bürkert
FLUID CONTROL SYSTEMS

Flowmeter
for continuous flow measurement

- Economic integration in pipe systems without any additional piping
- Optic or magnetic measuring principle
- Configurable output: 1 analog 4 - 20 mA and/or 1 transistor output (frequency or switch)
- Outputs configurable (through interface on USB port with PC)

Type 8012 can be combined with...

Type 8619
Multifunction transmitter/controller

Type 8802-GD
TopControl System

Type 8611
Universal Controller eControl

Type 8032
Flow controller

PLC

The paddle wheel flowmeter for continuous flow measurement is especially designed for use in neutral, slightly aggressive, solid free liquids in its magnetic measuring version and for use in liquids which let pass the infra-reds in its optic measuring version.

The 8012 is made up of a fitting (S012) and an electronic module (SE12) connected together with screws. The Bürkert designed fitting system ensures simple installation into all pipes from DN06 to DN65. It can also be installed in fluid block systems.

The 8012 produces a programmable frequency pulse signal, proportional to the flow rate, which can easily be transmitted and processed by a Bürkert remote transmitter/controller, or a programmable switch output or a 4 - 20 mA signal.

General data	
Compatibility	with fittings S012
Materials	
Housing / Seal	PPS / EPDM
Fixed connector M12, (gland on request)	PA
1 meter cable	PVC
Wetted parts materials	
Fitting	Brass, stainless steel 1.4404/316L, PVC or PP
Paddle wheel / Holder	PVDF
Axis and bearing / Seal	Ceramics (Al_2O_3) / FKM (EPDM option)
Electrical connection	Free positionable fixed connector M12-5 pin (or with 1 m cable length, on request)
Connection cable	1.5 mm² max. cross-section

Complete device data (fitting + electronic module)	
Pipe diameter	DN06 to DN50 (DN65 on request)
Measuring range	0.3 m/s to 10 m/s
Measuring element	Optical - infra-reds (or magnetical paddle-wheel, on request)
Medium temperature with	
PVC fitting	0°C to 60°C
PP fitting	0°C to 80°C
Stainless steel or brass fitting	-15°C to 100°C (if T°ambient ≤ 45°C) or -15°C to 90°C (if 45°C ≤ T°ambient ≤ 60°C)
Fluid pressure max.	PN10 (with plastic fitting) PN16 (with metal fitting)
Viscosity / Pollution	300 cSt. max. / max. 1% (size of particles 0.5 mm max.)
Accuracy	with standard K-factor ±(0.5% of FS.* + 2.5% of Reading)[1)]
Linearity	±0.5% of FS.* (at 10 m/s)
Repeatability	±0.4% of Reading[1)]

* FS. = Full scale (10 m/s)

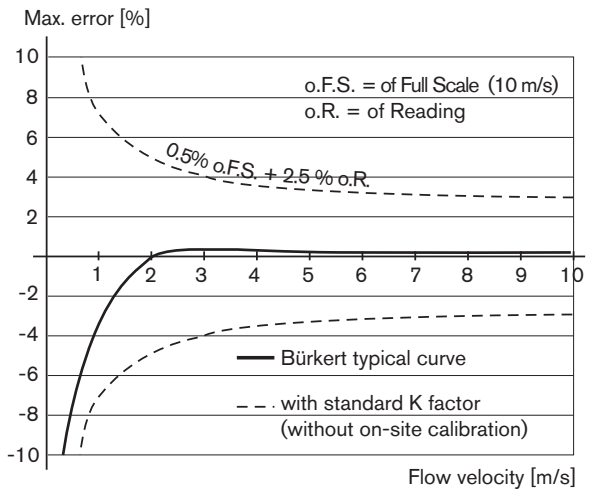
1) Under reference conditions i.e. measuring fluid = water, ambient and water temperature = 20°C, applying the minimum inlet and outlet pipe straights, matched inside pipe dimensions.

Electrical data	
Operating voltage (V+)	12 - 36 V DC, filtered and regulated
Current consumption	< 60 mA (at 12 V DC for current version - without load)
Reversed polarity of DC	Protected
Voltage peak	Protected
Short circuit	Protected for transistor output
Output Transistor version	Transistor NPN (default setting) / PNP (configurable on request), open collector, max. 700 mA, NPN output: 0.2 - 36 V DC (default setting) PNP output: operating voltage frequency or switching mode
Current version (configurable on request)	4 - 20 mA, sinking (default setting), image of flow velocity (default setting), configurable on request (sourcing mode); Loop impedance max.: 1125 Ω at 36 V DC; 650 Ω at 24 V DC; 140 Ω at 12 V DC
Environment	
Ambient temperature	-15°C to +60°C (operating and storage)
Relative humidity	≤ 80%, without condensation
Standards, directives and approvals	
Protection class	IP67 with multipin M12 (IP65 with cable)
Standard and directives EMC Pressure Vibration Shock	 EN 61000-6-3, EN 61000-6-2 Complying with article 3 of §3 from 97/23/CE directive.* EN 60068-2-6 EN 60068-2-27
Approval / Certificate on request	3.1 certificate; 2.2 certificate; Surface finish certificate; Calibration certificate; FDA (only for device with EPDM seal and stainless steel fitting) KTW (only for device in magnetic measuring version with EPDM seal and stainless steel or brass fitting)

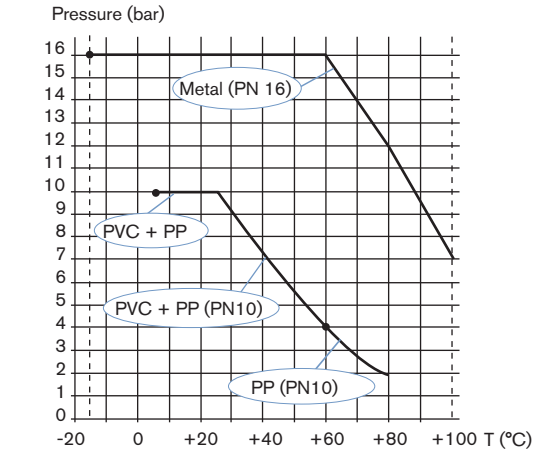
* For the 97/23/CE pressure directive, the device can only be used under following conditions (depend on max. pressure, pipe diameter and fluid).

Type of fluid	Conditions
Fluid group 1, §1.3.a	DN ≤ 25 only
Fluid group 2, §1.3.a	DN ≤ 32, or DN > 32 and PN*DN ≤ 1000
Fluid group 1, §1.3.b	PN*DN ≤ 2000
Fluid group 2, §1.3.b	DN ≤ 200

Accuracy diagram



Pressure/temperature diagram



A: Application range for complete device (fitting + electronic module)

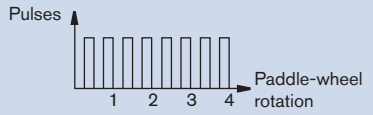
Main features

8012 with optical (standard) or magnetical (on request) principle

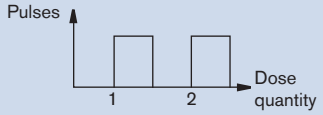
Version with Transistor output

- Transistor output: NPN (standard) or PNP (on request) operation
- With one configured transistor output mode (4 possibilities)
  - Raw frequency (standard) - (2 pulses per paddle wheel rotation)
  - Proportional frequency (on request) - (e.g. 5 pulses per litre)
  - Switching mode
    - 2 switching modes for the output, either hysteresis or window, inverted or not, depending on transistor output version
    - Configurable delay before switching
  - Detection of flow direction - only with optical principle

Raw frequency
Pulse length:
- 50% ON
- 50% OFF

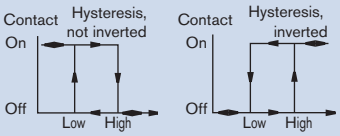


Proportional frequency
Pulse length:
- 50% ON
- 50% OFF

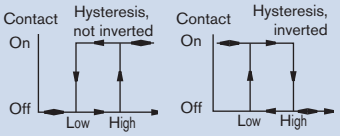


Hysteresis operation

NPN wiring

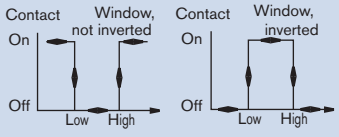


PNP wiring

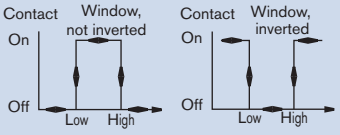


Window operation

NPN wiring



PNP wiring



Version with Transistor and current outputs

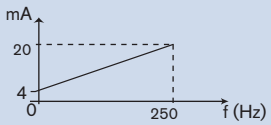
Transistor output:

- Same features described as above

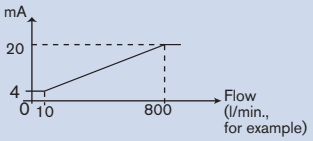
Current output:

- with sinking (standard) or sourcing (on request) wiring
- 8012 with configurable current output
  - 4 - 20 mA current corresponding to paddle wheel frequency (0 - 250 Hz) - (standard)
  - 4 - 20 mA current corresponding to a flow range - (on request)
  - Damping of fluctuation of current output through filter function
  - Generation of an alarm current (22 mA) - when fluid circulation is opposite to the direction indicated by the arrow on the side of the housing (only versions with optical principle) or when full scale has been exceeded (versions with optical or magnetical principle)

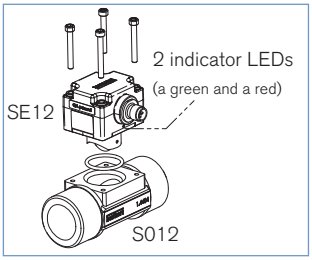
Paddle-wheel frequency
and Q = f/K
where Q: flow rate [l/s]
f: frequency [Hz]
K: K-factor [pulse/litre]



Flow range



Design and principle of operation



The flowmeter 8012 is built up with an electronic module and a measurement paddle wheel associated to a fitting. This connection is made by means of screws.
The electronic module SE12 is equipped with 2 indicator LEDs, visible by transparency under the fixed connector (standard).
When the device is energized, the green indicator LED lights up and then flashes proportionally to the rotation frequency of the paddle wheel. The switch on of the red indicator LED indicates a malfunction of the device.

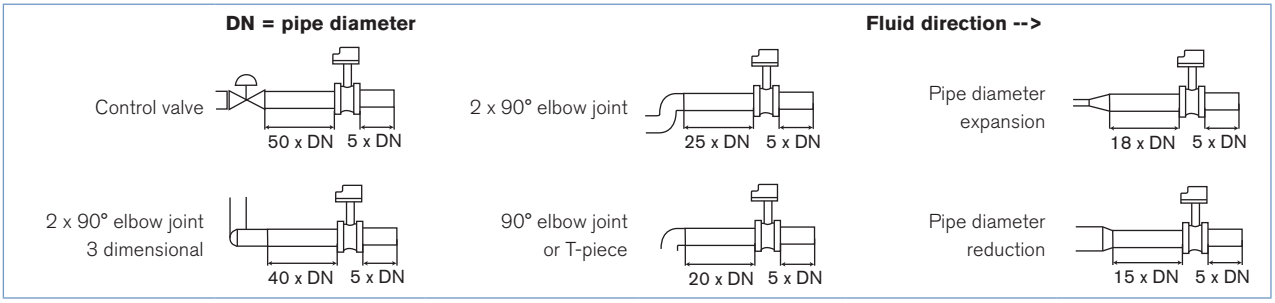
When liquid flows through the pipe, the paddle wheel is set in rotation. The non-wetted permanent magnets inserted in the paddle wheel generate a measuring signal which frequency is proportional to the flow velocity.

Two electronic module versions allow the following outputs:
- with one pulse output (either NPN or PNP transistor output - configurable).
  An external power supply of 12 - 36 V DC is required. This pulse output generates a signal which frequency is proportional to the flow velocity. It is designed for connection to any system with open collector NPN or PNP frequency input.
  - with one 4 - 20 mA current output and one pulse output (either NPN or PNP transistor output configurable).
    An external power supply of 12 - 36 V DC is required. The 4 - 20 mA output delivers a current which value is the image of the flow velocity

In a 3-wire system, the signal can be displayed or processed directly. The output signal is provided via a free positionable male M12-5 pin fixed connector (or a 1 m-length cable on request).

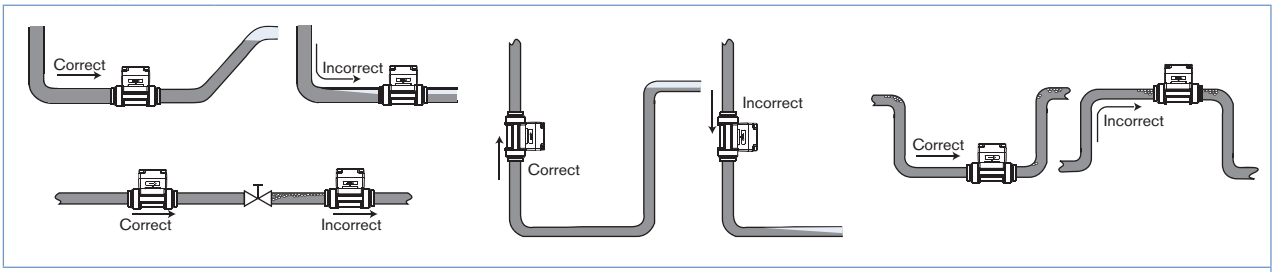
Installation

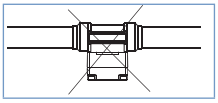
Minimum straight upstream and downstream distances must be observed. According to the pipe design, necessary distances can be bigger or use a flow conditioner to obtain the best accuracy. For more information, please refer to EN ISO 5167-1.
EN ISO 5167-1 prescribes the straight inlet and outlet distances that must be complied with when installing fittings in pipe lines in order to achieve calm flow conditions. The most important layouts that could lead to turbulence in the flow are shown below, together with the associated prescribed minimum inlet and outlet distances. These ensure calm, problem-free measurement conditions at the measurement point.



The flowmeter can be installed in either horizontal or vertical pipes, but following additional conditions should be respected

- always install the 8012 so that the paddle wheel axis is horizontal..
- ensure the pipe is maintained full at all times, near the device
- ensure the pipe design does not allow the build-up of air bubbles or cavities within the medium, near the device





When installing the 8012 on an horizontal pipe, make sure the paddle wheel is oriented down

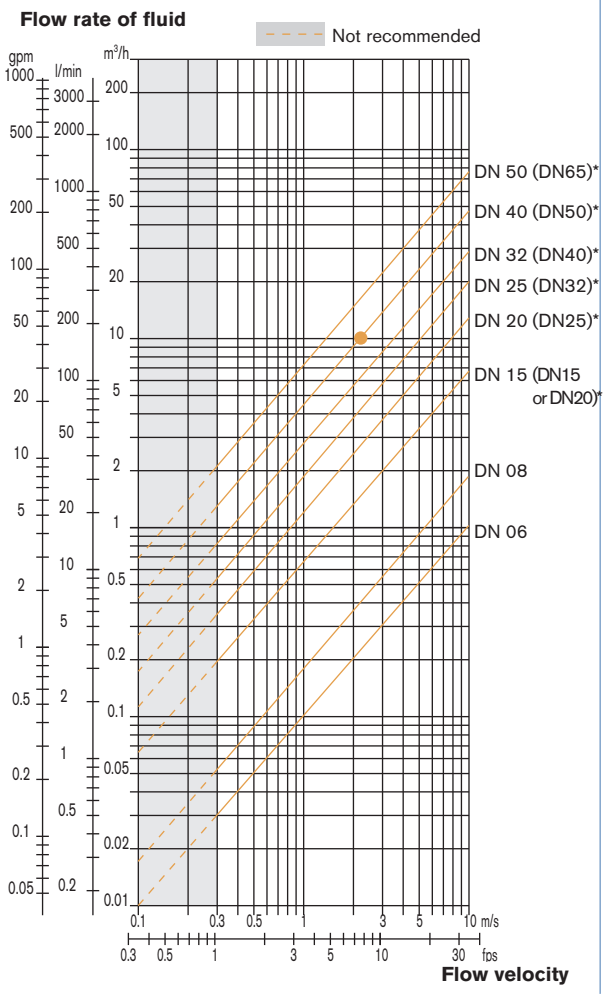
Pressure and temperature ratings must be respected according to the selected fitting material.
The suitable pipe size is selected using the diagram Flow/Velocity/DN.
The measuring device is not designed for gas flow measurement.

Diagram Flow/Velocity/DN

Example:

- Flow: 10 m³/h
- Ideal flow velocity: 2...3 m/s

For these specifications, the diagram indicates a pipe size of DN40 [or DN50 for (*) mentioned fittings]

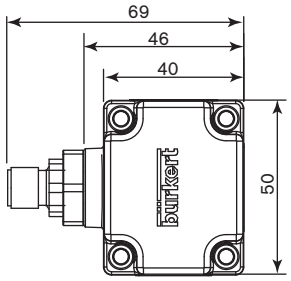


*** for following fittings with:**
- external threads acc. to SMS 1145
- weld ends acc. to SMS 3008, BS 4825 / ASME BPE or DIN 11850 Series 2
- Clamp acc. to SMS 3017 / ISO 2852, BS 4825 / ASME BPE or DIN 32676

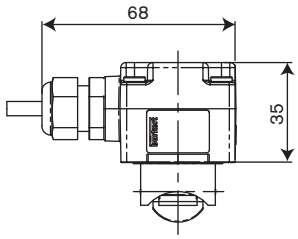
Dimensions electronic module SE12 [mm]

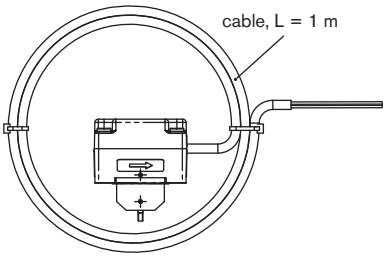
Electronic module SE12

with free positionable male M12-5 pin fixed connector



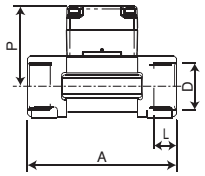
with cable





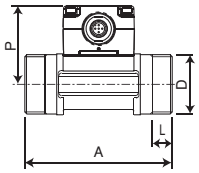
Dimensions 8012

8012 with internal thread connection
G, NPT or Rc
in stainless steel (316L - 1.4404) or
brass (CuZn39Pb2)



DN [mm]	P [mm]	A [mm]	D [inch]	L [mm]
15	57.5	84.0	G 1/2 NPT 1/2 Rc 1/2	16.0 17.0 15.0
20	55.0	94.0	G 3/4 NPT 3/4 Rc 3/4	17.0 18.3 16.3
25	55.2	104.0	G 1 NPT 1 Rc 1	23.5 18.0 18.0
32	58.8	119.0	G 1 1/4 NPT 1 1/4 Rc 1 1/4	23.5 21.0 21.0
40	62.6	129.0	G 1 1/2 NPT 1 1/2 Rc 1 1/2	23.5 20.0 19.0
50	68.7	148.5	G 2 NPT 2 Rc 2	27.5 24.0 24.0

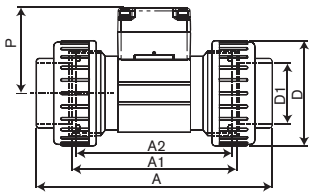
8012 with external thread connection
G, NPT or Rc
in stainless steel (316L - 1.4404),
brass (CuZn39Pb2)
or PVC



DN [mm]	P [mm]	A [mm]	D [inch]	[mm]	L [mm]
06	52.5	90.0	G 1/2	-	14.0
08	52.5	90.0	** 1/2	M 16 x 1.5	14.0

** G, NPT, RC according to fitting version

8012 with True union connection
DIN 8063, ASTM D 1785/76 or JIS K in PVC



DN	P	D	A			D1			A2	A1
[mm]	[mm]	[mm]	DIN	ASTM	JIS	DIN	ASTM	JIS	[mm]	[mm]
15	57.5	43	128	130.0	129	20	21.3	18.40	90	96
20	55.0	53	144	145.6	145	25	26.7	26.45	100	106
25	55.2	60	160	161.4	161	32	33.4	32.55	110	116
32	58.8	74	168	170.0	169	40	42.2	38.60	110	116
40	62.6	83	188	190.2	190	50	48.3	48.70	120	127
50	68.7	103	212	213.6	213	63	60.3	60.80	130	136

Ordering chart for 8012 with optical measuring method, 12 - 36 V DC, M12-5pin

Two versions of the fitting in DN15 and DN20 exist, having different K factors.

Only version 2, identified by the "v2" marking, is available from March 2012. The "v2" marking can be found:

- on the bottom of the DN15 or DN20 fitting in plastic:

- on the side of the DN15 or DN20 fitting in metal:

Port connection	Standard	Output*	Item no. DN06 - 1/4"	Item no. DN06 - 1/2"	Item no. DN08 - 1/2"	Item no. DN15	Item no. DN20	Item no. DN25	Item no. DN32	Item no. DN40	Item no. DN50
Brass - Medium temperature max. 100°C, PN16											
Internal thread	G ISO 228	Pulse	-	-	-	556 003	556 004	556 005	556 006	556 007	556 008
		Pulse + 4-20 mA	-	-	-	556 012	556 013	556 014	556 015	556 016	556 017
	NPT	Pulse	-	-	-	556 018	556 019	556 020	556 021	556 022	556 023
		Pulse + 4-20 mA	-	-	-	556 024	556 025	556 026	556 027	556 028	556 029
	Rc (ISO7)	Pulse	-	-	-	556 030	556 031	556 032	556 033	556 034	556 035
		Pulse + 4-20 mA	-	-	-	556 036	556 037	556 038	556 039	556 040	556 041
External thread	G ISO 228	Pulse	556 000	556 001	556 002	-	-	-	-	-	-
		Pulse + 4-20 mA	556 009	556 010	556 011	-	-	-	-	-	-
Stainless steel - Medium temperature max. 100°C, PN16											
Internal thread	G ISO 228	Pulse	-	-	-	556 045	556 046	556 047	556 048	556 049	556 050
		Pulse + 4-20 mA	-	-	-	556 054	556 055	556 056	556 057	556 058	556 059
	NPT	Pulse	-	-	-	556 061	556 062	556 063	556 064	556 065	556 066
		Pulse + 4-20 mA	-	-	-	556 068	556 069	556 070	556 071	556 072	556 073
	Rc (ISO7)	Pulse	-	-	-	556 074	556 075	556 076	556 077	556 078	556 079
		Pulse + 4-20 mA	-	-	-	556 080	556 081	556 082	556 083	556 084	556 085
External thread	G ISO 228	Pulse	556 042	556 043	556 044	-	-	-	-	-	-
		Pulse + 4-20 mA	556 051	556 052	556 053	-	-	-	-	-	-
	NPT	Pulse	-	-	556 060	-	-	-	-	-	-
		Pulse + 4-20 mA	-	-	556 067	-	-	-	-	-	-
PVC - Medium temperature max. 60°C, PN10											
True union	DIN 8063	Pulse	-	-	-	556 088	556 089	556 090	556 091	556 092	556 093
		Pulse + 4-20 mA	-	-	-	556 094	556 095	556 096	556 097	556 098	556 099
	ASTM	Pulse	-	-	-	556 100	556 101	556 102	556 103	556 104	556 105
		Pulse + 4-20 mA	-	-	-	556 106	556 107	556 108	556 109	556 110	556 111
	JIS	Pulse	-	-	-	556 112	556 113	556 114	556 115	556 116	556 117
		Pulse + 4-20 mA	-	-	-	556 118	556 119	556 120	556 121	556 122	556 123
External thread	G ISO 228	Pulse	-	556 086	556 124	-	-	-	-	-	-
		Pulse + 4-20 mA	-	556 087	556 125	-	-	-	-	-	-

* Factory setting:
- pulse NPN (raw frequency)
- pulse NPN (raw frequency) + 4 - 20 mA (sinking mode, 0 - 250 Hz)
- other configurations on request

Further versions on request

Port connection
Weld ends, Clamp, Flange, spigot...

Materials
PP

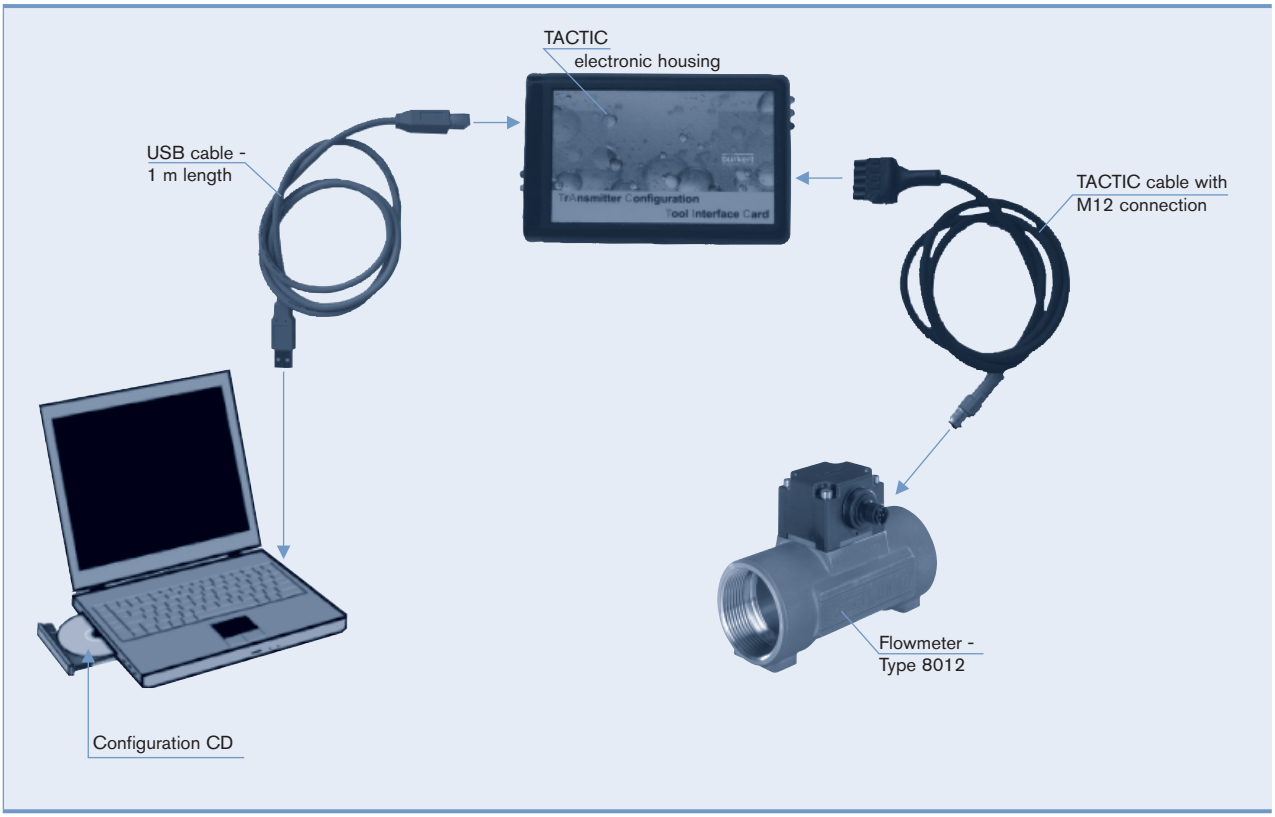
Please also use the "request for quotation" form on page 12 for ordering further version of the 8012 go to page .

Ordering chart for accessories for 8011 (to be ordered separately)

Specification	Item no.
4 short screws (M4 x 35 - A4) + 4 long screws (M4 x 60 -A4)	555 775
5-pin M 12 female connector moulded on cable (2 m, shielded)	438 680
5-pin M 12 female connector with plastic threaded locking ring	917 116
Configuration tool TACTIC (1-m length USB cable + 1 TACTIC cable with M12 connection + 1 TACTIC electronic housing + 1 configuration CD)	556 500
Connecting cables: 8012-TACTIC and TACTIC-PC (1-m length USB cable + 1 TACTIC cable with M12 connection)	556 160

Specification	Item no. DN06	Item no. DN08	Item no. DN15	Item no. DN20	Item no. DN25	Item no. DN32	Item no. DN40	Item no. DN50
O-ring set for metal fitting - FKM	426 340	426 340	426 340	426 340	426 340	426 340	426 340	426 340
O-ring set for metal fitting - EPDM	426 341	426 341	426 341	426 341	426 341	426 341	426 341	426 341
O-ring set for plastic fitting - FKM	-	448 679	431 555	431 556	431 557	431 558	431 559	431 560
O-ring set for plastic fitting - EPDM	-	448 680	431 561	431 562	431 563	431 564	431 565	431 566

Configuration accessories



Variants of flowmeter Type 8012

A flowmeter Type 8012 consists of:

- an electronic module SE12 with either optical or magnetical measuring principle, with only pulse output or with both pulse and 4 - 20 mA current outputs - configured in **standard** (see ordering chart Type SE12) or **customized** (see specifications sheet on last page). The electrical connection is carried out through a 5-pin M12 fixed connector or a 1 m cable.
- a fitting Type S012 available in different materials providing many installation options of the electronic module into all pipes, ranging from DN06 to DN65, due to the large range of process connections (see specification sheet on last page).
- screws and O-ring (see ordering chart for accessories).

The following charts indicate the different variants:

Electronic module Type SE12

Specifications	Operating voltage	Pipe connection	Output*	Connection	Item no.
Magnetical measuring principle	12-36 V DC	DN06, DN08, DN15 v2 and DN20 v2	Frequency with pulse NPN	Free positionable M12-5pin	557 054
			Frequency with pulse NPN + 4-20 mA	Free positionable M12-5pin	557 058
			Frequency with pulse NPN	with 1 m cable	557 056
			Frequency with pulse NPN + 4-20 mA	with 1 m cable	557 060
		DN15 to DN50 (except DN15 v2 and DN20 v2)	Frequency with pulse NPN	Free positionable M12-5pin	557 053
			Frequency with pulse NPN + 4-20 mA	Free positionable M12-5pin	557 057
			Frequency with pulse NPN	with 1 m cable	557 055
			Frequency with pulse NPN + 4-20 mA	with 1 m cable	557 059
Optical measuring principle	12-36 V DC	DN06, DN08, DN15 v2 and DN20 v2	Frequency with pulse NPN	Free positionable M12-5pin	557 062
			Frequency with pulse NPN + 4-20 mA	Free positionable M12-5pin	557 066
			Frequency with pulse NPN	with 1 m cable	557 064
			Frequency with pulse NPN + 4-20 mA	with 1 m cable	557 068
		DN15 to DN50 (except DN15 v2 and DN20 v2)	Frequency with pulse NPN	Free positionable M12-5pin	557 061
			Frequency with pulse NPN + 4-20 mA	Free positionable M12-5pin	557 065
			Frequency with pulse NPN	with 1 m cable	557 063
			Frequency with pulse NPN + 4-20 mA	with 1 m cable	557 067

* Factory setting:
- pulse NPN (raw frequency)
- pulse NPN (raw frequency) + 4 - 20 mA (sinking mode, 0 - 250 Hz)
- other configurations on request

Fitting Type S012 (possibilities versions - ⚠ can not be ordered separately)

Process connection	Materials	Available DN06	Available DN08	Available DN15	Available DN20	Available DN25	Available DN32	Available DN40	Available DN50	Available DN65
Internal thread	Brass, stainless steel	-	-	Yes	Yes	Yes	Yes	Yes		-
External thread	Brass, stainless steel, PVC, PP	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-
	Stainless steel acc. SMS 1145	-	-	-	-	Yes	-	Yes	Yes	-
Weld ends	Stainless steel	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clamp	Stainless steel	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Flange	Stainless steel	-	-	Yes	Yes	Yes	Yes	Yes	Yes	-
True union	PVC	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-
	PP	-	-	Yes	Yes	Yes	Yes	Yes	Yes	-
Spigot	PVC, PP	-	-	Yes	Yes	Yes	Yes	Yes	Yes	-

⚠ Fitting in PVDF not available.

Note: Such new 8012 configuration should be ordered to your Bürkert Sales Center.

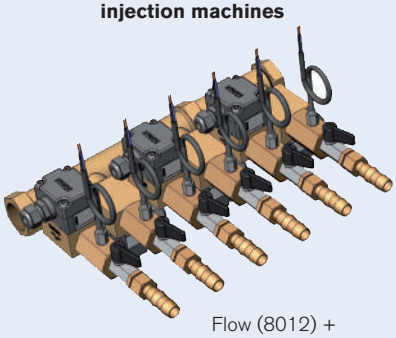
Interconnection possibilities with the 8012

Fluid block system for the 8012

The modular concept of the electronic module Type SE12 allows fully customized, pre-mounted and tested solutions to completely meet application needs. It is designed for being mounted in a system block, associated with other Bürkert products. This allows cost reduction and compact design for customized solutions.
Please contact your Bürkert local office to have individual counselling and engineering support in order to find the best solution corresponding to your application.

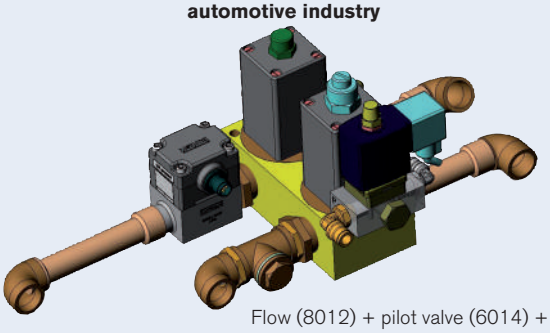
Example of flow regulation systems with our SE12 electronic module

Cooling of molding tools in plastic injection machines



Flow (8012) +
temperature +
manual On/Off valve

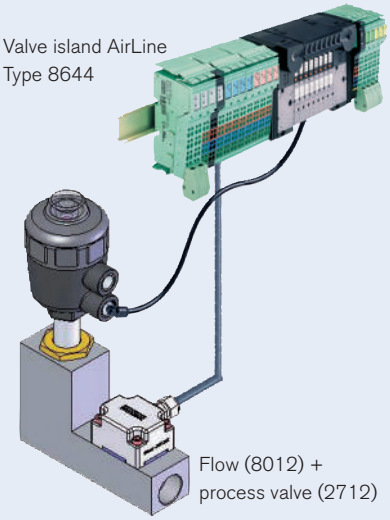
Cooling of welding robot in automotive industry



Flow (8012) + pilot valve (6014) +
On/Off diaphragm valve (0263)

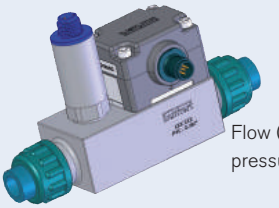
On/Off control loop

Valve island AirLine
Type 8644



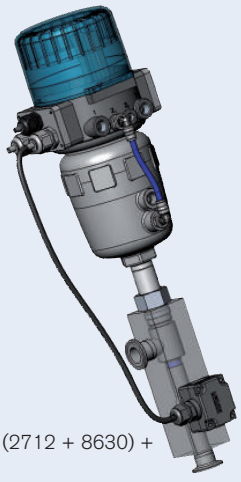
Flow (8012) +
process valve (2712)

Filter monitoring in waste water treatment



Flow (8012) +
pressure (8314)

Flow regulation in Ro water treatment skid



Process valve (2712 + 8630) +
Flow (8012)

bürkert

Flowmeter 8012 - request for quotation

Note
You can fill out the fields directly in the PDF file before printing out the form.

Please fill in and send to your local Bürkert Sales Centre with your inquiry or order.

Company:	Contact person:
Customer No.:	Department:
Address:	Tel. / Fax.:
Postcode / Town:	E-mail:

Flowmeter 8012 **Quantity:** **Desired delivery date:**

Fitting S012

Pipe diameter DN ☐ 6 ☐ 8 ☐ 15 ☐ 20 ☐ 25 ☐ 32 ☐ 40 ☐ 50 ☐ 65

Materials:

Body	☐ Brass	☐ Stainless steel
	☐ PVC	☐ PP
Seal	☐ FKM	☐ EPDM

Process connection:

Internal thread	☐ G	☐ NPT	☐ Rc
External thread	☐ G	☐ NPT	☐ Rc
Weld ends	☐ EN ISO1127/ISO4200		☐ SMS 3008
	☐ BS4825/ASME BPE		☐ DIN 11850 S2
Clamp	☐ ISO (for pipe EN ISO1127/ISO4200)		☐ SMS 3017/ISO2852
	☐ BS4825/ASME BPE		☐ DIN 32767
Flange	☐ EN1092-1	☐ ANSI, B16-5-1988	☐ JIS, 10K
True union	☐ DIN 8063	☐ ASTM	☐ JIS
Spigot	☐ DIN 8063		

Special surface finish ☐ without ☐ with Ra int. = Ra ext. =

Flow unit (will determine the needed volume unit)

☐ l/s	☐ m^3/min	☐ Ga/s	☐ USGa/s
☐ l/min		☐ Ga/min	☐ USGa/min
☐ l/h	☐ m^3/h	☐ Ga/h	☐ USGa/h

Electronic module SE12

Measuring method ☐ Magnetical ☐ Optical
Electrical connection ☐ Multipin M12 ☐ with 1 m cable
Output signal ☐ Transistor (Fill in 1. below) ☐ Transistor & 4-20 mA current (Fill in 1. and 2. below)

1. Transistor output feature

Transistor operation ☐ NPN ☐ PNP

Output configured as

☐ Raw frequency (paddle-wheel rotation)

☐ Proportional frequency ("V" determined volume per pulse)
V =

☐ Switching mode
☐ Hysteresis ☐ Window
☐ Inverted ☐ Not inverted
Switching threshold value:
Low val.
High val.
Switch. delay s (0 to 3276 s)

☐ Detection of flow direction (only with optical version)
Switching mode
☐ Inverted ☐ Not inverted
Switch. delay s (0 to 3276 s)

2. Current output feature

Wiring mode ☐ Sinking ☐ Sourcing

Output configured as

☐ 4-20 mA current (corresp. to paddle wheel frequency 0-250 Hz)

☐ 4-20 mA current (corresp. to a specific flow range)
Flow value corresponding to: 4 mA /20 mA

☐ without filtration

☐ with filtration (1 to 9):
(filtration level: min. 1; max. 9)

reset form