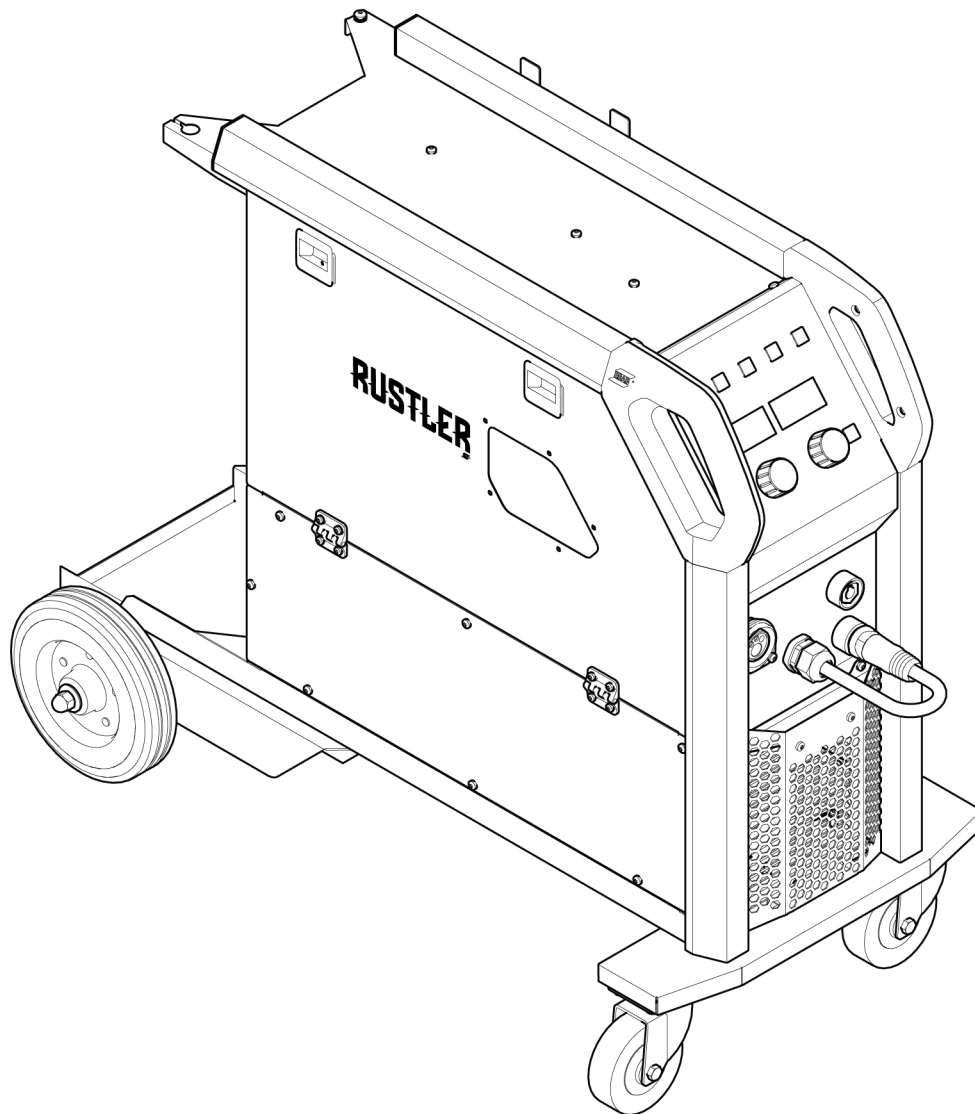


# ***Rustler***

***EM 280C PRO, EM 350C PRO,  
EM 350C PRO SYNERGIC***



## **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**

MIG/MAG welding power source

**Type designation**

Rustler EM280C PRO              P/N: 0448280880              from serial number GC236 YY XX XXXX  
Rustler EM350C PRO              P/N: 0448350881              from serial number GC237 YY XX XXXX  
Rustler EM350C PRO Synergic P/N: 0448350882              from serial number GC238 YY XX XXXX

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 60974-5:2013, Arc Welding	Equipment – Part 5: Wire Feeders
EU reg. no. 2019/1784	Ecodesign requirements for welding equipment pursuant to Directive 2009/125/EC
EN 60974-10:2014	Arc Welding Equipment - Part 10: Electromagnetic compatibility (EMC) requirements

**Additional Information:**

Restrictive use, Class A equipment, intended for use in locations other than residential.  
All the above products are part of Rustler family.

**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**

Gothenburg  
2022-12-15

**Signature**

Pedro Muniz  
Standard Equipment Director





## UK DECLARATION OF CONFORMITY

According to:

- Electric Equipment (Safety) Regulations 2016;
- Electromagnetic Compatibility Regulations 2016;
- The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 (as amended)
- The Ecodesign for Energy-Related Products and Energy Information Regulations 2021

Type of equipment

MIG/MAG welding power source

Type designation

Rustler EM280C PRO P/N: 0448280880 from serial number GC236 YY XX XXXX

Rustler EM350C PRO P/N: 0448350881 from serial number GC237 YY XX XXXX

Rustler EM350C PRO Synergic P/N: 0448350882 from serial number GC238 YY XX XXXX

Brand name or trademark

ESAB

Manufacturer or his authorised representative established within United Kingdom

ESAB Group (UK) Ltd,

322 High Holborn, London, WC1V 7PB, United Kingdom

[www.esab.co.uk](http://www.esab.co.uk)

The following British Standards and Instruments in force within the United Kingdom has been used in the design:

- EN IEC 60974-1:2018/A1:2019	Arc welding equipment - Part 1: Welding power sources
- EN IEC 60974-5:2019	Arc welding equipment - Part 5: Wire feeders
- EN 60974-10:2014	Arc welding equipment - Part 10: Electromagnetic compatibility (EMC)
- UK S.I. 2021/745	Requirements for welding equipment pursuant to the Ecodesign for Energy-Related Products and Energy Information Regulations 2021

Additional Information:

Restrictive use, Class A equipment, intended for use in locations other than residential.

All the above products are part of Rustler family.

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

Signature

Gary Kisby

Sales & Marketing Director,

ESAB Group UK & Ireland

London, 2022-12-21

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# 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!**



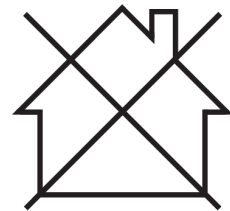
**CAUTION!**

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.



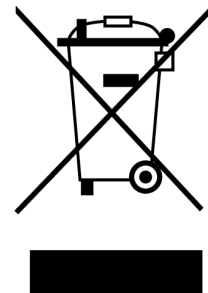
**NOTE!**

**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 **Rustler EM 280PRO, EM 350 PRO** and **EM 350 PRO Synergic** is a compact welding power source intended for welding with solid wires, flux cored wires and coated electrodes (MIG/MAG, FCAW, and MMA).

The equipment has built in wheels and gas bottle bracket to move easily around the work place and provide a better reach.

Main features of Rustler EM PRO:

- High output current and duty cycle
- Easy and intuitive set up
- Durable housing
- Superb arc characteristic, optimized for most common based materials
- MMA welding mode

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

### 2.1 Equipment

The power source is supplied with:

- 4 m black rubber gas hose
- 3 m return cable with crocodile type earth clamp
- Safety instruction
- Quick start guide

## 3 TECHNICAL DATA

	EM 280	EM 350	EM 350 SYN
<b>Mains voltage</b>	400 V $\pm$ 15%, 3~ 50/60 Hz		
<b>Primary current I<sub>max</sub></b>			
MIG/MAG	14 A	20.6 A	20.6 A
MMA	13.5 A	20 A	20 A
<b>Setting range</b>			
MIG/MAG	40 A/16 V - 280 A/28 V	30 A/15.5 V - 350 A/31.5 V	30 A/15.5 V - 350 A/31.5 V
MMA	20 A/20.8 V - 250 A/30 V	20 A/20.8 V - 320 A/32.8 V	20 A/20.8 V - 320 A/32.8 V
Wire feed speed	1.5 - 22 m/min		
<b>Permissible load at MIG/MAG</b>			
40 % duty cycle	280 A/28 V	350 A/31.5 V	350 A/31.5 V
60 % duty cycle	229 A/25.5 V	286 A/28.3 V	286 A/28.3 V
100% duty cycle	177 A/22.9 V	222 A/25.1 V	222 A/25.1 V
Open-circuit voltage	65 V	71 V	71 V
<b>Permissible load at MMA</b>			
40 % duty cycle	250 A/30 V	320 A/32.8 V	320 A/32.8 V
60 % duty cycle	204 A/28.2 V	262 A/30.5 V	262 A/30.5 V
100% duty cycle	158 A/26.3 V	203 A/28.1 V	203 A/28.1 V
Open-circuit voltage	63 V	66.6 V	66.6 V
Apparent power at maximum current	9.7 kVA	14 kVA	14 kVA
Active power I <sub>2</sub> at maximum current	8.7 kW	12.6 kW	12.6 kW
Power factor at maximum current	0.9	0.9	0.9
Efficiency at maximum output power	90 %	89 %	89 %
No-load power demand when energy-saving mode	20 W	20 W	20 W
Weight	54 kg	57.5 kg	61 kg
Recommended generator	12 kW	17 kW	17 kW
Operating temperature	-10 to +40°C (+14 to 104°F)		
<b>Transportation temperature</b>	-20 to +55°C (-4 to +131°F)		
<b>Dimensions l × w × h</b>	977 × 487 × 800 mm		
<b>Insulation class</b>	H		
<b>Enclosure class</b>	IP 23		
<b>Application class</b>	S		

### 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.

### 3.1 ECO design information

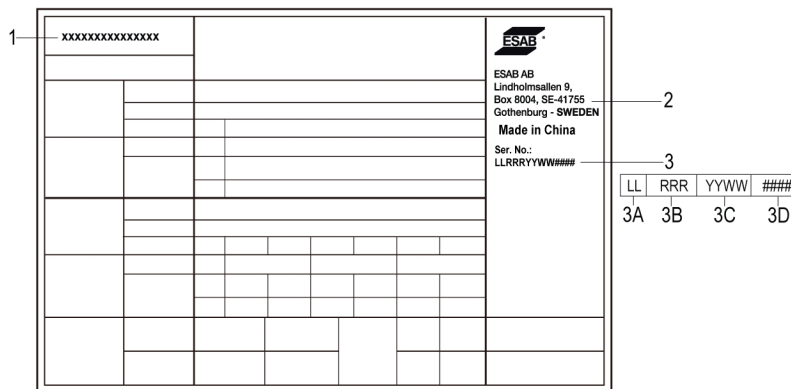
The equipment has been designed in order to be compliant with the Directive 2009/125/EC and the Regulation 2019/1784/EU.

Efficiency and idle power consumption:

Name	Idle power	Efficiency when max power consumption
EM 280C PRO	30 W	89%
EM 350C PRO	30 W	89%
EM 280C PRO SYNERGIC	30 W	89%

The value of efficiency and consumption in idle state have been measured by method and conditions defined in the product standard EN 60974-1.

Manufacturer's name, product name, serial number and date of production can be read from rating plate.



- 1. Product name
- 2. Manufacturer's name and address
- 3. Serial number
  - 3A. Manufacturing location code
  - 3B. Revision level (last digit of year and week number)
  - 3C. Year & week produced (last two digits of year and week number)
  - 3D. Sequential number system (each week starts with 0001)

## 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.

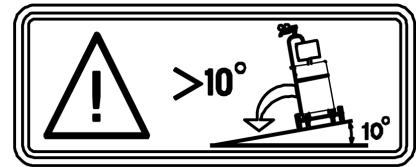
### 4.1 Location

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



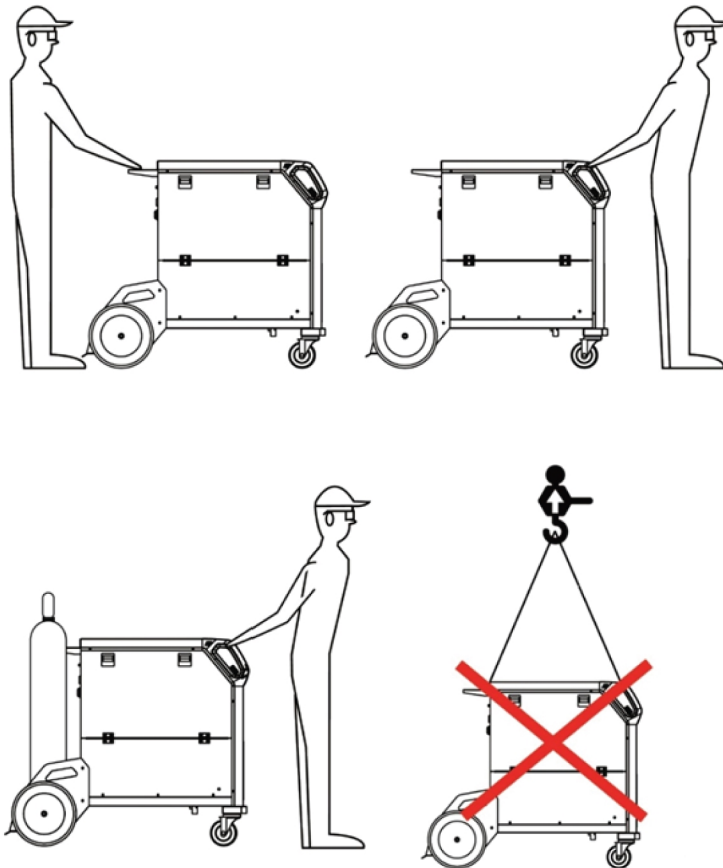
### WARNING!

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



### 4.2 Move instructions (No lifting)

Mechanical lifting must be done with both outer handles.



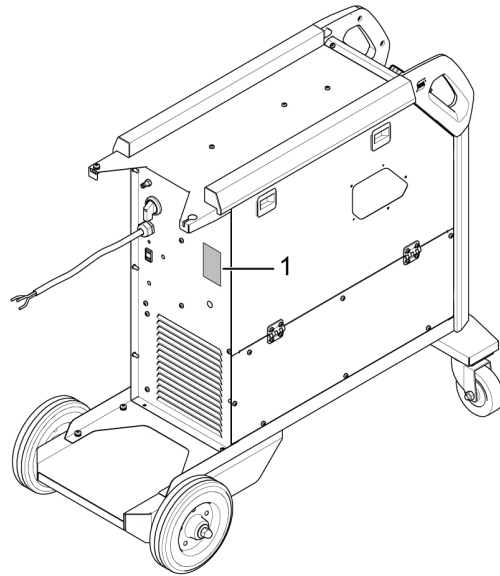
## 4.3 Mains supply



### NOTE! Mains supply requirements

This equipment complies with IEC 61000-3-12 provided that the short-circuit power is greater than or equal to  $S_{scmin}$  at the interface point between the user's supply and the public system. It is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator if necessary, that the equipment is connected only to a supply with a short-circuit power greater than or equal to  $S_{scmin}$ . Refer to the technical data in the TECHNICAL DATA chapter.

1. Rating plate with supply connection data.



Recommended fuse sizes and minimum cable area			
	EM 280C PRO	EM 350C PRO	EM 350C PRO SYN
<b>Mains voltage</b>	<b>400 V ±15%, 3~50/60 Hz</b>		
<b>Mains cable area</b>	4×2.5 mm <sup>2</sup>	4×2.5 mm <sup>2</sup>	4×2.5 mm <sup>2</sup>
<b>Maximal current rating <math>I_{max}</math> (MIG/MAG)</b>	14 A	21 A	21 A
<b><math>I_{1eff}</math></b>	9 A	13 A	13 A
<b>Fuse anti-surge type C MCB</b>	20 A 20 A	30 A 30 A	30 A 30 A
<b>Maximum recommended extension cord length</b>	100 m/330 ft.	100 m/330 ft.	100 m/330 ft.
<b>Minimum recommended extension cord size</b>	4×2.5 mm <sup>2</sup>	4×2.5 mm <sup>2</sup>	4×2.5 mm <sup>2</sup>

## 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!

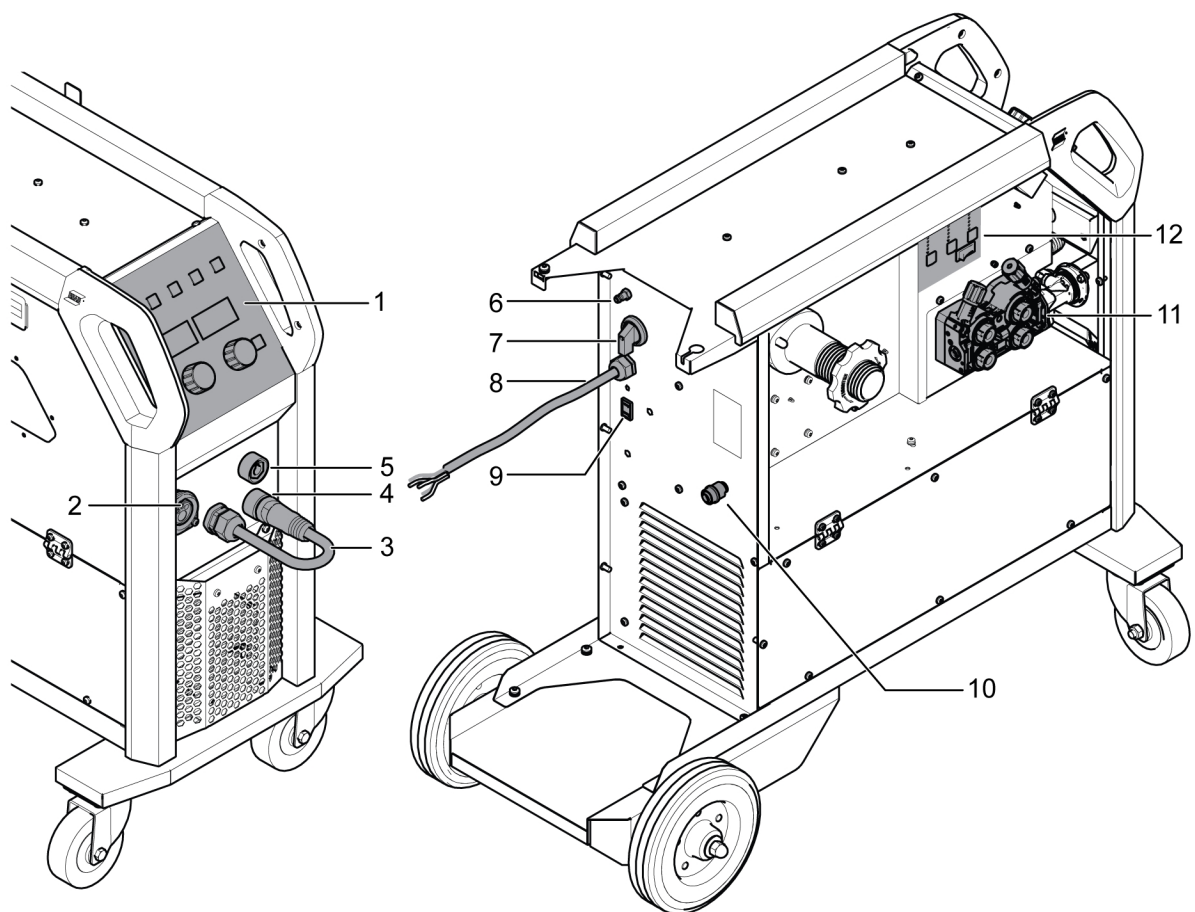
When moving the equipment use intended handle. Never pull the cables.



### WARNING!

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

### 5.1 Connections and control devices



- |   |   |
|---|---|
| 1. External control panel                   | 7. Mains power supply switch, O/I                           |
| 2. Connector for welding torch              | 8. Mains cable  |
| 3. Cable for change the polarity            | 9. Heater socket (optional)                                 |
| 4. Negative welding terminal: Return        | 10. Wire inlet adapter to use with Marathon Pac™ (optional) |
| 5. Positive welding terminal: Welding cable | 11. Wire feeding mechanism                                  |
| 6. Connection for shielding gas             | 12. Internal control panel                                  |

## 5.2 Recommended maximum current values for connection cables set

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/10 m
	100%	60%	35%	
50	285 A	320 A	370 A	0.352 V/100 A
70	355 A	400 A	480 A	0.254 V/100 A
95	430 A	500 A	600 A	0.189 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/10 m
	100%	60%	35%	
50	250 A	280 A	320 A	0.352 V/100 A
70	310 A	350 A	420 A	0.254 V/100 A
95	375 A	440 A	530 A	0.189 V/100 A

## 5.3 Connecting welding and return cables

The power source has two outputs, a positive welding terminal (+) and a negative welding terminal (-), for connecting welding and return cables. The output to which the welding cable is connected depends on the welding method or type of electrode used.

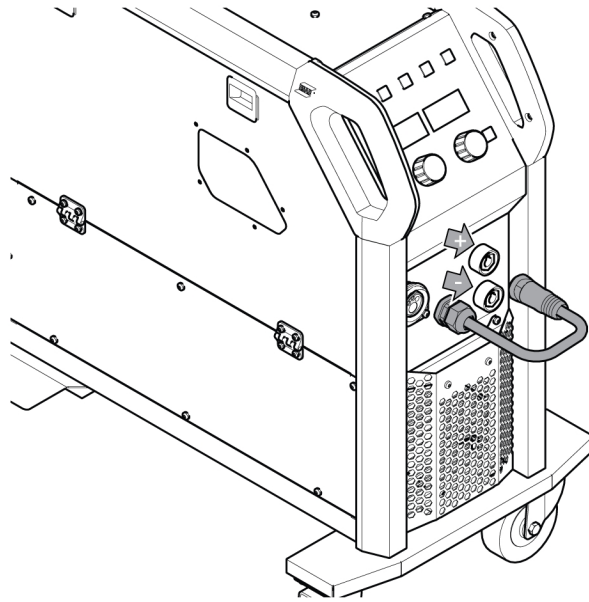
Connect the return cable to the other output on the power source. Secure the return cable's contact clamp to the work piece and ensure that there is good contact between the work piece and the output for the return cable on the power source.

- For MIG/MAG and MMA welding, the welding cable can be connected to the positive welding terminal (+) or negative welding terminal (-) depending on the type of electrode used. The connecting polarity is stated on the electrode packaging.

## 5.4 Polarity change

The power source is delivered with the polarity changeover cable connected to the positive terminal. Some wires, e.g. self-shielded cored wires, are recommended to be welded with negative polarity. Negative polarity means that the polarity changeover cable is connected to the negative terminal and the return cable to the positive terminal. Check the recommended polarity for the welding wire you want to use.

The polarity can be changed by moving the polarity changeover cable to suit the applicable welding process.



## 5.5 Turning the mains power on/off

Turn on the mains power by turning switch to the "I" position.

Turn the unit off by turning the switch to the "O" position.

Whether the mains power supply is interrupted or the power source is switched off in the normal manner, weld programs will be stored so that it is available next time the unit is started.



### CAUTION!

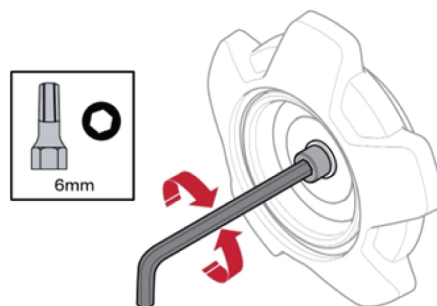
Do not turn off the power source during welding (with load).

## 5.6 Bobbin brake

The bobbin brake force should be increased just enough to prevent wire feed overrun. The actual brake force needed, is dependent of the wire feed speed and the size and weight of the bobbin spool.

Do not overload the bobbin brake! A too high brake force may overload the motor and reduce the welding result.

The bobbin brake force is adjusted using the 6 mm hexagon Allen screw in the middle of the brake hub nut.



## 5.7 Changing and loading wire

- 1) Open the left door of the power source
- 2) Untighten and remove the brake hub nut and remove the old wire spool.
- 3) Insert a new wire spool into the unit and straighten out the new welding wire 10–20 cm. File away burrs and sharp edges from the end of the wire before inserting it into the feeder mechanism.



- 4) Lock the wire spool onto the brake hub, by tightening the brake hub nut.
- 5) Thread the wire through the feeder mechanism.

**NOTE!**

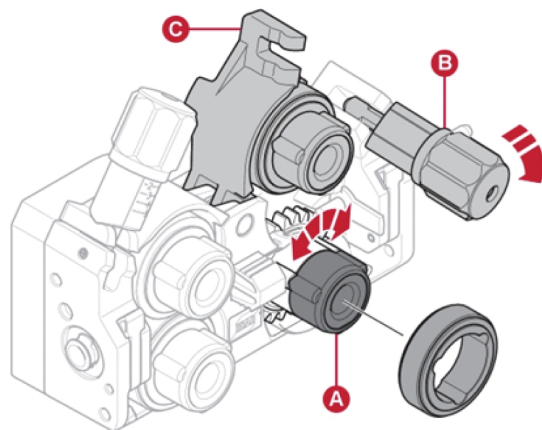
Replace the brake hub nut and the brake hub sleeve if they are worn out and do not lock properly.

- 6) Close and lock the left door of the wire feeder.

## 5.8 Changing feed rollers

When changing to a different type of wire, the feed rollers should be changed to match the new type of wire. For information about correct feed roller depending on wire diameter and type, see the WEAR PARTS appendix.

- 1) Open the left door of the wire feeder.
- 2) Unlock the feed rollers to be exchanged, by rotating the roller quick lock (A) for each roller.
- 3) Relieve the pressure on the feed rollers, by folding the tensioner units (B) down and thereby releasing the swing arms (C).

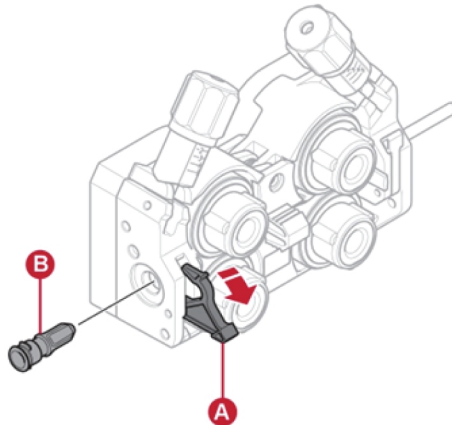


- 4) Remove the feed rollers and install the correct ones (according to the WEAR PARTS appendix).
- 5) Reapply the pressure on the feed rollers, by pushing the swing arms (C) down and secure them using the tensioner units (B).
- 6) Lock the rollers by rotating the roller quick locks (A).
- 7) Close and lock the left door of the wire feeder.

## 5.9 Changing the wire guides

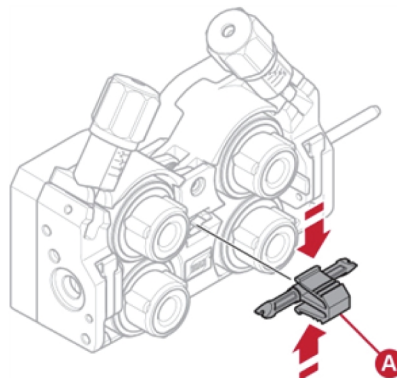
When changing to a different type of wire, the wire guides may have to be changed to match the new type of wire. For information about the correct wire guides depending on wire diameter and type, see the WEAR PARTS appendix.

### 5.9.1 Inlet wire guides



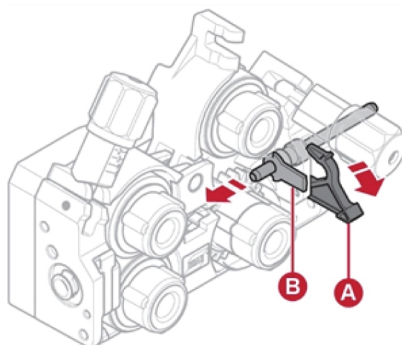
- 1) Unlock the inlet wire guide quick lock (A) by folding it out.
- 2) Remove the inlet wire guide (B).
- 3) Install the correct inlet wire guide (according to the WEAR PARTS appendix).
- 4) Lock the new inlet wire guide using the wire guide quick lock (A).

### 5.9.2 Middle wire guide



- 1) Apply a little pressure on the middle wire guide clip and pull out the middle wire guide (A).
- 2) Push in the correct type of wire guide (according to the WEAR PARTS appendix). The clip automatically locks the wire guide when in the correct position.

### 5.9.3 Outlet wire guide



- 1) Remove the lower right feed roller (see Section 5.8 "Changing feed rollers", page 17).
- 2) Remove the middle wire guide (see Section 5.9.2 "Middle wire guide", page 18).
- 3) Unlock the outlet wire guide quick lock (A) by folding it out.
- 4) Remove the outlet wire guide (B).

- 5) Install the correct outlet wire guide (according to the WEAR PARTS appendix).
- 6) Lock the new outlet wire guide using the wire guide quick lock (A).
- 7) Reattach the second pair of feed rollers and reapply the roller pressure (see Section 5.8 "Changing feed rollers", page 17).

## 5.10 Roller pressure

The roller pressure should be adjusted separately on each tensioner unit, depending on used wire material and diameter.

Start by making sure that the wire moves smoothly through the wire guide. Then set the pressure of the wire feeder's pressure rollers. It is important that the pressure is not too high.

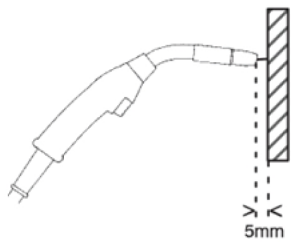


Figure A.

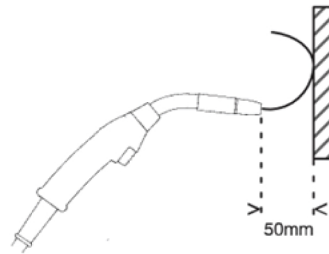


Figure B.

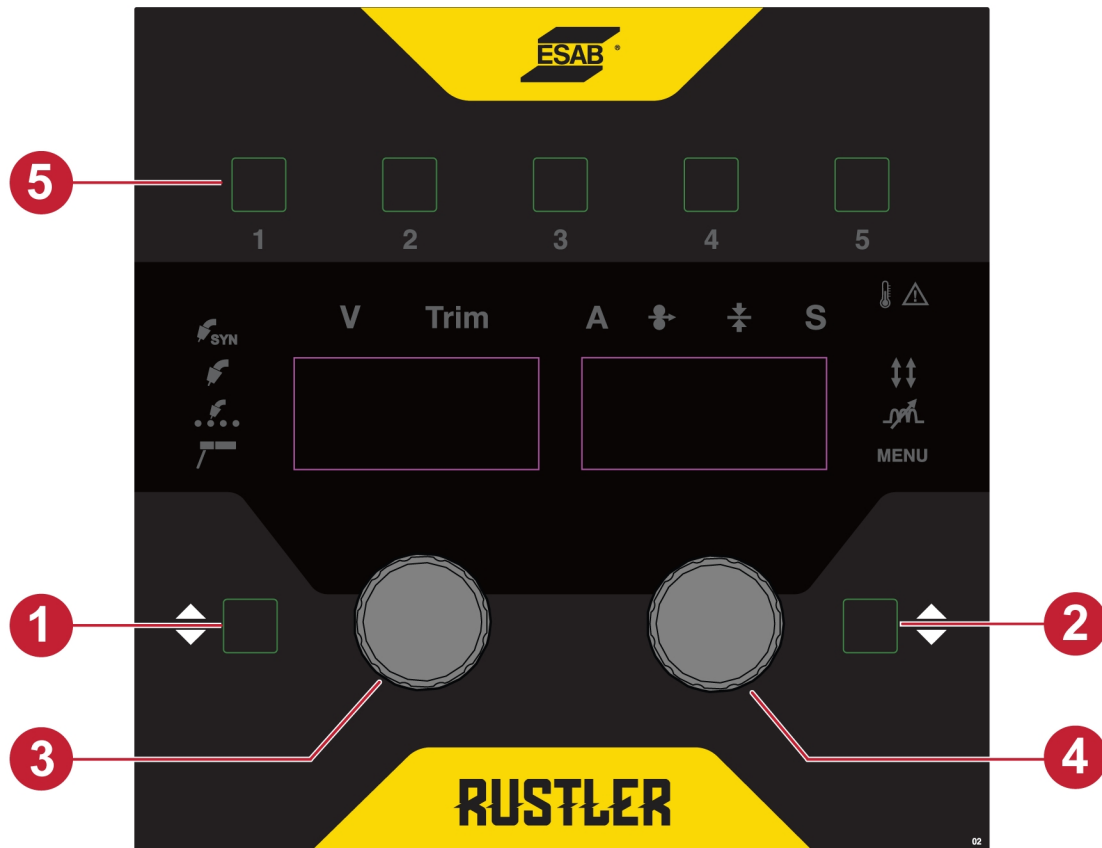
To check that the feed pressure is set correctly, you can feed out the wire against an insulated object, e.g. a piece of wood.

When you hold the welding torch approx. 5 mm from the piece of wood (figure A) the feed rollers should slip.

If you hold the welding torch approx. 50 mm from the piece of wood, the wire should be fed out and bend (figure B).

## 6 CONTROL PANEL

### 6.1 External control panel



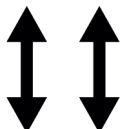
- |                               |                             |
|-------------------------------|-----------------------------|
| 1. Process selection button   | 4. Right potentiometer knob |
| 2. Parameter selection button | 5. Jobs                     |
| 3. Left potentiometer knob    |                             |

#### Process selection button (1)

The various welding processes such as MIG, MIG SYN, MIG SPOT and MMA can be selected through this button. When the machine is turned ON, it will be in MIG mode by default. Press this button to change to MIG SYN/MIG SPOT/MMA and repeat.

#### Parameter selection button (2)

Parameter selection button is used to switch the functionality of the torch trigger from trigger mode, Inductance and Menu.



#### Trigger mode

To access the functions, press the parameter selection button and let the trigger mode symbol ON. The left display shows the letter TRG and the right display shows 2T or 4T. Select the function by turning the knob (4).



#### Inductance

To access the functions, press the parameter selection button and let the inductance symbol ON. The left display shows the letter IND and the right display shows the value. The knob (4) is used to change the value of the selected function.

## MENU

There are basic functions in the menu feature. To access the functions, press the parameter selection button until the MENU symbol is ON. The left display shows a letter and the right display shows a value. Select the function by pressing the same button. The knob (4) is used to change the value of the selected function. The knob (3) is used to change the different functions.



### NOTE!

The list of MENU functions will vary depending on the application selected.

### Left potentiometer knob (3)

In MIG (GMAW/FCAW) mode, the knob is used to adjust the output voltage of the unit. In Manual MIG Mode, the setup chart is attached to the Wirefeeder compartment door.

In MIG SYN mode (EM 350C PRO SYNERGIC) turning the knob will select the TRIM function. In TRIM function, the knob clockwise increases the voltage by 0.1V increments and the maximum value is +5V.

In the Parameter selection state, adjusting the left knob (3) will select the different feature and the name will show on the left LED.

### Right potentiometer knob (4)

The right knob (4) adjusts the amount of welding current delivered by the power source. In MMA modes, the knob directly adjusts the power inverter to deliver the desired level of output current.



In MIG (GMAW/FCAW) mode, the right knob adjusts the speed of the wire feed motor. The optimum Wire feed speed required will be dependent on the type of welding application. The setup chart is attached to the Wirefeeder compartment door.







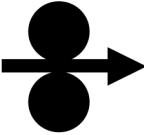
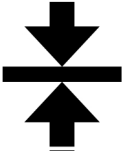

In MIG SYN mode (EM 350C PRO SYNERGIC) turning the right Knob will select wire feed speed or thickness. The default value will be wire feed speed and thickness can be selected in the hidden functions.

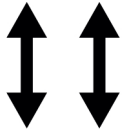


### Jobs (5)

These buttons have five sets of welding dates for the user to load and save. It can be applied for MIG/ MAG welding.

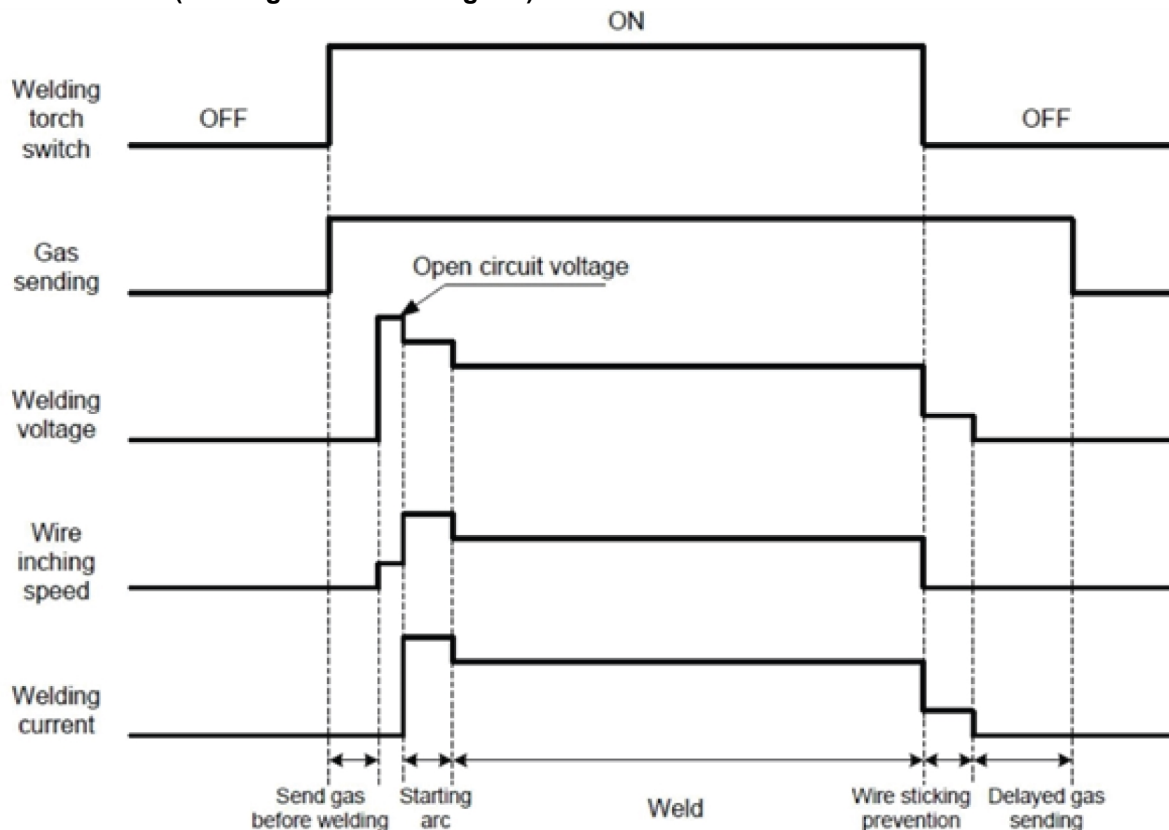
## 6.2 LED indicators description

Indicator	Description
	<b>MIG/MAG</b> Constant voltage control process is where the set voltage and the wire feed speed are set independent of each other.
	<b>MIG/MAG SYN</b> A process with synergic voltage and inductance, in relation to wire feed speed using predetermined synergic line programs providing stable arc performance. The process operates through short circuit, globular and spray droplet transfer mode.

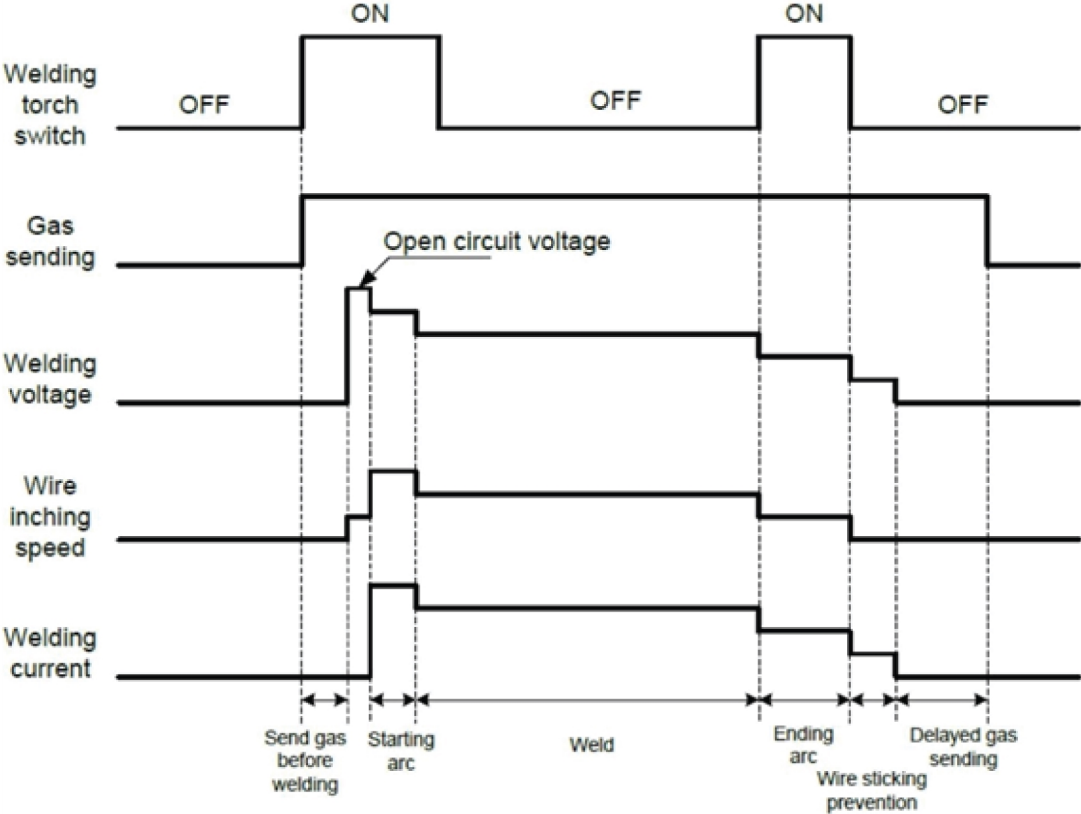
Indicator	Description
	<p><b>MIG/MAG SPOT</b></p> <p>Spot welding is used when you want to spot weld thin plates together.</p> <div style="border: 1px solid black; padding: 5px;"> <p> <b>NOTE!</b> It is not possible to shorten the welding time by releasing the trigger switch.</p> </div>
	<p><b>MMA</b></p> <p>MMA welding may also be referred to as welding with coated electrodes. Striking the arc melts the electrode, and its coating forms protective slag.</p>
	<p><b>Measured voltage</b></p> <p>Measured value in the display for welding voltage V is an average numerical value which is calculated during the welding excluding the weld termination.</p>
	<p><b>Trim</b></p> <p>Trim is the process of adjusting the parameter within an acceptable range.</p> <p>This function is applicable only in MIG/MAG Synergic.</p>
	<p><b>Measured amperage</b></p> <p>Measured value in the display for welding current A is an average numerical value which is calculated during the weld excluding the weld termination.</p>
	<p><b>Wire feed speed</b></p> <p>Measured value in the display for wire feed speed is an average numerical value which is calculated during the weld excluding the weld termination.</p>
	<p><b>Thickness</b></p> <p>Selected thickness in the display for the welding workpiece.</p> <p>This function is applicable only in MIG/MAG Synergic.</p>
	<p><b>Time</b></p> <p>Selected time in the display for the spot and rest time in seconds.</p> <p>This function is applicable only in MIG/MAG Spot.</p>

Indicator	Description
	<p><b>2-stroke</b></p> <p>This indicator blinks in green and displays 2T.</p> <p>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.</p> <p><b>4-stroke</b></p> <p>This indicator lit in static green and displays 4T.</p> <p>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.</p>
	<p><b>Inductance</b></p> <p>The arc control is used to adjust the intensity of the welding arc. Lower arc control settings make the arc softer with less weld spatter. Higher arc control settings give a stronger driving arc which can increase weld penetration. Soft means maximum inductance while Hard means minimum inductance.</p>
	<p><b>Thermal protection</b></p> <p>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.</p>

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

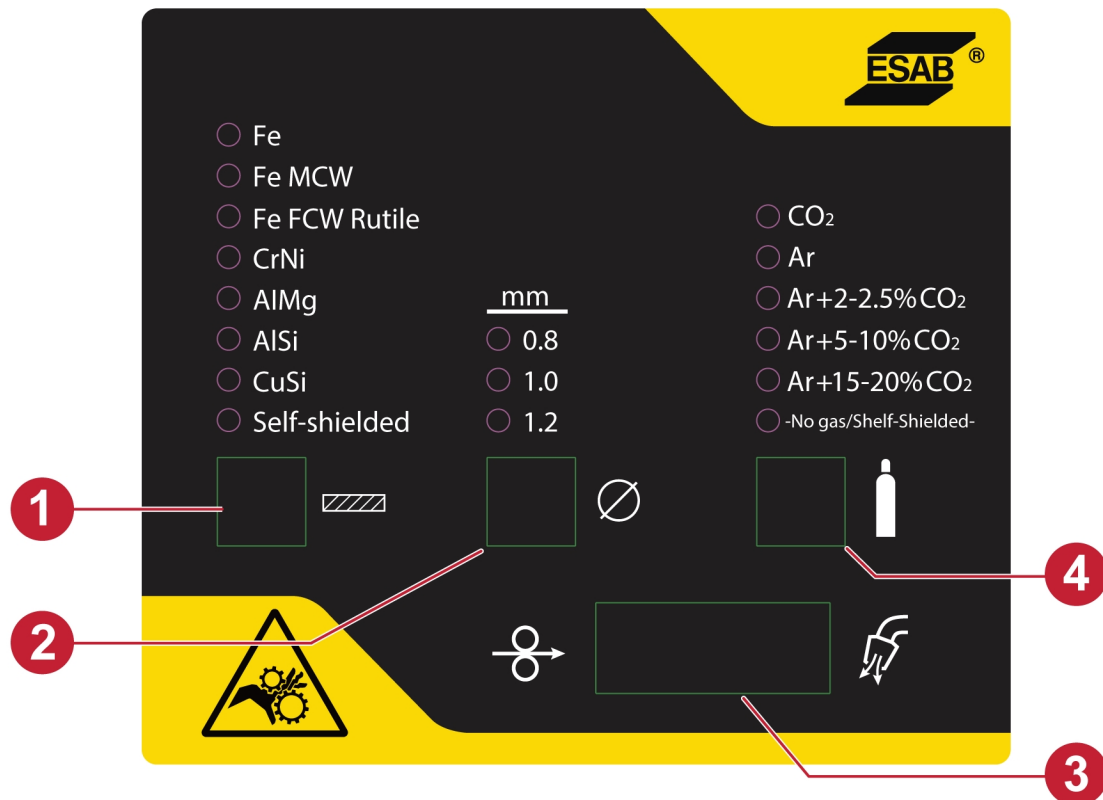


4-stroke mode (welding without ending arc)





## 6.3 Internal control panel



1. Material selection button
2. Wire diameter selection button
3. Wire inch and gas purge button
4. Gas selection button (Synergic variant only)

### Material selection button

This is used to select welded base material for optimal characteristics in the internal control panel.

### Wire diameter selection button

This is used to select the diameter of the installed wire in the internal control panel.

### Wire inching and gas purge button

Wire inching is used to feed wire without welding voltage being applied. The wire is fed as long as the button is pressed. This function is active in MIG applications only.

Gas purging is used while measuring the gas flow or for flushing any air or moisture from the gas hoses before welding starts. Gas purging occurs for 15 seconds when the gas purge button or torch trigger is pressed or until it is pressed again. Gas purge occurs without voltage or wire feed start. This function is active in MIG applications only.

### Gas selection button

This is used to select the proper gas type that is currently connected to the equipment in the internal control panel.

## 6.4 Menu selection

### 6.4.1 MIG/MAG and MIG/MAG SYN

In MIG mode, press the parameter selection button three times to navigate to MENU option. Select the desired welding function one after the other by turning the left potentiometer knob and adjust the desired value by turning the right potentiometer knob.

Left display letter	Function	Default	Right display settings
B-B	Burnback	0.1	0.01-0.35
CRA	Crater fill time	0	0.0-9.9
PRG	Pre-flow	0.1	0.5-9.9
POG	Post-flow	0.5	0.5-9.9
RIN	Creep start (Run in)	ON	ON/OFF

#### Burnback (B-B)

Burnback time is a delay between the time when the wire starts to brake until the time when the power source switches off the welding voltage.

Too short burnback time results in a long wire stick out after completion of welding, with a risk of the wire being caught in the solidifying weld pool.

Too long a burnback time results in a shorter stick out, with increased risk of the arc striking back to the contact tip.

#### Crater fill (CRA)

Crater filling makes a controlled reduction in the heat and size of the weld pool possible when completing the weld. This makes it easier to avoid pores, thermal cracking and crater formation in the weld joint.

#### Pre/flow (PRG)

Pre-flow controls the time during which shielding gas flows before the arc is struck.

#### Post/flow (POG)

This controls the time during which shielding gas flows after the arc is extinguished.

#### Creep start (RIN)

Creep start feeds out the wire at a low wire feed speed until it makes electrical contact with the workpiece.

### 6.4.2 Hidden functions for MIG/MAG and MIG/MAG SYN

Long press the parameter selection button to navigate the hidden MENU option (No welding). Select the desired function one after the other by turning the left potentiometer knob and adjust the value by turning the right potentiometer knob.

Left display letter	Function	Default	Right display settings
DIS	Display value during welding	WFS	WFS/AMP
SYN	Workpoint in synergic	WFS	WFS/THI
UNT	Unit (metric or imperial)	MPM	MPM/IPM
TJS	Trigger job select	OFF	ON/OFF

Left display letter	Function	Default	Right display settings
VEN	Version no.	V4.0	-
RES	Default settings	No	No/Yes

**Display (DIS)**

This function enables to display of the wire feed speed (WFS) or amperage (AMP) values during welding.

**Synergic (SYN)**

This function enables to set up a machine work point based on wire feed speed (WFS) or material thickness (THI).

**Unit (UNT)**

This function enables switching the units of measure for wire feed speed and thickness between the metric (MPM) or imperial (IPM).

**Trigger job (TJS)**

This function permits changing between different welding data memories by pressing the trigger of the welding torch. Pressing the trigger once will activate Job 1 and pressing the trigger twice will activate Job 2. The same procedure should be followed for all the Jobs.

**Version No. (VEN)**

This function enables viewing the software versions of the connected system.

**Reset (RES)**

This function resets to the factory default settings. All saved jobs will be deleted as a result of the reset.

### 6.4.3 MIG SPOT

In MIG SPOT mode, press the parameter selection button three times to navigate to the MENU option. Select the desired welding function one after the other by turning the left potentiometer knob and adjusting the value by turning the right potentiometer knob.

Left display letter	Function	Default	Right display settings
B-B	Burnback	0.1	0.01-0.35
S/T	Spot time	0.1	0.1-5.0
DWE	Rest time	0.1	OFF/0.1-5.0
POG	Post-flow	0.5	0.5-9.9

**Burnback (B-B)**

Burnback time is a delay between the time when the wire starts to brake until the time when the power source switches off the welding voltage.

Too short burnback time results in a long wire stick out after completion of welding, with a risk of the wire being caught in the solidifying weld pool.

Too long a burnback time results in a shorter stick out, with increased risk of the arc striking back to the contact tip.

**Spot Time (S/T)**

Spot time is a time when the arc will be enabled after pressing the trigger.

**Rest time (DWE)**

Rest time is used to define time without arc between spot welds.

**Post-flow (POG)**

This controls the time during which shielding gas flows after the arc is extinguished.

**6.4.4 Hidden functions for MIG SPOT**

Long press the parameter selection button to navigate the hidden MENU option (No welding). Select the desired function one after the other by turning the left potentiometer knob and adjust the value by turning the right potentiometer knob.

Left display letter	Function	Default	Right display settings
DIS	Display value during welding	WFS	WFS/AMP
UNT	Unit (metric or imperial)	MPM	MPM/IPM
VEN	Version no.	V4.0	-
RES	Default settings	No	No/Yes

**Display (DIS)**

This function enables to display of the wire feed speed (WFS) or amperage (AMP) values during welding.

**Unit (UNT)**

This function enables switching the units of measure for wire feed speed and thickness between the metric (MPM) or imperial (IPM).

**Version No. (VEN)**

This function enables viewing the software versions of the connected system.

**Reset (RES)**

This function resets to the factory default settings. All saved jobs will be deleted as a result of the reset.

**6.4.5 MMA**

In MMA mode, press the parameter selection button once the MENU option will appear. Select the desired function one by one (HOT, ARC) by turning the left potentiometer knob and adjust the value by turning the right potentiometer knob.

Left display letter	Function	Default	Right display settings
HOT	Hot start	AUT	0-10
ARC	Arc force	AUT	0-10

**Hot start**

The hot start function temporarily increases the current in the beginning of the weld, thus reducing the risk of lack of fusion in the starting point.

**Arc force**

The arc force function determines how the current changes in response to variations in arc length during welding. Use a low value of arc force to get a calm arc with little spatter and use a high value to get a hot and digging arc.

## 6.4.6 Hidden functions for MMA

Long press the parameter selection button to navigate the hidden MENU option (No welding). Select the desired function one by one (RES, VER) by turning the left potentiometer knob and adjust the value by turning the right potentiometer knob.

Left display letter	Function	Default	Right display settings
VEN	Version no.	V4.0	-
RES	Default settings	No	No/Yes

### Version No. (VEN)

This function enables viewing the software versions of the connected system.

### Reset (RES)

This function resets to the factory default settings. All saved jobs will be deleted as a result of the reset.

## 7 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!**



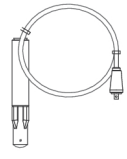

Perform maintenance more often during severe dusty conditions.

Before each use - make sure that:

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

### 7.1 Routine maintenance

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

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

## 7.2 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

## 7.3 Inspection, cleaning and replacement

**CAUTION!**

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

**CAUTION!**

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

### Wire feed mechanism

Check regularly that the wire feed unit is not clogged with dirt.

- Cleaning and replacement of the wire feed unit mechanism's worn parts should take place at regular intervals in order to achieve trouble-free wire feed. Note that if pre-tensioning is set too hard, this can result in abnormal wear on the pressure roller, feed roller and wire guide.
- Clean the liners and other mechanical parts of the wire feed mechanism, using compressed air, at regular intervals or if the wire feed seems slow.
- Changing nozzles.
- Checking driving-wheel.
- Changing the cog-wheel package.

### Bobbin holder

Inspect at regular intervals that the brake hub sleeve and the brake hub nut are not worn out and that they lock properly, replace if necessary.

### Welding torch

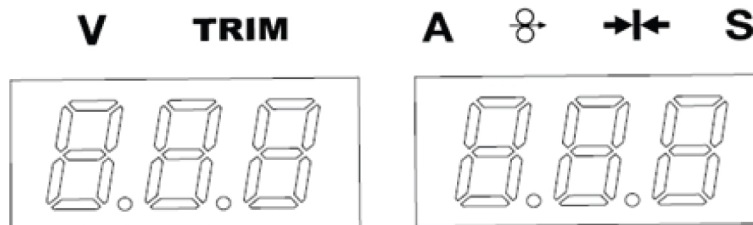
The wear parts of the welding torch should be cleaned and replaced at regular intervals in order to achieve trouble-free wire feed. Blow the wire guide clean regularly and clean the contact tip.

After cleaning and perform testing according to IEC 60974-4. Follow the procedure in section "After repair, inspection and test" in the Service manual.

## 8 ERROR CODES

The error code is used to indicate that a fault has occurred in the equipment. Errors are indicated by the text "Err" followed by the error code number shown in the display.

### Screens



### 8.1 Error code descriptions

Error codes that the user can handle are listed below. If any other error code appears, contact an authorised ESAB service technician.

Error code	Description
<b>Err 002</b>	<p><i>Torch trigger-related error</i> The torch trigger be pressed all the time or the torch trigger signal be short circuit and the ARC is also not established.</p> <p><b>Action:</b></p> <ol style="list-style-type: none"> <li>1. Check that the Torch Trigger Switch is not depressed when the Power Source is switched ON.</li> <li>2. When releasing the trigger, check if the torch switch is short circuit.</li> <li>3. If the error code persist, retrieve the service log.</li> </ol>
<b>Err 205</b>	<p><i>Lack-phase protection</i> The input socket loses the phase when connecting the input wires to the socket.</p> <p><b>Action:</b></p> <ol style="list-style-type: none"> <li>1. Check the condition of the mains supply and make sure they are all good connection.</li> <li>2. Make sure that the power source connects to the rated input mains supply voltage and turn the mains power supply switch ON. If the error code persist, retrieve the service log.</li> </ol>
<b>Err 206</b>	<p><i>Over temperature</i> The power source run more than the duty cycle.</p> <p><b>Action:</b></p> <ol style="list-style-type: none"> <li>1. Wait until the power source cools down for ten minutes.</li> <li>2. Make sure that you are not exceeding the rated data for the power source.</li> <li>3. Make sure that the power source connects to the rated input mains supply voltage and turn the mains power supply switch ON. If the error code persist, retrieve the service log.</li> </ol>



Error code	Description
<b>Err 215</b>	<p><i>Output Short Circuit</i> Short circuit is detected during output activation fault trigger.</p> <p><b>Action:</b></p> <ol style="list-style-type: none"> <li>1. Make sure that the welding cables are properly installed of the weld terminals.</li> <li>2. Turn OFF the power source and wait a few minutes. If the error code persist, retrieve the service log.</li> </ol>
<b>Err 216</b>	<p><i>Over output current</i> The output amps over design limitation.</p> <p><b>Action:</b></p> <ol style="list-style-type: none"> <li>1. Make sure that you are not exceeding the rated data for the power source.</li> <li>2. Turn OFF the power source and wait a few minutes.</li> <li>3. Set the power source to the rated output voltage &amp; current, If the error code persist, retrieve the service log.</li> </ol>
<b>Err 311</b>	<p><i>Over output current for wire feeder</i> The wire feeder motor amps over design limitation.</p> <p><b>Action:</b></p> <ol style="list-style-type: none"> <li>1. Check the liner, clean using pressurized air. Replace the liner if damaged or worn out.</li> <li>2. Check the wire pressure setting and adjust if needed.</li> <li>3. Check the drive rolls for wear and replace if needed.</li> <li>4. Make sure the filler metal spool can rotate without much resistance. Adjust the brake hub if needed.</li> </ol>

## 9 TROUBLESHOOTING

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

Check that the mains voltage is disconnected before starting any type of repair action.

Type of fault	Corrective action
No arc	Check that the mains power supply switch is turned on.
	Check that the mains, welding and return cables are correctly connected
	Check that the correct current value is set.
	Check the mains power supply fuses.
The thermal protection trips frequently	Make sure that you are not exceeding the rated data for the power source (i.e. that the unit is not being overloaded).
	Check that the ambient temperature is not above the one for the rated duty cycle 40°C/104°F.
Poor welding performance	Check that the welding current supply and return cables are correctly connected.
	Check that the correct current value is set.
	Check that the correct welding wires are being used.
	Check the main power supply fuses.
The wire feed is slow/stiff through the wire feed mechanism	Clean the liners and other mechanical parts of the wire feed mechanism, using pressurized air.
	Clean and adjust the roller pressure as per the table on the decal on the left side door.

## 10 CALIBRATION AND VALIDATION



### WARNING!

Calibration and validation should be performed by a trained service technician, possessing sufficient training in welding and measurement technology. The technician should have knowledge of hazards that may occur during welding and measurement and should take necessary protective actions!

### 10.1 Measurement methods and tolerances

When calibrating and validating, the reference measuring instrument must use the same measuring method in the DC range (averaging and rectification of the measured values). A number of measurement methods are used for reference instruments, e.g. TRMS (True Root Mean Square), RMS (Root-Mean-Square) and rectified arithmetic mean. Rustler EM PRO uses the rectified arithmetic mean value and should therefore be calibrated against a reference instrument using the rectified arithmetic mean value.

In the field application it will occur that a measuring device and a Rustler EM PRO may display different values even though both systems are validated and calibrated. This is due to the measurement tolerances and the method of measurement of the two measurement systems. This can result in a total deviation up to the sum of both measurement tolerances. If the measurement method differ (TRMS, RMS or rectified arithmetic mean), significantly larger deviations are to be expected!

The ESAB Rustler EM PRO welding power source presents the measured value in rectified arithmetic mean and should therefore not show any significant differences compared to other ESAB welding equipment, due to the measurement method.

### 10.2 Requirements specifications and standards

Rustler EM PRO is designed to meet the accuracy for indication and meters required by IEC/EN 60974-14, by definition Standard grade.

#### Calibration accuracies of displayed value

Arc voltage	$\pm 1.5 \text{ V}$ ( $U_{\min}-U_2$ ) under load, resolution 0.25 V (Theoretical measuring range in a Rustler EM PRO system is 0.25-199 V.)
Welding current	$\pm 2.5\%$ of $I_2$ max according to rating plate of the unit under test, resolution 1 A. The measuring range is specified by the rating plate on the used Rustler EM PRO welding power source.

#### Recommended method and applicable standard

ESAB recommend calibration and validation to be executed according to IEC/EN 60974-14(:2018) or EN 50504:2008 (unless another way of execution is communicated from ESAB).

## 11 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.

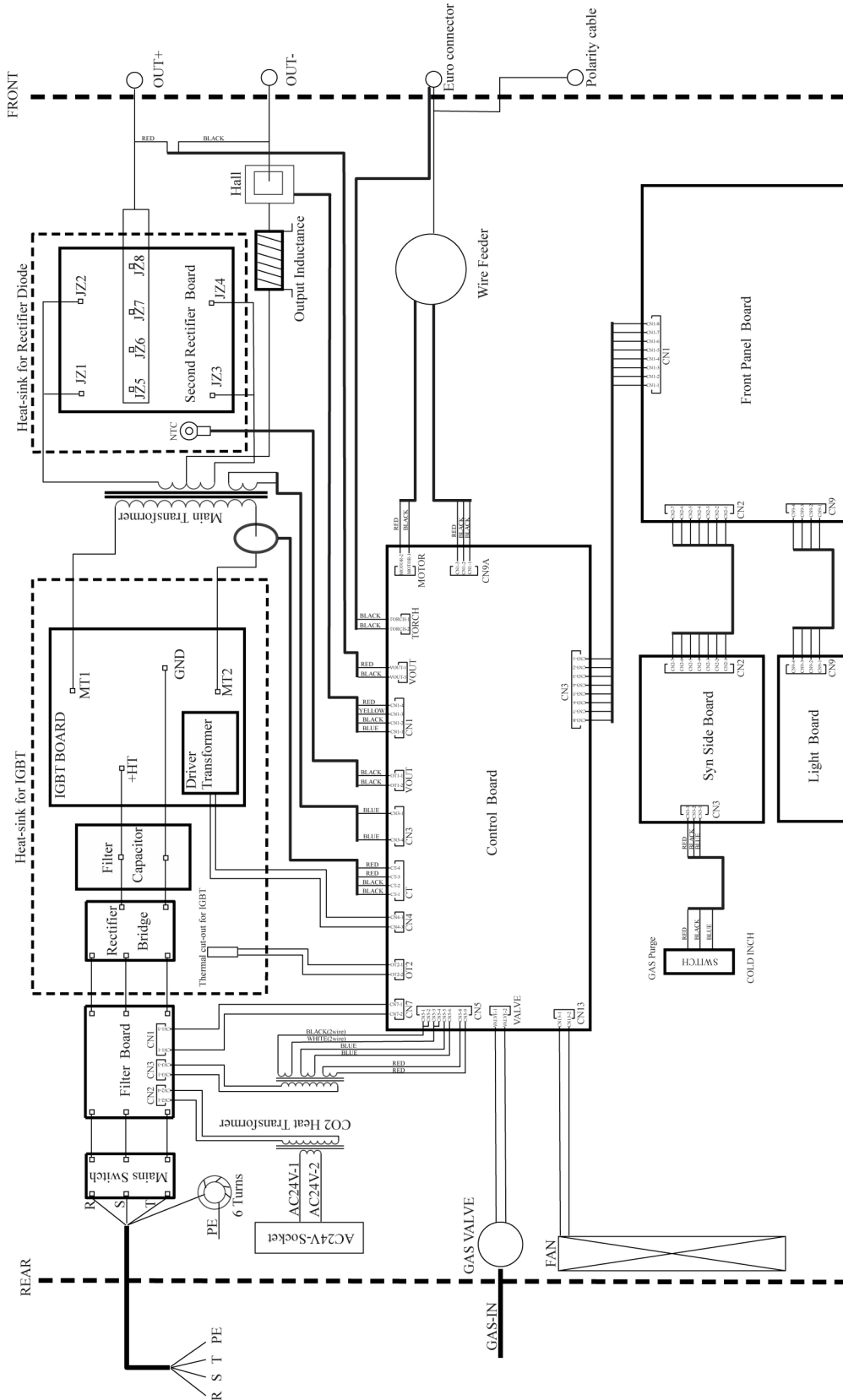
The Rustler EM 280 PRO, EM 350 PRO and EM 350 PRO SYNERGIC are designed and tested in accordance with the international and European standards **EN IEC 60974-1**, **EN IEC 60974-5** and **EN IEC 60974-10 Class A**. On completion of service or repair work, it is the responsibility of the person(s) performing 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.

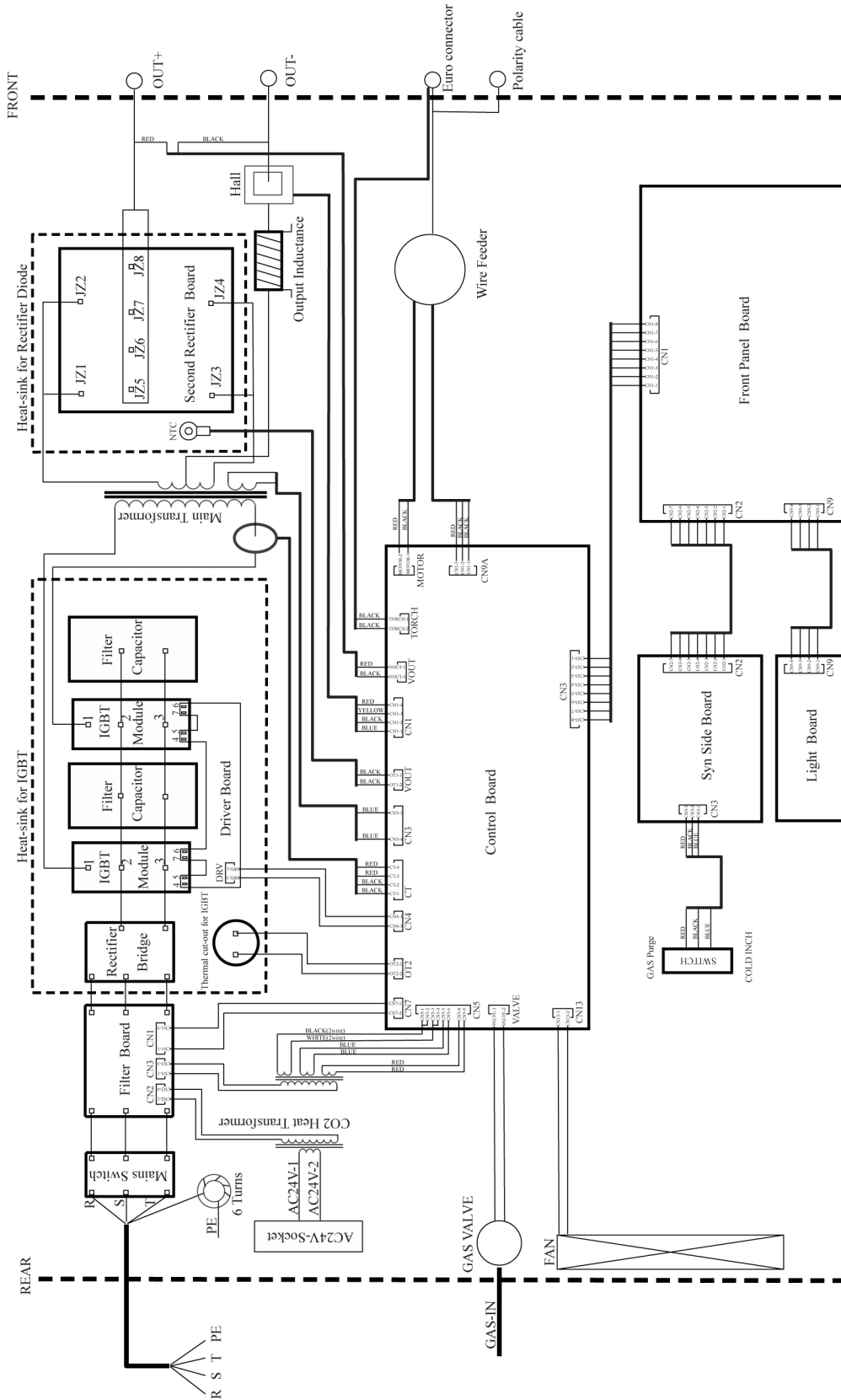
# APPENDIX

## WIRING DIAGRAM

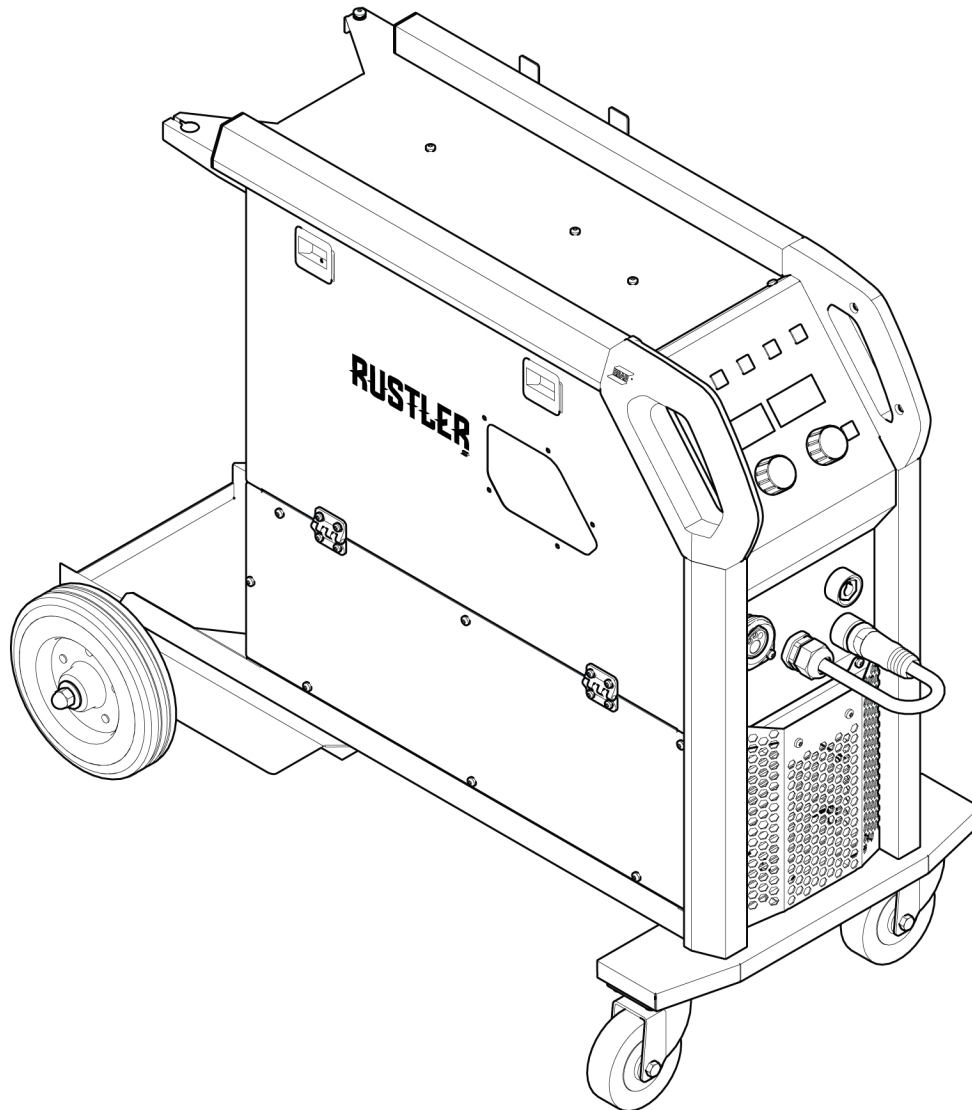
EM 280 PRO



EM 350 PRO



## ORDERING NUMBERS





Ordering number	Denomination	Notes
0448 280 880	Rustler EM 280C PRO	With Exeor Torch 315, Remote 4 m
0448 350 881	Rustler EM 350C PRO	With Exeor Torch 315, Remote 4 m
0448 350 882	Rustler EM 350C PRO Synergic	With Exeor Torch 315, Remote 4 m
0448 280 890	Rustler EM 280C PRO	
0448 350 891	Rustler EM 350C PRO	
0448 350 892	Rustler EM 350C PRO Synergic	
0463 930 *	Instruction manual	Rustler EM PRO
0463 931 001	Spare parts list	Rustler EM PRO


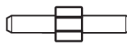

The three last digits in the document number of the manual show the version of the manual. Therefore they are replaced with \* here. Make sure to use a manual with a serial number or software version that corresponds with the product, see the front page of the manual.

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



## WEAR PARTS


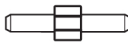

### Fe, Ss and cored wire

Wire diameter (in.) (mm)	.023 0.6	.030 0.8	.040 0.9/1.0	.045 1.2	.052 1.4	1/16 1.6	.070 1.8	5/64 2.0	 Feed roller
<b>V-groove</b> 	<b>X</b>	<b>X</b>							0445 850 001
		<b>X</b>	<b>X</b>						0445 850 002
			<b>X</b>						0445 850 003
			<b>X</b>	<b>X</b>					0445 850 004
				<b>X</b>					0445 850 005
					<b>X</b>	<b>X</b>			0445 850 006
								<b>X</b>	0445 850 007

Inlet wire guide 	Middle wire guide 	Outlet wire guide 
0445 822 001 (2 mm)	0446 080 882	0445 830 883 (Tweco) 0445 830 881 (Euro)






### Cored wire – Different wire guides dependent on wire diameter!

Wire diameter (in.) (mm)	.040 0.9/1.0	.045 1.2	.052 1.4	1/16 1.6	.070 1.8	5/64 2.0	3/32 2.4	 Feed roller
<b>V-K-knurled</b> 	<b>X</b>	<b>X</b>						0445 850 030
		<b>X</b>						0445 850 031
		<b>X</b>	<b>X</b>					0445 850 032
					<b>X</b>			0445 850 033
						<b>X</b>		0445 850 034
							<b>X</b>	0445 850 035
								<b>X</b>




	Inlet wire guide 	Middle wire guide 	Outlet wire guide 
<b>Wire diameter 0.040–1/16 in. 0.9–1.6 mm</b>	0445 822 001 (2 mm)	0446 080 882	0445 830 883 (Tweco) 0445 830 881 (Euro)
<b>Wire diameter 0.070–3/32 in. 1.8–2.4 mm</b>	0445 822 002 (3 mm)	0446 080 883	0445 830 884 (Tweco) 0445 830 882 (Euro)



## Al wire

Wire diameter (in.) (mm)	<b>.023</b> 0.6	<b>.030</b> 0.8	<b>.040</b> 0.9/1.0	<b>.045</b> 1.2	<b>.052</b> 1.4	<b>1/16</b> 1.6	<b>.070</b> 1.8	 <b>Feed roller</b>
<b>U-groove</b> 		<b>X</b>	<b>X</b>					0445 850 050
			<b>X</b>	<b>X</b>				0445 850 051
				<b>X</b>		<b>X</b>		0445 850 052
<b>Inlet wire guide</b> 	<b>Middle wire guide</b> 					<b>Outlet wire guide</b> 		
0445 822 001 (2 mm)	0446 080 881					0445 830 886 (Tweco)		
						0445 830 885 (Euro)		

## ACCESSORIES

0700 026 114	MIG Torch Exeor 315 R4, Remote, 4 m	
<b>MIG Torch PSF 315</b>		
0700 0250 030	3 m	
0700 0250 031	4 m	
0700 0250 032	5 m	
F102 440 880	Quick connector Marathon Pac™	
0448 156 880	Top storage toolbox	
0448 157 880	User Interface protective cover	
0700 401 024	CO <sub>2</sub> heater kit	
0700 006 902	Electrode holder kit, Handy 300, OKC 50, 3 m	
0700 006 888	Electrode holder kit, Handy 300, OKC 50, 5 m	





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