LCM4570 12te Submersible Load Shackle with Data Logging

Application

Mooring line monitoring of fish farm tanks

Features

- Manufactured using a 12te Crosby G2130 bow shackle
- Load pin manufactured from 17-4PH H1150 stainless steel
- Environmentally sealed to IP68 for subsea operation
- Data logger powered by 4 x AA lithium batteries to provide 90 days of power
- Removable 512MB SD card
- Low noise, high resolution, low power consumption data logger, supplying 2 readings per minute
- Easy to open subsea data logger enclosure for SD card retrieval

Design Brief

We were contacted by a leading Canadian aquaculture company who were looking for a monitoring system that could log the tension in mooring lines that anchored tanks used for the farming of salmon to the sea bed. They had seen the SHK-B load shackle range on our website, but as it would be located at a depth of around 4.5 metres, needed a special subsea version. An initial system was required for testing purposes (carried out in a tow tank), but if successful multiple systems would be fitted to the fish tanks out in the field. The requirement was to monitor the loads on the mooring lines to check that they did not exceed safe operational limits, particularly during severe weather conditions. A data logger was required to record measurement readings from the load shackle, which as well as being suitable for long term submersion underwater, also needed to be able to operate unattended for long periods between retrieval of the monitoring system for data download. LCM System engineers designed an IP68 enclosure for housing the data logging electronics, which was simple to open to facilitate easy access to the SD card and to replace the batteries. Lithium batteries were chosen to provide maximum battery life (around 90 days) and the data logger chosen featured low noise, high resolution and low power consumption, with the provision for 2 readings per minute. Data output was in Excel format for straight forward importation to a PC for analysis.

The enclosure was connected to the load shackle via a 1 metre cable and housed within a float to keep it away from the mooring lines, to avoid any possibility of it becoming entangled during stormy seas.

Main Criteria

- Load shackle must be suitable for subsea operation
- Data logging capability required
- Monitoring system to be robust enough for long term submersion and to withstand storm conditions
- The data logger must have a minimal power consumption requirement so it can be left unattended for up to 6 weeks
- Excel data output for importing to a PC
- Full material traceability required
- Load shackles to be calibrated to traceable standards

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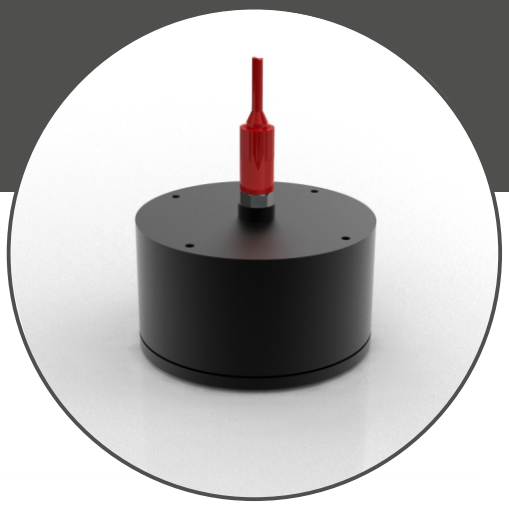
Solutions in Load Cell Technology



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Specification

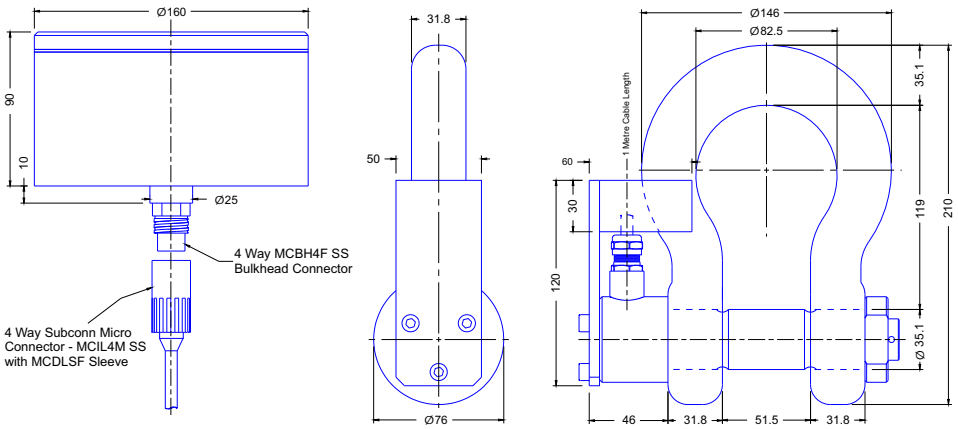
Load Shackle

Rated load (tonnes)	12te
Proof load	150% of rated load
Ultimate breaking load	>300% of rated load
Output	1.5mV/V (nominal)
Non-linearity	<±1% of rated load (typically)
Non-repeatablity	<±0.1% of rated load
Excitation voltage	2.5V
Bridge resistance	1000 Ohm
Insulation resistance	>500 MOhm@ 500 VDC
Operating temperature range	-20°C to +70°C
Environmental protection level	5 metre submersion depth
Cable	4 core PUR (1 metre)

Data Logger

Sample rate	2 samples per minute
Battery life	Approx 90 days @ 2 samples/min
Communication interface	RS232
Power supply	4 x AA lithium batteries
Memory card type	SD card (512MB)
Enclosure Material	Acetal (black)
Operating Temperature	-40°C to +60°C
Environmental protection level	5 metre submersion depth

Dimensions



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