

OPERATING MANUAL

PRO 915-2

Differentialmanometer Thermometer



INSTRUFIBER

Fibra Óptica Cabo Rede Instrumentação Energia Ferramenta



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senseca

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1 General information

Read this document carefully and familiarize yourself with the operation of the device before using it. Keep this document ready to hand and in the immediate vicinity of the device so that it is always available to the personnel/user in case of doubt.

Only technically qualified persons are permitted to carry out commissioning, operation, maintenance and decommissioning. The personnel must have carefully read and understood the operating manual before starting any activity.

Legal notices

- For your safety, use only the manufacturer's original spare parts and accessories. We assume no responsibility for the use of other products and any resulting damage.
- The user must have adequate knowledge of the measuring process and use of the measurements. The user is liable in case of damage/danger due to misinterpretation of the measurements as a result of inadequate knowledge.
- The liability and warranty of the manufacturer for product damages and consequential damages are voided in the event of misuse, failure to comply with these operating instructions, failure to observe safety warnings, assignment to inadequately qualified technical personnel and arbitrary modifications of the device.
- No part of this document may be reproduced, modified or translated without prior written permission of the product manufacturer. In case of ambiguity between different language versions of this document, the English version applies.
- This document does not create any legally binding obligations for the product manufacturer. All legally binding obligations are included only in the General Terms and Conditions of Sale.

Correctness of content

- This document was checked for corrected contents and is subject to a continuous updating process. This does not rule out potential errors. In the event that errors are discovered or in case of suggestions to make this document more user-friendly, please inform us via the contact information given in this document.
- We reserve the right to change the product specifications and the contents of this document without prior notice.

Explanation of symbols used

Danger!

Warning of danger that could result in death, serious bodily injury, or serious property damage if not observed.

Caution!

Warning of potential danger or harmful situation that may cause damage to the device or the environment if not observed.

Attention!

Action that may have a direct effect on operation or may cause an unexpected behavior.

[p.4] Reference to the indicated page number.

1.1 Product identification

Exact product name can be found on device rear plate. The firmware version is displayed at startup. The info in this manual applies to devices with **firmware version 1.4.1.0 or later**.

1.2 Safety information

Fault-free operation and operational safety of the device can only be guaranteed if the general safety requirements and the specific safety requirements in this document are observed.

Do not use the device in climatic conditions other than those specified in this document.

Do not use the device in places with:

- Rapid ambient temperature variations that may cause condensation.
- Direct vibrations / shocks to the device.
- High-intensity electromagnetic fields or static electricity.

Intended use

The device is a handheld meter designed for measuring temperature and differential pressure in air and non-aggressive dry gases.

Foreseeable misuse

If the following notices are disregarded, personal injury or death, as well as property damage can occur.



Danger!

- Do not use in safety / emergency stop devices!
- Not suitable for use in hazardous areas (Ex-environments)!
- Not suitable for diagnostic or other medical purposes on patients!
- Not suitable for SIL (Safety Integrity Level)!
- The device is not suitable for contact with food (use only appropriate probes)!
- Not suitable for children!
- Do not use as PPE (Personal Protection Equipment).



Caution!

Do not use if:

- There is visible damage to the device.
- The device is not working as expected.
- The device has been stored under unsuitable conditions for an extended period.

On suspicion that the device can no longer be operated without danger, it must be decommissioned and prevented from recommissioning with appropriate labelling.

In case of doubt, send the device to the manufacturer for repair or maintenance.



Caution!

Penetration probes entail the risk of **stab injuries** due to the pointed probe. Handle penetration probes with care and fit a protective cap on the probe tip when not in use!



Caution!

Risk of burns when measuring high or very low temperatures: use gloves if necessary!



Attention!

Remove batteries to prevent leakage if the device is stored at a temperature above 50 °C or not used for an extended period of time.

2 Overview

PRO 915-2 is a professional handheld temperature and differential pressure meter with data logging capabilities.

The meter has an internal digital differential pressure sensor. Offset and slope user corrections allows compensating any possible sensor drift with time, for the best measuring accuracy.

Supplied with universal barbed pressure ports for connecting 4 and 6 mm inner diameter hose.

The pressure ports are screwed to the meter by a standard G 1/8 thread, allowing the user to change them with a different type of port, if necessary, to fit his specific needs.

In combination with a Pitot tube, the meter can calculate air speed and duct flow rate. The Pitot tube constant and the duct section are configurable.

A standard type K thermocouple probe can be connected to the temperature input. The input

al-

lows taking advantage of the K-type thermocouple sensor built into some Pitot tubes.

Detection of minimum, average and maximum values. The user can reset the statistical info to start a new statistical calculation.

Alarm thresholds can be set, to warn the user when the set values are exceeded.

The HOLD feature allows freezing the measurement on display, while the REL feature allows showing the measurement against a value determined by the user.

The meter can be connected to a PC via the USB-C port, for data acquisition in COM interface

mode or, in mass storage mode, for viewing or downloading the files stored in the internal memory or connecting to the **ProXware** application software.

Powered by 4 standard AA size alkaline batteries. For permanent operation, the instrument can also be powered via the USB-C port by a standard 5 Vdc standard power adapter or suitable power bank.

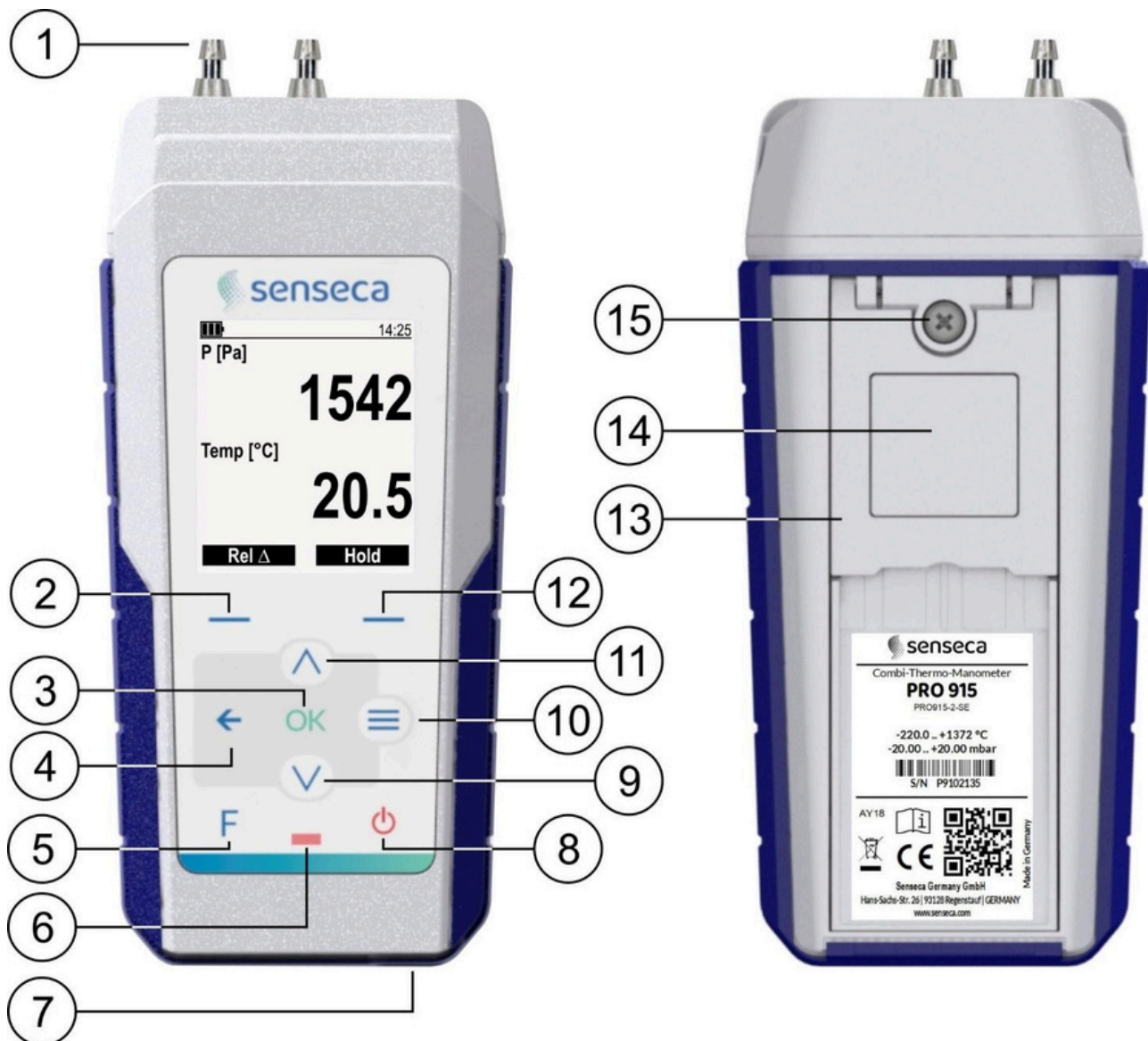
The scope of delivery includes the configuration off feature and LCD backlight level allows for more energy saving options.

PRO 915-2 is supplied with:

- Quick start guide
- Sheet with Master PIN
- 4 alkaline batteries, AA size
- 2 PVC hoses, inner Ø 4 mm, outer Ø 6 mm
- USB cable
- Test report

The **ProXware** application software is downloadable from Senseca website.

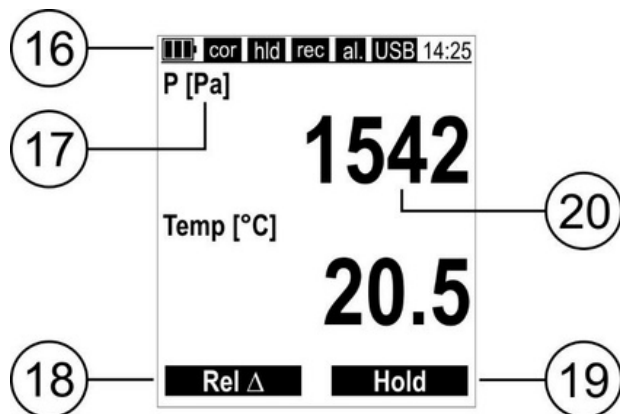
3 Description



1. Inputs (pressure ports and miniature female flat-pin TC connector).
2. Left function key: runs the command shown at the bottom left on display.
3. **OK** key: confirms the selection.
4. key: in measurement display cycles through the various available visualization modes; in the menu goes up one level, cancelling any unconfirmed changes.
5. **F** key: favorite functions (menu shortcuts).
6. Status LED.
7. USB-C port for connecting the PC or the external power supply.
8. **ON/OFF** key: turns the instrument on/off.
9. **Down arrow** key: scrolls down in a list or decreases the value of a parameter.
10. **MENU** key: enters the configuration menu.
11. **Up arrow** key: scrolls up in a list or increases the value of a parameter.

12. Right function key: runs the command shown at the bottom right on display.
13. Foldable stand: pull to open the stand.
14. Magnet, for attachment to metal surfaces.
15. Battery compartment fixing screw.

DISPLAY



Symbols in the status bar:

	Battery charge level
	External power supply
	connected Measurement
	correction applied Protected
	mode active (*)
	Hold function active
	Logging in progress
	Measurement in alarm
14:25	Current time
USB	USB port connected to PC

16. Status bar.
17. Measured parameter and unit of measurement.
18. Function corresponding to the left function key.
19. Function corresponding to the right function key.
20. Measured value.

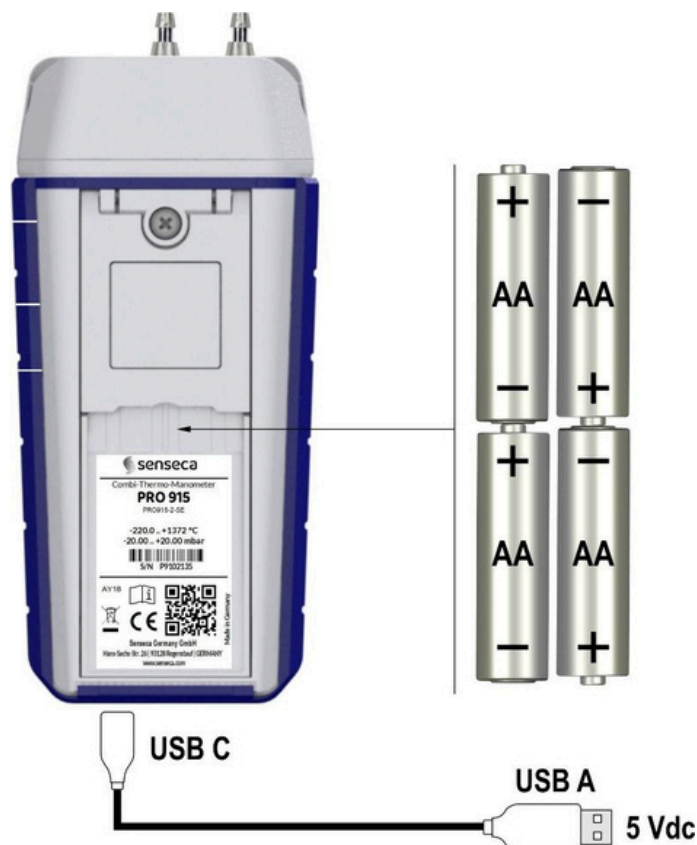
(*) and symbols share the same position. has priority over , which is not displayed if is on.

4 Preparing the instrument

Power supply

The instrument is powered by 4 AA size alkaline batteries, already assembled in the device as standard.

If for some reason (e.g., shipping rules) the batteries are not already assembled, unscrew the battery cover fixing screw and remove the cover, then insert the batteries as shown below.



The instrument can also be powered via the USB-C port by a 5 Vdc standard power adapter or power bank. If a power bank is used, make sure it is of appropriate capacity and does not have the auto-shutdown function when the current draw is very low (for example, suitable power banks are those in the Varta Power Bank Energy series).

Inputs connection

The instrument is supplied as standard with universal barbed pressure ports for 4 and 6 mm inner diameter hose. Connect the hoses respecting the +/- polarity according to the system to be monitored.



 Attention!

Use hoses with a diameter compatible with the pressure ports. The inner diameter of the hose should not be too large to avoid pressure loss and should not be too small to avoid mechanically forcing the ports when inserting the hose.

 Caution!

- Use hoses suitable for the pressure to be measured.
- It is recommended that the hoses are not under pressure during connection.
- It is recommended to secure the hoses to the pressure ports with hose clamps when measuring pressures above 1 bar. **GDZ-18** hose clamp is available as optional accessory.

The pressure ports are interchangeable. It is possible to unscrew the ports to replace them with ports of a different type, provided they have G 1/8 thread. When tightening the ports, use a suitable tool and observe the maximum torque of 2 Nm.

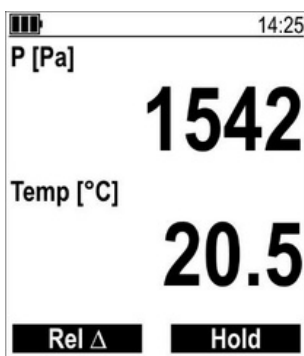
A K-type thermocouple sensor (e.g., the sensor built into some Pitot tubes) can be connected to the temperature input.

5 Measurement mode

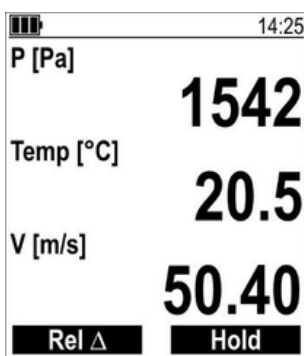
To switch on the instrument, press the ON/OFF key. After a few seconds, the instrument displays the measured value.

Note: when the instrument is turned on for the first time, it automatically enters the menu displaying some factory settings (language, date/time, etc.); press repeatedly OK to accept the proposed settings or change them as indicated in the Configuration chapter [p.14].

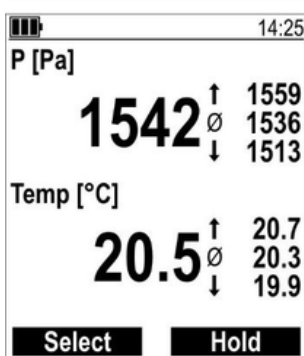
By repeatedly pressing the  key, measurements can be displayed in different formats:



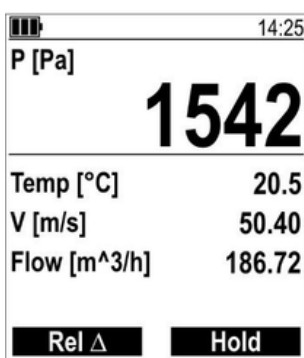
Parameters displayed in large format.



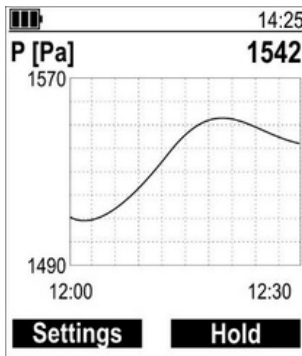
Parameters displayed in medium format.



Parameters displayed in medium format with indication of maximum (↗), average (↖) and minimum (↘) values for each parameter.



One parameter displayed in large format and the remaining in small format.



One parameter displayed numerically and graphically.

Up to 3 parameters can be displayed graphically, selectable in the **Chart setup** → **Channel select** menu. The left function key **Settings** is a shortcut to the **Chart setup** menu.

A graph for each of the chosen parameters is displayed. Use the **down/up arrow** keys to scroll through the various graphs.

To enable/disable the display of a parameter, change the units of measurement or the order in which parameters are displayed, see the Configuration chapter [p.14].

5.1 Hold function

The **Hold** function, which can be activated/deactivated by pressing the right function key, freezes the current measurement values on the display.

The function activation is highlighted by the **hld** symbol in the status bar of the display.

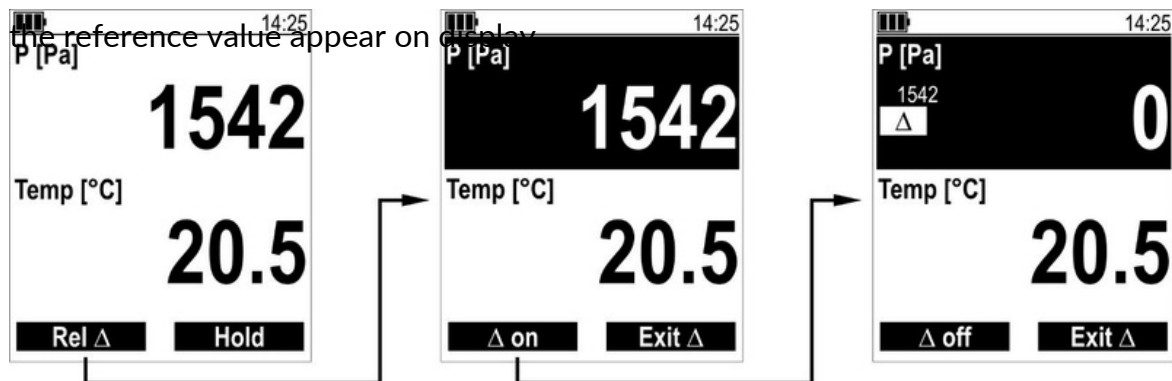
5.2 Rel function

The **Rel** function displays the relative measurement against a reference value, consisting of the measurement value at the time the function is activated.

To activate the relative measurement, press the left function key (**Rel Δ**), select with the **down/up arrow** keys the measurement for which the function should be activated (the measurement is highlighted in negative), then press the left function key (**Δ on**). The symbol **Δ**

Δ

and the reference value appear on display.



To disable the relative measurement, press the left function key (**Δ off**) again.

By pressing the right function key (**Exit Δ**), the instrument exits the relative measurementenable/disable (**Δ on/off**) mode.

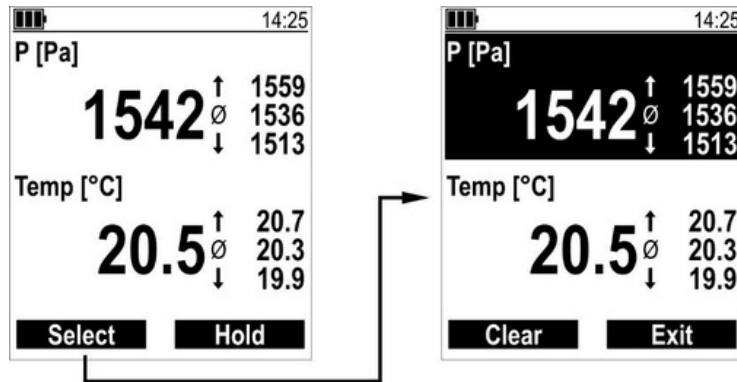
The **Rel Δ** command is not available:

- in the screen with the statistical values;
- in the screen with the graph;
- while logging.

5.3 Reset of the statistical values

To reset the statistical values, press the left function key (**Select**) in the measurement screen with the maximum/medium/minimum values, select with the **down/up arrow** keys the measurement whose statistical values should be reset (the selected measurement is highlighted in negative), then press the left function key (**Clear**).

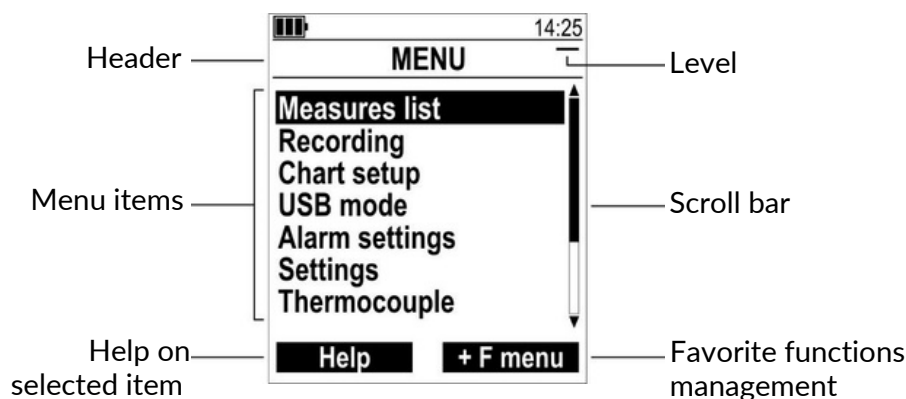
To exit the statistical values reset mode, press the right function key (**Exit**).



6 Configuration

Press the **MENU** key to enter the configuration menu.

The menu is structured in levels. The current level is indicated by the number of overlapping bars in the menu header:



Use the **down/up arrow** keys to select an item, press **OK** to confirm.

The presence of the scroll bar indicates that there are additional items available beyond those displayed.

The left function key (**Help**) provides a description of the selected item. If the help function is entered, press the left function key (**Help off**) again to exit.

The right function key (**+ F menu** or **- F menu**) adds or remove the selected item to or from the list of favorite functions [p.18].

! Attention!

It is not possible to access the menu if the instrument is logging.

6.1 Menu structure

The menu structure is shown below; each item is preceded by the level according to the bar symbology shown on the display.

MENU	DESCRIPTION
- Measures list	Selection of the quantities to display and log
- Recording	
= Start recording	Automatic logging start
= Set interval	Setting of logging interval: 1/2/5/10/15/30 s, 1/2/5/10/15/30 min, 1 h
= Mode	Setting of single recording mode
= Single recording	Manual storing of the current measurements (single sample)
- Chart setup	Setting of the measurement graphical display
= Channel select	Selection of parameters to be displayed graphically (up to 3 parameters, selectable from those enabled in the "Measures list" menu)
= Chart interval	Chart measurement interval: 1/2/5/10/15/30 s, 1/2/5/10 min
- USB mode	Configurable between COM interface (for logging and serial communication) or Mass storage (for viewing logging files from PC)

MENU	DESCRIPTION
- Alarm settings	Type of alarm signaling: Off, acoustical (buzzer) and/or optical (flashing backlight and red flashing status LED)
- Settings	Displaying of instrument info (model, S/N, FW revision, ...)
= Device info	Backlight configuration
= Backlight	Backlight duration: Off, 5 s, 30 s, 1 min, always On
≡ BL activation	Backlight intensity: Low, Medium, High
≡ BL intensity	Auto-off setting: Off, 30 min, 1/2/4/6/12 h
= Auto-off	Setting of date and time (yyyy-mm-dd hh:mm:ss)
= Date & time	UTC or CET time zone setting
= Time zone	Selection of the menu language
= Language	Protected mode configuration
= PIN configuration	Protected mode enabling/disabling
≡ Activate PIN code	Setting of access code
= Set PIN	Black background enabling/disabling
= Dark mode	Reset to factory settings
= Factory reset -	Temperature measurement settings
Thermocouple	Setting of the unit of measurement: °C, °F, K
= Measures units	Alarm thresholds enabling/disabling
= Alerting	Lower alarm threshold (alarm if measure < threshold)
= Min. alarm (*)	Upper alarm threshold (alarm if measure > threshold)
= Max. alarm (*)	Thresholds hysteresis
= Hysteresis (*)	Temperature measurement adjustment
= Correction	Offset adjustment
≡ Zero point	Slope adjustment
≡ Gradient	Setting of correction factor for contact probes
≡ Surface	Information on the probe
= Probe info	Pressure measurement settings
- Pressure sensor	Setting of the unit of measurement: Pa, hPa, kPa, bar, mbar, inHg, mmHg, inH ₂ O, mmH ₂ O
= Measures units	Alarm thresholds enabling/disabling
= Alerting	Lower alarm threshold (alarm if measure < threshold)
= Min. alarm (*)	Upper alarm threshold (alarm if measure > threshold)
= Max. alarm (*)	Thresholds hysteresis
= Hysteresis (*)	Pressure measurement adjustment
= Correction	Offset adjustment
≡ Zero point	Slope adjustment
≡ Gradient	Information on the sensor
= Probe info	Velocity measurement settings
- Velocity	Setting of the unit of measurement: m/s, km/h, mph, knot
= Measures units	Setting of barometric pressure for velocity calculation
= Air pressure	Coefficient of the pitot tube used
= Pitot coefficient	Alarm thresholds enabling/disabling
= Alerting	

MENU	DESCRIPTION
= Min. alarm ^(*)	Lower alarm threshold (alarm if measure < threshold)
= Max. alarm ^(*)	Upper alarm threshold (alarm if measure > threshold)
= Hysteresis ^(*)	Thresholds hysteresis
= Cross section	Duct cross-sectional area for flow rate calculation

(*) The item does not appear if "Alerting" is set to "Off"; to display the item, first select a measure/channel to associate the alarm with.

To go back up one level within the menu, press the  key. The **MENU** key allows exiting the menu directly and return to measurement mode from any level (except from parameter setting screens, from which you can exit only with ).

6.2 Configuring a parameter

Configuring a parameter may require choosing an option from those proposed, or setting a numerical value.

Configuring a parameter by choosing an option from those proposed:

The current setting is marked by the check mark. To change it, choose an option with the **down/up arrow** keys, then press **OK** to confirm.

Pressing the  key it is possible to exit by canceling changes not yet confirmed.



Configuring a parameter by setting a numerical value:

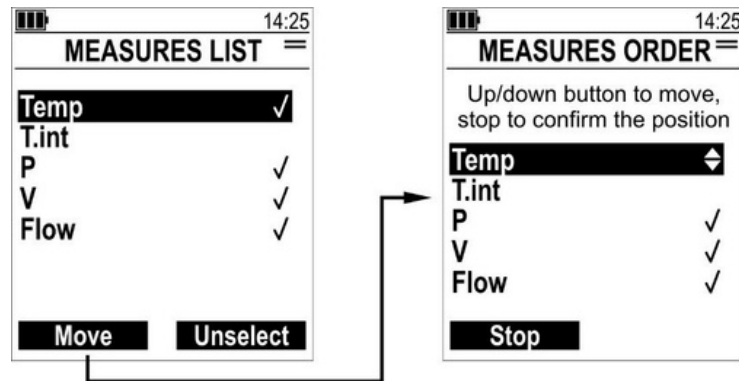
Select the various digits using the function keys (< >). To change a digit, use the **down/up arrow** keys. When finished, press **OK** to confirm the value.

Pressing the  key it is possible to exit by canceling changes not yet confirmed.



6.3 Selecting and sorting the quantities to be displayed

The **Measures list** menu item allows choosing which quantities to display and in which order.



Enabled quantities are marked by the check mark. To enable or disable a quantity, select it with the **down/up arrow** keys, then press the right function key (**Select** or **Unselect** depending on whether the quantity is disabled or enabled).

The quantities are displayed in the measurement screens in the order in which they appear in this menu. To change the position of a quantity, select it with the **down/up arrow** keys, press the left function key (**Move**), move the quantity with the **down/up arrow** keys, and press the left function key (**Stop**).

“T.int” indicates the cold junction temperature of the thermocouple channel.

6.4 Favorite functions (menu shortcuts)

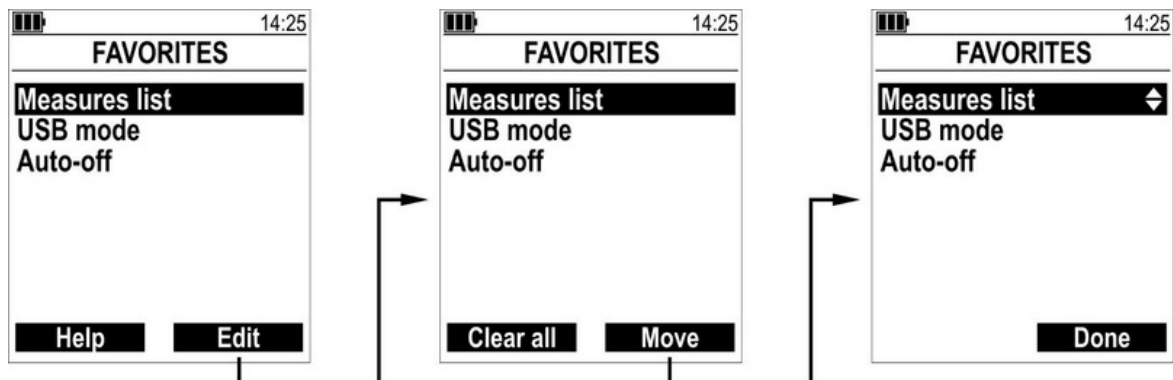
Frequently used menu items can be added to a list of favorite functions so that they are easily accessible without the need to navigate the menu structure.

To add a menu item to the list of favorite functions, select it in the menu and press the right function key (+ **F menu**). Items added to the list of favorite functions are marked with the symbol ★.



The favorite functions can be accessed from the measurement screens by pressing the **F** key. To execute a favorite function, select it with the **down/up arrow** keys, then press **OK** to confirm.

The list of the favorite functions can be edited by pressing the right function key (**Edit**).



The left function key (**Clear all**) deletes the entire list.

To change the position of a function, select it with the **down/up arrow** keys, press the right function key (**Move**), move the quantity with the **down/up arrow** keys, and press the right function key (**Done**).

Press the **?** key to exit from the function list editing mode.

To delete a single menu item from the list of favorite functions, select it in the menu and press the right function key (**- F menu**): the symbol ★ disappears.



Attention!

For security reasons, It is not possible to add the menu items “Activate PIN code”, “Set PIN”, and “Factory reset” to the list of favorite functions.

6.5 Protected mode

The configuration of the instrument can be protected with a numeric code (PIN) that is required to access the menu or send serial commands.

By default, the protected mode is disabled. To enable the protected mode, select **Settings** → **PIN configuration** → **Activate PIN code** → **Yes** and press **OK**. You are prompted to enter the PIN, which is **0** by default. Set the PIN, if different from the default, using the **down/up arrow** keys and function keys (**<** **>**), then press **OK**, the instrument returns to the setting screen with protected mode enabled.

The protected mode activation is highlighted by the **lc** symbol in the status bar of the display.

! Attention!

lck is not displayed if **co** is on, because the two symbols share the same position and **co** has priority over **lck**.

Upon exiting the menu after activating the protected mode, the mode is immediately active. If the menu is entered when the mode is already active (thus entering the access PIN), upon exiting the menu the PIN request to re-enter the menu is reactivated 2 minutes after the last key press (in the meantime, it is possible to re-enter the menu without entering the PIN), unless the 2 minutes without pressing keys have already elapsed within the menu, in which case the PIN request to re-enter the menu is reactivated immediately upon exiting the menu.

In protected mode, accessing the menu by entering the PIN does not automatically unlock serial communication, and sending the PIN via the appropriate serial command [p.24] does not automatically unlock menu access.

! Attention!

Menu items added to the list of favorite functions are not protected if accessed via the **F** key.

Changing the PIN:

The code can be set from 0 to 9999 (default = 0).

To change PIN, select **Settings** → **PIN configuration** → **Set PIN**, set PIN using **down/up arrow** keys and function keys (**<** **>**), then press **OK**, a message appears to remind you to activate protected mode, press **Help Off** to close the screen.

! Attention!

Changing the PIN automatically disables the protected mode if it is active. After changing the PIN, it is necessary to reactivate the protected mode again.

! Attention!

In the package of the instrument there is a sheet with a Master PIN, different for each instrument, which allows access to the protected features in case the user forgets the PIN after changing it.

If you lose your Master PIN sheet, you can request a copy by indicating the serial number of your device.

7 Measurement basics

7.1 Pressure measurement

The instrument internal pressure sensor detects the difference between the pressure applied to the "+" input and the pressure applied to the "-" input.

Before taking the measurement, check the need to perform zeroing by leaving the pressure inputs open (see next chapter for measurement adjustment).

By connecting only the "+" input and leaving the "-" input open, the pressure difference from the ambient pressure (relative pressure) can be measured.

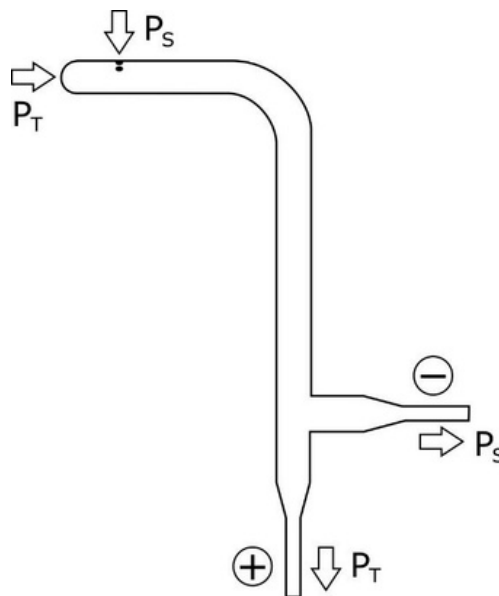
Caution!

- Do not exceed the maximum overpressure specified, the sensor may be damaged.
- The sensor is suitable for measurement in air and non-aggressive dry gases: do not use for measurement in corrosive gases.
- Avoid performing measurements in the presence of high-frequency sources, microwaves or strong magnetic fields.
- Connect the hoses to the instrument without forcing or bending the pressure ports.

7.2 Velocity measurement

By connecting a Pitot tube to the instrument, the velocity of an air flow can be measured.

The instrument calculates the velocity by measuring the dynamic pressure due to air flow, i.e., the difference between the pressure at the front inlet (total pressure P_T) and that detected by the side holes (pressure under static conditions P_s). Connect the Pitot tube to the instrument respecting the polarity shown in the figure below.



The upper segment of the tube should be kept parallel to the incident airflow.

Set the tube coefficient value in the **Velocity → Pitot coefficient** menu. The default value is 1.

If the Pitot tube is equipped with a K thermocouple temperature sensor, connect the sensor to the temperature input of the instrument. If the tube does not have a temperature sensor, a separate temperature probe can be used. If the temperature input is left open, the instrument

will use a standard default temperature for velocity calculation.

For best measurement accuracy, enter the barometric pressure value in the **Velocity → Air pressure** menu. By default, the instrument considers 1013 hPa as barometric pressure.

Attention!

If the measurement area is large or turbulence is present, the air velocity may vary from one point to another, or appear unstable. In these cases, for a more meaningful measurement it is advisable to consider the average of the measured values, possibly measuring at multiple points.

7.3 Flow rate measurement

If the Pitot tube is used to measure the air velocity in a duct, entering the value of the cross-sectional area of the duct in the **Velocity → Cross section** menu, the instrument provides the measurement of the airflow rate.

7.4 Temperature measurement

In the temperature probes, the sensor is located at the end of the probe.

Immersion or penetration measurement: immerse the probe stem for at least 60 mm; when measuring in liquids, stir the liquid if possible.

Attention!

The measurement may be inaccurate if the probe stem is not sufficiently immersed, due to heat loss from the metal stem.

Measurement in air/gases: immerse the stem as much as possible in the fluid to be measured. The response time is shorter in the presence of flow; in the absence of flow, you can speed up the measurement by moving the probe, if possible.

Attention!

The probe stem must be dry, otherwise a temperature lower than the actual temperature will be detected.

Measurement of solid materials by contact: the measuring surface should be flat and smooth; the probe should be perpendicular to the measuring plane. Probes with tip specially designed for contact measurements must be used. The ambient temperature and heat dissipation of the probe metal stem can affect the accuracy of the measurement.

Attention!

For a more accurate and faster contact measurement, interpose thermally conductive paste between the measuring surface and the probe tip.

Measurement on non-metallic surfaces takes longer because of the poor thermal conductivity.

7.5 General warnings on probes usage

Wait for thermal equilibrium between the sensitive part of the probe and the area to be measured before taking the measurement.

Thoroughly clean the probe after use.

Danger!

If the probe has a metal stem or other metal parts, be careful not to come into contact with live parts.

Caution!

- Do not expose the probe to corrosive gases or liquids!
- Do not expose the probe to temperatures exceeding the operating limit specified for the probe, the measuring sensor may be damaged.
- Avoid performing measurements in the presence of high-frequency sources, microwaves or strong magnetic fields.
- Connect the probe to the instrument without forcing or bending the connectors or contacts!
- Do not deform or drop the probe!
- Bending within moderate radius is only allowed for mineral insulated probes.

7.6 Warning on USB port isolation

The instrument USB port is not galvanically isolated, and its connection, either to the PC or to an external power supply that is not isolated from ground, may affect the measurement when using a probe that is in contact with the measured medium. Under such conditions, always check the measurement with and without USB connected: if a difference in the detected value is noticed, disconnect USB, or use an external suitable USB isolator (for example, DFRobot FIT0860) to detect reliable measurements.

8 Measurement adjustment

8.1 Pressure measurement

The measurement can be adjusted by setting the following parameters, available in the **Pressure sensor** → **Correction**:

- **Zero point:** adds an offset (P_{offs}) to the measurement.

$$\text{Displayed value} = \text{Measured value} + P_{\text{offs}}$$

- **Gradient:** applies a percentage correction ($C_{\text{slope}}\%$) to the measurement. Zero indicates no correction.

$$\text{Displayed value} = (\text{Measured value} + P_{\text{offs}}) * (1 + C_{\text{slope}}\% / 100)$$

If a measurement correction is applied by setting a value other than zero for the "Zero point" and/or "Gradient" parameters, the **cor** symbol appears on the display.

8.2 Temperature measurement

The measurement can be adjusted by setting the following parameters, available in the **Thermocouple** → **Correction** menu:

- **Zero point:** adds an offset (t_{offs}) to the measurement.

$$\text{Displayed value} = \text{Measured value} + t_{\text{offs}}$$

- **Gradient:** applies a percentage correction ($C_{\text{slope}}\%$) to the measurement. Zero indicates no correction.

$$\text{Displayed value} = (\text{Measured value} + t_{\text{offs}}) * (1 + C_{\text{slope}}\% / 100)$$

- **Surface:** correction used for contact measurements. Applies a correction factor ($C_{\Delta t}$) to take into account the difference between the measured value and the ambient temperature (T_{CJ} , instrument cold junction). The value 1 indicates no correction.

$$\text{Displayed value} = T_{\text{CJ}} + (\text{Measured value} - T_{\text{CJ}}) * C_{\Delta t}$$

The "Surface" factor can be used to correct the contact measurement of high temperature bodies, so as to compensate for the heat loss due to the lower ambient temperature.

If a measurement correction is applied by setting a value other than zero for the "Zero point" and/or "Gradient" parameters, the **cor** symbol appears on the display.

9 Logging

The logging function stores in the memory of the instrument the detected measurements, along with the date and time of each sample. Data recording can be automatic, according to the set interval, or single (manual).

! Attention!

- To use the logging function, the **USB mode** menu item must be set to **COM interface**.
- The Logging function records only the quantities enabled in the measurement screens. Before starting logging, make sure that all quantities of interest are enabled.

9.1 Automatic logging

The automatic logging data are stored in **CSV** format.

To start automatic logging, select the **Start recording** item from the **Recording** menu.

By selecting "Start recording," the instrument automatically exits the menu. It is not possible to access the menu during logging.

The logging activation is highlighted by the **rec** symbol in the status bar of the display. During logging, the status LED briefly flashes green every 5 seconds.

With logging active, in the measurement screens the left function key assumes the function of **Stop** logging.

During logging, the instrument auto-off is disabled.

9.2 Single recording

The single recordings data are stored in a single file in **JSON** format (history.json). The new recordings are added to existing recordings, which are not deleted.

Three modes are available for single recording, which can be selected in the **Recording → Mode** menu:

- **Standard**
- **Multiselect**
- **On hold**

Standard mode:

To make a single recording, select the **Single recording** item of the **Recording** menu, then select with the **down/up arrow** keys one of the available labels (Location xx) and press **OK** to confirm and save the measurement data.

During data saving, the **rec** symbol lights up in the status bar of the display.

The selected label is marked with the check mark. The label associated with the recording is useful for distinguishing the various recordings in the data file, which is unique for all single recordings. The label may, for example, represent the location where the recording takes place; recordings made in different locations may be associated with different labels. There are 20 distinct labels available (Location 1...20).

Multiselect mode:

Operation is similar to standard mode, except that the check mark always remains visible next to all labels that are selected (in standard mode only the last label selected is marked with the check mark).

The left function key **Clear**, which appears on the label list screen, removes all checkmarks from the list (but does not clear the data). The function key appears only if there is at least one check mark.

On hold mode:

Operation is similar to the standard mode, with the added option of directly accessing the label list when the Hold function key, which becomes **Hold/rec**, is pressed.

If, after pressing the **Hold/rec** function key, a label is selected and **OK** is pressed, the data is saved and the instrument returns to measurement mode, exiting the Hold function. If instead **OK** is not pressed to save the data, but the menu is exited to return to measurement mode, the instrument remains in Hold.

Changing the labels name:

The label names can be customized with the following serial command:

updateLocation: n, name

where n is the label index (1...20). The name has a maximum length of 16 characters.

9.3 Viewing the logged data

The instrument can be connected to the PC via a standard USB-C cable. The instrument is viewed by the PC as a mass storage device containing the various data files.

**Attention!**

With the instrument turned on, to view the device disk drive, logging must be off and the **USB mode** menu item must be set to **Mass storage**.

Regardless of the USB mode setting, the instrument disk drive is always visible when the instrument is turned off, if it is connected to a PC and protected mode is not enabled [p.19].

The **ProXware** application software can be used to read the CSV files.

JSON files can be imported into Microsoft Excel[®] (Data → Get data → From file → From JSON menu). See the Microsoft Excel[®] help for details on the data import procedure.

9.4 Deleting the logged data

The log files can be erased from the PC using a file manager.

10 Serial communication

Serial commands can be sent to the instrument, to read the instrument information and the measurements.

To send serial commands to the instrument, the **USB mode** menu item must be set to **COM interface**.

In the serial communication software used ⁽¹⁾, the PC COM port number to which the instrument is connected has to be set.

Recommended communication parameters:

- Baud rate = 115200
- Data bits = 8
- Stop bits = 1
- Parity = None

The full list of commands supported by the model, with their description, is obtained by sending the following command:

GetCommandList: 0<CR><LF>

<CR> = Carriage Return

<LF> = Line Feed

Between the characters ":" and "0" of the command there is a space.

All command strings sent to the instrument must be terminated by the <CR><LF> control characters.

Serial communication in protected mode:

If the protected mode is active [p.19], the following command must be sent to activate serial communication:

setPINCode: nnnn

where nnnn is the PIN.

The default PIN is **0000**. The PIN must always be written with 4 digits (e.g., 0023 for 23).

After the PIN is sent, the serial communication is locked again if the instrument does not receive serial commands for 2 minutes.



Attention!

In the package of the instrument there is a sheet with a Master PIN, different for each instrument, which allows access to the protected features in case the user forgets the PIN after changing it.

If you lose your Master PIN sheet, you can request a copy by indicating the serial number of your device.

¹ Any standard serial communication software, e.g., "HTerm", can be used.

11 Battery management

If the external power supply is not connected, the battery symbol on the display indicates the battery charge level.

If the battery charge is insufficient to ensure a correct measurement, the instrument turns off. The data remains stored even with low batteries.

In case of discharged batteries it is necessary to replace the batteries: unscrew the battery cover fixing screw and remove the cover, take out the exhausted batteries and insert 4 new AA size alkaline batteries [p.9], then screw the cover back on.



Attention!

If you plan to use the instrument on battery power alone, make sure the charge is sufficient to complete the measurements.

Tips:

To increase the battery autonomy, it is possible to reduce the brightness of the backlight and/or enable the instrument auto-off (see Configuration chapter [p.14]).



Danger!

- **Do not short-circuit the batteries, they may explode with serious risk to people!**
- Do not expose the batteries to high temperature!
- Do not throw the batteries into fire!



Caution!

Disposal: Dispose the exhausted batteries in the appropriate bins or deliver them to authorized collection centers. Comply with current regulations.

12 Maintenance

It is recommended to perform a calibration check of the instrument annually at accredited laboratories.

12.1 Cleaning

Do not use aggressive cleaning agents or incompatible with the materials indicated in the technical specifications. For cleaning, use a soft dry cloth or slightly dampened with clean water.

12.2 Storage

It is advisable to remove the batteries if the product is stored for a long time.



Caution!

Do not store the product where:

- Humidity is high.
- The product is exposed to direct sunlight.
- The product is exposed to a source of high temperature.
- There are strong vibrations.
- There is vapor, salt and/or corrosive gas.

12.3 Disposal



Electrical and electronic equipment marked with specific symbol in compliance with 2012/19/EU Directive must be disposed of separately from household waste. European users can hand them over to the dealer or to the manufacturer when purchasing a new electrical and electronic equipment, or to a WEEE collection point designated by local authorities. Illegal disposal is punished by law.

Disposing of electrical and electronic equipment separately from normal waste helps to preserve natural resources and allows materials to be recycled in an environmentally friendly way without risks to human health.

13 Technical specifications

Measurement specifications

Measuring range	Pressure	± 20.00 hPa
	Temperature	$-220.0 \dots +1372.0$ °C
Resolution	Pressure	0.01 hPa
	Temperature	0.1 °C
Accuracy	Pressure	± 0.15 %FSS ^(*) ± 1 digit typ. @ 25 °C ± 1.5 %FSS ± 1 digit max.
	Temperature	$\pm (0.2$ °C + 0.2% of measured value) ± 1 digit Cold junction: ± 0.3 °C
Measurement rate		4 meas./s
Overpressure limit	Pressure	± 100 hPa
temperature drift (ref. 25 °C)		± 0.002 %FSS/K typ.
Long-term drift	Pressure	± 1 %FSS/year max.
	Temperature	± 0.1 °C/year
Compatible media		Air and non-aggressive dry gases
Thermocouple cable length		<30 m

(*) FSS = 2 x full scale pressure

General specifications

Input channels	Pressure	1 differential 2 x universal barbed pressure ports (+/-) for 4 and 6 mm inner diameter hose Interchangeable G 1/8 thread connections
	Temperature	1 miniature female flat-pin TC connector
Storage capacity		Up to 1 million data sets, file system based. Each data set includes measurements of all channels and date/time stamp.
Logging type		Automatic with manual start/stop or manual single recording
Logging interval		1, 2, 5, 10, 15, 30 s / 1, 2, 5, 10, 15, 30 min / 1 h
Clock		User settable RTC Max. drift 1 min/month @ 25 °C
Display		140 x 160 dot matrix backlit LCD Visible area 42 x 50 mm
User interface		Multilingual (en, de, it, fr, es)
PC connection		USB-C, Mass Storage Device

Power supply	4 x AA alkaline batteries External 5 Vdc via USB C
Power consumption	20 mA typ.
Battery autonomy	> 150 h typ. continuous operation (backlight off)
Auto power off	Yes, user configurable
Operating conditions	-5...50 °C / 0...85 %RH non-condensing
Storage temperature	-25...65 °C (without batteries)
Protection degree	IP 67 (except pressure ports and Tc K input) IK 06
Dimensions	178 x 80 x 38 mm
Weight	350 g approx.
Housing material	ABS, TPE (side protection), Polyester (front panel)

14 Attachable probes and accessories

For the available thermocouple temperature probes, please visit Senseca website.

- Pitot-T-T0-300** Pitot tube, Stainless steel, nominal length 300 mm, Ø measuring tip Ø 3 mm, Ø shaft Ø 3 mm, max. 600 °C.
Scope of delivery: Incl. hose set, 2 x GDZ-01 1.5 m.
Art. No. 604150
- Pitot-T-T2-400** Pitot tube, Stainless steel, nominal length 400 mm, Ø measuring tip Ø 5 mm, Ø shaft Ø 8 mm, max. 600 °C.
Scope of delivery: Incl. hose set, 2 x silicone 1.5 m, ext. Ø6 mm / int. Ø4 mm, textile bag.
Art. No. 487876

Spare and optional pressure ports:

GDZ-UT



Universal barbed pressure port for 4 and 6 mm inner diameter hose.

Art. No. 479260

Spare part – Included in the scope of supply

GDZ-QC6



Quick coupling pressure port for 4 mm inner diameter hose.

Art. No. 479261

GDZ-MCF



2.7 mm nominal diameter mini female quick coupling for 4 mm inner diameter hose.

Art. No. 480221

GDZ-MCM



2.7 mm nominal diameter mini male quick coupling for 4 mm inner diameter hose.

Art. No. 479467

Other accessories:

GDZ-31-02



PVC hose 8/5 (8 mm outer Ø, 5 mm inner Ø).

Max. 2 bar at 23 °C. Max. 200 °C.

Art. No. 480659

CASE PRO-400



Case for PRO Line.

Recess for one instrument, space for accessories, carrying handle, zipper.

Dimensions: 415 x 245 x 70 mm (W x H x D).

Art. No. 486900

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