aquaconcept®
Domestic water meter PMK and communication modules

Application

Domestic water meters with modular communication interfaces for AMR systems for consumption recording up to the integration of meter reading data into your management software.

Product features

- Durable, robust domestic water meter with high measuring accuracy
- Integrated communication interfaces for all aquaconcept® system modules for «walkby» «driveby» or «fixed network» data transmission
- Wired pulse, M-Bus, CS interface or wireless communication for remote radio readout
- Reliable Swiss precision product
- Drinking water approval SVGW

Customer benefits

- Simple retrofitting with radio or wired communication interface
- 360° rotatable measuring unit
- Bayonet design (quick coupling) for short installation times and easy meter replacement

Product range

PMK-aquabasic®

- Multi-jet impeller meters in glanded design
- Measuring range according to OIML R49
- Measuring error limit ±2 % of measured value in the upper measuring range $Q2 \leq Q < Q4$ and ±5 % in the lower measuring range $Q1 < Q < Q2$
- For horizontal installation
- Brass body with threaded connection (WBA listed)
- Nominal pressure 16 bar
- Medium temperature 0.1 ... 40 °C
- Meter temperature class (EN ISO 4064): T30
- Integrated interface for all aquaconcept® system modules
- Protection class IP 66 (standard version), IP 68 and emptying device optionally available
- Input sieve

Nominal diameter	DN	mm	15	20	25	32	40	50
		Inches	1/2	3/4	1	1 1/4	1 1/2	2
Standard		Art. No.	92503	92505	92511	92517	92520	92526
IP68		Art. No.	-	93688	93689	93690	93691	93692
with drainage unit		Art. No.	-	92509	92515	-	-	-
Flow on overload	Q_4	m³/h	3	5	7.9	12.5	20	31
Continuous flow	**Q_3**	**m³/h**	**2.5**	**4**	**6.3**	**10**	**16**	**25**
Transitional flow rate	Q_2	m³/h	0.032	0.04	0.063	0.1	0.16	0.25
Min. flow	Q_1	m³/h	0.02	0.025	0.039	0.063	0.1	0.156
Starting flow at approx.		m³/h	0.008	0.008	0.022	0.022	0.045	0.045
Max. pressure drop at Q_3		bar	0.3	0.6	0.4	0.6	0.4	0.6
Flowrate at $\Delta p = 1$ bar	Q	m³/h	4.5	5.2	9.5	12.7	25.6	32.5
Measuring range			R125	R160	R160	R160	R160	R160
Smallest recordable volume		litres	0.1	0.1	0.1	0.1	0.1	0.1
Recording capacity		m³	100'000	100'000	100'000	100'000	100'000	100'000
Body thread size		Inches	3/4	1	1 1/4	1 1/2	2	2 3/8
Connection thread size		Inches	1/2	3/4	1	1 1/4	1 1/2	2
Weight without connections		ca. kg	1.4	1.6	2.4	2.7	5.4	6.7
		Overall length						
		a	165	220 [1]	260	260	300	300
		b	35.5	36.5	40	40	60	62
		c	79	88	96	96	106	113
		d	259	314	374	374	440	460
		e	85	92	106	106	139	175

1) available with face-to-face length of 190 mm (d = 285), Art. No. 92504
e = Housing width

Pressure loss curves: Page 11

Approvals
MID, SVGW

PMKB-aquabasic® (bayonet connection)

- Multi-jet impeller meters in glanded design
- Measuring range according to OIML R49
- Measuring error limit ±2 % of measured value in the upper measuring range $Q_2 \leq Q < Q_4$ and ±5 % in the lower measuring range $Q_1 < Q < Q_2$
- For mounting in horizontal or vertical pipes
- Brass body with connections for bayonet modules (quick-fit coupling); short mounting time when changing meters (WBA listed)
- Nominal pressure 16 bar
- Medium temperature 0.1 ... 40 °C
- Meter temperature class (EN ISO 4064): T30
- Integrated interface for all aquaconcept® system modules
- Protection class IP 66 (standard version), IP 68 and emptying device optionally available
- Input sieve

Nominal diameter	DN	mm	20	25
		Inch	3/4	1
Standard		Art. No.	92506	92512
IP 68		Art. No.	93810	93811
Flow on overload	Q_4	m³/h	5	7.9
Continuous flow	**Q_3**	**m³/h**	**4**	**6.3**
Transitional flow rate	Q_2	m³/h	0.04	0.063
Min. flow	Q_1	m³/h	0.025	0.039
Starting flow at approx..		m³/h	0.008	0.018
Max. pressure drop at Q_3		bar	0.5	0.8
Flowrate at Δp = 1bar	Q	m³/h	5.6	6.9
Measuring range			R160	R160
Smallest recordable volume		litres	0.1	0.1
Recording capacity		m³	100'000	100'000
Weight (with bayonet module approx.)		kg	2.0 (105 mm) 2.66 (220 mm) 2.46 (122 mm)	2.4 2.95
Overall length c		mm	162	162

Bayonet modules Face-to-face length a	Art. No. mm	80613 105	81332 122	81333 122	80615 150	80614 220
When used with PMKB-basic	**DN**	**20**	**25**	**25**	**20/25**	**20**
Bayonet module thread	Inch	1	1 1/4 [1]	1 1/2 [1]	1 1/4	1
Screw thread on connection	Inch	3/4	1	1 1/4	1	3/4
Face-to-face length with connection	mm	200	-	-	265	315
Accessories						
Extension nipple for face-to-face length of 190 mm		81336	-	-	-	-
Extension nipple for face-to-face length of 220 mm		80597	-	-	-	-
Extension nipple for face-to-face length of 260 mm		-	-	-	80738	-

[1] on the inlet side with cap nut

Pressure loss curves: Page 11

[2] without CE-M approval as Δp pressure loss is higher than 0.63 bar (EN ISO 4064)
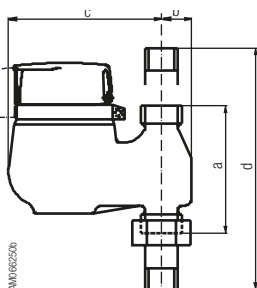
Approvals
MID, SVGW
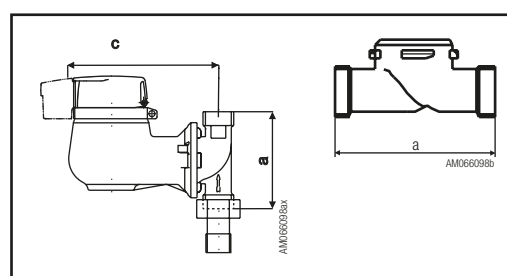
PMKF/-S-aquabasic® PMKF (downward flow) and PMKS-aquabasic® (upward flow)

- Multi-jet impeller meters in glanded design
- Measuring range according to OIML R49
- Measuring error limit ±2 % of measured value in the upper measuring range Q2≤Q<Q4 and ±5 % in the lower measuring range Q1<Q<Q2
- For mounting in vertical pipes (PMKF downward flow, PMKS upward flow)
- Brass body with threaded connection (WBA listed)
- Nominal pressure 16 bar
- Medium temperature 0.1 ... 40 °C
- Meter temperature class (EN ISO 4064): T30
- Integrated interface for all aquaconcept® system modules
- Protection class IP 66 (standard version), IP 68 and emptying device optionally available
- Input sieve

Nominal diameter	DN	mm	20	25	32	40
		Zoll	3/4	1	1 1/4	1 1/2
Standard	PMKF	Art. Nr.	92507	92513	92518 [1]	92521
	PMKS	Art. Nr.	92508	92514	92519	92522
Flow on overload	Q_4	m³/h	5	7.9	12.5	20
Continuous flow	**Q_3**	**m³/h**	**4**	**6.3**	**10**	**16**
Transitional flow rate	Q_2	m³/h	0.04	0.063	0.1	0.256
Min. flow	Q_1	m³/h	0.025	0.039	0.063	0.16
Starting flow at approx.		m³/h	0.014	0.022	0.022	0.045
Max. pressure drop at Q_3 / PMKF		bar	0.5	0.5	0.9	0.5
Max. pressure drop at Q_3 / PMKS		bar	0.5	0.4	0.5	0.6
Flowrate at $\Delta p = 1$bar / PMKF	Q	m³/h	5.4	8.6	10.3	22.2
Flowrate at $\Delta p = 1$bar / PMKS	Q	m³/h	6.0	9.7	13.6	20.8
Measuring range			R160	R160	R160	R100
Smallest recordable volume		Liter	0.1	0.1	0.1	0.1
Recording capacity		m³	100'000	100'000	100'000	100'000
Body thread size		Zoll	1	1 1/4	1 1/2	2
Connector thread size		Zoll	3/4	1	1 1/4	1 1/2
Weight without connections		ca. kg	1.8	2.4	2.7	5.0

Overall length

	20	25	32	40
a	105	150	150	200
b	25	30	30	54
c	126	148	148	198
d	199	264	264	340

Pressure loss curves: Page 12

[1] without CE-M approval as Δp pressure loss is higher than 0.63 bar (EN ISO 4064)

Approvals
MID, SVGW

aquadata® M-Bus

The aquadata® M-Bus system module supplies an M-Bus protocol and pulses for triggering devices controlling remote displays, data transmission and filling procedures. The system module has an internal battery when there is a power failure to the M-Bus.

aquadata® M-Bus	Art. Nr. 80517
Pulse value	**1 Litre***; can be set to 1 – 1,000 litre
Power supply	max. 1.5 mA (standard load)
Internal battery	3 V Li, 6 + 4 reserve years operating life
Pulse output**	Open Collector, S0 compatible to DIN 43864
Reverse flow monitoring	Yes, with compensation
Max. switching capacity	27 VDC, 27 mA
Pulse duration	50 ms
Data interface	M-Bus to EN 13757 (EN 1434-3), 300/2400 baud
Address	Primary address 0-250 / secondary address 8-digit extended secondary address with manufacturer's ID
M-Bus data readout Telegram 1 (FCB:0)	current meter reading, due date, next due date, consumption at due date, identification number
M-Bus data readout Telegramm 2 (FCB:1)	As Telegram 1 including 12 values of previous month
Protocol	Production number, medium, pulse value, primary address, meter reading, date, time, due date, meter reading on due date
Meter reading	0 m^3; format: 00000,000 m^3; freely selectable
Medium	**Water***, cold water, hot water freely selectable
Due date	**31.12.***, freely selectable
Parameterisation software	AMBUS® Win II
Protection class	IP 68
Ambient temperature, operation	0 °C to 50 °C
Ambient temperature, storage	- 20 °C to 60 °C
Ambient humidity	Max. 98 % relative humidity, condensation permitted
Cable length	1.5 m, permanently attached, 4 x 0.14 mm2 with cable end sleeves
Pin assignment	M-Bus: white/black pulse: brown (+) / blue (-)

*   Factory setting

**   electrically connected with M-Bus

aquatarif®

The aquatarif® system module stores values on actual consumption and those of the previous year, peaks, the previous 400 days and 15 months as well as days with downtimes and leakages.

aquatarif®	Art. No. 80191	Art. No. 80220
Optical interface acc. to IEC 62056-21 (IEC 1107) for reading data	Yes	-
CS interface with permanently attached 5 m cable	-	Yes
Power supply	Internal battery Operating life >10 years	Internal battery Operating life >10 years
Parameterisation software	AMBILL smart Suite 2	
Protection class	IP 66	IP 68
Ambient temperature	0 to 50 °C	0 to 50 °C
Transport and storage temperature	-20 to 70 °C	-20 to 70 °C
Permissible ambient humidity	Max. 98 % relative humidity	max. 98 % relative humidity, condensation permitted

Article No. 80192 additional CS interface for Article No. 80119;
consisting of plug-in terminal and cable gland, max. cable length 100 m,
Cross section 0.5mm^2, cable supplied by customer

aquapuls® / aquapuls® NAMUR

The aquapuls® system module provides impulses for controlling devices for remote display, transmission and filling controls. The system module is available as battery and Namur version

aquapuls®	
Pulse weighting **1 litre**	Art. No. 80113
Pulse weighting **10 litres**	Art. No. 80114
Pulse weighting **100 litres**	Art. No. 80115
Power supply	Internal battery
Operating life	MnO_2/Li 3 V battery 15 years
Pulse duration	1 litre = 50 ms / 10 litres = 500 ms / 100 litres = 5 s
Maximum switching capacity	48 VDC, 220 mA
Reverse flow monitoring	Yes, with compensation
Protection class	IP 68
Ambient temperature	0 to 50 °C
Transport and storage temperature	-20 to 70 °C
Permissible ambient humidity	Max. 98 % relative humidity, condensation permitted
Cable length, permanently attached 1.5 m	

aquapuls® NAMUR	
Pulse weighting **1 itre**	Art. No. 80117
Pulse weighting **100 itres**	Art. No. 80119
Power supply	NAMUR DIN 19234
Pulse duration	50 ms
Maximum switching capacity	27 VDC, 27 mA
Reverse flow monitoring	Yes, with compensation
Can be used as transmitter for	Acc. DIN 43864
Protection class	IP 68
Ambient temperature	0 to 50 °C
Transport and storage temperature	-20 to 70 °C
Permissible ambient humidity	Max. 98 % relative humidity, condensation permitted
Cable length, permanently attached 1.5 m	

aquapuls® + aquaradio® 100L wireless communication IP 68

The aquapuls® system module provides impulses for controlling devices for remote display, transmission and filling controls. The system module is available as battery and Namur version.

aquapuls® + aquaradio smart Puls set	
Pulse weighting **100 litres**	Art. No 80540
Power supply	Internal battery
Operating life	MnO_2/Li 3 V battery 15 years
Pulse duration	1 litre = 50 ms / 10 litres = 500 ms / 100 litres = 5 s
Maximum switching capacity	48 VDC, 220 mA
Reverse flow monitoring	Yes, with compensation
Protection class	IP 68
Ambient temperature	0 to 50 °C
Transport and storage temperature	-20 to 70 °C
Permissible ambient humidity	Max. 98 % relative humidity, condensation permitted
Cable length, permanently attached 1.5 m	

aquaradio® smart Puls

The aquaradio® smart Puls transmitter consists of an electronic unit which receives and saves meter information in the form of pulses. Every 8 seconds the radio module transmits the meter number, the meter reading as well as various operating information. The data can be received by a mobile or static receiver.

aquaradio® smart Puls	
	Art. No. 80539
Radio protocol	PRIOS
Versions / frequency band	868.95 MHz
Modulation	FSK
Transmission power	7 mW
Transmission mode	Unidirectional
Perm, ambient humidity	Max. 98 % relative humidity, condensation permitted
Radio range	Up to 400 m depending on ambient conditions
Programming interface	Optical IrDa
Approval in compliance standard	EN 60950 Information techniology equipment - Safety - Part 1: General requirements EN13757-4
Power upply	1 Lithium battery 3.6 V
Battery lifetime	Up to 15 years
Readout interval	Permanent
Transmission interval	8 s
Input frequency	Hz Max. 10
Min. input pulse duration	ms 50
Alarms	Leckage, Manipulation
Max. deviation real timer	Typically 1 h per year
Parameterisation software	IZAR® MOBILE 2
Operating temperature	-15 ... +55 °C
Storage temperature	-15 ... +55 °C
Humidity	0 ... 100 %
Protection class	IP 68
Programmable values	Radio on/off, serial number, meter index, medium, due date

aquaradio® smart M-Bus

The aquaradio® smart M-BUS transmitter consists of an electronic unit that records and stores meter information in the form of real meter data. The radio module transmits every 8 ... 16 seconds the meter number, the meter reading and various operating information. The data can be recorded by a mobile or stationary receiver.

aquaradio® smart M-Bus	
	Art. No. 80619
Radio protocol	OMS 2.0
Versions / frequency band	868.95 MHz wM-Bus nach OMS
Modulation	FSK
Transmission power	7 mW
Transmission mode	Unidirectional
Radio range	Up to 400 m depending on ambient conditions
Programming interface	Optical IrDa
Approval in compliance standard	EN 60950 Information techniology equipment - Safety - Part 1: General requirements EN13757-4
Power upply	2 Lithium batteries 3.6 V
Battery lifetime	Up to12 years
External power supply	AC 7.5 V ... 24 V, I = 10 mA; DC 5 V ... 24 V; I = 10 mA
Readout interval	Battery: daily; External power supply: every 3 minutes
Transmission interval	Dependent on telegram length 8 ... 16 s
Max. deviation real timer	Typically 1 h per year
Parameterisation software	IZAR® MOBILE 2
Operating temperature	-15 ... +55 °C
Storage temperature	-15 ... +55 °C
Humidity	0 ... 100 %
Protection class	IP 68
Programmable valuese	Radio on/off, meter index

aquainfo® CS

The installation set is used in combination with aquatarif® and for remote and external reading of the CS interface.

Installation set		
Art. No. 80388	Installation set Volag aquainfo® CS-1	1 slot
Art. No. 80389	Installation set Volag aquainfo® CS-2	2 slots
Art. No. 93115	Installation set Volag aquainfo® CS-4	4 slots
Art. Nr. 93116	Installation set Volag aquainfo® CS-8	8 slots
Art. No. 80390	Installation set BKW aquainfo® CS-1	1 slot
Art. No. 80391	Installation set BKW aquainfo® CS-2	2 slots

The Installation set aquainfo® / aquainfo® CS can be used with:

Art. No. 80158	Feller on-wall box with cover, IP 55	
Art. No. 80159	Feller lid with cover (without flush-mounted box) IP 55	
Art. No. 80174	Amacher housing for rail and wall mounting, IP 10	

## Read-out head Bluetooth IR/CS or K0-USB

The combined Read-out Head K01-Blue is used in combination with a PDA/PC with Bluetooth functio nality for optical read-out of devices with interface according to IEC 62 056-21 (IEC 1107). In addition, the device is equipped with a CS/CL interface.

Read-out head Bluetooth IR/CS (incl. charger)	• Art. No. 80249
Read-out head K01-USB	• Art. No. 80301

Construction

The basic unit of the aquaconcept® modular principle is the aquabasic® domestic water meter. Its completely rotatable roller unit forms the central unit for all system modules.

- The aquabasic® series is a proven speed meter based on the multi-jet principle (dry-running meter). This measuring principle is insensitive to turbulence in the liquid flow.
- The impeller is mounted on glass balls (DN 15 - 32) on both sides, which move on a thin film of water in the spherical caps. This results in smooth and precise running with excellent long-term measurement stability.
- The measuring sensor (hydraulic part) is completely separated from the roller unit. The impeller rotation is transmitted through the pressure-resistant end plate by means of a magnetic coupling.
- The regulating device required for calibration is located completely inside the measuring instrument (DN 15 - 32). Manipulation from the outside is thus excluded.
- The vacuum work box is protected by an impact-resistant cover.
- The roller counter indicates the water consumption in m^3.
- Even the smallest flow rates are displayed.
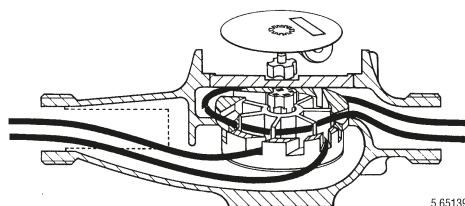
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Installation instructions

Pipeline routing

Ensure easily accessible reading and operation of the measuring and additional devices. The measuring instruments must be installed with the horizontal dial.

The pipe routing must ensure that the measuring instrument is always filled with liquid during measuring operation and that no air inclusions occur. aquabasic® vane meters do not require straight inlet and outlet sections.

Design of measuring instrument and accessories

Flow meters must be designed according to the load values. If necessary, adjust the pipeline. Design measuring and accessory devices according to the maximum operating conditions occurring in the system:

- Flow rate
- Operating pressure
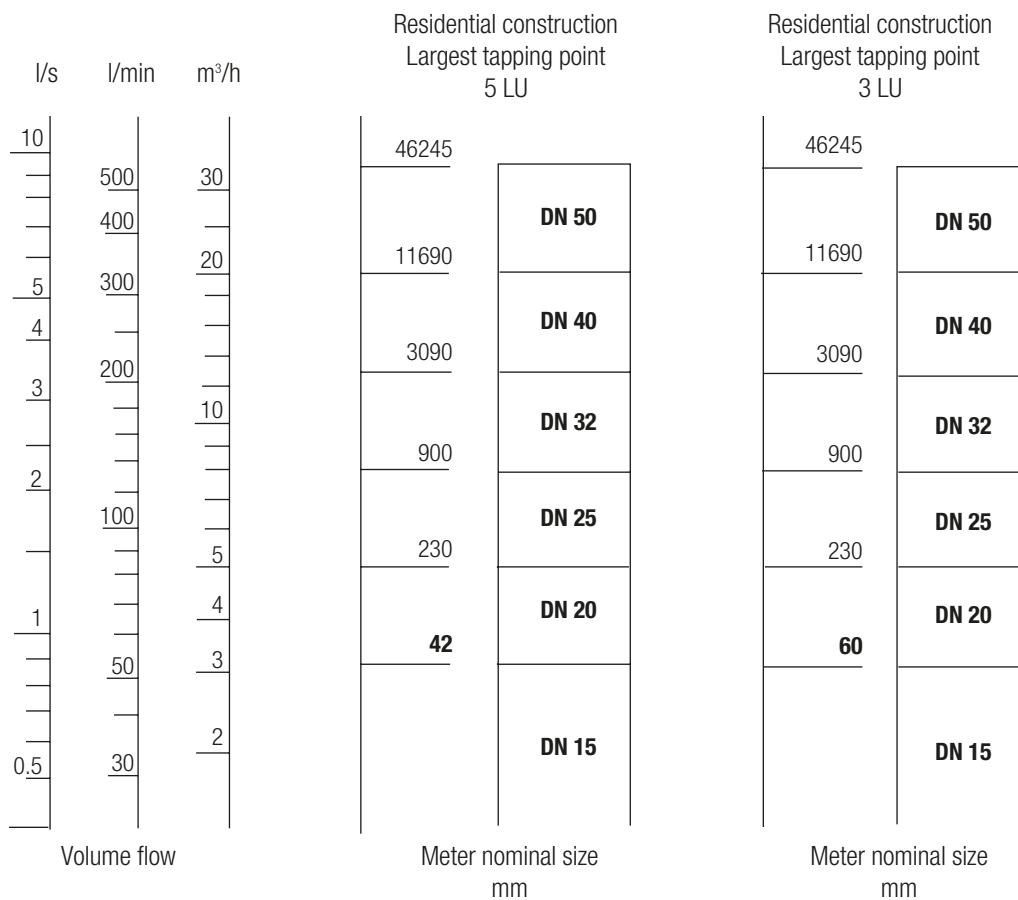- Operating temperature
- Ambient temperature

In buildings with the risk of negative temperatures (e.g. holiday homes) it is recommended to install aquabasic® meters with an emptying device and to empty them before the start of the cold season.

Planning, design of systems

Connected load LU of fittings and apparatus according to SVGW W3d 2013

Intended use	Q_A cold [l/s]	Q_A hot [l/s]	LU cold	LU hot
Washbasin, bidet, washtrough, hairdresser's shower	0.1	0.1	1	1
Domestic dishwasher, toilet tank, beverage automat	0.1	-	1	-
Household washing machine, balcony extraction fitting	0.2	-	2	-
Shower mixer, sink, washing trough, wall sinks	0.2	0.2	2	2
Automatic urinoir flushing	0.3	-	3	-
Bath faucet	0.3	0.3	3	3
Removal fitting for garden and garage	0.5	-	5	-

Guideline values for general determination of meter sizes (PMK basic)

l/s	l/min	m³/h	Residential construction Largest tapping point 5 LU		Residential construction Largest tapping point 3 LU	
10			46245		46245	
	500	30		DN 50		DN 50
	400		11690		11690	
		20		DN 40		DN 40
5	300		3090		3090	
4				DN 32		DN 32
3	200	10	900		900	
2				DN 25		DN 25
	100		230		230	
		5		DN 20		DN 20
1		4	**42**		**60**	
	50	3		DN 15		DN 15
		2				
0.5	30					

Volume flow — Meter nominal size mm — Meter nominal size mm

Planning guide for dimensioning the meter

1. Determination of the total flow rate Q_T

intended use	Load values [LU]			Installation data		
	cold	hot	total	Number of conn.		(A x B)
			(A)	(B)		
Washbasin	1	1	2			
Toilet tank	1	-	1			
Domestic dishwasher	1	-	1			
Bidet	1	1	2			
Washing trough	1	1	2			
Hairdresser›s shower	1	1	2			
Beverage automat	1	-	1			
Shower mixer	2	2	4			
Sink	2	2	4			
Washbasin	2	2	4			
Household washing machine	2	-	2			
Balcony extraction fitting	2	-	2			
Sink basin	2	2	4			
Stand and wall spouts	2	2	4			
Automatic urinoir flushing	3	-	3			
Bath faucet	3	3	6			
Removal fitting for garden and garage	5	-	5			
			Total Load values [LU]			
			Total flow $Q_T = LU \times 0.1$ l/s			

2. Determination of the peak flow rate in m³/h

3. Specify meter size ($Q_D \leq Q_4$)

4. Selecting meters within the allowed tolerance range (from approx. pressure loss ≥ 0.3 bar)

Load values Q_T	Total flow rates Q_D	Peak flow rate Q_D	Peak flow-rate Q_4	Pressure losses PMK aquabasic® [bar] Allowed area of operation [m³/h]					
[LU]	[l/s]	[l/s]	[m³/h]	3.2	5	7.9	12.5	20	31.25
				DN15	DN20	DN25	DN32	DN40	DN50
42	4.2	0.86	3.11	0.40	0.40				
50	5	0.90	3.26		0.44				
75	7.5	1.00	3.61		0.51				
100	10	1.08	3.89		0.60	0.16			
150	15	1.2	4.32		0.75	0.20			
200	20	1.32	4.76		0.82	0.23			
230	23	1.39	5.00		0.99	0.25	0.16		
250	25	1.43	5.15			0.28	0.17		
400	40	1.69	6.08			0.37	0.22		
500	50	1.83	6.57			0.42	0.25		
600	60	1.95	7.01			0.50	0.29		
830	83	2.18	7.86			0.62	0.37		
900	90	2.25	8.09			0.82	0.40	0.15	
1200	120	2.49	8.96				0.49	0.19	
1400	140	2.63	9.46				0.55	0.21	
1800	180	2.87	10.33				0.68	0.25	
2000	200	2.98	10.72				0.76	0.29	0.14
3090	309	3.47	12.50				0.99	0.37	0.18
11690	1169	5.56	20.00					0.94	0.44
46245	4624	9.02	32.50						0.99

5. Checking the pressure disposition

Building identification:			Mit Richtwerten	Nachrechnung
supply pressure [bar]				
Δp Level reservoir + Δp supply pipe	[bar]	-	0.3 [1]	
Max. Δp home connection (external and internal)	[bar]	-	0.4 [1]	
Δp Water meter	[bar]	-		
Δp by difference in height Hhuse connection to the highest extraction point [bar] (1m ~ 0.1 bar)	[bar]	-		
Δp Pipes (up to max. 50 m)	[bar]	-	1.5	
Minimum flow pressure at highest tapping point	[bar]	-	1	
Result	[bar]	=		

With result > 0 bar ithe interpretation is correct; in the case of a result < 0 bar the pressure loss must be optimized or the assumptions[1] must be checked.
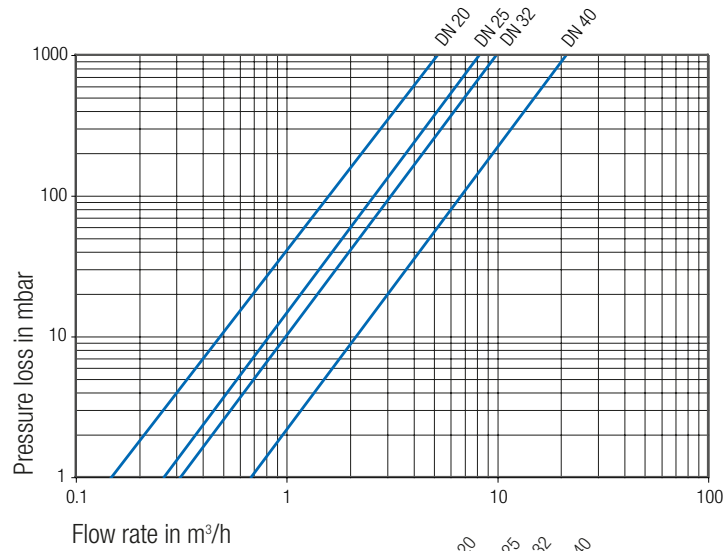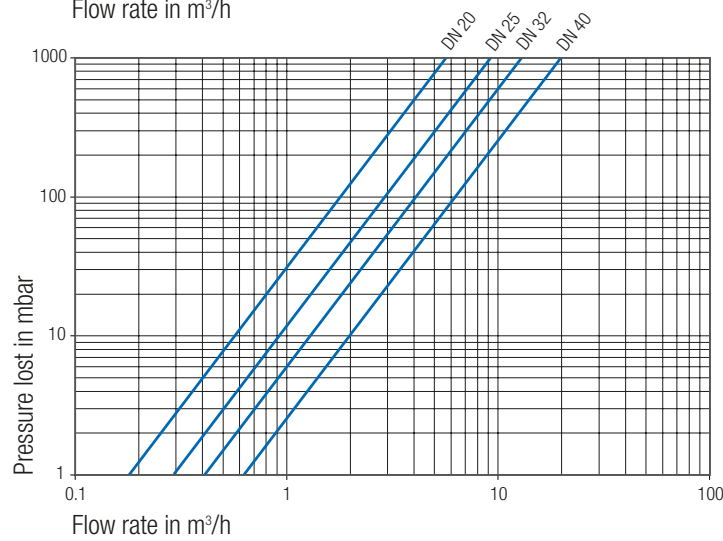
Pressure loss curves

aquabasic® PMK
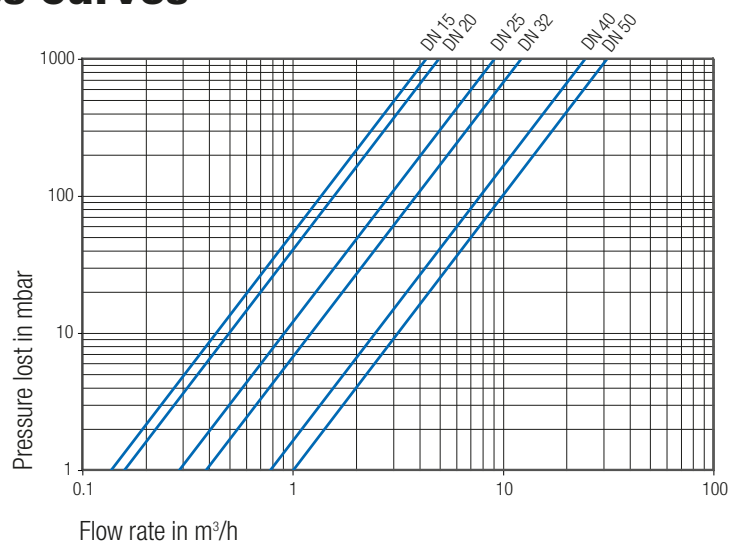
aquabasic® PMKB

aquabasic® PMKF

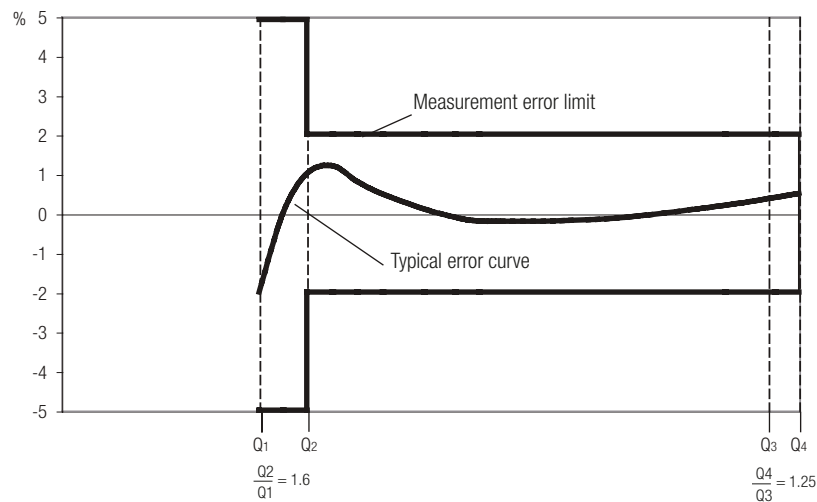Flow rate in m³/h

aquabasic® PMKS

Flow rate in m³/h
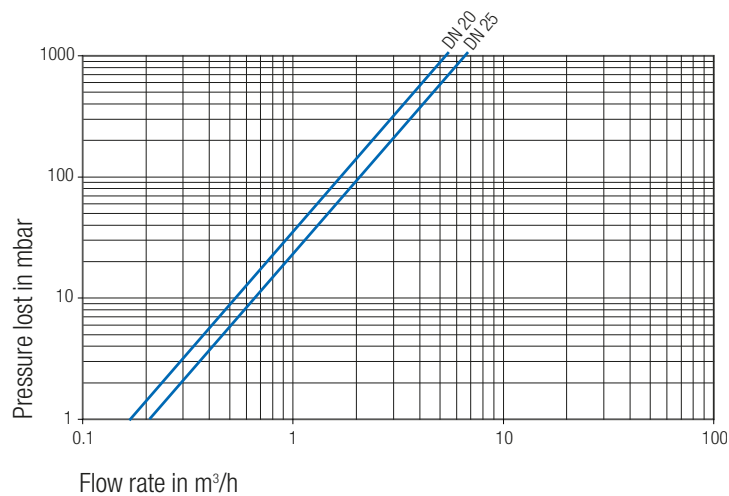
Measurement error limits and metrological class 2

According to OIML guideline R 49

rRference conditions: Process medium = Water, Temperature = 20 °C

Q1<Q<Q2
lower measuring range

Q2≤Q<Q4
upper measuring range

Error limit = 2 x Error margin

$$\frac{Q2}{Q1} = 1.6 \qquad \frac{Q4}{Q3} = 1.25$$

INTEGRA METERING