



## Air Velocity Transmitter

issue date: 7.Feb.2022, document no: SAV.DS\_v33

### Features

---

- Hotwire compact thermal sensor
- SAV.5 series field selectable ranges: 0...1, 0...2, 0...3 and 0...5 m/s
- SAV.2 series field selectable ranges: 0...5, 0...10, 0...15 and 0...20 m/s
- Zero & Span Calibrations
- AV analog output signal as 4-20 mA and 0...10 Vdc
- Temperature analog output signal as 4-20 mA and 0...10 Vdc
- Operating voltage 24V AC/DC

### Options

---

- Custom design Display
- Modbus / RS485 port
- Relay, 1 or 2 relays, can be set individually
- Buzzer, can be set individually
- PID, RTC and Datalogger advanced options for special applications

### Applications

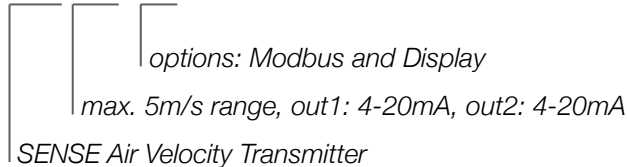
---

- HVAC supply or extract air measuring
- Cleanroom monitoring and control etc

## Ordering Codes

model	max. range	output 1	output 2	options	advanced options
SAV	2 20 m/s	0 no output	0 no output	M modbus	P PID out
	5 5 m/s	1 0...10 Vdc	1 0...10 Vdc	D display	T RTC
		2 2...10 Vdc	2 2...10 Vdc	R relay 1x	L Datalogger
		3 0...5 Vdc	3 0...5 Vdc	RR relay 2x	
		4 1...5 Vdc	4 1...5 Vdc	B buzzer	
	5 4...20 mA	5 4...20 mA			

sample order code: SAV . 555 . MD



1. AO1 is always for Air Velocity output
2. AO2 is Air Velocity output as standard but it can be as Temperature output
3. Temperature output requests should be informed while ordering
4. For fine temperature measurement, air velocity should be higher than 2 m/s
5. Relay and Buzzer options should have to be ordered with the Display option
6. For advanced options and special applications, please contact us [info@senseandcontrol.com](mailto:info@senseandcontrol.com)

## General Notes

1. High density of humidity may effect the measurements.
2. Observe maximum permissible cable lengths.
3. If cable runs parallel to the mains cable: Use shielded cables.
4. Never test with flammable gasses.
5. The cable entry always should have to be pointing downwards.
6. The data indicated under 'Technical Data' apply only to vertically mounted transmitters.
7. Transmitters should be far away from humidifiers, min. 2 meters.











## Response Time Setting

Please check if there is any special instruction on the enclosure or inside the cover

DIP	Response Time
	5 sec
	1 sec

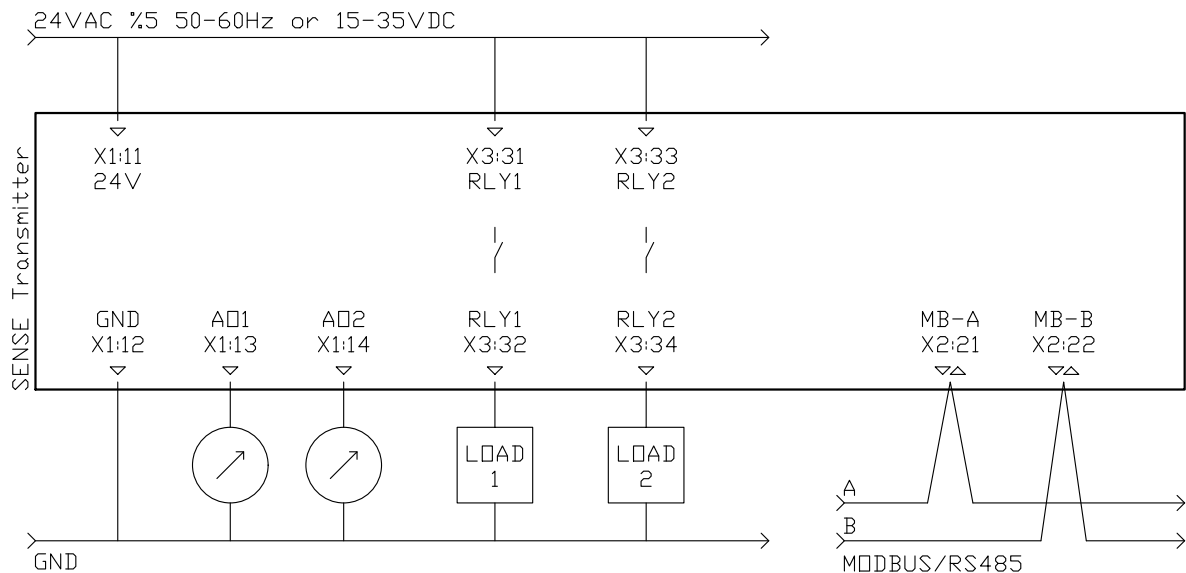
## Range Settings

Please check if there is any special instruction on the enclosure or inside the cover

DIP	SAV.5 Ranges	DIP	SAV.2 Ranges	DIP	Temp. Ranges
	0...5 m/s		0...20 m/s		-30 ...+70°C
	0...3 m/s		0...15 m/s		0 ...+100°C
	0...2 m/s		0...10 m/s		
	0...1 m/s		0...5 m/s		

## Electrical Connections

1. Please be sure about current direction for current outputs and polarity for voltage outputs.
2. Relay contact is Normally Open and rating is max. 1A at 230VAC
3. We kindly advise using 24V for avoiding high voltage harmonics and external power relay for bigger loads
4. Please use shielded and twisted paired cables for Modbus connections
5. Please observe RS485 termination rules, max. 32 devices in a single Modbus line

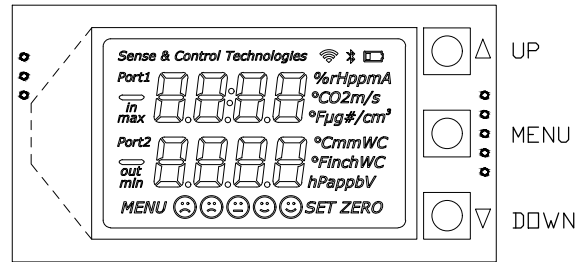
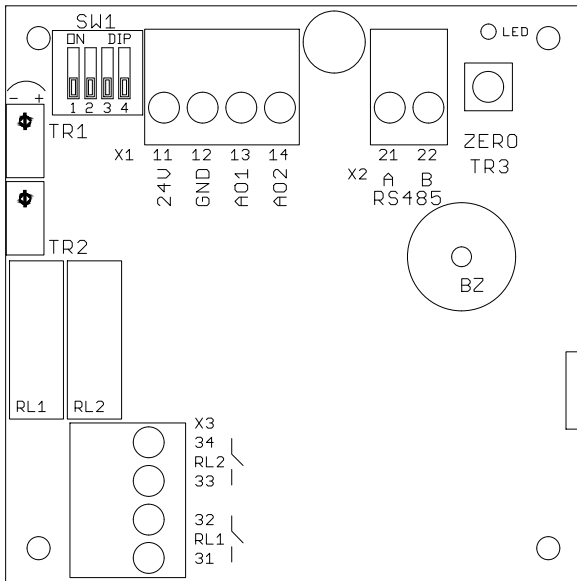


## Technical Data

---

Electrical	Power Supply	AC 24V ( $\pm$ 5%), 50-60 Hz DC 15...35 V
	Power Consumption	< 2.5 W
Outputs	Current Output	4...20 mA, maximum 500 $\Omega$
	Voltage Output	0...10 Vdc, minimum 1.000 $\Omega$ 0...5 Vdc, minimum 1.000 $\Omega$
	Relay Output	max. rating 1A @ 220 Vac
Accuracy	Air Velocity	$\pm$ 5% for 0...20 m/s
	Temperature	0,5°C at min. 1 m/s
General Data	Sensing Element	Hotwire PT1200
	Media	Air or non-aggressive gasses
	Operating Temperature	-25...+70°C
	Storage Temperature	-30...+85°C
General Data	Sensing Element	Electrochemical Cell
	Media	Air or non-aggressive gasses
	Storage Temperature	0 ...+20°C recommended
Ranges	SAV.5	0...1, 0...2, 0...3 and 0...5 m/s
	SAV.2	0...5, 0...10, 0...15 and 0...20 m/s
	Temperature	-30...+70 °C and 0...+100 °C
Connections	X1-X2 Terminals	Pluggable screw terminal
	X3 Terminals	Fixed screw terminal
	Cable	maximum 1.5mm <sup>2</sup>
	Cable Gland	M16
Protection	enclosure	IP65 or NEMA 4
	probe	IP10 or NEMA 1
Standards	EMC Directive	EN 61326-1
Dimensions	enclosure	98.0 x 81.5 x 45.5 mm
	probe	$\varnothing$ 13 mm x 225 mm
	packed	100 x 85 x 323 mm
Weight	packed	265gr

# Transmitter Hardware



**SW1** DIP Switch for configuration range and response time

## X1 TERMINAL

<b>11</b>	24V	15...35 Vdc or 24 Vac (± %5, 50-60 Hz)
<b>12</b>	GND	ground for power and reference for outputs
<b>13</b>	AO1	analog output 1
<b>14</b>	AO2	analog output 2

## X2 TERMINAL

<b>21</b>	A / RS485	modbus communication positive pair
<b>22</b>	B / RS485	modbus communication negative pair

**LED** bead LED, periodically lights ON and OFF  
modbus communication, blinks when there is a communication

**TR1** span trimmer for AV

**TR2** offset trimmer for temperature

**ZERO / TR3** zero button for AV

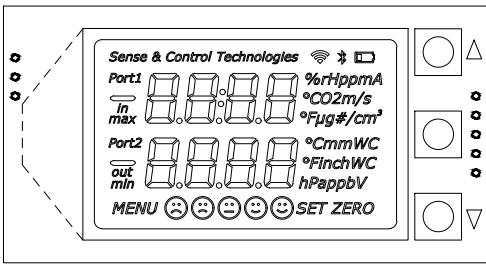
**RL1 & RL2** relay 1 and relay 2

**BZ** buzzer

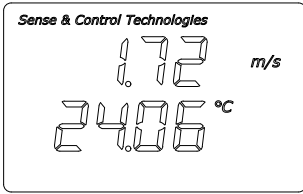
## X3 TERMINAL

<b>31-32</b>	NO - RL1	relay 1 dry contact max. rating 1A @ 220 Vac
<b>33-34</b>	NO - RL2	relay 2 dry contact max. rating 1A @ 220 Vac

# Display & Buttons



- UP *press for increasing the value or choosing the next parameter*
- MENU *press and wait to enter MENU, click to navigate between sub menus one by one*
- DOWN *press for decreasing the value or choosing the previous parameter*



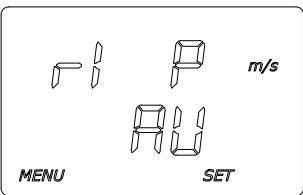
main screen  
transmitter is working



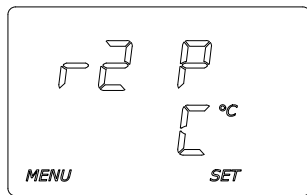
keep pressing MENU button until seeing SET  
transmitter is not working in MENU mode

## Parameters for Relay & Buzzer

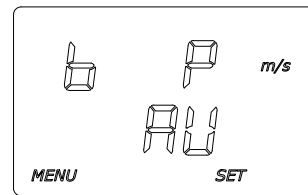
Main Screen >> r1 P >> r1 L >> r1 H >> r1 A >>  
 >> r2 P >> r2 L >> r2 H >> r2 A >>  
 >> B P >> B L >> B H >> B A >> Main Screen



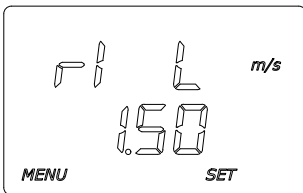
PARAMETER selection for Relay 1



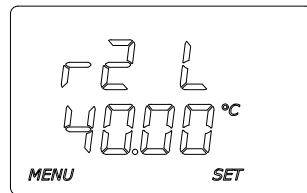
PARAMETER selection for Relay 2



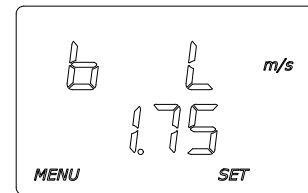
PARAMETER selection for Buzzer



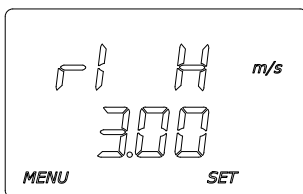
LOW set point for Relay 1



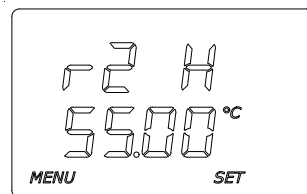
LOW set point for Relay 2



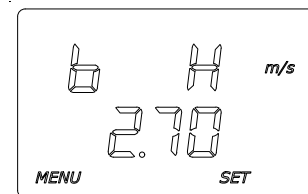
LOW set point for Buzzer



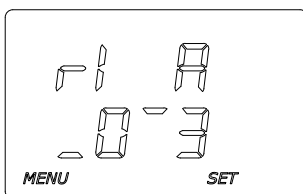
HIGH set point for Relay 1



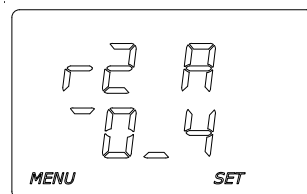
HIGH set point for Relay 2



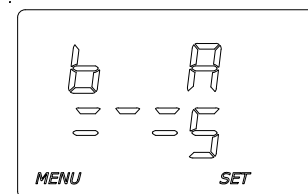
HIGH set point for Buzzer



ACTION selection for Relay 1



ACTION selection for Relay 2

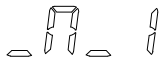


ACTION selection for Buzzer

## Actions for Relay & Buzzer



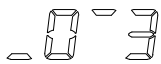
action 0, valid for relays and buzzer,  
 relay contact is always OPEN  
 buzzer is always SILENCE



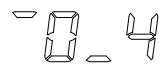
action 1, valid for relays and buzzer,  
 relay contact is CLOSED between points, OPEN under LOWpoint and OPEN over HIGHpoint  
 buzzer is WARNING between points, SILENCE under LOWpoint and SILENCE over HIGHpoint



action 2, valid for relays and buzzer,  
 relay contact is OPEN between points, CLOSED under LOWpoint and OPEN over HIGHpoint  
 buzzer is SILENCE between points, WARNING under LOWpoint and SILENCE over HIGHpoint



action 3, valid for relays and buzzer,  
 relay contact is CLOSED over HIGHpoint, OPEN under LOWpoint, hysteresis between points  
 buzzer is WARNING over HIGHpoint, SILENCE under LOWpoint, hysteresis between points



action 4, valid for relays and buzzer,  
 relay contact is OPEN over HIGHpoint, CLOSED under LOWpoint, hysteresis between points  
 buzzer is SILENCE over HIGHpoint, WARNING under LOWpoint, hysteresis between points



action 5, valid only for buzzer,  
 buzzer is WARNING over HIGHpoint, SILENCE under LOWpoint,  
 buzzer is WARNING intermittently between points,



action 6, valid only for buzzer,  
 buzzer is WARNING under LOWpoint, SILENCE over HIGHpoint,  
 buzzer is WARNING intermittently between points,



action 7, valid only for buzzer,  
 buzzer is following relay 1 contact,  
 buzzer is WARNING when relay 1 contact is CLOSED, SILENCE when the contact is OPEN



action 8, valid only for buzzer,  
 buzzer is following relay 2 contact,  
 buzzer is WARNING when relay 2 contact is CLOSED, SILENCE when the contact is OPEN

ACTIONS	under LOW	between LOW & HIGH	over HIGH
0 : 0.0.0	Open / Silence	Open / Silence	Open / Silence
1 : 0.1.0	Open / Silence	Closed / Warning	Open / Silence
2 : 1.0.1	Closed / Warning	Open / Silence	Closed / Warning
3 : 0.X.1	Open / Silence	Hysteresis	Closed / Warning
4 : 1.X.0	Closed / Warning	Hysteresis	Open / Silence
5 : 0.-.1	Silence	Pre Alarm	Warning
6 : 1.-.0	Warning	Pre Alarm	Silence
7 : =r1	Silence when RL1 is Open, Warning when RL1 is Closed		
8 : = r2	Silence when RL2 is Open, Warning when RL2 is Closed		

0 : Relay Contact is OPEN, Buzzer is in Silent mode

1 : Relay Contact is CLOSED, Buzzer is in Warning mode

X : Relay Contact is at HYSTERESIS position, OPEN if previous position open, CLOSED if previous position closed

- : Buzzer is in HYSTERESIS mode, Silent if previous mode is silent, Warning if previous mode is warning

- : Buzzer is in PRE ALARM mode, Buzzer is warning intermittently

## Modbus RS485 Protocol

Default Settings: Modbus ID:1, 9600, 8bit, None, 1. Register Table starts from Base 1.

Use Function 3 for Reading and Function 6 for Writing Holding Registers. Whenever writing to any Modbus Parameter, the new parameter is activated instantly and you should have to configure the master device according to new parameters. For every reboot/initializing, Modbus is activated with default parameters for 3 seconds. After 3 seconds, Modbus is reconfigured according to your parameter settings.

Unlisted registers are for analog output calibrations and some system parameters. Please do not change unlisted registers.

Register	R/W	Range	Description
1	R & W	1...254	Modbus Address
2	R & W	0...1	Baudrate, 0: 9.600, 1: 19.200
3	R & W	0...3	Bit_Parity_Stop, 0: 8bit_None_1, 1: 8bit_None_2, 2: 8bit_Even_1, 3: 8bit_Odd_1
4	R	0...2.000	AV as m/s x100, divide by 100 for exact value
5	R	-3.000...10.000	TEMP as C x100, divide by 100 for exact value
6	R	0 or 1	Relay 1, contact position, 0: OFF - Contact is Open, 1: ON - Contact is Closed
7	R	0...1.000	Relay 1, LOW point
8	R	0...1.000	Relay 1, HIGH point
9	R	0...4	Relay 1, ACTION
10	R	0 or 1	Relay 2, contact position, 0: OFF - Contact is Open, 1: ON - Contact is Closed
11	R	0...1.000	Relay 2, LOW point
12	R	0...1.000	Relay 2, HIGH point
13	R	0...4	Relay 2, ACTION
14	R	0 or 1	Buzzer, 0: OK-Silence, 1: PreAlarm - warning intermittently, 2: WARNING continuously
15	R	0...1.000	Buzzer, LOW point
16	R	0...1.000	Buzzer, HIGH point
17	R	0...4	Buzzer, ACTION
18-28			set-up parameters, never use, never change..!
29	R	0...2.000	AV as m/s x100, divide by 100 for exact value
30	R	0...3.937	AV as feet/min
31	R	-3.000...10.000	TEMP as C x100, divide by 100 for exact value
32	R	-30...100	TEMP as C
33	R	-2.200...21.200	TEMP as F x100, divide by 100 for exact value
34	R	-22...212	TEMP as F



# Air Velocity Calibration Procedure

---

## Set-up for Calibration

1. Power the unit and connect the unit with Modbus/RS485,
2. Check response time, response time can be set 1 sec. or 5 sec., it is recommended to set 1 second for any calibration, *check page 2 for response time setting*,

## ZERO Calibration

3. Close the probe with the original cap and keep the unit working,
4. Wait for about 10 minutes, for measuring the raw value of 0 m/s,
5. Read  $U_0$  value from MR\_48, note this value to your records,
6. Write  $U_0$  value to MR\_41,
7. Write 9 to MR\_27, this is a must for saving the parameters, MR\_27 value turns to 0 automatically,
8. Remove the cap and you are ready for span calibrations,

## SPAN-1 Calibration, for low AV values

9. After ZERO please do not loose much time,
10. Apply air velocity as much as:  
for SAV.2 series, 5 m/s,  
for SAV.5 series, 1 m/s,
11. You do not need to wait too much, just be sure that you have a stable measurement,
12. Read  $U_{50-1}$  value from MR\_48, note this value to your records,
13. Write  $U_{50-1}$  value to MR\_42,
14. This calibration value is used for the sub-ranges for:  
for SAV.2 series, 5 and 10 m/s,  
for SAV.5 series, 1 and 2 m/s,
15. Write 9 to MR\_27, this is a must for saving the parameters, MR\_27 value turns to 0 automatically,

## SPAN-2 Calibration, for high AV values

16. After SPAN-1 calibration, please do not loose much time,
17. Apply air velocity as much as:  
for SAV.2 series, 10 m/s,  
for SAV.5 series, 2,5 m/s,
18. You do not need to wait too much, just be sure that you have a stable measurement,
19. Read  $U_{50-2}$  value from MR\_48, note this value to your records,
20. Write  $U_{50-2}$  value to MR\_45,
21. This calibration value is used for the sub-ranges for:  
for SAV.2 series, 15 and 20 m/s,  
for SAV.5 series, 3 and 5 m/s,
22. Write 9 to MR\_27, this is a must for saving the parameters, MR\_27 value turns to 0 automatically,

## Other Parameter Setting

23. Please calculate the values for = square root of  $(V_{50}) \times 1.000$
24. Typical  $V_{50-1}$  values:  
for SAV.2 series:  $V_{50-1}$  for 5 m/s is 2.236, write it to MR\_43,  
for SAV.5 series:  $V_{50-1}$  for 1 m/s is 1.000, write it to MR\_43,
25. Typical  $V_{50-2}$  values:  
for SAV.2 series:  $V_{50-2}$  for 10 m/s  $V_{50}$  is 3.162, write it to MR\_46,  
for SAV.5 series:  $V_{50-2}$  for 2,5 m/s is 1.581, write it to MR\_46,
26. Write 9 to MR\_27, this is a must for saving the parameters, MR\_27 value turns to 0 automatically,
27. Calibration is done.

## Notes:

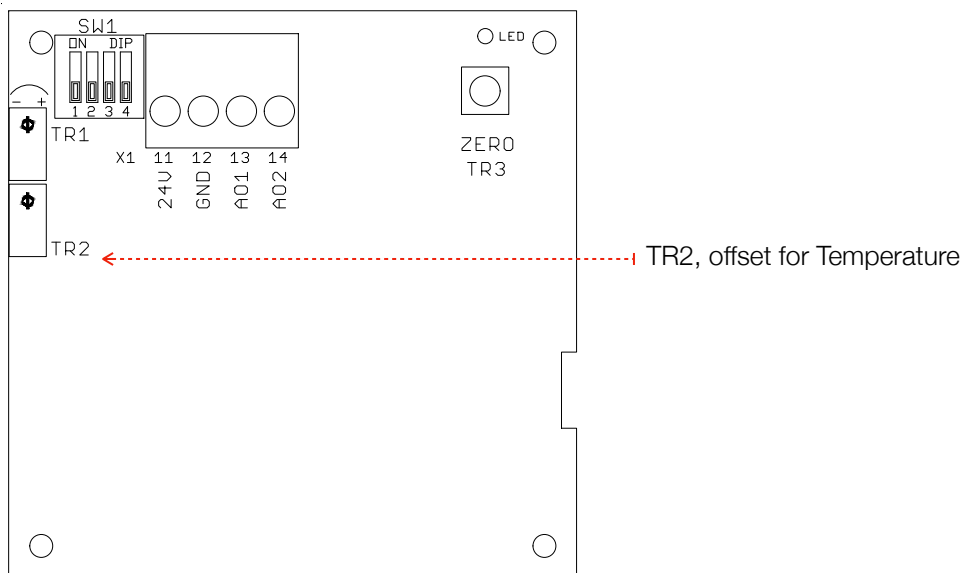
28. Please do not un-power the unit while calibration,
29. Please use filtered clean air while applying air velocity,
30. Please re-power the unit and check the parameters that you set,

## Air Velocity Calibration Parameters

Below you can find the Modbus/RS485 Register List for Calibration Parameters. These parameters are so important for fine working. Please do not change any parameter unless re-calibration.

Register	R/W	Code	Description
27	R & W		Write 9 for saving calibration parameters
41	R	$U_0$	Raw Value at 0 m/s
42	R & W	$U_{50-1}$	Raw Value for the lower calibration point
43	R & W	$V_{50-1}$	Air Velocity for the lower calibration point
44	R	$k_{av-1}$	K constant for the lower calibration point, calculated automatically
45	R & W	$U_{50-2}$	Raw Value for the higher calibration point
46	R & W	$V_{50-2}$	Air Velocity for the higher calibration point
47	R	$k_{av-2}$	K constant for the higher calibration point, calculated automatically
48	R	$U_x$	Raw Value of the sensing element
49	R	AV	Air Velocity x1.000, divide 1.000 for actual value, in m/sec.
50	R		blank

## Temperature Calibration



### OFFSET for Temperature

1. Apply air flow min. 1 m/sec
2. Adjust the TR2 trimmer while reading analog out or display

# Drawings

