



# Surge Arrester

## Metal Oxide Distribution Class

Electrical network suffers through many electrical stresses like Lightning stroke, switching surges, temporary over voltages etc. This causes damage of equipments used in electrical network. For these reasons, the approach usually followed is to build protective device into the network.

Shreem make Surge Arresters are designed with MOV gapless technology & certified by NABL accredited laboratories. Metal oxide type surge arresters offer such special features inherent in gap-less structure as quick response to surge voltage, high energy dissipation capability, safe operation, compactness / lightweight and free from pollution.

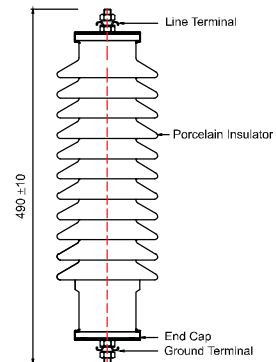
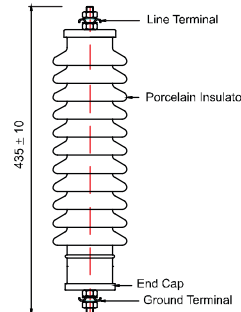
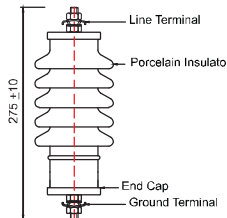
### Metal oxide distribution class gapless Lightning Arrester

#### Applications

- Protection against over voltage caused by lightning / switching surges.
- Utilized distribution network.
- Range : 3 kV to 36 kV.

#### Advantages

- Negligible wattage dissipation under normal operating condition.
- Proper end sealing to prevent due to moisture.
- Compact size, minimum assembly components & minimum weight ensures ease in transportation and installation.
- Maximum reliability and durability due to gapless design.
- Excellent surge protection characteristics & temporary over voltage capability.



#### Technical Specification :

Reference Standard : IEC 60099-4, ANSI IEEE Std. C62.11, IS 3070 part 3  
 Frequency : 48 - 62 Hz  
 Nominal Discharge Current : 5 kA

| RATED VOLTAGE | MCOV  | TOV (min.) |       |       | MAXIMUM RESIDUAL VOLTAGE           |  |      |       | CREEPAGE (min.) |
|---------------|-------|------------|-------|-------|------------------------------------|--|------|-------|-----------------|
|               |       | 1S         | 10S   | 100S  | 1/20 $\mu$ s Steep current impulse | 8/20 $\mu$ s Lightning current Impulse |      |       |                 |
| kVrms         | kVrms | kVrms      | kVrms | kVrms | 10 kA                              | 2.5 kA                                 | 5 kA | 10 kA | mm              |
| 3             | 2.6   | 3.5        | 3.3   | 3.2   | 9                                  | 7                                      | 8    | 10    | 100             |
| 6             | 5.1   | 6.9        | 6.6   | 6.3   | 19                                 | 14                                     | 17   | 21    | 300             |
| 9             | 7.7   | 10.4       | 9.9   | 9.5   | 32                                 | 27                                     | 30   | 32    | 300             |
| 12            | 10.2  | 13.8       | 13.2  | 12.6  | 38                                 | 35                                     | 36   | 44    | 310             |
| 15            | 12.8  | 17.3       | 16.5  | 15.8  | 48                                 | 42                                     | 44   | 48    | 600             |
| 18            | 15.3  | 20.7       | 19.8  | 18.9  | 62                                 | 56                                     | 60   | 66    | 600             |
| 30            | 25.5  | 34.5       | 33.0  | 31.5  | 103                                | 90                                     | 99   | 107   | 900             |
| 33            | 28.1  | 38.0       | 36.3  | 34.7  | 110                                | 97                                     | 108  | 113   | 900             |
| 36            | 30.6  | 41.4       | 37.8  | 37.8  | 122                                | 110                                    | 120  | 126   | 900             |

# Surge Arrester

## Metal Oxide Station Class

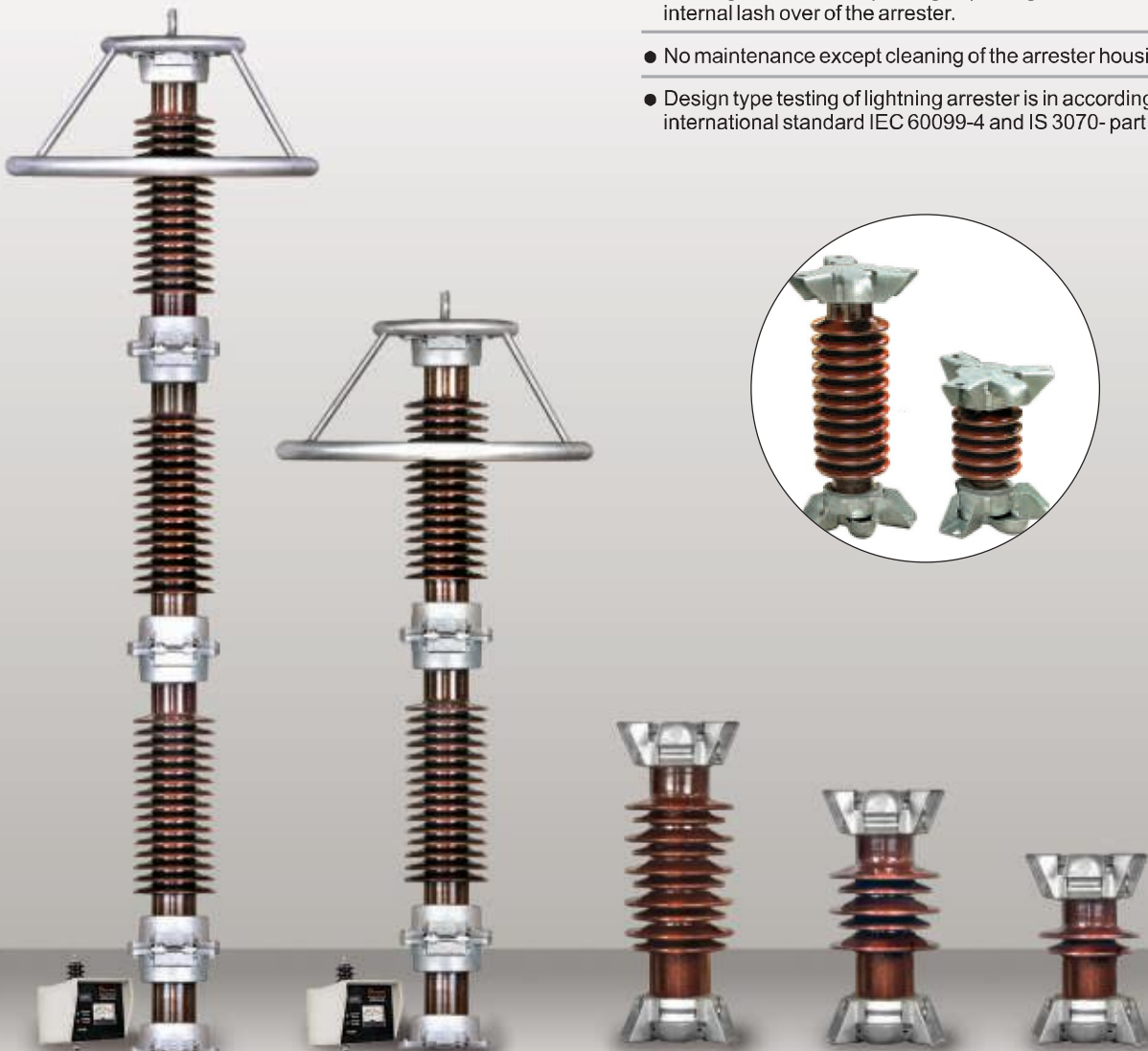
### Metal oxide station class gapless Lightning Arrester

#### Applications

- Protection of equipment for substation against over voltage caused by lightning / switching surges.
- Range : 3 kV to 198 kV.
- Line discharge class - I, II & III

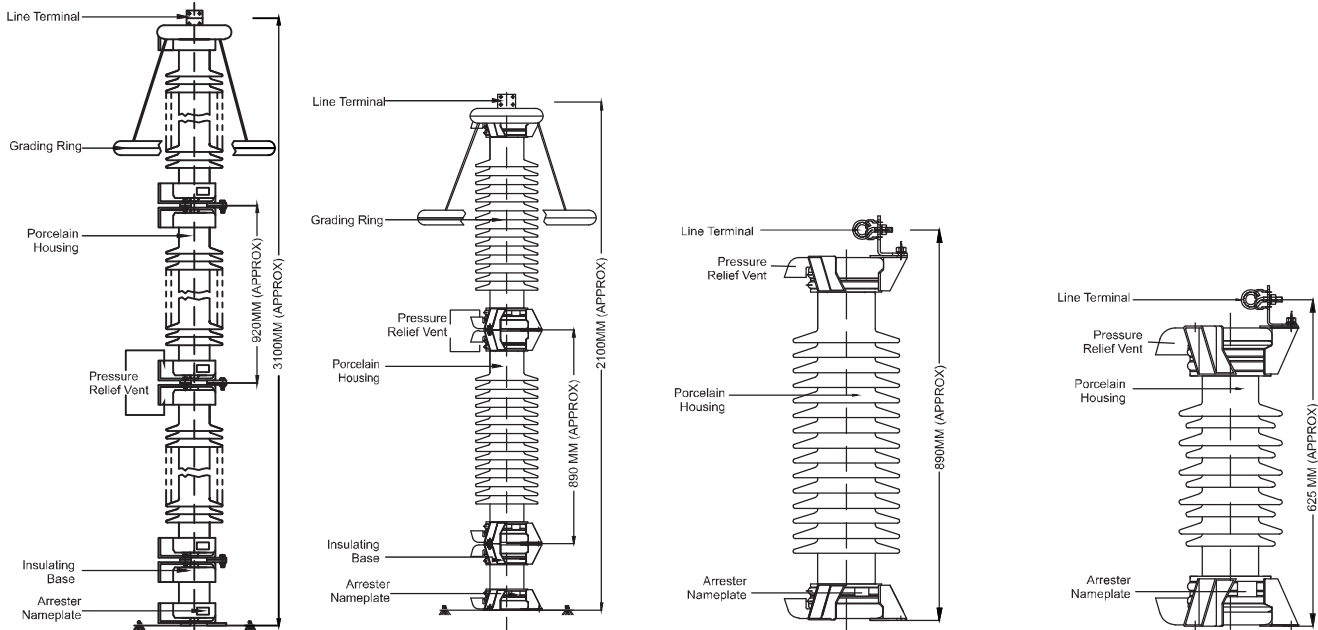
#### Advantages

- Absorbs switching surges caused either due to load rejection, system faults & clearing or line energisation / de-energisation.
- Excellent protection characteristic against temporary over voltage arising from either earth faults, load rejection or resonance and ferro-resonance.
- Better thermal stability and efficient dissipation of energy due to eccentric assembly of MOV blocks individually supported by silicon rubber support and strip.
- Simple rugged construction prevents internal arrester damage during shipping and installation.
- Ensures longer life due to hermetic sealing of the arrester.
- Pressure relief system prevents explosive failure of the arrester housing in the event of prolonged passage of fault current of internal lash over of the arrester.
- No maintenance except cleaning of the arrester housing.
- Design type testing of lightning arrester is in according with international standard IEC 60099-4 and IS 3070- part 3.



# Surge Arrester

## Metal Oxide Station Class



### Arrester Contamination

Shreem arresters have outstanding capability to withstand the effects of external contamination.

### Ambient Temperature

Ambient temperature is an important consideration in the application of Surge arresters.

The reference standard indicates the standard service ambient temperature not exceeding 40 degree celsius.

Our arresters are designed to operate at a weighted average of 45 degree celsius with excursions to 60 degree celsius.

### Altitude

Shreem arresters are designed for altitudes not exceeding 1000 m above sea level. For higher altitude applications extra clearances arcing distance is required.

### Mounting Considerations

Shreem distribution class arresters are for pole mounting in vertical position and station class arresters are self supporting for vertical mounting.

To avoid unwanted flash overs and electrical overstress to internal arrester elements, recommended clearances between lightning arrester and any adjacent equipment must be observed.

Higher the clearance the equipment would be subjected to higher over voltage and lesser the clearance the voltage distribution of the arrester would be disturbed.

### General

The objective of arrester application is to select the lowest rating of Surge arrester that will have a satisfactory service life on the power system while providing adequate of equipment insulation.

An arrester of the minimum practical rating is generally preferred because it provides the highest margin of protection for the insulation.

The use of higher rating increaser the capability of the arrester to survive on the power system but reduces the margin of protection it provides for specific insulation level.

Thus arrester selection must strike a balance between arrester survival and equipment protection.

Stresses to which the arrester will be exposed :

- Continuous system voltage
- Temporary over voltages
- Lightening surges

Continuous system voltage is the recommended limit to the magnitude of the permissible rms power frequency voltage, which may be continuously applied between the arrester terminals.

Temporary over voltages can be caused by a number of system events such as line-to-ground faults, circuit back feeding, load rejection and ferro resonance.

Arrester temporary over voltage (TOV) capability must meet or exceed expected TOV stresses.

Arrester selected must have sufficient capability to meet the anticipated service requirements in all categories.

# Surge Arrester

## Metal Oxide Station Class

**Reference Standard :** IEC 60099-4, ANSI IEEE Std. C62.11, IS 3070 part 3

**Frequency :** 48 - 62 Hz

**Nominal Discharge Current :** 10 kAp

**Line Discharge Class :** 1

**Range :** 3 kV to 36 kV

| Rated Voltage | MCOV  | TOV (min.) |         |          | Maximum Residual Voltage           |   |  |        |        | Creepage (min.) |
|---------------|-------|------------|---------|----------|------------------------------------|---|--|--------|--------|-----------------|
|               |       | 1 Sec.     | 10 Sec. | 100 Sec. | 1/20 $\mu$ s Steep current impulse | 30/60 $\mu$ s Switching current impulse | 8/20 $\mu$ s Lightning current Impulse |        |        |                 |
| kVrms         | kVrms | kVrms      | kVrms   | kVrms    | at 10 kA                           | at 500 A                                | 5 kAP                                  | 10 kAP | 20 kAP | mm              |
| 3             | 2.6   | 3.5        | 3.3     | 3.2      | 8                                  | 7                                       | 7                                      | 8      | 10     | 100             |
| 6             | 5.1   | 6.9        | 6.6     | 6.3      | 20                                 | 15                                      | 14                                     | 17     | 21     | 310             |
| 9             | 7.7   | 10.4       | 9.9     | 9.5      | 28                                 | 18                                      | 22                                     | 26     | 32     | 310             |
| 10            | 8.5   | 11.5       | 11.0    | 10.5     | 33                                 | 22                                      | 25                                     | 29     | 35     | 310             |
| 12            | 10.2  | 13.8       | 13.2    | 12.6     | 40                                 | 29                                      | 30                                     | 36     | 44     | 310             |
| 15            | 12.8  | 17.3       | 16.5    | 15.8     | 48                                 | 35                                      | 38                                     | 46     | 56     | 600             |
| 18            | 15.3  | 20.7       | 19.8    | 18.9     | 59                                 | 43                                      | 46                                     | 56     | 68     | 600             |
| 21            | 17.9  | 24.2       | 23.1    | 22.1     | 70                                 | 50                                      | 54                                     | 66     | 71     | 600             |
| 24            | 20.4  | 27.6       | 26.4    | 25.2     | 79                                 | 57                                      | 62                                     | 75     | 83     | 600             |
| 27            | 23.0  | 31.1       | 29.7    | 28.4     | 92                                 | 62                                      | 72                                     | 86     | 95     | 900             |
| 30            | 25.5  | 34.5       | 33.0    | 31.5     | 102                                | 70                                      | 85                                     | 96     | 105    | 900             |
| 33            | 28.1  | 38.0       | 36.3    | 34.7     | 110                                | 77                                      | 95                                     | 106    | 116    | 900             |
| 36            | 30.6  | 41.4       | 39.6    | 37.8     | 122                                | 86                                      | 103                                    | 116    | 125    | 900             |

**Reference Standard :** IEC 60099-4, ANSI IEEE Std. C62.11, IS 3070 part 3

**Frequency :** 48 - 62 Hz

**Nominal Discharge Current :** 10 kAp

**Line Discharge Class :** 2

**Range :** 3 KV - 120 kV

| Rated Voltage | MCOV  | TOV (min.) |         |          | Maximum Residual Voltage           |   |          |  |       |       | Creepage (min.) |
|---------------|-------|------------|---------|----------|------------------------------------|---|----------|--|-------|-------|-----------------|
|               |       | 1 Sec.     | 10 Sec. | 100 Sec. | 1/20 $\mu$ s Steep current impulse | 30/60 $\mu$ s Switching current impulse |          | 8/20 $\mu$ s Lightning current Impulse |       |       |                 |
| kVrms         | kVrms | kVrms      | kVrms   | kVrms    | at 10 kA                           | at 125 A                                | at 500 A | 5 kA                                   | 10 kA | 20 kA | mm              |
| 3             | 2.55  | 3.5        | 3.3     | 3.2      | 9.1                                | 6.1                                     | 6.3      | 7.3                                    | 8.1   | 8.9   | 100             |
| 6             | 5.10  | 6.9        | 6.6     | 6.3      | 18.1                               | 12.2                                    | 12.6     | 14.6                                   | 16.2  | 17.8  | 300             |
| 9             | 7.65  | 10.4       | 9.9     | 9.5      | 27.2                               | 18.3                                    | 18.9     | 21.9                                   | 26.0  | 26.7  | 300             |
| 10            | 8.50  | 11.5       | 11.0    | 10.5     | 29.2                               | 20.4                                    | 21.0     | 23.3                                   | 28.1  | 29.3  | 300             |
| 12            | 10.20 | 13.8       | 13.2    | 12.6     | 36.2                               | 24.4                                    | 25.2     | 29.2                                   | 32.4  | 35.6  | 300             |
| 15            | 12.75 | 17.3       | 16.5    | 15.8     | 45.3                               | 30.5                                    | 31.5     | 36.5                                   | 40.5  | 44.5  | 600             |
| 18            | 15.30 | 20.7       | 19.8    | 18.9     | 54.4                               | 36.6                                    | 37.8     | 43.8                                   | 48.6  | 53.4  | 600             |
| 21            | 17.85 | 24.2       | 23.1    | 22.1     | 63.6                               | 42.7                                    | 44.1     | 51.1                                   | 56.7  | 62.3  | 600             |
| 24            | 20.40 | 27.6       | 26.4    | 25.2     | 72.7                               | 48.8                                    | 50.4     | 58.4                                   | 64.8  | 71.2  | 600             |
| 27            | 22.95 | 31.1       | 29.7    | 28.4     | 81.9                               | 54.9                                    | 56.7     | 65.7                                   | 72.9  | 80.1  | 900             |
| 30            | 25.50 | 34.5       | 33.0    | 31.5     | 91.1                               | 61.0                                    | 63.0     | 73.0                                   | 81.0  | 89.0  | 900             |
| 33            | 28.05 | 38.0       | 36.3    | 34.7     | 99.3                               | 67.1                                    | 69.3     | 8.3                                    | 89.1  | 97.9  | 900             |
| 36            | 30.60 | 41.4       | 39.6    | 37.8     | 109.2                              | 73.2                                    | 75.6     | 87.6                                   | 97.2  | 106.8 | 900             |
| 45            | 38.25 | 51.8       | 49.5    | 47.3     | 136.5                              | 91.5                                    | 94.5     | 109.5                                  | 121.5 | 133.5 | 1050            |
| 60            | 51.00 | 69.0       | 66.0    | 63.0     | 182.2                              | 122.0                                   | 126.0    | 146.0                                  | 162.0 | 178.0 | 2200            |
| 66            | 56.10 | 75.9       | 72.6    | 69.3     | 200.2                              | 134.2                                   | 138.6    | 160.6                                  | 178.2 | 195.8 | 2200            |
| 72            | 61.20 | 82.8       | 79.2    | 75.6     | 215.0                              | 146.4                                   | 151.2    | 175.2                                  | 194.4 | 213.6 | 2200            |
| 120           | 102.0 | 138.0      | 132.0   | 126.0    | 325.0                              | 226.0                                   | 235.0    | 292.0                                  | 310.0 | 344.0 | 4400            |

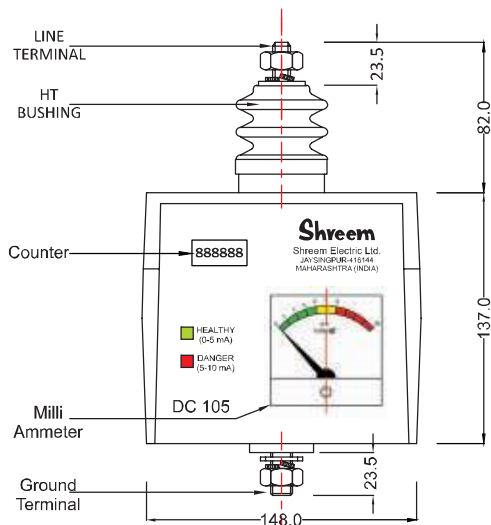
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**Reference Standard :** IEC 60099-4, ANSI IEEE Std. C62.11, IS 3070 part 3  
**Frequency :** 48 - 62 Hz  
**Nominal Discharge Current :** 10 kAp  
**Line Discharge Class :** 3  
**Range :** 3 KV - 220 KV

| Rated Voltage | MCOV   | TOV (min.) |         |          | Maximum Residual Voltage           |   |         |  |       |       | Creepage (min.) |
|---------------|--------|------------|---------|----------|------------------------------------|---|---------|--|-------|-------|-----------------|
|               |        | 1 Sec.     | 10 Sec. | 100 Sec. | 1/20 $\mu$ s Steep current impulse | 30/60 $\mu$ s Switching current impulse |         | 8/20 $\mu$ s Lightning current Impulse |       |       |                 |
| kVrms         | kVrms  | kVrms      | kVrms   | kVrms    | at 10kA                            | at 250 A                                | at 1 kA | 5 kA                                   | 10 kA | 20 kA | mm              |
| 3             | 2.55   | 3.5        | 3.3     | 3.2      | 8.7                                | 5.9                                     | 6.2     | 7.1                                    | 7.5   | 8.3   | 100             |
| 6             | 5.10   | 6.9        | 6.6     | 6.3      | 17.3                               | 11.6                                    | 12.5    | 14.2                                   | 15.0  | 16.6  | 300             |
| 9             | 7.65   | 10.4       | 9.9     | 9.5      | 26.9                               | 17.4                                    | 18.9    | 21.3                                   | 22.5  | 24.9  | 300             |
| 12            | 10.20  | 13.8       | 13.2    | 12.6     | 34.2                               | 23.3                                    | 25.1    | 28.4                                   | 30.0  | 33.2  | 300             |
| 15            | 12.75  | 17.3       | 16.5    | 15.8     | 43.7                               | 29.4                                    | 30.6    | 35.5                                   | 37.5  | 41.5  | 600             |
| 18            | 15.30  | 20.7       | 19.8    | 18.9     | 52.2                               | 34.9                                    | 36.2    | 42.6                                   | 45.0  | 49.8  | 600             |
| 21            | 17.85  | 24.2       | 23.1    | 22.1     | 60.5                               | 41.1                                    | 42.5    | 49.7                                   | 52.5  | 58.1  | 600             |
| 24            | 20.40  | 27.6       | 26.4    | 25.2     | 68.5                               | 46.8                                    | 48.2    | 56.8                                   | 60.0  | 66.4  | 600             |
| 27            | 22.95  | 31.1       | 29.7    | 28.4     | 77.1                               | 53.9                                    | 55.4    | 63.9                                   | 67.5  | 74.7  | 900             |
| 30            | 25.50  | 34.5       | 33.0    | 31.5     | 86.0                               | 61.0                                    | 62.2    | 71.0                                   | 75.0  | 83.0  | 900             |
| 33            | 28.05  | 38.0       | 36.3    | 34.7     | 95.7                               | 65.4                                    | 66.7    | 78.1                                   | 82.5  | 91.3  | 900             |
| 36            | 30.60  | 41.4       | 39.6    | 37.8     | 103.2                              | 73.6                                    | 74.4    | 85.2                                   | 90.0  | 99.6  | 900             |
| 60            | 51.00  | 69.0       | 66.0    | 63.0     | 172.0                              | 121.0                                   | 124.1   | 142.0                                  | 150.0 | 166.0 | 2200            |
| 66            | 56.10  | 75.9       | 72.6    | 69.3     | 191.4                              | 132.9                                   | 136.6   | 156.2                                  | 165.0 | 182.6 | 2200            |
| 72            | 61.20  | 82.8       | 79.2    | 75.6     | 203.4                              | 144.1                                   | 149.8   | 170.4                                  | 180.0 | 199.2 | 2200            |
| 120           | 102.00 | 138.0      | 132.0   | 126.0    | 344.0                              | 246.4                                   | 253.0   | 284.0                                  | 300.0 | 332.0 | 4400            |
| 198           | 168.30 | 227.7      | 217.8   | 207.9    | 568.3                              | 412.0                                   | 421.0   | 468.6                                  | 495.0 | 547.8 | 6500            |
| 216           | 183.60 | 248.4      | 237.6   | 226.8    | 626.4                              | 442.0                                   | 450.5   | 511.2                                  | 540.0 | 597.6 | 6500            |

### Discharge Counter



The Discharge Counter is a device used to count & record the number of discharges that the Arresters experienced.

This device also monitors the continuous leakage current flowing through Arrester.

The DC105 model is self contained device & does not required any external power supply for its operation.

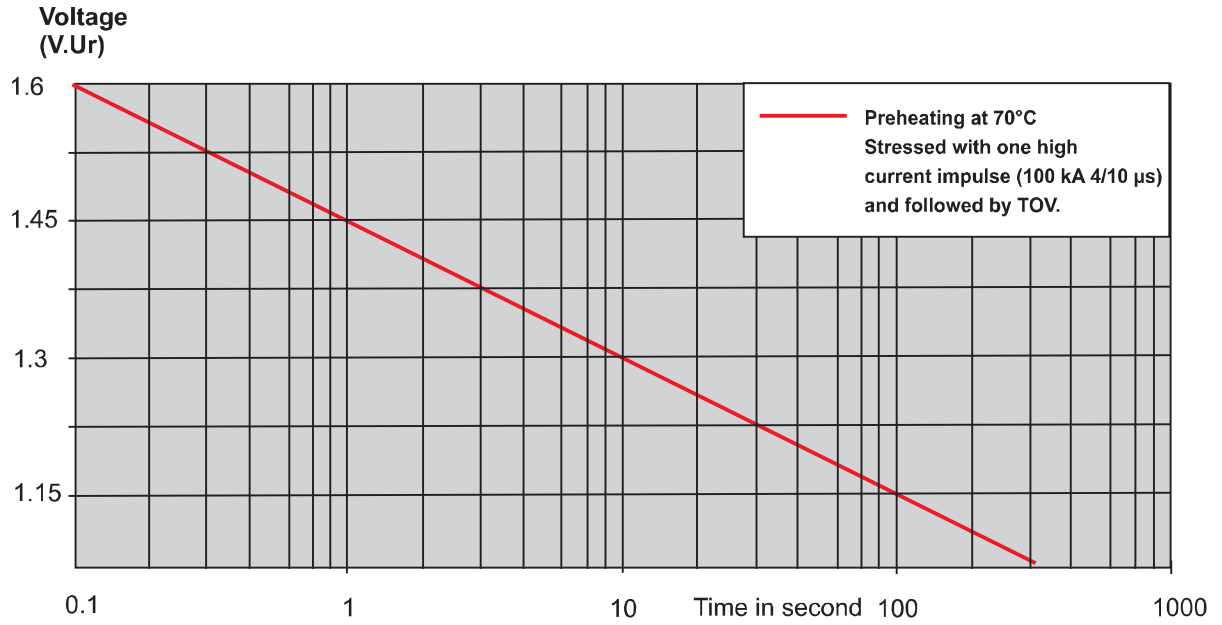
| TYPE                              | DC105                               |
|-----------------------------------|-------------------------------------|
| Counter Indication                | 6 Digit Cyclometer (Non Resettable) |
| Minimum Operating Current         | 100 A (8/20 $\mu$ s)                |
| High Current withstand capability | 100 KA (4/10 $\mu$ s)               |
| Ammeter Scale                     | 0–10 mA Linear Scale                |



# Surge Arrester

## Metal Oxide Station Class

### Power frequency voltage vs. time characteristic



### Mounting Considerations

