Pilot Plant since 1959

PATON®

# Data sheet and operating manual

PATON™ semi automatic digital inverter

**ProMIG-200 | ProMIG-250 | ProMIG-250-380V**

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Connection to power mains / power board (at 25°C):

**ATTENTION: make provision for cables routed in the walls and other extension cords**

| Electrode used in MMA mode | Set current value in MMA and TIG modes | Wire cross-section diameter for MIG/MAG welding | Power cable cross-section, sq. mm | Max. cable length, m |
|---|---|---|---|---|
| **ProMIG-200** | | | | |
| Φ3 mm | 120 A at most | Φ0.8 mm at most | 1.5 | 75 |
| | | | 2 | 105 |
| | | | 2.5 | 130 |
| | | | 4 | 205 |
| | | | 6 | 310 |
| Φ4 mm | 160 A at most | up to Φ1,0 mm | 2 | 75 |
| | | | 2.5 | 95 |
| | | | 4 | 155 |
| | | | 6 | 230 |
| Φ5 mm | 200 A at most | | 2.5 | 75 |
| | | | 4 | 125 |
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| Φ3 mm | 120 A at most | Φ0.8 mm at most | 1.5 | 75 |
| | | | 2 | 105 |
| | | | 2.5 | 130 |
| | | | 4 | 205 |
| | | | 6 | 310 |
| Φ4 mm | 160 A at most | Φ1.0 mm at most | 2 | 75 |
| | | | 2.5 | 95 |
| | | | 4 | 155 |
| | | | 6 | 230 |
| Φ5 mm<br>Φ6 mm, low-melting | 250 A at most | up to Φ1,2 mm | 2.5 | 60 |
| | | | 4 | 100 |
| | | | 6 | 150 |
| **ProMIG-250-400V** | | | | |
| Φ3 mm | 120 A at most | Φ0.8 mm at most | 1.5 | 150 |
| | | | 2 | 210 |
| | | | 2.5 | 260 |
| | | | 4 | 410 |
| | | | 6 | 620 |
| Φ4 mm | 160 A at most | Φ1.0 mm at most | 2 | 150 |
| | | | 2.5 | 190 |
| | | | 4 | 310 |
| | | | 6 | 460 |
| Φ5 mm<br>Φ6 mm, low-melting | 250 A at most | up to Φ1,2 mm | 2.5 | 120 |
| | | | 4 | 200 |
| | | | 6 | 300 |

# 1. GENERAL PROVISIONS

Digital inverter semi-automatic machines PATON ProMIG-200/250/250-400V are designed for manual metal arc welding (MMA), tungsten arc inert gas welding (TIG) and semiautomatic metal inert/active gas welding (MIG/MAG) in the atmosphere of shielding gas with direct current. Advantageous completely digital control implemented in the design of the machine provides freedom from limitations typical for multi-functional systems based on analogous control system, which are always inherently geared towards a specific mode, while other modes are additional and have drawbacks in terms of control. On the contrary, control board of a completely digital system offers all capabilities of the source within the range of its full power, regardless of the mode of use. This Professional series is designed for industrial use. The source can be separated from the wire-feeding machine both for convenience and safety practices. What is more, additional adjustments allow setting the inverter rectifier to optimum settings in different situations. They provide virtually uninterruptible load duration at full fair rated current of 200 A and 250 A respectively, which is sufficient for work with any electrodes from $\Phi$1.6 mm in diameter up to low-melting $\Phi$6 mm electrodes, as well as for semiautomatic solid wire welding featuring wire from Φ0.6 mm to $\Phi$1.2 mm in diameter. Initially, the source is set to settings, which are optimum for most applications, and is quite easy to use if you do not go into additional details of settings, which require good welder's skills. For safety in dangerous working conditions, the rectifier is equipped with an in-built unit for open-circuit voltage reduction in MMA mode, which can be enabled or disabled. The distinctive feature of PATON semi-automatic machines is very robust, high-quality and structurally sound wire feeding mechanism, as well as availability of KZ-2 slot of world standard EURO type, which allows user changing torches at his/her own discretion.

This ProMIG model by PATON is equipped with a unit for overvoltage, as well as undervoltage, protection.

Due to increased frequency of voltage supplied to the transformer, the transformer can be made several tenfolds smaller. That is why weight and overall dimensions of this machine is several times smaller than those of regular equipment with identical output parameters.

**Main advantages:**

1. Wide range of welding parameters adjustment:
   a) in MMA mode – 1 (main) + 10 (additional)
   b) in TIG mode – 1 (main) + 8 (additional)
   b) in semiautomatic MIG/MAG mode – 2 (main) + 4 (additional)
2. Adjustable pulsed welding mode for all welding types.
3. In addition to voltage surge protection, the machine is equipped with a stabilization system for **large long-term** voltage variations in the 160 V to 260 V single-phase supply mains. However, it must be kept in mind that minimum voltage of 160 V allows for welding with an electrode not more than $\Phi$3 mm in diameter or semiautomatic welding with wire up to $\Phi$0.8 in diameter.
4. The machine fits standard domestic power mains. Due to high efficiency factor, the source provides **twice lower power consumption** compared to regular sources.
5. Adaptive fan speed – i.e. increases when the machine heats up and slows down when it is cold, thus prolonging service life of the fan and reducing amount of dust accumulated in the machine.
6. Convenient use due to high load duration (LD) at **rated current**, which enables virtually **uninterruptible** welding electrodes at rated current, at a temperature of 25 °C.
7. Increased machine reliability in dusty production environment, microelectronic circuitry of the source is located in a separate compartment.
8. All heating elements of the source are provided with an **electronic heat protection system.**
9. All electronic parts of the machine are impregnated with **two layers** of high-quality varnish, which ensures product reliability during the entire service life.
10. Enhanced arcing stability.

| PARAMETERS | ProMIG-200 | ProMIG-250 | ProMIG-250-400V |
|---|---|---|---|
| Rated voltage of 50 Hz supply mains, V | 220 | 220 | 3x400+N |
| Rated current consumption from mains, A | 25... 28 | 32... 36 | 10... 12 |
| Rated arc current, A | 200 | 250 | 250 |
| Maximum root-mean-square current, A | 270 | 335 | 335 |
| Load duration (LD) | 70% at 200 A<br>100% at 167A | 70% at 250 A<br>100% at 208A | 70% at 250 A<br>100% at 208A |
| Mains voltage variation range, V | 160~260 | 160~260 | ±20% |
| Arc current adjustment range, A | 10~200 | 12~250 | 12~250 |
| Arc voltage adjustment range, A | 12~28 | 12~28 | 12~28 |
| Stick electrode diameter, mm | 1.6~5.0 | 1.6~6.0 | 1.6~6.0 |
| Filler wire diameter, mm | 0.6~1.0 | 0.6~1.2 | 0.6~1.2 |
| Pulsed welding modes | MMA; TIG; MIG/MAG | MMA; TIG; MIG/MAG | MMA; TIG; MIG/MAG |
| Hot Start in MMA mode | adjustable | adjustable | adjustable |
| Arc Force in MMA mode | adjustable | adjustable | adjustable |
| Anti-Stick function in MMA mode | automatic | automatic | automatic |
| Open-circuit voltage reduction unit | on / off | on / off | on / off |
| MMA open-circuit voltage, V | 12 / 70 | 12 / 70 | 12 / 70 |
| Arc striking voltage, V | 110 | 110 | 110 |
| Rated power consumption, kW | 5.5... 6.1 | 6.9... 7.7 | 6.9... 7.7 |
| Maximum power consumption, kW | 6.6... 8.0 | 8.5... 11.0 | 8.5... 11.0 |
| Efficiency factor, % | 90 | 90 | 90 |
| Cooling | forced | forced | forced |
| Operating temperature range | –25... +45°C | –25... +45°C | –25... +45°C |
| Overall dimensions, mm (length, width, height) | 360 x 260 x 270 | 360 x 260 x 270 | 360 x 260 x 270 |
| Weight excluding coil and accessories, kg | 10.6 | 10.7 | 10.8 |
| Ingress protection class* | IP33 | IP33 | IP33 |

** For Professional series machines, their frame protects them from ingress of objects more than 2.5 mm in diameter, as well provides rain protection, so that water streaming vertically or at an angle of 60° to the vertical does not infringe the machine operation*

**Recommended length of power welding cables during welding:**

| Cable length (one way) | Maximum current | Cross-section area | Cable grade |
|---|---|---|---|
| **1...5 m** | **160 A at most** | **16 mm²** | **КГ 1х16** |
| **2...8 m** | **200 A at most** | **25 mm²** | **КГ 1х25** |
| **3...11 m** | **250 A at most** | **35 mm²** | **КГ 1х35** |



**1** – LCD display.

**2** – Buttons for adjusting the selected parameter for decreasing and increasing (by default: at MMA - arc current; at TIG - arc current; MIG/MAG - welding voltage).

**3** – Source function selection button in the current welding mode.

**4** – Welding mode selection button:

a) manual metal arc welding with a stick electrode MAW "MMA";

b) tungsten arc inert gas welding, with non-consumable electrode ARG «TIG»;

c) semi-automatic welding in protective gases SA "MIG/MAG".

**5** – Machine operation indicator:
a) permanent green light – during stabilization of source operating mode and MMA welding;
b) permanent yellow light – in the operator wait mode during tungsten arc inert gas welding and semiautomatic welding;
c) blinks green and yellow – while welding in any mode;
d) permanent red light – in case of malfunction;
e) no light – in case of mains voltage rise or drop beyond the normal value.

**6 –** Digital seven-segment display of the wire-feeding machine.
**7** – The button of wire leading-in (while gas is not supplied).
**8** – Buttons for adjusting parameters for decreasing and increasing (by default: wire feeding speed).
**9** – Shielding gas test button (wire feeding is disabled).
**10** – Button for selecting the functions of the wire-feeding machine.
**11** – Socket KZ-2 of EURO type for semiautomatic torch connection.
**12** – Plug for power current supply to the wire-feeding machine.
**A** – Power current socket "+" of bayonet type:
a) in case of MMA welding – for connection of electrode cable (very occasionally "mass" cable can be connected, if special electrodes are used);
b) in case of TIG welding – only "mass" cable is connected;
c) in case of MIG/MAG solid wire welding – a cable is connected internally to the feeder (by default);
d) in case of semiautomatic MIG/MAG fluxing wire welding – "mass" cable is connected.
**B** – Power current socket "-" of bayonet type:
a) in case of MMA welding – for connection of "earth" cable (very occasionally electrode cable can be connected, if special electrodes are used);
b) in case of TIG welding – only argon torch is connected;
c) in case of MIG/MAG solid wire welding – "earth" cable is connected;
d) in case of semiautomatic MIG/MAG fluxing wire welding – "earth" cable is connected internally to the feeder (it is possible to attach it independently).
**13** – The input for leading-in welding wire.
**14** – The coil holder for a wire with a spring braking mechanism.
**15** – The input for cable supplying control signals from the wire-feeding machine to the welding current source.
**16** – Fitting for shielding gas supply.
**17** – On/off automatic device of the source.

# 2. START-UP

**Attention:** Before start-up, read the chapter "Safety rules", paragraph 13.

## 2.1 INTENDED USE

The welding machine is designed solely for manual metal arc welding with a stick electrode, tungsten arc inert gas welding, as well as semiautomatic metal inert/active gas welding.

Other use of the machine is considered undue. The manufacturer is not responsible for damage cause by undue use of the machine.

Intended use of the machine implies adherence to instructions of this operating manual.

**Attention: Do not use the welding machine for pipes defrosting.**

## 2.2 INSTALLATION REQUIREMENTS

The welding machine is protected from ingress of foreign solid objects of more than 2.5 mm in diameter.

The welding machine can be placed and operated outdoors. Internal electric parts of the machine are protected against direct moisture impact, but not against condensate drops.

**ATTENTION:** Do not switch the machine off immediately after completion of welding works in hot weather or intense welding works in any weather conditions! Electronic parts must be allowed to cool down for 5 minutes.

**ATTENTION: When the machine is switched off and cools down after operation in cold season, condensate forms inside of it, so do not switch the machine on again in less than 3...4 hours!!!**

Therefore, do not switch the machine off in cold season, if you are going to switch it on within 4 hours.

The machine must be placed to ensure free inlet and outlet of cooling air through vent holes on the front and the rear panels. Take care that metal dust (for example, during emery grinding) does drawn directly into the machine by the cooling fan.

**ATTENTION: The machine may be life-threatening after a hard fall. So place it on stable solid surface.**

## 2.3 POWER CONNECTION

The welding machine of series design is rated for mains voltage of 220 V (-27% +18%) or three-phase mains voltage of 3x400 V (± 20%).

**Attention: All manufacturer's warranty liabilities become void if the single-phase machine is connected to mains voltage exceeding 450 V! Such a situation may occur due to huge imbalance of line-to-line voltage in standard mains or due to use of non-standard connection.**

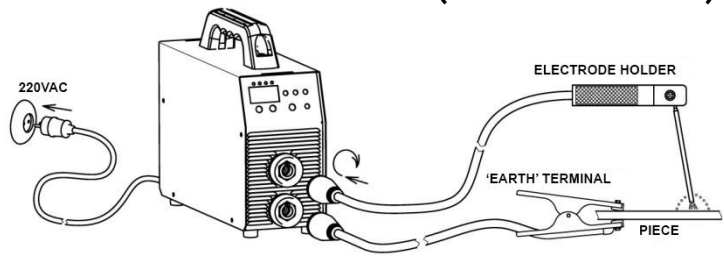
**In addition, manufacturer's warranty liabilities become void if mains line has been connected by mistake to the neutral wire or to the source earthing wire during connection of a three-phase machine.**

Mains connector, cross-sections of power supply cables and supply-line fuses must be selected on the basis of technical specifications of the machine.

### 2.4 MAINS PLUG CONNECTION

**Attention:** Mains plug shall correspond to supply voltage and current consumption of the welding machine (see technical data). In accordance with safety practices, use receptacles **with guaranteed earthing!!!**

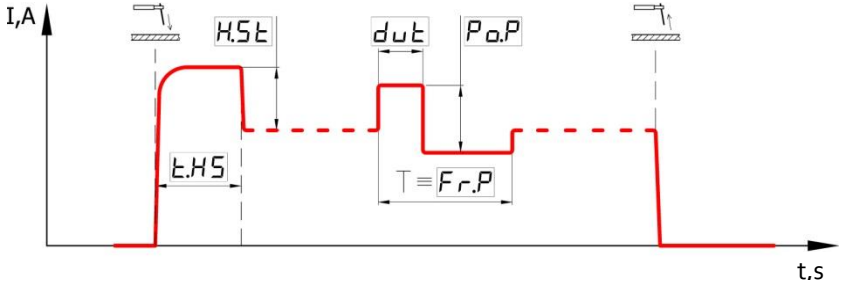
## 3. MANUAL METAL ARC WELDING (MMA WELDING)




Procedure for machine preparation to operation:
- insert the electrode cable into the source socket **A "+"**;
- insert the "earth" cable into the source socket **B "–"**;
- connect the "earth" cable to the work piece;
- connect the mains plug to the supply mains;
- set power switch **15** on the rear panel to position "I";
- set the MMA welding mode by pressing the button **5** and holding it for about 5 s. The indicator will start flashing, thus informing the user that the machine is ready for switching to the next welding mode. If you skipped the required welding mode, press button **5** again – the modes switch over end-around;
- use buttons **3** to set the main parameter, which is arc current;
- if necessary, additional functions of welding process can be adjusted – see changeover sequence in paragraph 6.1.

**Attention:** Once the power switch is set to position "I" in the MMA welding mode, the stick electrode becomes energized. Do not touch conductive or earthed objects, such as, for example, welding machine frame etc., with the electrode, since the machine will take this as a signal to start the welding process.

### 3.1 WELDING CYCLE – MMA




See paragraph 6.1 for sequence of changing the value of any function

### 3.2 HOT START FUNCTION

Advantages:

- improved striking even when using electrodes with bad striking properties;
- better penetration of base material during striking and, consequently, less poor penetrations;
- prevention of slag inclusions;
- manual adjustment; allows setting the function level to minimum value, thus significantly reducing power consumption in the initial moment of striking. This allows starting the source at values of mains voltage around the possible minimum value, but compromises the quality of the striking moment (the machine becomes similar to a transformer source, but in some cases this is the only possible method). The function can also be increased to maximum value for even better quality of the striking moment (if the machine is operated from good power mains). However, keep in mind that boosted current of this function can burn through the work piece when welding thin metal pieces, so it is recommended to reduce the Hot Start value in such a case.

The result is achieved by the following means:

In the moment of arc striking, arc current increases by the default value of +40% for a short time.

Example: welding with a $\Phi$3 mm electrode, set base value of arc current is 90 A.
Result: hot start current is 90 A + 40% = 126 A.

In the additional settings, you can change both Hot Start magnitude [H.St] and Hot Start time [t.HS]. Do not set Hot Start magnitude and time to unnecessarily high values, since large limit values required for very strong power supply mains, and if

good mains is not available, striking process can even abort. See paragraph 6.1 for sequence of changing the value of any function in the current welding mode

### 3.3 ARC FORCE FUNCTION

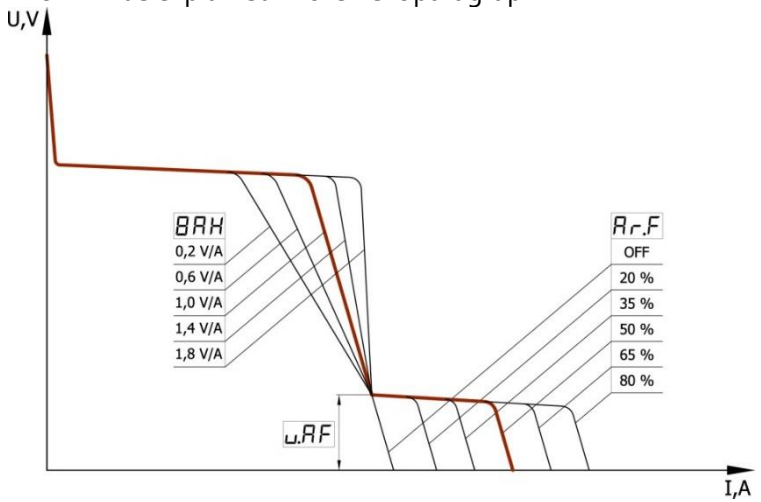
Advantages:

- enhanced short-arc welding stability;
- better transfer of metal drops into the weld pool;
- better arc striking;
- reduced risk of electrode sticking; however, it is not the Anti-Stick function, which will be explained in the next paragraph;
- manual adjustment; allows setting the function level to minimum value, thus reducing power consumption (although insignificantly), as well as heat input concentration when welding thin metal pieces. This reduces the risk of burn-through, but also reduces stability of short arc burning (the machine becomes similar to a transformer source). The function can also be increased to maximum value for even better stability of short-arc burning, but this requires for better supply mains and increases the risk of work piece burn-through.

The result is achieved by the following means:

Due to reduction of arc voltage below the minimum permissible voltage of stable arc burning, arc current increases by the default value of +40%.

In the additional settings you can change both Arc Force magnitude [Ar.F] and trigger level of this function [u.AF]. Do not set Arc Force magnitude and trigger level to unnecessarily high value, because at high limit values, especially during welding with thin electrodes less than Φ3.2 mm in diameter, affects actuation of Anti-Stick function, which will be explained in the next paragraph.



See paragraph 6.1 for sequence of changing the value of any function in the current welding mode

### 3.4 ANTI-STICK FUNCTION

During initial arc striking, the electrode can stick or be tacked to the work piece. Many functions of the machine resist this occurrence, but it is possible nevertheless, first leading to overheating and eventually to damage of the electrode.

In such a case, this machine actuates the built-in Anti-Stick function, which is constantly operating in the MMA mode. Within 0.6...0.8 s after detection of this condition, this function reduces arc current. In addition, this function helps the welding operator to separate (detach) the electrode from the work piece without risk to burn his eyes with accidental arc striking. Once the electrode is separated from the work piece, the process of welding can be readily resumed.

### 3.5 FUNCTION OF SLOPE ADJUSTMENT FOR A CURRENT-VOLTAGE CURVE

This function is primarily designed for convenient welding using electrodes with different types of coating. By default, current-voltage curve slope [CVS] is set to 1.4V/A, which corresponds to the most commonly used electrodes with rutile coating (АНО-21, МР-3). For more convenient work with basic-coated electrodes (УОНИ-13/45, ЛКЗ-70), it is recommended, although not required, to set the slope [CVS] to 1.0V/A. On the other hand, cellulose electrodes (ЦЦ-1, ВСЦ-4А) even require for setting the slope [CVS] to 0.2...0.6V/A, and sometimes it is also necessary to rise trigger level of the Arc Force Function [u.AF] up to 18 V. See paragraph 6.1 for sequence of changing the value of any function in the current welding mode

### 3.6 SHORT ARC WELDING FUNCTION

This function is especially important for overhead welding, when very long arc is undesirable. For this purpose, the machine provides the possibility to set the Short Arc function [Sh.A] to "ON" position. By default, it is set to "OFF" position. See paragraph 6.1 for sequence of changing the value of any function in the current welding mode

### 3.7 FUNCTION OF AN OPEN-CIRCUIT VOLTAGE REDUCTION UNIT

When performing welding works in vessels, tanks and applications requiring for enhanced electric safety system, one can enable the function of open-circuit voltage reduction.

In 0.1 s after the electrode is detached from the work piece, voltage on the source terminals drops to safe level below 12 V.

To enable this function, an open-circuit voltage reduction unit [BSn] is required. This unit is envisaged in this equipment model, but is set to "OFF" position by default, i.e. disabled, since it is known, that enabling of any function of this kind

results in somewhat worse arc striking. See paragraph 6.1 for sequence of changing the value of any function in the current welding mode

### 3.8 PULSED CURRENT WELDING FUNCTION

This function is designed to facilitate control over welding process in spatial positions other than downhand position, as well as during welding of non-ferrous metals. This function affects directly weld metal dilution and metal drop transfer into the weld pool and, consequently, on stability of weld forming and of the welding process. In other words, this process substitutes movements of welder's hand to some extent, which is especially important in hard-to-reach places. Correct setting determines weld shape and quality of weld forming, thus reducing risk of porosity and grain structure of the weld and consequently increasing weld strength.

In order to implement this functions, three parameters must be set in the machine: pulsing power [Po.P], pulsing frequency [Fr.P] and mark-to-space ratio (or duty ratio) [dut]. By default, pulsing power [Po.P], which is the key parameter, is set to "OFF" position, i.e. disabled, while pulsing frequency [Fr.P] and duty ratio [dut] are set to most common values of 50 Hz and 50% respectively. In order to enable this function, it is enough to set pulsing power [Po.P] to a value above zero. This parameter is set in percent of current set value of base arc welding.

Example: welding with a Φ3 mm electrode, set base value of arc current is 90 A, and pulsing power [Po.P] = 40%, while pulsing frequency [Fr.P] = 50 Hz and duty ratio [dut] = 50% by default.

Result: current will pulse in the range from 54 A to 126 A with frequency of 50 Hz, pulses will be of the same shape in terms of both magnitude and time. If duty ratio parameter [dut] is changed to a value other than 50%, pulses become asymmetric, but the machine calculates pulsing in such a way that, at constant set differential of pulses, average level of arc current is maintained at the level of set base arc current value of 90 A (i.e. equal to the set value), in order to keep the resulting average heat input into the weld at a constant level. This is necessary in the situation, when a user has reduced base current and provided maintenance of stable welding process using pulses – thus, decrease of heat input can be also clearly determined by comparison with initial base current.

These parameters are set differently in different situations in accordance with welding operator's requirements. See paragraph 6.1 for sequence of changing the value of any function in the current welding mode

# 4. TUNGSTEN ARC INERT GAS WELDING (TIG)

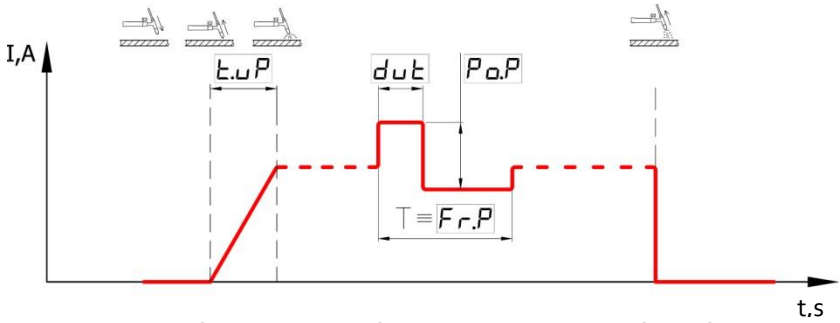
**Attention:** Shielding gas is most often pure argon "Ar", sometimes helium "He", as well as their mixtures with different ratios.

Example: argon + helium "40%Ar+60%He".

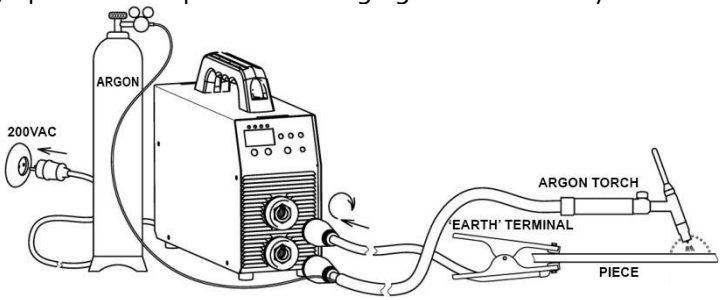
EXCLUDE usage of combustible gases! Other gases can only be used upon approval of the equipment manufacturer.

**Attention:** A common mistake is "needle-like" electrode sharpening; in this case, arc may wag from side to side. A correctly sharpened electrode has slightly blunted neg, and the smaller is the "butt" withstanding set current, the better. Remember that a very sharp-pointed electrode flashes off very easily at high arc currents due to low heat emission. In addition, sharpening notches shall be located along the electrode axis.

### 4.1.1 WELDING CYCLE – TIG-LIFT




See paragraph 6.1 for sequence of changing the value of any function




Procedure for machine preparation to operation:

- insert the torch cable into the source socket **B "-"**;
- insert the "earth" cable into the source socket **A "+"**;
- connect the "earth" cable to the work piece;
- install pressure reducer on the gas bottle;
- connect gas hose of the torch to pressure reducer of the gas bottle;
- open the cock of the gas bottle and check it for tightness;

- connect the mains plug to the supply mains;
- set power switch **15** on the rear panel to position "I";
- set the TIG welding mode by pressing the button **5** and holding it for about 5 s. The indicator will start flashing, thus informing the user that the machine is ready for switching to the next

welding mode. If you skipped the required welding mode, press button **5** again – the modes switch over end-around;
- use buttons **3** to set the main parameter, which is arc current;
- if necessary, additional functions of welding process can be adjusted – see changeover sequence in paragraph 6.1.

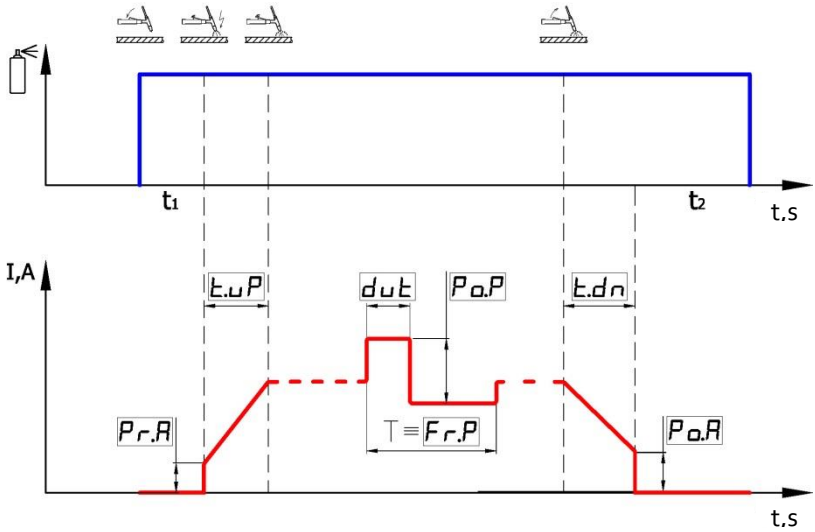
**Attention:** Argon torch shall be a valve torch, with a bayonet connector of $\Phi$13 mm. Select maximum torch current depending on your operating requirements.

### 4.1.2 TIG-LIFT ARC STRIKING FUNCTION

This function is installed by default in this model of equipment and is designed for torches with contact arc striking, without use of high-frequency injection units and other similar units. However, unlike the conventional method, it completely eliminates surge current in the moment of striking, thus reducing several-fold destruction of the non-consumable tungsten electrodes and ingress of its inclusions into the weld, which is very adverse effect.

This function is implemented by touching the work piece with the element. The user can keep the electrode in this position for an unlimited time, and when he/she decides that he/she is ready to proceed with welding (for example: he/she has covered the eyes with a headshield and sufficiently purged the place of welding with shielding gas), it is enough to start SLOWLY lifting the tip of the sharpened electrode from the work piece. The machine will detect this moment and take it as a signal to start the welding process. Thus, it will start FADING arc current up to the set value. The higher is base operating current, the faster the electrode shall be lifted, otherwise it will flash off. Time of current fade-in [t.uP] up to the set value will be reviewed in the next paragraph.

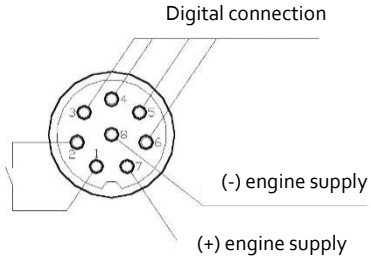
### 4.1.3 WELDING CYCLE – TIG-2T




See paragraph 6.1 for sequence of changing the value of any function

The procedure of the machine preparation for operation with an external high-frequency injection unit is individual and shall be described in the operating manual of the high-frequency injection unit. Source switch-on control slot is located on the rear panel. Use only contacts 1 and 2, NEVER confuse them with contacts 3 and 4 – these are contacts of the supply source of the wire-feeding machine, and if they are accidentally short-circuited, this source will break down!

**Attention:** If this slot is not used, cover it with a rubber cap to prevent clogging.




After assembly is completed:

- switch on the non-contact arc striking unit (high-frequency injection unit);
- set power switch **15** on the rear panel of the source to position "I";
- set the TIG welding mode by pressing the button **5** and holding it for about 5 s. The indicator will start flashing, thus informing the user that the machine is ready for switching to the next welding mode. If you skipped the required welding mode, press button **5** again – the modes switch over end-around;

- set the function of button of the TIG-LIFT torch by pressing button **5** until the indicator shows [But], in 1 s after the button is released, the machine will display current positions of this function: use buttons **3** to set it to [2t]. If nothing is done

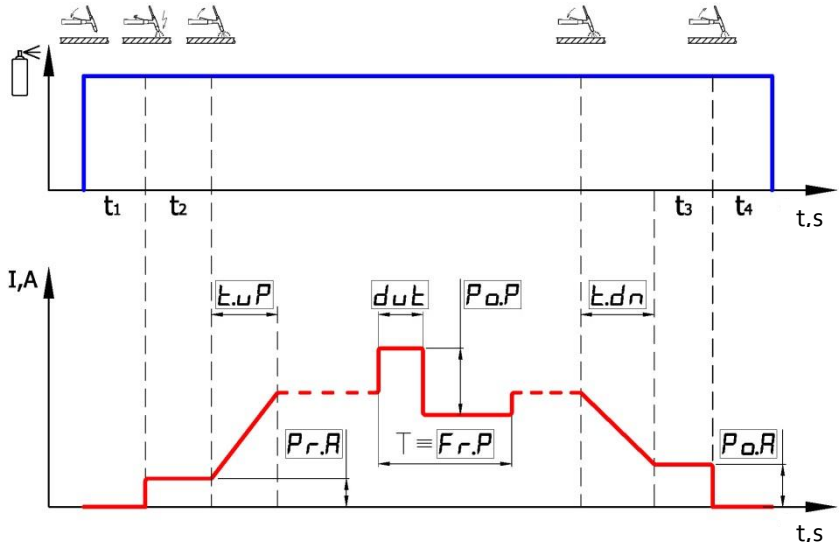
for a long time, the machine will leave this function. You can return to it in the same way, and if you skipped the required welding mode, press button **5** again – the modes switch over end-around;
- use buttons **3** to set the main parameter, which is arc current;
- if necessary, additional functions of welding process can be adjusted – see changeover sequence in paragraph 6.1.

**Attention:** Argon torch shall be a button torch, with a bayonet connector of $\Phi$13 mm. Select maximum torch current depending on your operating requirements.

### 4.1.4 FUNCTION OF BUTTON ON A TIG-2T TORCH

This control button function is used only upon availability of an external independent non-contact arc-striking unit (high-frequency injection units) and in-built gas valve. Cable of the torch control button is connected directly to this unit. When the torch button is pressed, the control signal is sent to the high-frequency injection unit, which performs the function of weld zone pre-purging with gas $t_1$ (opens the gas valve) and sends the switch-on signal to the PROMIG-200P/250P source with a time delay; at the same time, a high-frequency high-voltage pulse is issued for arc striking. The source performs all other functions (they will be explained in details in next paragraphs) in accordance with the welding cycle described above. After the button is released, the source performs its functions and switches off independently upon completion. The high-frequency injection unit must perform the function of weld zone post-purging with gas $t_2$ (close the gas valve with a delay).
**ATTENTION: The high-frequency injection unit MUST be equipped with a protective circuit, which protects the inverter output against fault due to high-voltage discharge created by the unit at the moment of arc striking. Protection circuit must always be enabled before using the unit.**

### 4.1.5 WELDING CYCLE – TIG-4T




See paragraph 6.1 for sequence of changing the value of any function

The procedure of the machine preparation for operation with an external high-frequency injection unit is individual and shall be described in the operating manual of the high-frequency injection unit. Source switch-on control slot is located on the rear panel; the connection diagram is the same as for TIG-2T mode (see paragraph 4.1.3). After assembly is completed:

- switch on the non-contact arc striking unit (high-frequency injection unit);
- set power switch **15** on the rear panel of the source to position "I";
- set the TIG welding mode by pressing the button **5** and holding it for about 5 s. The indicator will start flashing, thus informing the user that the machine is ready for switching to the next welding mode. If you skipped the required welding mode, press button **5** again – the modes switch over end-around;
- set the function of button of the TIG-4T torch by pressing button **5** until the indicator shows [But], in 1 s after the button is released, the machine will display current positions of this function: use buttons **3** to set it to [4t]. If nothing is done for a long time, the machine will leave this function. You can return to it in the same way, and if you skipped the required welding mode, press button **5** again – the modes switch over end-around;
- use buttons **3** to set the main parameter, which is arc current;
- if necessary, additional functions of welding process can be adjusted – see changeover sequence in paragraph 6.1.

**Attention:** Argon torch shall be a button torch, with a bayonet connector of $\Phi$13 mm. Select maximum torch current depending on your operating requirements.

### 4.1.6 FUNCTION OF BUTTON ON A TIG-4T TORCH

This control button function is used only upon availability of an external independent non-contact arc striking unit (high-frequency injection units) and in-built gas valve. Cable of the torch control button is connected directly to this unit. Pressing of the torch control button is processed similarly to TIG-2T welding cycle (see paragraph 4.1.4), but there is the first difference in the beginning of welding: while the button is held when pressed for the first time, weld zone pre-purging with gas $t_1$ and high-voltage striking will be performed at constant $t_2$ preheating current (pilot arc) on the source output. The process of current raising, resulting in operating current establishment in the source, will start only after the button release, i.e. there is no need to hold the button during operating current. The second difference takes place in the end of welding: after the torch button is pressed for the second time, current starts dropping to the level of crater filling current and is maintained on that level $t_3$ until the button is released. Only when the button is released for the second time, the source switches off, and the high-frequency injection unit must perform the function of weld zone post-purging with gas $t_4$ (gas valve is closed with a delay).
**ATTENTION: The high-frequency injection unit MUST be equipped with a protective circuit which protects the inverter output against fault due to high-voltage discharge created by the unit at the moment of arc striking. Protection circuit must always be enabled before using the unit.**

### 4.2 PREHEATING CURRENT (PILOT ARC) FUNCTION

This function is required to ensure convenient use of torch in the moment of arc striking. It allows starting the welding process at low current value, which only maintains the process, but does not provide significant heat input and does not burn the work piece through. If TIG-4T button mode is used, place of welding may be preliminary heated. By default, preliminary current [Pr.A] is set to 15 A. See paragraph 6.1 for sequence of changing the value of any function in the current welding mode

### 4.3 ARC CURRENT FADE-IN FUNCTION

Except for saving operating life of the electrode and, to some extent, of the torch itself, this function is also requires for convenient use of the torch. It eliminates initial splashing of weld pool. In addition, if TIG-2T button mode is used, one can guide the torch exactly to the required welding place during the set time of current

fade-in [t.uP], since the place of arc striking on critical-duty work pieces is not always coincident with the place of welding. Place of welding can also be preliminarily heated. By default, the time is set to 1.0 s. See paragraph 6.1 for sequence of changing the value of any function in the current welding mode

### 4.4 ARC CURRENT FADE-OUT FUNCTION

This function is essential for improving the process of crater filling. This crater is formed by pressure of base operating arc current and is a nucleus of weld defects, thus being a very adverse effect. Therefore, the resulting cavity can be filled during the time of current fade-out [t.dn]. By default, the time is set to 2.0 s. See paragraph 6.1 for sequence of changing the value of any function in the current welding mode

### 4.5 CRATER FILLING CURRENT FUNCTION

This function is essential for setting the final level of pressure drop after completion of welding. This current is required for crater filling if TIG-4T button mode is used (when the torch button is being held for the second time). By default, crater filling current is set to 20 A. See paragraph 6.1 for sequence of changing the value of any function in the current welding mode

### 4.6 PULSED CURRENT WELDING FUNCTION

This function is designed to facilitate control over welding process in spatial positions other than downhand position, as well as during welding of non-ferrous metals. This function affects directly weld metal dilution and, consequently, on stability of weld forming. It substitutes movements of welder's hand to some extent, which is especially important in hard-to-reach places. It also somewhat forces drop transfer from the filler wire into the weld pool. Correct setting determines weld shape and quality of weld forming, thus reducing risk of porosity and grain structure of the weld and consequently increasing weld strength.

In order to implement this functions, three parameters must be set in the machine: pulsing power [Po.P], pulsing frequency [Fr.P] and mark-to-space ratio (or duty ratio) [dut]. By default, pulsing power [Po.P], which is the key parameter, is set to "OFF" position, i.e. disabled, while pulsing frequency [Fr.P] and duty ratio [dut] are set to most common values of 5.0 Hz and 50% respectively. In order to enable this function, it is enough to set pulsing power [Po.P] to a value above zero. This parameter is set in percent of current set value of base arc welding.

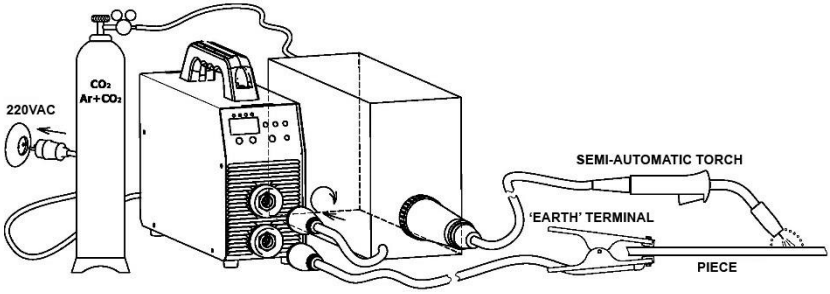
Example: welding with a non-consumable tungsten electrode of 2 mm in diameter, set base value of arc current is 100 A, and pulsing power [Po.P] = 30%, while pulsing frequency [Fr.P] = 5.0 Hz and duty ratio [dut] = 50% by default.

Result: current will pulse in the range from 70 A to 130 A with frequency of 5 Hz, pulses will be of the same shape in terms of both magnitude and time. If duty ratio

parameter [dut] is changed to a value other than 50%, pulses become asymmetric, but the machine calculates pulsing in such a way that, at constant set differential of pulses, average level of arc current is maintained at the level of set base arc current value of 100 A (i.e. equal to the set value), in order to keep the resulting average heat input into the weld at a constant level. This is necessary in the situation, when a user has reduced base current and provided maintenance of stable welding process using pulses – thus, decrease of heat input can be also clearly determined by comparison with initial base current.

These parameters are set differently in different situations in accordance with welding operator's requirements. See paragraph 6.1 for sequence of changing the value of any function in the current welding mode

# 5. SEMIAUTOMATIC METAL INERT/ACTIVE GAS WELDING (MIG/MAG)




**Attention:** In the most general case, carbon dioxide "$CO_2$" is used as shielding gas for welding of iron, and aluminium is welded only using inert gases, such as argon "Ar" and sometimes expensive helium "He". As an alternative option for stainless and high-alloy steels, mixtures with different ratios are often used, such as "70%Ar+30%$CO_2$". Other gases can only be used upon approval of the equipment manufacturer.

**Attention:** Since the machine is equipped with a standard torch slot KZ-2 of EURO type, the user can purchase a torch at his/her own discretion in the future.

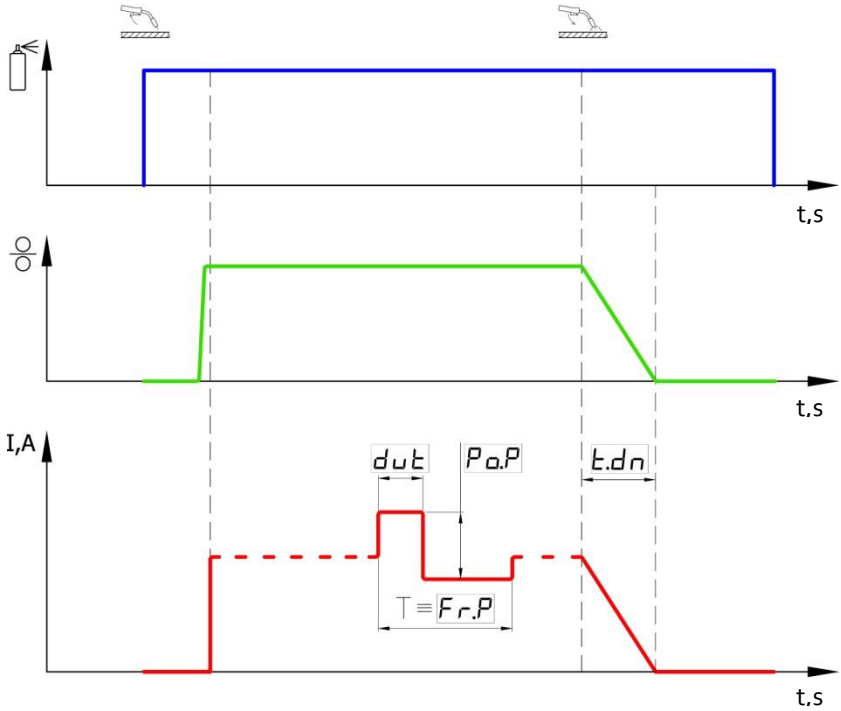
Procedure for preparation to operation:

- install the source on the base of wire-feeding machine, for better rigidity brace the source and the base with a strap (through slit-type apertures on the sides of the source) and tighten the strap. The strap is bundled with the machine;
- connect the supply cable of the wire-feeding machine to slot **12** on the rear panel of the source;
- insert the "earth" cable into the source socket **B "-"**;
- connect the "earth" cable to the work piece;

- connect the power current plug **11** of the wire-feeding machine of the source socket **A** "+";
- connect the semiautomatic welding torch to socket **10** of the wire-feeding machine;
- install pressure reducer on the gas bottle with shielding gas "$CO_2$" or "Ar+$CO_2$";
- connect gas hose to pressure reducer of the gas bottle and fitting **13** on the rear panel of the wire-feeding machine;
- open the cock of the gas bottle and check it for tightness;
- connect mains plug of the source to the supply mains;
- set power switch **15** on the rear panel of the source to position "I";
- set the semiautomatic MIG/MAG welding mode by pressing the button **5** and holding it for about 5 s. The indicator will start flashing, thus informing the user that the machine is ready for switching to the next welding mode. If you skipped the required welding mode, press button **5** again – the modes switch over end-around;
- use buttons **3** to set the required arc voltage;
- feed the wire using the "wire feed" button on the wire-feeding machine;
- test operation and presence of shielding gas supply using the "gas test" button on the wire-feeding machine;
- use the potentiometer to set the required speed of wire feeding on the wire-feeding machine;
- if necessary, additional functions of welding process can be adjusted – see changeover sequence in paragraph 6.1.

Remember to supply shielding gas. If you are new to welding and do not have experience in establishing optimum pressure for welding of a specific work piece, you can for the first time set gas pressure above the optimum value ~0.2 MPa: this will have minor effect on the process, only increase consumption of shielding gas. However, follow general recommendations on semiautomatic welding in the future to save gas. Start also with average position of wire feeding speed controller on the feeding machine (~ 7...10 m/min.) and average source voltage (~19 V) for any diameter of installed wire (Φ0.6...1.2 m). This configuration may be not optimum, but, under condition of correct work, even wire feeding (without jerks) and correct connection, this "source + feeding machine" combination shall be able to weld so far. For better results, adjust source voltage with buttons **3** and use the potentiometer **8** to adjust the speed of wire feeding by the feeding machine according to general recommendations on semiautomatic welding. Remember that these parameters are different for each specific application.

## 5.1 WELDING CYCLE – MIG/MAG




See paragraph 6.1 for sequence of changing parameters of functions.

### 5.2 FUNCTION OF VOLTAGE FADE-OUT IN THE END OF WELDING

This function is designed for smooth filling of a crater, which is formed in the weld pool by the action of electromagnetic draft of the electric arc and subsequently becomes a source of weld defects. Release of the torch button in the end of welding becomes the signal to start the function. Once this happens, stop moving the torch and weld the pothole (which is a crater) in the weld with fading-out voltage. Smoothness of this process can be controlled through voltage fade-out time [t.dn], which is set to 1.0 s by default and can be changed at user's discretion. See paragraph 6.1 for the procedure of changing.

### 5.3 PULSED VOLTAGE WELDING FUNCTION

This function is designed to facilitate control over welding process in spatial positions other than downhand position, as well as during welding of non-ferrous metals. This function affects directly weld metal dilution, therefore it primarily affects the shape of weld. It also forces drop transfer from the filler wire into the

weld pool and, consequently, affects the process stability. Just as other types of welding, this process substitutes movements of welder's hand to some extent, which is especially important in hard-to-reach places. In addition to weld shape, correct setting also determines quality of weld forming, thus reducing risk of porosity and grain structure of the weld and consequently increasing weld strength.

In order to implement this functions, three parameters must be set in the machine: pulsing power [Po.P], pulsing frequency [Fr.P] and mark-to-space ratio (or duty ratio) [dut]. By default, pulsing power [Po.P], which is the key parameter, is set to "OFF" position, i.e. disabled, while pulsing frequency [Fr.P] and duty ratio [dut] are set to most common values of 20 Hz and 50% respectively. In order to enable this function, it is enough to set pulsing power [Po.P] to a value above zero. This parameter is set in percent of voltage set value of base arc welding.

Example: welding with wire of 0.8 mm in diameter, set wire feeding speed is 5.5 m/min., set base value of arc voltage is 18 V, and pulsing power [Po.P] = 20%, while pulsing frequency [Fr.P] = 20 Hz and duty ratio [dut] = 50% by default.

Result: current will pulse in the range from 14.4 V A to 21.6 V with frequency of 20 Hz, pulses will be of the same shape in terms of both magnitude and time. If duty ratio parameter [dut] is changed to a value other than 50%, pulses become asymmetric, but the machine calculates pulsing in such a way that, at constant set differential of pulses, average level of arc voltage is maintained at the level of set base voltage value of 18 V (i.e. equal to the set value), in order to keep the resulting average heat input into the weld at a constant level.

If the goal is to reduce heat input into the weld (for example, when welding thin metal pieces), it is enough to reduce base voltage of the source in a standard way, whereas the pulses will adapt to this mode automatically. Thus, the user will clearly see the reduction of heat input into the weld compared to the previous mode, while varying power and duty ratio of pulses in any combination in order to achieve stable process.

These parameters are set differently in different situations in accordance with welding operator's requirements. See paragraph 6.1 for sequence of changing the value of any function in the current welding mode

# 6. MACHINE SETTING

If buttons on the front panel are not touched, the machine always displays value of the main parameter of the current welding mode on its digital indicator:

1) in MMA mode – arc current;
2) in TIG mode – arc current;
3) in MIG/MAG – arc voltage.

Button **5** on the machine front panel is multifunctional and allows for the following:

1) end-around selection of any function in the current welding mode (quick pressing);
2) end-around selection of welding mode (holding for more than 5 s);
3) reset of all functions to factory settings for the current welding mode (holding for more than 12 s).

Buttons **3** on the front panel serve to change the value of the selected function or the main parameter.

### 6.1 SWITCHING TO THE REQUIRED FUNCTION

When button **5** is pressed, the digital display shows graphic name of the current function, which can be viewed while the button is pressed. After the button is released, the display shows current value of this function, which can be increased or decreased with buttons **3**. By quickly pressing and releasing button **5**, one can switch to the next function end-around.

**Attention:** If button **5** is being held for a long time while the user views the function name, the digital board will blink once in about 3.5 s, thus warning, that if the user does not release the button, the machine will soon transfer to the mode of switching to the next welding mode (this mode will be explained in the next paragraph).

### 6.2 SWITCHING TO THE REQUIRED WELDING MODE

If button **5** is pressed and held for more than 5 s, the digital boards will start blinking, thus warning, that if button **5** will be released now, the machine will switch to the next welding mode. The modes switch over end-around, it can be seen from lamps **4** on the front panel. This process might seem as somewhat long, but it will not be performed very often in the course of operation.

**Attention:** If button **5** is being held for even longer time (more than 12 s), the board will display countdown 333...222...111, and the user must release the button before this time expires, unless he wants to reset settings of this mode to standard factory settings. This task will be considered in the next paragraph.

### 6.3 RESET OF ALL FUNCTIONS SETTINGS FOR THE CURRENT WELDING MODE

There can be situations when the user becomes confused with the machine settings. In order to reset them to standard factory values, just hold button **5** for more than 12 seconds. As it was mentioned in previous paragraphs, in about 5 s the machine will warn about readiness to switch to the next mode, but do not get embarrassed and continue holding the button. In another 5 s the board will display

countdown 333...222...111, and once it shows "000", all settings of the current welding mode will be reset to factory values. In order to reset all machine settings, this procedure shall be performed for each mode individually. It is designed this way for convenience, so that the user does not reset customized settings of the remaining two modes.

# 7. GENERAL LIST AND SEQUENCE OF FUNCTIONS

**MMA welding mode**

0) [-1-] – main displayed parameter CURRENT = 90 A (by default)
   a) 10... 200 A (increment 1 A) for PROMIG-200
   b) 12... 250 A (increment 1 A) for PROMIG-250
1) [H.St] Hot Start power = 40% (by default)
   a) 0[OFF]... 100% at low current values (increment 1%)
2) [t.HS] Hot Start time = 0.3 s (by default)
   a) 0.1... 1.0 s (increment 0.1 s)
3) [Ar.F] Arc Force power = 40% (by default)
   a) 0[OFF]... 100% at low current values (increment 1%)
4) [u.AF] Arc Force trigger level = 12 V (by default)
   a) 9... 18 V (increment 1 V)
5) [CVS] current-voltage curve slope = 1.4V/A (by default)
   a) 0.2... 1.8V/A (increment 0.4V/A)
6) [Sh.A] short arc welding = OFF (by default)
   a) ON
   b) OFF
7) [BSn] voltage reduction unit = OFF (by default)
   a) ON
   b) OFF
8) [Po.P] current pulsing power = OFF (by default)
   a) 0[OFF]... 80% (increment 1%)

9) [Fr.P] current pulsing frequency = 50 Hz (by default)
   a) 10... 500 Hz (increment 1 Hz)
10) [dut] mark-to-space ratio (duty ratio) is the ratio of larger current cycle to pulse spacing in percent = 50% (by default)
   a) 20... 80% (increment 1%)

**TIG welding mode**

0) [-2-] – main displayed parameter CURRENT = 100 A (by default)
   a) 10... 200 A (increment 1 A) for PROMIG-200
   b) 12... 250 A (increment 1 A) for PROMIG-250

1) [But] torch button mode = [LFT] (by default)
    a) [LFt] – contact striking mode TIG-LIFT
    b) [2t] – non-contact striking mode, TIG-2T button mode
    c) [4t] – non-contact striking mode, TIG-4T button mode
2) [Pr.A] preliminary current (pilot arc) = 15 A (by default)
    a) 10... 40 A (increment 1 A) for PROMIG-200
    b) 12... 40 A (increment 1 A) for PROMIG-250
3) [t.uP] current fade-in time = 1.0 s (by default)
    a) 0.1... 5.0 s (increment 0.1 s)
4) [t.dn] current fade-out time = 2.0 s (by default)
    a) 0.1... 5.0 s (increment 0.1 s)
5) [Po.A] crater filling current = 20 A (by default)
    a) 10... 60 A (increment 1 A) for PROMIG-200
    b) 12... 60 A (increment 1 A) for PROMIG-250
6) [Po.P] current pulsing power = OFF (by default)
    a) o[OFF]... 80% (increment 1%)
7) [Fr.P] current pulsing frequency = 5.0 Hz (by default)
    a) 0.2... 50.0 Hz (increment 0.1 Hz)
8) [dut] mark-to-space ratio (duty ratio) is the ratio of larger current cycle to pulse spacing in percent = 50% (by default)
    a) 20... 80% (increment 1%)

**MIG/MAG welding mode**

o) [-3-] – main displayed parameter VOLTAGE = 19.0 V (by default)
    a) 12.0... 28.0 V (increment 0.1 V)
1) [t.dn] voltage fade-out time = 1.0 s (by default)
    a) 0.1... 5.0 s (increment 0.1 s)
2) [Po.P] voltage pulsing power = OFF (by default)
    a) o[OFF]... 80% (increment 1%)
3) [Fr.P] voltage pulsing frequency = 20 Hz (by default)
    a) 5... 200 Hz (increment 1 Hz)
4) [dut] mark-to-space ratio (duty ratio) is the ratio of larger voltage cycle to pulse spacing in percent = 50% (by default)
    a) 20... 80% (increment 1%)

# 8. ATTENDANCE AND TECHNICAL MAINTENANCE

**Attention:** Before opening the machine, switch it off and disconnect the mains plug. Wait until internal circuits of the machine de-energize (about 5 minutes), and

only then proceed with other actions. When leaving the machine, install a restrictive plate which prohibits switching the machine on.

In order to ensure proper operation of the machine for many years, adhere to several rules:

- conduct inspection in accordance with safety practices within the established time intervals (see "Safety rules" chapter);
- if the machine is subject to heavy use, it is recommended to purge it with dry compressed air once per six month. **Attention:** If the machine is purged from a very short distance, electronic components may be damaged;
- if the machine is very dust-laden, clean channels of the cooling system manually.

## 9. GENERATOR OPERATION MODE

The power source can be operated from a generator upon the following condition:

| When working with electrodes | Set current value in MMA and TIG modes | When working with wire of specified diameter in MIG/MAG mode | Minimum generator power |
|---|---|---|---|
| Φ2 | 80 A at most | Φ0.6 mm at most | 2.9 kVA |
| Φ3 | 120 A at most | Φ0.8 mm at most | 4.5 kVA |
| Φ4 | 160 A at most | Φ1.0 mm at most | 6.2 kVA |
| Φ5 | 200 A at most | | 8.0 kVA |
| Φ6, low-melting | 250 A at most | up to Φ1,2 mm | 11.0 kVA |

**In order to ensure trouble-free operation:** Output voltage of the generator shall not fall beyond the permissible range of 160~260 V; these are permitted values for each phase, if a three-phase machine is used.

## 10. STORAGE RULES

A preserved and packaged source shall be stored in storage conditions 4 as per GOST 15150-69 for 5 years.

A de-preserved source shall be stored in dry closed rooms at air temperature not lower than plus 5 °C. The rooms must be free from acid vapours and other active substances.

## 11. TRANSPORTATION

A packaged source can be transported by any means of transportation, which provide its integrity, complying with all transportation rules established for this type of transport.

## 12. TECHNICAL SPECIFICATIONS

**Attention:** If a source is designed for special supply voltage, its technical specifications are provided on the identification plate on the rear panel. In this case, mains plug and mains cable shall be selected according to the voltage used.

| | |
|---|---|
| Rated voltage of mains 50/60 Hz | ~220 V<br>~3x400B |
| Efficiency ratio (at rated current) | 90% |
| Arc current adjustment range | 10 – 200 A<br>12~250 A |
| Arc current at:<br>5 min. / 70% LD<br>5 min. / 100% LD | <br>200 A / 250 A<br>167 A / 208 A |
| Maximum power consumption | 6,6... 8.0 kVA<br>8,5... 11.0 kVA |
| Normal operating voltage:<br>- manual metal arc welding with an electrode (MMA)<br>- tungsten arc inert gas welding with an electrode (TIG)<br>- semiautomatic welding with wire (MAG/MIG) | <br>21~28 V<br>10~18 V<br>12~28 V |

## 13. DELIVERY SET

1. Welding arc supply source with a mains cable – 1 pce.
2. Wire-feeding machine (+ rollers 0.6~0.8 and 1.0~1.2) – 1 pce.
3. Shoulder carrying strap – 1 pce.
4. PATON brand corrugated box – 1 pce.
5. 3 m Binzel semi-automatic torch – 1 pce.
6. 3m welding cable with Binzel electrode holder – 1 pce.
7. 3 m welding cable with Binzel ground terminal – 1 pce.
8. Operating manual – 1 pce.

## 14. WARRANTY LIABILITIES

Pilot Plant of Welding Equipment named after Ye. O. Paton guarantees proper operation of the supply source, provided that the consumer observes operating, storage and transportation conditions.

Free warranty servicing is not provided in case of:

- mechanical damages of the welding machine!

Warranty operation life is __ **years** from the sale date specified in the data sheet.

**Warranty servicing does not include** replacement of consumable parts that have worn out in the course of operation or are subject to obligatory replacement during repair, such as supply connectors and power sockets of the machine.

## 15. SAFETY RULES

### GENERAL PROVISIONS

The welding machine is manufactured in accordance with technical standards and established safety rules. However, incorrect handling results in the following dangers:

- injury of maintenance personnel or third persons;
- damage of the machine or property of the enterprise;
- derangement of efficient working process.

All persons dealing with start-up, operation, attendance and maintenance of the machine must:

- undergo relevant qualifying examination;
- have knowledge about welding;
- carefully follow these instructions.

Malfunctions that can reduce safety must be eliminated immediately.

### USER'S RESPONSIBILITIES

The user assures that he will not allow working with the welding machine, except for persons who:

- have become familiar with the main safety rules and have been trained on using welding equipment;
- have read the "Safety rules" chapter and instruction on necessary safety measures provided in this manual and have confirmed this by signature.

### INDIVIDUAL PROTECTIVE EQUIPMENT

To ensure individual protection, adhere to the following rules:

- wear robust footwear, which retains insulating properties in moist conditions as well;
- protect the hands with insulating gloves;
- protect the eyes with a headshield, with is equipped with a black-light filter complying with safety standards;
- wear only proper low-flammable clothes.

### DANGER OF HAZARDOUS GASES AND VAPOURS

- if smoke and hazardous gases emerge in the operating zone, remove them with special means;

- provide sufficient fresh air inflow;
- arc radiation field must be free from solvent vapours.

**DANGER OF SPARKING**

- remove flammable objects from the operating zone;
- it is not allowed to weld vessels where gases, fuel or oil products are stored or used to be stored. Residues of these products may explode;
- when working in fire-dangerous or explosion-dangerous rooms, adhere to special rules in compliance with national and international regulations.

**DANGER OF MAINS AND ARC CURRENT**

- electric shock can lead to death;
- magnetic fields created by this machine can have adverse effect on operability of electrical appliances (such as cardiac pacemakers). People who use such appliances shall consult with a doctor before approaching the operating welding area;
- welding cable must be robust, intact and insulated. Loose connections and damaged cables must be immediately replaced. Mains cables and cables of the welding machine must be checked for insulation integrity by an electrical engineer on a regular basis;
- when using the machine, never remove its outer case.

**INFORMAL SAFETY MEASURES**

- the manual must be always stored near the place where the welding machine is used;
- in additional to the manual, adhere to general and local safety and environmental rules;
- all instructions on the welding machine shall be kept readable.

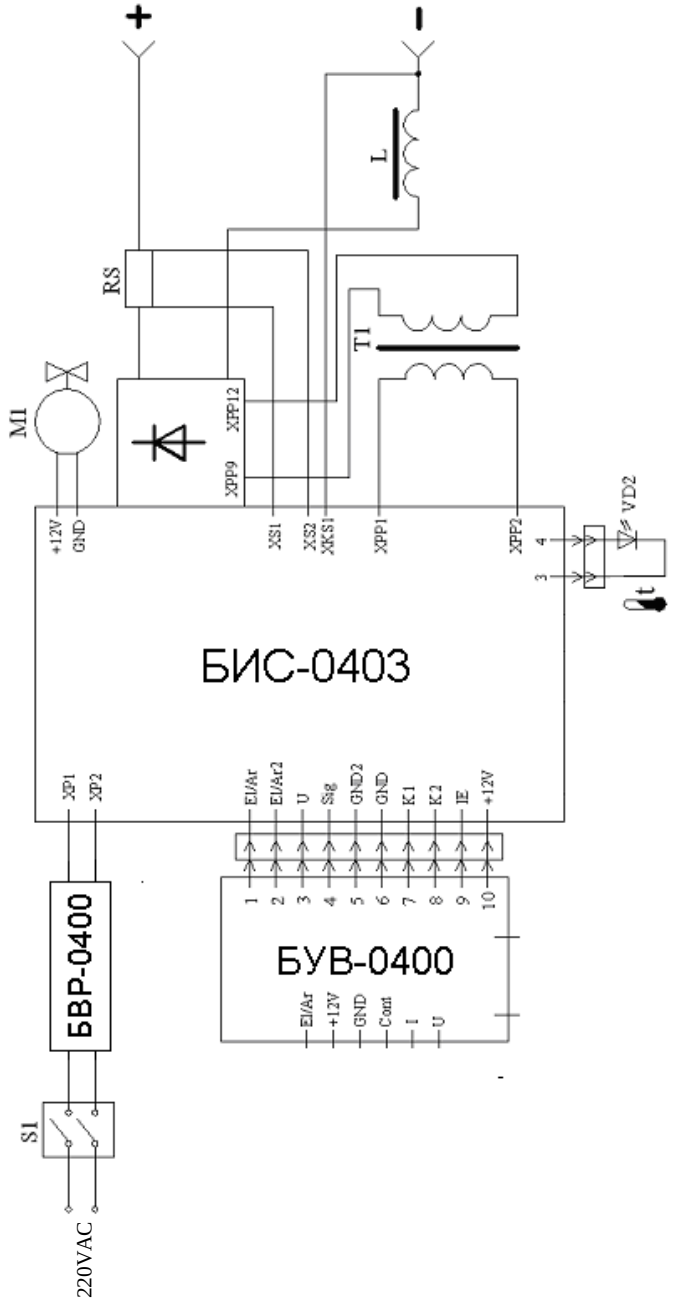
**STRAY WELDING CURRENTS**

- make sure that the earth cable terminal is securely connected to the work piece;
- if possible, avoid installing the welding machine directly on the conductive coating of floor or work table, use insulating pads.

**SAFETY MEASURES IN NORMAL CONDITIONS**

Check the machine for external damages and performance of safety devices at leat once a week.

Schematic electrical diagram
of the Source PATON ProMIG-200/250 DC MMA/TIG/MIG/MAG



# 16. ACCEPTANCE CERTIFICATE

Arc inverter rectifier PATON PROMIG-200/250

Serial number _____**P** has been approved for operation.

Sale date "_____"_____20____

Stamp here _____
(vendor signature)

Date of receipt for repair "_____"_____20____

_____
(signature)

Symptoms of non-operability:

_____

Cause: _____

_____

_____

_____

==========

Date of receipt for repair "_____"_____20____

_____
(signature)

Symptoms of non-operability:

_____

Cause: _____

_____

_____

_____

Date of receipt for repair "_____"_____20____

_____
(signature)

Symptoms of non-operability:

_____

Cause: _____

_____

_____

_____

==========

Date of receipt for repair "_____"_____20____

_____
(signature)

Symptoms of non-operability:

_____

Cause: _____

_____

_____

_____