

CP6632

Process Calibrator



User's Manual

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Content verification

The CP6632 has been checked mechanically and electrically prior to dispatch. The necessary precautions have been taken to ensure it reaches the user without being damaged.

Nonetheless, it is wise to perform a rapid check to detect any deterioration which may have occurred during transport. If this is the case, inform the carrier immediately thereof.

The standard accessories are the following:

- Quick user manual
- Measurement cables
- 4 AA batteries (1.5 V)
- Protective sheath
- Carrying strap
- Factory test report

If the product needs to be returned, use the original packaging where possible and indicate as clearly as possible the reasons for the return in a note accompanying the device.

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A. GENERAL

Thank you for choosing this AOIP SAS precision measuring instrument, which incorporates our extensive experience in the manufacture of precision measuring appliances, which spans over more than a century.

We are thus able to continue our policy of constant innovation which has served our customers so well for more than 100 years. AOIP S.A.S welcomes any comments or suggestions you might have to enable us to perfect our know-how and make our future products even better.

A.1 Introduction

The CP6632 is a hand-held process calibrator. It is more particularly intended for calibration and maintenance. It can measure and generate electrical quantities either on site or in the laboratory. It fulfils voltage and current measuring and generation functions (DC or LF ramp signals) and a continuity test (on passive loop).

Owing to its monitoring (regulation) mechanism in transmission mode, the instrument cannot take measurements and transmit simultaneously.

The CP6632 features numerous associated functions that extend its range of applications:

- Display of results in accordance with a linear conversion law or not.
- Generation of increments, single or cyclic ramp signals.

Its utilisation is facilitated by a series of improvements:

- Fast access to all the functions.
- Intuitive user interface.
- Graphic display of 160x160 pixels
- Connection by 4-mm safety sockets.
- Powered by 4 AA batteries or a rechargeable battery pack with fast internal charger (Option).

The instrument is enclosed in an ABS casing with an elastomer sheath.

A.2 The instrument

General characteristics:

- Hand-held instrument energized by 4 AA batteries (or 1.7 Ah Ni-MH battery pack on option).
- Autonomy: from 12 to 53 hours depending on the functions used.
- Wrist-strap for carrying and use on sites
- Graphic 160 x 160 pixel liquid crystal display (LCD).
- Choice of language of the messages and programming functions, ranges and parameters on 6-key keypad + 1 navigator.
- Display backlighting accessible via the keypad, with the possibility of programming automatic extinction after a given period of inactivity.
- Presentation: ABS casing (elastomer sheath on option).
- Dimensions: 157 mm x 85 mm x 45 mm (without sheath).
- Weight: 306 g without sheath.
- Sealing IP54 in accordance with standard EN 60529

Options:

Reference	Designation
AV 6909	Protective sheath
AN 6011	Battery pack + charger
ER 48519-000	USB cable

A.3 Safety

A.3.1 Conformity with safety standards

The instrument complies with the directives in effect concerning both electrical safety (2006/95/CE) and electromagnetic compatibility of electrical measuring equipment (2004/108/CE).

This user's manual contains information and warnings that must be adhered to in order to protect the user against the hazards of electric current, ensure safe operation of the appliance, and protect it against incorrect manipulations that could damage it or be detrimental to its safety of use.

A.3.2 Climatic conditions

Per publication CEI 359: operating category I.

Standards application altitude: from 0 to 2 200 m.

Reference conditions: 23°C ±5°C, relative humidity: 45% to 75%.

Nominal operating conditions: -10°C to +50°C, relative humidity: 20% to 80% non-condensing.

Extreme operating conditions: -15°C to +55°C, relative humidity: 10% to 80% (70% at 55°C).

Extreme storage and transport conditions: -30°C to +60°C (without AA batteries or rechargeable battery pack).

A.3.3 Disposal of instrument at end of life

When the instrument reaches the end of its life we recommend that you dispose of it using the specialized waste disposal channels available in your region, and not the ordinary waste collection service, as the instrument contains elements that are environmental pollutants. Failing this, you can return the instrument to our company which will dispose of it free of charge.

A.3.3.1 *Waste produced by the instrument*

List of classified waste materials:

- 16.02.14: Waste from electronic equipment:
 - Electronic boards incorporated in the instrument.

- 16.06.02: Cells and batteries (dangerous)
 - Alkaline batteries
 - 3 V lithium battery (CR1225 type).
 - Or Ni-MH batteries (If the unit is equipped with an AN 6011 battery pack)

- 15.01.02: Packaging
 - Instrument casing in ABS plastic.
 - Elastomer protective sheath.

A.3.3.2 *Instrument destruction procedure*

To open the instrument: remove the battery compartment cover screw, and the 5 screws fastening the 2 half-shells. Separate the 2 half-shells. Remove the electronic board from the top shell.

The batteries are housed in the battery compartment (see putting into service chapter).

With the battery pack option, there are 2 polluting elements: the NI-MH (Nickel-Metal Hybrid) batteries and an electronic board. Separate the 2 elements.

A.3.4 Instructions

The instrument has been designed to function in complete safety if the instructions given in the accompanying documents are applied. Use of the instrument in any other way can reduce operator safety, and is therefore dangerous and prohibited.

A.3.5 Taking measurements

The measuring leads and wires must be in good condition and be replaced if their insulation seems defective (insulation cut, burnt, etc.).

When the instrument is connected to the measuring circuits the terminals can be dangerous, therefore do not place your hands near a terminal, whether used or not.

Never exceed the protection limit values indicated in the specifications.

When the order of size of the measured value is not known, ensure that the starting measurement range is as high as possible, or select automatic range change mode.

Before changing function, disconnect the measuring wires from the external circuit. Remember that when taking even low current and/or voltage measurements, that the circuits can carry voltages which, with respect to earth, are hazardous for the operator.

Never take measurements when the instrument is connected to another appliance by the USB link or when charging the batteries (option)

A.3.6 **Faults and abnormal stresses**

Whenever the level of protection of the instrument is believed to be degraded, remove it from service and ensure it cannot be put back into service accidentally.

The protection might have been degraded if, for example:

- ✓ The instrument displays visible damage.
- ✓ The instrument is no longer capable of taking precise measurements.
- ✓ The instrument has been stored in unfavourable conditions.
- ✓ The instrument has suffered severe stresses during transport.

A.3.7 **Definitions**

A.3.7.1 *Definition of category and pollution level*




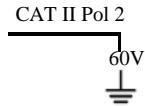


CAT II 60V:

The notion of categories determines the maximum transient voltage that can be applied to the measurement inputs (it is also called overvoltage category). For the CP6632, the maximum permissible overvoltage is 60V (DC or AC)

POL 2:

The notion of pollution determines the isolation distance between the circuits. Level 2 allows temporary conductivity caused by condensation.

A.3.7.2 *Symbols used*

Symbol	Meaning
	Caution: see the accompanying documents
	Earth
	Compliant with the European Union directives
	Category II, Pollution 2. Maximum voltage rating with respect to earth=60V
	Do not dispose. Unit at end of service life: See chapter A.3.3
	Do not dispose. Unit at end of service life: See chapter A.3.3

A.4 Maintenance

The instrument must always be reassembled in accordance with the instructions given in this manual. Incomplete or incorrect assembly can jeopardize operator safety.

The authority in charge must check regularly that the safety components have not altered over time and perform all the necessary preventive maintenance operations.

Before opening the instrument for maintenance work, always ensure that all the wires have been disconnected from it.

Work (adjustment, servicing, repair) on the open instrument must be avoided insofar as possible, but if such work is absolutely necessary, it must be performed by qualified personnel that is well aware of the risks involved.

B. USING THE INSTRUMENT

In order to use the device in all the safety required, all operators must read the paragraph on safety carefully, along with the paragraph below.

B.1 Power-up

B.1.1 Battery replacement

The instrument is supplied with four 1.5V AA batteries. The batteries must be installed in the battery compartment in the back of the instrument. To open the compartment, remove the cover screw. Screw the cover back on after inserting the batteries.

Pay attention to the polarity when installing the batteries as an error could damage the instrument. The polarity is indicated inside the compartment cover.

The figure below illustrates how to open the battery compartment as well as the correct positioning of each battery.



After inserting the dry cells (or NiMH batteries) correctly, press the ON/OFF key to turn ON the product. To turn the unit off completely, press the ON/OFF key until the "Instrument in power off mode" screen comes up. Date and hours are saved by a lithium battery.

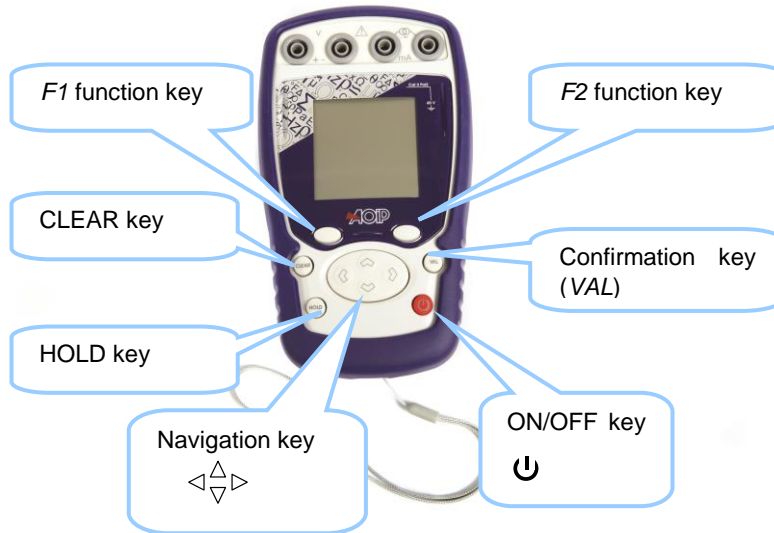
B.1.2 Back-up battery (date and time)

The back-up of the date and time when the unit is powered down is guaranteed by a 3V lithium battery – type CR1225. The battery is located inside the unit and can be accessed by removing the 5 screws on the back of the unit.

B.1.3 The keypad

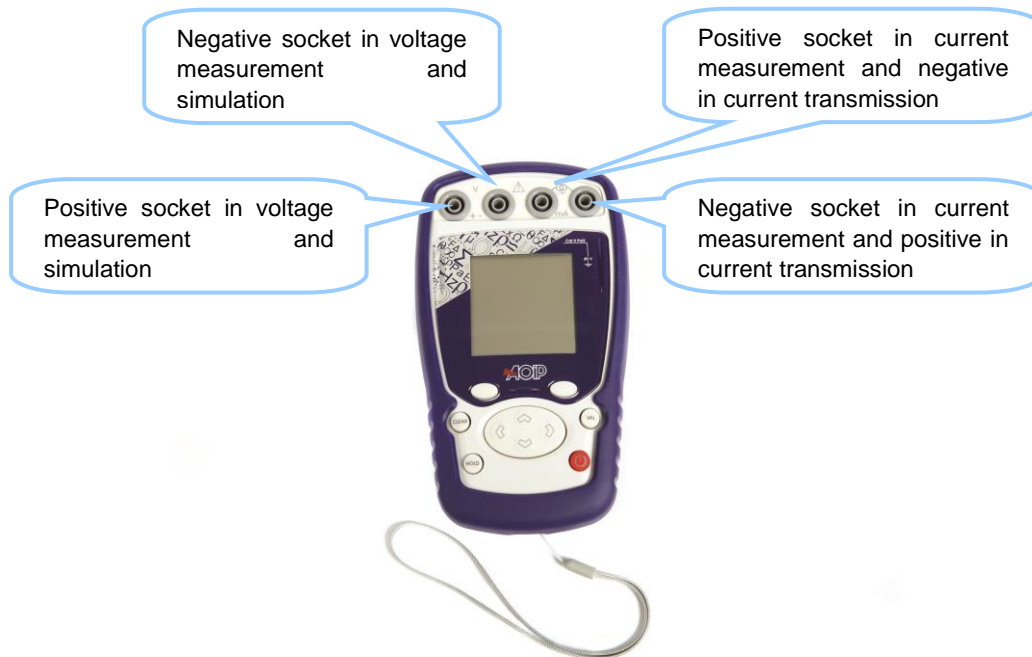
The keyboard features:

- 2 function keys (**F1** and **F2**) for the selection of the various menus displayed on the screen.
- The navigator, consisting of 4 arrows (up (↑), down (↓), right (→), left (←))
- A clear key (**CLEAR**).
- A device on/off and backlighting on/off key (**ON/OFF**).
- Press briefly to start the device. During operation, press briefly to turn the lighting on or off. Press it longer for 2 seconds to stop the device.
- A validation key (**VAL**).
- A HOLD key allows you to suspend a process temporarily

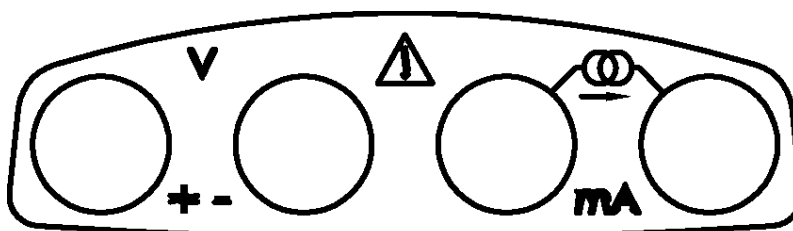


B.1.4 The measurement and simulation terminals

The CP6632 is equipped with 4 safety sockets (4 mm diameter). Two of these sockets are for voltage measurement and transmission, while the other two are for current measurement and transmission and the continuity test.



The figure below shows the inscription on the sockets of the CP6632.



B.1.5 The USB connector

The CP6632 features a USB connector (mini B) for loading new software versions and adjusting the instrument.

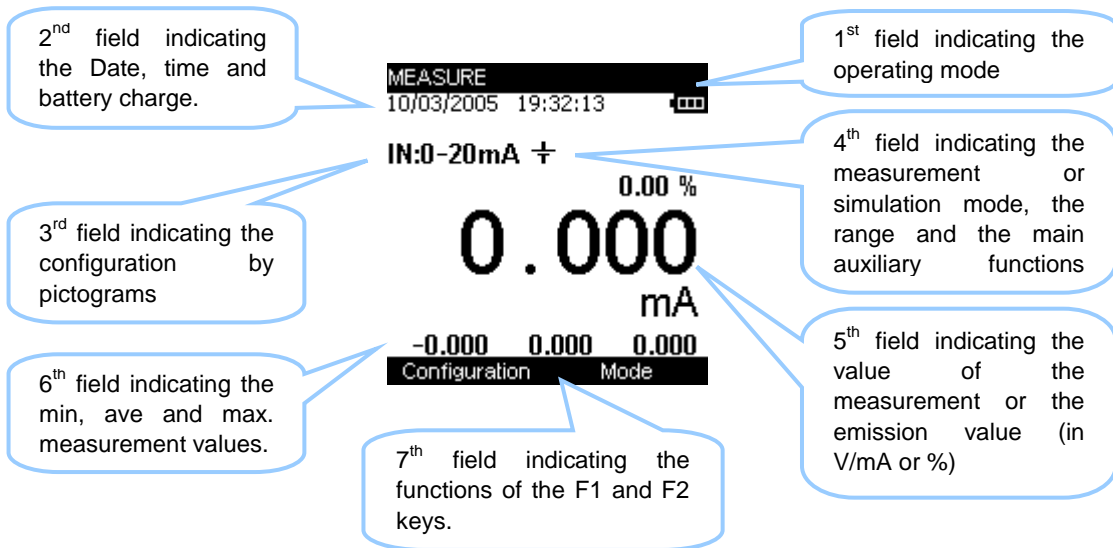


B.1.6 Screen

The CP6632 has a backlit graphic liquid crystal display (LCD), with a resolution of 160 x 160 pixels.

In normal operating conditions, the display is divided up into seven horizontal fields:


















- The 1st field indicates the operating mode (Measurement or emission).
- The 2nd field indicates the date, time and battery charge.
- The 3rd field is reserved for icons indicating the operating mode (related functions: Scaling, filtering...).
- The 4th field indicates the operating mode, the gauge and certain related functions.
- The 5th field indicates the value of the measurement or of the emission. These values are expressed in V, mA or as a %.
- The 6th field indicates (in measurement mode) the min., average and max. values of the measurement.
- Lastly, the 7th field indicates the functionality of keys **F1** and **F2**.




The diagram shows the LCD screen divided into seven horizontal fields with callouts:

- 1st field:** MEASURE (operating mode)
- 2nd field:** 10/03/2005 19:32:13 (Date, time and battery charge)
- 3rd field:** IN:0-20mA (configuration by pictograms)
- 4th field:** 0.00% (measurement or simulation mode, range and main auxiliary functions)
- 5th field:** 0.000 mA (value of the measurement or emission value)
- 6th field:** -0.000 0.000 0.000 (min, ave and max. measurement values)
- 7th field:** Configuration Mode (functions of the F1 and F2 keys)

The following table gives the meaning of the pictograms that appear on the screen:

Symbol	Description
	Step increment transmission mode
	Single ramp signal transmission mode
	Cyclic ramp signal transmission mode
	Scaling
	On hold
	Quadratic scale
	Filtering
	%FS (full scale) function
	Valve test
	Warning: the CP6632 is in error condition (range exceeded (1)...etc)
	Incremental mode using the arrows
	Passive mode (the instrument delivers a +24V source to the sensor)
	Active mode (the instrument delivers no voltage source)
	Hart mode
	Caution: The current source cannot deliver the current demanded (unlooping probable).
	Caution: The voltage source cannot deliver the voltage demanded (output current probably too high).
	Battery life indication

Note 1:

When the range is exceeded (limits determined in the next chapter), the following pictogram  appears and the measurement display (5th field) indicates:

- :----- If the measured value is below the low limit.
- + :----- If the measured value is above the high limit.

B.1.7 Starting (after powering on)

At powering on (insertion of the AA batteries or battery pack), the instrument automatically starts functioning (loading of the software into memory). It is recommended not to connect the instrument to any external circuits during this period. To avoid any signal conflicts, the instrument then enters measurement mode.

B.1.8 Operating modes

There are 5 main operating modes:

- Voltage measurement
- Current measurement
- Voltage transmission
- Current transmission
- Continuity test

The functional and electrical characteristics not to be exceeded are indicated below.

B.1.8.1 DC voltage measurement

The following ranges are available:

Range	0/10 V (Process)	25 V	50 V
Resolution (display)	1 mV (or 10 mV or 100 mV)	1 mV (or 10 mV or 100 mV)	1 mV (or 10 mV or 100 mV)
Extent of the range	-2 V to +12 V	-2 V to +25 V	-5 V to 50 V

B.1.8.2 Current measurement

Range	0-20 mA (Process)	4-20mA (Process)	25mA
Resolution (display)	1 μ A (or 10 μ A or 100 μ A)	1 μ A (or 10 μ A or 100 μ A)	1 μ A (or 10 μ A or 100 μ A)
Extent of range	-6 mA to +24 mA	3.2 mA to +24 mA	-6 mA to +25 mA
Loop supply	YES	YES	YES
Scale	Linear or quadratic	Linear or quadratic	Linear

B.1.8.3 Voltage transmission

The following ranges are available:

Range	0/10 V	15 V
Resolution (display)	1 mV (or 10 mV or 100 mV)	1 mV (or 10 mV or 100 mV)
Extent of range	0 V to +12 V	0 V to +15 V
Mode	Continuous, increments, or ramp	Continuous, increments, or ramp

B.1.8.4 Current transmission

The following ranges are available:

Range	0/20 mA	4/20 mA	25 mA
Resolution (display)	1 μ A (or 10 μ A or 100 μ A)	1 μ A (or 10 μ A or 100 μ A)	1 μ A (or 10 μ A or 100 μ A)
Extent of the range	+500 μ A to +24 mA	+3.2 mA to +24 mA	+500 μ A to 25 mA
Mode	Continuous, increments, ramp or predefined (valve, %FS), linear or quadratic scale	Continuous, increments, ramp or predefined (valve, %FS), linear or quadratic scale	Continuous, increments or ramp.

B.1.8.5 Continuity

Range	Continuity
Resolution	Open/Closed: Considered closed for $Z=[0...11\text{ K}\Omega \pm 10\%]$ and open for $Z=]11\text{ K}\Omega \pm 10\% \dots \infty[$

The loop to be tested is connected through the current channel. Caution, the tested loop must be resistive and passive.

B.1.8.6 Maximum permissible electrical characteristics (values not to be exceeded)

Function	Range	Vin max	Iout max	Z load
U measurement	0/10 V 25 V 50 V	60 V - -		
U transmission	0/10 V 15 V		6 mA 5 mA	1500 Ω min 3000 Ω min
I measurement	0/20 mA 4/20 mA 25 mA	60 V - -		
I transmission	0/20 mA 4/20 mA 25 mA		24 mA - 25 mA	800 Ω max - -
Continuity		60 V		

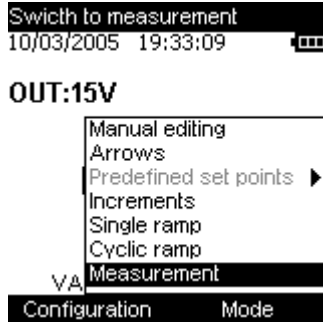
These 5 operating modes are explained in the following chapters (chapter C).

C. PROGRAMMING MODES

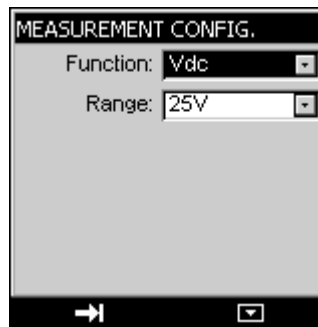
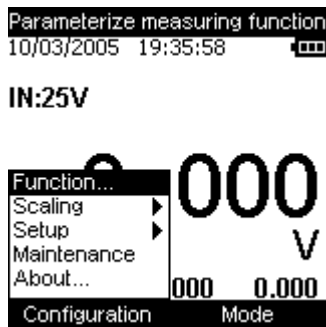
C.1 Voltage (DC) measurement

- Measurement or transmission mode is selected using key **F2 (mode menu)**.
- Using the navigation keys (↑ and ↓), move down through the menu to the **Measurement** field.
- Press **VAL** to confirm.

It should be noted that Measurement mode is the mode selected by default.

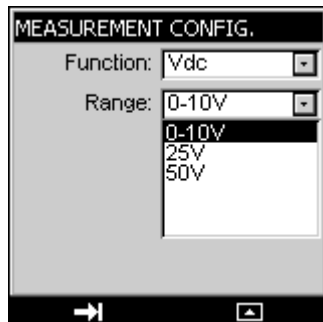


- The type of function (voltage or current) is selected using key **F1 (Configuration menu)**.
- Using the navigation key (↑ and ↓), go onto the **Function** field
- Press **VAL** to confirm.

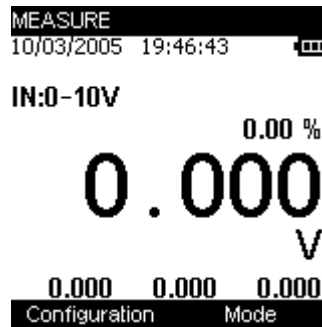


In the **MEASUREMENT CONFIGURATION** menu, go onto the **Function** field using key **F1**.

- Go into the **Function** menu by pressing **F2**.
- Select the type of function (**Vdc**) using the navigation keys.
- Press **VAL** to confirm.
- Using key **F1**, go onto **Range** to define it.
- Go into the menu by pressing **F2**.
- Select the range using the navigation keys.
- Press **VAL** to confirm (the range).



- Press **VAL** again to confirm the desired function and call up the measurement screen.



- Measurement** mode provides for display of the Minimum (bottom left), Mean (bottom centre) and Maximum (bottom right) values since the last **Min/Max Reset** command.
- This command is accessed through key F2.
- Using the navigation key, go onto the **Min/Max Reset** field.
- Press **VAL** to confirm.

C.2 Current (DC) measurement

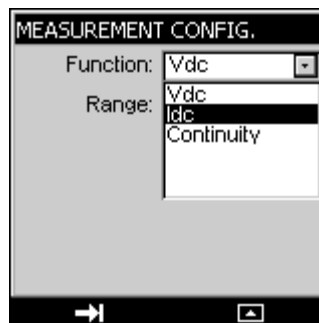
- Measurement or transmission mode is selected using key **F2 (mode menu)**.
- Using the navigation keys, go onto the **Measurement** field.
- Press **VAL** to confirm.

It should be noted that Measurement mode is the mode selected by default.

- The type of function (voltage or current) and the range are selected using key **F1 (Configuration menu)**.
- Using the navigation key, go onto the **Function** field
- Press **VAL** to confirm.

In the **MEASUREMENT CONFIGURATION** menu, go onto the **Function** field using key **F1**.

- Go into the **Function** menu by pressing **F2**.
- Select the type of function (**Idc**) using the navigation keys (↑ and ↓).

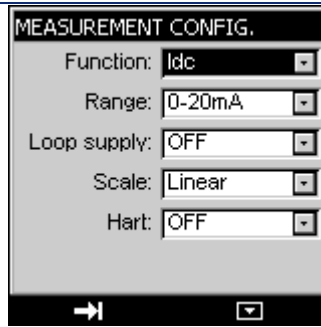


- Press **VAL** to confirm.

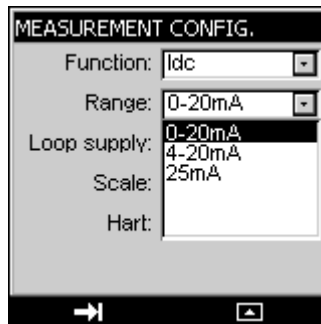
→ The navigation keys can be used to make a shortcut.

In the **MEASUREMENT CONFIGURATION** menu, go onto the **Function** field using key **F1**:

- Select the type of function (Idc) using the navigation keys (↑ and ↓),



- Using key F1, go onto the **Range** field and define the **Range**.
- Go into the menu by pressing **F2**.
- Select the range using the navigation keys (0/20mA, 4/20mA or 25mA).



- Press **VAL** to confirm (the range).

→ The navigation keys can be used to make a shortcut.

In the **MEASUREMENT CONFIGURATION** menu, go onto the **Range** field using key **F1**:

- Select the range directly using the navigation keys (↑ and ↓),

→ Other configuration parameters can be defined at this level, such as the current loop supply, the type of scale and Hart compatibility. These parameters are defined in the next chapter.

- Press **VAL** (again) to confirm the desired function and call up the measurement screen.
- **Measurement** mode provides for display of the Minimum (bottom left), Mean (bottom centre) and Maximum (bottom right) values since the last **Min/Max Reset** command.
- This command is accessed through key F2.
- Using the navigation key, go onto the **Min/Max Reset** field
- Press **VAL** to confirm.

C.3 Current measurement / auxiliary functions

Auxiliary functions can be defined for all the ranges. Examples include:

- Supply of a +24 voltage to the sensors or not → Passive or active mode
- Linear or quadratic scale (for process ranges only).
- Hart compatibility (for process ranges only).

After selecting the Function and Range, the auxiliary functions described above must be defined.

→ Passive or active mode?

- Using key F1, go onto the **Loop Supply** field.
- Using the navigation keys (↑ and ↓), select the mode **ON** or **OFF** (Passive or Active).

This active or passive mode also concerns the Hart mode.

→ Scale?

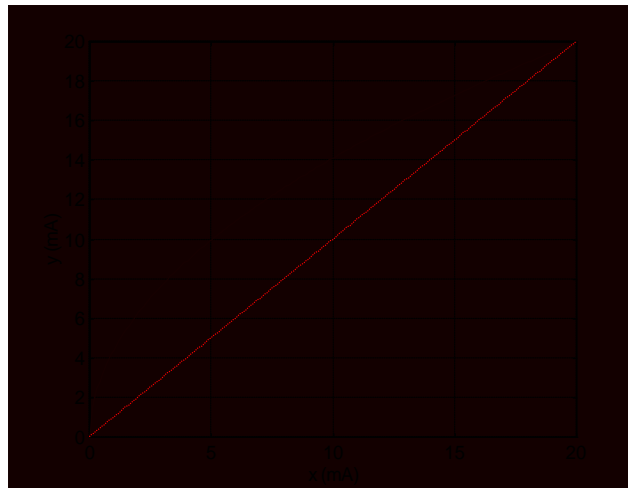
- Using key F1, go onto the **Scale** field.
- Using the navigation keys (↑ and ↓), select **Linear** or **Quadratic** mode.

When quadratic scaling is activated, the CP6632 takes the square root of its input and displays the result as a percentage. For example, if the CP6632 is connected to the output of a differential pressure transmitter it displays a result proportional to the flow.

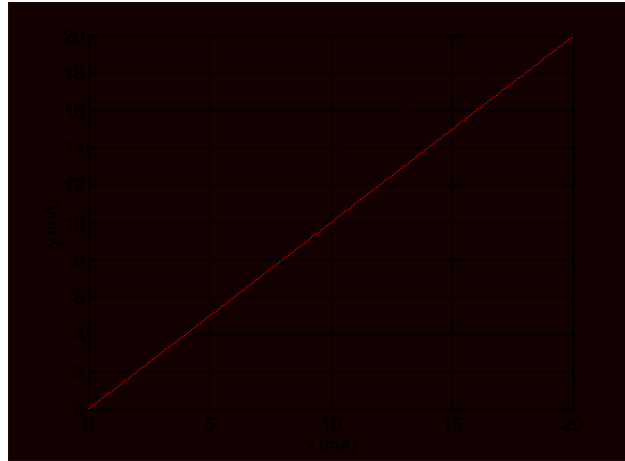
If the input current x varies between a and b , scaling complies with the formula below:

$$y = a + (b - a) \sqrt{\frac{(x - a)}{(b - a)}}$$

The scaling curve for the 0-20mA range is as follows:

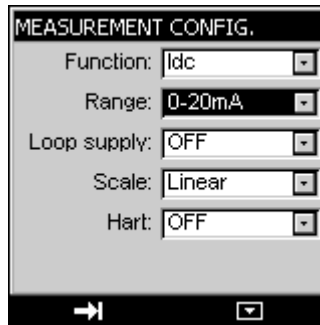


The scaling curve for the 4-20mA range is as follows:



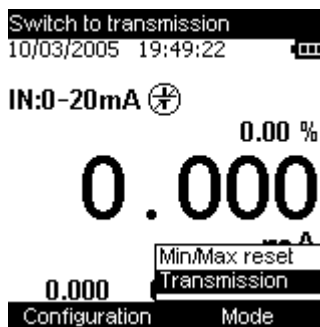
→ Hart?

- Using key F1, go onto the **Hart** field.
- Using the navigation keys (↑ and ↓), select the mode **ON** or **OFF**.



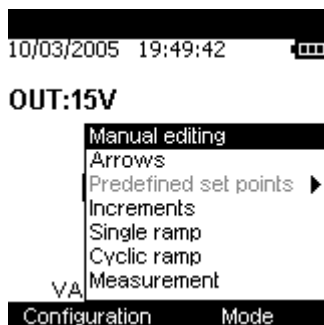
C.4 Voltage or current (DC) transmission

- Transmission mode is selected using key **F2 (mode menu)**.
- Using the navigation keys (↑ and ↓), move down through the menu to the **Transmission** field.
- Press **VAL** to confirm.



After confirming Transmission mode, the type of generation must be defined:

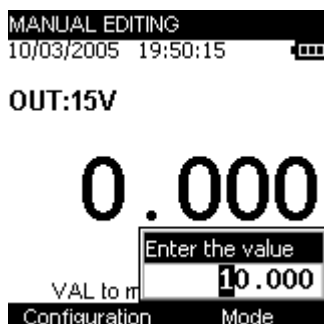
- Continuous (manual or incremental editing).
- Incremental (in steps).
- Single ramp (only one ramp signal transmitted).
- Cyclic ramp.



→ Voltage or current generation / manual editing?

- Press key F2 to display the edit menu.
- Using the navigation keys (↑ and ↓), select the **Manual editing** mode and confirm (**VAL** key).
- Press **VAL** again and enter your value using the navigation keys:
 - ↑ and ↓ to increment or decrement the value
 - ← and → to select the hundreds/tens/units/tenths/hundredths.

Caution: if the Scaling mode is **ON**, the value to be edited is %, otherwise this value is in volts, and in this case the hundreds unit does not exist.



→ Voltage or current generation / editing using the arrows?

- Press key F2 to display the edit menu.
- Using the navigation keys (↑ and ↓), select the **Arrows** editing mode and confirm (**VAL** key).
- The value is entered using the navigation keys:
 - ↑ and ↓ to increment or decrement the value
 - ← and → to select the tens/units/tenths/hundredths/thousandths.

→ Voltage or current generation / incremental editing?

- Press key F2 to display the edit menu.
- Using the navigation keys (↑ and ↓), select the **INCREMENTS** editing mode and confirm (**VAL** key).
- The value displayed is that programmed in the **CONFIGURATION/RAMP** menu (see next chapter).
- Using the navigation key (↑), start the automatic incrementing phase (according to the parameters programmed in the **CONFIGURATION/RAMP** menu).
- The voltage can be automatically decremented from the programmed maximum value using the navigation key (↓).
- The transmitted voltage can be manually incremented (according to the parameters programmed in the **CONFIGURATION/RAMP** menu) using the navigation key (→).
- The transmitted voltage can be manually decremented from the maximum programmed value using the navigation key (←).

→ Voltage or current generation / single ramp editing?

- Press key F2 to display the edit menu.
- Using the navigation keys (↑ and ↓), select **SINGLE RAMP** editing mode and confirm (**VAL** key).

The value displayed is that programmed in the **CONFIGURATION/RAMP** menu (see next chapter).

- Using the navigation key (↑), start the automatic incrementing phase (according to the parameters programmed in the **CONFIGURATION/RAMP** menu).
- The voltage can be automatically decremented from the programmed maximum value using the navigation key (↓).
- The transmitted voltage can be manually incremented (according to the parameters programmed in the **CONFIGURATION/RAMP** menu) using the navigation key (→).
- The transmitted voltage can be manually decremented from the maximum programmed value using the navigation key (←).

The Hold key allows generation to be stopped and restarted

Ramp generation can be done step by step by pressing the navigation keys (← and →) and automatic generation restarted with the navigation keys (↑ and ↓).

Transmission can be delayed by a programmable length of time (in the **CONFIGURATION/RAMP/DELAY** menu)

→ Voltage or current generation / cyclic ramp editing?

- Press key F2 to display the edit menu.
- Using the navigation keys (↑ and ↓), select **CYCLIC RAMP** editing mode and confirm (**VAL** key).

The value displayed is that programmed in the **CONFIGURATION/RAMP** menu (see next chapter).

- Using the navigation key (↑), start the automatic incrementing phase (according to the parameters programmed in the **CONFIGURATION/RAMP** menu).
- The voltage can be automatically decremented from the programmed maximum value using the navigation key (↓).
- The transmitted voltage can be manually incremented (according to the parameters programmed in the **CONFIGURATION/RAMP** menu) using the navigation key (→).
- The transmitted voltage can be manually decremented from the maximum programmed value using the navigation key (←).

The Hold key allows generation to be stopped and restarted

Ramp generation can be done step by step by pressing the navigation keys (← and →) and automatic generation restarted with the navigation keys (↑ and ↓).

→ Current generation / predefined editing / valve test?

Valve test transmission mode is a mode that transmits predefined current values (3.8; 4; 4.2; 8; 19; 20 and 21mA).

- Press key F2 to display the edit menu.
- Using the navigation keys (↑ and ↓), select **Predefined setpoints** mode and confirm (**VAL** key).
- Using the navigation keys (↑ and ↓), select the **Valve test** mode and confirm (**VAL** key).
- A transmission screen is displayed with a setpoint value of 3.8 mA.
- Press the navigation keys (← and →) to increment or decrement the setpoint value.

→ Current generation / predefined editing / % FS?

The "% FS" (percentage of full scale) transmission mode transmits predefined current values: 0%, 25%, 50%, 75% and 100%.

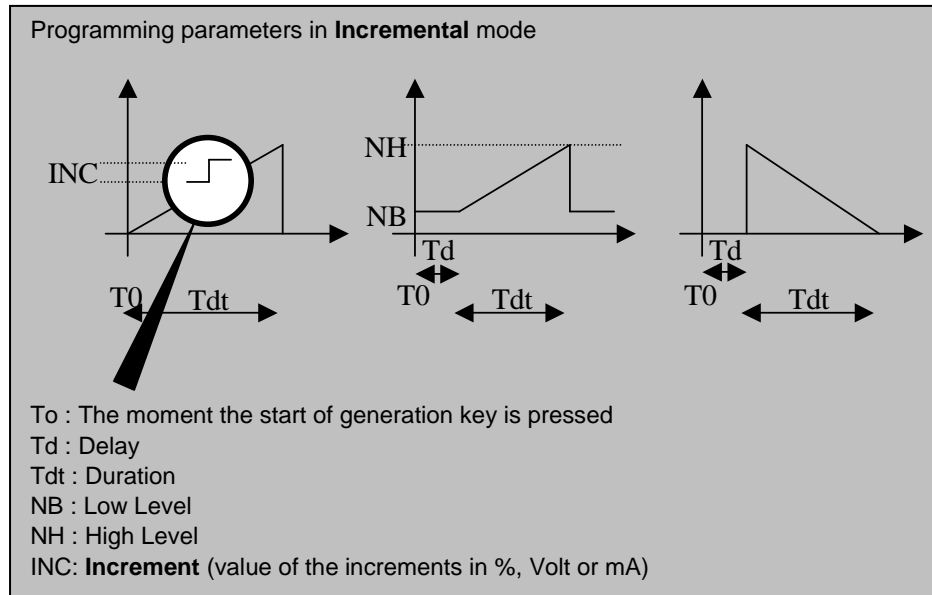
- Press key F2 to display the edit menu.
- Using the navigation keys (↑ and ↓), select **Predefined setpoints** mode and confirm (**VAL** key).
- Using the navigation keys (↑ and ↓), select **%FS** mode and confirm (**VAL** key).
- A transmission screen is displayed with a setpoint value of 0.00%.
- Press the navigation keys (← and →) to increment or decrement the setpoint value.

C.5 Configuration of the ramp generation

The CONFIGURATION/RAMP menu is used for the generation of incremental, single or cyclic ramp signals in both voltage and current.

→ Incremental ramp signal configuration?

The figure below illustrates the type of single ramp that can be generated and their parameters:

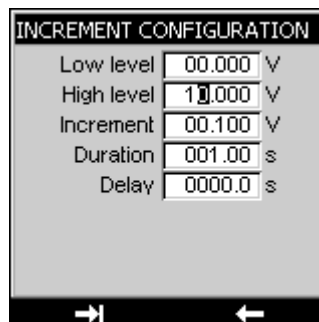


The **LOW level** and **HIGH level** levels are expressed:

- As a percentage of the range if the scaling mode is ON.
- In volts or mA if the scaling mode is OFF and depending on the type of quantity transmitted (voltage or current transmission).

The **Duration** corresponds to the incrementation time it takes to go from **Low Level** to **High Level** (and vice versa with decrementation). It is given in seconds and is limited to a maximum of 1000s.

The **Delay** corresponds to the timeout that can be programmed between the moment the start of transmission key is pressed and the actual start of generation. It is given in seconds and is limited to a maximum of 1000s.



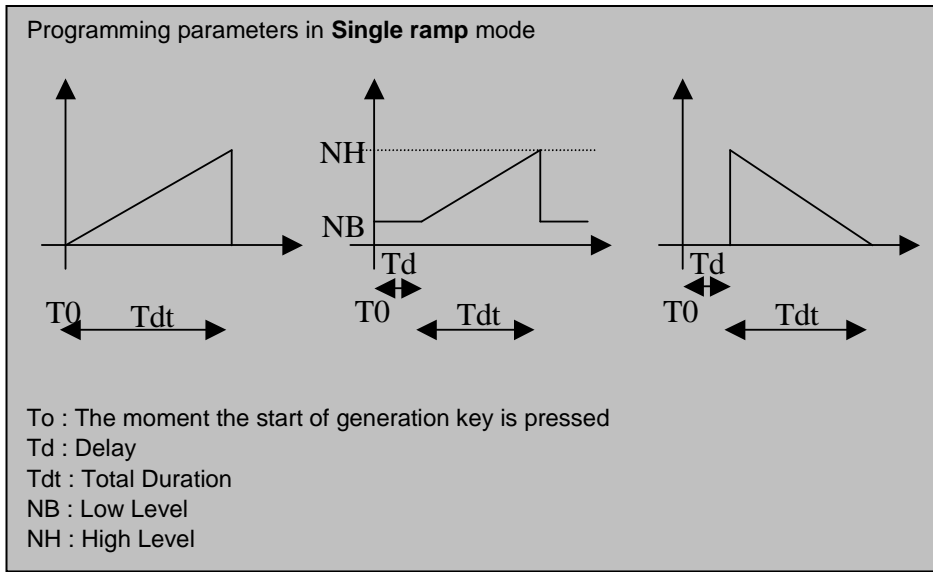
- Use key **F2** to move from one field to the next

The value is entered using the navigation keys:

- As a percentage of the range if scaling mode is ON.
- ↑ and ↓ to increment or decrement the value.
- ← and → to select the hundreds/tens/units/tenths/hundredths/thousandths.
- Press **VAL** to save the parameters.
- Press **CLEAR** to quit the menu without saving.

→ Single ramp signal configuration?

The figure below shows the type of single ramp that can be generated along with its parameters:

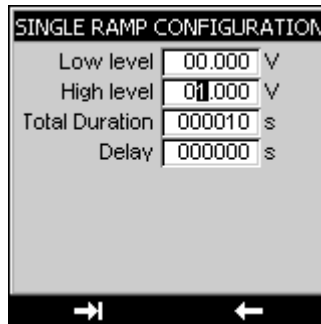


The **LOW level** and **HIGH level** levels are expressed:

- As a percentage of the range if the scaling mode is ON.
- In volts or mA if the scaling mode is OFF and depending on the type of quantity transmitted (voltage or current transmission).

The **Total Duration** corresponds to the incrementation time it takes to go from **Low Level** to **High Level** (and vice versa with decrementation). It is given in seconds and is limited to a maximum of 1000s.

The **Delay** corresponds to the timeout that can be programmed between the moment the start of transmission key is pressed and the actual start of generation. It is given in seconds and is limited to a maximum of 1000s.



The **CONFIGURATION/RAMP** menu is accessed using key **F2**. **Important:** The appropriate function mode (**INCREMENTS** mode) must have been programmed in order to access the **CONFIGURATION/RAMP/SINGLE** menu.

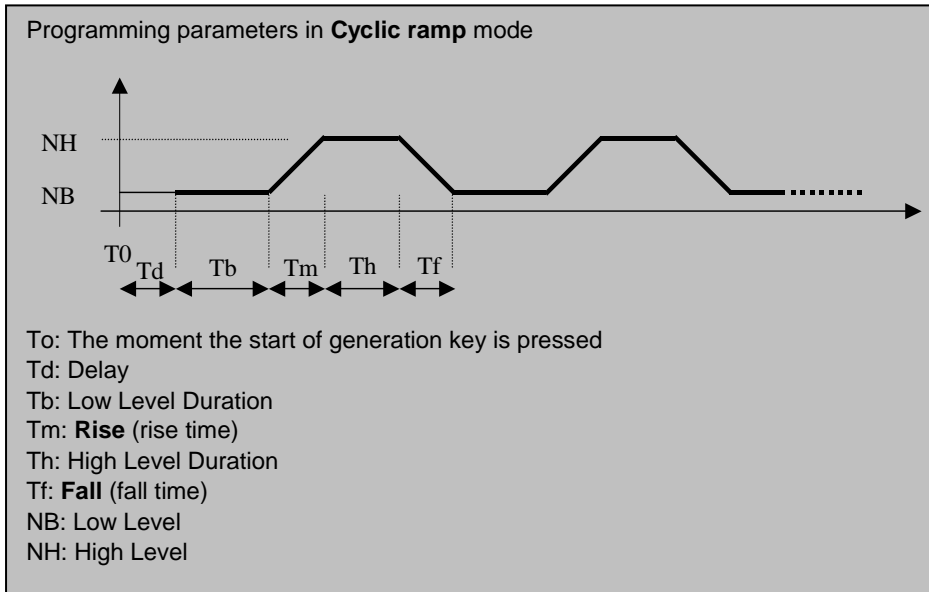
- Use key **F2** to move from one field to the next in the **CONFIGURATION/RAMP/SINGLE** menu.

The value is entered using the navigation keys:

- As a percentage of the range if scaling mode is ON.
- ↑ and ↓ to increment or decrement the value
- ← and → to select the hundreds/tens/units/tenths/hundredths/thousandths.
- Press **VAL** to save the parameters.
- Press **CLEAR** to quit the menu without saving.

→ Cyclic ramp signal configuration?

The figure below shows the type of cyclic ramp signal that can be generated along with its parameters:

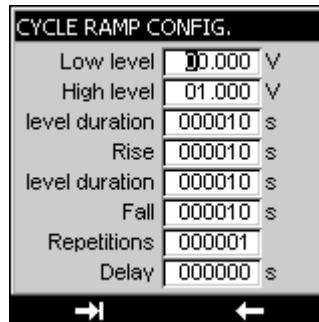


The LOW Level and HIGH level are given:

- As a percentage of the range if scaling mode is ON.
- In volts or mA if the scaling mode is OFF and depending on the type of quantity transmitted (voltage or current transmission).

The **Low Level Duration, Rise, High Level Duration, Fall and Delay** times are given in seconds and are limited to a maximum of 1000s.

The **Repetitions** field gives the number of ramp signals to be generated. There can be a maximum of 1000 repetitions.



The **CONFIGURATION/RAMP** menu is accessed using key **F2**. Caution, it is vital to have programmed the appropriate function mode (**Single Ramp** mode) to access the **CONFIGURATION/RAMP/CYCLIC RAMP** menu.

- Use key **F2** to move from one field to the next in the **CONFIGURATION/RAMP/CYCLIC RAMP** menu.

The value is entered using the navigation keys:

- As a percentage of the range if scaling mode is ON.
- ↑ and ↓ to increment or decrement the value.
- ← and → to select the hundreds/tens/units/tenths/hundredths/thousandths.
- Press **VAL** to save the parameters.
- Press **CLEAR** to quit the menu without saving.

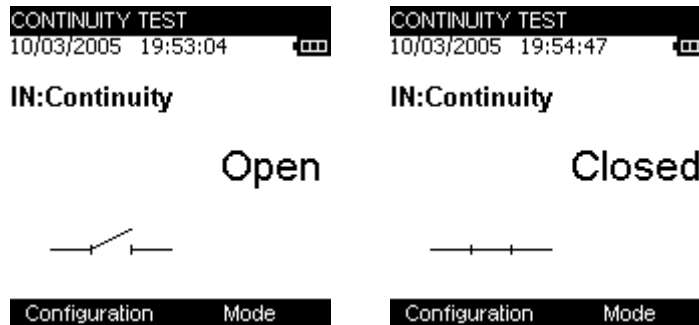
C.6 Continuity

CONTINUITY mode is a MEASUREMENT mode applied to the current channel (I+, I- terminals).

It indicates whether the circuit (the loop) is open or closed. The circuit must be resistive with no active elements. The loop shall be considered closed at loop impedances of 0 to 11 K Ω ($\pm 10\%$), and open at impedances above 11 K Ω ($\pm 10\%$).

- Select the measurement mode using key **F2 (mode menu)**.
- Using the navigation keys, move down through the menu to the **Measurement** field.
- Press the **VAL** key to confirm.
- The type of function (voltage or current or **Continuity**) is selected using key **F1 (configuration menu)**.
- Using the navigation key, go onto the **Function** field and press **VAL** to confirm.
- Using the navigation key (\uparrow and \downarrow), select the **Continuity** function and press **VAL** to confirm. It is possible to enter the Function field using key **F2** and to select the function with the navigation keys (\uparrow and \downarrow).

Confirming the Continuity function calls up the following screen:

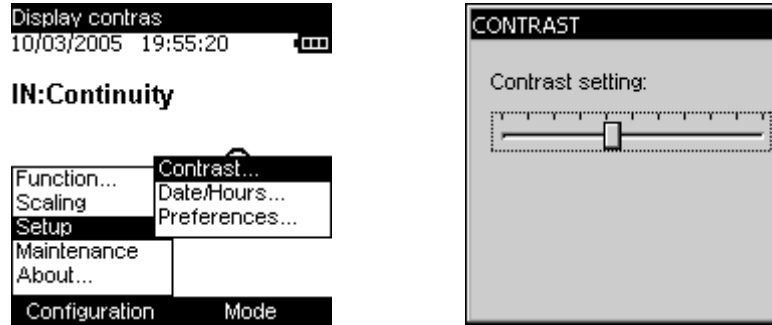


D. PARAMETER SETTINGS

D.1 Contrast adjustment

In the CONFIGURATION/SETUP menu, you can adjust the display contrast.

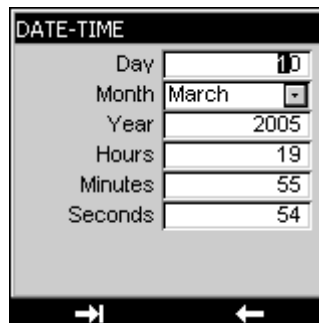
- Access this menu using the F1 key.
- Select the **Setup** field using the navigation keys (↑ and ↓), then confirm.
- Select the **Contrast** field using the navigation keys (↑ and ↑), then confirm.
- Using the navigation keys (← and →), increase or decrease the contrast as required.



D.2 Date and time setting

In the CONFIGURATION/SETUP menu, you can set the time and date.

- Access this menu using the F1 key.
- Select the **Setup** field using the navigation keys (↑ and ↑), then confirm.
- Select the **Date/Time** field using the navigation keys (↑ and ↑), then confirm.



- Use the navigation keys (↑ and ↓) to increase the various parameters.
- Use the navigation keys (← and →) to go to the next field.
- Press **VAL** to confirm.

D.3 Preferences" setting

D.3.1 Filtering setting

In the event of noisy measurements, you can filter the latter to make the value displayed on the screen more stable.

- Access this menu using the **F1** key (configuration menu).
- Select the **Setup** field using the navigation keys (↑ and ↑), then confirm.
- Select the **Preferences** field using the navigation keys (↑ and ↑), then confirm.
- Select the **Filtering** field by pressing the F1 key.
- Four filtering values are available (OFF, 0.5s, 1s and 2s). Select these values using the navigation keys (↑ and ↓).
- Confirm by pressing the VAL key.

D.3.2 Display resolution setting

In the **CONFIGURATION/SETUP/PREFERENCE** menu, you can select the desired display resolution:

- Access this menu using the **F1** key.
- Select the **Setup** field using the navigation keys (↑ and ↵), then confirm.
- Select the **Preferences** field using the navigation keys (↑ and ↵), then confirm.
- Select the **Resolution** field by pressing the F1 key.
- Three types of resolution are available: high (res=1μV), medium (res=10μV) and low (res=100μV).
- Select this resolution using the navigation keys (↑ and ↵).
- Confirm by pressing the VAL key.

D.3.3 Lighting duration setting

In the same menu (**CONFIGURATION/SETUP/PREFERENCE**), you can control the duration of the lighting (manual, 10s or 1min). Press the **ON/OFF** key briefly to turn on the lighting for the selected duration (10s or 1min). Press it again briefly to start the timing or to turn off the lighting in the case of the **manual** mode.

- Access this menu using the **F1** key.
- Select the **Setup** field using the navigation keys (↑ and ↵), then confirm.
- Select the **Preferences** field using the navigation keys (↑ and ↵), then confirm.
- Select the **Lighting** field by pressing the F1 key.
- Choose the manual or timed mode using the navigation keys (↑ and ↓).
- Confirm by pressing the VAL key.

D.3.4 “Key beeping” setting

In the **CONFIGURATION/SETUP/PREFERENCE** menu, you can emit a beeping sound every time a key is pressed:

- Access this menu using the F1 key.
- Select the **Setup** field using the navigation keys (↑ and ↵), then confirm.
- Select the **Preferences** field using the navigation keys (↑ and ↵), then confirm.
- Select the **Key Beeping** field using the F1 key.
- Using the navigation keys (↑ and ↓), select the **ON** or **OFF** mode then confirm by pressing the VAL key (if the parameter settings are completed or go to the next field using the F1 key).

D.3.5 Language setting

In the **CONFIGURATION/SETUP/PREFERENCES** menu, the interface language can be selected from French, English, German, Italian or Spanish.

- Access this menu using the F1 key.
- Select the **Setup** field using the navigation keys (↑ and ↵), then confirm.
- Select the **Preferences** field using the navigation keys (↑ and ↵), then confirm.
- Select the **LANGUAGE** field using the F1 key.
- Using the navigation keys (↑ and ↵), select your desired language then confirm by pressing the VAL key (if the parameter settings are completed or go to the next field using the F1 key).

D.4 "Maintenance" menu

Not accessible to the user:

Consult AOIP who will indicate the procedure to follow for maintenance services.

D.5 "About the instrument" menu

In the CONFIGURATION/SETUP/ABOUT menu you can find:

- The reference of the instrument
- The serial number
- The software version
- The name of the company

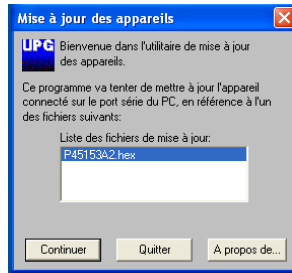
E. SOFTWARE UPDATE

The software is updated by the UPG32 program available on CD-ROM supplied with the product. To find out which version of firmware is installed in your unit, use the **Configuration** → **About** menu.

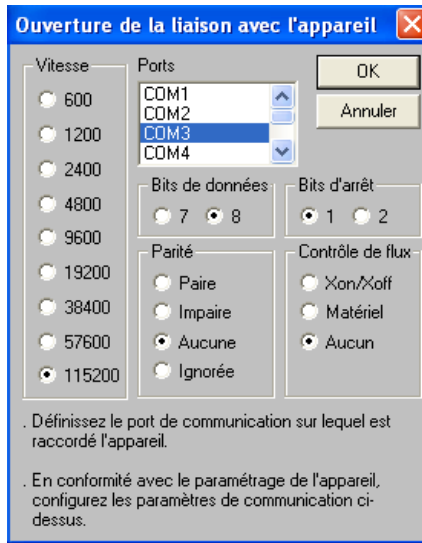
The quickest way to find out if an update is available is to visit the AOIP S.A.S website and look at the “Software” page.

To update the firmware, proceed as follows:

1. If necessary, install on the PC the USB driver for communication with AOIP instruments. This driver can be downloaded from our site, along with an information page describing the installation procedure
2. Disconnect the leads connected to the measurement and simulation terminals.
3. Connect the instrument to the PC using the USB lead.
4. Download and run the firmware update program.
5. Select the language then the file containing the firmware and download in the first stage.



6. Choose the communication parameters that match the parameters of the TC6621. The communication port used is a virtual port which does not correspond to a physical port on your computer. The other parameters to be selected are defined in the diagram below.



7. Confirm the update by pressing “OK” and wait for the firmware to load into the unit.

F. CALIBRATION AND ADJUSTMENT

In the context of metrological quality monitoring, the user may have to carry out periodic performance verification.

The verification must take the standard metrological precautions into consideration. The following instructions are to be applied.

The operations are carried out under reference conditions, namely:

- Room temperature: 23°C ±5°C.
- Relative humidity: 45% to 75%.

The standards that constitute the measuring chain must be such that the errors at the check points are known and are less than or equal to ±0.008%.

If this verification reveals one or more characteristics of the instrument to be outside the tolerances specified in the technical specifications chapter, you can:

Either carry out the adjustment procedure given in the maintenance document, which requires an instrument whose performance is at least as good as that used for the preceding verification.

Or return the instrument to the address indicated below for verification and calibration.

<p>AOIP SAS Rue Dupont Gravé F-14600 Honfleur</p>
<p>From France: 01 69 02 89 30 From your country: +33 (0)169 028 950</p>
<p>Fax : +33 (0)169 028 960 Email : sav@aoip.com</p>

G. TECHNICAL SPECIFICATIONS

The indicated levels of precision apply at temperatures of +18°C to +28°C, unless otherwise specified, and are expressed in $\pm (n \% R + C)$ where R = Reading and C = Constant expressed in practical units and given for a confidence interval of 95%.

They apply to an instrument placed in the reference conditions defined elsewhere, after fifteen minutes of warming up.

The precision includes the precision of the reference standards, the non-linearity, the hysteresis, the repeatability and the long-term stability over the period mentioned.

G.1 Measurement function

Maximum rated voltage in common mode: 60 VDC or VAC.

G.1.1 DC voltage

Range	Measurement range	Minimum resolution	Precision / 1 year (CI : 95%)
0/10 V	-2 V / +12 V	1 mV	0.015% RDG + 2 mV
25 V	-2 V / +25 V	1 mV	0.015% RDG + 2 mV
50 V	-5 V / +50 V	1 mV	0.015% RDG + 4 mV

- Temperature coefficient < 15 ppm range /°C from 0°C to 18°C and from 28°C to 50°C.
- Rin = 1 MΩ ±1%
- Common mode rejection: ≥ 120 dB at 50 and 60 Hz.

G.1.2 Direct current

Range	Measurement range	Minimum resolution	Precision / 1 year (CI : 95%)
0/20 mA	-6 mA / +24 mA	1 μA	0.015% RDG + 2 μA
4/20 mA	3.2 mA / +24 mA	1 μA	0.015% RDG + 2 μA
25 mA	-6 mA / +25 mA	1 μA	0.015% RDG + 2 μA

- Temperature coefficient < 20 ppm range/°C from 0°C to 18°C and from 28°C to 50°C.
- Possible loop power supply = 24 V ±10%.
- Rin < 30 Ω
- HART compatibility: R = 250 Ω ±5%.
- Common mode rejection: ≥ 120 dB at 50 and 60 Hz.

G.2 "Transmission" function

Maximum rated voltage in common mode: 60 VDC or VAC.

G.2.1 DC voltage

Range	Measurement range	Minimum resolution	Precision /1 year
0/10 V	0 V / +12 V	1 mV	0.015% RDG + 2 mV
15 V	0 V / +15 V	1 mV	0.015% RDG + 2 mV

- Temperature coefficient: < 15 ppm range/°C from 0°C to 18°C and from 28°C to 50°C.
- Rise time: < 1 ms (0 V to 15 V across 1 MΩ load).
- Internal resistance: ≤ 1 Ω.
- VLF noise: < 1 mV (at F < 100 Hz).

G.2.2 Direct current

Range	Measurement range	Minimum resolution	Precision / 1 year
0/20 mA	+500 μA/+24 mA	1 μA	0.015% RDG + 2 μA
4/20 mA	+3.2 mA/+24 mA	1 μA	0.015% RDG + 2 μA
25 mA	+500 μA/+25 mA	1 μA	0.015% RDG + 2 μA

- Temperature coefficient: < 20 ppm range/°C from 0°C to 18°C and from 28°C to 50°C.
- Rise time: < 500 μS (0 to 20 mA across a 20 Ω load).
- VLF noise: < 1 μA_{cc} (at F < 100 Hz).

G.3 "Continuity" function

Maximum rated voltage in common mode: 60 VDC or VAC.

Range	Resolution	Remarks
Continuity	Open / Closed	Considered closed at Z=[0...11 KΩ (±10%)] and open at Z=]11 KΩ (±10%)...∞[I < 5 mA

G.4 Power supply - Autonomy

The CP6632 is designed to function either with four 1.5 V AA batteries or with a 4.8 V battery pack.

The following autonomies are given for information.

Mode	Voltage & current measurement Voltage simulation	Current Simulation (20 mA / 24 V)
Autonomy	> 53 hours	> 12 hours

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