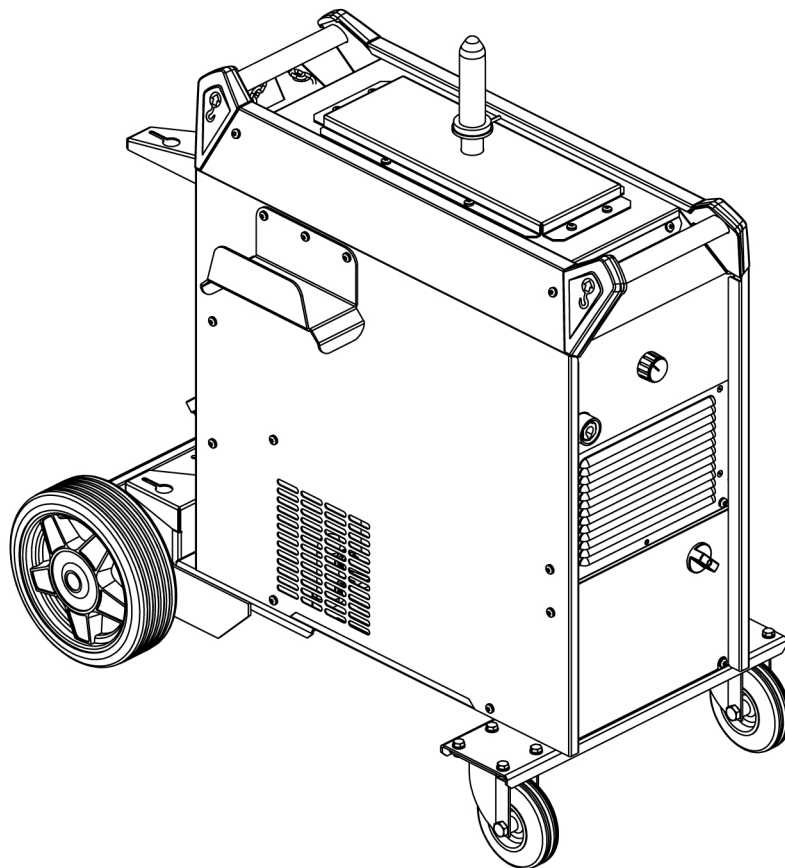




# ***Fabricator EM 401i, Fabricator EM 501i***



## **Instruction manual**



## EU DECLARATION OF CONFORMITY

According to:

The Low Voltage Directive 2014/35/EU;      The EMC Directive 2014/30/EU;  
The RoHS Directive 2011/65/EU;              The Ecodesign Directive 2009/125/EC

Type of equipment

Arc welding power source

Type designation

Fabricator EM 401i	from serial number	OP110YY XXXXXX.
Fabricator EM 401i with cooling unit	from serial number	OP110YY XXXXXX.
Fabricator EM 501i with cooling unit	from serial number	OP110YY XXXXXX.

X and Y represents digits, 0 to 9 in the serial number, where YY indicates year of production.

Brand name or trademark

ESAB

Manufacturer or his authorised representative established within the EEA

ESAB AB

Lindholmsallén 9, Box 8004, SE-402 77 Göteborg, Sweden

Phone: +46 31 50 90 00, [www.esab.com](http://www.esab.com)

The following EN standards and regulations in force within the EEA has been used in the design:

EN IEC 60974-1:2018/A1:2019	Arc welding equipment - Part 1: Welding power sources
EN 60974-10:2014/A1:2015,	Arc welding equipment - Part 10: Electromagnetic compatibility (EMC) requirements
EU no. 2019/1784	Ecodesign requirements for welding equipment pursuant to Directive 2009/125/EC

Additional Information:

Restrictive use, Class A equipment, intended for use in locations other than residential.  
IEC EN draft standard 26/708/CDV have been used to establish EU no. 2019/1784 data.

By signing this document, the undersigned declares as manufacturer, or the manufacturer's authorised representative established within the EEA, that the equipment in question complies with the safety and environmental requirements stated above.

Place/Date

Signature

Göteborg  
2021-04-20

Pedro Muniz  
Standard Equipment Director

**CE** marked in 2021

TABLE OF CONTENTS

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<b>1</b>	<b>SAFETY</b> .....	<b>4</b>
1.1	Meaning of symbols .....	4
1.2	Safety precautions .....	4
<b>2</b>	<b>INTRODUCTION</b> .....	<b>7</b>
2.1	Equipment .....	7
<b>3</b>	<b>TECHNICAL DATA</b> .....	<b>8</b>
<b>4</b>	<b>INSTALLATION</b> .....	<b>11</b>
4.1	Location .....	11
4.2	Feeder mounting bracket instructions .....	11
4.3	Lifting instructions .....	12
4.4	Mains supply .....	13
<b>5</b>	<b>OPERATION</b> .....	<b>15</b>
5.1	Connections and control devices .....	15
5.2	Welding control mode .....	18
5.3	Connection of welding and return cable .....	20
5.4	Symbols and functions .....	21
5.5	Thermal protection .....	21
5.6	Fan control .....	21
5.7	Usage of the cooling unit .....	22
5.8	Coolant connection .....	22
5.9	Coolant pressure controller .....	22
<b>6</b>	<b>MAINTENANCE</b> .....	<b>23</b>
6.1	Maintenance .....	23
6.2	Routine maintenance .....	23
6.3	Power source .....	23
6.4	Cooling unit .....	25
6.5	Filling the coolant .....	25
<b>7</b>	<b>TROUBLESHOOTING</b> .....	<b>27</b>
<b>8</b>	<b>ORDERING SPARE PARTS</b> .....	<b>30</b>
	<b>ORDERING NUMBERS</b> .....	<b>31</b>
	<b>BLOCK DIAGRAM</b> .....	<b>32</b>
	<b>ACCESSORIES</b> .....	<b>33</b>

# 1 SAFETY

## 1.1 Meaning of symbols

As used throughout this manual: Means Attention! Be Alert!



### DANGER!

Means immediate hazards which, if not avoided, will result in immediate, serious personal injury or loss of life.



### WARNING!

Means potential hazards which could result in personal injury or loss of life.



### CAUTION!

Means hazards which could result in minor personal injury.



### WARNING!

Before use, read and understand the instruction manual and follow all labels, employer's safety practices and Safety Data Sheets (SDSs).



## 1.2 Safety precautions

Users of ESAB equipment have the ultimate responsibility for ensuring that anyone who works on or near the equipment observes all the relevant safety precautions. Safety precautions must meet the requirements that apply to this type of equipment. The following recommendations should be observed in addition to the standard regulations that apply to the workplace.

All work must be carried out by trained personnel well-acquainted with the operation of the equipment. Incorrect operation of the equipment may lead to hazardous situations which can result in injury to the operator and damage to the equipment.

- 1 Anyone who uses the equipment must be familiar with:
  - its operation
  - location of emergency stops
  - its function
  - relevant safety precautions
  - welding and cutting or other applicable operation of the equipment
- 2 The operator must ensure that:
  - no unauthorised person is stationed within the working area of the equipment when it is started up
  - no-one is unprotected when the arc is struck or work is started with the equipment
- 3 The workplace must:
  - be suitable for the purpose
  - be free from drafts
- 4 Personal safety equipment:
  - Always wear recommended personal safety equipment, such as safety glasses, flame-proof clothing, safety gloves
  - Do not wear loose-fitting items, such as scarves, bracelets, rings, etc., which could become trapped or cause burns
- 5 General precautions:
  - Make sure the return cable is connected securely
  - Work on high voltage equipment **may only be carried out by a qualified electrician**

- Appropriate fire extinguishing equipment must be clearly marked and close at hand
- Lubrication and maintenance must **not** be carried out on the equipment during operation

**If equipped with ESAB cooler**

Use ESAB approved coolant only. Non-approved coolant might damage the equipment and jeopardize product safety. In case of such damage, all warranty undertakings from ESAB cease to apply.

For ordering information, see the "ACCESSORIES" chapter in the instruction manual.



**WARNING!**

Arc welding and cutting can be injurious to yourself and others. Take precautions when welding and cutting.



**ELECTRIC SHOCK - Can kill**

- Do not touch live electrical parts or electrodes with bare skin, wet gloves or wet clothing
- Insulate yourself from work and ground.
- Ensure your working position is safe



**ELECTRIC AND MAGNETIC FIELDS - Can be dangerous to health**

- Welders having pacemakers should consult their physician before welding. EMF may interfere with some pacemakers.
- Exposure to EMF may have other health effects which are unknown.
- Welders should use the following procedures to minimize exposure to EMF:
  - Route the electrode and work cables together on the same side of your body. Secure them with tape when possible. Do not place your body between the torch and work cables. Never coil the torch or work cable around your body. Keep welding power source and cables as far away from your body as possible.
  - Connect the work cable to the workpiece as close as possible to the area being welded.



**FUMES AND GASES - Can be dangerous to health**

- Keep your head out of the fumes
- Use ventilation, extraction at the arc, or both, to take fumes and gases away from your breathing zone and the general area



**ARC RAYS - Can injure eyes and burn skin**

- Protect your eyes and body. Use the correct welding screen and filter lens and wear protective clothing
- Protect bystanders with suitable screens or curtains



**NOISE - Excessive noise can damage hearing**

Protect your ears. Use earmuffs or other hearing protection.

**MOVING PARTS - Can cause injuries**



- Keep all doors, panels and covers closed and securely in place. Have only qualified people remove covers for maintenance and troubleshooting as necessary. Reinstall panels or covers and close doors when service is finished and before starting engine.



- Stop engine before installing or connecting unit.
- Keep hands, hair, loose clothing and tools away from moving parts.

**FIRE HAZARD**



- Sparks (spatter) can cause fire. Make sure therefore that there are no inflammable materials nearby
- Do not use on closed containers.

**HOT SURFACE - Parts can burn**



- Do not touch parts bare handed.
- Allow cooling period before working on equipment.
- To handle hot parts, use proper tools and/or insulated welding gloves to prevent burns.

**MALFUNCTION - Call for expert assistance in the event of malfunction.**

**PROTECT YOURSELF AND OTHERS!**



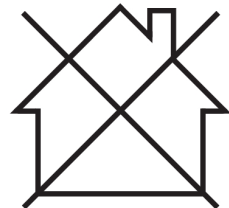
**CAUTION!**

This product is solely intended for arc welding.



**CAUTION!**

Class A equipment is not intended for use in residential locations where the electrical power is provided by the public low-voltage supply system. There may be potential difficulties in ensuring electromagnetic compatibility of class A equipment in those locations, due to conducted as well as radiated disturbances.



**NOTE!**

**Dispose of electronic equipment at the recycling facility!**

In observance of European Directive 2012/19/EC on Waste Electrical and Electronic Equipment and its implementation in accordance with national law, electrical and/or electronic equipment that has reached the end of its life must be disposed of at a recycling facility.

As the person responsible for the equipment, it is your responsibility to obtain information on approved collection stations.

For further information contact the nearest ESAB dealer.



**ESAB has an assortment of welding accessories and personal protection equipment for purchase. For ordering information contact your local ESAB dealer or visit us on our website.**

## 2 INTRODUCTION

---

The **Fabricator EM 401i** and **Fabricator EM 501i** are welding power sources intended for MIG/MAG welding, welding with powder filled cored wire (FCAW-S) and welding with coated electrodes (MMA). The power sources are intended for use with the following wire feed units:

- Fabricator Feed 304
- Fabricator Feed 304w

**EM 401i** is available with and without built-in cooling unit.

**EM 501i** is available only with built-in cooling unit.

**ESAB accessories for the product can be found in the "ACCESSORIES" chapter of this manual.**

### 2.1 Equipment

The power source is supplied with:

- 5 m (16 ft) return cable with earth clamp
- 5 m (16 ft) mains cable
- Instruction manual
- Quick start guide
- Safety instruction

## 3 TECHNICAL DATA

Fabricator EM 401i / EM 401i with cooling unit			
<b>Mains voltage</b>	380-415 V $\pm$ 10%, 50/60 Hz		
<b>Mains supply <math>S_{scmin}</math></b>	1.9 MVA		
<b>Primary current <math>I_{max}</math></b>	380 V	400 V	415 V
MIG/MAG	28 A	27 A	25 A
MMA	29 A	28 A	26 A
<b>Setting range (DC)</b>			
MIG/MAG	30 A / 15.5 V - 400 A / 34.0 V		
MMA	30 A / 21.2 V - 400 A / 36.0 V		
<b>Permissible load at MIG/MAG</b>			
60% duty cycle	400 A / 34.0 V		
100% duty cycle	310 A / 29.5 V		
<b>Permissible load at MMA</b>			
60% duty cycle	400 A / 36.0 V		
100% duty cycle	310 A / 32.4 V		
<b>Power factor</b> at maximum current	0.91		
<b>Maximum</b> input power at idle mode	<35 W		
<b>Efficiency</b> at maximum current	86%		
<b>Open-circuit voltage</b>	65.0 V		
<b>Recommended wire</b>	0.8 - 1.2 mm		
<b>Operating temperature</b>	-10 to +40°C (14 to 104 °F)		
<b>Transportation temperature</b>	-40 to +70 °C (-40 to 158 °F)		
<b>Dimensions l × w × h</b>	1035 × 500 × 1015 mm (40.7 × 19.6 × 39.9 in.)		
<b>Weight</b>			
Weight without cooling unit	102.0 kg (225 lbs)		
Weight with cooling unit without coolant	107.5 kg (237 lbs)		
Weight with cooling unit with coolant	111.5 kg (246 lbs)		
<b>Insulation class</b>	H		
<b>Enclosure class</b>	IP 23		
<b>Application class</b>	S		

Fabricator EM 501i with cooling unit			
<b>Mains voltage</b>	380-415 V $\pm$ 10%, 50/60 Hz		
<b>Mains supply <math>S_{scmin}</math></b>	6.2 MVA		
<b>Primary current <math>I_{max}</math></b>	380 V	400 V	415 V
MIG/MAG	39 A	37 A	36 A
MMA	41 A	38 A	37 A
<b>Setting range (DC)</b>			



<b>Fabricator EM 501i with cooling unit</b>	
MIG/MAG	30 A / 15.5 V - 500 A / 39.0 V
MMA	30 A / 21.2 V - 500 A / 40.0 V
<b>Permissible load at MIG/MAG</b>	
60% duty cycle	500 A / 39.0 V
100% duty cycle	390 A / 33.5 V
<b>Permissible load at MMA</b>	
60% duty cycle	500 A / 40.0 V
100% duty cycle	390 A / 35.6 V
<b>Power factor</b> at maximum current	0.91
<b>Maximum</b> input power at idle mode	<35W
<b>Efficiency</b> at maximum current	87%
<b>Open-circuit voltage</b>	78.0 V
<b>Recommended wire</b>	1.0 - 1.6 mm
<b>Operating temperature</b>	-10 to +40°C (14 to 104 °F)
<b>Transportation temperature</b>	-40 to +70 °C (-40 to 158 °F)
<b>Dimensions l × w × h</b>	1035 × 500 × 1015 mm (40.7 × 19.6 × 39.9 in.)
<b>Weight</b>	
Weight with cooling unit without coolant	111.5 kg (246 lbs)
Weight with cooling unit with coolant	115.5 kg (255 lbs)
<b>Insulation class</b>	H
<b>Enclosure class</b>	IP 23
<b>Application class</b>	S
<b>Cooling unit (500A - 60% duty cycle)</b>	Only for power sources with cooling units
<b>Cooling power</b>	1 kW at 25°C ambient temperature
<b>Coolant</b>	ESABs ready mixed coolant
<b>Coolant quantity</b>	4.5 l
<b>Maximum water flow</b>	1.8 l/min
<b>Maximum pressure lift for torch Q<sub>max</sub></b>	66.7 PSI (4.6 bar)

**Mains supply, S<sub>sc min</sub>**

Minimum short circuit power on the network in accordance with IEC 61000-3-12.

**Duty cycle**

The duty cycle refers to the time as a percentage of a ten-minute period that you can weld or cut at a certain load without overloading. The duty cycle is valid for 40 °C / 104 °F, or below.

**Enclosure class**

The **IP** code indicates the enclosure class, i.e. the degree of protection against penetration by solid objects or water.

Equipment marked **IP23** is intended for indoor and outdoor use.

**Application class**

The symbol **S** indicates that the power source is designed for use in areas with increased electrical hazard.

## 4 INSTALLATION

The installation must be carried out by a professional.



**CAUTION!**

This product is intended for industrial use. In a domestic environment this product may cause radio interference. It is the user's responsibility to take adequate precautions.

### 4.1 Location

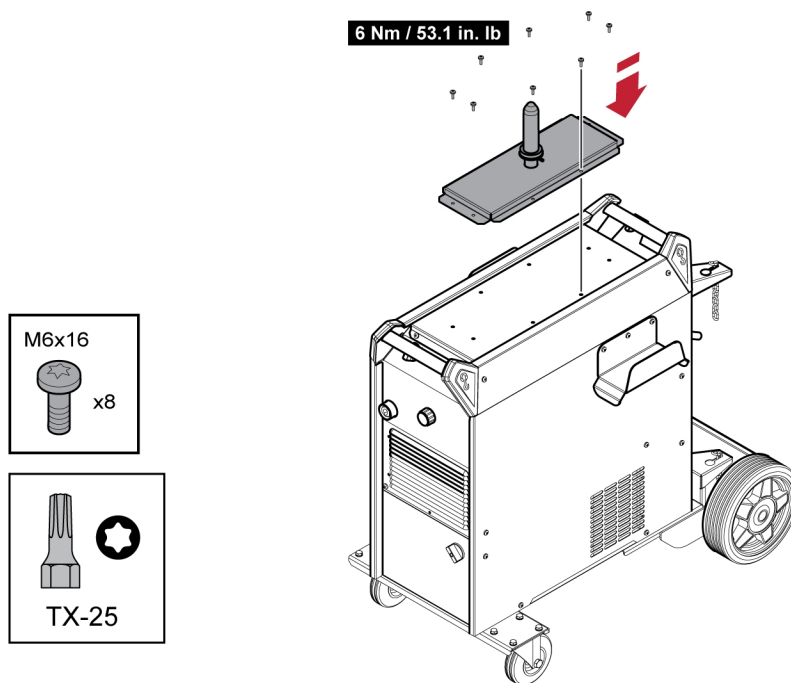
Position the power source so that cooling air inlets and outlets are not obstructed.

### 4.2 Feeder mounting bracket instructions

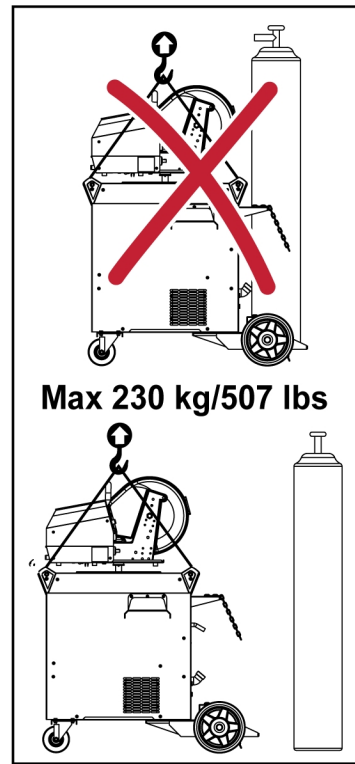
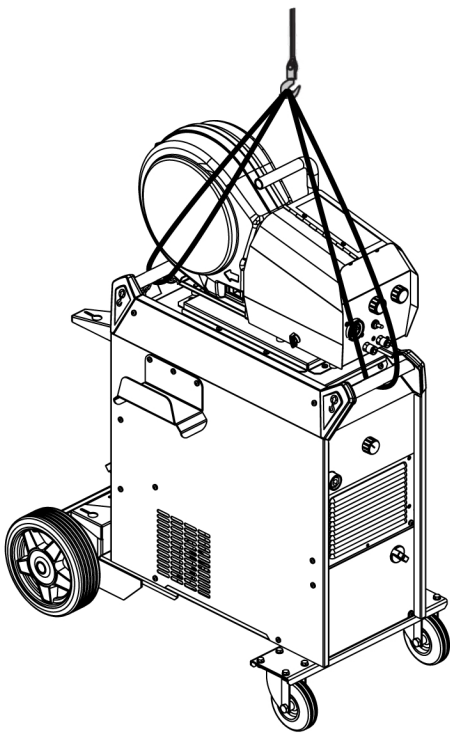
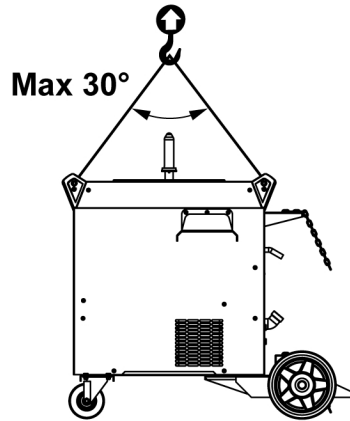


**WARNING!**

Do not operate the equipment without the feeder mounting bracket.

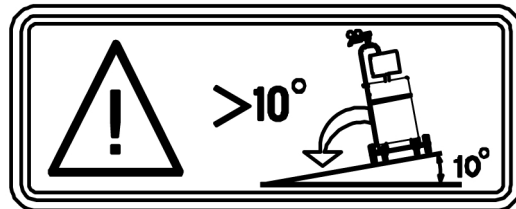


### 4.3 Lifting instructions



**WARNING!**

Secure the equipment - particularly if the ground is uneven or sloping.



## 4.4 Mains supply



### NOTE!

This equipment does not comply with IEC 61000-3-12. If it is connected to a public low voltage system, it is the responsibility of installer or the user of the equipment to ensure, by consultation with the distribution network if necessary, that the equipment may be connected.

Make sure that the welding power source is connected to the correct supply voltage and that it is protected by the correct fuse rating. A protective earth connection must be made in accordance with regulations.

The power source will automatically adjust to the supplied input voltage.

### Recommended MCB sizes and minimum cable area

Fabricator EM 401i / EM 401i with cooling unit			
Mains voltage	380 V 3~ 50/60 Hz	400 V 3~ 50/60 Hz	415 V 3~ 50/60 Hz
Mains cable area	4 × 6 mm <sup>2</sup>	4 × 6 mm <sup>2</sup>	4 × 6 mm <sup>2</sup>
Maximal current rating I <sub>max</sub>	29 A	28 A	26 A
I <sub>1eff</sub>			
MIG/MAG	21 A	20 A	19 A
MMA	22 A	21 A	20 A
Input protection device (distribution box) Miniature circuit breaker (MCB)	Type C and 32 A		

Fabricator EM 501i with cooling unit			
Mains voltage	380 V 3~ 50/60 Hz	400 V 3~ 50/60 Hz	415 V 3~ 50/60 Hz
Mains cable area	4 × 6 mm <sup>2</sup>	4 × 6 mm <sup>2</sup>	4 × 6 mm <sup>2</sup>
Maximal current rating I <sub>max</sub>	41 A	38 A	38 A
I <sub>1eff</sub>			
MIG/MAG	30 A	28 A	27 A
MMA	31 A	29 A	28 A
Input protection device (distribution box) Miniature circuit breaker (MCB)	Type C and 32 A		



### NOTE!

The mains cable areas and fuse sizes as shown above are in accordance with Swedish regulations. For other regions, supply cables must be suitable for the application and meet local and national regulations.

### Supply from power generators

The power source can be supplied from different types of generators. However, some generators may not provide sufficient power for the welding power source to operate correctly. Generators with Automatic Voltage Regulation (AVR) or with equivalent or better type of regulation, with rated power ≥40 kW, are recommended.

### Connection instruction



**WARNING!**

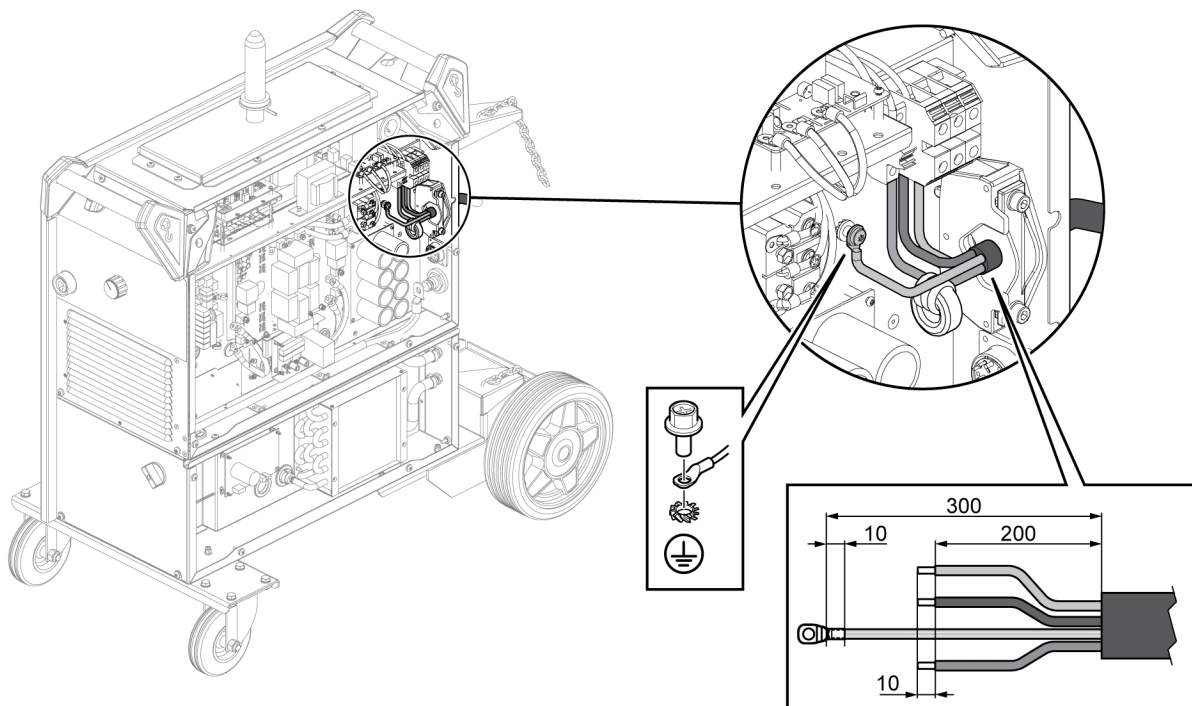
The mains supply must be disconnected during installation.



**WARNING!**

Wait until the DC bus capacitors are discharged. The DC bus capacitor discharge time is at least 2 minutes!

If the mains cable needs to be changed, the earth connection to the bottom plate and the ferrites must be installed correctly. See the picture below for the installation order of the ferrites, washers, nuts and screws.



## 5 OPERATION

General safety regulations for handling the equipment can be found in the "SAFETY" chapter of this manual. Read it through before you start using the equipment!



### NOTE!

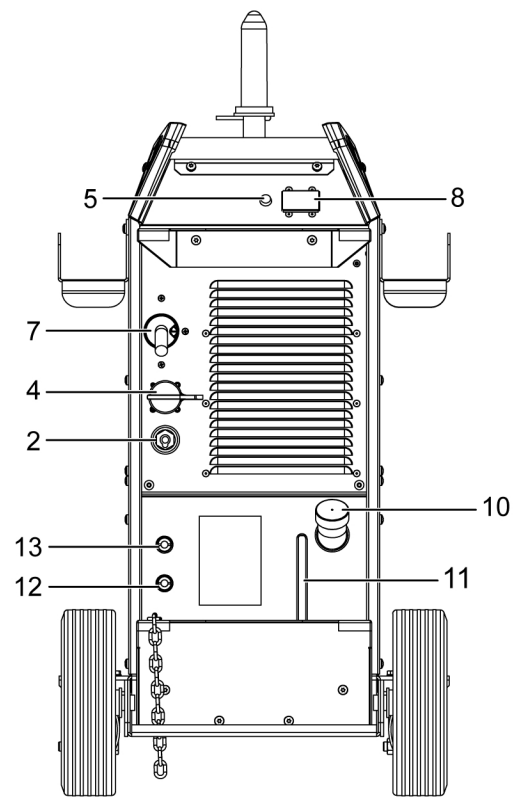
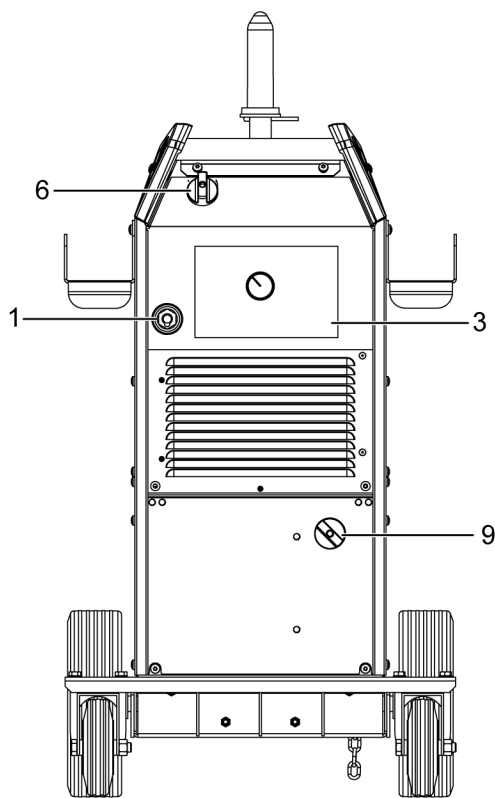
When moving the equipment use intended handle. Never pull the cables.



### WARNING!

Electric shock! Do not touch the workpiece or the welding head during operation!

### 5.1 Connections and control devices



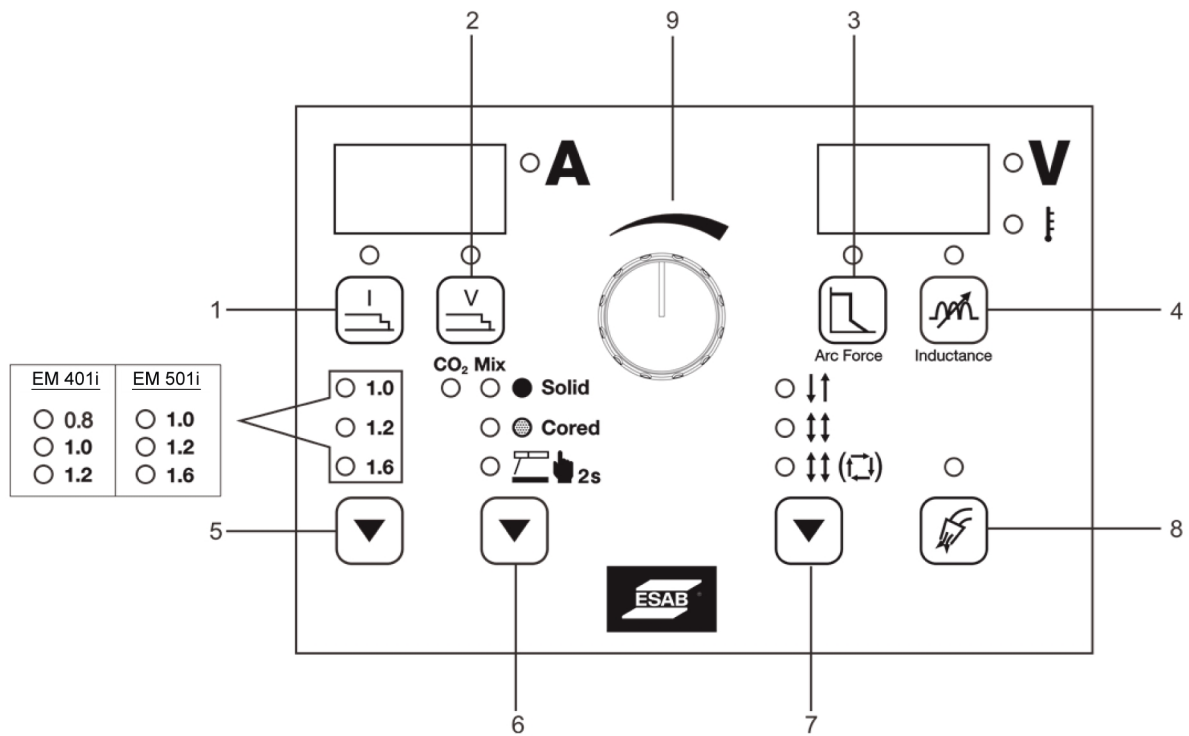
- |  |  |
|--|--|
| 1 Connection (+): MIG/MAG: Welding cable, MMA: Welding cable or return cable | 8 24 V AC power supply socket for gas regulator        |
| 2 Connection (-): MIG/MAG: Return cable, MMA: Return cable or welding cable  | 9 Cooling unit mains switch ON/OFF                     |
| 3 Indicating LED, Overheating  | 10 Coolant filling                                     |
| 4 Connection of wire feed unit   | 11 Min/Max of coolant                                  |
| 5 Fuse for the gas regulator input supply                                    | 12 Connection RED for coolant (return) to cooling unit |
| 6 Mains power supply switch, ON/OFF  | 13 Connection BLUE for coolant from cooling unit       |
| 7 Mains cable inlet  |  |



### WARNING!

Do not use DC- in MIG mode, if DC- needed, please contact authorised ESAB local service.

The following figure shows the front control panel and the buttons on the control panel of the welder.



S.no.	Name	Function
1	Ending arc current	Adjusts the Ending arc current in 4T and 4T repeat mode
2	Ending arc voltage	Adjusts the Ending arc voltage in 4T and 4T repeat mode
3	Arc force	The arc force is important in determining how the current changes in response to a change in the arc length. A lower value gives a calmer arc with less spatter. It only applies to MMA welding.
4	Inductance	Sets the dynamic of arc. Lower inductance will give hard arc and higher inductance will give soft arc.
5	Wire diameter	Selects the diameter of the welding wire. Only applicable for MIG welding
6	Welding process / Wire type and gas	<p>Selects the welding process</p> <ul style="list-style-type: none"> <li>• Solid wire-CO2, (MIG/MAG)</li> <li>• Solid-Mix gas, (MIG/MAG)</li> <li>• Cored wire (MIG/MAG)</li> <li>• MMA welding</li> </ul> <p>If MMA mode to be selected, press and hold for 2 seconds. To come out from MMA mode again press once.</p> <div style="border: 1px solid black; padding: 5px;"> <p><b>i NOTE!</b> Gas options are only for solid wires and not for cored wires.</p> </div>
7	Welding control	Selects the welding control mode (2T, 4T, 4T repeat). See chapter "5.3 Welding control mode".



S.no.	Name	Function
8	Gas detection	Detects gas flow.
9	Value adjusting knob	Manually adjusts <ul style="list-style-type: none"> <li>the current for MMA process</li> <li>the ending arc voltage, ending arc current, Inductance for MIG/MAG process and</li> <li>the current and voltage within specified ranges.</li> </ul>

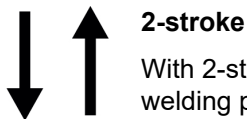
#### Internal menu feature

- 1 Press the arc current and arc voltage buttons (see items 1 and 2 in the "Connections and control devices" chapter) at the same time for 3 seconds to enter the internal menu and press the arc current and arc voltage buttons at the same time to exit the internal menu settings.
- 2 In the internal menu setting, use the knob on the panel to switch between menu options at the same level and adjust parameter values.
- 3 In the internal menu setting, the inductance button on the panel is used as the parameter selection confirmation button.
- 4 When setting each parameter in the internal menu, when the digital display shows "OFF", the current parameter is the default parameter of the welding power source, and when the digital display shows other values, it is the user setting parameter.

Code	Description	Default	Range	Internal Menu Explanation
F01	Restore factory settings			
F02	Given wire feeding speed	SPd		
F10	Slow wire feeding speed (Creep start) m/min	OFF	1.4 – 18	<b>MIG/MAG:</b> The wire feed speed before the welding arc ignites or before the filler wire comes in contact with the workpiece
F11	Pre-gas time	OFF	0 – 25 s	<b>MIG/MAG:</b> Gas delivery time before arc starts
F14	Post-gas time	OFF	0 – 25 s	<b>MIG/MAG:</b> Gas delivery time after arc ends
F20	DC burn back voltage	OFF	12 – 45 V	<b>MIG/MAG:</b> The voltage at the end of welding, to melt a part of wire at the tip to prevent the wire from sticking to the workpiece
F21	DC burn back time	OFF	0 – 1.00 s	<b>MIG/MAG:</b> Time for DC burn back voltage. Longer time will lead to melt the contact tip
F22	DC chopping time	OFF	0 – 1.00 s	<b>MIG/MAG:</b> The function is to prevent obvious small balls at the end of the wire after welding and improve the success rate of arc starting next time. This parameter is used in conjunction with burn-back voltage and burn-back time

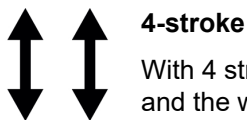
Code	Description	Default	Range	Internal Menu Explanation
F25	Arc Start voltage	OFF	12 – 38 V (EM 401i) 12 – 45 V (EM 501i)	<b>MIG/MAG:</b> Higher arc-start current and arc-start voltage to improve the arc-start fusion effect.
F26	Arc Start current	OFF	30 – 400 A (EM 401i) 30 – 500 A (EM 501i)	
F27	Arc Start time	OFF	0 – 10.0 s	<b>MIG/MAG:</b> The duration of arc-start current and arc-start voltage.
F50	Arc Striking current	OFF	30 – 400 A (EM 401i) 30 – 500 A (EM 501i)	<b>MMAW:</b> Current at the moment when electrode contacts base metal
F51	Hot Start current	OFF	0 – 100 A	<b>MMAW:</b> Additional current during arc start, based on the given welding current.
FB0	Board software and hardware version query	–	010 – 104	For service purpose
			110 – 102	
			210 – 103	
			300 – 201	
FB1	Fault record query	Err	–	For service purpose
FB2	Machine model query	C50	–	For service purpose

## 5.2 Welding control mode



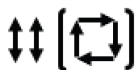
### 2-stroke

With 2-stroke, gas pre-flow starts when the welding torch trigger switch is pressed. The welding process then starts. Releasing the trigger switch stops welding entirely and starts gas post-flow.



### 4-stroke

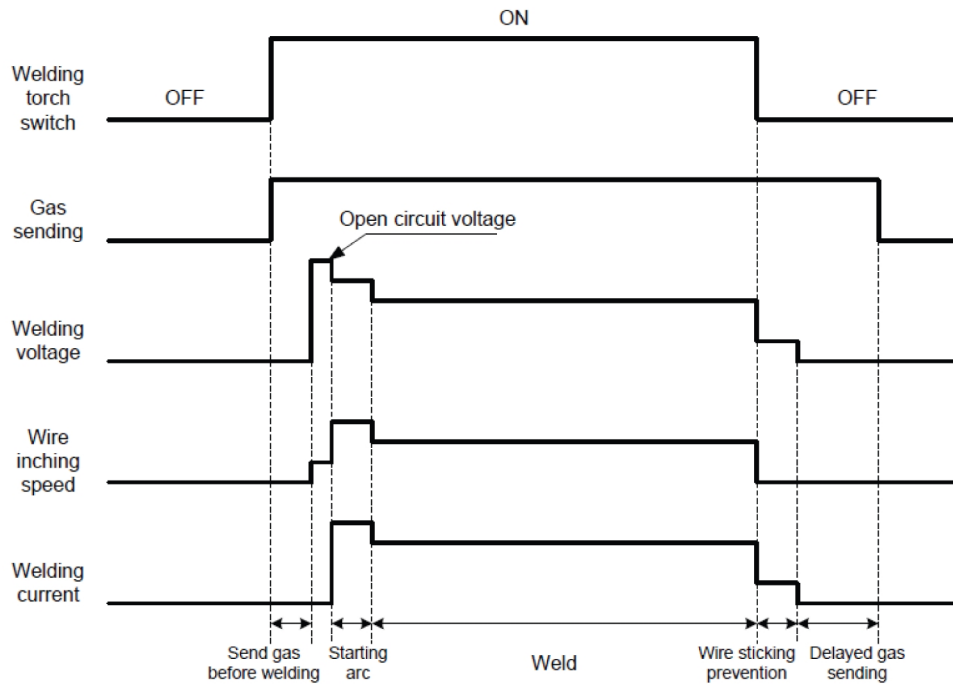
With 4 stroke, the gas pre-flow starts when the welding torch trigger switch is pressed in and the wire feed starts when it is released. The welding process continues until the switch is pressed in again, the wire feed then stops and when the switch is released the gas post-flow starts.



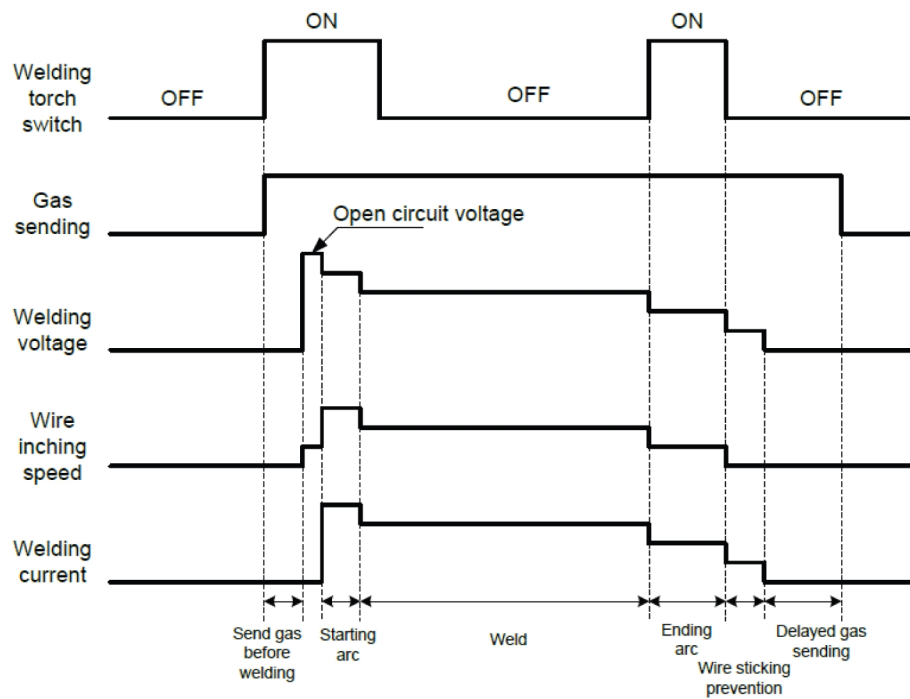
### 4-stroke repeat

When the torch trigger switch is pressed in, the gas flow starts and an arc is generated. When the trigger switch is released the arc generation is locked. When the trigger switch is pressed in again, the ending arc is generated using the ending arc voltage and current. When the switch is released again, the welding stops. When the trigger switch is pressed in again within two seconds and holding it, welding with repeated ending arc starts. When the switch is released the repeated ending arc stops. If the switch is not pressed in again within 2 seconds, the welding with repeated ending arc stops.

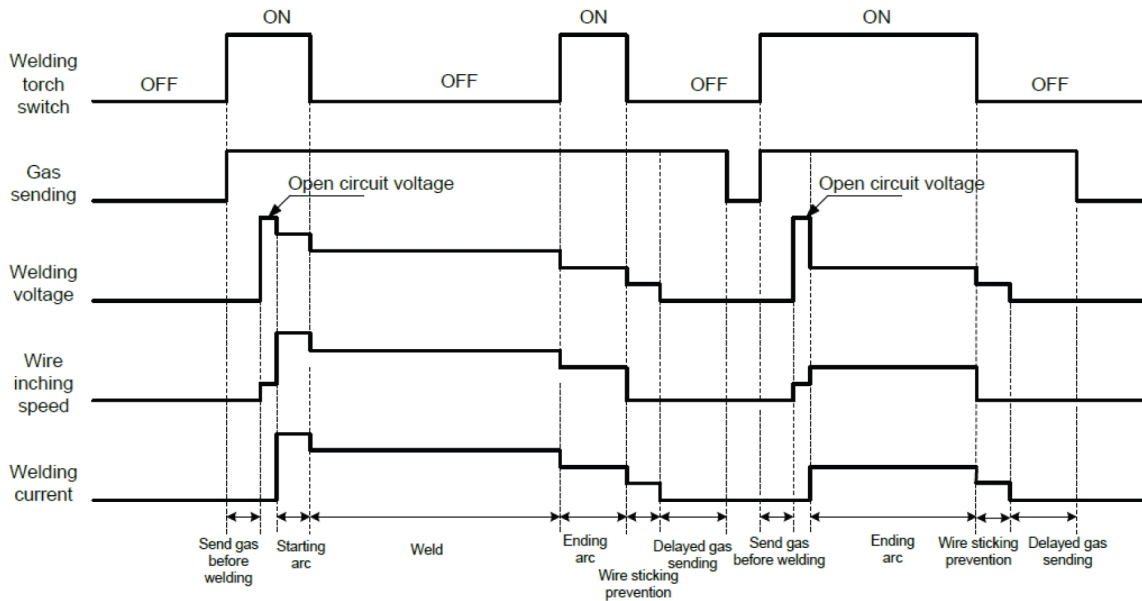
**2-stroke mode (welding without ending arc)**



**4-stroke mode (welding with ending arc)**



**4-stroke repeat mode (Welding with repeated ending arc)**



**5.3 Connection of welding and return cable**

The power source has two outputs, a positive terminal (+) and a negative terminal (-), for connecting welding and return cables.

Connect the return cable to the negative terminal on the power source. Secure the return cable's contact clamp to the work piece and ensure that there is good contact between the work piece and the output for the return cable on the power source.











**Recommended maximum welding current values for the welding/return cable(copper) at an ambient temperature of +25°C and normal 10minutes cycle**

Cable size mm <sup>2</sup>	Duty cycle			Voltage drop/10m
	100%	60%	35%	
50	290 A	320 A	370 A	0.35 V / 100 A
70	360 A	400 A	480 A	0.25 V / 100 A
95	430 A	500 A	600 A	0.19 V / 100 A

**Recommended maximum welding current values for the welding/return cable(copper) at an ambient temperature of +40°C and normal 10minutes cycle**

Cable size mm <sup>2</sup>	Duty cycle			Voltage drop/10m
	100%	60%	35%	
50	250 A	280 A	320 A	0.35 V / 100 A
70	310 A	350 A	420 A	0.25 V / 100 A
95	380 A	440 A	530 A	0.19 V / 100 A

## 5.4 Symbols and functions

ON  OFF	Mains power supply switch		Overheating (3)
	Protective earth		Positioning of lifting eye
	Arc force		Inductance
	Gas detection		MMA welding
	Arc-closing current / Ending arc current		Arc-closing voltage / Ending arc voltage

## 5.5 Thermal protection

The welding power source has overheating protection that operates if the temperature becomes too high. When this occurs, the welding current is interrupted, and an overheating Indication lamp is lit. The overheating protection resets automatically when the temperature has fallen within its normal working temperature.

## 5.6 Fan control

The fan will run during the startup of the machine and will continue to run only for 10 minutes if there is no operation.

In Fabricator EM 401i when the welding current is less than 200A, the fan will run at low speed, if the welding current goes above 200A, the fan will run at high speed.

In Fabricator EM 501i when the welding current is less than 300A, the fan will run at low speed, if the welding current goes above 300A, the fan will run at high speed.

After the welding stops, the fan will continue to run for 10 minutes and the power source switches to idle mode (energy-saving mode).

## 5.7 Usage of the cooling unit



### **CAUTION!**

**Important!** Turn OFF the cooling unit when welding MMA or using air cooled MIG/TIG welding torches to avoid excessive wear of the pump. Otherwise, the pump will work against a closed valve.

Turn ON the cooling unit when using a water cooled MIG welding torch to avoid damages on the cable set.

## 5.8 Coolant connection

For problem-free operation it is recommended that the height from the cooling unit to the water-cooled MIG/MAG torch is of 8.5 m.

## 5.9 Coolant pressure controller

The pump has an enclosed pressure relief valve. The valve opens gradually when the pressure is too high. This can occur if a hose is folded, which causes the flow to fail or stop.

## 6 MAINTENANCE

### 6.1 Maintenance


**WARNING!**

The mains supply must be disconnected during cleaning and maintenance.


**CAUTION!**

Only persons with the appropriate electrical knowledge (authorised personnel) may remove the safety plates.


**CAUTION!**

The product is covered by manufacturer's warranty. Any attempt to carry out repair work by non-authorised service centers or personnel will invalidate the warranty.


**NOTE!**

Regular maintenance is important for safe and reliable operation.


**NOTE!**


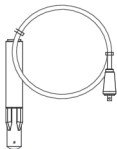

Perform maintenance more often during severe dusty conditions.

Before each use - make sure that:

- Product and cables are not damaged,
- The torch is clean and not damaged.

### 6.2 Routine maintenance

Maintenance schedule during normal conditions. Check equipment prior to every use.

Interval	Area to maintain	
Every 3 months	 Clean weld terminals.	 Check or replace weld cables.
Every 6 months	 Clean inside equipment. Use dry compressed air with 4 bar pressure.	

### 6.3 Power source

To maintain the performance and increase the lifetime of the power source it is mandatory to clean it regularly. How often depends on:

- the welding process
- the arc time

- the working environment
- the surrounding environment, that is among others grinding.

Tools needed for the cleaning procedure:

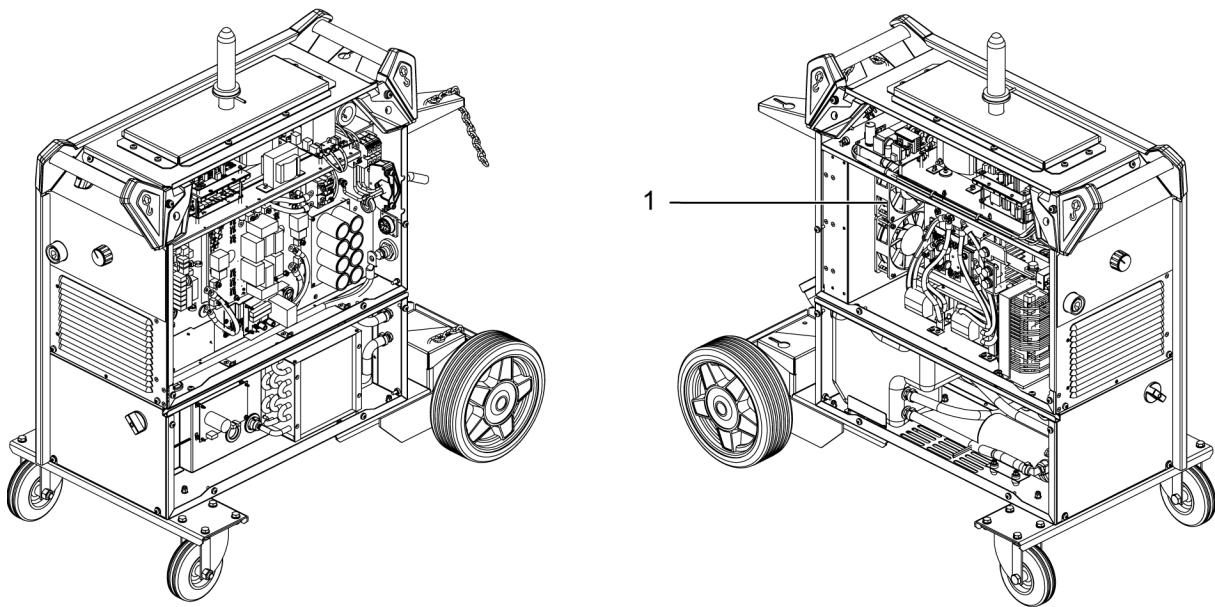
- torx screwdriver, T25 and T30
- dry compressed air at a pressure of 4 bar
- protective equipment like ear plugs, safety glasses, masks, gloves and safety shoes



**CAUTION!**

Make sure that the cleaning procedure is done in a suitable prepared workspace.

**Cleaning procedure**



**CAUTION!**

The cleaning procedure should be carried out by authorised service technician.

- 1 Disconnect the mains supply.



**WARNING!**

Wait until the DC bus capacitors are discharged. The DC bus capacitor discharge time is at least 2 minutes!

- 2 Remove the side panels on the power source.
- 3 Remove the top panel on the power source.
- 4 Remove the plastic cover between the heat sink and fan (1).
- 5 Clean the power source with dry compressed air (4 bar) as follows:
  - The upper rear part.
  - From the rear panel through the secondary heat sink.
  - The inductor, transformer and current sensor.
  - The power components side, from the rear side behind PCB15AP1.
  - The PCBs at both sides.
- 6 Make sure that there is no dust left on any part.



- 7 Install the plastic cover between the heat sink and the fan (1) and make sure it is correctly fitted against the heat sink.
- 8 Reassemble the power source after cleaning and perform testing according to IEC 60974-4. Follow the procedure in section “After repair, inspection and test” in the Service manual.

## 6.4 Cooling unit

### Dust, grinding, swarf

The air stream through the cooling unit carries particles that become trapped in the cooling element, particularly in dirty working environments. This results in reduced cooling capacity. For this reason, blow clean using compressed air at regular intervals.

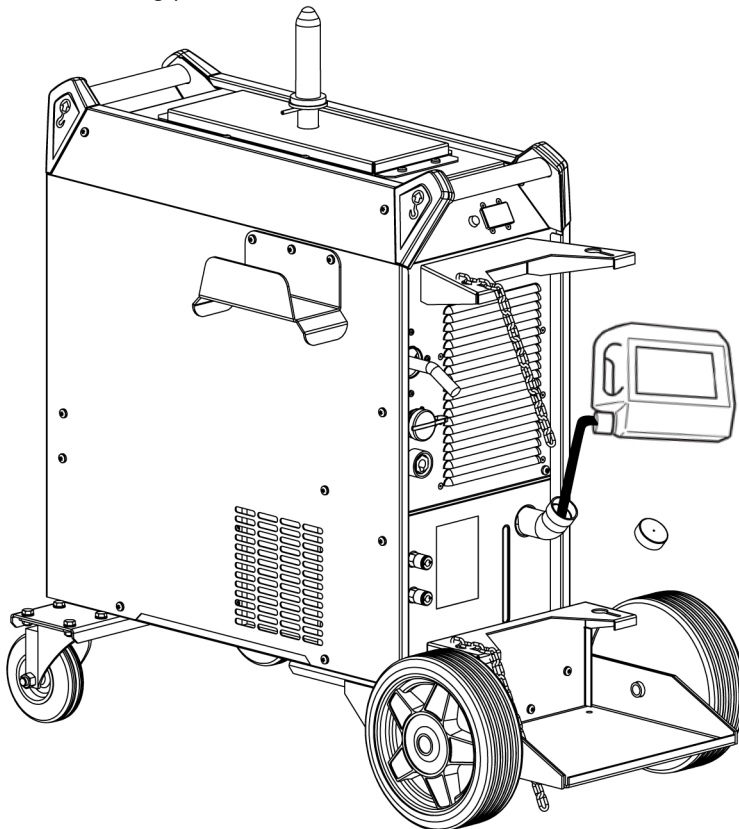
### The coolant system

The recommended coolant must be used in the system otherwise clumps can be created that block the pump, water connections or elements. Flushing can only be performed via red water connection. Then drain the tank manually, that is empty via the tank’s filling hole.

## 6.5 Filling the coolant

Only use ESAB’s ready mixed coolant, see the “ACCESSORIES” chapter.

- Fill with coolant. (The fluid level must not exceed the upper marking but must not be below lower marking.)



### CAUTION!

The coolant must be handled as chemical waste.

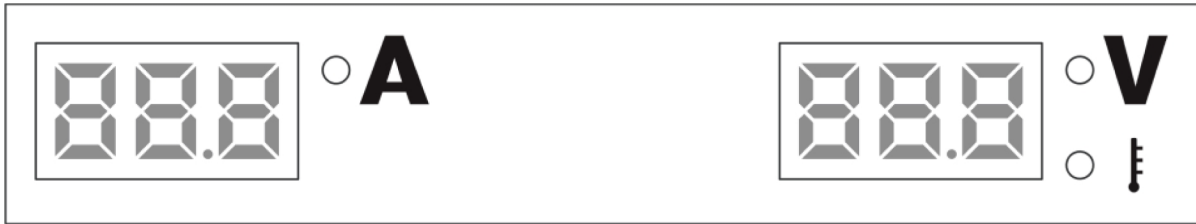


**NOTE!**

Coolant must be topped up if connecting a welding torch or coolant hosed that are 5 meters in length or longer. When adjusting the water level by topping up, the coolant hosed do not need to be disconnected.

## 7 TROUBLESHOOTING

Perform these checks and inspections before sending for an authorised service technician.



The following table describes the welder error code, as well as the causes and solutions

Error Code	Displayed Content		Fault	Cause	Solution
	Left display	Right display			
F00	F00	None	Power-on self-test		
E1	E1	None	Welding torch fault	When the equipment is turned on, the welding torch trigger switch is on. the switch may be faulty.	Turn off the switch. Replace the welding torch.
E2	E2	None	Output terminal over-temperature	The OKC terminal and welding cable is not connected properly. The copper cross-sectional area of the output power cable is too small. The output cable OKC fails to meet the specification requirement. The fan does not work or slows down.	Verify the OKC terminal and welding cable is connected properly. Use cables with correct cross-sectional areas. Select suitable cable OKC. Verify that the fan blades are not stuck with any foreign objects.
E3	E3	None	Abnormal input power	The input power cable is not connected properly. Input power overvoltage occurs. Input power under voltage occurs. Input power phase imbalance occurs. The input power frequency exceeds the range.	Verify that the input cables are connected properly. Verify that all the three input phases are present.

Error Code	Displayed Content		Fault	Cause	Solution
	Left display	Right display			
E4	E4	None	IGBT or diode over-temperature	The rated duty cycle is exceeded. The air vent of the housing is blocked. The fan does not work or slows down.	Ensure that the user does not exceeds the rated duty cycle range. Verify that the air vent is not blocked. Verify that the fan blades are not stuck with any foreign objects that the fan blades are not stuck with any foreign objects.
E5	E5	1 - 8	Button error	Button is not working. Button does not rebound after being pressed.	Check the button and make sure it does not stick.
E6	E6	None	Output overcurrent	The output is short-circuited, or the current is too high.	Verify that the output is not short-circuited.
E7	E7	None	Input power fault	The input power cable is not connected properly. Input power phase loss or phase imbalance occurs.	Verify that the input cables are connected properly. Verify that the input power is normal.
E8	E8	None	Output overvoltage	The input voltage is too high. The output cables are not connected correctly.	Verify that the input voltage is normal. Verify that the output cables are connected correctly.
E9	E9	None	Primary side overcurrent	The output is short-circuited.	Verify that the output is not short-circuited.
E10	E10	None	Primary side overvoltage	The input voltage is too high.	Verify that the input voltage is normal.
E11	E11	None	Current sensor disconnection	The connector on the current sensor is disconnected or damaged.	Refer note below the table
E12	E12	None	PCB not registered	The PCB is not certified.	Refer note below the table
E13	E13	None	Overcurrent of wire feeder motor	The welding wire is blocked or jammed	Check whether the welding wire is blocked or jammed

Error Code	Displayed Content		Fault	Cause	Solution
	Left display	Right display			
E14	E14	1/2	Gas solenoid valve on Wire feeder	Gas solenoid valve short Circuit or damage;/ Gas solenoid valve open circuit or cable disconnect	Check whether the valve is short-circuited or damaged;/ Check whether the valve is open or whether the cable is disconnected;
E17	E17	None	The encoder of the wire feeder motor has an open circuit problem	Loose control cable or wire	Check whether the control cable is loose, or the wire feeder is stuck

**NOTE!**

Call ESAB authorised service personnel.

Perform these checks and inspections before sending for an authorised service technician.

Type of fault	Corrective action
No arc.	<ul style="list-style-type: none"> <li>• Check that the mains power supply switch is turned on.</li> <li>• Check that the mains, welding and return cables are correctly connected.</li> <li>• Check that the correct current value is set.</li> <li>• Check the mains power supply fuses.</li> </ul>
The welding current is interrupted during welding.	<ul style="list-style-type: none"> <li>• Check whether the thermal protection trip has operated (indicated by the orange LED on the front).</li> </ul>
The thermal protection trips frequently	<ul style="list-style-type: none"> <li>• Make sure that you are not exceeding the rated data for the power source (i.e. that the unit is not being overloaded).</li> <li>• Check that the ambient temperature is not above the one for the rated duty cycle 40°C/104°F.</li> </ul>
Poor welding performance	<ul style="list-style-type: none"> <li>• Check that the welding current supply and return cables are correctly connected.</li> <li>• Check that the correct current value is set.</li> <li>• Check that the correct welding wires are being used.</li> <li>• Check the main power supply fuses.</li> </ul>
Poor cooling effect.	<ul style="list-style-type: none"> <li>• Clean the cooling element using compressed air</li> <li>• Check the coolant level</li> <li>• Check the on/off switch on the cooling unit is set to ON</li> </ul>

**CAUTION!**

Repair and electrical work should be performed by an authorised ESAB service technician. Use only ESAB original spare and wear parts.

## 8 ORDERING SPARE PARTS

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**CAUTION!**

Repair and electrical work should be performed by an authorised ESAB service technician.  
Use only ESAB original spare and wear parts.

The **Fabricator EM 401i/EM 401i with cooling unit / EM 501i with cooling unit** is designed and tested in accordance with international standards **EN IEC 60974-1**, **EN IEC 60974-2** and **EN IEC 60974-10**. On completion of service or repair work, it is the responsibility of the person(s) performing the work to ensure that the product still complies with the requirements of the above standards.

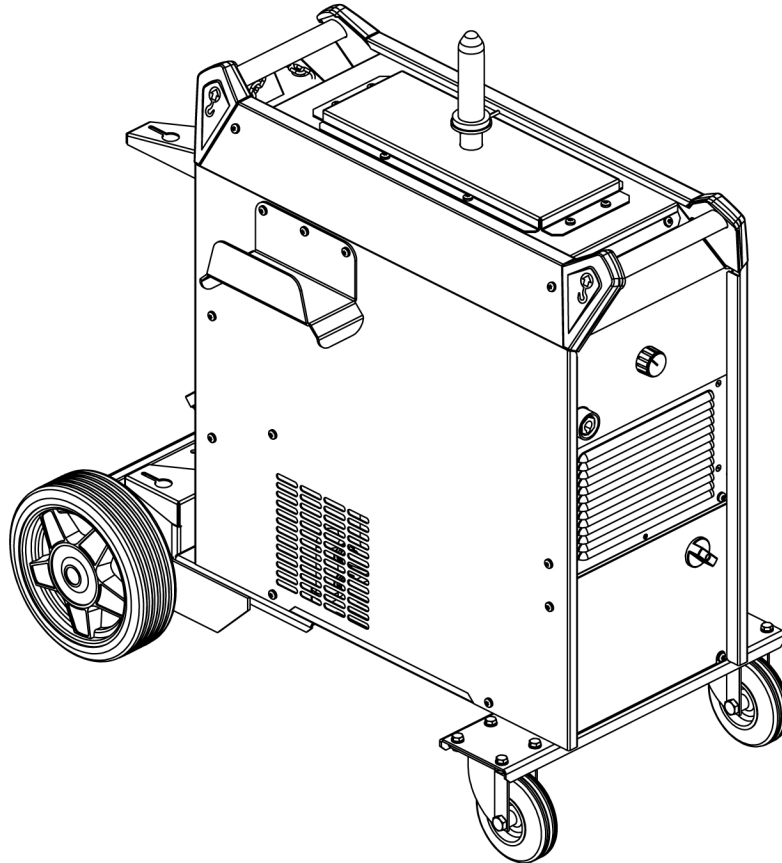
Spare parts and wear parts can be ordered through your nearest ESAB dealer, see [esab.com](https://www.esab.com). When ordering, please state product type, serial number, designation and spare part number in accordance with the spare parts list. This facilitates dispatch and ensures correct delivery.

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# APPENDIX

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## ORDERING NUMBERS

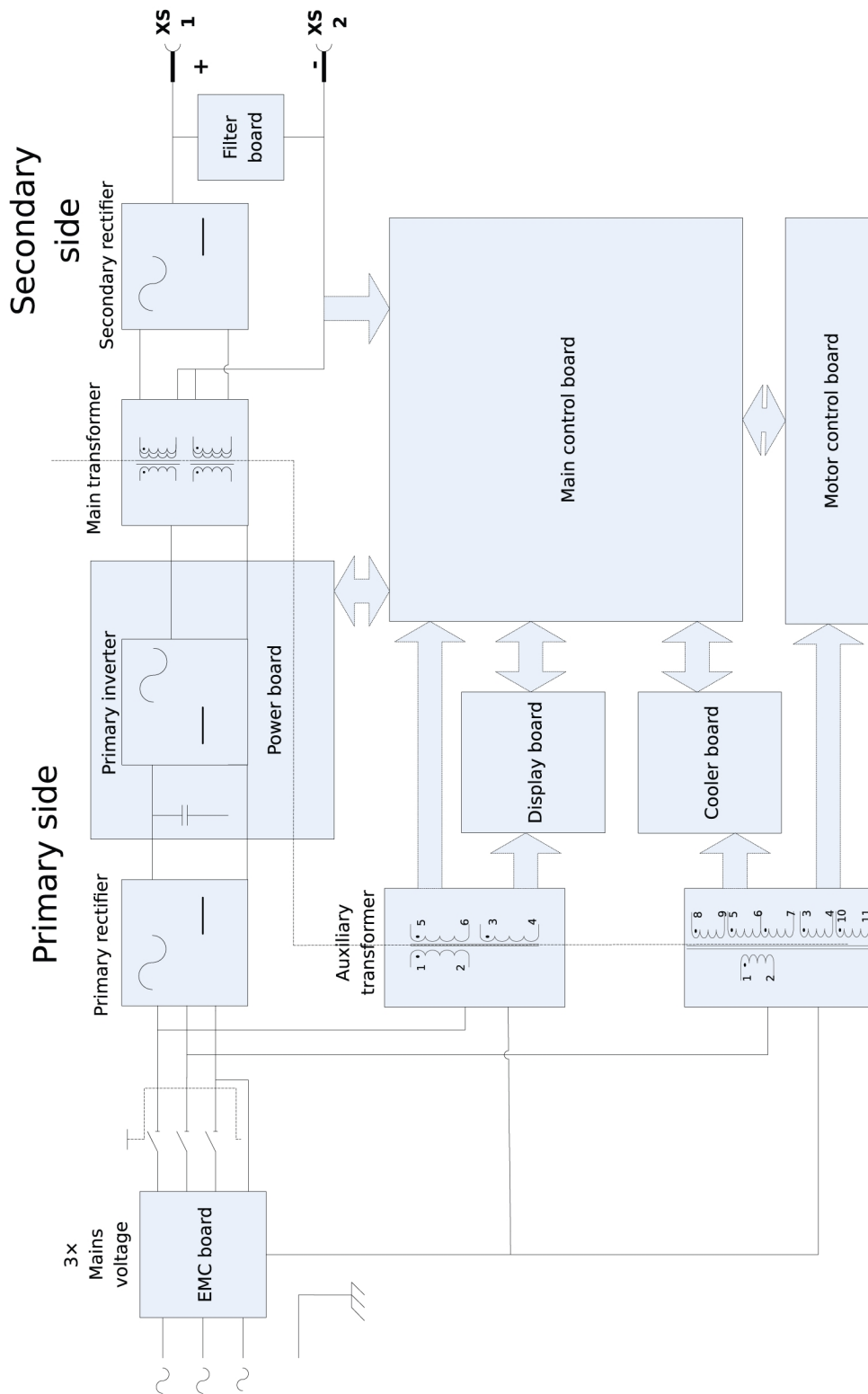


Ordering number	Denomination	Type	Notes
0446 400 884	Power source	Fabricator EM 401i	CE
0446 400 883	Power source	Fabricator EM 401i with cooling unit	CE
0446 400 882	Power source	Fabricator EM 501i with cooling unit	CE
0446 455 *	Instruction manual		
0463 802 001	Service manual		
0463 810 001	Spare parts list		

The three last digits in the document number of the manual show the version of the manual. Therefore they are replaced with \* here. Make sure to use a manual with a serial number or software version that corresponds with the product, see the front page of the manual.

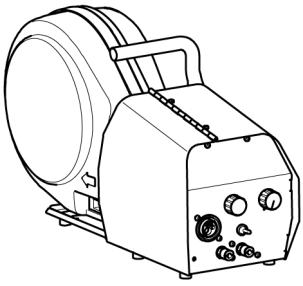
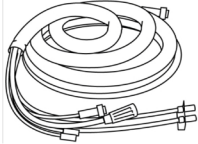
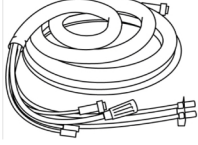
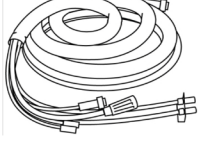

Technical documentation is available on the Internet at: [www.esab.com](http://www.esab.com)

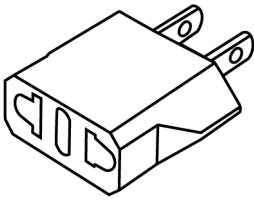
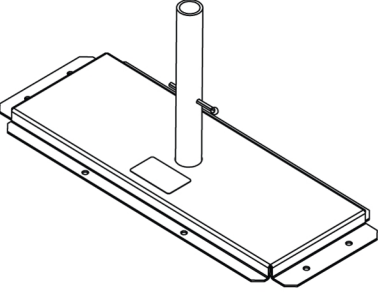
# BLOCK DIAGRAM





## ACCESSORIES

0446 401 881	Fabricator Feed 304	
0446 401 882	Fabricator Feed 304w	
<b>Connection set, 70mm<sup>2</sup>, 19 poles</b>		
0459 836 880	2 m	
0459 836 881	5 m	
0459 836 882	10 m	
0459 836 884	25 m	
<b>Connection set water, 70mm<sup>2</sup>, 19 poles</b>		
0459 836 890	2 m	
0459 836 891	5 m	
0459 836 892	10 m	
0459 836 894	25 m	
<b>Connection set water, 95mm<sup>2</sup>, 19 poles</b>		
0459 836 990	2 m	
0459 836 991	5 m	
0459 836 992	10 m	
0459 836 994	25 m	
0465 720 002	<p><b>ESAB ready mixed coolant (10 l / 2.64 gal)</b>          Use of any other cooling liquid than the prescribed one might damage the equipment. In case of such damage, all warranty undertakings from ESAB cease to apply.</p>	

0447 014 001	Converter plug for gas heater supply	
0447 617 880	<b>Wire Feed mounting bracket kit</b> Applicable only for Wirefeeder assembled with Wheel kit	





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