

daviteq

PulseCAP10 ver 4.X Smart Fuel Level Sensor



Prepared by Tran Yen Chau
11-2018

www.daviteq.com

About Daviteq

Company Name	: Dai Viet Controls & Instrumentation Company Limited
Brand name	: daviteq
Type	: 100% Private
Established in	: 09-2004
Nature of Business	: R&D, Manufacturing Sensor and Controls products
Labour	: 45 people. R&D: 12.
Operating Capital	: 2M USD
Sensor Capacity	: > 10.000 Fuel sensor / year
Quality standard	: Applying ISO9001-2008
Other Certificates	: CE Mark, EMC Test report, RoHS

The Pioneer of developing and manufacturing sensor & controls products in Vietnam :

Smart fuel level sensor - PulseCAP10

Compact orifice flow meter for Steam/Gas

Liquid level transmitter and switch

Energy Monitoring Solution – EMS

IoT based SCADA

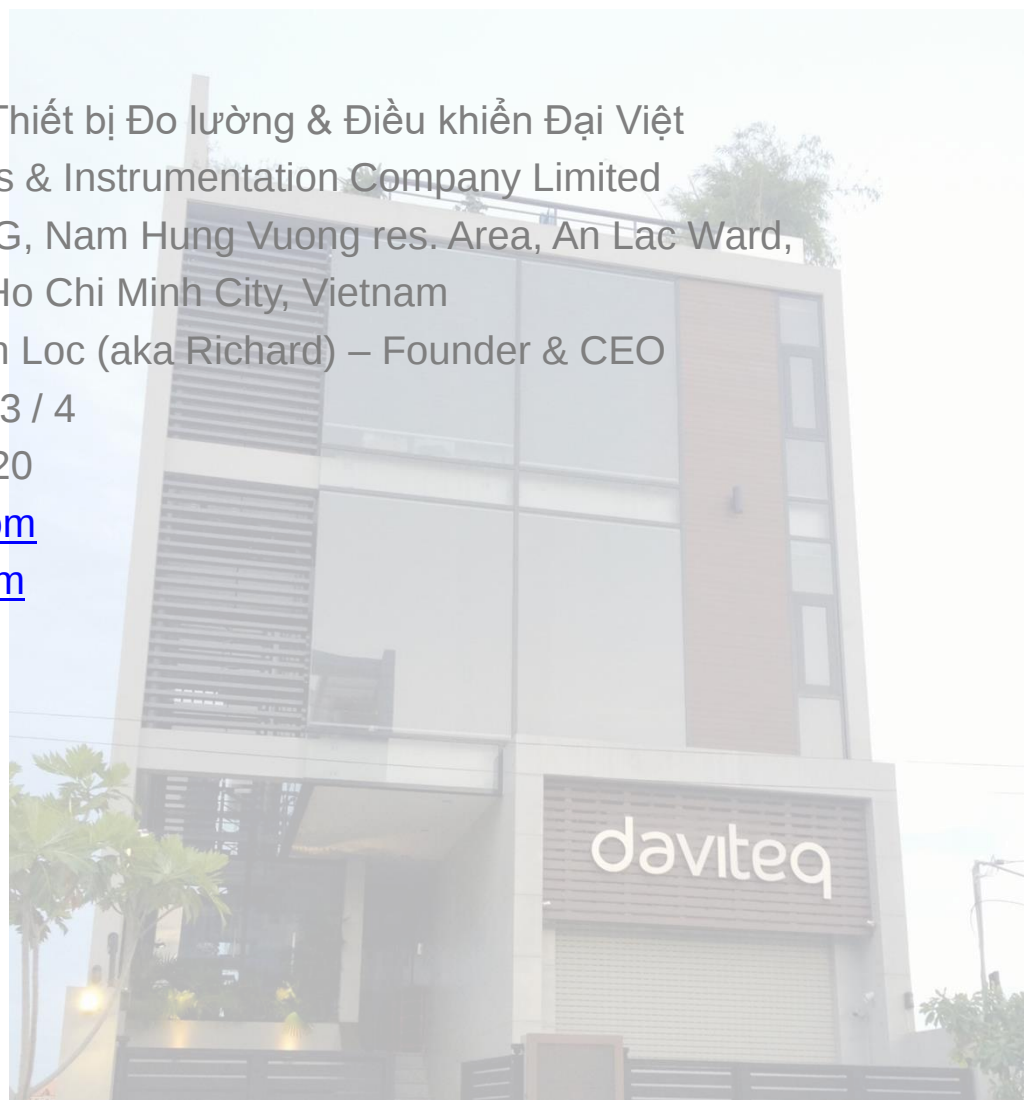
Have been exported to many countries, such as: America, Mexico, Japan, Malaysia, Singapore, Philippines, India, Indonesia...



About Daviteq

Contact Information

Company name : Công ty TNHH Thiết bị Đo lường & Điều khiển Đại Việt
In English : Dai Viet Controls & Instrumentation Company Limited
Address : No. 11, Street 2G, Nam Hung Vuong res. Area, An Lac Ward,
Binh Tan Dist., Ho Chi Minh City, Vietnam
Representative : Mr. Nguyen Vinh Loc (aka Richard) – Founder & CEO
Tel : +84-8-6268.2523 / 4
Fax : + 84-8-6268.2520
Email : info@daviteq.com
Webpage : www.daviteq.com



Industries Served



Steel



Cement



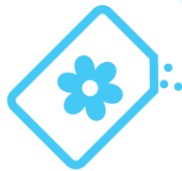
Mining



Petrochemical



Chemical



Fertilizers

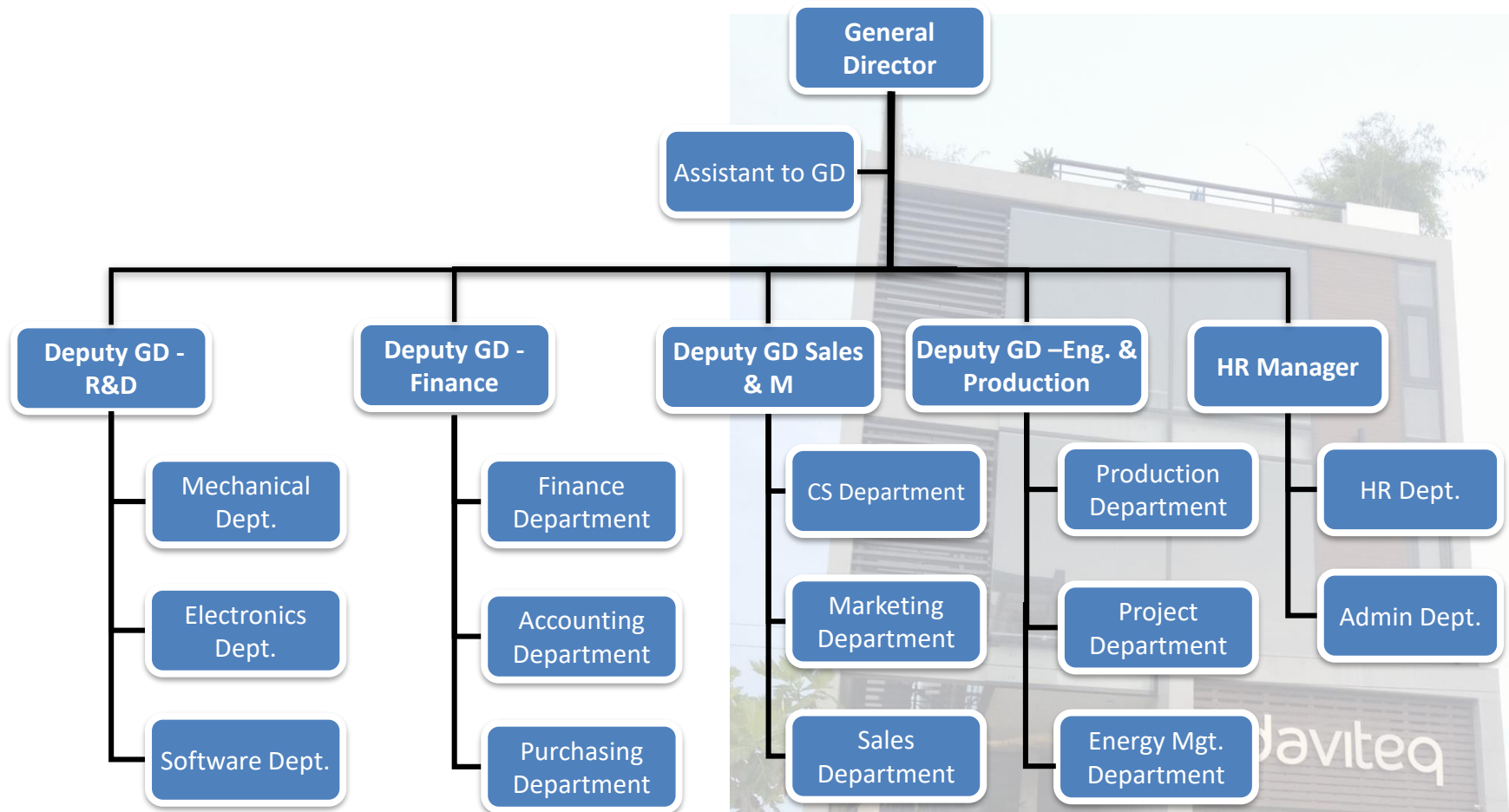


Food &
Beverages



Textile

Organization Chart



Operation photos



Manufacturing



Sales & Marketing



Attended Industrial Automation Expo



R&D

Quality Statement

Mission

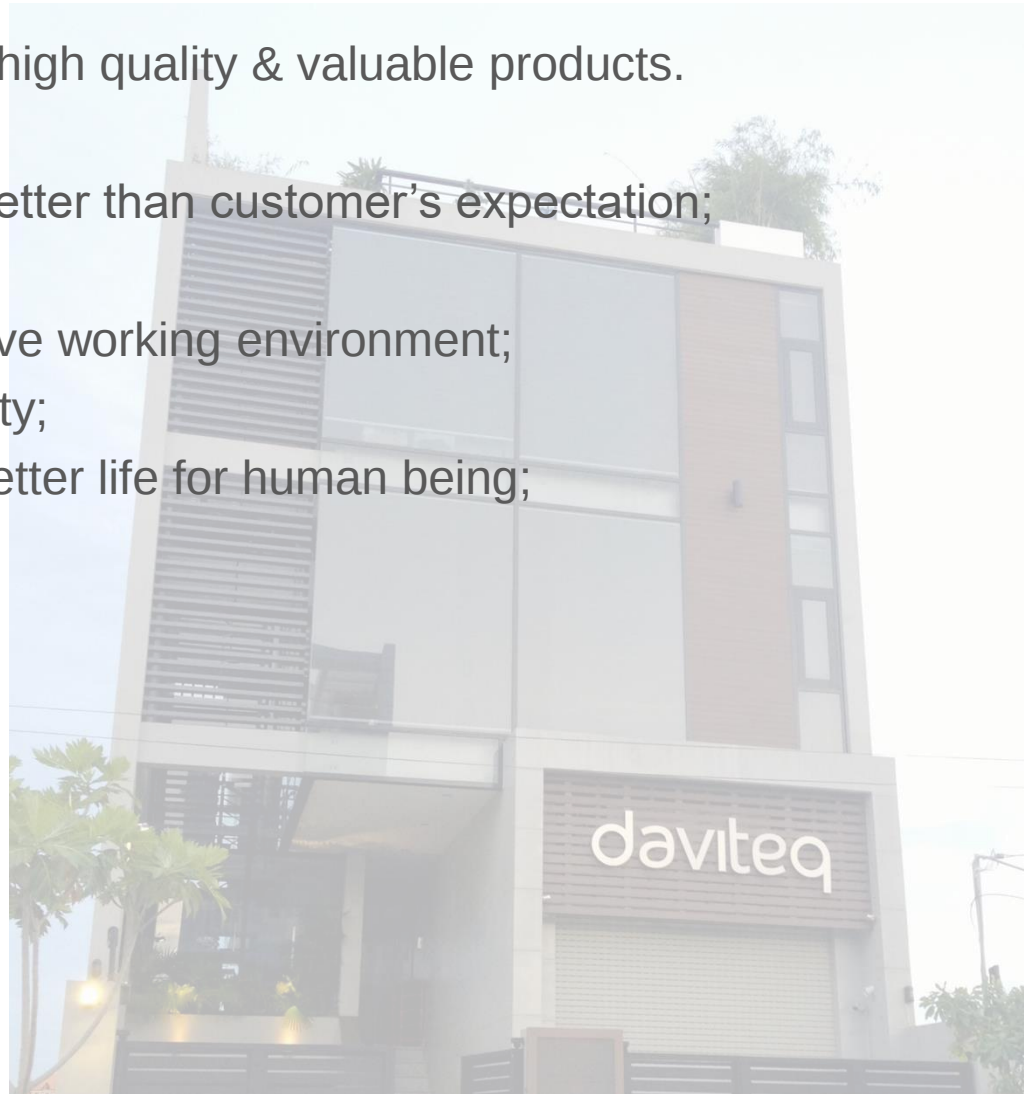
We aim to develop and manufacture high quality & valuable products.

Value

- Producing the products which are better than customer's expectation;
- Customer benefit is our success;
- Everyone in Daviteq aim to innovative working environment;
- Planning – Discipline – Responsibility;
- Sustainable development to build better life for human being;

Operation Philosophy

- Planning in works;
- Discipline in actions;
- Flexible in issues;
- Responsibility at last;



Smart Fuel Level Sensor – PulseCAP10

PulseCAP10 technology



- Since 2009;
- Digital Capacitance Technique;
- High Resolution;
- High Stability/Repeatability;
- Very low temperature drift;
- Low Power consumption;

Highlighted Features



- Accuracy: $< \pm 0.1\%$ of Span;
- Near zero temperature Drift, thanks to PulseCAP Technology;
- Built-in Filtering for stable output on rough terrain;
- Heavy-duty sensor construction;
- Smart & Simple Protection Covers for preventing from tampering;

Highlighted Features



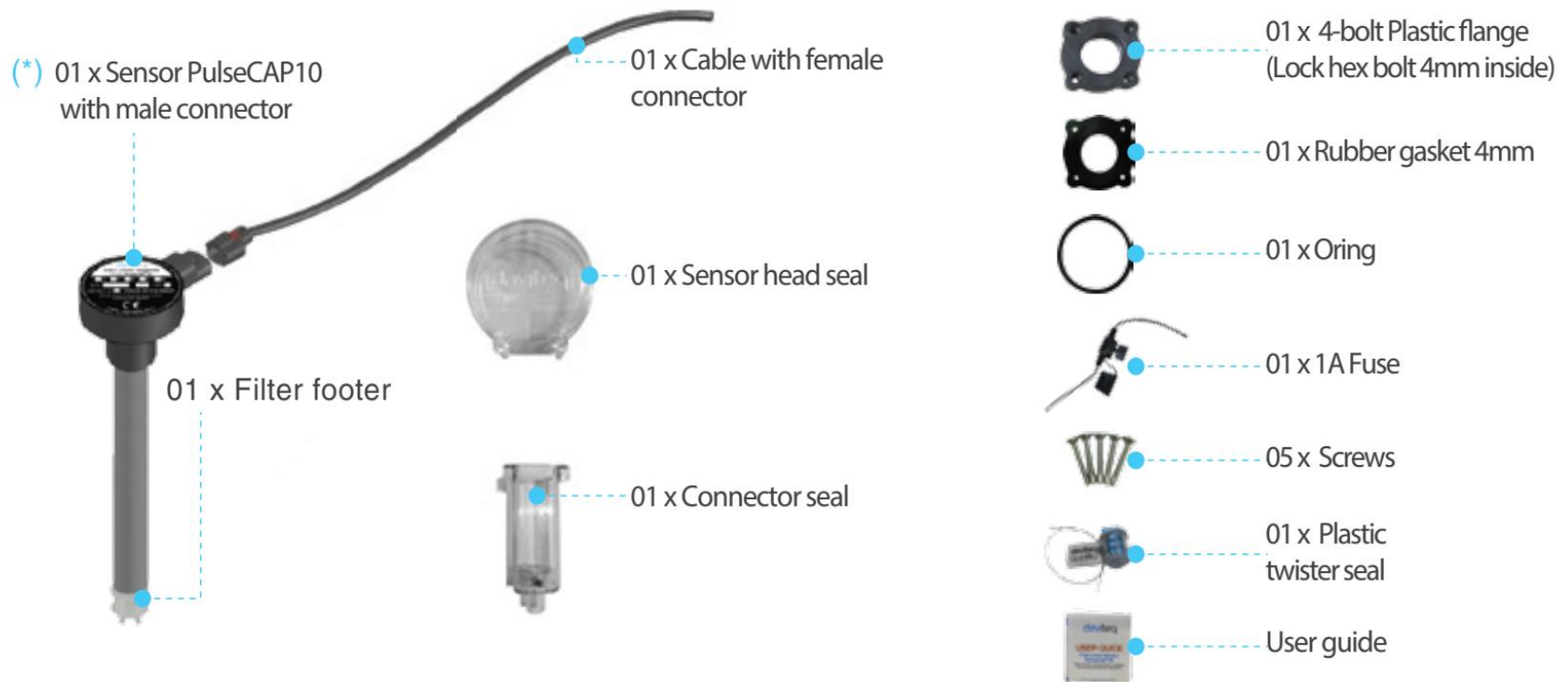
- Ingress Protection: IP67
- Field cutting down from 700mm to 150mm;
- Auto-Calibration after cutting;
- Factory calibrated with standard Diesel;
- Installable on both Flat or Curved surfaces;
- CE Mark, EMC test report, RoHS

Specification



SENSOR LENGTH	Standard Length: 1000, 1500
OUTPUT	Frequency: 50 .. 1050 Hz, 5 Vp-p Pulse Width: 1.7 sec cycle, 5 Vp-p Analog: 1.00 .. 5.00 Vdc RS232: Tx, DS Protocol, 5 Vp-p RS485: Modbus RTU
POWER SUPPLY	8..50 VDC for output: analog, pulse, frequency and RS 232 5..50 VDC for output: Modbus RS485 Current Consumption: max 15mA
PRESSURE/ TEMPERATURE	Vacuum .. 2 barg/ -40oC .. +85oC
PERFORMANCE	Output Linearity: +/- 0.1% of Span (at 25oC) Temperature drift: < +0.03% of Span per 10oC
RESOLUTION	1/1000 of span
SENSOR MATERIALS	Cast Aluminum, Thermal plastic
ELECTRICAL CONNECTOR	3-way connector, IP67 with 7m PVC cable, 3-core
HOUSING/ RATING	Cast Aluminum/ IP67
PROCESS CONNECTION	4-bolt Flange
ACCESSORIES	4-bolt Flange, Rubber Gasket 5mm, Ruber Gasket 2mm, Flange seal cover, M4 hex bolt. Connector cable with M12 connector (order seperately)
CERTIFICATE	CE-Marking; Standard: EN61236-1

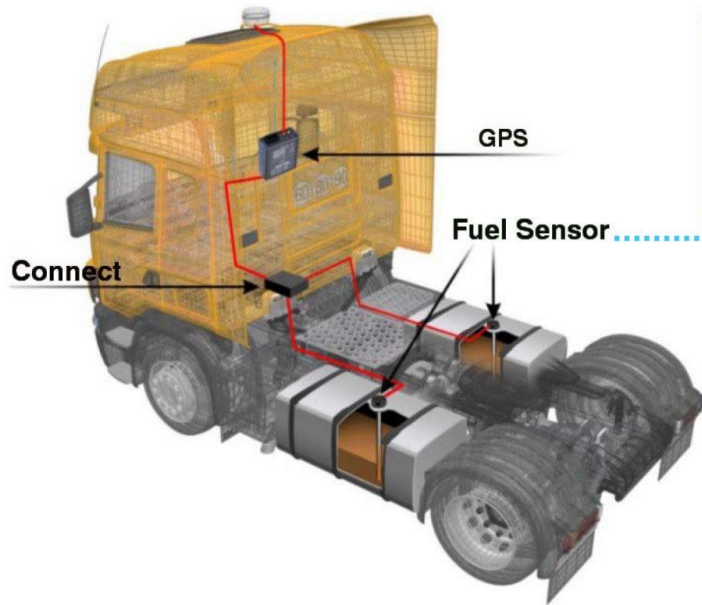
Installation on any surface



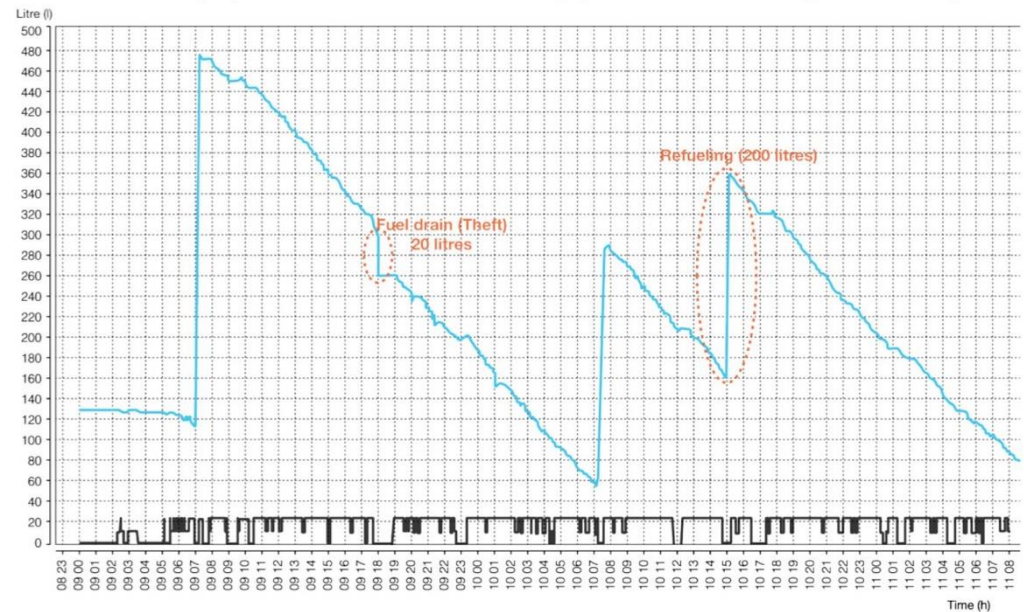
- Low profile design, not impact on the vehicle structure
- 4 mm thickness Rubber gasket (Shore 50) allow the sensor can be mounted on Flat or Curved surface (as photo)
- Bolts/Screws → NO loosen by VIBRATION

Applications – Special for Vehicles

► Vehicles



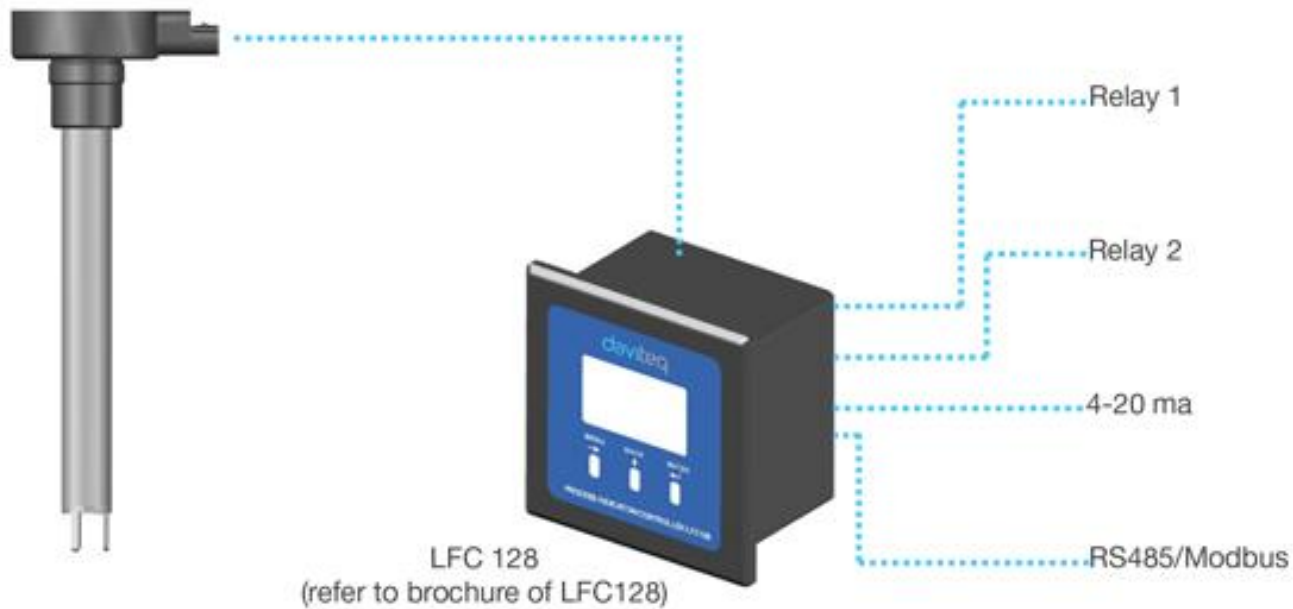
Actual graph of Fuel Level/Volume trending (from a customer using PulseCAP10)



Truck registered no.61R-XXXX from date 09/04/2013 to 11/04/2013

Applications – for Stationary Equipments

► Stationary Equipments



PulseCAP10 v.s Other brands

PulseCAP10



V.S



Specification comparison

	PulseCAP10	Competitor 1	Competitor 2	Competitor 3
Power supply	8...50Vdc	7...45Vdc	10...50Vdc	9...36Vdc
Current/power consumption	15mA	0.9W	- 25mA (with 24Vdc) - 50mA (with 12Vdc)	- 5.5mA (with 24Vdc) - 2.5mA (with 12Vdc)
Output	Analog, Pulse, Frequency, RS232, RS485	Analog, Frequency, RS232, RS485	Analog, Frequency, RS232, RS485	Analog, Frequency, RS232, RS485
Accuracy	±0.5%	±1%	±1%	±1%
IP	67	57	57	67
Temperature range	-40...+85°C	-60...+85°C	-40...+85°C	-40...+75°C
Certificate	CE	CE	Not found	Not found

Certification

 TỔNG CỤC TIÊU CHUẨN ĐO LƯỜNG CHẤT LƯỢNG TRUNG TÂM KỸ THUẬT TIÊU CHUẨN ĐO LƯỜNG CHẤT LƯỢNG 3 QUALITY ASSURANCE & TESTING CENTER 3		
KT3-002EC3	PHIẾU KẾT QUẢ THỬ NGHIỆM TEST REPORT	15/01/2013 Trang 1 / 21
1. Tên mẫu : CẢM BIẾN ĐO MỨC Name of sample CAP10 FUEL LEVEL SENSOR 2. Số lượng mẫu : 01 Quantity 3. Ngày nhận mẫu : 08/01/2013 Date of receiving 4. Thời gian thử nghiệm: 08/01/2013 – 15/01/2013 Test duration 5. Khách hàng : CÔNG TY TNHH TBĐL VÀ ĐK ĐẠI VIỆT Customer 245 Hậu Giang, P. 5, Q. 6, TP Hồ Chí Minh 6. Phương pháp thử : TCVN 7317:2003 Test method Thiết bị công nghệ thông tin – Đặc tính miễn nhiễm – Giới hạn và phương pháp đo Information technology equipment – Immunity characteristics – Limits and methods of measurement 7. Kết quả thử nghiệm : Xem trang 2/21 - 21/21 Test result See pages		
PT. PTN TƯƠNG THÍCH ĐIỆN TỬ HEAD OF EMC TESTING LAB.		PHỤ TRÁCH KTN CƠ – ĐIỆN MECH.-ELEC. TESTING DIV. MANAGER
 Lương Trọng Sĩ		 Trương Thanh Sơn
1. Các kết quả thử nghiệm ghi trong phiếu này chỉ có giá trị đối với mẫu do khách hàng gửi đến/ Test results are valid for the sample submitted completely only. 2. Không được tái sản xuất hoặc phân phối lại mà không có sự đồng ý bằng văn bản của Trung tâm Kỹ thuật Tiêu chuẩn Đo lường Chất lượng 3. 3. Tên mẫu, tên khách hàng được ghi trên phiếu này chỉ để phục vụ cho việc nhận mẫu và không có giá trị pháp lý. 4. Độ không đảm bảo do sai số tổng cộng của kết quả thử nghiệm không vượt quá 10%. 5. Phòng Thí nghiệm đã được Ủy ban Công nhận Quốc gia (Bộ) - Việt Nam công nhận phù hợp theo ISO/IEC 17025:2005 (VILAS 004). Các chỉ tiêu của nó là 173 là công nhận duy nhất. The Testing Lab is accredited as conforming to ISO/IEC 17025:2005 by Bureau of Accreditation - Viet Nam (VILAS 004). The characteristics marked with (*) are not accredited yet. Head Office: 49 Pasteur, Q1, Hồ Chí Minh City, VIET NAM Tel: (84-8) 3829 4274 Fax: (84-8) 3829 3012 Website: www.quatest3.com.vn Testing: 7 Road 1, Bàu Hòa Industrial Zone, Đồng Nai Tel: (84-61) 383 8212 Fax: (84-61) 383 6296 E-mail: gp-dien@quatest3.com.vn Lần sửa đổi: 0 B019 (03/2012) M01/03 - T1/04		

	
EUROPEAN INSPECTION AND CERTIFICATION COMPANY S.A.	
<u>CERTIFICATE OF CONFORMITY</u> FULLNESS EXAMINATION OF TECHNICAL FILE	
Certificate No.	: VN.CE.0009-07/15
Issue Date	: 01/07/2015
Applicant	: Dai Viet Controls & Instrumentation Company LTD (Daviteq),
(Name & Address)	No.11, Street 2G, Nam Hung Vuong Area Res., An Lac Ward, Binh Tan Dist, Ho Chi Minh City, Vietnam
Manufacturer	: Same as applicant
(Name & Address)	: Same as applicant
Test Report No.	: E15050609
Product Description	: Fuel Level Sensor
Model(s)	: PulseCAP10
Directive(s)	: Electromagnetic Compatibility Directive 2004/108/EC
Standard(s)	: EN 61326-1:2013
This is to attest that, upon the relevant application of Dai Viet Controls & Instrumentation Company LTD (Daviteq), EUROCERT as Third Party Authority has reviewed the Technical Construction File of the described product which found to fulfill the basic health and safety prerequisites of above mentioned Directive(s).	
Note:	
- The manufacturer should issue a EC Declaration of Conformity according to the basic requirements of the applicable and relevant EC directives. - The holder of the certificate shall use it in connection with the EC declaration of conformity. - The CE marking can be affixed on the above mentioned product with the manufacturer's responsibility, if all relevant and applicable EC directives are complied with. - All modifications to the Technical File should be first submitted to the Third Party Inspection Authority to ensure further validity of this attestation. - This certificate is valid only for the product and configuration described above.	
	On Behalf of EUROCERT  George Nikolopoulos Technical Director
89, CHLOIS STR. & LIKOVRISEOS, 144 52 METAMORFOSI, ATHENS, GREECE Tel.: ++30 210 62.52.495, 30 210 62.53.927 - Fax: ++30 210 62.03.018 Internet site: www.eurocert.gr - e-mail: eurocert@otenet.gr	

EMC Certification

CE-Marking

Housing design & Protection

PulseCAP10



- 1 Integrated Connector
- 2 Complete protection
- 3 Easy connecting
- 4 Patented probe locking system
- 5 Protecting set allows cable seal with corrugated hose

Integrated Connector v.s Split Connector

PulseCAP10



Long - lasting

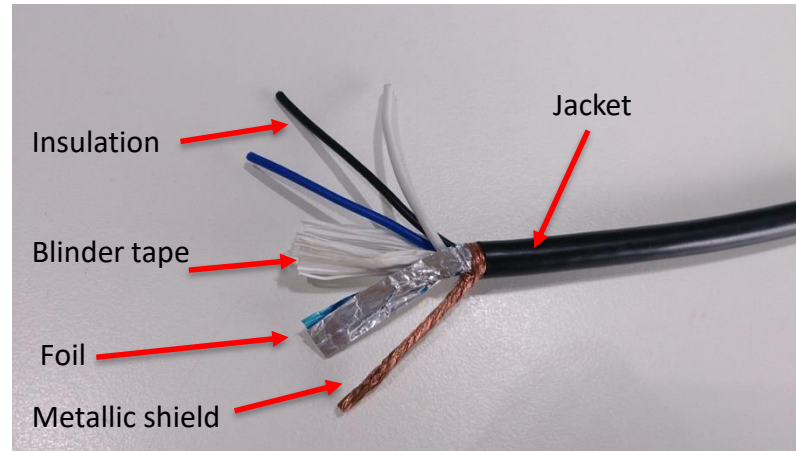
Getting damage easily

Competitor

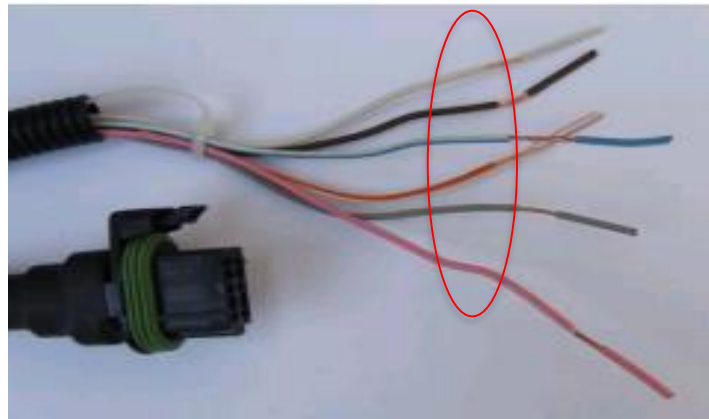


Robust Cable With Shield Protection

PulseCAP10 Cable



Competitor Cable



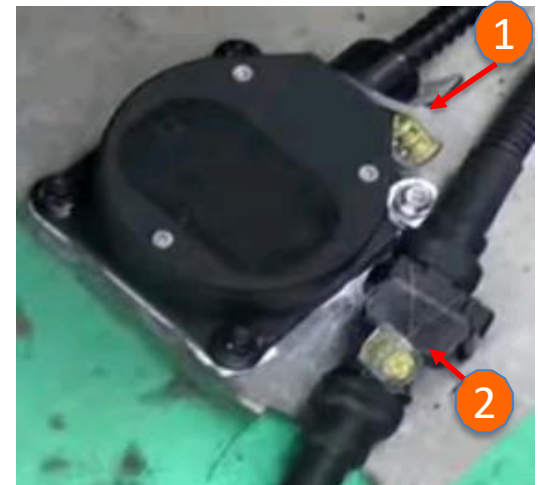
Single point Sealing v.s 2-point Sealing

PulseCAP10



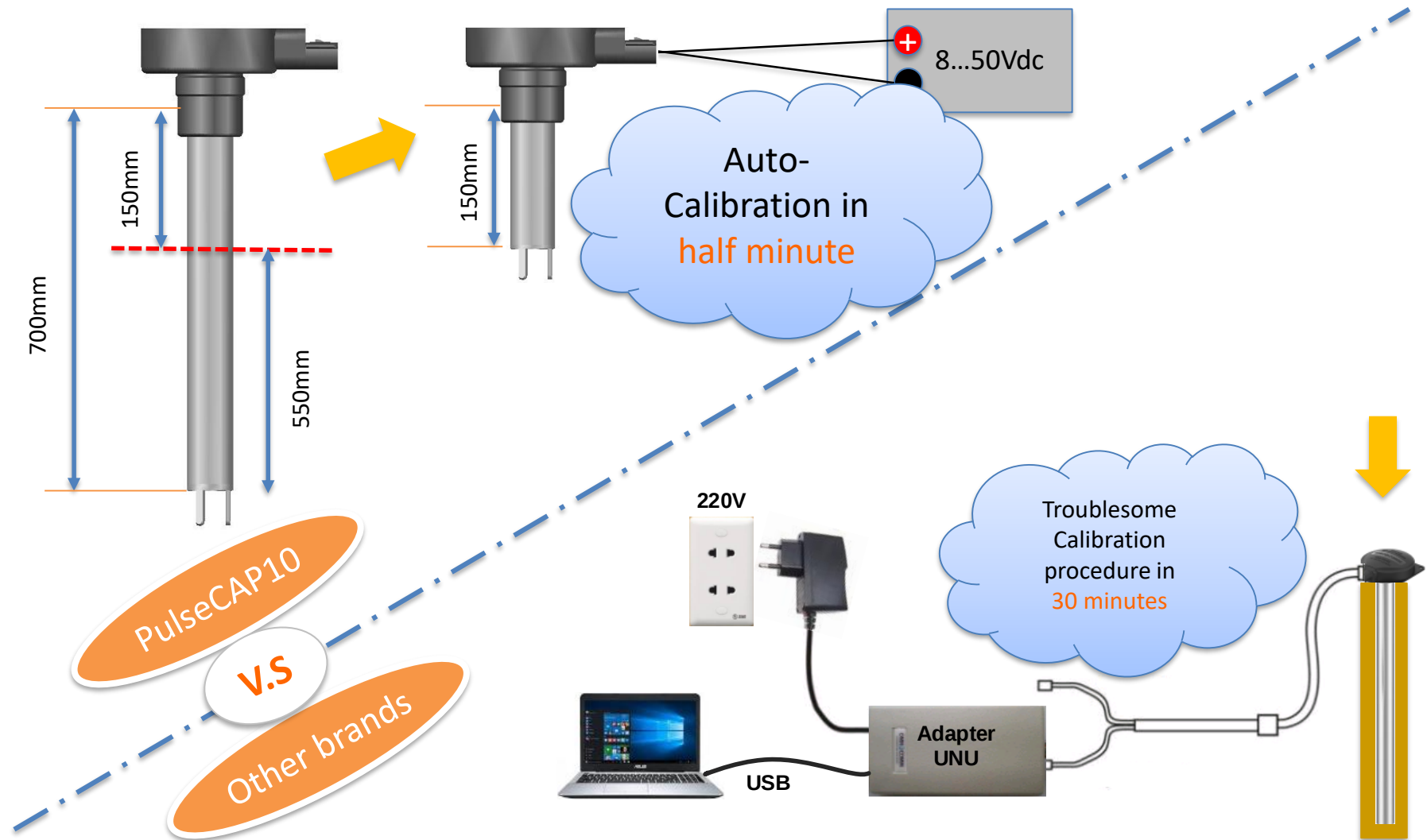
- Single Point Sealing

Competitor



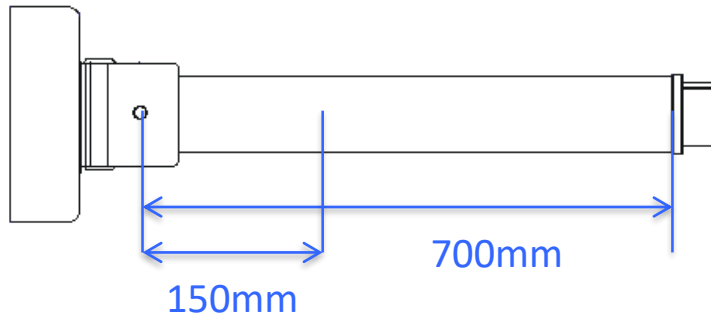
- Double Point Sealing

Auto-Calibration after Cutting = Saving 30 minutes



Keep stock one size only

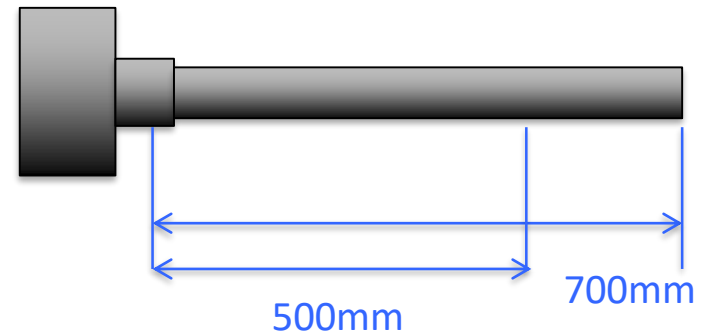
PulseCAP10



- Can be cut down from 700mm to 150mm → Customer to stock ONE size of sensor

Stock ONE size only

Other brands



- Can be cut down from 700mm to 500mm → Customer needs to stock many sizes of sensor: 300, 500, 700mm

Stock MANY sizes

Saving upto 25% Labour Cost

PulseCAP10

- Step 1: To drain away the Fuel and removing Tank (if needed); ==> takes 30 - 45 minutes, depend on Tank Capacity
- Step 2: To drill the holes and Installing the Flange; ==> takes 20 minutes
- Step 3: Metering the Tank height and Cutting sensor; ==> takes 10 minutes
- **Step 4:** No need to re-calibrate by any tools, just need to turn on the power in 30s in order to recognize its new length ==> spends maximum **0.5 minute** only
- Step 5: Cable routing ==> takes 15 minutes
- Step 6: Installing sensor and Lead sealing ==> 15 minutes
- Step 7: Wiring & apply Power

==> Total: 1h45 to 2h00m ==> Saving **up to 25% working time** ==> **upto 25% Labour cost can be reduced**

Other Brands “O” “T” “E” ...

- Step 1: To drain away the Fuel and remove Tank (if needed); ==> takes 30 - 45 minutes, depend on Tank Capacity
- Step 2: To drill the holes and Installing the Flange; ==> takes 20 minutes
- Step 3: Metering the Tank height and Cutting sensor; ==> takes 10 minutes
- **Step 4:** Must have Re-Calibrate sensor with Diesel, in need a special tool and PC ==> takes **30 minutes at least**;
- Step 5: Cable routing ==> takes 15 minutes
- Step 6: Installing sensor and Lead sealing ==> 15 minutes
- Step 7: Wiring & apply Power

==> Total: 2h15 to 2h30m

Actual installation photos





Installation guide

NOTE

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

SAFETY

- PulseCAP10 is intended to use with Diesel Oil, Vegetable Oil.
- PulseCAP10 must not be used with other flammable fluid such as Gasoline, Alcohol, Ethanol, Acetone, Toluene or other solvents.
- Be careful while drilling, cutting, grinding, ect. the fuel tank or other flammable fluid.
- Daviteq is not responsible for compensation in case of explosion to bodily injury or property damage.

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.
- PulseCAP10 be equipped with screws. We advise customers should use inox rivets to fasten the plastic flange onto tank for all type of tanks and only using screws for the thick and hard ones.

TOOLS

No	Tool Name	No	Tool Name
01	Drilling machine	10	Drill $\Phi 38$
02	Pump	11	Sticone gasket
03	Rivet clippers (In case of using inox rivet)	12	Twist drill 4 mm (In case of using inox 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 2mm	18	Calibration can

DISASSEMBLY GUIDANCE

Please follow the below steps:	Note
<u>Step 1:</u> Cut the seal and open the sensor head seal <u>Step 2:</u> Remove the terminal connector <u>Step 3:</u> Use the 2mm allen key to unlock the hex bolt <u>Step 4:</u> 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, ect. to twist the sensor as this cause damages the structure of the sensor such as cast aluminium housing, label, signal cables (conector), circuit board, ect. and it will not be covered under warranty

Installation guide

SENSOR INSTALLATION GUIDANCE

Discription	Note
1. Remove fuel: Remove all fuel from the tank	Some vehicles have been welded with oil filter so it is necessary to take out the float level sensor before removing the fuel
2. Clean the tank: - Remove or rotate the tank. - 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 affect the stability of the fuel trending graph directly
4. Drilling the central hole: - Use a 38 mm drill to do - Clean the wound by hand-held grinder. - 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 of the tank

5. Flange installation:

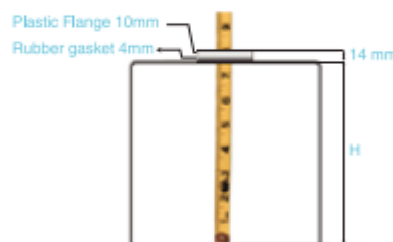
- Place the 4mm rubber gasket at the center of the tank's upper side
- Place the plastic flange onto the rubber gasket (4mm)
- Mark 4 points at the bolt hole
- Use screws /rivets to fasten the 4mm rubber gasket and the plastic flange onto tank

- Only using screws for the thick and hard tanks.

- Unplug the screw / rivet symmetrically

6. Sensor cutting and Auto-recognition

After flange installation, measure the tank height as below picture:



$$C = L + 20 + 18 - (H + 14) \Rightarrow C = L + 24 - H \text{ (mm)}$$

C: Length to be cutted.

L: Original length of the sensor.

H: Height of the tank.

* Example:

Sensor length is L = 700mm, H = 650 mm



$$\Rightarrow C = 74 \text{ mm}$$

$\Rightarrow$ cut the sensor tube a minimum length of 74 mm

7. Auto-recognition:

- After cutting, make sure the sensor tube is clean
- Replug 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 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 unthreading during operation.
- Connect the sensor with the cable.
- Use sensor head seal to cover the sensor and then use plastic twister seal to lock the head seal and connector seal to protect the sensor

Installation guide

WIRE CONNECTING INSTRUCTION



FOLLOW LABELS IN 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)

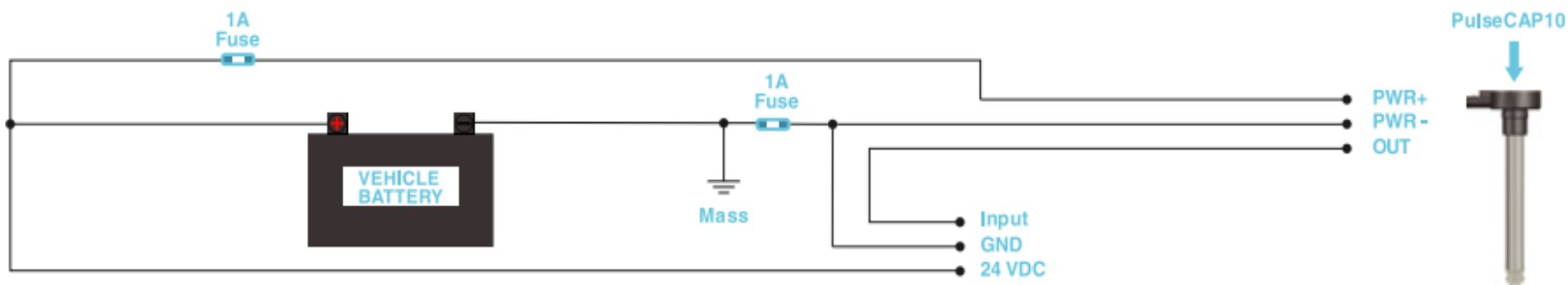
FOLLOW WIRE COLOURS:

White: PWR+(8...50VDC)
Blue: PWR-(0VDC)
Black: Output

CAUTION!

- Remain power supply permanently (it is advised to use power directly from battery for easy control when problems occur), should use 24VDC power with 1A fuse.
- The signal cable from sensor to the black box should be protected by corrugated hose or the $\Phi 16$ plastic tube, keep the cable avoid high temperature areas.
- Output wire of sensor must be connected to the proper input gate of the black box.

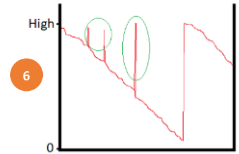
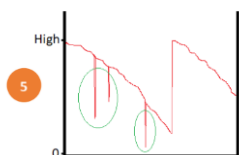
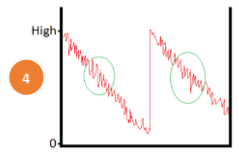
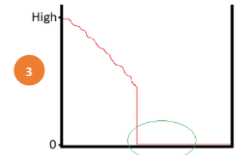
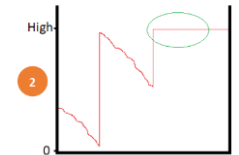
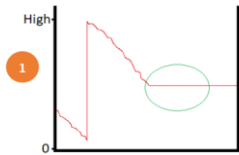
FUSE CONNECTION GUIDANCE



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.

Trouble shooting



	PHENOMENA	REASONS	SOLUTIONS
1	Output signal is unchanged even if be filling fuel or driving	Circuit board contained liquid	Can not be repaired => Must have install the other sensor
		The filter of sensor footer was obstructed by impurity	Cleaning the sensor footer and fuel tank Removing all impurities on the sensor probe
2	The output signal is stated on the highest level	Circuit board contained liquid	Can not be repaired => Must have install the other sensor
		Male connector was defective (Available at Analog output sensor)	
3	- No output signal - Output signal is less than 1.0 VDC - Fuel Graph is on lowest level (Available at Analog output sensor)	No power supply	- Checking the power supply - Checking the connector as if it were loose or unconnected
		Control cable was cut	Checking control cable, and pay attention to the output position
		Circuit board was burnt, maybe the sensor was short during the installation or repairing vehicle, and high voltage get into the sensor suddenly	Can not be repaired => Must have install the other sensor
		Receiver device or server be wrong at configuration (Available at Analog output sensor)	Let sensor connect to Computer directly, then using Terminal software for checking sensor output signal
4	The fuel graph was fluctured constantly, different 3-10% of volume	Bad terrain	Additional signal filtering in GPS device or server
		Great width- short height fuel tank makes fuel is fluctuated heavily	
		Being short circuit	Using VOM to check as if the sensor were hit the chassis frame
		Being eccentric of the tank	Re-installation, must have install the sensor at the place which is nearest the center of tank
5	The signal sometimes drop to 0, and then it turns back the normal level	Unstable power supply	Checking the power supply Checking the connector
6	The signal sometimes reach to the maximum value, then it turns back the normal level	Connector was defected Circuit board contained liquid	Can not be repaired => Must have install the other sensor
		Having the unwanted things in the sensor probe	Cleaning the sensor footer and fuel tank

Ordering

For ordering, please contact us

Hotline: 0932.740.966

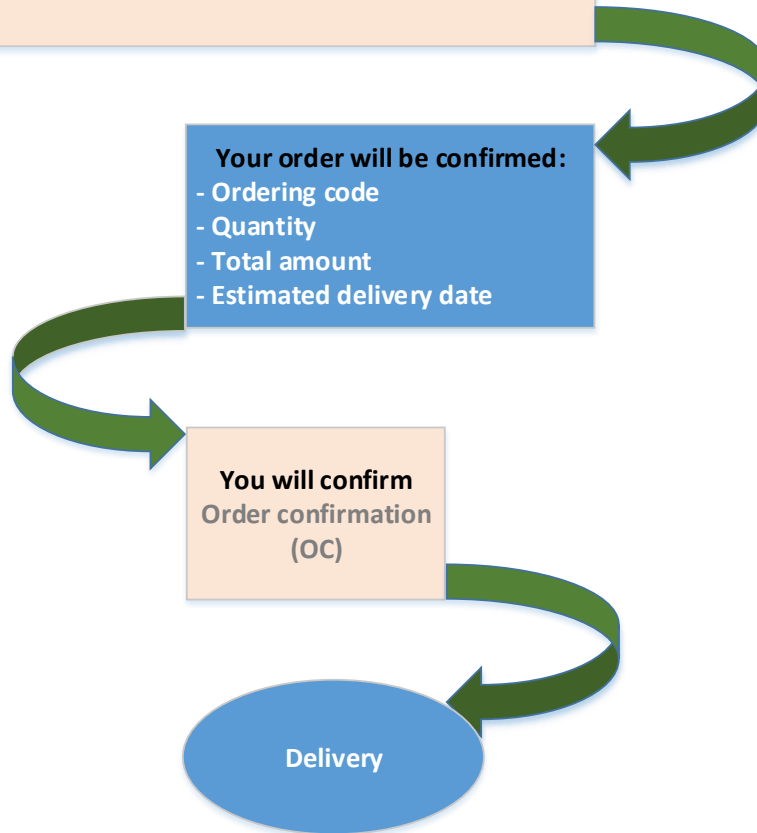
Email: sales.admin.2@daviteq.com
yenchau.tran@daviteq.com

Your order will be confirmed:

- Ordering code
- Quantity
- Total amount
- Estimated delivery date

You will confirm
Order confirmation
(OC)

Delivery



Contacts

Dai Viet Controls and Instrumentation Co., Ltd.

Address : No. 11, Street 2G, Nam Hung Vuong res. Area, An Lac Ward,
Binh Tan Dist., Ho Chi Minh City, Vietnam

Tel : +84-8-6268.2523 / 4

Fax : + 84-8-6268.2520

Email : info@daviteq.com

Webpage : www.daviteq.com

Working hours:

From Monday to Friday: from 8h00- 17h00
Saturday morning: from 8h00-12h00

Manager
Trần Yến Châu
0985.064432

Ordering
0932.740.966

Technical supports
0903.898.256

Warranty claim
0903.791.445

Thank You



Công ty TNHH TB DL & DK Đại Việt
Dai Viet Controls & Instrumentation Co., Ltd

Số 11, Đường 2G, KDC Nam Hùng
Vương, An Lạc, Bình Tân, TP HCM

Tel 028-62682523/4
Fax: 028-62682520

Email: info@daviteq.com
www.daviteq.com