DynaVar®

Distribution Class (PDV) and Riser Pole (PVR) Surge Arresters

Introducing the NEW PDV-100 OPTIMA

U.S. Patent Numbers: 6,828,895
& 6,956,458

IEEE C62.11 TESTED

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NOTE: Because Hubbell has a policy of continuous product improvement, we reserve the right to change design and specifications without notice.

Introduction

The PDV-100 arrester was introduced in 1986 as the very first U.S. non-ceramic arrester for heavy duty applications. Now, 18 years and 15 million arresters later, we are pleased to introduce the newest addition to the Ohio Brass arrester family, the PDV-100 Optima.

Ohio Brass offers a full line of polymer arresters for distribution voltages. The newest in the line, the PDV-100 Optima, adds all the benefits of a heavy duty distribution arrester, combined with a new disconnector which improves system reliability and increases TOV capability. The PVR targets cable applications where low discharge voltages promote longer cable life. The PDV-65 is our normal duty arrester offering cost effective protection.

The PDV-100 Optima joins an impressive list of advances that Ohio Brass has brought to arrester technology since it began making arresters in 1950. Improvements in design, such as the Optima have increased protective margins and durability. More important in terms of dollars and service reliability, Ohio Brass arresters have generated substantial savings for utilities. On the following pages are additional benefits and capabilities of our arresters.

Benefits of the NEW PDV-100 Optima

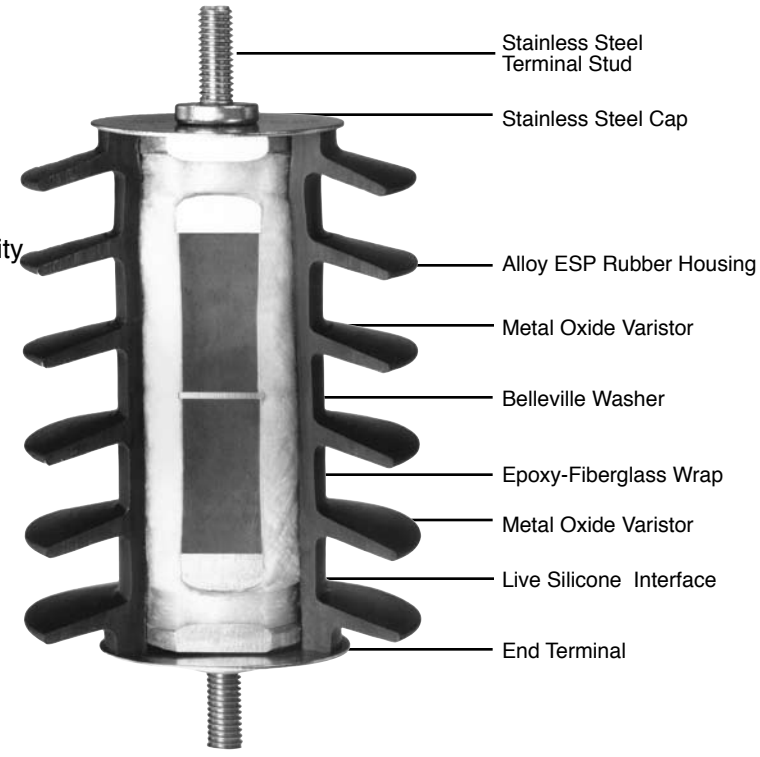
- Improved Isolator Reliability
- Patented Isolator Design Good Down to One Amp Operation
- Saves Utilities Money and Improves System Reliability
- New Universal Protective Cap
- Higher 60 Hz TOV Capability
- Field Proven Sealing System

Basic Construction

In the PDV/PVR arresters, the Varistors are locked in place with tightly wound layers of fiberglass filament impregnated with epoxy resin. The arrester housing is made from our proprietary blend of ESP silicone alloy. In addition to ESP's exceptional performance as an insulator material, ESP's properties have been confirmed in a series of performance tests which include tracking resistance, contamination, aging, and seal design.

The PDV/PVR arresters can be used with all standard mounting arms and brackets. They come with all the necessary fasteners, isolators, and terminal attachments. A specially designed glass-filled polyester insulating bracket, with integrated disconnector, along with optional mounting brackets such as the cross arm or transformer bracket, enable mounting the arrester in a way which best suits each individual customer. Below is a typical cross section view of one of our distribution type arresters.

Cutaway View of Typical PDV/PVR Unit



Tests Verify PDV/PVR Arrester Design

Full Scale Fault Current Tests

Short circuit design tests were performed on PDV65, PDV100 Optima, and PVR arresters in accordance with Section 8.18 of IEEE C62.11-2004 Standard. Eight arresters of each type were tested. Per the standard, four samples were tested at the claimed high current withstand capability. Two of these samples were assembled with internal fuse wires. The other two were good arresters which were subjected to an overvoltage condition, which failed the arrester (with a weak source). The arrester was immediately subjected to the claimed high current fault current. Two additional arresters were subjected to fault currents approximately half of the claimed high current value. The fault current duration for all high current tests was 12 cycles. Finally, two arresters were subjected to a nominal 600 amp, 1 second fault current test. All test arresters were 17 kV MCOV, the longest single module configuration used for each arrester type. Tests were performed at full voltage (17 kV rms).

Successful performance was demonstrated when the epoxy-fiberglass wrapped arrester modules burned through to relieve internal pressures associated with the fault current arcing. In all cases, the arrester remained intact, except at the high current levels which caused polymer housing fragmentation, which is acceptable.

The following table summarizes the claimed short circuit capabilities for the arresters.

Arrester Type	Short Circuit Test Current Arms	Short Circuit Test Duration-Sec.
PDV 65	15,000	.20
PDV 65	7,500	.20
PDV 65	500	1.0
PDV 100 Optima	20,000	.20
PDV 100 Optima	10,000	.20
PDV 100 Optima	500	1.0
PVR	20,000	.20
PVR	10,000	.20
PVR	500	1.0

PDV/PVR Design Test Report Summary

The PDV-100 Optima and PDV-65 arresters have been tested in accordance with IEEE Standard C62.11-2004 for metal-oxide surge arresters. There is no standard for PVR arresters so they were tested per the heavy duty requirement.

The PDV-100 Optima/PVR meet or exceed all the requirements for heavy-duty distribution arrester designs. The PDV-65 meets or exceeds all requirements for normal duty surge arresters.

The table below summarizes the capabilities of these designs.

Test	Heavy Duty PDV-100 Optima +Riser Pole PVR	Normal Duty PDV-65
High Current-Short Duration	2 - 100 kA Discharges	2 - 65 kA Discharges
Low Current Long Duration	20 - 250A x 2000 μsec Discharges	20 - 75A x 2000 μsec Discharges
Duty Cycle	20 - 10 kA plus 2 - 40 kA Discharges	22 - 5 kA Discharges

The above is merely a summary of a portion of the design tests performed on PDV/PVR arresters. Contact your Ohio Brass sales representative for complete test reports on these two arresters.

PDV-100 Optima Design Improvements

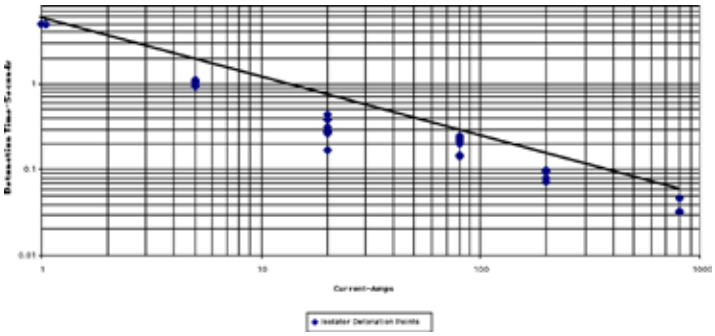
The new Ohio Brass PDV-100 Optima incorporates a redesigned disconnector and a new line end protective cap. Both of these are aimed at improving the overall system reliability.

Improved Disconnector Reliability

Historically distribution class surge arresters were installed with a ground lead disconnecting device. The purpose of this component is to allow a failed (shorted) arrester to automatically disconnect from the line. This allowed the line to quickly be returned to service and also provided a visual indication to crews as to which arrester had failed and needed to be replaced.

Occasionally under conditions that allowed a low fault current to flow through the arrester - damage will occur to the disconnector's internal grading resistor. When this condition occurs the disconnector will not operate. With the introduction of polymer arrester designs this situation was aggravated since it was nearly impossible to identify a failed arrester from the ground and the circuit would be locked out. The PDV-100 Optima design incorporates a patented capacitor-graded Optima disconnector into the insulated bracket attached to the base end of the arrester.

The following curve shows that the low current end of the detonation range for the capacitor-graded Optima disconnector has been extended from 20 amps down to 1 amp. This assures proper disconnector operation even at very low fault current levels.



Laboratory testing has confirmed that the electrical integrity of the capacitor-graded Optima disconnector is not affected by exposure to prolonged TOV conditions or 100 kA lightning duty. In the unlikely event of arrester failure, it does ensure proper detonation of the disconnector, separating the arrester ground lead and preventing lockout from occurring.

New Universal PDV 100 Optima Protective Cap

The new Optima line end protective cap is designed for single or thru connection lead wires. Each side of the cap has webbed fingers which prevent accidental contact with the arrester top end hardware by wildlife.-

Selection Considerations

NORMALLY RECOMMENDED DYNAVAR PDV/PVR MCOV FOR VARIOUS SYSTEM VOLTAGES			
System L-L Voltage kV		Arrester MCOV-kV	
Nominal	Maximum	Effectively Grounded Neutral Circuits	Impedance Grounded and Ungrounded Circuits
2.4	2.54	—	2.55
4.16	4.4	2.55	5.1
4.8	5.08	—	5.1
6.9	7.26	—	7.65
12.0	12.7	7.65	12.7
12.47	13.2	7.65	—
13.2	13.97	8.4	—
13.8	14.52	8.4	15.3
20.78	22.0	12.7	22.0
22.86	24.2	15.3	22.0
23.0	24.34	—	22.0
24.94	26.4	15.3	—
34.5	36.5	22.0	—

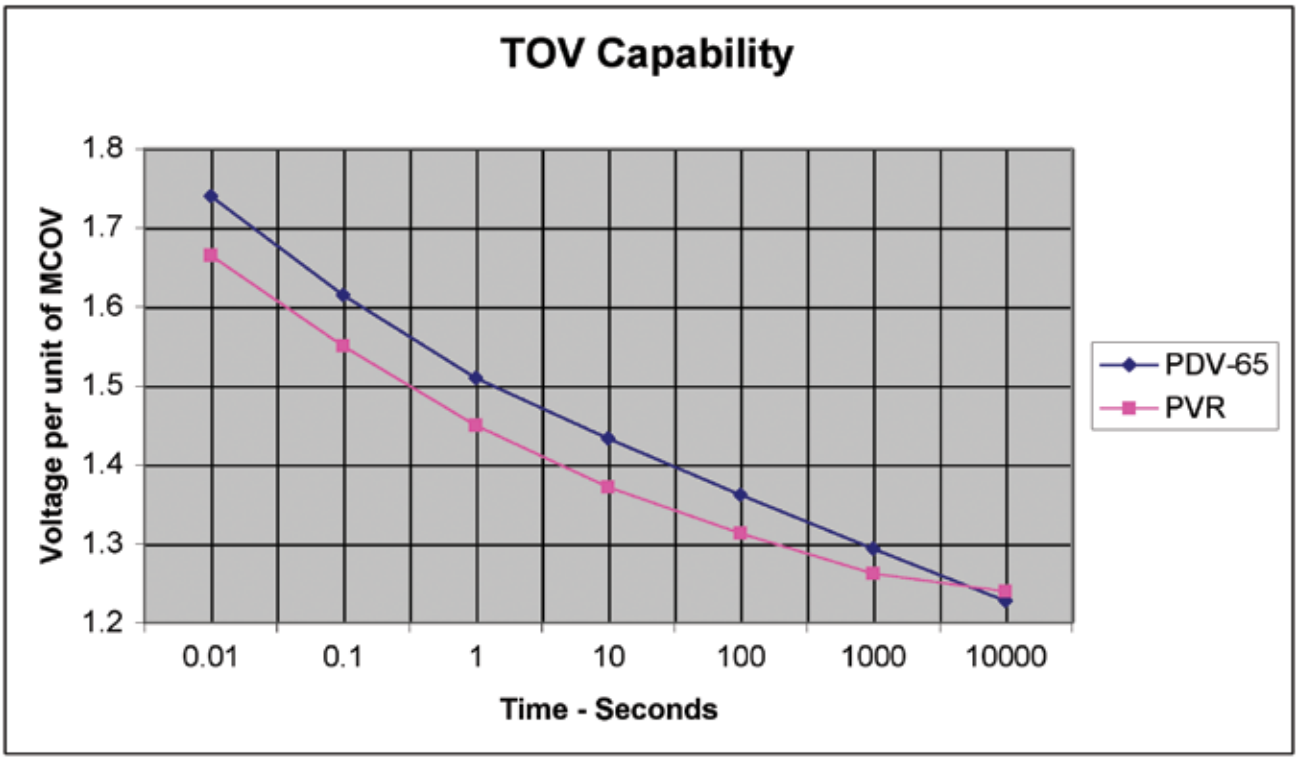
Selection of arrester size is based upon the maximum continuous operating voltage (MCOV) that is applied across the arrester in service (line-to-ground). For arresters on effectively grounded systems, this is normally the maximum line-to-ground voltage -- e.g., 7.65 kV on a 12.47 kV multi-grounded system. For ungrounded or impedance-grounded systems, the MCOV should be at least 90 percent of maximum phase-to-phase voltage. Smaller arresters than shown may be used, contact your Ohio Brass representative for details.

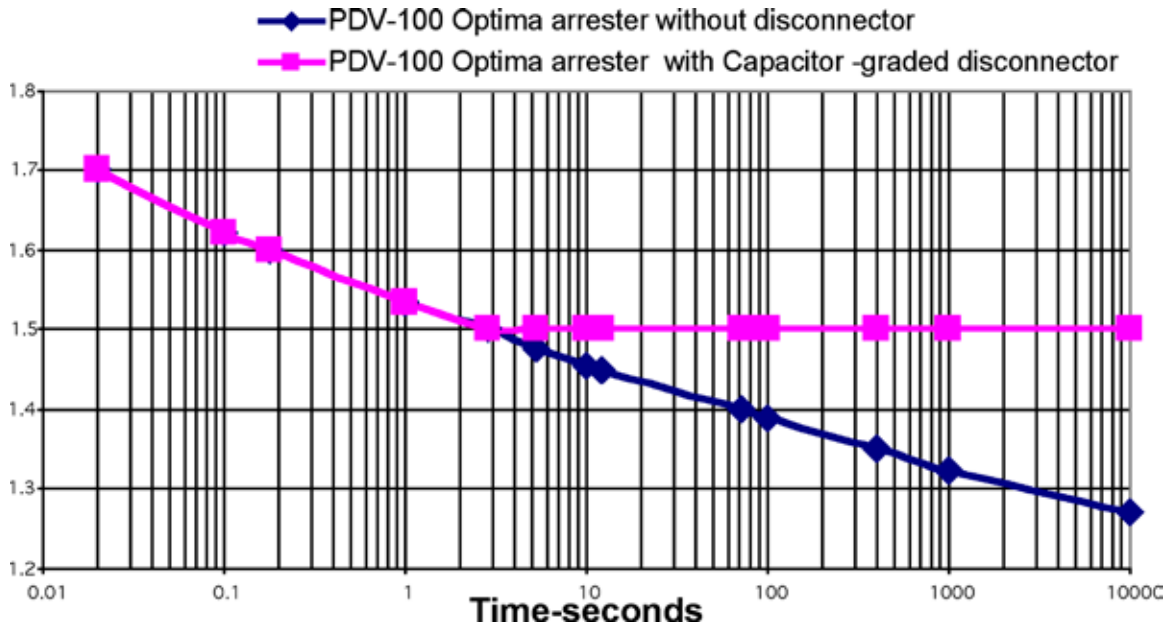
For convenience, the data shown in this catalog includes the traditional duty-cycle voltage rating associated with the MCOV of each arrester.

The selection of the actual type will be primarily governed by the insulation being protected.

Temporary Overvoltage

MOV arresters by nature are voltage sensitive devices. At normal line to ground voltages, the arrester is energized at its MCOV (Maximum Continuous Operating Voltage) and conducts very little current. During disturbances on the system, the arrester can see elevated voltages and therefore higher 60Hz current through the unit. The magnitude and duration of the system-generated temporary over voltage (TOV) that the arrester can withstand is best expressed graphically. The two curves on the next page shows the TOV capability versus time for OB distribution style arresters. The PDV-100 Optima demonstrates an improved TOV capability. The capacitance-based isolator as in a PDV-Optima improves the TOV capability while increasing the reliability of disconnector function. The PDV-100 Optima technology results in a family of TOV curves that are a function of voltage rating of the arrester. Curves for other ratings can be found in our design test report online at http://www.hubbellpowersystems.com. Contact your HPS representative for more information on this new technology.


TOV Capability
Voltage per unit of MCOV
1.8
1.7
1.6
1.5
1.4
1.3
1.2
0.01
0.1
1
10
100
1000
10000
Time - Seconds
PDV-65
PVR


PDV-100 Optima arrester without disconnector
PDV-100 Optima arrester with Capacitor -graded disconnector
1.8
1.7
1.6
1.5
1.4
1.3
1.2
0.01
0.1
1
10
100
1000
1000C
Time-seconds

How to Specify a 7XXX Suffix Hardware Code

Procedure

(Example) To obtain the 7000 code suffix number for a 10 kV duty cycle rated PDV-65 arrester equipped with a line terminal, wire clamp, insulating base bracket, NEMA crossarm hanger for a 4 x 5 crossarm and a ground lead isolator with terminal nut, follow this procedure:

Step 1 - The catalog number (page 8) of the basic 10 kV PDV-65 arrester is 217259.
Step 2 - The 72XX code in the table below specifies the top terminal and wire clamp.
Step 3 - The 7X2X code specifies the insulating base bracket and 4 x 5 NEMA crossarm hanger.
Step 4 - The 7XX4 code specifies the ground lead isolator, terminal nut and nut.
Step 5 - Combine the three suffix digits following the 7 in their correct order gives us the suffix code: 7224.
Step 6 - Order the arrester by complete catalog number 2172597224.

For all PDV-100 Optima Arresters:

The 73XX code will be the only one with a cap. The 74XX code is not available since the Optima only has one cap style which is the newest design.

Notes:

1. The ground isolator identified in codes 7003, 7004 and 7005 is an integral part of the insulating base bracket. The color for the insulating base bracket/ground lead isolator assembly is ANSI-70 gray.
2. Code 7030 identifies the insulating base bracket/transformer mounting bracket combination. The transformer mounting bracket used in code 7030 is Ohio Brass part number 2730664004 (≤ 8.4 kV MCOV) and 2730254004 (≥ 10.2 kV MCOV). A drawing of the 273066 bracket is included on page 11 to assist in applying this arrester. Contact your HPS representative for further information.
3. All terminals are solderless, clamp type, suitable for conductor sizes from No. 6 AWG solid to No. 2 AWG stranded.

If the spacing of the mounting holes on mounting brackets listed are not suitable for the intended application, other mounting brackets are available and in these cases, the HPS sales representative should be consulted.

RECOMMENDED TIGHTENING TORQUES FOR PDV ARRESTER FASTENERS

Fastener	Recommended Tightening Torque
3/8 inch line terminal	20 foot pounds
3/8 inch ground terminal	20 foot pounds
1/2 inch fastener connecting base bracket to crossarm or transformer sidewall bracket	20 foot pounds

TABLE A TOP TERMINAL HARDWARE

	71XX 3/8" Stud (No Option)	72XX Nut & Wire Clamp	73XX Nut, Wire Clamp & Protective Cap (One Slot)	74XX Nut, Wire Clamp & Protective Cap (One Hole)	75XX Nut, Wire Clamp, Protective Cap (One Slot), & 18" Wire Lead	76XX Flipper Fuse Assembly Nut & Wire Clamp	77XX Nut, Wire Clamp, 3-Piece Protective Cap

TABLE B MOUNTING HARDWARE

7X0X No Bracket No Isolator	7X1X Insulated Base Bracket with Isolator	7X2X Insulated Base Bracket with Isolator & NEMA 4x5 X-Arm Bracket	7X3X Insulated Base Bracket with Isolator and Transformer Bracket	7X4X Insulated Base Bracket with Isolator and NEMA Angle Bracket	7X5X Insulated Base Bracket with Isolator & NEMA 6x6 X-Arm Bracket	7X6X Metal Base Mounting Strap	7X7X Metal Base Mounting Strap and NEMA 4x5 X-Arm Bracket

TABLE C LOWER TERMINAL HARDWARE

	7XX1* 3/8" Stud (No Option)	7XX2* Nut, Washers & Threaded Terminal Nut	7XX3 Isolator, Nut, Ground Strap Washer	7XX4 Isolator, Nut, Washer & Threaded Terminal Nut	7XX5 Isolator, Nut, Protective Cap (2 Slot), Washer & Threaded Terminal Nut	7XX6* Ground Strap, Nut, Washers & Threaded Terminal Nut	7XX7* Nut, Washers & Threaded Terminal Nut

*Must be ordered in conjunction with codes 7000, 7060 or 7070.

HUBBELL POWER SYSTEMS, INC. OHIO BRASS

Electrical Characteristics

Heavy Duty
PDV-100 Optima

Rated Voltage kV	MCOV kV	Unit Catalog Number	0.5 µsec 10kA Maximum IR-kV (1)	500 A Switching Surge Maximum IR-kV(2)	8/20 Maximum Discharge Voltage - kV					
					1.5 kA	3 kA	5 kA	10 kA	20 kA	40 kA
3	2.55	213703	10.6	7.6	8.0	8.5	9.0	9.9	11.1	13.2
6	5.1	213705	21.3	15.3	15.9	17.0	18.0	19.8	22.3	26.5
9	7.65	213708	31.2	22.4	23.3	24.9	26.4	29.0	32.6	38.8
10	8.4	213709	34.0	24.4	25.4	27.1	28.8	31.6	35.6	42.3
12	10.2	213710	40.4	29.0	30.3	32.3	34.2	37.6	42.3	50.3
15	12.7	213713	51.4	36.9	38.5	41.1	43.5	47.8	53.8	64.0
18	15.3	213715	60.6	43.5	45.4	48.4	51.3	56.4	63.5	75.5
21	17.0	213717	68.3	49.0	51.1	54.5	57.8	63.5	71.4	85.0
24	19.5	213720	81.9	58.8	61.3	65.5	69.3	76.2	85.7	102.0
27	22.0	213722	91.9	65.9	68.8	73.4	77.8	85.5	96.2	114.4
30	24.4	213724	101.1	72.5	75.7	80.7	85.5	94.0	105.8	125.8
36	29.0	213729	121.4	87.0	97.9	97.0	102.7	112.9	127.0	151.1

Normal Duty
DynaVar PDV-65

Rated Voltage kV	MCOV kV	Unit Catalog Number	0.5 µsec 5kA Maximum IR-kV(1)	500 A Switching Surge Maximum IR-kV(2)	8/20 Maximum Discharge Voltage - kV					
					1.5 kA	3 kA	5 kA	10 kA	20 kA	40 kA
3	2.55	217253	12.5	8.5	9.8	10.3	11.0	12.3	14.3	18.5
6	5.1	217255	25.0	17.0	19.5	20.5	22.0	24.5	28.5	37.0
9	7.65	217258	33.5	23.0	26.0	28.0	30.0	33.0	39.0	50.5
10	8.4	217259	36.0	24.0	27.0	29.5	31.5	36.0	41.5	53.0
12	10.2	217560	42.4	31.3	33.8	36.3	38.5	42.8	49.0	59.7
15	12.7	213263	54.0	39.9	43.1	46.3	49.0	54.4	62.4	76.0
18	15.3	213265	62.8	46.4	50.1	53.8	57.0	63.3	72.6	88.4
21	17.0	213267	68.3	50.5	54.5	58.5	62.0	68.9	79.0	96.1
24	19.5	217570	84.9	62.7	67.7	72.7	77.0	85.5	98.1	119.4
27	22.0	213272	96.4	71.2	76.9	82.6	87.5	97.2	111.5	135.6
30	24.4	213274	105.2	77.7	83.9	90.2	95.5	106.1	121.7	148.0
36	29.0	217579	134.0	92.0	104.0	112.0	120.0	132.0	156.0	202.0

Riser-Pole
DynaVar PVR

Rated Voltage kV	MCOV kV	Catalog Number	0.5 µsec 10kA Maximum IR-kV(1)	500 A Switching Surge Maximum IR-kV(2)	8/20 Maximum Discharge Voltage - kV					
					1.5 kA	3 kA	5 kA	10 kA	20 kA	40 kA
3	2.55	221603	9.9	6.6	7.2	7.8	8.2	9.1	10.4	12.3
6	5.1	221605	20.0	13.3	14.6	15.7	16.6	18.3	21.0	24.8
9	7.65	221608	26.8	17.8	19.5	21.0	22.2	24.5	28.1	33.2
10	8.4	221609	29.5	19.6	21.5	23.1	24.4	27.0	31.0	36.6
12	10.2	221610	35.5	23.6	25.9	27.9	29.4	32.5	37.3	44.0
15	12.7	221613	44.2	29.4	32.2	34.7	36.7	40.5	46.5	54.8
18	15.3	221615	53.4	35.5	38.9	41.9	44.3	48.9	56.1	66.2
21	17.0	221617	60.7	40.3	44.3	47.6	50.3	55.6	63.8	75.3
24	19.5	221620	70.9	47.1	51.7	55.6	58.7	64.9	74.4	87.9
27	22.0	221622	78.6	52.2	57.3	61.7	65.2	72.0	82.6	97.5
30	24.4	221624	88.5	58.7	64.5	69.4	73.3	81.0	92.9	110.0
36	29.0	221629	105.0	69.7	76.5	82.4	87.0	96.1	110.0	130.0

All Ohio Brass Arresters are fully compliant with ANSI/IEEE C62.11 Standard

(1) Maximum discharge voltage for a 10-kA impulse current wave which produces a voltage wave cresting in 0.5 μs. This can be used for coordination where front-of-wave sparkover was formerly used.

(2) Based on a 500A surge of 45-μs time to crest.

Insulation Coordination

These electrical characteristics are used to determine protective margins for insulation levels in use.

These two figures illustrate a 34.5 kV effectively grounded system, 150 kV BIL, protected with 22 kV MCOV Type PDV arresters.

Figure 1 shows equipment protected with a PDV-100 arrester Catalog Number 213722 and Figure 2 shows the same equipment protected with a PDV-65 arrester Catalog Number 213272.

The protective margins are calculated using the following formula:

$$\left(\frac{\text{Insulation Level}}{\text{Arrester Discharge Voltage}} - 1\right) \times 100 = \%\ \text{Margin}$$

The insulation levels are obtained from the manufacturer of the equipment being protected. The arrester discharge voltages are obtained from the table on page 8.

For example, the protective margin for the BIL is determined by first finding the arrester discharge voltage at the impulse current level selected. In this example, the 10 kA discharge current is used as representative of typical lightning stroke currents discharged through the arrester. The 10 kA 8/20 discharge voltage of catalog number 213722 is 85.5 kV. The percent protective margin using the formula is:

$$\left(\frac{150\ \text{kV}}{85.5\ \text{kV}} - 1\right) \times 100 = 75\ \text{percent.}$$

The protective margins for other impulse currents are found in a similar fashion. In the case of the PDV-65 arrester, the 10 kA 8/20 discharge voltage of the arrester is 97.2 kV. This results in a protective margin of 54 percent.

These examples include many simplifying assumptions. Not included are the effects of faster rates of current rise on the discharge voltage, reduced insulation levels due to various factors, and line and ground leads.

For example, if the effect of lead length was included in the calculations and 1.6 kV per foot of lead length added to the discharge voltage of the arrester. With two feet of line lead and two feet of ground lead, 6.4 kV is added to the published discharge voltage of the arrester. Therefore, the discharge voltage of the PDV-100 is effectively 91.9 kV, resulting in a reduction of protective margin to 63 percent at 10 kA. In the case of the PDV-65 arrester, the 97.2 kV discharge voltage of the arrester is added to the 6.4 kV from the leads resulting in equipment seeing 103.6 kV reducing the protective margin to 44.7 percent.

The chopped wave strength of the insulation being protected is typically coordinated with the .5 μsec discharge voltage of the surge arrester. The heavy duty PDV-100 uses a 10 kA current while the PDV-65 catalog value is for a 5 kA peak current.

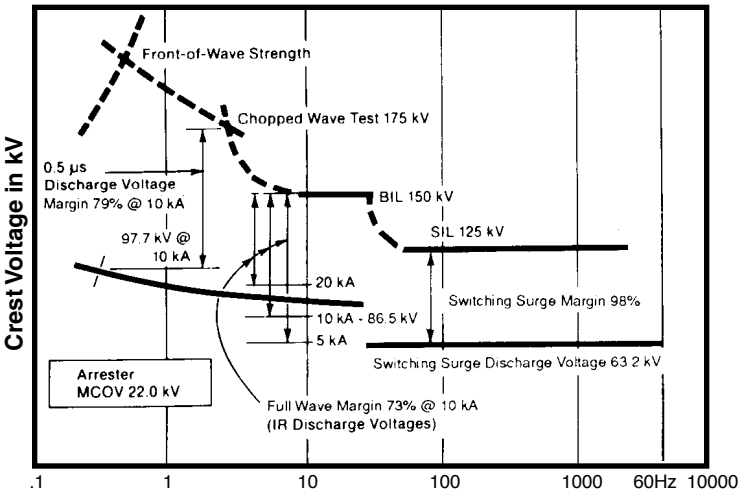
The switching surge insulation level of the equipment is coordinated with the 500 ampere switching discharge voltage of the surge arrester.

The effects of faster rates of rise and of reduced insulation strength due to aging effects would result in further reduced protective margins.

Industry standards recommend minimum margins of 20 percent for the chopped wave and BIL levels and 15 percent for switching surge protection.

Fig. 1

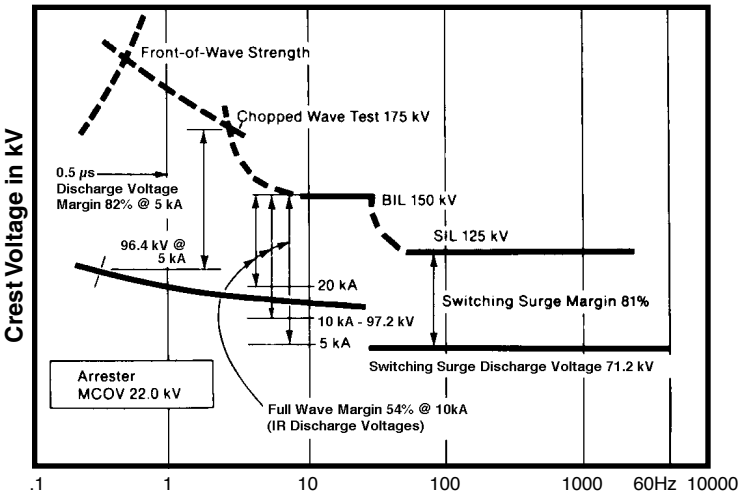
PDV-100
METAL-OXIDE ARRESTER INSULATION COORDINATION
34.5 kV System



Time to Voltage Crest in Microseconds

Fig. 2

PDV-65
METAL-OXIDE ARRESTER INSULATION COORDINATION
34.5 kV System



Time to Voltage Crest in Microseconds

Heavy Duty
DynaVar PDV-100 Optima

Rated Voltage	MCOV	"X" Overall Height	Leakage Distance Terminal to Base	Mounting Clearance (1)		Approx. Net Weights		
				Center Line to Center Line	Center Line to Ground	Unit Only	Unit with Insulating Base Bracket	Unit with Insulating Base Bracket and NEMA Bracket
kV	kV	inches	inches	inches	inches	pounds	pounds	pounds
3	2.55	6.8	8.5	5	3	1.9	2.9	5.4
6	5.1	7.6	11.3	5.4	3.4	2.3	3.3	5.8
9	7.65	8.7	14.4	6	4	2.8	3.8	6.3
10	8.4	8.7	14.4	6.2	4.2	2.8	3.8	6.3
12	10.2	9.3	17.0	7.5	5.5	3.3	4.3	6.8
15	12.7	11.6	25.2	8.5	6.5	4.6	5.6	8.1
18	15.3	11.6	25.2	9.5	7.5	4.6	5.6	8.1
21	17.0	12.4	28.1	10.0	8.0	5.2	6.2	8.7
24	19.5	15.3	36.5	12.0	10.0	7.0	8.3	10.8
27	22.0	16.4	39.6	13.0	11.0	7.4	8.7	11.3
30	24.4	16.9	42.2	14.0	12.0	7.9	9.2	11.7
36	29.0	19.3	50.4	16.5	14.5	9.0	10.3	12.8

Normal Duty
DynaVar PDV-65

Rated Voltage	MCOV	"X" Overall Height	Leakage Distance Terminal to Base	Mounting Clearance (1)		Approx. Net Weights		
				Center Line to Center Line	Center Line to Ground	Unit Only	Unit with Insulating Base Bracket	Unit with Insulating Base Bracket and NEMA Bracket
kV	kV	inches	inches	inches	inches	pounds	pounds	pounds
3	2.55	9.4	15.4	4.8	3	2.6	3.5	6.0
6	5.1	9.4	15.4	5	3.2	2.6	3.5	6.0
9	7.65	9.4	15.4	5.6	3.8	2.6	3.5	6.0
10	8.4	9.4	15.4	5.8	4.1	2.6	3.5	6.0
12	10.2	9.4	15.4	7.5	5.7	5.6	6.7	10.3
15	12.7	12.4	25.0	8.5	6.7	5.6	6.7	10.3
18	15.3	12.4	25.0	9.5	7.7	5.6	6.7	10.3
21	17.0	12.4	25.0	10	8.2	5.6	6.7	10.3
24	19.5	14.7	30.8	12	10.2	8.9	10.0	12.5
27	22.0	17.8	40.4	13	11.2	8.9	10.0	12.5
30	24.4	17.8	40.4	13.6	11.8	8.9	10.0	12.5
36	29.0	20.8	46.2	16.2	14.4	12.2	13.3	15.8

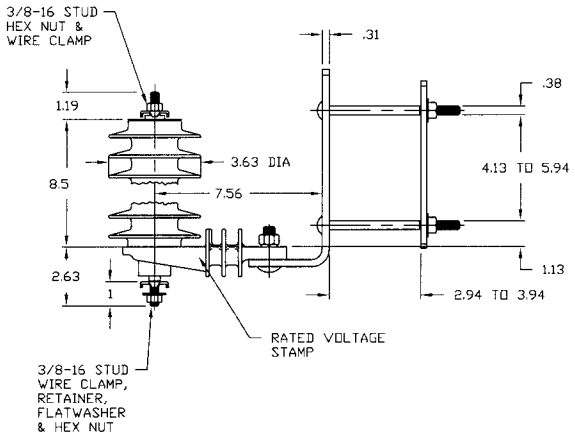
Riser Pole
DynaVar PVR

Rated Voltage	MCOV	"X" Overall Height	Leakage Distance Terminal to Base	Mounting Clearance (1)		Approx. Net Weights		
				Center Line to Center Line	Center Line to Ground	Unit Only	Unit with Insulating Base Bracket	Unit with Insulating Bracket, Isolator and NEMA Bracket
kV	kV	inches	inches	inches	inches	pounds	pounds	pounds
3	2.55	7.0	8.0	5.0	3.0	2.3	3.3	5.8
6	5.1	9.4	15.4	5.3	3.3	3.1	4.1	6.6
9	7.65	9.4	15.4	5.8	3.8	3.1	4.1	6.6
10	8.4	9.4	15.4	6.0	4.0	3.1	4.1	6.6
12	10.2	9.4	15.4	7.3	5.3	3.3	4.3	6.8
15	12.7	12.4	26.0	8.3	6.3	4.5	5.5	8.0
18	15.3	12.4	26.0	9.2	7.2	5.1	6.1	8.6
21	17.0	12.4	26.0	9.7	7.7	5.1	6.1	8.6
24	19.5	14.7	30.8	11.6	9.6	6.1	7.4	9.9
27	22.0	21.1	52.0	12.5	10.5	8.3	9.6	12.1
30	24.4	21.1	52.0	13.5	11.5	8.3	9.6	12.1
36	29.0	21.1	52.0	16.0	14.0	9.5	10.8	13.3

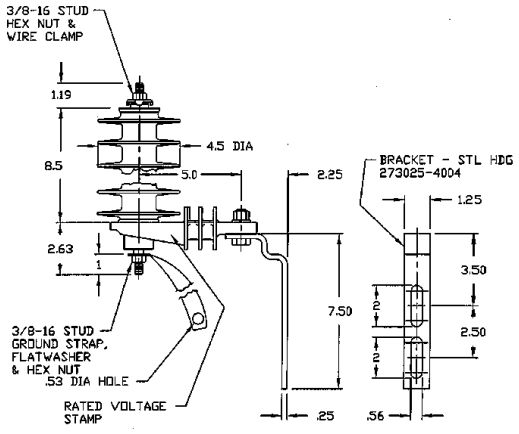
(1) Center line to center line is equivalent to phase-to-phase; center line to ground is equivalent to phase-to-ground. These are recommended minimum clearances only and as such are not intended to take precedence over existing construction codes or specifications.

For appropriate packed weight, add 0.5 lb. per arrester.

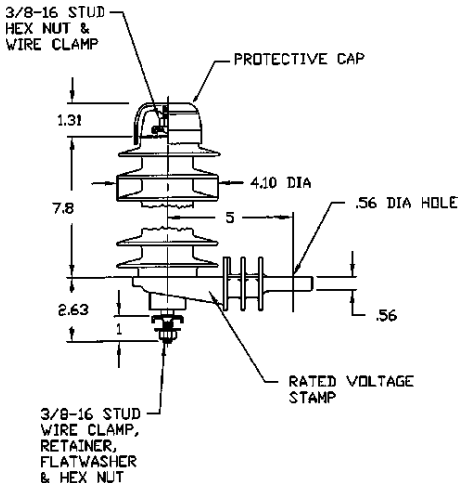
Typical Mounting Configurations and Hardware



PDV-65
Catalog No. 2172657224

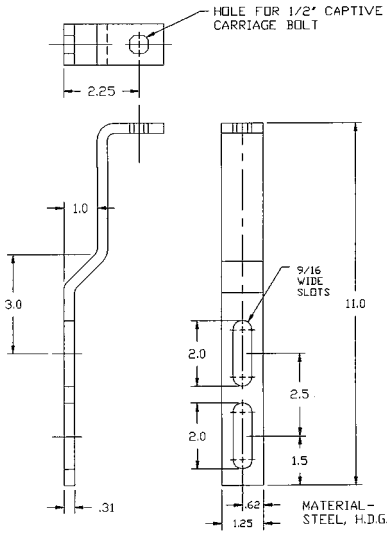


PVR
Catalog No. 2216157233

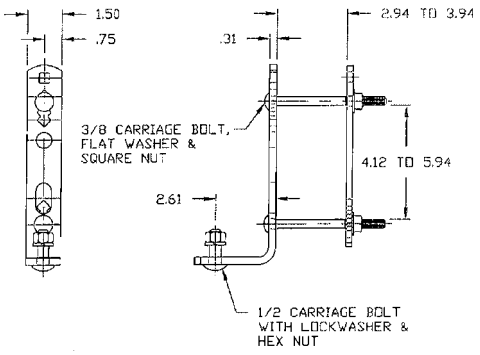


PDV-100 Optima
Catalog No. 2137157314

Standard Mounting Brackets



Transformer Mounting
Part No. 2730664004



Crossarm Mounting
Part No. 2734563001

HUBBELL POWER SYSTEMS

OHIO BRASS

PDV-100 OPTIMA

Solves Problems:

- *"Finally someone has listened to us and has a more reliable disconnector for the product."* — Utility in Louisiana
- *"We have never had a moisture failure of an Ohio Brass arrester. You guys are the only ones that know how to seal the product."* — Utility in Washington State
- *"At last someone has a 21st Century disconnector for our 21st Century arresters."* — California Utility

Saves Time and Money:

- Older style disconnectors can cause lock-outs
- Locating problem arresters costs an average of $200
- Actual costs can be much higher
- PDV-100 Optima reliably disconnects a shorted arrester
  - Allows line to be re-energized
  - Provides a visual indication to line crews

How do I make sure I am getting the new Optima design?

Just change the first 6 digits of the catalog number in your order according to the chart below:

Duty Cycle (kv)	MCOV (kV)	Original PDV-100	PDV-100 Optima
3	2.55	217602	213703
6	5.1	217605	213705
9	7.65	217608	213708
10	8.4	217609	213709
12	10.2	213510	213710
15	12.7	213613	213713
18	15.3	213615	213715
21	17	213617	213717
24	19.5	213520	213720
27	22	213622	213722
30	24.4	213624	213724
36	29	213629	213729

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