Trench is a recognized world leader in the design and manufacture of high voltage equipment for application on electric utility and high energy industrial systems. Since several decades Trench offers an advanced line of relays for capacitor bank protection. The CPR 500 is a sophisticated protection relay specifically designed for comprehensive and optimized protection of medium and high voltage capacitor banks and filter installations.
<table>
<thead>
<tr>
<th>General</th>
<th>Application</th>
<th>System Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>The non-availability of capacitor/ filter banks can be extremely costly for electricity users. The loss of capacitors and/or reactors possibly results in major penalties in maximum demand charges, affects plant production, disables the operation of complete electric systems and is often also associated with unacceptable thermal loading of transformers, cables and switchgear, coupled to higher voltage drops, unacceptable voltage regulation and excessive harmonic distortion. This necessitates an optimized protection of capacitor banks and filter installations under all possible operating conditions.</td>
<td>The CPR 500 provides comprehensive protection for the capacitive, inductive and resistive elements of three phase medium and high voltage shunt capacitor banks and harmonic filter circuits. The capacitor banks may have a single star, double star, delta or &quot;H&quot; configuration, with internally fused, externally fused or unfused capacitor units.</td>
<td>The CPR 500 functions are designed to limit the possible damage to capacitors in a power factor correction system. Noting the CPR 500 does not have any facility to control power factor. The main objective is to remove the protected equipment from service before damage occurs. The CPR 500 has two types of protection modes residing in the firmware, either one can be selected to suit the protection requirements. The NORMAL MODE (N mode) covers the common protection applications. The H-BRIDGE MODE (H mode) is specifically for &quot;H&quot; configuration capacitor banks. There can be more than one CPR 500 used in a protection scheme that may require both N &amp; H protection, or where there are parallel circuits and fine protection is required in one leg of the parallel circuit.</td>
</tr>
</tbody>
</table>
**DESIGN FEATURES**

**Protection Functions**
- Peak repetitive overvoltage protection to the 50th harmonic
- Fundamental frequency overcurrent, undercurrent and earth fault protection
- RMS overcurrent protection (up to 50th harmonic)
- Neutral unbalance protection with residual compensation
- Line unbalance protection
- Thermal protection for capacitor, inductor & resistor elements
- Dual breaker fail protection with programmable logic
- Capacitor re-switching protection

**Key Features**
- Capacitive touch user interface
- Graphic colour display
- MODBUS RTU default to all expansion modules
- IEC61850 Server (optional)
- USB communications interface
- Multi-language support
- Removable GUI (panel door mount)
- Available communication expansion modules:
  - RS485 standalone
  - Ethernet (TCP/IP) and RS485
  - Ethernet (61850) and RS485

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CPR500 basic version

CPR500 with Man Machine Interface (MMI)
## TECHNICAL DATA

### CURRENT MEASURING ELEMENTS
- **Quantity**: 4
- **Nominal rated current IN**
  - 1A or 5A programmable in the software
  - 15 A
- **Max. continuous current**: 300A for 1s
- **Max. short time current**
  - < 40mOhm
- **Input impedance**: +/- 2% of nominal rated current

### AUXILIARY POWER SUPPLY
- **Option 1 PSU**
  - not polarity sensitive
  - AC 100V - 230 V +/- 20%
  - DC 110V - 250V +/- 20%
- **Option 2 PSU**
  - not polarity sensitive
  - AC 32V - 42 V +/- 20%
  - DC 24V - 60V +/- 20%
- **Maximum load**
  - 20 W with all relays and backlight ON

### CONTROL RELAYS OUTPUTS
- **Changeover contacts**
  - 5 x single pole (N/O, N/C)
  - 1x self supervision relay (N/O, N/C)
- **K1**
  - max. voltage: 264 VAC / 250 VDC
  - making capability: 5A
  - breaking capability: 100VA AC / 30W DC - L/R 40ms
- **K2 - K6**
  - max. voltage: 264 VAC / 125 VDC
  - making capability: 5A
  - breaking capability: 30VA AC / 15W DC - L/R 40ms

### SIGNAL RELAY OUTPUTS
- **Solid state relays**
  - 3 x single pole (N/O)
- **SR1 - SR3**
  - max. voltage: 110 VAC / 110 VDC
  - ON Resistance: 8 Ohm
  - max. ibad current cont.: 200 mA

### DIGITAL INPUTS
- **Quantity**: 4
- **Function**: Breaker on, Remote reset, event trip, ...
- **Isolation**: optically
- **Voltage**: 30 - 110 VAC/DC

### COMMUNICATIONS INTERFACE
- **Additional slot-in communication module**
  - Modbus RTU (RS485) - Default to all expansion modules, plus
  - option 1: TCP/IP (RI45), or
  - option 2: IEC61850 (RI49)