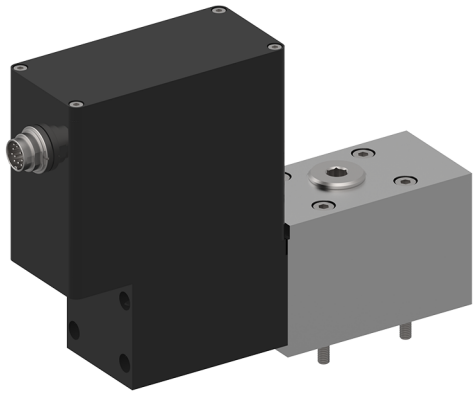
High-Response Valve FOSA, ISO size 03

Q_{max} = 180 l/min, Q_N = 80 l/min at Δp 10 bar, p_{max} = 350 bar
Direct acting, actuation via stepper motor
Series FWKSMH43_-6-…

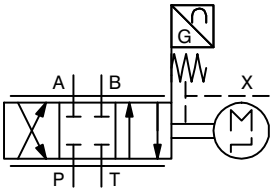


- Manifold-mounting design, interface to ISO 4401-03
- Actuation via stepper motor
- Controlled spool position (closed loop)
- Low hysteresis
- High dynamic and stability

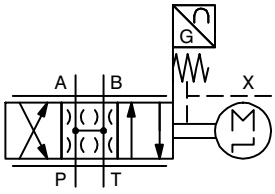
1 Description

The high-response valves, series FWKSMH43_-6…, are direct acting, actuated via stepper motor, in flange design and size 03 interface to ISO 4401-03. The valve has an integrated positional control of the valve spool with very high resolution. This assures a minimal hysteresis and improved dynamic characteristics. Low pressure drop due to the body design and spool profiling. With an increasing set-point value signal, the valve opening and therefore the volume flow increases and vice versa. Housing for electronics with protection class IP67 for harsh environment. These valves are mainly used in certain industrial applications, where straightforward installation, user-friendly operation and maximum precision are of great importance. All steel-external parts are zinc-nickel plated according to DIN EN ISO 19 598, and are thus suitable for use in the harshest operating environments. For self-assembly, please refer to the section related data sheets.

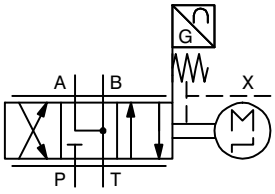
2 Symbol



D-spool



DZ-spool



G-spool

3 Technical data

General characteristics	Description, value, unit
Designation	high-response valve with OBE
Design	flange design, direct acting, actuated by a stepper motor
Mounting method	4 mounting holes for M5 mounting bolts (valve mounting bolts supplied with the valve)
Tightening torque	5.2 Nm ± 10 %
Size	size 03 interface to ISO 4401-03

General characteristics	Description, value, unit
Weight	3.4 kg
Mounting attitude	unrestricted
Ambient temperature range with actuator	-30 °C … +80 °C
Surface corrosion protection	all steel external parts are zinc-nickel plated
$MTTF_D$ values	150 years, see data sheet 400-P-010101-en

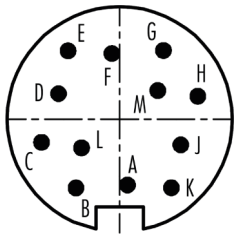
Hydraulic characteristics	Description, value, unit
Maximum operating pressure	350 bar
Maximum tank pressure	250 bar with releasing pressure at X-port 30 bar without releasing pressure at X-port
Maximum flow rate	180 l/min
Nominal flow rate at Δp 10 bar	80 l/min
Flow direction	see symbols
Hydraulic fluid	HL and HLP mineral oil to DIN 51 524; HEES biodegradable fluids; for other fluids, please consult BUCHER
Hydraulic fluid temperature range	-30 °C … +80 °C
Viscosity range	7.2….3000 mm^2/s (cSt), recommended 11…500 mm^2/s (cSt)
Minimum fluid cleanliness Cleanliness class to ISO 4406 : 1999	class 21/18/15
Step response	< 17 ms

IMPORTANT!:
With tank pressure < 30 bar, the interface layout according to ISO 4401-03-02 can be used. For tank pressure > 30 bar, the interface layout in accordance with ISO 4401-03-03 has to be used.

Fail-Safe time	Description, value, unit
Stroke 100 % Stroke 75 % Stroke 50 % Stroke 25 %	40 ms 34 ms 28 ms 17 ms

Electrical characteristics	Description, value, unit
Actuator type	stepper motor
Supply voltage	24 V DC
Supply voltage range	18…30 V DC
Maximum current consumption	3 A
Relative duty cycle	100 %
Protection class to ISO 20 653 / EN 60 529	IP67 (with appropriate mating connector and proper fitting and sealing)
Reproducibility	< ± 0.1 % from max. control range
Hysteresis	< ± 0.3 % from max. control range
Thermal drift	< 0.5 % at $\Delta T = 40$ °C

Control	Description, value, unit
Control signal input voltage (differential input)	-10…0…+10 V 0...+10 V on request resolution > 10 bit accuracy < 1 % FS
Control signal input current	4...20 mA on request Load 120 Ohm resolution > 10 bit accuracy < 1 % FS
Actual value voltage	-10…0…+ 10 V 0...+ 10 V on request R_{Load} < 1 kOhm C_{Load} < 1 uF short-circuit protected resolution > 10 bit accuracy < 1 % FS
Actual value current	0...20 mA on request 4…20 mA on request R_{Load} < 450 Ohm C_{Load} < 1 uF short-circuit protected resolution > 10 bit accuracy < 1 % FS
Enable (potential-free input)	active > 12 V DC inactive < 6 V DC Max. input voltage 30 V DC

Control	X1 - plug		Description, value, unit
M16 12-Pol			• A: Supply voltage 24 V DC • B: GND_supply • C: Enable + • D: Setpoint U+ • E: Setpoint U- • F: Actual value • G: Setpoint I • H: Enable - • J: do not connect • K: do not connect • L: do not connect • M: GND_signal

Environmental requirements	Description, value, unit
Protection class according to DIN EN 60529	IP67
Shock according to DIN EN 60068-2-27	half sinus 50 g / 6 ms / 10 shocks / 3 axis
Vibration according to DIN EN 60068-2-6 Vibration according to DIN EN 60068-2-64	sinus 0.5 g / 10 ... 2000 Hz / 20 sweeps / 3 axis random / 10 … 2000 Hz / 5.9 g RMS / 2h / 3 axis
EMC *	EN 61000-6-2:2019 immunity EN 61000-6-4:2019 emission
Compliance	EMV guideline 3014/EU ROHS REACH

* It is recommend the use of a metal connector, shielded cable and the use of SELV/PELV power supply to ensure electromagnetic compatibility (EMC) and to avoid electromagnetic disturbances.

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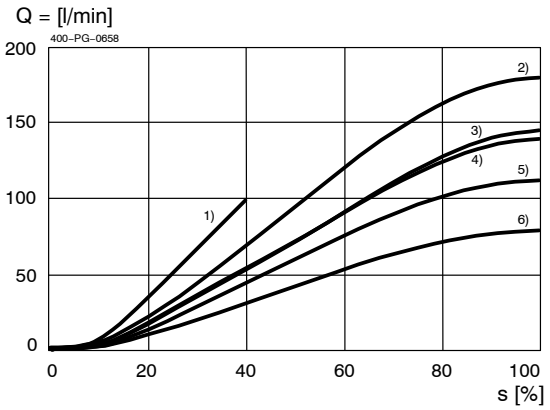
4 Performance graphs

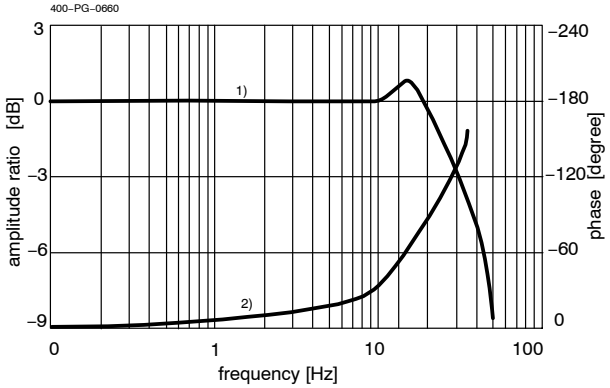
measured with oil viscosity 33 mm²/s (cSt)

Q = f (s) Flow rate adjustment characteristic
[P to A and P toB]



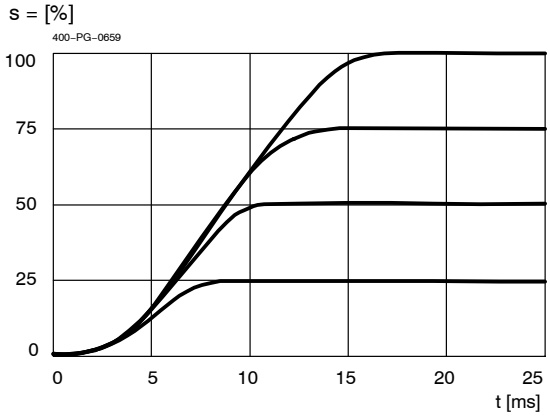
1) Δp 100 bar
2) Δp 50 bar
3) Δp 35 bar
4) Δp 30 bar
5) Δp 20 bar
6) Δp 10 bar

Bode diagram
[0 % ↔ ±100 % stroke]



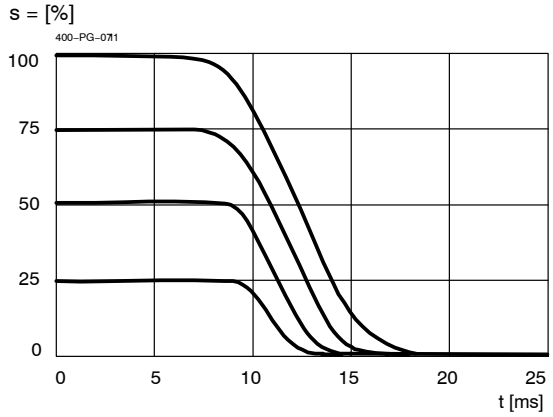
1) amplitude ratio
2) phase

S = (s) Response time

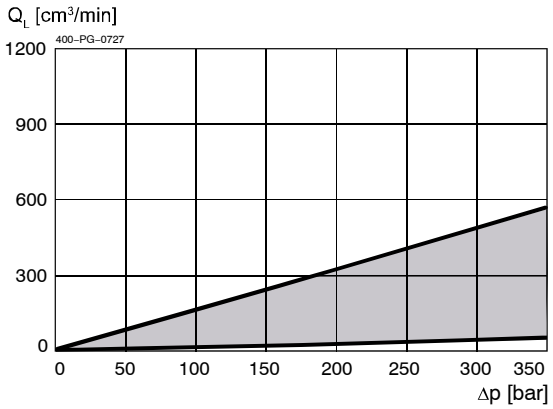


P → A at 30 l/min

S = (s) Response time

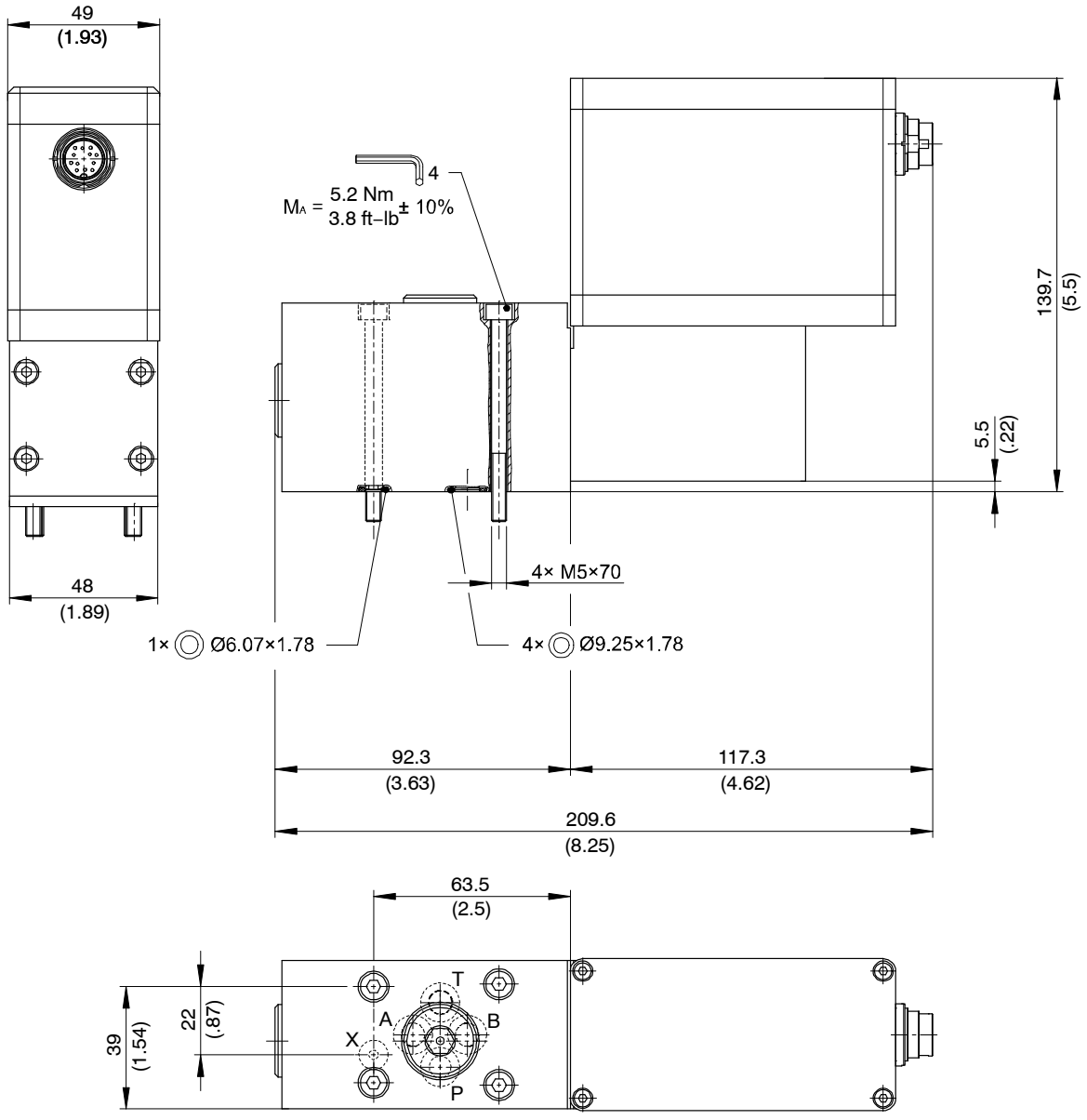


QL = f (Δp) Leakage flow rate



5 Dimensions & sectional view

Beispiel für die Masseinheit:
Example for the dimensional units:
0.79 = 0.79 mm millimeter
(.031) = 0.031" inch



6 Installation information

ATTENTION!
Only qualified personnel with mechanical skills may carry out any maintenance work. Generally, the only work that should ever be undertaken is to check, and possibly replace, the seals. When changing seals, oil or grease the new seals thoroughly before fitting them.

IMPORTANT!
When fitting the valves, use the specified tightening torque for the mounting bolts. No adjustments are necessary, since the cartridges are set in the factory.

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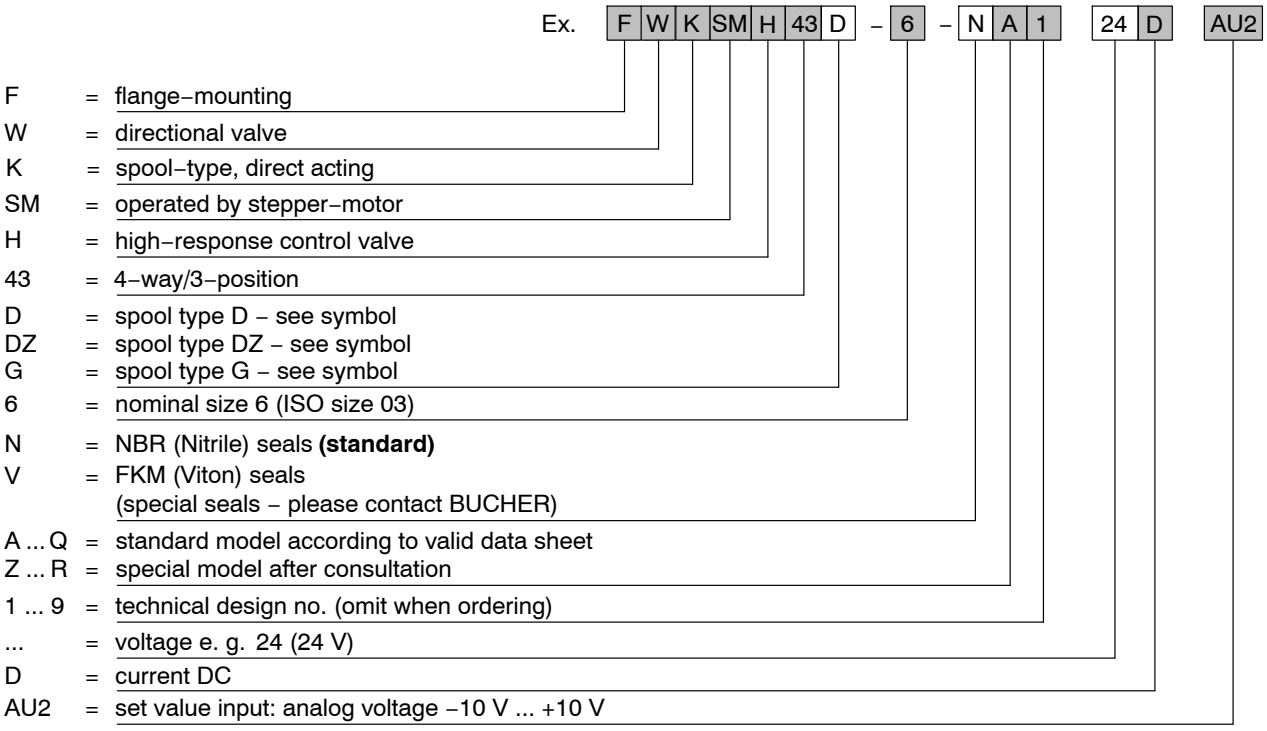
7 Ordering code



8 Related data sheets

Reference	Description
400-P-030501	Size 03 interface to ISO 4401-03
400-P-010101	$MTTF_D$ Value for Hydraulic Valves

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Classification: 430.300.-.-.-