Cathodic Protection (CP) is an important method of preventing corrosion on buried metal pipelines, but it must be applied at the correct level. Every pipeline operator must carry out regular measurements of CP – at rectifiers or solar stations and at CP tests points (in impressed current systems) and at sacrificial anodes (in galvanic systems). Some key pipelines – crossing main roads, rivers or centres of population – may have additional protection against corrosion in the form of a sleeve filled with an inert gas (nitrogen). The gas pressure in the sleeve has to be maintained above a specific threshold, which requires regular checks.

Collecting and analysing field measurements is labour-intensive and costly. And (very importantly) they can only be reactive – problems can lie undetected for long periods, during which the pipeline is insufficiently protected.

**INTRODUCING MERLIN™**

Abriox has developed the MERLIN system with input from pipeline operating companies and independent CP consultants. The MERLIN system remotely monitors cathodic protection levels at rectifiers and test points along pipelines, and also the pressure within nitrogen sleeves.

All measured data is automatically transmitted in a management report to the system HQ where it is displayed and archived in Abriox’s iCPSM/CPSM software. The system is proactive - identifying potential corrosion problems wherever and whenever they occur and alerting the operator immediately.

MERLIN Remote Cathodic Protection Monitors (also known as Remote Monitoring Units - RMUs) are commonly used at:

- Rectifiers and Solar Stations - measuring electrical supply, voltage output, current output, ON and OFF potentials and also interrupting the current output for above ground surveys
- Test Stations, CP Posts and Riser Posts – measuring pipe to soil ON potentials, instant OFF potentials, coupon currents
- On-shore Tanks, Sacrificial Anodes, Isolation Joints and Critical Bonds
- Nitrogen filled sleeves - measuring nitrogen pressure to ensure sleeve integrity
- Pipeline sleeves - ensuring sufficient isolation between the pipeline and the sleeve

**INNOVATIVE DESIGN**

Through careful consideration of what pipeline operators require from a monitoring system, Abriox has been able to combine low power consumption electronics with remote telemetry to create a compact, affordable package offering all the key CP measurements. Our design is intelligent, yet practical. Some of the points our customers repeatedly comment on are:

- The ease of installation of our monitors. No specialist equipment is required, simply standard tools and a cell phone.
- The ability to get readings in the field from our monitors. Transformer Rectifier monitors are continuously powered, so technicians can get readings sent directly to their cell phone on demand.
- Reliability is ensured by extensive testing during production – all units are 100% tested – with particular attention to ingress and lightning protection.

**BENEFITS**

With installations across the globe, MERLIN offers major economic, operational, safety and environmental benefits; providing significant cost savings and make our customers’ operations more efficient by:

- Reducing the cost of data collection and pipeline surveys
- Improving the quality of data
- Reducing health and safety risks to technicians
- Increasing the efficiency of Integrity teams
- Offering zero carbon footprint for data collection
- 24/7 proactive monitoring
- Elimination of data loss through product failure
- Reputational benefit to network from faster resolutions leading to increased customer satisfaction
**OVERVIEW**
The MERLIN GX Transformer Rectifier Monitor is a compact Remote Monitoring Unit (RMU) that monitors the operation of a transformer rectifier or solar station. It carries out the functional checks of rectifier output (voltage and currents) required in order to ensure a continuous CP supply to the pipeline and to comply with regulatory guidelines.

The unit checks that the rectifier remains powered by its external electrical supply. If the power fails, an alarm is transmitted and its internal batteries take over monitoring for up to 2 years. They quickly repay their capital cost when compared to monthly manual checks.

The MERLIN GX Transformer Rectifier Monitor offers additional CP measurements (ON and OFF potentials) as well as the facility to synchronize remotely with other rectifiers on a pipeline for CIPS (Close Interval Potential Surveys) or DCVG (Direct Current Voltage Gradient) surveys.

The Excel model additionally controls a solid state Interrupter to provide a signal for tracing the pipeline route.

**FEATURES & BENEFITS**
- Compatible with 4G and 3G networks
- Cell phone test & set-up, on-demand readings and control of rectifier output relay
- Sealed, weatherproof unit with robust lightning protection and wide operational temperature range
- AC powered (110V to 230V) with 2 year battery backup. DC power option for solar stations
- Hourly check of rectifier outputs, ON/OFF potentials
- Synchronization enables close interval surveys to be carried out more quickly, with no rectifier setup
- Pipeline locate (offered on Excel model)
- Immediate alarm generation (user pre-set thresholds on all channels)
- Alarms when protection inadequate or power fails at rectifier
- Weekly report gives min, max and average of all channels for the week

**MODEL LIST**

<table>
<thead>
<tr>
<th></th>
<th>Electrical Supply</th>
<th>Rectifier Voltage</th>
<th>Rectifier Current</th>
<th>ON/OFF Potential</th>
<th>Rectifier 2nd Current</th>
<th>Remote Sync</th>
<th>Pipeline Locate</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUPER</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>EXCEL</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓ or ✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

**TECHNICAL SPECIFICATIONS**
- Dimensions (H x W x D): 4.9” x 3.35” x 2.17”
- Ingress Protection: NEMA 4
- Temperature Range: -40°F to +185°F 100% condensing humidity
- Communications: 4G (LTE Cat.1) and 3G networks
- Battery Backup: 2 year life, replaceable battery module
- Lightning Protection:
  - Surge protection on all external inputs and outputs
  - 2,500A at 3,000V (8/20µs)
  - Additional protection using recommended arrestors
- Software Management:
  - iCPSM (web-based) or CPSM (PC-based)
- Inputs:
  - Rectifier AC supply (indirectly)
  - Rectifier output voltage 0 to 150V DC 0.1V resolution
  - Rectifier output current (using shunt) ±100mA DC 0.01mA resolution
  - ON potential of the pipe
  - 4V DC with AC rejection
  - 0 mV resolution
  - 10 MOhm input impedance
  - OFF potential of the pipe (using optional relay)
- Outputs:
  - Fail-safe relay drive, 0.43A maximum at 12V DC nominal
  - Interruption drive, 0.43A maximum at 12V DC nominal
  - Output patterns from 1s to 60s with 0.1s resolution
  - Short circuit and surge protection
  - Synchronization error less than 1ms

Specifications are subject to change without prior notice.

Visit us online at www.abriox.com for further information on how our remote monitoring systems can improve your network management.

---

**OVERVIEW**
The MERLIN XT Transformer Rectifier Monitor is an externally mounted durable Remote Monitoring Unit (RMU) that monitors the operation of a transformer rectifier or solar station. It carries out the functional checks of rectifier output (voltage and currents) required in order to ensure a continuous CP supply to the pipeline and to comply with regulatory guidelines.

The unit checks that the rectifier remains powered by its external electrical supply (including from a solar station or wind turbine). If the power fails, an alarm is transmitted immediately and its internal batteries take over monitoring for up to 2 years. Because they are usually deployed in remote locations, they will very quickly repay their capital cost when compared to monthly manual checks.

MERLIN XT Transformer Rectifier Monitor offers additional CP measurements (ON and OFF potentials) as well as the facility to synchronize remotely with other rectifiers on a pipeline for CIPS (Close Interval Potential Surveys) or DCVG (Direct Current Voltage Gradient) surveys.

MERLIN XT uses Iridium satellite communications and is designed for use in areas where no cell network service is available. This ensures connectivity across the globe in the most remote locations.

**FEATURES & BENEFITS**
- Full global satellite coverage with fast messaging
- Sealed, weatherproof unit with robust lightning protection and wide operational temperature range
- Fully automatic test and set-up (no laptop required)
- AC powered (110V to 230V) with 2 year battery backup - DC power option
- Hourly check of rectifier outputs, ON/OFF potentials
- Control of rectifier output relay for remote synchronized interruption
- Pipeline locate (offered on Excel model)
- Immediate alarm generation (user pre-set thresholds on all channels)
- Weekly report gives min, max and average of all channels for the week

**MODEL LIST**

<table>
<thead>
<tr>
<th></th>
<th>Electrical Supply</th>
<th>Rectifier Voltage</th>
<th>Rectifier Current</th>
<th>ON/OFF Potential</th>
<th>Rectifier 2nd Current</th>
<th>Remote Sync</th>
<th>Pipeline Locate</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUPER</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>EXCEL</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓ or ✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

**TECHNICAL SPECIFICATIONS**
- Dimensions (H x W x D): 8.5” x 12.4” x 6.9”
- Ingress Protection: NEMA 4
- Temperature Range: -31°F to +158°F 100% condensing humidity
- Communications: Iridium satellite (meshed constellation)
- Battery Backup: 2 year life, replaceable batteries
- Lightning Protection:
  - Surge protection on all external inputs and outputs
  - 2,500A at 3,000V (8/20µs)
  - Additional protection using recommended arrestors
- Software Management:
  - iCPSM (web-based) or CPSM (PC-based)
- Inputs:
  - Rectifier AC supply (indirectly)
  - Rectifier output voltage 0 to 150V DC 0.1V resolution
  - Rectifier output current (using shunt) ±100mA DC 0.01mA resolution
  - ON potential of the pipe
  - 4V DC with AC rejection
  - 0 mV resolution
  - 10 MOhm input impedance
  - OFF potential of the pipe (using optional relay)
- Outputs:
  - Fail-safe relay drive, 0.43A maximum at 12V DC nominal
  - Interruption drive, 0.43A maximum at 12V DC nominal
  - Output patterns from 1s to 60s with 0.1s resolution
  - Short circuit and surge protection
  - Synchronization error less than 1ms

Specifications are subject to change without prior notice.
OVERVIEW

The MERLIN GX CP Monitor is a compact Remote Monitoring Unit (RMU) housed within a test post. MERLIN monitors collect CP data automatically, checks the measurements against specified alert criteria and reports immediately if an alarm threshold is exceeded. They can be deployed anywhere on the pipeline network where it is important to record ON/OFF pipe-to-soil potentials, native coupon potentials and measurements of bonding or interfering currents. Alternatively it may simply be that certain measurement points on the pipeline create risks to CP technicians, such as at busy road or rail crossings, or are difficult to access, such as on private land. At these points remote monitoring is very cost-efficient and can improve safety.

All measurements are taken automatically by the MERLIN monitor and data is seamlessly sent in a management report to the system HQ where it is displayed and archived in Abriox’s MERLIN CPSM software or online via iCPSM.

FEATURES & BENEFITS

• Compatible with 4G and 3G networks
• Cell phone test & set-up
• Compact size, sealed weatherproof unit for deployment inside test posts
• Robust lightning protection and wide operational temperature for all extremes
• Daily CP level check (hourly optional) for problem solving
• DC and AC monitoring for full corrosion prevention
• ON / OFF / Native Potentials and coupon current monitoring channels
• Alarms reported immediately (user pre-set thresholds for all channels)
• Weekly report gives min, max and average of all channels for the week

MODEL LIST

<table>
<thead>
<tr>
<th>Pipe-to-Soil 1</th>
<th>Pipe-to-Soil 2 or Instant OFF</th>
<th>Coupon Current or Bond Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC</td>
<td>DC (OFF)</td>
<td>DC (OFF)</td>
</tr>
<tr>
<td>AC</td>
<td>AC</td>
<td>AC</td>
</tr>
<tr>
<td>3 Channel</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>3 Channel</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>4 Channel</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>

MERLIN GX CP Hemi Monitor

OVERVIEW

The MERLIN GX CP Hemi Monitor is a compact Remote Monitoring Unit (RMU) designed to fit invisibly within a CP riser post. MERLIN monitors collect CP data automatically, checks the measurements against specified alert criteria and reports immediately if an alarm threshold is exceeded. They can be deployed anywhere on the pipeline network where it is important to record ON/OFF pipe-to-soil potentials, native coupon potentials and measurements of bonding or interfering currents. Alternatively it may simply be that certain measurement points on the pipeline create risks to CP technicians, such as at busy road or rail crossings, or are difficult to access, such as on private land. At these points remote monitoring is very cost-efficient and can improve safety.

All measurements are taken automatically by the MERLIN monitor and data is seamlessly sent in a management report to the system HQ where it is displayed and archived in Abriox’s MERLIN CPSM software or online via iCPSM.

FEATURES & BENEFITS

• Compatible with 4G and 3G networks
• Cell phone test & set-up
• Compact size, sealed weatherproof unit for deployment inside riser posts
• Robust lightning protection and wide operational temperature for all extremes
• Daily CP level check (hourly optional) for problem solving
• DC and AC monitoring for full corrosion prevention
• ON / OFF / Native Potentials and coupon current monitoring channels
• Alarms reported immediately (user pre-set thresholds for all channels)
• Weekly report gives min, max and average of all channels for the week

MODEL LIST

<table>
<thead>
<tr>
<th>Pipe-to-Soil 1</th>
<th>Pipe-to-Soil 2 or Instant OFF</th>
<th>Coupon Current or Bond Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC</td>
<td>DC (OFF)</td>
<td>DC (OFF)</td>
</tr>
<tr>
<td>AC</td>
<td>AC</td>
<td>AC</td>
</tr>
<tr>
<td>3 Channel</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>3 Channel</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>4 Channel</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>

TECHNICAL SPECIFICATIONS

Dimensions (H x W x D):
4.9” x 3.35” x 2.17”

Ingress Protection:
NEMA 6

Temperature Range:
-40°F to +185°F 100% condensing humidity

Communications:
4G (LTE Cat.1) and 3G networks

Battery Backup:
5 year life, replaceable battery module

Lightning Protection:
• Surge protection on all external inputs and outputs
• 2,500mA at 3,000V (8/20us)

Software Management:
iCPSM (web-based) or CPSM (PC-based)

Inputs:
• DC Potential
  ♦ 10 MOhm input impedance
  ♦ ± 4V DC with AC rejection
  ♦ 1mV resolution
• AC
  ♦ 0-70V AC RMS, 10mV resolution
  ♦ Current Shunt
  ♦ 0-100mA
  ♦ 0.01mA resolution
  ♦ AC and DC measured
• All monitoring channels are fully independent

Outputs:
• Pair of relay contacts, normally closed
• Contacts open to take instant OFF
• Contacts rated at 1A at 30V DC

Specifications are subject to change without prior notice.

Visit us online at www.abriox.com for further information on how our remote monitoring systems can improve your network management.
**Technological Specifications**

- **Dimensions**: (H x W x D): 6.5” x 6.9” x 4.2”
- **Ingress Protection**: NEMA 1
- **Temperature Range**: -40°F to +158°F
- **Switched Terminals**: Suitable for 66 ring terminals (included)
- **Control Input Terminals**: Suitable for 1.5mm² wire
- **Maximum Switching Voltage**: 100V peak
- **Maximum Switching Current**: 40A @ -40°F to +77°F, 20A @ +77°F to +189°F
- **Locate Frequency Range**: 30Hz - 20,000Hz
- **Fail Safe**: Electromechanical
- **Control Voltages**: 12VDC ± 10% 320mA max for fail safe, 12VDC ± 10% 25mA max for solid state relay
- **Output Protection**: Short circuit and surge

Specifications are subject to change without prior notice.

**Features & Benefits**

- Compact size for ease of installation within most rectifier enclosures
- Robust unit housed in metal casing
- Quick and easy to install, with labelled connections to MERLIN monitor
- Wide operational temperature for all extremes
- Can be used worldwide - unlike mercury relays (which cannot be used in certain countries)
- Designed for all interruption cycles and extended use
- Precision solid state switching
- Less than 500us switching delay
- Electromechanical fail safe
- Short circuit and surge protection on output
- Switches up to 20A current (40A below +77°F)
- Compatible with all industry recognised Close Interval and DCVG survey patterns and most portable above-ground survey equipment
- Outputs a pipeline locate signal when used with MERLIN ‘Excel’ Transformer Rectifier Monitors

**Description**

The MERLIN Interrupter TX is designed for precise solid state interruption of rectifiers connected to a buried pipeline. Used in conjunction with specific MERLIN GX and MERLIN XT Transformer Rectifier Monitors, it enables interruption (switching of the current output) at a rectifier to be controlled remotely.

Rectifier interruption is used to carry out Close Interval and DCVG (Direct Current Voltage Gradient) surveys, major ON/OFF surveys at CP test posts and pipeline maintenance work.

Compatible with industry standard interruption patterns, the Interrupter TX may be switched on and off, or the cycle changed, from Abriox’s iCPSM or CPSM software. Interruption and cycle time management can also be controlled from a cell phone when in the field.

The MERLIN Interrupter TX is suitable for switching a current of 40A at -40°F to +77°F or 20A at +77°F to +189°F. When coupled with a MERLIN Excel Transformer Rectifier Monitor the Interrupter TX can also be used for pipeline location.

The Interrupter TX will transmit a user-defined frequency between 30Hz and 2000Hz. This will provide a signal range far greater than portable transmitters with minimal additional cost over your remote monitoring system, all controlled by either SMS text messaging in the field or from the office via our dedicated software.

**Features & Benefits**

- Remote access to rectifier and CP data
- Graphical and numerical data display
- Overview shows status of all monitors on a pipeline
- Configurable alarms to specified users
- Notes facility for locations and individual reports
- Plan scheduled interruptions for above-ground surveys and maintenance
- Configurable data export and interface options
- Licences allow different authorisation levels to software/user options

**Overview**

The MERLIN Interrupter TX is designed for precise solid state interruption of rectifiers connected to a buried pipeline. Used in conjunction with specific MERLIN GX and MERLIN XT Transformer Rectifier Monitors, it enables interruption (switching of the current output) at a rectifier to be controlled remotely.

Rectifier interruption is used to carry out Close Interval and DCVG (Direct Current Voltage Gradient) surveys, major ON/OFF surveys at CP test posts and pipeline maintenance work.

Compatible with industry standard interruption patterns, the Interrupter TX may be switched on and off, or the cycle changed, from Abriox’s iCPSM or CPSM software. Interruption and cycle time management can also be controlled from a cell phone when in the field.

The MERLIN Interrupter TX is suitable for switching a current of 40A at -40°F to +77°F or 20A at +77°F to +189°F. When coupled with a MERLIN Excel Transformer Rectifier Monitor the Interrupter TX can also be used for pipeline location.

The Interrupter TX will transmit a user-defined frequency between 30Hz and 2000Hz. This will provide a signal range far greater than portable transmitters with minimal additional cost over your remote monitoring system, all controlled by either SMS text messaging in the field or from the office via our dedicated software.

**Features & Benefits**

- Compact size for ease of installation within most rectifier enclosures
- Robust unit housed in metal casing
- Quick and easy to install, with labelled connections to MERLIN monitor
- Wide operational temperature for all extremes
- Can be used worldwide - unlike mercury relays (which cannot be used in certain countries)
- Designed for all interruption cycles and extended use
- Precision solid state switching
- Less than 500us switching delay
- Electromechanical fail safe
- Short circuit and surge protection on output
- Switches up to 20A current (40A below +77°F)
- Compatible with all industry recognised Close Interval and DCVG survey patterns and most portable above-ground survey equipment
- Outputs a pipeline locate signal when used with MERLIN ‘Excel’ Transformer Rectifier Monitors

**Description**

The MERLIN Interrupter TX is designed for precise solid state interruption of rectifiers connected to a buried pipeline. Used in conjunction with specific MERLIN GX and MERLIN XT Transformer Rectifier Monitors, it enables interruption (switching of the current output) at a rectifier to be controlled remotely.

Rectifier interruption is used to carry out Close Interval and DCVG (Direct Current Voltage Gradient) surveys, major ON/OFF surveys at CP test posts and pipeline maintenance work.

Compatible with industry standard interruption patterns, the Interrupter TX may be switched on and off, or the cycle changed, from Abriox’s iCPSM or CPSM software. Interruption and cycle time management can also be controlled from a cell phone when in the field.

The MERLIN Interrupter TX is suitable for switching a current of 40A at -40°F to +77°F or 20A at +77°F to +189°F. When coupled with a MERLIN Excel Transformer Rectifier Monitor the Interrupter TX can also be used for pipeline location.

The Interrupter TX will transmit a user-defined frequency between 30Hz and 2000Hz. This will provide a signal range far greater than portable transmitters with minimal additional cost over your remote monitoring system, all controlled by either SMS text messaging in the field or from the office via our dedicated software.

**Features & Benefits**

- Compact size for ease of installation within most rectifier enclosures
- Robust unit housed in metal casing
- Quick and easy to install, with labelled connections to MERLIN monitor
- Wide operational temperature for all extremes
- Can be used worldwide - unlike mercury relays (which cannot be used in certain countries)
- Designed for all interruption cycles and extended use
- Precision solid state switching
- Less than 500us switching delay
- Electromechanical fail safe
- Short circuit and surge protection on output
- Switches up to 20A current (40A below +77°F)
- Compatible with all industry recognised Close Interval and DCVG survey patterns and most portable above-ground survey equipment
- Outputs a pipeline locate signal when used with MERLIN ‘Excel’ Transformer Rectifier Monitors

**Description**

The MERLIN Interrupter TX is designed for precise solid state interruption of rectifiers connected to a buried pipeline. Used in conjunction with specific MERLIN GX and MERLIN XT Transformer Rectifier Monitors, it enables interruption (switching of the current output) at a rectifier to be controlled remotely.

Rectifier interruption is used to carry out Close Interval and DCVG (Direct Current Voltage Gradient) surveys, major ON/OFF surveys at CP test posts and pipeline maintenance work.

Compatible with industry standard interruption patterns, the Interrupter TX may be switched on and off, or the cycle changed, from Abriox’s iCPSM or CPSM software. Interruption and cycle time management can also be controlled from a cell phone when in the field.

The MERLIN Interrupter TX is suitable for switching a current of 40A at -40°F to +77°F or 20A at +77°F to +189°F. When coupled with a MERLIN Excel Transformer Rectifier Monitor the Interrupter TX can also be used for pipeline location.

The Interrupter TX will transmit a user-defined frequency between 30Hz and 2000Hz. This will provide a signal range far greater than portable transmitters with minimal additional cost over your remote monitoring system, all controlled by either SMS text messaging in the field or from the office via our dedicated software.

**Features & Benefits**

- Compact size for ease of installation within most rectifier enclosures
- Robust unit housed in metal casing
- Quick and easy to install, with labelled connections to MERLIN monitor
- Wide operational temperature for all extremes
- Can be used worldwide - unlike mercury relays (which cannot be used in certain countries)
- Designed for all interruption cycles and extended use
- Precision solid state switching
- Less than 500us switching delay
- Electromechanical fail safe
- Short circuit and surge protection on output
- Switches up to 20A current (40A below +77°F)
- Compatible with all industry recognised Close Interval and DCVG survey patterns and most portable above-ground survey equipment
- Outputs a pipeline locate signal when used with MERLIN ‘Excel’ Transformer Rectifier Monitors