



## Features

- Replaceable Electrochemical Cell (sensor)
- Measuring ranges  
0-50 ppm, 0-100 ppm, 0-200 ppm or 0-300 ppm,  
selectable ranges with DIP switch  
on request 0-500 ppm and 0-1000 ppm
- Analog outputs 0-10 Vdc and 4-20 mA,  
on request 0-5 Vdc
- Response time  
1 sec, 5 sec, 30 sec or 60 sec,  
selectable with DIP switch
- Zero-Span Calibration & Linear output
- Power supply 24 Vac/dc
- IP ratings  
IP65 for enclosure  
IP41 for sensor
- Accuracy  $\pm 3\%$
- $t_{90} < 45$  sec.
- Sensor life time 6 years expected

### COW 1351:

- Two Outputs  
Output 1 : 4-20 mA and Output 2 : 0-10 Vdc

### COW 1351 MDR2B:

- Two Outputs  
Output1 : 4-20 mA and Output 2 : 0-10 Vdc
- Modbus RS485 communication
- LCD Display
- 2 x relay outputs, user can set any level
- Buzzer

COW 1351 and COW 1351 MDR2B are standard types,  
Other types on next page.

## Application

For detection of Carbon Monoxide (CO)  
within a wide range of commercial applications such as:



Vehicle exhaust in parking structures  
(e.g. underground garages)

Engine repair shops, Tunnels, loading bays,  
Engine test benches, Shelters, Go-kart race courses, Etc.

## Ordering codes

Mounting type	Range	Output 1	Output 2	"Options"	Advanced Options
COW = Wall IP65 enclosure IP41 sensor	13 = 0-50 ppm 0-100 ppm 0-200 ppm or 0-300 ppm jumper selectable	0 = no output 1 = 0-10 Vdc 2 = 2-10 Vdc 3 = 0-5 Vdc	0 = no output 1 = 0-10 Vdc 2 = 2-10 Vdc 3 = 0-5 Vdc	M = Modbus RS485  D = LCD display  R = Relay x 1  R2 = Relays x 2  P = PID out  B = Buzzer	P = PID out  T = RTC  L = Datalogger
	310 = 0-100 ppm 0-300 ppm 0-500 ppm or 0-1000 ppm jumper selectable	4 = 1-5 Vdc 5 = 4-20 mA	4 = 1-5 Vdc 5 = 4-20 mA		

## Ordering examples

Type no.	Description	
<b>COW 1351</b>	Carbon Monoxide (CO) detector - For wall mounting, IP65 for enclosure and IP41 for sensor - Range 0-50 ppm , 0-100 ppm, 0-200 ppm or 300 ppm, selectable ranges with DIP switch - Two Outputs, Output 1: 4-20 mA and Output 2 : 0-10 Vdc	
<b>COW 1351 MDR2B</b>	Carbon Monoxide (CO) detector - For wall mounting, IP65 for enclosure and IP41 for sensor - Range 0-50 ppm , 0-100 ppm, 0-200 ppm or 300 ppm, selectable ranges with DIP switch - Two Outputs, Output 1: 4-20 mA and Output 2 : 0-10 Vdc - Modbus RS485 communication - LCD Display - 2 x relay outputs, user can set any level - Buzzer	

### Notes:

COW 1351 and COW 1351 MDR2B are standard types  
COW 1351 is the simple competitive type.  
COW 1351 MDR2B is the "full featured" type.  
Other types in ordering codes above can be supplied in minimum 25 pcs per each unique type.

Relay and Buzzer options should be ordered with LCD option for installer to change the set values and relay actions anytime.

For advanced options and special application contact us on [info@vcp.se](mailto:info@vcp.se)

Duct type available, see separate data sheet.

Room type are under development

## Technical data

Electrical	Power Supply	24 Vac ( $\pm$ %5), 50-60 Hz <sub>SEP</sub> 15-35 Vdc
	Power Consumption	< 2.5 W
Outputs	Current Output	4-20 mA, maximum 500 $\Omega$ <sub>SEP</sub>
	Voltage Output	0-10 Vdc, minimum 1.000 $\Omega$ 0-5 Vdc, minimum 1.000 $\Omega$
	Relay Output	max. rating 1A @ 220 Vac
Accuracy	CO	$\pm$ 3 %
Sensor	Sensing Element	Electrochemical
	t90	< 45 sec.
	Sensor life time	> 6 years expected
	Drift	< 5% per year
	Resolution	0.5 ppm
	Repeatability	+/-2%
	Baseline	< 5 ppm
	Filter capacity	> 20.000 ppm per hour
	Media	Air or non-aggressive gasses
	Operating Temperature	-20 to +50°C
Operating Humidity	15 to +90% % rH	
Operating Pressure	800 to 1.200 mbar	
CO ranges	COW 13-types :	0-50 ppm, 0-100 ppm, 0-200 ppm or 0-300 ppm, selectable ranges with DIP switch
	COW 310-types:	0-100 ppm or 0-300 ppm, 0-500 ppm or 0-1000 ppm, selectable ranges with DIP switch
Response time	1 sec, 5 sec, 30 sec or 60 sec, selectable with DIP switch	
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
	Sensor	IP41 or NEMA 3
Standards	EMC Directive	EN 61326-1
	CE Conformity	CE1701
Dimensions	Enclosure	98.0 x 81.5 x 45.5 mm
Weight Packed	230 grams	
Sensing Coverage area	400 m <sup>2</sup>	
Display	For COW types supplied with display the display type is LCD with visual area 25x40 mm	

## General Notes

- 1.. High density of some other gasses may effect the reading.
- 2.. Observe maximum permissible cable lengths.
- 3.. If cable runs parallel to the mains cable: Use shielded cables.
- 4.. Test only with certified calibration 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.. Wall type transmitters should have to be mounted in the center of wall but not near to any doors and windows.

## Cross Sensivity

The values given are only for information and should not be used as a basis for cross calibration.

Cross sensitivities may not be linear and should not be scaled either.

Datas based on gasing for 5 minutes using test equipment.

Test Gas	Test Gas Concentration	CO Equivalent
Carbon Monoxide	100 ppm	100 ppm
Hydrogen Sulfide	50 ppm	0 ppm
Sulphur Dioxide	20 ppm	0 ppm
Hydrogen	100 ppm	< 35 ppm
Nitric Oxide	50 ppm	< 10 ppm
Ethanol	200 ppm	< 1 ppm
Ammonia	50 ppm	0 ppm
Chlorine	15 ppm	< 1 ppm
Ethylene	100 ppm	96 ppm

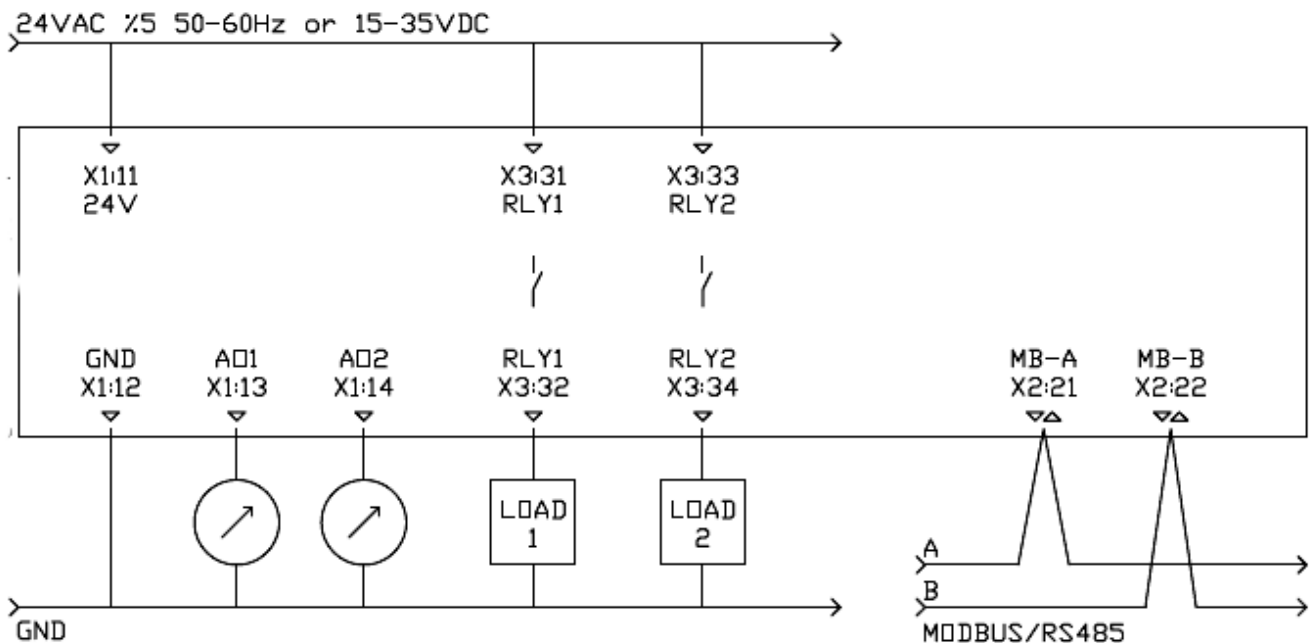
## DIP Switch Settings

- 1.. Please check if there is any special instruction on the enclosure or inside the cover
- 2.. For any calibration, please choose 1 sec. response time for faster measurements

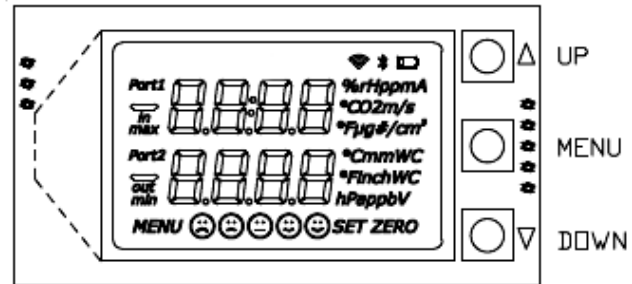
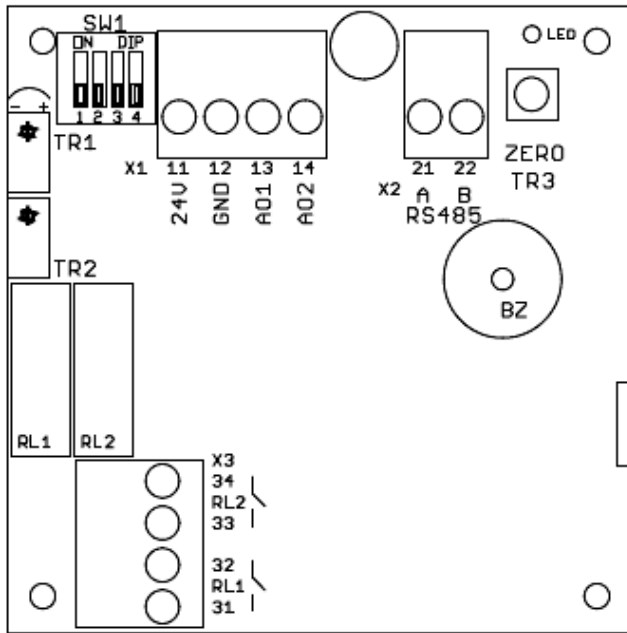
COW 13-types		COW 310-types			
DIP	Standard Ranges	DIP	Extended Ranges	DIP	Response
	50 ppm		100 ppm		1 sec
	100 ppm		300 ppm		5 sec
	200 ppm		500 ppm		30 sec
	300 ppm		1.000 ppm		60 sec

## 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



## Transmitter Hardware



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

### X1 TERMINAL

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

### X2 TERMINAL

21	A / RS485	modbus communication positive pair
22	B / RS485	modbus communication negative pair

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

**TR1** not used

**TR2** not used

**ZERO / TR3** not used

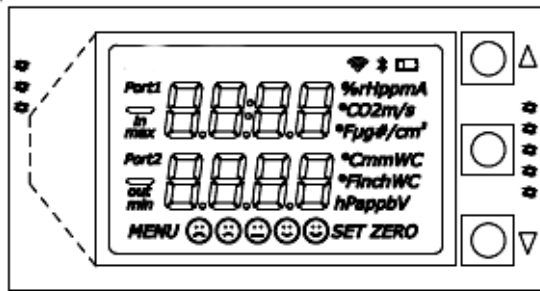
**RL1 & RL2** relay 1 and relay 2

**BZ** buzzer

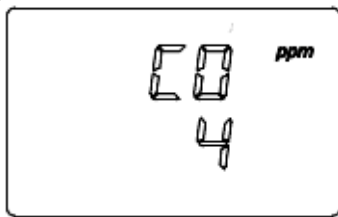
### X3 TERMINAL

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

## Display and 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*



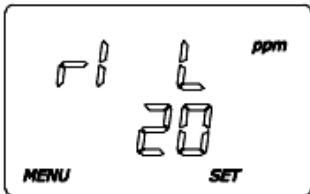
main screen  
transmitter is working



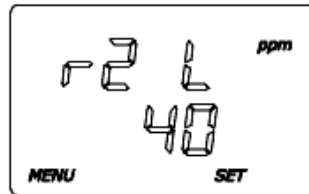
keep pressing MENU button until seeing SET  
transmitter is not working in MENU mode

## Parameters for Relay and Buzzer

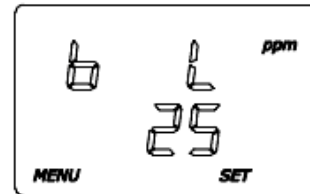
Main Screen >> r1 L >> r1 H >> r1 A >> r2 L >> r2 H >> r2 A >> BL >> BH >> BA >> Main Screen



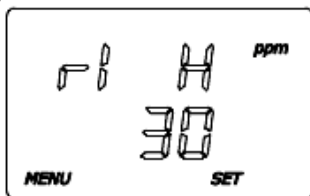
LOW set point for Relay 1



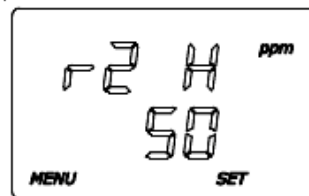
LOW set point for Relay 2



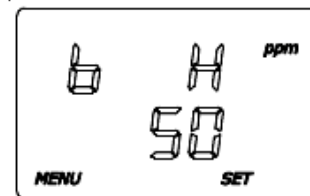
LOW set point for Buzzer



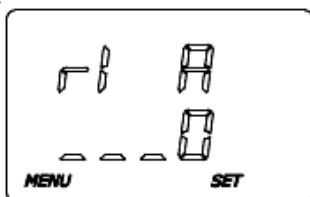
HIGH set point for Relay 1



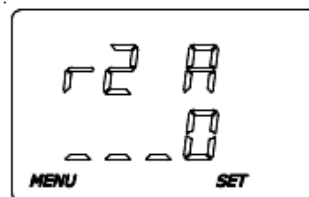
HIGH set point for Relay 2



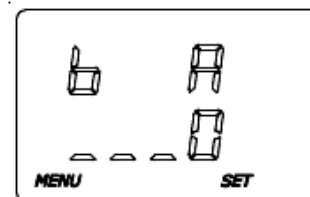
HIGH set point for Buzzer



ACTION selection for Relay 1



ACTION selection for Relay 2



ACTION selection for Buzzer

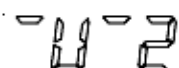
## Actions for Relay and Buzzer



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



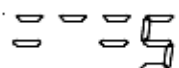
action 2, valid for relays and buzzer,  
relay contact is OPEN between points, CLOSED under LOWpoint and OPEN over HIGHpoint  
buzzer is SILENCE between points, WARNING under LOWpoint and SILENCE over HIGHpoint



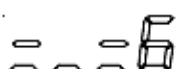
action 3, valid for relays and buzzer,  
relay contact is CLOSED over HIGHpoint, OPEN under LOWpoint, hysteresis between points  
buzzer is WARNING over HIGHpoint, SILENCE under LOWpoint, hysteresis between points



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



## Cont.. Actions for Relay and Buzzer

ACTIONS	under LOW	between LOW & HIGH	over HIGH
0 : 0.0.0	Open / Silence	Open / Silence	Open / Silence
1 : 0.I.0	Open / Silence	Closed / Warning	Open / Silence
2 : I.0.I	Closed / Warning	Open / Silence	Closed / Warning
3 : 0.X.I	Open / Silence	Hysteresis	Closed / Warning
4 : I.X.0	Closed / Warning	Hysteresis	Open / Silence
5 : 0.-.I	Silence	Pre Alarm	Warning
6 : I.-.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

I : 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, new parameter is activated instantly and you should have to configure master device according to new parameters.

For every reboot/initializing, Modbus is activated with default parameters for 3 seconds.

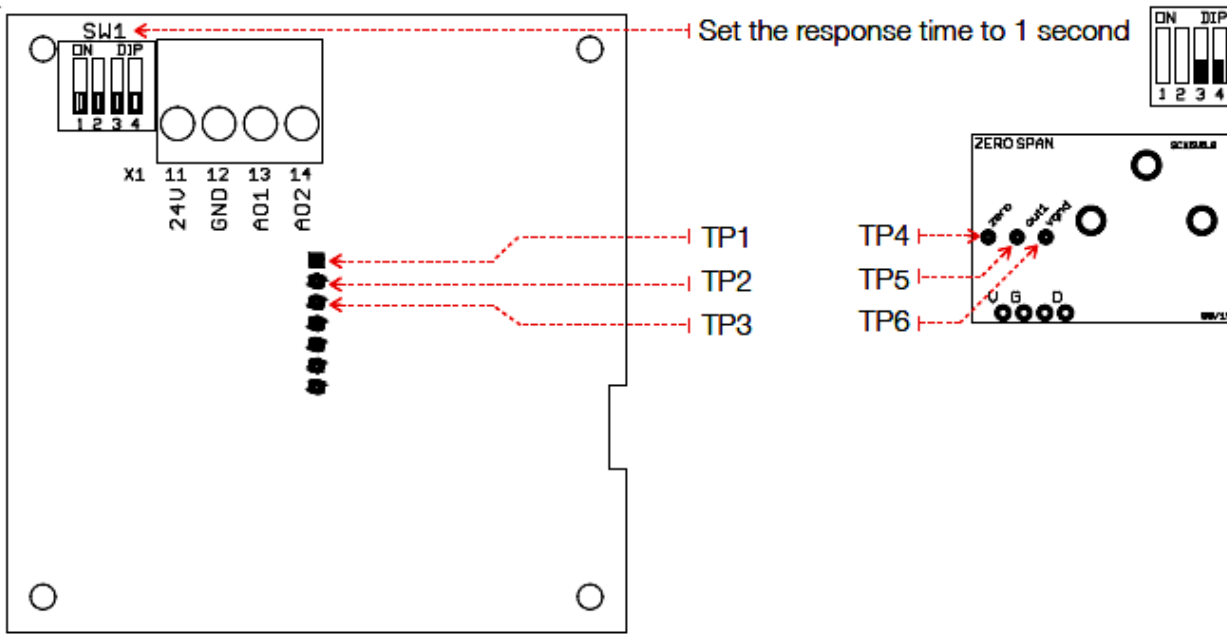
After 3 seconds, Modbus is reconfigured according your parameter settings.

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...4	Baudrate, 0: 9.600, 1: 19.200, 2: 38.400, 3: 57.600, 4: 115.200
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...1.000	CO level as ppm
5	R	0...10.000	CO level as ppm x10, divide by 10 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

## Calibration - General Information)



Before the process;

1. Please keep the unit working for minimum 10 minutes at fresh air for settling the baseline.
2. Please use certified calibration CO Test Gasses.
3. Please use a precision multimeter,  
⊖ is showing Negative/Reference Point,  
⊕ is showing Positive Measurement Point.
4. Set the best range according to calibration gas.
5. Single point calibration is enough for any range.
6. Calibration steps: Check the typical values, Set ZERO, Set SPAN.

## Check Typical Values

1. TP2⊖ vs TP1⊕ is about 5 VDC
2. TP2⊖ vs TP6⊕ is about 455 mV DC
3. TP6⊖ vs TP5⊕ is lower than 5 mV DC

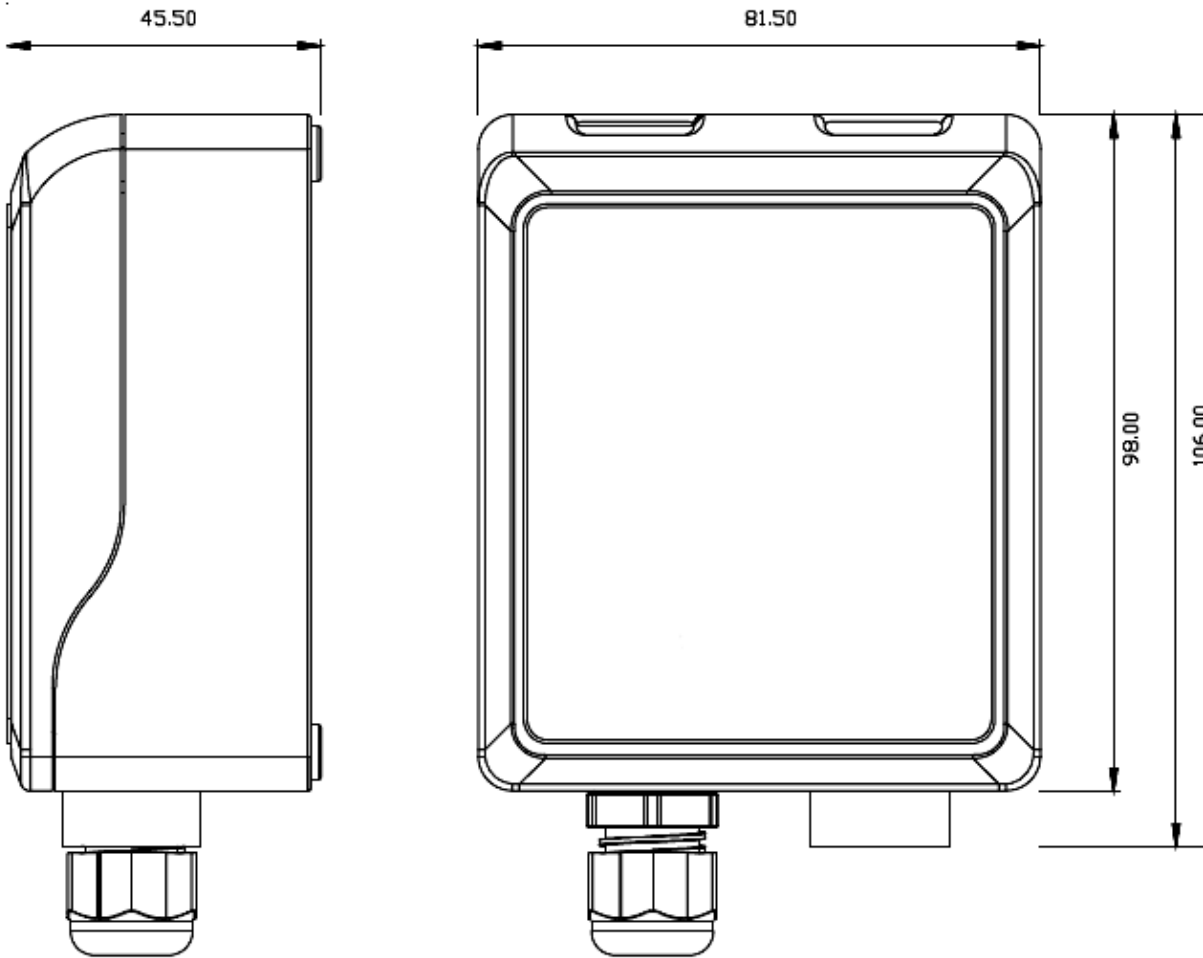
## ZERO Calibration

1. Use ZERO Trimmer for setting below values,
2. TP2⊖ vs TP4⊕ should be closest to 455 mV DC,
3. TP6⊖ vs TP4⊕ should be closest to 0 VDC,
4. TP6⊖ vs TP3⊕ should be closest to 0 VDC,

## SPAN Calibration

1. Use SPAN Trimmer for calibration.
2. Before applying the Test Gas, measure output as AO1⊕ vs GND⊖, should be very close to 0ppm.
3. Apply the test gas for min. 1 minute with 0.5 lt/min. flow rate,
4. Start calibration with SPAN trimmer,
5. Analog output should show the test gas concentration value (AO1⊕ vs GND⊖).
6. Applying test gas for 3 minutes is enough for a standard calibration.
7. For best calibration, you can apply the test gas for 5 minutes.
8. Applying the test gas for longer and for many times, reduces the CO Sensing Element life.

**Dimensions (mm)**



We reserve the right to make changes in our products without any notice which may effect the accuracy of the information contained in this leaflet.