

Throttle valves

FESTO



Key features

Function

The piston speed of pneumatic drives, both advancing and retracting, can be regulated using one-way flow control valves. 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 throttle 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 adjusting element.



Note

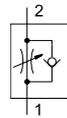
The documentation for the one-way flow control valves can be found at
 → www.festo.com/catalogue

General information

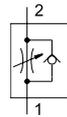
Standard nominal flow rate q_{nN}

The standard nominal flow rate q_{nN} is the volumetric 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 $t = 20^\circ\text{C}$.

Exhaust air one-way flow control function



Supply air one-way flow control function



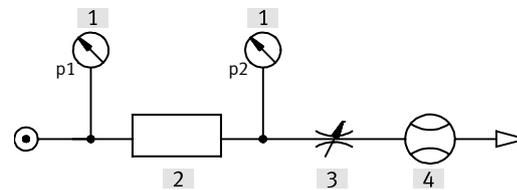
Standard flow rate q_n

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).

Flow control function acting in both directions

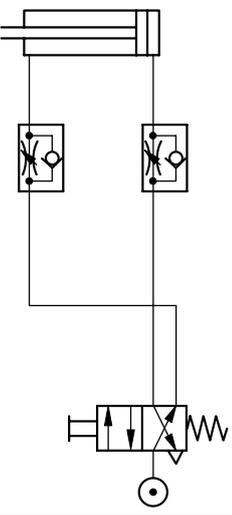
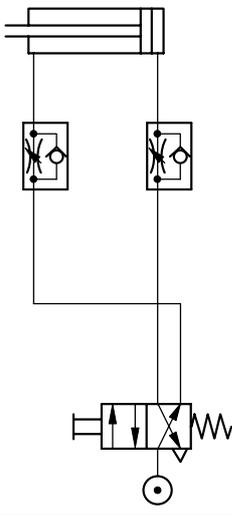
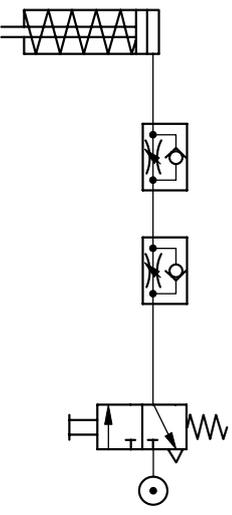
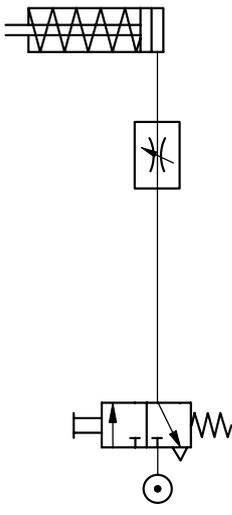


Circuit for flow measurement



- [1] Pressure gauge
 - [2] Test specimen
 - [3] Throttle valve
 - [4] Flow meter
- p_1 Operating pressure
 p_2 Output pressure

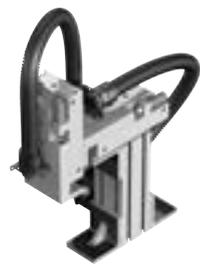
Key features

Flow control functions and range of applications		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 throttle 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 used with single-acting or small cylinders. The benefit of this application is its simplicity.</p>

Application examples

Mini slide SLT

Flat cylinder DZF



Throttle valves

Product range overview

Version	Valve function	Version	Type	Outlet direction of connection	Pneumatic connection 1	Pneumatic connection 2	qnN ¹⁾ [l/min]	Adjusting element	→ 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	Straight	QS-3, QS-4, QS-6	QS-3, QS-4, QS-6	25 ... 160	Knurled screw	gro

1) Standard nominal flow rate in flow control direction.

Type codes

001	Series	
GRLO	Flow control valve, L outlet	

002	Pneumatic connection	
M3	Male thread M3	
M5	Male thread M5	

003	Pneumatic connection 1	
	Connection size as for port 1 or 2	
QS-3	Push-in connector 3 mm	
QS-4	Push-in connector 4 mm	
PK-3	CK connection 3 mm	

004	Flow rate characteristic	
	None	
LF	Low flow	

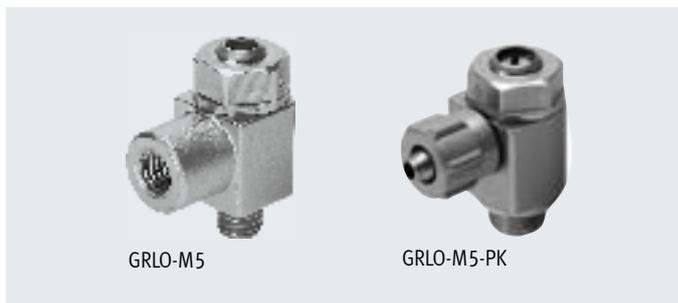
005	Generation	
	None	
B	Series B	
C	Series C	

Datasheet – Female thread/barbed connector, metal

Function



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

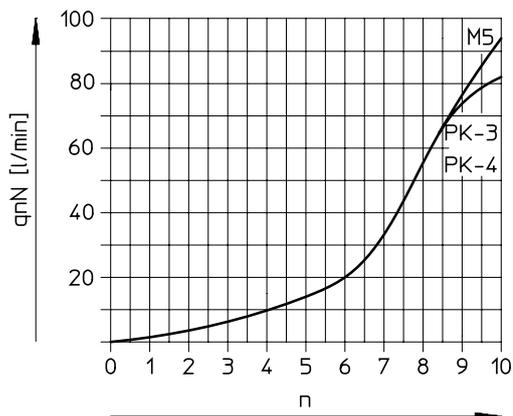


General technical data		
Pneumatic connection 1	M5	M5
Pneumatic connection 2	M5 ¹⁾	PK-3
Valve function	Flow control function	
Adjusting element	Slotted head screw	
Type of mounting	Screw-in	
Mounting position	Any	
Max. tightening torque [Nm]	1.5	1.5

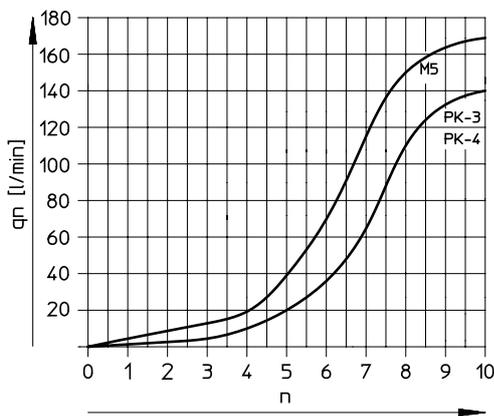
1) Note: This product conforms to ISO 1179-1 and ISO 228-1

Operating and environmental conditions		
Operating pressure [bar]	0 ... 10	
Operating medium	Compressed air to ISO 8573-1:2010 [7:4:4]	
Note on the operating/pilot medium	Lubricated operation 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 spindle rotations n



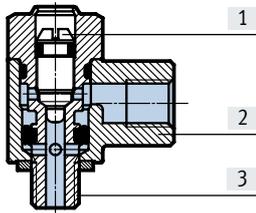
Standard flow rate q_n at 6 → 0 bar as a function of spindle rotations n



Datasheet – Female thread/barbed connector, metal

Materials

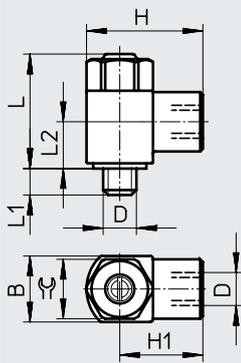
Sectional view



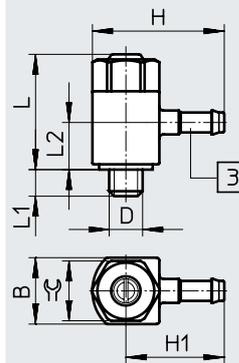
Throttle valve		
[1]	Adjusting screw	Brass
[2]	Swivel connection	Die-cast zinc
[3]	Screwed trunnion	Brass, nickel-plated
-	Seals	NBR
Note on materials		RoHS-compliant

Dimensions

Female thread



Push-in connector



Download CAD data → www.festo.com

[3] Barbed connector

Type	Connection D	Nominal width [mm]	B	~H	~H1	~L	L1	~L2	⊕
Female thread									
GRLO-M5	M5	2	10 -0.15	17.5	12.5	18 ±6.2%	4 ±0.3	7.1	9
Push-in connector									
GRLO-M5-PK-3	M5	2	10 -0.15	19.7	14.7	18 ±5.7%	4 ±0.3	8.5	9

Ordering data

	Pneumatic connection		Standard nominal flow rate q _{nN} at 6 → 5 bar in flow control direction [l/min]	Standard flow rate q _n at 6 → 0 bar in flow control direction [l/min]	Weight [g]	Part no.	Type
	1	2					
	M5	M5	95	169	11	151181	GRLO-M5-B
	M5	PK-3	83	140	10	151182	GRLO-M5-PK-3-B

Datasheet – Push-in connector QS, metal

Function



Low flow: precise adjustment
for low speed

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

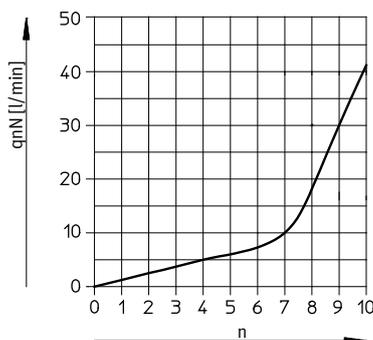


General technical data		
Pneumatic connection 1	M3	M5
Pneumatic connection 2	QS-3	QS-3, QS-4
Valve function	Flow control function	
Adjusting element	Slotted head screw	
Type of mounting	Screw-in	
Mounting position	Any	
Max. tightening torque [Nm]	0.3	1.5

Operating and environmental conditions		
Operating pressure [bar]	0 ... 10	
Operating medium	Compressed air to ISO 8573-1:2010 [7:4:4]	
Note on the operating/ pilot medium	Lubricated operation 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	

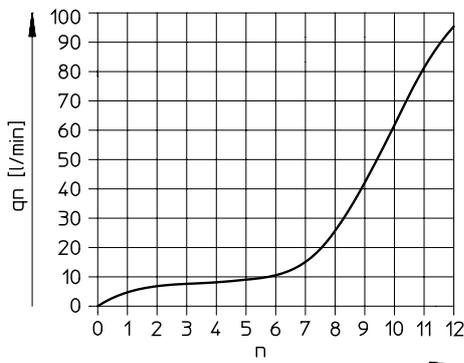
Standard nominal flow rate q_{nN} at 6 → 5 bar as a function of spindle rotations n

GRLO-M3

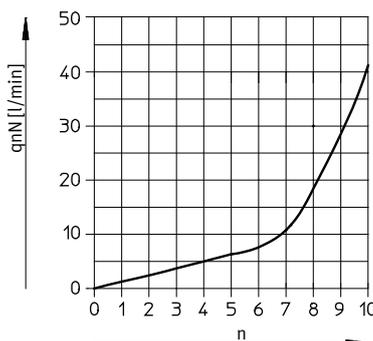


Standard flow rate q_n at 6 → 0 bar as a function of spindle rotations n

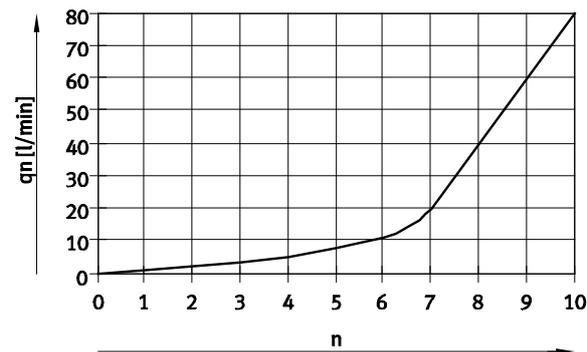
GRLO-M3



GRLO-M5



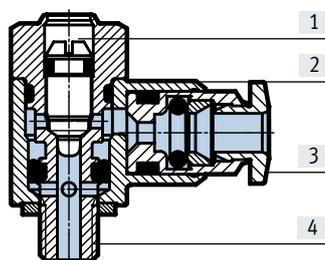
GRLO-M5



Datasheet – Push-in connector QS, metal

Materials

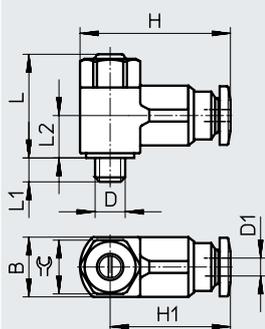
Sectional view



Throttle valve

[1]	Adjusting screw	Brass
[2]	Swivel connection	Die-cast zinc
[3]	Releasing ring	POM
[4]	Screwed trunnion	Brass
-	Seals	NBR
Note on materials		RoHS-compliant

Dimensions

Download CAD data → www.festo.com

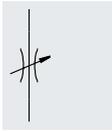
Type	Connection D	Nominal width [mm]	Tubing O.D. D1	B	~H	~H1	~L	L1	~L2	≅
GRLO	M3	1.4	3	8 -0.15	20	15.8	16.6 ±3.3%	2.3 +0.15/-0.3	7	7
	M5	1.4	3	9.8 -0.15	22.4	18.4	17.2 ±3.1%	3.1 +0.15/-0.35	7.3	
		1.4	4	9.8 -0.15	22.2	18.2	17.2 ±3.1%	3.1 +0.15/-0.35	7.3	

Ordering data

	Pneumatic connection		Standard nominal flow rate q _{nN} at 6 → 5 bar in flow control direction [l/min]	Standard flow rate q _n at 6 → 0 bar in flow control direction [l/min]	Weight [g]	Part no.	Type
	1	2					
	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

Datasheet – Female thread, metal

Function



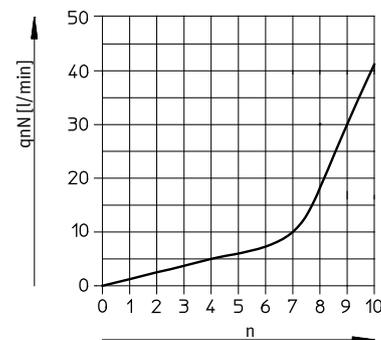
-  - Flow rate
0 ... 18 l/min
-  - Temperature range
-10 ... +60°C
-  - Operating pressure
0 ... 10 bar



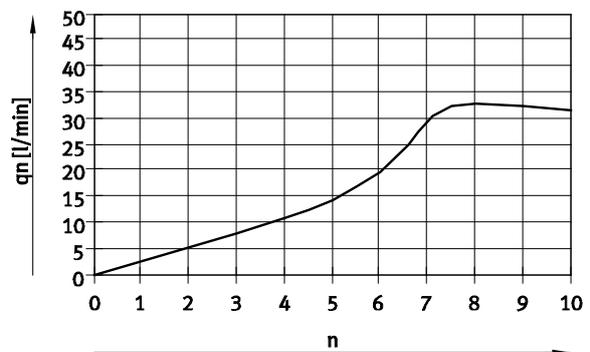
General technical data		
Pneumatic connection 1		M3
Pneumatic connection 2		M3
Valve function		Flow control function
Adjusting element		Slotted head screw
Type of mounting		Screw-in
Mounting position		Any
Max. tightening torque	[Nm]	0.3

Operating and environmental conditions		
Operating pressure	[bar]	0 ... 10
Operating medium		Compressed air to ISO 8573-1:2010 [7:4:4]
Note on the operating/ pilot medium		Lubricated operation 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 spindle rotations n

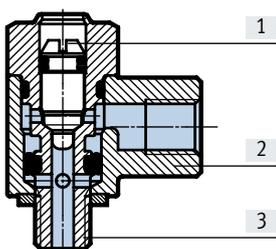


Standard flow rate q_n at 6 → 0 bar as a function of spindle rotations n



Materials

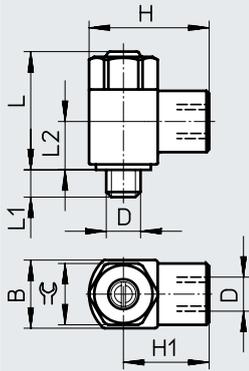
Sectional view



Throttle valve		
[1]	Adjusting screw	Brass
[2]	Swivel connection	Die-cast zinc
[3]	Screwed trunnion	Brass, nickel-plated
-	Seals	NBR
Note on materials		RoHS-compliant

Datasheet – Female thread, metal

Dimensions

Download CAD data → www.festo.com

Type	Connection D	Nominal width [mm]	B	~H	~H1	~L	L1	~L2	≙
GRLO	M3	0.8	5 -0.1	9	6.5	13.4 ±3.9%	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 flow control direction [l/min]	Standard flow rate q _n at 6 → 0 bar in flow control direction [l/min]	Weight [g]	Part no.	Type
	1	2					
Slotted head screw							
	M3	M3	18	33	2	175039	GRLO-M3