

# MW2050/2070/3050

EN - welding machine

## Masterweld MW3050 Inverter MIG Package EN - Instruction for use and maintenance



**MADE IN EU**



# ENGLISH

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## Introduction

Thank you for purchasing one of our products. Before using the equipment you should carefully read the instructions included in this manual. In order to get the best performance from the system and ensure that its parts last as long as possible, you must strictly follow the usage instructions and the maintenance regulations included in this manual. In the interest of customers, you are recommended to have maintenance and, where necessary, repairs carried out by the workshops of our service organization, since they have suitable equipment and specially trained personnel available. All our machinery and systems are subject to continual development. We must therefore reserve the right to modify their construction and properties.

## Description

New Masterweld inverter MIG welding machines MW2050 / 2070 / 3050 MIG are designed as small and light high performance digital three-phase inverters. New generation digital controls ensure not only optimal setting of the welding characteristics, but its dynamic adaptation during the welding process as well. This way a substantially higher quality weld joint and simplification of welding process are achieved. Significant benefits are new functions, which help to keep the welding arc in an optimal working area. Due to this arc control technology excellent results may be achieved even by less experienced welders.

Digital and progressive hardware design enabled significant reduction in weight, dimensions and subsequently also in price of the new inverters. The performance part itself is overdesigned to ensure reliability, high performance and high load capacity.

**WARNING:** If machines work in a dusty environment, they need to be equipped with a dust filter. Filter prevents the machine from being contaminated with impurities, thus extending the interval of cleaning its internal parts. At the same time, it enhances reliability of the machine which highly depends on the level of contamination.

Warranty cannot be accepted if the machine is damaged by excessive dustiness while the filter is not properly mounted.

## Technical data

The general technical data of the machines are summarised in table 1.

Table 1

Technical data	MW2050 MIG	MW2070 MIG	MW3050 MIG
Supply voltage 3x50/60Hz	400 V +10% -20%	400 V +10% -20%	400 V +10% -20%
Duty cycle (40°C)	–	220 A / 100%	220 A / 100%
Duty cycle (40°C)	220 A / 100%	270 / 60%	300 / 40%
Adjustable voltage	8 - 30 V	8 - 30 V	8 - 30 V
Top welding current	up to 500 A	up to 500 A	up to 500 A
Incoming cable/slow protection	4x1.5 mm <sup>2</sup> – 5 m/16 A	4x1.5 mm <sup>2</sup> – 5 m/16 A	4x2.5 mm <sup>2</sup> – 5 m/25 A
Secondary voltage	65 V	65 V	65 V
Speed of wire feeder	1 – 20 m/min	1 – 20 m/min	1 – 20 m/min
Diameter of welding wire			
- steel, stainless steel	0.6 – 1.2 mm	0.6 – 1.2 mm	0.6 – 1.2 mm
- aluminum	1.0 – 1.2 mm	1.0 – 1.2 mm	1.0 – 1.2 mm
- tube	0.9 – 1.6 mm	0.9 – 1.6 mm	0.9 – 1.6 mm
Diameters (LxWxH)	595x270x430 mm	595x270x430 mm	595x270x430 mm
Weight	27 kg	27 kg	27 kg
Protection class	IP23S	IP23S	IP23S
Protection level	I	I	I
Welding cables	35 mm <sup>2</sup> x 3 m	35 mm <sup>2</sup> x 3 m	35 mm <sup>2</sup> x 3 m
Temperature range during welding	-10°C to +40°C	-10°C to +40°C	-10°C to +40°C
Temperature range during transportation and storage	-25°C to +55°C	-25°C to +55°C	-25°C to +55°C
Relative humidity	to 50% at 40°C	to 50% at 40°C	to 50% at 40°C
Relative humidity	to 90% at 20°C	to 90% at 20°C	to 90% at 20°C

## Usage limits

Welding machines must be used for welding and not for other improper uses. Never use the welding machines with its removed covers. By removing the covers the cooling efficiency is reduced and the machine can be damaged. In this case the supplier does not take his responsibility for the damage incurred and for this reason you cannot stake a claim for a guarantee repair. Their use is permitted only by trained and experienced persons. Please obey safety directions and warnings contained in this manual!

### PLEASE FOLLOW OPERATING IN-

During welding it is necessary to use Welding inverters must be used inadequate purposes.

The equipment may be only used in

During operation the welding machine may not be enclosed in a tight space (for instance in a box or another container). Do not place the machine on wet surfaces. Always control incoming and welding cables before welding and immediately replace all damaged and unsuitable cables. Operation with damaged cables may cause injury or damage the machine. Cables may not touch sharp edges or hot surfaces.

Insulate yourself from the circuit current by wearing proper protective clothing.

Avoid welding in wet clothing. Do not place the welding torch or welding cables on the welding machine or other electrical equipment.



### STRUCTIONS

appropriate equipment and tools for injury protection. exclusively for welding and may not be used for any other

operating conditions and sites specified by the manufacturer.

### DANGERS WHILE WELDING AND SAFETY INSTRUCTIONS FOR MACHINE OPERATORS ARE STATED:

ČSN 05 06 01/1993 Safety regulations for arc welding of metals. ČSN 05 06 30/1993 Safety rules for welding and plasma cutting. The welding machine must be checked through in regular inspections according to ČSN 33 1500/1990. Instructions for this check-up, see Paragraph 3 Public notice ČÚPB number 48/1982 Digest, ČSN 33 1500:1990 and ČSN 050630:1993 Clause 7.3.

### KEEP GENERAL FIRE-FIGHTING REGULATIONS!

Keep general fire-fighting regulations while respecting local specific conditions at the same time. Welding is always specified as an activity with the risk of a fire. **Welding in places with flammable or explosive materials is strictly forbidden.** There must always be fire extinguishers in the welding place.

**ATTENTION!** Sparks can cause an ignition many hours after the welding has been finished, especially in unapproachable places.

After welding has been finished, let the machine cool down for at least ten minutes. If the machine has not been cooled down, there is a high increase of temperature inside, which can damage power elements.

**SECURITY OF WORK WHILE WELDING OF METALS CONTAINING LEAD, CADMIUM, ZINK, MERCURY AND GLUCI-NUM**

Make specific precautions if you weld metals containing these metals:

- Do not carry out welding processes on gas, oil, fuel etc. tanks (even empty ones) because there is **the risk of an explosion. Welding can be carried out only according to specific regulations!!!**
- In spaces with the risk of an explosion there are specific regulations valid.

**PREVENTION FROM ELECTRICAL**

This machine is electrical equipment, result of unprofessional interference who come in contact with this Welding machines must be operated and serviced by qualified and trained personnel only. The operator must follow norms EN 60974-1 and all safety requirements in order to ensure his own safety and the safety of third parties. All connections must meet all current regulations and norms ČSN 332000-5-54 and laws concerning injury protection.



**CURRENT INJURY**

which presents serious danger of injury or death as a with the equipment or as a result of negligence by people, equipment.

This is a safety class I equipment, equipped with protective conductor, no case interrupted - for instance as danger of an electrical current injury. Make sure that the machine is the weldment.



which may be supplied only from an electrical outlet which must be connected to the machinery (it may be in in an extension cord). In such case there would be a

properly grounded and ground also the working area and

Do not weld in wet environment or in rain. Do not weld with a welding torch, welding or supply cables with insufficient diameter. Always check the welding torch and welding and supply cables and make sure that their insulation is not damaged and that the conductors are not lose at their connections. Cables and sockets must be checked in regular intervals in order to ensure compliance with the appropriate regulations and standards. Do not use the machine, when the covers are removed or damaged. During parts replacement (for instance in the torch) turn off electrical supply with the main switch.

**Repairs and maintenance may be performed only while the equipment is disconnected from electrical supply.**

All repairs, replacements and settings may be performed only by service technicians authorized by the producer. Parts that directly affect work safety (for instance supply switches, transformers, etc.) must be replaced with original parts only. After each replacement of such parts, safety tests must be performed (visual checks, protective conductor tests, insulation firmness measurement, measurement of circuit currents, functionality testing).



**WELDING BURNS**

Always use protective welding gear and protect all body parts during welding! Always use protective clothing, shoes, shatter-proof glasses and protective gloves. This protective equipment prevents injury not only from hot metal spattering and hot objects, but also from dangerous ultraviolet radiation, which emanates during welding. Ultraviolet radiation may cause very serious health complications. Never wear clothing during welding, which is contaminated by paint or other inflammable liquids.

**SAFETY REGARDING WELDING FUMES AND GAS**

Place the welding set into well ventilated space. Electrical discharges cause ozone formation, which in just small concentration may cause irritation of mucous membranes and headaches. Ozone in high concentrations is a poisonous gas.

Always ventilate the work area well! Ensure clean working area and exhaust ventilation of all gases formed during welding, especially in closed spaces. If it is not possible to ensure clean air, use respirators. If you do not have a good respirator (chemical byproducts filter), do not weld metals containing lead, graphite, chrome, zinc, cadmium and beryllium. Many otherwise harmless materials may become dangerous substances when they come into contact with the welding arc.

Remove all paint, dirt and oil, which covers parts designated for welding in order to prevent release of toxic gases.

**RADIATION ASSOCIATED WITH**



**THE ELECTRIC ARC**

During welding a wide radiation spectrum is created, out of which the ultraviolet radiation is the most dangerous. Therefore protect your whole body with protective equipment designated for welders. Try to reduce the radiation during welding to a minimum (protective screens, black coating of the welding box, etc.).

Protect your eyes by a special welder's mask fitted with dark protective glass. When selecting self-adjusting mask, pay attention to filter parameters and especially to the adjustment speed. The level of protection must correspond to the nature of the job. Unsuitable protective dark glass must be removed immediately.

Do not watch the welding arc without proper protective shield or mask.

Do not start welding before making sure that all the people in your vicinity are properly protected.

Do not use contact lenses during welding. There is a danger of sticking to the eye cornea.

#### DANGER OF EXPLO-

- During welding near the welding
- Fire can break out
- There must not be any inflammable materials or objects present in the vicinity of the welding area.
- Do not weld containers that held flammable materials.
- Never weld near an operating oxy-acetylene welding machine.
- Always allow the weldment to cool down before contact with flammable materials.
- Do not weld in rooms with
- Do not carry flammable materi-
- Check the working area 30 can break out even several hours



#### SION AND FIRE

functional inspected fire equipment must be present area. by electrical discharges, spattering of hot metal, flying particles or hot objects, which can become hot during welding.

flammable vapours or explosive dust concentration. als or objects in your pockets. minutes after finishing of welding. Fire from sparks after welding termination.



#### AVOIDANCE OF FLAMES AND EXPLO-

- Remove all combustibles from
- Do not weld close to inflamma- with explosive gasses.
- Do not wear clothing impregnated with oil and grease, as sparks can trigger off fame's.
- Do not weld on recipients that have contained inflammable substances, or on materials that can generate toxic and inflammable vapours when heated.
- Do not weld a recipient without first determining what it has contained. Even small traces of an inflammable gas or liquid can cause an explosion.
- Never use oxygen to degas a container.
- Avoid gas-brazing with wide cavities that have not been properly degassed.
- Keep a fire extinguisher close to the workplace.
- Never use oxygen in a welding torch; use only inert gases or mixtures of these.



#### SIONS

the workplace. ble materials or liquids, or in environments saturated

#### HANDLING AND STOCKING COM-

- Inert gas tank valves should be ing manipulation should be always
- Always avoid contact between the storage systems. Do not attempt proper regulators and pressure reductions.
- If you need to obtain further information, please see safety regulations pertaining to compressed gases use according to standards ČSN 07 83 05 a ČSN 07 85 09.



#### PRESSED GASES

fully opened during operation and after use or dur- closed. welding cables and compressed gas tanks and their to fill the tanks with compressed gas; always use

#### RISKS DUE TO ELECTROMAGNETIC FIELDS

- The magnetic field generated by the machine can be dangerous to people fitted with pace-makers, hearing aids and similar equipment. Such people must consult their doctor before going near a machine in operation.
- Do not go near a machine in operation with watches, magnetic data supports and timers etc. These articles may suffer irreparable damage due to the magnetic field.

#### ATTENTION, REVOLVING GEARING – SAFETY INSTRUCTIONS

- Wire shift must be handled very carefully, only if the machine is switched off

- While manipulating with the shift, never use protection gloves, there is a danger of catching in the gearing

#### MATERIALS AND DISPOSAL

- These machines are built with or poisonous to the operator.
- During the disposal phase the should be separated according to



materials that do not contain substances that are toxic

machine should be disassembled and its components the type of material they are made from.

#### DISPOSAL OF USED MACHINERY

- Collecting places / banks detail of machinery put out of operation.
- Don't throw away machinery tioned above.



signed for back withdrawer should be used for disposal.

into common waste and apply the procedure mentioned above.

**ATTENTION!** When using the welding machine with standby power supply, mobile power supply (generator), it is necessary to use a quality standby supply with sufficient performance and with quality regulation. The performance of the machine must comply with the minimum value of supply on the label of the machine for maximum load. If you do not adhere to this rule, there is a danger that the machine will not weld in a quality way or will stop welding for the given maximum welding current or that the machine will be damaged because of great decreases and increases of the supply voltage.

## Description and installation

#### DESCRIPTION OF MAIN PARTS

Picture 1



- 1 - Euro Connector (+)
- 2 - Earth Cable Socket (-)
- 3 - Remote control connector
- 4 - Control panel
- 5 - Shielding gas inlet
- 6 - Main switch
- 7 - Primary cable inlet
- 8 - Spool Holder
- 9 - Wire feeder



### PLACEMENT OF THE MACHINE

When choosing the position of the machine placement, be careful to prevent the machine from conducting impurities and getting them inside (for example flying particles from the grinding tool).

### CONNECTION OF THE MACHINE TO ELECTRICAL SUPPLY

The MW2050, MW2070 and MW3050 MIG machines comply with safety class I requirements. This means that all metal parts, which are accessible without the necessity to take off the cover, are connected to protective grounding of the electrical supply. The machine can be connected to power supply only by a cable with a socket equipped with a protective ground contact. Always turn the machine on and off with the main switch! Do not use for turning off the terminating unit! The necessary protection is listed in the chapter "technical data".

### WELDING TORCH CONNECTION

Check whether there is the correct liner in the welding torch for the size of welding wire you are using. Use only wires, which are properly rated for the particular machine output. Insert the torch into the euro-connector A2 (picture 1) and secure it with a sleeve nut.

### EARTH CABLE CONNECTION

Use cable with sufficient cross-section (see chapter „technical data“). Connect cable into clamp A1 (pic. 1). The cable should be as short as possible and placed at the floor level or near it.

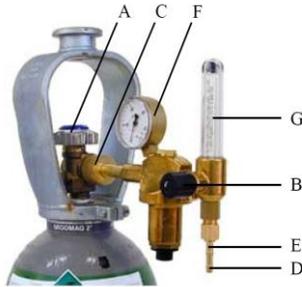
Place the grounding clamp directly on the welded part (if possible). The touching surface must be clean and as big as possible - it must be cleaned from paint and rust.

### SHIELDING GAS AND GAS BOTTLE INSTALLATION

Use inert gases (Pure argon for Aluminium, 2 - 2.5% CO<sub>2</sub> in Argon for stainless steel, and 5 - 20% CO<sub>2</sub> in Argon on mild steels depending on thickness of material) as a shielding gas for MIG welding. Make sure that gas regulator is correct for the type of the gas you are using.

### Gas bottle installation

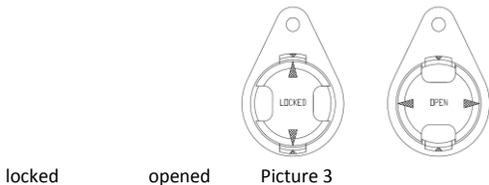
Always properly secure the gas bottle in a vertical position in a special holder on the wall or in the cart. After you finish welding, do not forget to close the gas tank valve.



Picture 2

The following installation instructions apply for most reduction valve types:

1. Step aside and open the gas tank valve (A) for a moment. This way possible dirt particles are blown off the tank valve. **NOTICE! Watch for high gas pressure!**
2. Turn the pressure regulation screw (B) of the reduction valve until you feel the spring pressure.
3. Close the reduction valve.
4. Put the reduction valve on the tank over the intake connection seal and tighten the cap nut (C) with a wrench.
5. Install the hose adapter (D) with the cap nut (E) to the gas hose and secure it with a hose clamp.
6. Connect one end of the hose to the reduction valve and the other end to the welding machine. If the torch had a built-in valve, the hose could be part of the torch.
7. Tighten the cap nut with the hose to the reduction valve.
8. Slowly open the tank valve. The tank pressure gauge (F) will show pressure in the tank. **NOTICE! Do not use all the tank's contents. Replace the tank when the pressure drops to approximately 2 bars.**
9. Open the reduction valve.
10. Turn the regulation screw (B) until the flow meter (G) shows the required flow.



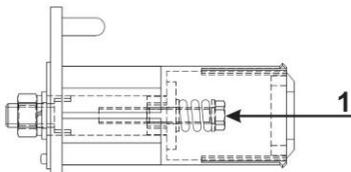
### THE WIRE SPOOL INSTALLATION

Open the side cover of the wire magazine. Install wire feed pulleys appropriately for the particular wire type and diameter. (As a standard, pulleys with a V groove for diameter 1.0 – 1.2 mm are installed.)

Set the wire spool driver lock to the open position and attach the wire spool to the driver. The hole in the spool must slide into the driver peg. Use the included adapters for different spool types as needed. Set the wire spool driver lock to the closed position.

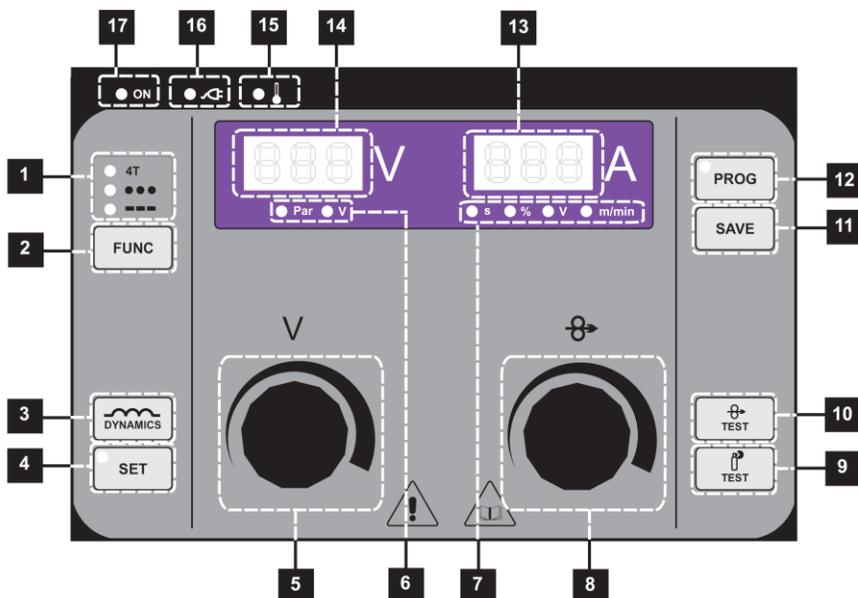
### WELDING WIRE SPOOL BRAKE ADJUSTMENT

The wire feed speed can be regulated by selector 8 (pic. 5) on the front panel. The wire loading can be terminated by repeatedly pushing button 10 (pic. 5) or by pushing the torch button. During wire loading no gas will flow through the machine.



Picture 4

Dismount the gas tip of welding torch. Unscrew the flow drawing tip.



Connect the socket plug into the network. Turn on the main switch B1 (pic. 1) to position I.

Press button 10 (pic. 5) - the welding wire is lead into the torch without gas. The speed of the leading-in can be adjusted with the potentiometer 8 (pic. 5). Press button 10 on control panel (or switch on torch) again to stop lead-in of wire.

Before welding use separating spray in the space of gas tube and flow drawing tie. In that way you prevent adherence of metal spatter and prolong the life of gas tube

**ATTENTION!** During wire threading don't aim the torch against eyes!

## Panel of functions

**Control and signal elements on the digital panel – description of functions:**

1. **4T controls, tack welding, tack welding with delay.** The control lights are on, if these modes are active.
2. **FUNC button.** Individual modes can be selected with this button.
3. **DYNAMICS button.** By pushing this button the mode for arc hardness setting is entered. The hardness value is then set with selector 8. By choosing a low value we get a softer arc and bigger weld penetration of the material. By choosing a higher value we will get a bigger weld deposit. By choosing the correct arc dynamics selection we regulate spatter.

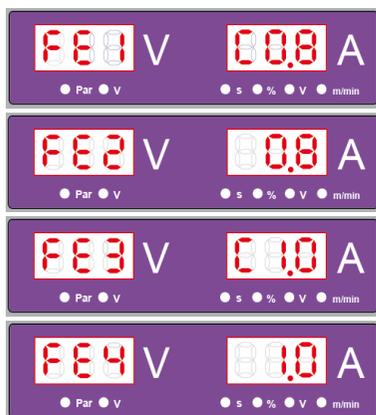
4. **SET mode button with a control light for selection of function parameter.** After pushing this button we enter a mode, which allows us to change the values of individual functions. Switching between functions is made by swinging of selector 5. If the button is activated, the LED control light will go on.
5. **Selector for setting of welding voltage and switching between functions in the SET mode.**
6. **Controls showing the display mode.**
7. **Controls showing the value unit on the display.**
8. **Selector for setting of feed speed and values in the SET mode.**
9. **Gas test button.** By pushing this button countdown for setting of gas flow will start. The time is shown on display 13 (pic. 5). The countdown can be terminated by repeatedly pushing the button 9 (pic. 5) or the welding torch button.
10. **Wire loading button.** After pushing button 10 the loading of wire is started. The loading process can be stopped by pushing button 10 again or by the welding torch button.
11. **The SAVE button.** This button allows saving of the set parameters into pre-selections PrG1 to PrG20.
12. **PROG button with control.** This button serves for programs display. By pushing this button we enter the program selection mode. The programs are chosen by selector 8. The chosen program is confirmed by repeatedly pushing button 12 (pic. 5).
13. **Display showing the wire feed speed, welding voltage/value and the functions status.** During welding the display shows the welding voltage value. After termination of welding this value remains on the display for approximately three seconds.  
In an idle state the wire feed speed is displayed. During setting in the SET mode the status of the selected function is displayed – either off or the selected function value.
14. **Display showing voltage value or the selected function type.** During welding and three seconds after its termination the display shows the welding voltage value. After welding termination, the value remains on display for another three seconds. In the SET mode the abbreviation of the function currently being set is displayed.
15. **The temperature indicator light.** The temperature indicator signals the machine overheating.
16. **The input voltage indicator.** The indicator light is on when the input voltage is out of range.
17. **The indicator inverter ON.** The indicator is on when the output part of the machine is running.

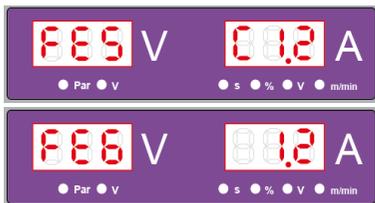
## Function SYNERGIC

### Activation of synergic function

Press button PROG (pos. 12) and by switch 8 choose one of synergic programs.

Description of synergic programs is on page 82.





FE1	CO,8	CO <sub>2</sub> – wire 0,8 mm
FE2	0,8	82% Ar, 18% CO <sub>2</sub> – wire 0,8 mm
FE3	C1,0	CO <sub>2</sub> – wire 1,0 mm
FE4	1,0	82% Ar, 18% CO <sub>2</sub> – wire 1,0 mm
FE5	C1,2	CO <sub>2</sub> – wire 1,2 mm
FE6	1,2	82% Ar, 18% CO <sub>2</sub> – wire 1,2 mm

Confirm the selected program by pressing button PROG (pos. 12).

Assumed welding current glows on the left display, on the right display adjusted correction of wire shift.

By the left switch (pos. 5) the voltage correction (from -9,0 to +9,0) is selected. During whirling by the right switch (pos. 8) the speed of wire is shown on the right display (pos. 13) and assumed welding current on the left display (pos. 14). Assumed welding current can be adjusted by the right switch.

### Deactivation of synergic function

Press button PROG (pos. 12). By switch 8 choose OFF.



Confirm by pressing the button PROG (pos. 12) again.

### Saving of optimized synergic program

After choosing a program and optimization of its parameters we can save it as a new program on any program's position Pr 1 – Pr 20.

1. Optimize parameters
2. Press button SAVE
3. Choose number of program under which you want to save it.
4. Hold the SAVE button until symbol -S- is shown on display. Now the new program is saved.



### Saving of created program without synergic

1. Set parameters
2. Press button SAVE
3. Choose number of program under which you want to save it.
4. Hold the SAVE button until symbol -S- is shown on display. Now the new program is saved.



### Loading of saved program

1. Press button SAVE
2. Choose one of program Pr 1 – Pr 20
3. Shortly press button SAVE



On the display makes light symbol -L- and the chosen program is set. The parameters of adjusted program, voltage and speed of wire remain to glow on display. Only values saved in programs Pr1 – Pr20 could be changed.

### TEMPERATURE PROTECTION

The machines are equipped with protective thermostats on all its performance parts. In case of overheating (for example as a result of exceeding the maximum allowed cycle), welding is automatically interrupted and the temperature control light will go on at the control panel and the display will show „-t-“. After cooling off the overheating message disappears and the machine is ready for operation.

After welding termination always let the machine cool down. If the machine is shut off prematurely and turned back on, the ventilator will not start even if the machine is not completely cooled off.

### BLOWER

The machine is equipped with automatic blower turn-off function. If the machine is idle for several minutes, the blower will be automatically shut off. This is the state when you turn the machine on. This functions leads to electric energy savings and noise reduction in case the machine is idle for longer period of time.

## Operation

Welding in places where there is danger of explosion and fire is prohibited!

Welding vapors may be harmful to your health. Assure good ventilation during welding!

### PRESET PROGRAMS SELECTION

Push the SAVE 11 button (pic. 5). The indicator near the button will come on. Select a suitable program (one of programs marked 1-20) with selector 8 (pic. 5). Confirm activation by repeatedly pushing the SAVE 11 button (the indicator light will go off).

### CUSTOM PROGRAMS SELECTION

Push the SAVE 11 button (pic. 5). The indicator near the button will come on. Select a suitable position from positions 1 – 20 with selector 8 (pic. 5). After you selected functions and parameters, confirm activation by repeatedly pushing the SAVE 11 button (pic. 5). The indicator light will go off. If you don't push the SAVE 11 button second time within the time limit (pic. 5), the program will not be saved and the action is canceled.



### Custom programs saving

Custom programs can be saved in positions Pr 1 – 20 after setting your chosen functions and parameters. Push the SAVE 11 button (pic. 5). Select one of the positions marked 1 – 20 with selector 8. Confirm the saving by pushing the SAVE 11 button for 3 seconds (pic. 5). If the SAVE 11 button (pic. 5) is not pushed second time within the time limit, the program not will be saved and the action will be canceled.

### Functions selection and setting up its parameters

By pressing button SET 2 you can get into setting mode where can be adjusted particular functions and its parameters. The LED on button SET will light up. Switching between functions is made by potentiometer 5 (pic. 5), chang-

ing of parameters by potentiometer 8 (pic. 5). By pressing SET again or after a few second without any activity the setting mod is leaved.

**NOTE:** Functions and its parameters cannot be changed during welding process. During welding only welding current and speed of wire feed can be changed.

## Functions

Table of functions and parameters:

Function	Description	Disp.	Rozsah parametru
<b>Pre-Gas Time</b>	Gas pre-blow	PrG	0,1 to 2,0 s
<b>Start Level</b>	Approaching speed	StA	1,0 to 20 m/s
<b>Hot Start</b>	Hot Start off	Hot	OFF
	Hot Start - increasing of current and speed of wire feeder	Hot	1 to 100%
	Hot Start - duration	Hot	0,5 to 5,0 s
<b>Crater Fill</b>	Crater fill off	CrA	OFF
	Crater fill - decreasing of current and speed of wire feeder	CrA	0 to -60%
	Crate fill - duration	CrA	0,5 to 10,0 s
<b>Burn Back</b>	Burn out of wire	bb	0,01 to 1,00 s
<b>Post-Gas Time</b>	Gas post-blow	PoG	0,2 to 10,0 s
<b>Spot Time</b>	Length of spot	bod	1 to 10 s
<b>Pause Time</b>	Length of pause	PAU	1 to 10 s
<b>Dynamics</b>	Manual mode	DYN	0 to 50
	Synergic mode	DYN	-9 to 50

### PRE-GAS TIME

This function ensures on-time presence of the protective gas, which prevents weld oxidation during welding commencement.



### START LEVEL

The function enables problem-free arc ignition without unnecessary spatter and “jerking” of the welding torch. The welding wire is moved at the preset approach speed by pushing the torch button. At the moment of welding wire contact with the material, the arc is ignited and the speed is automatically switched to the preset welding moving speed.



### HOT START

The HOT START function is mostly used when welding aluminum, where it facilitates the creation of better arc ignition and higher quality weld start.

In case of activation the function, the following parameters can be set:

**Current and speed of feed** – change the current and wire feed speed in % in comparison with value adjusted on display.



**Time** – period for which the function is active.



The function can be completely turned off by choosing OFF.



### CRATER FILL

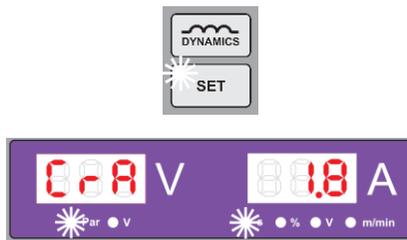
This function is used at welding termination. This function serves to fill the end crater and creation of a high quality good looking weld finish.

In case of activation the function, the following parameters can be set:

**Current and speed of feed** – change the current and wire feed speed in % in comparison with value adjusted on display.



**Time** – period for which the function is active.



The function can be completely turned off by choosing OFF.



### BURN BACK

This function prevents welding wire sticking to melt or the contact tip if properly set.  
 Setting of this function influences the “ball” at the end of the welding wire and subsequently the quality of the next arc ignition.

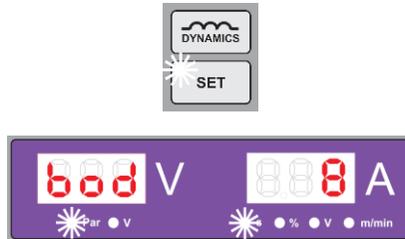


**POST GAS TIME**

This function assures the protective gas presence after welding termination, which prevents the weld end oxidation.



If the Spot Time mode is activated, the pulse time setting option in the SET mode is activated.



If the Pause Time mode is activated, the pause time setting option in the SET mode is activated.



**RC – REMOTE CONTROL**



**RC OFF** – remote control is off



**RC Ana** – analog (torch with 10 kΩ potentiometer)



**RC dig** – digital (torch with Up/Down buttons)

Preinstalled programs tables are listed on page 82.

### DYNAMICS mode

By pushing the Dynamics 3 button (Pic. 5) we switch to the arc hardness setting mode. The hardness is set by selector 8 (Pic. 5). Confirm the settings by pushing the Dynamics button again or by waiting until the time limit runs out. The settings are saved in both cases. The mode can be selected and saved regardless of the program type (user or preset).



### Setting of welding voltage and wire feed speed

The welding voltage value is selected by selector 5 (Pic. 5).

The welding wire feed speed is adjusted by selector 8 (Pic. 5).



## Problems solving

### ERROR MESSAGE DISPLAY

During machine operation some errors and breakdowns may appear which will be announced by an Err sign and error code. The following ones are important for the user:

#### Err - t- (TEMP – overheating)

Activation of the machine heat protection. Wait till the machine cools down and then continue your work.



#### Err 1 (POWERSUPPLY – over/under voltage in the power supply)

The input clamps' voltage (power supply cable) is outside the machine toleration.



#### Err 8 (ERR OUT SHORT)

When turning the machine on – short on the input clamps (for instance the grounding cable and cable with the electrode holder are shorted, or it can signify a machine problem).



Some error messages can be deleted only by turning the machine on and off with the main switch.

## TROUBLE SHOOTING

### Display is not on - no voltage is entering the machine.

- Check the main fuses, replace burned fuses.
- Check the main supply cable and replace faulty parts.

### The machine is not welding properly.

#### During welding the spatter is big, the weld is porous.

- Check the welding parameters setting or reset them.
- Check the gas connection and attachment of the gas hose.
- Check the grounding clamp, make sure it is properly attached and the grounding cable is not damaged. Change the grounding position and replace damaged parts if necessary.
- Check the welding torch cable and connector. Tie connections and replace damaged parts.
- Check replacement parts of the welding torch. Clean and replace damaged parts.

## Maintenance

**Please pay attention to the main power supply! It is necessary to disconnect it during any manipulation with the welding machine.**

During maintenance planning the frequency and circumstances of the machine's use must be considered. Considerate use and preventive maintenance helps in avoidance of unnecessary breakdowns and failures.

### REGULAR MAINTENANCE AND CHECK-UP

Perform the check-up according to CSN EN 60974-4. Always check the condition of the welding and supply cables before using the machine. Do not use damaged cables.

Perform visual check-up:

- 1) torch/electrode holder, the welding current clamp
- 2) power supply
- 3) welding circuit
- 4) covers
- 5) control and indicator elements
- 6) overall condition

### EVERY SIX MONTHS

Disconnect the machine from the electrical outlet and wait for about two minutes (the charge inside the machine condensers will dissipate). Then remove the machine cover. Clean all dirty electrical connections and retie any loose ones.

Clean all internal parts from dust and dirt, for instance with a soft brush or with a vacuum cleaner.

**NOTE:** Be careful when using compressed air in order to not damage any parts.

Never use solvents or thinners (for example acetone etc.), because they may damage plastic parts and signs on the front panel.

**Only a technician with electrotechnical qualification may repair this machine.**

**WARNING! Depending on environment, in which the machine works, it can be necessary to clean interior of the machine more often (e.g. each week).**

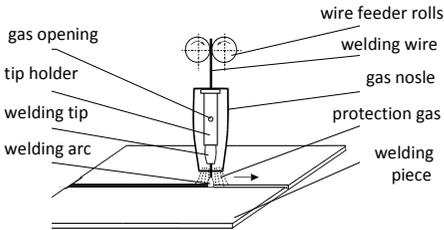
### STORAGE

The machine must be stored in a clean and dry room. Protect the machine from rain and direct sunlight.

# MIG/MAG welding method

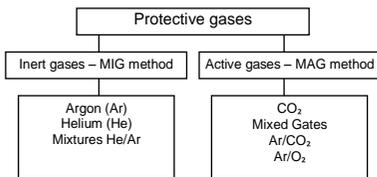
## PRINCIPLE OF MIG/MAG WELDING

Welding wire is lead from the roller into the flow drawing tie with the use of the feed. Arc joins thawing wire electrode with welding material. Welding wire functions as a carrier of the arc and as the source of additional material at the same time. Protective gas flows from the spacer who protects arc and the whole weld against the effects of surrounding atmosphere (pic. 6).



Picture 6

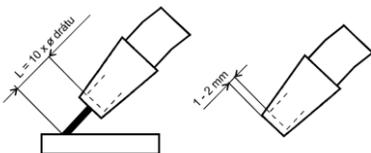
## PROTECTIVE GASES



Picture 7

## ADJUSTING OF WELDING PARAMETERS

For proximate adjusting of welding current and voltage for MIG/MAG is used formula  $U_2 = 14 + 0,05 \times I_2$ . According to this formula can be calculated required voltage. When adjusting voltage, we must calculate with its decrease during welding. Decrease is about  $4,8 \text{ V} / 100 \text{ A}$ . Adjusting of welding current - for chosen voltage set required welding current by increasing or decreasing of wire feeding speed, eventually slightly tune voltage so that welding arc is stable. For good quality of weld and optimal adjusting of welding current is necessary the range of supply girder from welded material to be approximately 10x diameter of welding wire (pic. 8).



Picture 8

## WELDING ARC TYPES

### a/ Short welding arc

Welding with a very short welding arc means low welding arc voltage and current in the low part of the range. Surface tension of the bath helps to draft in the drop into the melt and consequently new ignition of the welding arc. This cycle repeats itself every time anew and this way permanent alternation between the short connection and the welding arc burning period is created. The melt flow is relatively "cool", so this welding method is suitable

for welding of thinner sheet metal and welding in forced positions. The switch from the short to the shower arc depends on the welding voltage, the wire diameter and gas mixture (pic. 9).

**b/ Transient welding arc**

If the dimensions of the welded material allow it, welding should be done with a higher flashing output (for economical reasons) without exceeding the long or the shower arc. By transient welding arc we understand a somewhat extended short welding arc. The material joint is partially free and partially in a short connection. The number of short connections is this way lowered and the welding bath flow is “warmer” than in the short welding arc. This type is suitable for medium material thicknesses and descending welds.

**c/ Long welding arc**

In the long welding arc large drops, which penetrate the material by its own weight, are created. During this process accidental short joints are created and they cause spatter during repeated ignition of the welding arc. The reason for this is the rise of current at the moment of the short connection. The long welding arc is suitable for CO2 welding and gas mixture welding because of its high content in the upper part of the range. It is not suitable for welding in forced position (pic. 9).

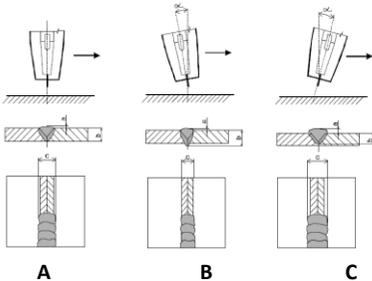
**d/ Shower welding arc**

The main property of this welding is the transfer of material in small drops without joining. The shower arc is set up, when we weld in inert gasses or in mixtures with high argon content in the upper part of the range. It is not well suitable for welding in forced positions.



Picture 9

**HOLDING AND GUIDING THE WELDING TORCH**



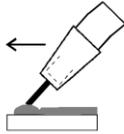
Picture 10

**Metal welding in a protective atmosphere can be performed in all possible positions if relevant parameters are selected accordingly** (horizontally, above the head, vertically ascending and descending and also crosswise in all the mentioned positions). In the horizontal position the usual torch holding is in an angle less than 30°.

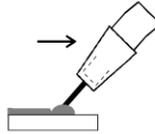
Thicker layers can be occasionally welded easily by pulling. The most feasible torch holding in order to cover the weld with protective gas is vertical (neutral) torch setting (pic. 10A). However, in this position the welding spot is hard to see, because it is covered by the gas jet. For this reason we tilt the torch (pic. 10 B and C). If we tilt the torch too much, there is a danger of sucking air into the protective gas, which could result in poor quality of the weld.

### Welding by pushing and pulling

A gentle “pushing” move is used during vertical welding in the upward direction and during horizontal welding above the head (pic. 11). Only when welding a descending weld in the downward direction, the torch is held in neutral or slightly “pulling” position. Vertical welding in the downward position is used mostly for thin sheet metal. Thicker sheet metal presents danger of bad joining, because the melt flows along the joint and runs ahead of the weld, especially if the melt is too liquid as a result of high tension. Such procedure requires significant level of expertise and experience (pic. 12).



Picture 11



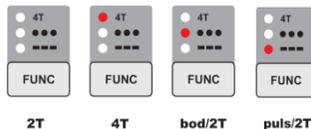
Picture 12

### WELDING IN MIG/MAG METHOD

- With the machine disconnected from power supply, connect the welding torch to the out connector 1 (pic. 1) and the grounding cable to the out connector 2 (pic.1).
- Connect the gas hose from the gas bottle reduction valve to the 5 output (pic. 1) on the rear panel. Turn the gas on with the gas bottle valve.
- Connect the machine to power supply.
- Turn on the main switch 6 (pic. 1)
- Wait until the welding machine test runs through – all display indicator lights will be on for several seconds.
- Install the wire spool according to the spool installation chapter.
- Load the wire to the wire feed according to the relevant chapter.
- Perform the brake adjustment by following the brake adjustment chapter.
- Set the gas flow by following the gas bottle installation chapter.
- Choose the welding mode you wish to use.

### WELDING MODE SELECTION

By pushing button 1 (pic. 5) select welding mode (2-stroke, 4-stroke, spot welding or pulsation).



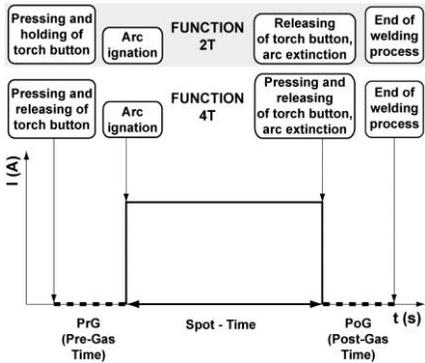
Picture 13

### TWO-STROKE

Welding process is started by only the pressing the switch of the torch. The switch must always be held during the welding process and it can be interrupted releasing the switch of the torch.

### FOUR-STROKE

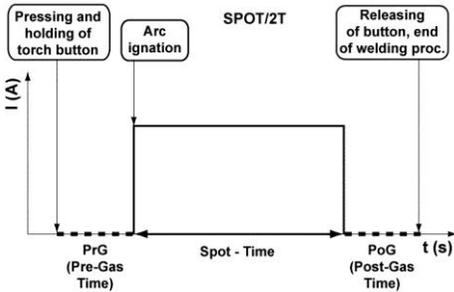
Pushing the torch button will start the welding process. After its release the welding process continues. After another push and release of the torch button the welding process is terminated.



Picture 14

### SPOT TIME WELDING

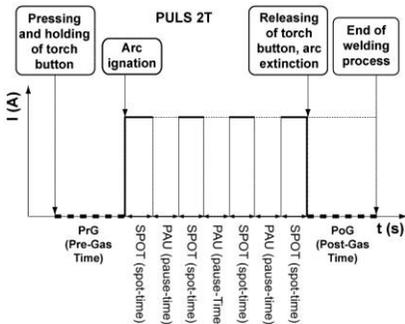
It is used for welding by individual short spots, whose length can be continuously adjusted. By pressing the switch on the torch, the time circuit is started, which starts the welding process and after the set time it turns off. After further pressing the button, the whole process is repeated.



Picture 15

### PULSE WELDING

It is used for welding by short spots. Length of these spots and pauses can be continuously adjusted.



Picture 16

Depending on the gas type used, wire diameter and strength of the material (alternatively the welding current) determine the feasible program with preset parameters according to table on page 50.

If none of the preselected programs fits your needs, choose one of the positions in SAVE 1-20, where you can save your own programs.

## Table of preinstalled programs

Popis programů (Description of programs) 220/270/320 MIG SYNERGIC						Displej (Display)	
Čís. (No.)	Program	Materiál (Material)	Typ drátu (Type of wire)	Průměr drátu (Diameter of wire)	Plyn (Gas)	Levý (Left)	Pravý (Right)
0	OFF	Všechny (All)	Všechny (All)	Všechny (All)	Všechny	[V]	[m/min]
1	FE1	Běžná ocel (Common steel)	SG2	0,8 mm	100%CO <sub>2</sub>	FE1	C0,8
2	FE2	Běžná ocel (Common steel)	SG2	0,8 mm	82%Ar, 18%CO <sub>2</sub>	FE2	0,8
3	FE3	Běžná ocel (Common steel)	SG2	1,0 mm	100%CO <sub>2</sub>	FE3	C1,0
4	FE4	Běžná ocel (Common steel)	SG2	1,0 mm	82%Ar, 18%CO <sub>2</sub>	FE4	1,0
5	FE5	Běžná ocel (Common steel)	SG2	1,2 mm	100%CO <sub>2</sub>	FE5	C1,2
6	FE6	Běžná ocel (Common steel)	SG2	1,2 mm	82%Ar, 18%CO <sub>2</sub>	FE6	1,2

## Welding parameters for individual thickness of welded materials

DRÁT (WIRE) Ø 0,8 mm / CO <sub>2</sub>		
Síla materiálu Mat. thickness (mm)	Rychlost posuvu Wire feeder speed (m/min.)	Velikost proudu Value of el. current (A)
1,0	3,0	51
2,0	4,5	67
3,0	8,6	110
4,0	10,9	140
5,0	13,7	170
6,0	15,5	185
7,0	16,0	190

DRÁT (WIRE) Ø 0,8 mm / 18% CO <sub>2</sub> + 82% Ar		
Síla materiálu Mat. thickness (mm)	Rychlost posuvu Wire feeder speed (m/min.)	Velikost proudu Value of el. current (A)
1,0	1,9	50
2,0	5,6	101
3,0	8,7	140
4,0	13,0	170
5,0	16,0	195
6,0	18,0	220
-	-	-

DRÁT (WIRE) Ø 1,0 mm / CO <sub>2</sub>		
Síla materiálu Mat. thickness (mm)	Rychlost posuvu Wire feeder speed (m/min.)	Velikost proudu Value of el. current (A)
1,0	2,0	60
2,0	2,7	82
3,0	3,6	105
4,0	5,2	136
5,0	6,7	160
6,0	8,8	192
7,0	9,8	207
8,0	10,7	220
10,0	12,5	239

DRÁT (WIRE) Ø 1,0 mm / 18% CO <sub>2</sub> + 82% Ar		
Síla materiálu Mat. thickness (mm)	Rychlost posuvu Wire feeder speed (m/min.)	Velikost proudu Value of el. current (A)
1,0	2,0	60
2,0	3,5	112
3,0	4,9	150
4,0	7,0	175
5,0	8,3	200
6,0	9,5	226
7,0	10,2	243
8,0	10,8	260
10,0	12,5	290

DRÁT (WIRE) Ø 1,2 mm / CO <sub>2</sub>		
Síla materiálu Mat. thickness (mm)	Rychlost posuvu Wire feeder speed (m/min.)	Velikost proudu Value of el. current (A)
2,0	2,0	100
3,0	3,0	125
4,0	4,0	158
5,0	5,7	196
6,0	6,5	215
7,0	7,5	240
8,0	8,3	263
10,0	9,5	284

DRÁT (WIRE) Ø 1,2 mm / 18% CO <sub>2</sub> + 82% Ar		
Síla materiálu Mat. thickness (mm)	Rychlost posuvu Wire feeder speed (m/min.)	Velikost proudu Value of el. current (A)
2,0	2,0	85
3,0	3,0	130
4,0	3,9	160
5,0	5,6	209
6,0	6,4	240
7,0	6,8	256
8,0	7,8	275
10,0	9,0	300



# DECLARATION OF CONFORMITY

Masterweld UK declares on its responsibility, that products mentioned below, answer requirements of direction of European Parliament and European Council 2006/95/ES in recent definition (low voltage electrical device) and direction 2004/108/ES in recent definition (electromagnetic compatibility).

Typy / Types / Typ:

**MW2050 MIG**

**MW2070 MIG**

**MW3050 MIG**

Description of device

**Welding inverter for MIG welding method**

Reference to standards

**EN 60974-1**  
**EN 60974-5**  
**EN 60974-10**

Year of placing CE mark on product

**10**

Date of issue

**01/01/2014**