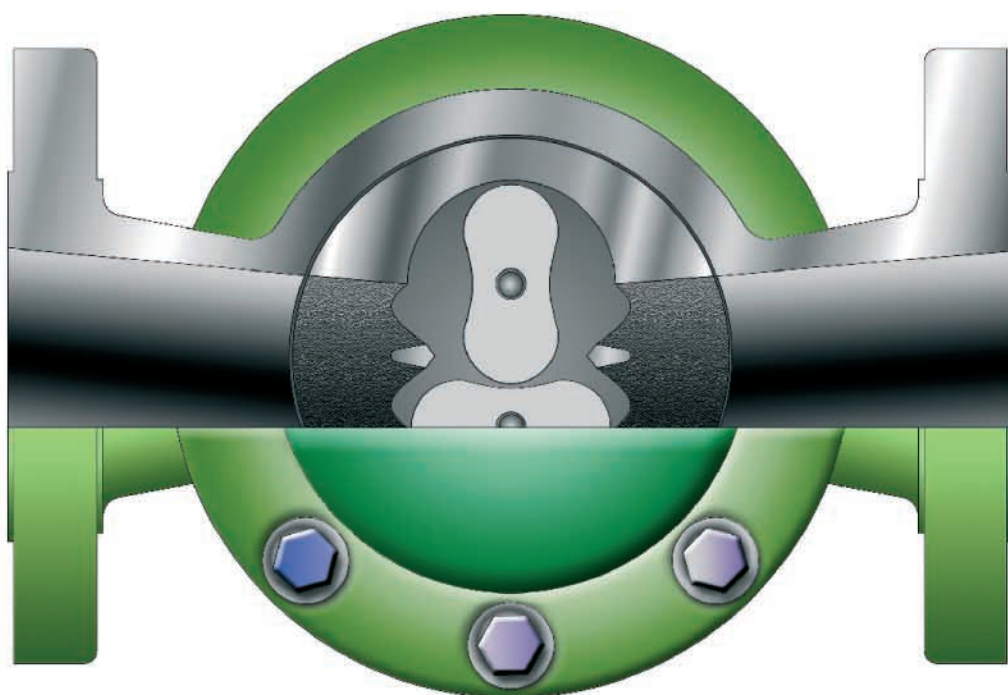




Produzione Misuratori Volumetrici

PETROL
Metering *Systems*

PD meters *For liquids*



Bi-rotor Mechanism

Horizontal Design



www.petrolms.it

Production line

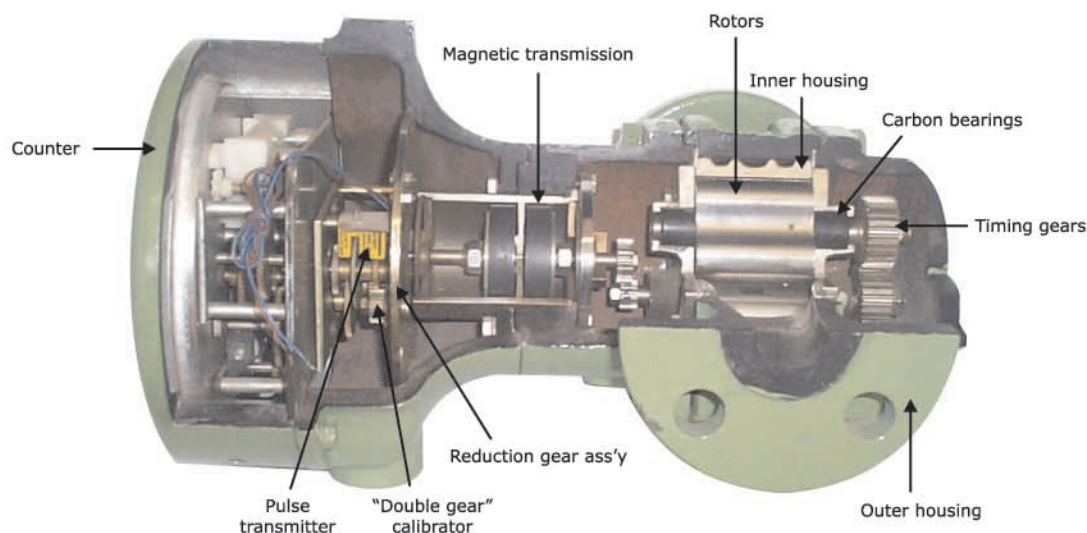
P.M.S. Petrol Metering Systems S.r.l. is producing PD meters for liquids on the basis of the manufacturing technology and experiences accumulated since the year 1970 from its employees and managers. The production started just after the year 1970 as a result of the technical agreement with a Japanese company who was already producing this type of PD meters since the year 1945.

After the year 1980 the former Petrol S.r.l. now **P.M.S. Petrol Metering Systems S.r.l.** became a completely free PD meters manufacturer operating with an own technology all over the world from the own factory of Aprilia (Lt). The PD meters work on "Roots" principle, known since the beginning of the last century and in this case specialized to obtain an extremely precise and reliable volumetric measure of liquids flowing through pipes. In other cases the same principle has been specialized to produce pumps, low pressure compressors and other industrial devices. Since their commercial debut in the European markets "Petrol" PD meters have contributed to the automation and modernization of the industrial processes for their reliability and exceptional operating characteristics coupled with a very high manufacturing technique. "Petrol" PD meters are to-day available for the measure for almost all the liquid industrially utilized in a range of models so wide to cover flow rate ranges from few hundred of litres/hour to 1.800 m³/h with nominal sizes from 1" to 16". Furthermore they can meet even contemporary either in the standard version either in the jacketed version operating specifications as severe as max. operating pressure till 15 MPa and max. operating temperatures over 230°C. Up to PD meters model 112 (10" nominal size) their design is horizontal, i.e. the rotors shafts work in horizontal position while from model 212 (12" nominal size and over) their design is vertical, i.e. the rotors shafts work in vertical position. In addition up to PD meters model 28 (8" nominal size) their metering mechanism is composed of two (2) rotors keyed on two (2) shafts while from model 110 (10" nominal size and over) their metering mechanism is composed of four (4) rotors always keyed on two (2) shafts but shifted of 45° (tetra-rotor mechanism).

The PD meters 10" size and over (tetra-rotor mechanism) are duly described in the specific bulletin available on request.

Sectional view (mod. FA11-22-C8)

Scale 1:3



Main features

DETAILED DESCRIPTION IN THE GENERAL CATALOGUE AVAILABLE ON REQUEST

Double case construction

Floating rotors

Magnetic transmission

Carbon bearings

Change gear calibrator (auto-check)

Construction materials

High pressure / temperature

Capability of metering viscous liquids

"Tailored" versions

Excellent accuracy and repeatability

Reduced maintenance

Extended production line

Wide range of ancillary equipment

Horizontal and vertical design

"PETROL" PD meters



Approved by Industry and Commerce Ministry, Weight and Measure Dept. with D.M. 28/7/1970, n.347828 for Italy and D.M. 10/9/1989 n.99.03.01.002 for European Countries.

"Petrol" PD meters are typical volumetric instruments which directly measure the quantity of liquid flowing through pipes by means of a couple of rotors. These instruments, totally manufactured in our factory since more than 30 years, allow an accurate measure either of the flow rate either of volumes transferred (integrated flow rate) of practically all the liquids industrially utilized. They may be used for custody transfer purposes, operating controls and for the many other needs of the petroleum, chemical, pharmaceutical, crude oil extractions, ships and steel making industries, power plants, etc.

Operating principle

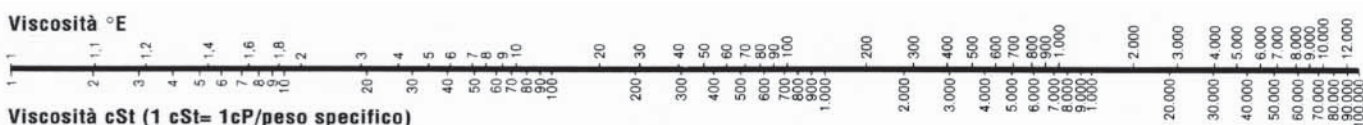
The two rotors, manufactured in such a way that they never touch each other nor they touch the other components of the "base volume", are alternatively driven by the timing gears coupled on rotor's shafts just outside the rear cover of the inner housing.

As shown in the operating scheme, the liquid entering the PD meter pushes the bottom rotor, which is in condition of unbalanced pressure, to rotate counterclockwise. Contemporarily the top rotor, being driven by the timing gears, rotates clockwise.

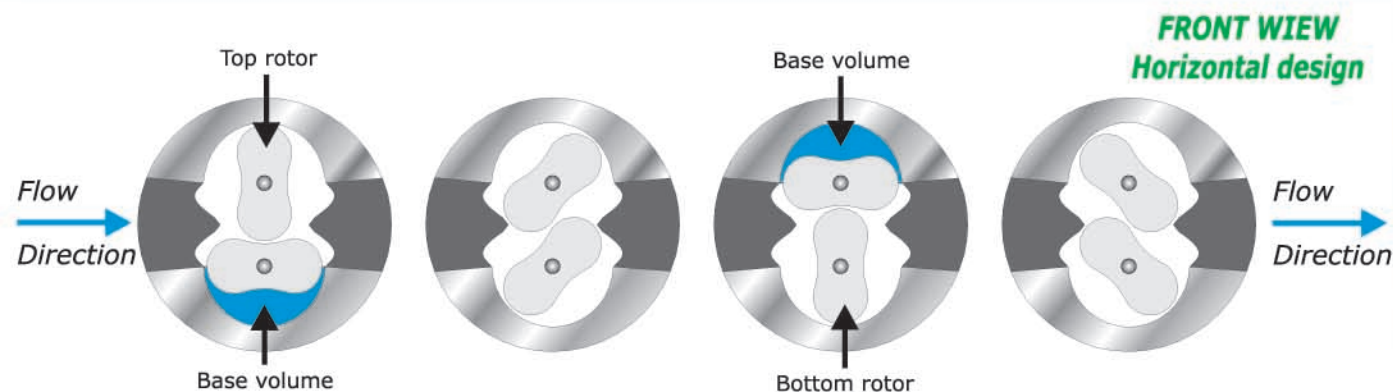
After a 90 degrees rotation, the rotors are in a reciprocal position in respect to the initial one and therefore it is the top rotor (pushed from the liquid to rotate clockwise) which drives the bottom rotor, through the timing gears, to rotate counterclockwise. During a complete cycle, i.e. a 360° rotors' rotation four (4) "base volumes" are generated. By transmitting the number of rotors' rotations to the counter the volume passed through the PD meter is displayed.

To select a PD meter the viscosity of the liquid to be metered is the most important characteristic to be known. PD meter size an relevant flow-rate range directly depends from its value.

For this reason hereinafter is printed a viscosity conversion diagram.

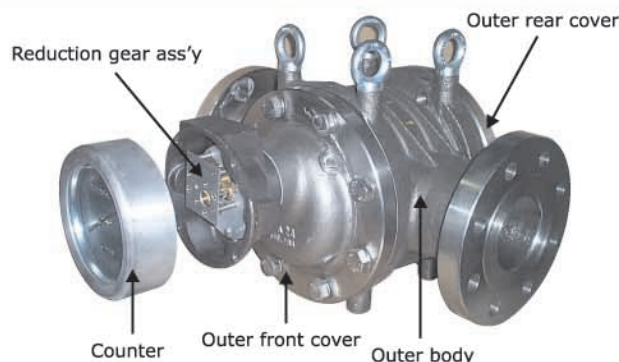


Operating scheme (Bi-rotor mechanism)



Horizontal design means that the rotors' shafts MUST WORK IN HORIZONTAL POSITION (as in above sequence)

Outer housing (Body + front cover + rear cover)

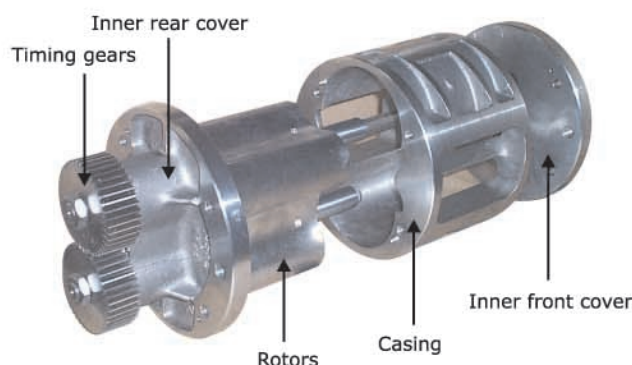


Outer housing materials

CODE	Body/Covers	Gaskets
A	Cast iron	Universal SA
B	Bronze	Universal SA
C	Cast steel	Universal SA
D	Ductile iron	Universal SA
E	AISI 304	Teflon
F	AISI 316	Teflon
G	AISI 316 L	Teflon

Magnetic transmission to drive the counter (standard)

Inner housing (Casing + front cover + rear cover + rotors)

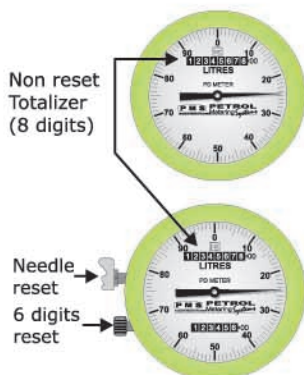


Inner housing materials

CODE	Casing/Covers	Rotors
1	Bronze	Bronze
2	Bronze	Allum. Alloy
3	Cast iron	Allum. Alloy
5	Cast iron	Cast iron
7	AISI 304	AISI 304
8	AISI 316	AISI 316
9	AISI 316 L	AISI 316 L

Impregnated carbon bearings to support rotors' shafts (standard)

Counter models



MOD. 12

10 figures non reset type totalizer (8 on digits + 2 on dial)

For electronic counters, explosion proof or control room version, see general catalogue.

MOD. 22

8 figures reset type counter (6 on digits + 2 on dial) plus 8 digits non reset totalizer.

The needle scope is to increase the counter resolution.
One needle revolution = one (1) unit of the totalizer.

Identification code

F A 53 - 12 - F 8

F	PD meter type
A	Max pressure
53	PD meter model
12	Counter model
F	Outer housing materials
8	Inner housing materials

Standard flanges according to ANSI or UNI codes.
Special flanges according to other codes on request

How to select

PD meter type

F standard **FJ** jacketed

Max Pressure

(See table)

PD meter model

From the table "flow rate ranges" select the PD meter model more suitable for the specific needs with reference to the type/viscosity of liquid to be metered.

Accessories

Transmitters code are:

P for electric pulses

N for pneumatic pulses

Insert above codes after the first number of the counter model, ex. -1P2- or/and -2N2-.

For temperatures above 80°C use mod. AK-5 fin-cooler.

To read from the top use mod. AM-6 angle adaptor.

Construction materials

From the relevant "tables" select the construction materials more suitable for the specific needs for what concerns both the outer housing and the inner housing. For diluted HCl and diluted H2SO4 are available PD meters completely realized in "Moplen". For other construction materials consult the factory.

Max pressure

CODE	Mpa
A	1
L	2
M	6,2
H	11
X	>11

Flow-rate ranges (m³/h)

PD meter model	Flanges size (DN)	Viscosity in mPa.s							Water
		> 0.5	2	10	50	150	500	2000	
51	25	0,6÷3	0,55÷3,5	0,4÷4	0,35÷4	0,25÷4	0,18÷3,5	0,005÷2,8	0,5÷2,8
11	25	1÷5,5	0,9÷6	0,65÷6,5	0,55÷6,5	0,4÷6,5	0,3÷6	0,1÷5	0,9÷5
12	50	2,2÷12	2÷13	1,4÷14	1,2÷14	0,9÷14	0,65÷13	0,2÷10	1,8÷10,5
22	50	3,5÷18	3÷20	2,2÷22	1,8÷22	1,5÷22	1÷20	0,3÷16	2,5÷16,5
53	80	6÷34	5,5÷36	3,8÷38	3,2÷38	2,5÷38	1,8÷36	0,6÷30	4,5÷28
13	80	9,5÷52	8,5÷54	5,6÷56	4,5÷56	3,8÷56	2,8÷54	0,9÷45	7÷42
14	100	15÷85	14÷90	10÷100	8,5÷100	6,5÷100	4,5÷90	1,5÷75	12÷75
24	100	22÷120	20÷130	14÷140	12÷140	9,5÷140	6,5÷130	2÷100	16÷100
16	150	27÷150	25÷160	17÷170	14÷170	11,5÷170	8÷160	2,5÷130	20÷125
18	200	36÷200	34÷220	24÷240	20÷240	17÷240	11÷220	3,5÷170	30÷175
28	200	48÷260	45÷280	30÷300	25÷300	20÷300	14÷280	4,5÷220	35÷225

PD meters may be supplied with the underdetailed alternative flanges size without changing the above flow ranges.

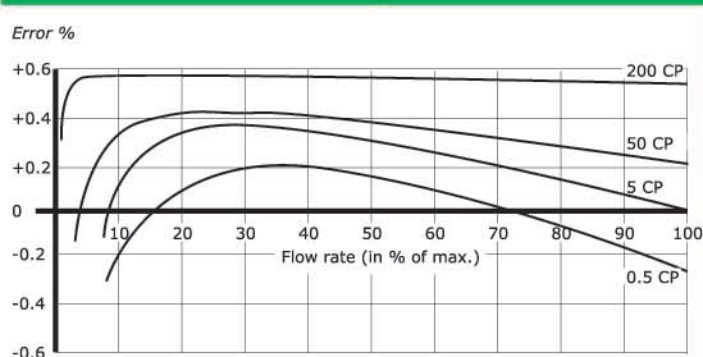
Alternative flanges size

PD meter model	Flanges size (DN)	Flow-rate range m³/h
51AB	40	<p>See above table</p> <p>Same model number Same flow-rate range</p>
11AB	40	
12AB	40	
22BC	65	
53B	50	
13B	50	
14C	80	
24C	80	
16D	100	
18F	150	
28F	150	

Notes on flow-rate ranges

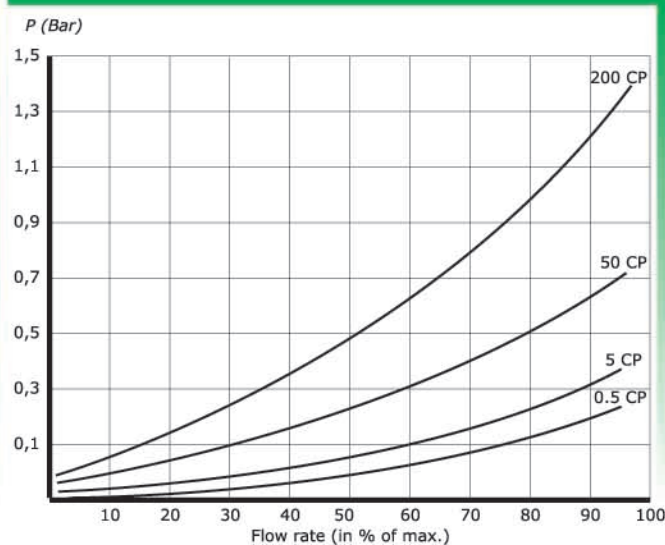
Flow rate ranges shown in the table are referred to intermittent service. For continuous service (8/24 hours of operation per day), as well as for service on lines operated with reciprocating or volumetric pumps its recommended to reduce the max. flow rate of about the 30 % or to consult the factory. The table has been prepared very conservatively to allow anybody to ask for a quotation or to select a "Petrol" PD meter, provided operating temperature is below 80 °C. It is possible to use "Petrol" PD meters for flow rates and viscosities outside mentioned ranges but in such cases it is necessary to consult the factory. The max allowed flow rate is about 20% higher than that shown in the table. PD meters accuracy is in accordance with the official approvals issued by Italian Ministry for installation in Italy and in European Countries.

Accuracy curves

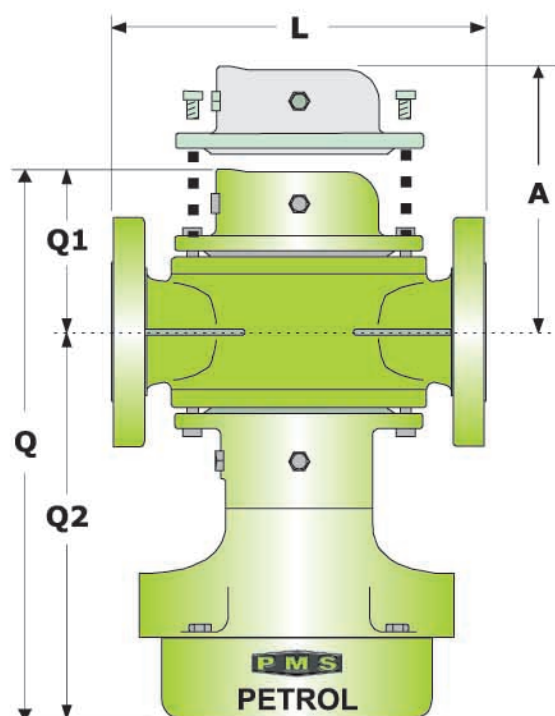


The graph shows only the trend of the accuracy curve for liquids of different viscosity. Curves may then be shifted up and down along the Error % axis with the calibrator.

Pressure drop



PD meters outline dimensions



Dimensions table

MOD	L	Q	Q1	Q2	A
51	200	311	78	233	110
11	200	329	86	243	130
12	250	375	110	265	180
22	250	425	135	290	230
53	320	432	148	284	230
13	320	492	178	314	290
14	385	565	210	355	360
24	450	655	255	400	450
16	610	695	240	455	520
18	610	795	288	507	600
28	625	889	335	554	700

Dimensions valid for PD meters flanged
ANSI 150 RF and UNI PN 10/16

The inner housing is removed from the rear. The dimension A shows the minimum space to be left for its removal.

Tests

- All the outer housings are tested at a pressure 1,5 times the max. operating pressure printed in the PD meter name-plate;
- Performance tests are carried out with water as liquid medium and with calibrated tanks (see picture at the right showing a 5 KI calibrated tank) sealed by Italian Weight and Measure Dept., as reference volume.



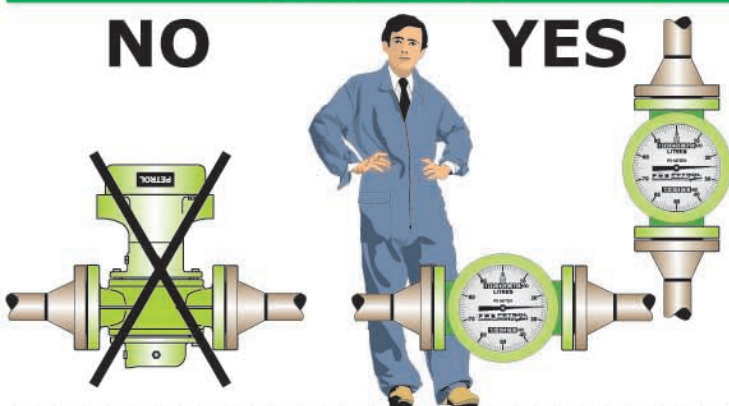
Precautions

- The majority of PD meters troubles is caused by solid particles which entering the metering mechanism, block the rotors. Remove the flanges' protections just before PD meter installation and be sure that the PD meter inlet line has been properly cleaned before the start-up
- Use the PD meter within the flow rate range, pressure and temperature values printed in the name-plate and be sure that the flow direction agrees with the arrow stamped on equipment body.
- The use of a protection strainer mounted just upstream the PD meter or directly coupled on the PD meter inlet flange is strongly recommended. More-over install the PD meter if possible on a by-pass.
- PD meters over 3" size shall be duly anchored on a strong foundation.
- PD meter flow direction may be: left-right, right-left, down-up, up down. However **the rotors' shafts must compulsory work in horizontal**

Installations

NO

YES



During the years "Petrol" has accumulated a very strong experience in the production of PD meters suitable for the heaviest operating conditions in the more different industrial fields such as the measurement of blood, of phthalic and of maleic anhydride, of crude oil on well-heads, of heavy oils at high temperatures, of sea water etc. Such a technical background and the investments yearly destined to the research in the field of the volumetric measurement of liquids have till now satisfied any particular need of the customers. Hereinafter are listed the most significant references for crude oil extraction industry, for power plants and for marine terminals.

Users and application

Chemical industry

acetic acid, alcohol, caustic soda, demi water, formaldehyde, methanol, naphthalene, nitric acid, paintings, saline solutions, solvents, sulphuric acid.

Crude oil extraction and marine terminals

Crude-oil, fuel-oils, refined products.

Food industry

alcohol, alcoholic beverages, fats (animal and vegetal), fatty acids, saline solutions, vegetal oils, water.

Petrochemical industry

Acetaldehyde, acetone, acrylonitrile (AN), benzene, butanol, ethanol, ethylene, LPG, maleic anhydride, phthalic anhydride, propylene, styrene, toluene, xylene.

Petroleum industry

asphalt, bitumen, crude-oil, gasoline, heavy oils, jp4, light-oil, LPG, lubricants, kerosene, naphta, paraffines, tar.

Pharmaceutical industry

Acid solutions, caustic soda, demi water, HCL diluted, H₂SO₄ diluted and concentrated, phosphoric acid.

Power plants industry

bunker C, crude-oil, demi water, heavy oil, naphta.

Ships and steel making industry

bunker C, diathermic-oil, heavy-oil, light-oil, turbine-oil, sweet water, sea water.

Marine terminals

ITALY

Costiero Gas Livorno

LPG ships unloading max flow-rate

600/1200 m³/h

ABROAD

Sudan

Marsa Bashayer Marine Terminal

Crude oil loading max flow-rate

8000m³/h

Lebanon

Zaharani marine terminal

Gasoil unloading max flow-rate

1800 m³/h

Beddawi Marine terminal

Gasoil unloading max flow-rate

1800 m³/h

See specific reports in the General Catalog

Power plants

ITALY: Acea Montemartini, ASM Brescia, ASM Ponti sul Mincio, Bastardo, Brindisi Nord, Brindisi Sud, Borgo Trento, Fiume Santo, Isab Priolo, La Spezia, Melilli, Monfalcone, Montalto di Castro, Napoli Levante, Ostiglia, Pietrafitta, Piombino, Porto Tolle, Rosignano Solvay, S. Barbara, San Filippo del Mela, S. Gilla, Sermide, Sulcis, Tavazzano, Termini Imerese, Torrevaldaliga Nord, Torrevaldaliga Sud, Trino Vercellese, Vado Ligure.

ABROAD: Algeria, Arabia Saudita, Argentina, Cambogia, Chile, China, Egypt, Ethiopia, Ghana, Jordan, Greece, Indonesia, Ivory Coast, Irak, Lebanon, Jamaica, Malaysia, Malta, Morocco, Pakistan, Syria, Sud Africa, Tunisia, Turkey, U.A.E., Uruguay, Venezuela, Yemen.

Crude oil

Platforms:

(Off-shore)

ITALY: Agostino, Amelia, Angela / Angelina, Annalisa, Aquila, Barbara, Cervia, Daria, Emilio, Emma, Fratello, Garibaldi, Giovanna, Hera Lacinia, Luna, Nilde, Pennina, Perla, Prezioso, Regina, Squalo, Vega.

ABROAD: Brasil, China, Croazia, Congo, India, Libya, Nigeria, Vietnam.

Extraction fields:

(On shore)

ITALY: Cavone, Gaggiano, Gela, Monte Alpi, Pisticci, Torrente Baganza, Torrente Tona, Trecate, Val D'Agri, Villa Fortuna.

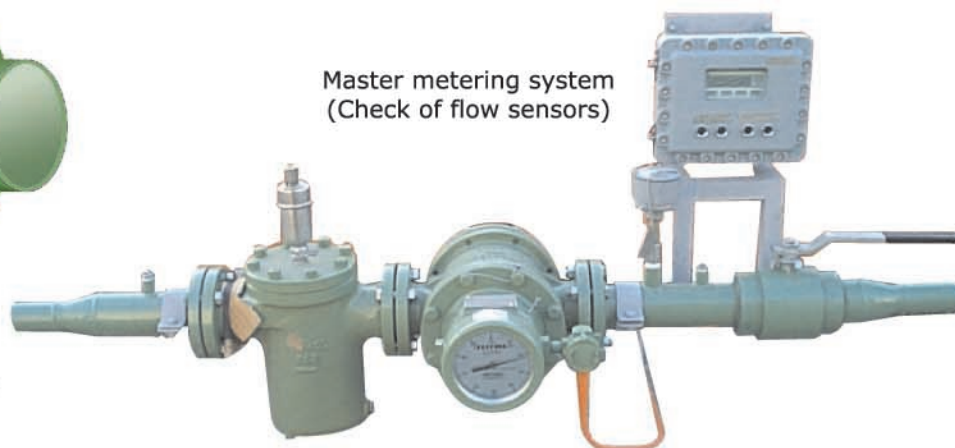
ABROAD: Austria, Egypt, Libya, Nigeria.

Metering Systems

"PETROL" PD meters are also used as the main component of metering systems for custody transfer purposes and for calibration and/or control of other flow sensor devices.



Skidded 16" size PD meters
(ships loading/unloading)



Master metering system
(Check of flow sensors)



Produzione Misuratori Volumetrici

P E T R O L
Metering *Systems*

Name	:	P.M.S. Petrol Metering Systems S.r.l.
Address	:	Via delle Valli, 25 04011 Aprilia (LT) ITALY
Phone	:	++39.06.92727658
Fax	:	++39.06.92860025
I. V. A. code	:	IT02068390596
Fiscal code	:	06381091005
Total ground	:	2.500 m ²
Covered area	:	1.000 m ²
URL web site	:	http://www.petrolms.it
E-mail:		
General Info	:	petrolms@petrolms.it
Dott. Ing. Mario Romiti	:	mario.romiti@petrolms.it
Dott.ssa Silvia Romiti	:	silvia.romiti@petrolms.it
Bank references	:	Monte Dei Paschi Di Siena - Aprilia (LT)
Account n.	:	9650.06
ABI code	:	01030
CAB code	:	73920
SWIFT code	:	PASCITMMAPR

...Thanks for having selected our company.