SanRex

SANMIG 400M

DC INVERTER ARC WELDER

Operators Manual

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RECORD OF REVISIONS

LETTER	DESCRIPTION	DATE	BY	APP'D	X=PAGE CHANGED THIS REVISION				
					PG NO	-	A	B	C
None	Initial Issue	6/8/2015	C. DUNST		Title	X			
2	Update model name nomenclature	8/3/2015	C. DUNST						
3	Corrected section number reference	8/5/2015	C. Dunst		46				
4	Simplify Front Control Cover + Adapter P/L	8/20/15	CD		62				
5	Corrected version ## of WK-5594	8/31/15	CD		61				
6	Corrected 14-pin connector 1K Ohm	2/4/16	CD						

Welcome to the SanRex Family Welding Team!

Dear Welding Professional,

We would like to take this opportunity to thank you, and congratulate you on procuring a SanRex SANMIG 400M DC MIG Welding Machine.

Welding Professional, now that is a term that we do not take lightly. The welding machine that you purchased is a full function, portable unit that was designed with the Welding Professional in mind. The unit is suitable for use as a portable welder on the job site, to a unit utilized in an industrial manufacturing setting. This unit will perform and is truly a welder for the Professional Welder. As you review this manual, you will be provided with information regarding the use and functionality of the unit. What you will not see is information or instruction on "how to weld", as this appropriately left to the vast array of Vocational, Trade and other institutions that provide instructional education in welding.

This manual also contains sections that are dedicated solely to the safety of you and others in the work area. It is highly recommended that this information be reviewed and that this manual be kept in a secure but accessible location for reference of these import safety and well-being notices. Remember, the number one requirement in performing any job is safety.

Sansha Electric of Osaka Japan and its "SanRex" brand name of products has specialized in the power supply and power semiconductor manufacturing business for over 80 years. With over 55 years producing welding power supplies and over 30 years producing inverter based welding and plasma cutting power supplies, you can be assured that you have purchased one of the best welding machines on the market today.

The superior Arc Characteristics that you will experience is achieved through our dedication and commitment to research and development as well as developing smart solutions for safe, reliable and environmentally friendly welding machines.

We value long term relationships with our customers and strive to provide the most cost effective solutions that support this philosophy.

We thank you for choosing SanRex equipment.

SanRex Family Welding Team

INTRODUCTION

PURPOSE OF THIS MANUAL

This manual has been prepared to present the safety, installation/operation and maintenance instructions for the SanRex SANMIG 400M, hereby referred to as 400M, a DC Stick, TIG and MIG welding machine manufactured by the Sansha Corporation of Osaka, Japan. The manual contains the information necessary for the Professional Welder to correctly use and operate the 400M. It is not the intent of this manual, and *does not*, instruct or offer information on how to weld.

This operation manual includes an introduction followed by detailed information sections.

The information in this operating manual is generic to this model line of the welding machine and must be supplemented with the application specific data, environment condition (location), electrical input connections, limitations, and principal safety standards.

SECTION 1 - SAFETY REGULATIONS AND REQUIREMENTS

This section contains the leading particulars and descriptions of the welding symbols, safety, warning instructions; additional symbols for a complete understanding and safe use of the equipment are also included.

SECTION 2 – INTRODUCTION AND DESCRIPTION

This section includes descriptions and features of the product, V-A curves and the block diagram of the product.

SECTION 3 - INSTALLATION RECOMMENDATIONS

Describing the transportation, working environment, electrical hook-up with consideration for grounding and high frequency interference. Also input power, connections and specifications.

SECTION 4 – OPERATOR CONTROLS, DIMENSIONS AND OUTLINE

Included in this section is a sequence of operation, welding process selection, 400M attributes and model features, plus torch switch receptacle specifications.

SECTION 5 - SEQUENCE OF OPERATION

This section describes the sequence to set-up the machine to perform STICK, TIG and HF-TIG welding operations.

SECTION 6 – VOLTAGE REDUCTION DEVICE (VRD)

This section includes information in the Voltage Reduction device that is built-in to the unit. This device lowers the Open Circuit Voltage in STICK welding. This function is useful in applications where a high OCV could be dangerous. The SANMIG 400M is shipped from the factory in the disabled state.

SECTION 7 - TROUBLESHOOTING

This section provides information on Power Source problems and Power Source Error Codes.

SECTION 8 - MAINTENANCE

This section describes basic maintenance for the welding power source.

SECTION 9 - SPARE PARTS

This section contains the basic schematic, exploded view and a listing of the spare parts and order numbers.

Table of Contents

SECTION 1- SAFETY REGULATIONS AND REQUIREMENTS

Please read this operating manual thoroughly before utilizing the equipment.
Wherever welding equipment is used, safety is always our concern.
PROTECT yourself and others.

1.0 SAFETY REGULATIONS AND REQUIREMENTS

Throughout this manual, notes, cautions, danger, attention and warnings are used to highlight important information. These highlights are categorized as follows:

1.1 NOTES, CAUTIONS AND WARNING ANNOTATIONS

NOTE: An operation, procedure, or background information which requires additional emphasis or is helpful in efficient operation of the system.

CAUTION: A procedure which, if not properly followed, may cause damage to the equipment.

WARNING: A procedure which, if not properly followed, may cause injury to the operator or others in the operating.

DANGER: Procedures, which if not properly followed, may lead to death or serious injury.

1.2 SAFETY RECOMMENDATIONS

For the purpose of safety, it is recommended that this welding equipment be installed, maintained, inspected, and repaired by appropriable qualified person or persons who are well familiarized with welding equipment.

As for safety training, it is recommended to avail yourselves of various seminars and qualifying examinations for welding engineers and welding technicians sponsored by the Welding Society, the Welding Engineering Society, and the headquarters or branch offices of societies or associations concerned.

For the purpose of safety, it is recommended that this welding equipment should be operated by persons who have enough knowledge and skill to understand all safety precautions and instructions in the Operating Manual and to be able handle the equipment safely.

After reading this Operating Manual, please store it carefully with guarantee where it will be made accessible to all personnel dealing with the equipment

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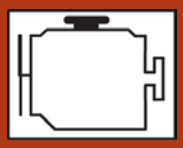
Please call your local distributors, business offices, or service agents if you have any questions

1.3 WELDING SYMBOLS

1.3.1 SAFETY SYMBOL LEGEND

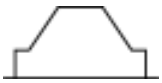
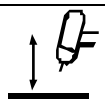
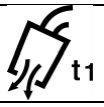
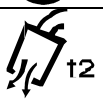
SYMBOL	SOURCE OF HAZARD	HAZARD	HOW TO AVOID
	Welding Electrode	Electric Shock	Don't weld on painted parts. Remove the surface coating before you begin welding. Keep your face away from the welding plume.
	Wiring	Electric Shock	Protect welding cables from sparks, hot metal, open flames, sharp edges, oil, and grease. Do not use cables with frayed, cracked or bare spots in the insulation. Learn all you can about safety. Your employer must provide safety training.
	Welding Arc	Arc Rays	Required protection varies with time of exposure, distance from source, and shielding used. Follow recommended procedures in AWS F2.1
	Engine Fuel	Fire	Develop adequate procedures, and use proper equipment to do the job safely. When required obtain a Hot-Work Permit (See NFPA 51B). If relocation is not possible, protect combustibles with fire resistant covers
	Welding Fumes and Gases	Fumes and Gases	Keep your head out of the fumes. Do not breathe the fumes. Use enough ventilation or exhaust at the arc, or both, to keep fumes and gases from your breathing zone and general area
	Welding Electrode and Wiring	Electric Shock	Read all instructions, labels, and installation manuals before installing, operating, or servicing the equipment. Train all personnel involved in welding operations to observe safe electrical work practices according to OSHA 1910.332. Do not touch live electrical parts.

SYMBOL	SOURCE OF HAZARD	HAZARD	HOW TO AVOID
	Chromium and Nickel Fumes	Welding Fumes	Do not breathe fumes and gases. Keep your head out of the fumes. Use enough ventilation or exhaust at the arc or both to keep fumes and gases from your breathing zone and general area
	Hazard Distances	Ultraviolet Radiation	Maintain proper distances from the arc ray. Review the “Safety and Health Fact Sheet No. 26” from the AWS for recommendations.
	Falling Objects	Falling Objects	Be certain that material being welded or cut is secured from falling. Do not permit loose objects near the edge of overhead structures
	Confined Space	Fire, Exposure to Hazardous Air Contaminants	Determine if special training or a permit is required to enter the space. Open all covers and secure them from closing. Test atmosphere for: (1) suitable oxygen content (2) combustibles or reactives (3) toxics
	Sparks, Radiation, Hot Metal, Slag, Heat	Electrical, Thermal	Wear a helmet with filter lens and cover plate that complies with ANSI Z87.1 for protection from radiant energy, flying sparks, and spatter. According to ANSI Z49.1 and OSHA 29 CFR 1910.252, "Helmets and hand shields shall protect the face, forehead, neck, and ears PPE
	Hot Metal, Slag, Arc Rays, Hot Work Piece	Thermal	Use approved helmets or hand shields that provide protection for the face, neck, and ears, and wear a head covering. Wear approved safety goggles or safety glasses with side shields, even under your helmet. Wear dry, hole-free insulating gloves.

SYMBOL	SOURCE OF HAZARD	HAZARD	HOW TO AVOID
	Optical Radiation and Arc Heat	Thermal	Establish a written policy documenting general safety requirements for the wearing of contact lenses. Conduct an eye hazard evaluation in the workplace
	Cuts, Scrapes, Heat, Flames, Molten Metal, Wet Gloves, Insulation Failure	Mechanical, Thermal, Electrical	Gloves should be: Dry and moisture resistant. In good condition, no holes or tears. Flame resistant. Electrically and thermally insulated to suit the process.
	Coating of Steel	Fumes and Gases	Obtain the Material Safety Data Sheets (MSDSs) for all materials used. Read and understand the specification for coating type and coating weights. Find out what hazardous materials are present or might be given off by the coating when it is exposed to the arc of high temperatures
	Reactive Force from Tools, Tool Jammed or Coming Loose	Mechanical	Wear proper head, eye and hand protection. Use face shields, safety glasses, and goggles as appropriate. Inspect tools before use. Never use a tool that is in poor or faulty condition. Keep all tools in good condition.
	Engine-Driven Generators, power source Equipment	Health Hazard	Reduce the intensity of the source. Shield the source where practical. Use engineering control methods, such as room acoustics, to control noise.
	Place Body Between Welding Electrode and Work Cables	Electric & Magnetic Fields	Do not place your body between the welding electrode and work cables. Route cables on the same side of your body. Route the welding cables close together. Secure them together with tape or cable ties.

SYMBOL	SOURCE OF HAZARD	HAZARD	HOW TO AVOID
	Any Coatings on Base Metal, Weld Process	Fumes and Gases	Keep your head out of the fumes. Do not breathe the fumes. Use enough ventilation or exhaust at the arc, or both, to keep fumes and gases from your breathing zone and general area
	Welding & Cutting	Toxic Fumes, Electric Shock	Be alert, aware, and focused on the job and the work area; notice any changing conditions. Wear and use only the correct, approved equipment for the specific job; be sure it is properly installed and used
	Welding or its Allied Processes	Pneumatic, Electrical, Gases, Liquid	Employers must develop a written lockout/tagout program and procedure. Employees must be trained in these procedures, as well as the purpose and methods of lockout/tagout.

1.3.2 GRAPHIC SYMBOL LEGEND

A	**Amperage**	V	**Voltage**
Hz	**Hertz (cycles per second)**	%	**Percentage**
SEC	**Seconds**	f	**Frequency**
—	**Negative**	+	**Positive**
⎓	**DC (Direct Current)**	∿	**AC (Alternating Current)**
	**Remote Control (Panel/Remote)**		**Remote Function**
VRD	**Voltage Reduction Device Circuit**		**Arc Control (SMAW)**
	**Standard Function**		**Protective Ground**
	**Slope Function**		**Slope W/Repeat Function**
	**Spot Function**		**Pulse Current Function**
	**STICK (Shielded Metal Arc SMAW)**		**Spot Time (GTAW)**
	**Touch Start (Lift Start TIG circuit GTAW)**		**Impulse Starting (High Frequency GTAW)**
	**Gas Input**		**Gas Output**
	**Gas Pre-Flow**		**Gas Post-Flow**

1.4 SAFETY PRECAUTIONS

ATTENTION

FOR PROPER USE, PLEASE READ THIS OPERATING MANUAL THOROUGHLY PRIOR TO UTILIZING THE WELDING MACHINE.

The safety precautions described in this Operating Manual will give you the information necessary for you to handle the equipment safely and prevent any hazard or damage to you or others.

Although this welding equipment is designed and manufactured taking into account all possible scenarios, be sure to observe the safety precautions in this Operating Manual when operating this welding equipment. Not doing so may cause harm to the operator or others, resulting in death or serious injury.

Improper use of the equipment may cause various levels damages. In this Operating Manual, such damages are classified into two ranks by combination of attention attracting symbols and signal for the purpose of warning indications. These attention attracting symbols and signal terms have the same meanings as those for warning labels on the equipment.

CAUTION

PROCEDURES, IF NOT PROPERLY FOLLOWED, MAY CAUSE A RISK TO OPERATORS RESULTING IN MEDIUM OR SLIGHT INJURY AND/ OR DAMAGE

Serious or light injury includes loss of sight, (high temperature and/or low temperature) burns, electric shock, bone fracture, and poisoning which may lead to hospitalization or long-term hospital stay for treatment. Further, medium and slight injury includes burns, and electric shock, which do not require hospitalization or long-term visit to hospital stays for treatment. Damage to objects denotes widespread damage to property or equipment.

DANGER

PROCEDURES NOT PROPERLY FOLLOWED, MAY LEAD TO DEATH OR SERIOUS INJURY.

1.5 SAFE OPERATION OF THE WELDER AND PERSONAL PROTECTION

1.5.1 IMPORTANT SAFETY PRECAUTIONS

To prevent serious injury to the operator or others, be sure to observe the following:

Never allow any unqualified person to enter the surrounding area of this welding equipment or the welding area inadvertently.

Perform any work of power source on the input side, select any location, handle and store and pipe high pressure gases, store work pieces welded, and treat wastes in accordance with legislations and/or regulations, and your company's standards.

Although this welding equipment is designed and manufactured taking into account safety adequately be sure to observe safety precautions in this Operating Manual when operating this welding equipment.
Not doing so may cause fatal injury to the operator or others, resulting in death or serious injury.

Perform any work of power source on the input side, select any location, handle and store and pipe high pressure gases, store work pieces welded, and treat wastes in accordance with legislations and/or regulations, and your company's standard.

Those who use heart pacemakers should not enter the surrounding area of this welding equipment in operation or the welding area without permission of the doctor.
Welding equipment during energizing produces a magnetic field in the surrounding area which adversely affects the operation of such pacemakers

For the purpose of safety, it is recommended that this welding equipment should be installed, maintained, inspected, and repaired by appropriately qualified personnel or persons who are well familiarized with welding equipment

For the purpose of safety, it is recommended that this welding equipment should be operated by persons who have enough knowledge and skill to understand all safety precautions and instructions in the Operating Manual and to handle the equipment safely.

Do not use this welding equipment for applications other than welding.

1.5.2 ELECTRIC SHOCK

To prevent electric shock, be sure to observe the following precaution:

Touching any parts that are electrically “live” or “hot” may cause fatal electric shock or burns.

Have a qualified electrician connect the Welding Power Source. Check the enclosure, base metal and jig that they are electrically connected in ordnance with local regulations. (Electrical Facilities Technical Standards)

Before installing, maintaining, or inspecting this welding equipment, leave the equipment for over 5 minutes after turning off power supply at the distribution panel switch.

Capacitors built-in may be electrically charged even after the power has been switched off.

Before performing works, make sure that no charging voltage should be applied to such parts.

Do not use cables which have insufficient capacity, are damaged, or in which any conductor is exposed.
Tighten cable connections securely and insulate properly.

Tighten cable connections securely and insulate it.

Do not operate with welding equipment with its cover or enclosure loose or removed

Do not wear damaged, torn or wet gloves. Always wear dry insulated gloves

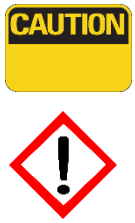
Use a lifeline harness when performing works at any high elevations.

Carry out maintenance and inspection periodically and use it after the repair of any and all damaged parts.

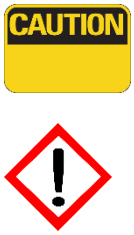
Turn off both the Mains ON/OFF switch on equipment and the distribution panel switch when not in use.

1.5.3 GASES AND FUMES

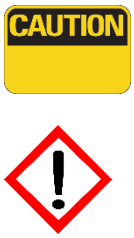
To protect you and others from fumes and gases produced during the welding processes, use safeguards.



Inhalation of gases and fumes produced during the welding processes can be dangerous and hazardous to your health.
Welding in confined spaces may cause oxygen deficiency, resulting in suffocation.

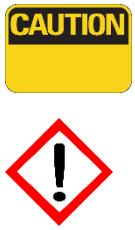


Never perform the welding work in the vicinity of degreasing, washing, and spraying operations. Doing so may cause harmful gases



To prevent gas poisoning or suffocation, use local ventilating facilities set forth in legislations or Regulations (Industrial Safety and Health Law and Ordinance on Prevention of Hazards Due to Dusts and/or Fumes) or wear a respirator.

When welding in confined spaces, ensure that the welding area is adequately ventilated, wear the respirator, and perform the welding work under



When welding a coated steel plate, ensure that the welding area is adequately ventilated or wear the respirator. Welding the coated steel plate may produce harmful fumes or gases.

1.5.4 FIRE AND EXPLOSIONS

To prevent fire, explosion, or rupture, be sure to observe the following precautions.

Spatter or hot base metals produced during and immediately after the welding processes may cause fire.

Poor connections of cables or defective contacts in any current path on the base metal such as steel frame may cause overheating due to conducting current, resulting in fire.

Explosion can be caused by the welding arc produced on containers that may have held combustibles such as gasoline.

Rupture can be caused by welding enclosed tanks or pipes.

Keep combustibles away from scattered spatter. Cover combustibles that cannot be removed with incombustible shields.

Do not weld in the vicinity of flammable gases.

Keep hot base metals immediately after the welding processes away from combustibles.

When welding ceiling, floor or wall, remove combustibles hidden adjacent to them.

Tighten cable connections securely and insulate them.

Connect work lead so that it is positioned as close to the part welded as possible.

Do not weld a gas pipe that may have held any gas or an enclosed tank or pipe

Have a fire extinguisher handy in the vicinity of the welding area in preparation for emergency.

1.5.5 ARC WELDING RAYS, NOISE AND SPATTER OR SLAG

To protect you and others from arc rays, scattered spatter or slag, and loud noise produced during the welding processes, use safeguards.

Arc rays can cause your eyes irritation and burn your skin.

Scattered spatter or slag will damage your eyes and cause burns.

Loud noise can cause hearing loss.

To perform or monitor welding works, wear an eye protector with filter lenses providing sufficient scale number, or a welding face shield.

To protect your eyes from spatter or slag, wear goggles.

Wear safeguards including gauntlet type of welding safety gloves, long-sleeved clothing, leggings and spats, and leather aprons, etc.

Prevent the gas cylinder from being exposed to welding arc generated from the welding torch.

To protect others' eyes from arc rays, place protective booths, screens, or shields around the work area.

Never touch the gas cylinder with the electrode.

In case when noise levels exceed safe levels, wear protective earplugs and/or earmuffs.

1.5.6 GAS CYLINDERS

To prevent the turnover of gas cylinder or the rupture of gas flow regulator, be sure to observe the following precautions.

Turnover of the gas cylinder may cause injury to the operator or others.

If gas cylinder containing a gas at high pressure is handled improperly, high pressure gas may flow out, causing injury to the operator or others.

Handle the gas cylinder according to legislations or regulations and your company's standards.

Use a gas flow regulator of the proper size and is suited for shielding gas type being used.

Read and follow all warnings, safety precautions, and instructions in Operating Manual which is supplied with the gas flow regulator prior to use.

Fix the gas cylinder on the special-purpose holder.

Gas cylinder shall not be exposed to high temperature.

Keep your face out of the gas cylinder outlet when opening the gas cylinder valve.

Be sure to attach a protective cap to the gas cylinder outlet when not in use.

Prevent the gas cylinder from being exposed to welding arc generated from the welding torch.

1.6 REFERENCE PUBLICATIONS

Refer to the following standards or their latest revisions for more information:

1. OSHA, SAFETY AND HEALTH STANDARDS, 29CFR 1910, obtainable from the Superintendent of Documents, U.S. Government Printing Office, 732 N. Capital St NW, Washington, D.C. 20402
2. ANSI Standard Z49.1, SAFETY IN WELDING AND CUTTING, updated 2010, obtainable from the American Welding Society, 8669 NW 36th Street, Miami, FL 33166-6672
3. NIOSH, SAFETY AND HEALTH IN ARC WELDING AND GAS WELDING AND CUTTING, obtainable from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402
4. ANSI Standard Z87.1, SAFE PRACTICES FOR OCCUPATION AND EDUCATIONAL EYE AND FACE PROTECTION, obtainable from American National Standards Institute, 25 West 43rd Street, Fourth Floor, New York, NY 10036
5. ANSI Standard Z41.1, STANDARD FOR MEN'S SAFETY-TOE FOOTWEAR, obtainable from the American National Standards Institute, 25 West 43rd Street, Fourth Floor, New York, NY 10018
6. ANSI Standard Z49.2, FIRE PREVENTION IN THE USE OF CUTTING AND WELDING PROCESSES, obtainable from American National Standards Institute, 25 West 43rd Street, Fourth Floor, New York, NY 10018
7. AWS Standard A6.0, WELDING AND CUTTING CONTAINERS WHICH HAVE HELD COMBUSTIBLES, obtainable from American Welding Society, 8669 NW 36th Street, Miami, FL 33166-6672
8. NFPA Standard 51, OXYGEN-FUEL GAS SYSTEMS FOR WELDING, CUTTING AND ALLIED PROCESSES, obtainable from the National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169
9. NFPA Standard 70, NATIONAL ELECTRICAL CODE, obtainable from the National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169
10. NFPA Standard 51B, CUTTING AND WELDING PROCESSES, obtainable from the National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169
11. CGA Pamphlet P-1, SAFE HANDLING OF COMPRESSED GASES IN CYLINDERS, obtainable from the Compressed Gas Association, 14501 George Carter Way, Suite 103, Chantilly, VA, 20151
12. CSA Standard W117.2, CODE FOR SAFETY IN WELDING AND CUTTING, obtainable from the Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3
13. NWSA booklet, WELDING SAFETY BIBLIOGRAPHY obtainable from the National Welding Supply Association, 1900 Arch Street, Philadelphia, PA 19103
14. American Welding Society Standard AWSF4.1, RECOMMENDED SAFE PRACTICES FOR THE PREPARATION FOR WELDING AND CUTTING OF CONTAINERS AND PIPING THAT HAVE HELD HAZARDOUS SUBSTANCES, obtainable from the American Welding Society, 8669 NW 36th Street, Miami, FL 33166-6672
15. ANSI Standard Z88.2, PRACTICE FOR RESPIRATORY PROTECTION, obtainable from American National Standards Institute, 25 West 43rd Street, Fourth Floor, New York, NY 10018

SECTION 2- INTRODUCTION AND DESCRIPTION

2.0 INTRODUCTION AND DESCRIPTION

2.1 GENERAL

This manual is intended to be a guide to understanding of the 400M welding machine and process requirements. The application outlined is typical and serves only to illustrate and explain the relationship of power source to the process. Selecting the correct power source depends upon process requirements.

This manual will concentrate only on safety and the operational aspects of the welding power source.

2.2 WELDING MACHINE DESCRIPTION

The SanRex model 400M is as an inverter based DC Power Source Unit. The unit can be powered from an external source of 208, 230 or 460 VAC, single or three phase power. The 400M is capable of providing Constant Current (CC) or Constant Voltage (CV) output characteristics and is equipped with separate digital Voltage and Amperage meters that are located on the front control panel as well as a lift arc starter for use with Gas Tungsten Arc Welding (GTAW), inductance control for Gas Metal Arc Welding (GMAW), and hot start for Shielded Metal Arc Welding (SMAW) processes. The 400M incorporates a high-performance microcomputer to achieve complete digital control. The 400M is designed with an impact resistant and non-conductive plastic case enclosure**.**

2.3 SANMIG 400M POWER SOURCE FEATURES

Digital Control

- All welding parameters are fully adjustable.

Touch Panel Switches

- Touch switch eliminates mechanical damage.

Flip-Up Control Cover

- Protects front panel controls from damage.

Digital Volt & Ammeter

- Displays selected weld parameter value.
- Displays average weld current when welding.
- Displays average weld current for 20 seconds after weld has been completed.
- A selected weld parameter value can be adjusted at any time even while welding.

Intelligent Fan Control

- The intelligent cooling system is designed to reduce dust and foreign material build-up, while providing optimum cooling.
- Fan speed reduces approximately 30 seconds after machine is turned on.
- Fan speed increases when internal components reaches operating temperature.

ON/OFF Switch

- Mains ON/OFF switch located on rear panel.

Voltage Reduction Device (VRD)

- VRD fully complies with IEC 60974-1.
- VRD light is ON and operational when in STICK mode.

Control Knob

- For the selected weld parameter, rotating the knob clockwise increases the parameter.
- Rotating the knob counter-clockwise decreases the parameter.
- A selected weld parameter value can be adjusted at any time even while welding.
- Pressing the Control Knob while welding will display the arc voltage.

Self-Diagnostic Error Codes

- An error code is displayed on the *Digital Meter* when a problem occurs with Mains supply voltage or internal component problems.

Save/Load of Welding Programs

A total number of 5 welding programs can be saved into the 400M memory.

***SAVEing* the Current Weld Parameters into Memory**

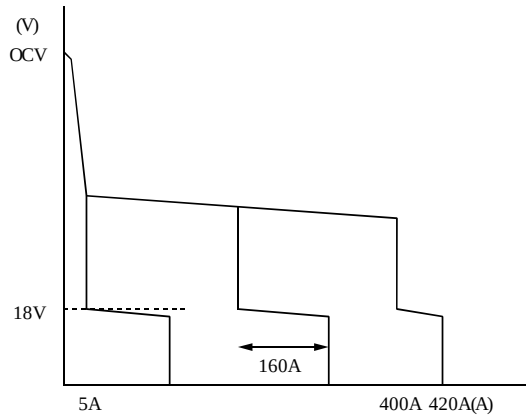
- Press the ***SAVE*** button.
- Select one of the five (ie. 1 thru 5) memory location by rotating the control knob. Numbers 1 thru 5 will be displayed on the meter as the control knob is turned.
- After selecting the desired memory location (ie 1 to 5), press the parameter button, the machine sound a beep to confirm the weld parameters from the control panel are saved.

***LOADing* (retrieving) a Prior SAVEd Program to the Control Panel**

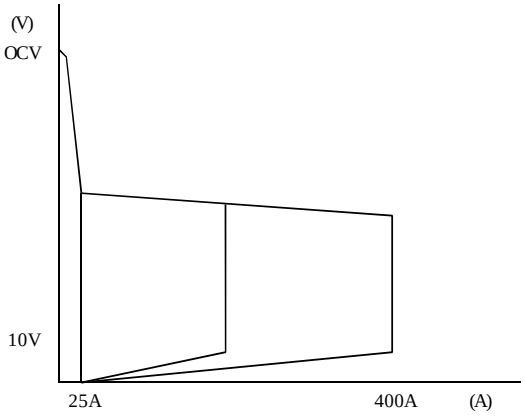
- Press the ***LOAD*** button.
- Select one of the five (ie. 1 thru 5) memory location by rotating the control knob. Numbers 1 thru 5 will be displayed on the meter as the control knob is turned.
- After selecting the desired memory location (ie 1 to 5), press the parameter button, the machine sound a beep to confirm the weld parameters are loaded onto the control panel.

2.4 WELDING OUTPUT VOLTAGE AND AMPERAGE CURVES

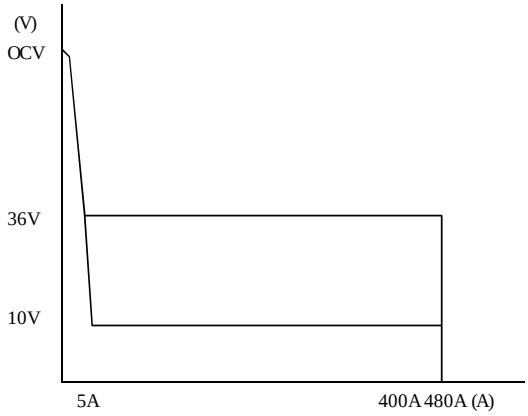
The waveforms shown in figure 2.1 are the maximum Voltage-Amperage output capabilities of the 400M. Curves for actual welding setting will fall within the curves shown.



STICK PROCESS



LIFT-TIG PROCESS



MIG PROCESS

FIGURE 2.1 : 400M Voltage-Ampere Curves

NOTE:

Volt-Ampere curves show the maximum Voltage and Amperage output capabilities of the welding power source. Curves of other settings will fall between the curves shown.

2.5 FUNCTIONAL BLOCK DIAGRAM

Figure 2.5 shows the functional block diagram of the 400M.

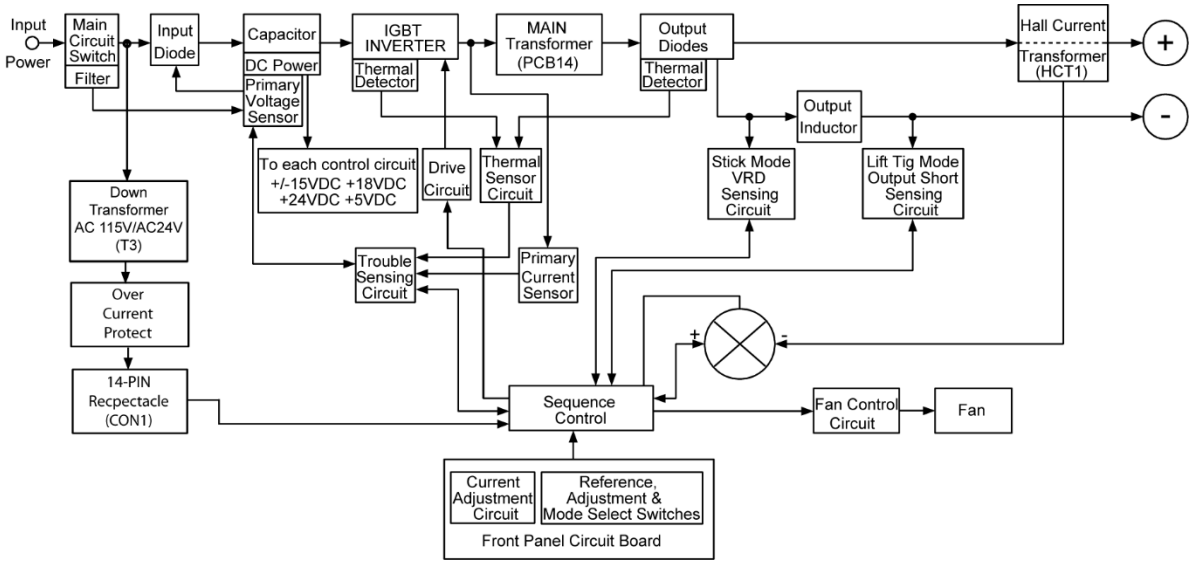


FIGURE 2.5 : 400M Functional Block Diagram

3.0 INSTALLATION RECOMMENDATIONS

3.1 TRANSPORTATION METHODS

The case design of the 400M incorporates a built-in handle for carrying purposes. The case design also allows for the units to be stacked where the feet on one unit aligns with the notches on the top of another unit.

WARNING:

ELECTRIC SHOCK can kill. DO NOT TOUCH live electrical parts. Disconnect input power conductors from de-energized supply lines before moving the welding power source.

WARNING:

If stacking units, DO NOT stack units more than two units high. Stacked units must be supported in an appropriate way such that the units can not fall and cause damage.

WARNING:

FALLING EQUIPMENT can cause serious personal injury and equipment damage.

- Always lift the unit utilizing the handle on top of case.
- Use handcart or similar device of adequate capacity when transporting
- If using a fork lift vehicle, place and secure unit on a proper skid before transporting.

3.2 ENVIRONMENT

The 400M is designed for use in adverse environments with an IP23S rating.

Examples of environments with increased adverse conditions are -

- With its small, lightweight and portable form factor, the 400M is ideal for use in locations in which freedom of movement is restricted, so that the operator is forced to perform work in cramped (kneeling, sitting or lying) positions.
- The external case is constructed of non-conductive ABS plastic for use in locations which are fully or partially limited by conductive elements, and in which there is a high risk of unavoidable or accidental contact by the operator, or
- In wet or damp hot locations where humidity or perspiration considerably reduces the skin resistance of the human body and the insulation properties of accessories.

Environments with adverse conditions do not include places where electrically conductive parts are in the near vicinity of the operator, which can cause increased hazard, have been insulated.

3.3 MACHINE GROUNDING & HIGH FREQUENCY INTERFERENCE

3.3.1 GROUNDING

The welder must be properly grounded. Check the local codes and the National Electric Code (NEC) book for proper grounding regulation.

3.3.2 HIGH FREQUENCY INTRODUCTION

The 400M unit is an inverter power source that produce many high frequency signals that may cause other equipment to perform adversely. The importance of correct installation of the unit, and other high frequency welding equipment cannot be over-emphasized. Interference due to high frequency starting or even in a stabilized arc is almost invariably traced to improper installation. The following information is intended as a guide for personnel installing high frequency welding machines.

WARNING:

Explosives:

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

WARNING:

Computers:

It is also possible that operation close to computer installations may cause computer malfunction.

3.3.3 HIGH FREQUENCY INTERFERENCE

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

Direct Radiation

Radiation from the machine can occur if the unit is not properly grounded. The shielding of the high frequency unit in the Power Source will prevent direct radiation if the equipment is properly grounded.

Remedy: Keep the input power lines as short as possible. Enclose excessive lengths in rigid metal conduit or equivalent shielding. The metal conduit should have a good common ground to the welder ground.

Transmission via the Supply Lead

Without adequate shielding and filtering, high frequency energy may be fed back into the wiring within the installation (mains) by direct coupling. The energy is then transmitted by both radiation and conduction.

Remedy: Keep the work and torch leads as short as possible and as close together as possible.

Radiation from Welding Leads

Radiated interference from welding leads, although pronounced in the vicinity of the leads, diminishes rapidly with distance.

Remedy: Keeping leads as short as possible will minimize this type of interference. Looping and suspending of leads should be avoided where possible when welding to avoid producing additional interference.

Re-radiation from Unearthed Metallic Objects

A major factor contributing to interference is re-radiation from unearthed metallic objects close to the welding leads.

Remedy: Effective grounding of such objects will prevent re-radiation in most cases.

3.4 LOCATION

The location of the 400M should be in accordance to the following guidelines:

- In areas, free from moisture and dust.
- In areas, free from oil, steam and corrosive gases.
- In areas, not exposed to direct sunlight or rain.
- Ambient temperature between 0 degrees C to 40 degrees C.
- In areas, not subjected to abnormal vibration or shock.
- Place at a distance of 12" (304.79mm) or more from walls or similar that could restrict natural airflow for cooling.

3.5 ELECTRICAL INPUT CONNECTIONS & REQUIREMENTS

The 400M welding power source operates from a single or three-phase 50/60 Hz, AC power supply. The input voltage must match one of the electrical input voltages shown on the input data label on the unit nameplate. Contact the local electric utility for information about the type of electrical service available, how proper connections should be made, and any inspection required.

3.5.1 INPUT POWER

The 400M incorporates an INRUSH circuit and input voltage sensing circuit. When the MAIN CIRCUIT SWITCH is turned on, the inrush circuit provides a pre-charging of the input capacitors. SCR's in the Power Control Assembly (PCA) will turn on after the input capacitors have charged to full operating voltage (approximately 5 seconds).

NOTE:

Damage to the PCA could occur if 575VAC or higher is applied.

The following 208-230/460V Primary Current recommendations are required to obtain the maximum welding current and duty cycle from this welding equipment:

<table>
<tr><th rowspan="2">Model</th><th rowspan="2">Primary Supply Lead Size</th><th colspan="2" rowspan="2">Minimum Primary Current Circuit Size (Vin/Amps)</th><th colspan="3">Current & Duty Cycle</th></tr>
<tr><th>MIG</th><th>TIG</th><th>STICK</th></tr>
<tr><td rowspan="12">SANMIG 400M</td><td rowspan="9">8/4 AWG minimum (Factory Fitted)</td><td rowspan="9">3 ϕ</td><td>208/63</td><td rowspan="3">400A @ 25%</td><td>-</td><td>-</td></tr>
<tr><td>230/57</td><td>-</td><td>-</td></tr>
<tr><td>460/29</td><td>-</td><td>-</td></tr>
<tr><td>208/49</td><td>-</td><td rowspan="3">400A @ 25%</td><td>-</td></tr>
<tr><td>230/44</td><td>-</td><td>-</td></tr>
<tr><td>460/22</td><td>-</td><td>-</td></tr>
<tr><td>208/67</td><td>-</td><td>-</td><td rowspan="3">400A @ 25%</td></tr>
<tr><td>230/61</td><td>-</td><td>-</td></tr>
<tr><td>460/31</td><td>-</td><td>-</td></tr>
<tr><td rowspan="6">8/3 AWG minimum</td><td rowspan="6">1 ϕ</td><td>208/88</td><td rowspan="2">300A @ 25%</td><td>-</td><td>-</td></tr>
<tr><td>230/79</td><td>-</td><td>-</td></tr>
<tr><td>208/67</td><td>-</td><td rowspan="2">300A @ 25%</td><td>-</td></tr>
<tr><td>230/60</td><td>-</td><td>-</td></tr>
<tr><td>208/97</td><td>-</td><td>-</td><td rowspan="2">300A @ 25%</td></tr>
<tr><td>230/87</td><td>-</td><td>-</td></tr>
</table>

Table 3-1. 208-230/460V Primary Current Circuit sizes to achieve maximum current

The 400M is designed for use with a generator as an input power source. As a general rule, depending on the type of generator used, the minimum generator capacity should be twice the maximum rating of the welder.

3.5.2 FUSING

The 400M is equipped with an input switch and does not have and input circuit breaker for protection. It is the responsibility of the user to provide proper fuse protection for the welding power source. Failure to do so will void the warranty. The installer should reference the table above to select a suitable fuse for the input voltage of the installation location.

NOTE:

Maximum fuse size should be such that the fuse value not be more than 200 percent of the rated input amperage of the welding power source.
(Based on Article 630, National Electrical Code).

3.5.3 ELECTRICAL INPUT CONNECTIONS

- DO NOT TOUCH live electrical parts.
- SHUT DOWN welding power source, disconnect input power employing lockout/tagging procedures. Lockout/tagging procedures consist of padlocking line disconnect switch in open position, removing fuses from fuse box, or shutting off and red-tagging circuit breaker or other disconnecting device.

WARNING:

ELECTRIC SHOCK can kill; a SIGNIFICANT DC VOLTAGE is present after removal of input power until the internal components have time to discharge.

A line disconnect switch provides a safe and convenient means to completely remove all electrical power from the welding power supply whenever necessary to inspect or service the unit.

NOTE:

These units are equipped with a three-conductor with earth power cable that is connected at the welding power source end for single and three phase electrical input power. For Single-Phase operation connect the GREEN, BLACK and WHITE input conductors. Insulate the RED conductor, it is not used for single-phase operation. The welding power source will not operate properly if the BLACK or WHITE wire is exchanged for the RED wire in single-phase operation.

Do not connect an input (WHITE or BLACK or RED) conductor to the ground terminal.

Do not connect the ground (GREEN) conductor to an input line terminal.

Refer to figure 3-1 and:

1. Connect end of ground (GREEN) conductor to a suitable ground. Use a grounding method that complies with all applicable electrical codes.
2. Connect the other lines as follows:
   a. For three-phase input connections: Connect the ends of line 1 (BLACK) and line 2 (WHITE) and line 3 (RED) input conductors to a de-energized line disconnect switch.
   b. For single-phase input connections: Connect the ends of line 1 (BLACK) and line 2 (WHITE) input conductors to a de-energized line disconnect switch. Insulate the end of line 3 (RED) conductor, as it is not used for single-phase operation.
3. Use Table 3-1 and section 3.5.2 as a guide to select proper line fuses for the disconnect switch.

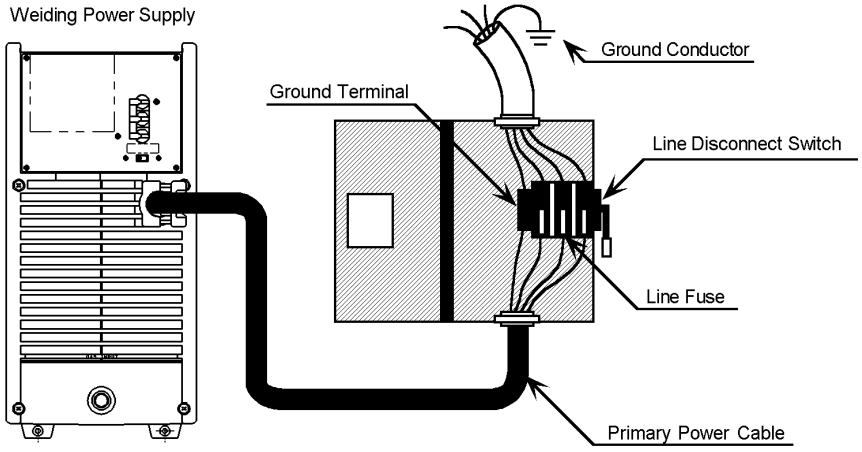


Figure 3-1. Electrical Input Connections

3.6 SPECIFICATIONS 400M

3.6.1 INPUT/OUTPUT

PARAMETERS		SANMIG 400M			
MODEL		ID-4000C-U1E			
DESCRIPTION		DC ARC WELDER : MIG (STEEL / STAINLESS), DC STICK, LIFT TIG			
RATED OUTPUT		400A @ 36V, 25% DUTY CYCLE (STICK)			
WELDING MODE		Input Power	25% Duty Cycle	60% Duty Cycle	100% Duty Cycle
OUTPUT Current/Voltage	**TIG**	208-230/460 3Ø	400A @ 34V	300A @ 29V	200A @ 24V
		230 1Ø	300A @ 29V	190A @ 24V	150A @ 22V
	STICK	208-230/460 3Ø	400A @ 36V	300A @ 32V	200A @ 28V
		230 1Ø	300A @ 32V	190A @ 28V	150A @ 26V
	MIG	208-230/460 3Ø	400A @ 26V	300A @ 22V	200A @ 18V
		230 1Ø	300A @ 22V	190A @ 18V	150A @ 16V
OPEN CIRCUIT VOLTAGE		Approx. 65V at AC230V/460V input Approximately 18V with low OCV circuitry enabled			
OUTPUT RANGE					
Volts		10-36V	MIG		
Amperes		5-400A	STICK/TIG		

INPUT/OUTPUT at RATED OUTPUT	Three-Phase		Single-Phase		
	Voltage	Current	Voltage	Current	
RATED INPUT VOLTAGE/CURRENT	208	67	208	97	
	230	61	230	87	
	460	31	N/A	N/A	
OUTPUT AMPERES	400		300		
OUTPUT VOLTS	36		32		Input at No Load
KVA	24		20		0.5
KW	18		12		0.13

INPUT	
Input Voltage	208 - 230/460VAC 3-Phase, 208-230VAC 1-Phase
Line Frequency	50 / 60 Hz
Line Volts Compensation	+/-10%
Input Cable	AWG 8/4 SOOW, approximately 10 feet long

SanRex continuously strives to produce the best product possible and therefore reserves the right to change, improve or revise the specifications or design of this or any product without prior notice. Such updates or changes do not entitle the buyer of equipment previously sold or shipped to the corresponding changes, updates, improvements or replacement of such items.

The values specified in the table above are optimal values, your values may differ. Individual equipment may differ from the above specifications due to in part, but not exclusively, to any one or more of the following; variations or changes in manufactured components, installation location and conditions and local power grid supply conditions.

3.6.2 GENERAL

Model	ID-4000C-U1E		
General			
Approval/Standard	IEC60974-1, IP23S		
Language	English		
Front Panel			
Control Encoder	Welding Current / Welding Voltage / Parameters Adjustment		
Function Select Button	Process	STICK / LIFT TIG / MIG (STEEL/STAINLESS)	
	Parameter	STICK : Hot / Weld Current / Arc Control	
		MIG : Weld Voltage / Inductance Control	
	Control	A/V Panel-Remote Contactor On-Off	
Save / Load Button	Save / Load	Ch1 – Ch5	
Digital Panel Meter Indicator	Amperage/Parameter/Error Code		
	* Holds weld value for 8sec after weld current has stopped. Value stops displaying if control encoder is rotated.		
LED Indicator	Selected Function and Parameter		
	RED	HOT START, WELD(A), WELD(V), A, V	
		A/V REMOTE	
		ARC CONTROL, INDUCTANCE, %	
		STICK, LIFT TIG, MIG, CONTACTOR ON	
		VRD DISABLED*	
	GREEN	VRD ENABLED*	
	* Both VRD light off in MIG and TIG modes		
Output Terminal Plug	DINSE style		
Remote Control	14 pin connector for wire feeder with automation controls		
Rear Panel			
ON/OFF Switch	Switch : 3Ø		
230/460VAC Selector	Switch : Slide		
24VAC Circuit Breaker	Push button resettable (for remote device)		
115 VAC Circuit Breaker	Push button resettable (for remote device)		
Size			
Width	8.26 in. (210 mm)		
Height	17.12 in. (420 mm)		
Depth	17.71 in. (450 mm)		
Weight (Shipping)	56 lbs. (25kg)		
Case Material	Plastic		
Attachment	Terminal plug : 2 pcs		
	Operation Manual :1 pcs		

3.7 DUTY CYCLE

The duty cycle of a welding power source is the percentage of a ten (10) minute period that it can be operated at a given output without causing overheating and damage to the unit. If the welding amperes decrease, the duty cycle increases. If the welding amperes are increased beyond the rated output, the duty cycle will decrease.

WARNING:

Exceeding the duty cycle ratings will cause the thermal overload protection circuit to become energized and shut down the output until the unit has cooled to normal operating temperature.

Continually exceeding the duty cycle ratings can cause damage to the welding power source and will void the manufactures warranty.

4.0 OPERATOR CONTROLS, DIMENSIONS & OUTLINE

4.1 DIMENSIONS AND OUTLINE

The figure below shows the dimensions and the outline of the 400M.

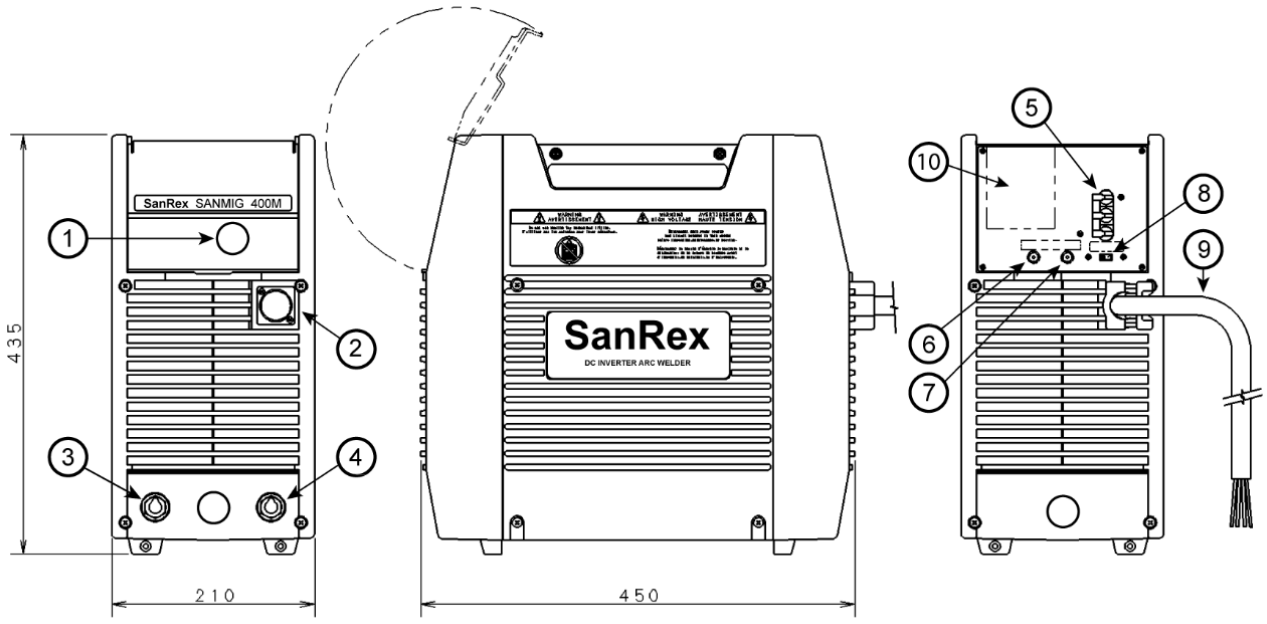


FIGURE 4-1 : 400M Dimensions and Controls

4.2 OPERATOR CONTROLS, LOCATION AND FUNCTIONALITY

Refer to the figure above for the corresponding reference numbers.

1. Control Knob

This knob is used to change the value of the selected weld parameter, rotate it clockwise to increase the selected weld parameter and counter clockwise to decrease the value. The value is indicated on the digital meter. Pushing the knob in previews the actual welding voltage while welding.

2. 14-PIN Remote Control Receptacle

The 14 pin Remote Control Receptacle is used to connect a remote current control devices to the welding Power Source. To make the connection, align the keyway, insert plug, and rotate threaded collar fully clockwise. See separate section for details description of the 14-PIN Remote Control Receptacle.

3. Positive Output Terminal

Welding current flows from the Power Source via heavy duty DINSE type terminal. It is essential, however, that the male plug is inserted and turned securely to achieve a sound electrical connection. A loose or worn connection will cause excessive heat and may cause damage to the front frame.

4. Negative Output Terminal

Welding current flows from the Power Source via heavy duty DINSE type terminal. It is essential, however, that the male plug is inserted and turned securely to achieve a sound electrical connection. A loose or worn connection will cause excessive heat and may cause damage to the front frame.

Loose welding terminal connections can cause overheating and result in the male plug being fused in the bayonet terminal and /or melting of the housing (case).

6. ON/OFF Switch

This switch connects the Primary supply voltage to the inverter when in the ON position. This enables the Power Supply.

WARNING:

When the welder is connected to the Primary supply voltage, the internal electrical components maybe at 500V potential with respect to earth.

6. 24VAC Remote Device C/B

Controls the 24VAC power source for the wire feeders controlled through the 14-PIN Remote Control Socket. A green pin protruding from the circuit breaker indicated that the circuit breaker has tripped. Push the green pin inward to reset the circuit after determining the cause of the short circuit.

7. 115VAC Remote Device C/B

Controls the 115VAC power source for the wire feeders controlled through the 14-PIN Remote Control Sockets. Push the green pin inward to reset the circuit after determining the cause of the short circuit.

8. Voltage Input Select Switch

This manual slide, user selectable switch selects the proper AC input voltage range. If this slide switch is not set to the position that matches the input line voltage, the internal microcontroller will inhibit the welding power source from turning on and will display an error code on the front control display panel.

WARNING:

Do not alter the position of the Voltage Input Select Switch when the ON/OFF switch is in the ON position and the unit is powered up.

---

9. Input Cable

The input cable connects the Primary supply voltage to the equipment.

10. Manufactures Identification Data Plate

The Manufacturers Identification Data Plate label is located on the rear panel, upper left hand side. The layout of the data plate is based on IEC standard 60974-1 and indicates model type, manufacturer, serial number, load voltage, rated output amperage, duty cycle percentage, primary input voltage, input amperage and open circuit voltage. The Data Plate is also where you will find the serial number of the unit. This number is required when requesting spare parts and for all warranty work claims.

NOTE:

Due to variations that can occur in manufactured products, claimed performance, voltages, ratings, all capacities, 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.

4.3 14-PIN REMOTE CONTROL RECEPTACLE

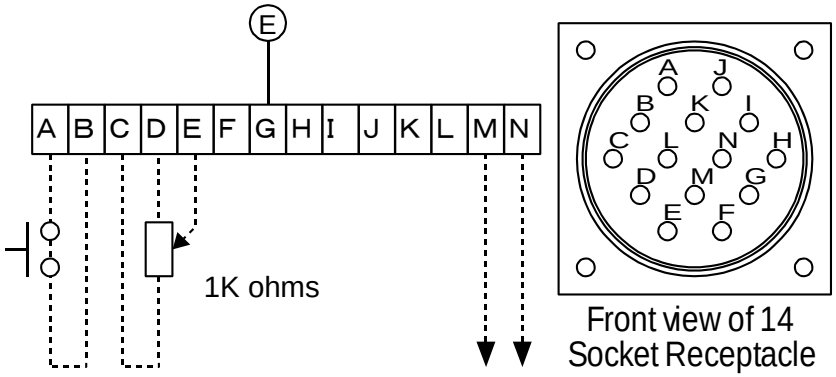


FIGURE 4-2 : 14-PIN Remote Control Receptacle Layout.

Socket Pin	Function
A	24VAC Auxiliary Voltage high side.
B	Torch Switch Input. To energize weld current, connect pins A & B.
C	+10VDC. 1k ohm (maximum). Connection to 1k ohm remote control potentiometer.
D	Zero ohm (minimum). Connection to 1k ohm remote control potentiometer.
E	Wiper arm connection to 1k ohm remote control potentiometer.
F	Current Feedback Signal, Ifb. 100Amps = 1 Volt.
G	24/115 VAC circuit common. Internally connected to chassis ground.
H	Voltage Feedback Signal, Vfb. 10 Arc Volts = 1 Volt.
I	115VAC Auxiliary Voltage high side.
J	Torch Switch Input. To energize weld current, connect pins I & J.
K	Chassis Ground
L	Not used
M	OK-to-Move (current detect signal, dry contact closure to pin N)
N	OK-to-Move (current detect signal, dry contact closure to pin M)

Table 4-1 : 14-PIN Remote Control Receptacle Pin-Out Description.

NOTE:

The 14-Pin Remote Control Contactor has the capability to operate by shorting pin set A-B or pin set I-J.

4.4 PARAMETER DISPLAY PANEL

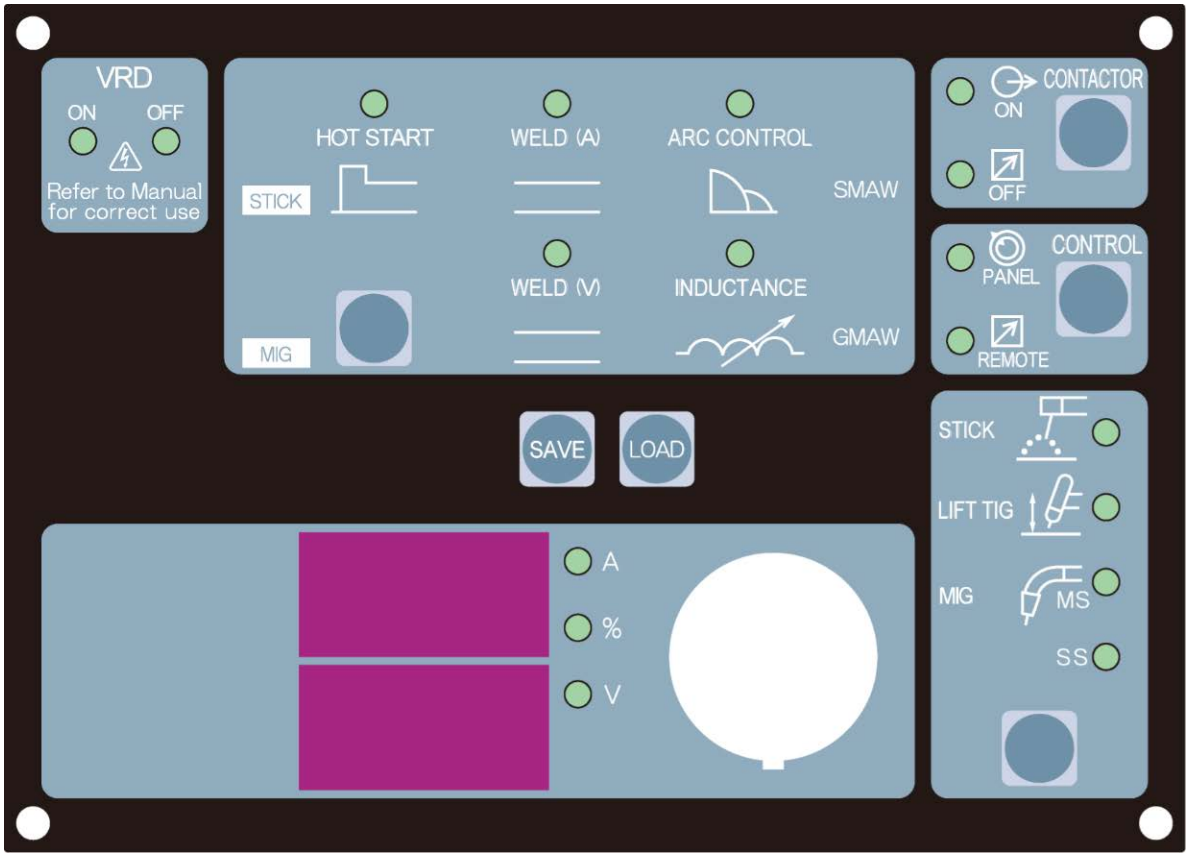
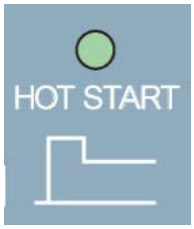
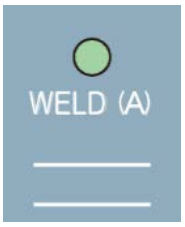
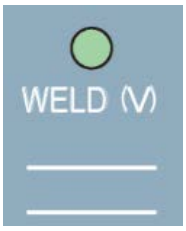


FIGURE 4-3 : 400M Front Panel

4.5 PARAMETER DESCRIPTION

Parameter	USED IN	Description
	STICK	This parameter selectable in STICK weld mode and is used to improve the arc-starting characteristics for stick electrodes (e.g. low hydrogen electrodes). When lit, turning the parameter knob allows the setting of a peak start current that rides above the WELD (A) current at arc-start.
	STICK LIFT TIG	This parameter is selectable when either the STICK or LIFT TIG weld mode is selected. When lit, turning the parameter knob allows the setting of the weld current, WELD (A).
	STICK	This parameter selectable in STICK weld mode is sometimes referred to as “Arc Force” or “Dig” and provides a suitable short circuit current in STICK welding to help prevent electrode sticking and increase arc stability. When lit, turning the parameter knob allows for a percentage setting (%) of Arc Control. A low percentage will provide a soft arc with low spatter and low penetration while a high percentage will provide a hard arc and deep penetration.
	MIG	This parameter is selectable when in the MIG MS (Mild Steel) or MIG SS (Stainless Steel) weld mode is selected. When lit, turning the parameter knob allows the setting of the weld voltage, WELD (V).
	MIG	This parameter is selectable when in the MIG MS (Mild Steel) or MIG SS (Stainless Steel) weld mode is selected and is similar to the ARC CONTROL in STICK mode When lit, turning the parameter knob allows for a percentage setting (%) of inductance which allows for the adjustment of the dynamic property of the arc. A low percentage will provide an arc with fast response, crisp arc noise and coarse spatter while a high percentage will provide an arc with slow response resulting in a soft arc and fine spatter. As the inductance is increased the output voltage may need to be adjusted to achieve the desired weld characteristics.

4.6 PARAMETER SELECTION

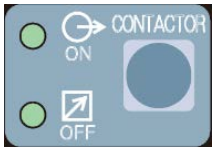
The Table below provides information of the parameters that are available for modification using the front panel display. The table also provides information on the ranges available for each parameter as well as to which weld process the parameter is available.

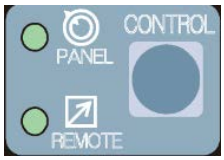
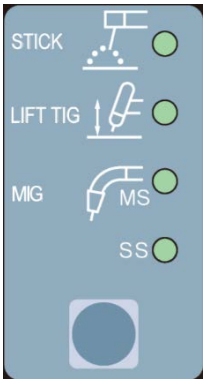
				Process		
PARAMETER	RANGE	Default *1	Units	STK	LFT	MIG
WELD VOLTAGE	10.0 TO 36.0V	17V	0.1V	NO	NO	YES
INDUCTANCE	0 to 100%	10%	1%	NO	NO	YES
WELD CURRENT	5 to 400A	80A	1A	YES	YES	NO
HOT START CURRENT	0 to 70A	20A	1A	YES	NO	NO
ARC CONTROL	0 to 100% per 160A	10%, 16A	1A	YES	NO	NO

Table 4-2 : 400M Welding Parameters

*1 : The values listed in the "Default" column are the "Factory Default Settings". Once these are changed, the last setting(s) before the unit is turned off will remain in memory for the next turn on. These NEW settings will become the new default setting. The user must manually adjust the setting to the values in the above chart to return to the "Factory Default Settings".

4.7 FUNCTION DESCRIPTION

FUNCTION	DESCRIPTION
	**CONTACTOR : ON/OFF(Remote)** Pressing the *CONTACTOR* button will toggle the output contactor between *ON* and *OFF(Remote).* ***ON*** : • When the LED is lit, the output contactor is enabled and welding Current/Voltage is present at the output terminals. ***OFF*** : • When the LED is lit, the output contactor is disabled and welding Current/Voltage in not available at the output terminals. • This setting is used when a remote device is used to enable the output contactor on demand. Once the remote device enables the output contactor, the ON LED will light until the remote device disables the output contactor. Once the output contactor is disabled, the ON LED will distinguish and the OFF LED will once again light.

FUNCTION	DESCRIPTION
	**CONTROL : PANEL/REMOTE** Pressing the *CONTROL* button will toggle the control of the output Current/Voltage between *PANEL* control and *REMOTE* device control. ***PANEL*** : • When the LED is lit, the Current/Voltage output of the welder is determined by the setting of the front panel display. ***REMOTE*** : • When the LED is lit, the Current/Voltage output of the welder is determined by the setting of the remote device. The maximum allowable Current/Voltage that the remote device will provide is determined by the maximum output of the machine settings.
	**WELD MODE SELECTION** Pressing the weld mode selection button will toggle thru the welding modes available on the 400M. ***STICK*** : • Select this mode when STICK (SMAW) welding. ***LIFT TIG*** : • Select this mode when TIG (GTAW) welding. ***MIG MS***: • Select this mode when MIG (GMAW) welding mild steels. ***MIG SS***: • Select this mode when MIG (GMAW) welding stainless steels.

FUNCTION	DESCRIPTION
	**VOLTAGE REDUCTION DEVICE (VRD) INDICATOR** This indicator is for displaying the operation status of the VRD. The VRD circuitry only operates in the STICK (SMAW) welding mode and is not adjustable from the front panel. ***ON***: • VRD Operating. • When the green ON LED is lit, the VRD is operating which corresponds with a reduction of the Open Circuit Voltage (OCV) present at the weld output terminals. • The ON LED will go out and the OFF LED will light when a welding arc is established. The ON LED will once again light when the welding arc has extinguished. ***OFF***: • When the VRD is off or disabled, the red OFF LED will light. There is no reduction of the OCV when the OFF LED is lit. • If the user has enabled the VRD circuitry, the OFF LED will light when a welding arc is established. See the separate section in this manual for a complete explanation of VRD operation.
  Parameter Button location (reference)	**SAVE/LOAD** The SAVE/LOAD buttons are used to save and retrieve a total number of 5 programs into memory. ***SAVE* the Current Weld Parameters into Memory :** • Press the *SAVE* button. • Select a memory location by rotating the control knob. Numbers 1 thru 5 can be selected on the meter display. • After selecting the desired memory location (i.e. 1 to 5), press the parameter button and the machine will give an audible beep to confirm the weld parameters from the control panel are saved. ***LOAD* (retrieve) a saved Program to Control Panel :** • Press the *LOAD* button. • Select a previously saved memory location by rotating the control knob. Numbers 1 thru 5 can be selected on the meter display. • After selecting the desired memory location (i.e. 1 to 5), press the parameter button and the machine will give an audible beep to confirm the weld parameters are loaded onto the control panel.

5.0 SEQUENCE OF OPERATION

NOTE: The parameter button is used to select the parameters to be set. The LED's shows which function can being adjusted.

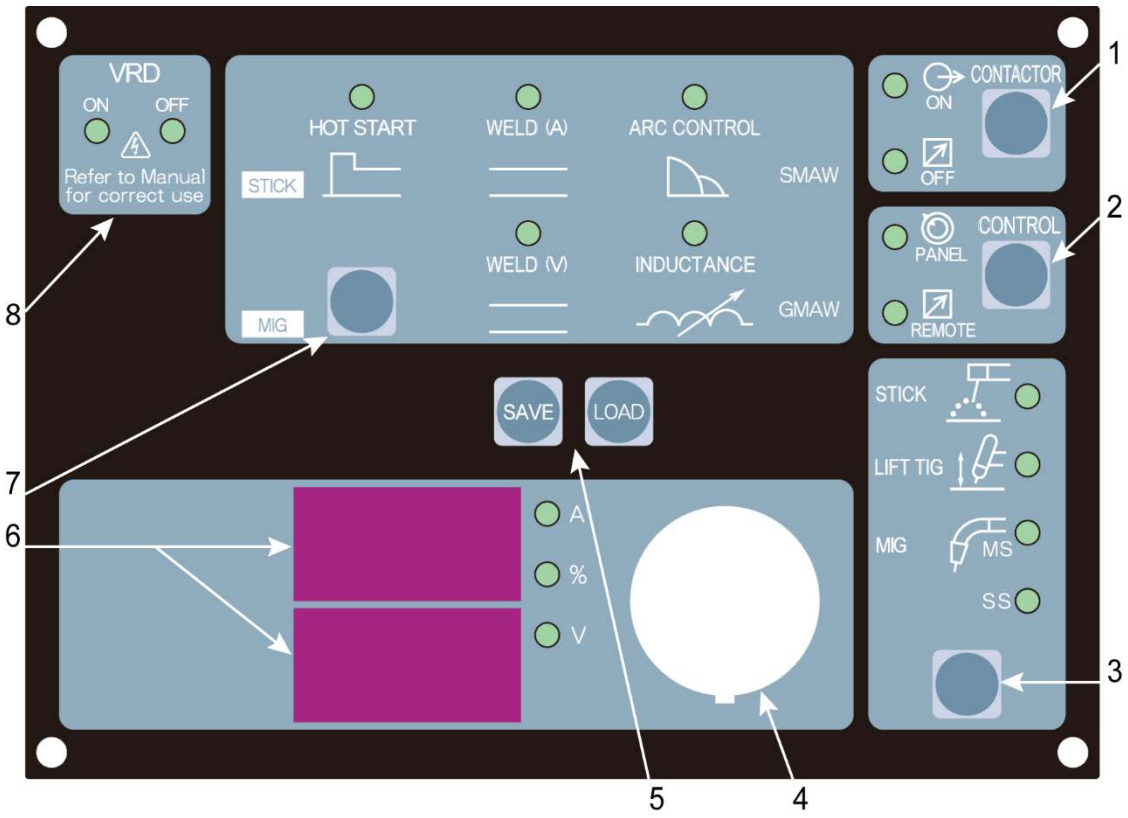


Figure 5-1 : 400M Front Panel

1. CONTACTOR: Pressing this button enables Contactor functions.
2. REMOTE FUNCTION: Pressing this button enables remote current and/or Contactor functions.
3. Process Button – This button selects between STICK, LIFT TIG, and MIG modes. MIG modes include MS for mild steel and SS for stainless steel. Save/Load Buttons
4. Control knob – Allows the operator to adjust the output amperage/voltage within the entire range of the power source, also used to set each parameter value.
5. SAVE and LOAD: By using the SAVE and LOAD buttons, the user can easily save up to 5 welding parameter programs.
6. Digital LED displays – Welding amperage, Voltage and parameter values are displayed in these windows. Internal warnings such as over temperature, low or high input voltage applied, are signaled to the operator by a warning sound and error message on the display.

7. Parameter Button. – This button select between HOT START, WELD CURRENT, and ARC CONTROL while in STICK and Lift TIG modes and selects between WELD VOLTAGE and INDUCTANCE CONTROL while in MIG mode. This button is also used in conjunction with the Save/Load buttons to save and load welding programs.
8. VRD (Voltage Reduction Device) – Operates in STICK mode only. Displays the status of the Voltage Reduction Device (VRD). When the VRD is off or disabled, the red OFF LED will light. Similarly, the when the green ON LED is lit, the VRD is operating which corresponds with a reduction of the Open Circuit Voltage (OCV) present at the weld output terminals. The 400M is shipped from the factory with the VRD in the disabled mode. See the separate section in this manual for a complete explanation of VRD operation.

5.1 STICK WELDING

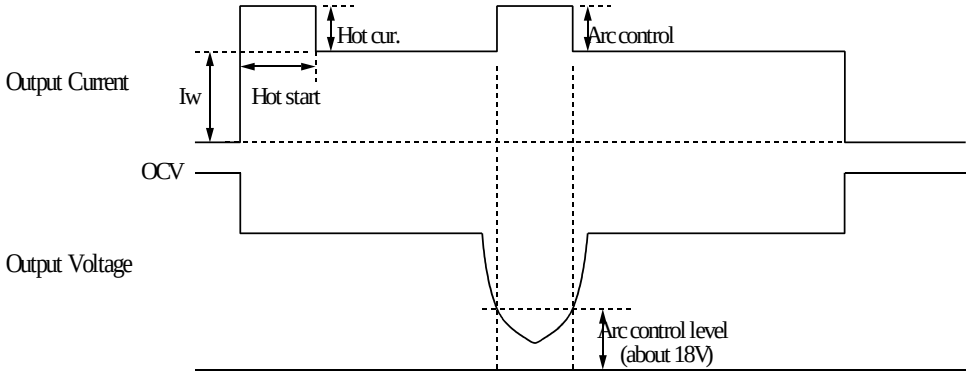
- Connect work lead to negative terminal.
- Connect electrode lead to positive terminal.
- Connect remote control device if required.
- Switch machine on.

Use the Parameter Buttons to move to the parameter to be set. The LED will show which function is being adjusted. Use the control knob to adjust each parameter.

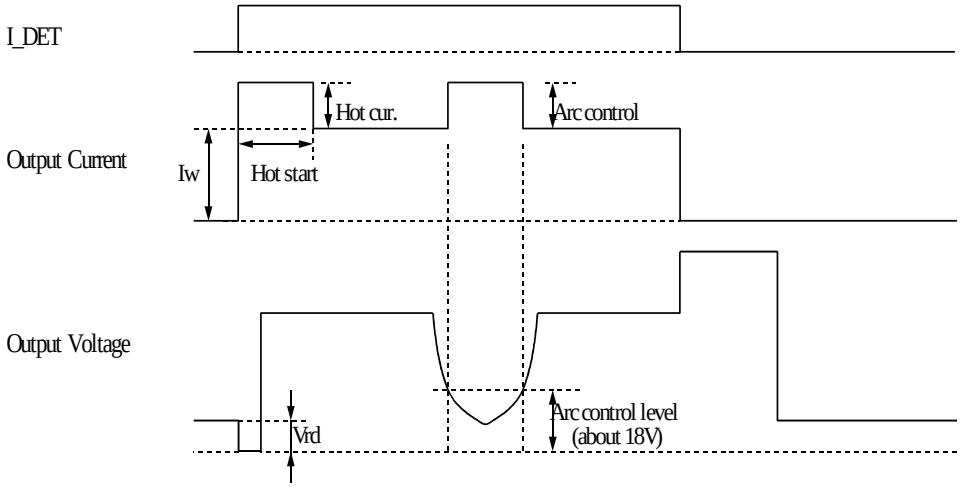
- Select *STICK* welding mode.
- Set *HOT START*.
- Set *ARC CONTROL*.
- Set *WELD* current.
- Set *CONTROL* to
  PANEL: Used when no remote device is used, *or*,
  REMOTE: Used when a remote device is used.
- Set *CONTACTOR* to
  ON: Used when no remote device is used, *or*,
  OFF: Used when a remote device is used.

  Commence welding.

5.1.1 STICK SEQUENCE WITH VOLTAGE REDUCTION DEVICE DISABLED



5.1.2 STICK SEQUENCE WITH VOLTAGE REDUCTION DEVICE ENABLED



*** The VRD function can be enabled with a switch located on a PCB**
Units are shipped with the VRD function DISABLED

5.2 LIFT TIG Welding

- Connect work lead to positive terminal.
- Connect TIG torch to negative terminal.
- Connect remote control device if required.
- Switch machine on.

Use the Parameter Buttons to move to the parameter to be set. The LED will show which function is being adjusted. Use the control knob to adjust each parameter.

- Select *LIFT TIG* welding mode.
- Set *WELD* current.
- Set *CONTROL* to
  PANEL: Used when no remote device is used, *or,*
  REMOTE: Used when a remote device is used.
- Set *CONTACTOR* to
  ON: Used when no remote device is used, *or,*
  OFF: Used when a remote device is used.

  Commence welding.

5.3 MIG Welding

- Connect work lead to negative terminal.
- Connect external Wire-Feeder to positive terminal.
- Switch machine on.

Use the Parameter Buttons to move to the parameter to be set. The LED will show which function is being adjusted. Use the control knob to adjust each parameter.

- Select *MIG MS* for mild steel or *MIG SS* for stainless steel.
- Set *WELD* voltage.
- Set *INDUCTANCE.*
- Set wire feed speed (IPM) on external Wire-Feeder.
- Set *CONTROL* to
  PANEL: Used when no remote device is used, *or,*
  REMOTE: Used when a remote device is used.
- Set *CONTACTOR* to
  ON: Used when no remote device is used, *or,*
  OFF: Used when a remote device is used.

  Commence welding

SECTION 6 – VOLTAGE REDUCTION DEVICE

6.0 VOLTAGE REDUCTION DEVICE (VRD)

The 400M is equipped with a Voltage Reduction Device circuit that when enabled lowers the Open Circuit Voltage (OCV) in STICK mode. This function is used in applications where a high OCV in STICK mode is dangerous or applications where a lower OCV would be advantageous. The 400M is shipped from the factory with the VRD in the disabled mode. To utilize the VRD, the user must enable the VRD function.

6.1 VRD SPECIFICATIONS

Description	SANMIG 400M	Notes
VRD Open Circuit Voltage	15.3 to 19.8V	Open circuit voltage between welding terminals.
VRD Resistance	148 to 193 ohms	The required resistance between welding terminals to turn ON the welding power.
VRD Turn OFF Time	0.2 to 0.3 seconds	The time taken to turn OFF the welding power once the welding current has stopped.

6.2 SWITCHING VRD ON/OFF

Switch the machine OFF.

a) Remove the clear plastic cover from the control panel (see Figure 6-1).

- Lift up the cover so it rests on the top of the unit.
- Place a small flat bladed screw driver between the cover hinge on the front panel.
- Gently lift the cover hinge out of the front cover mounting hole.
- Remove the control's clear plastic cover.

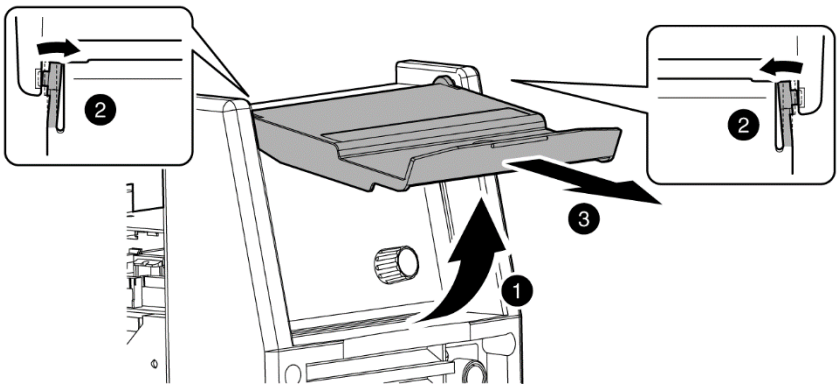


Figure 6-1 : VRD ON/OFF Step A

Remove four mounting screws from the control panel (see Figure 6-2).

b) Access the VRD control by gently prying back the front panel controls to reveal the VRD on/off potentiometer (see Figure 6-2).

Do not pull back the front panel with excessive force as this may unplug the control PCB. Plugging the control PCB back into the front panel controls can only be achieved by removing the side covers.

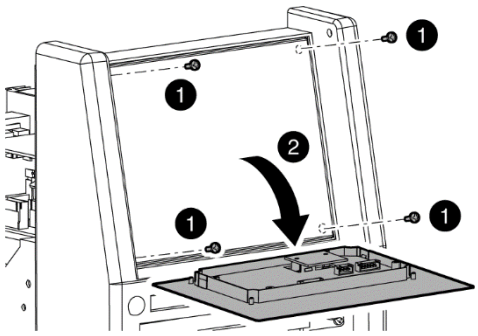


Figure 6-2 : VRD ON/OFF Step B, C

WARNING:

The VRD ON/OFF trim potentiometer MUST ONLY be positioned fully clockwise OR fully counter clockwise as the VRD function will be unknown for every other position.

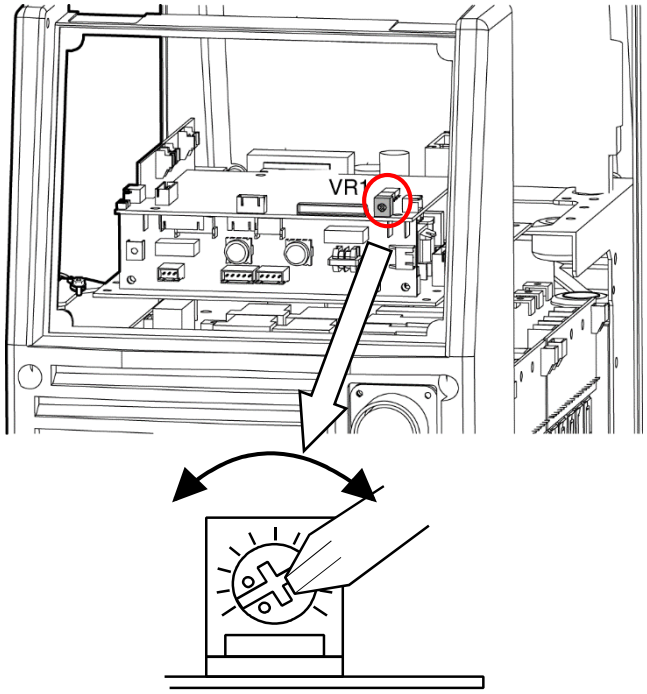


Figure 6-3 : VRD ON/OFF Step D

c) Turning the VRD ON/OFF (see Figure 6-3).

- To turn VRD ON: rotate the trim potentiometer (VR1) on the display PCB fully clockwise. When VRD is turned ON check that it operates as per VRD Specifications.
- To turn VRD OFF: rotate the trim potentiometer (VR1) on the display PCB fully counter-clockwise.

7.0 TROUBLE SHOOTING

7.1 POWER SOURCE PROBLEMS

Description		Possible Cause		Remedy	
1	The welding arc cannot be established.	A	The Primary supply voltage has not been switched ON.	A	Switch ON the Primary supply voltage.
		B	The Welding Power Source switch is switched OFF.	B	Switch ON the Welding Power Source.
		C	Loose connections internally.	C	Have an Accredited Service Agent repair the connection
2	Maximum output welding current cannot be achieved with nominal Mains supply voltage.		Defective control circuit.		Have an Accredited Service Agent repair the connection
3	Welding current reduces when welding.	A	Loose welding cable connections.	A	Tighten all welding cable connections.
		B	Incorrect welding cable size.	B	Use proper size and type of cable.
		C	Improper input connections.	C	Refer Electrical Input Connections & Requirements section.
		D	Poor electrode condition.	D	Replace electrode.
		E	Wrong welding polarity.	E	Verify output torch connections.

7.2 POWER SOURCE ERROR CODES

Description		Possible Cause		Remedy		Remarks
1.	E01 error code displayed Temperature sensor TH1 (protects IGBTs) is greater than 80ºC for about 1 second	**A.**	The Welding Power Source's duty cycle has been exceeded.	**A.**	Let Power Source cool down then keep within its duty cycle.	Weld current ceases. Buzzer sounds constantly. Fan operates at max speed. E01 resets when TH1 decreases to 70ºC for about 30 seconds.
		B.	Fan ceases to operate.	**B.**	Have an Accredited SanRex Service Agent investigate	
		C.	Air flow is restricted by vents being blocked	**C.**	Unblock vents then let Power Source cool down.	
2.	E02 error code displayed Temperature sensor TH2 (protects secondary diodes) is greater than 80ºC for about 1 second	**A.**	The Welding Power Source's duty cycle has been exceeded.	**A.**	Let Power Source cool down then keep within its duty cycle.	Weld current ceases. Buzzer sounds constantly. Fan operates at max speed. E02 resets when TH1 decreases to 70ºC for about 30 seconds.
		B.	Fan ceases to operate.	**B.**	Have an Accredited SanRex Service Agent investigate	
		C.	Air flow is restricted by vents being blocked	**C.**	Unblock vents then let Power Source cool down.	
3.	E03 error code displayed Primary (input) current too high	**A.**	Primary current is too high because welding arc is too	**A.**	Reduce length of welding arc.	Weld current ceases. Buzzer sounds constantly. Switch machine off, wait 3 seconds, and then switch on to reset E03 error.
		B.	Mains supply voltage is more than 10% below nominal voltage	**B.**	Have an Accredited SanRex Service Agent or a qualified electrician check for low Mains voltage.	
4.	E04 error code displayed Output voltage exceeds the secondary voltage specification		TIG torch cable and/or work lead are too long or leads are coiled.		Reduce the length of the TIG torch cable and/or work lead or un-coiled leads.	Weld current ceases. Buzzer sounds constantly. Switch machine off, wait 3 seconds, and then switch on to reset E04 error.

	Description		Possible Cause		Remedy	Remarks
5.	E11 error code displayed Over Primary supply (input) voltage at primary capacitors is exceeded for one second		Primary supply voltage is greater than the nominal voltage plus 10%		Have an Accredited SanRex Service Agent or a qualified electrician check the Primary voltage.	Weld current ceases. Buzzer sounds constantly. Error code E11 automatically will reset when the voltage reduces.
6.	E14 error code displayed Under mains supply (input) voltage warning primary capacitors is reduced for one second		Mains supply voltage is less than the nominal operating voltage less 10%.		Have an Accredited SanRex Service Agent or a qualified electrician check the Mains voltage.	Weld current available. Buzzer sounds intermittently. Error code E14 will automatically reset when the voltage increases.
7.	E12 error code displayed Under mains supply (input) voltage primary capacitors is reduced for one second		Mains supply voltage is down to a dangerously low level.		Have an Accredited SanRex Service Agent or a qualified electrician check the Mains voltage	Weld current ceases. Buzzer sounds constantly. Error code E12 will automatically reset when the voltage reduces.
8.	E81 error code displayed Wrong Primary supply (input) voltage connected		When 3 phase machine is first turned on with the wrong Primary supply (input) voltage connected		Have an Accredited SanRex Service Agent or a qualified electrician check the Mains voltage	No weld current is available. Buzzer sounds constantly. Switch machine off.
9.	E82 error code displayed Link switch plug not connected		Link switch plug not connected		Have an Accredited SanRex Service Agent check connector plug on input PCB	No weld current is available. Buzzer sounds constantly. Switch machine off.

Description		Possible Cause		Remedy		Remarks
10.	E83 error code displayed CPU checks mains supply (input) voltage when the on/off switch on rear panel of machine is turned ON.		The Primary supply (input) voltage fluctuates and is not stable.		Have an Accredited SanRex Service Agent check connector plug on input PCB and the Mains voltage	No weld current is available. Buzzer sounds constantly. Switch machine off, wait 3 seconds, and then switch on to reset E83 error.
11.	E85 error code displayed Pre-charge abnormality		Due to a malfunction inside the Welding Power Source, the primary capacitors are not charging		Have an Accredited SanRex Service Agent service the machine	No weld current is available. Buzzer sounds constantly. Switch machine off, wait 3 seconds, and then switch on to reset E85 error.
12.	E93 error code displayed Memory chip (EEPROM) on control PCB can not read/write weld parameters		Memory chip (EEPROM) error		Have an Accredited SanRex Service Agent check the control PCB	Weld current ceases. Buzzer sounds constantly. Switch machine off.
13.	E94 error code displayed Temperature sensor TH1 for IGBTs or sensor TH2 for secondary diodes are open circuit		The Welding Power Source's temperature sensors have malfunctioned.		Have an Accredited SanRex Service Agent check or replace the temperature sensors.	Weld current ceases. Buzzer sounds constantly. Switch machine off.
14.	E99 error code displayed Mains supply (input) voltage has been turned off but control circuit has power from the primary capacitors	A. B.	Main on/off switch on machine has been turned off Mains supply (input) voltage has been turned off	A. B.	Turn on/off switch on. Have an Accredited SanRex Service Agent or a qualified electrician check the Mains voltage and fuses	Weld current ceases. Buzzer sounds constantly. Switch machine off, wait 3 seconds, and then switch on to reset E99 error.

8.0 ROUTINE MAINTENANCE

Routine inspection and testing (power source)

An inspection of the power source, an insulation resistance test and an earth resistance test should be carried out

a) For transportable equipment, at least once every 3 months; and

b) For fixed equipment, at least once every 12 months.

The owners of the equipment shall keep a suitable record of the periodic tests.

The only routine maintenance required for the power supply is a thorough cleaning and inspection, with the frequency depending on the usage and the operating environment.

WARNING:

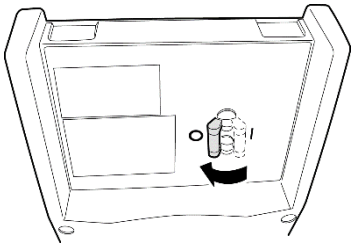
Disconnect Primary power at the source before opening the enclosure. Wait at least two minutes before opening the enclosure to allow the primary capacitors to discharge

To clean the unit, open the enclosure (please refer to Section 8.1, Opening The Enclosure) and use a vacuum cleaner to remove any accumulated dirt and dust. The unit should also be wiped clean, if necessary; with solvents that are recommended for cleaning electrical apparatus.

Do not blow air into the power supply during cleaning. Blowing air into the unit can cause metal particles to interfere with sensitive electrical components and cause damage to the unit.

8.1 OPENING THE ENCLOSURE

1) Confirm that the switch of power supply and the switch on switchboard (distribution panel) are all OFF.



CAUTION

The capacitors inside the power supply will slowly discharged after you turn off the switch of the power supply or the switch at the breaker box (distribution panel). Wait at least 5 minutes for the discharge to complete.

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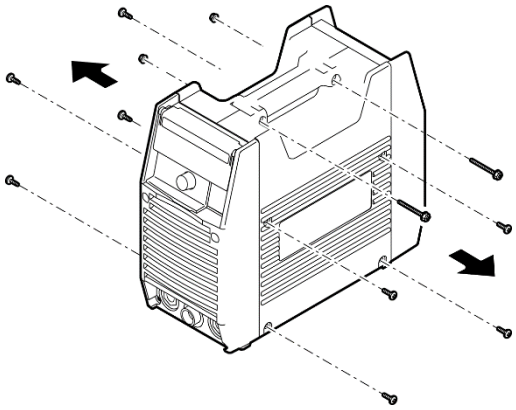
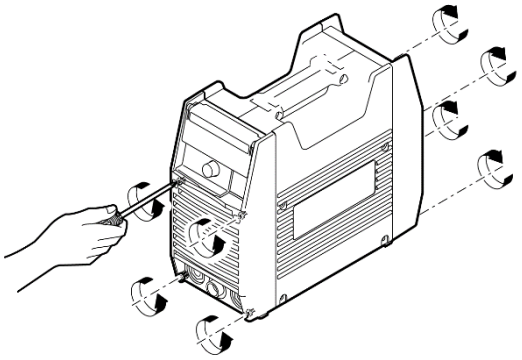
2) Remove all screws and nuts on the side covers.



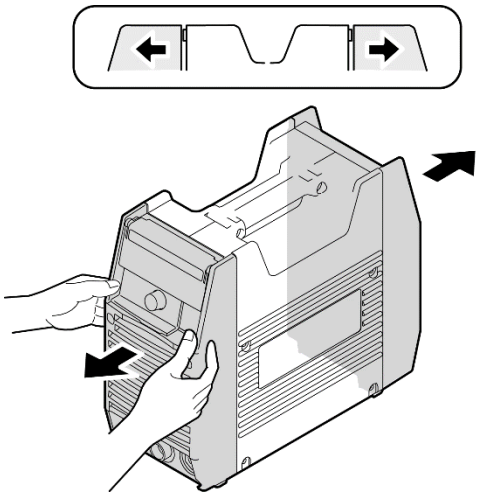
3) Loosen the screws on the front panel and the rear panel by turning them approximately two turns CCW.



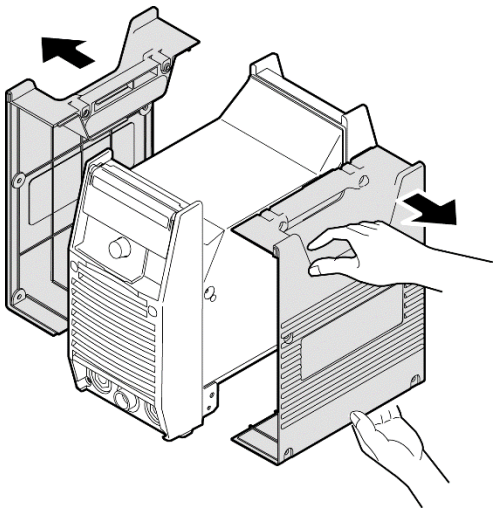
NOTE:

DO NOT remove the screws completely.

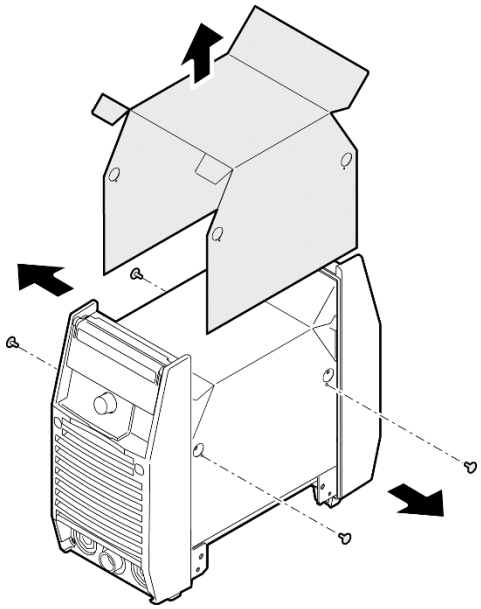
4) Pull the front panel slightly forward and pull the rear panel slightly backward.
The interlocking hooks of the side case covers can now be disengaged from the front and rear panels



5) Remove the side covers.



6) Remove protection cover sheet by removing the plastic tabs.



NOTE:

When you re-assemble the parts, conduct the above process backwards.

9.0 PARTS LIST 400M

DESCRIPTION	TYPE & RATING	QTY	INTERCONNECT DIAGRAM REFERENCE	EXPLODED VIEW REFERENCE # - Sheet	ORDER NUMBER
Remote Socket	N/MS3102A20-27S(NIC) 14PIN (with Wiring Assembly)	1	CON1	1-1	U0A910900
Current Trans	F2A503001 CT 1:40	2	CT2-3	3-2	F2A503001
Diode	DFA100BA160R	1	D1	4-2	450A30160
Diode	DBA200UA60R	4	D2,4,5,7	5-2	4583A0060
Fan	109E5724H507 DC 24V 16.8W (with wiring assembly)	1	FAN1	6-1	U0A912300
Inductor	F3A285202 STICK/MIG FCH	1	FCH1	7-2	F3A285202
Current Sensor	HC-TN200V4B15M 200A/4V	1	HCT1	8-2	11251009300
Reactor	GP-7	1	L1	9-2	479531341
Molded Case Circuit Breaker	TBC5071-0110820 1P 125V 2.5AT	1	MCB1	10-1	25720001000
Molded Case Circuit Breaker	TBC5071-2011420 1P 125V 10AT	1	MCB2	11-1	25720001100
Printed Circuit Board	WK-5493 U05 MAIN CAPACITOR (or WK-5493)	1	PCB1	12-2	PZZA0549305 (P0A549300)
Printed Circuit Board	WK-5597 U09 LINK (or WK-5597)	1	PCB2	13-2	PZZA0559709 (P0A559700)
Printed Circuit Board	WK-5548 U13 DC CONTROL VOLTAGE (or WK-5548)	1	PCB3	14-2	PZZA0554813 (P0A554800)
Printed Circuit Board	WK-4819 U12 DETECT	1	PCB4	15-2	P0A481912

DESCRIPTION	TYPE & RATING	QTY	INTERCONNECT DIAGRAM REFERENCE	EXPLODED VIEW REFERENCE # - Sheet	ORDER NUMBER
Printed Circuit Board	WK-5696 U03 CONNECT (or WK-5696)	1	PCB5	16-2	PZZA0569603 (P0A569600)
Printed Circuit Board	WK-5688 U06 MIG CTRL (400M) (or WK-5688 U03)	1	PCB6	17-2	P0A568806 (P0A568803-NY2)
Printed Circuit Board	WK-5689 U03 FILTER (or WK-5689)	1	PCB7	18-2	PZZA0568903 (P0A568900)
Printed Circuit Board	WK-5479 U07 (U01) GATE KIT (with IGBT, IGBT Spring Clip, Silicon Rubber Sheet)	2	PCB8-11	19-2	U0A835900
Printed Circuit Board	WK-5527 U15 RoHS MIG PANEL (or WK-5527 U24)	1	PCB12	20-1	P0A552715 (P0A552724)
Printed Circuit Board	WK-5528 U03 ENCODER (or WK-5528)	1	PCB13	21-1	PZZA0552803 (P0A552800)
Printed Circuit Board	WK-5594 U09 TRANSFORMER (or WK-5594 U08)	1	PCB14	22-2	PZZA0559409 (P0A559408)
Printed Circuit Board	WK-5606 U03 DIODE SNUBBER (or WK-5606)	1	PCB15	23-2	PZZA0560603 (P0A560600)
Printed Circuit Board	WK-4917 U15 AC INPUT FILTER (or WK-4917 U12)	1	PCB16	24-1	PZZA0491715 (P0A491712)
Printed Circuit Board	WK-5699 U03 14-PIN CONNECT (or WK-5699)	1	PCB17	25-2	PZZA0569903 (P0A569900)
Printed Circuit Board	WK-5499 U07 MIG FILTER (or WK-5499 U03)	1	PCB18	26-2	PZZA0549907 (P0A549903)

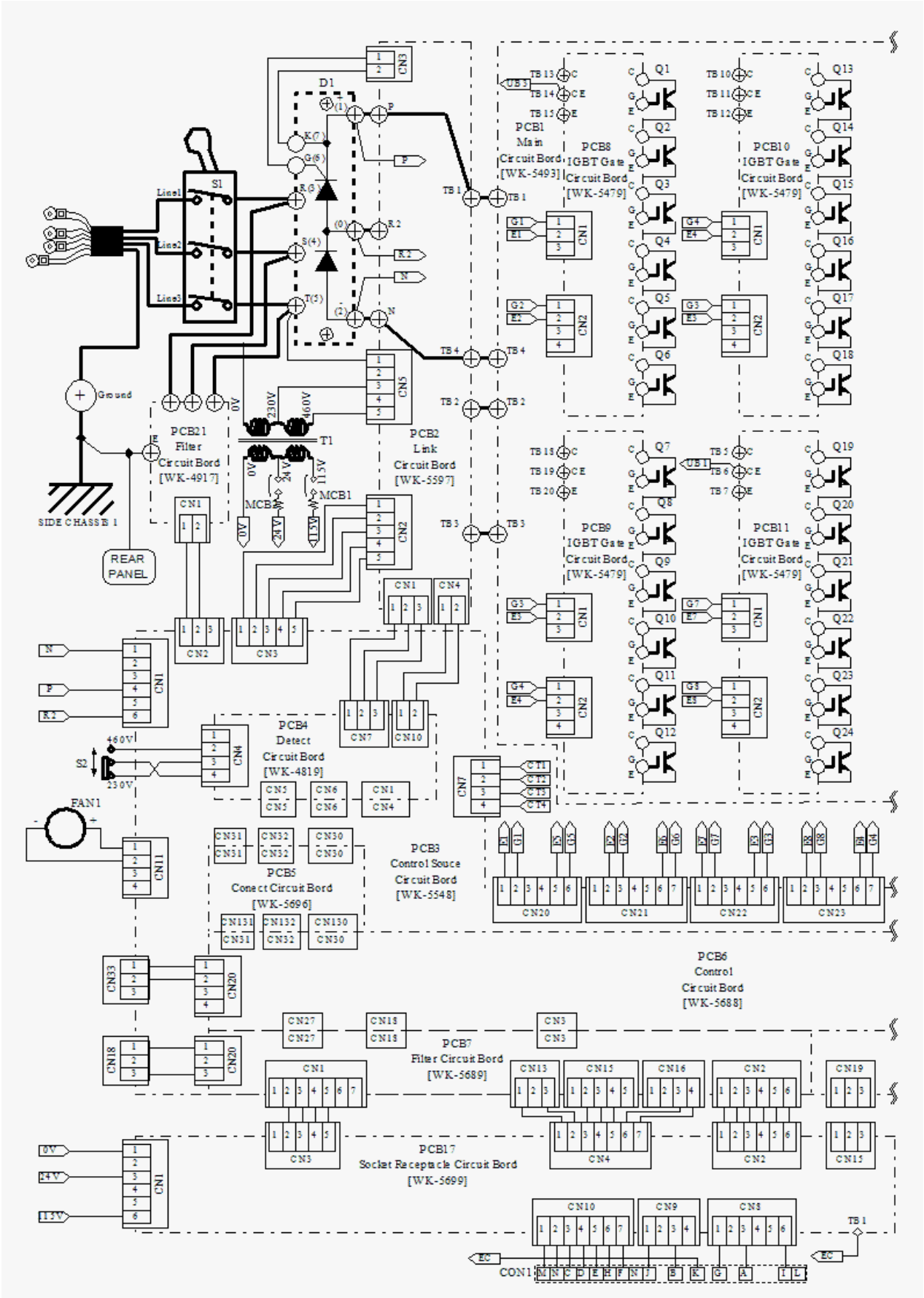
DESCRIPTION	TYPE & RATING	QTY	INTERCONNECT DIAGRAM REFERENCE	EXPLODED VIEW REFERENCE # - Sheet	ORDER NUMBER
Resistor	MHS20A151JI 150Ω 20W	2	R2-3	27-2	40322117900
Switch (AC Input)	DCP-103SR100C-480V 3P-480V	1	S1	28-1	25850003700
Switch (AC Input Select)	SDKGA4-A-1-A SLIDE SWITCH 250V 5A DPDT	1	S2	29-1	24704531400
Transformer	F3A216701Ω	1	T1	31-2	F3A216701
Thermistor	PTP-46F-S1 (with Wiring Assembly)	1	TH1	32-2	U1A145900
Thermistor	PTP-46F-S1 (with Wiring Assembly)	1	TH2	88-2	U1A146000
Front Panel	E0D004801 (with Hole Cover Sheet)	1	n/a	33-1	U0A960400
Rear Panel	E0D004901 (with Hole Cover Sheet)	1	n/a	34-1	U0A960500
Side Panel	E0D005209 (No labels)	2	n/a	35-1	E0D005209
Front Control Cover	E0C346000	1	n/a	36-1	E0C346000
Front Control Cover Adapter Plate	JEA496001	1	n/a	37-1	JEA496001
Rear Control Cover	JDA788902	1	n/a	38-1	JDA788902
Flip-up Protection Cover	E0C299200 (Assembly) (No name label)	1	n/a	39-1	U0A921900
Encoder Cover	EBA514400	1	n/a	40-1	EBA514400
PCB Cover Sheet (Nomex)	E1B547900 + (2) E00B0215801	1	n/a	41-1	U0A839800

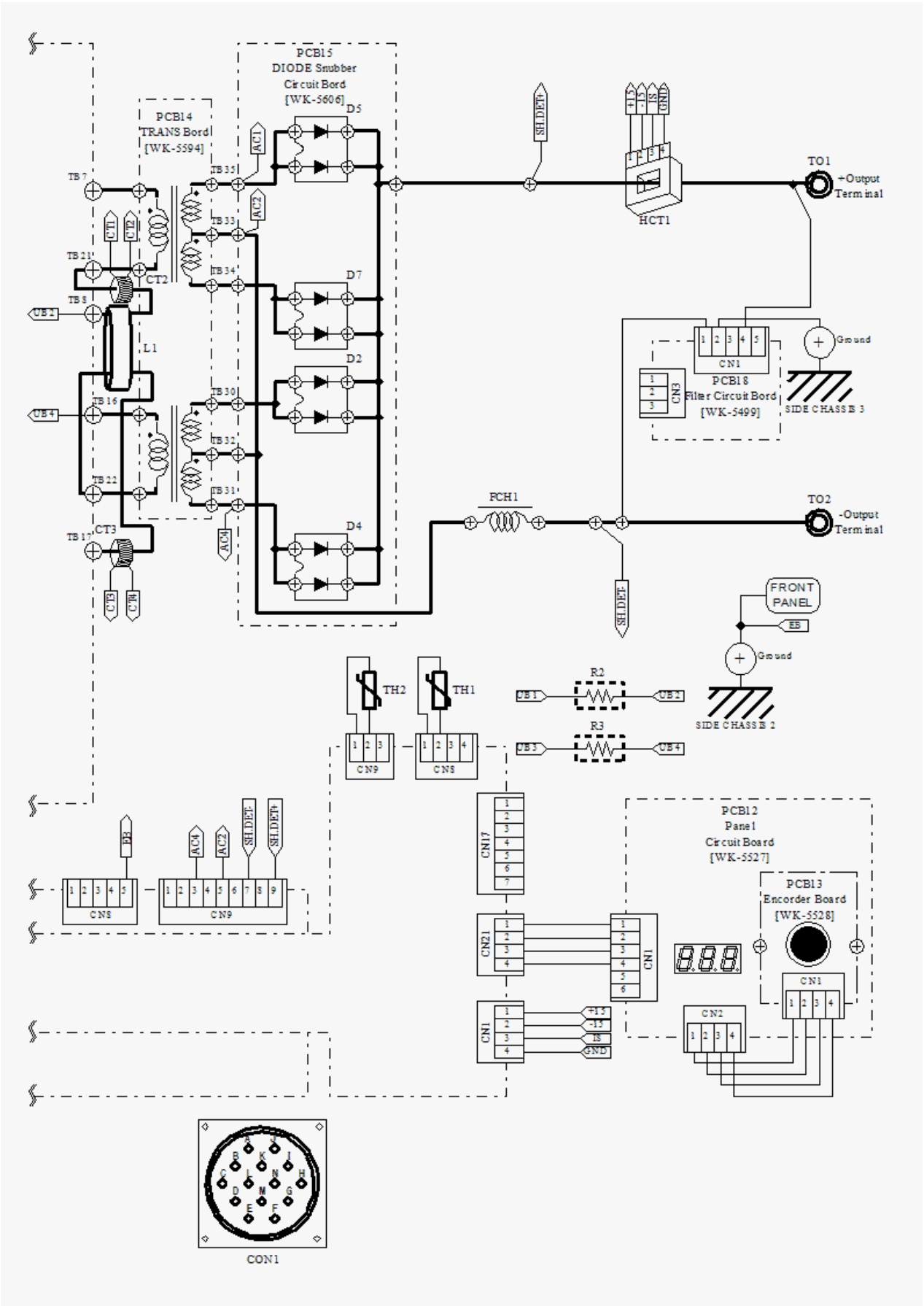
DESCRIPTION	TYPE & RATING	QTY	INTERCONNECT DIAGRAM REFERENCE	EXPLODED VIEW REFERENCE # - Sheet	ORDER NUMBER
Name Label	N00A0712600 (400M)	2	n/a	42-1	N00A0712600
Side Label	N4A056600 (SanRex DC Inverter)	2	n/a	43-1	N4A056600
Warning Label #1	N1B029700 Safety Instructions	1	n/a	44-1	N1B029700
Warning Label #2	N1B029800 Two Warnings	1	n/a	45-1	N1B029800
Output Terminal Label	N4A040400	1	n/a	46-1	N4A040400
Switch Label	N4A146500 (Input voltage select)	1	n/a	47-1	N4A146500
MCB Label	N4A144200	1	n/a	49-1	N4A144200
Output Terminal (female)	TRAK-BE35-70S	2	n/a	52-1	26999025900
Input Cable	SOOW AWG8X4C L=3.4m	1	n/a	53-1	U0A722400
Input Cable Clamp	EBA156800	1	n/a	54-1	EBA156800
Heatsink	E1B895000 (IGBT)	2	n/a	55-2	E1B895000
Heatsink	E1B870100 (Output Diodes)	1	n/a	56-2	E1B870100
IGBT Spring Clip	E1B850100 (See PCB8-11)	8	n/a	57-2	E1B850100
PCB1 Chassis	J5B017500	1	n/a	58-2	J5B017500
Chassis (main support)	J3C356600	1set	n/a	59-2	J3C356600
Knob	2621603	1	n/a	60-1	50990001600
Knob Cap	3021104	1	n/a	61-1	50990000300

DESCRIPTION	TYPE & RATING	QTY	INTERCONNECT DIAGRAM REFERENCE	EXPLODED VIEW REFERENCE # - Sheet	ORDER NUMBER
Control Cover Sheet (Mylar)	N00B0177700	1	n/a	62-1	N00B0177700
Silicone Rubber Sheet	EDA227700 (See PCB 8-11)	4	n/a	63-2	EDA227700
Post11(M5) (For S1)	EBA643600 (M5-M5)	3	n/a	64-1	EBA643600
D Bus Bar	EDA761400	1	n/a	65-2	EDA761400
T-D Bus Bar	EDA003800	4	n/a	66-2	EDA003800
D Bus Bar1	EDA046900	1	n/a	67-2	EDA046900
D Bus Bar2	EDA047000	1	n/a	68-2	EDA047000
D Bus Bar3	EDA047100	1	n/a	69-2	EDA047100
D Bus Bar4	EDA047200	1	n/a	70-2	EDA047200
S1 Bus Bar	ECA321000	3	n/a	71-1	ECA321000
Output Bus Bar	EDA761300	1	n/a	72-2	EDA761300
T-CC Bus Bar	EDA047300	1	n/a	73-2	EDA047300
Output Post	ECA867900	2	n/a	74-1	ECA867900

DESCRIPTION	TYPE & RATING	QTY	INTERCONNECT DIAGRAM REFERENCE	EXPLODED VIEW REFERENCE # - Sheet	ORDER NUMBER
Heatsink Insulated Board	E1B872000	2	n/a	75-2	E1B872000
PCB1 Insulated Sheet	E1B859700	1	n/a	76-2	E1B859700
PCB2 Insulated Sheet	EDA079800	1	n/a	77-2	EDA079800
Hole Cover Sheet	EBA710900	2	n/a	78-1	EBA710900
Dust Cover Sheet (Front)	E1B933900	1	n/a	79-2	E1B933900
Dust Cover Sheet (Rear)	E1B933100	1	n/a	80-2	E1B933100
Clip	#74 NATURAL	4	n/a	81-1	606024220
CON1 Dust Cover	0250468000 (with String & Clip)	1	n/a	82-2	U0A728200
Rubber Grommet for PCB1	C30SG20A	2	n/a	84-2	53631214500
Edge Protect	EH18U	2	n/a	85-2	53692118900
RATING Label	N00A0712200 (400M)	1	n/a	86-1	N00A0712200
IGBT Insulated Sheet	EEA405300	2	n/a	87-1	EEA405300
Output Plug (male)	TRAK-SK50 MALE	1	n/a	n/a	26999025800

9.1 INTERCONNECT DIAGRAM 400M

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DIODE Snubber
Circuit Bord
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PCB14
TRANS Bord
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AC2
AC4
TB7
TB35
TB33
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TB21
TB8
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TB16
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CT1
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CT3
CT4
CT5
CT6
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UB1
UB4
SH.DET+
SH.DET-
HCT1
+15
-15
IS
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Terminal
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PCH1
CN1
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PCB18
Filter Circuit Bord
[WK-5499]
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Ground
SIDE CHASSIS 2
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R2
R3
UB1
UB2
UB3
UB4
CN9
CN8
DR
PCB12
Panel
Circuit Board
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CN21
PCB13
Encorder Board
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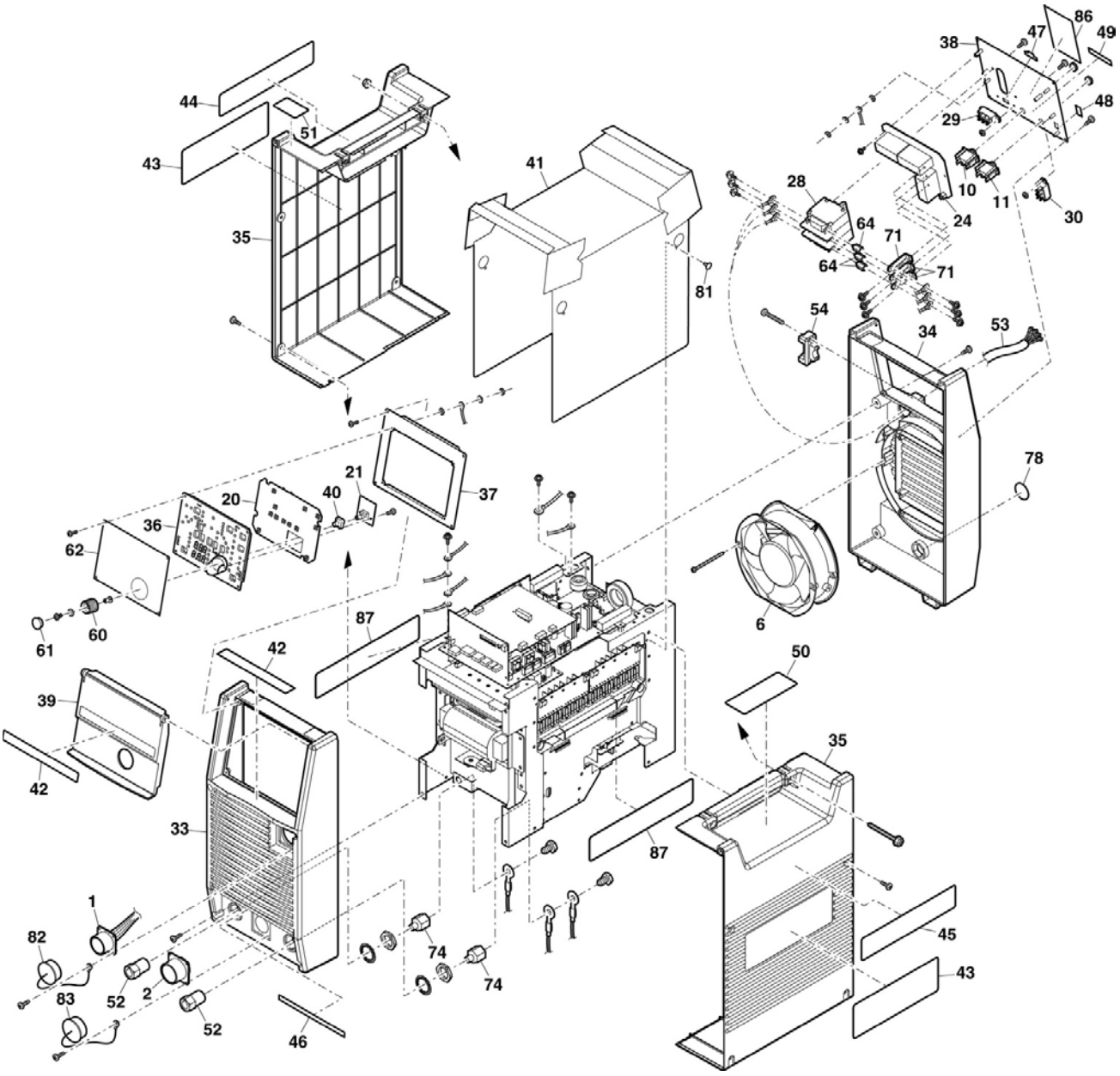
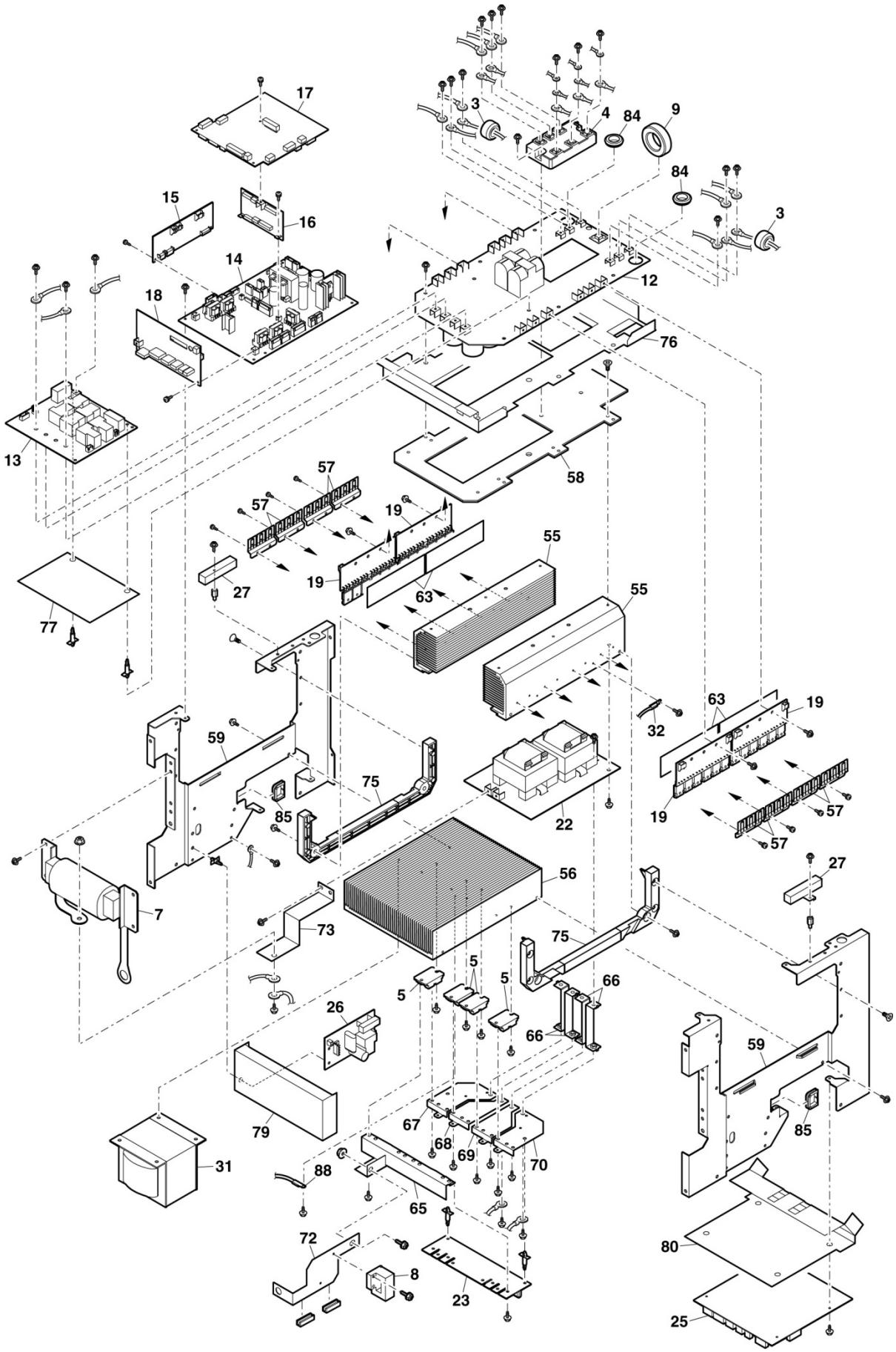
CN2
CON1

9.2 EXPLODED VIEW 400M

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