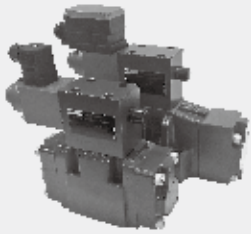
6.7

3-way Proportional pressure reducing valve, pilot operated

Type 3DRE(M) and 3DRE(M)E

Component series L6X
NG 10 and 16
Max pressure 315 bar
Max flow: 125L/min(size 10) 300L/min(size 16)



Contents

Features

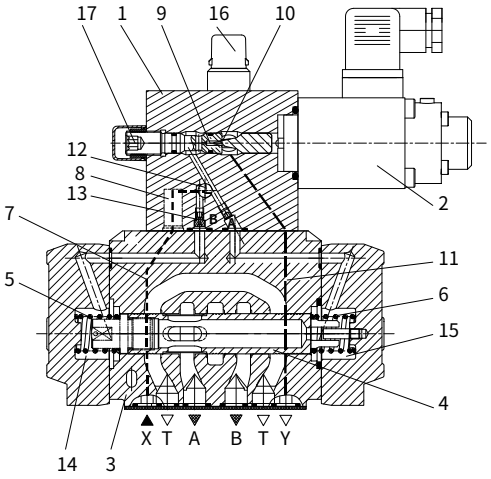
- Pilot operated valve for reducing a pressure (P to A) and limiting (A to T) a system pressure
- Actuation by proportional solenoid
- Maximum pressure relief function, optional
- Valve and control electronics from a single source
- Control electronics for type 3DRE(M):
  - Analogue amplifier type VT-VSPA1(K)-1in Euro-card format
  - Digital amplifier type VT-VSPD-1 in Euro-card format
  - Analogue amplifier type VT 11131 of modular design
- Linear command value/pressure characteristic curve
- Integrated electronics (OBE) with type 3DRE(M)E:
  - Low manufacturing tolerance of the command value/ pressure characteristic curve
  - Ramp times can be adjusted separately for pressure build-up

Function and configuration

Valves of types 3DRE(M) and 3DRE(M)E are electrically pilot operated 3-way pressure reducing valves with pres-sure relief function for the actuator. They are used to reduce a system pressure.

Technical structure:
The valves consist of three main assemblies:
1) Pilot valve (1) optionally with maximum pressure relief function (16)
2) Proportional solenoid (2)
3) Main valve (3) with main spool (4)

Function:
General function:
Command value-related adjustment of the pressure to be reduced in channel A by proportional solenoid (2).
When no pressure is applied in port P, main spool (4) is held by springs (5) and (6) in the central position. Here,the connections from P to A and A to T are closed. Pilot oil flows from bore (7) via flow controller (8), pilot valve (1) to orifice (9), throttling gap (10), pipe (11) to port Y. This port must be connected at zero pressure to the tank.



Type 3DREM10P-L6X/...G24K4V

Pressure reduction:
Build-up of pilot pressure in control chamber (12) as a function of the command value. Pressure is built up in spring chamber (14) via orifice (13) and the main spool is shifted to the right. Hydraulic fluid flows from P to A. The actuator pressure in port A is applied to spring chamber (15).
An increase in the pressure in port A to the pressure set on pilot valve (1) causes main spool (4) to be pushed to the left. The pressure in port A becomes virtually the same as the pressure set on pilot valve (1).

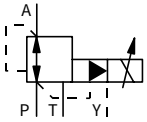
Pressure relief function:
When the pressure in port A exceeds the pressure set on pilot valve (1), main spool (4) is shifted further to the left. This causes the connection from A to T to open and limits the pressure applied in port A to the set command value.

Type 3DREM:
The valve is optionally available with an additional spring-loaded pilot valve (16) to provide a maximum pressure relief function.

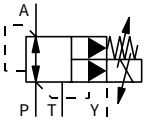
Types 3DREE and 3DREME
– with integrated electro-nics (OBE):
In terms of function and structure, these valves correspond to types 3DRE and 3DREM, except for the integrated electronics.
The electronics receives the supply and command value voltage via cable socket.
The command value/pressure characteristic curve (zero point on spindle (17) and the gradient are adjusted in the factory with narrow tolerances on the *Imax* potentiometer in the electronics.
The ramp time for pressure build-up and pressure reduction can be adjusted independently of each other with the help of two potentiometers.

Symbols

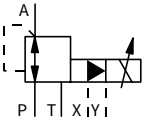
3DRE…Y…



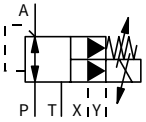
3DREM…Y…



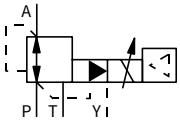
3DRE…XY…



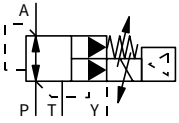
3DREM…XY…



3DREE…Y…



3DREME…Y…



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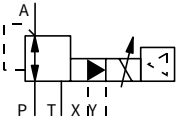
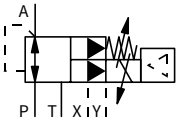


3DREME…XY…



Ordering code

3DRE				P	–	L6X	/		G24		/	V	*

Without maximum pressure relief function = No code
With maximum pressure relief function = M

For external control electronics = No code
With integrated electronics (OBE)=E

Size 10 = 10
Size 16 = 16

Subplate mounting = P

Component series 60 to 69 = L6X
(60 to 69: unchanged installation and connection dimensions)

Pressure stage
50bar = 50
100bar = 100
200bar = 200
250bar (size 16 only) = 250
315bar (size 10 only) = 315

Supply voltage for control electronics
G24 = 24V DC

Pilot oil supply and pilot oil drain
Y = Pilot oil supply internal, pilot oil drain external
XY = Pilot oil supply external, pilot oil drain external

For type 3DRE(M) :
K4= Without plug-in connector
Z4= With plug-in connector
For type 3DRE(M)E:
K31= Without plug-in connector
Z31= With plug-in connector

For type 3DRE(M) :
A1= Command/actual value 0 to 10V
F1=Command/actual value 4 to 20mA

V= FKM seals, suitable for phosphate ester (HFD-R)
No code= NBR seals

Further details inclear text

Technical data

General				
Size			10	16
Weight	3DRE and 3DREM	kg	7.7	10.2
	3DREE and 3DREME	kg	7.8	10.3
Installation orientation			Optional, preferably horizontal	
Storage temperature range		°C	-20 to +80	
Ambient temperature range	3DRE and 3DREM	°C	-20 to +70	
	3DREE and 3DREME	°C	-20 to +50	

Hydraulic (measured with HLP46; ϑ_{oil}=40°C ±5°C and p = 100bar)						
Size			10		16	
Max. operating pressure	Ports P, A and X	bar	315		P and X=315; A=250	
	Port Y	bar	separately and at zero pressure to tank			
Max. set pressure in channel A	Pressure stage50bar	bar	50		50	
	Pressure stage100bar	bar	100		100	
	Pressure stage200bar	bar	200		200	
	Pressure stage250bar	bar			250	
	Pressure stage315bar	bar	315			
Min. set pressure channel A at zero command value			see characteristic curves			
Maximum pressure relief function (infinitely adjustable)	Pressure stage 50bar	bar	Pressure adjustment range	30 to 70	Factor setting	to 70bar
	Pressure stage 100bar	bar		50 to 130		to 130bar
	Pressure stage 200bar	bar		90 to 230		to 230bar
	Pressure stage 250bar	bar		100 to 250		to 250bar
	Pressure stage 315 bar (size 10 only)	bar		150 to 350		to 350bar
Max. permissible flow		L/min	125		300	
Pilot oil flow		L/min	1			
Hydraulic fluid			Mineral oil (HL, HLP) to DIN 51524; further hydraulic fluids on enquiry!			
Hydraulic fluid temperature range		°C	-20 to +70			
Viscosity range		mm^2/s	20 to 380			
Degree of contamination			Maximum permissible degree of fluid contamination: Class 9.NAS 1638 or 20/18/15, ISO4406			
Hysteresis		%	±2 of max. set pressure			
Repeatability		%	< ±2 of max. set pressure			
Linearity		%	±3.5 of max. set pressure			
Manufacturing tolerance of command value/pressure char. curve, referred to hysteresis curve, increasing pressure	3DRE and 3DREM	%	±2.5 of max. set pressure			
	3DREE and 3DREME	%	±1.5 of max. set pressure			
Switching time		ms	100 to 200 (depending on system)			

Technical data

Electrical			
Supply voltage		V	24 V DC
Min. control current		mA	100
Max. control current	3DRE and 3DREM	mA	1600
	3DREE and 3DREME	mA	1440 to 1760
Solenoid coil resistance	Cold value at 20 ° C	Ω	5.4
	Max. hot value	Ω	7.8
Duty cycle		%	100
Electrical connection	3DRE and 3DREM		With component plug to DIN EN 175301-803
			Cable socket to DIN EN 175301-803
	3DREE and 3DREME		With component plug to E DIN EN 175201-804
			Cable socket to DIN EN 175201-804
Type of protection of the valve to EN 60529			Ip65 with cable socket mounted and locked

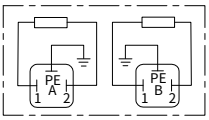
Control electronics			
Integrated electronics (OBE) with types 3DREE and 3DREME			Integrated in the valve
External control electronics for types 3DRE and 3DREM	Amplifier in Euro-card format	analogue	VT-VSPA1(K)-1
		digital	VT-VSPD-1
	Amplifier of modular design	analogue	VT 11131

Electrical connections, plug-in connectors

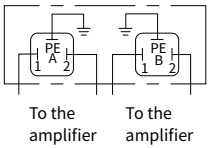
· For type 3DRE(M) ((without integrated electronics))

Connections on the component plug:

Cable socket to
DIN EN 175301-803
or ISO4400

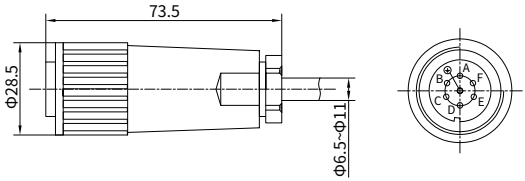


Connections on the plug-in connector:



· For type 3DRE(M)E (with integrated electronics (OBE))

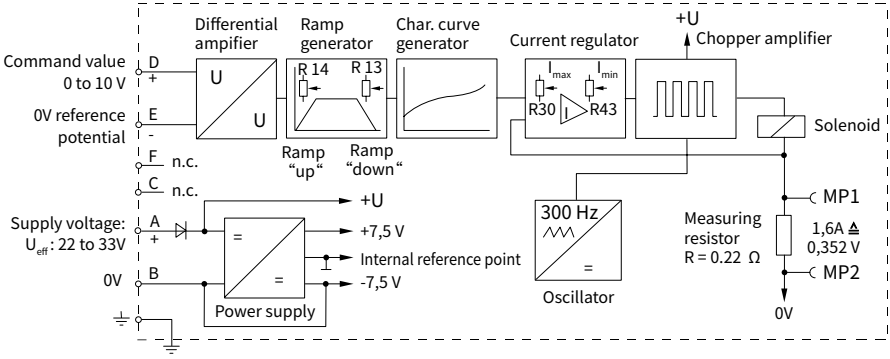
For pin allocation also
see block circuit diagram.
Plug-in connector to
DIN EN 175201-804



Integrated electronics (OBE) of Types DREE and DREME

Function:
The integrated electronics is controlled via the two differential amplifier connections D and E.
The ramp generator generates from a command value step change (0 to 10 V or 10 to 0 V) a delayed increase or drop of the solenoid current.
Potentiometer R14 can be used to adjust the rise time, potentiometer R13 to adjust the drop time of the solenoid current.
The maximum ramp time of 5s is only possible over the full command value range. In the case of minor changes in the command value, the ramp time shortens accordingly.
The command value/solenoid current characteristic curve is adjusted to the valve by means of the characteristic curve generator so that non-linearities in the hydraulic system are compensated for and a linear command value/pressure characteristic curve is obtained.

The current regulator regulates the solenoid current independently of the solenoid coil resistance.
Potentiometer R30 can be used to change the gradient of the command value/current characteristic curve and hence the gradient of the command value/pressure characteristic curve of the proportional pressure control valve.
Potentiometer R43 serves for adjusting the biasing current. This setting should not be changed. If required, adjust the zero point of the command value/pressure characteristic curve onthe valve seat.
A chopper amplifier forms the power stage of the electronics for controlling the proportional valve. It is pulsewidth-modulated with a clock frequency of 300 Hz.
The solenoid current can be measured at both measuring sockets MP1 and MP2. A voltage drop of 0.352V at the measuring resistor corresponds to a solenoid current of 1.6 A.

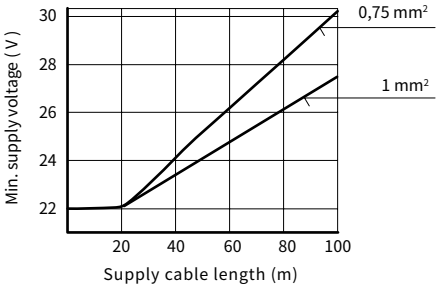


Block circuit diagram / pin assignment of integrated electronics

Integrated electronics (OBE) of Types DREE and DREME

· Supply voltage

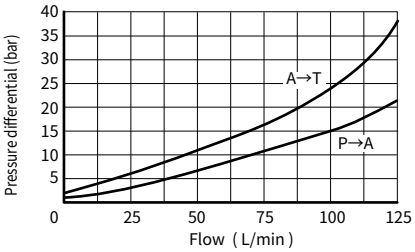
Power supply unit with rectifier.
Single-phase rectification or three-phase current bridge: U_{eff} =22 to 33V
Residual ripple content on the power supply unit : < 5 %
Output current: I_{eff} = max. 1.4A
Supply cable:
– **Recommended:** 5-wire, 0.75 or 1 mm² with protective conductor and shield
– Outer diameter 6.5 to 11 mm
– Shield to 0 V supply voltage
– Max. permissible length 100 m



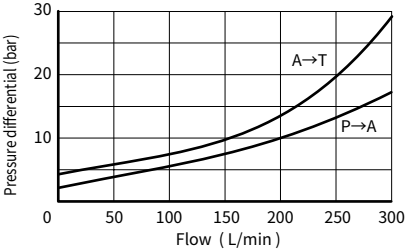
The minimum supply voltage of the power supply unit depends on the length of the supply cable (see diagram). In the case of lengths >50 m, a capacitor of 2200µ must be provided in the supply cable in the vicinity of valve.

Characteristic curves (measured with HLP46, ϑ_{oil}=40°C ±5°C and p=100bar)

Size 10

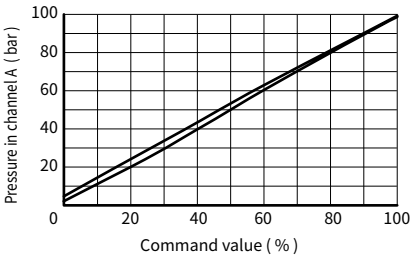


Size 16



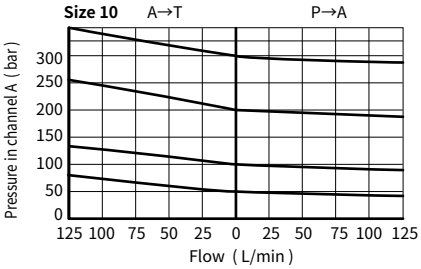
· Pressure in channel A -command value (measured at flow 0 L/min)

Size 10 and 16

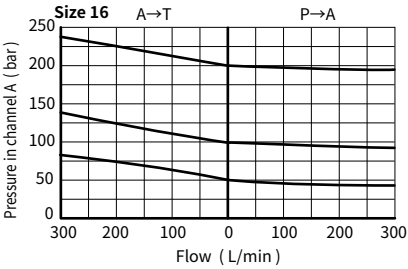


· Pressure in channel A – flow

Size 10

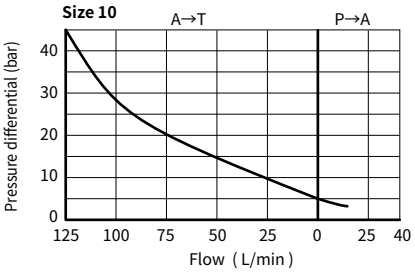


Size 16

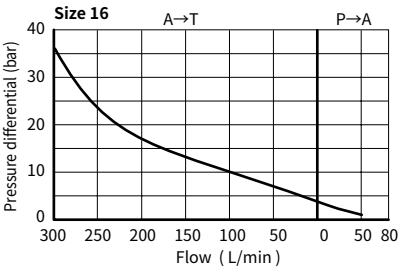


· Min. set pressure – flow

Size 10



Size 16

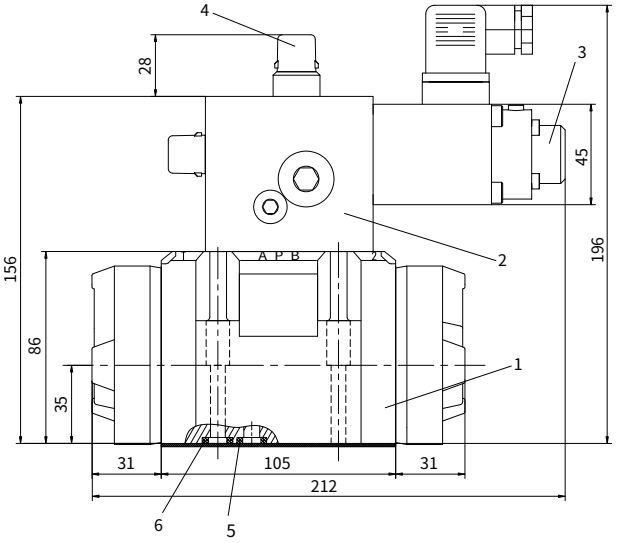


06

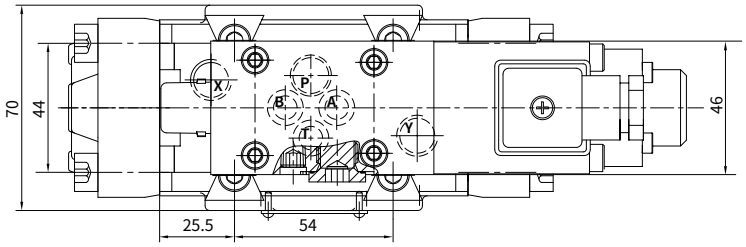
Unit dimensions

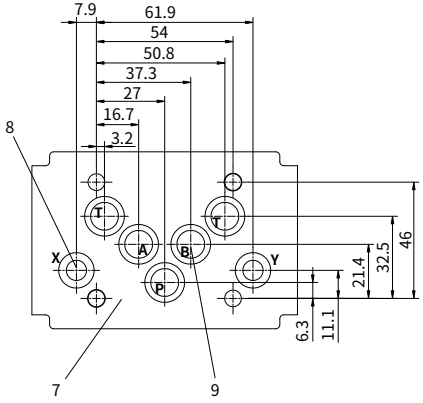
(nominal dimensions in mm)

Size 10

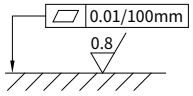


1 Main valve
2 Pilot valve
3 Proportional solenoid
4 Maximum pressure relief function (Type 3DREM...)
5 Identical seal rings for ports A, B, P, T (R-ring 13×1.6×2),
6 Identical seal rings for ports X and Y (11.18×1.6×1.78),
7 Machined mounting face, position of ports to DIN24 340 A, ISO 4401 and CETOP-RP 121 H
8 In the case of "internal" pilot oil supply (version Y), port X on the subplate must be plugged.
9 Port B on the subplate must be plugged





Valve fixing screws:
4 socket head cap screws
M6×45 GB/T 70.1-10.9;
tightening torque M_A=15.5Nm

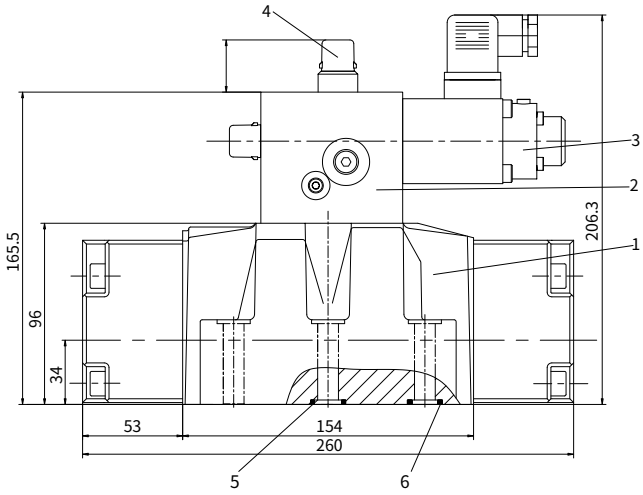


Required surface quality of mouting face

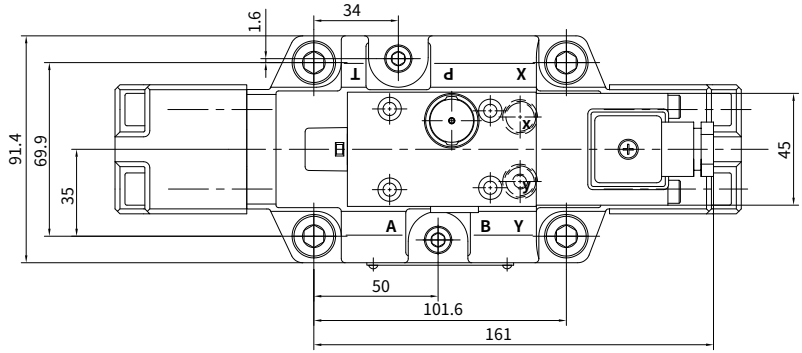
Unit dimensions

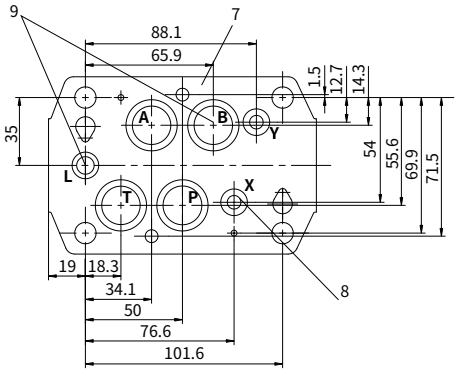
(nominal dimensions in mm)

Size 16

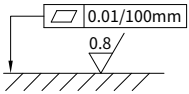


1 Main valve
2 Pilot valve
3 Proportional solenoid
4 Maximum pressure relief function (Type 3DREM...)
5 Identical seal rings for ports A, B, P, T (22.53×2.3×2.62),
6 Identical seal rings for ports X and Y (10×2×2),
7 Machined mounting face, position of ports to DIN24 340 A, ISO 4401 and CETOP-RP 121 H
8 In the case of "internal" pilot oil supply (version Y), port X on the subplate must be plugged.
9 Ports B and L on the subplate must be plugged





Valve fixing screws:
4 socket head cap screws M10×60 GB/T 70.1-10.9; tightening torque M_A=73Nm
2 socket head cap screws M6×55 GB/T 70.1-10.9; tightening torque M_A=15.5Nm



Required surface quality of mouting face

Pilot oil supply

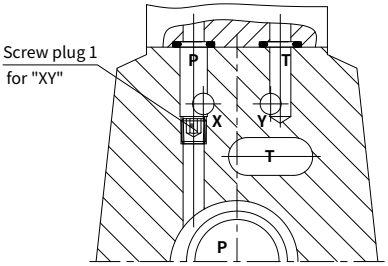
· **Type 3DRE...-...XY** Pilot oil supply external
Pilot oil drain external

With this version, the pilot oil is supplied from a separate control circuit (external).
The pilot oil drain is not directed to the T-channel of the main valve,
but fed separately to the tank via port Y (external).

· **Type 3DRE...-.../...Y⋯** Pilot oil supply internal
Pilot oil drain external

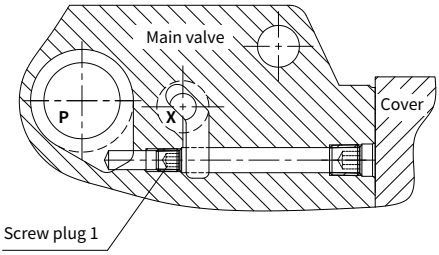
With this version, the pilot oil is supplied from the P-channel of the main valve (internal).
The pilot oil drain is not directed to the T-channel of the main valve,
but fed separately to the tank via port Y (external).
Port X on the subplate must be plugged.

Size 10



Pilot oil supply	external: 1 Closed internal: 1 Open
Pilot oil drain	external

Size 16



Pilot oil supply	external: 1 Closed internal: 1 Open
Pilot oil drain	external