GF Piping Systems

Instruction manual

MSA 2 CF
Electrofusion Unit

Index

I General Information

Dear Customer,

Thank you for choosing this product. The electrofusion MSA 2 CF is designed according to newest technology. Using it for purposes other than those described in this manual may cause injury to the operator or to other people. It may also cause damage of the machine or other equipments.

Safety

Please read and understand this instruction manual before using the MSA electrofusion processor.

Safety standards and precautions should be followed at all times.

Do not use or store the MSA electrofusion processor where volatile gas concentrations may be present.

Only properly trained and qualified personnel should use the MSA electrofusion processor.

Treat electrical equipment as a potential source of ignition and follow proper practices for working in an explosive atmosphere.

The electrofusion Processor must be located out of the trench.

For protection against the risk of electric shock, connect the MSA electrofusion processor only to properly grounded outlets.

Use only up-to-date fusion information supplied by the manufacturer of the fitting when fusing in manual mode.

To point out relevant aspects operating this electrofusion unit, symbols are frequently used. The following table contains their explanation.

➢ Warning notice

Warning notices are used to inform about possible injuries or damage to properties. Please read carefully and always consider these warnings!

Symbol	Meaning
 **Danger**	Imminent danger! Failure to comply could result in death or extremely serious injuries.
Warning	Possible danger! Failure to comply could result in serious injuries.
Caution	Dangerous situation! Failure to comply could lead to injury or damage to property.

The manufacturer reserves the right to make technical changes to MSA 2 CF which may result in differences from the pictures and information contained in this manual.

1 Introduction

1.1 Product description

The MSA 2 CF is an electrofusion control unit for the electrofusion jointing of COOL-FIT PE (PolyEthylene) pipes.

Fusion parameters input can be accomplished with a fusion barcode according to ISO/TR 13950 standard or manually.

The internal processor controls the values of welding parameters, set the power output accordingly and, thanks to the messages shown in the graphical display, guides the operator to successfully execute all the necessary operations.

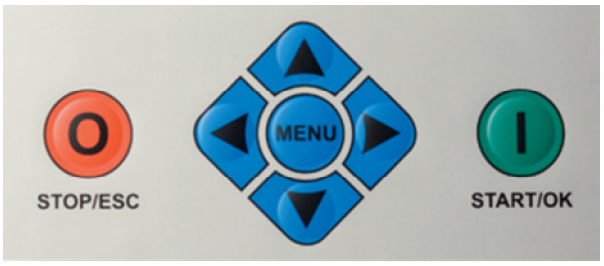
In addition, the MSA 2 COOLFIT is tracking and storing in the internal memory up to 1000 welding protocols, that can be browsed by the user even days or months after the welding execution.

To ensure high quality fusion cycles, depending on the ambient temperature, the machine is adjusting automatically the welding time, for the correct distribution of the energy to the fitting.

1.2 Components description

1.2.1 Operation Controls

There are seven buttons you can press to operate the machine. START (green button) and STOP (red button) are the most important, used to get a confirmation or a stop for all the actions. The remaining (blue) are auxiliary buttons used for menu navigation and data entry.

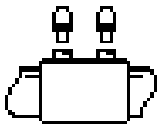


Button	Description
(▲)	Moves the cursor to previous field, increases set values, scrolls characters
(▼)	Moves the cursor to next field, decrement set values, scrolls characters in reverse order
(◀)	Moves the cursor to the left
(▶)	Moves the cursor to the right
MENU	Enters into additional menus
STOP/ESC (O)	Stops any operation and the process; goes back to previous step
START/OK (I)	Confirms inserted data and starts welding

1.2.2 Display

The graphical display is the main user interface of the welding machine. It shows the steps to be executed in sequence, the fusion data, possible errors and alarm messages.

It is possible to change its brightness using the ◂ and ▸ buttons and then save permanently the new value pressing the ▾ button, in case of limited visibility due to weather conditions. The operation can be done only when the display shows the fitting icon



1.2.3 Emergency Stop Switch

Pushing the E-stop switch instantly shuts off the power to the processor

1.2.3 Ambient Temperature Sensor

The outside sensor measures the ambient temperature, to check the temperature is in the permitted range (between 0° F and 120° F) and adjust the fusion time according to the external conditions.

1.2.4 USB Interface

The USB type-A interface available on the rear of the machine is the interface used to upgrade the software version, perform the calibration of the unit and export the protocols. The connector is protected against dust and water by a cap, which ensures an IP67 protection factor when properly fixed.

1.2.5 Power Cable

The power cable is delivered with an earthed plug for being connected to power supply at 115V/60Hz.

The power source can be either the mains or a generator. In the latter case there are no deterministic rules to select the right generator output power. Requirements will vary depending on the efficiency of the generator as well as other factors, like the power needed by the fitting.

1.2.6 Welding Cable

The fusion cable shall be connected to the fitting pins. As standard the terminals are supplied with straight female connectors, Ø4mm.

1.3 Barcode Reader Scanner

The barcode scanner allows a quick reading of welding parameters by reading the related barcode, pointing the barcode (at a distance of 10-15 cm) and pressing its button.

The successful reading is confirmed by special acoustic tones and a display change. In case of drawbacks, to check if the barcode reader is damaged, you can try to read for test purpose the code printed below, when the machine shows the barcode symbol.

If this code is read successfully, the issue is not on the barcode reader. After usage, remember to place the barcode scanner into its protective case.

1.4 Extension cords and pigtails

Due to the high amperage draw of electrofusion fittings, the use of an extension cord is not encouraged. In the event such usage is necessary, the following lengths and wire gauges are recommended:

Cord Length	Wire Gauge
25 ft.	# 10/3 (6 mm2)
50 ft.	# 8/3 (10 mm2)

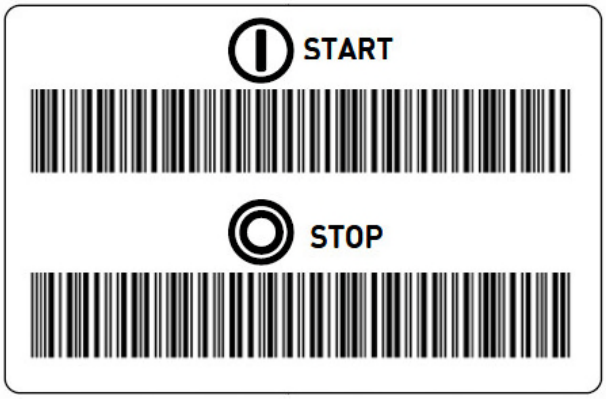
Extension cords should not be used on large couplers.

A pigtail is an adapter for converting from a 30 amp twist-lock to a 15 amp straight blade plug. Its purpose is for powering the processor where a NEMA L5 socket is not available, especially while downloading. Its use is not recommended in field applications with electrofusion fittings over 63mm in diameter.

1.5 START/STOP Card

START / STOP card can be used as alternative to the buttons on the keypad. For instance, you can confirm the commands or start the welding process by scanning the START bar code on the card.

The STOP barcode can be used instead to go back to the previuos step.

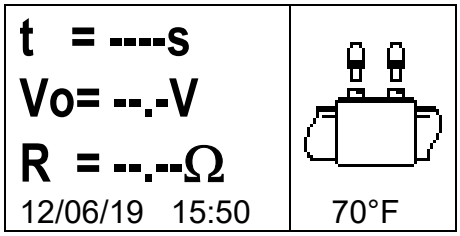


2 Fusion process

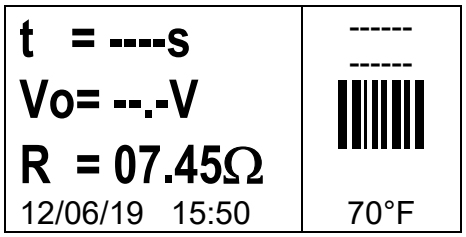
2.1 Overview of operating procedure

The welding workflow is shown in the picture below

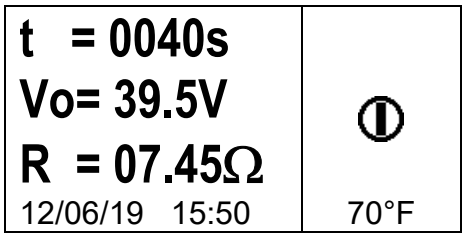
Prepare the welding and connect the fitting



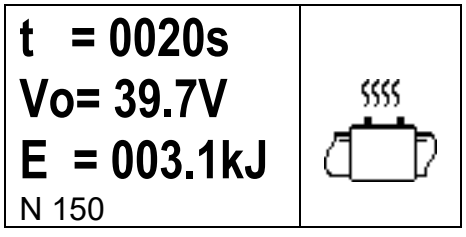
Read the fusion parameters



Start the fusion

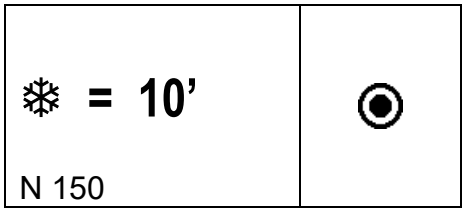


Fusion in progress



Fusion completed automatically

Cooling time

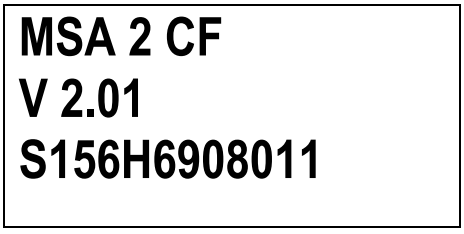


Next paragraphs describe step by step the interactions with the electrofusion unit.

2.2 Switching On

Attention **Before connecting the machine to the power source, please read the chapter 6 'Technical characteristics' and check the input voltage (100V-130V). If a generator is used, this has to be started before connecting the electro-fusion unit and must supply a constant output voltage! Any sudden changes could compromise the correct welding result and/or damage the control unit.**

Connect the machine to the power mains or generator (100v-130V) when the generator is already started. At power on the display shows the machine information: machine type, software version and serial number.



2.3 Material selection

As soon as the scanner is enabled during the power on, select the plastic material: the MSA 2 CF can weld PE, PP-R, PP/PVDF or PB INSTAFLEX fittings. As the fusion parameters change depending on the material, the user has to set the proper one. This shall be done reading with the scanner the desired barcode, out of the 4 shown below

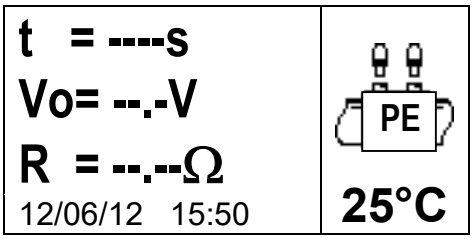
PE

INSTAFLEX BIG (PB)

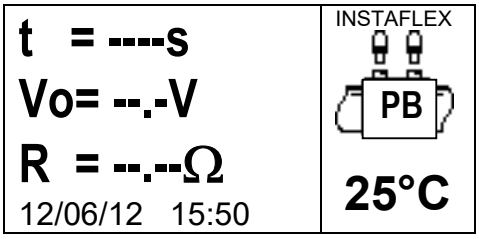
FUSEAL (PP)/PPro SEAL

PP-R

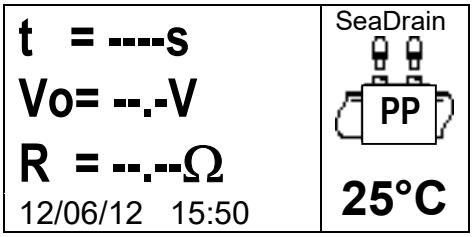
As soon as the MSA 2 CF has captured the code, it will change the icons accordingly. For PE:



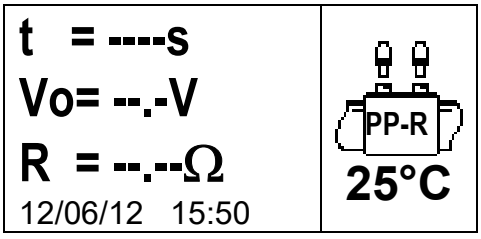
For INSTAFLEX BIG



For SEADRAIN



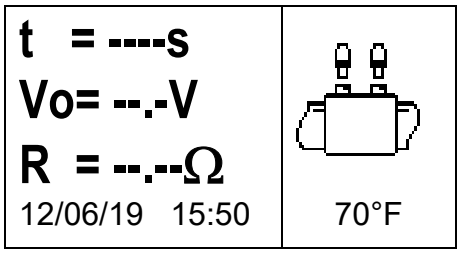
For PP-R



If the machine is switched off, the last setting will be shown at the next power-on.

2.4 Connect fitting

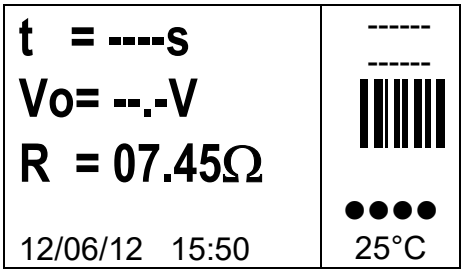
The next step consists of connecting the fitting to the machine leads. The MSA 2 CF asks this with a prolonged sound. The LED of the barcode scanner blinks to inform you have to do it. Awaiting for that, the display shows the icon of a fitting and the information about ambient temperature and current date/time.



As soon as a fitting presence is recognized, the MSA 2 CF moves automatically forward, asking for the fusion parameters.

This is also pointed out by a double short tone of the MSA 2 CF and the barcode scanner. The scanner LED switches off too, to alert the operator that it is ready to accept commands.

In case of PP, as there may be multiple coils connected in parallel, the MSA 2 CF will show roughly how many are present: to do that, the user has to connect the coils one after the other, and the unit will add a bullet, on the screen to report the coil is ok (connected properly, no short or open circuit) or not.



2.5 Enter operator code/job number

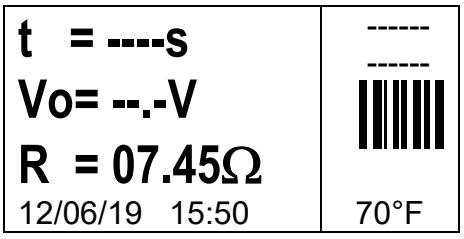
At the beginning you may add some work site information, like the operator code and the job number for the next welding.

The reading of the operator code can be set as mandatory or left optional.

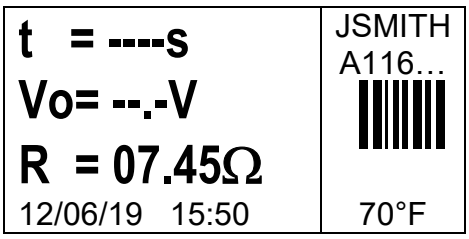
When the leads are properly connected to the fitting, the control unit checks the fitting resistance and displays it.

Before the acquisition of the fusion parameters, you can read with the scanner the operator code (ISO 12176-3 compliant) and the job number.

Alternatively, you can enter operator code and job number manually, pressing the STOP button for 2” to enable the “edit” mode, and then inserting the characters using (▲) and (▼) and (◀) (▶) to change field. Once the data are entered, you can confirm with the START button.



The information will be shown above the barcode icon, in place of the dash (‘-‘) symbols



In case the operator code is mandatory the first row ‘----‘ will blink and the MSA 2 CF will not move forward until the operator

code is entered, blocking the acquisition of the fusion parameters.

2.6 Enter fusion data

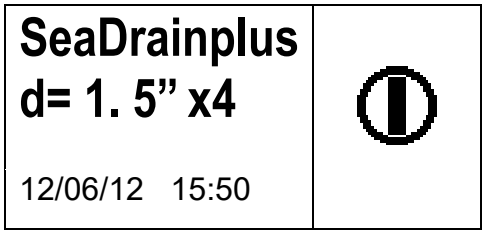
After that, you can insert the fusion parameters reading the barcode information with the scanner.

If the barcode cannot be read with a scanner for any reason, the data can be entered manually.

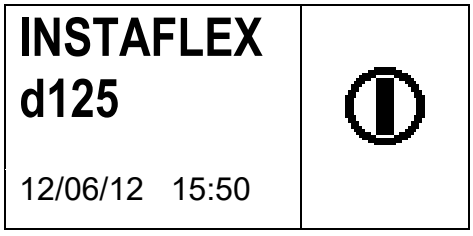
In case of manual mode, the machine works in different ways, depending on the material selection.

If the material selection is PE or PP-R, then time and voltage values must be entered, pressing the START/OK (I) button to go in “edit” mode and then using (▲) and (▼) to select the required digits and (◀) (▶) to change field. Once the values are entered, must be pushed START/OK (I)

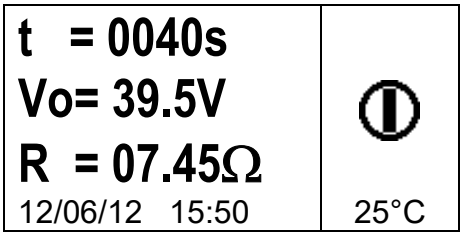
If the mode is PP, the manual mode is based on a list of selectable items the user can see pressing the START button. With (▲) and (▼) he can choose the fitting, confirming with the START/OK button.



If the mode is PB (INSTAFLEX), then the manual mode is also based on a list of selectable items the user can see pressing the START button. With (▲) and (▼) he can choose the fitting type, confirming with the START/OK button.



As soon as the data are correctly read from the barcode or selected manually, the machine confirms with a double acoustic tone and show on the display a summary of the captured fusion parameters: time, voltage and expected coil resistance.

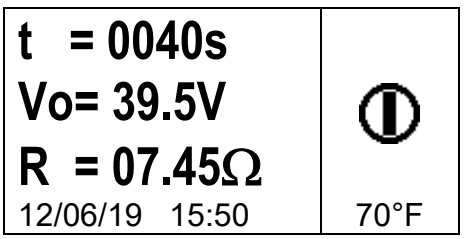


When the operator confirms his intent of starting the fusion process, pressing the START/OK (I) button, the unit will start to weld.

If fusion parameters are not acquired, there might be several reasons:

- The barcode reader may be operated in a wrong way: try to put it closer to the barcode
- The barcode may be damaged
- The data are not the expected ones (prolonged tone generated by the machine): the barcode read does not contain fusion parameters

As soon as the data are correctly read from the barcode, the machine confirms with a double acoustic tone and show on the display a summary of the captured fusion parameters: time, voltage and expected coil resistance.

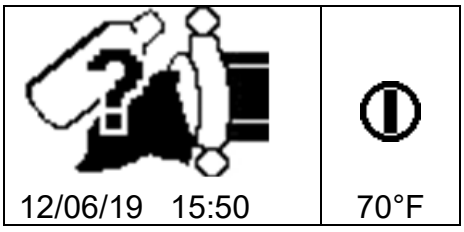


When you confirm the intent of starting the fusion process, pressing the START/OK button, the unit will start to weld.

If the barcode is not correct the machine and the scanner give both a prolonged tone to ask for the correct one. In case of inconsistency between measured versus scanned parameters the machine shows instead a message screen, with the proper error like the following one (fitting resistance too high in respect to the nominal value).

2.7 Preparation check

Before starting the fusion process, the MSA 2 CF shows a reminder, to ensure the preparation activities have been properly carried out.



As soon as you confirm with the START/OK button, the fusion process starts.

2.8 Fusion process

2.8.1 Welding phase

During the fusion process, the display shows the information concerning the output voltage, the remaining fusion time and the applied energy.

t = 0020s Vo= 39.7V E = 003.1kJ N 150	

Note **The machine adjusts the fusion time according to the external temperature and barcode information. Therefore the final fusion time values might be slightly different from the nominal values, captured from the barcode.**

The fusion process can be stopped at any time by pushing STOP/ESC. Then the fusion process immediately stops and an error message occurs (see 'Error Messages' chapter).

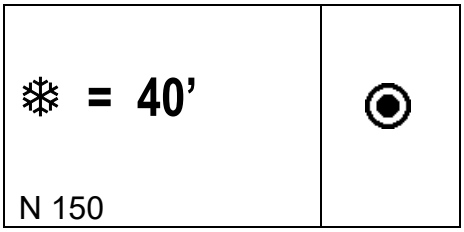
Warning **Stopping the on-going fusion process will result in a suspicious welding: the responsibility will be in charge of the operator.**

When the fusion operation is going to finish, a repeated acoustic signal alerts you that the process is near to complete. As soon as the fusion process is correctly concluded, the display shows briefly the information concerning the real fusion time, the average voltage and the total energy applied to the jointing. These data will be part of the welding protocol stored into the internal memory.

t = 0040s Vo= 39.6 V E = 007.5kJ N 150	

2.8.2 Cooling time

After the completion of the process, the fusion summary and the remaining cooling time, if defined in the barcode, are displayed alternately. Messages are active till the user will press the STOP/ESC button, to proceed with the next welding.



Warning **Remove the external clamp only when the cooling time is expired!**

Danger

Danger of burning!

The fitting area is hot! Pay attention during the removal of the cables.

Do not leave unattended the MSA during the fusion and cooling time!

When the cooling time is going to finish or finished, an acoustic signal alerts the user the process is near to complete.

2.9 Welding check

The electro-fusion fittings are equipped with pins, giving evidence of the heating process occurred: double check if they are sticking out.

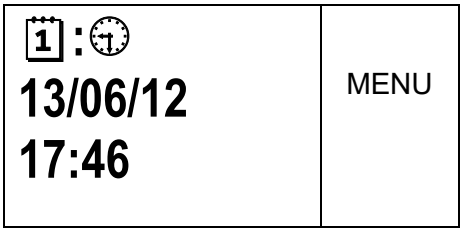
Attention **This indication is not enough to ensure the quality of the welding, but just confirming the heating has occurred! Therefore please follow the instructions of the fitting manufacturer.**

3 Configuration settings

The MSA 2 CF does not need any setting, except the change of date/time from time to time.

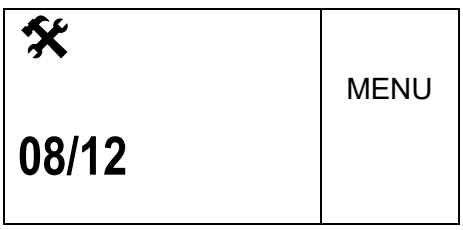
To go into the calendar menu, press the MENU button twice. Then, date and time can be modified immediately for MSA 2 CF. In the MSA 2 CF, the change can be done only in administrator mode: at the power-on, you have to scan the admin code as soon as the scanner is enabled.

Date/Time are shown in the format: Month/Day/Year hour:minutes



START/OK must be pressed to go in “edit” mode. Then the desired values can be selected by (▲)(▼)while the cursor position can be changed by (◀)(▶). When insertion is completed,press START/OK to confirm the setting. To cancel instead the operation press STOP/ESC.

Since the MSA 2 has to be calibrated regulary, you can check in advance the expiring revision date. Just pressing three times the MENU button you can access such information (mm/yy).



4 Data Management

The electro-fusion unit saves the welding protocols for each fusion cycle in the internal memory. For MSA 2 CF these data can be saved in a PDF/BINARY.

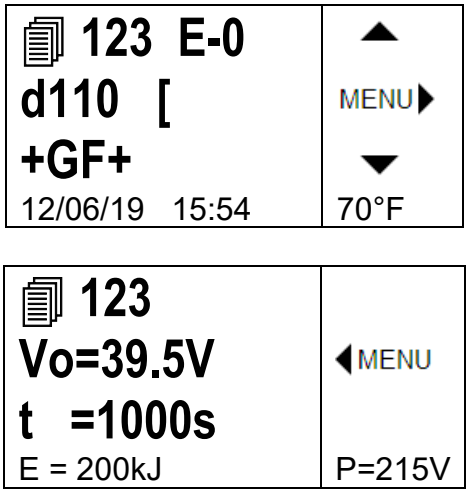
When the memory is full, the oldest protocol is overwritten by the most recent.

To conform to different standards, the welding machine saves (and provides for a later analysis) the following data:

MSA Type & Serial Number	MSA 2 CF S156H7001007
Fusion cycle number	# 1
Date/time of fusion cycle	02/09/13 15:04
Error number	St = 04
Fitting size	D = 32 mm
Fitting type	Ac = T
Fitting manufacturer	Man = GF
Fusion voltage nominal	Vn = 40.0V
Fusion time nominal	tn = 48"
Fusion preparation verified	Pre.= V
Fusion voltage actual	Vo = 40.0V
Fusion time actual	t = 8"
Energy	E = 2.2KJ
Mains voltage	P = 222V
Ambient temperature	T = 28°C
Operator code (only inside .BIN)	
Job number (only inside .BIN)	
Cooling time (only inside .BIN)	

4.1 Protocol view

To view the saved protocols, press MENU once: the most recent protocol appears as first.



The buttons (▲)(▼) allow to scroll up and down the list of protocols, while the (◀)(▶) ones allow to see all the information related to each single protocol. Pressing STOP/ESC you can go back to main menu again.

In the table below are summarized the symbols used to identify the fitting type.

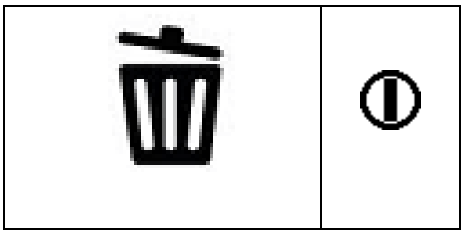
Symbol	Description
C	Elbow 45° - 90
T	Tee 90°
[	Single socket
I	Coupler
‡	Saddle and coupler
Y	Reducer
J	Tapping Tee
<	Electro-thermo-retractable sleeve

4.2 Protocol erase

The protocols stored in the internal memory can also be deleted in the protocol view window.

In the MSA 2 CF just press for 4-5” START/OK. A wastebasket will appear and, as soon as the user confirms with the green button, all protocols will be removed.

The action is permitted only to the machine administrator. At the power-on, you have to scan the admin code as soon as the scanner is enabled. Then you will be able to delete the protocols as mentioned above.

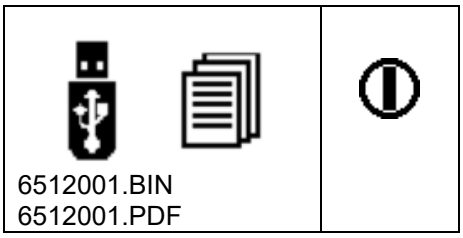


4.3 Protocol export

The protocols stored in the internal memory of the MSA 2 CF can be copied in a memory stick for being analysed in a PC in a later stage, both in PDF and BINARY format.

Insert the USB stick on the USB connector available on the rear panel of the machine, then press MENU till a USB memory icon appears.

Press START/OK to start the data transfer. The screen changes to the following one

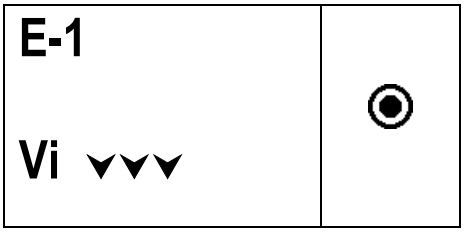


Wait till the screen reverts to the previous one. Then the USB memory stick can be extracted from the electro-fusion unit and connected to a PC for data upload.

5 Error messages

In case of anomalies or errors, the MSA 2 CF pops up a specific message useful to identify the possible issue. The related number will be even tracked within the welding protocol, to give evidence of the accident.

The error message appears on the display with the following format:



The table below summarizes all the messages managed by the electro-fusion unit, with a brief explanation of the possible causes.

ERR	DISPLAY INDICATION	MEANING	COMMENT
E1	Vi ▼▼▼	MAINS VOLTAGE TOO LOW	Generator voltage/freq. below the threshold
E2	Vi ▲▲▲	MAINS VOLTAGE TOO HIGH	Generator voltage/freq. above the threshold
E3	Vi ⊗	OUTAGE DURING LAST FUSION	Power cord disconnected during last fusion
E4	☞ ⊙	FUSION INTERRUPTED WITH STOP BUTTON	Fusion stopped by the user
E5	❄	AMBIENT TEMP. TOO LOW	Temp. sensor detected a value below the threshold
E6	☼	AMBIENT TEMP. TOO HIGH	Temp. sensor detected a value above the threshold
E7	i ▼	INTERNAL TEMP. TOO LOW	EF unit cannot fuse, since it is too cold
E8	i ▲	INTERNAL TEMP. TOO HIGH	EF needs to cool down, since it is too hot
E9	▼	FITTING RESISTANCE TOO LOW	Fitting coil different than expected
E10	▲	FITTING RESISTANCE TOO HIGH	Fitting coil different than expected
E11	Vo ▼▼▼	FUSION VOLTAGE TOO LOW	Not enough power from mains
E12	Vo ▲▲▲	FUSION VOLTAGE TOO HIGH	Internal circuit not calibrated or faulty
E13		FUSION CIRCUIT INTERRUPTED	Power cord or output cables detached during welding
E14	Io ▲▲▲	FUSION CURRENT TOO HIGH	Fitting broken or circuitry not calibrated or faulty
E15	?	FITTING OUT OF RANGE	Fitting is not in the right range
E16	⊗	SYSTEM ERROR	Electronic faults

6 Technical characteristics

Mains voltage and frequency	115 V (100V÷130V) 50/60 Hz
Suggested power generators	3.5kW
Welding technique	Voltage controlled
Fusion voltage	3.6÷42V
Operating temperature	0°F / +120°F (-20°C / + 50°C)
Temperature sensor resolution	± 1.8°F (±1 °C)
Fittings range	Ø20mm ÷ 450mm (inner diameter)
Fusion data input mode	Bar code, manual
Capacity of internal memory	1000 records
USB Port	Type A
Protection factor	IP 65
Dimensions	280x280x420 mm (max)
Weight	26.5 pounds (12.8 Kg)

6.1 Standards

- ISO 12176-2
- ISO 12176-3
- ISO 13950
- CSA 22.2

7 Maintenance

7.1 Cleaning

Clean the unit regularly with a slightly damp cloth. The membrane keyboard and other plates can be cleaned with industrial alcohol if necessary (no solvents or Trichlor products).

Warning

Under no circumstances should the unit be sprayed or immersed in water nor cleaned with compressed air.

7.2 Fusion Cables

Regular control of the fusion cable is necessary. Damaged cable must be replaced as well as the connector.

7.3 Function Check-up

Regular functional check-ups and readjustments are required. These must be carried out by a Georg Fischer authorized service agent.

7.4 Spare parts

If repairs are necessary, please contact your local representative.

There is a separate spare parts list for ordering replacement parts.

Please indicate the following information:

- Customer name.
- Product description.
- Machine type (code).
- Part code (see the spare parts list)
- Position of part into the spare parts draw.

8 Accident Prevention

8.1 Operating the Unit

Do not let unauthorized or untrained personnel use the unit. When the unit is not in operation, avoid unauthorized use by keeping it in a dry, locked room.
Safe operation of the fusion unit can only be ensured when the following criteria are fulfilled:

- appropriate transport
- appropriate storage
- operation for the correct purpose
- careful handling and operation
- periodic maintenance

Warning

The unit may only be used under surveillance.
All persons involved in the operation of the fusion must be properly qualified and should follow these Operating Instructions.
Use of the unit can be dangerous, if the Operating Instructions are not followed. The unit may not be used in surroundings having a high risk of explosion.

8.2 Check before Operation

Before each operation, check the unit for damage and whether it is able to function properly.

8.3 Protection of the Unit

Keep the mains lead and secondary cables away from sharp edges. Make sure damaged cables are immediately replaced by an authorized service agent.

8.4 Defect Unit

Arrange that damaged housings or other parts are replaced or repaired by an authorized service agent. If the unit is not working properly it must be sent without hesitation to an authorized service agent.

Warning

Only authorized and properly qualified personnel are allowed to make repairs on the unit. Such specialized technicians must be fully aware of all the safety guidelines, maintenance measures and possible dangers described in this manual!

8.5 Opening the Unit

The unit may only be opened by an authorized service agent. If not, the warranty will cease immediately.

Warning

When the unit has been opened or the housing removed, parts of the fusion unit are exposed having a dangerous electrical charge!

8.6 Working with safety in mind

“Make your contribution to safety in the workplace."

- Report any deviations from normal operation immediately to the responsible person.
- Always keep safety in mind while working.

8.7 Other disposal

Separate collection of electronic and electrical waste (as part of the equipment) has to be ensured through appropriate systems.

Note

The here above symbol is indicating separate collection for electrical and electronic equipment according to WEEE directive (Waste Electrical and Electronic Equipment).

9 Configuring the unit

9.1 Temperature scale set-up

As soon as the MSA 2 CF is switched on, the barcode reader is enabled; the installer can then change the measurement unit for the ambient temperature shown on the display

Reading the barcode

will program the machine to work with degrees Fahrenheit.

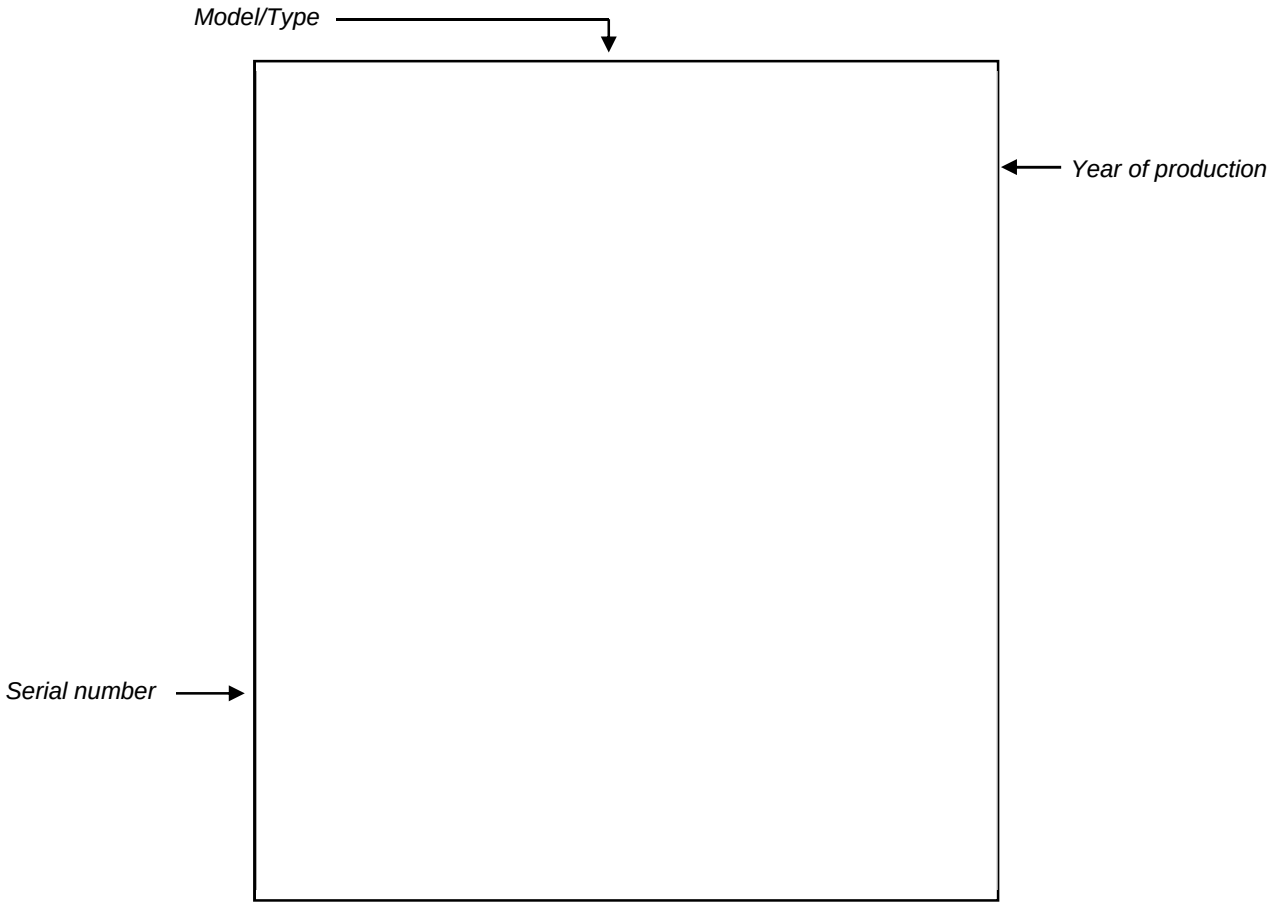
Instead, reading the barcode

Will switch to degrees Celsius.

The configuration will stay till other barcoe type is read.

CE Declaration of conformity

The manufacturer GEORG FISCHER OMICRON S.r.l. declares, on his sole responsibility, that the product Welding Machine for plastic fittings:



complies with all the relevant requirements of the following directives:

- EMC Directive 2014/30/UE
- RoHS II Directive 2011/65/UE
- LVD Directive 2014/35/UE

Applied harmonized standards for presumption of conformity:

- EN 61000-6-3:2007/A1:2011/AC:2012
- EN 61000-6-4:2007/A1:2011
- EN 61000-3-2:2014
- EN 61000-3-3:2013
- EN 61000-6-1:2007
- EN61000-6-2:2005/AC:2005
- EN 60335-1:2012/AC:2014/A11:2014/A13:2017
- EN 62233:2008/AC:2008

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Andrea Ing. Pezzuolo

Caselle di Selvazzano (PD) ITALY, 27/1/2022

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