SVM 3075
Rev.00 11-2018

SPEEDTEC® 320CP

For use with machines having code numbers: 50393

SERVICE MANUAL

LINCOLN ELECTRIC EUROPE
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Technical Specifications (K14168-1)

Primary side	
Primary power supply	400V +/- 20%
Primary power supply frequency	50/60Hz
Effective primary consumption	12 A
Maximum primary consumption	18,7 A
Fuse primary	16 A Gg
Maximum apparent power	13,1 KVA
Maximum active power	12,1 KW
Active power in standby (IDLE)	26 W
Efficiency at maximum current	0,86
Power factor at maximum current	0,91
Cos Phi	0,99
Secondary side	
No load voltage (according standard)	74 V
Welding range MIG	10V / 50V
Welding range MMA	15A / 320A
Duty cycle at 100% (10 min cycle at 40°C)	220A
Duty cycle at 60% (6 min cycle at 40°C)	280A MIG / 270A MMA
Duty cycle at maximum current at 40°C	320A (40%)
Wire feeder	
Rollers plate	4 rollers
Wire feeding speed	0,5 – 25,0 m / min
Wire diameter usable	0.6 to 1,2 mm
Weight, type, size of wire spool	300 mm / 20Kg maximum
Maximum pressure of gas	5 bar
Miscellaneous	
Dimensions (LxWxH)	743 x 335,4 x 533,75 mm
Weight	37 Kg
Weight with spool 20kg	58,4 Kg
Operating temperature	- 10°C/+40°C
Storage temperature	- 20°C/+55°C
Torch connection	“European type”
Protection index	IP 23
Insulation class	H
Standard	60974-1 & 60974-5 & 60974-10

Installation and Operator Instructions

General description

SPEEDTEC 320CP is a manual welding set that enables the following:

- MIG-MAG welding with short arc, speed short arc, spray-arc, normal pulsed mode using currents from 15A to 320A.
- SPEEDTEC 320CP work with the water cooler COOLARC 46.
- Feeding different types of wire
  steel, stainless steel, aluminum and special wires
  solid and cored wires
  diameters from 0.6-0.8-1.0-1.2 mm

WELDING SET COMPONENTS

The welding set consists of 4 main components:

1. power source including its primary cable (5m) without plug
2. gas hose kit assembly (2m)
3. work lead (3m)
4. rolls for solid wire V1.0/V1.2
5. USB key containing Instruction Manual

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

Read this entire section before installation or operation of the machine.

WARNING

The plastic handles are not intended for slinging the set.

Stability of the equipment is guaranteed only for an incline of maximum 15°.

Location and Environment

This machine will operate in harsh environments. However, it is important that simple preventative measures are followed to assure long life and reliable operation.

- 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 to and from the air vents. 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 to a minimum.
- This machine has a protection rating of IP23. Keep it dry when possible and do not place it on wet ground or in puddles.
- Locate the machine away from radio controlled machinery. Normal operation may adversely affect the operation of nearby radio controlled machinery, which may result in injury or equipment damage. Read the section on electromagnetic compatibility in this manual.
- Do not operate in areas with an ambient temperature greater than 40°C.

DUTY CYCLE AND OVERHEATING

- Duty cycle is the percentage of 10 minutes at 40°C ambient temperature that the unit can weld at its rated output without overheating.
- If the unit overheats, the output stops and the over temperature light comes On. To correct the situation, wait fifteen minutes for unit to cool.
- Reduce amperage, voltage or duty cycle before starting to weld again.

STARTING UP

The power source is composed with :

1 - Front panel display

2 - European plug for torch
3 - Additional plug for 2 potentiometers torch
4 - Plug for ground cable and polarity inversion
5 - Protection door for wire feeder section
6 - Spool axle, shaft, axle nut
7 - Gas purge button
8 - Cold wire feeding button

9 - Wire driver

Input Supply Connection

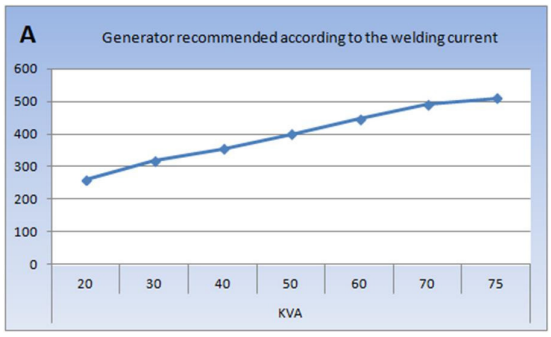
WARNING

Only a qualified electrician can connect the machine to the supply network. Installation the outlet plug to power lead and connecting the welding machine had to be made in accordance with the appropriate National Electrical Code and local regulations.

Check the input voltage, phase, and frequency supplied to this machine before turning it on. Verify the connection of grounding wires from the machine to the input source. **SPEEDTEC 320 CP** can only be connected to a mating grounded receptacle.

Input voltages is 3x400V 50/60Hz. For more information about input supply refer to the technical specification section of this manual and to the rating plate of the machine.

Make sure that the amount of mains power available from the input supply is adequate for normal operation of the machine. The type of protection and cable sizes are indicated in the technical specification section of this manual.



⚠ WARNING

The welding machine can be supplied from a power generator of output power at least 30% larger than input power of the welding machine.
See "Technical Specifications" chapter.

⚠ WARNING

When powering welder from a generator be sure to turn off welding machine first, before generator is shut down, in order to prevent damage to welding machine!

To set up the wire:

Turn the power source off.

Open the door of the wire-feeder unit [5] and ensure that it cannot fall.
Unscrew the spool axle nut. [6].

Insert the spool of wire on the axis. Make sure that the locating pin of the shaft [6] is properly located into the reel locator.
Screw the spool nut [6] back on the shaft, turning it in the direction shown by the arrow.
Lower the lever of wire driver [9] in order to release the rollers.
Take the end of the wire of the spool and cut the distorted end piece.
Straighten the first 15 centimeters of wire.

Insert the wire via the inlet wire-guide of the plate.

Lower the rollers [9] and raise the lever in order to immobilize it.
Adjust the pressure of the rollers on the wire to the correct tension.

Wire feed

The wire feeding button (8) feeds the wire into the torch. The wire feeds over 1s at minimum speed and the speed increases gradually until the set wire speed is reached, but is limited to 12 m/min. The settings may be change at any time; the power source displays the speed.
To feed the wire through the torch. Maintain the wire feeding button (8).

Wire speed can be adjusted with the button on front panel.

To full the gas line or adjust the gas flow. Push the gas bleed button (7).

WIRE DRIVER WEAR PART

The wearing parts of the wire driver, whose role is to guide and advance the welding wire, must be adapted to the type and diameter of the welding wire used. On the other hand, their wear may affect the welding results. Is necessary to replace them.

Connection of the torch

THE MIG WELDING TORCH IS CONNECTED TO THE FRONT OF THE POWER SOURCE, AFTER ENSURING IT HAS BEEN PROPERLY OUTFITTED WITH THE WEAR PARTS CORRESPONDING TO THE WIRE USED FOR WELDING.
For this purpose, please refer to the torch instructions.

Gas inlet connection

The gas inlet is positioned at the rear of the power source. Simply connect it to the pressure-regulator outlet of the gas cylinder.

- Place the gas cylinder on the trolley at the rear of the power source and fasten the bottle using the strap.
- Open the cylinder valve slightly to allow existing impurities to escape and then reclose it.

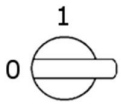
- Mount the pressure regulator/flowmeter. Open the gas cylinder.

During welding, the gas flow rate should be between 10 and 20l/min.

⚠ WARNING

Be sure that the gas cylinder is properly secured on the trolley by attaching the safety strap.

SWITCH ON



The main switch is located at the rear of the power source. **Flip this switch to turn the machine on.**

Note: This switch must never be flipped during welding.
At each start-up, the power source displays the software version and recognized power.

Instructions for use

Front panel functions

Left display: Voltage, Right display: Current/ wire speed /wire thickness	1
Display for selection of welding mode	2
Selector button for welding mode	3
Selector switch for welding process	4
Measurement indicator of displayed values (pre-welding, welding and post-welding data)	5
Led indicator for program mode	6
Encoder voltage setup and navigation	7
Encoder for current, wire speed, metal sheet thickness setup and navigation	8
Display mode indicator current, wire speed, metal sheet thickness	9
Selector button for pre-display and program management	10
Selector switch for type of gas, wire diameter and type of welding wire	11

Calibrate the power source

Step 1: Turn the wire diameter switch to  position and press the  to access the **COnFIG** Setup screen.
Step 2: Select the **CaL** parameter with the left-hand encoder and select **On** with the right-hand encoder.
Step 3: Press the  on the front panel. The display unit indicates **triGEr**.
Step 4: Remove the torch nozzle.
Step 5: Cut the wire.
Step 6: Place the piece in contact with the contact tube.
Step 7: Press the trigger.
Step 8: The display will indicate the value of L (cable inductance).
Step 9: Display the value of R using the right-hand encoder (cable resistance).
Step 10: Exit Setup. 

⚠WARNING
When starting up for the first time, the calibration is an unavoidable step to achieve quality welding. If polarity is reversed, this step must be repeated

Display and use

Synergic mode

The Current, Voltage and Thickness values listed for each wire feed speed setting are provided for information purposes only. They correspond to measurements under given operating conditions, such as position, length of the end section (flat position welding, butt welding).
The units current/voltage displayed correspond to the average measured values, and they may differ from the theoretical values.

Measurement indicator of displayed values :

OFF: pre-welding display of instructions.

ON: Display of measurements (average values).

Flashing: Measurements during welding.

Selection of wire, diameter, gas, welding process

Select the type of wire, the wire diameter, the used welding gas and welding process by turning the appropriate switch.
Selection of the material will determine the available values for diameter, gas and processes.
If synergy doesn't exist, power source displays nOt SYn,GAS SYn,DdIA SYn,oR Pro SYn.

Selection of welding mode, arc length and pre-welding display
Select welding mode 2S, 4S, spot, synergic and manual by pressing  . Arc length can be adjusted with left encoder (7) and pre-welding display adjustment is performed with right encoder (8). The selection of pre-welding preset is performed with press button  .

Manual mode
This is the disengaged mode of the welding machine. Adjustable parameters for it are wire speed, arc voltage and fine setting.
In this mode, only the wire speed value is displayed.

Have to select wire diameter, gas and welding process before starting
welding.

SETUP mode 

Accessing the SETUP:
The SETUP screen can only be accessed when no welding is in progress, by setting the Wire Diameter selector on the front panel to position 1.
It consist in two pull-down menu :
'CYCLE' → Setting for the cycle phases. Refer to table for detail. 'COnFIG' → Power source configuration

Configuring the SETUP:
In SETUP position, select CYCLE or COnFIG by pressing  . Turn the **left-hand** encoder to scroll through the available parameters.
Turn the **right-hand** encoder to set their value.
No welding start. All the changes are saved on exiting the SETUP menu.

List of accessible parameters in COnFIG menu				
Left display	**Right display**	**Step**	**Default**	**Description**
GrE	On -;OFF – Aut		Aut	Configuration of the Water Cooling Unit. 3 possible states : -On : Forced on, watercooler is always activated -OFF : Forced off, watercooler is always deactivated -Aut : Automatic mode, Watercooler works when according need
ScU	nc – no - OFF		OFF	Security of water cooling. 3 possible states : -nc : Normally closed, - no : Normally open, - OFF : Deactivate
Unit	US – CE		CE	Unit displayed for wire speed and thickness: - US : inch unit - CE : meter unit
CPt	OFF– 0,01 – 1,00	0,01 s	0,30	Trigger holding time in order to call program (Only in 2S welding mode). Can be used only for welding program from 50 to 99.
PGM	no – yES		no	Activate / de-activate program management mode
PGA	OFF – ;000 – 020 %	1%	OFF	Use to setup available adjustment range of the following parameters: wire speed, arc voltage, arc dynamics, pulse fine-setting. Use only when program management is activated and programs are locked.
AdJj	Loc – rC		Loc	Select adjustment Wire speed and arc voltage : - Loc : Local on the power source - rC : remote Control or torch potentiometer
CAL	OFF – on		OFF	Calibration of torch & ground harness
L	0 – 50	1 uH	14	Cable choke setting / display
r	0 – 50	1	8	Cable resistor setting / display
SoF	no – yES		no	Software update mode.
FAC	no – yES		no	Factory settings reset. Pressing YeS will cause a reset of the parameters to factory defaults when exit  .

List of accessible parameters in CYCLE menu				
Left display	**Right display**	**Step**	**Default**	**Description**
tPt	00.5 – 10.0	0,1 s	0,5	Spot time. In Spot mode and in Manual mode, the Hot Start, Downslope and sequencer settings cannot be changed
PrG	00.0 – 10.0	0,1 s	0,5	Pre-gas time
tHS	OFF – 00.1 – 10.0	0,1 s	0,1	Hot start time
IHS	-- 70 – 70	1 %	30	Hot start current (wire speed). X% the welding current
UHS	-- 70 – 70	1 %	0	Hot start voltage X% the arc voltage
dYn	--10 + 10 --20 + 20	1 %	0	Fine setting in short arc
rFP	--10 + 10 --20 + 20	1 %	0	Fine setting in pulse
dyA	00 – 100	1	50	Arc striking dynamics at electrode
tSE	OFF – 0.01 – 2.50	0,01 s	OFF	Sequencer time (Sequencer, only in synergic mode)
ISE	---90 + 90	1 %	30	Sequencer current level. X% the welding current
dSt	OFF – 00.1 – 05.0	0,1 s	OFF	Down-slope time
DdSI	-- 70 – 00.0	1 %	-- 30	Down-slope current (wire speed). X% the welding current
dSU	-- 70 – 70	1 %	0	Down-slope voltage. X% the arc voltage
Pr_	0.00 – 0.20	0,01 s	0,05	Anti-stick time
PrS	Nno – yES		no	Pr-Spray activation
PoG	00.0 – 10.0	0,05 s	0,05	Post-gas time

Program management

SPEEDTEC 320 CP allows creating, storing and modifying up to 99 welding programs directly on front panel from program 01 to program 99. This function is activated by moving parameter PGM from no to YES in COnFIG menu.

P00 is the working program in any state. (Program management mode activated or deactivated). When power source is working on this program, the Led indicator “JOB” is switched off. All commutators are accessible in this mode, so it will be used to set programs.

P01 to P99 are program saved, only if program management mode is activated. When power source is working on these programs, the led indicator “JOB” is switched on. In this mode, commutators welding process, wire diameter, gas and metal are not available.
When a program selected has been modified, the indicator “JOB” blinks.

Create and save a program:
These paragraph explains how to create, modify and save a welding program. Hereunder is explained the common menu used.

1. Activate program management mode: → PGM → put YES → exit
2. Set your program with the 4 commutators (4) and (11) then long push
3. Screen displays message as following:

Program call with trigger

This function allows to chain from 2 to 10 programs. This function is available in 4S welding mode only and program management mode has to be activated

Program chaining:
The function program call works with programs from P50 to P99 by ten.
P50→P59 ; P60→P69 ; P70→P79 ; P80→P89 ; P90→P99

Select first program with which you want to begin your chain. Then during welding, each time you will push trigger, program will change.
To chain less than ten programs, in the program following end of loop desired put a different parameter (As synergy or welding cycle).

It is possible to setup time of trigger push to detect change of program chain : → CPT → put value from 1 to 100 → exit

Example: Create a program list from P50 to P55 (6 programs).

3. In program P56, put different welding cycle or synergy than P55 in order to finish chain
4. Select program P50 (First program for start of welding
5. Start welding
6. Each time trigger will be pushed, power source will change program until P55. When chain is finished, power source will restart to P50.

Maintenance

General

Twice a year, depending on the use of the device, inspect the following:

- cleanliness of the power source
- electrical and gas connections
- Perform calibration of the current and voltage settings.
- Check electrical connections of the power, control and power supply circuits.
- Check the condition of insulation, cables, connections and pipes.

Perform a compressed air cleaning

⇨

⚠ WARNING

Never carry out cleaning or repair work inside the device before making sure that the unit has been completely disconnected from the mains.

Dismantle the generator panels and use suction to remove dust and metal particles accumulated between the magnetic circuits and the windings of the transformer.

Work must be performed using a plastic tip to avoid damage to the insulation of the windings.

At each start-up of the welding unit and prior to calling customer support for technical servicing, please check that:

Power terminals are not improperly tightened.
The selected mains voltage is correct.
There is proper gas flow.
Type and diameter of the wire. Torch condition.

Torch

REGULARLY CHECK THE PROPER TIGHTNESS OF THE CONNECTIONS OF THE WELDING CURRENT SUPPLY. MECHANICAL STRESSES RELATED TO THERMAL SHOCKS TEND TO LOOSEN SOME PARTS OF THE TORCH, PARTICULARLY:

The contact tube
The coaxial cable
The welding nozzle
The quick connector

Check that the gasket of the gas inlet spigot is in good condition.
Remove the spatter between the contact tube and the nozzle and between the nozzle and the skirt. Spatter is easier to remove if the procedure is repeated at short intervals.
Do not use hard tools that may scratch the surface of these parts and cause spatter to become attached to it.

Blow out the liner after each change of a spool of wire. Carry out this procedure from the side of the quick fitting connector plug of the torch.
If necessary, replace the wire inlet guide of the torch. Severe wear of the wire guide may cause gas leaks towards the rear of the torch.
The contact tubes are designed for long use. Nevertheless, the passage of wire causes them to wear off, widening the bore more than the permissible tolerances for good contact between the tube and the wire.
The need to replace them becomes clear when the metal transfer process becomes unstable, all the settings of the work parameters remaining otherwise normal.

Rollers and wire guide

UNDER NORMAL CONDITIONS OF USE, THESE ACCESSORIES HAVE A LONG SERVICEABLE LIFE BEFORE THEIR REPLACEMENT BECOMES NECESSARY.
Sometimes, however, after being used over a period of time, excessive wear or clogging due to adhering deposits may be noted.
To minimize such harmful effects, make sure the wire feeder plate remains clean. The motor reduction unit requires no maintenance.

⚠ WARNING

For any maintenance or repair operations it is recommended to contact the nearest technical service center or Lincoln Electric. Maintenance or repairs performed by unauthorized service centers or personnel will null and void the manufacturer's warranty.

The frequency of the maintenance operations may vary in accordance with the working environment. Any noticeable damage should be reported immediately.

- Check cables and connections integrity. Replace, if necessary.
- Keep clean the machine. Use a soft dry cloth to clean the external case, especially the airflow inlet / outlet louvers.

⚠ WARNING

Do not open this machine and do not introduce anything into its openings. Power supply must be disconnected from the machine before each maintenance and service. After each repair, perform proper tests to ensure safety.

Output Connections

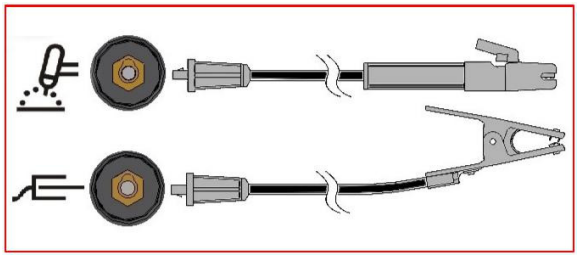
A quick disconnect system using Twist-Mate™ cable plugs is used for the welding cable connections. Refer to the following sections for more information on connecting the machine for operation of stick welding (MMA) or TIG welding.
7. Positive Quick Disconnect: Positive output connector for the welding circuit.
(-) Negative Quick Disconnect: Negative output connector for the welding circuit.

Stick Welding (MMA)

First determine the proper electrode polarity for the electrode to be used. Consult the electrode data for this information. Then connect the output cables to the output terminals of the machine for the selected polarity.

Shown here is the connection method for DC(+)

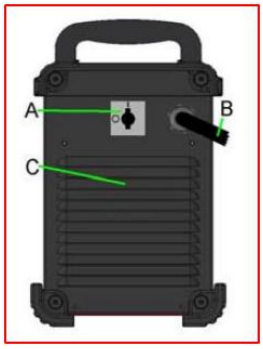
welding. Connect the electrode cable to the (+) terminal and the work clamp to the (-) terminal. Insert the connector with the key lining up with the keyway and rotate approximately ¼ turn clockwise. Do not over tighten. For DC(-) welding, switch the cable connections at the machine so that the electrode cable is connected to (-) and the work clamp is connected to (+).



Remote Control Connection

Refer to the accessories section for a list of remote controls. If a remote control is used, it will be connected to the remote connector on the front of the machine. The machine will automatically detect the remote control, turn on the REMOTE LED, and switch to remote control mode. More information on this mode of operation will be given in the next section.

Other Controls and Features



NEW

A: Power Switch: It turns ON/OFF the input power to the machine.
B: Input cable: Connect it to the mains.
C: Fan. This machine has a F.A.N. (Fan As Needed) circuitry inside: the fan is automatically turned ON or OFF. This feature reduces the amount of dirt which can be drawn inside the machine and reduces power consumption. When the machine is turned ON the fan will turn ON. The fan will continue to run whenever the machine is welding. If the machine doesn't weld for more than five minutes, the fan will turn OFF.
D: Water Cooler Connection SPEEDTEC 320CP work with the water cooler COOLARC 46 (see "Accessories" chapter).

⚠ WARNING

Read and understand the cooler manual before connecting it to the power source.
Before connecting cooler, refer to the manual of wire feeder.

The **COOLARC 46** is supplied by welding power source using 9-PIN socket.
Input voltages is 400V, 50/60Hz. Make sure that the supply voltage of the unit matches the cooler's rated voltage.

To connect the water cooler **COOLARC 46** to the power source:

- Turn off the power source and disconnect input plug.
- Remove the cap from the Water Cooler Supply Socket.
- Insert 9-pin plug of the water cooler power lead into the Water Cooler Power Supply Socket.

⚠ WARNING

Do not switch on the welding power source with the cooler applied if the reservoir was not filled and the torch's/gun's hoses are disconnected from the cooling unit. The no observance of this warning may be cause internal damages at the cooler unit.

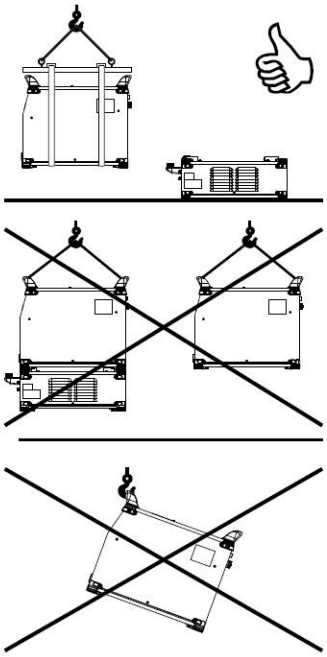
Transport & Lifting

⚠ WARNING

Falling equipment can cause injury and damage to unit.

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

- Power source does not include the eye bolt which can be used to transport or lifting the machine.
- To lift use of suitable lifting equipment capacity.
- To lifting and transport use a travers and minimum two belts.
- Lift only power source without gas cylinder, cooler and wire feeder, or/and any other accessories.



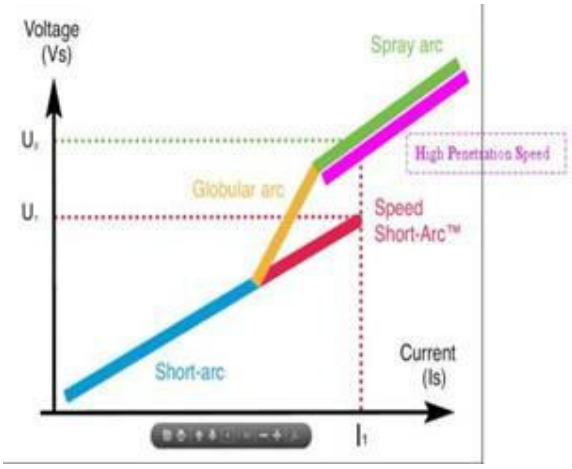
Presentation of welding processes

For carbon and stainless steel,**SPEEDTEC 320CP** uses 2 types of short arc:
“soft” or “smooth” short arc

The “dynamic” short arc or « SSA ».

PULSED MIG MAY BE USED ON ALL TYPES OF METAL (STEEL, STAINLESS STEEL AND ALUMINIUM) WITH SOLID WIRES AND SOME CORED WIRES. IT IS PARTICULARLY SUITABLE FOR STAINLESS STEEL AND ALUMINIUM, FOR WHICH IT IS THE IDEAL PROCESS, ELIMINATING SPATTER AND ACHIEVING EXCELLENT WIRE FUSION.

Characteristics of the power source arc



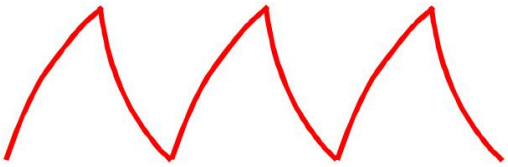
“Soft” or “Smooth” short arc (SA)

The “soft” short arc achieves **great reduction in spatter** when welding carbon steels, resulting in a very significant reduction in finishing costs.

It improves the appearance of the weld bead thanks to improved wetting of the molten pool.

The “soft” short arc is suitable for welding in all positions. An increase in wire feed speed enables entering spray arc mode without preventing transition into globular mode.

Waveform of short arc welding process



Note: The “soft” short arc is slightly more energetic than the "speed" short arc. Consequently the “speed” short arc may be preferable to the "soft" short arc for welding very thin sheets (≤ 1 mm) or for welding penetration passes.

“Dynamic” short arc or “Speed Short Arc” (SSA)

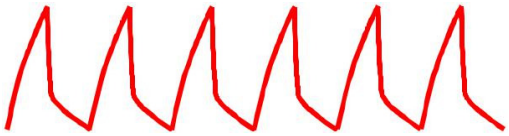
+

The Speed Short Arc or SSA allows greater versatility in welding carbon and stainless steels and absorbs fluctuations in the welder’s hand movements, for example when welding in a difficult position. It also helps compensate for differences in the preparation of the work pieces.

By increasing the wire feed speed, the SA mode enters seamlessly into SSA mode, while preventing the globular mode.

Thanks to its quick arc control and using appropriate programming, **SPEEDTEC 320CP** can artificially extend the Short Arc range to higher currents, in the range of the **speed short arc**.

Waveform of speed short arc welding process



By eliminating the "globular" arc mode, which is characterized by heavy and sticky spatter and higher energy than the short arc, the speed short arc enables to:

Reduce the amount of distortions at high welding currents in the typical "globular" welding range
Reduce the amount of spatter compared to the globular mode
Achieve good weld appearance
Reduce smoke emissions compared with the usual modes (up to 25% less)
Achieve good rounded penetration
Enable welding in all positions

Note: The CO_2 programs automatically and exclusively use the “soft” short arc and do not enable access to the speed short arc. The “dynamic” short arc is not suitable for CO_2, welding due to arc instability.

NORMAL Pulsed MIG PULSE

Metal transfer in the arc takes place by detachment of droplets caused by current pulses. The microprocessor calculates all the Pulsed MIG parameters for each wire speed, to ensure superior welding and striking results.

The advantages of pulsed Mig are :

Reduced distortions at high welding currents in the customary "globular" welding and spray arc
ranges Enables all welding positions
Excellent fusion of stainless steel and aluminum wires
Almost complete elimination of spatter and hence of finishing
work good bead appearance
Reduced smoke emissions compared with customary methods and even-speed short-arc (up to 50% less);

Pulsed **SPEEDTEC 320CP** programs for stainless steel eliminate the small spatter that may occur on thin sheets at very low wire feed speeds. These "balls" are caused by slight spraying of the metal at the time of droplet detachment. The extent of this phenomenon depends on the type and origin of the wires.

These programs for stainless steel have undergone improvements for operation at low currents and increasing the flexibility of use for thin sheet welding using Pulsed MIG method.

Excellent results for welding thin stainless steel sheets (1 mm) are obtained using the pulsed MIG method with Ø 1 mm wire in M12 or M11 shield (average 30A is acceptable).

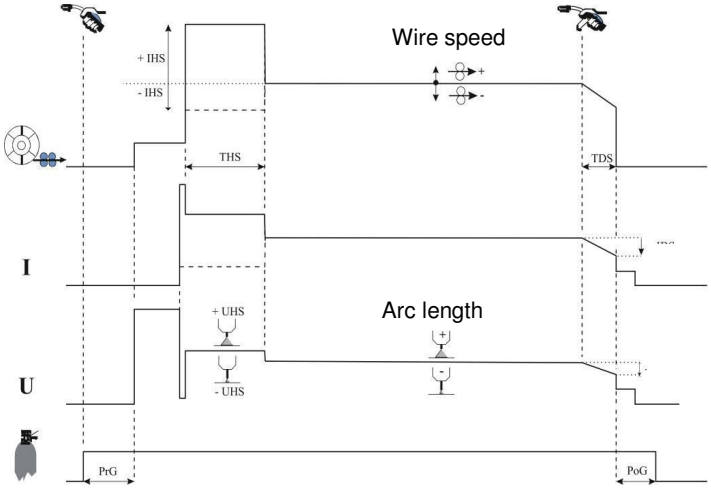
The appearance of joints processed using, **SPEEDTEC 320CP** is of a quality comparable with that achieved by TIG welding.

Advanced welding cycle

Step cycle 2S

Pressing the trigger activates wire feed and pre-gas and turns on the welding current.. Releasing the trigger causes the welding to stop.

The Hot Start cycle is validated by the **tHS OFF** parameter in the general Cycle submenu of the  . It enables starting the welding with a current peak that facilitates striking.
The down-slope enables weld bead finish with a decreasing level of welding.

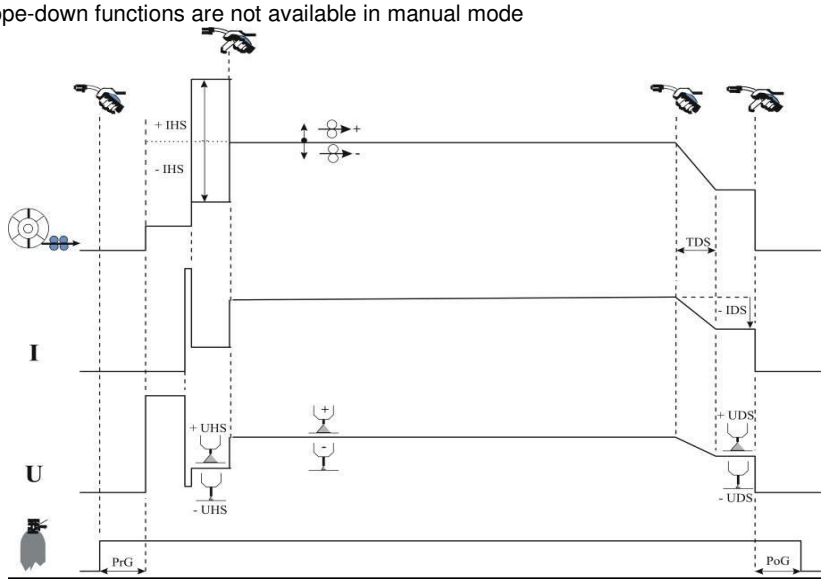


Step cycle 4S

Pulling the trigger the first time activates the pre-gas, followed by Hot Start. Releasing the trigger starts the welding.
If HOT START is not active, welding will start immediately after pre-gas. In such a case, releasing the trigger (2nd step) will have no effect, and the welding cycle will continue.

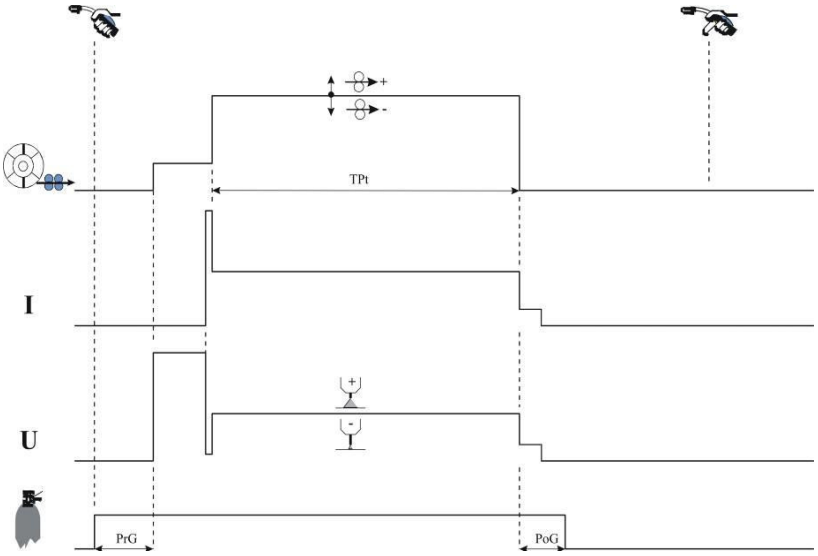
Pressing the trigger in the welding phase (3rd step) enables control of the duration of the down-slope and anti-crater functions, according to the pre-programmed time delay.
If there is no down-slope, releasing the trigger will immediately switch into post-gas (as programmed in the Setup).

In 4-Step mode (4S), releasing the trigger stops the anti-crater function if slope-down is ENABLED.
If slope-down is DISABLED, releasing the trigger will stop the POST-GAS.
The Hot Start and slope-down functions are not available in manual mode



Spot cycle (…)

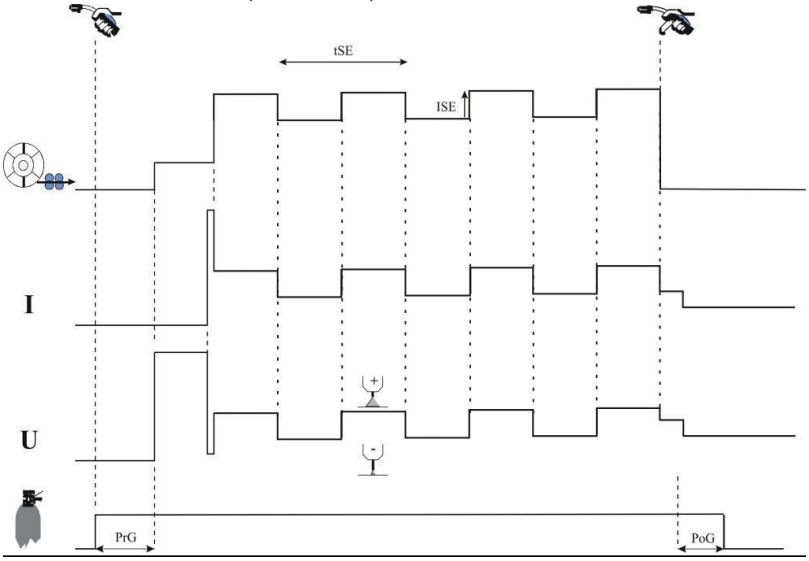
Pressing the trigger activates wire feed and pre-gas and turns on the welding current. Releasing the trigger causes the welding to stop.
Adjustment of the Hot Start, down-slope and sequencer settings is disabled. At the end of the spot time-delay, welding stops.



Sequencer cycle

The sequencer is validated by the parameter "**tSE 0FF**" in the specific cycle submenu of  .
To access it :
The "tSE" parameter is displayed in the "CYCLE" menu
Set this parameter to a value between 0 and 9.9 s.

TSE : DURATION OF THE 2 STEPS IF Off.
ISE : **2nd level current a**s % of the 1st level.
AVAILABLE ONLY IN SYNERGIC MODE, 2T CYCLE, OR 4T CYCLE

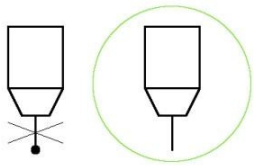


<u>Fine setting</u> (parameter adjustable in the "rFP cycle setup menu)
In pulsed welding, the fine-setting function enables optimizing the place of droplet detachment according to the variation in the compositions of utilized wires and welding gases.
When fine spatter that may adhere to the work piece is observed in the arc, the fine-tune setting must be changed toward negative values.
If large drops are transferred by the arc, the fine-tune setting must be changed towards positive values.

In Smooth mode (short arc), lowering the fine-tune setting enables achieving a more dynamic transfer mode and the possibility of welding while reducing the energy carried to the weld pool by shortening the arc length.
A higher fine-tune setting causes an increase in arc length. A more dynamic arc facilitates welding in all positions, but has the disadvantage of causing more spatters.

PR-spray or wire sharpening

The end of welding cycles can be modified to prevent the formation of a ball at the end of the wire. This wire operation produces almost
perfect restriking. The selected solution consists in injecting a current peak at end of cycle, which causes the wire end to become pointed.



Note: This current peak at end of cycle is not always desirable. For instance, when welding thin sheet metal, such this mechanism can cause a crater.

List of synergies

		SHORT ARC		
	0.6 mm	**0.8 mm**	**1 mm**	**1.2 mm**
Steel	M21	M21	M21	M21
	M14	M14	M14	M14
	M20	M20	M20	M20
	/	C1	C1	C1
CrNi	/	M11	M11	M11
	/	M12	M12	M12
	/	M12	M12	M12
AlSi	/	/	I1	I1
Al	/	/	/	I1
AlMg3	/	/	I1	I1
AlMg4,5 Mn	/	/	I1	I1
AlMg5	/	/	I1	I1
Cupro SI	/	I1	I1	I1
Cupro Alu	/	/	I1	I1
F CAW	/	/	M21	M21
RCW	/	/	M21	M21
SD 100	/	/	C1	C1
MCW : SD 200	/	/	M21	M21
BCW :	/	/	/	M21
SD 400	/	/	/	C1

	PULSE			
	0.6 mm	**0.8 mm**	**1 mm**	**1.2 mm**
Steel	/	M21	M21	M21
	/	M14	M14	M14
	/	M20	M20	M20
CrNi	/	M11	M11	M11
	/	M12	M12	M12
	/	M12	M12	M12
AlSi	/	/	I1	I1
Al	/	/	/	I1
AlMg 3,5	/	/	I1	I1
AlMg4,5 Mn	/	/	I1	I1
AlMg5	/	/	I1	I1
Cupro SI	/	/	I1	I1
Cupro Alu	/	/	I1	I1
MCW SD 200	/	/	/	M21
BCW SD 400	/	/	/	M21

NOTE: For any other synergies, please contact our agency.

GAZ TABLE	
Description on power source	**Gas name**
CO2	C1
Ar(82%) / CO2(18%)	M21
Ar(92%) / CO2(8%)	M20
Ar / CO2 / O2	M14
Ar / CO2 / H2	M11
Ar(98%) / CO2(2%)	M12
Ar / He / CO2	M12
Ar	I1

WIRE'S PART	
Description on power source	**Designation**
Steel	Steel Solid wire
F CAW	Cored wire for Zn coated steel
CrNi	Stainless steel solid wire
AlSi	
Al	
AlMg3	Aluminum solid wire
AlNI4,5Mn	
AlMg5	
CuproSi	Copper Silicium solid wire
CuproAl	Copper Aluminum solid wire
BCW	Basic core wire
MCW	Metal core wire
RCW	Rutil core wire

Troubleshooting procedure

Servicing of electrical equipment must be performed by qualified personnel only.

GENERATOR IS ON WHILE THE FRONT PANEL IS OFF	
Power supply	CHECK THE MAINS SUPPLY (TO EACH PHASE)
CAUSES	**SOLUTIONS**
DISPLAY OF THE MESSAGE E01-ond	
THE MAXIMUM STRIKING CURRENT OF THE POWER SOURCE WAS EXCEEDED	PRESS THE OK BUTTON TO CLEAR THE FAULT. IF THE PROBLEM PERSISTS, CALL CUSTOMER SUPPORT
DISPLAY OF THE MESSAGE E02 inu	
POOR RECOGNITION OF THE SOURCE OF POWER – ONLY AT START-UP –. Connectors in fault	Make sure that the ribbon cable between the inverter's main card and the cycle card is properly connected.
DISPLAY OF THE MESSAGE E07 400	
Inappropriate main voltage	Make sure that the main voltage is in the +/- 20% acceptable range of primary power supply of the power source.
DISPLAY OF THE MESSAGE E24 SEn	
Temperature sensor in fault	MAKE SURE THAT CONNECTOR B9 IS PROPERLY CONNECTED TO THE CYCLE CARD (IF NOT, TEMPERATURE MEASUREMENT IS NOT PERFORMED) THE TEMPERATURE SENSOR IS OUT OF ORDER. CALL CUSTOMER SUPPORT
DISPLAY OF THE MESSAGE E25 -C	
Power source overheating	Let the generator cool down *The fault disappears by itself after several minutes*
Ventilation	MAKE SURE THAT THE INVERTER FAN WORKS.
DISPLAY OF THE MESSAGE E33- MEM-LIM This message indicates that the memory is no longer operational	
Malfunctioning during saving of memory	CALL CUSTOMER SERVICE.
DISPLAY OF THE MESSAGE E43 brd	
Electronic board in default	CALL CUSTOMER SERVICE.
DISPLAY OF THE MESSAGE E50 H2o	
Cooler unit in default	MAKE SURE THAT COOLER UNIT IS WELL PLUGGED. CHECK COOLER UNIT (TRANSFORMER, WATERPUMP,...) IF NO COOLER UNIT IS USED, DESACTIVATE PARAMETER IN 
DISPLAY OF THE MESSAGE E63 IMO	
Mechanical problem	PRESSURE ROLLER IS TOO TIGHT. WIRE FEED HOSE IS CLOGGED WITH DIRT. THE LOCK OF THE WIRE FEED SPOOL AXLE IS TOO TIGHT.
DISPLAY OF THE MESSAGE E65-Mot	
Defective connectors	Check the connection of the encoder ribbon cable to the wire feeder's motor.
Mechanical problem	MAKE SURE THAT THE WIRE FEEDER ASSEMBLY IS NOT BLOCKED.
Power supply	Check the connection of the motor's power supply. Check F2 (6A) on the auxiliary power card.
DISPLAY OF THE MESSAGE E-71-PRO-DIA-MET-GAS	

HMI selector PROCESS-DIAMETER-METAL-GAS in default	Turn selector to unlock, after call customer service if always in default
DISPLAY OF THE MESSAGE StE PUL	
Inverter not well recognized	Call Customer Service
DISPLAY OF THE MESSAGE I-A-MAHX	
Maximum current of power source reached	Decrease wire speed or arc voltage
DISPLAY OF THE MESSAGE bPX-on	
Message indicating that  or  is kept depressed at unexpected times	Push  to unlock, after call customer service if always in default
DISPLAY OF THE MESSAGE SPEXXX	
Wire feeding is always activated involuntarily	Check the wire feeding button isn't blocked Check the connection of this button and electronic board
DISPLAY OF THE MESSAGE LOA DPC	
UPDATE software by PC is activated involuntarily	Stop and start the power source, after call customer service if always in default
TRIGGER FAULT	
This message is generated when the trigger is pulled at a time when it can accidentally cause starting a cycle.	*Trigger pulled before the power source is turned on or during a reset due to a fault.*
NO WELDING POWER - NO ERROR MESSAGE	
Power cable not connected Power source failure	Check the connection of the ground strip and the torch IN COATED ELECTRODE MODE, CHECK FOR VOLTAGE BETWEEN THE WELDING TERMINALS AT THE FRONT OF THE GENERATOR. IF NO VOLTAGE, CALL CUSTOMER SUPPORT.
WELDING QUALITY	
Wrong calibration	Check the fine setting parameter (RFP = 0)
Change of torch and/or ground strip or work piece	Perform re-calibration.(Verify proper electrical contact at the welding circuit).
Unstable or fluctuating welding	Make sure that the sequencer is not activated. Check the Hot Start and the down-slope.
Unstable or fluctuating welding	Select the manual mode. The limitation is imposed by synergy compatibility rules.
Limited range of adjustment settings	IF USING RC JOB MAKE SURE YOU HAVE NOT ACTIVATED THE PASSWORD-OPERATED SETTING LIMITATION
Poor power source power supply	Check proper connection of the three power supply phases.
OTHER	
Wire stuck in the molten pool or at the contact tube	OPTIMISE THE ARC EXTINCTION PARAMETERS:PR SPRAY AND POST RETRACT
Display of the triG message when turning the power on.	THE TTRIG MESSAGE IS DISPLAYED IF THE TRIGGER IS ACTIVATED BEFORE SWITCHING ON THE WELDING SET

If the problem persists, you may reset the parameters to factory defaults. For this purpose, with the welding unit turned off, select the Setup position at the front panel selector, press  and keep it depressed while turning on the generator.
PLEASE NOTE
Consider recording your work parameters first, because this operation will erase all the programs saved in memory. If RESETTING to factory values does not solve the problem, call Customer Support.

MAINTENANCE

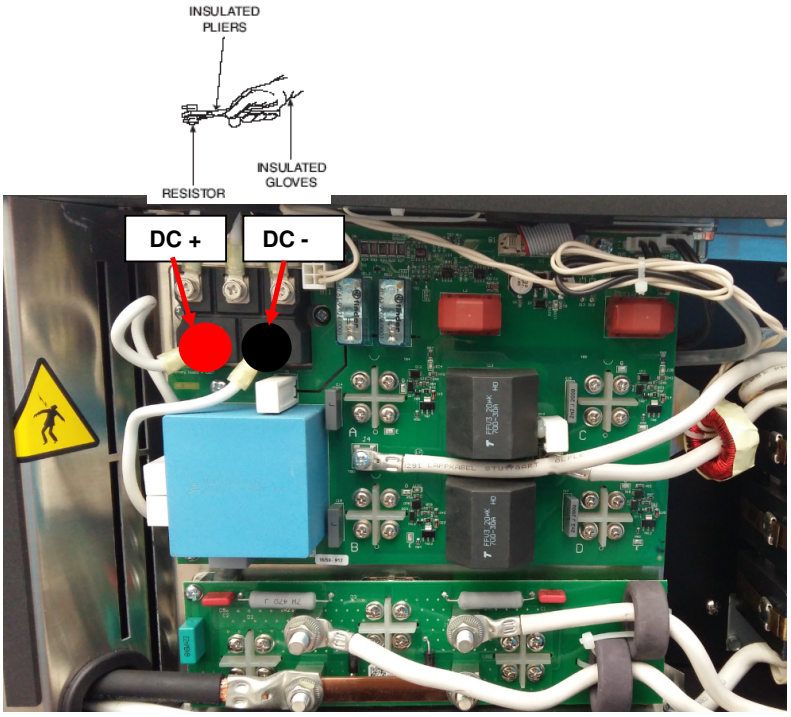
WARNING

ELECTRIC SHOCK can kill

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

INPUT DC BUS CAPACITORS DISCHARGE PROCEDURE

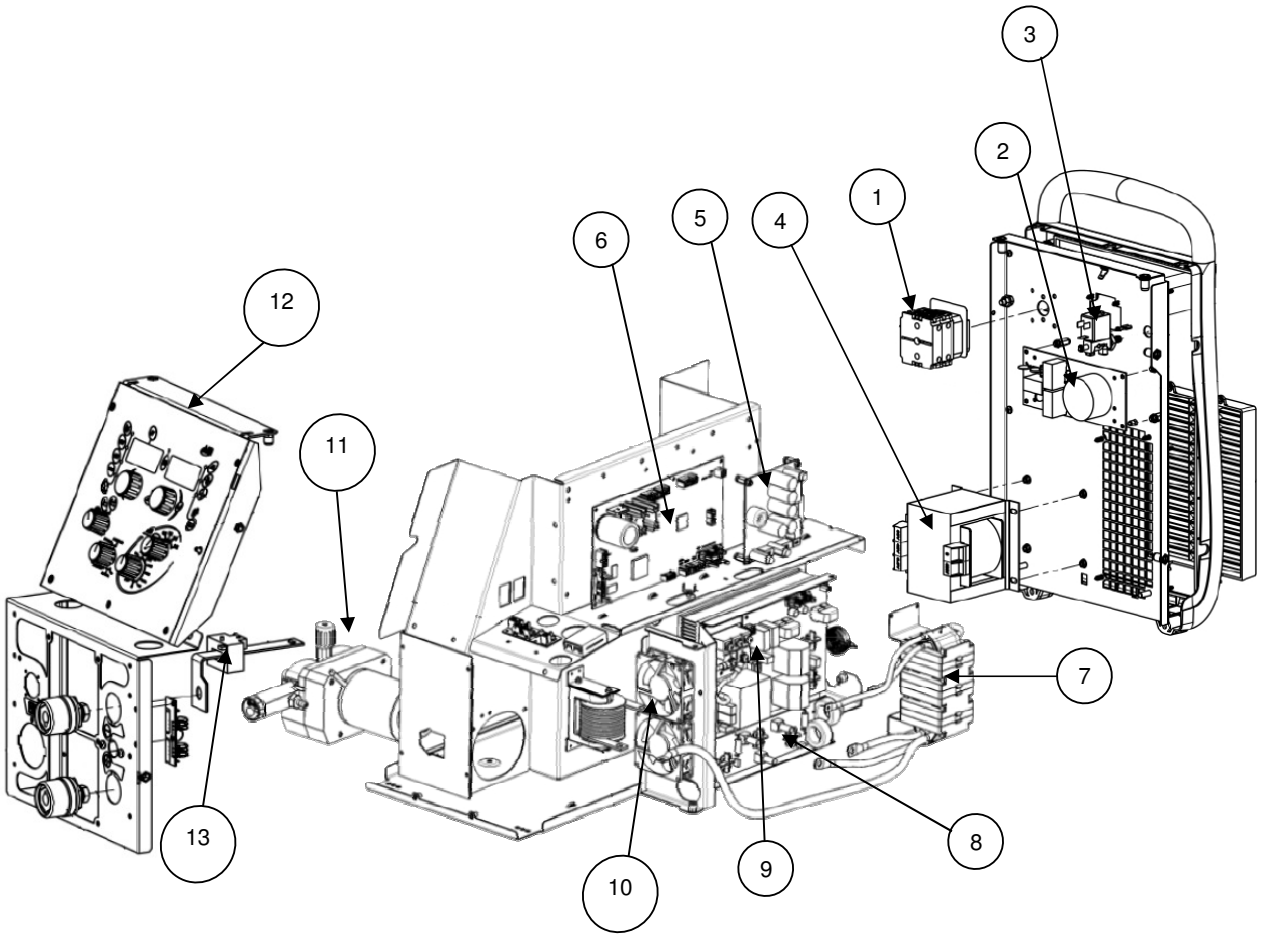
1. Remove input power to Speedtec® 320CP
2. Remove the cover following the instruction available in this Service manual.
3. Obtain a high resistance and high wattage resistor (25-1000 ohms and 25 watts minimum). This resistor is NOT supplied with the machine. NEVER USE A SHORTING STRAP FOR THIS PROCEDURE.
4. Locate the two terminals **DC+** and **DC –** on the Primary board (**See Figure 1**)
5. Use electrically insulate gloves and insulated pliers. Hold the body of the resistor and connect the resistor leads across the two terminals. Hold the resistor in place for 10 seconds. DO NOT TOUCH CAPACITOR TERMINALS WITH YOUR BARE HANDS.
6. Check the voltage across the two terminals. Voltage should be zero. If any voltage remains, repeat this procedure.



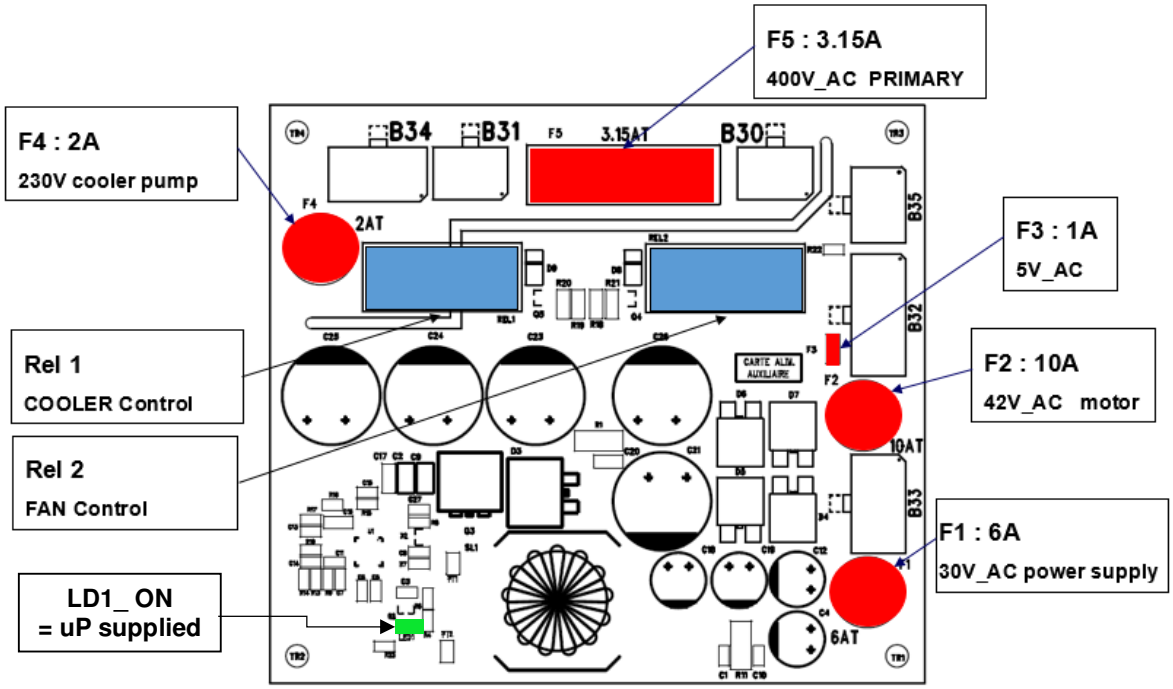
MAJOR COMPONENTS LOCATION

SPEEDTEC® 320CP

1. Mains switch
2. Filter Board
3. Gas Solenoid
4. Auxiliary Transformer
5. Auxiliary Power Supply Board
6. Cycle Board
7. Power Transformer
8. Secondary Board
9. Power Board
10. Fans
11. Wire Drive
12. Control Board
13. Current sensor

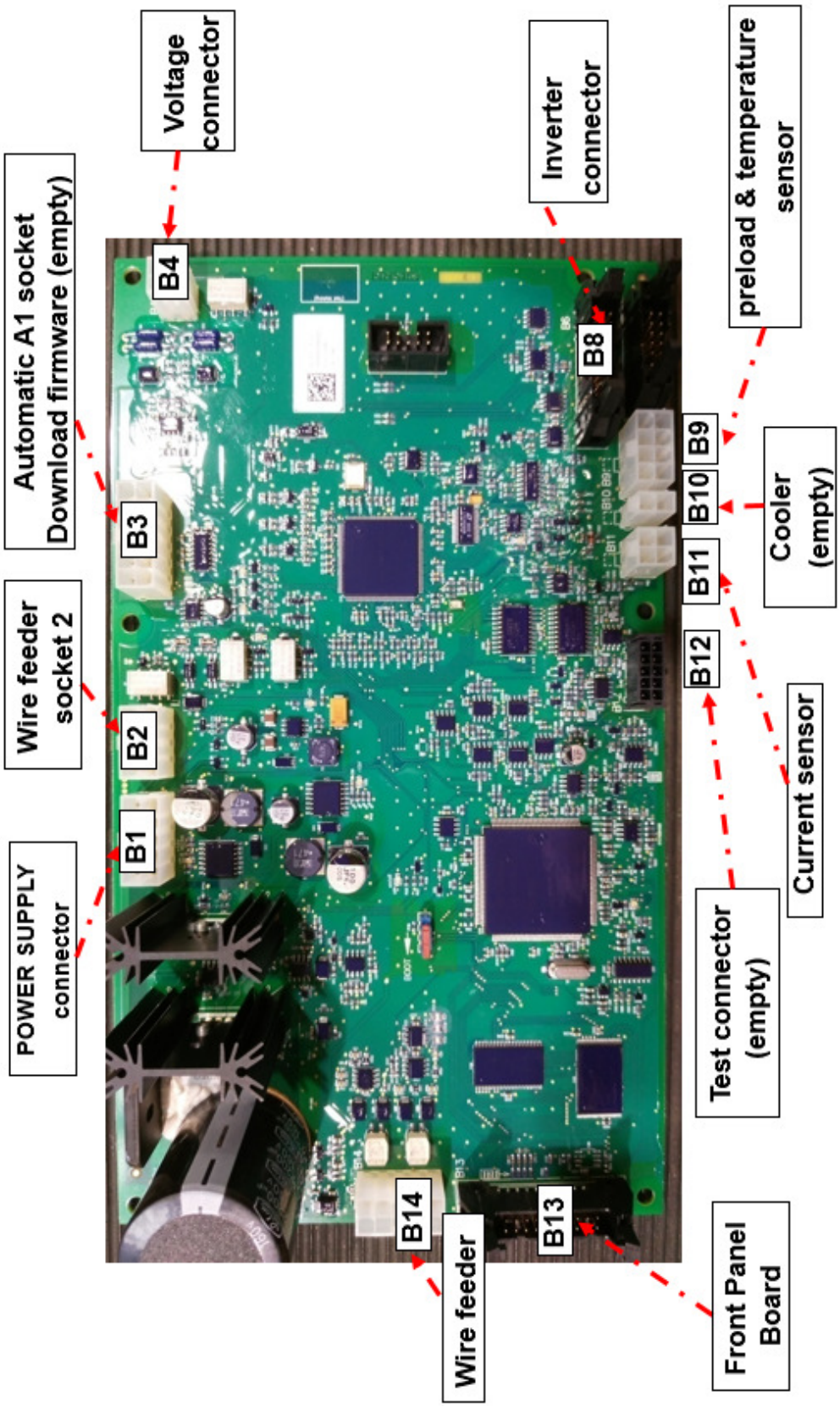


AUXILIARY POWER SUPPLY BOARD

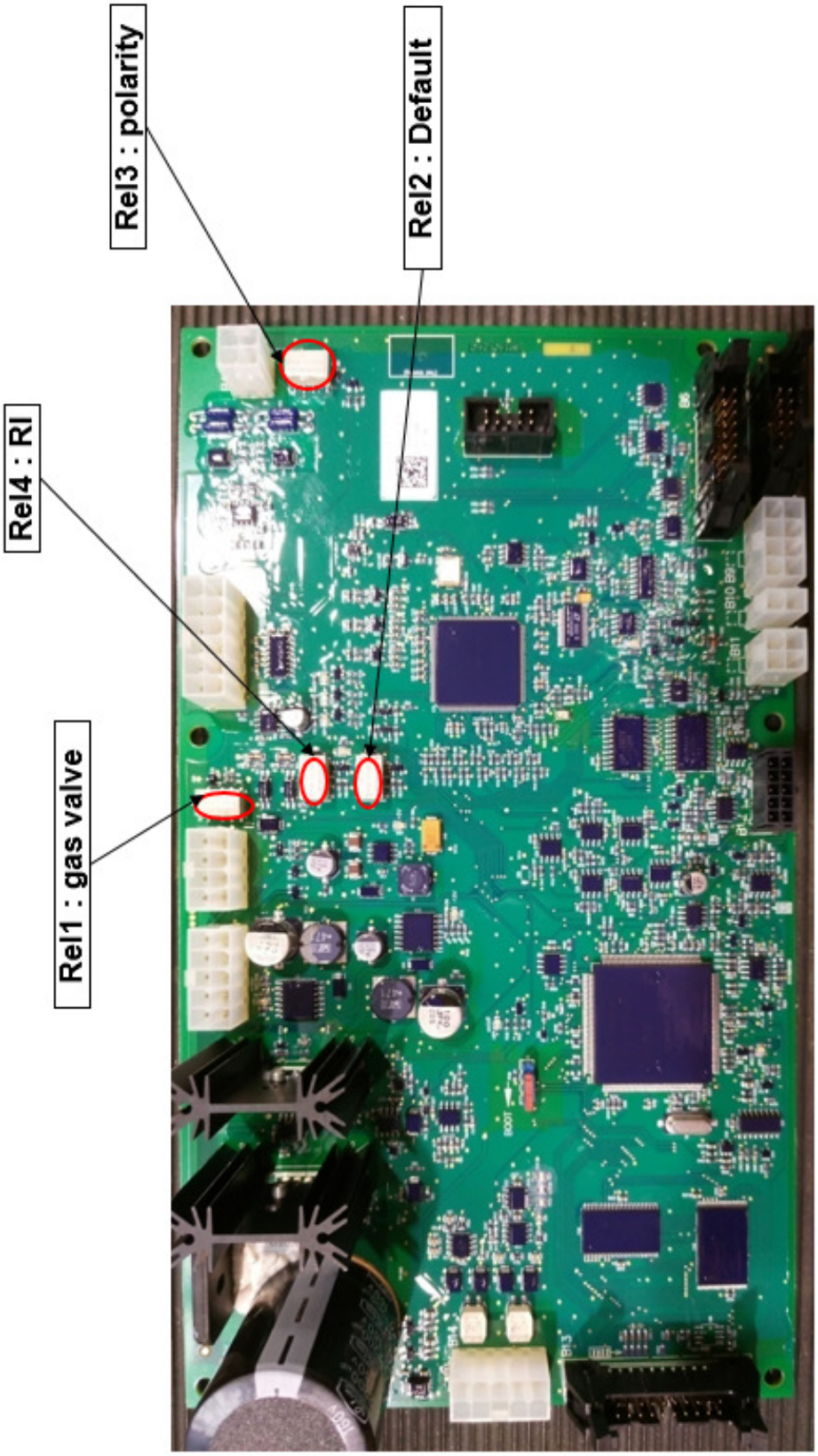


	Pin #	Description	Value	Notes
B31	4	Primary supply of Auxiliary transformer	400Vac +/- 10%	Always when machine is ON
	6			
B30	3	Power supply to PCB from input Filter	400Vac +/- 10%	Always when machine is ON
	4			
B33	3	Power supply from Aux. transf.	42Vac +/- 10%	Always when machine is ON
	5			
	7	Power supply from Aux. transf.	30Vac +/- 10%	Always when machine is ON
	8			
	4	Power supply from Aux. transf.	5Vac +/- 10%	Always when machine is ON
	6			
B35	1	Power supply fan 1	+24Vdc +/- 10%	When Welding or thermal condition is present
	3			
	4	Power supply fan 2	+24Vdc +/- 10%	
	6			
B32	3	Power supply to cycle board	42Vac +/- 10%	Always when machine is ON
	4			
	1	Power supply to cycle board	+24Vdc +/- 10%	Always when machine is ON
	6			
	2	Power supply to cycle board	5Vac +/- 10%	Always when machine is ON
	7			

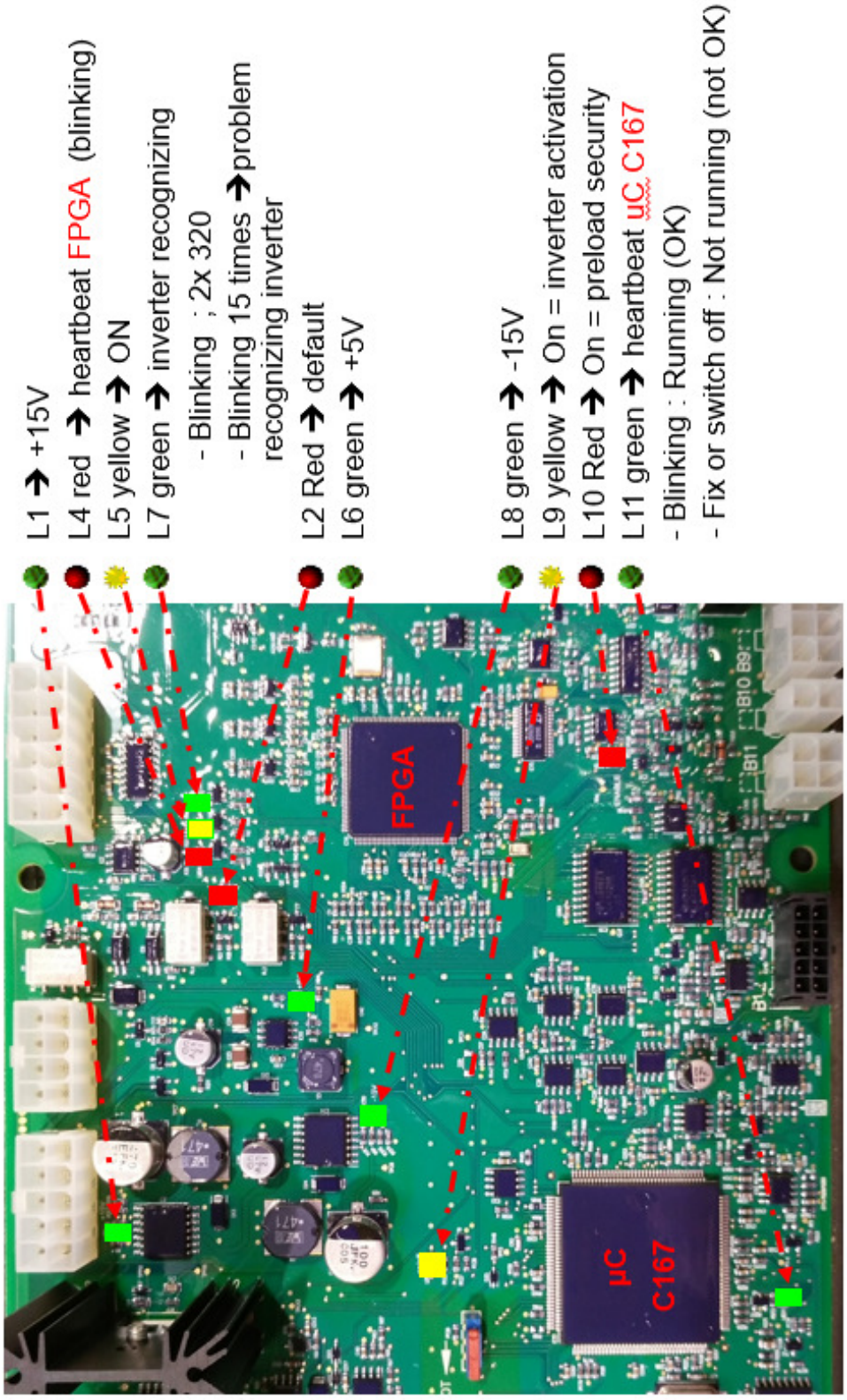
CYCLE BOARD CONNECTORS



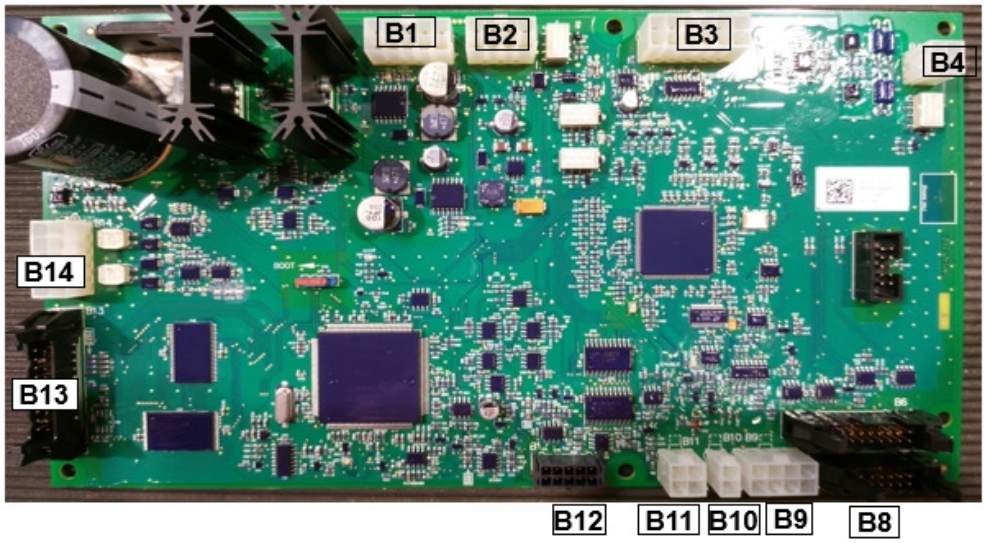
CYCLE BOARD RELAYS



CYCLE BOARD LEDS



CYCLE BOARD VOLTAGE TESTS



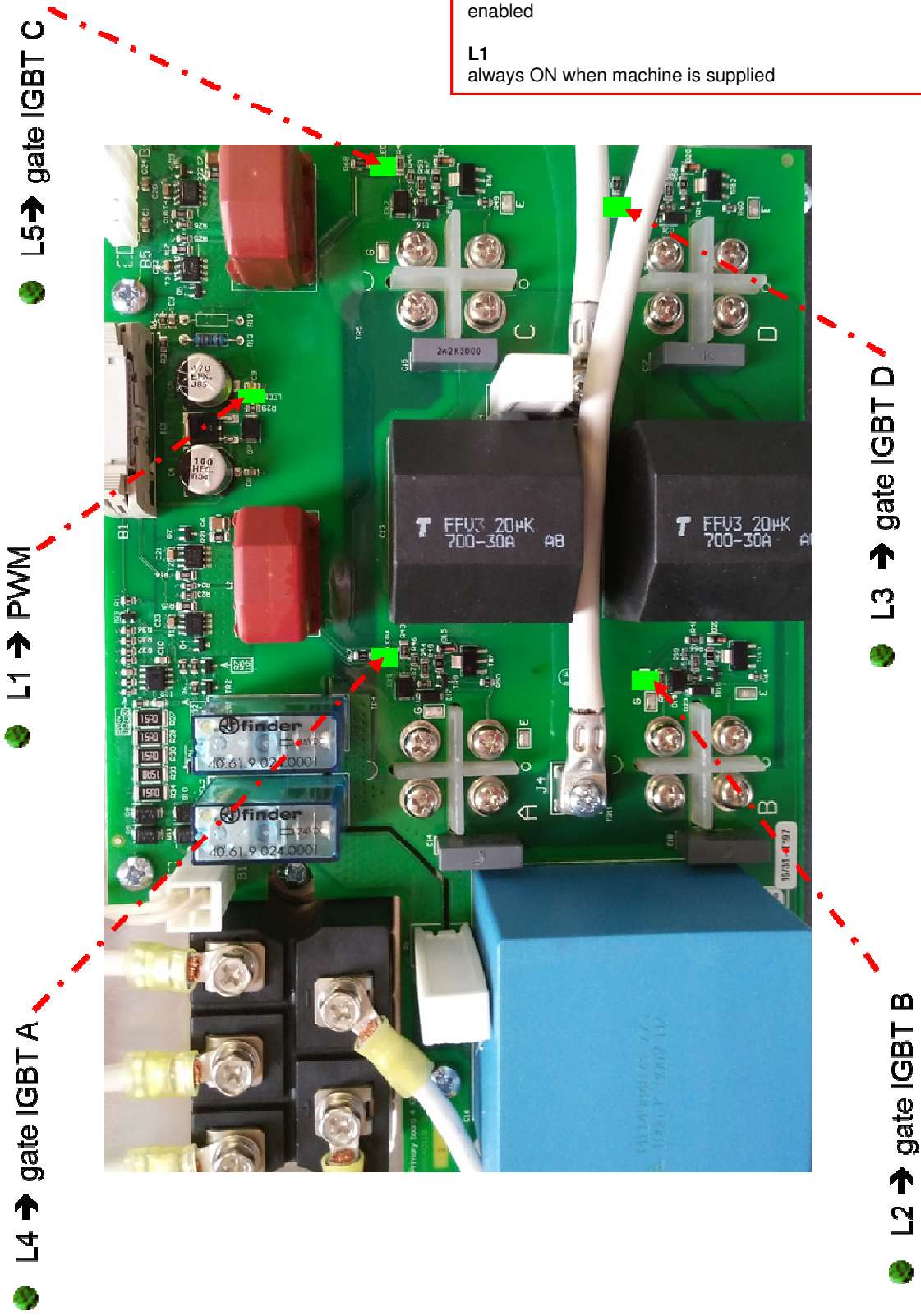
	Pin #	Description	Value	Notes
B2	1	Gas solenoid power supply	+24Vdc +/- 10%	Always when trigger is pressed
	6			
	2	Motor power supply	1 m/min = 2,2 Vdc 10 m/min = 16,5Vdc	when trigger is pressed and linked to the set-up of WFS
	3			
B11	1	Current sensor power supply	+15Vdc +/- 10%	Always when machine is ON
	4			
	2	Current sensor power supply	-15Vdc +/- 10%	Always when machine is ON
	4			
	3	Welding current feedback	100 A = 0,8 Vdc 200 A = 1,6 Vdc	When Machine is welding
	4			
B13	5,8,11,16	Power supply to front panel board	+5Vdc +/- 10%	Always when machine is ON
	18,19,20			
B6	9,10	Power supply to primary board	+24Vdc +/- 10%	Always when machine is ON
	4,6,14			

For B1 voltage test => see B32 Auxiliary Power Supply Board

POWER BOARD LEDS

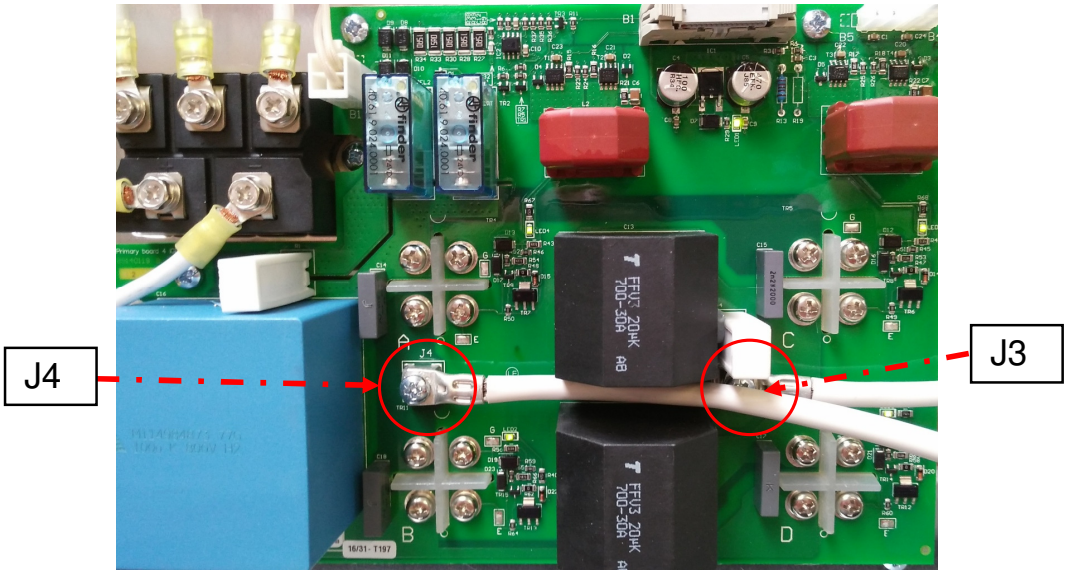
L2,L3,L4,L5
are ON in MMA, LIFT TIG or MIG when output is enabled

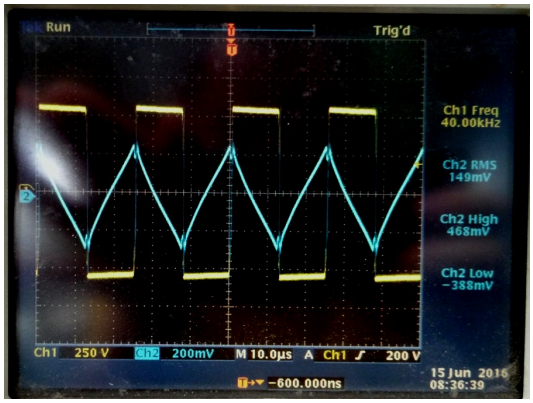
L1
always ON when machine is supplied



POWER VOLTAGE TEST

- Connect the insulated voltage probe between terminal **J3** (CH1) and **J4** (CH1) of the “primary board” and current probe on primary transformer cable (CH2).
- Turn the main switch ON .
- Set-up the power source on MMA and confirm by OK.
- Set-up the current to 100A.
- Adjust the oscilloscope:
    - CH1: Transformer Primary voltage, Voltage probe: range: x500; scale 250V/DIV
    - CH2: Transformer Primary current, Current probe: range:50A and scale 200mA/DIV





- **CH1:** Measure the frequency:
    - 40 kHz +/- 0.1kHz
- **CH2:** Measure RMS current:
    - 70 mA +/- 20mA

ERROR CODE	MEANING	CHECKING	WHAT TO CHANGE
E01 ond	*Over current*	*Current sensor wiring*	*Cycle board*
	Short circuit on output	*Output diodes*	*Secondary board*
E02 inu	*No power source recognizing*	*B8 wiring*	*Cycle board*
E03 PUU	Exceed maximum power	/	Cycle board
E07 400	*Network value not in the range*	*The main network 400V +15% -20%*	/
		5V Between B1-7 and B1-10	*Cycle board*
		0V Between B1-7 and B1-10	*Auxiliary supply board*
E24 Sen	*Thermal sensor circuit is faulty*	*Connection of thermal sensor circuit*	Thermal sensor
		Connection of thermal sensor circuit	*Cycle board*
E25 °C	*Overheat*	*The duty cycle is not exceed*	/
		The inverter fan is not working (Start up of the machine)	*Fan*
E32 RI	*protection RI in auto welding disappeared*	*Arc breaking during welding*	/

ERROR CODE	MEANING	CHECKING	WHAT TO CHANGE
E33 MEM	*No possibility to save in memory*	*Nothing. memory out of order*	*Cycle board*
E33 LIM	*No possibility to load data from memory*	*Nothing. memory out of order*	*Cycle board*
E33 PGM	*Programm error*	*Chaining program not correct (Ex : short arc to pulse program)*	*Chaining program*
E33 LOG	*Programm locked without interface*	*Connection of Rcjob or P500 wire feeder*	*Disable Pgm in setup*
E34 CFG	*Wrong configuration*	*(ex : Coated electrod in N1 level)*	*/*
E43 Brd	*Cycle board not tested*	*/*	*Cycle board*
E48 Sto	Stack overflow	Software problem	*Cycle board*
E48 Stu	Stack underflow	Software problem	*Cycle board*
E48 FAU	Fault instruction	Software problem	*Cycle board*

ERROR CODE	MEANING	CHECKING	WHAT TO CHANGE
E50	Cooling problem	Cooler/ harness	/
E62 UMo	Motor doesn´t work	/	*Supply board*
E63 IMO	*Wire motor overcurrent consumption*	*Motor blocked*	*Cycle board*
E65 Mot	*Motor problem : the motor doesn't work*	*Fuse F2 on Supply board*	*Supply board*
		Harness connection	/
E65 Mot	*Motor problem :The motor turn quickly*	*The encoder flat cable*	*Wire feeder board*
E67 tAc	Motor problem	The encoder or flat cable	/
E91 CAn	Communication problem	Harness of internal connections	/

CALIBRATION

WHEN IT'S NECESSARY TO CARRY OUT A CALIBRATION :

- At first start-up of the machine
- After harness's replacement (Length) torch ground cable
- After cycle board's replacement
- After a reset of factory parameters
- Before using a synergy with negative polarity

HOW TO CARRY OUT A CALIBRATION :

- **Setup => Config. => Calibration => Yes (the machine wait with trigger message)**

1. Connect the ground cable.
2. Remove the tip of the torch
3. Put the tip and the piece in contact
4. Push the trigger

R = Classic value is around 6 with 10 meters harness
L = Classic value is around 14 with 10 meters harness

RETEST AFTER REPAIR

Should a machine under test be rejected for any reason requiring the removal of any mechanical part that could affect the machine's electrical characteristics, or if any electrical components are repaired or replaced, the machine must be retested.

Machine input and output

SPEEDTEC 320CP

Input Voltage	Input Current	Rated Output
400Vac/3ph/50Hz	12A max	320A@40%

Output current range SMAW	**15 – 320 Amps**

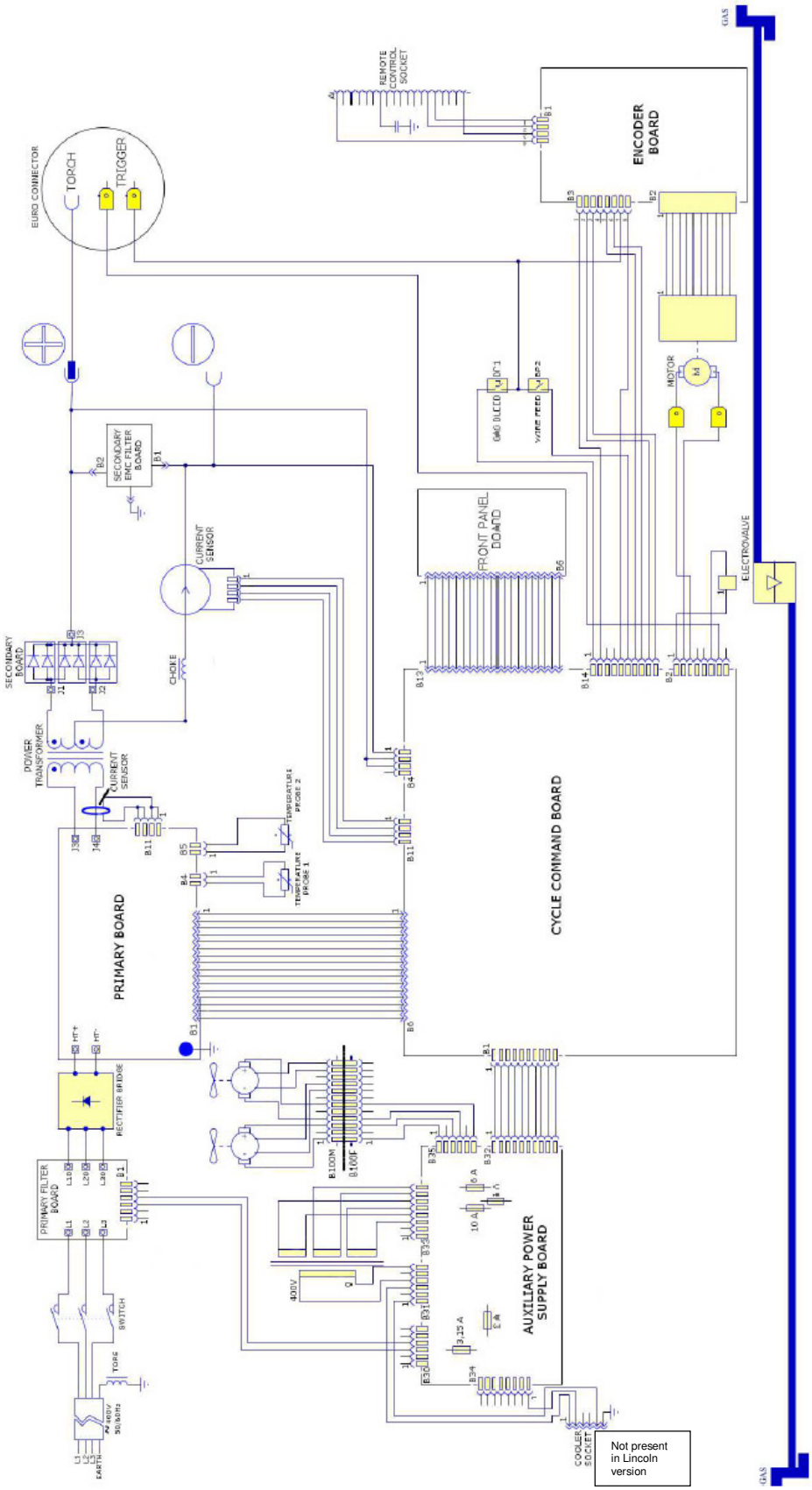
Maximum Open Circuit Voltage	**74 Vdc**

IMPORTANT !

After the repair the unit has to be tested accordingly to the norm **EN60974-4 Arc welding equipment "In-service inspection and testing"**

ELECTRICAL SCHEMATICS

Block Diagram



NOTE

LINCOLN® ELECTRIC

Lincoln Electric Europe