

## MEASUREMENT & MONITORING SOLUTIONS FOR HVAC TECHNICIANS

Our HVAC portfolio covers all applications in a building management system. From inexpensive logger to high-precision transmitter, for example for GxP-regulated environments. Using various protocols such as Modbus, the devices can be integrated into any existing infrastructure with standard analog outputs or into the complete range of our digital devices.

### HVAC parameters measured



Humidity



Temperature



CO<sub>2</sub>



Differential pressure



Monitoring of a duty-free warehouse

### Recommendations for a good climate

#### ASHRAE occupancy settings





Temperature and relative humidity are often measured as part of room air quality monitoring because these parameters influence the feeling of comfort in indoor environments. Heat transfer between the body and environment is influenced by factors such as temperature, humidity, air movement, personal activities, and clothing.





- The ANSI/ASHRAE Standard 55-2013: Thermal Environmental Conditions for Human Occupancy specifies the combinations of indoor environmental and personal factors that produce acceptable thermal conditions for a majority of occupants within a space [ANSI/ASHRAE 2013b].
- ASHRAE also recommends that indoor **relative humidity be maintained at or below 65%** [ANSI/ASHRAE 2013b].
- Assuming slow air movement (less than 40 feet per minute) and a **relative indoor humidity of 50 %**, the operative temperatures recommended by ASHRAE range **from 20 °C to 24 °C in the winter, and from 24 °C to 27 °C in the summer**. The difference in temperature ranges between the seasons is largely due to the choice of clothing.





#### CO<sub>2</sub> guidelines

A high CO<sub>2</sub> content becomes apparent in humans through fatigue and loss of concentration. Monitoring helps to keep the CO<sub>2</sub> content within acceptable limits.

350 – 450 ppm	400 – 1,200 ppm	> 1,000 ppm	5,000 ppm (0.5 %)	38,000 ppm (3.8 %)	> 100,000 ppm (10 %)
Fresh air in the open	Room air	Fatigue and loss of concentration become apparent	Maximum permissible value at the workplace during an 8-hour workday	Breathing air (direct exhalation)	Nausea, vomiting, loss of consciousness and death

DATA LOGGERS / DISPLAYS			HANDHELD INSTRUMENTS		
Inexpensive loggers and displays for determining indoor air quality.			Handheld instruments for CO <sub>2</sub> , humidity and temperature. Precise and easy to use.		
	<b>HL-1D</b>	<b>CO<sub>2</sub> display</b>		<b>HP32</b>	<b>CP11</b>
<b>Parameters</b>	RH, T	RH, T, CO <sub>2</sub>	<b>Parameters</b>	RH, T	RH, T, CO <sub>2</sub>
<b>Accuracy</b>	±3 %RH ±0.3 K	±5 %RH, ±30 ppm ±0.5 K	<b>Accuracy</b>	±0.8 %RH <sup>1</sup> ±0.1 K <sup>1</sup>	±3 %RH, ±30 ppm ±0.3 K
<b>Range</b>	-30...70 °C 0...100 %RH	0...5000 ppm -20...60 °C 0...100 %RH	<b>Range</b>	-10...60 °C 0...100 %RH	0...50 °C 0...95 %RH
<b>Data logging</b>	Yes	Yes	<b>Data logging</b>	Yes	Yes

TRANSMITTERS				
Standard HVAC products				
	<b>HF1</b>	<b>HF3</b>	<b>CF1</b>	<b>PF1</b>
<b>Parameters</b>	RH, T	RH, T	RH, T, CO <sub>2</sub>	ΔP
<b>Accuracy</b>	±2 %RH <sup>2</sup> / ±0.3 K	±2 %RH / ±0.3 K	±3 %RH / ±0.3 K ±40 ppm	±1.5 % full scale
<b>Range</b>	-20...50 °C	-40...60 °C <sup>2</sup>	0...2000 ppm 0...5000 ppm	-10...50 °C ±25 Pa...±500 Pa <sup>2</sup>
<b>Analog output</b>	4...20 mA / 0...1 V / 10 V			
<b>Modbus</b>	Yes	No	Yes	No
<b>Relay</b>	No	No	Yes	No

TRANSMITTERS				
Precision measuring instruments (e.g. GxP applications)				
	<b>HF4</b>	<b>HF5</b>	<b>PF4 (flow sensor)</b>	<b>PF5 (diaphragm sensor)</b>
<b>Parameters</b>	RH, T	RH, T	ΔP (RH, T)	ΔP (RH, T)
<b>Accuracy</b>	±1 %RH / ±0.2 K	±0.8 %RH <sup>1</sup> ±0.1 K <sup>1</sup>	±1 % full scale	±1 % full scale
<b>Range</b>	-40...60 °C <sup>2</sup>	-40...60 °C <sup>2</sup>	±10 Pa...±500 Pa <sup>2</sup>	±25 Pa...±500 Pa <sup>2</sup>
<b>Analog output</b>	4...20 mA / 0...1 V / 10 V			
<b>Modbus</b>	No	Yes	Yes	Yes
<b>Relay</b>	No	No	Yes	Yes

<sup>1</sup> With HC2A-S probe

<sup>2</sup> Type-dependent