Pilot Plant since 1959

PATON®

# Data sheet and operating manual

PATON™ semi automatic digital inverter

**StandardMIG-160 | StandardMIG-200 |**
**StandardMIG-250 | StandardMIG-250-400V**

## CONTENTS

## 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 | Phase conductor cross-section, sq. mm | Maximum cable length, m |
|---|---|---|---|---|
| **StandardMIG-160** | | | | |
| Φ2 mm | 80A at most | Φ0.6 mm at most | 1.0 | 75 |
| | | | 1.5 | 115 |
| | | | 2.0 | 160 |
| | | | 2.5 | 195 |
| | | | 4.0 | 310 |
| Φ3 mm | 120A at most | Φ0.8 mm at most | 1.5 | 75 |
| | | | 2.0 | 105 |
| | | | 2.5 | 130 |
| | | | 4.0 | 205 |
| | | | 6.0 | 310 |
| Φ4 mm | up to 160A | Φ1.0 mm at most | 2.0 | 75 |
| | | | 2.5 | 95 |
| | | | 4.0 | 155 |
| | | | 6.0 | 230 |
| **StandardMIG -200** | | | | |
| Φ3 mm | 120A at most | Φ0.8 mm at most | 1.5 | 75 |
| | | | 2.0 | 105 |
| | | | 2.5 | 130 |
| | | | 4.0 | 205 |
| | | | 6.0 | 310 |
| Φ4 mm | 160A at most | up to Φ1.0 mm | 2.0 | 75 |
| | | | 2.5 | 95 |
| | | | 4.0 | 155 |
| | | | 6.0 | 230 |
| Φ5 mm | up to 200A | | 2.5 | 75 |
| | | | 4.0 | 125 |
| | | | 6.0 | 185 |
| **StandardMIG -250** | | | | |
| Φ3 mm | 120A at most | Φ0.8 mm at most | 1.5 | 75 |
| | | | 2.0 | 105 |
| | | | 2.5 | 130 |
| | | | 4.0 | 205 |
| | | | 6.0 | 310 |
| Φ4 mm | 160A at most | Φ1.0 mm at most | 2.0 | 75 |
| | | | 2.5 | 95 |
| | | | 4.0 | 155 |
| | | | 6.0 | 230 |
| Φ5 mm<br>Φ6 mm, low-melting | up to 250A | up to Φ1.2 mm | 2.5 | 60 |
| | | | 4.0 | 100 |
| | | | 6.0 | 150 |
| **StandardMIG -250S-400V** | | | | |
| Φ3 m | 120A at most | Φ0.8 mm at most | 1.5 | 150 |
| | | | 2.0 | 210 |
| | | | 2.5 | 260 |
| | | | 4.0 | 410 |
| | | | 6.0 | 620 |
| Φ4 mm | 160A at most | Φ1.0 mm at most | 2.0 | 150 |
| | | | 2.5 | 190 |
| | | | 4.0 | 310 |
| | | | 6.0 | 460 |
| Φ5 mm<br>Φ6 mm, low-melting | up to 250A | up to Φ1.2 mm | 2.5 | 120 |
| | | | 4.0 | 200 |
| | | | 6.0 | 300 |

# 1. GENERAL PROVISIONS

Digital inverter semi-automatic one-body machines PATON StandardMIG-160/200/250/250-400V are designed for, manual metal arc welding (MMA) and tungsten arc inert gas welding (TIG), as well as for 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 the 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 machine is intended for domestic and semi-industrial use. It provides a good load duration at a full rated current of 160A, 200A, and 250A, respectively, when powered from a powerful 220V single-phase network or from a three-phase 380V network, which is enough to work with any electrodes from F1.6mm down to low-melting F6mm (for StandardMIG-250) and semiautomatic solid wire welding with a diameter from F0.6mm to F1.2mm (for StandardMIG -250). 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. It is possible to replace the polarity for fluxing wire welding. 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 "StandardMIG" series 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 StandardMIG model by PATON is equipped with a unit for minute undervoltage protection, as well as against minute overvoltage.

Due to the 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) + 7 (additional) + 3 (for pulsed mode)
   b) in TIG mode – 1 (main) + 1 (additional) + 3 (for pulsed mode)
   c) in semiautomatic MIG/MAG mode – 1 (main) + 6 (additional) + 3 (for pulsed mode)
2. Very wide range of settings for pulsed 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 160V to 260V single-phase supply mains. But it should be remembered that at a minimum voltage of 160V, it is possible to conduct welding with an electrode of not more than Φ3mm or semiautomatic welding with a wire of not more than Φ0.8mm.
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 the service life of the fan and reducing the amount of dust accumulated in the machine.
6. Convenient use due to high load duration (LD) at **rated current**, which enables virtually uninterruptible welding with Φ4mm electrodes (for StandardMIG-200S) and Φ5mm (for StandardMIG-250), for example, electrodes AHO-4, AHO-21, AHO-36, MP-3.
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. Improved arcing stability.

| PARAMETERS | StandardMIG-160 | StandardMIG - 200 | StandardMIG - 250 | StandardMIG – 250S-400V |
|---|---|---|---|---|
| Rated voltage of 50Hz supply mains, V | 220 | 220 | 220 | 3x400+N |
| Rated current consumption from the mains, A | 18 … 21 | 25 … 28 | 32 … 36 | 11 … 12 |
| Rated arc current, A | 160 | 200 | 250 | 250 |
| Maximum root-mean-square current, A | 215 | 270 | 335 | 335 |
| Load duration (LD) | 45%/at 160A<br>100%/at 107A | 45%/at 200A<br>100%/at 134A | 45%/at 250A<br>100%/at 167A | 45%/at 250A<br>100%/at 167A |
| Mains voltage variation range, V | 160 – 260 | 160 – 260 | 160 – 260 | ±20% |
| Arc current adjustment range, A | 8 – 160 | 10 – 200 | 12 – 250 | 12 – 250 |
| Arc voltage adjustment range, A | 12 – 28 | 12 – 28 | 12 – 28 | 12 – 28 |
| Wire-feeding speed range, m/min | 2.0 – 16 | 2.0 – 16 | 2.0 – 16 | 2.0 – 16 |
| Stick electrode diameter, mm | 1.6 – 4.0 | 1.6 – 5.0 | 1.6 – 6.0 | 1.6 – 6.0 |
| Filler wire diameter, mm | 0.6 – 1.0 | 0.6 – 1.0 | 0.6 – 1.2 | 0.6 – 1.2 |
| Maximum coil weight, no more than, kg | 5 | 5 | 5 | 5 |
| Pulsed welding modes | MMA: 0.2…500Hz<br>TIG: 0.2…500Hz<br>MIG/MAG: 5…500Hz | MMA: 0.2…500Hz<br>TIG: 0.2…500Hz<br>MIG/MAG: 5…500Hz | MMA: 0.2…500Hz<br>TIG: 0.2…500Hz<br>MIG/MAG: 5…500Hz | MMA: 0.2…500Hz<br>TIG: 0.2…500Hz<br>MIG/MAG: 5…500hz |
| Hot Start in MMA mode | adjustable | adjustable | adjustable | adjustable |
| Arc Force in MMA mode | adjustable | adjustable | adjustable | adjustable |
| Anti-Stick function in MMA mode | automatic | automatic | automatic | automatic |
| Open-circuit voltage reduction unit | on / off | on / off | on / off | on / off |
| MMA open-circuit voltage, V | 12 / 75 | 12 / 75 | 12 / 75 | 12 / 75 |
| Arc striking voltage, V | 110 | 110 | 110 | 110 |
| Rated power consumption, kVA | 4.0 … 4.6 | 5.5 … 6.1 | 6.9 … 7.9 | 6.9 … 7.9 |
| Maximum power consumption, kVA | 6.2 | 8.0 | 11.0 | 11.0 |
| Efficiency factor, % | 90 | 90 | 90 | 90 |
| Cooling | forced | forced | forced | forced |
| Operating temperature range | –25 … +45°C | –25 … +45°C | –25 … +45°C | –25 … +45°C |
| Overall dimensions, mm (length, width, height) | 420 x 245 x 298 | 420 x 245 x 298 | 420 x 245 x 298 | 420 x 245 x 298 |
| Weight excluding coil and accessories, kg | 11.0 | 11.2 | 11.5 | 11.6 |
| Ingress protection class * | IP21 | IP21 | IP21 | IP21 |

** For StandardMIG series machines, their frame protects them from the ingress of objects more than 5.5mm in diameter, as well provides rain protection, so that water streaming vertically 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 |
|---|---|---|---|
| 4…12m | 160A at most | 16mm² | КГ 1х16 |
| 5…15m | 200A at most | 25mm² | КГ 1х25 |
| 6…18m | up to 250A | 35mm² | КГ 1х35 |

**ATTENTION!** The mains button on the back of the device is not power one, so when you turn off the device, it does not completely de-energize all the internal electronics. For this reason, after completing the welding work, disconnect the plug from the mains, according to the safety requirements.


1
2
3
4
5
6
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11
12
13
A
B


14
15
16

**1** – Buttons for incrementation and decrementation of the selected parameter (by default: in MMA mode—welding current, in TIG mode—welding current, in MIG/MAG mode—welding voltage).
**2** – Digital seven-segment display of the source.
**3** – Unit of measurement of a current displayed parameter:
a) "V" – volt;
b) "A" – ampere;
c) "%" – percent;
d) "s" – second/time.
**4** – Indicator of a current/selected welding mode.
**5** – Button for selecting function in the current welding mode.
**6** – Button for selecting required welding mode:
a) manual metal arc welding with a stick electrode (MMA);
b) tungsten arc inert gas welding (TIG);
c) semiautomatic metal inert/active gas welding (MIG/MAG).
**7** – 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, as well as source overheating in any mode;
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.
**8** – The button of wire leading-in (while gas is not supplied).
**9** – Digital seven-segment display of the wire-feeding machine.
**10** – Button for selecting the functions of the wire-feeding machine.
**11** – Shielding gas test button (wire feeding is disabled).
**12** – Buttons for adjusting parameters for decreasing and increasing (by default: wire feeding speed).
**13** – Socket KZ-2 of EURO type for semiautomatic torch connection.
**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 plug 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 "mass" 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—"mass" cable is connected;

d) in case of semiautomatic MIG/MAG **fluxing** wire welding—a plug is connected internally to the feeder.

**14** – The on / off button of the device (color and shape is decorative).

**15** – The fuse holder (4A) for the wire-feeding unit.

**16** – Fitting for shielding gas supply.

## 2. START-UP

**Attention!** Before start-up and commissioning, please read the section "Safety rules", Clause 15.

### 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 caused by undue use of the machine.

Intended use of the machine implies adherence to the 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 5.5mm 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 an 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 the vent holes on the front and the rear panels. Take care that metal dust (for example, during emery grinding) does inhaust directly into the machine by the cooling fan.

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

## 2.3 POWER CONNECTION

The welding machine of series design is rated for mains voltage of 220V (-27%+18%) or for three-phase mains voltage of 3x380V (±20%).

**Attention! All manufacturer's warranty liabilities become void if the single-phase machine is connected to mains voltage exceeding 270V! Such a situation can occur with a very large phase voltage imbalance in a standard mains or using non-standard connection.**

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

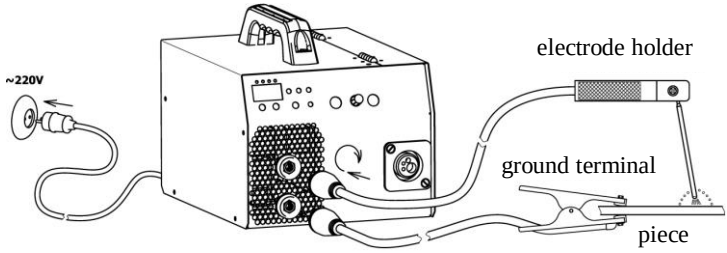
Mains connector, cross-sections of power supply cables, and supply-line fuses must be selected on the basis of technical specifications of the machine.

## 2.4 MAINS PLUG CONNECTION

Mains plug shall correspond to supply voltage and current consumption of the welding machine (see Technical specifications). In accordance with safety practices, use a sockets with a **guaranteed** earthing and in no case **do not use** a neutral wire for these purposes!!!

**ATTENTION!** The power switch **14** is a signal button that blocks only the power current of the welding machine, but does not completely de-energize the internal electronics of the device. Therefore, according to safety precautions, do not forget to remove the plug from the socket when reconnecting.

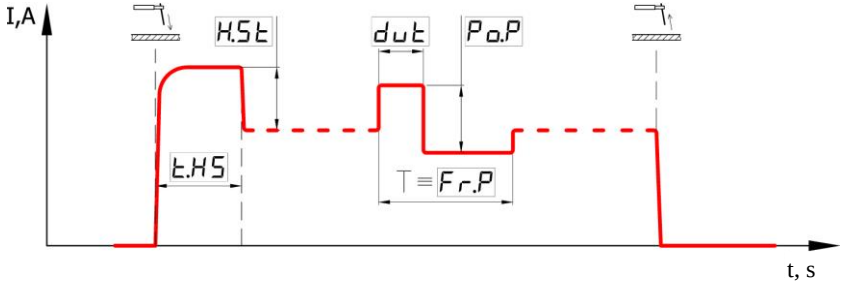
# 3. MANUAL METAL ARC WELDING WITH A STICK ELECTRODE (MMA WELDING)




Procedure for machine preparation for operation:
- insert the electrode cable into the source socket **A "+"**;
- insert the "mass" cable into the source socket **B "–"**;
- connect the "mass" cable to the work piece;
- connect the mains plug to the supply mains;
- set power switch **14** on the rear panel to position "I";
- set the MMA welding mode by pressing the button **6**; the modes switch over end-around;
- use buttons **1** to set the main parameter, which is welding current;
- if necessary, additional functions of welding process can be adjusted—see a changeover sequence in Clause 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 Clause 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, welding current increases by the default value of +40% for a short time.

Example: welding with a Φ3 mm electrode, set the base value of arc current is 90 A.

Result: hot start current is 90A + 40% = 126A.

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 are not available, striking process can even abort. See Clause 6.1 for sequence of changing the value of any function in the current welding mode.

### 3.3 ARC FORCE FUNCTION

Advantages:

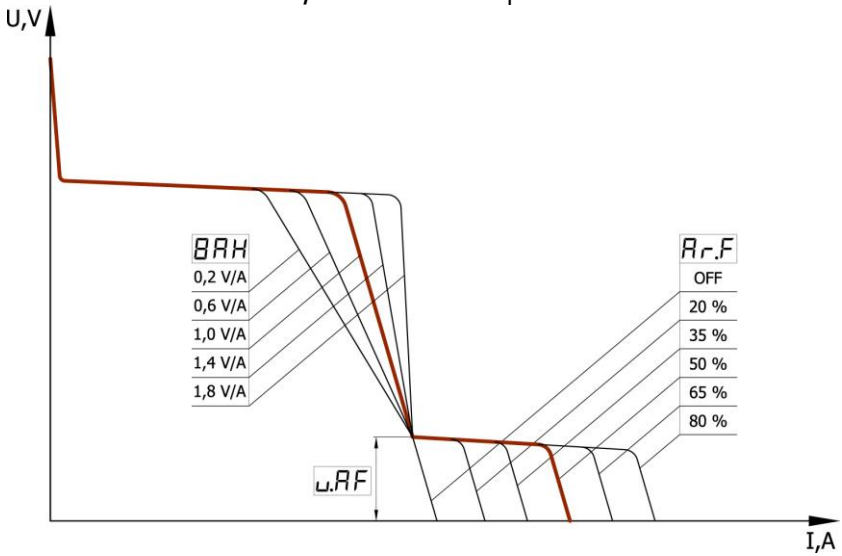
- enhanced short-arc welding stability;
- better transfer of metal drops into the weld pool;
- better arc striking;
- reduced risk of electrode sticking; however, it is not the Anti-Stick function, which will be explained in the next clause;
- manual adjustment: allows setting the function level to minimum 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 the 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 a trigger level to unnecessarily high value, because at high limit values, especially during welding with thin electrodes less than Φ3.2mm in diameter, affects actuation of Anti-Stick function, which will be explained in the next clause.




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

### 3.4 ANTI-STICK FUNCTION

During the 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...0.8s after detection of this condition, this function reduces welding 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 18V. See Clause 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 Clause 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 0.1s after the electrode is detached from the work piece, the voltage on the source terminals drops to a safe level below 12V.

In order 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 such function results in a somewhat worse arc striking. See Clause 6.1 for sequence of changing the value of any function in the current welding mode.

### 3.8 PULSED CURRENT WELDING FUNCTION

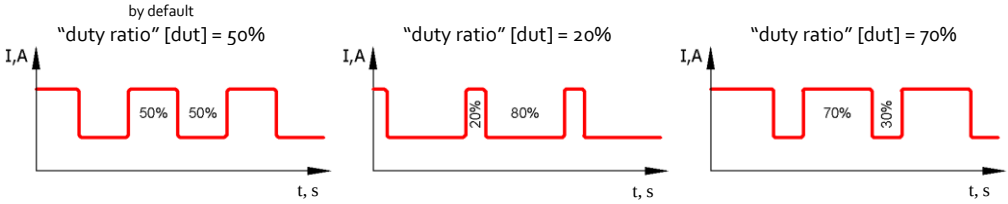
This function is designed to facilitate control over the welding process in spatial positions other than downhand position, as well as during welding of non-ferrous metals. This function affects directly weld metal dilution and metal

drop transfer into the weld pool and, consequently, on the stability of the 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. The correct setting determines weld shape and quality of the weld forming, thus reducing risk of porosity and grain structure of the weld and consequently increasing weld strength.

In order to implement this function, 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 the most common values of 50Hz 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 the current set value of base arc welding.

Example: welding with a Φ3mm electrode, set the base value of arc current is 60 A, and pulsing power [Po.P] = 40%, while pulsing frequency [Fr.P] = 5.0Hz and duty ratio [dut] = 50% by default.

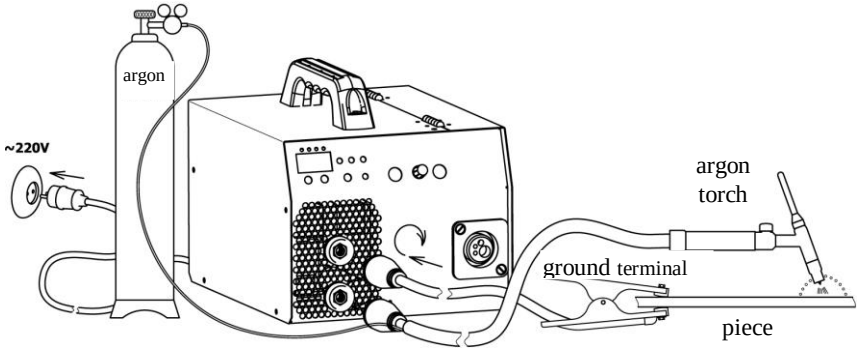
Result: current will pulse in the range from 36A to 84A with a frequency of 5Hz; pulses will be of the same shape in terms of both magnitude and time. If duty ratio parameter [dut] is changed to a value other than 50%, pulses become asymmetric—between the current pulse time and the current "pause" time:




The machine calculates pulsing in such a way that, at a constant set differential of pulses, average level of welding current is maintained at the level of set base welding current value of 60A (i.e. equal to the set value), in order to keep the resulting average heat input into the weld at a constant level of 60A, but the stability of the welding process and the mixing of the weld pool will change. 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 also be clearly determined by comparison with initial base current.

These parameters are set differently in different situations in accordance with welding operator's requirements. See Clause 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.

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

Procedure for machine preparation for operation:

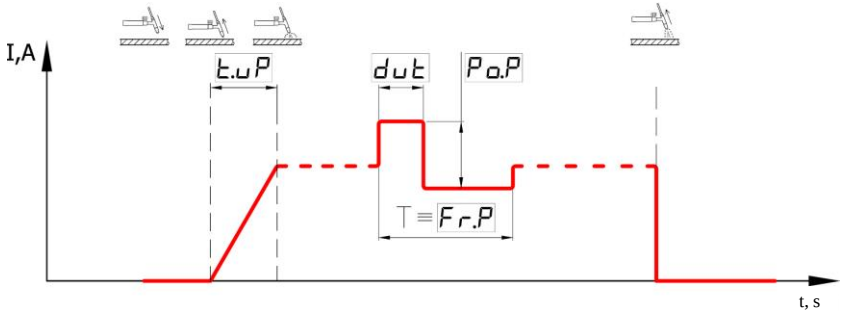
- insert the torch cable into the source socket **B "–"**;
- insert the "mass" cable into the source socket **A "+"**;
- connect the "mass" cable to the work piece;
- install the pressure reducer on the gas bottle;
- connect the torch gas hose to the gas bottle pressure reducer;
- open the gas bottle valve, check the tightness;
- connect the mains plug to the supply mains;
- set power switch **14** on the rear panel to position "I";
- set the TIG welding mode by pressing the button **6**; the modes switch over end-around;
- use buttons **1** to set the main parameter, which is welding current;
- if necessary, additional functions of welding process can be adjusted—see a changeover sequence in Clause 6.1.

**Attention!** The argon torch shall be a valve torch, with a bayonet connector Φ9 mm. Select the maximum torch current depending on your operating requirements.

**Attention!** A common mistake is "needle-like" electrode sharpening; in this case, the 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 WELDING CYCLE – TIG-LIFT




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

### 4.2 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 at the moment of striking, thus reducing the several-fold destruction of the non-consumable tungsten electrodes and ingress of its inclusions into the weld, which is very adverse effect.

**Attention!!!** This requires cleaning the work piece at the point of the arc striking.

This function is implemented by touching the work piece with the electrode. 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, and otherwise it will flash off. Time of current fade-in [t.uP] up to the set value will be reviewed in the next paragraph.

## 4.3 ARC CURRENT FADE-IN FUNCTION

Except for saving the operating life of the electrode and, to some extent, of the torch itself, this function is also required for convenient use of the torch. It eliminates initial splashing of the weld pool. In addition, 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 1.0s. See Clause 6.1 for sequence of changing the value of any function in the current welding mode

## 4.4 PULSED CURRENT WELDING FUNCTION

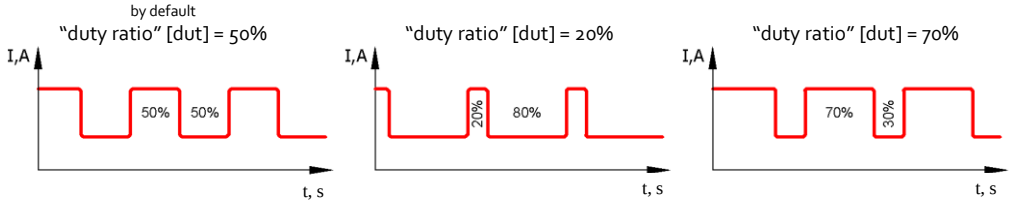
This function is designed to facilitate control over the welding process in spatial positions other than downhand position, as well as during welding of non-ferrous metals. This function affects directly weld metal dilution and, consequently, on the stability of weld forming. It substitutes movements 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. The correct setting determines weld shape and quality of the weld forming, thus reducing risk of porosity and grain structure of the weld and consequently increasing weld strength.

In order to implement this function, 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 the most common values of 10.0Hz 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 the current set value of base arc welding.

Example: welding with a non-consumable tungsten electrode of 2 mm in diameter, set the base value of arc current is 100 A, and pulsing power [Po.P] = 30%, while pulsing frequency [Fr.P] = 10.0Hz and duty ratio [dut] = 50% by default.

Result: current will pulse in the range from 70A to 130A with a frequency of 10Hz; 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—between the current pulse time and the current "pause" time:

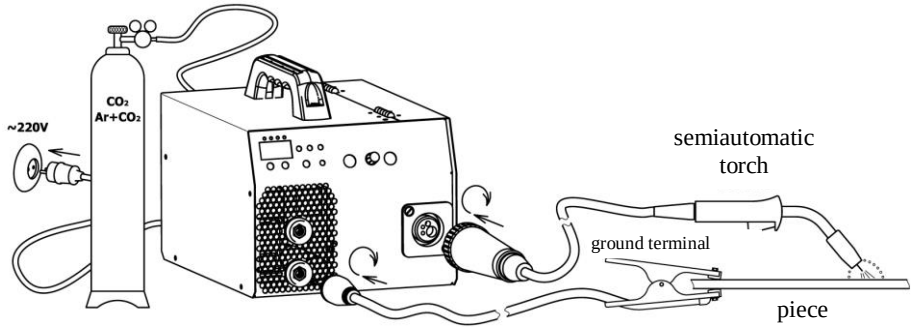


| t, сек | t, s |
|---|---|

The machine calculates pulsing in such a way that, at a constant set differential of pulses, average level of arc current is maintained at the level of set base arc current value of 100A (i.e. equal to the set value), in order to keep the resulting average heat input into the weld at a constant level of 100A, but the stability of the welding process and the mixing of the weld pool will change. 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 also be clearly determined by comparison with initial base current.

These parameters are set differently in different situations in accordance with welding operator's requirements. See Clause 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 ferrous metals, 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 "80%Ar+20%$CO_2$". Other gases can only be used upon approval of the equipment manufacturer.

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

Procedure for preparation for operation with **solid** wire welding:

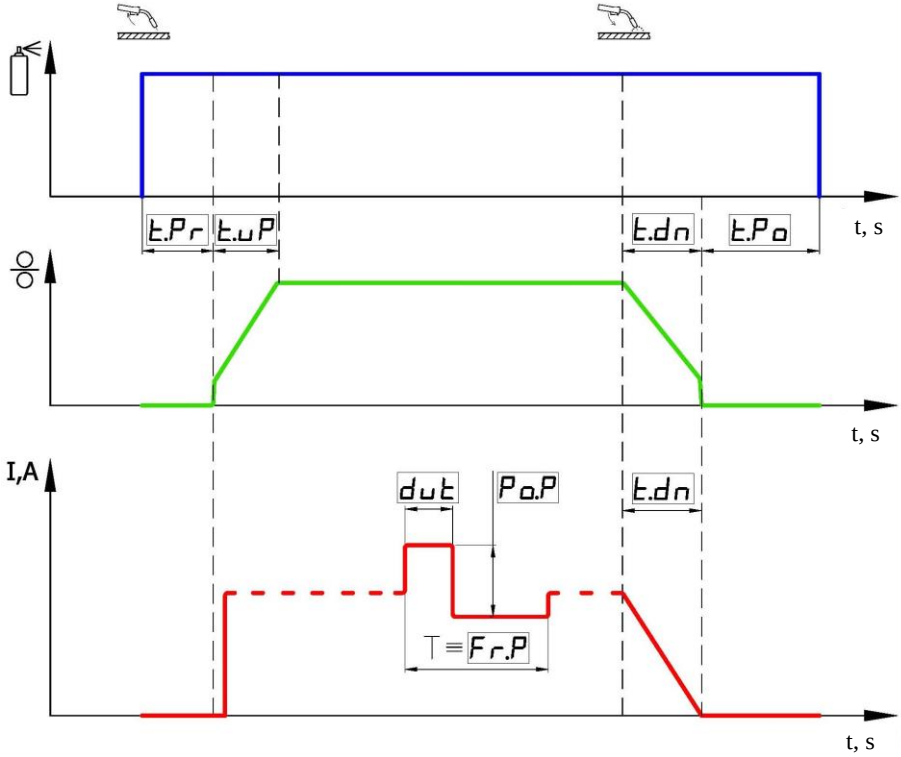
- insert the "mass" cable into the source socket **B "–"**;
- connect the "mass" cable to the work piece;

- connect the power current plug of the wire-feeding machine of the source socket **A "+"**;
- connect and fasten **against the stop** the semiautomatic welding torch to socket **13**;
- install a pressure reducer on the gas bottle with shielding gas "$CO_2$", "Ar", or "Ar+$CO_2$";
- connect gas hose to the pressure reducer of the gas bottle and fitting **16** on the rear panel;
- open the cock of the gas bottle and check it for tightness;
- connect the mains plug of the source to the supply mains;
- set power switch **14** on the rear panel of the source to position "I";
- set the semiautomatic MIG/MAG welding mode by pressing the button **6**; the modes switch over end-around;
- if the digital display of the wire-feeding machine **9** does not turn on, check the rear panel fuse **15** (4A);
- use buttons **1** to set the required welding voltage;
- install the coil with the wire of the required diameter;
- lift up the pressure roller arm;
- lead the free end of the wire through the input channel into the welding torch;
- lower and clamp the welding wire between the rollers; the pressing force of the rollers is written on a plastic handle; if there is no experience, then initially set to the middle position (this is about 3);
- using buttons **12**, set the required wire feed speed;
- use button **8** to pull the wire through the entire channel and adjust the final pressing force of the rollers according to the recommendations for semiautomatic welding; at the same time, pay special attention to the force of clamping the coil brake: the coil should be MINIMALLY-REQUIRED and easily rotated, but spontaneous unwinding should not be observed;
- if necessary, additional functions of welding process can be adjusted – see a changeover sequence in Clause 6.1.

Remember to supply shielding gas. In order to check its availability, a button **11** is provided in the torch channel, at the moment of pressing which the wire does not feed. 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 ~0.2MPa: this will have a 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 an average position of wire feeding speed controller on the feeding machine (~ 6.0...8.0m/min.) and average source voltage (~19V) for any

diameter of installed wire (Φ0.6...1.2m). This configuration may be not optimal, 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 the source voltage with buttons **1** and wire feeding speed by pressing buttons **12** on the wire-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-2T



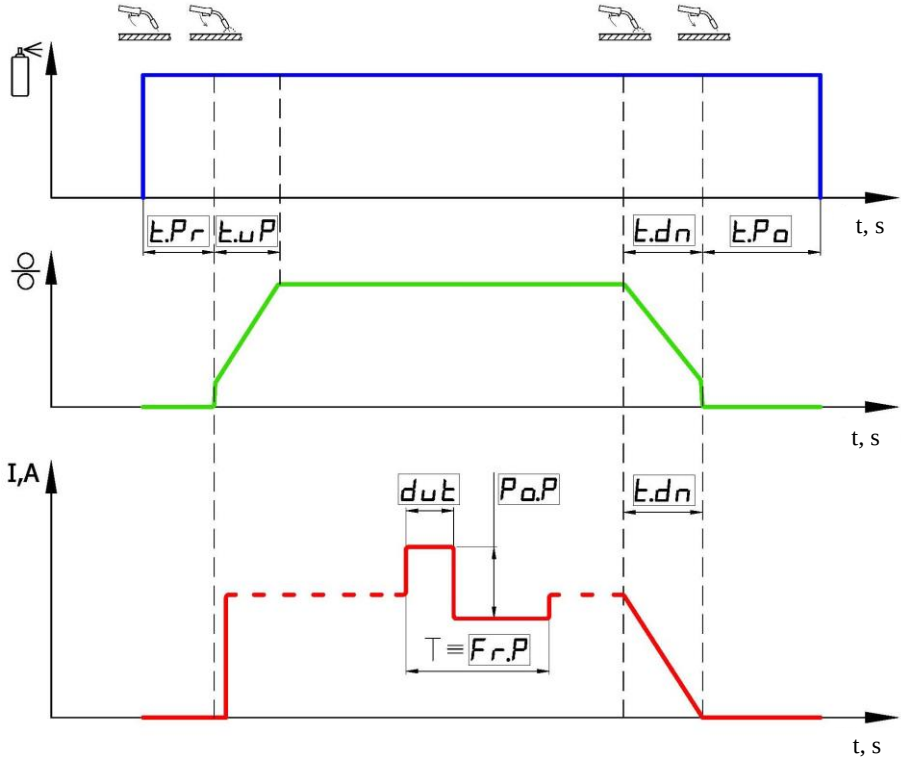

See Clause 6.1 for sequence of changing the value of any function in the current welding mode.

### 5.1.1 FUNCTION OF BUTTON ON A 2T TORCH

It is used in welding of short and medium length welds. The function is as follows: when pressing the button on the torch, the control signal enters the control unit, the function of pre-purging the welding zone with gas during the time [t.Pr] (the gas valve is opened) is processed, then a signal is given to turn on the source and

the wire feed motor. From now on, the welding process begins; at the same time, the function of smoothly entering the welding mode during the [t.uP] time is worked out, as well as additional functions can be worked out (for example, a pulsed mode, which we will discuss in detail in the following paragraphs) given on the cyclogram in Clause 5.1. After the button is released, the function of arc current fade-out and wire-feeding speed during the [t.dn] time is tested, and then the source turns off. Next, the function of the post-purging of the welding zone with shielding gas during the [t.Po] time is worked out (the gas valve is closed with a delay).

## 5.2 WELDING CYCLE – MIG/MAG-4T




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

### 5.2.1 FUNCTION OF BUTTON ON A 4T AND _4T TORCH

a) global standard of the button mode – 4T
b) alternate button mode – _4T

It is used in welding of long length welds. The function is as follows: when first pressing the button on the torch, the control signal enters the control unit, the function of pre-purging the welding zone with gas (the gas valve is opened) is processed, then, after the first release of the button, a signal is given to turn on the source and the wire feed motor. From now on, the welding process begins; at the same time, the function of smoothly entering the welding mode during the [t.uP] time is worked out, as well as additional functions can be worked out (for example, a pulsed mode, which we will discuss in detail in the following paragraphs)—all this is shown on the cyclogram in Clause 5.2, according to the cycle of the welding process. After the second press of the torch button, the function of arc voltage fade-out and wire-feeding speed during the [t.dn] time is tested, and then the source turns off. After the second release of the button, the function of the post-purging of the welding zone with shielding gas during the [t.Po] time is worked out (the gas valve is closed with a delay).

In the alternative mode, unlike the 4T global standard, the system does not wait for the first release of the torch button, and immediately after testing the function of pre-purging the welding zone with gas during the [t.Pr] time, the process of arc striking starts—this is similar to that in the 2T button mode. This mode is provided by the PATON Company as a bonus; it can be used only at will, since it is more familiar from the point of view of more frequent use of 2T mode by customers in classical semiautomatic machines, and therefore, it is more intuitive.

### 5.3 FUNCTION OF PRE-PURGING WITH SHIELDING GAS

This function is necessary to protect the weld zone from the harmful effects of atmospheric air and consists in pre-purging the weld zone with shielding gas before the arc striking. By default, the pre-purging time [t.Pr] is set to 0.5 seconds; this value can be changed at any time at your discretion. See Clause 6.1 for sequence of changing the value of any function in the current welding mode. Use the right indicator of the wire-feeding machine.

### 5.4 WIRE-FEEDING SPEED FADE-IN FUNCTION

This function is necessary for a smooth transition to the welding mode for a set time [t.uP], which reduces spilling of the weld pool and splashing at the time of

arc striking, when the wire is still cold. The increased time of a smooth transition is applied to the initial formation of the pool.

**ATTENTION!** The longer the rise time, the lower the initial penetration, so it is used only for medium and long length welds. For this reason, do not increase the time more than 0.1 seconds when welding with tick welds, etc.

By default, the output time is set to 0.1 seconds, that is, in fact, it is turned off. See Clause 6.1 for sequence of changing the value of any function in the current welding mode. Use the right indicator of the wire-feeding machine.

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

This function is intended for the smooth welding of a crater formed in the weld pool under the action of an electromagnetic blast by an electric arc and, subsequently, a source of defects in the weld. The signal to the beginning of the function is the release of the torch button at the end of the welding process, while it is necessary to stop the torch movement and brew a hole (this is the crater) in the weld with a falling voltage. The time of voltage drop [t.dn] in the source, as well as the time of drop of the wire-feeding speed [t.dn] of the wire-feeding machine is responsible for the regulation of the smoothness of this process. These values must match for correct operation. By default, both are set to 0.1 seconds, that is, in fact, in the "OFF" state. This value can be changed at your discretion; see Clause 6.1 for sequence of changing the value. Use the left source indicator and the right indicator of the wire-feeding machine.

### 5.6 FUNCTION OF POST-PURGING WITH SHIELDING GAS

This function consists in the subsequent purging of the welding zone with a shielding gas after the extinction of the welding arc, since the red-hot weld pool is afraid of the harmful effects of atmospheric air for some time. By default, the post-purging time [t.Po] is set to 1.5 seconds; this value can be changed at any time at your discretion. See Clause 6.1 for sequence of changing the value of any function in the current welding mode. Use the left source indicator and the right indicator of the wire-feeding machine.

### 5.7 PULSED VOLTAGE WELDING FUNCTION

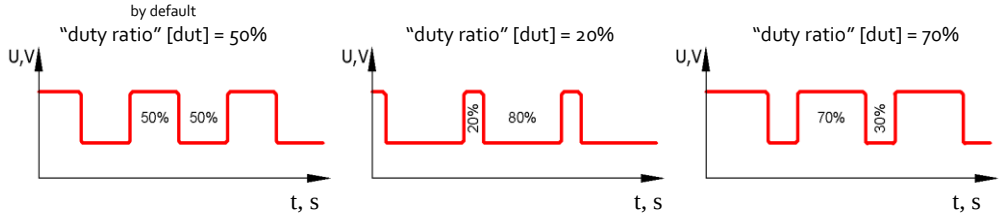
This function is designed to facilitate control over the welding process in spatial positions other than downhand position, as well as during welding of non-ferrous metals. This function affects directly weld metal dilution; therefore, it primarily affects the shape of weld. It also forces drop transfer 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—this is especially important in hard-to-reach places. In addition to weld shape, correct setting also determines the quality of the weld forming, thus reducing risk of porosity and grain structure of the weld and consequently increasing weld strength.

In order to implement this function, 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 the most common values of 20Hz 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 the voltage set value of the base arc welding.

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

Result: current will pulse in the range from 14.4V to 21.6V with a frequency of 20Hz; 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—between the current pulse time and the current "pause" time:




The machine calculates pulsing in such a way that, at a constant set differential of pulses, average level of arc voltage is maintained at the level of set base voltage value of 18V (i.e. equal to the set value), in order to keep the resulting average heat input into the weld at a constant level of 18V but the stability of the welding process and the mixing of the weld pool will change. 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 also be clearly determined by comparison with initial base current.

If the task is to reduce the heat input into the weld using a pulsed mode, for example, when welding thin metals, it is sufficient to reduce the main source voltage in a standard way; at the same time, the amplitude of the pulses and pauses established earlier will automatically adjust to this voltage; respectively, the user will clearly understand how much he has reduced the current heat input into the weld compared with the previous mode, while simultaneously changing the strength and "duty ratio" of the pulses in any combination to obtain the desired process. This task is not simple, since several parameters are regulated at once.

These parameters are set in different situations in different ways, according to the requirements of the welder. See Clause 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 the value of the main parameter of the current welding mode on the left of its digital indicator:

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

The value of the wire-feeding speed in "m/min" is displayed on the right side of the digital indicator in MIG/MAG mode.

Button **5** on the front panel of the machine is responsible for selecting the source function in the current welding mode, and button **10**—for selecting the function of the wire-feeding machine in MIG/MAG mode; this will be discussed in Clause 6.1.

Button **6** on the front panel of the machine is responsible for selecting the welding mode; this will be discussed in Clause 6.2.

Buttons **1** on the front panel of the source is responsible for changing the current value on the digital display on the left.

Button **12** on the front panel of the wire-feeding machine is responsible for changing the current value on the digital display on the right side.

## 6.1 SWITCHING TO THE REQUIRED FUNCTION

If the machine has a system of protection against unauthorized access to the function menu, then pressing the button **5** on the source on the indicator on the left does not make any changes, that is, this button is locked. In order to unlock it, it is necessary to keep it pressed for more than 3.5 seconds. When unlocked, the indicator will display horizontal bars indicating that the function menu is unlocked. After successful unlocking, when the button **5** is pressed, the digital indicator displays the graphic name of the current function of the power source of the welding arc and while it is held down, it can be viewed. After releasing the button, the current value of this function is displayed on the screen, which can be changed down or up using buttons **1**. With a quick press and release of the button **5**, you can switch to the next function over end-around.

**Attention!** If button **5** is being held for more than 10 seconds, then the countdown 333 ... 222 ... 111 ... appears on the display, and you need to release the button before this time has elapsed in order not to reset all settings of this mode to standard factory settings. This task will be considered in Clause 6.3.

Similarly, when you press button **10**, the graphic name of the current function of the wire-feeding machine is displayed on the digital indicator on the right side. Using buttons **12**, you can change it to a smaller or larger side.

If the menu is locked, as is the case with the function menu on the source, it is enough to hold this button for more than 3.5 seconds.

### 6.2 SWITCHING TO THE REQUIRED WELDING MODE

Press button **6** to select the desired welding mode. The modes switch over end-around; it can be seen from lamps **4** on the front panel.

### 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** continuously for more than 10 seconds. The countdown 333... 222... 111... appears on the display, and upon reaching "000", all settings of the current welding mode will be updated to the factory settings. In order to reset all the settings of the machine, you need to do this operation for each mode separately; this is done for convenience, so as not to reset the second two modes, previously individually configured by the user.

## 7. GENERAL LIST AND SEQUENCE OF FUNCTIONS

**MMA welding mode**

0) [-1-] – main displayed parameter CURRENT = 90A (by default)
   a) 8 ... 160A (increment 1A) for StandardMIG-160
   b) 10 ... 200A (increment 1A) for StandardMIG -200
   c) 12 ... 250A (increment 1A) for StandardMIG -250
1) [H.St] Hot Start power = 40% (by default)
   a) 0[OFF] ... 100% (increment 1%)
2) [t.HS] Hot Start time = 0.3 s (by default)
   a) 0.1 ... 1.0s (increment 0.1s)
3) [Ar.F] Arc Force power = 40% (by default)
   a) 0[OFF] ... 100% (increment 1%)

4) [u.AF] Arc Force trigger level = 12V (by default)
    a) 9 ... 18V (increment 1V)
5) [BAH] 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) o[OFF] ... 80% (increment 1%)
9) [Fr.P] current pulsing frequency = 5.0Hz (by default)
    a) 0.2 ... 500Hz (dynamic increment 0.1Hz ... 1Hz)
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 parameter CURRENT = 100A (by default)
    a) 8 ... 160A (increment 1A) for StandardMIG -160
    b) 10 ... 200A (increment 1A) for StandardMIG -200
    c) 12 ... 250A (increment 1A) for StandardMIG -250
1) [t.uP] current fade-in time = 1.0s (by default)
    a) 0.1 ... 15.0s (increment 0.1s)
2) [Po.P] current pulsing power = OFF (by default)
    a) o[OFF] ... 80% (increment 1%)
3) [Fr.P] current pulsing frequency = 10.0Hz (by default)
    a) 0.2 ... 500Hz (dynamic increment 0.1Hz ... 1Hz)
4) [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**

On the left indicator of the source:
0) [-3-] main displayed parameter VOLTAGE = 19.0V (by default)
    a) 12.0 ... 28.0V (increment 0.1V)
1) [t.dn] voltage fade-out time = 0.1s (by default)
    a) 0.1 ... 5.0s (increment 0.1s)
2) [Po.P] voltage pulsing power = OFF (by default)

a) o[OFF] ... 80% (increment 1%)

3) [Fr.P] voltage pulsing frequency = 20Hz (by default)

a) 5 ... 500Hz (increment 1Hz)

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%)

On the right wire feeder indicator:

0) [-1-] main displayed parameter FEED SPEED = 7.0m/min (by default)

a) 2.0 ... 16.0m/min (increment 0.1m/min)

1) [But] torch button mode = [2T] (by default)

a) [2t] – torch button mode 2T

b) [4t] – standard torch button mode 4T

c) [_4t] – alternate torch button mode 4T

2) [t.Pr] pre-purging with shielding gas time = 0.5s (by default)

a) 0.1 ... 25.0s (increment 0.1s)

3) [t.Po] post-purging with shielding gas time = 1.5s (by default)

a) 0.1 ... 25.0s (increment 0.1s)

4) [t.uP] wire-feeding speed fade-in time = 0.1s (by default)

a) 0.1 ... 5.0s (increment 0.1s)

5) [t.dn] wire-feeding speed fade-out time = 0.1s (by default)

a) 0.1 ... 5.0s (increment 0.1s)

## 8. GENERATOR OPERATION MODE

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

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

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

## 9. 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 months. **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.

## 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 mode of transport, which provides its integrity, complying with all transportation rules established for this mode 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 50/60Hz | ~220<br>~3x400+N |
| Efficiency ratio (at 200A) | 90% |
| Arc current adjustment range | 8 – 160A<br>10 – 200A<br>12 – 250A |
| Arc current at:<br>5min. / 45% LD<br>5min. / 100% LD | <br>160A / 200A / 250A<br>107A / 134A / 167A |
| Maximum power consumption | 6.2kVA<br>8.0kVA<br>11.0kVA |
| 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 – 28V<br>10 – 18V<br>12 – 28V |

## 13. DELIVERY SET

1. Welding arc supply source with a mains cable – 1 pcs.;
2. Rollers [0.6-0.8] and [1.0-1.2] – 1 pcs.;
3. PATON brand corrugated box – 1 pcs.;
4. 3m semiautomatic torch – 1 pcs.;
5. 3m welding cable with electrode holder – 1 pcs.;
6. 3m welding cable with ground terminal – 1 pcs.;
7. Operating manual – 1 pcs.

## 14. WARRANTY LIABILITIES

Pilot Plant of Welding Equipment named after Ye. O. Paton guarantees proper operation of the, 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 to 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**

In order 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;
- 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 an adverse effect on the 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**

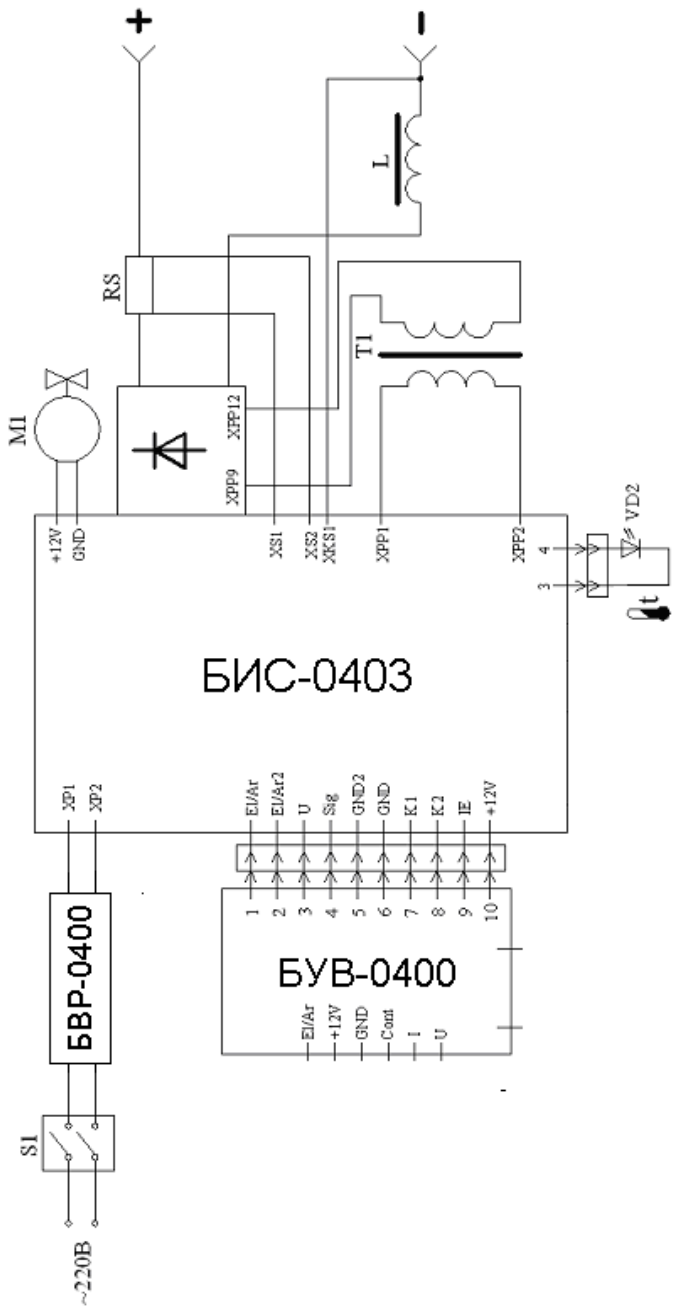
- the manual must be always stored near the place where the welding machine is used;
- in additional to the manual, adhere to general and local safety and environmental rules;
- all instructions on the welding machine shall be kept readable.

**STRAY WELDING CURRENTS**

- make sure that the "mass" 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 least once a week.

Schematic electrical diagram
of the PATON StandardMIG-160/200/250 DC MMA/TIG/MIG/MAG



# 16. ACCEPTANCE CERTIFICATE

Arc inverter rectifier PATON StandardMIG-160/200/250

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

Sale date _____ "_____", 20____.

Place of seal _____
(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: _____

_____

==========

Date of receipt for repair _____ "_____", 20____.

_____ (signature)

Symptoms of non-operability: _____

_____

Cause: _____

_____

==========

Date of receipt for repair _____ "_____", 20____.

_____ (signature)

Symptoms of non-operability: _____

_____

Cause: _____

_____