Pilot Plant since 1959

PATON®

5 YEAR WARRANTY

USER MANUAL
With Warranty Card

Digital semi-automatic inverter
PATON PSI 200 / 250 PRO 230 V

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EC Declaration of Conformity

The following products have been tested by us with the listed standards and found in compliance with the European Community Low Voltage Directive 2014/35/EU and Electromagnetic Compatibility Directive 2014/30/EU.

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MANUFACTURER ADDRESS
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Ukraine, 03045, Kyiv, 66 Novopyrohivska St.

PRODUCT:
DIGITAL SEMIAUTOMATIC INVERTER PATON PSI 200 PRO, PSI 250 PRO 230 V, DC MMA/TIG MIG/MAG

The statement is based on a single evaluation of one sample of above mentioned products. It does not imply an assessment of the whole production. The manufacturer should ensure that all product in series production are in conformity with the product sample detailed in this report. The applicant should hold the whole technical report at disposal of the competent all the right.

Applied EC Directives:
2014/35/EU (Low Voltage)
2014/30/EU (Electromagnetic Compatibility)

Applied Standards:
EN 60204-1:2006. Safety of machinery - Electrical equipment of machines – Part 1: General requirements; EN 60974-1:2012 Are welding equipment – Part 1: Welding power sources; EN 60974-10:2014 Are welding equipment – Part 10: Electromagnetic compatibility (EMC) – requirements.

CE

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We, MASTERWELD Sp. z o. o., hereby declare that specified above conforms covering European Parliament and Council Directives, 2014/35/EC Low Voltage Directive of 26 February 2014 and 2014/30/EU Electromagnetic Compatibility of 26 February 2014.
The CE mark above can be used under the responsibility of manufacturer. After completion of an EC declaration of conformity and compliance with all relevant EU Directives.

ATTENTION! When connecting the welding unit to the power distribution board (at a temperature of 25 ºC), take into account through-the-wall wiring and the lengths of extension cables.

Electrode diameter for a MMA welding process (mm)	Set current in MMA and TIG welding processes (A)	Electrode wire diameter for a MIG/MAG welding process (mm)	Cross-section area of the power cable conductor (mm^2)	Maximum cable length (m)
PATON PSI 200 PRO				
Φ 3 mm	Not more than 120	Not more than 0.8	1.5	75
			2.0	105
			2.5	130
			4.0	205
			6.0	310
Φ 4 mm	Not more than 160	Up to 1.0	2.0	75
			2.5	95
			4.0	155
			6.0	230
Φ 5 mm	Up to 200	Up to 1.0	2.5	75
			4.0	125
			6.0	185
PATON PSI 250 PRO 230 V				
Φ 3 mm	Not more than 120	Not more than 0.8	1.5	75
			2.0	105
			2.5	130
			4.0	205
			6.0	310
Φ 4 mm	Not more than 160	Not more than 1.0	2.0	75
			2.5	95
			4.0	155
			6.0	230
Φ 5 mm Φ 6mm for a free-melting electrode	Up to 250	Not more than 1.2	2.5	60
			4.0	100
			6.0	150

1. GENETAL INFORMATION

The digitally controlled invertor-rectifier welding units **PATON® PSI 200 PRO / 250 PRO 230V /** are designed for direct-current gas-shielded welding according to such welding processes as a manual arc welding process **(MMA),** an argon arc welding process **(TIG),** and a semiautomatic arc welding process **(MIG/MAG)**. The digital controller used in these welding units ensures significant advantages for the welding unit as compared with multifunctional analog controllers, as the analog controllers are designed for the specific operating modes of controlled equipment and are not optimal in all operating modes. The digital controller of the MIG welding units allows all the capabilities of the welding unit, up to its capabilities at full power, to be used in all the operating modes of the unit.

The MIG welding units pertain to the Professional Series equipment and are designed for industrial use. The operation of the welding unit is possible separately from an electrode wire feeding unit. This operational mode is reasonable in order to provide the ease of use of the unit and compliance of the unit with safety requirements.

The additional adjustment operations provided for the welding unit make it possible to set the optimal values of the operating parameters of the unit in various operating modes characterized by a high load factor at a rated current of up to 200 A or 250 A. The welding units can be used for manual arc welding with standard electrodes 1.6 … 5 mm in diameter and free-melting electrodes up to 6.0 mm in diameter and for semiautomatic arc welding with solid electrode wire 0.6 … 1.2 mm in diameter. The function of reduction of open-circuit voltage in the manual arc welding process (MMA), with the possibility for this function to be switched on and off, allows the welding unit to be operated in unsafe environment.

The distinctive feature of the welding units is the availability of a high-quality electrode wire feeding unit and a KZ-2 euro type style connector, which allows the operator to replace welding torches at his option. The welding unit contains a module for protection against excess and low power supply voltage.

Due to the increased frequency of the input voltage of the rectifier transformer of the welding unit, the weight and overall dimensions of the transformer are significantly reduced as compared with other welding units with similar characteristics.

The basic advantages of the PATON® welding units are the following:

1. The possibility to adjust welding parameters in wide ranges
   - **a)** 1 (**basic parameter**) + 10 (**additional parameters**) for the manual arc welding process **(MMA)**
   - **b)** 1 (**basic parameter**) + 8 (**additional parameters**) for the argon arc welding process **(TIG)**
   - **c)** 2 (**basic parameter**) + 9 (**additional parameters**) for the semiautomatic arc welding process **(MIG/MAG)**
2. The availability of the adjustable pulse welding mode for all the welding processes
3. The welding unit is protected against long-time fluctuations of power supply voltage and ensures welding arc stabilization when the input voltage of the unit changes in the range of 160 V through 260 V. It should be noted that welding at a minimum voltage of 160 V is allowed only by using an electrode not more than 3 mm in diameter for the manual arc welding process, or electrode wire not more than 0.8 mm in diameter for the semiautomatic arc welding process.
4. The welding unit is rated for operation with a standard power supply system. Due to the higher efficiency coefficient of the unit, the power consumed by the unit is reduced by 50% as compared with other similar welding units.
5. The rotation frequency of the driving motor of the ventilator of the welding unit can be automatically varied depending on the temperature inside the unit. This feature allows the service life of the ventilator and driving motor to be increased and, additionally, dust content inside the unit to be reduced.
6. The welding unit is easy operated due to the optimal operating load factor in operation at the rated current. This feature allows welding to be performed continuously at a temperature of 25 ºC.
7. The enhanced reliability of the welding unit in operation in dusty environment
8. The welding unit contains an electronic thermal protection system for protecting all the heat-generating components of the welding unit against overheating.
9. All the printed-circuit boards with electronic elements are impregnated with two layers of high-quality varnish in order to provide the high reliability of the welding unit within its service life.
10. Improved arc stability

1.1. TECHNICAL CHARACTERISTICS

PARAMETERS	PSI 200 PRO	PSI 250 PRO 230 V
Rated power supply voltage 50/60 Hz, V	230	230
Rated power supply current	25 … 28 A	32 … 36 A
Rated welding current	200 A	250 A
Maximum operating current,	270 A	335 A
Operating load factor, %	70% at 200 A 100% at 167 A	70% at 250 A 100% at 208 A
Power supply voltage range	160 … 260 V	160 … 260 V
Welding current control range	10 … 200 A	12 … 250 A
Welding voltage control, V range	12 … 26 V	12 … 28 V
Diameter of a stick electrode	1.6 … 5.0 mm	1.6 … 6.0 mm
Diameter of electrode wire	0.6 … 1.0 mm	0.6 … 1.2 mm
Maximum weight of the reel,	5 – 18 kg	5 – 18 kg
Number of pressure rolls	2	2 or 4
Welding processes with pulse welding modes	**MMA**: 0,2 … 500Hz **TIG**: 0,2 … 500Hz **MIG/MAG**: 0,2 … 500Hz	
Increased-current arc starting function of the manual arc welding process	Adjustable	Adjustable
Reduced-voltage welding function of the manual arc welding process	Adjustable	Adjustable
Protection against electrode sticking	Automatic	Automatic
Reduction of open-circuit voltage	ON/OFF	ON/OFF
Open-circuit voltage in the manual arc welding process	12/75 V	12/75 V
Welding arc starting voltage	110 V	110 V
Rated consumed power	5.5 … 6.1 kVA	6.9 … 7.7 kVA
Maximum consumed power	8.0 kVA	11.0 kVA
Efficiency coefficient	90%	90%
Cooling	Automatic	Automatic

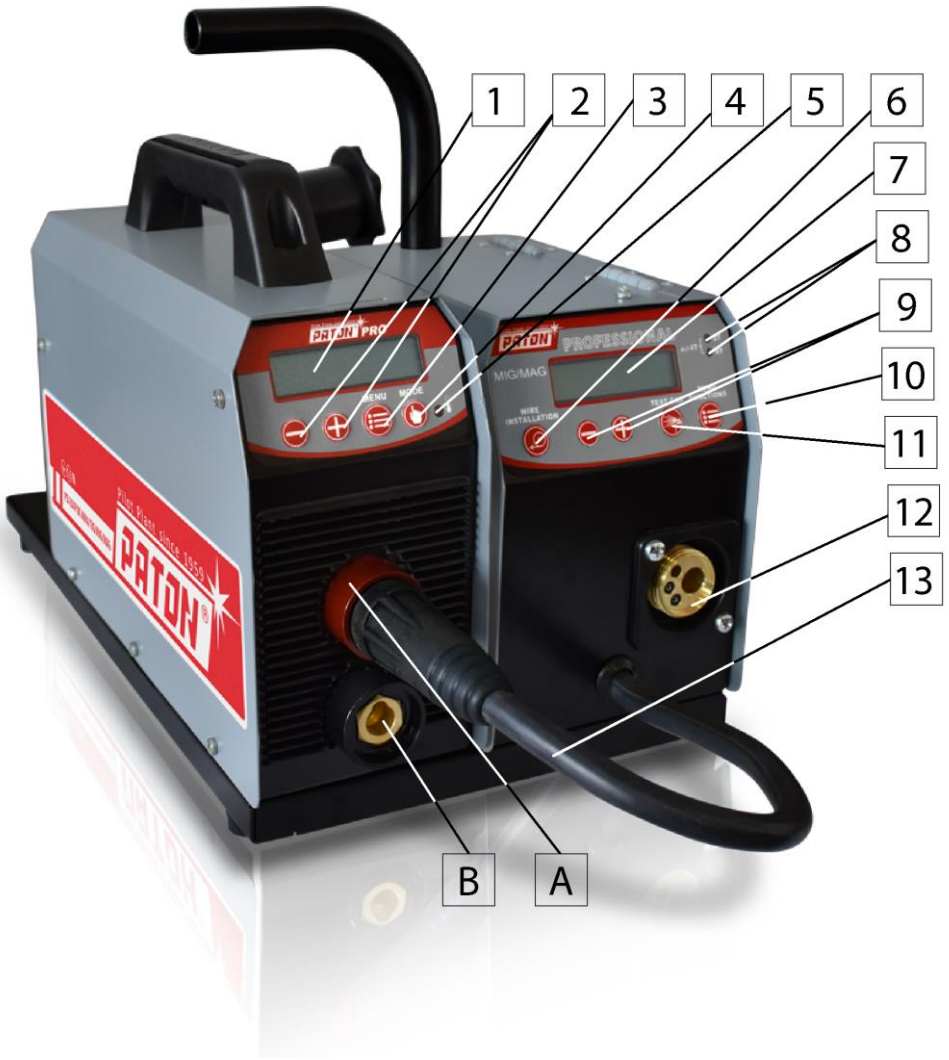
Operating temperature range	-25 … +45 ºC	-25 … +45 ºC
Overall dimensions (length × width × height)	360 × 260 × 270 mm	360 × 260 × 270 mm
Weight without the coil and accessories	10.6 kg	10.7 kg
Protection class*	IP 33	IP 33

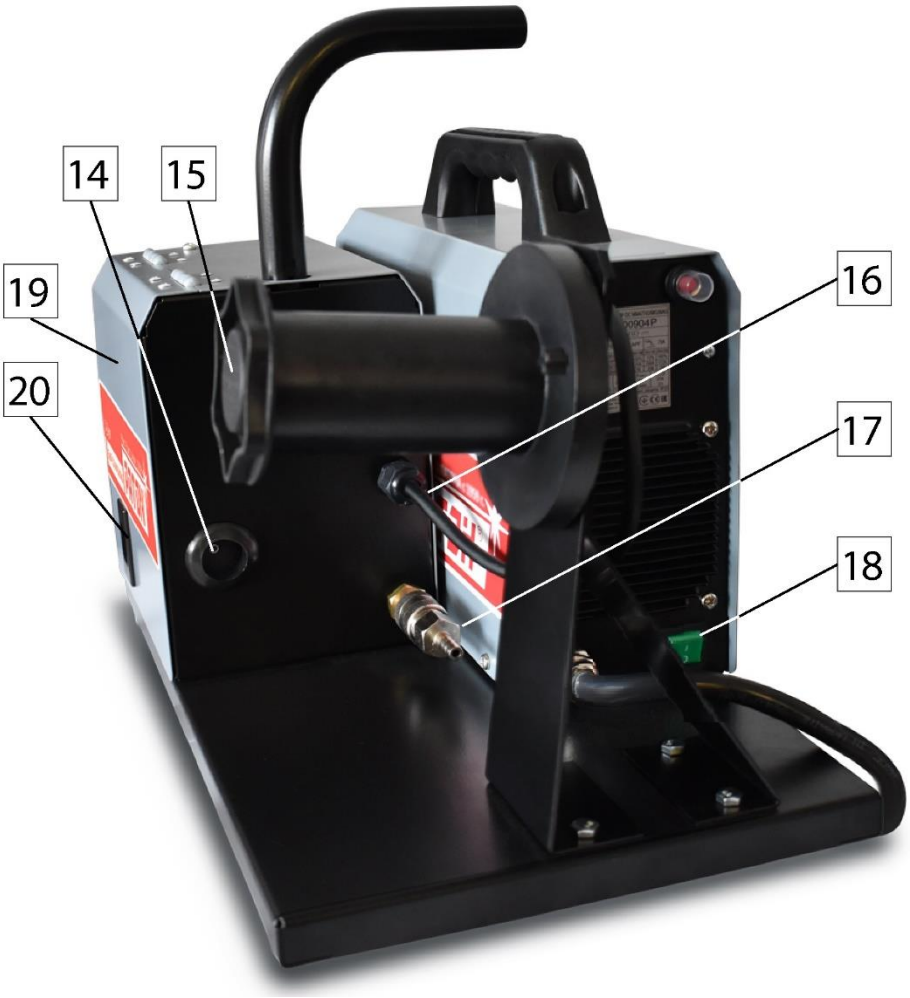
These Professional Series *welding units are protected against ingress of foreign particles more than 2.5 mm in size and against rain drops if the rain drops fall at an angle to the vertical surfaces of the welding unit not more than 60 degrees.*

THE RECOMMENDED LENGTHS OF THE WELDING CABLES ARE INDICATED BELOW:

Cable length	Maximum current	Cross-section area of the cable conductor	Cable designation
4 … 8 m	Not more than 160 A	16 mm^2	KG 1×16
5 … 10 m	Not more than 200 A	25 mm^2	KG 1×25
6 … 12 m	Up to 250 A	35 mm^2	KG 1×35

1.2. CONTROLS AND CONNECTRORS





1. Digital display showing the current value and welding functions;
2. The buttons for setting the welding current and parameters of the welding function (by default: in **MMA mode** - welding current, in **TIG mode** - welding current, in **MIG/MAG mode** - welding voltage);
3. Button for adjusting the function of the selected welding method
4. Button for selecting welding method:
   - **a)** Manual covered electrode arc welding **(MMA)**
   - **b)** Argon arc welding with a no consumable electrode **(TIG)**
   - **c)** Gas shielded semiautomatic arc welding **(MIG/MAG)**
5. Indicator of the operating condition of the welding unit, do not light normally (blinks when machine is overheating)
6. Button “WIRE INSTALLATION” When the button is pressed, only the wire feed is switched on.
7. Digital display showing the wire feed speed and feeder functions,
8. The buttons on the MIG/MAG handle (2T/4T mode);
9. Button for adjusting the wire feed speed and parameters of the feeder function
10. Button for adjusting the function of wire feeder.
11. Button “GAS TEST” When the button is pressed, only the gas supply valve is switched on
12. Euro connector socked for connecting the MIG/MAG holder
13. Polarization change cable
14. Wire feeder inlet connector
15. Wire reel fixing with spring brake;
16. Signal and power supply connection from source to wire feeder mechanism;
17. Socket for supplying protective gas to the welding torch in MIG/MAG method
18. Push-button switch for switching on and off the welding unit
19. Protective cover

20. Protective cover lock;

A (+) The bayonet connector socket for connecting:

- **a)** The electrode cable (or the grounding cable in some cases when special electrodes are used for welding) for the manual arc welding process **(MMA)**
- **b)** Only the grounding cable for the argon arc welding process **(TIG)**
- **c)** For welding with the **"MIG/MAG"** method with a solid wire - the polarization change wire **(13)** is connected and the ground wire is connected to the **"-"** current socket.

B (-) The bayonet connector socket for connecting:

- **a)** The grounding cable (or the electrode cable in some cases when special electrodes are used for welding) for the manual arc welding process **(MMA)**
- **b)** Only the argon gas torch for the argon arc welding process **(TIG)**
- **c)** For welding with the **"MIG/MAG"** method with self-shield wire - the polarization change wire is connected **(13)** and the ground wire is connected to the **"+"** current socket.

2. SETTING THE WELDING UNIT INTO OPERATION

ATTENTION! Read Section 16, **"Safety instructions"**, before setting the welding unit into operation.

2.1. PROPER USE

The welding unit is designed for manual covered-electrode arc welding **(GMAW)**, argon arc welding **(GTAW)**, gas-shielded arc welding **(GMAW)** or flux-cored arc welding (**FCAW** or **FCA**) for a semi-automatic or automatic arc welding process

Any other use of the welding unit is considered as improper. The manufacturer of the welding unit is not responsible for damages caused by any improper use of the unit. The use of the welding unit is proper if all the requirements of this Operation Manual are satisfied.

ATTENTION! Do not use the welding unit to unfreeze pipes.

2.2. REQUIREMENTS FOR INSTALLATION

The welding unit is protected against ingress of foreign particles more than 2.5 mm in size.

The welding unit is allowed for outdoor operation. The internal electrical and electronic elements of the welding unit are protected against moisture but are not protected against atmospheric condensate drops.

ATTENTION! After completing welding works in hot weather, or completing intensive welding works in any weather, switch off the welding unit only after at least 5 minutes of time required for the electronic elements of the unit to be cooled.

ATTENTION! When operating the welding unit in cold season, after the unit was switched off and cooled, condensate can be formed inside of the unit, so switch on the welding unit only 3 … 4 hours after the switching off.

For this reason, do not switch off the welding unit if it is anticipated that the unit is to be switched on not later than 4 hours after the switching off.
Install the welding unit so as not to block or cover the ventilation slots on the front and rear panels of the unit. Prevent ingress of metallic particles (for example, when grinding the weld) sucked into the welding unit by the unit ventilator.

ATTENTION! After fall from a height, the welding unit might be a source of electrical shock. Install the unit on a firm stable surface.

2.3. CONNECTION TO A POWER SUPPLY SYSTEM

The commercial welding unit is rated for an input power supply voltage of 230 V (-30% / +13%)

ATTENTION! The manufacturer's warranty is no longer valid if a single-phase device is connected to a power supply voltage of over **270 V**. This situation can occur if the phase voltages in the standard power system are unbalanced or if you use a non-standard connection..

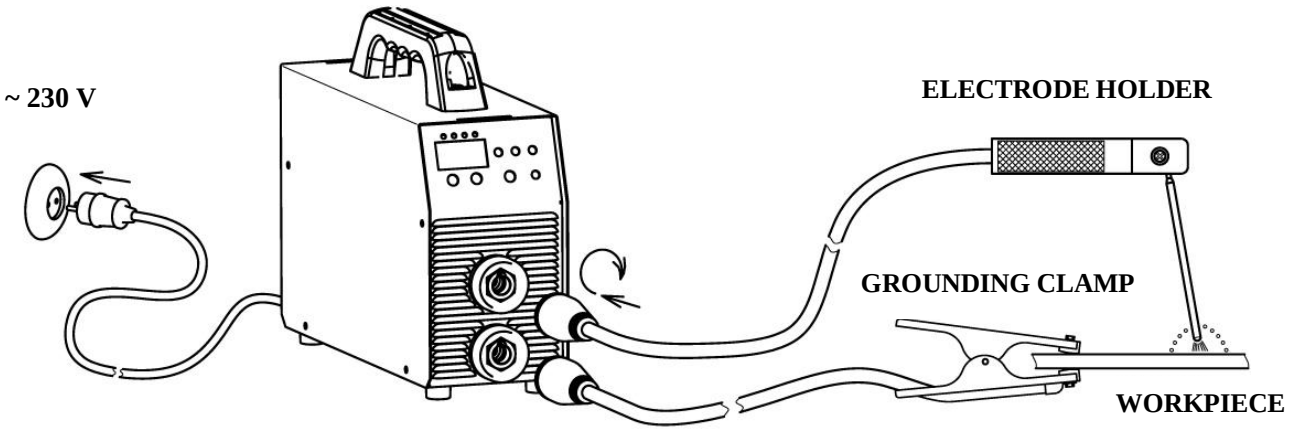
The power supply connector, power cable cross-section area, and supply-line fuses should be selected with consideration for the technical characteristics of the welding unit.

2.4. REQUIREMENTS FOR AN ELECTRICAL OUTLET

ATTENTION! The parameters of an electrical outlet for the power supply of the welding unit must correspond to the power supply voltage and consumption current of the welding unit (see Section 1.1, "Technical characteristics"). Connect the welding unit to an electrical outlet that is rated for **a three-wire plug with a grounding conductor. Do not use the supply system neutral wire for this purpose!!!**

3. MANUAL COVERED-ELECTRODE ARC WELDING PROCESS (MMA)

3.1. PREPARING THE WELDING UNIT FOR OPERATION



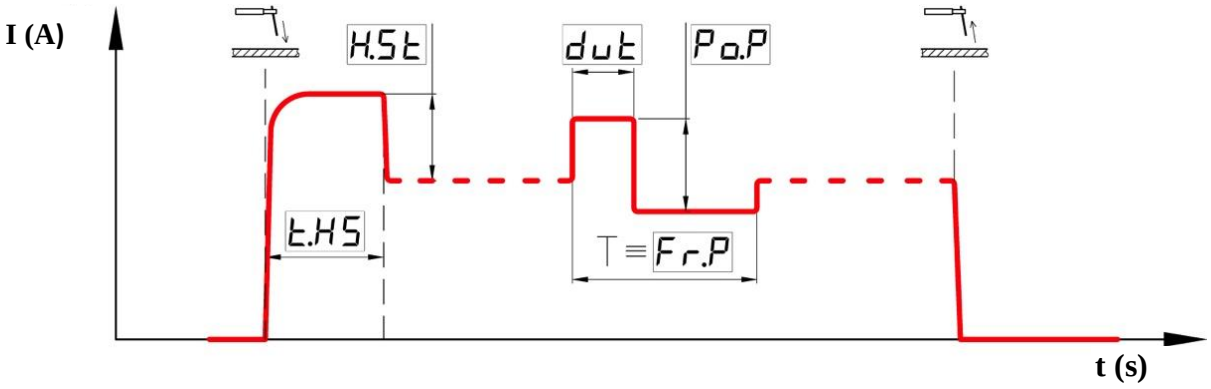
Preparation the welding unit for MMA operation:

1. Insert the plug of the electrode cable into socket **A (+)** of the welding unit.
2. Insert the plug of the grounding cable into socket **B (-)** of the welding unit.
3. Connect the grounding cable to the workpiece.
4. Connect the power cable of the welding unit to the outlet of the power supply system.
5. Set switch **(18)** on the rear panel of the welding unit to position I (switching on).
6. Switch the button **(4)** to the **MMA** welding position, if the desired welding method has been skipped, press the button **(4)** again - the methods are switched over and over again
7. Holding the button **(3)** for about 5 seconds, we gain access to the locked functions of the welder;
8. Using the buttons **(2)** set the current basic parameter - welding current or parameter of the selected function;
9. The device is ready for use. **Enjoy Your work.**

If required, perform the additional functions specified for the manual arc welding process (see Section 6.1).

ATTENTION! In the manual arc welding **(MMA)** process, after switching on the welding unit by switch **(18)**, the welding electrode is under voltage. Do not allow the electrode to contact current-conducting or grounded parts, such as the casing of the welding unit, because such a contact will cause the start of welding.

3.2. OPERATIONAL CYCLE OF THE MANUAL ARC WELDING PROCESS



The procedure for changing the values of the operational parameters of the welding unit is described in Section 6.1.

3.3. INCREASED – CURRENT ARC STARTING "HOT-START"

The advantages ensured by the increased-current arc starting function are the following:

1. Improved arc starting even when low-quality electrodes are used
2. Better joint penetration during arc starting period and, as a result, the lower number of defects associated with incomplete joint penetration.
3. Prevention of slag inclusions

Manual adjustment operations: allow the minimum arc starting current to be set in order to decrease power consumption at the stage of arc starting. As a result, the welding arc can be started at the minimum power supply voltage, but in this case, the arc quality characteristics at the stage of arc starting are deteriorated, as the welding unit functions as an arc-welding transformer. Nevertheless, in some conditions, this method of arc starting is the only possible one. The welding current may be increased in order to improve the conditions for arc starting (when the welding unit is connected to a reliable power supply system), but the increased current can cause burn-out when welding thin parts. Therefore, it is recommended to set the minimum arc starting current.

What is achieved by:

During the short time interval of arc starting, the welding current increases by 40% of the welding current set by default.

Example: Electrode diameter is 3 mm. Set welding current is 90 A. The current at the increased-current arc starting stage is 90 + 40%= 126 A

The additional adjustment operations allow both the arc starting current **[POWER HOT START]** and the arc staring period **[TIME HOT START]** to be varied. Do not set the increased values of these parameters if such increased values are not required, because the operation of the welding unit and reliable arc starting in these conditions are possible only if the welding unit is connected to a high-power system.

The procedure for changing the values of the operational parameters of the welding unit for the current welding process is described in Section 6.1.

3.4. REDUCED – VOLTAGE WELDING MODE "ARC-FORCE"

The advantages ensured by the reduced-voltage welding function are the following:

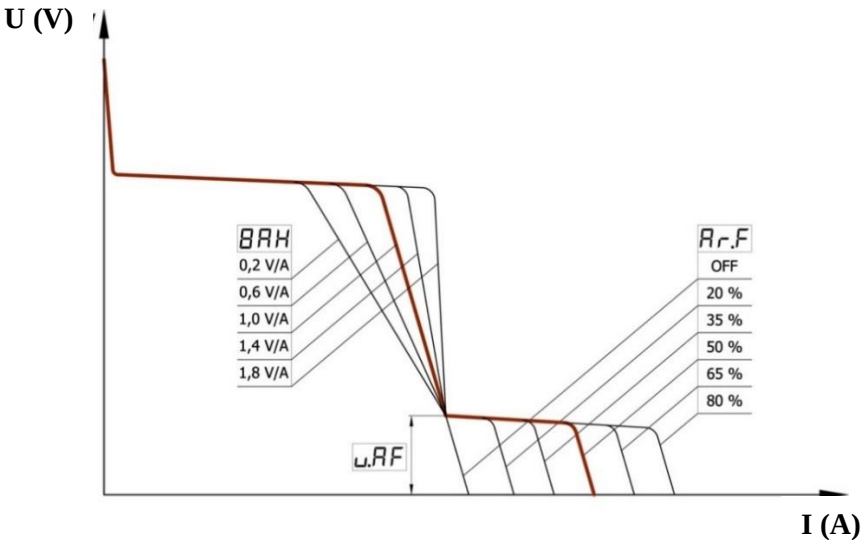
1. Improved arc stability in short arc welding mode
2. Improved transfer of molten metal drops into the welding pool
3. Improved arc starting
4. Reduced probability of electrode sticking **(see Section 3.5)**

Manual adjustment operations allow the minimum welding voltage to be set in order to decrease power consumption and heat input to the weld when welding thin parts. As a result, the probability of burn-out is decreased, but the stability of arc in short arc welding mode is also decreased, as the welding unit functions as an arc-welding transformer. It is possible to increase the voltage reduction percentage to the maximum value in order to improve the stability of arc in short arc welding mode (when the welding unit is connected to a reliable power supply system), but the increased current in this mode can cause burn-out when welding thin parts. Therefore, it is recommended to set the minimum voltage reduction percentage.

How it is achieved:

When the arc voltage drop is lower than the minimum voltage required for stable arcing, the welding current increases by 40% relative to the set current.

The additional adjustment operations allow both the welding voltage reduction percentage **[POWER ARC FORCE]** and the voltage reduction period **[TRESHHOLD ARC FORCE]** to be set. Do not set the increased values of these parameters if such increased values are not required, because in the operation of the welding unit in this condition, specifically in welding with electrodes less than 3.2 mm in diameter, electrode sticking is possible **(see Section 3.5)**.



The procedure for changing the values of the operational parameters of the welding unit for the current welding process is described in Section 6.1.

3.5. PROTECTION AGAINST ELECTRODE STICKING "ANTI-STICK"

At the stage of arc starting, the electrode can stick to the workpiece and, as a result, the electrode can be damaged due to overheating.
If the electrode has stuck to the workpiece, the welding current decreases within 0.6 … 0.8 s after the sticking. The temporary reduction in the welding current makes it easier for the welder to peel off the stuck electrode. After separating the electrode from the product, the welding process can be resumed without any problems.

3.6 SETTING THE SLOPE OF THE VOLT-AMPERE CHARACTERISTICK OF THE WELDING UNIT

This function is designed to facilitate welding with electrodes with diverse coatings. By default, the slope of the volt-ampere characteristic **[VOLT-AMPER CHARAKTERISTIC]** of the welding unit is **1.4 V/A.** This value is optimal for the most common electrodes with rutile coating. In order to facilitate welding with electrodes with standard coating, it is recommended to set the slope of the volt-ampere characteristic equal to **1.0 V/A**. If electrodes with cellulose coating are used, the slope of the volt-ampere characteristic should be **0.2 … 0.6 V/A**. In this case, it is sometimes required to increase the threshold value **[TRESHHOLD ARC FORCE]** for the reduced-voltage welding function to 18 V.

The procedure for changing the values of the operational parameters of the welding unit for the current welding process is described in Section 6.1.

3.7. SHORT ARC WELDING MODE

The short arc welding mode should be used in overhead position welding, when it is required to prevent arc stretching. For this purpose, activate **(ON)** the short arc welding function **[SHORT ARC MODE]** of the welding unit. By default, the function is deactivated **(OFF).**

The procedure for changing the values of the operational parameters of the welding unit for the current welding process is described in Section 6.1.

3.8. REDUCTION OF OPEN – CIRCUIT VOLTAGE

When welding works with the manual arc welding process are being performed on vessels, tanks, or other objects with higher requirements for electrical safety, it is reasonable to use the reduction of open-circuit voltage function **[VOLT REDUCTION DEVICE].**
When this function is activated, the output voltage of the welding unit is reduced to the safe value of **12 V** within 0.1 s after the detachment of the electrode from the workpiece.

The welding unit model is equipped with this function, it requires an open-circuit voltage reduce unit **[VOLT REDUCTION DEVICE]** but, by default, this function is deactivated **(OFF)**, as the reduction of open-circuit voltage impairs arc starting

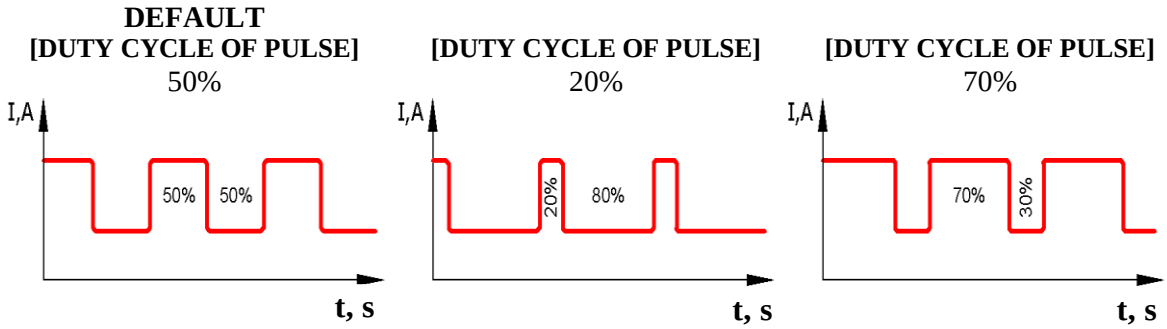
The procedure for changing the values of the operational parameters of the welding unit for the current welding process is described in Section 6.1.

3.9. WELDING AT PULSE WELDING CURRENT

This function is designed to simplify the control of a welding process in various spatial welding positions, excluding a flat welding position. This function is also used in welding nonferrous metals. When this function is activated, the application of pulse welding current improves the mixing of molten metals in the weld area and causes forced action on the transfer of molten metal drops into the welding pool, therefore the stability of the weld formation and the stability of the welding process are improved. The pulse welding current in the manual arc welding process affects the weld parameters similar to the movement of the operator hand in manual arc welding process, specifically at hard-to-reach places. The proper adjustment of the welding process parameters in the welding at pulse welding current has a direct effect on the weld quality, specifically reduces weld metal porosity and decreases the graininess of the weld metal. As a result of the improved weld quality, the weld strength increases.
To activate this function, it is necessary to set the following three operational parameters of the welding process: current pulse amplitude **[POWER OF PULSE],** current pulse frequency **[FREQUENCY OF PULSE],** and duty cycle **[DUTY CYCLE OF PULSE].** By default, the current pulse amplitude is 0 **[OFF],** that is, the function is switched off, the current pulse frequency is 50 Hz, and the duty cycle is 50%. To activate the function, set the current pulse amplitude **[POWER OF PULSE]** higher than 0. The current pulse amplitude should be set in percentage of the welding current specified for the welding process.

Example: Welding is to be performed with electrode wire Φ3.0 mm in diameter. The set welding current is 90 A. The current pulse amplitude **[POWER OF PULSE]** is 40%. The current pulse frequency **[FREQUENCY OF PULSE]** is 50 Hz (default value). The duty cycle **[DUTY CYCLE OF PULSE]** is 50% (default value).

Result: The result is the following: the welding current pulse amplitude will be in the range of 54 … 126 A, the current pulse frequency will be 50 Hz, and the current pulse length will be equal to the length of an interval between pulses. If the duty cycle is not equal to 50%, the current pulses will be nonsymmetrical relative to the intervals between pulses, but the average welding current value will be equal to the set welding current value of 90 A. As a result, the average heat input to the weld will not change.

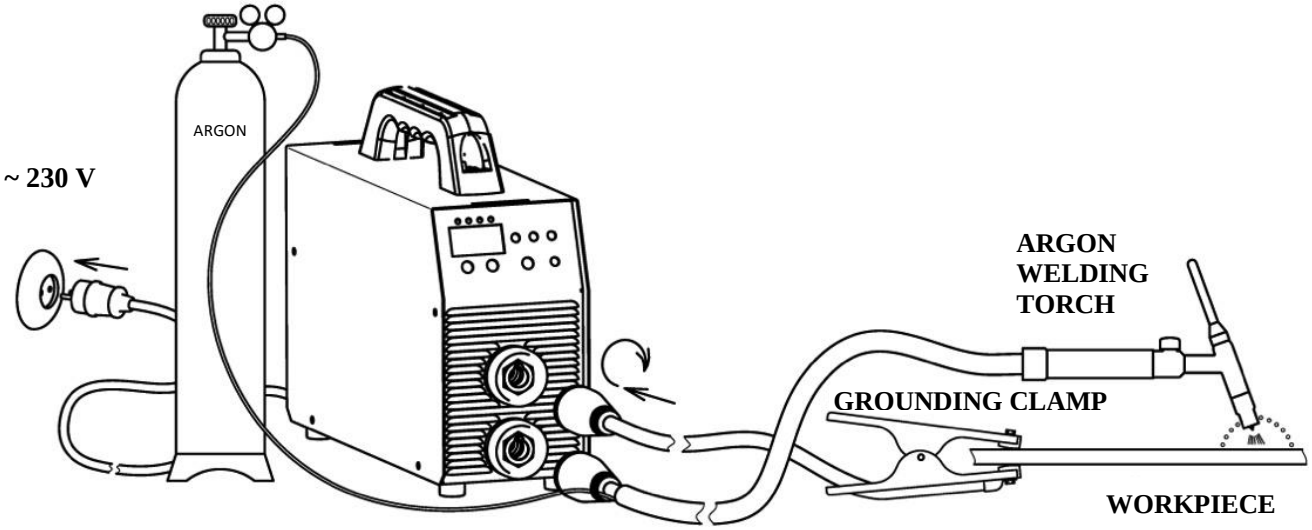


If it is required to reduce heat input to the weld, as in welding thin parts, the welding current should be decreased by performing the standard setting operations. In this case, current pulse parameters will be adjusted automatically according to the set welding current, and the operator can control the reduction of the heat input, as compared with the heat input at the initial welding current, by simultaneously varying the current pulse amplitude and duty cycle.
The aforementioned parameters should be set differently for different welding processes, depending on the requirements of the operator.

Operations required to set these parameters for the current welding process are described in Section 6.1.

4. ARGON ARC WELDING PROCESS (TIG)

4.1. PREPARING THE WELDING UNIT FOR OPERATION TIG – LIFT



ATTENTION! As a protective gas in argon arc welding, such inert gas as argon (Ar), sometimes helium (He), or a gas mixture, such as 40% Ar + 60% He, is used. **Do not use combustive gases**. The use of other gases is allowed only by agreement with the manufacturer of the welding unit.

Preparation the welding unit for TIG operation:

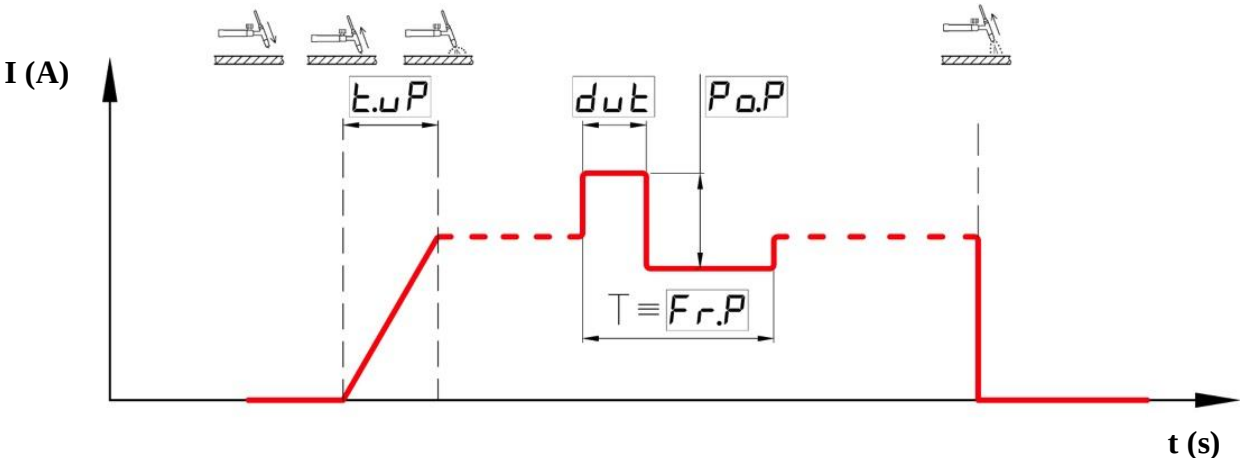
1. Connect the **TIG** torch into socket **B (–)** of the welding unit;
2. Connect the grounding cable into socket **A (+)** of the welding unit;
3. Connect the grounding cable to the workpiece;
4. Connect the power cable of the welding unit to the outlet of the power supply system;
5. Set gas reducer on gas bottle;
6. Open the shut-off valve of the gas cylinder. Check the tightness of the connection with the gas cylinder;
7. Connect the power cable of welding unit to the outlet of the power supply system;
8. Set switch **(18)** on the rear panel of the welding unit to position I (switching on);
9. Switch the button **(4)** to the **TIG** welding position, if the desired welding method has been skipped, press the button **(4)** again - the methods are switched over and over again;
10. Holding the button **(3)** for about 5 seconds, we gain access to the locked functions of the device;
11. Press button **(3)** and hold it until **[BUTTON OF TORCH]** indication is displayed for selecting the **TIG-LIFT** contact arc starting function of the button on the welding torch. When button **(3)** is released, after 1 s, the display will show the value of the current function. Set value [**LFT]** by buttons **(2)**. If the **TIG-LIFT** contact arc starting function has been missed during the selection, press button **(3)** again the methods are switched over and over again;
12. Using the buttons **(2)** set the current basic parameter - welding current or parameter of the selected function;
13. The device is ready for use. **Enjoy Your work.**

If required, perform the additional functions specified for the argon arc welding process (see Section 6.1).

ATTENTION! Do not sharpen the electrode tip to a needle-like shape, as such a shape can cause deviation of a welding arc from side to side. The properly sharpened electrode tip should have a slightly blunted end with a diameter corresponding to the specified welding current. In welding with a large welding current, the high-sharpened electrode easily melts due to insufficient heat dissipation. The sharpening marks should be arranged along the electrode centerline.

ATTENTION! Use a gated welding torch with a ***Φ13mm*** bayonet connector. Select the maximum current of the welding torch according to the specifications.

4.2. OPERATIONAL CYCLE OF THE WELDING PROCESS TIG – LIFT



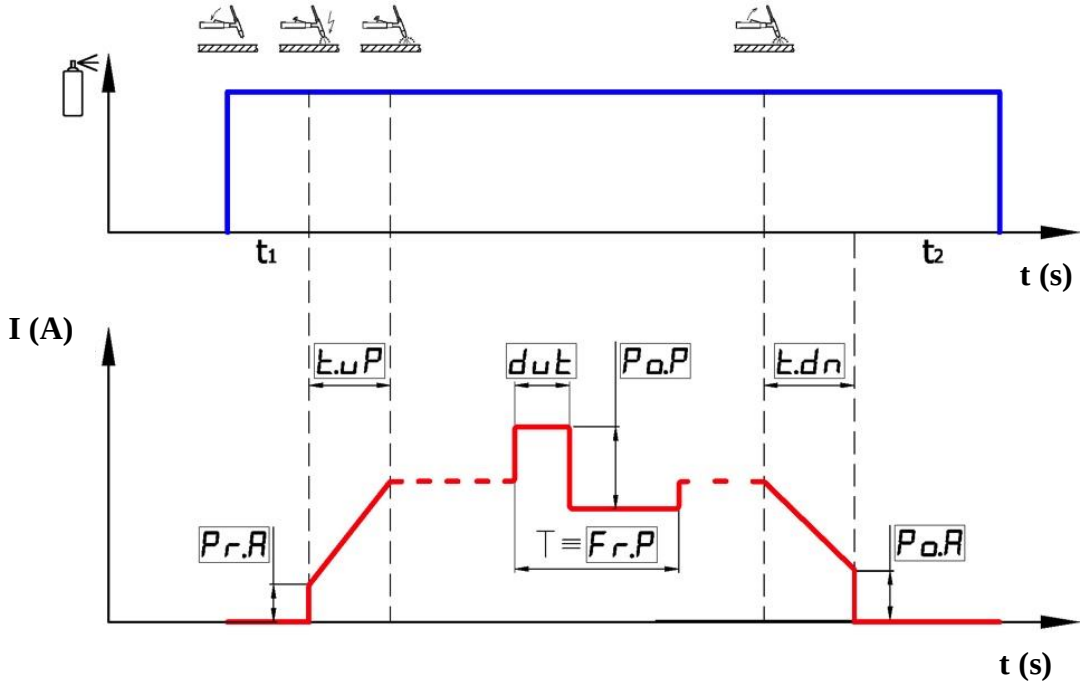
The procedure for changing the values of the operational parameters of the welding unit is described in Section 6.1.

4.2.1. TIG-LIFT CONTACT ARC-STARTING FUNCTION

This function of the control button on the welding torch is set by default and is designed for welding torches with contact arc starting, without using oscillators and other like devices. In contrast to conventional methods of arc starting, the contact arc starting prevents the formation of current surge at the instant of the arc starting. As a result, disintegration of the no consumable tungsten electrode and ingress of the electrode particles into the weld can be prevented.
When this function has been activated, contact the electrode with the workpiece. It is allowed to hold the electrode in this position for an unlimited length of time. When the operator is ready to welding (for example, when the operator has lowered the protective shield and purged the weld area with gas), it is necessary to lift the electrode tip slowly from the workpiece. The welding unit will sense this action as a signal to start welding, and the welding current will be linearly increased to the set value. To prevent surface melting of the electrode tip, the rate of lifting the electrode should correspond to the set welding current value. The period **[TIME UP ARC]** of linear current rise is discussed **in Section 4.6**.

4.3. PREPARING THE WELDING UNIT FOR OPERATION TIG – 2T

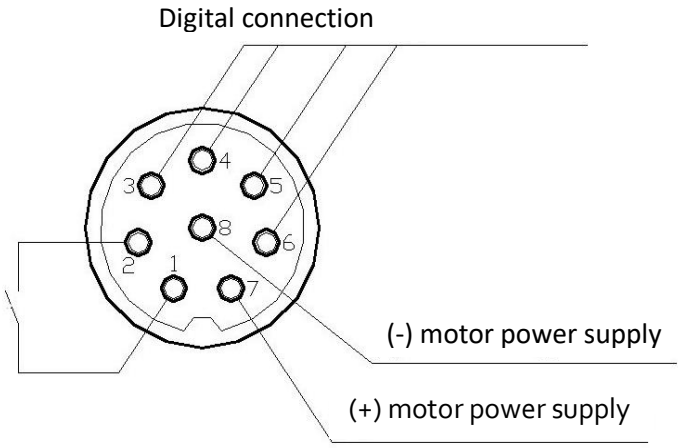
4.3.1 OPERATIONAL CYCLE OF THE WELDING PROCESS WITH TIG-2T



The procedure for changing the values of the operational parameters of the welding unit is described in Section 6.1.

The procedure for preparing the welding unit for operation with an external oscillator is an individual one and should be described in the oscillator operation manual. The connector for remote switching on and off the welding unit is located on the rear panel of the welding unit. Use only contacts 1 and 2 of the connector. Do not confuse contacts 1 and 2 with contacts 3 and 4, as these contacts are designed for powering the electrode wire feeding unit. When contacts 3 and 4 are cross-circuited, the electrode wire feeding unit will be damaged.

ATTENTION! If this connector is not used, cover it in order to prevent contamination.



1. Switch on the oscillator for contactless arc starting.
2. Set switch **(18)** on the rear panel of the welding unit to position I (switching on).
3. Press button **(4)** to select the argon arc welding process **(TIG)**. The display of the welding unit will blink, warning the operator that the unit is ready to switch to the next welding process. If the argon arc welding process has been missed during the selection, press button **(4)** again the methods are switched over and over again;
4. Holding the button **(3)** for about 5 seconds, you gain access to the locked functions of the welder;
5. Select the functions of the **TIG-2T** torch button. To do this, press the button **(4)** until the **[BUTTON OF TORCH]** function appears on the display, after releasing the button for 1 second, the device will display the current position of the function, use the **(2)** buttons to set **[2T].** If you do not do anything for a long time, the device will exit this function, you can go back the same way, if the desired mode has been skipped, press the button **(4)** again, the functions will switch over and over again;
6. Set the specified welding current by buttons **(2)**.

If required, perform the additional functions specified for the argon arc welding process (see Section 6.1).

ATTENTION! Use a gated welding torch with a Φ13mm bayonet connector. Select the maximum current of the welding torch according to the specifications.

4.3.2 TIG-2T CONTACTLESS ARC STARTING FUNCTION

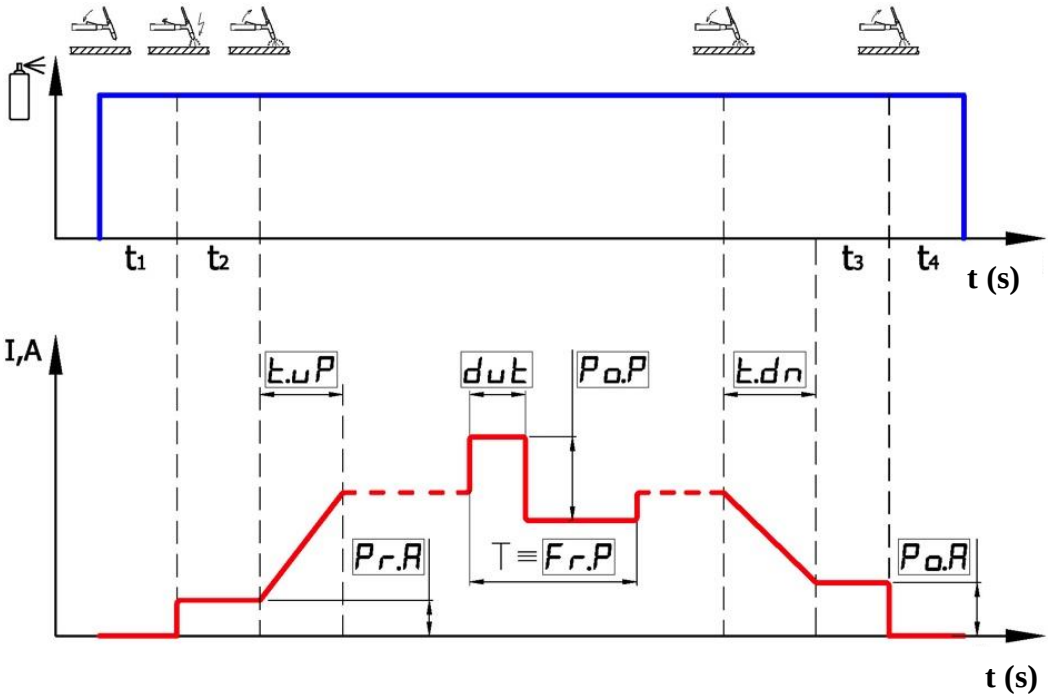
This function of the control button on the welding torch is used if the welding unit is connected to an external module for contactless arc starting (an oscillator) with an integrated gas supply valve.
The control button on the welding torch is connected directly to the oscillator. When the control button is pressed, the control signal is generated and transmitted to the oscillator. On this control signal (moment of time t1), the gas supply valve will be opened for purging the weld area with gas before welding, the welding unit will be switched on, with delay, and a high-voltage pulse for the contactless arc starting will be generated. After these operations, all other functions, specified with consideration for the operational cycle of this welding process, will be performed (see the sections presented below).

When the button is released, the welding current will decrease linearly, the welding unit will be switched off (instant of time t2), and the weld area will be purged with gas. After these operations, the gas supply valve will be closed.

ATTENTION! The oscillator must contain a device for protecting the output of the welding unit against electric breakdown caused by a high-voltage discharge generated at the instant of time of arc starting. Before the operation, activate the protective device.

4.4. PREPARING THE WELDING UNIT FOR OPERATION TIG – 4T

4.4.1. OPERATIONAL CYCLE OF THE WELDING PROCESS WITH TIG-4T



The procedure for changing the values of the operational parameters of the welding unit is described in Section 6.1.

The procedure for preparing the welding unit for operation with an external oscillator is an individual one and should be described in the oscillator operation manual. The connector for remote switching on and off the welding unit is located on the rear panel of the welding unit. The connection diagram for the remote switching on and of the welding unit is the same as for the TIG-2T welding process **(see Section 4.3).**

1. Switch on the oscillator for contactless arc starting.
2. Set switch **(18)** on the rear panel of the welding unit to position I (switching on).
3. Switch the button **(4)** to the **TIG** welding position, if the desired welding method has been skipped, press the button **(4)** again - the methods are switched over and over again;
4. Select the functions of the **TIG-4T** torch button, to do this press the button **(4)** until the function **[BUTTON OF TORCH]** appears on the display, after releasing the button for 1 second the device will display the current function values, using the buttons **(2)** set **[4T]**. If the **TIG-4T** function has been omitted while selecting, press and hold the button **(4)** again - the functions switch all the way

5. Using the buttons **(2)** set the current basic parameter - welding current or parameter of the selected function;
6. If required, perform the additional functions specified for the argon arc welding process **(see Section 6.1).**
7. The device is ready for use. **Enjoy Your work.**

ATTENTION! Use a gated welding torch with a Φ13 mm bayonet connector. Select the maximum current of the welding torch according to the specifications

4.4.2. TIG-4T CONTACTLESS ARC STARTING FUNCTION

This function of the control button on the welding torch is used if the welding unit contains an external module for contactless arc starting (oscillator) with an integrated gas supply valve.
The control button on the welding torch is connected directly to the oscillator. When the control button of the welding torch is pressed, this function is performed in such a manner as the **TIG-2T** contactless arc starting function **(see Section 4.3.2),** but with two differences.

According to the first difference, at the start of welding, when the control button is held down (t1) after the first pressing, the weld area has been purged with gas before welding, and the high-voltage arc starting has been provided, the initial current (for forming a pilot arc) is constant (instant of time t2), and only when the button is released, the welding current will increase to the set operational current value. Therefore, the button is not to be pressed during the welding with the set operational current.

According to the second difference, at the end of the welding, when the control button is held down (instant of time t3) after the second pressing, the welding current will decrease linearly to the crater welding current value and then is constant until the button is released. When the button is released, the welding current will decrease linearly, the welding unit will be switched off (instant of time t4) and the weld area will be purged with gas. After these operations, the gas supply valve will be closed.

ATTENTION! The oscillator must contain a device for protecting the output of the welding unit against electric breakdown caused by a high-voltage discharge generated at the instant of time of arc starting. Before the operation, activate the protective device.

4.5. INITIAL CURRENT (PILOT ARC CURRENT) SETTING

This function facilitates the arc starting in a welding process with the use of a welding torch. The function allows the welding process to be started at low welding current, which only support the welding process without increasing heat input to the weld and without burning through the workpiece. In the **TIG-4T** welding process, it is reasonable to heat the weld area before welding. By default, the initial current value is 15 A.

The procedure for changing the values of the operational parameters of the welding unit is described in Section 6.1.

4.6. LINEAR INCREASE OF WELDING CURRENT

This function provides the economic consumption of an electrode, promotes the extension of the service life of the welding torch, and facilitates the use of the welding torch. This function prevents the spillage of molten metal in the welding pool. Additionally, during the period **[TIME UP ARC]** of linear increase of the welding current, it is possible to accurately locate the welding torch in the weld area, as the arc starting point is initially not always is located in the weld area. It is reasonable to heat the weld area. By default, the period of linear increase of welding current is 1.0 s.

The procedure for changing the values of the operational parameters of the welding unit is described in Section 6.1.

4.7. LINEAR DECREASE OF WELDING CURRENT

This function is designed for smooth welding of a welding crater, which can be formed in the welding pool due to electromagnetic blow forces generated by the welding arc. The crater so formed can be a source of future welding defects. By default, the period **[TIME DOWN ARC]** of linear decrease of welding current is 2.0 s and can be varied by the operator at his option.

The procedure for changing the values of the operational parameters of the welding unit is described in Section 6.1.

4.8. WELDING CRATER CURRENT

This function is designed for decreasing the welding current at the end of welding. The decrease of welding current is required for welding a crater at the end of the weld. To activate the function for the TIG-4T welding process, press and hold the button of the welding torch for the second time. By default, the crater welding current is 20 A.

The procedure for changing the values of the operational parameters of the welding unit is described in Section 6.1.

4.9. WELDING AT PULSE WELDING CURRENT

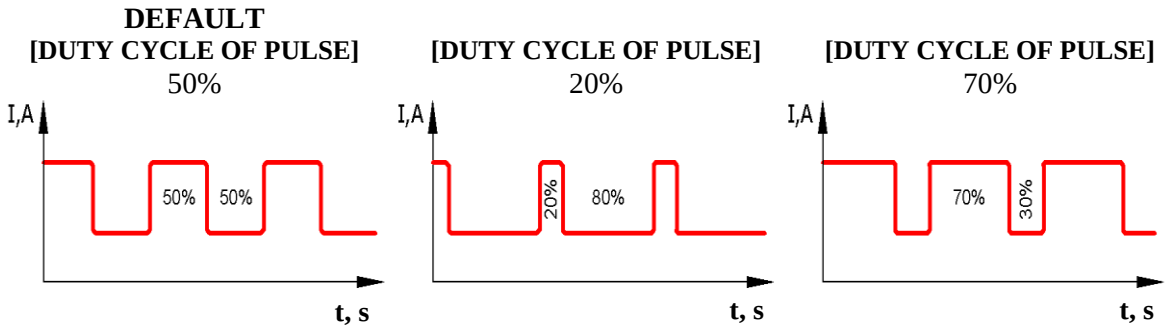
This function is designed to simplify the control of a welding process in various spatial welding positions, excluding a flat welding position. This function is also used in welding nonferrous metals. When this function is activated, the application of pulse welding current improves the mixing of molten metals in the weld area and causes forced action on the transfer of molten metal drops into the welding pool, therefore the stability of the weld formation and the stability of the welding process are improved. The pulse welding current in the manual arc welding process affects the weld parameters similar to the movement of the operator hand in manual arc welding process, specifically at hard-to-reach places.

The proper adjustment of the welding process parameters in the welding at pulse welding current has a direct effect on the weld quality, specifically reduces weld metal porosity and decreases the graininess of the weld metal. As a result of the improved weld quality, the weld strength increases.

To activate this function, it is necessary to set the following three operational parameters of the welding process: current pulse amplitude **[POWER OF PULSE]**, current pulse frequency **[FREQUENCY OF PULSE]**, and duty cycle **[FREQUENCY OF PULSE]**. By default, the current pulse amplitude is 0 **[OFF],** that is, the function is switched off, the current pulse frequency is 5 Hz, and the duty cycle is 50%. To activate the function, set the current pulse amplitude **[POWER OF PULSE]** higher than 0. The current pulse amplitude should be set in percentage of the welding current specified for the welding process.

Example: Welding is to be performed with welding nonconsumable tungsten electrode 2.0 mm in diameter. The set welding current is 100 A. The current pulse amplitude is 30%. The current pulse frequency is 5.0 Hz (default value). The duty cycle is 50% (default value).

Result: The result is the following: the welding current pulse amplitude will be in the range of 70 … 130 A, the current pulse frequency will be 5.0 Hz, and the current pulse length will be equal to the length of an interval between pulses. If the duty cycle is not equal to 50%, the current pulses will be nonsymmetrical relative to the intervals between pulses, but the average welding current value will be equal to the set welding current value of 100 A. As a result, the average heat input to the weld will not change.



If it is required to reduce heat input to the weld, as in welding thin parts, the welding current should be decreased by performing the standard setting operations. In this case, current pulse parameters will be adjusted automatically according to the set welding current, and the operator can control the reduction of the heat input, as compared with the heat input at the initial welding current, by simultaneously varying the current pulse amplitude and duty cycle.
The aforementioned parameters should be set differently for different welding processes, depending on the requirements of the operator.

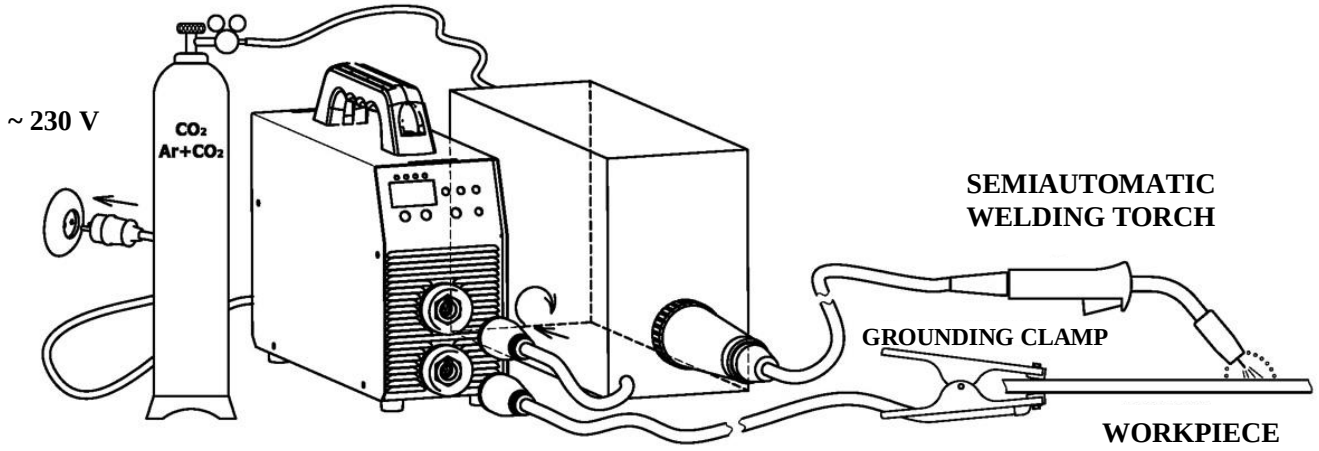
Operations required to set these parameters for the current welding process are described in Section 6.1.

5. SEMIAUTOMATIC ARC WELDING PROCESS (MIG/MAG)

ATTENTION! As the shielding gas during welding of carbon steel, carbon dioxide "CO2" is used, it is the cheapest option of protective gas, it is not widely used due to the large amount of fumes and welding dust, as well as spatter, the most common mix is used in the proportions "Ar" (82%) "CO2" (18%). When welding aluminum, inert gases are used - argon "Ar", sometimes more expensive helium "He". For stainless steel and high-alloy steels mixtures with variable proportions of "75% Ar + 25% CO2" are commonly used. The use of other gases only after consultation with the manufacturer of the device.

ATTENTION! As in the welding unit a standard KZ-2 euroconnector for a welding torch is used, any welding torch can be purchased at the option of the user

5.1. PREPARING THE WELDING UNIT FOR OPERATION



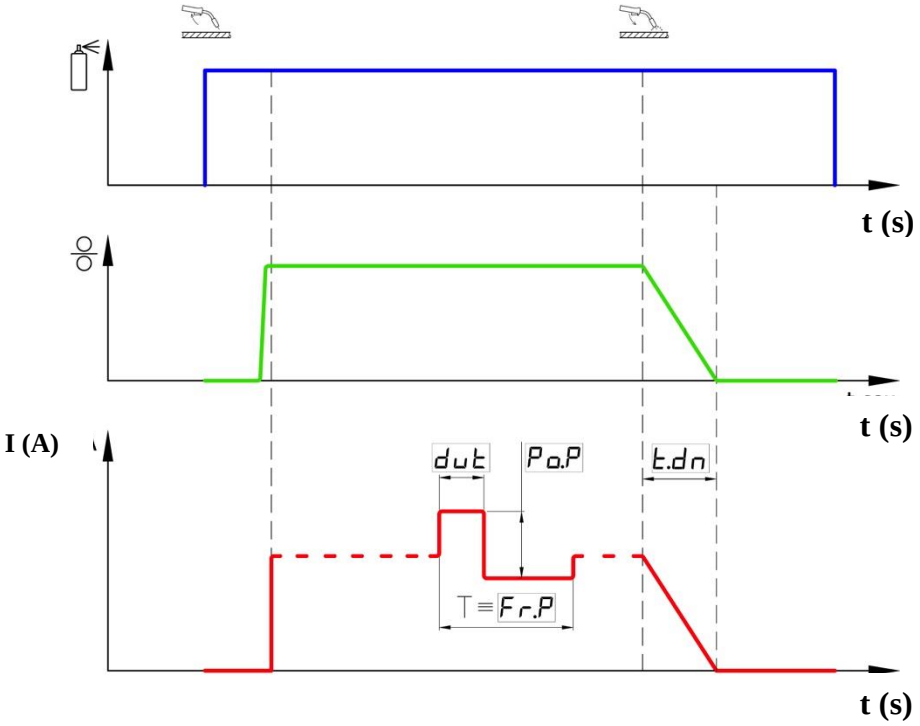
The order of preparation of the device for MIG / MAG welding

1. Install the welding unit on the base surface of the electrode wire feeding unit and fasten the welding unit by using a strap passed through the slots in the side panels of the welding unit. The strap is supplied together with the welding unit.
2. Connect the cable from the wire feeding unit to socket **(16)** on the rear panel of the welding unit.
3. Connect the grounding cable to the **B "-"** source socket, and the polarization change cable **(13)** to the **A "+"** source socket - solid wire welding, connect the grounding cable to the "+" source socket in the case of self-shielding wire, while the polarization change cable **(13)** should be attached to the **B "-"** source socket.
4. Connect the grounding cable to the workpiece;
5. Connect the **MIG/MAG** welding torch to the connector **(12)**, supplied in the kit;
6. Connect the pressure reducer to the cylinder with CO2 or Ar + CO2 protective gas;
7. Connect the gas hose to the pressure reducer of the gas cylinder and fitting **(17)** on the rear panel of the wire feeding unit;
8. Open the shut-off valve of the gas cylinder. Check the tightness of the connection with the gas cylinder;
9. Install the wire spools with the required diameter, lift up the pressure rollers and adjust them to the diameter of the installed wire;
10. Pass the end of the wire through the inlet connector inside the wire feeder;
11. Let down and clamp the welding wire between the rollers, the scale of the roller pressure is visible on the plastic knob, if the lack of experience can be initially set in the middle position (i.e., approximately 3);
12. Connect the power cable of welding unit to the outlet of the power supply system;
13. Set switch **(18)** on the rear panel of the welding unit to position I (switching on);
14. By using the button **(6)** we can increase the wire feed speed to the maximum value to quickly pass the wire through the MIG/MAG holder. Pay special attention to the strength of the brake clamp of the reel, the spool should be minimum, necessarily tightened and should easily spin, but it should not turn;
15. Switch the button **(4)** to the **MIG/MAG** welding position, if the desired welding method has been skipped, press the button **(4)** again - the methods are switched over and over again;
16. Check correct shielding gas flow using the button **(11)** "Gas test" on the wire feed mechanism;
17. Using the buttons **(2)** set the required welding voltage;
18. By using the button **(3)** in the welding machine we can select its additional functions, adjustment by means of the button **(2)** in the welding machine.
19. By using the button **(10)** we can regulate the functions of the wire feeder
20. By using the buttons **(9)** we can adjust the wire feeder speed and the value of additional functions of the wire feeder.
21. The device is ready for use. **Enjoy Your work.**

If required, perform the additional functions specified for the semiautomatic arc welding process (see Section 6.1).

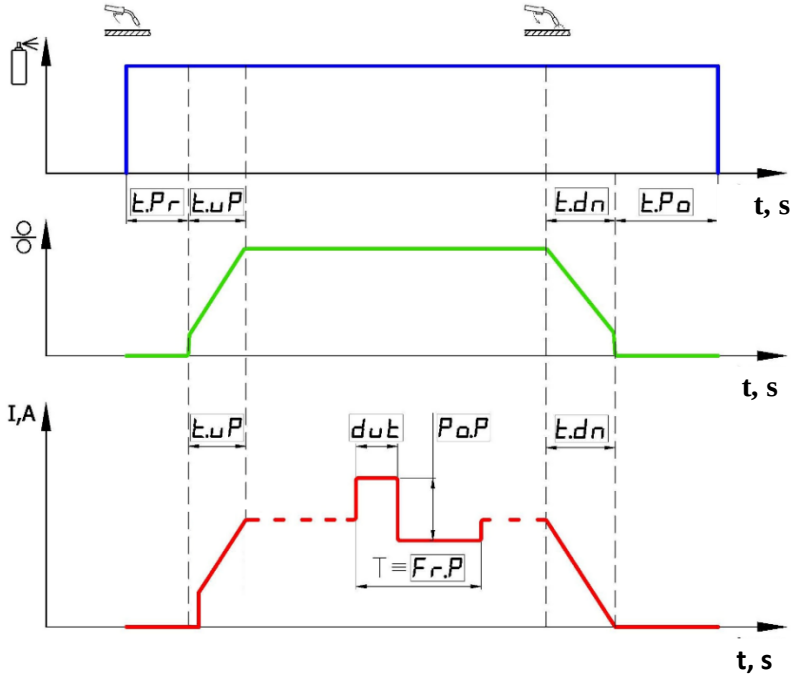
Do not forget to provide the supply of protective gas. If you have no experience in setting optimal gas pressure for welding the specific parts, first set the pressure so that it exceeds the expected optimal pressure by about 0.2 MPa. In this mode, the increased pressure will not affect the welding process and will only induce the increased consumption of protective gas. In the future, fulfill the general instructions concerning semiautomatic arc welding. For welding with any electrode wire diameter in the range of 0.6 … 1.2 mm, set the medium electrode wire feed velocity of 7 … 10 m/min and the medium welding voltage of about 19 V. Notwithstanding that these parameters are not optimal, they are sufficient for welding if the stable and uniform wire feed is provided. In order to achieve better results, set the optimal welding voltage, by buttons **(2)**, and electrode wire feed velocity by adjusting button **(9)** according to the general instructions on semiautomatic arc welding. Remember that the parameters to be set are different for different welding processes.

5.2. OPERATIONAL CYCLE OF THE WELDING PROCESS - MIG / MAG



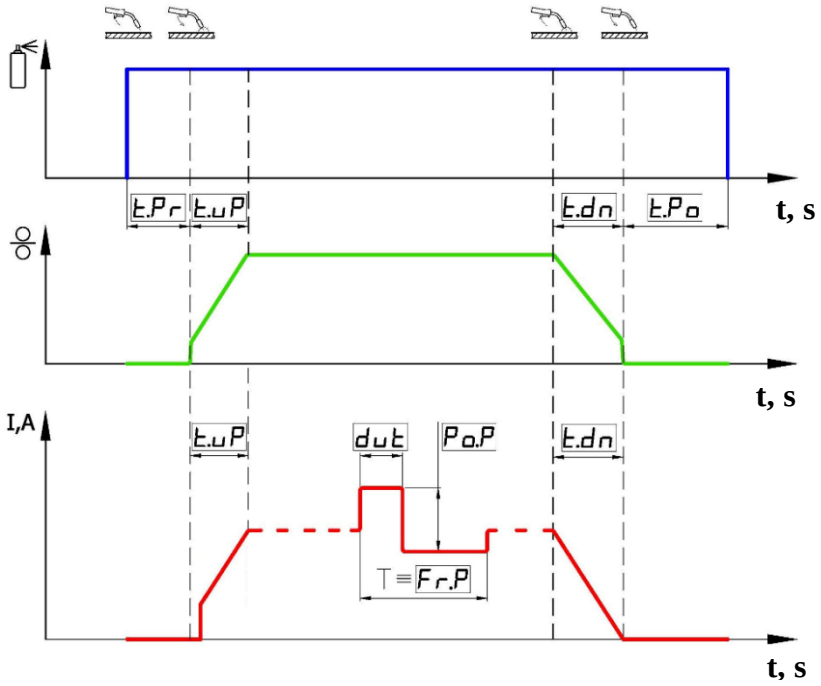
The procedure for changing the values of the operational parameters of the welding unit is described in Section 6.1.

5.2.1. OPERATIONAL CYCLE OF THE WELDING PROCESS - MIG / MAG 2T



This function is used to weld short and medium length welds. The function works as follows: after pressing the button on the **MIG/MAG** holder, the control signal enters the control unit, the pre-cleaning function of the shielding gas of the welded place is started. **[TIME PRE GAS]**, (the solenoid valve opens), then the source switching signal and the wire feed motor are passed. At this moment the welding process begins, at the same time the function of smooth voltage rise **[TIME POST GAS]**, and the time of increasing the wire feed speed are developed, in addition, the pulse welding function can be started. After releasing the button on the **MIG/MAG** holder, the voltage suppression function is started at the end of welding **[TIME DOWN VOLTAGE]** and the dropping time of the wire feed speed and then the source is switched off. In the last stage, the final cleaning function is started with the shielding gas of the welded space **[TIME POST GAS]** (the solenoid valve is closed with a delay).

5.2.2 CYCLE WELDING PROCESS - MIG / MAG FUNCTION 4T& 4T_



FUNCTION 4T and _4T

a) the standard button mode - 4T

b) an alternative button mode - _4T

We use this function when welding long welds, it works as follows. After the first press of the button on the **MIG/MAG** holder, the control signal enters the control unit, the pre-cleaning function is activated with shielding gas **[TIME PRE GAS]** (The gas profession is opened). After the first release of the **MIG/MAG** button, the source switching signal and the wire feed motor are transmitted. At this moment the welding process begins, at the same time the function of smooth voltage rise **[TIME UP VOLTAGE**], and the time of increasing the wire feed speed **[TIME UP SPEED]** are developed, in addition we can start the pulse welding function. After the second press of the button, the function **[TIME DOWN VOLTAGE]** time of sinking the wire feed speed **[TIME DOWN SPEED]** will be activated, the shielding gas will be supplied uninterrupted until the button is released, then the final shielding process will start with the shielding gas **[TIME POST GAS]** (the gas valve is closed with a delay).

In the alternative mode of the **_4T** button, we omit the first release of the button and this is different from the standard **4T** mode. The control system does not wait for the first release of the **MIG/MAG** handle button but only simultaneously activates the pre-cleaning function with shielding gas **[TIME PRE GAS]**, The wire feed rise function and the welding process together with the voltage rise function **[TIME UP VOLTAGE]** - it is very similar to the **2T** button mode. What's more, after the first release of the button, the welding process proceeds unchanged. The end of the welding process is the same as when the **4T** function is running. This mode is offered by **PATON** as above the standard setting

5.3 FUNCTION OF PRETREATMENT GAS CLEANING

This function is necessary to protect the welding zone from the harmful effects of atmospheric air and consists in pre-cleaning the welded place with shielding gas against electric arc ignition. By default, the purging time **[TIME PRE GAS]** is set to **1.5 seconds**, this value can be changed at any time in its sole discretion.

The procedure for changing the values of the operational parameters of the welding unit is described in Section 6.1.

5.4 FUNCTION OF INCREASES THE WIRE FEED SPEED

This function is intended for smooth transition into welding mode for a limited time **[TIME UP SPEED]**, which reduces spill of the weld pool and splashes when the arc is ignited when the wire is cold. Increased time of smooth transition is used for the initial formation of the lake.

ATTENTION! The longer the rise time, the lower the initial penetration, which is why the function is recommended when laying long or medium length joints. When grafting material, do not increase the value higher than 0.1s.

5.5. FUNCTION OF BURNING OUT AT THE END OF WELDING

This function is intended for smooth filling of the crater, which is formed in the weld pool under the influence of the electromagnetic deflection of the electric arc. The crater left at the end of the weld is a very serious defect in the weld, which can cause the seam to burst or leak and is the source of problems. The signal to the beginning of the function is to release the button on the handle at the end of the welding process, while the movement should be stopped and welded with the falling voltage of the dimples (this is the crater) in the weld. The time of voltage drop **[TIME DOWN VOLTAGE]** in the welding source and the time of falling of the wire feed **[TIME DOWN SPEED]** on the feeder correspond to the smoothness of this process, these values must be the same for the unit to function properly. The default value is set to 0.1s. This value can be changed at your own discretion, see section 6.1 for the order of change.

5.6 FUNCTION OF POSTWELD GAS CLEANING

This function is intended to clean the shielding gas welding zone after the welding arc has expired. The welded lake is exposed to the harmful effects of atmospheric air. By default, the purge time **[TIME POST GAS]** is set to 1.5 seconds, this value can be changed at any time in its sole discretion.

The procedure for changing the values of the operational parameters of the welding unit is described in Section 6.1.

5.7 INDUCTANCE CONTROL FUNCTION

Inductance control allows optimization of the arc characteristics according to the welded thickness element and welding method and conditions. This function is necessary to change the slew rate of the current when the arc voltage changes. The thinner the element to be welded with the met MIG/MAG the inductance should be higher (soft arc - less fusion), for thick elements vice versa (hard arc - greater embedding). As a result, the spatter decreases, but affects the droplet transfer process, which leads to a slowdown of the welding process and a strong decrease in the droplet transfer frequency at high values of inductance. Thus, changing this function, each user is given the opportunity to choose the optimal welding process for himself. By default, the inductance is set to "OFF", that is, it is set to zero.

Operations required to set these parameters for the current welding process are described in Section 6.1.

5.8. WELDING AT PULSE WELDING VOLTAGE

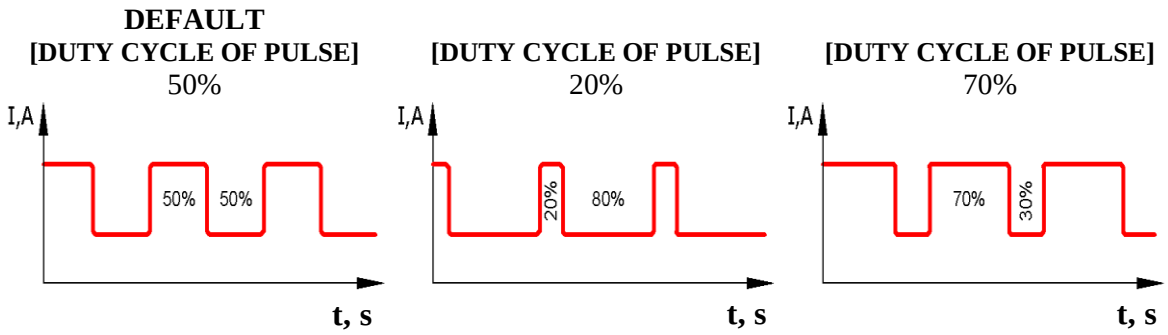
This function is designed to simplify the control of a welding process in various spatial welding positions, excluding a flat welding position. This function is also used in welding nonferrous metals. When this function is activated, the application of pulse welding voltage improves mixing of molten metals in the weld area and causes forced action on the transfer of molten metal drops into the welding pool, therefore the stability of the weld formation and the stability of the welding process are improved.
The pulse welding voltage in the manual arc welding process affects the weld parameters similar to the movement of the operator hand in a manual arc welding process, specifically at hard-to-reach places. The proper adjustment of the welding process parameters in the welding at pulse welding current has a direct effect on the weld quality, specifically reduces weld metal porosity and decreases the graininess of the weld metal. As a result of the improved weld quality, the weld strength increases.

To activate this function, it is necessary to set the following three operational parameters of the welding process: voltage pulse amplitude **[POWER OF PULSE],** voltage pulse frequency **[FREQUENCY OF PULSE],** and duty cycle **[DUTY CYCLE OF PULSE].** By default, the voltage pulse amplitude is 0 **[OFF],** that is, the function is switched off, the voltage pulse frequency is 20 Hz, and the duty cycle is 50%. To activate the function, set the voltage pulse amplitude **[POWER OF PULSE]** higher than 0. The voltage pulse amplitude should be set in percentage of the welding voltage specified for the welding process.

Example: Welding is to be performed with electrode wire 0.8 mm in diameter. The set wire feed velocity is 5.5 m/min. The set welding voltage is 18 V. The voltage pulse amplitude **[POWER OF PULSE]** is 20%. The voltage pulse frequency **[FREQUENCY OF PULSE]** is 20 Hz (default value). The duty cycle **[DUTY CYCLE OF PULSE]** is 50% (default value).

The result is: The following: the welding pulse voltage amplitude will be in the range of 14.4 V … 21.6 V. the welding voltage pulse frequency will be 20 Hz, and the pulse length will be equal to the length of an interval between pulses. If the duty cycle is not equal to 50%, the pulses will be nonsymmetrical relative to the intervals between pulses, but the average welding value will be equal to the set welding voltage of 18 V. As a result, the average heat input to the weld will not change.

If it is required to reduce heat input to the weld, as in welding thin parts, the welding voltage should be decreased by performing the standard setting operations. In this case, voltage pulse parameters will be adjusted automatically according to the set welding voltage, and the operator can control the reduction of the heat input as compared with the preceding mode by simultaneously varying the voltage pulse amplitude and duty cycle.
The aforementioned parameters should be set differently for different welding processes, depending on the requirements of the operator. Operations required to set these parameters in the current welding process are described in **Section 6.1.**



6. SETTING THE WELDING UNIT

When no button on the front panel of the welding unit is pressed, the digital display of the unit shows the value of the basic parameter of the current welding process:

1. Welding current in the manual arc welding process **(MMA)**
2. Welding current in the argon shielded tungsten-arc welding process **(TIG)**
3. Welding voltage in the semiautomatic arc welding process **(MIG/MAG)**
4. Welding wire speed in the semiautomatic arc welding process **(MIG/MAG)**

The buttons **(2)** on the front panel are responsible for changing the value of the selected function or basic welding parameter.

The button **(3)** on the front panel of the source is responsible for the following:

1. The choice of any function in the current welding method **to unblock the devices should be kept pressed button (3) for more than 5 seconds.**
2. Resetting all functions to the factory settings in the welding method being used should be **kept pressed for more than 10 seconds**; (The device does not reset the settings in other methods).

The button **(4)** on the front panel of the multifunction machine is responsible for the following:

1. The choice of welding method (quick press);

The button **(10)** on the front panel of the source is responsible for the following:

1. The choice of any feeder function in the MIG/MAG welding method, in order to unblock the feeder, keep the button **(10)** pressed for more than 5 seconds.

Buttons **(9)** on the front panel are designed for changing the value of the function or basic parameter of wire feeder.

6.1. CHOOSING A LANGUAGE ON THE DEVICE

The following languages are installed in the device: English, Russian.

1. When the device is turned off, press and hold the "MENU" button, then start the device with the main switch.
2. The language change function appears on the main screen. To change the language, press the "+" or "-" button.
3. After selecting the appropriate language, wait 2 seconds. , the selected language will be automatically saved.
4. Repeat points 1 to 3 to change the language again.

6.2. SWITCHING TO THE REQUIRED FUNCTION

To enter the advanced settings of the device function, keep the button **(3)** pressed for more than 5 seconds. After pressing the button **(3)**, the graphical name of the current function will be shown on the display. After releasing the button, the display will show the standard value of this function, which can be increased or decreased using the buttons **(2).** In the situation of fast pressing and releasing the button **(3)**, you can switch over to the next functions of the welder in the circle, the same situation applies to the button **(10)** on the wire feeder, the adjustment takes place via the buttons **(9).**

ATTENTION! If button **(3)** is held for more than 12 s, the display will show readouts 333 … 222 … 111 … 000. In this state, release the button before the end of the readout indication period (000); otherwise, all the values of the functions and parameters of the welding unit will return to the default factory values set for the current welding process **(see Section 6.3)**

6.3. SWITCHING TO THE REQUIRED WELDING PROCESS

After pressing the button **(4)**, the device switches to the next welding method. The methods switch over and over, you can see it on the icons **(4)** on the front panel, which will be highlighted.

6.4. RESETTING ALL FUNCTIONS CURRENT WELDING METHOD

There might be conditions when the operator cannot set the welding unit parameters properly. In this case, press button **(3)** and hold it for more than 12 s. At the 5th second, the welding unit will be ready to switch to the next welding process. Nevertheless, hold the button. After 5 seconds, the display will show readouts 333 … 222 … 111 … 000. When the readout is 000, the values of the functions and parameters of the welding unit will return to the default factory set values. These operations for setting default parameter values should be performed individually for all the welding processes of the welding unit.

7. GENERAL LIST OF FUNCTION SEQUENCES

7.1. MANUAL ARC WELDING PROCESS (MMA)

0) [-1-]	Basic indicated parameter: **welding current 90 A (default value)** **a)** 10 … 200 A (adjustment 1 A) for PSI 200 PRO **b)** 12 … 250 A (adjustment 1 A) for PSI 250 PRO 230 V
1.) POWER HOT START	Current intensity in the increased-current arc starting mode: **40% (default value)** **a)** 0 [OFF] … 100% at low currents (adjustment 1 %)
2.) TIME HOT START	Period of the increased-current arc starting: **0.3 s (default value)** **a)** 0.1 … 1.0 s (adjustment 0.1 s)
3.) POWER ARC FORCE	Voltage in the reduced-voltage welding mode: **40% (default value)** **a)** 0 [OFF] … 100% at low currents (adjustment 1%)
4.) TRESHHOLD ARC FORCE	Threshold voltage for the reduced-voltage welding mode: **12 V (default value)** **a)** 9 … 18 V (adjustment 1 V)
5.) VOLT-AMPER CHARAKT.	Volt-ampere characteristic slope: **1.4 V/A (default value)** **a)** 0.2 … 1.8 V/A (adjustment 0.4 V/A)
6.) SHORT ARC MODE	Short arc welding mode: **OFF (default value)** **a)** ON **b)** OFF
7.) VOLT REDUCTION DEVICE	Reduction of voltage: **OFF (default value)** **a)** ON **b)** OFF
8.) POWER OF PULSE	Current pulse amplitude: **OFF (default value)** **a)** 0 [OFF] … 80% (adjustment 1 %)
9.) FREQUENCY OF PULSE	Current pulse frequency: **50 Hz (default value]** **a)** 0.2 … 500 Hz (adjustment 0.2 Hz ... 1 Hz)
10.) DUTY CYCLE OF PULSE	Duty cycle (the ratio of the pulse length to the pulse repetition period): **50% (default value)** **a)** 20 … 80% (adjustment 1%)

7.2. ARGON SHIELDED TUNGSTEN-ARC WELDING PROCESS (TIG)

0) [-2-]	Basic indicated parameter: welding current **100 A (default value)** **a)** 10 … 200 A (adjustment 1 A) for PSI 200 PRO **b)** 12 … 250 A (adjustment 1 A) for PSI-250 PRO 230 V
1.) BUTTON OF TORCH	Function of the button on the welding torch: **[LFT] (default value)** **a)** [LFT] - contact arc starting, function TIG-LIFT **b)** [2T] - contactless arc starting, function TIG-2T **c)** [4T] - contactless arc starting, function TIG-4T
2.) TIME PRE-GAS	Period of voltage reduction: **1.0 s (default value)** **a)** 0,1 ... 25s (krok zmiany 0,1s)
3.) TIME POST-GAS	Period of post weld gas purging = **1.5 s., (default value),** **a)** 0,1 ... 25 s. (regulation 0.1 s.)
4.) PRIMARY ARC	Initial current (pilot arc current): **15 A (default value)** **a)** 10 … 40 A (adjustment 1 A) for PSI 200 PRO **b)** 12 … 40 A (adjustment 1 A) for PSI 250 PRO 230 V
5.) TIME UP ARC	Period of current rise: **1.0 s (default value)** **a)** 0.1 … 5.0 s (adjustment 0.1 s)

6.) TIME DOWN ARC	Period of current reduction: **2.0 s (default value)** **a)** 0.1 … 5.0 s (adjustment 0.1 s)
7.) POST CRATER ARC	Crater welding current: **20 A (default value)** **a)** 10 … 60 A (adjustment 1 A) for PSI 200 PRO **b)** 12 … 60 A (adjustment 1 A) for PSI 250 PRO 230 V
8.) POWER OF PULSE	Current pulse amplitude: **OFF (default value]** **a)** 0 [OFF] … 80% (adjustment 1%)
9.) FREQUENCY OF PULSE	Current pulse frequency: **5.0 Hz (default value]** **a)** 0.2 … 500 Hz (adjustment 0.1 Hz)
10.) DUTY CYCLE OF PULSE	Duty cycle (the ratio of the pulse length to the pulse repetition period): **50% (default value)** **a)** 20 … 80% (adjustment 1%)

7.3. SEMIAUTOMATIC ARC WELDING PROCESS (MIG/MAG)

0) [-3-]	Basic indicated parameter: **welding voltage 19.0 V (default value)** **a)** 12 … 26 V (adjustment 0.1 V) for PSI 200 PRO **b)** 12 … 28 V (adjustment 0.1 V) for PSI-250 PRO 230 V
1.) BUTTON OF TORCH	Mode on the torch button **[2T] (default value)** **a)** 2T **b)** 4T **c)** _4T
2.) INDUCTANCE	Select one of three function levels: = **OFF (default value)** (a) 1st stage – Hardest arc (b) 2nd stage – Average arc (c) 3rd stage – Softest arc
3.) TIME PRE GAS	Period of pre gas outflow before welding (1.0s by default) **a)** 0,1 ... 25s (krok zmiany 0,1s)
4.) TIME POST GAS	Period of post weld gas purging = **1.5 s., (default value),** **a)** 0,1 ... 25 s. (regulation 0.1 s.)
5.) TIME UP VOLTAGE	Period of voltage increase: 1.0 s (default value) **a)** 0.1 … 5.0 s (positive or negative increment 0.1 s)
6.) TIME DOWN VOLTAGE	Period of voltage reduction: **1.0 s (default value)** **a)** 0.1 … 5.0 s (positive or negative increment 0.1 s)
7.) POWER OF PULSE	Voltage pulse amplitude: **OFF (default value)** **a)** 0 [OFF] … 80% (adjustment 1%)
8.) FREQUENCY OF PULSE	Voltage pulse frequency: **20 Hz (default value)** **a)** 5 … 200 Hz (adjustment 1 Hz)
9.) DUTY CYCLE OF PULSE	Duty cycle (the ratio of the pulse length to the pulse repetition period): **50% (default value)** **a)** 20 … 80% (adjustment 1%)

7.3.1 WIRE FEEDER FUNCTION WELDING PROCESS (MIG/MAG)

0) WIRE SPEED	Basic indicated parameter **SPEED = 7,0 m/min (default value)** **a)** 2,0 ... 16 m/min (adjustment 0,1 m/min)
1) BUTTON OF TORCH	Mode on the torch button **[2T] (default value)** **a)** 2T **b)** 4T **c)** _4T
2) TIME PRE GAS	Period of preweld gas purging = **0.5 s., (default value),** **a)** 0,1 ... 25 s. (adjustment 0.1 s.)

3) TIME POST GAS	Period of post weld gas purging = **1.5 s., (default value),** **a)** 0,1 ... 25 s. (adjustment 0.1 s.)
4) TIME UP SPEED	Time increase the wire feed speed = **0.1 s., (default value),** **a)** 0,1 ... 5.0 s. (adjustment 0.1 s.)
5) TIME DOWN SPEED	Fall time of wire feed speed = **0.1 s., (default value),** **a)** 0,1 ... 5.0 s. (adjustment 0.1 s.)

8. OPERATION WITH AN ELECTRIC GENERATOR

The welding unit can operate with power supply from an electric generator if the following conditions are satisfied:

Electrode diameter (mm)	Set welding current in the MMA and TIG welding processes (A)	Electrode wire diameter in the MIG/MAG welding process (mm)	Minimum power of the generator (kVA)
Φ 2	Not more than 80	Not more than 0.6	2.9
Φ 3	Not more than 120	Not more than 0.8	4.5
Φ 4	Not more than 160	Not more than 1.0	6.2
Φ 5	Not more than 200	Not more than 1.0	8.0
Φ 6 for a free-melting electrode	Up to 250	Up to 1.2	11.0

ATTENTION! The output voltage of the electric generator must in the range of 160 … 260 V in the single phase. The manufacturer suggest the use of a generator set with the AVR system responsible for voltage stabilization.

9. MAINTENANCE

ATTENTION! Before maintenance, switch off the welding unit and disconnect the power cable from the outlet of the power supply system. Wait for about 5 minutes until static charges in the unit circuits disappear, and then perform the maintenance operations. After completion of works with the welding unit, apply to the unit a plate with a warning text prohibiting switching on the unit.

For ensuring the operability of the welding unit for a long-term service life, it is necessary to perform the following procedures:

1. Periodically, at specified time intervals, check that the safety requirements in operation of the welding unit are fulfilled **(see "Safety instructions").**
2. At half-yearly intervals, purge the welding unit with dry compressed air.
3. When working in environment with excessive dust content, manually clean the passages for cooling air.

ATTENTION! Purging the unit with compressed air at short distance can result in damage of the electronic elements of the unit.

10. STORAGE

The preserved and packed welding unit can be stored according to State Norm **for 5 years.** The welding unit should be stored in a dry closed room at an ambient temperature not lower than 5ºC. In the room, acid vapors and chemically active substances must not be present.

11. TRANSPORTATION

The packed welding unit can be transported by any means of transport, which ensure the integrity of the unit and compliance of the unit with the shipping rules established for the specified transport means.

12. SPECIFICATION DATA

ATTENTION! If the welding unit is rated for a special power supply voltage, the specification data of the unit are indicated on the nameplate on the rear panel of the unit. In this case, the electrical outlet of the power supply system and the power cable of the welding unit should be selected with consideration for the actual power supply voltage.

Rated power supply voltage, 50/60 Hz, V	**~ 230 V**
Efficiency coefficient	90%
Power supply voltage range	160 … 260 V;
Efficiency coefficient (at the rated current)	90 % ; ±15%
Welding current control range	10 … 200 A for PSI 200 PRO 12 … 250 A for PSI 250 PRO 230 V
Welding current at a load factor of 70%, for 5 minutes	200 A for PSI 200 PRO 250 A for PSI 250 PRO 230 V
Welding current at a load factor of 100%, for 5 minutes	167 A for PSI 200 PRO 208 A for PSI 250 PRO 230 V
Maximum consumed power	6.6 … 8.0 kVA for PSI 200 PRO 8.5 … 11.0 kVA for PSI 250 PRO 230 V
Normal operating voltage for the manual arc welding process **MMA**	21 … 28 V
Normal operating voltage for the argon arc welding process **TIG**	10 … 18 V
Normal operating voltage for **MIG/MAG** welding process	12 … 28 V

13. DELIVERY SET

1. Welding unit with a power cable 3 m in length – 1 pcs;
2. The welding cable 3 m in length with an **Abicor Binzel DE 2200 / 2300** electrode holder – 1 pcs;
3. The welding cable 3 m in length with a **Abicor Binzel MK300** grounding clamp – 1 pcs;
4. Gas quick connector – 1 pcs;
5. Shoulder-carry belt – 1 pcs;
6. Cardboard packaging **„PATON®"** – 1 pcs;
7. Operation manual of device – 1 pcs;

14. WARRANTY

The Pilot Plant of Welding Equipment of the E.O Paton Electric Welding Institute guarantees the correct operation of the power supply if the costumers provided service conditions, storage and transportation.

ATTENTION!!! Warranty commitments are cancelled in case of mechanical damage.

Term of the main guarantees for welding inverter series PRO is 5 years. The basic warranty period is calculated from the date of sale to the end customer of the inverter equipment.

During the main warranty period, the seller covenants charge the inverter equipment of **PATON®** to the owner:

1. To diagnose and determine the cause of failure,
2. To ensure the necessary repairs to units and elements,
3. To carry out work on the replacement of defective components and units,
4. To test the repaired equipment.

The basic warranty obligations do not include devices:

1. Mechanical damage affected the availability of the device (deformation body parts and in consequence of a fall or drop heavy objects on the equipment, loss of pins and connectors)
2. Traces of corrosion that caused the fault condition,
3. The failed because of the impact on its power and electronic elements abundant moisture,
4. The failed due to the accumulation of conductive dust inside (coal dust, metal chips, etc.),
5. In case of attempting to repair its nodes and / or replacement of electronic components,

Once on six months, clean internal parts and components with compressed air when removing the protective box in order to avoid exit of the unit system on the equipment. Cleaning should be carried out carefully, keeping the compressor hose at a sufficient distance to avoid damage to the soldering of electronic components and mechanical parts.

Also, the basic warranty does not apply to defective external elements of equipment that exposed to physical contact and the attendant / supplies. Claims on the fallowing items are accepted no later than two weeks from the date of sale:

1. Pins on and off,
2. Knobs of the welding parameters,
3. Cabling connectors and sleeves,
4. Connectors management
5. The power cable and power plug,
6. Carrying handle, shoulder strap, carrying case,
7. Electrode holder, earth clamp, burners, bayonet connectors, welding cable, hose.

The Seller reserves the right to refuse to provide warranty repairs, or set as the date for the commencement of the warranty a month and year of the machine (set by serial number):

1. In case of loss of the passport holder,
2. In the absence of a correct or even any passport fill the seller in the sale of the machine,
3. In the absence of a serial number on the machine manufacturer reserves the full right to refuse warranty service.

ATTENTION! The warranty period is extended for the period of the warranty service machine to the service center.

PSI PRO Series Welding Inverters - 5 years basic warranty. It is a mandatory condition that the service is carried out within the required time limits in an authorised service centre. The initial maintenance should take place 24 months after the date of sale.

15. WASTE ELECTRICAL & ELECTRONIC EQUIPMENT

(applies to households)

Do not dispose of electrical equipment together with normal waste! In observance of European Directive 2012/19/EC on Waste Electrical and Electronic Equipment (WEEE) and its implementation in accordance with national law, electrical equipment that has reached the end of its life must be collected separately and returned to an environmentally compatible recycling facility. As the owner of the equipment, you should get information on approved collection systems from our local representative. By applying this European Directive you will protect the environment and human health!

If you would like to return the unit for disposal, please contact your nearest point of sale or contact the importer of the equipment for further information.

IMPORTER / AUTHORIZED DISTRIBUTOR EU
MasterWeld Sp. z o.o.
Kapitałowa 4 street.
Rzeszów City, Poland zip-code 35213

Tel. +48 (22) 290 86 96
e-mail: sale@patonwelder.uk
service@patonwelder.uk

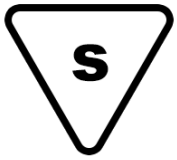
16. SAFETY INSTRUCTIONS

GENERAL INFORMATION

This device may only be used for the purposes for which it was created. This appliance is intended for use by persons with the requisite qualifications. It is the responsibility of the qualified personnel to install, service and repair. Please read this manual carefully before installing and using this product. Failure to follow the instructions in this manual may result in serious personal injury, death and damage

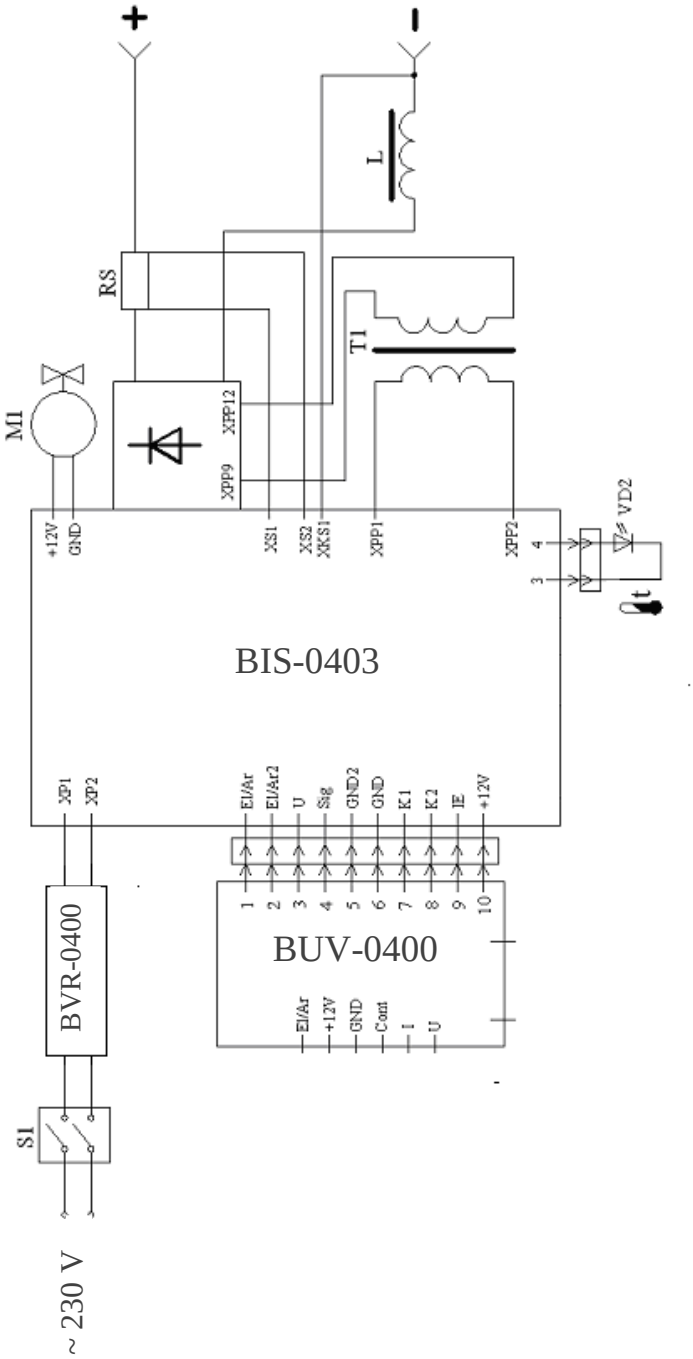
to the unit itself. Incorrect installation, maintenance and operation resulting in damage to the device - the manufacturer is not liable.

INSTRUCTION	Before using this product, please read this manual and use the instructions in this manual. This instruction manual is a basic piece of equipment.
	***USER RESPONSIBILITIES:*** The user agrees to allow only persons who: have been acquainted with the basic safety rules, have been trained in the use of welding equipment and have appropriate qualifications. They are familiar with the chapter "Safety Regulations" and the precautionary guidelines in this manual.
THREATS	
	***ELECTRIC SHOCK CAN KILL:*** Welding devices produce high voltage. While the machine is connected to the power supply, it is not allowed to touch the welding handle and the workpiece. All of these elements form a welding current circuit and may cause electric shock, so avoid touching them with bare hands and wet or damaged protective clothing. Protective clothing should not restrain movements. If possible, it should not be made of synthetic materials. **Electrocution can be fatal !!!**
	***ARC RAYS CAN BURN****:* It is not allowed to directly observe the welding arc with uncovered eyes. Arc and splinters may cause skin burns or flames, so always wear a protective mask fitted with a darkened filter (glasses should be equipped with glass filter grade DIN 9 10) Any unauthorized persons near your site should protect your eyes with special protective goggles or with non-flammable, radiation-absorbing screens.
	***VAPOUR AND GASES MAY BE DANGEROUS:*** The resulting smoke and harmful gases should be removed from the work area by means of specialized equipment, do not cover the ventilation openings. Welding should be carried out in well ventilated areas and welding vapors are harmful to health - especially when welding materials such as lead, mercury, cadmium, zinc, beryllium, galvanized or stainless steel. Ensure sufficient fresh air flow in the room. Do not allow solvent vapors to enter the welding arc area.
	***ELECTROMAGNETIC POLE MAY BE DANGEROUS:*** By inducing a high voltage current, the electromagnetic field flowing through the welding wires may have a negative effect on the performance of electrical devices such as the cardio-stimulator. Persons wearing such equipment should consult a physician before entering the area where welding work is performed. Welding hoses should be arranged in parallel, as close as possible to each other.

	***ELECTRICAL SPARK MAY CAUSE FIRE OR EXPLOSIVES:*** Flammable items should be removed from the workplace. Do not perform welding work on containers that contain gases, fuels, oil products or other flammable materials. There is a risk of explosion of residue of these products. When performing welding work in potentially explosive or fire hazards, special rules must be observed that comply with national and international standards. Firefighting equipment such as: (powder or snow fire extinguishers, fire blankets) should be located near the workstation in a visible, readily accessible place.
	***BOTTLE CAN EXPLODE:*** Use only approved bottles and properly functioning regulators. The cylinder should be transported and positioned vertically. Protect the cylinder from heat, overturning and mechanical damage.
	***WELDED MATERIALS MAY BURN:*** In no case should you touch the welded parts with bare hands. Always wear protective gloves when operating the machine. The arc and splinters that develop during the burn can cause skin burns. Wear protective gloves and pliers when touching or moving the welded item.
	***ELECTRIC POWER SOURCES:*** It is forbidden to work with damaged welding wires or on wet substrates. Welding cables should be strong, undamaged and insulated. Weakened connections and damaged cable must be replaced immediately. Do not carry the device by pulling it by the power cord or wires. Do not perform any maintenance work on the unit. **Removing the outside cover of the device while it is connected to the network and using the device with the lid removed is forbidden.**
	***NOISE ASSOCIATED WITH WELDING CAN BE HARMFUL:*** The welding arc formed during welding can emit sounds higher than 85dB for - 8 hours of working time. Welders operating the equipment are obliged to wear equivalent hearing protectors during work in accordance with the Regulation of the Minister of Labor and Social Policy of 6 June 2014r. - Dz. U. 2014 pos. 817. Pursuant to the Ordinance of the Minister of Health on Social Welfare dated 09.07.1996 OJ No. 68 pos. 194 - The employer is required to carry out research and measurement of factors harmful to health.
	***CONFORMITY DECISION:*** This device accomplish the recommendation of the European CE Committee.
	***SAFETY MARK:*** This device is suitable for mains power, for welding work in an environment of higher standard of electric shock. It is recommended that the power line be provided with a separate protection against the shock absorber.

17. ELECTRICAL SCHEMATIC DIAGRAM

Basic electrical diagram
Source PATON PSI-200P or 250P DC MIG/MAG MMA/TIG



18. ACCEPTANCE CERTIFICATE

Digital Inverter rectifiers „***PATON® PSI-_____Professional***”

The serial number: _____***PRO*** complies with the harmonized standards and is fit for use.

Date of sale "___" _____ 20___ year

Stamp here

_____
(signature of the seller)

==========

PATON SERVICE CENTER
Kapitałowa 4 Street
Rzeszów City, Poland zip-code 35213

Head of Service Center
Piotr Błaszkowski
Phone: +48 22 290 86 96
e-mail: service@patonwelder.uk

ATTENTION!!! DO NOT SEND the welding cables for repair, as these equipment items are not required for repair.

ATTENTION!!! The delivery of the device to the **PATON Service Center** is carried out at the expense of the manufacturer for the entire warranty period from the date of purchase exclusively in Poland!

19. WARRANTY CARD

DATE OF REPORT TO REPAIR			
DATE OF SERVICE REPAIR:			

_____ _____

(Signature) (Signature)

FAULTS DETECTED AND FAULTY-CONDITION CAUSE:

_____

_____

_____

_____

Tel. Technical support: +48 22 290 86 96
Address of the service center: 35213, Poland, Rzeszów, 4 Kapitałowa Street,

DATE OF REPORT TO REPAIR			
DATE OF SERVICE REPAIR:			

_____ _____

(Signature) (Signature)

FAULTS DETECTED AND FAULTY-CONDITION CAUSE:

_____

_____

_____

_____

Tel. Technical support: +48 22 290 86 96
Address of the service center: 35213, Poland, Rzeszów, 4 Kapitałowa Street,

DATE OF REPORT TO REPAIR			
DATE OF SERVICE REPAIR:			

_____ (Signature)

_____ (Signature)

FAULTS DETECTED AND FAULTY-CONDITION CAUSE:

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Tel. Technical support: +48 22 290 86 96
Address of the service center: 35213, Poland, Rzeszów, 4 Kapitałowa Street,