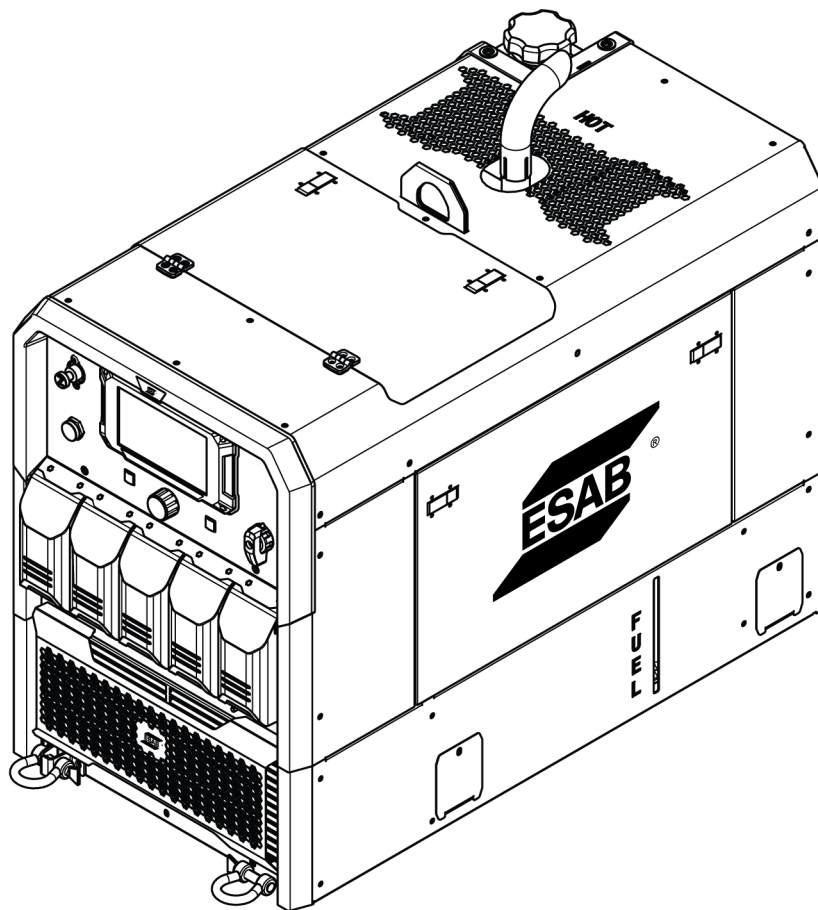




Ruffian EMP 270G EDW

Multiprocess Engine Driven Welder 270A



Instruction manual

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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 General safety precautions for arc welding



WARNING!

These Safety Precautions are for your protection. They summarize precautionary information from the references listed in the Additional Safety Information section. Before performing any installation or operating procedures, be sure to read and follow the safety precautions listed below as well as all other manuals, material safety data sheets, labels, etc. Failure to observe Safety Precautions can result in injury or death.



PROTECT YOURSELF AND OTHERS

Some welding, cutting and gouging processes are noisy and require ear protection. The arc, like the sun, emits ultraviolet (UV) and other radiation and can injure skin and eyes. Hot metal can cause burns. Training in the proper use of the processes and equipment is essential to prevent accidents. Therefore:

1. Wear a welding helmet fitted with a proper shade of filter to protect your face and eyes when welding or watching.
2. Always wear safety glasses with side shields in any work area, even if welding helmets, face shields and goggles are also required.
3. Use a face shield fitted with the correct filter and cover plates to protect your eyes, face, neck and ears from sparks and rays of the arc when operating or observing operations. Warn bystanders not to watch the arc and not to expose themselves to the rays of the electric-arc or hot metal.
4. Wear flameproof gauntlet type gloves, heavy long-sleeve shirt, cuffless trousers, high-topped shoes and a welding helmet or cap for protection, to protect against arc rays and hot sparks or hot metal. A flameproof apron may also be desirable as protection against radiated heat and sparks.
5. Hot sparks or metal can lodge in rolled up sleeves, trouser cuffs, or pockets. Sleeves and collars should be kept buttoned and open pockets eliminated from the front of clothing.
6. Protect other personnel from arc rays and hot sparks with a suitable non-flammable partition or curtains.
7. Use goggles over safety glasses when chipping slag or grinding. Chipped slag may be hot and can fly far. Bystanders should also wear goggles over safety glasses.



FIRES AND EXPLOSIONS

Heat from flames and arcs can start fires. Hot slag or sparks can also cause fires and explosions. Therefore:

1. Protect yourself and others from flying sparks and hot metal.
2. Remove all combustible materials well away from the work area or cover the materials with a protective non-flammable covering. Combustible materials include wood, cloth, sawdust, liquid and gas fuels, solvents, paints and coatings paper, etc.
3. Hot sparks or hot metal can fall through cracks or crevices in floors or wall openings and cause a hidden smoldering fire or fires on the floor below. Make certain that such openings are protected from hot sparks and metal.
4. Do not weld, cut or perform other hot work until the work piece has been completely cleaned so that there are no substances on the work piece which might produce flammable or toxic vapors. Do not do hot work on closed containers, they may explode.
5. Have fire extinguishing equipment handy for instant use, such as a garden hose, water pail, sand bucket, or portable fire extinguisher. Be sure you are trained in its use.
6. Do not use equipment beyond its ratings. For example, an overloaded welding cable can overheat and create a fire hazard.
7. After completing operations, inspect the work area to make certain there are no hot sparks or hot metal which could cause a later fire. Use fire watchers when necessary.



ELECTRICAL SHOCK

Contact with live electrical parts and ground can cause severe injury or death. DO NOT use AC welding current in damp areas, if movement is confined, or if there is danger of falling. Therefore:

1. Be sure the power source frame (chassis) is connected to the ground system of the input power.
2. Connect the workpiece to a good electrical ground.
3. Connect the work cable to the workpiece. A poor or missing connection can expose you or others to a fatal shock.
4. Use well-maintained equipment. Replace worn or damaged cables.
5. Keep everything dry, including clothing, work area, cables, torch/electrode holder and power source.
6. Make sure that all parts of your body are insulated from both the work piece and from the ground.
7. Do not stand directly on metal or the earth while working in tight quarters or a damp area; stand on dry boards or an insulating platform and wear rubber-soled shoes.
8. Put on dry, hole-free gloves before turning on the power.
9. Turn off the power before removing your gloves.
10. Refer to ANSI/ASC Standard Z49.1 for specific grounding recommendations. Do not mistake the work lead for a ground cable.



ELECTRIC AND MAGNETIC FIELDS

May be dangerous. Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). Welding and cutting current creates EMF around welding cables and welding machines. Therefore:

1. Welders with pacemakers should consult their physician before welding. EMF may interfere with some pacemakers.
2. Exposure to EMF may have other health effects which are unknown.

3. Welders should use the following procedures to minimize exposure to EMF:
 - a) Route the electrode and work cables together. Secure them with tape when possible.
 - b) Never coil the torch or work cable around your body.
 - c) Do not place your body between the torch and work cables. Route cables on the same side of your body.
 - d) Connect the work cable to the workpiece as close as possible to the area being welded.
 - e) Keep welding power source and cables as far away from your body as possible.



FUMES AND GASES

Fumes and gases can cause discomfort or harm, particularly in confined spaces. Shielding gases can cause asphyxiation. Therefore:

1. Keep your head out of the fumes. Do not breathe the fumes and gases.
2. Always provide adequate ventilation in the work area by natural or mechanical means. Do not weld, cut or gouge on materials such as galvanized steel, stainless steel, copper, zinc, lead, beryllium or cadmium unless positive mechanical ventilation is provided. Do not breathe fumes from these materials.
3. Do not operate near degreasing and spraying operations. The heat or arc can react with chlorinated hydrocarbon vapors to form phosgene, a highly toxic gas, and other irritant gases.
4. If you develop momentary eye, nose or throat irritation while operating, this is an indication that ventilation is not adequate. Stop work and take necessary steps to improve ventilation in the work area. Do not continue to operate if physical discomfort persists.
5. Refer to ANSI/ASC Standard Z49.1 for specific ventilation recommendations.



CYLINDER HANDLING

Cylinders, if mishandled, can rupture and violently release gas. A sudden rupture of cylinder valve or relief device can injure or kill. Therefore:

1. Locate cylinders away from heat, sparks and flames. Never strike an arc on a cylinder.
2. Use the proper gas for the process and use the proper pressure reducing regulator designed to operate from the compressed gas cylinder. Do not use adapters. Maintain hoses and fittings in good condition. Follow manufacturer's operating instructions for mounting regulator to a compressed gas cylinder.
3. Always secure cylinders in an upright position by chain or strap to suitable hand trucks, undercarriages, benches, wall, post or racks. Never secure cylinders to work tables or fixtures where they may become part of an electrical circuit.
4. When not in use, keep cylinder valves closed. Have valve protection cap in place if regulator is not connected. Secure and move cylinders by using suitable hand trucks.



WARNING! FALLING EQUIPMENT CAN INJURE

- Only use lifting eye to lift unit. Do NOT use running gear, gas cylinders or any other accessories.
- Use equipment of adequate capacity to lift and support unit.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.
- Keep cables and cords away from moving vehicles when working from an aerial location.



WARNING! EQUIPMENT MAINTENANCE

Faulty or improperly maintained equipment can cause injury or death. Therefore:

1. Always have qualified personnel perform the installation, troubleshooting and maintenance work. Do not perform any electrical work unless you are qualified to perform such work.
2. Before performing any maintenance work inside a power source, disconnect the power source from the incoming electrical power.
3. Maintain cables, earthing wire, connections, power cord and power supply in safe working order. Do not operate any equipment in faulty condition.
4. Do not abuse any equipment or accessories. Keep equipment away from heat sources such as furnaces, wet conditions such as water puddles, oil or grease, corrosive atmospheres and inclement weather.
5. Keep all safety devices and cabinet covers in position and in good repair.
6. Use equipment only for its intended purpose. Do not modify it in any manner.



CAUTION! ADDITIONAL SAFETY INFORMATION

For more information on safe practices for electric arc welding and cutting equipment, ask your supplier for a copy of "Precautions and Safe Practices for Arc Welding, Cutting and Gouging", Form 52-529.

The following publications are recommended:

- ANSI/ASC Z49.1 - "Safety in Welding and Cutting"
- AWS C5.5 - "Recommended Practices for Gas Tungsten Arc Welding"
- AWS C5.6 - "Recommended Practices for Gas Metal Arc welding"
- AWS SP - "Safe practices" - Reprint, Welding Handbook
- ANSI/AWS F4.1 - "Recommended Safe Practices for Welding and Cutting of Containers That Have Held Hazardous Substances"
- OSHA 29 CFR 1910 - "Safety and health standards"
- CSA W117.2 - "Code for safety in welding and cutting"
- NFPA Standard 51B, "Fire Prevention During Welding, Cutting, and Other Hot Work"
- CGA Standard P-1, "Precautions for Safe Handling of Compressed Gases in Cylinders"
- ANSI Z87.1, "Occupational and Educational Personal Eye and Face Protection Devices"

1.3 General safety precautions for engines and generators



MOVING PARTS

Moving parts, such as fans, rotors and belts can cause injury. Therefore:

1. Keep all doors, panels, guards and covers closed and securely in place.
2. Stop engine or drive systems before installing or connecting unit.
3. Have only qualified people remove covers for maintenance and troubleshooting as necessary.
4. To prevent accidental starting of equipment during service, disconnect negative (-) battery cable from battery.
5. Keep hands, hair, loose clothing and tools away from moving parts.
6. Reinstall panels or covers and close doors when service is finished and before starting engine.



ENGINE EXHAUST GASES

Engines produce harmful exhaust gases and can kill. Therefore:

1. Use equipment outside in open, well-ventilated areas.
2. If used in a closed area, vent engine exhaust outside and away from any building air intakes.



ENGINE FUEL

Engine fuel is highly flammable and can cause fire or explosion. Therefore:

1. Stop engine before checking or adding fuel.
2. Do not add fuel while smoking or if unit is near any sparks or open flames.
3. Allow engine to cool before fueling. If possible, check and add fuel to cold engine before beginning job.
4. Do not overfill tank - allow room for fuel to expand.
5. Do not spill fuel. If fuel is spilled, clean up before starting engine.



BATTERY ACID

Batteries contain acid and generate explosive gases. Sparks can cause battery gases to explode. Therefore:

1. Always wear a face shield when working on a battery.
2. Stop engine before disconnecting or connecting battery cables.
3. Do not allow tools to cause sparks when working on a battery.
4. Do not use welder to charge batteries or jump start vehicles.
5. Observe correct polarity (+ and -) on batteries.

1.4 User responsibility

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 unauthorized 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



WARNING!

Do not use the power source for thawing frozen pipes.



CAUTION!

This product is solely intended for arc welding and related process that draw less than the kVA of the system.

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.

1.5 California proposition 65 warning



WARNING!

Welding or cutting equipment produces fumes or gases which contain chemicals known in the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)



WARNING!

Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling.



WARNING!

For Gasoline Engines:

Engine exhaust contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.



WARNING!

This product can expose you to chemicals including lead, which are known to the state of California to cause cancer and birth defects or other reproductive harm. Wash hands after use.

For more information, go to www.P65Warnings.ca.gov.

2 INTRODUCTION

The **Ruffian EMP 270G EDW** is the next generation of ESAB engine driven welders. A lightweight, compact and powerful combination of generator and multiprocess welder.

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

2.1 Equipment

The **Ruffian EMP 270G EDW** is supplied with:

- Welder instruction manual
- Engine instruction manual

3 TECHNICAL DATA

Ruffian EMP 270G EDW	
Welder specifications	
Technology	Inverter
Output setting range (DC)	
Stick (SMAW)	20 - 265 A (20.8 - 30.4 V)
GTAW	20 - 270 A (10.8 - 20.8 V)
MIG (GMAW)	30 - 270 A (13.0 - 30.0 V)
Flux Cored (FCAW)	30 - 270 A (13.0 - 30.0 V)
Gouging (CAC-A)	20 - 265 A (20.8 - 30.4 V)
Rated Duty Cycle	100%
Stick (SMAW)	235 A / 29.4 V
GTAW	270 A / 20.8 V
MIG (GMAW)	260 A / 27 V
Flux Cored (FCAW)	260 A / 27 V
Gouging (CAC-A)	235 A / 29.4 V
Open-circuit voltage	94 V (VRD OFF) 10 V (VRD ON)
Generator specifications	
Phases	Single-phase
Voltages	120/240 VAC
Frequency	60Hz
Peak power	11kW
Continuous power	10.5kW @ 77°F (25°C) 9.5kW @ 104°F (40°C)
Max current (without welding)	20 +20 A (120V AC) 39 A (240V AC)
Auxiliary AC receptacles	4x 120 V / 20 A GFCI 1x 240 V / 50 A (6-50R) 1x 120V/240V 50A (14-50R)
Engine specifications	
Brand	Kohler
Model	Command PRO CH730
Power	23.5 HP
Fuel type	Gasoline
Cooling type	Air
Cylinders	2
Starting method	Electric

Ruffian EMP 270G EDW	
Speeds (RPM / Hz)	
Run speed (bare crankshaft)	3750 RPM / 62.5 Hz
Rating speed (full load)	3600 RPM / 60.0 Hz
Idle speed (bare crankshaft)	2650 RPM / 44.2 Hz
General specifications	
Tank fuel capacity	11 US gal. (43 L)
Operating temperature	14° to +104 °F (-10° to +40 °C)
Enclosure class	IP 23S WP
Noise level	<79.3 dB / <64dB @idle
Feeders	Robustfeed AVS
Application class	S
Dimensions (L×W×H)	
Without exhaust and lifting eye	37.6 x 19.9 x 27.2 in (955 x 505 x 691 mm)
With exhaust and lifting eye	37.6 x 19.9 x 31.7 in (955 x 505 x 805 mm)
Weight	425 lbs (192.8 kg)
Warranty	3 years

Enclosure class

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

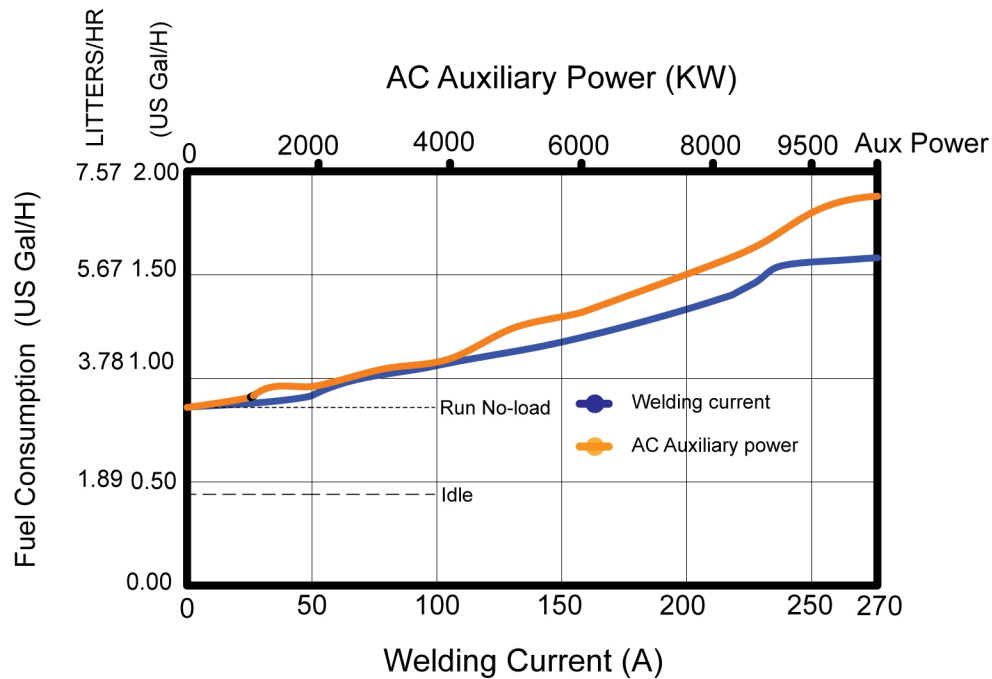
Equipment marked **IP23** is intended for indoor and outdoor use.

Application class

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

3.1 Fuel consumption curves

The fuel consumption curves show the typical fuel use under welding or auxiliary generator loads.



3.2 Welding current and auxiliary output power simultaneously

The generator auxiliary power decreases as the welding current increases. Refer to the below table which shows the relationship between welding out current and current available at each 120 VAC and 240 VAC receptacle.

WELDING AND AC AUXILIARY POWER SIMULTANEOUS OUTPUT			
Welding current (A)	AC auxiliary power (KW)	120V AC current (A)	240V AC current (A)
0	9.5	79	40
20	9	76	37
40	8.6	72	36
60	8.1	68	34
80	7.6	64	32
100	7.1	59	30
120	6.5	54	27
140	5.9	49	24
160	5.2	43	21
180	4.6	38	19
200	3.9	32	16
220	3.1	26	13
240	2.3	19	10

WELDING AND AC AUXILIARY POWER SIMULTANEOUS OUTPUT			
Welding current (A)	AC auxiliary power (KW)	120V AC current (A)	240V AC current (A)
260	1.5	13	6
270	1.3	12	6

4 INSTALLATION

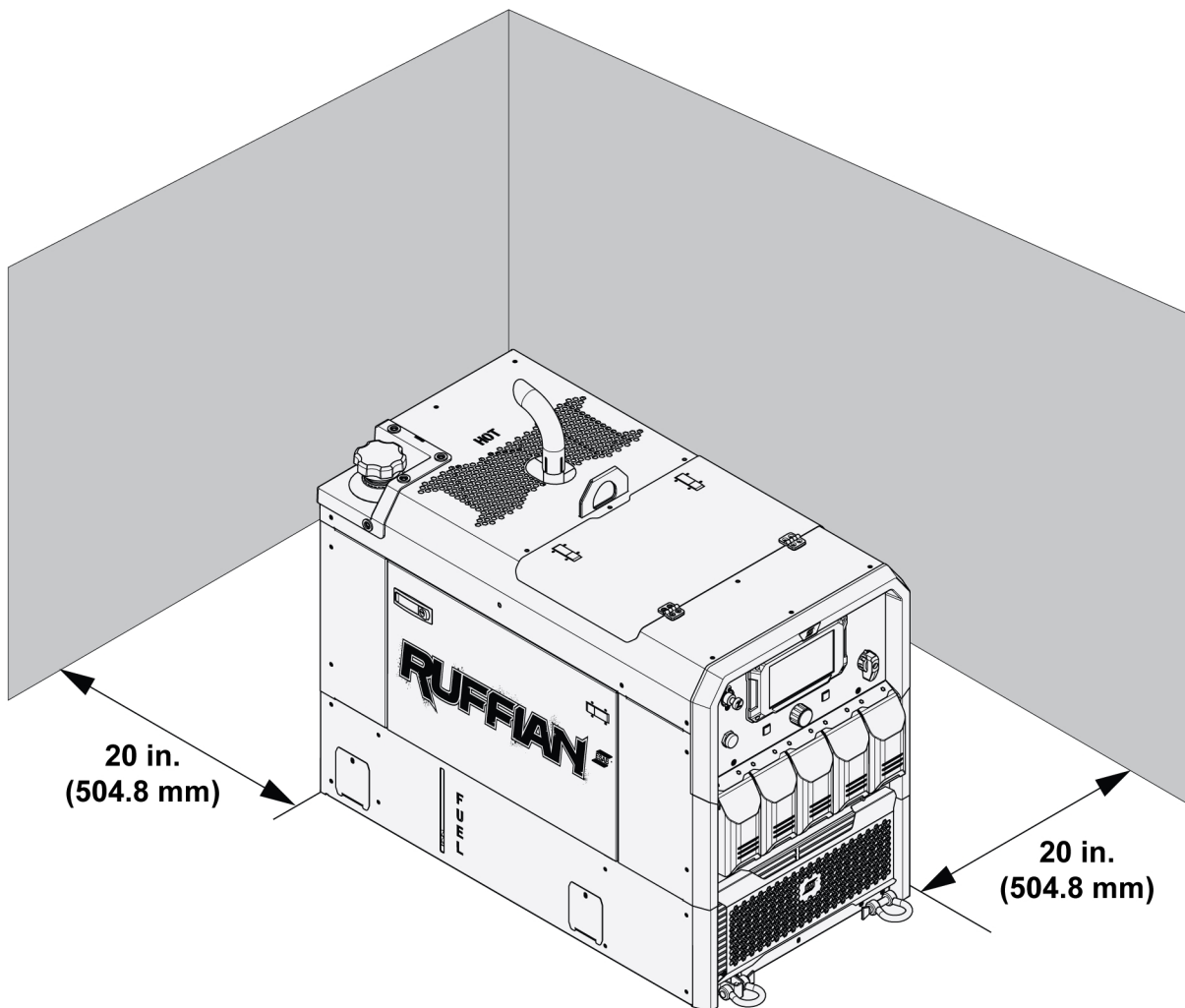
The installation must be carried out by a professional.

**CAUTION!**

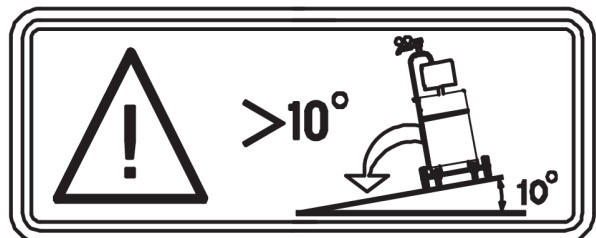
This product is intended for industrial use. In a domestic environment this product may cause radio interference. It is the user's responsibility to take adequate precautions.

4.1 Location

Position the engine driven welder so that cooling air inlets and outlets are not obstructed.

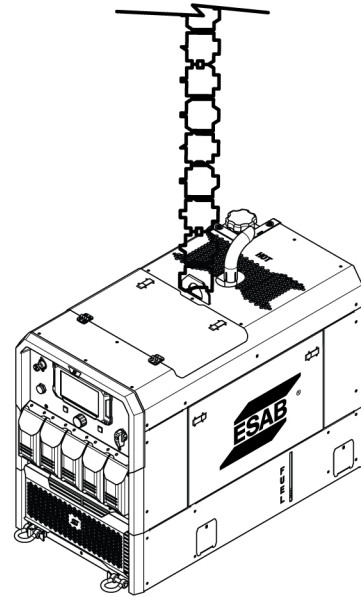
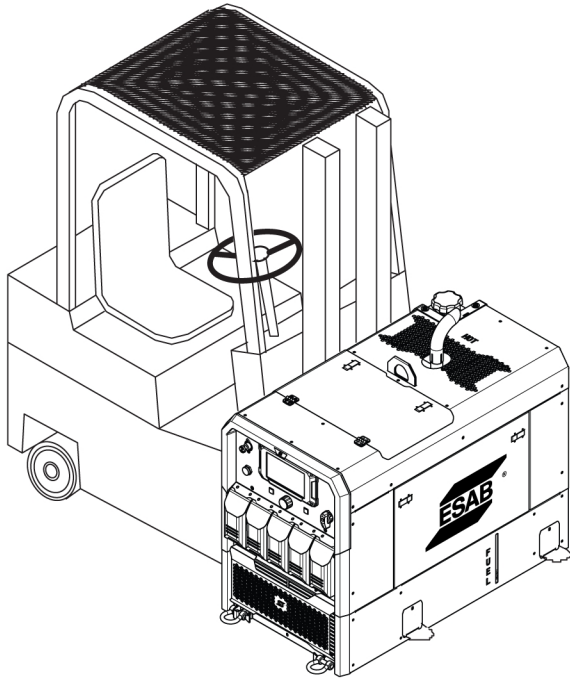
**WARNING!**

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

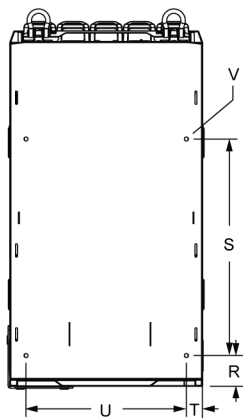
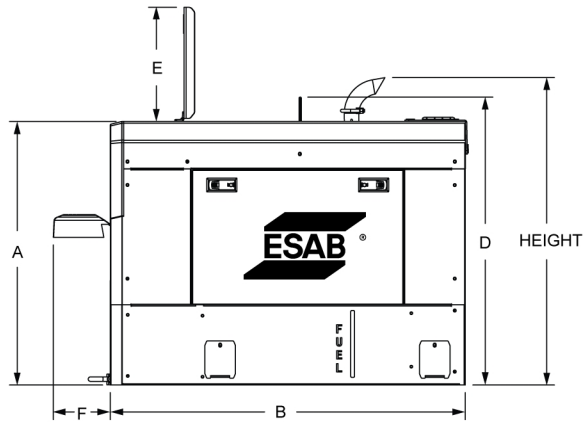
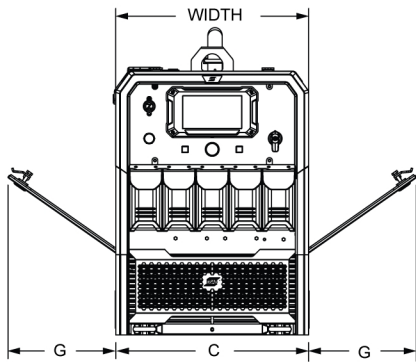
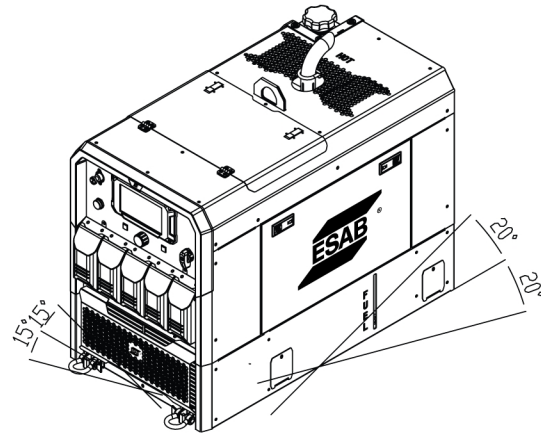
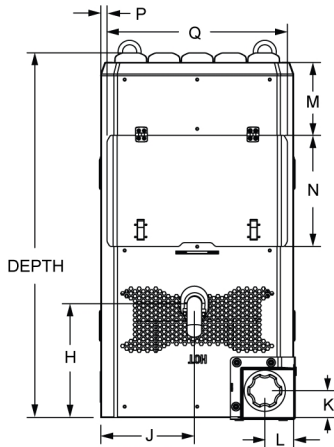


4.2 Lifting instructions

Mechanical lifting must be done using forklifts or slings with cranes.



4.3 Machine dimensions



Overall dimensions		Mounting holes location	
HEIGHT	31.69 in. (805 mm)	R	3.16 in. (80.3 mm)
DEPTH	37.59 in. (955 mm)	S	22.32 in. (567 mm)
WIDTH	20.15 in. (512 mm)	T	1.67 in. (42.5 mm)
A	27.16 in. (690 mm)	U	16.53 in. (420 mm)
B	36.59 in. (929.5 mm)	V	0.41 in. (10.5 mm)
C	19.88 in. (505 mm)		
D	29.66 in. (753.5 mm)		

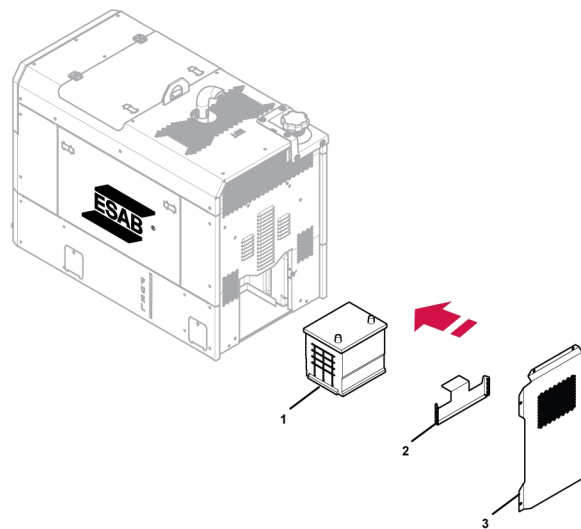
E	11.77 in. (299 mm)		
F	5.86 in. (149 mm)		
G	11.12 in. (282.5 mm)		

4.4 Connecting the battery



NOTE!

The Ruffian EMP 270G EDW is shipped with the negative battery cable disconnected (US market).



1. Battery
2. Battery holder

3. Battery rear panel

- 1) Make sure the engine is not running, and the start switch is at the OFF position.
- 2) Take the battery rear panel out (3).
- 3) Take the battery holder out (2).
- 4) Make sure the positive battery cable terminal (red rubber cover) is already connected to the positive battery terminal.
- 5) Install the negative battery cable terminal (black rubber cover) to the negative terminal of the battery (1).
- 6) If you are replacing an old battery, remove the negative battery cable first.



NOTE!

If the battery unused for several months, the battery may require a booster charge. Be careful to charge the battery with the correct polarity.

- 7) Reinstall the battery holder and rear panel with the corresponding screws.

4.5 Engine prestart checks

Inspect equipment before starting it. Check that air cleaner components and all shrouds, equipment covers, and guards are in place and securely fastened. Engine must be cold and on a level surface. If any problems are found, do not use equipment until fixed properly. The fluids need to be checked daily.

4 INSTALLATION

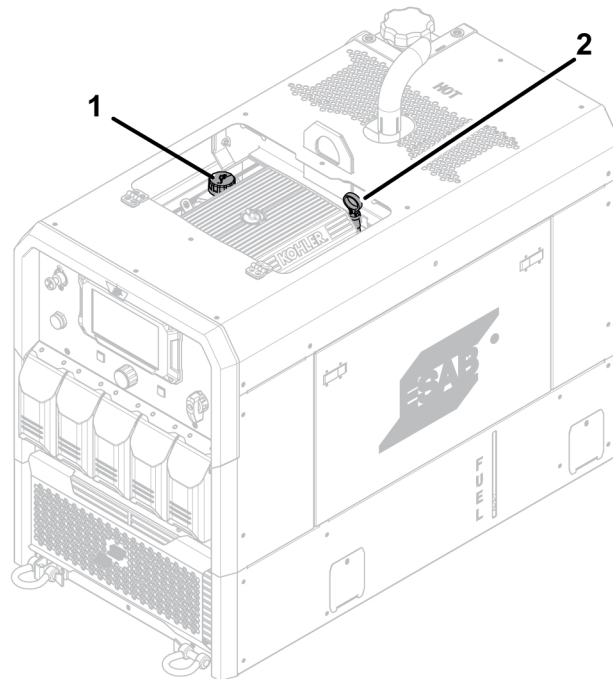
1. Check the oil level and add more if it is below the level.
2. Check the fuel level and fuel system components, lines for any leaks.
3. Check and clean cooling areas, air intake areas and external surfaces of engine (particularly after storage).
4. Check that air cleaner components and all shrouds, equipment covers, and guards are in place and securely fastened.
5. Check spark arrestor (if equipped).

Oil



NOTE!

To prevent extensive engine wear or damage, never run engine with oil level below or above operating range indicator on dipstick.



1. Oil fill inlet
2. Oil check lever (dipstick)

1. Ensure engine is cool. Clean oil fill/dipstick areas of any debris.
2. Remove dipstick, wipe oil off.
 - a) Push-in cap: reinsert dipstick into tube; push completely down.
 - b) Thread-on cap: reinsert dipstick into tube; rest cap on tube, do not thread cap onto tube.
3. Remove the dipstick, check the oil level. Level should be at top of indicator on dipstick.
4. If oil is low on indicator, add oil up to top of indicator mark.
5. Install the dipstick again by rotating clockwise and tighten securely.

Fuel



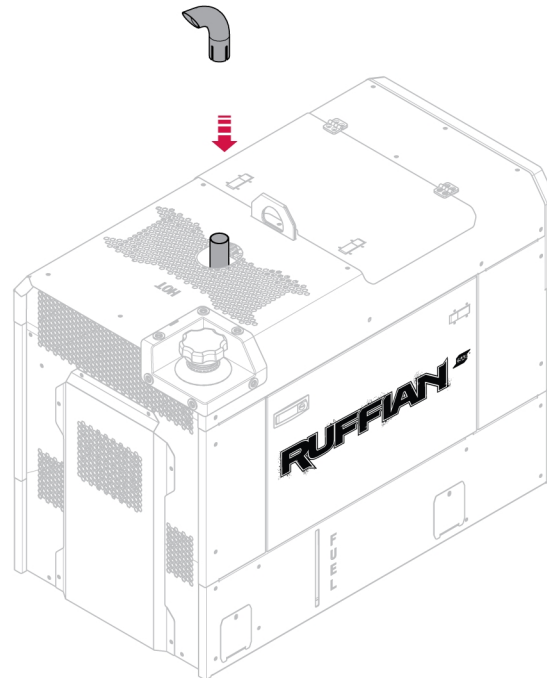
WARNING! TO PREVENT SERIOUS INJURY FROM FIRE:

Do not fill the fuel if the engine is hot and allow it to cool down.

Fill the fuel tank in a well-ventilated area free from ignition sources.

Do not smoke near the fuel tank.

Do not turn on the engine when the odor of fuel is in the air.



- 1) Make sure that the engine is switched OFF and cool.
- 2) Install the exhaust pipe at the outlet of the muffler of the engine.
- 3) Turn the exhaust pipe in the desired direction.
- 4) Attach the exhaust pipe with the metal clamp using the nuts and tighten evenly.

4.7 Connecting the EDW to ground

The engine driven welder must be properly grounded before use to prevent electric shock and static electricity. This should be performed by a qualified electrician.

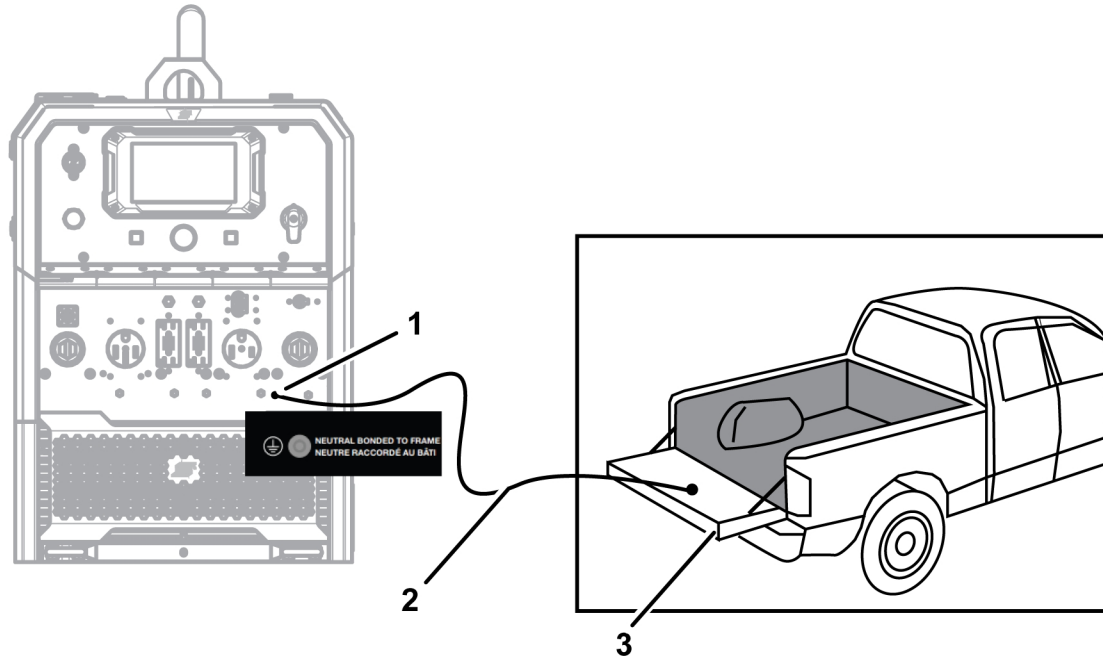
- 1) Connect the grounding cable (not included) to the grounding terminal at the front panel of the Ruffian.
- 2) Connect the other extreme of the grounding cable to the metal frame of the truck or trailer where the Ruffian is installed.



NOTE!

For grounding cable use an insulated copper wire of gage no less than 8 AWG.

Grounding the EDW to a trailer or truck



1. Grounding terminal
2. Grounding cable

3. Metal frame

4.8 Welding processes setup

The Ruffian EDW 270 is a DC (direct current) power source for multiple processes for SMAW, GTAW, GMAW and CAC-G processes. Each welding process requires a specific configuration of the connection of the welding terminals.



NOTE!

Before welding confirm that the correct welding cables sizes are used based on the output current, duty cycle and total welding circuit length.



NOTE!

This section provides general guidelines and may not always be the most appropriate for every application.



NOTE!

Ensure the welding terminals of the power source are firmly attached to the corresponding welding cable connectors. Any poor electrical contact due to a loose connection can cause the terminals or connectors to be damaged.



NOTE!

Make sure that there is always a good electrical contact between the workpiece and the work clamp of the return cable.

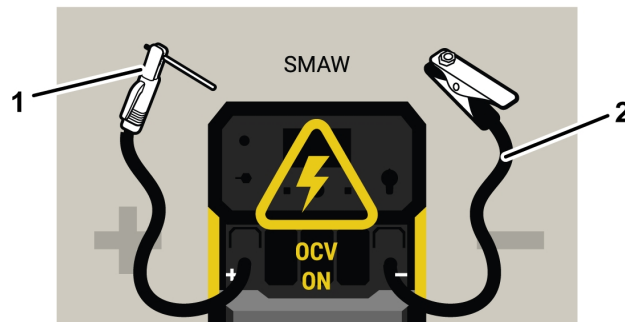
4.8.1 SMAW welding connections



NOTE!

The polarity of the welding cables depends on the type of the electrode and their specifications. Before use, refer electrode's data sheet

- 1) Connect the return cable to the negative terminal on the power source.
- 2) Secure firmly the work clamp of the return cable to the workpiece.
- 3) Connect the electrode holder cable to the positive terminals on the power source.



1. Electrode holder

2. Work clamp

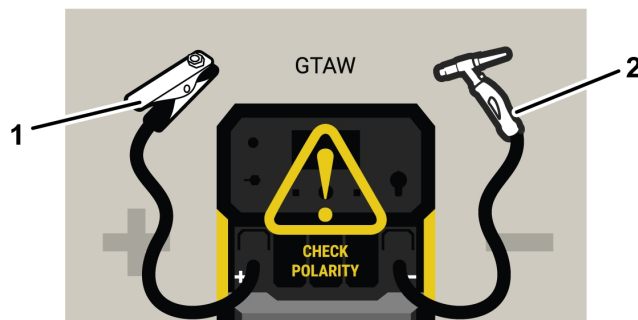
4.8.2 GTAW welding connections



NOTE!

The polarity of the welding cables depends on the type of the electrode and their specifications. Before use, refer electrode's data sheet.

- 1) Connect the return cable to the positive terminal (+) on the power source.
- 2) Secure firmly the work clamp of the return cable to the workpiece.
- 3) Connect the TIG torch cable to the negative terminal (-) on the power source.
- 4) Connect the gas hose from the TIG torch to regulator on cylinder.



1. Work clamp

2. TIG torch with gas valve

4.8.3 GMAW/FCAW connections

The connections set up of the wire feeder and return cable change if the welding application is with solid wire (GMAW) or flux core wire with gas (FCAW-G) or if it is with self-shielded flux core wire (FCAW-S).

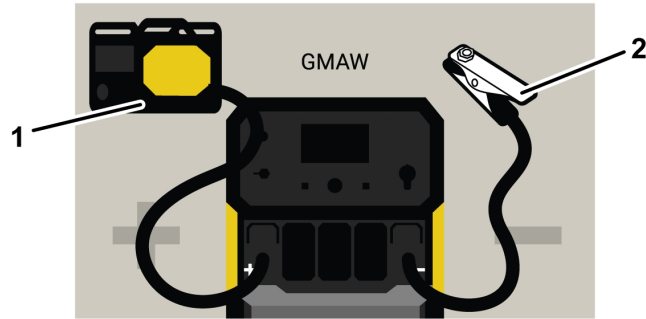


NOTE!

Check the accessories section to find out which wire feeders are compatible with EMP270GEDW.

GMAW/FCAW-G

- 1) Connect the return cable to the negative terminal (-) on the power source.
- 2) Secure firmly the work clamp of the return cable to the workpiece.
- 3) Connect the wire feeder cable to the positive terminal (+) on the power source.
- 4) Connect the gas hose from the wire feeder to the gas cylinder regulator.



1. Wire feeder

2. Work clamp

FCAW-S

- 1) Connect the return cable to the positive terminal (+) on the power source.
- 2) Secure firmly the work clamp of the return cable to the workpiece.
- 3) Connect the wire feeder cable to the negative terminal (-) on the power source.



1. Work clamp

2. Wire feeder

4.8.4 Spool gun connections

The connections set up of the spool gun and return cable change if the welding application is with solid wire (S-GUN) or self-shielded flux core wire (S-GUN / FCAW-S).



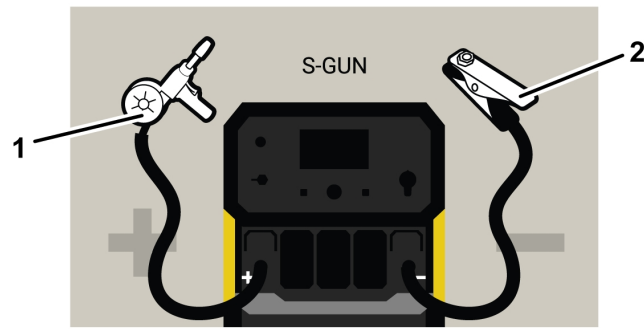
NOTE!

For the EMP 270G EDW a spool gun with gas valve integrated is needed.

S-GUN

- 1) Connect the return cable to the negative terminal (-) on the power source.
- 2) Secure firmly the work clamp of the return cable to the workpiece.
- 3) Connect the spool gun weld cable to the positive terminal (+) on the power source.
- 4) Connect the gas hose from the spool gun to the regulator on cylinder.

- 5) Connect the control cable of the spool gun to the Spool gun/ remote control Receptacle on the power source.

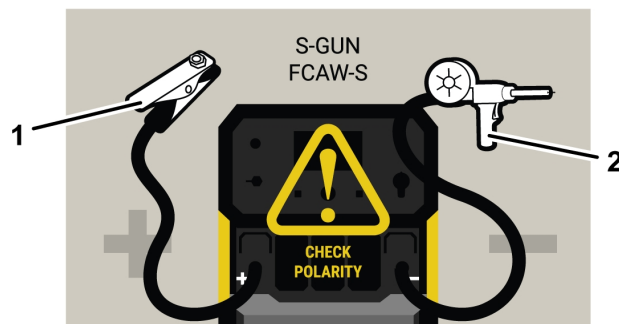


1. Spool gun

2. Work clamp

S-GUN FCAW-S

- 1) Connect the return cable to the positive terminal (+) on the power source.
- 2) Secure firmly the work clamp of the return cable to the workpiece.
- 3) Connect the spool gun weld cable to the negative terminal (-) on the power source.
- 4) Connect the control cable of the spool gun to the Spool gun/ remote control Receptacle on the power source.



1. Work clamp

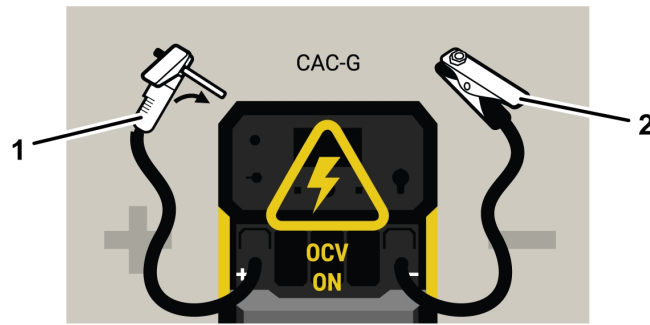
2. Spool gun

4.8.5 CAC-A connections

The EMP 270G EDW can perform carbo air cutting and gouging process (CAC-A).

- 1) Connect the return cable to the negative terminal (-) on the power source.
- 2) Secure firmly the work clamp of the return cable to the workpiece.
- 3) Connect the gouging torch weld cable to the positive terminal (+) on the power source.

4) Connect the air hose from the gouging torch to the air compressed line.



1. Gouging torch

2. Work clamp

4.9 Selecting and preparing welding cables

Required copper gage based on total length of cable leads in the circuit								
Welding Current (A)	Total length of cable leads in the circuit							
	100 ft (30 m) or less	150 ft (45 m)	200 ft (60 m)	250 ft (70 m)	300 ft (90 m)	350 ft (105 m)	400 ft (120 m)	
	Duty Cycle AWG (mm ²)							
	10% to 60%	60% to 100%	10% to 100%					
100	4 (20)	4 (20)	4 (20)	3 (30)	2 (35)	1 (50)	1/0 (60)	1/0 (60)
150	3 (30)	3 (30)	2 (35)	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	3/0 (95)
200	3 (30)	2 (35)	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	4/0 (120)
250	2 (35)	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2x2/0 (2x70)	2x2/0 (2x70)
300	1 (50)	1/0 (60)	2/0 (70)	3/0 (95)	4/0 (120)	2x2/0 (2x70)	2x3/0 (2x95)	2x3/0 (2x95)



NOTE!

Weld cable size (AWG) is based on either 4 volts or less drop or a current density of not more than 300 circular mils per ampere. Use weld cable with insulation rating equal to or greater than the open-circuit voltage of the unit.

5 OPERATION

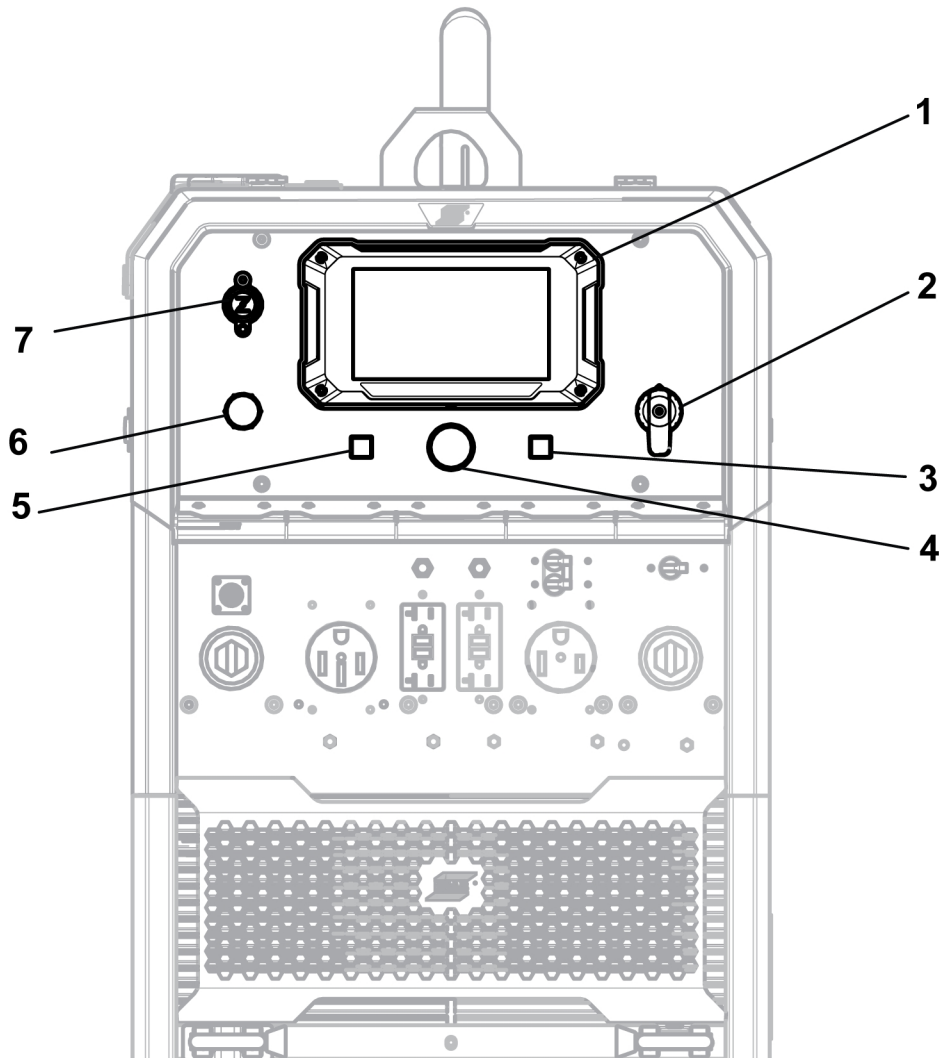
General safety regulations for handling the equipment can be found in the "SAFETY" chapter of this manual. Read it through before you start using the equipment!

5.1 Front panel control devices and connections

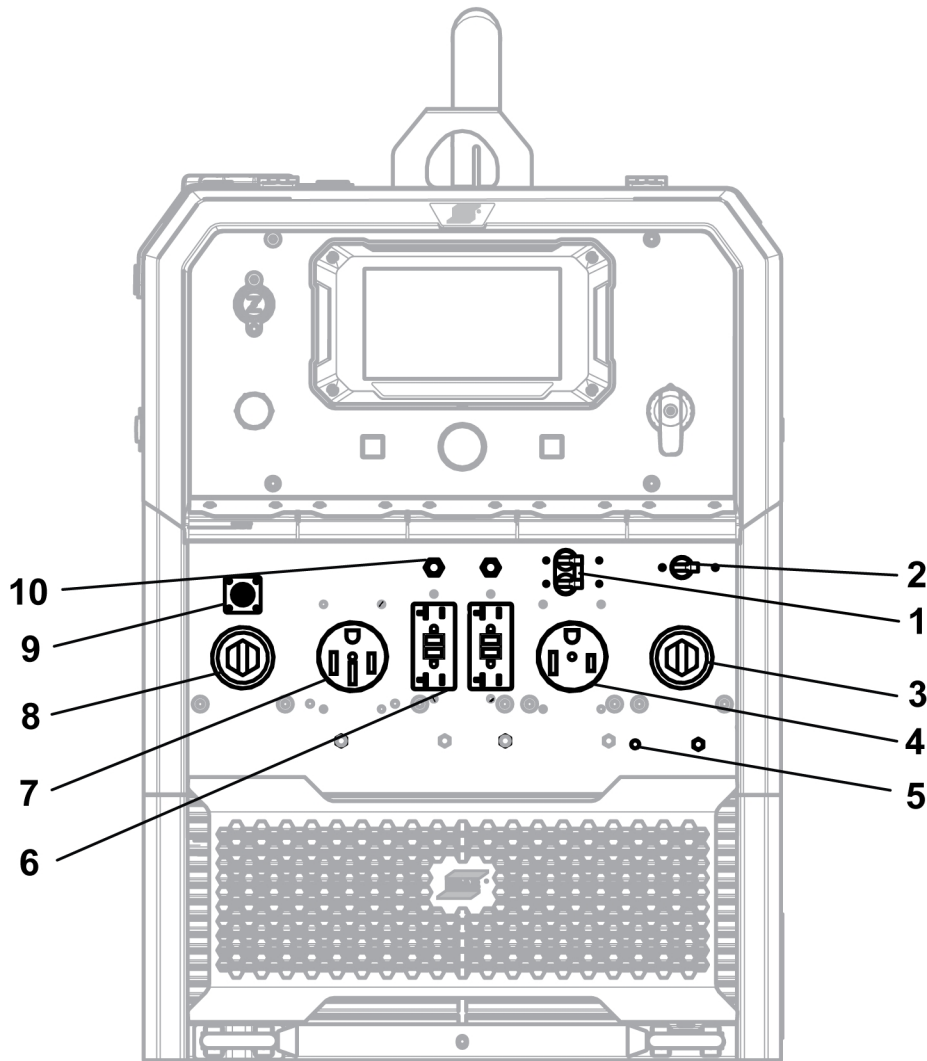


WARNING!

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



1. **7" Display**
2. **Engine control switch:** Used to turn on the display, to start and stop the engine. It is also used to select between Run and Idle modes:
 - When at the Run position, the engine runs at maximum rated speed, enabling the welder and auxiliary outputs.
 - When at the Idle position, the engine runs at a reduced speed until any load is detected, reducing fuel consumption and noise.
3. **Menu button:** push to access the main menu screen from any other screen.
4. **Control knob:** rotate the knob to navigate through the menus; push to select.
5. **Back button:** push to return to previous screen; press and hold to go to home screen.
6. **USB port:** used to update the control software.
7. **Choke:** used to control the fuel/air mixture during cold engine starts.



1. **Main circuit breaker:** 50A AC circuit breaker that protects the generator and AC receptacles from overload. When set to the OFF position, there will be no power to the AC receptacles (120VAC and 240VAC). When set to the ON position, the AC receptacles will be powered on.
2. **Welder circuit breaker:** 50A AC circuit breaker that protects the generator and welding module from overload. The circuit breaker must be at the ON position to weld.
3. **Negative welding terminal:** Used to connect the return cable when welding in Direct Current Electrode Positive (DCEP) polarity; Also used to connect the electrode holder or torch when welding in Direct Current Electrode Negative (DCEN) polarity.
4. **240VAC receptacle:** One 240VAC/50A receptacle (NEMA #6-50R) supplies single phase 240V 60Hz power at Run speed. Maximum continues power is 9.5KVA/KW.
5. **Grounding terminal:** Used to connect the unit to ground through a grounding wire (not included) to prevent electric shock and static electricity hazards.
6. **120VAC GFCI receptacles:** Two duplex 120VAC/20A GFCI receptacles (NEMA #5-20) supplies single phase 120V 60Hz power at Run speed. Maximum continues power from the duplex receptacles is 2.4KVA/KW.
7. **120/240VAC receptacle:** One 120/240VAC/50A receptacle (NEMA #14-50R) supplies single phase 120/240V 60Hz power at Run speed. Maximum continues power is 9.5KVA/KW.
8. **Positive welding terminal:** Used to connect the electrode holder or torch when welding in Direct Current Electrode Positive (DCEP) polarity; Also used to connect the return cable when welding in Direct Current Electrode Negative (DCEN) polarity.
9. **Spool gun/remote control receptacle:** 8-pin connector used to connect the spool gun, the remote control or foot pedal (not included).
10. **Fuse reset buttons:** 20A fuse reset buttons protect each 120VAC duplex receptacles from overload. If a fuse opens, the corresponding receptacle will not work. Push the button to reset the fuse.

5.2 Starting and stopping the engine



NOTE!

Make sure that the fuel valve is closed before moving the unit or the carburetor may flood and make starting difficult.

Starting the engine

- 1) To start a cold engine, pull the choke lever.
- 2) Turn the engine control switch clockwise to the engine ON position and release it after the engine starts running.
- 3) Push the choke lever after the engine starts.
- 4) Keep the engine control switch to Idle position to consume less fuel. Make sure that the engine control switch is at the Run position when tools and other equipment are connected through any of the AC auxiliary receptacles.
- 5) To restart a warm engine, you can leave the choke lever in normal position.



NOTE!

If the engine does not start, don't try the restart again while the engine is still rotating. Wait until the engine is completely stopped.

Stopping the engine

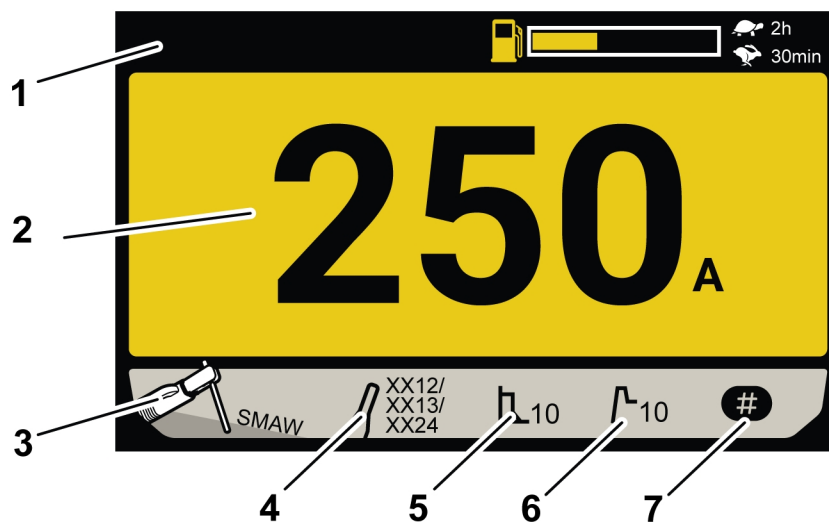
- 1) Before turning OFF the engine, turn OFF all electrical loads, then unplug them.
- 2) Turn the engine control switch to the OFF position.

5.3 Operating the welder

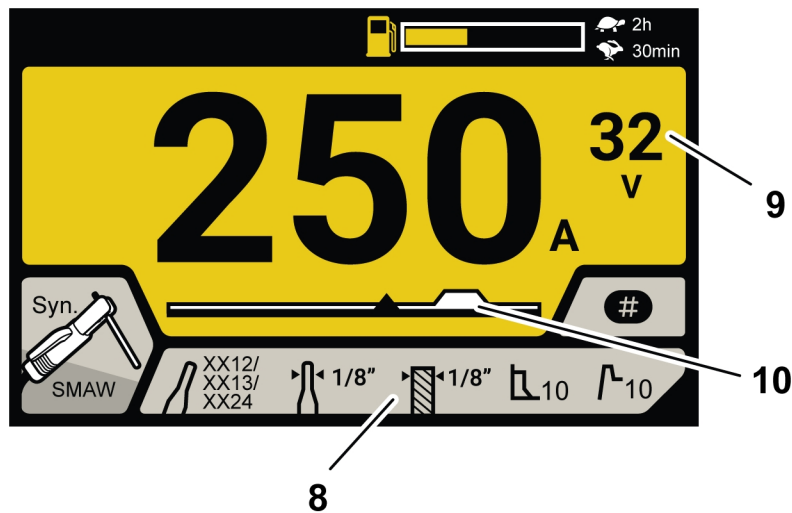
Rotate the engine control switch to the Idle or Run position to turn ON the welder.

5.3.1 Home screen

Once the welder is on, Ruffian logo will be shown on the display, followed by the home screen. Welding output will be off until the engine is started.



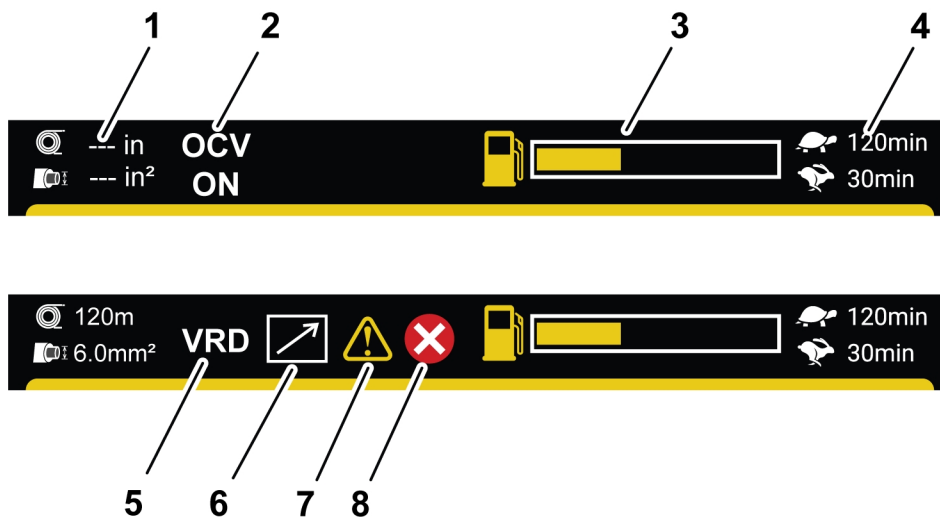
If synergic is set (see *"Synergic screen"*, page 39), an alternative home screen will be shown, depending on the selected process:



1. **Upper toolbar:** The toolbar can show multiple equipment indicators.
2. **Primary amperage/voltage settings:** Rotate the control knob to change welding voltage or amperage, depending on the selected process.
3. **Current process:** Indicates the process selected.
4. **Electrode type*:** Indicates the selected electrode type.
5. **Arc force*:** Indicates the selected arc force value.
6. **Hot start*:** Indicates the selected Hot Start value.
7. **Jobs:** Indicates the current selected job with a number or if there is no job currently selected (“#”).
8. **Synergic parameters:** Indicate the current electrode or wire diameter; material and gas combination; and plate thickness settings if applicable for the selected welding process.
9. **Secondary amperage/voltage Indicator:** If synergic parameters are set, indicates the calculated amperage/voltage based on the primary amperage/voltage settings.
10. **Synergic bar:** The black triangle Indicates the current amperage/voltage; the black rectangle indicates the possible adjusting range, and the white trapezoid indicate the recommended synergic welding amperage/voltage settings.

**only available for stick welding.*

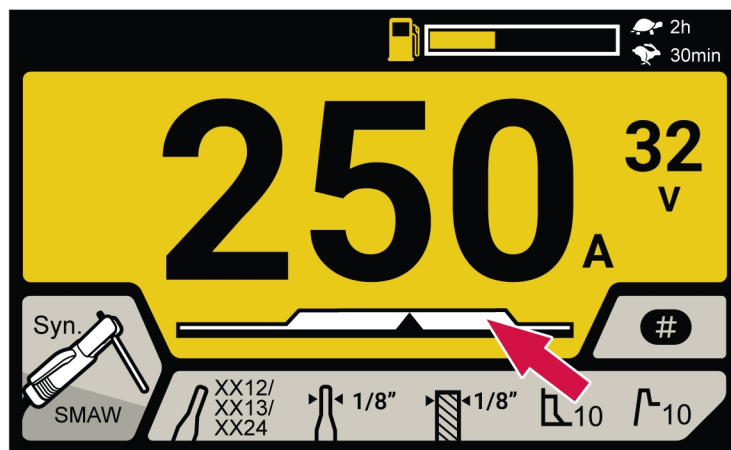
Upper toolbar



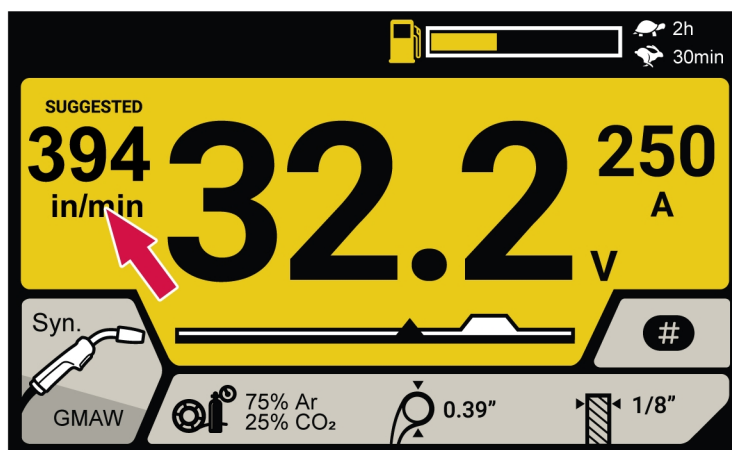
1. **Cables calibration indicator:** icons, values and units are always shown, even if disabled (only applicable for Constant Voltage (CV) processes).
2. **OCV ON indicator:** shown every time there is voltage on the output welding terminals.

3. **Fuel level indicator:** always shown, even when engine is not running.
4. **Remaining usage hours:** Calculated based on fuel level for both Run and Idle modes.
5. **VRD ON indicator:** icon shown when Voltage Reduction Device is enabled (only applicable for stick welding). Contact an authorized service center to turn this feature ON or OFF.
6. **Remote ON indicator:** The square with an arrow icon indicates a remote control or foot pedal connected.
7. **Warning indicator:** The yellow sign icon indicates a warning. Push the center knob from home screen to review the active warnings.
8. **Error indicator:** The red sign indicates an error. Push the center knob from home screen to review the active warnings.

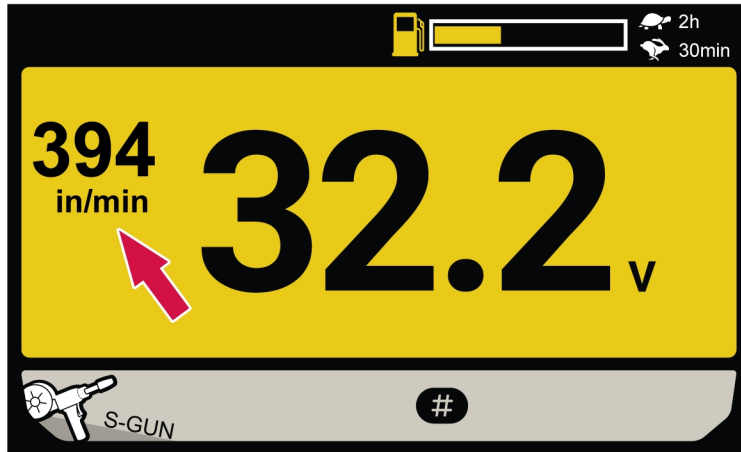
During the synergic set up, If the “full range” button is selected on “plate thickness” screen, the recommended range will be enlarged:



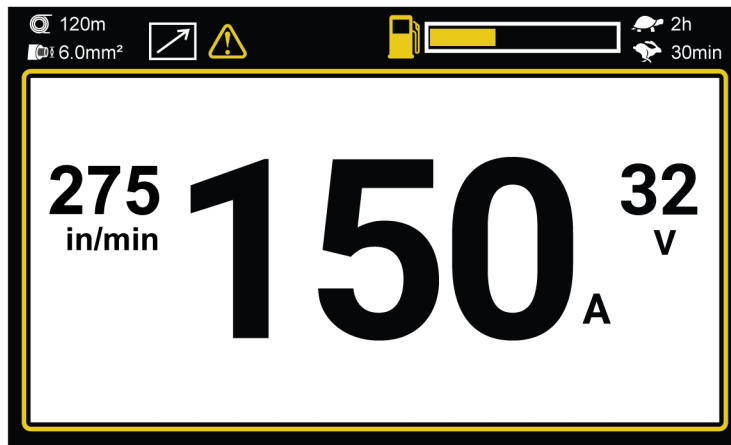
If GMAW or FCAW are selected, and the synergic is also set, a suggested wire feed speed will be shown to be adjusted on the feeder:



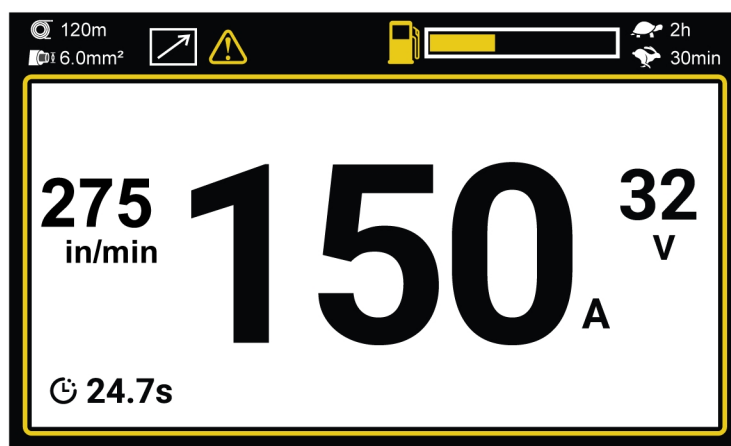
If a spool gun is connected (with or without synergic on), the actual wire feed speed will be shown at the same location:



When welding, current, voltage and wire feed speed values (when applicable) will be shown real time on the screen:

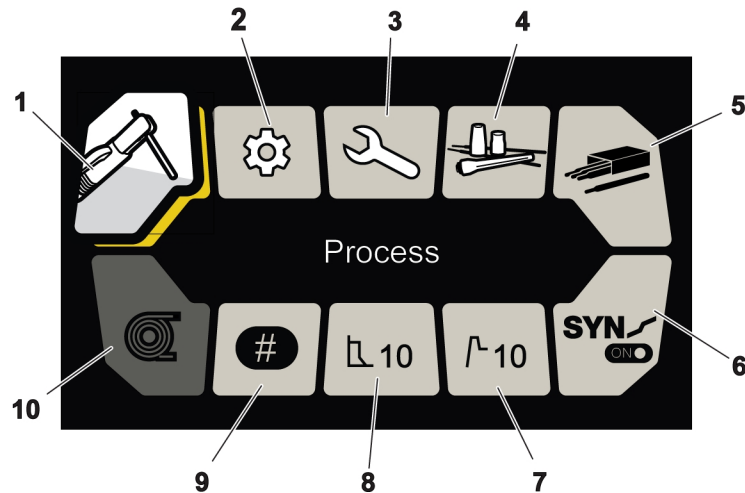


After a weld is finished, the screen will be frozen and last welding values will be fixed on the screen for 10 seconds. Total welding time will be shown at the bottom left corner of the screen:



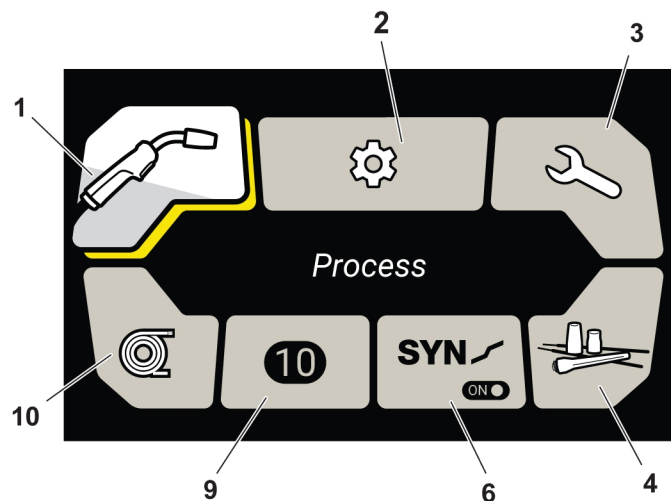
5.3.2 Menu screen

Access this screen by pushing the menu button:

**NOTE!**

When Stick Electrodes (SMAW) mode is selected, three additional buttons will be shown on the menu (5, 7 and 8).

When all the other welding processes are selected except (SMAW), menu will always show the same seven buttons as below:

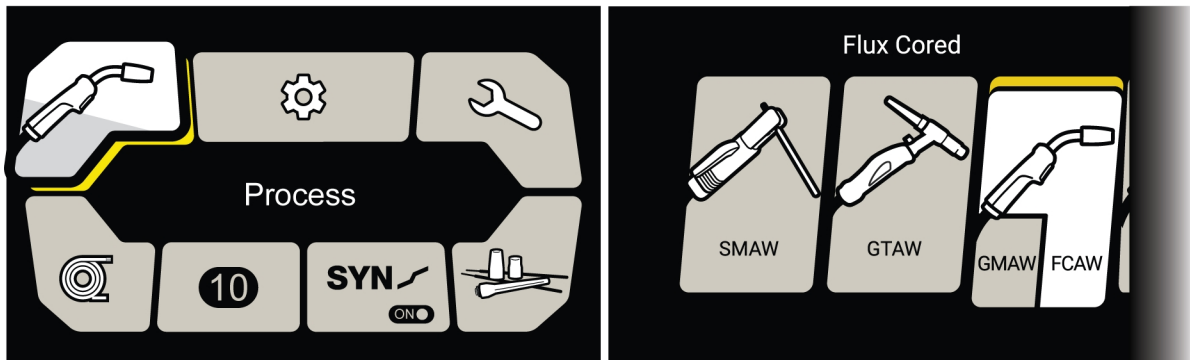


1. **Process button:** Click to access the process selection screen.
2. **Settings button:** Click to access the general settings screen.
3. **Maintenance button:** Click to access the maintenance screen.
4. **Parts and consumables button:** Click to access the parts and consumables screen.
5. **Electrode type button*:** Click to access the electrode type screen.
6. **Synergic button:** Click to access the synergic settings screen.
7. **Hot start button*:** Click to access the hot start settings screen.
8. **Arc force button*:** Click to access the arc force settings screen.
9. **Jobs button:** Click to access the jobs screen.
10. **Cables calibration button:** Click to access the cables calibration settings screen.

*Only available for Stick Electrodes (SMAW).

5.3.3 Process screen

Access this screen by selecting the Process icon from the main menu:



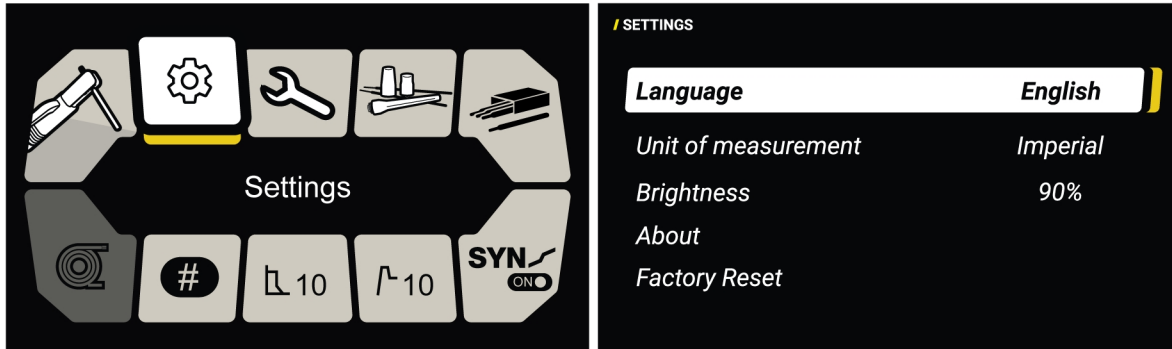
The following table shows all possible process selections.

1. **Stick Electrodes (SMAW):** Shielded Metal Arc Welding (SMAW) may also be referred to as welding with coated electrodes. Striking the arc melts the electrode, and its coating forms protective slag.
2. **TIG (GTAW):** Gas Tungsten Arc Welding (GTAW) melts the workpiece metal, with an arc initiated from a non-consuming tungsten electrode. The weld pool and electrode are protected by a shielding gas.
3. **MIG (GMAW):** Gas Metal Arc Welding (GMAW) melts a continuously supplied filler metal wire to the weld pool on the workpiece, protected by a shielding gas.
4. **Flux Cored (FCAW-G):** Gas Shielded Flux-Cored Arc Welding (FCAW-G) combines a flux-filled wire electrode with an external shielding gas to produce strong, clean welds, especially suitable for thick materials and structural applications.
5. **Flux Cored Gasless (FCAW-S):** Self-Shielded Flux-Cored Arc Welding (FCAW-S) protects the weld automatically through the flux inside the wire, making it suitable for outdoor or windy conditions where external shielding gas would be easily blown away.
6. **Spool Gun* (GMAW):** Gas Metal Arc Welding (GMAW) with Spool Gun is a variation of MIG welding where the wire spool is built into the gun itself, reducing wire-feeding problems. Especially useful when welding soft wires like aluminum or working far from the power source.
7. **Spool Gun Flux Cored Gasless* (FCAW-S):** Self-Shielded Flux-Cored Arc Welding (FCAW-S) with Spool Gun is a variation of flux cored welding; a welding where a spool gun feeds self-shielded flux-cored wire, providing easy handling and portability. Especially useful for field or outdoor welding where wind could disturb gas shielding.
8. **Gouging (CAC-A):** Air Carbon-Arc Gouging (CAC-G) is a metal removal process that uses an electric arc between a carbon (or graphite) electrode and the workpiece to melt the metal, which is then blown away by a high-velocity jet of compressed air.

* Only available when there is a spool gun connected.

5.3.4 Settings screen

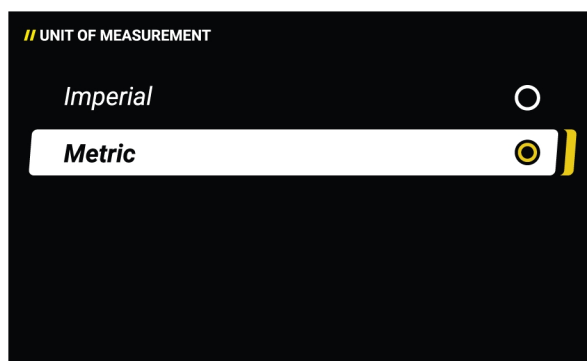
Access this screen by selecting the Settings icon from the main menu:



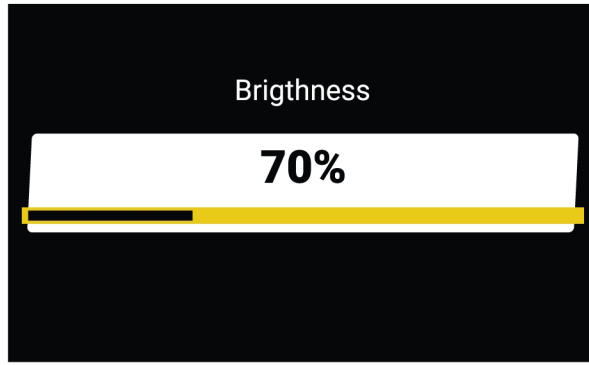
Language: Select any option from the list to change the interface language. English is the default value.



Unit of measurement: Select the interface unit of measurement system. Imperial is the default value.



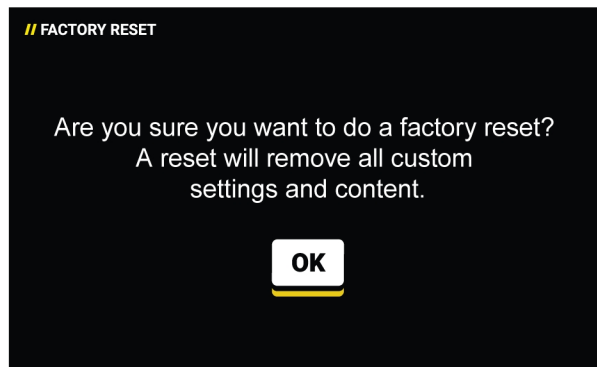
Screen brightness: Select the preferable screen brightness. 100% is the default value.



About: View product model, software versions, ESAB website and a QR code for ESAB manuals and supportive materials:

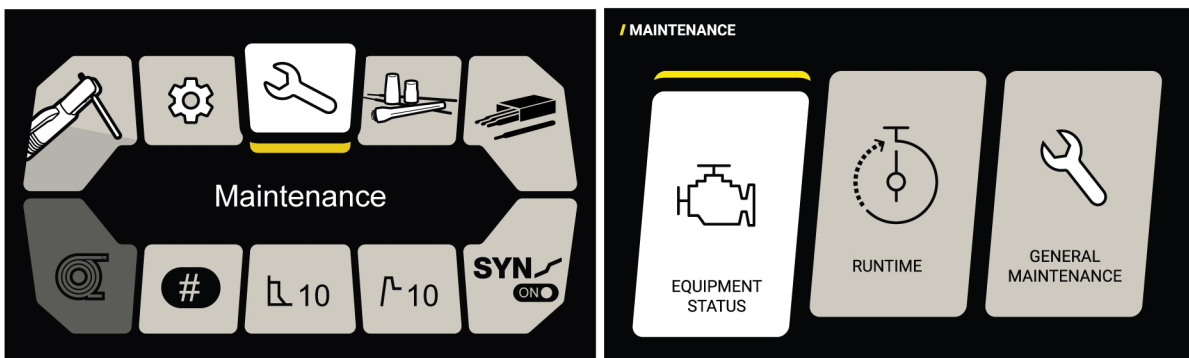


Factory reset: Select OK to perform a factory reset. All settings and jobs will be wiped, except runtime and replaced parts.

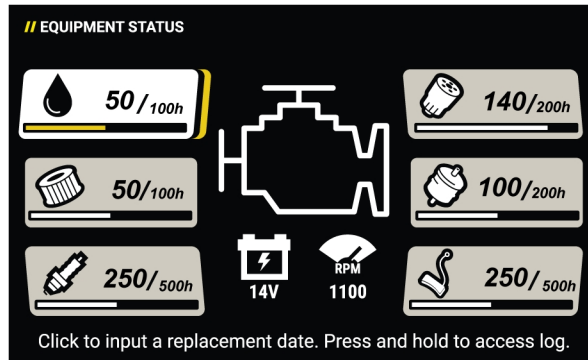


5.3.5 Maintenance screen







Access this screen by selecting the Maintenance icon from the main menu:



Equipment status: The equipment status screen shows the status of the most important parts of each engine and generator, battery voltage and current engine speed, either idling or running.



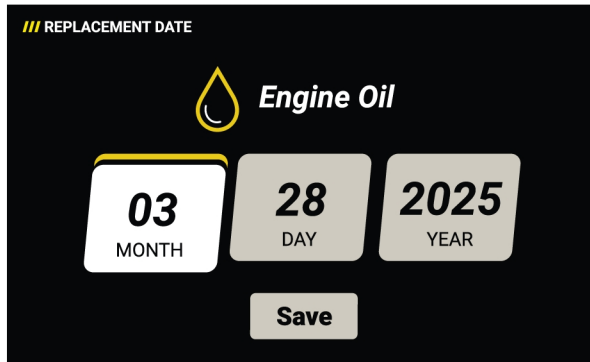
The remaining runtime will be shown next to each respective part icon, followed by the maximum recommended runtime between replacements (see *"Engine and generator routine maintenance"*, page 49 for more details).

Icon	Engine or generator part	Recommended runtime
	Spark plug	500 hours
	Air filter	100 h
	Engine oil	100 h
	Oil filter	200 h
	Fuel filter	200 h
	Generator brushes	500 hours

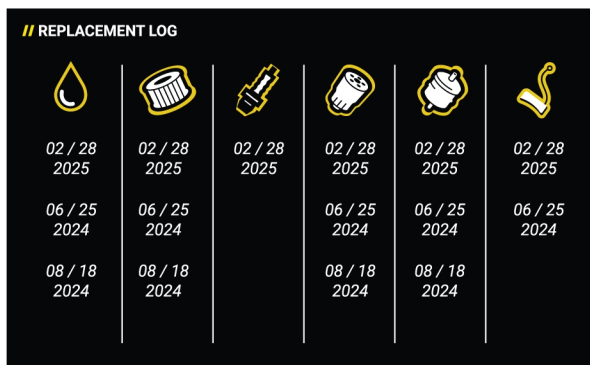
i NOTE! Whenever the remaining runtime for a specific part is below 10, a warning will pop up. Whenever the remaining hours are over (0), an error will pop up. Check the full list of errors on *"TROUBLESHOOTING"*, page 55.

NOTE! The replacement of each part is mandatory and must be recorded through this screen. This is a responsibility of the user.

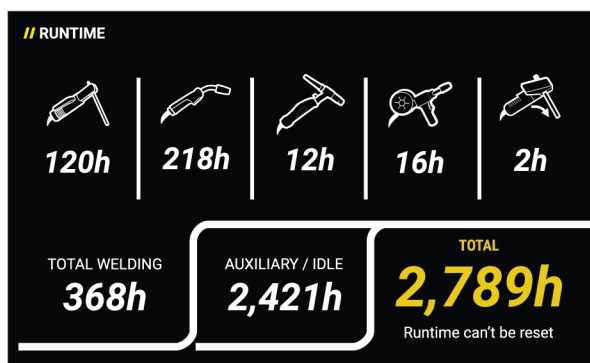
When any of these parts mentioned in the previous section are replaced, select the respective part icon to input a replacement date. Set the month, day and year, then select Save.



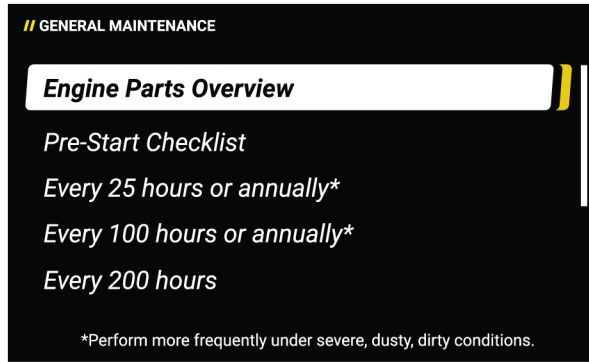
After the input, the replaced part will be shown on the log screen. Press and hold the center knob while on the equipment status screen to access the replacement log screen.



Runtime: check runtime hours for each process, total welding, auxiliary power / idle and overall total.

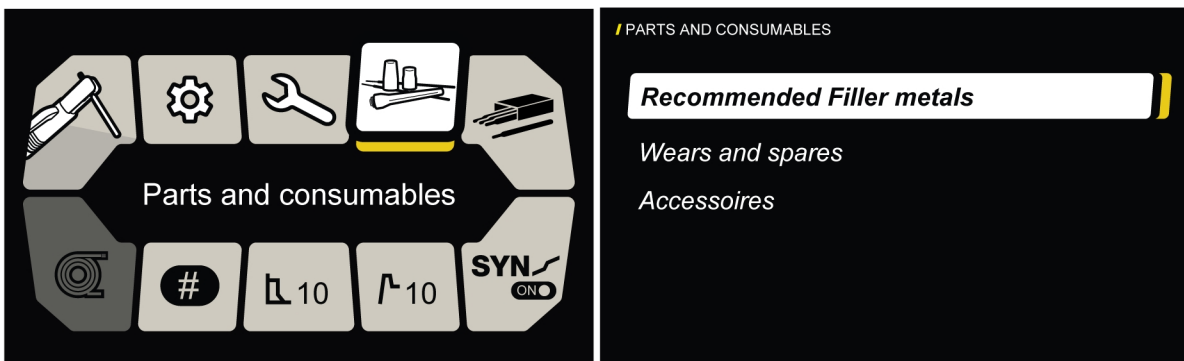


General maintenance: Check the engine parts overview, pre-start checklist and all routine maintenance material for the engine parts.



5.3.6 Parts and consumables screen

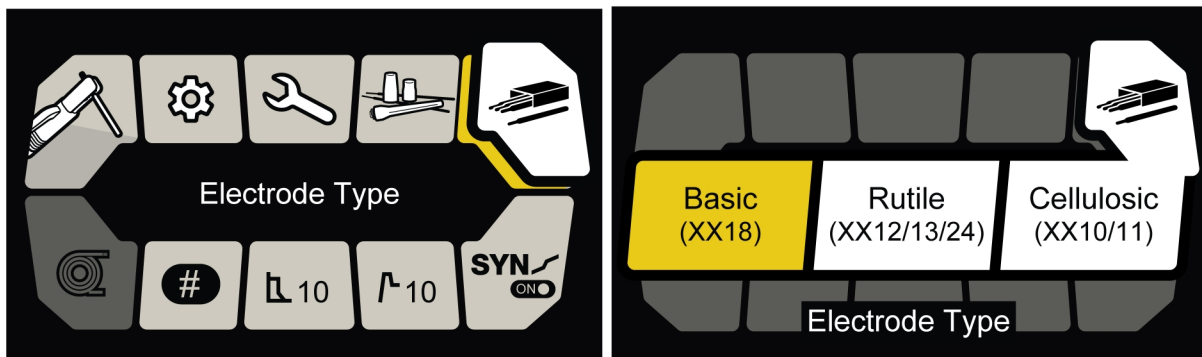
Access this screen by selecting the Parts and consumables icon from the main menu:



Check updated information about recommended filler metals, wears, spares and accessories for the machine.

5.3.7 Electrode type screen (SMAW only)

Access this screen by selecting the Electrode type icon from the main menu:



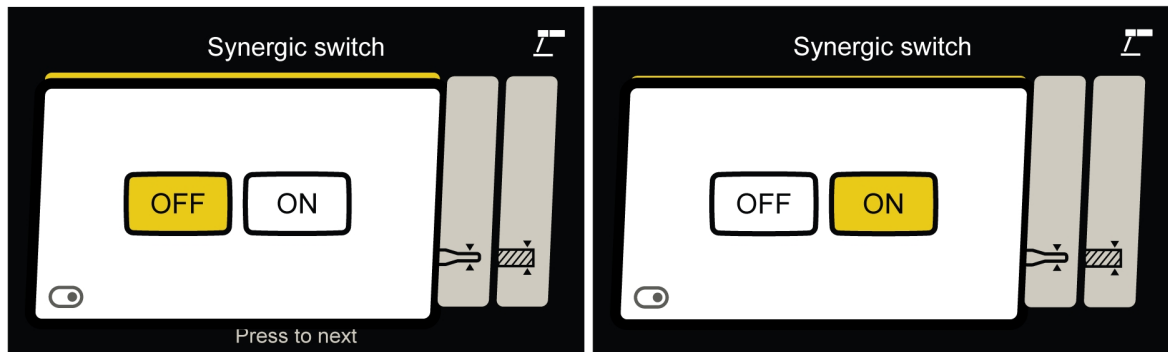
Select between Basic (XX18), Rutile (XX12/12/24) and Cellulosic (XX10/11) based on the application and filler metal used.

5.3.8 Synergic screen

Access this screen by selecting the Synergic icon from the main menu:

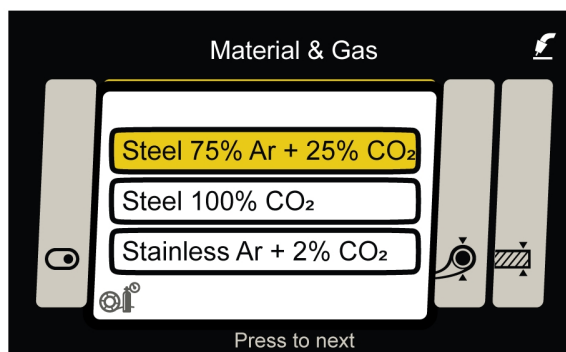


1. Choose to turn synergic mode ON or OFF:

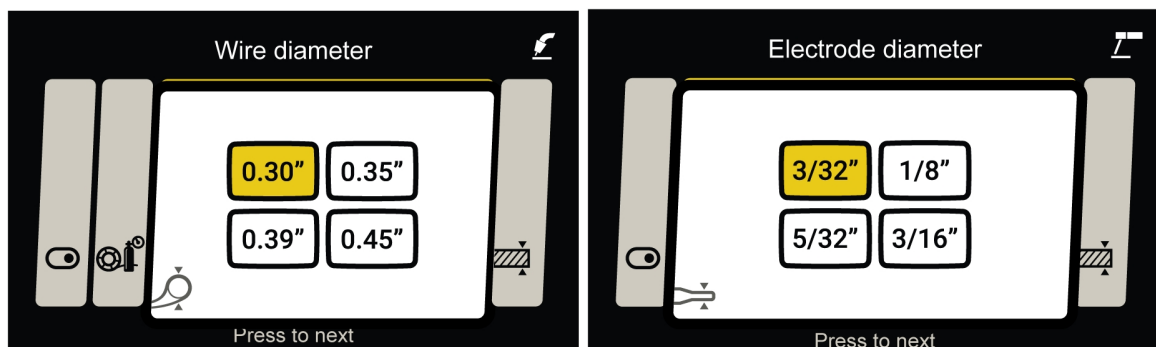


NOTE!
The number of synergic settings tabs will be different depending on the process selected.

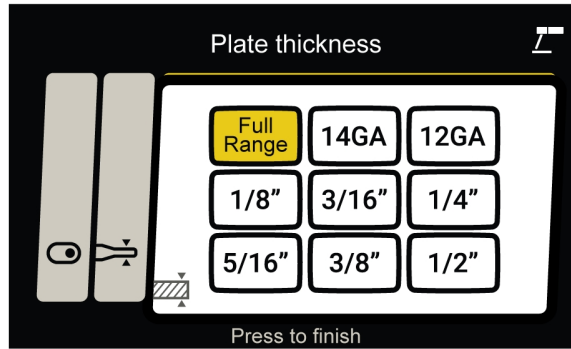
2. If the synergic was turned on, select the Material & Gas combination (only applicable for constant voltage processes (CV):



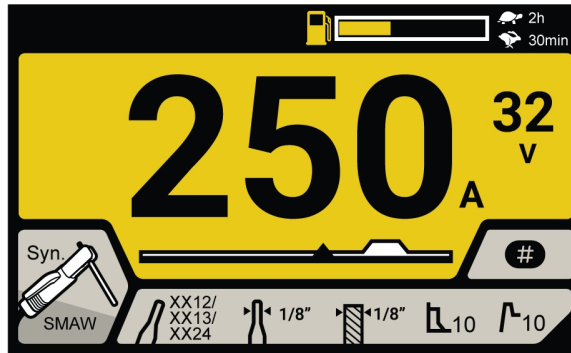
3. Select the filler metal diameter:



- Select the plate thickness and push the knob to finish:

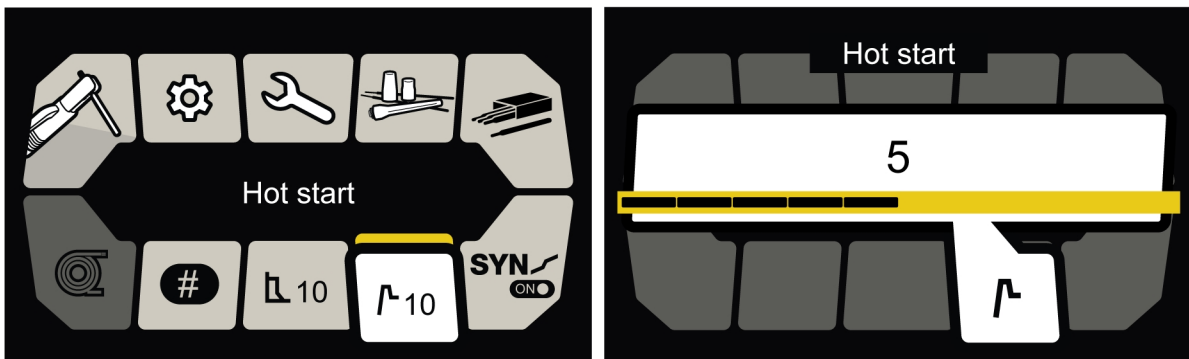


- The advanced home screen will be shown with the recently selected synergic parameters on the bottom toolbar.



5.3.9 Hot start screen (SMAW only)

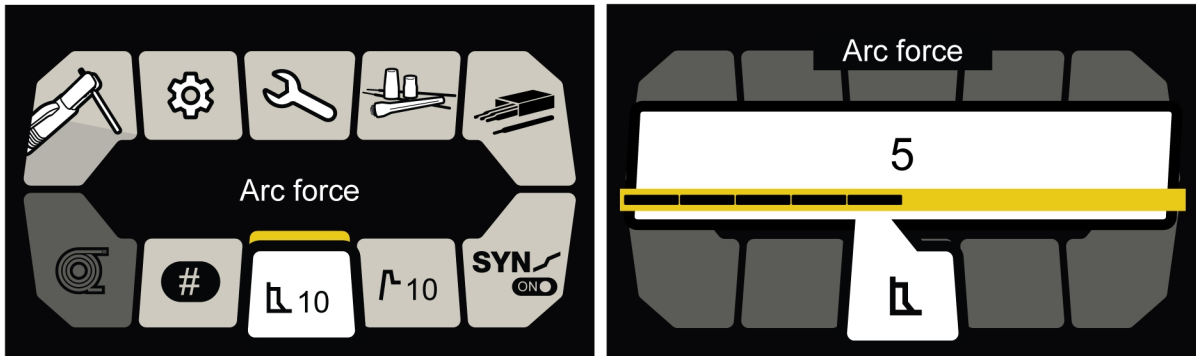
Access this screen by selecting the Hot start icon from the main menu:



Select a value from 0 to 10. This feature increases voltage during arc striking, ensuring stability and less spatter, in addition to prevent the electrode from sticking to the workpiece. Default and recommended value is 3.

5.3.10 Arc force screen (SMAW only)

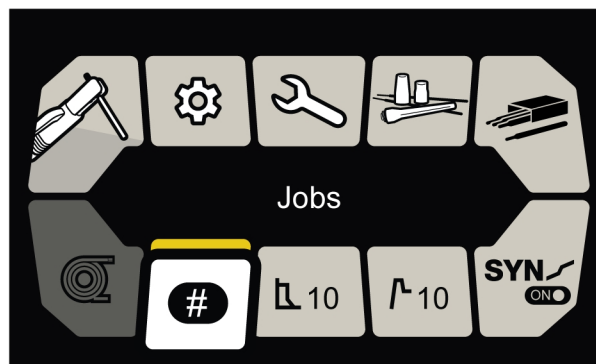
Access this screen by selecting the Arc force icon from the main menu:



Select a value from 0 to 10. This feature controls the current to keep the arc open and stable, for various welding positions. Default and recommended value is 3.

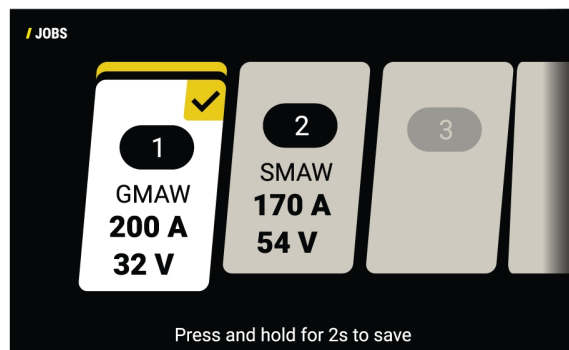
5.3.11 Jobs screen

Access this screen by selecting the Jobs icon from the main menu:



The Jobs are memory slots used to save welding settings and configurations.

- Press and hold for 2 s to save a new job or overwrite current selection.



- Push the center control knob to load a job.

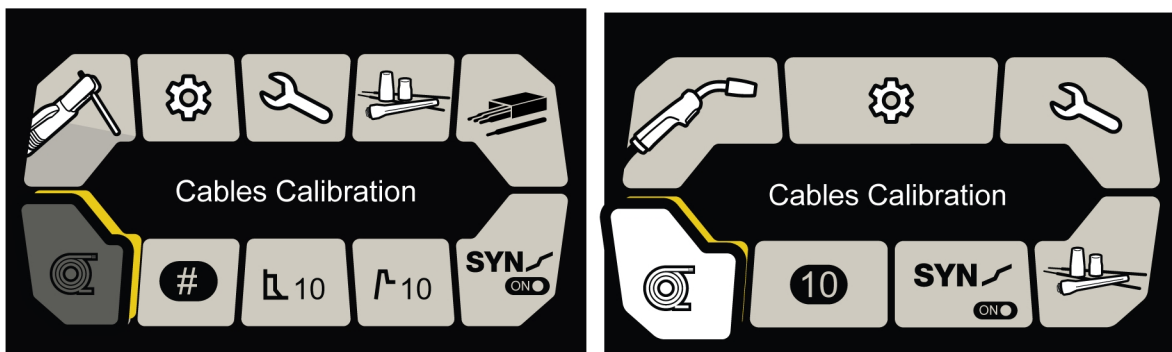


- Press and hold back button for 2 s to wipe current selection.



5.3.12 Cables calibration

Access this screen by selecting the Cables Calibration icon from the main menu:



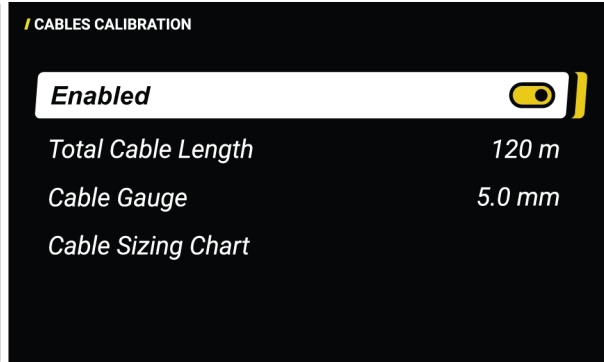
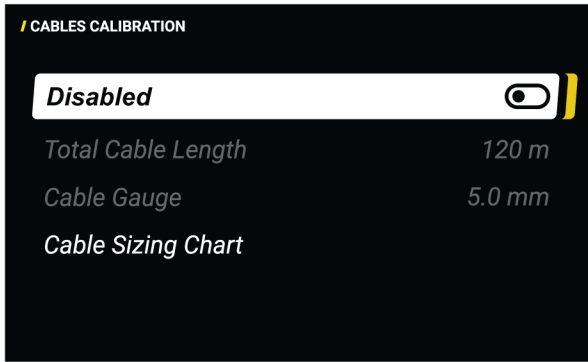
This feature compensates for any voltage drops on the cables set due to ohmic losses to ensure the most accurate set voltage on the arc.



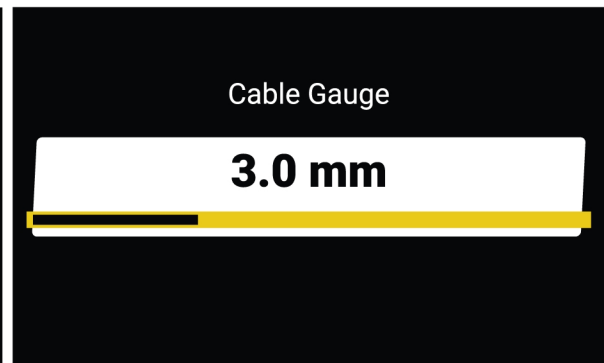
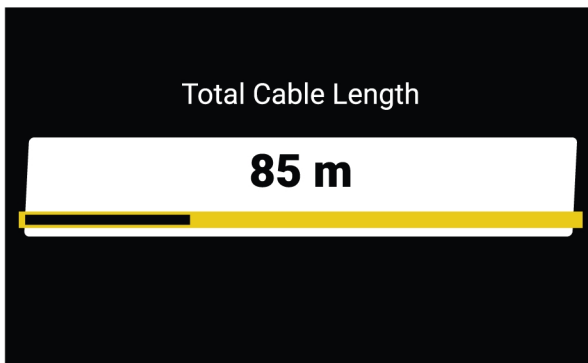
NOTE!

Cables calibration is only available for CV welding modes (MIG/MAG, Flux Cored and Spool Gun), as on CC welding modes (Stick Electrodes, TIG and Gouging) the voltage drops on the cables will not affect the arc voltage.

When enabled, Total Cable Length and Cable Gage will become available to be selected.



Input the total welding cable length (welding torch and ground clamp, including the power cable connecting the EDW to the wire feeder) and gage.



Select the Cable Sizing Chart to access a table with data to support selecting the most suitable cable length and gage for each specific welding current and duty cycle.


// CABLE SIZING CHART

	CABLE LENGTH					CABLE GAUGE (AWG)
	0-50ft	51-100ft	101-150ft	151-200ft	201-250ft	
125A @ 30%	6	5	3	2	1	
150A @ 40%	6	5	3	2	1	
180A @ 30%	4	4	3	2	1	
200A @ 60%	2	2	2	1	1/0	
225A @ 30%	3	3	2	1	1/0	
250A @ 30%	3	3	2	1	1/0	
250A @ 60%	1	1	1	1	1/0	
300A @ 60%	1	1	1	1/0	2/0	

// CABLE SIZING CHART

	CABLE LENGTH					CABLE CROSS SECTION (mm ²)
	0 - 15m	16 - 30m	31-45m	46-60m	61-75m	
125A @ 30%	13	17	27	34	42	
150A @ 40%	13	17	27	34	42	
180A @ 30%	21	21	27	34	42	
200A @ 60%	34	34	34	42	54	
225A @ 30%	27	27	34	42	54	
250A @ 30%	27	27	34	42	54	
250A @ 60%	42	42	42	42	54	
300A @ 60%	42	42	42	54	67	

5.4 Operating AC auxiliary power (Generator)

 **WARNING!**
TO PREVENT SERIOUS INJURY: Connect only properly wired plugs to the receptacles. This should be performed by a qualified electrician.

Make sure that the receptacles (120 or 240 volts) tools and equipment are compatible with the electrical characteristics and rated capacities of the generator.

- 1) Check if the AC auxiliary power receptacles can handle the power required by the electrical equipment to be connected.
- 2) Start the engine and allow it to run and warm up for five minutes without electrical load connected to the AC auxiliary power receptacles.

- 3) It is a good practice to test the 120 V AC GFCI receptacles before each use as follows:
 - a) Push test button on receptacle to trip the GFCI device.
 - b) The reset button should pop up, cutting off electricity to the receptacle. If this test fails, do not use receptacle until it is repaired or replaced.
 - c) Push the reset button in to enable again the output voltages at all the receptacles.
- 4) Move the circuit breaker to the ON position to enable the output voltages at all the AC auxiliary power receptacles.
- 5) Plug in the electrical equipment.
 - a) Connect the first item that requires more power.
 - b) Connect "inductive" load appliances, tools, and equipment next. Inductive loads are small hand tools and some small appliances.
 - c) Following that, connect any lights.
 - d) Voltage sensitive appliances, tools, and equipment should be the last to be connected.



NOTE!

Do not connect voltage sensitive items such as TVs, DVD players, microwaves, etc without a power line conditioner (not included).

- 6) After concluding the work, move the circuit breaker to the OFF position and disconnect all the electrical loads from the receptacles.



NOTE!

Do not allow the generator to run out of fuel with loads connected.



NOTE!

Failure to connect and operate can cause damage to the generator and/or to the appliances, tools, and equipment connected and will invalidate the warranty of this generator.



NOTE!

The AC voltages levels (120VAC and 240VAC) are independent of the welder, but AC auxiliary power available at the receptacles decreases as the welding current increases.



NOTE!

To achieve output currents above 20A at the 120VAC output, distribute the electrical loads over the 2 receptacles. This is required as each receptacle can support 20A maximum.



6 AC AUXILIARY POWER GUIDE



NOTE!

A generator that is rated more than the minimum required starting watts will last much longer than a generator that only supplies the exact watts needed.

6.1 AC auxiliary power supplied by the generator

1- LIMIT LOAD TO 90% OF GENERATOR NOMINAL OUTPUT.

Always start connecting the non-resistive (motor) loads from high to low power and then add resistive loads.

2- 5 SECONDS RULE.

If the motor connected does not start within 5 seconds, turn off the machine to prevent the motor to be damaged. It may require more power than the generator supplied power.

6.2 AC auxiliary power required by the load

Before using the AC auxiliary power, check that the products to plug into that socket are rated below and within the maximum wattage of the generator.

- 1) 1. Add up the running watts for all items you would like to use at any given time. To calculate the power consumed by the load you can multiply volts and amps to get watts (volts x amps = watts).
- 2) Make sure that the products total ratings should not exceed the 9,500 running watts of the generator.
- 3) Find the single highest starting watts for the selected items and add to the total.
- 4) Make sure that the products total ratings should not exceed the 11,000 maximum starting watts of the generator.
- 5) Plug in and turn on the loads from the high to low watts.

6.3 Approximate AC auxiliary power requirements by loads



NOTE!

For most lights or heaters: there are no additional start-up watts.

JOB SITE	Rating	Starting watts	Running watts
Air compressor	1/2 HP	3200	1000
	1 HP	6200	1500
	1-1/2 HP	8200	2200
	2 HP	10,500	3000
Circular saw	6-1/2"	500	500
	7-1/4"	950	950
	8-1/4"	1400	1400

JOB SITE	Rating	Starting watts	Running watts
Portable drill	1/4"	350	350
	3/8"	400	400
	1/2"	580	580
Bench saw	9"	4500	1500
	10"	6400	1900
Bench grinder	6"	1720	720
	8"	3900	1400
	10"	5200	1600
Pressure washer	1/2 HP	3200	950
	3/4 HP	4500	1400
	1 HP	6150	1600

FARM EQUIPMENT	Rating	Starting watts	Running watts
Grain cleaner	1/4 HP	1700	680
Grain elevator	3/4 HP	4400	1400
Mixers	1/2 HP	3300	1000
Farm duty motors	1/2 HP	2575	975
	3/4 HP	4500	1400
	1 HP	6000	1580
	1-1/2 HP	8200	2200
	2 HP	10,600	2900

HOUSEHOLD	Rating	Starting watts	Running watts
Froster		3100	800
Radio		50-200	50-200
Furnace blower	1/8 HP	800	300
	1/6 HP	1250	500
	1/4 HP	1600	600
	1/3 HP	2100	700
	1/2 HP	3225	875
Lights bulbs		as indicated on the bulb	

INDUSTRIAL MOTORS	Rating	Starting watts	Running watts
Capacitor start-induction run	1/3 HP	2000	700
	1/2 HP	3000	920
	3/4 HP	4500	1350
	1 HP	6100	1600
	1-1/2 HP	8300	2200
	2 HP	10,600	2850

INDUSTRIAL MOTORS	Rating	Starting watts	Running watts
Capacitor start-capacitor run	1-1/2 HP	8100	2000
	5 HP	23.3	6000
Split phase	1/8 HP	800	300
	1/6 HP	1200	500
	1/4 HP	1600	600
	1/3 HP	2100	700
	1/2 HP	3200	900

7 MAINTENANCE

**WARNING!**

TO PREVENT SERIOUS INJURY FROM ACCIDENTAL STARTING: Turn the Engine to “OFF” position. Allow the engine to cool down and disconnect the ground spark plug lead before performing any inspection, maintenance, or cleaning procedures.

**WARNING!**

TO PREVENT SERIOUS INJURY, FIRE AND BURNS: Turn the welder to the “OFF” position, leave the electrode holder and ground clamp on a clean surface, non-conductive of electricity and heat, and allow all parts of the welder to cool before service.

**CAUTION!**

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

**CAUTION!**

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

**NOTE!**

Regular maintenance is important for safe and reliable operation.

7.1 Engine and generator routine maintenance

**NOTE!**

Make sure that this equipment meets US EPA Evaporative Standards and fuel system replacement parts meet EPA Evaporation Standards.

Maintenance procedure	Every 25 hours ¹	Every 100 Hours or annually (whichever comes first) ¹	Every 200 hours ¹	Every 300 hours	Every 500 hours ² or annually (whichever comes first) ²
Check engine oil level	x			x	
Check and clean air filter element	x	x			
Change engine oil		x			
Clean cooling areas		x			
Replace air filter element	x				
Check fuel filter, clean or replace if needed			x		
Change oil filter			x	x	
Replace spark plug and set gap					x
Clean the generator brushes			x		
Change generator brushes					x

1- Perform these procedures more frequently under severe, dusty, dirty conditions.

2- Contact Kohler authorized dealer to perform this service.



NOTE!

This engine should be operated in its original configuration below 4000 ft. (1219 meters). Operating this engine with the wrong engine configuration at a given altitude may increase its emissions, decrease fuel efficiency and performance, and result in damage to the engine. If this engine is operated at an altitude of 4000 ft. (1219 meters) or above, a high-altitude carburetor kit is required.

Kohler's part numbers

Spark plug, RFI	25 132 14-S
Air filter element	24 083 03-S
Pre-cleaner (high)	24 083 05-S
Fuel filter	24 050 13-S
High altitude kit (4000-8000 ft)	24 755 420-S
High altitude kit (8000+)	24 755 422-S
Oil filter	12 050 01-S
Maintenance kit*	24 789 02-S

*Includes (2) Quarts of oil; (2) Spark plugs; Air filter; Fuel filter; Oil filter; Pre-cleaner.



NOTE!

See CH730 Kohler engine manual for complete engine care. Give engine specifications and serial number when ordering parts.



NOTE!

REPAIRS/SERVICE PARTS Kohler genuine service parts can be purchased from Kohler authorized dealers. To find a local Kohler authorized dealer visit <https://kohlerpower.com/en/engines/dealers> or call 1-800-544-2444 (U.S. and Canada).

7.2 Changing engine oil



NOTE!

Dispose of used oil in accordance with local ordinances.



NOTE!

The Kohler CH730 has an oil capacity (refill) of 1.7-1.9 U.S.qt (1.6-1.8 L).

Inspect equipment before starting it. If any problems are found, do not use the equipment until fixed properly. The oil level needs to be checked daily. See "[Engine prestart checks](#)", page 18 to find the position of the oil dipstick and the drain plugs at the engine.

- 1) Make sure the equipment is stopped, and the engine is still warm and on a level surface.
- 2) Clean the area around the oil fill cap/dipstick and drain plugs/oil drain valve.
- 3) Open the oil drain valve cap, rotate the valve drain body counterclockwise and remove the dipstick.
- 4) Place a drain pan underneath the machine and allow the oil to drain completely.
- 5) Clean the area around oil filter. Place a container under the filter to catch any oil and remove the filter. Clean the mounting surface.

- 6) Reinstall the drain plug.
- 7) Close oil drain valve body and replace the cap.
- 8) Place a new filter in shallow pan with the open end up. Fill with new oil until oil reaches bottom of threads. Allow 2 minutes for oil to be absorbed by filter material.
- 9) Apply a thin film of clean oil to the rubber gasket on the new filter.
- 10) Refer to instructions on oil filter for proper installation.
- 11) Fill crankcase with new oil to the specified level on the dipstick.
- 12) Reinstall oil fill cap/dipstick and tighten it securely.
- 13) Start engine, check for oil leaks. Stop engine, correct leaks. Recheck oil level.
- 14) Reinstall the oil dipstick and tighten it securely.

Oil recommendations

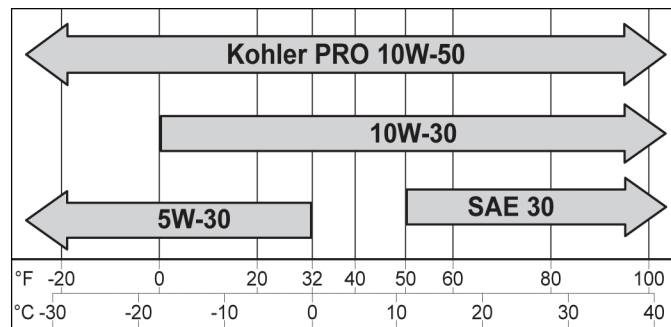


NOTE!

To improve cold weather starting, use correct grade oil for cold weather.

SAE 10W 50 synthetic oil is recommended for general use. (The SAE Viscosity Grade defines other viscosities to use in different average temperatures, see engine owner’s manual).

Oil must be API (American Petroleum Institute) service class SJ or higher. Select viscosity based on air temperature at time of operation as shown below.



7.3 Air filter element maintenance



NOTE!

The AIR CLEANER SYSTEM is CARB/EPA certified, and components should not be altered or modified in any way.



NOTE!

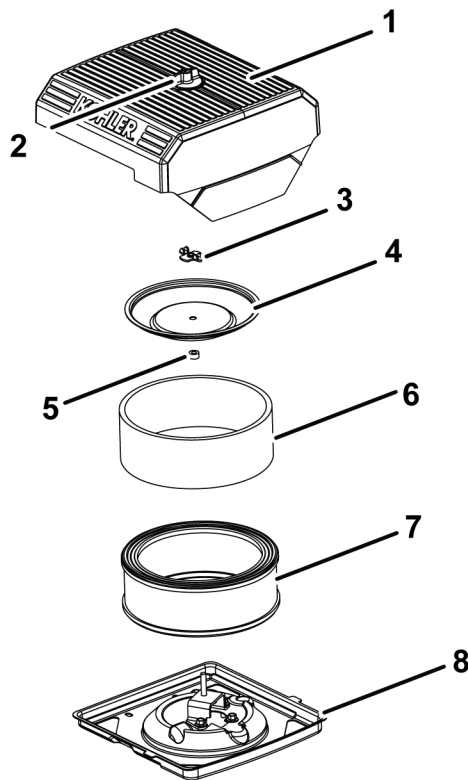
Operating engine with loose or damaged air cleaner components could cause premature wear and failure. Replace all bent or damaged components.



NOTE!

Running engine with cover positioned for cold weather operations in normal conditions can damage engine.

Low profile air filter components



- | | |
|----------------------|---------------------|
| 1. Air cleaner cover | 5. Rubber seal |
| 2. Air cleaner knob | 6. Pre-cleaner |
| 3. Wing nut | 7. Paper element |
| 4. Element cover | 8. Air cleaner base |

Replace or clean the low profile air filter components

- 1) Remove the air cleaner knob and air cleaner cover.
- 2) Remove the pre-cleaner from the paper element.
- 3) Replace if needed or wash the pre-cleaner in warm water with detergent. Rinse and allow to air dry.
- 4) Lightly oil the pre-cleaner with new engine oil; squeeze out excess oil.
- 5) Reinstall the pre-cleaner over paper element.
- 6) Clean the area around the paper element. Remove the wing nut, element cover, and paper element with pre-cleaner.
- 7) Remove the pre-cleaner from the paper element, service the pre-cleaner and replace the paper element.
- 8) Check the condition of the rubber seal and replace if necessary.
- 9) Install a new paper element on the base.
- 10) Install the pre-cleaner over the paper element and reinstall the element cover with the wing nut.
- 11) Reinstall the air cleaner cover and attach the air cleaner knob.

7.4 Spark plug maintenance



NOTE!

Do not clean spark plug in a machine using abrasive grit. Some grit could remain in spark plug and enter engine causing extensive wear and damage.

Engine misfire or starting problems are often caused by a spark plug that has improper gap or is in poor condition.

Engine CH730 is equipped with following spark plug:

Gap	0.030 in. (0.76 mm)
Thread size	12 in. (14 mm)
Reach	3/4 in. (19.1 mm)
Hex size	5/8 in. (15.9 mm)

Replacing or cleaning and adjusting the spark plug

- 1) Disconnect spark plug cap from end of plug. Clean out debris from around spark plug.
- 2) Remove spark plug.
- 3) If the electrode is oily, clean it using a clean, dry rag. If the electrode has deposits on it, polish it using emery paper.
- 4) Check gap using wire feeler gage. If possible, adjust gap to 0.030 in (0.76 mm).
- 5) Install the adjusted spark plug into cylinder head if it is in a good condition or replace it by a new one. Torque the spark plug to 20 ft. lb. (27 N·m).



NOTE!

Tighten the spark plug properly, to avoid the engine overheating and block damage.

7.5 Battery maintenance

A 12-volt battery with 400 cold cranking amps (cca) is generally recommended for starting in all conditions. A smaller capacity battery is often sufficient if an application is started only in warmer temperatures. Refer to following table for minimum capacities based on anticipated ambient temperatures. Cranking requirements increase as temperatures decrease and battery capacity shrinks. If the battery connected to the ruffian machine is kept idle for more than 3 months, it needs to be recharged.

If the battery is not connected to the ruffian machine for more than 6 months (shelf life), it needs to be recharged.



NOTE!

If the machine is actively in use, changing is not required.

Battery sizing recommendations:

Temperatures	Battery required
Above 32°F (0°C)	200 cca minimum
0°F to 32°F (-18°C to 0°C)	250 cca minimum
-5°F to 0°F (-21°C to -18°C)	300 cca minimum
-10°F (-23°C) or below	400 cca minimum




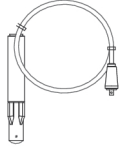
**NOTE!**

If battery charge is insufficient to turn over engine, recharge battery.

7.6 Welder routine maintenance

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

For engine maintenance schedule, refer to *"Engine and generator routine maintenance"*, page 49.

Interval	Area to maintain		
At every start	Check the fuel level and condition. If necessary, replace with fresh fuel.	Check oil level and condition.	Check that there is no fuel or oil spills inside the unit.
Every 100 hours	 <p>Clean or replace unreadable labels.</p>	 <p>Clean weld terminals and battery terminals.</p>	
Every 200 hours	 <p>Clean inside equipment. Use dry compressed air with reduced pressure.</p>	 <p>Check or replace weld cables.</p>	
Every 500 hours	Service center to revise slip rings and replace brushes at the generator.		

8 TROUBLESHOOTING

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

8.1 Welder troubleshooting

Type of fault	Corrective action
No welding output	Check if the circuit breaker of the welder is ON.
	Check for any error messages on the screen that could be disabling the output.
	Contact your authorized ESAB service center checking the slip rings and brushes of the generator.
Welding problems	Check that the engine speed is normal.
	Check that the welding and return cables are correctly connected to the welder outputs and have a clean and tight connection.
	Make sure the return clamp has proper contact with the workpiece
	Check the condition of the consumables: wire or electrodes. Use dry consumables.
	Check that the correct polarity is being used. For polarity, check the consumable packaging.
	Check that the correct welding current or voltage value is set.
	Contact your authorized ESAB service center checking the slip rings and brushes of the generator.
Thermal protection trips frequently	Make sure that the recommended duty cycle for the weld current has not been exceeded.
	Make sure that the air inlets or outlets are not clogged.

8.2 AC auxiliary power troubleshooting

Type of fault	Corrective action
No AC auxiliary power output	Check that the 50 Amp circuit breaker of the AC power is in ON position.
	Check that the 20 Amp circuit breakers for 120VAC receptacles did not trip.
	Check that the 120VAC GFCI is not tripped.
	Check receptacle wiring and connections.
	Contact your authorized ESAB service center checking the slip rings and brushes of the generator.
Erratic AC auxiliary power output.	Check the plugs connections.
	Check fuel level and fuel system.
	Maintain air cleaner and spark plug according to engine manual.
	Contact your authorized service center to check and adjust engine speed or the governor linkage for smooth, non-binding operation.

8.3 Engine troubleshooting

Type of fault	Corrective action
Engine does not start	Check fuel and oil levels and refill if necessary. Do not use gasoline with more than 10% ethanol (E15, E20, E85, etc.).
	Operate engine on level surface. Engine mounted on slope, could trigger the low oil shutdown.
	Check the battery charge and connections.
	Check the starter terminals for loose connection.
	Check that the choke lever is at the START position when engine is cold.
	Change the fuel with fresh gasoline if the engine was stopped for a long time.
	Check the fuel filter and fuel lines.
	Check spark plug connection and condition. Replace the spark plug if required.
	Contact qualified technician to diagnose/ repair fuel system, head gasket, valves, or ignition system.
Engine stalls during normal operation	Check fuel level. Fill fuel tank with fresh 87+ octane stabilizer- treated unleaded gasoline. Do not use gasoline with more than 10% ethanol (E15, E20, E85, etc.).
	Secure the spark plug cap.
	Check the fuel filter.
	Check the engine oil before use.
	Check the low oil pressure shutdown switch.
	Check the battery and recharge it if necessary.
	Contact qualified technician to diagnose/ repair fuel system, head gasket, valves, or ignition system.
Engine knocks	Check fuel quality. Fill fuel tank with fresh 87+ octane stabilizer- treated unleaded gasoline. Do not use gasoline with more than 10% ethanol (E15, E20, E85, etc.).
	Do not operate equipment at overload.
	Contact qualified technician to diagnose/ repair fuel system, head gasket, valves, or ignition system.
Engine stops during cold temperatures	Use only the RUN position until the unit is warm enough.
	Use fuel treated for low temperatures.
Engine does not go to low Idle speed	Check that the engine control switch is at the Idle position.
	Remove all the load from the outputs.
	Contact a qualified technician to diagnose/ repair Idle solenoid or Run/Idle control pc board.
Unstable or slow engine speed	Check and adjust engine speed.
	Check that the fuel cap is well installed.
	Check if the fuel or air filters are clogged.
	Check fuel level and quality. Fill fuel tank with fresh 87+ octane stabilizer-treated unleaded gasoline. Do not use gasoline with more than 10% ethanol (E15, E20, E85, etc.).

9 WARNINGS AND ERROR CODES

9.1 List of warnings

Code	Description	Cause	Action
001	REPLACE ENGINE OIL SOON.	Engine oil has reached the remaining 10 hours mark* before its recommended scheduled change.	Go to Equipment Status screen for more information or to input a replacement.
002	REPLACE AIR FILTER SOON.	Air filter has reached the remaining 10 hours mark* before its recommended scheduled change.	Go to Equipment Status screen for more information or to input a replacement.
003	REPLACE FUEL FILTER SOON.	Fuel filter has reached the remaining 10 hours mark* before its recommended scheduled change.	Go to Equipment Status screen for more information or to input a replacement.
004	REPLACE SPARK PLUG SOON.	Spark plug has reached the remaining 10 hours mark* before its recommended scheduled change.	Go to Equipment Status screen for more information or to input a replacement.
005	REPLACE BRUSHES SOON.	Generator brushes have reached the remaining 10h mark* before their recommended scheduled change.	Go to Equipment Status screen for more information or to input a replacement.
006	REPLACE OIL FILTER SOON.	Oil filter has reached the remaining 10 hours mark* before its recommended scheduled change.	Go to Equipment Status screen for more information or to input a replacement.
010	RUNNING OUT OF FUEL.	Only 10% of fuel left in the tank.	Turn the switch off, let engine cool down and add more fuel.
014	CABLES CALIBRATION NOT AVAILABLE.	Cables calibration function is only available for constant voltage (CV) processes (e.g. GMAW, FCAW and Spool gun).	Select any of the CV processes to set up cables calibration properties.
015	SPOOL GUN NOT CONNECTED.	Spool gun processes will not be available until it is connected to the 8-pin CPC connector on the front panel.	Connect the spool gun to the 8-pin connector in front of the machine to access this process.
023	WELDING OUTPUT AMPERAGE EXCEEDED.	Welding output current was exceeded, either due to incorrect settings or an electronic malfunction.	Check maximum output parameters on the rating label or user manual and adjust settings accordingly.
024	WELDING OUTPUT POWER EXCEEDED.	Welding output power was exceeded, either due to incorrect settings or an electronic malfunction.	Check maximum output parameters on the rating label or user manual and adjust settings accordingly.

**Alerts will always be 10h before recommended scheduled change. Hours cannot be adjusted by the user.*

9.2 List of errors

Code	Description	Cause	Action
101	ENGINE OIL MUST BE REPLACED.	The engine has been running for over 100 hours* with no oil change date given.	Go to Equipment Status screen for more information or to input a replacement.
102	AIR FILTER MUST BE REPLACED.	The engine has been running for over 100 hours* with no air filter change date given.	Go to Equipment Status screen for more information or to input a replacement.
103	FUEL FILTER MUST BE REPLACED.	The engine has been running for over 200 hours* with no fuel filter change date given.	Go to Equipment Status screen for more information or to input a replacement.
104	SPARK PLUG MUST BE REPLACED.	The engine has been running for over 500 hours* with no spark plug change date given.	Go to Equipment Status screen for more information or to input a replacement.
105	BRUSHES MUST BE REPLACED.	The engine has been running for over 500 hours* with no generator brushes change date given.	Go to Equipment Status screen for more information or to input a replacement.
106	OIL FILTER MUST BE REPLACED.	The engine has been running for over 200 hours* with no oil filter change date given.	Go to Equipment Status screen for more information or to input a replacement.
111	ELECTRONIC COMPONENTS OVERHEATED.	The welding output power exceeded the specification limits and caused the electronic components to overheat.	Run engine for a couple of minutes until the error is cleared to restart welding.
116	SHORT-CIRCUITED WELDING OUTPUT.	A short circuit has been detected between the positive and negative welding outlets.	Move the welding cables away from each other or have inverter serviced.
120	CONTROL BOARD COMMUNICATION ERROR.	Communication between the front panel PCB and the control board was unsuccessful.	Have control board or its harnesses serviced.
125	LOW ENGINE OIL PRESSURE.	Low engine oil pressure was detected.	Turn the switch off, let engine cool down and replace the oil. Or have the oil sensor serviced.
126	ENGINE SHUT DOWN DUE TO LOW SPEED.	Engine RPM has been below 3420 RPM / 57 hz for more than 10 seconds. Main cause is electrical overload.	Check the user manual for the maximum power limits the machine can handle.

**Preset runtime periods are recommended by engine and generator manufacturers and cannot be changed by the user.*

10 ORDERING SPARE PARTS



CAUTION!

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

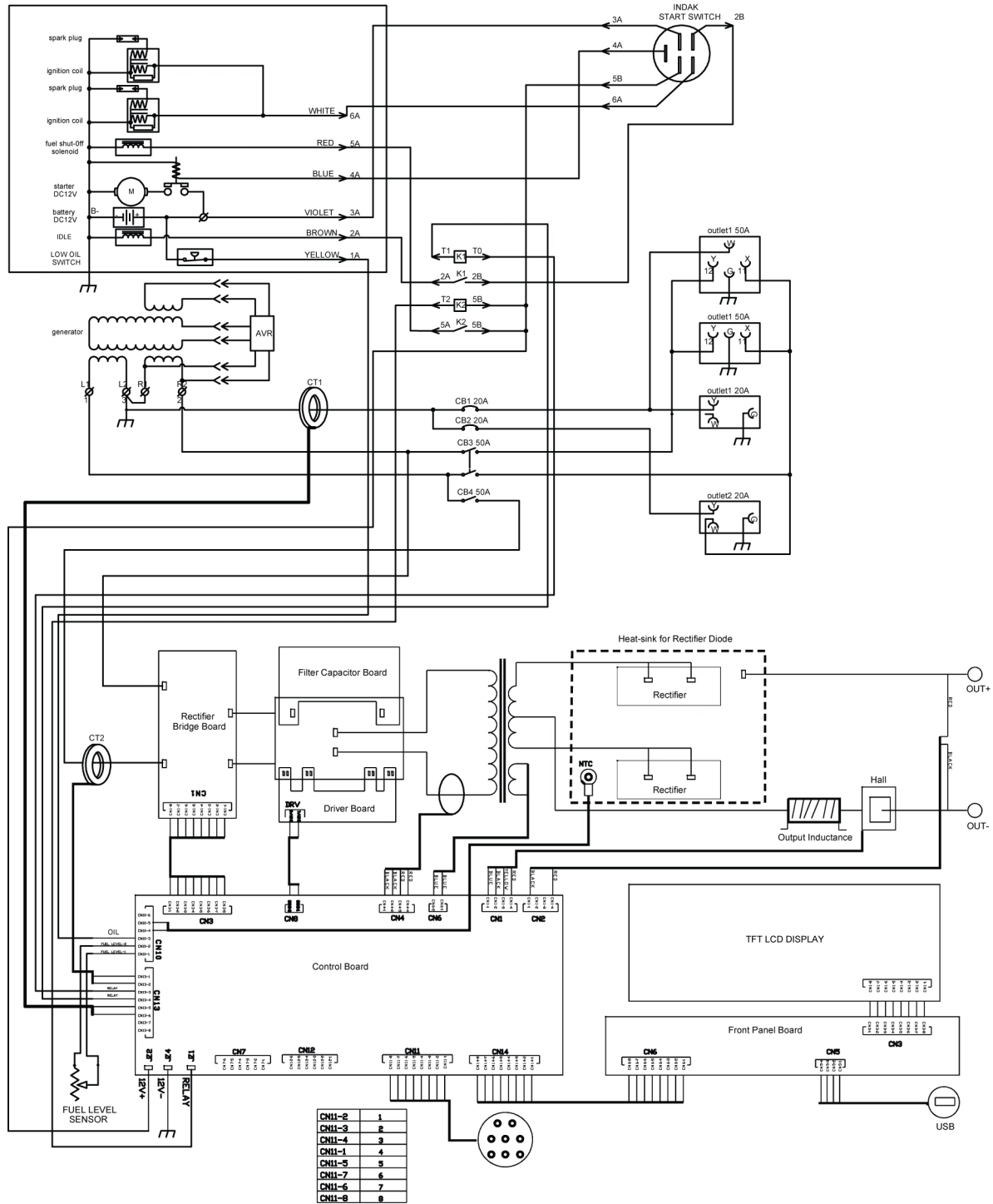
The Ruffian EMP 270G EDW is designed and tested in accordance with the Canadian standards **CSA C 22.2 60974-1** and US standard **ANSI/NEMA/IEC 60974-1**. On completion of service or repair work, it is the responsibility of the person(s) performing the work to ensure that the product still complies with the requirements of the above standards.

Spare parts and wear parts can be ordered through your nearest ESAB dealer, see esab.com. 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.

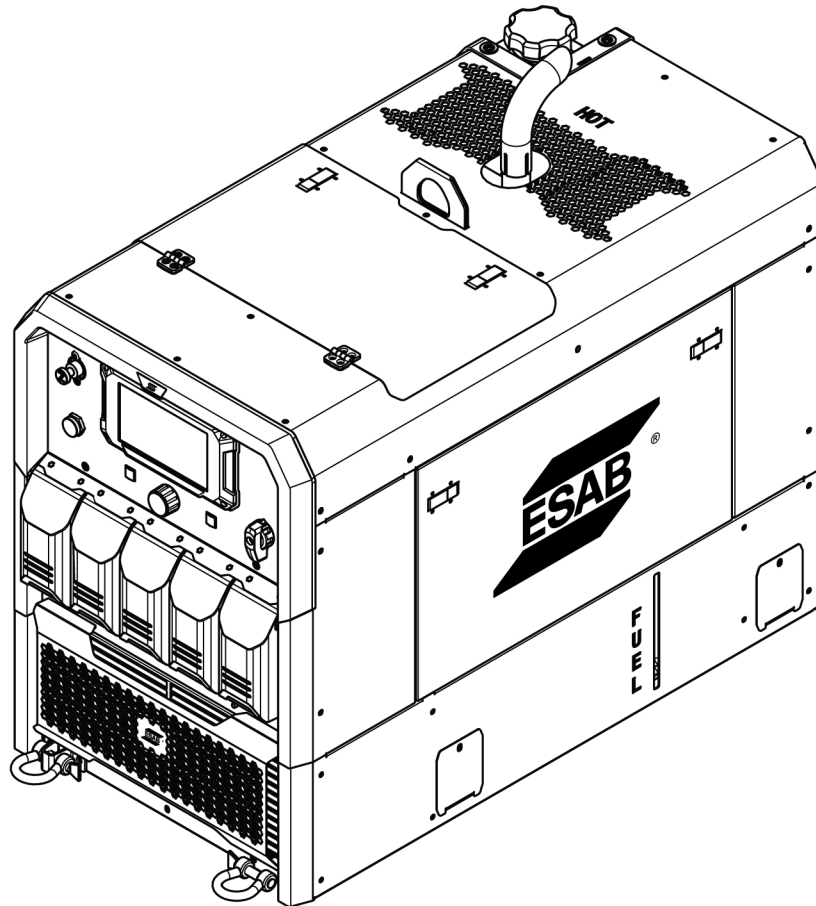
Spare parts and wear parts for the engine can be ordered from Kohler authorized dealers. To find a local Kohler authorized dealer visit <https://kohlerpower.com/en/engines/dealers> or call 1-800-544-2444 (U.S. and Canada).

APPENDIX

BLOCK DIAGRAM



ORDERING NUMBERS



Ordering number	Denomination	Type	Notes
0707 070 270	Engine Driven Welder	RUFFIAN EMP 270G EDW	CSA
0448 578 *	Instruction manual	RUFFIAN EMP 270G EDW	CSA
0448 579 001	Spare parts list	RUFFIAN EMP 270G EDW	CSA
0448 581 001	Service manual	RUFFIAN EMP 270G EDW	CSA

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

ACCESSORIES

9110-1103	TwecoTong A-732 Electrode Holder (300A, 2/0 MAX, thru 7/32) Copper Alloy, Clamshell
9205-1130	Tweco GC-300 Ground Clamp (300A, thru 3/0) Copper Alloy, Clamshell
0700500084	MMA 4 Analog Remote Control incl. 33 ft cable and 8-pin connector
9425-1431	2 in. Dinse Cable Connector Male (Pkg 2)
9425-1432	50 mm Dinse Cable Connector Female (Pkg 2)
1036-1610	Tweco Spray Master 350 Air Cooled MIG Gun (350A, 1/16, 10FT)
1036-1613	Tweco Spray Master 350 Air Cooled MIG Gun (350A, 1/16, 12 ft)
1036-1615	Tweco Spray Master 350 Air Cooled MIG Gun (350A, 1/16, 15 ft)
1031-1642	Tweco Flux Cored SEFC MIG Gun (350A 10ft / 3m)
1031-1643	Tweco Flux Cored SEFC MIG Gun (350A 15ft / 4.6m)
SG250120612	Tweco Spool Gun 250, OKC50 8pin 12.5 ft
SG250250612	Tweco Spool Gun 250, OKC50 8pin 25 ft
0700026624	Heliarc SR-26V TIG Torch, Air-cooled with Gas-valve, 5/32 in. (4.0 mm), 12.5 ft (3.8 m) cable
0700026625	Heliarc SR-26V TIG Torch, Air-cooled with Gas-Valve, 5/32 in. (4.0 mm), 25 ft (7.6 m) cable
W4014450	Tweco TIG Foot Control 15 ft (5 m), 8-pin connector
0781-2743	Victor HRF 1425-580, Regulator/Flowmeter, for Ar/CO2
0781-2703	Victor GRF400-320 Flowmeter Regulator, for CO2
W4013900	Gas hose with 5/8 in. 18 RH fittings, 10 ft (3 m)
61082008	Arcair K4000 Air Carbon-Arc Gouging Torch and Cable (1000A, up to 0.5 in. round and 0.6 in. flat)



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