**SVM 3165** Rev.00 06-2021

# LF56D

For use with machines having code number: 50580



# SERVICE MANUAL



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## **TECHNICAL SPECIFICATIONS**

NAME		INDEX			
LF 56D			K143	36-1	
		INF	TUT		
Input Voltage U <sub>1</sub>		Input An	mperes I <sub>1</sub> EMC Class		EMC Class
40Vdc		4A	dc		А
		RATED	OUTPUT		
Duty Cycle 40°C (base	d on a 10	min. period)		Output	Current
100	)%			42	DA
60	%			50	DA
Welding Cu	rrent Rang	je	Pea	ak Open C	ircuit Voltage
5 ÷ 5	A00			113Vd	c peak
		DIME	NSION		
Weight		Height	Width		Length
17,7 kg	516 mm		302 mm		642 mm
	WIR	E FEED SPEED RA	NGE / WIRE DIAME	TER	
WFS Range	WFS Range Drive		Rolls	s Drive roll diameter	
1.5 ÷ 22 m/min	1.5 ÷ 22 m/min 4		4	Ø37	
Solid Wires Aluminu		m Wires		Cored Wires	
0.8 ÷ 1.6 mm		1.0 ÷ 1	l.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)**

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 tric.

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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.

#### 

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.

#### 

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.





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.
Ĩ	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.
HT I	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	CE COMPLIANCE: This equipment complies with the European Community Directives.
	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.
	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.
	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.
	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.

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	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.
S	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

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

POWERTEC® i350S, POWERTEC® i420S, POWERTEC® i500S, SPEEDTEC® 400SP SPEEDTEC<sup>®</sup> 500SP. FLEXTEC<sup>®</sup> 350x, FLEXTEC<sup>®</sup> 500x.

The CAN 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.

## 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.

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".

## 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.



## **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 2

EURO Socket: For connecting a welding gun (for GMAW, FCAW process).

Coupling Socket: Coolant outlet Quick (supplies cool coolant to the welding gun).



Quick Coupling Socket: Coolant inlet (takes warm coolant from the welding gun).



### 

Maximum coolant pressure is 5 bar.

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

#### 

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

Control Socket: 5 pins socket for connecting a control cable. The CAN protocol is used for communication between the power source and wire feeder.



- Current Socket: For connecting a welding cable.
- Quick Coupling Socket: Coolant inlet (supplies cool coolant from cooler to the welding machine).



- Quick Coupling Socket: Coolant outlet (takes warm coolant from welding machine to cooler).
- Gas Flow Regulator Plug: Gas Flow Regulator can be purchased separately. See "Accessories" section.
- Switch: Cold Inch / Gas Purge: This switch allows wire feeding (wire test) and gas flow (gas test) without switching on the output voltage.
- Transport Holder: For the feeder lifting and transporting using a crane.
- Wire Spool Holder: For wire spool with maximum 16kg weight. Holder allows mounting plastic, steel and fiber spools on the 51mm spindle.

## 

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

Spool with Wire: Not supplied as standard.

Wire Drive: 4-rolls wire drive.

## 

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

#### 

Do not use handle to move the machine during operation.



- <u>Remote Control Socket:</u> For connecting a Remote Control (see "Errore. L'origine riferimento non è stata trovata." chapter).
- <u>USB Port:</u> For connecting the USB memory and software updates.

## **User Interface Advanced (U7)**



- <u>7" display:</u> TFT display shows welding processes parameters.
- Left Control with Active Button: Sets the value in the lower left corner of the display. Cancel selection. Return to the previous menu.
- <u>Right Control with Active Button:</u> Sets the value in the lower right corner of the display. Confirmation of changes.

Button: It enables return to main menu.

User has access to the two different views of interface: Standard view (Figure 5) Advanced view (Figure 6).

To choose the view of interface:

Press the Button [0] or Right Control [0].

Use the Right Control [0] to highlight the "Configuration" icon.

Press the Right Control [0] to confirm decision.

Use the Right Control [0] to highlight "UI look" icon.

Press the Right Control [0] to confirm decision.

Select one of the view (Standard – Figure 5 or Advanced – Figure 6).

Press the button [0] or Left Control [0] to return to main menu.



Figure 6. Advanced view

#### Status Bar.



- A A/B Procedure
- **B** Information about active welding mode
- **C** Trigger torch operating mode (2 step/ 4 step)
- **D** USB Memory Connected
- E Access control is active
- F Cooler status
- G MECHAPULSE™ active
- H Time

Measured value of current (Figure 5) and voltage (Figure 6).

Measured value of voltage.

- Parameter Value (wire feed speed or current) regulated by Left Control [0].
- Parameter Value (voltage, trim) regulated by Right Control [0]. Visualization of Welding Parameters (for synergic modes only).

Welding Parameters Bar.

#### Welding Parameters Bar

The Welding Parameters Bar enables:

Welding process / program selection.

- Gun operating mode selection (2 step/4 step for GMAW, FCAW, GTAW process).
- Add or hide functions and welding parameters user setup.

Change the setup.

## Table 1 Default GMAW and FCAW Welding Parameters Bar

Symbol	Description	
5	Welding process / program selection	
	Support	
Ra-	Trigger torch operating mode (2 step/ 4 step)	
_pril_	Pinch	
e C	Configuration	
	User setup	

### 

Availability of the parameters depend on selected welding program / welding process.

#### Table 2 Default GTAW Welding Parameters Bar

Symbol	Description		
5	Welding process / program selection		
i	Support		
	Hot Start		
	Trigger torch operating mode (2 step/ 4 step)		
2	Configuration		
	User setup		

#### 

Availability of the parameters depend on selected welding program / welding process.

#### Table 3 Default GTAW-P Welding Parameters Bar

Symbol	Description		
70~	Welding process / program selection		
i	Support		
	Pulse Period		
Πл	Background		
	Trigger torch operating mode (2 step/ 4 step)		
e C	Configuration		
	User setup		

## 

Availability of the parameters depend on selected welding program / welding process.

#### Table 4 Default SMAW Welding Parameters Bar

Symbol	Description		
<b>_0</b> _	Welding process / program selection		
	Support		
$\square$	Arc Force		
<u>∧</u>	Hot Start		
e - C	Configuration		
	User setup		

## 

Availability of the parameters depend on selected welding program / welding process.

#### Table 5 Default Gouging Welding Parameters Bar

Symbol	Description		
5	Welding process / program selection		
	Support		
e C	Configuration		
	User setup		

### 

Availability of the parameters depend on selected welding program / welding process.

## Select Welding Program

To select the Welding Program:

Press the button [0] or Right Control [0] to get access of Welding Parameters Bar.

Press the Right Control [0] to highlight "Welding process / program selection"



Use the Right Control [0] to highlight the icon "Select Welding Program"



Figure 9

Use the Right Control [21] to highlight the program number



Press the Right Control [0] to confirm the selection.

## 

The list of available programs depends on the power source.

If user does not know the Welding Program Number, it can be choose manually. In that case please follow below guide:

Welding Process



## 

Depending on the selected process, some steps may be skipped.

## Support

To access the Support Menu:

Press the button [0] or Right Control [0] to get access of Welding Parameters Bar.

Use the Right Control [0] to highlight the icon "Support".



Press the Right Control [0] to confirm the selection.

 Technical Specifications

 Accessories

 Consumables

 Safety

 Welding Variables

Figure 12

The Support Menu enables to get information of the following points: Technicial specification.

Accessories. Welding materials.

Safety guides. Welding variables effect MIG.

## User setup

To access the User Setup:

Press the button [0] or Right Control [0]. Use the Right Control [0] to highlight the icon "User setup".

Press the Right Control [0] to confirm the selection.



The User Setup Menu enables to add the additional function and / or parameters to the Welding Parameters Bar [0] as shown in Table 6.

#### Table 6. User Setup Menu

Symbol	Description
t1 [//	Preflow Time
[]/ t2	Postflow Time
<u>t</u>	Burnback Time
	Spot Welding Settings
00	Run-in WFS
$\mathbf{\Lambda}$	Start Procedure
	Crater Procedure
A)\$B>	A/B Procedure
$\mathbf{M}$	Recall from the User Memory
<b>→</b> M	Save to the User Memory
<b>.</b>	USB Memory
	MECHAPULSE™

## 

To change the parameters or functions value, theirs icons has to be added to the Welding Parameters Bar [29].

To add parameter or function to the Welding Parameters Bar [0]:

Access to the "User Setup" (see the Figure 13).

Use the Right Control [0] to highlight the parameter or function icon which will be added to the Welding Parameters Bar [0], for example Run-in WFS.



Figure 14





Figure 15

- To remove the icon press the Right Control [0] once again.
- To exit from User Setup Menu press the left button [0].

Selected parameter or function were added to the Welding Parameters Bar [0].



To remove selected parameter or function from the Welding Parameters Bar [29]:

Access to the "User Setup".

Use the Right Control [0] to highlight the parameter or function icon which was added to the Welding Parameters Bar [0].



Press the Right Control [0] – selected icon will disappeared from the display bottom.



Selected parameter or function was disappeared from the Welding Parameters Bar [0].



Figure 19

14

#### Parameters and functions description:



Preflow Time - time that shielding gas flows after the torch trigger was pressed before prior to wire feeding.

Regulation range: from 0 seconds (OFF) to 25 seconds. Default settings for non-synergic mode: 0,2s. Default settings for synergic mode: AUTO mode.



Postflow Time - time that shielding gas flows after the welding stopped.

Regulation range: from 0 seconds (OFF) to 25 seconds.

Default settings for non-synergic mode: 0,5s.

Default settings for synergic mode: AUTO mode.



Burnback Time - amount of time that the welding is continued after the wire stops feeding. It prevents the wire from sticking in the puddle and prepares the end of the wire for the next

arc ignition. Regulation range: from OFF to 0,25 seconds. Default settings for non-synergic mode: 0.07s. Default settings for synergic mode: AUTO mode.



Spot Welding Settings - sets the total welding time even if the torch trigger is still pressed. This function does not work in 4-Step Trigger Mode.

Regulation range: from 0 second (OFF) to 120 seconds. Default settings for non-synergic mode: OFF. Default settings for synergic mode: OFF.

#### 

Spot Timer has no effect in 4-Step Trigger Mode.



Run-in WFS - sets the wire feed speed from the time the torch trigger is pressed until an arc is established.

Regulation range: from minimum to 150 in/min (factory default is set at Auto mode).

Default settings for non-synergic mode: OFF.

Default settings for synergic mode: AUTO mode.



Start Procedure - controls the WFS (or value in ampere units) and Volts (or Trim) for a specified time at the beginning of welding. During the start time, the machine will ramp up or down from the Start Procedure to the preset Welding

Procedure. Adjust time range: from 0 seconds (OFF) to 10 seconds. Default settings for non-synergic mode: OFF. Default settings for synergic mode: AUTO mode.



Crater Procedure - controls the WFS (or value in ampere units) and Volts (or Trim) for a specified time at the end of the welding after

the trigger was released. During the crater time, the machine will ramp up or down from the Weld Procedure to the Crater Procedure.

Adjust time range: from 0 seconds (OFF) to 10 seconds. Default settings for non-synergic mode: OFF. Default settings for synergic mode: OFF.



**MECHAPULSE™** - is available for all synergy modes and produces very high quality welds with rippled seam appearance. This effect is achieved by combining two operating points,

two different wire feed speeds related to different arc

welding power.

Table 7 MECHAPULSE<sup>™</sup> Parameters

Symbol	Description		
ЛЛ M	Frequency		
<u>]]]</u>	Offset		
¥ лл	TUNE1		
¥ Ш	TUNE2		

A/B Procedure - enables quick weld procedure change. The sequence changes A)\$B) may occur between:

Two different welding programs. Different settings for the same program.



Recall from the User Memory - recall the stored programs from the user Memory. To recall the Welding Program from the User

Note: Before using, the Welding Program had to be assigned to the user memory

Add the "Load" icon to the Welding Parameters Bar.

Use the Right Control [0] to highlight the "Load" memory icon

Press the Right Control [0] to confirm - the "Load" memory menu is shown on the display.

Use the Right Control [0] to highlight the Memory number from which Welding Program will be recall.

Confirm the selection - press the right button [0].



Save to the User Memory - Store the welding programs with their parameters to one of the fifty user memories. To save in memory:

Add icon "Save to the User Memory" to Welding Parameters Bar.

Use the Right Control [0] to highlight the icon "Save to the User Memory"



Press the Right Control [0] to confirm - "Save to the User Memory" is shown on the display.

Use the Right Control [0] to highlight the memory number where the program will be stored.



Figure 21

Confirm selection – press and hold for 3 second Right Control [0].

•••	12 Steel Ø1.0 ArC02	Save
	44. job 44	
	45. job 45	
	46. job 46	
	47. job 47	
= <b>→</b> M		

Figure 22

Rename job – turn Right Control [0] to select: numbers 0-9, letters A-Z, a-z. Press Right Control [0] to confirm first character of the name.

Next characters should be selected in the same way.

To confirm the name of job and go back to the main menu press button [0] or Left Control [0].



**USB Memory** - when the USB storage device is connected to USB port user have access to (Table 8):

#### Table 8 USB Menu

Symbol	Description
	Save
<b>→</b>	Load

#### Table 9 Save and restore selection

Symbol	Description			
1111	Current Welding Settings			
e - C	Advanced Parameters Configuration (P menu)			
	All welding programs stored in user memory			
M1 : M50	One of the welding programs stored in user memory			

To save data into USB device:

Connect the USB to welding machine.

Add "USB Memory" icon to the Welding Parameters Bar [0].

Use the Right Control [0] to highlight the icon "USB Memory".



Figure 23

Press the Right Control [0] to confirm selection – the USB menu is shown on the display.

Use the Right Control [0] to highlight the icon "Save".



Figure 24



**Save** – the following data can be save on a USB Memory Stick: (Table 9):

Press the Right Control [0] to get access of "Save" option – the save menu is shown on the display.



Figure 25

Create or choose a file in which data copies will be saved. Display shows the Save Data Menu on USB Memory Stick.



Figure 26

Use Right Control [0] to highlight data icon which will be saved in the file on USB Memory Stick. For example: Advanced Parameters Configuration icon.



Press the Right Control [0] to confirm.



To confirm and save the data on USB Memory Stick,

highlight the "Check Mark" icon and then press the Right Control [0].

To exit the "USB Memory" menu – press Left Control [0] or button [0] or disconnect USB Memory Stick from the USB receptacle.



**Load** – restore data from the USB Device to the machine memory.

#### Table 10 Load Menu

Symbol	Description
	Settings
	Video

To load the data from the USB Memory:

Connect the USB to welding machine.

- Add "USB Memory" icon to the Welding parameters bar [0].
- Use the Right Control [0] to highlight the icon "USB Memory".



Figure 29

Press the Right Control [0] to confirm the file selection -"USB memory" menu is shown on the display.

Press the Right Control [0] to get access to "Load" menu – the load menu is shown on the display.



Figure 30

Press the Right Control [0] to get access to "Settings" menu – the "Settings Menu" is shown on the display.



Figure 31

Settings - this option allows you to load.



**Settings**, – this option allows you to load Current Welding Settings, Advanced Parameters Configuration or Welding Programs stored in memory. To load one of

above:

Select file with the data to be loaded into machine. by Right Control [0].



Figure 32

Press the Right Control [0] to confirm the file selection. The display shows the data which can be loaded. Use the Right Control [0] to highlight the data icon.



Figure 33

Press the Right Control [0] to confirm the data selection.



Figure 34

To confirm and load the data from a USB Memory Stick, highlight the "Check Mark" icon and then press the Right Control [0].



Figure 35

To exit from "USB Memory" menu press the Left Control [0] or the button [0] or disconnect USB Memory Stick from the USB receptacle.



**Video** – this option allows you to play video from USB.

To open video file:

Press the Right Control [0] to get access to "Load" menu – the "Load Menu" is shown on the display.



Figure 36

Use the Right Control [0] to highlight the Video icon and confirm by press it.



Figure 37

A list of available video files will be displayed on the screen.



Figure 38

Highlight the file by Right Control [0] and confirm by pressing it.



Figure 39

#### Table 11 Video Player Menu

Symbol	Description
	Play
	Pause
	Stop
	Repeat off
Ŋ	Repeat on
<b>■(</b> ))	Volume
	Mute

Video player Menu navigation:

- Selecting option turn Right Control.
- Confirm by press it.

In any case you can return to selection of files list by Left control [0] press.

## 

Only files provided by Lincoln Electric Company can be played.

## **Settings and Configuration Menu**

To access the Settings and Configuration Menu:

Press the button [0] or Right Control [0] to get access to Welding Parameters Bar.

Use the Right Control [0] to highlight the icon "Configuration".

Press the Right Control [0] to confirm the selection.



Figure 40

#### Table 12 Configuration Menu

Symbol	Description	
I¢ M ≯	Limits of parameters	
•••	Display Configuration Settings	
÷∯÷	Brightness Level	
<del></del> 0	Access control	
	Enable/ Disable Jobs Mode or Select Jobs for Jobs Mode	
	Set the Language	
	Restore Factory Setting	
?	Machine information	
	Advanced Setup	
	Cooler	
° <mark>¢</mark>	Service Menu	
ECO	Green Mode	
	Volume Level	
$\overline{(1)}$	Date / Time	



**Limits** – it allows the operator to set the limits of main welding parameters in selected job. The Operator is able to adjust the parameter value within specified limits.

## 

Limits can be set only for the programs stored in the user memory.

Limits can be set for following parameters: Welding Current Wire Feed Speed Welding Voltage Trim Hot Start Arc Force Pinch Background Pulse Period UltimArc<sup>™</sup> Frequency (SSP) To set the range: Enter to "Configuration" menu. Use Right Control [0] to highlight "Limits" icon.



Figure 41

Press Right Control [0] to confirm. List with available jobs will be presented on the screen.



Use Right Control [0] to highlight the job. Press Right Control [0] to confirm selection.



Use Right Control [0] to choose the parameter which will be changed.

Press Right Control [0] to confirm.

Use Right Control [0] to change the value. Press Right Control [0] to confirm.

Figure 44 shown the change effect of parameter limit values.



Press button [0] to exit with saving changes.



**Display Configuration Settings** 

Two Display configuration are available:

#### **Table 13 Display Configuration Settings**

Symbol	Description			
	Standard UI look			
- Contraction of the second se	Advanced UI look			

To set the Display Configuration: Access to the "Configuration Menu".

Use Right Contro [0] to highlight the "UI look" icon.



Figure 45

Press Right Control [0]. The "UI look" menu is shown on the display.



Figure 46

Use the Right Control [0] to choose the display configuration.



It allows to adjust the display brightness from 1 to 10.

Dis	play	Brightnes	SS	Co	ntr	ol			
			4	4					
1.00								1	0.00
¢,C									

Figure 47



Access control This function allows following activities:

#### **Table 14 Access control**

Symbol	Description		
<b>?</b> ***_	PIN		
	Select Item to lock		
M	Enable/ Disable Jobs Save		
	Enable/ Disable Jobs Mode or Select Jobs for Jobs Mode		



PIN - it allows to set the PIN.

#### To set the PIN:

Access to "Configuration Menu" and then to "Access Control Menu".

Use the Right Control [0] to highlight the "PIN" icon.



Figure 48

Press Right Control [0]. The "Lock" setting menu is shown on the display.



Figure 49

Turn Right Control [0] to select: numbers 0-9.

Press Right Control [0] to confirm first character of the password.

Next characters should be selected in the same way.

## 

After setting last character menu automatically exit.



**Select Item to lock –** it allows to lock/unlock some functions on welding parameters bar. To lock functions:

Access to "Configuration Menu" and then to "Access Control Menu".

Use Right Control [0] to highlight the "Select Item to lock" icon.



Figure 50

Press the Right Control [0]. Lock function menu is presented on the display.

Use the Right Control [0] to highlight the function (for example "Advanced Setup").



Press Right Control [0]. The icon of chosen parameter will disappeared from the lower part of the display (Figure 52). This parameter disappeared from the Welding parameters bar as well [0].



riguie oz

## 

To unlock function user has to perform the same steps as steps to lock function.



Enable/ Disable Jobs Save - it allows to switch off/on save jobs to memory

Access to "Configuration Menu" and then to "Access Control Menu".

Use Right Control [0] to highlight the "Enable/Disable Jobs" icon.



Figure 53

- Press Right Control [0] to confirm. The "Enable/Disable Jobs menu is shown on the display.
- Use the Right Control [0] to highlight the job number. The icon of selected job will disappear from the lower part of the display.



Figure 54

Press Right Control [0]. The icon of the selected program will disappear from the bottom of the display.



Figure 55

## 

The jobs which are disabled can not be used in "Save memory" function – shown Figure 56 (job 2 is not available).



......



Select Jobs for Job Work - it allows to choose which jobs will be enable when Job Mode will be activated.

To select Jobs for Job Work:

- Access to "Configuration Menu" and then to "Access Control Menu".
- Use the Right Control [0] to highlight the icon "Select Jobs for Job Mode".

Select Jobs for Job Mode	
<del></del> 0	
2	
Figuro 57	

Figure 57

Press Right Control [0] to confirm.

Use Right Control [0] to highlight the job number.

Press Right Control [0] to confirm – the icon of chosen parameter will appear on the lower part of the display.



Press button [0] to return to main menu.



has access to operate only with selected jobs.

**WARNING:** First of all user has to select jobs which can be used in Job Mode (*Lock -> Enable/ Disable Jobs Mode* or Select Jobs for Jobs Mode).

### To activate Job Mode:

Access to "Configuration Menu". Use Right Control [0] to highlight the "Job Mode" icon.



Figure 59

- Press Right Control [0]. The Job Mode menu is shown on the display.
- Use Right Control [0] to highlight one of the option shown on the figure below.



Cancel Job Mode





Press Right Control [0] to confirm the selection.

## 

After activated Job Mode the icon of this function will be displayed on the Welding Parameters Bar. Load Memory and Save Memory options will be blocked in this mode. Turkish, Russian, Portuguese).

To set the language:

Access to "Configuration Menu".

Use Right Control [0] to highlight the "Set the Language" icon.



Figure 61

Press the Right Control [0]. The Language Menu is shown on the display.



Figure 62

Use Right Control [0] to choose the Language. Press the Right Control [0] to confirm selection.



**Set the Language** – user can choose interface language (English, Polish, Finnish, French, German, Spanish, Italian, Dutch, Romanian, Slovak, Hungarian, Czech,



**Green Mode** – is a power management feature that enables welding equipment to switch to low power state and reduce power consumption while is not using.

#### WARNING Not apply to Flextec<sup>®</sup> 350x i Flextec<sup>®</sup> 500x.

To adjust this functions: Access to "Configuration Menu". Use Right Control [0] to highlight the "Green Mode" icon.



Figure 63

Press Right Control [0]. The "Green Mode" menu is shown on the display



Figure 64

#### Table 15 Display Configuration Settings

Symbol	Description		
<50W	Standby (default :Off)		
<10W	Shutdown (default :Off)		



To set the time for Standby option:

Press Right Control [0] to enter in to Standby menu By the Right Control [21] set require time from 10-300min

range or Off this function. Press Right Control [21] to confirm.



When machine is under Standby mode any action on user interface or trigger activates normal work of welding machine



**Shutdown** – this option allows you to reduce energy consumption to the level below 10W when the welding equipment is unused.

To set the time when Shutdown option will be

turn on: Press Right Control [21] to enter in to Shutdown menu By the Right Control [0] set require time from 10-300min

range or Off this function. Press Right Control [0] to confirm.



Operating system inform you 15s before activate Shutdown Mode by time counter.



## 

When machine is under Shutdown mode it is required to switch the machine off and on to activate normal operation.

## 

Under Standby and Shutdown mode display backlight is disable.



Sound volume - It allows to adjust the operation sound level.

To adjust this functions:

Access to "Configuration Menu".

Use the Right Control [0] to highlight the "Volume level icon.

Press the Right Control [0]. The Volume Level Menu is shown on the display.



Figure 68

By the Right Control [0] set require time volume level from 1-10 range or Off this function.

Press Right Control [0] to confirm.



Figure 69

Notification system sound volume is separated from video player volume level.



**Date / Time** – It allows to setup current date and time.

To set date and time: Access to "Configuration Menu". Use Right Control [0] to highlight the "Date / Time" icon. Press the Right Control [0]. The Date / Time Menu is shown on the display.



By the Right Control [0] select one of the date or time components you want to change.

Press Right Control [0] to confirm, chosen cell will blink. By the Right Control [0] set require value.

Press Right Control [0] to confirm. Date / Time Settings 2020 - 04 - 25 (14:59)

Figure 71

Setuped time will be displayed on Status Bar [0].



Figure 72

**Restore Factory Setting** 

#### 

After Factory Settings restore, the settings stored in user memory will be deleted.

To restore factory settings: Access to "Configuration Menu".

Access to "Configuration Ment

Use the Right Control [0] to highlight the "Restore Factory Settings" icon.



Figure 73

Press the Right Control [0]. The "Restore Factory Settings" icon is presented on the display. Use the Right Control [0] to highlight the "Check Mark".



Figure 74

 Press the Right Control [0] to confirm selection. The factory settings are restored.



## Machine information

Available information: Software Version. Hardware Version. Welding Software. Machine IP Address.



## Advanced Setup

This menu enables access to the configuration parameters of the device. To set the configuration parameters:

Access to "Configuration Menu".

Use Right Control [0] to highlight the "Advance setup" icon.



Press the Right Control [0]. The "Advance Manu" is shown on the display.

Use the Right Control [0] to highlight the parameter number which will be changed, for example P.1 allows change WFS units, factory default: m/min.

P.9 Crater Delay	
P.7 Gun Offset Adjustment	
P.5 Procedure change method	
P.4 Recall memory with trigger	
P.1 Wire feed speed units	m/min
P.0 Exit	
2	
Figure 76	

Press Right Control [0].

Use Right Control [0] to highlight the in/min (English/Imperial).

P.9 Crater Delay	
P.7 Gun Offset Adjustment	
P.5 Procedure change	in/min
P.4 Recall memory wit	m/min
P.1 Wire feed speed units	m/min
P.0 Exit	
2	

Figure 77

Press the Right Control [0] to confirm selection.

 Table 16 The Configuration Parameters

P.0	The Menu Exit	Exit from menu
P.1	Wire Feed Speed (WFS) units	Enables change WFS units: "m/min" (factory default) "in/min"
P.4	Recall Memory with Trigger	<ul> <li>This option allows a memory to be recalled by quickly pulling and releasing the gun trigger:</li> <li>"Enable" = Selecting memories 2 through 50 by quickly pulling and releasing the gun trigger. To recall a memory with the gun trigger, quickly pull and release the trigger the number of times that correspond to the memory number. For example, to recall memory 3, quickly pull and release the trigger 3 times. Trigger memory recall can only be performed when the system is not welding.</li> <li>"Disable" (factory default) = Memory selection is performed only by the Panel Buttons.</li> </ul>
P.5	Procedure change method	<ul> <li>This option selects how remote procedure selection (A/B) will be made. The following methods can be used to remotely change the selected procedure:</li> <li>"External Switch" (factory default) = Dual Procedure selection may only be performed by the Cross-switch gun or remote control.</li> <li>"Quick Trigger" = Allows switching between Procedure A and procedure B while welding with 2-stroke mode. To operate: <ul> <li>Set welding parameters for procedure A nd B (see the A/B Procedure in Welding Parameters Bar.).</li> <li>Start the weld by pulling the gun trigger. The system will weld with procedure A settings.</li> <li>While welding, quickly release and then pull the gun trigger. The system will switch to procedure B settings. Repeat to switch back to procedure A settings. The procedure can be changed as many times as needed during the weld.</li> <li>Release the trigger to stop welding. When the next weld is made, the system will start again with procedure A.</li> </ul> </li> </ul>
P.7	Gun Offset Adjustment	<ul> <li>This option adjusts the wire feed speed calibration of the pull motor of a push-pull gun. This should only be performed when other possible corrections do not solve any push-pull feeding problems. An rpm meter is required to perform the pull gun motor offset calibration. To perform the calibration procedure do the following: <ol> <li>Release the pressure arm on both the pull and push wire drives.</li> <li>Set the wire feed speed to 5,08m/min.</li> <li>Remove wire from the pull wire drive.</li> <li>Hold an rpm meter to the drive roll in the pull gun.</li> <li>Pull the trigger on the push-pull gun.</li> <li>Measure the rpm of the pull motor. The rpm should be between 115 and 125 rpm. If necessary, decrease the calibration setting to slow the pull motor, or increase the calibration setting to speed up the motor.</li> </ol> </li> </ul>
P.9	Crater Delay	This option is used to skip the Crater sequence when making short tack welds. If the trigger is released before the timer expires, Crater will be bypassed and the weld will end. If the trigger is released after the timer expires, the Crater sequence will function normally (if enabled). OFF (0) to 10.0 seconds (default = Off)

P.17	Remote Control Type	<ul> <li>This option selects the type of analog remote control being used.</li> <li>"Push-Pull Gun" = Use this setting while MIG welding with a push-pull gun that uses a potentiometer for wire feed speed control.</li> <li>"TIG Amp Control" = Use this setting while TIG welding with a foot or hand current control device (Amptrol). While TIG welding, the Left Control on the User Interface sets the maximum current obtained when the TIG amp control is at its maximum setting.</li> <li>"Stick/Gouge Rem." = Use this setting while stick welding or gouging with a remote output control device. While stick welding, the upper left Control on the User Interface sets the maximum current obtained when the stick remote is at its maximum setting.</li> <li>"All Mode Remote" = This setting allows the remote control to function in all weld modes which is how most machines with 6-pin and 7-pin remote control connections operate.</li> <li>"Joystick MIG Gun" = Use this setting while MIG welding with a push MIG gun with a joystick control. Stick, TIG and gouge welding currents is set using the User Interface</li> </ul>
P.20	Display Trim as Volts	<ul> <li>Determines how trim is displayed</li> <li>"No" (factory default) = The trim value is displayed in the format defined in the weld set.</li> <li>"Yes" = All trim values are displayed as a voltage.</li> <li>Note: This option may not be available on all machines. The power source must support this functionality, or this option will not appear in the menu.</li> </ul>
P.22	Arc Start/Loss Error Time	This option can be used to optionally shut off output if an arc is not established, or is lost for a specified amount of time. Error 269 will be displayed if the machine times out. If the value is set to OFF, machine output will not be turned off if an arc is not established or arc is lost. The trigger can be used to hot feed the wire (default). If a value is set, the machine output will shut off if an arc is not established within the specified amount of time after the trigger is pulled or if the trigger remains pulled after an arc is lost. To prevent nuisance errors, set Arc Start/Loss Error Time to an appropriate value after considering all welding parameters (run-in wire feed speed, weld wire feed speed, electrical stick out, etc.). <b>Note:</b> This parameter is disabled while welding in Stick, TIG or Gouge.
P.25	Joystick Configuration	<ul> <li>This option can be used to change the behavior of the left and right joystick positions:</li> <li>"Disable Joystick" = The joystick does not function.</li> <li>"WFS/Trim" = The left and right joystick positions will adjust Arc Length Trim, Arc Voltage, based on the selected weld mode.</li> <li>"WFS/Job"(memory) = The left and right joystick positions will: Select a user memory while not welding.</li> <li>"WFS/Proced. A-B" = The left and right joystick positions will be used to select procedure A and B, while welding and while not welding. The left joystick position selects procedure A, the right joystick position selects procedure B.</li> <li>Note: In all configurations other than "Disable Joystick", the up and down joystick positions will adjust the wire feed speed, while welding and while not welding.</li> </ul>
P.80	Sense From Studs	Use this option for diagnostic purposes only. When power is cycled, this option is automatically reset to False. "False" (default) = Voltage sensing is automatically determined by the selected weld mode and other machine settings. "True" = Voltage sensing is forced to "studs" of the power source.
P.81	Electrode Polarity	Used switches for configuration of the work and electrode sense leads: "Positive" (default) = Most GMAW welding procedures use Electrode Positive welding. "Negative" = Most GTAW and some inner shield procedures use Electrode Negative welding.
P.99	Show Test Modes?	Uses for calibration and tests: "Cancel" (factory default) = Turned off; "Accept" = Allows selection of test modes. <b>Note:</b> After the device has been restarted the test weld modes are hidden.

F	9.323	System Update	This parameter is active when a USB memory is connected to the USB port. "Cancel" = Returns to the configuration parameters menu; "Accept" = Starts the update process.

\*Note: The list of available Configuration Parameters depends on the power source.



Cooler Menu

WARNING Cooler Menu is available when cooler is connected.

# WARNING Not apply to Flextec<sup>®</sup> 350x and Flextec<sup>®</sup> 500x.



Figure 78

#### Table 17 Cooler Menu

Symbol	Description
****	Settings
	Filling



**Settings of the cooler –** this function allows following cooler modes:

### Table 18. Settings of the cooler modes

Symbol	Description
	Automatic
0	Off
	On

For more details please refer to a cooler instruction manual.



#### Service Menu

It allows the access to special service functions.

### 

Service Menu is available when USB storage device is connected.



Figure 79

#### Table 19 Service Menu

Symbol	Description
	Service weld logs
	Weld History
ÍÔ	SnapShot



**Service weld logs -** allows recording of the welding which were used during welding.

#### To access the menu:

Make sure that the USB device is connected to welding machine.

Access to "Configuration Menu".

- Use the Right Control [0] to highlight the "Service Menu" icon.
- Press the Right Control [0] recording process will start.



Figure 80

Press Right Control [0] to continue.



Figure 81

Press the Left Control [0] or button [0] to exit. Recording icon will appear on the Status bar [0].



## 

To stop recording please move to Service Menu and press the Service weld logs icon again.



Weld History – after recording, welding parameters are saved into the USB device folder.

To access the Welding history: Make sure that the USB device is connected. Access to "Configuration Menu". Go to the "Service Menu"  $\rightarrow$  "Weld History".



Figure 82

Press the Right Control [0] to get access of "Weld History " – the list of recorded parameters: Weld number Average WFS Average current [A]

Average voltage [V] Arc time [s] Welding program number Job number/name Make sure that the USB device is connected. Go to Configuration  $\rightarrow$  Service Menu  $\rightarrow$  Snapshot.



Figure 83

Press the Right Control [0] to start Snapshot process.

Snapshot. Please wait . . .

Snapshot in progress

Progress 8%

Figure 84



**SnapShot** – create a file that contains detailed configuration and debugging information collected from each module. This file can be sent to Lincoln Electric Support to

troubleshoot any possible issues that cannot be easily resolved by the user.

To obtain a SnapShot:

## Welding GMAW, FCAW-GS and FCAW-SS Process in non-synergic mode

Dracasa	Cas	Program Number					
Process	Gas	Powertec®	Speedtec®	Flextec®			
	ArMIX	2					
GMAW	CO <sub>2</sub>	3	5	10			
	Ar	4					
ECANA CS	ArMIX	7	7	01			
FCAW-03	CO <sub>2</sub>	8		01			
FCAW-SS	-	6	6	80			

Table 20. GMAW and FCAW non-synergic Welding Programs

Note: The list of available programs depends on the power source.

In non-synergic mode wire feed speed and welding voltage are independent parameters and must be set by the user.

Procedure of beginning welding of GMAW, FCAW-GS or FCAW-SS process:

- Connect a recommended Lincoln Electric power source (see "Accessories" chapter).
- Place the welding set close to the work area, in the place that minimize exposure to weld spatter and guarantee avoid sharp bends of torch cable.
- Determine the wire polarity for the wire to be used. Check data sheet of wire to determine the wire polarity.
- Connect output the gun to GMAW, FCAW-GS or FCAW-SS process to Euro Socket [0].
- Connect the work lead to output sockets of the power source and lock it.
- Connect the work lead to the welding piece with the work clamp.
- Install the proper wire.
- Install the proper drive roll.
- Manually push the wire into the gun's liner.
- Make sure, if it is needed (GMAW, FCAW-GS process), that the gas shield has been connected.
- Turn the input power ON.
- Insert the wire into the welding gun.

#### 

Keep the gun cable as straight as possible when loading electrode through cable.

## 

Never use defected gun.

Check gas flow with Gas Purge Switch [0] - GMAW and FCAW-GS process.

Close the wire drive door.

Close the spool wire case.

Select the right welding program. Non-synergic programs are described in the Table 20.

Note: The list of available programs depends on the power source.

Set the welding parameters.

The welding machine is now ready to weld.

## 

The wire drive door and wire spool case have to be completely closed during welding.

## 

Do not kink or pull cable around sharp corners.

By applying the principle of occupational health and safety at welding, welding can be begun.

For 5, 6 and 7 program can set: Wire Feed Speed, WFS The welding voltage Preflow Time/ Postflow Time **Burnback Time** Spotweld Run-in WFS 2-Step/4-Step Polarization Start procedure Crater Wave Control • Pinch

The 2-Step - 4-Step change the function of the gun's triaaer.

- 2 Step trigger operation turns welding on and off in direct response to the trigger. Welding process is performed when the gun's trigger is pulled.
- 4-Step mode allows to continue welding, when the gun's trigger is released. To stop welding, the gun's trigger is pulled again. 4-step mode facilitates to make long welds.

Note: 4-Step does not work during Spot Welding.





**Pinch** controls the arc characteristics when short-arc welding. Increasing Pinch Control results in a crisper arc (more spatter) while decreasing provides a softer arc (less spatter).

Adjust range: from -10 to +10. Factory default, Pinch is OFF.

Pinch			
		Off	
-10.0		Off	10.0
	_prnL		

Figure 87

## Welding GMAW and FCAW-GS Process in synergic mode CV

Wire material	Gas	Wire diameter [mm]						
wire material		0.8	0.9	1.0	1.2	1.32	1.4	1.6
Steel	CO <sub>2</sub>	11		13	15			19
Steel	ArMIX	10		12	14	16	17	18
Stainless	ArMIX	25		26	27			
Aluminum AISi	Ar				30			32
Aluminum AIMg	Ar				31			33
Metal Core	ArMIX			20	21		22	23
Cored Wire	CO <sub>2</sub>				42			
Cored Wire	ArMIX			40	41			
Si Bronze	Ar	35		36				

#### Table 21. Exemplify GMAW and FCAW-GS synergic programs for POWERTEC®

## Table 22. Exemplify GMAW and FCAW-GS synergic programs for SPEEDTEC®

Wire material	Gas	Wire diameter [mm]						
wire material		0.8	0.9	1.0	1.2	1.32	1.4	1.6
Steel	CO <sub>2</sub>	93		10	20			105
Steel	ArMIX	94		11	21	156	25	107
Stainless	ArMIX	61		31	41			
Aluminum AlSi	Ar				71			73
Aluminum AlMg	Ar				75			77
Metal Core	ArMIX				81		83	85
Cored Wire	ArMIX				91			
Si Bronze	Ar	190		191				

#### Table 23. Exemplify GMAW and FCAW-GS synergic programs for FLEXTEC®

Wire motorial	Can	Wire diameter [mm]						
wire material	Gas	0.030	0.035	0.040	0.045	3/64	0.052	1/16
Steel	CO <sub>2</sub>	12	15	18	21		24	
Steel	ArMIX	11	14	17	20		23	26
Stainless	ArMIX	30	34		38			41
Aluminum AlSi	Ar/He/CO <sub>2</sub>	31	35		39			
Aluminum AlMg	Ar		48			50		52
Metal Core	Ar		54			56		58
Cored Wire	ArMIX				70		72	74
Cored Wire	CO <sub>2</sub>				83		85	87
Si Bronze	ArMIX				82		84	86

Note: The list of available programs depends on the power source.

In synergic mode, the welding voltage is not set directly by user. The correct welding voltage will be set by the machine's software.

Optimal voltage value is related to the input data: Wire Feed Speed, WFS.

If it is needed, the welding voltage can be adjusted by the Right Control [0]. When the Right Control is rotated, the display will show a positive or negative bar indication if the voltage is above or below the optimal voltage.

Voltage setup above optimal value



Voltage setup at optimal voltage



Voltage setup above optimal voltage



Additionally can manually set:
Preflow Time/ Postflow Time
Burnback
Spotweld
Run-In WFS
Start procedure
Crater
2-Step/4-Step
MECHAPULSE™
Wave Control
Pinch

The 2-Step - 4-Step change the function of the gun's trigger.

- 2 Step trigger operation turns welding on and off in direct response to the trigger. Welding process is performed when the gun's trigger is pulled.
- 4-Step mode allows to continue welding, when the gun's trigger is released. To stop welding, the gun's trigger is pulled again. 4-step mode facilitates to make long welds.

Note: 4-Step does not work during Spot Welding.





**Pinch** controls the arc characteristics when short-arc welding. Increasing Pinch Control results in a crisper arc (more spatter) while decreasing provides a softer arc (less spatter).

Adjust range: from -10 to +10. Factory default, Pinch is OFF.

Pinch		
	Off	
-10.0	Off	10.0

Figure 90.
## Welding High Penetration Speed (HPS) Process in synergic mode

#### Table 24 Exemplify synergic programs for HPS

Wire motorial	Gas	Wire diameter [mm]						
wire material	Gas	0.8	0.9 1.0 1.2 1	1.32	1.4	1.6		
Steel	ArMIX			117	127			

Note: The list of available programs depends on the power source.

In synergic mode, the welding voltage is not set directly by user. The correct welding voltage will be set by the machine's software.

Optimal voltage value is related to the input data: Wire Feed Speed, WFS.

**HPS** is a modified welding process designed by Lincoln Electric that combines the advantages of the spray and short arc modes.

Lower welding voltage than in the classic spray arc mode cause lower energy and more concentrated arc.

Advantages:

The possibility of welding with long stick out.

Concentrated arc that increases penetration.

Reduction of workpiece distortion (lower voltage = input less energy into the weld).

Increased productivity (higher welding speed and reduced requirements for preparing the material for welding).

Additionally can manually set: Preflow Time/ Postflow Time Burnback Spotweld Run-In WFS Start procedure Crater 2-Step/4-Step MECHAPULSE™ Wave Control Pinch

The 2-Step - 4-Step change the function of the gun's trigger.

- 2 Step trigger operation turns welding on and off in direct response to the trigger. Welding process is performed when the gun's trigger is pulled.
- 4-Step mode allows to continue welding, when the gun's trigger is released. To stop welding, the gun's trigger is pulled again. 4-step mode facilitates to make long welds.

Note: 4-Step does not work during Spot Welding.





**Pinch** controls the arc characteristics when short-arc welding. Increasing Pinch Control results in a crisper arc (more spatter) while decreasing provides a softer arc (less spatter).

Adjust range: from -10 to +10. Factory default, Pinch is OFF.



## Welding Speed Short Arc (SSA) Process in synergic mode

Wire motorial	Can	Wire diameter [mm]						
wire material	Gas	0.8 0.9 1.0 1.2 1.32					1.4	1.6
Steel	ArMIX	97		15	24			
Stainless	ArMIX	65		35	45			

#### Table 25. Exemplify synergic programs for SSA FOR SPEEDTEC®

**Note:** The list of available programs depends on the power source.

In synergic mode, the welding voltage is not set directly by user. The correct welding voltage will be set by the machine's software.

Optimal voltage value is related to input data: Wire Feed Speed, WFS.

**Speed Short Arc (SSA)** provides greater comprehensiveness during steel and stainless welding. Up to fast arc control during increasing the wire feeding speed, standard short arc naturally shifts to SSA mode, extending the range of the short arc to higher current and prevents the globular mode, which is characterized by high spattering and higher energy than short arc.

#### Advantages:

Reduction of welded material distortions (less energy introduced into the weld).

- Wider range of feeding speed with maintaining the short arc.
- Reduction of spattering in comparison to standard CV mode.
- Fume reduction in comparison to the standard CV mode (up to 25% less).

Additionally can manually set: Preflow Time/ Postflow Time Burnback Spotweld Run-In WFS Start procedure Crater 2-Step/4-Step MECHAPULSE™ Wave Control Pinch

The 2-Step - 4-Step changes the function of the gun's trigger.

- 2 Step trigger operation turns welding on and off in direct response to the trigger. Welding process is performed when the gun's trigger is pulled.
- 4-Step mode allows to continue welding, when the gun's trigger is released. To stop welding, the gun's trigger is pulled again. 4-step mode facilitates to make long welds.

Note: 4-Step does not work during Spot Welding.





Figure 95

**Pinch** controls the arc characteristics when short-arc welding. Increasing Pinch Control results in a crisper arc (more spatter) while decreasing provides a softer arc (less spatter).

Adjust range: from -10 to +10. Factory default, Pinch is OFF.



#### Welding GMAW-P Process in synergic mode Table 26. Exemplify GMAW-P programs for SPEEDTEC®

Wire motorial	Can	Wire diameter [mm]						
wire material	Gas	0.8	0.9	1.0	1.2	1.32	1.4	1.6
Steel	ArMIX	95		12	22	157	26	108
Stainless	ArMIX	66		36	46			56
Metal Core	ArMIX						84	
Aluminum AlSi	Ar				72			74
Aluminum AIMg	Ar			152	76			78
Cored Wire	ArMIX				92			

#### Table 27. Exemplify GMAW-P programs for FLEXTEC®

Wire motorial	Gas	Wire diameter [mm]						
whenaterial	Gas	0.030	0.035	0.040	0.045	3/64	0.052	1/16
Steel	ArMIX		16	19	22		25	27
Stainless	ArMIX		36		40			42
Aluminum AISi	ArMIX		49			51		53
Aluminum AIMg	Ar		55			57		59
Metal Core	Ar				71		73	75

Note: The list of available programs depends on the power source.

Synergic GMAW-P (Pulsed MIG) welding is ideal for low spatter, out of position. During pulse welding, the welding current continuously switches from a low level to a high level and then back again. Each pulse sends a small droplet of molten metal from the wire to the weld puddle.

Wire Feed Speed is the main control parameter. As the Wire Feed Speed is adjusted, the power source adjusts the waveform parameters to maintain good welding characteristics.

Trim is used as a secondary control – the value of parameter in the upper right side of display [26]. The Trim setting adjusts the arc length. Trim is adjustable from 0.50 to 1.50. 1.00 is the nominal setting.

Increasing the Trim value increases the arc length. Decreasing the Trim value decreases the arc length.



When Trim is adjusted, the power source automatically recalculates the voltage, current and time of each part of the pulse waveform for the best result.

Additionally can manually set: Preflow Time/ Postflow Time Burnback Spotweld Run-In WFS Start procedure Crater 2-Step/4-Step MECHAPULSE™ Wave Control UltimArc™

The 2-Step - 4-Step change the function of the gun's trigger.

- 2 Step trigger operation turns welding on and off in direct response to the trigger. Welding process is performed when the gun's trigger is pulled.
- 4-Step mode allows to continue welding, when the gun's trigger is released. To stop welding, the gun's trigger is pulled again. 4-step mode facilitates to make long welds.

Note: 4-Step does not work during Spot Welding.





**UltimArc**<sup>TM</sup> – for pulse welding adjusts the focus or shape of the arc. In consequence of increasing UltimArc<sup>TM</sup> Control value the arc is tight, stiff for high speed sheet metal welding.

Adjust range: from -10 to +10 Factory default, UltimArc<sup>™</sup> is OFF.



- 1. UltimArc<sup>™</sup> Control "-10.0": Low Frequency, Wide.
- 2. UltimArc™ Control OFF: Medium Frequency and Width.
- 3. UltimArc™ Control "+10.0": High Frequency, Focused.

## Welding Soft Silence Pulse (SSP<sup>™</sup>) Process in synergic mode

Wire material	Gao	Wire diameter [mm]						
wire material	Gas	0.8 0.9 1.0 1.2 1.					1.4	1.6
Steel	ArMIX			13	23			
Stainless	ArMIX			39	49			

Note: The list of available programs depends on the power source.

**SSP™** is a modified especially pulse process characterized by a very soft and silent arc. This process is dedicated to welding stainless steel materials and provide much better wetting of the welded edge than the standard pulse.

Soft and quieter characteristic of the arc than standard pulse process, makes welding more enjoyable and less tiring. Additionally the stability afforded by this transfer allows to weld in all positions.

During pulse welding, the welding current continuously switches from low to high level in the loop. Each pulse delivers a small drop of molten metal from the wire to the welding pool.

Wire Feed Speed is the main control parameter. As the Wire Feed Speed is adjusted, the power source adjusts the waveform parameters to maintain good welding characteristics.

Trim is used as a secondary control – the value of parameter in the upper right side of display [26]. The Trim setting adjusts the arc length. Trim is adjustable from 0.50 to 1.50. 1.00 is the nominal setting.

Increasing the Trim value increases the arc length. Decreasing the Trim value decreases the arc length.



When Trim is adjusted, the power source automatically recalculates the voltage, current and time of each part of the pulse waveform for the best result.

Additionally can manually set: Preflow Time/ Postflow Time Burnback Spotweld Run-In WFS Start procedure Crater 2-Step/4-Step MECHAPULSE™ Wave Control Frequency The 2-Step - 4-Step change the function of the gun's trigger.

- 2 Step trigger operation turns welding on and off in direct response to the trigger. Welding process is performed when the gun's trigger is pulled.
- 4-Step mode allows to continue welding, when the gun's trigger is released. To stop welding, the gun's trigger is pulled again. 4-step mode facilitates to make long welds.

Note: 4-Step does not work during Spot Welding.





Figure 104

**Frequency** – for pulse welding adjusts the focus or shape of the arc. In consequence of increasing Frequency control value the arc is tight for high speed sheet metal welding.

Adjust range: from -10 to +10 Factory default, frequency is OFF.





- 1. Frequency Control "-10.0": Low Frequency, Wide.
- 2. Frequency Control OFF: Medium Frequency and Width.
- 3. Frequency Control "+10.0": High Frequency, Focused.

### **MECHAPULSE™** function

**MECHAPULSE<sup>™</sup>** function produces very high quality welds with rippled seam appearance. This effect is achieved by combining two operating points, two different wire feed speeds related to different arc welding power. This function is especially recommended for welding aluminum and thin materials. The different power levels cause input less energy into the workpiece and consequently less distortion.

This function is available for all synergic modes.

The **MECHAPULSE™** function is available in the user settings - see "User Setup" subchapter.

For the **MECHAPULSE**<sup>™</sup> can be set: Frequency Offset TUNE1 TUNE2



**Frequency** - determines the thickness of the stacked. Adjust range from -2 to +2. Default settings: 0



Figure 107







**TUNE** in pulse processes – the arc length is adjusted by TUNE1 and TUNE2.

Regulation range for pulse process: from 0.50 to 1.50 of nominal value.

Default TUNE value: 1.00 (the nominal setting).



Figure 113



**TUNE** in short arc processes (CV) regulates the voltage levels at the higher TUNE1 and lower TUNE2 working points. Regulation range for short arc process (CV): -50% to + 50% of nominal value. Default value: nominal value.

Voltage setup above optimal value



Voltage setup at optimal voltage

Voltage setup above optimal voltage



### Welding SMAW (MMA) Process

#### Table 29. SMAW Welding Programs

	Program number						
Process	Powertec®	Speedtec <sup>®</sup>	Flextec®				
SMAW		1					

**Note:** The list of available programs depends on the power source.

Procedure of begin welding of SMAW process:

- Connect Lincoln Electric source to wire feeder (mentioned in Introduction chapter).
- Determine the electrode polarity for the electrode to be used. Consult the electrode data for this information.
- Depending on the polarity of using electrode, connect the work lead and the electrode holder with lead to output sockets and lock them. See the Table 30.

#### Table 30

			Output Sock	et
		The electrode holder with lead to SMAW	[4]	<del>.</del> .
	(+) C	Power connection lead	Power source	╋
RITY		Work lead	Power source	
POLA		The electrode holder with lead to SMAW	[4]	<u>,</u>
	-) DC	Power connection lead	Power source	
		Work lead	Power source	╋

Connect the work lead to the welding piece with the work clamp.

Install the proper electrode in the electrode holder.

Turn the input power ON.

Set the SMAW welding program.

**Note:** The list of available programs depends on the power source.

Set the welding parameters.

The welding machine is now ready to weld.

By applying the principle of occupational health and safety at welding, welding can be begun.

For 1 program can set: Welding current Switch on / switch off the output voltage on the output lead Wave Controls: ARC FORCE

HOT START

**ARC FORCE** - the output current is temporarily increased to clear short circuit connections between the electrode and the workpiece.

Lower values will provide less short circuit current and a softer arc. Higher settings will provide a higher short circuit current, a more forceful arc and possibly more spatter.

Adjust range: from -10 to +10. Default value: 0 (OFF).



**HOT START** – value in percentage of nominal value welding current during arc start current. The control is used to set the level of the increased current and arc start current is made easy. Adjust range: from 0 to +10.

Default value: +5.



Figure 115

### Welding GTAW / GTAW-PULSE Process

Arc ignition can be achieved only by lift TIG method (contact ignition and lift ignition).

	Program Number				
Proces	Powertec®	Speedtec <sup>®</sup>	Flextec®		
GTAW	-	3			
GTAW-P	-	8	-		

**Note:** The list of available programs depends on the power source.

Procedure of begin welding of GTAW/GTAW-PULSE process:

Connect Lincoln Electric power source that is using for communication CAN protocol.

Connect GTAW torch to Euro Socket [1].

**Note:** To connect GTAW torch, adapter TIG-EURO has to be purchased (See "Accessories" chapter).

Connect the work lead to output sockets of the power source and lock it.

Connect the work lead to the welding piece with the work clamp.

Install the proper tungsten electrode in the GTAW torch. Turn the input power ON.

Set the GTAW or GTAW-P welding program.

**Note:** The list of available programs depends on the power source.

Set the welding parameters.

The welding machine is now ready to weld. **Note:** Arc Ignition is achieved by touching the work piece with the electrode and lifting it by a few millimeters – contact ignition and lift ignition.

By applying the principle of occupational health and safety at welding, welding can be begun.

For program number 3 can be set:

Welding current

Switch on / switch off the output voltage on the output lead **Note:** It does not work in the 4-Step.

Postflow Time 2-Step / 4-Step Start procedure (4-STEP only) Crater Wave Control:

HOT START

For program number 8 can set: Welding current Switch on / switch off the output voltage on the output lead **Note:** It does not work in the 4-Step.

Postflow Time 2-Step / 4-Step Start procedure (4-STEP only) Crater Wave Control

Pulse Period Background current

#### 

Availability of the parameters depend on selected welding program / welding process and welding source. **The 2-Step - 4-Step** change the function of the gun's

trigger.

2 Step trigger operation turns welding on and off in direct response to the trigger. Welding process is performed

when the gun's trigger is pulled.

4-Step mode allows to continue welding, when the gun's trigger is released. To stop welding, the gun's trigger is pulled again. 4-step mode facilitates to make long welds.

Note: 4-Step does not work during Spot Welding.





**HOT START** – value in percentage of nominal value welding current during arc start current. The control is used to set the level of the increased current and arc start current is made easy. Adjust range: from 0 to +10.

Default value: +5.



Figure 118

**Pulse Period** influences the width of the arc and the amount of heat input to the weld. If the value of parameters is lower:

Improves penetration and the microstructure of the weld.

The arc is narrower, more stable. Reduces the amount of heat input to the weld.

Reduces distortions.

Increases welding speed.

Note: Adjust range depend on the power source.

<b>Pulse Period</b>	
	<b>1.00</b> s
Off	2.00
<u> </u>	

Figure 119

**Background Current** - value in percentage of nominal value welding current. Adjusts the overall heat input into the weld. Changing the background current changes the shape of the back bead. Default value: 60%.

Default value: 60%.



Figure 120

## Gouging

## Table 32. The Welding Program – gouging

	Program number					
Process	Powertec®	Flextec®				
Gouging	9					

**Note:** The list of available programs depends on the power source.

For 9th program can set:

Gouging current.

Switch on / switch off the output voltage on the output lead.



Figure 121

#### 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 [0].

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.

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 122

- 30. Locking Nut.
- 31. Adjusting Screw M10.
- 32. 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.

#### 

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 [0]. 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 [0] or use torch trigger until wire appear over threaded end of the gun.

When the Cold Inch Switch [0] 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).

#### 

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

#### 

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

Wire Feeders LF 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 [33].

Release the pressure roll levers [37].

Change the drive rolls [34] corresponding to the used wire.

#### 

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

#### 

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

- The guide tube of the feeding console [35] and [36].
- The guide tube of the Euro Socket [38].

Lock 4 new rolls by turning 4 Quick-Change Carrier Gear [33].

- 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 [37].



#### Gas Connection

#### 

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.

#### 

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

#### 

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 [0]. 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 [0].

#### 

To weld GMAW process with CO<sub>2</sub> shielding gas, CO<sub>2</sub> gas heater should be used.

#### Transport and Lifting



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 [0] can be used to lifting and transporting using a crane only. This solution enables welding while lifting the feeder.



Figure 124

#### Maintenance

#### 

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.

## 

Do not touch electrically live parts.

## 

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

#### 

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.

# Connection configuration







# **MAJOR COMPONENTS LOCATION**

# LF56D

- 1. Motor Board (mounted on the leftside panel)
- 2. Gas Solenoid
- 3. Motor

- 4. Wire Drive
- 5. Reel Hub
- 6. User Interface Board











# **GENERAL DESCRIPTION**

The **LF56D** is a four rolls, digitally controlled, wire feeders that operates on 40 VDC input power. **LF56D** 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. **LF56D** 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

**LF56D** 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.



- 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

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.
- 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.
- 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	<ul> <li>MAKE SURE THAT THE LF52D or LF56D RECEIVE THE 40VDC POWER SUPPLY</li> <li>THE GUN TRIGGER MAY BE DEFECT</li> </ul>	<ul> <li>PERFORME THE MOTOR BOARD TEST</li> <li>CHECK AND REPLACE THE GUN TRIGGER IF NECESSARY</li> </ul>	
NO CONTROL OF WIRE FEED SPEED	<ul> <li>THE TACHIMETER MAY BE FAULTY</li> <li>THE USER INTERFACE BOARD MAY BE MAULTY</li> <li>THE MOTOR BOARD MAY BE FAULTY</li> </ul>	<ul> <li>PERFORM THE TACHIMETER TEST</li> <li>REPLACE THE USER ITERFACE</li> <li>PERFORM THE MOTOR BOARD TEST AND REPLACE IF DEFECT</li> </ul>	
THERE IS NO WELDING OUTPUT WHEN THE GUN TRIGGER IS PRESSED. THE WIRE FEEDS NORMALLY AND THE GAS SOLENOID IS ACTIVATED PROPERLY	<ul> <li>THE ARC LINK CABLES BETWEEN POWER FEED AND POWER SOURCE MAY BE DEFECT.</li> <li>THE MOTOR BOARD MAY BE FAULTY</li> <li>THE POWER SOURCE MAY BE DEFECT</li> </ul>	<ul> <li>CHECK STATUS LED ON POWER SOURCE FOR COMMUNICATION ERROR</li> <li>CHECK THE ARCLINK CABLES FOR GOOD CONTINUITY</li> <li>REPLACE THE MOTOR BOARD</li> <li>PERFORM THE POWER SOURCE TESTS</li> </ul>	
THE WELDING VOLTAGE IS NOT CHANGING WHILE TURNING THE USER INTERFACE VOLTAGE ENCODER	<ul> <li>THE USER INTERFACE MAY BE FAULTY</li> <li>THE MOTOR BOARD MAY BE FAULTY</li> <li>THE POWER SOURCE MAY BE DEFECT</li> </ul>	<ul> <li>REPLACE THE USER INTERFACE</li> <li>REPLACE THE MOTOR BOARD</li> <li>PERFORM THE POWER SOURCE TEST</li> </ul>	
WELDING PROCESS DOES NOT CHANGE WHEN THE LEFT PUSH BUTTON ON THE UI IS PRESSED	<ul> <li>MAY BE A SOFTWARE PROBLEM ON UI IS PRESENT</li> <li>THE BUTTON IS DEFECT</li> </ul>	<ul><li>RE-FLASH FEEDER SOFTWARE</li><li>REPLACE THE UI BOARD</li></ul>	
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	<ul> <li>LOOSE OR FAULTY MOTOR CONNECTION MAY BE PRESENT</li> <li>THE MOTOR BOARD MAY BE FAULTY (NO POWER TO THE MOTOR)</li> </ul>	<ul> <li>CHECK LEADS 288 AND 289 CONNECTIONS FROM MOTOR BOARD CONNECTOR TO MOTOR CONNECTOR (SEE FEEDERS WIRING DIAGRAMS)</li> <li>PERFORM THE MOTOR BOARD TEST</li> </ul>	
NO WIRE FEEDING BUT THE DRIVE ROLLS ARE TURNING	<ul> <li>THE DRIVE ROLLS PRESSURE MAY BE NOT CORRECT</li> <li>THE DRIVE ROLLS OR WIRE GUIDE MAY BE NOT CORRECTLY INSTALLED</li> <li>A MECHANICAL RESCTRICTION MAY BE PRESENT INSIDE THE TORCH</li> <li>THE SPOOL BRAKE TORQUE MAY BE TOO MUCH</li> </ul>	<ul> <li>CHECK THE DRIVE ROLLS FOR CORRECT PRESSURE</li> <li>CHECK THE DRIVE ROLLS AND WIRE GUIDE FOR CORRECT INSTALLATION</li> <li>CHECK THE TORCH LINER, REPLACE IF NECESSARY</li> <li>CHECK THE SPOOL BRAKE TORQUE</li> </ul>	
THE GAS SOLENOID IS NOT ACTIVATED WHEN TRIGGER IS PRESSED, BUT ROLLS ARE TURNING	<ul> <li>THE GAS SOLENOID MAY BE FAULTY</li> <li>THE MOTOR BOARD MAY BE FAULTY (NO POWER TO THE GAS SOLENOID)</li> </ul>	<ul> <li>PERFORM THE GAS SOLENOID TEST</li> <li>PERFORM THE MOTOR BOARD TEST</li> </ul>	
THE COLD INCH/GAS PURGE SWITCH DOES NOT ENABLE THE WIRE DRIVE MOTOR BUT WIRE DRIVE MOTOR IS ACTIVATED WHEN GUN TRIGGER IS PRESSED	<ul> <li>A MECHANICAL DAMAGE ON THE COLD INCH/PURGE SWITCH MAY BE PRESENT</li> <li>CHECK FOR LOOSE OR FAULTY LEAD CONNECTIONS BETWEEN THE COLD INCH/PURGE SWITCH AND MOTOR BOARD CONNECTOR</li> </ul>	<ul> <li>REPLACE THE COLD INCH/PURGE SWITCH IF NECESSARY</li> <li>IF THERE IN MECHANICAL PROBLEMS AND ALL CONNECTIONS ARE OK, THE MOTOR BOARD IS DEFECT; REPLACE IT.</li> </ul>	

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 33 Interface Components**



**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 34 Error codes	5
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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.	<ul> <li>Remove tight bends from the gun and cable.</li> <li>Check that the spindle brake is not too tight.</li> <li>Verify the adequacy of the electrode to the welding process.</li> <li>Verify a high quality electrode is being used.</li> <li>Check drive rolls alignment and gears.</li> <li>Wait for the error to reset and the motor to cool (approximately 1 minute).</li> </ul>
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.

### 

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



## **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.

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#### **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





## TEST PROCEDURE

#### 1 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	$\pm 40$ / dc $\pm 10$	Power supply for the User Interface Board
4	to UI board	14000001/-0,10	Power supply for the Oser Interface Doard

#### X7: Feeder Board to Gas Purge/Cold inch Switch

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

#### X12: Feeder power supply

Pin #	Description	Value	Notes	
3	Feeder Power supply	140)/do 1/ 0.1)/	Dowor output coming from the power opured	
4	from power source	+40VdC +/- 0,1V	Power supply coming from the power source	

#### X1: Voltage Supply to Gas solenoid

Pin #	Description	Value	Notes
1	1 Gas solenoid	+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
2 power supply	,	oscilloscope to perform this test -> see picture below	

#### X9: Tachimeter and drive motor supply

Pin #	Description	Value	Notes	
1	Drive motor	From 2)/DC to 21 5)/DC	Press the gun trigger for this test. Expected reading	
3	power supply		dependent upon WFS setting	
4	Tachimeter			
5	supply	+50DC	rachimeter voltage supply	
4	Tachimeter	Approx. 2,5VDC	When motor is not running 0VDC or 5VDC	
6	feedback	when motor is running	Depend upon where the motor is stopped	

#### X16: Illumination Power Supply

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

## 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 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 - LF 56D User Interface component

## TEST PROCEDURE

#### (1) Use always electrically insulate gloves during this test procedure

- 1. Remove input power from the wire feed unit.
- 2. Follow the **LF56D** 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 Points	Expected reading	PCB LEDs status and color	Note
<b>X1</b> 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

#### Test table 1 – LF 56D 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.

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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)



# 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 550hms +/- 10%
- If Voltage is not presend check first for loose or faulty wires connections between gas solenoid and motor control board plug. See wire feeder LF52D and LF56D wiring diagrams. If connections are good, the Motor Control board may be faulty.

## 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 wire drive motor receives the correct voltage and if it is capable of working properly.

MATERIALS NEEDED

Multimeter Feeder wiring diagrams



## 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.
- 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.
## 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 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





### 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





## **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.
- Carefully remove the Motor Control board from wire feeder left side panel.
  For the new Motor Control board re-assembly operations, make the previous steps in the reverse order

WIRE DRIVE MOTOR AND WIRE DRIVE PLATE REMOVAL AND REPLACEMENT PROCEDURE



## **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

USER INTERFACE BOARD REMOVAL AND REPLACEMENT PROCEDURE







## **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.

USER INTERFACE BOARD REMOVAL AND REPLACEMENT PROCEDURE



- 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

GAS VALVE REMOVAL AND REPLACEMENT PROCEDURE



## **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).

### This calibration has to be performed using the Feeder LF-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.

## Schematic Diagram




