USER MANUAL

THREE PHASES LOAD BENCH
2 WAYS / 115V - 300/1000HZ

FOR AIRCRAFT NETWORK

Reference: MU-AC0218-01

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LISTE DES MISES A JOUR

REFERENCE DOCUMENT	RELEASE	DATE	PAGES	OBJECT
MU-AC0218	00	17/12/2012	all	Initial version
	01	13/03/2013	§5.1, 5.7 and 6.3	Phase angle changed to power factor Control of voltage presence before switch ON

TABLES DE MATIERES

1. RECOMMANDATIONS

The bench must be used indoors only on a stable, horizontal and hard soil.

Any interference connection must be carried out by trained and authorized personnel.

The cabinet door connection provides access to exposed live parts: it must always be kept closed and locked his key. This compact door actuates a switch which stops the bench when opening the door, the sensor should never be changed or turned off.

The bench has wheels equipped with a braking device: it must be used to immobilize the bench before use ..

Any modification of the bench makes our warranty void.

2. GENERAL PRESENTATION

This dynamic load bank incorporates two distinct and insulated phase loads, which can be used simultaneously or not, to load networks whose neutral may be distinct.

This charge has characteristics and features that enable it to meet the needs of network simulation aircraft.

It has in particular a block linear power capable of generating a fundamental signal of 300 Hz to 1 kHz and harmonics of 300 Hz to 150 kHz.
Internal card (Synu3) manages synchronization with the network wired and provides analog pilot signal according to the profile requested.

This load is embedded in a bench consists of the following items:
- Two three-phase power amplifiers
- Two synthesizer boards (Synu3)
- A PC interface card (MICRO2)

The load is drive by a set of command / control :
- The software OPS1-2-3
- PRM files (front panel of the PC screen).
- An Ethernet bus
- A CAN bus
- An analog bus

The bench is driven by a command board with a touch screen display.
It has two working modes :

- **LOCAL mode :** the parameters are directly set by the user using the touch screen display

- **Remote mode :** the parameters are set by a remote computer, using a Ethernet or a CAN link. In this mode, the touch screen display cannot be used to set parameters

3. Bench installation

It is mandatory to observe the connection sequence below to avoid damage to the equipment.

3.1 Mains wiring

Mains input wiring :

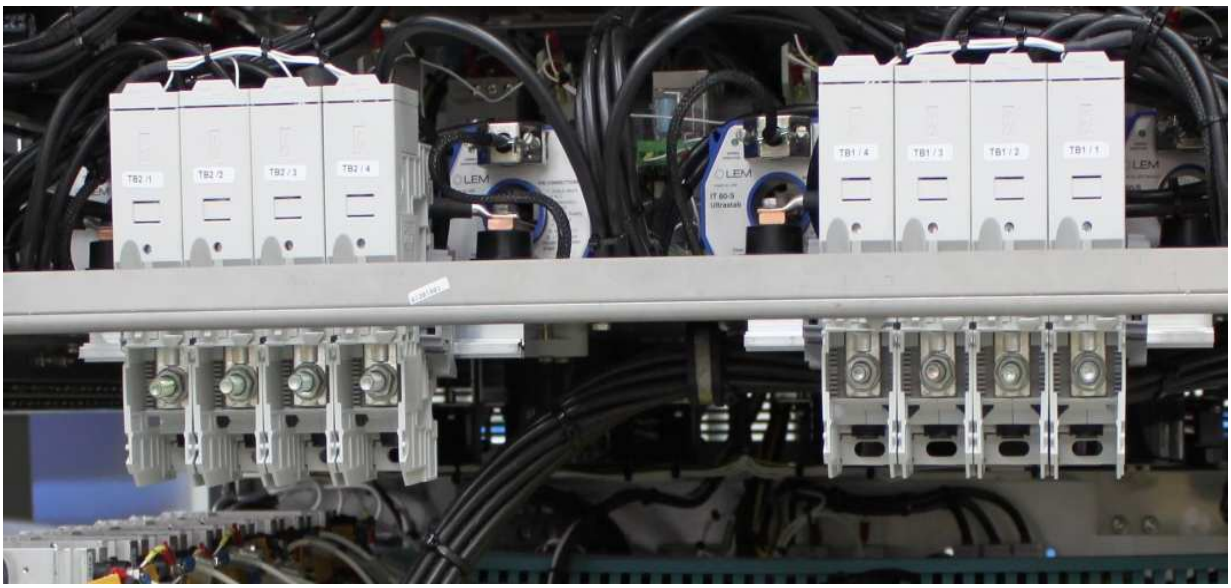
- Type: HO7RNF – 3P+T – 4x16 mm² - length: 5m
- Topology: three phase without neutral + earth
- Plug: 5 pole CETAC 63A
- Input voltage : 400V rms. +6% -10%
- Input frequency : From 45Hz to 55Hz
- Input current : about 45 A rms per phase on network 400V at nominal conditions
- Dielectric> 2500V rms for 1 minute mains input to output connected to the frame ground.

The bench power supply must be protected by a magnetothermic Breaker adapted to bench consumption: 45 Amps curve D, 300 mA differential.

3.2 Input loads wiring

The loads inputs are located on the back of the bay, behind the bench door. Eight power terminals equipped with M8 studs allow the connection of the AC mains (phase and neutral).

The connexion points are located at about 72 cm from the ground.



Connexion from left to right:

- Input 2 :
  - TB2/1: Phase 1
  - TB2/2: Phase 2
  - TB2/3: Phase 3
  - TB2/4: Neutral
- Input 1 : Neutral, Phase 3, 2, 1

- TB1/4: Neutral
- TB1/3: Phase 3
- TB1/2: Phase 2
- TB1/1: Phase 1

3.3 Control / command wiring

The amplitude of currents can be controlled using a digital order or an analog signals. The six corresponding analog inputs (BNC) are located on the bench front face. The expected signal level is 0/10 Vpk. 0V set the current to 0, 10V set the current to the maximum amplitude of the waveform (26 Arms in sine or 36.76 A pk for an arbitrary waveform).

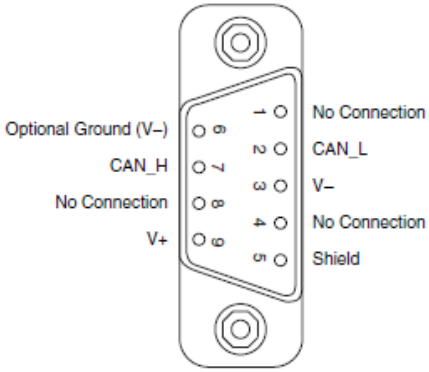
The bench can be controlled locally using the touch screen display, or a remotely using the Ethernet or CAN BUS link. These two links are located on the rear low part of the bench

Ethernet link J4 :

- RJ45 plug
- Up to 100 Mb/s
- Cat 5^{e} cable

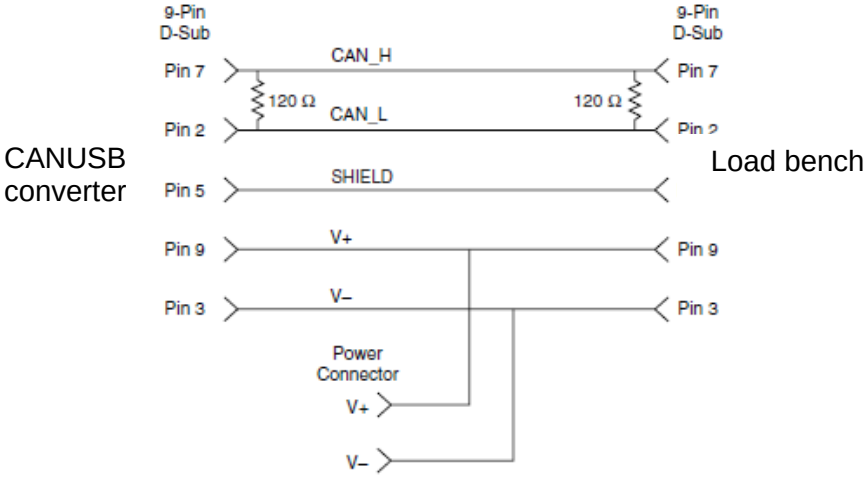
CAN BUS J3:

- DB9 femal plug
- From 10Kb/s to 1Mb/s selectable on the touch screen or Ethernet order
- Pinout :



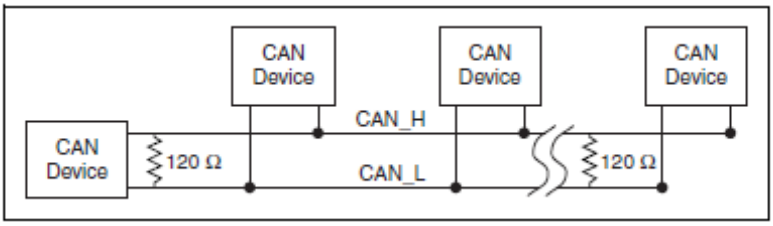
The impedances end of line must be installed according to the CAN BUS used

- **Point to point wiring:** two resistors 120 ohms must be connected as above.



Only the signals CAN_H, CAN_L et SHIELD must be wired.
Wiring of signal V+ et V- are not required.

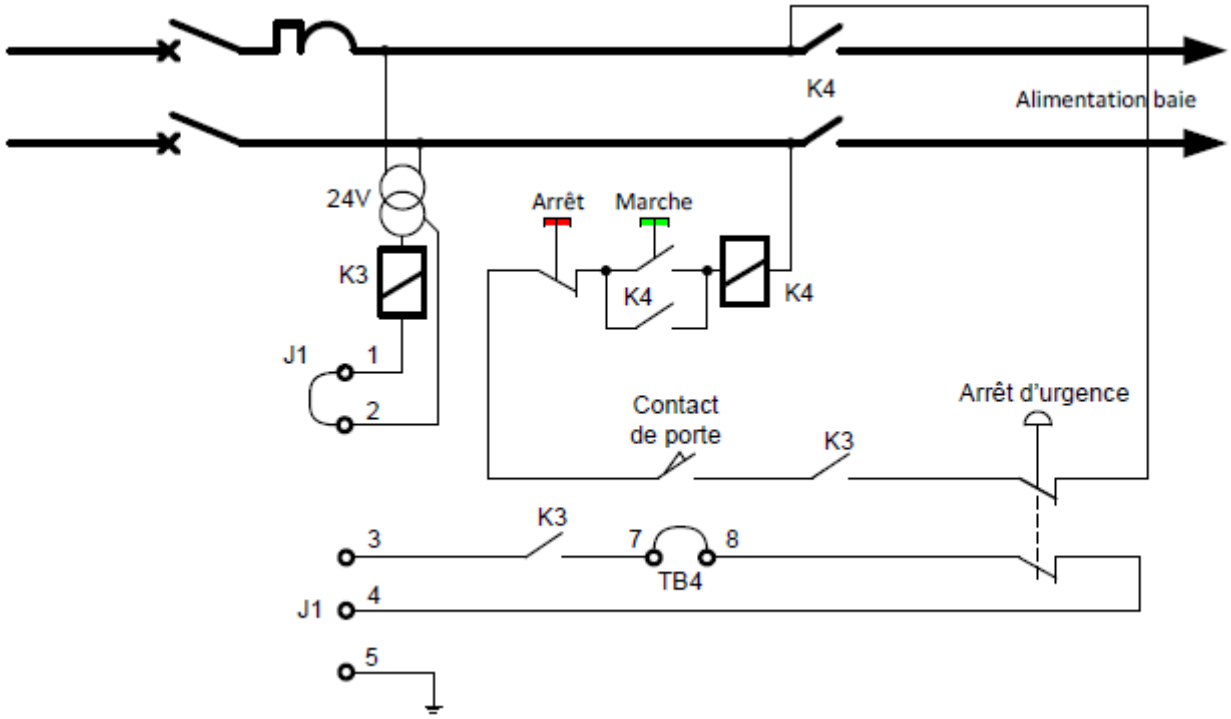
- **Wiring on an existing network :** the network must only contains two impedances end of line.



3.4 Emergency stop wiring

The servitude protection module includes a J1 DIN 5 pins connector allowing to remotely control the emergency functions. J1 is located at the bottom right corner of the following protection module:

The associated functions are as follows:



The presence of the mains closes the contactor K3 if a link is established between points 1 and 2 of connector J1. The safety loop incorporates buttons ON and OFF, the closing contact of back door, and a switch K3 contact emergency stop button.

Upon delivery, the J1 connector is equipped with a plug that provides the internal closure of the emergency stop by a permanent connection between points 1 and 2.

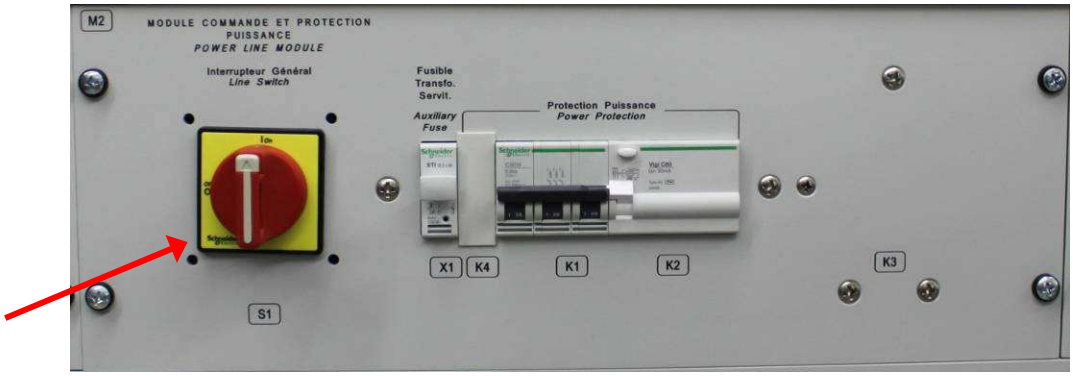
If an external emergency stop must be added, it should replace the permanent connection between points 1 and 2 by a dry contact normally closed. The voltage between points is 24 VRMS (contact open), the current is less than 50 mArms.

A dry contact status information of the bench is also available on pins 3 and 4. The maximum voltage on this contact is 24 VRMS and maximum permissible current is 1 ARMS. It can be connected to another customer emergency system.

4. BENCH COMMISSIONING

4.1Procedure for starting the bench

1. Ensure that the network loaded is off
2. Connect the network load
3. Ensure proper locking the door behind the bench
4. Make sure that the emergency stop button is unlocked
5. Turn on the main switch on the bench: the yellow indicator lights



6. Turn on the bench by pressing the START button: The LED located between the white and OFF buttons lights up. After a few seconds, the screen turns on and the software starts

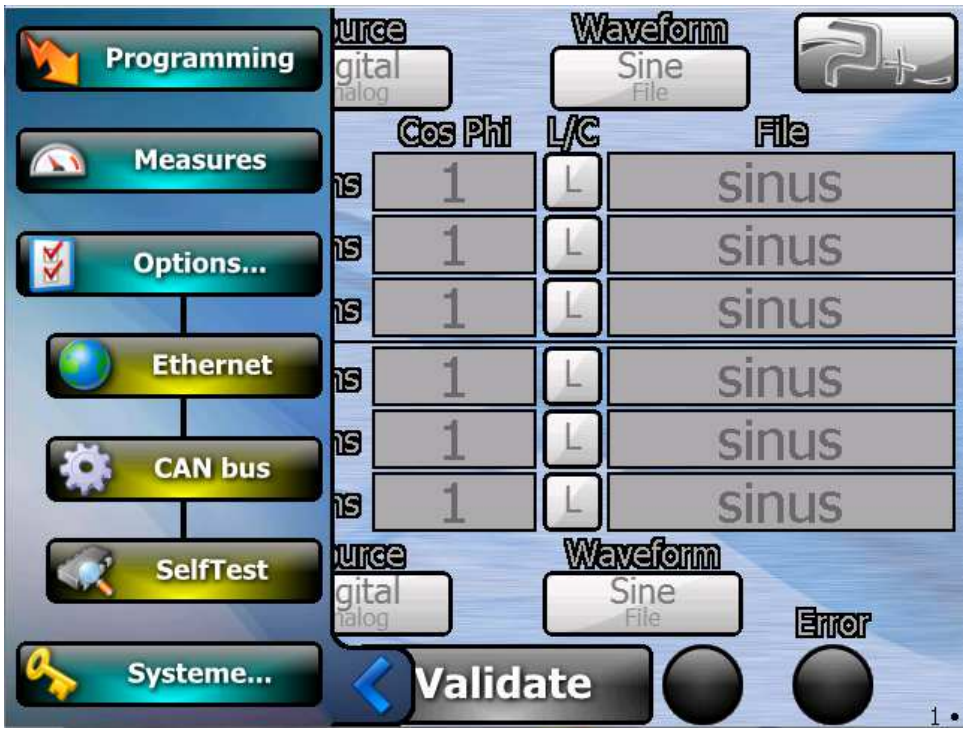
7. Check a smooth start on the bench screen (see screenshots in section 5 of this document)
8. Configure the load according to the desired use
9. Apply the input voltage.

4.2Procedure for stopping the bench

1. Ensure that the network load is off
2. Close the application on the PC
3. Stop the bench by pressing the STOP button
4. Turn off the bench

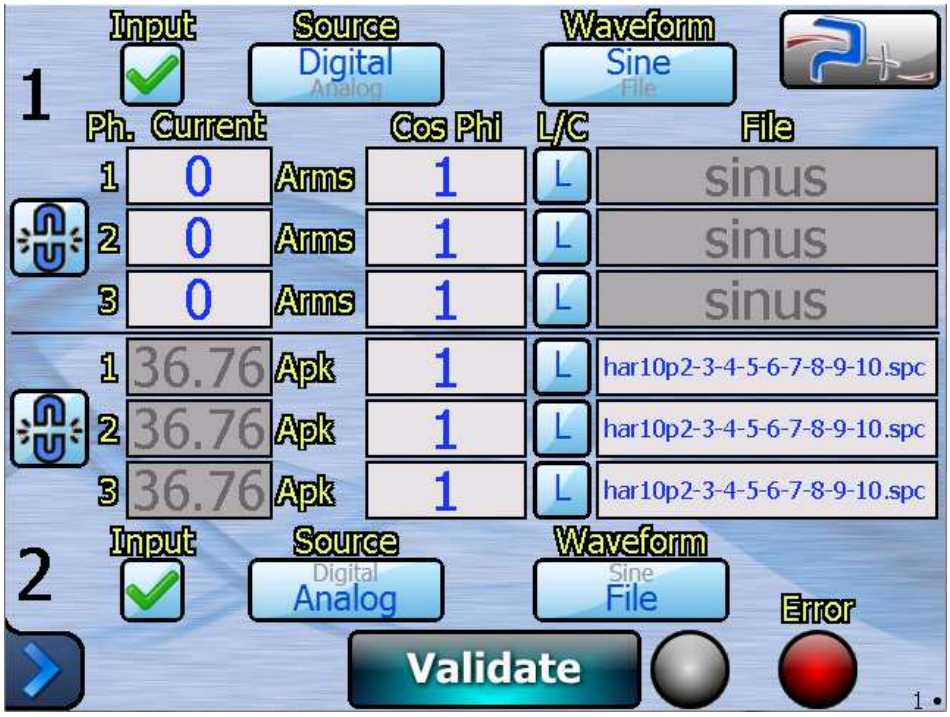
5. TOUCH SCREEN DISPLAY

The software is organized in several screens. The screen displayed can be selected sliding a digit on the display, or using the menu. The menu appears/disappears when pressing the blue arrows in the bottom left corner.



5.1 Programming screen

This screen allows to set both loads amplitudes, power factor, waveforms:



- **Input** set the input contactors, and allows to connect/disconnect the load to the network. **The check is undimmed when the three phases voltage measured at the bench input are greater than 70 Vrms during at least 100 ms. In any other cases, it is dimmed and set to OFF.**

- **Source** allows to specify if the waveform amplitude is control by the value displayed on the screen, or by the 6 analog inputs of the bench. In case of analog controls, the amplitude displayed on the screen is set to maximum (26 A rms for sine or 36.76 A pk for arbitrary waveform), corresponding to an analog value 10 V.

- **Waveform** select a sine waveform, or an arbitrary waveform. The waveform is created by OPS1, and downloaded to the instrument using ftp protocol on Ethernet. This operation can be done graphically using the instrument driver on OPS3, or manually with the procedure described in chapter 6.4.

- **Current** set the signal amplitude when “source” is set to “Digital”. The amplitude unit is A rms when the Waveform is set to Sine, or A pk when signal is set to waveform.

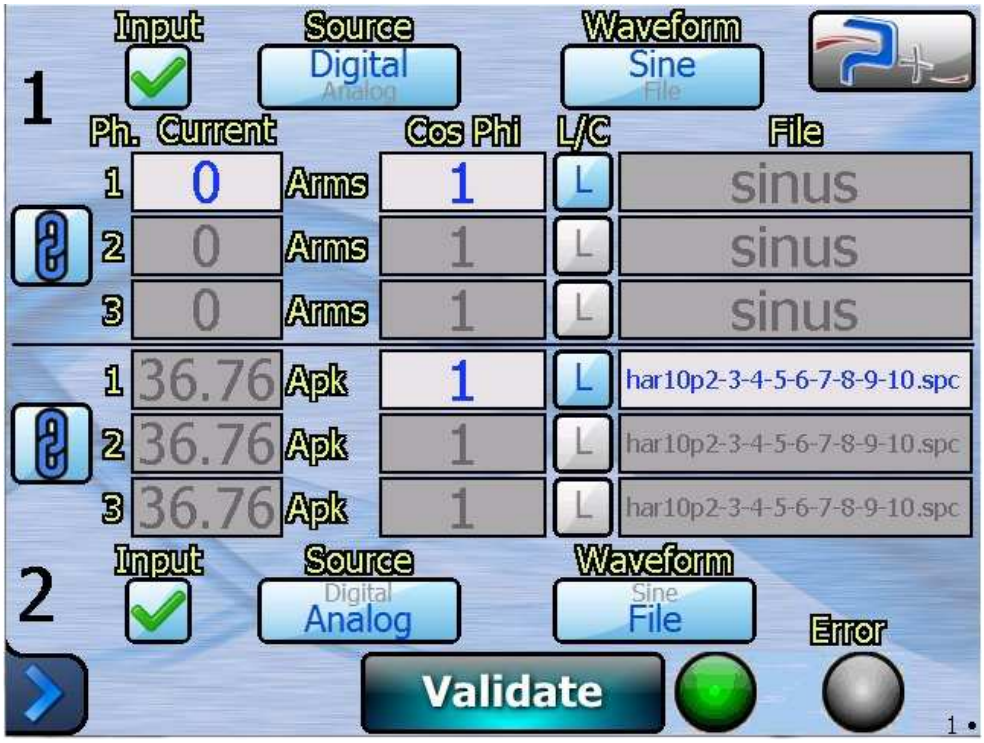
- **Power factor and L/C** set the angle of the current compared to the voltage measured on phase 1.

  Formulas for inductive load:
  - PHASE 1=0 – ARCCOS (POWER FACTOR PHASE A)
  - PHASE 2=240 – ARCCOS (POWER FACTOR PHASE B)
  - PHASE 3=120 – ARCCOS (POWER FACTOR PHASE C)

  Formulas for capacitive load:
  - PHASE 1=0 + ARCCOS (POWER FACTOR PHASE A)
  - PHASE 2=240 + ARCCOS (POWER FACTOR PHASE B)
  - PHASE 3=120 + ARCCOS (POWER FACTOR PHASE C)

- **Validate** allows to program the instrument with the parameters entered on the screen. The **LED** located on the right of the button indicates that the parameters have been properly programmed (green = ok, red=not ok).

- The **ERROR LED** synthesis the hardware default. These defaults are detailed in other panels.



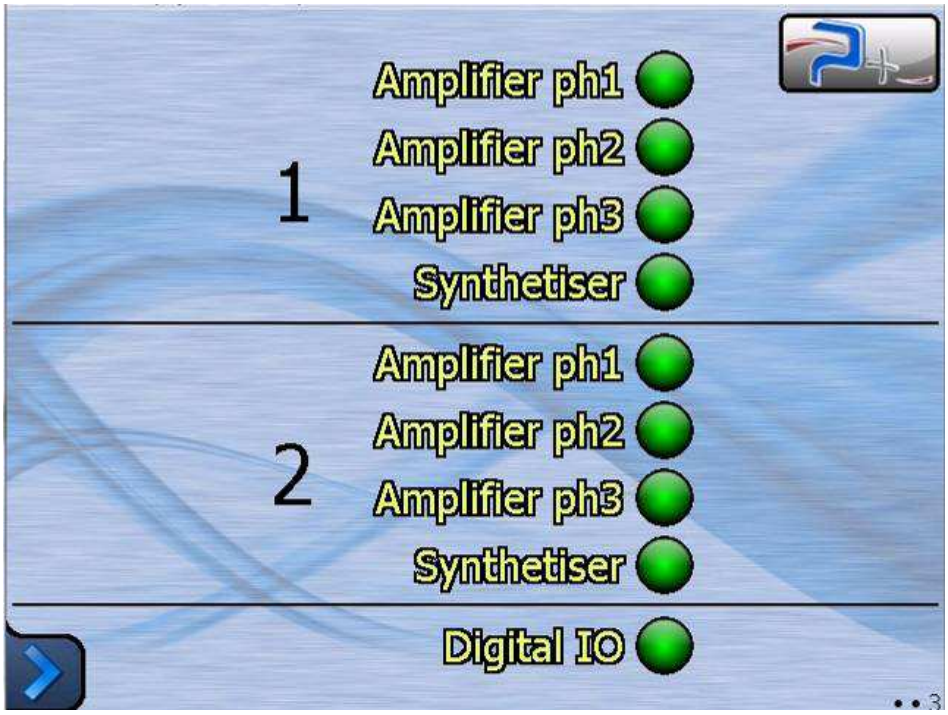
- The **locker** on the left allows to only enter the parameters of phase 1. Other phases are set to the same value. Angles are set to fixed values.

5.2 Measure screen

This screen display periodically the Current and Voltage measured on the bench input, the state of Thermal defaults of the Transistors and the states of Fuses.

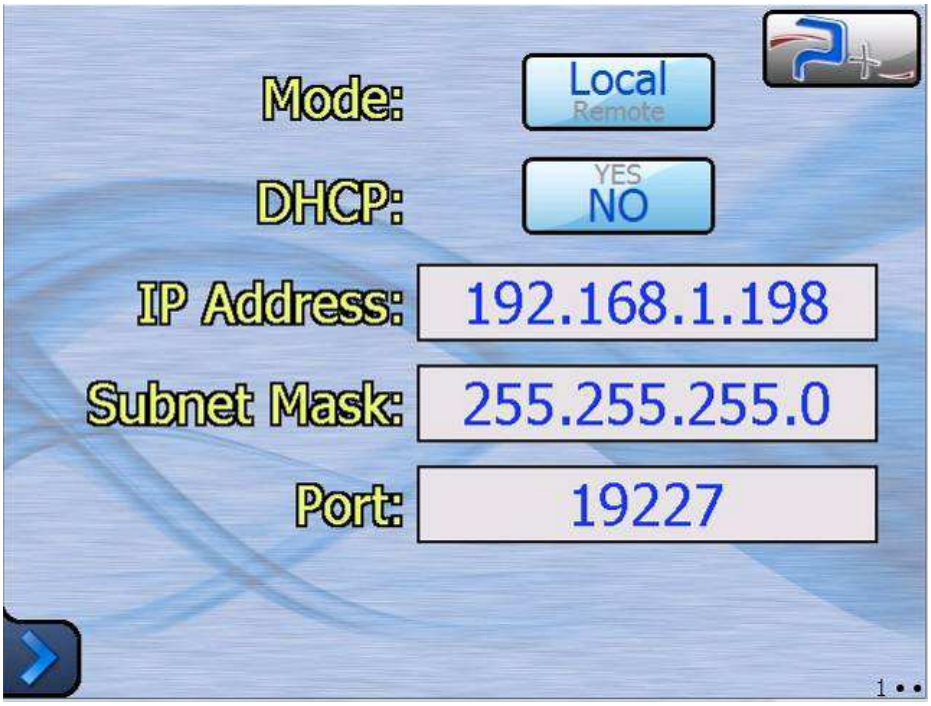
5.3 Selftest screen

This screen displays the status of the internal communication with the several boards of the bench. The statuses of LEDs are set during the power on of the bench and are not refreshed.



5.4 Ethernet configuration screen

This screen allows to configure the Ethernet IP port of the bench : DHCP or fixed addrees, address, mask and port.



- After each Ethernet or CAN dialog, the **Mode** is set to Remote, and the user cannot enter any value on the touch screen. The **Local** control can be restored pressing the Mode button.

- When using **DHCP** automatic configuration, the **IP address** can change at each power ON. When using dialog with software using a fixed address, such as OPS3, it is recommended to use a fixed address.

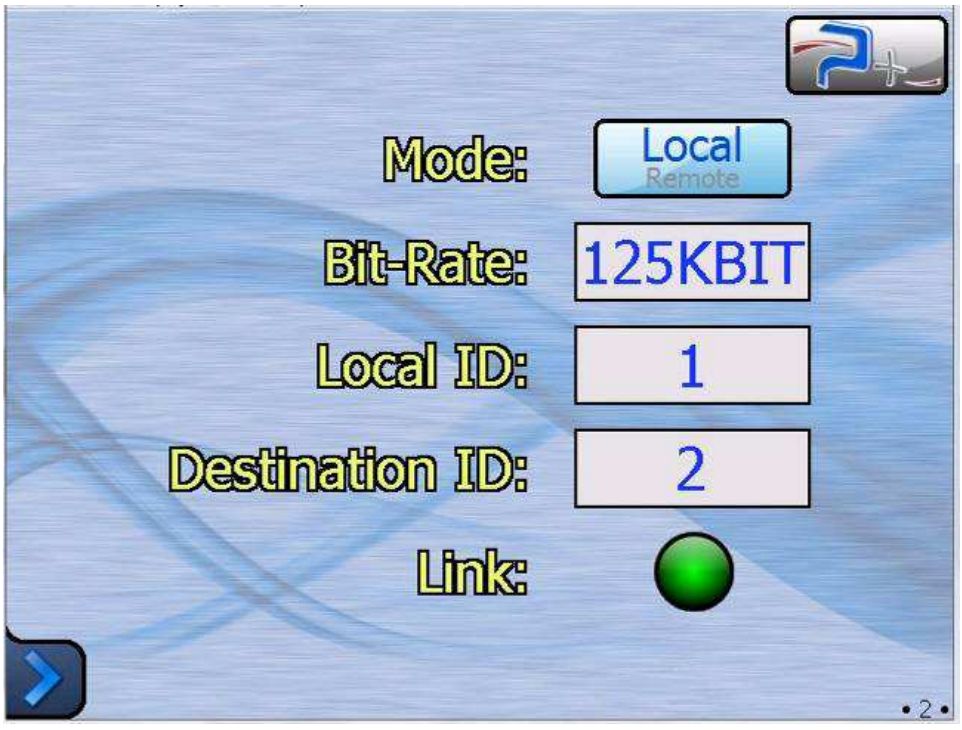
- **Port** is usually set to 5025, to comply with the LXI standard.

After changing any settings, this icon appears in the bottom right of the screen asking you to save your new configuration.

After saving, the new configuration will be taken into account after a reboot of the control board of the bench. This can be done by clicking on the icon that appears at the bottom right of the screen.

5.5 CAN BUS configuration screen

This screen allows to configure the CAN BUS communication: Bit-rate, Local ID of the bench, Destination ID of the computer.



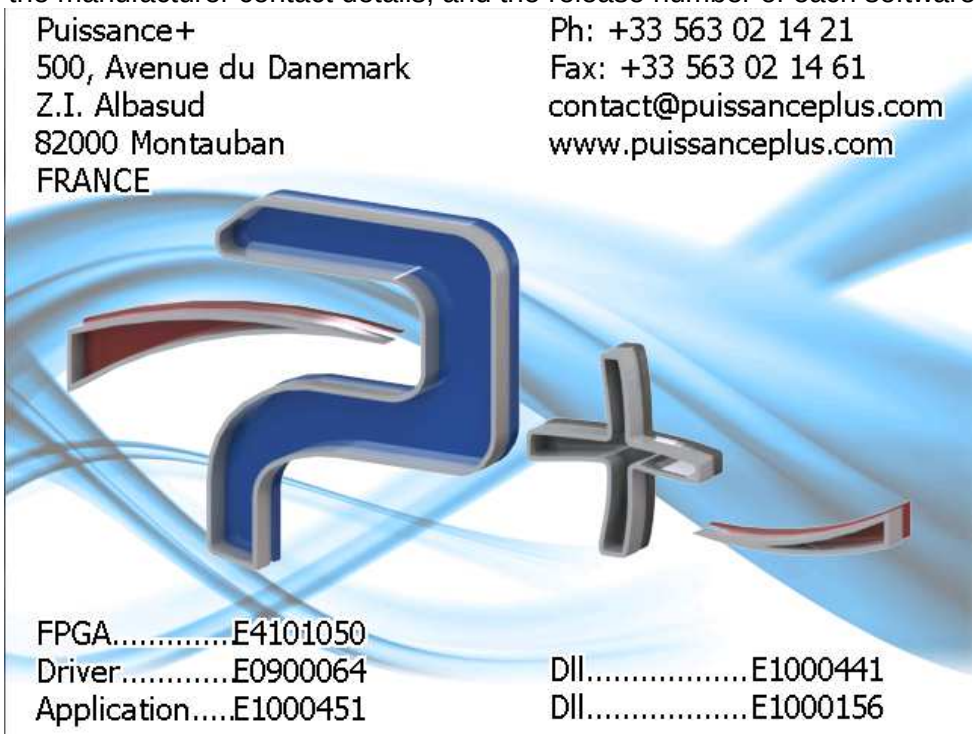
- After each Ethernet or CAN dialog, the **Mode** is set to **Remote**, and the user cannot enter any value on the touch screen. The **Local** control can be restored pressing the Mode button.

- The **LINK** LED displays the detection of the internal Ethernet ⇔ CAN BUS interface of the bench:
  Green: detected
  Red: internal error, interface not detected

5.6 « About » screen

The screen « About » can be reach from any screen, using the upper left button: 

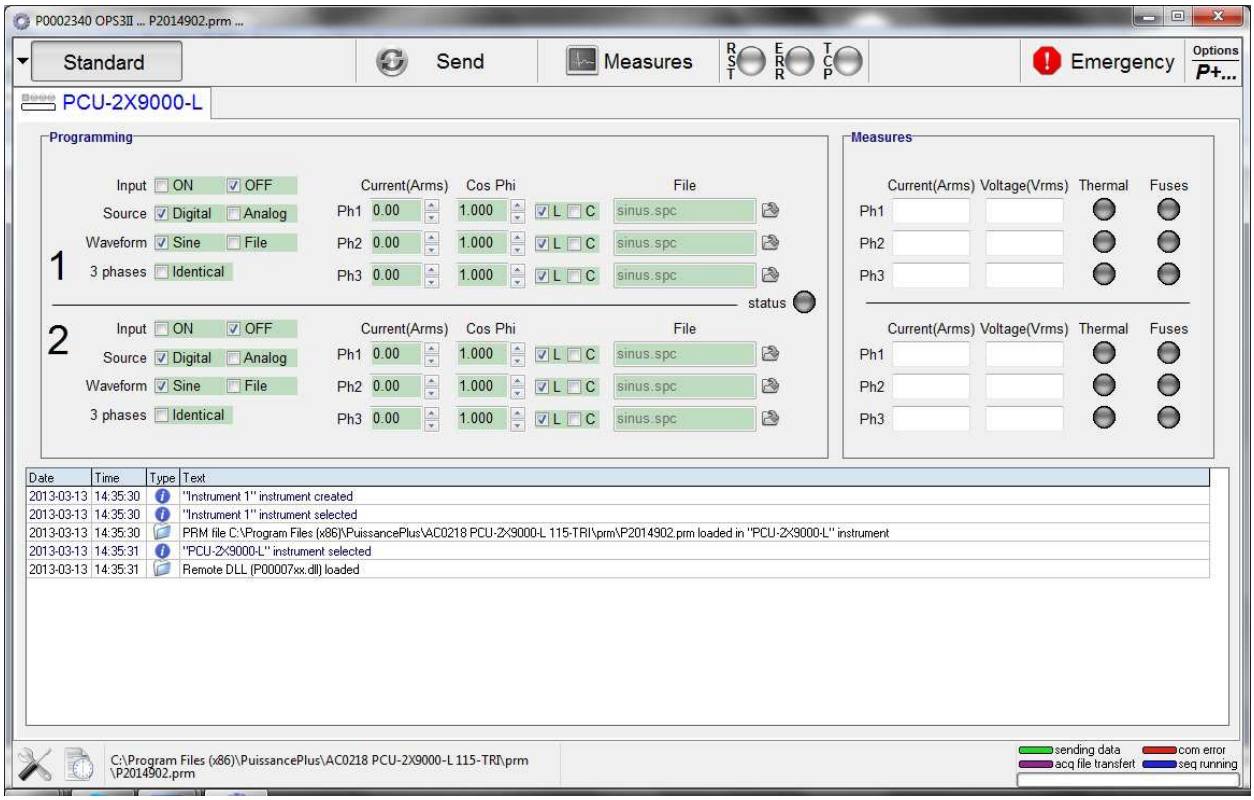
It displays the manufacturer contact details, and the release number of each software module.



5.7 Bench remote control using OPS3

An IHM (called prm) has been developped to control the bench using a PC.
The operating system of the PC must be Windows XP or windows seven in mode Windows XP compatible

The interface is similar to screens on the bench.



The toolbox on the bottom left corner allows to select the prm, and to configure the IP address of the instrument.

After editing the controls, press the button “Send” to transfer and validate the data to the bench.

The checks ON/OFF allows to set the input contactor of the bench. After setting the instrument, the software read back the value. The check can go to “OFF” if the voltage is not greater than 70 Vrms on the three phases at the bench inputs (see chapter 5.1)

Switch on the button “Measures” to refresh periodically the measures displayed on the left part of the screen.

The waveforms can be edited using OPS1.

6. REMOTE PROGRAMMING

6.1 CAN BUS command syntax

The CAN BUS communication uses the protocol 2.0b.

A CAN communication received by the instrument is composed of a maximum of 3 parts:

1) Action type / data format: 1 quartet
2) Parameter number : variable number of quartets
3) Data : variable number of quartet

Usage	Type/format	Parameter number	Data	Expected answer
16 bits data programming	0h	3 quartets	2 bytes	3 bytes

Float programming	1h	3 quartets	4 bytes	3 bytes
16 bits data reading	8h	3 quartets	/	6 bytes
Float data reading	9h	3 quartets	/	8 bytes

Frames components :

n = parameter number
d = Data
h = hexadecimal code value
s-e-m = float number (sign, exponent, mantissa). Float are in format IEEE 754 32 bit.
c = CheckSum of the programming (Sum of the last bytes truncated on 8 bits)
S = Status. Sum of the following error:

- bad command 0x01
- bad format 0x02
- bad value 0x04
- system error 0x08
- send / read timeout 0x10
- disabled parameter 0x20
- checksum error 0x40
- id error 0x80

16 bits data Programming :

Byte 1	Byte 2	Byte 3	Byte 4
0 0 0 0 n n n n	n n n n n n n n	h h h h h h h h	h h h h h h h h

Byte 5
c c c c c c c c

Answer:

Byte 1	Byte 2	Byte 3
0 0 0 0 0 0 0 0	S S S S S S S S	c c c c c c c c

Float data Programming :

Byte 1	Byte 2	Byte 3	Byte 4
0 0 0 1 n n n n n n n n n n n n		s e e e e e e e e e e m m m m	

Byte 5	Byte 6	Byte 7
m m m m m m m m m m m m m m m m		c c c c c c c c

Answer:

Byte 1	Byte 2	Byte 3
0 0 0 1 0 0 0 0	S S S S S S S S	c c c c c c c c

Reading 16 bits :

Byte 1	Byte 2	Byte 3
1 0 0 0 n n n n n n n n n n n n		c c c c c c c c

Answer:

Byte 1	Byte 2	Byte 3	Byte 4
1 0 0 0 n n n n n n n n n n n n		h h h h h h h h h h h h h h h h	

Byte 5	Byte 6
S S S S S S S S	c c c c c c c c

Reading Float :

Byte 1	Byte 2	Byte 3
1 0 0 1 n n n n	n n n n n n n n	c c c c c c c c

Answer:

Byte 1	Byte 2	Byte 3	Byte 4
1 0 0 1 n n n n	n n n n n n n n	s e e e e e e e	e e e e m m m m
Byte 5	**Byte 6**	**Byte 7**	**Byte 8**
m m m m m m m m	m m m m m m m m	S S S S S S S S	c c c c c c c c

6.2 Ethernet BUS command syntax

Principe :

The Ethernet connection is the physical standard used to transfer commands which allow driving the cabinet via a LAN interface.

The equipment uses the customer/server TCP/IP WinSock architecture standard on the chosen port. The equipment is functioning like a server. The other equipment which wants to drive the cabinet will connect itself as a customer by opening a communication socket.

The commands are ASCII characters strings transported by the TCP protocol.

The interface allows driving equipment parameters with specifics requests. The parameter characteristics are given in a table in 6.3

Parameters programming :

Only the writable parameters (Programmable or P) can be programmed.

A parameter programming is done by sending the parameter name (or address), followed by the character “=”, followed by the value:

***Parameter*=*value*\r\n**

The decimal separator is the point “.” If there is the unit, the request will be programmed, even if the unit is not the same as the one described in the parameter table. The unit used is always the one described in the parameter table.

If the command is correct, the equipment sends the character string: “OK\r\n”

Parameter reading:

To read a parameter, the user has to send the address or the corresponding name, followed by the character “?”.

***Parameter*?\r\n**

If the command is correct, the equipment sends the character string: “OK\r\n”, followed by the character string constituted by the answer and the characters “\r\n”.

***Parameter*=*value* *unit*\r\n**

Example: M_Ph1Voltage?
OK
M_Ph1Voltage=10.20 V

6.3Parameters

The array below indicates the list of remote command.

Parameters beginning with P_ are programmable and readable.
Parameters beginning with M_ are measurable.

All these parameters can be set using the Ethernet TCP/IP BUS. The syntax is described in chapter 6.2
Parameters having a number in the column NBR can be set using the CAN BUS. The syntax is described in chapter 6.1.

Nbr	Name	**Description**	Possible Programming Values	Conversion Standard/hexa	Default value	Volatile
00h	P_SysDisplay	Choice of the panel displayed on screen.	Prog Meas	Prog/00h Meas/01h	Prog	YES
01h	*RST	Instrument reset	/	/	/	YES
02h	*IDN	Identification request	PUISSANCE-PLUS, AC0218xx,0,E1000451 + E0900062 + E4101050 + E1000441 + E1000155		/	/
08h	P_1Input	Program the three phases input relay of the load (allows to disconnect the load)	OFF ON	OFF/0000h ON/0007h	OFF	YES
18h	P_1CurSrc	Program the current amplitude source: digital order or analog input	Digital Analog	Digital/0000h Analog/0001h	Digital	YES
90h	P_1AllPhIdentic	Allows to set phases 2 and 3 at the same values as phase 1 (amplitude and waveform) (amplitude and waveform). Angles are set to 0/120/240°.	OFF ON	OFF/0000h ON/0001h	OFF	YES

	P_1Waveform	Allows to choose the waveform of the current : sine or arbitrary waveform	Sine File	Sine/0000h File/0001h	Sinus	YES
	P_1Ph1FileName	When the current setting is waveform, choose le name of the arbitrary waveform to be played on the channel	*FileName*	*FileName*/0000h	*Empty*	YES
	P_1Ph2FileName	See above	*FileName*	*FileName*/0000h	*Empty*	YES
	P_1Ph3FileName	See above	*FileName*	*FileName*/0000h	*Empty*	YES
A0h	P_1Ph1CosPhi	Allows to set the current angle compared to the voltage applied on phase 1	Min:0.000 Max:1.000°	Hexa= PrAn*FFF/1.000	1.000	YES
A1h	P_1Ph1LoadType	Allows to set the angle sign	L C	L/0000h C/0001h	L	YES
A2h	P_1Ph2CosPhi	Allows to set the current angle compared to the voltage applied on phase 1	Min:0.000 Max:1.000°	Hexa= PrAn*FFF/1.000	1.000	YES
A3h	P_1Ph2LoadType	Allows to set the angle sign	L C	L/0000h C/0001h	L	YES
A4h	P_1Ph3CosPhi	Allows to set the current angle compared to the voltage applied on phase 1	Min:0.000 Max:1.000°	Hexa= PrAn*FFF/1.000	1.000	YES
A5h	P_1Ph3LoadType	Allows to set the angle sign	L C	L/0000h C/0001h	L	YES

30h	P_1Ph1Current	When the current setting is digital, program the amplitude in rms (sine) or peak (File mode)	*P_1Waveform=Sine* Min : 00.00A Max : 26.00A *P_1Waveform=File* Min : 00.00A Max : 36.76A	*P_1Waveform=Sine* Hexa= PrAn*FFFh/26.00 *P_1Waveform=File* Hexa= PrAn*FFFh/36.75	00.00A	YES
31h	P_1Ph2Current	See above	*P_1Waveform=Sine* Min : 00.00A Max : 26.00A *P_1Waveform=File* Min : 00.00A Max : 36.75A	*P_1Waveform=Sine* Hexa= PrAn*FFFh/26.00 *P_1Waveform=File* Hexa= PrAn*FFFh/36.75	00.00A	YES
32h	P_1Ph3Current	See above	*P_1Waveform=Sine* Min : 00.00A Max : 26.00A *P_1Waveform=File* Min : 00.00A Max : 36.75A	*P_1Waveform=Sine* Hexa= PrAn*FFFh/26.00 *P_1Waveform=File* Hexa= PrAn*FFFh/36.75	00.00A	YES
38h	M_1Ph1Voltage	Measure the rms voltage on the load channel	Min : 000.00V Max : 135.00V	Hexa= PrAn*FFFh/135.00		
39h	M_1Ph2Voltage	See above	Min : 000.00V Max : 135.00V	Hexa= PrAn*FFFh/135.00		
3Ah	M_1Ph3Voltage	See above	Min : 000.00V Max : 135.00V	Hexa= PrAn*FFFh/135.00		
40h	M_1Ph1Current	Measure the rms current on the load channel	Min : 00.00A Max : 29.40A	Hexa= PrAn*FFFh/29.40	00.00A	YES
41h	M_1Ph2Current	See above	Min : 00.00A Max : 29.40A	Hexa= PrAn*FFFh/29.40	00.00A	YES

42h	M_1Ph3Current	See above	Min : 00.00A Max : 29.40A	Hexa= PrAn*FFFh/29.40	00.00A	YES
48h	M_1Ph1Thermal	Return the thermal default state	(Red) KO (Green) OK	KO:0001h OK:0000h		
49h	M_1Ph2Thermal	See above	(Red) KO (Green) OK	KO:0001h OK:0000h		
4Ah	M_1Ph3Thermal	See above	(Red) KO (Green) OK	KO:0001h OK:0000h		
78h	M_1Ph1Fuse	Return the fuse default state	(Red) KO (Green) OK	KO/0000h OK/0001h		
79h	M_1Ph2Fuse	See above	(Red) KO (Green) OK	KO/0000h OK/0001h		
7Ah	M_1Ph3Fuse	See above	(Red) KO (Green) OK	KO/0000h OK/0001h		
09h	P_2Input	Program the three phases input relay of the load (allows to disconnect the load)	OFF ON	OFF/0000h ON/0007h	OFF	YES
19h	P_2CurSrc	Program the current amplitude source: digital order or analog input	Digital Analog	Digital/0000h Analog/0001h	Digital	YES
91h	P_2AllPhIdentic	Allows to set phases 2 and 3 at the same values as phase 1 (amplitude and waveform) (amplitude and waveform). Angles are set to 0/120/240°.	OFF ON	OFF/0000h ON/0001h	OFF	YES

	P_2Waveform	Allows to choose the waveform of the current : sine or arbitrary waveform	Sine File	Sine/0000h File/0001h	Sinus	YES
	P_2Ph1FileName	When the current setting is waveform, choose le name of the arbitrary waveform to be played on the channel	*FileName*	*FileName*/0000h	*Empty*	YES
	P_2Ph2FileName	See above	*FileName*	*FileName*/0000h	*Empty*	YES
	P_2Ph3FileName	See above	*FileName*	*FileName*/0000h	*Empty*	YES
A8h	P_2Ph1CosPhi	Allows to set the current angle compared to the voltage applied on phase 1	Min:0.000 Max:1.000°	Hexa= PrAn*FFF/1.000	1.000	YES
A9h	P_2Ph1LoadType	Allows to set the angle sign	L C	L/0000h C/0001h	L	YES
AAh	P_2Ph2CosPhi	Allows to set the current angle compared to the voltage applied on phase 1	Min:0.000 Max:1.000°	Hexa= PrAn*FFF/1.000	1.000	YES
ABh	P_2Ph2LoadType	Allows to set the angle sign	L C	L/0000h C/0001h	L	YES
ACh	P_2Ph3CosPhi	Allows to set the current angle compared to the voltage applied on phase 1	Min:0.000 Max:1.000°	Hexa= PrAn*FFF/1.000	1.000	YES
ADh	P_2Ph3LoadType	Allows to set the angle sign	L C	L/0000h C/0001h	L	YES

33h	P_2Ph1Current	When the current setting is digital, program the amplitude in rms (sine) or peak (File mode)	*P_1Waveform=Sine* Min : 00.00A Max : 26.00A *P_1Waveform=File* Min : 00.00A Max : 36.76A	*P_1Waveform=Sine* Hexa= PrAn*FFFh/26.00 *P_1Waveform=File* Hexa= PrAn*FFFh/36.75	00.00A	YES
34h	P_2Ph2Current	See above	*P_1Waveform=Sine* Min : 00.00A Max : 26.00A *P_1Waveform=File* Min : 00.00A Max : 36.75A	*P_1Waveform=Sine* Hexa= PrAn*FFFh/26.00 *P_1Waveform=File* Hexa= PrAn*FFFh/36.75	00.00A	YES
35h	P_2Ph3Current	See above	*P_1Waveform=Sine* Min : 00.00A Max : 26.00A *P_1Waveform=File* Min : 00.00A Max : 36.75A	*P_1Waveform=Sine* Hexa= PrAn*FFFh/26.00 *P_1Waveform=File* Hexa= PrAn*FFFh/36.75	00.00A	YES
3Bh	M_2Ph1Voltage	Measure the rms voltage on the load channel	Min : 000.00V Max : 135.00V	Hexa= PrAn*FFFh/135.00		
3Ch	M_2Ph2Voltage	See above	Min : 000.00V Max : 135.00V	Hexa= PrAn*FFFh/135.00		
3Dh	M_2Ph3Voltage	See above	Min : 000.00V Max : 135.00V	Hexa= PrAn*FFFh/135.00		
43h	M_2Ph1Current	Measure the rms current on the load channel	Min : 00.00A Max : 27.30A	Hexa= PrAn*FFFh/max	00.00A	YES
44h	M_2Ph2Current	See above	Min : 00.00A Max : 27.30A	Hexa= PrAn*FFFh/max	00.00A	YES

45h	M_2Ph3Current	See above	Min : 00.00A Max : 27.30A	Hexa= PrAn*FFFh/max	00.00A	YES
4Bh	M_2Ph1Thermal	Return the thermal default state	(Red) KO (Green) OK	KO:0001h OK:0000h		
4Ch	M_2Ph2Thermal	See above	(Red) KO (Green) OK	KO:0001h OK:0000h		
4Dh	M_2Ph3Thermal	See above	(Red) KO (Green) OK	KO:0001h OK:0000h		
7Bh	M_2Ph1Fuse	Return the fuse default state	(Red) KO (Green) OK	KO/0000h OK/0001h		
7Ch	M_2Ph2Fuse	See above	(Red) KO (Green) OK	KO/0000h OK/0001h		
7Dh	M_2Ph3Fuse	See above	(Red) KO (Green) OK	KO/0000h OK/0001h		
50h	P_Validate	Validate all previously programmed parameters	OFF ON *Automatique reset to OFF*	OFF/0000h ON/0001h	OFF	YES
58h	M_StatusProg	Return the status of the last P_Validate order.	(Red) KO (Green) OK (Gray) Modified	KO/0000h OK/0001h Modified/0002h		
	MD5=Filename MD5?	Allows to calculate, then to read the checksum MD5 of a filename. Allows to check if a file has changed.	*MD5Value*	*MD5Value*:0000h	*Empty*	YES

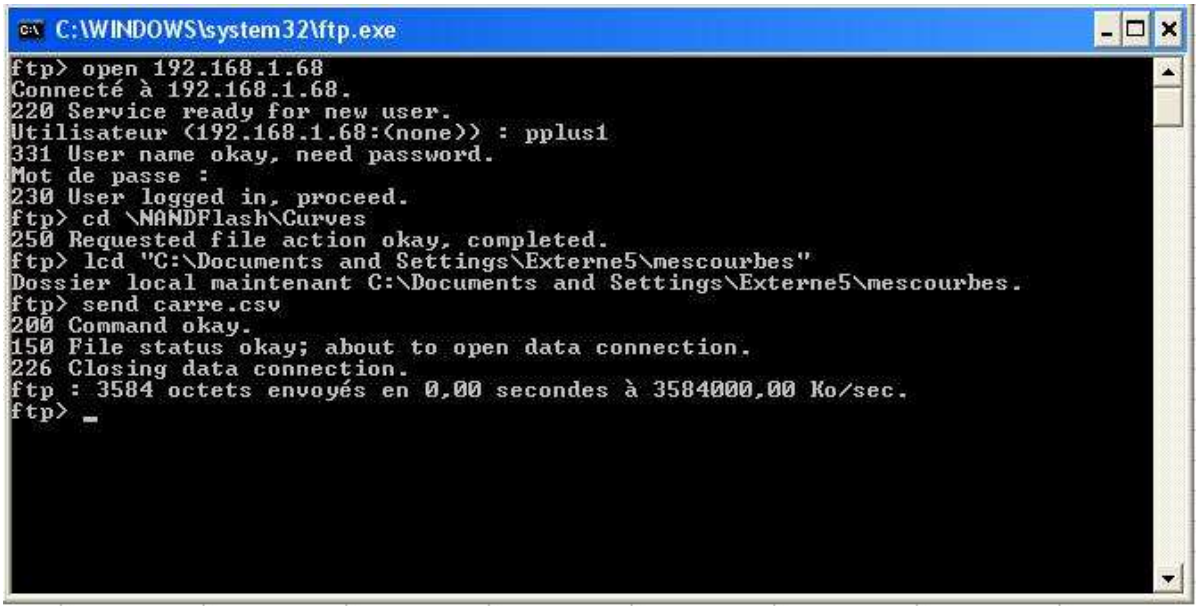
98h	M_GeneralFault	Summerize all the default status (fuse and thermal).		KO/0000h OK/0001h		
60h	A_1Ph1Amplifier	CRU board selftest	(Red) KO (Green) OK	KO:0000h OK:0001h		
61h	A_1Ph2Amplifier	See above	(Red) KO (Green) OK	KO:0000h OK:0001h		
62h	A_1Ph3Amplifier	See above	(Red) KO (Green) OK	KO:0000h OK:0001h		
68h	A_1synthetiser	Synu3 board selftest	(Red) KO (Green) OK	KO:0000h OK:0001h		
63h	A_2Ph1Amplifier	CRU board selftest	(Red) KO (Green) OK	KO:0000h OK:0001h		
64h	A_2Ph2Amplifier	See above	(Red) KO (Green) OK	KO:0000h OK:0001h		
65h	A_2Ph3Amplifier	See above	(Red) KO (Green) OK	KO:0000h OK:0001h		
69h	A_2synthetiser	Synu3 board selftest	(Red) KO (Green) OK	KO:0000h OK:0001h		
80h	A_DigIO	Digital I/O board selftest	(Red) KO (Green) OK	KO/0000h OK/0001h		

	CAN_LocalID	CAN Bench Label ID	Min : 0 Max : 2047	0:0000h 2047:07FFh	1	NO
	CAN_DestID	Answer label ID	Min : 0 Max : 2047	0:0000h 2047:07FFh	2	NO
	CAN_Speed	CAN BUS speed	10Kbit 20Kbit 50Kbit 100Kbit 125Kbit 250Kbit 500Kbit 800Kbit 1Mbit	10Kbit:0000h 20Kbit:0001h 50Kbit:0002h 100Kbit:0003h 125Kbit:0004h 250Kbit:0005h 500Kbit:0006h 800Kbit:0007h 1Mbit:0008h	250Kbit	NO
	CAN_Link	Allows to know if a CAN BUS communication dialog is established	(Red) KO (Green) OK	KO:0000h OK:0001h		

6.4 Downloading new wavefroms

Waveforms can be created using OPS1, and can be downloaded to the instrument using the graphical user interface OP3, directly or ftp command. This chapter describes this last method.

CAUTION: The following procedure must be followed carefully to avoid errors that can damage system files and therefore affect the proper functioning of the bench.



Step 1: Create the file describing the waveform
Using the software OPS1, create new waveform and save it in the desired format (CSV, SPC)

Step 2: identify the IP address of the bench.
The IP address is displayed in the GUI described in section 5.4. In our example, the IP address is 192.168.1.68

Step 3: Communication in Windows
Click "Start" then "Execute" and type "ftp" and confirm by "Ok" button. You should see the console as above.

Enter "open IPaddress". In our example "open 192.168.1.68".
Enter the login "pplus1" and enter the password "ppluscom"

The files are stored in a specified directory on the control board.
Type "cd \ NandFlash \ Curves"

The next step allows you to move locally (on your PC) to the folder where you saved your waveform. Enter "lcd My_directory""

Send your file typing "send filename" In our example, "send carre.csv"

The last step is to close the connection to enter this "close" and "quit".

The waveform will appear in the list of waveforms available locally.

7. SPECIFICATIONS

7.1 Line input specifications

Mains input wiring :

- Type: HO7RNF – 3P+T – 4x16 mm² - length: 5m
- Topology: three phase without neutral + earth
- Plug: 5 pole CETAC 63A
- Input voltage : 400V rms. +6% -10%
- Input frequency : From 45Hz to 55Hz
- Input current : about 45 A rmsper phase on network 400V at nominal conditions
- Dielectric> 2500V rms for 1 minute mains input to output connected to the frame ground.

The bench power supply must be protected by a magnetothermic Breaker adapted to bench consumption: 45 Amps curve D, 300 mA differential.

The bench is provided by default with a 5 meters input mains cable, with mains plug.

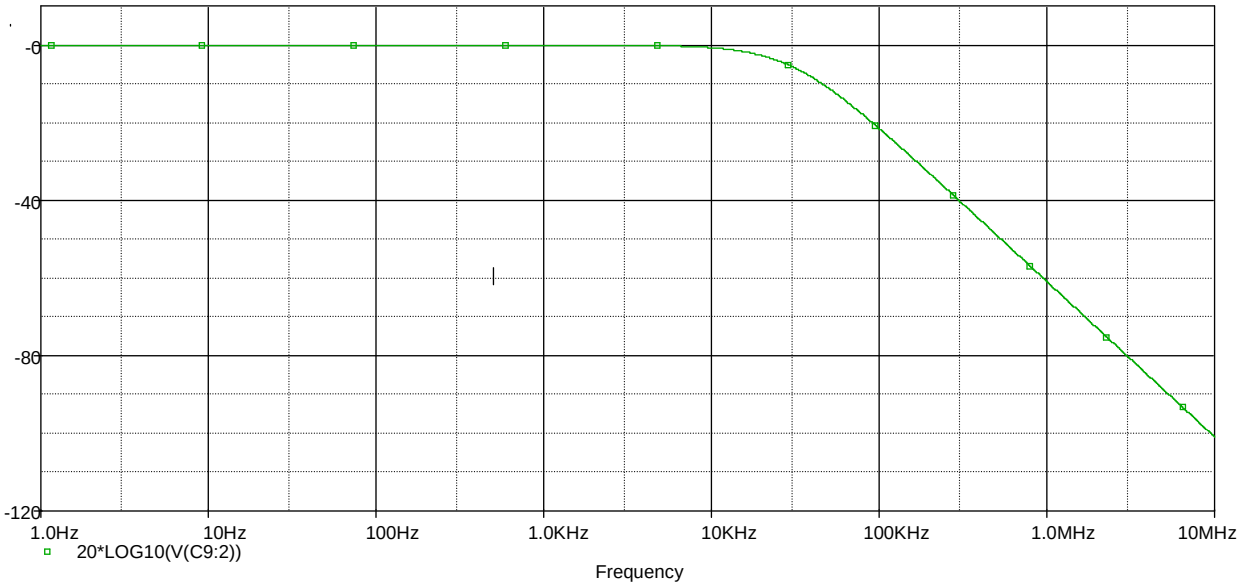
7.2 Characteristics of output current (per phase)

On each phase the source is able to absorb a current of 26 Arms (0-26 amps)

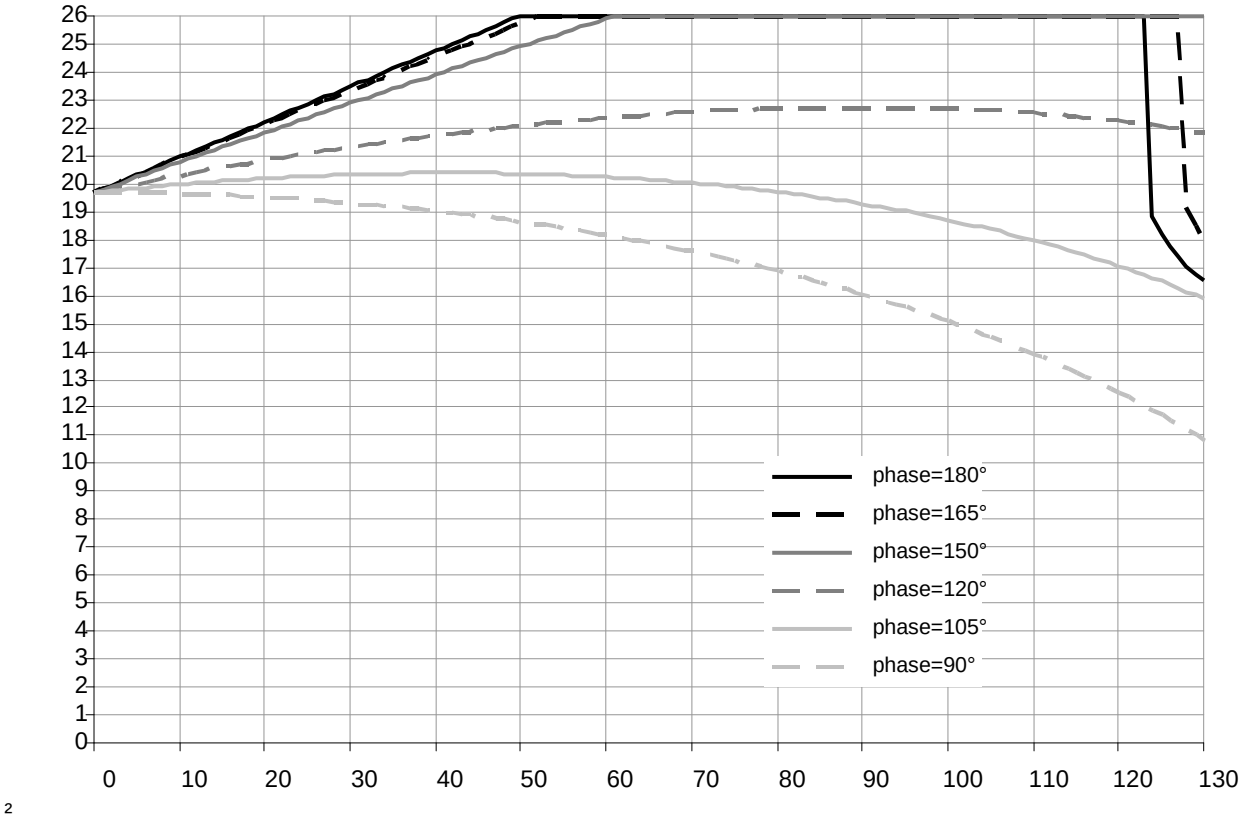
Output ratings

- Fundamental frequency : 300 à 10 00 Hz
- Harmonic frequency : 300 Hz à 150 kHz
- Current range : 26 A rms (see working area below)
- Current Accuracy : 0.5% + 130 mA from 300 Hz to 1 kHz
- Maximum network voltage: 130 Vrms
- 10-90% response time : <50 µs
- Ripple and noise (for nominal IS and VS) : <10-4 typ (rms)
- Temperature Coefficient : < 50 ppm/°C
- Output impedance : < 10µH @ 1kHz
- Regulatory network : <0.1% (384V à 424V)

Bandwith :

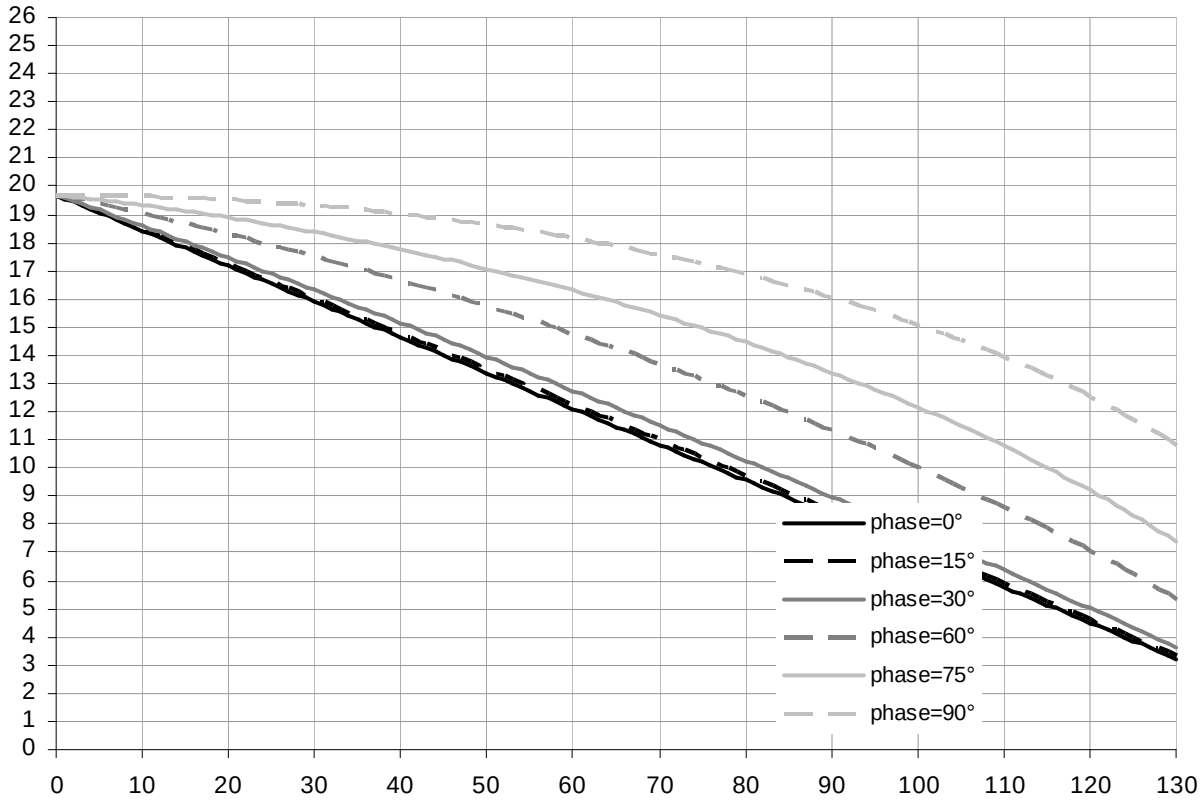


The following graph shows the maximum limits of working areas, for several angles.
180° represents a pure resistive load.
The curves I = f(U) are the maximum limits for a permanent point. These limits can be exceeded during a short time.



2

The following graph shows the maximum limits of working areas, when the load bench is used as a source on the network. When used in these angle ranges, the bench is still synchronized on the voltage on phase 1, so the bench is not autonomous and must be connected on a polarized network.



7.3 Characteristics of measures

The source measures rms voltage and current on each phase.

Baseline measurement:

- Accuracy (voltage and current) : <1% of full scale (<0.3% of points 115 volts)
- Resolution : 12 bits

7.4 Mechanical characteristics and dimensions of the bench

Total width of the bench : 800 mm
Total depth of the bench: 800 mm
Total height of the bench: 2000 (cabinet + casters)

Total mass of the bench: about 590 Kg

Clearance under the bench: about 140 mm

Finishes :

- Frame of the bench: Grey paint color RAL 7030
- Tailgate and sides of the bench: Grey Paint color RAL 7035
- Front face: Grey Paint color RAL 7035