ROSS

Bulletin E485A

Proportional Valves
ND 2.5 - 50

- Standard Interface
- Poppet Valve Construction
- Customized Solutions
- Plug-and-Play Design

Glossary

Response Time

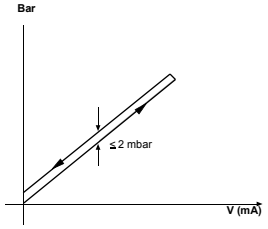
The smallest nominal value difference that causes a change of the outlet pressure, is called response sensitivity (response time). Given as a percentage of the maximum outlet pressure, this value may be, for instance, 0.02 bar. It allows a very precise adjustment of the outlet pressure.

Closed Control Loop

The closed control loop features an actual comparison with the given value on a permanent basis. In summary, **DIN 19226** defines the term "regulation" as a process, recording continuously the quantity to be controlled, comparing it with the reference quantity with the aim to adjust it to the reference quantity. A characteristical regulating feature is the closed operation sequence where the quantity to be controlled is continuously influencing itself within the regulation loop.

Hysteresis

As ROSS proportional valves feature optimal concurrence of all component parts (largely due to friction-optimized moving parts), a small hysteresis is achieved, in accordance with the proportional pressure behavior.



Actual Value

Real (actual) value of a physical quantity; e.g. pressure, force, temperature, flow, etc.

Linearity

If the outlet pressure is shown as a function of the nominal value, a next-to linear characteristic line should appear so that the best-possible pressure prediction can be made at any given parameter. The deviation results from the maximum difference compared with the ideal characteristic line, relative to the maximum outlet pressure.

Constant Regulation

Constant regulators are designed to interfere constantly with the process thereby performing their adjustment function. The adjustment process is continuous. Within the defined adjustment range the adjustment quantity can assume any value. Permanent adjustment signals within a range of 0 to 100% are provided.

Nominal Value

Given value of the quantity to be controlled; this value is required to be actually maintained during the control process.

Repeatability

Regulating components feature more precise repeatability of a set value as compared with piloting absolute values. Linearity deviation is ignored in this connection. Furthermore, repeatability is positively influenced by a best-possible hysteresis.

Symbols

Pressure - Voltage Converter

Voltage - Pressure Converter

Pressure - Current Converter

Motion Pickup

Voltage - Current Converter

Digital - Analog Converter

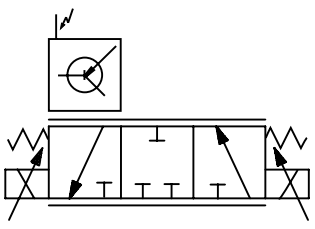

Analog Indication


Digital Indication


Potentiometer


Signal Amplifier

Proportional valve with integrated piloting / pressure measuring



General Information

CONTENTS

Just „plug-and-play"...

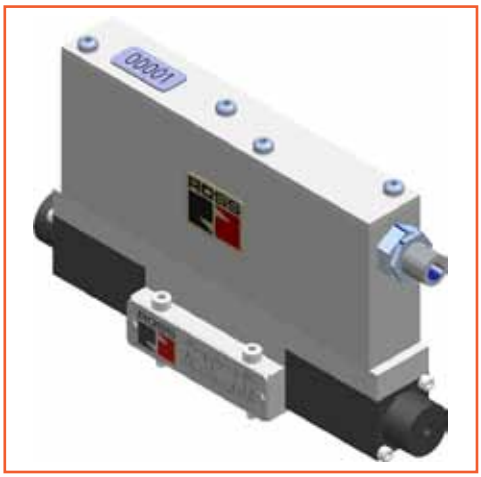
ROSS Proportional Valves provide fine-tuned Regulating Functions —

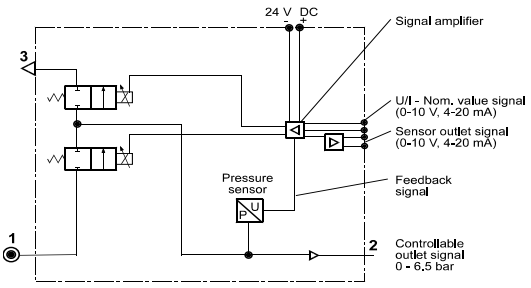
and they like it hot...

Your Benefits at a Glance:

- Temperature range up to 70°C (85°C optional)
- Proportional pressurizing and exhausting
- Poppet valve design
- Pressure- or volume control
- High precision
- Long service life
- Various interface options
- Automatic zero point adjustment
- Customized control and electrical supply
- Nominal Diameters (ND) 2.5 to 50
- Minimum maintenance needed
- High enclosure rating, IP 65
- Base-mounting concept

3-Way Proportional Valve





The electronic part of the proportional valve is designed to control both solenoids in relation to an indicated nominal value. A controlled buildup and drop of the control pressure is ensured. All analog values (nominal value, measured value) are digitalized and used in the regulator algorithm for calculating the set values.

SPECIFICATIONS

Flow medium: compressed air or neutral gases, recommended filter rating < 50 µm, lubricated or unlubricated.

Porting: G 3/8 (sub-base).

Operating pressure: 0 to 7 bar max.

Max. inlet pressure: 7 bar.
Min. inlet pressure must be at least max. regulation pressure.

Regulating range: see chart below.

Ambient temperature: 0°C to +70°C.

Medium temperature: -25°C to +70°C.

Analog nominal value: 4 to 20 mA
(for 0 to 10 V and 1 to 20 mA ranges, consult ROSS).

Hysteresis: 0.02 bar.

Repeatability: 0.02 bar.

Mounting position: any orientation.

DESCRIPTION

Design: Poppet valves with force-balanced valve elements, one valve element being used for pressurizing the downstream system. As a special feature of this design the system is **proportionally exhausted** by the second proportional valve.

Materials

Housing: aluminum alloy, surface finish
(techn. eloxal coating15 µm).

Valve internals: brass.

Seals: FKM (Viton).

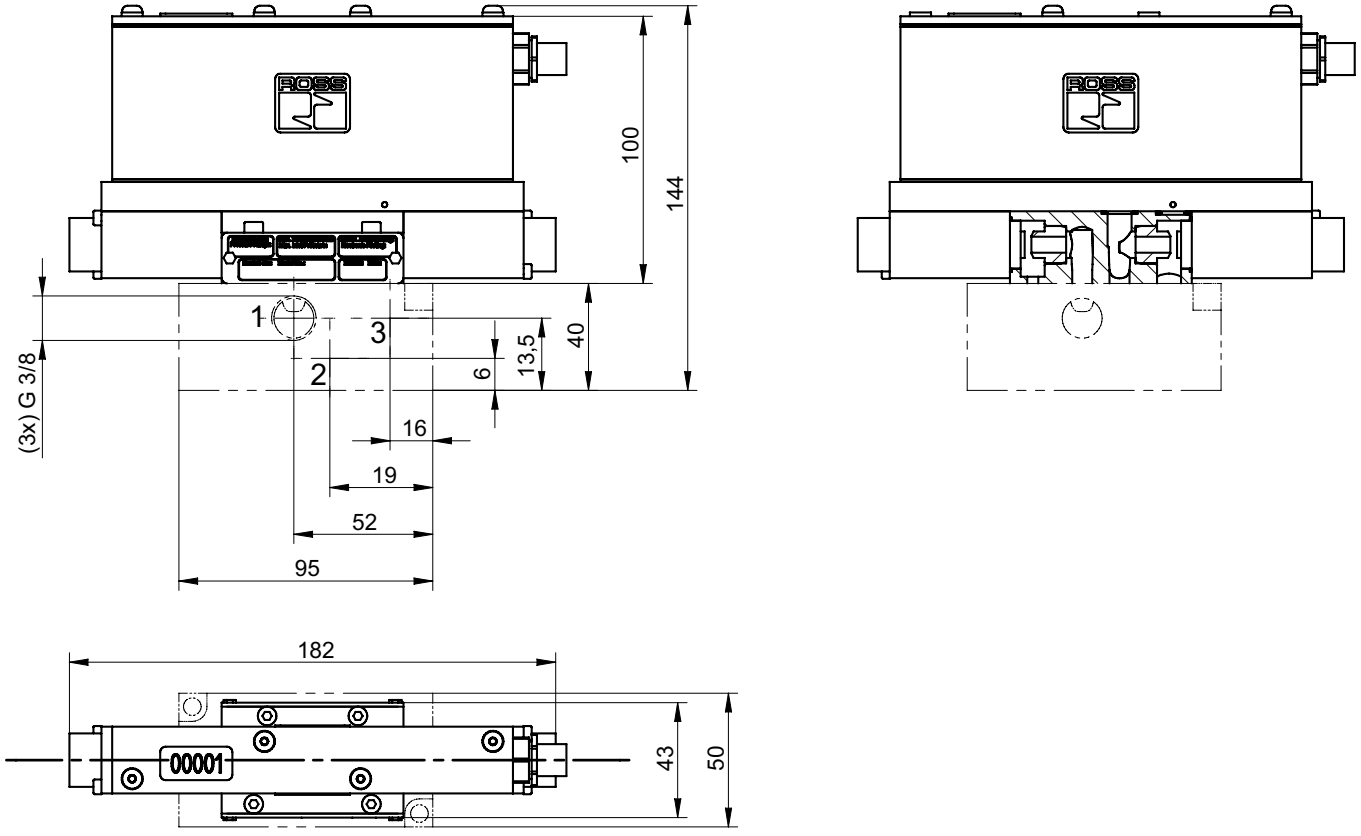
Note: At temperatures below 4°C the media used (e.g. air) must be free of moisture in order to prevent movable parts from freezing.

Valve Model Number	Voltage	Power Consumption max. mA	Enclosure Rating	Cable-, Socket Connection
025P180000	24V DC ± 10%	500 mA for quick exhaust, 150 mA max. when regulating	IP 65	7-pin M12 connector

Sub-base Number	Regulating Range (bar)	Port Size	Nominal Diameter mm	Flow at 6 bar (Nl/min)	Weight kg
050P180700	0 – 7	G 3/8	2.5	400	1.1

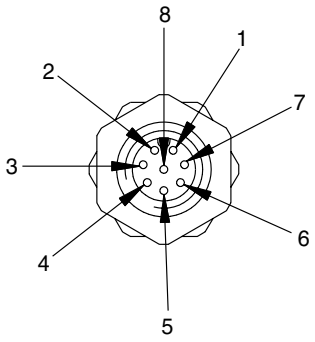
3-Way Proportional Valve

Dimensions - mm

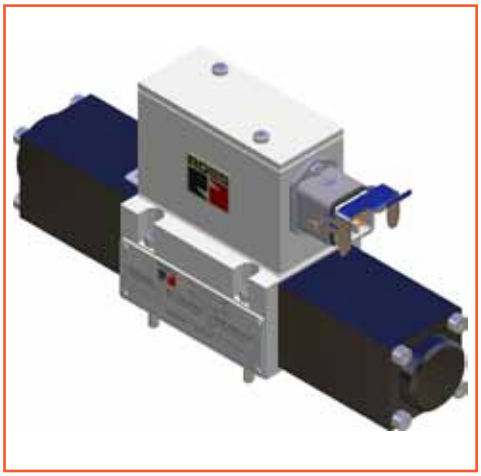


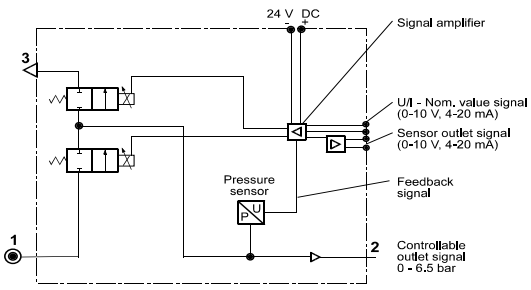
Pin - Schematic

Valve Model Number	025P180000
Pin 1	0 VDC Supply voltage
Pin 2	+ 24 VDC Supply voltage
Pin 3	4-20 mA (+) Actual value output
Pin 4	4-20 mA (-) Input signal
Pin 5	4-20 mA (+) Input signal
Pin 6	Vacant
Pin 7	Vacant
Pin 8	Protective conductor



3-Way Proportional Valve





The electronic part of the proportional valve is designed to control both solenoids in relation to an indicated nominal value. A controlled buildup and drop of the control pressure is ensured. All analog values (nominal value, measured value) are digitalized and used in the regulator algorithm for calculating the set values.

SPECIFICATIONS

Flow medium: compressed air or neutral gases, recommended filter rating < 50 µm, lubricated or unlubricated.

Porting: G 1/2, G 3/4 and G 1 (sub-base).

Operating pressure: see chart below.

Regulating range: see chart below.

Ambient temperature: 0°C to +70°C.

Medium temperature: 0°C to +70°C.

Analog nominal value: 0 to 10 V (for 4 to 20 mA and 0 to 20 mA ranges, consult ROSS).

Hysteresis: 0.02 bar.

Repeatability: 0.02 bar.

Mounting position: any orientation.

Max. inlet pressure: 7 bar.
Min. inlet pressure must be at least max. regulation pressure.

DESCRIPTION

Design: Poppet valves with force-balanced valve elements, one valve element being used for pressurizing the downstream system. As a special feature of this design the system is **proportionally exhausted** by the second proportional valve.

Materials

Housing: aluminum alloy, surface finish (techn. eloxal coating15 µm).

Valve internals: stainless steel.

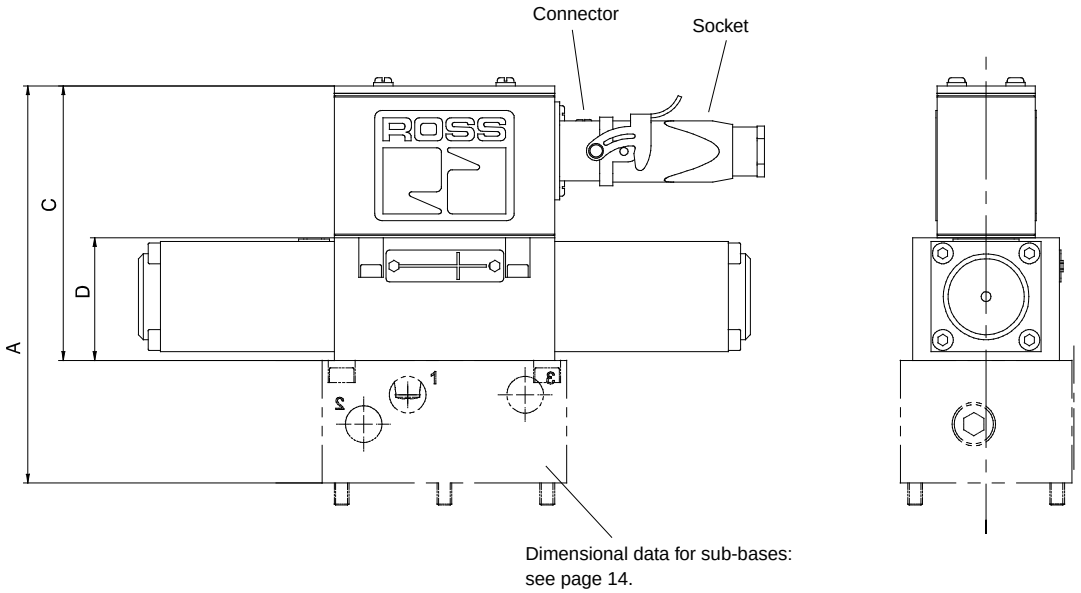
Seals: FKM (Viton).

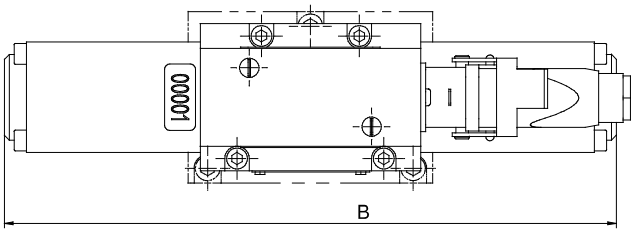
Note: At temperatures below 4°C the media used (e.g. air) must be free of moisture in order to prevent movable parts from freezing.

Valve Model Numbers	Voltage	Power Consumption max. mA	Enclosure Rating	Cable-, Socket Connection
060P140000	24 VDC ± 10 %	1.4 A for quick exhaust, 0.53 A max. when regulating	IP 65	7-pin plug
095P140000		1.55 A for quick exhaust, 0.6 A max. when regulating		
120P140000				
140P170000		1.8 A for quick exhaust, 1.2 A max. when regulating		
200P160000		2.7 A for quick exhaust, 1.4 A max. when regulating		

Valve Model Numbers	Sub-base Number	Pressure Range bar	Regulating Range bar	Port Size	Nominal Diameter mm	Flow at 6 bar (Nl/min)	Weight kg
060P140000	095P140300	7	0 – 7	G 1/2	6	1200	2.8
095P140000	095P140300	7	0 – 7	G 1/2	9.5	2450	2.9
120P140000	120P140300	5.5	0 – 5.5	G 3/4	12	3300	3.0
140P170000	01-SOP-01-09-0-0	7	0 – 7	G 3/4	14	4800	5.45
200P160000	200P160400	7	0 – 7	G 1	20	8600	10.15

3-Way Proportional Valve

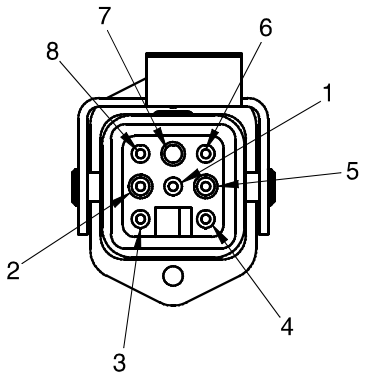




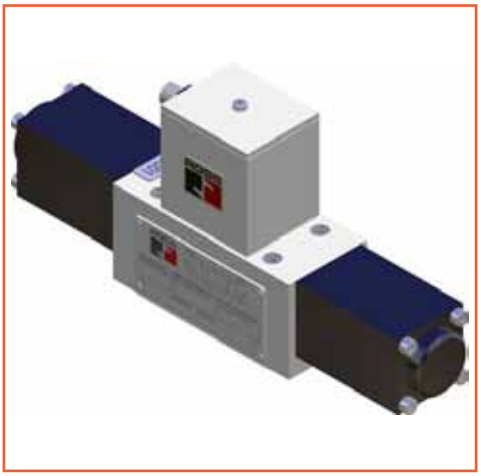
Valve Model Numbers	Dimensions - mm			
	A	B	C	D
060P140000	162	237	112	50
095P140000	162	250	112	50
120P140000	165	264	112	50
140P170000	182	276	124	62
200P160000	191	364	132	70

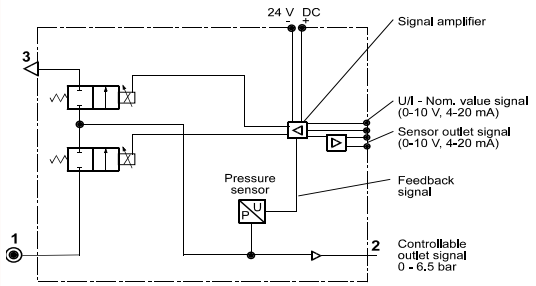
Pin - Schematic
(for all valves on this page)

Pin 1	Supply GND
Pin 2	Nominal value GND
Pin 3	Nominal value (0-10 V)
Pin 4	Supply 24 VDC
Pin 5	Actual value - 0 V
Pin 6	Actual value + 0-10 V
Pin 7	Vacant
Pin 8	Protective conductor



3-Way Proportional Valve





The electronic part of the proportional valve is designed to control both solenoids in relation to an indicated nominal value. A controlled buildup and drop of the control pressure is ensured. All analog values (nominal value, measured value) are digitalized and used in the regulator algorithm for calculating the set values.

SPECIFICATIONS

Flow medium: compressed air or neutral gases, recommended filter rating < 50 µm, lubricated or unlubricated.

Porting: G 1/2 (sub-base).

Operating pressure: see chart below.

Regulating range: see chart below.

Ambient temperature: 0°C to +70°C.

Medium temperature: 0°C to +70°C.

Analog nominal value: 4 to 20mA, 0 to 10 V on request.

Hysteresis: 0.02 bar.

Repeatability: 0.02 bar.

Mounting position: any orientation.

Max. inlet pressure: 7 bar.
Min. inlet pressure must be at least max. regulation pressure.

DESCRIPTION

Design: Poppet valves with force-balanced valve elements, one valve element being used for pressurizing the downstream system. As a special feature of this design the system is **proportionally exhausted** by the second proportional valve.

Materials

Housing: aluminum alloy, surface finish (techn. eloxal coating 15 µm).

Valve internals: stainless steel.

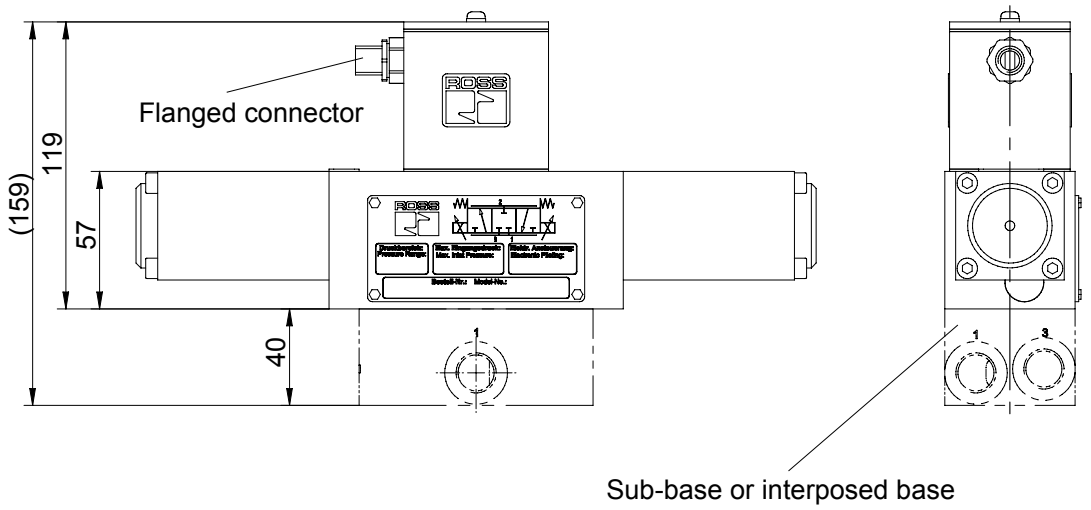
Seals: FKM (Viton).

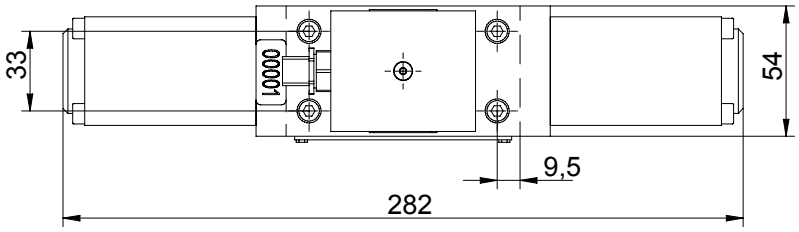
Note: At temperatures below 4°C the media used (e.g. air) must be free of moisture in order to prevent movable parts from freezing.

Valve Model Number	Voltage	Power Consumption max. mA	Enclosure Rating	Cable-, Socket Connection
095P090000	24 V DC ± 10%	1.55 A for quick exhaust, 0.6 A max. when regulating	IP 65	7-pin - Flange-type connector M12 design

Valve Model Number	Sub-base Number	Regulating Range (bar)	Port Size	Nominal Diameter mm	Flow at 6 bar (Nl/min)	Weight kg
095P090000	095P090900	0 – 4	G 1/2	9.5	2450	3.1

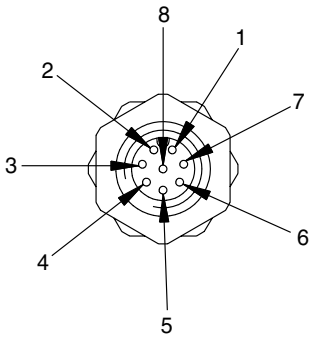
Dimensions - mm



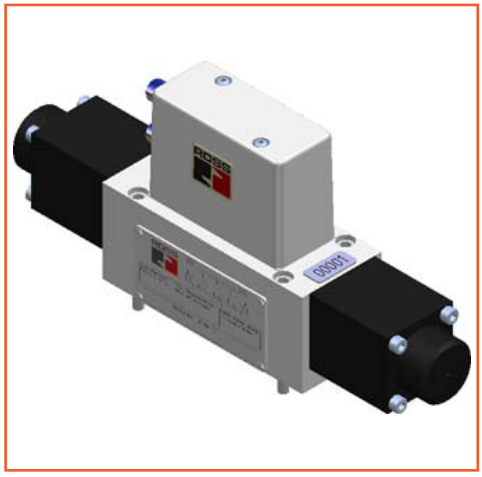


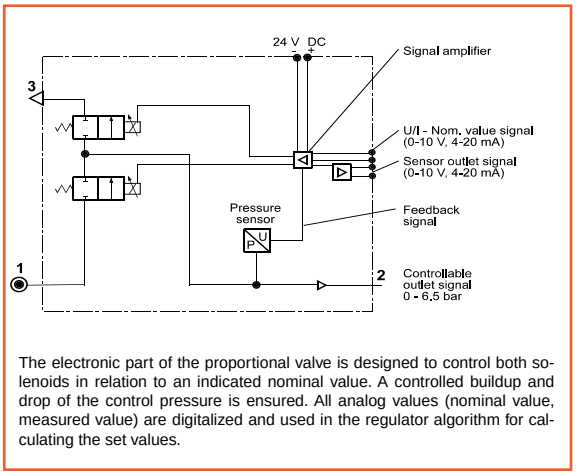
Pin - Schematic

Valve Model Number	095P090000
Pin 1	0 V DC Supply voltage
Pin 2	+ 24 V DC Supply voltage
Pin 3	4 - 20 mA (+) Actual value output
Pin 4	4 - 20 mA (-) Input signal
Pin 5	4 - 20 mA (+) Input signal
Pin 6	Additional function "Cylinder fast - slow"
Pin 7	Vacant
Pin 8	Grounded guard wire



3-Way Proportional Valve





The electronic part of the proportional valve is designed to control both solenoids in relation to an indicated nominal value. A controlled buildup and drop of the control pressure is ensured. All analog values (nominal value, measured value) are digitalized and used in the regulator algorithm for calculating the set values.

SPECIFICATIONS

Flow medium: compressed air or neutral gases, recommended filter rating < 50 µm, lubricated or unlubricated.

Porting: G 1/2 (sub-base).

Operating pressure: see chart below.

Regulating range: see chart below.

Ambient temperature: 0°C to +70°C.

Medium temperature: 0°C to +70°C.

Analog nominal value: 0 to 10 V.

Hysteresis: 0.02 bar.

Repeatability: 0.02 bar.

Mounting position: any orientation.

Max. inlet pressure: 5,5 bar.
Min. inlet pressure must be at least regulation pressure.

DESCRIPTION

Design: Poppet valves with force-balanced valve elements, one valve element being used for pressurizing the downstream system. As a special feature of this design the system is **proportionally exhausted** by the second proportional valve.

Materials

Housing: aluminum alloy, surface finish (techn. eloxal coating 15 µm).

Valve internals: stainless steel.

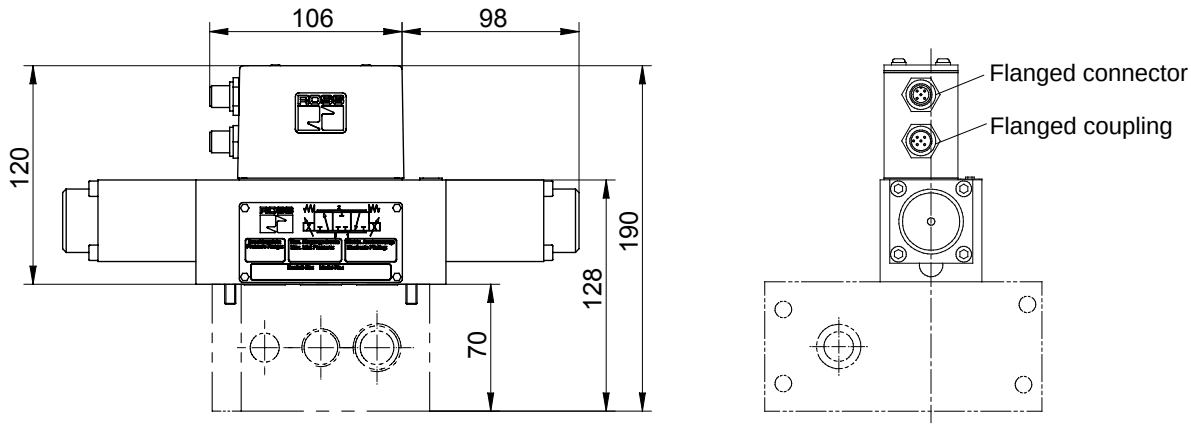
Seals: FKM (Viton).

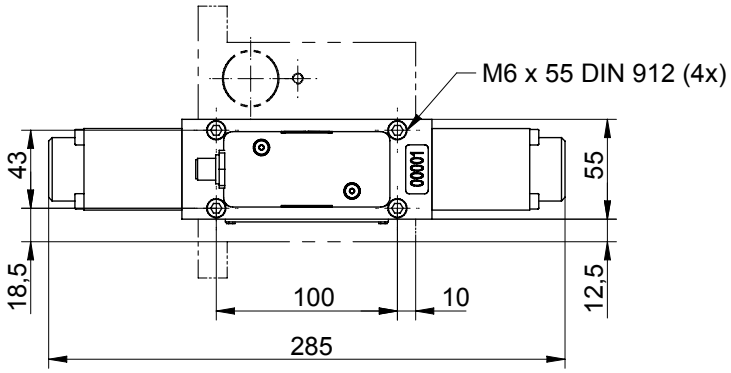
Note: At temperatures below 4°C the media used (e.g. air) must be free of moisture in order to prevent movable parts from freezing.

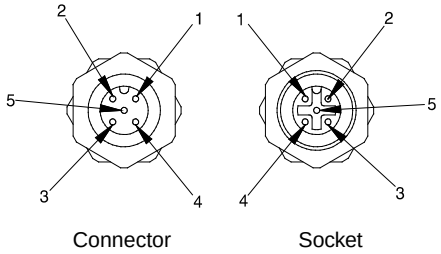
Valve Model Number	Voltage	Current Consumption max. mA	Enclosure Rating	Cable-, Socket Connection M12 Design
01-SOP-03-00-0-0	24 V DC ± 10%	1.2 A for quick exhaust, 0.41 A max. when regulating	IP 65	5-pin flange-type connector and 5-pin flange-type coupling

Valve Model Number	Sub-base Number	Pressure Range bar	Regulating Range bar	Port Size	Nominal Diameter mm		Flow at 6 bar (Nl/min)	Weight kg
					Pressurizing	Exhausting		
01-SOP-03-00-0-0	01-SOP-03-11-0-0	5.5	0 – 3.5	G 1/2	9.5	10.5	2625	3.0

Dimensions - mm



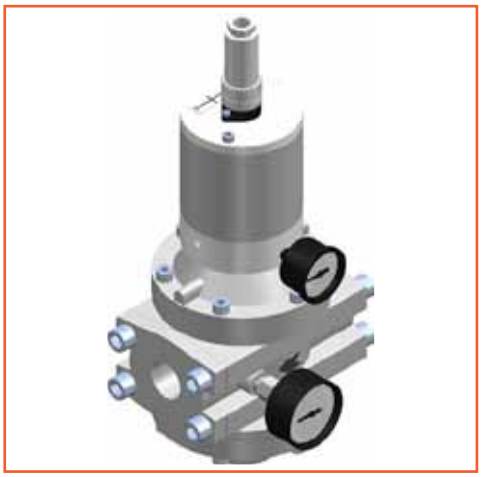


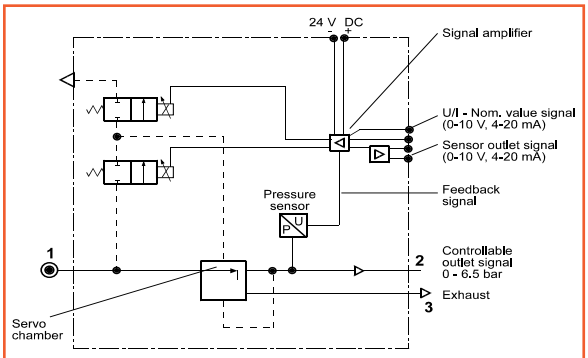


Pin - Schematic

Valve Model Numbers	5-pin flange-type connector, M12 x1	5-pin flange-type coupling, M12 x 1
Pin 1	+24 V Supply voltage	Nominal value GND
Pin 2	NC	0 to +10 V Nominal value
Pin 3	0 V Supply voltage	0 to +10 V Actual value
Pin 4	NC	NC
Pin 5	PE	PE

Proportional Pressure Regulator





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SPECIFICATIONS

Flow medium: compressed air or neutral gases, recommended filter rating < 50 µm, lubricated or unlubricated.

Porting: G 1-1/2 and G 2

Operating pressure: see chart below.

Regulating range: see chart below.

Ambient temperature: 0°C to +70°C.

Medium temperature: 0°C to +70°C.

Analog nominal value: 0 to 10 V; 0/4 to 20mA.

Hysteresis: 0.02 bar.

Repeatability: 0.02 bar.

Mounting position: any orientation.

DESCRIPTION

Design: Poppet valves with force-balanced valve elements, one valve element being used for pressurizing the downstream system. As a special feature of this design the system is **proportionally exhausted** by the second proportional valve.

Materials

Housing: aluminum alloy, surface finish (techn. eloxal coating15 µm).

Valve internals: brass.

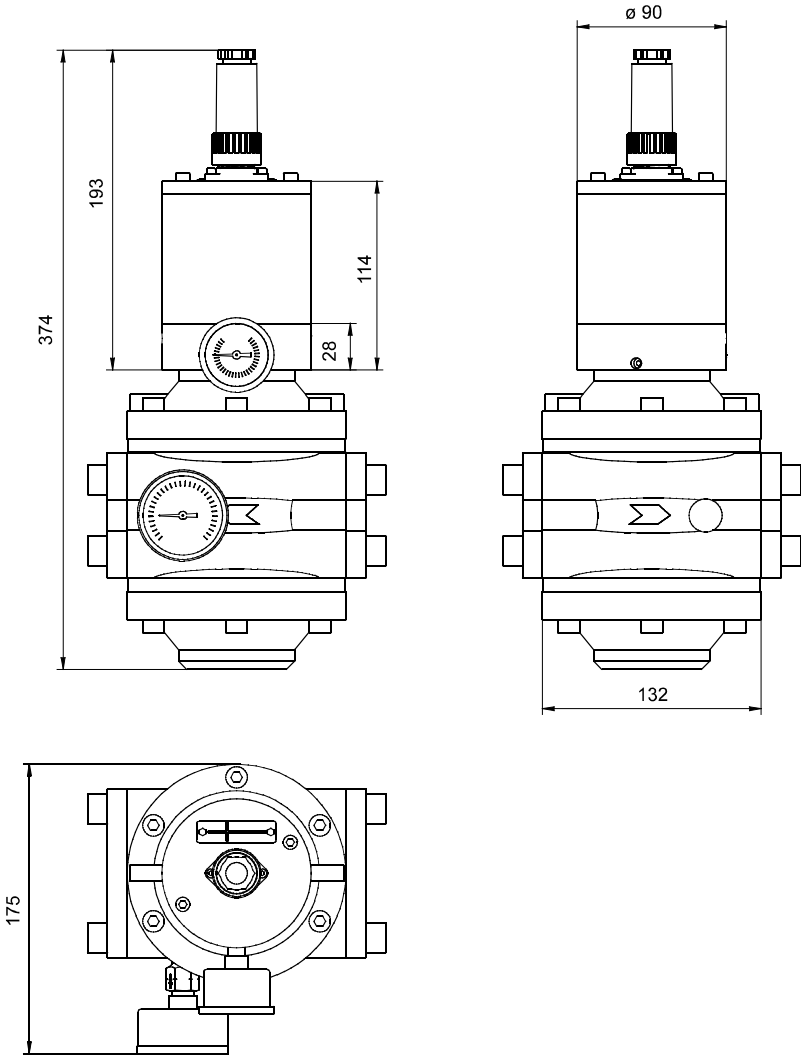
Seals: FKM (Viton).

Note: At temperatures below 4°C the media used (e.g. air) must be free of moisture in order to prevent movable parts from freezing.

Valve Model Numbers	Voltage	Power Consumption	Encl. Rating max. mA	Cable-, Socket Connection
RESK 3889.4	24V DC ± 10 %	500 mA for quick exhaust, 150 mA max. when regulating	IP 65	7-pin Flat-type connector
RESK 3889.3				

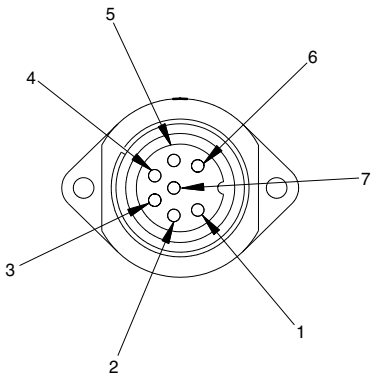
Valve Model Numbers	Pressure Range (bar)	Regulating Range (bar)	Port Size	Nominal Diameter mm	Flow at 6 bar (Nl/min)	Weight kg
RESK 3889.4	10	0 – 7	G 1-1/2	36	15000	5.2
RESK 3889.3	10	0 – 7	G 2	50	17000	

Dimensions - mm



NOTE: Mounting bracket is not supplied with the regulator (see Accessories, Page 17).

Pin - Schematic

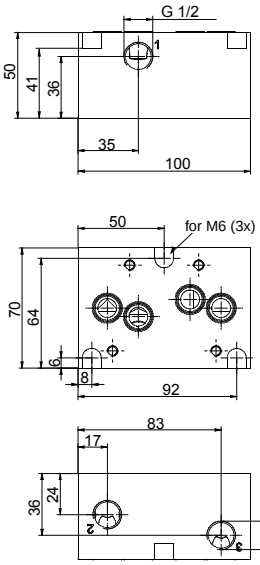


Valve Model No.	RESK 3889.4 / RESK 3889.3 (G 1-1/2) (G 2)
Pin 1	-0 V Supply GND
Pin 2	-0 V Nominal value GND
Pin 3	Supply +24 V DC
Pin 4	0-10 V DC
Pin 5	Actual value - 0 V
Pin 6	Actual value + 0 -10 V
Pin 7	PE

Sub-bases

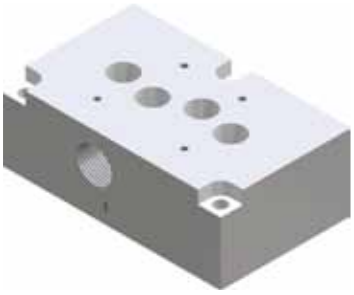
Sub-base – 095P140300

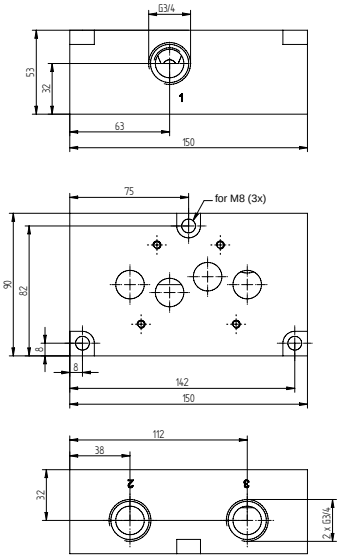
Valves on pages 6 and 7 (ND 6 / ND 9.5)
Dimensions - mm



Sub-base – 120P140300

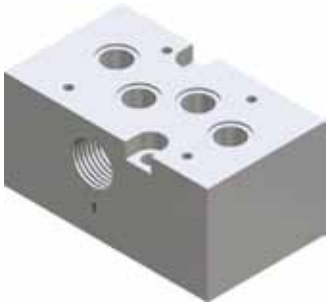
Valves on pages 6 and 7 (ND 12)
Dimensions - mm

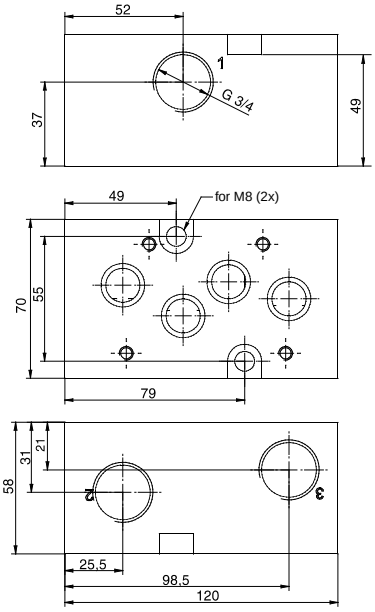




Sub-base – 01-SOP-01-09-0-0

Valves on pages 6 and 7 (ND 14)
Dimensions - mm

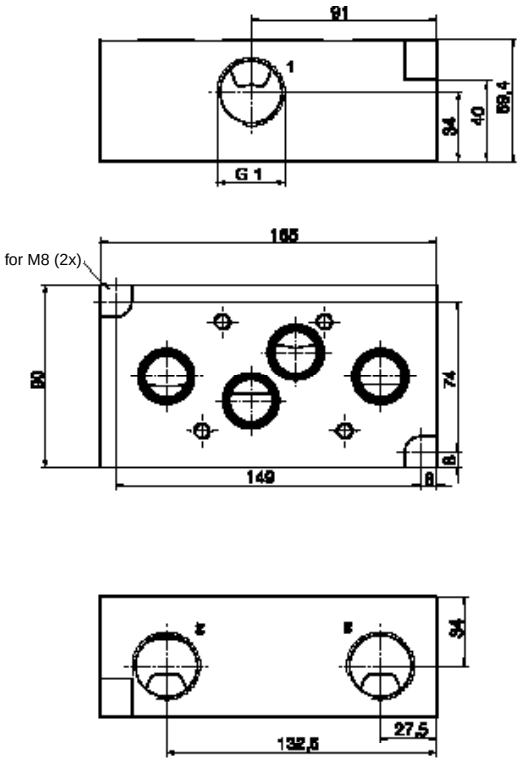




Sub-bases

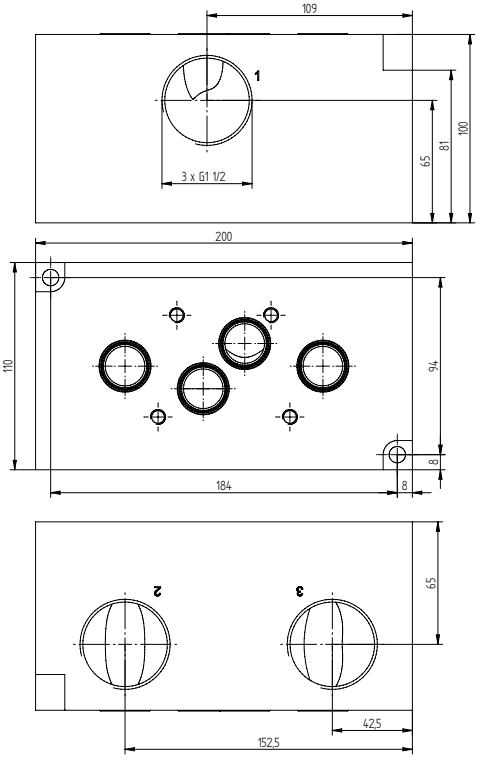
Sub-base – 200P160400

Valves on pages 6 and 7 (ND 20)
Dimensions - mm



Sub-base – 200P160410

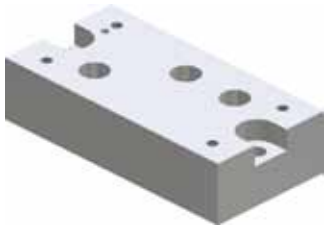
Valves on pages 6 and 7 (ND 20)
Dimensions - mm

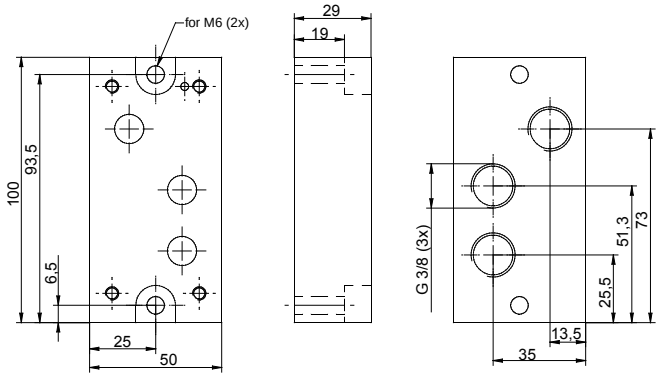


Sub-bases / Interposed Bases

Sub-base - 095P090900

Dimensions - mm

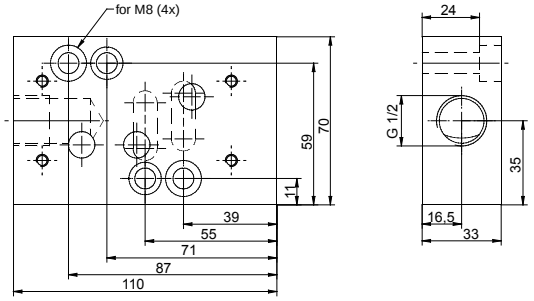




Interposed Bases

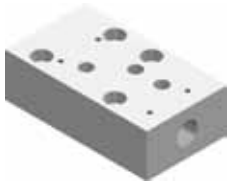
ND 9.5; for ISO 3

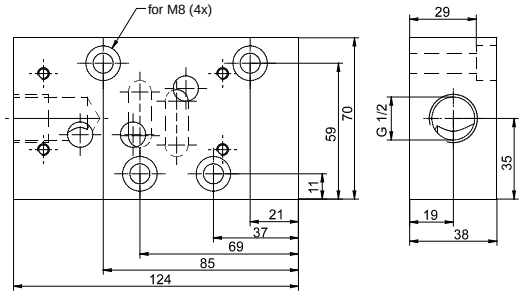
095P091000
Dimensions - mm



Pressure connection: Port 1 of ISO-base

095P091500
Dimensions - mm

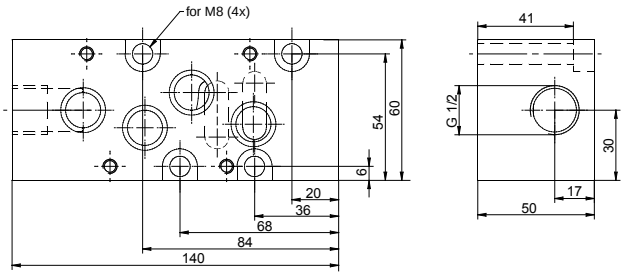




Pressure connection: Port 4 of ISO-base

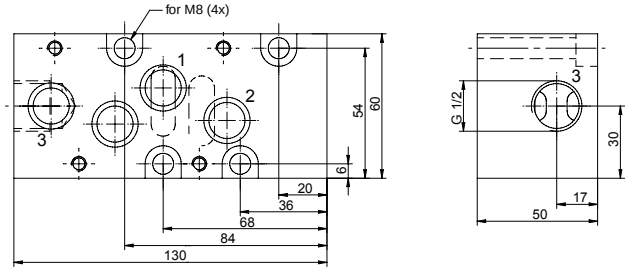
ROSS-Interface, ND 14 for ISO 3 Base

01-SOP-01-12-0-0
Dimensions - mm



Pressure connection: Port 1 of ISO-base

01-SOP-01-20-0-0
Dimensions - mm



Pressure connection: Port 4 of ISO-base

NOTE: Other interposed bases are available on request.

Accessories

Pressure Gauges: Male pipe threads - Centre back mounting

Port Size	Model Numbers	Range (bar)	Housing (mm)	Weight (kg)	Class
G 1/8	W5400A1002	0 - 11	ø 42	0.09	2.5
G 1/4	W5400A2010	0 - 4	ø 55	0.15	2.5
	W5400A2011	0 - 14	ø 55	0.15	2.5
	W5400A2012	0 - 21	ø 55	0.15	2.5

Pressure Gauges: Male pipe threads - Centre back mounting

Port Size	Model Numbers	Graduation of Scale	Range (bar)	Housing (mm)	Weight (kg)	Class
G 1/4	RESK 4250.1	0.2	0 - 4	ø 63	–	1.6
	RESK 4250.2	0.2	0 - 6	ø 63	–	1.6
	RESK 4250.3	0.5	0 - 10	ø 63	–	1.6
	RESK 4250.4	0.5	0 - 16	ø 63	–	1.6
G 1/2	RESK 4251.1	0.1	0 - 4	ø 100	–	1.0
	RESK 4251.2	0.1	0 - 6	ø 100	–	1.0
	RESK 4251.3	0.2	0 - 10	ø 100	–	1.0
	RESK 4251.4	0.5	0 - 16	ø 100	–	1.0

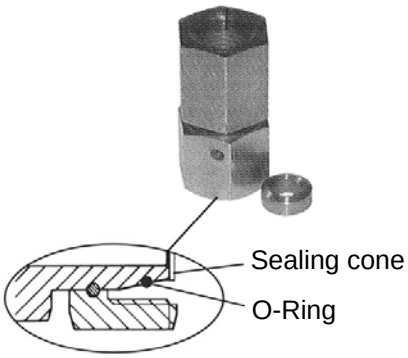
Digital Gauges: 360° swiveling, battery-powered.

Ambient temperature: 0° C to +60° C.
Media temperature: -30° C to +85° C.

Port Size	Model Numbers	Indication Range (bar)	Auxiliary Energy	Size of Digits (mm)	Enclosure Rating	Weight (kg)	Class
G 1/4	RESK 4252.1	0 - 4	9 V	12.7	IP 65	–	0.5
	RESK 4252.2	0 - 6	9 V	12.7	IP 65	–	0.5
	RESK 4252.3	0 - 10	9 V	12.7	IP 65	–	0.5
	RESK 4252.4	0 - 16	9 V	12.7	IP 65	–	0.5

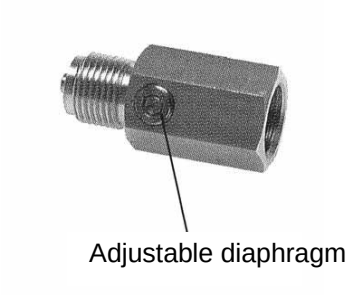
Accessories

Threaded Gauge: with threaded sealing cone.



Type Steel, galvanized	Part Numbers	Thread of Clamping Nut	Outside ø of Pipe	Thread
light	RESK 4253.1	M 12 x 1.5	6	G 1/4
	RESK 4253.2	M 14 x 1.5	8	G 1/4
	RESK 4253.3	M 16 x 1.5	10	G 1/4
	RESK 4253.4	M 18 x 1.5	12	G 1/4
heavy	RESK 4254.1	M 14 x 1.5	6	G 1/2
	RESK 4254.2	M 16 x 1.5	8	G 1/2
	RESK 4254.3	M 18 x 1.5	10	G 1/2
	RESK 4254.4	M 20 x 1.5	12	G 1/2

Shock-absorbing Gauge: for fluids and gases

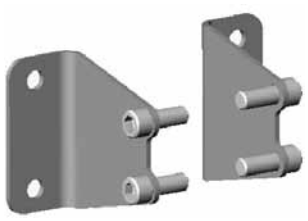


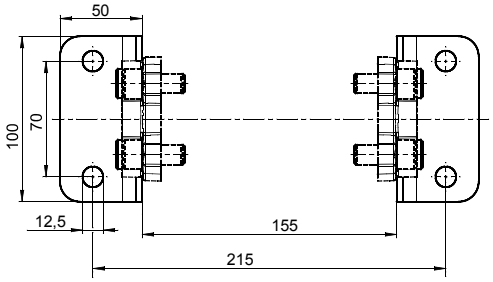
Type Numbers	Part	Thread
Brass	RESK 4255.1	G 1/4
	RESK 4255.2	G 1/2
Steel	RESK 4256.1	G 1/2

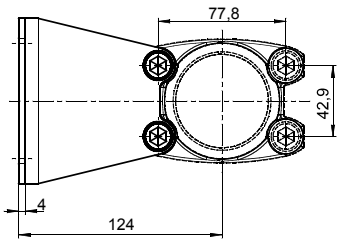
Mounting Bracket: Part Number: 18672R

for Proportional Regulator, G 1-1/2 to G 2, see Page 12.

Dimensions - mm



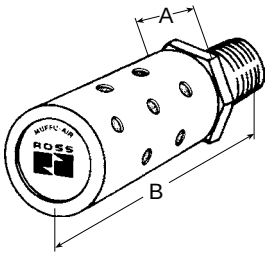




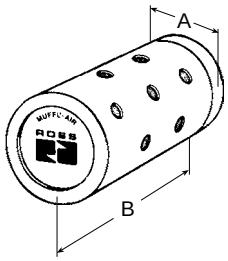
MUFFL-AIR®-Silencers

R 1/8 to R 2-1/2

k_v: 1.3 to 57



Male Threads



Female Threads

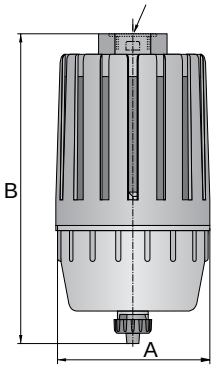
ROSS MUFFL-AIR® silencers substantially reduce exhaust noise levels in the workplace, yet produce little back pressure. Typical impact noise reduction is in the 20-25 decibel range. Non-clogging design.

Pressure Range: up to 10 bar.

Port Size	Average k_v-value	Model Numbers	Thread	Dimensions (mm) A	B	Weight (kg)
R 1/8	1.3	D5500A1003	male	21	56	0.1
R 1/4	1.7	D5500A2003	male	21	56	0.1
R 3/8	1.7	D5500A3013	male	21	56	0.1
	5.0	D5500A3003	male	32	96	0.2
R 1/2	6.1	D5500A4003	male	32	96	0.2
R 3/4	6.1	D5500A5013	male	32	96	0.2
	13	D5500A5003	male	51	142	0.7
R 1	16	D5500A6003	male	51	142	0.7
R 1-1/4	16	D5500A7013	male	51	142	0.7
	32	D5500A7001	female	64	149	1.0
R 1-1/2	33	D5500A8001	female	64	149	1.0
R 2	44	D5500B9001	female	77	185	1.6
R 2-1/2	57	D5500A9002	female	102	173	1.6

SILENCERS / RECLASSIFIERS

Pipe Connection



These are integral air-silencer and oil-separation devices. When installed at the exhaust ports of pneumatic valves, they capture over 90 per cent of the exhausted lubricants. They also reduce exhaust noise substantially. These units help to meet requirements for noise and oil mist control and have been approved globally by a number of reputed manufacturers.

Port Size	Model Numbers	Dimensions (mm) A	B	Weight (kg)
G 1/4	C5055H2009	ø 77	130	0.3
G 3/8	C5055H3009	ø 77	130	0.3
G 1/2	C5055H4009	ø 90	180	0.6
G 3/4	C5055H5009	ø 90	180	0.6
G 1	C5055H6009	ø 110	254	1.1
G 1-1/4	C5055H7009	ø 110	270	1.1
G 2	C5055H9009	ø 110	311	1.2

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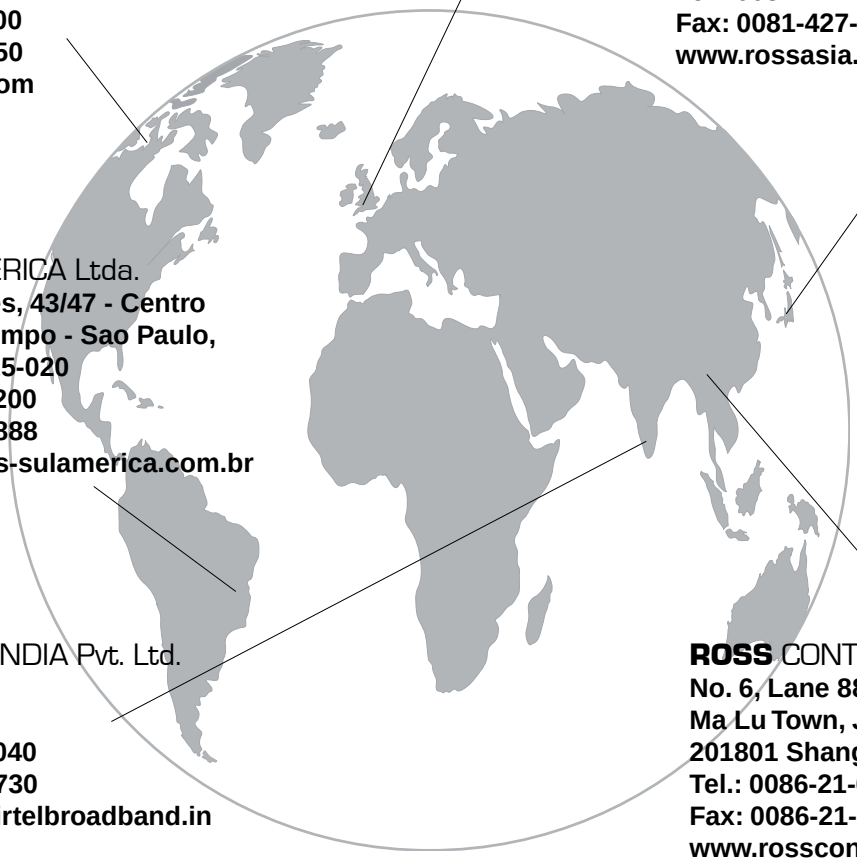

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