



ARC

(PCR)

EX and Safe models

ARC Polarization Cell Replacement (PCR)

Description

The Polarization Cell Replacement (PCR) is a solid-state DC isolation/AC grounding (i.e., coupling) device designed for use in conjunction with cathodically protected equipment located in Class I, Zone 2, Group IIC or in Class I, Division 2 hazardous (classified) locations or in ordinary (non-hazardous) locations.

In fact, The PCRs act as a filter for bonding or grounding cathodically protected structures. The PCRs block the cathodic DC current in the range of cathodic DC voltage and simultaneously allow to passing the:

- Short circuit fault current
- AC induced current
- Lightning and switching surge current

Technical

PCRs have different parameters that should be specified by the customers. These parameters are presented in the blow table.

AC Fault Current Ratings: This parameter is specified according to the maximum fault current rating where the PCR is to be installed. The ARC PCRs are manufactured in two variety of fault current rating: 5KA and 10 KA. It is recommended to consider the lowest possible short-circuit current to reduce costs.

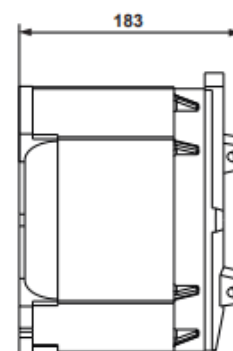
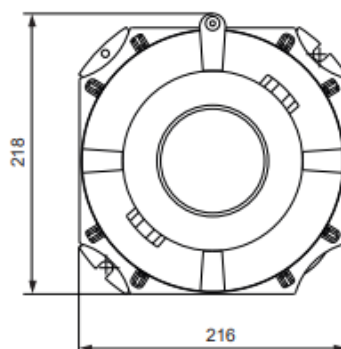
Steady-State AC Current Ratings: This rating represents the maximum steady-state AC current that is allowed to flow through the device while still blocking the flow of DC current. Two ratings are available for the PCRs: 15A and 30A.

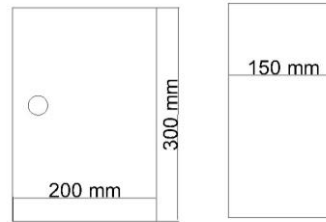
DC Blocking Voltage Rating: If the PCR is used to provide over-voltage protection for an insulated joint and both sides of the joint are cathodically protected, the DC voltage across the joint will be the difference in voltage between the two cathodic protection systems, normally near zero volts. For this application, it is desirable to select the symmetrical +/- 2.0 volt blocking rating. If one side of the insulated joint is cathodically protected and the other side is grounded, then it is preferable to select the asymmetrical version, which blocks from -3.0 volts to +1.0 volt since one side has been shifted to a more negative voltage.

Lightning Surge Current Rating: All models have the same lightning surge current rating 100KA (10/350us)

model	PC5K20B22S	P105K20B22S	PC5K20B31S	P105K20B31S	PC5K20B22E	PC10K20B22E	PC5K20B31E	PC10K20B31E
AC Fault curret rating (KA)	5	10	5	10	5	10	5	10
DC Blocking Voltae Range (V)	-2/+2	-2/+2	-3/+0.6	-3/+0.6	-2/+2	-2/+2	-3/+0.6	-3/+0.6
Application	safe	safe	safe	safe	Ex	Ex	Ex	Ex
Steady-State AC Current (A)	20	20	20	20	20	20	20	20
Lightning Impulse current (8/20us)	100 KA							
Lightning Impulse current (10/350us)	100 KA							
Lightning voltage protection	< 2.5KV							
Leakage current	< 100mA							
AC Impedance	< 50mΩ							
Power consumption by AC induced current	< 3 W							
Temperature range	-200 C < t < 550 C							
Enclosure material	Copper free aluminum				Carbon Steel			
Ex marking	Ex d IIC T6/T5/T4 Gb, Ex t IIIC T85°C				Safe			
IP	66				55			
Dimensions (mm)	218×183(D×H)				30×20×15 (L×D×H)			
painting	electrostatic				Minimum 120 um electrostatic			
Glands	Two glands, the size upon on request							

Enclosure layout





Installation

Mounting

Mount the PCR so that the total length of conductor to the connection points will be as short as possible. All conductors have inductance, which will cause a significant voltage per unit of conductor length when subject to lightning surge current. For most insulated joint applications the PCR can, and should, be installed with about 150mm from the glands. The PCR enclosure should be installed with suitable supports, that can be ordered separately.

Polarity

If the PCR purchased has asymmetrical blocking characteristics and it is being connected between a cathodically protected structure and ground, connect the negative terminal of the PCR to the cathodically protected structure and the positive terminal to ground. If being connected between two different cathodically protected systems, attach the negative terminal to the more negative structure and the positive terminal to the less negative structure. A label on the PCR cover shows the polarity of each conductor. If a symmetrical version of the PCR was furnished, the polarity marks are not relevant since the unit has identical voltage blocking with either polarity.

Field Testing

Before installation of the PCR, the following measurements are suggested to confirm that the steady-state conditions imposed on the PCR will be within its ratings.

1. Measure the open-circuit DC voltage between the PCR connection points with a multimeter. The open-circuit DC voltage measured should be within the DC blocking voltage rating of PCR.
2. Measure the steady-state short-circuit AC-RMS current between the PCR connection points with a clamp-on ammeter. The short-circuit AC-RMS steady-state current measured should be less than the steady-state AC current rating of the PCR model ordered.
3. After installation, the AC Current through PCR conductors can again be measured. The current measured should be comparable to the value measured prior to installation since the AC impedance of the PCR is negligible.
4. Check for the presence of DC current leakage with a clamp-on ammeter. It should be near to zero.