

CAEL-HH Humidity and Temperature Transmitter

With heater for high humidity environment



Features

- Heating for avoid condensed
- 0 ... 100%RH measurement,
- Temperature range up to +120°C
- Probe pressure up to 10 bar
- IP-65 housing
- 1-point user adjustment
- Analog output and RS485
- MODBUS RTU protocol
- Alarm output
- Dip switch for temperature range
- Configure adapter support

Applications

- High humidity environment
- Greenhouse, storage room, cooling chamber
- Agriculture, farms
- Pharmaceutical industry, paper industry
- Environmental chambers, spraying equipment
- Building Automation
- Environment and ventilation control

SERIAL's newest CAEL-HH series temperature and humidity transmitter meets the high humidity environmental requirements for temperature and humidity measurement. Via temperature and relative humidity values, the output can be calculated dew point temperature, absolute humidity, wet bulb temperature, the specific enthalpy and other parameters of humidity.

On the sensor board with a heater which for heating to avoid condense. Up to 95%RH at 25°C, a slight temperature change -0.9 °C will caused condense on sensor board. This would affect the measurement accuracy. The heat will remove the dew on the sensor board as well, that minimums the errors on the measurement accuracy.

There are two mode for heater, which were R-HEAT and I-HEAT.

R-HEAT regularly heat the sensor board when meet the two conditions. One is the heating cycle time which can be set range from 1 to 24 hours. Another is the heating threshold which can be set range from 60% to 99%RH. When heating cycle times up and the environment humidity higher then the heating threshold, this would trigger the R-HEAT conditions then the heating process would be started.

I-HEAT intelligently heat the sensor board when condensed occur by self check. Every hour I-HEAT will check internal parameter such as original humidity value, humidity stability, temperature stability and temperature humidity dependency, etc., combine these information to detect if sensor board was condensed.

When the heating process begin, the heater turns on 30 seconds and the sensor board temperature will be raised about 20°C then turns off the heater. While temperature raise, the dew on the sensor board will be removed and the humidity goes to lower then the environment. At this time, the output will be keep at last value constant about 10 minutes.

LCD display will show "HEAT" to indicate the heating process. The parameter of R-HEAT "Heating cycle time" and "Heating threshold" can be set by LCD operation. I-HEAT function can be turn on/off by LCD operation.

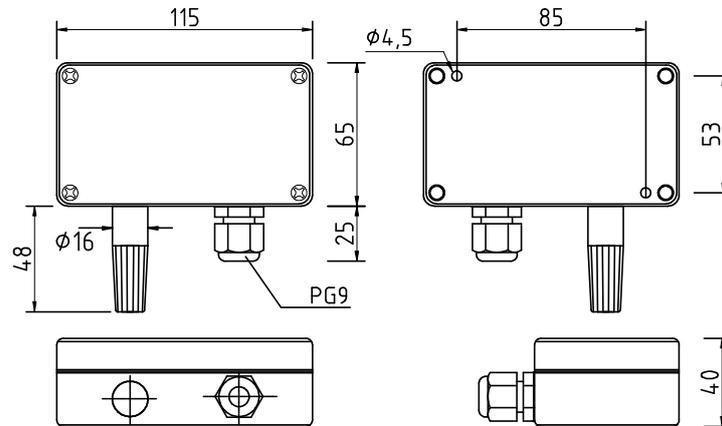
CAEL-HH series Temperature and Humidity transmitter supported wall mount type, duct type and remote probe type. Metal probe provides a high temperature, mechanical stress, pressure and withstand harsh environments generated by the fine waterproof housing can avoid environmental contamination and prevent condensation generated.

Parameter values measured through the two analog output channels, the output may be a current or voltage output. You can simply establish a network by RS485 connection to achieve remote monitoring and data logging, measurement data through the storage device for analysis and processing.

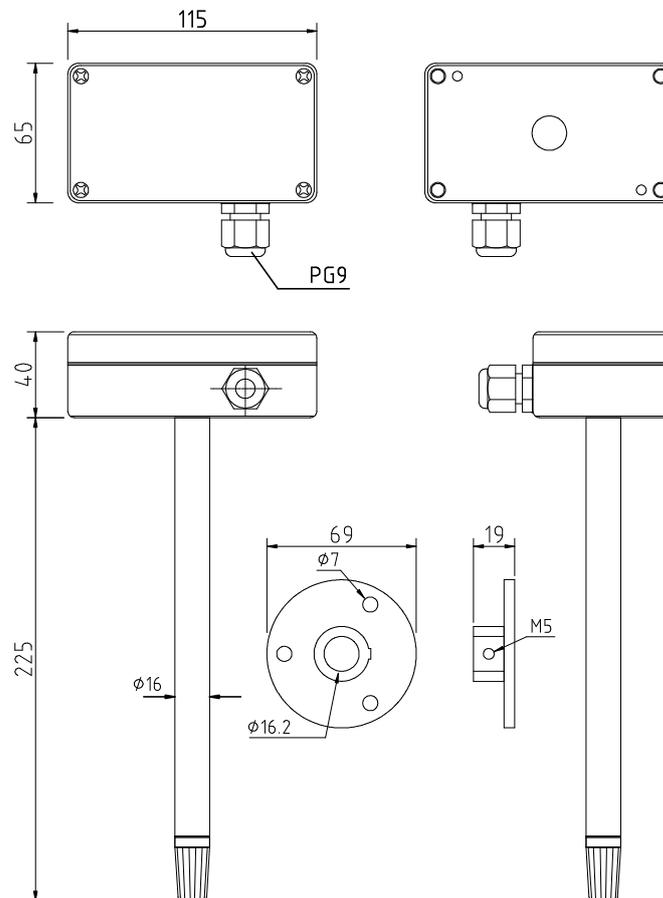
LCD monitor would displays three measurement parameters at the same time, or the font is enlarged for single display to provide different visual needs. Touch buttons without having to open the housing can be set a one point adjustment for temperature and humidity, output selection, range setting, adjustment parameters, and do not carry the computer in the environment field will be able to complete the setup work.

Dimensions (mm)

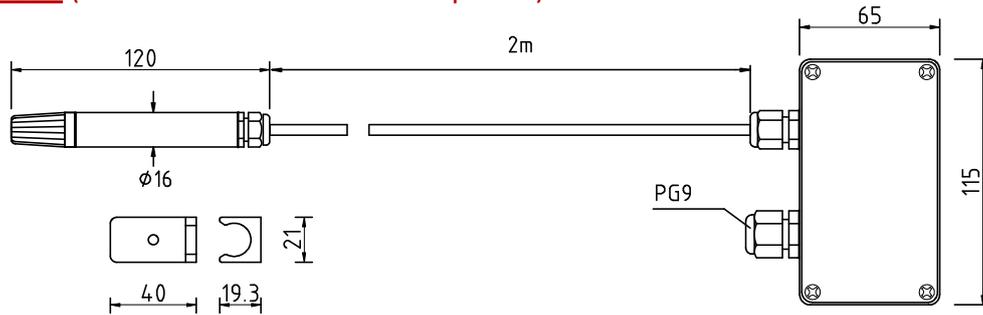
110 Wall mount version (Probe material: ABS)



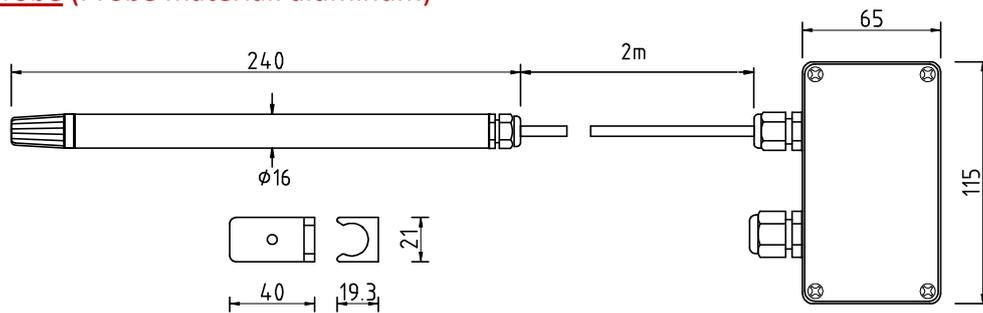
120 Duct version (Probe material: aluminum)



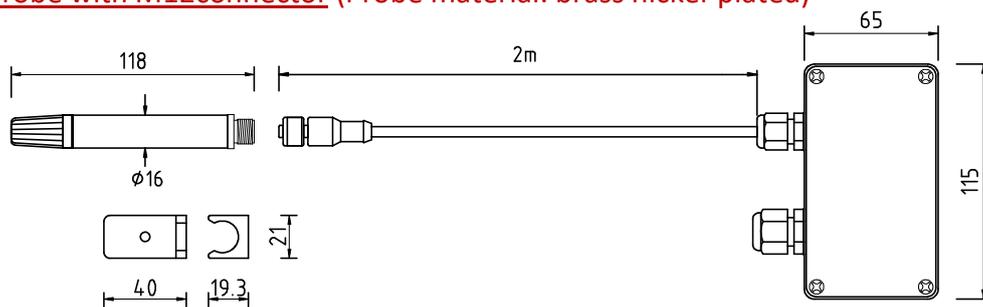
130 Remote probe (Probe material: brass nickel-plated)



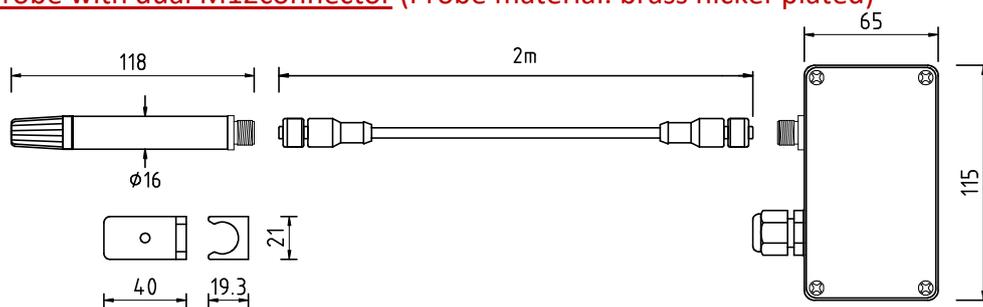
131 Remote probe (Probe material: aluminum)



135 Remote probe with M12connector (Probe material: brass nickel-plated)



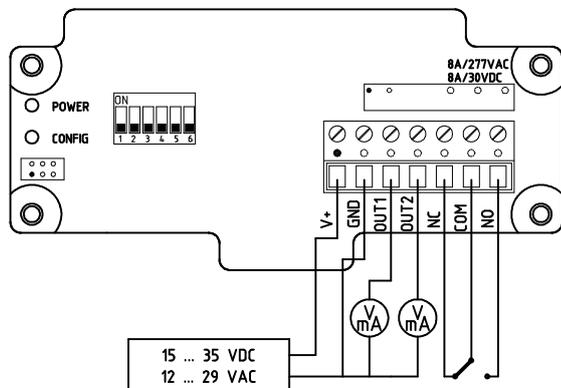
136 Remote probe with dual M12connector (Probe material: brass nickel-plated)



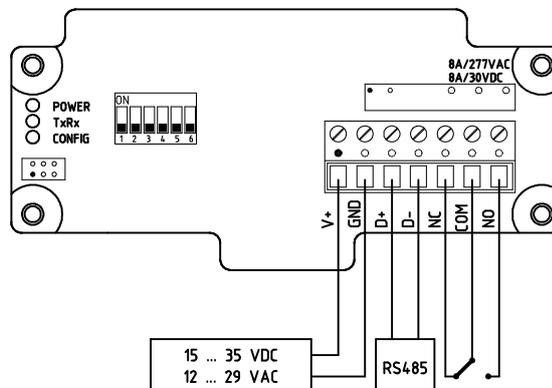
Connection Diagrams

Cable gland with terminal block

3-wire 4...20mA or voltage output

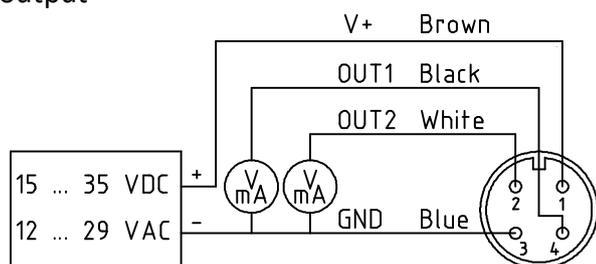


RS485 output



M12 – 4 pin connector

3-wire 4...20mA or voltage output



RS485 output

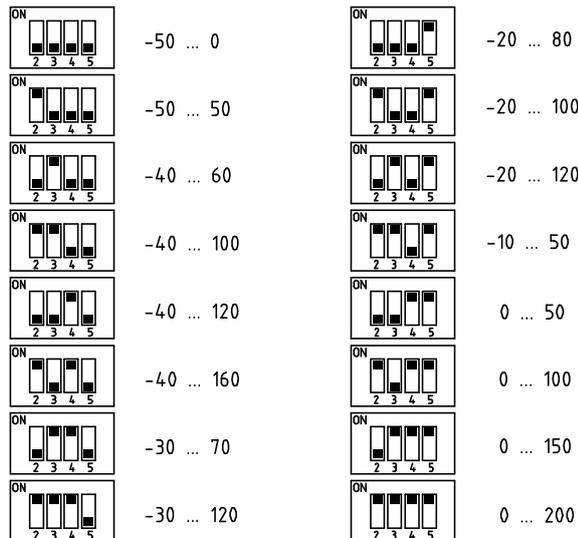
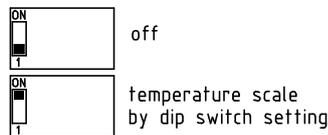


Physical Quantity Output Range

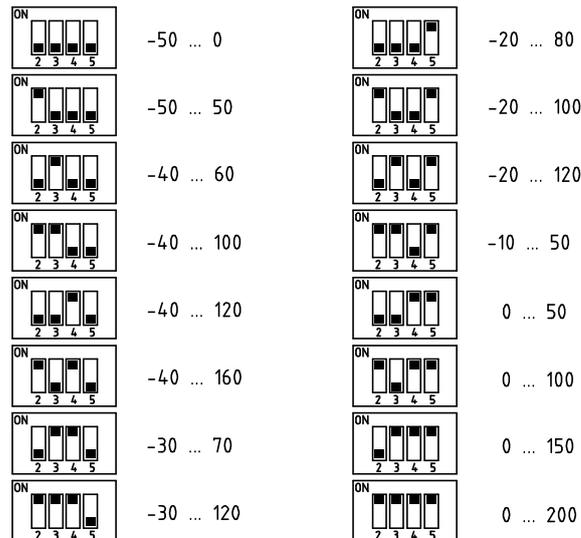
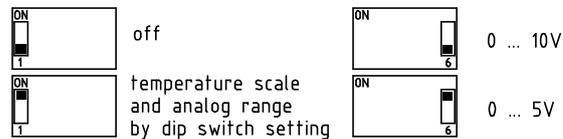
Item	Metric	Imperial
Temperature <u>I</u>	-40 ... 120 °C	-40... 248 °F
Relative Humidity <u>RH</u>	0 ... 100 %	0 ... 100 %
Dew point <u>Td</u>	-20 ... 100 °C	-4 ... 212 °F
Frost/dew point <u>Tf</u>	-20 ... 100 °C	-4 ... 212 °F
Wet bulb temperature <u>Tw</u>	-40 ... 100 °C	-40 ... 212 °F
Water vapor pressure <u>E</u>	0 ... 1013 mbar	0 ... 14.7 psi
Mixing ratio <u>R</u>	0 ... 30000 g/kg	0 ... 210000 gr/lb
Absolute humidity <u>A</u>	0 ... 550 g/m ³	0 ... 240 gr/ft ³
Enthalpy <u>S</u>	-40 ... 40000 kJ/kg	-10 ... 20000 BTU/lb

DIP Switch

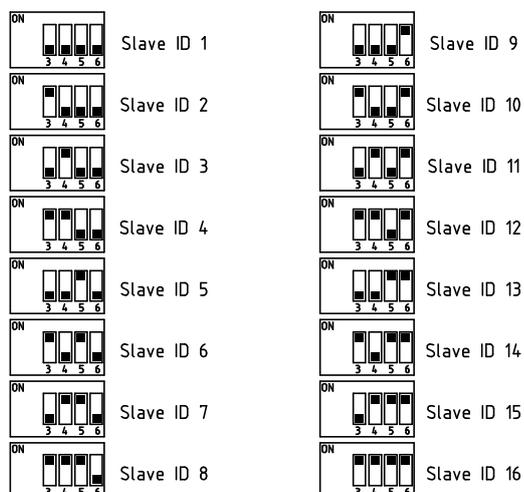
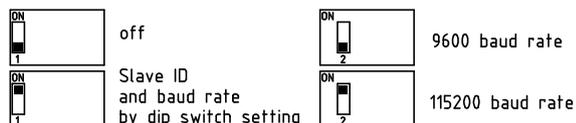
4...20mA version



Voltage version

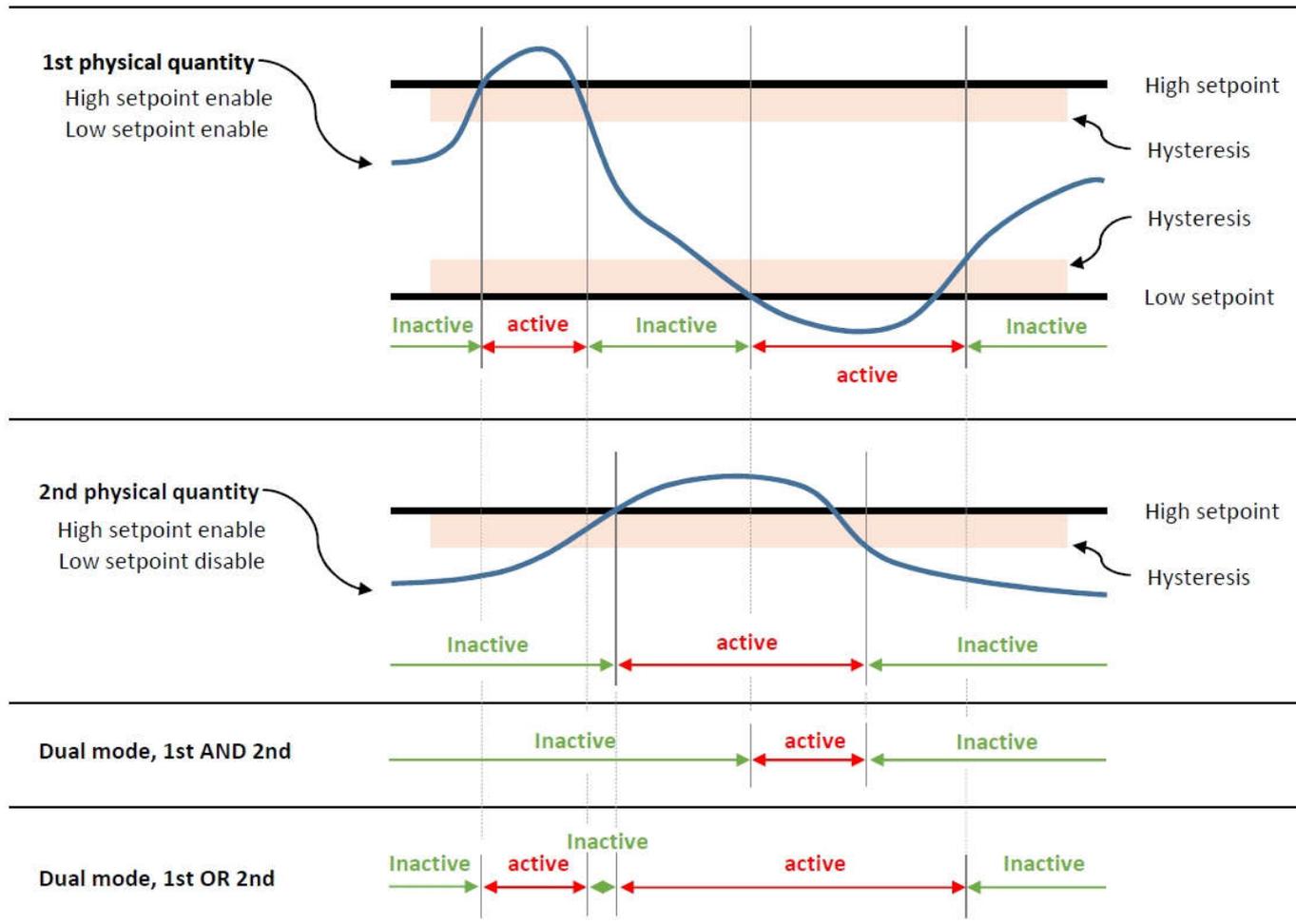


RS485 version



Alarm Output

Parameter	Description
Single or Dual mode	Alarm relative one or two physical quantities.
AND or OR logic	Alarm turn ON logic based on 1 st physical quantity AND/OR 2 nd physical quantity. This is only available on dual mode.
Hysteresis	The Hysteresis setting defines a tolerance band for suppressing alarm alerts. The function prevents multiple alarm alerts if the reading oscillates around the specified threshold.
1 st / 2 nd quantity	Physical quantities for alarm.
High/Low setpoint	Setpoint is a setting at which the system will automatically indicate an alarm. Each physical quantity has a high setpoint and a low setpoint.
Setpoint enable/disable	Enable or disable a setpoint.
Delay	The alarm delay property enables you to configure advanced alarms so that they will not turn ON unless their triggering conditions remain true for a specified period.
Latch	The alarm will turn OFF if the process value goes outside alarm operation range. This can be prevented by using a latch, which holds the alarm output until the power supply turns OFF once the process value enters the alarm range.
Physical quantities with psychrometric calculations	(RH) relative humidity, (T) temperature, (Td) dew point temperature, (A) absolute humidity, (Tf) frost/dew point temperature, (R) mixing ratio, (S) enthalpy, (Tw) wet bulb temperature, (E) water vapor pressure
Physical quantities without psychrometric calculations	(RH) relative humidity, (T) temperature



Technical Data

Humidity

Measurement range 0 ... 100 %RH
Accuracy (including non-linearity, hysteresis, and repeatability)

CAEL-HHA ±1.5%RH@25°C (20 ... 80%RH)
±2%RH@25°C (0 ... 20/80 ... 100%RH)

CAEL-HH ±2%RH@25°C (20 ... 80%RH)
±3%RH@25°C (0 ... 20/80 ... 100%RH)

Temperature coefficient (from 0°C to 80°C)
typ. ±0.02%RH/°C

Humidity Hysteresis ±1%RH

Long term drift¹ < 0.25%RH/year

Response time T63² 8 second (at 1m/s air flow)

Temperature

Measurement range -40 ... 120 °C

Accuracy (including non-linearity, hysteresis, and repeatability) ±0.2°C±0.003*T@25°C

±0.7°C (-40 ... 5°C)

±0.3°C (5 ... 60°C)

±0.9°C (60 ... 120°C)

Long term drift³ < 0.02°C/year

Analog output (two channels)

Current version 3-wire, 4 ... 20 mA

Voltage version 0 ... 1 V / 5 V / 10 V

Accuracy of analog outputs at +25 °C ±0.1% full scale

Temperature dependence ±0.005%/°C full scale

External loads current output RL < 500 ohm
voltage output RL > 10k ohm

RS485 Modbus RTU

ID 1 ... 247

Baud rate 9600/19200/38400/57600/115200

Data format N81/N82/E81/E82/O81/O82

Heater

Power consume 100mA

Heating time 30 second

Temperature raised 20°C

Keep output time 10 minute

Indicate LCD

R-HEAT (regular heat)⁴

Heating cycle time 1 ... 24 hour

Heating threshold 60 ... 99%RH

I-HEAT (intelligent heat)⁵ on/off

Display with touch button (option)

LCD 128x64 dots without backlight

Lines 1,2 or 3

Buttons capacitive x3

Psychrometric calculations (option)

(Td) dew point temperature, (A) absolute humidity,

(Tf) frost/dew point temperature, (R) mixing ratio,

(S) enthalpy, (Tw) wet bulb temperature,

(E) water vapor pressure

Alarm (option)

Relay type Electromagnetic x1

Contact SPDT / 8A / 277 VAC (resistive load)

Dual mode logic AND/OR

Activate High-point and Low-point with enable

Setpoint -9999 ... 9999

Hysteresis 0 ... 9999

Delay 0 ... 3600 second

Latch on/off

Power supply

15 ... 35 VDC, 12 ... 29 VAC

Power consume

Current version max. 50mA

Voltage version typ. 10mA

Voltage version + alarm typ. 25mA

RS485 version typ. 25mA

RS485 version + alarm typ. 40mA

Mechanics

Housing material PC, Polycarbonate

Filter material 110 ABS

Filter material 120/13X PC, Polycarbonate

Flange material Aluminum

Cable of remote probe version 2m, shield PVC, 80 °C

Housing classification IP65

Cable gland PG9 with strain relief

Cable bushing 4.5 ... 8.2 mm

Terminal block AWG 12...24

Connection Cable gland with terminal block
or M12-4 pin

Probe material

Duct version 120 aluminum

Remote probe 130/135/136 brass nickel-plated

Remote probe 131 aluminum

Temperature range

without display -40 ... 80 °C

with display -20 ... 70 °C

Probe temperature range

Duct and remote probe version -40 ... 120 °C

Electromagnetic compatibility

Complies with EMC standard
EN61326-1, Industrial Environment

¹ Typical value for operation in normal RH/T operating range. Max. value is < 0.5%RH/year. Value may be higher in environments with vaporized solvents, outgassing tapes, adhesives, packaging materials, etc.

² Time for achieving 63% of a step function, valid at 25°C and 1m/s airflow.

³ Max. value is < 0.04°C/year.

⁴ Turn on the heater when humidity over the threshold, checked at the each cycle time.

⁵ Self check if the sensor board was condensed, then turn on the heater to remove the dew.

Ordering Guide

Model	Installation	Output	Connection
CAEL-HHA CAEL-HH	Wall mount 110	3-wire 4...20mA 7	Cable gland A
	Duct version 120	0 ... 10V 3	M12-4 pin B
	Remote probe 130	0 ... 5V 5	(with 2m cable)
	Remote probe 131	0 ... 1V 6	
	Remote probe 135	RS485 4	
	Remote probe 136		
	Psychrometric calculations (Option)	Display with touch button (Option)	Alarm (Option)
	No N Yes M	No N Yes D	No N Yes R
	R-HEAT cycle time (Hour)	R-HEAT threshold (%RH)	I-HEAT
	1...24 01...24	60...99 60...99	On A Off B

Example

CAEL-HH1207AMDR0690A

Humidity accuracy: $\pm 2\%$ RH (20...80%RH)	HH	Psychrometric calculations: Yes	M
Installation: Duct version	120	Display with touch button: Yes	D
Output: 3-wire 4 ... 20 mA	7	Alarm: Yes	R
Connection: Cable gland with terminal block	A	R-HEAT cycle time: 6 hour	06
		R-HEAT threshold: 90%RH	90
		I-HEAT: On	A

Accessories

SA020002 Stainless steel sintered, pores size: 30 μ m		SA020401 PT1/2" stainless steel sample block with PT1/4" inlet & outlet ports	
SA020004 Stainless steel mesh, pores size: 75 μ m		SA020201 PT 1/2" Stainless steel fitting	
SA021001 Wall mounting clip		SA010201 Configure adapter	