GEORG FISCHER
PIPING SYSTEMS

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MSA 340

Polyvalent Electrofusion Units

Instruction Manual

GEORG FISCHER
CENTRAL PLASTICS

TABLE OF CONTENTS

GENERAL INFORMATION

To allow an easy understanding of the manual and point out the duties of the operator, symbols are frequently used. The following tables contain the explanation of all symbols used in this manual.

WARNING NOTICE

Warning notices are used in this manual to inform the user 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.

OTHER SYMBOLS AND NOTICES

Symbol	Meaning
Attention	Mandatory: You must comply with this regulation.
Note	Suggestion: This notice contains important information.

ABBREVIATIONS

Symbol	Meaning
PE	Polyethylene
d_n	Pipe outer diameter (nominal)
PDF	Adobe® Portable Document format
CSV	Comma Separated Values format

1. INTRODUCTION

The electrofusion MSA processor is designed according to current technology standards. Using it for purposes other than those described in this manual may cause injury to the operator or to others and could also damage the processor and/or other equipment.

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.

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1.1 PRODUCT DESCRIPTION

The MSA processor is an electrofusion control unit for the electrofusion joining of PE pipes.

Fusion parameters input can be accomplished with a fusion barcode according to ISO/TR 13950 standard, using the dedicated CP mode (implanted resistor), or manually.

The internal microprocessor controls the values of the fusion parameters, sets the power output accordingly, and using the messages shown on the LCD display, guides the operator to successfully execute all the necessary operations.

The MSA 340 has GPS capability and stores up to 1000 fusions that can be transferred to a PC via USB memory stick, in either PDF or CSV formats.

1.2 COMPONENTS DESCRIPTION

1.2.1 Operation Controls

There are seven keypad buttons the user can press to operate the machine. START/OK (green button) and STOP/ESC (red button) are the most important and are used to get a confirmation or cancellation for all the actions. The remaining keypad buttons (yellow) are auxiliary buttons used for menu navigation and data entry.

Button	Description
(▲)	Moves the cursor to previous field, increases set values, scrolls up.
(▼)	Moves the cursor to next field, decrease set values, scrolls down.
(◄)	Moves the cursor to the left.
(►)	Moves the cursor to the right.
MENU	Enters into CONFIGURATION menus (DATA RETRIEVAL or SET UP menu).
STOP/ESC (O)	Stops any operation and/or fusion; goes back to previous step.
START/OK (I)	Confirms inserted data and/or starts fusion; advances to next step.

1.2.2 Display

The display, an alphanumeric LCD 4 rows x 20 characters each, is the main user interface of the MSA unit. It shows the steps to be executed in sequence, the fusion data, possible errors and alarm messages.

It is possible to change the display's contrast using the (◄) and (►) buttons and then save the new value by pressing the (▼) button, in case of visibility issues due to weather conditions. The operation can be done only when the display shows the message "CONNECT FITTING!".

1.2.3 Emergency Stop Switch

Pushing the E-stop switch instantly shuts off the processor.

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1.2.4 Ambient Temperature Sensor

This sensor measures the ambient temperature, to verify the temperature is in the permitted range (between -10° F and +120° F). It is located near the end of the fusion cables in the barcode din connector. The temperature sensor does not respond immediately to thermal changes.   In order to assure accurate ambient temperature measurements, the cable end should be left in the fitting environment for at least 15 minutes. Direct exposure to sun light and other heat sources will affect accuracy.

1.2.5 USB Interface

The USB type-A interface available on the front of the machine is the main interface for communication purposes. Via USB, the user can download the protocols (fusion data) stored in the processor's memory as well as upload new software versions. The connector is protected against dust and water by a cap, which ensures an IP65 protection factor when properly sealed.

1.2.6 Power Cable

The power cable is delivered with a plug to be connected to either a 115V, 50/60Hz or 230V,50/60Hz power supply (plug is determined by processor input power requirement).

115V models - PLUG 30A/125V TWISTLOCK NEMA L5-30
230V models - PLUG 250V/30AMP TWISTLOCK NEMA L14-30

1.2.7 Fusion Cables

The fusion cables are not detachable.

The fusion cables come with 4.7mm (replaceable) tip connectors.
- 3.0mm tip adapters will be available free of charge for customers who might still have some of the old style 3-pin connector type Central Plastic fittings on hand.
- 4.0mm tip-adapters are available for purchase if required.

1.3 BARCODE WAND OR BARCODE SCANNER

Using the barcode wand or scanner enables a quick insertion of fusion parameters by reading the related bar code.

The barcode wand operates best when held at a perpendicular angle of 10–30 degrees and run across the barcode label in one continuous swipe (can be swiped forward or backwards on the label).

A successful reading is confirmed by an acoustic tone and a display change.

- Three consecutive tones indicates a reading failure.

To check if the barcode reader is damaged, try reading the test bar code printed below when the machine says ENTER FUSION DATA.

If this code is read successfully, the issue is not the barcode reader.

9507063103284074040448542

After use, place the reader into its protective case.

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2. FUSION PROCESS

2.1 OVERVIEW OF OPERATING PROCEDURE

A standard fusion workflow is shown below:

```
MSA 340
S/N: S160C5930212
SW vers.:2.23
Calibration due: 2019
```

```
CONNECT FITTING!
- - - Ohm              110V
Ta=73°F                60Hz
01.01.17  15:20        OK
```

```
ENTER FUSION DATA   or
use CP dedicated mode
----------------------------
-------
```

```
START FUSION    N° 15
CP  I    1"  CTS
time=40s
01.01.17  15:22    ESC OK
```

```
FUSION IN PROGRESS
VOLTAGE=40V
time=20s          I= 4.5A
01.01.17 15:22
```

```
FUSION DONE   N° 15
CP  I    1"  CTS
time=40s          I= 4.1A
01.01.17  15:23       ESC
```

```
COOLING INTERVAL

time=10minutes
01.01.17   15:23
```

```
COOLING INTERVAL
ENDED

01.01.17   15:33       ESC
```

2.2 SWITCHING ON

Attention: Before connecting the machine to a power source, the operator must read 'Technical Characteristics' Section 7!

Caution: Check the voltage!

The generator has to be started and allowed to run at full throttle before connecting the MSA unit and it must supply a constant output voltage! Any sudden changes could compromise the fusion and/or damage the processor.

Connect the processor to utility or generator power and switch the machine on. The display shows the processor model, serial number, software version and the recommended calibration date.

```
MSA 340
S/N: S160C5930212
SW vers. :      2.23
Calibration due: 2019
```
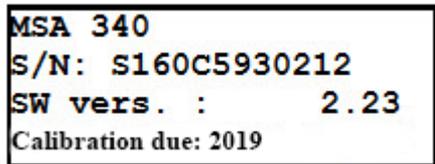
2.3 ENTER WORK SITE DETAILS

2.3.1 Operator Identity and Job Number

The OPERATOR IDENTITY and JOB NUMBER functions can be enabled or disabled individually. Options for each will be discussed in the "Configuration Settings.".

```
OPERATOR/JOB NUMBER

--------------    ⬄
                Esc OK
```
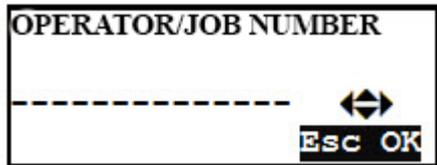
The operator identity and job number entered for the first fusion are stored in the processor's memory and can be used for subsequent fusions, until the user name or job number is changed or the processor is switched off.

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If the job number function is active and the user wants to bypass this screen without entering any information, press the (▶) button and then the START/OK (I) button to proceed.

2.4 CONNECT FITTING

At this point, the display shows the ambient temperature, the date/time, the voltage and frequency values of the input supply voltage.

Attention: When the input voltage is out of range (see Technical Characteristics) the display shows, in place of the voltage value, '^^^' if the voltage is above the voltage limit threshold, or 'vvv' if the voltage is below the voltage limit threshold. In this case, the unit will stop the operation during the fusion if the input voltage does not return within the voltage threshold limit.

```
CONNECT FITTING!
--- Ohm          110 V
Ta=73°F           60Hz
01.01.17    15:20   OK
```
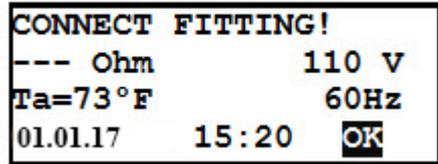
Attention: It is important to check that the fusion cable ends are properly connected to the fitting's terminal post before moving forward.

Once the fusion cables have been connected to a fitting, push the START/OK (I) button.

If a fitting is recognized, the processor program will advance and the display message will change by asking for additional information.

2.5 ENTER FUSION DATA

Fusion data can be entered by automatically reading the implanted resistor in the fitting (CP mode), by reading the fitting's barcode label, or by inserting the fusion data manually. At this stage, to ensure a reliable joining, pipes and fitting have to be

carefully prepared: pipes shall be scraped, cleaned and aligned using a clamping tool.

2.5.1 CP Mode

The processor program is designed to search for the CP mode connection first.

To perform this task, the MSA processor tries first to work in CP mode, by reading the implanted resistors, according to ISO 13950. In this mode, the value of the fusion voltage is automatically set to 39.5V and the fusion and cooling time are set according to the resistor value.

The correct usage of the CP Mode requires the user to connect the red connector end of the fusion cables to the fitting post with the implanted resistor

and the white connector end to the fitting post that is solid (no implanted resistor). Once the processor and fitting are properly connected, press the START/OK (I) button.
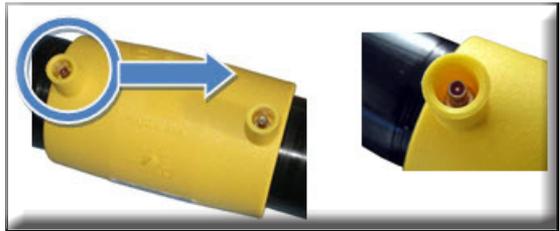
The processor will display the related parameters.

Once the processor has verified the coil resistance and ID resistance, and displayed a fusion time, press the START/OK (I) button to begin the fusion.


```
FUSION DATA (CP MODE)
 CP MODE          N° 15
Time= 90s
01.01.17    15:28
```

If the fitting is not correctly connected, or not equipped with the implanted ID resistor, the processor will initiate the barcode mode and the user has a series

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of options available to enter the required data as shown below:
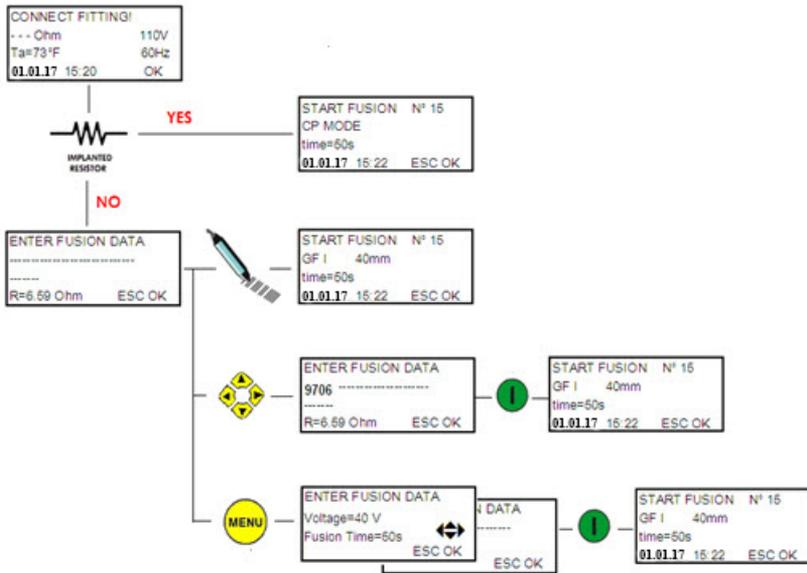
2.5.2 Barcode Insertion

The user can acquire the fusion parameters by scanning the barcode label with the barcode wand when the following is displayed:
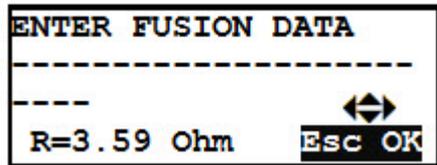
If the data cannot be read with the barcode wand for any reason, the user can manually enter the 24 digits printed on the barcode by pressing the (▶) button to go into "edit" mode and then using (▲) and (▼) to select the required digits. Once the 24 digits are entered, push START/OK (I).

As soon as the data has been correctly entered (either with the barcode wand or with the 24 digit input), the machine will confirm with a beep and the display will show a summary of the captured

fusion parameters as seen below:

If the data is correct, push START/OK (I).

```
START FUSION N° 15
  CP I    1" CTS
time= 40s
01.01.17     15:22 Esc OK
```
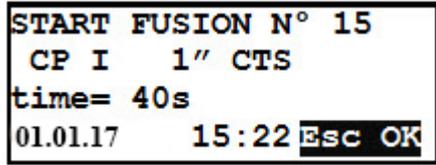
The processor will then compare the measured fitting resistance with the nominal value embedded in the barcode, and if there is not a conflict in resistance values, the processor will start the fusion process.

If the value of the fitting resistance doesn't match with the barcode data, the display shows an error message. Then the user has to press the STOP/ESC (O) button, and re-enter the data.

• Common issues causing an error at this stage are the fusion cables not correctly connected and/or damage to the fusion cables.

If the fusion cables have no obvious signs of damage, the user should double check the fitting and the related bar code, and then repeat the entire procedure.

If the problem still remains, the fitting and the barcode shall be replaced.

If all the steps above are not solving the issue, it is recommended to get assistance from GF Central Plastics.

2.5.3 Manual Insertion

In case the barcode (or the 24 digits) cannot be read, the user can switch to manual mode, by pressing the MENU button when "Enter Fusion Data" is shown on

```
ENTER FUSION DATA
Voltage= 40 V        ↕
Fusion Time=00 00s  ⬌
                  Esc OK
```

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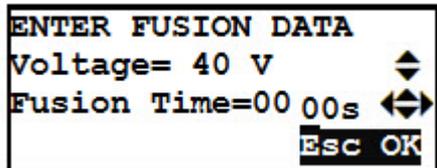
the display.

Enabling the manual mode allows the operator to input the fusion voltage and time using the membrane keypad as explained above:

Using (▲)(▼), set the fusion Voltage and push START/OK (I) to confirm the entered voltage and move to the next field. Next, use (▲)(▼) and (◄)(►) to set the Fusion Time. Press START/OK (I) to confirm the entered time.

To cancel the operation and go back to the previous page, (the barcode mode), the user may press STOP/ESC (O) at any time.

To provide more traceability, the operator can add data such as: fitting manufacturer, fitting type and diameter.

```
ENTER  FUSION  DATA
Manuf= CP              ⬍
Type= I      D=    1"  ⬌
                  Esc OK
```
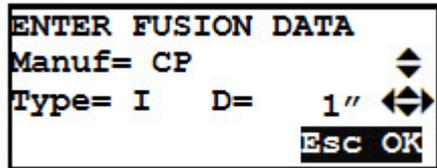
When all the proper data has been entered, press START/OK (I) to advance to the fusion process.

2.6 PROCESS INCOMPLETE PRE-ALERT

Before starting the fusion process, the processor will measure it's internal temperature, and if the temperature is too high, a message will be displayed informing the user that the machine needs to be allowed to cool down before use!

The message is simply a warning to inform the user that the fusion process may not be concluded successfully due to the internal temperature of the machine. Since fittings have

```
INSTRUMENT  TEMP.
LIMIT = 150°F
Ti=158°F          110 V
01.01.17      15:21  60Hz
```

different power requirements depending on manufacturer, size, and technology parameters, it does not prevent the user from going forward, but should be taken into consideration.
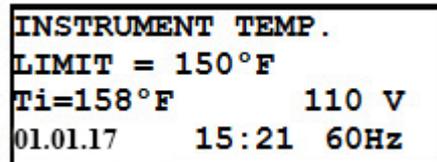
NOTE: When the processor's internal temperature is above 190°F, it will not allow a fusion to start and the following message will be displayed.

```
ERROR N:12
INTERNAL TEMP.
  TOO HIGH
          Esc OK
```
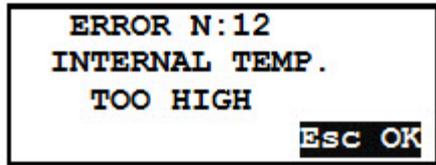
At this point, it will be necessary to allow the processor to cool down before a fusion can be attempted.

2.7 FUSION PREPARATION

To use the FUSION PREPARATION function, this option has to be enabled in the configuration menu.

```
PIPE ENDS PREPARED?
(peel, clean, Align)

01.01.17   15:20 Esc OK
```
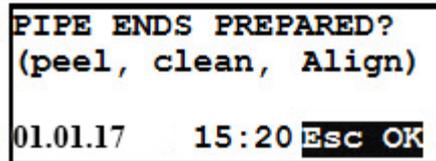
If the FUSION PREPARATION function is enabled, the display shows a message which asks for confirmation that all pipe preparations (scraping, cleaning, and alignment) has been done. If all pipe preparation is complete, press START/OK (I) to start the fusion process.

NOTICE: The preparation of the pipes according to guidelines (scraping, cleaning, and alignment) are essential to ensure the quality of the fusion.

2.8 TRACEABILITY

Traceability allows the collection of information about the most important elements (pipes and fittings) involved in the fusion process.

To use the TRACEABILITY function, this option has to be enabled by selecting "Optional, "Required", "NO ISO", or "ASTM" mode in the configuration menu (see 'Configuration' chapter). If this mode is left "Disabled", the end user will not see anything associated with the traceability data during the fusion initiation process.

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- Optional—user can enter data or simply press the START/OK (I) button to bypass and proceed
- Required---user must enter traceability data to proceed (this format exclusively uses the European ISO barcode format only)
- NO ISO---is a "free text" format that allows the customer to enter any data they choose using the arrow keys on the membrane or scanning a barcode (using Code 128 format)
- ASTM---Using the 16 digit linear ASTM traceability barcode, the MSA can read, decode, and document the embedded information in the fusion memory log.

Information shall be entered prior to the start of the fusion process.

To record each section of information, the operator shall enter the desired traceable information by scanning the appropriately formatted barcode or using the (▲)(▼) buttons on the front of the processor to select the digits and the (◄) (►) to move through the cursor. Once the data has been entered, press the START/OK (I) button to confirm the content and advance to the next traceability input screen (if using a barcode to enter the traceability data, the MSA will automatically advance to the next traceability input screen).

```
TRACEABILITY FITTING
--------------
------          ⬌
             Esc OK
```

```
TRACEABILITY PIPE 1
--------------
------          ⬌
             Esc OK
```

```
TRACEABILITY PIPE 2
--------------
------          ⬌

             Esc OK
```
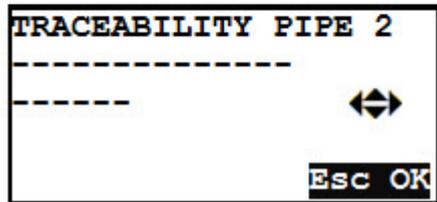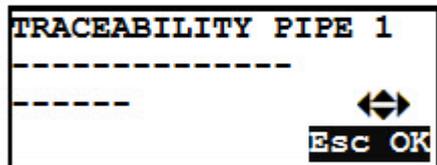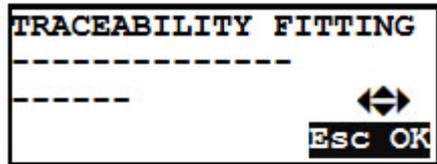
When all the traceability input data has been completed, the MSA displays a summary of the fusion parameters.

2.9 GPS

The MSA 340 is equipped with a GPS (Global Positioning System) receiver, and allows for visualization and storage of

the geographical coordinates (latitude, longitude) of the fusion location.

The acquisition of the coordinates is done just before starting the fusion process. At that time, the processor must be near the exact position where the fusion is to be performed.

In order for the processor to acquire the GPS coordinates, the unit must be static (no motion) and preferably in open air. To allow the unit to identify the position with accuracy, a warm up time must be ensured: the unit should be powered on for at least 5 minutes to allow it to acquire the satellite(s) signal.

After the required warm up period, if GPS signal has been acquired, an icon will

appear in the upper right hand corner of the display. When the icon is present, the GPS coordinates for each individual fusion are stored in the fusion memory. If the icon is not present, GPS signal has not yet been acquired or has been lost.

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Once the GPS signal Icon is present, you can view the actual coordinates by pushing the (▲) button. The display will show the latitude, longitude, altitude of the current location.

Press the STOP/ESC (O) to go back to the "Connect Fitting" screen.

```
GPS COORDINATES
Lat.: 45°24.465N
Long: 11°49.015E
Alt.:  1012 ft
```
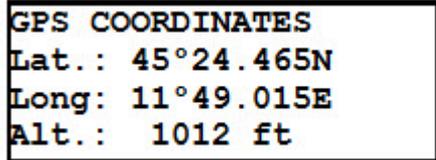
The GPS MANAGEMENT configuration settings are set for optimal, everyday use from the GFCP factory, but can be adjusted to take into account location surroundings/obstacles to help increase GPS signal acquisition rates if needed.

```
GPS MANAGEMENT

HDOP             ◆
                   OK/ESC
```
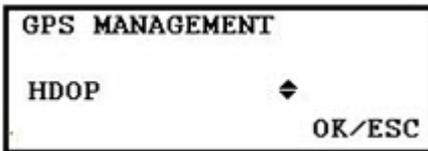
Values
HDOP
DGPS MODE
SATELLITES VIEW
COMPUTATION

All options are all available under the GPS MANAGEMENT menu to users with the "Service Mode" password.

The settings the user can alter are related to:

• HDOP (Horizontal Dilution of Precision)
• DPGS (Differential GPS) mode
• Satellites in view
• Computation

All these menus influence the reactivity and quality of the GPS coordinates. They are selected by using the(▲) and (▼) buttons, and confirming with START/OK (I) button.

2.9.1 HDOP

HDOP (Horizontal Dilution of Precision) selects the best positional precision based on wider angular separation between the satellites used to calculate a GPS unit's position. This parameter is influenced by obstructions such as nearby mountains or buildings. The possible values the user can select are:

```
HDOP

  < 2          ◆
                  OK/ESC
```

Values
‹ 1
‹ 2
›2
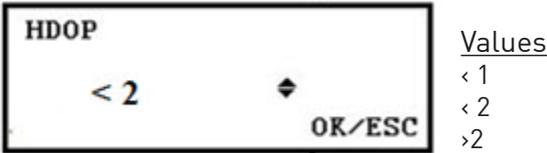
- ‹1 This is the best confidence level to be used for applications demanding the highest possible precision at all times.
- Between 1 and 2 This is a good compromise between precision and number of samples accepted (15m)
- › 2 Positional measurements could be used to make reliable in route navigation suggestions (50-100m).

Depending on the selected value, the MSA will accept the coordinates only if they are marked accordingly by the receiver. Example if ‹1 is selected, the MSA will discard all the data provided by the GPS receiver which are marked as HDOP›1. Vice versa, if › 2 is selected, the MSA will consider all the data coming in.

2.9.2 DGPS

Differential Global Positioning System (DGPS) is an enhancement to GPS that provides improved location accuracy using ground based stations that transmit a correction signal.

```
DGPS MODE

  ENABLED        ◆
                  OK/ESC
```

Values
ENABLED
DISABLED

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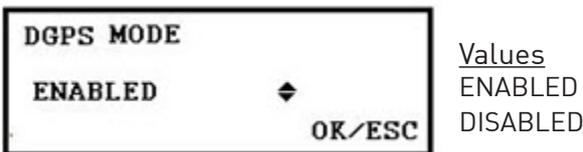
The user can choose to receive only signals which are tagged as DGPS (when 'ENABLED' is selected) to get more accurate GPS coordinates, but at this time this is only an advantage in areas that have the ground based stations in place. When the DGPS Mode is 'Enabled', the processor stops receiving signals from the orbital satellites to prevent interference with the ground based signals. For this reason, the processor leaves the factory with this mode 'Disabled' and the end user will have to determine the best setting for their particular circumstances.

2.9.3 Satellites in View

In principle, the more satellite signals received by the GPS receiver, the more accurate the GPS coordinates will be. The minimum Satellites number acceptable by the user can be defined in this menu:
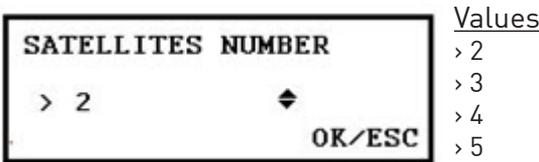
Values
› 2
› 3
› 4
› 5

Keep in mind, that if this value is set to "›5", the GPS signal lock icon will not appear until the GPS receiver receives signal from 5 satellites. If the user is in an urban setting, with many tall obstructions or in a deep valley, getting 5 signals may be difficult.

2.9.4 Computation

The calculation used to determine the GPS coordinates is based on a statistical process: the accuracy of the coordinates is improved by using a larger period of observation, converging on a mean value.

The MSA provides different options to reach "the best coordinates", performing algorithmic calculations based on the GPS raw data received.

There are 2 options available to the user:

```
COMPUTATION

AVERAGE          ◆

                 OK/ESC
```

Values
IMMEDIATE
AVERAGE
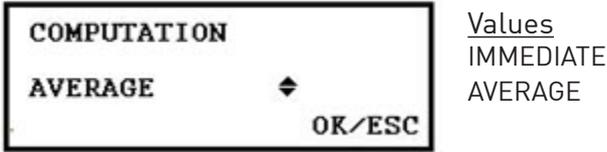
Immediate: What you get on the display is what the GPS sees at that time. In this case the data samples obtained are not manipulated, meaning that possible errors are not filtered out. These coordinates may not be as accurate as those calculated using the "Average" setting.

Average: The MSA gathers a much larger sample base of signals which are averaged to smooth the deviations and provide more accurate coordinates.

The default configuration of the MSA340 is to work in optimal to average conditions : clear sky and small or no obstructions.

Under these conditions, the GPS coordinates shown are the current average, no matter HDOP, DPGS or number of satellites monitored.

If the conditions are different (cloudy weather, high buildings or other obstructions in the proximity) and the GPS is not receiving data, it would be better to switch to the 'Immediate' setting.

2.10 FUSION PROCESS

2.10.1 Fusion Phase

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

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NOTE: The MSA processor adjusts the fusion time according to the external temperature with temperature compensated fittings. Therefore, the final fusion time values might be slightly different from the nominal values captured from the barcode.

```
FUSION IN PROGRESS
VOLTAGE = 40V
time=50s    I=  4.0A
01.01.17    15:22
```

During the first 10-15 seconds of the fusion, the machine checks the quality of the input voltage. If the input voltage is not adequate, the fusion is interrupted and the following error message occurs.

NOTE: Check the voltage stability and the power capacity of the generator before starting the fusion.

```
FUSION STOPPED
Check power supply
time= 10s        89 V
                 60Hz
```

The operator can stop the fusion process at any time by pushing STOP/ESC (0). Once the STOP/ESC button has been pushed, the fusion process immediately stops and an error message occurs (see 'Error Messages' Section 5).

⚠️ **Stopping a fusion in progress will result in an incomplete and potentially unreliable fusion: Ensuring a proper fusion is the operator's responsibility.**

When the fusion cycle nears completion, an acoustic signal alerts the user that the process is almost finished.

As soon as the fusion cycle is complete, the display will briefly show the information concerning the fusion time and the average current applied to

```
FUSION DONE N° 15
 CP I     1"CTS
time= 40s    I= 7.1A
01.01.17    15:25  ESC
```

the fusion. This data will be part of the fusion protocol stored into the processor's memory.

2.10.2 Cooling Time

After the completion of the fusion process, the protocol summary and the remaining cooling time, if contained in the barcode, are displayed alternately. These messages are

```
COOLING INTERVAL

time=15minutes
01.01.17    15:25
```

active until the user presses the STOP/ESC (O) button to proceed with the next fusion, or shuts the processor off.

NOTE: No cooling time will be displayed if the fusion is performed in "Manual" mode.

Warning: At the end of the fusion cycle, the user has to wait until the cooling time is complete before removing the external clamp!

Danger of Burning! The fusion area is hot! Pay attention when disconnecting the fusion cables.

When the cooling time is complete, an acoustic signal will sound alerting the operator. If the operator does not push the STOP/ESC (O) button, or power the unit off at this point,

```
COOLING INTERVAL
ENDED

01.01.17    15:40  Esc
```

the alert will continue to sound and the following message is displayed.

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3. CONFIGURATION SETTINGS

To enter into the configuration menu, press the MENU button and select "MACHINE SETUP" using the (▲)(▼) buttons and push START/OK (I).

The (▲)(▼)buttons allow the user to navigate all the machine settings, to scroll to a specific menu, and to make changes to the corresponding setting . Any changes made must be validated by pressing START/OK (I).

The number of configurable items depends on the user permission. If the user has the "Service Mode" password, all the parameters shown below can be modified. If the user is a "standard" user, access will be limited to the "LANGUAGE" and "SERVICE MODE" settings only.

(*) Visible only with "SERVICE MODE" password.

3.1 LANGUAGE

The LANGUAGE menu, allows the user to choose the language of the messages displayed by the processor as well as the language used in the fusion memory reports.

LANGUAGE	
EN	▲▼
	Esc OK

LANGUAGE	
DATE/TIME	(*)
FUSION PREPARATION	(*)
SERVICE MODE	
TRACEABILITY MODE	(*)
OPERATOR/JOB NUMBER	(*)
MEMORY MANAGEMENT	(*)
TEMPERATURE UNIT	(*)
CP MODE	(*)
MANUAL MODE	(*)
SHORT CIRCUIT CU.	(*)
RESIST. TOLERANCE	(*)
GPS MANAGEMENT	(*)
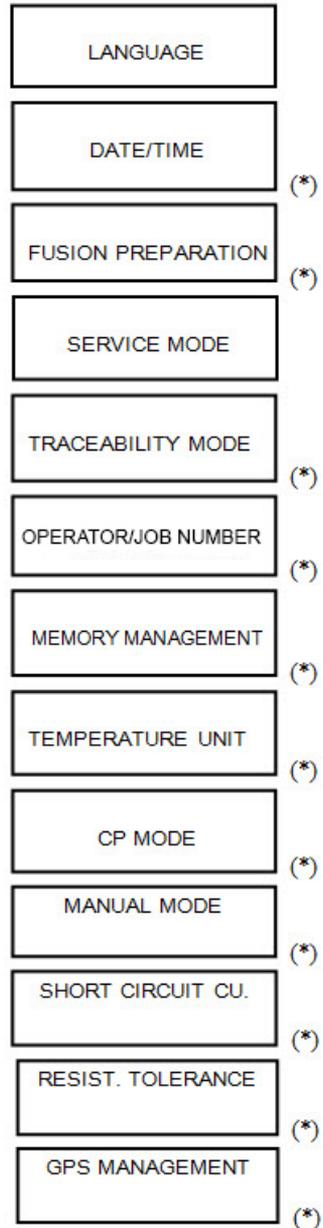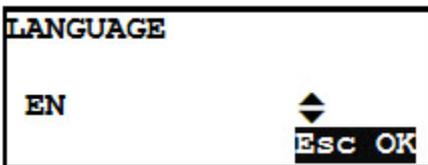
Select the desired language by using the (▲)(▼) buttons and pushing START/OK (I) to confirm the setting. To cancel the operation press STOP/ESC (O).

3.2 DATE/TIME SETTING

The DATE/TIME menu allows the user to set the calendar; date and time are shown in the format:

```
DATE/TIME

MM.DD.YY HH:MM ⬍
              Esc OK
```
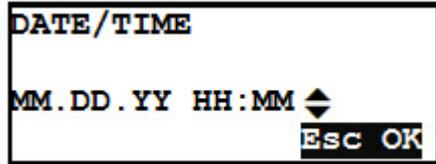
Month/ Day/ Year   Hour : Minutes

Select the desired value by using(▲)(▼); move the cursor position by using (◄)(►). When the desired information has been entered, press START/OK (I) to confirm the setting. To cancel the operation press STOP/ESC (O).

3.3 FUSION PREPARATION

The FUSION PREPARATION menu enables/disables the assistance message (asking for "peel, clean, align") during the fusion process.

```
FUSION PREPARATION

Enabled        ⬍
              Esc OK
```
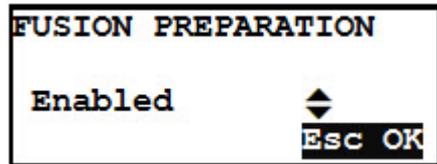
Select to enable or disable the assistance mode by using the (▲) (▼) keys and pushing START/OK (I) to confirm the setting. To cancel the operation press STOP/ESC (O).

3.4 SERVICE MODE

This is a password protected menu. Entering the required password to enter this menu will allow the user access to all of the menus.

NOTE: This is also the setting that will allow the user to set the Rental Guardian expiration date if desired.

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3.5 TRACEABILITY

The TRACEABILITY menu defines the way the traceability data is considered during the fusion process:

TRACEABILITY MODE

Required ▲▼
Esc OK
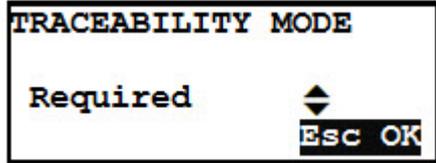
- Disabled: During the fusion initiation process, the machine will not ask for data to be entered (the related menu will not appear in the process sequence).
- Optional: User can enter data or simply press the START/OK (I) button to bypass and proceed
- Required: User must enter traceability data to proceed (this format exclusively uses the European ISO barcode format only)
- NO ISO: is a "free text" format that allows the customer to enter any data they choose using the arrow keys on the membrane or scanning a barcode (using Code 128 format)
- ASTM: Using the 16 digit linear ASTM traceability barcode, the MSA can read, decode, and document the embedded information in the fusion memory log.

Select the traceability mode using the (▲)(▼) keys and press START/OK (I) to confirm the setting. To cancel the operation press STOP/ESC (O).

3.6 OPERATOR /JOB NUMBER

The OPERATOR/JOB NUMBER menu enables the insertion of the operator's identity and the job number.

3.6.1 OPERATOR:

- ISO: An Operator Identity must be entered to proceed. Data is entered by scanning an ISO 12176-3 compliant barcode or manually entering the 20-digit operator ID code using the keypad.

OPERATOR/JOB NUMBER

▲▼
Esc OK

- OPT: Data may be entered or skipped, depending on availability of the information and user preference using the keypad or by scanning a barcode (Interleaved 2/5 format).
- NO: During the fusion process sequence, the machine will not ask for operator identity (the related menu will not appear in the process sequence).
- FREE: Operator ID can be any number alpha/numeric characters from 1 to 20 characters. ID can be input manually using the keypad or by scanning a barcode (Code 128 format). This setting does not require an Operator ID to be entered and can be bypassed if the user desires.

3.6.2 JOB NUMBER:

- YES: Insertion of a Job Number (code, worksite, etc...) is required for the process sequence to proceed. Data can be entered manually using the keypad or by scanning a barcode (Code 128 format).
- OPT: Optional, a job number can be entered or this section can be bypassed if the user desires.
- NO: During the fusion pocess sequence, the machine will not ask for a job number to be entered.

Select the mode by using the (▲)(▼) buttons and press START/OK (I) to confirm the setting. To cancel the operation press STOP/ESC (O).

3.7 MEMORY MANAGEMENT

The fusion protocols are stored in the processors internal memory. The MEMORY MANAGEMENT menu allows the user to select how to proceed when the memory is full:

```
MEMORY MANAGEMENT

OVERWRITE        ↕
              Esc OK
```

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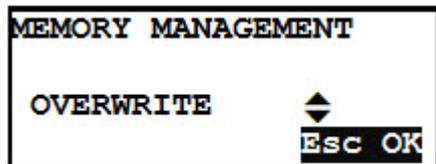
- REMINDER: When there is room for less than 50 fusions to be stored in the internal memory, a message will be displayed at the beginning of each fusion cycle to alert the user that if the stored memory is important, it needs to be exported. If the user ignores these messages and does not export the data, the processor will assume that the data is not relevant and erase all the stored data once the memory is full.
- OVERWRITE: When the memory is full, the oldest fusions will be removed to store the most recent ones.

Select the mode by using the (▲)(▼) buttons and press START/OK (I) to confirm the setting. To cancel the operation press STOP/ESC (O).

3.8 TEMPERATURE UNIT

The user can select the unit the temperature is reported.

- ° C: Internal and outside temperatures are presented in Celsius degrees.
- ° F: Internal and outside temperatures are presented in Fahrenheit degrees.
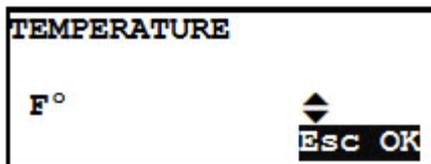
Select the mode by using the (▲)(▼) buttons and press START/OK (I) to confirm the setting. To cancel the operation press STOP/ESC (O).

3.9 CENTRAL PLASTICS (CP) MODE

The user can choose to Enable or Disable the ability of the MSA processor to sense if a fitting has an implanted resistor pin. If this mode is disabled, the processor can only work in
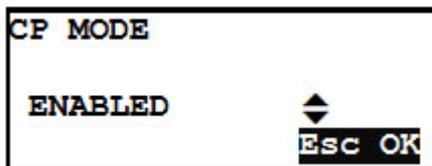
"Bar-code" or "Manual" modes.

Select to enable or disable this mode by using the (▲)(▼) buttons and pushing START/OK (I) to confirm the setting. To cancel the operation press STOP/ESC (O).

3.10 MANUAL MODE OPERATION

The user can choose to Enable or Disable the ability of the MSA processor to operate in "Manual" mode. If this mode is disabled the processor can only work in "CP" and "barcode" modes.
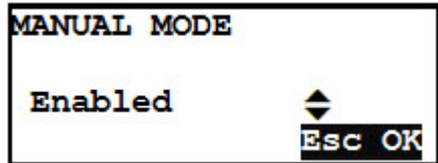
```
MANUAL MODE

Enabled          ▲
                 ▼
            Esc OK
```

Select to enable or disable the assistance mode by using the (▲) (▼) buttons and pushing START/OK (I) to confirm the setting. To cancel the operation press STOP/ESC (O).

3.11 SHORT CIRCUIT (Sudden Current Rise)

This is a safety feature built into the fusion process. The MSA processor constantly regulates the amperage draw of the fitting during the fusion cycle. If the amperage draw increases above

```
SHORT CIRCUIT CU.

20%              ▲
                 ▼
            Esc OK
```

the pre-set current rise limit, the processor shuts the fusion down and alerts the operator to possible causes by audible alarm and visual display.
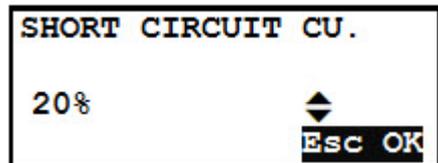
This feature is designed to reduce the possibility of the fusion coil shorting out and overheating to the point that a wire will burn in two. This type of fault is normally due to operator error resulting from improper assembly of the pipe to fitting.

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This setting can be adjusted from 5% to 20%, but should remain at the pre-set factory setting of 20%. If the user feels this setting needs to be adjusted, they should discuss this with an authorized GF Central Plastics representative first.

Select the desired short circuit value by using the (▲)(▼) buttons and pushing START/OK (I) to confirm the setting. To cancel the operation press STOP/ESC (O).

3.12 RESIST. TOLERANCE

This is the amount of allowable tolerance allowed for the coil resistance readings and should be left at the factory setting unless discussed with a Georg Fischer Central Plastics representative.

```
RESIST.  TOLERANCE

15%            ▲▼
              Esc OK
```
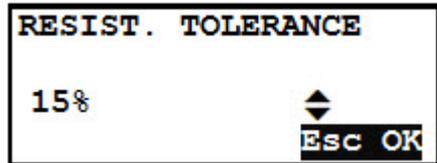
3.13 GPS MANAGEMENT

The options available in this menu allow the user to alter the GPS configuration settings to improve accuracy and account for location/ surroundings circumstances.

```
GPS MANAGEMENT

HDOP           ▲▼
              Esc OK
```
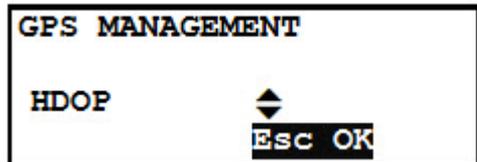
4. DATA MANAGEMENT

The MSA processor stores the fusion protocols for each fusion cycle in the internal memory. This stored data is kept until the operator deletes them or the memory is full.

To conform to ISO12176 standards, the MSA processor will store (and provide for a later analysis) the following data:

- The Processor's Serial Number
- Job Number
- Operator Identity
- Date/Time of Fusion Cycle
- Calibration Expired (Yes or No)
- Calibration Due Date
- Fusion Cycle Number
- Error Number
- Fitting Manufacturer
- Ambient Temperature
- Primary Voltage Min/Max
- Data Input
- Fusion Voltage Applied
- Fusion Time
- Fusion Current
- Cooling Time
- GPS Coordinates
- ASTM Data
- All Traceability Data

To enter the data management menu, press MENU, select DATA RETRIEVAL by using (▲)(▼) and press START/OK (I) to see the possible options. The (▲)(▼) buttons allow the user to scroll through the different options; press START/OK (I) to select the desired option.

(*) Visible only with "Service Mode" password.

- View the fusion data on the display.
- Export the fusion data to a USB memory stick.
- Erase the stored memory.

VIEW FUSIONS

EXPORT FUSIONS

DELETE FUSIONS

(*)

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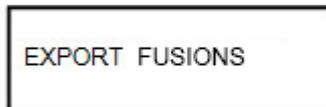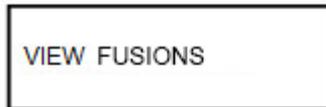
The options available depend on user permission: a user in possession of the service password can access all the menus, while a standard user can only browse the existing protocols (**cannot delete the fusions without the service mode password**).

4.1 VIEW FUSIONS

VIEW FUSIONS shows the basic information of the stored fusion data on the display. The most recent fusion cycle appears first.

```
VIEW FUSIONS     N 97
CP MODE          1"
Time= 40S       4.1A
01.01.17   16:19 E=22
```
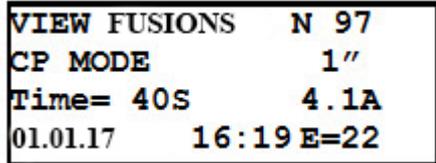
The (▲)(▼) buttons allow the user to scroll up and down through the list of fusion cycles. By pressing STOP/ESC (O), the user can go back to the DATA RETRIEVAL menu.

4.2 EXPORT FUSIONS

Using an external USB memory stick the operator can export all the stored fusions in the processors internal memory.

```
EXPORT FUSIONS

PDF FORMAT        ⬍
                Esc OK
```
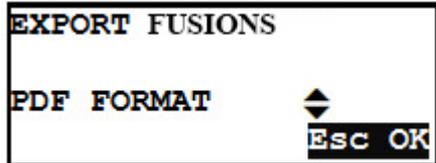
Insert the USB memory stick into the USB connector on the front panel of the machine, and then select EXPORT FUSIONS. Use the (▲)(▼) buttons to choose the format of the file to export.

PDF and CSV format are available. The PDF files can be opened with Acrobat® Reader, while the CSV file can be imported in Microsoft® Excel (or any other electronic spreadsheet) for further analysis.

Press START/OK (I) to start the data transfer.

Attention: A message asking to overwrite the file will appear if the memory stick already contains a file with the same name and extension. By Pressing START/OK (I), the old data will be overwritten and the newest data stored.

Wait until the message "EXPORT IN PROGRESS" disappears, then you can extract the USB memory stick from the processor, and connect the memory stick to a PC for data upload.

If you want to transfer both PDF and CSV files, you can repeat the transfer operation after the first data transfer, being careful not to erase the stored data!

4.3 DELETE FUSIONS (Service Password Required)

By selecting DELETE FUSIONS, all stored data will be deleted.

```
DELETE FUSIONS

Do you want to Remove
all records?
```

Attention: Before going forward with this operation, ensure that all data inside the internal memory has been saved to an external USB stick. Once the data has been deleted, you cannot recover them!

Press START/OK (I) to erase all fusion memory data. To cancel the operation press STOP/ESC (O).

5. ERROR MESSAGES

In case of anomalies or errors, the MSA processor will display a specific message to help identify the possible issue. The corresponding error code number will be recorded in the processor's internal memory.

```
ERROR N: 22
FUSION STOPPED BY
THE USER
```

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

The following table summarizes all the messages managed by the processor, with a brief explanation of the possible causes.

E	DISPLAY INDICATION	COMMENT
1	AMBIENT TEMP TOO LOW	Temp sensor detected a value below set limit.
2	AMBIENT TEMP TOO HIGH	Temp sensor detected a value above set limit.
4	CURRENT RISE	Short stab/alignment
5	SECONDARY OPEN ERROR	Output cables detached during welding.
6	REGULATION VOLTAGE ERROR	Not enough power from mains, internal circuit not calibrated or faulty.
9	UNIT RANGE EXCEEDED	Fitting not supported.
11	INTERNAL TEMP TOO LOW	Processor cannot fuse since it is too cold.
12	INTERNAL TEMP TOO HIGH	Processor too hot. Allow to cool down.
13	POWER SUPPLY INTERRUPTION	Previous cycle lost power.
15	INPUT VOLTAGE TOO LOW	Generator voltage/frequency below the threshold.
16	INPUT VOLTAGE TOO HIGH	Generator voltage/frequency above the threshold.
18	FITTING RESISTANCE TOO LOW	Fitting faulty or different from one specified in the barcode.
19	FITTING RESISTANCE TOO HIGH	Fitting faulty or different from one specified in the barcode.
20	INTERNAL TEMP TOO HIGH DIAM ›=6" IPS	EF needs to cool down since it cannot ensure the fusion process can be completed successfully for large diameters.
22	RESET	Fusion stopped by the user.
32	SYSTEM ERROR	Electronic faults/service required
	ALERT! THE UNIT REVISION HAS EXPIRED	Calibration suggested
	ALERT! RENTAL TIME HAS EXPIRED	Rental time expired
	MEMORY EMPTY	No data protocols stored in the unit.

6. FITTING CODING

In the table below are the symbols used to identify the fitting type.
This is useful for manual data entry.

Symbol	Description
C	Elbow 45° - 90°
T	Tee 90°
[	Single socket
I	Coupler
‡	Tapping Tee
Y	Reducer
‹	Electro-thermo-retractable sleeve

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7. TECHNICAL CHARACTERISTICS

Input Voltage and Frequency	115 V (+/-20%) 50 – 70 Hz 230 V (+/-20%) 50 – 70 Hz
Suggested Generator Power Requirements	6kVA All fittings including 26" IPS / 660 mm couplings 3.5KVA Couplings up to 8"/ 225 mm, all reducers, and all saddles (service tapping tees, high volume tapping tees, & branch)
Input Waveform	AC (sine, square, or quasi-sine)
Fusion Technique	8 – 48 V~
Operating Temperature	-10 °F to 120°F
Internal Temperature	-10°F to 190°F
Power Cable Length	12 ft
Fusion Cable Length	25 ft
Fusion Data Input Mode	Barcode, manual, CP mode
Capacity of Internal Memory	1000 fusions (MSA340 model)
USB Port	Type A
Barcode Reader Port	Dedicated inputs, DIN 5 connector
Protection Factor	IP 54
Dimensions	13.5"x12.5"x16.8"
Weight	52 lbs
Revision/Calibration Interval	2 Years
Warranty	1 Year
4.7mm to 3.0mm Connector Tip Adapters	Part # 10001004 (optional - no charge)
4.7mm to 4.0mm Connector Tip Adapters	Part # 10001005 (optional)
4.7mm Standard Connector Tip	Part # 10001727 (equipped)
4.7mm Connector Tip with Pogo-Pin	Part # 10001728 (equipped)

7.1 STANDARDS

- ISO 12176-2
- ISO 12176-3
- ISO 12176-4
- EN 60335-1 (Safety)
- EN 61000-6-2 (EMC)
- EN 61000-6-4 and others (EMC)
- CSA Certified

8. ENVIRONMENT CONDITIONS

8.1 WEATHER CONDITIONS

Cold weather affects both fittings and equipment. Electrofusion fittings require the most energy at the beginning of the fusion cycle. This energy requirement is increased in cold weather situations. Make sure that your generator is in good mechanical condition and that it meets the minimum wattage output.

8.2 POWER SOURCES

For the installation of electrofusion fittings in field applications, it will be necessary to have a reliable source of AC power.

The selected AC power source should conform to the following:
- be well maintained and subjected to a periodic maintenance schedule
- provide output voltage within the specified operating range of the machine
- have a minimum wattage capacity per the fitting power table.

A matching outlet is needed to mate with the plug equipped on the MSA electrofusion processor:

115V models —PLUG 30A/125V TWISTLOCK NEMA L5-30
230V models — PLUG 250V/30AMP TWISTLOCK NEMA L14-30

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8.2.1 Utility Power

Utility power is a reliable and ideal source of energy for the MSA electrofusion processor, however, it is not practical to access such a source in most field applications. When fusing with utility power, a dedicated connection to the service panel is recommended, since the potential amperage draw is very high.

8.2.2 Generators

Fuel powered generators are typically a good source of electrical power for the MSA electrofusion processor. Minimum fitting power requirements must be noted, and additional power capacity is recommended for intangibles (powering other accessories, wear & tear, etc.).

Prior to beginning a fusion, it is important to insure the following:
- Make sure the generator has enough fuel to complete the entire fusion cycle.
- Turn off the "auto" or "economy" idle control.
- Recommend a generator with a minimum 30 Amp breaker for couplings 10" and larger.

8.2.3 Inverters

Inverters are an acceptable AC power source for the MSA electrofusion processor, though some produce output waveforms that are troublesome with specific fittings. Georg Fischer/Central Plastics recommends performing compatibility tests using the lightest and heaviest anticipated loads before approving an inverter system. Feel free to contact GF/Central Plastics to discuss issues regarding the use of inverters.

8.3 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 12 IPS & larger 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 2" in diameter, however, its use is tolerable with saddles and smaller couplers, elbows, end-caps, & reducers (2" IPS / 63 mm coupler maximum).

9. MAINTENANCE
When cleaning the processor, the unit must be disconnected from the power supply!

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

Attention: Maintenance and repair operations (opening of the unit, replacing damaged/defective components, etc.) must only be performed by Georg Fischer Central Plastics personnel or by an authorized service center!

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

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9.2 FUSION CABLES

Regular inspection of the fusion cables is necessary. Damaged cables must be repaired or replaced.

9.3 FUNCTION CHECK-UP

Regular updates and maintenance are required for the MSA processor (recommended maintenance is every 2 years).

9.4 PROCESSOR REPAIR

If repairs are necessary, please contact your local representative.

Please indicate the following information:
• Customer Name
• Product Description
• Machine Type (code)
• Power Supply Type/Size
• Error Codes/Problem Description

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

9.5 OPENING THE UNIT

The unit may only be opened by an authorized service centre. If not, the warranty will be void.

When the unit has been opened or the housing removed, parts of the processor are exposed and should be considered "live" and a potential shock hazard !

9.6 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.

9.7 OTHER DISPOSAL

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

Note: This symbol indicates the requirement of separate collection of electrical and electronic equipment according to WEEE directive (Waste Electrical and Electronic Equipment) standards.

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For more information, please contact:

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