Energy Division

Bowthorpe EMP
remote surge monitoring systems
SC14 surge counter
• Date and time stamp of surge(s)
• Low power consumption
• Surge classification report
• Alarm alerts
• Measures Surge Amplitude and Width

SC15 surge counter
• As SC14 plus
• Leakage current measurement
• Temperature and humidity measurement

PAC-G (Programmable Access Controller - Gateway)
• Functions as the master node within the network to handle communications with the individual surge counters
• Contains a Zigbee antenna (surge counter communications), Wi-Fi antenna (laptop communications) and GPRS modem/antenna (server communications)
• Commissioned via laptop
• Automatic upload of surge data from PAC-G to a server if GPRS link is available
• If GPRS link is not utilised, data can be downloaded to a laptop using Wi-Fi
• Remote updates from desktop PC

Humidity and Temperature sensor
• Measures temperature and humidity
• Temperature range -40°C to + 60°C
• Connects to PAC-G via serial connection
The Bowthorpe EMP range of surge counters are fully tested and are compatible with other manufacturers surge arresters. The Bowthorpe EMP SC12 is a surge counter only, whilst the Bowthorpe EMP SC13 provides the additional measurement of total leakage current.

The Bowthorpe EMP SC14 and SC15 are the next generation surge counters, being intelligent, they transmit data from the surge counter to a receiving device (PAC-G ‘Programmable Access Controller - Gateway’). They utilise leading edge technologies in terms of reliability, accuracy and ease of use.

Benefits of the SC14 are listed below:

- Measures & records pulse amplitude
- Measures & records pulse duration
- Automatic upload to remote server
- Time stamping of surge activity
- Alarm thresholds set by customer
- Ease of installation
- Remote communications via Web Server or laptop
- Access to reports, history and status of individual or grouped counters over the internet.
- User definable reports.
- Instantaneous SMS and/or email alerts in the event of an alarm condition.

The SC15 has the same benefits as the SC14 with the additional advantages of:

- Measures & records leakage current
- Measures & records temperature and humidity

The Bowthorpe EMP remote surge monitoring systems consists of 2 main hardware components.

- The surge counter itself which directly monitors surge activity on an individual arrester.
- The PAC-G is a gateway device that receives data from individual surge counters. The PAC-G has a wireless internet connection (GPRS) to upload data to the web-server periodically or whenever it detects an alarm condition.

The following software components are supplied with the system.

- SurgeManager is a software application that will run on any laptop with Windows XP. This application allows the user/installer to commission the network of devices and also to monitor its status/health.
- The Web-Server based service handles all the related surge data from the various installations. The data on this is securely stored and is accessible only to selected personnel, with varying degrees of access. This incorporates a powerful report generating facility on the web-server which allows for the quick creation of user defined reports.
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remote surge monitoring systems

The Bowthorpe EMP surge counters use patented Planar Magnetic Current Sensing technology to accurately and reliably detect and measure current impulses. This technology is exclusive to Tyco Electronics.

When the surge counter detects an impulse it immediately transmits the data wirelessly to the PAC-G. If the impulse has exceeded the alarm thresholds then the PAC-G immediately uploads the data to the web-server and an alarm is raised, an SMS and/or Email is then sent to all relevant personnel giving Time, Date, Location and Surge data information.

If the impulse is below the specified alarm threshold then the PAC-G will store the data and only upload it during its regular periodic connection to the web-server. The frequency of this is typically once per 24 hours, but can be specified by the user via the web interface.

Initial setup data is loaded to handheld during synchronisation process, data may also be uploaded to server after commissioning for offline PAC-G.

Commissioning is done with a laptop over a Wi-Fi data link. Synchronisation is done when the laptop is connected to the local Intranet.
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remote surge monitoring systems

Technical Data

Surge Measurement

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum surge amplitude (30/60 μs)</td>
<td>125 A</td>
</tr>
<tr>
<td>Maximum surge amplitude (4/10 μs)</td>
<td>120 kA</td>
</tr>
<tr>
<td>Surge measurement accuracy</td>
<td>&lt;10 %</td>
</tr>
<tr>
<td>Time stamp resolution</td>
<td>1 s</td>
</tr>
<tr>
<td>Leakage current</td>
<td>60mA max</td>
</tr>
</tbody>
</table>

Wireless Communications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surge counter communications protocol</td>
<td>IEEE 802.15.4-2006 (Zigbee)</td>
</tr>
<tr>
<td>Surge counter transmission range</td>
<td>300m Line of Sight</td>
</tr>
<tr>
<td>Surge counter antenna</td>
<td>Stub 2.4GHz Antenna</td>
</tr>
<tr>
<td>PAC-G communications</td>
<td>IEEE 802.15.4-2006 (Zigbee), GPRS*, 802.11b/g (WiFi)</td>
</tr>
<tr>
<td>PAC-G Antenna</td>
<td>2.4GHz Dipole x 2 (Zigbee &amp; Wifi), Quad-Band GPRS Antenna</td>
</tr>
</tbody>
</table>

Power Requirements

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surge counter Power</td>
<td>Long Life Battery†</td>
</tr>
<tr>
<td>PAC-G Power</td>
<td>85-264 VAC, 47-63 Hz‡</td>
</tr>
</tbody>
</table>

Environmental Specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surge counter Operating Temperature Range</td>
<td>-40°C to +60°C</td>
</tr>
<tr>
<td>PAC-G Operating Temperature Range</td>
<td>-40°C to +60°C</td>
</tr>
<tr>
<td>Temperature and humidity sensor</td>
<td>-40°C to +60°C</td>
</tr>
<tr>
<td>Surge counter</td>
<td>IP67</td>
</tr>
<tr>
<td>PAC-G</td>
<td>IP67</td>
</tr>
</tbody>
</table>

Surge counter and PAC-G installation instructions  BOW-EPP-1652
Surge counter web-server user manual  BOW-EPP-1787

* Discuss GPRS requirements with sales representative prior to order. Geographic factors may require further clarification. If GPRS coverage is not available in your area, please contact Sales rep for alternative options.

† Please consult sales representative for replacement batteries, or for further information on specification.

‡ Please consult the sales representative to specify power supply needs for individual installations.
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SC14 / SC15 and PAC-G dimensions

M12 x 35 Stainless Steel Set Screw With Full Nut And Washers

Moulded Resin Insulator

Line Terminal M16 Fitted With Locknuts

Ground Termination M16 Fitted with locknuts

Zigbee Antenna

WiFi Antenna

Zigbee Antenna

88
180
183.5
163.5
97.25
181.75
52
30
137
53
24
57
10
52
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Data Access and Reporting System

- Data reports for surge activity at a summary level or detailed level are available
- Data can be easily exported to packages such as Microsoft Excel
- Users can easily build their own custom reports

### Detailed History

<table>
<thead>
<tr>
<th>Reading Date</th>
<th>Reading Time</th>
<th>Ampl</th>
<th>uS</th>
<th>Surge Type</th>
<th>Location / Phase</th>
<th>Serial No</th>
<th>Manufacturer</th>
<th>Model</th>
<th>Year Manuf</th>
<th>Class Material</th>
<th>Commissioned Date (S.A.)</th>
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</thead>
<tbody>
<tr>
<td>11/01/2008</td>
<td>11:39:20:0</td>
<td>49.89</td>
<td>0.77</td>
<td>Fast front</td>
<td>NORTH Line 384KV</td>
<td>T 9547</td>
<td>bowthorpe</td>
<td>pca3-2</td>
<td>1996</td>
<td>Porcelain</td>
<td>11/01/2008</td>
</tr>
<tr>
<td>11/01/2008</td>
<td>11:41:55:0</td>
<td>102.00</td>
<td>0.21</td>
<td>Fast front</td>
<td>NORTH Line 384KV</td>
<td>T 9547</td>
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<td>pca3-2</td>
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<td>Porcelain</td>
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</tr>
<tr>
<td>11/01/2008</td>
<td>11:42:05:0</td>
<td>0.50</td>
<td>70.22</td>
<td>Switching Surge</td>
<td>NORTH Line 384KV</td>
<td>T 9547</td>
<td>bowthorpe</td>
<td>pca3-2</td>
<td>1996</td>
<td>Porcelain</td>
<td>11/01/2008</td>
</tr>
<tr>
<td>11/01/2008</td>
<td>11:42:07:0</td>
<td>0.60</td>
<td>50.39</td>
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<td>T 9547</td>
<td>bowthorpe</td>
<td>pca3-2</td>
<td>1996</td>
<td>Porcelain</td>
<td>11/01/2008</td>
</tr>
<tr>
<td>11/01/2008</td>
<td>11:42:11:0</td>
<td>0.70</td>
<td>50.10</td>
<td>Switching Surge</td>
<td>NORTH Line 384KV</td>
<td>T 9547</td>
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<td>1996</td>
<td>Porcelain</td>
<td>11/01/2008</td>
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<tr>
<td>11/01/2008</td>
<td>11:42:12:0</td>
<td>15.00</td>
<td>5.02</td>
<td>Lightning Strike</td>
<td>NORTH Line 384KV</td>
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<td>pca3-2</td>
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<td>Porcelain</td>
<td>11/01/2008</td>
</tr>
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</table>

The above report shows a detailed history of surge activity.

### Surge Grouping

<table>
<thead>
<tr>
<th>Area</th>
<th>Sub-Station Location/Phase</th>
<th>SA Installed</th>
<th>&lt; 1 kA</th>
<th>1.5-5 kA</th>
<th>5-10 kA</th>
<th>10-20 kA</th>
<th>20-40 kA</th>
<th>40-70 kA</th>
<th>70-100 kA</th>
<th>&gt; 100 kA</th>
<th>Total Surge Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOUTH WEST</td>
<td>NORTH Line 384KV - R</td>
<td>10/12/2007</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
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<tr>
<td></td>
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<td>0</td>
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<td></td>
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<td></td>
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</table>

The above report shows a summary of surge amplitude.

### Leakage Current Graph

The above shows a summary of leakage current graph and reported data.
The Energy Division, a global operating unit of Tyco Electronics develops manufactures and markets products and systems for the electrical power industry. Today, the Energy Division employs approximately 4,100 people. Our products are extensively employed by power utilities and equipment manufacturers, in rail transport systems and in industry around the world.