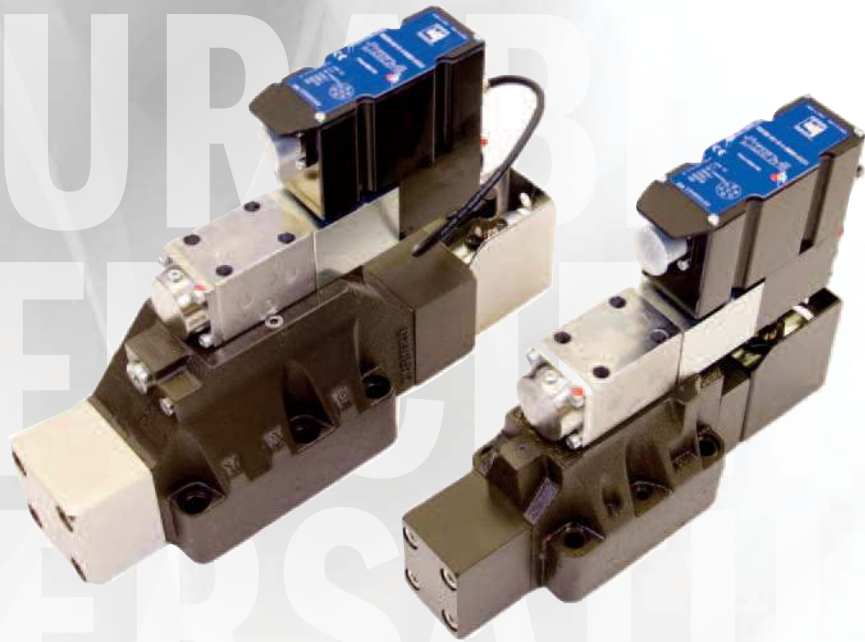




CONTINENTAL HYDRAULICS

# VED\*MX

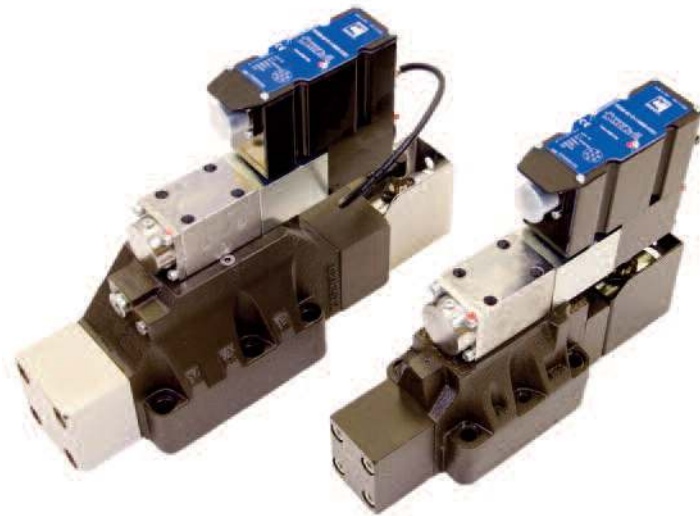
PILOT OPERATED, SERVO-PROPORTIONAL DIRECTIONAL CONTROL VALVE



VED\*MX - PILOT OPERATED, SERVO-PROPORTIONAL DIRECTIONAL CONTROL VALVE

# VED\*MX

PILOT OPERATED PROPORTIONAL DIRECTIONAL CONTROL VALVE, SERVO-SOLENOID, DUAL POSITION FEEDBACK



## DESCRIPTION

Continental Hydraulics VED\*MX, High Response 4-way proportional valve with precision lapped Spool, Dual position sensing LVDT's and Enhanced On-Board Digital Amplifier.

## FEATURES and OPERATION

The VED\*MX pilot operated 4-way Proportional valves, conform to NFPA and ISO 4401:2005 (CETOP RP 121H) mounting standards.

The main spool position is controlled by highly dynamic pilot valve in closed loop via linear transducer LVDT for high precision, repeatability and increased control.

- Class leading High frequency response
- On-Board Digital Control resulting in extremely low Phase Lag and high frequency operation
- High performance Pilot Valve
- High Precision Lap Spools
- Dual Spool position feedback
- High flow pilot valve for high performance over a wide range of pilot pressures

## TYPICAL PERFORMANCE SPECIFICATIONS

<b>MAXIMUM OPERATING PRESSURE</b>	P - A - B Ports	5000 psi (350 bar)
	X-Y-T Port	3600 psi (250 bar)
<b>HYSTERESIS</b>	% of Q max	< 0.2%
<b>REPEATABILITY</b>	% of Q max	< 0.1%
<b>CONNECTION</b>	7 pin MIL-C-5015-G	
<b>CONTAMINATION LEVEL (ISO class)</b>	preferred	16/14/11
	maximum	17/15/12
<b>VISCOSITY</b>	25 cSt recommended (5-400 cSt viscosity range)	
<b>TEMPERATURE RANGE</b>	Ambient	-4 to +140° F -20 to +60° C
	Fluid	-4 to +180° F -20 to +80° C

	VED05*MX		VED07MX		VED08MX	
<b>FLOW CAPACITY WITH ΔP 145 PSI (10 BAR)</b>	26 gpm	100 l/min	32 gpm 53 gpm	120 l/min 200 l/min	66 gpm 105 gpm	250 l/min 400 l/min
<b>MAX FLOW</b>	48 gpm	180 l/min	120 gpm	450 l/min	240 gpm	900 l/min
<b>PEAK PILOT FLOW REQUIREMENTS</b>	1,8 gpm	7 l/min	3,4 gpm	13 l/min	7,4 gpm	28 l/min
<b>MOUNTING SURFACE</b>	NFPA D05 alt. A/alt. B ISO 4401-05-*0-05		NFPA D07 ISO 4401-07-07-0-05		NFPA D08 ISO 4401-08-08-0-05	
<b>WEIGHT</b>	18.7 lbs	8.5 kg	23.2 lbs	10.5 kg	37.5 lbs	17 kg

# IDENTIFICATION CODE

**VED**    **MX** -       -    -       -       **D - D** \_\_\_\_\_ DESIGN LETTER

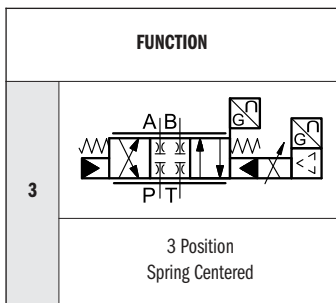
HIGH  
RESPONSE

SIZE	
<b>05A</b>	NFPA D05 alt. A
<b>05B</b>	NFPA D05 alt. B
<b>07</b>	NFPA D07
<b>08</b>	NFPA D08

SEAL	
<b>A</b>	Buna (STD)
<b>G</b>	Viton

PILOT / DRAIN	
<b>1</b>	Internal pilot External drain
<b>2</b>	External pilot External drain
<b>3</b>	Internal pilot Internal drain
<b>4</b>	External pilot Internal drain

REFERENCE SIGNAL	
<b>E0</b>	Voltage ± 10 V (STD)
<b>E1</b>	Current 4-20 mA



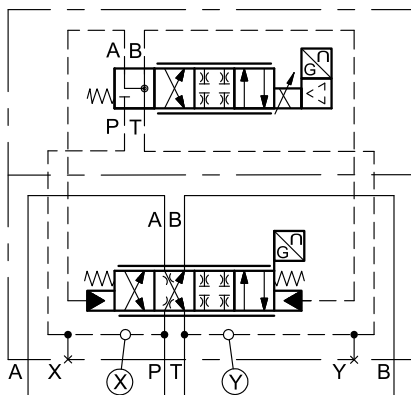
NOMINAL FLOW (with Δp P-T 143 psi)		
size	code	
<b>05</b>	100	100 l/min (26 gpm)
	120	120 l/min (32 gpm)
<b>07</b>	200	200 l/min (53 gpm)
	250	250 l/min (66 gpm)
<b>08</b>	400	400 l/min (106 gpm)

CONNECTION	
<b>OBW</b>	On board electronics - Internal Enable Monitor signal PIN F to PIN B
<b>OBC</b>	On board electronics - PIN C Enable Monitor signal PIN F to PIN B
<b>OBM</b>	On board electronics - Internal Enable Monitor signal PIN F to PIN C

SPOOLS		
NAME	SYMBOL	DESCRIPTION
<b>ZC</b>		EQUAL METERING ZERO LAP

TYPICAL ORDERING CODE:  
**VED07MX-3ZC-200-A1-OBMEOD-D**

## DETAILED SYMBOL



## FUNCTIONAL DESCRIPTION

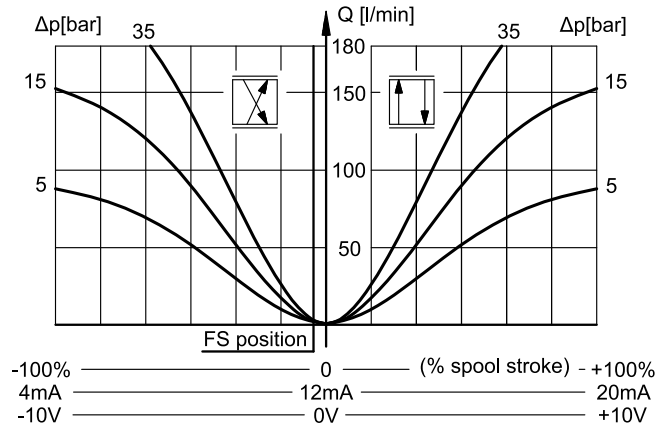
When the valve is not powered, the pilot valve is held by springs in a fail-safe position and the main stage spool will be in a spring centered mid position, with limited opening (1%.. 6% of main spool stroke in P-B/A-T direction).

# PERFORMANCE CURVES VED05\*MX

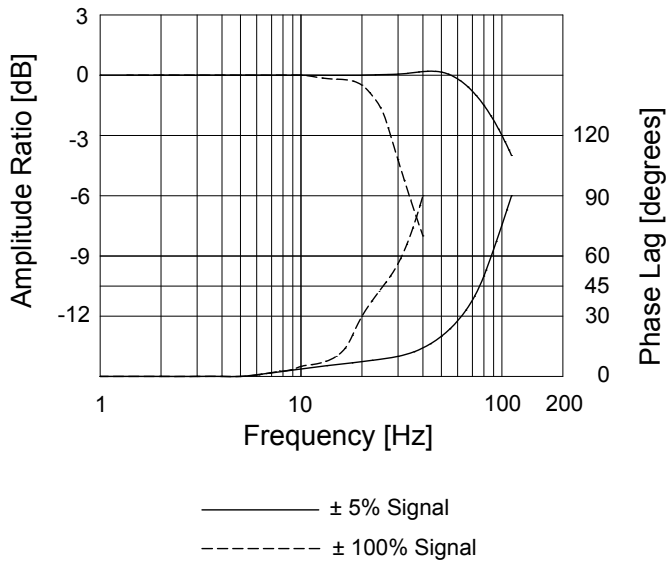
Curves obtained with mineral oil viscosity of 170 sus (36 cSt) at 122°F (50°C) and dedicated OBE

VED\*MX - PILOT OPERATED, SERVO-PROPORTIONAL DIRECTIONAL CONTROL VALVE

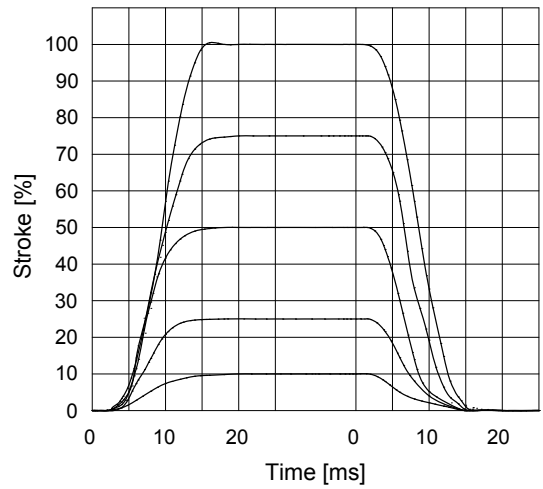
## ZC-100



## FREQUENCY RESPONSE



## STEP RESPONSE TIME

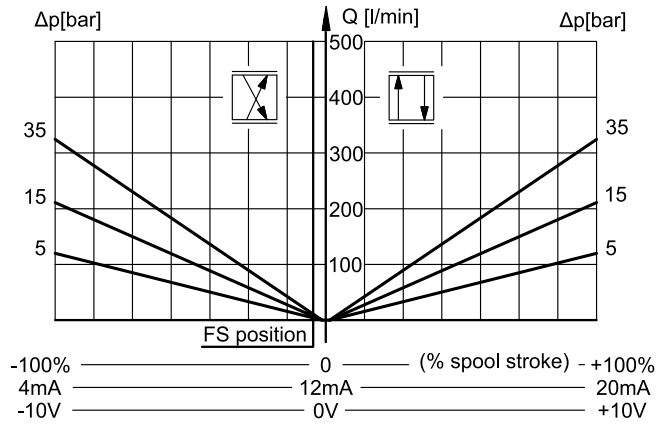


Due to inherent phase lag characteristics of the overall system and machine, common industrial control practices recommends, as rule of thumb, to utilize the 45°, or less phase lag frequency ratings, when applying Servo and Proportional valves to any position control loop for stable, repeatable and consistent control.

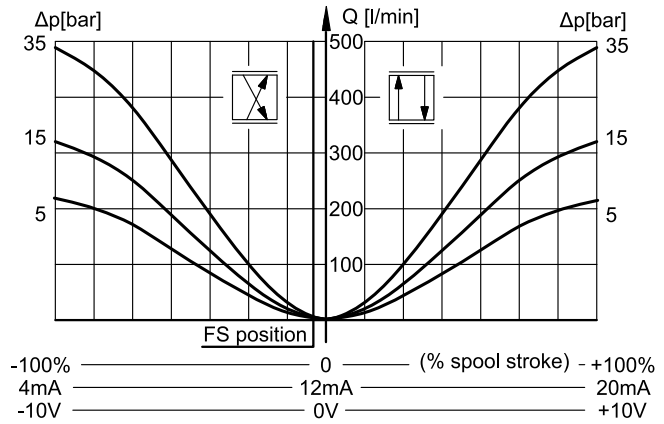
# PERFORMANCE CURVES VED07MX

Curves obtained with mineral oil viscosity of 170 sus (36 cSt) at 122°F (50°C) and dedicated OBE

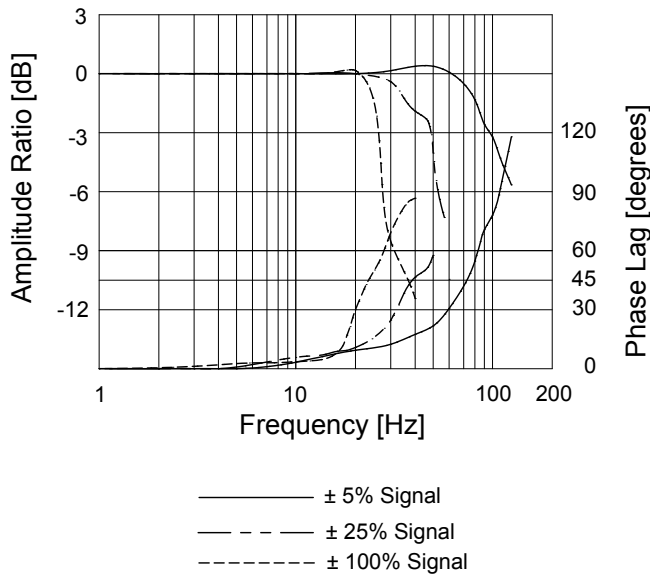
**ZC-120**



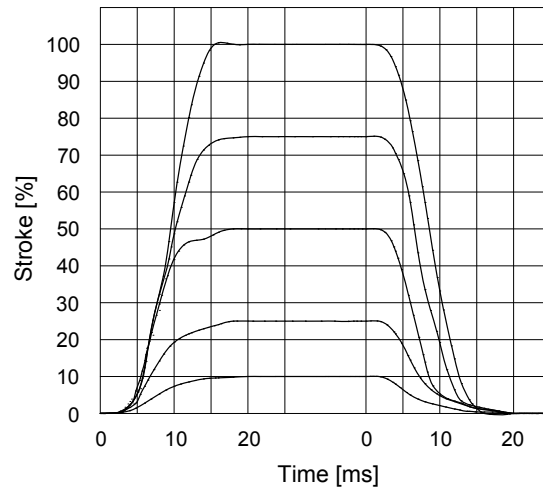
**ZC-200**



**FREQUENCY RESPONSE**



**STEP RESPONSE TIME**

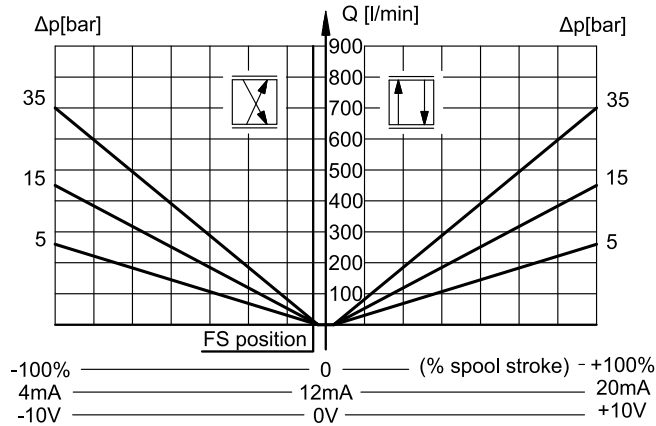


Due to inherent phase lag characteristics of the overall system and machine, common industrial control practices recommends, as rule of thumb, to utilize the 45°, or less phase lag frequency ratings, when applying Servo and Proportional valves to any position control loop for stable, repeatable and consistent control.

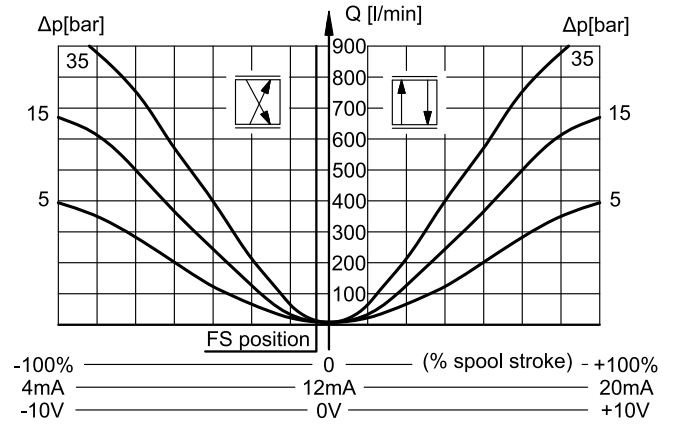
# PERFORMANCE CURVES VED08MX

Curves obtained with mineral oil viscosity of 170 sus (36 cSt) at 122°F (50°C) and dedicated OBE

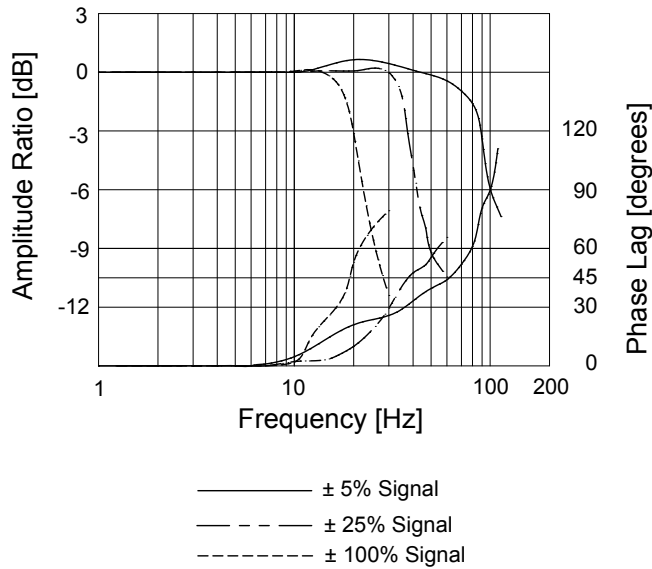
**ZC-250**



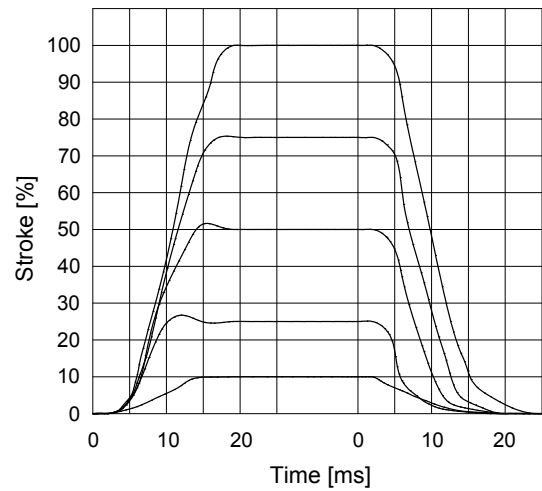
**ZC-400**



**FREQUENCY RESPONSE**



**STEP RESPONSE TIME**



Due to inherent phase lag characteristics of the overall system and machine, common industrial control practices recommends, as rule of thumb, to utilize the 45°, or less phase lag frequency ratings, when applying Servo and Proportional valves to any position control loop for stable, repeatable and consistent control.

# PILOT AND DRAIN CONFIGURATION

The VED\*MX valves are available with pilot/drain configurations, both internal and/or external.

**The version with internal pilot configurations and system pressure above 3600 psi (250 bar), the code Z option pilot pressure reducer must be utilized.**

Minumim pilot pressure to maintain a full shift position of 220 psi (15 bar) must be maintained.

The version with external drainage allows a higher back pressure on the unloading.

CODE	PILOT	X PLUG	DRAIN	Y PLUG
1	Internal	<input type="checkbox"/>	External	<input checked="" type="checkbox"/>
2	External	<input checked="" type="checkbox"/>	External	<input checked="" type="checkbox"/>
3	Internal	<input type="checkbox"/>	Internal	<input type="checkbox"/>
4	External	<input checked="" type="checkbox"/>	Internal	<input type="checkbox"/>

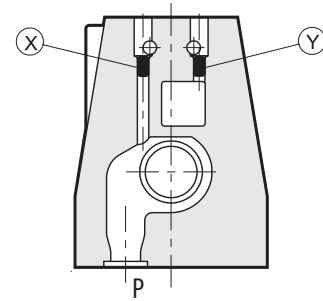
■ Plugged    □ Unplugged

## PRESSURES

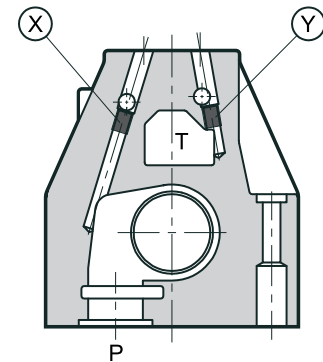
PRESSURE	MIN	MAX
Piloting pressure on X port	220 psi (15 bar)	3600 psi (250 bar)
Pressure on T port with internal drain	-	440 psi (30 bar)
Pressure on T port with external drain	-	3600 psi (250 bar)

### PLUG MOUNTING

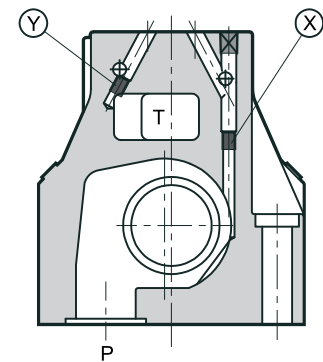
VED05\*MX



VED07MX



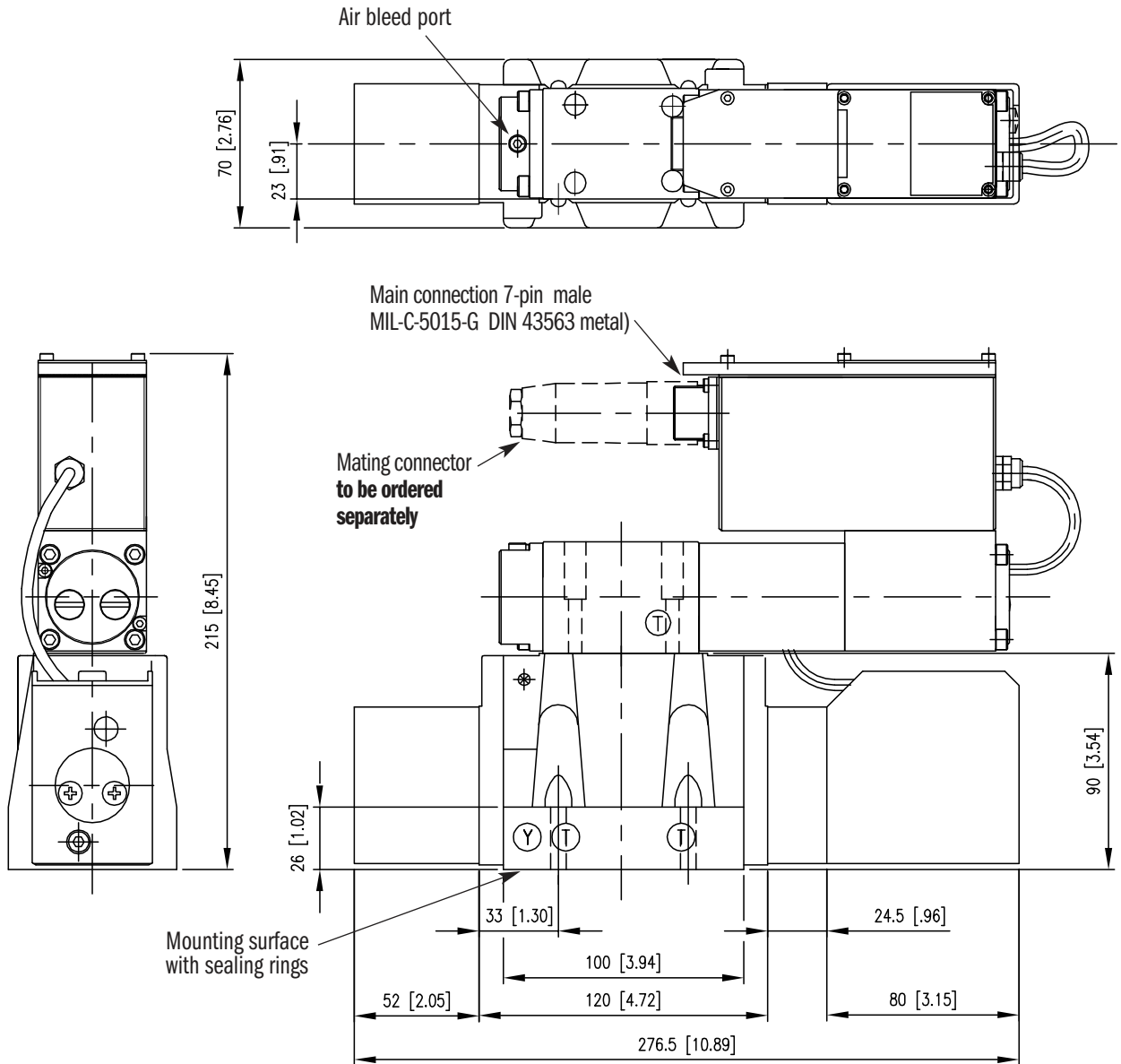
VED08MX





# OVERALL AND MOUNTING DIMENSIONS VED05\*MX

Dimensions in mm [IN]



In order to avoid electromagnetic noises and fulfill the EMC regulations, a 7-pin metal plug according to MIL-C-2015 G should be used instead of the standard plastic 6+PE plug.

The plug is not supplied, but can be ordered separately.

### THREAD OF MOUNTING HOLES

1/4 - 20 UNC-2B x 0.60

### FASTENING

4 bolts 1/4 - 20 UNC-2B X 1 1/2

### TIGHTENING TORQUE

6 lbf-ft (8 Nm)

### SEALING RINGS

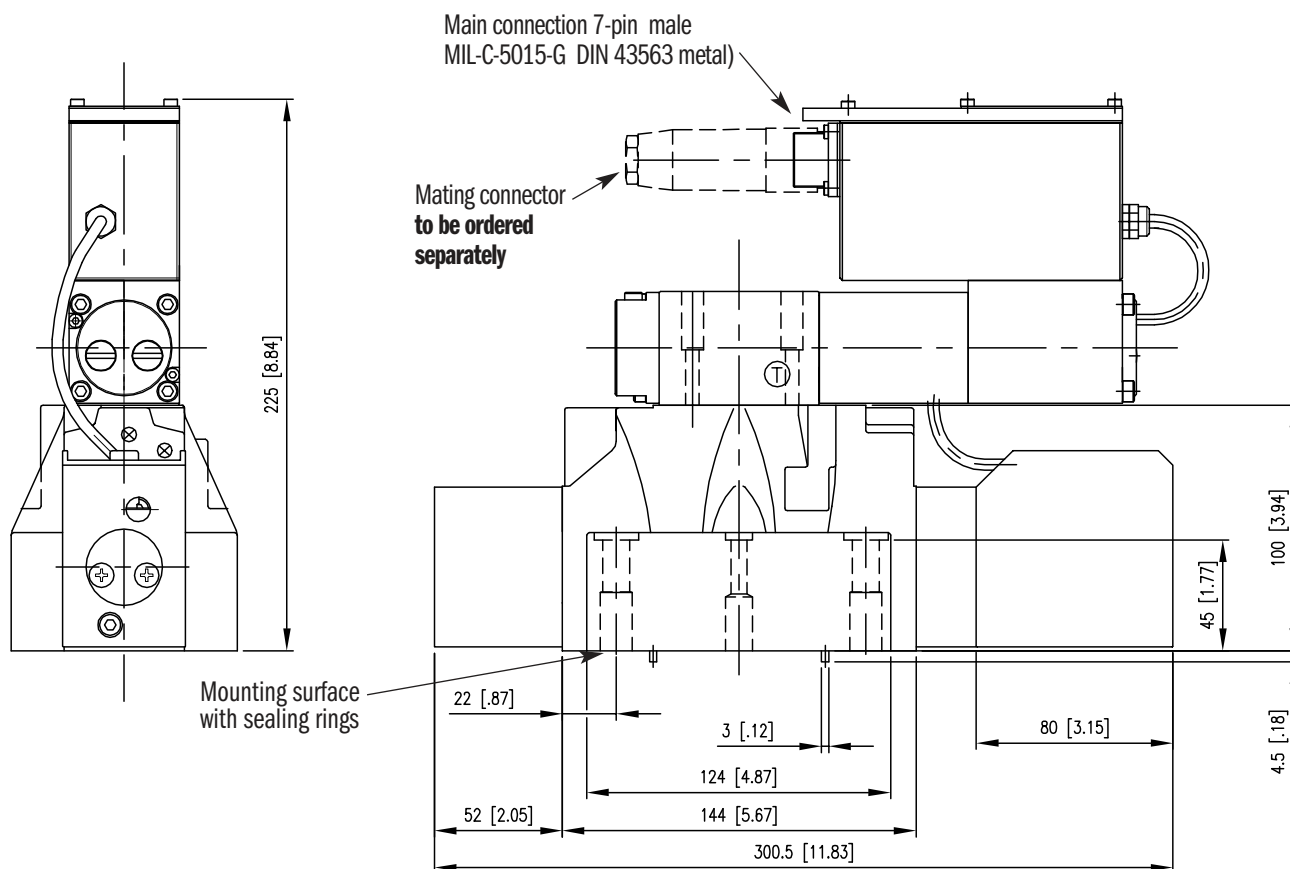
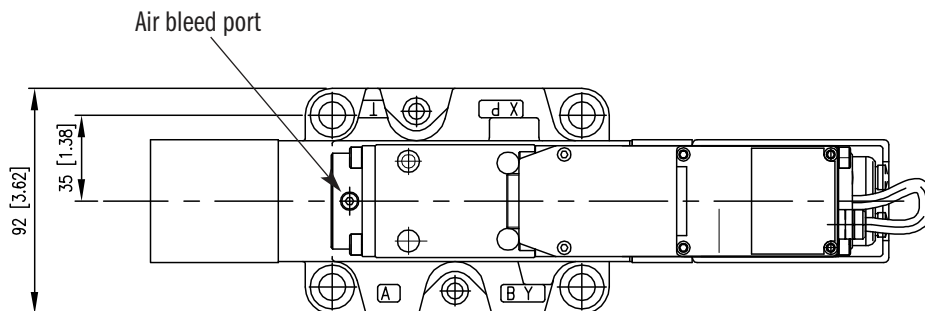
5 O-rings AS568-014 90 Shore A

2 O-rings AS568-012 90 Shore A



# OVERALL AND MOUNTING DIMENSIONS VED07MX

Dimensions in mm [IN]



### THREAD OF MOUNTING HOLES

1/4 - 20 UNC-2B x 0.60

3/8 - 16 UNC-2B x 0.90

### FASTENING

2 bolts 1/4 - 20 UNC-2B x 2 (50 mm)

4 bolts 3/8 - 16 UNC-2B x 2 1/2 (60 mm)

### TIGHTENING TORQUE

1/4 - 20 UNC-2B: 6 lb-ft (8 Nm)

3/8 - 16 UNC-2B: 29.5 lb-ft (40 Nm)

### SEALING RINGS

4 O-rings 22.22mm ID x 2.62 CS 90 Shore A

2 O-rings AS568-012 90 Shore A

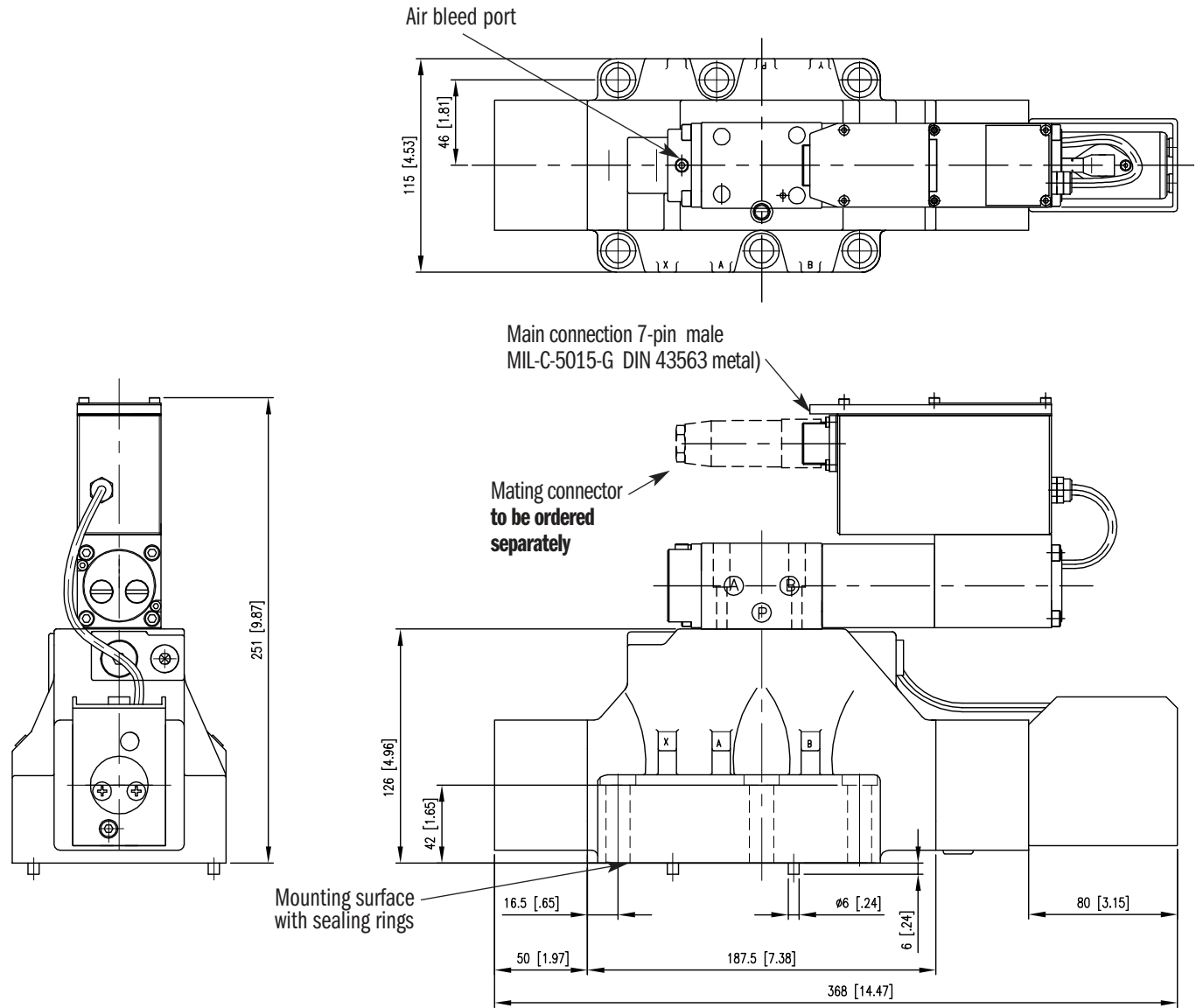


In order to avoid electromagnetic noises and fulfill the EMC regulations, a 7-pin metal plug according to MIL-C-2015 G should be used instead of the standard plastic 6+PE plug.

The plug is not supplied, but can be ordered separately.

# OVERALL AND MOUNTING DIMENSIONS VED08MX

Dimensions in mm [IN]



In order to avoid electromagnetic noises and fulfill the EMC regulations, a 7-pin metal plug according to MIL-C-2015 G should be used instead of the standard plastic 6+PE plug.

The plug is not supplied, but can be ordered separately.

### THREAD OF MOUNTING HOLES

1/2 - 13 UNC x 0.90

### FASTENING

6 bolts 1/2 - 13 UNC X 2 1/2 (60 mm)

### TIGHTENING TORQUE

51 lbf-ft (69 Nm)

### SEALING RINGS

4 O-rings AS568-123 90 Shore A

2 O-rings AS568-117 90 Shore A

# ELECTRICAL CHARACTERISTICS

The proportional valve is controlled by a digital amplifier (driver), which incorporates a microprocessor that controls all the valve functions.

## THE STANDARD VALVE IS SET AT THE FACTORY WITH:

- UP/DOWN ramp at zero value
- Deadband compensation preset at factory
- Max valve opening (100% of spool stroke)

It is possible to customize these and others parameters using the optional kit, VEA-PB7 to be ordered separately (see related literature).

## THE DIGITAL DRIVER ENABLES THE VALVE TO REACH BETTER PERFORMANCE COMPARED TO THE ANALOG VERSION, AND GIVES:

- Reduced response times
- Optimization and reproducibility of the characteristic curve, optimized in factory for each valve
- Complete interchangeability in case of valve replacement
- Opportunity to set, via software, the functional parameters
- Opportunity to perform a diagnostic program by means of the LIN connection
- High immunity to electromagnetic interference

The electronic card is available with (OBC) or without (OBW/OBM) external enabling signal feature.

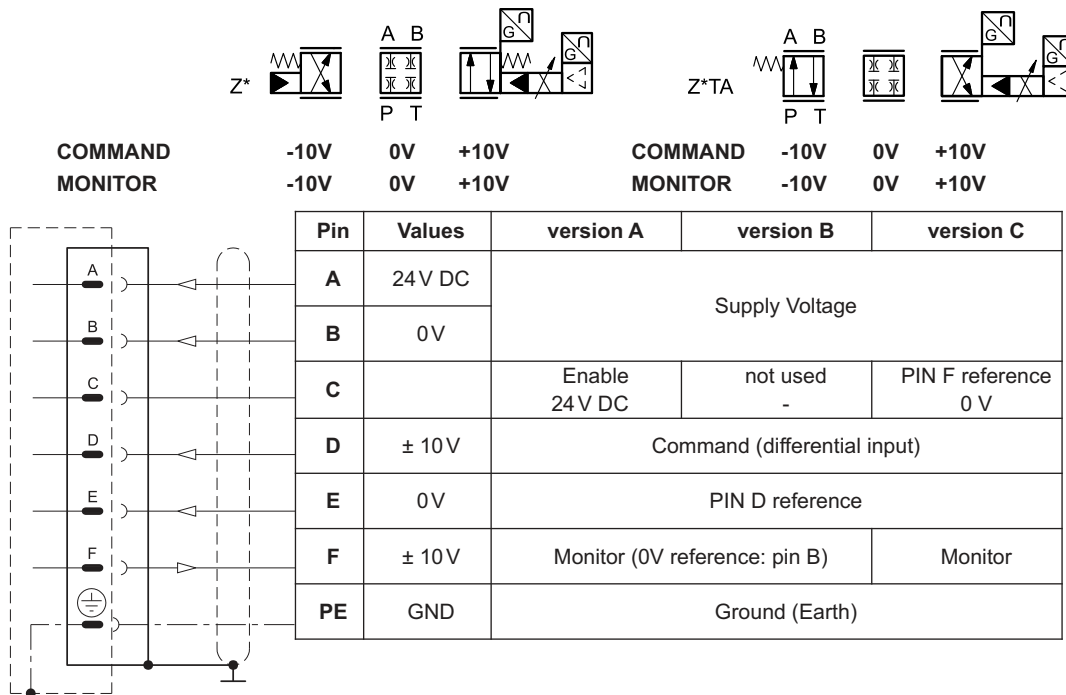
<b>POWER SUPPLY</b>	24V DC (19V to 35V, ripple max 3Vpp)	
<b>ABSORBED POWER</b>	35 VA	
<b>MAX CURRENT</b>	2.6 A	
<b>DUTY CYCLE</b>	100%	
<b>MAIN CONNECTOR</b>	7-pin MIL-C-5015 G (DIN 43563)	
<b>ELECTROMAGNETIC COMPATIBILITY (EMC)</b>	Emissions	IEC EN 61000-6-4
	Immunity	IEC EN 61000-6-2
<b>PROTECTION AGAINST ATMOSPHERIC AGENTS</b>	IEC 60529	IP 65 / 67
<b>ELECTRICAL PROTECTION</b>	Overload electronics overheating LVDT sensor error, cable break power failure or < 4 mA	

<b>COMMAND SIGNAL</b>	voltage (E0)	V DC	±10 (Impedance Ri > 11 kΩ)
	current (E1)	mA	4-20 (Impedance Ri = 58 Ω)
<b>MONITOR SIGNAL</b>	voltage (E0)	V DC	±10 (Impedance Ro > 1 kΩ)
	current (E1)	mA	4-20 (Impedance Ro = 500 Ω)

## E0 VERSION - VOLTAGE REFERENCE SIGNAL

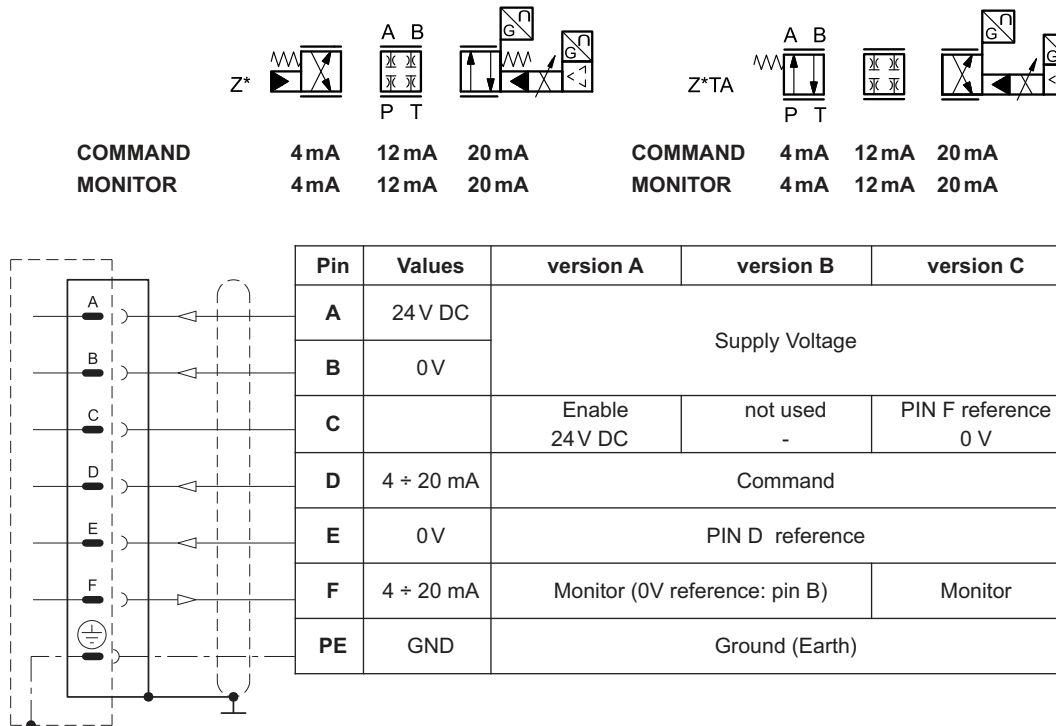
Reference signal required is  $\pm 10$  volt.

The monitor signal is  $\pm 10$  volt. This signal is available 0.5 sec after card is powered on OBW / OBM.



## E1 VERSION - CURRENT REFERENCE SIGNAL

Reference signal required is 4-20 mA. If the current value drops below 4 mA, the card will shut down until the correct signal has been applied. The monitor signal is 4-20 mA. This signal is available 0.5 sec after card is powered on OBW / OBM.



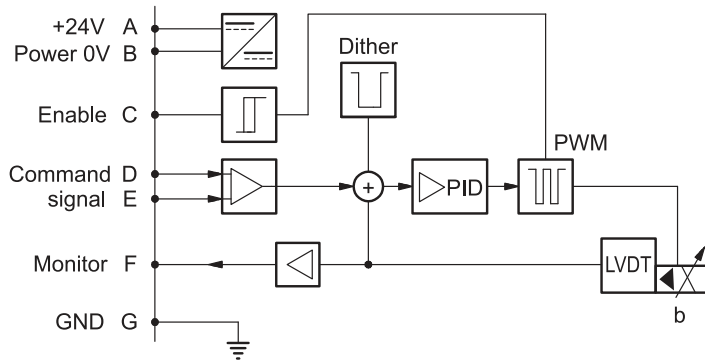
# OBC / OBW / OBM VERSIONS

OBC version is programmed for use of an external 24 volt Enable signal applied at Pin C to allow the valve to function. The Monitor signal output is referenced between Pin F and Pin B.

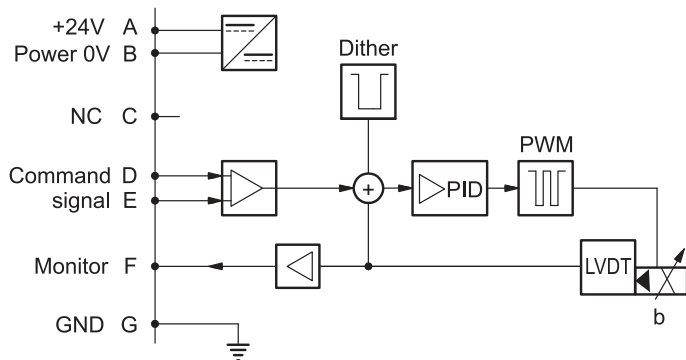
OBW version is programmed for Internal enable, power for enable is taken directly from the power supply. The power to the valve must be turned off to disable the valve. The Monitor signal output is referenced between Pin F and Pin B.

OBM version is programmed for Internal enable, power for enable is taken directly from the power supply. The power to the valve must be turned off to disable the valve. The Monitor signal output is reference between Pin F and Pin C for PIN to Pin interchangeability with other manufacturers.

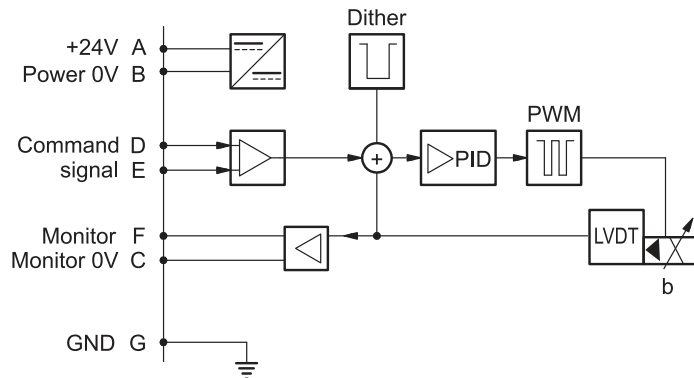
## OBC ON-BOARD FUNCTION



## OBW ON-BOARD FUNCTION



## OBM ON-BOARD FUNCTION



# APPLICATION DATA

## FLUIDS

All pressure drops shown on these data pages are based on 170 SUS fluid viscosity and 0.87 specific gravity. For any other specific gravity (G1) the pressure drop ( $\Delta P$ ) will be approx.  $\Delta P_1 = \Delta P (G1/G)$ . See the chart for other viscosities.

FLUID VISCOSITIES	Cst	10	14.5	32	36	43	54	65	76	86	108	216	324	400
	SUS	60	75	150	170	200	250	300	350	400	500	1000	1500	1900
MULTIPLIER		0.77	0.81	0.97	1.00	1.04	1.10	1.15	1.20	1.24	1.31	1.56	1.72	1.83

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. For fluids HFDR type (phosphate esters) use FPM seals (code G). For the use of other kinds of fluid such as HFA, HFB, HFC, please consult our technical department.

Using fluids at temperatures higher than 180 degrees F causes the accelerated degradation of seals as well as degradation of the fluids physical and chemical properties.

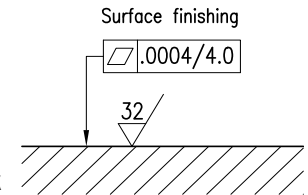
From a safety standpoint, temperatures above 130 degrees F are not recommended.

## INSTALLATION

VED\*MX valves can be installed in any position without impairing correct operation.

Ensure that there is no air in the hydraulic circuit.

Valves are fixed by means of screws or tie rods on a flat surface with planarity and roughness equal to or better than those indicated in the relative symbols. If minimum values are not observed, fluid can easily leak between the valve and support surface.



## 7 PIN PLUGS AND CORD ASSEMBLIES

VEA-3P7P-A	Straight plug 7-pin plastic housing	264893
VEA-3P7M-A	Straight plug 7-pin metal housing	265947
VEA-3P7C-A	Straight plug 7-pin metal housing with 3 meter cord	1013946
VEA-3P7C-6-A	Straight plug 7-pin metal housing with 6 meter cord	1019090

## BOLT KITS

D05 SIZE	BD05H-150	Valve only	1009397
D07 SIZE	BD07-250	Valve only	1009400
D05 SIZE	BD08-250	Valve only	1009401

VED\*MX - PILOT OPERATED, SERVO-PROPORTIONAL DIRECTIONAL CONTROL VALVE





POWERFUL  
DURABLE  
INNOVATIVE  
PRECISE  
DURABLE  
EFFICIENT  
VERSATILE

## ABOUT CONTINENTAL HYDRAULICS

Rugged, durable, high-performance, efficient—the reason Continental Hydraulics' products are used in some of the most challenging applications across the globe. With a commitment to quality customer support and innovative engineering, Continental's pumps, valves, power units, mobile and custom products deliver what the markets demand. Continental has been serving the food production, brick and block, wood products, automotive and machine tool industries since 1962. Learn how our products survive some of the most harsh environments.

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