



INSTRUCTION MANUAL

EMP 285ic 1ph & EMP 285ic 3ph



Valid for: serial nos. 745-xxx-xxxx, 747-xxx-xxxx

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BE SURE THIS INFORMATION REACHES ALL OPERATORS OF THIS EQUIPMENT. EXTRA COPIES ARE AVAILABLE THROUGH THE ESAB SUPPLIER OR FROM THE ESAB WEB SITE: WWW.ESAB.COM.

CAUTION

These INSTRUCTIONS are for experienced operators. If you are not fully familiar with the principles of operation and safe practices for arc welding and cutting equipment, we urge you to read our booklet, "Precautions and Safe Practices for Arc Welding, Cutting, and Gouging," Form 52-529. See:

<http://www.esabna.com/eu/literature/precautions%20and%20safe%20practices%20for%20arc%20welding,%20cutting%20and%20gouging.pdf>

Do NOT permit untrained persons to install, operate, or maintain this equipment. Do NOT attempt to install or operate this equipment until you have read and fully understand these instructions. If you do not fully understand these instructions, contact your supplier for further information. Be sure to read the Safety Precautions before installing or operating this equipment.

This equipment will perform in conformity with its proper use when installed, operated, maintained and repaired in accordance with the instructions provided. This equipment must be checked periodically. Malfunctioning or poorly maintained equipment should not be used. Parts that are broken, missing, worn, distorted or contaminated should be replaced immediately. Should such repair or replacement become necessary, the manufacturer recommends that a request for service advice be made to the Authorized Distributor from whom it was purchased. This equipment or any of its parts should not be altered without the prior written approval of the manufacturer. The user of this equipment shall have the sole responsibility for any malfunction which results from improper use, faulty maintenance, damage, improper repair or alteration by anyone other than the manufacturer or a service facility designated by the manufacturer.

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1.1 HOW TO USE THIS MANUAL

To ensure safe operation, read the entire manual, including the section on safety instructions and warnings.

Throughout this manual, the words WARNING, CAUTION, and NOTE may appear. Pay attention to the information provided under these headings.

1.2 EQUIPMENT IDENTIFICATION

The unit's identification number (specification or part number), model, and serial number usually appear on a data tag attached to the rear panel. Equipment which does not have a data tag such as torch and cable assemblies are identified only by the specification or part number printed on a loosely attached card or the shipping container. Record these numbers on this book for future reference.

1.3 RECEIPT OF EQUIPMENT

When you receive the equipment, check it against the invoice to make sure it is complete and inspect the equipment for possible damage due to shipping. If there is any damage, notify the carrier immediately to file a claim.

1.4 DESCRIPTION

The ESAB EMP 285ic 1ph (230V or 120V) and the EMP 285ic 3ph (575V or 460V) are 50/60 Hz, constant current welding machines capable of performing SMAW (STICK), and GTAW (LIFT TIG) welding processes and constant voltage welding capable of performing GMAW (MIG) welding processes. The unit is equipped with amperage and voltage meters which display on its User Interface during welding. A host of other features display to satisfy the broad operating needs of the user.

The ESAB EMP 285ic provides excellent welding performance across a broad range of applications when used with the correct welding consumables and procedures. The following instructions detail how to correctly and safely set up the machine and give guidelines on gaining the best efficiency and quality from the Power Source. Please read these instructions thoroughly before using the unit.

Additional copies of this manual may be purchased by contacting ESAB. Include the Owner's Manual number and equipment identification numbers.

Electronic copies of this manual can also be downloaded at no charge in Acrobat PDF format by going to the ESAB web site: <http://www.esab.com>.

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SECTION 2

SAFETY**2.1 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.

Figure 2-1. Danger and Warning Symbols

2.1.1 SAFETY GUIDANCE AND INFORMATION

	WARNING Before use, read and understand the instruction and follow all labels, employer's safety practices and Safety Data Sheets.	
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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 the Safety Precautions could result in injury or death.

2.1.2 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

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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:
 - Use side shields in any work area, even if welding helmets, face shields and/or goggles are also required.
 - 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 look at the arc and not to expose themselves to the rays of the electric-arc or hot metal.
 - Wear flameproof gauntlet-type gloves, heavy long-sleeve shirt, cuff-less pants, high-topped shoes, and a welding helmet or cap for personal protection. A flameproof apron may also be desirable as additional protection against radiated heat and sparks.

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- Hot sparks or metal can lodge in rolled up sleeves, trouser cuffs, or pockets. Sleeves and collars should be kept buttoned (closed) and open pockets should be eliminated from the front of the clothing.
- Protect other personnel from arc rays and hot sparks with a suitable non-flammable partition or curtains. Post warning signs advising others not to watch the welding arc or be in direct exposure to the active arc without proper protection.
- Use goggles or face shields over safety glasses when chipping slag or grinding. Chipped slag may be hot and can fly for long distances. Bystanders should also wear goggles over safety glasses.

2.1.3 FIRES AND EXPLOSIONS



FIRE HAZARD: Sparks (spatter) can cause fire.

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 an approved protective non-flammable covering. Combustible materials include wood, cloth, sawdust, liquid and gas fuels, solvents, paints, and coating 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. Follow the "hot work" procedures for the location. This can include a fire watch person who monitors the sparks during the work, the requirement for a formal work permit and the surveillance of the scene for an extended period of time to ensure no smoldering fires are developing.
5. Do not weld, cut, or perform other hot work until the work piece has been completely cleaned so that there are no substances on or in the work piece which might produce flammable or toxic vapors. Do not perform hot work on closed containers, they may explode.
6. 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.
7. Do not use equipment beyond its ratings. For example, an overloaded welding cable can overheat and create a fire hazard.

SAFETY

8. After completing work, inspect the work area to make sure there are no hot sparks or hot metal that could cause a fire later. Use fire watchers when necessary.

2.1.4 ELECTRICAL SHOCK



ELECTRIC SHOCK can kill.

Therefore:

1. Be sure the power source frame (chassis) is connected to the earth system of the input power. All ground points should be verified with periodic testing by an electrician.
2. Connect the workpiece to a good electrical earth.
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 ground while working in tight quarters or a damp area; stand on an effective insulation layer, such as dry boards, 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 an earth cable.

2.1.5 ELECTRIC AND MAGNETIC FIELDS



ELECTRIC AND MAGNETIC FIELDS – Can be dangerous to health.

SAFETY

Therefore:

1. Welders with medical pacemakers fitted should consult their doctor 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 together 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 the welding power source and cables as far away from your body as possible.

2.1.6 FUMES AND GASES



Therefore:

1. Keep your head out of the fumes, smoke, and vapors. Do not breathe the smoke, fumes, and gases that are generated by welding processes. Always provide adequate ventilation in the work area by natural or mechanical means.
2. 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 in the fumes from these materials.
3. Orient the ventilation to draw smoke, fumes, and vapors in a direction away from the welding operator. Position ventilation suction to pull welding fumes and smoke from the far side of the work area if possible.
4. Provide general ventilation for the surrounding work area if there is a risk of workers or other persons beyond the immediate work area getting exposed to significant welding fumes. Monitor the fugitive fumes and smoke for potential collateral

SAFETY

exposures. Install appropriate ventilation controls or cease surrounding activity if fumes become an exposure issue outside of the immediate work area

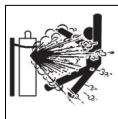
5. Do not operate near degreasing and spraying operations. The heat or arc can react with chlorinated hydrocarbon vapors or liquids to form phosgene, a highly toxic gas, and other irritant gases.
6. If you develop momentary eye, nose or throat irritation while operating, this is an indication that the ventilation is not adequate. Stop work and take the necessary steps to improve ventilation in the work area. Do not continue to operate if physical discomfort persists.
7. Respiratory protection is required if worker respiratory exposures to fumes exceed recommended thresholds. Those thresholds can only be accurately measured through standardized industrial hygiene sampling protocols. Seek the assistance of specialists if your work causes respiratory exposures or you have other exposure concerns.
8. Refer to ANSI/ASC Standard Z49.1 for specific ventilation recommendations.



WARNING

This product when used for welding or cutting, typically produces fumes or gases which contain chemicals known to the State of California that can cause birth defects and in some cases cancer (California Health & Safety Code §25249.5 et

2.1.7 CYLINDER HANDLING



EXPLODING CYLINDERS – Can injure or kill.

Therefore:

1. Locate cylinders away from heat, sparks and flames.
2. Inspect all connections before use to detect and correct any leaks or system defects. Use soapy water as a test if you suspect a leak but have difficulty confirming its location or existence.
3. Never strike an arc on a cylinder. Handle cylinders with care and avoid jolts and impacts to cylinders; regardless of if they are empty, partial, or full.
4. Secure all cylinders in a way that prevents them from falling and potentially doing damage to the valve, regulator, or attachments. Typically, this requires the use of a secure strap or chain at an appropriate height that helps to prevent the cylinder from falling over.

SAFETY

5. 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 the manufacturer's operating instructions for mounting a regulator to a compressed gas cylinder.
6. Never secure cylinders to work tables or fixtures where they may become part of an electrical circuit.
7. 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.

2.1.8 MOVING PARTS



MOVING PARTS – Can injure.

Therefore:

1. Keep all doors, panels, guards, and covers closed and securely in place.
2. Have only qualified people remove covers for maintenance and troubleshooting as necessary
3. Keep hands, hair, loose clothing and tools away from moving parts. Do not use gloves near moving parts.
4. Reinstall panels or covers and close doors when service is finished and before starting engine.

2.1.9 MALFUNCTION

- Call for expert assistance in the event of a malfunction.

2.1.10 EQUIPMENT MAINTENANCE



WARNING

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 for such work.
2. Before performing any maintenance work inside a power source, disconnect the power source from the incoming electrical power.

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3. Maintain cables, earthing wire, connections, power cord and power supply in safe working order. Do not operate faulty equipment in a 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.

2.1.11 FALLING EQUIPMENT



WARNING

Falling equipment can injure.

Therefore:

1. Use equipment of adequate capacity to life and support unit.
2. Keep cables and cords away from moving vehicles and moving equipment when working from an aerial location.

2.1.12 ARC RAYS



WARNING

Arc Rays can injure eyes and burn skin.

Therefore:

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

2.1.13 NOISE



WARNING

Excessive noise can damage hearing.

Therefore:

1. Protect your ears. Use earmuffs or other hearing protection with the appropriate level of noise reduction/hearing protection.

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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 to you:

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

2.1.14 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 or exceed the standard requirements that apply to this type of equipment.

This equipment will perform as per the information contained herein when installed, operated, maintained and repaired in accordance with the instructions provided. This equipment must be checked periodically. Defective equipment (including welding leads) should not be used. Parts that are broken, missing, plainly worn, distorted or contaminated, should be replaced immediately. Should such repairs or replacements become necessary, it is recommended that such repairs be carried out by appropriately qualified persons approved by ESAB. Advice in this regard can be obtained by contacting an accredited ESAB distributor.

This equipment or any of its parts should not be altered from standard specification without prior written approval of ESAB. The user of this equipment shall have the sole responsibility for any malfunction which results from improper use or unauthorized modification from standard specification, faulty maintenance, damage or improper repair by anyone other than appropriately qualified persons approved by ESAB.

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 could result in injury to the operator and damage to the equipment.

1. ANYONE WHO USES THE EQUIPMENT MUST BE FAMILIAR WITH:

- its operation

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- location of emergency stops and safety features
 - its function
 - relevant safety precautions
 - welding and cutting methods or other applicable operations of the equipment
2. THE OPERATOR MUST ENSURE THAT:
- no unauthorized person is 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 to the extent possible, to maintain effective ventilation and the control of welding fumes and work byproducts
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

SAFETY

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SECTION 3

INTRODUCTION

The ESAB, EMP product family is a new generation of multi-process (MIG/Stick/TIG) welding power sources.

All Rebel power sources are designed to match the needs of the user. They are tough, durable, and portable, providing excellent arc performance across a variety of welding applications.

The EMP features a 4.3 in. (11 cm) color TFT (Thin Film Transistor) user interface (UI) display which provides quick and easy selection of weld process and parameters, suitable for both newly trained and intermediate-level users. For more advanced users, any number of functions could be introduced and customized to give maximum flexibility.

3.1 KEY FEATURES

- Excellent MIG characteristics
- Excellent multi-process, MIG/Stick and Lift/TIG (EMP) welding capabilities
- Automatic recognition of input power with PFC
- Large 4.3 in. (11 cm) high resolution customizable user interface (EMP)
- Rugged case design and internal hardware
- Portable
- High grade cast aluminum wire drive system provides excellent control of drive roll geometry ensuring smooth, precise wire feeding
- Professional high-grade accessories

3.2 EQUIPMENT

Package consists of the following:

3.2.1 EMP 285ic 1ph

- ESAB EMP 285ic 1ph power source
- Tweco® Spray Master® V250 MIG torch with 15 ft (4.5 m) cable, with 0.032 in, 0.035 in., 0.045 in. (0.8 mm, 0.9 mm, 1.2 mm) contact tips, 5/8" recess nozzle,
- ESAB stick electrode holder, 12 ft (4 m), 300 A
- Ground clamp, 10 ft. (3 m), 300 A
- Victor® Flow Meter with 6 ft (2 m) gas hose
- ESAB OK AristoRod™ premium solid wire 0.035 in. (0.9 mm) 11# spool
- ESAB Atom Arc Acclaim 1/8 in. premium stick electrodes 1# sample pack
- Drive rollers: 0.035 in. (0.9 mm) to 0.045 mm (1.2 mm) V-Groove, 0.045 in. (1.2 mm) to 0.052 mm (1.4 mm) Knurled
- Guide tubes: 0.030 in. (0.8 mm) to 0.062 mm (1.6 mm) Solid Wire
- Thickness gauge tool

INTRODUCTION

- 4-pin to 8-pin jumper
- USB stick including manuals
- Quick Start Guide
- Safety manual

3.2.2 EMP 285ic 3ph:

- ESAB EMP 285ic 3ph power source
- Tweco® Spray Master V350 MIG gun with 15 ft (4.5 m) cable, 0.030 in., 0.035 in., 0.045 in. (0.8 mm, 0.9 mm, 1.2 mm) contact tips and Allen key
- ESAB stick electrode holder, 12 ft (4 m), 300 A
- Ground clamp, 10 ft. (3 m), 300 A
- Victor® Flow Meter with 6 ft (2 m) gas hose
- ESAB OK AristoRod™ premium solid wire 0.035 in. (0.9 mm) 11# spool
- ESAB Atom Arc Acclaim 1/8 in. premium stick electrodes 1# sample pack
- Drive rollers: 0.035 in. (0.9 mm) to 0.045 mm (1.2 mm) V-Groove, 0.045 in. (1.2 mm) to 0.052 mm (1.4 mm) Knurled
- Guide tubes: 0.030 in. (0.8 mm) to 0.062 mm (1.6 mm) Solid Wire
- Thickness gauge tool
- 4-pin to 8-pin jumper
- USB stick including manuals
- Quick Start Guide
- Safety manual

3.3 OVERHEATING PROTECTION



CAUTION!

This unit is equipped with overheating protection for its power supply.

The welding power source has overheating protection that operates if the internal temperature becomes too high. When this occurs, the welding current is interrupted, and an overheating symbol appears on the display. The overheating protection resets automatically when the temperature has returned to normal working temperature.

SECTION 4

TECHNICAL SPECIFICATIONS

This section lists the specifications for the EMP 285ic (1ph and 3ph) models.

TECHNICAL SPECIFICATION PUBLISHED IN THIS MANUAL:

- Due to variations that can occur in manufactured products, claimed performance, voltages, ratings, all capabilities, measurements, dimensions and weights quoted are approximate only. Achievable capacities and ratings in use and operation will depend upon correct installation, use, applications, maintenance and service.
- The Effective Input Current should be used for the determination of cable size & supply requirements.
- Motor start fuses, or thermal circuit breakers are recommended for this application. Check local requirements for your situation in this regard.
- Generator Requirements at the Maximum Output Cycle.
- Due to large variations in performance and specifications of different brands and types of generators, ESAB cannot guarantee full welding output power or duty cycle on every brand or type of generator. ESAB recommends that when selecting a generator, that the power source/generator combination be adequately tested to ensure the combination performs to the user's expectations without notice.

4.1 EMP 285ic (1ph) SPECIFICATIONS

Table 4-1. Specifications for EMP 285ic 1ph

SPECIFICATION	230 V $\pm 10\%$, 1 ph, 50/60 Hz	120 V $\pm 10\%$, 1 ph, 50/60 Hz
PRIMARY CURRENT		
I _{max} . GMAW - MIG	43.0 A	Breaker 20 A: 28.6 A Breaker 15 A: 20.3 A
I _{max} . GTAW - TIG	33.1 A	Breaker 15 A: 20.8 A
I _{max} . SMAW - Stick	43.6 A	Breaker 15 A: 20.8 A
I _{eff} . GMAW - MIG	27.2 A	Breaker 20 A: 18.0 A Breaker 15 A: 14.6 A
I _{eff} . GTAW - TIG	18.2 A	Breaker 15 A: 14.7 A
I _{eff} . SMAW - Stick	27.6 A	Breaker 15 A: 14.7 A
PERMISSIBLE LOAD AT GMAW - MIG		
100% duty cycle*	160A (V _{out} = 22V)	Breaker 15A: 75A (V _{out} = 17.75V) Breaker 20A: 90A (V _{out} = 18.5V)

TECHNICAL SPECIFICATIONS

SPECIFICATION	230 V $\pm$ 10%, 1 ph, 50/60 Hz	120 V $\pm$ 10%, 1 ph, 50/60 Hz
60% duty cycle*	220A (V_{out} = 25V)	Breaker 15A: 90A (V_{out} = 18.5V) Breaker 20A: 110A (V_{out} = 19.5V)
40% duty cycle*	285A (V_{out} = 28V)	Breaker 15A: 100A (V_{out} = 19V)
Setting range (DC)	15A (V_{out} = 14.75V) - 300A (V_{out} = 34V)	15A (V_{out} = 14.75V) – 130A (V_{out} = 20.5V)
PERMISSIBLE LOAD AT GTAW - TIG		
100% duty cycle*	185A (V_{out} = 17.4V)	Breaker 15A: 75A (V_{out} = 17.75V) Breaker 20A: 90A (V_{out} = 18.5V)
60% duty cycle*	240A (V_{out} = 19.6V)	Breaker 15A: 90A (V_{out} = 18.5V) Breaker 20A: 110 A (V_{out} = 19.5V)
40% duty cycle*	285A (V_{out} = 21.4V)	Breaker 15A: 100A (V_{out} = 19V)
Setting range (DC)	5A (V_{out} = 10.2V) to 285A (V_{out} = 21.4V)	5A (V_{out} = 10.2V) – 200A (V_{out} = 18.0V)
PERMISSIBLE LOAD AT SMAW - STICK		
100% duty cycle*	135A (V_{out} = 25.4V)	65A (V_{out} = 22.6V)
60% duty cycle*	210A (V_{out} = 28.4V)	80A (V_{out} = 23.2V)
40% duty cycle*	260A (V_{out} = 30V)	85A (V_{out} = 23.4V)
Setting range (DC)	16A (V_{out} = 20.6V) to 180A (V_{out} = 27.2V)	16A (V_{out} = 20.6V) – 130A (V_{out} = 25.2V)
Open Circuit Voltage (OCV)	68 V	68 V
Efficiency	82%	84%
Power factor	0.98	0.99
Wire feed speed	60–800 in./min	60–800 in./min
WIRE DIAMETER		
Mild steel solid wire	0.030-0.052in.(0.8-1.2mm)	0.030-0.052in.(0.8-1.2mm)
Stainless steel solid wire	0.030-0.052in.(0.8-1.2mm)	0.030-0.052in.(0.8-1.2mm)
Flux-cored wire	0.030-0.062in. (0.8-1.6mm)	0.030-0.062in.(0.8-1.6mm)
Aluminum	0.030-3/64in.(0.8-1.2mm)	0.030-3/64in.(0.8-1.2mm)

TECHNICAL SPECIFICATIONS

SPECIFICATION	230 V ±10%, 1 ph, 50/60 Hz	120 V ±10%, 1 ph, 50/60 Hz
Bobbin size	4–12 in. (100–300 mm)	4–12 in. (100–300 mm)
Dimensions l × w × h	686 × 292 × 495 mm (27.0 × 11.5 × 19.5 in.)	686 × 292 × 495 mm (27.0 × 11.5 × 19.5 in.)
Weight	31.75 kg (70 lb.)	31.75 kg (70 lb.)
Operating temperature	14 to 104 °F (-10 to +40°C)	14 to 104 °F (-10 to +40°C)
Enclosure class**	IP23S	IP23S
Application class***	S	S
* Duty cycle The duty cycle refers to the time as a percentage of a ten-minute period that you can weld at a certain current without overheating. The duty cycle is valid for 104 F / 40 °C. For more information, see section "Duty cycle" in the OPERATION chapter.		
** Enclosure Class The IP code indicates the enclosure class, i.e. the degree of protection against penetration by solid objects or water. Equipment marked IP 23S is intended for indoor and outdoor use; however, should not be operated in precipitation.		
*** Application Class The symbol S indicates that the power source is designed for use in areas with increased electrical hazard.		

TECHNICAL SPECIFICATIONS

4.2 EMP 285ic (3ph) SPECIFICATIONS

Table 4-2. Specifications for EMP 285ic 3ph

SPECIFICATION	575 V, 3 ph 50/60 Hz	460 V, 3 ph 50/60 Hz
PRIMARY CURRENT		
I _{max} . GMAW - MIG	15.0A per phase	18.0A per phase
I _{max} . GTAW - TIG	10.5A per phase	10.7A per phase
I _{max} . SMAW - Stick	13.7A per phase	15.6A per phase
I _{eff} . GMAW - MIG	8.6A per phase	9.8A per phase
I _{eff} . GTAW - TIG	7.0A per phase	7.4A per phase
I _{eff} . SMAW - Stick	9.8A per phase	11.0A per phase
PERMISSIBLE LOAD AT GMAW - MIG		
100% duty cycle*	200A (V _{out} = 24V)	200A (V _{out} = 24V)
60% duty cycle*	265A (V _{out} = 27.25V)	265A (V _{out} = 27.25V)
50% duty cycle*	285A (V _{out} = 28.25V)	285A (V _{out} = 28.25V)
Setting range (DC)	15A (V _{out} = 14.75V) – 350A (V _{out} = 34V)	15A (V _{out} = 14.75V) – 350A (V _{out} = 34V)
PERMISSIBLE LOAD AT GTAW - TIG		
100% duty cycle*	220A (V _{out} = 18.8V)	220A (V _{out} = 18.8V)
60% duty cycle*	265A (V _{out} = 20.6V)	265A (V _{out} = 20.6V)
50% duty cycle*	285A (V _{out} = 21.4V)	285A (V _{out} = 21.4V)
Setting range (DC)	5A (V _{out} = 10.2V) – 320A (V _{out} = 22.8V)	5A (V _{out} = 10.2V) – 320A (V _{out} = 22.8V)
PERMISSIBLE LOAD AT SMAW - STICK		
100% duty cycle*	180A (V _{out} = 27.2V)	180A (V _{out} = 27.2V)
60% duty cycle*	255A (V _{out} = 30.2V)	255A (V _{out} = 30.2V)
50% duty cycle*	285A (V _{out} = 31.4V)	285A (V _{out} = 31.4V)
Setting range (DC)	16A (V _{out} = 20.6V) – 300A (V _{out} = 32V)	16A (V _{out} = 20.6V) – 300A (V _{out} = 32V)
Open Circuit Voltage (OCV)	68V	68V
Efficiency	87%	87%
Power factor	0.77	0.86
Wire feed speed	50–800 in./min (1.3– 20.3m/min)	50–800 in./min (1.3– 20.3m/min)
WIRE DIAMETER		

TECHNICAL SPECIFICATIONS

SPECIFICATION	575 V, 3 ph 50/60 Hz	460 V, 3 ph 50/60 Hz
Mild steel solid wire	0.030-0.052 in.	0.030-0.052 in.
Stainless steel solid wire	0.030-0.052 in.	0.030-0.052 in.
Flux-cored wire	0.030-0.062 in.	0.030-0.062 in.
Aluminum	0.030-3/64 in.	0.030-3/64 in.
Bobbin size	4–12 in. (100–300 mm)	4–12 in. (100–300 mm)
Dimensions l × w × h	27.0 × 11.5 × 19.5 in.	27.0 × 11.5 × 19.5 in.
Weight	70 lb.	70 lb.
Operating temperature	14 to 104 °F (-10 to +40°C)	14 to 104 °F (-10 to +40°C)
Enclosure class**	IP23S	IP23S
Application class***	S	S
* Duty cycle The duty cycle refers to the time as a percentage of a ten-minute period that you can weld at a certain current without overheating. The duty cycle is valid for 104 °F / 40 °C. For more information, see section "Duty cycle" in the OPERATION chapter.		
** Enclosure Class The IP code indicates the enclosure class, i.e. the degree of protection against penetration by solid objects or water. Equipment marked IP 23S is intended for indoor and outdoor use; however, should not be operated in precipitation.		
*** Application Class The symbol S indicates that the power source is designed for use in areas with increased electrical hazard.		

SECTION 5

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.

5.1 LOCATION

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

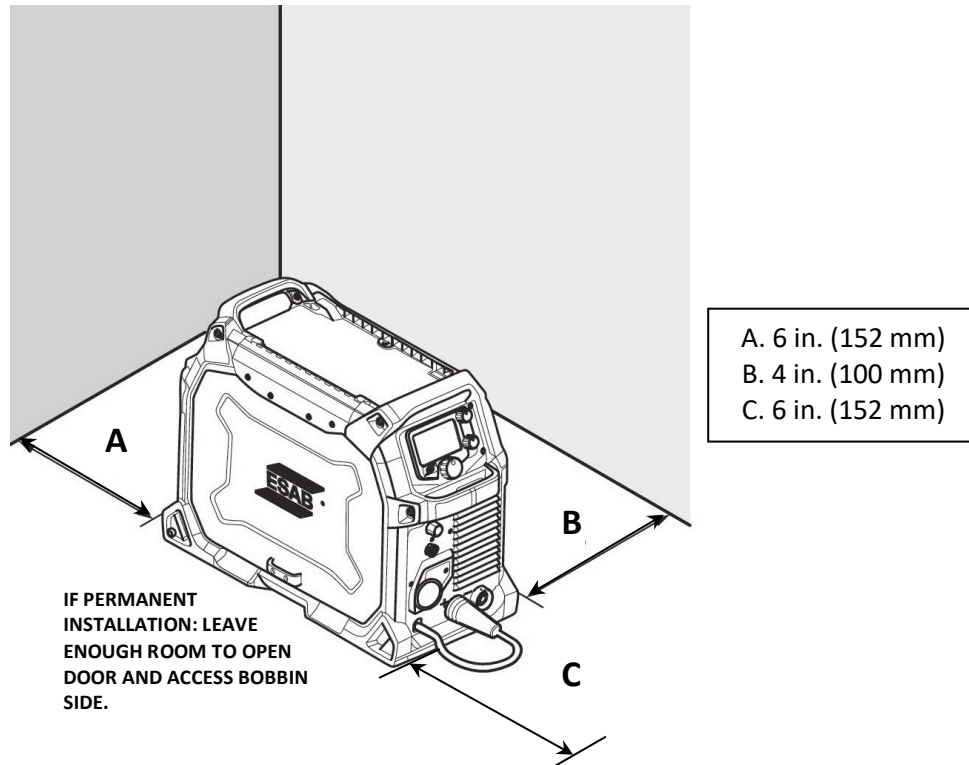


Figure 5-1. Minimum Safe Clearances

INSTALLATION

5.2 HIGH FREQUENCY INTERFERENCE

**WARNING**

The high frequency section of this machine has an output like a radio transmitter. The machine should NOT be used near blasting operations due to the danger of premature firing.

**WARNING**

Operation close to computer installations may cause computer malfunction.

**WARNING**

HIGH FREQUENCY FIELDS CAN BE DANGEROUS TO HEALTH. Extra precautions may be required when this welding power source is used in a domestic situation. Welders with medical pacemakers should consult their doctor before welding. EMF may interfere with some pacemakers.

**WARNING**

The welding circuit may or may not be earthed for safety reasons. Changing the earthing arrangements should only be authorized by a person who is competent to assess whether the changes will increase the risk of injury, for example: by allowing parallel welding current return paths which may damage the earth circuits of other equipment.

**WARNING**

Equipotential Bonding:

Bonding of all metallic components in the welding installation and adjacent to it might be considered. However, metallic components bonded to the work piece will increase the risk that the operator could receive a shock by touching the metallic components and the electrode at the same time. The operator should be insulated from all such bonded metallic components.

**WARNING**

Earthing/Grounding of the work place:

Care should be taken to prevent the earthing of the work piece increasing the risk of injury to users, or damage to other electrical equipment. Changing the earthing arrangements should only be authorized by a person who is competent to assess whether the changes will increase the risk of injury.

INSTALLATION



WARNING

The importance of correct installation of high frequency welding equipment cannot be overemphasized. Interference due to high frequency initiated or stabilized arc is almost invariably traced to improper installation. A duly authorized person such as a properly licensed electrician should perform the installation to avoid injury, death, or any equipment damage.

5.2.1 User's Responsibility

The user is responsible for installing and using the welding equipment according to the manufacturer's instructions. If electromagnetic disturbances are detected, then it shall be the responsibility of the user of the welding equipment to resolve the situation with the technical assistance of the manufacturer. This remedial action may be as simple as earthing the welding circuit. In other cases, it could involve constructing an electromagnetic screen enclosing the Welding Power Source and the work, complete with associated input filters. In all cases, electromagnetic disturbances shall be reduced to the point where they are no longer Troublesome.

5.2.2 Assessment of Area

Before installing welding equipment, the user shall assess potential electromagnetic problems in the surrounding area. The following shall be considered:

- (1) Other supply cables, control cables, signaling and telephone cables; above, below and adjacent to the welding equipment.
- (2) Radio and television transmitters and receivers.
- (3) Computer and other control equipment.
- (4) Safety critical equipment, e.g. guarding of industrial equipment.
- (5) The health of people around, e.g. the use of pace-makers and hearing aids.
- (6) Equipment used for calibration and measurement.
- (7) The time of day that welding or other activities are to be carried out.
- (8) The immunity of other equipment in the environment: the user shall ensure that other equipment being used in the environment is compatible: this may require additional protection measures.
- (9) The size of the surrounding area to be considered will depend on the structure of the building and other activities that are taking place. The surrounding area may extend beyond the boundaries of the premises.

Interference may be transmitted by a high frequency initiated or stabilized arc welding machine in the following ways:

INSTALLATION

- Direct Radiation: Radiation from the machine can occur if the case is metal and is not properly grounded. It can occur through apertures such as open access panels. The shielding of the high frequency unit in the Power Source will prevent direct radiation if the equipment is properly grounded.
- Transmission via the Supply Lead: Without adequate shielding and filtering, high frequency energy may be fed to the wiring within the installation (mains) by direct coupling. The energy is then transmitted by both radiation and conduction. Adequate shielding and filtering is provided in the Power Source.
- Radiation from Welding Leads: Radiated interference from welding leads, although pronounced near the leads, diminishes rapidly with distance. Keeping leads as short as possible will minimize this type of interference. Looping and suspending of leads should be avoided wherever possible.
- Re-Radiation from Unearthed Metallic Objects: A major factor contributing to interference is re-radiation from unearthed metallic objects close to the welding leads. Effective grounding of such objects will prevent re-radiation in most cases.

5.3 LIFTING INSTRUCTIONS

The power source can be lifted using any of the handles.

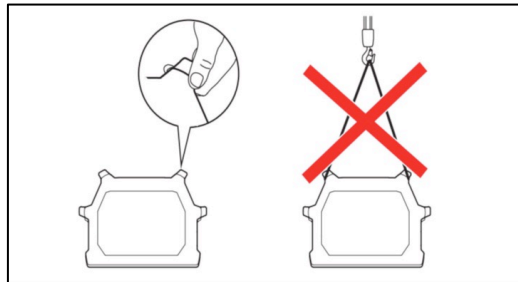


Figure 5-2. Lifting Illustrated

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

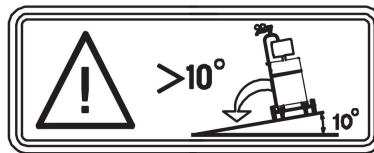


Figure 5-3. Sloping Ground

INSTALLATION

5.4 MAIN SUPPLY



NOTE

Main 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} .

The supply voltage should be:

- For 1ph: 230 V AC $\pm 10\%$ or 120 V $\pm 10\%$
- For 3ph: 460 V AC $\pm 10\%$ or 575 V $\pm 10\%$

Too low supply voltage may cause poor welding performance. Too high supply voltage will cause components to overheat and possibly fail. Contact the local electric utility for information about the type of electrical service available, how proper connections should be made, and inspection required.

The welding power source must be:

- Correctly installed, if necessary, by a qualified electrician.
- Correctly earthed (electrically) in accordance with local regulations.
- Connected to the correct size power and fuse as table below (Table 5-1, Table 5-2).



NOTE

Use the welding power source in accordance with the relevant national regulations.



CAUTION

Disconnect input power and secure employing 'Lock-out' / 'Tagging' procedures. Ensure input power line disconnect switch is locked (Lock-out/Tagging) in the 'Open' position BEFORE removing input power fuses. Connection/Disconnect should be carried out by competent persons.

INSTALLATION

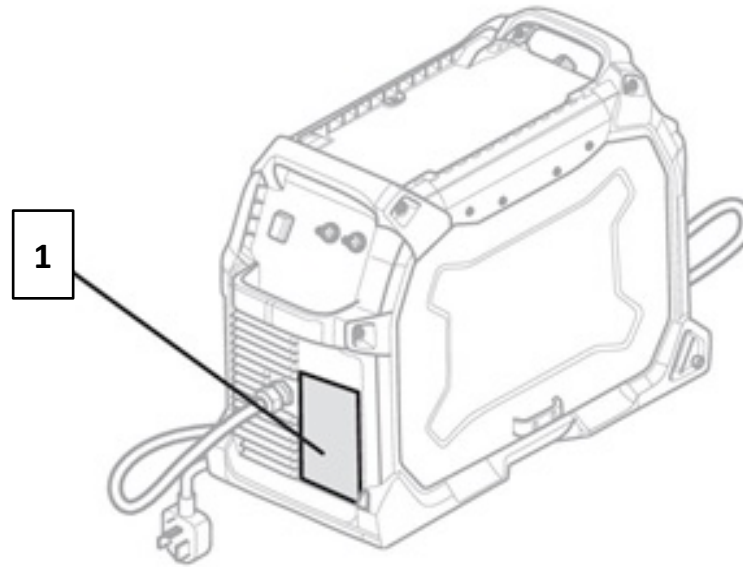


Figure 5-4. Rating plate (1) with supply connection data

5.5 RECOMMENDED ELECTRICAL-SUPPLY SPECIFICATIONS



WARNING

An electrical shock or fire hazard is probable if the following electrical service guide recommendations are not followed. These recommendations are for a dedicated branch circuit sized for the rated output and duty cycle of the welding power source.

Table 5-1. Recommended Electrical-Supply Specifications: 1 ph, 50/60 Hz

Specification	Value
Supply $\pm 10\%$	120 V or 230 V
Input current at maximum output	43.6A
Maximum recommended fuse* or circuit breaker rating *Time delay fuse	50A
Minimum recommended cord size	5.3mm ² (10 AWG)
Maximum recommended extension cord length	15 m (50ft)
Minimum recommended grounding conductor size	5.3mm ² (10 AWG)

INSTALLATION

Table 5-2. Recommended Electrical-Supply Specifications 3 ph, 50/60 Hz

Specification	Value
Supply $\pm 10\%$	460 V or 575 V
Input current at maximum output	18 A
Maximum recommended fuse* or circuit breaker rating *Time delay fuse	16 A
Minimum recommended cord size	2.5 mm ² (13 AWG)
Maximum recommended extension cord length	15 m (50ft)
Minimum recommended grounding conductor size	2.5 mm ² (13 AWG)

5.6 SUPPLY FROM POWER GENERATORS

The power source can be supplied from different types of generators. However, some generators may not provide sufficient power for the welding power source to operate correctly. Generators with Automatic Voltage Regulation (AVR) or with equivalent or better type of regulation, with rated power of at least 15 kW, is recommended.

SECTION 6

OPERATION

General safety regulations for handling the equipment can be found in the "SAFETY PRECAUTIONS" section 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!

Rotating parts can cause injury, take great care.



WARNING!

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



WARNING

Assure that the side panels are closed during operation.



WARNING

Tighten the bobbin locking nut to prevent it from sliding off the hub.

OPERATION

6.1 UNIT'S CONNECTIONS AND CONTROLS

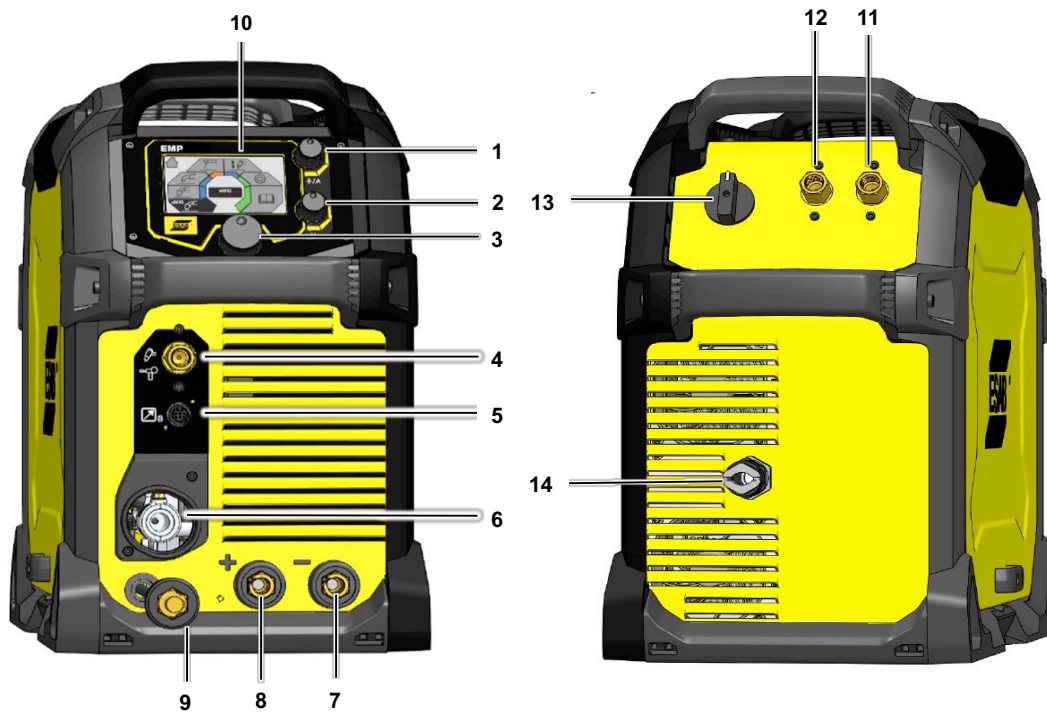


Figure 6-1. Front & Rear Views: Model EMP 285ic

- | | |
|--|------------------------------|
| 1. Knob for current or wire feed speed selection | 8. Positive output (+) |
| 2. Knob for voltage selection | 9. Polarity changeover cable |
| 3. Main knob for menu navigation | 10. Display |
| 4. Gas outlet | 11. Gas inlet for MIG/MAG |
| 5. Torch/ Remote control connection | 12. Gas inlet for TIG |
| 6. Torch connection | 13. Main power switch ON/OFF |
| 7. Negative output (-) | 14. Main power cable |

OPERATION

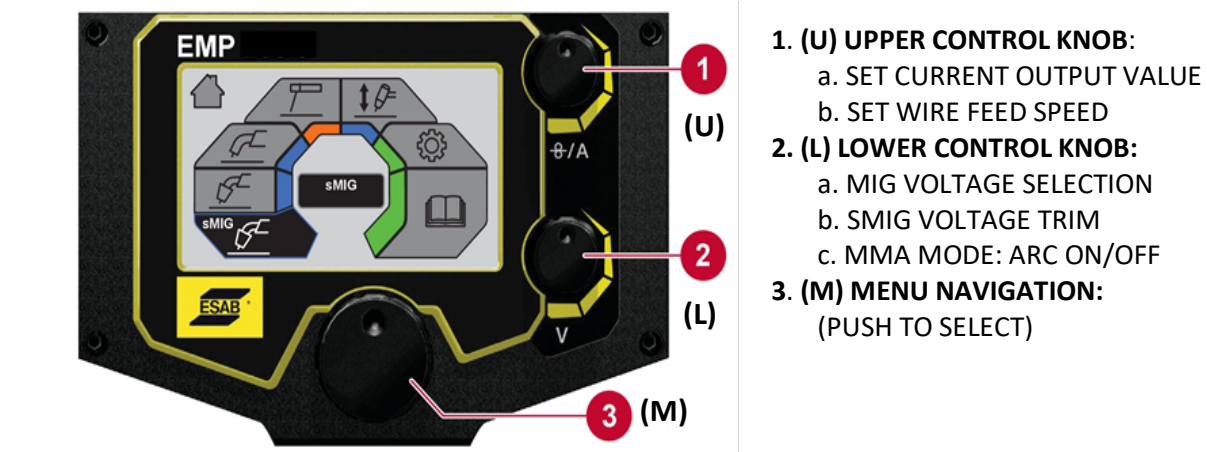


Figure 6-2. Function of User Interface Control Dials



NOTE

Lower Control Knob (2), in MMA Mode, Turns Output Power ON/OFF. When Output Power is ON, background of display turns Orange. See SECTION 7, CONTROL PANEL.

6.2 CONNECTION OF WELDING AND RETURN CABLES

The power source has two outputs for connecting welding and return cables: a negative [-] terminal (7) and a positive [+] terminal (8) (see Figure 6-1).

6.2.1 FOR MIG/MMA PROCESS

For MIG/MMA process, the output to which the welding cable is connected depends on the type of electrode. Refer to electrode packaging for information relating to the correct electrode polarity. Connect the return cable to the remaining welding terminal (9) on the power source.

Secure the return cable's contact clamp to the work piece and ensure that there is good electrical contact. Connect the torch connector to the Torch connection (6).



NOTE

MIG Welding Guidance Chart:

The backside of the door on the Bobbin side displays a MIG welding guidance chart for initial selection of welding controls. This is intended as a guide for setting parameters on this machine.

OPERATION

6.2.2 FOR TIG PROCESS

For TIG process (**requires optional TIG accessories**), connect the TIG torch power cable to the negative [-] terminal (7), see illustration. Connect the gas inlet nut on the TIG torch to the gas outlet connector (4) located on the front of the machine. Connect the gas inlet nut (12), on rear panel, to a regulated shielding gas supply. Connect the work return lead to the return-cable terminal (9). Connect the torch connector to the Torch connection (6) (see Figure 6-1).

6.3 POLARITY CHANGE

The unit's 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 remains as the connection for the torch return-cable. Check the recommended polarity for the welding wire you want to use. Refer to electrode packaging for information relating to the correct electrode polarity. The polarity can be changed by moving the polarity changeover cable to suit the applicable welding process

6.4 SHIELDING GAS

The choice of suitable shielding gas depends on the material. Typically, mild steel is welded with mixed gas (Ar + CO₂) or 100% carbon dioxide (CO₂). Stainless Steel can be welded with mixed gas (Ar + CO₂) or Trimix (He + Ar + CO₂). Aluminum and silicon bronze use pure argon gas (Ar). In the sMIG mode (see section "sMIG mode" in the CONTROL PANEL chapter), the optimal welding arc with the gas used will be automatically set.

OPERATION

6.5 VOLT-AMPERE CURVES

The curves below show the maximum voltage and amperage output capabilities of the power source for three common welding process settings. Other settings result in curves that fall between these curves.

A=Welding current (AMPS), V=Output voltage

6.5.1 1ph VOLT-AMPERE CURVES

6.5.1.1 SMAW (Stick) 120 V, 1ph

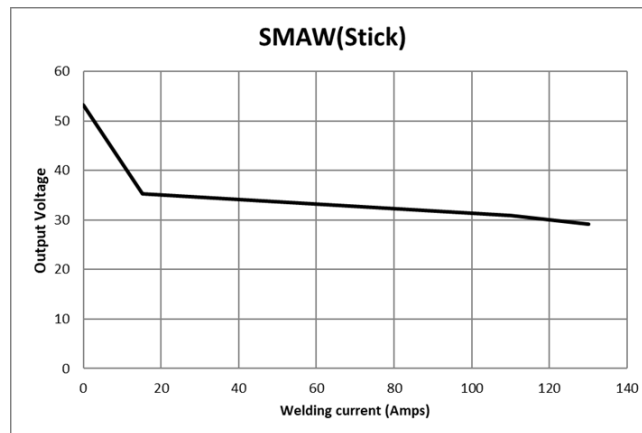


Figure 6-3. SMAW (Stick) 120 V, 1ph

6.5.1.2 SMAW (Stick) 230 V, 1ph

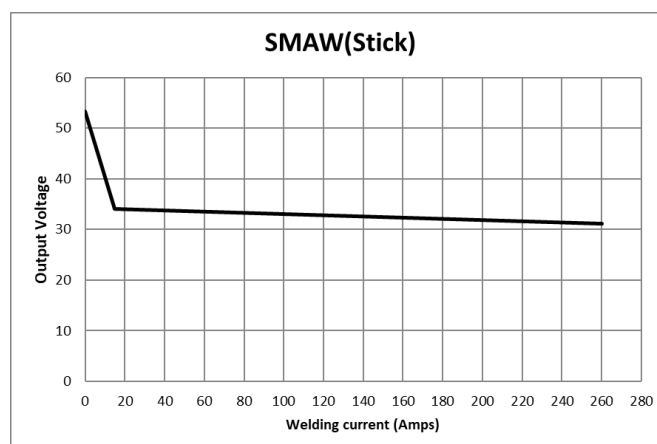


Figure 6-4. SMAW (Stick) 230 V, 1ph

OPERATION

6.5.1.3 GMAW (MIG) 120 V, 1ph

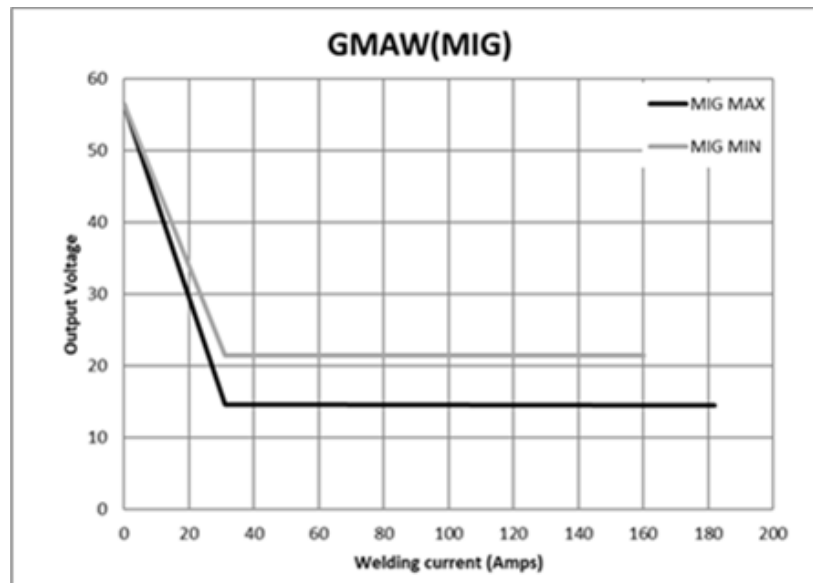


Figure 6-5. GMAW (MIG), 120 V, 1 ph

6.5.1.4 GMAW (MIG) 230 V, 1ph

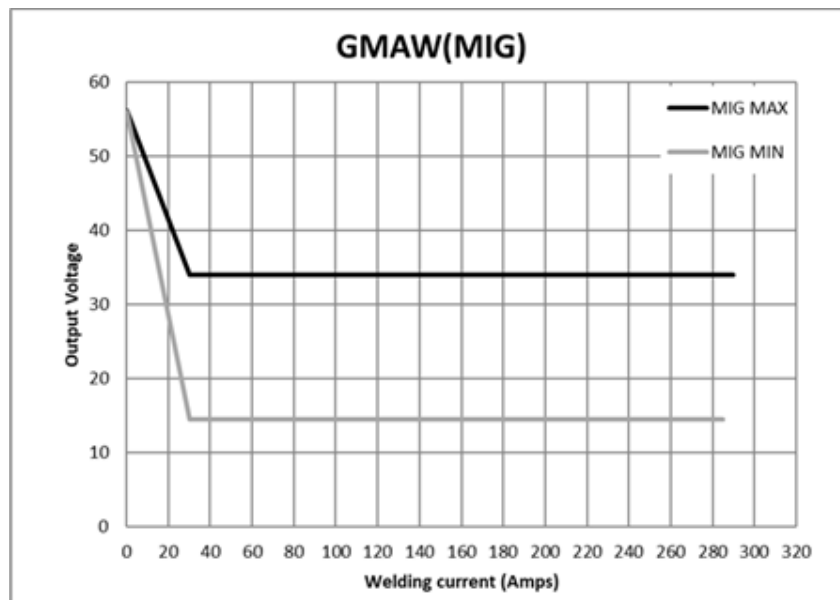


Figure 6-6. GMAW (MIG) 230 V, 1ph

OPERATION

6.5.1.5 GTAW (TIG) 120 V, 1ph

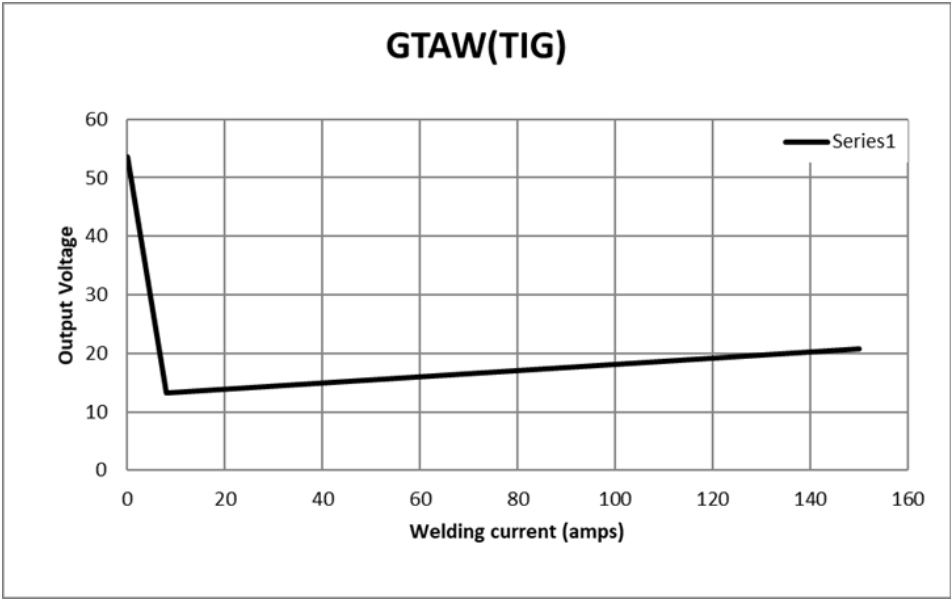


Figure 6-7. GTAW (TIG) 120 V, 1ph

6.5.1.6 GTAW (TIG) 230 V, 1ph

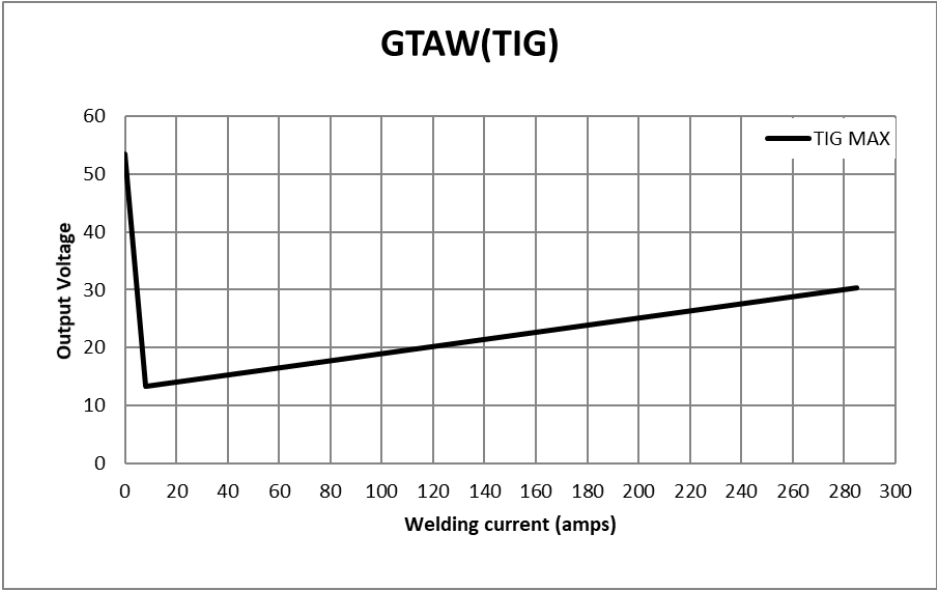


Figure 6-8. GTAW (TIG) 230 V, 1ph

OPERATION

6.5.2 3ph VOLT-AMPERE CURVES

6.5.2.1 SMAW (Stick) 460 V, 3ph / SMAW (Stick) 575 V, 3ph

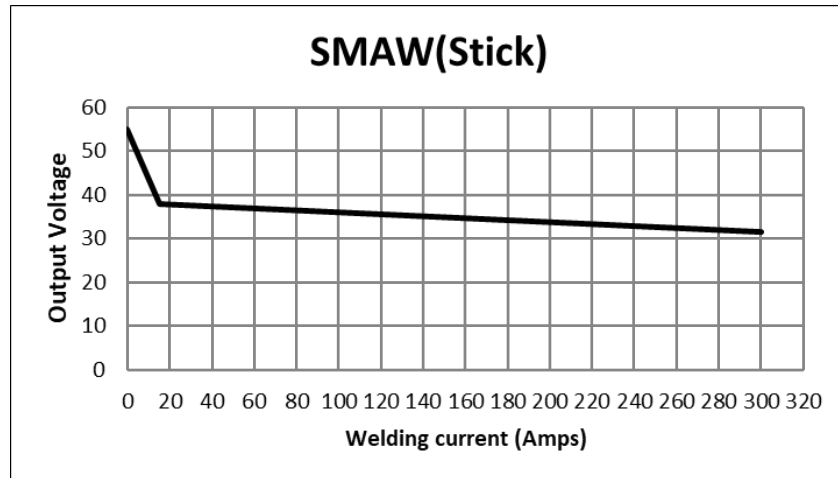


Figure 6-9. SMAW (Stick) 460 V, 3ph / SMAW (Stick) 575 V, 3ph

6.5.2.2 GMAW (MIG) 460 V, 3ph / GMAW (MIG) 575 V, 3ph

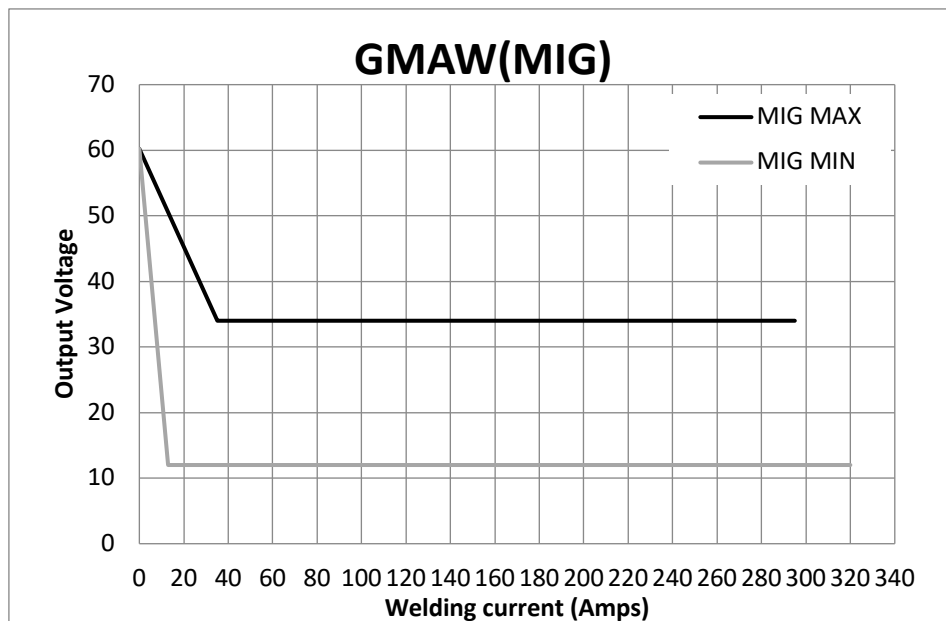


Figure 6-10. GMAW (MIG) 460 V, 3ph / GMAW (MIG) 575 V, 3ph

OPERATION

6.5.2.3 GTAW (TIG) 460 V, 3ph / GTAW (TIG) 575 V, 3ph

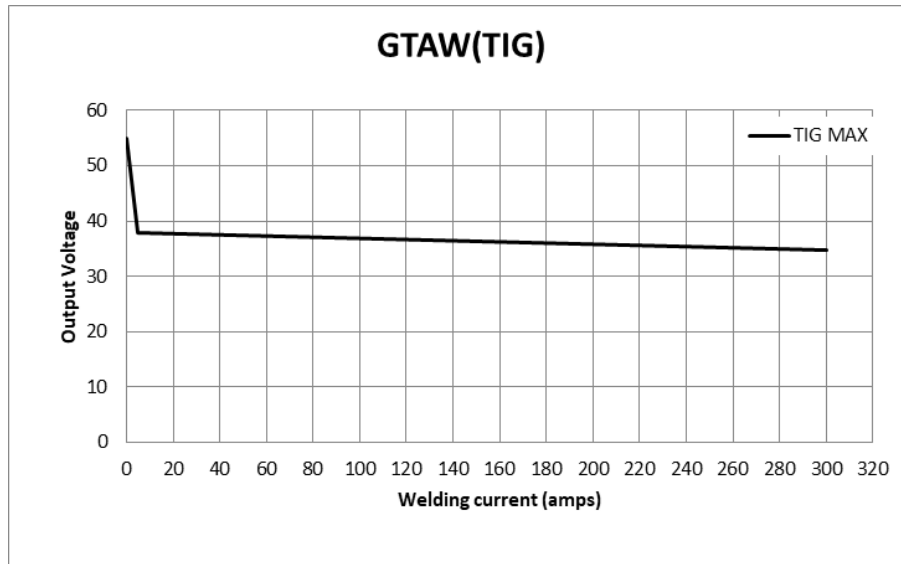


Figure 6-11 GTAW (TIG) 460 V, 3ph / GTAW (TIG) 575 V, 3ph

OPERATION

6.6 DUTY CYCLE

A self-resetting thermostat will protect the power source if the duty cycle is exceeded.

Example: If the power source operates at a 40% duty cycle, it will provide the rated amperage for a maximum of 4 minutes out of every 10-minute period. The remaining time, 6 minutes, the power source must be allowed to cool down.

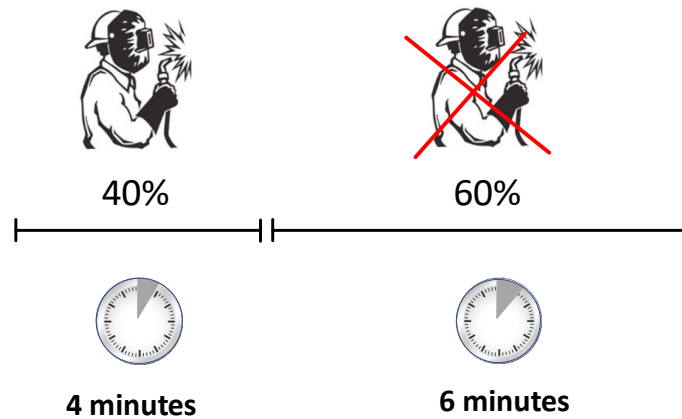


Figure 6-12. Example of 40 % Duty Cycle

A different combination of duty cycle and welding current can be selected. Use the graphs below to determine the correct duty cycle for a given welding current.

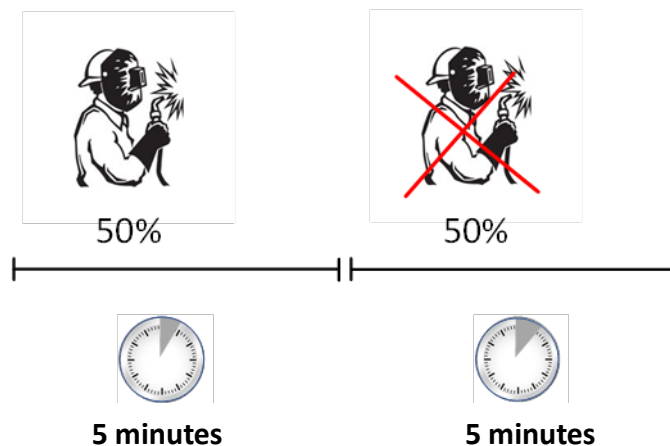


Figure 6-13. Example of 50 % Duty Cycle

OPERATION

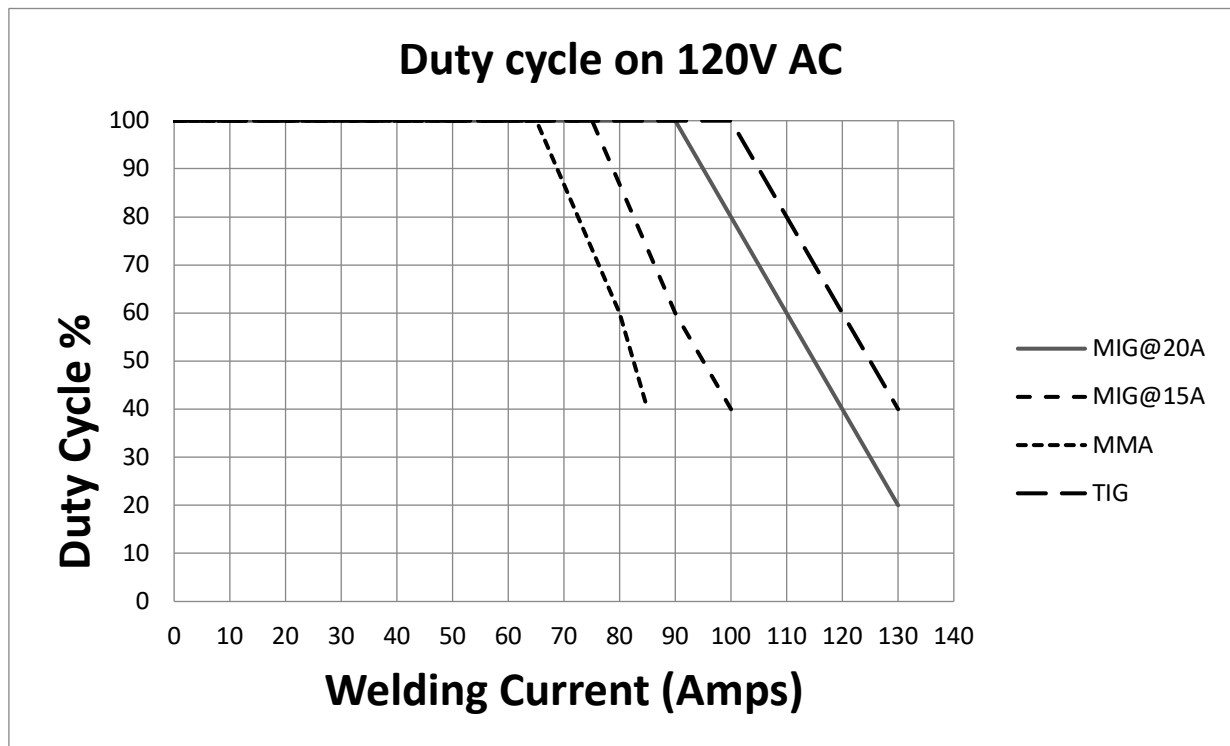


Figure 6-14. Plotting Duty Cycle for 120 V, 1ph AC

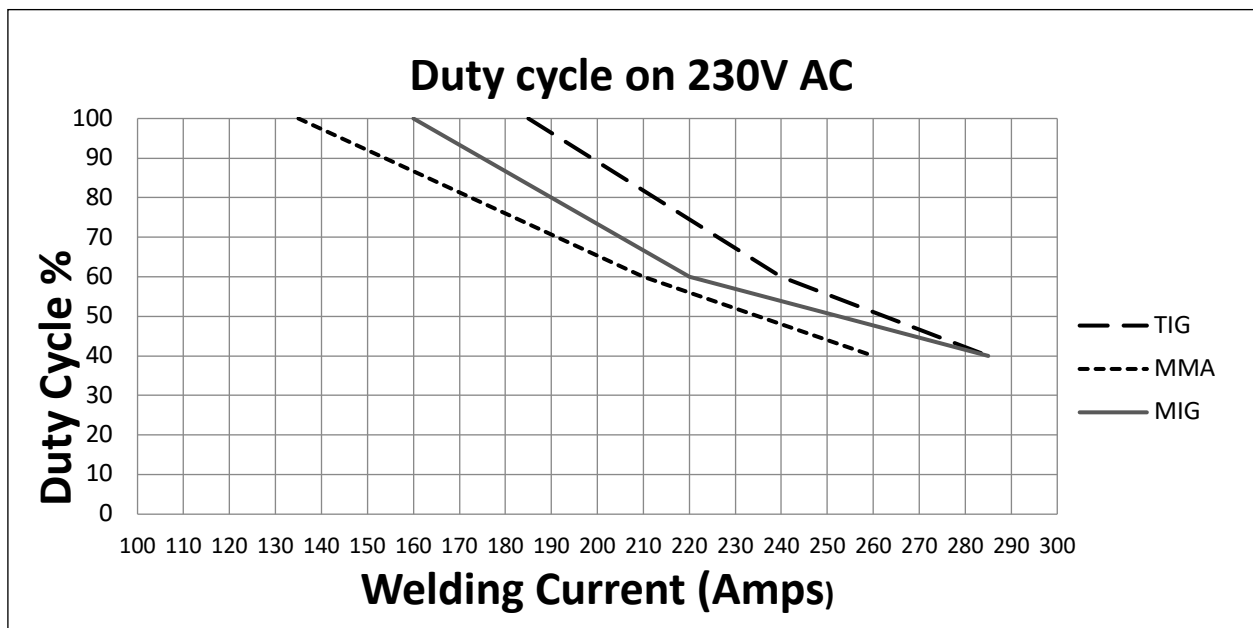


Figure 6-15. Plotting Duty Cycle for 230 V, 1ph AC

OPERATION

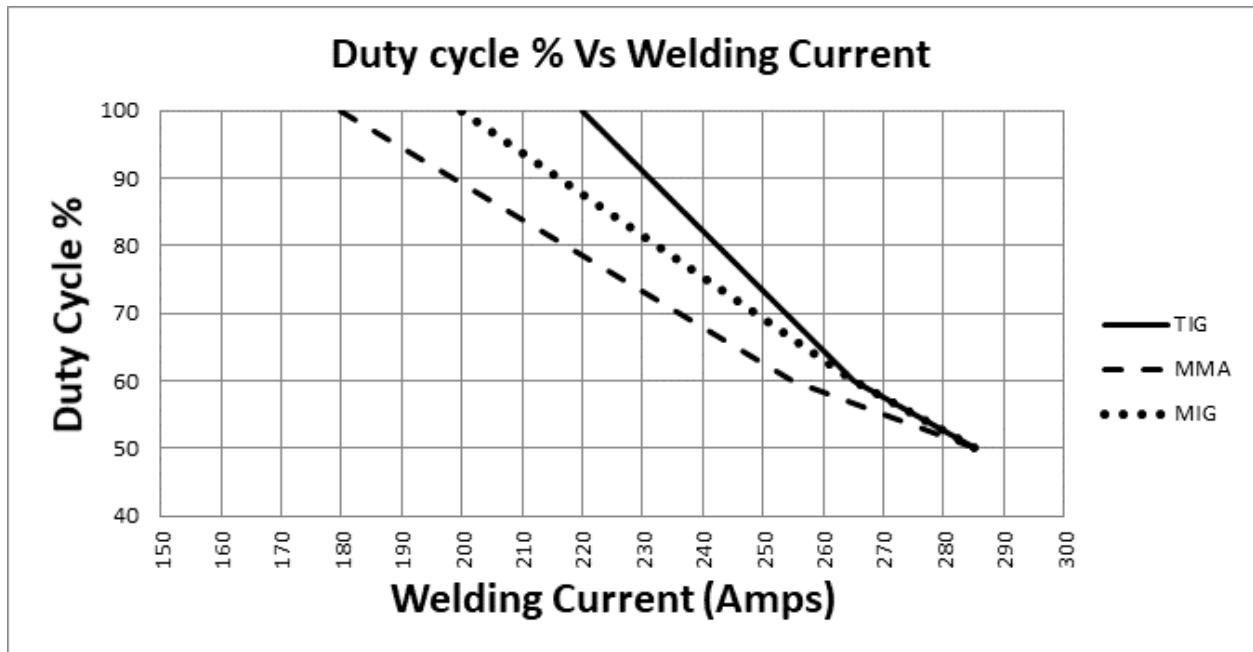


Figure 6-16 Plotting Duty Cycle for 460 V or 575 V, 3ph AC

OPERATION

6.7 REMOVING/INSTALLING BOBBIN



NOTE

The gas need not be connected for this procedure.
Power should be turned off for this procedure.

The spring sets the “braking value” working against the wire-feed motor and the pull of the roller-feed wheels. Tighten the bolt “A” (see Figure 6-17 or Figure 6-18) hand tight.

1. Remove/Install the Bobbin as shown in Figure 6-17 or Figure 6-18.

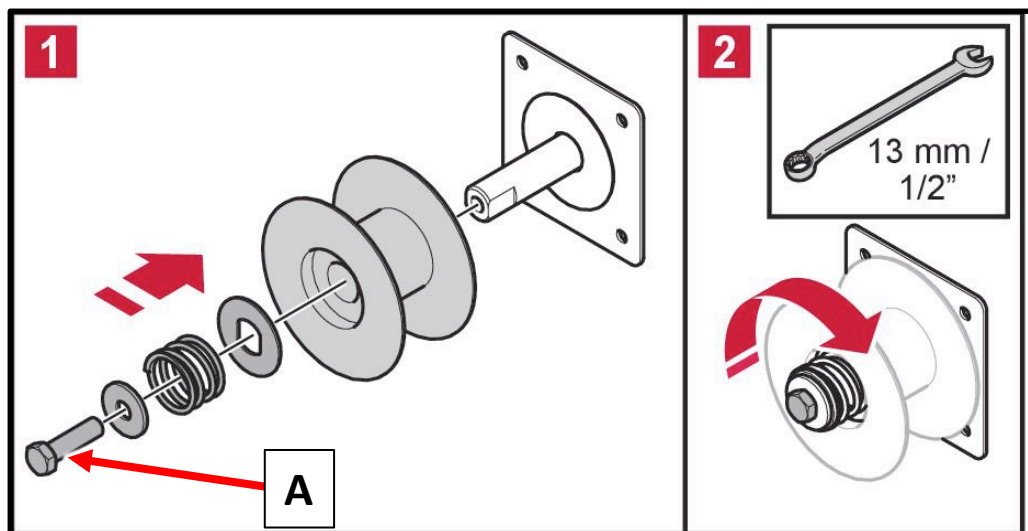
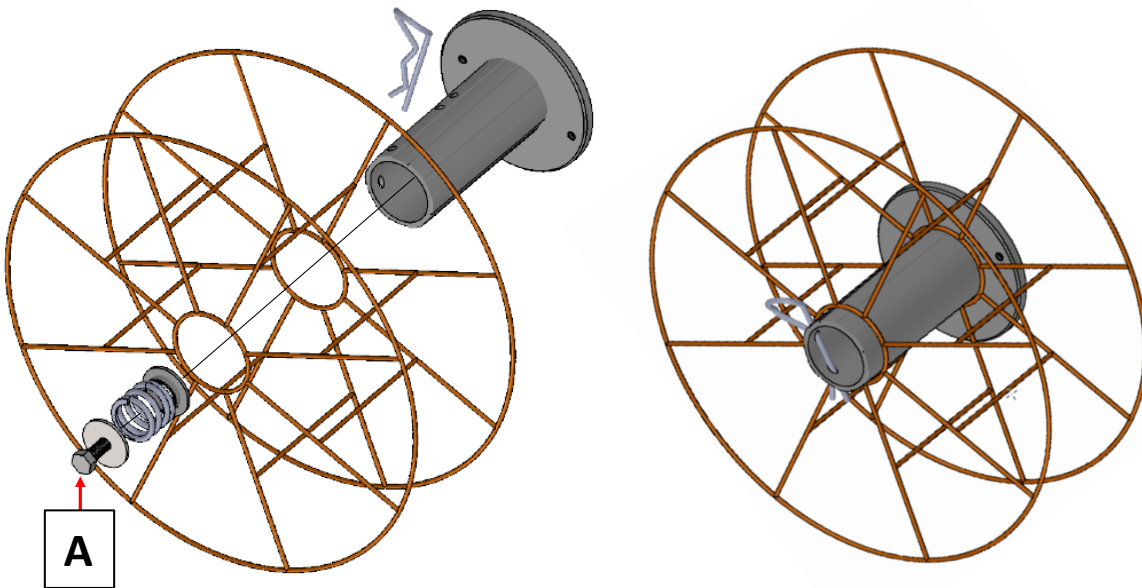


Figure 6-17 Tightening the Bobbin Locking Nut (A) for 100 mm (4 in.)

OPERATION



NOTE

The larger Bobbin may come in the wire form shown in the Figure or may be molded plastic form. Either mounts the same way as shown.

Figure 6-18. Tightening the Bobbin Locking Nut (A) for 200 mm (8 in.), 300 mm (12 in.)

OPERATION

6.8 REMOVING/INSTALLING WIRE



NOTE

If installing aluminum wire, see Section 6.9.

The EMP 285ic will handle bobbin sizes of 100 mm (4 in.), 200 mm (8 in.) and 300 mm (12 in.). See TECHNICAL SPECIFICATIONS section for suitable wire dimensions for each wire type.

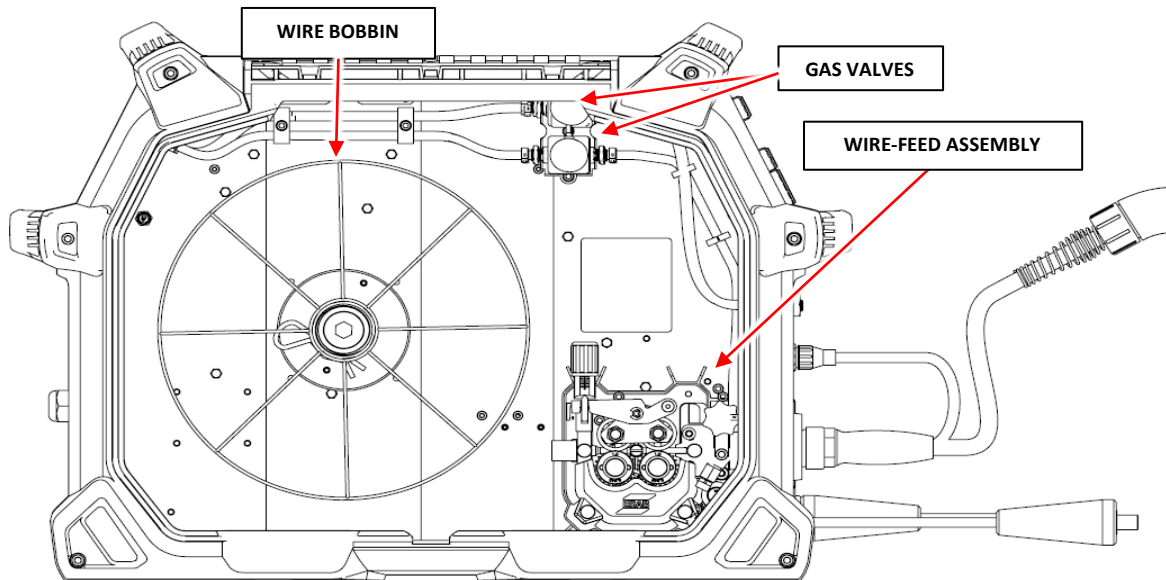


Figure 6-19. View of Wire-Bobbin-Side



WARNING

Do not place or point the torch near the face, hand or body as this may result in injury.



NOTE

Make sure the correct wire-feed rollers are selected.



NOTE

Remember to use the correct contact tip in the welding torch for the wire diameter used.

OPERATION

6.8.1 REMOVING WIRE

1. Disconnect the electrical power source from the unit.
2. Open the wire-bobbin side cover of the EMP unit.

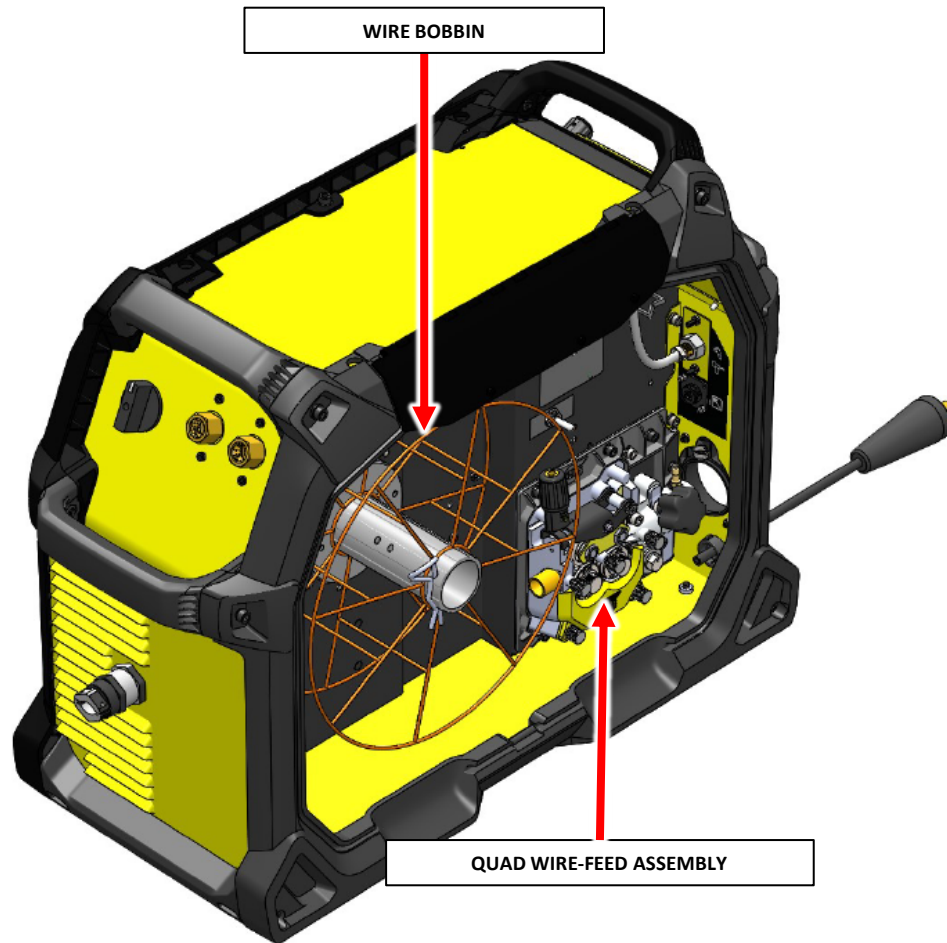


Figure 6-20. Wire-Bobbin Side Exposed View

3. On the Wire-Feed Assembly release the tensioning arm by pulling it up out of its detent and rotating it toward you (see (1) in Figure 6-21).

OPERATION

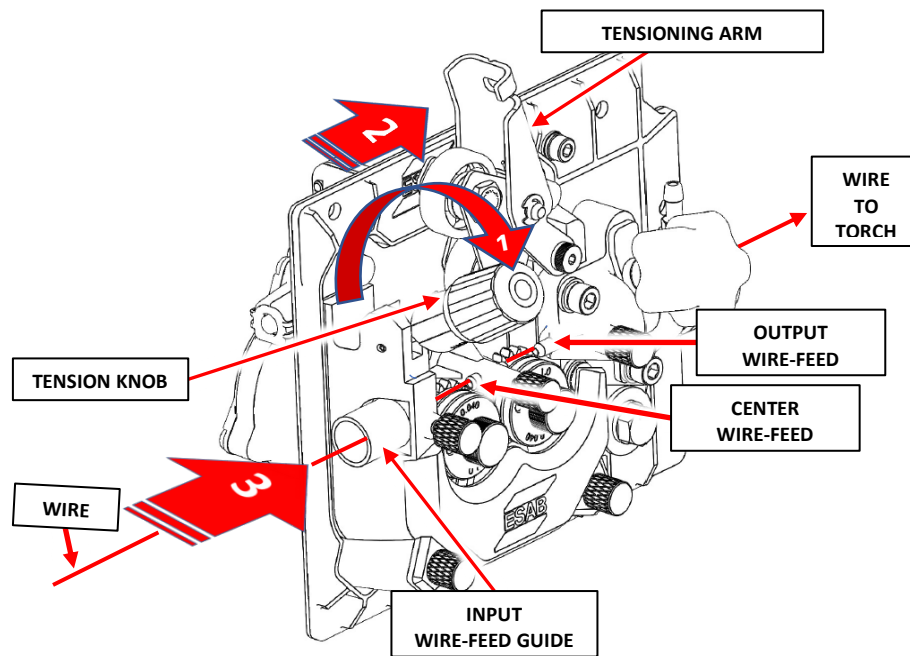


Figure 6-21. Wire-Feed Mechanism

4. IF WIRE REMAINS IN THE TORCH ASSEMBLY: Near the input end of the wire-feed guide on the wire-feed assembly (see Figure 6-21) cut the wire while holding the bobbin-end (so the wire does not unravel from the bobbin after cutting it loose). Secure the cut end of the wire to the bobbin (if any wire is left on the bobbin) to prevent the wire from unraveling from the bobbin.
5. IF WIRE REMAINS IN THE TORCH ASSEMBLY: Disconnect the torch assembly from the EMP unit by loosening the torch connector holding knob and disconnecting the torch connector (see Figure 6-22).

OPERATION

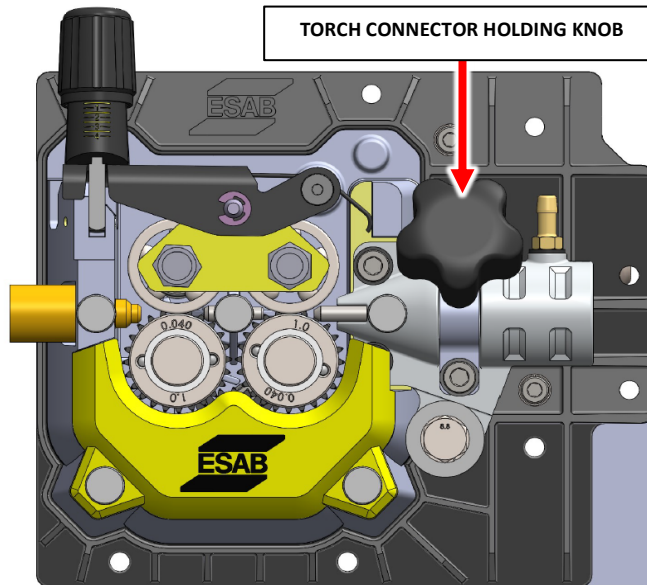


Figure 6-22. Holding Knob for Torch Adapter

6. Pull the remaining length of the wire through the wire-feed assembly and, with the torch, set the torch assembly aside (with the loose wire still installed in the torch). The old wire should now be completely removed from the wire-feed assembly.
7. Remove the Bobbin from the unit (see Section 6.7 “REMOVING/INSTALLING BOBBIN”).
8. IF WIRE REMAINS IN THE TORCH ASSEMBLY: Pull the length of old wire out of the torch assembly from either end of the torch assembly.

6.8.2 INSTALLING WIRE



CAUTION!

Too long a torch liner risks damage to the wire-feed assembly if forced to fit when attempting to connect the torch to the power unit.
Refer to the torch manual for instructions for torch liner replacement.



NOTE

If wire replacement requires a replacement of the torch liner in the torch assembly, the liner may be too long and will then require trimming. For installing a new liner in the torch hose, refer to the torch manual.

OPERATION

1. Disconnect the electrical power source from the unit.
2. Open the wire-bobbin side door of the EMP unit.
3. Install the new bobbin (see Section 6.7 REMOVING/INSTALLING BOBBIN).
4. On the Wire-Feed Assembly release the tension arm by pulling the tension knob up out of its detent and rotating it toward you. The tension arm is spring-loaded. It will pop-up when the tension knob in the previous step is rotated out-of-the-way.
5. Install rollers for selected wire size (See Appendix C).
6. With a clean-cut (no bends) strait bitter-end pull the wire from the newly-installed bobbin and feed it into the input wire-feed guide, through the center wire-guide, then across the feed roller groove and through the output wire-feed guide until it protrudes out of the Euro-Adapter output end about three centimeters (3 cm).
7. Close the Tension-Arm on to the wire in its groove on the Wire-Feed Rollers. Verify that the wire is in its groove and not floating out of the groove on the roller surface.
8. Re-connect the torch assembly to the EMP unit being careful to insert the bitter end of the wire protruding from the torch-adapter into torch liner on the torch connector.
9. Power up the EMP unit. Gas does not need to be connected for this procedure.
10. With the torch cable laid out reasonably straight, feed the wire through the torch cable till visible at its welding tip by depressing the trigger switch on the torch. Refer to the relevant Torch manual for length of wire-protrusion at tip end.
 - Model EMP 285ic 1ph uses torch model: Spray Master Velocity 250V
 - Model EMP 285ic 3ph uses torch model: Spray Master Velocity 350V
11. To more accurately set and verify the wire-feed tension for correct wire-feed pressure go to Section 6.10 SETTING WIRE-FEED PRESSURE.
12. After completing the previous step, close the door on the wire-bobbin side of the EMP unit.

OPERATION

6.9 WELDING WITH ALUMINUM WIRE

**NOTE**

After completing the instructions in this section return to Section 6.8 REMOVING/INSTALLING WIRE.

To weld aluminum using the standard supplied torch, refer to MIG torch instruction manual for replacing standard steel torch conduit liner with a Teflon torch conduit liner.

Order the following accessories:

- Torch Teflon Conduit Liner (PTFE liner), 3 m (10 ft.): See PARTS section (Wire Liner Table) in the ESAB Torch Instruction Manual (see NOTE above).
- Teflon coated Output Wire-Guide Tube (select size to match wire from Table in Appendix C).
- U-groove, Aluminum Feed-Roller (select size to match wire from Table in Appendix C).

OPERATION

6.10 SETTING WIRE-FEED PRESSURE



NOTE

This procedure requires the unit be powered ON.
The gas does not need to be connected for this procedure.

1. Turn power to the unit ON.
2. Start by making sure that the wire moves smoothly through the wire guide.



CAUTION

It is important that the feed-pressure is not too high or too low.

3. Check that the feed-pressure is set correctly, feed out the wire against an insulated object, e.g. a piece of wood.
4. ADJUSTING FOR MINIMUM ROLLER PRESSURE:

When you hold the welding torch approximately $\frac{1}{4}$ in. (6 mm) from the piece of wood (Figure 6-23), the wire-feed rollers should slip. If they don't reduce the tension on the wire by adjusting the Tension Knob on the Wire-Feed Assembly.

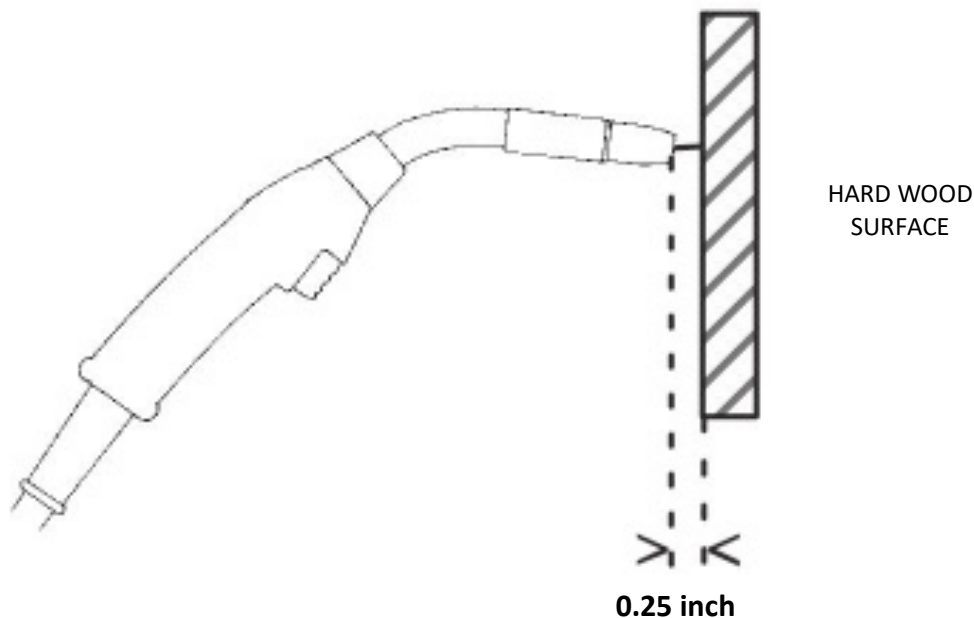


Figure 6-23. Check Feed-Roller for Slip, Indicating no Over-pressure

OPERATION

5. ADJUSTING FOR CORRECT ROLLER PRESSURE:

If you hold the welding torch approximately 2 in. (50 mm) from the piece of wood, the wire should be fed out and bend (Figure 6-24).

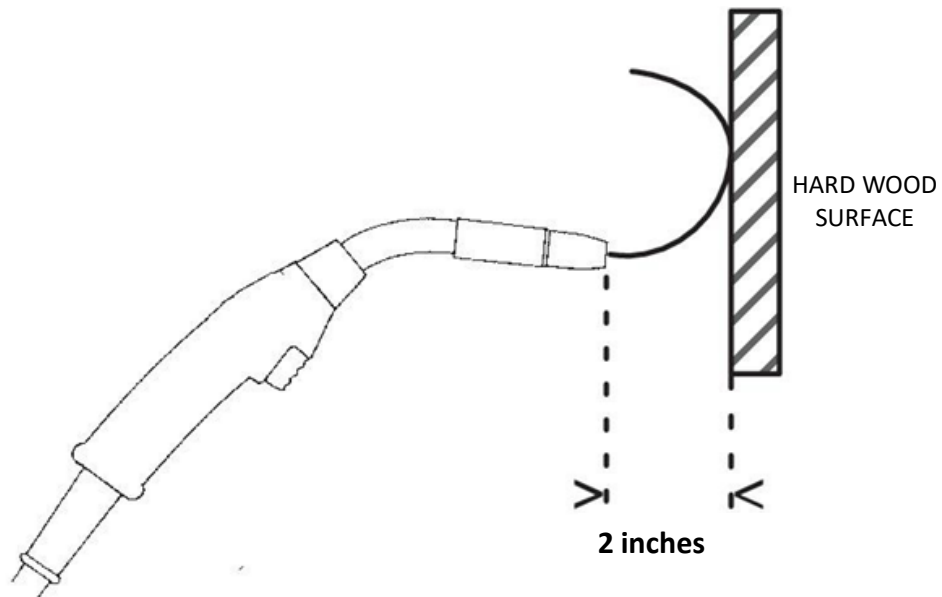


Figure 6-24. Checking for Proper Feed-Roller Pressure

OPERATION

6.11 REMOVING/INSTALLING WIRE-FEED ROLLERS



WARNING

POWER SHOULD BE TURNED OFF FOR THIS PROCEDURE.



NOTE

Gas does not need to be connected for this procedure.

Different-size pairs of dual-groove feed-rollers are supplied as standard (Listed in Appendix C as “DEFAULT” and as “ACCESSORY”). Change the feed rollers to match the wire size/type on the wire bobbin. See Appendix C for Feed Roller selection. Figure 6-25 shows location of Wire-Feed rollers. The Pressure Rollers are not replaced.

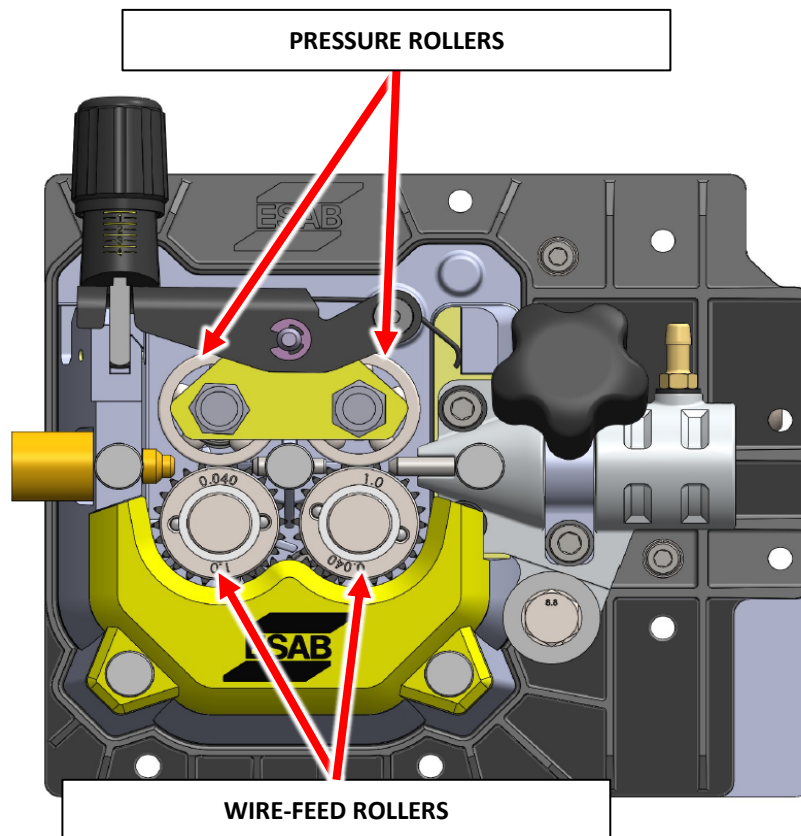


Figure 6-25. Location of Wire-Feed Rollers and Pressure Rollers

OPERATION

6.11.1 REMOVING WIRE-FEED ROLLERS

1. If new rollers are being installed select the correct size and type (Steel or aluminum) for wire being installed (See Appendix C).
2. Disconnect the electrical power source from the unit.
3. Open the cover on the wire-bobbin side of the EMP unit.
4. Release the Tensioning Arm by pulling tension knob up out of its detent and rotating it toward you (see (1) in Figure 6-26). Since the wire-feed pressure must be disturbed to release this arm, the tension on the rollers will have to be re-adjusted in a later step. The Tensioning Arm (2) is spring-loaded. It will pop-up when the Tension Knob in the previous step is rotated out-of-the-way.

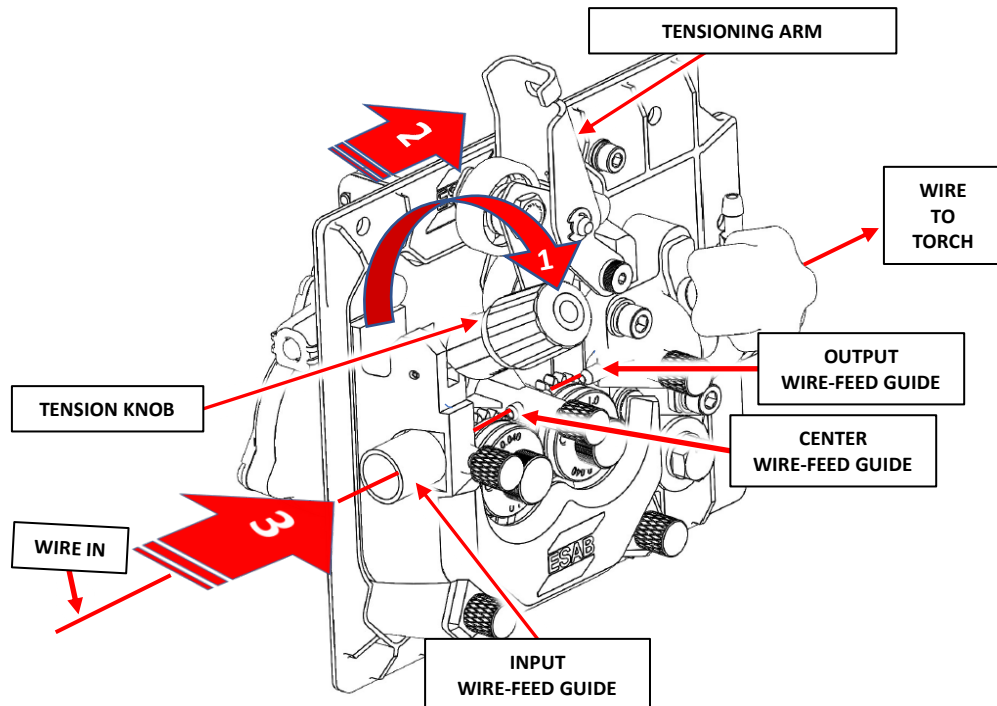


Figure 6-26. Wire-Feed Mechanism

5. Remove the wire from the wire-feed mechanism.

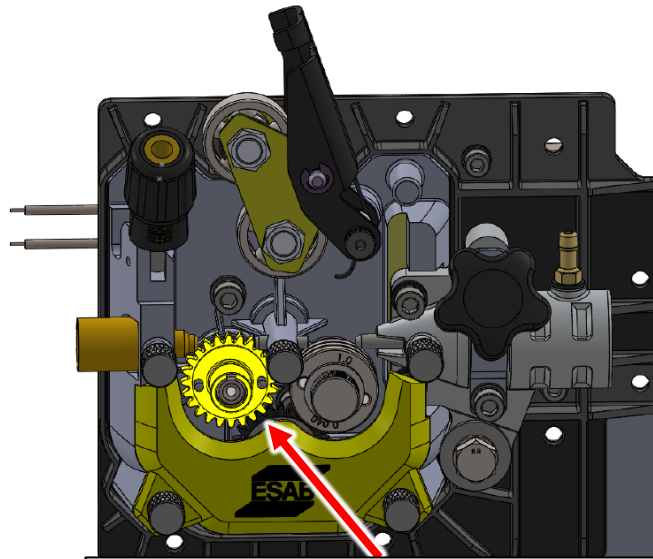
OPERATION



CAUTION

When removing the drive roller (roller located on left side) be careful NOT to remove the drive gear with it. Doing so risks losing the small Woodruff key on the motor shaft. Failure to comply will render the entire unit useless until this part is replaced (see Figure 6 20).

6. Remove the two wire-feed rollers by removing their Thumb Screws and sliding each roller from its shaft (see Figure 6-27, Figure 6-28).



CAUTION
AVOID REMOVING DRIVE GEAR
(RISK LOOSING DRIVE-SHAFT WOODRUFF KEY)

Figure 6-27. Drive Gear with Woodruff Key on Motor Shaft

OPERATION

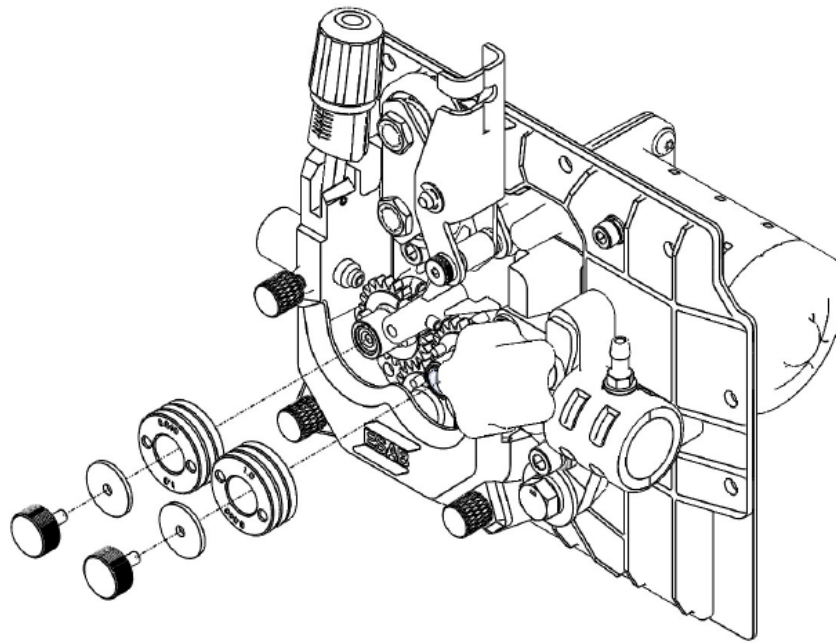


Figure 6-28. Feed Roller Removal and Installation

6.11.2 INSTALLING WIRE-FEED ROLLERS



CAUTION

When installing the Wire-Feed Rollers avoid (and do not force) installing a roller if either wire guide's position interferes. Slide the offending wire guide slightly to provide clearance for the roller. The wire-guides are adjusted AFTER the rollers are installed.

1. Install the two new Drive Rollers (both the same part number and in the same and correct groove orientation). Verify that the correct size groove is oriented on the INSIDE (see Figure 6-29).



NOTE

The wire-feed rollers will either be replaced (so they correspond with the size and type of the new wire being installed or reused if the same size and type of wire is being replaced.

OPERATION

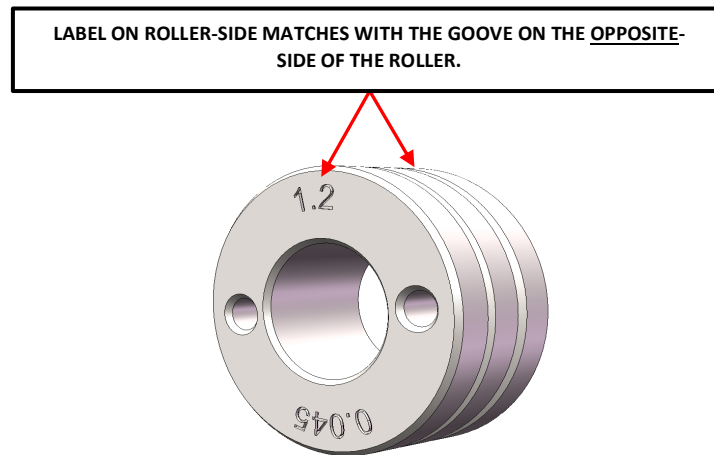


Figure 6-29. Wire-Feed Rollers Offered in Multiple Sizes

2. Tighten the Drive-Roller retaining screw by turning it in the clockwise direction. Hand-tight is sufficient.
3. The wire must be installed through the wire-feed assembly (See Section 6.8.2 INSTALLING WIRE).



NOTE

If the wire was removed the wire will have to be re-installed. Refer to Section 6.8.2 "INSTALLING WIRE".

4. Close the pressure rollers on the wire.
5. Adjust the wire-feed pressure by adjusting the tension on the wire at the Wire-Feed Rollers by turning the Tension Knob using the procedure SETTING WIRE-FEED PRESSURE (see Section 6.10).
6. Close the cover on the wire-bobbin side of the EMP unit.

OPERATION

6.12 REMOVING/INSTALLING/ADJUSTING WIRE-FEED GUIDES

**NOTE**

The gas does not need to be connected for this procedure.

**NOTE**

The OUTPUT WIRE-GUIDE TUBE must be selected to match the size that corresponds with the wire size and type (steel or aluminum) selected for use.

There are three wire-feed guide tubes: **Input Wire-Guide Tube**, **Center Wire-Guide Tube** and **Output Wire-Guide Tube**. The Input Wire-Guide Tube and the Center Wire-Guide Tube are standard parts for all wire types/sizes, so they are not mentioned here. This procedure addresses the removal/installation and then adjustment of the Output Wire-Guide Tube.

**NOTE**

This Section requires that the wire-feed rollers have been removed to provide access to the wire-guides. Perform wire-feed roller removal and, later in this procedure, roller install steps. See Section 6.11 REMOVING/INSTALLING WIRE-FEED ROLLERS when referred in the steps below.

OPERATION

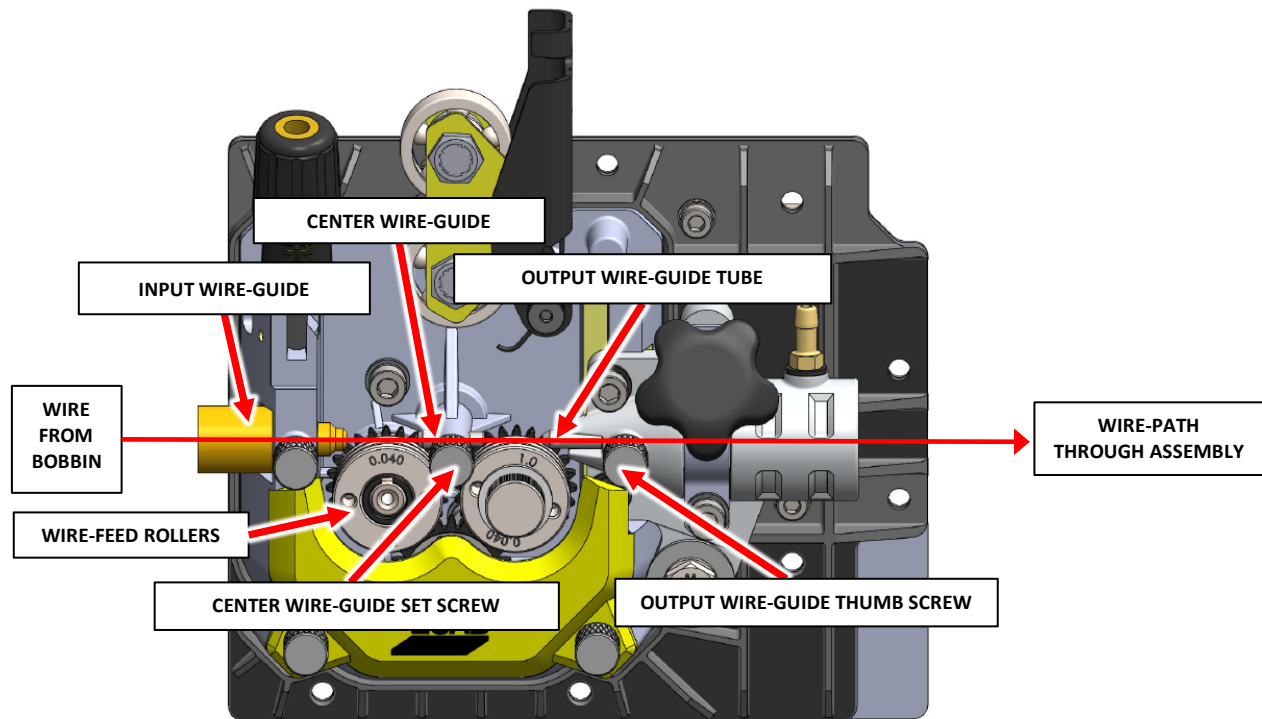


Figure 6-30. Location of Wire-Guides and Their Set Screws

1. Select and obtain the correct replacement wire guides (See Appendix C).



NOTE

Since this is based on the size and type (steel or aluminum) wire selected, it is assumed that the wire is already-selected, obtained and available for this procedure.

OPERATION

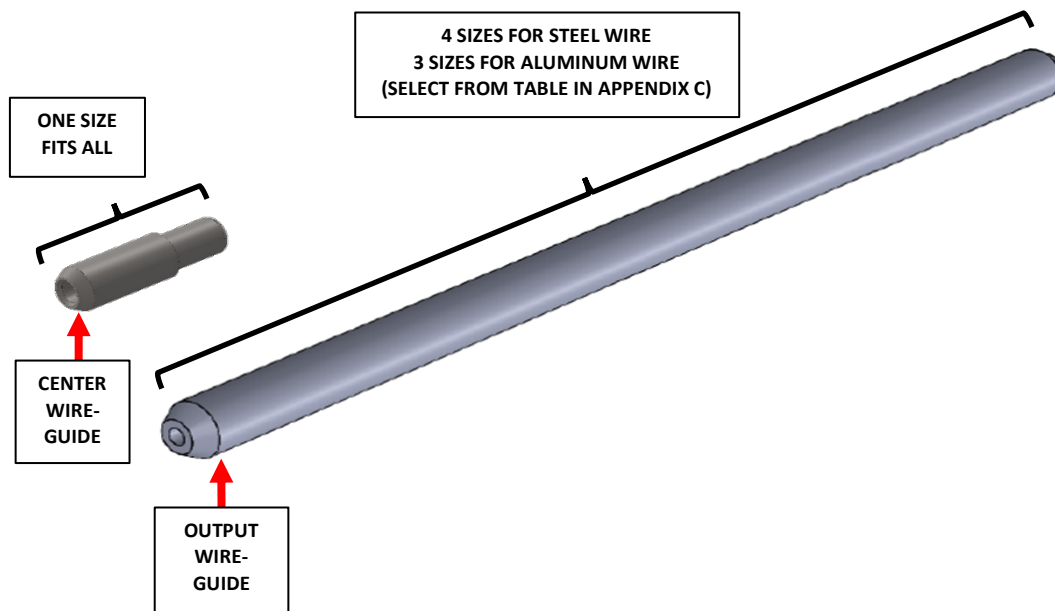


Figure 6-31. Wire Guides

2. Disconnect the electrical power source from the unit.
3. Open the door on the wire-bobbin side of the EMP unit.
4. Release the Tensioning Arm by loosening the Tension Knob, pulling it up out of its detent and rotating it toward you (see (1) in Figure 6-32).

OPERATION

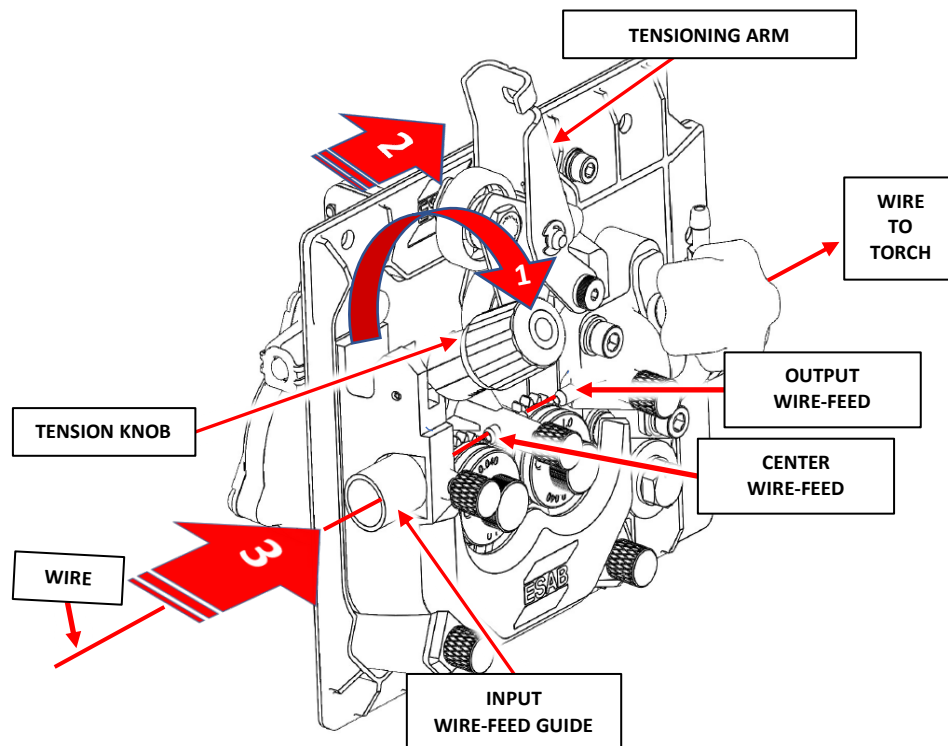


Figure 6-32. Wire-Feed Mechanism

5. To remove the wire from the EMP unit cut the wire just before entry into the wire-feed assembly. Be sure to hold the bobbin-end of the wire before cutting to restrain the wire from unravelling from its spooling on the bobbin. Secure the bitter end by any convenient means to the wire frame of the bobbin to mechanically restrain it while this procedure continues.
6. Disconnect the torch assembly from the EMP unit by loosening the torch connector holding knob and disconnecting the torch connector.
7. Pull the remaining length of the wire through the wire-feed assembly and, with the torch, set the torch assembly aside (with the loose wire still installed in the torch). The old wire should now be completely removed from the wire-feed assembly.
8. Remove the torch assembly from the EMP unit and remove the remainder of the old wire still in the torch assembly and properly dispose of it. The torch assembly will be re-connected near the end of this procedure.
9. REMOVE WIRE-FEED ROLLERS:
 - a. See Section 6.11 REMOVING/INSTALLING WIRE-FEED ROLLERS: steps for removing.

OPERATION

6.12.1 OUTPUT WIRE-GUIDE REMOVAL/INSTALLATION

1. Loosen the Output Wire-Guide thumb screw (see Figure 6-30).
2. Remove the Output Wire-Guide Tube out-through and out-of the CSA adapter Assembly.
3. Replace with the new, correct-size tube in the reverse order. Do NOT tighten its set-screw now (will be done below in ADJUSTING WIRE GUIDES).

6.12.2 CENTER WIRE-GUIDE REMOVAL/INSTALLATION

1. Loosen and remove the original Center Wire-Guide Tube (see Figure 6-30 for location). This Center Wire-Guide Tube removes/installs only from the left side.
2. Install the new Center Wire-Guide Tube. Slide this tube (narrow part first and from the left side) into its center post until it stops and hand-tighten its set screw.

6.12.3 ADJUSTING WIRE GUIDES

1. Verify Center Wire-Guide Tube has clearance from each Feed-Roller. The Center Wire-Guide Tube set screw should be finger-tight (see Figure 6-33, Figure 6-30). The Center Wire-Guide Tube requires no adjustment, but it must be inserted completely to assure clearance from the rollers.
2. Adjust the Output Wire-Guide Tube for one mm (1 mm) of clearance from the right Feed-Roller. Verify Center Wire-Guide Tube has clearance from each Feed-Roller. (see Figure 6-33) and tighten its thumb screw finger-tight.

OPERATION

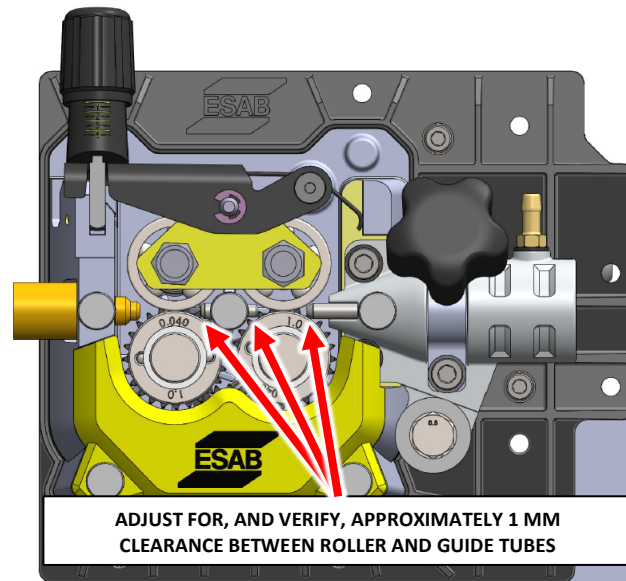


Figure 6-33. Verify Clearance of Both Guide Tubes

3. Access the bitter-end of the wire on the bobbin and cut off the length from the bitter end to have a clean, straight, bitter-end. This is needed to allow a low-resistance-travel re-install of the wire along the length of the torch cable to the torch tip.
4. Feed the wire from the bottom of the bobbin through the Wire-Feed Guides laying the wire in the grooves of the Wire-Feed Rollers as shown in Figure 6-30 . Lay the wire into the INSIDE groove of the Wire-Feed Rollers. Continue feeding the wire until it projects beyond the Euro-Adapter output side by a few centimeters.
5. Close the pressure rollers on the wire.
6. Re-connect the torch assembly on the EMP unit.
7. Power ON the EMP unit.



NOTE

The gas does not need to be connected for this procedure.

8. With the torch cable reasonably straight, feed the wire through the torch cable till visible at its welding tip by depressing the trigger switch on the torch. Refer to the relevant Torch manual for length of wire-protrusion at tip end.

OPERATION

9. Adjust the wire-feed pressure by adjusting the tension on the wire at the Wire-Feed Rollers by using the procedure SETTING THE WIRE-FEED PRESSURE (see Section 6.10) for a more accurate adjustment of this tension knob.
10. Close the cover on the wire-bobbin side of the EMP unit.

SECTION 7

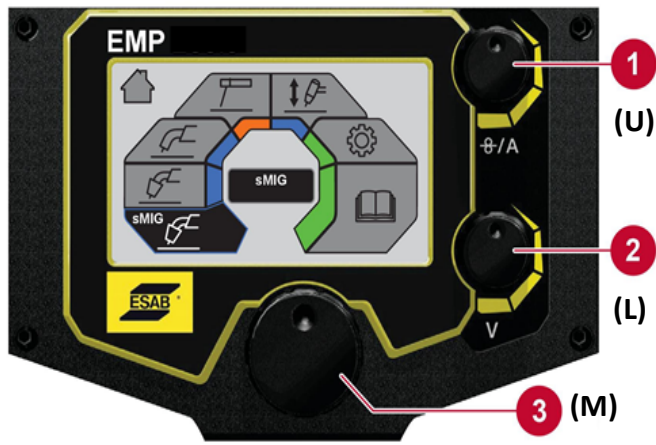
CONTROL PANEL



NOTE

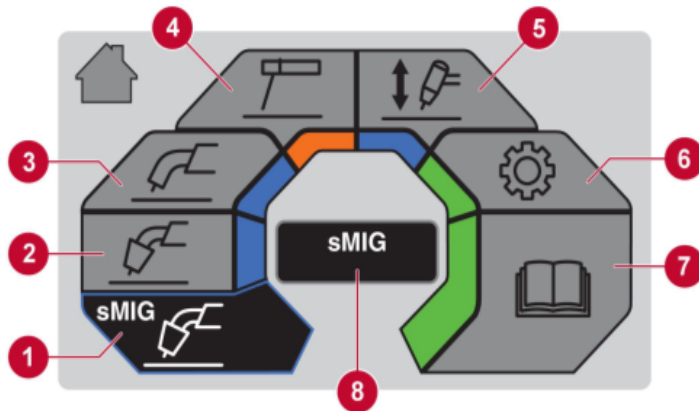
After power-on has completed the main menu appears on the control panel.

7.1 HOW TO NAVIGATE



1. **(U) UPPER CONTROL KNOB:**
 - a. SET CURRENT OUTPUT VALUE
 - b. SET WIRE FEED SPEED
2. **(L) LOWER CONTROL KNOB:**
 - a. MIG VOLTAGE SELECTION
 - b. SMIG VOLTAGE TRIM
 - c. MMA MODE: ARC ON/OFF
3. **(M) MENU NAVIGATION**
(PUSH TO SELECT)

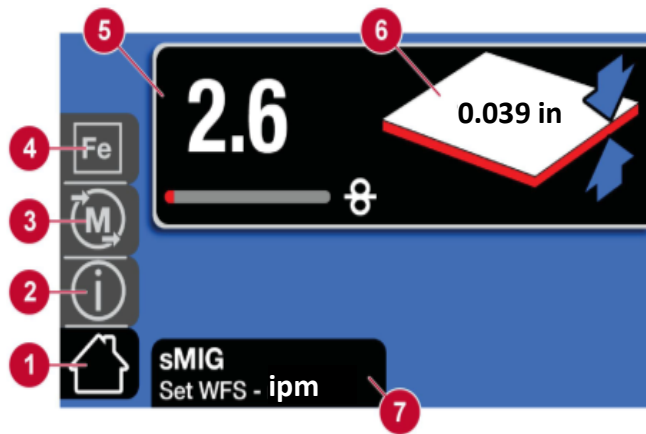
7.2 MAIN MENU



1. **sMIG MODE**
2. **MANUAL MIG MODE**
3. **FLUX-CORED WIRE MODE**
4. **MMA MODE**
5. **LIFT-TIG MODE**
6. **SETTINGS**
7. **USER MANUAL**
8. **DIALOGUE BOX**

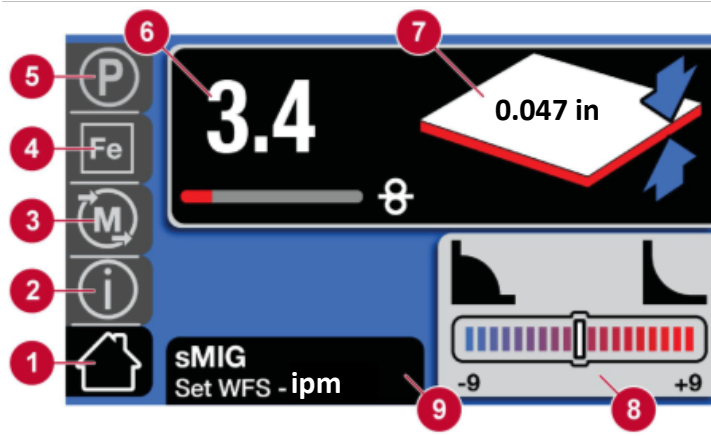
CONTROL PANEL

7.3 SMIG MODE: BASIC



1. HOME SCREEN
2. INFORMATION
3. MEMORY
4. MATERIAL SELECTION
5. WIRE-FEED SPEED SELECTION (U)
6. MATERIAL THICKNESS INDICATOR
7. DIALOGUE BOX

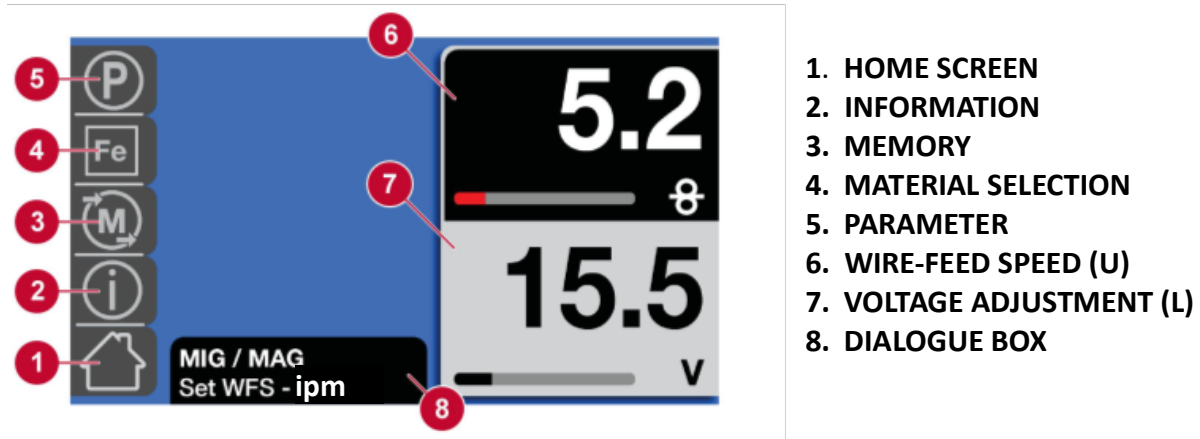
7.4 SMIG MODE: ADVANCED



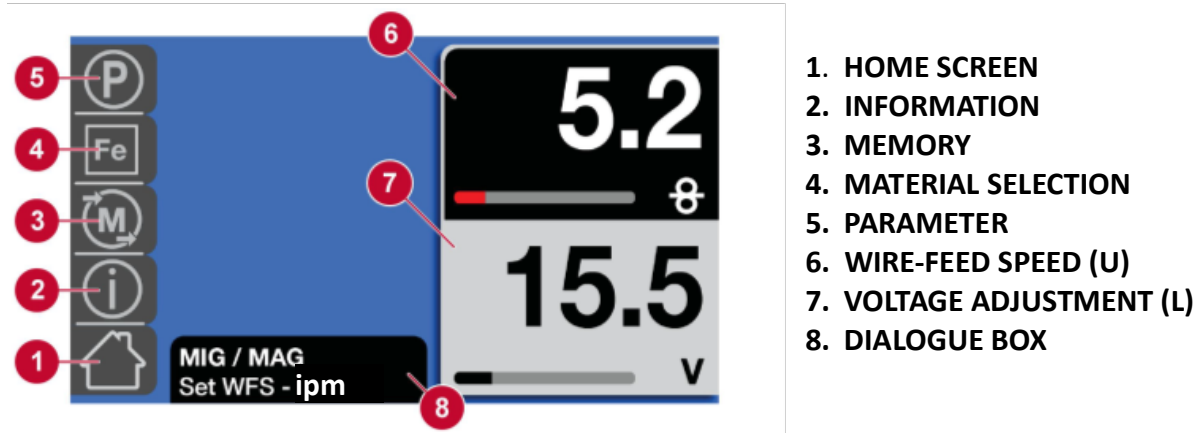
1. HOME SCREEN
2. INFORMATION
3. MEMORY
4. MATERIAL SELECTION
5. PARAMETER
6. WIRE-FEED SPEED (U)
7. MATERIAL THICKNESS INDICATOR
8. VOLTAGE TRIM ADJUSTMENT (L)
9. DIALOGUE BOX

CONTROL PANEL

7.5 MANUAL MIG MODE: BASIC

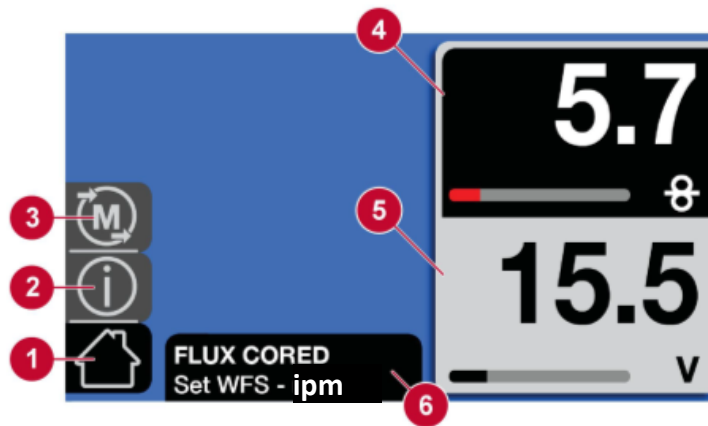


7.6 MANUAL MIG MODE: ADVANCED



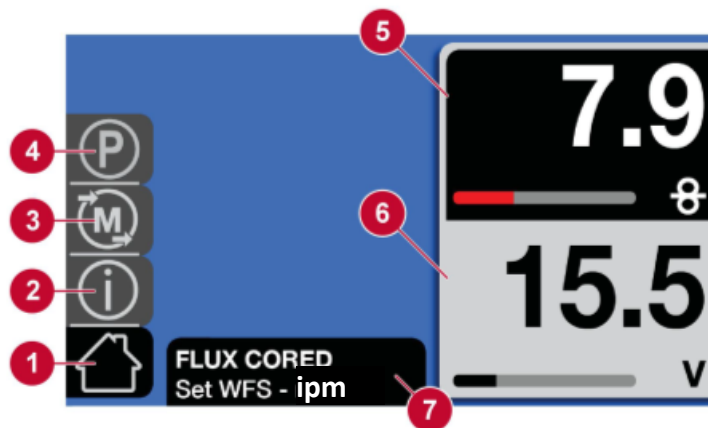
CONTROL PANEL

7.7 FLUX CORED WIRE MODE: BASIC



1. HOME SCREEN
2. INFORMATION
3. MEMORY
4. WIRE-FEED SPEED (U)
5. VOLTAGE ADJUSTMENT (L)
6. DIALOGUE BOX

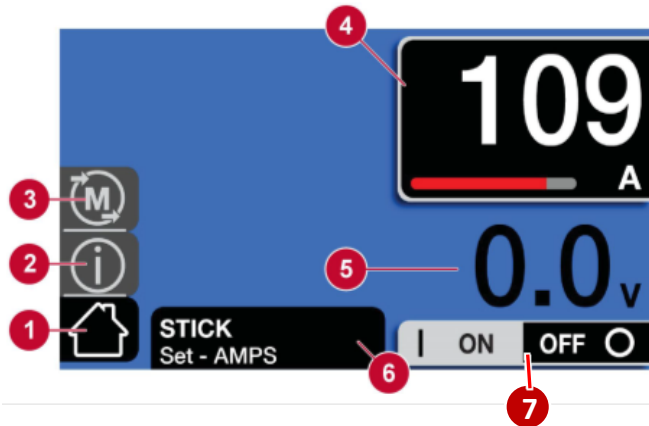
7.8 FLUX CORED WIRE MODE: ADVANCED



1. HOME SCREEN
2. INFORMATION
3. MEMORY
4. PARAMETER
5. WIRE-FEED SPEED (U)
6. VOLTAGE ADJUSTMENT (L)
7. DIALOGUE BOX

CONTROL PANEL

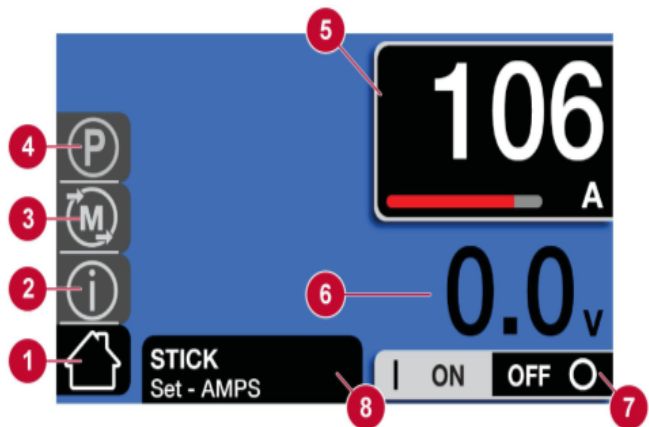
7.9 MMA MODE: BASIC



1. HOME SCREEN
2. INFORMATION
3. MEMORY
4. AMPERAGE ADJUSTMENT (U)
5. POWER-SUPPLY OUTPUT VOLTAGE (OPEN CIRCUIT VOLTAGE OR ARC)
6. DIALOGUE BOX
7. ARC ON/OFF (L)

BLUE CHANGES TO ORANGE WHEN OUTPUT IS "HOT"

7.10 MMA MODE: ADVANCED

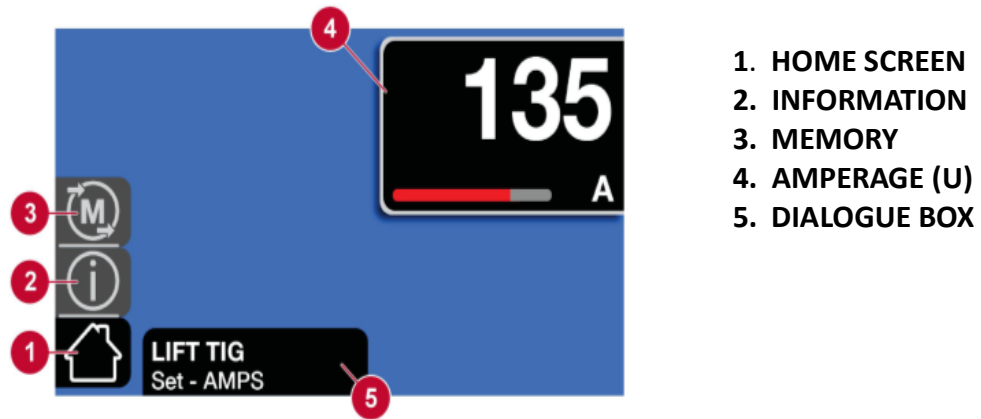


1. HOME SCREEN
2. INFORMATION
3. MEMORY
4. PARAMETER
5. AMPERAGE
6. POWER-SUPPLY OUTPUT VOLTAGE (OPEN CIRCUIT VOLTAGE OR ARC)
7. ARC ON/OFF (L)
8. DIALOGUE BOX

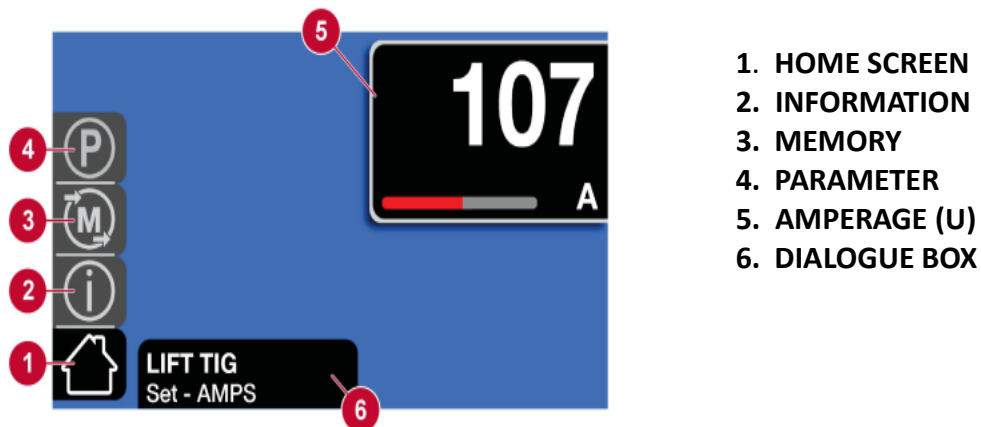
BLUE CHANGES TO ORANGE WHEN OUTPUT IS "HOT"

CONTROL PANEL

7.11 LIFT-TIG MODE: BASIC

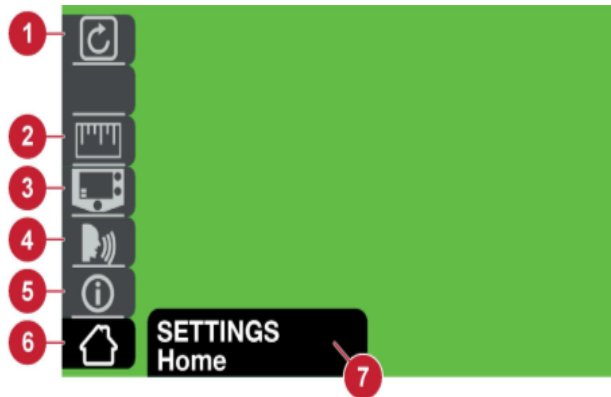


7.12 LIFT-TIG MODE: ADVANCED



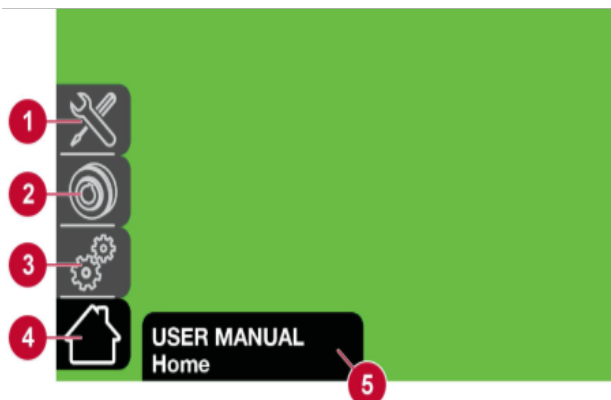
CONTROL PANEL

7.13 SETTINGS



1. RESET MODES
2. INCH/METRIC
3. BASIC/ADVANCED
4. LANGUAGE
5. INFORMATION
6. HOME SCREEN
7. DIALOGUE BOX

7.14 USER MANUAL INFORMATION



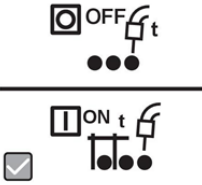
1. MAINTENANCE INFORMATION
2. WEAR/SPARE PARTS
3. OPERATION INFORMATION
4. HOME SCREEN
5. DIALOGUE BOX

CONTROL PANEL

7.15 Icon reference guide

NOTE:

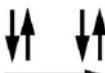
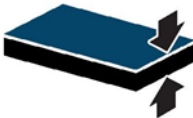
SCT – Short Circuit Termination is a method of automatic burn back at the end of the weld to electrically cut the wire by pulsing high current in a controlled process. The result is a nice clean wire end with no balling or sticking to the weld pool or tip. This allows exceptional restarting of subsequent welds. This feature is primarily for Mild and Stainless steel short-arc welding. For spray and flux core welding, traditional burn back is recommended. When burn back time is set to zero, SCT automatically is enabled. A non-zero burn back setting will disable SCT

ICON	MEANING	ICON	MEANING
	Home		Spot time on/off selection (use navigation knob and push to select from display)
	Burn back Adjusting the time when the voltage stays on after the wire feed is stopped to keep the wire from freezing in the weld puddle	SCT Selection on display	Short Circuit Termination (SCT: see NOTE above) ON: burnback set to zero OFF: burnback set to non-zero.
	Information		Wire feed speed
	MIG Torch		Spot time on adjustment

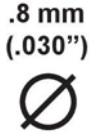
CONTROL PANEL

ICON	MEANING	ICON	MEANING
	Parameters		Flux cored
	Parameters		Manual MIG
%	Percent		STICK
	Pre-flow The time the shielding gas stays on before the welding arc is started		Smart MIG
	Post-flow The time the shielding gas stays on after the welding arc is stopped		Lift-TIG
S	Seconds		Saving welding programs for a specific application when in the Memory Mode
	Settings on user manual menu		Cancel
	Spool Gun (Not all markets)		Remote

CONTROL PANEL

ICON	MEANING	ICON	MEANING
	Settings		Foot control
	2T, Trigger On/OFF	V	Volts
	4T, Trigger Hold/Lock		User manual on main menu
A	Amps		Plate thickness at sMIG mode
	Arc force On stick welding-increasing amps when the arc length is shortened to reduce or eliminate the freezing of the stick electrode in the weld puddle		Trim bar Changing the weld bead profile from flat to convex or flat to concave
	Downslope Sloping the current down over a period of time at the end of the weld cycle		Advanced Settings
	Hot start The increase of amps when striking the electrode to reduce sticking		Basic Settings

CONTROL PANEL

ICON	MEANING	ICON	MEANING
	Inductance The addition of inductance into the arc characteristics to stabilize the arc and reduce spatter when in the short circuit process		Language selection
	Memory Ability to save welding programs for a specific application		Stick electrode choice
	Upslope Sloping the current up over a period of time at the beginning of the weld cycle		Unit of Measure
	Wire diameter		Bead profile, concave
			Bead profile, convex

SECTION 8

MAINTENANCE



WARNING

Power should be turned off for maintenance.



CAUTION

Only authorized persons may remove the cover of this product or carry out service, maintenance or repair.



CAUTION

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



CAUTION

Before each use, make sure:

The torch body and torch cable and leads are not damaged

The contact tip on the torch is not damaged

The nozzle on the torch is clean and does not contain any debris.



NOTE

Perform maintenance more often during severe dusty conditions.



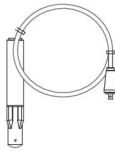
NOTE

There are no user serviceable parts inside of the power supply side of the EMP unit. Any need for service on the electronics/electrical-power side should be referred to the nearest ESAB service center.

MAINTENANCE

8.1 ROUTINE MAINTENANCE

Table 8-1. Maintenance Schedule During Normal Conditions

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.		

8.2 WIRE-FEEDER ASSEMBLY MAINTENANCE

General good practice is to perform this procedure each time a Wire Bobbin is replaced.

8.2.1 WIRE-FEEDER ASSEMBLY CLEANING



WARNING

Always use hand and eye protection when cleaning.

MAINTENANCE

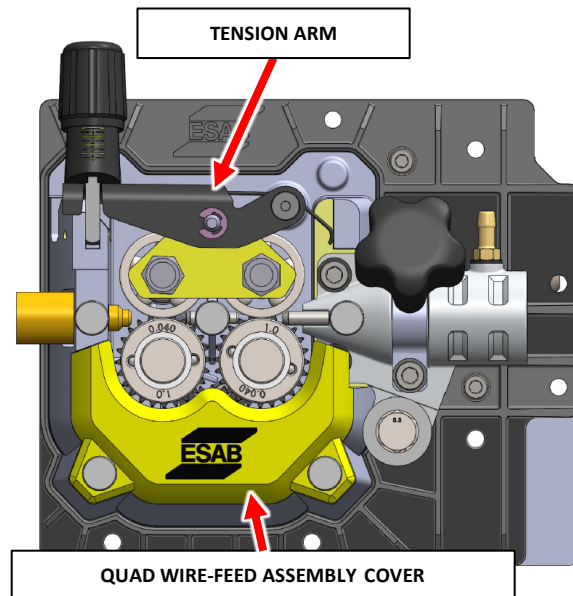


Figure 8-1. Tension Arm & Wire-Feed Cover on Wire-Feed Assembly

1. Disconnect the electrical power source from the unit.
2. Open the cover on the wire-bobbin side of the EMP unit.
3. Release the tension from the Pressure Rollers by turning the Tension Knob on the Tension Arm counter-clockwise enough to pull it first up (out of its detent slot) and then toward you (see 1 in Figure 6-32). The Tension Arm will spring-up as soon as the Tension Arm is released. This should free the wire movement to remove the wire in the next step.
4. Remove the Quad Wire-Feed Assembly Cover (see Figure 8-1) and using (as needed) either soft-bristle brush or use a forced air source by blowing compressed air (max. 5 bar) to remove all debris which may have accumulated in this space. **WEAR EYE PROTECTION.**
5. Inspect if the **Input Wire-Feed Guide**, the **Output Wire-Feed Guide**, the **Center Wire-Feed Guide**, or the **Feed Rollers** are worn and need replacement. See Section 10.2 WEAR PARTS for ordering Wear-Part numbers. See Section 6.11 for REMOVING/INSTALLING WIRE-FEED ROLLERS and/or Section 6.12 REMOVING/INSTALLING/ADJUSTING WIRE-FEED GUIDES. If none need replacement – only cleaning – go to the next step.

MAINTENANCE



CAUTION

Avoid removing the drive gear behind the left wire-feed roller. Doing so risks losing the Woodruff key on the motor shaft. Losing this key renders the unit useless until the key is replaced.

6. Remove the Wire-Feed Rollers per Section 6.11.1 REMOVING WIRE-FEED ROLLERS.
7. Clean the Wire-Feed Rollers with a soft brush.
8. Clean the Pressure Rollers attached to the Tension Arm with a soft brush.



CAUTION

Do not loosen any of the set screws for any of the three components listed in this next step. Loosening any one will require re-adjusting their position as performed in Section 6.12.3, ADJUSTING WIRE GUIDES.

9. Clean the **Input Wire-Feed Guide**, the **Output Wire-Feed Guide**, the **Center Wire-Feed Guide** by blowing compressed air (max. 5 bar) through them (see Figure 6-30).
10. Replace the Wire-Feed Rollers per Section 6.11.2 INSTALLING WIRE-FEED ROLLERS.
11. Close the Tension-Arm on to the wire in its groove on the wire-feed rollers.



NOTE

Verify that the wire is in its groove and not floating out of the groove on the roller surface.

12. Visually verify that the wire appears as a straight line through the entire Wire-Feed Assembly.



NOTE

The Bobbin may be turned counter-clockwise to take up any slack. Do this only AFTER step 12 because the tension on the wire is the only force preventing the movement of the wire at the torch tip.

13. Visually verify that the wire protrudes per specification at the torch tip and has not been pulled into the torch head.
14. Adjust the wire-feed pressure by adjusting the tension on the wire at the Wire-Feed Rollers by turning the Tension Knob using the procedure SETTING WIRE-FEED PRESSURE (see Section 6.10).
15. Close the cover on the wire-bobbin side of the EMP unit.

MAINTENANCE

8.3 EMP-UNIT POWER-SIDE MAINTENANCE



NOTE

There are no user-serviceable parts on the Power-Side. In dusty environments, the Power-Side should be checked periodically for any dust/debris accumulation because of the fan forced-air cooling used on this side. Because of the electro-static sensitive components and exposed circuit boards any maintenance on this side should be done by an authorized ESAB service technician.

8.4 TORCH LINER MAINTENANCE

Refer to MIG torch instruction manual for replacing standard steel torch conduit liner with a Teflon torch conduit liner.

- Model EMP 285ic 1ph uses torch model: Spray Master Velocity 250V
- Model EMP 285ic 3ph uses torch model: Spray Master Velocity 350V

8.4.1 TORCH LINER CLEANING

1. Disconnect the power source from the input powersocket.
2. Disconnect the torch assembly from the unit
3. Remove the wire from the torch wire-liner by pulling the wire out from the torch wire-liner and laying it neatly for re-installation at the end of this procedure.
4. Remove the liner from the torch hose and inspect it for damage or kinks. Clean the liner by blowing compressed air (max. 5 bar) through the end of the liner that was mounted closest to the unit.
5. Re-install the liner.
6. Re-install the wire through the Wire-Feed Assembly until visible at the torch tip. Verify that the wire does correctly feed out of the torch.

TROUBLESHOOTING

SECTION 9

TROUBLESHOOTING

9.1 PRELIMINARY CHECKS

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

Before attempting to troubleshoot the ESAB Rebel it is recommended to first perform a WELD DATA RESET (navigate to HOME/SETTING/RESET/WELD DATA RESET). A WELD DATA RESET of the system will restore the unit to its default welding condition. Performing this Reset will not lose any user stored memory values but will establish a baseline from which all troubleshooting should start. If the WELD DATA RESET is not successful it is recommended to perform a Factory Reset and repeat testing. **CAUTION:** A Factory Reset will also erase all user stored memory locations. If this does not correct the problem, follow the table where possible.

Table 9-1. Table of Faults

Type of fault	Corrective action
Porosity within the weld metal	• Check gas bottle is not empty. • Check gas regulator is not closed. • Check gas inlet hose for leaks or blockage. • Check that the correct gas is connected, and the correct gas flow is used. • Keep the distance between the MIG torch nozzle and the work piece to a minimum. • Do not work in areas where drafts, which would disburse the shielding gas, are common. • Make sure the work piece is clean, with no oil or grease on the surface, before welding.
Wire feeding problems See Section 10.2 WEAR PARTS for correct sizes or types.	• Make sure the wire spool brake is adjusted correctly. • Make sure the feed roller is correct size and not worn. • Make sure the correct pressure is set on the feed rollers. • Make sure the proper direction of motion is set based on the wire type (into the weld pool for aluminum, away from the weld pool for steel). • Make sure the correct contact tip is used and it is not worn. • Make sure liner is the right size and type for wire. • Make sure the liner is not bent so that friction is caused between the liner and the wire.

TROUBLESHOOTING

Type of fault	Corrective action
MIG (GMAW/FCAW) welding problems	• Make sure the MIG torch is connected to the correct polarity. Refer to the electrode wire manufacturer for the correct polarity. • Replace contact tip if it has arc marks in the bore causing excessive drag on the wire. • Make sure the correct shielding gas, gas flow, voltage, welding current, travel speed and MIG torch angle is used. • Make sure the work lead has proper contact with the work piece.
MMA (SMAW) basic welding problems	• Make sure you are using the correct polarity. The electrode holder is usually connected to the positive polarity and the work lead to the negative polarity. If in doubt, consult the electrode data sheet.
TIG (GTAW) welding problems	• Make sure the TIG torch is connected to the power source: Connect the TIG torch to the negative [-] welding terminal. Connect the welding ground cable to the positive [+] welding terminal. • Use only 100% Argon gas for TIG welding. • Make sure the regulator/flow meter is connected to the gas bottle. • Make sure the gas pipe for the TIG torch is connected to the gas outlet connector on the front of the power source. • Make sure the work clamp has proper contact with the work piece. • Make sure the gas bottle is opened and check the gas flow rate on the regulator/flow meter. The flow rate should be between 10 – 25 CFH (4.7 – 11.8 L/min). • Make sure the power source is turned on and TIG welding process is selected. • Make sure all connections are tight and leak-free.
No power/No arc	• Check that the input power supply switch is turned on. • Check if a temperature fault is shown on display. • Check if system breaker is tripped. • Check that the input power, welding and return cables are correctly connected. • Check that the correct current value is set. • Check the input power supply fuses/breakers.

TROUBLESHOOTING

Type of fault	Corrective action
Overheating protection trips frequently.	• Make sure that you are not exceeding the recommended duty cycle for the weld current you are using. See section "Duty cycle" in the OPERATION chapter. • Make sure the air inlets or outlets are not clogged. • Make sure fans are operating when welding.

9.2 USER INTERFACE (UI) SOFTWARE-DISPLAYED ERROR CODES

The following table exhibits fault codes that may appear to assist in troubleshooting.

Severity Level Meaning (see **Severity Level** Column in table):

- **(C)** Critical Service Required - Unit not functional or locked, not recoverable
- **(NC)** Non-Critical - Service may be desired - unit functional with limited performance
- **(W)** Warning - Unit functional and will recover on its own

Table 9-2. UI Error Codes

Error Code	Severity Level	Functional Circuit Failure Explanation
001	W	PFC Heatsink, IGBT Heatsink or Main transformer has overheated > 85 C
002	W	Output diode Temperature fault, Analog temperature sensor.
003	W/C	Warning - If occurred during load/arc-start, cause is due to low input AC volts - Err009 Critical - If occurred at power-up under no-load condition. DC Bus (400V) fault droop under load, PFC not supplying 400 to inverter.
004	C	Output voltage is above VRD levels when VRD switch is active
005 - 007		(reserved)
008	C	OCV error, Output voltage not sensed at Control Board CN1 as expected
009	W	Low Voltage Error, AC Mains voltage is less than 108 VAC, this could trip Err 003
010		(reserved)
011	C	User has attempted a parameter or factory reset, and this was not confirmed by the system.
012	C	Communication Link Down, no communication between UI and Ctrl PCB at CN6
013	C	Low Internal Power Supply (IPS) Voltage Error, +24V IPS is less than 22VDC
014	C	Secondary Current Sensor output not detected at Control PCB CN18
015 - 019		(reserved)
020	C	No Image found in Flash
021	C	The image read from the flash is corrupted
022	NC	Failed two attempts of saving user memory to permanent memory in SPI Flash.
023	NC	Failed two attempts of recovering user memory permanent memory from SPI Flash.

SECTION 10

ORDERING SPARE PARTS

10.1 SPARE PARTS

The spare parts list is published in a separate document that can be downloaded from the Internet: www.esab.com. Wear-Part numbers are listed here for convenience in Section 10.2.



CAUTION

Repair work should be done by an authorized ESAB service technician. Use only ESAB parts.

The EMP 285ic 1ph and the EMP 285ic 3ph is designed and tested in accordance with international standards IEC-/EN 60974-1, IEC-/EN 60974-5, IEC-/EN 60974-7, IEC-/EN 60974-10, IEC-/EN 60974-12, and IEC-/EN 60974-13. It is the obligation of the authorized serviced center carrying out the service or repair work to ensure that the product still conforms to these standards.

SPARE PARTS



Table 10-1. Unit Part Numbers

Part #	Description	Note
0558102554	EMP 285ic 1ph	Bobbin Size 100–300 mm (4–12 in), bayonet
0558102556	EMP 285ic 3ph	Bobbin Size 100–300 mm (4–12 in.), bayonet
0463619001	Spare Parts List	

SPARE PARTS

10.2 WEAR PARTS

Certain mechanical parts on the wire-feed assembly are subject to more frequent use hence may wear more frequently. These are exhibited here.

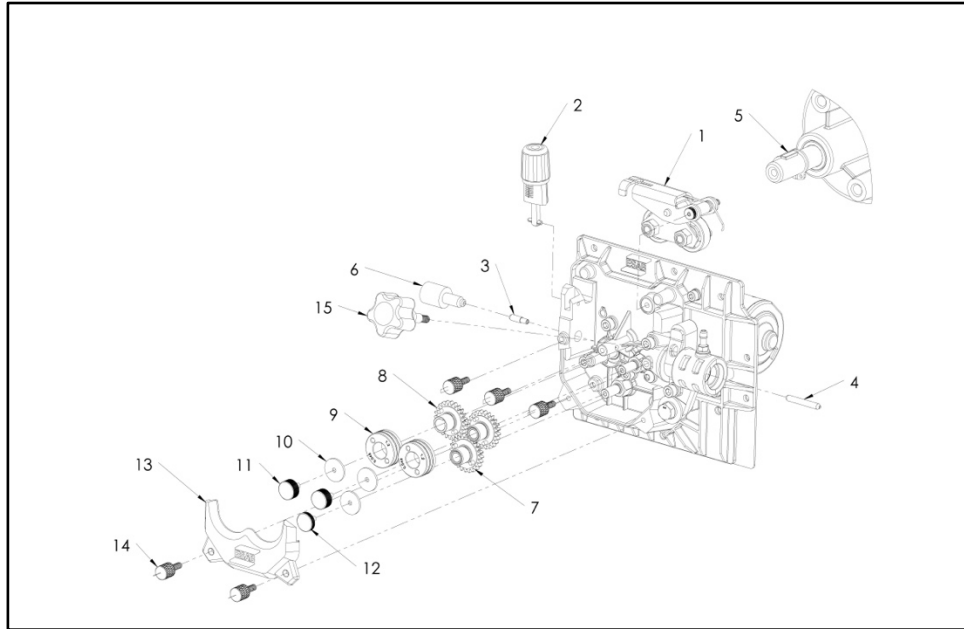


Figure 10-1. Wire-Feed Assembly, Wear-Parts

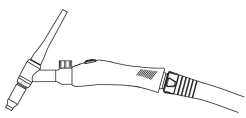
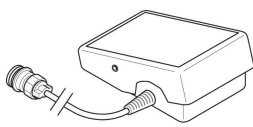
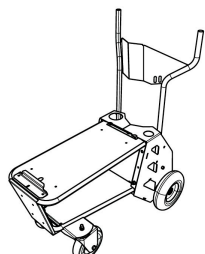
Table 10-2. Reference for Figure 10-2 Wire-Feed Assembly, Wear-Parts

#	PART #	DESCRIPTION	Qty
1	0558102591	PRESSURE ROLLER ASSEMBLY	1
2	0558102592	TENSION ADJUSTMENT ASSEMBLY	1
3	0558102608	CENTER WIRE-GUIDE TUBE	1
4	(See Appendix C)	OUTPUT WIRE-GUIDE TUBE	1
5	0558102609	MOTOR-GEAR SHAFT WOODRUFF KEY	1
6	0558102597	INLET QUAD WF	1
7	0558102605	DRIVEN GEAR ASSEMBLY	2
8	0558102606	DRIVE GEAR ASSEMBLY	1
9	(See Appendix C)	WIRE-FEED ROLLERS	2
10	0558102600	WASHER FLAT M4 LARGE OD	3
11	0558102601	THUMB SCREW M4 X 10 X 8 KNURLED	2
12	0558102602	THUMB SCREW M4 X 10 X 5 KNURLED	1
13	0558102603	QUAD WF COVER	1
14	0558102604	THUMB SCREW M5 X 14 KNURLED	5
15	0558102625	WIRE DRIVE KNOB, BAYONET	1

SPARE PARTS

10.3 ACCESSORIES

Table 10-3. Accessories

Part #	Description	
1023-1277	MIG Torch: Spray Master Velocity 250V, 15 ft (4.5 m)	
1036-1756	MIG Torch: Spray Master Velocity 350V, 15 ft (4.5 m)	
0558102493	TIG Torch: TXH™ 201, 4 m (12 ft.) TIG torch c/w 8-pin plug	
W4014450	Foot control: Contactor on/off and current control with 4.5 m (15 ft.) cable and 8-pin male plug	
0558102491	Rebel Single Cylinder Cart Accommodates 1 × 9 in. (228.6 mm) diameter cylinders	
0558102492	Rebel Dual Cylinder Cart Accommodates 2 × 9 in. (228.6 mm) diameter cylinders	

SPARE PARTS

10.4 REPLACEMENTS PARTS

Table 10-4. Replacement Part #

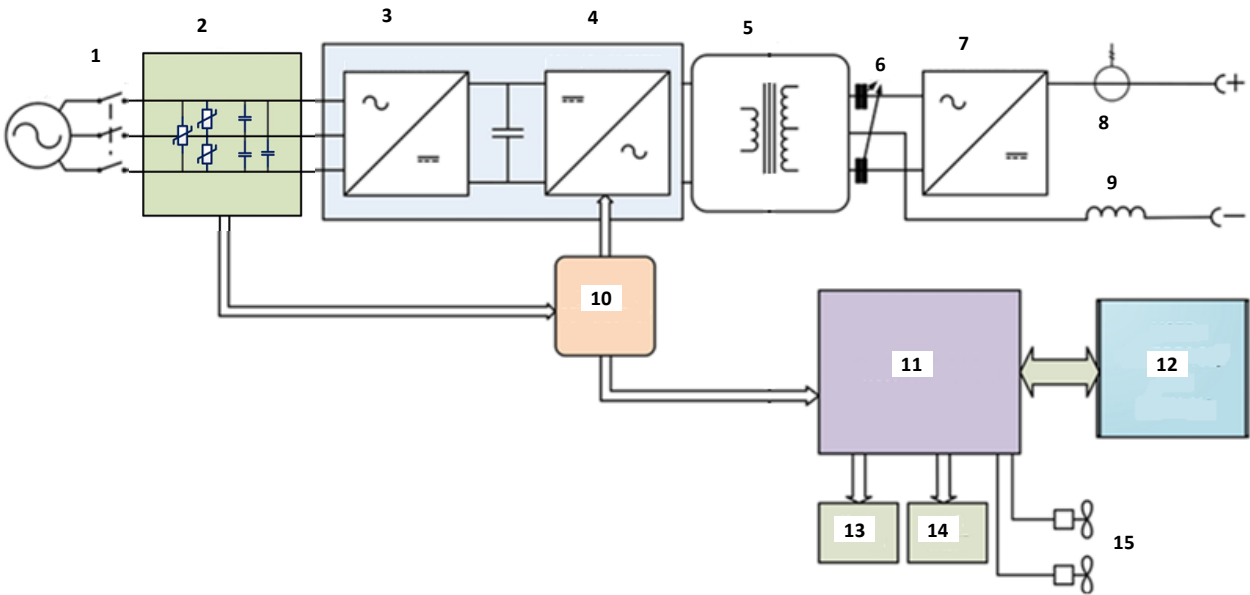
Part #	Description
0781-2743	Victor® Flow Meter with 10 ft (3 m) gas hose
WS200G10	Tweco Ground Clamp w/Lead, 10 ft. (3m), 50 mm Dinse
WS200E13	Electrode Holder 200A and Lead Assembly, 13 ft. (4 m), 50 mm Dinse
W4014000	Power adapter cable 230 V to 120 V, 15 A
354TA8	Adapter cable 4 pin to 8 pin

DIAGRAMS

APPENDIX A

DIAGRAMS

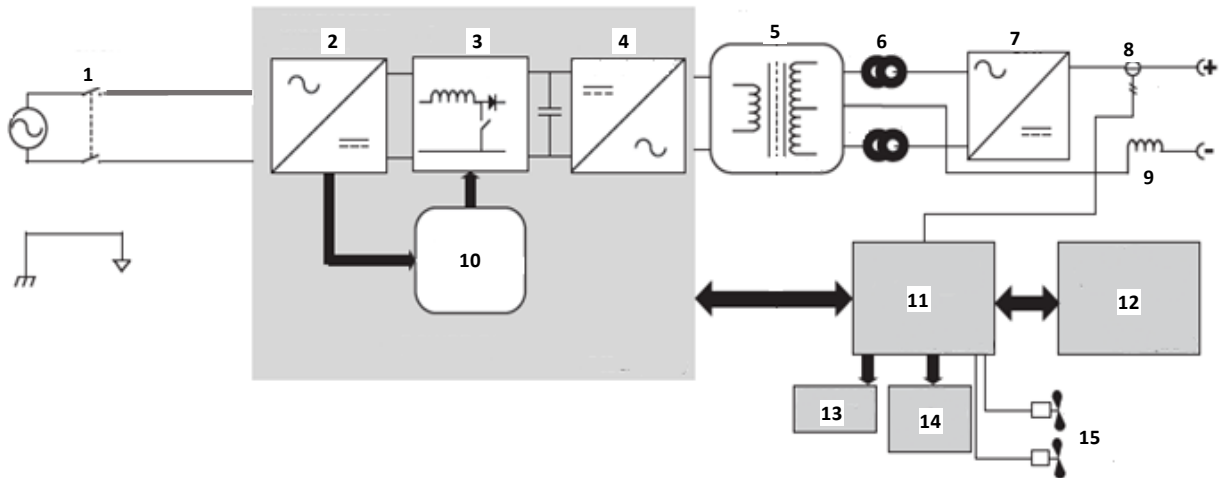
A.1 Functional Block Diagram 3 ph



#	DESCRIPTION
1	Main Power Switch
2	EMI Filter Board
3	Primary Rectifier on Power Board
4	Primary Inverter on Power Board
5	Main Transformer
6	Ferrite Cores
7	Output Diode Assembly
8	Current Sensor
9	Output Inductor
10	Internal Power Supply Board
11	Control Board
12	User Interface (UI)
13	Wire Feeder
14	Gas Valves
15	Fans

DIAGRAMS

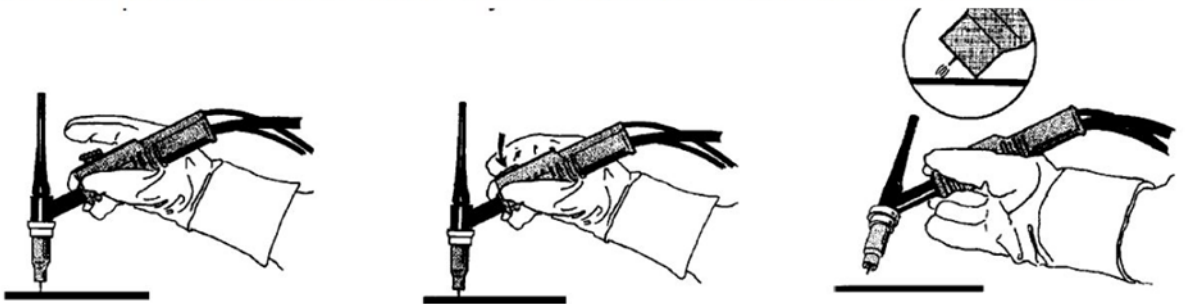
A.2 Functional Block Diagram 1 ph



#	DESCRIPTION
1	Main Power Switch with thermal breaker
2	Primary Rectifier on Power Board
3	Boost PFC
4	Primary Inverter on Power Board
5	Main Transformer
6	Ferrite Rings
7	Output Diode Assembly
8	Current Sensor
9	Output Inductor
10	Internal Power Supply on Power Board
11	Control Board
12	User Interface (UI)
13	Wire Feeder
14	Gas Valves
15	Fans

B.1 2-Stroke and 4-Stroke Welding Process Illustrated

The trigger is used and some current flows already when lifting away the electrode to strike it.



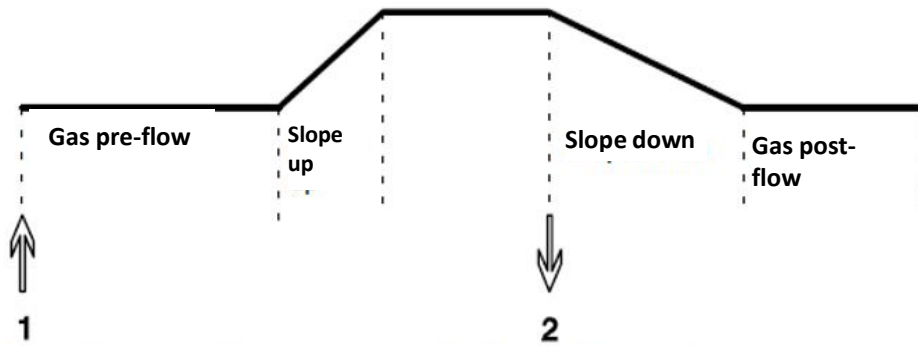
Striking the arc with the LiftArc function:

Step 1: the electrode is touched on to the work piece.

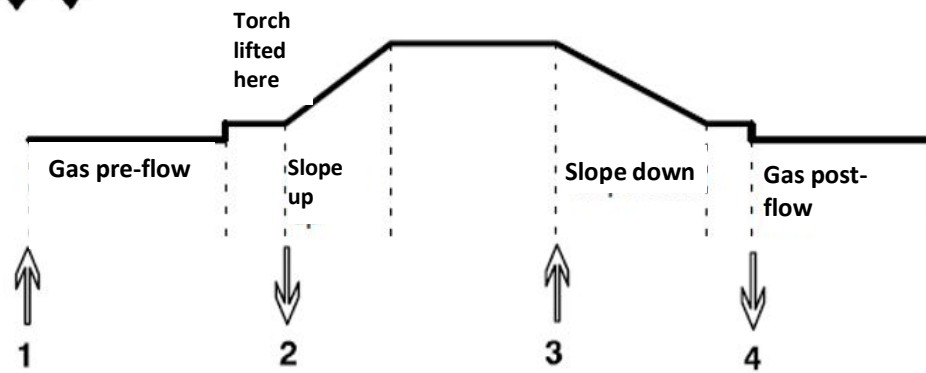
Step 2: the trigger switch is pressed, and a low current starts to flow.

Step 3: the welder lifts the electrode from the work piece; the arc strikes, and the current rises automatically to the set value.

↓ ↑ 2 STROKE



↕ ↕ 4 STROKE



APPENDIX C**Roller & Wire-Guide Selection****C.1 Roller Selection**

ITEM	PART #	DESCRIPTION	COMMENT
FEED ROLLERS FOR ALL WIRES EXCEPT ALUMINUM			
1	21155	ROLLER, .024 (.6) - .030 (.8), V-SOLID	OPTIONAL FOR PURCHASE
2	21156	ROLLER, .035 (0.9) - .045 (1.2), V-SOLID	DEFAULT*/ACCESSORY**
3	21157	ROLLER, .052 (1.4) - .062 (1.6), V-SOLID	OPTIONAL FOR PURCHASE
4	21160	ROLLER, .030 (0.8) - .035 (0.9), V-KNURLED	OPTIONAL FOR PURCHASE
5	21161	ROLLER, .045 (1.2) - .052 (1.4), V-KNURLED	ACCESSORY**
FEED ROLLERS FOR ALUMINUM WIRE			
6	21159	ROLLER, .045 (1.2) - .062 (1.6), ALUM (U-GROOVE)	OPTIONAL FOR PURCHASE
* DEFAULT (size included in package) ** ACCESSORY (included with each model)			

C.2 Wire-Guide Selection

ITEM #	PART #	DESCRIPTION	COMMENT
OUTPUT WIRE-GUIDE TUBES EXCEPT FOR ALUMINUM WIRE			
1	0558 102 585	TUBE, WIRE GUIDE .024 (.6), V-SOLID	OPTIONAL FOR PURCHASE
2	0558 102 584	TUBE, WIRE GUIDE .030 (.8) - .040 (1.0), V-SOLID	ACCESSORY**
3	0558 102 582	TUBE, WIRE GUIDE .035 (0.9) - .045 (1.2), V-SOLID	DEFAULT*
4	0558 102 583	TUBE, WIRE GUIDE .052 (1.4) - .062 (1.6), V-SOLID	ACCESSORY**
OUTPUT WIRE-GUIDE TUBES FOR ALUMINUM WIRE			
5	0558 102 586	TUBE, WIRE GUIDE .035 (0.9), ALUM	OPTIONAL FOR PURCHASE
6	0558 102 587	TUBE, WIRE GUIDE .045 (1.2), ALUM	OPTIONAL FOR PURCHASE
7	0558 102 588	TUBE, WIRE GUIDE .052 (1.4) - .062 (1.6), ALUM	OPTIONAL FOR PURCHASE
* DEFAULT (size included in package) ** ACCESSORY (optional size included with each model)			

NOTE

For an extensive listing of standard welding terms and definitions the following publication is recommended.

ESAB Glossary of Technical Terms

See:

<http://www.esabna.com/us/en/support/documentation/downloads.cfm>

(or see)

<http://online.fliphtml5.com/zitj/zqen/>

EMP	ESAB Multi Process
FCAW	Flux Core Arc Welding
GMAW	Gas Metal Arc Welding
GTAW	Gas Metal Tungsten Arc Welding
IC	Inverter, Compact
IP 23S	(class of enclosure)
MAG	Metal Active Gas
MIG	Metal Inert Gas
MMA	Manual Metal Arc
OCV	Open Circuit Voltage
PFC	Power Factor Correction
SCT	Short Circuit Termination
SMAW	Shield Metal Arc Welding
SMIG	Smart MIG
TFT	Thin Film Transistor
TIG	Tungsten Inert Gas
TXH	(brand of ESAB torch)
VRD	Voltage Reducing Device

(Intentionally Blank)

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www.esab.com



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