



## ESTAsym CPR Unbalance Protection Relay



### KEY BENEFITS

- Compensation of the natural unbalance (current or voltage) of the capacitor bank
- Display of the actual unbalance current or unbalance voltage
- Self monitoring function with own alarm contact
- Separately adjustable thresholds and delay times for alarm and trip
- Adjustable drop-off-value for Alarm/Trip
- Separately programmable reset mode for Alarm/Trip (automatic or manual reset)
- In manual mode, after power interruption, memory of switching outputs, original state and display indications
- Adjustable transformer ratio (voltage/current)
- Thresholds and readings as current or voltage value or as percentage value related to the nominal input range of current or voltage channel
- Separate password protection for setup and operator menu
- Storage of the last five trips and alarms with maximum value during delay time
- One free programmable output relay (Rel.3)
- Display flashing as visual indicator under the Alarm/Trip condition

### RESOURCES

- For technical questions contact [esta@vishay.com](mailto:esta@vishay.com)





# ESTAsym CPR

## Vishay ESTA

The operation of high- and medium-voltage capacitors needs to be monitored constantly. Most such capacitors use insulating oil for their dielectrics, and monitoring is required to avoid any combustion of this material in event of failure. This monitoring can be done either by monitoring the unbalance current or unbalance voltage of capacitor groups.

However, this voltage / current may change in case of any failure of one capacitor, for instance caused by a flashover inside the wound foils.

### Applications: Monitoring Unbalance Current

#### Double-Star Connection

In a double-star connection, the star points of two capacitor groups are connected together as shown in Figure 1. In the event of a failure, i.e., element breakdown or group short-circuit, the star point of the respective branch is shifted and causes a current flow between the star points. The intensity of the current is determined by the capacitor construction and the number of capacitors.

Figure 1

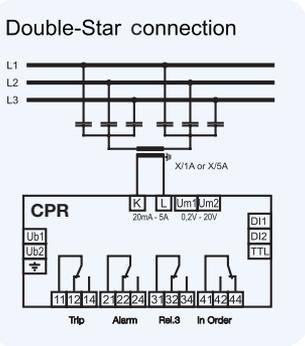
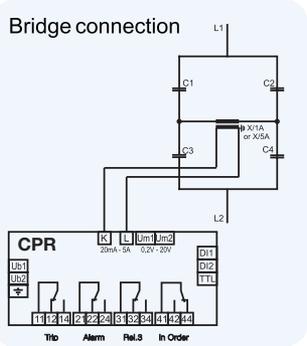


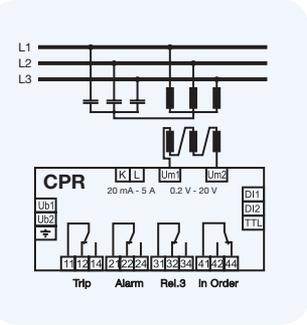
Figure 2



#### Bridge Connection

In a bridge connection, as shown in Figure 2, the capacitor bank is built up with four bridge branches, with two branches each constituting a series connection. The medium potentials of the branches are connected by a current transformer. The division of the bridge branches preferably should be symmetrical. An unsymmetrical structure would also be possible. However, with an unsymmetrical structure, the pick-up values must be set to the more sensitive branch.

Figure 3



### Monitoring Unbalance Voltage

To monitor the capacitor bank via the voltage, the voltage of the capacitors of the three phases is connected to three two-pole insulated PTs, which are on the secondary side connected in series. In Figure 3, the ESTAsym CPR is measuring the voltage at this open delta.

### Hardware

- Wide range of power supplies suitable for DC/AC voltages
- X/1 or X/5, without conversion on the device
- Mechanical NO and NC contacts for outputs
- Measurement signal is passed via low-pass filter
- Digital input to block alarm function
- LCD with backlight
- Sign of life signal
- Capacitor protection relay in plastic case
- Backside is made of metal



# ESTAsym CPR

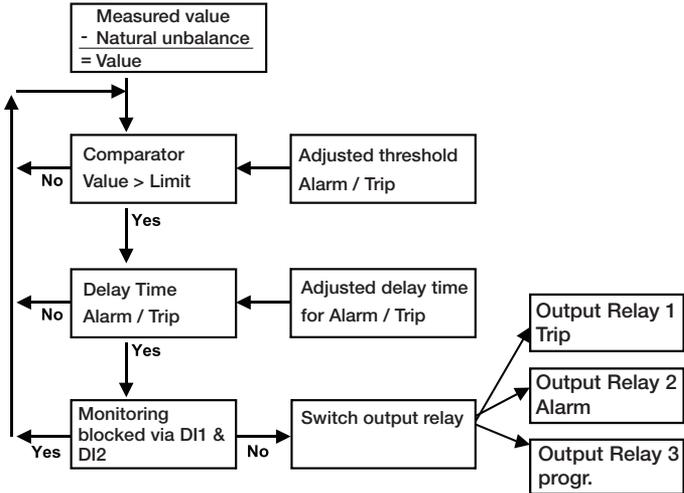
## Vishay ESTA

### Optional Features:

Interface RS485, Modbus RTU  
Programming via USB 2.0 interface

### Function

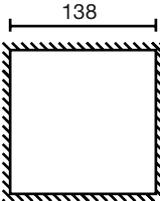
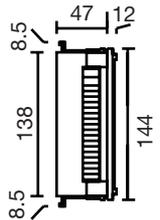
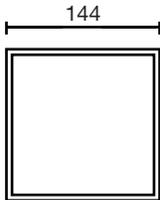
The ESTAsym CPR is designed to monitor medium- and high-voltage capacitors. The ESTAsym CPR can be set from the menu to monitor current or voltage. The device can monitor two threshold levels for Alarm/Trip. All thresholds/readings can be set either as a specific current or voltage value or as a percentage of the maximum value. Once the Alarm or Trip level is reached, the appropriate relay will operate, after the programmed delay time has elapsed. Both output relays can be programmed to be held in the Alarm/Trip position until reset by the user. Alternatively they can be set to automatically reset if the fault condition has cleared. A further output relay can be used to operate when the Alarm/Trip or both Alarm+Trip have operated. The ESTAsym CPR can record details of the last five Alarm and Trip operations. An natural unbalance (out of balance or asymmetrical value) can be programmed into the device if required. This natural unbalance is subtracted from the measured value and allows a more exact setting of the thresholds.



### Technical Data

Supply voltage:	40 to 250 VAC, 45 to 65 Hz / 40 to 300 VDC, 5 VA; max fuse 6 A
Measuring voltage:	0.2 to 20 V; burden 284 kΩ; vt-ratio from 1 to 350, with low pass filter Continuous overload: 120 V; Short term overload: 500 V for 10 seconds Accuracy: 0.5 % from upper range value
Current measuring:	20 mA to 5 A; burden 20 mΩ; ct-ratio from 1 to 4000, with low pass filter Continuous overload: 25 A; Short term overload: 100 A for one second Accuracy: 0.5 % from upper range value
Relay outputs:	Maximum output rating AC: 1250 VA, max switching voltage: 440 VAC Maximum output rating DC (ohmic): 30 V / 5 A; 60 V / 1 A; 110 V / 0.5 A; 220 V / 0.3 A
Digital input:	Blocking Alarm / Trip via digital input
Interface:	TTL, rear (optional: RS485, Mod bus, RTU)
Ambient temperature:	Operation: - 20 °C to + 70 °C, storage: - 40 °C to + 85 °C
Humidity:	0 % to 95 %, without moisture condensation
Overvoltage class:	II, pollution degree 3 (DIN VDE 0110, Teil 1 / IEC 60664-1)
Standards:	DIN VDE 0110 part 1 (IEC 60664-1:1992) VDE 0411 part 1 (DIN EN 61010-1 / IEC 61010-1:2001) VDE 0843 part 20 (DIN EN 61326 / IEC 61326: 1997+ A1:1998 +A2: 2000)
Conformity and listing:	CE
Terminals:	Screw-type, maximum 4 mm <sup>2</sup>
Casing front:	Instrument casing plastic (UL94-VO), rear: metal
Protection class Front:	IP50, (IP54 by using a gasket), Rear: IP20
Weight:	Approximately 0.65 kg

### Dimensions: (mm)





## SEMICONDUCTORS

### *MOSFETs Segment*

#### MOSFETs

- Low-Voltage TrenchFET® Power MOSFETs
- Medium-Voltage Power MOSFETs
- High-Voltage Planar MOSFETs
- High-Voltage Superjunction MOSFETs
- Automotive-Grade MOSFETs

#### ICs

- VRPower® DrMOS Integrated Power Stages
- Power Management and Power Control ICs
- Smart Load Switches
- Analog Switches and Multiplexers

### *Diodes Segment*

#### Rectifiers

- Schottky Rectifiers
- Ultra-Fast Recovery Rectifiers
- Standard and Fast Recovery Rectifiers
- High-Power Rectifiers/Diodes
- Bridge Rectifiers

#### Small-Signal Diodes

- Schottky and Switching Diodes
- Zener Diodes
- RF PIN Diodes

#### Protection Diodes

- TVS Diodes or TRANSZORB® (unidirectional, bidirectional)
- ESD Protection Diodes (including arrays)

#### Thyristors/SCRs

- Phase-Control Thyristors
- Fast Thyristors

#### IGBTs

- Field Stop Trench
- Punch-Through Trench

#### Power Modules

- Input Modules (diodes and thyristors)
- Output and Switching Modules (contain MOSFETs, IGBTs, and diodes)
- Custom Modules

### *Optoelectronic Components Segment*

#### Infrared Emitters and Detectors

#### Optical Sensors

- Proximity
- Ambient light
- Light Index (RGBW, UV, IR)
- Humidity
- Quadrant Sensors
- Transmissive
- Reflective

#### Infrared Remote Control Receivers

#### Optocouplers

- Phototransistor, Photodarlington
- Linear
- Phototriac
- High-Speed
- IGBT and MOSFET Driver

#### Solid-State Relays

#### LEDs and 7-Segment Displays

#### Infrared Data Transceiver Modules

#### Custom Products

## PASSIVE COMPONENTS

### *Resistors and Inductors Segment*

#### Film Resistors

- Metal Film Resistors
- Thin Film Resistors
- Thick Film Resistors
- Power Thick Film Resistors
- Metal Oxide Film Resistors
- Carbon Film Resistors

#### Wirewound Resistors

- Vitreous, Cemented, and Housed Resistors
- Braking and Neutral Grounding Resistors
- Custom Load Banks

#### Power Metal Strip® Resistors

#### Battery Management Shunts

#### Crowbar and Steel Blade Resistors

#### Thermo Fuses

#### Chip Fuses

#### Pyrotechnic Initiators / Igniters

#### Variable Resistors

- Cermet Variable Resistors
- Wirewound Variable Resistors
- Conductive Plastic Variable Resistors
- Contactless Potentiometers
- Hall Effect Position Sensors
- Precision Magnetic Encoders

#### Networks/Arrays

#### Non-Linear Resistors

- NTC Thermistors
- PTC Thermistors
- Thin Film RTDs
- Varistors

#### Magnetics

- Inductors
- Wireless Charging Coils
- Planar Devices
- Transformers
- Custom Magnetics

#### Connectors

### *Capacitors Segment*

#### Tantalum Capacitors

- Molded Chip Tantalum Capacitors
- Molded Chip Polymer Tantalum Capacitors
- Coated Chip Tantalum Capacitors
- Solid Through-Hole Tantalum Capacitors
- Wet Tantalum Capacitors

#### Ceramic Capacitors

- Multilayer Chip Capacitors
- Disc Capacitors
- Multilayer Chip RF Capacitors
- Chip Antennas
- Thin Film Capacitors

#### Film Capacitors

#### Power Capacitors

#### Heavy-Current Capacitors

#### Aluminum Electrolytic Capacitors

#### ENYCAP™ Energy Storage Capacitors