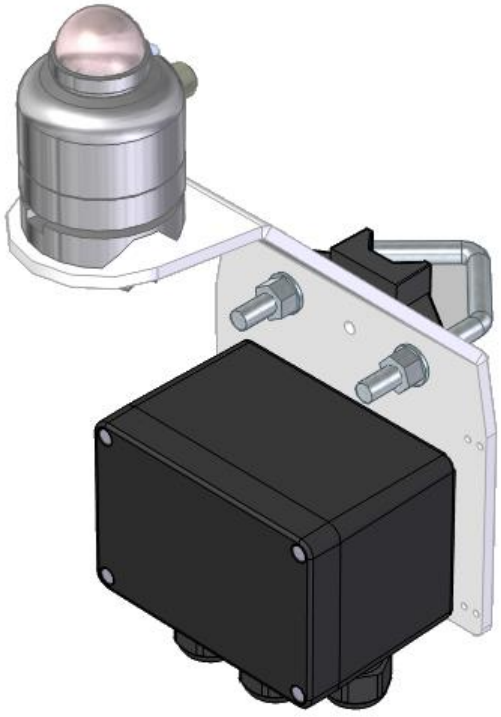
OBSERVATOR
instruments

OIC-604



Meteolink Solar Radiation Sensor

Manual

Version 1.05 – April 2024

Author: Observator Instruments

Revisions:

0.1	(January 2017)	First issue
0.2	(February 2017)	Preliminary edition
1.01	(March 2017)	First release
1.02	(April 2017)	First reviewed release
1.03	(April 2018)	Updated model
1.04	(April 2018)	Reviewed manual
1.05	(April 2024)	Update EU declaration of Conformity

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1 Introduction

Observator OIC-604 Pyranometer is an accurate and reliable instrument for solar radiation measurement including mounting bracket, basic node and inclinometer using the Hukseflux SR05 pyranometer.

This manual is intended for the System integrator, Installer and Commissioner of the Observator OIC-604 Pyranometer.
Due to the integration of the basic node other sensors can be interfaced (like anemometers). The signals will be combined in 1 NMEA stream. When interfacing other sensors we recommend to use the Observator Meteolink manual for more detailed information.
For specific information concerning the Pyranometer sensor itself we kindly refer to the Hukseflux SR05 user manual.

The Operator can use this document as a reference manual.

2 Safety

For correct functioning of the Observator OIC-604 it must be installed according installation instructions. We recommend you read the complete manual prior to installation.

Any unused gland should be filled with the included plug when not in use.

Remember: instruments are tools.
They do NOT replace your own observations!

After end of life dispose this product according local regulations or return to manufacturer.

3 Description

3.1 General description

Observator Meteolink Solar Radiation sensor OIC-604 is designed for use on board vessels and buoys. It uses an accurate pyranometer and inclination sensor.
The sensor signal is converted into a standard NMEA signal by the basic node, which also functions as a junction connection box and houses the inclination sensor.
The measured solar radiation data will be validated by means of the inclination sensor.
The basic node has 2 spare glands available and can interface and link through other Observator Meteolink sensors. See the Observator Meteolink manual for more details.

3.2 Data validation

The OIC-604 will send actual Solar Radiation data at 1Hz whenever the sensor is level within 5 degrees. When the sensor tilt exceeds the 5 degrees, the last valid data will be transmitted for a maximum of 1 minute. After 1 minute the data messages will be empty until the sensor is level within 5 degrees again. This will minimize natural wave influence and prevents incorrect data is sent while the sensor is continuous tilted over 5 degrees.

3.3 Data format

Observator Meteolink sensors add a prefix to the ‘standard’ NMEA message. This prefix is conform the NMEA and IEC61162 standard will simply be ignored by NMEA and IEC61162 compliant input drivers if they have no use for it.

Format Solar Radiation:

\s:B**sss**S3*cc\$IIXDR, G, **x.xx**,,SR*cc

sss = last 3 digits of node serial number.
x.xx = Solar radiation in W/m2

example:

\s:B271S3*5F\$WIXDR,G,1.09,,SR*00

Format Inclination:
\s:B**sss**S2*cc\$POBSHPR,,**x.xx**,**y.yy***4B

x.xx = Pitch in degrees
y.yy= Roll in degrees
(First position is for heading, but this is not measured by the OIC-604).

Examples:

\s:B271S2*5E\$POBSHPR,,0.184,0.020*67

The output rate is 1 Hz.

Once every 30 minutes and at start up, a VER message is sent, containing the serial number and firmware version of the Basic Node.

example:

\s:B271G1*49\$WIVER,1,1,WI,OBS,,OIC,OICB00271,00,1.0B3,,0*74

The OIC-604 will also work without the tilt sensor. In that case it will output the Solar Radiation unfiltered and no inclination sentence will be present.

NMEA output (OIC-604 output)	***SR05 (solar radiation)***	***Inclination***
$WIXDR,G,**actual SR value**,,SR*hh	OK	Sensor not connected / defect
$WIXDR,G,**actual SR value**,,SR*hh $POBSHPR,,**pitch**,**roll***hh	OK	Device tilt <= 5°
$WIXDR,G,**last valid SR value**,,SR*hh $POBSHPR,,**pitch**,**roll***hh	OK	Device tilt > 5° less the 1 minute
$WIXDR,G,,,SR*hh $POBSHPR,,**pitch**,**roll***hh	OK	Device tilt > 5° over 1 minute
No output data	Not detected	Sensor not detected

Please note: it can take up to 1 minute before data is transmitted when the sensor is powered!

4 Installation

4.1 General

For correct and accurate measurement of solar radiation it is important to select the right mounting location of the OIC-604:

- The OIC-604 should be mounted on a stable vibration free mast
- Avoid shadow wherever possible, since it will affect the measurement
  Install it as horizontal possible, the solar radiation sensor itself has a tilt correction option of maximum 10 degrees.
- The bracket is meant for pipe mounting (pipe diameter max 51mm).
- Use shielded cable (see Chapter 6 for maximum lengths).
- Use twisted pair cable for all RS422/485 connections (See Chapter 6).
- The nodes require a 12 ..24 Vdc power supply. Power can be linked through all Meteolink nodes, however check the power rating of connected sensors, especially when they have heating!

  Note: Use the specific power out connections (pin 9&10 or pin 13&14) for linking nodes! Maximum allowed total current is 10A when using these connections

Avoid ground loops: Shield must be connected on the output side of each cable only!

4.2 Mechanical installation

For correct installation and optimum result the sensor must be installed perfectly level.

- Mount the bracket to a vertical pole (diameter 25 – 51mm) and tighten the u-bolt.
- Loosen the 4mm hex bolt on the side of the Hukseflux pyranometer a little and position pyranometer level with aid of the integrated bubble level.
- Retighten the 4mm hex bolt.

See also Hukseflux SR05 manual.

In case of installation on board a vessel, the vessel should be stable and level during the level adjustment!

4.3 Electrical installation

*Terminals used are of the push in cage type. The terminals are opened with a **gently** push using a small screwdriver in the opening above the terminal.*

Do not use any force!

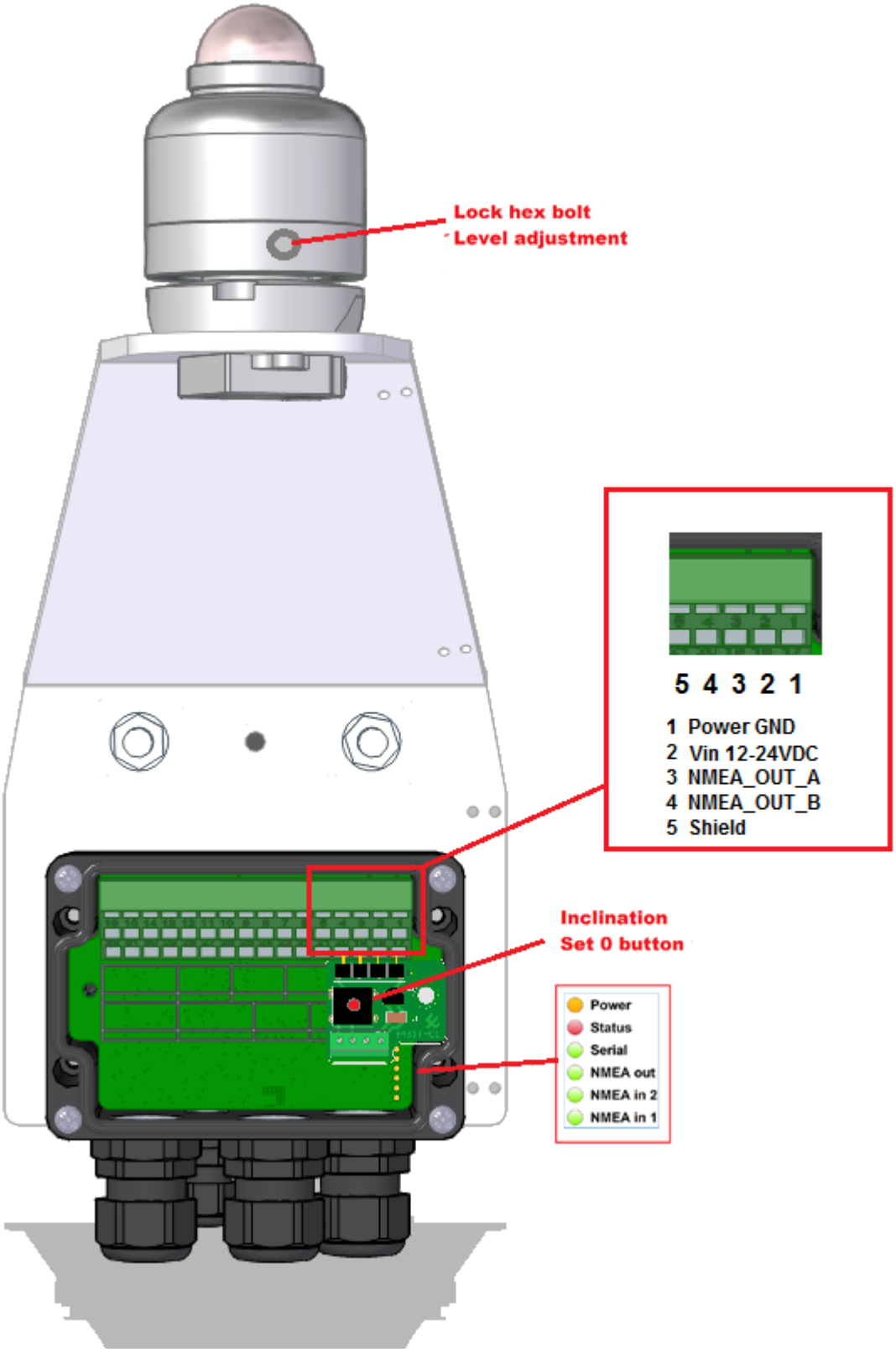
Connect power (terminal 1&2) and NMEA out including shield (terminal 3,4 & 5) on the OIC-604 side *(see connector and terminal layout in chapter 5).*

Connect the power and receiving NMEA side, do not connect shield on this side!
Tighten the gland and check all unused glands are plugged.

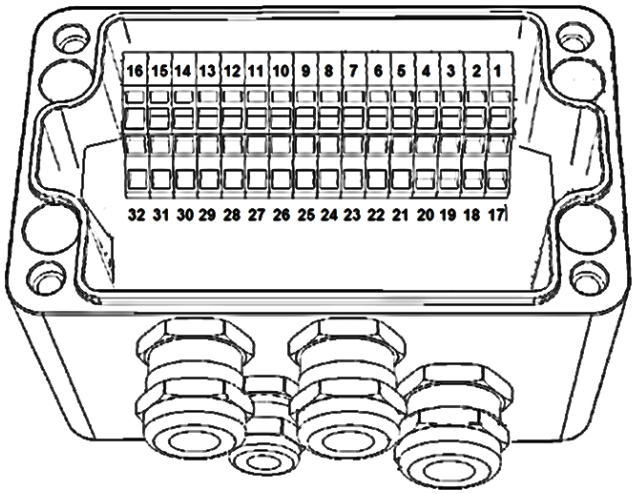
4.4 Commissioning

The pyranometer has been set level during installation, the inclination sensor must be set to 0 as well.

- First check the OIC-604 is working, power the sensor and check for output on the NMEA line, Baud rate is 4800, there should be XDR messages.
- While powered, open the junction box of the OIC-604 and locate the ‘inclination set 0’ pushbutton.
- Check the solar radiation sensor is still level.
- Push the ‘inclination set 0’ button for at least 1 second: the (red) Status LED should lit and go off when the button is released.
- Close the junction box.
- Check for sensible data.


Lock hex bolt
Level adjustment
5 4 3 2 1
1 Power GND
2 Vin 12-24VDC
3 NMEA_OUT_A
4 NMEA_OUT_B
5 Shield
Inclination
Set 0 button
Power
Status
Serial
NMEA out
NMEA in 2
NMEA in 1

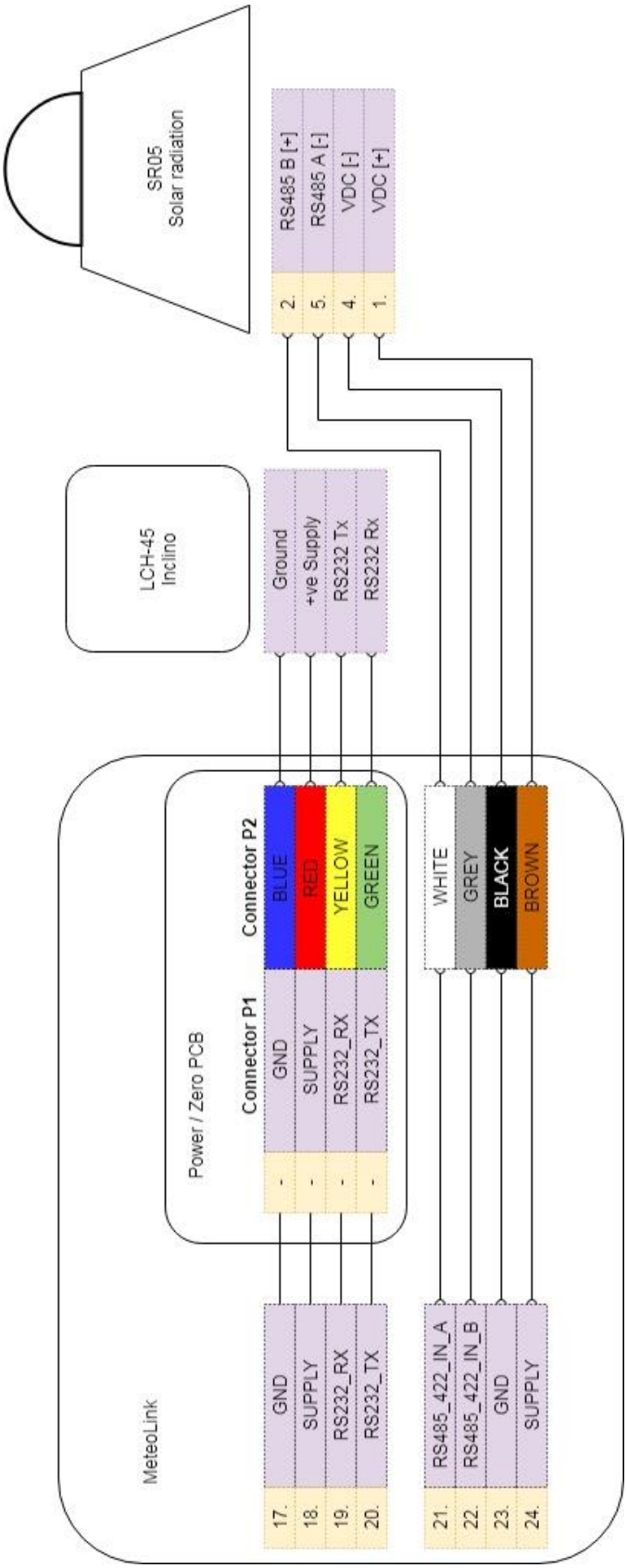
5 Basic Node connections



Basic node

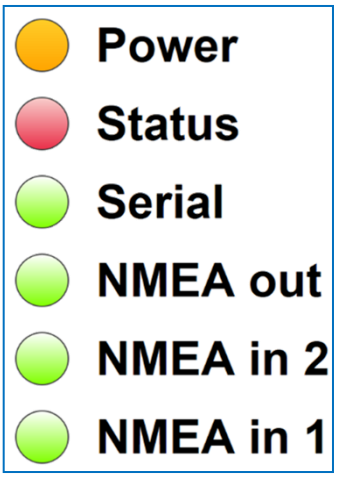
Top		Bottom	
1	GND (Supply)	17	GND (Sensor)
2	VIN [12-24VDC]	18	SUPPLY
3	NMEA_OUT_A	19	RS232_TX
4	NMEA_OUT_B	20	RS232_RX
5	SHIELD		
		21	RS485_422_IN_A
6	NMEA_RETURN_A	22	RS485_422_IN_B
7	NMEA_RETURN_B		
8	SHIELD	23	GND (Sensor)
		24	SUPPLY
9	GND (Supply)	25	0-5VDC_IN_1
10	SUPPLY		
11	NMEA1_IN_A	26	GND (Sensor)
12	NMEA1_IN_B	27	SUPPLY
		28	0-24mA_IN_1
13	GND (Supply)		
14	SUPPLY	29	GND (Sensor)
15	NMEA2_IN_A	30	CMOS_SUPPLY (3.3V)
16	NMEA2_IN_B	31	CMOS_TX
		32	CMOS_RX

6 Sensor connections



Device status LED's

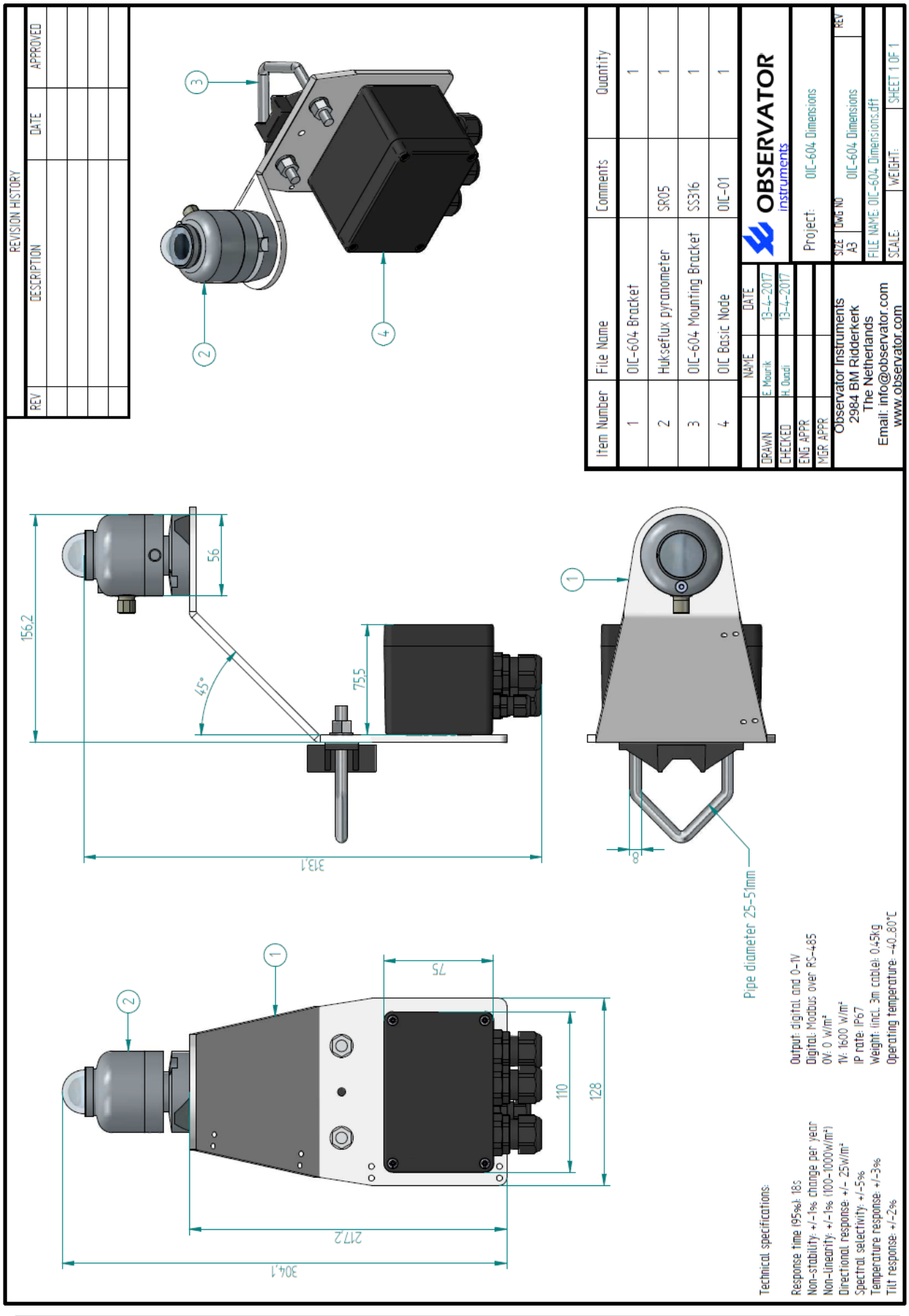
There are six LED's on the bottom right corner of the printed circuit board, they indicate the status of the device. After power-up the orange LED indicates that the microcontroller is powered. The second LED is red and indicates a bus overflow, when this LED blinks there is too much data input to send 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 yet 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.

7 Dimensional drawings



8 EU declaration of conformity

OBSERVATOR instruments

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EU DECLARATION OF CONFORMITY

(1) Apparatus model: **OIC-604**

(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:

OIC-604 Meteolink Solar Radiation Sensor

(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 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 63000:2018

(7)

(8) Ridderkerk, 23 November 2023,
Observator Instruments B.V.

dr. R. de Vries
CEO