

User manual

Version 3.01

SEBAPuls

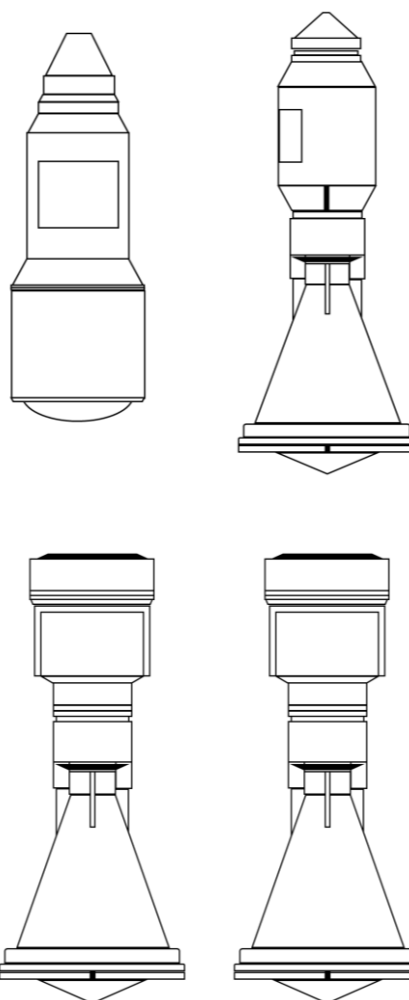
Product code: RAD 580X

English

SEBA HYDROMETRIE GmbH & Co. KG

Gewerbestrasse 61 a
87600 Kaufbeuren
Germany

Tel. (+49) 8341 9648-0
Fax (+49) 8341 964848
E-Mail: info@seba.de
www.seba.de



Content

1	INTENDED USE	- 4 -
2	PRODUCT DESCRIPTION	- 4 -
3	SAFETY AND DANGER INSTRUCTIONS.....	- 5 -
4	MOUNTING	- 6 -
4.1	Mounting variants.....	- 6 -
4.2	Mounting example	- 8 -
4.3	Reference plane and antenna edge	- 9 -
4.4	Positioning the SEBAPuls	- 10 -
4.5	Analog signal output (4-20 mA / 0.2-1V / 0.4-2V)	- 11 -
4.5.1	Connecting SEBAPuls with analog output (with DC/DC converter)	- 11 -
4.5.2	Connecting SEBAPuls with analog output (without DC/DC converter).....	- 12 -
4.6	Digital signal output (SDI-12)	- 13 -
4.6.1	Settings via SDI-12 protocol	- 13 -
4.6.2	Measurement value output	- 13 -
4.6.3	Connecting SEBAPuls 8 / 15 with SDI-12 output.....	- 14 -
4.6.4	Connecting SEBAPuls 20 / 120 with SDI-12 output.....	- 15 -
5	PUTTING INTO OPERATION	- 16 -
5.1	SEBAPuls with analog output.....	- 16 -
5.2	SEBAPuls with SDI-12 output	- 16 -
6	POWER SUPPLY	- 17 -
7	MAINTENANCE.....	- 17 -
8	TECHNICAL DATA.....	- 18 -
9	ACCESSORIES.....	- 18 -
10	DISPOSAL	- 19 -

1 INTENDED USE

The radar sensor SEBAPuls is solely used for non-contact measurement of water level in rivers, channels, dams, lakes or tidal areas.

Consider the technical specifications in **chapter 8** when using the device.

Solely the use in accordance with the instructions described in this user manual is an intended use. Any other use is not an intended use of this device.

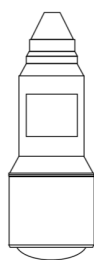
2 PRODUCT DESCRIPTION

The radar sensor SEBAPULS is a high accuracy measuring device measuring the surface water level without direct contact. Therefore the radar measurement is unaffected by mudding, drifting materials, weed, sewage and brackish or saline water etc.

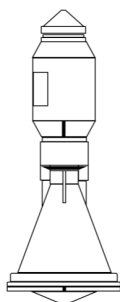
There is no influence in the measurement accuracy caused by air humidity (fog) or air temperature fluctuations. Further advantages implementing this radar sensor are the low energy consumption, the short measuring cycle and the short mounting distance.

The measuring principle, the so called pulse procedure, sends a short microwave impulse to the water surface. Subsequently the transmitter has a short time lag. Within this time lag, it receives the reflected impulse from the water surface and transmits it to the integrated evaluation system. The run time of the impulses corresponds directly to the distance of the actual surface water level.

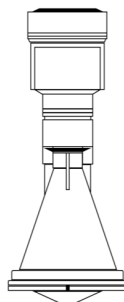
SEBAPuls 8



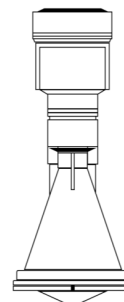
SEBAPuls 15



SEBAPuls 20



SEBAPuls 120



3 SAFETY AND DANGER INSTRUCTIONS

General

- Read the user manual carefully before starting with operation!
- Only use the device as intended and described in this user manual!
- Always keep the user manual available at site where the device is used!
- Keep the user manual for future operation!
- In case you sell the device or hand it to someone else, also hand over the user manual!
- Please be informed that operation and connection faults are beyond our sphere of influence. So, understandably, we cannot take over liability for resulting damages.

Marks

Pay attention to the different marks used in this user manual.
See hereafter the explanation of meanings of the used marks.



Warning: Situation that might result in injury or death.



Attention: Situation that might result in damage to the device.



Important notice: Important notice and additional information.

Working with electrical voltage

By handling devices, which are supplied by electrical voltage, the valid VDE-instructions, especially VDE 0100, VDE 0550 und VDE 0700 have to be considered.

Before opening an instrument, pull off the mains plug (if existing) and make sure that the instrument is without power supply.

Parts, construction groups or instruments must only be set into operation, in case they are built into a housing and protected against touching. During installation they have to be without power.

It is only allowed to use tools at the instruments, parts or construction groups, in case it is secured that the instruments are dropped out and the electric loads which are stored in the construction groups inside the instrument, are unloaded.

Conducting cables or conductors, which are connected to the instrument, part or construction group, have to be checked continuously to isolation faults or sites of fractures. By verification of a fault in the supply cable, the instrument has to be switched-off immediately, until the defect cable has been exchanged.

Before setting into operation, generally check if the instrument or construction group is suitable for the field of application. In case of doubts, unconditionally contact specialists, experts or the manufacturer of the used construction group!

4 MOUNTING

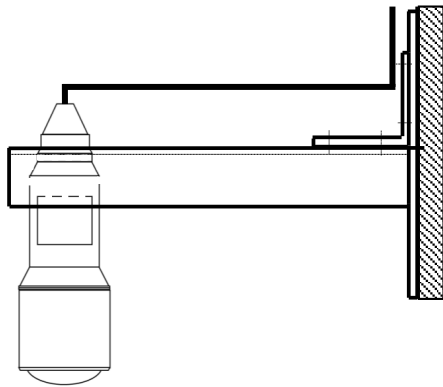
4.1 Mounting variants

Mounting with locknut

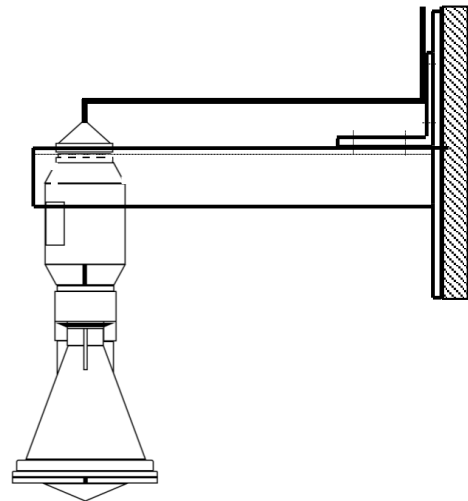
The types SEBAPuls 8 and 15 can be mounted on the SEBA standard boom with opening for thread G 1^{1/2} by means of the locknut. Push the sensor into the opening of the boom and fix it with the enclosed locknut.

For the distance to the wall, refer to chapter 4.4.

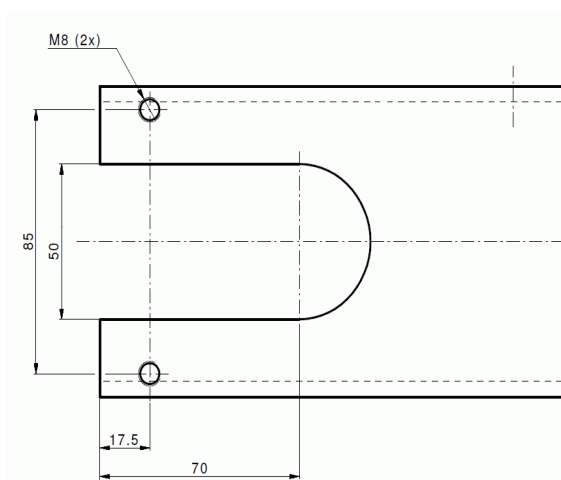
SEBAPuls 8
mounted to SEBA standard boom
with lock nut



SEBAPuls 15
mounted to SEBA standard boom
with lock nut



SEBA standard boom



Mounting with mounting strap

The types SEBAPuls 15, 20 and 120 can be mounted using a mounting strap. First attach the mounting strap to the desired position and then attach the radar sensor to the mounting strap using the screws provided.

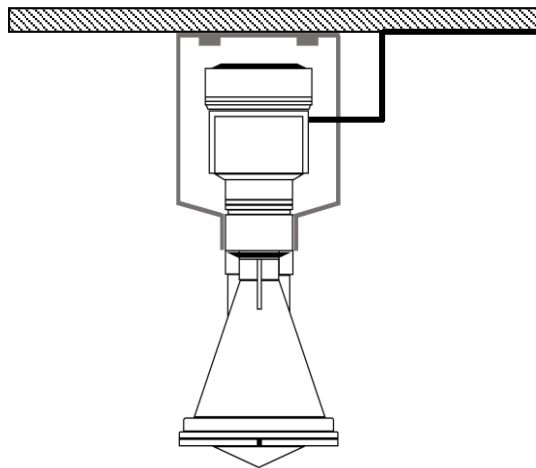
The mounting strap is optional for the SEBAPuls 15 and included in the standard scope of delivery for the SEBAPuls 20 and 120 types.

The mounting strap can be attached both to the SEBA standard boom and directly to ceilings or walls.

For the distance to the wall, refer to chapter 4.4.

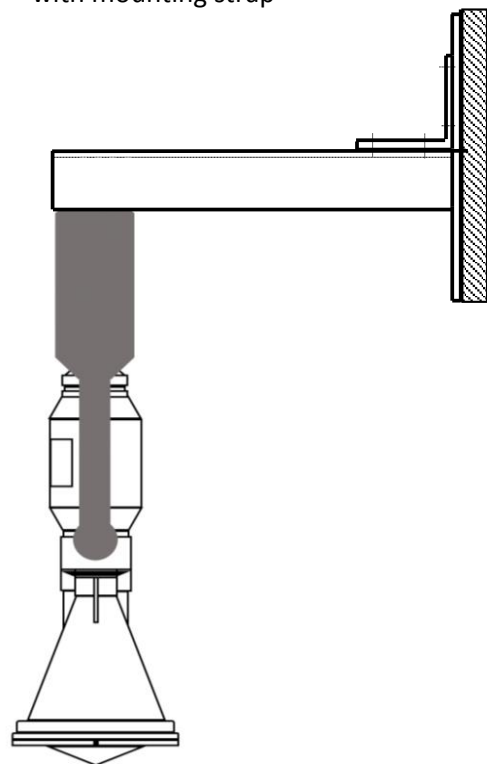
SEBAPuls 20 / 120

Ceiling mounting with mounting strap

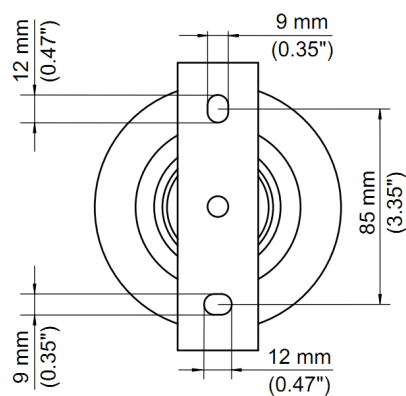


SEBAPuls 15

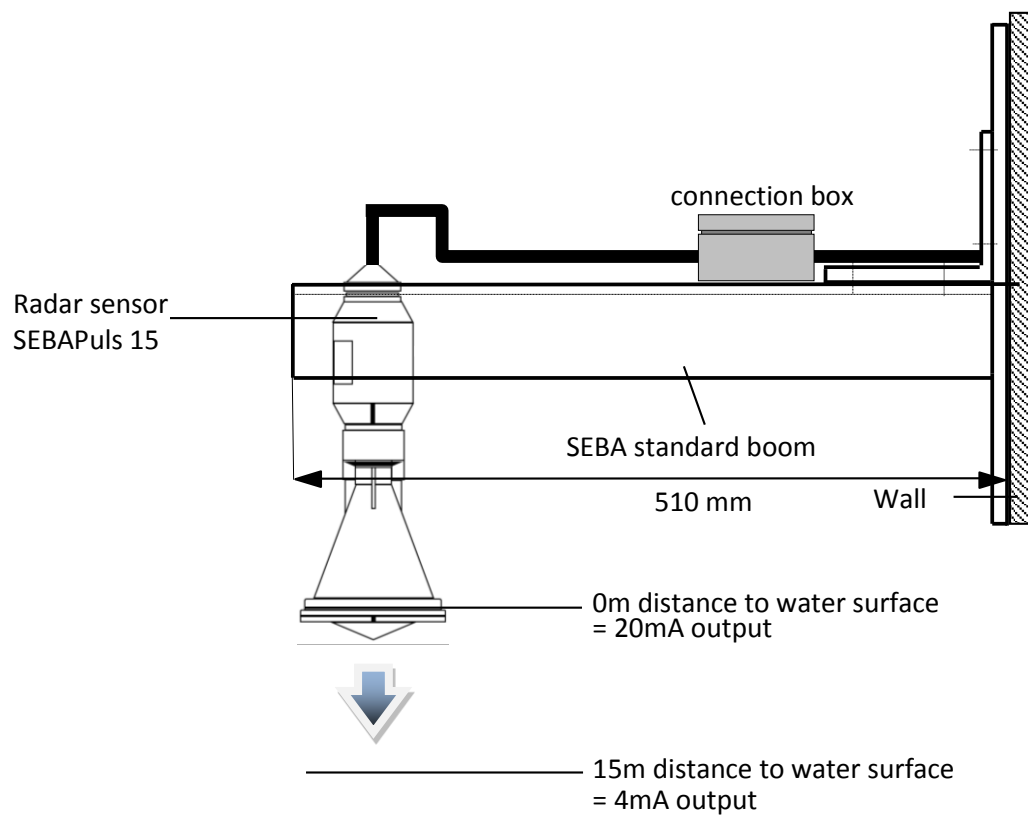
mounted to SEBA standard boom with mounting strap



Top view of mounting strap



4.2 Mounting example



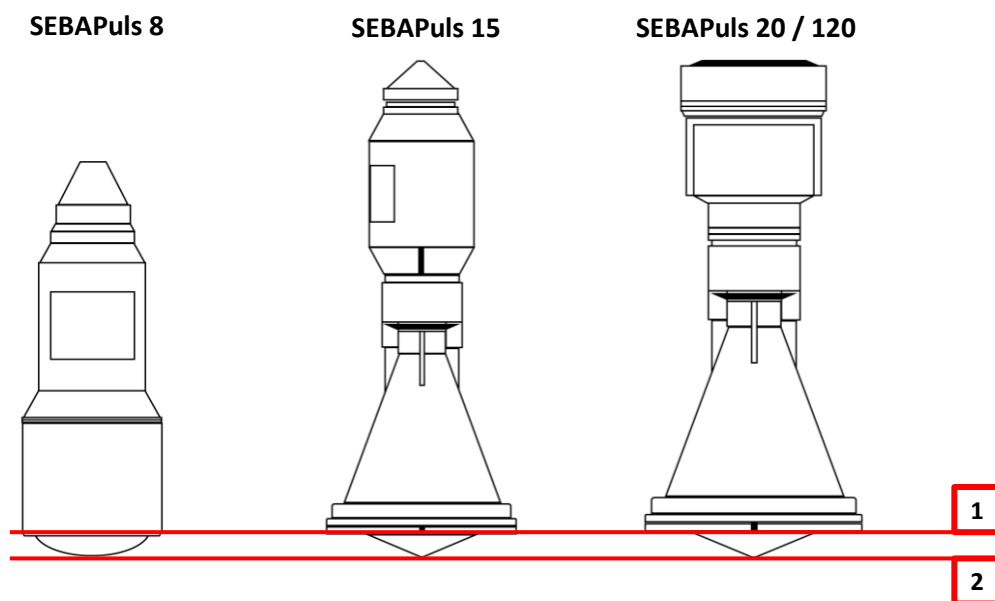
4.3 Reference plane and antenna edge

The reference plane (1) marks the zero point of the measuring range of each sensor.

The minimum distance to the water surface is measured from the end of the antenna (2) on the sensor. The following minimum distances to the water surface apply to the various sensor types:

Model	Minimum distance to water surface* (measured from antenna edge)
SEBAPuls 8	5 cm, factory setting 0,5 m
SEBAPuls 15	5 cm, factory setting 1 m
SEBAPuls 20	5 cm, factory setting 1 m
SEBAPuls 120	25 cm, factory setting 1 m

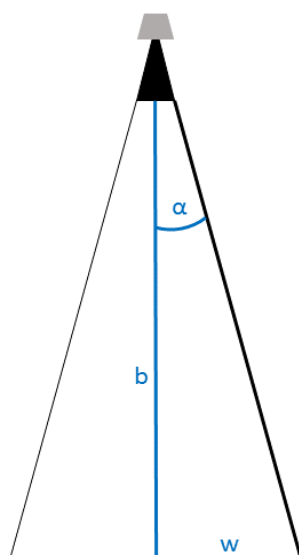
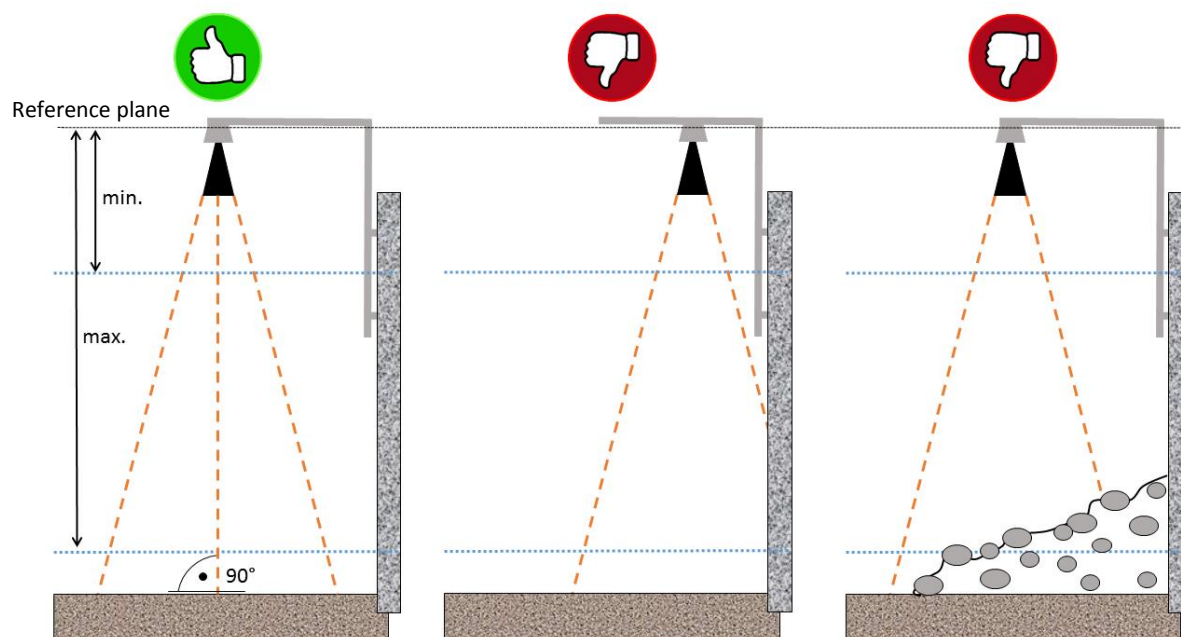
* Individual setting possible, sensor needs to be sent to SEBA.



(1) Reference plane

(2) Antenna edge

4.4 Positioning the SEBAPuls



Formula to calculate minimum distance to wall/shore/etc.

$$w = \tan \alpha * b$$

α = radiation angle

b = measuring range

w = radiation radius (minimum distance to wall/shore/etc.)

Model	Radiation angle α	Measuring range b	Radiation radius (minimum distance to wall/shore) w
SEBAPuls 8	10°	8 m	1.41 m
SEBAPuls 15	5°	15 m	1.31 m
SEBAPuls 20	5°	35 m	3.06 m
SEBAPuls 120	3.5°	120 m	7.34 m



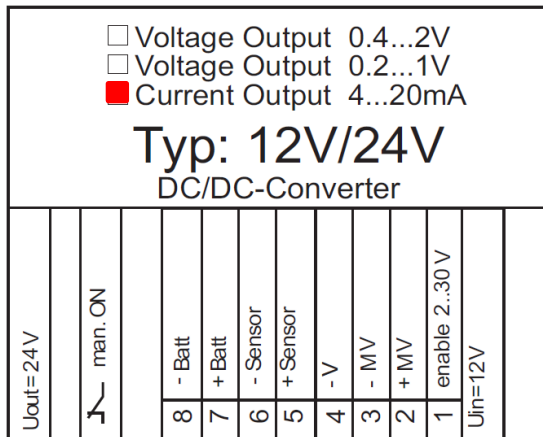
Important notice

Pay attention to the vertical installation of the sensor shaft to the measuring medium because otherwise the echoes are reflected into wrong directions and cannot be received by the antenna.

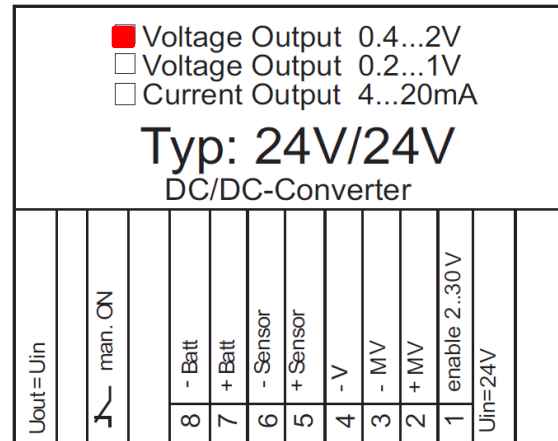
4.5 Analog signal output (4-20 mA / 0.2-1V / 0.4-2V)

The analog signal output of SEBAPuls is available in three different versions.

The output version is marked on the label of the DC/DC converter.

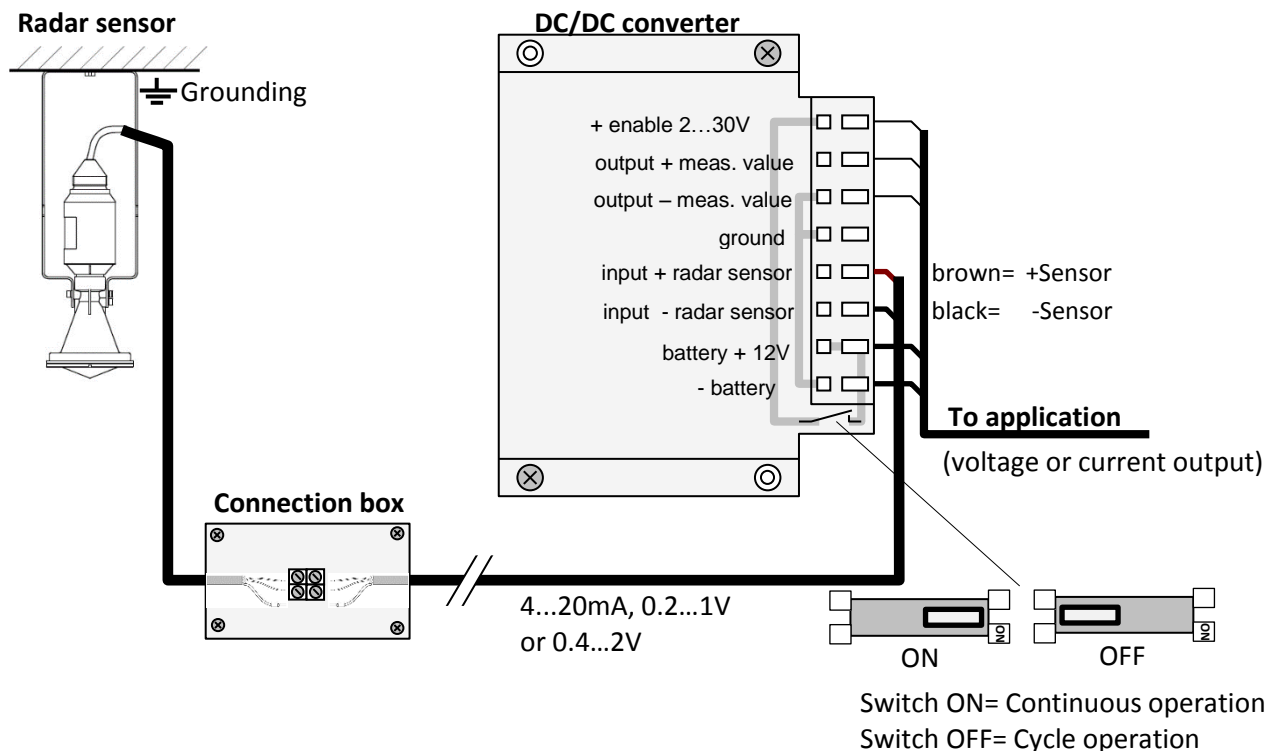


Example: Type 12V/24V
with output 4...20mA



Example: Type 24V/24V
with output 0.4...2V

4.5.1 Connecting SEBAPuls with analog output (with DC/DC converter)



The system can be switched on by applying a voltage between 2V and 30V to the switch input. This makes sure that energy will be consumed only during the measurement. For permanent operation the switch can be put ON.

4.5.2 Connecting SEBAPuls with analog output (without DC/DC converter)

The DC/DC converter is not required for the following data loggers:

- Unilog
- UnilogCom (where the cable length of the radar sensor is <200 m)



Important notice

More information is available in the operating instructions regarding connecting the respective data logger and/or in the connection diagram supplied with your shipment.

4.6 Digital signal output (SDI-12)

All SEBAPuls sensors can be equipped with a digital SDI-12 output instead of the standard analog output.

4.6.1 Settings via SDI-12 protocol

The sensor address of SEBAPuls can be changed by the following commands of the SDI-12 protocol:

Command	Response
aAb!	b<CR><LF>
a – the sensor address	b – the address of the sensor (will equal the new address or the original address if the sensor is unable to change the address)
A – the change address command	<CR><LF> - terminates the response
b – address to change to	
! – terminates the command	

4.6.2 Measurement value output

4.6.2.1 Start measurement command

The SEBAPuls supports the following start measurement command:

aM! (resp. aMC! with checksum)

With the aM! – command the measurement of channel 1 is started. As a response the sensor sends, in addition to the number of available channels, a hold-back time after which the measured values are available. If measured values are earlier available a Service Request can be sent so the collecting of data will happen faster.

Collecting the measurement values:

Collecting the measurement values is done by the aD0! command, whereas aD0! corresponds to channel 1.

4.6.2.2 Concurrent measurement

Furthermore it is possible to start measurement of all channels concurrently by the aC! command.

aC! (resp. aCC! with checksum)

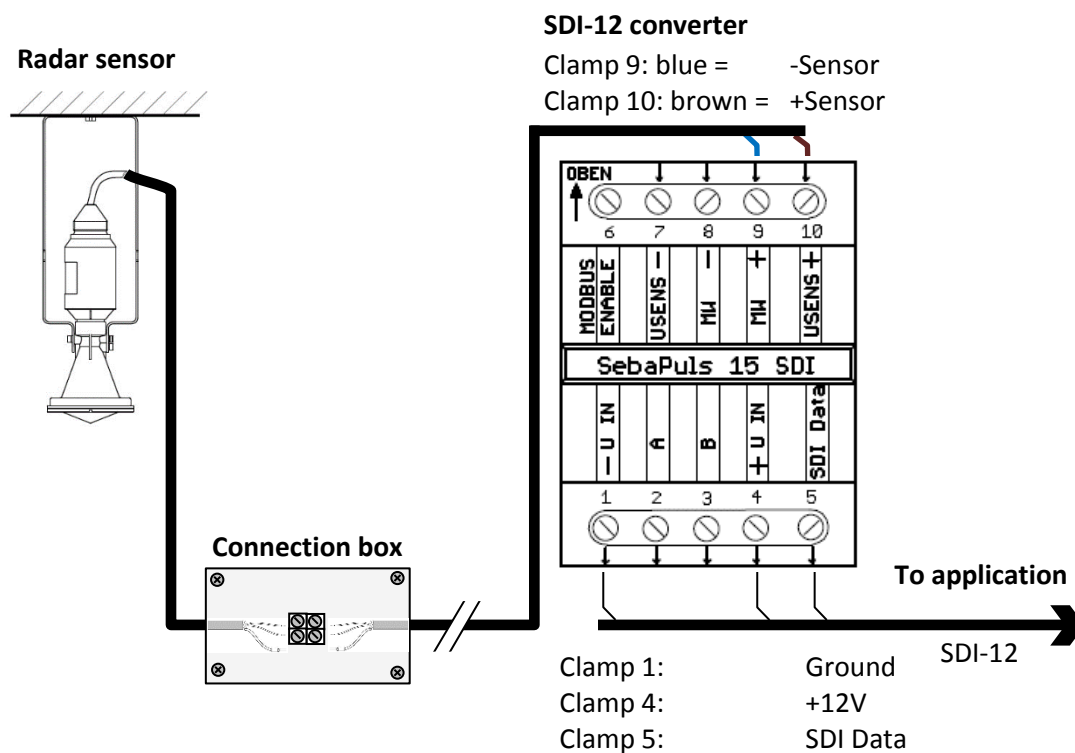
With the aC! – command the measurement of channel 1 is started. As a response the sensor sends, in addition to the number of available channels, a hold-back time after which the measured values are available. If measured values are earlier available a Service Request can be sent so the collecting of data will happen faster.

Collecting the measurement values:

Collecting the measurement values is done by the aD0! command, whereas aD0! corresponds to channel 1.

4.6.3 Connecting SEBAPuls 8 / 15 with SDI-12 output

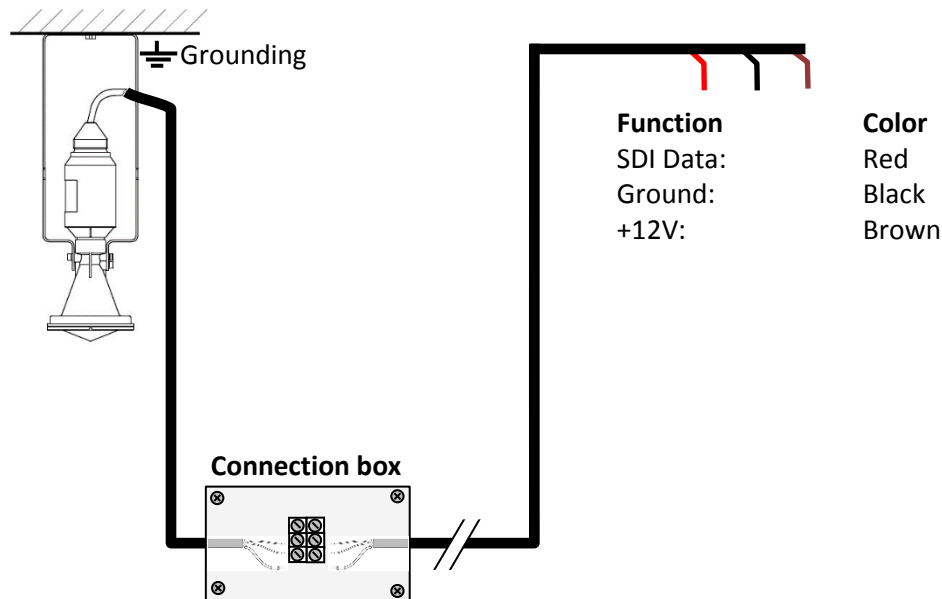
The SEBAPuls 8 / 15 with SDI-12 output is delivered with an external SDI-12 converter, which can be mounted to mounting rails. The connection of the converter has to be performed as follows:



4.6.4 Connecting SEBAPuls 20 / 120 with SDI-12 output

The SDI-12 output of the sensors SEBAPuls 20 / 120 is provided directly without converter. The wiring of the sensor has to be performed according to the following terminal assignment:

Radar sensor



Depending on the configuration of the data logger, you can connect SDI-12 sensors either with a M12-plug or wire them on a mounting rail with terminal strip, provided that the data logger has a SDI-12 sensor input.

In case you connect the SDI-12 sensor with a M12-plug to the data logger, consider the following pin assignment for mounting the plug to the sensor, if this has not been prepared at the factory.



Back side
of M12-plug

Pin 1	GND:	Shared ground connection between data logger and sensor
Pin 2	DATA:	SDI-12 data (bidirectional)
Pin 3	+Supply:	SDI-12 supply
Pin 4		not allocated

In case you wire the SDI-12 sensor on a mounting rail with terminal strip, additionally consider the wiring diagram included in delivery.

5 PUTTING INTO OPERATION

5.1 SEBAPuls with analog output

- Perform wiring according to the scheme in **chapter 4.5.1**
The DC/DC converter should be mounted close to the data logger – not close to the radar sensor.
- The connection clamps of the DC/DC converter are screw-less. Press a small screwdriver into the small opening. Then insert the wire to be connected and remove the screwdriver. Proceed with each contact of the connector. The wire may be used with core sleeve at its end or simply insulation-stripped
- Connect the grounding screw (not applicable for SEBAPuls 8 / 15) at the bottom of the sensor housing to a proper grounding next to the sensor with a wire of at least 4 mm².
- The instrument is switched on by applying operation voltage. The first valid measured value depends on the lead time of the sensor (hence on sensor type):

Lead times:

SEBAPuls 8:	55 seconds
SEBAPuls 15:	55 seconds
SEBAPuls 20:	55 seconds
SEBAPuls 120:	55 seconds

- During the initialization, resp. if no echo is recognized; there is a 22mA fault current signal or a 2.2V fault voltage signal.

5.2 SEBAPuls with SDI-12 output

- Perform wiring of SEBAPuls 8 / 15 according to the scheme in **chapter 4.6.3** and for the types SEBAPuls 20 / 120 according to the scheme in **chapter 4.6.4**.
- The connection clamps of the SDI-12 converter of SEBAPuls 8 / 15 are with screws. Open the screw of the respective clamp. Insert the wire to be connected and tighten the screw again. Proceed with each contact of the connector. The wire may be used with core sleeve at its end or simply insulation-stripped.
- Connect the grounding screw (not applicable for SEBAPuls 8 / 15) at the bottom of the sensor housing to a proper grounding next to the sensor with a wire of at least 4 mm².

6 POWER SUPPLY



Warning

Do not connect the device directly to 110 VAC or 230 VAC!

Analog version:

12VDC (with DC/DC converter Type 12V/24V) or

24VDC (with DC/DC converter Type 24V/24V)

12VDC (without DC/DC converter) => depending on cable length and cross section

Digital version:

9.6...30VDC

7 MAINTENANCE

From time to time the measuring site has to be controlled, if the sensor is dirty due to weather conditions, insects or other circumstances.



Important notice

Should there be any damages in spite of proper use, the device has to be sent back to SEBA for repair. All modifications on electronic components or cables that are beyond the herein described procedures, must only be conducted by SEBA.

Neglecting this regulation leads to termination of all warranty claims!

8 TECHNICAL DATA

	SEBAPuls 8	SEBAPuls 15	SEBAPuls 20	SEBAPuls 120
Measuring range:	0 -8 m	0 -15 m	0 -35 m	0 -120 m
Accuracy:	± 5 mm	± 2 mm	± 2 mm	± 5 mm
Operation / storage temperature:	-40...+ 60°C -40...+ 80°C	-40...+ 80°C	-40...+ 80°C	-40...+ 80°C
Output:	Analog version: Current output 4...20 mA or Voltage output 0.2...1V or 0.4...2 V Digital version: SDI-12			
Operation voltage:	Analog version: 12VDC (with DC/DC converter Type 12V/24V) or 24VDC (with DC/DC converter Type 24V/24V) 12VDC (without DC/DC converter) Digital version: 9.6...30VDC			
Dimensions:	Ø93 mm Length 243 mm	Ø116 mm Length 300 mm	Ø116 mm Length 245 mm	Ø116 mm Length 245 mm
Material horn antenna:	Plastic	Plastic	Plastic	Plastic
Housing/Protection:	Plastic, IP68	Plastic, 68	Aluminum, IP68	Aluminum, IP68
Weight:	approx. 0.7 kg	approx. 2 kg	approx. 2 kg	approx. 2 kg

9 ACCESSORIES

Please note that the following accessories are not mandatory included in the delivery. Depending on your order and related order confirmation the following articles are either part of the delivery or not part of the delivery.

- EKT 9500901008 Mounting strap 300mm for SEBAPuls 15
- RAD 58092 SEBA standard boom for all SEBAPuls sensors

10 DISPOSAL

Disposal of old devices within the member countries of the European Union

In accordance with the European Union directive 2002/96/EG, SEBA takes back old devices and disposes of them appropriately.

Disposal in all other countries

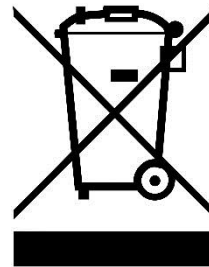
Dispose of old devices appropriately.

Consider the laws for disposal of old electronic devices that are applicable in your country.



Important notice

- Do not dispose of old devices or batteries in the ordinary domestic waste!
- For information on used materials, please see chapter „Technical Data“.



For further information on returning old devices, please contact:

SEBA Hydrometrie GmbH & Co. KG

Gewerbestrasse 61 a

87600 Kaufbeuren

Germany

Tel.: +49 (0) 8341 9648-0

Fax: +49 (0) 8341 9648-48

info@seba.de

WEEE Reg.-No.: 33649137

