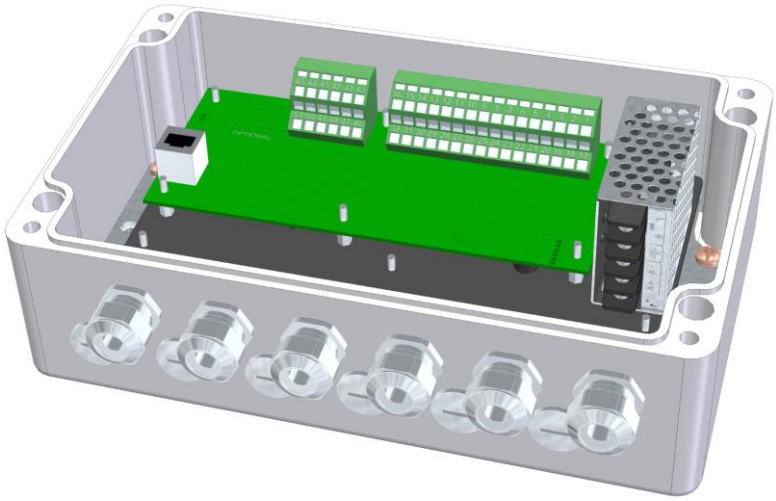
OBSERVATOR
instruments

OMC-183-ML Signal Conditioning Unit



Installation & technical user manual

Version 1.05 - 2019

Author: Observator Instruments

Revisions:

0.1 (26-08-2016)	Conversion of OMC-183 hardware into OMC-183-ML hardware Original OMC-183 manual version 3.17 was used to create this installation & technical user manual
0.2(26-09-2016)	Review version
1.01 (25-10-2016)	First release
1.02 (24-9-2018)	Correction in connection OMC-938 display (page 12).
1.03 (15-11-2018)	Correction baud rate OMC-2900 output (fixed 4800 like both NMEA inputs) .
1.04 (4-12-2018)	Correction name 'new OMC-406' to OIC-406
1.05 (8-10-2019)	Correction connections OMC-9501 (page 11 chapter 2.9)

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1. Introduction

The OMC-183-ML is a signal conditioning unit. It is designed to read and feed multiple sensors and multiplex these signals to a serial signal. It does not log or store any data. Although the OMC-183 can be used in many applications, this manual assumes it is used for meteorological applications.

This manual is intended for qualified engineers with basic electronics knowledge. Usually the OMC-183-ML is factory configured for your application and no changes besides some optional user settings are required.

1.1. Included types of OMC-183-ML

In 2016 the hardware of the OMC-183 has been revised and all types of OMC-183 are included into one hardware design. The following inputs* and outputs are available:

Inputs name	Functionality
0-5Vdc IN 1	Voltage in no.1
0-5Vdc IN 2	Voltage in no.2
0-5Vdc IN 3	Voltage in no.3
0-5Vdc IN 4	Voltage in no.4
0-24mA IN 1	Current in no.1
0-24mA IN 2	Current in no.1
0-24mA IN 3	Current in no.1
NMEA1 IN	Wind sensor 1
NMEA2 IN	Wind sensor 2

Outputs name	Functionality**
NMEA OUT	RS422 with NMEA
NMEA Return	RS422 with OMC-2900 format
RS232 TX RS232 RX	Used for firmware upgrade, configuration ***

* 4 analogue inputs of this list can be selected simultaneously as a maximum.

** The functionality of Current Loop (CL) output is no longer present in the new hardware design.

*** For backwards compatibility OMC-2900 is also at RS232 available after changing user settings.

2. Installation

The OMC-183-ML is designed to be used indoors. Find a suitable location with the required power and run your cables for all sensors.

Typically you will find the following sensors:

- wind sensor (OMC-160, OMC-116, OMC-118, OMC-150 or OMC-115)
- temperature & humidity sensor (OMC-406, OMC-443 or OMC-448)
- barometric pressure sensor (OMC-506: preferable build in OMC-183-ML housing*)

** The OMC-506 must be vented outside via a tube whenever it is build in the OMC-183 housing and the room is pressurized. We recommend to use a pressure head OMC-509 at the outdoor end of the tube.*

Output:

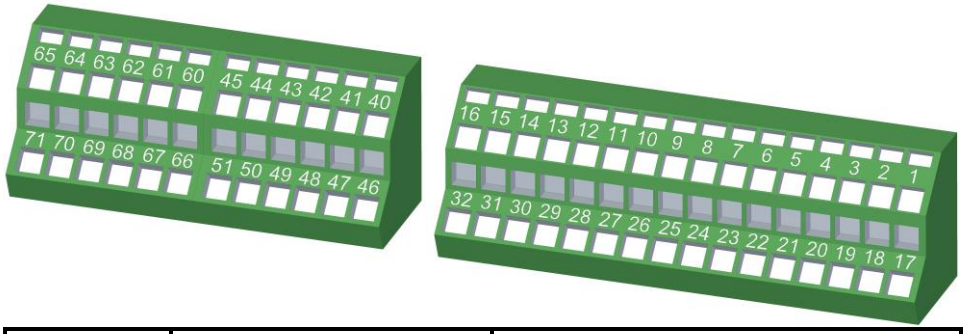
- Observator Display line: OMC-140, OMC-138/139 OMC-938/939
- OMC-data Online / OMC-DOL-HMS

Typical configuration with OMC-160 wind sensor, OMC-406 temperature & humidity sensor & (dual) barometric pressure sensor.

The OMC-183-ML is the replacement of the OMC-183 and got similar functionality. The additional connectors are used in the MeteoLink products, some of these connectors may be functional in the OMC-183-ML but others got a different functionality when compared to the MeteoLink concept.

2.1. Connections

The in the lid of the casing and on the printed circuit board a description of the functionality of each pin is given. These descriptions are also used for MeteoLink products, therefore some functionalities are available in the OMC-183-ML software.



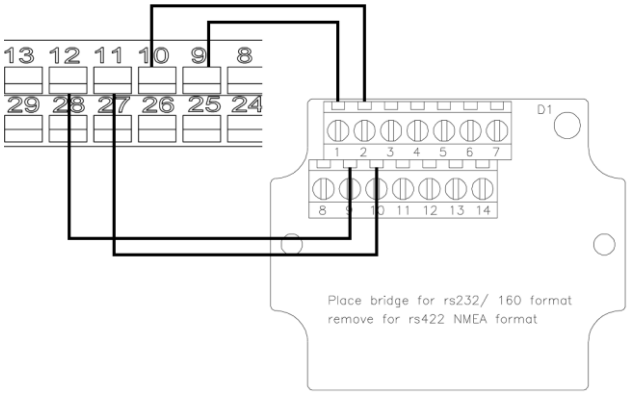
Top row Pin	Function	Bottom row Pin	Function
1	GND [SUP] IN	**17**	GND
2	VIN [12-24VDC] IN	**18**	SUPPLY
3	NMEA_OUT_A	**19**	RS232_TX
4	NMEA_OUT_B	**20**	RS232_RX
5	SHIELD	**21**	RS485_422_IN_A
6	NMEA_RETURN_A	**22**	RS485_422_IN_B
7	NMEA_RETURN_B	**23**	GND
8	SHIELD	**24**	SUPPLY
9	GND [SUP]	**25**	0-5VDC_IN_1
10	SUPPLY	**26**	GND
11	NMEA1_IN_A	**27**	SUPPLY
12	NMEA1_IN_B	**28**	0-24mA_IN_1
13	GND [SUP]	**29**	GND
14	SUPPLY	**30**	CMOS_SUPPLY
15	NMEA2_IN_A	**31**	CMOS_TX
16	NMEA2_IN_B	**32**	CMOS_RX

Top row Pin	Function	Bottom row Pin	Function
40	GND	**46**	GND
41	RAIN_IN	**47**	SUPPLY
42	GND	**48**	0-5 V INPUT 2
43	SUPPLY	**49**	GND
44	RS485_A	**50**	SUPPLY
45	RS485_B	**51**	GND

Top row Pin	Function	Bottom row Pin	Function
60	0-24 mA INPUT 2	**66**	0-5 V INPUT 3
61	SUPPLY	**67**	GND
62	GND	**68**	SUPPLY
63	0-24 mA INPUT 3	**69**	0-5 V INPUT 4
64	SUPPLY	**70**	GND
65	GND	**71**	SUPPLY

2.2. OMC-160 Wind sensors (NMEA)

The Cup & Vane wind sensor got a standardized RS-422 output with NMEA protocol.
2 sensors can be connected.



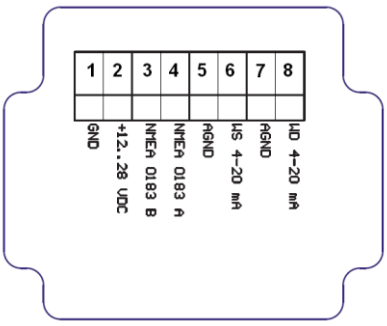
OMC-183-ML			OMC-160	
Sensor	**1**	**2**		
GND [SUP]	9	13	1	Power GND
SUPPLY	10	14	2	Power 12-24V
NMEA1_IN_A	11	15	10	RS422 - out
NMEA1_IN_B	12	16	9	RS422 + out

Recommended cable: shielded 2x2x0,75mm2 twisted pair

OMC-160: ***NO Jumper on 13 -14***
The optional heater will require a separate power supply.
Refer to OMC-160 manual.

2.3. OMC-116 Wind sensors (NMEA)

The Ultrasonic wind sensor got a standardized RS-422 output with NMEA protocol.
2 sensors can be connected.



OMC-183-ML			OMC-116	
Sensor	**1**	**2**		
GND [SUP]	9	13	1	Power GND
SUPPLY	10	14	2	Power 12-24V
NMEA1_IN_A	11	15	4	NMEA 0183 A
NMEA1_IN_B	12	16	3	NMEA 0183 B

Recommended cable: shielded 2x2x0,75mm2 twisted pair

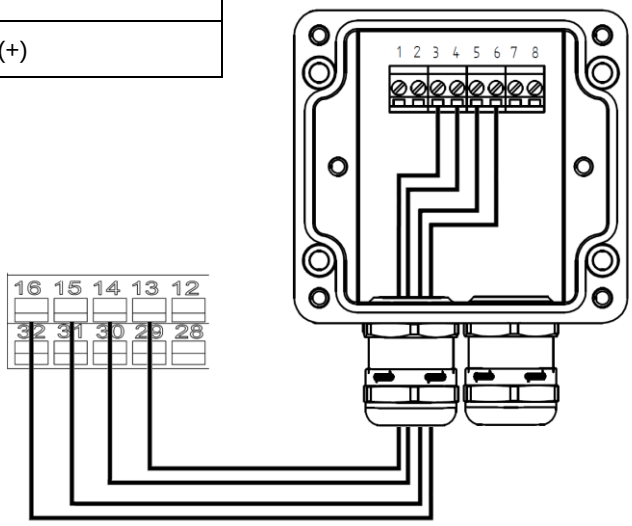
2.4. OMC-118 Ultrasonic Wind sensor (RS422 NMEA)

Recommended cable: shielded 2x2x0,75mm2 twisted pair

OMC-183-ML		OMC-118	
GND [SUP]	13	3 Black	POWER SUPPLY V- (GND)
SUPPLY	14	4 Red	POWER SUPPLY V+ (12-24V)
NMEA1_IN_A	15	5 Black	RS 422 TXA (-)
NMEA1_IN_B	16	6 Green	RS 422 TXB (+)

Wires of OMC-118 come in pairs
Take care to use the correct (black) wires.

The junction box is part of the optional bracket OMC-122(-M).



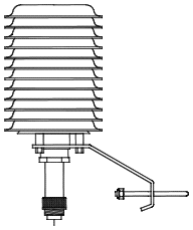
2.5. OMC-150/158 EEx Wind sensor.

The old OMC-158 is not compatible met the OMC-183-ML, however the new OMC-158-2 contains RS-422 NMEA output signal and is compatible. The wiring is similar to the OMC-160.

2.6. OIC-406 Temperature & Humidity sensor.

The OIC-406 has NMEA output. Connecting the basic node to OMC-183-ML is possible by using NMEA1 IN or NMEA2 IN.

OMC-183-ML		**OIC-406 (**NMEA)	
GND [SUP]	13	1	GND [SUP]
SUPPLY	14	2	SUPPLY
NMEA2_IN_A	15	3	NMEA_OUT_A
NMEA2_IN_B	16	4	NMEA_OUT_B



2.7. OMC-406 Temperature & Humidity sensor**.**

The old OMC-406 is a less accurate sensor, and got two 4-20mA analog outputs. These signals can be connected to OMC-183-ML by using two of the analog current input ports for example current inputs 2 & 3:

OMC-183-ML		**OMC-406** (4-20mA)	
GND	62	Yellow	Power GND
SUPPLY	61	Green	Power +24V
0-24 mA INPUT 2	60	Brown	4-20mA out (temperature)
0-24 mA INPUT 3	63	White	4-20mA out (humidity)

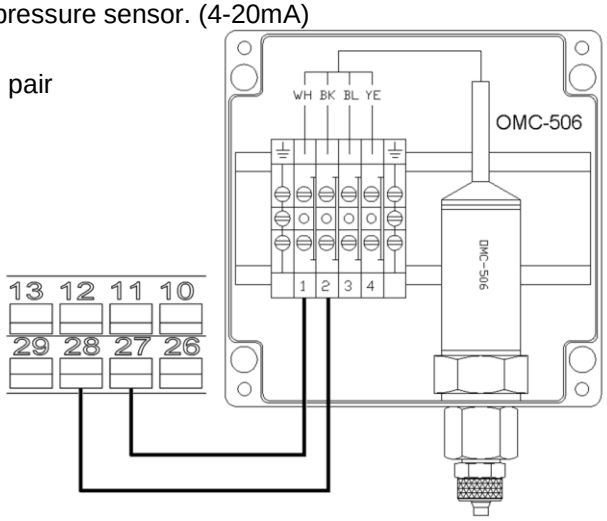
Recommended cable: shielded 2x2x0,75mm2 twisted pair

2.8. OMC-506 Single Barometric pressure sensor. (4-20mA)

Recommended cable: shielded 2x0,75mm2 twisted pair

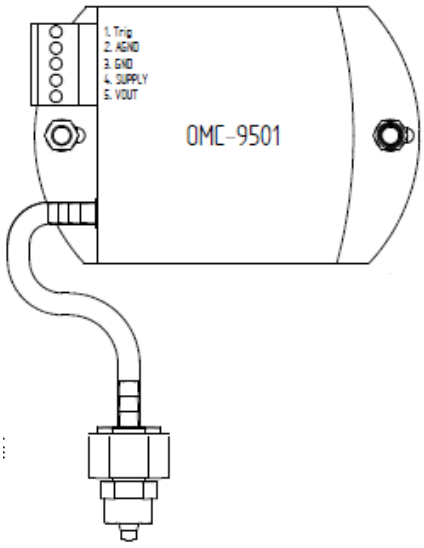
OMC-183-ML		OMC-506	
GND [SUP]	26		
SUPPLY	27	2 Black	Power 12-24V
0-24mA_IN_1	28	1 White	4-20 mA out

The sensor can be build in the same housing as the OMC-183-ML
Connections of sensor wires are identical.



2.9. OMC-9501 Barometric pressure sensor(s). (0 - 2.5V / 0 -5V)

OMC-183-ML			OMC-9501	
Sensor	**1**	**2**		
V_IN	66	69	VOUT	V out
GND	67	70	GND	Power GND
			AGND	Analogue GND
SUPPLY	68	68	TRIG	Trigger
			Supply	Supply



2.10. OMC-443 Temperature sensor (4-20mA)

Recommended cable: shielded 2x0,75mm2 twisted pair

This type of sensor comes in different versions. They all are loop powered 4-20mA sensors.

OMC-183-ML		OMC-406 NMEA
SUPPLY	27	Power +24V
0-24 mA INPUT 2	28	4-20mA out (Air temperature)

2.11. **OMC-938/939** Display (RS422 / OMC-2900)

Recommended cable: shielded 2x0,75mm2 twisted pair

The OMC-938 is usually connected to the RS422 output of the OMC-183-ML.
With the OMC-183-ML it's no longer optional to use current loop output.
Reconfigure the OMC-938/9 to RS422 if required, see OMC-938/939 manual.

OMC-183-ML		OMC-938	
GND [SUP]	1	1	POWER SUPPLY V- (GND)
VIN [12-24VDC]	2	2	POWER SUPPLY V+ (12-24V)
NMEA_RTRN_A	6	3	RS 422 TXA (-)
NMEA_RTRN_B	7	4	RS 422 TXB (+)
SHIELD	8		

3. Commissioning the OMC-183-ML

There are two output options, both use one way RS-422 serial communication. One contains the NMEA data protocol format. The other one got the old OMC-2900 format for backwards compatibility purposes. To execute analog input calibration and other configuration settings, there is also a bi-directional RS-232 menu available.
To read the sensors, each unit contains four 0-5 Voltage inputs and three 0-24mA current inputs. All these analog inputs have already been configured during the manufacturing process.

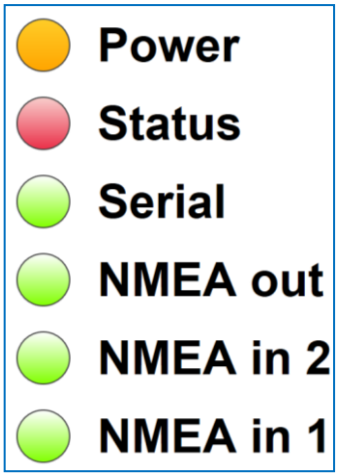
3.1. Connecting your PC / laptop to the OMC-183-ML

Since most computers don't have a comport any more, an additional Serial to USB adapter is needed. Install a terminal program like HyperTerminal, OMC-Terminal, Procomm+, etc. and use the following settings for the different COM ports.

	Connector pins	Interface	Default data settings *Baud rate, Data bits, Parity, stop bit*
NMEA OUT	1-4	RS-422	4800 (or 9600), 8, N, 1
OMC-2900 OUT	6-7	RS-422	4800, 8, N, 1
Interface	17-20	RS-232	115200 (or 4800/9600), 8, N, 1

NO flow control!

3.2. Device status



There are six LED's on the bottom right corner of the printed circuit board, they indicate the status of the device. After power-up the orange LED indicates that the microcontroller is powered. The second LED is red and indicates a bus overflow, when this LED blinks there is too much data input to send all incoming messages as output. In this case the device has to ignore some input messages and information might not be sent as output and information might get lost.

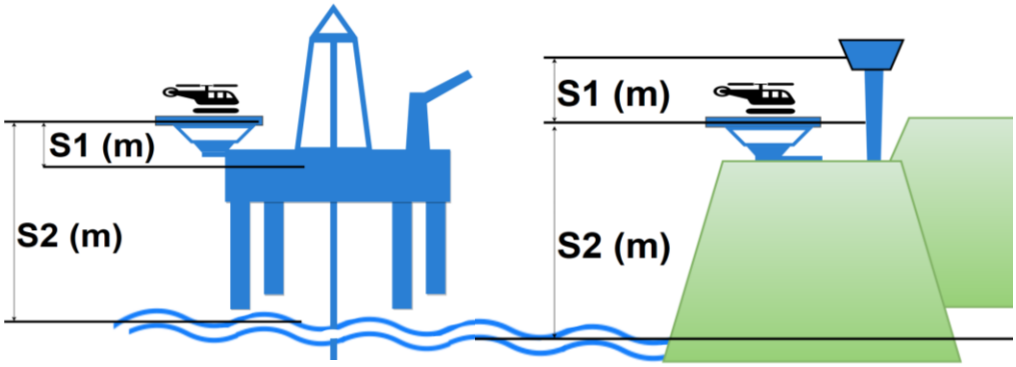
The other four green LED's indicate the status of the *Serial*, *NMEA out*, *NMEA in 2*, *NMEA in 1* inputs. When valid messages are received these LED's blink. All NMEA messages have to be compliant in order to let de LED blink. For the serial LED a blink means that a valid RS-485, RS-232 or other sensor message is received. For each serial sensor a software driver is included in the device. In order to connect jet unknown sensors an additional driver and new firmware is needed.

If you experience difficulties connecting with the device; Check if the LED's are blinking, Check the wiring of the Tx/Rx or A/B wires; Check the data settings of your COM port.

Note: The RJ-45 / Ethernet option is not active on the OMC-183-ML, theses LED's are switched off.

3.3. User settings QNH & QFE

Calculation of the QNH & QFE is required when the meteorological station is used for helideck or runway monitoring. QNH is the barometric pressure at sea level, while QFE is the barometric pressure at helideck (the same applies for a runway).
For this calculation the height of the helideck above sea level is required as well as the height of the barometric sensor above the helideck. These values will be negative if they are below sea level or helideck.
The height of the barometric sensor above the helideck will be set in variable S1, this value will be negative when the sensor is below the helideck.
The height of the helideck above sea level will be set in variable S2, this value will be negative when runway is below sea level.



Always use the height of the location of the barometric sensor itself, even if a pressure head (OMC-509) is used. The location of the pressure head is irrelevant for the sensor height! The sensor is preferable build in the same housing as the OMC-183-ML.

According to the CAP-437 barometric pressure must be measured with a minimum of 2 sensors placed at the same location. These Dual barometric sensors have been implemented in the OMC-183-ML according to the CAP-437. One important implementation is output messages: First when the difference between the two sensors is >0.5 hPa, no data should be presented. *In this case no barometric information messages will be send by the device.*

In the OMC-2900 format an additional status message of the Barometric sensors is included:
S0 = Normal operation of dual barometric sensors
S1 = Sensor 1 Error or out of range (threshold settings)
S2 = Sensor 2 Error or out of range (threshold settings)
S3 = Sensor 1 or 2 Error or both out of range (threshold settings)
S4 = Maximum deviation of barometric pressure > default 0.5

4. Menu structure

Once the RS-232 connection is established, the command “menu” can be given in the terminal screen, which will display the following text.

```
0: 0-20 mA INPUT 1 (pin 28):   [not assigned]
1: 0-20 mA INPUT 2 (pin 60):   [4-20 mA      Baro sensor (range: 800 - 1100 mB)]
2: 0-20 mA INPUT 3 (pin 63):   [4-20 mA      Baro sensor (range: 800 - 1100 mB)]

3: 0-5  V  INPUT 1 (pin 25):   [not assigned]
4: 0-5  V  INPUT 2 (pin 48):   [not assigned]
5: 0-5  V  INPUT 3 (pin 66):   [not assigned]
6: 0-5  V  INPUT 4 (pin 69):   [not assigned]

7: Calculation settings
8: Configure baudrates
9: OMC-2900 Output over RS-232:       [ENABLED]
A: Calibrate: 0-24 mA INPUT 2 (pin 60)  [CALIBRATED]
B: Calibrate: 0-24 mA INPUT 3 (pin 63)  [CALIBRATED]
C: Calibrate: 0-5  V  INPUT 3 (pin 66)  [CALIBRATED]
D: Calibrate: 0-5  V  INPUT 4 (pin 69)  [CALIBRATED]
E: Show Analog calibration values

O: Save and exit menu
```

Commands 0-2: The 0-24mA current inputs need to be configured in order to convert the current value into the right parameter**.**

```
0: not assigned
1: 4-20 mA     Baro sensor (range: 800 - 1100 mB)
2: 4-20 mA     Air temperature sensor (range: -40 - 60 C)
3: 4-20 mA     Air temperature sensor (range: -30 - 70 C)
4: 4-20 mA     Humidity sensor (range: 0 - 100 %)
```

The OMC-183-ML will use 2 baro sensors as maximum, do not assign more (either current or voltage), since this could lead to unpredictable behavior!

Commands 3-6: The 0-5 Voltage inputs need to be configured in order to convert the voltage into the right parameter.

```
0: not assigned
1: 0-5 V       Baro sensor (range: 800 - 1100 mB)
2: 0-2,5V      Baro sensor (range: 800 - 1100 mB)
```

Command 7: Certain parameters are needed in order to calculate the QNH and QFH pressure and to set the status settings as explained in chapter 3.3.

Calculation Settings
0: Barometer height above runway (m): -5.00
1: Runway elevation above sea level (m): 10.00
2: Lower threshold barometric pressure (mB): 975.00
3: Upper threshold barometric pressure (mB): 1050.00
4: Maximum deviation barometric pressure (mB): 0.50
5: Wind sensor offset on NMEA1 IN: 0.00
6: Wind sensor offset on NMEA2 IN: 0.00
O: return

Command 8: It's possible to change the baud rate of the serial inputs and outputs. These settings will only be active after twice the "Q" command and the 'Save and exit menu'.

Configure Baud rate (save & reboot after change)
0: NMEA INPUT (baud): 4800
1: NMEA OUTPUT (baud): 4800
2: RS-232 OUTPUT (baud): 115200
Q: return

Note: When you change RS-232 baud rates, change your terminal settings as well, change is effective once you leave the menu.

Command 9: It's possible to use the RS232 as OMC-2900 output as well. Command 9 enables/disables the OMC-2900 over RS-232.

Command A-D: (re)Calibration of the analog inputs can be done by using the commands A-D. The represented inputs are located on the extension board, therefore they need calibration after the assembly line. Please make sure calibrated equipment is used to present the right current or voltage.
If the presented values are way of the expected values the old values of calibration will remain.

Connect 0 mA reference, then press ENTER
Connect 24 mA reference, then press ENTER
OR
Connect 0 Volt reference, then press ENTER
Connect 5 Volt reference, then press ENTER

Command E: With ‘E’ the calibration values stored in the device can be requested

Current Input 2 (pin 60):
0 mA value: 407
24 mA value: 63055

Current Input 3(pin 63):
0 mA value: 421
24 mA value: 63132

Voltage Input 3(pin 66):
0 Volt value: 536
5 Volt value: 64310

Voltage Input 4(pin 69):
0 Volt value: 536
5 Volt value: 64309

Always use the ‘Q’ command “Save and exit menu” if you change anything.
Without your changes might be lost once the power is switched off!

After changing ‘baud rate’ reboot device as well.

5. EU DECLARATION OF CONFORMITY

OBSERVATOR instruments

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EU DECLARATION OF CONFORMITY

(1) Apparatus model: **Meteolink**
OMC-183-ML

(2) Manufacturer:
Observator Instruments B.V.
Rietdekkerstraat 6
2984 BM Ridderkerk
The Netherlands

(3) This declaration of conformity is issued under the sole responsibility of the manufacturer.

(4) Object of the declaration:

Meteolink
OMC-183-ML
Including all manufacturer-supplied options for these products

(5) The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:
- Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility
- Directive 2014/35/EU of the European Parliament and of the Council of 26 February 2014 the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits
- Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment

(6) References to the relevant harmonised standards used:

EN IEC 60945:2002 including EN IEC 60945/C1:2008
EN IEC 61326-1:2013
EN IEC 61010-1:2010 including EN IEC 61010-1/C1:2011 and /C2:2013
EN 50581:2012

(7)

(8) Ridderkerk, 14 October 2016,
Observator Instruments B.V.

dr. R. de Vries
CEO