

***Portable  
Tank Measuring  
System***





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## 1. What's PMS ?

### **PMS : Portable Tank Measuring System**

Tankers shall be provided with an effective Oil/Water Interface Detectors approved by the administration

#### **Semi-Closed(Restricted) Type : MODEL T2000-TFS-01**

which penetrates the tank and which, when in use, permits a small quantity of cargo vapour or liquid to be exposed to the atmosphere. When not in use, the device is completely closed. The design should ensure that no dangerous escape of tank contents (liquid or spray) can take place in opening the device.

#### **Closed(Gas-Tight) Type : MODEL T2000-TFC-01/02**

which penetrates the tank, but which is part of a closed system and keeps tank contents from being released. Examples are the float-type systems, electronic probe, magnetic probe and protected sight glass. Alternatively an indirect device which does not penetrate the tank shell and which is independent of the tank may be used. Examples are weighing of cargo, pipe flow meter.



## **2. APPLICABLE RULES**

**IMO Regulation 15 (3)(b)** : Effective oil/water interface detectors approved by the Administration shall be provided for a rapid and accurate determination of the oil/water interface in slop tanks and shall be available for use in other tanks where the separation of oil and water is effected and from which it is intended to discharge effluent direct to the sea.

**IMO Resolution MEPC.5(XIII) 1.1** : The instrument should be capable of providing a rapid and accurate determination of the oil/water interface in slop tanks and /or other tanks where the separation of oil and water is effected and from which it is intended to discharge effluent direct to the sea.

**IMO Resolution A.446(XI) 4.4.4** : Means such as level gauges, hand dipping and stripping system performance gauges as referred to in 4.4.8 shall be provided for checking that the bottom of every cargo tank is dry after crude oil washing. Suitable arrangements for hand dipping must be provided at the aftermost portion of a cargo tank and in three other suitable locations unless other approved means are fitted for efficiently ascertaining that the bottom of every cargo tank is dry. For the purpose of this paragraph, the cargo tank bottom shall be considered “dry” if there is no more than a small quantity of oil near the stripping suction with no accumulation of oil elsewhere in the tank.



### 3. Oil Storage Tank Function Item & Equipment

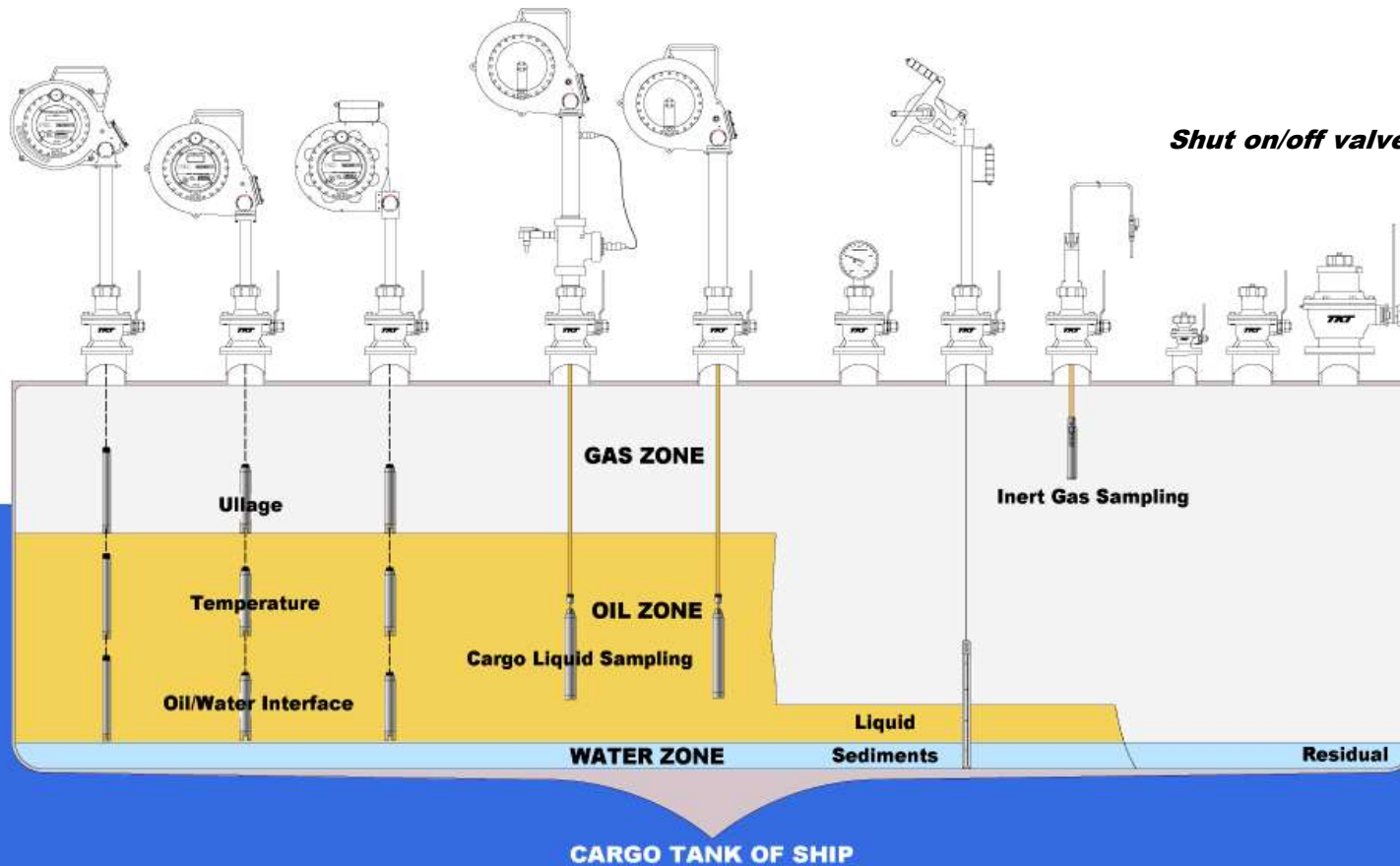
Function Item	Contents	Equipment Type
Ullage level	Ullage level gauging	- Closed(Gas-tight) type T2000-TFC-01/02 - Semi-closed type T2000-TFS-01
Oil-water interface level	Oil-water interface level gauging	
Oil temperature	Temperature gauging	
Dryness	Tank bottom liquid and sediments checking device	T2000-TLS-01
Liquid sampling	Cargo liquid sampling	T2000-TSS-01/02
Vapor control	Vapor lock installation of portable tank Measuring system	Vapor control valve
Oxygen	Oxygen and flammable gas concentration measuring	T2000-TOS-01
Inert gas	Inert gas sampling hose / adapter	T2000-TPG-01
	Inert gas pressure gauging	Inert gas pressure meter

## 4. All kinds of TANKTECH Portable Measuring System

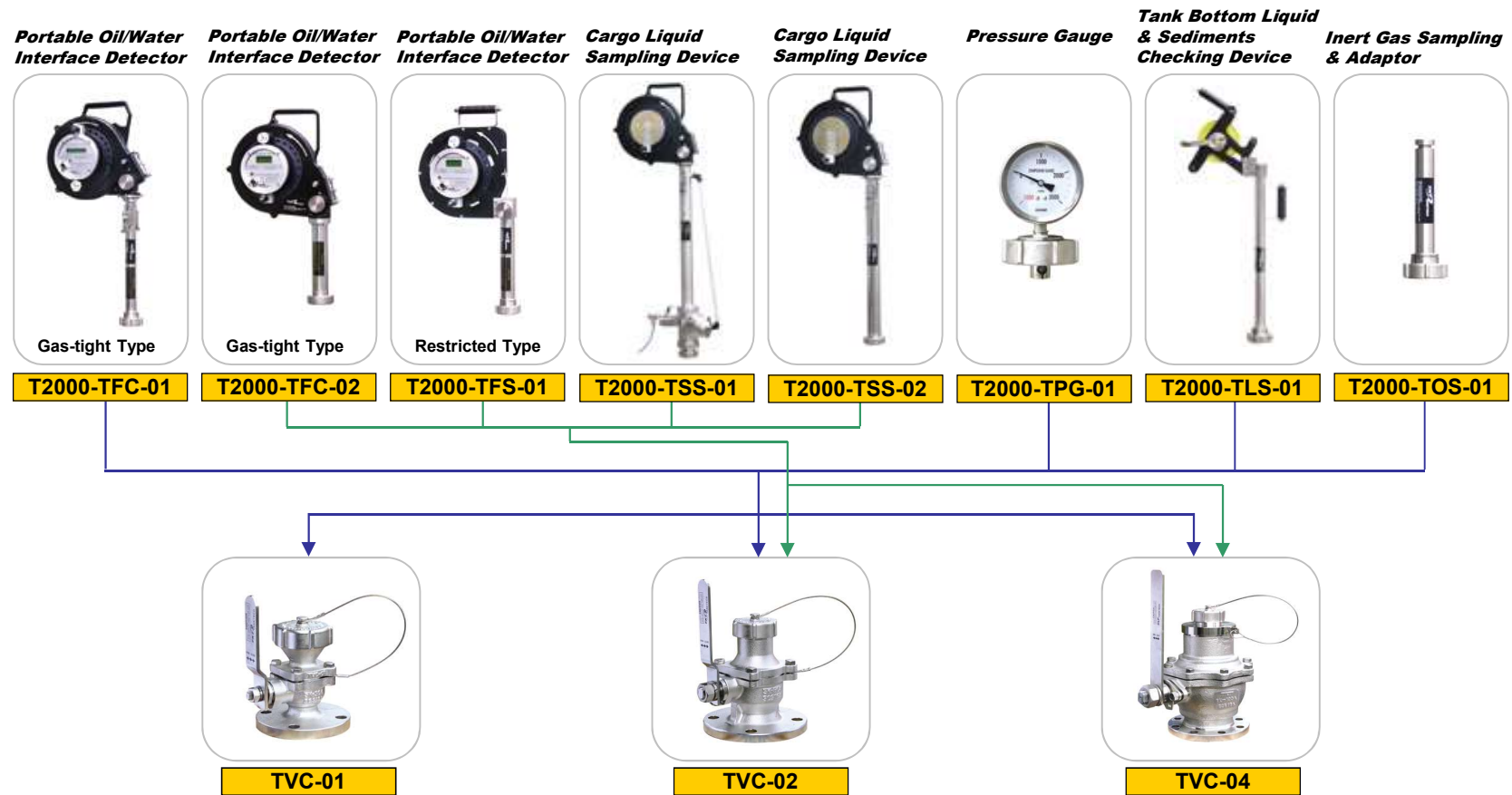
### Cargo liquid sampling

#### Portable Oil/Water Interface Detector

#### Accessories



## 5. Chart for TANKTECH Portable Measuring System





## 6. PORTABLE OIL/WATER INTERFACE DETECTOR

### 1. General Description :

Tankers shall be provided with an effective oil/water interface detectors approved by the Administration. And this device shall be provided for a rapid and accurate determination of the oil/water interface in slop tanks and shall be available for use in other tanks where the separation of oil and water is effected and from which it is intended to discharge effluent direct to the sea. This device should be tested according to the IMO Resolution MEPC. 5 (XIII) for the prevention of pollution from ships.

2. **Material** - Body : T2000-TFC-01, T2000-TFC-01<Aluminum casting (JIS-AC4C-T6)>  
T2000-TFS-01<Aluminum plate (JIS-5052)>

3. **Coating** - In/Out : Epoxy nylon coating, Color : Black, Thickness : (In/Out Side) 80mic.



**Model** T2000-TFC-01  
Gas-tight Type



**Model** T2000-TFC-02  
Gas-tight Type



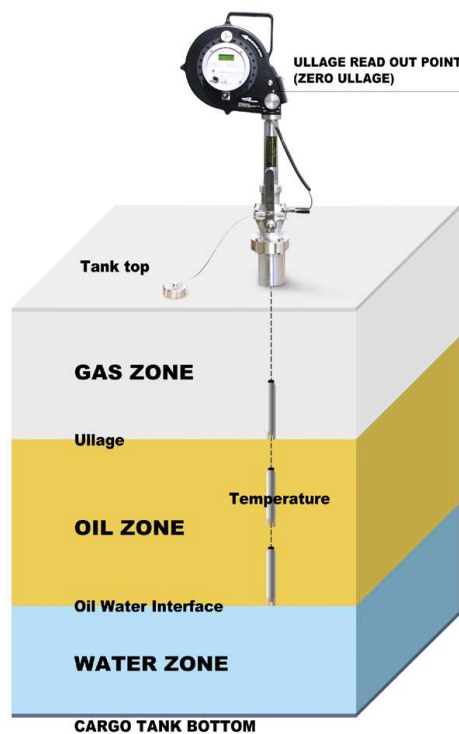
**Model** T2000-TFS-01  
Restricted Type



## 6-1. Specification for Portable Oil/Water Interface Detector

Accuracy of ullage, interface detection		± 2 mm
Indication of level divided by ullage and interface		Visible and Audible
Tape length		15 M / 30 M / 40 M
Tape graduation		Metric
Tape resolution		1 mm
Diameter of probe	TFC-01	24 mm
	TFC-02, TFS-01	34 mm
Minimum detectable level		10 mm
Ambient temperature range		-20. C to 70. C
Temperature sensor measurement range		-20. C to 110. C
Temperature measurement resolution		0.1. C
Accuracy over calibration range		± 0.1. C ( 0. C to 60. C )
Temperature reading mode .		C(Celsius) or . F
LCD display		4- 7 Segment
Top Coupling (Connection)		PF 2-1/4" TAP
Weight	TFC-01	9.0 kg / 30M
	TFC-02	8.1 kg / 30M
	TFS-01	6.4 kg / 30M
Overall dimensions (H X W X T)	TFC-01	APP. 713 X 346 X 177 mm
	TFC-02	APP. 585 X 346 X 150 mm
	TFS-01	APP. 617 X 297 X 140 mm
Battery		9 Volt ( Model : MN1604)
Intrinsically safe type		Ex ia IIB T4

## 6-2. Working Principle



Ullage level detection

### Detection of Ullage

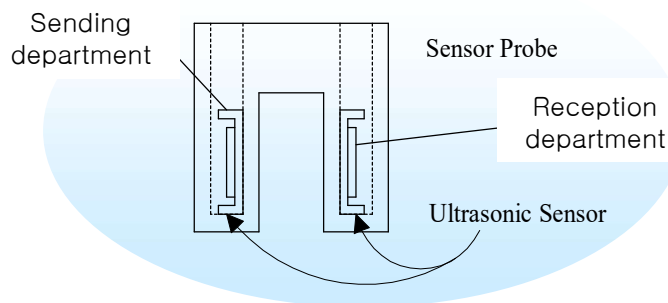
Ultrasonic method-Liquid filled in the gap between two piezoelectric transducers carries the vibrations from the transmitter to the receiver and activates an electronic switch to indicate "OIL" and changes the beeping tone be intermittent.

### Detection of Interface

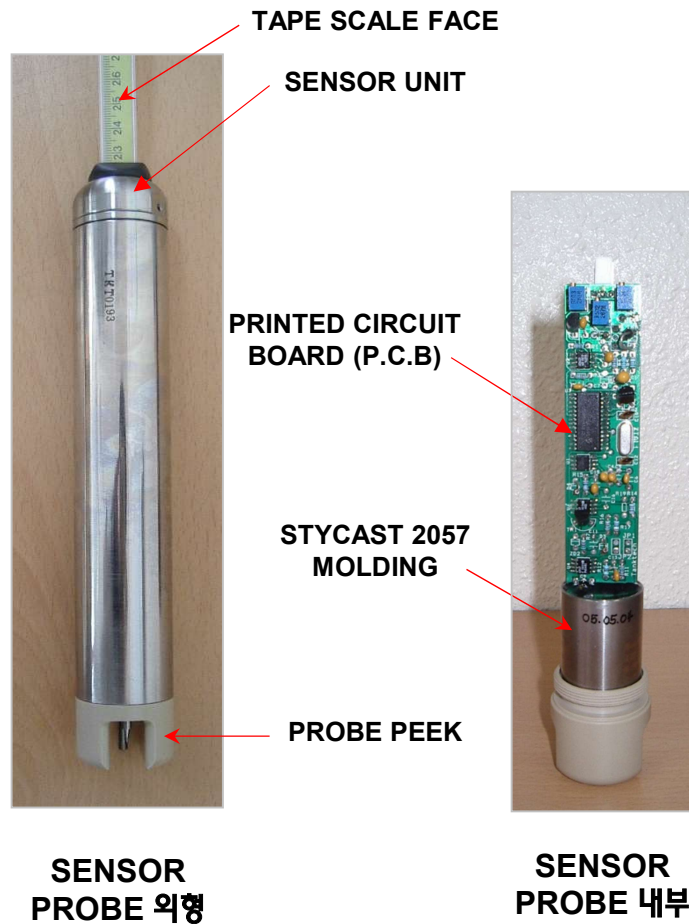
Two electrodes are used to measure the electrical resistance of water, which is much more lower than oil. This conductivity of water let the electrical current through and triggers a switch to indicate "WATER" and changes the beeping tone continuously.

### Temperature measurement

Temperature is measured simultaneously without playing with the switch. The sensing element is a PT100 RTD(Resistance Temperature Detector) sensor embedded inside the electrode. Everythings is constantly monitoring on the LCD while the ullage and interface levels are determined.

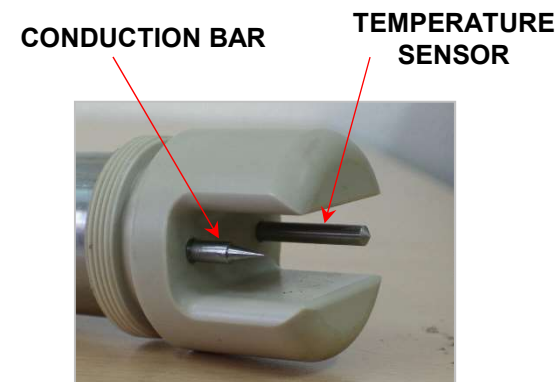


## 6-2. Working Principle



### □ SENSOR PROBE ASS'Y 구성

- **Ultrasonic Sensor** (Transmitter-2MHz, Receiver)
- **Temperature Sensor** : PT100Ω RTD  
(Metal electric resistance varies according to temp. changes.)  
International Standards : A CLASS  
Tolerance(°C) :  $\pm(0.15+0.002 [t])$
- **Conduction Bar** (Use to the conductivity of the water)
- **Printed Circuit Board** : Ex ia IIB T4 (KIMM)





### 6-3. Type Approval Cert

CLASS	MODEL & SIZE	ISSUED DATE	VALID DATE	CERT NO
MOMAF	T2000-TFC-01	2000.12.13	—	유경-01
	T2000-TFS-01 T2000-TFC-02	2003.11.20	—	유경-04 유경-05
KR	TVC-01(25A)/TVC-02(50A)	2001.01.04		GCH80350-VV001
	T2000-TFC-01	2001.11.05		CWN05618-MS001
ABS	T2000-TFC-01/TVC-01,02	2000.11.01		05-BK649425-X
	T2000TFC-02/TFS-01	2003.12.19	—	03-BK413807-PDA
USCG	T2000-TFC-01	2001.04.04		162.055/5/0
	T2000-TFC-02(RESTRICTED) T2000-TFS-01(CLOSED)	2004.01.28		162.055/7/0 162.055/8/0
RRS	T2000-TFC-01	2002.02.20	—	02.031.009
	T2000-TFC-02	2005.02.28	—	02.032.009
BV-CE MARK	T2000-TFC-01	2001.02.12		10637/A1 EC
	T2000-TFC-02/TFS-01	2004.08.24		13611/A0 EC
CANADA	T2000-TFC-01	2003.06.04	—	OWD005
	T2000-TFC-02 T2000-TFS-01	2004.03.08	—	OWD006 OWD007
CCS	T2000-TFC-02 / T2000-TFS-01	2005.09.28		FS05T00005
KIMM	T2000-TFC-01	2000.11.09	—	EX20IS671, Ex ia IIB T4
	T2000-TFC-02 T2000-TFS-01	2003.08.28	—	EX23IS968, Ex ia IIB T4 EX23IS969, Ex ia IIB T4

## 7. CARGO LIQUID SAMPLING DEVICE



View of Sampling

MODEL : T2000-TSS-01



Model T2000-TSS-01



Model T2000-TSS-02

### 1. General

This device is used for collecting sample of oil, storage in oil tank.

### 2. Name and Shape of Structure :

This device is constructed the sampling bottle part, measuring tape to fix the bottle and indicate the depth of bottle, reel part to move the measuring tape and frame part to fix all device and connect the shut on-off valve of TANKTECH.

### 3. Specification

Tape length : 15M / 30M / 40M  
 Top connection : PF 2-1/4" TAP  
 Capacity of Sampling bottle : 0.5 Liter

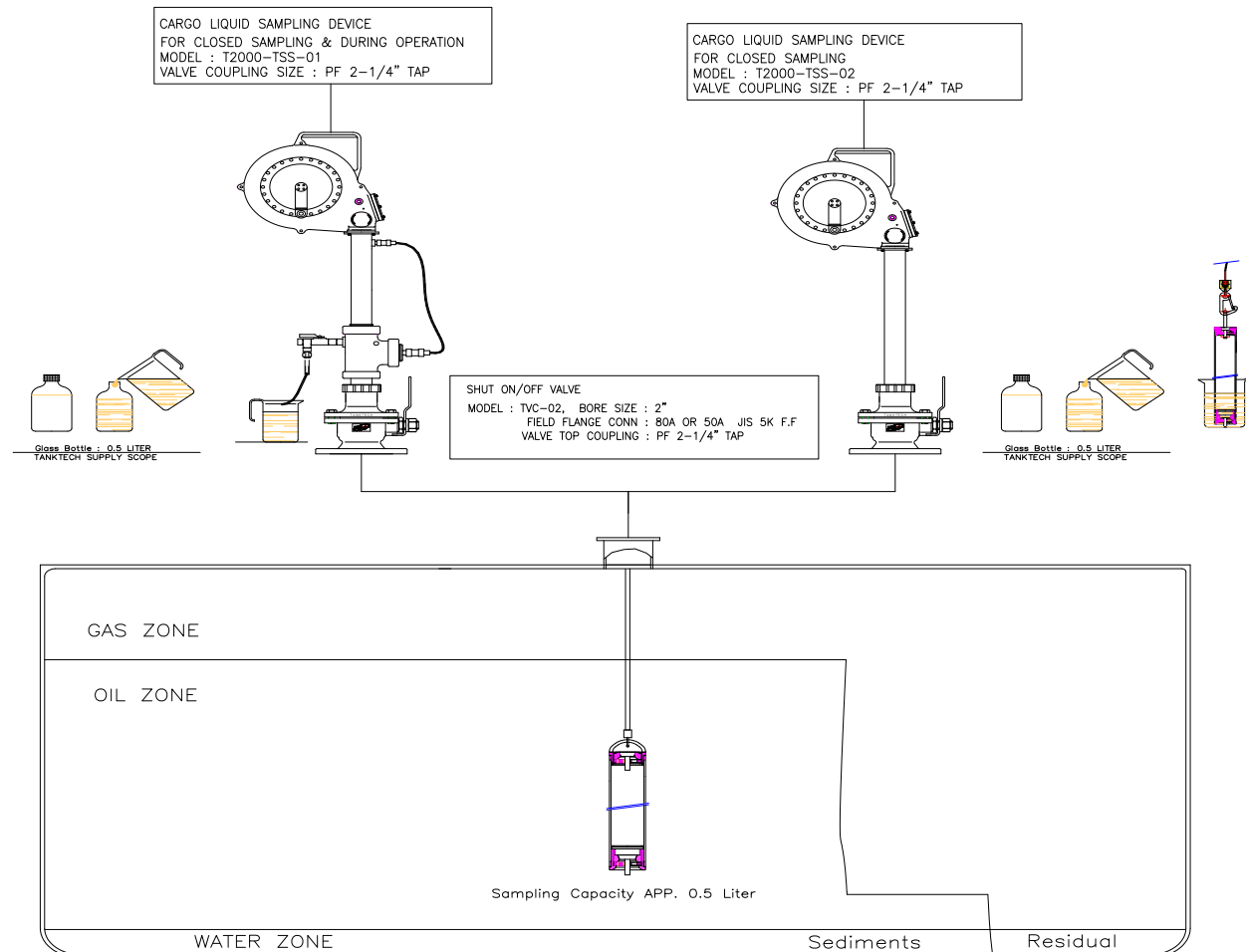
#### ▶ T2000-TSS-01 for closed sampling & during operation :

During take a sampling of cargo liquid, these is no leakage of cargo and no emission of flammable and toxic gas. (APP.1112 x 346 x 180mm, 13.9kg / 30M)

#### ▶ T2000-TSS-02 for closed sampling :

During take a sampling of cargo liquid, it ensures to make a gas tightness and it makes to emit for a remain gas to the atmosphere (APP.950 x 346 x 180mm, 9.1kg / 30M)

## 7-1. Installation for Cargo Liquid Sampling Device



CARGO TANK OF SHIP

## 8. PRESSURE GAUGE

1. **General** : Portable pressure gauge is connected with TANKTECH shut on/off valve and used on it.

### 2. Specification

Pressure range : -1000 to 3000 mmH<sub>2</sub>O

Accuracy : 1.5% of full scale

Top connection : PF 2-1/4" TAP

Weight : 1.0kg



## 9. TANK BOTTOM LIQUID & SEDIMENT CHECKING DEVICE

### 1. General :

After cleaning inside cargo tank, this device is being used for checking the dryness of the cargo tank bottom.



Model T2000-TLS-01

**2. Related regulations and contents :** The IMO requirements on tanker safety and pollution prevention, 1978-Resolution A, 446(XI) 4.4.4 : means such as level gauges , hand dipping , an stripping system performance gauges as referred to in paragraph 4.4.8 shall be provided for checking that the bottoms of cargo tanks are dry after the crude oil washing.

Suitable arrangements for hand dipping must be provided at the after-most portion of a cargo tank and in three other suitable locations unless other approved means are fitted for efficiently ascertaining that the bottom of every cargo tank is dry.

### 3. Specification

Tape length : 50M

Top connection : PF 2-1/4" TAP

Weight : 5.0kg / 50M

Overall dimensions (H x W x T) : APP.795 x 245 x 90mm



## 10. INERT GAS SAMPLING HOSE & ADAPTOR

### 1. General Description :

Measured the oxygen in tank absorbed the inert gas by the portable oxygen tester, use to connect the gas sampling device at the shut on-off valve of TANKTECH on the deck without the leakage of the inert gas.



Model T2000-TOS-01

### 2. Related regulations and contents

The IMO requirements on tanker safety and pollution prevention, 1978-Resolution A 446(XI),6,6 : before each tank is crude oil washed, the oxygen level shall be determined at a point 1 meter from the deck and at the middle region of the ullage space and neither of these determinations shall exceed 8% by volume.

### 3. Specification

Tape length : 25M / 35M  
 Top connection : PF 2-1/4" TAP  
 Weight : 3.5kg / 35M  
 Hose size : O.D 8 x I.D 6 mm



## 11. SHUT ON/OFF VALVE (Vapor Control Valve)

### 1. General Description

After user is finished the cleaning in the cargo tank, this device is the tester checking the dryness of the tank bottom.

### 2. Purpose of tank gauging station

- Prevention of dangerous gas leakage during gauging
- Determination on height of ullage read-out point
- Grounding of the gauging device
- Easiness of gauging job on tank top



Model TVC-01  
(25A / 50A)



Model TVC-02  
(50A / 80A)



Model TVC-04  
(100A)