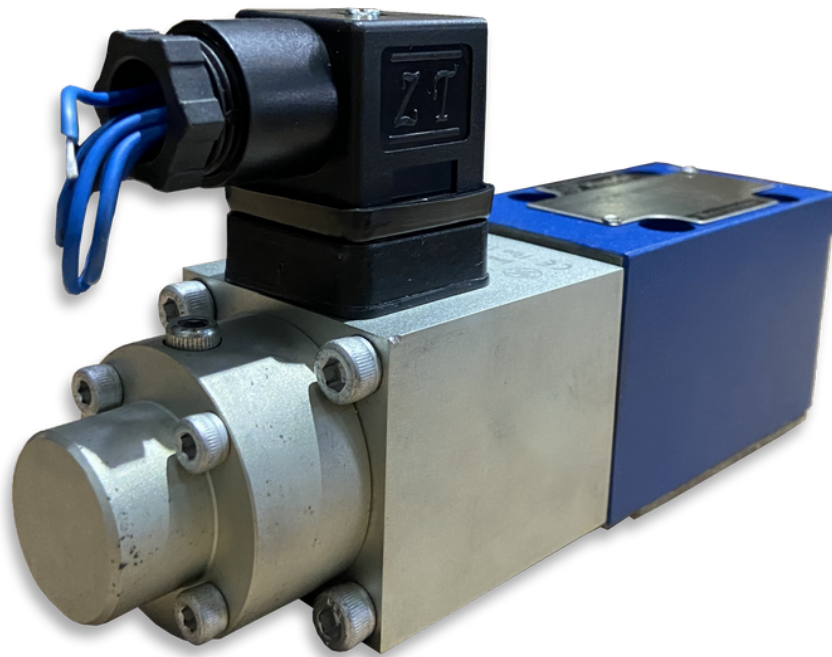




HUADE
AMERICA

Catalog

Proportional Pressure Relief Valve Model: DBET and DBEMT, Series 5X





Proportional Pressure Relief Valve Model DBET and DBEMT, Series 5X

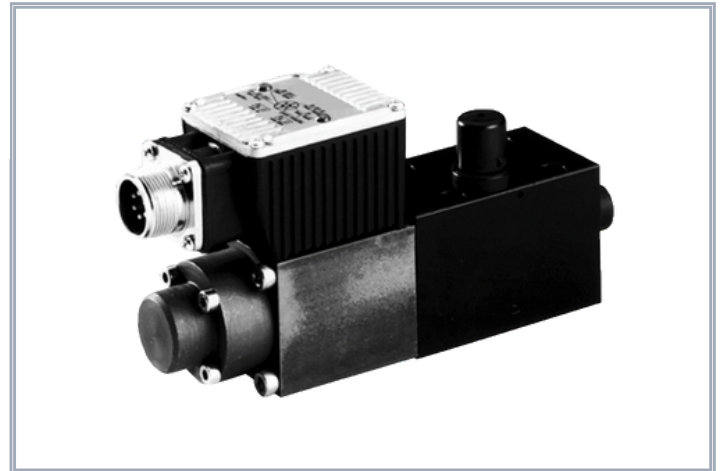
HD-DBET..
HD-DBEMT..

Size 6 (R 03)

**... 5100 PSI
(350 bar)**

**... 0.5 GPM
(2 L/min)**

- Direct operated valves for limiting pressure
- Proportional solenoid operation
- Mounts on standard ISO 6264-03, NFPA/ANSI R 03 interface (use ports P and T only)
For subplates
- Optional maximum pressure limiting
- Control electronics for type DBET and DBEMT:
 - For type VT 2000 amplifier in Eurocard format (separate order)
 - For type VT 11030 in modular construction (separate order)
- Type DBETE and DBEMTE with integral control electronics with up and down ramp adjustments



Model DBETE-5X/...
with integrated control electronics

Ordering codes

DBE **T** **- 5X/** **G24** *****

Proportional pressure relief valve

without maximum pressure protection = no code
with maximum pressure protection = **M**

without integrated control electronics = no code
with integrated control electronics = **E**

Series 50 to 59 = **5X**
(50 to 59, externally interchangeable)

Pressure stage

| | |
|--------------------------|--------------|
| up to 725 PSI (50 bar) | = 50 |
| up to 1450 PSI (100 bar) | = 100 |
| up to 2900 PSI (200 bar) | = 200 |
| up to 4600 PSI (315 bar) | = 315 |
| up to 5100 PSI (350 bar) | = 350 |

Supply voltage for control electronics 24 V DC = **G24**

without manual overrides = no code
with manual overrides = **N¹⁾**

¹⁾ Note: Accidental operation of the manual override may result in uncontrolled machine movements

Further details to be written in clear text

M = NBR seals, suitable for petroleum oils (HL, HLP)
V = FPM seals, suitable for phosphate ester fluids (HFD-R)

Type of electrical connection for DBET; DBEMT:

K4 = with component plug DIN 43 650-AM2
without plug-in connector
plug-in connector under material no. **RR00 074 684**

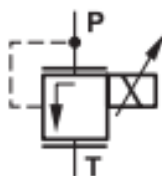
Z4 = angled plug to DIN 43 650

for DBETE; DBEMTE:

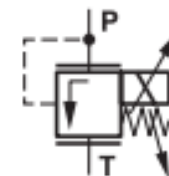
Z31 = Plug to E DIN 43 563-BF6-3/Pg11
K31 = with component plug
E DIN 43 563-AM2
without plug-in connector
plug-in connector – separate order under material

Symbols

without maximum pressure protection



with maximum pressure protection



Functional description, section

Model DBET and DBEMT

Proportional pressure relief valves Model DBET and DBEMT are remote control valves in seated construction and are used for limiting system pressure. They are actuated by means of a proportional solenoid. With these valves the system pressure to be limited can be set steplessly depending on the electrical signal value.

Basically these valves consist of the housing (1), a proportional solenoid (2), the valve seat (3) and the valve poppet (4).

The proportional solenoid converts electric current proportionally into mechanical force. An increase in current intensity will bring about a corresponding increase in solenoid power. The solenoid cavity is filled with hydraulic fluid and is pressure sealed.

The system pressure is set in dependence on the signal value via the proportional solenoid (2). The force of the solenoid presses the valve poppet on to the seat (3). The pressure in line P arising from the system acts on the valve poppet (4) and thus against the force of the proportional solenoid. If the hydraulic force on the valve

poppet (4) is equal to the solenoid force, then the valve will regulate the pressure set by the valve poppet lifting from the valve seat (3) allowing hydraulic fluid to flow from P to T.

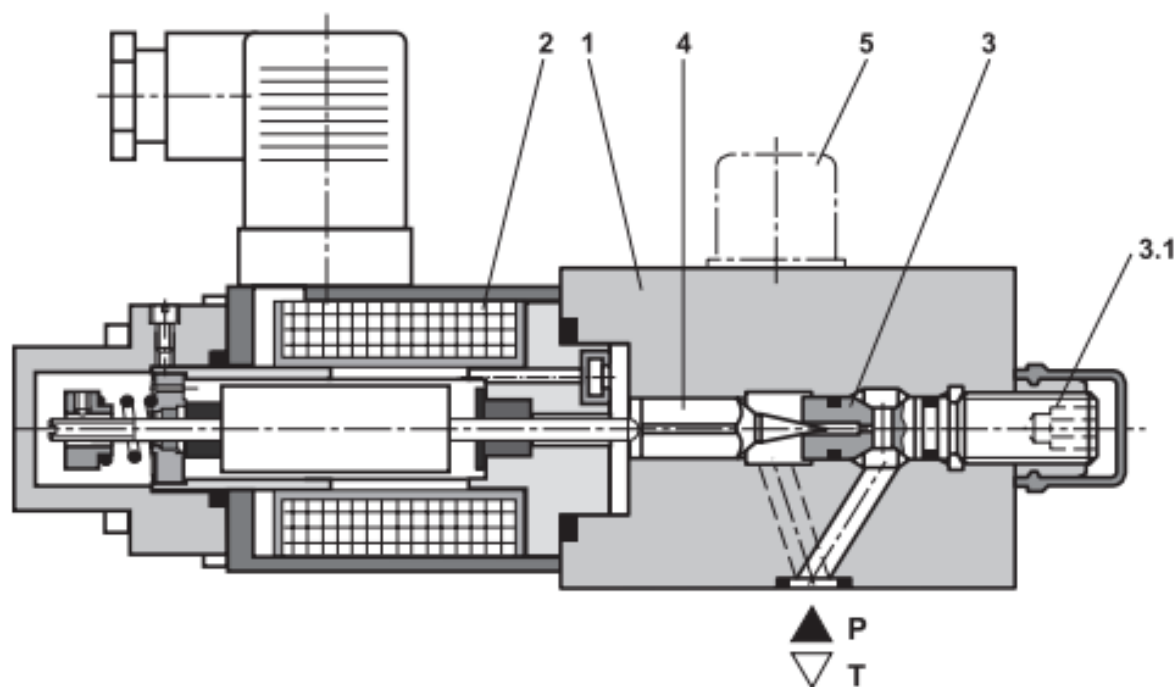
At minimum pilot oil flow, if the signal value corresponds to zero, the minimum set pressure will be observed.

Model DBEMT

In order to protect the system from excessive currents at the proportional solenoid (2), possibly leading to excessive pressures, a spring loaded pressure relief valve may also be installed as a maximum pressure limiter (5).

The maximum pressure limiter (5) should be set at least 15 % higher than the maximum pressure at the proportional solenoid (2).

(When using these valves please refer to the notes on page 3).



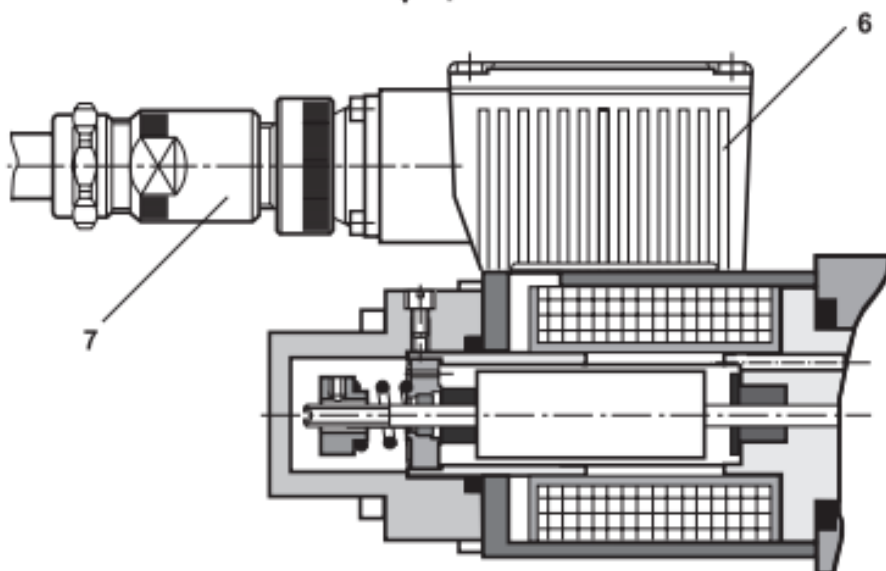
Model DBETE and DBEMTE

(with integral control electronics)

In terms of function and structure these valves correspond to Models DBET and DBEMT. On the proportional solenoid there is also a housing (6) with the control electronics. The supply and signal value voltages are applied to the unit plug (7).

The signal value pressure characteristic curve (zero point at valve seat) (3.1) and the I_{max} potentiometer (R30) are factory set in the control electronics with low typical variation.

The ramp time for pressure increase and decrease may be set independently from each other with two integral potentiometers.



Technical data (For applications outside these parameters, please consult us)**General**

| | | | |
|---------------------------|------------------|----------|---------------------------|
| Weight | DBET and DBEMT | lbs (kg) | 4.4 (2) |
| | DBETE and DBEMTE | lbs (kg) | 4.6 (2.1) |
| Installation position | any | | |
| Ambient temperature range | DBET and DBEMT | °F (°C) | - 4 ... 122 (- 20 ... 50) |
| | DBETE and DBEMTE | °F (°C) | 32 ... 122 (0 ... 50) |

Hydraulic, measured at $v = 190 \text{ SUS}$ (41 mm²/s), $t = 122 \text{ °F}$ (50 °C)

| | | | |
|--|--|-----------|--|
| Operating pressure (Port P) | PSI (bar) | | max. permissible 5100 (350) |
| max. set pressure | Pressure range 50 | PSI (bar) | 725 (50) |
| | Pressure range 100 | PSI (bar) | 1450 (100) |
| | Pressure range 200 | PSI (bar) | 2900 (200) |
| | Pressure range 315 | PSI (bar) | 4600 (315) |
| | Pressure range 350 | PSI (bar) | 5100 (350) |
| min. set pressure at comm. level 0 | PSI (bar) | | see operating curves page 6 |
| Return pressure (Port T) | separate and unpressurized to tank | | |
| Max. pressure limiting (steplessly settable) | Set pressure range | | Set on delivery |
| | Pressure range 50 | PSI (bar) | 435 to 1015 (30 to 70) at 1015 (70) |
| | Pressure range 100 | PSI (bar) | 725 to 1885 (50 to 130) at 1885 (130) |
| | Pressure range 200 | PSI (bar) | 1305 to 3335 (90 to 230) at 3335 (230) |
| | Pressure range 315 | PSI (bar) | 1305 to 3335 (150 to 350) at 5075 (350) |
| | Pressure range 350 | PSI (bar) | 2610 to 5510 (180 to 380) at 5510 (380) |
| Flow | GPM (L/min) | | max. 0.5 (2) |
| Hydraulic fluid | Petroleum fluids (HM, HL, HLP) | | |
| | Phosphate ester fluids (HFD-R) | | |
| Maximum degree of fluid contamination | Class 16/13 to 18/15 according to ISO 4406. Therefore, we recommend a filter with a retention rate of $\beta_{10} \geq 75$. | | |
| Hydraulic fluid temperature range | °F (°C) | | - 4 ... 158 (- 20 ... 70) |
| Range of viscosity | SUS (mm ² /s) | | 75 ... 1760 (15 ... 380) |
| Hysteresis (see command value pressure characteristics) | ± 1.5 % of max. set pressure | | |
| Repeatability | < ± 2 % of max. set pressure | | |
| Linearity | ± 3.5 % of max. set pressure | | |
| Typical scatter of command value pressure characteristic with regard to hysteresis characteristic, pressure rising | DBET and DBEMT | | ± 2.5 % of max. set pressure |
| | DBETE and DBEMTE | | ± 1.5 % of max. set pressure |
| Operating time | ms | | 30 to 150 (depending on installation) |

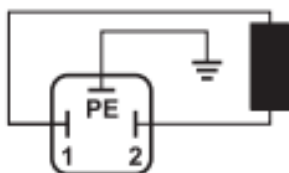
Electrical

| | | | |
|--|---|--|--|
| Type of voltage | DC | | |
| Min. pilot current | mA | | 100 |
| Max. pilot current | DBET and DBEMT | | 800 |
| | DBETE and DBEMTE | | 1600 |
| Solenoid coil resistance | | | |
| - Value when cold at 68 °F (20°C) | DBET and DBEMT | | Ω 19.5 |
| | DBETE and DBEMTE | | Ω 5.4 |
| - Max. value warm | DBET and DBEMT | | Ω 28.8 |
| | DBETE and DBEMTE | | Ω 7.8 |
| Duty | % | | 100 |
| Electrical connection | DBET and DBEMT | | Z4 Plug connection to DIN 43650/2-pin + PE/Pg 11 |
| | DBETE and DBEMTE | | Z31 Unit plug: Plug to E DIN 43 563-BF6-3/Pg11 |
| | Mounting socket: socket to E DIN 43 563-AM6-3 | | |
| Valve insulation (DIN 40 050) | Exceeds NEMA class B (IP65) | | |
| Control electronics for DBET and DBEMT (order separately) | - amplifier in Eurocard format | | Model VT 2000 |
| | - amplifier module | | Model VT 11029 |
| | for DBETE and DBEMTE | | integral in valve |

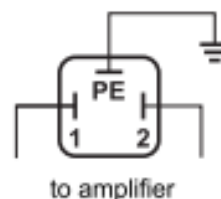
Electrical connections, Plug-in connectors

For models DBET, DBEMT

Connection to component plug



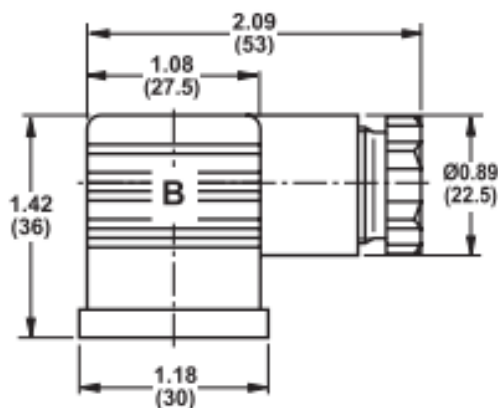
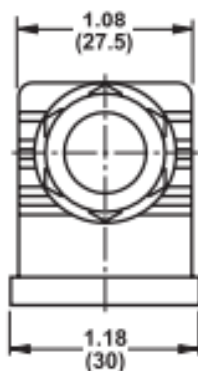
Connection to plug-in connector



Plug-in connector to DIN 43 650-AF2

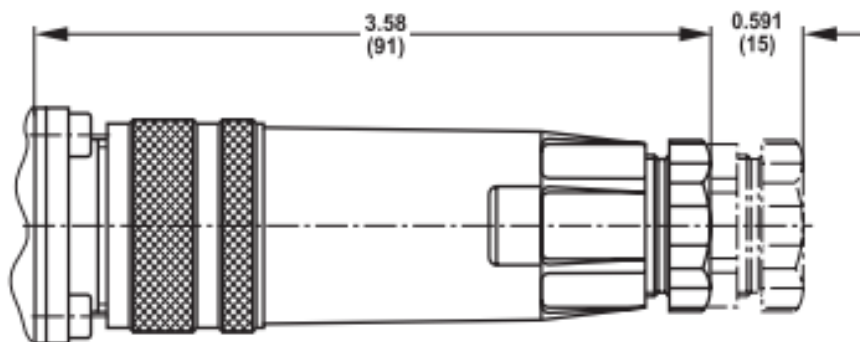
Black, (Z4)

Black, 1/2" NPT (Z45)



For types DBETE, DBEMTE

Plug-in connector to E DIN 43 563-BF6-3



For pin allocation, see block circuit diagram

Integral electronics for Model DBETE, DBEMTE

Functional description

Control of the integral electronics is via the differential amplifier inputs, D and E.

The ramp generator produces a gradually rising or falling output solenoid current from the stepped command input signal (0 to 10V or 10 to 0V). The rise time is set at potentiometer R14 and the fall time at potentiometer R13.

The full ramp time of 5 seconds is only available over the full command signal range. Smaller changes in command value will reduce the ramp time accordingly.

The control curve generator modifies the command value/solenoid current curve in order to overcome any non-linearities in the hydraulics in order to produce a linear command value/pressure curve.

The current regulator controls the current independently of the coil resistance.

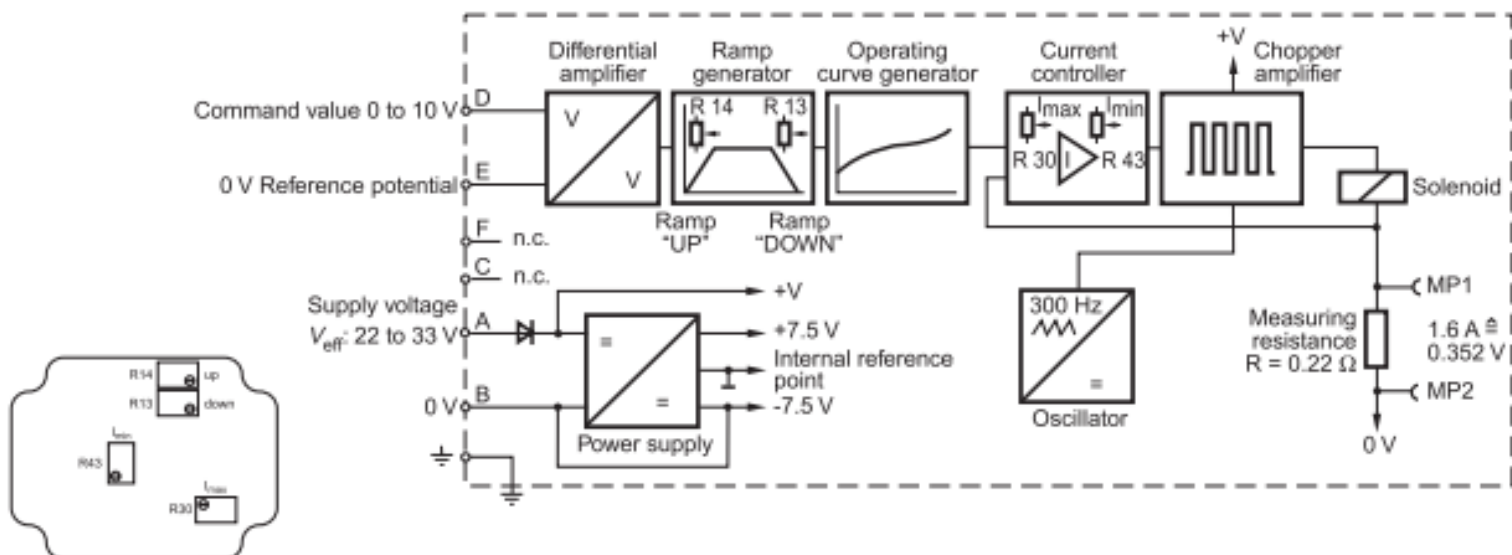
The gradient of the command value/current curve and therefore that of the command value/pressure curve is modified by potentiometer R30.

Potentiometer R43 is used to set the pilot current. The adjustment should not be changed. If necessary, the null point of the command value/pressure curve is adjustable.

The power output stage of the electronics consists of a chopper amplifier. This is pulse width modulated at a frequency of 200 Hz.

The solenoid current can be measured at test points MP1 and MP2. A voltage drop of 0.352 V at the test resistor corresponds to a solenoid current of 1.6 A.

Terminal connections / Block circuit diagram for the integral electronics



Supply voltage

Power supply

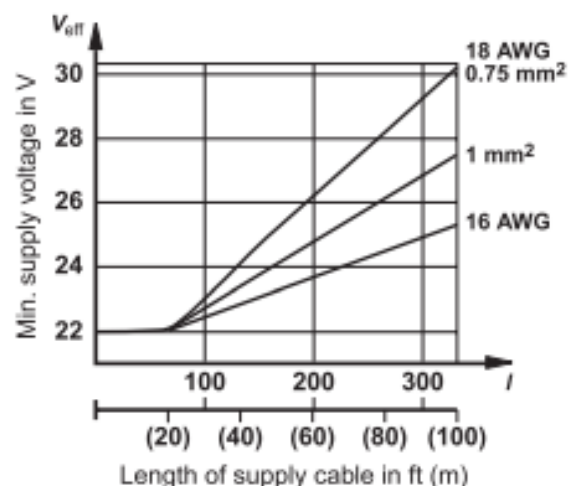
$V_{eff} = 22$ to 33 V

Residual ripple of power section: $< 5\%$

Supply current: $I_{eff} = \text{max. } 1.4$ A

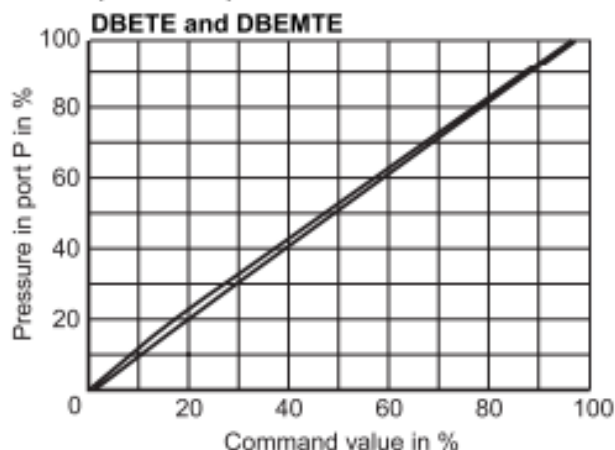
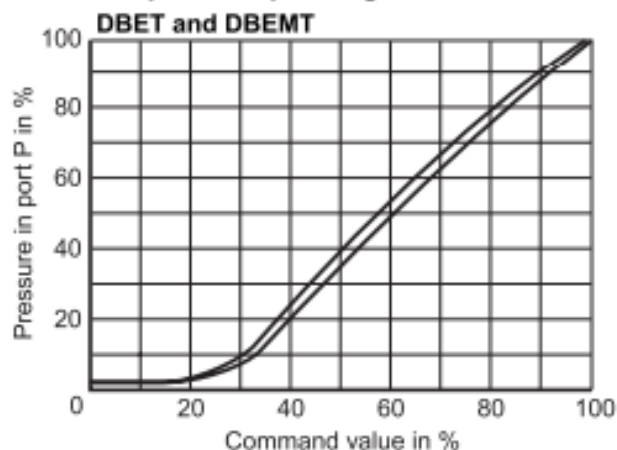
- Supply cable:
- Recommended 5-core 18 AWG or 16 AWG (0.75 or 1 mm²) with shield and armoured protection
 - Outer diameter 0.26 to 0.44 in (6.5 to 11.2 mm)
 - Shield to 0V supply voltage
 - Maximum permissible length 330 ft (100 m)

The minimum supply voltage at the power section is dependent on the length of the supply cable (see diagram). For lengths of >160 ft (50 m) a $2200 \mu\text{F}$ capacitor must be installed in the supply line of an unregulated power supply.

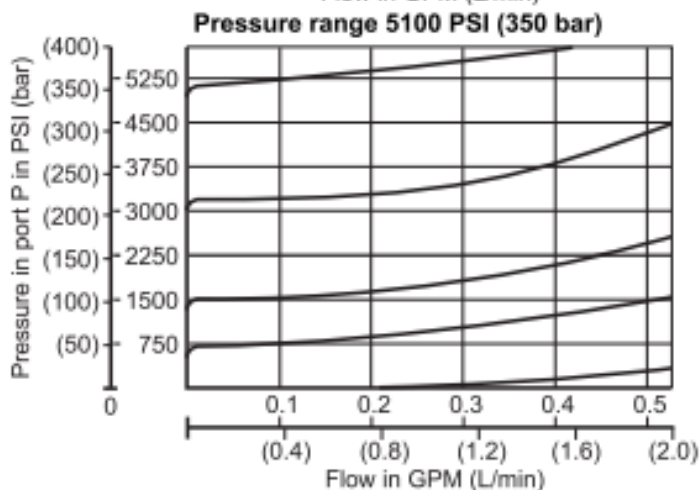
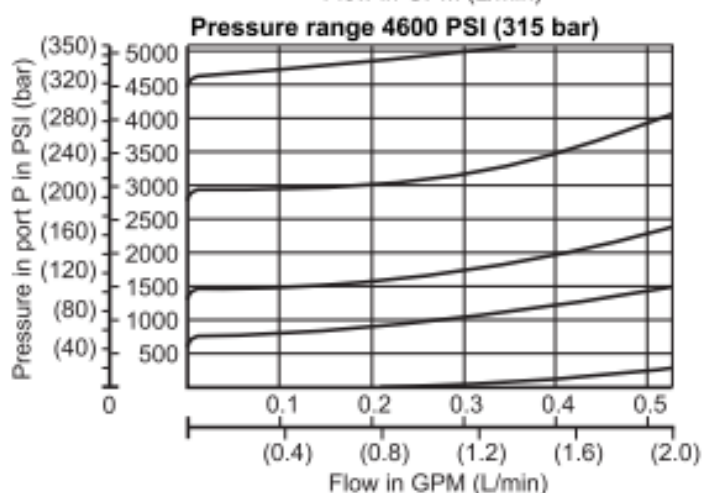
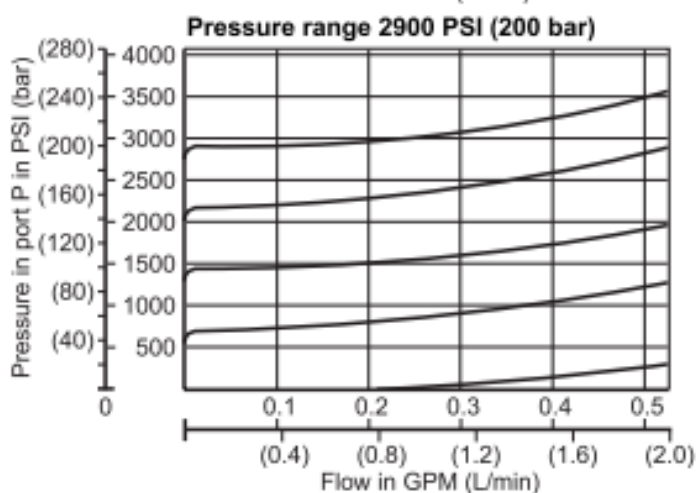
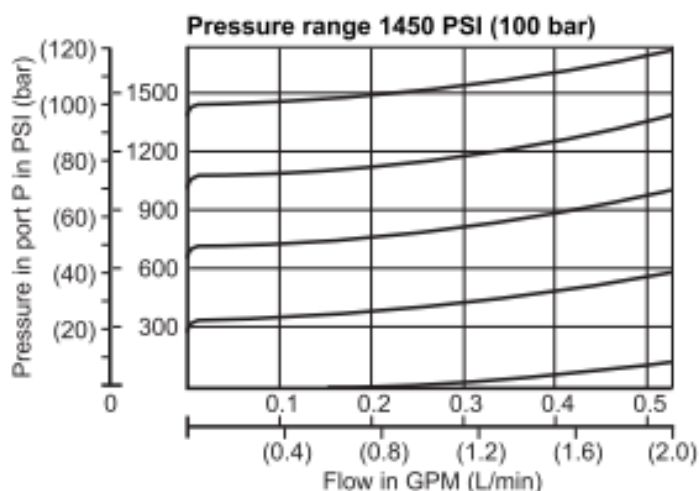
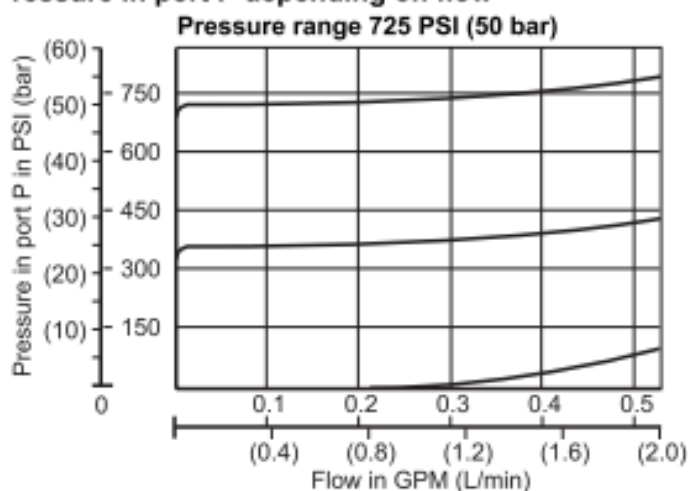


Technical data, measured at $v = 190$ SUS ($41 \text{ mm}^2/\text{s}$) and $t = 122 \text{ }^\circ\text{F}$ ($50 \text{ }^\circ\text{C}$)

Pressure in port P depending on command value $Q = 0.21 \text{ GPM}$ (0.8 L/min)



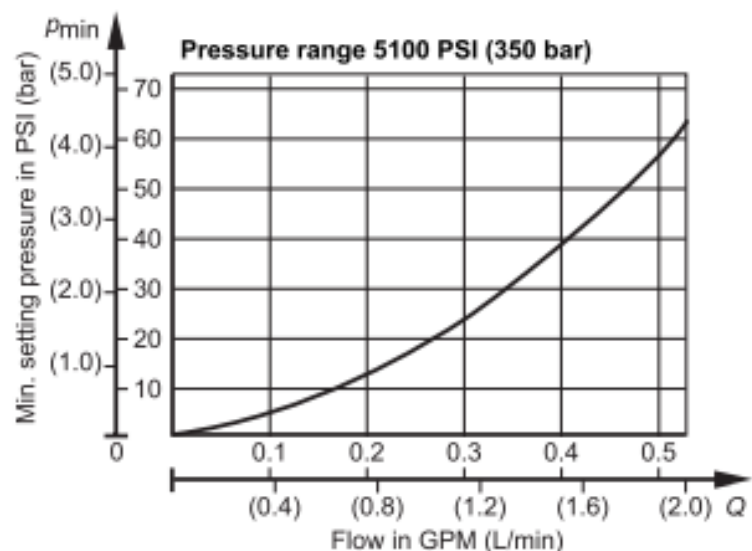
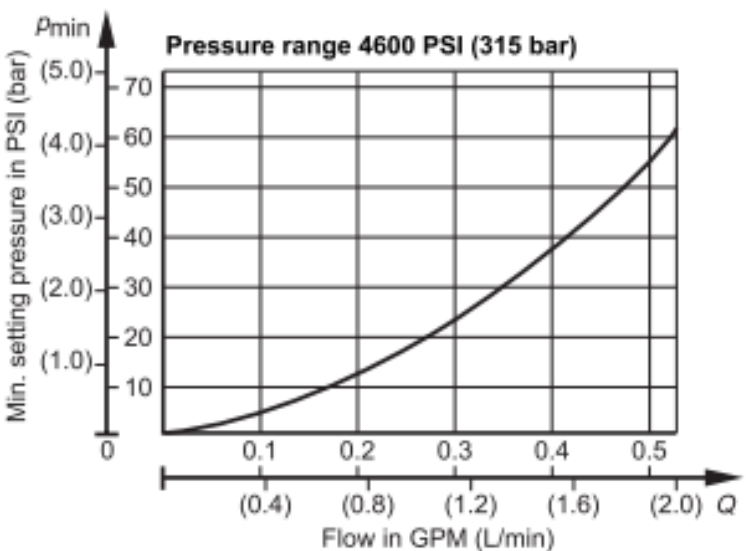
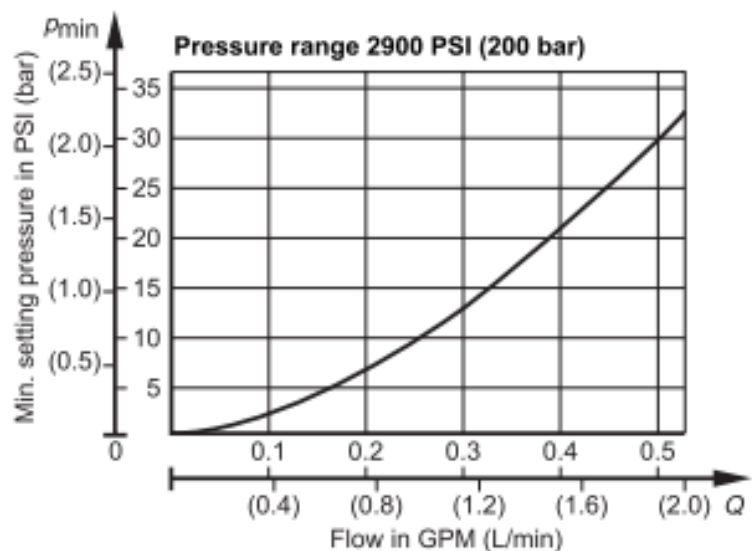
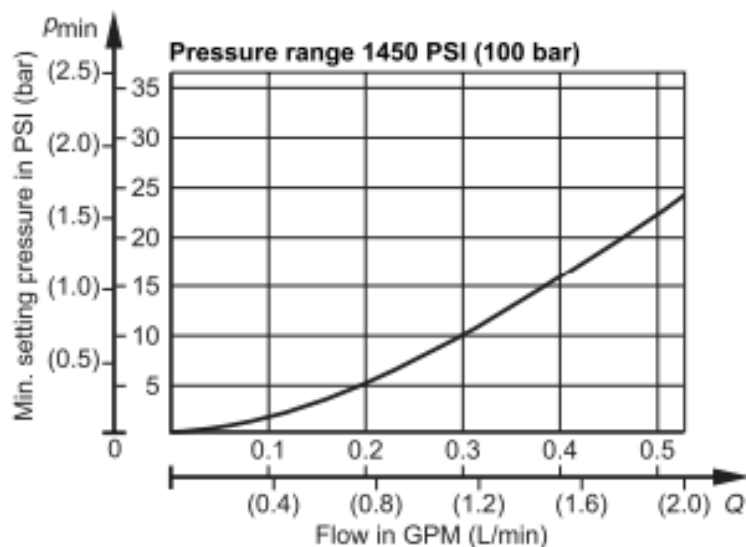
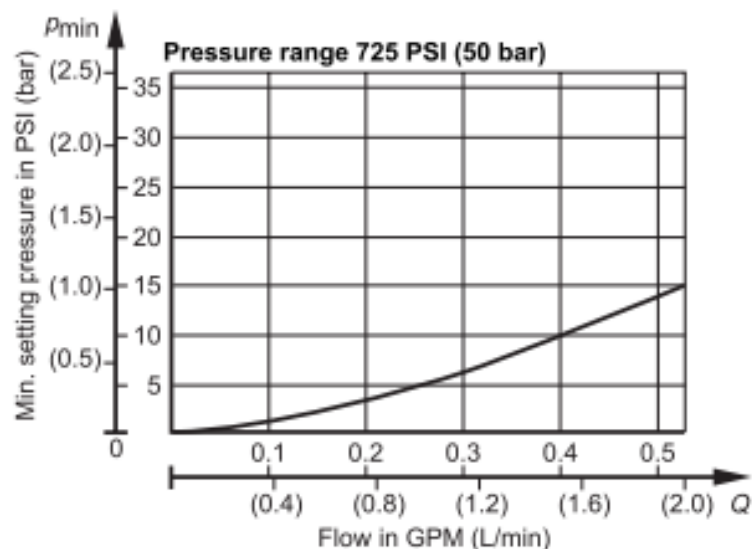
Pressure in port P depending on flow



The performance curves were measured without back pressure in port T

Performance curves, measured at $v = 190$ SUS ($41 \text{ mm}^2/\text{s}$) and $t = 122 \text{ }^\circ\text{F}$ ($50 \text{ }^\circ\text{C}$)

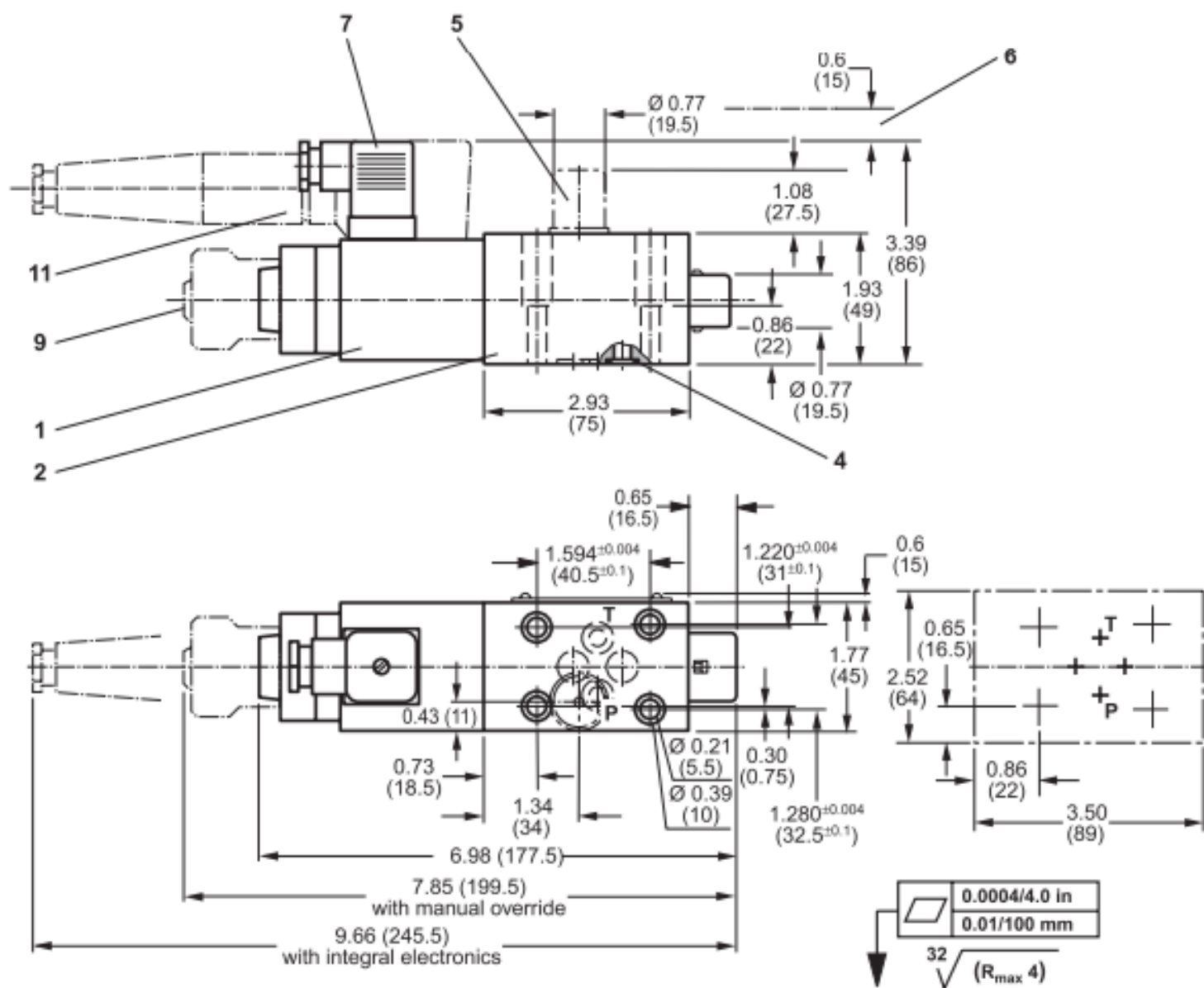
Min. set pressure in port P at command value 0



The performance curves were measured without back pressure in port T

Note: To ensure achievement of minimum set pressure the pilot current may not exceed 100 mA.

Unit dimensions: dimensions in inches (millimeters)



Required surface finish
of interface when mounting
the valve without our subplate

Subplate and valve mounting bolts must be ordered separately.

- 1 Proportional solenoid
- 2 Valve housing
- 3 Name plate
- 4 R rings 9.81 x 1.5 x 1.78
- 5 Maximum pressure limiter (Model DBEMT; DBEMTE)
When using these valves refer to notes on page 3
- 6 Space required to remove plug
- 7 Plug connection to DIN 43 650/2-pin + PE/Pg 11
- 8 Blind counterbore
- 9 Model with emergency operator "N" ¹⁾
- 10 Porting pattern to ISO 6264-03 NFPA T3.5.1M R1 R 03
ANSI B93.7 R 03.
- 11 Integrated electronics with plug 6+PE

- Subplates**
- G 341/05 (1/4" NPT),
 - G 341/12 (SAE-4; 7/16-20),
 - G 342/05 (3/8" NPT),
 - G 342/12 (SAE-6; 9/16-18),
 - G 502/05 (1/2" NPT),
 - G 502/12 (SAE-8; 3/4-16).

- Valve mounting bolts**
- 10-24 x 1 1/4" (M5 x 30 mm) socket head cap screw
(SAE grade 8 or better)
 - Tightening torque 6.6 lb-ft (9 Nm)

¹⁾ Accidental operation of the manual override
may result in uncontrolled machine movements

Control electronics DBET and DBEMT: Amplifier Model VT 2000 (order separately)

Technical data

Supply voltage V_{DC} : 24 VDC; +40%, -5%

- Upper limit value $V_{DC}(t)_{max}$: 35 V

- Lower limit value $V_{DC}(t)_{min}$: 22 V

Pilot current (set at factory) I : 100 mA

Max. output current I_{max} : 800 mA

Card dimensions:
Eurocard
3.93 x 6.29 in
(100 x 160 mm)
DIN 41 494

Face plate dimensions

- Height: 3 U 5.05 in (128.4 mm)

- Width soldering side: 1 HP 0.20 in (5.08 mm)

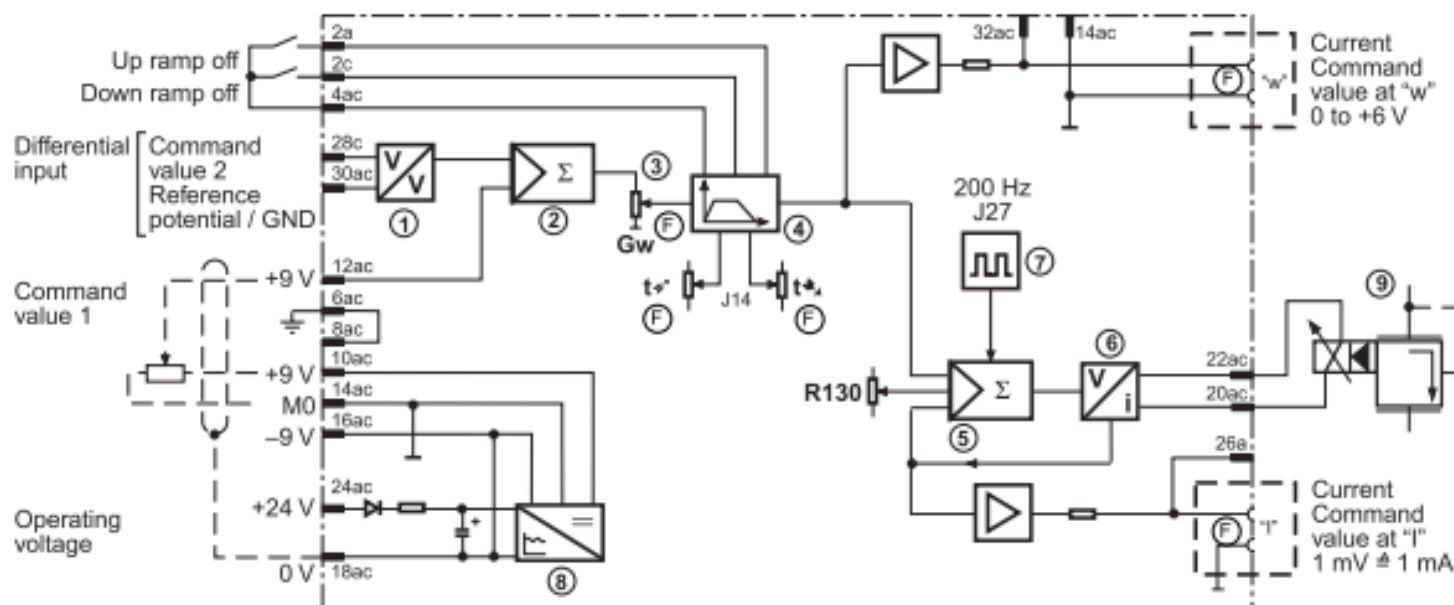
- Width component side: 3 HP

For applications outside these parameters, please consult us!

For further information see data sheet RA 29 904

Terminal connections / Block wiring diagram

Measured zero (M0) is raised +9V with respect to zero volt supply voltage (L0)



1 Differential amplifier (0 to +10 V)

2 Summation

3 Max. command value, attenuator

4 Ramp generator

5 Current regulator with summation

6 Current amplifier

7 Pulse generator

8 Power supply

9 Valve with proportional solenoid

R130 = Pilot current (factory setting)
I = 100 mA

Gw = max. command value (F)

t+ = Ramp time "Up" (F)

t- = Ramp time "Down" (F)

(F) = on face plate

Ordering codes

VT 2000 - 5X / *

Amplifier for proportional pressure valves

Series 50 to 59

(Series 50 to 59: externally interchangeable)

= 5X

Further details to be written in clear text