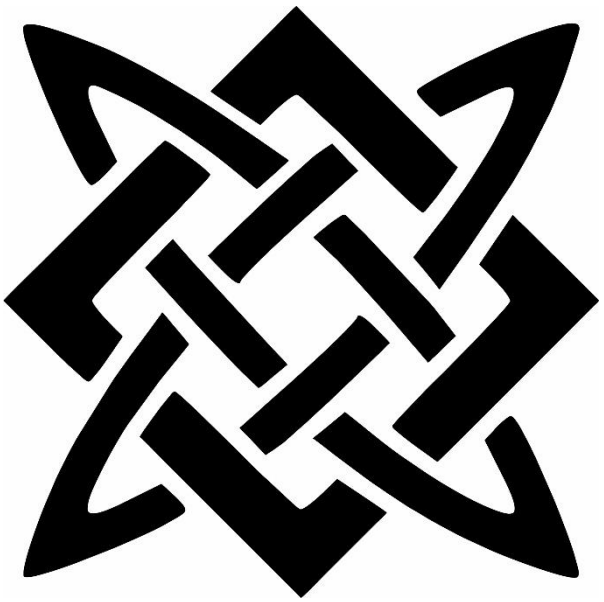
WELDING MACHINE

SVAROG 320 HD PULSE MODULAR

OPERATING MANUAL



CONTENT

1 INTRODUCTION

Dear consumer,

Company ALFA IN a.s. thanks you for buying our product and believe that you will be satisfied with our machine.

Welding machine may be operated only by trained persons and only in the technical provisions. Company ALFA IN a.s. accept no responsibility for damage caused by improper use. Before commissioning please read carefully this manual.

The machine complies with the appropriate CE mark.
For maintenance and repairs, use only original spare parts. There is of course a complex of our services.

Welding machine SVAROG 320 HD PULSE MODULAR is a modular IGBT inverter. The machine is designed for welding method **MMA, MIG (Metal Inert Gas) and the MAG (Metal Active Gas)** method.

With this machine it is possible to weld various types of joints (blunt, single-sided, double-sided, corner, overlapped, etc.). Using wires with a diameter of 0.8 to 1.2 and up to 1.6 mm, from various metal materials and alloys (carbon and alloy steel, aluminium alloys, etc.). They are designed not only for heavy industrial operations, but also for industries demanding accuracy and speed

S The machines can be used for welding in areas with increased risk of electric shock. The machines meet the requirements of the corresponding CE mark.

We reserve the right to make modifications and changes in case of printing errors, changes in technical parameters, accessories, etc. without prior notice. These changes may not be reflected in the user manuals in paper or electronic form.

2 SAFETY PRECAUTIONS

PERSONAL PROTECTION

1. For safety reasons, protective gloves must be worn during welding. These gloves protect you from electric shock (circuit voltage at no load). It also protects you from heat radiation and splashing drops of hot metal.
2. Wear insulated shoes. Open shoes are not suitable as drops of hot metal can cause burns.
3. Do not look into the welding arc without face and eye protection. Always use a high-quality welding helmet with an intact protective filter.
4. Notice
   Persons with implanted pacemakers must not work with the machine or move in their immediate vicinity! There is a risk of the stimulator malfunctioning!
5. Persons in the vicinity of the welding site must also be informed of the danger and provided with protective equipment.
6. When welding especially in small spaces, it is necessary to ensure a sufficient supply of fresh air, as welding produces harmful emissions.
7. Do not perform welding work on gas, oil, fuel, etc. Tanks (even empty ones) as there is a risk of explosion.
8. Special regulations apply in potentially explosive atmospheres.
9. Stop welding immediately if the power cord is damaged. Do not touch this cable. Unplug it.
10. In areas with an increased risk of electric shock. Only machines marked with the symbol can be used S.
11. Welded joints that are subject to high stress must meet special safety requirements. These are mainly rails, pressure vessels, etc. These joints may only be made by qualified trained welders with the necessary authorization.

SAFETY REGULATIONS

1. Before use, the operator is obliged to inform himself about the legislation in the country of use that deals with safety for welding, metal welding and arc welding.
2. The CO2 bottle of mixed gases must be handled in accordance with the regulations for working with pressure vessels.
3. When handling the machine with a lifting device, hook the machine on all crane eyes. Other mounting is not permitted!
4. Disconnect the device from the mains before carrying out any work on the electrical system, removing the cover or cleaning it.

MACHINE PROTECTION

This machine is electronically protected against overload. Do not turn off the main power switch while the machine loaded.

ACL ECO coolant is designed for ambient temperatures up to -10˚C.

☝Notice☝

Persons with implanted pacemakers must not operate the machines or move in close proximity to them! There is a risk of impaired pacemaker function!

3 OPERATING CONDITIONS

1. The commissioning of the instrument may only be carried out by trained personnel and only within the technical provisions. The manufacturer is not liable for damage caused by improper use and operation. Only use original ALFA IN spare parts for maintenance and repair.
2. The device complies with EN 61000-3-12 under the following conditions: The short-circuit power of the S_{sc} network at the interface between the user supply and the public power supply (PCC) shall be at least 4106 kW. The user is obliged to consult with the electricity supplier whether the impedance of the network at this location corresponds to the required value of short-circuit power Z_{max} = 36 mΩ and whether the device can be connected to the public low-voltage network.
   The following symbols appear on the machine's nameplate:  .
3. The welding machine can be manipulated using the crane eyes that are part of the chassis. The machine can only be handled if it is attached by all crane eyes. It is forbidden to transport the SVAROG using the eyes if a gas cylinder is placed on the platform.
4. The welding machine is tested according to the standard for protection class IP 23S, which provides protection against the ingress of solid bodies with a diameter greater than 12 mm and against the ingress of water falling in a vertical to oblique direction up to an inclination of 60°.
5. Operating ambient temperature between -10 and +40 °C.
6. Relative humidity below 90% at +20 °C.
7. Up to 3000 m above sea level.
8. The machine must be positioned in such a way that cooling air can enter and exit through the cooling vents without restriction. Care must be taken to ensure that no mechanical particles, especially metal particles (e.g. during grinding), are drawn into the machine.
9. The handling handle is designed for travelling only, it is not designed for lifting the machine.
10. If the machine overheats, welding is automatically interrupted and this condition is indicated by a light.
11. All interventions in the el. equipment, as well as repairs (removal of the mains plug, replacement of fuses) may only be carried out by an authorised person.
12. The relevant mains voltage and input power must be matched to the mains plug.
13. Do not use the machine for other purposes, e.g. defrosting pipes, starter

power, etc.

14. The welding machine must be subjected to a periodic inspection once every 6/12 months by an authorised person - see paragraph Maintenance and service tests.
15. The welding machine is primarily designed for industrial environments in terms of suppression. If other areas are used, special precautions may be necessary (see EN 60974-10).
16. The stability of the machine is guaranteed up to an inclination of 10° if the following conditions are met:

a. The machine must be secured against spontaneous movement
b. A gas cylinder with a maximum height of 0.9 m may be placed on the platform and properly anchored.

17. The machine must be protected against:
    a. Moisture and rain
    b. Mechanical damage
    c. Drafts and possible ventilation of neighbouring machines
    d. Excessive overloading - exceeding tech. parameters
    e. Rough treatment
    f. Chemically aggressive environment

ELECTROMAGNETIC COMPATIBILITY

In terms of interference suppression, the welding equipment is designed primarily for industrial premises. It meets the requirements of EN 60974-10 class A and is not intended for use in residential areas where electricity is supplied by a public low-voltage power supply network. There may be possible problems with ensuring electromagnetic compatibility in these areas, caused by line propagation interference as well as radiated interference.

The device may be a source of interference during operation.

✋Notice✋

Due to the size of the installed capacity, the approval of the distribution plants must be required to connect the equipment to the public distribution network. We warn the user that he is responsible for any interference from welding.

4 TECHNICAL DATA

SVAROG 320 HD PULSE MODULAR			
Method		MIG/MAG	MMA

Mains voltage	V/Hz	3x400/50-60	
Welding current range	A	30/15,5 - 320/30,0	20/20,8 - 300/32,0
Open-circuit voltage U_{20}	V	60,0	
Mains protection	A	16 @	
Max. effective current I_{1eff}	A	15,1	14,1
Welding current (DZ=100%) I_2	A	240	200
Welding current (DZ=60%) I_2	A	280	240
Welding current (DZ=x%) I_2	A	35%=320	30%=300
Protection		IP 23S	
Standards		EN IEC 60974-1, EN 60974-10 cl. A	
Dimensions (w x d x h) generator	mm	534 x 1141 x 943	
Weight of liquid-cooled version	kg	84	
Weight of the air-cooled version	kg	77	
Maximum load of the pull-out storage box	kg	25	
Wire speed	m/min	1,0 - 20,0	---
Spool diameter	mm	300	---
Spool weight	kg	18	---
Efficiency	%	89	
Input power in idle mode P_{10}	W	18	
Max. input power S_{1max}	kVA	16,0	15,8
Ambient temperature	°C	-10 ÷ +40	
Insulation class		F	

5 MACHINE ACCESSORIES

PART OF THE DELIVERY

1. Pulleys for wire diameters 1,0 - 1,2 mm
2. Operating Instructions
3. Torch ARC M6OSW 4m DIGIMIG (M6OSW-DM3-4M)
4. Reducer for wire spool 5 kg and 15 kg
5. 3 m long earthing cable with clamp
6. Hose for gas connection

   * Bypass connection of the cooling unit is not included in the standard delivery.

ACCESSORIES ON REQUEST

See. Catalogue

HOOKAHS TO ORDER

1. M6OSW-DM3-4M	Torch ARC M6OSW 4m
2. M22-4M	Torch ARC M22 4m 250/220/145A
3. DMB500-4-1	PARKER DIGIMIG 501W 4m aXe UD torch
4. DMB24-4-1	PARKER DIGIMIG 240 4m aXe IN UD Torch
5. DMB36-4-1	Torch PARKER DIGIMIG 360 4m aXe IN UD
6. SGB36-4	PARKER SGB 360 4m Torch
7. DMB24W-4-1	PARKER DIGIMIG 240W 4m aXe IN UD Torch

Notice If you decide to use a torch other than the one above, you must select according to the current range used and the torch load time. ALFA IN a.s. is not responsible for damage to welding torches due to overload.

6 MACHINE DESCRIPTION AND FUNCTIONS

MAIN PARTS OF THE MACHINE

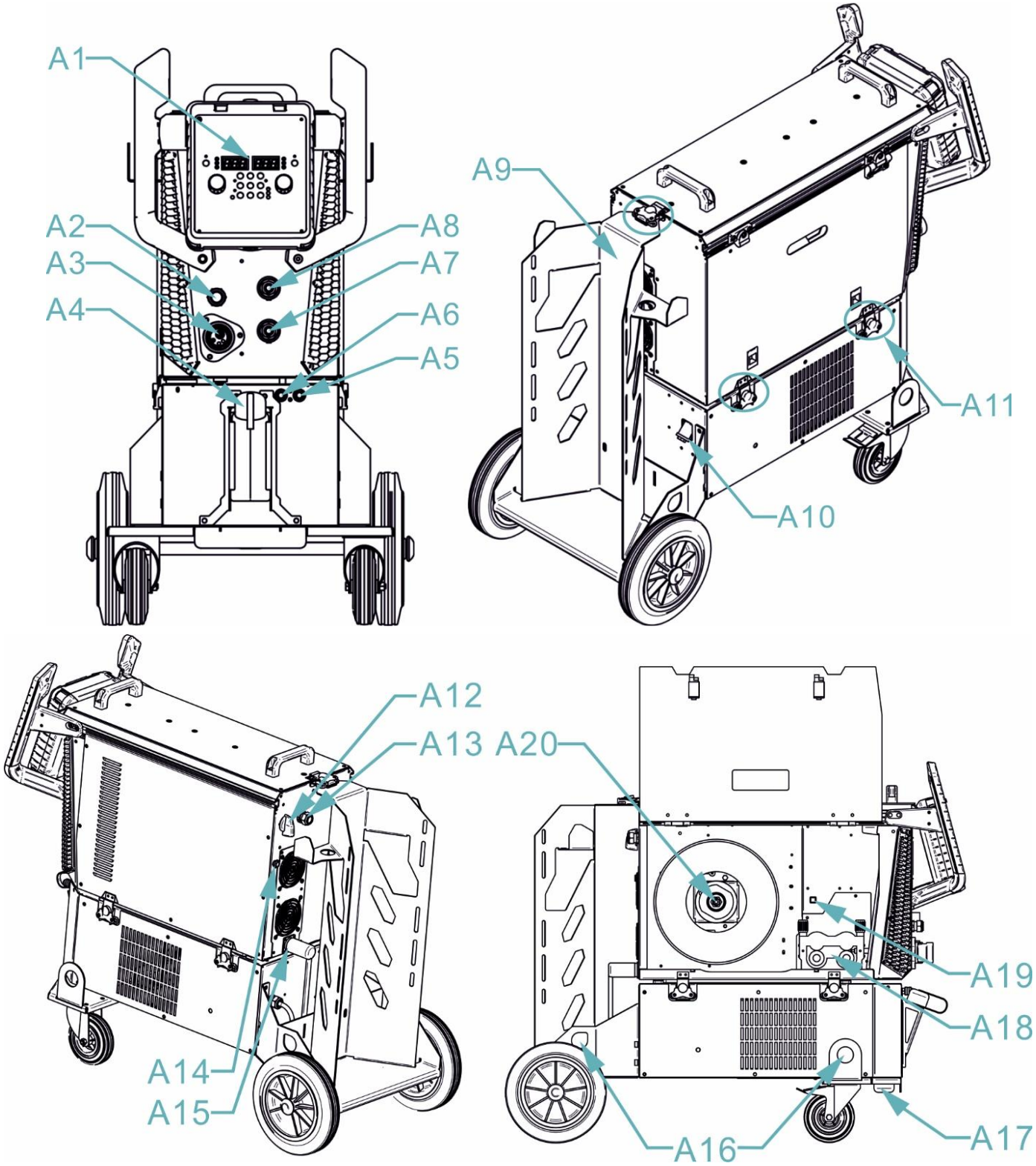


Image 1 - Main machine parts

Item.	Description
A1	Control panel
A2	Connection cable (re-polarity)
A3	Euro torch connector

A4	Coolant reservoir
A5	Quick connector H2O (depends on machine variant)
A6	Quick connector H2O (depends on machine variant)
A7	Quick connector (+)
A8	Quick connector (-)
A9	Gas bottle holder
A10	Coolant filter
A11	Butterfly lock
A12	Main switch
A13	Mains cable
A14	Gas connection connector
A15	Connector for CU and generator connection
A16	Crane eyes
A17	Coolant drain hole
A18	Wire feeder
A19	Button: wire guide
A20	Wire spool holder

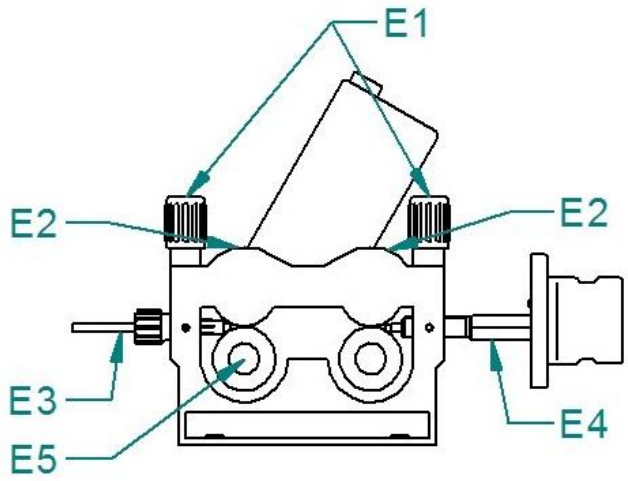
☝Please note☝

If the machine is supplied only in the version without chassis, wear-resistant insulating rails are used as a base.

Separation of the generator from the CU

To separate the generator part from the cooling unit, it is necessary to loosen the five butterfly nuts **A11** and disconnect the connector **A15** (electrical connection between the CU and the generator). The generator can then be easily manipulated.

WIRE FEED MECHANISM



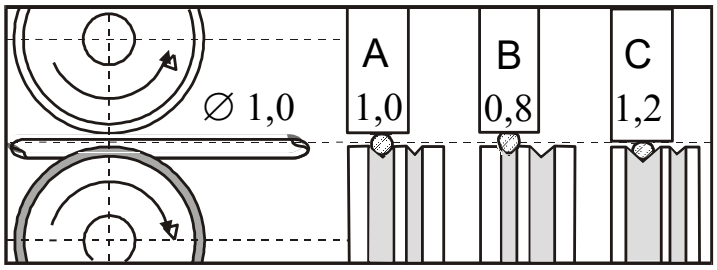
Item.	Description
E1	Pressure arm nut
E2	Pressure arm
E3	Bovden boot
E4	EURO connector
E5	Pulley

Figure 2 **-** Four-fold scroll

SELECTING A FEED PULLEY

All ALFA IN MIG/MAG machines use double groove pulleys. These grooves are designed for two different wire diameters (e.g. 0.8 and 1.0 mm).

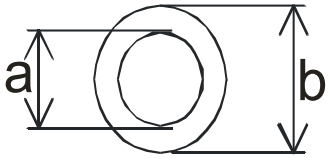
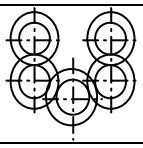
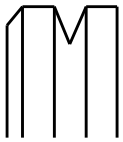
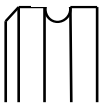
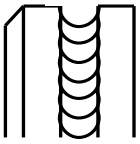
The wire feed pulleys must be suitable for the diameter and material of the welding wire. Only in this way can a smooth wire feed be achieved. Irregularities in wire feed lead to poor welding quality and wire deformation.



A	Correct
B	Wrong
C	Wrong

Figure 3 - Effect of the pulley on the welding wire

OVERVIEW OF WIRE FEED PULLEYS

		4position
		
		a = 19 mm
		b = 37 mm
Pulley groove type	Wire diameter	Order numbers of pulleys
Steel wire 	0,6-0,8	4299
	0,8-1,0	4300
	1,0-1,2	4301
	1,2-1,6	4302
Aluminium wire 	1,0-1,2	4306
	1,2-1,6	4307
	1,6-2,0	4308
	2,4-3,2	4309
Tubular wire 	1,0-1,2	4303
	1,2-1,6	4304
	2,4-3,2	4305

ADJUSTING THE FEED FOR A DIFFERENT WIRE DIAMETER

All ALFA IN MIG/MAG machines use pulleys with two grooves. These grooves are designed for two different wire diameters (e.g. 0.8 and 1.0 mm). The groove

can be changed by removing the pulleys and turning them, or by using other pulleys with grooves of the required dimensions.

1. Unscrew the clamping nuts **E1** towards the front of the four-post slide, the pressure pulleys **E2** open upwards.
2. Unscrew the locking part and remove the pulley.
3. If there is a suitable groove on the pulley, turn the pulley over and put it back on the shaft and secure it by screwing in the piece.

FEED ADJUSTMENT FOR ALUMINIUM WIRE

1. Replace rollers **G2** for rollers **G2** with U profile of the groove for AL welding.
2. Allow nut **G5** on the EURO connector.
3. Replace the Torch used on steel for an aluminium Torch or at least replace the Torch cable with a teflon one.
4. Remove the capillary from the EURO **G1** connector.
5. Trim the end of the teflon bowden cable so that it is close to the **G2** feed pulley. Thread collet **G3**, o-ring **G4**, nut **G5** on the ned of the teflone cable brass pipe **G7** for stabilization **G7**. Tighten nut **G5**.

Place the Torch on the EURO connector **G1** and insert the wire into it.

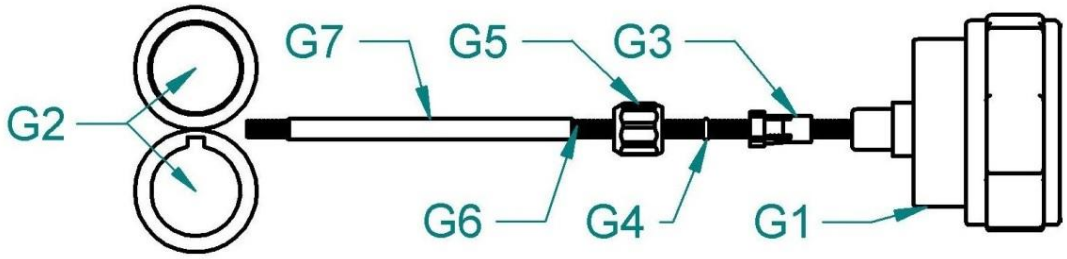


Figure 4 - Feed adjustment for aluminium wire

Item.	Description
G1	EURO connector
G2	Wire feed pulleys
G3	Bovden end cap for 4,0mm, 4,7mm outer diameter
G4	O-ring 3,5x1,5mm
G5	EURO connector nut
G6	Teflon bovden
G7	Bovden support - brass tube

INTRODUCING THE WIRE INTO THE FEED

1. Open the coil cover and release the lock **D2** on the coil holder **D1**. Insert the wire coil reducer **D3** and the wire coil on top of it, secure with lock **D2**. Before doing so, ensure that the mandrel is inserted into the appropriate hole in the wire reducer or coil.
2. If necessary, it is possible to adjust the braking force with screw **D4** so that the wire does not unwind from the spool after the wire feed has stopped.
3. Cut the end of the wire attached to the edge of the coil and feed it into the bovden **E3** through the pulleys **E5** and about 5 cm inside the EURO

connector tube **E4**. Check that the wire runs through the correct groove of the pulley.

4. Fold down the pressure arms **E2** and return the clamping nuts **E1 to the** vertical position.
5. Adjust the pressure of the clamping nut to ensure smooth movement of the wire without deforming the wire. Press button **A13**, located in the feed area of the machine, to start the feed motor. The adjustment screw is located under the plastic screws **E1**.
6. The coil brake is set by the manufacturer. If necessary, it can be adjusted with screw **D4** so that when the feed stops, the coil stops in time and the wire does not become too loose. However, an over-tightened brake puts unnecessary stress on the feeding mechanism and can cause the wire to slip in the pulleys.

Item.	Description
D1	Coil holder
D2	Fuse
D3	Wire spool reducer
D4	Screw - brake force adjustment

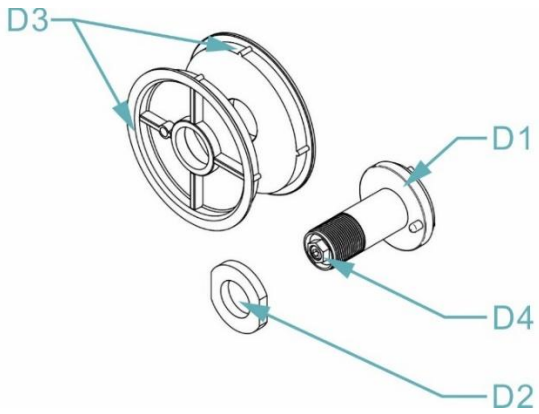


Figure 5 - Wire spool holder

ADJUSTING THE CLAMPING FORCE OF THE FEED PULLEYS

The amount of clamping force of the feed pulleys is important for the reliable operation of the feeding mechanism.

The amount of force depends on the type of welding wire, for aluminium or tubular wire we choose a smaller clamping force.

If the clamping force is insufficient, the pulleys slip and the feed rate becomes irregular.

If the pressure force is too high, the mechanical wear of the bearings increases, the pressure mechanism does not fulfil its protective function and in case of increased resistance of the wire feed (damaged or contaminated bovden, baked wire in the grommet, etc.), the wire does not slip and there is a risk of the wire being displaced to the side. In the extreme case, the motor may be completely blocked and the gearbox will be unduly mechanically stressed, the electric motor and the power output of the controller will be overloaded and may be damaged. Clean the pulleys of canned oil before starting.

INTRODUCTION OF THE WELDING WIRE INTO THE TORCH AND CONNECTION OF THE EARTHING CABLE

1. Connect the grounding pliers to the welding machine or welding table.
2. ☝Caution☝ Do not point the torch against the eyes when inserting the wire!
3. Screw the central torch tip to the **A3** connector on the machine with the machine switched off.
4. Remove the gas nozzle from the Torch.
5. Unscrew the current feedthrough.
6. Connect the machine to the network.
7. Turn the main switch to position I.
8. Press button **A13** located in the feed area of the machine to start the feed motor. The welding wire is fed into the torch. After the wire has been run out of the torch tube, screw on the current pass and the gas nozzle.
9. Before welding, spray the area in the gas nozzle and the jet line with a separating spray to prevent spatter from sticking.

GAS FLOW ADJUSTMENT

The electric arc and the melt bath must be perfectly protected by gas. Too little gas cannot create the necessary protective atmosphere; on the contrary, too much gas entrains air into the electric arc.

☝**Warning**☝ The gas cylinder must be well secured against falling. This manual does not address the safe securing of the gas cylinder. Information can be obtained from the supplier of industrial gases.

1. Attach the gas hose to the gland on the rear panel of the machine.
2. Press button **V1** (fig. 7) on the main panel to switch on the gas valve. If the button is pressed for less than 3 s, the gas valve will be switched off when the button is released. If the button press time is longer than 3 s, the gas valve will be switched off after approx. 20 s or after pressing any button.
3. Turn the adjusting screw **F7** on the bottom of the pressure reducing valve until the flow meter **F6** shows the desired flow, then release the button. The optimum flow rate is 10-15l/min.
4. After a prolonged machine shutdown or torch change, it is advisable to purge the pipe with shielding gas before welding.

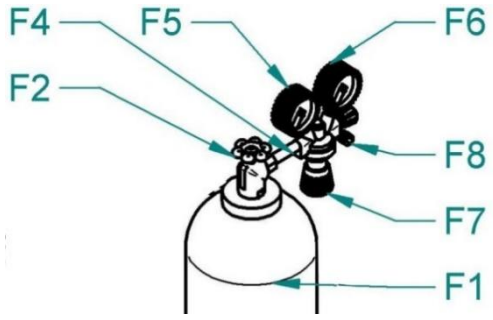


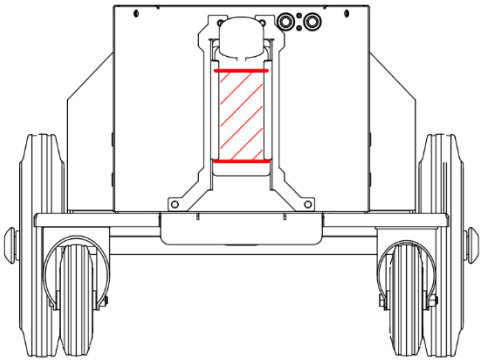
Figure 6 - Gas flow settings

Item.	Description
F1	Bottle
F2	Bottle valve
F4	Reducing valve
F5	High pressure manometer
F6	Low pressure manometer
F7	Adjusting screw
F8	Gas valve

WATER TORCH COOLING SYSTEM

1. The cooling unit is located at the bottom of the machine.
2. The pump seal in this ALFA IN welder is specially designed for ACL ECO fluid (pink, order no. 4600, 5 l canister. Operating range - ambient temperature -10 °C to +40 °C).
3. Leakage of the cooling circuit may occur if other fluids are used. A failure of the cooling circuit using a fluid other than ACL ECO cannot be covered under the manufacturer's warranty.
4. We recommend a complete fluid change every one to three years. The fluid must not be mixed with any other type of fluid. The procedure for changing the fluid can be found at

   https://www.alfain.eu/static/_dokumenty/1/2/9/7/1/1/Vymena-chladici-kapaliny1-navod-CZ.pdf
5. Keep the coolant level in the coolant reservoir within the permitted range (see picture). The fluid level is visually visible on the front of the reservoir. Use the fluid prescribed by the manufacturer.

   If the error message "**Err 2**" - **Low fluid pressure** lights up during operation, turn off the main switch and check the coolant level. After switching on the machine, test the cooling unit. If the error recurs, the cause of the fault must be determined.

   NOTE: The seal at the red cap must be replaced every time the fluid is changed. The gasket can be ordered as an accessory (4712F).
6. ACL ECO liquid is not poisonous. However, due to its operation in the pump, treat the replaced fluid as hazardous waste. Do not pollute the environment. In the worst case, take it to a salvage yard in its original canister. The safety data sheet can be found at

   https://www.alfain.eu/z36182-kapalina-chladici-acl-eco-5l
7. Note: When connecting a gas-cooled torch, it is necessary to connect the water quick couplings with the liquid circuit connection hose! Failure to do so may result in damage to the pump.

VENTING OF THE TORCH COOLING SYSTEM

1. After filling an empty torch cooling system or after refilling the fluid after a large leak and aeration, a complete venting of the circuit is required.

2. Remove the coolant reservoir cap and connect the water quick couplers with the fluid circuit connecting hose.
3. Run the cooling test for about 30 seconds.
4. Connect the torch and run the cooling test for about 30 seconds.
5. If the error message "**Err 2**" - **Low fluid pressure** lights up after pressing the torch button, the procedure must be repeated.

COOLING UNIT CONVERSION KIT

The machine with a pull-out storage box can be converted to a water-cooled version. A conversion KIT E.466 is required. The conversion KIT has to be built into the existing pull-out storage box. We will send you the conversion instructions together with the conversion kit E.466.

7 BASIC SETTINGS

DESCRIPTION OF THE CONTROL PANEL

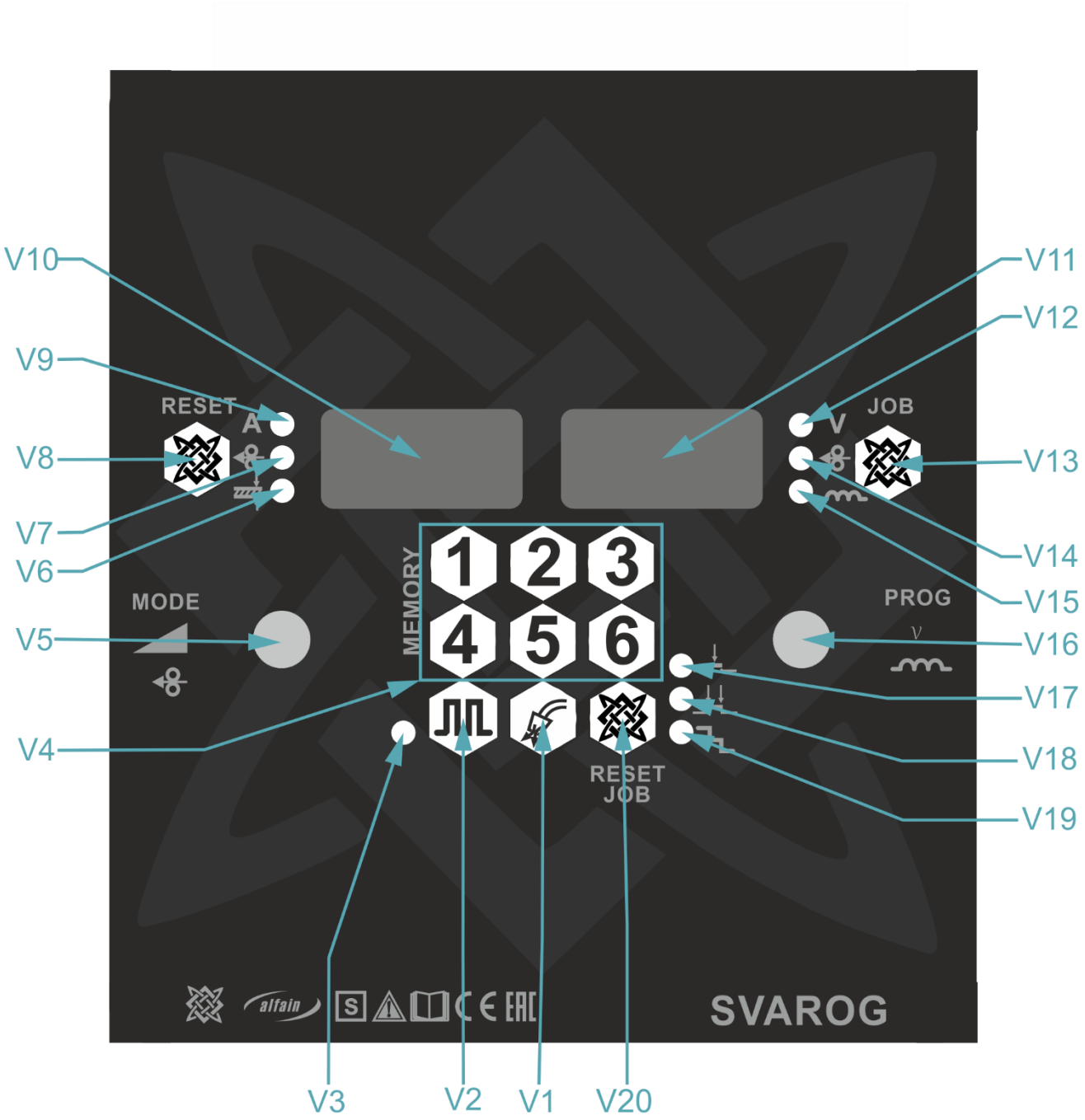


Figure 7 - Control Panel

Item.	Description
V1	Button: gas test
V2	Button: Pulse mode
V3	LED - shines when PULSE mode is selected.
V4	Quick JOB selection
V5	Encoder 2 + confirmation button
V6	LED - lights up when the material thickness is displayed on the left display.

V7	LED - lights up when the wire feed speed is displayed on the left display.
V8	Button: Select synergy display
V9	LED - lights up when the left display shows the current - the expected value the welder wants.
V10	The display shows: 1. Welding current size 2. The size of the welding current in the electrode 3. Feed rate 4. Material thickness 5. Secondary parameter name
V11	The display shows: 1. Welding voltage size 2. Correction 3. The value of the choke
V12	LED - shine when voltage data is displayed on the right display
V13	Button: Correction selection
V14	LED - lights up when wire feed speed correction is set
V15	LED - shines when the right display shows data about the choke
V16	Encoder 1
V17	LED - shines when 2T mode is selected
V18	LED - shines when 4T mode is selected
V19	LED - shine when stair mode is selected
V20	Button: 2T/4T/stairs

SELECTION OF THE WELDING METHOD

1. Long press encoder **V5** to enter the method selection menu.
2. Rotate encoder **V5** to select **ELE** (coated electrode MMA), **MAN** (MIG/MAG manual), **SYN** (MIG/MAG synergic). Confirm the selected method by pressing encoder **V5**.
3. For the **SYN** method, use the **V16** encoder to set the synergy program number.

SYN METHOD

The synergy curves are welded in the PB position (fillet weld, horizontal, inclined from above). For welding in other positions, parameter correction is necessary.

SVAROG 320 HD PULSE		ø 0.8	ø 1.0	ø 1.2
SG/Fe	With 82% CO_2 18%	0 *	1 *	2 *
SG/Fe	With 92% CO_2 8%	3 *	4 *	5 *
SG/Fe	CO_2 100%	6n	7n	8n
Cr/Ni 308	With 97.5% CO_2 2.5%	9 *	10 *	11 *
Cr/Ni 316	With 97.5% CO_2 2.5%	12 *	13 *	14 *

CuSi 3	With 100 %	15 *	x	x
AlMg	With 100 %	x	16 **	17 **
AlSi	With 100 %	x	18 **	19 **

Table of synergy programmes

* - Use the **V2** button to switch the pulse mode on/off.

** - Can only be welded in pulse mode and is only available for AL machines.

n - Cannot weld in pulse mode.

1. **The SYN** is displayed on the left display **V10** and the synergy curve number is displayed on the right display **V11.**
2. Use encoder **V16** to select the synergy curve (program number). Confirm the selected program number by pressing encoder **V5**.

WELDING CIRCUIT CALIBRATION

The welding characteristics of the synergistic curve depend on many factors, such as the length of the welding torch, the length of the grounding cable, the quality of the grounding, the distance of the weldment from the grounding point, etc. It is therefore advisable to calibrate the welding circuit for the actual welding conditions.

1. Press button **V20** and encoder **V5** simultaneously to enter the secondary parameters menu.
2. Select the CAL parameter with the **V5** encoder, press to confirm
3. Set CrE with encoder **V5**, press to confirm.
4. Unscrew the gas nozzle of the welding torch.
5. Cut the welding wire close to the welding nozzle.
6. Pull a piece of welding wire (approx. 50 mm) into the wire feed. There must now be no welding wire in the jet nozzle.
7. Apply slight pressure to the welding torch with the jet nozzle on a clean and cleaned area of the workpiece, press the torch button and hold it down for approx. 2 seconds. A short-circuit current flows for a while, by means of which the new circuit resistance is determined and displayed. (The value can be 0 mΩ to 60 mΩ - these values are not important for the user, factory setting CrE = 10 mΩ, the value can be set badly with the **V16** encoder).
8. If an error occurs, **Err** is displayed on the right display of **V11**, the measurement must be repeated.
9. Confirm the measured value by pressing encoder **V5**, exit the menu by pressing any button twice.
10. Screw on the gas nozzle of the welding torch.
11. Insert the welding wire.

QUICK JOB SELECTION - MEMORY

Works for all welding methods.

1. Long press (4s) of one of the **V4** buttons (1,2,3,4,5,6) will save the set parameters to the memory.
2. JOBs are stored as active (they can be switched by remote control on the torch).
3. A short press of one of the **V4** buttons (1,2,3,4,5,6) will retrieve the stored parameters from memory.
4. If no JOB is stored for the desired position, the display will show **No Job**.

WELDING MODE 2T - TWO-STROKE

Works for both MIG/MAG welding methods.

Use the **V20** button to switch between the **2T**  , **4T**  and  modes. If the **V17** light is on, the machine is set to two-stroke mode. The first stroke is to press the torch button and keep it pressed, the machine will start the welding process. The second stroke means to release the torch button, the machine stops the welding process.

WELDING MODE 4T - FOUR STROKE

Works for both MIG/MAG welding methods.

Use the **V20** button to switch between **2T**  , **4T**  and  modes. If the **V18** light is on, the machine is set to 4-stroke mode. The first stroke is to press the torch button and keep it pressed, the machine will start the welding process. The second stroke means to release the torch button, the machine continues the welding process. The third stroke means to press the torch button, the welding process continues. The fourth stroke means to release the torch button, the machine stops the welding process.

WELDING MODE 2T - DOUBLE STAIRS

Works for both MIG/MAG welding methods (only in SYN mode).

Press the **V20** button to switch between the **2T**  , **4T**  and  modes. If the **V17** and **V19** lights are on, the machine is set to two-stroke stair mode. The first stroke means to press the torch button and keep it pressed, the machine will start welding with the starting current **SCu** for the starting current **t S**. Then the machine will start welding with the main welding current (100%) after the start-up time **tuP**. The second stroke means to release the torch button, the machine will start welding with the end current **ECu** for the end current **t E** after the start-up time **tdo**.

WELDING MODE 4T - FOUR STAIRS

Works for both MIG/MAG welding methods.

Press the **V20** button to switch between the **2T** , **4T** and modes. If the **V18** and **V19** lights are on, the machine is set to the 4-stroke stair mode. The first stroke is to press the torch button and keep the button pressed, the machine will start welding with the starting current **SCu**. The second stroke means to release the torch button, the machine will start welding with the main welding current (100%) after the ramp-up time **tuP**. The third stroke means to press the torch button, the machine will start welding with the end current **ECu** after the ramp-down time **tdo**. The fourth stroke means to release the torch button, the machine stops the welding process.

BILEVEL bCu ≠ 100 %

The difference of the BILEVELU compared to the classical steps is in the second stroke, when by quickly pressing and releasing the torch button the machine switches between the two set main welding currents.

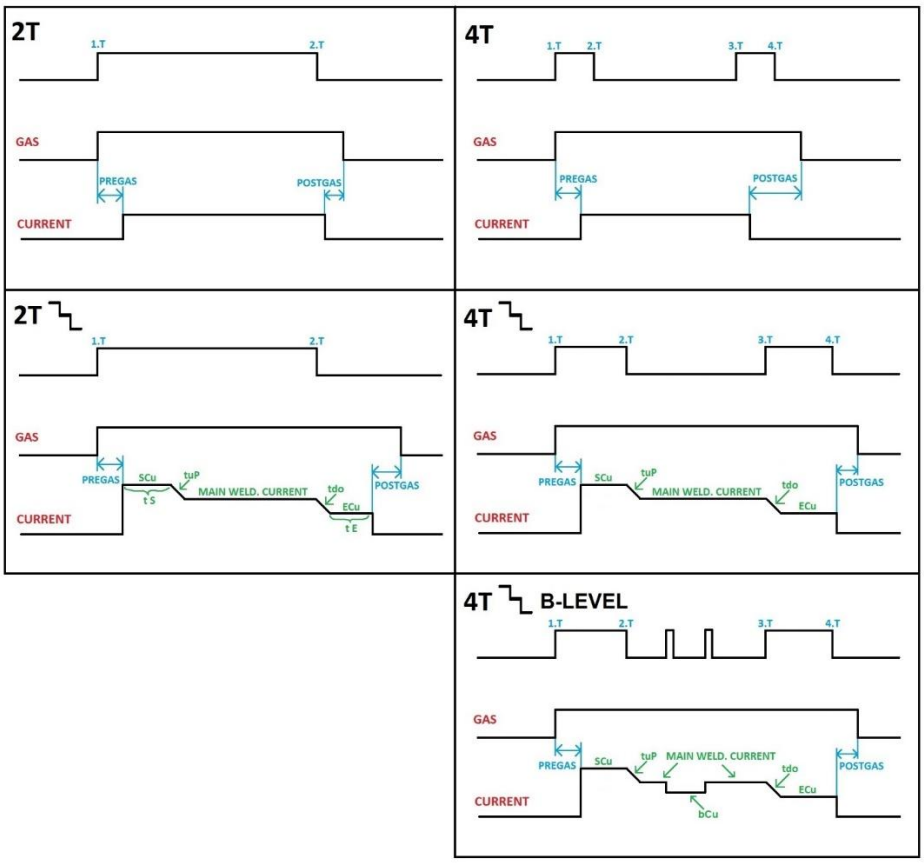


Figure 8 **-** Mode curves

CHANGE OF SECONDARY WELDING PARAMETERS

The welder is set to factory default settings. For most jobs it is not advisable to change secondary parameters. The secondary parameters for manual and synergic methods are identical.

1. Press button **V20** and encoder **V5** simultaneously to enter the secondary parameters menu.
2. Use encoder **V5** to select the parameter (ISP, PrG, PoG, brn, SCu, bCu, ECu, tuP, tdo, t S, t E, CAL), use encoder **V16** to set the desired value.
3. Press encoder **V5** to confirm the selection.
4. Secondary parameters are common to the manual and synergistic methods. The synergistic method allows for multiple secondary parameters to be set.

Symbol	**Meaning of**	**Range (Default)**	**Mark.**
ISP (Initial speed)	Initial speed	10 - 100 % (30 %).	
PrG (Pre gas time)	Pre gas	0 - 20 s (0.1 s).	
PoG (Post gas time)	Post gas	0 - 20 s (0.5 s).	
brn (Burnback)	Burnback	0 - 150 ms (50 ms)	
SCu (Start current)	Start current	10 - 200 % (130 %)	2, 4
bCu (Bilevel current)	Bilevel current)	10 - 200 % (100 % = off)	2, 4
ECu (End current)	End current	10 - 200 % (70 %)	2, 4
tuP (Time UP)	Time up	0.1 - 10.0 s (0.1 s)	2, 4
tdo (Time DOWN)	Time down	0.1 - 10.0 s (0.1 s)	2, 4
t S (Time START)	Time start	0.1 - 10.0 s (0.1 s)	2
t E (Time end)	Time ned	0.1 - 10.0 s (0.1 s)	2
CAL (Calibration menu)	Calibration menu	x.xx (sw version)	

The last menu item is **CAL** - it is used to enter the calibration menu.

Parameters marked 2 are only available in 2T-stairs mode. Parameters marked 4 are only available in 4T-stairs mode.

COUNTER OF WELDING HOURS

The data can be displayed at any time if you have entered the Secondary Parameters menu.

Long press button **V4 (1)** to display the welding time in hours.

CALIBRATION MENU

u-I	Voltage and current calibration (password protected - for authorized service).
Cu1	Cooling unit oFF/on/Aut
Cu2	Sensor settings 0 - service mode 1 - pressure switch / flow sensor 2 - flow sensor with propeller password protected - for authorized service
Cor	Reset correction (YES = reset correction to synergy value when power value is changed in synergy mode)
CrE	See welding circuit calibration

Long press the **V4** button (**1)** to test the display.

Long press the **V4** button **(2)** to display the machine variant / pulley size (only for machines with speed measurement).

(37 - AXE 250/320 PULSE SMART, 30 - AXE 250/320 PULSE MOBILE).

REMOTE CONTROL FROM PARKER TORCH

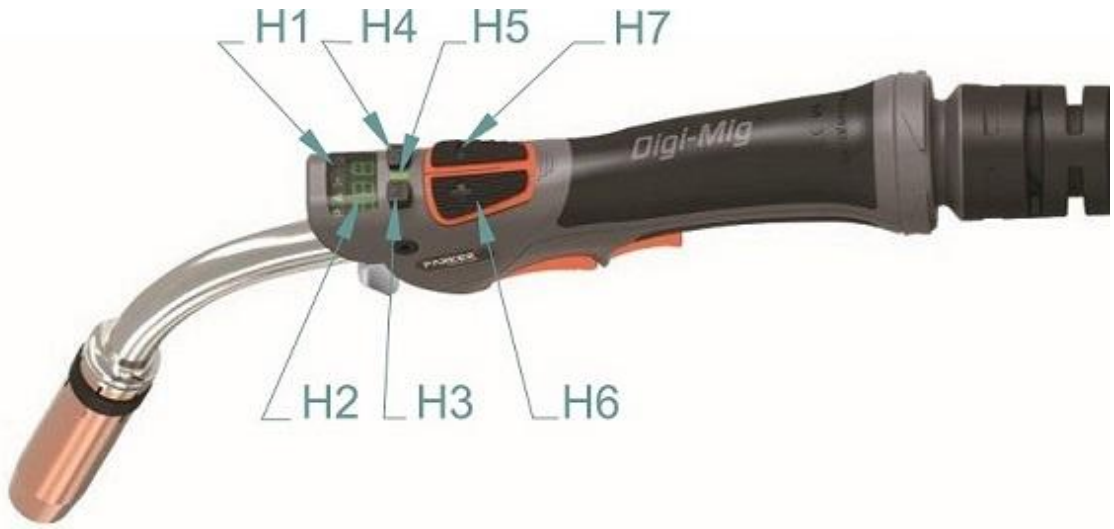


Figure 9 **-** Remote control from the PARKER Torch

Item.	Description
H1	H1 symbol display
H2	H2 display
H3	The M button selects functions MAN: Wire feed speed, Voltage/Damping (selectable depending on machine settings - button **V13**), JOB SYN: Power, Correction/Damping (selectable depending on machine settings - button **V13**), JOB Switch between the individual JOBS using the **H6** (+) and **H7** (-) buttons
H4	The LOCK button locks/unlocks the UP/DOWN and M buttons

	Pressing the Torch button automatically locks the UP/DOWN and M buttons.
H5	LED indicates unlocking of UP/DOWN and M buttons.
H6	UP button
H7	DOWN button

ENABLE THE JOB SWITCHING FUNCTION VIA REMOTE CONTROL (ONLY VALID FOR SOFTWARE VERSIONS BELOW 0.14)

1. Long press the **V13** and **V20** buttons simultaneously to activate the JOB selection with the remote control.

   The V10 and **V11** displays show **JOB on**.

2. Press the **H3** button on the Torch to switch to the JOB change function.
3. Use the **H6** (UP) and **H7** (DOWN) buttons to switch between the saved JOBs.
4. Simultaneously briefly press the **V13** and **V20** buttons to deactivate the JOB remote control selection.

   The V10 and **V11** displays show **JOB off**.

Display of symbols on the remote control:	
Symbol	**Description**
P	A synergy program is set up on the machine.
A	Machine power setting according to current (SYN).
	Adjusting the machine power according to the wire feed speed (SYN).
WITHOUT SYMBOL	Machine power adjustment according to material thickness (SYN). Voltage adjustment (MAN).
	Adjustment of tension or wire feed speed correction, according to machine settings (SYN).
The information shown on the H2 display.	
J.xx	JOB switching (xx - JOB number).
I.xx	Inductance value setting [Inductance] (SYN/MAN). Only for machines with new software version.
ELE	The machine is in ELECTRODE mode, the buttons do not respond.

RESET

1. **Pressing the V8** and **V20** buttons simultaneously for more than 3 seconds will restore the factory settings and clear the stored JOBs (1 - 6).

COOLING UNIT TEST

1. **Pressing the V1** and **V20** buttons simultaneously for more than 3 seconds will start the cooling unit.
2. Press any button to end the test.
3. If a flow meter (Hall-Effect) is used, a numerical value corresponding to the coolant flow rate is displayed. **Error Err 2** occurs when the value is less than 4 (this corresponds to approx. 0.7 l/min).

8 MIG/MAG SYNERGY WELDING

1. Select the **SYN** method according to SELECTION OF THE WELDING METHOD.
2. The left display **V10** shows the machine power (current, wire feed speed, material thickness), the right display **V11 shows the** voltage value. The correction value (voltage, wire feed speed) or the choke value is shown on display **V11** only during setup.
3. Press the **V8** button to switch the settings and display the machine performance (current, wire feed speed, material thickness).
4. Set the machine output (current, wire feed speed, material thickness) using the **V5** encoder.
5. The calibration menu can be set to disable the resetting of the correction and change the choke when the machine power value changes.
6. Long press button **V13** to switch between voltage and wire feed speed correction. Short press to switch between the set correction and the choke value.
7. Adjust the voltage correction, wire feed rate or choke value using the **V16** encoder (if necessary).
8. Press the **V20** button to switch between **2T/4T/2T-stairs/4T-stairs** mode.
9. In the **2T-stairs/4T-stairs** mode, parameters cannot be set during welding.
10. If a torch with remote control is connected, its display shows machine power (current, wire feed speed, material thickness), correction (voltage, wire feed speed), choke value or JOB. Use the **UP/DOWN** buttons to adjust the displayed value, **use the MODE button** to switch between functions.

9 PULSE MODE

1. Press the **V2** button to switch on the pulse mode (only available for specified synergy programs).
2. Switching on the pulse mode is indicated by LED **V3** at the **V2** button.
3. The left display **V10** shows the machine power (current, wire feed speed, material thickness), the right display **V11 shows the** voltage value. The correction value (voltage, wire feed speed) is shown on the **V11** display only during setup.
4. Press the **V8** button to switch the settings and display the machine performance (current, wire feed speed, material thickness).
5. Set the machine output (current, wire feed speed, material thickness) using the **V5** encoder.
6. The calibration menu can be set to disable the resetting of the correction when the machine power value changes.
7. Long press the **V13** button to switch the wire tension and feed rate correction.
8. Adjust the voltage or wire feed rate correction using encoder **V16** (if necessary).
9. Press the **V20** button to switch between **2T/4T/2T-stairs/4T-stairs** mode.
10. If a torch with remote control is connected, its display shows machine power (current, wire feed speed, material thickness), correction (voltage, wire feed speed), choke value or JOB. Use the **UP/DOWN** buttons to adjust the displayed value, **use the MODE button** to switch between functions.

10 WELDING MIG/MAG MANUAL

1. Select the **MAN** method according to SELECTION OF THE WELDING METHOD.
2. The left display **V10** shows the wire feed rate, the right display **V11 shows the** voltage or choke.
3. Set the wire feed speed using encoder **V5**.
4. Set the voltage or inductor using the **V16** encoder.
5. Select the setting and display of the voltage or choke by long pressing the **V13** button.
6. Press the **V20** button to switch between **2T/4T** modes.
7. During the welding process, the welding current is displayed on **V10** and the voltage is displayed on **V11**.

8. After the welding is finished, the measured values remain on the displays (**HOLD**) for 6 s.
9. If a torch with remote control is connected, its display shows the machine power (wire feed speed, tension) and the choke or JOB value. Use the **UP/DOWN** buttons to adjust the displayed value, use **the MODE button** to switch between functions.

WELDING FLOW - GENERAL INFORMATION

The amount of welding current depends on the wire feed speed and the amount of tension. The arc characteristic ("hardness/softness") can be controlled by correction of the choke.

The empirical relation U2 = 14+0,05I2 corresponds to the approximate setting of welding current and voltage by MIG/MAG methods. According to this relationship, we can determine the required voltage. When adjusting the voltage, we must take into account the voltage drop when the welding load is applied. The voltage drop is about 4.5-5.0 V per 100 A.

Adjust the welding current by adjusting the desired welding current for the selected welding voltage by increasing or decreasing the wire feed speed until the arc burns optimally.

Please note that the actual settings for optimum arc bur00n may vary slightly depending on the position of the weld, the material and the fluctuations in line voltage.

In order to achieve good weld quality and optimum welding current setting, the distance of the feed line from the material should be approximately 10 x the diameter of the welding wire (Fig. 11).

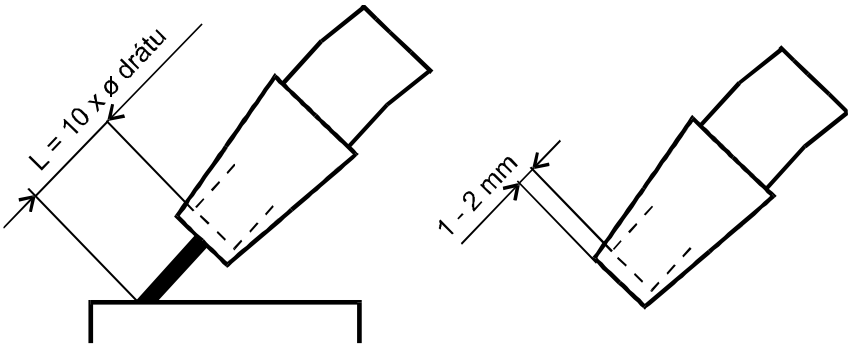


Figure 10 - Distance of the tube from the material

TUBULAR WIRE - POLARITY SELECTION OF MIG/MAG WELDING TORCH

For welding with self-protective tubular wire, the polarity of the MIG/MAG torch must be negative (-). In the case of tubular wire welding, connect the connecting cable A2 to the lower quick coupler A7 (-).

11 MMA WELDING (ELECTRIC WELDING - ELE)

1. Select the **MMA** method according to SELECTION OF THE WELDING METHOD.
2. Disconnect the connecting cable **A2**, connect the electrode holder to the quick connector **A8.**
3. The left display **V10** shows the set value of the welding current, the right display **V11** shows the abbreviation ELE.
4. Set the value of the welding current using encoder **V5**.
5. During welding, the welding current is measured on display **V10** and the voltage on display **V11**.
6. After the welding is finished, the measured value (**HOLD**) remains on the display for 6 s.
7. If a Torch with a remote control is connected, ELE is shown on its display**.**
8. **If the MIG/MAG torch remains connected, the welding voltage will be on it!**

12 CONSUMPTION TABLES

TABLE OF WIRE CONSUMPTION DURING WELDING

Wire diameter [mm]	Wire feed speed range [m/min]	Maximum wire feed speed [m/min]	Weight of 1 m wire [g]	Wire consumption per 1 minute of welding [g/min]	Wire consumption per 1 hour of welding [g/hr]
Steel wire					
0,6	2 - 5	5	2,3	11,5	690
0,8	3 - 6	6	4	24	1440
1,0	3 - 12	12	6	72	4320
1,2	4 -18	18	9	162	9720
Stainless steel wire					
0,6	2 - 5	5	2,3	11,5	690
0,8	3 - 6	6	4	24	1440
1,0	3 - 12	12	6	72	4320
1,2	4 -18	18	9	162	9720
Aluminium wire					
0,6	2 - 5	5	0,8	4	240
0,8	3 - 6	6	1,3	7,8	468
1,0	3 - 12	12	2	24	1440
1,2	4 -18	18	3	54	3240

TABLE OF GAS CONSUMPTION DURING WELDING

Wire diameter [mm]	Gas flow [l/min]	Gas consumption per 1 hour of welding [l/hour]
0,6	6	6 * 60 = 360
0,8	8	8 * 60 = 480
1,0	10	10 * 60 = 600
1,2	12	12 * 60 = 720
1,6	16	16 * 60 = 960
2,0	20	20 * 60 = 1200

TABLE OF ELECTRODE CONSUMPTION DURING WELDING

Electrode diameter [mm]	Welding current range [A]	Electrode length [mm]	Weight of welded electrode without slag [g]	Electrode welding time [s]	Weight of welded electrode without slag in 1 s [g/s]
1,6	30 - 55	300	4	35	0,11
2,5	70 - 110	350	11	49	0,22
3,2	90 - 140	350	19	60	0,32
4,0	120 - 190	450	39	88	0,44

13 MMA WELDING (ELECTRIC WELDING - ELE)

9. Select the **MMA** method according to SELECTION OF THE WELDING METHOD.
10. Disconnect the connecting cable **A2**, connect the electrode holder to the quick connector **A8.**
11. The left display **V10** shows the set value of the welding current, the right display **V11** shows the abbreviation ELE.
12. Set the value of the welding current using encoder **V5**.
13. During welding, the welding current is measured on display **V10** and the voltage on display **V11**.
14. After the welding is finished, the measured value (**HOLD**) remains on the display for 6 s.
15. If a torch with a remote control is connected, ELE is shown on its display.
16. **If the MIG/MAG torch remains connected, the welding voltage will be on it!**

14 MAINTENANCE AND SERVICE TESTS

The equipment requires minimal care and maintenance under normal working conditions. Certain principles must be observed to guarantee faultless operation and long service life:

1. The machine may only be opened by our service personnel or a trained electrician.
2. Occasionally, the condition of the mains plug, mains cable and welding cables should be checked.
3. Once or twice a year, blow out the entire plant with pressurised air, especially the aluminium cooling profiles. Beware of the risk of damage to electronic components by direct compressed air from a short distance!

OPERATIONAL SAFETY CHECK OF THE MACHINE ACCORDING TO EN 60 974-4

The prescribed test operations, procedures and required documentation are specified in EN 60974-4.

ERROR MESSAGES

The left display **V10** shows **Err**, the right display **V11 shows the** error number/label.

Err 1	Machine overheating. Allow the machine to cool down, DO NOT START THE MACHINE!
Err 2	Low fluid pressure. Check the amount of fluid in the reservoir or clean the water circuit. If the cooling unit test cannot be started, check the fuse in the cooling unit.
Err noP	Pulse mode cannot be enabled for the selected synergy program.
Err noS	The pulse mode cannot be switched off, the synergy program is only for pulse mode.

TROUBLESHOOTING

Symptom	Cause	Solution
Torch too hot.	The airlock is clear.	Tighten the grommet.
It doesn't respond to the torch button.	The euro connector connection is loose.	Tighten the euro connector.
	Damaged el. wiring in the torch.	Check or replace.
Irregular wire feed or wire welded to the grommet.	The wire on the spool is wound too tightly.	Recheck and replace the coil if necessary.
	Ball fused to the vent.	Cut the ball and piece of wire at the beginning.
Irregular wire feed or no wire feed.	Poor pressure of the pulleys in the wire feed.	Adjust the pressure according to these operating instructions.
	Damaged torch.	Check and replace if necessary.

	The groove on the feed pulley does not correspond to the diameter of the welding wire.	Fit the correct pulley.
	Poor quality welding wire.	Check and replace if necessary.
	Bovden in the torch is dirty or defective.	Check and replace if necessary.
	The coil brake is set wrong.	Set up according to these operating instructions.
An arc or short between the nozzle and the spout.	Spatter stuck inside the gas nozzle.	Remove the spatter.
Unstable arc.	Incorrect diameter of the grommet or excessively worn or defective grommet.	Replace the vent.
Insufficient supply of shielding gas, pores in the weld.	Incorrectly set gas supply quantity.	Set the correct amount as described in the instructions.
	Contaminated pressure reducing valve on the bottle.	Check and replace if necessary.
	Torch or gas hoses contaminated	Check and replace if necessary.
	The shielding gas is blown off by a draft.	Avoid draughts.
Worse welding performance.	Missing a phase.	Try plugging the machine into a different socket. Check the power cord and circuit breakers.
	Bad grounding.	Ensure the best connection between the weldment and the machine ground cable(s).
	The ground cable is incorrectly inserted into the machine connector.	Tighten the earth cable in the connector on the machine.
	Damaged torch.	Check and replace if necessary.

The welding wire is removed by sliding.	The groove on the feed pulley does not correspond to the diameter of the welding wire.	Fit the correct pulley.
	Poor top pulley pressure.	Adjust the pressure according to these instructions.

STATEMENT OF WARRANTY

1. In accordance with the warranty periods stated below, ALFA IN guarantees the proposed product to be free from defects in material or workmanship when operated in accordance with the written instructions as defined in this operating manual.
2. ALFA IN products are manufactured for use by commercial and industrial users and trained personnel with experience in the use and maintenance of electrical welding and cutting equipment.
3. The statutory warranty period is 6 months from the sale of the machine to the buyer. The warranty period begins on the day the machine is handed over to the buyer, or on the day of possible delivery. The manufacturer extends this period to 24 months. The warranty period does not include the time from the claim to the time when the machine is repaired.
4. ALFA IN warranty will not apply to:
   a) Equipment that has been modified by any other party other than ALFA IN's own service personnel or with prior written consent obtained from ALFA IN Service Department.
   b) Equipment that has been used beyond the specifications established in the operating manual.
   c) Installation not in accordance with the installation/operating manual.
   d) Any product that has been subjected to abuse, misuse, negligence or accident.
   e) Failure to clean and maintain (including lack of lubrication, maintenance and protection), the machine as set forth in the operating, installation or service manual.
5. During the warranty period, no modifications or alterations to the machine that may affect the functionality of the individual parts of the machine are permitted.
6. Warranty claims must be made immediately upon discovery of a manufacturing or material defect by the manufacturer or dealer.
7. If a defective part is replaced during a warranty repair, ownership of the defective part passes to the producer.
8. The proof of purchase (invoice), on which the serial number of the product is indicated, or the guarantee certificate stated on the last page of this manual serves as a guarantee certificate.
9. A fault in the cooling circuit when using a fluid other than ACL ECO cannot

be covered by the manufacturer's warranty

WARRANTY AND POST-WARRANTY REPAIRS

1. Warranty repairs are performed by the manufacturer or a service organization authorized by him.
2. The procedure is similar in the case of post-warranty repairs.
3. Report the complaint to e-mail: servis@alfain.eu or to the phone number +420 563 034 626. The operating hours of the service are from 7:00 to 15:30 every working day.

15 ECODESIGN OF WELDING EQUIPMENT

The equipment meets the requirements of EU Commission Regulation 2019/1784 of 1 October 2019 laying down ecodesign requirements for welding equipment.

The power source efficiency values and the power consumption at standstill are given in chapter 4. Material consumption is given in chapter 12.

16 DISPOSAL OF ELECTRICAL WASTE

Information for users on the disposal of electrical and electronic equipment in the Czech Republic:

ALFA IN a.s., as a manufacturer, places electrical equipment on the market and is therefore obliged to ensure the take-back, processing, recovery and disposal of electrical waste.

The company ALFA IN a.s. is registered in the LIST of the collective system EKOLAMP s.r.o. (under the producer registration number 06453/19-ECZ).

This symbol on products or in accompanying documents means that used electrical and electronic products must not be added to normal municipal waste.

The equipment must be disposed of at separate collection and take-back points of the company. EKOLAMP s.r.o. The list of locations can be found at http://www.ekolamp.cz/cz/mapa-sbernych-mist .

FOR USERS IN EUROPEAN UNION COUNTRIES

To dispose of electrical and electronic equipment, ask your dealer or supplier for the necessary information.

17 WARRANTY LETTER

The warranty certificate is the proof of purchase (invoice) with the serial number of the product or the warranty certificate below filled in by the authorised dealer.

Production number:	
Day, month in words and year of sale:	
Stamp and signature of the seller:	