

**PD FLOW METER SPECIFICATION SHEET O/L 7048/1 Rev. 1 dated 31/05/2012**

 <p><b>PETROL</b> Instruments S.r.l. Tel. +39-06-9201.941 r.a. Fax +39-06-9201.9446 www.petrol-instruments.com e-mail info@petrol-instruments.com</p>	<b>Customer</b>	DESMET BALLESTRA SPA
	<b>City</b>	MILANO ( MI )
	<b>P. Order</b>	121291 dated 30/05/2012
	<b>Project</b>	Comm. 2F11
	<b>Destination</b>	

Rev.	Item	OPERATING DATA
1	Liquid	Water
2	Flow-rate range	2 ÷ 10,5 m3/h
3	Max Pressure	1 MPa
4	Temperature range	-5 ÷ 80 °C
5	Viscosity	1 mPa.s
6	Service	Intermittent

**PD FLOW METER**

7	Tag.	FQ 62.1	
8	<b>Model</b>	<b>FBA12-22-F8</b>	<b>Serial No.</b> B122-7350
9	Accuracy	± 0,3 % of reading	
10	Flanges Connections	2" ANSI 150RF	
11	Heating Fluid flanges		
12	Flow Direction	Left --> right	
13	Body Material	St. st. AISI 316	
14	Rotors Material	St. st. AISI 316	
15	Shafts & Gears Material	St. st. AISI 316	
16	Bearings Type	Carbon bushing	
17	Gaskets	O-Ring Teflon	
18	Transmission System	Magnetic	
19	Counter Model	22 reset needle 100 l/rev.	
20	- Non Reset Totalizer Digit	8	
21	- Reset Totalizer Digit	6 + 2 on dial	
22	Angle Adaptor Mod.		
23	Air Fin Cooler Mod.		
24	Pulse Transmitter Mod.		
25	Amplifier Mod.		
26	Amplifier Mod.		
27	F/I Converter Mod.		

**BASKET STRAINER**

28	Tag.		
29	<b>Model</b>		<b>Serial No.</b>
30	End Connections		
31	Body Material		
32	Screener Material		
33	Gaskets		
34	Screener size		

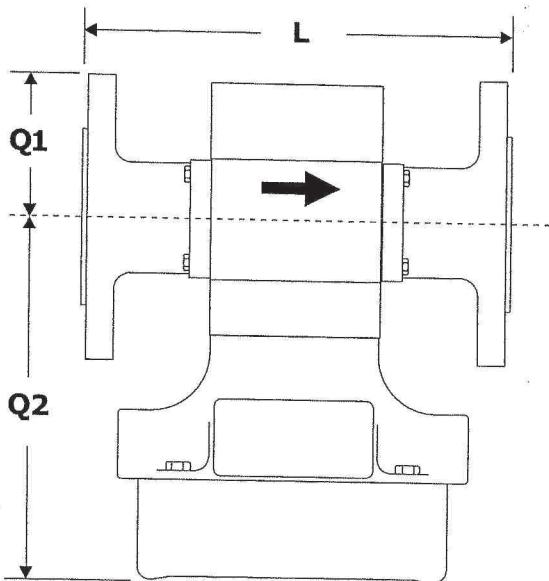
**PD Flow Meter Accessories****Strainer Accessories**

35	PD Meter inox name plate	
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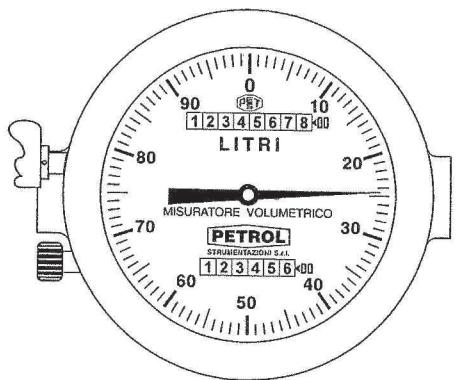
**NOTES**

36	97/23/CE "PED" - Not applicable.
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Written	M. Zeoli	
Approved	P. Romiti	



**Testata indicatrice  
azzerabile mod. 22/100**



Unità di lettura (indice) **1 litro**  
 Una rivoluzione indice **100 litri**

## ***ISTRUZIONI DI MONTAGGIO***

Il misuratore può essere montato in qualsiasi posizione purché gli assi dei rotori siano orizzontali (quadrante della testata contatrice in posizione verticale) ed il flusso del fluido vada nella direzione della freccia stampata sulla cassa esterna del misuratore.

## **MOUNTING INSTRUCTIONS**

The PD meter may be mounted in any position providing that rotors' shaft are horizontal (counter dial in vertical position) and that the flow direction is the one shown by the arrow on the outer housing of the PD meter.

**CAMPO - FIELD** **SALA CONTROLLO - CONTROL ROOM**

Lo spessore minimo del corpo esterno e dei coperchi è di 10 mm  
The thickness of outer housing and covers is 10 mm

Dimensioni in mm. Tolleranza  $\pm$  5mm  
Dimensions in mm. Tolerance  $\pm$  5mm

FQI 62.1	FBA12-22-F8	2" ANSI 150 RF	250	103	215	*	*	*	*		⇒	*
Sigle / Tags	Modello / Model	Flange / Flanges	L	Q1	Q2	A	C	E	F		Direzione flusso Flow direction	Peso Kg. WT. Kg.



**PETROL Instruments S.r.l.**

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# **MISURATORI VOLUMETRICI "PETROL" "PETROL PD FLOWMETERS"**

**DIMENSIONI DI INGOMBRO - SCHEMA COLLEGAMENTI ELETTRICI  
GENERAL ARRANGEMENT AND OUT-LINE DIMENSIONS**

Cliente / Customer  
**DESMET BALLESTRA S.P.A.**

## **Ordine / P.Order**

121291 DATED 30/05/2012

Comessa / Job  
**7048**



## **PIANO CONTROLLO QUALITA'**

### Quality Control Plan

ITEM	TESTS	APPLICATION CODE			DOC. REF.
		C		S	
1	PD flowmeters visual and dimensional test	R		W	51B003
2	PD flowmeters and strainers hydraulic test	R		W	PI-02-E
3	PD flowmeters functional test	R		W	CF-02/E rev. 4
	<b>APPLICATION CODE :</b> <b>C : CUSTOMER    S : PETROL INSTRUMENTS</b>				
	<b>TYPE OF ACTIVITY :</b> <b>R - REVIEW CERTIFICATES AND/OR DOCUMENTS CONTROL</b> <b>W - EXECUTED CONTROL WITH ISSUE OF THE CERTIFICATE</b>				

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e-mail info@petrol-instruments.com

### **MISURATORI VOLUMETRICI "PETROL"**

"PETROL PD FLOWMETERS"

Impianto / Plant

**SABIZ – Job 2F11**

Cliente / Customer

**DESMET BALLESTRA SPA**

Ordine / P.Order

**121291 DATED 30/05/12**

Commissa / Job

**7048**

Revision	0	1	2
Date	04/06/12	02/07/12	
Revision	3	4	5
Date			

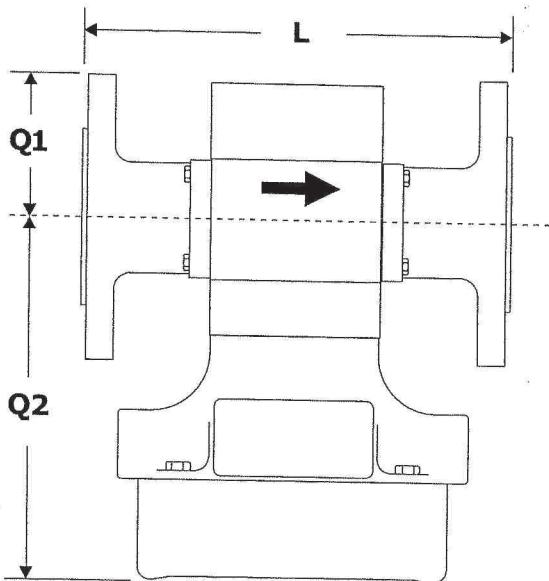
Sigla  
Tag

PETROL INSTRUMENTS

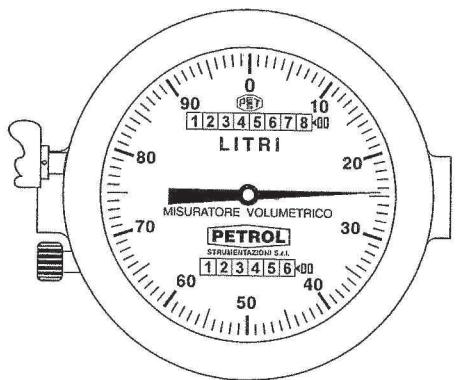
Firma Cliente  
Customer Signature

Doc. n° / Doc. n°

**7048 PCQ**Foglio  
Sheet **1** di **1**



**Testata indicatrice  
azzerabile mod. 22/100**



**Unità di lettura (indice) 1 litro  
Una rivoluzione indice 100 litri**

Reading unit (needle) 1 liter  
One needle revolution 100 liters

#### **ISTRUZIONI DI MONTAGGIO**

Il misuratore può essere montato in qualsiasi posizione purché gli assi dei rotori siano orizzontali (quadrante della testata contrarie in posizione verticale) ed il flusso del fluido vada nella direzione della freccia stampata sulla cassa esterna del misuratore.

## **MOUNTING INSTRUCTIONS**

The PD meter may be mounted in any position providing that rotors' shaft are horizontal (counter dial in vertical position) and that the flow direction is the one shown by the arrow on the outer housing of the PD meter.

CAMPO - FIELD  
SALA CONTROLLO - CONTROL ROOM

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Dimensioni in mm. Tolleranza  $\pm$  5mm  
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FQI 62.1	FBA12-22-F8	2" ANSI 150 RF	250	103	215	*	*	*	*		⇒	*
Sigle / Tags	Modello / Model	Flange / Flanges	L	Q1	Q2	A	C	E	F		Direzione flusso Flow direction	Peso Kg. WT Kg



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# **MISURATORI VOLUMETRICI "PETROL"**

**"PETROL PD FLOWMETERS"**

**DIMENSIONI DI INGOMBRO - SCHEMA COLLEGAMENTI ELETTRICI  
GENERAL ARRANGEMENT AND OUT-LINE DIMENSIONS**

**Cliente / Customer**  
**DESMET BALLESTRA S.P.A.**

## **Ordine / P.Order**

**121291 DATED 30/05/2012**

**Comessa / Job  
7048**



PETROL Instruments S.r.l.

Sheet n. 1

DOC. CF-02/E rev. 4

## PETROL INSTRUMENTS S.r.l. - ITALY

### P D F L O W M E T E R S PERFORMANCE TEST PROCEDURE MODELS 12 - 22 - 53 - 13

#### A. GENERALITY

1. "PETROL" flowmeters have been legally approved with D.M. 28/07/70 n. 347828, whose copy is hereto attached. This approval foresees that the first verification is made directly in the plant and, alternatively, at the manufacturer factory, in which case, however, an additional verification in the plant is needed.
2. The liquid medium used at factory for performance test is water.

#### B. TEST STATION

1. In order to provide the performance test of mod. 12 - 22 -53 and mod. 13 PD flowmeters, it is used a closed-type hydraulic circuit, which includes the under detailed equipment.
  - 1000 litres capacity calibrated tank;
  - centrifugal pump, complete with by-pass and valves to adjust the flow-rate;
  - stainless steel reservoir, 1800 litres capacity about.
2. Main characteristics of involved equipment are the following:
  - calibrated tank
    - capacity : 1000 litres
    - loading : from top
    - unloading : from bottom
    - graduation : only on top neck
    - official seals : local Metric Office
  - centrifugal pump
  - manufacturer : Audoli & Bertola - Torino
  - model : S 5155
  - serial number : 12362
  - head : 32 - 18 m. H<sub>2</sub>O
  - flow rate : 300 - 850 litres/1'
  - power : 5,5 HP



PETROL Instruments S.r.l.

Sheet n. 2

DOC. CF-02/E rev. 4

## C. TEST'S PROCEDURE

1. Batches of about 1000 litres are delivered into the calibrated tank, in such a way that, at the end of each batch, the level of liquid falls within the graduated portion of calibrated tank neck.
2. Volume ( $V_m$ ) flown through PD flowmeter, as shown by PD flowmeter counter, is compared with the volume ( $V_c$ ) as shown by calibrated tank.
3. Through the formula:

$$\frac{V_m - V_c}{V_c} \times 100 = E\%$$

the error of PD flowmeter, as percentage, is calculated.

4. Should calculated value of  $E\%$  be greater than that required, PD flowmeter calibration is changed by replacing the calibrating gear, which is an integrant part of reduction gear train (calibration by gear replacing).

## D. SPECIFIC CONSIDERATIONS

1. Should the PD flowmeter be required for service on liquids with viscosity value greater than 10 cP the calculated value  $E\%$  must be lower of about 0,5% of the required accuracy value at operating flow-rate; this is to compensate the slippage reduction, at operating conditions, between the rotors themselves and between the rotors and the measuring chamber.
2. Should the PD flowmeter be required for service on liquids with viscosity value greater than 10 cP the calculated value  $E\%$  will remain almost steady till a minimum flow-rate equal to 10% of the maximum flow-rate printed in the nameplate.

- - - - 0 0 0 0 - - - -

Aprilia, 05/10.

# PETROL INSTRUMENTS S.r.l. - ITALY

## MISURATORI VOLUMETRICI PD FLOWMETERS

### HYDRAULIC TEST

#### Generality

All PD flowmeters produced by Petrol Instruments S.r.l. are of double case type. This means that the measuring unit is working in "balanced pressure" conditions. The parts subject to line pressure are only those composing the outer housing, i.e., the flanged body and the front/rear covers in case of horizontal PD flowmeters or the flanged body and the top/bottom covers in case of vertical PD flowmeters. Consequently all the PD flowmeters outer housings are subject to the hydraulic test to check their integrity and the lack of any liquid leakage.

#### Test station

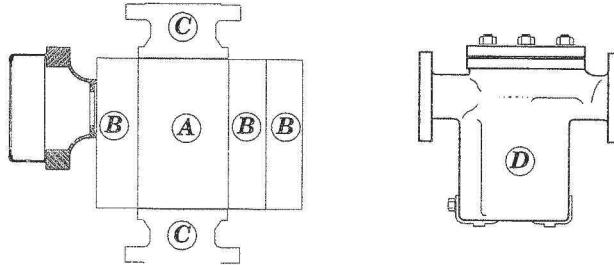
The test station for hydraulic test is mainly composed by an hydraulic hand pump, a series of blind flanges to seal the various meter body types and several interconnecting rubber hoses to pressurize the piece. The hand pump is equipped with a pressure gauge to indicate the actual pressure of the test and with isolating valves. Liquid medium used is water.

#### Test procedure

As standard the test is carried out applying a pressure 1,5 times the design pressure of the outer housing to be tested for a period of 5 minutes. In relation to specific customer requirements the pressure applied and the test duration may be different. Once completed the test the operator signs the specific working sheet to confirm that the piece has been hydraulically tested.

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Aprilia, 05/2002.


**ELENCO MISURATORI E FILTRI CON RIFERIMENTO AI RELATIVI CERTIFICATI**  
 List of flow meters and strainer with reference to the relevant certificates
**N° 7048 CERTMAT**

MISURATORE VOLUMETRICO PD METER			MODELLO MODEL	FBA12-22-F8		N.S. S.N.
	PARTICOLARE <i>Detail</i>	ARTICOLO <i>Article</i>	CERTIFICATO N° <i>Certificate n°</i>	DATA <i>Date</i>	COLATA <i>Charge</i>	COSTRUTTORE <i>Manufacturer</i>
A	Corpo <i>Body</i>	130	1827313/7583228/BIT	21/06/12	448730	Deutsche Edelstahlwerke
B	Coperchio anteriore / posteriore <i>Front / Rear cover</i>	130	1827313/7583228/BIT	21/06/12	448730	Deutsche Edelstahlwerke
C	Tronchetti <i>Spool pipe</i>	160	1795558/1223168/OST	24/02/12	439830	Deutsche Edelstahlwerke

Tutti i certificati materiali sono del tipo EN10204 3.1/3.1B

All material certificates are according to EN10204 3.1/3.1B

Att. / - Certificati materiali

- Material certificates

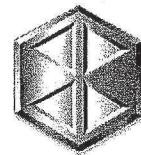
Zertifiziert  
nach:

ISO 9001  
ISO / TS 16949  
EN 9100  
ISO 14001



# DEUTSCHE EDELSTAHLWERKE

Providing special steel solutions



D-58452 Witten, D-57012 Siegen , http://www.dew-steel.com

Datum/Date: 21.06.12

Seite/Page: 1 / 3

Zertifiziert nach:	AD2000 W 0 TRD 100	Werkstofflieferant gemäß Druckgeräte- richtlinie 97 / 23 EG
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**Abnahmeprüfzeugnis nach**  
Inspection Certificate acc.to/Certificat de réception selon DIN EN 10204 3.1/01.05  
**Zeugnis-Nr./Certificate No./No.de Certificat** 1827313/7583228/bit

**DEUTSCHE EDELSTAHLWERKE**  
Schmolz + Bickenbach Inox srl  
Via G. di Vittorio  
IT-20068 Peschiera Borromeo

Herstellerzeichen/Supplier's Mark/Marque d'usine	
Prüfstempel/Inspector's stamp/Poinçon de l'expert	

Ihre Auftr.-Nr. vom Your order No. date /No.de votre commande du	2058006138   10.04.12	Kundenmaterial-Nr. Your material No./No.de votre matérielle	2009694
Unsere Auftr.-Nr. Our order No./No.de notre Commande	1372388 / 4	Unsere Material-Nr. Our material No./No.de notre matériel	2181807
Unsere Abteilung/Our department/Notre département	VR-H	Telefon/Telephone/Téléphone	02302/29-4121

## Produkt/Product/Produit

STAEBE AUS NICHROSTENDEM STAHL  
ACIDUR 4401/4404 NIROCUT, TYPE 316/316L  
GEWALZT, ABGESCHRECKT,  
GERICHTET, GESCHAELT  
EN 10088-3, EN 10272, AD 2000 W2/W10,  
ASTM A 182/276/479, ASME SA 182/479,  
NACE MR 0175, ISO 15156-3, NACE MR 0103,  
IN ANLEHNUNG AN EN 10222-5

STAINLESS STEEL BARS  
ACIDUR 4401/4404 NIROCUT, TYPE 316/316L  
HOT ROLLED, QUENCHED,  
STRAIGHTENED, PEELED  
EN 10088-3, EN 10272, AD 2000 W2/W10,  
ASTM A 182/276/479, ASME SA 182/479,  
NACE MR 0175, ISO 15156-3, NACE MR 0103,  
FOLLOWING EN 10222-5

BARRES EN ACIER INOXYDABLE  
ACIDUR 4401/4404 NIROCUT, TYPE 316/316L  
LAMINE, HYPERTREMPE,  
DRESSE, ECROUTE  
EN 10088-3, EN 10272, AD 2000 W2/W10,  
ASTM A 182/276/479, ASME SA 182/479,  
NACE MR 0175, ISO 15156-3, NACE MR 0103,  
EN PRENANT EN CONSIDERATION EN 10222-5

Fertigungsauftr.-Nr./Production lot-No./Lot de fabrication No. :

Lieferschein-Nr./Delivery note/No. de l'avis de livraison :

Schmelzen-Nr./Heat No./No.de coulée :

Stückzahl/Piece No./Nombre des pièces :

Gewicht/Weight/Masse :

Zeichnungs-Nr./Drawing No./No du dessin :

Format/Shape/Profil :

Durchm./Breite/Diameter/width/Diamètre/largeur :

Dicke/Thickness/Epaisseur :

Länge/Length/Longueur :

Stückzahl und Gewicht siehe Rechnung. / Quantity and weight see delivery bill/invoice.  
Nombre des pièces et masse voir facture.

Lieferzustand/Condition as supplied/Etat de livraison :

1920 DEGREE F SOLUTION ANNEALED AND QUENCHED, 1050 GRAD C  
LOESUNGSGEGLUEHT UND ABGESCHRECKT

Die Prüfergebnisse zu Ihrer Lieferung finden Sie auf der Rückseite bzw. den nächsten Seiten  
As for test results of your delivery see overleaf. / Vous trouverez les résultats d'essais de votre livraison aux pages suivantes.

**DEUTSCHE EDELSTAHLWERKE GMBH**  
Abnahmetechnik/Inspection department/Département de Réception

Krause

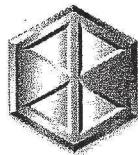
**Abnahmebeauftragter/Der Werkssachverständige**  
Test House Manager/Works' inspector/Responsible Reception/L'Agent Réceptionnaire de l'usine

Zertifiziert  
nach:

ISO 9001  
ISO / TS 16949  
EN 9100  
ISO 14001



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D-58452 Witten, D-57012 Siegen , http://www.dew-steel.com

Datum/Date: 21.06.12

Seite/Page: 2 / 3

Zeugnis-Nr. Certificate No./No.de Certificat	Unsere Auftr.-Nr. Our order No./No.de notre Commande	Ihre Auftr.-Nr. vom Your order No. date /No.de votre commande du	Fertigungsauftr.-Nr. Production lot-No./Lot de fabrication No.
1827313/7583228/bit	1372388 / 4	2058006138	

Schmelzen-Nr. Heat No. No.de coulée	Erschmelzungsart Steelmaking process Procédé d'élaboration	Sekundärmetallurgie Secondary metallurgy Metallurgie secondaire	Gießverfahren Casting process Procédé de coulée
448730	E	VOD	VSG

**Chemische Zusammensetzung/ Chemical Composition/ Composition chimique**

	C	Si	Mn	P	S	Cr	Mo	Ni	Cu	V	W	Co	Al	
Ist/Actual/ Actuel	0.017	0.29	1.72	0.023	0.025	16.86	2.03	10.17	0.20	0.02	0.02	0.033	0.017	[%]
	N													
Ist/Actual/ Actuel	0.040													[%]

**Härte/ Hardness/ Dureté**

Lieferzustand/ Condition as supplied/Etat de livraison

Proben-Nr./Specimen-No./No.d'éprouvette	36502
Ist/Actual/ Actuel	162 [HB]

MAX 22 HRC

**Zugversuch/ Tensile test/ Essai de traction**

Lieferzustand/ Condition as supplied/Etat de livraison

Probenabm./Specimen dimension/Dimension d'éprouvette	Probenrichtung/Specimen direction/Sens de Prélèvement	Prüftemp./Test temperature/Température d'essai
Zugprobe; 10 mm rd	längs/longitudinal/longueur	23 [°C]
Proben-Nr./Specimen-No./No.d'éprouvette	Rp0.2 [MPa (N/mm²)]	Rp1.0 [MPa (N/mm²)]
36504	278	335
36503	289	329
Rm [MPa (N/mm²)]	A5 [%]	A2 [%]
586	50.1	51.9
585	53.6	55.4
Z [%]		75

**Schlagbiegeversuch/ Impact test/ Essai de résilience**

Lieferzustand/ Condition as supplied/Etat de livraison

Probenform/Type of specimen/Type d'éprouvette	Probenrichtung/Specimen direction/Sens de Prélèvement	Prüftemp./Test temperature/Température d'essai
[CHARPY V]	längs/longitudinal/longueur	23 [°C]
Proben-Nr./Specimen-No./No.d'éprouvette	1. Prfl./Spec./Eprouvette	2. Prfl./Spec./Eprouvette
36504	274 [J]	269 [J]
36503	268 [J]	271 [J]
3. Prfl./Spec./Eprouvette		280 [J]
		269 [J]

**Korngröße/ Grain size/ Grosseur de grain**  
Liegzustand/ Condition as supplied/Etat de livraison

Körnethreihe gemäß/Chart acc.to/Série type selon	Größe/Size/Grosseur
ASTM E 112	4 - 5

**Interkristalline Korrosion/ Intergranular corrosion/ Corrosion intercristalline**

Material beständig nach / material resistant according / matériel resistant suivant: ASTM A 262 Practice E / EURONORM 114 / ISO 3651-2 Verfahren A

**US-Prüfung/ Ultrasonic testing/ Contrôle par ultrasons**

Die Lieferung wurde US-geprüft nach/Delivery US-checked acc.to/Livraison contrôlé par ultrasons selon: EN 10308 Typ 1a, Tab.3, Kl.3

entspricht auch/also correspond to/correspond aussi a:EN 10228-4 Typ 1a, Tab.4, Kl.3/ASTM A 388

Die Lieferung wurde auf Identität geprüft(Optische Emissionsspektrometrie) / Identity has been checked(Optical Emission Spectrometry) / Identification (Spectro.) a été effectué DIN EN 10277-1, Tabelle 1, Klasse 3

Die Lieferung wurde besichtigt und auf Maß kontrolliert/Visual inspection and control of dimensional accuracy have been performed/  
Contrôle visuel et inspection dimensionnelle ont été effectuée

Das Material ist frei von Radioaktivität./The Product is free from radioactive./Le matériel n'est pas radioactif.  
El material es libre de radioactividad.

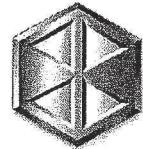
Zertifiziert  
nach:

ISO 9001  
ISO / TS 16949  
EN 9100  
ISO 14001



# DEUTSCHE EDELSTAHLWERKE

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Datum/Date: 24.02.12

Seite/Page: 1 / 3

Zertifiziert nach:	AD2000 W 0 TRD 100	Werkstofflieferant gemäß Druckgeräte- richtlinie 97 / 23 EG
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**Abnahmeprüfzeugnis nach**  
Inspection Certificate acc.to/Certificat de réception selon DIN EN 10204 3.1/01.05  
**Zeugnis-Nr./Certificate No./No.de Certificat** 1795558/1223168/ost

**DEUTSCHE EDELSTAHLWERKE**  
Schmolz + Bickenbach Inox srl  
Via G. di Vittorio  
IT-20068 Peschiera Borromeo

Herstellerzeichen/Supplier's Mark/Marque d'usine	
Prüfstempel/Inspector's stamp/Poinçon de l'expert	

Ihre Auftr.-Nr. vom Your order No. date /No.de votre commande du	2058004927   08.07.11	Unsere Auftr.-Nr. Our order No./No.de notre Commande	1317987 / 4	Unsere Material-Nr. Our material No./No.de notre matériel	2274592
Unsere Abteilung/Our department/Notre département	VR-H	Telefon/Telephone/Téléphone	02302/294121		

## Produkt/Product/Produit

STAÈBE AUS NICHTROSTENDEM STAHL  
1.4401/4404 NIROCUT, TYPE 316/316L  
GEWALZT, ABGESCHRECKT,  
GERICHTET, GESCHAELT  
EN 10088-3, EN 10272, AD 2000 W2/W10,  
ASTM A 182/276/479, ASME SA 182/479,  
NACE MR 0175

STAINLESS STEEL BARS  
1.4401/4404 NIROCUT, TYPE 316/316L  
HOT ROLLED, QUENCHED,  
STRAIGHTENED, PEELED  
EN 10088-3, EN 10272, AD 2000 W2/W10,  
ASTM A 182/276/479, ASME SA 182/479,  
NACE MR 0175

BARRES EN ACIER INOXYDABLE  
1.4401/4404 NIROCUT, TYPE 316/316L  
LAMINE, HYPERTREMPE,  
DRESSE, ECROUTE  
EN 10088-3, EN 10272, AD 2000 W2/W10,  
ASTM A 182/276/479, ASME SA 182/479,  
NACE MR 0175

Fertigungsauftr.-Nr./Production lot-No./Lot de fabrication No. : 986277

Lieferschein-Nr./Delivery note/No. de l'avis de livraison : 305362

Schmelzen-Nr./Heat No./No.de coulée : 439830

Stückzahl/Piece No./Nombre des pièces : 5

Gewicht/Weight/Masse : 4418 [kg]

Zeichnungs-Nr./Drawing No./No du dessin :

Format/Shape/Profil : rund / round / rond

Durchm./Breite/Diameter/width/Diamètre/largeur : 160.000 [mm] +0.630/-0.000 [mm]

Dicke/Thickness/Epaisseur :

Länge/Length/Longueur : 5000 - 6000 [mm]

Lieferzustand/Condition as supplied/Etat de livraison:  
1920 DEGREE F SOLUTION ANNEALED AND QUENCHED, 1050 GRAD C  
LOESUNGSGEGLÜHTE UND ABGESCHRECKT, NO WELDING HAS BEEN PERFORMED,  
AM MATERIAL WURDE NICHT GESCHWEISST

Die Prüfergebnisse zu Ihrer Lieferung finden Sie auf der Rückseite bzw. den nächsten Seiten  
As for test results of your delivery see overleaf. / Vous trouverez les résultats d'essais de votre livraison aux pages suivantes.

DEUTSCHE EDELSTAHLWERKE GMBH  
Abnahmetechnik/Inspection department/Département de Réception

Krause

Abnahmevertragspartner/Der Werkssachverständige

Test House Manager/Works' inspector/Responsible Reception/L'Agent Réceptionnaire de l'usine

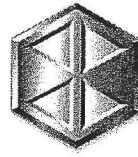
Zertifiziert  
nach:

ISO 9001  
ISO / TS 16949  
EN 9100  
ISO 14001



# DEUTSCHE EDELSTAHLWERKE

Providing special steel solutions



D-58452 Witten, D-57012 Siegen , http://www.dew-steel.com

Datum/Date: 24.02.12

Seite/Page: 2 / 3

Zeugnis-Nr. Certificate No./No.de Certificat	Unsere Auftr.-Nr. Our order No./No.de notre Commande	Ihre Auftr.-Nr. vom Your order No. date /No.de votre commande du	Fertigungsauftr.-Nr. Production lot-No./Lot de fabrication No.
1795558/1223168/ost	1317987 / 4	2058004927	986277

Schmelzen-Nr. Heat No./No.de coulée	Erschmelzungsart Steelmaking process/Procédé d'élaboration	Sekundärmetallurgie Secondary metallurgy/Metallurgie secondaire	
439830	E	VOD	

## Chemische Zusammensetzung/ Chemical Composition/ Composition chimique

	C	Si	Mn	P	S	Cr	Mo	Ni	Cu	N	
Ist/Actual/Actuel	0.015	0.29	1.65	0.023	0.029	16.87	2.02	10.01	0.20	0.039	[%]

## Härte/ Hardness/ Dureté

Lieferzustand/Condition as supplied/Etat de livraison

Proben-Nr./Specimen-No./No.d'eprouvette	47014
Ist/Actual/Actuel	161 [HB]

## Zugversuch/ Tensile test/ Essai de traction

Lieferzustand/Condition as supplied/Etat de livraison

Probenabm./Specimen dimension/Dimension d'éprouvette	Probenrichtung/Specimen direction/Sens de Prélèvement	Prüftemp./Test temperature/Température d'essai
Zugprobe; 12,5 mm rd	längs/longitudinal/longueur	23 [°C]
Proben-Nr./Specimen-No./No.d'eprouvette	Rp0.2 [MPa (N/mm²)]	Rp1.0 [MPa (N/mm²)]
47016	281	332
47015	288	328
	Rm [MPa (N/mm²)]	A5 [%]
	586	51.3
	A2'' [%]	Z [%]
	53.1	74
	585	53.7
	55.5	75

## Schlagbiegeversuch/ Impact test/ Essai de résilience

Lieferzustand/Condition as supplied/Etat de livraison

Probenform/Type of specimen/Type d'éprouvette	Probenrichtung/Specimen direction/Sens de Prélèvement	Prüftemp./Test temperature/Température d'essai
[CHARPY V]	längs/longitudinal/longueur	23 [°C]
Proben-Nr./Specimen-No./No.d'eprouvette	1. Prfl./Spec./Eprouvette	2. Prfl./Spec./Eprouvette
47016	280 [J]	266 [J]
47015	269 [J]	268 [J]
3. Prfl./Spec./Eprouvette		
	273 [J]	269 [J]

## Korngröße/ Grain size/ Grosseur de grain

Lieferzustand/Condition as supplied/Etat de livraison

Richtreihe gemäß/Chart acc.to/Sérié type selon	Größe/Size/Grosseur
STM E 112	5 - 6

## Interkristalline Korrosion/ Intergranular corrosion/ Corrosion intercristalline

ASTM A 262 PRACTICE E / DIN 50914 / EURONORM 114 ISO 3651-2

## US-Prüfung/ Ultrasonic testing/ Contrôle par ultrasons

Die Lieferung wurde US-geprüft nach/Delivery US-checked acc.to/Livraison contrôlé par ultrasons selon: EN 10228-4 TYP 1A, Tab.4 KL.3

ENTSPRICHT AUCH/ALSO CORRESPONDING TO/CORRESPOND AUSSI A/CORRESPONDE TAMBIEN EN 10308 TYP 1A KL.3, ASTM A 388

Die Lieferung wurde auf Identität geprüft(Optische Emissionsspektrometrie) /Identity has been checked(Optical Emission Spectrometry) /Identification (Spectro.) a été effectué  
Risskontrolle wurde durchgeführt./Testing for surface cracks has been performed./Contrôle de fissures à la surface a été effectué.

Die Lieferung wurde besichtigt und auf Maß kontrolliert/Visual inspection and control of dimensional accuracy have been performed/  
Contrôle visuel et inspection dimensionnelle ont été effectué

Umformgrad/Hot forming ratio/Ratio de déformation: 8.04 fach/fold/fois

Das Material ist frei von Radioaktivität./The Product is free from radioactive./Le matériel n'est pas radioactif.

El material es libre de radioactividad.



## CERTIFICATO INTERNO DI COLLAUDO FACTORY INSPECTION CERTIFICATE

Certificato n° Certificate No.	5471	Commessa n° Job No.	7048/1
Cliente Customer	<b>DESMET BALLESTRA</b>		
Ordine P. Order	121291	Data Ordine P.Order Date	30/05/12

### DATI OPERATIVI / OPERATING DATA

Liquido Liquid	Water	Viscosità Viscosity	1 mPa.s.
Campo di Portata Flow-rate range	2 ÷ 10,5 m3/h	Pressione Massima Max Pressure	1 MPa

### MISURATORE VOLUMETRICO / PD FLOW METER

Sigla Tag	FQ 62,1	Numero di Serie Serial Number	B122-7350
Modello Model	FBA12-22-F8	Flange Flanges	2" ANSI 150RF
Materiale corpo Outer Housing	AISI 316	Materiale Rotori Rotors Material	AISI 316

### FILTRO A CESTELLO / BASKET STRAINER

Sigla Tag		Numero di Serie Serial Number	
Modello Model		Flange Flanges	
Materiale Corpo Body Material		Materiale Cestello Screener Material	

### PROVE / TESTS

A) **PROVA IDRAULICA** - il misuratore/filtro è stato sottoposto a 1,5 MPa di pressione idraulica per 5 MINUTI.  
*PRESSURE TEST - the meter,strainer was subjected to 1,5 MPa of hydrostatic pressure for 5 minutes.*

B) **ACCURATEZZA** - Il misuratore è stato tarato con liquido avente viscosità di 1 mPa.s.

*ACCURACY TEST - The meter was calibrated with a liquid having a viscosity of 1 mPa.s.*

L'accuratezza è  $\pm 0,3\%$  nel campo di portata indicato e per esercizio sul liquido sopra specificato.

*Accuracy is  $\pm 0,3\%$  within operating range and for service on the liquid above specified.*

### RISULTATI DELLE PROVE / TESTS RESULT

Il misuratore/filtro non ha mostrato difetti dopo la prova idraulica. L'accuratezza del misuratore è indicata al punto B. Questo misuratore è idoneo per la misura del liquido sopra indicato, entro il campo di portata sopra indicato ad una pressione uguale od inferiore a quella sopra indicata.

*The meter,strainer showed no indication of failure after the pressure test. The meter accuracy is shown under above item B. This meter is satisfactory for service applications when used to meter the products designated, within the operating range indicated and, or below, the maximum pressure value shown above.*

Compilato DRN	MZ	Controllato CHKD	AR	Data Dated
------------------	----	---------------------	----	---------------



## CERTIFICATO DI CONFORMITÀ

*Certificate of Compliance*

<i>A:</i> <i>To:</i>	<b>DESMET BALLESTRA SPA</b>
<i>Ordine:</i> <i>P.Order:</i>	<b>121291 DATED 30/05/2012</b>
<i>Progetto:</i> <i>Project:</i>	<b>C. 2F11</b>
<i>Ns. rif:</i> <i>Our ref.:</i>	<b>C.7048</b>

**Apparecchiature: Misuratori volumetrici***Equipment: Positive Displacement Flowmeters*

**SI CERTIFICA CON LA PRESENTE CHE LE APPARECCHIATURE SONO CONFORMI CON QUANTO RICHIESTO NELL'ORDINE E RELATIVE SPECIFICHE.**

*We hereby certify that involved PD flowmeters comply with above mentioned Purchase Order Specifications.*

**Data 27/09/12**  
*Date*

**Firma**  
*Signature*

**PETROL INSTRUMENTS S.r.l.**



**DICHIARAZIONE CE DI CONFORMITÀ**  
**EC Declaration of Conformity**

**Noi**  
We

**dichiariamo sotto la nostra esclusiva responsabilità che i prodotti**  
*declare under our sole responsibility that the products*

**Misuratori Volumetrici per liquidi**  
*PD flowmeters for liquids*

**Mod.: 51, 11, 12, 22, 53, 13, 14, 24, 16, 18, 28, 110, 112, 212, 612, 114**

**ai quali questo attestato si riferisce, sono conformi alle seguenti Direttive Europee**  
*to which this declaration refers, are in conformity with the following European Directives*

**Direttiva 94/9/CE**  
*Directive 94/9/EC*

**Gruppo II, Categoria 2 GD / Group II, Category 2 GD**

La valutazione di conformità è stata eseguita in accordo alle richieste dell'**Allegato VIII (art 8.1.b.ii)** della direttiva 94/9/CE  
*The conformity evaluation have been carried out according to Annex VIII (8.1.b.ii) of 94/9/EC directive*

**File tecnico n° FT-001 Rev. 1**  
*Technical file n° FT-001 Rev. 1*

depositato presso LCIE (un'azienda Bureau Veritas), organismo notificato n°0081  
*submitted to LCIE (a Bureau Veritas company), notified body n° 0081*

documento di ricevuta n° **ATEX/ITA/05/024** del **07/04/2005**  
*receipt documents n° ATEX/ITA/05/024 dated 07/04/2005*

**Direttiva 97/23/CE**  
*Directive 97/23/EC*

**sono costruiti in accordo alle seguenti norme armonizzate**  
they are manufactured according to the following harmonized standards

**ASTM A216M-93 – ANSI B16,5 – D.M. 28/07/1970 N°347 828**

La valutazione di conformità è stata eseguita in accordo alle richieste **del Mod. A1 Cat. II** della direttiva 97/23/CE  
*The conformity evaluation have been carried out according to Mod. A1Cat. II of 97/23/EC directive*

**Certificato n° 131 del 03/08/2006**  
*Certificate n° 131 dated 03/08/2006*

Organismo notificato n°1115 - Pascal - Milano  
*Notified body n° 1115 – Pascal - Milan*

*Aprilia*

08/08/2006  
(luogo e data)  
(place and date of issue)

*Ing. Paola Romiti*

Nome e firma della persona autorizzata  
*Name and signature of authorized person*





# PETROL INSTRUMENTS S.r.l. - ITALY

## 97/23/CE (PED) DIRECTIVE

### LIMITS OF APPLICABILITY

The Directive 97/23/CE (PED) specifies the following limits of applicability for liquids with a vapour pressure, at the max allowable temperature, below or equal to 0,5 bar above the atmospheric pressure (1.013 mbar) :

- for fluids of group 1, when the volume V is greater than one litre and the product PS\*V is greater than 200 bar\*L, or when the pressure PS is greater than 500 bar (attachment II, table 3);
- for fluids of group 2, when the pressure PS is greater than 10 bar and the product PS\*V is greater than 10.000 bar\*L, or when the pressure is greater than 1.000 bar (attachment II, table 4).

In the article 1 paragraph 2.5 V is defined as the volume inside a compartment, included the volume of the fitting to the first connection and excluded the volume of the internal permanent elements.

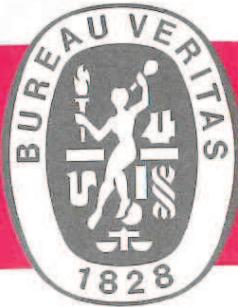
In relation to the above definitions and to the typical values of the volumes V of our instruments, the minimum pressure PS lower than which the directive is not applicable can be immediately identified. These values are shown in the table below.

Meter Model	Volume (litres)	Min. PS (bar)
51	< 1	N.A.
11	< 1	N.A.
12	1,1	>180
22	1,6	>125
53	4	>50
13	4,7	>42,5
14	10	>20
24	12	>16,6
16	30	>6,6
18	39,2	>5,1
28	46,7	>4,28
110	46,7	>4,28
112	62,7	>3,19
212	189	>1
612	>200	Always
114	>200	Always

Strainer Model	Volume (litres)	Min. PS (bar)
S1	1,8	>111
S2	3,2	>62,5
S3	8,4	>23
S4	18,5	>10
S6	39,6	>5
S8	83	>2,4

Furthermore, in case the operating conditions are outside the limits of applicability, the directive imposes not to mark PED the instruments.

BUREAU VERITAS  
Certification



## Certification

Awarded to

PETROL INSTRUMENTS SRL

HEAD OFFICE AND OPERATIVE SITE:  
Via della Tecnica, 5 - 04011 APRILIA (LT) - ITALY

Bureau Veritas Italia certify that the Management System of the above organisation has been audited and found to be in accordance with the requirements of the management system standards detailed below

ISO 9001:2008

Scope of supply

Design, production, maintenance and sale of positive displacement flowmeters  
for liquids and accessories.

EA sector(s): 19

Original Emission Date: 31/07/2008

Last Emission Date: 31/07/2011

Expiration Date: 30/07/2014

Subject to the continued satisfactory operation, to check this certificate validity please refer to website: [www.bureauveritas.it](http://www.bureauveritas.it).

Further clarifications regarding the scope of this certificate and the applicability of standard's requirements may be obtained by consulting the organisation.

Certificate N°: IT229954

ACCREDIA

SGQ N° 009A  
SGA N° 008D  
PRD N° 009B  
SCR N° 008F  
FSMS N° 003I  
PRS N° 076C

Membro degli Accordi di Mutuo Riconoscimento EA e IAF  
Signatory of E-Lad L-IP Mutual Recognition Agreements

Managing & Certification Office:

Bureau Veritas Italia S.p.A. - Divisione Certificazione - Viale Monza, 261 - 20126 Milano - ITALIA





PETROL INSTRUMENTS S.r.l.

# POSITIVE DISPLACEMENT FLOWMETERS

MOD.

51 - 11 - 12 - 22  
53 - 13 - 14 - 24  
16 - 18 - 28

## INSTALLATION OPERATION AND MAINTENANCE

PETROL INSTRUMENTS S.r.l. - 04011 APRILIA (LT) - ITALY



INSTALLATION OPERATION AND MAINTENANCE MANUAL

ED. 03  
REV. 05

P.O. No.	_____
Mod.	_____
Ser. No.	_____
C.	_____



<b>1. General</b>	<b>4</b>
<b>2. Construction</b>	<b>5</b>
<b>3. Application Limits</b>	<b>6</b>
<b>4. Installation Instructions</b>	<b>8</b>
<b>5. Start-up and Operating Instructions</b>	<b>11</b>
<b>6. Failure Analysis</b>	<b>13</b>
<b>7. Inspection Procedures</b>	
<b>models 51-11-12-22-53-13-14-24</b>	<b>14</b>
<b>models 16-18-28</b>	<b>17</b>
<b>8. Maintenance</b>	
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# 1

## **General**

---

"PETROL" PD flowmeters are instruments capable of measuring the volume of flowing liquids with a standard accuracy of  $\pm 0,5\%$  of reading for general purposes and of  $\pm 0,2\%$  of reading for fiscal transactions.

"PETROL" PD flowmeters have been employed since many years by different industries (such as ship-building, steel making, power generation plants, refineries and depots, chemical, pharmaceutical, textile industries etc.) of many countries and have always satisfied the users for their good performances and dependable service during the years.

This manual has been prepared for people responsible of their installation and, at the same time, for people responsible of their maintenance and service.

INVOLVED PERSONNEL ARE KINDLY REQUESTED TO READ CAREFULLY THE PRESCRIPTIONS CONTAINED IN THIS MANUAL, MAINLY THOSE RELEVANT TO PD FLOWMETERS INSTALLATION BEFORE THEIR START-UP.



2

## Construction

PD flowmeters are mainly composed of the measuring unit assembly and of the reading unit (see dwg.1).

The reading unit, available in different models, is that required for the specific application.

The measuring unit assembly is composed of three main sub-assemblies, namely:

- The outer housing;
- The inner housing assembly;
- The coupling assembly.

The outer housing is the part that withstands the liquid pressure and its construction is in accordance to maximum expected pressure of flowing liquid.

The inner housing assembly is the part that accurately measures the volume of flowing liquid through the revolutions of the rotors ("roots" type mechanism).

The coupling assembly is the part through which the number of rotors revolutions is transmitted to the reading unit where are displayed the volumes metered.



## 3

### **Application Limits**

---

PD flowmeters must be used only within the limits specified in the name-plate, i.e. only for the liquid, the flow rate, the temperature, the max pressure and the viscosity specified in the name-plate (see dwg.1).

IT IS THEREFORE REQUESTED TO ACCURATELY CHECK THE NAME-PLATE BEFORE FLOWMETER START-UP.

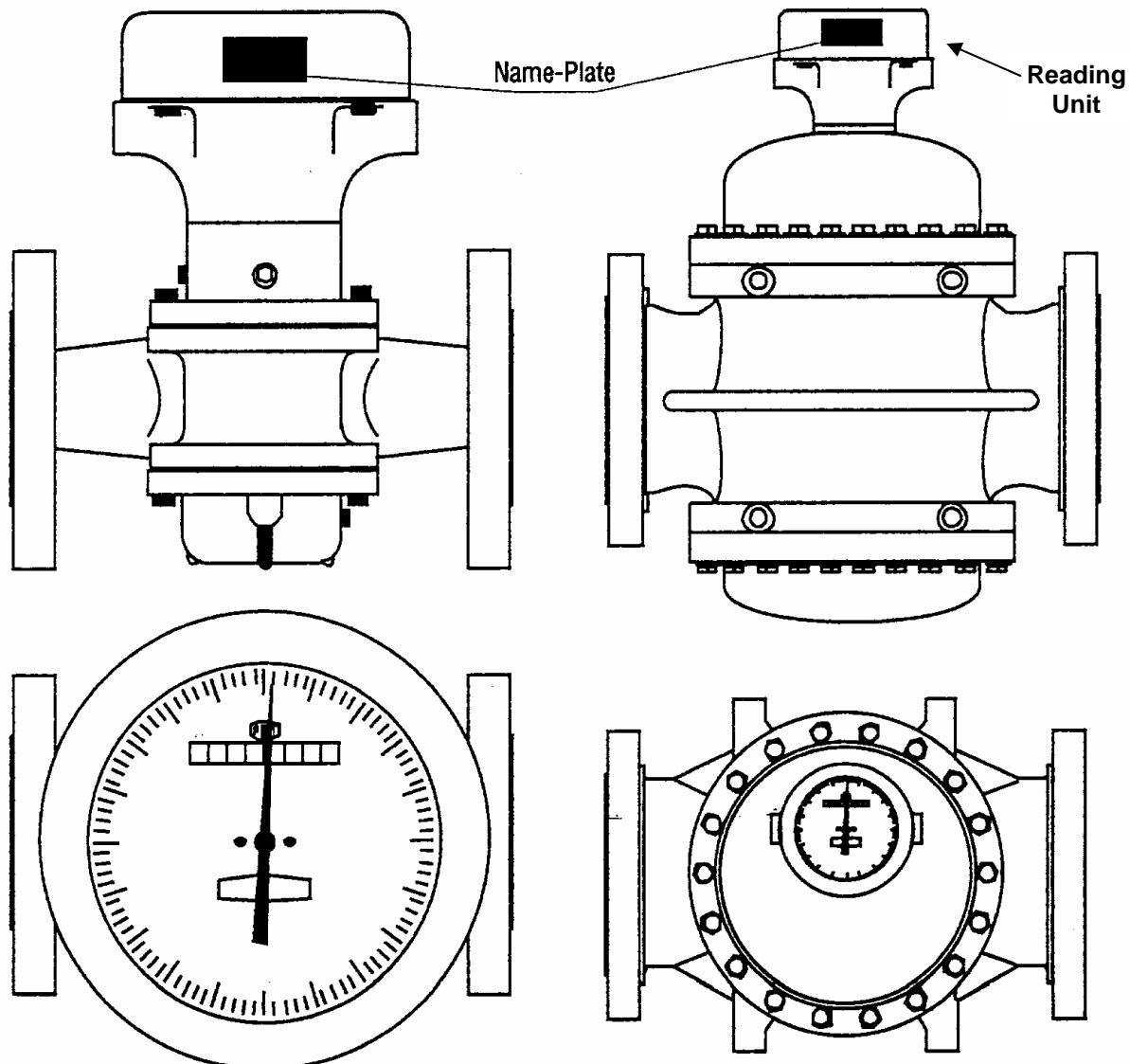
**PETROL**

®

**PETROL INSTRUMENTS S.r.l.**

mod. 51, 11, 12, 22, 53, 13, 14, 24

mod. 16, 18, 28



dwg.1 - PD Flowmeters



## 4

# Installation Instructions

## PRECAUTIONS

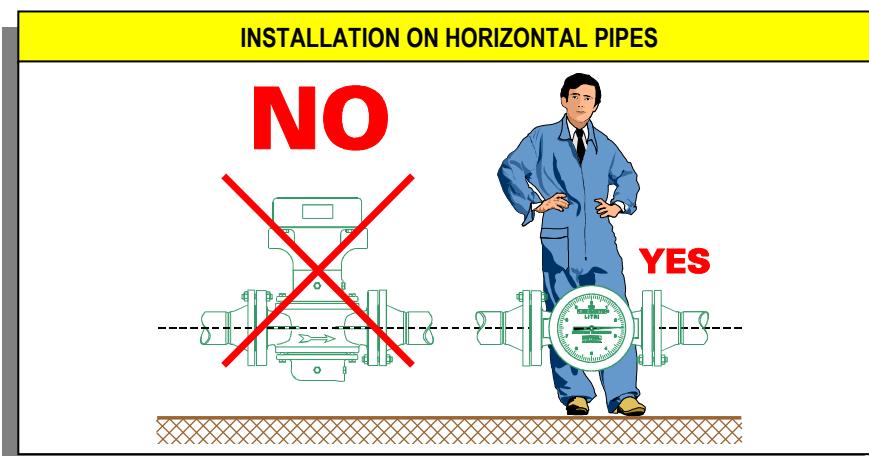
The majority of PD flowmeters failures are caused by infiltration of solid particles from the outer housing flanges during "inoperative conditions".

It is therefore very important:

- to remove the flanges protection only immediately before the instrument installation;
- to absolutely prevent the entering of solid particles into the measuring unit assembly during installation.

## INSTRUCTIONS

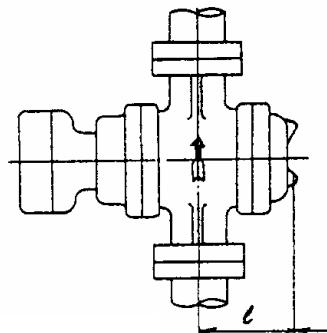
1. During flowmeter installation avoid that deformation and/or stresses are induced into the outer housing from the connecting pipes. If threaded holes for anchoring purpose are available on the PD flowmeters outer housing, provide for a strong anchoring to avoid vibrations;
2. Check that actual flow direction is the same indicated by the arrow stamped on the flowmeter outer housing and/or is in accordance to the "in" and "out" nameplates attached to the inlet and outlet flanges of the flowmeter itself;
3. The PD flowmeter must be mounted with the rotor shafts in horizontal position and the counter dial must be in a vertical position (see dwg. 1a). In any case, on the glass of the counter are glued several drawings which clearly show the correct mounting position of the PD flowmeter. In case the counter dial is required to be positioned horizontally or inclined at 45°, the flowmeter will be equipped with a proper 90° or 45° angle adaptor.



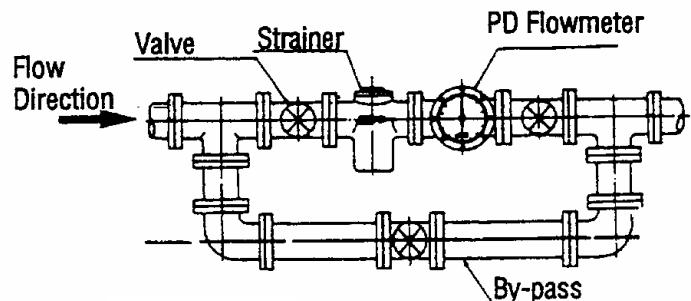
dwg.1a

**PETROL**

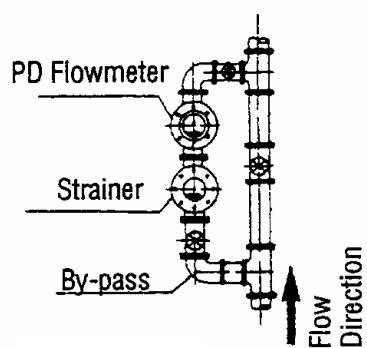
**PETROL INSTRUMENTS S.r.l.**



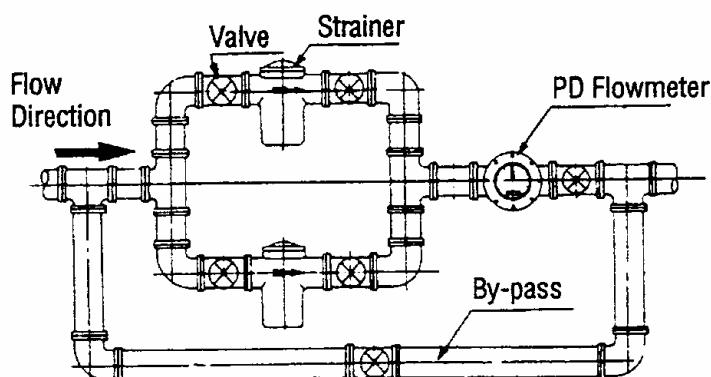
**dwg. 2a**



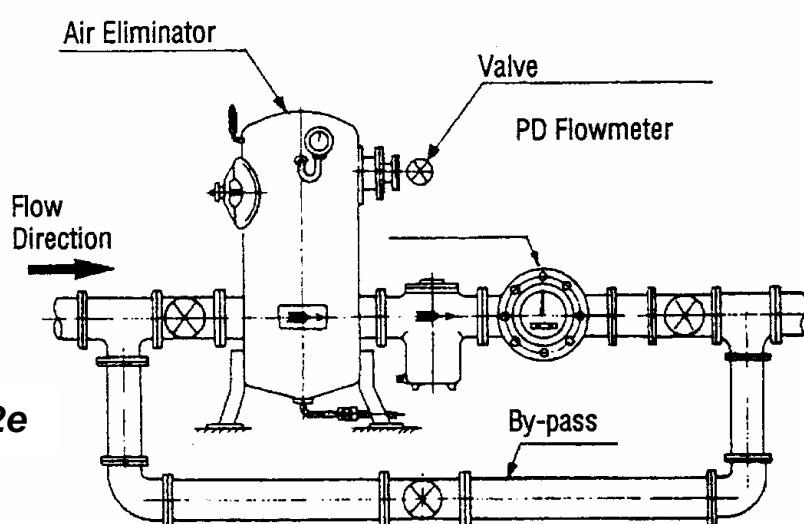
**dwg. 2b**



**dwg. 2c**



**dwg. 2d**



**dwg. 2e**

**dwg.2 - Installation Examples**



## 4

### Installation Instructions

4. For the measure of very viscous liquid at ambient temperature it is recommended to provide heating for both the line and the flowmeter (if necessary jacketed type PD flowmeters are available).
5. It is recommended to provide enough space on the rear side of flowmeter (i.e. on the opposite side of the reading unit) for rear-cover removal as well as for inner housing assembly removal (dwg. 2a).
6. It is good practice to install a strainer just before the flowmeter. However if plant configuration does not permit the direct coupling of flowmeter and strainer, it is imperative to clean thoroughly, before flowmeter installation, the spool pipe used for strainer and flowmeter connection.
7. In case of new lines and specially in case of new and long lines, flush accurately the lines themselves, by pumping liquid, before flowmeter installation, should such operation be impractical, remove the inner housing assembly from outer housing during the start-up.

#### INSTALLATION EXAMPLES

1. Wherever possible, install the flowmeter on a by-pass, as shown in dwg. 2b and dwg. 2c for its easier disassembly and inspection.
2. When an appreciable quantity of solid particles is expected to be present in the flowing liquid, install two strainers in parallel for alternate use as shown in dwg 2d, or install a "duplex" type strainer;
3. When gas bubbles are expected in the flowing liquid, install an air eliminator as shown in dwg.2e.



PETROL INSTRUMENTS S.r.l.

5

## Start-up and Operating Instructions

1. For new lines let the liquid flow through the by-pass in order to completely wash away any scale trace. Scale remaining in the lines might cause unusual wear of bearings and of timing gears;
2. In case PD flowmeter is not installed on a by-pass or in case the line doesn't have a by-pass, remove the inner housing assembly from the PD flowmeter outer housing flanged to the piping and let the liquid flow through the line until the line itself is completely clean and any trace of scale has been washed away. Once the line flushing has been completed, re-install the inner housing assembly into the outer housing and proceed with the PD flowmeter start-up.
3. To start-up flowmeter open first the inlet valve and then open slowly the outlet valve.
4. In case of Jacketed PD flowmeter in order to avoid any damage to the instruments, the operator has to be sure that the heating liquid or vapour has already properly heat the liquid to be measured.

AVOID TOO HIGH FLOW RATES AS WELL AS TOO SHORT OPENING AND/OR CLOSING CYCLES.



## 5

### **Start-up and Operating Instructions**

---

4. During initial service periods check frequently the strainer screener, eventually cleaning it to avoid clogging.
5. PD flowmeters maintain an high accuracy for long periods of time when operating within the flow rate range for which they have been realized. It is recommended to operate the flowmeter only within the flow rate limits specified in the name-plate.
6. If flowmeters are installed in cold places and so when measuring water in such cold places, it is recommended, once the measuring cycle has been completed, to drain completely, through the proper drain plugs, the liquid remained inside the instrument to avoid damages to the housing and/or rotors deformations due to liquid freezing.
7. Should the line where the PD flowmeter is installed be subject to periodic flushing with high temperature steam and/ or vapor, it is strongly recommended during the flushing phase, that inner housing assembly is removed from the outer housing flanged to the piping, to avoid that sudden mechanic and thermic shocks may damage the components of the measuring mechanism.



**6**

## **Failure Analysis**

Failure of the flowmeter reading unit may be caused by:

1. Solid particles inside the inner housing assembly;
2. Rotors interference due to excessive wear of bearings and/or of timing gears;
3. Failure of movement transmission system due to:
  - excessive wear of transmission gears for models 51, 11, 12, 22, 53 and 13 or of fork-type coupling for models 14, 24, 16, 18 and 28;
  - wear of magnetic transmission components;
4. Misoperation of the reading unit.

In case of flowmeter reading unit failure it is necessary to inspect the instrument following step-by-step the listed maintenance procedures, replacing, where needed, damaged parts with new parts.



## 7

### **Inspection Procedures** **models 51-11-12-22-53-13-14-24**

1. To check the measuring unit assembly it is convenient to inspect at first the inner housing assembly.

To do that it is enough to remove the flowmeter rear cover and check, by hands, whether the timing gears rotate freely or not (dwg. 3a).

2. In case the timing gears rotate freely and the counter does not move, it is necessary to check the transmission system and the reading unit.

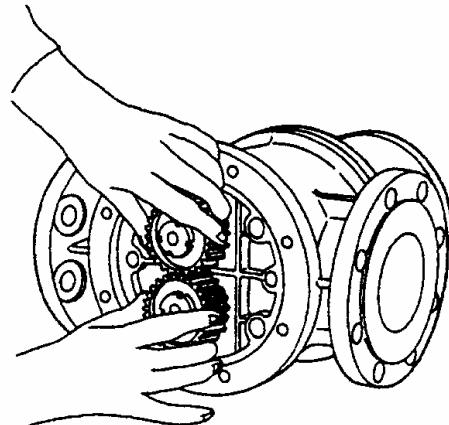
The reading unit, mainly composed of the reduction gear assembly and of the counter, may be easily inspected removing the counter itself, which may be of standard type or of an equivalent type. In any case the counter is removed unscrewing the four bolts as shown in dwg. 3b.

If the counter rotate freely it is necessary to rotate again the timing gears of the inner housing assembly to check whether the trouble is in the reduction gear assembly, which can now be easily inspected, or in the magnetic transmission. Should be necessary to inspect the magnetic transmission it is suggested to remove the inner housing assembly following the procedures mentioned under following item 3.

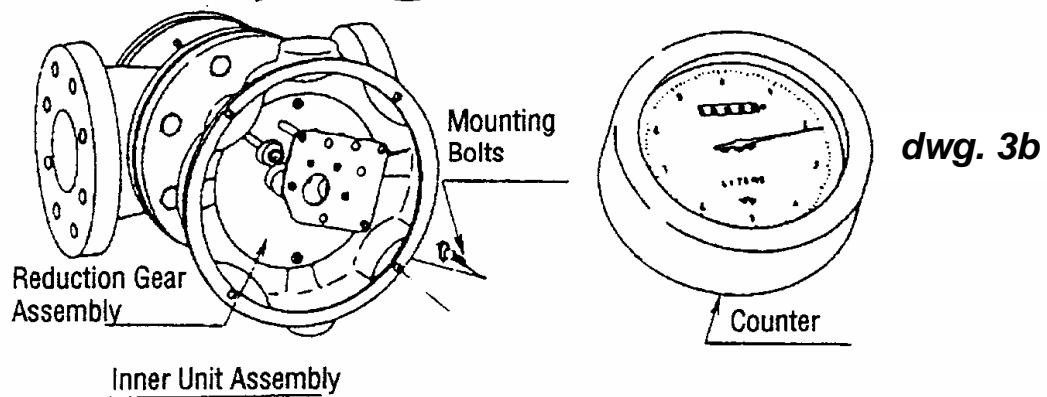
Doing that it is also possible to inspect the transmission gears for models 51, 11, 12, 22, 53 and 13 or the fork-type coupling for models 14 and 24. Magnetic transmission is then removed unscrewing the eight bolts which provide its coupling to the front cover of the outer housing.

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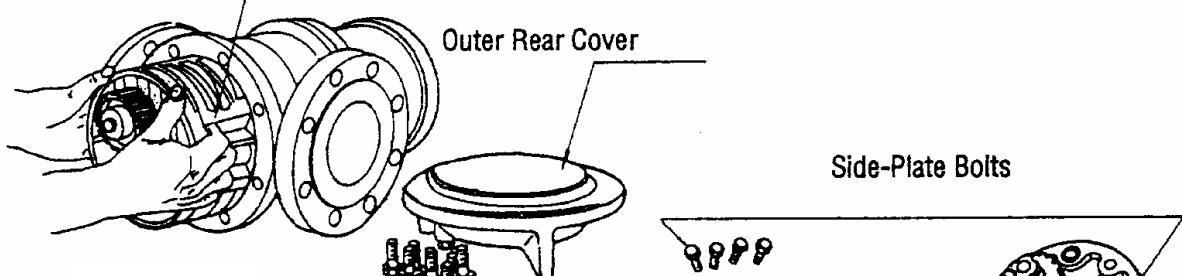
**PETROL INSTRUMENTS S.r.l.**



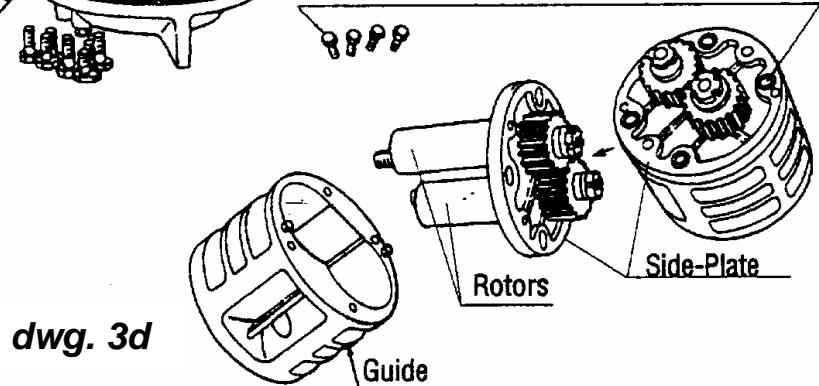
**dwg. 3a**



**dwg. 3b**



**dwg. 3c**



**dwg. 3d**

**dwg.3 - Inspection Procedures**



## 7

### **Inspection Procedures**

**models 51-11-12-22-53-13-14-24**

3. At contrary, should the rotation of timing gears be not free and uniform, it is necessary to pull-out the inner housing assembly from the outer housing and to proceed to its inspection.

Inner housing assembly is pulled-out from the outer housing taking it from the timing gears (dwg. 3c).

Should such operation results difficult, do not force on timing gears because the bearings might be damaged. In this case please use the two threaded holes, worked-out in the inner rear cover close to the timing gears, on which the bolts of the outer housing rear cover may be mounted. Once the inner housing assembly is removed it is possible to provide to its maintenance in accordance to the procedures mentioned under item 9.

4. The PD flowmeter re-assembly is made just reversing the disassembly procedures.

It is the case to point-out that the inner unit assembly is equipped with an its own "anti-rotational" pin having its seat in the outer housing front cover. In re-positioning the inner housing assembly inside the outer housing it is necessary that this coupling is correctly made. Furthermore before mounting the rear cover of the outer housing check that the counter is properly operating by rotating the timing gears with the hands.

It is also recommended to replace the PD flowmeter gaskets before its mounting.



## 7

## Inspection Procedures

**models 16-18-28**

The measuring unit is shown as exploded view in dwg. B.

The numbers mentioned in the drawing, and which will be referred to hereinafter, are those identifying the components listed in the legenda.

To check the reading unit, mainly composed of the reduction gear assembly and of the counter, disassembly the adaptor of the counter (82) unscrewing the relevant fixing bolts (81). In this way either the reading unit either the magnetic transmission are removed and can be therefore easily inspected.

It is just the case to mention that the counter is disassembled from the reading unit unscrewing the relevant four fixing bolts.

Should the reading unit and the magnetic transmission be properly operating it is necessary to check the measuring unit. To do that it is necessary to remove the outer front cover (72) of the PD flowmeter, unscrewing the relevant fixing bolts (79).

In this way either the fork-type movement transmission system either the timing gears of the inner housing assembly can be inspected. It is therefore possible to check if the timing gears rotate freely and steadily.

In case the rotation of the timing gears is not free and steady it is necessary to pull-out the inner housing assembly from the outer housing to proceed to the relevant inspection and maintenance.



## 8

### Maintenance

**models 51-11-12-22-53-13-14-24**

The inner housing unit is shown as exploded view in dwg. A.

In case the rotation of the rotors is not free and uniform it is necessary to check the following:

1. eventual wearing of the timing gears;
2. eventual wearing of the bearings, normally evidenced by an excessive clearance between rotors shafts and the relevant bearings;
3. rotors axial clearance, which shall be of few centesimal units;
4. eventual solid particles between the rotors preventing their rotation.

To check the rotors conditions it is necessary to disassembly the inner housing assembly into its main components. To do that, it is enough to unscrew the inner housing cover, timing gears side, and remove it from the inner housing assembly together with the rotors, as a single sub-assembly (dwg. 3c). Before doing this operation it is necessary for PD flowmeters mod. 51 and mod. 11 to remove the rotor gear positioned on the front cover side of the inner housing assembly.

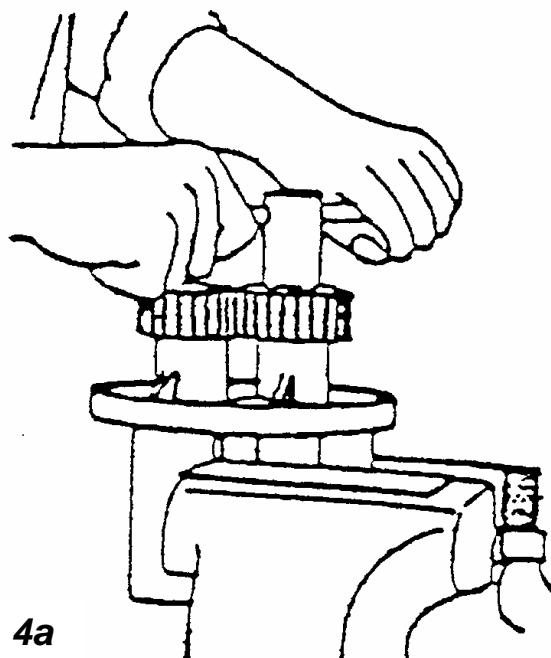
It is now possible to check:

1. the actual conditions of the rotors and eventually eliminate any seizing marks;
2. the actual conditions of the bearings, either those mounted on the inner unit assembly front cover either those mounted on the inner unit assembly rear cover;
3. the actual conditions of the inner surface of the front and of the rear covers, and eventually eliminate any seizing marks;
4. the uniformity of rotor shafts dimensions, front cover side, in their coupling to the bearings.

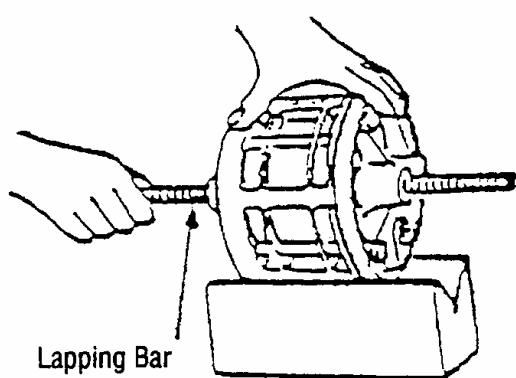
**PETROL**

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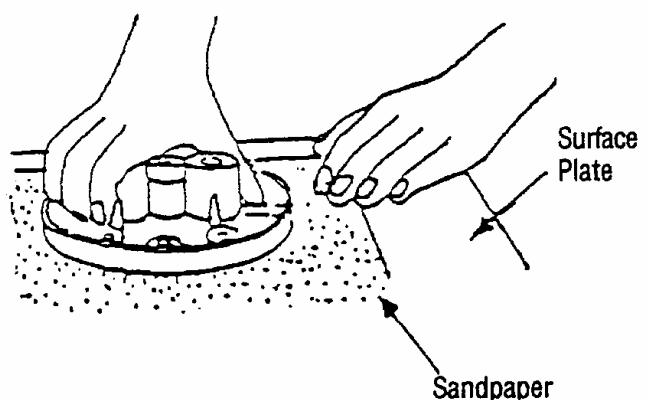
**PETROL INSTRUMENTS S.r.l.**



***dwg. 4a***



***dwg. 4b***



***dwg. 4c***

**dwg.4 - Maintenance Procedures**



## 8

### Maintenance

**models 51-11-12-22-53-13-14-24**

In case even the front cover of the inner unit assembly has to be inspected, it is enough to remove it unscrewing the relevant fixing bolts. In making the maintenance of the inner housing assembly it is recommended not to dissynchronise the rotors, if possible. To do that and in case it is necessary to check and/or to replace the timing gears, it is convenient to clamp on a vise the sub-assembly rear cover-rotors (dwg. 4a), inserting between the rotors a thickness gauge of some centesimal units, that, in case of need, may be also replaced by a simple paper. In case the rotors have to be disassembled, for example for their replacing and/or to check the uniformity of the rotors shafts dimensions and/or to check the dimensions of the rotors themselves and/or for rear cover bearings replacement, it is suggested to proceed as follows when re-assembling the inner housing assembly.

1. install separately the two rotors inside the inner housing and check that they rotate freely;
2. install contemporarily the two rotors inside the inner housing and check that they do not interfere;
3. in the conditions of the above item 2) mount the first timing gear on its shaft;
4. to mount the other timing gear proceed as follows:
  - a) block the rotor on which the first timing gear has been already mounted with a soft material;
  - b) push with hands the rotor on which the timing gear has to be mounted against the other rotor, inserting between them a thickness gauge of about 0.1 mm;
  - c) in the conditions of the above item b) mount the second timing gear;
  - d) check that the clearances between the rotors and between the rotors themselves and the inner housing are uniform;
  - e) In case the bearings have been replaced it is recommended that the same are aligned with a proper lapping bar (dwg. 4b) and that the inner surface of the covers has been made perfectly plane (dwg. 4c).



## 8

### **Maintenance models 16-18-28**

The inner housing is shown as exploded view in dwg. B. To disassembly the rotors it is recommended to proceed in the following way:

- remove the inner cover (50), timing gears side, unscrewing the relevant fixing bolts (66);
- remove the shaped rotors plate (48) unscrewing the relevant fixing bolts (49). To do that it is necessary to slightly push upward the rotors to avoid that the plate may damage, by blowing, the centering pins between body and cover (13);
- mark the relative position of timing gears by making a recognizing sign on them. Such marking is necessary for the correct re-assembly of rotors;
- pull-out the rotors from inner housing assembly, using the timing gears as pullers.

The actual conditions of the rotors and the wear conditions of the timing gears and of the bearings may now be properly evaluated.

It is just the case to mention that rear cover is disassembled following the same procedures mentioned hereinabove.

The purpose of the timing gears is to synchronise the rotors and their relative position is established by the centering pins (34).

Should timing gears be replaced it is recommended to use particular care in the re-positioning of the new gears.

The timing gears are removed by unscrewing the relevant fixing bolts (37).



## 8

### **Maintenance** **models 16-18-28**

Should be necessary to replace the bearings (22, 59), those must be removed from the relevant covers together with the bearing holders (23, 60). To facilitate such operation it is, recommended to mount a screw on the threaded holes of the bearing holder and to use them to remove the system bearing/ bearing holder.

Inner housing re-assembly procedures are just the reverse of rotors disassembling procedures above mentioned.

However the utmost care and attention must be placed to the following points:

- check that the clearances, i.e. the distance between the rotors and the distance between the rotor and the inner unit body are uniform;
- check that rotor position is that corresponding to the recognizing marks previously made on the timing gears.

The PD flowmeter re-assembly procedures are just the reverse of the disassembly procedures above mentioned for the check of the measuring unit assembly and of the reading unit.

The utmost care must however be put in re-assembly the outer front cover to avoid damages to the fork-type coupling (43, 45) between the inner housing assembly and the reading unit.



**9**

## **Spare Parts**

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Parts found weared or damaged must be replaced with new parts, to order spare parts make reference to the attached exploded-view drawings.

When placing the order please specify:

- a) flowmeter model, printed on the name plate;
- b) flowmeter serial number, printed on the name plate;
- c) item number and description of the parts, as mentioned in the attached exploded-view drawings (dwg. A and dwg. B).



# 10

## **Storage**

PD flowmeters are normally supplied packed inside wooden cases that may be easily handled without damaging the instruments.

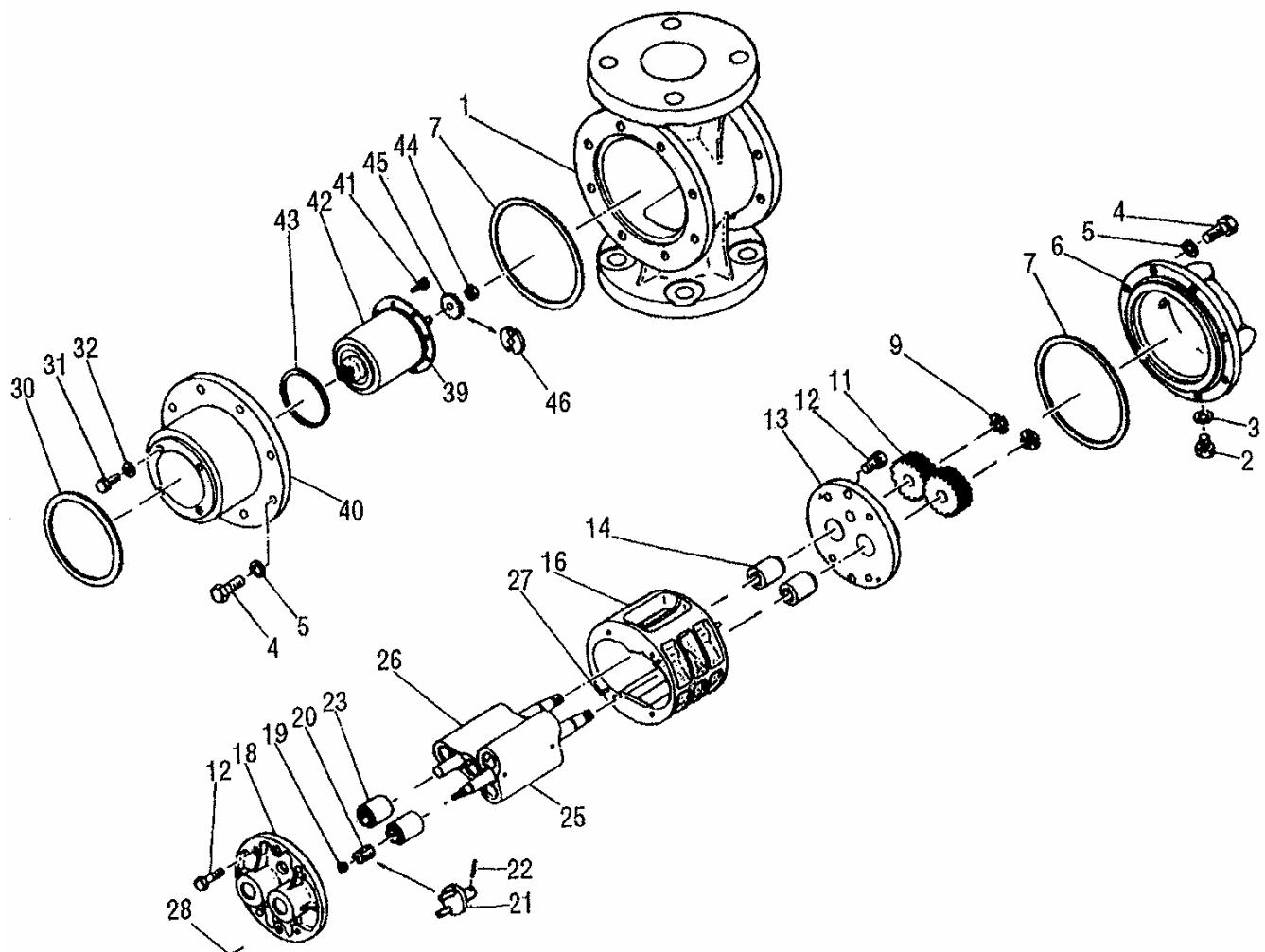
For cases handling all types of motor machinery and/or hand machinery generally available at storage houses may be used.

It is however recommended to avoid cases superimposing except in case of equal dimensions and similar gross weight.

No special precautions have to be taken for short periods of storage. It is however recommended that cases are possibly stored in a closed warehouse and anyway not left in open areas exposed to rain, sand and wind.

In case of long periods of storage, cases must be stored in a closed warehouse. In addition, PD flowmeters maintenance procedures must be strictly followed immediately after equipment unpacking and/or immediately before their installation and/or start-up.

It is in any case imperative that at least the measuring units are removed from the outer housings and duly checked according to their specific maintenance procedures, before PD flowmeters start-up.

**PETROL****PETROL INSTRUMENTS S.r.l.****"A" Spare Parts List**  
**models 51-11-12-22-53-13-14-24**

dwg.A - "PETROL" PD flowmeters, Double Case Type



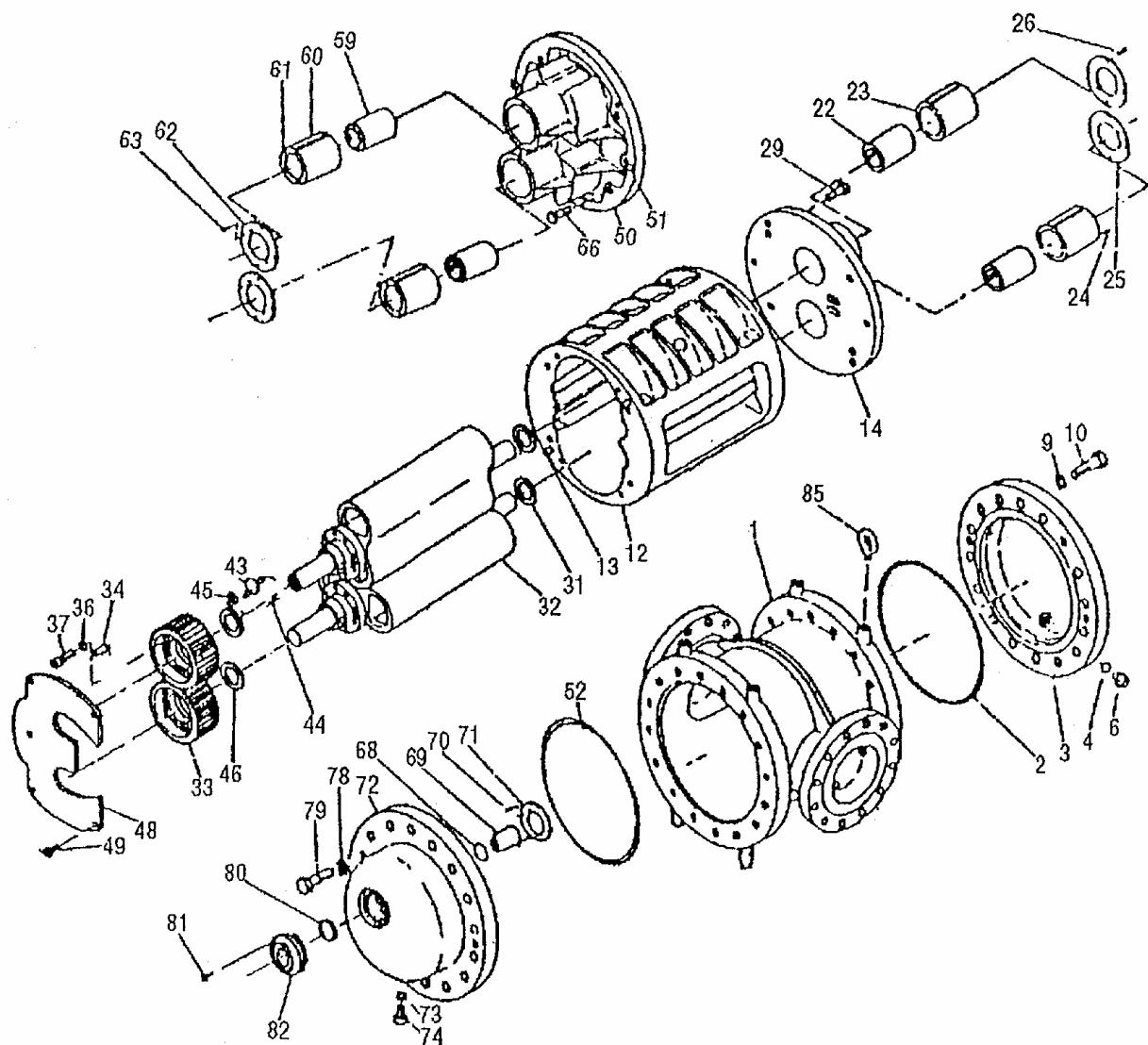
POS.	DESCRIZIONE	DESCRIPTION	DESCRIPTION	QTY
	(1) MOD. 51, 11, 12, 22, 53, 13			
	(2) MOD. 14, 24			
46	DISCO DI ACCOPPIAMENTO (2)	COUPLING DRIVEN (2)	DISQUE DE COUPLAGE (2)	1
45	INGRANAGGIO DI TRASMISSIONE (1)	MAGNETIC COUPLING GEAR (1)	ENGRENAGE DE TRANSMISSION (1)	1
44	DADO BLOCCO INGR. TRASMISS.	LOCK NUT TANSMISSION	ECROU BLOCAGE ENGR. DE TRANSMISSION	1
43	GUARNIZIONE TRASMISSIONE	GASKET, MAGNETIC COUP.	GUARNITURE DU COMPTEUR	1
42	TRASMISSIONE MAGNETICA	MAGNETIC COUPLING ASS'Y	TRANSMISSION MAGNÉTIQUE	1
41	BULLONE TRASMISSIONE	BOLT, TRANSMISSION	BOULON DE LA TRANSMISSION	1
40	COPERCH. ESTERNO FRONTALE	FRONT COVER	COUVERCLE EXTERNE FRONTAL	8
39	FLANGIA BLOCCAGGIO TRASMISS.	LOCK FLANGE, TRANSMISSION	BRIDE DE BLOCAGE DE LA TRANSMISSION	1
32	RONDELLA ELAST., SUPPORTO.	SPRING WASHER, COUNTER	SEGMENT DU SUPPORT	4
31	BULLONE, SUPPORTO TESTATA INDI.	BOLT, COUNTER	BOULON DU SUPPORT DU COMPTEUR	4
30	GUARNIZIONE SUPP. TEST. INDICAT.	GASKET, COUNTER	GARNITURE DU SUPPORT DU COMPTEUR	1
28	SPINA COPERCHIO ESTERNO FRONT.	PIN, FRONT END PLATE	GOUPILLE DU COUVERCLE EXTERNE FRONTAL	1
27	SPINA GUIDA CAMERA DI MISURA	PIN, INNER HOUSING	GOUPILLE GUIDE DE LA BOÎTE DE MESURE	4
26	ASSIEME ROTORE	ROOTS ASS'Y	ENSEAMBLE DU ROTOR	1
25	ASSIEME ROTORE	ROOTS ASS'Y	ENSEAMBLE DU ROTOR	1
23	BOCCOLA, FRONTALE IN GRAFITE	BEARING, FRONT	DOUILLE FRONTALE EN GRAPHITE	2
22	FORCHETTA DI ACCOPPIAMENTO (2)	PIN (2)	FOURCHETTE DE COUPLAGE (2)	1
21	SPINA DI TRASMISSIONE (2)	COUPLING ASSEMBLY (2)	GOUPILLE DE LA TRANSMISSION (2)	1
20	INGRANAGGIO ROTORE (1)	TRANSMISSION GEAR (1)	ENGRENAGE DU ROTOR (1)	1
19	DADO BLOCCO ROTORE (1)	LOCK NUT, TRANSMISSION (1)	ECROU DE BLOCAGE DU ROTOR (1)	1
18	COP. FRONT. CAMERA MISURA	FRONT END PLATE	COUVERCLE FRONTAL BOÎTE DE MESURE	1
16	CORPO CAMERA DI MISURA	INNER BODY	CORPS DE LA BOÎTE DE MESURE	1
14	BOCCOLA, POSTERIORE IN GRAFITE	BEARING, REAR	DOUILLE POSTERIEURE EN GRAPHITE	2
13	COPERCHIO POST. CAMERA MISURA	REAR END PLATE	COUVERCLE POSTÉRIEUR BOÎTE DE MESURE	1
12	BULLONE, CAMERA MISURA	BOLT, INNER HOUSING	BOULON BOÎTE DE MESURE	8
11	INGRANAGGI, SINCRONISMO	TIMING GEAR	ENGRENAGES DE SYNCHRONISME	2
9	DADO BLOCCO INGR. DI SINCRON.	LOCK NUTS, SHAFTS	ECROU BLOCAGE ENGRENAGES DE SYNCHR.	2
7	GUARNIZIONE, CORPO	GASKET, BODY	GARNITURE DU CORPS	2
6	COPERCHIO EST. POST.	REAR COVER	COUVERCLE POSTÉRIEUR EXTERNE DU CORPS	1
5	GROVER COPERTI ESTERNI	SPRING WASHER, COVER	SEGMENT DU COUVERCLES EXTERNES	16
4	BULLONE COPERTI ESTERNI	BOLT, COVER	BOULON DES COUVERCLES EXTERNES	16
3	GUARNIZIONE, DRENAGGIO	GASKET, DRAIN	GARNITURE DU DRAINAGE	4
2	TAPPO, DRENAGGIO SFIATO	PLUG, DRAIN	BOUCHON DE DRAINAGE	4
1	CORPO ESTERNO	OUTER BODY	CORPS EXTERNE	1



**PETROL INSTRUMENTS S.r.l.**

## **“B” Spare Parts List**

**models 16-18-28**



dwg.B - "PETROL" PD flowmeters, Double Case Type



**PETROL INSTRUMENTS S.r.l.**

POS.	DESCRIZIONE	DESCRIPTION	DESCRIPTION	QTY
89	SPINA CONICA	CONIC PIN, ROTOR PLATE	GOUPILLE CONIQUE, PLAQUE ROTORS	6
88	PIATTO SAGOMATO ROTORI	SHAPED ROTOR PLATE	PLAQUE PROFILÉE ROTORS	1
85	GOLFARE	EYE BOLT	EILLET	4
82	ADATTATORE, SUPP. TEST.	ADAPTOR, COUNTER	ADAPTEUR DU SUPPORT DU COMPTEUR	1
81	BULLONE, SUPP. TEST.	BOLT, COUNTER BASE	BOULON DU SUPPORT DU COMPTEUR	6
80	GUARNIZIONE, SUPP. TEST.	GASKET, COUNTER BASE	GUARNITURE DU SUPPORT DU COMPTEUR	1
79	BULLONE, COPERCHIO	BOLT, COVER	BOULON DU COUVERCLE	16
78	RONDELLA ELASTICA, COP.	SPRING WASHER, COVER	SEGMENT DU COUVERCLE	16
77	DADO PRIGIONIERI	NUD, STUD	ECROU DE BLOCAGE	2
76	RONDELLA ELAST. PRIG.	SPRING WASHER, STUD	SEGMENT DE L'ECROU	2
75	PRIGION.COP.EST.FRONT.	STUD, FRONT COVER	ECROU BLOCAGE COUVERCLE EXTERNE FRONTAL	2
74	TAPPO, DRENAGGIO	PLUG, DRAIN	BOUCHON DE DRAINAGE	2
73	GUARNIZIONE, DRENAGGIO	GASKET, DRAIN	GARNITURE DU DRAINAGE	2
72	COPERCHIO EST. FRONT.	FRONT COVER	COUVERCLE EXTREME FRONTAL	1
71	SUPPORTO, TRASMISSIONE	RETAINER, MAGNETIC COUP.	SUPPORT DEL LA TRANSMISSION	1
70	BULLONE, TRASMISSIONE	BOLT, MAGNETIC COUPLING	BOULON DE LA TRANSMISSION	8
69	TRASMISSIONE MAGNETICA	MAGNETIC COUPLING ASS'Y	TRANSMISSION MAGNÉTIQUE	1
68	GUARNIZIONE TRASMISSIONE	GASKET, MAGNETIC COUP.	GUARNITURE DU COMPTEUR	1
66	BULLONE, CAMERA MISURA	BOLT, INNER HOUSING	BOULON BOÎTE DE MESURE	4
63	BULLONE, SUPPORTO	BOLT, RETAINER	BOULON DU SUPPORT	8
62	SUPPORTO, BOCCOLA	RETAINER, BEARING	SUPPORT DE LA DOUILLE	2
61	SPINA, BOCCOLA	PIN, FRONT BEARING	GOUPILLE DE LA DOUILLE	4
60	MANICOTTO, BOCCOLA	BUSH, FRONT BEARING	MANCHON DE LA DOUILLE	2
59	BOCCOLA, FRONTALE	BEARING, FRONT	DOUILLE FRONTALE	2
52	GUARNIZIONE, CORPO	GASKET BODY	GARNITURE DU CORPS	1
51	SPINA GUIDA, CAM. MIS.	PIN, INNER HOUSING	GOUPILLE GUIDE DE LA BOÎTE DE MESURE	1
50	COPERC. INT. FRONTEALE	FRONT END PLATE	COUVERCLE INTERNE FRONTAL	1
49	BULLONE, PIATTO SAGOM.	BOLT, SIDE PLATE	BOULON DE LA PLAQUE PROFILÉE	5
48	PIATTO SAGOMATO CHIUS.	SIDE PLATE	PLAQUE PROFILÉE DE FERMETURE	1
46	ANELLO RASAM., FRONTEALE	SIDE RING, FRONT	BAGUE D'ARRÊT FRONTALE	2
45	DISCO, TRASMISSIONE	COUPLING, DRIVEN	DISQUE DE TRANSMISSION	1
44	GRANO, TRASMISSIONE	DOWEL COUPLING, DRIVING	GOUPILLE DE TRANSMISSION	1
43	FORCHETTA TRASMISSIONE	COUPLING, DRIVING	FOURCHETTE DE TRANSMISSION	1
37	BULLONE, INGRANAGGI	BOLT, TIMING GEAR	BOULON DES ENGRÈNAGES	16
36	RONDELLA ELAST., INGR.	SPRING WASHER, T. GEAR	SEGMENT DES ENGRÈNAGES	16
35				
34	SPINA, INGRANAGGI	KNOCK PIN, TIMING GEAR	GOUPILLE DES ENGRÈNAGES	2
33	INGRANAGGI, SINCRONISMO	TIMING GEAR	ENGRÈNAGES DE SYNCHRONISME	2
32	ASSIEME ROTORE B	ROOTS ASS'Y B	ENSAMBLE DU ROTOR B	1
31	ANELLO RASAMENTO, POST.	SIDE RING, REAR	BAGUE D'ARRÊT POSTÉRIEUR	2
30	ASSIEME ROTORE A	ROOTS ASS'Y A	ENSAMBLE DU ROTOR A	1
29	BULLONE, CAMERA MISURA	BOLT, INNER HOUSING	BOULON DE LA BOÎTE DE MESURE	4
26	BULLONE, SUPPORTO	BOLT, RETAINER	BOULON DU SUPPORT	8
25	SUPPORTO, BOCCOLA	RETAINER BEARING	SUPPORT DE LA DOUILLE	2
24	SPINA, BOCCOLA	PIN, REAR BEARING	GOUPILLE DE LA DOUILLE	4
23	MANICOTTO, BOCCOLA	BUSH, REAR BEARING	MANCHON DE LA DOUILLE	2
22	BOCCOLA, POSTERIORE	BEARING, REAR	DOUILLE POSTÉRIEURE	2
14	COPERCHIO INT. POST.	REAR END PLATE	COUVERCLE INTERNE POSTÉRIEUR	1
13	SPINA GUIDA CAMERA	PIN, INNER HOUSING	GOUPILLE GUIDE DE LA BOÎTE DE MESURE	4
12	CAMERA DI MISURA	INNER BODY	CORPS DE LA BOÎTE DE MESURE	1
10	BULLONE COPERCHIO	BOLT, COVER	BOULON DU COUVERCLE	16
9	RONDELLA ELAST. COP.	SPRING WASHER, COVER	SEGMENT DU COUVERCLE	16
8	DADO PRIGIONIERI	NUT, STUD	ECROU DE BLOCAGE	2
7	RONDELLA ELAST. PRIG.	SPRING WASHER, STUD	SEGMENT DE L'ECROU	2
6	PRIGION. COP. EST. POST.	STUD REAR COVER	ECROU BLOCAGE COUVERCLE EXTERNE POST.	2
5	TAPPO, DRENAGGIO	PLUG, DRAIN	BOUCHON DE DRAINAGE	2
4	GUARNIZIONE, DRENAGGIO	GASKET, DRAIN	GARNITURE DU DRAINAGE	2
3	COPERCHIO EST. POST.	REAR COVER	COUVERCLE EXTERNE POSTÉRIEUR	1
2	GUARNIZIONE, CORPO	GASKET, BODY	GARNITURE DU CORPS	1
1	CORPO ESTERNO	OUTER BODY	CORPS EXTERNE	1



## Customer Satisfaction Questionnaire

Per ognuno degli aspetti elencati di seguito, Vi preghiamo di esprimere il Vostro giudizio sul livello qualitativo del prodotto/servizio fornito dalla Petrol Instruments S.r.l. e di quantificarlo attribuendogli un valore/voto all'interno di una scala di valori crescenti da 1 a 10 e corrispondente ai seguenti giudizi rispetto alle Vostre aspettative.

	DESCRIZIONE DELLA CARATTERISTICA DEL SERVIZIO	VOTO
1	Esaustività delle informazioni complessive ricevute da parte degli interlocutori della Petrol Instruments nel corso dei primi contatti a scopo conoscitivo e informativo	
2	Professionalità degli interlocutori con cui avete avuto i primi contatti	
3	Tempestività nella risposta da parte degli interlocutori ad eventuali richieste o informazioni supplementari o particolari	
4	Tempestività nella elaborazione e trasmissione dell'offerta	
5	Completezza e chiarezza espositiva della documentazione tecnica	
6	Qualità attesa del prodotto e qualità percepita	
7	Accuratezza degli strumenti	
8	Affidabilità e regolarità di funzionamento	
9	Facilità di manutenzione e ripristino	
10	Disponibilità parti di ricambio	
11	Qualità assistenza tecnica on-line	
12	Completezza e chiarezza nella documentazione amministrativa	
13	Puntualità nell'assistenza post-vendita	

<b>CLIENTE:</b> .....	<b>COMPILATORE:</b> .....
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### Suggerimenti:

Quali aspetti del prodotto/servizio offerto dalla Petrol Instruments S.r.l. ritenete possano essere migliorati o modificati?

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Aprilia ,

Il Responsabile Gestione Qualità