



## Features

- **Replaceable Electrochemical Cell (sensor) new October 2019**
- **Measuring ranges 0-50 ppm, 0-100 ppm or 0-300 ppm, jumper selectable on request 0-1000 ppm**
- **Analog outputs 0-10 Vdc or 4-20 mA, on request 0-5 Vdc**
- **Single Point Calibration**
- **Power supply 24 Vac/dc**
- **IP ratings IP65 for enclosure IP41 for probe**
- **Accuracy ±3 %**
- **t90 < 50 sec.**
- **Sensor life time 6 years expected**

**COW 13F0:**

- **Output 0-10 Vdc or 4-20 mA , jumper selectable**

**(No Modbus RS485, No LCD Display and No Relay output for COW 13F0)**

**COW 1351 MDR:**

- **Two Outputs 4-20 mA and 0-10 Vdc**
- **Modbus RS485 communication**
- **LCD Display 12x2**
- **Relay output, user can set any level**

**COW 13F0 and COW 1351 MDR 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" |
|---|---|---|---|---|
| COW = Wall IP65 enclosure IP41 probe | 13 = 0-50 ppm 0-100 ppm or 0-300 ppm jumper selectable<br>310 = 0-100 ppm 0-300 ppm or 0-1000 ppm jumper selectable | 0 = no output<br>1 = 0-10 Vdc<br>2 = 2-10 Vdc<br>3 = 0-5 Vdc<br>4 = 1-5 Vdc<br>5 = 4-20 mA<br>F = 0-10 Vdc or 4-20 mA field selectable | 0 = no output<br>1 = 0-10 Vdc<br>2 = 2-10 Vdc<br>3 = 0-5 Vdc<br>4 = 1-5 Vdc<br>5 = 4-20 mA<br>F = 0-10 Vdc or 4-20 mA field selectable | M = Modbus RS485<br>D = LCD display<br>R = Relay<br>P = PID out<br>1 = 1 input<br>2 = 2 inputs |

## Ordering examples

| Type no. | Description | |
|---|---|---|
| **COW 13F0** | Carbon Monoxide (CO) detector<br>- for wall mounting, IP65 enclosure and IP41 probe<br>- Range 0-50 ppm, 0-100 ppm or 300 ppm, jumper selectable range<br>- 1 field selectable output 0-10Vdc or 4-20mA |  **COW 13F0** |
| **COW 1351 MDR** | Carbon Monoxide (CO) detector<br>- for wall mounting, IP65 enclosure and IP41 probe<br>- Range 0-50 ppm, 0-100 ppm or 0-300 ppm, jumper selectable range<br>- Two Outputs 4-20 mA and 0-10 Vdc<br>- Modbus RS485 communication<br>- LCD Display 12x2<br>- Relay output, user can set any level |  **COW 1351 MDR** |

**Notes:**

COW 13F0 and COW 1351 MDR are standard types
COW 13F0 is the simple competitive type.
COW 1351 MDR is the "full featured" type.
Other types in ordering codes above can be supplied in minumum 25 pcs per each unique type.

Relay option can be ordered with LCD or Modbus option otherwise Relay is set with a simple trimmer.

Standard ranges are 0-50 ppm, 0-100 ppm and 0-300ppm.
On request ranges are 0-100 ppm, 0-300 ppm and 0-1.000ppm.

PID option can be ordered with LCD or Modbus option (MOQ 100 pcs)
Universal inputs are only factory set as 0-5 Vdc, 0-10Vdc, NO/NC dry-contact or NTC10k (MOQ 100 pcs)

Room (IP30) and duct version with new CO cell (sensor) are under development

## Technical data

| | | |
|---|---|---|
| Electrical | Power Supply | 24 Vac (± %5), 50-60 Hz<br>14-35 Vdc |
| | Power Consumption | < 2.5 W |
| Outputs | Current Output | 4-20 mA, maximum 500 Ω |
| | Voltage Output | 0-10 Vdc, minimum 1.000 Ω<br>0-5 Vdc, minimum 1.000 Ω |
| | Relay Output | max. rating 1A @ 220 Vac accuracy |
| Accuracy | CO | ±3 % |
| Sensor | Sensing Element | Electrochemical |
| | t90 | < 50 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 |
| Ranges | CO | 0-50 ppm, 0-100 ppm or 0-300 ppm<br>on request 0-100 ppm or 0-300 ppm or 0-1000 ppm |
| Connections | Terminals | Pluggable screw terminal |
| | Cable | maximum 1.5mm2 |
| | Cable Gland | M16 |
| Protection | Enclosure | IP65 or NEMA 4 |
| | Probe | IP41 or NEMA 3 |
| Standards | EMC Directive | EN 61326-1 |
| | CE Conformity | CE1701 |
| Dimensions | Enclosure | 98.0 x 81.5 x 45.5 mm |
| | Probe | ø 12 mm x 46.5 mm |
| Weight Packed | 230 grams | |
| Sensing Coverage area | 400 m2 | |
| Storage | 0 to +20°C (recommended) | |

## 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 sensivities may not be linear and should not be scaled either.

Datas based on gasing for 5 minuttes using test equipment.

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

## Output Jumpers

1.. There is no output jumper for the fixed output types
2.. Please check if there is any special Jumper Instruction in the enclosure
3.. Range Jumpers for AO1 and AO2 have same specifications

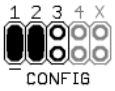
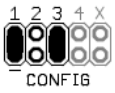
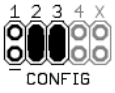
| AO1 | Output 1 |
|---|---|
| no jumpers | fixed at the factory *according to your request* |
|   | 0…10V *jumper selection* |
|   | 4…20mA *jumper selection* |

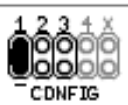
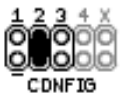
| AO2 | Output 2 |
|---|---|
| no jumpers | fixed at the factory *according to your request* |
|   | 0…10V *jumper selection* |
|   | 4…20mA *jumper selection* |

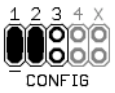
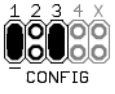
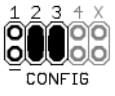
## CONFIG Jumpers

1.. Never use the jumper X at CONFIG..!
2.. Please check if there is any special Jumper Instruction in the enclosure
3.. There is no jumper for fixed range models
4.. Calibration Mode, Response selection is ignored and response time is 1 sec.

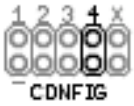
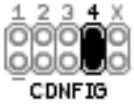
| RANGE | Standard range 0-50, 0-100, 0-300 ppm |
|---|---|
|   | 0…50 ppm |
|   | 0…100 ppm |
|   | 0…300 ppm |

| RANGE | Calibration Modes |
|---|---|
|   | 0…50 ppm, response time 1 sec |
|   | 0…100 ppm, response time 1 sec |
|   | 0…300 ppm, response time 1 sec |

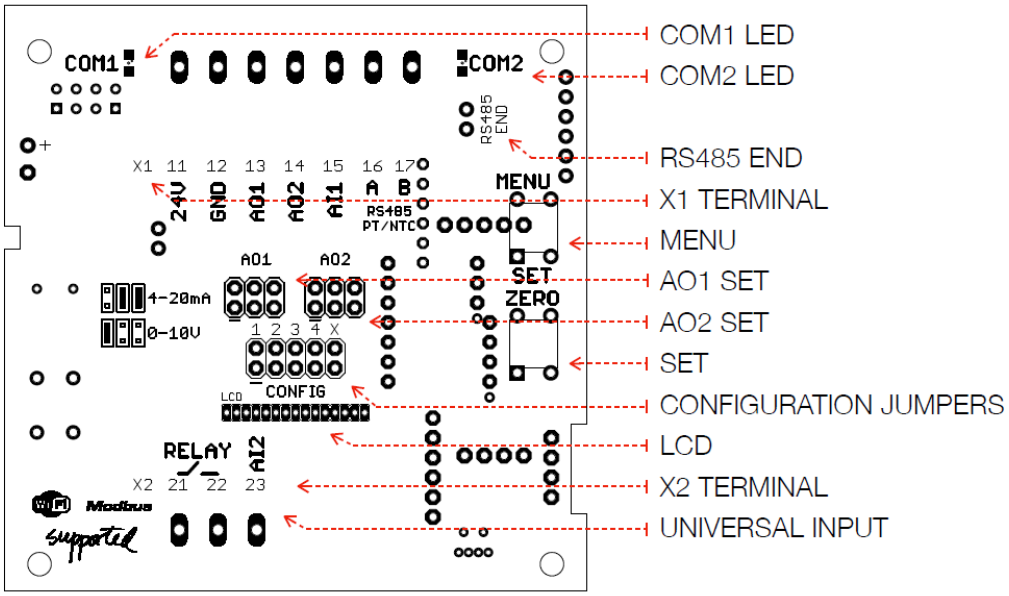
| RANGE | Extended range 0-100, 0-300, 0-1000 ppm |
|---|---|
|   | 0…100 ppm |
|   | 0…300 ppm |
|   | 0…1.000 ppm |

| RANGE | Calibration Modes |
|---|---|
|   | 0…100 ppm, response time 1 sec |
|   | 0…300 ppm, response time 1 sec |
|   | 0…1.000 ppm, response time 1 sec |

## Response

| | |
|---|---|
|   | 5 sec. |
|   | 60 sec. |

## Transmitter Hardware




**COM1 LED** without relay option, Bead LED, lights ON and OFF
with relay option, shows the relay position, lights when contact is closed (X2:21-22)

**COM2 LED** modbus communication LED, blinks when there is communication

**RS485 END** modbus ending jumper to connect internal 120ohm resistor to the RS485 line

**X1 TERMINAL**

| | | |
|---|---|---|
| **11** | power | 15-35 Vdc or 24 Vac (± %5, 50-60 Hz) |
| **12** | GND | ground for power and reference for outputs and inputs |
| **13** | output 1 | analog output for main measurement |
| **14** | output 2 | analog output for other measurement or duplicated output1 for third party devices |
| **15** | input 1 | universal input for nearby passive field devices |
| **16** | A modbus | modbus communication positive pair |
| **17** | B modbus | modbus communication negative pair |

**MENU BUTTON** press and wait to enter MENU, click to navigate between sub menus one by one
after all parameters turns back to main screen

**AO1 & AO2 SET** output set as 0-10 Vdc or 4-20 mA with jumpers, only for output selectable products,
for the fixed output models there is no jumpers,
please be sure about the output type and electrical connections

**SET BUTTON** click to change parameters, parameters are automatically set while exiting menu

**CONFIGURATION JUMPERS** jumpers to set output range and delay time
please refer to the "jumper reference" sticker on PCB or inside of cover

**CAUTION** **never use jumper X..!**

**LCD** 12x2 LCD for monitoring and setting parameters

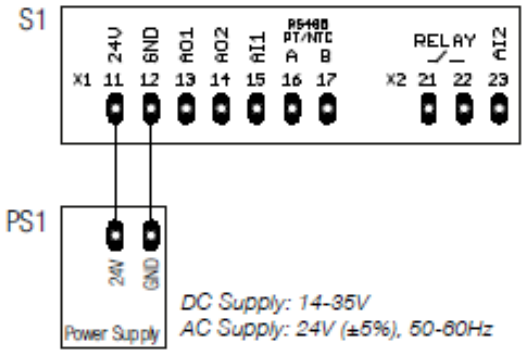
| | |
|---|---|
| contrast | adjust the contrast from MENU for a better performance |
| brightness | adjust the brightness from MENU for a better performance |

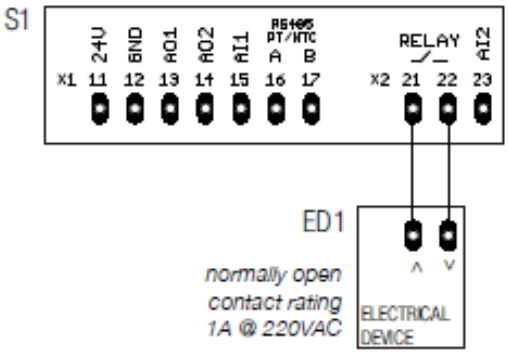
**X2 TERMINAL**

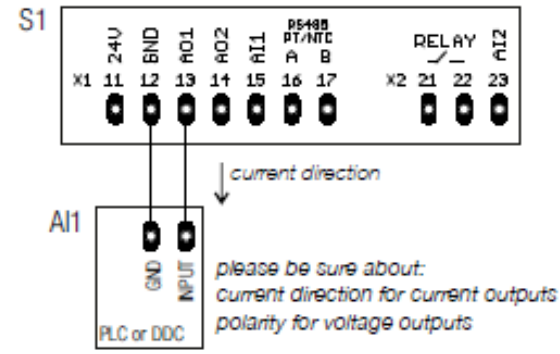
| | | |
|---|---|---|
| **21** | NO contact | relay dry contact max. rating 1A @ 220 Vac |
| **22** | NO contact | relay dry contact max. rating 1A @ 220 Vac |
| **23** | input 2 | universal input for nearby passive field devices |

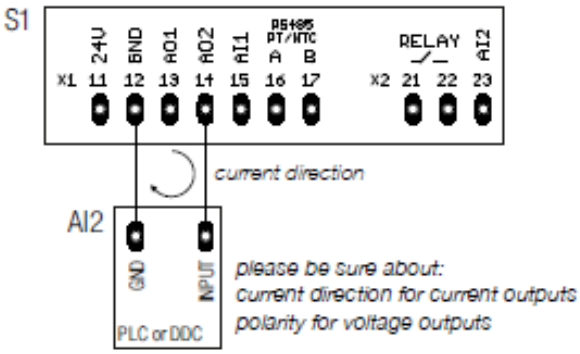
**UNIVERSAL INPUT** universal inputs (X1:15 and X2:23) can be digital input as dry contact or
analog input as NTC10k, PT1000, 0-10 Vdc or 0-5 Vdc.
universal input is an advanced option, please contact us for more details

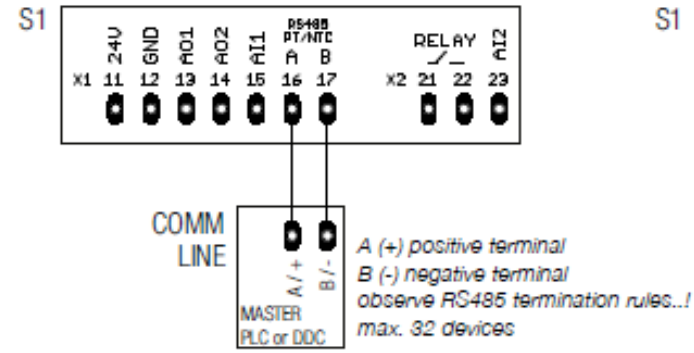
## Electrical connections

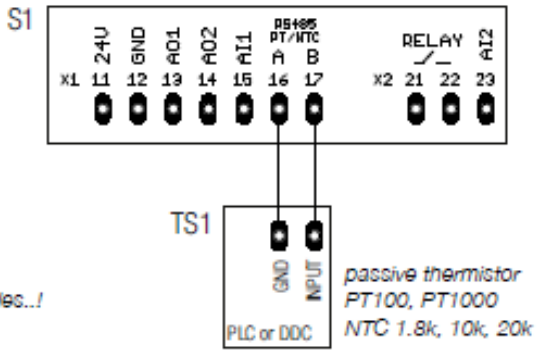


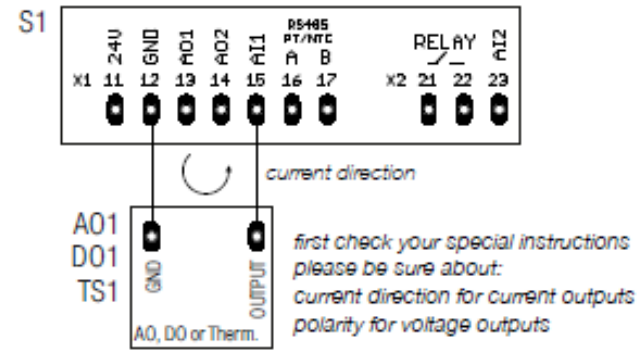



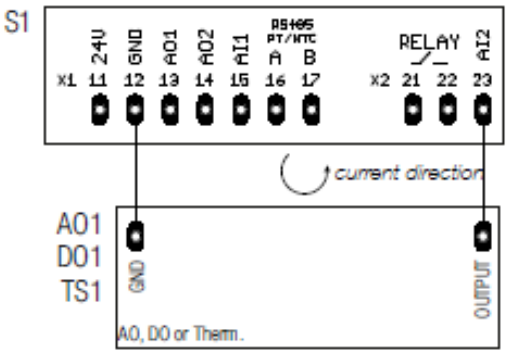



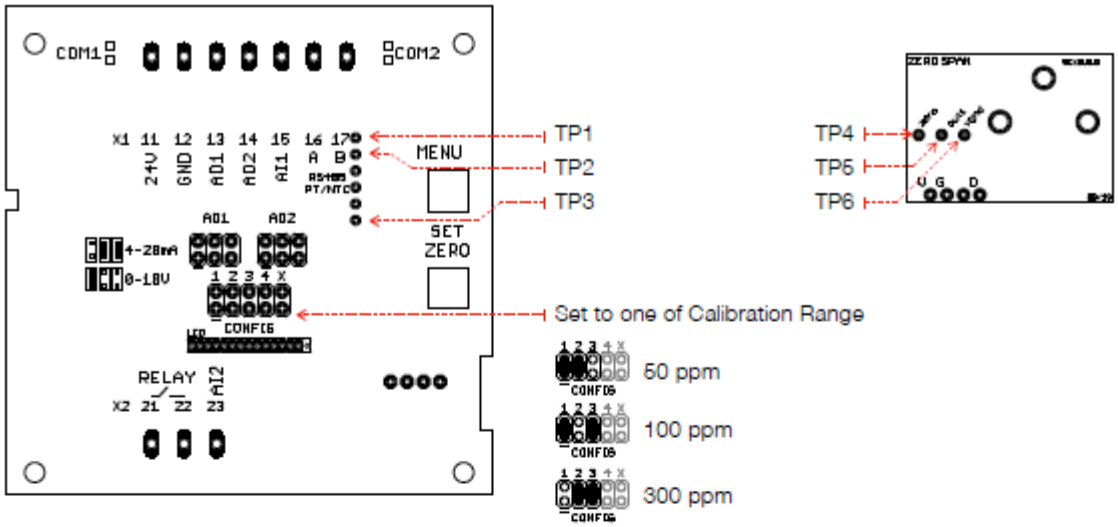



## Calibration




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. TP1⊖ vs TP2⊕ is about 6 VDC
2. TP1⊖ vs TP6⊕ is about 455 mV DC
3. TP6⊖ vs TP5⊕ is lower than 6 mV DC

### ZERO Calibration

1. Use ZERO Trimmer for setting below values,
2. TP1⊖ 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.

## Menu

| | |
|---|---|
| VCP | intro screen<br>duration 2 seconds |
| CO ppm<br>8 | Main screen, measuring value<br>normal operating mode |
| ENTER MENU<br>>>>>>>> | press and hold MENU button for entering menu<br>if you skip pressing MENU button before seeing OK, you will be back to main screen |
| ENTER MENU<br>OK | now you are in MENU |
| M1 Relay<br>EnterSetting | RELAY_MENU, press SET button for entering RELAY_MENU,<br>press MENU button to skip RELAY_MENU and pass to M2_RANGE |
| M1a Min.Set<br>10 ppm <> | you can set Min.Set for RELAY_MENU while arrows (< >) are on screen,<br>press SET button for decreasing or MENU button for increasing the Min.Set |
| M1a Min.Set<br>12 ppm | wait for 3 sec. after pressing to any button, the arrows (< >) are hidden,<br>press MENU button to pass Max.Set, press SET button for editing Min.Set |
| M1b Max.Set<br>22 ppm <> | Max.Set setting is same as Min.Set setting |
| M1c Mode Set<br>Closed 0.I.0 | relay contact action according to min. and max. set points,<br>select with SET button, skip or pass to next screen with MENU button |
| M2 RANGE<br>0...100 ppm | select the RANGE with SET button,<br>skip or pass to next screen with MENU button |
| M3 RESPONSE<br>SLOW (60sec) | select the RESPONSE time with SET button,<br>skip or pass to next screen with MENU button |
| M4 CONTRAST<br>5 | set the CONTRAST between 0 to 10 with SET button, default is 5,<br>skip or pass to next screen with MENU button |
| M5 BRIGHTNES<br>5 | set the BRIGHTNESS between 0 to 10 with SET button, default is 5,<br>skip or pass to next screen with MENU button |
| M6 OUTP. set<br>EnterSetting | OUTPUT_MENU, press SET button for calibration Analog Outputs,<br>press MENU button to skip this menu and pass to M7_MODBUS |
| M6a out1.min<br>780 | calibration AO1 for min. value, you can set it while arrows (< >) are on screen,<br>press SET button for decreasing or MENU button for increasing the value |
| M6b out1.max<br>3920 | calibration AO1 for max. value, you can set it while arrows (< >) are on screen,<br>press SET button for decreasing or MENU button for increasing the value |
| M6c out2.min<br>0 | calibration AO2 for min. value, you can set it while arrows (< >) are on screen,<br>press SET button for decreasing or MENU button for increasing the value |
| M6d out2.max<br>3910 | calibration AO2 for max. value, you can set it while arrows (< >) are on screen,<br>press SET button for decreasing or MENU button for increasing the value |

| | |
|---|---|
| M7 MODBUS<br>EnterSetting | MODBUS_MENU, press SET button for setting Modbus Parameters,<br>press MENU button to skip this menu and EXIT |
| M7a MB ID<br>1 | Modbus ID, you can set it while arrows (< >) are on screen,<br>press SET button for decreasing or MENU button for increasing the value |
| M7b MB Baudr<br>9600 | select the MODBUS BAUDRATE with SET button,<br>skip or pass to next screen with MENU button |
| M7c MB B-P-S<br>8 None 1 | BIT - PARITY - STOP BIT settings, select with SET button,<br>skip or pass to next screen with MENU button |
| MB Set: 1<br>9600 8N1 | no settings, just showing the Modbus Parameters,<br>press MENU button for EXIT |
| CO ppm<br>1 | Main screen, measuring value<br>normal operating mode |

## Modbus Protocol

Using Function 3 for Reading and Function 6 for Writing Holding Registers.
Register Table starts from Base 1. Default Settings: Modbus ID:1, 96000, 8bit, None, 1.

| 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…1.000 | CO level as ppm |
| 6 | R | 0 or 1 | Relay contact position, *0: OFF/Open, 1: ON/Close* |
| 7 | R & W | 0 to 4 | Relay Mode, *0:Closed, 1:Open, 2:HighOn, 3:LowOn, 4:Off* |
| 8 | R & W | 0…1.000 | MIN SET for Relay |
| 9 | R & W | 0…1.000 | MAX SET for Relay |
| 10 | R & W | | Blank |
| 11 | R & W | | Blank |
| 12 | R & W | | Blank |
| 13 | R & W | | Blank |
| 14 | R & W | | Blank |
| 15 | R & W | | Blank |
| 16 | R & W | | Blank |
| 17 | R & W | | Blank |
| 18 | R & W | | Blank |
| 19 | R & W | | Blank |
| 20 | R & W | | Blank |

## Relay

| Relay Mode | < Min. Set | between Min. & Max. Set | > Max. Set |
|---|---|---|---|
| Closed / 0.I.0 | OPEN | CLOSED | OPEN |
| Open / I.0.I | CLOSED | OPEN | CLOSED |
| HighOn / 0.X.I | OPEN | HYSTERESIS | CLOSED |
| LowOn / I.X.0 | CLOSED | HYSTERESIS | OPEN |
| Off / 0.0.0 | OPEN | OPEN | OPEN |

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

## Dimensions (mm)