



# Water Hammer Relief, Pilot Operated 2 Port Solenoid Valve For Water and Oil

## Series VXR21/22/23



- Water hammer is alleviated.
- Easy to disassemble and reassemble in a short time.

VC□

VDW

VQ

VX2

**VX□**

VX3

VXA

VN□

LVC

LVA

L VH

LVD

LVQ

LQ

LVN

TI/  
TIL

PA

PAX

PB

### Variations

**Valve**

Normally closed (N.C.)

Normally open (N.O.)

**Rated voltage**

AC  
Standard — 100 V, 200 V  
Option — 48 V, 110 V, 220 V, 240 V

DC  
Standard — 24 V  
Option — 12 V

**Material**

Body — BC6  
Seal — NBR, FKM

**Electrical entry**

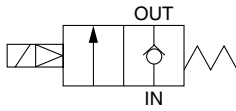
- Grommet
- Conduit
- DIN terminal
- Conduit terminal

**Model**

Model	Port size Rc	Orifice size (mmØ)
VXR215 $\frac{1}{2}$	1/2, 3/4	20
VXR226 $\frac{1}{2}$	1	25
VXR227 $\frac{1}{2}$	1 1/4	35
VXR238 $\frac{1}{2}$	1 1/2	40
VXR239 $\frac{1}{2}$	2	50

## Normally Closed (N.C.)

JIS Symbol



## Fluid

Standard specifications	Option <sup>Note 1)</sup>
Water (Standard, up to 60°C)	High temperature water ..... (D)
Turbine oil	High temperature oil ..... (D)



Note) Refer to page 17-3-11 "Applicable Fluids Check List" for details of special fluids outside of the standard options and specifications.

## Model/Valve Specifications

Connection Thread	Orifice size (mmø)	Model	Min. operating pressure differential (MPa)	Max. operating pressure differential (MPa)		Flow characteristics		Max. system pressure (MPa)	Weight (g)
				Water	Oil	Water, Oil			
1/2	20	VXR2150-04	0.04	1.0	0.7	160	6.5	1.5	1250
3/4	20	VXR2150-06				180	7.5		1250
1	25	VXR2260-10				290	12		1730
1 1/4	35	VXR2270-12				530	22		2900
1 1/2	40	VXR2380-14				720	30		3700
2	50	VXR2390-20				1200	48		4600



Note) Weight of grommet type. Add 10 g for conduit type, 30 g for DIN terminal 60 g for conduit terminal type respectively.

- Refer to "Glossary" on page 17-3-15 for details of max. operating pressure differential min. operating pressure differential and max. system pressure.

## Solenoid Specifications

Model	Power source	Frequency (Hz)	Apparent power (VA)		Power consumption W (Holding)	Temperature rise (°C) (Rated voltage)
			Inrush	Holding		
VXR21	AC	50	20	11	4.5	45
		60	17	7	3.2	35
VXR22	DC	—	—	—	6	55
		50	40	18	7.5	60
VXR23	AC	60	35	12	6	50
		—	—	—	8	60
VXR23	DC	50	50	21	11	65
		60	45	17	9.5	60
		—	—	—	11.5	65



- Note) • They are values in an ambient temperature of 20°C ±5°C and application of rated voltage.
- Changing a coil from AC to DC is possible, but it's impossible to change from DC to AC.  
(Hum sound may generate because of no shading coil for DC.)
  - Return voltage is 20% or more of the rated value at AC power and 2% or more at the DC power.
  - Allowable voltage fluctuation is ±10% of the rated voltage.

## Operating Fluid and Ambient Temperature

Temperature conditions	Power source	Operating fluid temperature (°C)				Ambient temperature (°C)
		Water (Standard)	Oil (Standard)	High temperature water <sup>(2)</sup> (D)	High temperature oil <sup>(2)</sup> (D)	
Maximum	AC	60	60	80	80	60
	DC	40	40	—	—	40
Minimum	AC/DC	1	-5 <sup>(1)</sup>	—	—	-10



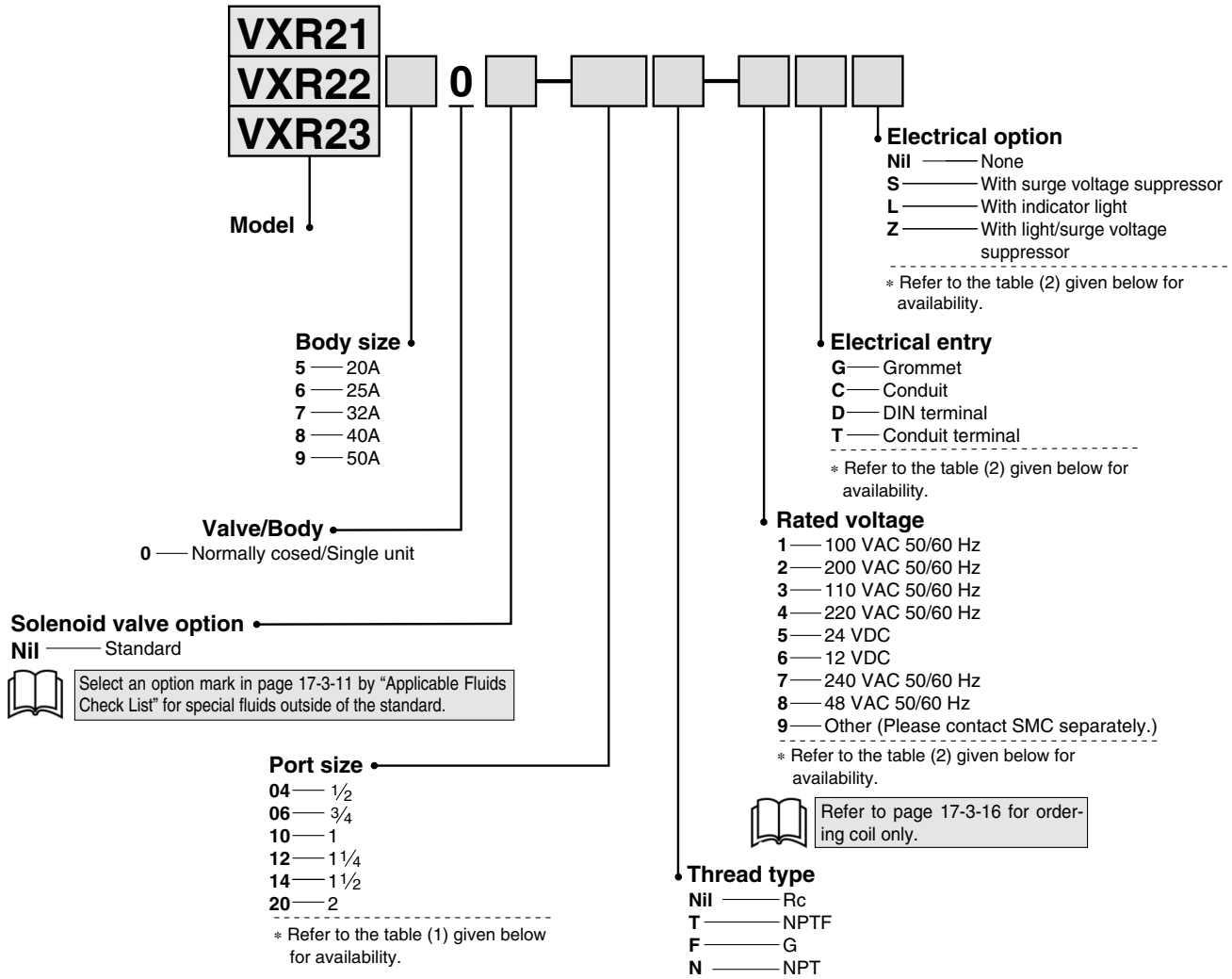
Note 1) 50 cSt or less

Note 2) "D" in parentheses is an option symbol.

# Water Hammer Relief, Pilot Operated 2 Port Solenoid Valve For Water and Oil Series VXR21/22/23

The VX\* series will be revised shortly.

## How to Order (Normally Closed)



- VC
- VDW
- VQ
- VX2
- VX
- VX3
- VXA
- VN
- LVC
- LVA
- LVH
- LVD
- LVQ
- LQ
- LVN
- TI/TIL
- PA
- PAX
- PB

**Table(1)**  
**Connection Size and Applicable Model**

Size	Applicable model
1/2	VXR2150-04
3/4	VXR2150-06
1	VXR2260-10
1 1/4	VXR2270-12
1 1/2	VXR2380-14
2	VXR2390-20

**Ordering example**

(Example) Series VXR21, Rc 3/4, 24 VDC,  
 Conduit terminal  
 (Part no.) **VXR2150-06-5T**

**Table(2)**  
**Rated Voltage-Electrical Entry-Electrical**

Insulation type	Class B				Class H		
	G	C	D, T	G, C	T		
Electrical entry	G	C	D, T	G, C	T		
Electrical option	S <sup>Note)</sup>	—	S, L, Z	—	S, L, Z		
AC	1 (100 V)	●	●	●	●	●	
	2 (200 V)	●	●	●	●	●	
	3 (110 V)	●	●	●	●	●	
	4 (220 V)	●	●	●	●	●	
	7 (240 V)	●	●	—	●	—	
DC	5 (24 V)	●	●	●	—	—	
	6 (12 V)	●	●	●	—	—	

Note) Surge voltage suppressor is attached in the middle of lead wire.

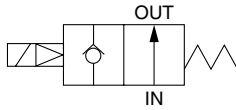
**Made to Order Specifications**

**Splashproof Specifications** (Based on JIS C 0920 Based on IEC529IP-X4)

VXR  Model —  Port size —  Electrical entry - X36  
 DIN terminal or class H coil not available.

## Normally Open (N.O.)

JIS Symbol



## Fluid

Standard specifications	Option <sup>Note)</sup>
Water (Standard, up to 60°C)	High temperature water ..... (D)
Turbine oil	High temperature oil ..... (D)



Note) Refer to page 17-3-11 "Applicable Fluids Check List" for details of special fluids outside of the standard options and specifications.

## Model/Valve Specifications

Connection Thread	Orifice size (mmø)	Model	Min. operating pressure differential (MPa)	Max. operating pressure differential (MPa)		Flow characteristics		Max. system pressure (MPa)	Weight (g)
				Water	Oil	Water, Oil Av x 10 <sup>-6</sup> m <sup>2</sup>	Cv converted		
1/2	20	VXR2152-04	120	0.7	0.6	160	6.5	1.5	1270
3/4	20	VXR2152-06	135			180	7.5		1270
1	25	VXR2262-10	210			290	12		1770
1 1/4	35	VXR2272-12	400			530	22		2900
1 1/2	40	VXR2382-14	540			720	30		3700
2	50	VXR2392-20	860			1200	48		4600



Note) Weight of grommet type. Add 10 g for conduit type, 30 g for DIN terminal type, 60 g for conduit terminal type respectively.

- Refer to "Glossary" on page 17-3-15 for details of max. operating pressure differential and min. operating pressure differential and max. system pressure.

## Solenoid Specifications

Model	Power source	Frequency (Hz)	Apparent power (VA)		Power consumption (W) (Holding)	Temperature rise (°C) (Rated voltage)
			Inrush	Holding		
VXR21	AC	50	25	12	5	50
		60	20	8	3.5	35
VXR22	AC	50	45	20	8	55
		60	40	15	6.5	45
VXR23	AC	50	60	25	0.5	60
		60	50	20	9.5	50
	DC	—	—	—	11.5	55



- Note) • They are values in an ambient temperature of 20°C ± 5°C and application of rated voltage.  
 • Changing coils from AC to DC and vice versa is impossible. because of different core shapes.  
 • Return voltage is 20% or more of the rated value at AC power and 5% or more at the DC power.  
 • Allowable voltage fluctuation is ±10% of the rated voltage.

## Operating Fluid and Ambient Temperature

Temperature conditions	Power source	Operating fluid temperature (°C)				Ambient temperature (°C)
		Water (Standard)	Oil (Standard)	High temperature water <sup>(2)</sup> (D)	High temperature oil <sup>(2)</sup> (D)	
Maximum	AC	60	60	80	80	60
	DC	40	40	—	—	40
Minimum	AC/DC	1	-5 <sup>(1)</sup>	—	—	-10



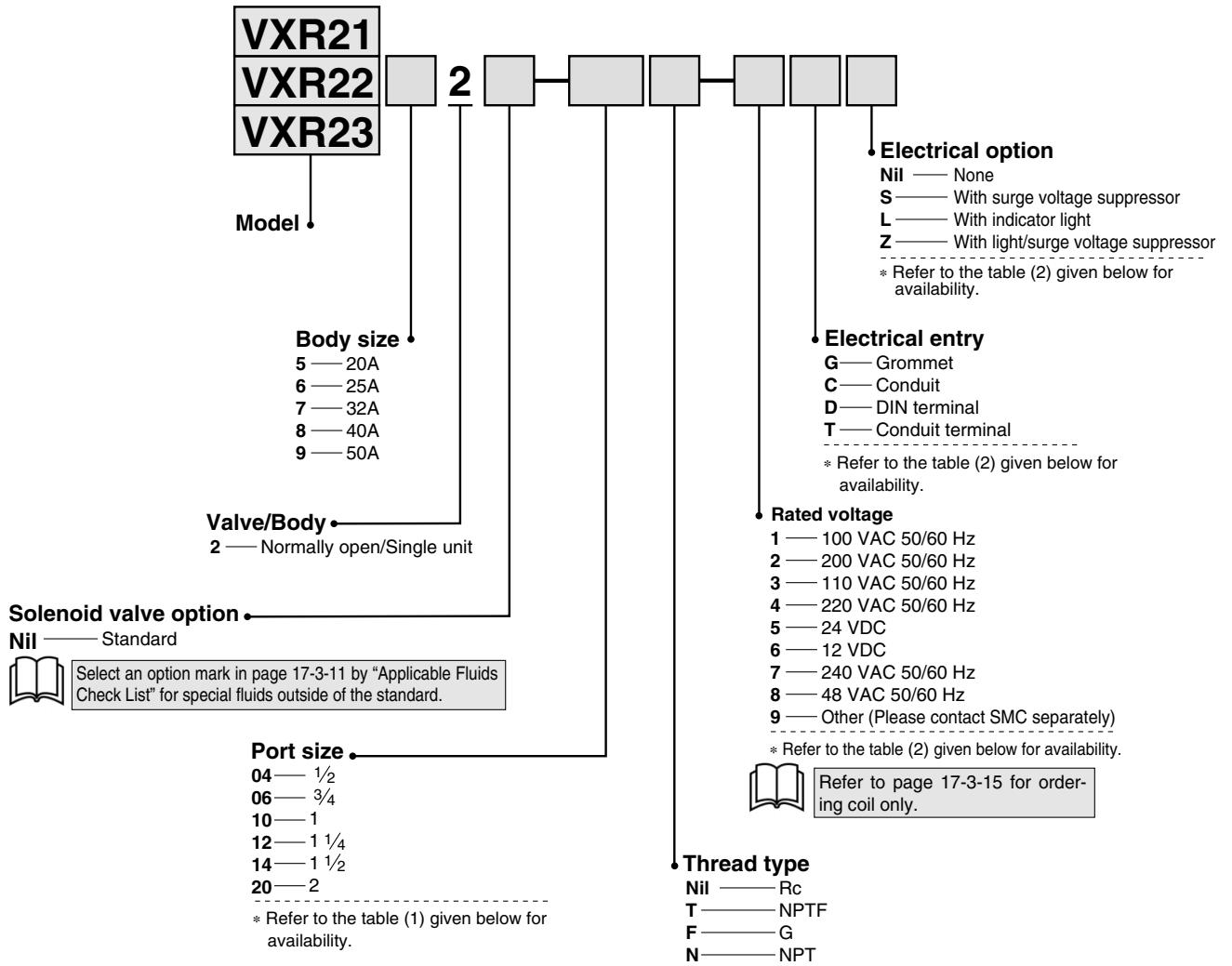
Note 1) 50 cSt or less

Note 2) "D" in parentheses is an option symbol.

# Water Hammer Relief, Pilot Operated 2 Port Solenoid Valve For Water and Oil Series VXR21/22/23

The VX\* series will be revised shortly.

## How to Order (Normally Open)



VC

VDW

VQ

VX2

VX

VX3

VXA

VN

LVC

LVA

L VH

LVD

L VQ

LQ

L VN

T/ TIL

PA

PAX

PB

**Table (1)  
 Connection Size and Applicable Model**

Size	Applicable model
1/2	VXR2152-04
3/4	VXR2152-06
1	VXR2262-10
1 1/4	VXR2272-12
1 1/2	VXR2382-14
2	VXR2392-20

**Ordering example**

(Example) Series VXR22, Rc 1 1/4, 200 VAC,  
 Conduit terminal  
 (Part no.) **VXR2272-12-2G**

**Table (2)  
 Rated Voltage-Electrical Entry-Electrical Option**

Insulation type	Class B				Class H		
	G	C	D, T	L, Z	G, C	S	T
Electrical entry	S	—	S	L, Z	—	S	L, Z
Electrical option	S	—	S	L, Z	—	S	L, Z
AC	1 (100 V)	●	●	●	●	●	●
	2 (200 V)	●	●	●	●	●	●
	3 (110 V)	●	●	●	●	●	●
	4 (220 V)	●	●	●	●	●	●
	7 (240 V)	●	●	●	—	●	●
DC	8 (48 V)	●	●	●	—	●	—
	5 (24 V)	●	●	●	—	—	—
	6 (12 V)	●	●	●	—	—	—

Note) Surge voltage suppressor is attached in the middle of lead wire.

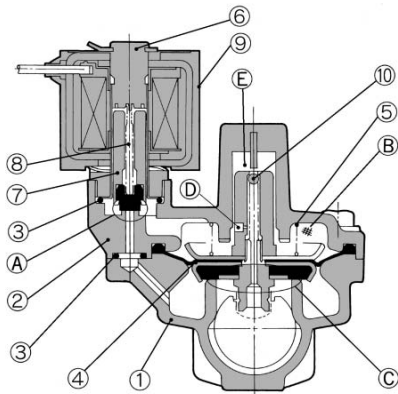
**Made to Order Specifications**

**Splashproof Specifications** (Based on JIS C 0920 Based on IEC529IP-X4)

VXR Model — Port size — Electrical entry - X36  
 DIN terminal or class H coil not available.

## Construction/Principal Parts Material

## Normally Closed (N.C.)

**Operation**

< **Valve opened** > When the coil ⑨ is energized the armature assembly ⑦ is attracted into the core of the core assembly ⑥ and the pilot valve ① opens. Then the pressure in the pressure action chamber ② falls to open the main valve ③.

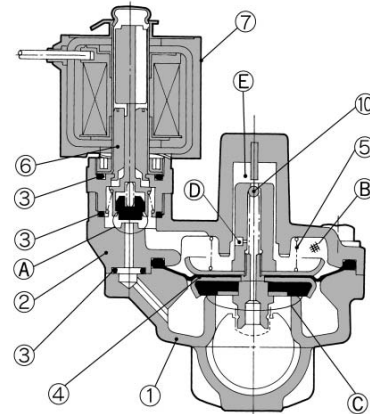
< **Valve closed** > When the coil ⑨ is not energized, the pilot valve ① is closed and the pressure in the pressure action chamber B rises and the main valve ③ closes.

**Water hammer relieving**

Check valve mechanism is provided in the ④ side of the supply orifice ⑤ and ⑥ and supply into the pressure action chamber ② can be controlled with two stages by moving the diaphragm assembly ④. After release of the energy, when the open amount of the main valve ③ becomes small, ④ is blocked. A low valve closing speed relieves the water hammer.

No.	Description	Material	
		Standard	Option
①	Body	BC6	—
②	Bonnet	BC6	—
③	O-ring	NBR	FKM
④	Diaphragm assembly	Stainless steel, Brass NBR	Stainless steel, Brass FKM
⑤	Valve spring	Stainless steel	—
⑥	Core assembly	Stainless steel, Copper	—
⑦	Armature assembly	Stainless steel, NBR	Stainless steel, FKM
⑧	Return spring	Stainless steel	—
⑨	Coil assembly	Class B molded	Class H molded

## Normally Open (N.O.)

**Operation**

< **Valve opened** > When the coil ⑦ is energized the opened pilot ① closes, the pressure in the pressure action chamber ② rises and the main valve ③ closes.

< **Valve closed** > When the coil ⑦ is not energized, the closed pilot valve ① opens, the pressure in the pressure action chamber B drops and the main valve ③ opens.

**Water hammer relieving**

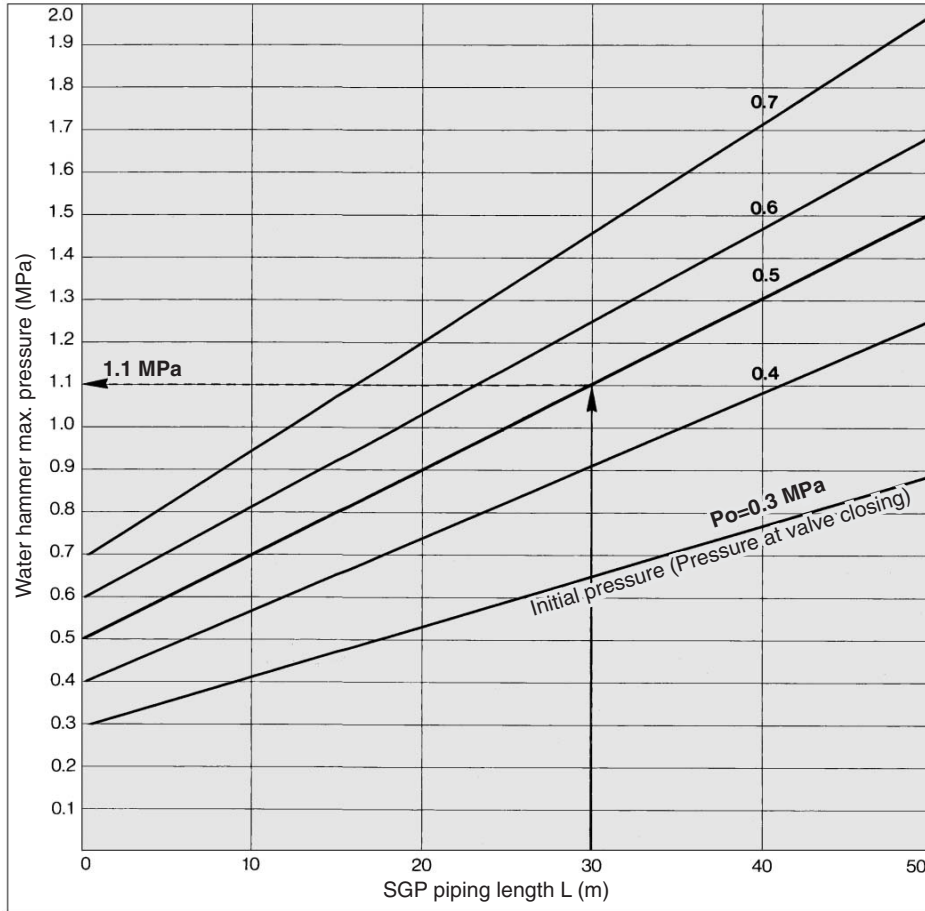
Check valve mechanism is provided in the ④ side of the supply orifice ⑤ and ⑥ and supply into the pressure action chamber ② can be controlled with two stages by moving the diaphragm assembly ④. After release of the energizing, when the open amount of the main valve ③ becomes small, ④ is blocked. A low valve closing speed relieves the water hammer.

No.	Description	Material	
		Standard	Option
①	Body	BC6	—
②	Bonnet	BC6	—
③	O-ring	NBR	FKM
④	Diaphragm assembly	Stainless steel, Brass NBR	Stainless steel, Brass FKM
⑤	Valve spring	Stainless steel	—
⑥	Core assembly	Stainless steel, Copper, NBR, Polyacetal, PTFE	Stainless steel, Copper FKM, PTFE
⑦	Coil assembly	Class B molded	Class H molded

Water Hammer Relief, Pilot Operated 2 Port Solenoid Valve For Water and Oil **Series VXR21/22/23**

The VX\* series will be revised shortly.

Water Hammer Relieving Characteristics (VXR2150/2152/2260/2262)



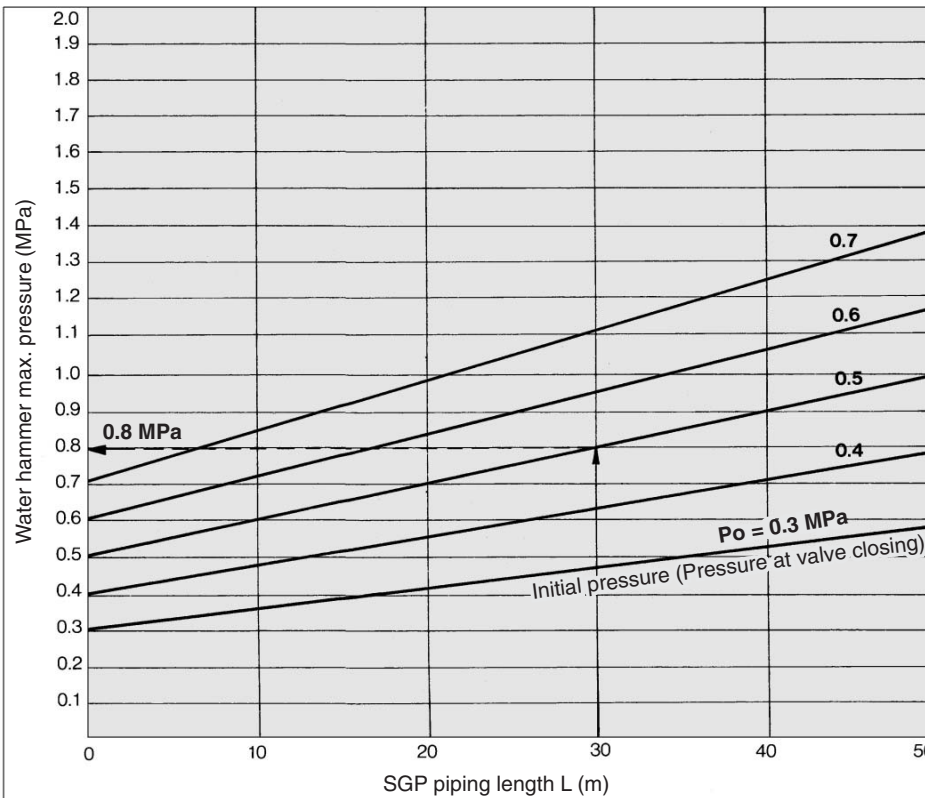
Water hammer

(Example) Series VXR2 prevents damage of piping, equipment and system and generation of vibration through a great relieving of a water hammer generated using an ordinary solenoid valve.

How to read the graph

When the SGP piping having the same bore as the solenoid valve is 30 m in length, the maximum pressure at the initial pressure of 0.5 MPa results in about 1.1 MPa. (General purpose solenoid valve is 4.0 to 7.0 MPa.)

Water Hammer Relieving Characteristics (VXR2270/2272/2380/2382/2390/2392)



How to read the graph

When the SGP piping having the same bore as the solenoid valve is 30 m. in the length, the maximum pressure at the initial pressure of 0.5 MPa results in about 0.8 MPa. (General purpose solenoid valve is 2.0 to 4.0 MPa.)

- VC
- VDW
- VQ
- VX2
- VX
- VX3
- VXA
- VN
- LVC
- LVA
- LVH
- LVD
- LVQ
- LQ
- LVN
- TI/TIL
- PA
- PAX
- PB



# Series VXR21/22/23

The VX\* series will be revised shortly.

## Dimensions

Normally Closed: VXR21□0/22□0/23□0 Normally Open: VXR21□2/22□2/23□2

**Grommet: G**

**Conduit: C**

**DIN terminal: D**

**Conduit terminal: T**

Model		Port size P Rc	A	B	C	D	E	F	H	J	K	L	Electrical entry									
													Grommet		Conduit		DIN terminal			Conduit terminal		
Normally closed	Normally open												M	N	M	N	M	N	Q	M	N	Q
VXR2150-06	VXR2152-06	1/2, 3/4	80	101 (112)	18	32.5	36	36	39	41	20	30	74 (81)	23	67 (74)	39	67 (74)	59	47	67 (74)	92	59
VXR2260-10	VXR2262-10	1	90	119 (136)	21	36.5	40	42	45	45	23	35	88 (98)	25.5	80 (90)	41.5	80 (90)	60	48	80 (90)	95	62
VXR2270-12	VXR2272-12	1 1/4	125	126 (143)	26.5	43.5	51.5	53	67.5	57.5	23	35	90 (100)	25.5	82 (92)	41.5	82 (92)	60	48	82 (92)	95	62
VXR2380-14	VXR2382-14	1 1/2	132	142 (157)	30	46.5	54.5	60	72	60	25.5	40	101 (111)	28	93 (103)	44.5	93 (103)	62	50	93 (103)	97	64
VXR2390-20	VXR2392-20	2	150	153 (168)	35.5	52	59	70	81	69	25.5	40	106 (116)	28	98 (108)	44.5	98 (108)	62	50	98 (108)	97	64

( ): N.O.