

## CAEL-HTB/HT/HTA Series Multi-function Humidity and Temperature Transmitter



### Features

- Remote probe w/M12 connector
- Metal probe reduce electromagnetic interference
- 2-wire 4...20mA with selectable physical quantity
- 0 ... 100%RH measurement,
- Temperature range up to +120°C
- Probe pressure up to 10 bar
- Display and touch buttons for convenient operation
- Excellent quality and stable measurement
- IP-65 housing
- 1-point user adjustment
- Modbus RTU protocol
- Alarm output
- Dip switch setting
- Configure adapter support

### Applications

- Semiconductor and microelectronics industry
- Pharmaceutical and paper industry
- Environmental chambers
- Drying and spraying equipment
- Agriculture, farms
- Greenhouse, storage room
- Cooling chamber
- Building Automation
- Environment and ventilation control

SERIAL's latest CAEL series Temperature and Humidity transmitter meets the harsh 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.

CAEL 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.

#### LCD Display

Industrial-grade specifications provide -20 ... 70 ° C temperature working range, it can be reliably display measured values in harsh demanding environments. 128X64 image pixel can clearly show the measured values on large font, or it can display three measured values simultaneously.

#### DIP Switch

DIP switch on the PCB board involves the most common configuration options, so adjust the parameters will having the maximum convenience.

#### Alarm Output

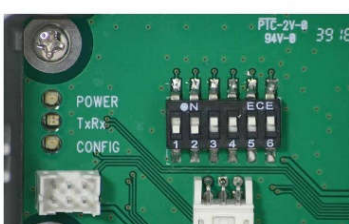
Use function with relay outputs (option) can be realized switch alarm and control, it can easily complete the set points via LCD display and touch buttons. 8A ac current capacity, so that the control can be more free.

#### Configure Adaptor

Configure adaptor can set measuring type, measuring scale, output type, alarm point, RS485 parameters, as well as a one point temperature and humidity adjustment in the measuring field without having to use a computer.

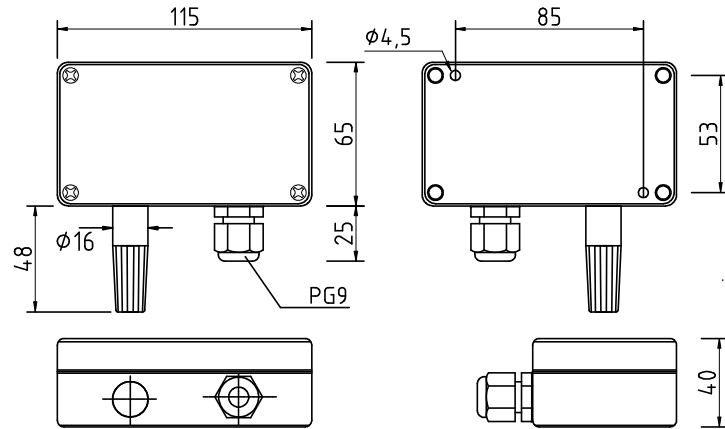
#### Output

2/3-wire 4 ... 20mA  
0 ... 1V / 5V / 10V  
RS485 Modbus RTU

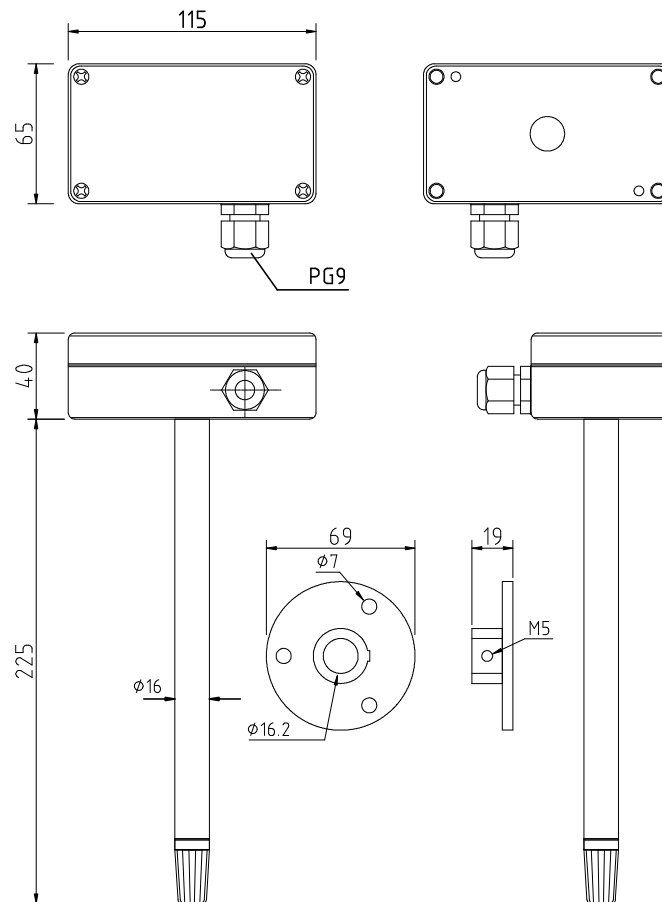


## Dimensions (mm)

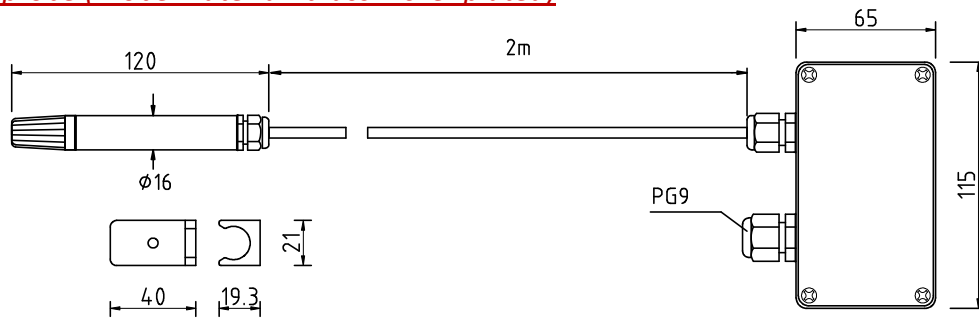
### 110 Wall mount version (Probe material: ABS)



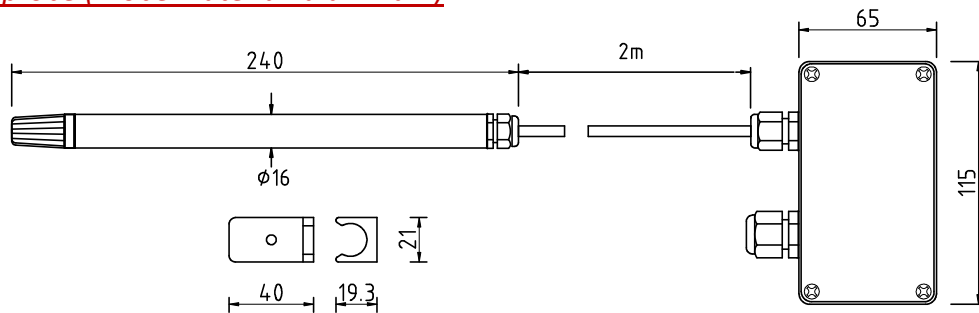
### 120 Duct version (Probe material: aluminum)



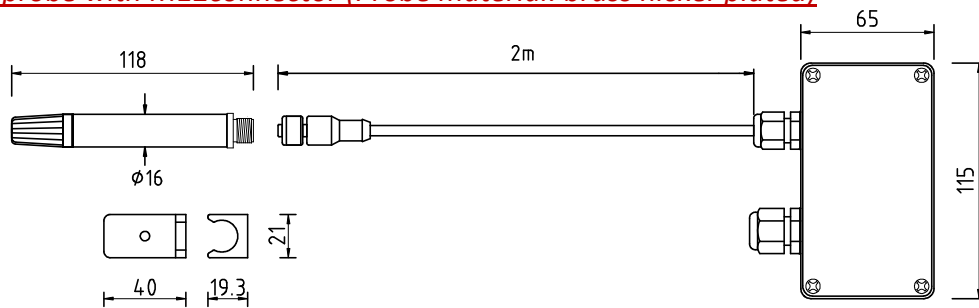
**130 Remote probe (Probe material: brass nickel-plated)**



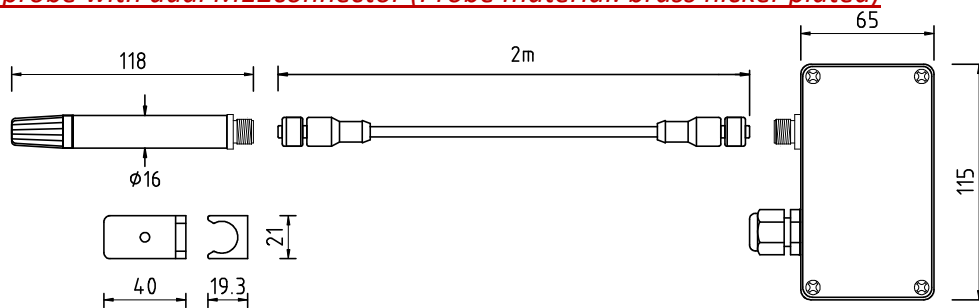
**131 Remote probe (Probe material: aluminum)**



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



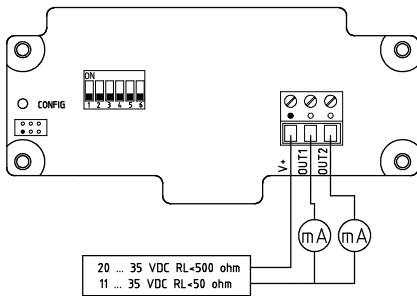
**136 Remote probe with dual M12connector (Probe material: brass nickel-plated)**



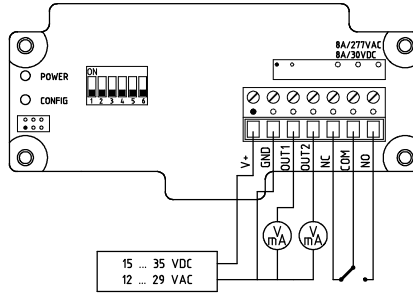
## Connection Diagrams

### Cable gland with terminal block

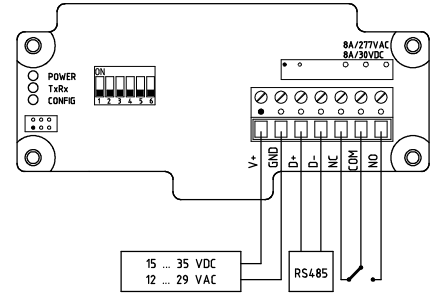
2-wire 4...20mA output  
(OUT1 must be connected)



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

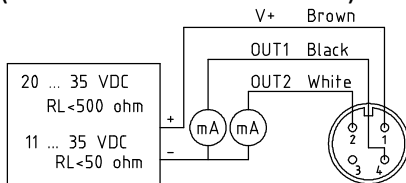


RS485 output

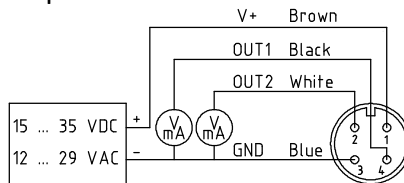


### M12 – 4 pin connector

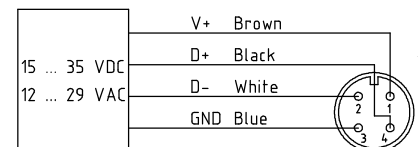
2-wire 4...20mA output  
(OUT1 must be connected)



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



RS485 output

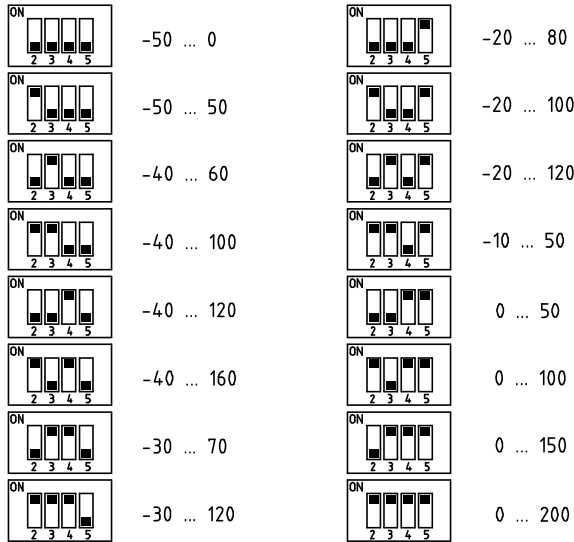
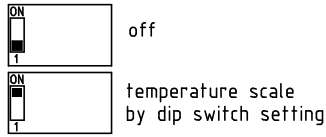


## Physical Quantity Output Range

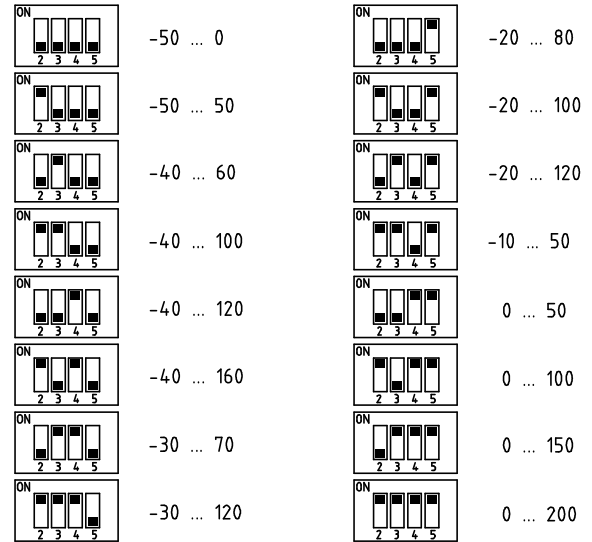
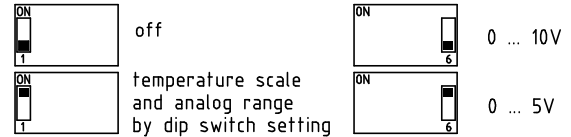
Item	Metric	Imperial
Temperature $\underline{T}$	-40 ... 120 °C	-40... 248 °F
Relative Humidity $\underline{RH}$	0 ... 100 %	0 ... 100 %
Dew point $\underline{T_d}$	-20 ... 100 °C	-4 ... 212 °F
Frost/dew point $\underline{T_f}$	-20 ... 100 °C	-4 ... 212 °F
Wet bulb temperature $\underline{T_w}$	-40 ...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

# DIP Switch

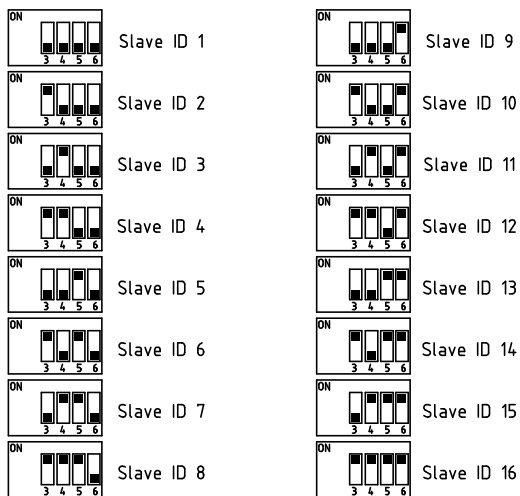
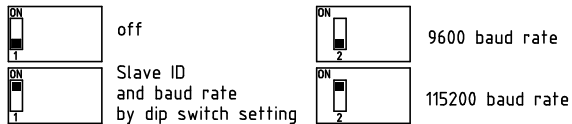
## 4...20mA version



## Voltage version

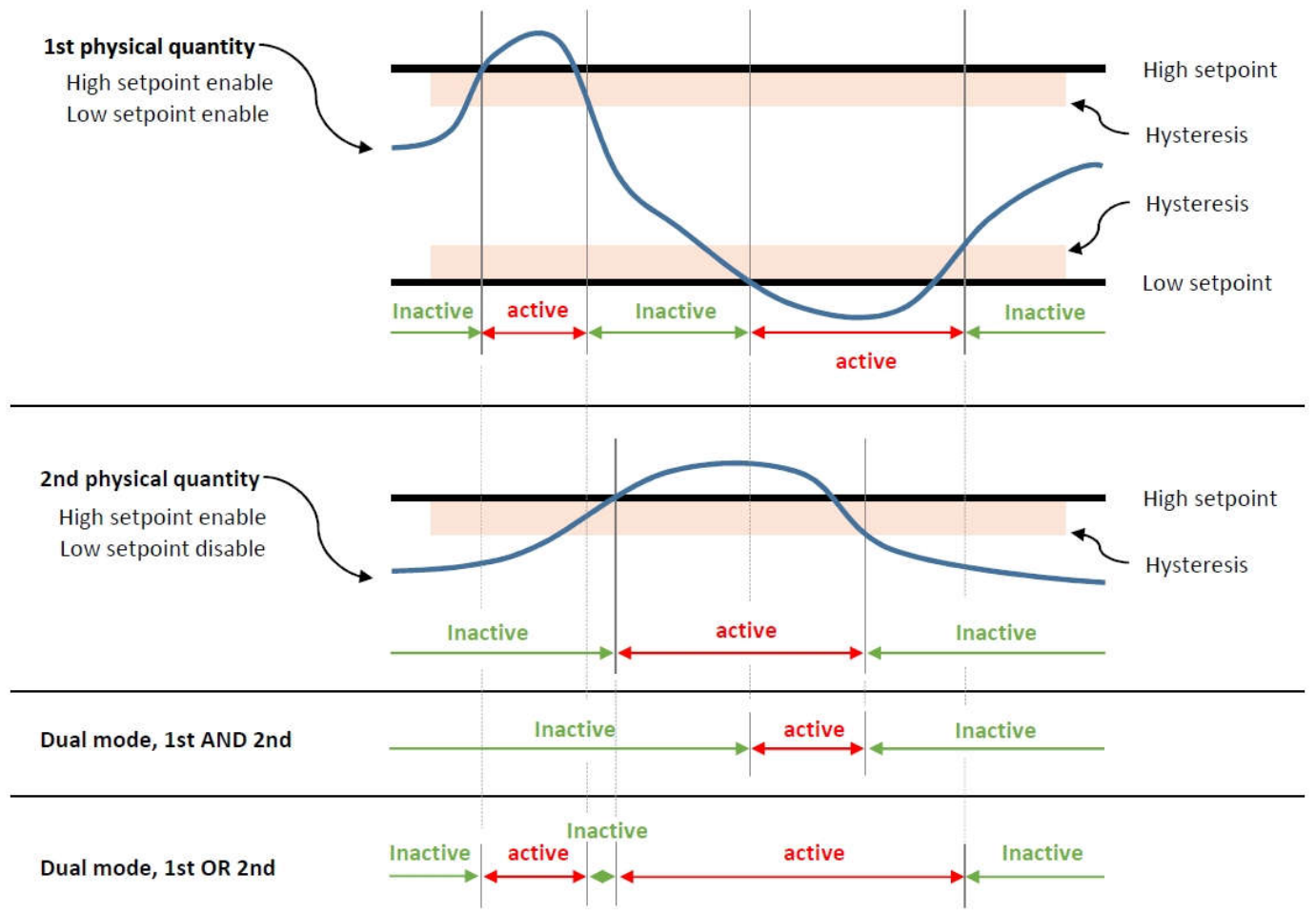


## RS485 version



## 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 <sup>st</sup> physical quantity AND/OR 2 <sup>nd</sup> 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 <sup>st</sup> / 2 <sup>nd</sup> 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-HTA** ±1.5%RH@25°C (20 ... 80%RH)  
±2%RH@25°C (0 ... 20/80 ... 100%RH)

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

**CAEL-HTB** ±3%RH@25°C (20 ... 80%RH)  
Temperature coefficient (from 0°C to 80°C)

typ. ±0.02%RH/°C

Humidity Hysteresis ±1%RH

Long term drift<sup>1</sup> < 0.25%RH/year

Response time T63<sup>2</sup> 8 second (at 1m/s air flow)

### Temperature

Measurement range -40 ... 120 °C

Accuracy (including non-linearity, hysteresis, and repeatability)

±0.2°C@25°C

±0.7°C (-40 ... 5°C)

±0.3°C (5 ... 60°C)

±0.9°C (60 ... 120°C)

Long term drift<sup>3</sup> < 0.02°C/year

### Analog output (two channels)

Current version 2-wire or 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 < 400 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

### 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

### Display with touch button (option)

LCD 128x64 dots without backlight

Lines 1,2 or 3

Buttons capacitive x3

### 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

2-wire current version 11 ... 35 VDC RL<50 ohm

20 ... 35 VDC RL<500 ohm

3-wire current version 15 ... 35 VDC, 12 ... 29 VAC

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

RS485 version 15 ... 35 VDC, 12 ... 29 VAC

### Power consume

2-wire current version max. 40mA

3-wire current version max. 50mA

Voltage version typ. 10mA

Voltage version + alarm typ. 25mA

RS485 version typ. 10mA

RS485 version + alarm typ. 25mA

### 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 120/120A aluminum/stainless steel

Remote probe 130/135/136 brass nickel-plated

Remote probe 131/131A aluminum/stainless steel

### 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

<sup>1</sup> 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.

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

<sup>3</sup> Max. value is < 0.04°C/year.



## Ordering Guide

Model	Installation	Output	Connection
<b>CAEL-HTA</b>	Wall mount	<b>110</b>	2-wire 4 ... 20mA <sup>2</sup> <b>2</b>
<b>CAEL-HT</b>	Duct	<b>120</b>	3-wire 4...20mA <b>7</b>
<b>CAEL-HTB</b>	Duct	<b>120A</b>	0 ... 10V <b>3</b>
<b>CAEL-TS<sup>1</sup></b>	Remote probe	<b>130</b>	0 ... 5V <b>5</b>
	Remote probe	<b>131</b>	0 ... 1V <b>6</b>
	Remote probe	<b>131A</b>	RS485 <b>4</b>
	Remote probe	<b>135</b>	
	Remote probe	<b>136</b>	
	Psychrometric calculations (Option)	Display with touch button (Option)	Alarm (Option)
	Yes <b>M</b>	Yes <b>D</b>	Yes <b>R</b>

<sup>1</sup> CAEL-TS only support temperature output

<sup>2</sup> 2-wire 4...20mA version without Alarm option

<sup>3</sup> M12-4 pin output version without Alarm option

## Example

### CAEL-HT-120-7AMDR

Humidity accuracy: ±2%RH (20...80%RH)

Installation: Duct version

Output: 3-wire 4 ... 20 mA

Connection: Cable gland with terminal block

**HT** Psychrometric calculations: Yes **M**  
**120** Display with touch button: Yes **D**  
**7** Alarm: Yes **R**  
**A**

## Accessories

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

