

	
OIML Member State Sweden	OIML Certificate No. R117/2019-A-SE1-22.02 Revision 1

OIML CERTIFICATE ISSUED UNDER SCHEME A	
OIML Issuing Authority Name: RISE Research Institutes of Sweden AB Address: Box 857, SE-50115 Borås, Sweden Person responsible: Martin Tillander	
Applicant Name: Dover Fueling Solutions UK Limited Filial (DFS) Postal address: PO.Box 50559, SE-205 15 Malmö Visiting address: Hanögatan 8, SE-211 24 Malmö	
Manufacturer Name: Dover Fueling Solutions UK Limited Address: Unit 3, Baker Road, West Pitkerro Industrial Estate, Dundee DD5 3RT, United Kingdom	
Identification of the certified type <i>(the detailed characteristics will be defined in the annex to this certificate)</i> DFS Fuel dispensers a family of Wayne and Tokheim branded fuel dispensers with type designations listed under Construction below.	
Designation of the module <i>(if applicable)</i>	
This OIML Certificate attests the conformity of the above identified type (represented by the sample(s) identified in the OIML type evaluation report) with the requirements of the following Recommendation of the International Organization of Legal Metrology (OIML): OIML R117 Edition (year): 2019 For accuracy class 0,5 or 1,0 (for LPG)	
This OIML Certificate relates only to metrological and technical characteristics of the type of measuring instrument covered by the relevant OIML Recommendation identified above. This OIML Certificate does not bestow any form of legal international approval.	



OIML Member State
Sweden

OIML Certificate No.
R117/2019-A-SE1-22.02 Revision 1

The conformity was established by the results of tests and examinations provided in the associated OIML type evaluation report:

No. 1128310 dated 2022-07-15 that includes 17 pages

The technical documentation relating to the identified type is contained in documentation file which is included in OIML type evaluation report mentioned above.

OIML Certificate History

This revision replaces previous versions of the certificate

Revision No.	Date	Description of the modification
0	2022-07-06	First edition
1	2022-07-15	Second edition, adding TQC

Identification, signature and stamp

The OIML Issuing Authority

RISE Research Institutes of Sweden AB

Date: 2022-07-15

Important note: Apart from the mention of the Certificate's reference number and the name of the OIML Member State in which the Certificate is issued, partial quotation of the Certificate and of the associated OIML type evaluation report(s) is not permitted, although either may be reproduced in full. The validity of this certificate can be verified by RISE.

ANNEX to an OIML Certificate of Conformity

In respect of (type of instrument)

DFS Fuel dispensers a family of Wayne and Tokheim branded fuel dispensers, for petrol, kerosene, diesel, ethanol, FAME/RME, HVO fuel, DEF (Diesel Exhaust Fluid), Windshield liquid or LPG, including ATC conversion device (optional).

Construction

Product names (see pictures below):

- Wayne Helix 6000-II
- Wayne Helix 6
- Wayne Helix 4000-II
- Wayne Helix 5000-II
- Wayne Helix 5
- Wayne Century 3
- Tokheim Quantum ML
- Tokheim Quantum FS

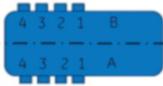
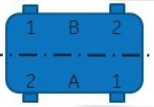
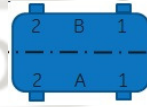
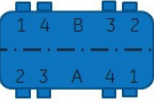
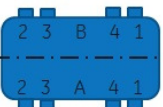
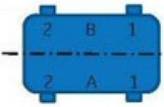
Product designation:

Product designation is built up in the following order 1/2/3/4/5/6/7/8/9/10/11 (Info picked from each colon below) **Example designation:** TL/FUEL/SU/LANE/2-4-2/E/NC//B2B/1-2-1/LPG

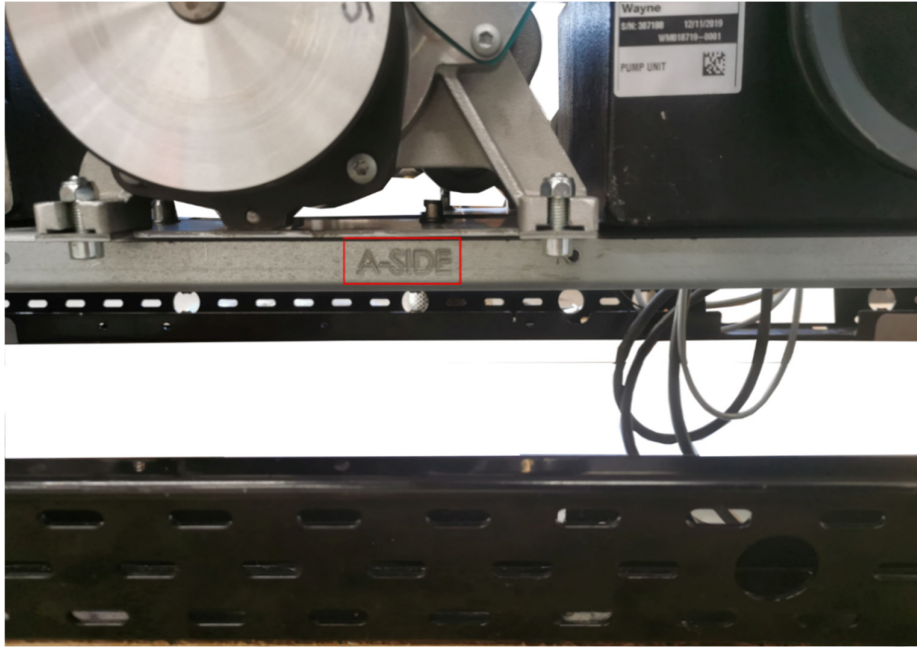
	1	2	3	4	5
Type	Brand & Shape	Fuel	Pressure/ Suction	Orientation	Inlets/hoses/nozzle
Options	WL	FUEL	SU	LANE	X-Y-Z
	TL	AdB	PR	ISL	
	WS	LPG			
	TS	WIN			
	WH				
Description	W as in Wayne	WIN - Windshield	SU = Suction		X PRODUCTS Y HOSES Z NOZZLES PER SIDE
	T as in Tokheim	AdB - AdBlue	PR=Pressure		
	L as in L-Shape				
	S as in Small Pump				BLD - Blend
	H as in H-Shape				

Designation table continuous:

	6	7	8	9	10	11
Type	EL.head	ATC	SAT	B2B	B2B model	FUEL
Options	E=Standard head	NC	SAT M	B2B	X-Y-Z	LPG
	P = Payment	ATC	SAT S			AdB
	M= Media	ATC NA				CNG
Description	E=Standard head	NC = Not compensated	SAT M =Master	B2B	X PRODUCTS Y HOSES Z NOZZLES PER SIDE	LPG
	P = Payment	ATC = Temperature compensation activated	SAT S= Slave			AdB
	M= Media	ATC NA =Temperature compensation not activated				CNG

Shape	Design/Brand		Orientation			
	Wayne	Tokheim	LANE		ISL=ISLAND	
						
L-Shape			Unmirrored	Mirrored		
						
Small pump			Unmirrored	Mirrored	Dual Display	Single Display
						
H-Shape			Unmirrored	Mirrored	Helix 4000-II	
						

A and B side is recognized by removing one of the doors from the hydraulic cabinet and look at the sheet metal support for pumping units (suction-dispensers) or meters (remote-dispensers).
There is the letter A punched in to the sheet metal on the A-side as can be seen in the red square of the picture below.



Measuring system (fuel dispenser) description

A complete measuring system consists of one electronic module and one to six hydraulic modules. The hydraulic modules are placed in one or two cabinets (B2B). One electronic module can serve both cabinets, for example a combination of LPG and petrol. If one pump and air separator is serving more than one nozzle simultaneously the total maximum flowrate through these nozzles is limited by the air separator (90 l/min per CPU air separator or 110 l/min for TQP-HS air separator) and the volume sensor (according to “Volume sensor flowrate range” under “Measurement range”). For higher flowrate another hydraulic module have to serve the same nozzle. For further information see block diagram in this chapter.

Electronic module function

TQC, iGEM and iGEM 2 is an electronic subsystem and it consists mainly of: calculator, indicating device, and keyboard with pre-set. This module can handle up to 6 motors, 6 pulse transmitters (each handling a single equipped or a duplex volume sensor), 12 nozzles, 14 solenoid valves and in case of ATC one temperature compensation module. The electronic module is able to serve up to four customers at a time (called 4 User).

Hydraulic function modules

Measurement transducer function is a hydraulic subsystem and it consists mainly of: volume sensor (single equipped side A, single equipped side B or duplex) and pulse transmitter. In case of ATC (automatic temperature compensation) each volume sensor (iMeter2, Xflo™) is equipped with a temperature sensor, all connected to one temperature compensation module.

Pump and air separator function is a hydraulic subsystem and it consists mainly of: Compact Pumping Unit (CPU) including air separator, motor and non-return valve and for LPG a differential valve.

Regulation function is a hydraulic subsystem and it consists mainly of: solenoid valves for flow rate regulation, blending and on/off.

Delivery function is a hydraulic subsystem and it consists mainly of: hoses, nozzles and nozzle switch, this includes also satellite function.

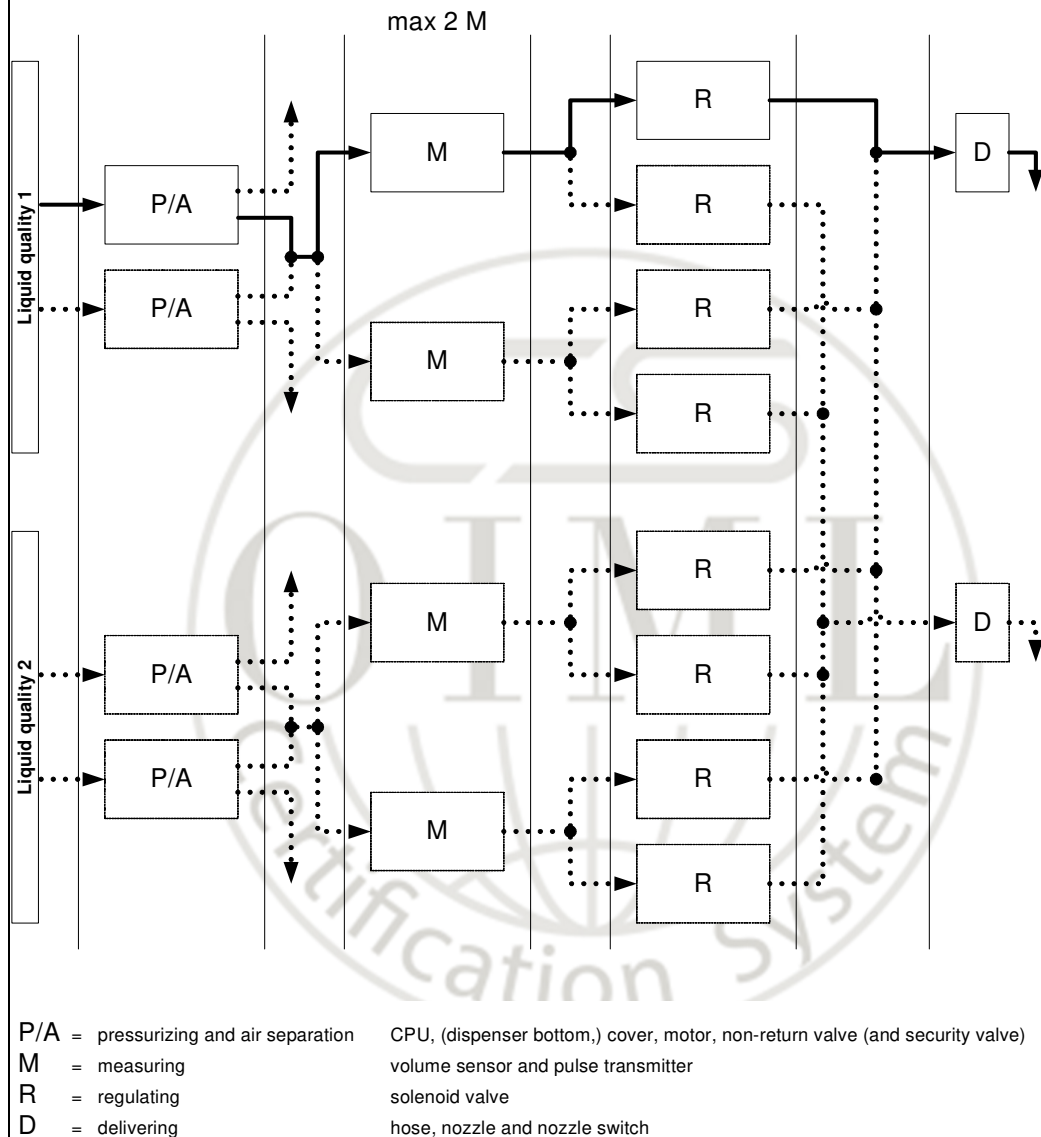
Central pump function is a hydraulic subsystem and it consists mainly of: delivery of air free liquid according to OIML R117-1, item 5.1.3 and security valve.

If the measuring system is equipped with a central pump an external (central) pump is used instead of an internal pump. The external system must comply with OIML 117-1, item 5.1.3 (i.e. it shall be equipped with an arrangement that prevents air to come into the system). The same applies to additive injection.

During verification it shall be possible to verify each volume sensor separately.



Block diagram describing permitted ways, and some restrictions, to produce one delivery product for one customer. Each such configuration shall be a subset of the diagram. To produce multiple delivery products for a customer the block diagram is used several times.





Picture 1: Wayne Helix 6000-II



Picture 2: Wayne Helix 6000-II
with Payment Terminal



Picture 3: Tokheim Quantum ML



Picture 4: Tokheim Quantum ML with
Payment Terminal



Picture 5: Wayne Helix 6



Picture 6: Wayne Helix 5



Picture 7: Helix 4000



Picture 7: Tokheim Quantum FS



Picture 8: Tokheim Quantum FS with
Payment Terminal



Picture 9: Wayne Century 3



Picture 10: Wayne Century 3 with Payment
Terminal



Picture 11: Tokheim Quantum ML DEF



Picture 12: Tokheim Quantum ML LPG



Picture 13: Wayne Century 3 DEF



Picture 14: Wayne Century 3 LPG

Components included

DFS Fuel dispensers may include the following components.

Measurement transducer function

Volume sensor (petrol,
petrol/ethanol mixtures, kerosene,
diesel or diesel/FAME/RME/HVO
mixtures)

DFS/Wayne iMeter2 Duplex (DM2-2) or
DFS/Wayne iMeter2 Single equipped side A (DM2-1) or
DFS/Wayne iMeter2 Single equipped side B (DM2-1) or
DFS/Wayne Xflo™ Duplex (magenta or silver id label) or
DFS/Wayne Xflo™ Single sided A (yellow id label) or
DFS/Wayne Xflo™ Single sided B (cyan id label)

Volume sensor (DEF)

DFS/Wayne iMeter2 DM2-X DEF

Volume sensor (DEF and
Windshield liquid)

DFS/Wayne iMeter DM2-X UREA

Volume sensor (LPG)
(including differential valve)

DFS/Tokheim GPL700

Pulse transmitter

DFS/Wayne PNo	i-Meter2	Xflo™	LPG
WM001682-0005			NFC
WM001682-0009	FC		
WM072446-0002	FC		
WM011529-0001		FCI	
WM019142-0001		FCI	
WM019142-0003		FCI	

FC=Flow Compensating, FCI = Flow Compensating Individual(XWIP),
NFC= Not Flow Compensating (WIP)

Board temperature module, phase 2,
0-1 pc****

DFS/Wayne WM044193-000X

Software Board temperature module,
0-1 pc****

W&M checksum **EB6A**, or **7EA9**

Temperature sensor, 0-10 pcs****

DFS/Wayne WM040341-0001

Pump and air separator function, not LPG

Compact Pumping Unit (CPU) *

Wayne	i-Meter2	Xflo™
WM002219-0001	D, H	
WM002219-0002	P, K, E	
WM018719-0001	P, K, D,H, E, F	P, K, D,H, E, F
WM016720-0001		P, K, D,H, E, 40 l/min
WM016720-0003		P, K, D,H, 70 l/min
WM078195-0001	P, K, D, H, E, F	P, K, D, H, E, F

P = petrol, K = kerosene, D = diesel, E = ethanol, F=FAME/RME,
H=HVO

Pumping Unit High Speed
(TQP-HS)

DFS/Tokheim	i-Meter2	Xflo™
WM077376-0001	P, K, D, H, E, F	P, K, D, H, E, F

P = petrol, K = kerosene, D = diesel, E = ethanol, F=FAME/RME, H=HVO

Anti-Foaming pipe 0-1 pcs

DFS WR002578

(Can be installed in any above
mentioned pumping units)

Cover
(between CPU and meter) **

DFS/Wayne 167360 or
DFS/Wayne WM000635 or
DFS/Wayne WM009207 or
DFS/Wayne WM011470 or
DFS/Wayne WM011337 or
DFS/Wayne WM018512-000X or
DFS/Wayne WM011485-000X or
DFS WM075106 or
DFS WM075418

Motor **, one per CPU

0,75 kW, 50Hz, 1400-1500 rpm or
1,1 kW, 50Hz, 1400-1500 rpm or
0,75 kW, 60Hz, 1700-1800 rpm or
1,1 kW, 60Hz, 1700-1800 rpm

Inlet suction check valve **

DFS/Wayne WM049971-000X

Additive liquid injection tank
gauge, 0-1pc

DFS/Wayne (START ITALIANA S.r.l. (ProGauge))
WT010992

Pump and air separator function, LPG

Remote pump, submerged

Vapour return line from gas separator and differential valve at volume sensor

Tokheim GPL Gas separator

950996

LPG Diff valve

943166

Non return valve

949695

* is replaced in dispenser variant
** is left out in dispenser variant

*** is added in dispenser variant
**** is added for ATC

Regulating function, solenoid valve, not LPG

NEW ASCO code		Wayne code	Wayne designation
Cat no	Voltage	(Datasheet in parentheses)	
JV 430298-001	24/DC	WM044745-0001 (WM045843)	SOLENOID VALVE, PROPORTIONAL, SINGLE IECEX, ALU BODY, CABLE LENGTH 3000 mm
JV 430298-002	24/DC	WM044745-0002 (WM045843)	SOLENOID VALVE, PROPORTIONAL, SINGLE IECEX, ALU BODY, INMETRO, PRODUCTION BRAZIL
JV 430298-003	24/DC	WM044745-0003 (WM045843)	SOLENOID VALVE, PROPORTIONAL, SINGLE IECEX, COMPCOTE ALU BODY
JV 430298-004	24/DC	WM044745-0004 (WM045843)	SOLENOID VALVE, PROPORTIONAL, SINGLE IECEX, COMPCOTE ALU BODY, CABLE LENGTH 1750 mm
JV 430298-005	24/DC	WM044745-0005 (WM045843)	SOLENOID VALVE, PROPORTIONAL, SINGLE IECEX, COMPCOTE ALU BODY, CABLE LENGTH 1750 mm
JV 430298-006	24/DC	WM044745-0006 (WM045843)	SOLENOID VALVE, PROPORTIONAL, SINGLE IECEX AND INMETRO, ALU BODY, 3 M CABLE
JV 430298-007	24/DC	WM044745-0007 (WM045843)	SOLENOID VALVE, PROPORTIONAL, SINGLE IECEX, COMPCOTE ALU BODY, 5 M CABLE
JV 430299-001	24/DC	WM044746-0001 (WM045844)	SOLENOID VALVE, ON/OFF, SINGLE IECEX, ALU BODY
JV 430301-001	24/DC	WM044747-0001 (WM045846)	SOLENOID VALVE, PROPORTIONAL, DUPLEX IECEX, BRASS BODY
JV 430302-001	24/DC	WM044750-0001 (WM045847)	SOLENOID VALVE, PROPORTIONAL, DUPLEX, SINGLE EQUIPPED RIGHT, IECEX, BRASS BODY
JV 430303-001	24/DC	WM044751-0001 (WM045850)	SOLENOID VALVE, ON/OFF, DUPLEX IECEX, BRASS BODY

Regulating function, LPG

Differential valve, liquid pressure at least 1 bar higher than vapour pressure
Manometer, between volume sensor and differential valve

Separate after the volume sensor GPL700.

Scale interval $d \leq 2$ bar

Delivery function

Hose, 16 mm (5/8"), max length 10 m
Hose, 16 mm (5/8"), max length 10 m
Hose, 16 mm (5/8"), max length 10 m
Hose, 16 mm (5/8"), max length 10 m
Hose, 19 mm (3/4"), max length 10 m
Hose, 21 mm (7/8"), max length 10 m

Elaflex Conti-Slimline 16
Elaflex Conti-Slimline 16 BIO
Elaflex Conti-Slimline 16 LT
Goodyear EN 1360, type 3, 16 bar
Goodyear Hardwall Petrol Hose B.S. 3395/1989 type 3
Elaflex Conti-Slimline 21

Hose, 21 mm (7/8"), max length 6 m	Elaflex Conti-Slimline 21 - COAX (vapour recovery)
Hose, 21 mm (7/8"), max length 10 m mmq = 5,0 l	Elaflex Conti-Slimline 21 - COAX (vapour recovery)
Hose, 21 mm (7/8"), max length 10 m	Elaflex Conti-Slimline 21 BIO
Hose, 21 mm (7/8"), max length 10 m	Elaflex Conti-Slimline 21 LT
Hose, 21 mm (7/8"), max length 6 m	Elaflex Conti-Slimline 21 LT (vapour recovery)
Hose, 21 mm (7/8"), max length 10 m mmq = 5,0 l	Elaflex Conti-Slimline 21 LT (vapour recovery)
Hose, 25 mm (1"), max length 6 m	Elaflex Conti-Slimline 25 LT
Hose, 25 mm (1"), max length 10 m, mmq = 5,0 l	Elaflex Conti-Slimline 25 LT
Hose, 25 mm (1"), max length 10 m	Goodyear EN 1360, type 3, 16 bar
Hose, 32 mm (1 1/4"), max length 7 m mmq = 5,0 l	Elaflex HD 32
Hose, DEF, max length 6 m, mmq = 5,0 l	Elaflex LPG ID=16, max working p=25 bar
Hose, LPG, max length 6 m, mmq = 5,0 l	Elaflex LPG ID=13, Elaflex LPG ID=16 or Elaflex LPG ID=19, max working p=25 bar
Hose, 25 mm (1"), max length 40 m, mmq = 20 l, max flow rate >60 LPM	Elaflex HD 25 C winded on Reel
Hose, 32 mm (1 1/4"), max length 40 m, mmq = 20 l, max flow rate >60 LPM	Elaflex HD 32 C winded on Reel
Nozzle 40-70 l/min	Elaflex ZVA slimline or OPW 21 or equivalent
Nozzle 40-70 l/min	Elaflex ZV 19 or equivalent
Nozzle 40-70 l/min, mmq = 5,0 l	Elaflex ZVA slimline TMV"DRIP-STOP" or equivalent
Nozzle 40 l/min, mmq = 5,0 l	OPW ACN or AVN or equivalent
Nozzle 90-130 l/min	Elaflex ZVA 25, 1" or equivalent
Nozzle 90-200 l/min	Elaflex ZVA 32, 1 1/4" or equivalent
Nozzle, DEF	Elaflex ZVA SS AdBlue or OPW 21 DBM or equivalent
Nozzle, DEF	Elaflex ZVA AdBlue LV or equivalent
Nozzle, LPG	Elaflex ZVG 2, Elaflex Gasguard LPG, Boessenkool LPG, OPW LPG or equivalent

Components included for electronic Calculator function, TQC

Processor board (CPU), (0-1 pcs)	Sitara, TQC APB6 / TQC 011 (Tok-943567)
Calculator software, running on the TQC-APB	libTqcWM.so.Sit, 18.001.13, CRC 5854 DisplayHdl.Sit, 18.001.64, CRC 9064 VgaMgr.Sit, 18.001.47, CRC 82BD IFSF_srv.Sit, 18.001.19, CRC 0416
Basic I/O board	DFS/Tokheim, TQC EIO6 / TQC 001L6 (Tok-942283)
Slave I/O board	DFS/Tokheim TQC - SI01 / TQC 208L3 (TOK-942687)
Hydraulic Module Board, (0-5 pcs)	DFS/Tokheim TQC - HYM11 / TQC 002L11 (WM075518) DFS/Tokheim HYML2 / TQC054L2 (WM076962) DFS/Tokheim TQC-HYM7 / TQC 002L7 (TOK-953709)
ATC- TQC interface board	DFS/Tokheim ACI2 (WM075602)
IFSF LON Interface	DFS/Tokheim IFSF LONC TQC LON4 / TQC 007L4 (TOK- 942692)
Display complete (volume, price & upd), (0-4 pcs)	DFS/Tokheim TQC-CSD-664-PPU4 / TQC 027L4 (TOK-947944, TOK-955955) DFS/Tokheim TQC-775-CSD4 (TOK-958430)
Display board (volume, price & upd), (0-4 pcs)	DFS/Tokheim CSD765+ CSD-IR1 (WM075585 + WM079313)
Display module TN neg (volume, price & upd), (0-4 pcs)	PS-044ATL-02 (WM056449-0001), upd right or PS-045ATL-02 (WM056449-0002), upd left or
Heater (0-1 pcs)	DFS/Tokheim TOK-909214

Components included for electronic calculator function, iGEM

CPU-board, 0, 1 or 2 (only for 4User) pc	DFS/Wayne WM001908-0001 or DFS/Wayne WM001908-0002 or DFS/Wayne WM001908-0005 or DFS/Wayne WM001908-0006 or DFS/Wayne WM001908-0011 or DFS/Wayne WM001908-0012 or DFS/Wayne WM001908-0015 or DFS/Wayne WM001908-0016 or DFS/Wayne WM069506-0001
--	---

Software CPU board, 0 or 1 pc	W&M checksum 62D1 (Rev 12.xx) or D3CD (Rev 16.xx)
iGEM expansion board, 0-1 pc	DFS/Wayne WM044451-0001 or WM044451-0002
Nozzle Switch Converter (0 or 1 pcs)	DFS/Wayne WU004202-0001 or WU006752

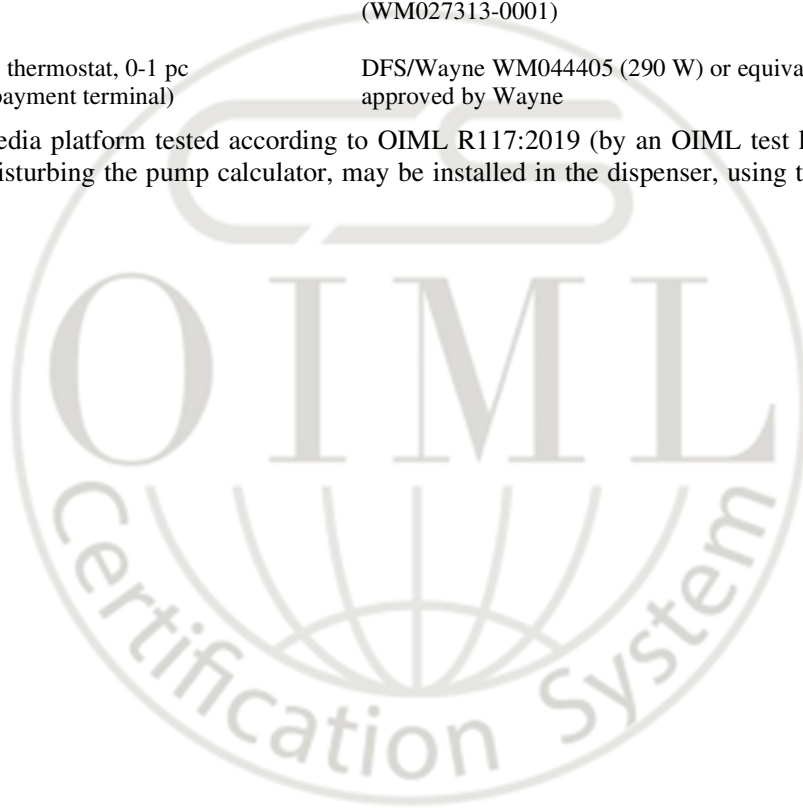
Components included for electronic calculator function, iGEM 2

CPU-board, 0, 1 (1 to 4 User) pc	DFS/Wayne WM044721-0001 or DFS/Wayne WM044721-0002 or DFS/Wayne WU020193-0001
I/O-board 0, 1 pc	WM054392-0001 or WU016738-000X
Bootloader CPU board, 0 or 1 pc	W&M checksum F92E 4B0B (Rev 007.XXX.XXX)
Dispenser App. SW CPU board, 0 or 1 pc	W&M checksum 2FC0 77BE (Rev 017.XXX.XXX) or 416F 8BF7 (Rev 18.XXX.XXX)
iGEM 2 expansion board, 0-1 pc	DFS/Wayne WM070224-000X
Ethernet communication board	DFS/Wayne WM067037-0001
Control board, Additive injection, 0-1pc	DFS/Wayne WM067598-000X

Components included for electronic function, iGEM & iGEM 2

Isolated interface communication board, 0-1 pcs	DFS/Wayne WM004360
ATCL/RS422 communication board, 0-1 pcs	DFS/Wayne WM001827
IFSF/LON communication board, 0-1 pcs	DFS/Wayne WM008766
NPCL/SINP communication board, 0-1 pcs	Wayne WM008750
iGEM-ISB board (pulse transmitter), 1-3 pcs	DFS/Wayne WU004200-0001 or WU04200-0002 or WM002450 or WM069425-000X or WM072390-0001
TTL/CAN converter, 0-1 pc****	DFS/Wayne WU007564-0001
Software TTL/CAN converter, 0-1 pc****	W&M checksum 3FBD or 7E60 or 082A or 55AB
Display board complete (volume, price & upd), 1-4 pcs)	DFS/Wayne WU007562-0001 or WM065705-0001 or WM084971-0001 or WM063229 or WU015222-0001 or WM069974-0001

Display module TN neg (volume, price & upd), 1-4 pcs	POLYTRONIX, PS-039ATL-02 (WM053326-0001), upd under or PS-044ATL-02 (WM056449-0001), upd right or PS-045ATL-02 (WM056449-0002), upd left or
Nozzle Switch Interface (0 or 1 pcs)	DFS/Wayne WU004201-0001 or WU006751-000X
Control Board iGEM printer (0, 1 or 2)	Innovision 10600101100G (WR001816)
iGEM Printer (0, 1 or 2)	Fujitsu FTP-629MCL374-R (WR001815)
Board; Connector, without heating regulation and surge protection	DFS/Wayne WXXXXXXX-000X
Power supply, 1 pc	Channel Well Technology, UAS150B, 150 W Max (WM027313-0001)
Heater including thermostat, 0-1 pc (mandatory for payment terminal)	DFS/Wayne WM044405 (290 W) or equivalent approved by Wayne
Payment or Media platform tested according to OIML R117:2019 (by an OIML test laboratory) to show evidence not disturbing the pump calculator, may be installed in the dispenser, using the dispenser power supply.	



Optional equipment and functions

- ATC conversion device (Not for DEF, Windshield liquid and HVO)
- Pre-set of volume or price *****
- Volume totalizer
- Blending (designation only e g 92, 95, 98 octane not 50/50, 70/30 etc)
- Satellite (SAT and MASTER enable button in case of direct sales)
- When using the measuring system to refill aircrafts or helicopters it is allowed to use a water elimination device according to OIML 117-1 5.8.1.2 (E 2019) between meter and hose. For safety reasons it is required to drain the device on a regular base by opening the drain valve. This has to be done by a trained service technician on the measuring system under pressure with closed nozzle. This is to ensure that the hydraulic system is always filled with fuel. The drain valve has not to be sealed.
- Additive injection function for injecting additive liquids to the fuel before the meter. A tank gauge meter is required in the storage tank for additive liquid to avoid injection of air into the fuel. See requirements for central pump function.
If additive liquid is injected before the air separator, the additive is not subject to-OIML requirements.

Integrated equipment and functions not subject to legal metrology control

Vapour recovery system with vapour pump, regulating proportional valves and an electronic board (for example Bürkert control board, Dover Ivory power pump control or Dover Global VR) connected to the calculator CPU-board. The vapour flow is controlled by the electronic board or the calculator CPU-board. Optionally also a vapour recovery monitoring system consisting of a Vapour meter and belonging Intrinsic safe barrier may be used. Means for vapour recovery must not influence the accuracy of measurements such that the maximum permissible error is exceeded.

For DEF, heating is installed to keep the liquid from freezing. As an option a pump circulates liquid downstream the meter between deliveries, through the coax hose to a container (max volume 2,55 litre in circulation system) to avoid freezing.

Rated operating conditions

Measurand

Volume of liquid fuel expressed in litre. If ATC conversion device is included (not for DEF, Windshield liquid and HVO), the volume at base condition (15 °C) is displayed. The calculations are based on OIML R63 (API/ASTM 54B) except for petrol/ethanol mixtures where Verfahren 1 according to PTB-1.5-40520004 dated April 11, 2011, is used.

Measurement range

Maximum flowrate ($q_{\max}$)	40 to 200 l/min (DEF and Windshield down to 10 l/min)
Minimum flowrate ($q_{\min}$)	≥ 0,2 l/min
Minimum measured quantity (mmq)	2,0 l or 5,0 l or 20 l (see specification of hoses and nozzles). As option, 5,0 l can be used on any configuration up to 5 l. For LPG, 5 l only. DEF iMeter DM2-X UREA, 5,0 l only. DEF iMeter2 DM2-X DEF, 2,0 and 5,0 l.
Scale interval, volume display	0,01 l
Maximum working pressure	0,3 MPa, and 2,5 MPa only for GPL700
Minimum working pressure	0,12 MPa, not for LPG

* is replaced in dispenser variant	*** is added in dispenser variant
** is left out in dispenser variant	***** is added for ATC
***** can be controlled through key pad on dispenser or by softkey on payment/media terminal	

RISE Research Institutes of Sweden AB | Certification

Box 857, SE-50115 Borås, Sweden
Phone +46 10 516 50 00 | certifiering@ri.se | www.ri.se

Date: 2022-07-15

Page 18 of 40 pages

1128310



Liquid temperature range	-30°C to +55°C, -25°C to +55°C only for FAME/RME -5°C to +35°C only for DEF -30°C to +55°C only for LPG (GPL700)
Type of liquids, volume sensor iMeter2 and Xflo™ Viscosity range volume sensor iMeter DM2-X UREA volume sensor iMeter2 DM2-X DEF volume sensor GPL700	Petrol, kerosene, diesel, ethanol or FAME/RME/HVO 0,4 -8,0 mPas DEF (Diesel Exhaust Fluid, e.g. AdBlue) and Windshield liquid DEF (Diesel Exhaust Fluid, e.g. AdBlue) LPG
Volume sensor flow rate range, iMeter2 Duplex (each meter) and Single (Flow compensating Pules Transmitter)	0,2 to 110 l/min 0,4 to 40 l/min only for DEF
iMeter DM2-X UREA	2 to 40 l/min only for DEF
iMeter DM2-X UREA	1 to 40 l/min only for Windshield liquid
Xflo™ Duplex (each meter) and Single	4 to 80 l/min 4 to 70 l/min only for FAME/RME
GPL700	10 to 50 l/min only for LPG
Mixture conditions, two liquids	5% to 95% (designation only e g 92, 95, 98 octane not 50/50, 70/30 etc)
The ratio between maximum and minimum flow rate should be at least 10 for single quality and 5 for blending quality, DEF, Windshield liquid and LPG.	

Environments classes / influence quantities

Mechanic:	class M1
Electromagnetic:	class E1
Humidity:	class H3

Ambient temperature limits:	-40°C to +55°C (tested to +60°C) -25°C to +55°C for DEF, Windshield liquid and LPG +5°C to +55°C for iGEM printer
-----------------------------	---

Interfaces and compatibility conditions

Interface for vapour recovery systems.

Communication between fuel dispenser and other parts of a measuring system (e g POS-systems) using one of the following non-reactive interfaces is evaluated and approved. (This does not imply that the complete self-service arrangement fulfils the requirements of OIML R117):

SW protocol	Hardware
DART	RS485 or RS422 (CPU board)
LJCL	RS422 (CPU board)
Ferranti	UKCL (CPU board)
IFSF	IFSF/LON communication board
ATCL	ATCL/RS422 communication board
SINP	NPCL/SINP communication board

Most protocols do not include “unit”, for example “volume @ 15°C”. Instead this has to be handled during set up of the station controller and dispensers. It must be possible for the measuring system to print “@ 15 °C” on the ticket.

When the dispenser is a part of a self-service arrangement the following requirements have to be fulfilled:

- The communication between the dispenser and the self-service device/devices has to be through one of the interfaces/protocols listed above.
- The connection has to be verified by the installer so the metrological data are presented in a way, whether it is an indicated, printed or memorized result, that meets the requirements of OIML R117.

Control of the measuring tasks of the instrument in use

For dispensers with ATC the volume at base condition is displayed in normal working mode.

Alternative 1: When verifying the dispenser as a “black box”, the delivered volume measured in a volume standard $V_{t\text{ ref}}$ is converted to volume at base condition V_{15} using $V_{15\text{ ref}} = V_{t\text{ ref}} \times \text{VCF}$ where VCF, volume correction factor, is based on the quality and temperature t of the liquid.

Alternative 2: (iGEM & iGEM 2 only) When the display is showing ATC Revision and CRCs press the CRC button and the W&M-mode is active for 30 minutes (or until next push on the CRC-button) displaying V_t , V_{15} , temperature t , product and density. A test well (inner diameter 4 mm) can be used for the reference temperature sensor.

Nozzle out:

Amount display	Product and density for primary meter
Volume display:	Product and density for secondary meter
UPD:	Blank

In filling:

Amount display	Uncompensated volume, V_t
Volume display:	Temperature for primary meter (momentary value)
UPD:	Temperature for secondary meter (momentary value)

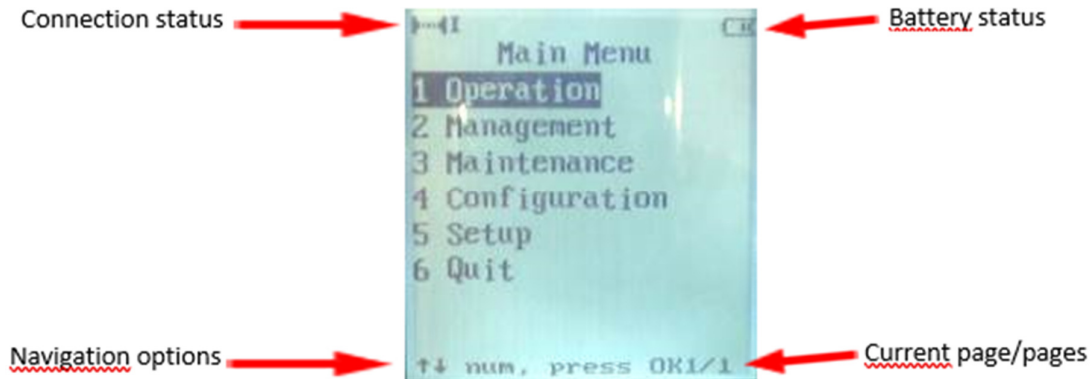
On nozzle return:

Amount display	Volume at 15 °C, V_{15} altered with product and density for primary meter
Volume display:	Uncompensated volume, V_t altered with product and density for secondary meter
UPD:	Temperature t (mean value, volume weighted)

LPG: A thermometer well is installed upstream the meter, to be used during verification

Identification Software for TQC

The software version of TQC and its peripheral software can be inspected with the aid of the handheld terminal or can be downloaded via a remote terminal



- User interface window in Hand Held Terminal (HHT)
 - Point the HHT to the IRDA of the TQC (next to LCD or under VGA);
 - When you have connection (shown in left upper corner of HHT screen, see photo) press OK on `login` (Pin = 124578);
 - Use the up/down or numerical buttons to navigate, the green OK button to confirm and the red C button to go back;
 - Navigate to number 4; `Configuration`, then to number 3; `Software info`, and once again number 4; `Peripheral modules`;
 - In this submenu navigate to [Type] or [Name], use the yellow checkmark button to select and then up/down to change the item, press OK to confirm;
 - To exit, use the C button until you're in the Main Menu and press button number 6.



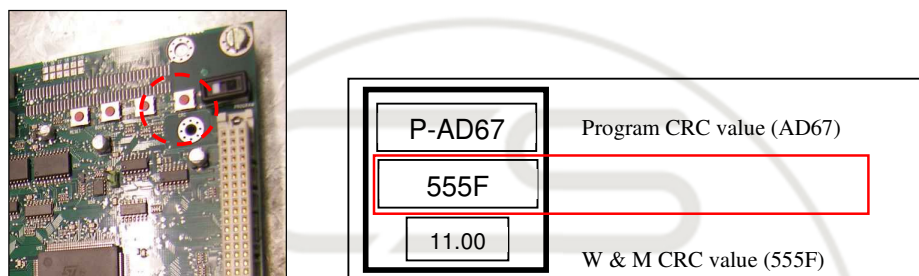
The integrity check procedure implies that the MID version and the time stamp correlate with the listed version numbers in section “Components included for electronic Calculator function, TQC” If that is not the case, then the embedded software integrity check mechanism will:

- Block new deliveries
- Indicate error on the display
- Log this event in the journal loggings

For further description, see TQC user manual.

Identification Software for iGEM

The metrological software is identified by the checksum (W&M CRC value), which can be accessed by pressing the CRC button on the iGEM calculator CPU board. (Upon this also the program CRC values and software version number are indicated at the dispenser display.)



CRC button and example of indication of software version on display

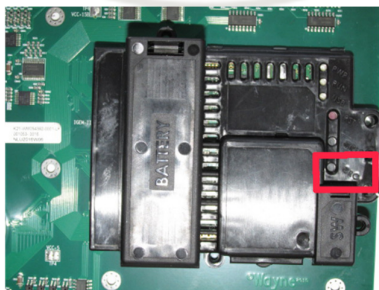
For ATC this information is altered by

Amount display: W&M CRC value on board temperature module
Volume display: Revision of board temperature module
UPD: AtC
and

Amount display: W&M CRC value on TTL/CAN converter
Volume display: Revision of TTL/CAN converter
UPD: Can

Identification Software for iGEM 2

The metrological software is identified by the checksum (W&M CRC value), which can be accessed by pressing the CRC button on the iGEM 2 calculator CPU board. The software versions and CRC values are shown in the following sequence:



CRC button placement

- The first indicating on the sales volume display after the CRC button is pushed is the Firmware version of the dispenser application.
- After a few seconds the display will change and show the CRC for complete program both LR and non LR is included.
- After an other few seconds the display will change again and the amount and volume display will show the W&M-CRC for the LR part of the code and the UPD will show LrCrC. It will looks like this:



Example of W & M CRC

- Then will the display change again and show the Bootloader Firmware version.
- After that the Bootloader Firmware CRC. The UPD will show b CrC
- When the display change again it will show the ATC information
Amount display: W&M CRC value on board temperature module
Volume display: Revision of board temperature module
UPD: AtC

Calibration-/adjustment procedure

- TQC Dispensers are calibrated/adjusted according to Tokheim manual 955745 for all meters and ATC. (English version, other languages may be available, contact DFS local technical support).
- iGEM and iGEM 2 Dispensers with iMeter & iMeter2 volume sensors are calibrated/adjusted according to Wayne manual WM064180 (English version, other languages may be available).
- iGEM and iGEM 2 Dispensers with Xflo™ volume sensors are calibrated/adjusted according to Wayne manual WM018625 (English version, other languages may be available).
- iGEM and iGEM 2 Dispensers with GPL700 volume sensors are calibrated/adjusted according to Wayne manual WM078856 (English version, other languages may be available).
- iGEM and iGEM 2 Dispensers with ATC is calibrated/adjusted according to Wayne manual WM055095 (English version, other languages may be available, contact Wayne local technical support).

Sealing

The dispenser is sealed according to description in this chapter. See also pictures in “Example pictures of sealing of the instrument”.

NOTE: When using wire through screws etc. to make seals, ensure that the wire is as short and taut as possible. The closing stamp must be placed such as it is within reach for pressing with intended pliers, without dismantle surrounding components with the help of tools. The closing stamp can be of any suitable material.

TQC Calculator

The following seals are applied:

- The impulse encoder's connection to the connector board on the EIO board
- Weight and Measure seal on TQC and TQC EIO
- Weight and Measure seal on TQC EST
- Sealing of the cable between the VGA indication device and the single board computer
- TQC in combination with VGA indicating devices, Weight and Measure seals on the TCDU

When a SD is applied the cold start switch must be sealed.

(Sealing of the SD card itself is not necessary)

iGEM Calculator

The following seals are applied:

- CPU Board against removal
- Prog/Load switch against switching to open position.
- Electromechanical totalizer connector is sealed if used as a basis for legal transaction

The following components are not sealed, but protected/identified in the following way:

- The pulsers are uniquely electronically identified by the calculator (not TQC), including a presence check

iGEM 2 Calculator

The following seals are applied:

- CPU Board against removal
- Prog/Load switch compartment against opening.
- Electromechanical totalizer connector is sealed if used as a basis for legal transaction

The following components are not sealed, but protected/identified in the following way:

- The pulsers are uniquely electronically identified by the calculator, including a presence check

ATC Temperature Module

The following seals are applied:

- ATC Temperature module board sealed against removal
- ATC Temperature module board sealed against opening cap to access cables and settings switch.

For sealing of temperature sensors see each meter blow.

iMeter 2 Liquid Meter

The following seals are applied:

- ATC Temperature sensor sealed against removal
- Sealing of pulser against manipulation of calibration.
- Sealing of pulser against opening and removal.
- Sealing of meter against opening.
- Sealing of meter against removal.
- Sealing air separator against opening.

Xflo™ Liquid Meter

The following seals are applied:

- ATC Temperature sensor sealed against removal
- Sealing of pulser against manipulation of calibration.
- Sealing of pulser against opening and removal.

- Sealing of meter against opening.
- Sealing of meter against removal.
- Sealing air separator against opening.

GPL700 LPG Meter

The following seals are applied:

- ATC Temperature sensor sealed against removal
- Sealing of pulser against manipulation of calibration.
- Sealing of pulser against opening and removal.
- Sealing of the differential valve.
- Sealing of the connection between meter and pulser against opening removal.
- Sealing of meter against opening
- The volume sensor, pulser, differential valve, pressure calibration screw (if present) of the differential valve and manual valves in vapour return line are sealed or labelled.

Nameplate

The following seals are applied:

- Name plate (aluminium or vinyl sticker) is sealed to the frame with a small "vandal proof" label.

Electromechanical totalizer

The following seals are applied:

- Electromechanical totalizer is sealed if used as a basis for legal transaction

Information to be borne by and to accompany the instrument

The name plate mounted on the instrument shall contain the following information:

- the OIML certificate number
- Space for verification mark
- the name or trademark
- the serial number and year of manufacture
- the designation or type name (according to "Product names and designation")
- Type of Liquid or Viscosity class (not for LPG, DEF, and Windshield liquid) *
- the temperature range of the dispensed liquid
- the accuracy class
- max. flow rate Q_{max}
- min. flow rate Q_{min}
- minimum measured quantity
- max. pressure P_{max}
- the ambient temperature range
- mechanical class
- electromagnetic class
- humidity class
- Nominal value of the AC voltage supply

* depending of volume sensor

Further inscriptions, if necessary

Minimum measured quantity shall be inscribed on the "indicator face". If ATC is included, "@ 15 °C" shall be marked adjacent to the volume display.



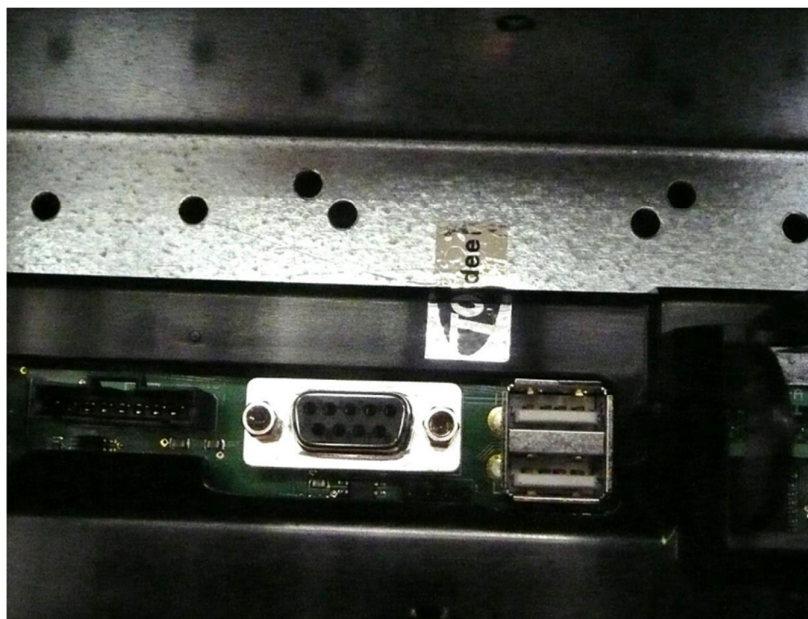
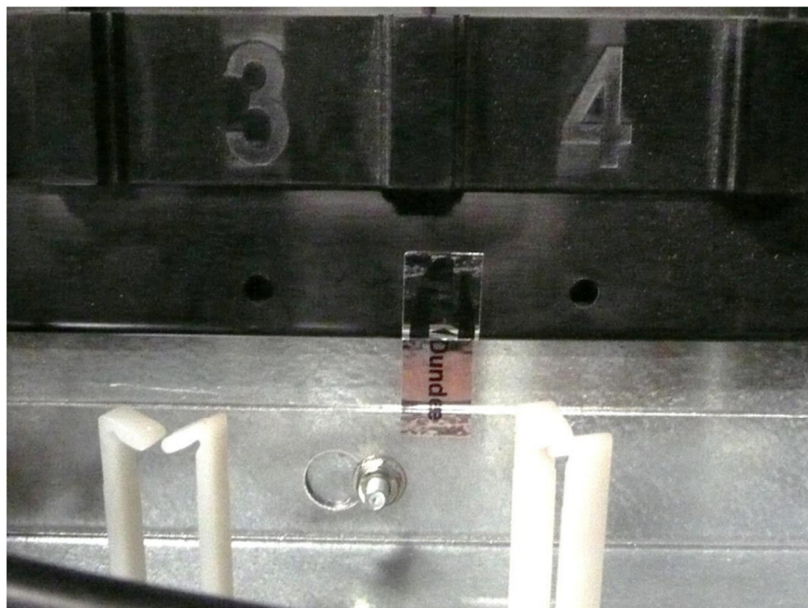
Display for ATC including ”@ 15 °C”



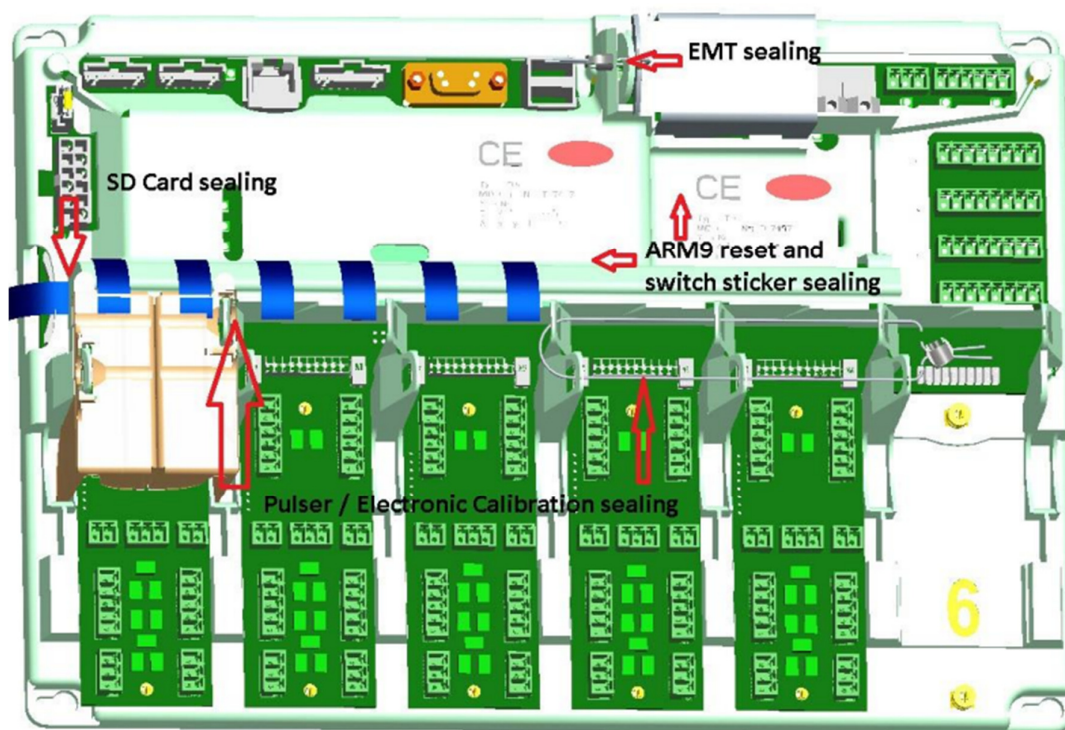
Alt Display for ATC including ”@ 15 °C”

Example pictures of sealing of the instrument.

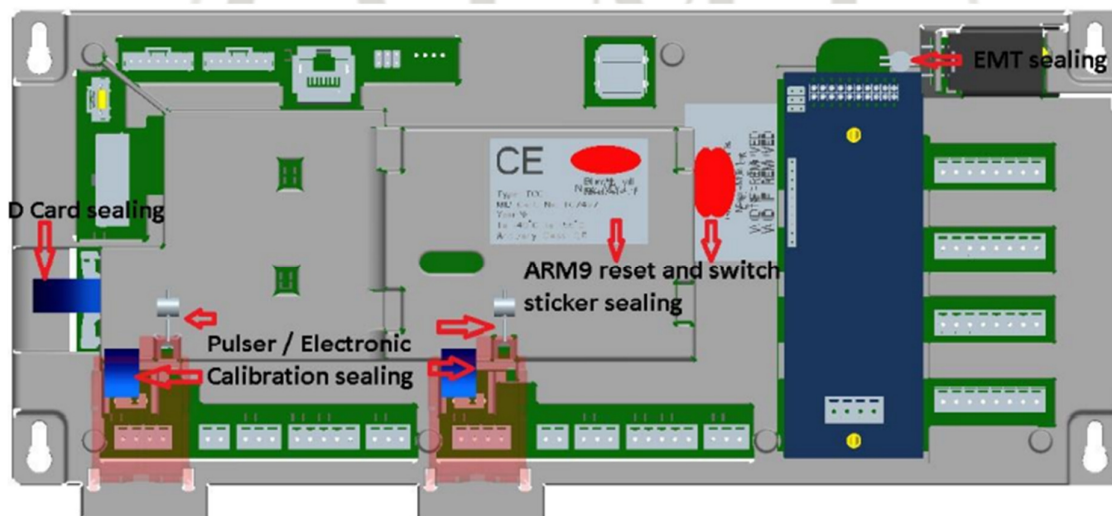
TQC Calculator



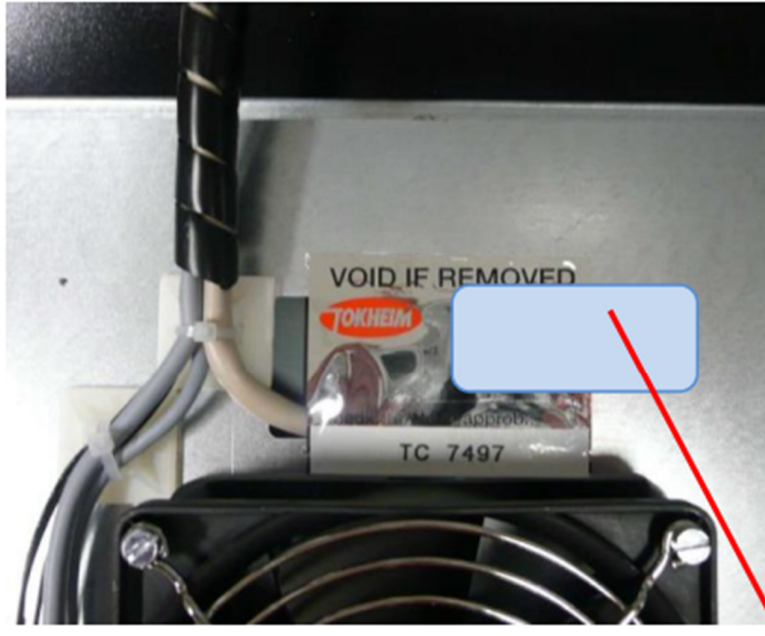
Example of weight & measure sealing for TQC and TQC EIO



Example of weight & measure sealing for TQC and TQC EIO

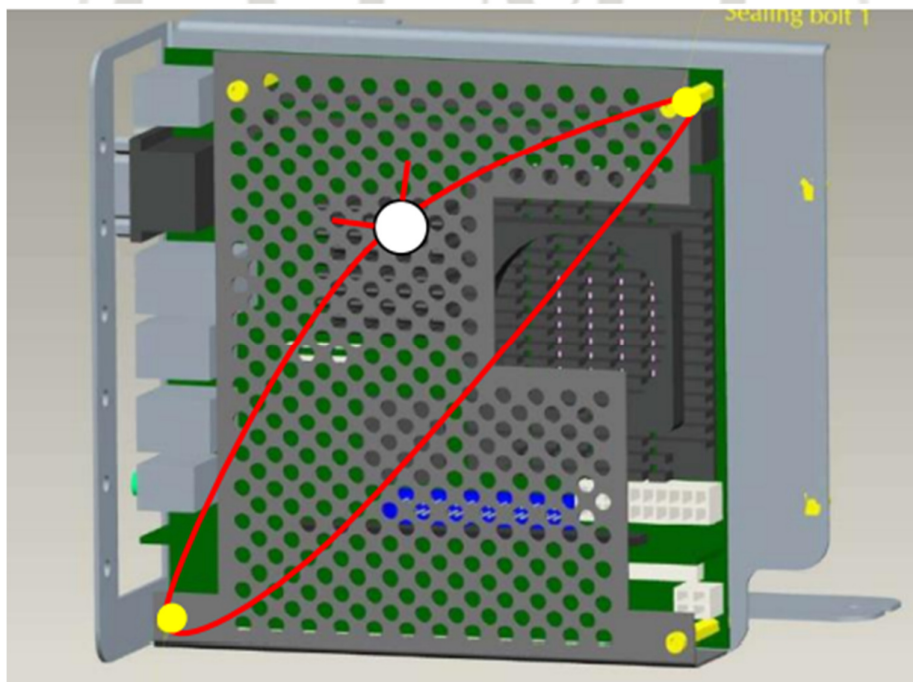


Example of weight & measure sealing for TQC EST



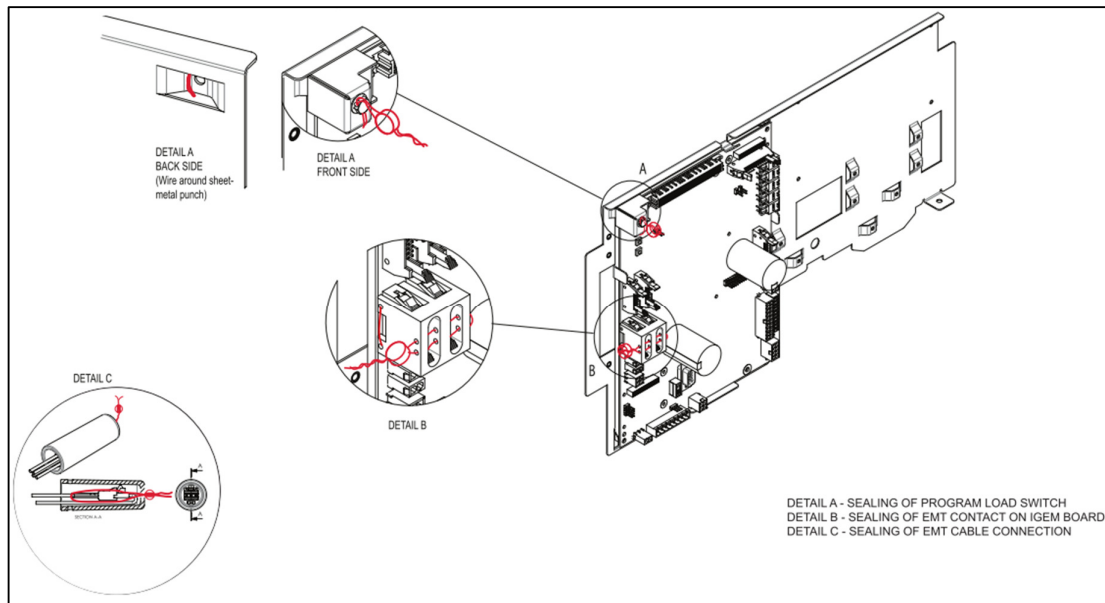
Seal sticker partly over
Tokheim sticker

Example of weight & measure sealing for the data cable on the VGA display



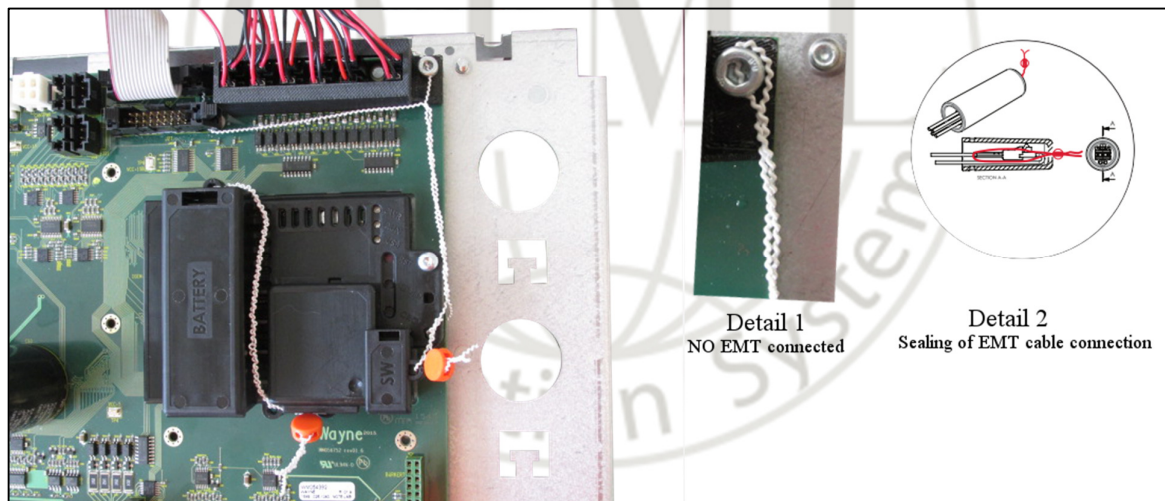
Example of weight & measure sealing for the single board processor for the VGA display device.

iGEM Calculator

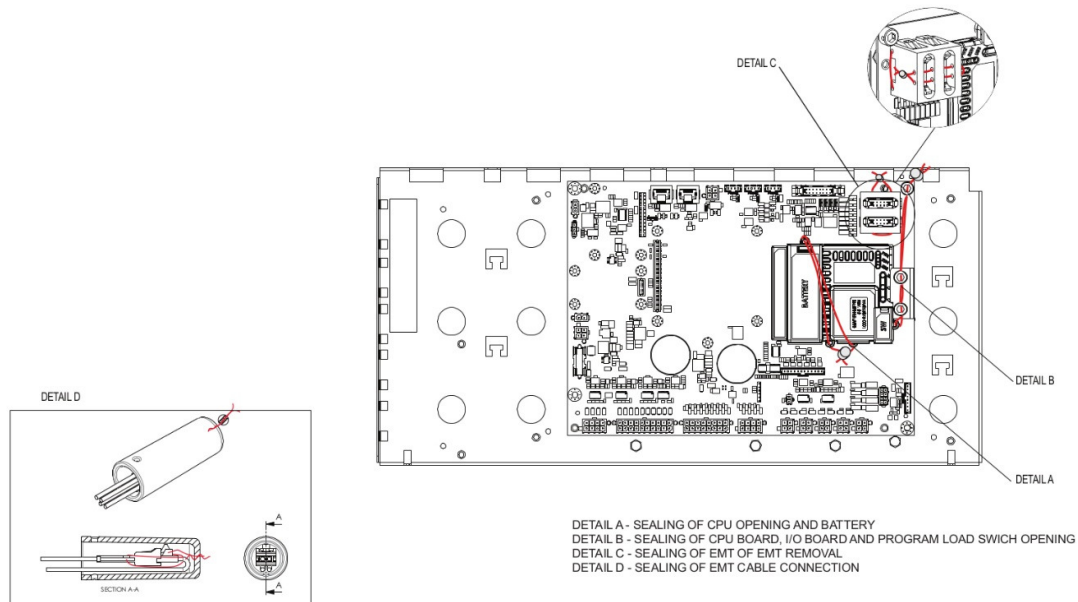


Example of sealing of iGEM with electromechanical totalizer (if used as a basis for legal transaction)
for Helix see detail B and C. For sealing of the program load “PRG LOAD” switch for Helix see detail A.

iGEM 2 Calculator

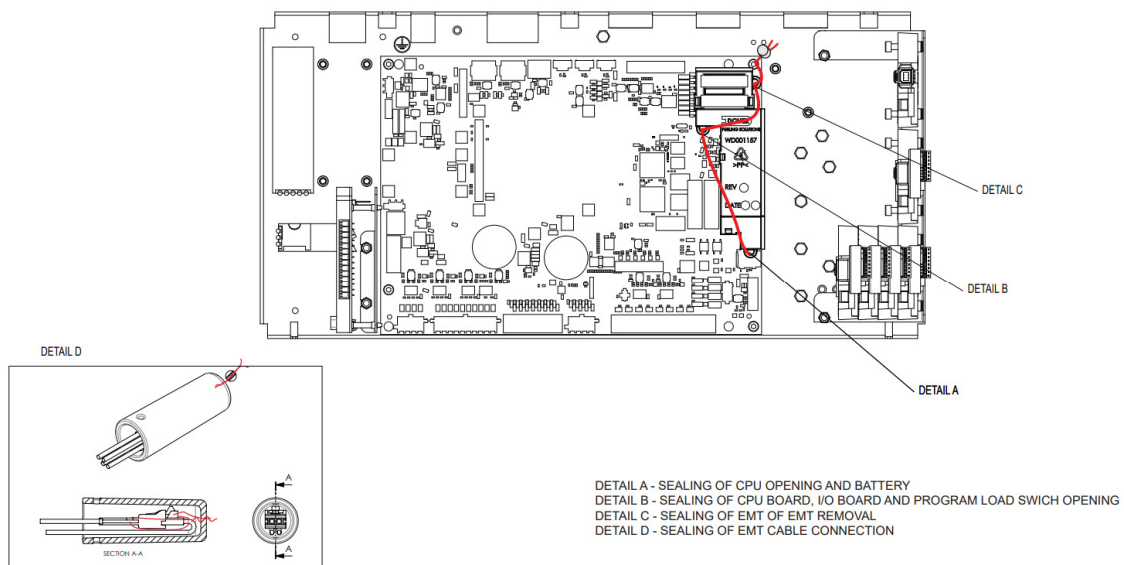


Example of sealing of iGEM 2 electronic module with electromagnetic totalizers
(if used as a basis for legal transaction).
Even though no electromagnetic totalizer is connected the sealing have to include the
CPU-module and the sealing screw in detail 1



Example of sealing of iGEM 2 Generation 2 electronic module with electromagnetic totalizers
(if used as a basis for legal transaction).

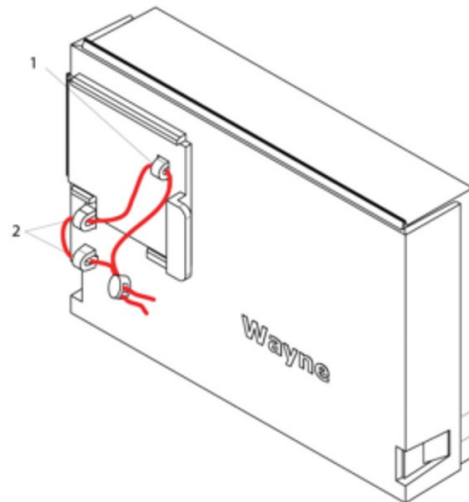
Even though no electromagnetic totalizer is connected the sealing have to include the CPU-module and the sealing screw in detail A & B



Example of sealing of iGEM 2 Generation 3 electronic module with electromagnetic totalizers
(if used as a basis for legal transaction).

Even though no electromagnetic totalizer is connected the sealing have to include the CPU-module and the sealing screw in detail A & B

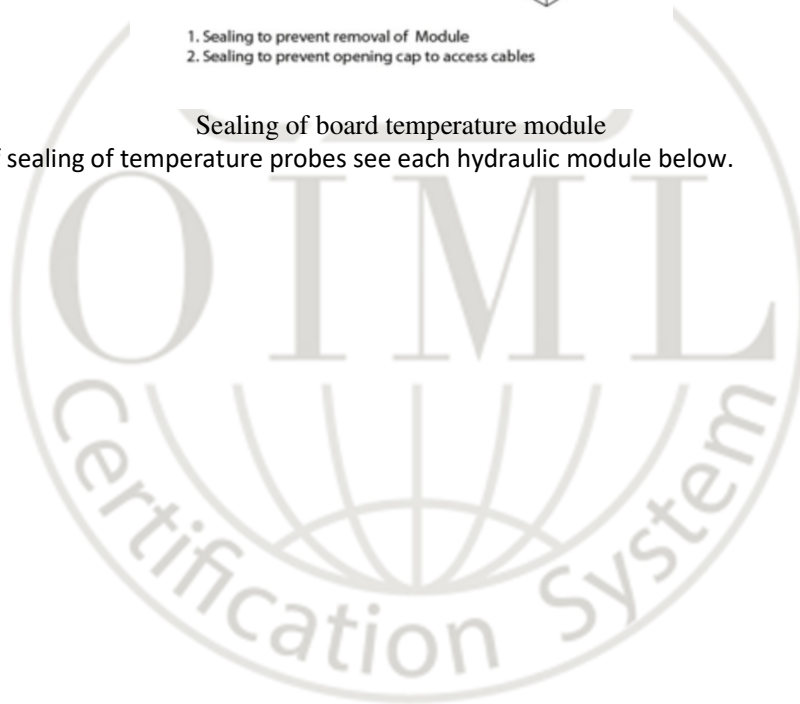
ATC Temperature Module



- 1. Sealing to prevent removal of Module
- 2. Sealing to prevent opening cap to access cables

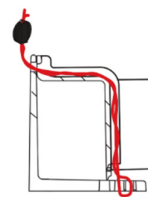
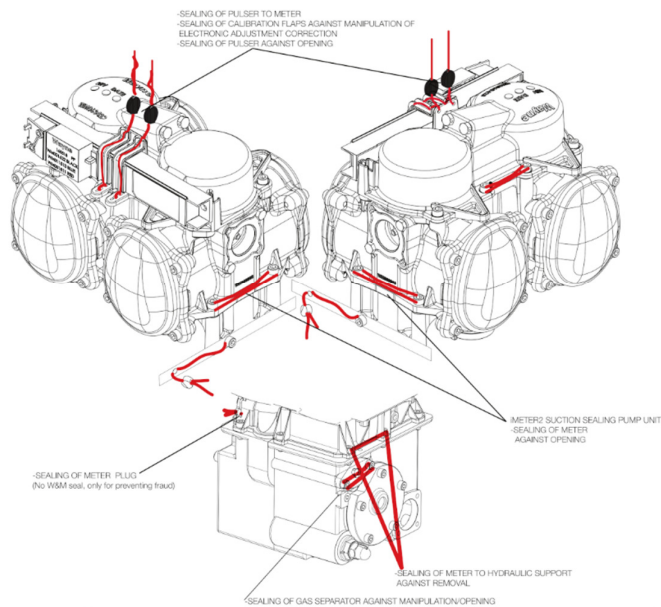
Sealing of board temperature module

For example of sealing of temperature probes see each hydraulic module below.

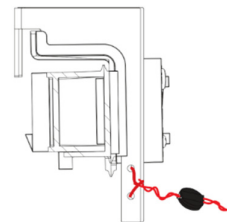


iMeter² Liquid Meter

IMeter² - REMOTE / SUCTION

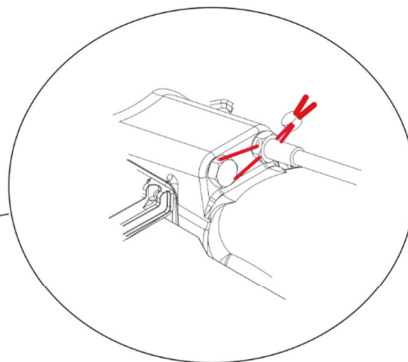
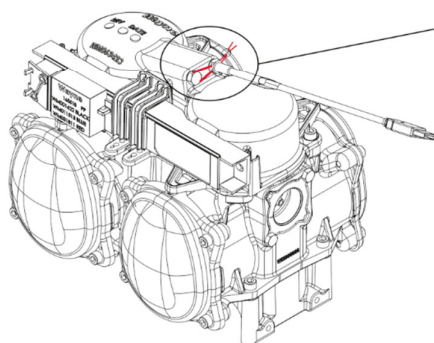


SEALING OF PULSER AND CALIBRATION FLAPS
SECTION SHOWING PLACEMENT OF SEALING WIRE FOR SEALING OF PULSER AND CALIBRATION FLAPS. PLACE SEALING AS CLOSED TO SEALED PARTS AS POSSIBLE.

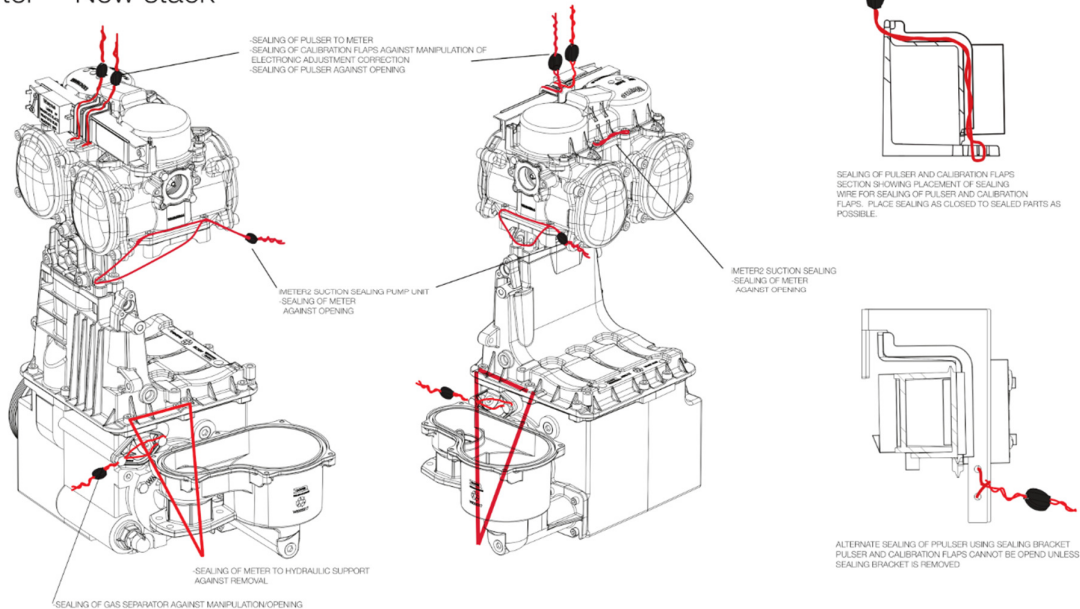


ALTERNATE SEALING OF PULSER USING SEALING BRACKET
PULSER AND CALIBRATION FLAPS CANNOT BE OPENED UNLESS SEALING BRACKET IS REMOVED

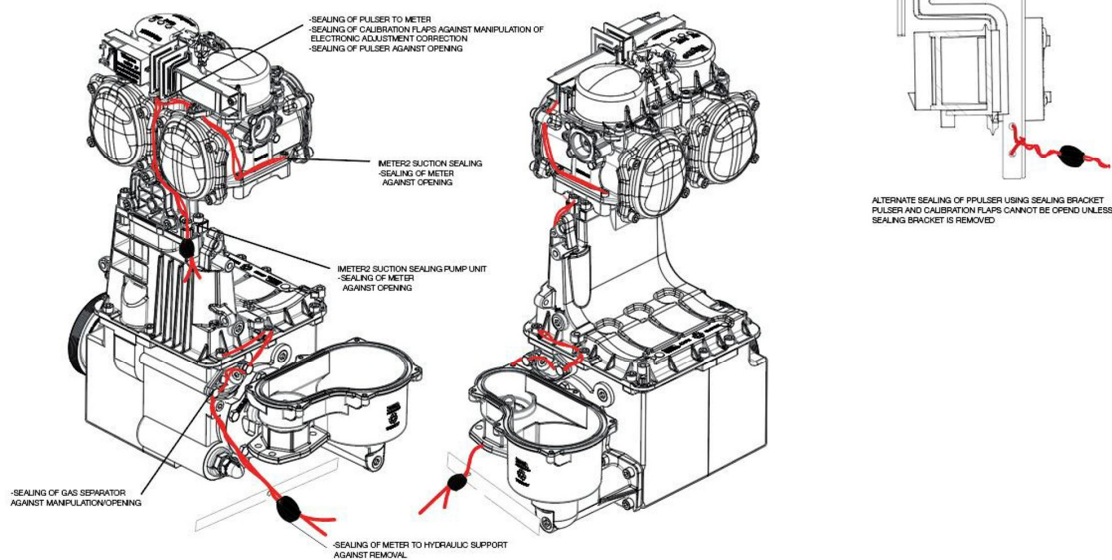
ATC



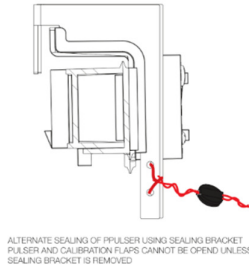
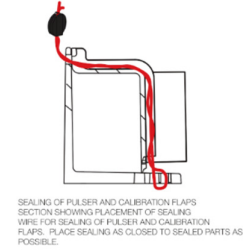
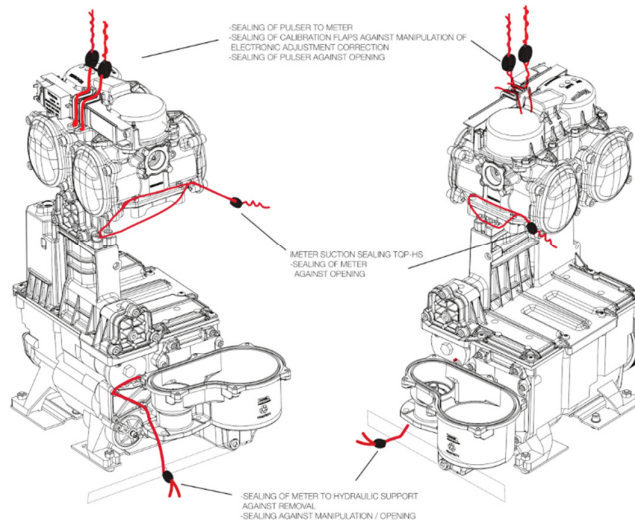
IMeter² - New stack



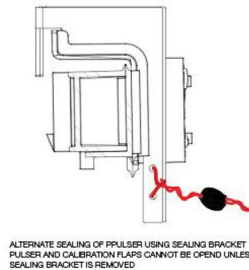
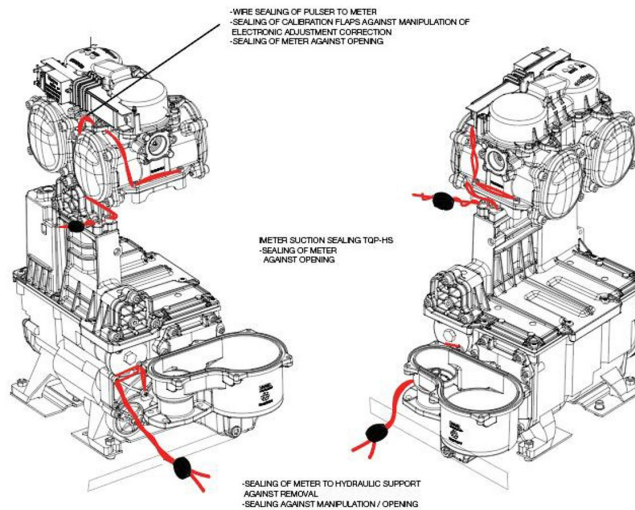
IMeter² - New stack



TQP-HS iMeter

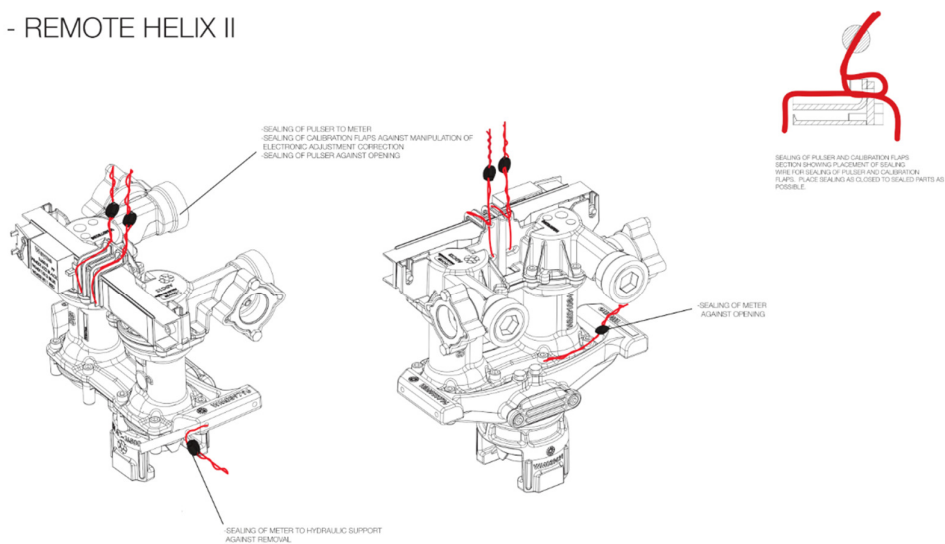


TQP-HS iMeter

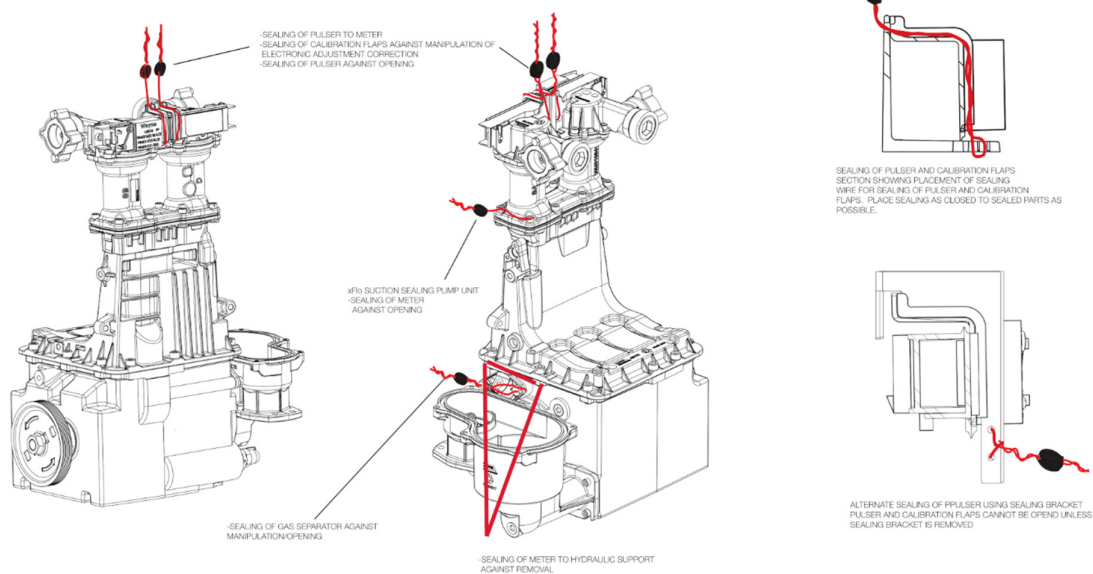


Xflo™ Liquid Meter

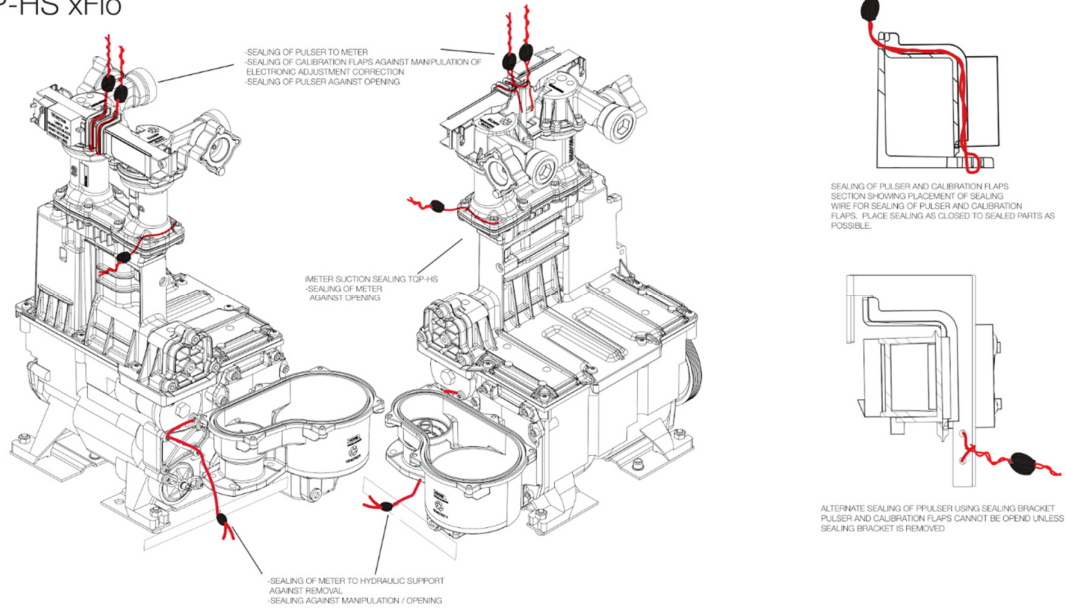
XFLO - REMOTE HELIX II



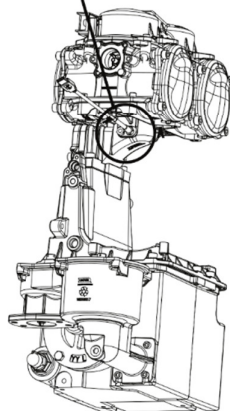
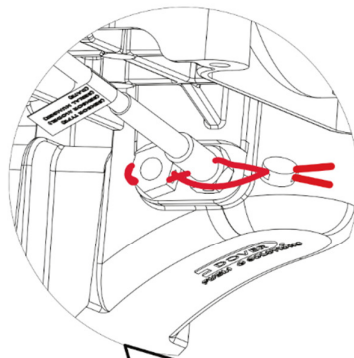
xFlo - New stack



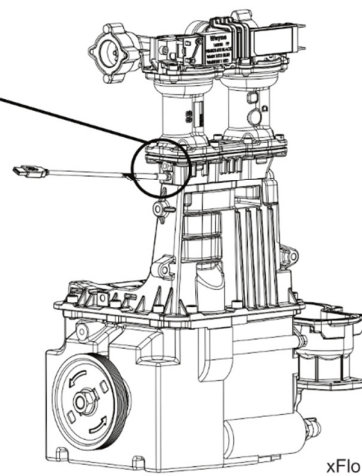
TQP-HS xFlo



IMeter² & xFlo - New stack ATC

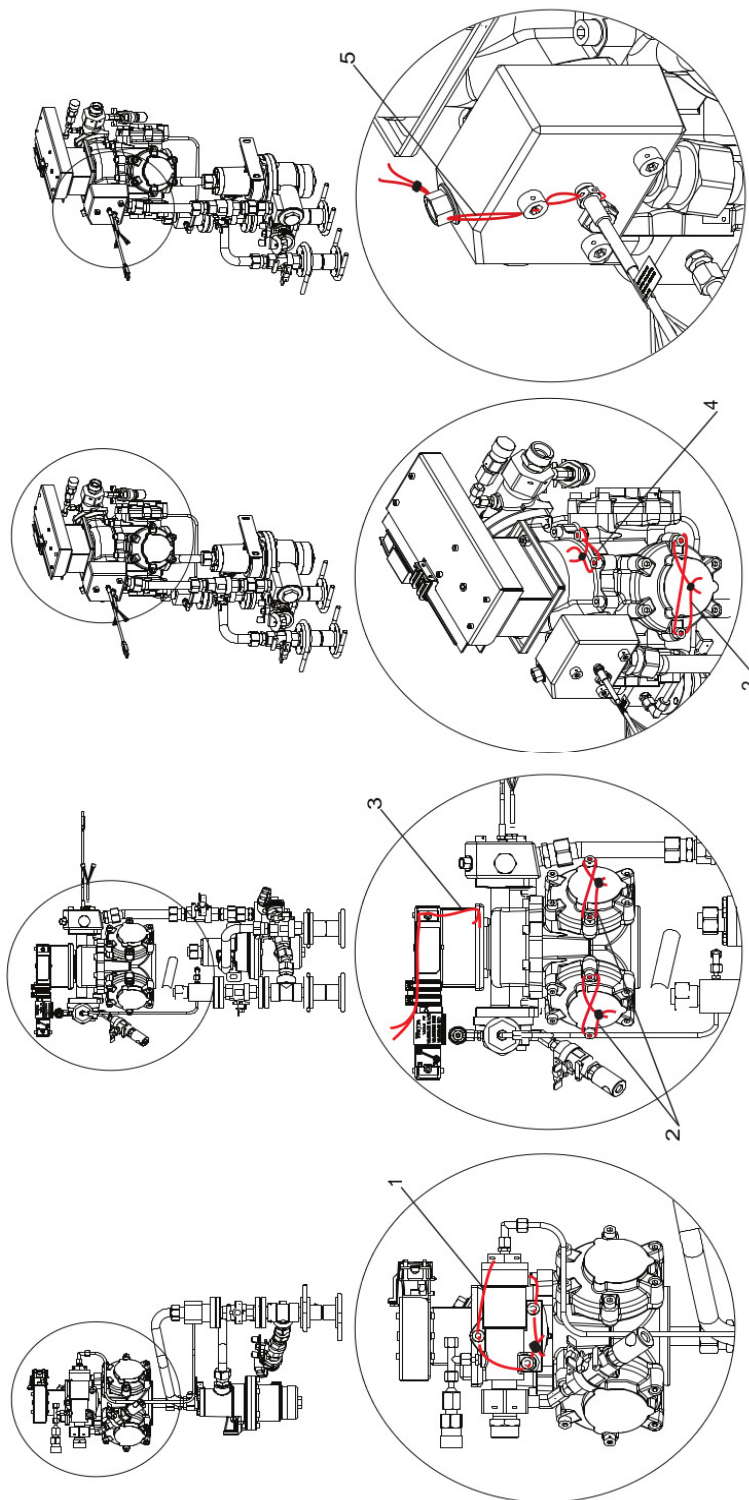


iMeter

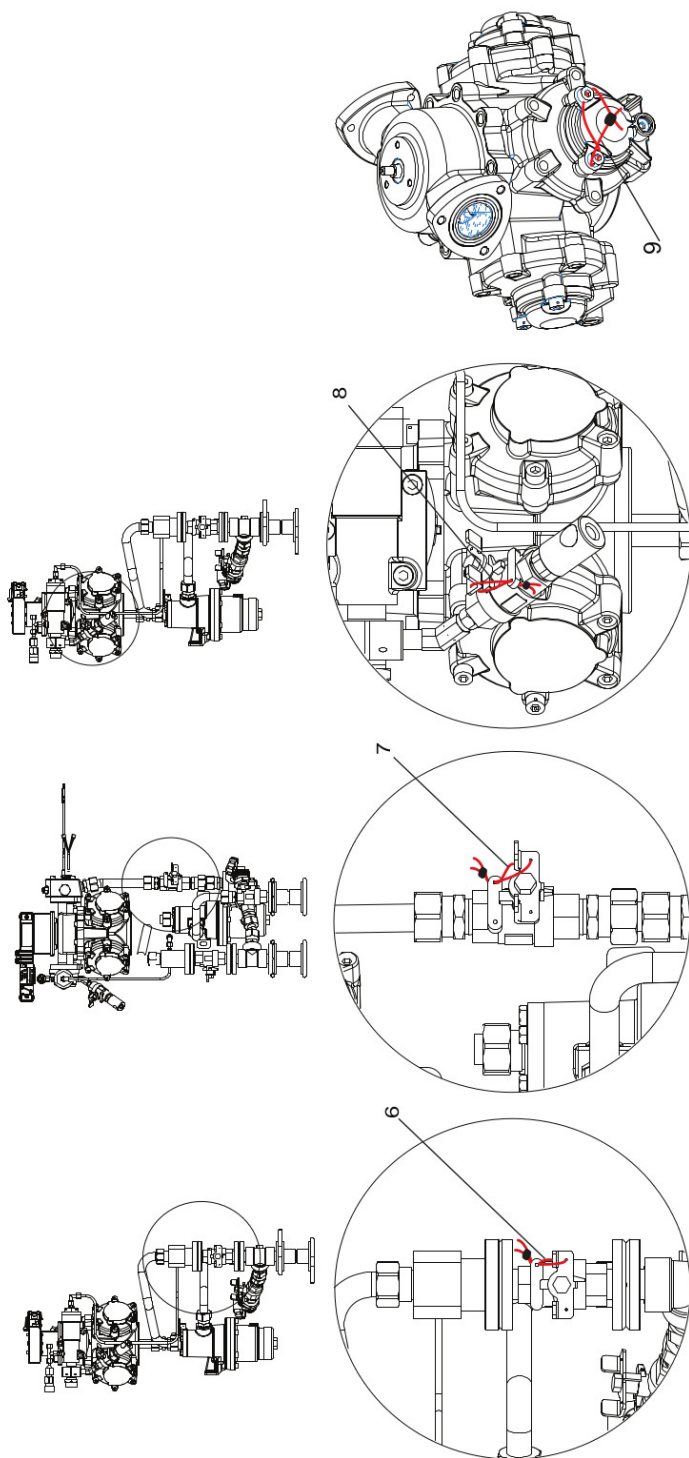


xFlo

GPL700 LPG Meter



1. Sealing of the differential valve
2. Sealing of the Meter electronic calibration/against opening
3. Sealing of the connection between meter and pulser against opening/removal
4. Sealing of the Meter against opening
5. Sealing of the ATC



9. Sealing of the Mech calibration

6. Sealing of the gas return line
7. Sealing of the ball valve
8. Sealing of the nitrogen purge points

