
HP RHT SENSOR

USER MANUAL



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User manual of HP RHT sensor



General

Description

Sensor is used for structural relative humidity and temperature measurements. It is especially designed to be used together with compatible sleeve and gaskets for long term moisture monitoring in concrete using the borehole method. The sleeve and gaskets are recommended for measurement depths from 20 mm to 70 mm.

Handling and storing

Handle with care as the device contains sensitive measurement electronics.

Store in normal room conditions away from the light and chemicals and their fumes. Avoid very dry (<20 %RH) and moist (>80 %RH) conditions to keep the sensor drift at minimum.

Keep the sensor clean of dirt and dust for optimal performance. Use compressed air with low pressure levels or moist lint-free cloth. Do not use solvents for cleaning.

Borehole measurement

Measurement prerequisites and planning

Measurement conditions

- Relative humidity is strongly dependent on temperature. For best measurement reliability, following conditions should be met:
 - Slab's temperature should be stable and close to its intended final temperature.
 - Temperature difference between the slab and ambient air should be minimal. Difference of greater than two degrees may already cause a notable error in measurement result.
 - When measurement probe is installed in borehole, its temperature should be close to the slab's temperature. If the probe is notably colder than the slab, measurement might be ruined due to condensation of the humid air in the borehole.

Choosing structural measurement locations and depths

- Depends on target of the measurement; investigation due to moisture or water damage, drying monitoring, flooring permission
- Normally drying new casts:
 - Prior to flooring, the moisture levels should be measured on at least one location per each cast and per each different structure. Areas with different flooring materials and different drying conditions should be also considered, as they may increase the need for measurements.
 - Avoid placing meters in locations with strong changes in temperature, as this may degrade the reliability of the measurement.
 - For energy efficiency, moisture monitoring is needed in areas where dryers are used to accelerate drying. In such areas meters should be placed and measurements timed so, that the heat from the dryers has minimal effect on the measurement results.
 - Slab's theoretical drying profile is used to determine the measurement depth, where the relative humidity corresponds to the humidity level that will be equilibrated under the flooring after the covering or coating prevents further drying. Generally:
 - 40% of the slabs thickness, if the slab is drying in one direction
 - 20% of the slabs thickness, if the slab is drying in two directions
 - Additional measurement depths may be used to ensure that the slab's moisture profile is as expected. Especially the moisture in the top part of the slab should be measured to comply with the requirements prior to flooring.
 - The general rule of measurement depth may not apply if the structure is layered or very thick, or if the slabs has got wet once the drying has started
- Old concrete structures and wetted new casts
 - In the case of moisture or water damage, measurement locations are first chosen to determine the affected area and structures. Afterwards the locations may need to be changed, as measurements are used to ensure efficient drying.

- In areas where dryers are used to accelerate drying, meters should be placed and measurements timed so, that the heat from the dryers has minimal effect on the measurement results.
- The slab's moisture profile usually needs to be measured before appropriate depths for monitoring can be determined. Suitable measurement depths are specific to the structure and situation.

Drilling

- Drill the measurement hole to planned depth using 16 mm masonry drill.
- Clean dust from the borehole using a vacuum cleaner with suitable nozzle.

Installing the sleeve

- Fit the rubber gasket into the lower end of the measurement sleeve.
- Insert the sleeve with gasket into the borehole (see picture 1) and press it all the way down tightly against the bottom. Use a rubber hammer if necessary.



Picture 1

- Use vacuum cleaner with suitable nozzle again to remove dust from the bottom of the sleeved hole.

- Fit other rubber gasket into the top end of the sleeve (see picture 2).



Picture 2

- Use non-hygroscopic putty to seal the sleeve against the concrete surface.

Installing the sensor

- Before installing the sensor, ensure that its temperature has stabilized near the temperature of the concrete. Colder sensor may cause condensation inside borehole and thus decrease the reliability of the measurement.
- Insert the sensor into the sleeve and press it all the way down against the bottom of the hole.

- When correctly positioned, the sensor sits firmly inside both gaskets and only 2 cm of the gray body is visible (see picture 3).



Picture 3

Removing the sensor

- If the sensor is to be replaced, pull the sensor out of the sleeve by holding it from the gray body part. Do not pull from the cable or from the bend relief.
- If the whole setup is to be disassembled, pull the sleeve out of the borehole first and then pull the sensor out of the sleeve. Use long nose pliers to pull the gasket out of the borehole, if necessary.

Calibration of HP RHT sensors with SuperVision® 2.0

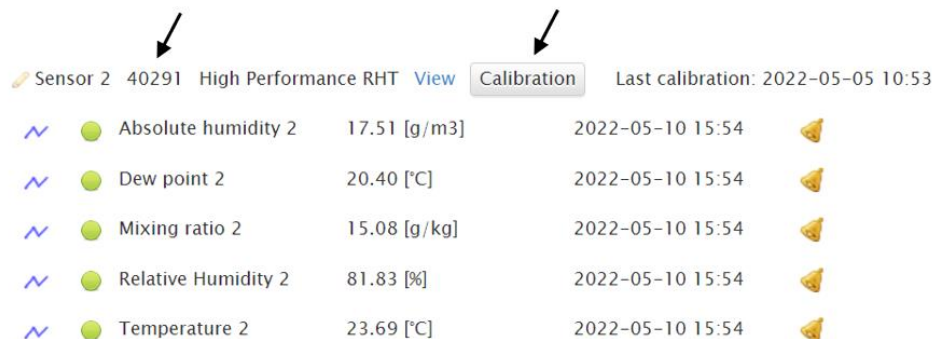
The High Performance RHT sensors intended for measurements of humidity and temperature in concrete can be calibrated without any external devices or equipment other than that used to put the sensor itself in a controlled environment such as bottles with saturated salt solutions. The calibrations made are stored with the sensor identities, their serial numbers, and will thus be applied to all the data the given sensor is providing, regardless of with what Gateway or Sensor Node it is used. The serial number of the HP RHT sensor is printed on its label positioned close to the connector end of its cable.

The calibration implemented with SuperVision® 2.0 is a two-point calibration that for suitable separation must be selected so that the lower point applied is in the range 20 – 50%RH and the upper in the 75 to 90%RH range. In terms of commonly used salt solutions and their respective RH levels this means that the lower point is either 23%, 33% or 43%RH and the upper point either 75% or 85%RH depending on what salt solutions are available in suitable packaging. The acceptable temperature range is 18 to 24 degrees Celsius, allowing calibration to be performed in normal indoors environments, office or workshop. To perform a calibration, the user must have a project admin, unit admin or company admin user account.

The calibration features of the SuperVision® 2.0 are available within the standard project view so, beyond subjecting the sensors to be calibrated to known and stable environments, there are no other measures to take other than to connect and to start up the system in the same manner as for normal use. The procedure can be described as follows:

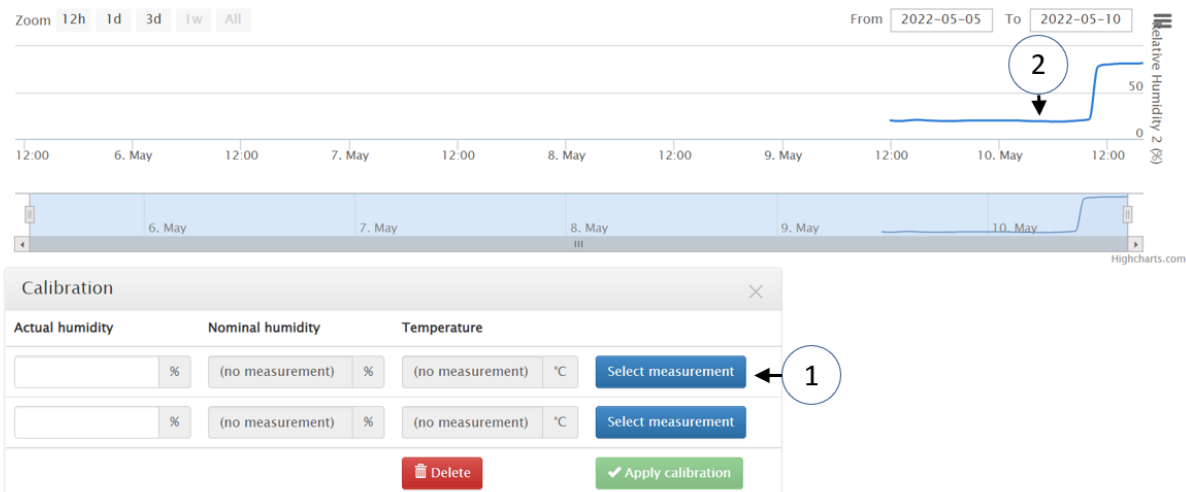
1. Connect the sensor(s) to be calibrated to a sensor node and power up the Gateway and verify that the system is up and running and online. Put the sensors in controlled environment, calibration bottle or similar, and allow them the time required for the climate to stabilize. The time required is mainly governed by the calibration equipment used but will for bottle type equipment be likely to be in the range of 8 to 12 hours. The sensor nodes will automatically send measurements once every hour and additional reports are easy to trigger by use of the push buttons.
2. When required time has passed, go online and verify, using the Project View for the given project, that the sensor(s) have stabilized in their environment and thus that successive measurement report show no significant changes in RH value. Again, the push buttons of the sensor nodes can be used to trigger additional data points. Remember however that to see these new measurements presented in the graph, one needs to refresh the view with the browser used to have new data downloaded from the server.

- When satisfied that correct data is collected and available for the given calibration point, push the Calibration button found with the sensor in the expanded Project view to have the calibration functions presented. Note that the sensor serial number is given on the same row, to the left, for easy identification.



	Sensor 2	40291	High Performance RHT	View	Calibration	Last calibration: 2022-05-05 10:53
		Absolute humidity 2	17.51 [g/m3]		2022-05-10 15:54	
		Dew point 2	20.40 [°C]		2022-05-10 15:54	
		Mixing ratio 2	15.08 [g/kg]		2022-05-10 15:54	
		Relative Humidity 2	81.83 [%]		2022-05-10 15:54	
		Temperature 2	23.69 [°C]		2022-05-10 15:54	

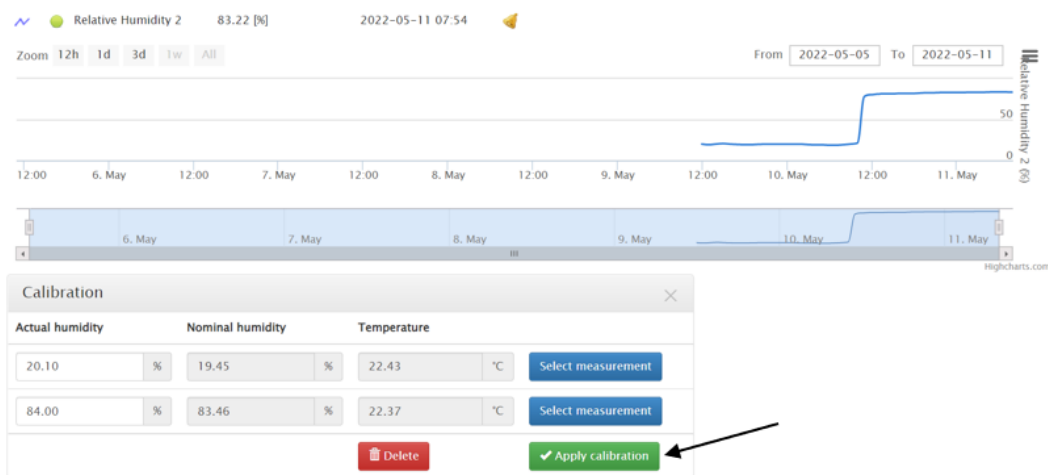
- In the calibration window below the RH graph, depicted below, push Select Measurement (1) and then proceed to select the representative, suitable measurement point in the graph (2). Hovering over the graph, the different data points are presented with their respective time stamps, a feature that comes in handy when locating the point to be used.



- Now that selected data point is presented in the first row of the calibration view, read the temperature and from the data sheet of the calibration equipment/relevant salt solution, calculate the correct actual RH value and enter that in the data field for Reference humidity. Use decimal point, not decimal comma.

Entered data is automatically stored and will be presented next time the project view is visited, provided the project in question is still open.

6. Continue the process by moving the sensors to the new environment and let them stabilize.
7. When relevant data points are available for the second level, enter the same project view and repeat the process under 4 and 5, see previous page. Once the two points are selected and their respective actual relative humidity levels entered, save and apply the calibration by pushing the Apply calibration button on the lower right corner of the calibration view. Doing so will present a confirmation window where optional data can be entered such as the inventory number of the calibration equipment used or other relevant information relating the inhouse calibration methods or processes.



Apply calibration

Current calibration parameters will be applied to all new incoming RH values. Current calibration will be overwritten. This operation cannot be undone.

















Optional information to Calibration log

Calibration chamber 112A

Cancel Proceed

If the entered values, the calculated Reference RH values deviate more than 5%RH from the raw data provided by the sensor itself, the user is presented with a warning saying that the user should verify the measurements made and if these are correct, the sensor could be contaminated. It is but a warning in that the user can still proceed but should do so only with caution as the sensor might no longer be reliable. Similarly, if the temperatures with the selected data points are not within the range of 18 to 26 degrees Celsius, the user will be alerted through a warning.

Once a sensor has been calibrated, the date and time of this calibration is presented in the project view with the given sensor as depicted below.

	Sensor 2	40291	High Performance RHT	View	Calibration	Last calibration: 2022-05-05 10:53
		Absolute humidity 2	17.82 [g/m3]		2022-05-11 10:54	
		Dew point 2	20.69 [°C]		2022-05-11 10:54	
		Mixing ratio 2	15.36 [g/kg]		2022-05-11 10:54	
		Relative Humidity 2	82.67 [%]		2022-05-11 10:54	
		Temperature 2	23.82 [°C]		2022-05-11 10:54	

In addition, to check on calibration history or to do an inventory, in the Devices menu the High performance RHT sensors are easily filtered out. With each sensor, any existing calibration history is available through the down arrow button at the far right. Pushing that button, Calibrations will be presented as the first option and that presents a pop-up overview of all the calibrations made including date and time, the user who made it, the projects in which they were made as well as any additional, optional information entered.

Device	Alias	Type	Company	Business unit	System	Last contact	Description	Active	Last calibration	Actions
HP-RHT-40291-837		high perf								
HP-RHT-40291-837		High Performance RHT	Corroventa	Bu1	SYS-049162FAAFF9-370	2022-05-11 12:54			2022-05-05 10:53	<div> Edit Calibrations Delete </div>

Showing 1 to 1 of 1 rows

Calibration history			
Time finished	Initiated by user	Project	Comments
2022-05-05 10:53	Marcus	PROJ-1094	<div> Calibration notes Bottle 134B </div>
Close			

Technical data

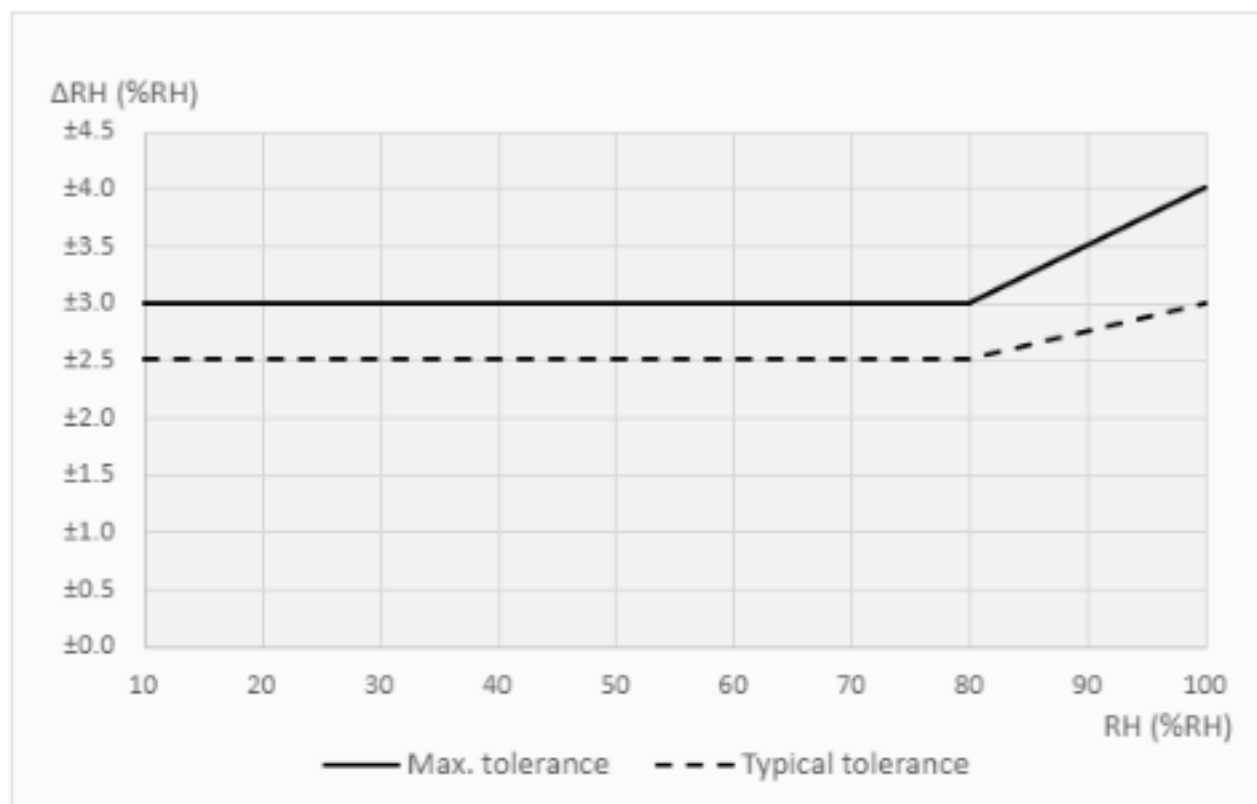
Humidity measurement

Measurement range ⁽¹⁾	10 ... 100 %RH
Measuring accuracy ⁽²⁾ (see picture 1)	±2.5%RH (10 ... 80%RH)
Repeatability ⁽³⁾	±0.2%RH
Hysteresis	< ±1%RH
Resolution	0.1%RH
Linearity error	< ±1%RH
Response time (T10-90%)	< 20s
Long-term drift	< 0.5%RH/a
Sensor type	Capacitive polymer

(1) Max dew point has been limited to 80°C.

(2) Accuracy has been tested 23°C towards the rising relative humidity. Linearity error and hysteresis has not been taken into account in the accuracy.

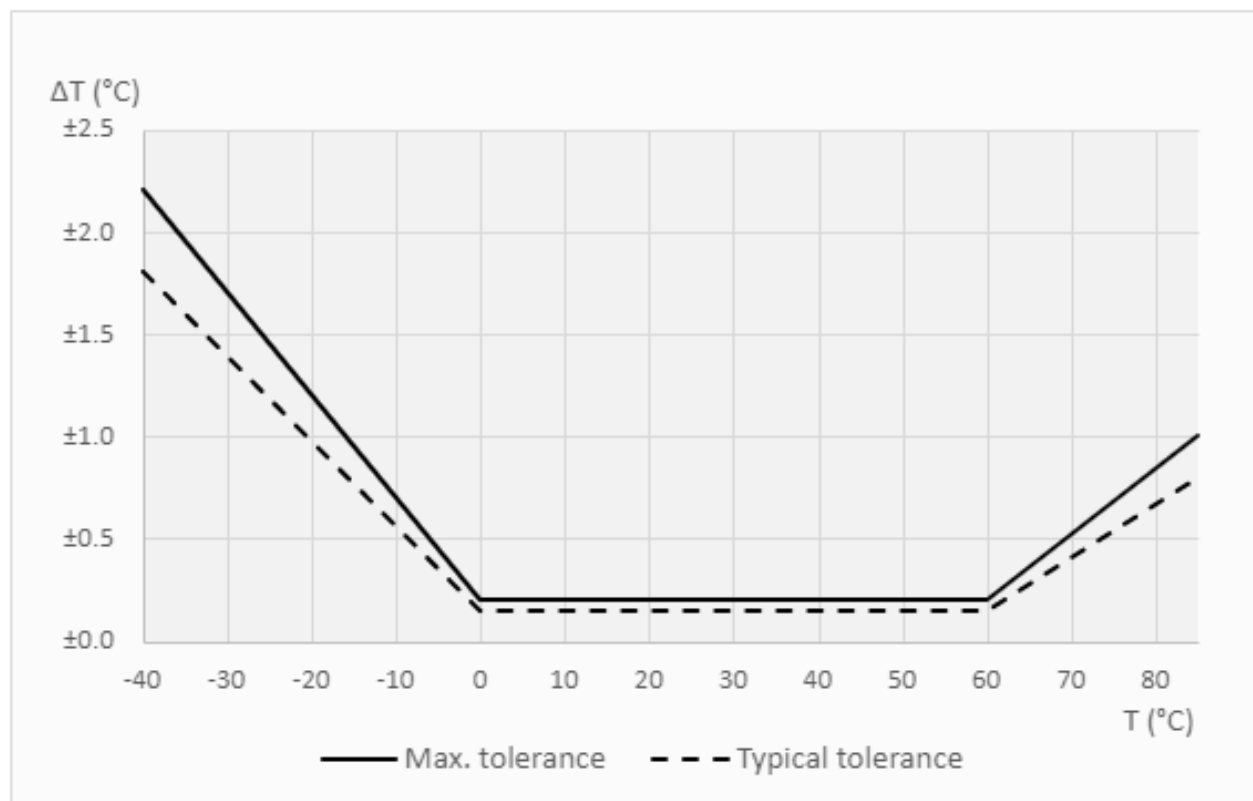
(3) Repeatability has been measured in the same direction and does not take hysteresis into account.



Picture 1

Temperature measurement

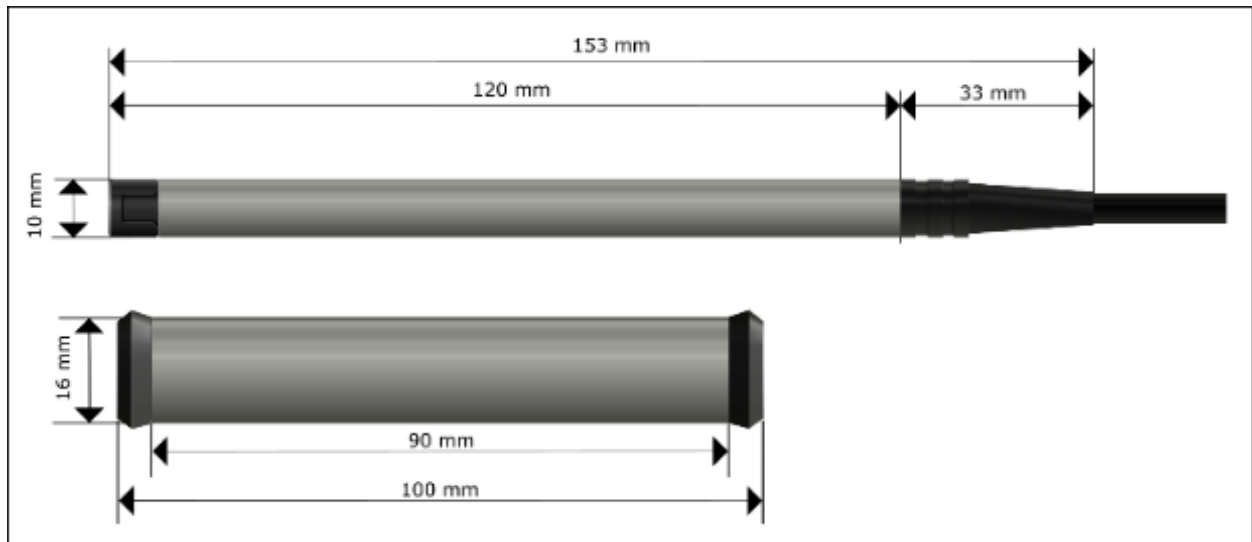
Measurement range	-40 ... 85°C
Measuring (see picture 2)	$\pm 0.2^\circ\text{C}$ (0... 60°C)
Repeatability	$\pm 0.1^\circ\text{C}$
Resolution	0.1°C
Response time (T10-90%)	< 10min
Long-term drift	< 0.05°C/a
Sensor type	PTAT



Picture 2

Mechanical properties

External dimensions	See picture 3
Cable length	200 cm
Weight	85 g
IP rating	IP 57



Picture 3

Use and storage

Operating temperature range	-40 ... 85°C
Storage conditions	20 ... 30°C / 40 ... 60%RH

Must be kept away from sun light, dust, and chemicals and their vapours.



DO YOU HAVE QUESTIONS OR NEED HELP?

*Visit www.corroventa.com or call us to speak with an expert.
We have the knowledge and the equipment to find a solution as efficiently as possible.*

Corroventa develops, manufactures, sells and rents high quality products for dealing with water damage, moisture, odours and radon. We are one of the market leaders and specialists in innovation within the industry. Our products are compact, effective, ergonomic and energy efficient. In emergency situations and during flooding, Corroventa's customers have access to one of the largest rental parks in Europe. All our products are manufactured in Bankeryd, Sweden.

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