

# MONITORING RELAYS

QUICK

## CURRENT MONITORING RELAYS

## CURRENT

PRODUCT	P100P Current Monitor 1A/2A/5A AC/DC	SP103 Current Monitor 1A/5A AC/DC	P101P Current Monitor 0-200mA AC/DC 60mV/150mV (DC Shunt) 0-5V AC/DC	SP104 Current Monitor 0-200mA AC/DC 60mV/150mV (DC Shunt) 0-5V AC/DC	P120P Current Window Comparator 1A/2A/5A AC																																																																																		
ORDERING CODE	<table border="1"> <tr> <td>TYPE</td> <td>SUPPLY VOLTAGE</td> <td>AC/DC</td> <td>RELAY CONTACTS</td> <td>Fn</td> </tr> <tr> <td>P100PD</td> <td>230</td> <td>A</td> <td>S</td> <td>3</td> </tr> </table>	TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	Fn	P100PD	230	A	S	3	<table border="1"> <tr> <td>TYPE</td> <td>SUPPLY VOLTAGE</td> <td>AC/DC</td> <td>RELAY CONTACTS</td> <td>Fn</td> </tr> <tr> <td>SP103</td> <td>240</td> <td>AC</td> <td>S</td> <td>3</td> </tr> </table>	TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	Fn	SP103	240	AC	S	3	<table border="1"> <tr> <td>TYPE</td> <td>SUPPLY VOLTAGE</td> <td>AC/DC</td> <td>RELAY CONTACTS</td> <td>Fn</td> </tr> <tr> <td>P101PD</td> <td>230</td> <td>A</td> <td>S</td> <td>3</td> </tr> </table>	TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	Fn	P101PD	230	A	S	3	<table border="1"> <tr> <td>TYPE</td> <td>SUPPLY VOLTAGE</td> <td>AC/DC</td> <td>RELAY CONTACTS</td> <td>Fn</td> </tr> <tr> <td>SP104</td> <td>240</td> <td>AC</td> <td>S</td> <td>3</td> </tr> </table>	TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	Fn	SP104	240	AC	S	3	<table border="1"> <tr> <td>TYPE</td> <td>SUPPLY VOLTAGE</td> <td>AC/DC</td> <td>RELAY CONTACTS</td> <td>Fn</td> </tr> <tr> <td>P120PD</td> <td>230</td> <td>A</td> <td>S</td> <td>3</td> </tr> </table>	TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	Fn	P120PD	230	A	S	3																																
TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	Fn																																																																																			
P100PD	230	A	S	3																																																																																			
TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	Fn																																																																																			
SP103	240	AC	S	3																																																																																			
TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	Fn																																																																																			
P101PD	230	A	S	3																																																																																			
TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	Fn																																																																																			
SP104	240	AC	S	3																																																																																			
TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	Fn																																																																																			
P120PD	230	A	S	3																																																																																			
FRONT PLATE CONTROLS	<p>L = LED P = Potentiometer S = Selector Switch</p>																																																																																						
FEATURES	<ul style="list-style-type: none"> <li>DIN rail mount</li> <li>Fail-to-safe design.</li> <li>Interchangeable plug-in power supply (up to 240V).</li> <li>Programmable for overload or underload monitoring.</li> <li>1A, 2A or 5A, AC or DC input range (programmable).</li> <li>Internal shunt for direct in-line current sensing (max 5A AC or DC).</li> <li>Direct interface with conventional current transformers.</li> <li>Trip point adjustable on percentage scale (10% to 100%).</li> <li>Adjustable hysteresis (5% to 30%).</li> <li>Adjustable response time available on trip and/or recovery (0,1 to 10 seconds).</li> <li>Available with either fixed or adjustable start-up delay.</li> <li>Latching on overload or underload (programmable).</li> <li>Power ON &amp; Relay ON LEDs</li> <li>10A SPDT relay output.</li> </ul>	<ul style="list-style-type: none"> <li>11-pin plug-in</li> <li>Fail-to-safe design</li> <li>Adjustable time delay on trip 0.1 to 10 seconds</li> <li>Programmable <ul style="list-style-type: none"> <li>Overload detection</li> <li>Underload detection</li> <li>Input ranges: <ul style="list-style-type: none"> <li>1A or 5A (AC or DC)</li> </ul> </li> <li>Latching</li> </ul> </li> <li>Adjustable: <ul style="list-style-type: none"> <li>Trip point 10 to 100%</li> <li>Hysteresis 5 to 30%</li> </ul> </li> <li>Start-up delay 10 sec fixed</li> <li>Internal shunt</li> <li>Interfaces with 5A CT</li> <li>10A SPDT relay output</li> <li>Supersedes SP100</li> </ul>	<ul style="list-style-type: none"> <li>DIN rail mount</li> <li>Fail-to-safe design.</li> <li>Interchangeable plug-in power supply (up to 240V).</li> <li>Programmable for overload or underload monitoring.</li> <li>Internal shunt for direct in-line sensing of currents up to 200mA (AC or DC).</li> <li>Direct interface with DC shunt resistors.</li> <li>Range selector switch for 1 mA, 20 mA, 200 mA, 60 mV, 150 mV and 5V.</li> <li>Trip point adjustable on percentage scale (10% to 100%).</li> <li>Adjustable hysteresis 5-30%</li> <li>Adjustable response time available on trip and/or recovery (0,1 to 10 seconds).</li> <li>Available with either fixed or adjustable start-up delay.</li> <li>Latching on overload or underload (programmable).</li> <li>Power ON &amp; Relay ON LEDs</li> <li>10A SPDT relay output.</li> </ul>	<ul style="list-style-type: none"> <li>11-pin plug-in</li> <li>Fail-to-safe design</li> <li>Adjustable time delay on trip 0.1 to 10 seconds</li> <li>Programmable <ul style="list-style-type: none"> <li>Overload detection</li> <li>Underload detection</li> <li>Input ranges: <ul style="list-style-type: none"> <li>(AC or DC) <ul style="list-style-type: none"> <li>1mA 60mV</li> <li>20mA 150mV</li> <li>200mA 5V</li> </ul> </li> </ul> </li> <li>Latching</li> </ul> </li> <li>Adjustable: <ul style="list-style-type: none"> <li>Trip point 10 to 100%</li> <li>Hysteresis 5 to 30%</li> </ul> </li> <li>Start-up delay 10 sec fixed</li> <li>Internal shunt</li> <li>Interfaces with DC shunt (60mV or 150mV)</li> <li>10A SPDT relay output</li> <li>Supersedes SP101</li> </ul>	<ul style="list-style-type: none"> <li>DIN rail mount</li> <li>Fail-to-safe design.</li> <li>Combined overload and underload monitoring.</li> <li>1A, 2A, or 5A AC input range (programmable).</li> <li>Internal shunt for direct in-line current sensing (AC).</li> <li>Direct interface with conventional current transformers.</li> <li>Separate adjustment of overload and underload setpoints.</li> <li>Adjustable response time available on trip and/or recovery (0,1 to 10 seconds).</li> <li>Adjustable start-up delay (0 to 10 seconds).</li> <li>Latching on overload or underload (programmable).</li> <li>LED indication of Power ON, Relay ON and fault type.</li> <li>10A SPDT relay output.</li> </ul>																																																																																		
TYPICAL WIRING & CONNECTION DIAGRAM																																																																																							
TECHNICAL SPECS	<ul style="list-style-type: none"> <li><b>Power Supply:</b> <b>AC transformer:</b> 22.5mm wide housing: 12, 24, 115, 230(220-240)V 45mm wide housing: 400(380-415), 525V <b>DC (no isolation):</b> 22.5mm wide housing: 12, 24, 48, 60, 110V</li> <li><b>Current Input:</b> Setpoint: 0.1-1A, 0.2-2A, or 0.5-5A AC/DC adj. Repetitive accuracy: 1% Hysteresis: 5-30% Max input current: 6A cont. or 20A (10sec max) Input impedance: 50mΩ</li> <li><b>Response Time &amp; Start-up Delay (Fn3 standard):</b></li> </ul> <table border="1"> <tr> <th>Fn.</th> <th>Trip</th> <th>Recovery</th> <th>Start-up</th> </tr> <tr> <td>1</td> <td>10 sec (adj)</td> <td>0.1 sec (fixed)</td> <td>10 sec (fixed)</td> </tr> <tr> <td>2</td> <td>0.1 sec (fixed)</td> <td>10 sec (adj)</td> <td>10 sec (fixed)</td> </tr> <tr> <td>3</td> <td>10 sec (adj)</td> <td>10 sec (single adj)</td> <td>10 sec (fixed)</td> </tr> <tr> <td>4</td> <td>1 sec (fixed)</td> <td>1 sec (fixed)</td> <td>10 sec (adj)</td> </tr> </table>	Fn.	Trip	Recovery	Start-up	1	10 sec (adj)	0.1 sec (fixed)	10 sec (fixed)	2	0.1 sec (fixed)	10 sec (adj)	10 sec (fixed)	3	10 sec (adj)	10 sec (single adj)	10 sec (fixed)	4	1 sec (fixed)	1 sec (fixed)	10 sec (adj)	<ul style="list-style-type: none"> <li><b>Power supply:</b> <b>AC:</b> 12, 24, 110, 230, 240, 400, 415, 525 V±15% Isolation: 2kV <b>DC:</b> 10 - 30V at 100mA 48, 60, 110V ± 15% at 30mA No galvanic isolation</li> <li><b>Current Input:</b> Sensitivity: 0.1 to 1A or 0.5 to 5A (AC or DC) adjustable Repetitive accuracy: 1% Hysteresis: 5 to 30% Max. input current: 6A continuous Peak short-term over-current (10 sec): 20A Input impedance: 50mΩ</li> <li><b>Response:</b> Start-up delay: 10 sec (approx.) (0-15s on special order) Adjustable time delay on trip: 0,1 to 10 sec (approx.)</li> </ul>	<ul style="list-style-type: none"> <li><b>Power Supply:</b> <b>AC transformer:</b> 22.5mm wide housing: 12, 24, 115, 230(220-240)V 45mm wide housing: 400(380-415), 525V <b>DC (no isolation):</b> 22.5mm wide housing: 12, 24, 48, 60, 110V</li> <li><b>Current/Voltage Input:</b></li> </ul> <table border="1"> <tr> <th>RANGE</th> <th>INPUT Imp.</th> <th>MAX. INPUT (CONT.)</th> </tr> <tr> <td>1 mA</td> <td>400Ω</td> <td>25mA</td> </tr> <tr> <td>20mA</td> <td>20Ω</td> <td>100mA</td> </tr> <tr> <td>200mA</td> <td>2Ω</td> <td>500mA</td> </tr> <tr> <td>60mV to 5V</td> <td>10kΩ</td> <td>50V</td> </tr> </table> <p>Repetitive accuracy: 1% Hysteresis: 5-30%</p> <li><b>Response Time &amp; Start-up Delay (Fn3 standard):</b></li> <table border="1"> <tr> <th>Fn.</th> <th>Trip</th> <th>Recovery</th> <th>Start-up</th> </tr> <tr> <td>1</td> <td>10 sec (adj)</td> <td>0.1 sec (fixed)</td> <td>10 sec (fixed)</td> </tr> <tr> <td>2</td> <td>0.1 sec (fixed)</td> <td>10 sec (adj)</td> <td>10 sec (fixed)</td> </tr> <tr> <td>3</td> <td>10 sec (adj)</td> <td>10 sec (single adj)</td> <td>10 sec (fixed)</td> </tr> <tr> <td>4</td> <td>1 sec (fixed)</td> <td>1 sec (fixed)</td> <td>10 sec (adj)</td> </tr> </table>	RANGE	INPUT Imp.	MAX. INPUT (CONT.)	1 mA	400Ω	25mA	20mA	20Ω	100mA	200mA	2Ω	500mA	60mV to 5V	10kΩ	50V	Fn.	Trip	Recovery	Start-up	1	10 sec (adj)	0.1 sec (fixed)	10 sec (fixed)	2	0.1 sec (fixed)	10 sec (adj)	10 sec (fixed)	3	10 sec (adj)	10 sec (single adj)	10 sec (fixed)	4	1 sec (fixed)	1 sec (fixed)	10 sec (adj)	<ul style="list-style-type: none"> <li><b>Power supply:</b> <b>AC:</b> 12, 24, 110, 230, 240, 400, 415, 525 V±15% Isolation: 2kV <b>DC:</b> 10 - 30V at 100mA 48, 60, 110V ± 15% at 30mA No galvanic isolation</li> <li><b>Current/Voltage Input:</b></li> </ul> <table border="1"> <tr> <th>RANGE</th> <th>INPUT Imp.</th> <th>MAX. INPUT (CONT.)</th> </tr> <tr> <td>1 mA</td> <td>60Ω</td> <td>60mA</td> </tr> <tr> <td>20mA</td> <td>3Ω</td> <td>350mA</td> </tr> <tr> <td>200mA</td> <td>0.7Ω</td> <td>800mA</td> </tr> <tr> <td>60mV to 5V</td> <td>10kΩ</td> <td>50V</td> </tr> </table> <p>Repetitive accuracy: 1% Hysteresis: 5 to 30%</p> <li><b>Response:</b> Start-up delay: 10 sec (approx.) (0-15s on special order) Adjustable time delay on trip: 0,1 to 10 sec (approx.)</li>	RANGE	INPUT Imp.	MAX. INPUT (CONT.)	1 mA	60Ω	60mA	20mA	3Ω	350mA	200mA	0.7Ω	800mA	60mV to 5V	10kΩ	50V	<ul style="list-style-type: none"> <li><b>Power Supply:</b> <b>AC transformer:</b> 45mm wide housing: 12, 24, 115, 230(220-240), 400(380-415), 525V <b>DC (no isolation):</b> 45mm wide housing: 12, 24, 48, 60, 110V</li> <li><b>Current Input:</b> Setpoint: 0,2A - 1A, 0,4A - 2A, 1A - 5A adj. Repetitive accuracy: 1% Hysteresis: 5% fixed Max input current: 6A cont. or 20A (10sec max) Input impedance: 50mΩ</li> <li><b>Start-up Delay:</b> 0-10 sec (adj.)</li> <li><b>Response Time (Fn3 standard):</b></li> </ul> <table border="1"> <tr> <th>Fn.</th> <th>Trip</th> <th>Recovery</th> </tr> <tr> <td>1</td> <td>10 sec. (adj)</td> <td>0,1 sec. (fixed)</td> </tr> <tr> <td>2</td> <td>0,1 sec. (fixed)</td> <td>10 sec. (adj)</td> </tr> <tr> <td>3</td> <td>10 sec. (adj)</td> <td>10 sec. (single adj)</td> </tr> </table>	Fn.	Trip	Recovery	1	10 sec. (adj)	0,1 sec. (fixed)	2	0,1 sec. (fixed)	10 sec. (adj)	3	10 sec. (adj)	10 sec. (single adj)
Fn.	Trip	Recovery	Start-up																																																																																				
1	10 sec (adj)	0.1 sec (fixed)	10 sec (fixed)																																																																																				
2	0.1 sec (fixed)	10 sec (adj)	10 sec (fixed)																																																																																				
3	10 sec (adj)	10 sec (single adj)	10 sec (fixed)																																																																																				
4	1 sec (fixed)	1 sec (fixed)	10 sec (adj)																																																																																				
RANGE	INPUT Imp.	MAX. INPUT (CONT.)																																																																																					
1 mA	400Ω	25mA																																																																																					
20mA	20Ω	100mA																																																																																					
200mA	2Ω	500mA																																																																																					
60mV to 5V	10kΩ	50V																																																																																					
Fn.	Trip	Recovery	Start-up																																																																																				
1	10 sec (adj)	0.1 sec (fixed)	10 sec (fixed)																																																																																				
2	0.1 sec (fixed)	10 sec (adj)	10 sec (fixed)																																																																																				
3	10 sec (adj)	10 sec (single adj)	10 sec (fixed)																																																																																				
4	1 sec (fixed)	1 sec (fixed)	10 sec (adj)																																																																																				
RANGE	INPUT Imp.	MAX. INPUT (CONT.)																																																																																					
1 mA	60Ω	60mA																																																																																					
20mA	3Ω	350mA																																																																																					
200mA	0.7Ω	800mA																																																																																					
60mV to 5V	10kΩ	50V																																																																																					
Fn.	Trip	Recovery																																																																																					
1	10 sec. (adj)	0,1 sec. (fixed)																																																																																					
2	0,1 sec. (fixed)	10 sec. (adj)																																																																																					
3	10 sec. (adj)	10 sec. (single adj)																																																																																					

## WINDOW COMPARATORS      POWER FLOW      VOLTAGE MONITORS

<b>SP123</b> Current Window Comparator 1A/5A AC	<b>P121P</b> DC Current Window Comparator	<b>SP124</b> DC Current Window Comparator	<b>SP510</b> Single Phase Reverse Power Monitor	<b>P200P</b> Voltage Monitor Single Phase AC/DC	<b>SP201</b> Voltage Monitor Single Phase AC/DC																																																														
<ul style="list-style-type: none"> <li>● 11-pin plug-in</li> <li>● Fail-to-safe design</li> <li>● Adjustable time delay on trip 0.1 to 10 seconds</li> <li>● Combined overload and underload detection</li> <li>● Programmable                             <ul style="list-style-type: none"> <li>- Input ranges: 1A or 5A (AC or DC)</li> <li>- Latching</li> </ul> </li> <li>● Separately adjustable overload and underload (10% to 100%)</li> <li>● Start-up delay 10 sec fixed</li> <li>● Internal shunt</li> <li>● Interfaces with 5A CT</li> <li>● Fixed hysteresis: 2%</li> <li>● 10A SPDT relay output</li> <li>● <b>Supersedes SP120</b></li> </ul>	<ul style="list-style-type: none"> <li>● DIN rail mount</li> <li>● Fail-to-safe design.</li> <li>● Combined overload and underload monitoring.</li> <li>● Internal shunt for direct in-line sensing of currents up to 200mA DC.</li> <li>● Direct interface with DC shunt resistors.</li> <li>● Range selector switch for 1 mA, 20 mA, 200 mA, 60 mV, 150 mV and 5V.</li> <li>● Separate adjustment of overload and underload setpoints.</li> <li>● Adjustable response time available on trip and/or recovery (0,1 to 10 seconds).</li> <li>● Adjustable start-up delay (0 to 10 seconds).</li> <li>● Latching on overload and underload (programmable).</li> <li>● LED indication of Power ON, Relay ON and fault type.</li> <li>● 10A SPDT relay output.</li> </ul>	<ul style="list-style-type: none"> <li>● 11-pin plug-in</li> <li>● Fail-to-safe design</li> <li>● Adjustable time delay on trip 0.1 to 10 seconds</li> <li>● Combined overload and underload detection</li> <li>● Programmable                             <ul style="list-style-type: none"> <li>- Input ranges: (DC) 1mA 60mV 20mA 150mV 200mA 5V</li> <li>- Latching</li> </ul> </li> <li>● Separately adjustable overload and underload (10 to 100%)</li> <li>● Start-up delay 10 sec fixed</li> <li>● Direct interfaces with DC shunt resistors</li> <li>● Fixed hysteresis: 2%</li> <li>● 10A SPDT relay output</li> <li>● <b>Supersedes SP121</b></li> </ul>	<ul style="list-style-type: none"> <li>● 11-pin plug-in</li> <li>● Fail-to-safe design</li> <li>● Monitors level &amp; direction of AC current flow</li> <li>● Adjustable reverse current tripping level</li> <li>● Current monitoring through internal shunt</li> <li>● Time delay on trip adjustable up to 10 seconds</li> <li>● Start-up delay adjustable up to 10 seconds</li> <li>● Insensitive to change in power factor</li> <li>● LED indication of reverse power</li> <li>● LED indication of relay ON</li> <li>● Latching facility</li> <li>● 10A SPDT relay output</li> </ul>	<ul style="list-style-type: none"> <li>● DIN rail mount</li> <li>● Fail-to-safe design.</li> <li>● Interchangeable plug-in power supply (up to 240V).</li> <li>● Programmable for overvoltage or undervoltage monitoring.</li> <li>● Programmable input voltage range up to 600V AC(RMS) or DC.</li> <li>● Trip point adjustable on percentage scale (10% to 100%).</li> <li>● Adjustable hysteresis (5% to 30%).</li> <li>● Adjustable response time available on trip and/or recovery (0,1 to 10 seconds).</li> <li>● Available with either fixed or adjustable start-up delay.</li> <li>● Latching on overload or underload (programmable).</li> <li>● Power ON and Relay ON LED's.</li> <li>● 10A SPDT relay output.</li> </ul>	<ul style="list-style-type: none"> <li>● 11-pin plug-in</li> <li>● Fail-to-safe design</li> <li>● Adjustable time delay on trip 0.1 to 10 seconds.</li> <li>● Programmable                             <ul style="list-style-type: none"> <li>- Over-voltage detection</li> <li>- Under-voltage detection</li> </ul> </li> <li>● Input ranges: (AC or DC) 15V 150V 30V 300V 60V 600V (each range: 0 to 100%)</li> <li>● Latching</li> <li>● Adjustable:                             <ul style="list-style-type: none"> <li>- Trip point 0 to 100%</li> <li>- Hysteresis 5 to 30%</li> </ul> </li> <li>● Internal shunt</li> <li>● 10A SPDT relay output</li> <li>● <b>Supersedes SP200</b></li> </ul>																																																														
<ul style="list-style-type: none"> <li>● <b>Power supply:</b>                      AC: 12, 24, 110, 230, 240, 400, 415, 525 V±15%                      Isolation: 2kV                      DC: 10 - 30V at 100mA                      48, 60, 110V ± 15% at 30mA                      No galvanic isolation</li> <li>● <b>Current Input:</b>                      Sensitivity: 0.1 to 1A or 0.5 to 5A (AC or DC) adjustable                      Repetitive accuracy: 1%                      Hysteresis: 2% (fixed)                      Max. input current: 6A continuous                      Peak short-term over-current (10 sec): 20A                      Input impedance: 50mΩ</li> <li>● <b>Response:</b>                      Start-up delay: 10 sec (approx.)                      (0-15s on special order)                      Adjustable time delay on trip: 0,1 to 10 sec (approx.)</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Power Supply:</b>                      AC transformer:                      45mm wide housing:                      12, 24, 115, 230(220-240), 400(380-415), 525V                      DC (no isolation):                      45mm wide housing:                      12, 24, 48, 60, 110V</li> <li>● <b>Current/Voltage Input:</b> <table border="1" data-bbox="367 1713 558 1848"> <thead> <tr> <th>RANGE</th> <th>INPUT Imp.</th> <th>MAX. INPUT (CONT.)</th> </tr> </thead> <tbody> <tr> <td>1mA</td> <td>400Ω</td> <td>25mA</td> </tr> <tr> <td>20mA</td> <td>20Ω</td> <td>100mA</td> </tr> <tr> <td>200mA</td> <td>2Ω</td> <td>500mA</td> </tr> <tr> <td>60mV to 5V</td> <td>&gt;20kΩ</td> <td>50V</td> </tr> </tbody> </table>                     Repetitive accuracy: 1%                      Hysteresis: 5% fixed</li> <li>● <b>Start-up Delay:</b>                      0-10 sec (adj.)</li> <li>● <b>Response Time (Fn3 standard):</b> <table border="1" data-bbox="367 1982 558 2116"> <thead> <tr> <th>Fn.</th> <th>Trip</th> <th>Recovery</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>10 sec. (adj)</td> <td>0,1 sec. (fixed)</td> </tr> <tr> <td>2</td> <td>0,1 sec. (fixed)</td> <td>10 sec. (adj)</td> </tr> <tr> <td>3</td> <td>10 sec. (adj) (single adj)</td> <td></td> </tr> </tbody> </table> </li> </ul>	RANGE	INPUT Imp.	MAX. INPUT (CONT.)	1mA	400Ω	25mA	20mA	20Ω	100mA	200mA	2Ω	500mA	60mV to 5V	>20kΩ	50V	Fn.	Trip	Recovery	1	10 sec. (adj)	0,1 sec. (fixed)	2	0,1 sec. (fixed)	10 sec. (adj)	3	10 sec. (adj) (single adj)		<ul style="list-style-type: none"> <li>● <b>Power supply:</b>                      AC: 12, 24, 110, 230, 240, 400, 415, 525 V±15%                      Isolation: 2kV                      DC: 10 - 30V at 100mA                      48, 60, 110V ± 15% at 30mA                      No galvanic isolation</li> <li>● <b>Current Input:</b> <table border="1" data-bbox="590 1713 782 1848"> <thead> <tr> <th>RANGE</th> <th>INPUT Imp.</th> <th>MAX. INPUT (CONT.)</th> </tr> </thead> <tbody> <tr> <td>1mA</td> <td>60Ω</td> <td>60mA</td> </tr> <tr> <td>20mA</td> <td>3Ω</td> <td>350mA</td> </tr> <tr> <td>200mA</td> <td>0,7Ω</td> <td>800mA</td> </tr> <tr> <td>60mV to 5V</td> <td>10kΩ</td> <td>50V</td> </tr> </tbody> </table>                     Repetitive accuracy: 1%                      Hysteresis: 2% fixed</li> <li>● <b>Response:</b>                      Start-up delay: 10 sec (approx.)                      (0-15s on special order)                      Adjustable time delay on trip: 0,1 to 10 sec (approx.)</li> </ul>	RANGE	INPUT Imp.	MAX. INPUT (CONT.)	1mA	60Ω	60mA	20mA	3Ω	350mA	200mA	0,7Ω	800mA	60mV to 5V	10kΩ	50V	<ul style="list-style-type: none"> <li>● <b>Power supply:</b>                      AC: 110, 230, 400, 415, 525 V±10%</li> <li>● <b>Current Input:</b>                      Reverse current sensitivity: 0,1 to 1A AC (adjustable)                      Max. input current: 6A continuous                      Peak input current: 20A for 20 sec.                      Repetitive accuracy: 1%                      Hysteresis: 5% (fixed)                      Input impedance: 50mΩ</li> <li>● <b>Response:</b>                      Start-up delay: 0 to 10 sec. (adjustable)                      Adjustable time delay on trip: 1 to 10 seconds (approx.)</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Power Supply:</b>                      AC transformer:                      22.5mm wide housing:                      12, 24, 115, 230(220-240)V                      45mm wide housing:                      400(380-415), 525V                      DC (no isolation):                      22.5mm wide housing:                      12, 24, 48, 60, 110V</li> <li>● <b>Voltage Input:</b>                      Range                      1.5-15V      15-150V                      3-30V      30-300V                      6-60V      60-600V                      Input impedance: 50mΩ                      Repetitive accuracy: 1%                      Hysteresis: 5-30%</li> <li>● <b>Response Time &amp; Start-up Delay (Fn3 standard):</b> (start-up delay disables latching)                             <table border="1" data-bbox="1053 1960 1244 2116"> <thead> <tr> <th>Fn.</th> <th>Trip</th> <th>Recovery</th> <th>Start-up</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>10 sec (adj)</td> <td>0,1 sec (fixed)</td> <td>10 sec (fixed)</td> </tr> <tr> <td>2</td> <td>0,1 sec (fixed)</td> <td>10 sec (adj)</td> <td>10 sec (fixed)</td> </tr> <tr> <td>3</td> <td>10 sec (adj) (single adj)</td> <td></td> <td>10 sec (fixed)</td> </tr> <tr> <td>4</td> <td>1 sec (fixed)</td> <td>1 sec (fixed)</td> <td>10 sec (adj)</td> </tr> </tbody> </table> </li> </ul>	Fn.	Trip	Recovery	Start-up	1	10 sec (adj)	0,1 sec (fixed)	10 sec (fixed)	2	0,1 sec (fixed)	10 sec (adj)	10 sec (fixed)	3	10 sec (adj) (single adj)		10 sec (fixed)	4	1 sec (fixed)	1 sec (fixed)	10 sec (adj)	<ul style="list-style-type: none"> <li>● <b>Power supply:</b>                      AC: 12, 24, 110, 230, 240, 400, 415, 525 V±15%                      Isolation: 2kV                      DC: 10 - 30V at 100mA                      48, 60, 110V ± 15% at 30mA                      No galvanic isolation</li> <li>● <b>Input voltages:</b>                      Ranges:                      0 - 15V 0 - 150V                      0 - 30V 0 - 300V                      0 - 60V 0 - 600V                      Impedance: 500kΩ (all ranges)                      Max. voltage: 700V (all ranges)                      Repetitive accuracy: 1%                      Hysteresis: 5 to 30%</li> <li>● <b>Response:</b>                      Latching disabled during power-up:                      10 sec (approx.)                      Adjustable time delay on trip: 0.1 to 10 sec (approx.)</li> </ul>
RANGE	INPUT Imp.	MAX. INPUT (CONT.)																																																																	
1mA	400Ω	25mA																																																																	
20mA	20Ω	100mA																																																																	
200mA	2Ω	500mA																																																																	
60mV to 5V	>20kΩ	50V																																																																	
Fn.	Trip	Recovery																																																																	
1	10 sec. (adj)	0,1 sec. (fixed)																																																																	
2	0,1 sec. (fixed)	10 sec. (adj)																																																																	
3	10 sec. (adj) (single adj)																																																																		
RANGE	INPUT Imp.	MAX. INPUT (CONT.)																																																																	
1mA	60Ω	60mA																																																																	
20mA	3Ω	350mA																																																																	
200mA	0,7Ω	800mA																																																																	
60mV to 5V	10kΩ	50V																																																																	
Fn.	Trip	Recovery	Start-up																																																																
1	10 sec (adj)	0,1 sec (fixed)	10 sec (fixed)																																																																
2	0,1 sec (fixed)	10 sec (adj)	10 sec (fixed)																																																																
3	10 sec (adj) (single adj)		10 sec (fixed)																																																																
4	1 sec (fixed)	1 sec (fixed)	10 sec (adj)																																																																

# MONITORING RELAYS

QUICK

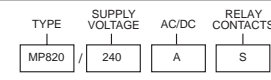
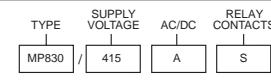
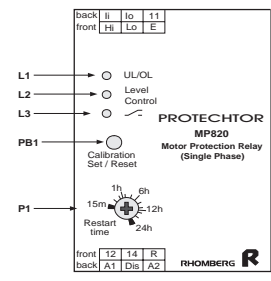
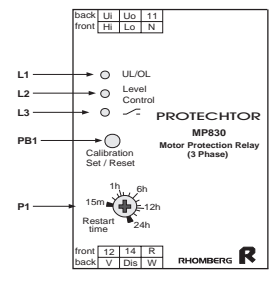
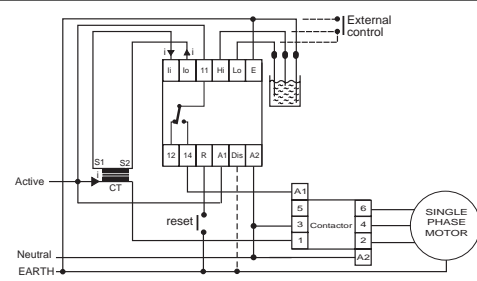
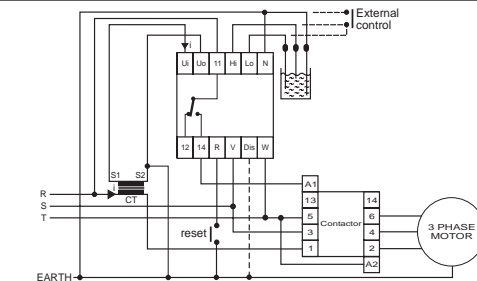
## VOLTAGE WINDOW COMPARATORS (1-PHASE & 3-PHASE)

PRODUCT	P220P Voltage Window Comparator Single Phase	SP221 Voltage Window Comparator Single Phase	P230P Voltage Window Comparator Three Phase	SP231 Voltage Window Comparator Three Phase	SP232 Voltage Window Comparator Three Phase with Neutral																																																		
ORDERING CODE	<table border="1"> <tr> <td>TYPE</td> <td>SUPPLY VOLTAGE</td> <td>AC/DC</td> <td>RELAY CONTACTS</td> <td>Fn</td> </tr> <tr> <td>P220PD</td> <td>230</td> <td>A</td> <td>S</td> <td>3</td> </tr> </table>	TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	Fn	P220PD	230	A	S	3	<table border="1"> <tr> <td>TYPE</td> <td>SUPPLY VOLTAGE</td> <td>AC/DC</td> <td>RELAY CONTACTS</td> <td>Fn</td> </tr> <tr> <td>SP221</td> <td>240</td> <td>AC</td> <td>S</td> <td>3</td> </tr> </table>	TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	Fn	SP221	240	AC	S	3	<table border="1"> <tr> <td>TYPE</td> <td>SUPPLY VOLTAGE</td> <td>AC/DC</td> <td>RELAY CONTACTS</td> <td>Fn</td> </tr> <tr> <td>P230PD</td> <td>400</td> <td>A</td> <td>S</td> <td>3</td> </tr> </table>	TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	Fn	P230PD	400	A	S	3	<table border="1"> <tr> <td>TYPE</td> <td>SUPPLY VOLTAGE</td> <td>AC/DC</td> <td>RELAY CONTACTS</td> <td>Fn</td> </tr> <tr> <td>SP231</td> <td>415</td> <td>AC</td> <td>S</td> <td>3</td> </tr> </table>	TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	Fn	SP231	415	AC	S	3	<table border="1"> <tr> <td>TYPE</td> <td>SUPPLY VOLTAGE</td> <td>AC/DC</td> <td>RELAY CONTACTS</td> <td>Fn</td> </tr> <tr> <td>SP232</td> <td>415</td> <td>AC</td> <td>S</td> <td>3</td> </tr> </table>	TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	Fn	SP232	415	AC	S	3
TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	Fn																																																			
P220PD	230	A	S	3																																																			
TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	Fn																																																			
SP221	240	AC	S	3																																																			
TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	Fn																																																			
P230PD	400	A	S	3																																																			
TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	Fn																																																			
SP231	415	AC	S	3																																																			
TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	Fn																																																			
SP232	415	AC	S	3																																																			
FRONT PLATE CONTROLS	<p>L = LED P = Potentiometer S = Selector Switch</p>	<p>LED 1 ● Over voltage LED 2 ● Relay ON LED 3 ● Under voltage</p>		<p>LED 1 ● Over voltage LED 2 ● Relay ON LED 3 ● Under voltage</p>	<p>LED 1 ● Over voltage LED 2 ● Relay ON LED 3 ● Under voltage</p>																																																		
FEATURES	<ul style="list-style-type: none"> <li>DIN rail mount</li> <li>Fail-to-safe design.</li> <li>Combined overvoltage and undervoltage monitoring.</li> <li>Monitoring of own supply voltage.</li> <li>Selectable power supply voltages.</li> <li>Independent adjustment of overvoltage and undervoltage setpoints.</li> <li>Adjustable response time available on trip and/or recovery (0,1 to 10 seconds).</li> <li>Adjustable start-up delay for disabling latching 0 to 10 sec</li> <li>Latching on overvoltage or undervoltage -programmable</li> <li>LED indication of Power ON, Relay ON and fault type.</li> <li>10A SPDT relay output.</li> </ul>	<ul style="list-style-type: none"> <li>11-pin plug-in</li> <li>Fail-to-safe design</li> <li>Adjustable time delay on trip 0.1 to 10 seconds</li> <li>Combined over-voltage and under-voltage detection</li> <li>Latching facility</li> <li>Separately adjustable: over-voltage (5 to 20%) and under-voltage (-5 to -20%)</li> <li>Monitoring of single phase supply</li> <li>LED indication of fault</li> <li>Power-up latching disabled</li> <li>Fixed hysteresis: 2%</li> <li>10A SPDT relay output</li> <li><b>Supersedes SP220</b></li> </ul>	<ul style="list-style-type: none"> <li>DIN rail mount</li> <li>Fail-to-safe design.</li> <li>Combined overvoltage and undervoltage monitoring.</li> <li>Monitoring of own supply voltage.</li> <li>Selectable power supply voltages.</li> <li>Independent adjustment of overvoltage and undervoltage setpoints.</li> <li>Adjustable response time available on trip and/or recovery (0,1 to 10 seconds).</li> <li>Adjustable start-up delay (0 to 10 seconds).</li> <li>Latching on overvoltage or undervoltage -programmable</li> <li>LED indication of Power ON, Relay ON and fault type.</li> <li>10A SPDT relay output.</li> </ul>	<ul style="list-style-type: none"> <li>11-pin plug-in</li> <li>Fail-to-safe design</li> <li>Adjustable time delay on trip 0.1 to 10 seconds</li> <li>Combined over-voltage and under-voltage detection</li> <li>Latching facility</li> <li>Separately adjustable: over-voltage (5 to 20%) and under-voltage (-5 to -20%)</li> <li>Monitoring of three phase supply</li> <li>LED indication of fault</li> <li>Power-up latching disabled</li> <li>Fixed hysteresis: 2%</li> <li>10A SPDT relay output</li> <li><b>Supersedes SP230</b></li> </ul>	<ul style="list-style-type: none"> <li>11-pin plug-in</li> <li>Fail-to-safe design</li> <li>Monitoring of three phase supply with neutral</li> <li>Combined over-voltage and under-voltage detection</li> <li>Latching facility</li> <li>Separately adjustable: over-voltage (5 to 20%) and under-voltage (-5 to -20%)</li> <li>LED indication of fault</li> <li>Power-up latching disabled</li> <li>Fixed hysteresis: 2%</li> <li>10A SPDT relay output</li> </ul>																																																		
TYPICAL WIRING & CONNECTION DIAGRAM																																																							
TECHNICAL SPECS	<ul style="list-style-type: none"> <li><b>Power Supply:</b> <b>AC transformer:</b> 45mm wide housing: 12, 24, 115, 220, 230, 240, 380, 400, 415, 525V <b>DC (no isolation):</b> 45mm wide housing: 12, 24, 48, 60, 110V</li> <li><b>Voltage sensing:</b> Setpoints: cal. to RMS of Vsupply Repetitive accuracy: 1% Hysteresis: 2% (fixed) Max voltage: Vsupply +20%</li> <li><b>Start-up Delay:</b> 0-10 sec (adj.) (for disabling latching)</li> <li><b>Response Time (Fn3 standard):</b></li> </ul> <table border="1"> <thead> <tr> <th>Fn.</th> <th>Trip</th> <th>Recovery</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>10 sec. (adj)</td> <td>0,1 sec. (fixed)</td> </tr> <tr> <td>2</td> <td>0,1 sec. (fixed)</td> <td>10 sec. (adj)</td> </tr> <tr> <td>3</td> <td>10 sec. (adj) (single adj)</td> <td></td> </tr> </tbody> </table>	Fn.	Trip	Recovery	1	10 sec. (adj)	0,1 sec. (fixed)	2	0,1 sec. (fixed)	10 sec. (adj)	3	10 sec. (adj) (single adj)		<ul style="list-style-type: none"> <li><b>Power supply:</b> <b>AC:</b> 12, 24, 110, 230, 240, 400, 415, 525 V±15% Isolation: 2kV <b>DC:</b> 12, 24V at 100mA 48, 60, 110V ± 15% at 30mA No galvanic isolation</li> <li><b>Voltage Sensing:</b> Repetitive accuracy: 1% Hysteresis: 2% (fixed)</li> <li><b>Response:</b> Latching disabled during power-up: 10 sec (approx.) Adjustable time delay on trip: 0,1 to 10 sec (approx.)</li> </ul>	<ul style="list-style-type: none"> <li><b>Power Supply:</b> 45mm wide housing: 115, 230(220, 230 or 240), 400(380, 400 or 415), 525V (phase-to-phase)</li> <li><b>Voltage sensing:</b> Setpoints: cal. to RMS of Vsupply Repetitive accuracy: 1% Hysteresis: 2% (fixed) Max voltage: Vsupply +20%</li> <li><b>Start-up Delay:</b> 0-10 sec (adj.) (for disabling latching)</li> <li><b>Response Time (Fn3 standard):</b></li> </ul> <table border="1"> <thead> <tr> <th>Fn.</th> <th>Trip</th> <th>Recovery</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>10 sec. (adj)</td> <td>0,1 sec. (fixed)</td> </tr> <tr> <td>2</td> <td>0,1 sec. (fixed)</td> <td>10 sec. (adj)</td> </tr> <tr> <td>3</td> <td>10 sec. (adj) (single adj)</td> <td></td> </tr> </tbody> </table>	Fn.	Trip	Recovery	1	10 sec. (adj)	0,1 sec. (fixed)	2	0,1 sec. (fixed)	10 sec. (adj)	3	10 sec. (adj) (single adj)		<ul style="list-style-type: none"> <li><b>Power supply:</b> <b>AC:</b> 110, 220, 380, 400, 415, 525 V±20%</li> <li><b>Voltage Sensing:</b> Repetitive accuracy: 1% Hysteresis: 2% (fixed)</li> <li><b>Response:</b> Latching disabled during power-up: 10 sec (approx.) Adjustable time delay on trip: 0,1 to 10 sec (approx.)</li> </ul>	<ul style="list-style-type: none"> <li><b>Power supply:</b> <b>AC:</b> 110, 220, 380, 400, 415, 525 V±20%</li> <li><b>Voltage Sensing:</b> Repetitive accuracy: 1% Hysteresis: 2% (fixed)</li> <li><b>Response:</b> Latching disabled during power-up: 10 sec (approx.) Time delay on trip: 1 sec (approx.) fixed</li> </ul>																										
Fn.	Trip	Recovery																																																					
1	10 sec. (adj)	0,1 sec. (fixed)																																																					
2	0,1 sec. (fixed)	10 sec. (adj)																																																					
3	10 sec. (adj) (single adj)																																																						
Fn.	Trip	Recovery																																																					
1	10 sec. (adj)	0,1 sec. (fixed)																																																					
2	0,1 sec. (fixed)	10 sec. (adj)																																																					
3	10 sec. (adj) (single adj)																																																						

## FREQUENCY THREE-PHASE MONITORING RELAYS

<b>SP320</b> Frequency Monitoring Relay	<b>AP430</b> Phase Sequence, Failure, Asymmetry Detector	<b>P430P</b> Phase Sequence, Failure, Asymmetry Detector Adjust. time delays	<b>SP430</b> Phase Sequence, Failure, Asymmetry Detector	<b>SP431</b> Phase Sequence, Failure, Asymmetry, loss of Neutral Detector	<b>SP433</b> Phase Sequence Phase Failure Detector																																																		
<table border="1" style="font-size: 8px; margin: auto;"> <tr><td>TYPE</td><td>SUPPLY VOLTAGE</td><td>AC/DC</td><td>RELAY CONTACTS</td></tr> <tr><td>SP320</td><td>240</td><td>AC</td><td>S</td></tr> </table>	TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	SP320	240	AC	S	<table border="1" style="font-size: 8px; margin: auto;"> <tr><td>TYPE</td><td>SUPPLY VOLTAGE</td><td>AC/DC</td><td>RELAY CONTACTS</td></tr> <tr><td>AP430</td><td>400</td><td>A</td><td>S</td></tr> </table>	TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	AP430	400	A	S	<table border="1" style="font-size: 8px; margin: auto;"> <tr><td>TYPE</td><td>SUPPLY VOLTAGE</td><td>AC/DC</td><td>RELAY CONTACTS</td><td>Fn1</td></tr> <tr><td>P430PD</td><td>400</td><td>A</td><td>S</td><td>2</td></tr> </table>	TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	Fn1	P430PD	400	A	S	2	<table border="1" style="font-size: 8px; margin: auto;"> <tr><td>TYPE</td><td>SUPPLY VOLTAGE</td><td>AC/DC</td><td>RELAY CONTACTS</td></tr> <tr><td>SP430</td><td>415</td><td>AC</td><td>S</td></tr> </table>	TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	SP430	415	AC	S	<table border="1" style="font-size: 8px; margin: auto;"> <tr><td>TYPE</td><td>SUPPLY VOLTAGE</td><td>AC/DC</td><td>RELAY CONTACTS</td></tr> <tr><td>SP431</td><td>415</td><td>AC</td><td>S</td></tr> </table>	TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	SP431	415	AC	S	<table border="1" style="font-size: 8px; margin: auto;"> <tr><td>TYPE</td><td>SUPPLY VOLTAGE</td><td>AC/DC</td><td>RELAY CONTACTS</td></tr> <tr><td>SP433</td><td>415</td><td>AC</td><td>S</td></tr> </table>	TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	SP433	415	AC	S
TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS																																																				
SP320	240	AC	S																																																				
TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS																																																				
AP430	400	A	S																																																				
TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	Fn1																																																			
P430PD	400	A	S	2																																																			
TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS																																																				
SP430	415	AC	S																																																				
TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS																																																				
SP431	415	AC	S																																																				
TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS																																																				
SP433	415	AC	S																																																				
<ul style="list-style-type: none"> <li>● 11-pin plug-in</li> <li>● Fail-to-safe design</li> <li>● Programmable:                             <ul style="list-style-type: none"> <li>- Over-frequency</li> <li>- Under-frequency</li> <li>- Frequency window</li> <li>- Start-up delay: 0 sec or 10 sec (selectable)</li> </ul> </li> <li>● Separately adjustable:                             <ul style="list-style-type: none"> <li>- Over-frequency (52 to 58 Hz)</li> <li>- Under-frequency (42 to 48 Hz)</li> </ul> </li> <li>● 60Hz &amp; 400Hz nominal frequency versions available on request</li> <li>● Fixed hysteresis: 0,5 Hz</li> <li>● LED indication of Relay ON, over frequency &amp; under frequency</li> <li>● 10A SPDT relay output</li> </ul>	<ul style="list-style-type: none"> <li>● DIN rail mount</li> <li>● Fail-to-safe design</li> <li>● Monitoring on three phase supply</li> <li>● Sensitive to:                             <ul style="list-style-type: none"> <li>- NPS Voltage</li> <li>- Reverse phase sequence</li> <li>- loss of phase</li> <li>- phase imbalance</li> <li>- phase asymmetry</li> </ul> </li> <li>● Insensitive to regenerated EMF</li> <li>● Adjustable NPS sensitivity</li> <li>● Power ON and Relay ON LED's</li> <li>● 10A SPDT or 5A DPDT relay output</li> </ul>	<ul style="list-style-type: none"> <li>● DIN rail mount</li> <li>● Fail-to-safe design</li> <li>● Monitoring on three phase supply</li> <li>● Sensitive to:                             <ul style="list-style-type: none"> <li>- NPS Voltage</li> <li>- Reverse phase sequence</li> <li>- loss of phase</li> <li>- phase imbalance</li> <li>- phase asymmetry</li> </ul> </li> <li>● Insensitive to regenerated EMF</li> <li>● Adjustable NPS sensitivity</li> <li>● Power ON &amp; Relay ON LED</li> <li>● 10A SPDT relay output.</li> <li>● Latching on relay trip (programmable)</li> <li>● Adjustable time delays on trip or recovery.</li> </ul>	<ul style="list-style-type: none"> <li>● 11-pin plug-in</li> <li>● Fail-to-safe design</li> <li>● Monitoring on three phase supply</li> <li>● Sensitive to:                             <ul style="list-style-type: none"> <li>- NPS Voltage</li> <li>- Reverse phase sequence</li> <li>- loss of phase</li> <li>- phase imbalance</li> <li>- phase asymmetry</li> </ul> </li> <li>● Insensitive to regenerated EMF</li> <li>● Adjustable NPS sensitivity</li> <li>● Relay ON LED.</li> <li>● 10A SPDT or 5A DPDT relay output</li> </ul>	<ul style="list-style-type: none"> <li>● 11-pin plug-in</li> <li>● Fail-to-safe design</li> <li>● Monitoring on three phase supply with <b>neutral</b></li> <li>● Sensitive to:                             <ul style="list-style-type: none"> <li>- NPS Voltage</li> <li>- Reverse phase sequence</li> <li>- loss of phase</li> <li>- phase imbalance</li> <li>- phase asymmetry</li> <li>- <b>loss of Neutral</b></li> </ul> </li> <li>● Insensitive to regenerated EMF</li> <li>● Adjustable NPS sensitivity</li> <li>● Relay ON LED.</li> <li>● 10A SPDT or 5A DPDT relay output</li> </ul>	<ul style="list-style-type: none"> <li>● 11-pin plug-in</li> <li>● Fail-to-safe design</li> <li>● Monitoring on three phase supply</li> <li>● Sensitive to:                             <ul style="list-style-type: none"> <li>- NPS Voltage</li> <li>- Reverse phase sequence</li> <li>- loss of phase</li> </ul> </li> <li>● Insensitive to regenerated EMF</li> <li>● Fixed 7% NPS sensitivity</li> <li>● Relay ON LED.</li> <li>● 10A SPDT relay output</li> <li>● <b>Not suitable for motor protection - refer SP430.</b></li> </ul>																																																		
<ul style="list-style-type: none"> <li>● Power supply: 12, 24, 110, 230, 240, 380, 400, 415, 525 V±15%</li> <li>● Frequency: 42 to 58Hz (60Hz and 400Hz also available on special request)</li> <li>● Frequency Sensing: Repetitive accuracy: 1% Hysteresis: 0,5Hz (fixed)</li> <li>● Response: Start-up delay: 0 sec or 10 sec (0 - 15 sec available on special order) Time delay on trip: 1sec Time delay on recovery: 1sec</li> </ul>	<ul style="list-style-type: none"> <li>● Power supply (phase-to-phase): 110, 190, 220, 380, 400-415, 525, 550 VAC ±20%</li> <li>● Voltage Sensing: Setpoint: 5-15% NPS Repetitive accuracy: 1% Hysteresis: 2% (fixed)</li> <li>● Response: Time delay on trip: 1sec Time delay on recovery: 1sec</li> </ul>	<ul style="list-style-type: none"> <li>● Power supply (phase-to-phase): 115, 230 (ie. 220, 230 or 240), 400 (ie. 380, 400 or 415), 525 VAC ±20%</li> <li>● Voltage Sensing: Setpoint: 5-15% NPS Repetitive accuracy: 1% Hysteresis: 2% (fixed)</li> <li>● Response: Time delay on trip: 1-10 sec (adjustable for ordering option Fn1) Time delay on recovery: 1-100 sec (adjustable for ordering option Fn2)</li> <li>● Start-up Delay: 10 sec (fixed) (for disabling latching)</li> </ul>	<ul style="list-style-type: none"> <li>● Power supply (phase-to-phase): 110, 220, 380, 400-415, 525, VAC ±20%</li> <li>● Voltage Sensing: Setpoint: 5-15% NPS Repetitive accuracy: 1% Hysteresis: 2% (fixed)</li> <li>● Response: Time delay on trip: 1sec Time delay on recovery: 1sec</li> </ul>	<ul style="list-style-type: none"> <li>● Power supply (phase-to-phase): 110, 220, 380, 400-415, 525, VAC ±20%</li> <li>● Voltage Sensing: Setpoint: 5-15% NPS Repetitive accuracy: 1% Hysteresis: 2% (fixed)</li> <li>● Response: Time delay on trip: 1sec Time delay on recovery: 1sec</li> </ul>	<ul style="list-style-type: none"> <li>● Power supply (phase-to-phase): 110, 220, 380, 400-415, 525, VAC ±20%</li> <li>● Voltage Sensing: Setpoint: 7% NPS fixed Repetitive accuracy: 1% Hysteresis: 2% (fixed)</li> <li>● Response: Time delay on trip: 1sec Time delay on recovery: 1sec</li> <li>● <b>Not suitable for motor protection - refer SP430.</b></li> </ul>																																																		

## MOTOR / PUMP PROTECTION RELAYS

PRODUCT	<b>MP820</b> Motor / Pump Protection Relay Single Phase	<b>MP830</b> Motor / Pump Protection Relay Three Phase
ORDERING CODE	TYPE    SUPPLY VOLTAGE    AC/DC    RELAY CONTACTS 	TYPE    SUPPLY VOLTAGE    AC/DC    RELAY CONTACTS 
FRONT PLATE CONTROLS	 <p style="font-size: small;">                         L = LED                          P = Potentiometer                          S = Selector Switch                          PB = Pushbutton                     </p>	
FEATURES	<ul style="list-style-type: none"> <li><b>DIN rail mount</b></li> <li>Underload sensing by measuring phase angle</li> <li>Overload sensing by measuring current amplitude</li> <li>Unit automatically calibrates for underload and overload detection at the push of a button</li> <li>Calibration reset for easy setting up of motor changeover</li> <li>Direct in-line current sensing for motors up to 1.1kW</li> <li>Direct interface with conventional current transformer for motors &gt; 1.1kW</li>   <li>Liquid Level Control</li> <li>Adjustable restart timer on underload (ie running dry)</li> <li>Fixed start-up delay (3 seconds standard)</li> <li>Unit latches in de-energised state on overload fault only</li> <li>LED indication of all fault conditions and all modes of operation.</li> <li>Adhesive Laminated Chart supplied to affix to inside of cabinet - details wiring and table of all fault conditions.</li> </ul>	<ul style="list-style-type: none"> <li><b>DIN rail mount</b></li> <li>Underload sensing by measuring phase angle</li> <li>Overload sensing by measuring current amplitude</li> <li>Unit automatically calibrates for underload and overload detection at the push of a button</li> <li>Calibration reset for easy setting up of motor changeover</li> <li>Direct in-line current sensing for motors up to 4kW</li> <li>Direct interface with conventional current transformer for motors &gt; 4kW</li>   <li>Phase Sequence and phase failure detection</li> <li>Liquid Level Control</li> <li>Adjustable restart timer on underload (ie running dry)</li> <li>Fixed start-up delay (3 seconds standard)</li> <li>Unit latches in de-energised state on overload fault only</li> <li>LED indication of all fault conditions and all modes of operation.</li> <li>Adhesive Laminated Chart supplied to affix to inside of cabinet - details wiring and table of all fault conditions.</li> </ul>
TYPICAL WIRING & CONNECTION DIAGRAM		
TECHNICAL SPECS	<ul style="list-style-type: none"> <li><b>Power supply (single phase):</b> 100-120VAC or 220-240VAC</li> <li><b>Supply voltage tolerance:</b> 80-144VAC or 176-288VAC</li> <li><b>Supply frequency:</b> 50/60Hz</li> <li><b>Isolation (current input to power supply):</b> 2kV</li> <li><b>Response:</b>                          Start-up Delay: 3 seconds fixed, standard (other times avail. on request)                          Response delay on overload: 3 seconds                          Response delay on all other faults: 1 second</li> <li><b>Restart:</b>                          Restart timer (underload, ie. running dry): 15 min - 24 hrs (adjustable)                          Rapid cycle starting: max 3 starts per 15 minutes</li> <li><b>Current Input (motors &lt; 1.1kW):</b>                          Current limits to ensure calibration: 0.5 to 10A                          Repetitive accuracy: 1%                          Maximum input current (continuous): 15A</li> <li><b>Current Input (motors &gt; 1.1kW): Use correctly rated external CT</b>                          CT Example: 220, 230 or 240VAC                          1.5kW Motor (use 20/5 CT), or 2.2kW Motor (use 30/5 CT).</li> <li><b>Calibration:</b>                          Phase Shift limits, Underload: 90° or 125% of calibration value                          Current limits, Overload: 13A or 125% of calibration value</li> <li><b>Voltage limits:</b> over &amp; under voltage trip points: calibration voltage ± 10%</li> <li><b>Level control:</b> Sensitivity: 50kΩ</li> <li><b>Relay:</b> SPDT</li> </ul>	<ul style="list-style-type: none"> <li><b>Power supply (phase-to-phase):</b> 415 VAC</li> <li><b>Supply voltage tolerance:</b> ± 20%</li> <li><b>Supply frequency:</b> 50/60Hz</li> <li><b>Isolation (current input to power supply):</b> 2kV</li> <li><b>Response:</b>                          Start-up Delay: 3 seconds fixed, standard (other times avail. on request)                          Response delay on overload: 3 seconds                          Response delay on phase sequence/failure: instantaneous                          Response delay on all other faults: 1 second</li> <li><b>Restart:</b>                          Restart timer (underload, ie. running dry): 15 min - 24 hrs (adjustable)                          Rapid cycle starting: max 3 starts per 15 minutes</li> <li><b>Current Input (motors &lt; 4kW):</b>                          Current limits to ensure calibration: 0.5 to 8A                          Repetitive accuracy: 1%                          Maximum input current (continuous): 12A</li> <li><b>Current Input (motors &gt; 4kW): Use correctly rated external CT</b>                          eg. 5.5kW (use 15/5 CT), 7.5kW (use 20/5 CT), 11kW (use 30/5 CT),                          15kW (use 40/5 CT), 18.5kW (use 50/5 CT), 22kW (use 50/5 CT),                          30kW (use 75/5 CT), 37kW (use 100/5 CT), 45kW (use 100/5 CT),</li> <li><b>Calibration:</b>                          Phase Shift limits, Underload: 90° or 125% of calibration value                          Current limits, Overload: 10A or 125% of calibration value</li> <li><b>Voltage limits:</b> over &amp; under voltage trip points: 415VAC ± 15% fixed</li> <li><b>Level control:</b> Sensitivity: 50kΩ</li> <li><b>Relay:</b> SPDT (terminal 11 must be connected to R-phase)</li> </ul>

## LEVEL CONTROL RELAYS

## CONTROL RELAYS

<b>SC100</b> Switching Relay for Resistive Sensors	<b>AC130</b> Liquid Level Relay Single/Dual Level	<b>SC130</b> Liquid Level Relay Single/Dual Level	<b>SC230</b> Level Control Relay for NAMUR Sensors	<b>SC300</b> Switching Amplifier Relay for NAMUR Sensors	<b>SC314</b> Switching Relay for DC PNP or NPN Sensors
<ul style="list-style-type: none"> <li>● 11-pin plug-in</li> <li>● AC modulation of probe signal to prevent plating and electrolytic corrosion</li> <li>● Low voltage probe signal for human safety and certain hazardous environments</li> <li>● Adjustable Sensitivity from 15k to 500k Ohms</li> <li>● 10A SPDT relay output</li> </ul>	<ul style="list-style-type: none"> <li>● DIN rail mount</li> <li>● Fail-to-safe design</li> <li>● Programmable:                             <ul style="list-style-type: none"> <li>- charging (filling)</li> <li>- discharging (draining)</li> </ul> </li> <li>● Adjustable sensitivity: 0 - 100k ohms</li> <li>● AC modulation of probe signal to prevent plating and electrolytic corrosion</li> <li>● 1 or 2 level control</li> <li>● Sensing of conductive liquids</li> <li>● Low voltage probe signals for human safety and certain hazardous environments</li> <li>● Rhomberg CP-3C, CP-2C or CP-1C probes recommended</li> <li>● 10A SPDT or 5A DPDT relay</li> <li>● Power ON and Relay ON LEDs</li> </ul>	<ul style="list-style-type: none"> <li>● 11-pin plug-in</li> <li>● Fail-to-safe design</li> <li>● Programmable:                             <ul style="list-style-type: none"> <li>- charging (filling)</li> <li>- discharging (draining)</li> </ul> </li> <li>● Adjustable sensitivity: 0 - 50k ohms</li> <li>● AC modulation of probe signal to prevent plating and electrolytic corrosion</li> <li>● 1 or 2 level control</li> <li>● Sensing of conductive liquids</li> <li>● Low voltage probe signals for human safety and certain hazardous environments</li> <li>● Rhomberg CP-3C, CP-2C or CP-1C probes recommended</li> <li>● 10A SPDT or 5A DPDT relay</li> <li>● Relay ON LED</li> </ul>	<ul style="list-style-type: none"> <li>● 11-pin plug-in</li> <li>● Fail-to-safe design</li> <li>● Programmable:                             <ul style="list-style-type: none"> <li>- charging</li> <li>- discharging</li> </ul> </li> <li>● Direct interface with Rhomberg &amp; other Namur sensors (DIN 19234)</li> <li>● Independent indication:                             <ul style="list-style-type: none"> <li>- sensor status</li> <li>- sensor or cable fault</li> <li>- relay status</li> </ul> </li> <li>● High speed solid state transistor output</li> <li>● Direct interface for solid state relays</li> <li>● 10A SPDT relay output</li> </ul>	<ul style="list-style-type: none"> <li>● 11-pin plug-in</li> <li>● Fail-to-safe design</li> <li>● Programmable:                             <ul style="list-style-type: none"> <li>- target response</li> <li>- space response</li> </ul> </li> <li>● Direct interface with Rhomberg &amp; other Namur sensors (DIN 19234)</li> <li>● Sensor or cable fault detection and indication</li> <li>● Cost efficient sensor and relay replacement</li> <li>● Sensing in certain hazardous environments</li> <li>● High noise immunity</li> <li>● 10A SPDT or 5A DPDT relay output</li> </ul>	<ul style="list-style-type: none"> <li>● 11-pin plug-in</li> <li>● Direct interface with all 3-wire PNP or NPN DC sensors (inductive, capacitive and opto-electronic / photo-electric)</li> <li>● LED indication of relay status</li> <li>● Cost efficient interface with DC sensors</li> <li>● Impervious to outside interference</li> <li>● 10A SPDT relay output</li> </ul>
<ul style="list-style-type: none"> <li>● Power supply (AC only) AC: 12, 24, 110, 230, 240, 400, 415, 525V ± 15% Isolation (probe to power supply) : 2kV</li> <li>● Probe input: Probe voltage: 12VAC Modulating frequency: Equal to supply frequency (typically 50Hz)</li> <li>● Adjustable sensitivity: 15k to 500k Ω</li> </ul>	<ul style="list-style-type: none"> <li>● Power supply: AC: 12, 24, 110, 230, 240, 400, 415, 525V ± 15% Isolation (probe to power supply) : 2kV DC: 12, 24, 48, 60, 110V ± 15% No galvanic isolation</li> <li>● Level sensing inputs: Probe voltage: 4VAC Modulating frequency: 100Hz</li> <li>● Adjustable sensitivity: 0 to 100k Ω</li> <li>● Response time: 0,5 second (approx)</li> </ul>	<ul style="list-style-type: none"> <li>● Power supply: AC: 12, 24, 110, 230, 240, 400, 415, 525V ± 15% Isolation (probe to power supply) : 2kV DC: 10 - 30V at 100mA 48, 60, 110V ± 15% at 30mA No galvanic isolation</li> <li>● Level sensing inputs: Probe voltage: 4VAC Modulating frequency: 100Hz</li> <li>● Adjustable sensitivity: 0 to 50k Ω</li> <li>● Response time: 0,5 second (approx)</li> </ul>	<ul style="list-style-type: none"> <li>● Power supply AC: 12, 24, 110, 230, 240, 400, 415, 525V ± 15% Isolation (sensor to power supply) : 2kV DC: 10 - 30V at 100mA 48, 60, 110V ± 15% at 30mA No galvanic isolation</li> <li>● Sensor input: Type NAMUR (DIN 19234) Max. sensing speed: 25Hz Short circuit current: 20mA DC Open circuit voltage: 8,2 VDC</li> <li>● Open collector output: (pin 9-11) NPN transistor Output sink current: 100mA Max. voltage: 30 VDC</li> <li>● Solid state relay output: (pin 8-9) Max. source current: 8mA Open circuit voltage: 12 VDC</li> </ul>	<ul style="list-style-type: none"> <li>● Power supply AC: 12, 24, 110, 230, 240, 400, 415, 525V ± 15% Isolation (sensor to power supply) : 2kV DC: 10 - 30V at 100mA 48, 60, 110V ± 15% at 30mA No galvanic isolation</li> <li>● Sensor input: Type NAMUR (DIN 19234) Max. sensing speed: 25Hz Short circuit current: 20mA DC Open circuit voltage: 8,2 VDC</li> </ul>	<ul style="list-style-type: none"> <li>● Power supply AC: 12, 24, 110, 230, 240, 400, 415, 525V ± 15% Isolation (sensor to power supply) : 2kV</li> <li>● DC Sensor output: 10 to 15V at 30mA</li> <li>● PNP Sensor input: Brown wire (+ve) to pin 6 Blue wire (-ve) to pin 7 Black wire (output) to pin 5 Link between pins 7 + 8</li> <li>● NPN Sensor input: Brown wire (+ve) to pin 6 Blue wire (-ve) to pin 7 Black wire (output) to pin 8 Link between pins 5 + 6</li> <li>● Each sensor must be able to conduct at least 80mA to operate the modules internal relay.</li> <li>● Max. sensing speed: 20Hz</li> </ul>

# MONITORING RELAYS

QUICK

## CONTROL RELAYS

PRODUCT	C320P Rotational Speed Monitor (Tacho Relay) 4-20mA O/P	SC320 Tachometer Relay	SC410 Opto-Electronic Control Relay	SC501 Temperature Control Relay PT100 / RTD	C510S Thermistor Motor Protection Relay																																																		
ORDERING CODE	<table border="1"> <tr> <td>TYPE</td> <td>SUPPLY VOLTAGE</td> <td>AC/DC</td> <td>RELAY CONTACTS</td> <td>Fn</td> </tr> <tr> <td>C320PD</td> <td>230</td> <td>A</td> <td>S</td> <td>2</td> </tr> </table>	TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	Fn	C320PD	230	A	S	2	<table border="1"> <tr> <td>TYPE</td> <td>SUPPLY VOLTAGE</td> <td>AC/DC</td> <td>RELAY CONTACTS</td> <td>Fn</td> </tr> <tr> <td>SC320</td> <td>240</td> <td>AC</td> <td>S</td> <td>-</td> </tr> </table>	TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	Fn	SC320	240	AC	S	-	<table border="1"> <tr> <td>TYPE</td> <td>SUPPLY VOLTAGE</td> <td>AC/DC</td> <td>RELAY CONTACTS</td> <td>Fn</td> </tr> <tr> <td>SC410</td> <td>240</td> <td>AC</td> <td>S</td> <td>-</td> </tr> </table>	TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	Fn	SC410	240	AC	S	-	<table border="1"> <tr> <td>TYPE</td> <td>SUPPLY VOLTAGE</td> <td>AC/DC</td> <td>RELAY CONTACTS</td> <td>Fn</td> </tr> <tr> <td>SC501</td> <td>240</td> <td>AC</td> <td>S</td> <td>-</td> </tr> </table>	TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	Fn	SC501	240	AC	S	-	<table border="1"> <tr> <td>TYPE</td> <td>SUPPLY VOLTAGE</td> <td>AC/DC</td> <td>RELAY CONTACTS</td> <td>Fn</td> </tr> <tr> <td>C510SD</td> <td>230</td> <td>A</td> <td>S</td> <td>-</td> </tr> </table>	TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	Fn	C510SD	230	A	S	-
TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	Fn																																																			
C320PD	230	A	S	2																																																			
TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	Fn																																																			
SC320	240	AC	S	-																																																			
TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	Fn																																																			
SC410	240	AC	S	-																																																			
TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	Fn																																																			
SC501	240	AC	S	-																																																			
TYPE	SUPPLY VOLTAGE	AC/DC	RELAY CONTACTS	Fn																																																			
C510SD	230	A	S	-																																																			
FRONT PLATE CONTROLS	<p>L = LED P = Potentiometer S = Selector Switch PB = Pushbutton</p>																																																						
FEATURES	<ul style="list-style-type: none"> <li>DIN rail mount</li> <li>Fail-to-safe design.</li> <li><b>Pulse frequency to current conversion (4-20mA)</b></li> <li>Interchangeable power supply (up to 240V).</li> <li>Direct interface with Rhomberg &amp; other Namur two-wire proximity sensors.</li> <li>Low power sensor signal to DIN 19234.</li> <li>Sensor cable fault indication.</li> <li>Microprocessor technology</li> <li>Programmable speed ranges: 10 RPM to 10 000 RPM.</li> <li>Programmable for overspeed or underspeed monitoring.</li> <li>Relay &amp; 4 to 20mA output</li> <li>Speed setpoint adjustable on calibrated scale (10 to 100%)</li> <li>Adj. start-up delay 0-30 sec</li> <li>Cable fault detection.</li> <li>LED indication of Sensing, Relay ON and cable fault.</li> <li>Short response time.</li> <li>10A SPDT relay output.</li> </ul>	<ul style="list-style-type: none"> <li><b>11-pin plug-in</b></li> <li>Fail-to-safe design</li> <li>Programmable: <ul style="list-style-type: none"> <li>over-speed detection</li> <li>under-speed detection</li> <li>speed ranges: 10 to 10000 RPM</li> </ul> </li> <li>Adjustable trip point on a 0 to 100% scale</li> <li>Direct interface with Rhomberg &amp; other Namur sensors</li> <li>Sensor or cable fault detection</li> <li>0-1mA analogue output</li> <li>Other analogue output types available on special request</li> <li>Analogue display via optional PQ72 instrument</li> <li>Start-up delay</li> <li>10A SPDT relay output</li> </ul>	<ul style="list-style-type: none"> <li><b>11-pin plug-in</b></li> <li>Direct interface with R02 Detector sensor range</li> <li>Programmable: <ul style="list-style-type: none"> <li>dark or light response</li> </ul> </li> <li>Adjustable: <ul style="list-style-type: none"> <li>delayed ON up to 5s</li> <li>delayed OFF up to 5s</li> <li>transmit light intensity</li> </ul> </li> <li>Signal modulated beam to stop foreign light source interference</li> <li>High speed solid state transistor output</li> <li>Direct interface for solid state relays</li> <li>10A SPDT relay output</li> <li>SC-411</li> <li>Sensor or cable fault detection and indication</li> </ul>	<ul style="list-style-type: none"> <li><b>11-pin plug-in</b></li> <li>Fail-to-safe design</li> <li>Programmable: <ul style="list-style-type: none"> <li>6 overlapping temperature ranges from -50 to 300°C</li> <li>over-temp. detection</li> <li>under-temp detection</li> </ul> </li> <li>Direct interface with PT-100 / RTD sensor</li> <li>Adjustable: <ul style="list-style-type: none"> <li>Trip point 0 to 100%</li> <li>Recovery 0 to 100%</li> </ul> </li> <li>Sensor or cable fault detection and indication</li> <li>0-1mA analogue output</li> <li>Other analogue output types available on special request</li> <li>Analogue display via PQ72</li> <li>Latching facility</li> <li>High repetitive accuracy</li> <li>10A SPDT relay output</li> </ul>	<ul style="list-style-type: none"> <li><b>DIN rail mount</b></li> <li>Fail-to-safe design.</li> <li>Interfaces with PTC sensors as per DIN 44081.</li> <li>Can connect up to 6 thermistors.</li> <li>Sensor or cable fault detection and indication with an automatic relay de-energisation for failsafe operation.</li> <li>10A SPDT relay output.</li> </ul>																																																		
TYPICAL WIRING & CONNECTION DIAGRAM																																																							
TECHNICAL SPECS	<ul style="list-style-type: none"> <li><b>Power Supply:</b> AC transformer: 22.5mm wide housing: 12, 24, 115, 230(220-240)V 45mm wide housing: 400(380-415), 525V DC (no isolation): 22.5mm wide housing: 12/24, 48/110, 60V</li> <li><b>Sensing Input:</b> Namur sensor (DIN 19234) Speed Ranges: <table border="1"> <tr> <th>Scale (RPM)</th> <th>Response (TR)</th> </tr> <tr> <td>10 - 100</td> <td>6.1 - 0.7s</td> </tr> <tr> <td>50 - 500</td> <td>1.3 - 0.22s</td> </tr> <tr> <td>100 - 1000</td> <td>0.7 - 0.16s</td> </tr> <tr> <td>500 - 5000</td> <td>0.22 - 0.11s</td> </tr> <tr> <td>1000 - 10000</td> <td>0.16 - 0.11s</td> </tr> </table> <p>Note: TR = 0.1 + Tp sec. (Tp = time between 2 consecutive pulses). Hysteresis: 12% (fixed) Accuracy: 5% Repeatability: &lt;1% Start-up delay: 0-30s (adj)</p> <table border="1"> <tr> <th>Fn</th> <th>Range</th> <th>Max. load</th> </tr> <tr> <td>1</td> <td>0 - 1mA DC</td> <td>8kΩ</td> </tr> <tr> <td>2</td> <td>4 - 20mA DC</td> <td>400Ω</td> </tr> <tr> <td>3</td> <td>0 - 20mA DC</td> <td>400Ω</td> </tr> </table> </li> </ul>	Scale (RPM)	Response (TR)	10 - 100	6.1 - 0.7s	50 - 500	1.3 - 0.22s	100 - 1000	0.7 - 0.16s	500 - 5000	0.22 - 0.11s	1000 - 10000	0.16 - 0.11s	Fn	Range	Max. load	1	0 - 1mA DC	8kΩ	2	4 - 20mA DC	400Ω	3	0 - 20mA DC	400Ω	<ul style="list-style-type: none"> <li><b>Power supply</b> AC: 12, 24, 110, 230, 240, 400, 415, 525 V±15% Isolation: 2kV DC: 10 - 30V at 100mA 48, 60, 110V ± 15% at 30mA No galvanic isolation</li> <li><b>Sensor input:</b> Type NAMUR (DIN 19234) Short circuit current: 20mA DC Open circuit voltage: 8.2 VDC</li> <li><b>Speed ranges:</b> <table border="1"> <tr> <th>Scale [RPM]</th> <th>Response time [s]</th> </tr> <tr> <td>10-100</td> <td>10</td> </tr> <tr> <td>30-300</td> <td>10</td> </tr> <tr> <td>100-1000</td> <td>1</td> </tr> <tr> <td>300-3000</td> <td>1</td> </tr> <tr> <td>1K - 10K</td> <td>1</td> </tr> </table> <p>Accuracy: 5% Hysteresis: 10% (fixed) Repeatability: 1% Start-up delay: 10 sec (approx.) (0-15s on special order)</p> <li><b>Analogue output:</b> 0-1mA DC (proportional) Max. load: 7kΩ Open circuit voltage: 12 VDC</li> </li></ul>	Scale [RPM]	Response time [s]	10-100	10	30-300	10	100-1000	1	300-3000	1	1K - 10K	1	<ul style="list-style-type: none"> <li><b>Power supply</b> AC: 12, 24, 110, 230, 240, 400, 415, 525 V±15% Isolation: 2kV DC: 10 - 30V at 100mA 48, 60, 110V ± 15% at 30mA No galvanic isolation</li> <li><b>Transmitter:</b> (pin 6-7) Current pulse: 1.5 A/25 us Short circuit current: 20mA (average)</li> <li><b>Receiver:</b> (pin 5-6) Short circuit current: 3mA Open circuit voltage: 8.2V</li> <li><b>Open collector output:</b> (pin 9-11) NPN transistor Output sink current: 100mA Max. voltage: 30 VDC</li> <li><b>Solid state relay output:</b> (pin 8-9) Max. source current: 8mA Open circuit voltage: 12 VDC</li> </ul>	<ul style="list-style-type: none"> <li><b>Power supply</b> AC: 12, 24, 110, 230, 240, 400V ±15% Isolation: 2kV DC: 12, 24 ±15% No galvanic isolation</li> <li><b>Sensor Input:</b> PT-100 resistive temperature sensor Short circuit current: 1mA Open circuit voltage: 220mV</li> <li><b>Temperature ranges:</b> -50 to 50°C 0 to 100°C 100 to 150°C 150 to 200°C 200 to 250°C 250 to 300°C</li> <li><b>Repetitive Accuracy:</b> 1%</li> <li><b>Analogue output:</b> 0 to 1mA (proportional) Max. load: 7k Ohms Open circuit Voltage: 12 VDC</li> </ul>	<ul style="list-style-type: none"> <li><b>Power Supply:</b> AC transformer: 22.5mm wide housing: 12, 24, 115, 230(220-240)V 45mm wide housing: 400(380-415), 525V DC (no isolation): 22.5mm wide housing: 12, 24, 48, 60, 110V</li> <li><b>Sensor input:</b> PTC sensor (DIN 44081) Input impedance: 2200Ω Open circuit voltage: ≤2.5V Short circuit current: 1mA (max) Max. cold resistance of PTC: 1500Ω Trip threshold: 3100Ω Recovery threshold: 1650Ω Short circuit detection: &lt;10Ω Open circuit detection: 10kΩ Repetitive accuracy: 1%</li> <li><b>Response time:</b> 1s max.</li> </ul>														
Scale (RPM)	Response (TR)																																																						
10 - 100	6.1 - 0.7s																																																						
50 - 500	1.3 - 0.22s																																																						
100 - 1000	0.7 - 0.16s																																																						
500 - 5000	0.22 - 0.11s																																																						
1000 - 10000	0.16 - 0.11s																																																						
Fn	Range	Max. load																																																					
1	0 - 1mA DC	8kΩ																																																					
2	4 - 20mA DC	400Ω																																																					
3	0 - 20mA DC	400Ω																																																					
Scale [RPM]	Response time [s]																																																						
10-100	10																																																						
30-300	10																																																						
100-1000	1																																																						
300-3000	1																																																						
1K - 10K	1																																																						

## CONTROL RELAYS

## SOCKETS FOR RELAYS

<b>SC510/SC511</b> Thermistor Motor Protection Relay	<b>SC610/SC611</b> Flip Flop Relay (SC611 with memory)	<b>SC700</b> Multi-Function Preselect Counter	<b>SC900</b> Power Supply Module	<b>S2-B</b> DIN rail Socket for 8 pin relays	<b>S3-B</b> DIN rail Socket for 11 pin relays																										
<ul style="list-style-type: none"> <li>● <b>11-pin plug-in</b></li> <li>● Fail-to-safe design</li> <li>● Interfaces with DIN 44081 standard PTC sensors</li> <li>● Sensor or cable fault detection and indication with automatic relay de-energisation for failsafe operation</li> <li>● 10A SPDT relay output</li> <li>● Latching facility on SC511</li> <li>● Test button on SC511</li> <li>● Manual reset button on SC511</li> </ul>	<ul style="list-style-type: none"> <li>● <b>11-pin plug-in</b></li> <li>● Many power supply options</li> <li>● Direct interface with potential free contact or 3 wire DC NPN sensor</li> <li>● Retention of output state after loss of power on SC-611</li> <li>● LED indication of relay status</li> <li>● Power on indication</li> <li>● 10A SPDT or 5A DPDT relay output</li> </ul>	<ul style="list-style-type: none"> <li>● <b>11-pin plug-in</b></li> <li>● Four count functions                             <ul style="list-style-type: none"> <li>- ADD</li> <li>- SUBTRACT</li> <li>- ADD/SUBTRACT mode 1</li> <li>- ADD/SUBTRACT mode 2</li> </ul> </li> <li>● Dividing prescaler from 1 to 250</li> <li>● Programmable relay hold time 0,1 to 25 sec</li> <li>● 1kHz high speed input</li> <li>● 30Hz low speed input for mechanical switches</li> <li>● Gate input to pause high speed counting</li> <li>● Direct interface to DC-NPN/ PNP or Namur sensors</li> <li>● No unreliable batteries (Retention of setting using an EEPROM)</li> <li>● 10A SPDT relay output</li> </ul>	<ul style="list-style-type: none"> <li>● <b>11-pin plug-in</b></li> <li>● Ease of use due to 11 pin plug-in concept</li> <li>● High input voltage ranges</li> <li>● Large variety of output supply options</li> <li>● Cost effective power supply unit</li> </ul>	<ul style="list-style-type: none"> <li>● <b>DIN rail mount</b></li> <li>● Unique retainer clip securing module to socket - protects against vibration</li> <li>● High stacking density</li> <li>● All connections in line on the same level</li> <li>● Self opening terminal sleeve with pressure plate</li> <li>● Shrouding of terminals</li> <li>● Suitable for DIN-rail, C-rail or panel mounting</li> <li>● Terminals for testing of wiring</li> <li>● Protection class: IP20</li> <li>● UL recognised, SEV, CSA, NEMKO and FEMKO approved and Lloyd's certified</li> </ul>	<ul style="list-style-type: none"> <li>● <b>DIN rail mount</b></li> <li>● Unique retainer clip securing module to socket - protects against vibration</li> <li>● High stacking density</li> <li>● All connections in line on the same level</li> <li>● Self opening terminal sleeve with pressure plate</li> <li>● Shrouding of terminals</li> <li>● Suitable for DIN-rail, C-rail or panel mounting</li> <li>● Terminals for testing of wiring</li> <li>● Protection class: IP20</li> <li>● UL recognised, SEV, CSA, NEMKO and FEMKO approved and Lloyd's certified</li> </ul>																										
<ul style="list-style-type: none"> <li>● <b>Power supply</b></li> <li>AC: 12, 24, 110, 230, 400, 415, 525V ±15%</li> <li>DC: 10 - 30V at 100mA</li> <li>48, 60, 110V ± 15% at 30mA</li> <li>No galvanic isolation</li> <li>● <b>Sensor Input:</b></li> <li>PTC sensor as per DIN 44081 or IEC 34-11</li> <li>Input impedance: 2200Ω</li> <li>Open-circuit voltage: &lt;=2,5V DC</li> <li>Short circuit current: 1mA (max.)</li> <li>Triggering threshold: 3100Ω at ±10%</li> <li>Recovery threshold: 1650Ω at ±10%</li> <li>Short circuit detection: &lt; 20Ω</li> <li>Open circuit detection: &gt; 10k</li> <li>Repetitive accuracy: 0,5%</li> <li>● <b>Response:</b></li> <li>Response time: 50ms</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Power supply</b></li> <li>AC: 12, 24, 110, 230, 400V ±15%</li> <li>DC: 12, 24V at 100mA</li> <li>48, 60, 110V ± 15% at 30mA</li> <li>No galvanic isolation</li> <li>● <b>12 VDC output:</b></li> <li>Voltage tolerance: 10 - 15 VDC</li> <li>Source current: 50mA (max.)</li> <li>● <b>Input:</b></li> <li>SC-610: Short circuit current: 8,5mA</li> <li>Open circuit voltage: 8,2V</li> <li>Reset speed: 20ms</li> <li>SC-611: Short circuit current: 1mA</li> <li>Open circuit voltage: 8,2V</li> <li>Reset speed: 10ms</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Power supply</b></li> <li>AC: 110, 230, 400, 525V ±15%</li> <li>AC/DC: 24V ±15%</li> <li>DC: 12V ±10%</li> <li>● <b>Display:</b></li> <li>3-digit, 7 segment LED, 10mm height, red</li> <li>● <b>Input:</b></li> <li>Low speed: 30Hz (max.) NPN or potential free contact</li> <li>High speed: 1kHz (max.) NPN, PNP, Namur, potential free contact</li> <li>Gate: 1kHz (max.) NPN, PNP, Namur, potential free contact</li> <li>Reset: minimum pulse width with 0,5 seconds NPN or potential free contact</li> <li>● <b>8,5/12V Output:</b></li> <li>NAMUR sensor option: 8,2 VDC at 10mA</li> <li>DC (NPN/PNP) sensor option: 12 VDC at 50mA</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Power supply:</b></li> <li>AC: 12, 24, 110, 230, 240, 400, 415, 525V ±15%</li> <li>Isolation: 2kV</li> <li>Consumption: 6VA (approx.)</li> <li>● <b>Output supply:</b></li> <table border="1"> <thead> <tr> <th>Voltage [V]</th> <th>Current [mA]</th> </tr> </thead> <tbody> <tr> <td colspan="2"><b>AC</b></td> </tr> <tr> <td>12 VAC</td> <td>300mA</td> </tr> <tr> <td>24 VAC</td> <td>150mA</td> </tr> <tr> <td>36 VAC</td> <td>100mA</td> </tr> <tr> <td colspan="2"><b>Unregulated DC &lt;5% ripple</b></td> </tr> <tr> <td>12 VAC</td> <td>200mA</td> </tr> <tr> <td>24 VAC</td> <td>120mA</td> </tr> <tr> <td>36 VAC</td> <td>100mA</td> </tr> <tr> <td colspan="2"><b>Regulated DC &lt;0,5% ripple</b></td> </tr> <tr> <td>12 VAC</td> <td>150mA</td> </tr> <tr> <td>24 VAC</td> <td>100mA</td> </tr> <tr> <td>36 VAC</td> <td>80mA</td> </tr> </tbody> </table> </ul>	Voltage [V]	Current [mA]	<b>AC</b>		12 VAC	300mA	24 VAC	150mA	36 VAC	100mA	<b>Unregulated DC &lt;5% ripple</b>		12 VAC	200mA	24 VAC	120mA	36 VAC	100mA	<b>Regulated DC &lt;0,5% ripple</b>		12 VAC	150mA	24 VAC	100mA	36 VAC	80mA	<ul style="list-style-type: none"> <li>● <b>Nominal load:</b> 10A/300V</li> <li>● <b>Dielectric strength (adjacent screws):</b> 2.5kV</li> <li>● <b>Dielectric strength (screws / rail):</b> 2.5kV</li> <li>● <b>Max screw torque:</b> 1.2Nm</li> <li>● <b>Screw dimensions:</b> M3, Pozi</li> <li>● <b>Wire in-lets capacity:</b></li> <li>Solid wire: 4mm<sup>2</sup> or 2 x 2.25 mm<sup>2</sup></li> <li>Multi core: 22 - 14 AWG</li> </ul>	<ul style="list-style-type: none"> <li>● <b>Nominal load:</b> 10A/250V</li> <li>● <b>Dielectric strength (adjacent screws):</b> 2.5kV</li> <li>● <b>Dielectric strength (screws / rail):</b> 2.5kV</li> <li>● <b>Max screw torque:</b> 1.2Nm</li> <li>● <b>Screw dimensions:</b> M3, Pozi</li> <li>● <b>Wire in-lets capacity:</b></li> <li>Solid wire: 4mm<sup>2</sup> or 2 x 2.25 mm<sup>2</sup></li> <li>Multi core: 22 - 14 AWG</li> </ul>
Voltage [V]	Current [mA]																														
<b>AC</b>																															
12 VAC	300mA																														
24 VAC	150mA																														
36 VAC	100mA																														
<b>Unregulated DC &lt;5% ripple</b>																															
12 VAC	200mA																														
24 VAC	120mA																														
36 VAC	100mA																														
<b>Regulated DC &lt;0,5% ripple</b>																															
12 VAC	150mA																														
24 VAC	100mA																														
36 VAC	80mA																														