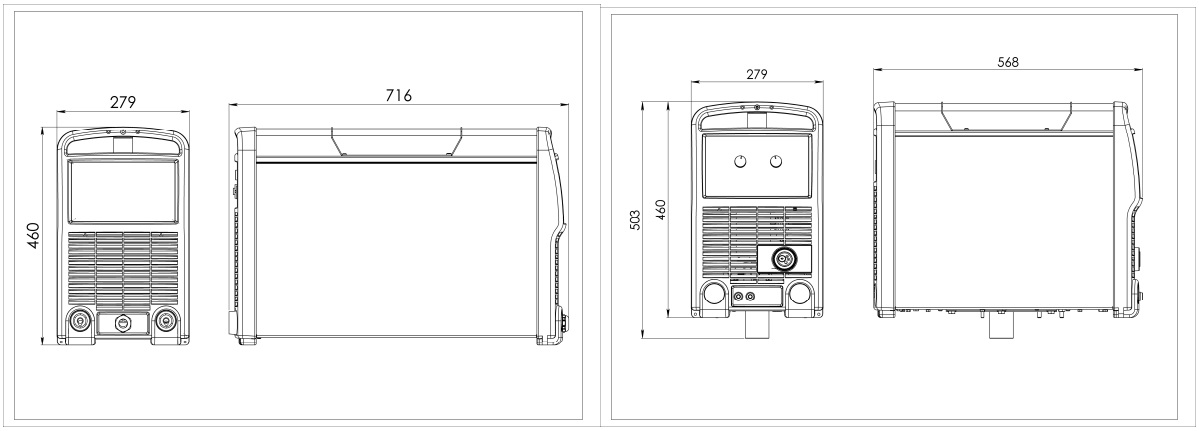
Easy to use, it can be adjusted exactly to your need:
- It has a linear electronic inductor, which allows the arc adjustment (soft or hard) and limits the amount of spatter.

- It has an adjustable burn-back which allows you to adjust the wire's length on the torch's head at the end of the welding.

(All parameters adjustment p.21 to 27)

It's perfectly suited to the MIG welding with aluminium wire.

5. TECHNICAL CHARACTERISTICS



POWER SOURCE **WIRE FEEDER**

DIMENSIONS (in mm)

PRIMARY		THERMAL ARC 400 GMS		
Three phase power supply	V	400 +/-10%		
Frequency	Hz	50 / 60		
		MMA	**TIG**	**MIG**
Maximum primary current	A	37.8	30.8	37.1
Maximum power consumption	kVA	26.2	21.3	25.7
cos Ø		0.98		
SECONDARY				
		MMA	**TIG**	**MIG**
Off load voltage	V	70-80	70-80	70-80
Welding current range	A	3-380	3-400	400
VRD	V	22V	n/a	n/a
Welding current at 40°C				
Welding current at 40 %	A	380	400	400
Welding current at 60 %	A	340	360	360
Welding current at 100 %	A	280	300	300
Protection Class		IP 23		
Insulation Class		H		
Standards		EN 60974-1 / EN 60974-10		
Weight	kg	POWER SOURCE : 34 WIRE FEEDER : 15		
Dimensions L x W x H	mm	POWER SOURCE : 716*279*460 WIRE FEEDER : 568*279*460		

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6. CONNECTION TO THE MAIN SUPPLY

The power source must be connected to 3phase 400V - 50 Hz/60 Hz + ground.

Main supply must be protected by fuses or circuit-breaker according to the value $I1_{eff}$ written on the specification plate of the power source.

It is strongly suggested to use a differential protection for the operator's safety

7. CONNECTION TO THE GROUND

For the operator's protection, the power source must be correctly grounded (according to the International Protections Norms).

It is absolutely necessary to set a good ground connection installation with the green/yellow wire of the power cable. This will avoid discharges caused by accidental contacts with grounded pieces.

If no earth connection has been set, a high risk of electric shock through the chassis of the unit remains possible.

8. PRELIMINARY PRECAUTIONS

For the good operation of your welding power source, make sure that the air flow produced by the fan inside the unit is not obstructed.

Also try to operate in a non-dusty area.

Avoid all impacts, exposure to damp areas or excessive temperatures.

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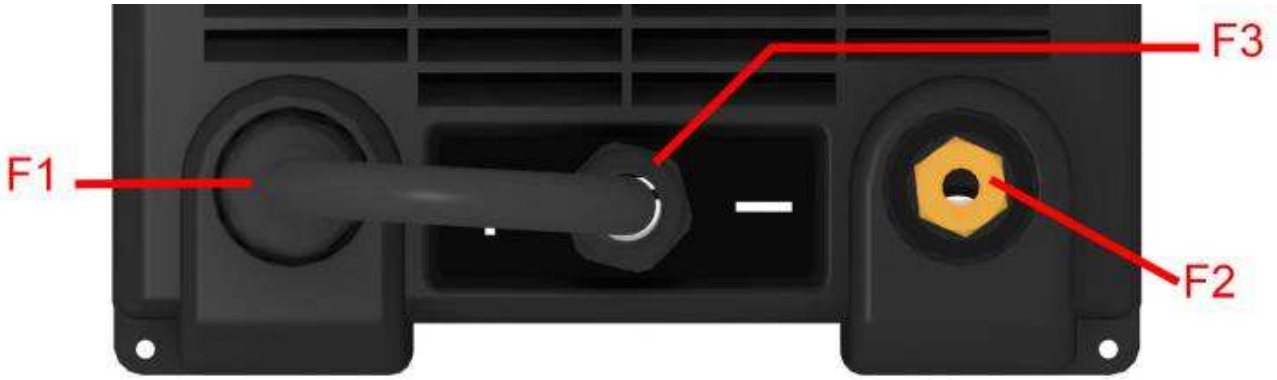
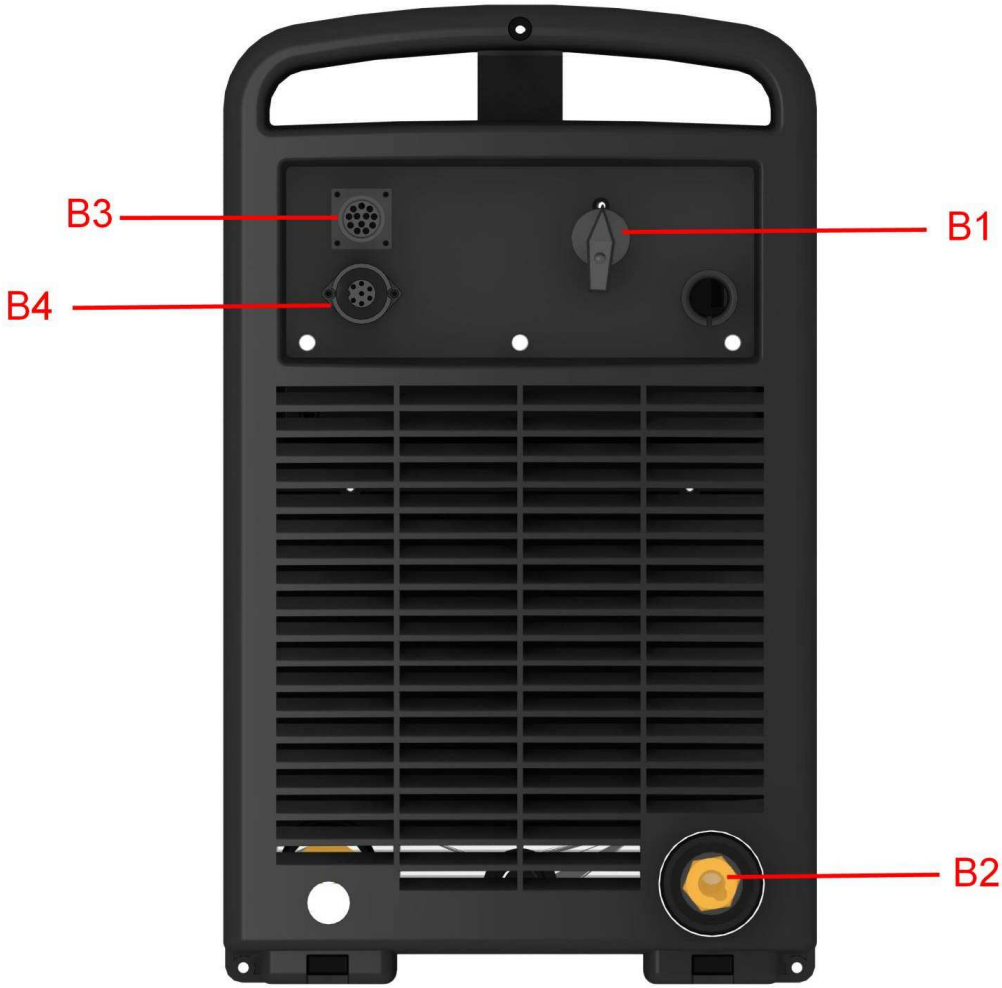
9. POWER SOURCE FRONT PANEL DESCRIPTION



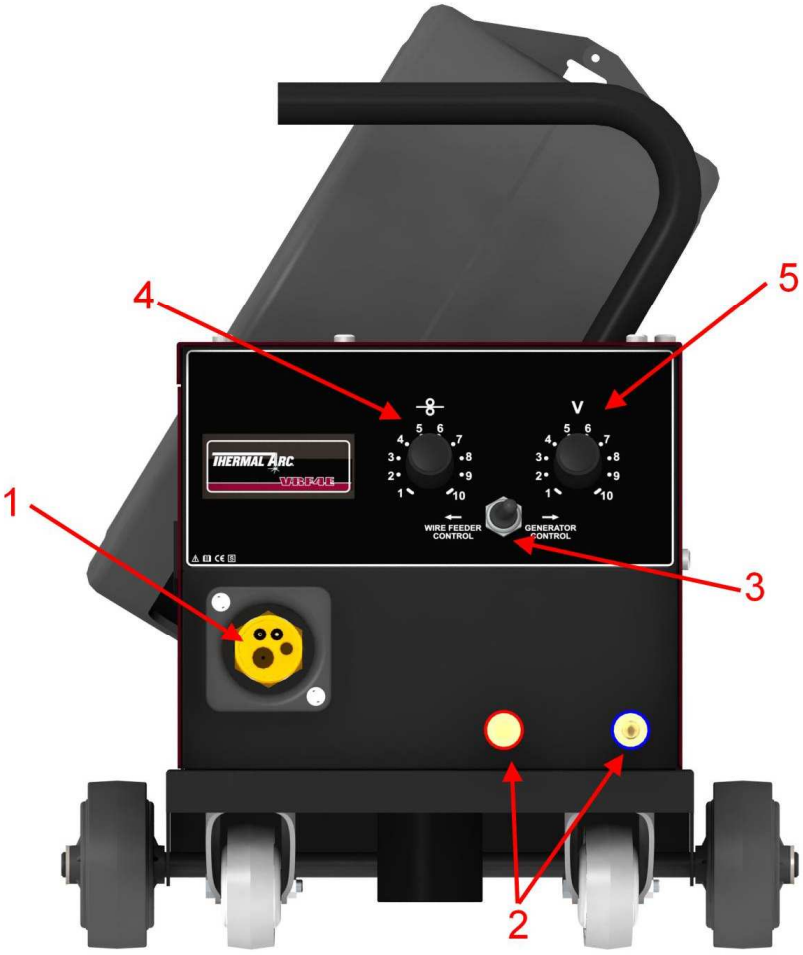
ITEM N°	DESCRIPTION
F1	Power terminal **+**
F2	Power terminal **-**
F3	Torch's polarity connection
F5	Setting key for "LOAD" program
F6	Setting key for "SAVE" program
F7	F13 adjustment knob
F8	«second» indicator on F13 display
F9	Setting key for "SET UP" program
F10	"SET UP" program indictor
F11	«Volt» indicator on F13 display
F12	«%» indicator on F13 display
F13	Digital display
F14	Digital display
F15	«Amps» indicator on F14 display
F16	Power supply fault indicator
F17	« Water colling fault » indicator
F18	«m/min» indicator on F14 display
F19	« TIG welding » indicator
F20	F14 adjustment knob
F21	« MIG welding » indicator
F22	Setting key for selecting welding mode
F23	Setting key for selecting 2 strokes or 4 strokes welding mode
F24	« MMA welding » indicator
F25	Indicator « 4 strokes welding »

10. POWER SOURCE BACK PANEL DESCRIPTION



ITEM N°	DESCRIPTION
B1	Switch ON/OFF
B2	Power Terminal output (for W.F.U.)
B3	Outlet socket for remote control
B4	Outlet socket for cooler unit

11. WIRE FEEDER FRONT FASCIA DESCRIPTION



ITEM N°	DESCRIPTION
1	Euro connector
2	Kwik Fit connections for the water cooled mig gun
3	Control switch for Volts (V): Wire feeder to the left and power source to the right
4	Wire speed control
5	Welding voltage control

***FP = Factory parameter**

12. MMA (STICK) WELDING

Connect the power source to the main supply and the ground as explained in the chapter « Setting up » (as 6 and 7 section).
Connect the ground cable and the electrode-holder to the appropriate power connections + **F1** and – **F2** according to the electrode polarity being used (refer to the electrodes manufacturer's datasheets).
The "torch's polarity connection" **F3** is not connected.
Start up the power source with the main switch ON/OFF **B1**.
Select MMA(stick) welding mode with the setting key **F22**, the indicator **F24** illuminates.
Adjust welding current with knob **F20**.
Place the electrode on the piece you have to weld in order to strike the arc.

Arc force control (dyn)
FP*: OFF
Select "**SET UP**" menu with the setting key **F9**, the indicator F10 flashes.
With the knob **F20**, select "**DYN**" function on **F14** display.
With knob **F7**, adjust the arc force between **1** and **99**% on display **F13**.
To exit this function, select "**SET UP**". The indictor **F10** is off.

HOT START CONTROL (hot)
FP*: OFF
Select "**SET UP**" menu with the setting key **F9**, the indicator F10 flashes.
With the knob **F20**, select "**HOT"** function on **F14** display.
With knob **F7**, adjust the HOT START between **0.1** and **3** sec. on display F13.
To exit this function, select "**SET UP**". The indictor **F10** is off.

Off load voltage control (Vrd)
FP*: OFF
Select "**SET UP**" menu with the setting key **F9**, the indicator **F10** flashes.
With the knob **F20**, select "**Vrd"** function on **F14** display.
With knob **F7**, choose the output load voltage on display F13 between:
- "OFF" (standard off load voltage)
- "ON" 20 V (limited to 22V)

To exit this function, select "**SET UP**". The indictor **F10** is off.

13. TIG WELDING

Connect the unit to main power
Connect the power source to the main supply and the ground as explained in the chapter « Setting up » (as 6 and 7 section).
Connect the ground cable to the power terminal + **F1** and the torch's polarity connection **F3** to the – **F2**.
Connect the torch in the EURO connector **F4** and do it up to the end of the threads.

Connect the gas supply
Open the valve of the bottle for a moment to remove any impurities.
Fit the flow-control valve (flow from 5 to 8 l/mn) to the output of the bottle and its pipe.
Connect the gas pipe at the rear of the cable, to the gas input **B2**.
Open the bottle.

Set TIG parameters
Start up the power source with the main switch ON/OFF **B1**.

TIG welding mode choice
Select TIG welding mode with the setting key **F22**, the indicator **F19** illuminates.

2 strokes or 4 strokes mode
If the indicator **F25** is OFF, 2 stroke mode is selected.
Select 4 stroke mode with the setting key **F23**, the indicator **F25** illuminates.

Post gas (tpo)
FP* : Auto
Select "**SET UP**" menu with the setting key **F9**, the indicator **F10** flashes.
With the knob **F20**, select "**tPo"** function on **F14** display.
With knob **F7**, control and adjust the post gas between **3** and **25** sec. on display **F13** or select "**AUTO**" function (post gas is automatically regulated).
To exit this function, select "**SET UP**".**F9** The indictor **F10** is off

Down-slope time
Adjust the down-slope time from 0 to 16s with the knob **F7**.

Welding current
Adjust the welding current with the knob **F20**.

Start current control (IS)
FP*: 50%
Select "**SET UP**" menu with the setting key **F9**, the indicator **F10** flashes.
With the knob **F20**, select "**IS"** function on **F14** display.
With knob **F7**, control and adjust the start current (percentage of welding current) between 30% and 200%.

To exit this function, select "**SET UP**" **F9**. The indictor **F10** is off

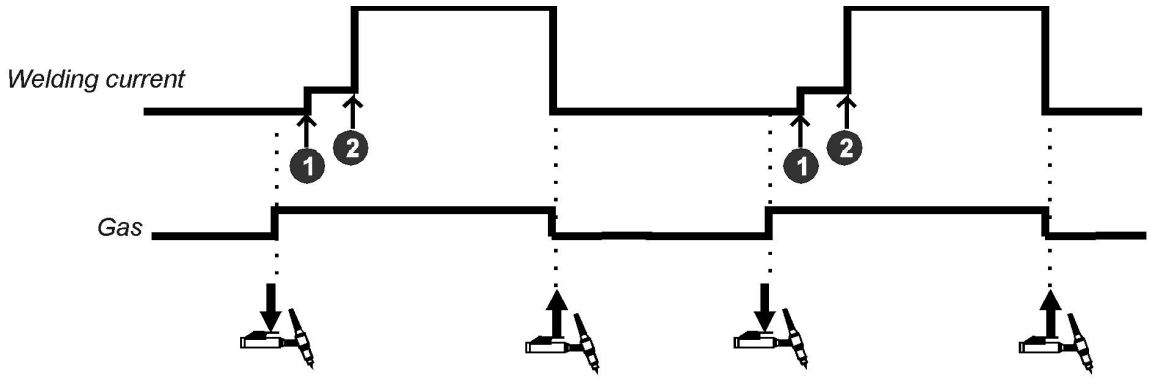
Time of progressive start current (tup)
FP*: 1 sec
Select "**SET UP**" menu with the setting key **F9**, the indicator **F10** flashes.
With the knob **F20**, select "**tUP"** function on **F14** display.
With knob **F7**, adjust the time between **0.1** and **10** sec or select "**OFF**".
To exit this function, select "**SET UP**" **F9** The indictor **F10** is off

Time of up-current (up slope) (dia)
FP*: 1.4mm
Select "**SET UP**" menu with the setting key **F9**, the indicator **F10** flashes.
With the knob **F20**, select "**dia"** function on **F14** display.
With knob **F7**, adjust the tungsten diameter between 1 and 6mm or select "**OFF**" function.
To exit this function, select "**SET UP**".**F9** The indictor **F10** is off

End current control (IF)
FP*: 30%
Select "**SET UP**" menu with the setting key **F9**, the indicator **F10** flashes.
With the knob **F20**, select "**IF"** function on **F14** display.
With knob **F7**, adjust the parameter between **30%** and **100%** of welding current.
To exit this function, select "**SET UP**". The indictor **F10** is off

Spot welding control (spt)
FP*: OFF
Select "**SET UP**" menu with the setting key **F9**, the indicator **F10** flashes.
With the knob **F20**, select "**SPt"** function on **F14** display.
With knob **F7**, adjust the time spot between **0.1** and **25** second. To stop Spot welding, select "OFF" .
To exit this function, select "**SET UP**". The indictor **F10** is off

Welding
Put the tungsten electrode in direct contact with the workpiece. Push on the trigger.
Raise the torch slowly. The arc strike start according to the cycle described hereunder.
NOTE : When the tungsten electrode comes into contact with the workpiece, the current is maintained at a low value till the electrode lifts up in order to avoid tungstens penetration



1 *tungsten electrode in contact with the piece*

2 *tungsten electrode lifts up*

Purge the gas

Press the purge gas knob inside the wire feeder

14. MIG WELDING

14.1. PREPARATION

Connect the unit

Connect the power source to the main supply and the ground as explained in the chapter « Setting up » (as 6 and 7 section).

Connect the ground cable and the torch's polarity connection **F3** to the power connection + **F1** and – **F2**, regarding to the type of wire used.

Connect the gas supply

Open the valve of the bottle for a moment to remove any impurities.
Fit the flow-control valve (flow from 10 to 15 l/mn) to the output of the bottle and its pipe.
Connect the gas pipe at the rear of the cable.
Open the bottle.

Fitting the feed rolls

Place the fitted feed rolls in the wire feeding unit according to the instructions given in chapter 17.
It is essential that the spool be fitted with the appropriate feed rolls, to provide the best welding and spooling conditions.

Install the wire in the spool
(Please see the spare parts lists of the wire feeder in chapter 17)
You can use wire's type : steel, stainless steel, aluminium wire from 0.6 mm to 1.2 mm.
Undo the retaining screw of the spool (screw on **Item.19)**.
Engage the spool on its support, (**Item. 19**), taking care to position the rod of the spool brake correctly. The spool must be mounted so that the wire is spooled from below.
The firmness of the spool brake can be adjusted using the central screw located behind the screw (**Item. 19**). This system allows the motion of the spool to be stopped at the end of spooling, preventing it from rotating further. This is vital when one is spooling at high speeds. **Nevertheless, the spool should not be braked excessively, in order not to overload the motor.**

Re-fit the retaining screw (screw on **Item. 19**).

Engage the wire in the wire feeding unit according to the instruction given chapter 17 and let it go out the EURO connector **F4.**

14.2. ADJUSTMENT OF THE PARAMETERS

- MIG welding mode
Select MIG welding mode with the setting key **F22**, the indicator **F21** illuminates.

- 2 strokes or 4 strokes mode
If the indicator **F25** is OFF, 2 stroke mode is selected.
Select 4 strokes mode with the setting key **F23**, the indicator **F25** illuminates.

Pre gas (tpr)
FP*: 0.5 sec
Select "**SET UP**" menu with the setting key **F9**, the indicator **F10** flashes.
With the knob **F20**, select "**tPr"** function on **F14** display.
With knob **F7**, adjust the pre-gas between **0.1 à 5** sec. or "**OFF**" on display **F13.**
To exit this function, select "**SET UP**". The indictor **F10** is off

Inductance control (spatter limitation) (ind.)
FP*: 100%
Select "**SET UP**" menu with the setting key **F9**, the indicator **F10** flashes.
With the knob **F20**, select "**Ind"** function on **F14** display.
With knob **F7**, control and adjust the inductance between **0 and 100%**
To exit this function, select "**SET UP**" **F9**. The indictor **F10** is off

BURN BACK control (bb)
FP : 0.4 sec
Select "**SET UP**" menu with the setting key **F9**, the indicator **F10** flashes.
With the knob **F20**, select "**bb"** function on **F14** display.
With knob **F7**, control and adjust the BURN BACK between **0.1** and **1.0** second.
To exit this function, select "**SET UP**". The indictor **F10** is off

Post gas (tpo)
FP* : 3 sec
Select "**SET UP**" menu with the setting key **F9**, the indicator **F10** flashes.

With the knob **F20**, select "**tPo"** function on **F14** display.
With knob **F7**, control and adjust the post between **0.1** and **10** sec.

To exit this function, select **F9** "**SET UP**". The indictor **F10** is off (post gas is automatically regulated).

HOT START CONTROL (hot)
FP* : 30%
Select "**SET UP**" menu with the setting key **F9**, the indicator **F10** illuminates.
With the knob **F20**, select "**Hot"** function on **F14** display.
With knob **F7**, control and adjust the HOT START between **0** to **100%** on display **F13**.
To exit this function, select **F9** "**SET UP**". The indictor **F10** is off.

- Wire speed
Adjust the wire speed from 1 to 20 m/min with knob **F20** on F14 display

- Arc voltage
Adjust the arc voltage from 12V to 34V with the knob **F7** on **F13** display

15. SPOT MIG WELDING (SPT)

Read the instructions for the preparation of the generator given in **13.1** section

Select "**SET UP**" menu with the setting key **F9**, the indicator **F10** flashes.
With the knob **F20**, select "**SPt"** function on **F14** display.
With knob **F7**, adjust the time spot between **0.1** and **2.5** second. To stop Spot welding, select "**OFF**".
To exit this function, select "**SET UP**" **F9**. The indictor **F10** is off

Welding
Depress the torch's trigger in order to start welding. The arc stops after the spot time.
Release and depress the trigger to start a new spot time.

16. INTERMITTENT MIG WELDING (SPT+INT)

Read the instructions for the preparation of the generator given in **13.1**

- Spot time
Select "**SET UP**" menu with the setting key **F9**, the indicator **F10** flashes.
With the knob **F20**, select "**SPt"** function on **F14** display.
With knob **F7**, adjust the time spot between **0.1** and **2.5** sec on **F13** display. To stop Spot welding, select "OFF".
To exit this function, select **F13** "**SET UP**". The indictor **F10** is off

- Time adjustment between spots

Select "**SET UP**" menu with the setting key **F9**, the indicator **F10** flashes.
With the knob **F20**, select "**Int"** function on **F14** display.
With knob **F7**, adjust the time spot between **0.4** and **25** sec on **F13** display. To stop intermittent welding, select "**OFF**".
To exit this function, select "**SET UP**". The indictor **F10** is off

Welding

Depress the torch's trigger in order to start welding. When holding on the trigger, you will do the welding cycles defined with parameters adjusted above. Release the trigger to stop the cycle.

17. « SAVE » AND « LOAD » MENU

« SAVE » to save welding parameters (1 to 15 programs)

1) Press "**SAVE**" key for SAVE menu – "**SAU**" is flashing = SAVE
2) Choice a program number from 1 to 15 with the knob **F7** in the right display **F13**
3) Press **SAVE** key during 3 seconds to memorise the parameters program. The right display shows « **yES** » =**YES** flashing
4) Press **SAVE** key to exit the **SAVE** mode

« LOAD » loading registered parameters

5) Press "**LOAD**" key for SAVE menu – "**Ld**" is flashing = SAVE
6) Choice a program number from 1 to 15 with the knob **F7** in the right display **F13**
7) Press **LOAD** key during 3 seconds to load registered programs. The right display shows « **yES** » =**YES** flashing
8) Press **LOAD** key to exit the **SAVE** mode

After loading saved program, it's possible to adjust all parameters but they won't be automatically saved

« FAC » Loading factory parameters

Press "**SETUP**
With the knob **F20**, select "**FAC"** function on **F14** display.
Select "FAC" with the knob **F7** in the right display **F13**
Press **SETUP** key during 3 seconds to load factory preset. The right display shows « **FAC** » =**YES** flashing
Press **SETUP** key to exit the **SAVE** mode

18. ADJUSTABLE VALUES FOR WLEDING PARAMETERS

ADJUSTABLE VALUES FOR WELDING PARAMETERS

	Unit	THERMAL ARC 400 GMS	*FACTORY SETTINGS*
stick welding			
Welding current range	**A**	3 - 380	*100A*
Arc force control	**%**	OFF - 1 - 99%	OFF
Hot Start	**S**	OFF - 0.1 - 3	OFF
Off low voltage	**V**	70-80V (22V with Vrd On)	70-80V
TIG Welding			
Welding current range	**A**	3 - 400	*100*
Post gas	**s**	AUTO - 3 - 25	*Auto*
Down slope	**s**	0 - 16	*NC*
Start current	**%**	30% - 200%	50%
Progressive time of start current	**s**	0.01 – 10	1
Over-current start in function of tungsten diameter	**mm**	OFF- 1 - 5mm	2.4mm
Final current	**%**	30 - 100	30
MIG Welding			
Arc voltage	**V**	12 - 34	*20*
Wire speed	**m/min**	1 - 20	*10*
Post gas	**s**	1 - 10	*3*
Inductor	**%**	0 - 100	*100*
Burn back	**s**	0.1 - 1	*0.4*
Spot's length	**s**	OFF-0.1 - 2.5	*OFF*
Time between 2 spots	**s**	OFF-0.4 - 2.5	*OFF*

19. MAINTENANCE

CAUTION : BEFORE OPENING the unit, disconnect the power source from the mains. Voltages are high and dangerous inside the machine.

In spite of their robustness, THERMADYNE's power sources require some regular maintenance. Once every 6 months (more often in dusty surroundings):

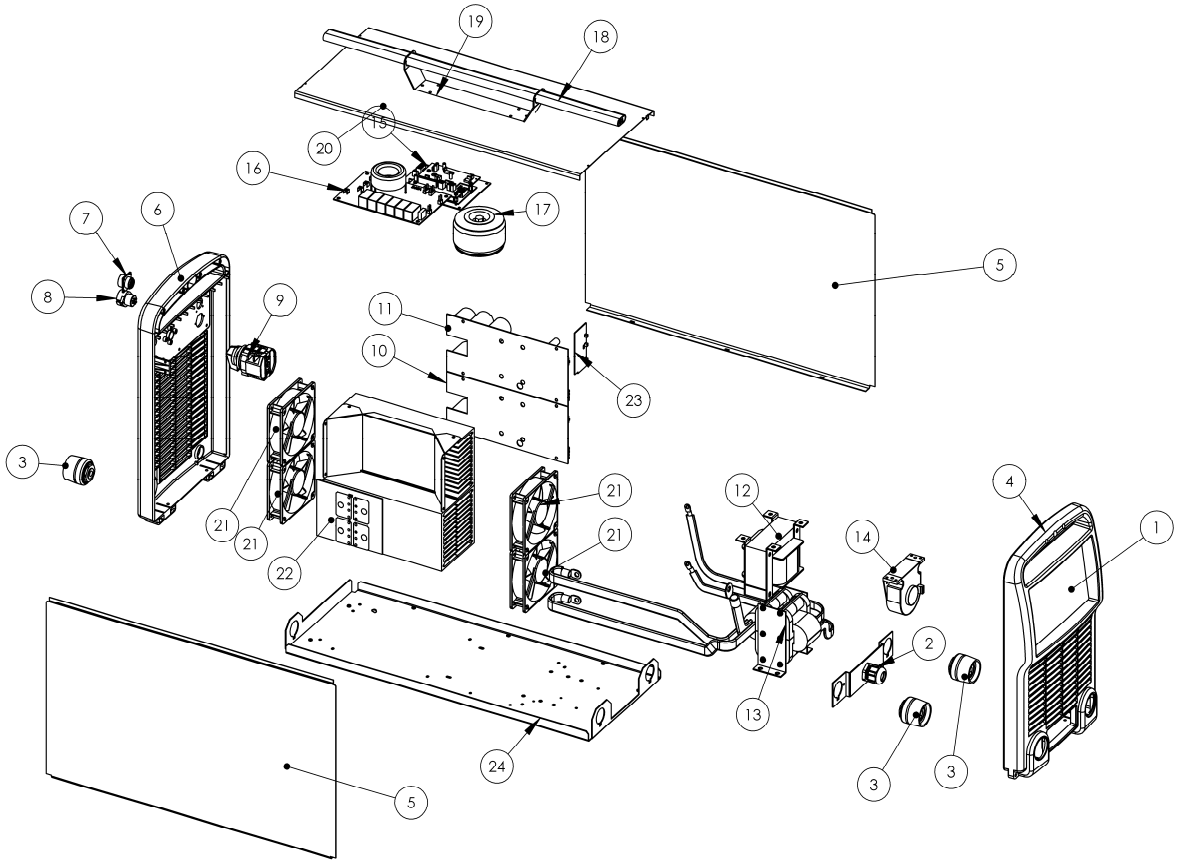
- the machine must be blown through with dry, oil free compressed air
- check for continuity all electrical connections.
- Check all cable connections including ribbon cables.

TROUBLE SHOOTING

POSSIBLE CAUSES	CHECKING / REMEDY
FRONT PANEL OFF = NO SUPPLY	
ON/OFF main switch is OFF	Put the switch ON
Power supply cable is cut	Check cable and connections
No main supply	Check circuit breaker and fuses
Defective ON/OFF main switch	Replace the switch
DIGITAL DISPLAY OFF AND INDICATOR F16 ON = INPUT VOLTAGE DEFAULT	
Input voltage too low	Check supply voltage
Lack of one phase	Check the supply
DIGITAL DISPLAY F13 FLASHES AND SHOWS « tPb » = PRIMARY WARMING UP	
Primary temperature over rated	The machine doesn't stop but the welding current is limited to 0A
DIGITAL DISPLAY F13 FLICKERS AND SHOWS « tSb » AND INDICATOR F13 ON = SECONDARY WARMING UP	
Secondary temperature over rated	The machine doesn't stop but the welding current is limited to 0A
DIGITAL DISPLAY F13 FLASHES AND SHOWS « tH » = WARMING UP	
Duty cycle over rated (particularly if ambient t° i s > 40℃)	Let the machine cool, it will automatically start again
Insufficient cooling air	Clean the air inlets
Very dusty machine	Open the machine and blow it through
Fan doesn't start	Replace the fan
DIGITAL DISPLAY F13 FLASHES AND SHOWS « coL » AND INDICATOR F17 ON = COOLING UNIT FAULT	
The machine stops until repair of the default	
Lack of water	Check the water level
Water circuit blocked up	Check the torch
STICK WELDING - IMPROPER WELDING	
Wrong electrode polarity	Use the right polarity according to the indications of electrode's manufacturer

TIG - IGNITION FAILURE	
Wrong polarity	Check the connection Torch to power terminal **–** Ground to power terminal **+**
Pre gas time selected	You must wait for the end of the pre gas flow or cancel it
DIGITAL DISPLAY F13 FLASHES AND SHOWS « C_O » = OVER LOAD	
Over load indication	Press the MIG GUN switch
DIGITAL DISPLAY F13 FLICKERS ANS SHOWS « FEd » = WIRE FEEDER DEFAULT	
Wire feeding fault	Check the wire feeder motor
OTHER FAILURES	
No gas arrives to the machine	Check the gas supply
No gas goes out of the machine	Check the gas valve
Initial current too low	Check the value of initial current (see chapter 12)

POWER SOURCE – 030431-01-TH



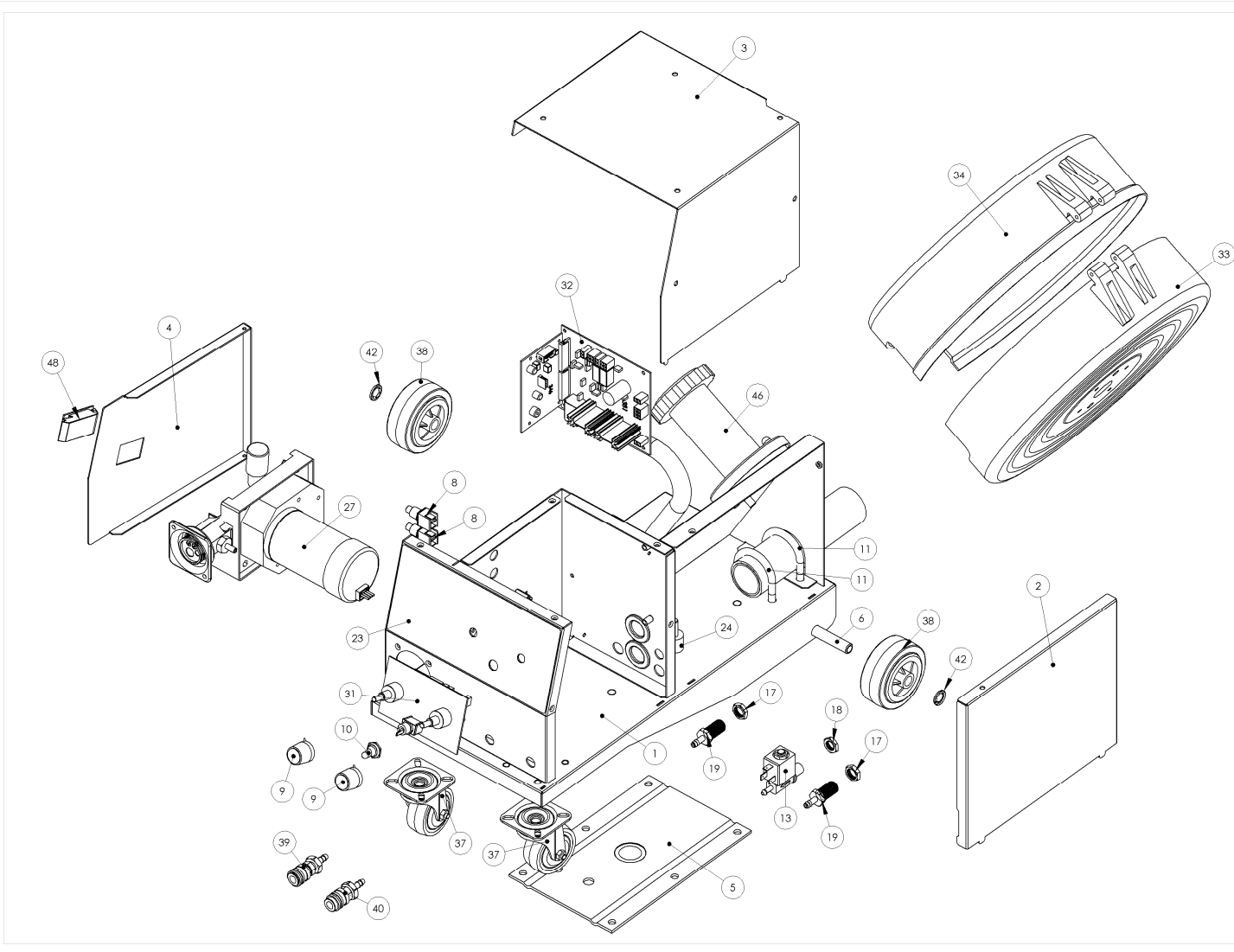
<u>OPTIONAL ACCESSORIES</u> (NOT SHOWN).

Dust filter option kit, part number 020207
And filter (for replacement, by quantity of 10): F03040

SPARE PARTS FOR THE POWER SOURCE

ITEM N°	PART NUMBER	DESCRIPTION
2	**B06058**	70mm2 wire fixer
	B06059	Wire fixer nut
3	**060156**	Power terminal 70/95 mm2
4	**I06011**	Plastic black front frame
5	**I06038–P3005**	Painted panel
6	**I06021-PULS500**	Black back frame
7	**C02612**	Socket 12 points
8	**C02107**	Socket 7 points
9	**G02011**	ON/OFF commutator
	K20047	Wire kit
10	**E32435**	Slave primary PCB
11	**E32434**	Master primary PCB
12	**T18127**	Inductor
13	**T18126**	Transformer
14	**CAP001**	Current sensor
15	**E32423**	Control PCB
16	**L94101**	EMI PCB
17	**T18122**	Toric transformer
18	**J15021-6-P9005**	Painted handle
19	**I06099**	Handle and support panel
20	**I06032-P3005**	Painted cover
21	**V01008**	Fan 120*120*32 – 12V dc
22	**E92281**	Secondary PCB
23	**L94081**	Amps regulator
24	**I06004**	Chassis
25	**E32424**	Display for GMS 400
26	**B00022-TH**	Front faschia
27	**B01062**	Black button – diam 23mm

WIRE FEEDER – 030105-TH



Wheel kit: 030153

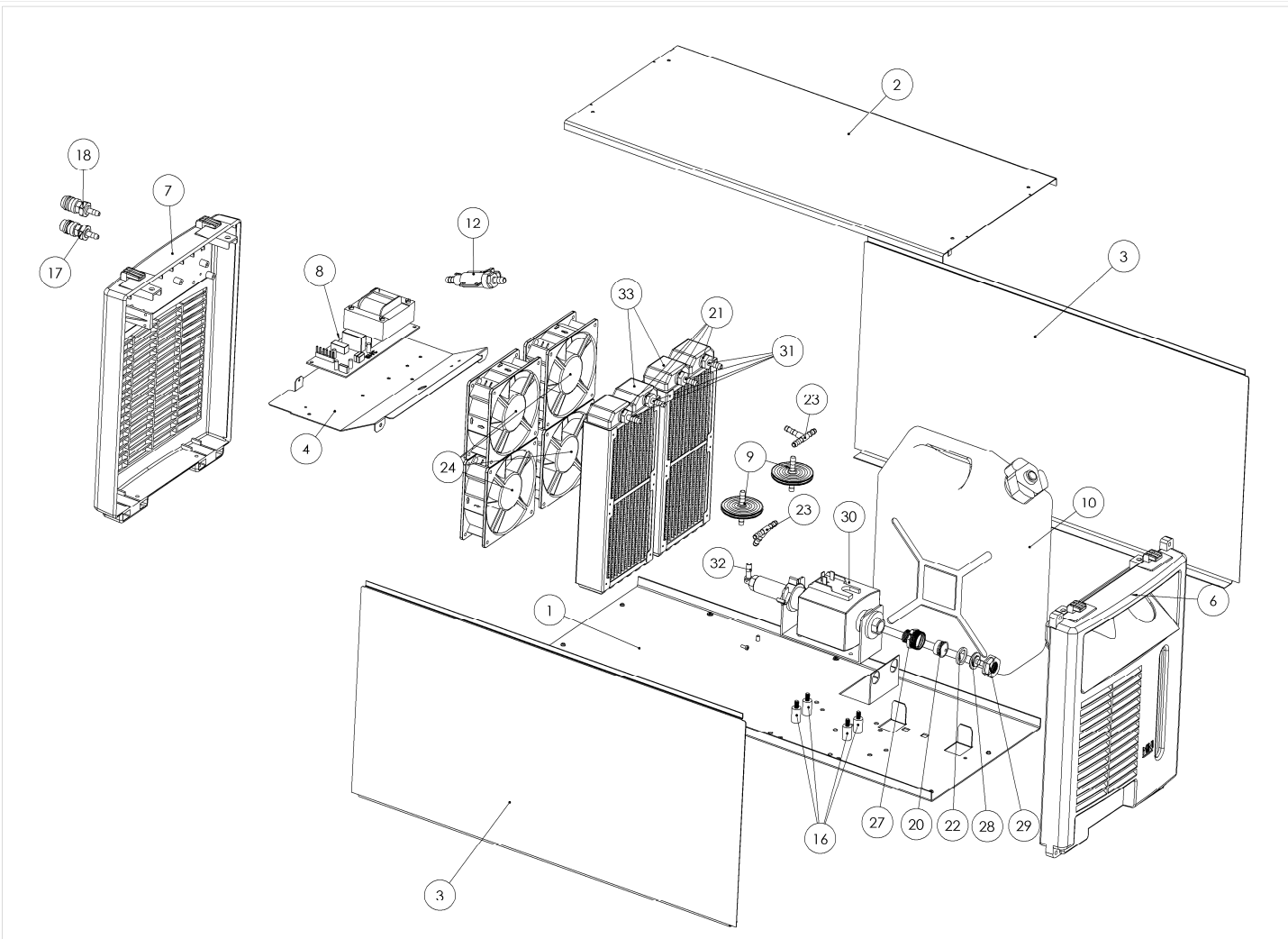
SPARE PARTS FOR THE WIRE FEEDER

ITEM N°	PART NUMBER	DESCRIPTION	QTY
1	**I07700**	chassis	1
2	**I07707-P3005**	Lateral panel	1
3	**I07706-P3005**	Wire-feeder cover	1
4	**I07708-P3005**	Wire-feeder door	1
5	**I07203**	Wire-feeder support for trolley	1
6	**I07709**	Wheel shaft – length: 350 mm	1
8	**B05001**	Black knob	2
9	**B01010**	Knob with arrow – diam. 23 mm	2
10	**B05030**	Waterproof cap + kit of rings	1
11	**A31000**	M8 bracket - Ø42,4mm	2
13	**F04001**	Gas valve	1
17	**F30003**	Nut 14x100	2
18	**F30002**	Nut 12x100 – thickness 4mm	1
19	**F12003**	Water output 14x100	2
23	**B00036**	Adhesive fascia	1
24	**A40002**	Insulator m8/m6	1
27	**U24031**	4r wire drive	1
31	**L9420C100**	PCB	1
32	**E32419**	Control PCB	1
33	**SW96010-2-2**	Spool compartment (support)	1
34	**SW96010-2-1**	Spool compartment (protection)	1
37	**R30601**	Pivoting wheel diam. 60	2
38	**R10801**	Rubber wheel diam. 80 mm	2
39	**F13012-2**	Fast plug socket for water – red chassis	1
40	**F13012-1**	Fast plug socket for water – blue chassis	1
42	**A10052**	Ring diam. 11 mm	2
46	**U20030**	Spool support with blue nut	2
48	**A20002**	Lock for door	1

FEED ROLLS FOR WIRE FEEDER

PART NUMBER	DESCRIPTION
U450810AC	Feed roll – Steel 0.8/1.0
U451012AC	Feed roll – Steel 1.0/1.2
U451216AC	Feed roll – Steel 1.2/1.6
U451012AL	Feed roll – Aluminium 1.0/1.2
U451216AL	Feed roll – Aluminium 1.2/1.6
U451216FR	Feed roll – flux cored wire 1.2/1.6

WATER COOLER EL3P-AR – 020255-AR-TH

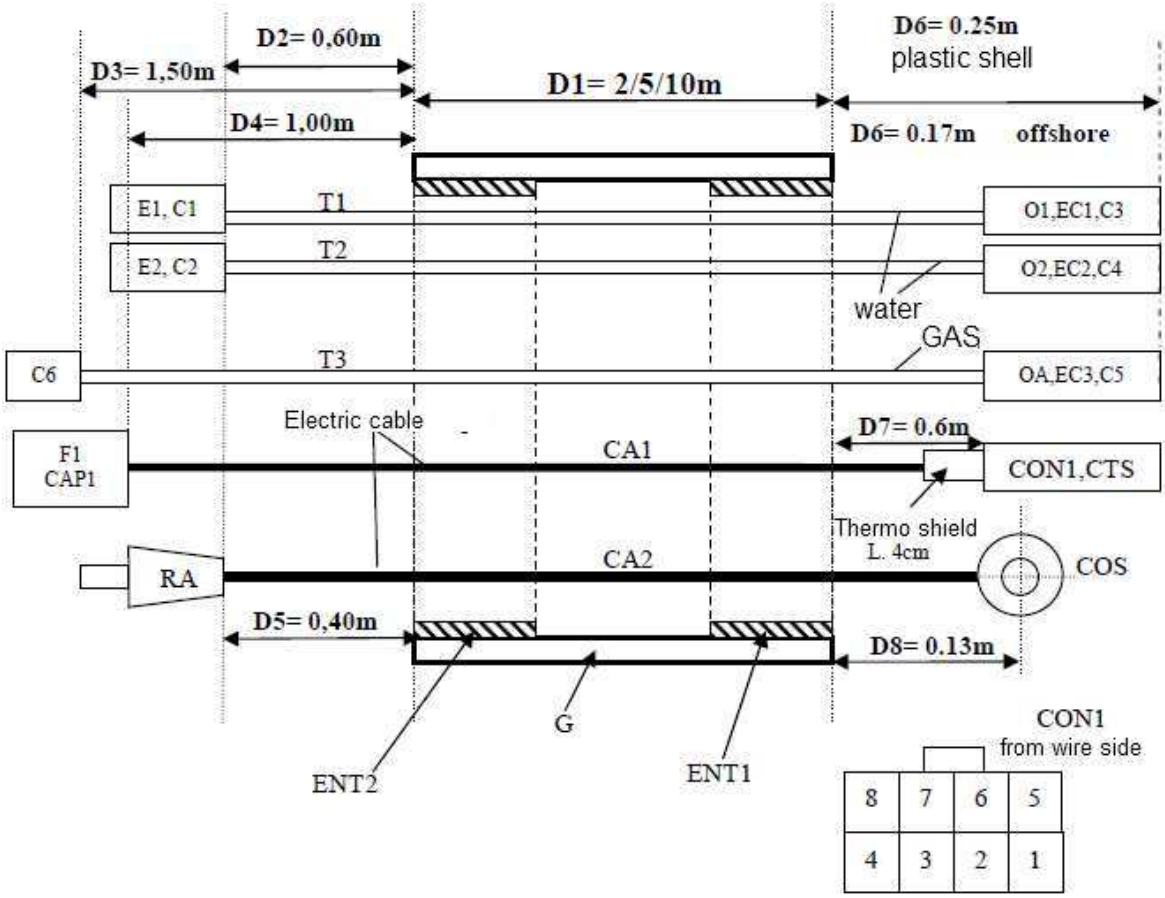


SPARE PARTS FOR THE WATER COOLER EL3P-AR

ITEM N°	PART NUMBER	DESCRIPTION	QTY
1	**I06101**	CHASSIS	1
2	**I06132**	COVER	1
3	**I06133-P3005**	SIDE PANEL	2
-	**I06176**	METAL PLATE FOR AIR CANALISATION	1
5	**I061661**	METAL PLATE SUPPORT FOR FANS	1
6	**I06111**	FRONT PANEL	1
7	**I06121**	BACK PANEL	1
8	**L92412**	PCB	1
9	**F03021**	VIBRATION ABSORBER	2
10	**F01009**	TANK FOR COOLANT	1
12	**F06041**	FLOW SENSOR	1
16	**A40012**	PLOT SILENT BLOC DIAM 12 H19 M/M M5	4
17	**F13012-2**	BASE FOR QUICK CONNECTOR (WATER) RED	2
18	**F13012-1**	BASE FOR QUICK CONNECTOR (WATER) BLUE	2
20	**F03030**	FILTER	1
21	**F10005**	O RING FOR F10004 DIAM20	4
22	**F03031**	O RING FOR FILTER	1
23	**F08002**	PLASTIC TE CONNECTOR	2
-	**V01003**	FAN 120*120 230V AC ALU	4
27	**F18024**	FILTER EMPLACEMENT	1
28	**F18023**	CAP FOR FILTER CONNECTOR	1
29	**F18025**	BOLT FOR CAP	1
30	**F03002**	PUMP WITH MEMBRANE	1
31	**F10004**	MILLED CONNECTOR 1-4 GAS FOR DIAM. 6 HOSE	4
32	**F09003**	WHITE CORNER CONNECTOR DIAM. 6	1
33	**F02005**	HEAT EXCHANGER	2

WATER COOLED INTERCONNECTING CABLE

030372-500-2 / 030372-500-5 / 030372-500-10



LINKS CA1

Start	End	Wire colour
F1.A	CON1.1	White
F1.B	CON1.2	Brown
F1.C	CON1.3	Green (1/2 of green-yellow pair
F1.D	CON1.4	Yellow (2/2 of green-yellow pair)
F1.E	CON1.5	Grey
F1.F	CON1.6	Pink
F1.G	CON1.7	Blue
F1.H	CON1.8	red

SPARE PARTS FOR WATER COOLED INTERCONNECTING CABLE
030372-500-2 / 030372-500-5 / 030372-500-10

ITEM N°	Qty	Description	Part number
E1, E2	2	WATER QUICK CONNECTOR – MALE	F13011-1
C1, C2, C3, C4	4	COLLAR WITH INSIDE RING FOR DIAM 6 – 13 HOSE	F07010
T1	1	RED RUBBER HOSE – DIAM 6	K50005
T2	1	BLUE RUBBER HOSE – DIAM 6	K50006
O1, O2	2	WATER HOSE (6) NIPPLE	F11002
EC1, EC2	2	NUT 14/100	F11006
OA	1	GAZ NIPPLE	F11001
EC3	1	NUT 12/100	F11005
C5, C6	2	COLLAR 1*540 120	
T3	1	TRICOCLAIR HOSE 4*8	K52004
F1	1	MALE PLUG 12 CONTACTS FOR REMOTE CONTROL WITHOUT COVER	C04612
CAP1	1	CAP FOR MALE/FEMALE PLUG 12 CONTACTS	C04613
CON1	1	MOLEX CONNECTOR 8 WAYS	C03431
CTS	8	FEMALE CONTACT FOR 8 WAYS MOLEX CONNECTORS	C03441
CA1	1	CABLE 5 SHIELDED PAIRS 10*0.5 MM²	K02005
RA	1	POWER MALE CONNECTOR	060157
CA2	1	PVC SECONDARY CABLE 70MM²	060215
COS	1	TERMINAL CONNECTOR 08-70 MM²	A61870
ENT1, ENT2	2	DIAM 40 SPACER , L= 100 MM	A00021
G	1	BLUE PVC LINING – DIAM 41	K70041

The wire feeding unit consists of two pressure feed rolls at the top, usable for all the wires, and two grooved feed rolls at the lower, which have to be adapted to the nature of the wire and to its diameter.

It is essential that the spool be fitted with the appropriate feed rolls, so as to provide the best welding and spooling conditions.

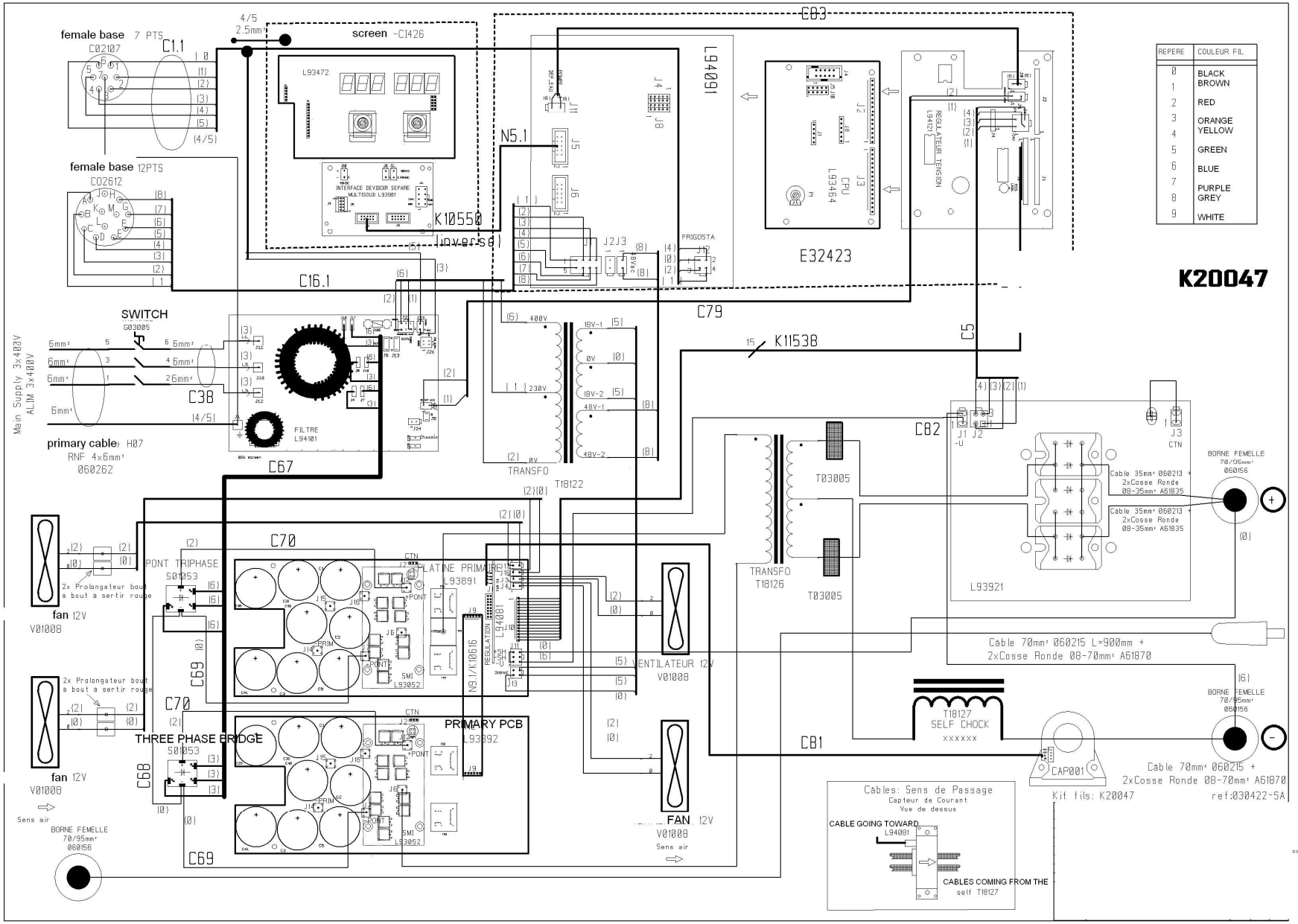
Each grooved feed roll is designed to weld 2 different diameters. To change diameter, the feed roll is just turned round. The feed rolls mounted as standard on delivery are designed to weld steel/stainless steel wire (triangular groove in « V ») 0.8 or 1,0 mm in diameter (by turning the feed roll).

Spooling of aluminium wires :
For aluminium wire, semicircular grooved (in « U ») feed rolls are available as options in diameters 0.8/1.0 mm.
These type of feed rolls are recommended for spooling of aluminium wires, since they prevent deformation or crushing of the wire.
Replacing the feed rolls
Release the pressure of the upper feed roll, using knob of the fixing shaft.
Undo the fixing caps of the lower feed rolls.

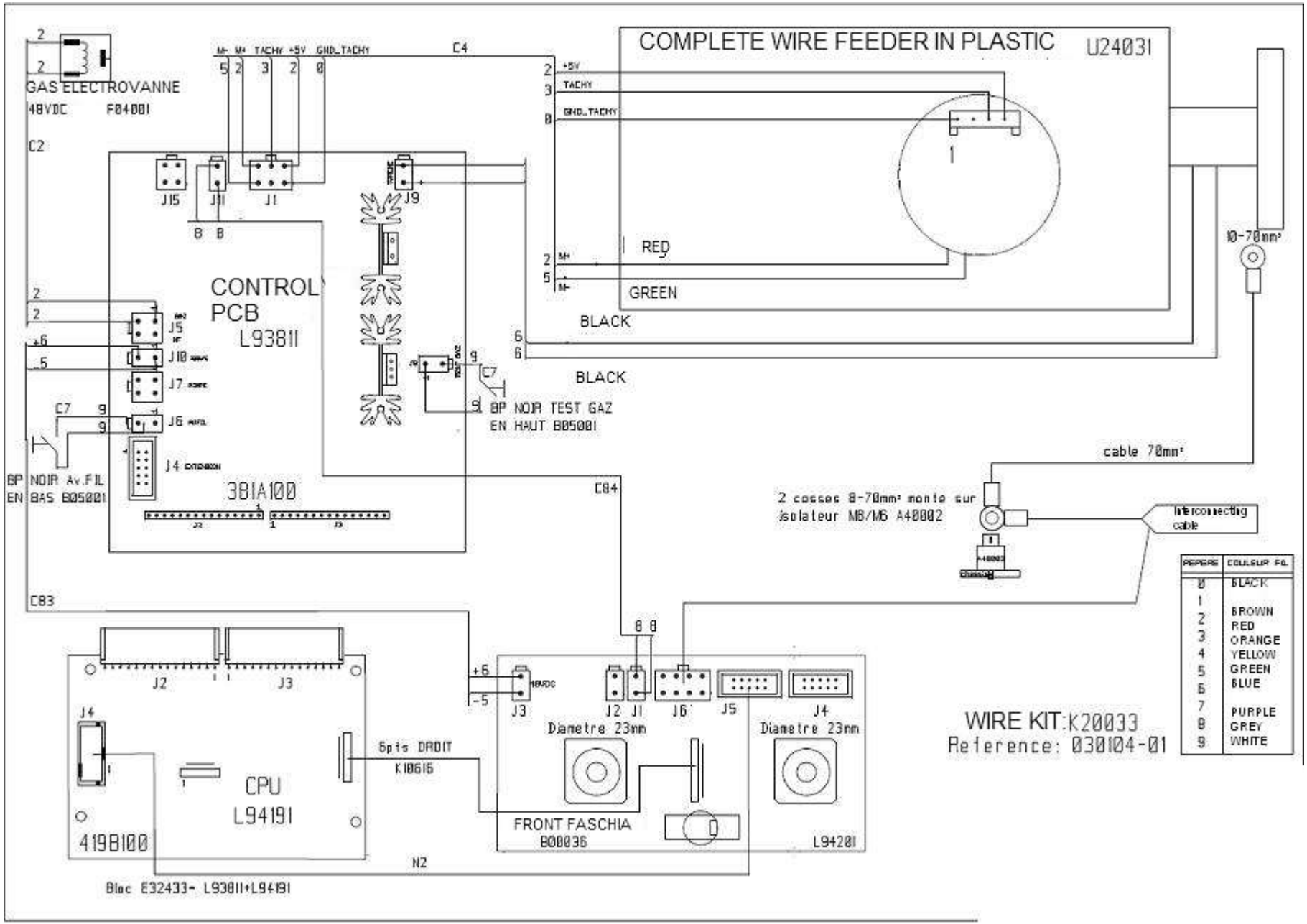
Remove the lower feed rolls, and turn them or fit a different feed roll in its place.
Engage the feed rolls well down onto the gear wheel.
Refit the fixing caps.
Refit the pressure of the upper feed rolls, using knob of the fixing shaft.

Place the wire in the wire feeding unit
Release the pressure of the upper feed rolls, using knob of the fixing shaft .
Engage the wire in the inlet guide, then in the groove of the feed rolls, finally in the wire inlet of the EURO connector **F14** until the wire comes out of the connect.

20. POWER SOURCE



21. WIRE FEEDER



NOTES

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