



The DCS 4100/4100R is intended for commercial reasons as well as for research purposes. It can be used to monitor the water current in harbors, along the coast, near offshore oil platforms etc. The In-line Doppler Current Sensor DCS 4100/4100R is a rugged and reliable sensor that offers users great flexibility to obtain accurate current measurements.

The sensor uses the Doppler Shift principle as the basis for its measurements. Four transducers transmit short pulses (pings) of acoustic energy along narrow beams. The same transducers receive backscattered signals from scatterers that are present in the beams (0.4 to 2.2m from the sensor), which are used for calculation of the current speed and direction.

The scattering particles are normally plankton, gas bubbles, organisms and particles stemming from man-made activity.

After reading the internal compass circuit (Hall effect compass), the sensor is able to determine the current speed and direction. The sensor will ping towards the water current. The current

Doppler Current Sensor 4100/4100R

A rugged, true vector averaging sensor for measuring current speed and direction in the sea. 4100 model: SR10 output for AADI dataloggers 4100R model: RS232 output for third party dataloggers.

Features 4100/4100R:

- Rugged and Reliable DCS with High Accuracy
- Insensitive to fouling
- Ideal for use on buoys, quays, piers, and in hand for in situ measurements
- Function test is easy carried out with our Test Unit
- Up to 4 DCS can be connected in a string
- Ping rates

4100R: selectable from 4 to 1200 pings per minute

4100: Intervals of 2min or less: 10pings/s

Intervals greater than 2min: 1ping/s

Features 4100R:

- RS-232 communication
- Customizable through RS-232 communication
- Can operate in both polled and non-polled mode
- In high speed mode the DCS 4100R can output ping data 4 times a second

measurements are compensated for tilt by the use of an electrolytic tilt sensor.

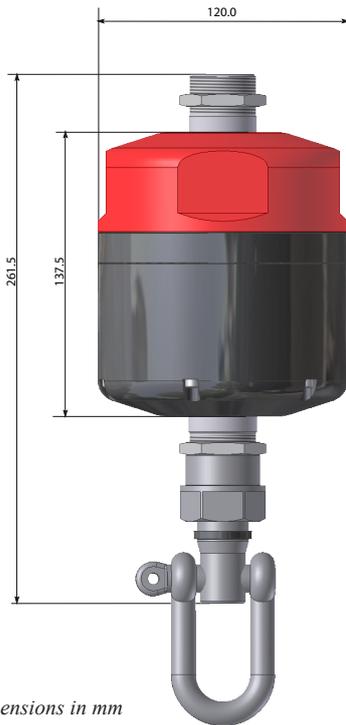
The measurement accuracy is proportional to the square root of the number of pings in a measuring interval. To obtain good accuracy at short intervals e.g. 1 minute, it is possible to choose a higher ping rate. The current consumption will, however, also be greater with increasing ping rates.

The temperature is measured using a temperature dependent crystal-oscillator-circuit.

The DCS 4100R can output data using the RS232 standard; output parameters are set up using the 4042 setup program. The sensor can be set up to output data automatically (non-polled) or only when polled via the RS232 line.

Various system parameters can be altered using the RS232 command system. DCS4100R can be set to 4 modes: Normal, comprehensive, high speed and 3500. In 3500 compatible mode, it will act as the former version of this sensor, the DCS3500R.

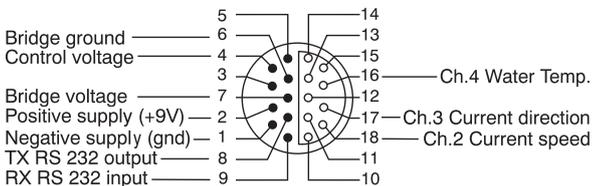
The DCS4100 outputs SR10 data.



dimensions in mm

Pin Configuration 4100R:

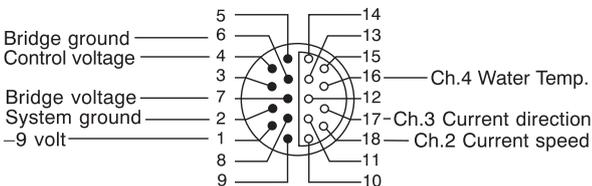
External view. Pin= ●; Bushing=○



All connections wired through from upper to lower receptacle

Pin Configuration 4100:

External view. Pin= ●; Bushing=○



Optional Accessories 4100R:

- Setup software 4042 (included)
- Maintenance Kit 3932
- Up to 4 DCS can be used in a string interconnected by 3 ea Cables 3802/3808.
- Cable 3803/3807 with one free end connects the upper DCS to the data reading device. Maximum length between the bottom DCS and the reading device is 15 meters
- Cable 3904 with 9-pin D-SUB connector to PC
- Power supply 3786, 12V/3A
- Test Unit 3731

Current Speed (vector averaged):

Available ranges:

- P/N 4100/4100R 0 - 300 cm/s standard
- P/N 4100A/4100RA 0 - 500 cm/s on request

Resolution:

0.1% of FS

Accuracy:

Absolute: ±0.15 cm/s

Relative: ±1% of reading

Statistic precision:

0.55 cm/s (Standard deviation)

Current Direction (vector averaged):

Range: 0-360° magnetic.

Resolution:

0.35°

Accuracy¹⁾:

±5° for 0-15° tilt.

±7.5° for 15-35° tilt.

Temperature:

Range:

-10 to 43°C

Resolution:

0.05°C

Accuracy:

±0.1°C

Settling Time (63%)²⁾:

20 minutes

Tilt Circuit:

Accuracy:

±1.5°

Compass Circuit:

Accuracy:

±3°

RS 232 Output:

9600 Baud, 8 data bit, No

parity, 2 stop bits

Acoustic Frequency:

2MHz

Acoustic Power:

25W in 1ms pulses

Beam Angle:

±1° (Main lobe)

Installation distance:

Min. 0.5m from the bottom

Min. 0.75m from the surface

Current consumption:

6mA · Ping rate

(ping rate in pings per second)

Supply Voltage:

7-14VDC

Operating Temp.:

-10 to +50°C

Depth Capability:

300 meters

Electrical Connection:

18-pin Strain-proof Plug

Breaking Load:

1500kg

Material and Finish:

Durotong, Titanium, POM,

Stainless Steel

Net. Weight:

1815 grams

¹⁾ DCS4100: Different coefficient set for each ping rate. DCS4100R: The accuracy is only valid for factory default settings. For other settings, contact factory.

²⁾ The temperature sensor is placed inside the sensor and therefore the long settling time. Please notice that the temperature sensor is calibrated with a fixed power supply, ping rate and recording interval.

Optional Accessories 4100:

- Maintenance Kit 3932
- Up to 4 DCS can be used in a string interconnected by 3 ea cable 3810
- Cable to Reading Unit: 3863/3809/3852
- Test Unit 3731

Available output parameters from the DCS 4100R RS232 line	Output Mode									
	Comprehensive				Normal				High Speed	3500
	Compass Compensation ON		Compass Compensation OFF		Compass Compensation ON		Compass Compensation OFF			
	R	P	R	P	R	P	R	P		
Current speed long the x-axis			•				•		•	•
Current speed long the y-axis			•				•		•	•
Current speed North	•				•					•
Current speed East	•				•					•
Absolute current speed		•		•		•		•		
Current direction ref to North		•				•				
Current direction ref to x-axis				•				•		
Signal strength	•	•	•	•						
Compass direction	•	•	•	•					•	•
Tilt along the x-axis			•	•					•	•
Tilt along the y-axis			•	•					•	•
Tilt along the North axis	•	•								
Tilt along the East axis	•	•								
Ping count	•	•	•	•						
Water temperature	•	•	•	•	•	•	•	•	•	•
Time series from AD converter	<i>Time series are available in polled mode using a poll command</i>									

R: Rectangular output
P: Polar output

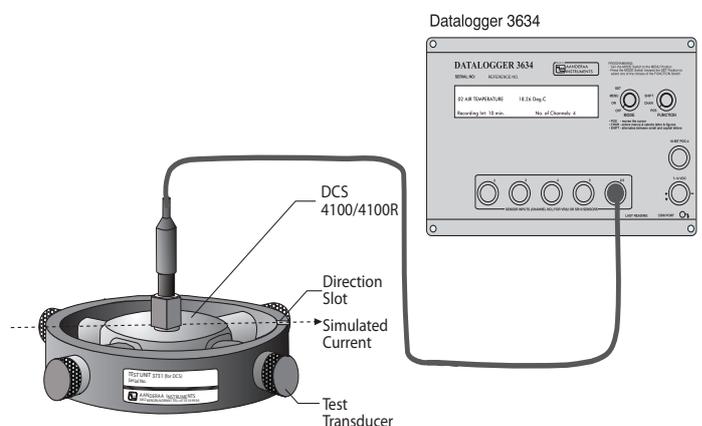
Test Unit 3731 for DCS4100/4100R

The Test Unit is designed to verify that vital parts of the Doppler Current Sensor (DCS) are working correctly. The Test Unit is designed for DCS installed on the RCM9/11 and for stand alone DCS in the 3500/3900/3920/3990/4100 series.

The Test Unit consists of a ring with 4 test transducers suspended by mechanical springs, enabling each test transducer to be pressed against the DCS transducers.

The test transducers pick up some of the energy transmitted by the 'ping' from the DCS. This energy is used to start oscillation of the test transducers. In the receiving stage of the DCS the test transducers are still oscillating and thus transmitting a weak signal back to the DCS.

Please refer data sheet D320 for information about the operating procedure.



Applications

Install the DCS at least 2.2m from any obstruction for correct measurements!

DCS 4100 in a buoy deployment, CMB 4280

The DCS 4100 is placed inside a central PVC tube at 1m depth, which gives a symmetrical installation with minimal interference from the buoy structure. The buoy can be equipped with up to three DCS 4100 and also sensors for wave and atmospheric parameters. Data can be relayed ashore by VHF radio where the data is displayed or conveyed further by telephone. See Data Sheet D 299 for further information.

DCS 4100/4100R in a string

Up to 4 DCS 4100/4100R can be connected in a string. Use an open end cable between the upper DCS and the Reading Unit. Use an interconnecting cable between each DCS. The open end cable exposes positive supply, GND and Rx/Tx lines for 4 DCS. The recommended maximum distance between the bottom DCS and the data reading equipment connected to the open end cable is 15 meters. Additional sensors can be connected below and between the DCS, use RS232 sensor together with DCS4100R and SR10 sensors together with DCS4100. NOTE! The standard cables allows 11 parameters to be send to the Reading Unit, contact factory for optional cables.

DCS 4100/4100R installed on a pier/single point

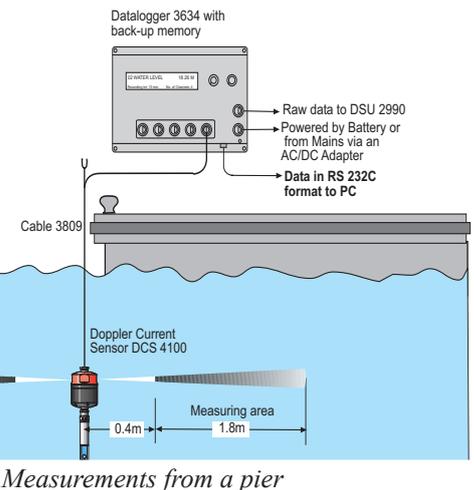
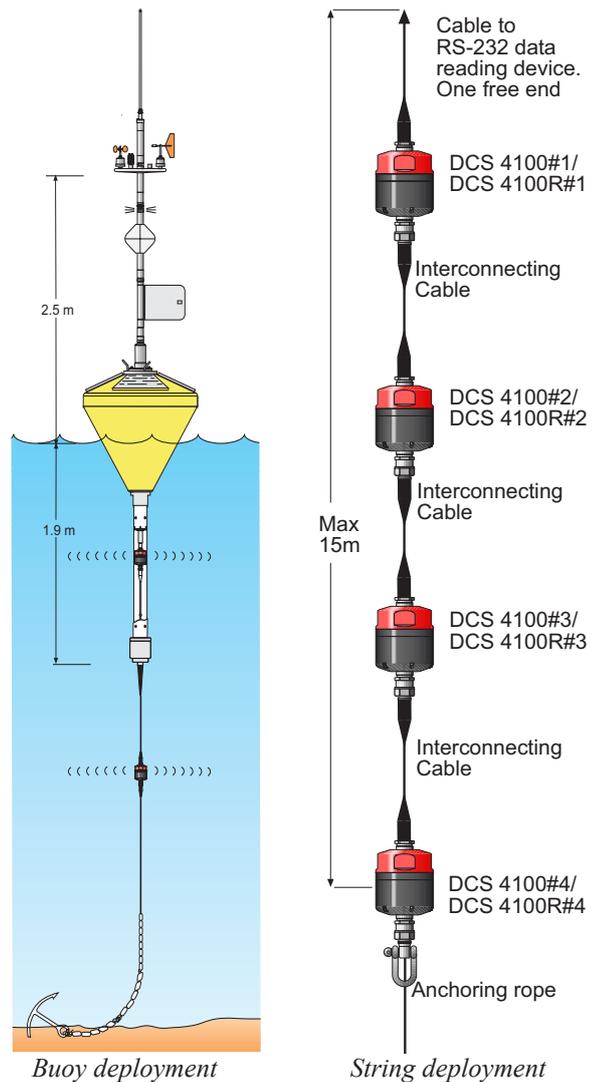
The DCS can be moored under the pier with an anchor. The cable from the sensor should be fastened to the pier and kept tight thus keeping the sensor horizontal and in a fixed position. Use an open end cable between the DCS and the Reading Unit. Maximum cable length is 500m. DCS 4100 can be connected to Datalogger 3634 for real-time measurements in engineering units. Additional sensors can be connected to the cable.

DCS 4100R and High speed mode

In comprehensive mode and normal mode, the DCS will collect a number of ping sets and then perform an averaging of this data. When using the highspeed mode, the DCS outputs uncompensated data from each ping set (Current speed X/Y, Compass direction, Tilt X/Y, and water temperature). This data can be output at a rate of 4 times a second.

DCS 4100/4100R used in a river or close to an obstruction

If DCS is used in a river or fasten to a fixed structure where one or two of the transducer are block, you might switch of the blocked transducer in a 4100R or order a 4101 (SR-10 version). 4101 is a riverbank version of 4100 with only two transducers activated.



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