Flow control valves

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Flow control valves

Key features

Function

Flow control or one-way flow control valves regulate the piston speed of pneumatic drives during advance and return strokes. This is done through suitable restriction of the flow rate of compressed air in exhaust air or supply air direction. With the one-way flow control valve GRLA or GRLZ, the flow control function works in one direction only (exhaust air or supply air); the non-return function works in the opposite direction. With the flow control valve GRLO, the flow control function is active in both directions.

The flow control function creates an adjustable annular gap inside the valve. This gap can be increased or decreased by turning the knurled screw or slotted head screw. The required restriction can be set with the help of this adjustment component.

Note

The documentation for the one-way flow control valves can be found at
➔ www.festo.com/catalogue

General information

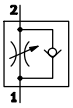
Standard nominal flow rate qnN

The standard nominal flow rate qnN is the flow rate based on standard conditions at an operating pressure of p1 = 6 bar and an output pressure of p2 = 5 bar, measured at room temperature t = 20 °C.

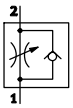
Standard flow rate qn

The standard flow rate is measured at an operating pressure of p1 = 6 bar and an output pressure with respect to atmospheric pressure (p2 = 0 bar).

Exhaust air one-way flow control function

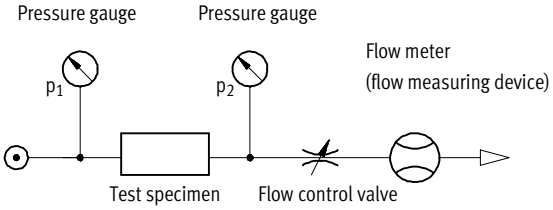


Supply air one-way flow control function



Flow control function in both directions

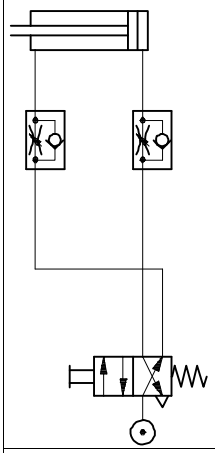
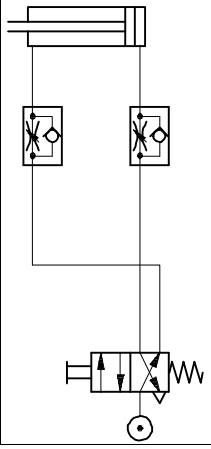
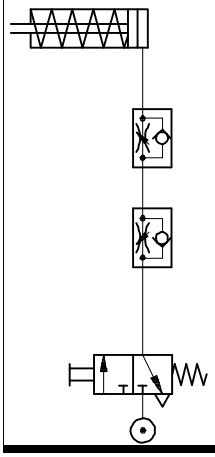
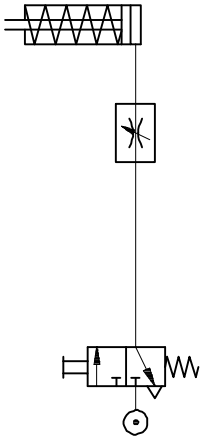
Flow measurement circuit

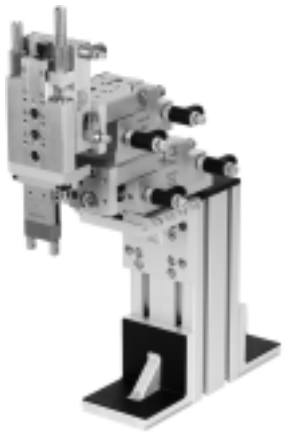


p_1 Operating pressure
p_2 Output pressure

Flow control valves

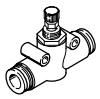
Key features

Flow control functions and range of applications				
Application	Description		Application	Description
Double-acting cylinder with one-way flow control valve				
Exhaust air one-way flow control function			Supply air one-way flow control function	
	Speed adjustment through exhaust air flow control. Uncontrolled supply air and controlled exhaust air move the piston between air cushions (improves motion, even with load changes).			Adjustable speed during advance and return strokes. The flow rate is identical in both directions.
Single-acting cylinder with one-way flow control valve			**Single-acting cylinder with flow control valve**	
Exhaust air and supply air one-way flow control function			Flow control function in both directions	
	Adjustable speed during advance and return strokes. The flow rate can be adjusted differently for both directions.			Speed adjustment through flow control on both sides is often applied in the case of single-acting or small cylinders. The benefit of this application lies in its simplicity.

Application examples	
Mini slide SLT	Flat cylinder DZF
	

Flow control valves

Product range overview

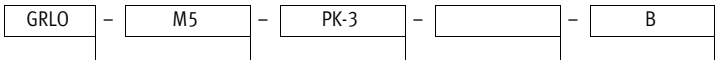
Version	Valve function	Version	Type	Connection direction	Pneumatic connection 1	Pneumatic connection 2	qnN[1)] [l/min]	Adjustment component	→ Page/ Internet
Standard	**Metal**								
	Flow control function		GRLO	Elbow outlet	M5	M5	95	Slotted head screw	6
					M5	PK-3	83	Slotted head screw	6
Mini	**Metal**								
	Flow control function		GRLO	Elbow outlet	M3, M5	QS-3, QS-4	40 … 41	Slotted head screw	8
					M3	M3	18	Slotted head screw	10
In-line installation	**Polymer**								
	Flow control function		GRO	Inline	QS-3, QS-4, QS-6	QS-3, QS-4, QS-6	25 … 160	Knurled screw	gro

1) Standard nominal flow rate in direction of flow control.

Flow control valves

Type codes

GRLO



Type	
GRLO	Flow control valve, elbow outlet

Pneumatic connection 1	
M3	Male thread M3
M5	Male thread M5

Pneumatic connection 2	
–	Female thread (connection size as for connection 2)
QS-3	Push-in connector for tubing O.D. 3 mm
QS-4	Push-in connector for O.D. tubing 4 mm
PK-3	Push-in connector for tubing I.D. 3 mm

Flow rate characteristic	
LF	Low flow

Generation	
B	B series
C	C series

Flow control valves GRLO, standard

Technical data – Female thread/barbed connector, metal

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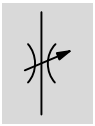
Function



- Flow rate
  83 … 95 l/min
- Temperature range
  –10 … +60 °C
- Operating pressure
  0 … 10 bar

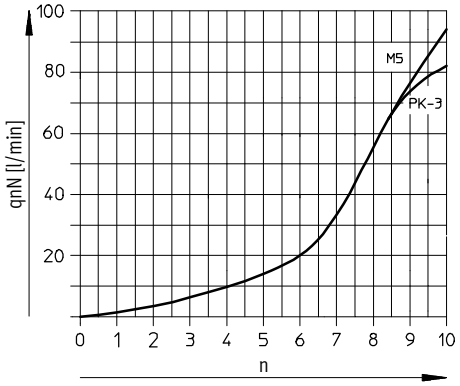
GRLO-M5 GRLO-M5-PK

General technical data			
Valve function		Flow control function	
Pneumatic connection 1		M5	M5
Pneumatic connection 2		M5[1)]	PK-3
Adjustment component		Slotted head screw	
Type of mounting		Screw-in	
Mounting position		Any	
Max. tightening torque	[Nm]	1.5	1.5

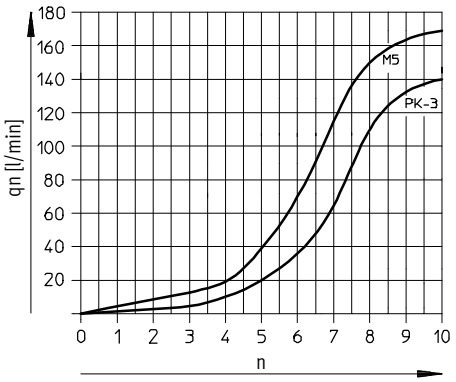
1) Note: This product conforms to ISO 1179-1 and ISO 228-1.

Operating and environmental conditions		
Operating pressure	[bar]	0 … 10
Operating medium		Compressed air in accordance with ISO 8573-1:2010 [7:4:4]
Note on operating/pilot medium		Operation with lubricated medium possible (in which case lubricated operation will always be required)
Ambient temperature	[°C]	–10 … +60
Temperature of medium	[°C]	–10 … +60
Storage temperature	[°C]	–10 … +40

Standard nominal flow rate qnN at 6 → 5 bar as a function of turns of the adjusting screw n



Standard flow rate qn at 6 → 0 bar as a function of turns of the adjusting screw n

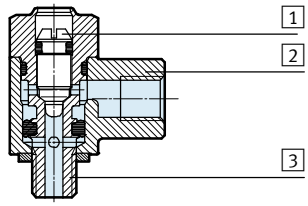


Flow control valves GRLO, standard

Technical data – Female thread/barbed connector, metal

Materials

Sectional view



Flow control valve	
1 Adjusting screw	Brass
2 Swivel connection	Die-cast zinc
3 Threaded plug	Nickel-plated brass
– Seals	NBR
Note on materials	RoHS-compliant

Dimensions

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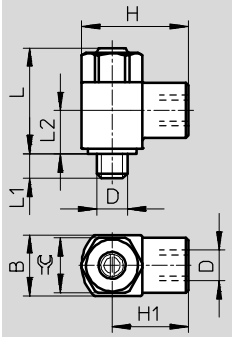
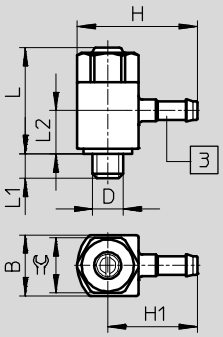
Female thread



Push-in connector



3 Barbed connector

Note: This product conforms to ISO 1179-1 and to ISO 228-1

Type	Connection D	Nominal size [mm]	B	H	H1	L max.	L1	L2	⌀
Female thread									
GRLO-M5	M5	2	10 –0.15	17.5	12.5	17.6	4 ±0.3	7.1	9
Push-in connector									
GRLO-M5-PK-3	M5	2	10 –0.15	19.7	14.7	17.6	4 ±0.3	8.5	9

Ordering data

	Pneumatic connection 1	Pneumatic connection 2	Standard nominal flow rate qnN at 6 ⇢ 5 bar in direction of flow control [l/min]	Standard flow rate qn at 6 ⇢ 0 bar in direction of flow control [l/min]	Weight [g]	Part No.	Type
Slotted head screw							
	M5	M5	95	169	11	**151181**	**GRLO-M5-B**
	M5	PK-3	83	140	10	**151182**	**GRLO-M5-PK-3-B**

Flow control valves GRLO, mini

Technical data – Push-in connector QS, metal

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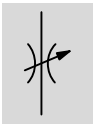
Function



- Low flow: precision adjustment for low speed

Flow rate
40 … 41 l/min

Temperature range
–10 … +60 °C

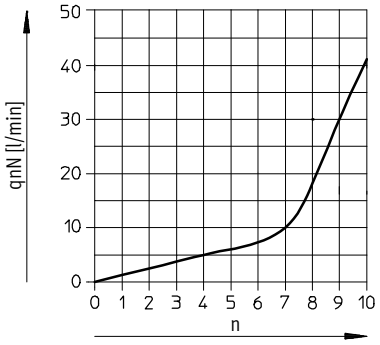
Operating pressure
0 … 10 bar

General technical data			
Valve function		Flow control function	
Pneumatic connection 1		M3	M5
Pneumatic connection 2		QS-3	QS-3, QS-4
Adjustment component		Slotted head screw	
Type of mounting		Screw-in	
Mounting position		Any	
Max. tightening torque	[Nm]	0.3	1.5

Operating and environmental conditions		
Operating pressure	[bar]	0 … 10
Operating medium		Compressed air in accordance with ISO 8573-1:2010 [7:4:4]
Note on operating/pilot medium		Operation with lubricated medium possible (in which case lubricated operation will always be required)
Ambient temperature	[°C]	–10 … +60
Temperature of medium	[°C]	–10 … +60
Storage temperature	[°C]	–10 … +40

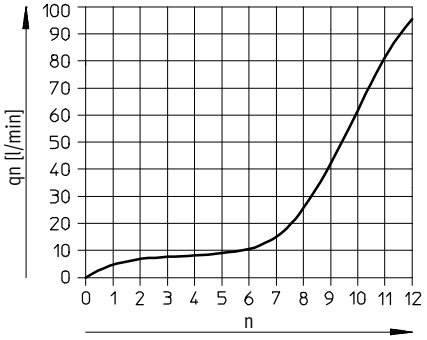
Standard nominal flow rate qnN at 6 → 5 bar as a function of turns of the adjusting screw n

GRLO-M3

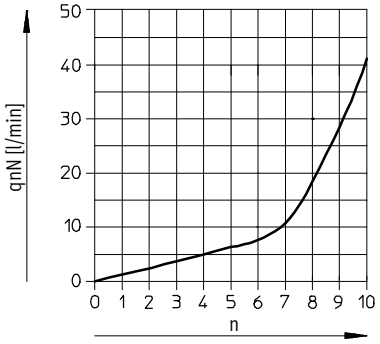


Standard flow rate qn at 6 → 0 bar as a function of turns of the adjusting screw n

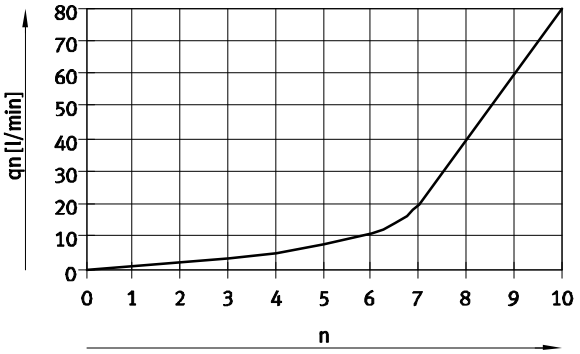
GRLO-M3



GRLO-M5



GRLO-M5



Flow control valves GRLO, mini

Technical data – Push-in connector QS, metal

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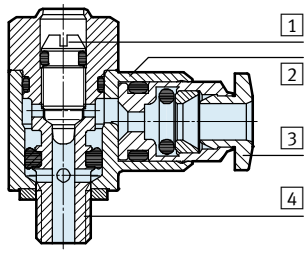
Materials

Sectional view

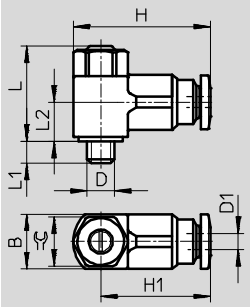


Flow control valve		
1	Adjusting screw	Brass
2	Swivel connection	Die-cast zinc
3	Releasing ring	POM
4	Threaded plug	Brass
–	Seals	NBR
Note on materials		RoHS-compliant

Dimensions

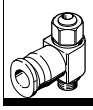
Download CAD data ➔ **www.festo.com**

GRLO, elbow outlet



Type	Connection D	Nominal size [mm]	Tubing O.D. D1	B	H	H1	L max.	L1	L2	⫧
GRLO	M3	1.4	3	8 –0.15	20	15.8	16.6	2.3 +0.15/–0.3	7	7
	M5	1.4	3	9.8 –0.15	22.4	18.4	17.7	3.1 +0.15/–0.35	7.3	
		1.4	4	9.8 –0.15	22.2	18.2	17.7	3.1 +0.15/–0.35	7.3	

Ordering data

	Pneumatic connection 1	2	Standard nominal flow rate qnN at 6 ⇢ 5 bar in direction of flow control [l/min]	Standard flow rate qn at 6 ⇢ 0 bar in direction of flow control [l/min]	Weight [g]	Part No.	Type
Slotted head screw							
	M3	QS-3	41	95	7	**175042**	**GRLO-M3-QS-3**
	M5	QS-3	40	80	9	**175054**	**GRLO-M5-QS-3-LF-C**
		QS-4	40	80	9	**175057**	**GRLO-M5-QS-4-LF-C**

Flow control valves GRLO, mini

Technical data – Female thread, metal

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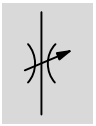
Function

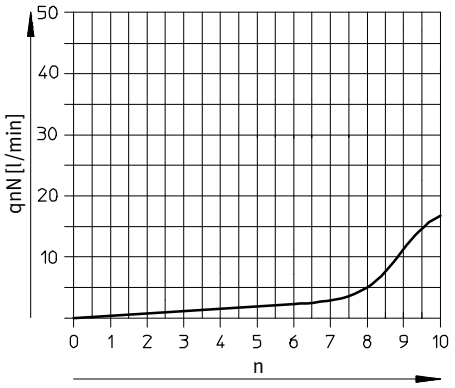


- Flow rate
  0 ... 18 l/min
- Temperature range
  –10 ... +60 °C
- Operating pressure
  0 ... 10 bar

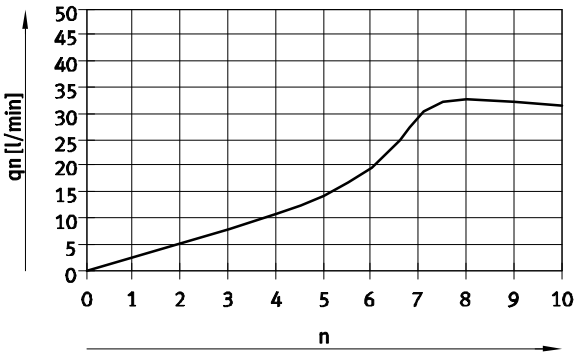
General technical data		
Valve function		Flow control function
Pneumatic connection 1		M3
Pneumatic connection 2		M3
Adjustment component		Slotted head screw
Type of mounting		Screw-in
Mounting position		Any
Max. tightening torque	[Nm]	0.3

Operating and environmental conditions		
Operating pressure	[bar]	0 ... 10
Operating medium		Compressed air in accordance with ISO 8573-1:2010 [7:4:4]
Note on operating/pilot medium		Operation with lubricated medium possible (in which case lubricated operation will always be required)
Ambient temperature	[°C]	–10 ... +60
Temperature of medium	[°C]	–10 ... +60
Storage temperature	[°C]	–10 ... +40

Standard nominal flow rate qnN at 6 ⇢ 5 bar
as a function of turns of the adjusting screw n

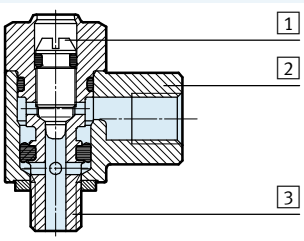


Standard flow rate qn at 6 ⇢ 0 bar
as a function of turns of the adjusting screw n



Materials

Sectional view



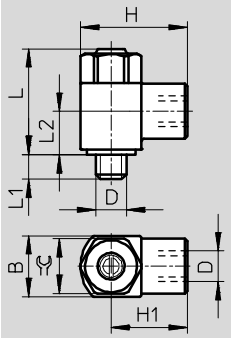
Flow control valve		
1	Adjusting screw	Brass
2	Swivel connection	Die-cast zinc
3	Threaded plug	Nickel-plated brass
–	Seals	NBR
Note on materials		RoHS-compliant

Flow control valves GRLO, mini

Technical data – Female thread, metal

Dimensions Download CAD data ➔ **www.festo.com**

Slotted head screw



Type	Connection D	Nominal size [mm]	B	H	H1	L max.	L1	L2	⌀
GRLO	M3	0.8	5 –0.1	9	6.5	13.3	2.5 +0.15/–0.3	6.4	4.5

Ordering data

	Pneumatic connection 1	Pneumatic connection 2	Standard nominal flow rate qnN at 6 ⇢ 5 bar in direction of flow control [l/min]	Standard flow rate qn at 6 ⇢ 0 bar in direction of flow control [l/min]	Weight [g]	Part No.	Type
Slotted head screw							
	M3	M3	18	33	2	**175039**	**GRLO-M3**