

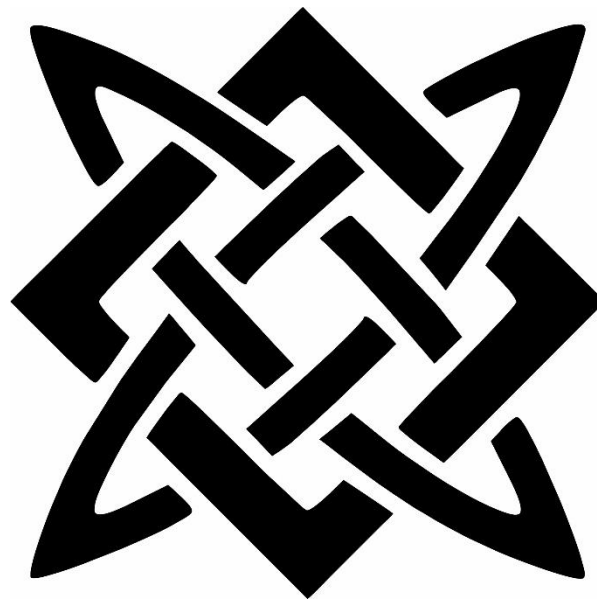
WELDING MACHINE

SVAROG 420/520 HD

SVAROG 420/520 HD PULSE

SVAROG 420/520 HD DOUBLE PULSE

OPERATING MANUAL



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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.

The SVAROG 420/520 HD synergic welding machine is a new generation of multifunctional synergic welding machines of the ALFA IN brand. The machine is designed for welding method MIG/MAG, MMA, TIG and the AIR method. The SVAROG HD series is very variable and in addition to perfect welding properties, is characterized by the following specifics:

1. Very high load 500 A at 60% (420 A at 100%) most other machines have significantly lower power.
2. Ecological – efficiency higher than 89%. This means that at least 89% of the energy from grid is converted into arc energy.
3. Remote control as standard – Thanks to the strong magnet, you can reliably place it at a distance of up to 12m (the length of the extension cable is 6m). You can easily place the panel on any ferromagnetic material, the side of the welder or directly on the welded structure.
4. Possibility to choose control panel with classic panel buttons or sub-foil solution of buttons. Classic buttons give many welders a sense of security when operating the welder.
5. Easy lock – the control panel can be locked by holding the button, unintentional change of settings is therefore unlikely.
6. Direct storage of 5 JOBS by holding the button and recalling JOBS by a short direct button. We reserved our own button for each of the JOBS out of 5.
7. Innovative industrial Torch ARC M6W with remote control as standard. Thanks to it, the Torch maintenance time is up to $\frac{2}{3}$.
8. ARC gun torch as alternative for high-performance welding.

9. Torch calibration – The accuracy of the synergy depends on the resistance of the welding circuit. Different lengths of torch, connection, ground cable or ground location affect the accuracy of the synergic curve. The Torch calibration function allows you to eliminate these effects.
10. Pulse mode can remove up to 70% of finishing work.
11. Coolant filter in the basic equipment of the machine.
12. Coolant ACL ECO – does not harm the environment, is not toxic.
13. Modularity of chassis for gas cylinders – for one, two or no cylinder.
14. Variable feed position on the current generator (Separate).
15. Czech prices of spare parts and service work.
16. Practical and smart cable Torch holders.


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, aluminum alloys, etc.). They are designed not only for heavy industrial operations, but also for industries demanding accuracy and speed.

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 paper or electronic operating instructions.



2. Safety precautions

2.1 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 sturdy 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 .
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.

2.2 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. The welder must use protective equipment.
4. When handling the machine with a lifting device, hook the machine on all crane eyes. Other mounting is not permitted!

5. Disconnect the device from the mains before carrying out any work on the electrical system, removing the cover or cleaning it.

2.3 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. Operatings conditions

1. SVAROG 420/520 Pulse H2O welding machine is designed for welding aluminium steels and their alloys, for commercial and industrial use.
2. Use only the specified transport equipment to transport the welder. Do not use a forklift or simple crates to move.
3. The welding machine can be manipulated with the help of crane eyes, which are part of the chassis. The machine can only be handled if it is attached to all crane eyes. The SVAROG transport with crane eyes is prohibited if a gas cylinder is placed on the platform.
4. The device may only be put into operation by trained personnel and only within the technical regulations. The manufacturer is not liable for damage caused by improper use and operation. Only use original spare parts from ALFA IN for maintenance and repairs.
5. The device complies with IEC 61000-3-12.
6. The welding machine is tested according to the standard for degree of protection IP 23S, which provides protection against intrusion of solids with a diameter greater than 12 mm and protection against intrusion of water falling in a vertical to oblique direction to a slope of 60°.
7. Operating ambient temperature between -10 to +40 °C.
8. Relative humidity below 90% at +20 °C.
9. Up to 3000 m above sea level.
10. The machine must be located so that the 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, are sucked into the machine (e.g. during grinding).

11. The handling handle is intended for travel only, it is not designed for lifting machines.
12. All interventions in the el. equipment as well as repairs (disassembly of the mains plug, replacement of fuses) may only be carried out by an authorized person.
13. For the welding machine, it is necessary to perform a periodic inspection once every 6/12 months by an authorized employee – see paragraph Maintenance and service tests.
14. From the point of view of interference suppression, the welding machine is designed primarily for industrial premises. If other premises are used, special measures may be required (see EN 60974-10).
15. 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

3.1 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 520 PULSE H20				
Method		MIG/MAG	MMA	TIG
Mains voltage	V/Hz	3x400/50-60		
Welding current range	A	20 - 500	10 - 500	10 - 500
Open-circuit voltage U_{20}	V	94,0	103,0	100,0
Mains protection	A	32 @		
Max. effective current I_{1eff}	A	32,0	31,4	27,0
Welding current (DC=100%) I_2	A	420	400	420
Welding current (DC=60%) I_2	A	500	450	500
Welding current (DC=x%) I_2	A	60% = 500	55% = 500	60% = 500
Protection		IP 23S		
Standards		EN IEC 60974-1, EN 60974-10 cl. A		
Dimensions (w x l x h) generator	mm	650 x 1140 x 1090		
Compact weight	kg	100		
Wire speed	m/min	1,0 - 20,0	---	---
Spool diameter	mm	300	---	---
Spool weight	kg	18	---	---
Weight - feeder	kg	16	---	---
Cooling power (Q=1l/min)	kW	0,74	---	0,74
Total liquid content	l	5,0	---	5,0
Max. pressure	Bar	3,5	---	3,5
Max. flow	l/min	9	---	9
Max. input power I_{1max}	A	41,2	42,3	34,6
Open-circuit voltage reduced U_{2R}	V	16,0		
Insulation class		F		
Max. input power S_{1max}	kVA	28,6	29,1	24,4
Efficiency	%	88		
Input power in idle mode P10	W	25		

5. Machine accessories

5.1 Part of delivery

1. Operating manual
2. Grounding cable 3 m 500 A 70 mm²
3. Pulley (s) for wire diameters 1,0 – 1,2 mm
4. 2x Reduction for wire spool

5.2 Accessories to order

See Catalog

5.3 Torchs to order

1. Torch ARC M6W 3m DIGIMIG
2. Torch ARC M6W 4m DIGIMIG
3. Torch ARC M6W 5m DIGIMIG
4. Torch ARC M6W 3m DIGIMIG PISTOL
5. Torch ARC M6W 4m DIGIMIG PISTOL
6. Torch ARC M6W 5m DIGIMIG PISTOL
7. Torch ARC M6OSW 3m DIGIMIG
8. Torch ARC M6OSW 4m DIGIMIG

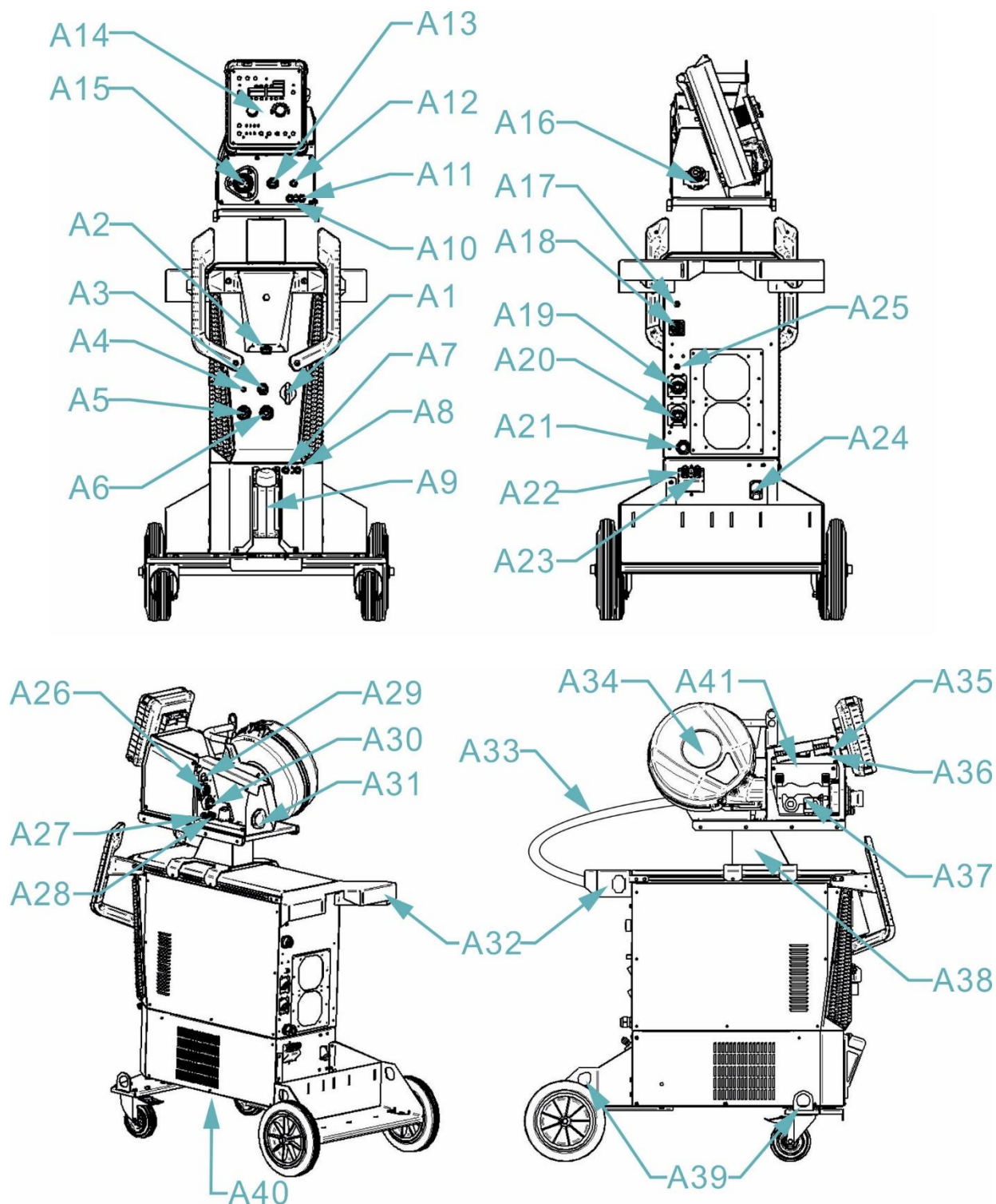
Assembly and maintenance instructions M6WP/M6OSWP:





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. Description of the machine and functions

6.1 Main parts of the machine



Pos.	Name
A1	ON/OFF switch
A2	Remote control connector (generator)
A3	TIG torch connector (depends on machine variant)
A4	Gas connection connector for TIG – output (depends on machine variant)
A5	Quick connector (+)
A6	Quick connector (-)
A7	Quick connector H2O (depends on machine variant)
A8	Quick connector H2O (depends on machine variant)
A9	Cooling unit
A10	Quick connector H2O
A11	Quick connector H2O
A12	Remote control connector (feeder)
A13	Push pull torch connector
A14	Control panel
A15	Euro torch connector
A16	Linking pass - feeder
A17	Thermal fuse (5A)
A18	Connecting cable connector female
A19	Quick connector (-)
A20	Quick connector (+)
A21	Mains cable
A22	Quick connector H2O
A23	Quick connector H2O

A24	Coolant filter
A25	Gas connection connector for TIG – input (depends on machine variant)
A26	Connecting cable connector male
A27	Quick connector H2O
A28	Quick connector H2O
A29	Gas connection connector
A30	Connecting cable quick coupler
A31	Linking pass - feed
A32	Connecting cable holder
A33	Connecting cable
A34	Wire spool holder
A35	Button: gas test 
A36	Button: wire guide 
A37	Wire feeder
A38	Feeder holder - spider
A39	Crane eyes
A40	Coolant outlet
A41	Feeder lighting

6.2 Cooling unit (only for water – cooled versions)

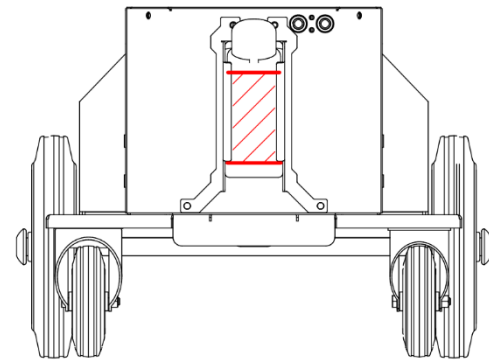
Recommendations for machines with detachable wire feed:

The cooling unit is ready to connect a TIG torch (front panel) and a MIG/MAG torch (rear panel). When you welding with one method, disconnect the torch for the other method. Of both Torches are connected, the cooling capacity for the active Torch may be reduced.

6.3 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. Working area - ambient temperature -10 ° C to +40 ° C).
3. If another fluid is used, the cooling circuit may leak. A defect in the cooling circuit when using a fluid other than ACL ECO cannot be covered under the manufacturer's warranty. The fluid must not be mixed with any other type of fluid.
4. Keep the coolant level in the coolant tank within the permitted range (see illustration). The fluid level is visually visible on the front of the tank. Use the fluid prescribed by the manufacturer.

If the error message "**ERR 2**" lights up during operation, switch off the main switch. After turning on the machine, perform a refrigeration unit test. If the error persists, 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).

5. ACL ECO fluid is non-toxic. However, due to its operation in the pump, the treated liquid is treated as hazardous waste. Do not burden the environment. In the worst case, take it to the collection yard in the original canister. You can find the safety data sheet on the line

<https://www.alfain.eu/z36182-kapalina-chladici-acl-eco-5l>

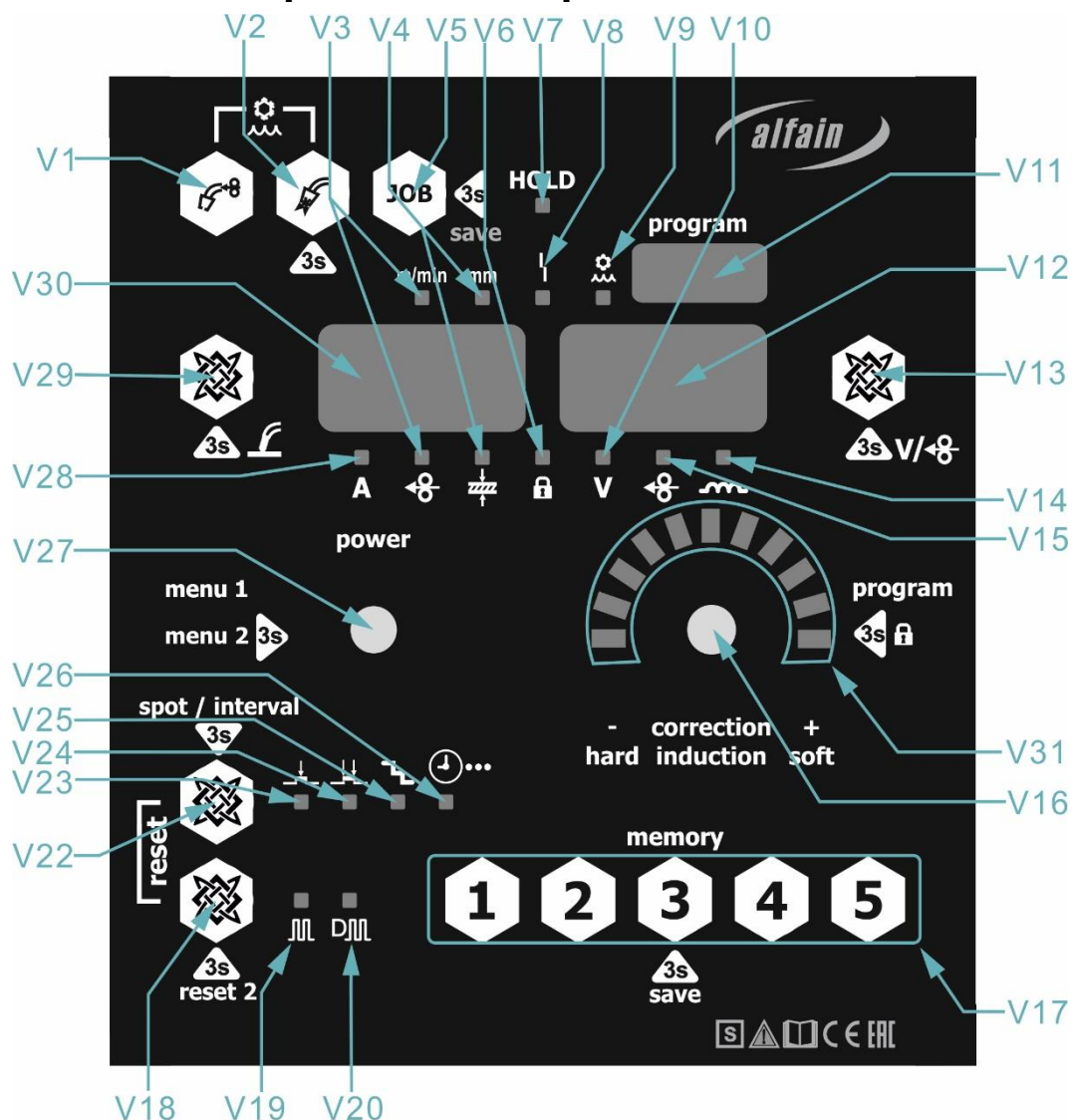
NOTE: When connecting a gas-cooled Torch, it is necessary to connect the water quick couplings with the connecting hose of the liquid circuit, or switch off the cooling unit!! Failure to observe this condition can damage the pump!

6.4 Bleeding the torch cooling system

1. After filling the empty Torch cooling system or replenishing the liquid after extensive leakage and aeration, it is necessary to perform a complete circuit venting.
2. Remove the coolant tank cap and connect the water quick couplings with the fluid circuit connecting hose.
3. Run the cooling test for approx. 30 seconds.
4. Connect the Torch and run the cooling test for approx. 30 seconds.

If the error message "**ERR 2**" - low water pressure lights up after pressing the Torch button, the procedure must be repeated.

6.5 Description of control panel



Pos.	Popis
V1	Button: wire guide
V2	Button: gas test
V3	Control light – feed rate (m/min)
V4	Control light – material thickness (mm)
V5	Button: JOB
V6	Control light – shines when control panel is locked
V7	Control light – Hold
V8	Control light – Error
V9	Control light – cooling unit error
V10	Control light – voltage or voltage correction
V11	Method selection display
V12	Display for voltage, choke and feed rate correction
V13	Button: correction selection
V14	Control light – choke or choke correction
V15	Control light – feeder rate correction
V16	Encoder voltage setting / correction / choke / short press encoder – enter the method setting menu
V17	Button: 1-5 – JOB speed dial
V18	Selection key: Synergy, Pulse / Double pulse
V19	Control light - pulse mode is selected
V20	Control light - double pulse is selected
V21	---
V22	Button: mode selection
V23	Control light - 2T mode is selected
V24	Control light - 4T mode is selected
V25	Control light - stairs mode is selected
V26	Control light = interval welding Control light flashes = pointing
V27	Encoder for setting current and feed rate / short press encoder – enter the MENU 1 (secondary parameters menu)
V28	Control light – lights up when the left display shows the current – the expected value that the welder wants
V29	Button: select synergy display
V30	Display for current flow, feed rate and material thickness
V31	LEDs for displaying choke values

6.6 Menu structure

6.6.1 Method setup menu

Press the **V16** encoder briefly to enter the method selection.

Use the **V16** encoder to set the **AIR / ELE / TIG / MAN / SYN** method. In synergic welding mode, select the synergic program number - the selection is shown on display **V11** (displays **V30** and **V12** are off). Press the **V16** or **V27** encoder to confirm the selection. Press another button to exit the menu.

You can use the **V18** key to switch between synergy and pulse synergy program. The selected method or synergy program number is displayed on the **V11** display.

6.6.2 Menu 1 (secondary parameters menu)

Press the **V27** encoder briefly to enter the secondary parameters menu.

The menu of secondary parameters differs according to the selected method.

Use encoder **V27** to select the parameter, use encoder **V16** to set the desired value.

Press any button to exit the menu.

The display **V30** shows "parameter", the display **V12** shows the set value and the display **V11** shows the default value.

Menu structure 1 ELE

Parameter tag	Parameter	Range	Default settings
VRD	Voltage reduce device	(on/off)	[on]
ASt	Antistik	(on/off)	[on]
HS	HotStart	(100-250%)	[150]
AF	ArcForce	(100-250%)	[130]
PdC	Second current	(1-99%)	[60]
dut	Shift	(1-99%)	[50]
FrE	Frequency	(0,5-250Hz)	[1,0]

Menu structure 1 TIG

Parameter tag	Parameter	Range	Default settings
LA	LiftArc	(on/off)	[on]
PoG	Post Gas	(0-20s)	[3,0]
tuP	Time Up	(0-20s)	[0]
Tdo	Time Down	(0-20s)	[0,5]
SCu	Start current	(10-100%)	[100]
bCu	Second (BiLevel) current	(10-100%)	[100]
ECu	End current	(10-100%)	[10]
PdC	Second current	(1-99%)	[40]
dut	Shift	(1-99%)	[50]
FrE	Frequency	(0,5-250Hz)	[1,0]

Menu structure 1 MAN

Parameter tag	Parameter	Range	Default settings
ISP	Initial Speed	(10-100%)	[30]
PrG	Pre Gas	(0-20s)	[0,1]
PoG	Post Gas	(0-20s)	[0,5]
Brn	Burnback	(0-150ms)	[60]
SPo	Spot – Body	(0,5-20s)	[2,0]
Int	Interval	(0,5-20s)	[2,0]

Menu structure 1 SYN (PULSE)

Parameter tag	Parameter	Range	Default settings
ISP	Initial Speed	(10-100%)	[30]
PrG	Pre Gas	(0-20s)	[0,1]
PoG	Post Gas	(0-20s)	[0,5]
Brn	Burnback	(0-150ms)	[60]
SPo	Spot – Body	(0,5-20s)	[2,0]
Int	Interval	(0,5-20s)	[2,0]
SCu	Start current	(10-200%)	[130]
bCu	Second (BiLevel) current	(10-200%)	[100]
ECu	End current	(10-200%)	[70]
tuP	Time uP	(0,0-10s)	[0,1]
Tdo	Time Down	(0,0-10s)	[0,1]
t S	Time Start	(0,0-10s)	[1,0]
t E	Time End	(0,0-10s)	[1,0]
FdP	Frequency of Double Pulse (DP)*	(0,1-10,0Hz)	[1,5]
dut	Class DP*	(20-80%)	[50]
bAL	Balance DP*	(10-90%)	[50]
dPC	Correction DP*	(-4,0 - 4,0)	[0,0]

Parameters of double pulse

- **FdP** – frequency of alternating main vs secondary current
- **dut** – Main vs secondary current duration ratio
- **bAL** – the ratio of how much % will be the secondary current compared to the main current (smaller number = greater difference between main and secondary current)
- **dPC** – side current correction
 - LEDs below the right display show the currently selected correction

6.6.3 Menu 2 (calibration menu)

Press and hold the V27 encoder to enter the secondary parameters menu.

Cu1 - Cooling unit

oFF - Cooling unit permanently switched off

on - The cooling unit is permanently switched on

Aut - Automatic start of the cooling unit

Cu2 – Flow sensor

0 - without sensor

1 - pressure switch / flow sensor

2 - flow meter (Hall-Effect)

Cor - Resetting the correction (1 - resetting the correction and choke when changing the power value).

LoC - Machine lock menu (control panel lock level)

1 - Cannot enter MENU 3 (calibration menu)

- Unable to save JOBS

- The torch cannot be calibrated

- Cannot switch method (only by loading JOB)

- Reset cannot be used

2- JOBS cannot be switched

- Unable to enter the secondary parameters menu

- It is not possible to change the set parameters, only the correction in synergy

3 - The machine can only be operated from the remote control

4 **u-I** - Voltage and current calibration menu (password protected)

toC – Token entry menu

tlm – Menu of counters for machine start-up time, total welding time and working time in individual modes

Press and hold button **1 (V17)** in this mode we call the **PAS** menu, where after entering the password (123) we can reset the counter.

Press and hold button **2 (V17)** to display the software version of the individual boards:

(V30) – PCB SVAROG control (7130)

(V12) – PCB SVAROG motor (7131)

(V11) – PCB SVAROG display (7132)

Press and hold button **5 (V17)** to test the display.

TOKEN

The token is a unique combination of characters for each machine and is generated by the manufacturer based on the required features or a purchased configuration extension. The token can be used to unlock features and configure the machine without having to reload the software. In case of a change request (purchase of functions), the supplier will send a new token together with the procedure for using the token.

GAS TEST

Press button **V2** to close both **TIG / MIG** gas valves. If the button press time is shorter than 3 s, the gas valve switches off when the button is released. If the button press time is longer than 3 s, the gas valve switches off after approx. 20 s or after pressing any button. Press button **A35** (gas test) to close the **MIG** gas valve (in feed). Release the button to turn off the gas valve.

INSERTING THE WIRE

Press button **A36** to start the feeder motor. Releasing the button stops the feeder motor. The wire feed speed is shown on the **V30** display. You set the wire feed speed with the **V27** encoder. The **V11** display shows INS, the V12 display is off. Press button **A36** (wire feed) inside the feed to start the feeder motor. Releasing the button stops the feeder motor.

WIRE INSERTION (optional)

Press buttons **V1** and **V29** at the same time to start the feeder motor. Releasing the **V1** button stops the feeder motor. The wire feed speed is shown on the **V30** display. You set the wire insertion speed with the **V27** encoder. The **V11** display shows **RET**, the **V12** display is off. Press buttons **A36** (wire feed) and **A35** (gas test) inside the feed at the same time to start the feeder motor. Stop the feed motor by releasing the **A36** button.

COOLING UNIT TEST

Start the cooling unit by pressing buttons **V1** and **V2** at the same time (for more than 3 s). To end the test, press any button.

In case of insufficient flow, the **V9** indicator light and the **ERR** message on the **V30** display light up. The **V11** display shows the **CU**, the **V12** display is off.

QUICK LOCK

Press and hold the **V16** encoder to lock / unlock the machine.

The lock is not under the password and is signalled by the **V6** lighting. The locked machine cannot be controlled from the control panel, the remote control can be used.

"SMALL RESET"

By briefly pressing the **V18** and **V2** buttons at the same time the selected method to the factory settings. **JOBs** will not be deleted - the values in the calibration menu will be retained.

"LARGE RESET"

Press and hold buttonys **V18** and **V22** at the same time to reset the machine to the factory settings. All **JOBs** will be deleted. The values in the calibration menu are retained.

7. JOBS

By **JOB** we mean the saved settings of the welder (programs) for a specific welding job. **JOBs** work only for MIG method (manual, synergic, pulse).

7.1 JOB storage

Press and hold **V5**  to enter the **JOB** save menu.

The display **V30** shows **SAV**, the **V12** display shows the **JOB** number, the **V11** display shows the **Job**.

Symbols in front of the number mean:

- E. - empty **JOB**.
- n. - inactive **JOB** (cannot be switched by remote control).
- A. - active **JOB** (can be switched by remote control).

Use the **V16** encoder to set the **JOB** number. Press encoder **V27** or **V16** to store the desired **JOB**. Press another button to exit the **JOB**.

7.2 Loading JOB (JOB LOA)

Press the **V5** buttons briefly to enter the JOB load menu.

The display **V30** shows **LoA**, the display **V12** shows the number JOB and on the **V11** display shows **Job**.

Symbols in front of the number mean:

- E. - empty JOB.
- n. - inactive JOB (cannot be switched by remote control).
- A. - active JOB (can be switched by remote control).

The **V16** encoder outputs the JOB number. Use **V27** encoder to set the JOB as active, inactive, or delete the selected JOB. Press encoder **V27** or **V16** to load the desired JOB. Press another button to exit the menu to load the job.

7.3 Quick select JOB – memory

JOBs only work for the MIG method (manual, synergic, pulse). The values, including the secondary parameters, are stored. JOBs are stored as inactive (they cannot be switched by remote control on the Torch).

Press and hold buttons 1-5 (position **V17**) to store the set parameters. Press keys 1-5 (position **V17**) briefly to read the stored parameters.

If no JOB is stored at the desired position, an error (ERR 6) will appear on the display.

8. Preparation of the machine for grooving (AIR)

8.1 Grooving torch connection

Connect the quick coupler of the grooving torch to the plus quick coupler **A5** on the generator, carefully locking by turning it clockwise.

8.2 Ground cable connection

Connect the ground wire quick coupler to the minus quick coupler **A6** on the generator, carefully locking by turning it clockwise. Attach the ground clamp to the weldment.

8.3 Air connection to the grooving torch

Connect the torch to the compressed air source and make sure that the compressed air pressure is at least 5 Bar.

9. Air welding (Grooving)

1. Select the **AIR** method in MENU 1.
2. The display **V11** shows **AIR**, the left display **V30** shows the set current value, the display **V12** is off.
3. Use encoder **V27** to set the slot current value.
4. During welding, the measured value of the welding current is shown on the **V30** display. The measured voltage value is shown on the **V12** display.
5. After welding, the measured **HOLD** value remains on the display. The **HOLD** value is signalled by the **V7** lighting up.
6. If a torch with remote control is connected, its display shows: ---.
7. **If the MIG/MAG torch remains connected, there will be welding voltage on it!**

10. Preparation of the machine for electrode welding (ELE)

10.1 Electrode holder and ground cable connection

Connect the electrode holder and ground cable to quick connectors **A5** and **A6** according to the polarity required by the electrode manufacturer on the electrode package. Carefully force to turn by turning it clockwise.

When using basic electrodes, connect the electrode pliers to the + pole.

When using rutile electrodes, connect the electrode pliers to the – pole.

11. Electrode welding (ELE)

1. Select the **ELE** method in MENU 1.
2. The display **V11** shows **ELE**, the left display **V30** shows the set current value, the right display **V12** is off.
3. Use encoder **V27** to set the welding current value.
4. Press **V18** to turn on pulse mode - function may not be available, depending on the machine software. The setting is displayed on **V19**.
5. During welding, the measured value of the welding current is shown on the **V30** display. The measured voltage value is shown on the **V12** display.
6. After welding, the measured **HOLD** value remains on the display. The **HOLD** value is signalled by the **V7** lighting up.
7. If a torch with remote control is connected, its display shows ---.
8. **If the MIG/MAG torch remains connected, there will be welding voltage on it!**

12. Preparation of the machine for TIG welding (TIG)

12.1 Torch connection

Connect the torch connector to the EURO connector **A15** on the feed unit. Then connect the torch fluid quick couplings by colour to fluid quick couplings **A10** and **A11** on the machine.

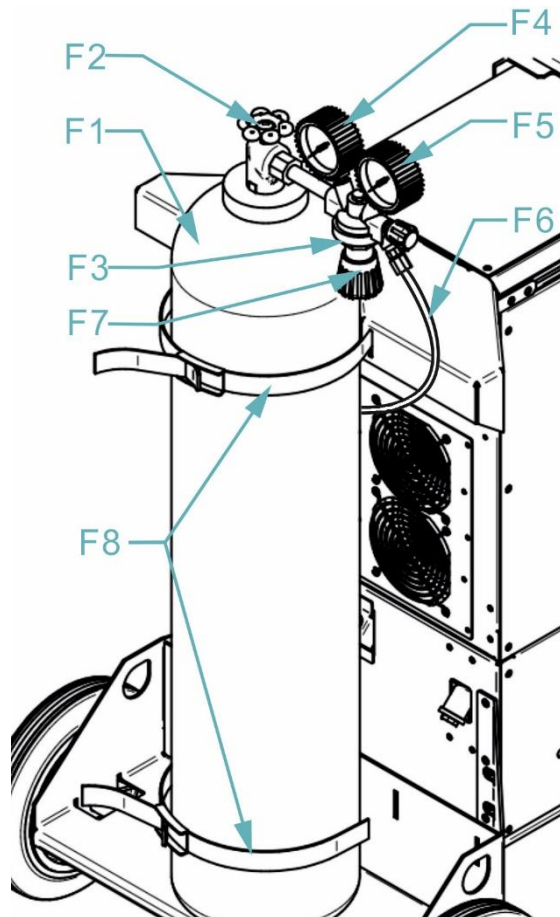
12.2 Ground cable connection

Connect the ground wire quick coupler to the minus quick coupler **A6** on the generator, carefully locking by turning it clockwise. Attach the ground clamp to the weldment.

12.3 Gas supply attachment

1. Place the gas bottle **F1** on the chassis at the rear of the machine and ensure it securely with **F8**.
2. Open valve **F2** several times to remove any dirt from the connection point.
3. Connect pressure reducing valve **F3** to cylinder **F1**.

4. Connect hose connector **F6** to pressure reducing valve **F3**.
5. Open the valve on bottle **F2** and set the gas flow through valve **F7**, you must run the gas test (button **A35** or **V2**). The flow rate is indicated on the flow meter **F5**. This should be approximately of the wire diameter times 10l/min. The contents of the cylinder are indicated by the manometer **F4**.



13. TIG welding

1. Select the **TIG** method in MENU 1.
2. The **V11** display shows **TIG**, the left current display **V30** shows the set current value, the display **V12** is off.
3. Use encoder **V27** to set the welding current value.
4. Press the **V22** button to switch the mode to **2T / 4T**.
5. Press the **V18** button to turn on pulse mode (Pulse mode is active only in main and bi-level current) - function may not be available, depending on the machine software.

6. During welding, the measured value of the welding current is shown on the **V30** display. The measured voltage value is shown on the **V12** display.
7. After welding, the measured **HOLD** value remains on the display. The **HOLD** value is signalled by the **V7** lighting up.
8. To cancel the HOLD value, press any button or turn the encoder.
9. A **TIG** torch can be used in the EURO connector. If a button connected to the EURO connector is used, both gas valves switch in the feed and in the generator. If the Torch button is connected to connector **A3**, only the gas valve closes.
10. When using a **TIG** torch to the EURO connector, switch the polarity on the quick connectors **A19** and **A20**.
11. If a Torch with remote control is connected, its display shows ---.
12. **If the MIG/MAG torch remains connected, there will be welding voltage on it!**

14. Machine preparation for TIG, MMA welding

14.1 Connecting cable connection

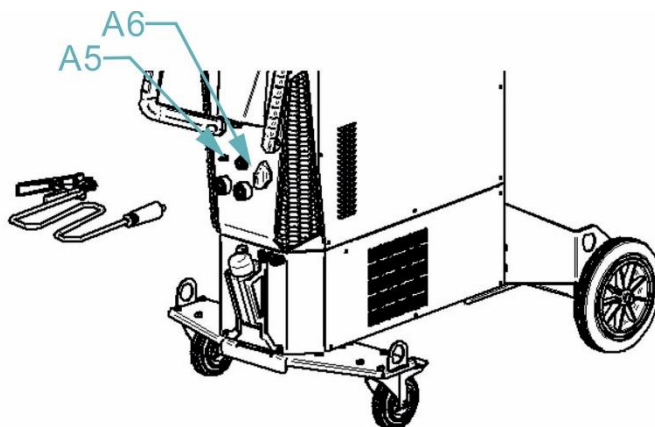
1. Connect the supplied connection cable **A33** to the generator connectors **A18**, **A20**, **A22**, **A23** and to the feed connectors **A26**, **A27**, **A28**, **A29**, **A30** and to the feed quick connectors. The power cable connector determines the appropriate side. Confusion is not possible. Secure all connectors with adequate force.

14.2 Torch connection

1. Connect the torch connector to the EURO connector **A15** on the feed unit. Then connect the torch fluid quick couplings according to colour to fluid quick couplings **A10** and **A11** on the machine.

14.3 Ground cable connection

Connect the ground wire quick coupler to the minus quick coupler **A6** on the generator, carefully turning by turning it clockwise. Attach the ground clamp to the weldment.



14.4 Earth terminal connection

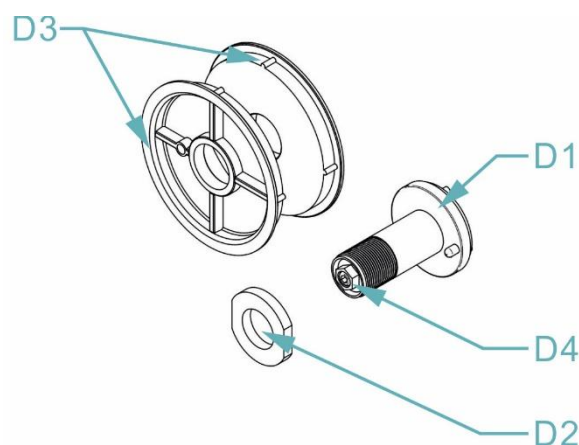
1. Fasten the earth clamp near the welding point. Care must be taken to make the connection of the clamp to the weldment as strong as possible.
2. Do not place the clamp on the welding machine or on the welding bottle!
3. Fasten the grounding pliers near the welding point. Care must be taken to ensure that the connection of the pliers to the weld is as strong as possible.

14.5 Network connection





1. Insert the mains plug into the corresponding mains socket. The circuit breakers must correspond to the technical data of the machine.
2. Switch on the machine by turning the main switch **A1** to position "I".

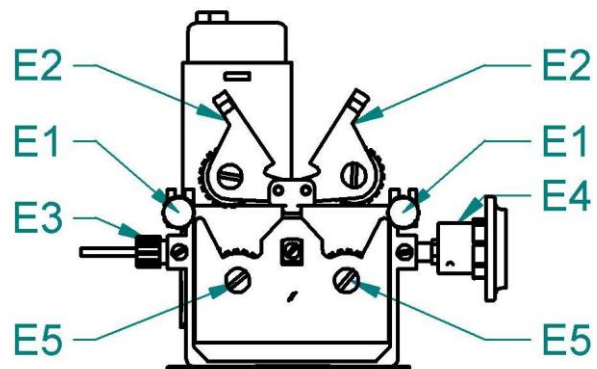
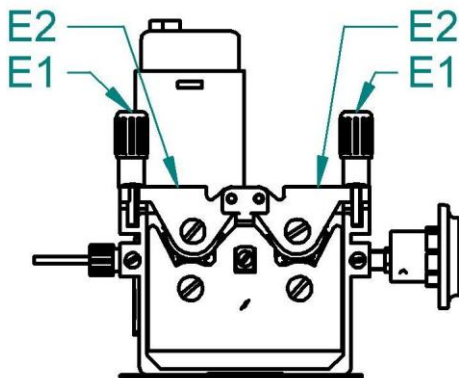
14.6 Wire coil installation

1. Open the coil cover and release the lock **D2** on the coil holder **D1**. Insert wire spool reducer **D3** and wire spool on it, secure with fuse **D2**. Before that, it must be ensured that the mandrel is inserted into the appropriate hole in the reducer or coil of wire
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 stopping the wire feed.

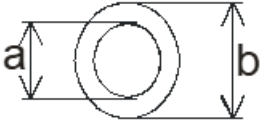



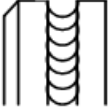










14.7 Guiding the wire into feed

1. Unscrew the nozzle and the flow die on the Torch. Open the wire feed door. The wire diameter must correspond to the size of the groove on the feed pulley. The size of the groove on the pulley can be read on the pulley, swing the levers **E1** towards you and pass the wire electrode through the capillary **E3** and the capillary of the EURO connector **E4**.
2. Press the pressure rollers **E2** and secure with the levers **E1**.
3. Switch on the machine with the main switch **A1**, run the welding torch cable and press the button (wire guide) **A36**  inside the feed **or** the button **V1**  on the control panel.
4. Adjust the force of the pressure by turning the plastic part on the lever **E1** so that the wire is not deformed, but at the same time so that the wire moves regularly.
5. Press button (wire guide) **A36**  **or** **V1**  again and hold it until the wire appears at the end of the torch.



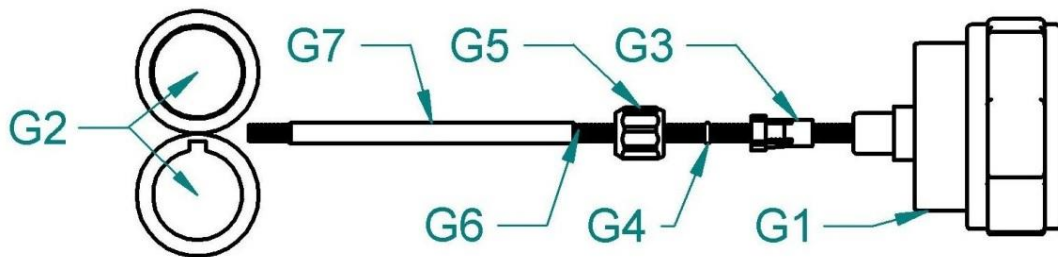
14.8 Overview of wire feed pulleys

		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

FEED ROLLER'S MARKING / OZNAČOVÁNÍ KLADEK							SM099
Type							EXAMPLES PŘÍKLADY
Ø mm	Order Nr. Obj. č.	Color Barva	Order Nr. Obj. č.	Color Barva	Order Nr. Obj. č.	Color Barva	
0.6 0.8	4299		-		-		Wire Drát 1.0 shape V drážka V 
0.8 1.0	4300		-		-		
1.0 1.2	4301		4306		4303		
1.2 1.6	4302		4307		4304		Mild steel / Běžná ocel Stainless steel / Nerez
1.4 1.6	4392		-		4393		 VIDEO Svařování hliníku Aluminium Welding

14.9 Machine adjustment – aluminium welding

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 end of the teflon cable brass pipe **G7** for stabilization **G7**. Tighten nut **G5**.
6. Place the Torch on the EURO connector **G1** and insert the wire into it.



For a welding aluminium is designed torch M6OSW. If necessary, it is possible to modify the M-series ARC torch with a special kit and preparation, see TORCHS TO ORDER.

15. MIG/MAG welding manual (MAN)

1. Select the **MAN** method in MENU 1.
- NOTICE:** The MAN method cannot be used in pulse mode.
2. The display **V11** shows **MAN**.
 3. The **V30** display shows the wire feed speed and the **V12** display shows the voltage value or choke value. The choke value is also shown on **V31**.
 4. Use the V27 encoder to set the wire feed speed (1.0 - 20 m / min [7.0]).
 5. Adjust the voltage or choke using an encoder.
 6. Briefly press the **V13** button to select the setting and display the voltage or choke.
 7. Briefly press the **V22** button to switch between **2T / 4T** modes.
 8. Press and hold **V22** to switch between spot, interval and normal welding.
 9. During welding, the measured value of the welding current is shown on the **V30** display. The measured voltage value is shown on the **V12** display.
 10. After welding, the measured **HOLD** values remain on the displays.

11. To cancel the **HOLD** value, press any button or turn the encoder.
12. If a torch with remote control is connected, its display shows the voltage and wire feed speed. Use the **UP** and **DOWN** buttons to set the displayed value, press the **MODE** button to switch between functions. If the JOB selection by remote control is activated, you can also switch between JOBS.

16. MIG/MAG synergy welding (SYN)

1. In the PROGRAM menu, select one of the synergy programs (according to the table inside the feed) – non-pulse version of the machine, 0-18 synergy only.

SYNERGY PROGRAMS		ø 0.8 mm	ø 1.0 mm	ø 1.2 mm
SG/Fe	Ar 82 % CO ₂ 18 %	0	1	2
SG/Fe	Ar 90 % CO ₂ 10 %	3	4	5
SG/Fe	CO ₂ 100 %	6	7	8
Cr/Ni 308	Ar 97,5 % CO ₂ 2,5 %	9	10	11
Cr/Ni 316	Ar 97,5 % CO ₂ 2,5 %	12	13	14
AlSi	Ar 100 %	-	15	16
AlMg	Ar 100 %	-	17	18
SYNERGY PROGRAMS PULSE		ø 0.8 mm	ø 1.0 mm	ø 1.2 mm
SG/Fe	Ar 82 % CO ₂ 18 %	19	20	21
SG/Fe	Ar 90 % CO ₂ 10 %	22	23	24
Cr/Ni 308	Ar 97,5 % CO ₂ 2,5 %	25	26	27
Cr/Ni 316	Ar 97,5 % CO ₂ 2,5 %	28	29	30
AlSi	Ar 100 %	-	31	32
AlMg	Ar 100 %	-	33	34

2. Perform TORCH CALIBRATION:

The welding properties of the synergic curve depend on many factors, such as the length of the welding torch, the length of the ground cable, the grounding quality, the distance of the weldment from the grounding point, etc. Therefore, it is advisable to calibrate the welding circuit for the current welding conditions.

- Unscrew the gas nozzle of the welding torch.
- Cut the welding wire close to the welding nozzle.
- Pull a piece of welding wire (approx. 50 mm) into the wire feed. There must now be no welding wire in the jet nozzle.
- In the MIG welding method, press and hold **V29** to enter the torch calibration menu.
- On the **V30** display is shown „reS“.
- Place the welding torch with jet nozzle to a clean and clear area on the workpiece, press and hold the burner button for approx. 3 seconds. The

machine performs 3 current pulses (the 1st one is used to create the conductive path, the remaining 2 are measured) and with their help the new resistance of the line is determined and displayed. The value is displayed on the **V12** display (0 mΩ to 60 mΩ).

- If the value is out of range, the right display (**V12**) shows **8.8.8.**, The measurement must be repeated.

The factory setting **reS = 10 mΩ** is shown on the display (**V11**).

3. The left display **V30** shows the machine power (current, wire feed speed, material thickness), the right display **V12** shows the voltage value, the correction value (voltage, wire feed speed) or the choke value.
4. Press the **V29** button to toggle the machine power settings and display (current, wire feed speed, material thickness).
5. Use encoder V27 to set the machine power (current, wire feed speed, material thickness).
6. In the calibration menu, set the option to turn off the correction reset and change the choke when the machine power value changes.
7. Press and hold **V13** to toggle between voltage correction and wire feed speed. The choke value is shown on **V31**.
8. Use encoder **V16** to set voltage correction, chokes, wire feed speed - set (as required).
9. Press the **V22** key to switch between the individual modes: **2T / 4T / 2T-stairs / 4T-stairs**.
10. During welding, the measured value of the welding current is shown on the display **V30**. The measured voltage value is shown on the **V12** display.
11. After welding, the measured **HOLD** values remain on the display. The **HOLD** value is signalled by the **V7** lighting up. To cancel the HOLD value, press any button, turn the encoder, or press the torch button (without igniting the arc).
12. If a torch with remote control is connected, its display shows the machine power (current, wire feed speed, material thickness) and the correction (voltage, wire feed speed). Use the **UP** and **DOWN** buttons to set the displayed value, use the **MODE** button to switch between the functions. If the JOB selection by remote control is activated, you can also switch between JOBs.

17. Pulse mode

NOTE: Function may not be available, depending on machine software!

1. Select pulse mode by selecting the pulse synergy curve or by pressing the **V18** button.
2. The setting is displayed on **V19**.
3. The left display **V30** shows the machine power (current, wire feed speed, material thickness), the right display **V12** shows the voltage value. The correction value (voltage, wire feed speed) is only shown on the **V12** display during setting. The **V13** display shows the number of the selected synergy program.
4. Press the **V29** button to toggle the machine power settings and display (current, wire feed speed, material thickness).
5. Set the machine power (current, wire feed speed, material thickness) with the **V27** encoder.
6. In the calibration menu, set the option to turn off the correction reset when the machine power value changes.
7. Press and hold **V13** to toggle wire and wire feed speed correction. **V31** shows the current correction settings.
8. Use encoder **V12** to adjust the voltage or wire feed speed correction (as required).
9. Press the **V22** button to switch between the individual modes: **2T / 4T / 2T-stairs / 4T-stairs**.
10. After welding, the measured **HOLD** values remain on the displays.
11. To cancel the **HOLD** value, press any button, turn the encoder, or press the torch button (without igniting the arc).
12. If a torch with remote control is connected, its display shows the machine power (current, wire feed speed, material thickness) and the correction (voltage, wire feed speed). Use the **UP** and **DOWN** buttons to set the displayed value, use the **MODE** button to switch between the functions. If the JOB selection by remote control is activated, you can also switch between JOBs.

18. Double pulse mode

NOTE: Function may not be available, depending on the machine software!

1. This mode uses the same parameters as pulse mode see chapter above.
2. Switch on the double pulse mode (DP) with the **V18** button.
3. Active mode is displayed on **V20**.
4. In this mode, the FdP, dut, bAL and dPC settings are available in the secondary parameters menu.
5. In the secondary parameter menu, the main correction used for the secondary current correction parameter (dPC) is shown by **V10** or **V15**.
6. DP is used only in the main stream. Not in the starting or stopping

19. Consumption tables

Wire consumption table during MIG/MAG welding

Wire diameter [mm]	Wire feed speed range [m/min]	Maximum wire feed speed [m/min]	1 m wire weight [g]	Wire consumption per 1 minute of welding [g/min]	Wire consumption per 1 hour of welding [g/h]
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

Gas consumption table during MIG/MAG welding

Wire diameter [mm]	Gas flow [l/min]	Gas consumption per 1 hour of welding [l/hod]
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 consumption during TIG welding

Tungsten electrode diameter [mm]	Argon flow [l / min]
	Steel / stainless steel
0,5	3 – 4
1,0	3 – 5
1,6	4 – 6
2,4	5 – 7
3,2	5 – 9

Electrode consumption table during welding

Electrode diameter [mm]	Welding current range [A]	Electrode length [mm]	Weight of boiled electrode without slag [g]	Electrode boiling time [s]	Weight of boiled 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

20. Maintenance and service tests

1. Take great care of the wire feeder, both the pulleys and the pulley space. When feeding the wire, the copper coating peels off and small sawdust falls off, which is either introduced into the cable or contaminates the interior of the feeder and causes unwanted leakage currents.
Regularly remove any dirt from the feeder area, preferably by blowing with compressed air.
2. Maintain the welding torch regularly and replace worn parts in time. The stress on the torch is significantly higher when welding in pulse mode.
3. The most stressed parts are the flow die, the gas nozzle, the wire guide, the connecting cable and the torch button.
4. The current die transfers the welding current to the wire and at the same time directs the wire to the welding site. It has a service life of 3 to 20 welding hours (according to the manufacturer's data), which depends mainly on the quality of the material (CuCr) and on the quality and surface treatment of the wire. We recommend replacing the die after the hole has worn to 1.5 times the wire diameter.
5. During each installation and replacement, we recommend spraying the die and its thread with a separating spray designed for this purpose.
6. The gas nozzle supplies gas designed to protect the arc and the melting bath. The metal spray clogs the nozzle, so clean it regularly to ensure a good and even shielding gas flow and to prevent a short circuit between the die and the nozzle. The speed of clogging of the nozzle depends mainly on the correct adjustment of the welding process. The metal spatter is more easily removed after spraying the gas nozzle with a separation spray. After these measures, the spatter partially subsides, but it must be removed every 10 to 20 minutes from the space between the nozzle and the die with a non-metallic rod with a gentle tap. Depending on the magnitude of the current and the intensity of work, it is necessary to remove the gas nozzle 2x - 5 times during the shift and thoroughly clean it, including the channels of the spacer, which are used for gas supply. The gas nozzle must not be knocked hard, as the insulating material may be damaged.
7. The adapter is also exposed to the effects of spatter and thermal stress. Its service life is 30-120 welding hours (according to the manufacturer's instructions).
8. Bowden replacement intervals depend on wire cleanliness and mechanism maintenance in the feeder and pulley adjustment. Clean them once a week with

trichlorethylene and blow them out with compressed air. In the event of heavy wear or blockages, the cable must be replaced.

9. Blow out the source box, especially the power coolers and the water cooler, with compressed air, depending on the degree of dust in the environment.
10. Regularly check the fluid level in the tank and check the fluid lines, including the Torch, for leaks. Avoid contaminating the coolant with mechanical dirt, grease or other, especially flammable substances. Change the coolant every 2 years!
11. **Caution:** Be aware of the danger of damaging electronic components by direct action of compressed air from a short distance when cleaning the machine.
12. Probably blow all printed circuit boards from a distance of at least 20 mm.
13. Do not touch semiconductor components on printed circuit boards. There is a risk of electrostatic damage.

OPERATIONAL SAFETY CONTROL OF THE RESOURCE ACCORDING TO EN 60

974-1

Prescribed test procedures, procedures and required documentation are listed in EN 60974-4.

21. Error messages

The **V30** display shows Err, the **V12** display shows the error number / designation. The error is signalled by lighting V8, the error of the cooling unit is signalled by lighting **V9**.

Err 1	Fan error.
Err 2	Low water pressure. Check the amount of liquid in the tank or clean the water circuit. If the chiller test cannot run, check the fuses
Err 3	Machine overheating (let the machine cool down, DO NOT SWITCH OFF THE MACHINE!). OT1-IGBT
Err 4	Machine overheating (let the machine cool down, DO NOT SWITCH OFF THE MACHINE!). OT2-MUR
Err 5	Feed motor overload.
Err 6	JOB is not saved.
Err 7	Communication error – CAN Bus.

Err 7 may be displayed when there is a communication failure/error or when one of the phases fails. Check the power supply (circuit breaker, fork..).

22. 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.

23. Ecodesign of welding equipment

The equipment complies with 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 (Technical data). The material consumption is given in Chapter 19 (Material consumption).

24. Electric waste disposal

INFORMATION FOR USERS FOR DISPOSAL OF ELECTRICAL AND ELECTRONIC EQUIPMENT IN THE CZECH REPUBLIC:

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

ALFA IN a.s. is enrolled in the LIST of the collective system EKOLAMP s.r.o. (under manufacturer's registration number 06453/19-ECZ).



This symbol on the products and / or accompanying documents means that used electrical and electronic products should not be mixed with general household waste.

The device must be disposed of at separate collection and collection points. EKOLAMP s.r.o. You can find a list of places at:

<http://www.ekolamp.cz/cz/mapa-sbernych-mist>.

For users in European Union countries:

If you want liquidate electrical and electronic equipment, contact your dealer or supplier for the necessary information.

25. Warranty list

As a warranty list serves proof of purchase (invoice) on which is the serial number of the machine, eventually a warranty list below, which is filled in by an authorised dealer.

Serial number:	
Day, month (written in words) and year of sale:	
Stamp and dealer signature:	