Energy Division

Bowthorpe EMP
remote surge monitoring systems

Tyco Electronics

Our commitment. Your advantage.

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

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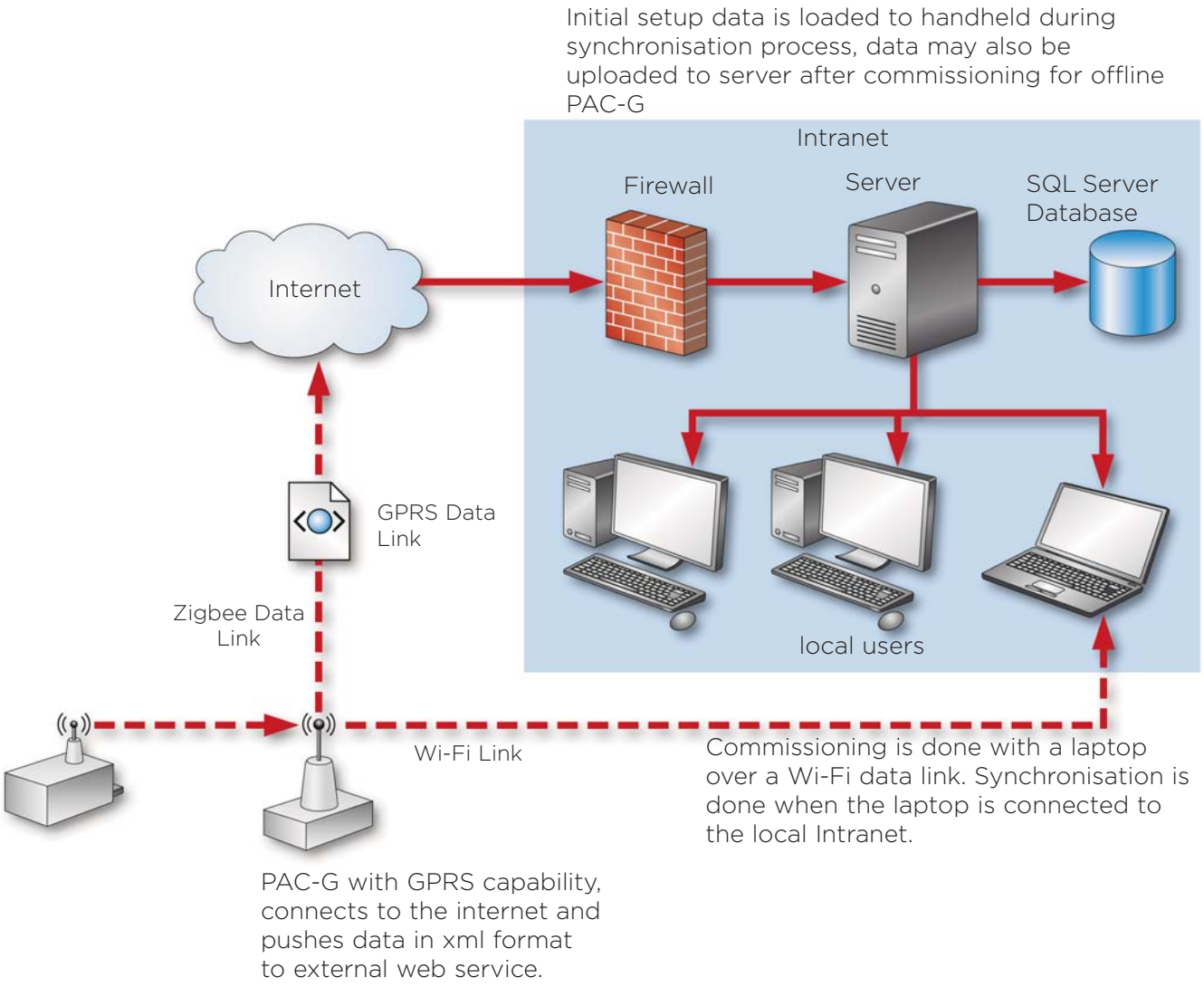
The Bowthorpe EMP surge counters use patented Planar Magnetic Current Sensing technology to accurately and reliably detect and measure current impulses. This technology is exclusive to Tyco Electronics.

When the surge counter detects an impulse it immediately transmits the data wirelessly to the PAC-G. If the impulse has exceeded the alarm tresholds 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.



Technical Data

Surge Measurement

Minimum surge amplitude (30/60 μs)	125 A
Maximum surge amplitude (4/10 μs)	120 kA
Surge measurement accuracy	<10 %
Time stamp resolution	1 s
Leakage current	60mA max

Wireless Communications

Surge counter communications protocol	IEEE 802.15.4-2006 (Zigbee)
Surge counter transmission range	300m Line of Sight
Surge counter antenna	Stub 2.4GHz Antenna
PAC-G communications	IEEE 802.15.4-2006 (Zigbee), GPRS*, 802.1 1b/g (WiFi)
PAC-G Antenna	2.4GHz Dipole x 2 (Zigbee & Wifi), Quad-Band GPRS Antenna

Power Requirements

Surge counter Power	Long Life Battery†
PAC-G Power	85-264 VAC, 47-63 Hz‡

Environmental Specifications

Surge counter Operating Temperature Range	-40°C to +60°C
PAC-G Operating Temperature Range	-40°C to +60°C
Temperature and humidity sensor	-40°C to +60°C
Surge counter	IP67
PAC-G	IP67

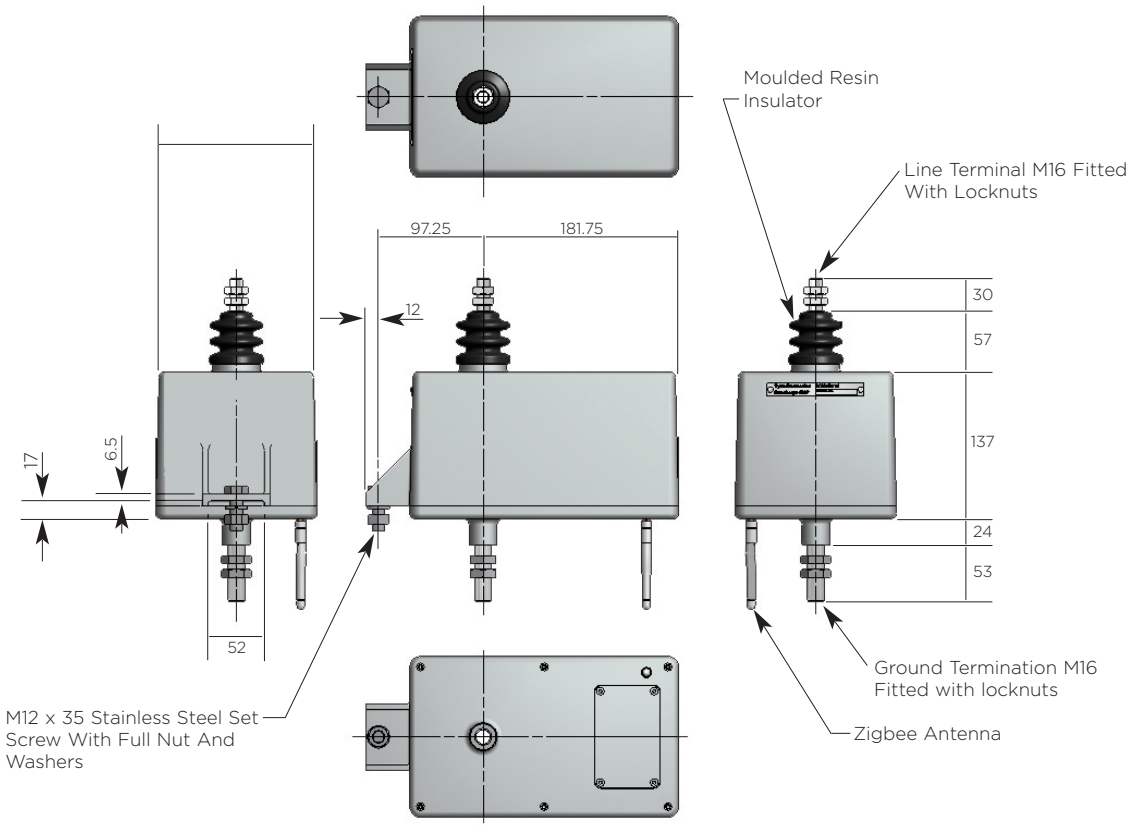
Surge counter and PAC-G installation instructions	BOW-EPP-1652
Surge counter web-server user manual	BOW-EPP-1787

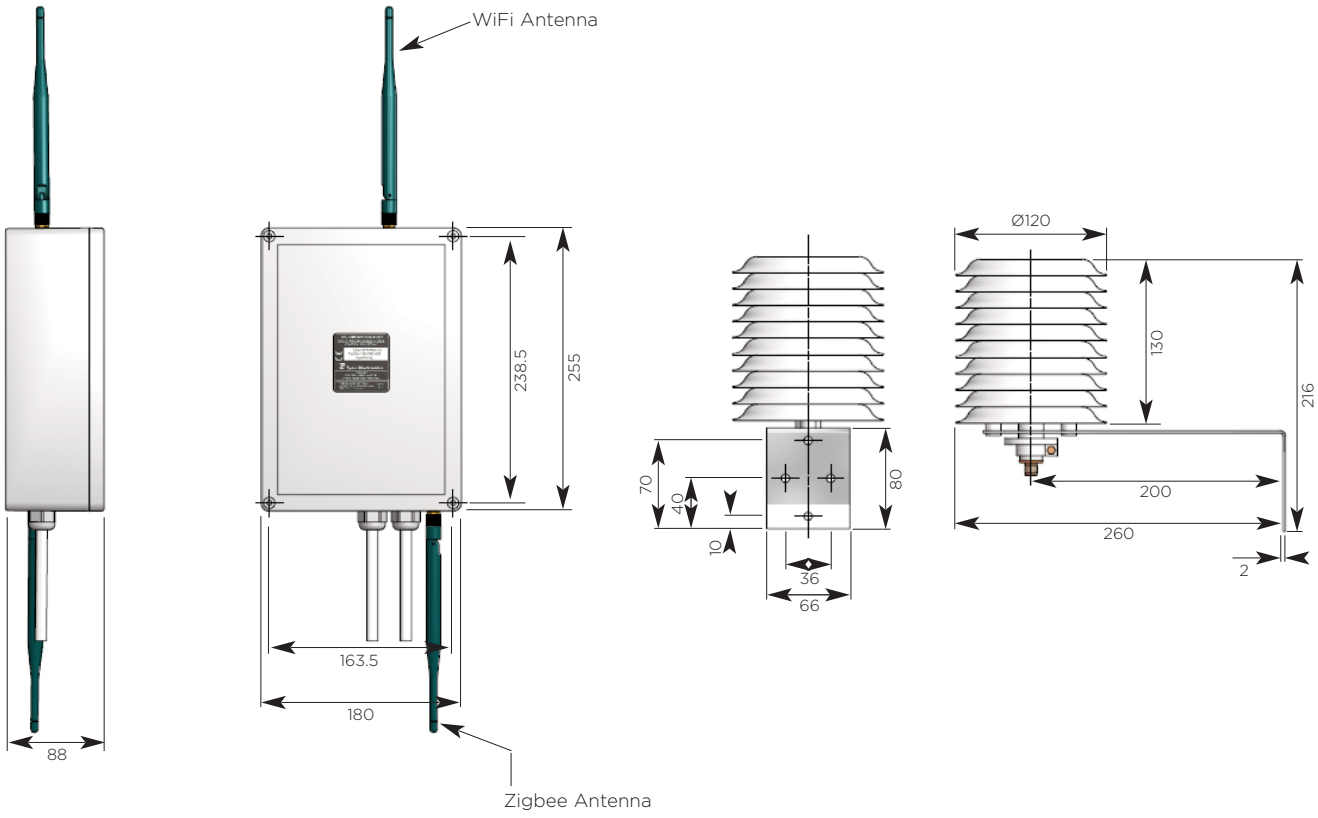
* Discuss GPRS requirements with sales representative prior to order. Geographic factors may require further clarification. If GPRS coverage is not available in your area, please contact Sales rep for alternative options.

† 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.

SC14 / SC15 and PAC-G dimensions





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

From 07/01/2008 to 06/02/2008
Area SOUTH WEST
Sub Station HV1 - 440KV

Reading Date	Reading Time	Ampl kA	Width uS	Surge Type	Location / Phase	Serial No	Manufacturer	Model	Year Manuf	Class	Material	Commissioned Date (S.A.)
11/01/2008	11:39:20:0	49.89	0.77	Fast front	NORTH Line 384KV : T	G9647	bowthorpe	pca3-2	1996	4	Porcelain	11/01/2008
11/01/2008	11:39:56:0	11.00	10.76	Lightning Strike	NORTH Line 384KV : T	G9647	bowthorpe	pca3-2	1996	4	Porcelain	11/01/2008
11/01/2008	11:41:56:0	102.00	0.21	Fast front	NORTH Line 384KV : T	G9647	bowthorpe	pca3-2	1996	4	Porcelain	11/01/2008
11/01/2008	11:42:06:0	0.50	70.22	Switching Surge	NORTH Line 384KV : T	G9647	bowthorpe	pca3-2	1996	4	Porcelain	11/01/2008
11/01/2008	11:42:07:0	0.60	50.69	Switching Surge	NORTH Line 384KV : T	G9647	bowthorpe	pca3-2	1996	4	Porcelain	11/01/2008
11/01/2008	11:42:11:0	0.70	50.10	Switching Surge	NORTH Line 384KV : T	G9647	bowthorpe	pca3-2	1996	4	Porcelain	11/01/2008
11/01/2008	11:42:12:0	15.00	5.02	Lightning Strike	NORTH Line 384KV : T	G9647	bowthorpe	pca3-2	1996	4	Porcelain	11/01/2008

The above report shows a detailed history of surge activity.

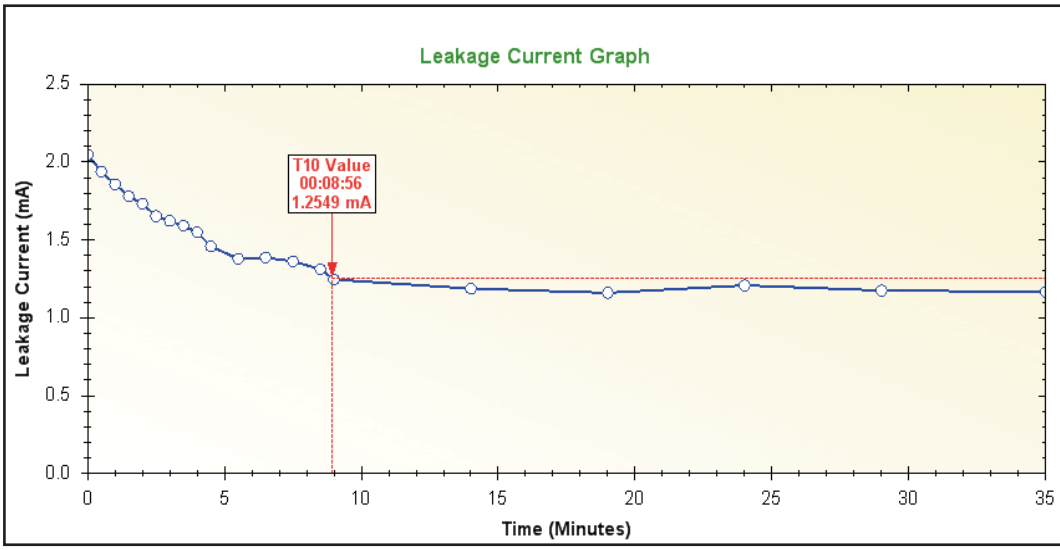
Surge Grouping

From 01/01/2008 to 06/02/2008

Executed 06/02/2008 11:47:54

Area	Sub-Station	Location/Phase	SA Installed Date	< 1 kA	1-5 kA	5-10 kA	10-20 kA	20-40 kA	40-70 kA	70-100 kA	> 100 kA	Total Surge Count
SOUTH WEST												
	HV1 - 440KV											
		NORTH Line 384KV - R	19/12/2007	0	0	0	0	0	0	0	2	2
		NORTH Line 384KV - S	19/12/2007	0	0	0	0	0	0	0	0	0
		NORTH Line 384KV - T	19/12/2007	2	34	2	1	1	2	1	1	44
		EAST Line 440KV - R	11/01/2008	0	0	0	0	0	0	0	0	0
		EAST Line 440KV - S	11/01/2008	5	11	1	0	1	3	1	0	22
		EAST Line 440KV - T	11/01/2008	1	2	0	0	0	0	0	0	3

The above report shows a summary of surge amplitude.



Date	Time	Peak (mA)
15/03/2010	00:00:00	2.047394903
15/03/2010	00:00:30	1.938707548
15/03/2010	00:01:00	1.858018675
15/03/2010	00:01:30	1.781431352
15/03/2010	00:02:00	1.733325027
15/03/2010	00:02:30	1.653258826
15/03/2010	00:03:00	1.622477587
15/03/2010	00:03:30	1.592075689
15/03/2010	00:04:00	1.55004366
15/03/2010	00:04:30	1.458966372
15/03/2010	00:05:30	1.379589121
15/03/2010	00:06:30	1.387142675
15/03/2010	00:07:30	1.362695308
15/03/2010	00:08:30	1.312507187
15/03/2010	00:09:30	1.246146779

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.

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