

Flow control valves



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

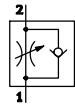
Standard nominal flow rate q_{nN}

The standard nominal flow rate q_{nN} is the flow rate based on standard conditions at an operating pressure of $p_1 = 6$ bar and an output pressure of $p_2 = 5$ bar, measured at room temperature $t = 20$ °C.

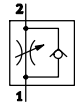
Standard flow rate q_n

The standard flow rate is measured at an operating pressure of $p_1 = 6$ bar and an output pressure with respect to atmospheric pressure ($p_2 = 0$ bar).

Exhaust air one-way flow control function



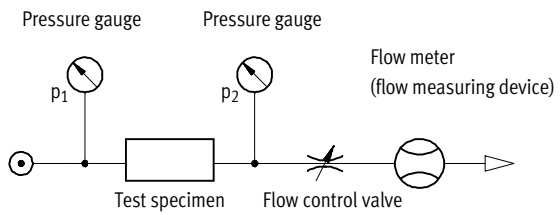
Supply air one-way flow control function



Flow control function in both directions



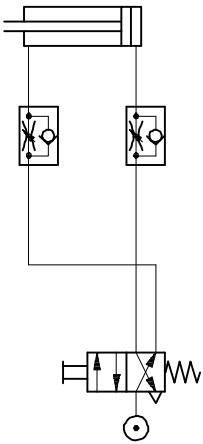
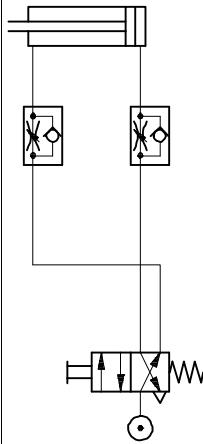
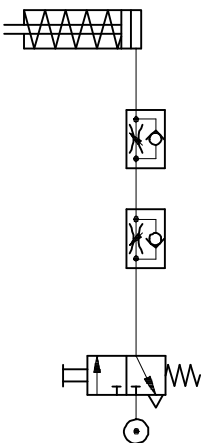
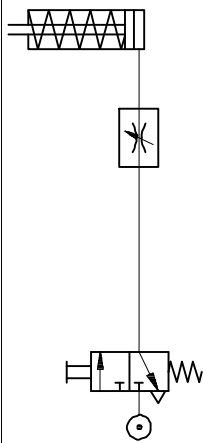
Flow measurement circuit



p_1 Operating pressure
 p_2 Output pressure

Flow control valves

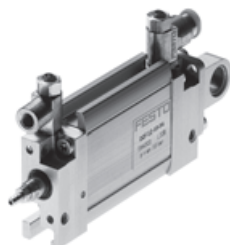
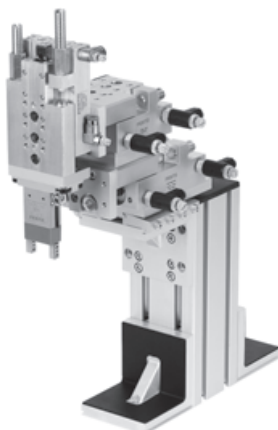
Key features

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	
	<p>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).</p>		<p>Adjustable speed during advance and return strokes. The flow rate is identical in both directions.</p>
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	
	<p>Adjustable speed during advance and return strokes. The flow rate can be adjusted differently for both directions.</p>		<p>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.</p>

Application examples

Mini slide SLT






Flat cylinder DZF



Flow control valves

Product range overview

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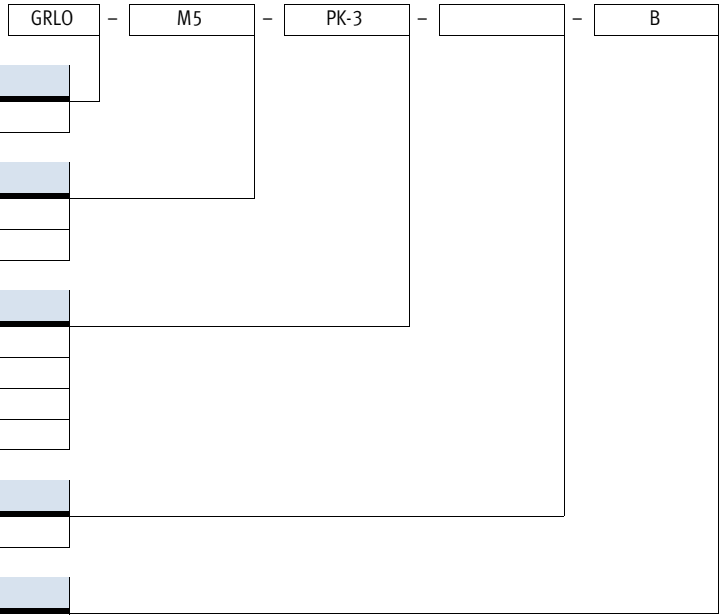
Version	Valve function	Version	Type	Connection direction	Pneumatic connection 1	Pneumatic connection 2	qnN ¹⁾ [l/min]	Adjustment component	→ Page/ Internet
Standard	Flow control function		GRLO	Elbow outlet	M5	M5	95	Slotted head screw	6
					M5	PK-3	83	Slotted head screw	6
Mini	Flow control function		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	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

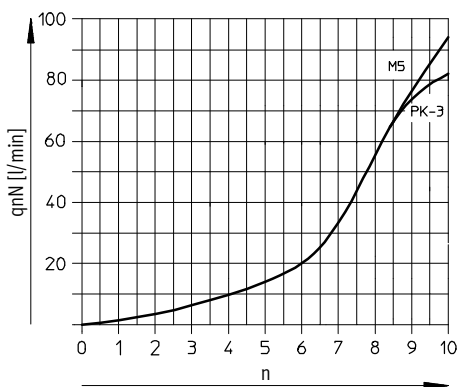
GRLO-M5-PK

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

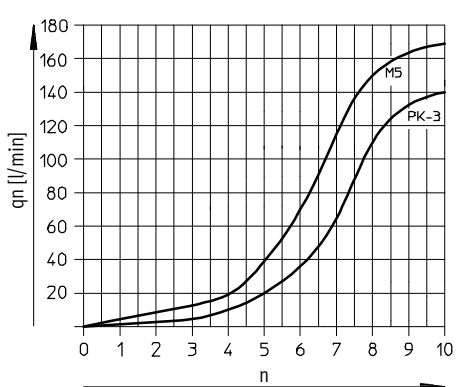
1) -  - Note: This product conforms to ISO 1179-1 and ISO 228-1.

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 q_{nN} at 6 → 5 bar as a function of turns of the adjusting screw n



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

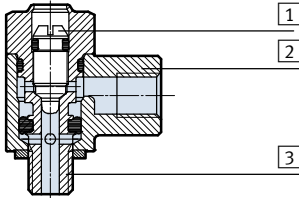


Flow control valves GRLO, standard

Technical data – Female thread/barbed connector, metal

Materials

Sectional view



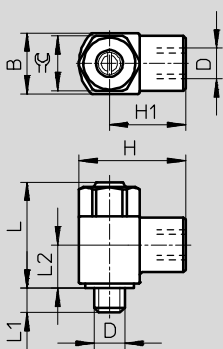
Flow control valve

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

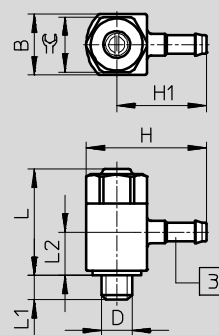
Dimensions

Download CAD data → www.festo.com

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	⌀C
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		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
	1	2					
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

Function



- Low flow: precision adjustment for low speed

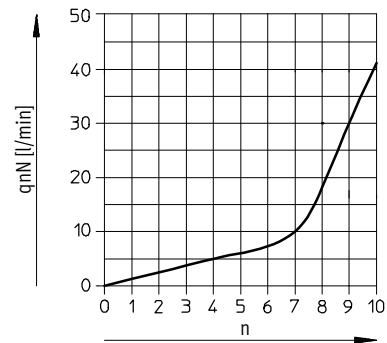
- - Flow rate
40 ... 41 l/min
- - Temperature range
-10 ... +60 °C
- - Operating pressure
0 ... 10 bar



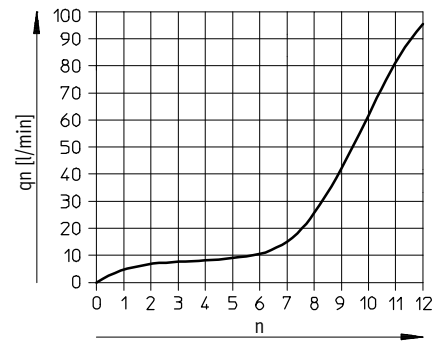
General technical data		
Valve function	Flow control function	
Pneumatic connection 1	M3	M5
Pneumatic connection 2	QS-3	QS-3, QS-4
Adjustment component	Slotted head screw	
Type of mounting	Screw-in	
Mounting position	Any	
Max. tightening torque [Nm]	0.3	1.5

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	

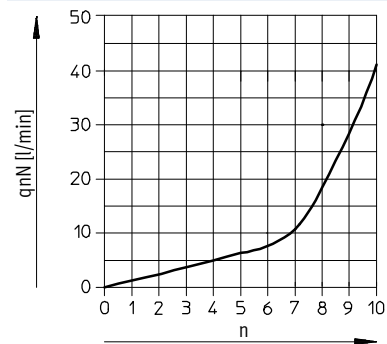
Standard nominal flow rate q_{nN} at 6 → 5 bar as a function of turns of the adjusting screw n
GRLO-M3



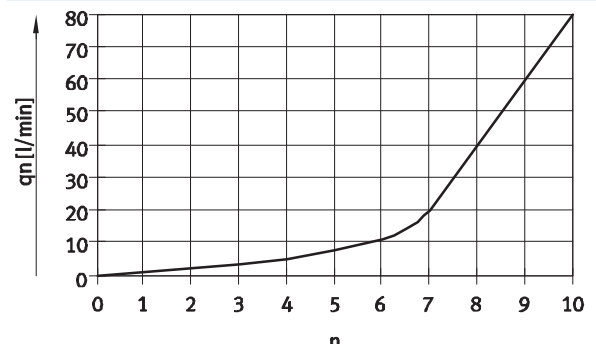
Standard flow rate q_n at 6 → 0 bar as a function of turns of the adjusting screw n
GRLO-M3



GRLO-M5



GRLO-M5



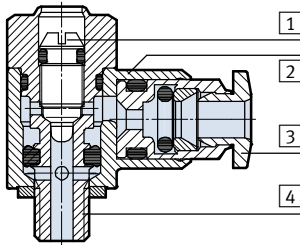
Flow control valves GRLO, mini

Technical data – Push-in connector QS, metal



Materials

Sectional view



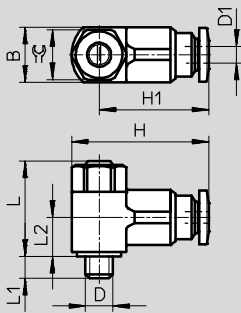
Flow control valve

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	Nominal size	Tubing O.D.	B	H	H1	L max.	L1	L2	≙
	D	[mm]	D1							
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

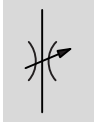
	Pneumatic connection		Standard nominal flow rate q _{nN} at 6 → 5 bar in direction of flow control	Standard flow rate q _n at 6 → 0 bar in direction of flow control	Weight	Part No.	Type	
	1	2	[l/min]	[l/min]	[g]			
	M3	QS-3	41	95	7	175042	GRLO-M3-QS-3	
		M5	QS-3	40	80	9	175054	GRLO-M5-QS-3-LF-C
			QS-4	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



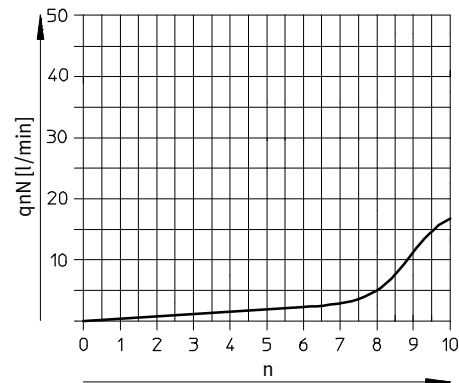
-  - Flow rate
0 ... 18 l/min
-  - Temperature range
-10 ... +60 °C
-  - Operating pressure
0 ... 10 bar



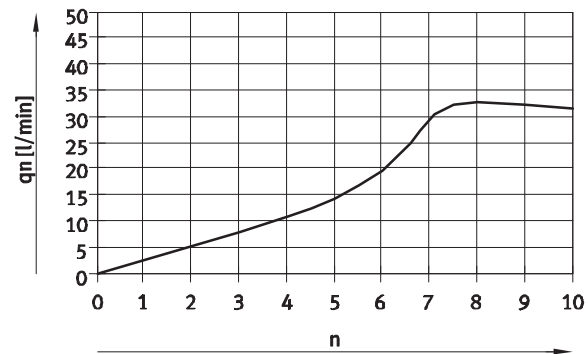
General technical data	
Valve function	Flow control function
Pneumatic connection 1	M3
Pneumatic connection 2	M3
Adjustment component	Slotted head screw
Type of mounting	Screw-in
Mounting position	Any
Max. tightening torque [Nm]	0.3

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 q_{nN} at 6 → 5 bar as a function of turns of the adjusting screw n

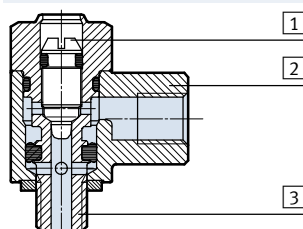


Standard flow rate q_n at 6 → 0 bar as a function of turns of the adjusting screw n



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

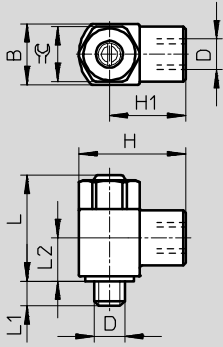
Flow control valves GRLO, mini

Technical data – Female thread, metal

Dimensions


Download CAD data → www.festo.com

Slotted head screw



Type	Connection	Nominal size	B	H	H1	L max.	L1	L2	⌀
	D	[mm]							
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		Standard nominal flow rate q _{nN} at 6 → 5 bar in direction of flow control	Standard flow rate q _n at 6 → 0 bar in direction of flow control	Weight	Part No.	Type
	1	2	[l/min]	[l/min]	[g]		
Slotted head screw							
	M3	M3	18	33	2	175039	GRLO-M3

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