SVM 3188
Rev.00 05-2023

PF56D

For use with machines having code number: 50633

SERVICE MANUAL

LINCOLN ELECTRIC EUROPE
www.lincolnelectric.eu

INDEX OF CONTENTS

TECHNICAL SPECIFICATIONS

NAME			INDEX
PF 56D			**K14392-1**
INPUT			
Input Voltage U_1	Input Amperes I_1		EMC Class
40Vdc	4Adc		A
RATED OUTPUT			
Duty Cycle 40°C (based on a 10 min. period)			Output Current
100%			420A
60%			500A
Welding Current Range			Peak Open Circuit Voltage
5 ÷ 500A			113Vdc peak
DIMENSION			
Weight	Height	Width	Length
17,7 kg	516 mm	302 mm	642 mm
WIRE FEED SPEED RANGE / WIRE DIAMETER			
WFS Range	Drive Rolls		Drive roll diameter
1.5 ÷ 22 m/min	4		Ø37
Solid Wires	Aluminum Wires		Cored Wires
0.8 ÷ 1.6 mm	1.0 ÷ 1.6 mm		0.9 ÷ 1.6 mm
OTHERS			
Protection Rating			Maximum Gas Pressure
IP23			0,5 MPa (5 bar)
Operating Temperature			Storage Temperature
from -10°C to +40°C			from -25°C to 55°C

Electromagnetic Compatibility (EMC)

01/11

This machine has been designed in accordance with all relevant directives and standards. However, it may still generate electromagnetic disturbances that can affect other systems like telecommunications (telephone, radio, and television) or other safety systems. These disturbances can cause safety problems in the affected systems. Read and understand this section to eliminate or reduce the amount of electromagnetic disturbance generated by this machine.

This machine has been designed to operate in an industrial area. To operate in a domestic area it is necessary to observe particular precautions to eliminate possible electromagnetic disturbances. The operator must install and operate this equipment as described in this manual. If any electromagnetic disturbances are detected the operator must put in place corrective actions to eliminate these disturbances, if necessary with assistance from Lincoln Electric.

Before installing the machine, the operator must check the work area for any devices that may malfunction because of electromagnetic disturbances. Consider the following.

Input and output cables, control cables, and telephone cables that are in or adjacent to the work area and the machine.

Radio and/or television transmitters and receivers. Computers or computer controlled equipment.

Safety and control equipment for industrial processes. Equipment for calibration and measurement.

Personal medical devices like pacemakers and hearing aids.

Check the electromagnetic immunity for equipment operating in or near the work area. The operator must be sure that all equipment in the area is compatible. This may require additional protection measures.

The dimensions of the work area to consider will depend on the construction of the area and other activities that are taking place.

Consider the following guidelines to reduce electromagnetic emissions from the machine.

Connect the machine to the input supply according to this manual. If disturbances occur if may be necessary to take additional precautions such as filtering the input supply.

The output cables should be as short as possible and positioned together as close as possible to each other. If possible connect the work piece to ground in order to reduce the electromagnetic emissions. The operator must check that connecting the work piece to ground does not cause problems or unsafe operating conditions for personnel and equipment.

Shielding of cables in the work area can reduce electromagnetic emissions. This may be necessary for special applications.

WARNING

EMC classification of this product is class A in accordance with electromagnetic compatibility standard EN 60974-10 which means that the product is designed to be used in an industrial environment only.

WARNING

The Class A equipment is not intended for use in residential locations where the electrical power is provided by the public low-voltage supply system. There may be potential difficulties in ensuring electromagnetic compatibility in those locations, due to conducted as well as radiated disturbances.

SAFETY

WARNING

This equipment have to be used by qualified personnel. Be sure that all installation, operation, maintenance and repair procedures are performed only by qualified person. Read and understand this manual before operating this equipment. Failure to follow the instructions in this manual could cause serious personal injury, loss of life, or equipment damage. Read and understand the following explanations of the warning symbols. Lincoln Electric is not responsible for damages caused by improper installation, improper care or abnormal operation.

	WARNING: This symbol indicates that instructions must be followed to avoid serious personal injury, loss of life, or equipment damage. Protect yourself and others from possible serious injury or death.
	READ AND UNDERSTAND INSTRUCTIONS: Read and understand this manual before operating this equipment. Arc welding can be hazardous. Failure to follow the instructions in this manual could cause serious personal injury, loss of life, or equipment damage.
	ELECTRIC SHOCK CAN KILL: Welding equipment generates high voltages. Do not touch the electrode, work clamp, or connected work pieces when this equipment is turned on. Insulate yourself from the electrode, work clamp, and connected work pieces.
	ELECTRICALLY POWERED EQUIPMENT: Turn off the input power using the disconnect switch at the fuse box before working on this equipment. Ground this equipment in accordance with local electrical regulations.
	ELECTRICALLY POWERED EQUIPMENT: Regularly inspect the input, electrode, and work clamp cables. If any insulation damage exists replace the cable immediately. Do not place the electrode holder directly on the welding table or any other surface in contact with the work clamp to avoid the risk of accidental arc ignition.
	ELECTROMAGNETIC FIELD MAY BE DANGEROUS: Electric current flowing through any conductor creates electromagnetic field (EMF). EMF fields may interfere with some pacemakers, and welders having a pacemaker shall consult their physician before operating this equipment.
	CE COMPLIANCE: This equipment complies with the European Community Directives.
	ARTIFICIAL OPTICAL RADIATION: According with the requirements in 2006/25/EC Directive and EN 12198 Standard, the equipment is a category 2. It makes mandatory the adoption of Personal Protective Equipment (PPE) having filter with a protection degree up to a maximum of 15, as required by EN169 Standard.
	FUMES AND GASES CAN BE DANGEROUS: Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. To avoid these dangers the operator must use enough ventilation or exhaust to keep fumes and gases away from the breathing zone.
	ARC RAYS CAN BURN: Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing. To protect the skin, use suitable clothing made of durable, fireproof material. Protect other nearby personnel with suitable, non-flammable screening and warn them not to watch the arc nor expose themselves to the arc.
	WELDING SPARKS CAN CAUSE FIRE OR EXPLOSION: Remove fire hazards from the welding area and have a fire extinguisher easily accessible. Welding sparks and hot materials from the welding process can easily go through small cracks and openings to adjacent areas. Do not weld on any tanks, drums, containers, or material until the proper steps have been taken to insure that no flammable or toxic vapors will be present. Never use this equipment when flammable gases, vapors or flammable liquids are present.
	WELDED MATERIALS CAN BURN: Welding generates a large amount of heat. Hot surfaces and materials in work area can cause serious burns. Use gloves and pliers when touching or moving materials in the work area.

	CYLINDER MAY EXPLODE IF DAMAGED: Use only certificate, compressed gas cylinders containing the correct shielding gas for the process used and properly operating regulators designed for the gas and pressure used. Always keep cylinders in an upright position securely chained to a fixed support. Do not move or transport gas cylinders with the protection cap removed. Do not allow the electrode, electrode holder, work clamp or any other electrically live part to touch a gas cylinder. Gas cylinders must be located away from areas where they may be subjected to physical damage or the welding process including sparks and heat sources.
	SAFETY MARK: This equipment is suitable for supplying power for welding operations carried out in an environment with increased risk of electric shock.
	MOVING PARTS ARE DANGEROUS: There are moving mechanical parts in this machine, which can cause serious injury. Keep your hands, body and clothing away from those parts during machine starting, operating and servicing.

The manufacturer reserves the right to make changes and/or improvements in design without upgrade at the same time the operator's manual.

Introduction

PF 56D is digital wire feeder which have been designed to work with Lincoln Electric power sources:

- **POWER WAVE® 350CE,**
- **POWER WAVE® 500CE.**

The **ArcLink®** protocol is used for communication between the power source and the wire feeder. All signals from the power source are displayed on the User Interface located in the wire feeder machine.

Set of power source and wire feeder allow welding in listed processes:

- GMAW (MIG/MAG),
- FCAW,
- SMAW (MMA),
- GTAW,
- CAG.

The complete package contains:

- Wire feeder.
- USB memory with operator's manual.
- Easy Start

Recommended equipment, which can be bought by user, was mentioned in the chapter "Accessories".

Installation and Operator Instructions

Read this entire section before installation or operating the machine.

Exploitation conditions

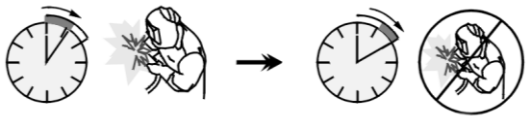
This machine can operate in harsh environments. However, it is important to use the following simple preventive measures that will ensure its long life and reliable operation:

- Do not place or operate this machine on a surface with an incline higher than 15° from horizontal.
- Do not use this machine for pipe thawing.
- This machine must be located where there is free circulation of clean air without restrictions for air movement. Do not cover the machine with paper, cloth or rags when switched on.
- Dirt and dust that can be drawn into the machine should be kept away from the item.
- This machine has a protection rating of IP23. Keep it dry when possible and do not place it on a wet ground or in puddles.
- Locate the machine away from a radio controlled machinery. Normal operation may adversely affect the operation of a nearby radio controlled machinery, which may result in injury or equipment damage. Read the section on electromagnetic compatibility in this manual.
- Do not operate in areas with an ambient temperature greater than 40°C.

Duty cycle and Overheating

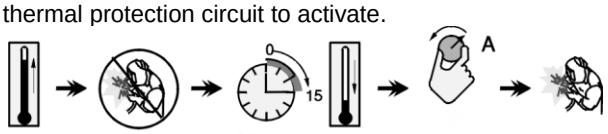
The duty cycle of a welding machine is the percentage of time in a 10 minute cycle at which the welder can operate the machine at rated welding current.

Example: 60% duty cycle:



Welding for 6 minutes. Break for 4 minutes.

Excessive extension of the duty cycle will cause the thermal protection circuit to activate.



Minutes or decrease Duty Cycle

Input Supply Connection

Check the input voltage, phase, and frequency of the power source that will be connected to this wire feeder. The acceptable level of input voltage is indicated in the section „Technical Specifications" and on the rating plate of the power source. Verify the connection of grounding wires from the power source to the input source.

Controls and Operational Features

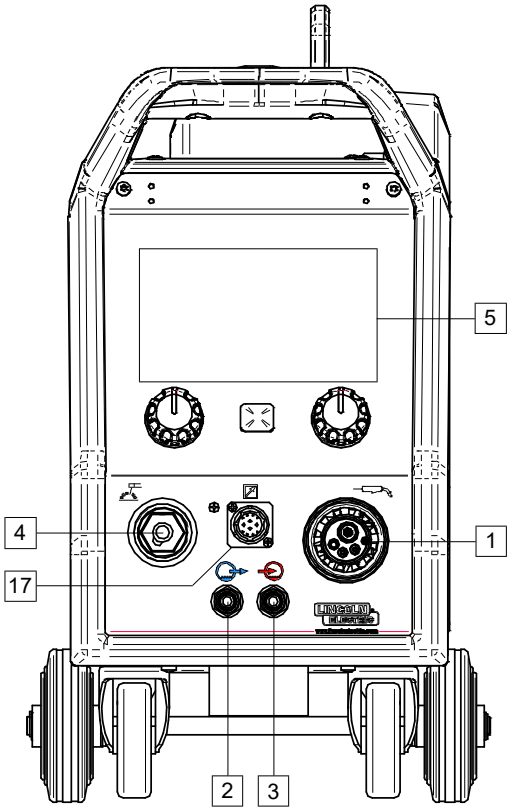


Figure 1

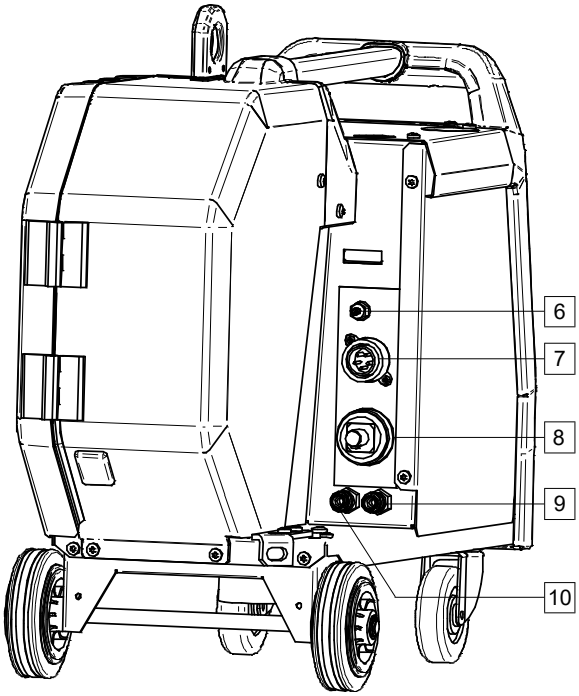


Figure 2

1. EURO Socket: For connecting a welding gun (for GMAW, FCAW process).
2. Quick Coupling Socket: Coolant outlet (supplies cool coolant to the welding gun).
3. Quick Coupling Socket: Coolant inlet (takes warm coolant from the welding gun).

WARNING

Maximum coolant pressure is 5 bar.

4. Output Socket for SMAW and CAG welding: For connecting welding cable with an electrode holder.
5. U7 User Interface: See „User Interface" section.
6. Gas Quick Coupling Socket: For connecting a gas pipe.

WARNING

The machine allows the use all suitable shielding gases with a maximum pressure of 5 bar.

7. Control Socket: 5 pins socket for connecting a control cable. The CAN protocol is used for communication between the power source and wire feeder.
8. Current Socket: For connecting a welding cable.
9. Quick Coupling Socket: Coolant inlet (supplies cool coolant from cooler to the welding machine).
10. Quick Coupling Socket: Coolant outlet (takes warm coolant from welding machine to cooler).
11. Gas Flow Regulator Plug: Gas Flow Regulator can be purchased separately. See "Accessories" section.
12. Switch: Cold Inch / Gas Purge: This switch allows wire feeding (wire test) and gas flow (gas test) without switching on the output voltage.
13. Transport Holder: For the feeder lifting and transporting using a crane.
14. Wire Spool Holder: For wire spool with maximum 16kg weight. Holder allows mounting plastic, steel and fiber spools on the 51mm spindle.

WARNING

Be sure that wire spool case has to be completely closed during welding.

15. Spool with Wire: Not supplied as standard.
16. Wire Drive: 4-rolls wire drive.

WARNING

The side panel and wire spool case have to be completely closed during welding.

WARNING

Do not use handle to move the machine during operation.

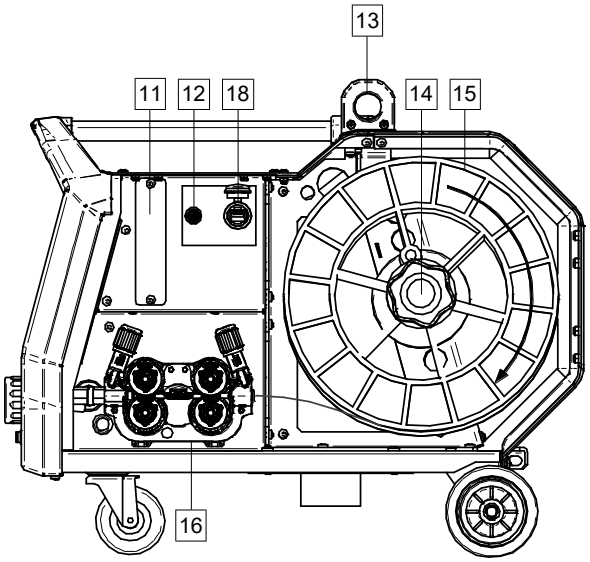


Figure 3

17. Remote Control Socket: For connecting a Remote Control (see "**Errore. L'origine riferimento non è stata trovata.**" chapter).

18. USB Port: For connecting the USB memory and software updates.

User Interface Advanced (U7)

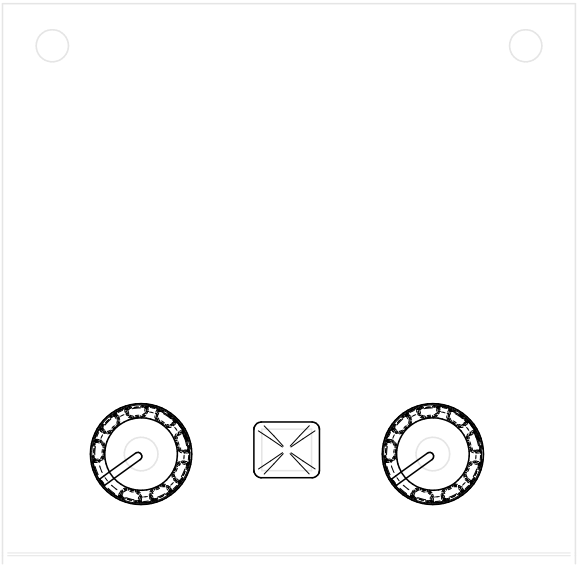


Figure 4

Detailed operation of User Interface U7 can be found in the Advanced (U7) IM3170 user manual.

Loading the Wire Spool

Spools of wire with a maximum weight of 16 kg can be used without an adapter. Holder allows mounting plastic, steel and fiber spools on the 51mm spindle.
It is possible to use other spools after using the appropriate adapter, which can be purchased separately (see "**Errore. L'origine riferimento non è stata trovata.**" chapter).

Loading the Electrode Wire

- Turn the input power OFF.
- Open the spool wire case.
- Unscrew the locking nut of the sleeve [14].
- Load the spool wire on the sleeve so that the spool turns clockwise when the wire is feed into the wire feeder.
- Make sure that the spindle brake pin goes into the fitting hole on the spool.
- Screw in the locking nut of the sleeve.
- Open the wire drive door.
- Put on the wire roll with the correct groove corresponding to the wire diameter.
- Free the end of the wire and cut off the bent end making sure it has no burr.

WARNING

Sharp end of the wire can hurt.

Rotate the wire spool clockwise and thread the end of the wire into the wire feeder as far as the Euro Socket.
Adjust force pressure roll of the wire feeder properly.

Adjustments of Brake Torque of Sleeve

To avoid spontaneous unrolling of the welding wire the sleeve is fitted with a brake.
Adjustment is carried by rotation of its screw M10, which is placed inside of the sleeve frame after unscrewing the brake locking nut.

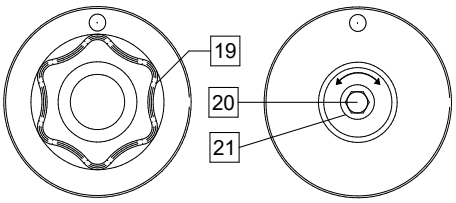


Figure 5

19. Locking Nut.
20. Adjusting Screw M10.
21. Pressing Spring.

Turning the M10 screw clockwise increases the spring tension and increase the brake torque

Turning the M10 screw anticlockwise decreases the spring tension and decrease the brake torque.

After finishing of adjustment, you should screw brake locking nut again.

Adjusting of Pressure Roll Force

The pressure arm controls the amount of force the drive rolls exert on the wire. Pressure force is adjusted by turning the adjustment nut clockwise to increase force, counterclockwise to decrease force. Proper adjustment of pressure arm gives the best welding performance.

⚠ WARNING

If the roll pressure is too weak, the roll will slide on the wire. If the roll pressure is set too heavy the wire may be deformed, which cause feeding problems in the welding. The pressure force should be set properly. For this purpose decrease the pressure force slowly until the wire just begins to slide on the drive roll and then increase the force slightly by turning of the adjustment nut by one turn.

Inserting Electrode Wire into Welding Torch

- Turn the welding machine off.
- Depending of welding process connect proper welding torch to the euro socket [1]. Rated parameters of the torch and welding machine should be matched.
- Depends on type of gun must be remove the nozzle from the gun and contact tip or protection cap and contact tip.
- Turn the welding machine on.
- Hold the Cold Inch/Gas Purge Switch [12] or use torch trigger until wire appear over threaded end of the gun.
- When the Cold Inch Switch [12] or torch trigger is released the spool of wire should not unwind.
- Adjust wire spool brake accordingly.
- Turn the welding machine off.
- Install a proper contact tip.
- Depending on the welding process and the type of the gun, install the nozzle (GMAW process) or protection cap (FCAW process).

⚠ WARNING

Take precaution to keep eyes and hands away from the end of the gun while the wire is being come out of the threaded end.

Changing Driving Rolls

⚠ WARNING

Turn the input power off before installation or changing drive rolls.

Wire Feeders **PF 56D** is equipped with drive roll V1.0/V1.2 for steel wire. For others wires and sizes it is required to install proper drive rolls kit (see "**Errore. L'origine riferimento non è stata trovata.**" chapter) and follow instruction:

- Turn the input power OFF.
- Unlock 4 rolls by turning 4 Quick-Change Carrier Gear [26].
- Release the pressure roll levers [27].
- Change the drive rolls [25] corresponding to the used wire.

⚠ WARNING

Be sure that the gun liner and contact tip are also sized to match the selected wire size.

⚠ WARNING

For wires with the diameter larger than 1.6mm, the following parts have to be changed:

- The guide tube of the feeding console [23] and [24].
- The guide tube of the Euro Socket [22].

- Lock 4 new rolls by turning 4 Quick-Change Carrier Gear [26].
- Insert the wire through the guide tube, over the roller and through the guide tube of Euro Socket into liner of gun. The wire can be pushed into the liner manually for a few centimeters, and should feed easily and without any force.
- Lock the pressure roll levers [27].

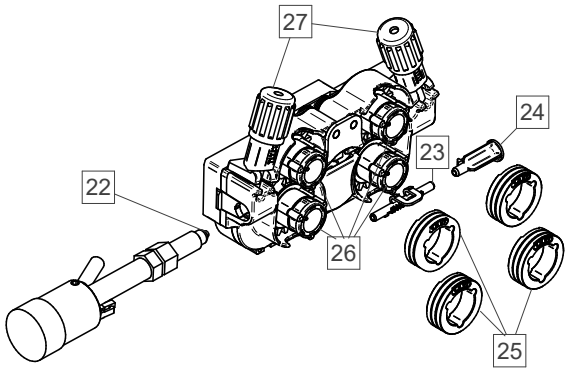


Figure 6

Gas Connection

WARNING

- CYLINDER may explode if damaged.
- Always fix the gas cylinder securely in an upright position, against a cylinder wall rack or purpose-made cylinder cart.
- Keep cylinder away from areas where it may be damaged, heated or electrical circuits to prevent possible explosion or fire.
- Keep cylinder away from welding or other live electrical circuits.
- Never lift welder with cylinder attached.
- Never allow welding electrode to touch cylinder.
- Build up of shielding gas may harm health or kill. Use in a well-ventilated area to avoid gas accumulation.
- Close the gas cylinder valves thoroughly when not in use to avoid leaks.

WARNING

Welding machine supports all suitable shielding gases at a maximum pressure of 5,0 bar.

WARNING

Before use, make sure that the gas cylinder contains gas suitable for the intended purpose.

- Turn off input power at the welding power source.
- Install a proper gas flow regulator to the gas cylinder.
- Connect the gas hose to the regulator using the hose clamp.
- The other end of the gas hose connect to the gas connector on the power source rear panel or directly to the quick connector located on the rear panel of the wire feeder [6]. More details you will find in power source instruction manual.
- Connect by dedicated interconnection cable (see „**Errore. L'origine riferimento non è stata trovata.**" chapter) wire feeder and power source.
- Turn on input power at the welding power source.
- Open the gas cylinder valve.
- Adjust the shielding gas flow of the gas regulator.
- Check gas flow with Gas Purge Switch [12].

WARNING

To weld GMAW process with CO_2 shielding gas, CO_2 gas heater should be used.

Transport and Lifting

WARNING

Falling equipment can cause injury and damage to unit.

During transporting and lifting with a crane, adhere to the following rules:

- For lifting a suitable lifting equipment capacity.
- Dedicated handle [13] can be used to lifting and transporting using a crane only. This solution enables welding while lifting the feeder.

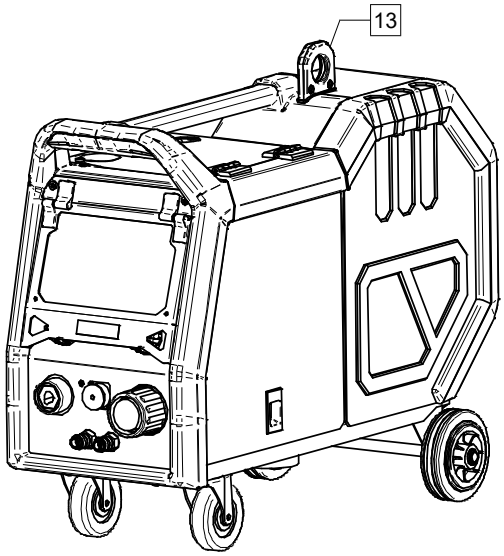


Figure 7

Maintenance

WARNING

For any repair operations, modifications or maintenances, it is recommended to contact the nearest Technical Service Center or Lincoln Electric. Repairs and modifications performed by unauthorized service or personnel will cause the lost of the manufacturer's warranty

Any noticeable damage should be reported immediately and repaired.

Routine maintenance (everyday)

Check condition of insulation and connections of the work leads and insulation of power lead. If any insulation damage exists replace the lead immediately.

Remove the spatters from the welding gun nozzle. Spatters could interfere with the shielding gas flow to the arc.

Check the welding gun condition: replace it, if necessary.

Check condition and operation of the cooling fan. Keep clean its airflow slots.

Periodic maintenance (every 200 working hours but at least once a year)

Perform the routine maintenance and, in addition:

Keep the machine clean. Using a dry (and low pressure) airflow, remove the dust from the external case and from the cabinet inside.

If it is required, clean and tighten all weld terminals.

The frequency of the maintenance operations may vary in accordance with the working environment where the machine is placed.

WARNING

Do not touch electrically live parts.

WARNING

Before removed case, machine has to be turned off and the power lead has to be disconnected from mains socket.

WARNING

Mains supply network must be disconnected from the machine before each maintenance and service. After each repair, perform proper tests to ensure safety.

Customer Assistance Policy

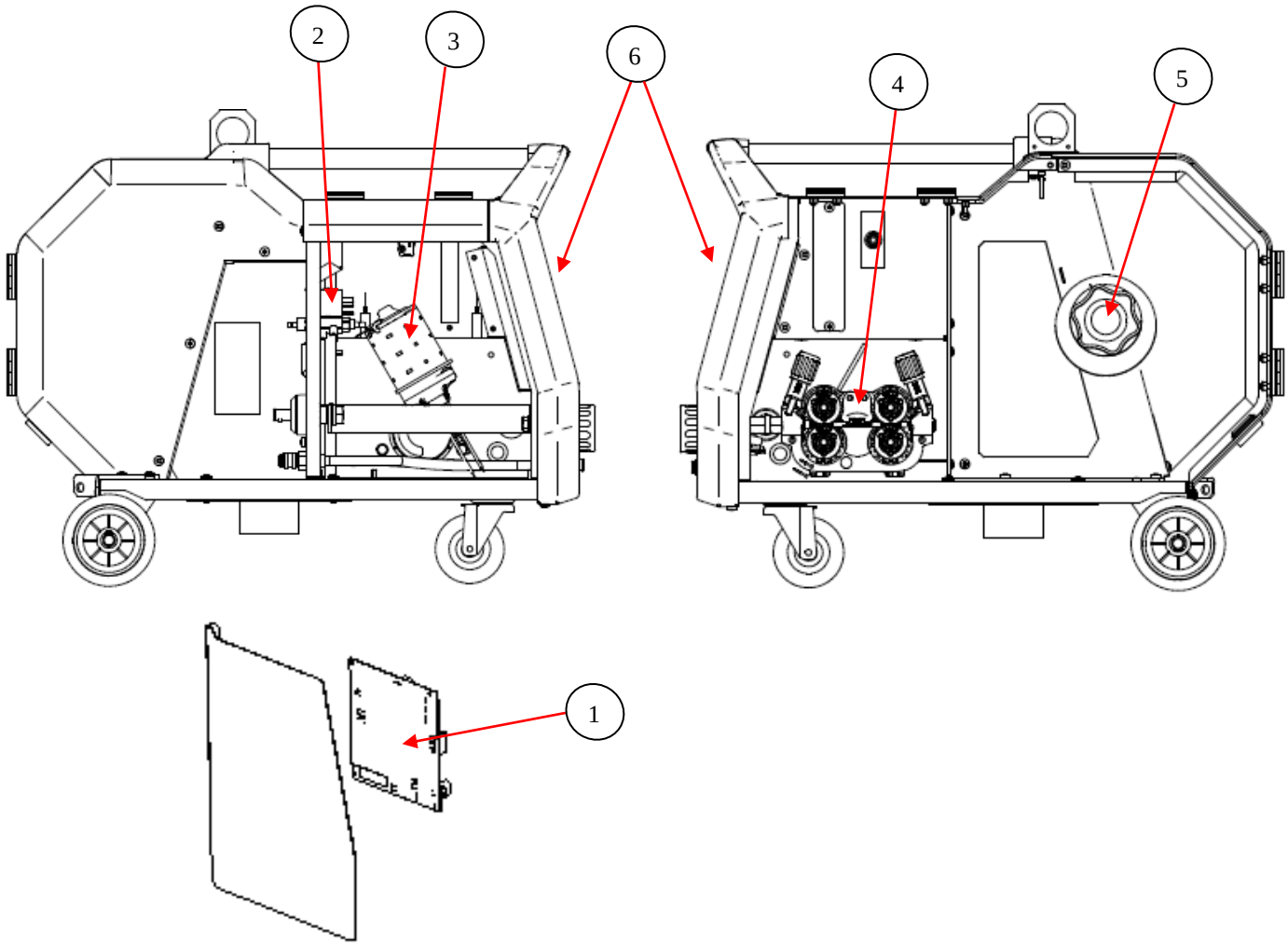
The business of The Lincoln Electric Company is manufacturing and selling high quality welding equipment, consumables, and cutting equipment. Our challenge is to meet the needs of our customers and to exceed their expectations. On occasion, purchasers may ask Lincoln Electric for advice or information about their use of our products. We respond to our customers based on the best information in our possession at that time. Lincoln Electric is not in a position to warrant or guarantee such advice, and assumes no liability, with respect to such information or advice. We expressly disclaim any warranty of any kind, including any warranty of fitness for any customer's particular purpose, with respect to such information or advice. As a matter of practical consideration, we also cannot assume any responsibility for updating or correcting any such information or advice once it has been given, nor does the provision of information or advice create, expand or alter any warranty with respect to the sale of our products Lincoln Electric is a responsive manufacturer, but the selection and use of specific products sold by Lincoln Electric is solely within the control of, and remains the sole responsibility of the customer. Many variables beyond the control of Lincoln Electric affect the results obtained in applying these types of fabrication methods and service requirements.

Subject to Change – This information is accurate to the best of our knowledge at the time of printing. Please refer to www.lincolnelectric.com for any updated information.

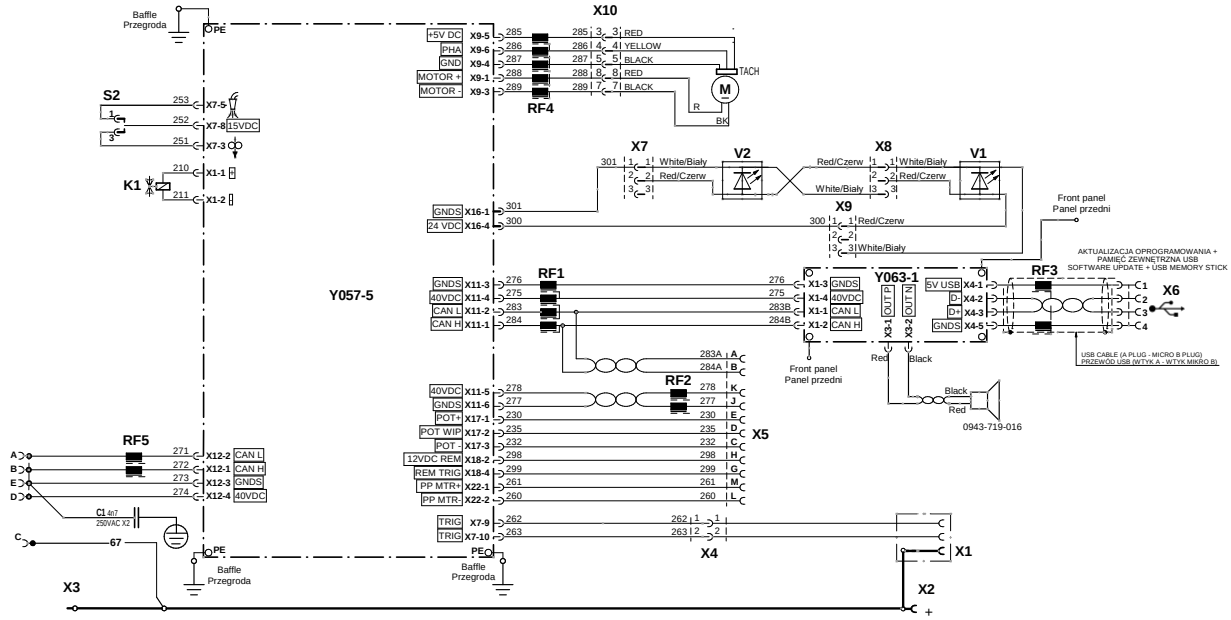
MAJOR COMPONENTS LOCATION

PF56D

1. Motor Board (mounted on the leftside panel)
2. Gas Solenoid
3. Motor
4. Wire Drive
5. Reel Hub
6. User Interface Board



THEORY OF OPERATION



GENERAL DESCRIPTION

The **PF56D** is a four rolls, digitally controlled, wire feeders that operates on 40 VDC input power. **PF56D** support all welding modes installed on power sources. Network communications, PC board input power, and arc voltage feedback is received and transmitted through the input male plug on the back of the feeders. **PF56D** is equipped with USB that can be used to share welding procedures and settings among many machines and many users and software update.

MOTOR CONTROL BOARD

The motor control board processes the information received from the various user operated switches, (cold inch, gas purge), the data reveived from the User Interface and sends the signals to energize the active components such as the solenoid and wire drive motor.
The tach feedback signal is also processed by this board which regulates the motor supply voltage to maintain the required wire feed speed.

USER INTERFACE BOARD

PF56D uses an innovative TFT User Interface. From both is possible to recall welding programs from the power source, pre-set welding parameters, read actual values during welding and define all welding parameters like start, crater, 2-4 steps, burn back and many others. Informations and data are exchanged between the User Interface and the motor control board via digital Arclink protocol.

TROUBLESHOOTING AND REPAIR SECTION

- How to use troubleshooting Guide
- Troubleshooting Guide
- Error Codes
- Case Cover Removal Procedure
- Feeder Control Board test
- User Interface Board test
- Gas Solenoid test
- Wire Drive Motor test
- Wire Drive Motor Tachimeter test

HOW TO USE TROUBLESHOOTING GUIDE

Service and repair should be performed by only Lincoln Electric Factory Trained Personnel. Unauthorized repairs performed on this equipment may result in danger to the technician and machine operator and will invalidate your factory warranty. For your safety and to avoid Electrical Shock, please observe all safety notes and precautions detailed throughout this manual.

……

This Troubleshooting Guide is provided to help you locate and repair possible machine malfunctions. Simply follow the three-step procedure listed below.

Step 1. LOCATE PROBLEM (SYMPTOM). Look under the column labeled “PROBLEMS”. This column describes possible symptoms that the machine may exhibit. Find the listing that best describes the symptom that the machine is exhibiting. Symptoms are grouped into three main categories: Output Problems, Function Problems, and LED Function Problems.

Step 2. PERFORM EXTERNAL TESTS. The second column, labeled “CHECKS”, lists the obvious external possibilities that may contribute to the machine symptom. Perform these tests/checks in the order listed. In general, these tests can be conducted without removing the case wrap-around cover.

Step 3. PERFORM COMPONENT TESTS. The last column, labeled “RECOMMENDED COURSE OF ACTION ” lists the most likely components that may have failed in your machine. It also specifies the appropriate test procedure to verify that the subject component is either good or bad. If there are a number of possible components, check the components in the order listed to eliminate one possibility at a time until you locate the cause of your problem.

All of the referenced test procedures referred to in the Troubleshooting Guide are described in detail at the end of this chapter. Refer to the Troubleshooting and Repair Table of Contents to locate each specific Test Procedure. All of the referred to test points, components, terminal strips, etc., can be found on the referenced electrical wiring diagrams and schematics. Refer to the Wiring Diagrams Section Table of Contents to locate the appropriate diagram.

WARNING

ELECTRIC SHOCK can kill

- Have an electrician install and service this equipment
- Turn the input power off at the fuse box before working on equipment
- Do not touch electrically hot parts
- Prior to performing preventive maintenance, perform the following capacitor discharge procedure to avoid electric shock

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Sometimes machine failures appear to be due to PC board failures. These problems can sometimes be traced to poor electrical connections. To avoid problems when troubleshooting and replacing PC boards, please use the following procedure:

1. Determine to the best of your technical ability that the PC board is the most likely component causing the failure symptom.
2. Check for loose connections at the PC board toassure that the PC board is properly connected.
3. If the problem persists, replace the suspect PC board using standard practices to avoid static electrical damage and electrical shock.
4. Test the machine to determine if the failure symptom has been corrected by the replacement PC board.

NOTE: Allow the machine to heat up so that all electrical components can reach their operating temperature.

5. Remove the replacement PC board and substitute it with the original PC board to recreate the original problem.
   - If the original problem does not reappear by substituting the original board, then the PC board was not the problem. Continue to look for bad connections in the control wiring harness, junction blocks, and terminal strips.
   - If the original problem is recreated by the substitution of the original board, then the PC board was the problem. Reinstall the replacement PC board and test the machine.
6. Always indicate that this procedure was followed when warranty reports are to be submitted.

NOTE: Following this procedure and writing on the warranty report, “INSTALLED AND SWITCHED PC BOARDS TO VERIFY PROBLEM,” will help avoid denial of legitimate PC board warranty claims.

TROUBLESHOOTING

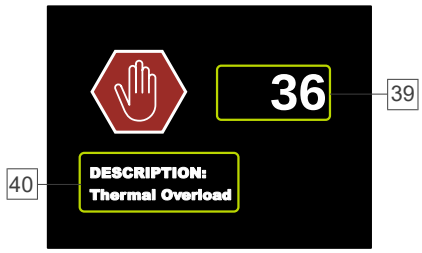
!! WARNING !! **BEFORE CONNECT POWER SUPPLY, MAKE A CAREFUL VISUAL INSPECTION INSIDE THE MACHINE, CHECK ALL THE BOARDS AND HARNESS.**

PROBLEMS / SYMPTOMS	CHECKS / ERROR DESCRIPTION	RECOMMENDED COURSE OF ACTION
A VISUAL DAMAGE IS EVIDENT WHEN YOU OPEN THE COVER	----------	• REPLACE THE BROKEN PART AND PERFORM THE TESTS FOR THE OTHER MACHINE COMPONENTS
NO WIRE FEED AND SOLENOID	• MAKE SURE THAT THE LF52D or LF56D RECEIVE THE 40VDC POWER SUPPLY • THE GUN TRIGGER MAY BE DEFECT	• PERFORME THE MOTOR BOARD TEST • CHECK AND REPLACE THE GUN TRIGGER IF NECESSARY
NO CONTROL OF WIRE FEED SPEED	• THE TACHIMETER MAY BE FAULTY • THE USER INTERFACE BOARD MAY BE MAULTY • THE MOTOR BOARD MAY BE FAULTY	• PERFORM THE TACHIMETER TEST • REPLACE THE USER ITERFACE • PERFORM THE MOTOR BOARD TEST AND REPLACE IF DEFECT
THERE IS NO WELDING OUTPUT WHEN THE GUN TRIGGER IS PRESSED. THE WIRE FEEDS NORMALLY AND THE GAS SOLENOID IS ACTIVATED PROPERLY	• THE ARC LINK CABLES BETWEEN POWER FEED AND POWER SOURCE MAY BE DEFECT. • THE MOTOR BOARD MAY BE FAULTY • THE POWER SOURCE MAY BE DEFECT	• CHECK STATUS LED ON POWER SOURCE FOR COMMUNICATION ERROR • CHECK THE ARCLINK CABLES FOR GOOD CONTINUITY • REPLACE THE MOTOR BOARD • PERFORM THE POWER SOURCE TESTS
THE WELDING VOLTAGE IS NOT CHANGING WHILE TURNING THE USER INTERFACE VOLTAGE ENCODER	• THE USER INTERFACE MAY BE FAULTY • THE MOTOR BOARD MAY BE FAULTY • THE POWER SOURCE MAY BE DEFECT	• REPLACE THE USER INTERFACE • REPLACE THE MOTOR BOARD • PERFORM THE POWER SOURCE TEST
WELDING PROCESS DOES NOT CHANGE WHEN THE LEFT PUSH BUTTON ON THE UI IS PRESSED	• MAY BE A SOFTWARE PROBLEM ON UI IS PRESENT • THE BUTTON IS DEFECT	• RE-FLASH FEEDER SOFTWARE • REPLACE THE UI BOARD
THE FEEDER RESET ITSELF WHEN THE WELD STARTS	• NOISE CAN BE THE CAUSE OF THIS PROBLEM	• CHECK CAPACITOR C1 FOR GOOD CONNECTIONS TO CONNECTOR X1 PIN E AND FEEDER FRAME (SEE FEEDER WIRIND DIAGRAM)
WITH TRIGGER PRESSED THE ROLLS DO NOT TURN BUT GAS SOLENOID IS WORKING PROPERLY	• LOOSE OR FAULTY MOTOR CONNECTION MAY BE PRESENT • THE MOTOR BOARD MAY BE FAULTY (NO POWER TO THE MOTOR)	• CHECK LEADS 288 AND 289 CONNECTIONS FROM MOTOR BOARD CONNECTOR TO MOTOR CONNECTOR (SEE FEEDERS WIRING DIAGRAMS) • PERFORM THE MOTOR BOARD TEST
NO WIRE FEEDING BUT THE DRIVE ROLLS ARE TURNING	• THE DRIVE ROLLS PRESSURE MAY BE NOT CORRECT • THE DRIVE ROLLS OR WIRE GUIDE MAY BE NOT CORRECTLY INSTALLED • A MECHANICAL RESCTRICTION MAY BE PRESENT INSIDE THE TORCH • THE SPOOL BRAKE TORQUE MAY BE TOO MUCH	• CHECK THE DRIVE ROLLS FOR CORRECT PRESSURE • CHECK THE DRIVE ROLLS AND WIRE GUIDE FOR CORRECT INSTALLATION • CHECK THE TORCH LINER, REPLACE IF NECESSARY • CHECK THE SPOOL BRAKE TORQUE
THE GAS SOLENOID IS NOT ACTIVATED WHEN TRIGGER IS PRESSED, BUT ROLLS ARE TURNING	• THE GAS SOLENOID MAY BE FAULTY • THE MOTOR BOARD MAY BE FAULTY (NO POWER TO THE GAS SOLENOID)	• PERFORM THE GAS SOLENOID TEST • PERFORM THE MOTOR BOARD TEST
THE COLD INCH/GAS PURGE SWITCH DOES NOT ENABLE THE WIRE DRIVE MOTOR BUT WIRE DRIVE MOTOR IS ACTIVATED WHEN GUN TRIGGER IS PRESSED	• A MECHANICAL DAMAGE ON THE COLD INCH/PURGE SWITCH MAY BE PRESENT • CHECK FOR LOOSE OR FAULTY LEAD CONNECTIONS BETWEEN THE COLD INCH/PURGE SWITCH AND MOTOR BOARD CONNECTOR	• REPLACE THE COLD INCH/PURGE SWITCH IF NECESSARY • IF THERE IN MECHANICAL PROBLEMS AND ALL CONNECTIONS ARE OK, THE MOTOR BOARD IS DEFECT; REPLACE IT.

These tests and repair should only be performed by Lincoln Electric Factory Trained Personnel. Unauthorized repairs performed on this equipment may result in danger to the technician and machine operator and will invalidate your factory warranty. For your safety and to avoid Electrical Shock, please observe all safety notes and precautions detailed throughout this manual.

ERROR CODES

Table 1 Interface Components

	Interface description
 **Figure 8**	39. Error code 40. Error description.

Errore. L'origine riferimento non è stata trovata. shows list of basic errors that can appear. To get full list of error codes, please contact with authorize Lincoln Electric service.

Table 2 Error codes

Error code	Symptoms	Cause	Recommended Course of Action
6	Power source is not connected.	The User Interface cannot seem to communicate with the Power Source.	• Check cable connections between the power source and the user interface.
36	The machine has shut down because it has overheated.	System detected a temperature level beyond the normal system operating limit.	• Be sure process does not exceed duty cycle limit of the machine. • Check the setup for proper air flow around and through the system. • Check that the system has been properly maintained, including removal of accumulated dust and dirt from the intake and outlet louvers. • User interface show information when machine will be cooled down. To continue welding operation Please press Left Control or start welding operation by the torch trigger. 
81	Motor overload, long term.	The wire drive motor has overheated. Check that the electrode slides easily through the gun and cable.	• Remove tight bends from the gun and cable. • Check that the spindle brake is not too tight. • Verify the adequacy of the electrode to the welding process. • Verify a high quality electrode is being used. • Check drive rolls alignment and gears. • Wait for the error to reset and the motor to cool (approximately 1 minute).
92	No coolant flow	There is no coolant flow in the cooler after 3 seconds of welding.	• Make sure there is enough coolant in the tank and that auxiliary power is suppied. • Make sure the pump is working. When the trigger is pulled the pump should run.

WARNING

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your Local Lincoln Authorized Field Service Facility for technical troubleshooting assistance before you proceed.

CASE COVER REMOVAL PROCEDURE

WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel.Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact your Local Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed.
……

DESCRIPTION

This procedure will aid the technician in the removal and replacement of the case sheet metal cover .

MATERIALS NEEDED

- Torx T25 wrench

PF56D - CASE COVER REMOVAL (continued)

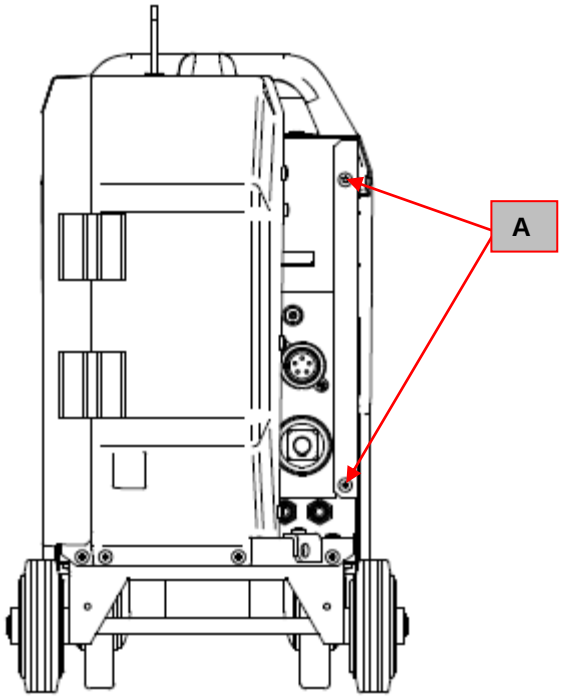


Figure 1

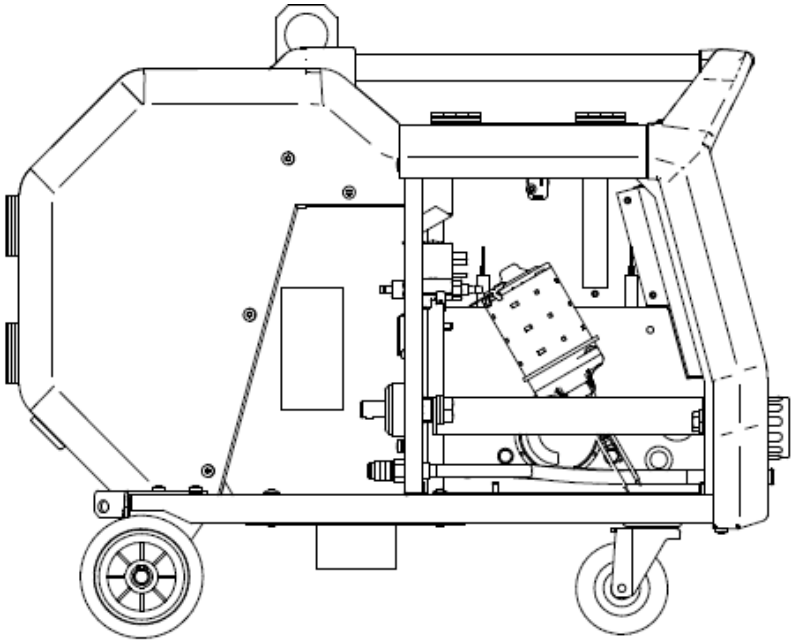


Figure 1a

Necessary tool:

- Torx T25 wrench

Procedure:

1. Turn the power source ON/OFF switch to OFF position.
2. **Disconnect Input Power from the power source !**
3. Remove the 2 screws (**A**) from the back of the left side feeder panel. **See Figure 1**
4. Slide back carefully the left side panel and disconnect all the connectors that are connected to the motor board fixed on the internal side of this panel.
5. Now you have access to the internal part of the feeder as shown in **Figure 1a**.

For the left side panel re-assembly operations, make the previous steps in the reverse order.

FEEDER CONTROL BOARD TEST

WARNING

Service and repair should be performed by only Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual. If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact your Local Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed.

……

TEST DESCRIPTION

This test will determine if the feeder control board is receiving the correct voltage and if it is working properly

MATERIALS NEEDED

Multimeter
Feeder wiring diagrams

FEEDER CONTROL BOARD TEST (continued)

Figure 1 - Feeder control board

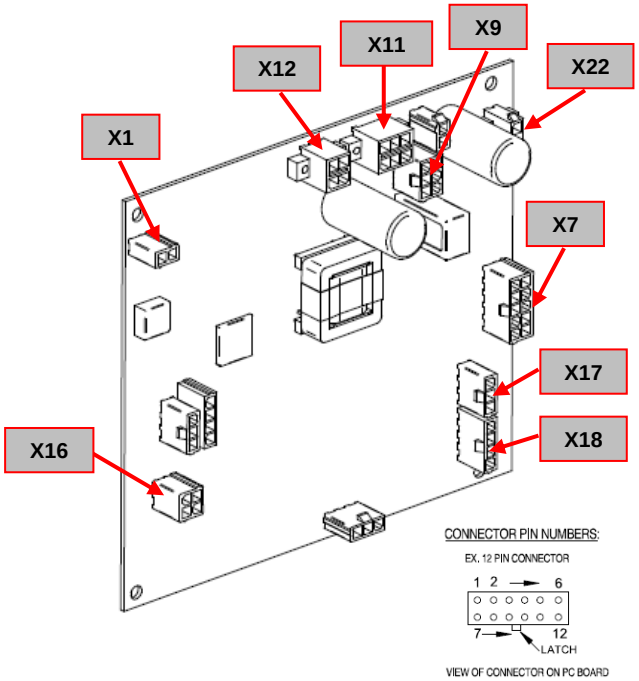


Figure 1a – Feeder Control Board Test points

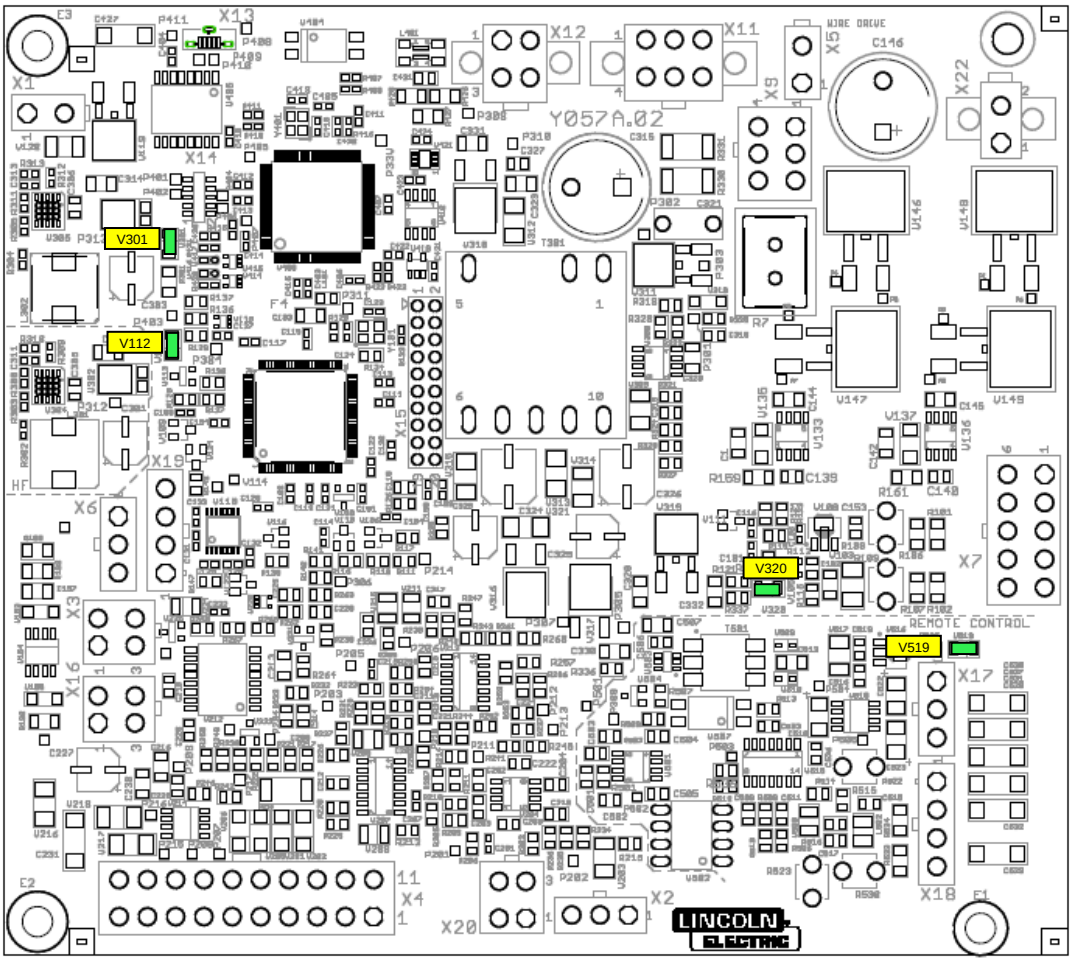


Figure 2 – LEDs location

FEEDER CONTROL BOARD TEST (continued)

TEST PROCEDURE

⚠ **Use always electrically insulate gloves during this test procedure**

1. Remove input power from the wire feed unit.
2. Perform the wire feeder case removal procedure.
3. Located the Feeder Control Board. See **Figure 1**. Do not remove the plugs from the Motor Control Board.
4. Visually check for burned or damaged components. If any components are physically damaged the motor control board has to be replaced.
5. Apply the correct input power to the wire feeder connecting it through control cable to the power source.
6. Using the multimeter perform the tests as indicated in **Test Table 1**. See **Figure 1a** for correct test points location.

LEDs Table

LED	Description	Status	Notes
V301	+24 Vdc	Always ON GREEN	It indicates that the 24Vdc is present
V320	3,3V dc	Always ON (GREEN)	It indicates that the 3,3 V dc is present
V112	Status LED green	Always ON after about 10 seconds from Power ON	Indicated correct machine status
V519	+5Vdc Remote supply voltage	Always ON (GREEN)	It indicates that the remote voltage supply is present

X11: Voltage Supply to User Interface

Pin #	Description	Value	Notes
3	Power supply to UI board	+40Vdc +/- 0,1V	Power supply for the User Interface Board
4			

X7: Feeder Board to Gas Purge/Cold inch Switch

Pin #	Description	Value	Notes
8	Cold inch	+15 Vdc +/-10%	When Gas purge switch is pressed the voltage drops to 0 (zero)
5			
8	Gas purge	+15 Vdc +/-10%	When cold inch switch is pressed the voltage drops to 0 (zero)
3			

X12: Feeder power supply

Pin #	Description	Value	Notes
3	Feeder Power supply from power source	+40Vdc +/- 0,1V	Power supply coming from the power source
4			

X1: Voltage Supply to Gas solenoid

Pin #	Description	Value	Notes
1	Gas solenoid power supply	+22,5 Vdc +/- 10%	This is a PWM signal and the reading can be different from multimeter to multimeter, it is recommended to use the oscilloscope to perform this test -> see picture below
2			

X9: Tachimeter and drive motor supply

Pin #	Description	Value	Notes
1	Drive motor power supply	From 2VDC to 21,5VDC	Press the gun trigger for this test. Expected reading dependent upon WFS setting
3			
4	Tachimeter supply	+5VDC	Tachimeter voltage supply
5			
4	Tachimeter feedback	Approx. 2,5VDC when motor is running	When motor is not running 0VDC or 5VDC Depend upon where the motor is stopped
6			

X16: Illumination Power Supply

Pin #	Description	Value	Notes
1	Internal light power supply	24VDC	Wire drive lamps power supply
4			

USER INTERFACE BOARD TEST

WARNING

Service and repair should be performed by only Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual. If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact your Local Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed.

……

TEST DESCRIPTION

This test will determine if the User Interface board is receiving the correct power supply voltage and if it is working properly. This test will not indicate if the entire board is fuctional.

MATERIALS NEEDED

Torx T25
Multimeter
Feed Wiring diagrams

USER INTERFACE BOARD TEST (continued)

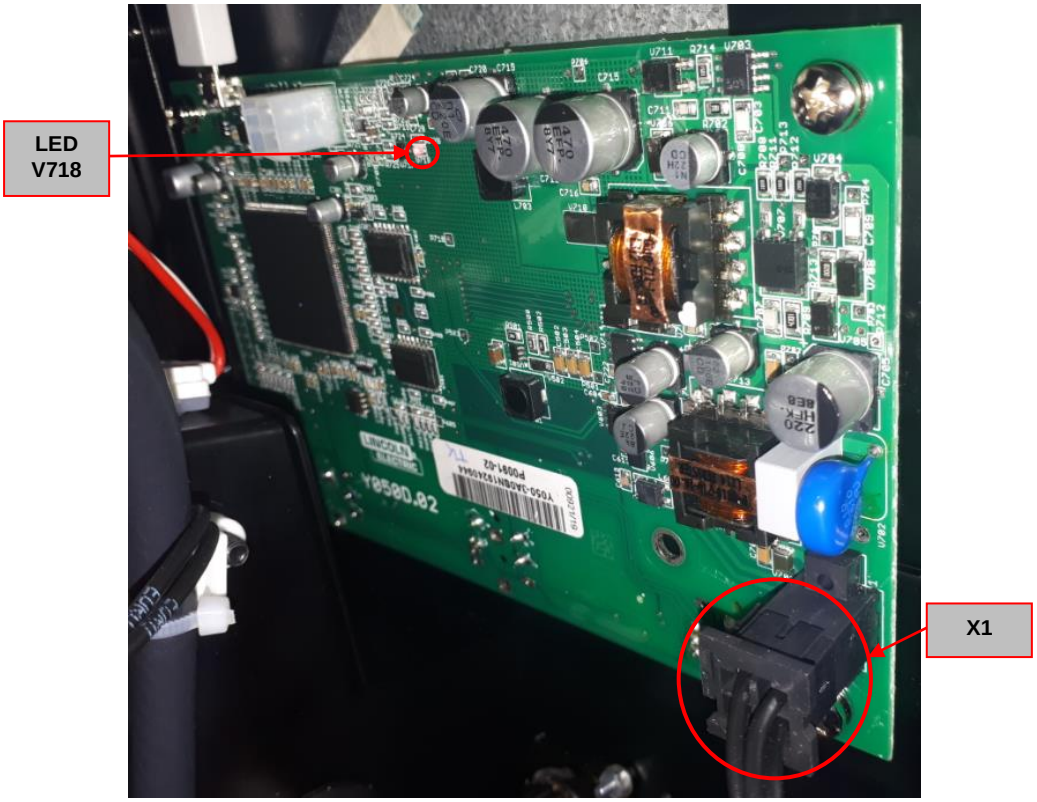


Figure 1 – PF 56D User Interface component

TEST PROCEDURE

⚠ **Use always electrically insulate gloves during this test procedure**

1. Remove input power from the wire feed unit.
2. Follow the **PF56D** User Interface removal procedure available inside this manual to get access to the connector X1. See **Figure 1.**
3. Do not unplug the User Interface board from the Power Feeder. Keep it connected as indicated in **Figure 1**.
4. Visually check for burned or damaged components. If any components are physically damaged the motor control board has to be replaced.
5. Apply the correct input power to the wire feeder connecting it through control cable to the power source.
6. Locate the User Interface board connector **X1** and using the multimeter perform the tests as indicated in **Test Table 1**.

Test table 1 – LF 56D User Interface Board test

Test Points	*Expected reading*	*PCB LEDs status and color*	*Note*
X1 pin 4(+) to pin 3(-)	40VDC	-	+40VDC power supply from Control Board
-	-	V718 red ON	3,3 Vdc generated by the User Interface board is present

GAS SOLENOID TEST

WARNING

Service and repair should be performed by only Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual. If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact your Local Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed.

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TEST DESCRIPTION

This test will help determine if the gas solenoid is working properly.

MATERIALS NEEDED

Multimeter
Feeder wiring diagrams

GAS SOLENOID TEST (continued)

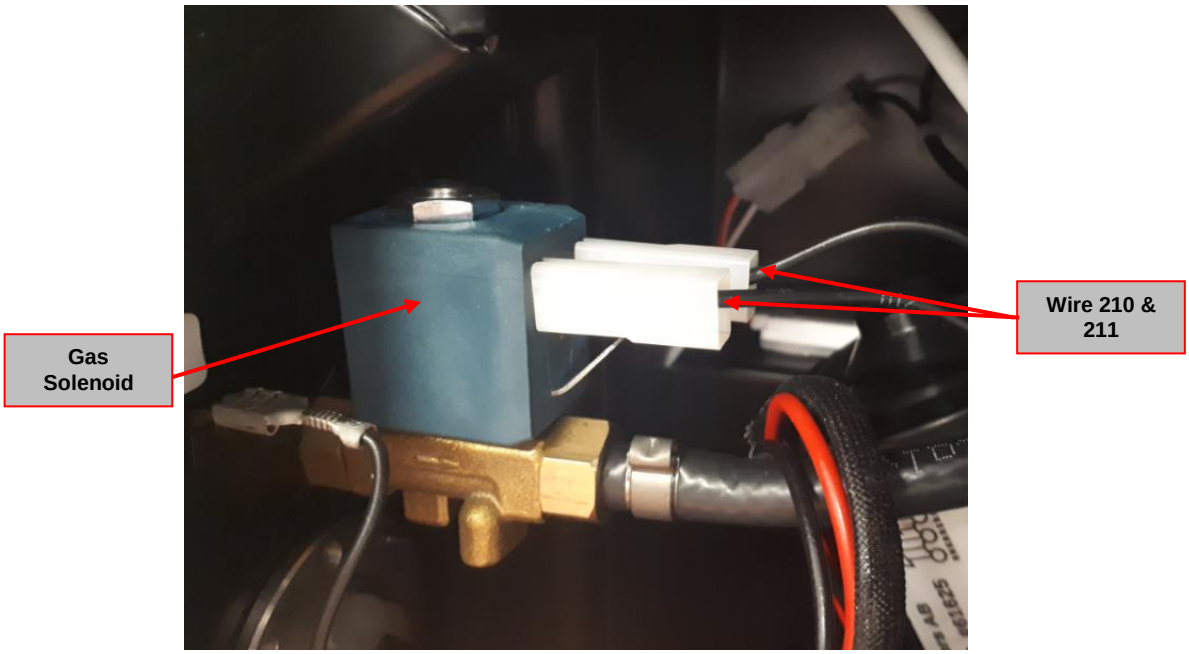


Figure 1 – Gas solenoid location

TEST PROCEDURE

⚠ **Use always electrically insulate gloves during this test procedure**

1. Remove input power from the wire feed unit.
2. Perform the wire feeder case removal procedure.
3. Located the Gas Solenoid. See **Figure 1**.
4. Apply the correct input power to the wire feeder connecting it through control cable to the power source.
5. Whit the gun trigger pressed check the supply voltage at gas solenoid terminals (wire 210 and 211). Normal voltage is 22,5VDC. Gas solenoid is supplied with a PWM signal. If the voltage is present but the gas solenoid is not activated, the gas solenoid may be faulty. Correct coil resistance with wire 210 and 211 disconnected is 55ohms +/- 10%
6. If Voltage is not presend check first for loose or faulty wires connections between gas solenoid and motor control board plug. See wire feeder PF56D wiring diagrams. If connections are good, the Motor Control board may be faulty.

WIRE DRIVE MOTOR TEST

WARNING

Service and repair should be performed by only Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual. If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact your Local Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed.

……

TEST DESCRIPTION

This test will help determine if the wire drive motor receives the correct voltage and if it is capable of working properly.

MATERIALS NEEDED

Multimeter
Feeder wiring diagrams

WIRE DRIVE MOTOR TEST (continued)

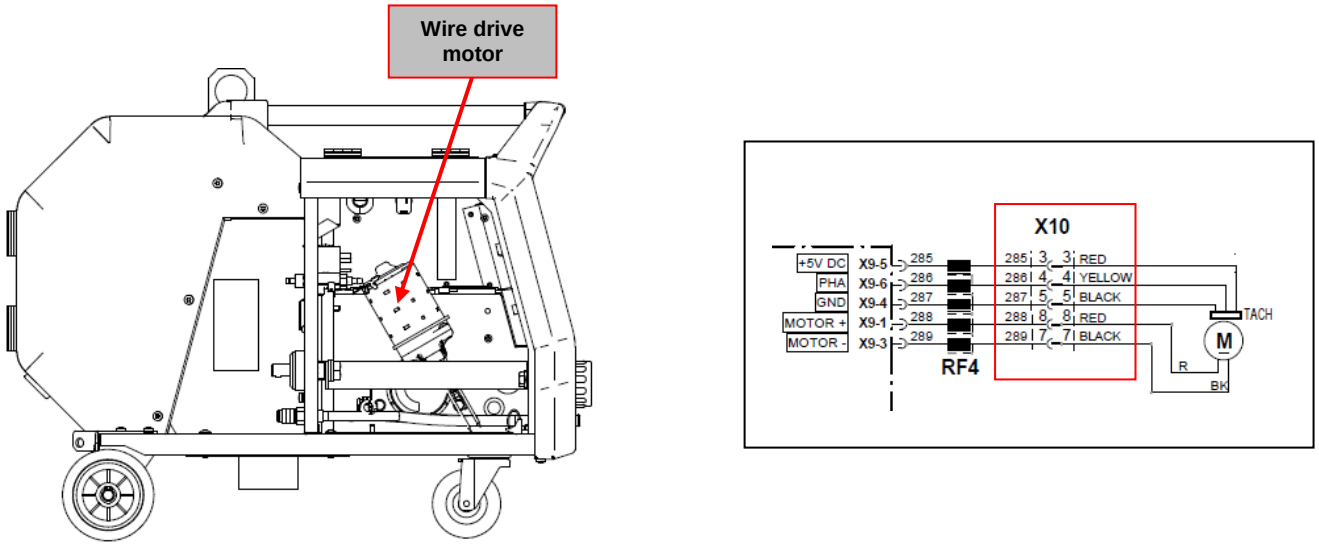


Figure 1 – Wire drive motor location and connectors

TEST PROCEDURE

⚠ **Use always electrically insulate gloves during this test procedure**

1. Remove input power from the wire feed unit.
2. Perform the wire feeder case removal procedure taking care of do not disconnect the Motor Control board harnesses.
3. Located the wire drive motor. See **Figure 1**.
4. Apply the correct input power to the wire feeder connecting it through control cable to the power source.
5. Press the gun trigger and with the motor running check at connector **X10** between pin 8 (wire288) and pin 7 (wire 289), see wiring diagram on **Figure 1**, for approximately 2VDC to 21,5VDC. Reading depends upon Run-in WFS setting on user interface panel.
6. If Voltage is not presend check, first, for loose or faulty wires connections between motor control boards plug and motor plug. See wire feeder wiring diagrams. If connections are good, the Motor Control board may be faulty.
7. If voltage is present but the wire drive motor does not run, the motor may be faulty.
8. If changing the WFS potentiometer setting on user interface the motor does not change the speed, perform the motor control board test and tachimeter test.

WIRE DRIVE MOTOR TACHOMETER TEST

WARNING

Service and repair should be performed by only Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual. If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact your Local Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed.

……

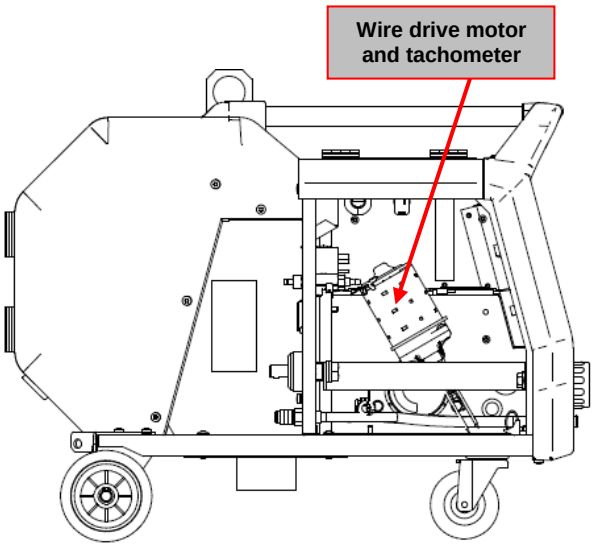
TEST DESCRIPTION

This test will help determine if the tachimeter is correctly supplied by the motor control board and if the tachometer is sending the correct feedback to the motor control board.

MATERIALS NEEDED

Multimeter
Feeder wiring diagram

WIRE DRIVE MOTOR TACHOMETER TEST (continued)



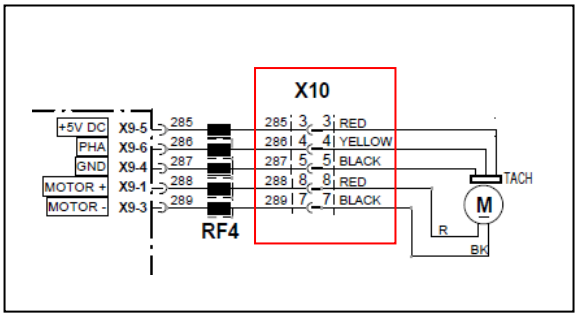


Figure 1 – Wire drive motor and tachometer location

TEST PROCEDURE

⚠ **Use always electrically insulate gloves during this test procedure**

1. Remove input power from the wire feed unit.
9. Perform the wire feeder case removal procedure taking care of do not disconnect the Motor Control board harnesses.
2. Located the wire drive motor. See **Figure 1**.
3. Apply the correct input power to the wire feeder connecting it through control cable to the power source.
4. Check at connector **X10** between pin 3 (wire 285) and pin 5 (wire 287), see wirng diagrams, for approximately 5 VDC. If the 5VDC are missing check, for loose or faulty connection, between connector **X9 or X10** and Motor Control board. If connection are good, may be the Motor Control board is faulty.
5. With the trigger pressed and the motor running check at connector **X10** the tachimeter feedback voltage between pin 4 (wire 286) and pin 5 (wire287). Normal feedback value should be about 2,5VDC. If the correct 5VDC supply are present but the voltage feedback is missing, the tachimeter is faulty.
6. With the motor not running the tachimeter voltage feedback may be 0VDC or 5VDC depending the position where the tachimeter magnet, mounted on the motor axle, has stopped.

DISASSEMBLY OPERATIONS

MOTOR CONTROL BOARD REMOVAL AND REPLACEMENT PROCEDURE

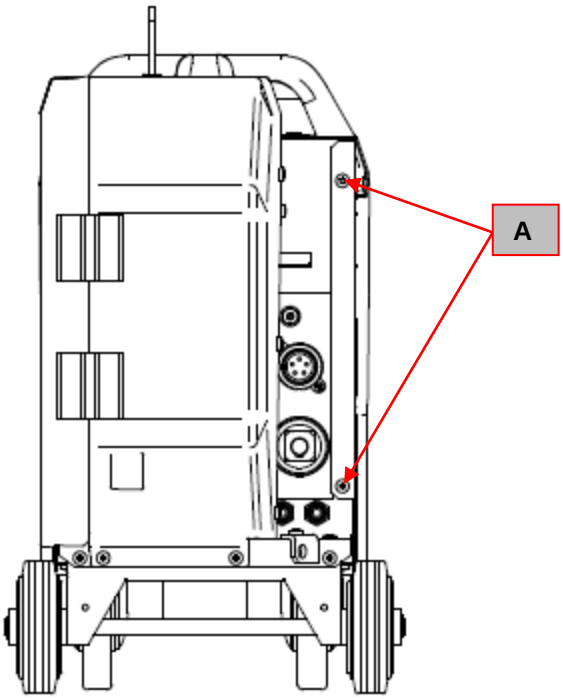


Figure 1

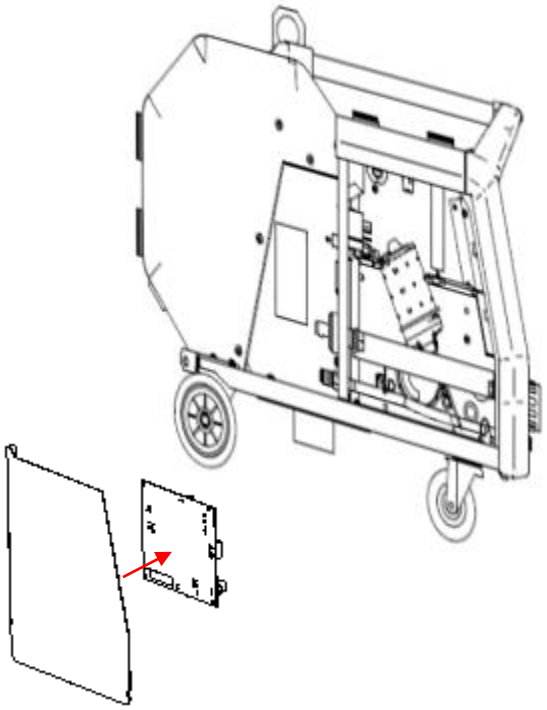


Figure 2 – Motor Control board location

REMOVAL PROCEDURE

Necessary tools:

- Torx T25 wrench
- Screwdriver type PH02

1. Turn the power source ON/OFF switch to OFF position.
2. **Disconnect Input Power from the power source!**
3. Remove the 2 screws (**A**) from the back of the left side feeder panel. **See Figure 1**
4. Slide back carefully the left side panel. Locate the motor control board. **See Figure 2**
5. Unplug, from the Motor Control Board, the connectors **X1, X9, X7, X11, X12, X16, X17, X18, X22**
6. Using screwdriver type PH02 remove the 4 screws from the motor control board corners.
7. Carefully remove the Motor Control board from wire feeder left side panel.
8. **For the new Motor Control board re-assembly operations,** make the previous steps in the reverse order

DISASSEMBLY OPERATIONS (continued)

WIRE DRIVE MOTOR AND WIRE DRIVE PLATE REMOVAL AND REPLACEMENT PROCEDURE

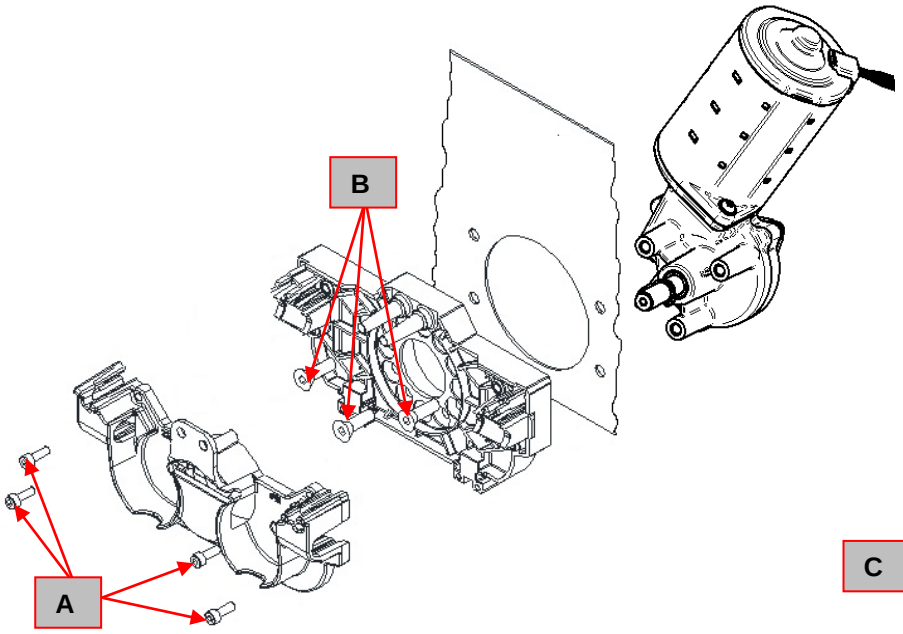


Figure 1

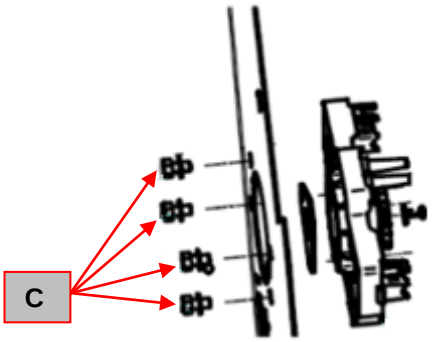


Figure 1a

REMOVAL PROCEDURE

Necessary tools:

- Screwdriver type PH02
- 3 mm allen wrench
- 10 mm wrench

1. Remove main input power from the Wire Feeder.
2. Perform the wire feeder left panel removal procedure disconnecting completely the harnesses from the Motor Control Board
3. Remove the drive rolls from the wire drive
4. Remove the bottom rolls gear wheels.
5. Using the 3mm allen wrench remove the 4 screws (**A**). See **Figure 1**.
6. Remove the half part of the wire drive plate.
7. Remove the cental motor gear wheel.
8. Unplug motor connectors **X10**.
9. Using the PH02 screwdriver remove the 3 screws (**B**), that are fixing the motor to the wire drive. See **Figure 1**.
10. Remove carefully the motor from the Wire Feeder.
11. Using the 10 mm wrench remove the 4 screws (**C**). **See Figure 1a**.
12. Remove the last half of the wire drive plate from the divider panel.
13. **For the new Motor and Wire Drive plate re-assembly operations,** make the previous steps in the reverse order

DISASSEMBLY OPERATIONS (continued)

USER INTERFACE BOARD REMOVAL AND REPLACEMENT PROCEDURE

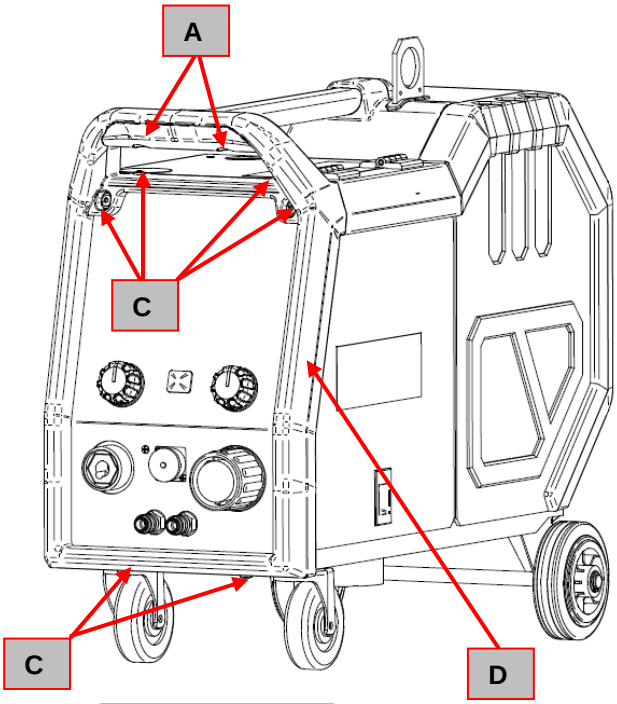


Figure 1

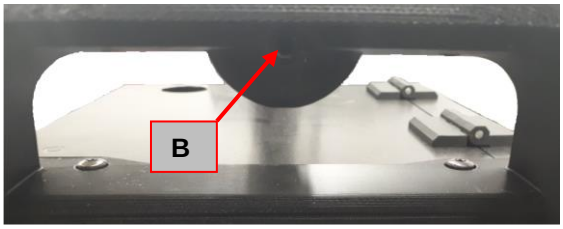


Figure 1a

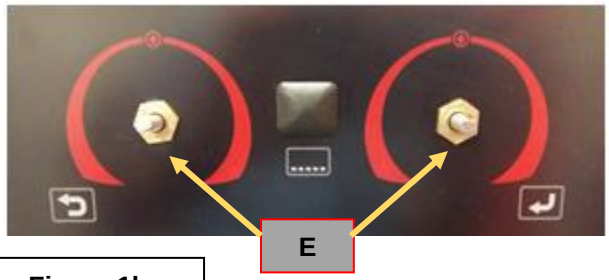


Figure 1b

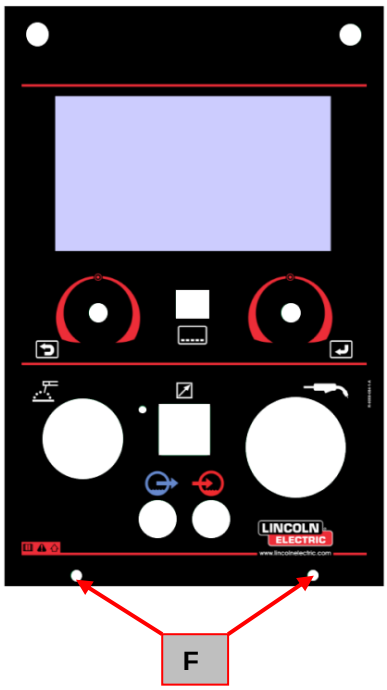


Figure 1c

REMOVAL PROCEDURE

Necessary tools:

- 8mm nut driver
- 14mm wrench
- 2 mm allen wrench
- Torx T25
- PH02 screwdriver

1. Remove main input power from the Wire Feeder.
2. Using the PH02 screwdriver remove the 2 screws (**A**) that are fixing the red small plastic part of the handle. See **Figure 1**
3. Using the PH02 screwdriver remove the screw (**B**) that is fixing the plastic frame to the metal handle. See **Figure 1a**
4. Using the torx T25 wrench remove the 6 screw (**C**). Two on the front upper left and right corners frame, two on the bottom of the front plastic frame and last two on the top of the front plastic frame. See **Figure 1**.
5. Carefully remove the plastic frame (**D**) from the feeder. See **Figure 1**.
6. Using the 2 mm allen wrench remove the two knobs. See **Figure 1b**.
7. Using the 10 mm wrench to remove the two encoder nuts (**E**). See **Figure 1b.**
8. Using the Torx T25 wrench remove the 2 screws (**F**) from the bottom of the plastic front panel. See **Figure 1c**
9. Carefully pull the plastic front panel and remove it.

DISASSEMBLY OPERATIONS (continued)

USER INTERFACE BOARD REMOVAL AND REPLACEMENT PROCEDURE

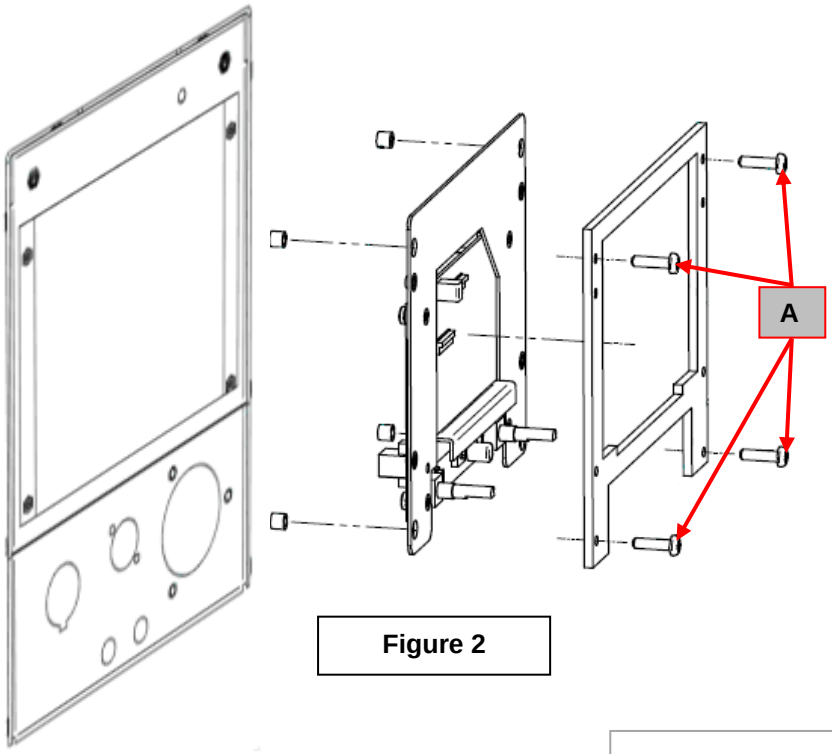


Figure 2

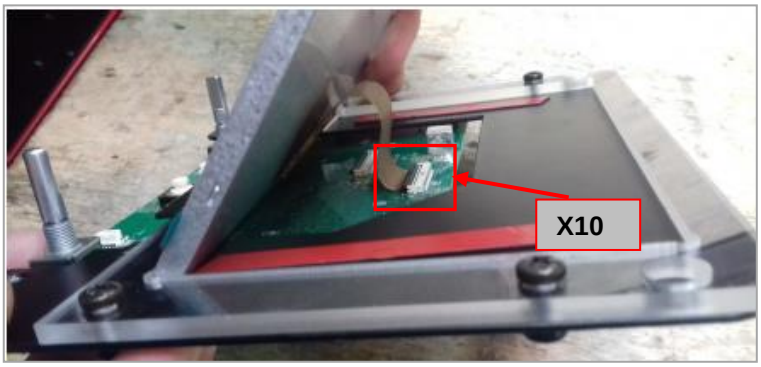


Figure 3

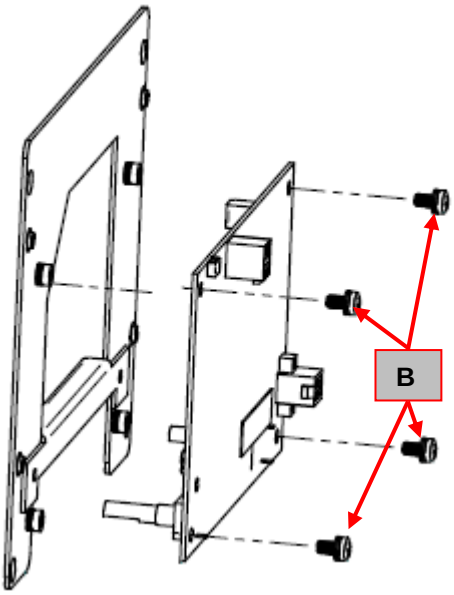


Figure 4

10. Using the torx T25 wrench remove the 4 screw (**A**) that are fixing the User Interface assembly on the Feeder front panel. See **Figure 2**.
11. Pull carefully the User Interface board and disconnect the connector **X1 and X4** from the User Interface.
12. Before doing any other operation remove the 7" LCD screen from the User Interface Board, disconnecting the flat cable from the connector X10. See **Figure 3**.
13. Using the Torx T25 wrench remove the 4 screws (**B**) that are fixing the User Interface Board to the metal frame.
14. Remove the User Interface board from the feeder. See **Figure 4**
15. **For the new User Interface Board re-assembly operations,** make the previous steps in the reverse order

DISASSEMBLY OPERATIONS (continued)

GAS VALVE REMOVAL AND REPLACEMENT PROCEDURE

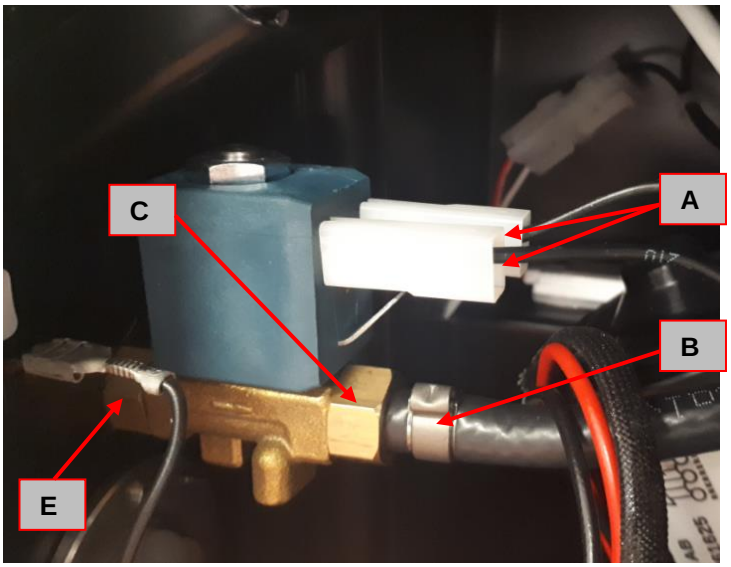


Figure 1

Figure 2

REMOVAL PROCEDURE

Necessary tools:

- 14mm wrench
- Pincers
- Metal clip 10,5 GER (part number 0656-790-105R)
- Threadlocker liquid

1. Remove main input power from the Wire Feeder.
2. Perform the wire feeder case removal procedure.
3. Disconnect the two gas valve supply leads n° 210 and 213 (**A**).
4. Using the pincers remove the metal clip (**B**) and using the 14mm wrench unscrew the couple (**C**). See **Figure 1.**
5. Using the 14 mm wrench remove the quick connect coupling (**D**), see **Figure 2,** and remove the gas valve from the wire feeder.
6. Using the 14mm wrench unscrew the couple (**E**)

For the new gas valve re-assembly operations, make the previous steps in the reverse order, using treadlocker liquid on couple thread (**C**), (**E**) and quick connect coupling thread (**D**).

CALIBRATION PROCEDURE

This calibration has to be performed using the Feeder PF-56D, connected to the machine.

1. Prepare the external reference ammeter (A) and voltmeter (V). Connect a load to output with A and V.

2. Enter to Service Mode: on the feeder, push the right encoder and switch machine on. Release button after end starting.

3. General information: left encoder is used for switch output **on/off** (clockwise: **on**, counter-clockwise: **off**)

4. There are 3 service modes (selected by right encoder and accepted by pushing right button /right encoder/):
a) Selecting test modes (**tESt**)
b) Voltmeter calibration (**CAL U**)
c) Ammeter calibration (**CAL I**)

5. **tESt**: you can select test mode numbers below:
a) **200** (CC)
b) **201** (CV)
c) **202** (CP)
d) **212**

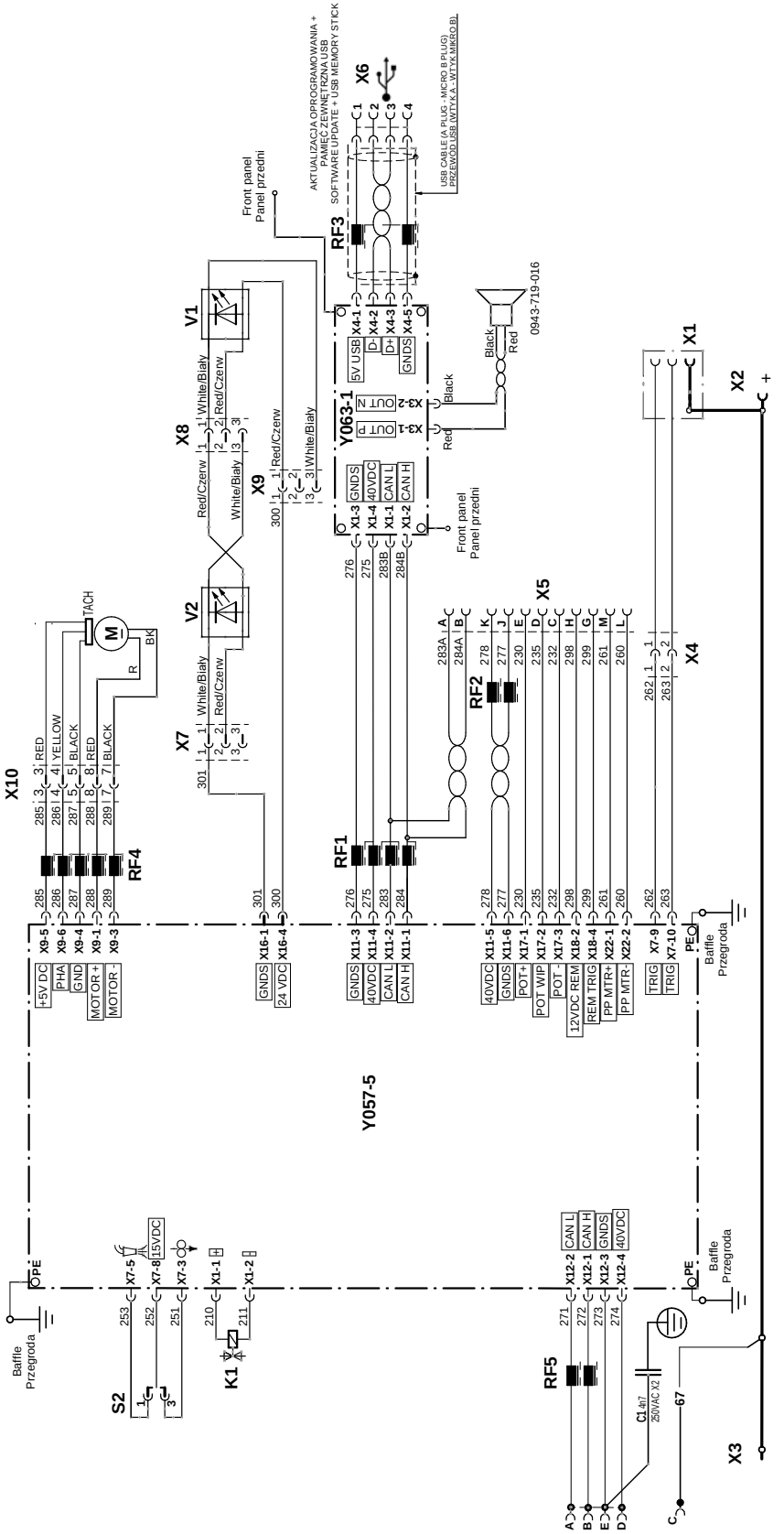
6. **CAL U**: you can follow procedure:
a) Left display shows **rEF** <-> **oFF**
b) Switch the output on: display shows **rEF** <-> **on**
c) Set reference voltage to ca. 25,0V/200A on external meter by turning right encoder and adjusting load
d) Confirm the setting by pushing the right button (right encoder) – machine is switching off
e) Switch the output on: display shows **SEt** <-> **on**
f) Set voltmeter value (on right display) to ca. 25,0V by turning right encoder. **WARNING:** be sure that the setting value is the same as the external reference voltmeter value.
g) Confirm the setting value by pushing the right button (right encoder) – machine is switching off
h) After that machine goes into the service modes selection (point 4)

7. **CAL I**: you can follow procedure:
a) Left display shows **rEF** <-> **oFF**
b) Switch the output on: display shows **rEF** <-> **on**
c) Set reference current to ca. 25,0V/200A on external meter by turning right encoder and adjusting load
d) Confirm the setting by pushing the right button (right encoder) – machine is switching off
e) Switch the output on: display shows **SEt** <-> **on**
f) Set ammeter value (on right display) to ca. 200A by turning right encoder. **WARNING:** be sure that the setting value is the same as the external reference ammeter value
g) Confirm the setting value by pushing the right button (right encoder) – machine is switching off
h) After that machine goes into the service modes selection (point 4)

8. Exit from Service Mode: switch machine off.

ELECTRICAL DIAGRAMS

Schematic Diagram



WIRE COLOURS / OPIS KOLORÓW:

BK: BLACK / CZARNY
Y: YELLOW / ŻÓŁTY
YG: YELLOW-GREEN / ŻÓŁTO-ZIELONY
R: RED / CZERWONY

NOTE

Lincoln Electric Europe