

Operation and Service Manual for HERMetric UTImeter Gtex

for use in non corrosive liquids

Portable Gas Tight Electronic Gauging Device
Ullage - Temperature - Interface detector



**EN ISO
9001 : 2000**



DNV

**Certified
Company**

Note 1: to identify the unit refer to section 2

Note 2: before using the instrument please read this book.

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2. Identification of your equipment

2.1 Serial number

Each HERMetric instrument is **individually identified** with a 6 digits serial number starting with the letter G, example G10058. This serial number is printed on the identification plate that is located on top of the handle. See Figure 2-1.

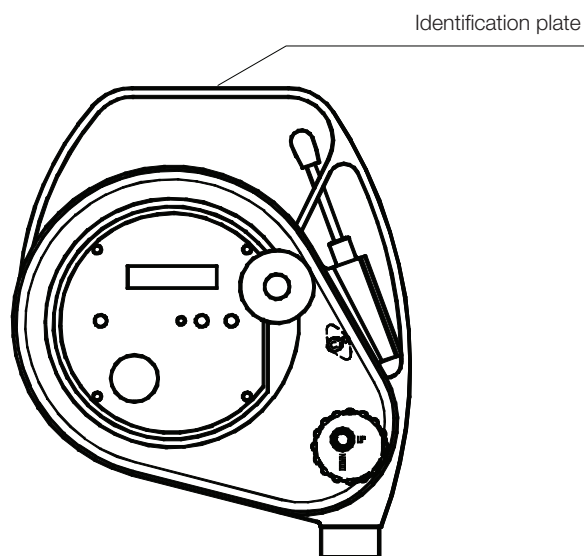


Figure 2-1

2.2 Abbreviations

Some abbreviations are used to define the equipment. Refer to following table and to Figure 2-2.

| Abbreviation | Meaning |
|----------------|---|
| ETCE | Special PTFE used for extruding |
| FFKM | Perfluoro rubber, special for chemical applications |
| FKM (Viton) | Fluoro rubber for crude oil and some products applications |
| Gtex | Gas tight mechanical housing for non corrosive liquids, i.e. with FKM gaskets and PA 11 coating (blue) |
| Gtex Chem | Gas tight mechanical housing for corrosive liquids, i.e. with FFKM gaskets and PA 11 coating (blue) |
| NBR | Acrylonitrile-butadiene rubber (nitrile rubber) |
| PA 11 (Rilsan) | Polyamid coating (blue, grey or yellow) used for protecting aluminium against liquids |
| PE | Polyethylene |
| PEHD | Polyethylene High Density |
| PFA | Perfluoro alkoxyl alkane |
| PTFE | Polytetrafluoroethylene |
| Q1 | Connector 1" |
| Q2 | Connector 2" |
| SS1 | Stainless steel Storage tube 1" |
| SS2 | Stainless steel Storage tube 2" |
| TEFZEL | ETFE coating of the tape |
| ULTRA | Ultrasonic sensing probe, second generation, covering a wide range of liquids from crude oil to light products, chemicals and heavy/viscous liquids |
| UTI | Stands for: U (ullage), T (temperature), I (oil/water interface) |
| Visc | Additional load on the sensing probe for innage measurement or gauging viscous liquids |

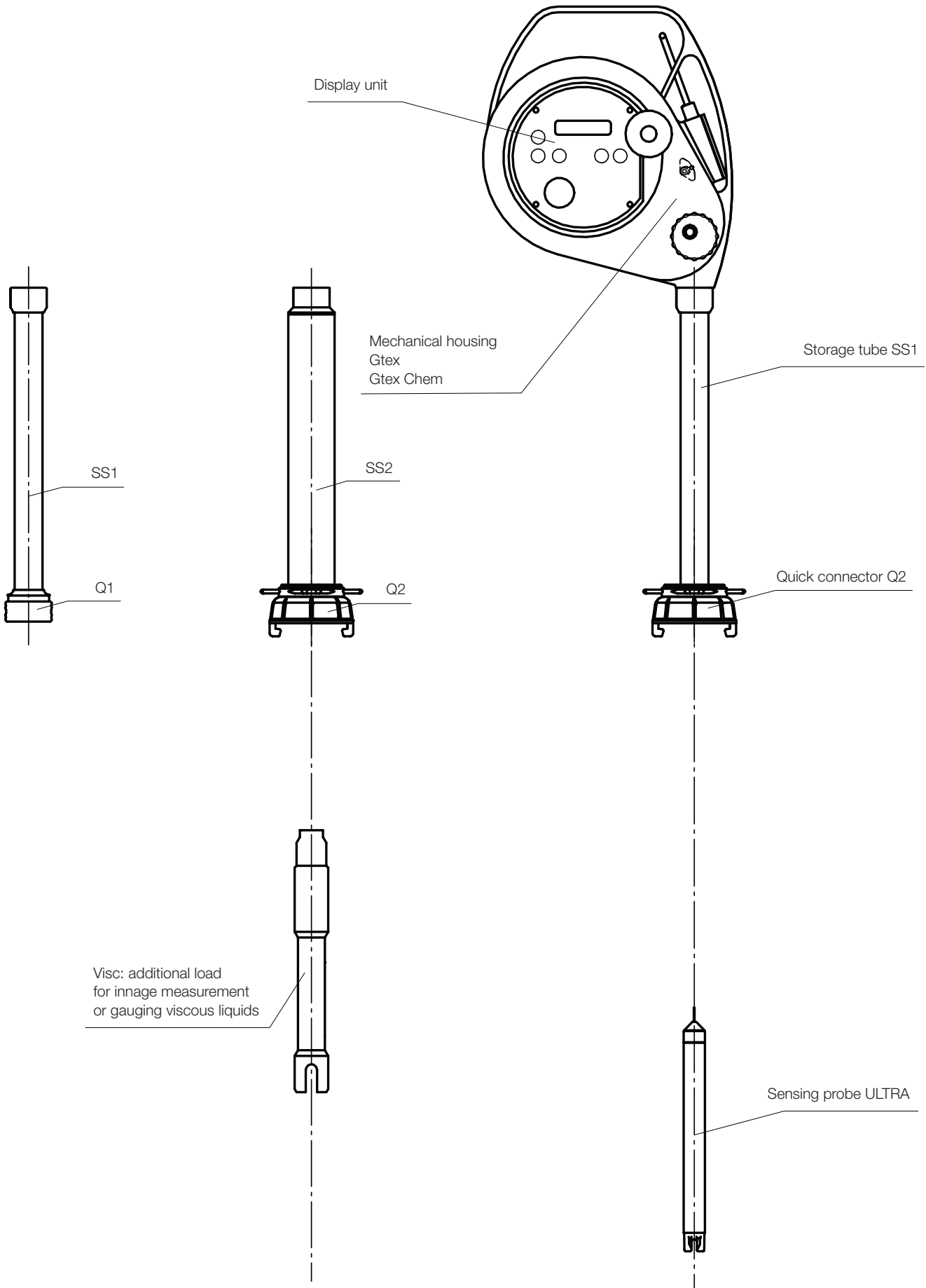


Figure 2-2

3. General information

3.1 Shipment note

The following parts should be included in the shipment:

- 1 instrument fitted out with one battery in the display;
- 1 set of 4 Allen keys: 1.5, 2, 2.5 and 3 mm;
- 1 Operation and Service Manual.

3.2 Initial inspection

Check the contents of the shipment for completeness and note whether any damage has occurred during transport. Carry out the “Initial test before installing the instrument” to verify the good functioning. If the contents are incomplete, or if there is a damage, do not use the device, a claim should be filled with the carrier immediately, and Enraf Tanksystem SA Sales or Service organization should be notified in order to facilitate the repair or replacement of the instrument.

3.3 Documentation discrepancies

The design of the instrument is subject to continuous development and improvement. Consequently, the instrument may incorporate minor changes in detail from the information contained in the manual.

3.4 Warranty

Two (2) years after installation but max. 30 months after delivery ex works except batteries.

The Vendor undertakes to remedy any defect resulting from faulty design materials or workmanship. The Vendor's obligation is limited to the repair or replacement of such defective parts by his own plant or one of his authorized service stations. The Purchaser shall bear the cost and risk of transportation of defective parts and repaired parts supplied in replacement of such defective parts.

When returned to Enraf Tanksystem SA or any of its agreed Service Stations equipment must be contamination-free.

If it is determined that the Purchasers equipment is contaminated, it will be returned to the Purchaser at the Purchasers expense. Contaminated equipment will not be repaired, replaced, or covered under any warranty until such time that the said equipment is decontaminated by the Purchaser.

The Purchaser shall notify by fax, telex or in writing of any defect immediately upon discovery, specifying the nature of the defect and/or the extend of the damage caused thereby.

Where no other conditions have been negotiated between the Vendor and the Purchaser “General Conditions 188” of United Nations shall apply.

This instrument has been certified as Intrinsically Safe Instrumentation for only those classes or categories of hazardous areas stated on the instrument label, bearing the mark of the applicable approval authority. No other usage is authorized.

Unauthorized repair or component replacement by the Purchaser will void this guarantee and may impair the intrinsic safety of the instrument. In particular it is not allowed to repair electronic circuits.

In no event shall Enraf Tanksystem SA be liable for indirect, incidental or consequential loss or damage or failure of any kind connected with the use if its products or failure of its products to function or operate properly.

Enraf Tanksystem SA do not assume the indemnification for any accident or damage caused by the operation of its product and the warranty is limited to the replacement of parts or complete goods.

3.5 Certification



Enraf Tanksystem SA is an ISO 9001 and MED-D certified company by Det Norske Veritas Certification GmbH.

The equipment has been approved for the electrical intrinsic safety by the following authorities :

IECEX

Zone 0 Ex ia IIB T4 -20°C < Ta < +50°C

Standards used:

- IEC 60079-0, Fourth Edition 2004-01,
- IEC 60079-11, Fifth edition 2006-07
- IEC 60079-26, First edition 2004-03

ATEX

II 1 G EEx ia IIB T4 / Tamb. 50 °C

Standards used:

- EN50014, (1997) + Amds 1 & 2
- EN50020, (2002)
- EN50284, (1999)

Regarding product compliance against standards updates or new standards, please refer to the Declaration of conformity.

Factory Mutual (FM Approvals)

- CL I, DIV 1, GP C&D, T4 Tamb. 50 °C and
- CL I, ZN 0, AEx ia IIB T4 Tamb. 50 °C

The equipment has been approved as oil/water interface detector according to MARPOL Resolution MEPC.5(XIII) of 13 June 1980 by National Maritime Authorities and/or Classification Societies.

If you need a copy of any of these certificates please contact:

Enraf Tanksystem SA
Rue de l'industrie 2
1630 Bulle, SWITZERLAND

Telephone : +41-26-91 91 500
Telefax : +41-26-91 91 505
Web site : www.tanksystem.com
E-mail : tanksystem@honeywell.com

3.6 Spare parts

When ordering spares identify the spare part by TS number and description. Refer to section "Drawings".

Some spares might be repairable; in this case send the part(s) to any authorised service center or to the factory.

In case of urgency, complete replacement units can be made available. Contact the factory or nearest Service Station for details.

3.7 Service and Repair

The customer is responsible for any freight and customs clearance charges. If units are sent on a "freight collect" the charges will be invoiced to the customer.

When returning units or parts for repair to the factory please fill out a service request form (see next page). The serial number (letter "G" followed by 5 digits) is printed on the identification plate as shown on the Figure 2-1.

When returned to Enraf Tanksystem SA equipment must be contamination-free. If it is determined that the customers equipment is contaminated, it will be returned to the customer at the customers expense. Contaminated equipment will not be repaired until such time that the customer decontaminates the said equipment.

Service Request

Customer's address:

.....

.....

.....

.....

Telephone:

E-mail:

Fax:

Type of unit or part:

.....

Serial number:

Short description of trouble:

.....

.....

.....

Do you want a quotation before repair is started: yes / no

Repaired unit has to be returned to the following address:

.....

.....

.....

.....

.....

4. Worldwide Service Stations network

The updated list can be found on our website www.tanksystem.com

| COUNTRY | ADDRESS | TELEPHONE/FAX/E-MAIL |
|-------------|--|---|
| SWITZERLAND | ENRAF TANKSYSTEM SA 2, rue de l'Industrie CH-1630 BULLE | Tel : +41-26-91 91 500 Fax : +41-26-91 91 505 info@tanksystem.com |
| CANADA | PYLON ATLANTIC A Div. Of Pylon Electronics Inc. 31 Trider Crescent., DARTMOUTH, N.S. B3B 1V6 | Tel : +1-902-4683344 Fax : +1-902-4681203 halifax_csr@pylonelectronics.com |
| CHINA | HUA HAI EQUIPMENT & ENGINEERING CO LTD Factory 7, Lane 1365, East Kang Qiao Road Kang Qiao Industrial Zone, Pu Dong SHANGHAI, P.C. 201315 | Tel : +86-21-68183183 Fax : +86-21-68183115 huahaish@huahaiee.com |
| GREECE | SPANMARIN 86, Filonos Street GR-185 36 PIRAEUS | Tel : +30-210-4294498 Fax : +30-210-4294495 spanmarin@ath.forthnet.gr |
| JAPAN | DAIWA HANBAI CORPORATION LTD 10-31, Mitejima 2-Chome, Nishiyodogawa-ku OSAKA 555-0012 | Tel : +81-6-64714701 Fax : +81-6-64729008 daiwa471@silver.ocn.ne.jp |
| KOREA | World Ocean CO., LTD Hang-Woon Building 1168-11, Cho Ryang 3 Dong Dong-Ku PUSAN | Tel : +82-51-462-2554/5 Fax : +82-51-462-0468 marine@worldocean.co.kr |
| MEXICO | URBAN S.A. DE C.V. Ave. Ejército Mexicano 1902 Col. Loma del Gallo 89460 CD. MADERO, TAMPS. MEXICO | Tel : +52-833-2170190 Fax : +52-833-2170190 E-mail : urbansa@prodigy.net.mx |
| NETHERLANDS | B.V. TECHNISCH BUREAU UITTENBOGAART Brugwachter 13 NL-3034 KD ROTTERDAM | Tel : +31-10-4114614 Fax : +31-10-4141004 info@tbu.nl |

The updated list can be found on our website www.enraftanksystem.com

| COUNTRY | ADDRESS | TELEPHONE/FAX/E-MAIL |
|----------------------|---|--|
| PORTUGAL | CONTROLIS Soc. Com. Equipamentos de Controlo, Lda. Rua Conceição Sameiro Antunes, 26E P-2800 COVA DA PIEDADE | Tel : +351-21-2740606 Fax : +351-21-2740897 controlis@netc.pt |
| RUSSIA | NPP "GERDA" Vilisa Latsisa str. 17 Building 1 125480 MOSCOW | Tel : +7-495-7558845 Fax : +7-495-7558846 info@gerda.ru |
| SINGAPORE | HUBBELL INT'L (1976) PTE LTD 322 Thomson Road SINGAPORE 307665 | Tel : +65-6-2557281 Tel : +65-6-2550464 Fax : +65-6-2532098 hubbell@mbox2.singnet.com.sg |
| SPAIN | E.N.I. Electronica y Neumatica Industrial, S.A. C/Jon Arrospide, 20 (Int.) 48014 BILBAO | Tel : +34-94-4746263 Fax : +34-94-4745868 eni.tecnica@eni.es |
| SWEDEN | INSTRUMENTKONTROLL Lars Petersson AB Varholmsgatan 1 414 74 GÖTEBORG | Tel : +46-31-240510 Tel : +46-31-240525 Fax : +46-31-243710 Info@instrumentkontroll.se |
| UNITED ARAB EMIRATES | MARITRONICS TRADING L.L.C. P.O. Box 6488 Shed # 72, Jadaf Ship Docking Yard DUBAI | Tel : +971-4-3247500 Fax : +971-4-3242500 maritron@emirates.net.ae |
| UNITED KINGDOM | ENERGY MARINE (INTERNATIONAL) LTD. 12 Clipstone Brook Industrial Estate Cherrycourt Way LEIGHTON BUZZARD, BEDS LU7 8TX | Tel : +44-1525-851234 Fax : +44-1525-852345 info@engmar.com |
| U.S.A/TEXAS | HERMETIC, INC. 4522 Center Street DEER PARK, TX 77536 | Tel: +1-281-930 1777 Fax: +1-281-930 1222 Toll free call in the USA: 1-800-900 1778 info@hermeticinc.com |

5. Recommendation for safe use

1. This Operation and Service Manual is a guide in order to help the user to operate the instrument to our best knowledge.
2. Nevertheless the maker disclaims all responsibility and liability for damage resulting from the use of the equipment regardless of the cause of the damage.
3. **Attention is drawn to the possible hazard due to electrostatic charges which may be present in the tank.** This may happen in particular with static accumulator liquids, i.e. liquids which have low conductivity of 50 picoSiemens/metre (pS/m) or less.
4. **It is very important that the instrument is grounded to the tank before the probe is introduced into the tank and remains grounded until after complete withdrawal from the tank.**
 - 4.1. If the instrument is installed with the quick connect coupler, grounding is effected through the quick connect coupler and the mating nipple of the valve provided that these parts are kept clean and free from corrosion in order to guarantee electrical conductivity. If a grease is used for this purpose, it must be one which contains graphite.
 - 4.2. If the instrument is not connected to the mating deck valve, the instrument has to be also earthed by means of the grounding cable and clamp.
5. **It is anticipated that the user will have specific operating methods laid down to ensure safety when using this type of apparatus. In this case the user's instructions shall be strictly observed.**
6. **In the absence of such instructions the following should be noted:**
 - 6.1. If a metal sounding pipe is fitted beneath the deck valve or tank is inerted, then ullaging, etc. is permissible at any time with no restriction.
 - 6.2. If there is no sounding tube or tank is not inerted, the following precautions shall be taken:
 - 6.2.1. If the cargo is not a static accumulator liquid, i.e. its conductivity is more than 50 pS/m, then ullaging is permitted provided that the instrument is properly grounded and earthed before the probe is inserted into the tank and remains earthed until the probe has been removed from the tank.
 - 6.2.2. If the cargo is a static accumulator liquid, i.e. its conductivity is less than 50 pS/m, then ullaging is permitted provided that:
 - 6.2.2.1. The instrument is properly grounded and earthed before the probe is inserted into the tank and remains earthed until the probe has been removed from the tank.
 - 6.2.2.2. The apparatus is not introduced into a tank until at least 30 minutes have elapsed after completion of any loading operation or stopping the injection of inert gas.
 - 6.3. For further guidance refer to International Safety Guide for Oil Tankers and Terminals (ISGOTT), ISBN 1 85609 291 7, Fifth Edition 2006, or consult the appropriate Legislative Authority for the installation.
7. **Warning: change of battery must be carried out in safe area only (non flammable atmosphere).**

6. Functions - Key Features

This HERMetric instrument is a gas-tight portable multiple functions gauging system that is designed to perform under completely closed conditions in a single operation 3 measurements:

- a) Ullage (outage). Optionally innage is available¹.
- b) Oil/water Interface Level.

Tape resolution: 1 mm (1/16")

Tape accuracy: ± 3.2 mm for 30 m

($\pm 1/8$ " approx. for 100 feet)

Ullage/interface detection accuracy:

± 2 mm (± 0.08 " approx.)

Minimum detectable tank bottom interface or liquid level:

4 mm (0.16" approx.).

- c) Temperature by continuous reading at any level.

Ambient temperature range: -20°C to 50°C

(-4°F to 122°F)

Sensor measurement range: -40°C to 90°C

(-40°F to 194°F)

Resolution: 0.01° or 0.1° , selectable

Accuracy over calibration range: $\pm 0.1^{\circ}\text{C}$ (0°C to 70°C);

$\pm 0.2^{\circ}\text{F}$ (32°F to 158°F)

Temperature reading: $^{\circ}\text{C}$ or $^{\circ}\text{F}$, selectable.

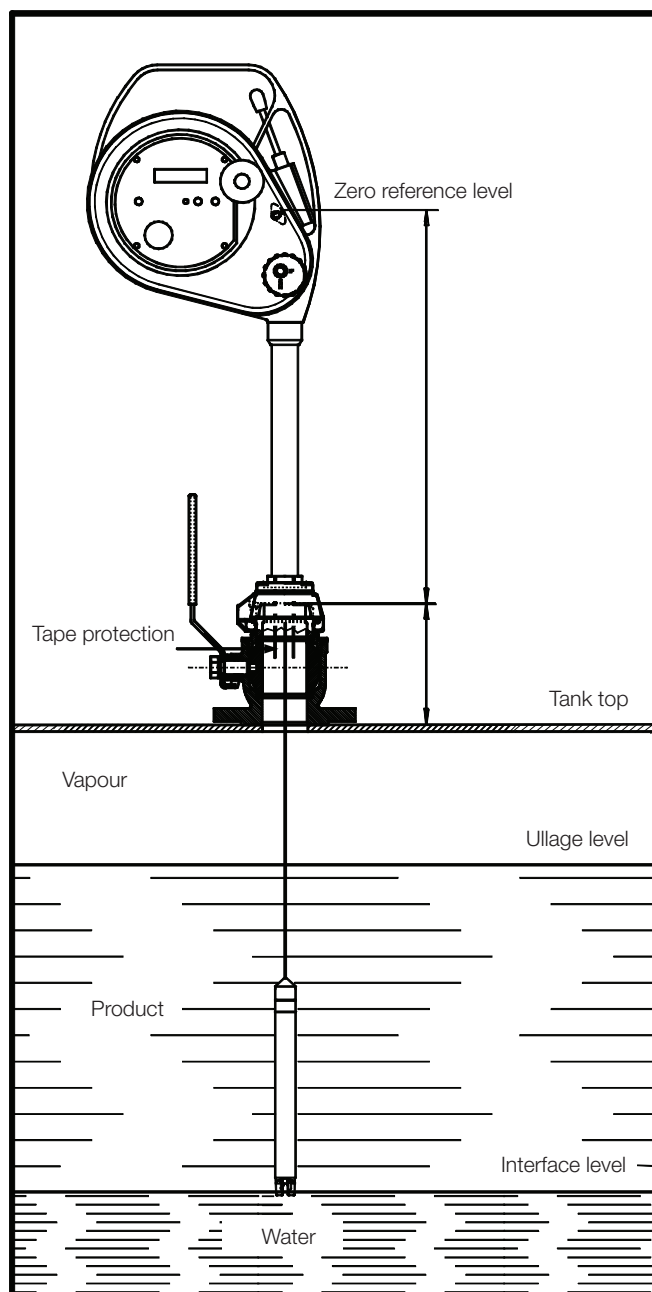
This HERMetric device meets the requirements of API MPMS Chapter 7 2001, table 3, ISO 4268 and IP PMM Part IV.

Thanks to the small diameter of the sensing probe this instrument can be used with valves of diameters down to 25 mm (1") only.

A tape protection tube prevents closing the valve on the tape through inadvertence.

Gauging is done under completely gas tight conditions therefore maintaining over- or underpressure in the tank.

The device is designed to withstand tank pressure up to 0.3 bar (4.4 psi).



¹ An additional device, usable with 2" valves only, can be provided that allows **Reference Height** and **Innage** measurement. Available on "Visc" models.

7. Description

7.1 General

Each HERMetic instrument is **individually identified** with a 6 digits serial number starting with the letter G, example G10058. This serial number is printed on the identification plate as shown on Figure 7-1.

The HERMetic instrument is fitted with an **ULTRA** sensing probe.

The unit emits control beep, continuous beep and intermittent beep.

When the sensing probe is surrounded by air, a control beep occurs every 2 sec.

When the sensing probe is in contact with any petroleum product, the beep is continuous.

When the sensing probe is in contact with water the beep is intermittent.

| | | | | | | | | | |
|-------------------|---|---|---|---|---|---|---|---|---|
| Control beep | • | • | • | • | • | • | • | • | • |
| Continuous beep | • | • | • | • | • | • | • | • | • |
| Intermittent beep | • | • | • | • | • | • | • | • | • |

A light signal (LED) can also be activated that blinks at the same frequency as the buzzer tones. This can be useful in noisy environments or at night.

A backlight can be used at night to light up the display.

The HERMetic instrument is powered by a 9 Volt battery stored in the electronic terminal named instrument unit. Current consumption is very low, ensuring long operation without battery replacement. **A continuous tone means that the battery needs replacement.** If the battery power is too low, it is no more possible to read the temperature.

Maintenance is easy because design is modular and allows quick exchange of parts.

See also Figure 7-2 to get to know the equipment.

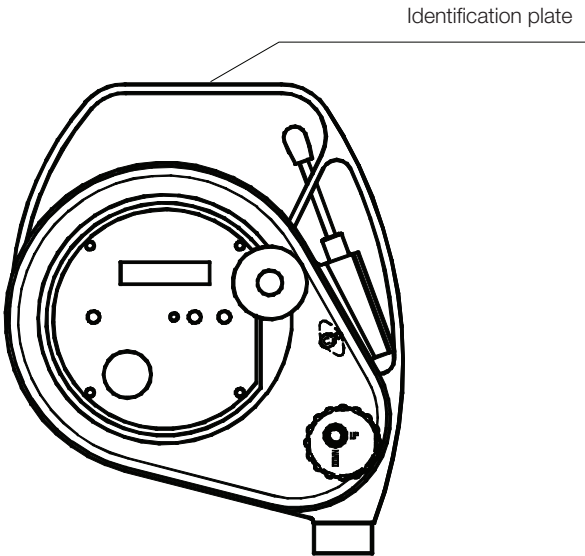


Figure 7-1

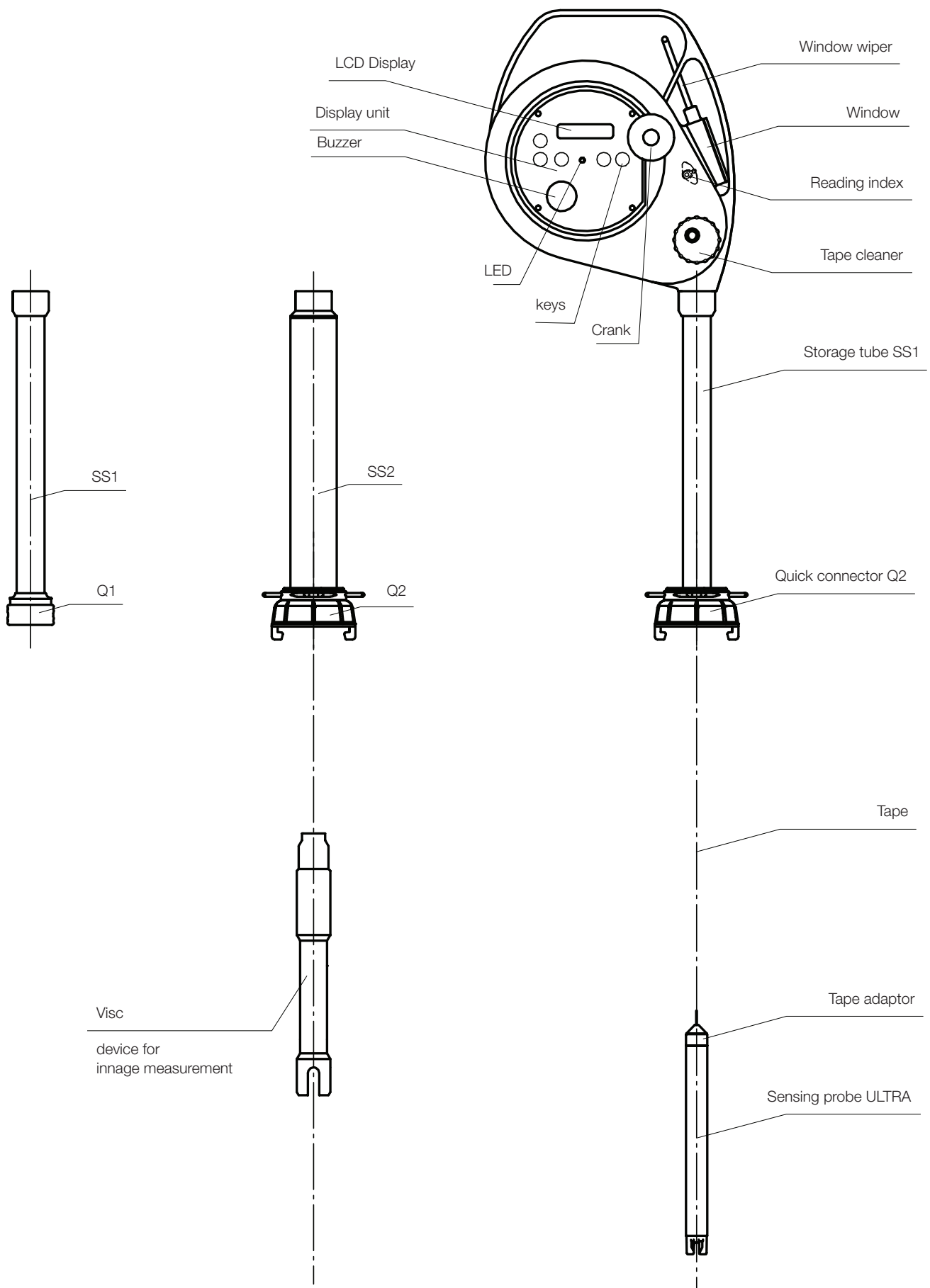


Figure 7-2

7.2 ULTRA sensing probe

7.2.1 Introduction

The ULTRA sensing probe consists of a stainless steel tube terminated by a high-tech plastic head which cannot be removed from the tube. The sensing probe includes an ultrasonic liquid level sensor, a temperature sensor and a conductivity electrode. The sensitivity for ullage and interface measurement is not adjustable. The temperature measurement is calibrated at the factory and does not require subsequent adjustment.

7.2.2 Ullage detection

The ullage detector consists of two piezoceramic plates and electronic circuits. When the sensor head is immersed in a non-conductive liquid (oil or petroleum), the emitted ultrasonic signal is detected by the receiver, coded and sent to the instrument unit which activates the buzzer with the continuous beep.

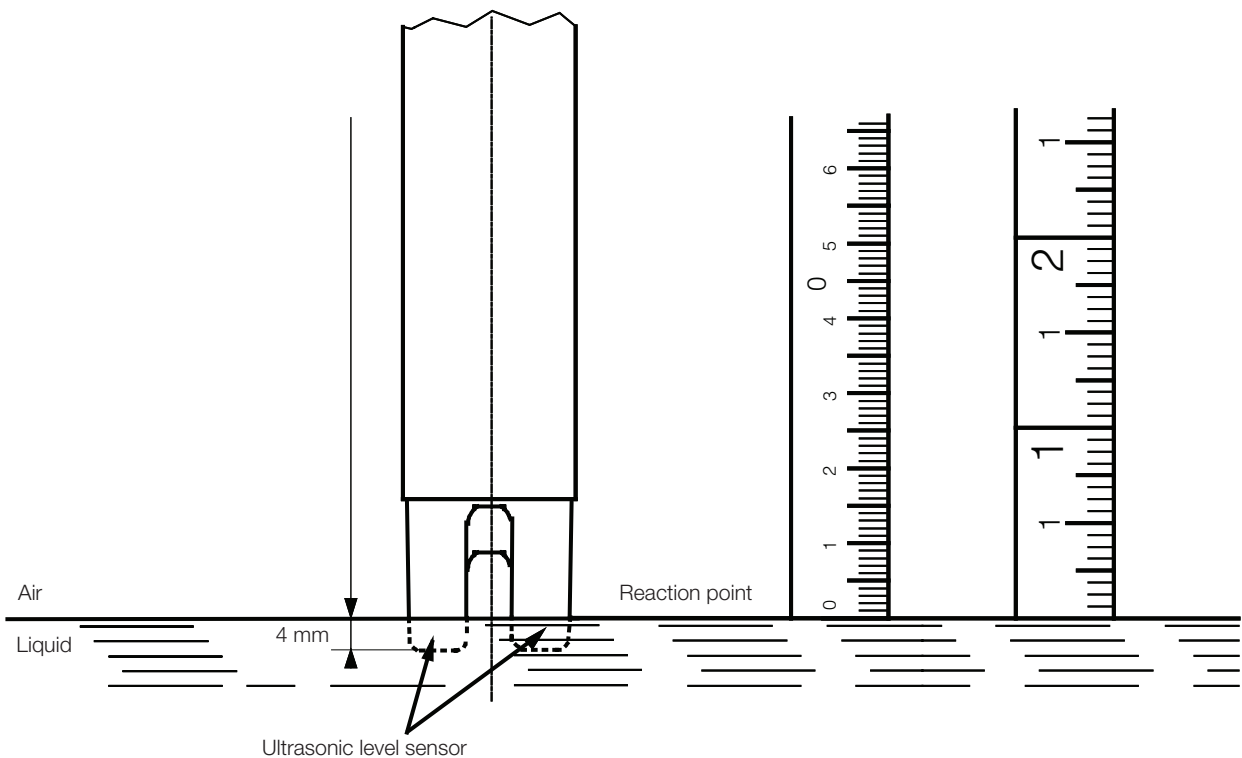


Figure 7-3

The reaction point is located 4 mm (5/32") from the sensor bottom and identical with the zero-point of the tape graduation.

7.2.3 Interface detection

The principle consists of a conductivity measurement between an active electrode and a grounded electrode. When the liquid is conductive (as water), the ullage

sensor detects the presence of the liquid as well and the conductivity electrodes and associated electronic circuits modulate the coded signal to generate the intermittent beep.

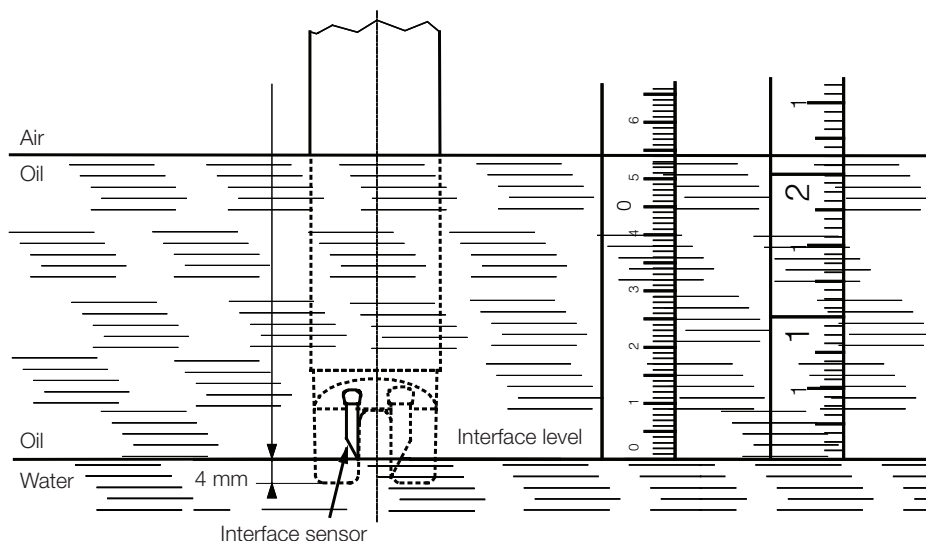


Figure 7-4

The reaction point is located 4 mm (5/32") from the sensor bottom and identical with the zero-point of the tape graduation.

7.2.4 Temperature measurement

The sensing element is a Platinum Resistance Temperature Detector (RTD) element. The element is located in the temperature electrode, which is filled in with a heat transfer compound paste to reduce the response time.

The RTD element signal is digitized, and then all errors (offset, non-linearity and drift) are corrected and compensated by the micro-controller located in the sensor probe. The RTD element

characteristics are stored in the sensor memory and are dedicated to one sensor. For this reason, changing a sensor does not require a new calibration.

All data are serialised and sent by the micro-controller to the Display Unit.

Temperature settings (resolution, scale) are easy to select by pressing the 5-key control panel.

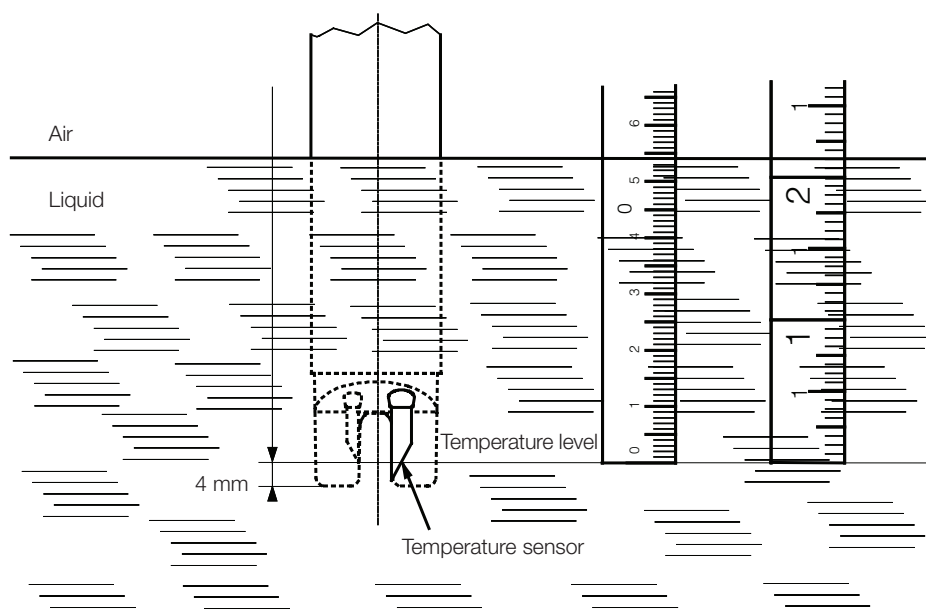


Figure 7-5

The reaction point is located 4 mm (5/32") from the sensor bottom and identical with the zero-point of the tape graduation.

7.3 Tape

The ETFE (TEFZEL) coated tape provides 3 main functions :

- It holds the sensing probe.
- It is graduated and therefore makes it possible to determine the distance between the reaction point and the reading

index. If the reading index is set up at the zero ullage level, the reading of the tape is identical to the ullage.

- It contains 2 wires for transmitting the signal and the power between the display unit and the probe. The steel tape itself is used as a grounding wire between the sensing probe tube and the display unit.

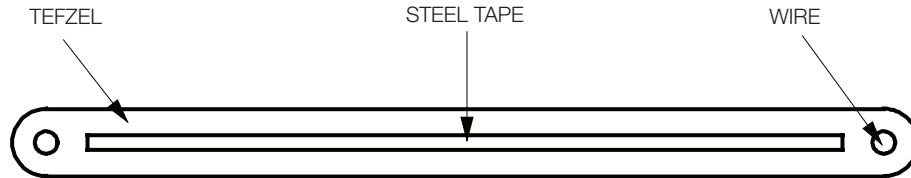


Figure 7-6

The standard graduation is a double side type that shows the metric graduation on one side and the inch one on the other side. The tape is mounted on the equipment according to the need.

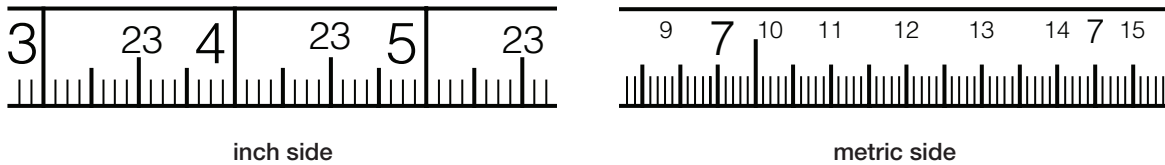


Figure 7-7

7.4 Tape protection

The tape protection tube is a mechanical safety device which prevents the valve from being closed as long as the sensing probe is inside the tank. When the sensing probe is lowered the protection tube will follow the sensing probe by gravity until the tube is retained by a ring located inside the coupler.

In that position the protection tube prevents closing the valve. When the tape is wound up the protection tube will stay in position until it is pushed up by the sensing probe. Before instrument is used check that the protection tube is moving freely. For cleaning purposes the protection tube is slotted.

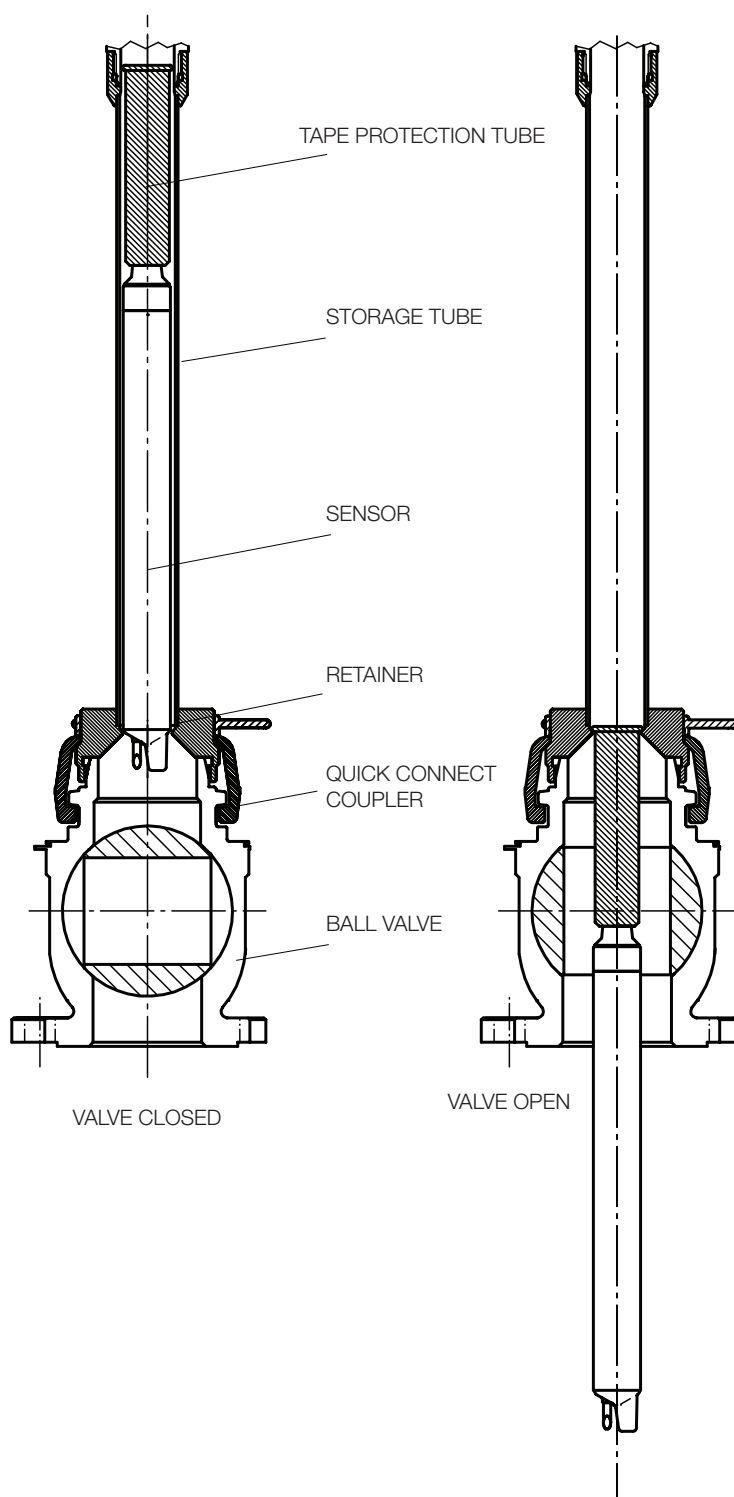


Figure 7-8

7.5 Reading index

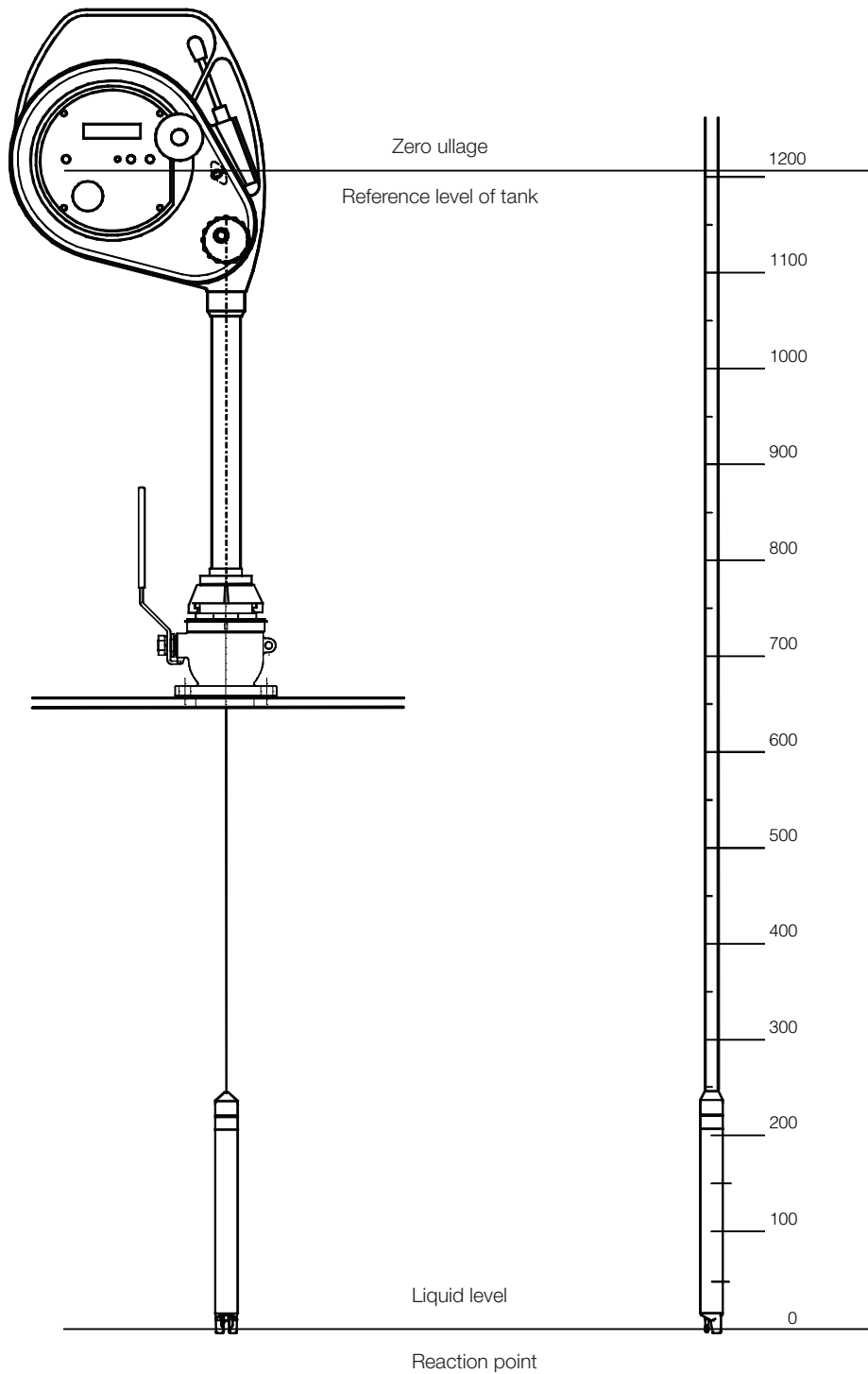


Figure 7-9

The tape reading at the height of the reading index of the instrument is indicating the distance between the reaction point and the reading index. If the instrument is installed in such a way that the reading index is at the same level as the zero-ullage reference level the reading of the tape corresponds to the ullage providing the reaction point of the sensing probe is positioned at the liquid level.

If the reading index is positioned below or above the reference level a positive or negative correction of the tape reading is necessary.

See also chapter 8 "Examples of installation of the gauging system".

7.6 Tape cleaner

This HERMetric equipment is fitted with a tape cleaner that helps draining the liquid back to the tank when rewinding the tape. It is very easy to operate:

- position “DOWN”: the wipers are not working, the tape is free;
- position “UP”: the wipers are cleaning the tape.

Refer to Figure 7-10.

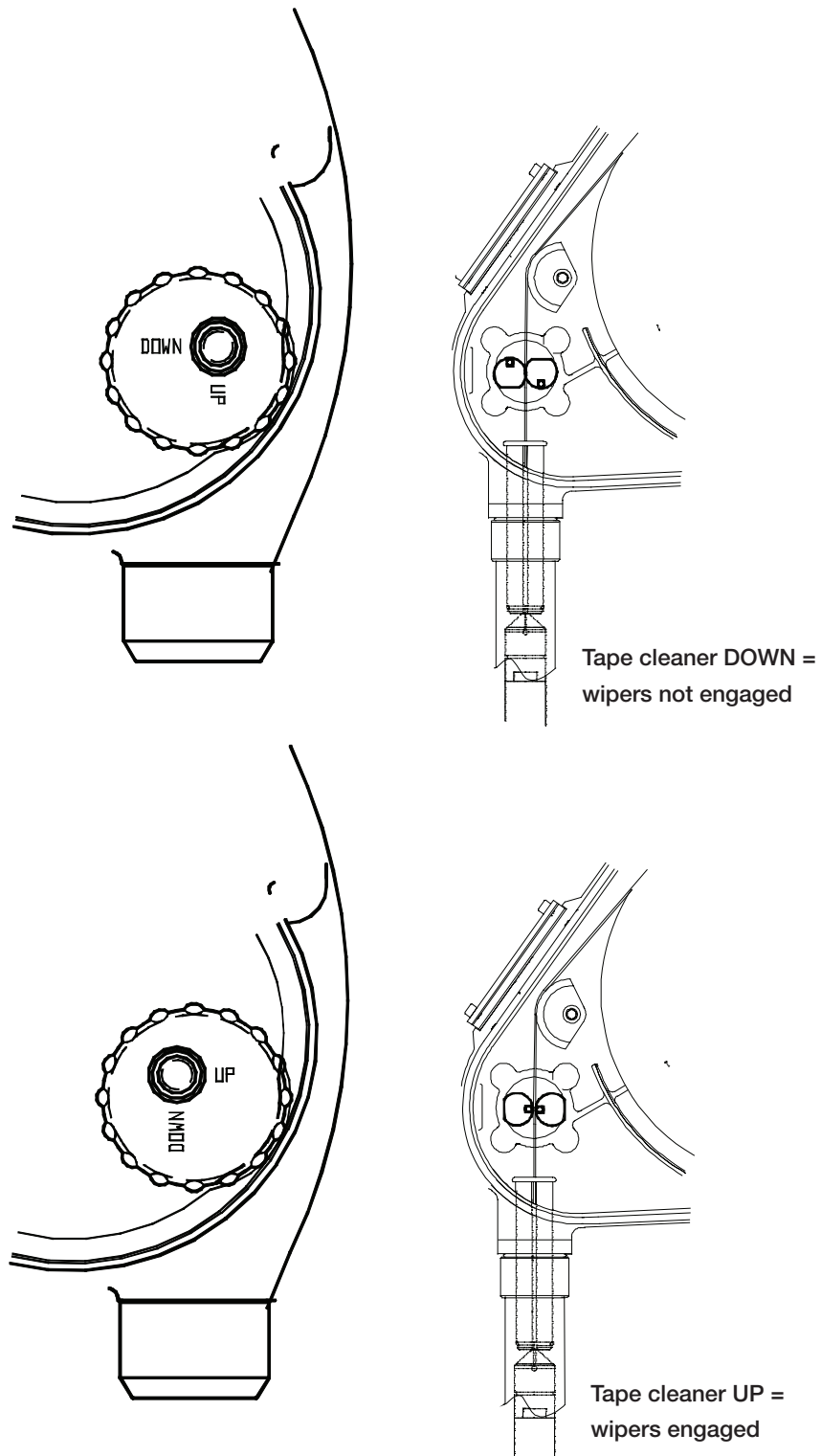


Figure 7-10

7.7 Gas tightness

All parts are assembled together with either gaskets or O-rings, that makes the device completely tight.

The sealing of the axle holding the tape with the mechanical housing is ensured by a special V-shape gasket.

7.8 Gaskets

Gaskets are made in FKM (Viton) for models UTImeter Gtex.

On UTImeter Gtex Chem models, gaskets which are in contact with the liquid are made in FFKM.

7.9 Additional Load (option)

An additional load (see Figure 7-2) on the sensing probe can be provided for one of the following reasons. This option is available on UTImeter Gtex Visc or UTImeter Gtex Chem Visc equipped with the storage tube Q2 (2") and needs valves of at least 2" size.

7.9.1 Viscous liquids (> 800 Cst)

For gauging viscous liquids the load can help the sensing probe in penetrating the liquid and in keeping the tape straight.

7.9.2 Reference height and innage

For measuring the reference height of a tank and innages the load allows the sensing probe to touch the dip/datum plate.

7.10 Housing and lid

These parts are made in aluminium coated with polyamid PA 11 (RILSAN).

7.11 Others

The tape is coiled on the axle which holds also the electronic box and the display unit.

The axle is assembled to the electronic box and can be locked at discrete positions by means of a stopping mechanism in the crank. Pull the crank to free the stopping mechanism.

The storage tube is threaded to the frame.

The storage tube is equipped with a quick-connector which fits on the HERMetric valves.

8. Examples of installation of the gauging system

8.1 General

The gauging system consists of the HERMetric instrument and the associated HERMetric valve. Two types of connector can be provided as shown on Figure 8-1.

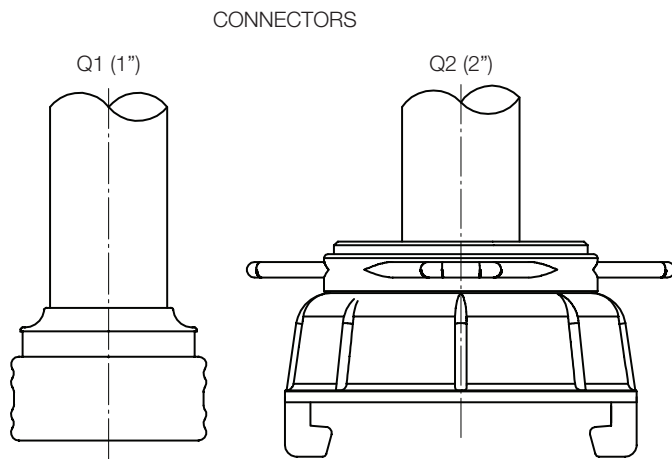


Figure 8-1

The following sections, respectively 8.2, 8.3 for connector Q2 and 8.4, 8.5 for connector Q1, describe 2 examples for installing the valves and adjusting the height of the gauging system.

The valves should be installed in such a way that the zero-ullage level coincides with the reading index level, so that no correction would be necessary. For achieving this it may be necessary to install an adjusting pipe between the deck and the valve.

If the valves are installed directly on deck or if for any reason the level of the reading index is below or above the zero-ullage level, then a correction table should be used.

There should be no internal tank structure between the valve outlet and the tank bottom such that will impede the path of the equipment into the tank.

All valves shall be installed at the same level.

Small systematic level error can be corrected by adjusting the reading index accordingly.

When designing the gauging port and to avoid damaging the tape during rewinding it is advised to chamfer or to grind all sharp edges (on pipes, flanges, etc.) that could damage the tape when operating the gauge.

8.2 Example of installation on a pipe, connector Q2

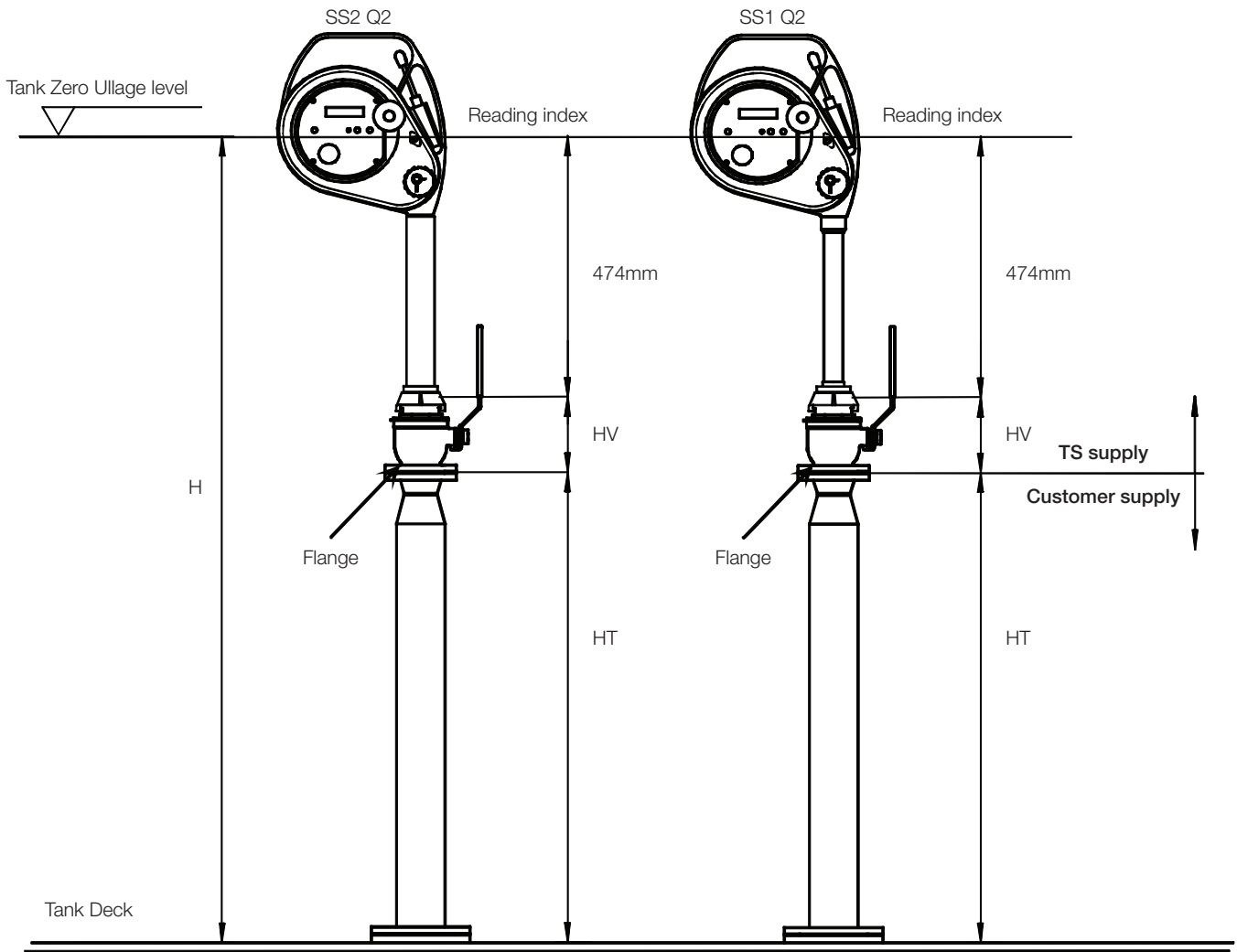


Figure 8-2

| Valve designation | C.2-SS; C.2-SS-W; C.2-SS-BL; C.2-SS-SEC |
|-------------------|---|
| Bottom connection | thread or flange |
| Boring | 2" |
| *) HV (mm) | 141 |
| *) HT (mm) | H-615 |

*) Dimension HV is without gasket. If gaskets are used dimension HT is reduced by thickness of gasket.

8.3 Example of installation on the deck, connector Q2

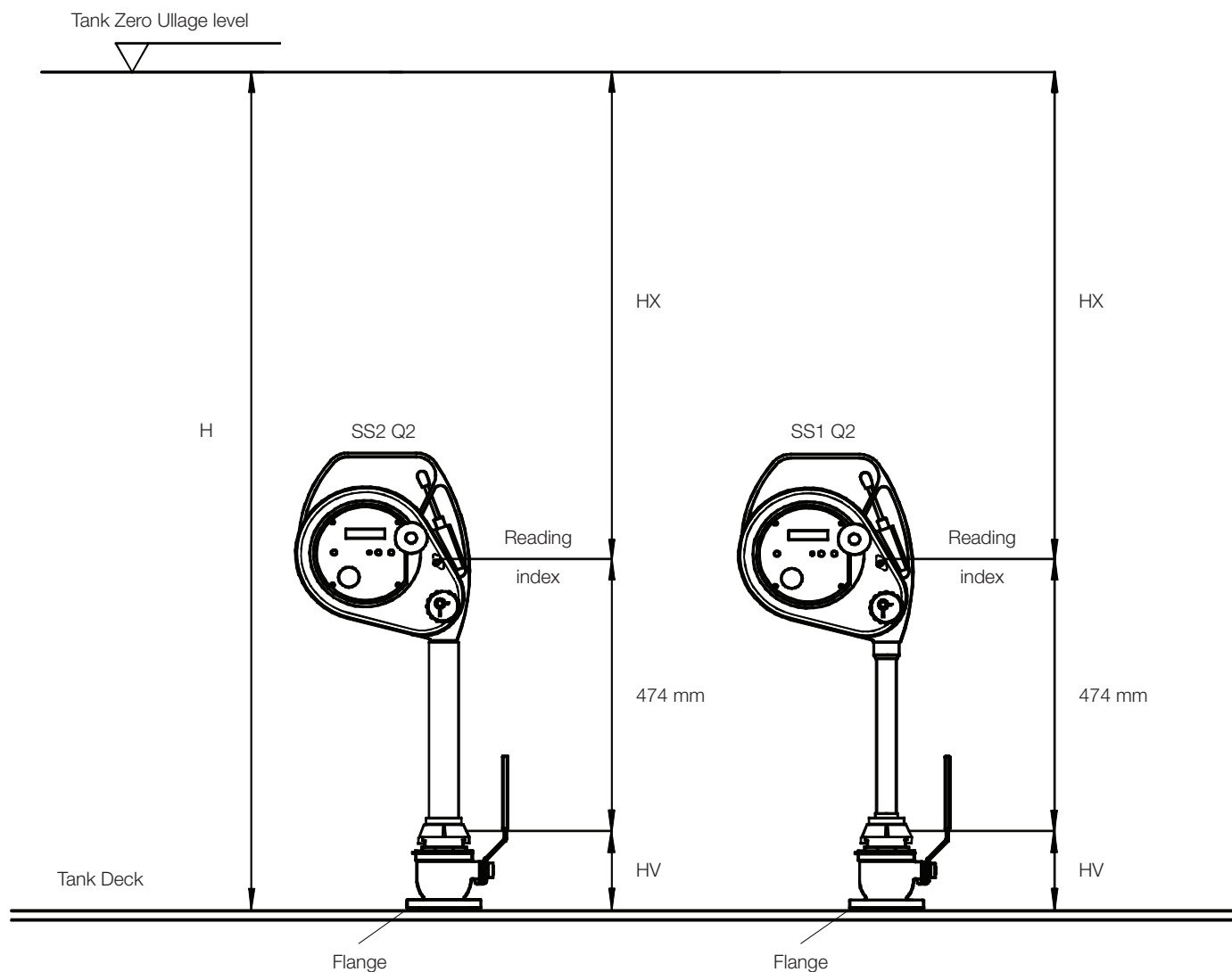


Figure 8-3

| Valve designation | C.2-SS; C.2-SS-W; C.2-SS-BL; C.2-SS-SEC |
|-------------------|---|
| Bottom connection | thread or flange |
| Boring | 2" |
| *) HV (mm) | 141 |
| *) HX (mm) | H-615 |

*) Dimension HV is without gasket. If gaskets are used dimension HX is reduced by thickness of gasket.

8.4 Example of installation on a pipe, connector Q1

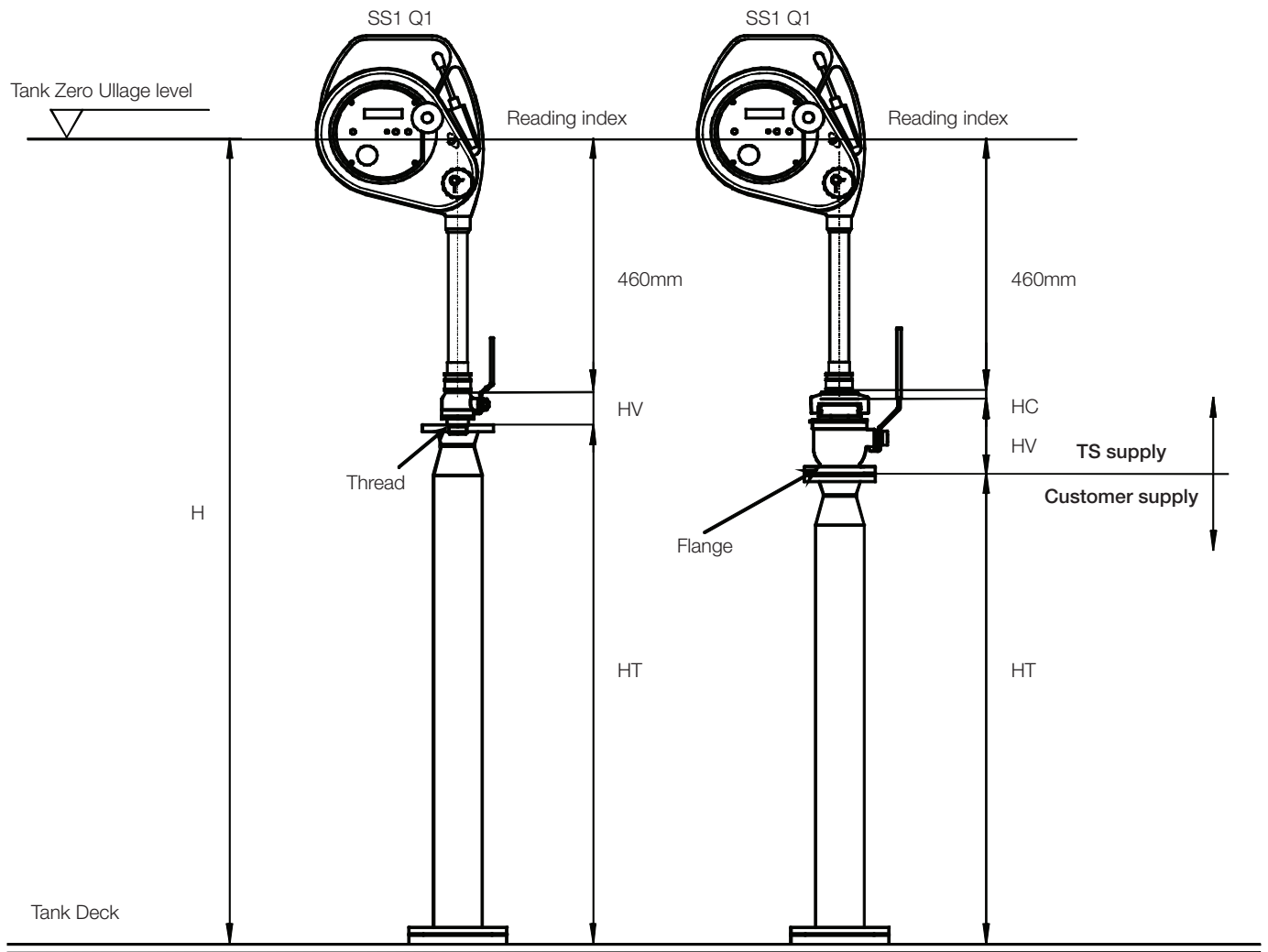


Figure 8-4

| Valve designation | A.1-SS | C.1-SS | C.1-SS | C.1-SS | C.2-SS C.2-SS-W | C.2-SS C.2-SS-W | A.2-SS | A.2,5-SS | A.4-SS |
|-------------------|--------|--------|--------------------|--------------------|--------------------|--------------------|--------|----------|--------|
| Boring | 1" | 1" | 1" | 1" | 2" | 2" | 2" | 2,5" | 4" |
| Bottom connection | thread | thread | flange JIS 5K25 | flange JIS 5K50 | thread | flange | flange | flange | flange |
| *) HV (mm) | 120 | 65 | 79 | 79 | 141 | 141 | 172 | 99 | 140 |
| HC (mm) | na | na | na | na | 14 | 14 | 41 | 53 | 58 |
| *) HT (mm) | H-580 | H-525 | H-539 | H-539 | H-615 | H-615 | H-673 | H-612 | H-658 |

*) Dimension HV is without gasket. If gaskets are used dimension HT is reduced by thickness of gasket.

8.5 Example of installation on the deck, connector Q1

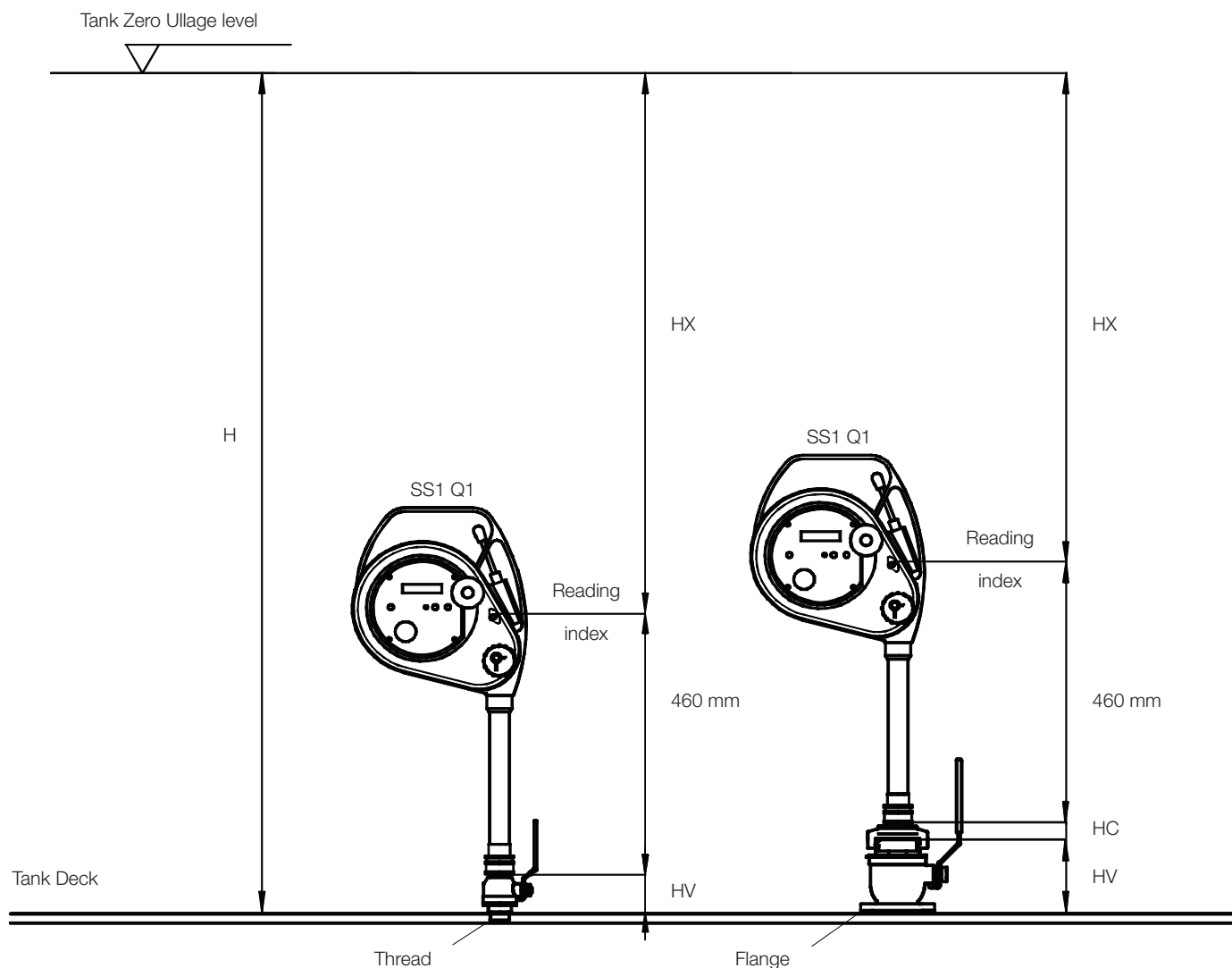


Figure 8-5

| Valve designation | A.1-SS | C.1-SS | C.1-SS | C.1-SS | C.2-SS C.2-SS-W | C.2-SS C.2-SS-W | A.2-SS | A.2,5-SS | A.4-SS |
|-------------------|--------|--------|--------------------|--------------------|--------------------|--------------------|--------|----------|--------|
| Boring | 1" | 1" | 1" | 1" | 2" | 2" | 2" | 2,5" | 4" |
| Bottom connection | thread | thread | flange JIS 5K25 | flange JIS 5K50 | thread | flange | flange | flange | flange |
| *) HV (mm) | 120 | 65 | 79 | 79 | 141 | 141 | 172 | 99 | 140 |
| HC (mm) | na | na | na | na | 14 | 14 | 41 | 53 | 58 |
| *) HX (mm) | H-580 | H-525 | H-539 | H-539 | H-615 | H-615 | H-673 | H-612 | H-658 |

*) Dimension HV is without gasket. If gaskets are used dimension HX is reduced by thickness of gasket.

9. Operation

9.1 Basic rules concerning the 5-key control pad

Apart from the "ON" / "OFF" keys that are self-explanatory, there are 3 other keys that help in customising the unit:

- pressing "+" allows to scroll down the menus, a pointer show the actual menu you have selected,

- pressing "-" allows to exit a menu,
- pressing "enter" (later on named "E") allows to enter a specific menu.

The small pointer displayed on the left is showing the active setting.

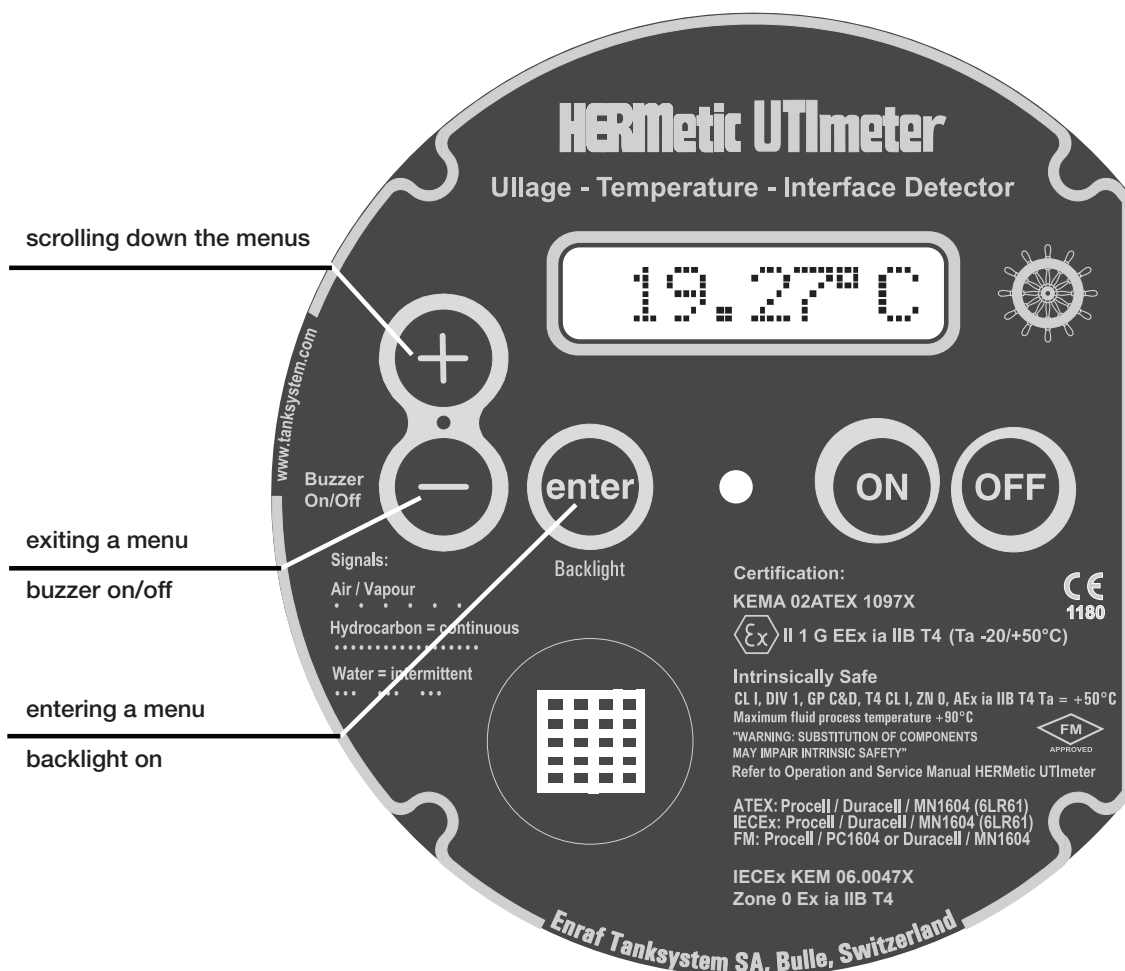


Figure 9-1

9.2 Selecting the language

English, German or French languages can be selected by following the sequences described in Figure 9-2.

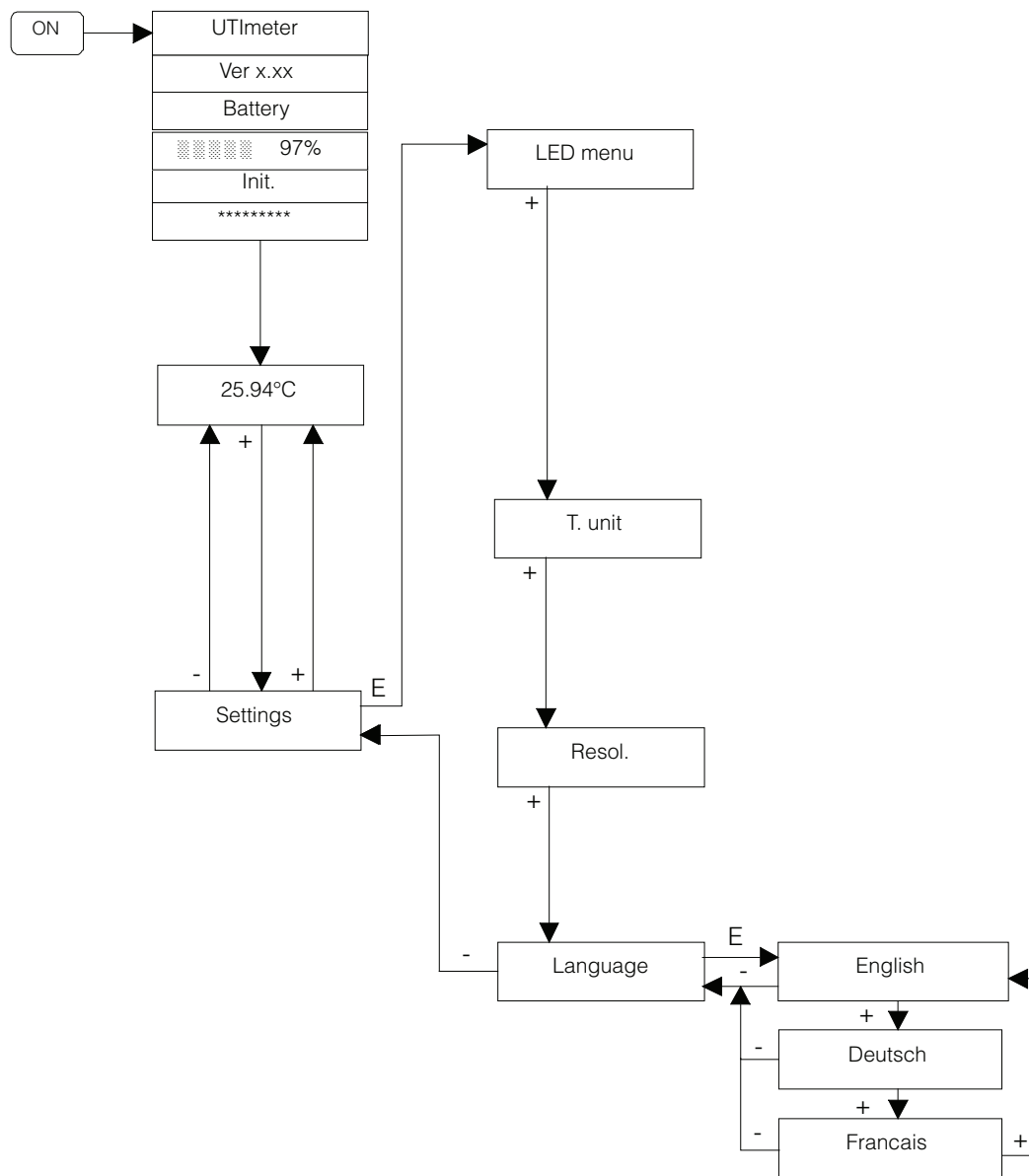


Figure 9-2

- Switch on the equipment,
- Wait until the temperature is displayed,
- Press on “+” to enter the settings menu,
- Press on “enter”, “LED menu” is displayed,
- Press on “+”; “T. unit” is displayed,
- Press on “+”, “Resol.” is displayed,
- Press on “+”, “Language.” is displayed,
- Press on “enter”,
- Select the language by pressing on “+” one or more times, the display shows the language selected,
- Press “-” two times to come back in measurement mode.

The new setting is stored in the permanent memory.

9.3 Selecting the temperature scale

The temperature can be displayed either in Celsius or Fahrenheit degrees. Refer to Figure 9-3.

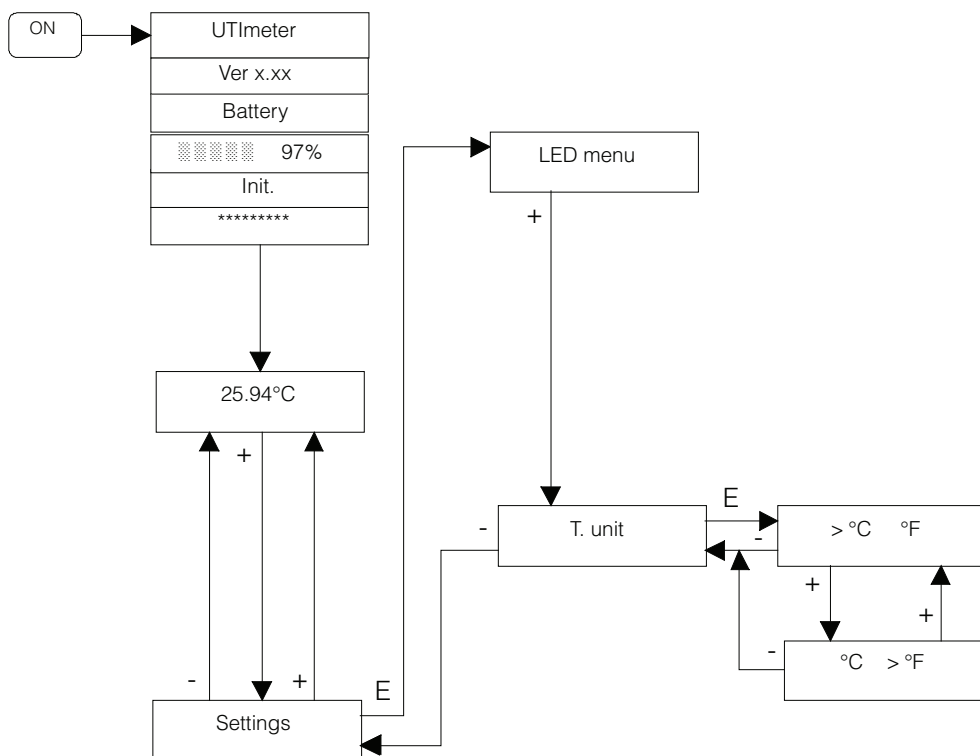


Figure 9-3

- Switch on the equipment,
- Wait until the temperature is displayed,
- Press on "+" to enter the settings menu,
- Press on "enter", "LED menu" is displayed,
- Press on "+"; "T. unit" is displayed,
- Press on "enter",
- Select the scale by pressing on "+" one or more times, the pointer shows the scale selected,
- Press "-" two times to come back in measurement mode.

The new setting is stored in the permanent memory.

9.4 Selecting the temperature resolution

The temperature reading can be given with 1 or 2 digits after the dot. Select the appropriate resolution as shown on Figure 9-4.

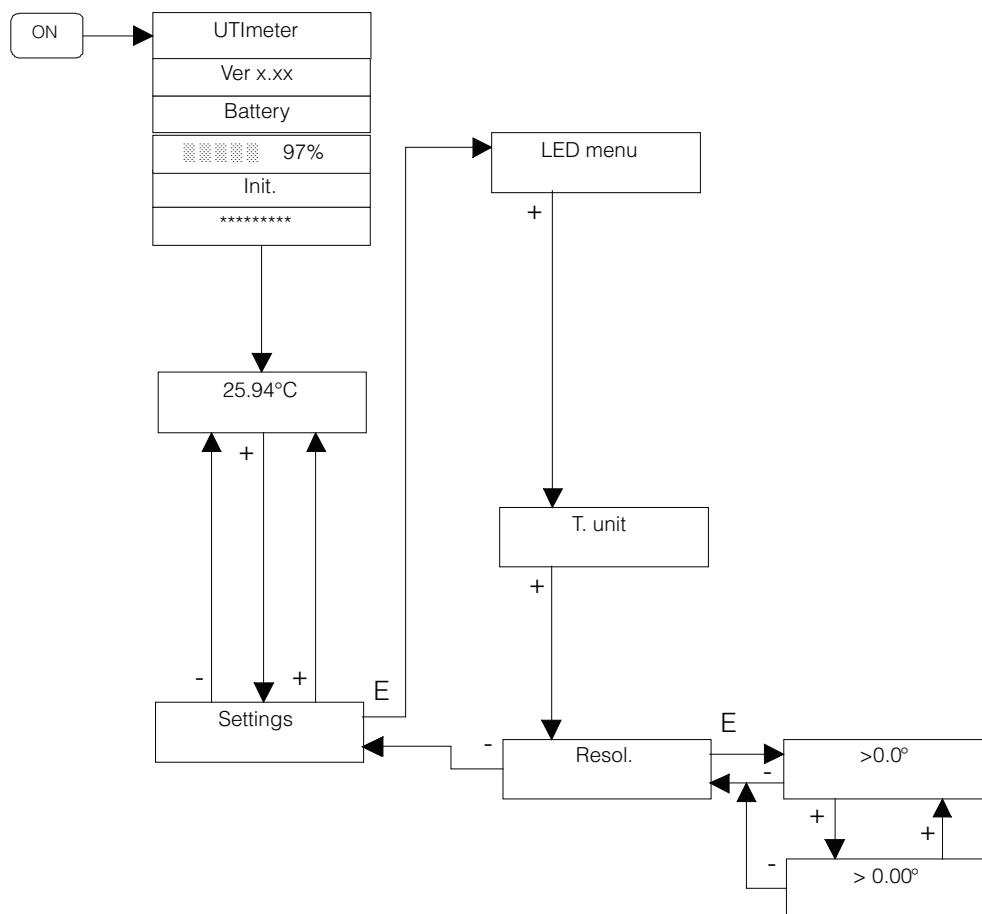


Figure 9-4

- Switch on the equipment,
- Wait until the temperature is displayed,
- Press on "+", "Settings" is displayed,
- Press on "enter", "LED menu" is displayed,
- Press on "+", "T. unit" is displayed,
- Press on "+", "Resol." is displayed,
- Press on "enter",
- Select the resolution by pressing on "+" one or more times, the pointer shows the resolution selected,
- Press "-" two times to come back in measurement mode.

The new setting is stored in the permanent memory.

9.5 Activating the LED

Refer to Figure 9-5.

The LED can be activated on 2 modes:

- one is temporary, it is automatically erased when the unit is switched off, in order to save the battery life;
- the other is permanent, it will stay even is the unit is switched off.

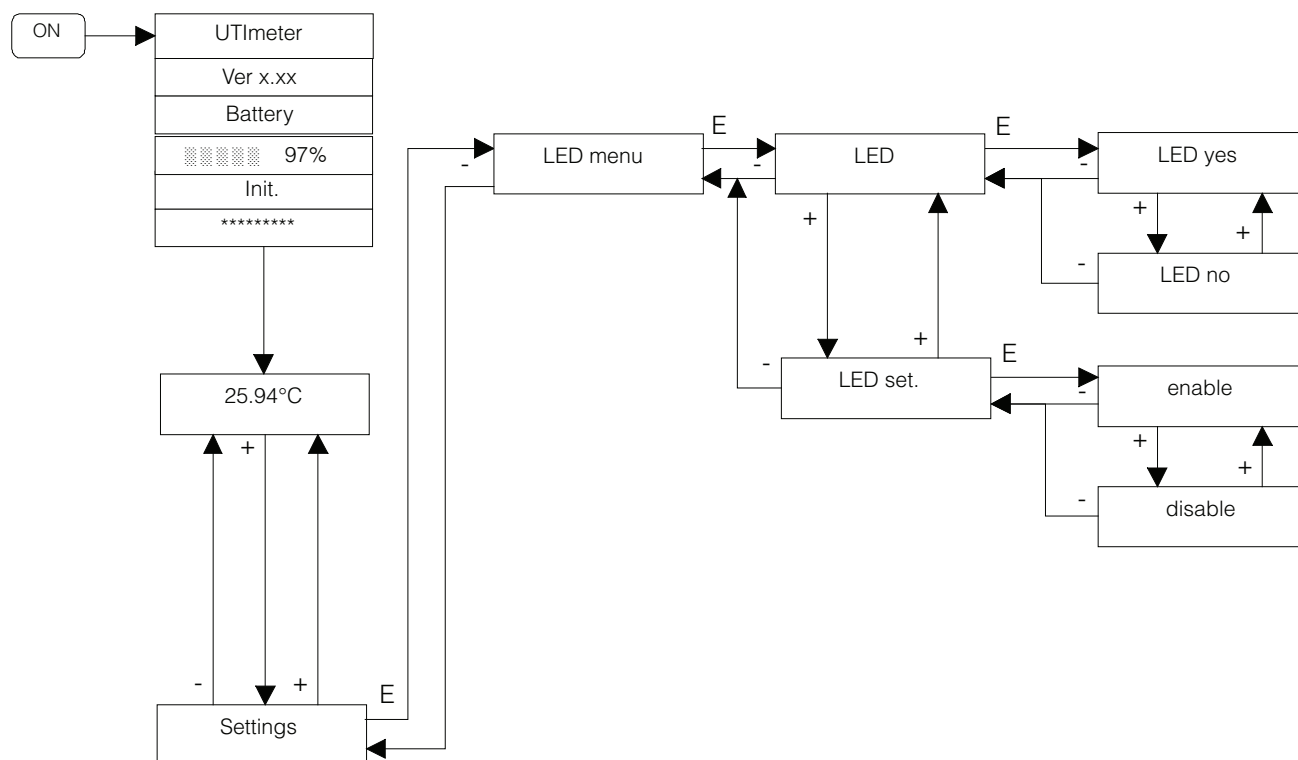


Figure 9-5

9.5.1 Temporary setting of the LED

- Switch on the equipment,
- Wait until the temperature is displayed,
- Press on "+" to enter the settings menu,
- Press on "enter"; "LED menu" is displayed,
- Press on "enter"; "LED" is displayed,
- Press on "enter", then select by pressing "+" the mode: "LED yes" or "LED no".
- Press "-" two times to come back in measurement mode.

It is always possible to change the status of the LED during gauging, by using the same menu again. If not done before, switching off the unit will automatically light off the LED.

9.5.2 Permanent setting of the LED

- Switch on the equipment,
- Wait until the temperature is displayed,
- Press on "+" to enter the settings menu,
- Press on "enter"; "LED menu" is displayed,
- Press on "enter"; "LED " is displayed,
- Press on "+", "LED Set." is displayed,
- Press on "enter",
- "Enable" or "disable" the LED by pressing on "+" one or more times,
- Press "-" two times to come back in measurement mode.

The new setting is stored in the permanent memory.

Remember that the LED needs an extra power and reduces the battery life accordingly.

9.6 Muting the buzzer

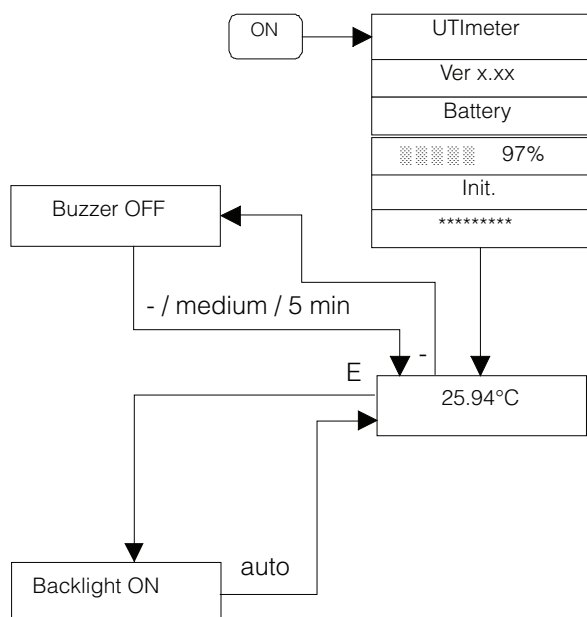


Figure 9-6

When in measurement mode it is possible to mute the buzzer.

- Press on “-”,
- Press on “-” again to reset the buzzer.

IMPORTANT NOTE: in order to prevent any misuse of the equipment, there is an automatic reactivation of the buzzer each time the medium changes (air to liquid, liquid to water, etc.) or after 5 minutes muting. To keep the buzzer muting, press again on “-”.

9.7 Backlight

Refer to Figure 9-6.

When in measurement mode press “enter”: this switches on the backlight. After around 10 seconds, the light switches off automatically to save the battery life.

9.8 Checking the functions before using the instrument

Before installing the HERMetric instrument as described in section 9.9, the following tests are recommended to ensure that the instrument is ready to work.

9.8.1 Battery

Refer to section 10.2 "Checking the battery".

9.8.2 Temperature

Switch on the unit.

The buzzer shall beep every 2 sec.

When the temperature is displayed, check that it shows the surrounding temperature.

9.8.3 Ullage

Switch on the unit.

The buzzer shall beep every 2 sec.

Check the ullage in a glass of water.

Check the ullage by immersing the ultrasonic gap sensor but not the electrodes (position A); The buzzer shall beep continuously.

9.8.4 Interface

Switch on the unit.

The buzzer shall beep every 2 sec.

Check the interface in a glass of water.

Check the interface by immersing the interface electrodes also (position B). The buzzer shall beep intermittently.

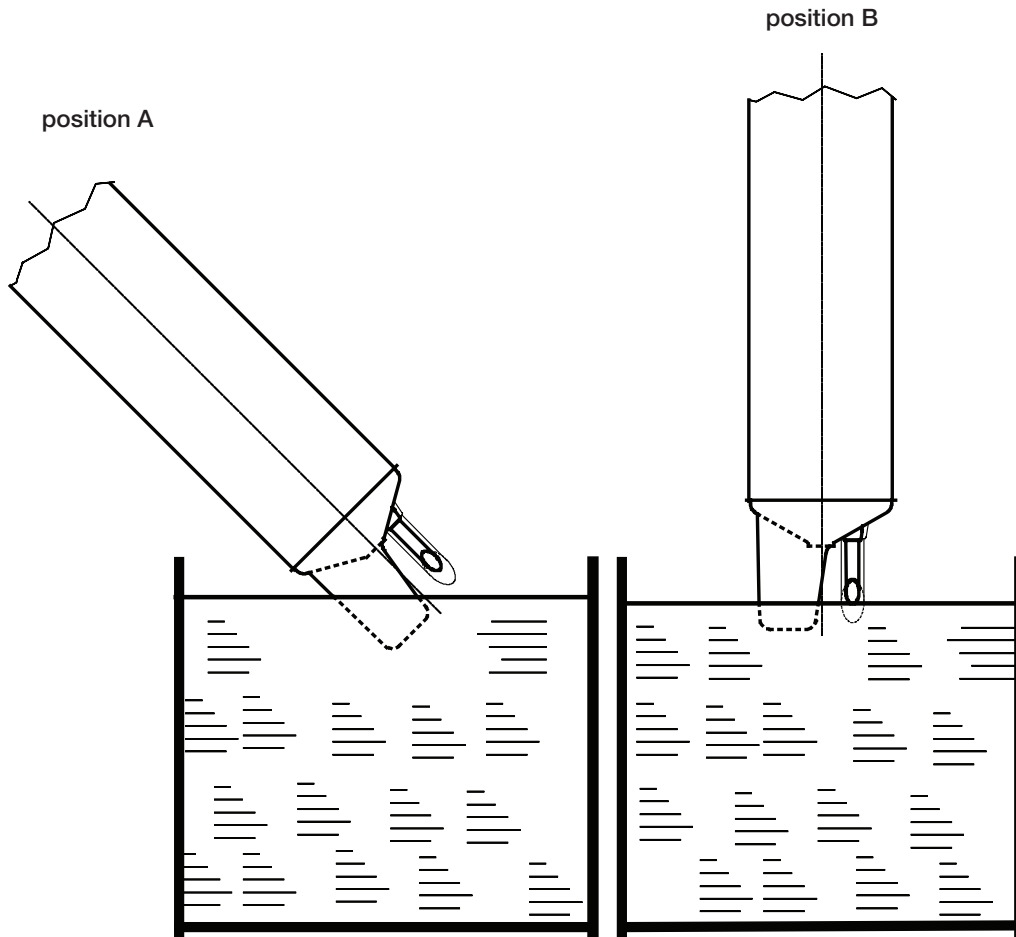


Figure 9-7

9.9 Installation of the instrument

- This HERMetric equipment must be coupled to a certified HERMetric valve.
- Before starting please read carefully the chapter “Recommendation for safe use” and follow your company’s safety instructions.
- Check that the HERMetric valve is closed.
- Remove the end cap (weather cap / blind cover / security cover) of the HERMetric valve.
- Clean the seal surfaces of the nipple of the valve and of the coupler of the instrument from dust or grease.

Note: **Cleaning** of the mating surfaces is very important for **earth grounding** purpose and for good accuracy on **zero reference level**.

- Check whether the tape protection tube is moving freely.
- Install the HERMetric instrument on top of the valve by means of the quick coupler. Ensure that the equipment is properly earthed. If not, ground it with the (optional) grounding cable before operating.

9.10 Purging the equipment

This HERMetric equipment can be fitted with a plug to purge it. This is an option, please contact Tanksystem.

9.11 Ullage / interface measurement

- Install the HERMetric equipment as per 9.9 “Installation of the instrument”.
- Open the valve by turning the handle.

- Switch on the equipment: a control beep is audible every 2 seconds.
- Put the tape cleaner on the “DOWN” position Disengage the knob of the crank handle and lower the sensing probe into the tank by turning the reel. Make sure that the tape does not rub on any sharp edge when lowering as its insulation could be damaged.
- As soon as the sensor comes in contact with the petroleum product the control beep will change for a continuous beep. Raise the sensing probe again until the continuous beep stops and lower the sensing probe again slowly until the continuous beep is heard again. Now the ullage level can be read against the ullage reference. If the zero-ullage reference does not correspond to the reading index of the instrument, a correction has to be made accordingly.
- Lower the sensing probe further until the sensor touches the oil-water interface. As soon as the sensor comes in contact with water the continuous beep will change for an intermittent beep. The difference between the ullage reading and the interface reading represents the thickness of the product layer.
- When the measurements are completed, switch off the unit, turn the tape cleaner on “UP” position and wind up the tape until the sensing probe is in the storage tube. The reading on the tape shall be less than 420 mm or 1 ft 5 inch.
- Close the valve and disconnect the instrument from the nipple.
- Put the end cap back on the valve.

9.12 Reference height / innage measurement

If the unit is fitted with the additional load (see Figure 9-8) then reference height / innage measurement are possible.

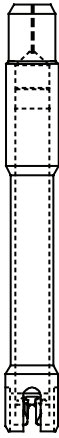


Figure 9-8

- Install the HERMeTic equipment as per 9.9 "Installation of the instrument".
- Open the valve by turning the handle.
- Put the tape cleaner on the "DOWN" position Disengage the knob of the crank handle and lower the sensing probe into the tank by turning the reel. Make sure that the tape does not rub on any sharp edge when lowering as its insulation could be damaged.
- When the sensing probe comes in contact with the dip/ datum plate record the distance shown on the reading index. See Figure 9-9. The exact distance from the plate to the reading index is (reading + 4 mm) or (reading + 5/32") which is the reference height providing the reading index level has been adjusted to the zero ullage level of the tank. If the tank zero ullage is levelled above or below the reading index, an additional correction shall apply. For more details refer to section "Installation of the gauging system".
- Turn the tape cleaner on "UP" position
- Switch on the unit and raise up the sensing probe until checking the oil/water interface if any (see details in section 9.11 "Ullage / interface measurement"). To get a better accuracy of the interface level, release the tape cleaner on

the "DOWN" position during the final checking. Calculate the free water height by subtracting the index reading to the reference height.

- Reengage the tape cleaner on the "UP" position and raise up the sensing probe until checking the ullage (see details in section 9.11 "Ullage / interface measurement"). Release the tape cleaner for final checking of the ullage. Calculate the innage by subtracting the index reading and the free water height to the reference height determined before.
- When the measurements are completed, switch off the unit, engage the tape cleaner on the "UP" position and wind up the tape until the sensing probe is in the storage tube. The reading on the tape shall be less than 420 mm or 1 ft 5 inch.
- Close the valve and disconnect the instrument from the nipple.
- Put the end cap back on the valve.

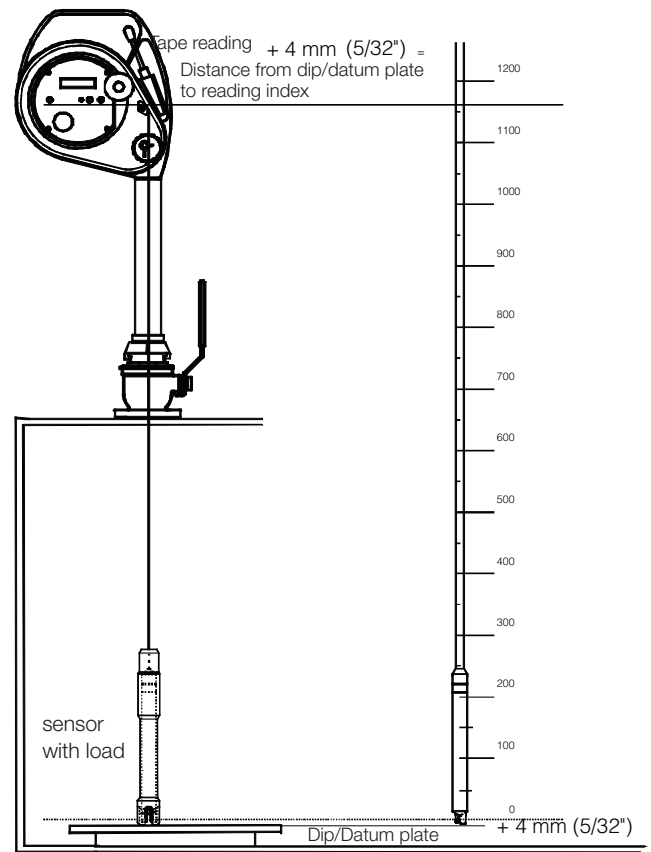


Figure 9-9

9.13 Temperature measurement

- Install the HERMetric equipment as per 9.9 “Installation of the instrument”.
- Open the valve by turning the handle.
- Switch on the unit: a control beep is audible every 2 seconds.
- Put the tape cleaner on the “DOWN” position Disengage the knob of the crank handle and lower the sensing probe to the **deepest** reading desired. Make sure that the tape does not rub on any sharp edge when lowering; its insulation might be damaged.
- The position of temperature sensor coincides with zero of tape, so the tape index reading shows directly level at which temperature is measured
- When the desired temperature ullage level is reached, joggle the sensing probe approximately 300 mm (1 foot) above and below the desired measurement level until the displayed temperature reading settles. For heavy crude oils which have a low thermal conductivity and a viscous nature, the joggling procedure is a necessity to assure an accurate temperature reading in a minimum amount of time.

- When temperature has settled, record it.
- Engage the tape cleaner on “UP” position Raise the probe to the next ullage level to be measured and repeat the procedure a.m. To joggle the sensing probe the tape cleaner must be on the “DOWN” position.
- When the measurements are completed, switch off the unit, engage the tape cleaner on “UP” position and wind up the tape until the sensing probe is in the storage tube. The reading on the tape shall be less than 420 mm or 1 ft 5 inch.
- Close the valve and disconnect the instrument from the nipple.
- Put the end cap back on the valve.

IMPORTANT NOTE

As mentioned in 9.6 “Muting the buzzer” it is easy to mute the buzzer during the temperature measurement by pressing on “-”.

Recall that after 5 minutes have elapsed or each time the probe detects a change of the medium (air, liquid, water), the buzzer will reactivate automatically. To keep it muting, press on “-” again.

10. Care and Maintenance

10.1 Care

Clean the instrument of any excess of liquid after use. Remove the housing lid and clean the tape housing. This cleaning must be done very properly, in particular when corrosive liquids are gauged, such as strong acids or caustic soda for instance.

Make sure that the sensing probe is completely stored in the storage tube after use (reading index shall indicate less than 420 mm or 1 ft 5”).

Check the tightness of the reading index screws and if necessary adjust the level, refer to section 7.5 “Reading index”.

Store the instrument in a dry location.

Check periodically (at least every 6 months) the continuity of grounding by measuring the electrical resistance between the

tape adaptor (or the sensing probe tube) and the quick connect coupler. Resistance should not exceed 10 Ω .

Periodically clean carefully the sensor probe, the tape housing and the mechanical parts, as storage tube, tape, with an appropriate solvent.

Note: always reassemble the storage tube to the housing in the vertical position to allow the O-ring to seat properly in the tube.

Check periodically the condition of the tape cleaner.

With such conductive liquids which form salts when drying, wash the sensing probe with water or alcohol and brush it very gently with a soft brush to prevent a water detection error due to a short-circuit between the electrode and the tube.

10.2 Checking the battery

Please note that in case you have to change the battery, it must be done only in a safe area. Refer to section 10.3 “Battery replacement”.

10.2.1 Before starting gauging

Switch on the unit. The buzzer tones every 2 seconds if the battery is not too low.

The following sequences are displayed as per Figure 10-1, the 4th sequence shows the remaining power of the battery in percentage and as a bar-graph.

If the power left is less than 50% we recommend to have a spare battery ready for exchange. See also 10.3 “Battery replacement”.

If the power left is less than 20% the message is blinking to advise that the power may not be enough to carry out all the work.

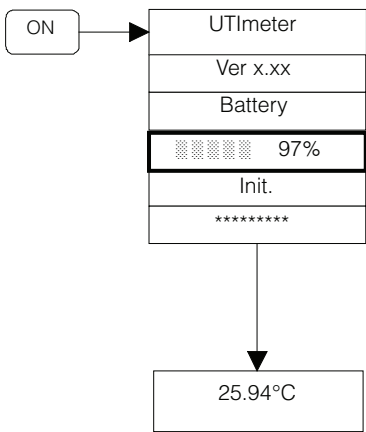


Figure 10-1

If the battery is too low, the unit will stop on the message “battery” as shown on Figure 10-2 and the buzzer tones continuously. Change the battery as per 10.3 “Battery replacement”.

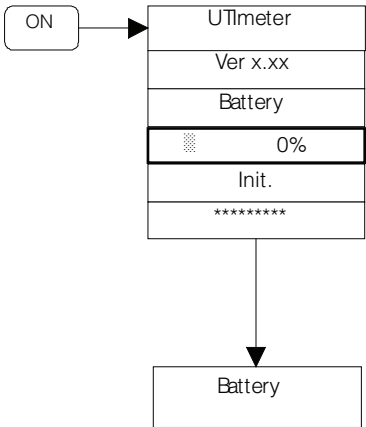


Figure 10-2

If it is not possible to switch on the unit, the battery is out or work. Change the battery first, as per 10.3 “Battery replacement”.

10.2.2 During gauging

When the unit is already switched on and working, it is always possible to see what power is left with the battery by entering the settings menu:

- Press on “+” to enter the settings menu,
- Press on “enter”, “LED menu” is displayed,
- Press on “+”; “T. unit” is displayed,
- Press on “+”, “Resol.” is displayed,

- Press on “+”, “Language” is displayed,
- Press on “+”, “Battery” is displayed,
- Press on “enter”,
- The remaining battery power is displayed in percentage and as a bar-graph; pressing “+” again allows to see the tension of the battery (B); the last information (A) is internal.
- Press “-” two times to come back in measurement mode.

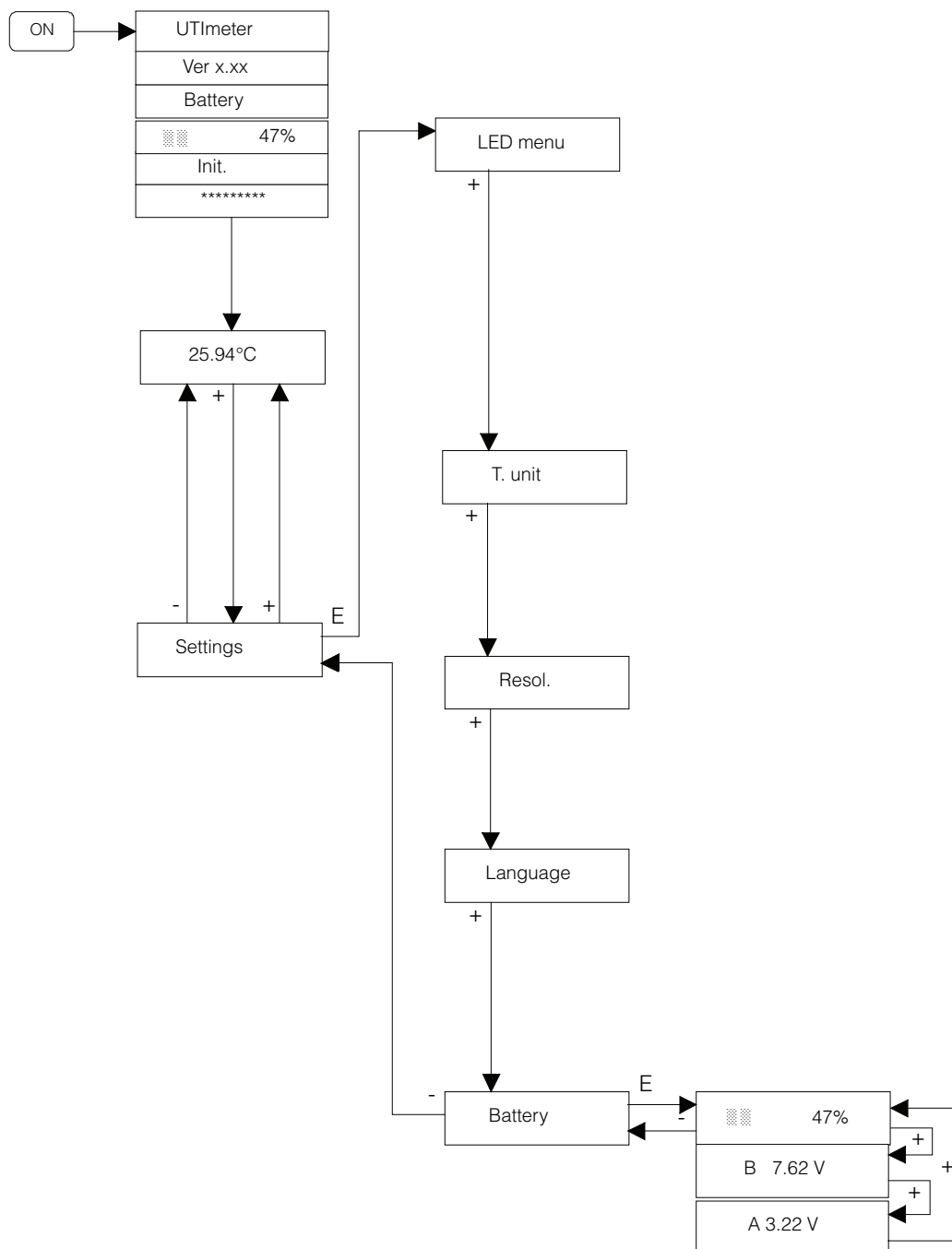


Figure 10-3

10.3 Battery replacement

Warning : change the battery only in a non hazardous area.

- Unscrew the 2 screws of the battery holder using the 2,5 mm Hex Allen key which is located on the carrying case. See Figure 10-4.

- Pull it gently out.
- Change the battery (one-way only device). See Figure 10-4.
- Push the battery holder back in its housing (one-way only).
- Tighten the 2 screws.

Only one battery is approved:

Duracell / Procell MN1604

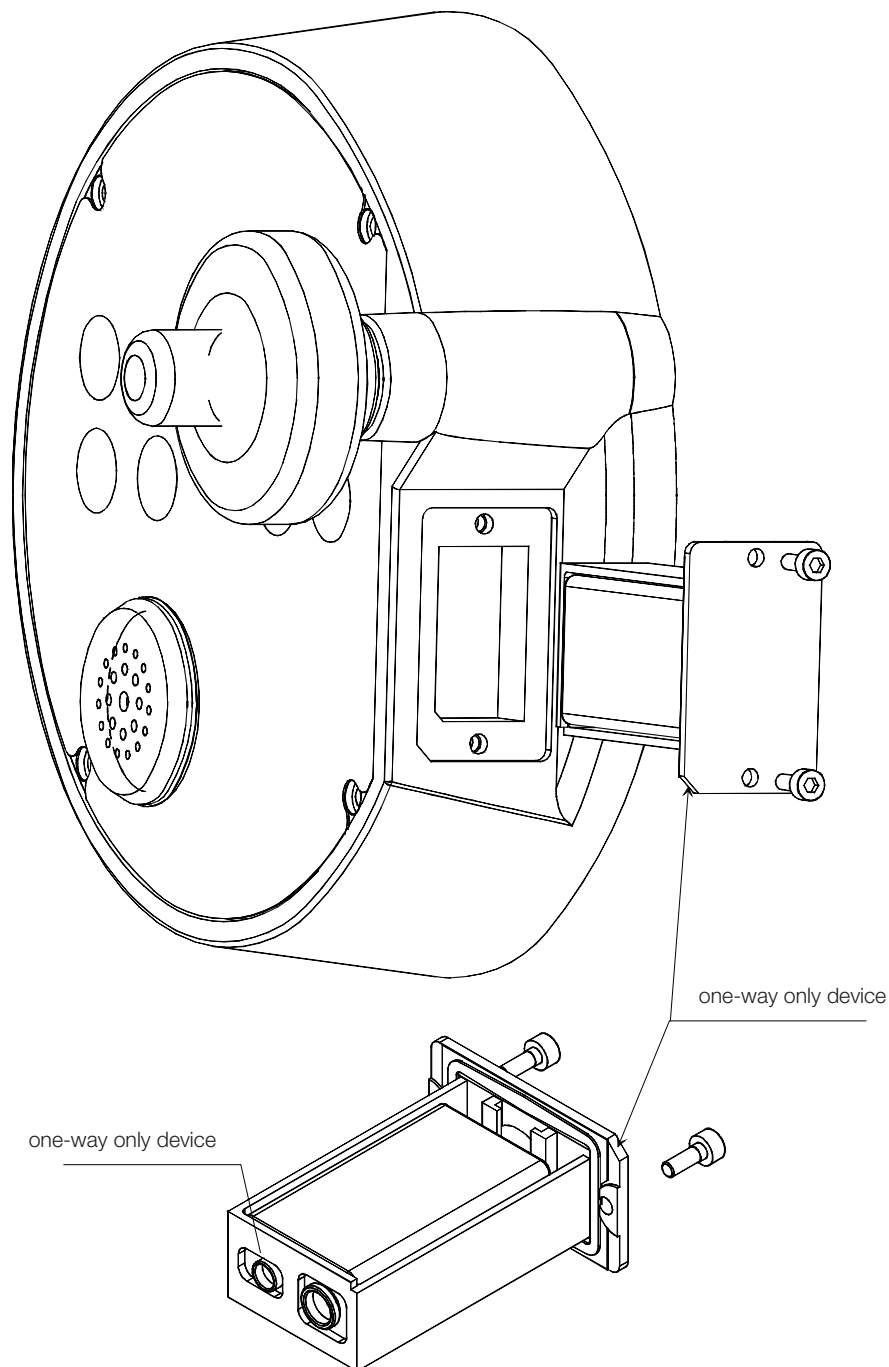


Figure 10-4

10.4 Tape replacement

THE REPLACEMENT OF THE TAPE DOES NOT REQUIRE TO RE-CALIBRATE THE TEMPERATURE.

Follow the different sequences as described below. The Figure 13-1: general assembly, list of the main spare parts can also help.

10.4.1 Disconnecting the tape from the sensor

Follow the instructions of section 10.5 "Sensing probe replacement".

10.4.2 Disconnecting the tape from the electronic box

- Unscrew with the 2.5 Allen key the 2 screws (A) of the battery holder and pull it out as shown on Figure 10-5.
- Unscrew with the 2.5 Allen key the 4 screws (B) of the display unit and pull it gently out as shown on Figure 10-5.

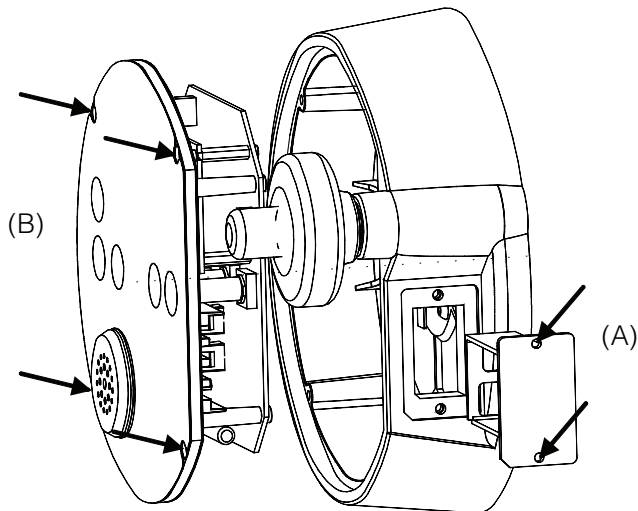


Figure 10-5

- Disconnect the connecting plug (C) as shown on Figure 10-6 and remove the display unit.
- Unscrew with the 2.5 Allen key the tape holder (G) by removing the 2 screws (F) and the grounding cable (D) as shown on Figure 10-6. Do not loose the 2 remaining screws that secure the reel axle.

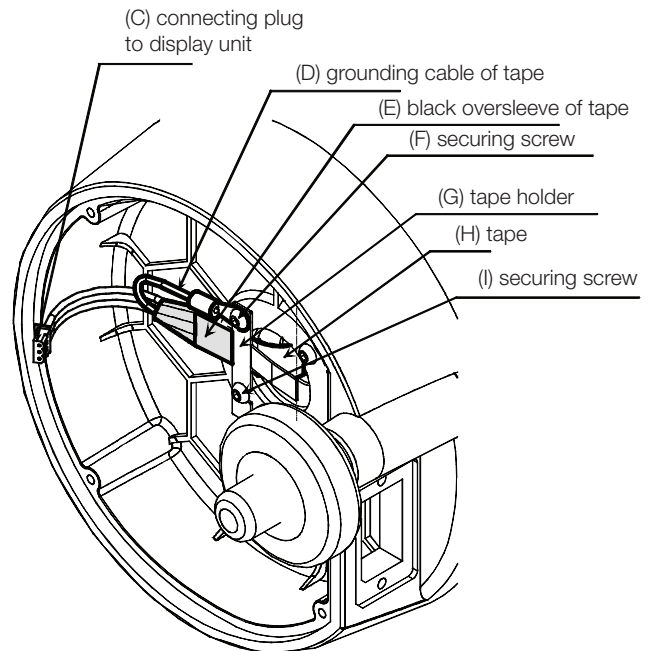


Figure 10-6

10.4.3 Disconnecting the tape from the reel axle

- Unlock the housing lid and remove it.
- Remove the axle cover (3 screws to unscrew with the 2.5 Allen key).
- Unscrew with the 2.5 Allen key the 4 screws (K) of the washer holder, as shown on Figure 10-7.
- Remove the tape from the reel axle.

10.4.4 Removing the tape from the housing

- Remove the tape protection tube from the tape.
- Turn the tape cleaner in position "DOWN" to free the tape.
- Pull the tape gently out of the tape cleaner.
- Pull the tape adaptor end out of the housing, through the storage tube.
- Unscrew the reading index and remove it (Figure 10-8).
- Slacken the tape a few turns from the reel axle.
- Remove the tape from the housing.

10.4.5 Mounting the new tape

- Install the new tape on the reel axle.
- Leave approximately 20 cm of tape free at the core.
- Make a loop (M) and a S-shape (L) with the tape as shown on Figure 10-7.
- Pass the tape end through the axle core.
- Secure the gaskets and the washers mounted on the tape in the axle core with the washer holder and its 4 screws (K) as shown on Figure 10-7.
- On the electronic box side, adjust the black oversleeve just to the edge of the tape holder (pull the tape gently from the other side) and tighten the tape end as shown on Figure 10-6 with.
- Follow in the reverse order the instructions of sub-section 10.4.2 to re-install the electronic box.
- If necessary, readjust the loop (M) and the S-shape (L) of the tape at the core of the reel axle.
- Follow the instructions of sub-section 10.4.4 in the reverse order to pass the tape through the tape cleaner, the storage tube and to mount the tape protection tube on.
- Reinstall the reading index (Figure 10-8).
- Adjust the reading index as described in section 10.9 .

- Put back the axle cover and its 3 securing screws.
- Follow the instructions of section 10.5 "Sensing probe replacement" to re-install the sensor on the tape.
- Carry out the functional tests as per 9.8 "Checking the functions before using the instrument".
- If there is any problem, refer to section 11 "Trouble shooting".

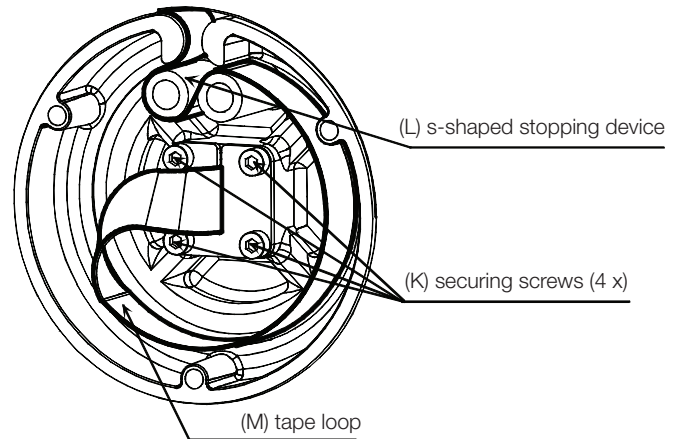


Figure 10-7

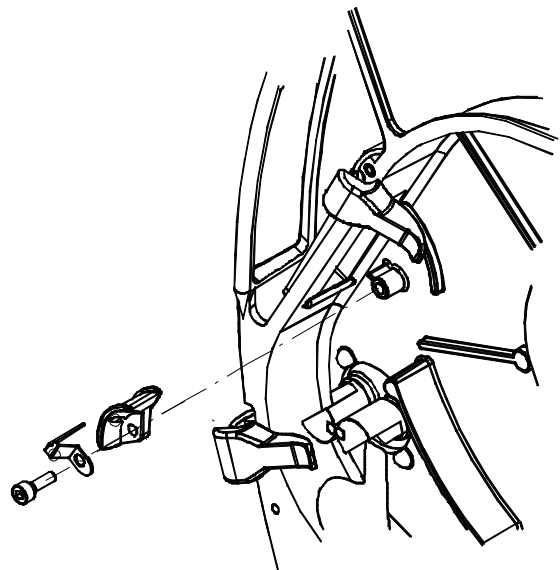


Figure 10-8

10.5 Sensing probe replacement

THE REPLACEMENT OF THE SENSING PROBE DOES NOT REQUIRE TO RE-CALIBRATE THE TEMPERATURE NOR THE ULLAGE / INTERFACE.

10.5.1 Disconnecting the old sensing probe

- Unscrew the securing screw with the 1.5 mm Hex Allen key.
- Pull carefully the adaptor out of the sensing probe tube by turning it slightly left and right. Make sure that the O-ring is not damaged when it passes the hole of the sensing probe tube.
- Disconnect the plug by pulling it gently out of the tube.

10.5.2 Connecting the new sensing probe

- Refer to Figure 10-9.
- Insert the 1.5 Allen key gently in the free hole in the middle of the tape plug.
- With one hand keep the sensing probe and the tape adaptor as shown on Figure 10-9.
- With the other hand drive the plug into the new sensor tube with the 1.5 Allen key to connect it to the sensing probe socket. Note this is a one way only plug. The wires shall be on the opposite side of the electronic circuit print as shown on Figure 10-9.
- Pull out gently the 1.5 Allen key from the plug while keeping the plug in place with another non sharp tool, for instance the 4 mm Allen key. Check that the plug is fully inserted.
- Switch on the unit and wait a few seconds. If all is OK, the temperature is displayed and the buzzer beeps every 2 seconds. If there is any problem, refer to the section 11 "Trouble shooting".
- Put some light grease on the O-ring.
- Push gently the adaptor into the sensing probe tube. Mind not to damage the O-ring when it passes the screw hole.
- Screw the securing screw back with the 1.5 mm Hex Allen key.

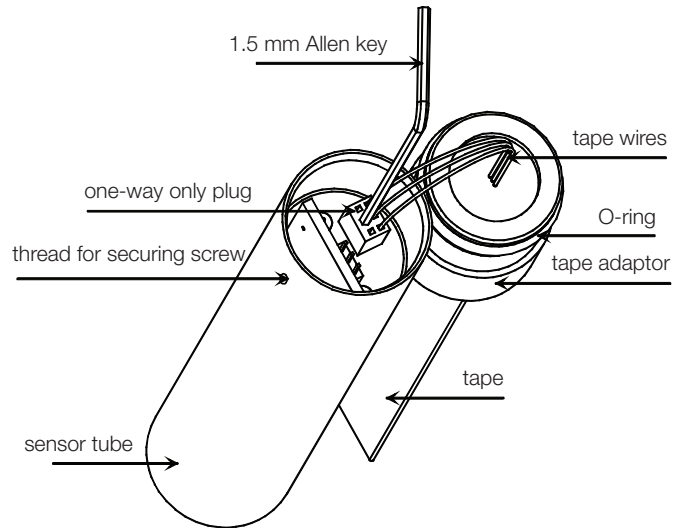


Figure 10-9

10.6 Tape wipers replacement

The 2 tape wipers can be easily replaced:

- Check that the tape cleaner is on "DOWN" position.
- Unlock and remove the housing lid.
- The tape wipers are inserted in holders grooves. Remove the old ones and insert the new ones.
- Put back and lock the housing lid
- Check that the tape cleaner is working properly.

Note: we recommend to change always both wipers.

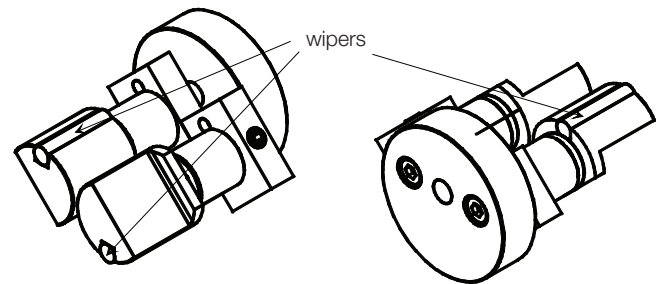


Figure 10-10

10.7 Display unit replacement

THE REPLACEMENT OF THE DISPLAY UNIT DOES NOT REQUIRE TO RE-CALIBRATE THE TEMPERATURE.

10.7.1 Disconnecting the old display unit

- Unscrew with the 2.5 Allen key the 2 screws (A) of the battery holder and pull it out as shown on Figure 10-11.
- Unscrew with the 2.5 Allen key the 4 screws (B) of the display unit and pull it gently out of the electronic box, as shown on Figure 10-11.
- Disconnect the tape plug, item (C) shown on Figure 10-6.

10.7.2 Connecting the new display unit

- Connect the tape plug to the new display unit.
- Put back the new display unit in the electronic box; tighten the 4 screws (B) of Figure 10-11.
- Reinstall the battery holder with the 2 screws (A) of Figure 10-11. Refer to Figure 10-4 page 40.
- Check that the unit is working properly, as described in 9.8.

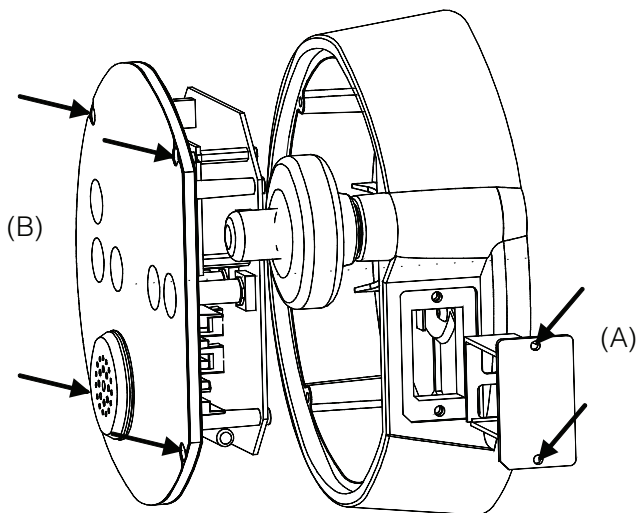


Figure 10-11

10.8 Verification and certification of tapes

The tape has to be periodically inspected for breaks, kinks, wear and illegible numbers.

As the tape is a cable it might be necessary to check its electrical conformity. Refer to section 11.9. It is necessary also to check it for accuracy regularly according to current National or International Standards, as API "Manual of Petroleum - Measurement Standards - Chapter 3 - Tank Gauging - Section 1A - Standard practice for the manual gauging of petroleum products in stationary tanks" or IP "Petroleum Measurement Manual - Part III - Manual Tank Gauging - Section 1 - Non-Electrical Methods" or relevant ISO standards.

In such a case it is important to remember that the bottom of the sensing probe is 4 mm lower than the zero of the tape, thus to assure that the electrical zero coincide with the tape zero.

It is also important to remember that the nominal tension at which the tape was produced is marked on each beginning of tape and is normally 6 N (1,3 lb). If tensioned at 44,5 N (10 lb) as per API this will result in a additional elongation up to 3.7 mm over 30 meters.

This periodical verification can be done at the factory or in a Service Station.

10.9

Verification and adjustment of the reading index

To verify or to adjust the reading index, in particular after having renewed a tape, apply the following instruction:

- if the equipment is fitted with a 2" connector (Q2) remove the clip and the collar as shown on Figure 10-12;
- unlock and remove the lid of the tape housing;
- put the tape cleaner on "DOWN" position;
- keep the equipment standing vertically on a flat surface;
- gently lower the tape until the sensor touches the surface (Figure 10-12);

- adjust the index to the value corresponding to the connector Q1 or Q2, as shown on Figure 10-12;
- In case of a 2" connector (Q2) put back the clip and the collar.
- Put the housing lid back and lock it.

IMPORTANT NOTE: these adjusting values for the reading index are different from the heights shown in the section 8 "Examples of installation of the gauging system". They take into account the recessment of the reaction point from the sensor tip end and other mechanical parameters.

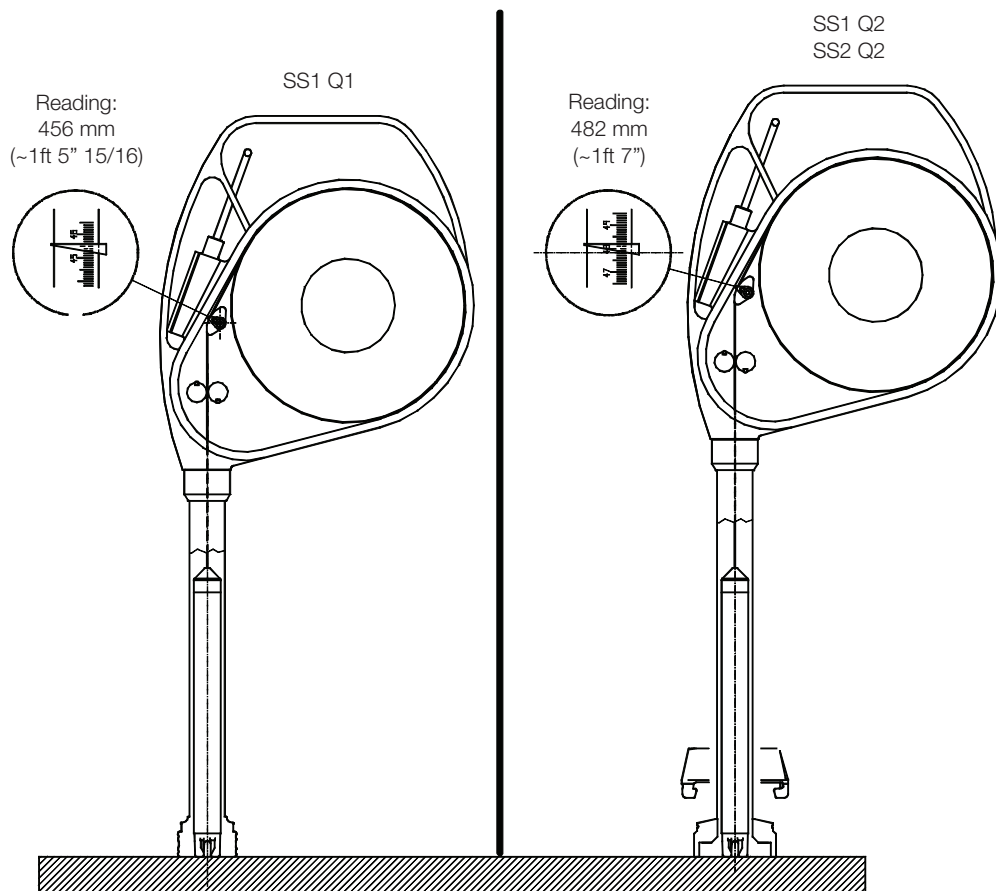


Figure 10-12

10.10 Temperature verification

The temperature calibration curve is stored in the sensor memory and cannot be modified. The calibration is set once at the factory and do not require subsequent adjustment.

Nevertheless it is recommended to check the temperature accuracy once a year. A one point check is enough to qualify the sensor.

10.10.1 Equipment required

- A Dewar flask or any vacuum flask, approximately 8 cm in diameter and 36 cm deep.
- Ice, preferably made from distilled water.
- Water, preferably distilled and precooled.

10.10.2 Preparing the Ice Point bath

- (1) Shave or crush the ice into small pieces, avoiding direct contact with the hands or any unclean object. The pieces shall be no more than 5 mm.
- (2) Fill the Dewar flask with the crushed ice and add sufficient water to form a slush, just filling the voids between ice particles but not enough to float the ice.

- (3) Insert the sensor, packing the ice gently about it.
- (4) Let it stand for half an hour to permit the sensor temperature, the ice particles and the water to equilibrate.
- (5) As the ice melts it will be necessary to drain off some water and add more crushed ice. Gently stir the ice with the sensor periodically to assist equilibration.

IMPORTANT NOTE: Attention to detail during the preparation of the Ice Point bath is critical to the accuracy and quality of the offset verification.

10.10.3 Checking the UTImeter

- (6) After 30 minutes have elapsed, gently stir the bath with the sensor again to ensure complete equilibration of temperature.
- (7) Switch on the UTImeter.
- (8) Observe the reading. It should be $\pm 0.10\text{ }^{\circ}\text{C}$ ($\pm 0.20\text{ }^{\circ}\text{F}$)
The temperature must be stable, i.e. within $\pm 0.04\text{ }^{\circ}\text{C}$ ($\pm 0.07\text{ }^{\circ}\text{F}$).
- (9) If it is not OK, refer to section 11 "Trouble shooting".

10.11 Ullage/Interface verification

The sensitivity of the instrument in ullage / interface cannot be adjusted. Both ullage and interface levels are set at the factory.

Checking ullage and interface level detection

The test liquid should be the one to be gauged. Fill in a container with appropriate liquid.

Switch on the unit. The buzzer shall beep every 2 sec.

If the liquid is conductive (alcohol, water, ...)

- Check the **ullage** by immersing the ultrasonic gap sensor but not the electrodes (position A); The buzzer shall beep continuously.
- Check the **interface** by immersing the interface electrodes (position B). The buzzer shall beep intermittently.

If the liquid is non conductive (gasoline, oil, ...)

- Check the **ullage** by immersing the sensor (position B); The buzzer shall beep continuously.
- Check the interface by immersing the sensor (position B) in water. The buzzer shall beep intermittently.

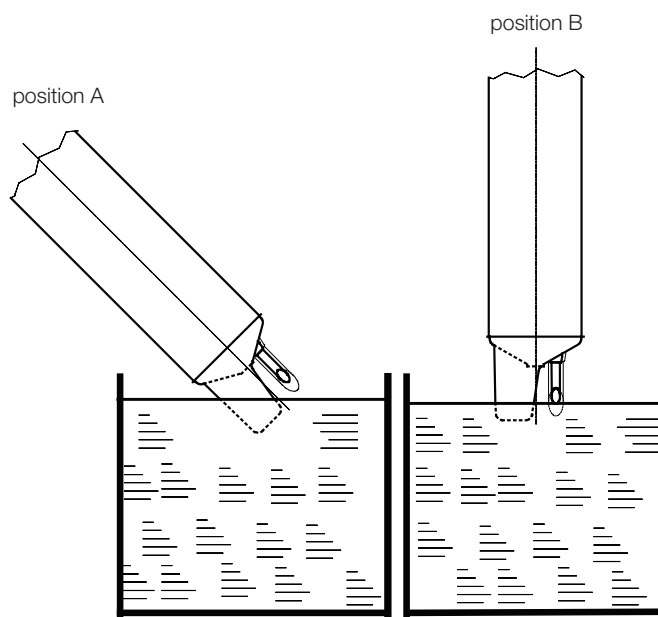


Figure 10-13

11. Trouble shooting

11.1 Safety warning

As this equipment is designed and approved for use in an explosive area (intrinsic safe equipment), only authorized service stations and the factory are allowed to repair electronic circuits.

However the customer can exchange parts and modules if the following points are observed :

1. Never open the instrument nor carry out any repair or trouble shooting in an hazardous area.
2. Use only original spare parts.

3. Work shall be done only by maintenance personnel who has an experience with intrinsically safe equipment.

The design of the equipment is modular, i.e. in case of breakdown the customer can find out which modules have to be replaced. The instrument consists of the following modules:

- Mechanical parts
- Sensing probe
- Tape assembly
- Display unit / electronic box
- Tape cleaner

The following sections should allow to identify the defective module and to replace it.

11.2 Power supply troubles

| Symptom | Origin | Action | Section |
|--|--|----------------------------------|---------|
| The unit does not switch on | Battery too low | Change the battery | 10.3 |
| | Corrosion of terminals (battery side) | Clean the battery terminals | --- |
| | Corrosion of terminals (display unit side) | Clean the display unit terminals | --- |
| | Switch defective | Change the display unit | 10.7 |
| The unit switches on but stops on the message "battery"; the buzzer tones continuously | Battery too low | Change the battery | 10.3 |

11.3 Transmission troubles

| Symptom | Origin | Action | Section |
|------------------------|-----------------------|------------------|---------|
| "No Msg " is displayed | Sensor out of work or | Renew the sensor | 10.5 |
| | Tape out of work | Renew the tape | 10.4 |
| "Invalid" is displayed | Sensor out of work | Renew the sensor | 10.5 |
| "Unknown" is displayed | Sensor out of work | Renew the sensor | 10.5 |

11.4 Ullage and/or Interface troubles

| Symptom | Origin | Action | Section |
|---|--|---|---------|
| The buzzer does not beep when the unit is switched on | Buzzer switched off or | Press on “-” to reactivate it | 9.6 |
| | Key-pad defective or | Pressing on “+” has no action Change the display unit | 10.7 |
| | Buzzer defective | Press on “+”: “Settings” is displayed Change the display unit | 10.7 |
| The buzzer tones continuously when the sensing probe is in air or liquid or water | Battery too low | Change the battery | 10.3 |
| The buzzer gives the water signal whatever liquid is gauged | Sensing head contaminated by conductive residues | Wash, clean and brush (soft brush) the sensing head or change the sensor | --- |
| | | | 10.5 |
| The buzzer gives the oil signal in water | Sensing head contaminated by non conductive residues | Wash, clean and brush (soft brush) the sensing head or change the sensor | --- |
| | | | 10.5 |

11.5 Temperature troubles

| Symptom | Origin | Action | Section |
|-------------------------------------|--|---|---------|
| “> 90°C” or “> 194°F” is displayed | Temperature too high | The temperature range shall be < 90°C / 194 °F | --- |
| “< -40°C” or “< -40°F” is displayed | Temperature too low | The temperature range shall be > -40 °C/F | --- |
| Temperature does not stabilise | Heated viscous liquid (such as heavy crude oils) | Check the stability in cold and hot water; if it is OK the problem is with the gauged liquid and not with the probe | --- |
| | Contaminated sensing probe | Clean the temperature electrode; remove any residues or sludge; check the stability in cold and hot water | --- |

11.6 Visual inspection for damaged or missing parts

General condition: missing parts
 Display unit: 5-key control pad, buzzer, front face, LED, screen

Sensing probe: sensors broken, smashed or damaged
 Tape: check at least the first 3 m; wires still insulated, no breaks, no kinks, ...
 Mechanical parts: check housing, lid, axle, storage tube, wipers of tape cleaner, window wiper

11.7 Coated aluminium parts

PA 11: Rilsan = blue, grey or yellow colour

The coating should be subject to regular and careful inspection. The continued use of the apparatus should not be permitted if inspection reveals that the protective material has become damaged to the extent that the underlying protected metal is visible, until such damage has been satisfactorily repaired.

11.8 Winding action becoming stiff

If after repeated use the winding action is becoming slightly stiff apply the following simple process:

- engage the tape cleaner (position "UP"), with the sensor retained in the storage tube,
- slacken the tape a few turns, typically 10,
- gently shake the instrument to free up the tape within the tape housing,
- wind the tape again and disengage the tape cleaner (position "DOWN").

11.9 Electrical checking of the tape assembly

☉ Test for grounding

- Remove the battery holder as described in section 10.3.
- ☉ Measure the resistance between the ground (-) terminal (as shown on Figure 11-1) of the electronic circuit and the tube of the sensing probe; the resistance should be less than 10 Ω . If it is higher, the steel tape might be broken or the connection between the sensing probe circuit and the sensing probe tube might be interrupted.

☉ Test for short-circuit

- Disconnect the tape at both ends: display unit side and sensing probe side (see sections 10.4.1 and 10.4.2).
- Measure the resistance between each conductor red-white, red-black, white-black. This resistance should be infinite as an open circuit. If not, the tape might be defective.

☉ Test for open-circuit (continuity)

- Disconnect the tape at the sensing probe side (see 10.4.1).
- Measure the resistance of each conductor of the tape (between red and red, white and white, etc.).
- The resistance should be less than 15 Ω . If not, the tape might be broken. To replace the tape see section 10.4.

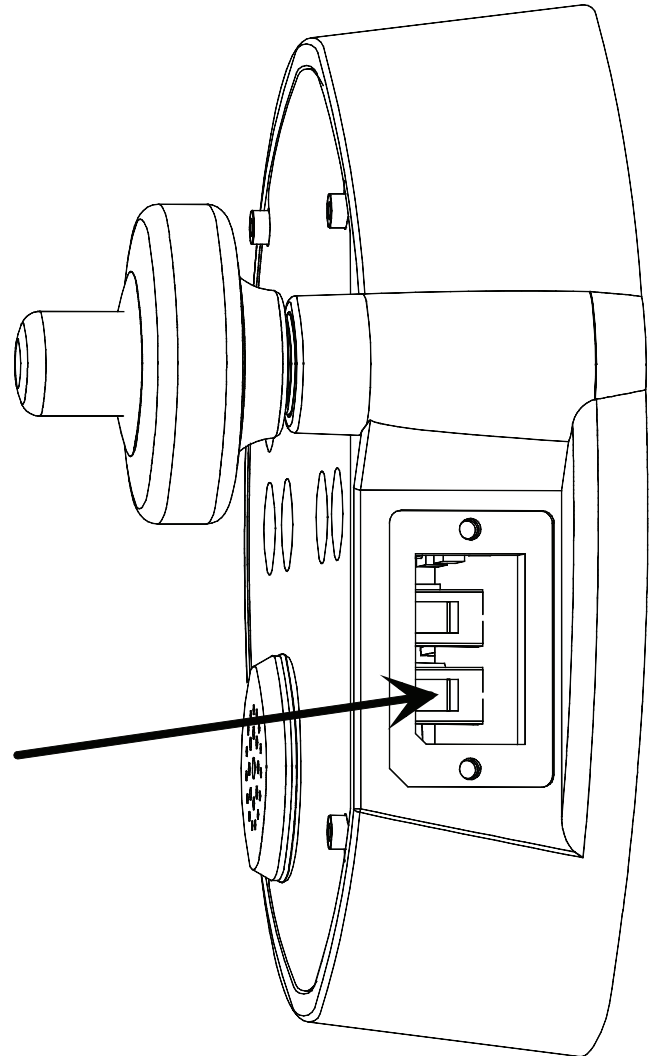


Figure 11-1

12. Specifications

General Specifications

| | |
|---|--|
| Accuracy of ullage-interface detection | ±2 mm (± 0.08" approx.) |
| Ullage, interface indication | Audible or visible |
| Tape length | 15 m/50 ft, 30 m/100 ft, 35 m/115 ft |
| Tape graduation | Metric/English |
| Tape resolution | 1 mm / 1/16" |
| Tape accuracy | ±1.5 mm/30 m (±1/16"/100 ft approx.) |
| Meets ISO 4512 and API MPMS Chap 3.1A requirements | |
| Diameter of probe (without load) | 23 mm (29/32" approx.) |
| Minimum detectable tank bottom liquid level | 4 mm (5/32" approx.) |
| Maximum tank pressure | 0,3 bar (4,4 psi) |
| Accuracy | ±0.1°C (0°C to 70°C); ±0.2°F (32°F to 158°F) |
| Meets ISO 4268, API MPMS Chap 7 and IP PMM Part IV requirements | |
| Ambient temperature range | -20°C to 50 °C (-4°F to 122°F) |
| Temperature sensor measurement range | -40°C to 90°C (-40°F to to 194°F) |
| Temperature measurement resolution | 0.01° or 0.1°, selectable |
| Temperature reading | °C or °F, selectable |
| LCD Display | 8 characters |
| Mechanical coupling | Q2 (2") or Q1 (1") |

Hazardous environments approvals

| | |
|-------------------------------|--|
| IECEEx | Zone 0 Ex ia IIB T4 -20°C < Ta < +50°C |
| ATEX | II 1 G EEx ia IIB T4 / Tamb 50°C |
| Factory Mutual (FM Approvals) | CL I, DIV 1, GP C&D, T4 Tamb 50°C and CL I, ZN 0, AEx ia IIB T4 Tamb 50°C |

Multifunctions-Sensor

| | |
|---------------------------|--------------------------|
| Ullage detection | ultrasonic |
| Interface detection | conductivity |
| Temperature | Platinum RTD Pt 1000 |
| Innage / Reference height | additional load (option) |

Tape cleaning device

UP / DOWN tape cleaner

Tape protection tube

on all units equipped with TS storage tubes

Maintenance

modular design / easy exchange of parts

Specifications subject to change without notice.

13. Spare parts

13.1 How to proceed

Each spare part is identified by the letters TS followed by a 5 digits number, as for instance TS 10207 for the sensor or TS 10192 for the 30 meters tape.

Proceed as follows to identify the part you need to order:

- 1) Find the adequate drawing on the next pages;
- 2) Note the item TS number, ex. TS 10207;

- 3) With the assistance of the below table, identify its description, ex. "Sensor Ultra".

For each order, please note the item number, its description and the required quantity.

Example: TS 10207 "Sensor Ultra", 3 x.

13.2 List of parts descriptions

| TS number | Description | Notes |
|-----------|------------------------------|--|
| 10182 | Storage tube S2-Q2 with load | |
| 10183 | Storage tube S1-Q2 | |
| 10184 | Storage tube 1" S1-Q1 | |
| 10189 | Battery holder assy | does not include TS 40300 & 37020 |
| 10190 | Electronic box assy | does not include TS 11210 & TS 40765 |
| 10191 | Tape 15m stand. double assy | kit (tape + 1 x TS 11603 + 1 x TS 40853) |
| 10192 | Tape 30m stand. double assy | kit (tape + 1 x TS 11603 + 1 x TS 40853) |
| 10193 | Tape 35m stand. double assy | kit (tape + 1 x TS 11603 + 1 x TS 40853) |
| 10205 | Tape cleaner Viton assy | |
| 10207 | Sensor Ultra | |
| 10210 | Display unit assy | |
| 11025 | Nut for load 700gr | |
| 11026 | Load 700gr | |
| 11082 | Security tube assy | |
| 11129 | Ball Inox Ø5.556 (7/32")10x | |
| 11130 | Compression spring | |
| 11131 | Clip | |
| 11132 | O-Ring Ø29.7x3.5 | |
| 11169 | Heat shrink tube 24/8 x 80 | |
| 11189 | Quick coupler lock | |
| 11207 | Axle bearing | |
| 11208 | Bearing for tape cleaner | |
| 11210 | Tape holder | |
| 11211 | Electronic box | |
| 11213 | Button handle | |
| 11214 | Connecting lever | |
| 11216 | Spacer | |
| 11217 | Gasket for electronic unit | |
| 11218 | Finger for handle | |
| 11221 | Index | |
| 11222 | Collar for connector 2" | |
| 11223 | Knob | |
| 11226 | Index block | |

| | | |
|-------|----------------------------------|-----------------|
| 11227 | Washer holder | |
| 11228 | Screw cup | |
| 11235 | Plate for battery holder | |
| 11240 | Wiper holder | |
| 11246 | Spring for battery holder | |
| 11247 | Reel axle | |
| 11248 | Gasket for battery holder | |
| 11249 | Battery holder | |
| 11251 | Axle cover | |
| 11252 | O-Ring Ø26.7 x 1.78 | |
| 11254 | Storage tube 1" - Q1 | without gaskets |
| 11255 | Storage tube 1" - Q2 | without gaskets |
| 11259 | External part of knob | |
| 11260 | Knob for handle | |
| 11263 | Front face assy | without gasket |
| 11264 | Knob black | |
| 11272 | Carter Gtex base | |
| 11600 | O-Ring Ø31x2 | |
| 11603 | O-Ring Ø15x3 | |
| 12047 | Lever | |
| 12083 | Axle of wiper | |
| 12084 | Bearing for window holder | |
| 12086 | Gasket for electronic box | |
| 12087 | Lock holder | |
| 12089 | Tape wiper holding flange | |
| 12093 | Gasket of window | |
| 12094 | Glass | |
| 12095 | Window holder | |
| 12096 | Frame of window | |
| 12097 | Wiper | |
| 12099 | Axle gasket | |
| 12101 | O-Ring Ø234 x 3 | |
| 12107 | Wiper Viton | |
| 12108 | Lock assy | |
| 12109 | Cover Gtex | |
| 12504 | O-Ring Ø9x1.5 | |
| 14093 | Spring | |
| 20513 | O-Ring Ø6.07x1.78 | |
| 20541 | O-Ring Ø56.74x3.53 | |
| 20549 | Clip | |
| 35069 | LCD 1x8 alphanumeric assy | |
| 37004 | Buzzer SC 235 B | |
| 37020 | Bat 9v alka mang Procell MN 1604 | |
| 37314 | Push Button Distancer | |
| 37340 | PCB Display UTImeter Tested Assy | |
| 37354 | Hard Paper Washer 2.2mm | |
| 40220 | Dowel pin 3x35 | |

| | | |
|-------|-------------------------------------|--|
| 40300 | Socket head cap screw M3x8 | |
| 40303 | Socket head cap screw M4x12 | |
| 40306 | Socket head cap screw M3x10 | |
| 40316 | Socket head cap screw M3x6 | |
| 40319 | Socket head cap screw M3x30 | |
| 40326 | Socket head cap screw M3x20 | |
| 40327 | Socket head cap screw M3x25 | |
| 40555 | Spacer M-M M3x6/M3x8 | |
| 40611 | Slotted flat head mach. screw M5x16 | |
| 40621 | Flat head socket screw M5x12 | |
| 40775 | Cover cap S6 | |
| 40776 | Socket button head cap screw M4x12 | |
| 40853 | Socket set screw M3x3 | |
| 40857 | Socket set screw M4x6 | |
| 40859 | Socket set screw M4x4 | |
| 40905 | Circlip Ø1.9 | |
| 40906 | Crescent ring Ø17 Benzing | |

13.3 Spare parts drawings

The next pages show the following drawings:

- Figure 13-1 : general assembly, list of the main spare parts
- Figure 13-2: display unit assembly TS 10210, details
- Figure 13-3: battery holder assembly TS 10189, details
- Figure 13-4: electronic box assembly TS 10190, details
- Figure 13-5: storage tube SS1-Q1 TS 10184, details
- Figure 13-6: storage tube SS1-Q2 TS 10183, details
- Figure 13-7: storage tube SS2-Q2 with load TS 10182, details
- Figure 13-8: tape cleaner assembly TS 10205, details

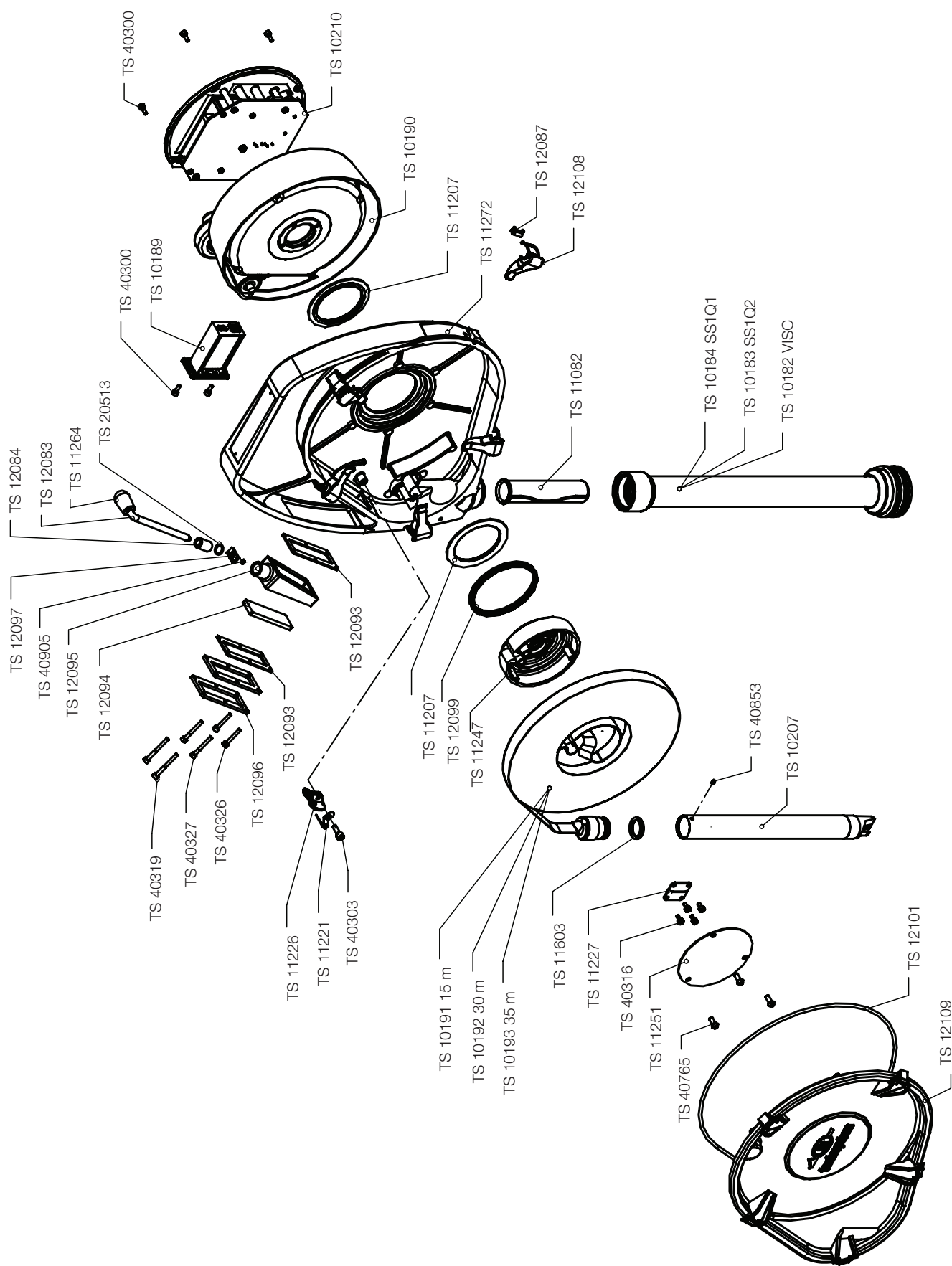


Figure 13-1: general assembly, list of the main spare parts

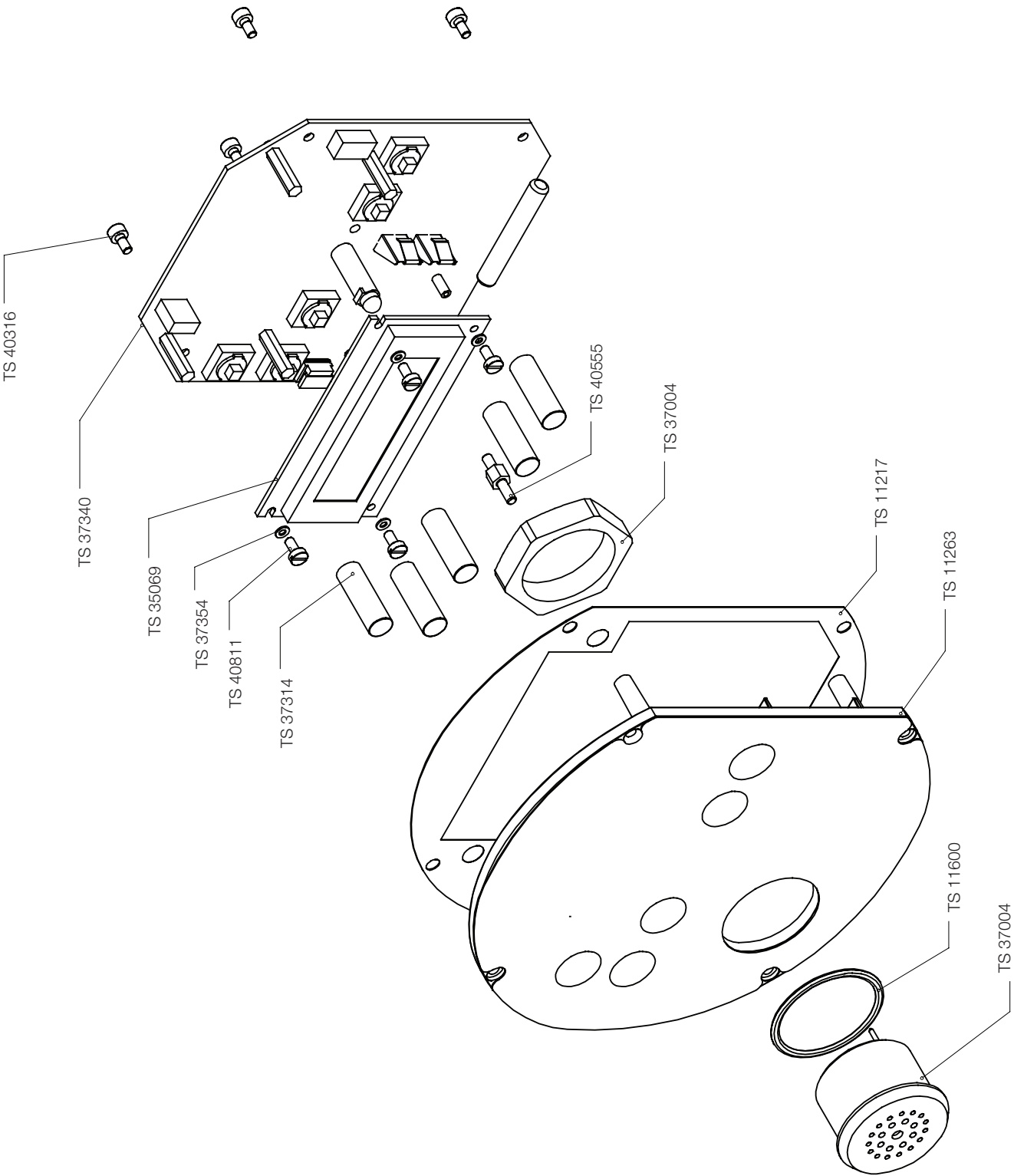


Figure 13-2: display unit assembly TS 10210, details

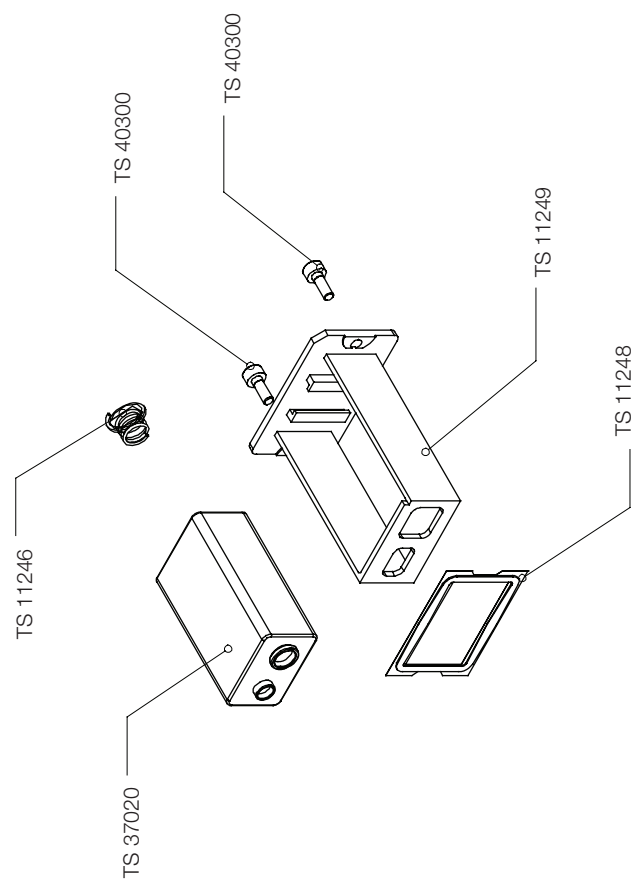


Figure 13-3: battery holder assembly TS 10189, details
 (the screws TS 40300 and the battery TS 37020 are not included in the TS 10189 assembly;
 these parts shall be ordered separately)

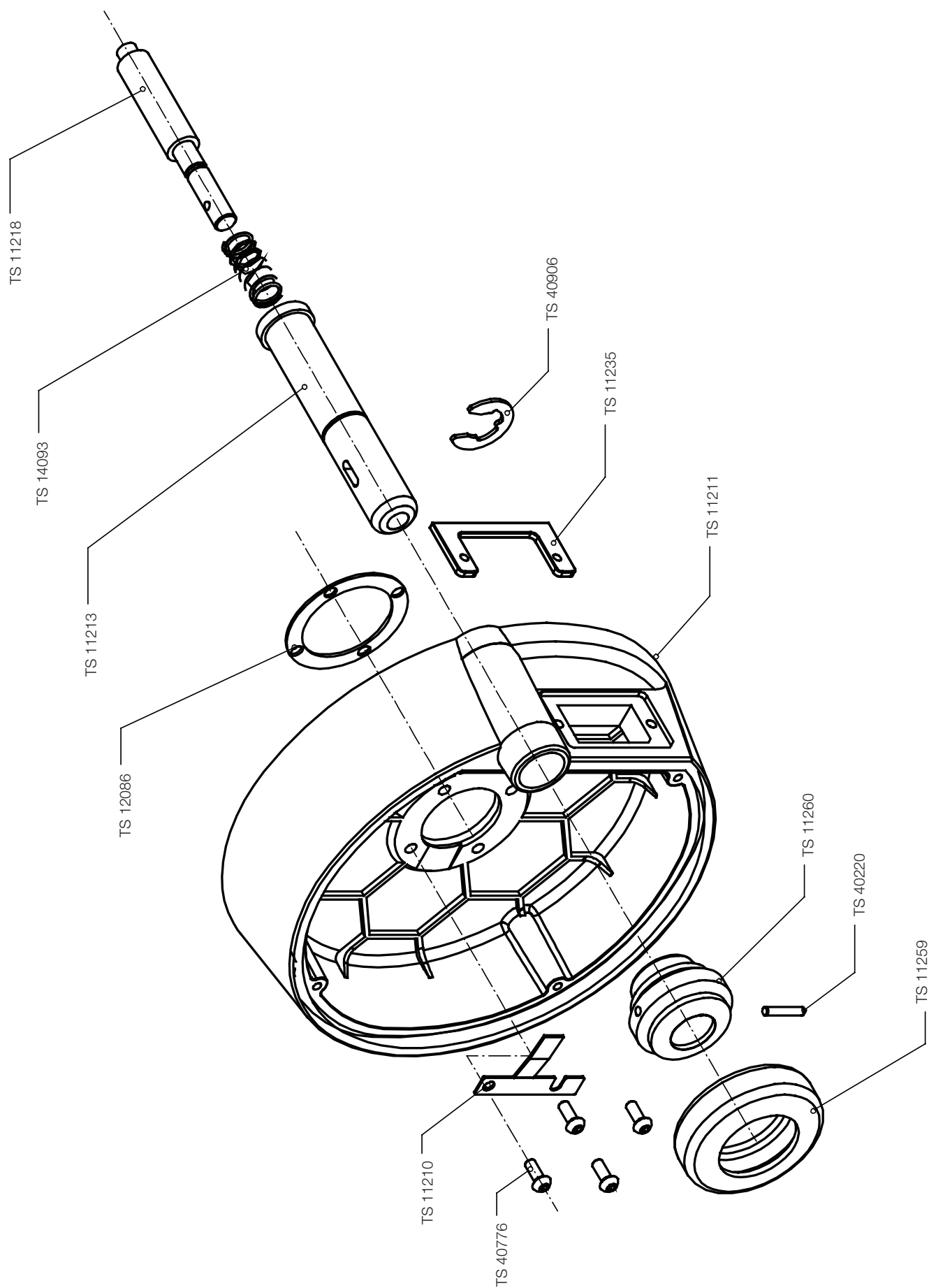


Figure 13-4: electronic box assembly TS 10190, details
(the screws TS 40765 and the plate TS 11210 are not included in the TS 10190 assembly; they shall be ordered separately)

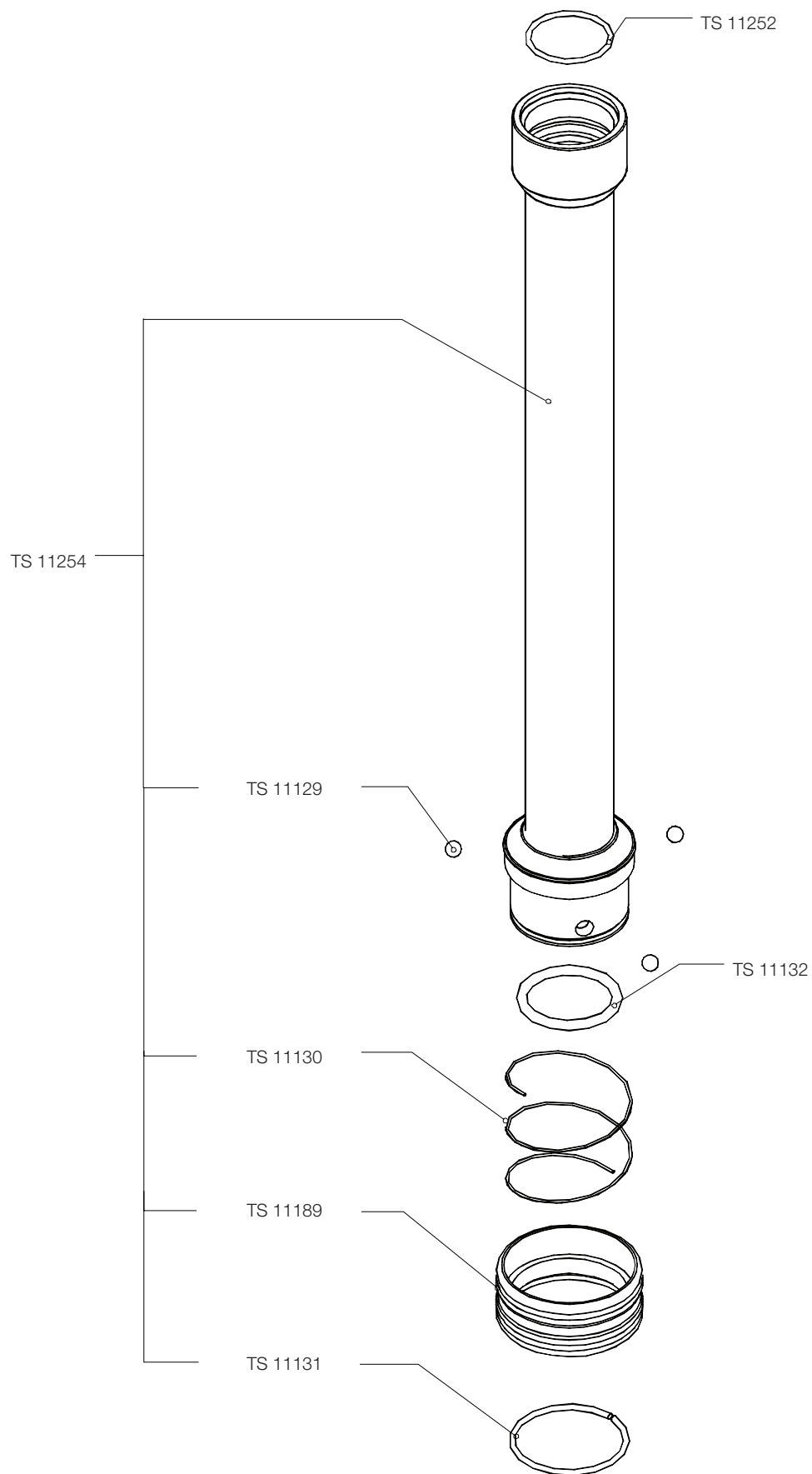


Figure 13-5: storage tube SS1-Q1 TS 10184, details

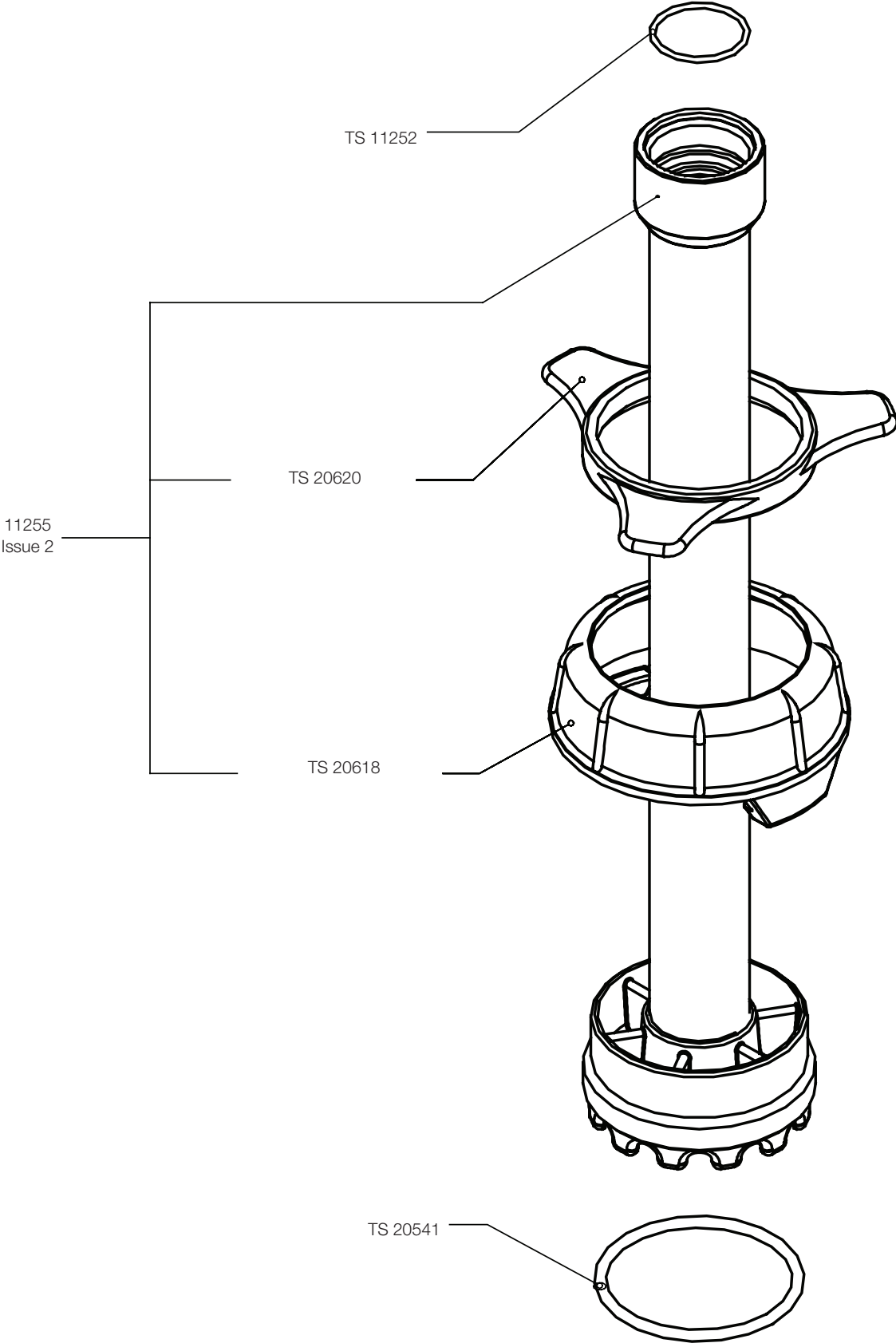


Figure 13-6: storage tube SS1-Q2 TS 10183, details

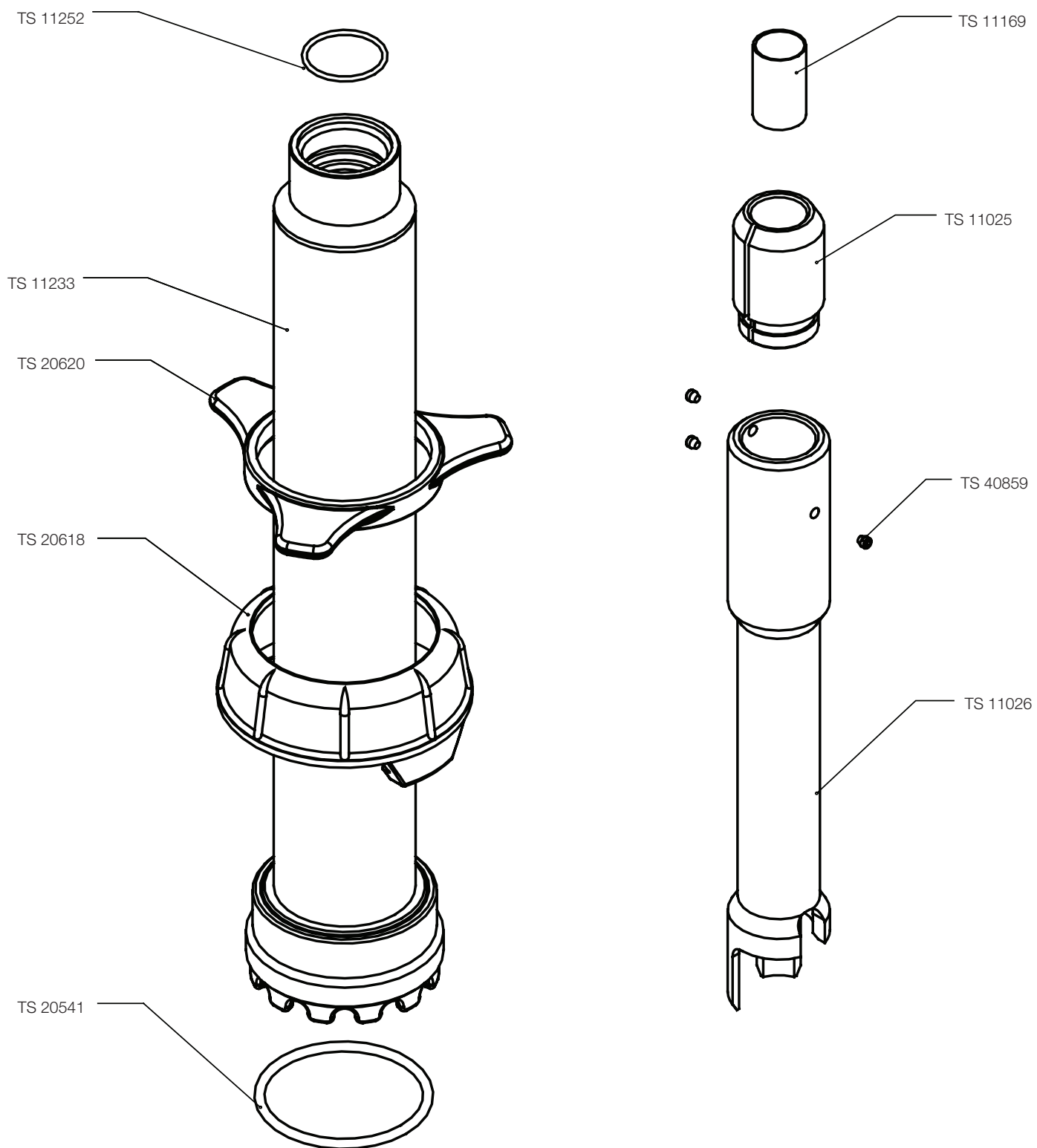


Figure 13-7: storage tube SS2-Q2 with load TS 10182, details

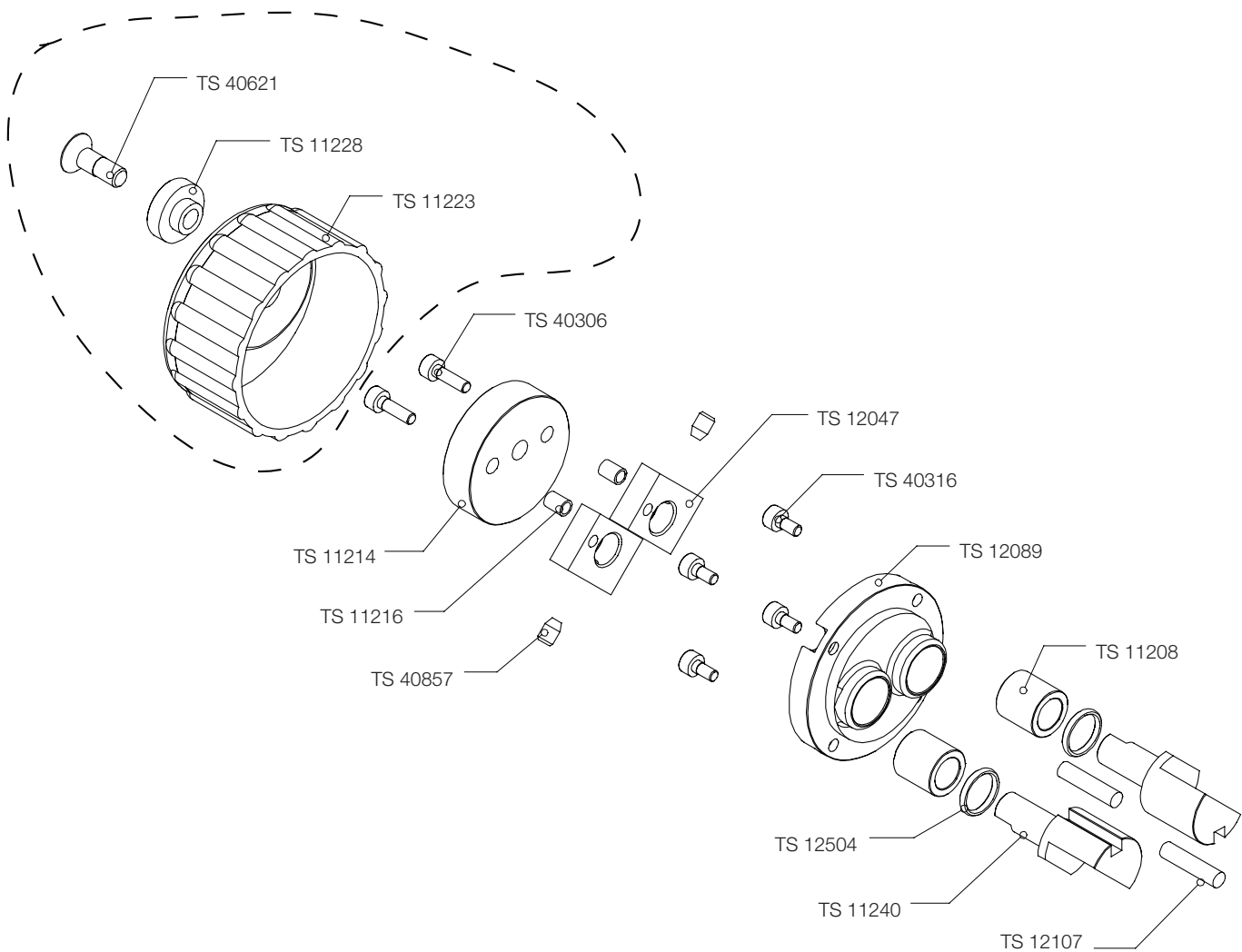


Figure 13-8: tape cleaner assembly TS 10205, details

(the items TS 40621, TS 11228, TS 11223 are not included in the TS 10205 assembly; they shall be ordered separately)

14. Valves drawings

14.1 Valves drawings list

Refer to the table and find the drawing in next section.

| Description | ND | TS |
|--|-------|-------|
| Valve C2-SS-W, 2" flange DUJ, weather cap | 20291 | 10083 |
| Valve C2-SS-SEC, 2" flange DUJ, security cover | 20287 | 10082 |
| Valve C2-SS-BL, 2" flange DUJ, blind cover | 20288 | 10081 |
| Valve C2-SS-BL, 2" female, blind cover | 30596 | 10085 |
| Valve C2-SS-W, 2" female, weather cap | 30391 | 10076 |
| Valve C2-SS-SEC, 2" female, security cover | 30374 | 10078 |
| Valve C1-SS-W, 1" thread male, weather cap | 30230 | 10055 |
| Deck valve A-4" SS-W, 4" flange, weather cap | 20252 | 10053 |
| Security cover with lock | 40495 | 10408 |
| Cover with weather cap | 41040 | 10415 |
| Weather cap assy | 40543 | 22609 |
| Blind cover | 41034 | 10414 |

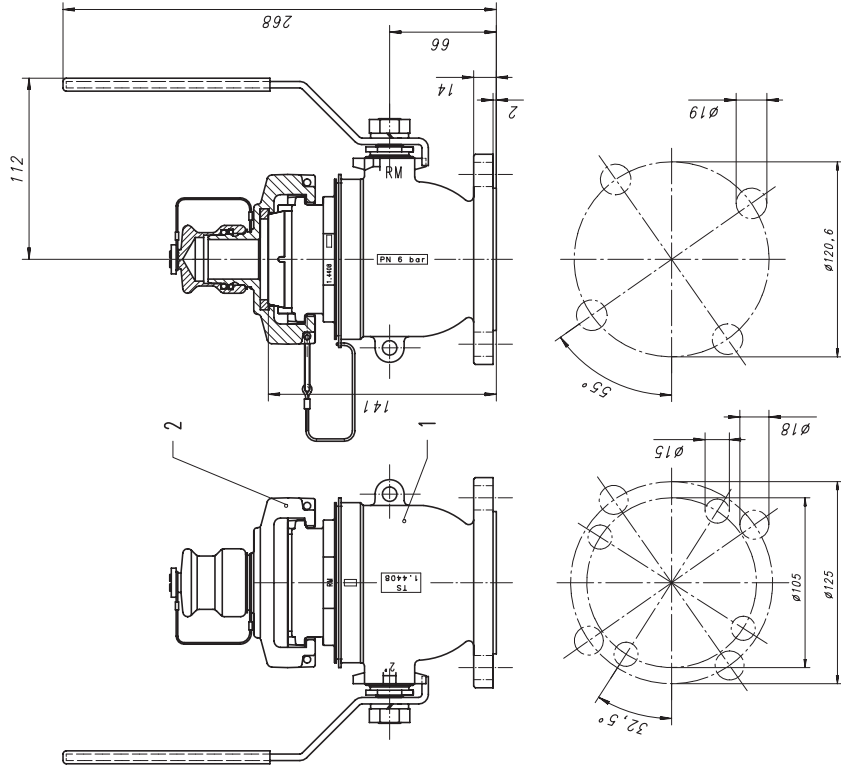
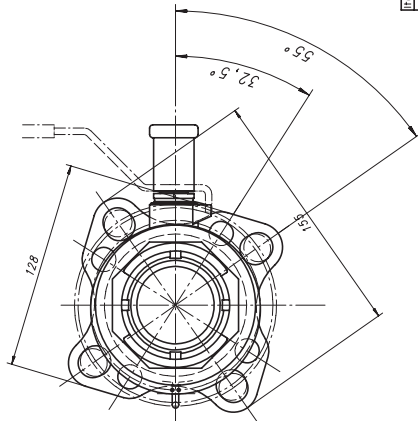
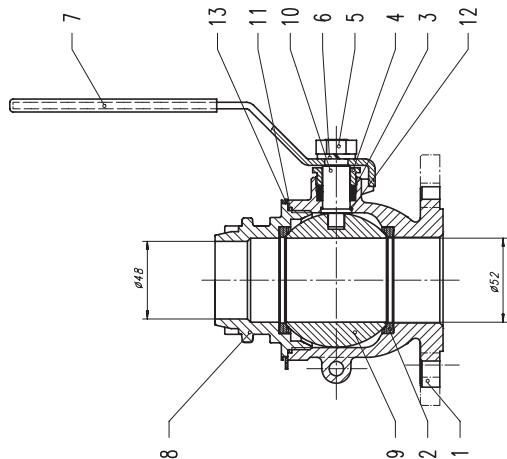
14.2 Drawings

See next pages.

TS 10413
ND 20283

Valve fits on flange:

- DIN PN10 DN50
- DIN PN16 DN50
- DIN PN25 DN50
- DIN PN40 DN50
- JIS 5K 50
- JIS 10K 50
- ANSI 150lbs 2"



| Item | QTY | Weight | Description | Material | TS # | ND # |
|---------------------------|-----|--------|------------------------------------|----------|-------|-------|
| 1 | 1 | 4480 | Compact valve C2 DUU | - | 10413 | 20283 |
| 2 | 1 | 5580 | Cover with weather cap | - | 10413 | 49540 |
| Weights: 5070 lbs, 0 Ert. | | | | | | |
| Item | QTY | Weight | Description | Material | TS # | ND # |
| 1 | 1 | 4480 | Compact valve C2 DUU | - | 10413 | 20283 |
| 2 | 1 | 5580 | Cover with weather cap | - | 10413 | 49540 |
| 3 | 1 | 100 | Stem packing 1/2 x 3/4 x 8.5 (2pc) | - | 10413 | 49540 |
| 4 | 1 | 100 | Gland | - | 10413 | 49540 |
| 5 | 1 | 100 | Nut | - | 10413 | 49540 |
| 6 | 1 | 100 | Spring washer | - | 10413 | 49540 |
| 7 | 1 | 100 | End cap | - | 10413 | 49540 |
| 8 | 1 | 100 | Ball DIN | - | 10413 | 49540 |
| 9 | 1 | 100 | Stem | - | 10413 | 49540 |
| 10 | 1 | 100 | Gasket # 86/90 x 25 | - | 10413 | 49540 |
| 11 | 1 | 100 | Gasket # 17/19 x 25 | - | 10413 | 49540 |
| 12 | 1 | 100 | Gasket # 17/19 x 25 | - | 10413 | 49540 |
| 13 | 1 | 100 | Gasket # 17/19 x 25 | - | 10413 | 49540 |

| Item | QTY | Weight | Description | Material | TS # | ND # |
|------|-----|--------|------------------------------------|----------|-------|-------|
| 1 | 1 | 4480 | Compact valve C2 DUU | - | 10413 | 20283 |
| 2 | 1 | 5580 | Cover with weather cap | - | 10413 | 49540 |
| 3 | 1 | 100 | Stem packing 1/2 x 3/4 x 8.5 (2pc) | - | 10413 | 49540 |
| 4 | 1 | 100 | Gland | - | 10413 | 49540 |
| 5 | 1 | 100 | Nut | - | 10413 | 49540 |
| 6 | 1 | 100 | Spring washer | - | 10413 | 49540 |
| 7 | 1 | 100 | End cap | - | 10413 | 49540 |
| 8 | 1 | 100 | Ball DIN | - | 10413 | 49540 |
| 9 | 1 | 100 | Stem | - | 10413 | 49540 |
| 10 | 1 | 100 | Gasket # 86/90 x 25 | - | 10413 | 49540 |
| 11 | 1 | 100 | Gasket # 17/19 x 25 | - | 10413 | 49540 |
| 12 | 1 | 100 | Gasket # 17/19 x 25 | - | 10413 | 49540 |
| 13 | 1 | 100 | Gasket # 17/19 x 25 | - | 10413 | 49540 |

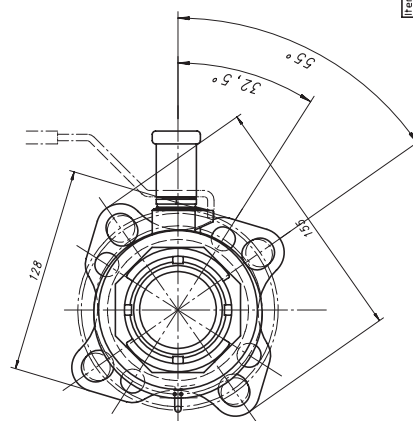
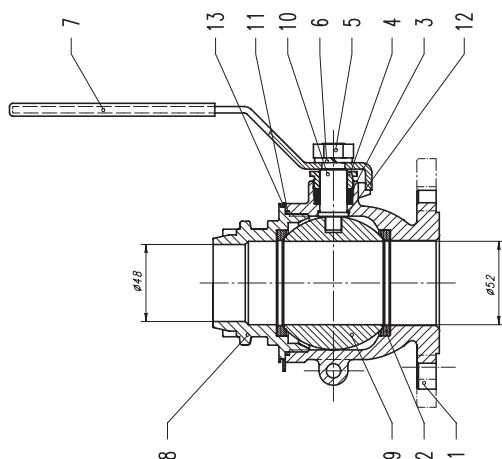
Enraf Tanksystem SA
RUE DE LA VALLEE 10
B-1400 BRUXELLES
Tel: 02 26 89 15 00 Fax: 02 26 89 15 05

TS 10413
ND 20283

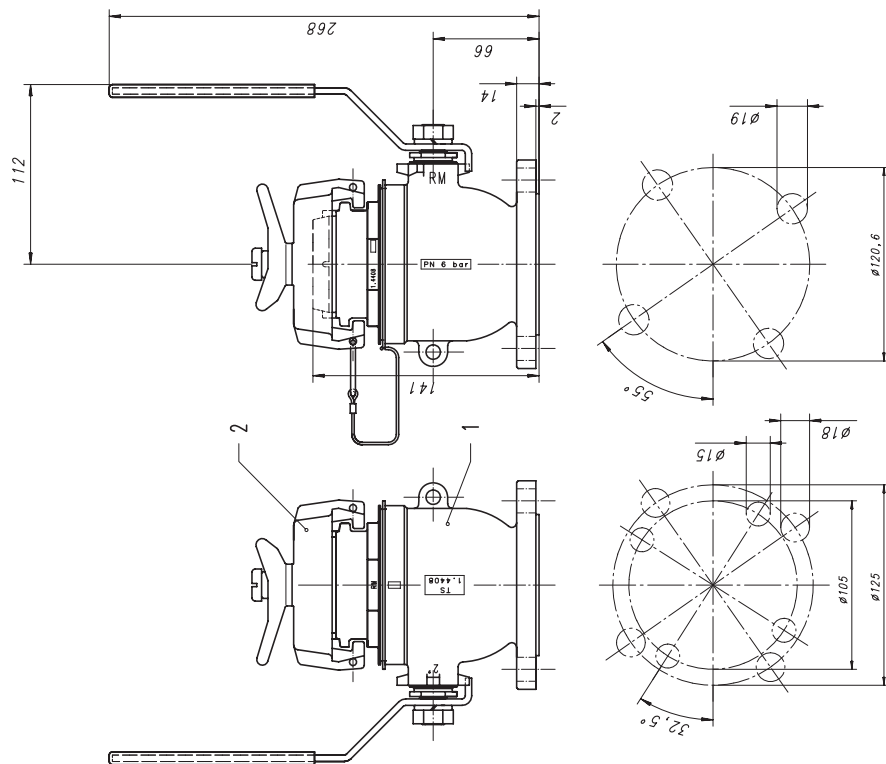
Valve fits on flange:

- DIN PN10 DN50
DIN PN16 DN50
DIN PN25 DN50
DIN PN40 DN50

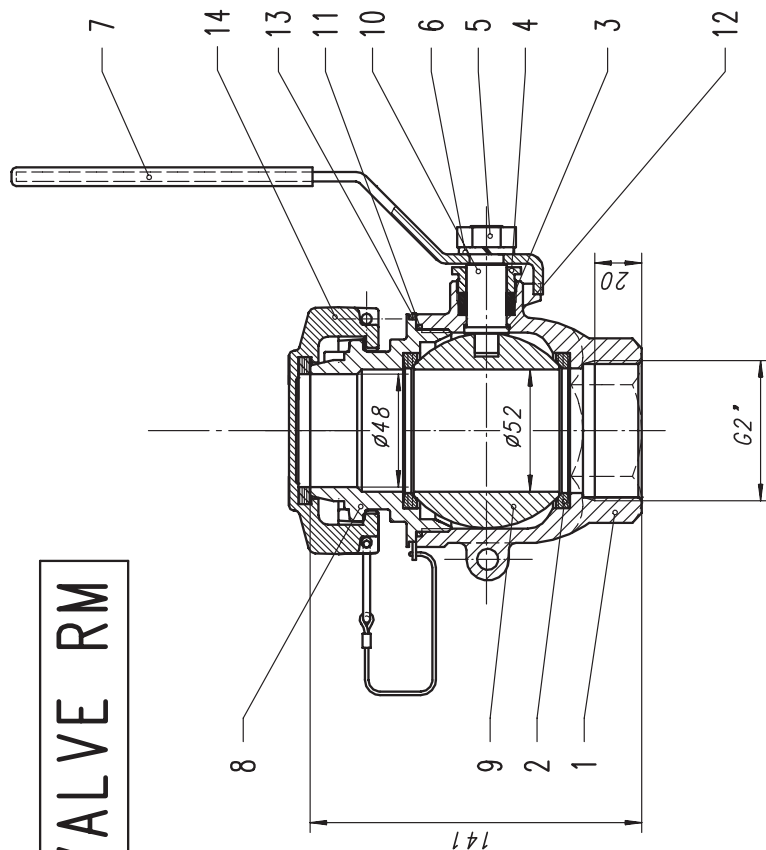
- JIS 5K 50
JIS 10K 50
ANSI 150lbs 2"



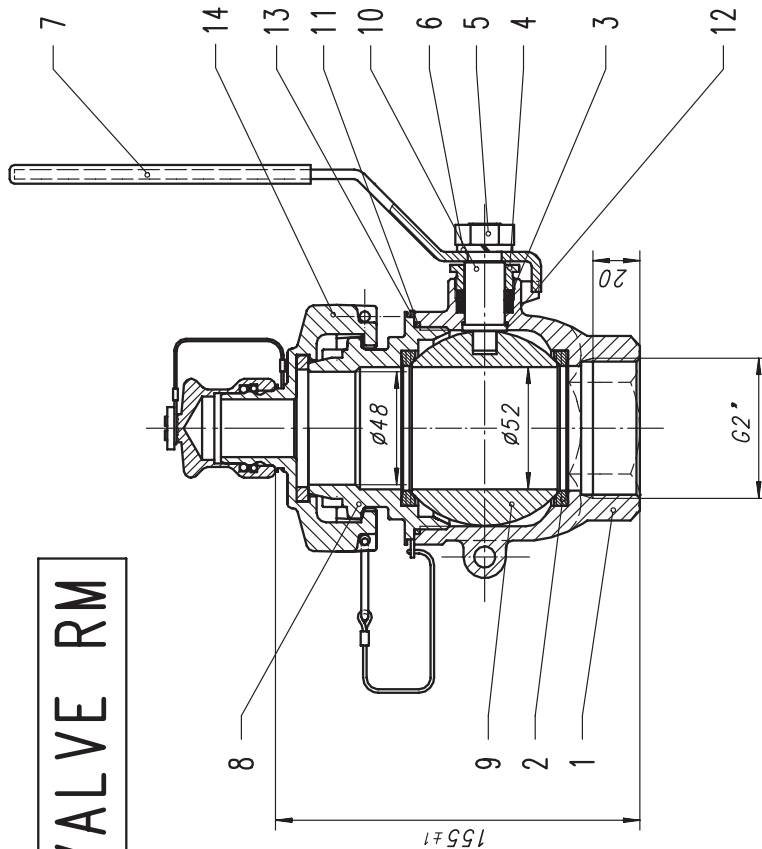
| Item | Unit | Weight | Description | Material | IS # | IS # |
|------|------|--------|---|------------|-------|-------|
| 1 | kg | 1 | Base (PU) | PU | 26630 | 40772 |
| 2 | kg | 2 | 0 Stem | PU | 26630 | 40772 |
| 3 | 1 | 0 | Stem ϕ 53/66 x 6 | PFE | 26632 | 40774 |
| 4 | 1 | 0 | Stem packing ϕ 17/23.9 x 8.5 (2pcrs) | PFE | 26632 | 40774 |
| 5 | 1 | 0 | Gland | ISI 304 | 26632 | 40774 |
| 6 | 1 | 0 | Nut | ISI 304 | 26633 | - |
| 7 | 1 | 0 | Spring washer | ISI 304 | 26634 | 40775 |
| 8 | 1 | 20 | End cap | AIN304/PFE | 26635 | 40775 |
| 9 | 1 | 0 | End cap | 14.0.08 | 26650 | - |
| 10 | 1 | 0 | Bolt, DIN | 1.4.3.36 | 26645 | 40780 |
| 11 | 1 | 0 | Stem | ISI 316 | 26638 | 40777 |
| 12 | 1 | 0 | Basket ϕ 53/68 x 2.5 | PFE | 26640 | 40778 |
| 13 | 1 | 0 | Washer | ISI 304 | 26641 | 40779 |
| 14 | 1 | 0 | Washer for cable on valve | ISI 304 | 26648 | 40992 |

[illegible]

VALVE RM



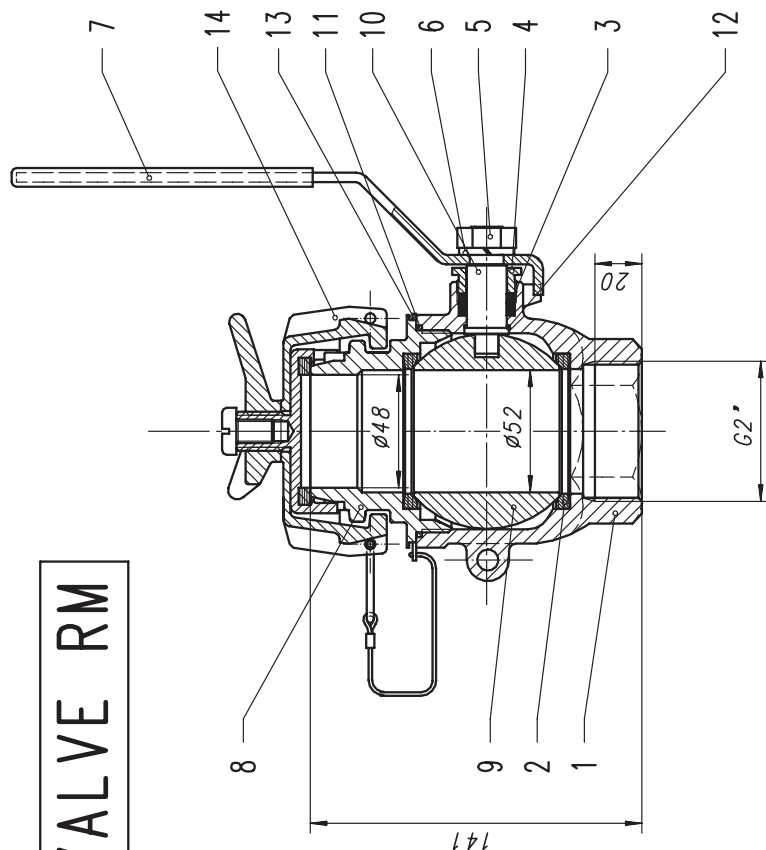
| Item | Q't | Weight | Description | Material | TS # | ND # |
|---|------|--------|------------------|----------|-------|-------|
| 14 | 1 | 370 | Blind cover assy | - | 10414 | 41034 |
| TOLERANCES UNLESS OTHERWISE SPECIFIED | | | | | | |
| Norm. Size | Over | 6 | 30 | 100 | 300 | 1000 |
| Fit | To | 6 | 30 | 100 | 300 | 1000 |
| Free | ± | 0.05 | 0.1 | 0.15 | 0.2 | 0.3 |
| | | | | | | 0.5 |
| | | | | | | 0.1* |
| REMOVE ALL BURRS AND SHARP EDGES | | | | | | |
| Control: | | | | | | |
| Drawn: UPR 21.04.1994 | | | | | | |
| 1:2 | | | | | | |
| Th. 4300 Eff. | | | | | | |
| MPSA 4110 | | | | | | |
| Replaced by: ND | | | | | | |
| Replacement for: ND | | | | | | |
| TS 10085 | | | | | | |
| ND 30596 | | | | | | |
| REF ND | | | | | | |
| Valves | | | | | | |
| HERMETIC Compact Valve C2-SS-BL | | | | | | |
| 2" Female | | | | | | |
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| RUE DE L'INDUSTRIE 2 CH-1630 BULLE | | | | | | |
| Tel. +41 26 91 91 500 - Fax +41 26 91 91 505 | | | | | | |



| Item | Qt | Weight | Description | Material | TS # | ND # | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|------|--------|------------------------|--|------|--------|---------------------------------------|--|--|--|---------|--|--|------------|------|---|----|-----|-----|------|-----|----|---|----|-----|-----|------|------|---|------|-----|------|-----|-----|--|--|--|--|--|--|-----|--|--|--|--|--|--|------|
| 14 | 1 | 590 | Cover with weather cap | | | 4,1040 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table><tr><td colspan="4">TOLERANCES UNLESS OTHERWISE SPECIFIED</td><td colspan="3">Weight:</td></tr><tr><td>Norm. Size</td><td>Over</td><td>6</td><td>30</td><td>100</td><td>300</td><td>1000</td></tr><tr><td>Fit</td><td>To</td><td>6</td><td>30</td><td>100</td><td>300</td><td>1000</td></tr><tr><td>Fine</td><td>±</td><td>0.05</td><td>0.1</td><td>0.15</td><td>0.2</td><td>0.3</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td>0.5</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td><td>0.1*</td></tr></table> | | | | | | | TOLERANCES UNLESS OTHERWISE SPECIFIED | | | | Weight: | | | Norm. Size | Over | 6 | 30 | 100 | 300 | 1000 | Fit | To | 6 | 30 | 100 | 300 | 1000 | Fine | ± | 0.05 | 0.1 | 0.15 | 0.2 | 0.3 | | | | | | | 0.5 | | | | | | | 0.1* |
| TOLERANCES UNLESS OTHERWISE SPECIFIED | | | | Weight: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Norm. Size | Over | 6 | 30 | 100 | 300 | 1000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Fit | To | 6 | 30 | 100 | 300 | 1000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Fine | ± | 0.05 | 0.1 | 0.15 | 0.2 | 0.3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | 0.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | 0.1* | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| REMOVE ALL BURRS AND SHARP EDGES | | | | 1:2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Drain: UPR 21.04.1994 | | | | Replaced by: ND | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Valves | | | | TS 10076 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HERMETIC Compact Valve C2SS | | | | ND 30391 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2" Female | | | | REF ND | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| Date | | | | RUE DE L'INDUSTRIE 2 CH-1630 BULLE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Viso | | | | Tel.: +41 26 91 500 - Fax: +41 26 91 505 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Item | Qt | Weight | Description | Material | TS # | ND # |
|------|----|--------|--------------------------------------|------------|-------|-------|
| 1 | 1 | 0 | Body 2" female | 1.4408 | 22646 | - |
| 2 | 2 | 0 | Seal Ø 53/66 x 6 | PTFE | 22630 | 40772 |
| 3 | 1 | 0 | Stem packing Ø 17/23,9 x 8,5 (2pres) | PTFE | 22631 | 40773 |
| 4 | 1 | 0 | Gland | AISI 304 | 22632 | 40774 |
| 5 | 1 | 0 | Nut | AISI 304 | 22633 | - |
| 6 | 1 | 0 | Spring washer | AISI 304 | 22634 | - |
| 7 | 1 | 207 | Handle | AISI304/PE | 22635 | 40775 |
| 8 | 1 | 0 | End cap | 1.4408 | 22650 | - |
| 9 | 1 | 0 | Ball 2" | 1.4436 | 22645 | 40780 |
| 10 | 1 | 0 | Stem | AISI 316 | 22638 | 40777 |
| 11 | 1 | 0 | Gasket Ø 86/90 x 2,5 | PTFE | 22640 | 40778 |
| 12 | 1 | 0 | Gasket Ø 17/19 x 1 | PTFE | 22641 | 40779 |
| 13 | 1 | 0 | Washer for cable on valve | AISI 304 | 22648 | 40996 |

VALVE RM

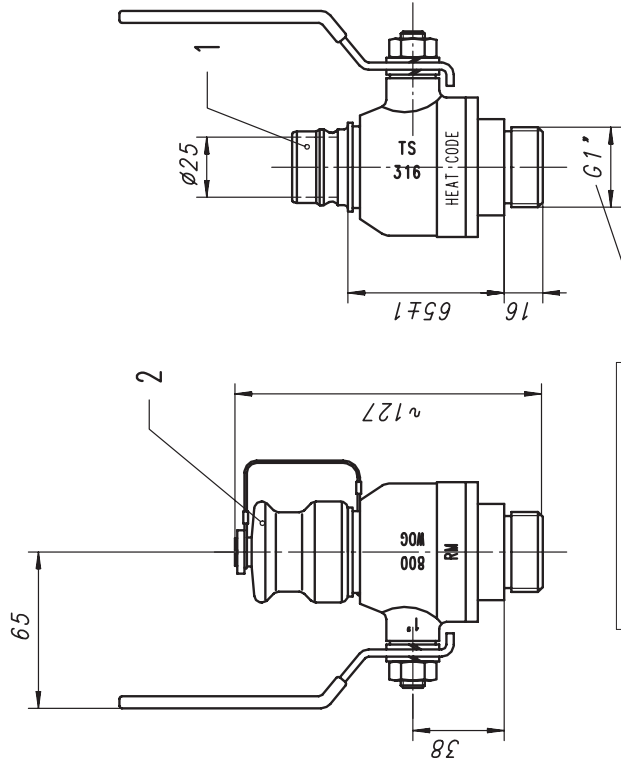
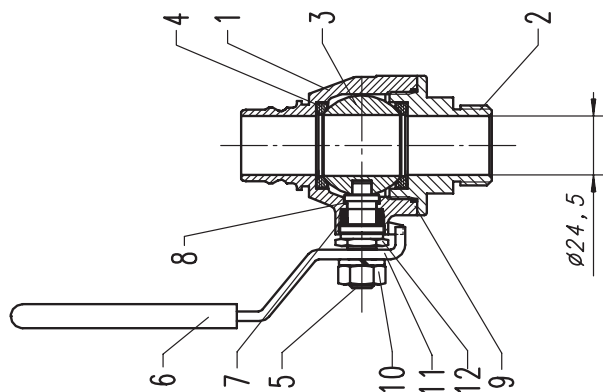


| Item | | Qt | Weight | Description | | Material | TS # | ND # |
|--|--|----------------|--------|--|------|----------|------|----------|
| 14 | | 1 | 957 | Security cover w/lock | | - | | 40495 |
| TOLERANCES UNLESS OTHERWISE SPECIFIED | | | | | | | | |
| Norm. Size | | Over | 6 | 30 | 100 | 300 | 1000 | Angles |
| Fit | | To | 6 | 30 | 100 | 300 | 1000 | 2000 |
| Fine | | ± | 0.05 | 0.1 | 0.15 | 0.2 | 0.3 | 0.5 0.1* |
| REMOVE ALL BURRS AND SHARP EDGES | | | | | | | | |
| Drawn: | | UPR 21.04.1994 | | Control: | | | | |
| Weight: | | 4746 Eff. | | 1:2 | | | | |
| MPSA | | 4110 | | Replaced for: | | ND | | |
| Replaced by: | | ND | | TS 10078 | | | | |
| ND 30374 | | REF ND | | HERMETIC Compact Valve C2-SS-SEC | | | | |
| 2" Female | | | | Valves | | | | |
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| Tel. +41 26 91 91 500 - Fax +41 26 91 91 505 | | | | | | | | |

| Item | Qt | Weight | Description | Material | TS # | ND # |
|------|----|--------|--|------------|-------|-------|
| 1 | 1 | 0 | Body 2" female | 1.4408 | 22646 | - |
| 2 | 2 | 0 | Seat ø 53/66 x 6 | PTFE | 22630 | 40772 |
| 3 | 1 | 0 | Stem packing ø 17/23.9 x 8.5 (2pieces) | PTFE | 22631 | 40773 |
| 4 | 1 | 0 | Gland | AISI 304 | 22632 | 40774 |
| 5 | 1 | 0 | Nut | AISI 304 | 22633 | - |
| 6 | 1 | 0 | Spring washer | AISI 304 | 22634 | - |
| 7 | 1 | 207 | Handle | AISI304/PE | 22635 | 40775 |
| 8 | 1 | 0 | End cap | 1.4408 | 22650 | - |
| 9 | 1 | 0 | Bail 2" | 1.4436 | 22645 | 40780 |
| 10 | 1 | 0 | Stem | AISI 316 | 22638 | 40777 |
| 11 | 1 | 0 | Gasket ø 86/90 x 2.5 | PTFE | 22640 | 40778 |
| 12 | 1 | 0 | Gasket ø 17/17 x 1 | PTFE | 22641 | 40779 |
| 13 | 1 | 0 | Washer for cable on Valve | AISI 304 | 22648 | 40996 |

TS 10405
ND 30373

VALVE RM

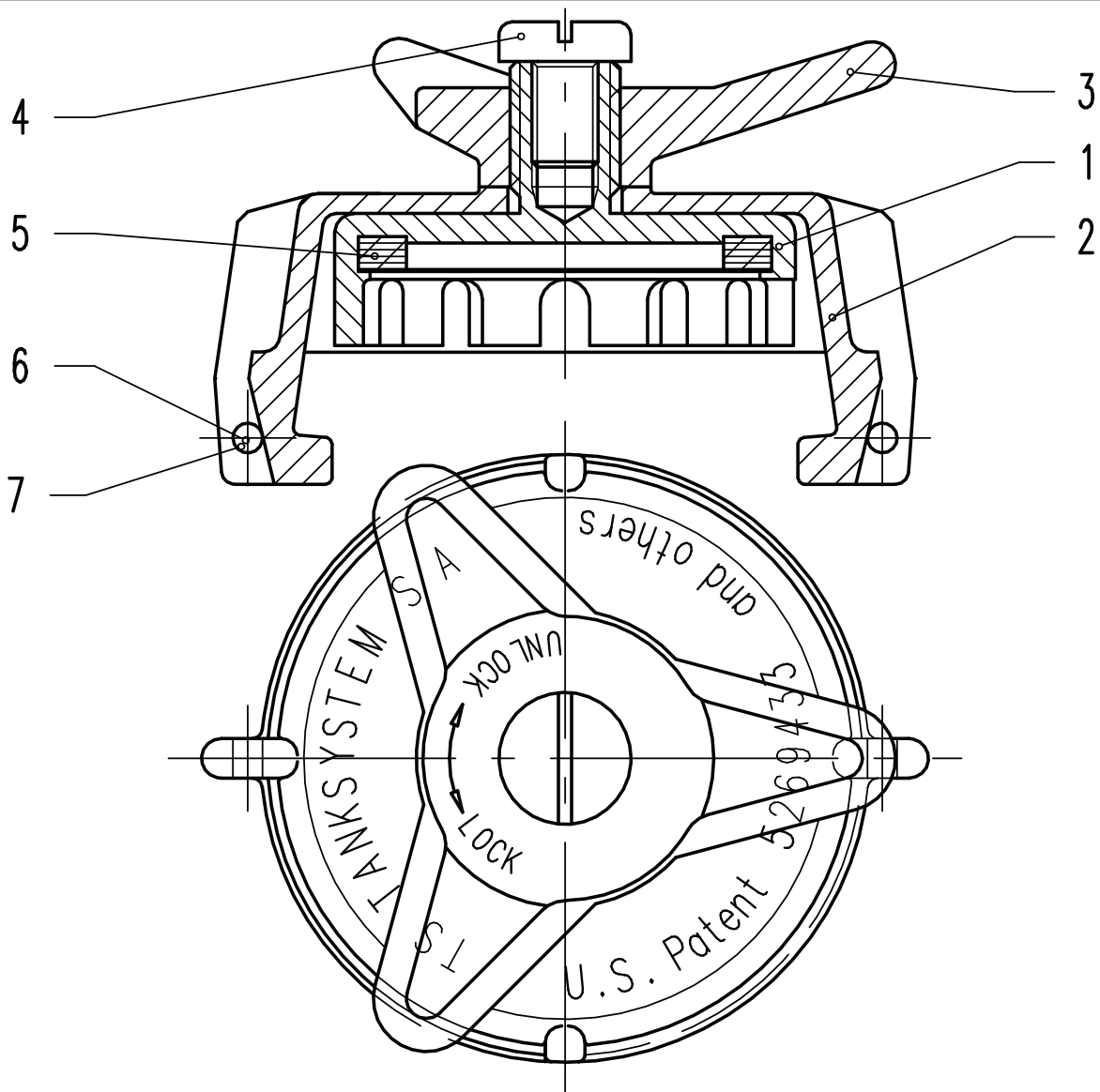


Pipe thread parallel G1"
Conforming to standard
ISO 228 (B.S. 2779 : 1973)

Please check production code when ordering parts :
RM letters use top parts list
No letters or RH contact TS Tanksystem for parts list

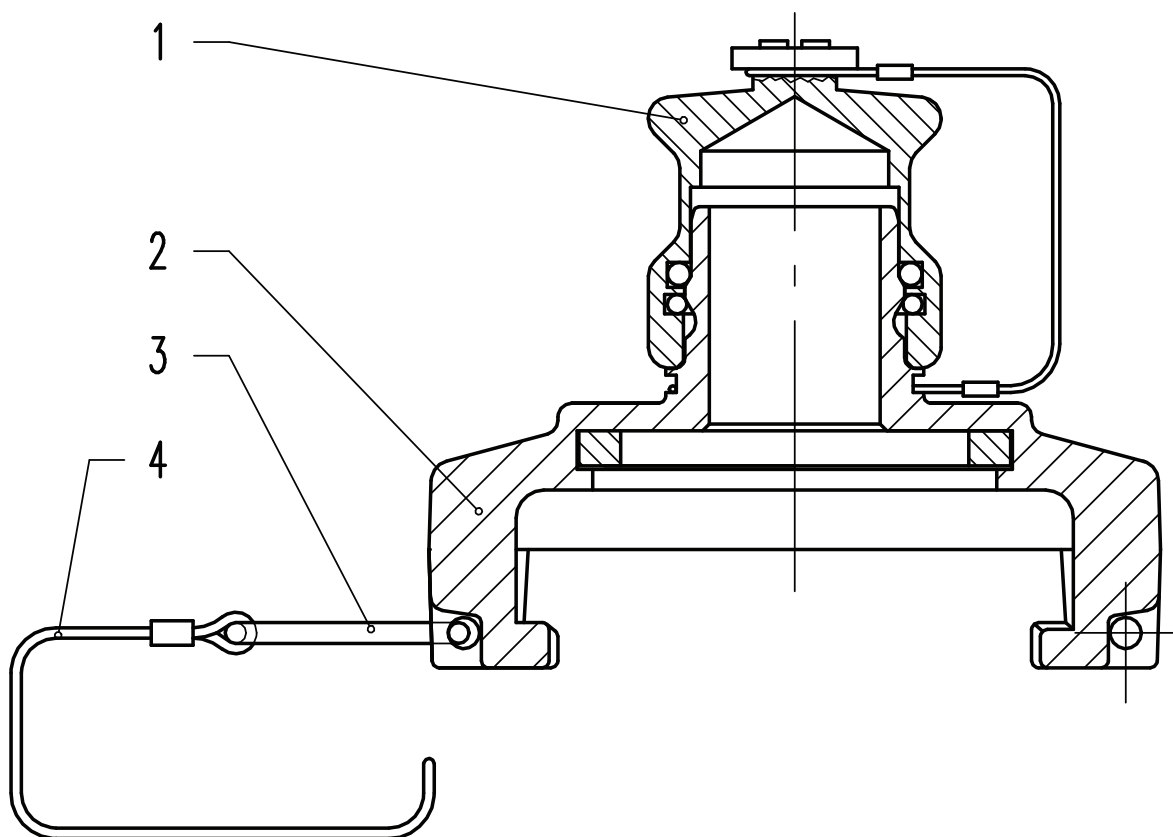
| Item | Qt | Weight | Description | Material | TS # | ND # |
|--|------|--------|--|----------|-------|-------|
| 1 | 1 | 860 | Valve Compact 1" | - | 10405 | 30373 |
| 2 | 1 | 166 | Weather cap assy | - | 22609 | 40543 |
| TOLERANCES UNLESS OTHERWISE SPECIFIED | | | | | | |
| Norm. Size | Over | 6 | 30 | 100 | 300 | 1000 |
| Fit | To | 6 | 30 | 100 | 300 | 1000 |
| ± | | 0.05 | 0.1 | 0.15 | 0.2 | 0.3 |
| ± | | 0.05 | 0.1 | 0.15 | 0.2 | 0.3 |
| REMOVE ALL BURRS AND SHARP EDGES | | | | | | |
| Drawn: | | | Control: | | | |
| MQS | | | 14.07.1992 | | | |
| 1:2 | | | MPSA 4110 | | | |
| Replaced by: | | | ND | | | |
| Valves | | | TS 10055 | | | |
| Hermetic Compact Valve C1SS | | | ND 30230 | | | |
| | | | REF ND | | | |
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| | | | RUE DE L'INDUSTRIE 2 CH-1630 BULLE Tel. +41 26 91 500 - Fax +41 26 91 505 | | | |

| Item | Qt | Weight | Description | Material | TS # | ND # |
|------|----|--------|-----------------------------------|------------|-------|-------|
| 1 | 1 | 0 | Body | CF8M | 22617 | 30552 |
| 2 | 1 | 0 | End cap | CF8M | 22618 | 30553 |
| 3 | 1 | 0 | Ball | CF8M | 22619 | 40756 |
| 4 | 2 | 0 | Seat 25.6/36 x 5 | PTFE | 22620 | 40757 |
| 5 | 1 | 0 | Stem | AISI 316 | 22621 | 40758 |
| 6 | 1 | 0 | Plastic coated handle | AISI304/PE | 22622 | 40832 |
| 7 | 1 | 0 | Stem packing 12/17.5 x 7.5 (2pcs) | PTFE | 22623 | 40759 |
| 8 | 1 | 0 | Stem seal 12/14.2 x 1 | PTFE | 22624 | 40760 |
| 9 | 1 | 0 | Gasket 44.5/46.8 x 2.5 | PTFE | 22625 | 40761 |
| 10 | 1 | 0 | Nut | AISI 304 | 22626 | - |
| 11 | 1 | 0 | Spring washer | AISI 304 | 22627 | - |
| 12 | 1 | 0 | Gland | AISI 304 | 22628 | 40762 |



| Item | Qt | Weight | Description | Material | TS # | ND # |
|------|----|--------|-------------------------------------|----------|-------|-------|
| 1 | 1 | 220 | Gasket holder | AISI 316 | 22714 | 40492 |
| 2 | 1 | 507 | Cover | AISI 316 | 22715 | 30360 |
| 3 | 1 | 196 | Lock 3/8" | AISI 316 | 22716 | 40521 |
| 4 | 1 | 20 | Slotted pan head mach. screw M10x16 | A4 | 40708 | 41004 |
| 5 | 1 | 11 | Gasket 62/50x5 | Viton | 22713 | |
| 6 | 1 | 5 | S Holder | AISI 304 | 11902 | 40537 |
| 7 | 1 | 7 | Short cable assy | - | 55135 | 40999 |

| | | | | | |
|---|------|---------------------|------|--|-------|
| TOLERANCES UNLESS OTHERWISE SPECIFIED | | Weight: | | ISSUE 3 : 9.2.1996 | |
| Norm. Size | Over | 6 | 30 | 100 | 300 |
| Fit | To | 6 | 30 | 100 | 300 |
| Fine | ± | 0,05 | 0,1 | 0,15 | 0,2 |
| REMOVE ALL BURRS AND SHARP EDGES | | 1000 | 3000 | 10000 | 20000 |
| Angles | | 0,3 | 0,5 | 0,1° | |
| Drawn: CPI 24.01.1990 | | Control: | | 1:1 | |
| HERMetic Deck valve C2SS | | MPSA | | Replacement for: ND | |
| Security cover with lock | | Replaced by: ND | | TS 10408 | |
| | | | | ND 40495 | |
| | | | | REF ND 20135/20136/20146/30374 | |
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| Item | Qt | Weight | Description | Material | TS # | ND # |
|------|----|--------|-----------------------|----------|-------|-------|
| 1 | 1 | 166 | Weather cap assy | AISI 316 | 22609 | 40543 |
| 2 | 1 | 401 | Connector 1" - 2" FKM | - | 22563 | 41032 |
| 3 | 1 | 5 | S Holder | AISI 304 | 11902 | 40537 |
| 4 | 1 | 7 | Short cable assy | - | 55135 | 40999 |

| TOLERANCES UNLESS OTHERWISE SPECIFIED | | | | | | | |
|---------------------------------------|------|------|-----|------|-----|------|--------|
| Norm. Size | Over | 6 | 30 | 100 | 300 | 1000 | Angles |
| Fit | To | 6 | 30 | 100 | 300 | 1000 | 2000 |
| Fine | ± | 0,05 | 0,1 | 0,15 | 0,2 | 0,3 | 0,5 |
| | | | | | | | 0,1° |

Weight: 579 Th.
0 Eff.

ISSUE 1 : 1.4.1997

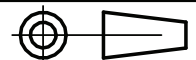
REMOVE ALL BURRS AND SHARP EDGES

Drawn: UPR 24.01.1990

Control:

1:1

MPSA
4110



Replacement for:
ND

Replaced by:
ND

HERmetic Deck valve C2SS
Cover with weather cap

TS 10415

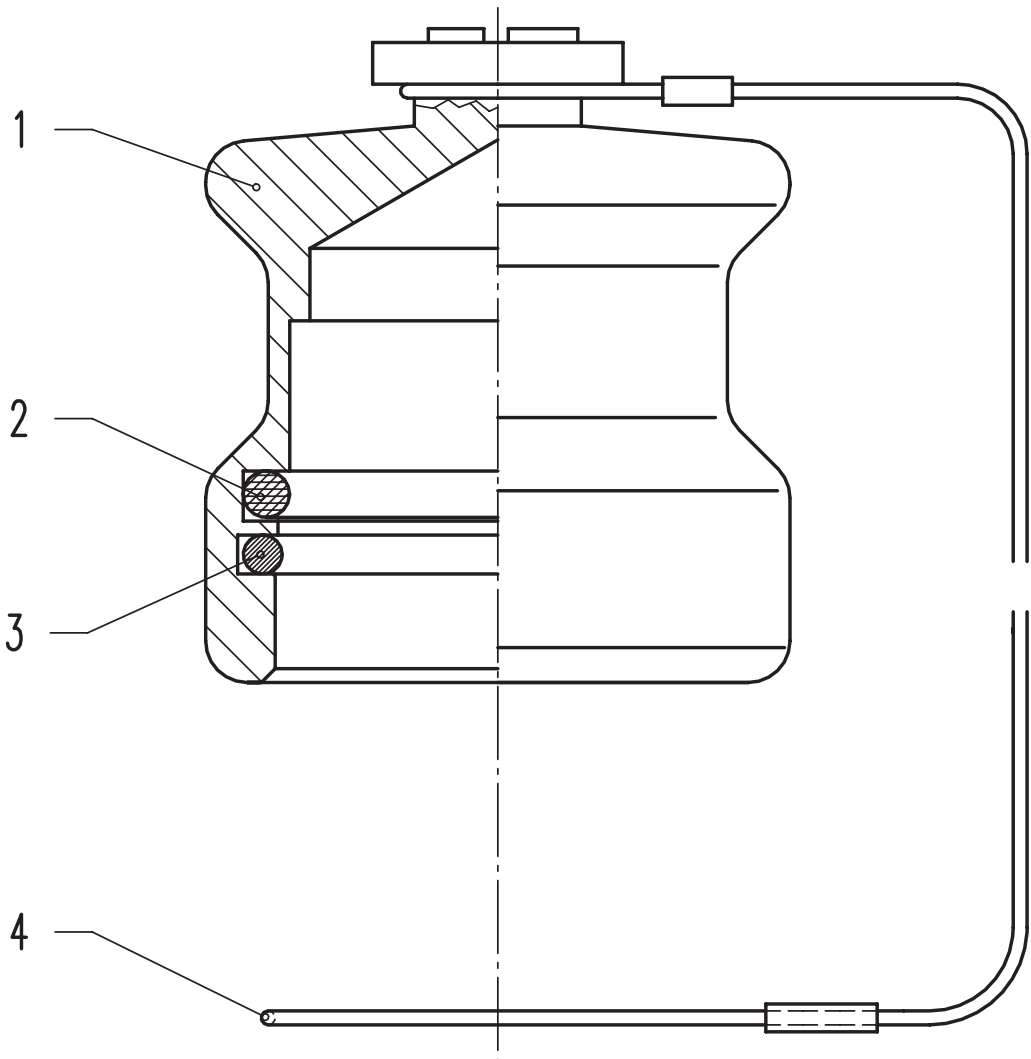
ND 41040

REF ND


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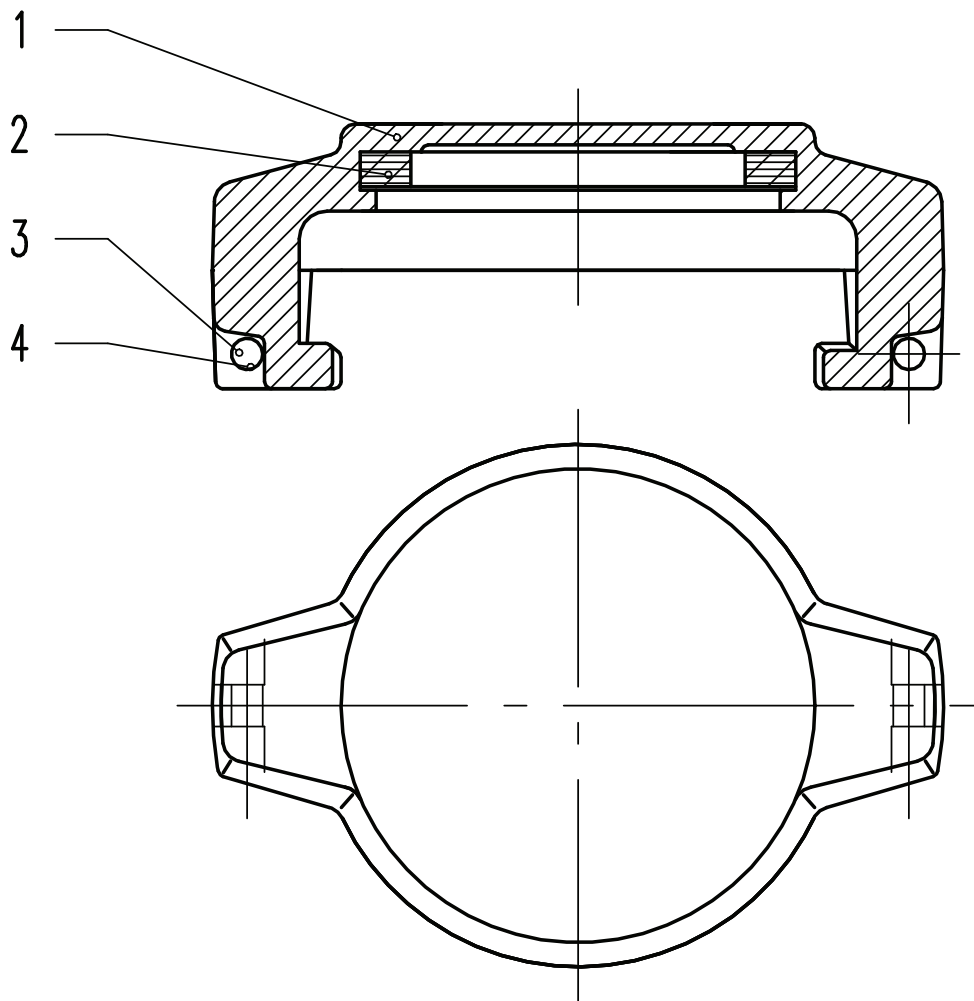
Enraf Tanksystem SA

RUE DE L'INDUSTRIE 2 CH-1630 BULLE
Tel. +41 26 91 91 500 - Fax +41 26 91 91 505





| Item | Qt | Weight | Description | Material | TS # | ND # |
|------|----|--------|-------------------------------|----------|-------|-------|
| 1 | 1 | 180 | Cap for nippel | 1.4408 | 22608 | 30396 |
| 2 | 1 | 2 | O-Ring $\phi 29.7 \times 3.5$ | FKM | 11132 | - |
| 3 | 1 | 4 | Clip for weather cap | AISI 301 | 40762 | 40542 |
| 4 | 1 | 4 | Cable assy | - | 55112 | 40525 |

| | | | | | | | | | | | |
|--|---------------------------------------|------|----------|------------|------|-----|------|--|--------------------------------|--------------------|---|
| Is Date Visa Modification | 4 | 1 | 4 | Cable assy | | | | | | 55112 | 40525 |
| | TOLERANCES UNLESS OTHERWISE SPECIFIED | | | | | | | | Weight: 190 Th. 190 Eff. | ISSUE 1 : 6.2.1992 | |
| | Norm.Size | Over | | 6 | 30 | 100 | 300 | 1000 | | | |
| | Fit | To | 6 | 30 | 100 | 300 | 1000 | 2000 | | | |
| | Fine | ± | 0,05 | 0,1 | 0,15 | 0,2 | 0,3 | 0,5 | 0,1° | | |
| | REMOVE ALL BURRS AND SHARP EDGES | | | | | | | | 2 : 1 | MPSA |  |
| | Drawn: | | Control: | | | | | | | | |
| | CPI 17.05.1994 | | | | | | | | Replacement for: | Replaced by: | |
| | ND 40402 | | | | | | | | ND | | |
| | Valves | | | | | | | | TS 22609 | | |
| Weather cap assy | | | | | | | | ND 40543 | | | |
| | | | | | | | | REF ND | | | |
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| | | | | | | | | RUE DE L'INDUSTRIE 2 CH-1630 BULLE Tel. +41 26 91 91 500 - Fax +41 26 91 91 505 | | | |



| Item | Qt | Weight | Description | Material | TS # | ND # |
|------|----|--------|------------------|----------|-------|-------|
| 1 | 1 | 332 | Blind cover | 1.4408 | 22651 | 41024 |
| 2 | 1 | 11 | Gasket 62/50x5 | FKM | 22713 | 20135 |
| 3 | 1 | 5 | S Holder | AISI 304 | 11902 | 40537 |
| 4 | 1 | 7 | Short cable assy | - | 55135 | 40999 |

| | | | | | | | | | | | | | | | | | | | | | | |
|--|----------|----|------|------|--------------|-----------------|---------------------------------------|----------|------|---------------------|------|--|------|--------------------|---------|-------------------|--------------|---|--|--|--|--|
| 1 | 28.11.97 | Is | Date | Visa | Modification | Material item 1 | TOLERANCES UNLESS OTHERWISE SPECIFIED | | | | | | | | Weight: | 355 Th. 0 Eff. | | ISSUE 1 : 28.11.1997 | | | | |
| | | | | | | | Norm.Size | Over | 6 | 30 | 100 | 300 | 1000 | Angles | | | | | | | | |
| | | | | | | | Fit | To | 6 | 30 | 100 | 300 | 1000 | 2000 | | | | | | | | |
| | | | | | | | Fine | ± | 0,05 | 0,1 | 0,15 | 0,2 | 0,3 | 0,5 | 0,1° | | | | | | | |
| | | | | | | | REMOVE ALL BURRS AND SHARP EDGES | | | | | | | | 1:1 | | MPSA 4110 |   | | | | |
| Drawn: UPR 27.11.1996 | | | | | | | | Control: | | | | Replacement for: ND | | Replaced by: ND | | | | | | | | |
| HERMetric Deck valve C2SS Blind cover assy | | | | | | | | | | TS 10414 | | ND 41034 | | REF ND 20288 | | | | | | | | |
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Honeywell

| General Manager | | | | |
|--------------------|------------|------------|--|--|
| Created / modified | Approved | Released | Remarks | |
| 6 | 2008/06/17 | 2008/06/17 | Update of the company logo - Honeywell | |
| 7 | 2008/08/28 | 2008/09/03 | Update of ATEX references & integration of IECEx declaration | |

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