

Signal Conditioning Unit

OMC-182

Users Manual
version nr. 1.01



Contents

1. General

The OMC-182 Signal conditionings Unit was developed to make an interface with analogue and digital sensors without the requirement to store sensor data. The data from the connected sensors is sent out in one serial string or as analogue signals. The serial information contains the measured parameters of the sensors connected. The span and offset on each channel can be set via a serial port provided. All this information is stored in EEPROM.

The OMC-182 consists of 2 printed circuit boards, the processor board (lower board) and the extension board (upper board). The processor board and the analogue board are connected via a 34 way ribbon cable.

The extension board has 4 analogue inputs and 4 additional serial inputs. The extension board can contain an optional LCD display and 3 keys.

1.1 Processor board

The processor board accepts the information from the Obsermet wind sensors. After conversion of the digital signal to analogue signals, outputs are provided via two analogue output channels on the processor board. The output signal can be set with jumper settings to 0...1 Volt, 0...10 Volt or 4...20 mA over a range that can be set in the software.

The processor board provides RS232, RS422 or RS485 outputs with certain protocols like OMC -2900, NMEA-183. This is selectable with jumper settings on the board.

A TTY output primary is provided for the transmission of all the captured input signals. The format used is identical to the OMC -2900 format. The transmission interval can be set in the software. The messages can contain the following information, Windspeed, Wind gust, Wind direction, Baro pressure, Solar radiation, Temperature, Humidity and precipitation.

The board has four digital inputs, passive switches can be connected to these inputs. The current through the contacts is ± 10 mA the voltage 15 Volts. The inputs can be used for precipitation or wind speed transmitters with pulse output.

The processor board is provided with basic protection against voltage spikes caused by Electro Magnetic Pulse.

Specifications processor board,

Input 1	: Currentloop serial info 300 baud 8N1
Input 2	: 4 x digital input
Output1	: 2 analogue out 0...1 V, 0...10 V or 4...20 mA (max load 500 Ohm)
Output2	: Currentloop serial info xxxx baud
Output3	: RS232, RS422 or RS485 NMEA-183 protocol
Supply voltage	: 115 Vac, 220 Vac or 24 Vdc
Supply current	: by 24 Vdc 400 Ma
Housing 1	: Polycarbonate
Dimensions 1	: 160 x 240 x 90 mm
Weight 1	: 1.5 kg
Housing 2 (optional)	: Diecast aluminum
Dimensions 2	: 160 x 260 x 95 mm
Weight 2	: 3.5 kg
Cable glands	: Tailored for application ; Max 12 size PG11

1.2 Extension board

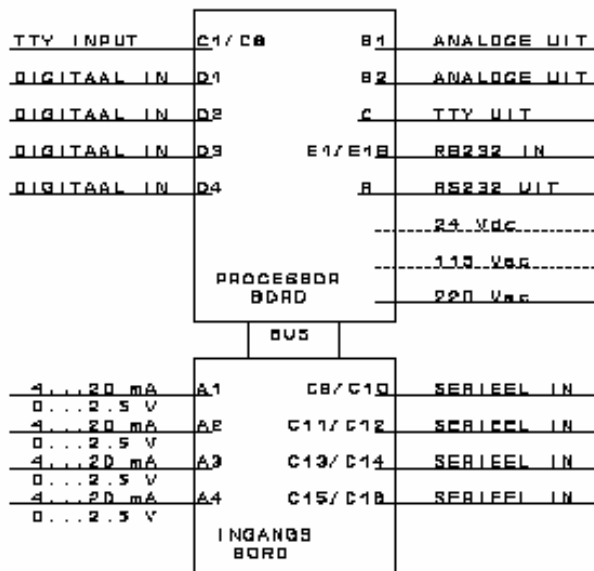
The analogue board must be used in conjunction with the processor board. Connections between the two boards are made via a single ribbon cable. The extension board has 4 analogue inputs and 4 serial inputs. There is a 4 channel A/D converter used, the resolution of A/D converters is 16 bits. The analogue inputs can be configured as potentiometer inputs or for 4-20mA signals.

The board can also carry a 2x40 character lcd module, which shows the values that are read from the connected sensors. Two keys on the board are used to select.

For serial sensors there is a separate connector to which the user can connect a sensor power supply voltage (12 VDC or 24 VDC). This voltage is distributed to the sensors through the extension board. The OMC -182 on-board power supply may not be able to output sufficient power for all sensors that are connected.

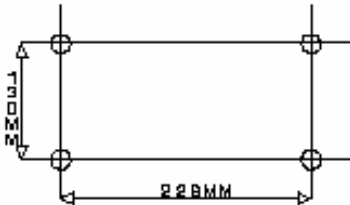
Specifications analogue in/output board,

Input signal : 4 x analogue in 4...20 mA or 0...2.5 Volt
 Resolution : 16 bit
 Serial input : 4 x TTY serial 20 mA loop (ASCII) 300 bd



2. Installation

2.1 Mechanical



The OMC-182 is supplied in a wall mounted box. To install the unit against a wall 4 screws or bolts are needed. Where to locate the holes is shown in the drawing.

The box is provide with maximal 12 cable glands PG11 to support cables with a maximum diameter of 11 mm (Normally the OMC-182 is tailored for application by the manufacturer)

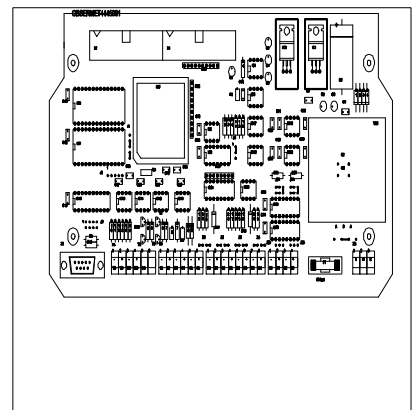
2.2 Electrical

The power supply is connected to the unit via a three core cable 3 x 1 mm². The unit can be supplied with 115 Vac or 240 Vac. The chose is made on the pro cessor board with some wires soldered just above the X8 connection terminal. For 220 Vac the connection marked "B" must be made, for 115 Vac the wires marked "A" must be installed. If the unit is supplied with 24 Vdc the transformer must be removed. Under the transformer the connections C1 and C2 must be made.

If 24 Volt dc power supply is used it has to be connected to the terminals,

X8.1 (L) = positive (+)
X8.2 (N) = negative (-)

If 220 Vac or 115 Vac is used the live and neutral wires are direct con nected to the terminal strip X8 of the processor board. The earth wire is connected to a earth connection connected to the metal bottom plate of the unit. In this way the whole unit is connected to earth and the metal bottom plate is used as a screen for high frequent voltage spikes.



2.4 Sensors connected to the processor board

2.4.1 Wind speed and direction OMC-160

The OMC-160 wind speed sensor is connected to the OMC-182 with a four core cable. Two core for the power supply and two cores for the transport of the output signal. The power supply is controlled via a watch dog circuit. If no data is received from the OMC -160 the power on the terminals X5.1 and X5.2 is switched on and off to restart the electronics inside the OMC-160.

OMC-182 processor board X5.1 OMC-160 1 - supply
 OMC-182 Processor board X5.2 OMC-160 2 + supply
 OMC-182 processor board X5.3 (C1)OMC-160 3 - currentloop output
 OMC-182 Processor board X5.4 (C1)OMC-160 4 + currentloop output

2.4.2 Wind speed sensor OMC-172

OMC-182 processor board X6.1 (D1) OMC-172 yellow
 OMC-182 processor board X6.2 (D1) OMC-172 green

2.4.3 Rain gauge pulse output OMC-210

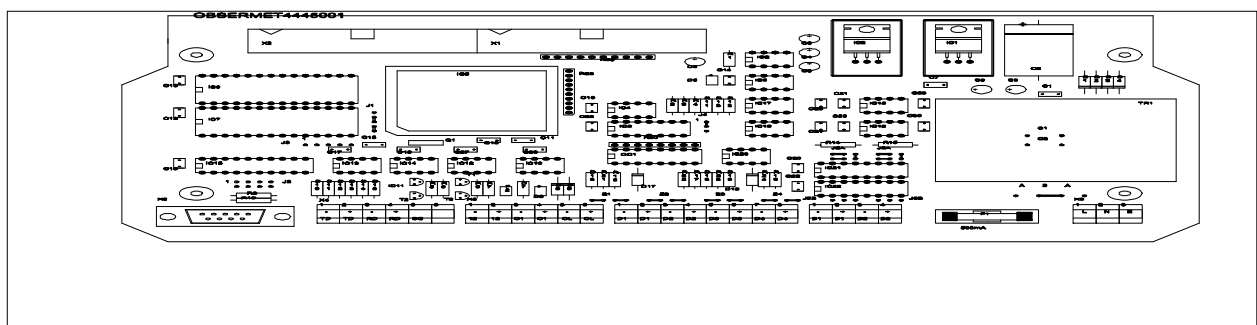
The raingauge is connected to the OMC-182 with a two core cable.

OMC-182 processor board X6.5 (D3) OMC-210 1
 OMC-182 processor board X6.6 (D3) OMC-210 2

The raingauge OMC-210 tips after 0.2 mm of rain has been fallen. This information is collected and counted up over a period of 24 hours. After 00:00 hour the rain information counter is set to zero. The analogue output is set to zero and the information in the serial string is set to zero.

2.4.4 Analogue output processor board

B1 = Raingauge 0...10 Volt = 0...100 mm rain
 B2 = Not connected 0...10 Volt =



2.5 Serial in/outputs

2.5.1 Serial input C1

The serial input C1 is a currentloop input. The input is active and will provide 20 mA when the loop is closed. The input signal must be a signal with a baud rate of 300 baud, none parity, 8 bit word length and 1 stopbit (300 8N1).

The input is dedicated for the Obsermet wind sensors OMC-160/162/165/170.

On request the input can be change to accept other signal which can be different in transmission parameter or in format of the message.

2.5.2 Serial output CL

The currentloop output is normally used to transport the collected data from the analogue inputs, currentloop input and the digital inputs. Using the system in this way it is not necessary anymore to output the data as analogue signals which upgrade the performance and the accuracy. The data is transmitted with a speed of 300 baud but can be change to higher speeds if necessary and if cable lengths used are allow higher speeds. The other parameters are the same as from the currentloop input. (300 8N1)

The message is transported in the following way,

```
<SOH> <LF>A+00003.456<SP>CSCS<CR>  
      <LF>B+00001.23<SP>CSCS<CR>  
      <LF>C+00002.367<SP>CSCS<CR>   <EOT>
```

Every message starts with a start of text character after this the messages are transmitted. All messages start with a line feed followed with the identifier for the data, then the data and then a checksum for protection reasons, the message end with a carriage return.

All input channels can be transmitted in this way every second to any receiving station.

Transmission takes place once every 5 seconds

In case of a malfunctioning sensor (when no data is received or malicious data is received) the value is replaced by a field with all nines (format is unchanged). Example:

```
<SOH> <LF>A+00003.456<SP>CSCS<CR>  
      <LF>B+99999.99<SP>CSCS<CR> (sensor error)  
      <LF>C+00002.367<SP>CSCS<CR>   <EOT>
```

The same output message can be transmitted from the RS-232 port and / or the RS-422 port.

Sequence of the telegrams: analogue inputs (A -channels), TTY channels (C -channels), digital channels (D-channels), RS-232 channels (E-channels) and calculated channels.

2.5.3 RS232 in/output channel

The RS232 signal is available on two different places, the 9 pin D-connector and the terminal strip X4. The selection can be made with jumpers on the board. Also it is possible to convert the RS232 signals into RS422 or RS485. The RS422 or the RS485 signals are only available on the terminal strip X4. It is possible to use this channel in such a setup that the input channel is used on RS232 level and the output on RS422 or RS485 level.

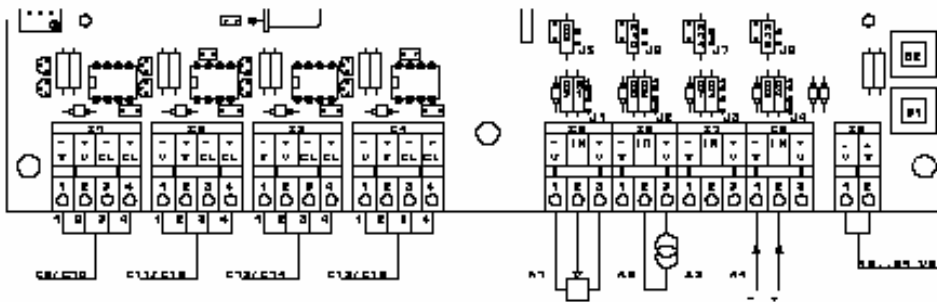
The RS232 channel is normally used to communicate with a computer to tell the OMC-182 which sensors are connected where and what the span and offset of the signal are.

If necessary it is possible to change the software of the OMC-182 to accommodate different protocols on customers request.

2.5 Sensor connections to the extension board

2.5.1 Analogue sensors

The 4 analogue inputs are suitable for sensors that have a potentiometer output, voltage output, or 4..20 mA from passive or active sensors. For a potentiometric input, the OMC-182 provides a stable reference voltage of about 2.7 Volts. If 4..20 mA sensors are connected, the OMC-182 can provide a 15 VDC supply voltage. These provisions settings are made by jumper-settings



This figure shows the connections of the various sensors

Serial sensors are connected through 4 wires, i.e. two wires for the sensor power supply, and two wires for the serial data from the sensor. Each of the serial inputs can accept up to two values. The channels are numbered as follows:

- X1 = C9 and C10
- X2 = C11 and C12
- X3 = C13 and C14
- X4 = C15 and C16

The CHTY command (Channel Type) is used to associate the incoming values by their identification letter to a specific channel.

Four analogue inputs can be used to connect a potentiometer or 4..20 mA transmitter. The input type is determined by the hardware configuration on the printed circuit board. A current measuring resistor is required to measure 4..20 mA signals.

A potentiometric sensor must be connected to terminals 1 to 3, according to the figure. A 2.7 V reference voltage will appear on terminals 1 and 3 when the jumpers are placed in the right position.

A 4..20 mA transmitter can be powered from the extension board. If the jumper is placed in the right position, a 15 V power supply voltage will be present on terminal 3. A 4..20 mA two-wire transmitter (passive sensor) must be connected to terminals 2 (-) and 3 (+).

An active 4..20 mA sensor output should be connected to terminal 1 (-) and 2 (+)

3. Setting up the unit

3.1 Available commands for communication

On the OMC-182 printed circuit boards there are no potentiometers for adjustments. All adjustments are done in and with the software. For calibration a digital voltmeter and a voltage transmitter are needed. Connect a computer with a serial cord to the 9 pin D -connector on the processor board or to the terminal strip X4. Start a terminal program on the computer with the settings 9600 baud 8N1. Type the letters "MENU" in capitals, and after this type the command "HELP" The following available commands are shown on your computer screen,

HELP Shows all available commands
INSP Sets the baud rate for communication
SAVE Save all settings in EEprom
STOP Leave the command interpreter
CHTY Channel type
CHTR Channel transmission
CHSC channel scaling
AOAS Analogue output assignment
AOSC Analogue output scaling
SYCA System calibration
AOST Analogue output set (for calibration purposes only)
AOCA Analogue output calibration
AICA Analogue input calibration
DATE System date
TIME System time
ACVA Actual values
CSTY Checksum type
SCFA Scaling factor

SYID System Identification
CHTE Channel Text (for use on optional LCD)
LDAS Display lines assignement to channels
CHAV Channel averaging

Special commands not available in every system.

NRSA Number of samples for averaging wind direction
SERA Set range select units for windspeed

HELP Shows all available commands

INEC The command INEC (initialize echo) is used to set the echo of characters by the OMC-182 ON or off. The command is used as follows INEC 1 or INEC 0

INSP The command INSP (initialize speed) is used to set the communication speed (baudrate) for the RS232 in/output (E) and the Currentloop output (C), at the same time the transmission speed between the computer and the OMC-182 is changed. If the transmission speed is changed the transmission speed of the computer must be set to the same otherwise communication is not possible. The command is used as follows, with the following possibilities,

INSP C,1 (300 baud) sets TTY input to 300 baud
INSP R,2 (1200/75baud) sets RS-232 port to 1200/75 (obsolete)
INSP 3 (1200/1200baud)
INSP 4 (2400baud)
INSP 5 (4800baud)
INSP 6 (9600baud)

The command INSP without any parameter shows the current settings,

INSP<CR>

C,3(Currentloop transmission speed 1200/1200 baud)

E,6(RS232 transmission speed 9600 baud)

SAVE The command SAVE is used to save all settings into an EEPROM. This means that settings that are changed are still available when the unit is switched on/off. After a setting is changed the command SAVE must be used to make this change permanent.

STOP When you are finished in the interactive mode, it is advisable to stop this mode by giving the "STOP" command. After this command it is not longer possible to use the 4 letter command words. When there are channels transmitting to the RS232 port you will see the values direct after the "STOP" command. In the interactive mode the transmission to the RS232 port is stopped.

CHTY The command CHTY (channel type) is used to set the channel specification for the serial currentloop input and the digital inputs. For the Digital channels D1, D2, D3 and D4 The second parameter is important the third parameter you must fill in a "-". This parameter determines the operating mode of the input. The following different modes are available,

0 = not used
1 = status
2 = pulse counter
4 = frequency
8 = serial input
16 = pulse time

If mode "8" is set the third parameter must also be filled with an ascii character.

For the serial input the second parameter is not used and must be a "0". The third parameter can be any ascii character except "-". If the "-" is used this means that the channel is disabled.

CHTY D1,2,- (set D1 as status input)
CHTY C9,-,V (value with the indent "V" is coupled to C9)
CHTY D2,8,A (set D2 for serial input and except a value with indent "A")

CHTR The command CHTR (channel transmission) is used to set the transmission of certain received, measured or calculated values to the RS232 output, the currentloop output and the display output. The command starts with a channel number followed by an indent character followed by a direction number from 0...255. It is possible to send information to all three outputs if necessary.

PAR 1Bit 0
PAR 1Bit 1Display number range 0...7
PAR 1Bit 2
PAR 2Bit 3Number of digits range 0...3
PAR 2Bit 4
PAR 3Bit 5Send to display ON=1 OFF=0
PAR 4Bit 6Send to currentloop ON=1 OFF=0
PAR 5Bit 7Send to RS232 port ON=1 OFF=0

The calculation for the mode is done as follows,

$$\text{MODE} = (\text{PAR } 5 * 128) + (\text{PAR } 4 * 64) + (\text{PAR } 3 * 32) + (\text{PAR } 2 * 8) + \text{PAR } 1$$

When you want to send information to the RS232 port PAR5 becomes "1", otherwise "0". If you want to send information to the displays, PAR3 becomes "1" PAR1 gives the display number starting from zero and PAR2 the size of the displays in digits before the decimal point minus one. The digits behind the decimal points must be set with the command Channel scaling. The command is used as follows,

CHTR A1,V,128 (send value A1 with indent "V" to the RS232 port)
CHTR C1,-,48 (send serial C1 to display 1 with 3 digits)

CHSC The command CHSC (channel scaling) is used to set range, offset and resolution of an input channel. The internal value in the OMC-182 = (real value * range) + offset. For the analogue inputs the internal value = (real value /2.5 * range) + offset. The number of digits behind the decimal point is only important when the channel is also used for output to a serial port or display. In case of a display you can't use more than 1 digit behind the decimal point. The Command is used as follows,

CHSC A3,-30,250,1
CHSC C1,0,0.1,1

AOAS The command AOAS (analogue output assignment) gives the possibility to assign an analogue output (B1...B8) to an input channel. The command is used as follows,

AOAS B1,A3 (value of A3 out on analogue output B1)

AOSC The command AOSC (analogue output scaling) sets zero offset and range of an analogue output. The offset gives the value at which the output is zero volts. The range gives the value plus the offset at which the output is maximum. The command is used as follows,

AOSC B1,-30,100 (output 0 volt by -30, and max. at +70)

SYCA The command SYCA (System calibration) is used to set the OMC-182 in the calibration mode. The command is used as follows,

SYCA 1 (OMC-182 set in calibration mode)
SYCA 0 (OMC-182 set in the working mode)

AOST The command AOST (Analogue output set) is used to force an analogue output to a certain output value. The digital to analogue converter is a 12 bits converter using 4096 steps. With the command AOST 2047 the D/A converter is forced to half the maximum output. This output must be measured with an accurate digital voltmeter. The command is used as follows,

AOST B1,1023 (output B1 gives a ¼ of the maximum output voltage)

AOCA The command AOCA (Analogue output calibration) is used to calibrate the analogue output. The command must be used together with the command AOST. The value measured with the digital voltmeter and the value that should be measured are the parameters for this command. The command is used as follows,

AOCA B1,5.123,5.000 (measured value,should be value)

AICA The command AICA (Analogue input calibration) is used to calibrate the analogue inputs. Connect the input of the channel that has to be calibrated to 0 volt line and give the command AICA A1,0 The system expect 0 mV input now, if there is an input signal this value is measured and the result is stored in EEPROM. Remove the connection between the input and the 0 volt line and apply a known voltage e.i. 1.000 mV, give the command AICA A1,1.000. The system expect a voltage of 1000 mV on the A/D converter, if this value is more or less than the value, a gain figure is calculated and stored in EEPROM.

NRSA The command NRSA (Number of samples) is used to set the number of samples used to calculate the average wind direction for displaying. The command is used as follows,

NRSA 60

The displayed value is now calculated over 60 samples. The maximum number of samples that can be set is 120.

SERA The command SERA (Set range) is used to select the units in which the wind speed is displayed. The command is used as follows,

SERA 1 Set windspeed indication to Miles per Hour
SERA 2 Set windspeed indication to Knots
SERA 3 Set windspeed indication to Meter per second
SERA 4 Set windspeed indication to Kilometers per hour

ACVA Shows the actual values to the computer

```
ACVA A1 <enter>
A1,2.3456
```

SYID Identify the resident firmware version

```
SYID <enter>
"OMC-182","Sw.ver. 1.00"
```

CHTE Name a channel to be used on the optional lcd. Maximum name length is 19 characters.
Maximum units length is 4 characters

```
CHTE L1,Waterlevel,mm
```

LDAS (Line Display Assignment) is used to assign channel numbers the lcd display lines . Up to 8 measured values can be displayed. Lines are numbered L1 through L8. The channels are numbered:

A1 .. A4	analogue inputs
C1 .. C8	serial inputs from the TTY port on the processor board
C9 .. C16	serial inputs from the TTY ports on the extension board
E1 .. E16	serial inputs from the RS-232 port on the processor board
D1 .. D4	digital inputs

Example:

```
LDAS L1,C9 sho the value from C9 to line 1 of the lcd
LDAS L2,A1
```

CHAV Channel averaging. This command sets a running averageing interval which can be uned on one (user selectable) channel.

```
Example
CHAV C1,600
```

The display value for C1 is now averaged over a 600 second interval (Running average)

3.2 Calibration Analogue input channels

Before applying power to the OMC-182 to start the calibration first short circuit all the analogue inputs. This is necessary because the OMC-182 calibrates the A/D converter when started.
After calibration analogue inputs that are not used must kept shorted.

1. Connect a computer to the serial input of the OMC-182
2. Type MENU from the terminal
3. The OMC-182 responds with a > as prompt
4. Input the command SYCA 1 (system calibration)

The OMC-182 is now in the calibration mode.

1. Connect a voltage/current transmitter to the input channel that needs to be calibrated.
2. Apply 0 volt to input channel and give the command AICA A1,0 informing the OMC-182 that the input signal is 0 volt. The response of the OMC-182, the offset measured by the A/D converter, is normally in the range of -10...+10.
3. Apply a known voltage to the input channel i.e. 2.500 volt.
Give the command AICA A1,2.500. The response of the OMC-182 is a scaling factor normally in the range 1.05...1.15.
4. Repeat the procedure for all channels.

The calibration of channel A2 is different from the other channels because there is an amplifier between the input and the A/D converter. The amplification of the amplifier is 100 times, therefore the maximum input voltage during calibration must not exceed 25 mV.

For the mA input a short circuit on the input means 0 volt input and 20 mA means 2.500 volt.

When the calibration is finished give the command SYCA 0, the OMC-182 will leave the calibration mode. Give the command SAVE to store all the calibration information in the EEPROM. If this is forgotten the OMC-182 will lose all his calibration information when the power is removed.

The commands AICA can only be used when in the calibration mode if the command is given outside the calibration mode the OMC-182 responds with an error 300 message.

3.3 Calibration analogue output channels

Before applying power to the OMC-182 to start the calibration first short circuit all the analogue inputs. This is necessary because the OMC-182 calibrates the A/D converter when started.
After calibration analogue inputs that are not used must kept shorted.

1. Connect a computer to the serial input of the OMC-182
2. Type MENU from the terminal
3. The OMC-182 responds with a > as prompt
4. Input the command SYCA 1 (system calibration)

The OMC-182 is now in the calibration mode.

The command AOST (analogue output set) is used to force an analogue output to a certain value. The D/A converter used is a 12 bit D/A converter using 4096 steps. With the command AOST the output is forced to a certain voltage which must be measured with an accurate digital voltmeter. The measured output in volts is then used in the command AOCA for calibration purposes.

1. Execute the command AOST B3,2047 the output voltage on output B3 should go to 5.000 volts.
2. Measure the voltage present on the output B3 this is e.i. 5.234 volt.
3. Execute the command AOCA B3,5.234,5000 the first parameter is the measured voltage and the second the voltage that was expected after the AOST command.
4. Repeat the procedure for all analogue output channels.

When the calibration is finished give the command SYCA 0, the OMC-182 will leave the calibration mode. Give the command SAVE to store all the calibration information in the EEPROM. If this is forgotten the OMC-182 will lose all his calibration information when the power is removed.

The commands AOCA and AOST can only be used when in the calibration mode if the command is given outside the calibration mode the OMC-182 responds with an error 300 message.

4. Jumper settings

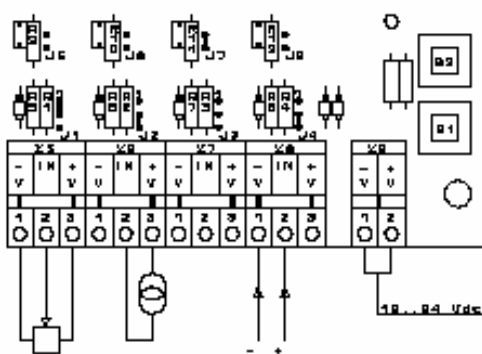
4.1 Jumper settings extension board

4.1.1 Jumper field J1, J2, J3, J4

J1 through J4 select the voltage on terminal 3 for each of the four analogue inputs to either 15 VDC or a reference voltage of 2.7 VDC.

For a potentiometer, select 2.7 VDC – jumper position 1-2

For a pressure sensor select 15 VDC – jumper position 2-3



For a pressure sensor the input circuit must be changed: Remove R1 (R2, 3, 4 for the other channels) and place a jumper wire instead.

Place resistor R5 (R6, 7, 8 for the other channels). This must be an accurate 124 Ohms resistor. This is the current measuring resistor, which converts the current to voltage.

If a voltage greater than 2500 mV could be measured, the input voltage divider resistors must be chosen to prevent a voltage higher than 2500 mV on the A/D converter under all circumstances.

4.1.2 Jumper field J5, J6, J7, J8

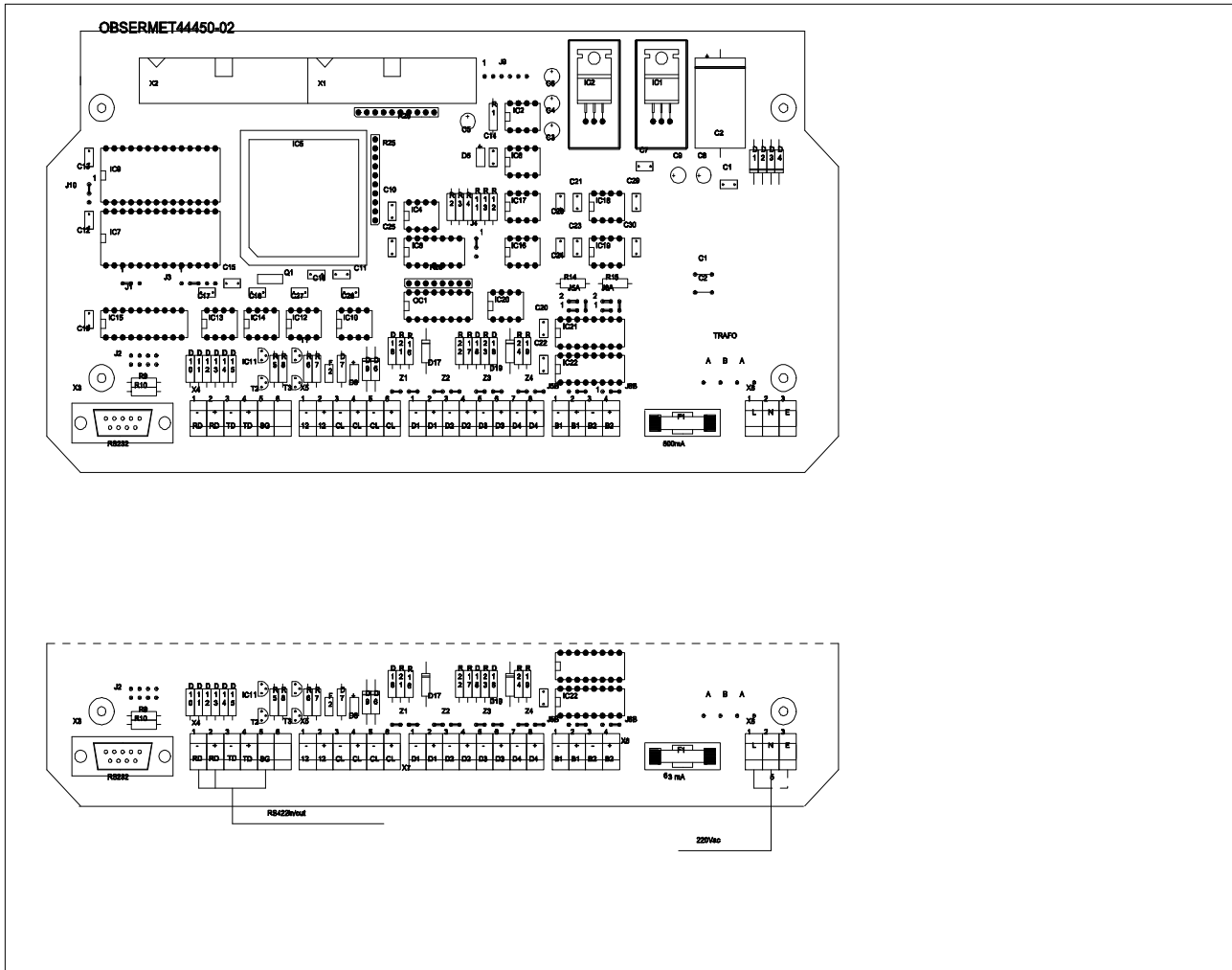
These jumpers must be used to short any unused input. If you do not short the unused inputs, the measured value of the other inputs can be affected. These jumpers can also be used during calibration of the analogue inputs.

The figure shows the jumper setting for the following sensors:

A1 = Potentiometer	: J1 = 1-2	J 4 = open
A2 = pressure transmitter	: J2 = 2-3	J5 = open
A3 = unused	: J3 = don't care	J6 = closed
A4 = active 4..20mA sensor	: J4 = 2-3	J7 = open

J4.2 Jumper settings processor board

The processor board has 12 jumper fields. Normally all jumper are set correctly in the factory.



4.2.1 Jumper field J1

The jumper field J1 is used to set the serial input for RS232 or RS422

J1 position 1-2 = RS232 input

J1 position 2-3 = RS422 input

4.2.2 Jumper field J2

The RS232 connection on the processor board is normally connected via the 9 pin D-connector installed on the lower left corner of the board. Normally this connection will only be used when programming the setup of the unit or to calibrate the unit. If a permanent connection is needed it is possible to connect the incoming RS232 cable to terminal strip X4 on the processor board. Doing it this way it is not necessary to disconnect the 9 pin D-connector to get the cable through the cable gland and then reconnect the plug again. If this option is used 4 jumpers must be placed in jumper field J2 and IC13 and IC14 must be removed.

The connection to terminal X4 are as follows,

Receive dataRXD = X4.2
Transmit dataTXD = X4.3
Ground GND = X4.5

4.2.3 Jumper field J3

With the jumper field J3 it is possible to select a RS422 or RS485 output on the terminal X4 of the processor board, also full or half duplex can be set with this jumper field.

For bus application one driver is used to transmit and to receive information. The jumper setting for field J3 is than short circuit to position 2-3. System is working as RS485 half duplex with hand shake control.

RS422 output Place IC14, place jumper J3 on position 4-5 and use the connections X4.3 and X4.4

RS422 input Place IC13, place jumper J1 on position 2-3 and use the connections X4.1 and X4.2

RS485 in-output Place IC13, place jumper J3 on position 2-3 and jumper J1 on position 2-3 use the connections X4.1 and X4.2

RS232 input Place jumper J1 on position 1-2

4.2.4 Jumper field J4

With the jumper field J4 it is possible to set the output swing of the analogue output channels B1 and B2. With the jumper placed on position 1-2 the output voltage of B1 and B2 is 0...10 Volt. With the jumper on position 2-3 the output is 0...1 Volt.

4.2.5 Jumper field J5/J6

With the aid of the jumper field J5 and J6 it is possible to select a voltage or a current output on the analogue outputs B1 and B2.

Jumper position J5/J6 1-2 = Current output
Jumper position J5/J6 2-3 = Voltage output

Jumper position J5A/J6A 1-3, 2-4, 5-6 = Voltage output
Jumper position J5A/J6A 1-2, 3-5, 4-6 = Current output

Both jumper fields must be set to the same position e.a voltage or current output.

4.2.6 Jumper field J10

Jumper field J10 is used to select the used memory IC.9.

Jumper position J10 1-2 = normal ram memory
Jumper position J10 2-3 = ram memory with internal clock

4.2.7 Jumper field Z1 to Z4

The jumper fields Z1 to Z4 are used for the digital inputs D1 to D4. The board can provide 15 Vdc for switches making the input active. Switch can be connected directly to the input.

If the digital signal connected to digital input is active (provide a voltage) the jumpers in the field must be set in such a way that the board does not provide a voltage supply.

Jumper position Z1/Z4 2-3 = input signal active

Jumper position Z1/Z4 1-2, 3-4 = input signal not active

4.2.8 Jumper field J9

J9 is not a jumper field. Pin strip marked J9 is used to connect serial displays and transmit the information to the displays.