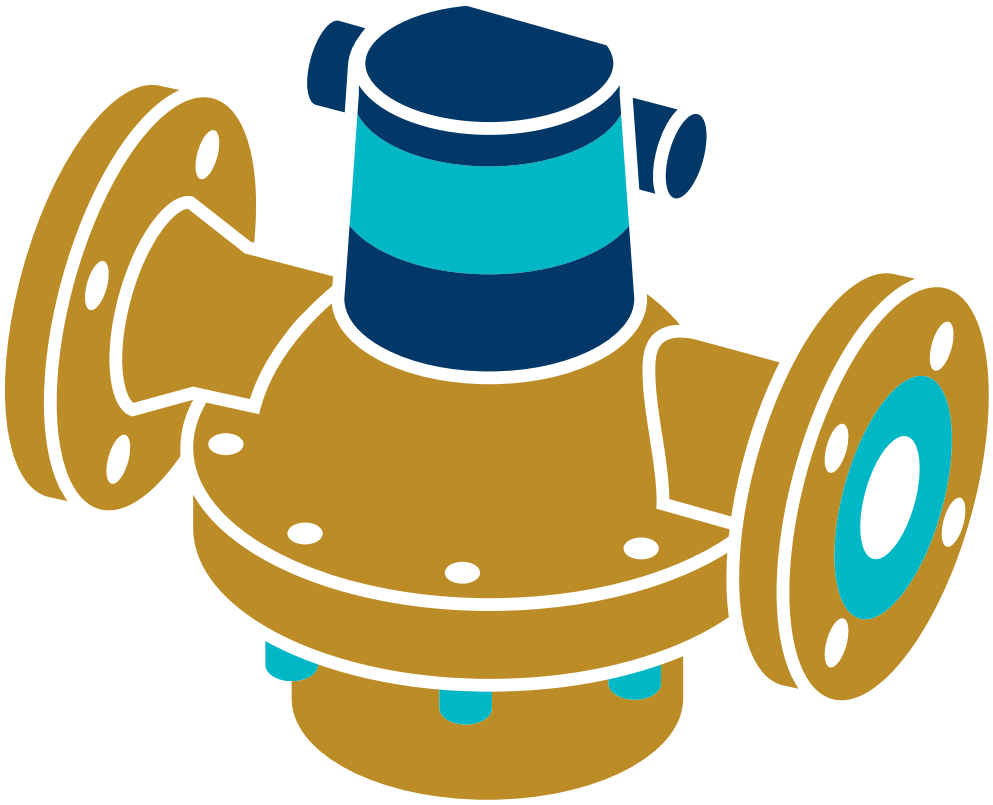
AQUAMETRO
OIL & MARINE



DOMINO®

Measurement, Dosing / Special fluids

DOMINO®

Flow meters for chemical liquids DN 15 - 50

Flow measurement of liquids in chemical, pharmaceutical, cosmetic and other industries. Batching and filling operations.

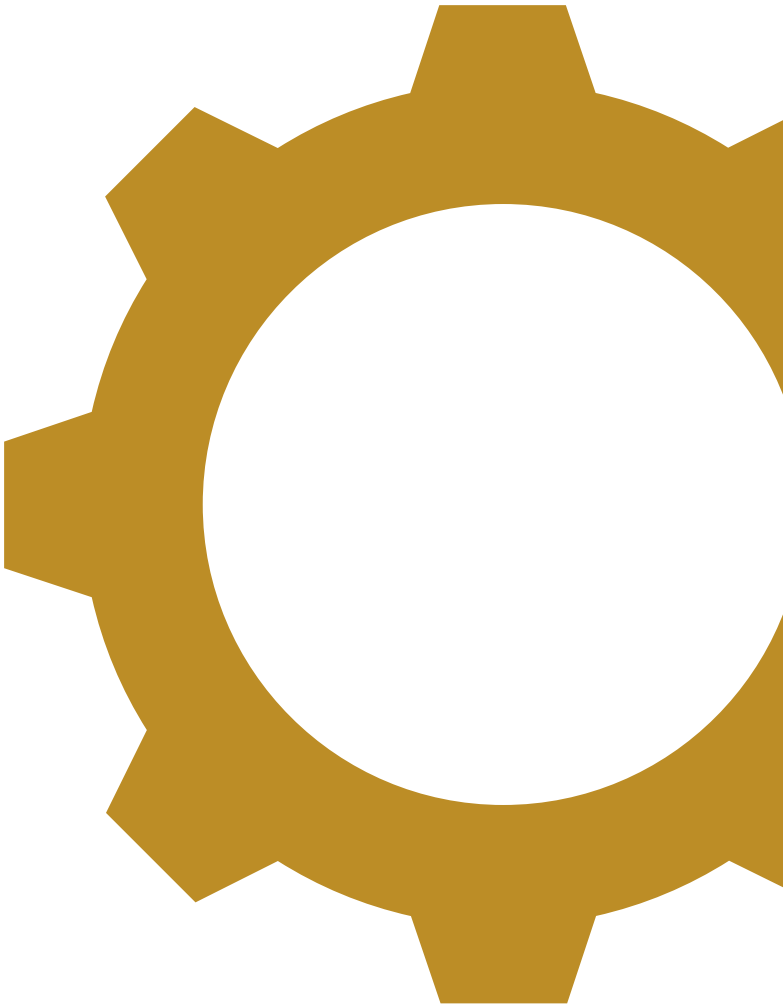
Features:

- Product versions for safe areas or for hazardous areas (ATEX)
- Modular products with wide range of flow
- Electronic batching controls

Benefits:

- Highly flexible mounting with least space requirements
- Suitable for any type of liquids, even very aggressive
- Flow disturbances do not influence proper operation and accuracy
- Long life with low maintenance

CONTENT



INTRODUCTION

Thank you for your decision to work with Aquametro Oil & Marine Flow Measurement Products.
This technical specification describes the installation, commissioning and use of DOMINO® flow meters.
For additional information please contact your local sales agent at: **www.aquametro-oil-marine.com**.

Liability Disclaimer

The manufacturer cannot monitor the compliance to this manual as well as the conditions and methods during the installation, operation, usage and maintenance of the flow meter. Improper installation can cause damage and endanger people. Therefore, we assume no responsibility and liability for losses, damage or costs that result due to incorrect installation, improper operation, usage and maintenance or in any manner associated therewith. Similarly, we assume no responsibility for patent right or other right infringements of third parties caused by usage of this flow meter. The manufacturer reserves the right, without prior notification, to make modifications concerning the product, technical data or installation and operating manual.

Safety precautions

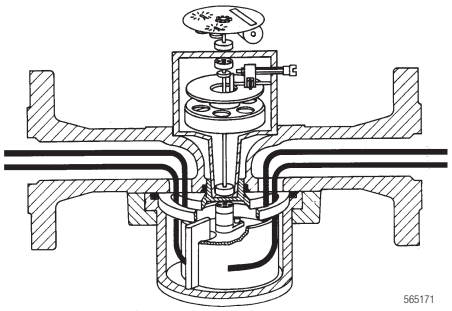
DOMINO® flow meters must only be used for their intended purpose and comply with local and international safety regulations. All documentation is to be followed exactly. None of the information stated here or elsewhere releases planners, installers and operators from their own careful and comprehensive assessment of the respective plant configuration in terms of functional capability and operational safety.

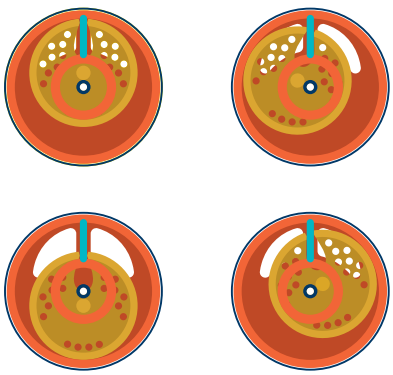
- Local applicable working regulations must be complied with, during all work on the plant and / or ship.
- All safety, installation and operation instructions as described in this manual must be followed.
- The flow meters are sensitive measuring instruments and should be treated carefully.

OPERATING PRINCIPLE

ARD range

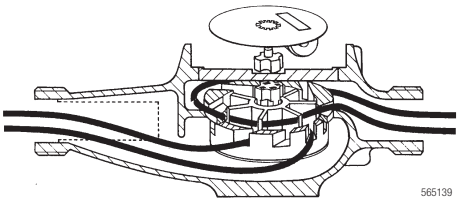
- Works on the volumetric principle with rotary pistons
- Wide measuring range with high precision
- Suitable for high viscosities
- Insensitive to flow disturbances
- No power supply needed - except VZF II electronic module





AMD and PMD series

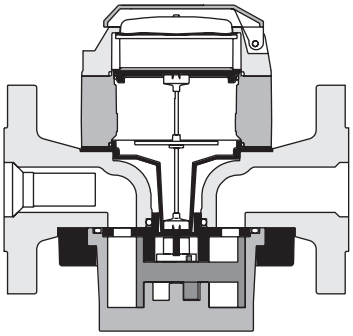
- Works on the velocity measuring principle with multi-jet vane wheel
- Extremely wide measuring range with good accuracy
- Largely insensitive to slight impurities in liquid media
- Insensitive to flow disturbances
- No power supply needed
- Mainly used for viscosities up to 4 cst



DESIGN FEATURES

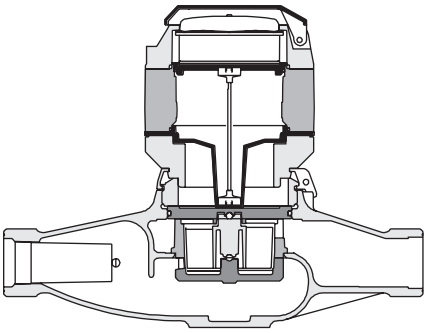
ARD range

- The only moving parts in contact with the liquid medium are the rotary piston, guide roller, separating plate and the driver. The hydraulic measuring module is completely isolated from the roller register, and signals are transmitted magnetically through the sealed cover of the measuring chamber.
- For optimal readability, the roller register can be swivelled through 360°, on versions with RV pulser and VFZ II in steps of 90°.



AMD and PMD series

- The only moving part in contact with the liquid medium is the vane-wheel. In AMD models this is mounted between PTFE or graphite bearings, and in PMD models on ruby bearings. This ensures years of easy running and high precision, long life and excellent long-term stability of the measuring characteristic.
- The hydraulic measuring module is completely isolated from the roller register, and signals are transmitted magnetically through the sealed cover of the measuring chamber.
- For optimal readability, the roller register can be swivelled through 360°.



APPLICATIONS

- ARD rotary piston flow meters for pure chemical liquids of various types
- AMD vane wheel flow meters for chemical liquids
- PMD vane wheel flow meters for water (in particular for dosing)

Selection of commonly measured liquids:

Acetic acid
Acetone
Animal fats
Ammonium hydroxide, ammonia solution

Butyl acetate, acetic butyl ester

Chloroform, trichloromethane
Citric acid

Diethylene glycol
Distilled water

Ethyl acetate, acetic ether, acetic ester
Ethyl alcohol, alcohol, ethanol
Ethyl ethylene, ethylene, diethyl ethylene
Ethylene glycol

Formaldehyde solution
Formic acid

Glycerine

Hexine
Hydrofluoric acid
Hydrogen peroxide, hydrogen superoxide

Isopropyl ether, di-isopropyl ether
Isopropyl alcohol, propyl alcohol

Kerosene, petroleum
Liquid ammonia
Liquid bromium
Liquid butane

Magnesium sulphate
Methanol, methyl alcohol)
Methylene chloride, dichloromethylene
Methyl ethyl ketone
Molasses (without urea)

Nitric acid

Paraffin
Perchloroethylene, tetrachloroethylene
Phosphoric acid
Potassium hydroxide, caustic potash
Propionic acid
Prussic acid
Pure benzene

Sodium chloride solution, brine
Sodium hydroxide, caustic soda solution
Sulfocarbonic acid
Sulphuric acid

Tar, pitch
Tetrachloromethane, carbon tetrachloride
Toluene
Trichloroethylene (dry)

Vegetable oils

SYSTEM OVERVIEW

Meter ancillaries

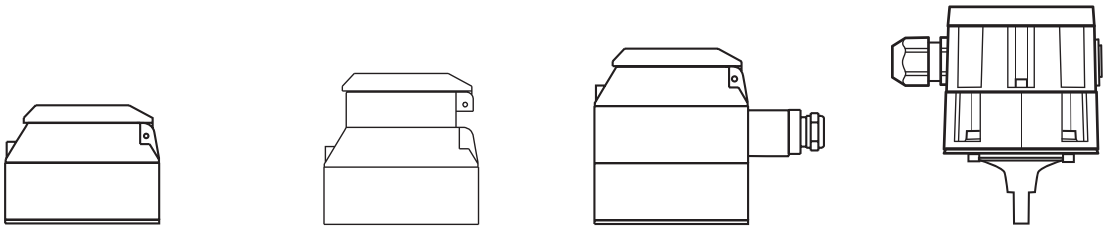
- display in volumetric units (liter or m^3)
- with pulser, roller counter or for batching devices

RW
Roller register
- local totalization

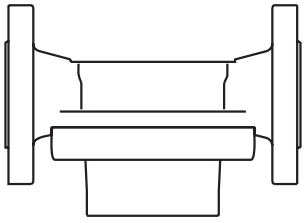
RV
Roller register with integrated reed pulser
- local totalization
- pulser for remote totalizing
- not for use in hazardous areas

IN
Inductive pulser for industrial control systems
- to IEC 60947-5-6
- 2 different resolutions
- for hazardous location Zone 1 (ATEX version)
- roller register

VZF II
Display unit with
- 1 analog and 2 digital outputs
- local totalization
- pulser for remote totalization
- not for use in hazardous areas
- only for ARD type



Measuring units
- different measuring principles (ARD, AMD and PMD)
- various materials according to the meter type (stainless steel, cast iron, brass)
- flanges according to DIN (in general also available with ANSI or JIS boring)



ARD rotary piston meters for chemical liquids

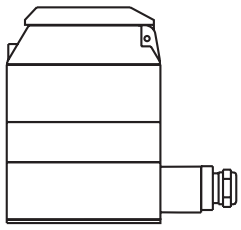
Nominal diameter	15, 20, 25, 40, 50 mm
Nominal pressure	16, 25, 40 bar
Temperature	40, 130, 180 °C
Flow rate	20 - 30'000 l/h

Possible combinations of flow meters and modules see technical specifications.

Accessories

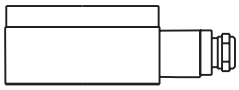
- batching devices for manual, semi-automatic and automatic control

INA module
Inductive pulser for industrial control systems
- to IEC 60947-5-6
- high resolution for analogue signal generation or input to electronic batching controls
- for hazardous location Zone 1 (ATEX version)
- optional roller register

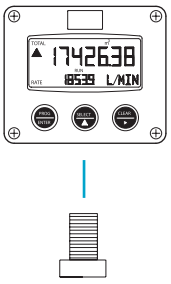


INA module
Inductive pulser for electronical batching units

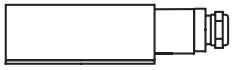
For split mounting

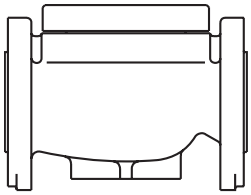


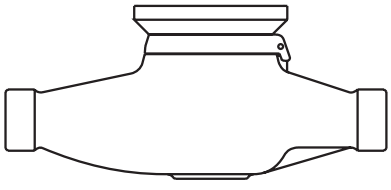
INA module
Inductive pulser for electronical batching units



MS-KP
Mounting set for compact mounting







AMD vane wheel meters for chemical liquids

Nominal diameter	25, 40 mm
Nominal pressure	16, 25 bar
Temperature	90, 180 °C
Flow rate	140 - 12’000 l/h

PMD vane wheel meters for cold and hot water

Nominal diameter	20, 25, 40 mm
Nominal pressure	16 bar
Temperature	90 °C
Flow rate	10 - 20’000 l/h

TECHNICAL SPECIFICATIONS

Technical data
DOMINO® ARD DN 15 - 50
Rotary piston flow meters

DOMINO® ARD			Meter DN size				
Nominal diameter		**DN mm**	**15**	**20**	**25**	**40**	**50**
		inch	1/2	3/4	1	1 1/2	-
Installation length		mm	165	165	190	300	350
Connection thread on meter		inch	3/4	1	1 1/4	2	-
Nominal pressure threaded ends							
ARD 1000	PN	bar	16	16	16	16	-
Nominal pressure flanges							
ARD 1000	PN	bar	25	25	25	25	25
ARD 2000	PN	bar	40	40	40	40	40
ARD 3000	PN	bar	25	25	25	25	25
Max. medium temperature	T_{max}	°C	40 / 130 / 180				
Maximum flow rate	Q_{max} [3]	l/h	400	1500	3000	9000	30000
Flow in batching mode	Q_{ch}	l/h	320	1200	2400	7200	24000
Continuous flow rate	**Q_{cont} [1]**	**l/h**	**200**	**750**	**1500**	**4500**	**15000**
Minimum flow rate	Q_{min} [2]	l/h	30	60	150	450	1500
Approx. starting flow rate	Q_{st} [2]	l/h	6	12	30	90	300
Max. permissible error of actual value			±0.5 %	±0.5 %	±0.5 %	±0.5 %	±0.5 %
Repeatability			±0.1 %	±0.1 %	±0.1 %	±0.1 %	±0.1 %
Measuring chamber volume		cm^3	12	36	100	330	1200
Safety filter mesh size		mm	0.400	0.400	0.400	0.800	0.800
Dirt trap filter mesh size		mm	0.100	0.100	0.250	0.250	0.250
Weight with threaded ends PN 16 [4]		kg	2.2	2.5	4.2	17.3	-
Weight with flanges PN 25		kg	3.8	4.5	7.5	20.3	41.0
Weight with flanges PN 40		kg	4.4	5.5	7.8	20.5	42.0

1) Flow rates for fuels are higher. For particular data see Technical Documentation CONTOIL® fuel oil meter.

2) Qmin and starting flow rates are valid for material combination: brass housing / aluminum pistons for fuel oil. Qmin for other material combination see following table „Measuring range as a function of material combination".

3) Manufacturer's specification, valid for the reference conditions as specified under reference conditions. Do not use this value for the design.

4) Weight without couplings.

Special versions or different flange-standards on request.

Measuring range as a function of material combination
Qmin* in % of Qmax with measuring error limits ±0.5 %.

Type	Measuring chamber	Rotary piston Aluminum	Graphite	Stainless steel	PTFE
ARD 1000	Brass	5 %	5 %	-	10 %
ARD 2000	Stainless steel	5 %	5 %	10 %	10 %
ARD 3000	Stainless steel	5 %	5 %	10 %	10 %

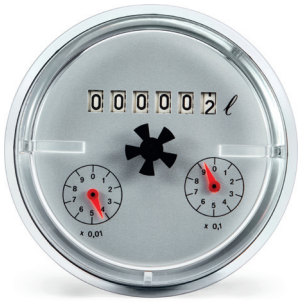
* Depending on the material combination piston to measuring chamber, the Qmin may change.

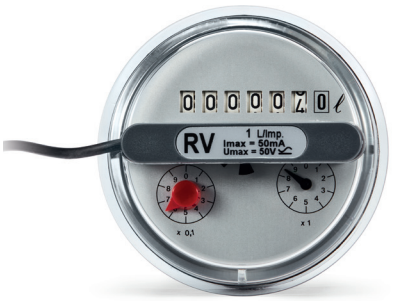
Measuring sensors and materials

Type	Component	Material
ARD 1000	Housing	Brass (threaded connections) or spherolitic cast iron (threaded or flanged connections)
	Housing finish	Enamelled yellow RAL 1007
	Measuring chamber	Brass / PPS (130 °C) or brass / PTFE (180 °C)
	Seals	FPM (fluoroelastomer)
	Rotary pistons	Aluminum, graphite or PTFE
ARD 2000	Housing	Spherolitic cast iron
	Housing finish	Enamelled yellow RAL 1007
	Measuring chamber	Stainless steel* / PPS (130 °C) or stainless steel* / PTFE (180 °C)
	Seals	FPM or PTFE (fluoroelastomer or polytetrafluoroethylene)
	Rotary pistons	Aluminum, graphite, stainless steel* or PTFE
ARD 3000	Housing	Stainless steel*
	Housing finish	Enamelled yellow RAL 1007
	Measuring chamber	Stainless steel* / PTFE
	Seals	FPM or PTFE (fluoroelastomer or polytetrafluoroethylene)
	Rotary pistons	Graphite, stainless steel* or PTFE

* Corrosion and acid-resistant steel (CrNiMo) to DIN 1.4408 / 1.4435 / 1.4404

Technical data
DOMINO® ARD
Mechanical display, pulsers RV, IN, INH, INA, INAH

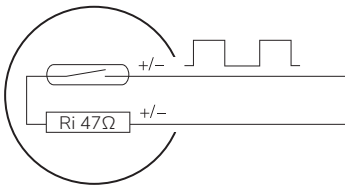




Mechanical display		**Meter DN size**				
Nominal diameter	**DN mm**	**15**	**20**	**25**	**40**	**50**
	inch	1/2	3/4	1	1 1/2	2
Smallest readable amount	l	0.01	0.1	0.1	0.1	1
Maximum registration capacity	m^3	1000	10000	10000	10000	100000
Registration time until overrun to zero at Q_{cont} (m^3)	h	2500	10000	5000	1667	5000

RV: Reed pulser with decadic pulse values						
Ambient temperature	°C	-10 to +70				
Switching element		Reed contact				
Switching voltage max.	VDC/VAC	48				
Switching current max.	mA	50 (Ri 47Ω / 0.5 W)				
Static current		open contact				
Switching power max.	W	2				
On-time	%	50 +/-10				
RV Reed		**DN 15**	**DN 20**	**DN 25**	**DN 40**	**DN 50**
	l/pulse	0.1	1	1	1	10
	l/pulse	1	-	-	10	100
Protection class		IP 65				
Connection		Permanent mounted cable, 3 m long, 2 x 0.14 mm^2 cross section				
No Ex installation possible!						

Functional diagram reed pulser

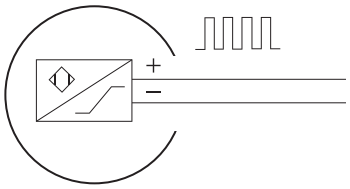


IN, INH, INA, INAH: Inductive pulser with decadic pulse values							
Supply voltage		VDC	5 - 25				
Nominal voltage		VDC	8.2 (R_i approx. 1 kΩ)				
Ambient temperature		°C	-10 to +70				
Protection class			IP 65				
Switching element			Slot initiator acc. to IEC 60947-5-6 (IN - NAMUR)				
Switching frequency		Hz	0 to 3000				
Residual ripple			<5 %				
Switching current		mA	≥3 (at 8.2 V, 1 kΩ)				
Static current zero		mA	≤1 (at 8.2 V, 1 kΩ)				
Pulse values for remote transmitter		**ARD**	**DN 15**	**DN 20**	**DN 25**	**DN 40**	**DN 50**
IN (NAMUR) inductive (IEC 60947-5-6)		l/pulse	0.01	0.01	0.1	0.1	1
INH (NAMUR) inductive (IEC 60947-5-6)	1)	l/pulse	0.1	0.1	1	1	10
INA (NAMUR) inductive (IEC 60947-5-6)	1) 2)	l/pulse	0.0006	0.00185	0.005	0.017	0.06
INAH (NAMUR) inductive (IEC 60947-5-6)	1) 2)	l/pulse	0.0006	0.00185	0.005	0.017	0.06
Pulse frequency IN	Q_{max}	Hz	11.111	41.667	8.333	25.000	8.333
	Q_{min}	Hz	0.278	0.833	0.208	0.625	0.208
Pulse frequency INH	Q_{max}	Hz	1.1111	4.1667	0.8333	2.5000	0.8333
	Q_{min}	Hz	0.0278	0.0833	0.0208	0.0625	0.0208
Pulse frequency INA, INAH	Q_{max}	Hz	185.185	225.225	166.167	147.059	138.899
	Q_{min}	Hz	4.630	4.505	4.167	3.676	3.472
Connection			Connection cable min. 2 x 0.35 mm² and 5.5 - 13 mm external cable diameter on plug (Prefabricated cable available)				
Pay attention to polarity when connecting the plug!							

1) High temperature versions are designated with H (INH or INAH).

2) The exact pulse value is indicated on the meter. Since this value is not known before calibration, the connected unit must have an adaptable input. Versions with 2 pulsers on request.

Functional diagram inductive sensor



Technical data
DOMINO® ARD
Electronic display VZF II

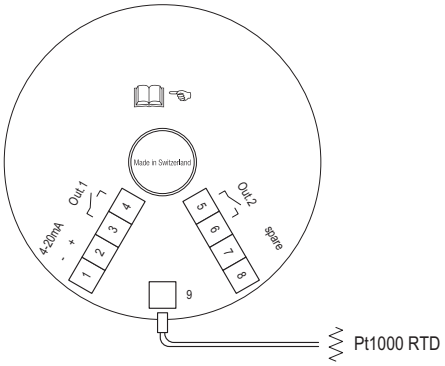
Electronic display			**Meter DN size**				
Nominal diameter		**DN mm**	**15**	**20**	**25**	**40**	**50**
		inch	1/2	3/4	1	1 1/2	2
Max. medium temperature	T_{max}	°C	130, 180				
Max. environment temperature		°C	-25 to +70				
Max. storage temperature		°C	-25 to +85				
Max. storage humidity	rh_{max}	% rh	95, non condensing				
Protection class			IP 66 / IP 68 / IP 69				
Total volume / mass		l, m^3, G[1], kg, t, lb	max. 3 decimals (dynamic)				
Resettable volume / mass		l, m^3, G[1], kg, t, lb	max. 3 decimals (dynamic)				
Flow rate			max. 3 decimals (dynamic)				
Smallest readable amount			0.001				
Maximum registration capacity			8 digits				
Registration time until overrun to zero at	Q_{cont} (m^3)		>100 years				
Data preservation			by non-volatile memory (EEPROM)				

1) 1 US gallon corresponds to 3.785 liters.

Outputs		
3 (2 pulse / frequency, 1 analog 4 - 20 mA)		freely selectable, totally independent of each other
Pulse output		volume or mass pulse 0 - 200 pulse/sec. (50 % duty cycle)
Current 4 - 20 mA		volume flow, mass flow or temperature signal
Frequency	Q_{min}, Q_{max}	volume flow, mass flow or temperatur minimum, maximum and hysteresis parameterized
Limit switch	$QLim_{max}$, $QLim_{min}$	allows you to set an alert whenever predefined flow rates are exceeded (NC / NO)
Flow meter state switch	Alarm, Error	state and on/off parameterized (NC / NO)

Electronic		
Power supply	VDC	6 - 30
Quiescent current zero	mA	4
Relais output		
Switching element		solid state relay (out1 & out2)
Resistance ON	Ω	≤40
Resistance OFF	MΩ	≥10
Max. Supplay voltage	VDC	≤48
Max. Switching current	mA	≤50
Pulse width	ms	2 - 500 (dynamic)
Pulse frequency	Hz	0 - 200
Current output		
Analog output	mA	4 - 20 passive
Resolution	bit	16
Max. error	mA	±0.2
Update interval	s	<0.1 s
Maximum Load (RL)	Ω	0 to 1116, depending on external supply voltage of the power supply unit $\frac{U-6}{0.0215}$ Ω;(e.g.: 1116Ω@30V)

Electronic counter DOMINO® VZF II



1 + 2 Power supply / output current loop (passive)
3 + 4 Output 1 (passive)
5 + 6 Output 2 (passive)
7 + 8 Spare
9 Temperature sensor Pt1000

Wire size for terminal 1 - 6 is:
0.75 - 1.5 mm² / 20 - 16 AWG

Factory setting of outputs

Output 1: Volume pulses: 50 ms, 1 ltr/pulse (exception: DN 15 is set to 0.1 ltr/pulse)
Output 2: Volume pulses: 50 ms, 1 ltr/pulse (exception: DN 15 is set to 0.1 ltr/pulse)
Analog: Disabled (off)

Engineering notes

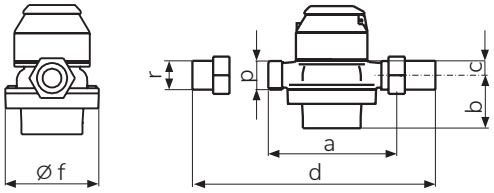
The maximum frequency is calculated with the following formula:

$$\frac{\text{max. flow rate in liters/hour}}{\text{pulse value in liters x 3600}} = \text{frequency in Hz} \leq 200 \text{ Hz}$$

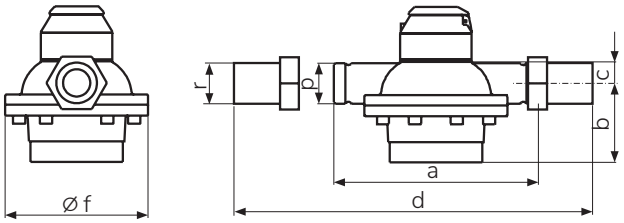
Dimensional drawings

All DOMINO® ARD 1000 with threaded ends are according to ISO 228-1.

DN 15, 20, 25: with threaded ends

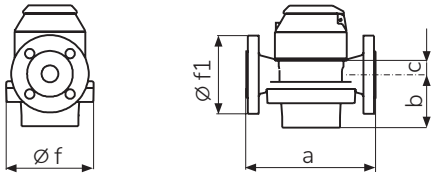


DN 40: with threaded ends

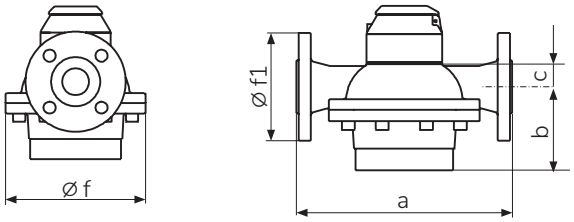


All DOMINO® ARD 1000, 2000 and 3000 with flanges are compatible to EN 1092-2, ASME B16.5 or JIS B2239.

DN 15, 20, 25: with flanges



DN 40, 50: with flanges

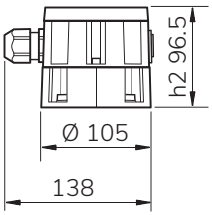


DOMINO®	DN	a	b	c	d	Øf	Øf1	p	r
ARD 15	15	165	42	17	240	105	95	G ¾”	G ½”
ARD 20	20	165	54	17	260	105	105	G 1”	G ¾”
ARD 25	25	190	78	21	305	130	115	G 1 ¼”	G 1”
ARD 40	40	300	116	32	435	210	150	G 2”	G 1 ½”
ARD 50	50	350	166	38	-	280	165	-	-

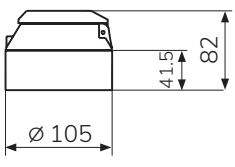
Dimensions in mm

Dimensions of display and pulse units

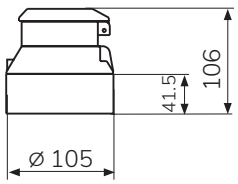
VZF II
Display unit
max. 180 °C



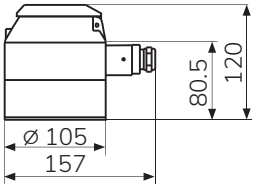
RW
roller register only
max. 180 °C



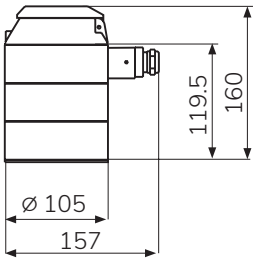
RV
with integrated pulser (reed type)
max. 180 °C



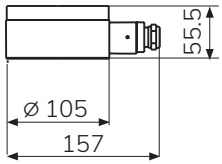
IN
max. 130 °C



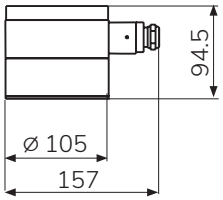
INH
max. 180 °C



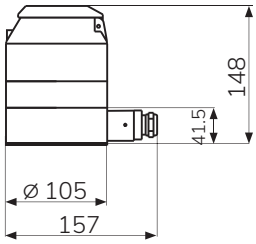
INA
without RW
(roller register)
max. 90 °C



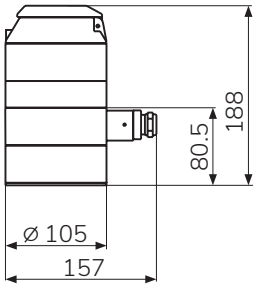
INAH
without RW
(roller register)
max. 180 °C



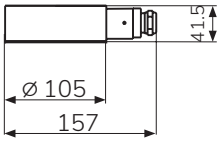
INA-RW
with RW
(roller register)
max. 90 °C



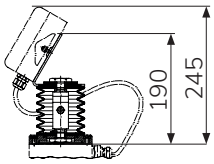
INAH-RW
with RW
(roller register)
max. 180 °C



INA - MS-KP

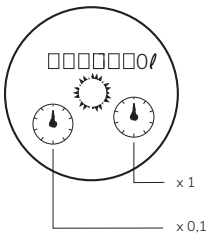


MS-KP
for compact mounting
with F-series

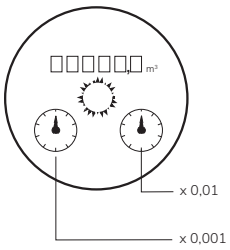


VZF II

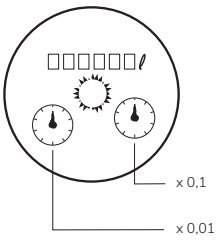
DN 20, 25, 40



DN 50

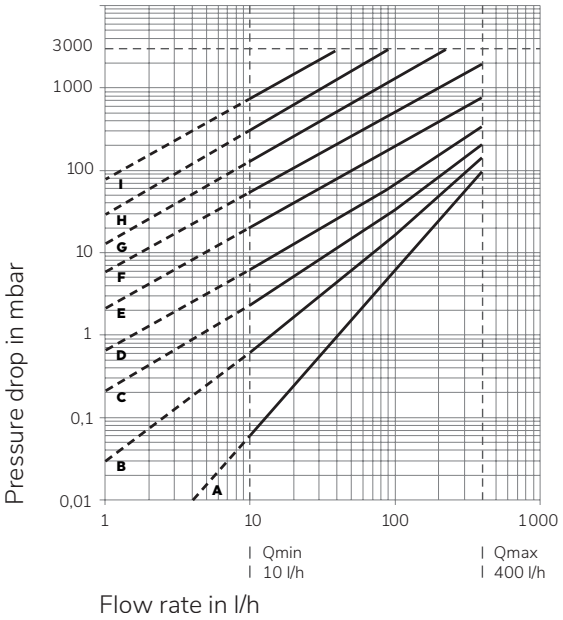


DN 15

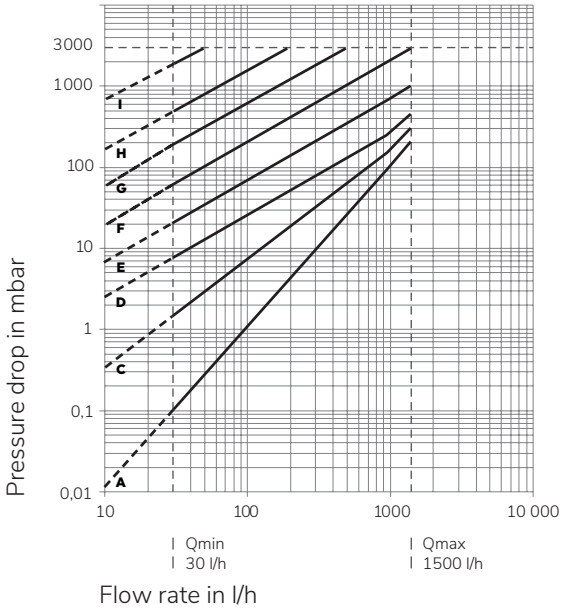


Pressure drop curves

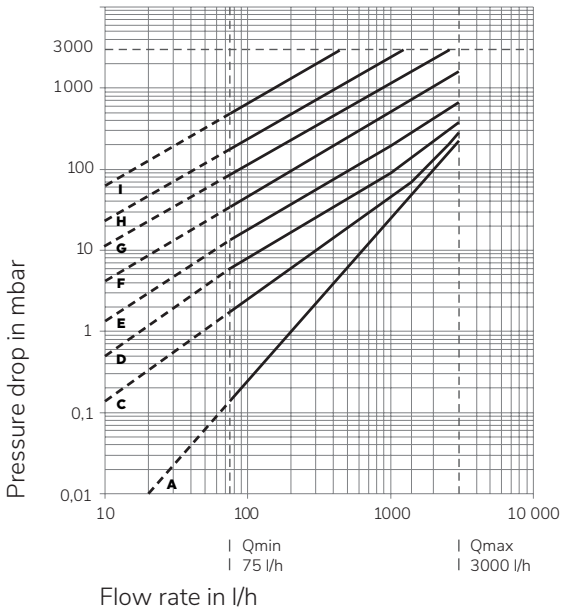
DN 15



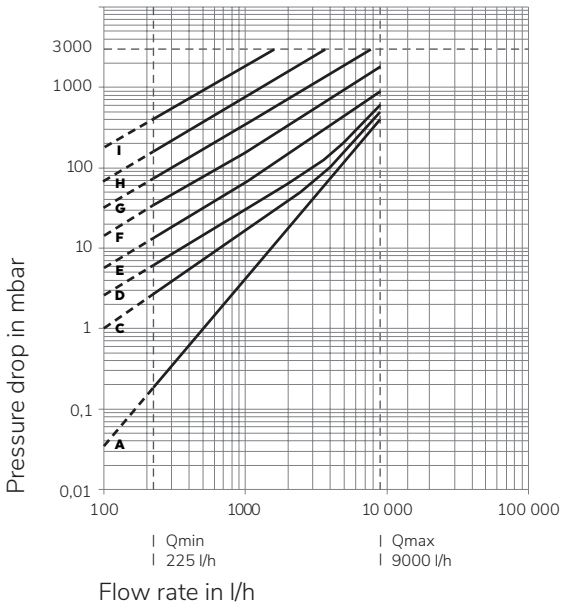
DN 20



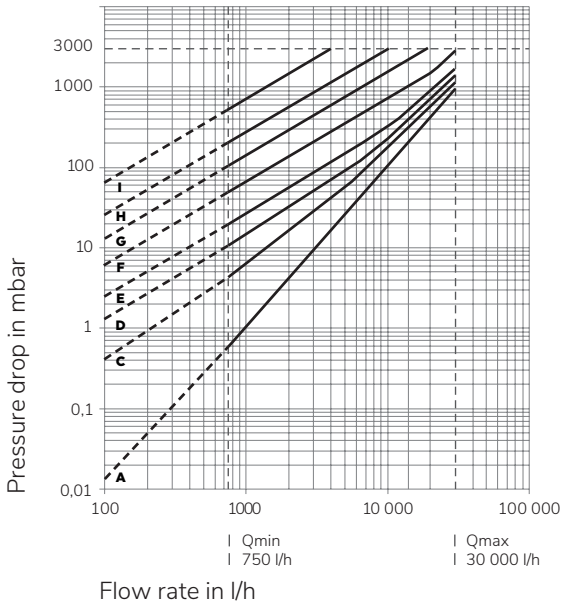
DN 25



DN 40



DN 50



Recommended pressure drop max. 1 bar
Admissible pressure drop max. 3 bar

Viscosity diagrams:

A = 4.5 mPas
B = 25 mPas
C = 50 mPas
D = 100 mPas
E = 200 mPas
F = 500 mPas
G = 1000 mPas
H = 2000 mPas
I = 5000 mPas

Technical data
DOMINO® AMD DN 25 + 40
Vane wheel flow meters

DOMINO® AMD			Meter DN size	
Nominal diameter		**DN mm**	**25**	**40**
		inch	1	1 1/2
Installation length		mm	165	300
Nominal pressure flanges	PN	bar	25	25
Max. medium temperature	T_{max}	°C	90 resp. 180	
Maximum flow rate	Q_{max}	l/h	5000	12000
Continuous flow rate	**Q_{cont} 1)**	**l/h**	**3500**	**10000**
Transitional flow rate	Q_t	l/h	280	800
Minimum flow rate	Q_{min}	l/h	140	400
Approx. starting flow rate		l/h	22	45
Max. permissible error of actual value 1)			±2.0 %	±2.0 %
Repeatability			±0.3 %	±0.3 %
Safety filter mesh size		mm	2.5	2.5
Weight		kg	7.20	14.20

1) ±5 % at lower end of measuring range between Qmin and Qt.

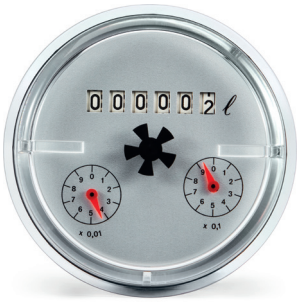
Special versions with other flange holes on request

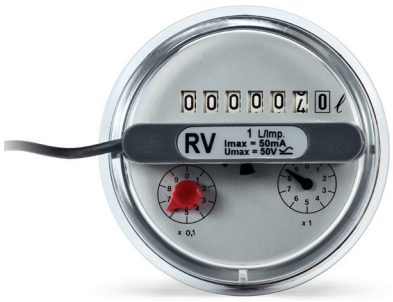
Measuring sensors and materials

Component	Material
Housing	Stainless steel*
Housing finish	Enamelled yellow RAL 1007
Measuring chamber	Stainless steel*
Seals	PTFE
Vane wheel bearings	PTFE (90 °C), graphite (180 °C)

* Corrosion and acid-resistant steel (CrNiMo) to DIN 1.4408 / 1.4435 / 1.4404.

Technical data
DOMINO® AMD
Mechanical display, pulsers RV, IN and INA

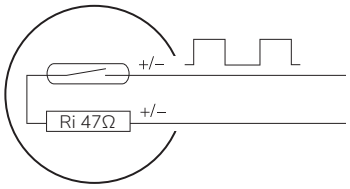




Mechanical display		**Meter DN size**	
Nominal diameter	**DN mm**	**25**	**40**
	inch	1	1 1/2
Smallest readable amount	l	0.1	0.1
Maximum registration capacity	m^3	100000	100000
Registration time until overrun to zero at Q_{cont} (m^3)	h	28500	10000

RV: Reed pulser with decadic pulse values			
Ambient temperature	°C	-10 to +70	
Switching element		Reed contact	
Switching voltage max.	VDC/VAC	48	
Switching current max.	mA	50 (Ri 47Ω / 0.5 W)	
Static current		open contact	
Switching power max.	W	2	
On-time	%	50 +/-10	
RV Reed		**DN 25**	**DN 40**
	l/pulse	1	1
Protection class		IP 65	
Connection		Permanent mounted cable, 3 m long, 2 x 0.14 mm^2 cross section	
No Ex installation possible!			

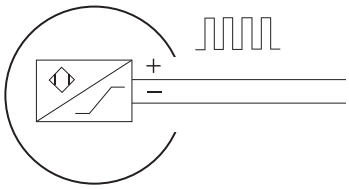
Functional diagram reed pulser



IN,INA: Inductive pulser with decadic pulse values				
Supply voltage		VDC	5 - 25	
Nominal voltage		VDC	8.2 (R_i approx. 1 kΩ)	
Ambient temperature		°C	-10 to +70	
Protection class			IP 65	
Switching element			Slot initiator acc. to IEC 60947-5-6 (IN - NAMUR)	
Switching frequency		Hz	0 to 3000	
Residual ripple			<5 %	
Switching current		mA	≥3 (at 8.2 V, 1 kΩ)	
Static current zero		mA	≤1 (at 8.2 V, 1 kΩ)	
Pulse values for remote transmitter		**AMD**	**DN 25**	**DN 40**
IN (NAMUR) inductive (IEC 60947-5-6)		l/pulse	0.1	0.1
		l/pulse	1	1
INA (NAMUR) inductive (IEC 60947-5-6)	1)	l/pulse	0.01032	0.03956
Pulse frequency IN	Q_{max}	Hz	13.889	33.333
	Q_{min}	Hz	0.389	1.111
Pulse frequency INA	Q_{max}	Hz	134.582	84.260
	Q_{min}	Hz	3.768	2.809
Connection			Connection cable min. 2 x 0.35 mm² and 5.5 - 13 mm external cable diameter on plug (Prefabricated cable available)	
Pay attention to polarity when connecting the plug!				

1) The exact pulse value is indicated on the meter. Since this value is not known before calibration, the connected unit must have an adaptable input. Versions with 2 pulsers on request.

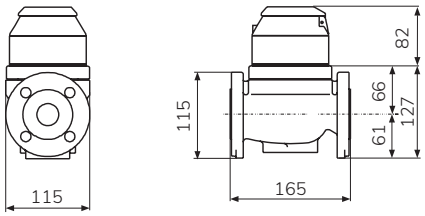
Functional diagram inductive sensor



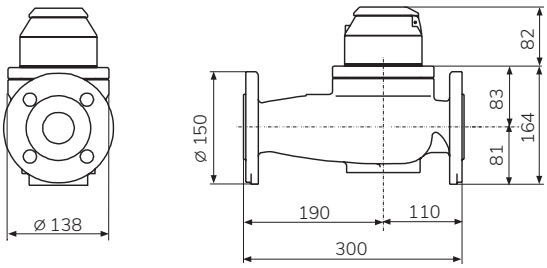
Dimensional drawings

All DOMINO® AMD with flanges are compatible to EN 1092-2.

DN 25



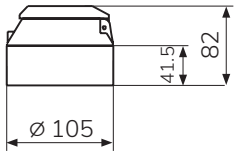
DN 40



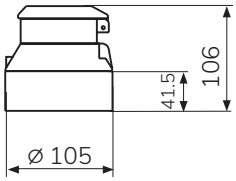
Dimensions in mm

Dimensions of display and pulse units

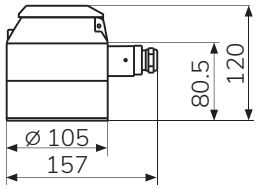
RW
roller register only
max. 180 °C



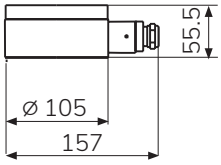
RV
with integrated pulser (reed type)
max. 180 °C



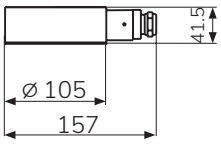
IN
max. 130 °C



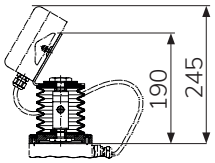
INA
without RW
(roller register)
max. 90 °C



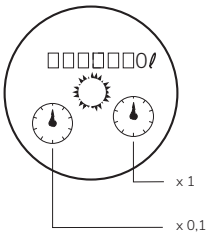
INA - MS-KP



MS-KP
for compact mounting
with F-series

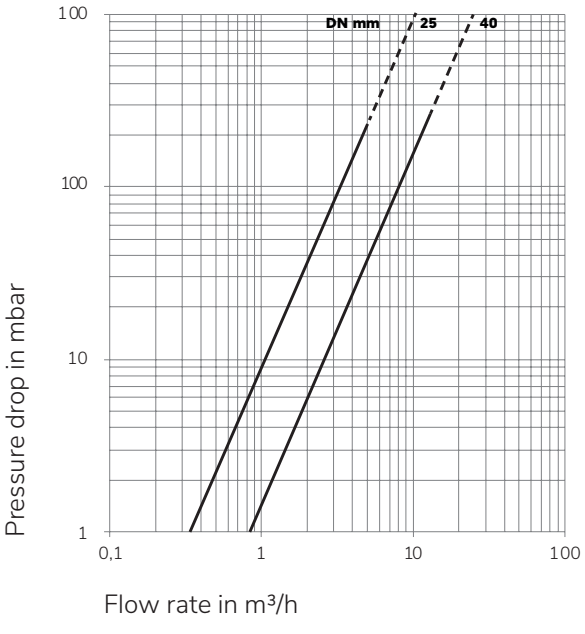


DN 20, 40



Pressure drop curves

DN 25, 40



Technical data
DOMINO® PMD DN 20 - 40
Vane wheel flow meters

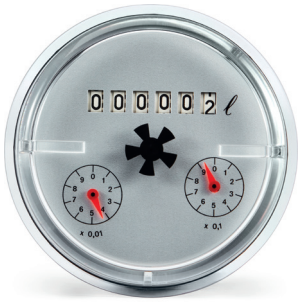
DOMINO® PMD			Meter DN size		
Nominal diameter		**DN mm**	**20**	**25**	**40**
		inch	3/4	1	1 1/2
Installation length		mm	190	260	300
Connection thread on meter		inch	1	1 1/4	2
Nominal pressure threaded ends	PN	bar	16	16	16
Max. medium temperature	T_{max}	°C	90	90	90
Maximum flow rate	Q_{max}	l/h	5000	7000	20000
Flow in batching mode	Q_{ch}	l/h			
Continuous flow rate	**Q_{cont} 1)**	**l/h**	**2500**	**3500**	**10000**
Transitional flow rate	Q_t	l/h	200	280	800
Minimum flow rate	Q_{min}	l/h	100	140	400
Approx. starting flow rate		l/h	8	22	45
Max. permissible error of actual value 1)			±2.0 %	±2.0 %	±2.0 %
Repeatability			±0.3 %	±0.3 %	±0.3 %
Safety filter mesh size		mm	1.5	1.5	2.5
Housing thread		inch	1	1 1/4	2
Screw connection thread		inch	3/4	1	1 1/2
Weight without screw connections		kg	3.10	4.10	6.50

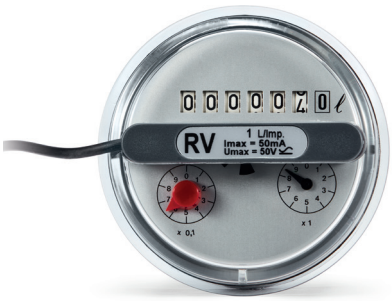
1) ±5 % at lower end of measuring range between Qmin and Qt.

Measuring sensors and materials

Component	Material
Housing	Brass
Housing finish	Enamelled yellow RAL 1007
Measuring unit	PPO plastic
Seals	EPDM (ethylene propylene)
Vane wheel bearings	Plastic and synthetic ruby balls

Technical data
DOMINO® PMD
Mechanical display, pulsers RV, IN and INA



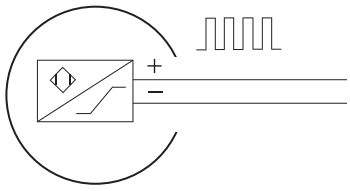


Mechanical display		**Meter DN size**		
Nominal diameter	**DN mm**	**20**	**25**	**40**
	inch	1	1	1 1/2
Smallest readable amount	l	0.1	0.1	0.1
Maximum registration capacity	m^3	100000	100000	100000
Registration time until overrun to zero at Q_{cont} (m^3)	h	40000	28500	10000

IN, INA: Inductive pulser with decadic pulse values					
Supply voltage		VDC	5 - 25		
Nominal voltage		VDC	8.2 (R_i approx. 1 kΩ)		
Ambient temperature		°C	-10 to +70		
Protection class			IP 65		
Switching element			Slot initiator acc. to IEC 60947-5-6 (IN - NAMUR)		
Switching frequency		Hz	0 to 3000		
Residual ripple			<5 %		
Switching current		mA	≥3 (at 8.2 V, 1 kΩ)		
Static current zero		mA	≤1 (at 8.2 V, 1 kΩ)		
Pulse values for remote transmitter		**PMD**	**DN 20**	**DN 25**	**DN 40**
IN (NAMUR) inductive (IEC 60947-5-6)		l/pulse	0.1	0.1	0.1
		l/pulse	1	1	1
INA (NAMUR) inductive (IEC 60947-5-6)	1)	l/pulse	0.00864	0.01434	0.04990
Pulse frequency IN	Q_{max}	Hz	13.889	19.444	55.555
	Q_{min}	Hz	0.278	0.389	2.227
Pulse frequency INA	Q_{max}	Hz	160.751	135.596	111.334
	Q_{min}	Hz	3.215	2.712	2.227
Connection			Connection cable min. 2 x 0.35 mm² and 5.5 - 13 mm external cable diameter on plug (Prefabricated cable available)		
Pay attention to polarity when connecting the plug!					

1) The exact pulse value is indicated on the meter. Since this value is not known before calibration, the connected unit must have an adaptable input. Versions with 2 pulsers on request.

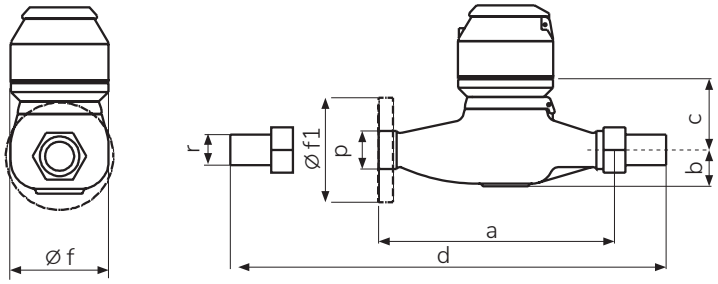
Functional diagram inductive sensor



Dimensional drawings

All DOMINO® PMD with threaded ends are compatible to ISO 228-1.

DN 20 - 40

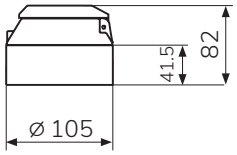


DOMINO®	DN	a	b	c	d	Øf	Øf1	p	r
PMD 20	20	190	37	74	285	92	105	G 1”	G ¾”
PMD 25	25	260	40	83	375	105	115	G 1¼”	G 1”
PMD 40	40	300	60	91	435	139	150	G 2”	G 1½”

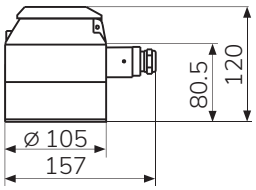
Dimensions in mm

Dimensions of display and pulse units

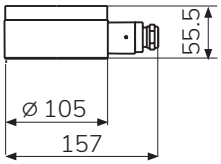
RW
roller register only
max. 180 °C



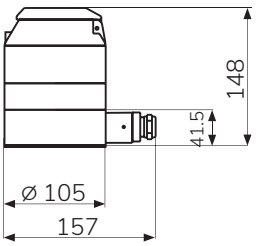
IN
max. 130 °C



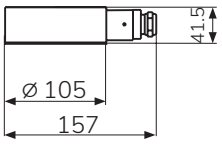
IN
without RW
(roller register)
max. 90 °C



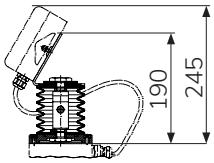
IN-RW
with RW
(roller register)
max. 90 °C



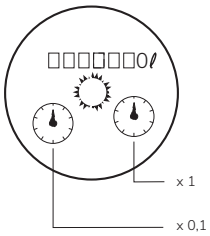
INA - MS-KP



MS-KP
for compact mounting
with F-series

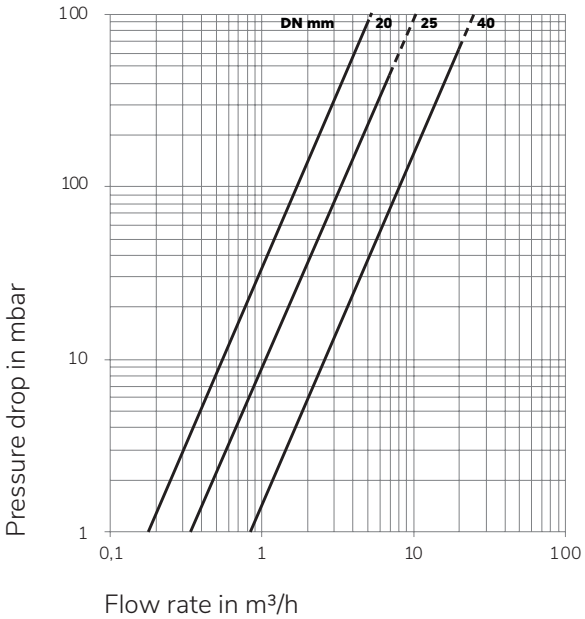


DN 20, 25, 40



Pressure drop curves

DN 20, 25, 40



ORDERING DETAILS

ARD sensors: Type designations and order numbers

(for standard versions; special versions on request)

ARD 1000 measuring module

Measuring chamber	Seal	Rotary piston	PN bar	Tmax °C	Type designation	Art. No. DN 15	DN 20	DN 25	DN 40	DN 50
Brass housing with threaded connections										
Brass / PPS	FPM	Aluminum	16	130	ARD../1111-A2	83000	83033	83058	-	-
		Graphite	16	130	ARD../1111-G2	83002	83035	83060	-	-
		PTFE	16	40	ARD../1111-P2	83004	83036	83062	-	-
Spherolitic cast iron housing with threaded connections										
Brass / PPS	FPM	Aluminum	16	130	ARD../1211-A2	-	-	-	83106	-
		Graphite	16	130	ARD../1211-G2	-	-	-	83108	-
		PTFE	16	40	ARD../1211-P2	-	-	-	83110	-
Spherolitic cast iron housing with flanged connections										
Brass / PPS	FPM	Aluminum	25	130	ARD../1221-A2	83005	83037	83063	83111	83154
		Graphite	25	130	ARD../1221-G2	83007	83039	83065	83113	83155
Brass / PTFE	FPM	Aluminum	25	180	ARD../1222-A2	83009	83040	83067	83115	83157
		Graphite	25	180	ARD../1222-G2	83010	83041	83068	83116	83158
		PTFE	25	40	ARD../1222-P2	83011	83042	83069	83117	83159
Brass / PTFE[1)]	FPM	Aluminum	25	180	ARD../1223-A2	83012	83043	83070	83118	83160

1) Measuring chamber, particularly for heavy fuel oil (measuring tolerance ±1 %)

ARD 2000 measuring module

Measuring chamber	Seal	Rotary piston	PN bar	Tmax °C	Type designation	Art. No. DN 15	DN 20	DN 25	DN 40	DN 50
Spherolitic cast iron housing with flanged connections										
Stainless	FPM	Aluminum	40	130	ARD../2224-A2	83013	83218	83071	83119	83161
steel / PPS		Graphite	40	130	ARD../2224-G2	83014	83219	83072	83120	83162
		Stainless steel	40	130	ARD../2224-S2	83015	83220	83073	83121	-
		PTFE	40	40	ARD../2224-P2	83017	83221	83075	83123	83165
Stainless	FPM	Aluminum	40	180	ARD../2225-A2	83018	83044	83076	83124	83166
steel / PTFE		Graphite	40	180	ARD../2225-G2	83019	83045	83077	83125	83167
		Stainless steel	40	180	ARD../2225-S2	83020	83046	83078	83126	-
		PTFE	40	40	ARD../2225-G2	83021	83047	83079	83127	83169
Stainless	PTFE	Graphite	40	180	ARD../2225-G6	83022	83048	83080	83128	83170
steel / PTFE		Stainless steel	40	180	ARD../2225-S6	83023	83049	83081	83129	-
		PTFE	40	40	ARD../2225-P6	83024	83050	83082	83130	83172

ARD 3000 measuring module

Measuring chamber	Seal	Rotary piston	PN bar	Tmax °C	Type designation	Art. No. DN 15	DN 20	DN 25	DN 40	DN 50
Stainless steel (corrosion and acid-proof) housing with flanged connections										
Stainless	FPM	Graphite	25	180	ARD../3315-G2	83026	83052	83096	83144	83173
steel / PTFE		Stainless steel	25	180	ARD../3315-S2	83027	83053	83097	83145	-
		PTFE	25	40	ARD../3315-P2	83028	83054	83098	83146	83175
Stainless	PTFE	Graphite	25	180	ARD../3315-G6	83029	83055	83099	83147	83176
steel / PTFE		Stainless steel	25	180	ARD../3315-S6	83030	83056	83100	83148	-
		PTFE	25	40	ARD../3315-P6	83031	83057	83101	83149	83178

ARD sensors: Type designation key for device identification

Example of type designation key			ARD	25	/ 1	22	3	/ A	2
Type series			**ARD**						
Nominal diameter		15 mm		15					
		20 mm		20					
		25 mm		25					
		40 mm		40					
		50 mm		50					
Configuration group		/1000			1				
		/2000			2				
		/3000			3				
Housing	Threaded	Brass				11			
		Spherolitic cast iron				21			
	Flanged	Spherolitic cast iron				22			
		Stainless steel				31			
Measuring chamber / Driver		Brass / PPS					1		
		Brass / PTFE					2		
		Brass / PTFE (1%) [1]					3		
		Stainless steel / PPS					4		
		Stainless steel / PTFE					5		
Rotary piston		Aluminum						A	
		Graphite						G	
		Stainless steel						S	
		PTFE						P	
Seal set		FPM Fluoroelastomer							2
		FFKM Perfluoroelastomer							6
Flange drillings		JIS & ANSI on request							

1) Measuring chamber, particularly for heavy fuel oil measuring tolerance ± 1 %

ARD modules: Type designations and order numbers

(for standard versions; special versions on request)

Pulser module		Tmax	Type	Art. No.				
Pulse values in liters	Pulse values in liters	°C	designation	DN 15	DN 20	DN 25	DN 40	DN 50
RW module		180	RW/RD ..	83500	83526	83552	83578	83604
IN module								
0.01		130	IN 0.01/RW/RD..	83509	83535	-	-	-
0.1		130	IN 0.1/RW/RD..	83512	83538	83561	83587	-
1		130	IN 1/RW/RD..	-	-	83564	83590	83613
10		130	IN 10/RW/RD50	-	-	-	-	83616
INH module								
0.01		180	IN 0.01H/RW/RD..	83513	83539	-	-	-
0.1		180	IN 0.1H/RW/RD..	83516	83542	83565	83591	-
1		180	IN 1H/RW/RD..	-	-	83568	83594	83617
10		180	IN 10H/RW/RD50	-	-	-	-	83620
INA module								
High-resolution		90	INA/RW/RD..	83517	83543	83569	83595	83621
High-resolution	compact for MS-KP	90	INA/RD..	80946	80948	80950	80952	80954
INAH module								
High-resolution		180	INAH/RW/RD..	83521	83547	83573	83599	83625
High-resolution	compact for MS-KP	180	INAH/RD..	80947	80949	80951	80953	80955

Mounting set for compact mounting

80083 MS-KP

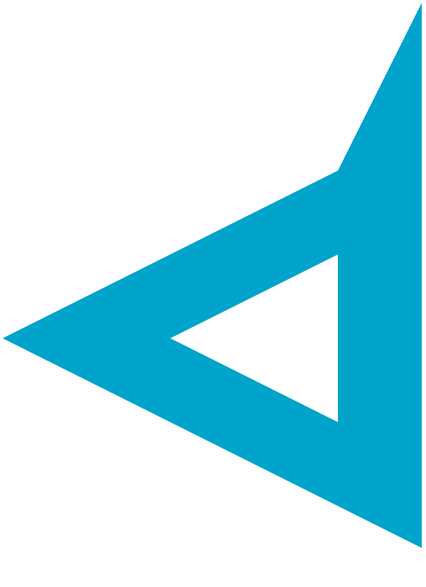
ATEX-modifications ⟨Ex⟩

96044 Modifications for ATEX devices

Pulser module		Tmax	Type	Art. No.				
Pulse values in liters	Pulse values in liters	°C	designation	DN 15	DN 20	DN 25	DN 40	DN 50
RV module - not available with ATEX-Conformity								
0.1		180	RV 0.1/RD..	83501	83695	-	-	-
1		180	RV 1/RD..	83502	83527	83553	83579	-
10		180	RV 01/RD..	-	83528	83554	83580	83605
100		180	RV 100/RD50	-	-	-	-	83606
VZF II module - not available with ATEX-conformity								
Electronic module VZF II				95588	-	-	-	-
Coupling				95584	95584	95585	95586	95587

ARD modules: Type designation key for device identification

Example of type designation key			**IN 0.1**	**/ RW**	**/ RD 25**
Pulser	**Pulse value in liters**	**Tmax °C**			
None		180			
IN Inductive	0.01	130	IN 0.01		
	0.1	130	IN 0.1		
	1	130	IN 1		
	10	130	IN 10		
INH Inductive	0.01	180	IN 0.01H		
	0.1	180	IN 0.1H		
	1	180	IN 1H		
	10	180	IN 10H		
INA Inductive high-resolution		90	INA		
		180	INAH		
Roller register				RW	
Roller register with integral pulser	0.1			RV 0.1	
	1			RV 1	
	10			RV 10	
	100			RV 100	
Electronic module VZF II		180	VZF II		
Sealing plate without roller register					
Nominal diameter of flow meter	DN 15				RD 15
	DN 20				RD 20
	DN 25				RD 25
	DN 40				RD 40
	DN 50				RD 50
Display units	Liters				



AMD sensors: Type designations and order numbers

(for standard versions; special versions on request)

Measuring chamber	Measuring unit bearings	PN bar	Tmax °C	Type designation	Art. No. DN 25	DN 40
AMD 3000						
Stainless steel	Stainless steel / PTFE	16	90	AMD../3331	84002	84006
	Stainless steel / graphite	16	180	AMD../3332	84003	84007

AMD sensors: Type designation key for device identification

Example of type designation key			**AMD**	**25**	**/ 3**	**3**	**3**	**1**
Type series			**AMD**					
Nominal diameter	25 mm			25				
	40 mm			40				
Configuration group	/3000				3			
Housing	Stainless steel	PN 25				3		
Measuring unit	Stainless steel						3	
Bearings	PTFE	90 °C						1
	Graphite	180 °C						2
Flange drilling	JIS & ANSI on request							

AMD modules: Type designations and order numbers

(for standard versions; special versions on request)

Pulser module Pulse values in liters	Roller register RV Pulse values in liters	Tmax °C	Type designation	Art. No. DN 15	DN 20
RW module		180	RW/MD ..	84010	84016
IN module		180	RV 1/MD ..	84040	84041
IN module					
0.1		130	IN 0.1/RW/MD..	84012	84018
1		130	IN 1/RW/MD..	84013	84019
0.1		180	IN 0.1H/RW/MD..	on request	on request
1		180	IN 1H/RW/MD..	on request	on request
INA module					
High-resolution	compact for MS-KP	90	INA/MD..	80956	80957
High-resolution		180	INAH/MD..	on request	on request

Mounting set for compact mounting
80083 MS-KP

ATEX-modifications
96044 Modifications for ATEX devices

AMD modules: Type designation key for device identification

Example of type designation key **IN 1** **/ RW** **/ MD 25**

Pulser	Pulse value in liters	Tmax °C			
None					
IN Inductive	0.1	130	IN 0.1		
	1	130	IN 1		
INA Inductive high-resolution		90	INA		
		180	INAH		
Roller register				RW	
Roller register with integrated pulser	1			RV 1/RW/	
Nominal diameter of flow meter	DN 25				MD 25
	DN 40				MD 40
Display units	Liters				

PMD complete flow meters: Order numbers

(for standard versions; special versions on request)

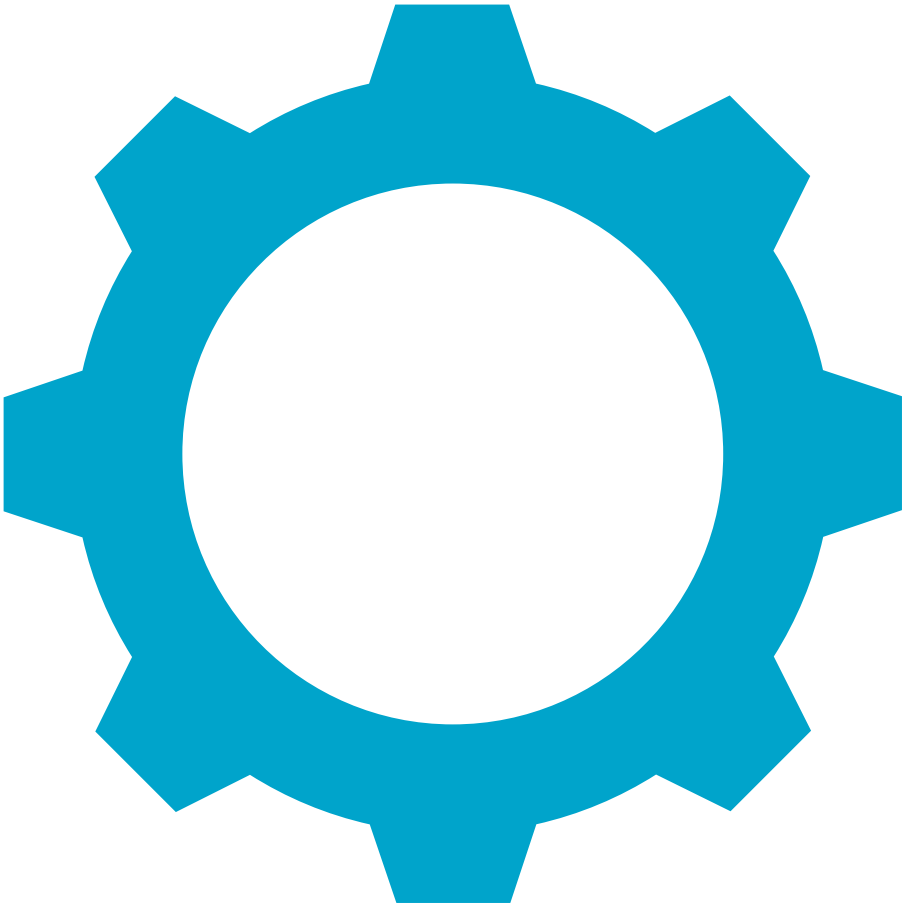
Type designation	Version	Art. No. DN 20	DN 25	DN 40
PMD xx - IN 0.1	with inductive pulser IN 0.1 l	84023	84027	84035
PMD xx - IN 1	with inductive pulser IN 1 l	84024	84028	84036
PMD xx - INA	with high-resolution pulser	on request	on request	on request
PMD xx - INA+	prepared for batching control system	80976	80977	80978

Mounting set for compact mounting

80083 MS-KP

ATEX-modifications

96044 Modifications for ATEX devices



ACCREDITATIONS

ATEX Directive

With the exception of the - RV ... and VZF II - ancillary groups, all DOMINO® components are certified according to ATEX Directive.

Marking:  II2G cT6

Pressure Equipment Directive PED

In accordance with the guidelines, a CE or supplier conformity declaration are available on our website for all DOMINO® devices.

WARRANTY, SAFETY INSTRUCTIONS

Warranty Disclaimer

Aquametro Oil & Marine guarantees the quality of the product in the context of its General Terms of Business. The owner, operator or installer will be liable for the correct installation as well as the appropriate handling of the equipment upon its receipt.

- Please observe the application, mounting and operating instructions.
- Use the unit exclusively for its designed purpose.
- Maintain the unit and service it according to prescriptions.
- Use accessories only if their applicability is technically safe.

Safety rules and precautionary measures

The manufacturer accepts no responsibility if the following safety rules and precautions are disregarded.

- Modifications of the device implemented without preceding written consent from the manufacturer, will result in the immediate termination of product liability and warranty period.
- Installation, operation, maintenance and decommissioning of this device must be carried out by trained, qualified specialists, authorized by the manufacturer, operator or owner of the facility. The specialist must have read and understood these mounting and operating instructions and must follow the instructions here in.
- Check the voltage and the information on the type plate before installing the device.
- Check all connections, settings and technical specifications of peripherals which may be present.
- Open the housing or parts of housings, which electric or electronic components included, only when the electric power is turned off.
- Do not touch any electronic components (ESD sensitivity).
- Expose the system with respect to the mechanical load (pressure, temperature, IP protection, etc.), only to a maximum of the specified classifications.
- During operations that involve mechanical components of the system, release the pressure in the pipe system or reduce the temperature of the medium to a safe level for humans.
- None of the information stated here or elsewhere releases planners, installers and operators from their own careful and comprehensive assessment of the respective system configuration in terms of functional capability and operational safety.
- The local labour and safety laws and regulations must be observed.

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