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**SPARTUS Pro TIG320P AC/DC**  
**SPARTUS Pro TIG320PW AC/DC**

**SPARTUS Pro TIG400P AC/DC**  
**SPARTUS Pro TIG400PW AC/DC**

# 1. SAFE USE – HAZARDS ASSOCIATED WITH ARC WELDING AND PLASMA CUTTING

ENG

Arc welding and plasma cutting are processes that can pose hazards for the operator and persons in his vicinity. The operator and his close surroundings are exposed, among others, to the risk of fire, explosion, electric shock, burning, as well as the risk of getting injured by moving parts of the device.

Once proper safety measures are provided, electric welding and plasma cutting are relatively safe processes. For this reason, it is crucial to strictly follow the valid OSH principles during welding operations.

The information provided below does not release the operator from the obligation to follow the OSH rules that are binding in his plant/workplace.

## 1.1. GENERAL SAFETY RULES

Welding operators and persons working in the vicinity of the welding process should be made aware of the following hazards associated with arc welding. They should be made aware of protective measures as specified in relevant international and national standards and regulations.

### 1.1.1. EQUIPMENT CONDITION AND MAINTENANCE

- Check the technical condition of the device and accessories before starting to weld/plasma cutting. It is forbidden to use equipment that is unserviceable..
- Equipment damaged or defective should be repaired immediately or removed from service.

### 1.1.2. OPERATION AND CARRYING

- Apply appropriate protective measures in the space around the zone, where welding operations are expected to be carried out.
- All equipment should be placed so that it does not present a hazard in passageways, on ladders or stairways, etc..
- Falling objects can cause injuries or kill. Protect device before accidentally falling.

- Welding equipment may be heavy (e.g. wire feeder fitted with spool and harness). Care shall be taken during manual handling..
- To handle heavy elements, use hoists/trucks/transport equipment designed especially for this purpose. Make sure the weight of equipment to be handled does not exceed the admissible maximum lifting capacity of used hoist/truck/transport equipment.
- It is forbidden for unauthorized persons, especially children, to be in the vicinity of the device during its use.
- The device is not suitable for pipe defrosting.
- Device use non-compliant with its intended purpose is forbidden.

### 1.1.3. TRAINING

- Only professionally trained and qualified personnel may install, operate, maintain and repair the device.
- For operators and their supervisors training is essential in: the safe use of the equipment; the processes; the emergency procedures.

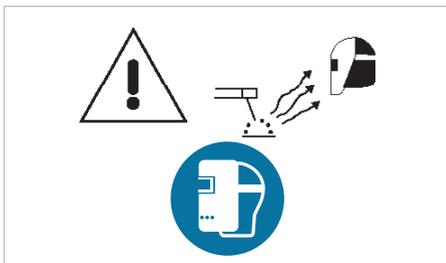
## 1.2. ELECTRIC SHOCK CAN KILL



- Before starting to weld and during the welding process, the operator should insulate himself from the ground and the environment by means of dry and undamaged protective clothes. It is forbidden to work on wet ground.
- It is forbidden to touch DINSE sockets („+” and/or „-”) when the device is in operation

- (connected to a power supply source).
- It is forbidden to touch live electric components of the device.
- Power supply must never be connected before the accessories of DINSE sockets/connectors are properly installed in the device.
- Use dry and undamaged welding gloves and protective clothing, in order to ensure proper insulation of the body. It is forbidden to touch with a bare hand any elements that are parts of an electric circuit.
- The operator must always make sure that there is a good electric connection of the return conductor to the element to be welded. The connection should be located as close to the welding zone as possible.
- Maintain the electrode grip, the welding torch, the chassis ground clamp, welding cables and the welding machine in proper technical condition that ensures safe operation. Damaged cable insulation should be replaced with new insulation.
- Never dip an electrode into water, to cool it down.
- When working above the floor level (at a height), use a safety harness to protect yourself against falling, in the case of potential electric shock.
- Exercise special caution, when using the device in small rooms or in rooms with elevated humidity levels.

### 1.3. WELDING ARC RADIATION CAN BE DANGEROUS



The arc generates:

- ultraviolet radiation (can damage skin and eyes);

- visible light (can dazzle eyes and impair vision);
- infrared (heat) radiation (can damage skin and eyes).

Such radiation can be direct or reflected from surfaces such as bright metals and light coloured objects.

#### 1.3.1. EYE AND FACE PROTECTION

- Use welder's helmet/shield with an appropriate filter to protect you face and eyes against sparks and welding arc radiation.
- Welding helmet/shield should prevent injuries from flying particles, e.g. slag, fragments from grinding or wire bristles, etc.
- Welding helmet/shield should be made in accordance with applicable standards.

#### 1.3.2. BODY PROTECTION

- The body should be protected by suitable clothing in accordance with applicable standards.
- Use appropriate protective clothing made of durable and fire-resistant material, to ensure proper skin protection.
- The use of neck protection can be necessary against reflected radiation.

#### 1.3.3. PROTECTION OF PERSONS IN THE VICINITY OF AN ARC

- Protect the remaining personnel present in the vicinity of welding works against negative impact of arc radiation and welding splatters. Warn them about the hazard resulting from exposure to the welding arc.
- In the vicinity of an arc, non-reflective curtains or screens should be used to isolate persons from the arc radiation. A warning, e.g. a symbol for eye protection, should refer to the hazard of arc optical radiation.
- Welder's assistants should also wear appropriate protective clothing.

## 1.4. VAPOURS AND GASES CAN BE DANGEROUS

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Arc welding and allied processes produce welding fume which may pollute the atmosphere surrounding the work. Welding fume is a varying mixture of airborne gases and fine particles which, if inhaled or swallowed, constitute a health hazard.

The degree of risk is depend on:

- the composition of the fume;
- the concentration of the fume;
- the duration of exposure.

A systematic approach to the assessment of exposure is necessary, taking into account the particular circumstances of the operator and the ancillary worker who can be exposed.

Welding fume may be controlled by a wide range of measures, e.g. process modifications, engineering controls, methods of work, personal protection and administrative action. First it is necessary to consider whether exposure can be prevented by eliminating the generation of welding fume altogether. Where this cannot be done, measures for reducing the quantity of welding fume generated should be investigated, after which the control of welding fume at source should be considered. The use of respiratory equipment should not be contemplated until all other possibilities have been eliminated. Normally, respiratory protective equipment should be used only as an interim measure. There will, however, be circumstances where, in addition to ventilation measures, the use of personal protection can be necessary.

### 1.4.1. VAPOURS AND GASES. ADDITIONAL PRECAUTIONS

- Welding operations can involve generation of vapours and gases that are hazardous to health. Inhaling the vapours should be avoided. Keep your head away from

vapours during welding operations. Ensure proper ventilation and/or mechanical welding exhaust draught to keep vapours and gases away from the breathing zone.

- When welding is carried out in a confined space, operators should only be permitted to weld when other persons, who have been instructed and who are able to react in case of an emergency, are in the immediate vicinity.
- In closed rooms or in certain circumstances during outdoor operations, it may be required to use individual equipment for the protection of the welder's airways, e.g. a respirator. Additional safety measures are also required when galvanized steel is welded.
- Welding operations must not be performed in the vicinity of chlorinated hydrocarbons generated during degreasing, cleaning or spraying operations. Heat and radiation generated by the arc may enter into a reaction with vapours of solvents, which may lead to the formation of phosgene – a highly toxic gas..
- The shielding gas used during arc welding may force the air out of a room. This may lead to a health hazard or even death. Proper ventilation, especially in closed rooms, should always be provided, to ensure appropriate amount of air that is indispensable for safe breathing.

## 1.5. NOISE CAN BE HARMFUL



In the welding environment, damaging levels of noise can exist. Continued exposure to a high noise level on the unprotected ear is injurious. The noise levels should be reduced to the lowest practicable level.

High levels may be tolerated for very short periods of time by wearing adequate ear protection in accordance with the national or local regulation.

In case of doubt, checks by an expert should be made to establish noise levels in any particular environment, and, if these are in excess of the prescribed limit, one of the following alternatives may apply:

- a) Insulation of the noise source as far as possible, e.g. by fitting silencers or sound proof enclosures
- b) Insulation of the operator from the noise source
- c) Effective maintenance of sound protection devices
- d) Indication as „ear protection areas” where applicable
- e) Restriction of entry to these „ear protection areas” to authorized persons.
- f) Protect your hearing with appropriate personal protection measures, e.g. earplugs or hearing protectors.

## 1.6. FIRE AND EXPLOSION

Arc welding and allied processes can cause fire and explosions and precautions should be taken to prevent these hazards.

### 1.6.1. FIRE



- Before setting to perform welding operations, ensure that elements involving fire hazard are removed from the zone where welding operations are to be performed. If this is impossible, protect all flammable elements against the impact of sparks. Remember that sparks and hot metal may penetrate through small cracks and openings into the adjacent area.
- Avoid welding in the vicinity of hydraulic conduits.
- The welding arc throws sparks and splatters out. Welders should wear clean and dry protective clothing (staining with oil should be avoided in particular) such as welding gloves, welder's apron, welder's trousers,

welder's boots, protective hood/cap, etc.

- When no welding operations are carried out, make sure no part of the electrode is in contact with the material to be welded or chassis ground. Accidental contact may lead to overheating and create a fire hazard.
- An extinguisher should always be ready for use and available in an easily accessible place nearby.
- The surroundings of the work should be observed for an adequate period after its termination.
- „Hot spots” and their immediate surroundings should be observed until their temperature has dropped to normal.

### 1.6.2. EXPLOSION

- It is forbidden to heat up, cut or weld tanks, barrels or containers that contained toxic or flammable materials. For there is an explosion hazard, even if the containers have been emptied and cleaned.

### 1.6.3. USE OF CYLINDERS WITH SHIELDING GAS



- In case compressed gases are used in the work place, apply special safety measures to prevent dangerous situations.
- Use gas cylinders with appropriate shielding gas, foreseen for a particular process. Additional equipment (pressure regulator, hoses, connectors) should be in good technical condition. A gas cylinder and accessories should have the required valid attestations and approvals for use.
- Gas cylinders should always be stored in vertical position, fixed to an undercarriage or permanent support.
- Gas cylinders should be placed far away from areas, where they could be exposed to the risk of being overthrown or suffering physical damage.

- Ensure gas cylinders are at a safe distance from places where electric welding or cutting operations are to be performed, away from other sources of heat, sparks or flames.
- Care shall be taken to prevent gas cylinders in the vicinity of the workpiece becoming part of the welding circuit.
- Never allow the electrode, electrode holder or any other live electric part to get in contact with the gas cylinder.
- Keep your face and head away from the cylinder valve socket when the valve is being opened.
- Special valve shield should always be installed during cylinder transportation or when the cylinder is not used.

### 1.7. OTHER HAZARDS

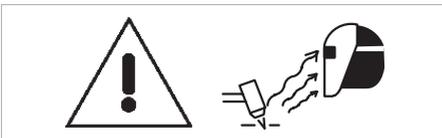
Arc welding and allied processes carrying other hazards not listed before.

#### 1.7.1. HOT PARTS CAN CAUSE BURNS



- Never touch hot parts with bare hands.
- Before handling an element, wait until it cools down.
- Use appropriate tools to grip and handle hot elements and wear special welding gloves and clothing that protects against burns.

#### 1.7.2. PLASMA ARC IS DANGEROUS



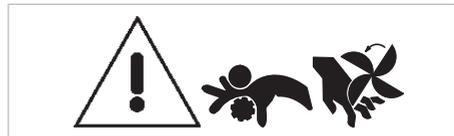
- Highly concentrated plasma arc poses a hazard for health and life. It is forbidden to aim plasma arc at people.

#### 1.7.3. WELDING WIRE CAN CAUSE INJURIES



- Accidental pressing of the button on the welding torch can cause welding wire to advance in an uncontrolled manner. The welding wire tip may be sharp.
- Never aim the burner tip of the welding torch at your face, eyes or other people.

#### 1.7.4. MOVING ELEMENTS CAN BE DANGEROUS



- All protective elements and device housing should be in place and in good technical condition. Keep your hands, hair, clothes and tools away from gear wheels, fans and other moving parts during their operation.
- Do not bring your hands close to fan motors. It is forbidden to try to stop a fan by pressing its axle.

#### 1.7.5. HF – HIGH FREQUENCY IGNITION MAY CAUSE INTERFERENCE



- As welding by the TIG method or plasma cutting involves high frequency ignition, it can interfere with mobile phones, radio equipment, TV equipment or improperly protected computers and industrial robots, which leads to total disabling of such devices.

## 1.8. OTHER INFORMATIONS

When performing welding work, you must apply equally to the health and safety requirements contained in the current normative acts, applicable in your country.



**WARNING:** The maximum voltage of 15kV. Accidental pressing of the microswitch results in unintentional arc ignition. Never bring a bare hand close to the electrode, when the device is connected to a power source.

## 1.9. SYMBOLS USED IN INSTRUCTIONS



We use this symbol to pay your attention about important information.

## 2. ELECTROMAGNETIC FIELD (EMF)

Electric current flowing through any conductor causes localized electric and magnetic fields (EMF). All welders should use the following procedures in order to minimize the risk associated with exposure to EMF from the welding circuit:

- Route the welding cables together – secure them with tape when possible
- Place your torso and head as far away as possible from the welding circuit
- Never coil welding cables around your body
- Do not place your body between welding cables. Keep both welding cables on the same side of your body;
- Connect the return cable to the workpiece as close as possible to the area being welded
- Do not work next to, sit or lean on the welding power source
- Do not weld whilst carrying the welding power source or wire feeder

**WARNING:** The electromagnetic field (EMF) generated during welding (and allied processes) may interfere with the operation of implanted medical devices for example: cardiac pacemakers. Persons with implanted medical devices such as cardiac pacemakers are obliged to consult a doctor before starting to weld/plasma cutting and to exercise special caution during work. It is forbidden for such persons to be present in the vicinity of the place where welding/plasma cutting processes are realized without previous consultation of a doctor.

## 3. ELECTROMAGNETIC COMPATIBILITY (EMC)

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**WARNING:** This Class A equipment is not intended for use in residential locations where the electrical power is provided by the public low-voltage supply system. There can be potential difficulties in ensuring electromagnetic compatibility in those locations due to conducted as well radiated radio-frequency disturbances.

### 3.1. GENERAL

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. 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.

Welding and plasma cutting processes may emit additional interferences. User is responsibility for the interferences caused by welding and plasma cutting.

### 3.2. ASSESMENT OF AREA

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

- a) other supply cables, control cables, signaling 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, for example guarding of industrial equipment
- e) the health of the people around, for example 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

### 3.3. METHODS OF REDUCING EMMISIONS

Methods of reducing electromagnetic interference are listed in detail in the standard EN 60974-9 - „Arc welding equipment - Part 9: Installation and use”.

## 4. CONFORMITY WITH STANDARDS

The SPARTUS Pro TIG320P AC/DC // TIG320PW AC/DC // TIG400P AC/DC // TIG400PW AC/DC is in conformity with the relevant Union harmonization legislation:

<b>LVD 2014/35/UE</b>	<b>Low Voltage Directive</b>
<b>EMC 2014/30/UE</b>	<b>Electromagnetic Compatibility Directive</b>

harmonized standards:

<b>EN 60974-1</b>	<b>Arc Welding Equipment – Part 1: Welding Power Sources</b>
<b>EN 60974-10</b>	<b>Arc Welding Equipment – Part 10: Electromagnetic Compatibility Requirements</b>

### 4.1. CE MARKING

CE marking is placed on the nameplate of device and/or on the front panel of device.



## 5. GENERAL DESCRIPTION

### SPARTUS Pro TIG 320P/400P/320PW/420PW AC/DC

Modern, inverter welder TIG AC/DC based on a IGBT transistors. High reliability and and overload resistance of the equipment were achieved thanks to use the best components and intelligence source protection systems.

This equipment is designed and produced for tough industrial environment. It allows to welding of steel, stainless steel, acid-proof steel, magnesium, titanium, aluminium and other weldable alloys in a wide range of materials thickness.

TIG320PW AC/DC and 400PW AC/DC models are equipped as a standard with integrated water cooling system for welding holders TIG. Source and the cooler system are located on a special cart to provide a well-balanced Tower type construction. There is also a possibility to install on a cart chassis a big shielding gas cylinder. Equipment can be dismantle in any time to perform maintenance works.

Easy to use and intuitive functional panel allows to precise control every important welding parameter for TIG AC/DC and MMA AC/DC methods.

SPARTUS Pro TIG 320P/400P/320PW/420PW is equipped with many modern technologies supporting operator's work, stabilising output parameters and protecting the welder from damage.

They include among others:

- MCU control system: reacts immediately to all changes.
- Welder intelligent protection system from over-voltage and overheating.
- Contactless arc starting system HF is easy and contactless arc starting TIG method.
- Digital multifunctional control panel gives an opportunity to select one of 6 welding modes: MMA DC, MMA AC, TIG DC, TIG DC PULS, TIG AC, TIG AC PULS.
- One can select one of 3 AC waveforms for TIG AC method.
- Support for remote control: possibility to connect control pedal, holder with current control in the handle, remote control device.

This device is perfect for welding works in the industrial and production sectors. As well as for welding steel, stainless steel, acid-proof steel, aluminium and other difficult alloys. Application examples: industry, renovation works, workshops, constructions, aluminium welding, aluminium wheel rims regeneration.

## 5.1. PURPOSE OF USE

SPARTUS Pro TIG: 320P AC/DC, 400P AC/DC, 320PW AC/DC, 400PW AC/DC is designed for:

- Manual metal arc welding (MMA) (SMAW – shielded metal arc welding)
- Tungsten inert gas welding (TIG)

## 6. TECHNICAL SPECIFICATIONS

### 6.1. OPERATION, STORAGE AND TRANSPORT

Conditions during operation, storage and transport	
Range of ambient air temperature during operation	-10°C to +40°C
Relative humidity of the air	up to 50% at 40°C
	up to 90% at 20°C
Ambient air	Free from abnormal amounts of dust, acids, corrosive substances etc. other than those generated by the welding process.
Base of the welding power source inclined	up to 10°
Range of ambient air temperature during storage and transport	-20°C to +55°C



### Duty cycle

Duty cycle is the time during which You can weld or cut at a certain load without causing overload. It is expressed in percent for time period of complete cycle which equals 10 minutes. For example: 60% duty cycle means that for 6 minutes device can operate at given load, after that required 4 minutes time break (no-load operation). Duty cycle is given to ambient temperature of 40°C.



The device has a degree of protection IP23S. Which means that it is intended to be used in closed and covered areas and suitable for use outdoors. However it is not designed to be used outdoor during precipitation if it is not covered.



### Protection against overheating

Security system from overheating will turn on when the welder is over-heat (possibility of welding is turned off, abnormal indicator on front panel lights up). In such a situation, You should not turning off the unit immediately. Wait some time until fan cools the unit. Time to return to the state from overheating can take up to approx. 15 minutes.

## 6.2. TECHNICAL PARAMETERS OF DEVICE

	TIG 320P AC/DC	TIG 400P AC/DC
<b>Input</b>	~3 x 400V ±10% 50/60 Hz	
<b>Welding Current TIG [A]</b>	10 – 320	10 – 400
<b>Duty cycle [%]</b>	60	
<b>TIG PARAMETERS</b>		
<b>Start Amps, End Amps</b>	✓	
<b>Gas pre flow [s]</b>	0,1 – 2	
<b>Up slope [s]</b>	0 – 10	
<b>Down slope [s]</b>	0 – 10	
<b>Gas post flow [s]</b>	0 – 10	
<b>TIG PULSE mode</b>	✓	
<b>Pulse Amps [A]</b>	10 – 320	10 – 400
<b>Base Amps [A]</b>	10 – 320	10 – 400
<b>Pulse Width [%]</b>	5 – 95	
<b>Pulse frequency [Hz]</b>	0,5 – 999	
<b>AC frequency [Hz]</b>	50 – 250	
<b>AC Wave Forms</b>	Square, Sinusoidal, Triangular	
<b>AC balance [%]</b>	10 – 99	
<b>2T/4T Control</b>	✓	

Arc ignition	LIFT / HF	
Output remote control	✓	
<b>MMA PARAMETERS</b>		
MMA welding mode [AC/DC]	✓	
Welding current MMA [A]	10 – 320	10 – 400
Hot Start range [A]	0 – 100	
Arc Force range [A]	0 – 100	
No-load voltage [V]	63	64
<b>OTHER</b>		
Current consumpiton [A]	TIG 19 / MMA 27	TIG 26.5 / MMA 36.5
Power factor (cosφ)	0,75	
Efficiency η [%]	85	
Insulation class	H	
Protection class	IP23	
Weight [kg]	26 {74,5}	
Dimensions [mm]	620 × 240 × 450 {1060 × 446 × 1100}	
Network security (fuse) [A]	16	

## 7.INSTALLATION AND USE

**WARNING:** SPARTUS Pro TIG 320P/PW AC/DC // // SPARTUS Pro TIG 400P/PW AC/DC is intended for professional and industrial applications. Installation and use of the device may only be carried out appropriately trained professionals.

**WARNING:** It is forbidden to grinding and/or carrying out other locksmith works or mechanical working of metal in the vicinity of the ventilation opening of unit.



Qualified person (def.)

A person who has gained the relevant technical education, training took place and / or gained experience to perceive the risk and avoid hazards during use of the product (IEC 60204-1). (IEC 60204-1).

### 7.1. PROPER COOLING

Unit should stand stable on dry and level surface. Avoid too much slope and slippery surfaces. Regularly check that the vents (inlet, outlet) are not covered. The minimum distance between the welder vents and walls should be 50 [cm].

## 7.2. MOVEMENT AND HANDLING

When moving the welding machine please take extra care. The device should be moved by using specially designed transport lugs. If transport handle is damaged, then it needs to be repaired at an authorized service center.

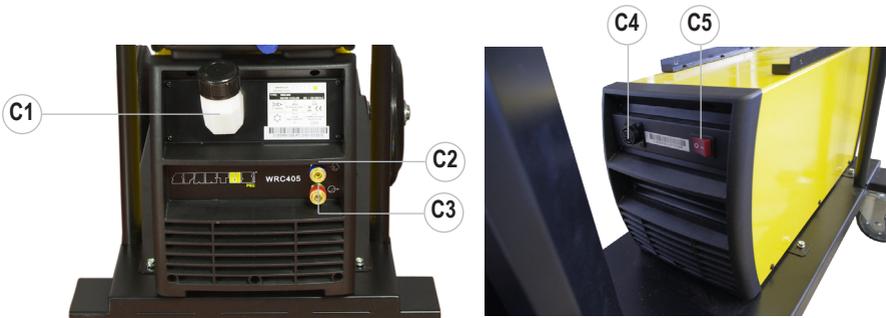
## 7.3. DESCRIPTION OF CONSTRUCTION



NO.	DESCRIPTION	NO.	DESCRIPTION
A	Welding cart	E	Shelf for mounting a gas cylinder
B	Handle	F	Welding source
C	Trolley wheels - front axle torsion	G	Water cooler MIG/TIG
D	Trolley wheels - rear axle		



NO.	DESCRIPTION	NO.	DESCRIPTION
1	Handle	7	Unit cover
2	Control panel	8	Protective flap
3	DINSE socket „+“	9	Water cooler connector
4	DINSE socket „-“	10	ON/OFF switch
5	Control plug socket (TIG)	11	Gas connector (only TIG)
6	Gas connector (only TIG)	12	Fan



NO.	DESCRIPTION	NO.	DESCRIPTION
C1	Cooling liquid tank (inlet)	C4	Water cooler connector
C2	Coolant Connection - Output (cold water)	C5	ON/OFF switch
C3	Coolant Connection - Input (hot water)		

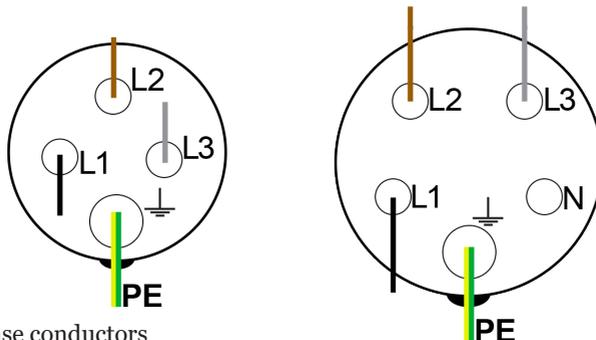
#### 7.4. CONNECTING TO POWER SUPPLY

Requirements for power network parameters (voltage, permissible range of mains voltage fluctuations etc.) are given in the table with technical parameters of device and on the rating plate of welding machine.

Before connecting the unit to the power source:

- Check whether the parameters comply with the requirements for unit.
- Check: mechanical condition of the power cord and plug. The connection status of the power cord with plug and unit (loose not allowed). If the power cord or plug is damaged or loose connection is between them, it is forbidden to connect the welder until fault has been rectified.
- Connect the welding machine only to the network where the power outlet is properly grounded.

#### 7.5. SCHEME OF CONNECTION OF POWER PLUG CONNECTOR



L1, L2, L3 – phase conductors  
 PE – protective conductor

**WARNING:** It is forbidden bridging PE and N cables. it may cause serious risk of electric shock.

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**NOTE:** In some cases, colours of power cords may vary from those shown on diagram. For example when the device has a four-wired three phase power cord. In this case, the PE protective conductor (yellow-green) must be connected to the terminal which is provided for it  $\perp$ . And the other cables must be connected to the appropriate terminals L1, L2, L3. If one of the wires colour is blue - do not connect it to the terminal N - neutral. In this case blue cable is one of the phase conductors (L1, L2, L3). It applies to four-wired three phase power cord.

## 7.5. INSTALLATION – TIG WELDING



Before connecting hardware and shielding gas to the device, make sure that the device is disconnected from power source and switch (10) is in the OFF position.

### 7.5.1. WATER COOLING SYSTEM ASSEMBLY

1. Connect the control cable to the cooler sockets (C4).
2. Connect the control cable to the sockets in TIG equipment (9).
3. Unscrew the coolant cap (C1).
4. Pour coolant into the cooler approx. 8 liters (recommended by the manufacturer).
5. Screw the coolant cap.

### 7.5.2. CONNECTING THE GAS CYLINDER

1. The cylinder with appropriate shielding gas, should stand upright and be secured against tipping over in accordance with safety requirements.
2. Make sure that the valve cylinder is closed.
3. Connect properly gas regulator to cylinder valve.
4. Connect the gas hose into gas regulator outlet. Use special clamps to seal connection.
5. Connect gas hose to the device (11)



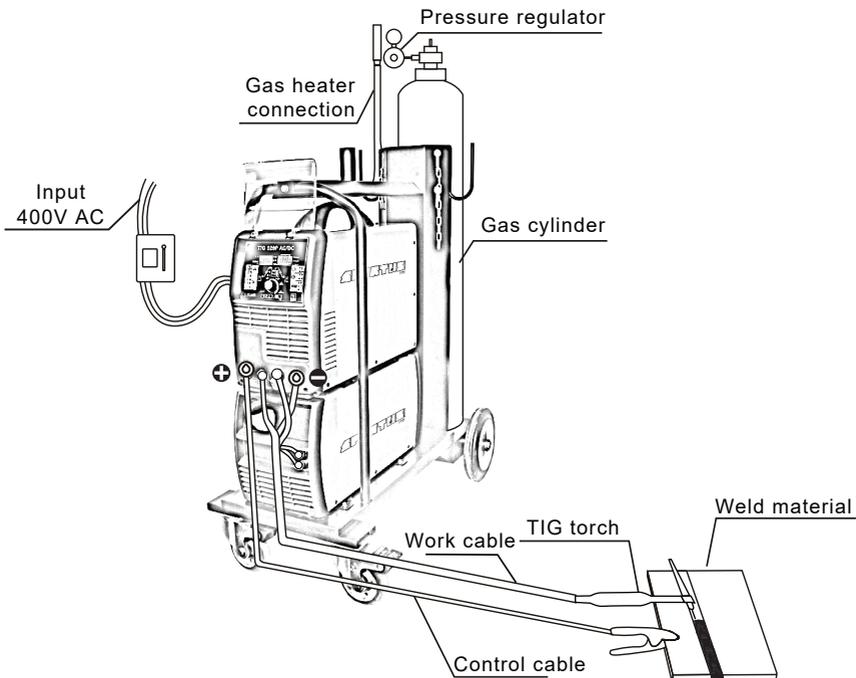
Valve in the cylinder should be opened immediately before welding. After welding is complete it should be closed.

### 7.5.3. TIG TORCH INSTALLATION

1. Connect properly TIG torch plug into DINSE „-„ (4)
2. Connect properly TIG torch control plug into control socket (5). Pay attention to suitable fitting of control pins.
3. Connect gas hose into shield gas connector at the front panel. (12)
4. Liquid cooled TIG torches: connect the end of liquid hose (hot water) to coupler (C3)
5. Liquid cooled TIG torches: connect the end of liquid hose (cold water) to coupler (C2)

### 7.5.4. CONNECTING THE DEVICE

1. Connect the cooler to the device in accordance with 7.5.1.
2. Connect the gas pipe to the device in accordance with 7.5.2.
3. Connect the welding holders TIG in accordance with 7.5.3.
4. Connect the return line to the DINSE socket „+” (3) and the mass clamp to the welded element.
5. Connect the welding device to the power source in accordance with the guidelines in paragraph 7.4
6. Turn on the device by setting switch (10) in the ON position.
7. The device is ready to work.



## 7.6. INSTALLATION – MMA WELDING

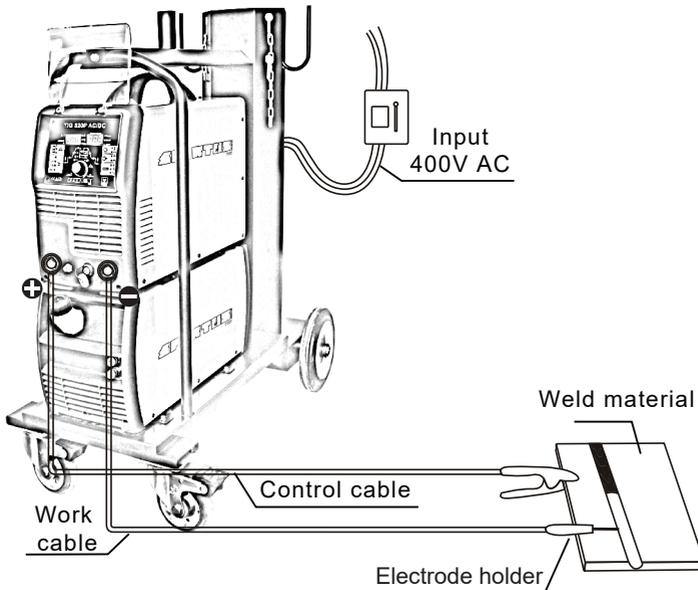


Before installing equipment to the welder, make sure that the device is disconnected from the power source and power switch (10) is in the OFF position.



Welding polarity depends on type of used electrodes. Before connecting the cables refer to the requirements specified by the manufacturer of electrodes.

1. Connect electrode cable plug into DINSE socket (for example: DINSE „+”)
2. Connect return cable plug into appropriate DINSE socket (for example: DINSE „-”)
3. Connect earth clamp into workpiece.
4. Connect the welder into power supply in accordance with appropriate guidelines (see 7.4)
5. Turn on the welder by setting power switch in the ON position.
6. Device is ready to weld.



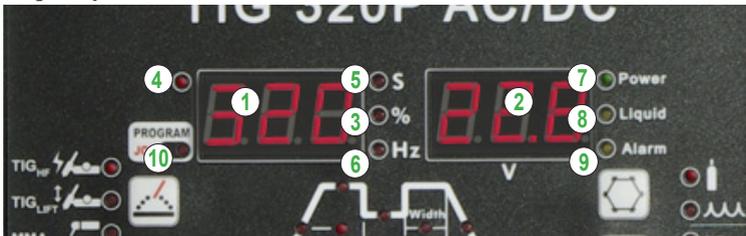
## 7.7 CONTROL PANEL - USING

### 7.7.1. CONTROL PANEL - DESCRIPTION

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- F1. Welding parameters adjustment knob
- F2. The choice of welding method
- F3. The choice of welding mode
- F4. Cooling
- F5. Operation mode 2T/4T
- M. MMA welding parameters
- T. A diagram of TIG parameters
- T1. Mode selection: TIG welding (no pulse)
- T2. Mode selection: TIG pulse welding
- T3. AC balance
- T4. Pulse frequency



- 1. Digital meter
- 2. Digital meter

Indicators inform the units that are shown on the display:

- 3. % – Value in percentage
- 4. A – welding current amps
- 5. S – the time in seconds,
- 6. Hz – frequency in Hertz

Inform indicator [7-9]

- 7. Power indicator
- 8. Abnormal indicator

9. Abnormal indicator  
 10. Information indicator: programming

ENG

Indicator [11 – 13] inform the choice of welding method

11. HF – TIG welding with high frequency arc ignition (contactless)  
 12. LIFT – TIG welding with arc ignition by friction  
 13. MMA – manual metal Arc Welding

Indicator [14 – 17] inform the selection of welding mode

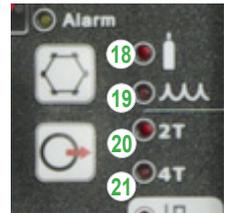
14. TIG AC / MMA AC (square wave AC)  
 15. TIG AC (sine wave AC)  
 16. TIG AC (triangle wave AC)  
 17. TIG DC / MMA DC

Indicator [18– 19] inform the choose the cooling mode torches:

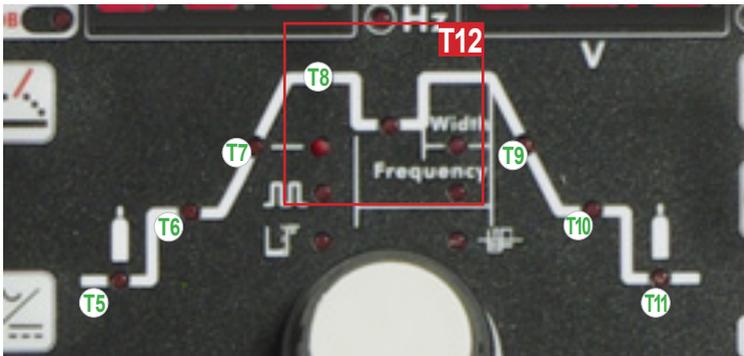
18. Gas cooling torch (cooler off)  
 19. Liquid cooling torch (cooler on)

Indicator [20 – 21] inform the selection of welding mode

20. TIG 2T  
 21. TIG 4T



### 7.7.2. TIG WELDING - ADJUSTMENT



T5. Pre-gas. Gas pre-flow time. (2T/4T)

T6. Starting current (4T).

T7. Up slope time. (2T/4T)

T8. Welding current. (2T/4T)

T9. Down slope time. (2T/4T)

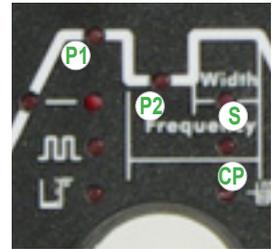
T10. Ending current (4T)

T11. Post-gas. Gas post-flow time. (2T/4T).

T12. Adjusting the parameters of pulsed current. Active for TIG pulse welding mode.

7.7.3. TIG WELDING WITH PULSE – ADJUSTMENT

- P1 Peak amps
- P2 Base amps
- CP Pulse frequency
- S Pulse width



ENG

7.7.4. TIG AC WELDING – PARAMETERS ADJUSTMENT

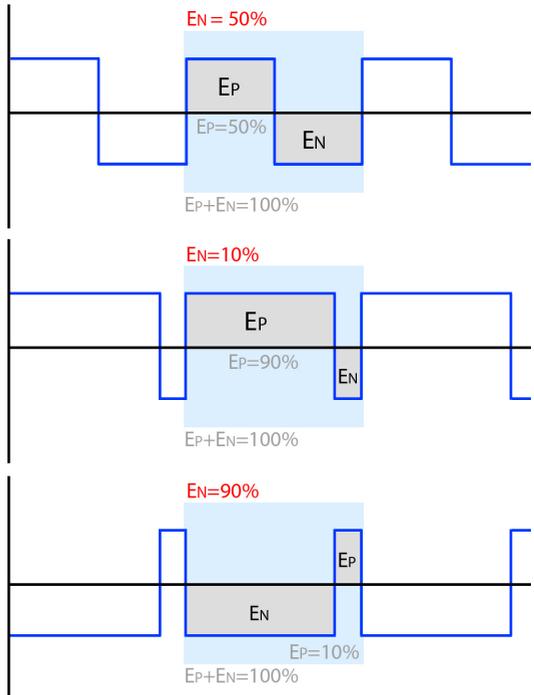


AC BALANCE (ACb)

When welding with AC by the TIG method, cyclic changes of polarisation direction occur. When the current flows from the tungsten electrode to the welded material (current in the „minus”) - the tungsten electrode is heated to a minimum. Heat energy is used to melt objects into material. When the current flows from the welded material to the tungsten electrode (current in „plus”), the removal of aluminium oxides from the welded surface occur. This process is accompanied by an increased heat load on the tungsten electrode. The AC balancing function provides the ability to adjust the ratio of the current in the „plus” performance to the duration of the current in the „minus” performance in a single T cycle of the alternating current flow. Thanks to this function, user has ability to influence on weld width and depth of penetration, degree of surface cleaning of aluminium oxide material, exposure time of the electrode to higher heat load (ageing rate). The balance adjustment range is between 10% and 99%. For a value of 50%, the

EP - ELECTRODE POSITIVE  
EN - ELECTRODE NEGATIVE

AC BALANCE



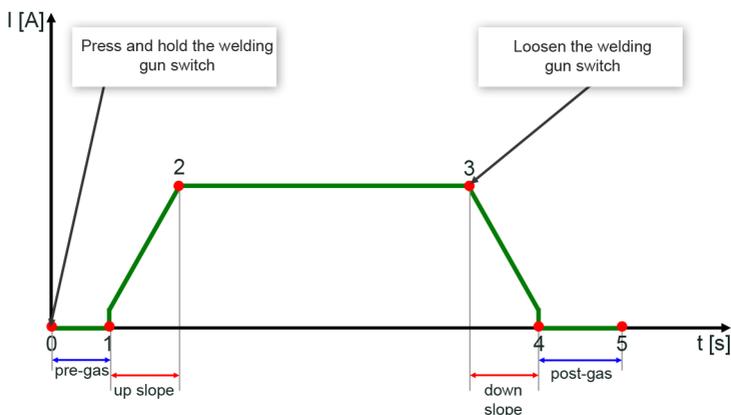
ratio of „negative” to „positive” current is 50/50. By reducing the value of the balance to less than 50%, the duration of the current in the „plus” is increased. By increasing the value of the balance to more than 50% the duration of the current in the „minus” is increased. For most typical welding jobs the recommended value is 60-70%.

## AC FREQUENCY (ACF)

The AC frequency determines the number of AC cycles per second [Hz]. The higher the welding current frequency, the more stable and more concentrated the welding arc. The physical properties of the weld are also improved. As the frequency increases, the level of noise emitted by the welding arc increases. The optimum welding current frequency is in the range of 60 to 120 Hz.

### 7.7.5. COURSE OF TIG WELDING PROCESS - 2T

During TIG function 2T, you can not set the current parameters of the initial and final current.



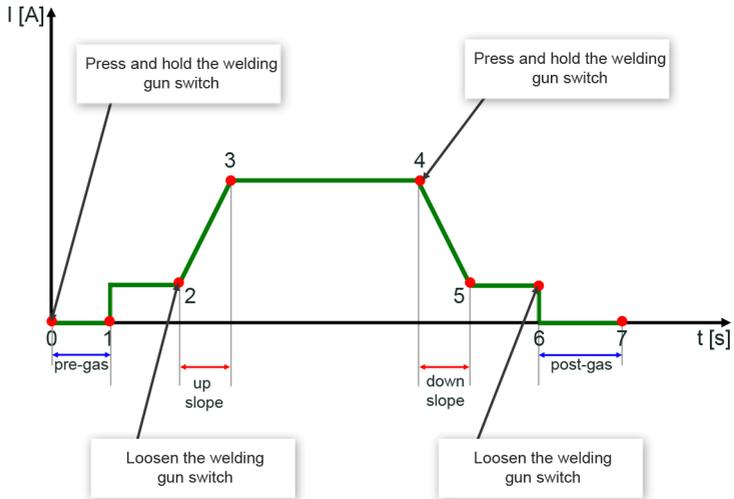
0	Press the gun switch and hold it. Electromagnetic gas valve is turned on. The shielding gas starts to flow.
0 – 1	Pre-gas time.
1	Initiation of the welding arc.
1 – 2	The rise time of the welding current.
2	Achieving the set value of welding current.
2 – 3	During the whole welding process, the gun switch is pressed and held without releasing.
3	Release the gun switch, the welding current will drop in accordance with the selected down-slope time.
3 – 4	The current drops to the minimum welding current from the setting current, and then arc is turned off.
4	Termination arc welding.
4 – 5	Post-gas time, after the arc is turned off. You can adjust it (0.1~10s) through turning the knob on the front panel.

5 Electromagnetic valve is closed and stop argon flowing. Welding is finished.

ENG

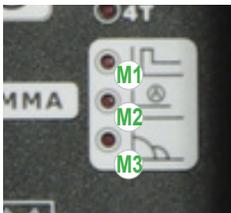
### 7.7.6. COURSE OF TIG WELDING PROCESS - 4T

During TIG 4T, it is possible to preset the current value of the initial and final current. With this feature, you can prevent flooding at the beginning of the weld and fill the crater formed at the end of the weld.



0	Press and hold the gun switch, Electromagnetic gas valve is turned on. The shielding gas starts to flow.
0 – 1	Pre-gas time.
1	Initiation of the welding arc.
1 – 2	The rise time of the welding current.
2	Loosen the gun switch, the output current slopes up from the start current.
2 – 3	The output current rises to the setting value ( $I_w$ or $I_b$ ), the upslope time can be adjusted.
3	Achieving the set value of welding current.
3 – 4	Welding process. During this period, the gun switch is loosen.
4	Press the torch switch again, the welding current will drop in accordance with the selected down-slope time.
4 – 5	The output current slopes down to the crater current. The downslope time can be adjusted.
5	Achieving the desired current end.
5 – 6	The crater current time.
6	Loosen the gun switch, stop arc and keep on argon flowing.
6-7	Post-gas time.
7	Electromagnetic valve is closed and stop argon flowing. Welding is finished.

### 7.7.7. MMA WELDING – ADJUSTMENT



M1 HOT START  
M2 Welding current [A]  
M3 Arc Force

### 7.8. NAMEPLATE

The rating plate and the serial number is located underneath the device.

## 8. MAINTENANCE

**WARNING:** Before performing any maintenance or repairing of device, disconnect welder from the power source and wait at least 5 minutes. The voltage accumulated in capacitors should be discharged at this time to a safe level. But even after that operation you should be careful.



Maintenance and repair work may be performed only by qualified personnel with the appropriate permissions. Regular maintenance provides adequate service life and trouble-free operation of the device.

#### Routine maintenance (Daily: before use/installation):

- Perform a visual inspection of the housing, knobs, control panel.
- Inspect (visual inspection) the power cord and power plug. Check the insulation of the cable.
- Check the condition of welding cables and their connectors. If cable insulation is damaged - replace it. If connection is too loose - eliminate backlash.
- Check if cooling fan is working properly
- Make sure that all vents are not obstructed.

#### At least once a month:

- Regularly remove dust from inside of the machine. Use for this compressed air. The pressure should be sufficiently low so as not to damage small components inside the machine. If in the workplace, dust levels are high. You should clean machine often.
- Perform inspection of connection of internal electrical components. If anywhere the joints are loose, tighten them.

#### Once a year:

- You should send device to an authorized service center for an interim review.

## 9. ENVIRONMENTAL PROTECTION



The product must not be disposed of into an ordinary waste container. It is totally forbidden to dispose of electric or electronic equipment marked with a crossed-out trash can symbol by throwing it into ordinary waste containers. According to the WEEE directive (directive 2012/19/UE), binding within the European Union, such products should be disposed of according to local regulations.

We hereby inform the client that, according to the regulations, each commodity is burdened with waste disposal costs (WDC) according to charging rates valid for a given year.

Attention! If using liquid to water-cooled torches, utilize it according to attached information.

## 10. TROUBLESHOOTING



Not all problems with functioning of the device, are the evidence of failure. You can independently carry out an analysis in search of probable failure. In case of doubt, please contact to SPARTUS® dealer or authorized service center.



During the warranty period all repairs should be carried by authorized service center. Repairs carried out by unauthorized persons will void the warranty.

Trouble	Probable reason	Solution
<b>PROBLEMS WITH THE DEVICE</b>		
After turning on the unit the fan is not working, digital meter is working. The unit does not weld.	<ul style="list-style-type: none"> <li>Incorrectly connected power. Switching on voltage control system.</li> </ul>	<ul style="list-style-type: none"> <li>Connect the device to a network that meets the requirements given in manual or in nameplate of the device.</li> </ul>
	<ul style="list-style-type: none"> <li>Unstable supply voltage. Too thin power cords or incorrectly connected power cables.</li> </ul>	<ul style="list-style-type: none"> <li>Check the connection cables. If the device is connected to the network via an extension cord. Connect the device directly into the power socket. If the problem persists, replace the extension cord for thicker.</li> </ul>
	<ul style="list-style-type: none"> <li>Incorrectly turned on power switch. Switching on control system over-voltage.</li> </ul>	<ul style="list-style-type: none"> <li>Turn off the device. Wait about 2-3 minutes and turn it back on..</li> </ul>
	<ul style="list-style-type: none"> <li>Failure of power switch</li> </ul>	<ul style="list-style-type: none"> <li>Check the connection of the switch. If necessary, correct.</li> </ul>
After turning ON the switch the device does not correspond	<ul style="list-style-type: none"> <li>Poorly connected to the supply voltage.</li> </ul>	<ul style="list-style-type: none"> <li>Check that the device is properly connected to the mains.</li> </ul>
	<ul style="list-style-type: none"> <li>Failure of power switch</li> </ul>	<ul style="list-style-type: none"> <li>Check the connection of the switch. If necessary, correct or replace.</li> </ul>
<b>TIG WELDING PROBLEMS</b>		
The problem with TIG arc ignition (HF and no HF). There is a spark when HF works.	<ul style="list-style-type: none"> <li>Poorly connected TIG torch. Return cable poorly connected or not connected.</li> </ul>	<ul style="list-style-type: none"> <li>Check the connection of TIG torch and return cable. If the connection is correct, call for service.</li> </ul>
	<ul style="list-style-type: none"> <li>Damaged current cable of TIG torch.</li> </ul>	<ul style="list-style-type: none"> <li>Contact service. Change the TIG torch.</li> </ul>
The problem with TIG arc ignition (HF and no HF). There is no spark when HF works.	<ul style="list-style-type: none"> <li>Damaged microswitch.</li> </ul>	<ul style="list-style-type: none"> <li>Repair TIG torch.</li> </ul>
	<ul style="list-style-type: none"> <li>Control plug is not connected. Problems with control plug.</li> </ul>	<ul style="list-style-type: none"> <li>Connect the control plug into the welding machine. Check connections control cables.</li> </ul>

Trouble	Probable reason	Solution
The problem with TIG arc ignition (strikes only by friction). There is no spark when HF works.	• HF board is broken.	• Contact service.
	• Device is damaged	• Contact service
No gas flow	• Closed valve in the gas cylinder, a closed valve in the gas pressure regulator. Clogged gas hoses leading the gas to the device.	• Try to check the valve in the gas cylinder and regulator. Check the gas hoses.
	• Electromagnetic valve is damaged.	• Change it. Contact service.
After switching on the device gas flows all the time.	• Electromagnetic valve is damaged.	• Change it. Contact service.
No AC current at the device output in AC welding mode.	• The power PCB is in trouble.	• Contact service
	• The AC drive PCB damaged.	• Contact service
	• The AC IGBT module damaged.	• Contact service
The problem of obtaining adequate weld penetration	• Too low welding current.	• Try to increase welding current.
Poor quality of weld	• Improper welding parameters	• Check the welding parameters.
	• Too little flow of the shielding gas or its quality is inadequate.	• Check that flow is correct. Replace the shielding gas.
	• Excessively worn of tungsten electrode	• Change tungsten electrode at new one.
<b>MMA WELDING PROBLEMS</b>		
Arc ignition problem.	• Incorrect connection of return cable or there is no connection of return cable.	• Check the connection of the return cable.
	• Too low welding current.	• Try to increase welding current. Check that setting value of welding current coincides with that given by the manufacturer of welding electrodes.

