Sensor Modbus-Register

- **22DTH-..5..**
  Duct sensor humidity / temperature
- **22UTH-..50X**
  Outdoor sensor humidity / temperature
- **22DTM-..5**
  Duct sensor CO2 / humidity / temperature
- **22ADP-..5..**
  Differential pressure sensor

Contents

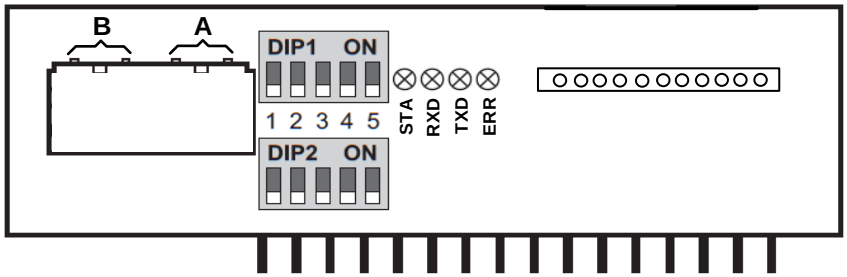
1. Modbus General Notes

General information	Protocol:	Modbus RTU / RS-485
	Number of nodes:	Max. 32 (without repeater)
	Address	1…31 0 = Broadcast
	Transmission Formats:	1-8-N-2, 1-8-E-1, 1-8-O-1 *Default: 1-8-N-2* *E = Even, O = Odd, N = None* *Bit structure: Start – Data – Parity – Stop*
	Baud rate:	9'600, 19'200, 38'400, 57'600 Bd *Default: 9'600*
	Terminating resistor:	120 Ω (can be switched on by a DIP Switch description see page 3)
	Parameterization:	Via DIP switches (setting of baud rate and parity description on page 3)
Register implementation	All data are arranged in a table and addressed by 1…n (register) or 0…n-1 (address). No distinction is made between data types (Discrete Inputs, Coils, Input Registers and Holding Registers). As a consequence, all data can be accessed with the commands below.	
Standard commands	Read Holding Registers [03] Write Single Register [06] Write Multiple Registers [16]	
Interpret values in the registers	All values in the registers are shown as unsigned (marked T = **u**), signed (marked T = **s**) or float integers (marked T = **f**). Signed integers are represented as two's complement.	
Example unsigned integer	Read (Function 03, 1 Register) Value Register No. 1 = $0000'0001'0010'1110_2 = 302_{10}$ Actual Value = Value * Scaling factor * Unit = 302 * 0.1 * °C = **30.2 °C**	
Example signed integer	Read (Function 03, 1 Register) Value Register No. 1 = $1111'1111'0010'0001_2 = -223_{10}$ Actual Value = Value * Scaling factor * Unit = -223 * 0.1 * °C= **-22.3 °C**	

2. Operating elements for addressing and parametrization

2.1 RS 485 module

In addition to the basic board, each Modbus sensor is equipped with a RS-485 module.
The Modbus communication lines A (D +) and B (D -) are connected to the module. Furthermore, on the two DIP switches, the Modbus address of the sensor can be selected and the communication parameters can be set.

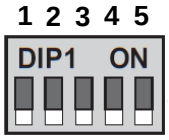


2.2 Functions of DIP switch 1 and DIP switch 2

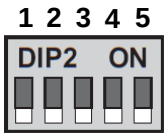
DIP switch **DIP1** (5-way) is used to set the Modbus address binary coded in a range of 1 - 31
(address 0 is reserved for broadcast and can't be set).

DIP switch **DIP2** (5-way) is used to parametrize termination (120 Ω), baud rate and parity.

All DIP switches are factory set to the OFF position.



1 – 5 = Address



1 = Termination
2, 3 = Baud rate
4, 5 = Parity

2^0 (1)	2^1 (2)	2^2 (4)	2^3 (8)	2^4 (16)	
1	**2**	**3**	**4**	**5**	**Address**
OFF	OFF	OFF	OFF	OFF	**0**
ON	OFF	OFF	OFF	OFF	**1**
OFF	**ON**	OFF	OFF	OFF	**2**
ON	**ON**	OFF	OFF	OFF	**3**
OFF	OFF	**ON**	OFF	OFF	**4**
ON	OFF	**ON**	OFF	OFF	**5**
OFF	**ON**	**ON**	OFF	OFF	**6**
⋮	⋮	⋮	⋮	⋮	⋮
ON	**ON**	**ON**	**ON**	**ON**	**31**

1	**2**	**3**	**4**	**5**	**Function**
OFF					Termination **OFF**
ON					Termination **ON**
	OFF	OFF			Baud rate **9600**
	ON	OFF			Baud rate **19200**
	OFF	**ON**			Baud rate **38400**
	ON	**ON**			Baud rate **57600**
			OFF	OFF	Parity **none** – **2** Stopbits
			ON	OFF	Parity **even** – **1** Stopbit
			OFF	**ON**	Parity **odd** – **1** Stopbit
			ON	**ON**	Parity **none** – **1** Stopbit

2.3 LED functions

The four LEDs on the RS-485 module show the actual operating status of the RS-485 module.

STA During normal operation the LED is flashing.
LED is turned ON during sensor initialization after Power ON of the device.

RXD LED is turned ON if bus telegrams are received by the RS-485 module.

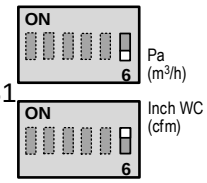
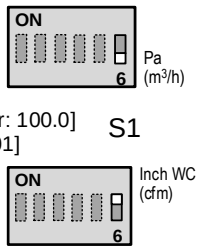
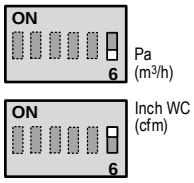
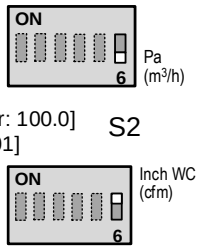
TXD LED is turned ON if bus telegrams are sent by the RS-485 module.

ERR LED is turned ON in case of a faulty bus configuration or in case of internal errors.

3. Modbus-Register description

3.1 Register measured variable

Registers No. 1 - 54 define the measured variable.
Sensor type detection in register 502.

No.	Adr	Register measured variable	unit		T	R/W
1	0	**Temperature** [scaling factor: 0.1] Selection of SI or Imperial units via register 401 (1 = SI, 2 = Imperial)	SI Imperial	°C °F	s	R
2	1	**Relative humidity** [scaling factor: 0.1]	**%** RH		s	R
3	2	**Absolute humidity** [scaling factor: 0.01] Selection of SI or Imperial units via register 401 (1 = SI, 2 = Imperial)	SI Imperial	g/m³ gr/ft³	s	R
4	3	**Enthalpy** [scaling factor: 0.1] Selection of SI or Imperial units via register 401 (1 = SI, 2 = Imperial)	SI Imperial	kJ/kg BTU/lb	s	R
5	4	**Dew point** [scaling factor: 0.1] Selection of SI or Imperial units via register 401 (1 = SI, 2 = Imperial)	SI Imperial	°C °F	s	R
6	5	**CO2** [scaling factor: 1.0]	ppm		s	R
7	6	**VOC** [scaling factor: 0.1]	%		s	R
8	7	**CO2 VOC Mix** [scaling factor: 0.1]	%		s	R
9	8	**Differential pressure 1** Selection **Pa** via 6th DIP switch (OFF) of sensor main board 22ADP. Value in Pa [scaling factor: 1.0] Value of register 401 is 1 (SI) Selection **inchWC** via 6th DIP switch (ON) of sensor main board 22ADP. Value in **inchWC** [scaling factor: 0.001] Value of register 401 is 2 (Imperial) S1 	SI Imperial	Pa inchWC	s	R
10	9	**Volumetric flow 1** Selection **(m³/h)** via 6th DIP switch (OFF) of sensor main board 22ADP. Value of register 401 is 1 (SI) If register 405 is set to 0 or 1 register shows a value in m³/h [scaling factor: 100.0] If register 405 is set to 2 register shows a value in m³/s [scaling factor: 0.01] Selection **(cfm)** via 6th DIP switch (ON) of sensor main board (22ADP). Value in **cfm** [scaling factor: 10.0] Value of register 401 is 2 (Imperial) S1 	SI Imperial	m³/h m³/s cfm	u	R
11	10	**Differential pressure 2** (@dual ADP only) Selection **Pa** via 6th DIP switch (OFF) of sensor main board 22ADP. Value in Pa [scaling factor: 1.0] Value of register 401 is 1 (SI) Selection **inchWC** via 6th DIP switch (ON) of sensor main board 22ADP. Value in **inchWC** [scaling factor: 0.001] Value of register 401 is 2 (Imperial) S2 	SI Imperial	Pa inchWC	s	R
12	11	**Volumetric flow 2** (@dual ADP only) Selection **(m³/h)** via 6th DIP switch (OFF) of sensor main board 22ADP. Value of register 401 is 1 (SI) If register 405 is set to 0 or 1 register shows a value in m³/h [scaling factor: 100.0] If register 405 is set to 2 register shows a value in m³/s [scaling factor: 0.01] Selection **(cfm)** via 6th DIP switch (ON) of sensor main board (22ADP). Value in **cfm** [scaling factor: 10.0] Value of register 401 is 2 (Imperial) S2 	SI Imperial	m³/h m³/s cfm	u	R

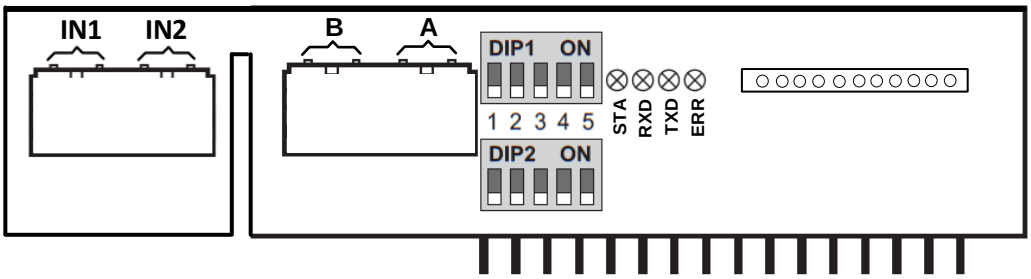
51	50	**Volumetric flow 1 (32 Bit)** (if register address 405 is set to the value 2, the value scales the unit m³/s) Calculation Volumetric flow: Value Adr 51 x 65'535 + Value Adr 50. [scaling factor: 1.0]	SI Imperial	m³/h m³/s cfm	u	R
52	51					
53	52	**Volumetric flow 2 (32 Bit)** (if register address 405 is set to the value 2, the value scales the unit m³/s) (@dual ADP only) Calculation Volumetric flow: Value Adr 53 x 65'535 + Value Adr 52. [scaling factor: 1.0]	SI Imperial	m³/h m³/s cfm	u	R
54	53					

3.2 Register Measurement Values of additional inputs

Registers No. 91 - 94 show values of additional inputs

Some device types include an option board with two additional inputs (IN1 & IN2). NTC10k temperature sensors or potential-free switching contacts can be connected to these inputs. The measured values are provided via the Modbus register No. 91…94. The BETA values of the connected NTC10k sensors can be configured via the Modbus registers 490 & 491.

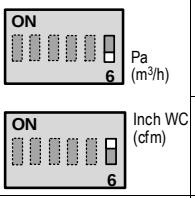
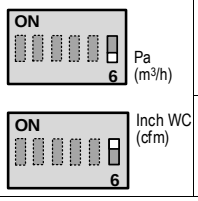
For details how to connect the external sensors and contacts, please refer to the product data sheet of the respective device.



No.	Adr	Register measured variable	unit		T	R/W
91	90	**Input 1 – Temperature NTC10k** [scaling factor: 0.1] Selection of SI or Imperial units via register 401 (1 = SI, 2 = Imperial)	SI	°C	s	R
			Imperial	°F		
92	91	**Input 2 – Temperature NTC10k** [scaling factor: 0.1] Selection of SI or Imperial units via register 401 (1 = SI, 2 = Imperial)	SI	°C	s	R
			Imperial	°F		
93	92	**Input 1 – Switch contact**	0	Contact open	s	R
			1	Contact closed		
94	93	**Input 2 – Switch contact**	0	Contact open	s	R
			1	Contact closed		

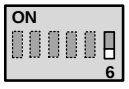
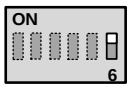
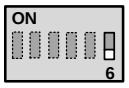
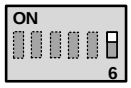
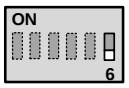
3.3 Register offset and correction values

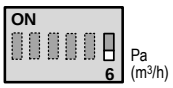
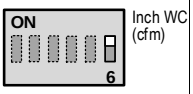
Registers 101 - 106 define the offset and correction values of the sensor.

No.	Adr	Register offset and correction values	unit		T	R/W
101	100	**Offset temperature** [scaling factor: 0.1] Selection of SI or Imperial units via register No. 401 (1 = SI, 2 = Imperial)	SI Imperial	°C °F	s	R/W
102	101	**Offset relative humidity** [scaling factor: 1.0]	**%** RH		s	R/W
103	102	**Offset CO2** [scaling factor: 1.0]	ppm		s	R/W
104	103	**Offset VOC** [scaling factor: 1.0]	%		s	R/W
105	104	**Offset differential pressure 1** Selection of **Pa** via 6th DIP switch (OFF) of sensor main board 22ADP. Value in Pa [scaling factor: 1.0] Value of register 401 is 1 (SI) S1 Selection **InchWC** via 6th DIP switch (ON) of sensor main board 22ADP. Value in **InchWC** [scaling factor: 0.001] Value of register 401 is 2 (Imperial) 	SI Imperial	Pa inchWC	s	R/W
106	105	**Offset differential pressure 2** (@dual ADP only) Selection of **Pa** via 6th DIP switch (OFF) of sensor main board 22ADP. Value in Pa [scaling factor: 1.0] Value of register 401 is 1 (SI) S2 Selection **InchWC** via 6th DIP switch (ON) of sensor main board 22ADP. Value in **InchWC** [scaling factor: 0.001] Value of register 401 is 2 (Imperial) 	SI Imperial	Pa inchWC	s	R/W

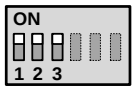
3.4 Register upper and lower limit of the sensor scale

Registers. 201 - 224 define the upper/lower limit for the sensor output and is used to scale the two DC 0 – 10 V analog outputs.

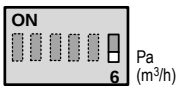
No.	Adr	Register upper and lower limit of the sensor scale	values	unit		T	R/W
201	200	**Lower limit temperature** [scaling factor: 1.0] Selection of SI or Imperial units via register 401 (1 = SI, 2 = Imperial)	-50…+250 °C	SI	°C	s	R/W
			-30…+480 °F	Imperial	°F		
202	201	**Upper limit temperature** [scaling factor: 1.0] Selection of SI or Imperial units via register 401	-50…+250 °C	SI	°C	s	R/W
			-30…+480 °F	Imperial	°F		
203	202	**Lower limit relative humidity** [scaling factor: 1.0]	0…100 % RH	**%** RH		s	R/W
204	203	**Upper limit relative humidity** [scaling factor: 1.0]	0…100 % RH	**%** RH		s	R/W
205	204	**Lower limit absolute humidity** [scaling factor: 1.0] Selection of SI or Imperial units via register 401 (1 = SI, 2 = Imperial)	0…80 g/m³	SI	g/m³	s	R/W
			0…35 gr/ft	Imperial	gr/ft³		
206	205	**Upper limit absolute humidity** [scaling factor: 1.0] Selection of SI or Imperial units via register 401 (1 = SI, 2 = Imperial)	0…80 g/m³	SI	g/m³	s	R/W
			0…35 gr/ft	Imperial	gr/ft³		
207	206	**Lower limit enthalpy** [scaling factor: 1.0] Selection of SI or Imperial units via register 401	0…85 KJ/kg	SI	kJ/kg	s	R/W
			0…40 BTU/lb	Imperial	BTU/lb		
208	207	**Upper limit enthalpy** [scaling factor: 1.0] Selection of SI or Imperial units via register 401	0…85 KJ/kg	SI	kJ/kg	s	R/W
			0…40 BTU/lb	Imperial	BTU/lb		
209	208	**Lower limit dew point** [scaling factor: 1.0] Selection of SI or Imperial units via register 401	-20…+80 °C	SI	°C	s	R/W
			0…+200 °F	Imperial	°F		
210	209	**Upper limit dew point** [scaling factor: 1.0] Selection of SI or Imperial units via register 401	-20…+80 °C	SI	°C	s	R/W
			0…+200 °F	Imperial	°F		
211	210	**Lower limit CO2** [scaling factor: 1.0]	0…5000 ppm	ppm		s	R/W
212	211	**Upper limit CO2** [scaling factor: 1.0]	0…5000 ppm	ppm		s	R/W
213	212	**Lower limit VOC** [scaling factor: 1.0]	0…100 %	%		s	R/W
214	213	**Upper limit VOC** [scaling factor: 1.0]	0…100 %	%		s	R/W
215	214	**Lower limit CO2 / VOC mix** [scaling factor: 1.0]	0…100 %	%		s	R/W
216	215	**Upper limit CO2 / VOC mix** [scaling factor: 1.0]	0…100 %	%		s	R/W
217	216	**Lower limit volumetric flow 1** Selection **(m³/h)** via 6th DIP switch (OFF) of sensor main board 22ADP. Value of register 401 is 1 (SI) If register 405 is set to 0 or 1 register shows a value in m³/h [scaling factor: 1.0] If register 405 is set to 2 register shows a value in m³/s [scaling factor: 1.0] S1		SI	m³/h m³/s	f	R/W
218	217	Selection **(cfm)** via 6th DIP switch (ON) of sensor main board 22ADP. Value of register 401 is 2 (Imperial) Value in **cfm** [scaling factor: 1.0] **Values:** 0…999'999 m³/s **/** 0…999'999 m³/h **/** 0…999'999 cfm		Imperial	cfm		
219	218	**Upper limit volumetric flow 1** Selection **(m³/h)** via 6th DIP switch (OFF) of sensor main board 22ADP. Value of register 401 is 1 (SI) If register 405 is set to 0 or 1 register shows a value in m³/h [scaling factor: 1.0] If register 405 is set to 2 register shows a value in m³/s [scaling factor: 1.0] S1		SI	m³/h m³/s	f	R/W
220	219	Selection **(cfm)** via 6th DIP switch (ON) of sensor main board 22ADP. Value of register 401 is 2 (Imperial) Value in **cfm** [scaling factor: 1.0] **Values:** 0…999'999 m³/s **/** 0…999'999 m³/h **/** 0…999'999 cfm		Imperial	cfm		
221	220	**Lower limit volumetric flow 2** (@dual ADP only) Selection **(m³/h)** via 6th DIP switch (OFF) of sensor main board 22ADP. Value of register 401 is 1 (SI) If register 405 is set to 0 or 1 register shows a value in m³/h [scaling factor: 1.0] If register 405 is set to 2 register shows a value in m³/s [scaling factor: 1.0] S2		SI	m³/h m³/s	f	R/W
222	221	Selection **(cfm)** via 6th DIP switch (ON) of sensor main board 22ADP. Value of register 401 is 2 (Imperial) Value in **cfm** [scaling factor: 1.0] **Values:** 0…999'999 m³/s **/** 0…999'999 m³/h **/** 0…999'999 cfm		Imperial	cfm		

223	222	**Upper limit volumetric flow 2** (@dual ADP only) Selection **(m^3/h)** via 6th DIP switch (OFF) of sensor main board 22ADP. Value of register 401 is 1 (SI)  If register 405 is set to 0 or 1 register shows a value in m^3/h [scaling factor: 1.0] If register 405 is set to 2 register shows a value in m^3/s [scaling factor: 1.0] S2		SI	m^3/h m^3/s	f	R/W
224	223	Selection **(cfm)** via 6th DIP switch (ON) of sensor main board 22ADP. Value of register 401 is 2 (Imperial) Value in **cfm** [scaling factor: 1.0] **Values:** 0…999'999 m^3/s **/** 0…999'999 m^3/h **/** 0…999'999 cfm 		Imperial	cfm		

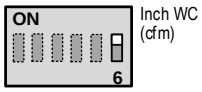
Limit differential pressure
Pressure range can be set with DIP switch 1-3 of sensor main board 22ADP. S1 for differential pressure 1 and S2 for differential pressure 2 (dual ADP only). For the specific values, please refer to the product data sheet of the respective device.



Selection of **Pa** via 6th DIP switch (OFF) of sensor main board 22ADP.

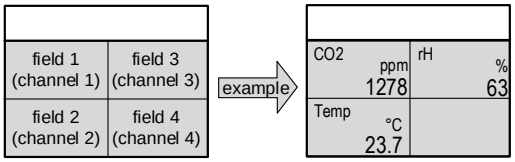


Selection **InchWC** via 6th DIP switch (ON) of sensor main board 22ADP.



3.5 Register channel selection for sensor output and LCD display

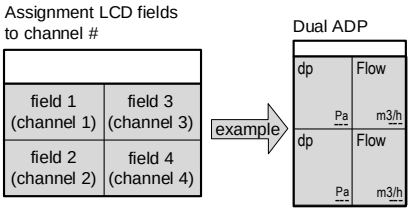
Registers 301 - 310 define the channel selection for the measured variable. This can be used to assign the two analog outputs to the corresponding measured value (channel # 1 = AOU1, channel # 2 = AOU2). In addition, 4 fields of the LCD display (optional) can be assigned to measured values by using the corresponding channel #.

No.	Adr	Channel selection for sensor output		T	R/W	Notes
301	300	**Channel temperature**	**Default value channel #**	u	R/W	**Channel Selection #** **Valid values 1, 2, 3 or 4** The channels with channel #1 and #2 are output both via Modbus registers 1 - 10 and via the analog outputs AOU1 and AOU2. **4 fields of the LCD display** (optional) can be assigned to measured values by using the corresponding channel #. Unused channels are set to zero. Assignment LCD fields to channel # 
		Sensor 22DTH-..5..	**2 (AOU2)**			
		Sensor 22UTH-..50X	**2 (AOU2)**			
		Sensor 22DTM-..5	**2 (AOU2)**			
		Sensor 22ADP-..5	0			
		Sensor 22ADP-..5	0			
302	301	**Channel relative humidity**	**Default value channel #**	u	R/W	
		Sensor 22DTH-..5..	**1 (AOU1)**			
		Sensor 22UTH-..50X	**1 (AOU1)**			
		Sensor 22DTM-..5	**3**			
		Sensor 22ADP-..5	0			
303	302	**Channel absolute humidity**	**Default value channel #**	u	R/W	
		Sensor 22DTH-..5..	0			
		Sensor 22UTH-..50X	0			
		Sensor 22DTM-..5	0			
		Sensor 22ADP-..5	0			
304	303	**Channel enthalpy**	**Default value channel #**	u	R/W	
		Sensor 22DTH-..5..	0			
		Sensor 22UTH-..50X	0			
		Sensor 22DTM-..5	0			
		Sensor 22ADP-..5	0			
305	304	**Channel dew point**	**Default value channel #**	u	R/W	
		Sensor 22DTH-..5..	0			
		Sensor 22UTH-..50X	0			
		Sensor 22DTM-..5	0			
		Sensor 22ADP-..5	0			
306	305	**Channel CO2**	**Default value channel #**	u	R/W	
		Sensor 22DTH-..5..	0			
		Sensor 22UTH-..50X	0			
		Sensor 22DTM-..5	**1 (AOU1)**			
		Sensor 22ADP-..5	0			
307	306	**Channel VOC**	**Default value channel #**	u	R/W	
		Sensor 22DTH-..5..	0			
		Sensor 22UTH-..50X	0			
		Sensor 22DTM-..5	0			
		Sensor 22ADP-..5	0			
308	307	**Channel CO2 VOC Mix**	**Default value channel #**	u	R/W	
		Sensor 22DTH-..5..	0			
		Sensor 22UTH-..50X	0			
		Sensor 22DTM-..5	0			
		Sensor 22ADP-..5	0			
309	308	**Channel differential pressure 1**	**Default value channel #**	u	R/W	
		Sensor 22DTH-..5..	0			
		Sensor 22UTH-..50X	0			
		Sensor 22DTM-..5	0			
		Sensor 22ADP-..5	**1 (AOU1)**			
		Sensor 22ADP-..5 (dual ADP)	**1 (AOU1)**			
310	309	**Channel volumetric flow 1**	**Default value channel #**	u	R/W	
		Sensor 22DTH-..5..	0			
		Sensor 22UTH-..50X	0			
		Sensor 22DTM-..5	0			
		Sensor 22ADP-..5	**2 (AOU2)**			
		Sensor 22ADP-..5 (dual ADP)	**3**			

3.6 Register channel selection for sensor output and LCD display for Sensor 22ADP-..5.. (dual ADP)

Registers 311 - 312 define the channel selection for the measured variable. This can be used to assign the two analog outputs to the corresponding measured value (channel # 1 = AOU1, channel # 2 = AOU2). In addition, 4 fields of the LCD display (optional) can be assigned to measured values by using the corresponding channel #.

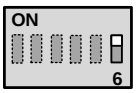
No.	Adr	Channel selection for sensor output		T	R/W
311	310	**Channel differential pressure 2**	**Default value channel #**	u	R/W
		Sensor 22DTH-..5..	0		
		Sensor 22UTH-..50X	0		
		Sensor 22DTM-..5	0		
		Sensor 22ADP-..5	0		
		Sensor 22ADP-..5 (dual ADP)	**2 (AOU2)**		
312	311	**Channel volumetric flow 2**	**Default value channel #**	u	R/W
		Sensor 22DTH-..5..	0		
		Sensor 22UTH-..50X	0		
		Sensor 22DTM-..5	0		
		Sensor 22ADP-..5	0		
		Sensor 22ADP-..5 (dual ADP)	**4**		



Channel Selection # Valid values 1, 2, 3 or 4
The channels with channel #1 and #2 are output both via Modbus registers 311 - 312 and via the analog outputs AOU1 and AOU2.
4 fields of the LCD display (optional) can be assigned to measured values by using the corresponding channel #.

3.7 Register sensor units of measurement and constants

Registers 401 - 492 the required unitary system (SI or Imperial) can be selected and further sensor parameters can be chosen.

No.	Adr	Register sensor units of measurement and contants	unit			T	R/W
401	400	**Selection of the unitary system** (SI or Imperial) Note: For sensors with differential pressure / volumetric flow (22ADP), this value is only readable and is set via the 6th dip switch (ON = Imperial / OFF = SI) 	SI	°C	value = 1	u	R/W
			Imperial	°F	value = 2		
402	401	**reserved**					
403	402	**Input height above sea level** [scaling factor: 1.0] Default value = 330 m (input always in m and not in ft)	m			u	R/W
404	403	**Input k-factor volumetric flow 1 according to manufacturer's specification** [scaling factor: 0.1] [Default value = 1.0] Example: k-factor 1500 = 15000_{10}	- -			u	R/W
405	404	**Selection off the fan manufacturer, volumetric flow 1** (The fan model has influence on the formula to calculate the volumetric flow) [Default value = 0]	Rosenberg Comefri Gebhart Nicotra		value = 0	u	R/W
			Ziehl-Abegg EBM-Papst AIR-CONCEPTS		value = 1		
			Fläkt-Woods		Value = 2		
406	405	**Input k-factor volumetric flow 2 according to manufacturer's specification** (@dual ADP only) [scaling factor: 0.1] [Default value = 1.0] Example: k-factor 1500 = 15000_{10}	- -			u	R/W
407	406	**Selection off the fan manufacturer, volumetric flow 2** (@dual ADP only) (The fan model has influence on the formula to calculate the volumetric flow) [Default value = 0]	Rosenberg Comefri Gebhart Nicotra		value = 0	u	R/W
			Ziehl-Abegg EBM-Papst AIR-CONCEPTS		value = 1		
			Fläkt-Woods		Value = 2		

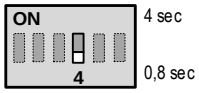
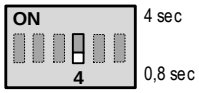
Equations of fan manufacturers

Each fan manufacturer has their own equation; k factor range and unit of measure (see tables). By selecting, a manufacturer in register 405 and corresponding plant-specific k factor in register 404, correct settings for each manufacturer will automatically be applied.

Manufacturer	Equation	Unit	k factor range
Fläkts Woods	$q = \frac{1}{k} \cdot \sqrt{\Delta P}$	m^3/s	0.3...99
Rosenberg	$q = k \cdot \sqrt{\frac{2 \cdot \Delta P}{\rho}}$	m^3/h	37...800
Nicotra-Gebhardt	$q = CPFN \cdot \sqrt{\frac{2 \cdot \Delta P}{\rho}}$	m^3/h	10...1500

Manufacturer	Equation	Unit	k factor range
Ziehl-Abegg	$q = k \cdot \sqrt{\Delta P}$	m^3/h	10...1500
Comefri	$q = k \cdot \sqrt{\frac{2 \cdot \Delta P}{\rho}}$	m^3/h	10...2000
EBM - Papst	$q = k \cdot \sqrt{\Delta P}$	m^3/h	10...1500
Gebhardt	$q = k \cdot \sqrt{\frac{2 \cdot \Delta P}{\rho}}$	m^3/h	50...4700

Note: If the units of measurement are set to Imperial register 10 output is cfm.

No.	Adr	Register sensor units of measurement and contants	unit	T	R/W
408	407	**Response time differential pressure 1** Response time can be set with DIP switch 4 of sensor main board 22ADP. S1 for differential pressure 1.	 1: DIP switch off -> 0.8 s 2: DIP switch on -> 4.0 s	u	R
409	408	**Response time volumetric flow 1** [scaling factor: 1.0] [Default value = 1.0]	1…30 s	u	R/W
410	409	**Response time differential pressure 2** (@dual ADP only) Response time can be set with DIP switch 4 of sensor main board 22ADP. S2 for differential pressure 2.	 1: DIP switch off -> 0.8 s 2: DIP switch on -> 4.0 s	u	R
411	410	**Response time volumetric flow 2** (@dual ADP only) [scaling factor: 1.0] [Default value = 1.0]	1…30 s	u	R/W
412	411	**Zeroing differential pressure 1**	0: no zeroing 1: start zeroing	u	R/W
413	412	**Zeroing differential pressure 2**	0: no zeroing 1: start zeroing	u	R/W
414	413	**Percentage value of the CO2 value in the CO2 VOC Mix Signal**	0…100 % Example: 25% means: CO2 VOC Mix = 25% CO2 and 75% VOC	u	R/W
491	490	**BETA-Value NTC 1**	Default (NTC10k2): 3970 NTC10k Carel: 3435 NTC10k Precon: 3690	u	R/W
492	491	**BETA-Value NTC 2**	Default (NTC10k2): 3970 NTC10k Carel: 3435 NTC10k Precon: 3690	u	R/W

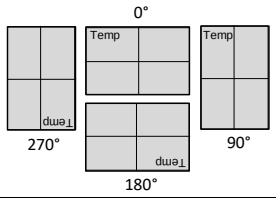
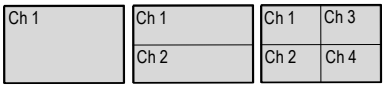
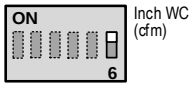
3.8 Register general device information

Registers 501 - 513 define general device information.

No.	Adr	Register general device information	unit	T	R/W	Notes
501	500	**Device detection**		u	R	700_{16}
502	501	**Sensor detection** [value 1 = Sensor value available, value 0 = Sensor not available]		u	R	example: CO2 available 0000'0000'0010'0000 example: CO2 & temperature available 0000'0000'0010'0001
		Bit				
		0 Temperature				
		1 Relative humidity				
		2 Absolute humidity				
		3 Enthalpy				
		4 Dew point				
		5 CO2				
		6 VOC				
		7 CO2 VOC Mix				
		8 Differential pressure 1				
		9 Volumetric flow 1				
		10 Differential pressure 2				
		11 Volumetric flow 2				
503	502	**Hardware version main circuit board**		u	R	version# is shown as a hexadecimal number (example V 4.6 → 0406_{16} → $0000'0100'0000'0110_2$)
504	503	**Firmware version main circuit board**		u	R	
505	504	**Hardware version RS-485 module**		u	R	
506	505	**Firmware version RS-485 module**		u	R	
507	506	**reserve**				
508	507	**reserve**				
509	508	**Minimum output voltage** [scaling factor: 1.0] (Value is adjustable 0…9 V, default value = 0 V)	V	u	R/W	-
510	509	**Maximum output voltage** [scaling factor: 1.0] (Value is 5 or 10 V according to pos. of 5th DIP switch of DIP switch on main board 22ADP OFF = 10 V, ON = 5V)	V	u	R	
511	510	**Operating hours counter** [scaling factor: 1.0]	h	u	R	-
512	511	**Countdown for maintenance** [scaling factor: 1.0] [Default value = 17520]	h	u	R/W	Set a maintenance or visual inspection time after which sensor shall be checked. (After countdown time has expired a new countdown value has to be set.
513	512	**Countdown for visual inspection** [scaling factor: 1.0] [Default value = 17520]	h	u	R/W	

3.9 Register LCD display configuration

Registers 601 - 617 define display parameters of the optional LCD.

No.	Adr	Register LCD display configuration	unit	T	R/W	Notes
601	600	**Enable LCD** [value 1 = enabled, value 0 = disabled]		u	R/W	-
602	601	**Brightness LCD** [scaling factor: 1.0] [0…100 %]	**%**	u	R/W	-
603	602	**Rotation LCD** [value 0 = 0°, value 1 = 90°, value 2 = 180°, value 3 = 270°]		u	R/W	
604	603	**Enable traffic light function LCD** [value 0 = disabled, value 1 = enabled]		u	R/W	-
605	604	**Enable symbol maintenance on LCD** [value 0 = disabled, value 1 = enabled, default = 1]		u	R/W	If the countdown time (set value of register 512 and 513) has expired, the symbol will be shown on the LCD display.
606	605	**Enable symbol visual inspection on LCD** [value 0 = disabled, value 1 = enabled, default = 1]		u	R/W	
607	606	**reserve**				
608	607	**Enable LCD channel 1** [value 0 = disabled, value 1 = enabled]		u	R/W	According to selection of sensor channels of measuring values register 301 - 310 
609	608	**Enable LCD channel 2** [value 0 = disabled, value 1 = enabled]		u	R/W	
610	609	**Enable LCD channel 3** [value 0 = disabled, value 1 = enabled]		u	R/W	
611	610	**Enable LCD channel 4** [value 0 = disabled, value 1 = enabled]		u	R/W	
612	611	**Channel assignment for traffic light function**		u	R/W	Input Channel Nr. 1 - 4 from the settings of Register 301 - 310
613	612	**Traffic light function** **Definition of color of LCD back lightning range 1**		u	R/W	0 = off 1 = green 2 = yellow 3 = red 4 = blue 5 = magenta 6 = cyan 7 = white
614	613	**Traffic light function** **Definition of color of LCD back lightning range 2**		u	R/W	
615	614	**Traffic light function** **Definition of color of LCD back lightning range 3**		u	R/W	
616	615	**Threshold value traffic light function** **Range 1 → range 2**		s	R/W	Setting for change threshold of LCD back lightning. The value input corresponds to Channel 1, which is set in Register 301 - 310 Example: Change from blue to green at 20° C Change from green to red at 35° C Range 1 (Register 613) set to blue = 4_{10} Range 2 (Register 614) set to green = 1_{10} Range 3 (Register 615) set to red = 3_{10} Threshold range1→ 2 (Register 616) = 20_{10} Threshold range 1→ 3 (Register 617) = 35_{10} Exception: If 6th DIP switch of the sensor main board (22ADP) is (ON) set to **inchWC** [scaling factor is 0.001] Value of register 401 is 2 (imperial) 
617	616	**Threshold value traffic light function** **Range 2 → range 3**		s	R/W	