Koehler
INSTRUMENT COMPANY, INC.

K873XX
Automatic Abel Flash Point Tester

Operation and Instruction Manual

REV B

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Petroleum Testing & Analysis Instrumentation • Custom Design & Manufacturing

CERTIFICATE OF CONFORMANCE

Automatic Abel Flash Point Tester
K873XX

This certificate verifies that part number K873XX, Automatic Abel Flash Point Tester, was manufactured in conformance with the applicable standards set forth in this certification.

Specifications:	**IP 170**
	ISO 1523
	ISO 13736
	NF M 07-011
	NF T 66-009

This unit is tested before it leaves the factory, to ensure total functionality and compliance to the above specifications and ASTM standards. Test and inspection records are on file for verification.

Jesse Kelly
Application Engineer
Koehler Instrument Company

CONTENTS

I- GENERAL

- 1.1 – VERIFICATION AFTER TRANSPORT

- Check the condition of the packaging and make any reservations to the transport operator in the event of any damage.
- Compare the contents (accessories) with the list supplied.
- Check the condition of the accessories.

- 1.2 – SAFETY INSTRUCTIONS

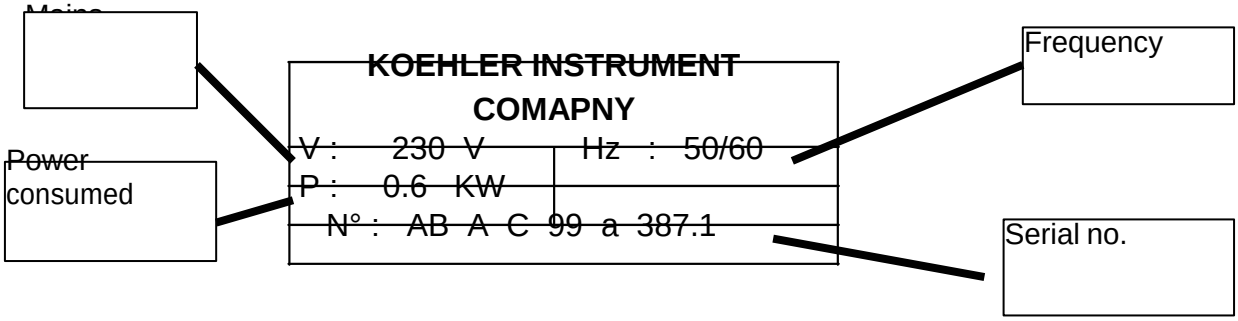
Before using the appliance, the operator must have :

- Knowledge of manual methods and experience of the types of tests to be performed.
- Knowledge of the hazards associated with handling products and samples.

Handling by the user of a hot cover/receptacle containing a sample should be avoided. Otherwise, this operation must be performed with extreme caution. In all cases the operator must wear the necessary personal protection: gloves, goggles, protective clothing.

1.3 – IDENTIFICATION OF THE APPLIANCE

The appliance has a manufacturer's plate on its left hand side:



- 1.4 – INSTRUCTIONS FOR USE

The appliance must be used solely :

- Using the methods indicated in the instructions
- Using the accessories supplied and indicated in the instructions
- In accordance with the test and start up procedures described in the instructions

When a test is in progress, the appliance should under no circumstances be left unsupervised.

It is mandatory to place the appliance under a smoke extractor hood; the work room must be adequately ventilated.

At least once a month the connections to the cryostat and to the gas must be checked to ensure the pipes and their fastenings are in satisfactory condition. The gas pipe must be changed before the expiry date indicated on it.

If an incident occurs (excess pressure of gas, abnormal overheating of the appliance, leaking or tipping up of the product) which may have caused damage, an internal and external inspection of the appliance by a qualified person is mandatory.

All maintenance work must be performed only by a qualified technician on an appliance restored to room temperature, switched off (except where necessary for calibration) and disconnected from the electricity, refrigerant and gas supply systems.

The maintenance functions described and detailed in the instructions shall only be performed by a qualified technician.

The functions and commands attached to the keyboard are clearly explained in the instructions; the operator must read these carefully before using the appliance.

- 1.5 – INSTALLATION INSTRUCTIONS

- The cooling circuit for the appliance must be connected to a cryostat regulated to a temperature at least 15 °C lower than the desired bath temperature (that is 32 °C below the expected temperature) .
- The connection to the cryostat must be made using the insulated pipes and collars supplied as accessories.
- The gas circuit of the appliance can be connected to mains gas of 50 mbar maximum with the pipes and collars supplied as accessories, or to a removable gas bottle, supplied as an option with its connection accessories.
- The appliance should be placed on a stable, strong table or laboratory bench.
- The electrical supply must comply with that described on the manufacturer's plate and be grounded.
- It is mandatory to place the appliance under a smoke extractor hood; the work room must be adequately ventilated.
- Check the condition of the accessories.

II– TECHNICAL CHARACTERISTICS

Field of use

Determination of a flash point in a closed receptacle in accordance with the standards:

- ISO 13736
- NF M 07 011
- IP 170

⇒ Ambient working temperature	15 °C to 30 °C
⇒ Range of working temperature	-30 °C to 110 °C
⇒ Temperature range	-70 °C to 700 °C
⇒ Measuring the sample temperature	Glass Pt 100 probe, 4 wire, resolution 0.1 °C
⇒ Detection of flashpoint	Ionising and/or thermocouple
⇒ Presentation of flame	Automatic gas or electric
⇒ Electrical test plug	Supply voltage adjusted by potentiometer
⇒ Stirring	2 speeds : 30 rpm and 75 rpm
⇒ Bath cooling	Connected to cryostat Connections : outside diameter 12.5 mm
⇒ Gas connection	Mains gas (50 mbar max.), gas bottle (option with 8 hours autonomy)
⇒ Pilot light and test flame	Adjusted by needle valves
⇒ Heating safety device	Heating cut off at 130°C measured in the bath independently of the micro-processor with audible alarm
⇒ Sample safety device	Current test stopped with audible alarm. Safety device programmable from 2 °C to 10 °C above the expected T°C
⇒ Probe safety device	Probe missing on account of no increase in temperature (3°C in 10 min)
⇒ Gas safety device	Optical detection of absence of flame with audible alarm and automatic cut off of gas with time delay of 30" and test stopped

⇒ Programming by tactile touch keyboard	• Select French or English • Automatic barometric correction or with manual input of atmospheric pressure • Select units : °C, °F, mbar, mmHg • Calibration of temperature measurements (regulated baths or decade unit) • Deletion or holding of expected temperature after each test • Buzzer (continuous or 3 min) • Correction of deviation of result: ± 9.9 °C

	• Sample security device parametrable from 3 °C to 10 °C above the expected temperature Alarm = safety - 3 °C • Printing of results with or without heating gradient • Programming appliance no. l • Configuration of ignition, gas or electric
⇒ Control of the appliance	Tactile touch keyboard, liquid crystal backlight screen, 240 x128 pixels
⇒ Printing configuration log	
⇒ Printing results	80 column or ticket printer (supplied)
⇒ Maintenance functions	For logical I/O test
⇒ Backing up programmed parameters	Flash Eprom
⇒ Software update	Downloaded
⇒ Last 100 results backed up	
⇒ Dimensions LxHxD (mm)	270 x 550 x 550
⇒ Weight	20 kg
⇒ Operating voltage	230 V ± 10 % - 50/60 HZ

III - DESCRIPTION OF THE APPLIANCE

- 3.1 - PRESENTATION (see presentation diagram)

3.1.1 Control Panel

- 1 tactile touch keyboard (1)
- 1 liquid crystal backlit graphics display (2)

3.1.2 – Middle front panel

- The flashpoint detection thermocouple connector (3)
- The ionizing detection cable connector (4)
- The Pt 100 sample probe connector (5)
- The bath probe connector (34)
- The gas connections for the pilot light and test flame (6)
- The plug power supply connectors (7)

3.1.3 Lower front panel

- The gas regulation valves for the pilot light (8), test flame (9)
- The heating (10) and refrigeration (11) indicator lights for the bath

3.1.4 Rear panel

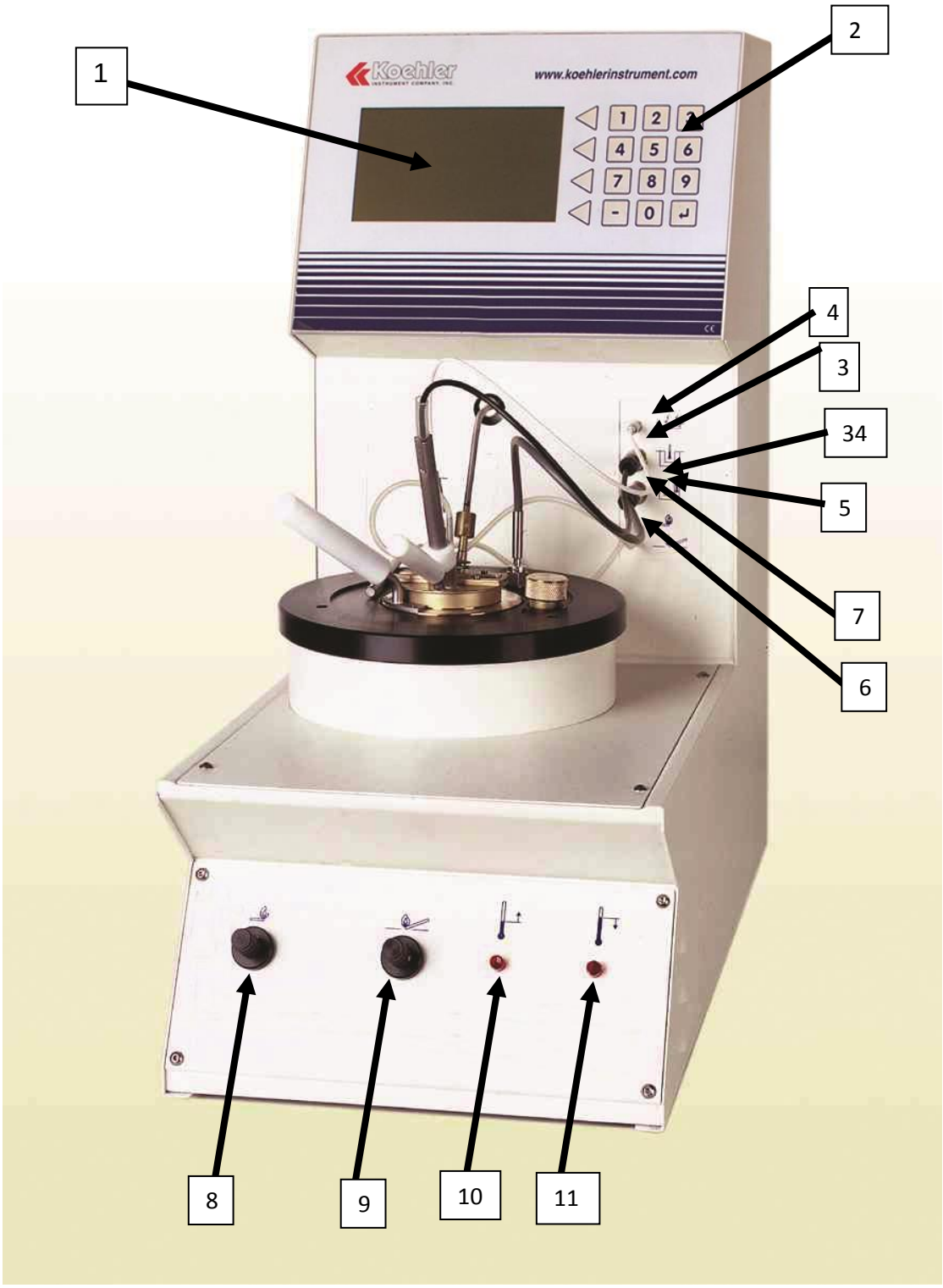
- The mains switch with protective fuse (12)
- The RS232 connector for link with the PC (13)
- The printer connection (14)
- The gas connection (15)
- The input (16) and output (17) connections to the cooling circuit.
- Gas bottle fastenings (18) (option)
- Output of pressure sensor for calibration by pressure simulation (19)
- Pressure sensor connector for calibration with a voltage generator (20)
- Bath over flow (21)
- Bath bleed (22)
- Drain for recovery of internal condensation (23)

3.1.5 Working zone

- Electrical plug connections (24)
- Rest receptacle (25)
- Bath (26)
- Flame presentation (27) or electric plug
- Pilot light (28)
- Flame presentation door control arm (29)
- Agitator connection rod (30)
- Temperature measuring probe rest (32)
- Bath filling plug (33)

3.1.6 – Right side

- Manufacturer's plate (31)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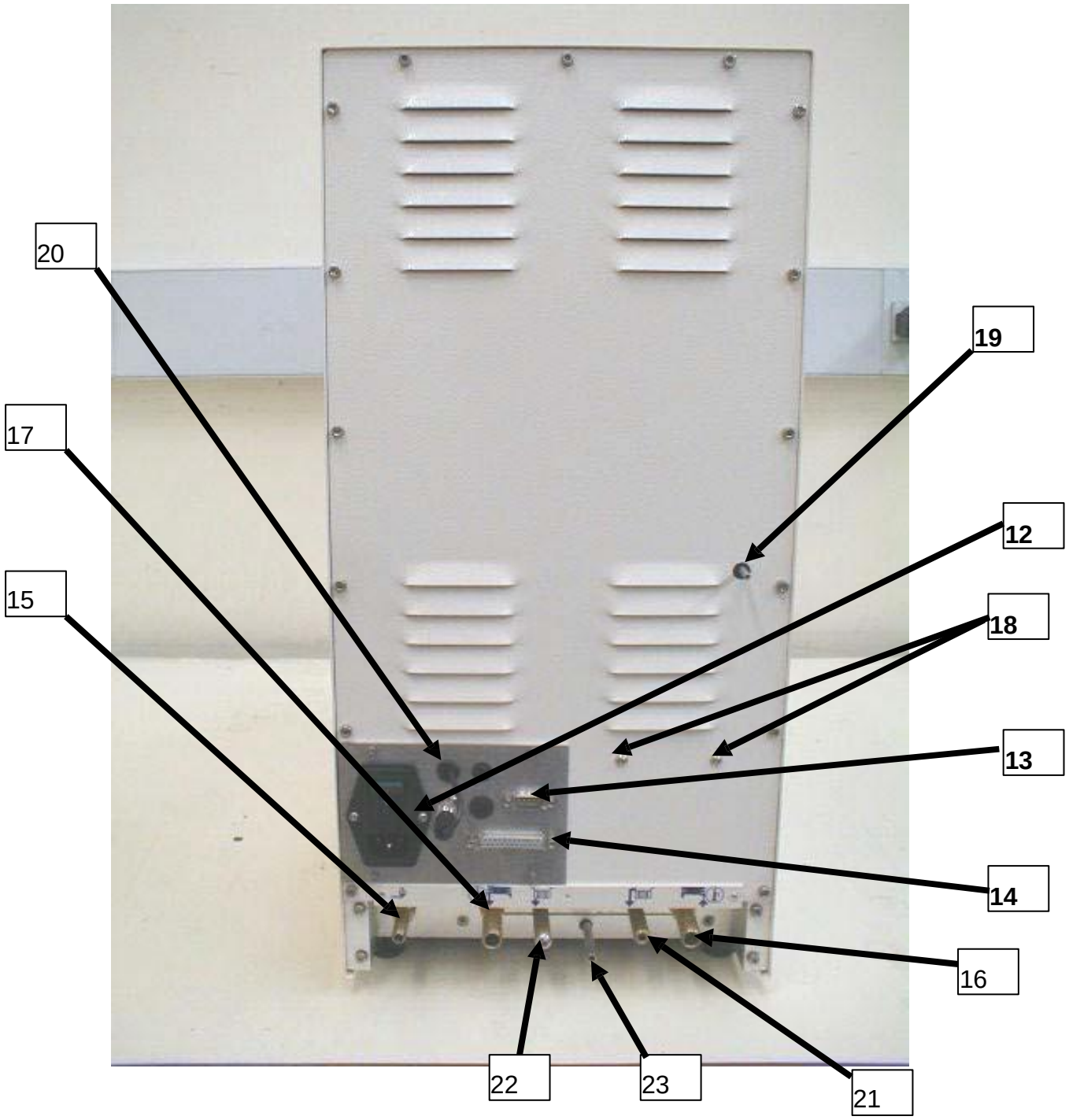
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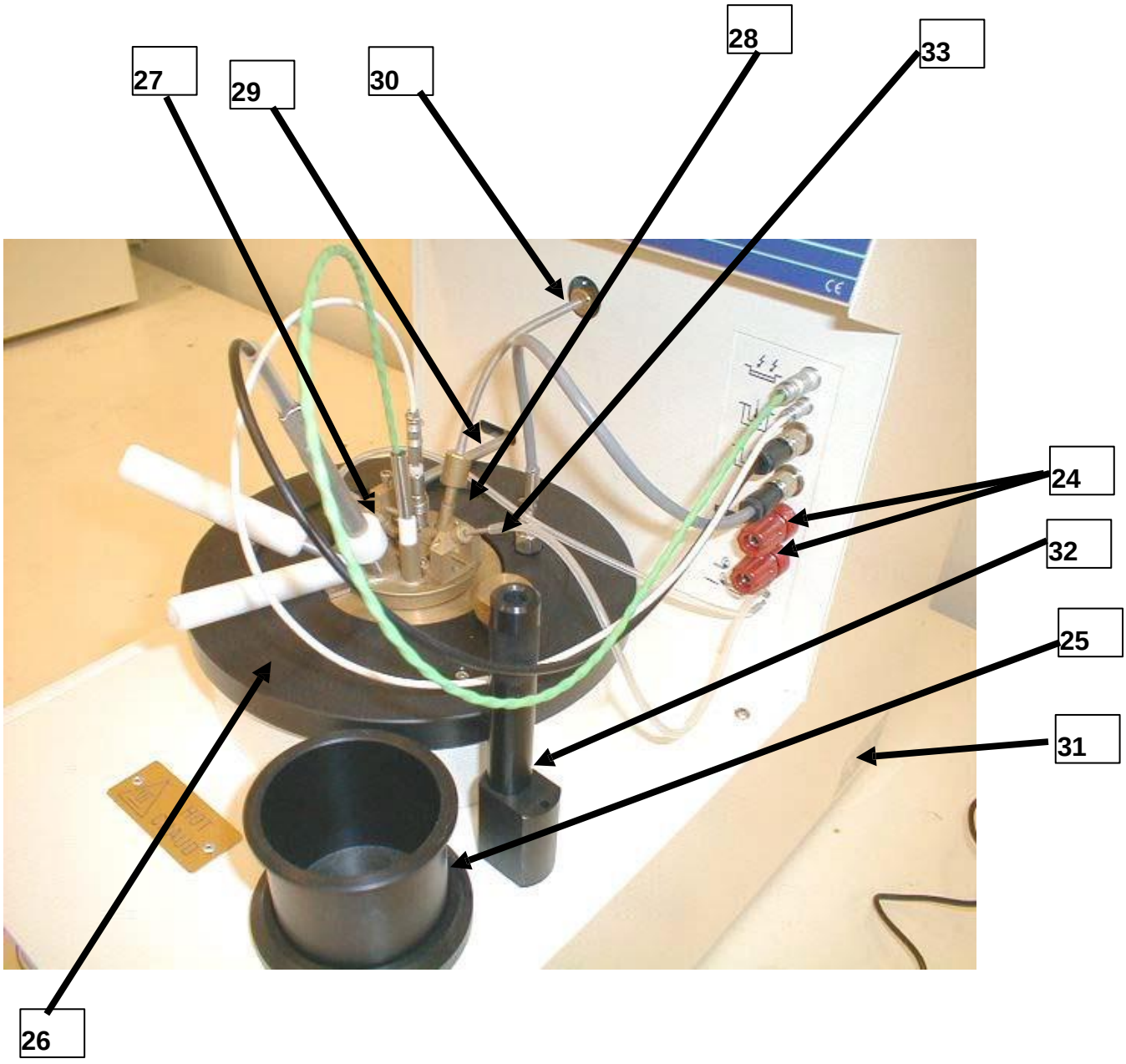
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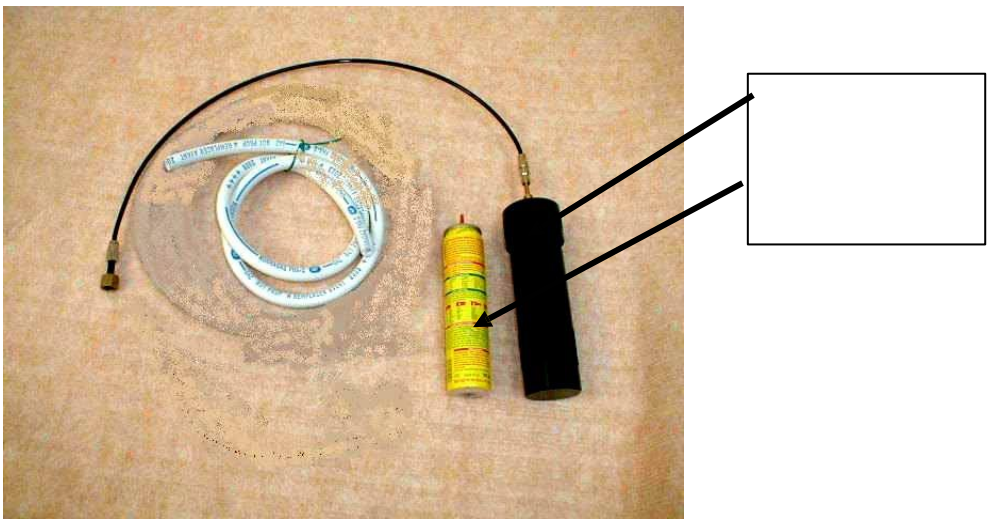
IV – ACCESSORIES SUPPLIED WITH THE APPLIANCE

- 4.1 – ACCESSORIES SUPPLIED AS STANDARD

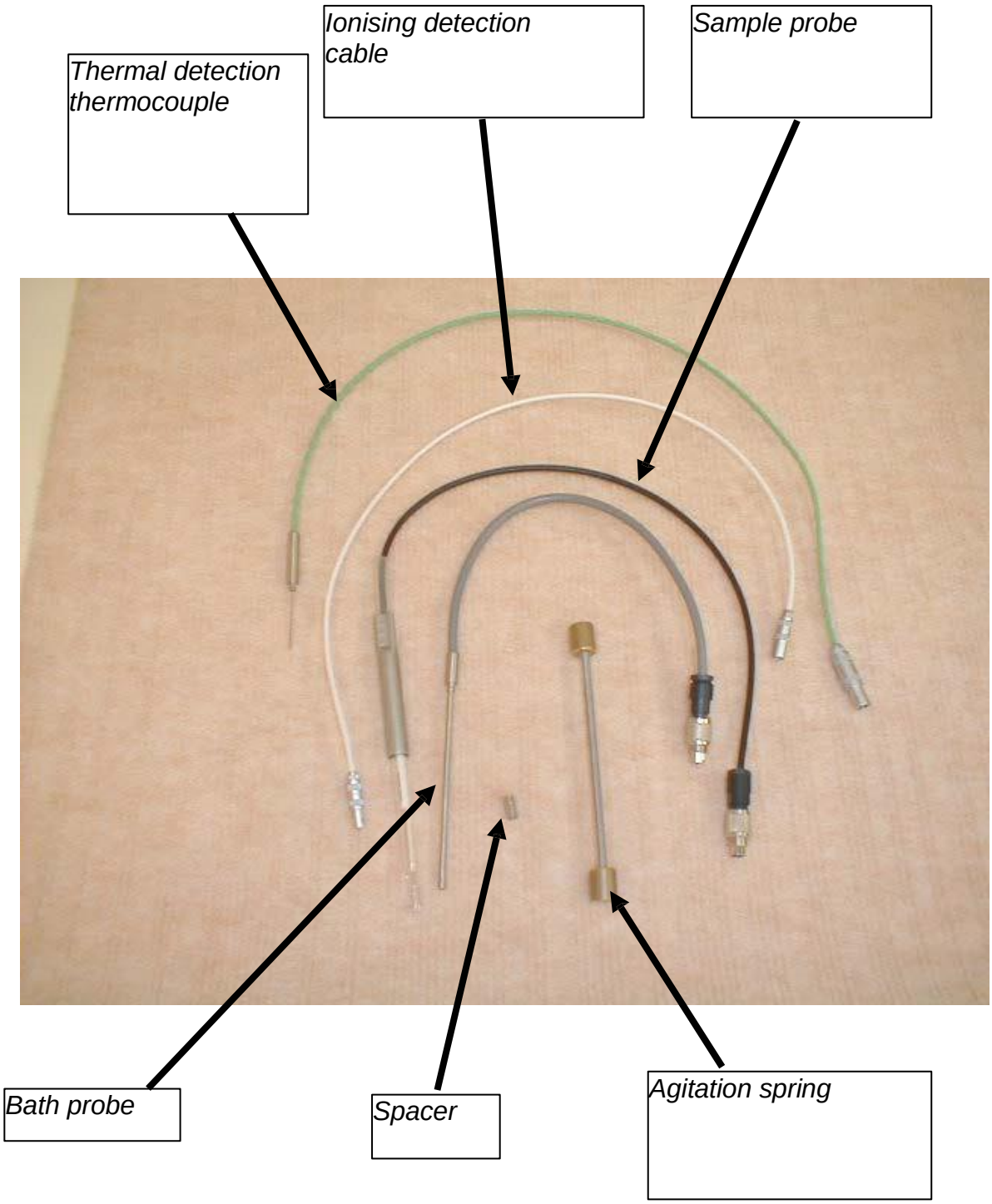
- 1 mains cable
- 1 cover and an Abel cup
- 1 rest receptacle
- 1 flash detection thermocouple
- 1 ionising detection cable
- 1 glass Pt 100 probe for the sample
- 2 pipes with collars for attaching to the cryostat
- 1 gas pipe with collars
- 1 agitation spring
- 1 operator's manual
- 1 certificate of conformity and attestation of final inspections
- 1 ticket printer with connector cable + recharge transformer
- 1 electric ignition coil
- 1 dipstick (small bath)
- 1 funnel

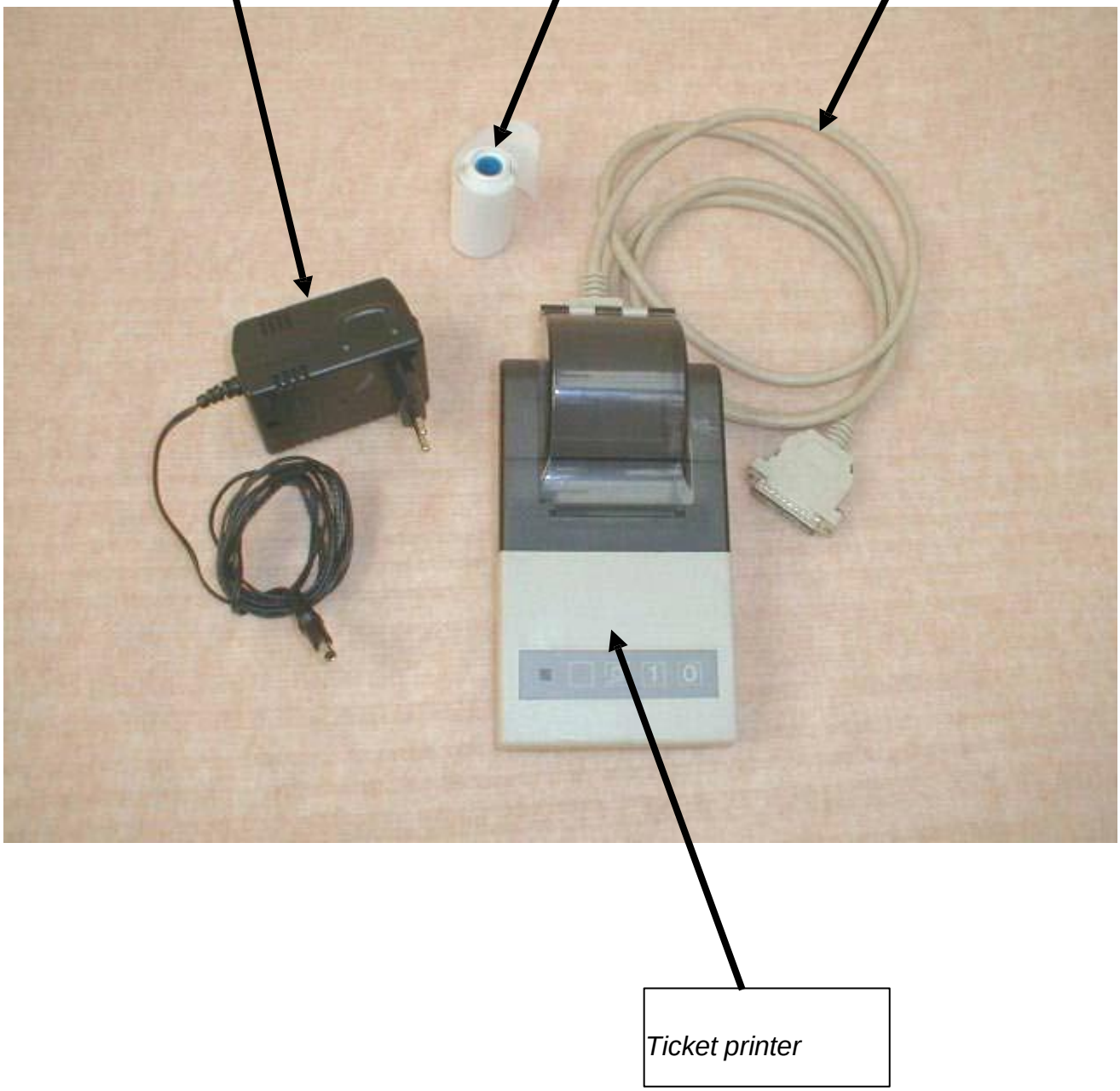
- 4.2 - OPTIONS

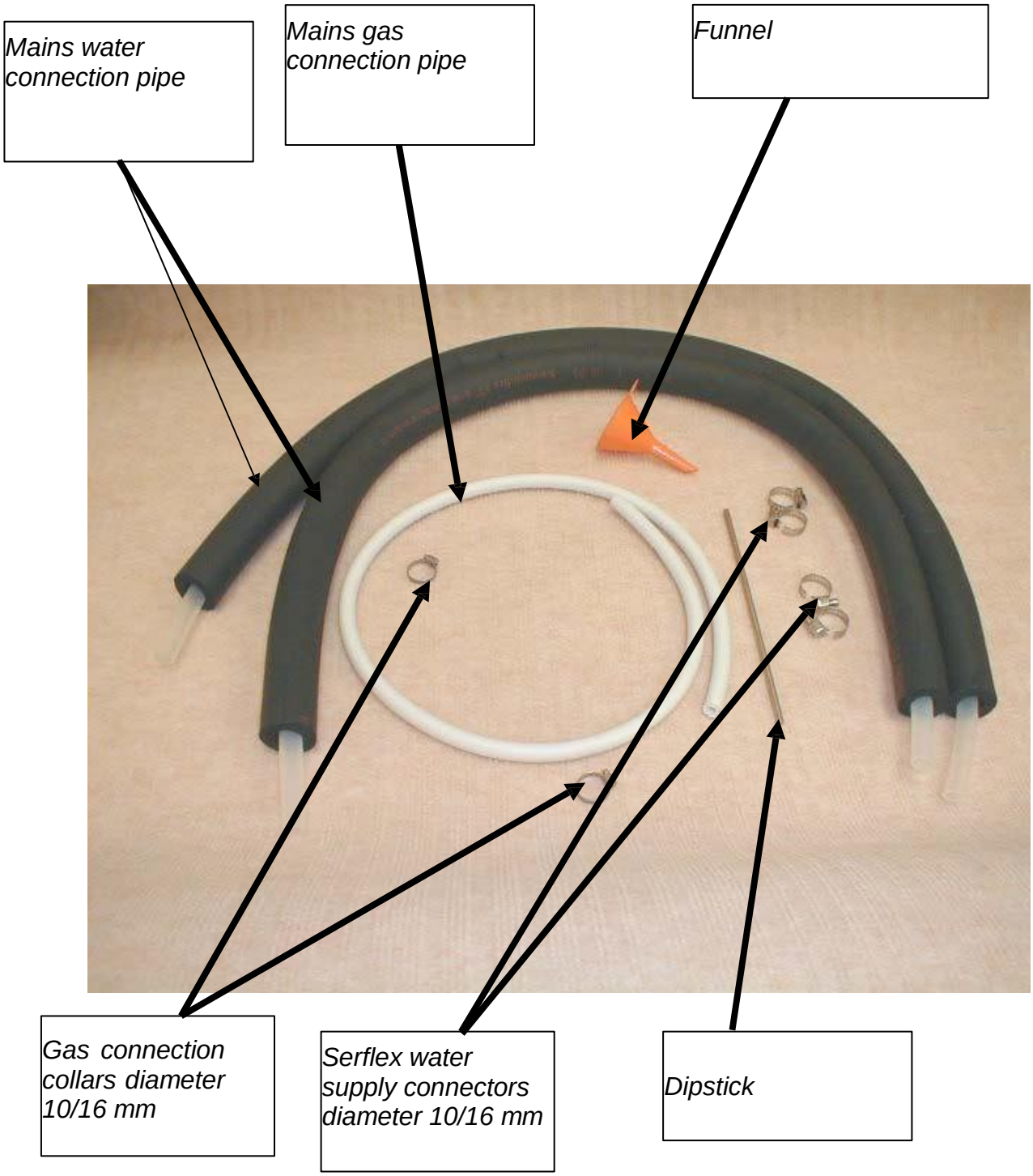
- Removable gas bottle with support bracket and connections

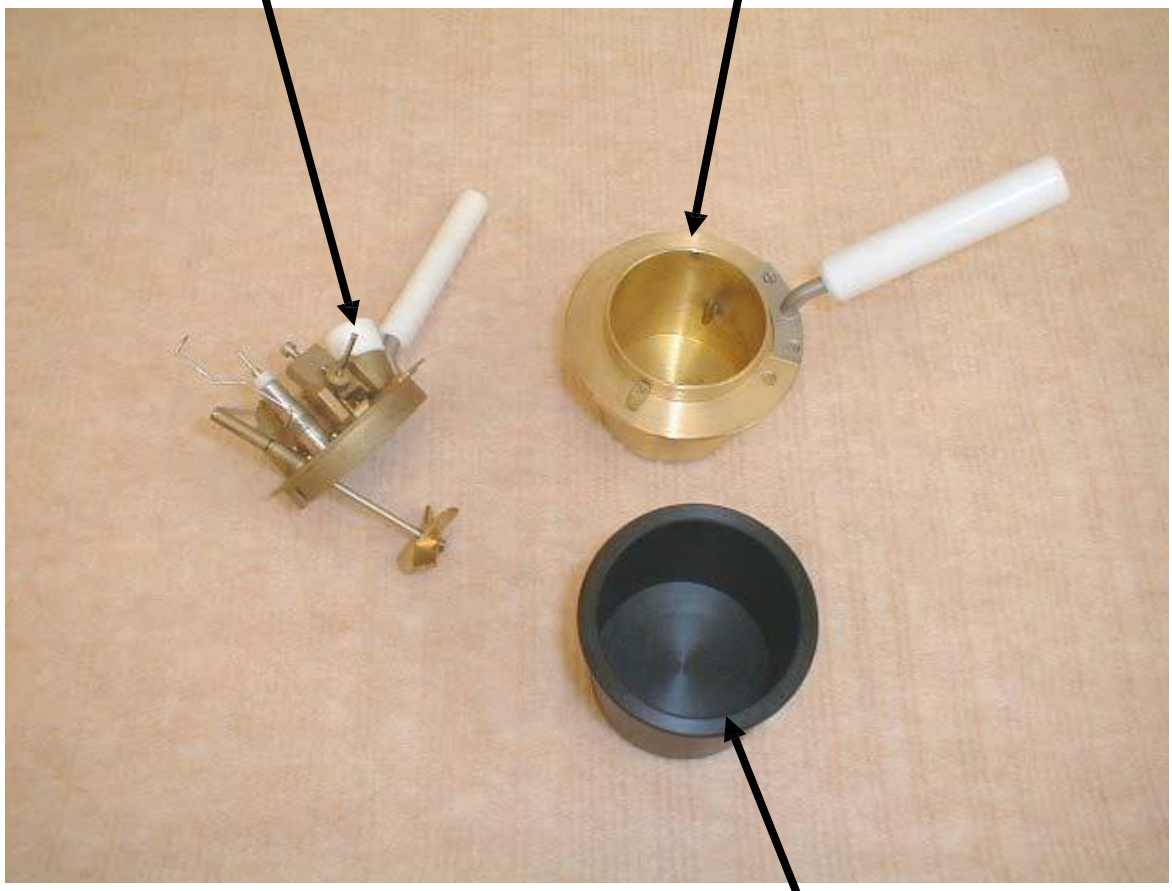


- 4.2 – ACCESSORY MODELS




Battery charger for ticket printer
Paper for printer
Parallel printer cable
Ticket printer


Mains water connection pipe
Mains gas connection pipe
Funnel
Gas connection collars diameter 10/16 mm
Serflex water supply connectors diameter 10/16 mm
Dipstick


Cover
Cup
Rest receptacle

V– METHODS AND BRINING INTO SERVICE

- 5.1 - STANDARDS

This appliance complies with the following standards:

- NF M 07 011
- ISO 13 736
- IP 170

Determination of the flashpoint in a closed cup of petroleum products and liquid mixtures practically free of foreign matter.

Test range	-18 to 71 °C
Repeatability (1)	1°C
Reproducibility (1)	1.5 °C

(1) No more than one case in 20 of exceeding the difference between 2 tests over a long period for the same sample.
Reliability of the method (repeatability and reproducibility values) could not be calculated for temperature measurements below – 5 °C or above + 66.5 °C

- 5.2 - METHODS

METHOD	GRADIENT °C/MIN	1st PRESENTATION	RATE	AGITATION
ISO 13 736	5°C/5 min +/- 0.5 °C	9 °C before expected T°	1/2 °C	30 rpm
IP 170	1 °C/min	9 °C before expected T°	1/2 °C	30 rpm
NF M 07 011	1°C / min	9 °C before expected T°	1/2 °C	30 rpm

- 5.3 – BRINGING INTO SERVICE

5.3.1 – Connections on the back of the appliance

Connection of utilities:

- Connect the refrigeration inputs/outputs, tighten the collars, open the cryostat valve (with the appliance in use) and check there are no leaks.
- Connect the overflow and the drain to a waste pipe (avoid any siphoning by the hoses)

- Connect the gas (50 mBars maximum pressure), tighten the collars (the electro-valve is closed except during testing, check the flame regulation valves are closed), open the gas and check there are no leaks.

- Plug in the printer cable.

- Plug in the mains cable (mains voltage : 230 V +/- 10%).

Filling the bath :

- Remove the plug from the bath orifice
- Using a funnel, slowly pour in the liquid (water and glycol) until it runs through the overflow (discharged to the rear)
- Fill the bath under the receptacle with appropriate liquid (water if the tests are at positive temperatures, add glycol for negative temperatures) using the dipstick supplied

- Replace the filling plug

5.3.2 – Connections to the front of the appliance

Connect :
The Pt 100 glass probe.
The ionising detection cable (the spring on the cover ground must be correctly positioned against the cable connector)
Possibly, the thermocouple detection cable.

Use with electrical ignition :

- Remove the presentation flame nozzle
- Remove the 2 silicone gas supply pipes
- Isolate the appliance from the gas supply

Place the electric ignition coil in its holder
The split ring inserted around the heating plug acts as a positioning shim.
Connect the two electrical supply wires of the heating plug to the two power supply terminals (see diagram).
Adjust the potentiometer for the ignition coil supply to 7/8 for the first time of use.
Configure the appliance (see functions flow chart) for electrical ignition

Note : the heating plug is supplied by low voltage AC.

Use of the appliance with an electrical test "plug" requires mandatory disconnection of the gas supply at the back of the appliance.

5.3.3 – Powering on the appliance

Note : ensure the mains electricity supply is compatible with the appliance.

Throw the switch on the back of the appliance.

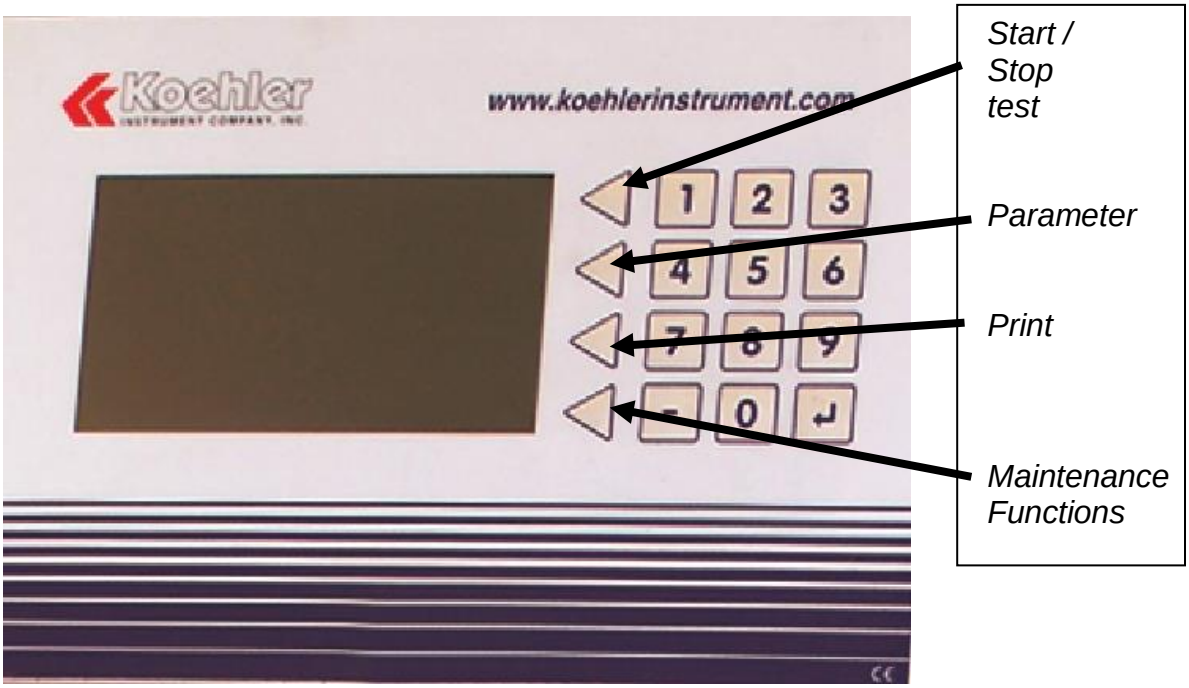
Initialisation of the CPU requires a short wait during which the screen will remain blank.

After about 20 seconds, the appliance is operational, the screen will indicate the values (see standby screen).

If the appliance is connected to a printer, power on the printer after the appliance. (If the printer is powered on during initialisation of the CPU, there may be interference with initialisation).

VI – GENERAL DESCRIPTION OF THE SOFTWARE

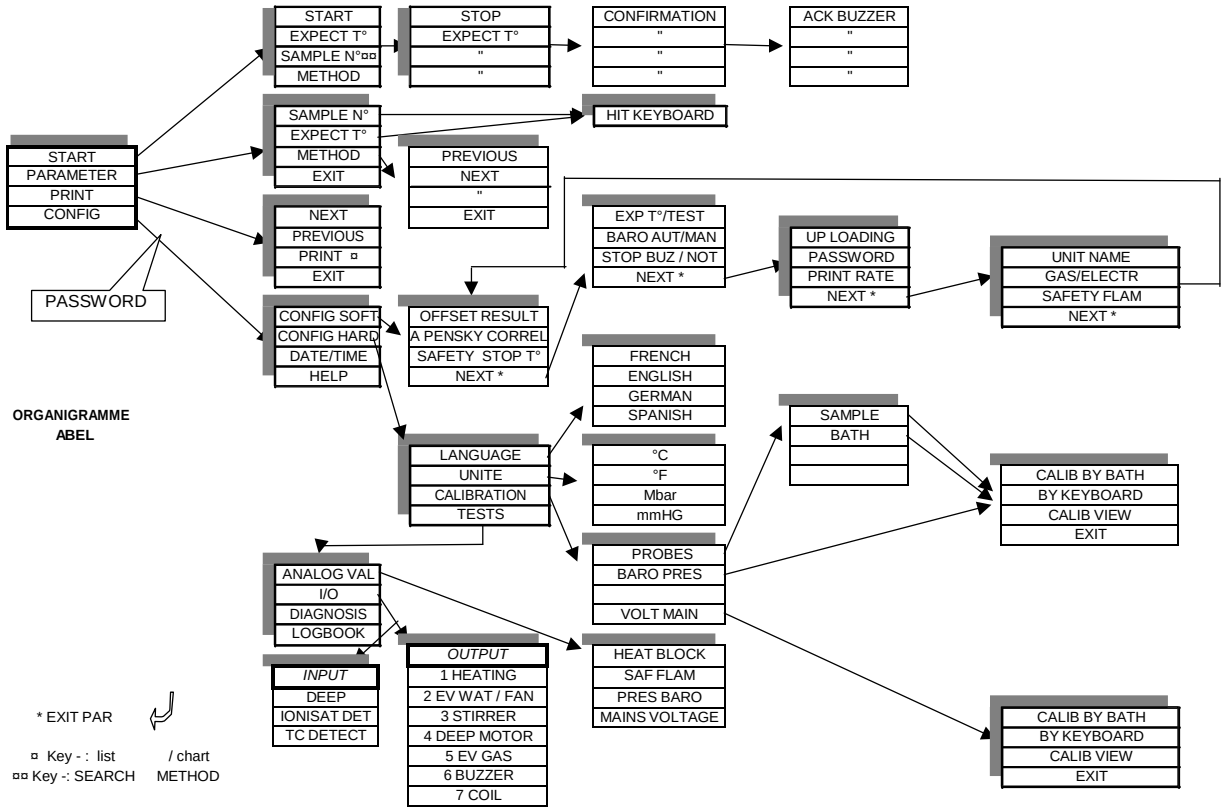
- 6.1 – MAIN STANDBY SCREEN



6.2 - MENUS FLOW CHART

Note : access to the various menus and submenus of the program is obtained by pressing the arrows to the right of the icons they designate. The screen is not a touch screen and excess pressure on the icons displayed on screen may damage the screen.

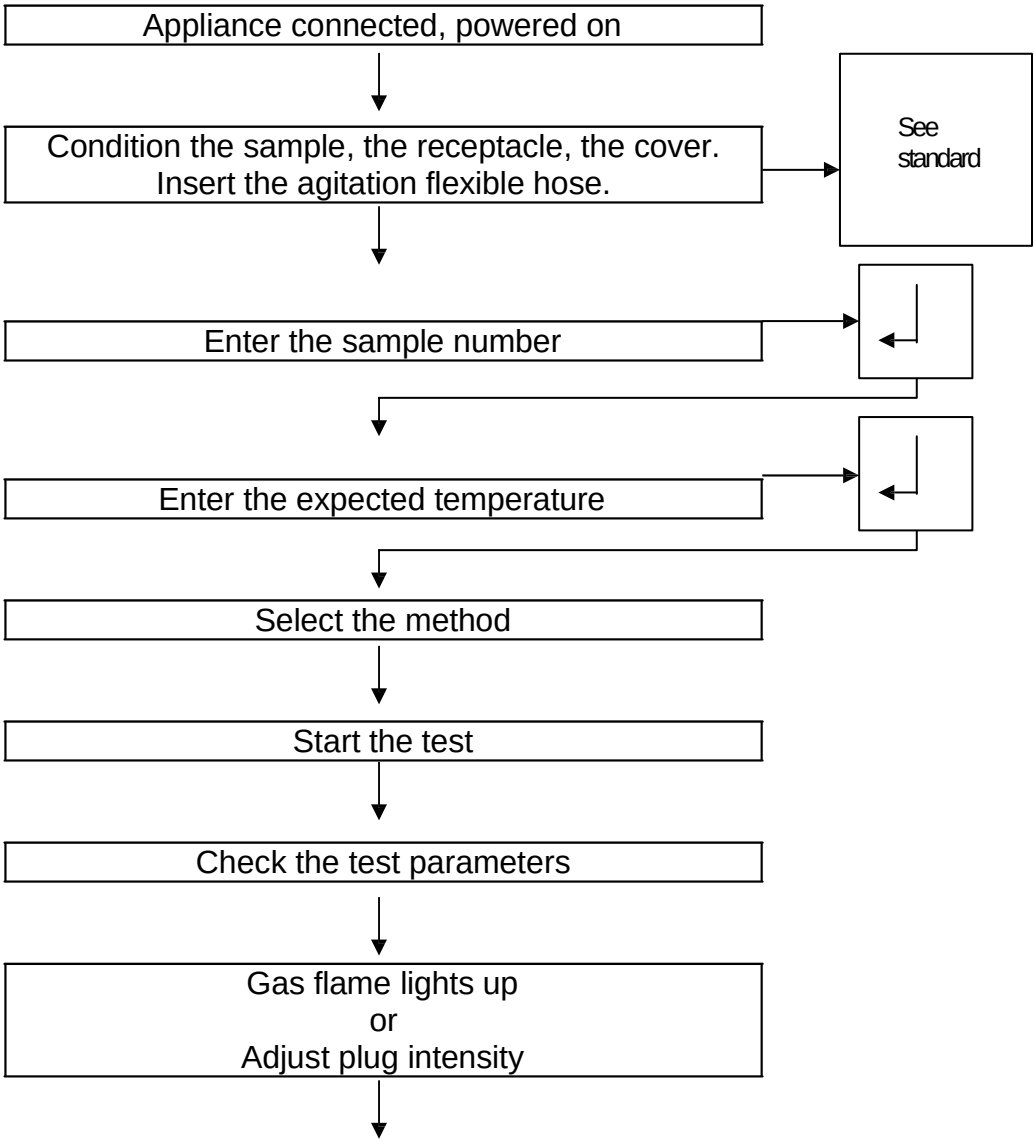
Each menu and submenu is represented by an icon with the following significance:
Note: in all cases pressing the key causes a return to the standby screen or the previous screen (except when waiting for numeric input).

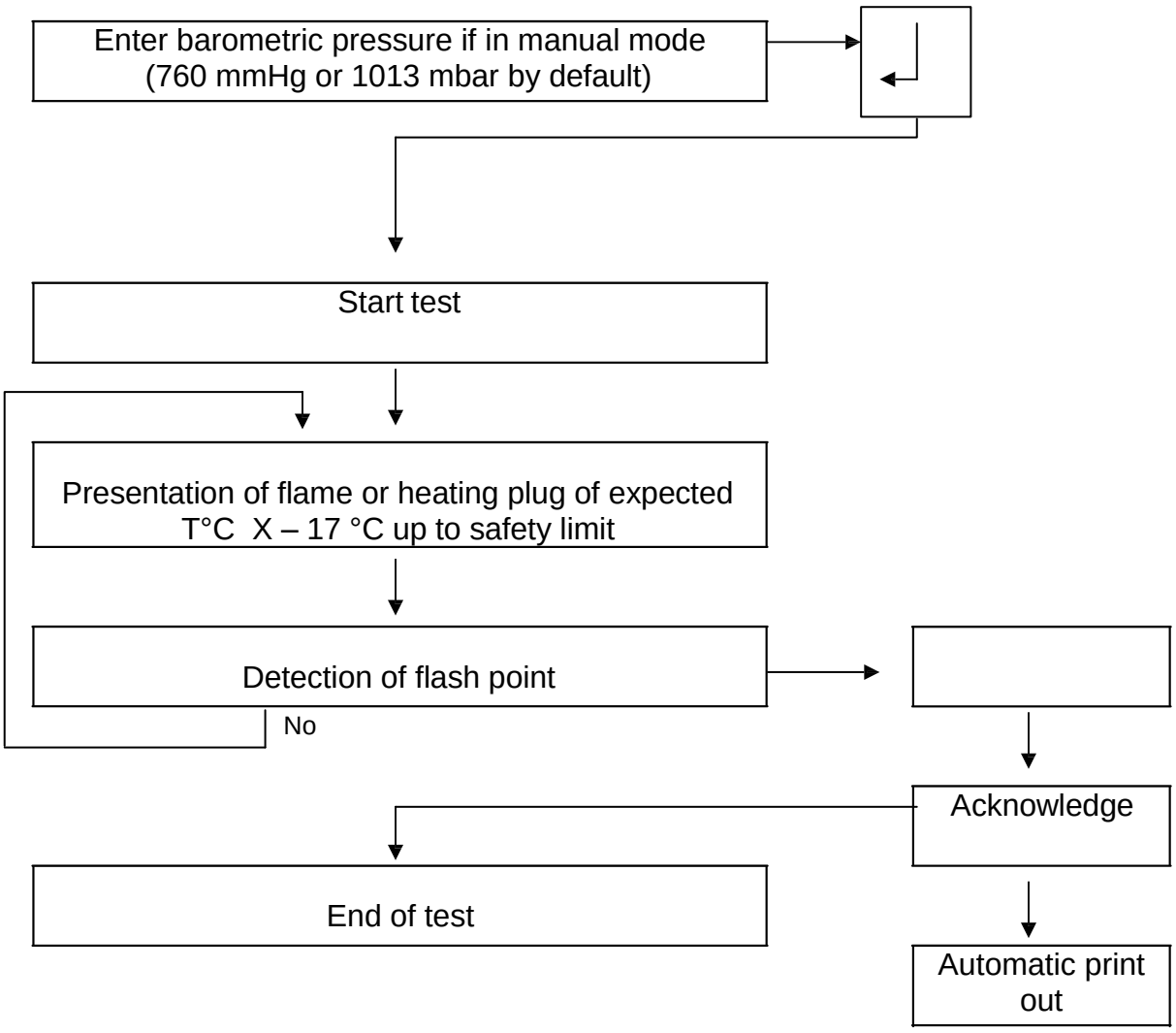


VII – STARTING A TEST

! Handling liquid petroleum products or similar requires wearing protection (gloves, goggles, working clothes). Do not handle flammable products near a source of heat or a flame.

- 7.1 – CONDUCT OF A TEST




Enter barometric pressure if in manual mode
(760 mmHg or 1013 mbar by default)
Start test
Presentation of flame or heating plug of expected
T°C X – 17 °C up to safety limit
Detection of flash point
No
Acknowledge
End of test
Automatic print
out

- 7.2 – START OF A TEST IN "SEARCH" MODE FOR A PRODUCT SATISFYING THE SPECIFICATIONS OF THE ABEL METHOD, OF WHICH THE FLASH POINT IS UNKNOWN

Important: This method allows approximating the flash point. To determine the true value another test complying with the method for finding the true value must be performed.

- Enter a expected T° C
- Enter a sample number "unknown" by pressing (-)
- Start the test as in 7.1

The appliance will then present flames from the start of the test, every 1 °C . The gradient depends on the method selected.
Note: for a wider ranging search without intervention, use the keyboard to modify the alarm and safety shutdown parameters linked to the expected temperature.

VIII - PRINTING

- 8.1 - TYPES OF PRINTER

- Ticket printer (model supplied as standard)
- All types of 80 column printer (except laser printers)

- 8.2 – PRINTING RESULTS OF TESTS IN PROGRESS

Automatic on acknowledgement of the audible alarm at the end of the test. Two possibilities for displaying the result: select by pressing " -" on the keyboard (list or table of the results).

- 8.3 - PRINTING RESULTS OF ARCHIVED TESTS (see chap 6.2)

Possibility of printing out the last 100 tests one by one.

- 8.4 – PRINTING THE TEMPERATURE GRADIENT

(see chap. 6.2).
(see chap. 11.2.9)

Allows "following up" the increase in the temperature of the sample during the test (printing out every minute from the 3rd minute of the test).

- 8.5 – MODEL PRINTOUT

```
                                        V1.0

    ABEL FLASH POINT

ISO 13736  IP170/95
NFT 66009  PI 113


App : 3871

Date : 23/6/1999Time : 17 :49

Test duration: 00 :17

Sample     :     545213
Presumed Temperature : 45 °C
Method :  ISO  13736  IP  170/95
Bar. Corr.:  Auto  /  1020 mbar
Number of presentation :   11
Flashpoint       : 45.5 °C

Corrected flashpoint     :     45.6 °C

Flash Flame Gas
```

- 8.6 – PRINTING OUT OF LOG

(see chap. 11.3.4.D)

Printing out of the log supplies all the information necessary for "quality" monitoring of the appliance.

IX – SAFETY DEVICES

- 9.1 – SAFETY DEVICE - ABSENCE OF SAMPLE PROBE

On starting the test, the appliance detects the fault and rejects the tests with a message and audible signal.

- 9.2 – NO INCREASE IN SAMPLE PROBE TEMPERATURE

Current test stopped with message and audible signal if no increase in temperature (2 °C) is recorded after 10 minutes of testing.

- 9.3 – ELECTRICAL SAFETY DEVICE

A bath temperature safety device is set at the factory to 190 °C. When the device is activated, there is an audible alarm with display of a safety message "safety limit". Only pressing the On/Off switch will allow restoring the normal functions of the appliance. If the fault persists, leave the appliance powered off, adopt the security precautions (isolate the appliance from the mains gas and electricity) and contact the After Sales department or the retailer as quickly as possible so that prompt action can be taken.

- 9.4 - SAMPLE TEMPERATURE SAFETY DEVICE

This is set at the expected temperature of the current test plus X degrees, programmed from the keyboard during the software configuration process.

The limits are from 3 °C to +10 °C above the expected T°.

An audible alarm sounds when the sample reaches safety T° – 3 °C . It is then possible to increase to the expected T° and continue the test.

An audible alarm sounds with display of "safety shutdown" when the safety T° is reached. The test is then stopped and acknowledgement using "ACKBUZZER" is necessary.

The programmed difference between the expected T° and the safety T° remains the same irrespective of the expected T° entered.

- 9.5 – GAS SAFETY DEVICE

Automatic cut off at the end of the test.

Message "gas lit" with audible signal at the start of the test.

X– INSTALLATION AND UPDATING OF SOFTWARE

(see chap. XI)

Power on the appliance.

Use the "administrative" pass word to access the item "new version" in "configuration/software configuration" (see chap. 11.2.8).

Note : the “ administrative ” pass word is supplied with the connector cable "kit" and the updating diskette.

Follow the instructions on the screen.

Link the serial port of the appliance with COM 1 of the PC and boot the PC using the updating diskette (boot program included). Follow the instructions on the PC screen.

XI - CONFIGURATION

See chap. VI

This function allows accessing all programming, test and maintenance functions.

Access can be protected by a pass word.

- 11.1 – PASSWORD

There is no need to enter the original pass word, simply validate it to access the following menus.

- 11.1.1 - CREATION OF A PASSWORD

Validate the software configuration icon.

Use the arrows to access the "new password" icon (see chap. VI).

Enter the new password and validate.

Confirm the password and validate.

Switch the appliance off and then back on after a few seconds.

Note : the configuration item remains accessible until the appliance is switched off. Then access to this item is once more impossible unless the password is used.

-11.2 – SOFTWARE CONFIGURATION (see chap. VI)

- 11.2.1 - CORRECTION OF THE RESULT (see chap. VI)

Offers the possibility of correcting the result by up to +/- 9.9 °C (9.9 °F) . For negative values, first enter the value then - .

- 11.2.2 – STOP COOLING (see chap. VI)

Set point for stopping cooling of the bath after the test: expected T° – 17 °C

- 11.2.3 – SAFETY SHUTDOWN (see chap. VI)

Allows stopping a test at the expected temperature + X °C.

X °C is the value entered as the safety shutdown set point
(3 °C to10 °C)

- 11.2.4 – ENTER PRESUMED TEMPERATURE (see chap. VI)

Offers the possibility of entering the expected temperature each time **a test is started** with deletion at the end of each test or storing in memory for the next test.

- 11.2.5 – BAROMETRIC PRESSURE (see chap. VI)

Automatic or manual barometric pressure (modification of status by c[>]).

If manual barometric pressure is selected, a default value (760 mmHg or 1013 mbar) which can be modified, appears when the test is first started.

- 11.2.6 - BUZZER (see chap. VI)

Choice of the time the alarm "buzzer" sounds: continuous or 3 minutes.

- 11.2.7 – NEW VERSION OF SOFTWARE

(see chap. VI and chap. X)

Update of appliance software.

- 11.2.8 - NEW PASSWORD (see chap. VI)

Allows changing the pass word.

To validate the password after it has been recorded, the appliance must be powered off. When it is powered on again, the configuration items are no longer accessible except by using the recorded pass word.

- 11.2.9 – PRINT OUT TEMPERATURE GRADIENT (se chap. VI)

Allows selecting:
- printing out the temperature gradient for the current test and the result at the end of the test
- or solely the result at the end of the test

(modification of status by C:>).

- 11.2.10 - "ESCAPING" FROM THE SOFTWARE CONFIGURATION ITEM

Press ↵ (excluding anticipated numeric input)

- 11.3 – HARDWARE CONFIGURATION

- 11.3.1 - LANGUAGE (see chap. VI)

Choice of language, French or English, to be enabled for display on screen.

- 11.3.2 - UNITS (see chap. VI)

Selection of units for measuring pressure and temperature for display on screen.

- 11.3.3 - CALIBRATION (see chap. VI)

Allows accessing calibration of the temperature, the bath, the barometric pressure, the test starting stages and the "image" of the electricity supply network.

- 11.3.3.A – SAMPLE PROBE AND BATH (see chap. VI)

Note : physical calibration of the measurement of the sample and bath temperature require a decade unit of resistors simulating a Pt 100 probe (resolution 0.01 Ω) and a special cable to link the appliance to the decade unit.
Calibration of the total measuring chain of the sample and bath temperature (including the sensor) is the optimum calibration. It requires immersing the Pt 100 probe in two thermostatically controlled baths, one after the other. A special extension cable is necessary. There must be a significant difference in the temperature of the two baths (minimum 80 °C) to perform calibration under satisfactory conditions. Temperatures below –50 °C and above 450 °C are not acceptable.

Connect the decade resistors unit with the special cable or connect the Pt 100 probe using the special extension in the case of calibration using thermostatically controlled baths.

Adjust the decade unit to a low value. For example: 50 °C (see table 1) or for example, immerse the Pt 100 probe in a bath of 40 °C.

Enter the same low value on screen in °C, validate by "input".

Adjust the decade unit to obtain a high value. For example 100 °C (see table 1) or for example, immerse the Pt 100 probe in a bath of 150 °C.

Enter the same high value on screen in °C, validate by "input".

The message "calibration rejected" indicates that the calibration is not correct. The values entered are too close or the difference between the 2 baths does not exceed 90 °C . Recommence the calibration operations.

Table 1

°C	Ohms
-40	84.7
-30	88.3
-15	94.2
0	100
25	109.73
50	119.
75	128.8
100	138.
150	157.2

Print out the log (see chap. VI and 11.3.4.D).

The information in the log can be used for calibration by points, in the case of accidental loss of calibration.

Displaying the probe calibration values

Allows checking the conversion point values of the probe calibration.

Calibration by points

In the case of accidental loss of probe calibration, it is possible to enter a calibration value using the conversions points previously printed out in the log.

Calibration by conversion point requires entering the low and high temperatures corresponding to the high and low conversion points to be entered.

- 11.3.3.B – BAROMETRIC PRESSURE (see chap. VI)

Physical calibration

Note : physical calibration of the barometric pressure measurement requires:

Either a device capable of accurate generation (+/- 1 mbar) of a pressure of 920 mbar (690 mmHg) and of 1066 mbar (800 mmHg) – (see chap. III for connection).

Or a voltage generator (accuracy 1 mV) capable of generating a voltage of 4.345 V (for 920 mbar) and 4.877 V (for 1066 mbar) – (see chap. III for connection). A special cable is required.

Connect the pressure or voltage generator using the special cable.

Apply pressure or equivalent voltage of 920 mbar (690 mmHg) and validate by "input" (see table 2).

Apply pressure or equivalent voltage of 1066 mbar (800 mmHg) and validate by "input" (see table 2).

The message "calibration rejected" indicates that the calibration is not correct. Recommence the calibration operations (values of 2 points too close)

Table 2

Mbar	mmHg	mV
920	690	4345
1066	800	4877

Print out the log (see chap. VI and 11.3.4.D).

The information in the log can be used for calibration by points, in the case of accidental loss of calibration.

Displaying the pressure sensor calibration values

Allows checking the conversion point values of the pressure sensor calibration.

Calibration by points

In the case of accidental loss of the barometric pressure calibration, it is possible to enter a calibration value using the conversions points previously printed out in the log.

Calibration by conversion points requires entering the low and high pressures corresponding to the high and low conversion points to be entered.

- 11.3.3.D – ELECTRICAL NETWORK IMAGE (see chap. VI)

The network image is a device which ensures, during the first 5 minutes of a test, compensation of output in the case of a variation in the network voltage during the 3 start-up stages.

Physical calibration

Note : physical calibration of the electrical network image requires use of a self transformer with a minimum amplitude of 210 V to 245 V.

The appliance must be supplied using the transformer solely during the calibration procedure.

Supply the appliance with 210 V (wait approximately 1 minute before validation). Enter the value 210 and validate by "input".

Supply the appliance with 245 V (wait approximately 1 minute before validation). Enter the value 245 and validate by "input".

Print out the log (see chap. VI and 11.3.4.D).

The information in the log can be used for calibration by points, in the case of accidental loss of calibration.

Displaying the network image

Allows checking the calibration values of the electrical supply network image.

Calibration by points

In the case of accidental loss of network image calibration, it is possible to enter a calibration value using the conversions points previously printed out in the log.

Calibration by conversion point requires entering the conversion point values corresponding to the voltages displayed on the screen.

- 11.3.4 - CHECKS (see chap. VI)

- 11.3.4.A – ANALOG READINGS

Display of the various analogue inputs of the appliance
(output by ↵)

- 11.3.4.B – LOGICAL INPUTS/OUTPUTS

Allows enabling the logical inputs of the appliance and displaying the logical outputs.
(output by ↵)

- 11.3.4.C – SELF-DIAGNOSTIC

Automatic procedure for automatic checking of various components of the appliance with printing out of a report.

- 11.3.4.D – PRINTING THE LOG

Printing of a log containing the various calibration, safety and operating parameters.

Model

```
     CONFIGURATION LOG : V1.0

     App : 3871

     Date :  9/7/1999    Time :   13 :28


     Safety shutdown at expected temp  + 05 °C
     Correction of result of  : 0.0 °C
     Calibration atmospheric pressure :
     690 mmHg / 920 mbar ? 0095 pts
     800 mmHg  /  1066 mmHg  ? 0204 pts
     Last pressure calibration 23/04/1999
     Mains voltage calibration:
     210 V ?  0006 pts
     245 V ?  0093 pts
     Last voltage calibration 22/04/1999
     Temperature calibration:
ohms ? 50.0 °C ? 183968 pts
153.6 ohms ? 140.0°C  ?  313870 pts
Last temperature calibration 22/04/1999
Bath calibration:
ohms  ? 0.0 °C  ?  110202 pts
ohms  ?  100.0 °C ?  257079  pts
Last temperature calibration 22/04/1999
No. of tests since last calibration: 10
No. of tests since brought into use: 10
```

XII - INCIDENTS

Excess gas pressure may cause uncoupling of the internal connections of the appliance (internal flexible connections).

Intervention by a qualified technician is mandatory before the appliance is re-used.

Abnormal heating may damage internal components and the gas pipes.

Intervention by a qualified technician is mandatory before the appliance is re-used.

If a sample is spilled on the working plate this may eventually cause a fire inside the appliance.

Thorough cleaning by a qualified technician is mandatory.

XIII – GENERAL MAINTENANCE

- 13.1 - CALIBRATION

Check the calibrations at least once a year.

- 13.2 – MISCELLANEOUS CHECKS

The appliance should be cleaned as frequently as possible to ensure optimum use conditions (do not use strong solvents).

An internal check of the appliance should be performed depending on the intensity of use. In the case of intensive use, we recommend annual servicing of the appliance.

XIV – ACCESSORIES AND PART NUMBERS

- 14.1 – ACCESSORY PART NUMBERS

NAF Part Number	Description
41 301	Cup
41 303	Complete cover
41 310	Glass Pt 100 probe
41 309	Ionising detection cable
41 379	Detection thermocouple
41 306	Agitation spring
40 343	Ticket printer
40 382	Paper roll for ticket printer
-	Ink ribbon for ticket printer
40 380	Electrical test plug
22 002	Insulated refrigerant pipe (10x16)
14 110	Gas pipe (rear connection) 1 metre
17 380	Gas pipe for test flame, minimum 2 metres

- 14.2 – ADDITIONAL ACCESSORIES (options)

NAF Part Number	Description
40 086	Sample temperature measurement calibration cable
40 088	Extension cable for Pt 100 sample probe (calibration with thermostatically controlled baths)
40 087	Barometric pressure sensor calibration cable

XVI - YOUR CONTACT

NORMALAB ANALIS FRANCE

Le Village

F 76210 LINTOT

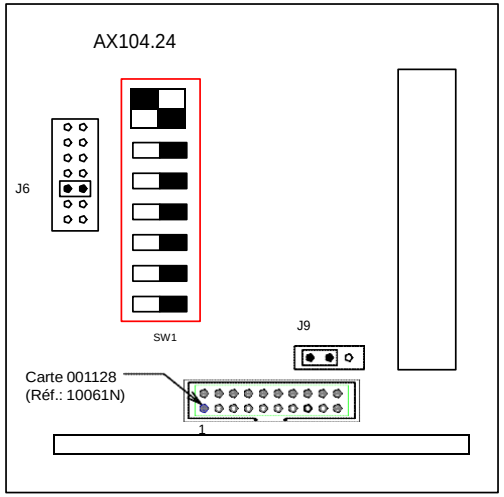
Tél. : 33 (0)2 35 38 59 59

Fax : 33 (0)2 35 38 78 55

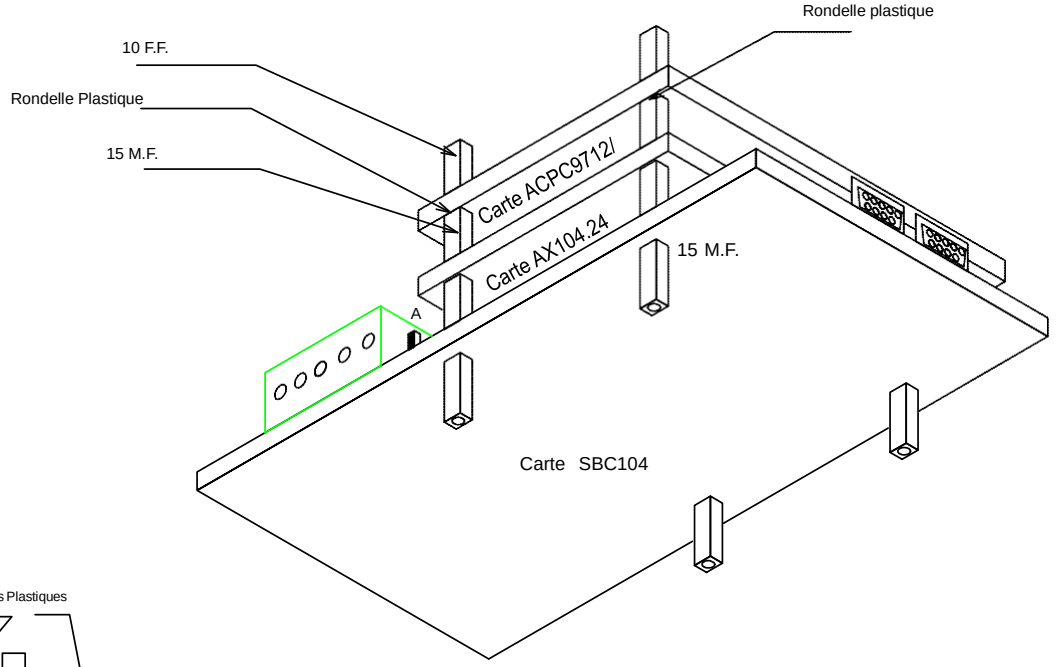
Télex : 190334

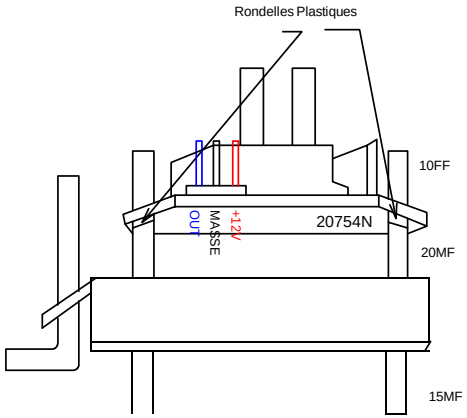
Web : http://www.normalabanalis.com

XVII – ELECTRICAL/ELECTRONIC DIAGRAMS

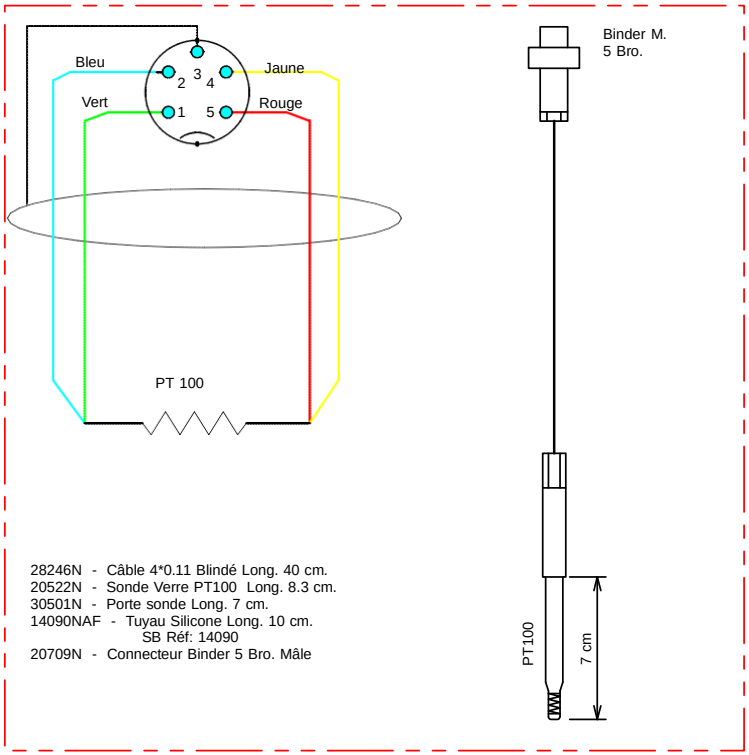


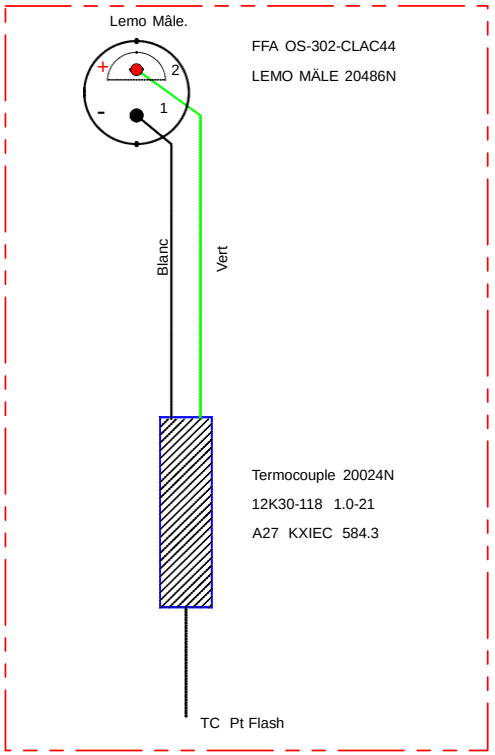
Le switch de la pile de la carte SBC104 doit être positionné en A.
Ajouter des rondelles en PLASTIQUE entre les entretoises de la carte AX 104.24 et l'ACPC 9712.

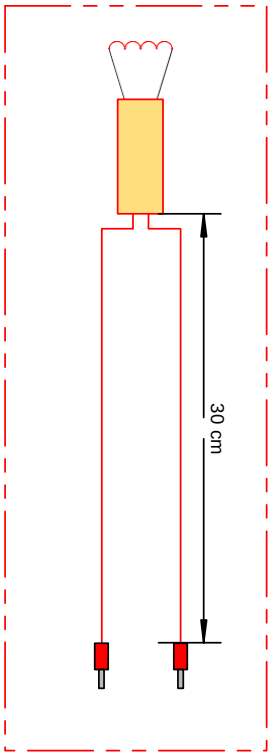


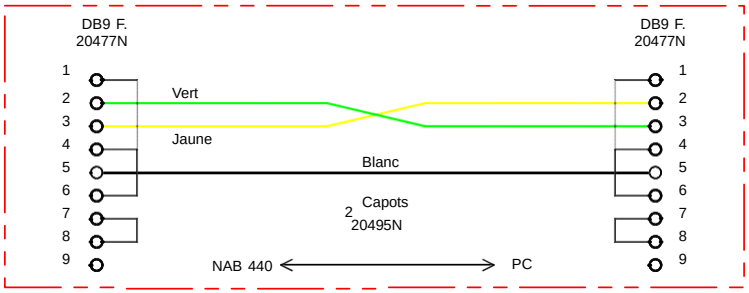


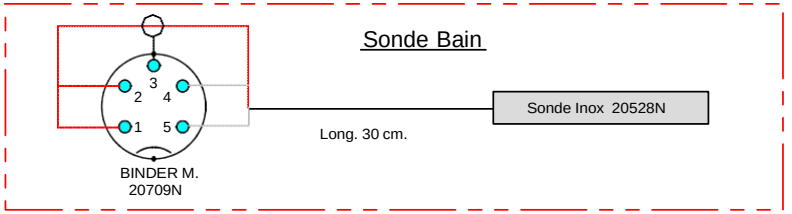
NORMALAB ANALIS			
TITRE ABEL 440 Montage Tour 386		DESSINE PAR Denis VAUDRY	V6
REP / NAB440	PLAN No tour386		0 18/03/03
			IND DATE



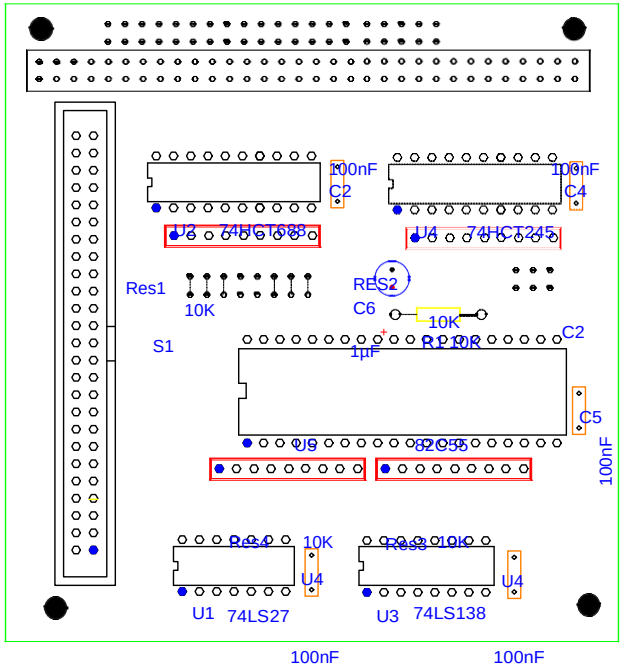




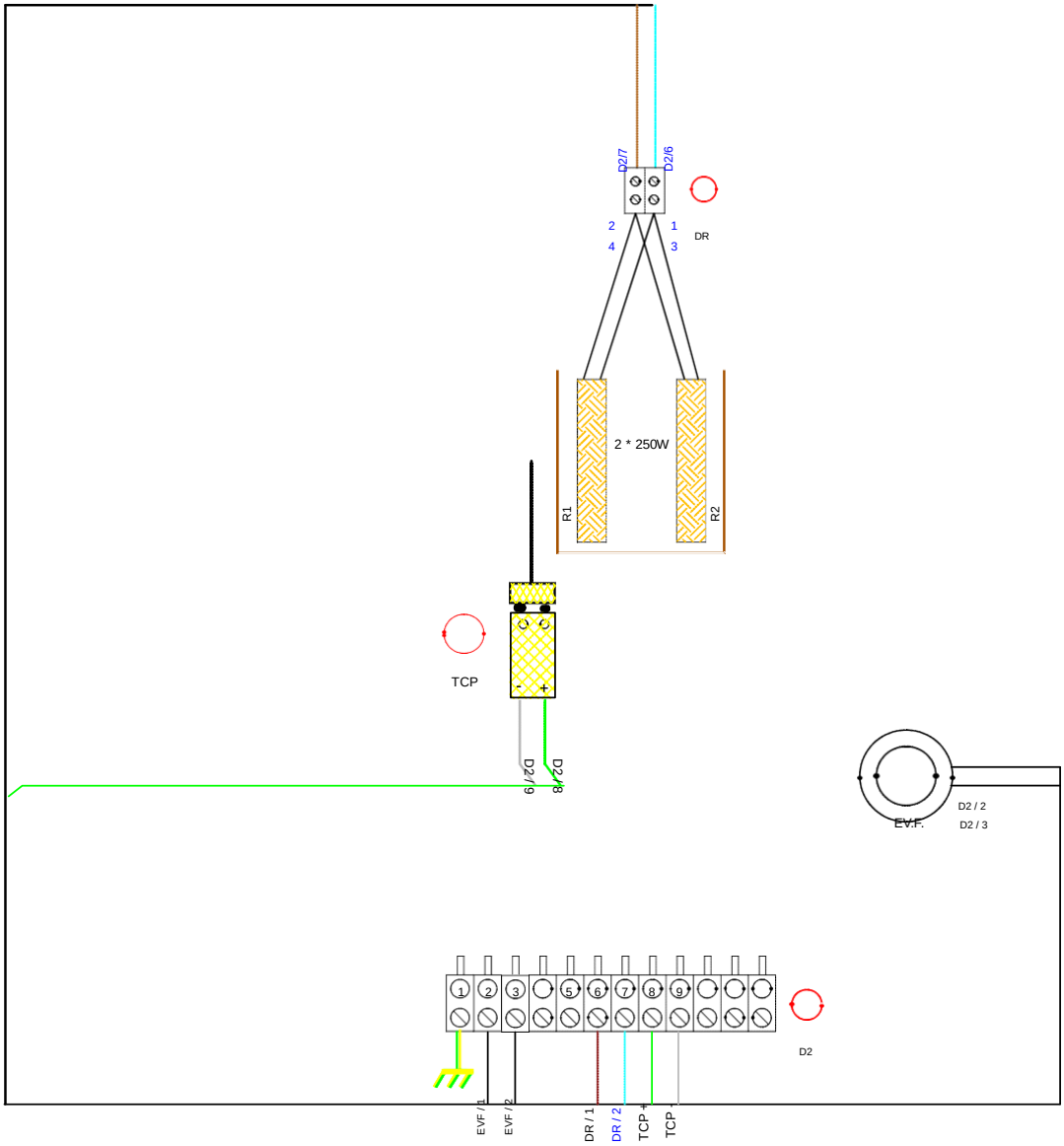




NORMALAB ANALIS			
TITRE Cablages des Accessoires NAB 440		DESSINE PAR Denis VAUDRY	
REP / NAB440	PLAN No ACCESSOIRES NAB 440 Ind_0	O	19/02/03
		IND	DATE

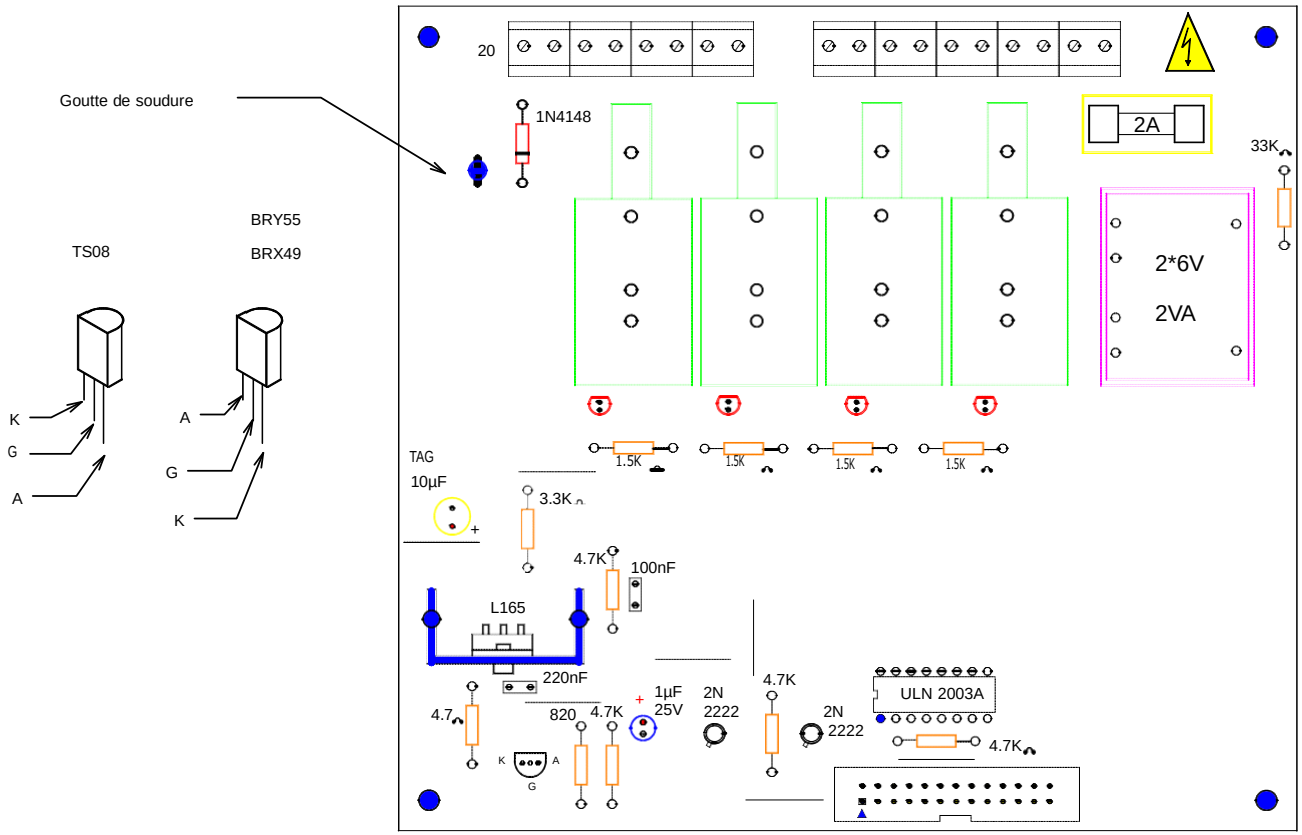


NORMALAB ANALIS			
TITRE CABLAGE DE LA CARTE ACPC9712/1 NAB 440	DESSINE PAR Denis VAUDRY		
REP / NAB440	PLAN No CARTE ACPC 9712_1 Ind 1	1 IND	19/02/03 DATE

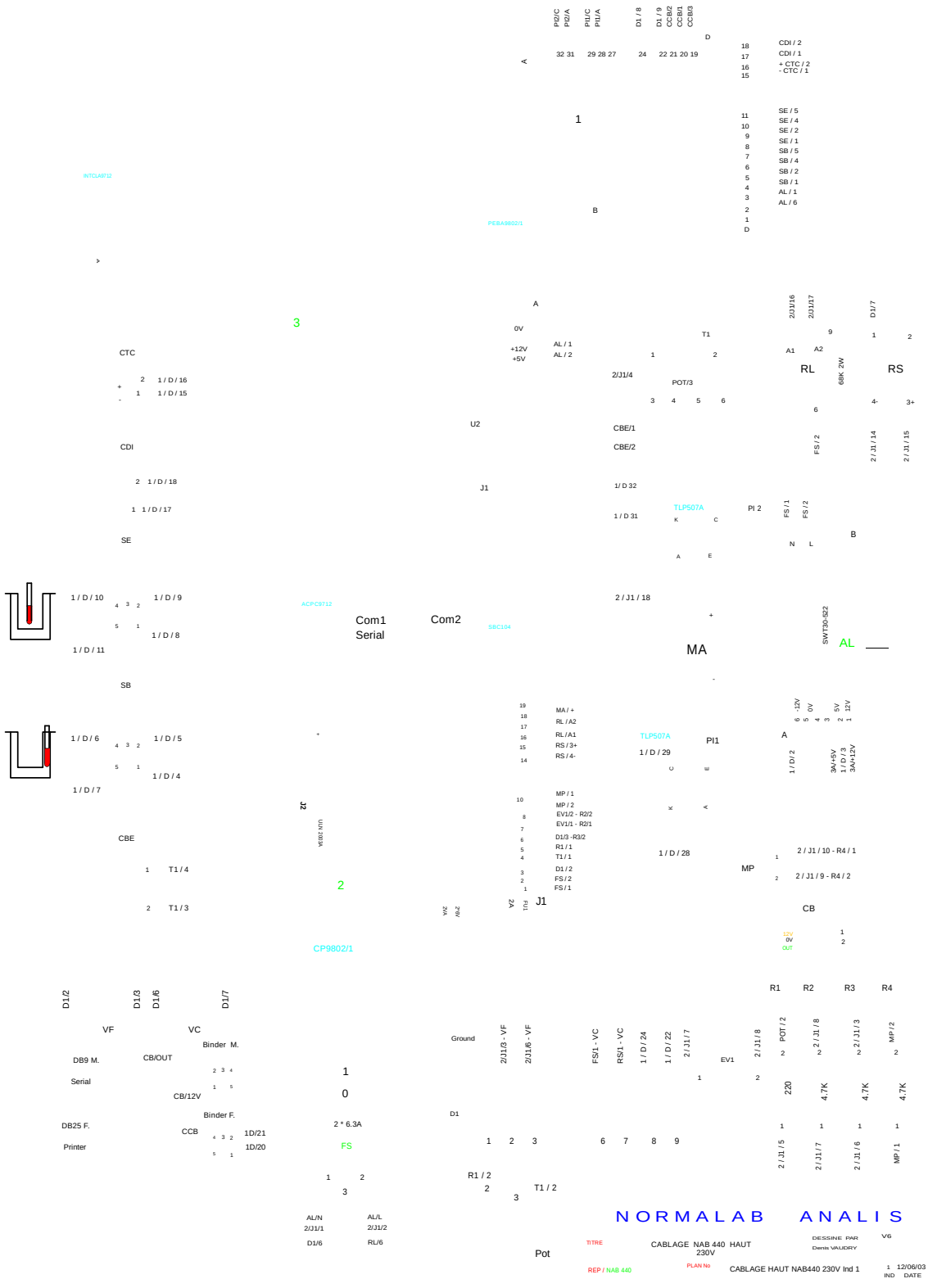


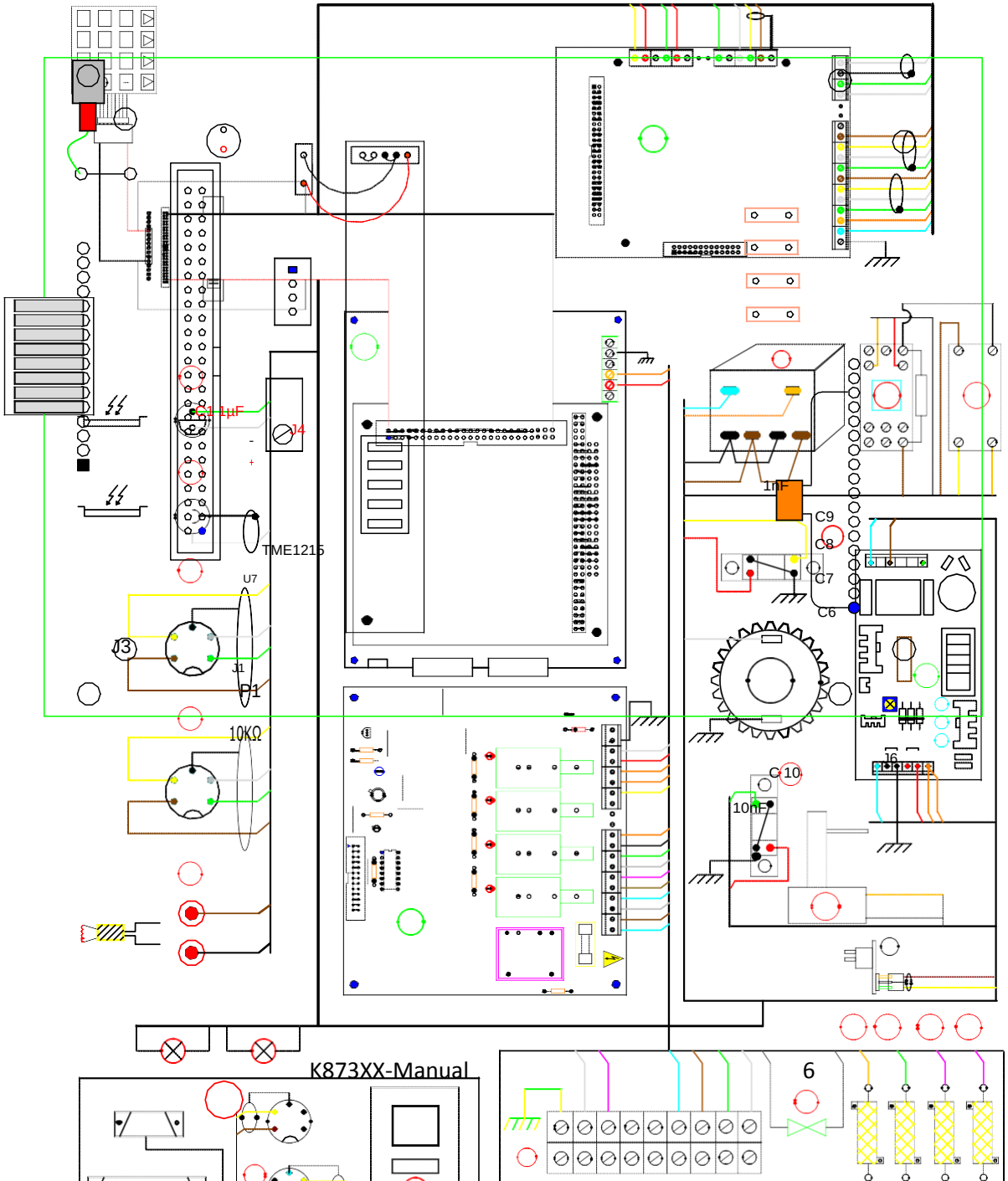
NORMALAB ANALIS				
TITRE	Câblage du Bloc de Chauffe NAB 440	DESSINE PAR Denis VAUDRY	V6	
REP / NAB440	PLAN No Câblage bloc de chauffe NAB440 Ind_1		1 IND	20/02/03 DATE

ABEL NAB 440 50

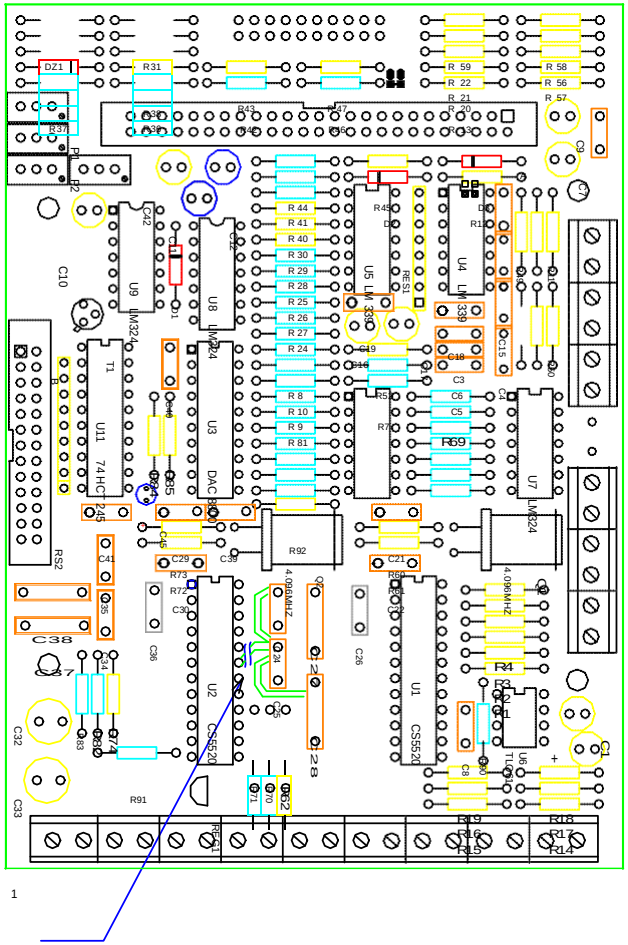


NORMALAB ANALIS			
TITRE Câblage CP9802/1 NAB 440		DESSINE PAR Denis VAUDRY	
REP / NAB 440	PLAN No Câblage CP 9802_1 Ind_0	IND 0	DATE 19/02/03

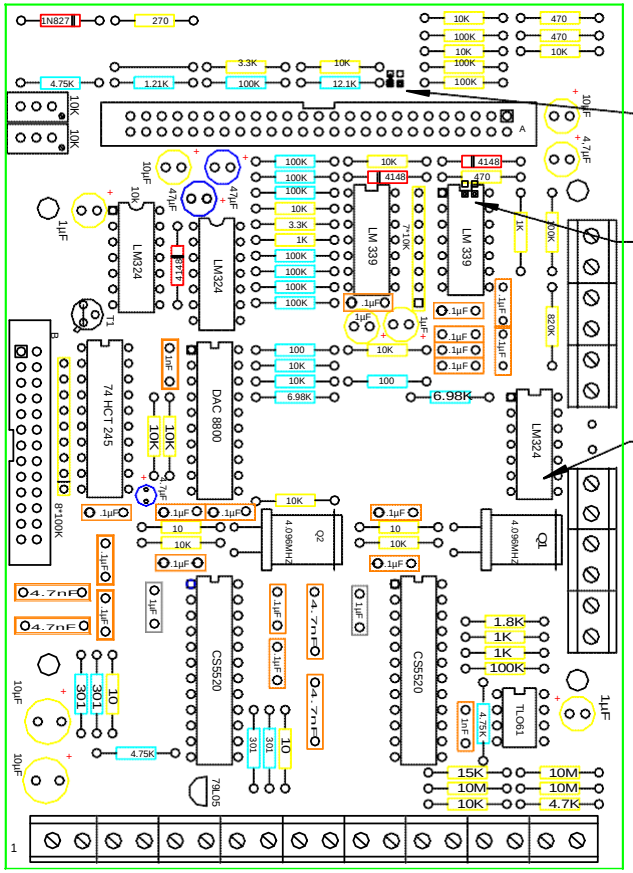

CTC
CDI
SE
SB
CBE
Com1
Serial
Com2
MA
AL
RL
RS
TLP507A
SBC104
CP9802/1
INTCLA9712
PEBA9802/1
ACPC9712
SW T30-S22
VF
VC
DB9 M.
Serial
DB25 F.
Printer
CB/OUT
CB/12V
CCB
Binder M.
Binder F.
Ground
Pot
FS
2 * 6.3A
NORMALAB ANALIS
CABLAGE NAB 440 HAUT 230V
CABLAGE HAUT NAB440 230V Ind 1
DESSINE PAR Denis VAUDRY
12/06/03


0.1 1µF
J4
TME1215
U7
J3
J1
P1
10KΩ
1nF
C9
C8
C7
C6
J6
C 10
10nF
K873XX-Manual
6

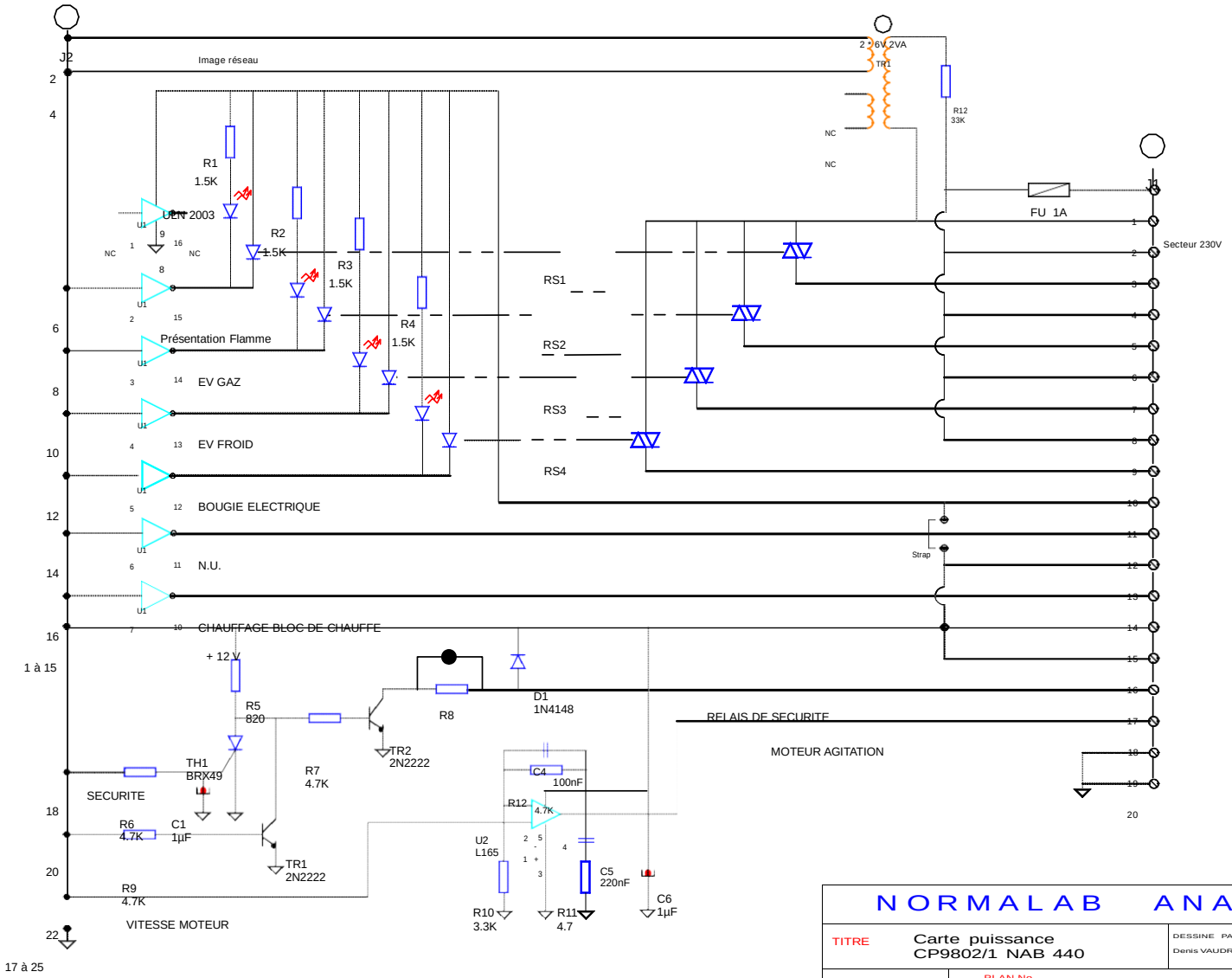
N O R M A L A B A N A L I S			
TITRE Interface Clavier INTCLA 9712/ 1	DESSINE PAR Denis VAUDRY Michael MAURAY		
REP / NAB440	PLAN No Câblage INTCLA 9712_1 Ind_1	O	20/02/03
		IND	DATE



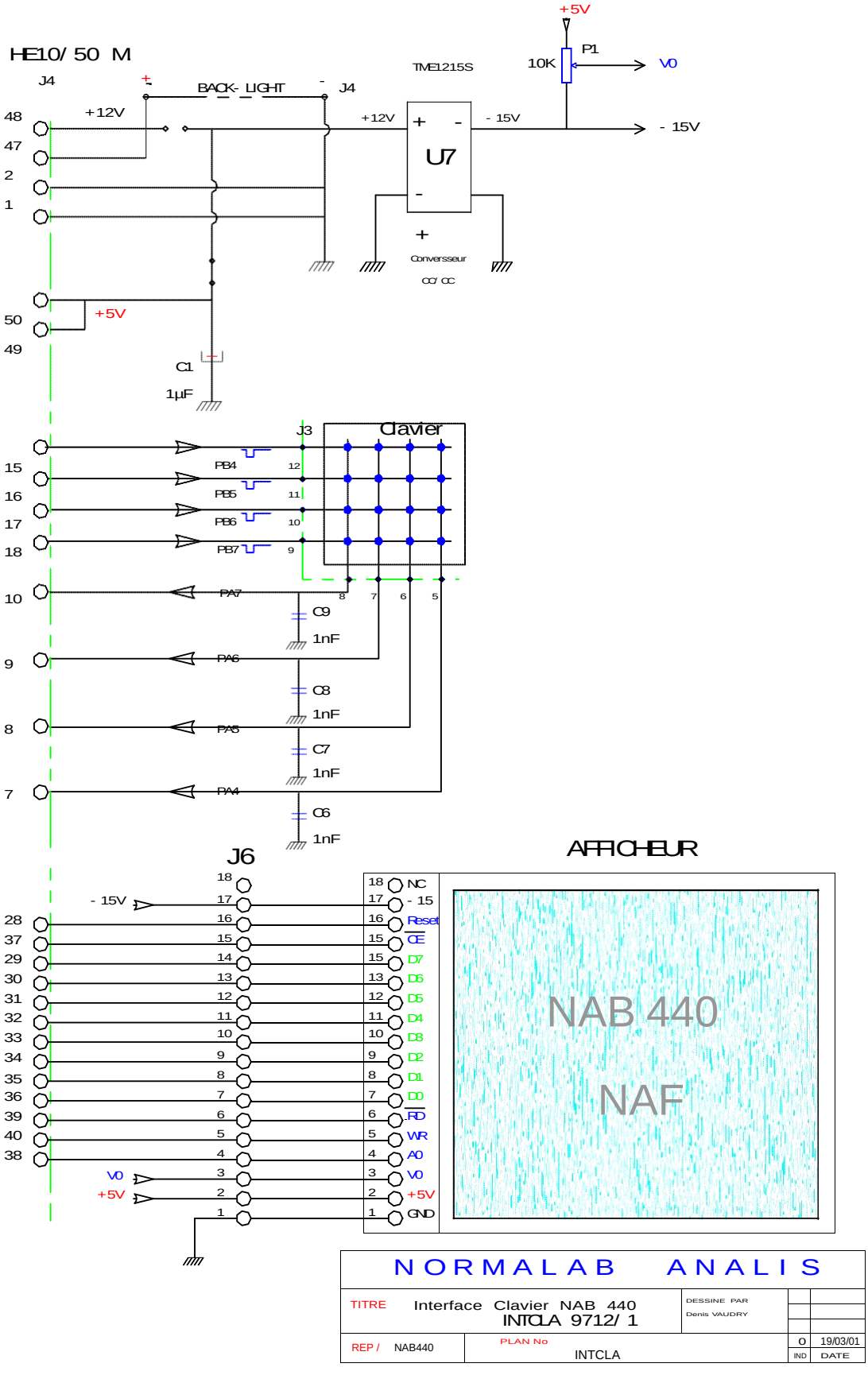
Piste à couper

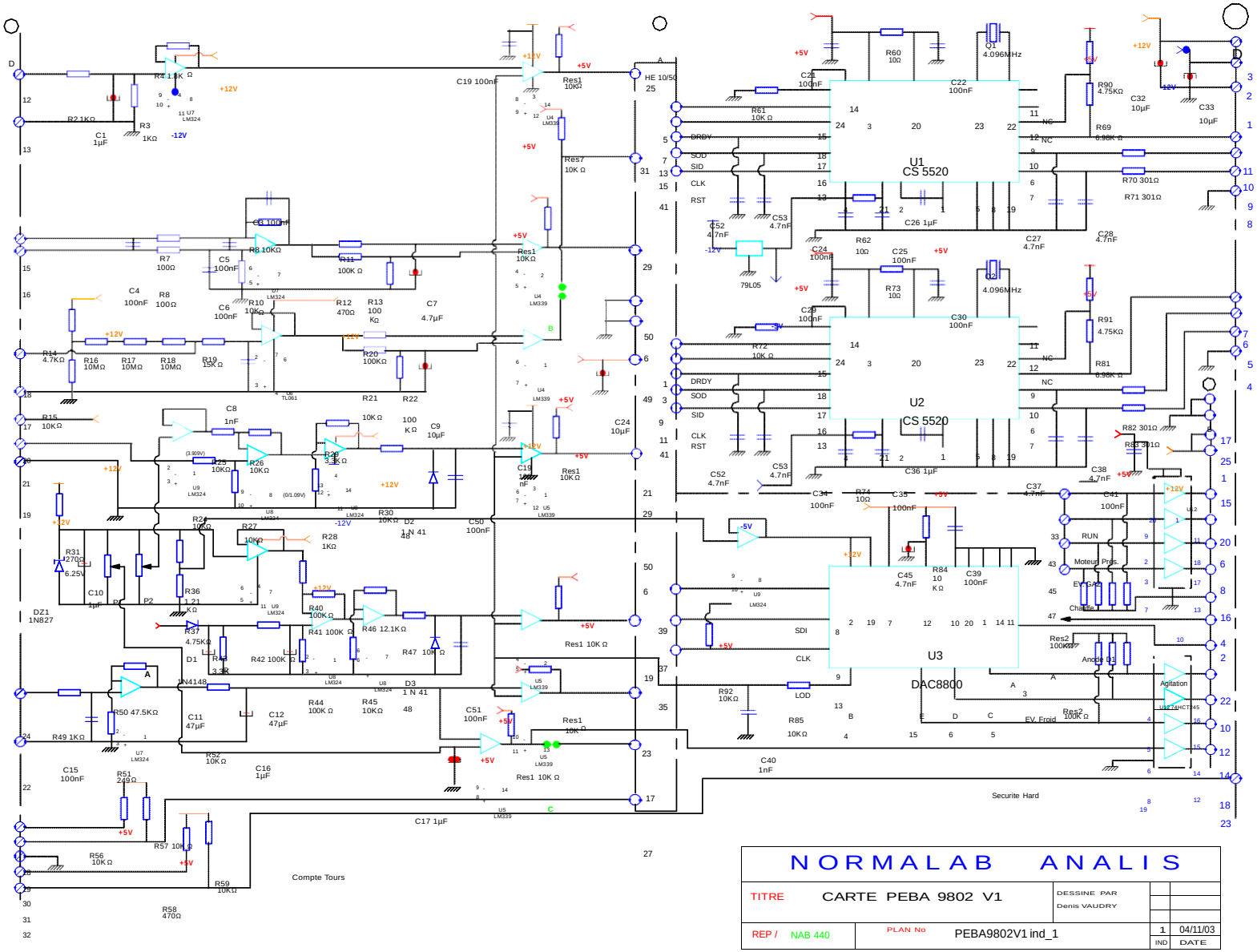


NORMALAB ANALIS			
TITRE INTERFACE PEBA9802/1		DESSINE PAR Denis VAUDRY	
REP / NAB440	PLAN No CABLAGE PEBA 9802_1 Ind 2	2 IND	20/06/03 DATE



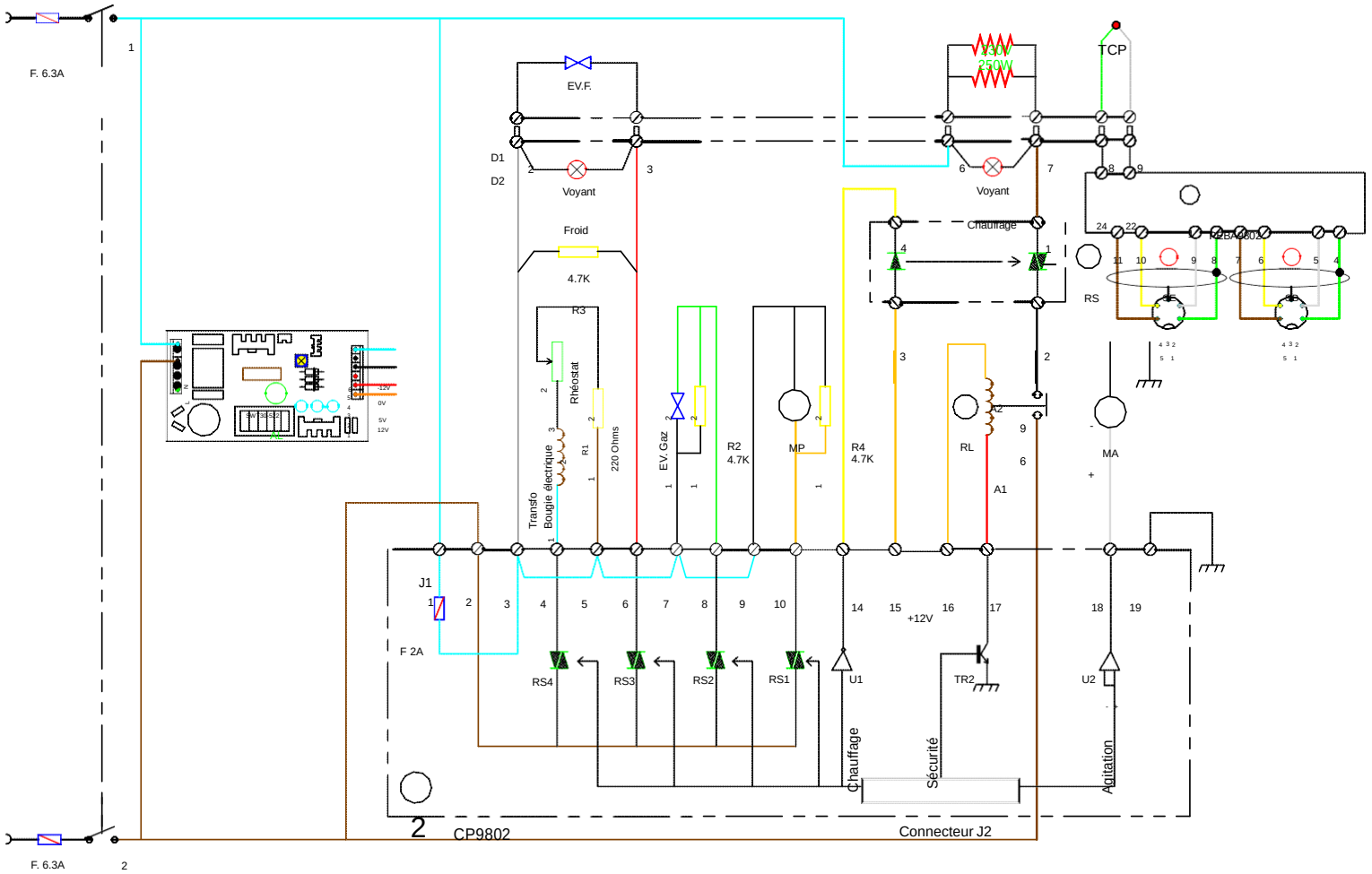
NORMALAB ANALIS			
TITRE	Carte puissance CP9802/1 NAB 440	DESSINE PAR Denis VAUDRY	
REP / NAB440	PLAN No CP9802_1 NAB 440 Ind 1	1	20/06/03
		IND	DATE


HE10/ 50 M
J4
BACK- LIGHT
J4
+12V
+12V
TME1215S
+5V
10K
P1
V0
- 15V
- 15V
U7
Convertisseur
CC/ CC
+5V
C1
1µF
J3
Clavier
PB4
PB5
PB6
PB7
PA7
PA6
PA5
PA4
C9
1nF
C8
1nF
C7
1nF
C6
1nF
J6
AFFICHEUR
- 15V
V0
+5V
NC
- 15
Reset
CE
D7
D6
D5
D4
D3
D2
D1
D0
RD
WR
A0
V0
+5V
GND
NAB 440
NAF
NORMALAB ANALIS
TITRE Interface Clavier NAB 440
INTCLA 9712/ 1
DESSINE PAR
Denis VAUDRY
REP / NAB440
PLAN No
INTCLA
0 19/03/01
IND DATE



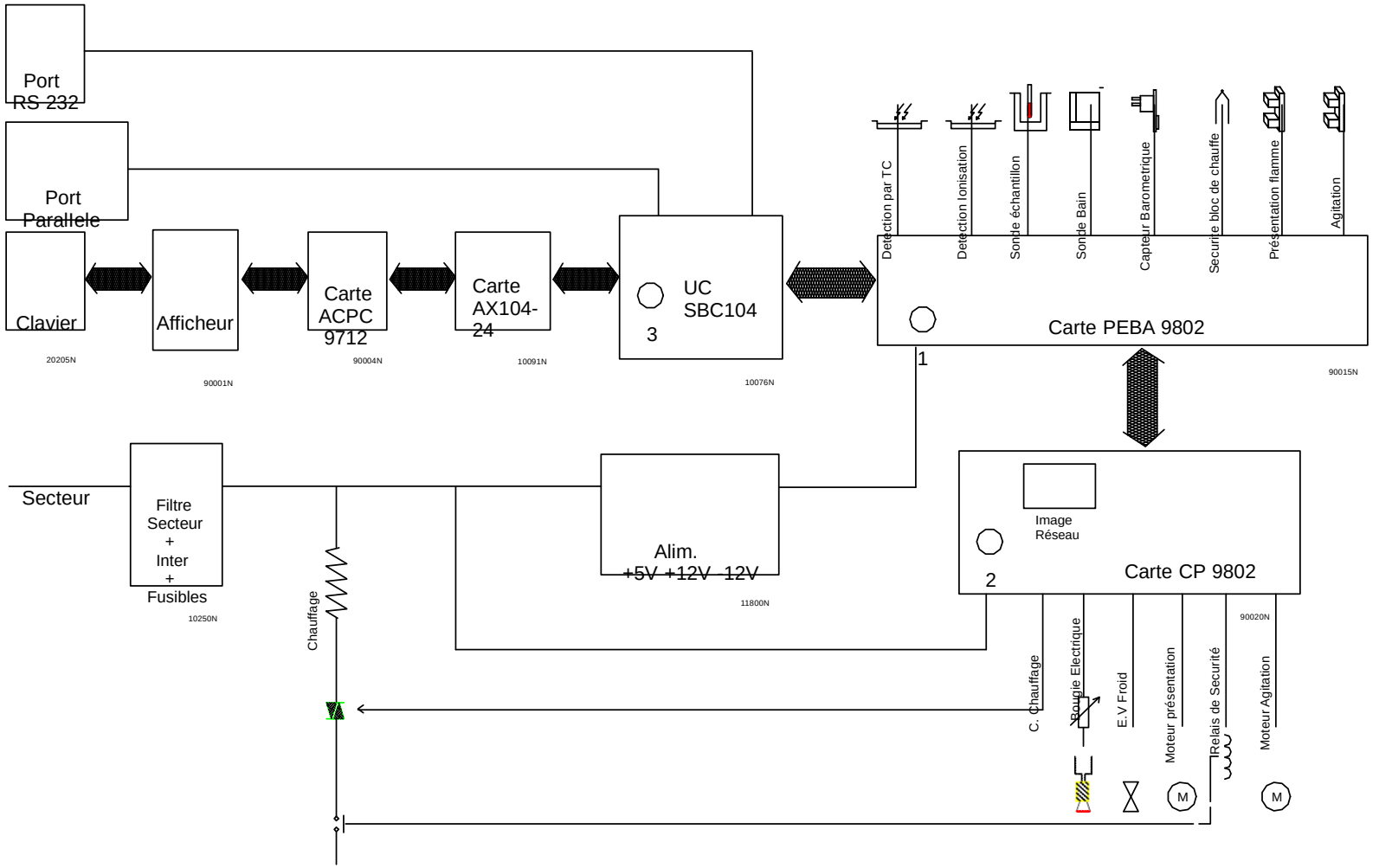
NORMALAB ANALIS			
TITRE	CARTE PEBA 9802 V1	DESSINE PAR Denis VAUDRY	
REP / NAB 440	PLAN No PEBA9802V1 ind_1	1	04/11/03
		IND	DATE

NORMALAB ANALIS FRANCE S.A. Le village 76210 LINTOT FRANCE
Tel . : 33 (0)2 35 38 59 59 Fax. 33 (0)2 35 38 78 55



NORMALAB ANALIS			
TITRE	SYNOPTIQUE PUISSANCE TENSION 230V	DESSINE PAR Denis VAUDRY	V6
REP / NAB440	PLAN No: Synoptique 230V NAB 440 Ind 1	1	28/11/00
		IND	DATE

NORMALAB ANALIS FRANCE S.A. Le village 76210 LINTOT FRANCE
Tel . : 33 (0)2 35 38 59 59 Fax. 33 (0)2 35 38 78 55



KOEHLER INSTRUMENT CO			
TITRE	SYNOPTIQUE GENERALE	DESSINE PAR Denis VAUDRY	V6
REP / NAB440	PLAN No: Synoptique generale NAB 440 Ind_0	IND	15/04/03 DATE