USER GUIDE FOR RS485 FUEL LEVEL SENSOR CAP10CNR

CAP10CNR-MN-EN-01	JUN-2020

This document is applied for the following products

1. Introduction

CAP10CNR is industrial version of PulseCAP10, designed for industrial applications like generator, stationary fuel tank in factory, building, construction site...CAP10CNR has RS485/ModbusRTU output, can be connected easily to any industrial devices like PLC, IoT Gateway, iConnector... CAP10CNR has very high accuracy 0.1% of span, can be used for tank up to 30.000 liters volume.



2. Notes

- The technicians who install sensor, must be graduated from college of mechanic or electric.
- The mechanical installation staff (drill, cut, grind, etc.) must have skills in mechanical engineering.
- The electrical installation staff (connect, etc.) must have skills in electrical engineering.
- The technician must be trained before using.

3. Safety

- CAP10CNR is intended to use with Diesel Oil, Vegetable Oil.
- CAP10CNR must not be used with other flammable fluid such as Gasoline, Alcohol, Ethanol, Acetone, Toluene or other solvents.
- Be careful while drilling, cutting, grinding, etc. The fuel tank or other flammable fluid.
- Daviteq is not responsible for compensation in case of explosion to bodily injury or property damage.

4. Note Before Installation

- Read specifications thoroughly and make sure that its output are suitable to reading devices.
- Power supply must be in the permitted range.

- Do not take out the label and take off the lid as this will lead to the instability of the sensor and manufacturer could deny warranty. (except cutting of sensor length within the allowed range).
- Make sure all the necessary tools are ready before the installation.
- **CAP10CNR be equipped with screws. We advise customers should use stainless steel rivets to fasten the plastic flange onto tank for all type of tanks and only using screws for the thick and hard ones.**

5. Specification

Sensor length	standard 1000mm or 1500 mm, extend to 4000 mm (by extension probe) or cut down to 100 mm
Output	RS485/ModbusRTU
Power supply	8..50VDC
Consumption	max 35mA
Working pressure	-1 .. 2 barg
Working temperature	-40 °C .. + 85 °C
Accuracy	+/- 0.1% of span (at 25 °C)
Temperature drift	< + 0.03% of span per 10 °C
Resolution	1/1000 of span
Sensor materials	Alloy & Engineering plastic
Electrical connection	connector M12 (matched connector and cable must be ordered separately)
Housing	Cast aluminum, IP67 protection
Process connection	Plastic flange
Standard accessories	flange, o-ring, gasket, protection covers, self-tapping screws, twisted seal
Certification	CE-Marking per EN61236-1 (with test report)

6. Full Package



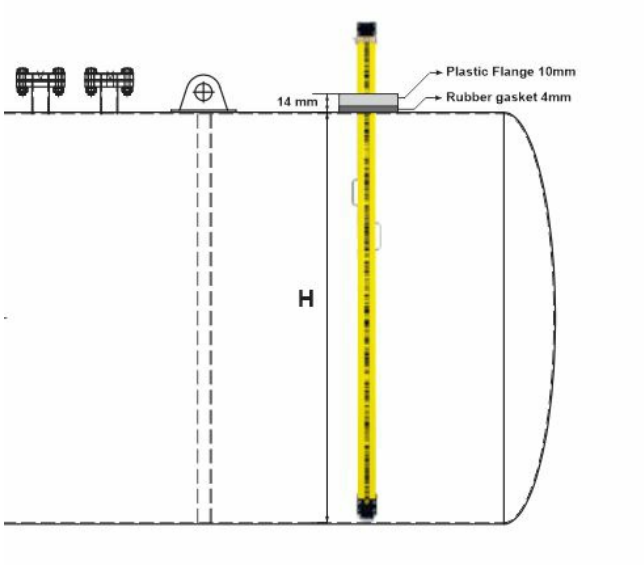
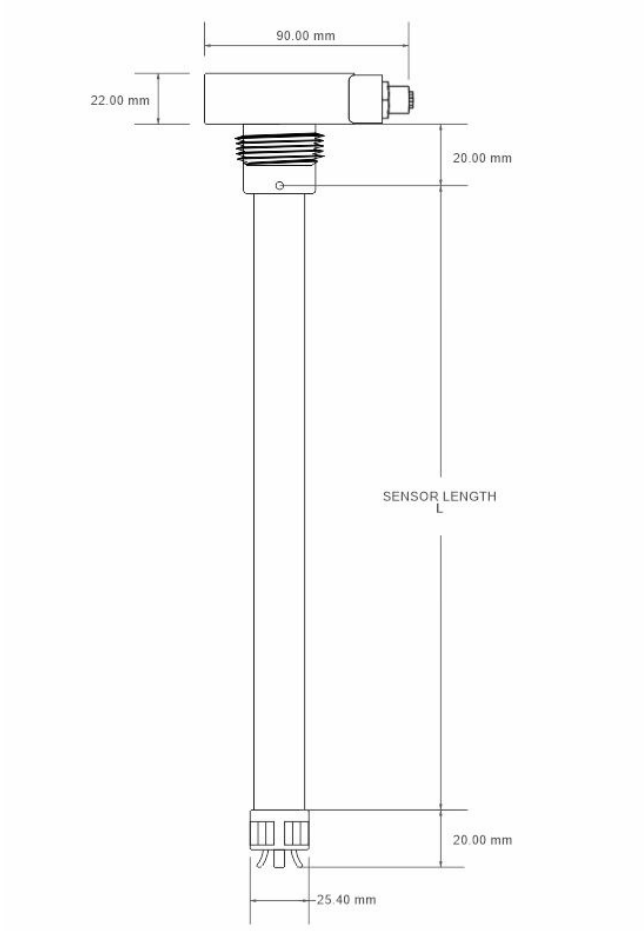
7. Tools

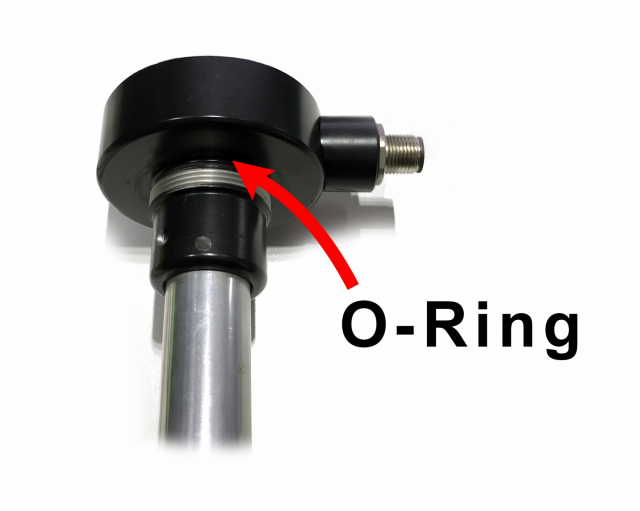
No	Tool Name	No	Tool Name
01	Drilling machine	**10**	Drill (Φ38)
02	Pump	**11**	Silicone gasket
03	Rivet clippers (In case of using stainless steel rivet)	**12**	Twist drill 4 mm (In case of using stainless steel rivet)
04	Tube cutter	**13**	Electrical tape
05	Swivel Blade	**14**	Cutting pliers
06	Hacksaw	**15**	Phillips screwdriver
07	File	**16**	Pencil
08	Tape measures	**17**	Multi Meter

09	Allen key 2 mm	**18**	Calibration can

8. Sensor Installation Guidance

Step	Discription	Note
1	**Remove fuel:** Remove all fuel from the tank.	Some tank have been welded with oil filter and have float level sensor installed, so it is necessary to take out the float level sensor before removing the fuel.
2	**Clean the tank**	Must clean the tank thoroughly.
3	**Central hole locating:** The hole will be in the center of tank's up-per side or closest to center.	This is an important step as it will directly affect the stability of the fuel level data.
4	**Drilling the central hole:** ● After determining the center of the oil tank, we clean the surface and use a 38 mm drill to make a hole on the oil tank. ● Remove any burrs from the drilled hole by a file.	Before drilling, it is vital to check whether the hole is affected by the internal metal frame or obstacles at the bottom the tank.
5	**Flange installation:** ● Place the 4 mm rubber gasket at the center of the tank's upper side. ● Place the plastic flange onto the rubber gasket (4 mm). ● Mark 4 points at the bolt hole. ● Use screws /rivets to fasten the 4 mm rubber gasket and the plastic flange onto tank.	● Only using screws for the thick and hard tanks. ● Unplug the screw/ rivet symmetrically.

6	**Sensor cutting:** After flange installation, we determine the length of the sensor to be installed as picture below:  **C = L+20+20-(H+14) => C = L+26-H (mm)** C: Length to be cut. L: Original length of the sensor. H: Height of the tank. ***Example:**  Sensor length is L = 2000, H = 1700 mm => C = 326 mm => Cut the sensor pipe length of 326 mm.
7	**Calibration:** • After cutting, make sure the sensor tube is clean. • Re-plug the Filter footer and tighten the screw. • Turn on the sensor in at least 30 seconds in order for the sensor to automatically recognize its new length.

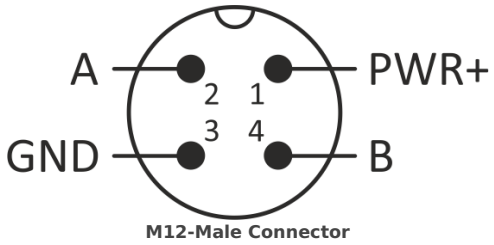
8	**Final:** • Place the O-ring on the top of the threads, ensure that it can touch the aluminum housing of the sensor (as below picture):  • Install sensor into the threads of flange and turn it in clockwise direction. • Using the O-ring enables to rotate the sensor within 180 degrees from final tighten position and assuring that the oil will be not spilled (as below picture):  • Use the 2mm Allen key to lock the hex bolt to protect the sensor rotate backwards. • Connect the sensor with the cable. • Use sensor head seal to cover the sensor and then use plastic and then use plastic twister seal to lock the head seal and connector seal to protect the sensor.

9. Disassembly Guidance

Please follow the below steps:	Note
Step 1: Remove the cover **Step 2:** Remove the terminal connector **Step 3:** Use the 2 mm Allen key to unlock the hex bolt **Step 4:** Turn the sensor in counter-clockwise direction	• Do not hold the male connector to rotate sensor directly, that can make the male connector broken. • Do not use locking pliers, pipe wrenches, etc. to twist the sensor as this cause damages the structure of the sensor such as cast aluminium housing, label, signal cables (connector), circuit board, ect. and it will not be covered under warranty.

10. Wiring

10.1 M12-Male Connector of Sensor

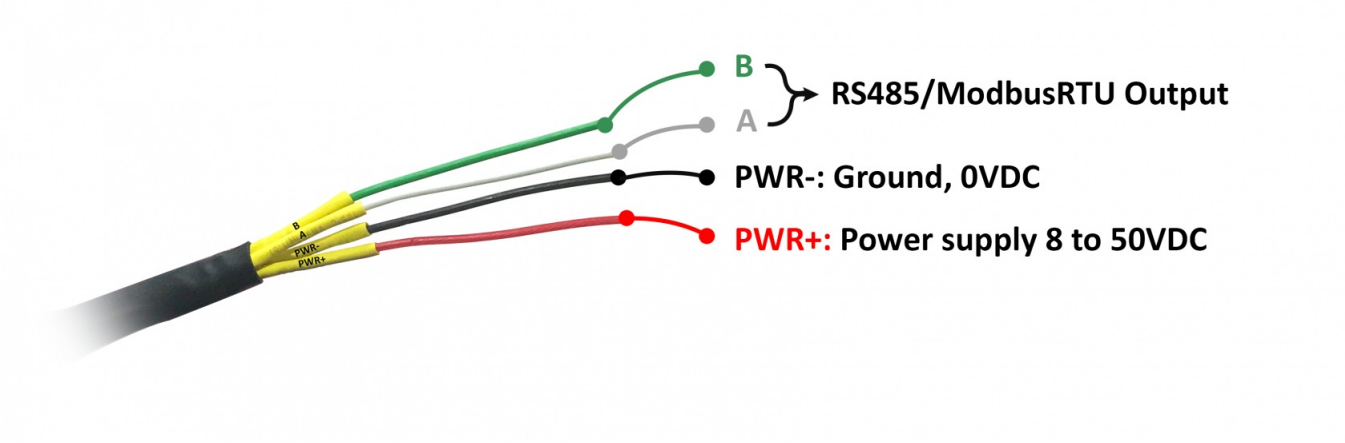


M12-Male Connector

1. **PWR+ : 8...50VDC**
3. **GND : OVDC, Ground**
2. **A**
4. **B**

10.2 Follow Labels on Wires

Each cable includes wires which are marked labels according to types of connection. (user should not cut these labels before installation to avoid confusing)



10.3 Follow Wire Colors

- **Red:** PWR+(8...50VDC)
- **Black:** PWR-(OVDC)
- **Green:** B
- **White:** A

Recommend to use **24VDC** power.

The signal cable from sensor should be protected by corrugated hose or the Φ16 plastic tube, keep the cable avoid high temperature areas.

10.4 RS485 Communication setting

Default communication parameter:

Baudrate : **19200**
Data bit : **8**
Stop bit : **1**
Parity : **None**
Modbus Slave address : **30**

10.5 Memmap registers

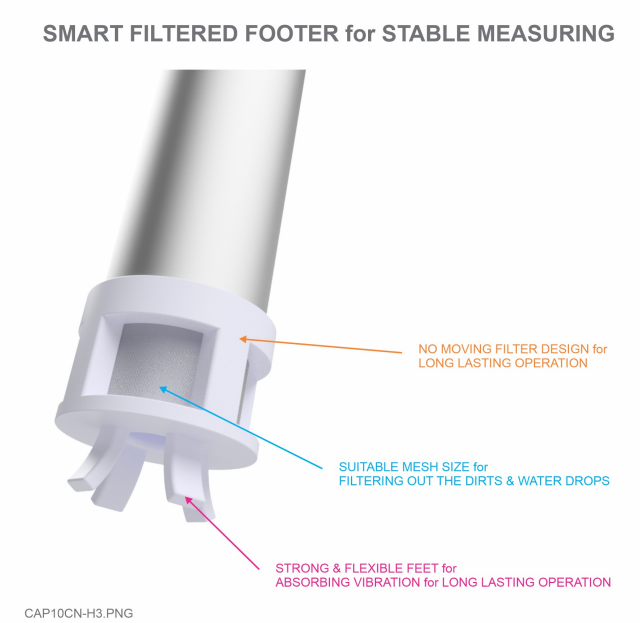
READ uses command **03**, WRITE uses command **16**

Modbus Register	Function code	# Register	Length	Range	Default	Format	Properties	Description	Unit	Comments
30001	4	1	2	0-1000		UINT16	Read	Damping output, part per thousand length	‰	

30002	4	1	2	0-1000		UINT16	Read	Non damping output, part per thousand length	‰	
30003	4	1	2			UINT16	Read	Value of C		
30005	4	1	2			UINT16	Read	FW_version		
30006	4	1	2			INT16	Read	Level Rate (difference in fuel level per minute)	‰	Multiply this value with area of tank to give the flowrate (liter per minute). Nagative value is flow out (consumptio Positive value is Flow in (Refilling)
40007	3	1	2	1-247	30	UINT16	Read/Write	Address of slave		
40008	3	1	2	0-1	1	UINT16	Read/Write	Baud rate		Baud rate: 0: 9600, 1: 19200
40009	3	1	2	0-2	0	UINT16	Read/Write	Parity		Parity: 0: none, 1: odd, 2: even

11. Periodic Cleaning Guidance

1. Periodically clean the oil tank 2, 3 or 6 months depending on usage and contamination.
2. Periodically clean the sensor and filter footer 2, 3 or 6 months by:
   - Cover a sensor's vent before using the air sprayer for another.
   - Remove and clean the filter footer.



12. Troubleshooting

No.	Phenomena	Reasons	Solutions

1	Modbus failed to communicate	Connection or configuration error	• Check the connection. • Check the Modbus configuration: Address, Baud Rate, Parity.
2	Timeout Modbus	Noise appears on the line	• Configure Baudrate 19200. • Use twisted pair cable with anti-jamming protection (if necessary to extend the signal cable) • The signal cable from sensor should be protected by corrugated hose or the Φ16 plastic tube, keep the cable avoid high temperature areas.

13. Warranty

Warranty is applied for CAP10CNR fuel level sensor manufactured by Daviteq.

CAP10CNR fuel level sensor will be warranted for a period of eighteen (18) months from date of delivery.

13.1 Free Warranty Condition:

1. Manufacturer undertakes to guarantee within 18 months.
2. Product failed due to defects in material or workmanship.
3. Serial number, label, warranty stamp remains intact (not purged, detected, edited, scraped, tore, blurry, spotty or pasted on top by certain items).
4. During warranty period, if any problem of damage occurs due to technical manufacturing, please notify our Service Centre for free warranty consultancy. Unauthorized treatments and modifications are not allowed.
5. Product failed due to the defects from the manufacturer, depending on the actual situation, Daviteq will consider replacement or repairs.

Notes:

- One way was shipping cost to the warranty centre shall be paid by Customers.

13.2 Paid Warranty

1. The warranty period has expired.
2. Product is not manufactured by Daviteq.
3. Product failed due to damage caused by disasters such as fire, flood, lightning or explosion, etc.
4. Product damaged during shipment.
5. Product damaged due to faulty of installation, usage or power supply.
6. Product damaged caused by the customer.
7. Product rusted, stained by effects of the environment or due to vandalism, liquid (acids, chemicals, etc.)
8. Product damaged caused by unauthorized treatments and modifications.

Note:

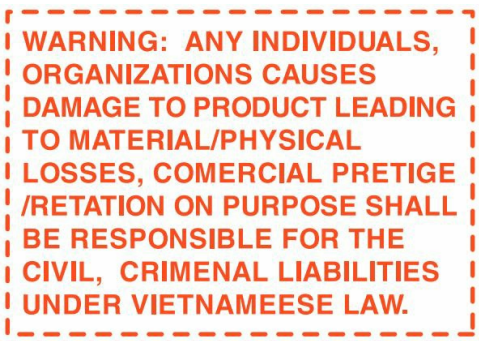
- Customers will be subjected to all repairing expense and shipping cost.
- If it arises disagreement with company's determining faults, both parties will have a third party inspection appraise such damage and its decision be and is final decision.

Warranty service support is available from Monday to Friday (excluding Public Holidays as prescribed)

08:00 AM - 12:00 AM

01:30 PM - 05:00 PM

Hotline: +84.906.885.858



14. Support contacts

Manufacturer
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