toPARC KIT CNC-2 / CNC-3 Benchtop Standard Machine Kit Instruction Manual

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WARNINGS – SAFETY RULES

Contents

GENERAL INSTRUCTION

 These instructions must be read and understood before any operation.
Any modification or maintenance not indicated in the manual must not be undertaken.

The manufacturer shall not be held liable for any personal injury or material damage caused by use not in accordance with the instructions in this manual. In the event of a problem or uncertainty, consult a qualified person to handle the installation correctly.

This manual describes the wiring of this product. Any user who does not strictly comply with the safety instructions described in this manual may be exposed to electrical risks and/or a serious or even fatal accident.

ELECTRIC SAFETY

During any intervention on the product, make sure to secure the area by keeping at a distance any person who has not read the instructions of safety described in this manual. This product should preferably be installed by a professional in accordance with the installation rules in force in the country.
If not, it is recommended that you read these rules before working on it.

WARNING

Opening the plasma cutting power source is needed to install this kit, for this reason this task has to be done by a qualified personal.

 Before going through it, it is absolutely necessary to unplug the plasma cutting power source from the mains and wait at least 5 minutes before accessing the inside of the machine.

Handle the electronic board of the CNC kit carefully to avoid damaging it:

- Remove the board from its antistatic bag at the last moment.
- Avoid manipulating the circuit board unnecessarily
- Use an antistatic wristband connected to earth or, failing that, make sure you have been electrostatically discharged by touching an earthed conductive part (e.g. the earth terminal of a power socket).
- Hold the board by the edges
  Do not touch the electronic components.

INSTALLATION PRODUCT OPERATION

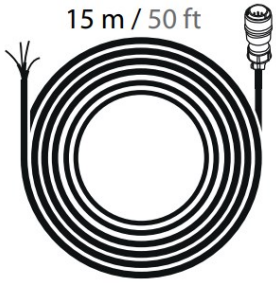
Only qualified personal authorised by the manufacturer should perform the installation.
During the installation, the operator must ensure that the machine is disconnected from the mains.

INTRODUCTION

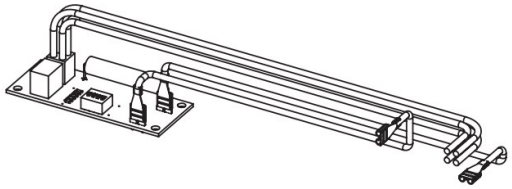
The CNC digital kit is designed to be installed in plasma cutting units of the NEOCUT range. This kit allows the interfacing between the plasma unit and the CNC by the means of the Modbus protocol based on a RS485 physical layer. As an example, the embedded message library allows remote current setting, switching between cutting modes and machine status interrogation.

INSIDE THE KIT

External link



Electronic card + Internal link



Screws

Installing manual + Communication protocol manual

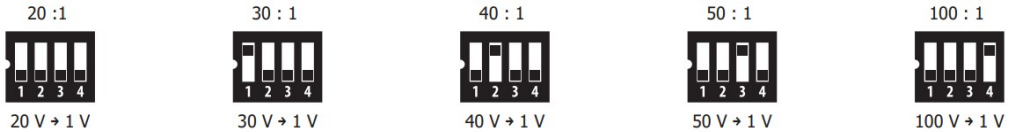
	CNC-2	**CNC-3**
1	✓	–
2	✓	✓
3	✓	✓
4	✓	✓

KIT SET-UP AND INSTALLATION

1. **Voltage divider set-up :**

   In order to carry low voltage (for safety reason), the arc voltage goes through a voltage divider board that will reduce the voltage.

   The arc voltage (several hundreds volts) goes through a voltage divider whos goal is sending outside the plasma unit a safe level divided arc voltage. Depending on the THC (Torch Height Control) unit, it will be necessary to adjust the dividing factor according to the THC specifications.



2. **Kit installation :**

WARNING

ELECTRIC SHOCKS CAN BE FATAL

Only experienced personal authorised by the manufacturer may carry out the installation. During installation, make sure that the generator is disconnected from the mains.

Kit installation video :

NEOCUT 105

CNC-2

https://youtu.be/EQHXFagRva4

CNC-3

https://youtu.be/iLZGoWJzZAM

Any access to internal areas beyond the areas described in this video guide is prohibited and voids the warranty and any other form of support.
Indeed, these manipulations may be damaging to the parts and/or the internal electronic components of the generator.

DESCRIPTION

The CNC kit uses two complementary types of signals :

- Analog and 2 state type necessary for basic operations
- Digital type : allowing advanced operations

Analog / 2 state functions :
The analog/on/off part consists of 4 signals (2 pins per signal). The logic is as follows:

Signal name	Function	Behaviour
Start	Starts the cutting	Closing a dry contact on CNC side tells the plasma unit to start the cutting, opening the contactresults in stop cutting.
Arc Voltage	Divided arc voltage	Divided arc voltage (see Voltage divider set-up chapter). The arc voltage is an image of the torch to metal sheet distance
OK to move	Arc transferred	The plasma unit closes a dry switch when the arc is transferred to the metal sheet. If this contact stays open or opens during cutting this means that the arc broken.
Force marking	Marking	A closed dry contact on CNC side forces the plasma unit in marking mode. Re-opening the contactrestores the plasma unit in its initial context.

Digital function :
The physical layer is a full duplex asynchronous RS-485 serial link

It consists of 5 wires:

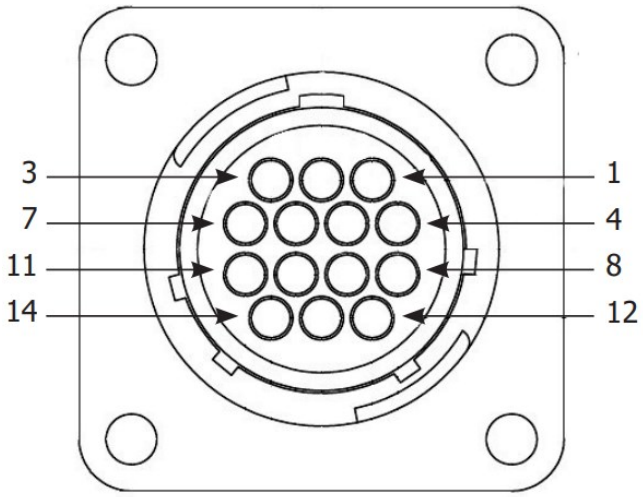
- 1 differential pair for message transmission (Tx+ / Tx-)
- 1 differential pair for message reception (Rx+ / Rx-)
- 1 reference ground (GND)

The protocol used is the MODBUS RTU protocol, the cutting power source is the slave, the CNC is the master. The list of messages and their coding is described in the communication protocol manual.

WIRING

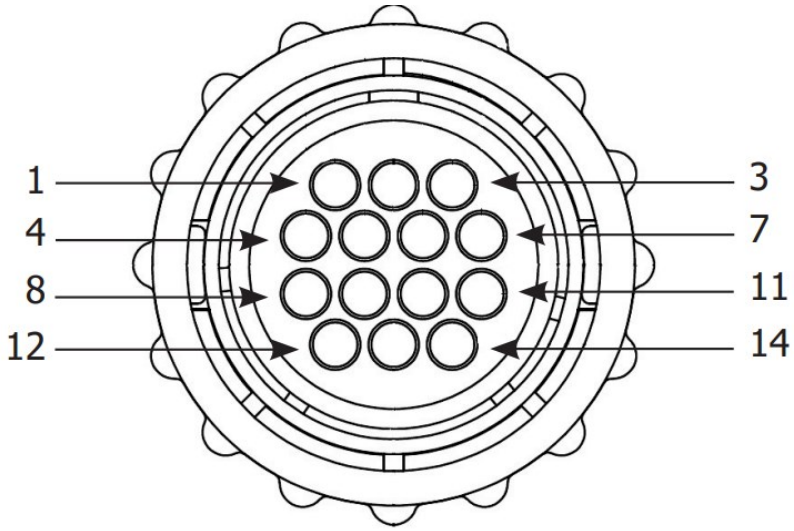
Connector pinout

CNC-2 / **CNC-3**



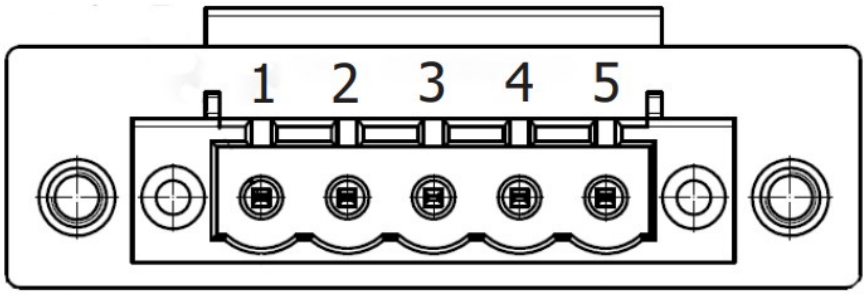
Pannel connector pinout **CN-1** at the back of the plasma cutting power source

CNC-2



Plug connector pinout at the end of the external cable

CNC-3



Pannel connector pinout **CN-2** at the back of the plasma cutting power source

Pin assignation

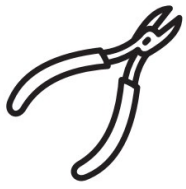
CN-1			
Pin number	**Wire colour**	**Pair colour**	**Signal name**
3	White	Black/White	Start (signal)
4	Black		Start (+)
5	Black	Black/Red	Arc Voltage (-)
6	Red		Arc Voltage (+)
12	Green	Black/Green	OK to move
14	Black		OK to move
1	Blue	Black/Blue	Force marking (signal)
2	Black		Force marking (+)
8	Yellow	Black/Yellow	Tx+ (Y)
9	Black		Tx- (Z)
10	Orange	Black/Orange	Rx+ (A)
11	Black		Rx- (B)
7	Black	Alone	GND

CN-2

Pin number

- 1
- 2
- 3
- 4
- 5

Connection to CNC

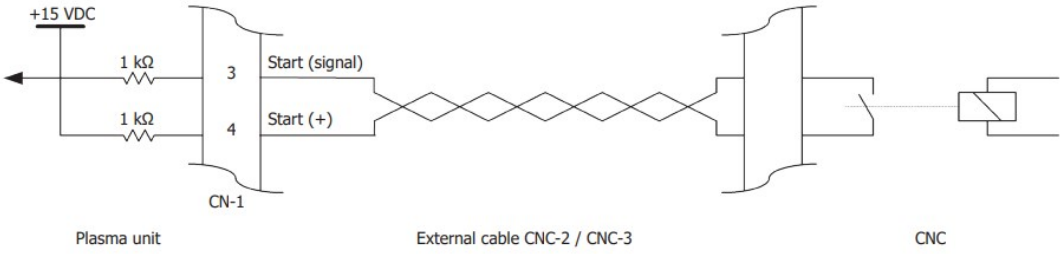


The external cable is also terminated at its other side by a small single row connector, the only purpose of this connector is for testing during cable manufacturing.
This connector can be cutted to fit the CNC's connection needs, the external cable can also be shortened to fit the overall configuration.

Unused wires shall be insulated to avoid any electrical damage.

a) Start(+)/Start(signal) signals
The « start + » potential is connected through a 1 kΩ impedance to a +15VDC internal supply of the CNC kit.
When the CNC closes its dry contact between those two signals, the +15VDC is sent back to the « start(signal)»

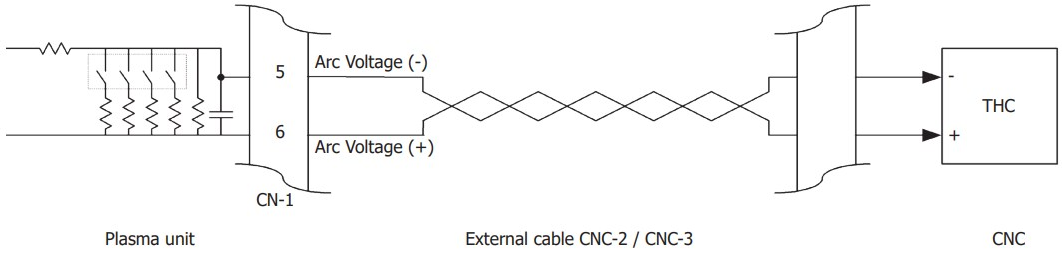
signal indicating a start order to the plasma unit.



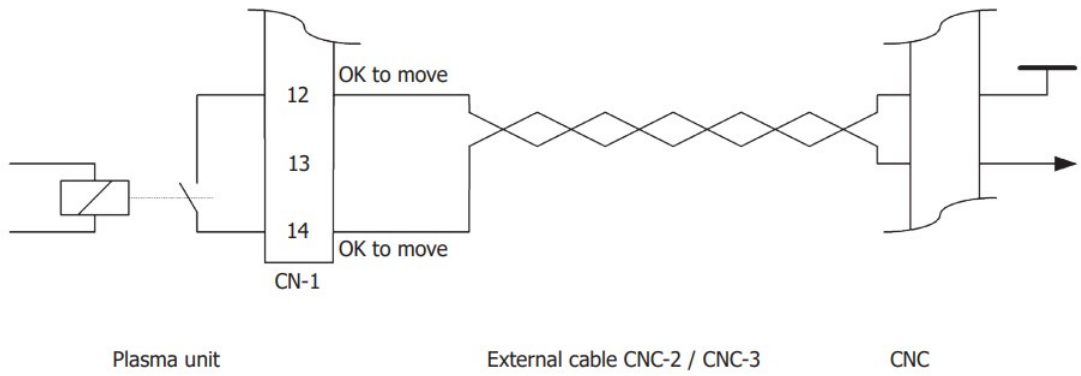
b) Arc voltage(+)/Arc voltage(-) signals
The arc voltage is divided by a passive voltage divider combined with a low-pass filter

Dividing ratio	**Output impedance**	**Cutoff frequency (-3dB)**	**Attenuation**
20 : 1	1.6 kΩ	1 kHz	-20 dB/decade
30 : 1	1.1 kΩ		
40 : 1	825 Ω		
50 : 1	660 Ω		
100 : 1	330 Ω		

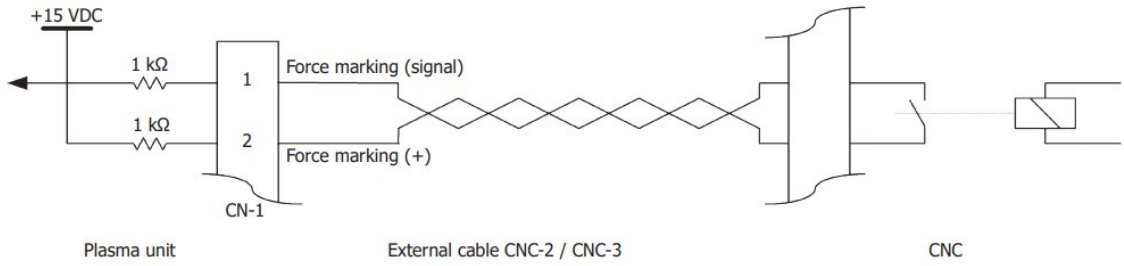
The « Arc Voltage (+) » potential is directly linked to the earth clamp potential.
The « Arc Volrtage (-) » potential is impedance linked to the electrode.



c) « OK to move » signals
When the arc is transferred to the metal, the plasma cutting power source closes its dry contact between those two « OK to move » signals, this
means that the cutting process is runing, if the plasma arc is broken, the contact opens. This information is mainly used on non THC equipped CNCs.



d) « Force marking(+)/ Force marking(signal) » signals
The « Force marking(+) » potential is connected thru a 1kohm impedance to a +15VDC internal supply of the CNC kit. When the CNC closes its dry contact between those two signals, the +15VDC is sent back to the « Force marking(signal)» signal indicating to the plasma unit to force its operation in marking mode.



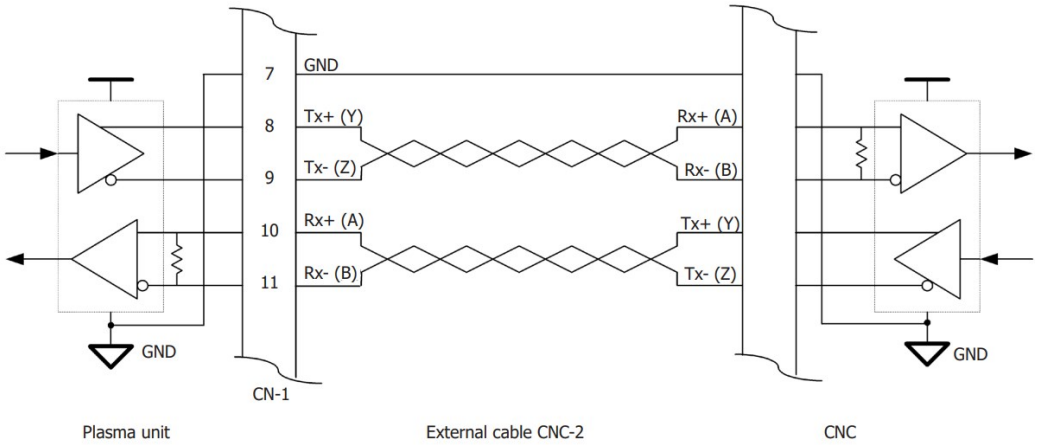
e) e) Digital signals
Tx+, Tx- : differential pair transmitting frames from the Plasma unit to the CNC, the connexion shall be terminated by a 120 Ω resistor at the CNC side.
Rx+, Rx- : differential pair receiving frames from the CNC to the plasma unit, the connexion is terminated by a 120 Ω resistor on the plasma unit side.
GND : Reference ground of the emission and reception circuits on the plasma generator side. The signals of the differential pairs must not exceed -7
VDC in negative and +12 VDC in positive with respect to the reference ground.

Tx+, Tx- : differential pair transmitting frames from the Plasma unit to the CNC, the connexion shall be terminated by a 120 Ω resistor at the CNC side.

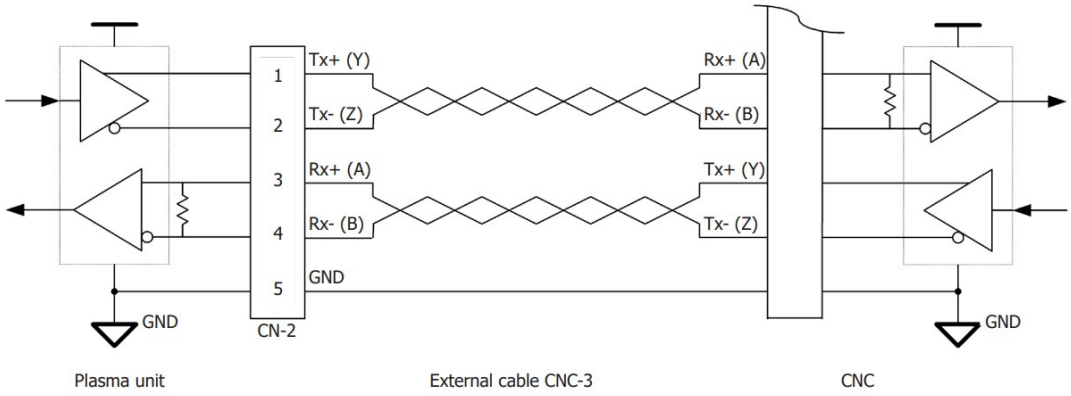
Rx+, Rx- : differential pair receiving frames from the CNC to the plasma unit, the connexion is terminated by a 120 Ω resistor on the plasma unit side.

GND : Reference ground of the emission and reception circuits on the plasma generator side. The signals of the differential pairs must not exceed -7 VDC in negative and +12 VDC in positive with respect to the reference ground.

CNC-2



CNC-3



SIGNALS AND ELECTRICAL SPECIFICATIONS SUMMARY

CN-1				
Pin no	**Wire colour**	**Pair colour**	**Signal name**	**Electrical specifications**
3	White	Black/White	Start (signal)	Input signal, 1kΩ input impedance
4	Black		Start (+)	+15VDC 15mA, 1kΩ output impedance
5	Black	Black/Red	Arc Voltage (-)	Dividing factor: 1:20, 1:30, 1:40, 1:50, 1:100 Output impedance < 1.6 kΩLow-pass filtered
6	Red		Arc Voltage (+)	
12	Green	Black/Green	OK to move	Dry contact: 7 A/250 VAC – 7 A/28 VDC Coil to contact insulation: 4000 VAC
14	Black		OK to move	
1	Blue	Black/Blue	Force marking (signal)	Input signal, 1kΩ input impedance
2	Black		Force marking (+)	+15VDC 15mA, 1kΩ output impedance
8	Yellow	Black/Yellow	Tx+ (Y)	Read the SN65HVD37 datasheet from Texas Instru -
9	Black		Tx- (Z)	
10	Orange	Black/Orange	Rx+ (A)	
11	Black		Rx- (B)	
7	Black	Alone	GND	Ground

CN-2

Pin no

- 1
- 2
- 3
- 4
- 5

WARRANTY

The warranty covers faulty workmanship for 2 years from the date of purchase (parts and labour).

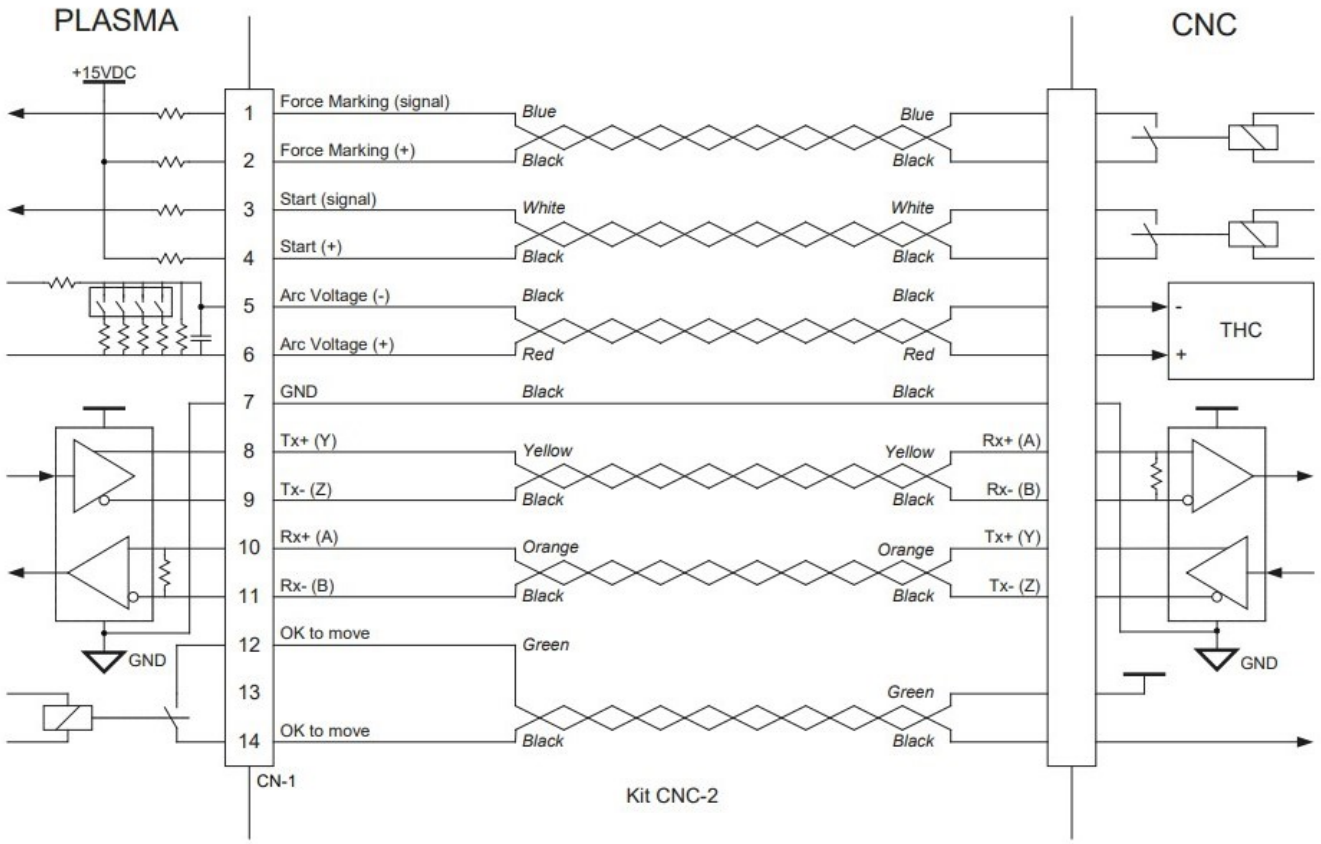
The warranty does not cover:

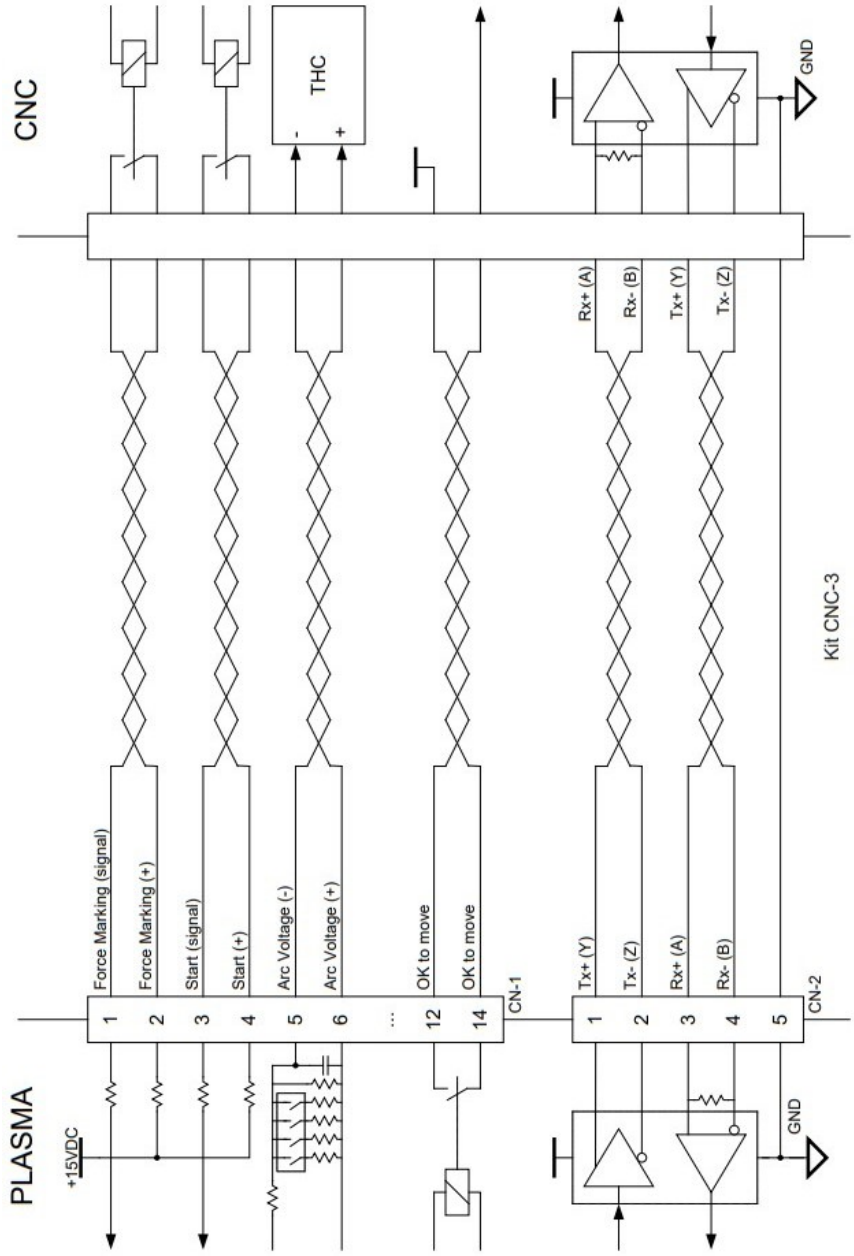
- Transit damage.
- Normal wear of parts (eg. : cables, clamps, etc..).
- Damages due to misuse (power supply error, dropping of equipment, disassembling).
- Environment related failures (pollution, rust, dust).

In case of failure, return the unit to your distributor together with:

- The proof of purchase (receipt etc …)
- A description of the fault reported.

GLOBAL WIRING DIAGRAM


PLASMA
CNC
+15VDC
1
2
3
4
5
6
7
8
9
10
11
12
13
14
Force Marking (signal)
Force Marking (+)
Start (signal)
Start (+)
Arc Voltage (-)
Arc Voltage (+)
GND
Tx+ (Y)
Tx- (Z)
Rx+ (A)
Rx- (B)
OK to move
OK to move
Blue
Black
White
Black
Black
Red
Black
Yellow
Black
Orange
Black
Green
Black
Blue
Black
White
Black
Black
Red
Black
Yellow
Black
Orange
Black
Green
Black
Rx+ (A)
Rx- (B)
Tx+ (Y)
Tx- (Z)
THC
-
+
GND
GND
CN-1
Kit CNC-2



SYMBOLS

CE Device complies with europeans directives. The EU declaration of conformity is available on our website (see cover page).

This hardware is subject to waste collection according to the European directives 2012/19/EU. Do not throw out in a domestic bin !

Recyclable product which falls under a sorting instruction.

Equipment in compliance with British requirements. The British Declaration of Conformity is available on our website (see home page).

Equipment in conformity with Moroccan standards. The declaration C) CMIM) of conformity is available on our website (see cover page).

JBDC
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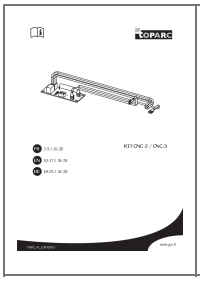
53941 SAINT-BERTHEVIN Cedex
FRANCE

Documents / Resources

	toPARC KIT CNC-2 / CNC-3 Benchtop Standard Machine Kit [pdf] Instruction Manual KIT CNC-2 CNC-3 Benchtop Standard Machine Kit, KIT CNC-2, CNC-3 Benchtop Standard Machine Kit, Standard Machine Kit, Machine Kit