



Operating Manual

Sabre-arc 35i/PT-50 Air Plasma Cutting System



**Please ensure that this
Instruction Manual and Parts List
is made available to the user of
the equipment**



DECLARATION OF CONFORMITY

Murex Welding Products Ltd.

Declare hereby that:

Murex Sabre-arc 35i/PT-50 Air Plasma Cutting Equipments

Part No's: 1415385 & 1415386

- are manufactured in accordance with the Council Directive 73/23/EEC (1973-02-19) and 89/336/EEC (1989-05-03) amended by Council Directive 93/68/EEC relating to electrical equipment designed for use within certain voltage limits.
- conform with the protection requirements of Council Directive 89/336/EEC, amended by Council Directives 91/263/EEC, 92/31/EEC and 93/68/EEC relating to electromagnetic compatibility.
- are manufactured in accordance with EN60974-1 Safety Requirements for Arc Welding Equipment and EN50192 Plasma Cutting Systems.
- are manufactured in accordance with EN50199 Electromagnetic Compatibility for Arc Welding Equipment.

On behalf of Esab Group (UK) Ltd
Hertford Road
Waltham Cross
Herts. EN8 7RP
England

A handwritten signature in cursive script, appearing to read "P. Karlsson".

P.Karlsson
Managing Director
Esab Welding Equipment AB
1st January 1996

Manufactured by Esab Welding & Cutting Products
Florence, SC. USA

Contents

	Page
Safety	5
Introduction	6
Specification	6
Unpacking	7
Installation	7
Assembling PT-50 Torch Consumables	9
Control & Facilities	9
Operation	10
Common Cutting Problems	11
Maintenance	12
Troubleshooting	13
Circuit Diagrams	16
Spare Parts Information	18



WARNING



This cutting equipment has been designed, manufactured and tested to the highest standards to ensure long and trouble free life. However, regular maintenance is an essential part of keeping the machine operating in a reliable and safe manner and your attention is drawn to any maintenance instructions that are contained in this manual.

In general, all welding equipment should be thoroughly inspected, tested and serviced at least annually. More frequent checking will be required when the equipment is heavily used.

Wear and tear, particularly in electro-mechanical and moving components, are gradual processes. Caught in time, repair costs are small and the benefits in performance reliability and safety are significant. Left alone, they can put the equipment, and you, at risk.

Have this equipment regularly inspected and maintained by an approved service centre.



WARNING



ARC WELDING AND CUTTING CAN BE INJURIOUS TO YOURSELF AND OTHERS. TAKE PRECAUTIONS WHEN WELDING. ASK FOR YOUR EMPLOYER'S SAFETY PRACTICES WHICH SHOULD BE BASED ON MANUFACTURERS' HAZARD DATA.

ELECTRIC SHOCK - Can Kill

- Install and earth the welding unit in accordance with applicable standards.
- Do not touch live electrical parts or electrodes with bare skin, wet gloves, or wet clothing.
- Insulate yourself from earth and work.
- Ensure your working position is secure.

FUMES AND GASES - Can be Dangerous to Health

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

ARC RAYS - Can Injure Eyes and Burn Skin

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

NOISE- Excessive noise can damage hearing

- Protect your ears. Use ear defenders or other hearing protection.
- Warn bystanders of the risks.

**READ AND UNDERSTAND THE INSTRUCTION MANUAL
BEFORE INSTALLING OR OPERATING AND SEE WMA PUBLICATION 237
'The arc welder at work' AVAILABLE FROM THE MANUFACTURER.**

PROTECT YOURSELF AND OTHERS

SAFETY

In any arc welding or gouging operation, it is the responsibility of the user to observe certain safety rules to ensure his personal safety and to protect those working near him.

Read all safety articles relevant to arc welding published by the WMA. Pay particular attention to any CAUTION or WARNING Notes included in this manual. CAUTION indicates possible equipment damage. WARNING indicates possible hazard to life.

⚠ WARNING ⚠

The ON/OFF switch on this equipment does not isolate the unit from the mains electrical supply. **AC POWER IS PRESENT ON THE ON/OFF SWITCH TERMINALS.** The On/Off lamp is an indication that the supply is switched on and does not imply that the unit is isolated from the supply. **BEFORE REMOVING THE COVERS FOR MAINTENANCE, ISOLATE THE UNIT FROM THE MAINS ELECTRICAL SUPPLY.**

1. Electrical

- ⚠ Treat electricity with respect. Even the open circuit voltage of this equipment can be dangerous. Adjustments to the torch or replacement of torch parts should be undertaken with the mains supply isolated from the unit.
If damaged torch cables or torch components are found, the unit must be disconnected from the mains and defective parts must be replaced using only Murex spare parts.
- ⚠ Do not work on live circuits or cables. Disconnect the main power supply before checking the machine or performing any maintenance operation.
- ⚠ Be sure the case of the welding machine is properly connected to a good electrical earth.
- ⚠ Have the wiring for the welding machine installed by a qualified electrician. All connections must be made according to specifications in force and to general safety standards.
- ⚠ Do not stand in water or on damp floors while using an arc welder or cutter. Do not use in the rain.
- ⚠ Do not operate with worn or poorly connected cables. Inspect all cables frequently for insulation failure, exposed wires and loose connections.
- ⚠ Do not overload cables or continue to operate with overheating cables. Cables which are too small for the current carried will overheat, causing rapid deterioration of the insulation.
- ⚠ Pay attention that live parts of the torch do not touch any metal which is connected to the earth cable. Fix an insulated hook to hang the torch on when it is not in use.

1. Ventilation

- ⚠ Do not weld or cut on containers which have held combustible or flammable materials, or materials which give off flammable or toxic vapours when heated, without proper cleaning.
- ⚠ Locate the welding/cutting operation far enough from any vapour-type degreaser using trichlorethylene or other chlorinated hydrocarbons as solvents. The ultraviolet light from the arc can decompose these vapours into toxic gases at a considerable distance from the arc, even though the concentration of the gases is low enough to be undetectable by smell.
- ⚠ Be sure to provide adequate ventilation for removal and dilution of fume and gases. Fume exhaust facilities near the arc, or a ventilated helmet should be used when cutting in confined spaces or on toxic material.

2. Glare

- ⚠ Never look at the arc without wearing eye protection. Always use the proper protective clothing, filter glasses, and gloves. Be careful to avoid exposed skin areas. Do not use cracked or defective helmets or shields.
- ⚠ Never strike an arc when there is someone near who is not protected from the strong light of the arc.
- ⚠ Warn bystanders who are not aware of the dangers of ultraviolet light.

3. General

- ⚠ Take care when lifting the unit.
- ⚠ Ensure that cylinders are secured by chains.
- ⚠ Locate the unit so that there is adequate air flow to the ventilation louvres.
- ⚠ Always dress correctly to protect against glare, radiation and spatter.

4. Fire

- ⚠ Ensure that the correct type of fire extinguisher is available in the welding area.
- ⚠ Do not weld near flammable materials or liquids, in or near explosive atmospheres, or on pipes carrying explosive gases.

5. Vehicle Electrics

- ⚠ When working on motor vehicles, remove the battery and any circuitry which may be damaged by the arc.
- ⚠ Whilst welding be aware of the possibility of 'hidden wires' behind panels or bulkheads.

INTRODUCTION

1. Sabre-arc 35i Power Sources

The Murex Sabre-arc 35i is a small portable plasma cutting system designed to work on industrial 400V 3 phase or domestic 230V 1 phase electricity dependent on mode. It utilises factory compressed air for both the plasma and secondary cooling gas. The power source uses inverter technology to give precise control of cutting current and together with the PT-50 torch and patented HD consumables, enables conducting materials up to 12mm thick to be cleanly cut.

2. PT-50 Plasma Cutting Torch

The patented Murex PT-50 torch and HD consumables are designed for manual plasma cutting up to 50A at 100% duty using **clean dry air** as both plasma and cooling gases. The PT-50 torch head contains an air flow check valve which, in conjunction with a flow switch in the Murex Sabre-arc power source, provides a safety interlock preventing the torch from being accidentally energised when the heatshield is removed.

The PT-50 is available with either 7.6 or 15m cables (7.6m standard with the Sabre-arc 35i) and has a 75° head angle. A pencil type 180° head is available as an optional extra, see Fig.1 and Optional Extras section.

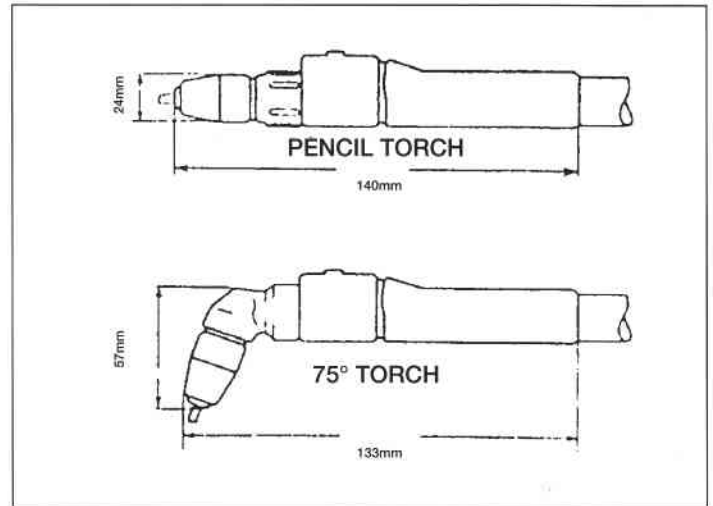


Fig. 1 PT-50 Torch

The torch can be used in either contact cutting mode for sheet metals up to 5-6mm thick. A stand off (tip to work) distance of 2-3mm is recommended for plates greater than 6mm thicker.

A cutting guide plate can be used to aid straight line cutting, see OPERATION, this technique is also useful when cutting mesh or grilles. In addition a Circle Cutting Attachment is available as an Option for cutting accurate circles from 125 to 680mm diameter. The circle cutting attachment dual castor assembly is also useful for maintaining a constant standoff for general sheet cutting.

SPECIFICATION

Sabre-arc 35i Power Source

Output:

Open Circuit Voltage	265V dc
Output Current	10-35A
	Continuously variable
Output Voltage	120V dc
Cutting Thickness (mild steel)	0.5 - 15mm
Rating (10 minute cycle)	35A 40% duty
	30A 60%
	22A 100%

Input:

	Sabre-arc 35i Pt. No. 1415386	Sabre-arc 35i Pt. No. 1415385
Mains Voltage	230V	400V
Frequency	50/60Hz	50/60Hz
Phase(s)	1	3
Input Fuse	30A	16A
Power factor	0.81	0.94
Efficiency	90%	90%
Air Requirement	6 - 10 bar 100-150 Lpm	6 - 10 bar 100-150 Lpm

Dimensions

Height	452mm
Width	218mm
Depth	490mm
Weight	23kg

PT - 50 Torch

Current Rating	50A 100% duty
Plasma/Cooling Gases	Air
Head Angle	75° (180° 'Pencil' Optional)
Cable Length	7.6mm (15m Optional)
Weight (shipping)	0.9kg
Air Pressure	5.5 bar/80psi
Air Flow	120 lpm/250cfh

UNPACKING

The Murex Sabre-arc 35i equipments comprises the following items:

- Either Pt. No. 1415386 Sabre-arc 35i Power Source 230V 1 phase supply
- OR Pt. No. 1415385 Sabre-arc 35i Power source 400v 3 phase supply
- Plus Pt. No. 1414206 PT-50 plasma torch with 7.6 lead
- Plus Pt. No. 1414205 Work return lead & clamp 7.6 (fitted)
- Plus - Consumable spares kit.

Check that all required items are present and inspect carefully for evidence of damage which may not have been apparent on the external packing. If necessary notify the carrier or your Murex Distributor immediately.

INSTALLATION - see Fig. 2

Installation must only be undertaken by a qualified electrician or suitably trained person.

1. Choose a location so that the louvres on the front and rear are clear of any obstruction and permit free flow of air through and around the unit. Refer to safety section for other precautions regarding siting the unit.

2. The Sabre-arc 35i power source is equipped with a 3m primary input cable. Connection should be made as follows:-

	Sabre-arc 35i 230V 1 phase Pt. No. 1415386	Sabre-arc 35i 400V 3 phase Pt. No. 1415385
Brown	L	L1
Blue	N	L2
Black	Not applicable	L3
Green-Yellow	Earth	Earth

A suitable switched isolator should be used and the circuit must be protected by suitable fuses, refer to specification section.

3. For operator safety, the torch connections are located on a panel behind the cover on the right hand side of the unit.

WARNING

Electric shock can kill! Precautionary measures should be taken to provide maximum protection against electric shock. Be sure that all power is off by opening the line (wall) disconnect switch and by unplugging the primary cable to the unit when connections are made inside the power supply.

4. Remove the cover and thread the power cable and torch switch lead to the PT-50 torch through the bushing in the front panel and connect the power cable to the torch fitting (LH threads). Connect the torch switch plug to receptacle provided. Ensure connections are tight. Refit the cover to the unit.

5. Connect a supply of CLEANED DRY COMPRESSED AIR to the regulator input nipple. Supply requirements are 6 bar minimum, 10 bar maximum (90 - 150 psi) at 100-150 L/minute. Do not use compressed air that has been oil loaded for pneumatic tools etc.

6. Clamp the earth clamp onto the workpiece ensuring that connection point is free from rust, scale or paint.

WARNING

Electric shock can kill! Precautionary measures should be taken to provide maximum protection against electric shock. Be sure that all power is off by opening the line (wall) disconnect switch and by unplugging the primary cable to the unit when connections are made inside the power supply.

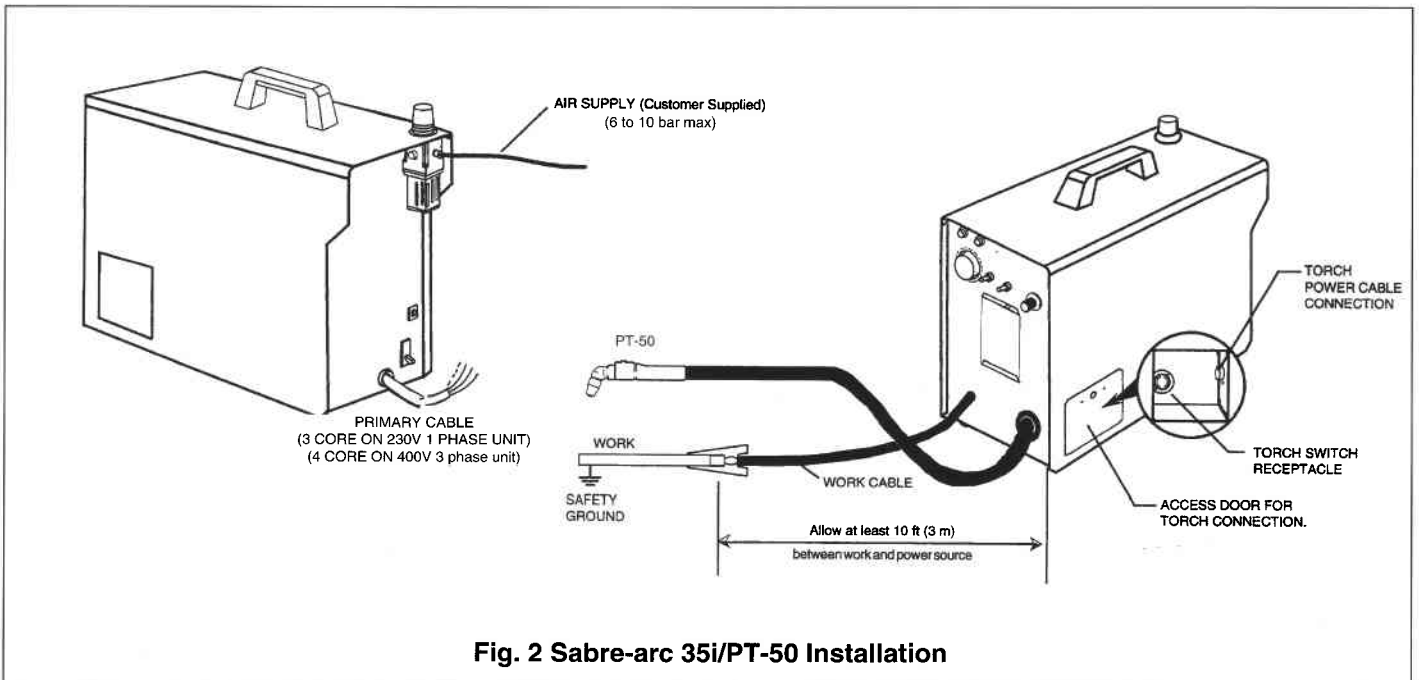


Fig. 2 Sabre-arc 35i/PT-50 Installation

INSTALLATION

Radio Interference

Murex welding power sources have been designed to high standards of electromagnetic compatibility. However, arc welding, by its very nature, generates radio-frequency energy and may cause interference. By installing and using the equipment correctly, in accordance with these instructions, the problems of interference may be minimised.

This equipment satisfies the requirements of the EU Directive 89/336/EC on EMC and complies with the limits in EN 50 199, 'EMC product standard for arc welding equipment'. These limits are designed to provide reasonable protection against interference in heavy industrial areas.

If this equipment is used in domestic areas, eg. for repair or maintenance, particular care should be taken. The time of day should be chosen and the duration of welding limited, to minimise any potential problems.

If this equipment caused interference the guidance given below should be considered. If a solution cannot be found please contact your distributor or the manufacturer.

Before installing this welding equipment an assessment should be made of potential EMC problems that may occur. It is good practice not to install welding equipment next to computers or safety critical control circuits, eg electronic machine guards, unless they have been suitably protected.

This equipment should be connected to the primary supply using the cable provided. However, for permanent installation, if interference problems occur, shielded cable or conduit should be considered. The primary cabling and welding cables should be kept separate to other mains wiring and control, signalling or communications (eg telephone) cables. If interference occurs than greater separation or re-routing should be considered. Welding cables should be kept as short as practically possible.

Interference may also be reduced by separating the welding equipment from the other equipment affected. A partition, brick wall or particularly, a metal screen will also reduce interference. Earthing and equi-potential bonding should also be considered but guidance should be sought from a competent person, the distributor or manufacturer.

To ensure continued compliance to the EMC Directive this equipment should be routinely maintained according to the manufacturers instructions and using only approved spare parts. In particular, the spark gaps of HF units should be adjusted and maintained according to the manufacturers recommendations.

All access and service door and covers should be closed properly fastened when the equipment is being used. This equipment should not be modified in any way except for those changes and adjustments approved by the manufacturer.

ASSEMBLING PT-50 TORCH CONSUMABLES - see Fig. 3

This section deals with fitting the electrode, tip etc. to the torch head.

WARNING

Ensure the power switch on Sabre-arc 35i is in the off position before installing or inspecting consumable parts.

The Sabre-arc 35i/PT-50 package is supplied with a kit of consumables parts as follows:-

2	Electrode HD	Part No. 1414210
1	Swirl baffle	Part No. 1414211
3	Tip HD	Part No. 1414209
1	Heatshield Long	Part No: 1415387

Note: The torch head contains a flow check valve that, along with flow sensing circuitry in the Sabre-arc power source, prevents the torch from being accidentally energised with the Heatshield removed.

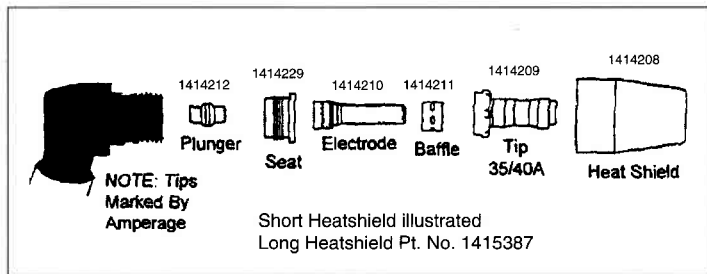


Fig 3. PT-50 Consumables

CONTROLS AND FACILITIES - see Fig. 4

1. Power On/Off Switch (rear panel). In the ON position the white pilot lamp is illuminated, the control circuitry is powered and the fan will run.

WARNING

Placing the power switch in the OFF position does not totally isolate the unit from mains electrical power. Always isolate the machine from the electrical supply before carrying out any work on or in the power source.

2. **Output Current Control.** Enables the precise cutting current to be set for the plate to be cut. Control range is 10-35A. see Fig.5.

3. **Air Check Switch.** In the ON position, the air filter regulator can be adjusted to the required pressure, normally 80 psi, before cutting operations. In this mode air flows continuously and it is recommended, at least at the beginning of each shift, that the system is purged of any condensation that may have accumulated during the off period. Ensure the switch is in the OFF position before cutting.

4. **Lock-in Switch** in the ON mode the torch switch can be released after the cutting arc has been established. To stop the cutting operation momentarily operate the torch switch again or pull the torch away from the work. In the OFF mode the torch switch must be pressed during the entire cutting cycle.

5. **Overload Light.** This yellow light will be illuminated and the machine output will be shut off under the following conditions.

a. When the duty cycle has been exceeded. The duty cycle of the Sabre-arc 35i is 40% at rated output current of 35A based on a 10 minute cycle, i.e., 4 minutes cutting and 6 minutes idling. Leave the machine with the power on and fan running, the thermal protection will automatically reset after a few minutes.

b. When the mains input voltage is outside acceptable limits i.e., 10% of nominal values.

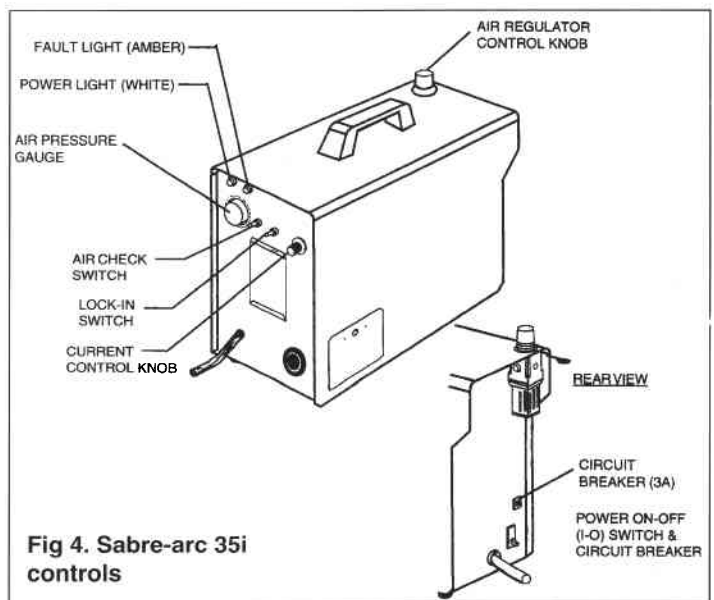


Fig 4. Sabre-arc 35i controls