

becker

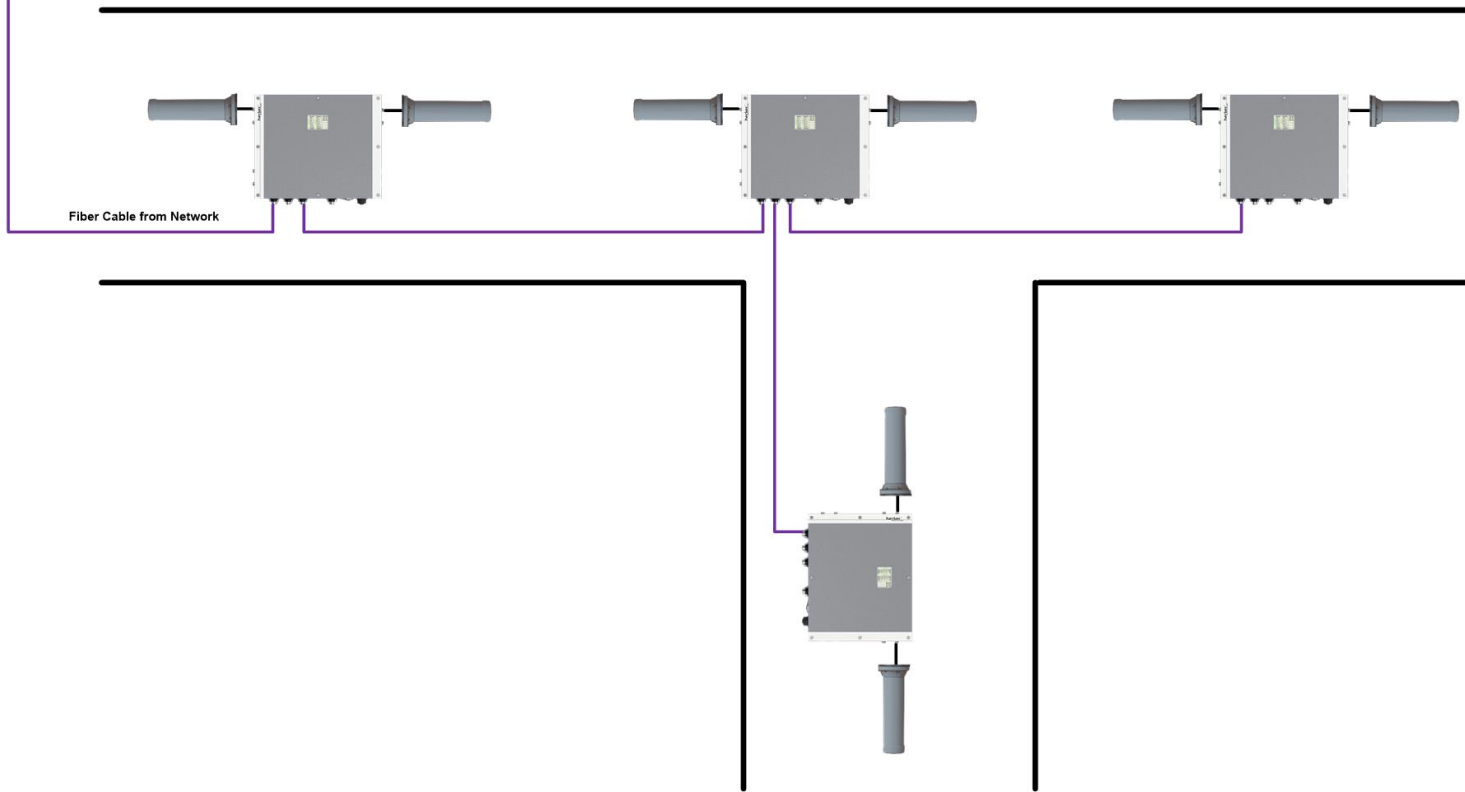
MINING SOUTH AFRICA

A PART OF THE BECKER MINING SYSTEMS GROUP OF COMPANIES

BMSA Underground Industrial Wi-Fi Technology

know-how | performance | reliability

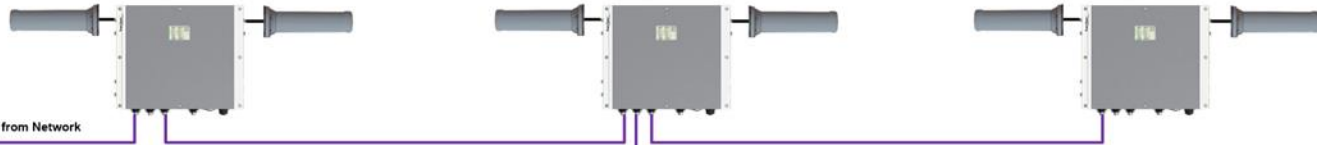
Underground Wi-Fi Access Point



Wi-Fi Access Point (Client Devices) with Wi-Fi Backbone Redundancy



Fiber Cable from Network



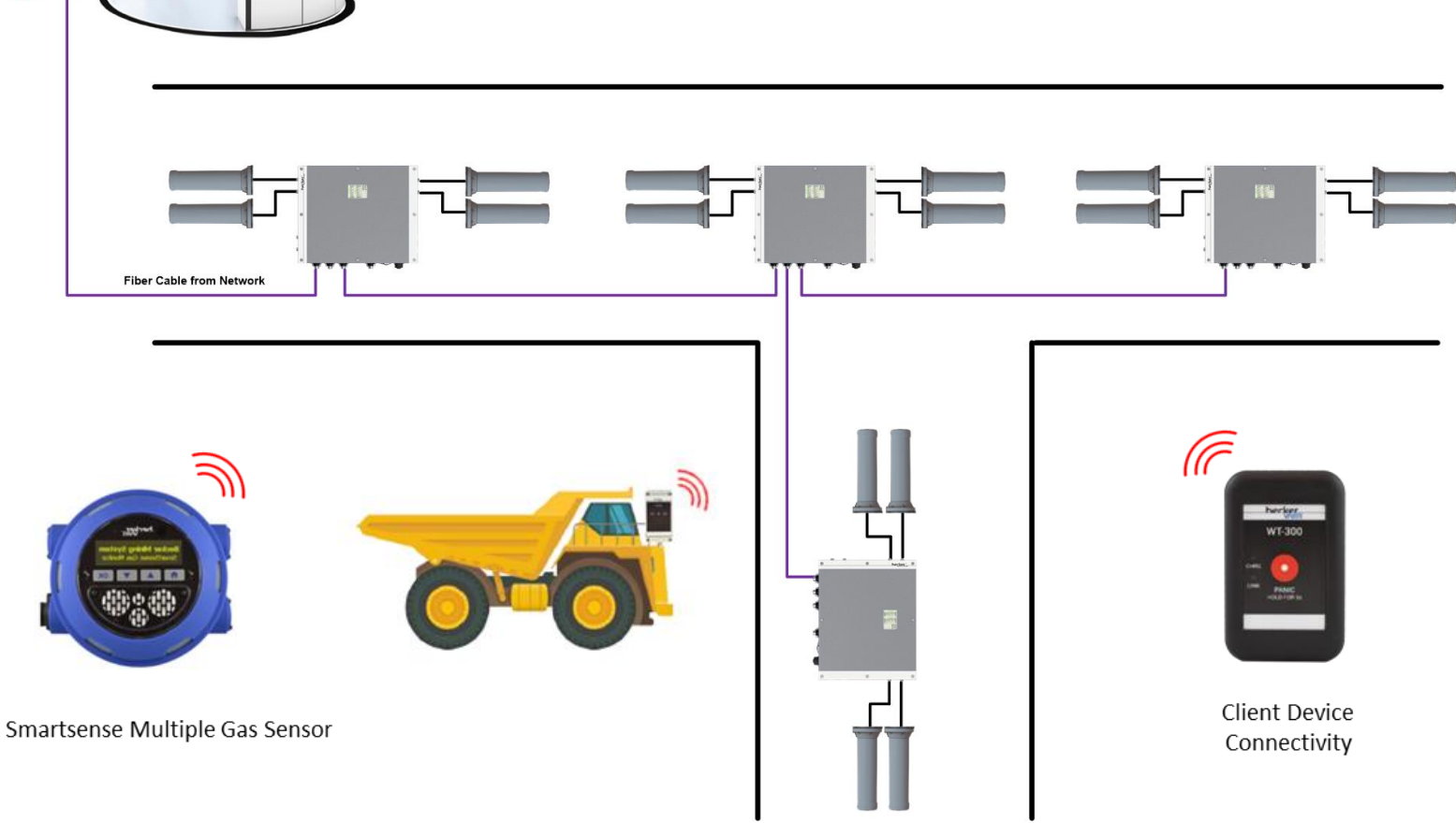
Smartsense Multiple Gas Sensor



Client Device Connectivity



Wi-Fi Access Point (Client Devices) with Wi-Fi Backbone Redundancy

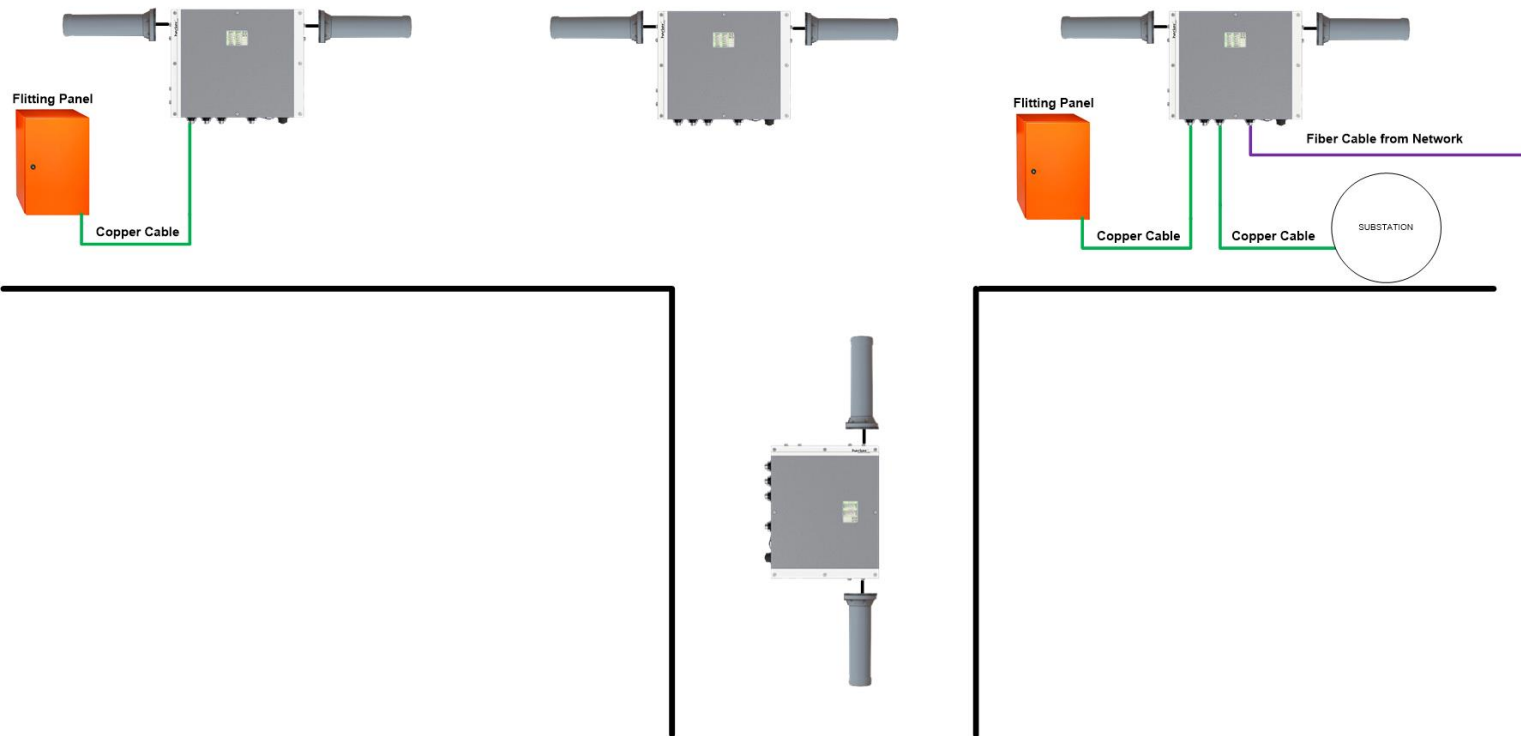


Smartsense Multiple Gas Sensor

Client Device Connectivity



Flitting Panel Layout



Network Infrastructure

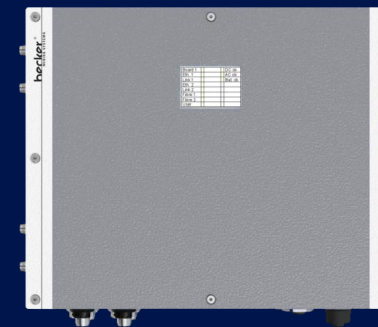


The WRAP product range comprises wireless router access points and network switches that support the 1 Gbit/s standard.

260 products are intrinsically safe, and 310 products are NON-IS both designed for mining purposes. They come with IP65 or IP67 ratings.

Products:

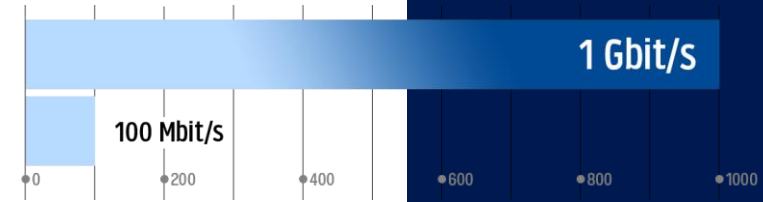
- WRAP260.1** Double Router
- WRAP260.2** Triple Router
- WRAP260.3** Single Switch
- WRAP260.4** Double Switch
- WRAP260.5 Gateway Switch
- WRAP310 NON-IS Triple Router



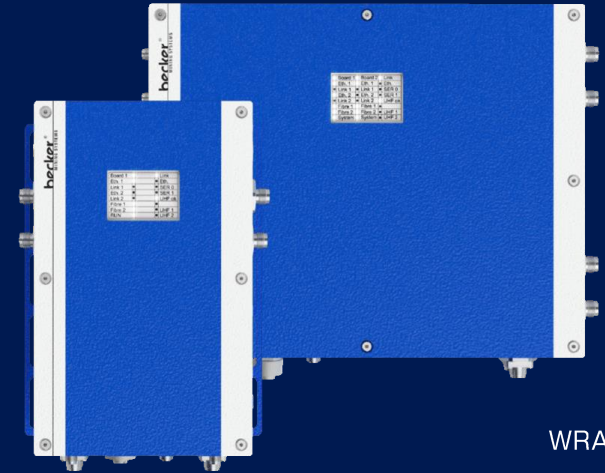
WRAP Features

WRAP Router Features

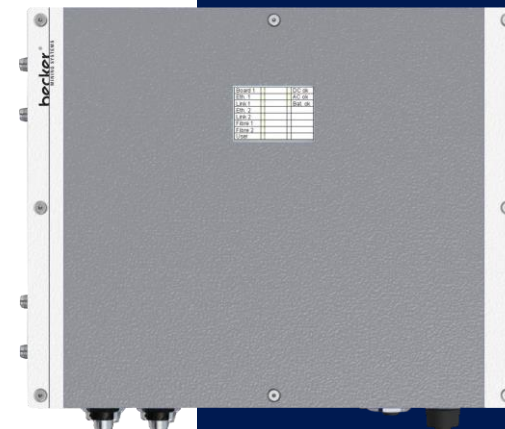
- Up to 4 x 1 Gbit/s fibre ethernet ports
- Ethernet speed of 1 Gbit/s
- Wireless data rates of 300 Mbit/s
- Support for up to 2 x 2 MIMO
- Intrinsically safe ia (WRAP 260 –Blue)
- ATEX / IECEx (WRAP 260 –Blue)
- Local diagnostics/ Data Traffic monitoring
- Optional Tagging & Tracking functionality with up to 2 Tag readers
- Optional RS485 interface
- Optional Built in Voice over IP server which can be integrated with most on premises PABX's
- Internal Power supply and backup battery for non-IS (WRAP 300 –Grey)



WRAP260.1



WRAP260.2



WRAP310 NON IS

WRAP Benefits

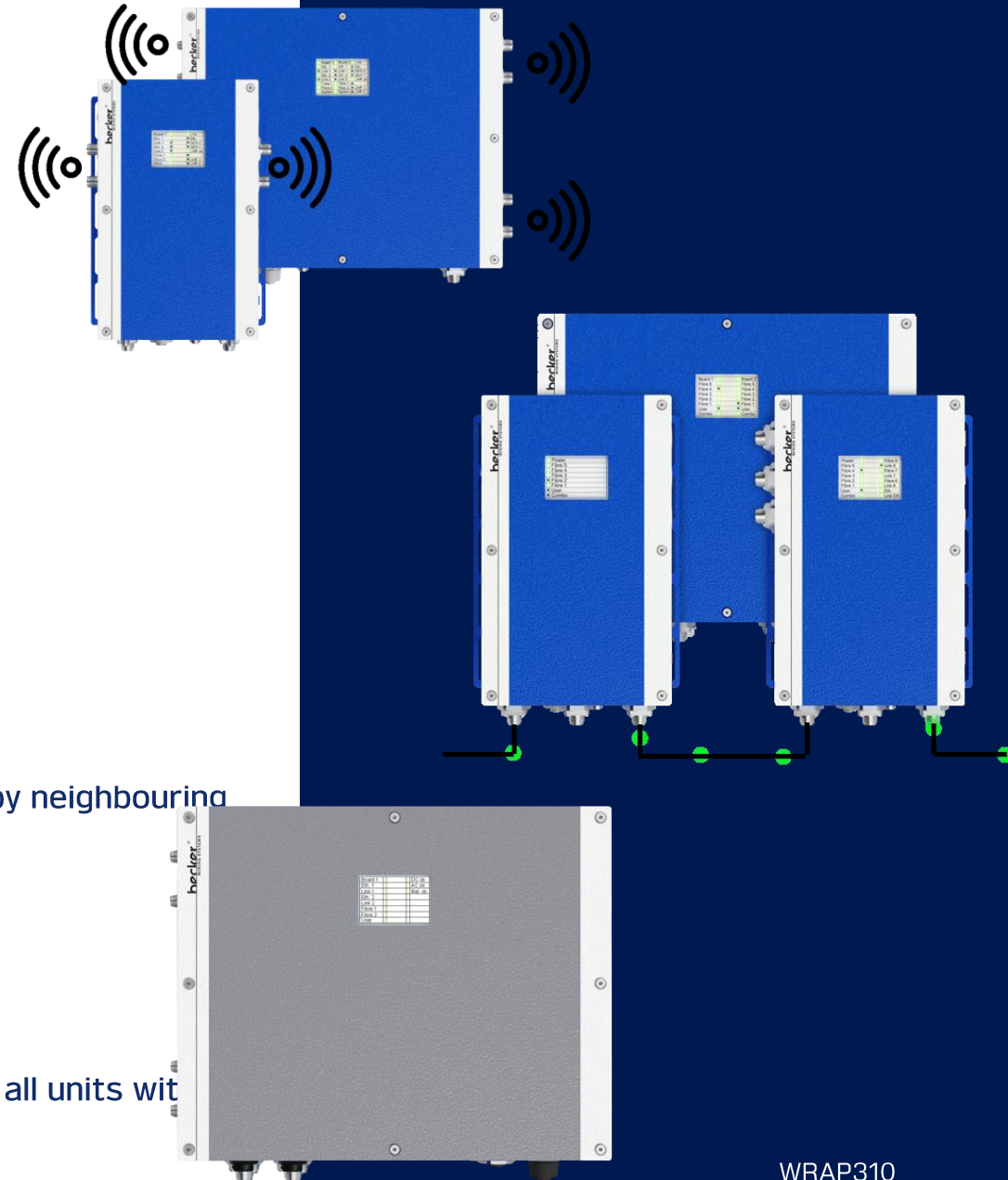
WRAP Key Benefits

- WRAP260.1 Double Router Ideal for providing full Wi-Fi coverage in tunnels with 2X 1Gbps fibre ports
- WRAP260.2 Triple Router Ideal for T junctions and 4 way junctions with 4X 1Gbps fibre ports and Wi-Fi coverage of 200Meters in 4 directions
- WRAP260.3 Single Switch for interconnection of 5X 1Gbps fibre links
- WRAP260.4 Double Switch for linking up to 10X 1Gbps links
- WRAP260.5 Gateway Switch for transition between up to 3 x100 Mbit/s legacy links and 5x 1 Gbit/s links networks combining in one network

Benefits shared across range

"Self - configuration" system, new units installed will be auto configured by neighbouring units

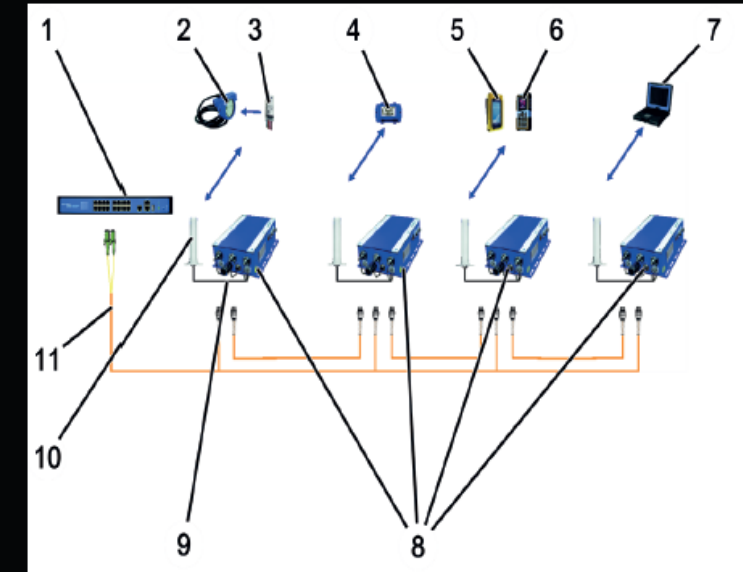
- Internal SIP Server on routers
- Compatibility with 99% of Industry standard Wi-Fi and Fibre protocols
- Multiple "hopping" between routers as redundancy for fibre connection to all units with NO data speed degradation (Up to 8 hops)



Wi-Fi Router Access Systems Benefits

- IS and non-hazardous area equipment available ensures that a system can be deployed in a hard rock mine or a hazardous area mining environment
- "Self - healing" system, new units installed will be auto configured by neighbouring units
- >500m spacing between Wi-Fi routers (Up to 800m dependent on tunnel dimensions)
- Two POE ports and additional RS485 port IS & Hard rock versions to allow for external device connection to the system
- Low cost hot-spot unit available for quick deployment in working areas (Flameproof)
- Integrated 3 x fibre ports allows for T-Junction connectivity on the fibre backbone
- Multiple "hopping" between routers as redundancy for fibre connection to all units with NO data speed degradation (Up to 8 hops)
- 3 Adjustable Wi-Fi tracking zones available for tracking resolution
- Personnel & Vehicle tracking units available for Tagging & Tracking
- Industry standard Wi-Fi connectivity to "off the shelf" devices i.e. Cameras, handheld devices, PC's, Environmental Monitors, Wi-Fi Tags etc.

APPLICATION EXAMPLE



1 Server	7 laptop
2 Cap lamp	8 WRAP 250
3 Tri Technology TAG,TCT3*	9 WiFi antenna cable
4 TPT*** Personnel TAG	10 WiFi antenna
5 Smart Ex Smartphone	11 Fiber-optic cable
6 BCOM MP03-Phone	

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Thanks For Your Attention

Becker Mining South Africa 2024

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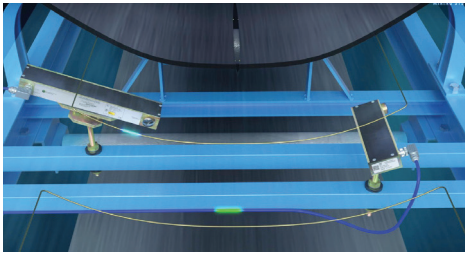
know-how | performance | reliability



BRS-2 BELT RIP DETECTION SYSTEM

- Colour 12 inch TFT display
- Virtual keypad
- Stainless steel IP65 housing
- 5 easy access shortcut buttons
- 3 signal lamps
- Direct real time loop diagnostics
- Remote network access (TCP/IP)
- Password protected

FEATURES



The Belt Rip Detection System BRS-2 has been developed to help increase the productivity of conveyor belts by detecting belt rips as soon and as reliable as possible.

To monitor steel cable and fibre belts, inductive loops need to be embedded in the belt. Once installed, the BRS-2 will detect the loops on the conveyor, define and number the loops and create its own image of the belt and its loops in real time.

The BRS-2 uses the real time loop diagnostics to continuously monitor the health of the belt, and in the event of a rip, stops the belt and reduces any further damage and downtime.

Detailed information can be seen in real time including loop position, loop status and the last ten status changes of each loop. Access and the monitoring of the system is simple, either locally with its 12" TFT screen, 5 shortcut buttons, mouse pad and virtual keypad or remotely via TCP/IP or other bus standards.

Other features include accurate belt speed, real time graphics, forward and reverse capability, local and remote password protection, system log of the last 10,000 system changes.

Technical data are limit values.

If the product is integrated into systems or operated in combination with other devices, its permissible operating values can deviate from these limit values. Subject to technical modifications without prior notice.

TECHNICAL DATA

ELECTRICAL DATA

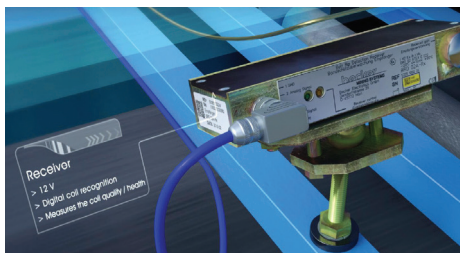
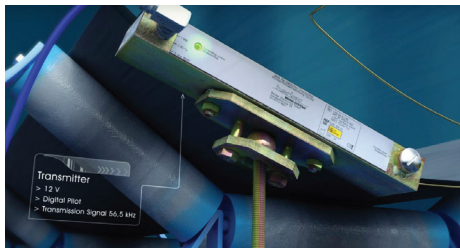
Supply voltage	85 - 264 V AC
Temperature measurement range	-20 +50

MECHANICAL DATA

Approx. width	540 mm
Approx. height	500 mm
Approx. depth	210 mm
Weight	23 kg
Material of housing	Stainless Steel

TFT DISPLAY

Size	26.4 cm
Resolution	1024 x 768



An I.S. version of the BRS is also available.

becker[®]
MINING SYSTEMS

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Becker Mining South Africa - CT Systems Pullkeys

Presenters:

know-how | performance | reliability

CT Systems Pullkeys

In the context of conveyor systems, “Pullkeys” also known as conveyor trip switches are safety devices that allow operators to emergency-stop a conveyor belt by pulling a cable or switch from anywhere along its length. They act as a critical safety measure in material-handling operations

Key Features of Pullkeys:

- Designed as emergency stop switches allowing operators to stop the conveyor electrically from any point along its length
- Typically installed at intervals of up to 100 m along the conveyor line

Product Range:

- Trip Switches (“Pullkeys”)
- Belt Protection Units
- Integrated Systems, Hardware Accessories, Spares, and technical documentation like Forms and Drawings

Conveyor Control Systems:

- 12V IS System up to 1.2km in hazardous areas.
- 48V System up to 8km without additional power supply and includes lightning protection.
- Control panel with 4-line LCD display unit. Optional colour touch screen HMI with onboard I/O and communication to surface, e.g., Ethernet port, Modbus, RTU etc.
- MK8/2 Control card with 8 x digital inputs, 6 x Relay outputs, Profibus, Modbus and Ethernet communications to optic fiber network switch and fully programmable.



CT Systems Pullkeys

- Long distance before a booster power supply is required (8km)
- Self test of pre-start sirens after every pullkey trip reset and during pre-start activation. A microphone on the pullkey compares the sound level, if one siren is faulty and alarm comes up, if both sirens are faulty the conveyor will not start up
- Continuous monitoring of the electronic and safe line circuits make the system failsafe
- Proven reliability over 25 years
- Large installed base in South Africa and Worldwide
- Conveyor protection devices and pullkeys are all integrated into one system and one cable
- Can integrate with the Becker Belt Rip System, all PLC and SCADA Systems
- The system is very flexible to accommodate the



CT Systems Pullkeys

- 48V Pullkey with auxiliary contact for CTS100 dummy switch.
 - 48V Primary device with 2 x auxiliary contacts for misalignment, Belt
 - Rip units, Belt speed, sequence, blocked chute, etc.
 - All protection devices connect to the 4 wire fail safe system.
 - 48V NFLP Intelligent Pullkeys.
-
- CTS100 Dummy Pullkey with 2 sets of change over contacts.
 - The end units are not intelligent and addressable for easier fault finding.





Thank you for your time.
Presenters: Team Becker Mining South Africa.

Becker Mining South Africa – Electrical Switchgear

Presenters:

know-how | performance | reliability

Electrical Switchgear

Types of Electrical switchgear refers to a combination of electrical disconnect switches, fuses, or circuit breakers used to control, protect, and isolate electrical equipment. It is essential in electrical power systems for both low-voltage (LV), medium-voltage (MV), and high-voltage (HV) applications.

- Protection: Interrupts faulty currents to protect equipment and personnel
- Control: Allows the manual or automatic control of power flow.
- Isolation: Provides a way to safely isolate equipment for maintenance
- Circuit Breakers: Interrupt current flow during faults
- Disconnect Switches/Isolators: Ensure safe isolation of equipment
- Fuses: Protect against overcurrent by breaking the circuit
- Relays: Detect faults and initiate breaker operation
- Busbars: Conduct electricity within the switchgear
- Enclosure: The casing that houses and protects all components
- Switchgear
- Pilot Control Relay: Designed to monitor the continuity of the Earth Circuit in a supply cable and to allow remote start/stop operation
- Contactors: Electromechanical switches used to control high-power electrical loads NO (Normally Open) / NC (Normally Closed)



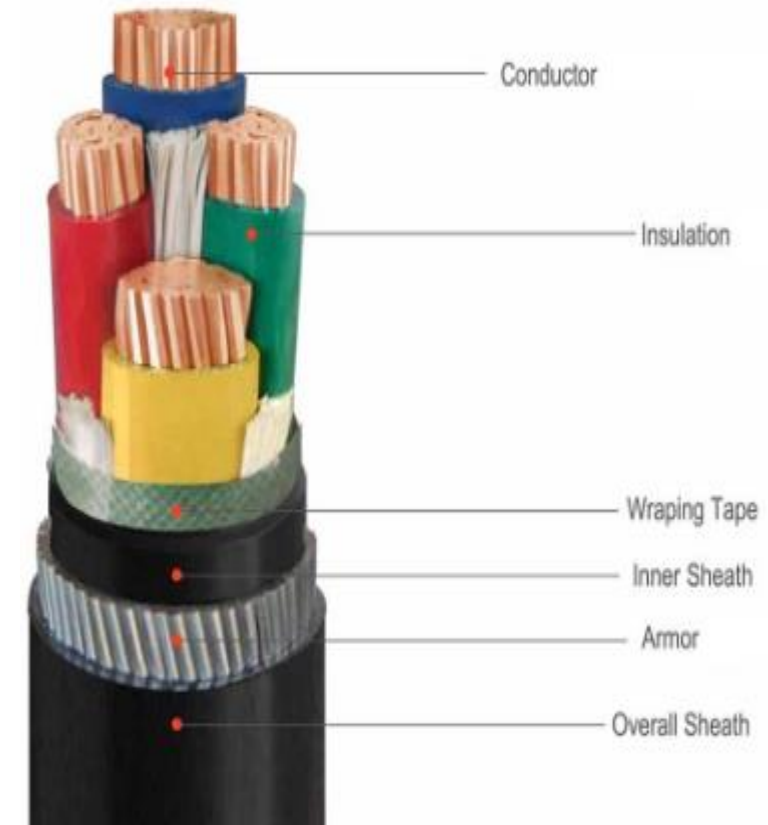
Electrical Switchgear

Cables

- PVC: used as insulation and sheathing material. It's durable, flame-retardant, and cost-effective.
- SWA: Steel Wire Armored - provides mechanical protection, making the cable suitable for underground or external use.
 - Excellent mechanical protection.
 - UV and chemical resistant (outer sheath).
 - Suitable for direct burial or exposed environments.
 - Long-lasting and weather-resistant.
- Instrumentation cable to transmit low-level signals (e.g., from sensors, transducers, or instruments) without interference.

Common Configurations:

- 1P x 0.5mm², 2P x 1.0mm², 12P x 1.5mm², etc.
- IS (Intrinsically Safe) versions for hazardous zones (blue outer sheath).





Thank you for your time.
Presenters: Team Becker Mining South Africa.

Becker Mining South Africa - Flameproof Enclosures

Presenters:

know-how | performance | reliability

Flameproof Enclosures

We specialize in the following Flameproof enclosures for electrical equipment for hazardous areas which are all pressure tested and Certex accredited ISO9001-2008:

Full range of approved FLP enclosures available and ability to custom design to clients requirements including the FLP VSD Belt drive.

- Flameproof Belt Drive Panels:
 - Wall mount
 - Head alarm with Pump
 - Head alarm with Pump and winch
 - Crusher
- Flameproof PLC and Instrumentation panels
- Stop start stations Control Panels
- Isolator panels
- Key switches
- Direct online and soft starters for conveyors
- Flameproof Junction Boxes
- Flameproof Flitting (The Flameproof Flitting enclosure is a forward / reverse starter and can be used for tramming purposes and pumps. It will protect any motors from 0.3amps to 250amps up to 1100Volts.)



Flameproof Enclosures

Features:

- Certex accredited and ISO9001-2008.
- Populated to customer requirements.
- Flame proof panels for drills/pumps/feeder breakers and compressors.
- SCADA reader via Fiber or copper.
- Turnkey solution for hazardous areas.
- Direct on-line and soft starters to customer requirements.
- Flitting panels forward reverse.
- Protection from 300 ma to 250 amps.
- Proven explosion test at SABS Commercial SOC Ltd - NETFA, up to 17kA on 3.3kV @ 0.3seconds. Electrical type test report on BMSA enclosure certified with WAM 3.3kV restraint sockets and plugs. NSC-180503-00001.
- All equipment can be designed with skid or trailer mounting.

Benefits:

- All FLP Panels are pressure tested on site and will receive a pressure certificate.
- FLP enclosures for FLP environment and Petro-chemical applications.
- FLP PLC and instrumentation.
- Provision is made for 8 intrinsically safe outputs.
- Colour display fault diagnostic screen.
- SCADA interface compatible.
- Build to IEC standard on any client request through MASC.
- Proven reliability for 25 years throughout all Mining, Petro chemical, Industrial and FMCG markets..





Thank you for your time.
Presenters: Team Becker Mining South Africa.

Becker Mining South Africa – Gulley Box

Presenters:

know-how | performance | reliability

Non-Flameproof Gulley Box

Electrical gulley boxes (or gully boxes) are robust, modular enclosures primarily used in underground mining and industrial applications to manage power distribution, motor control, and protection.

- **Operating Voltage:** Commonly rated for 525V, 550V, or 1000VAC, with specific models catering to different mining requirements.
- **Incomer Ratings:** Typically, 250A, 300A, 350A, or up to 800A for fixed units.
- **Feeder Capacities:** Ranging from 40A, 60A, to 100A feeder boxes.
- **Construction:** Manufactured from heavy-duty, epoxy powder-coated steel (1.6mm to 5mm thick) for durability.
- **Protection Rating:** IP54 for non-flameproof, options up to IP67 are available.
- **Busbar System:** Molded case busbar system, often modular, allowing for easy installation or removal without total system isolation.
- **Components:** Often include molded case circuit breakers (MCCB), output circuit breakers and transformers (e.g., 550V/230VAC) as per customers specification.
- **Motor Control:** Capable of controlling motors up to 110kW (Direct-on-Line - DOL).

Common Variations

- **Plug-in vs. Fixed:** Plug-in units allow for quick swapping without isolation; fixed units offer higher amperage, such as 800A.
- **Specialized Units:** Include lighting transformer boxes (3KVA–5KVA, 550V/1000V), winch starters, Fan Starters, Drill Rigs, Pump Starters, Ventilation Fans, Welding Plugs and conveyor starters.





Thank you for your time.
Presenters: Team Becker Mining South Africa.

Becker Mining South Africa Leaky Feeder

know-how | performance | reliability

smartcom

Leaky Feeder Basics

What is a Leaky Feeder system?

It is a radio system designed to use radio technology in underground/tunnels settings using a radiating cable as an antenna. Leaky Feeder cable runs along tunnels and emits and receives radio signals. The cable is leaky since it has gaps or slots in its outer shielding to allow signal to leak into or out of the cable along its entire length.

Becker Varis offers multiple types of leaky feeder systems based on VHF (150 MHz – 170MHz) and UHF (455MHz – 475MHz) technology. The two noted below are the most common, though Becker Mining South Africa also offers intrinsically safe options for potentially explosive atmospheres.

smartcom systems:

smartcom®150 is well suited for hard-rock mines where lateral coverage from the LF cable is not critical.

smartcom®450 is better suited to room and pillar or longwall mines as the signal propagates up to 4x better.

smartcom

Core Components



Leaky Feeder Head-End



500m or 350m VHF and UHF Leaky Feeder Cable



Leaky Feeder Repeater

The “brain” of the system, the Varis’ smartcom Head End is the interface between Base Station equipment such as Repeaters and the smartcom Leaky Feeder network. Head End units have a preamplifier which compensates for the splitting losses in the Head End and performs system Automatic Gain Control (AGC). The Head End unit also injects DC power onto the Leaky Feeder cable to power smartcom Line amplifiers located near the base station.

BMSA’ Leaky Feeder Cable acts as an antenna to bring wireless voice, data, video and Ethernet into mines and tunnels.

Leaky feeder repeaters are used to provide a channel or two on a wide spectrum of frequencies. They receive and transmit radio signals and can be used on digital or analog radio systems.

smartcom

Core Components



VHF and UHF Leaky Feeder Amplifier

Varis' smartcom Diagnostic Line Amplifiers compensate for Leaky Feeder cable and splitting losses Amplifiers generally provide up to 500m spacing on VHF systems and 350m on UHF systems.

Local/Remote Diagnostics, Ethernet, video and accurate Automatic Gain Control (AGC) without Return Pilot noise buildup are built-in to every amplifier.



DC Unit

The DC unit provides constant voltage output to power amplifiers & peripherals on the leaky feeder system. A backup battery can be connected to maintain power during AC power outages. Automatic shutoff circuitry with built-in hysteresis is also integrated to protect the battery during high and low voltage conditions.



2-way splitter

Two-way splitters enables an additional branch of Leaky Feeder cable.



3-way splitter

Three-way splitters enables 2 additional branches of Leaky Feeder cable.

smartcom

Core Components



Splice Unit

Splice Units are used to repair cable breaks and splice together lengths of Leaky Feeder cable during system configuration or repair.



Termination Unit

Termination units are required at the end of each Leaky Feeder cable branch to absorb RF signals, preventing reflections and distortion.



Stope Antenna

Stope Antennas increase off-cable coverage into stopes and other areas where cable damage is likely. Stope Antennas are installed at the end of a Leaky Feeder cable run in place of termination units when extra coverage is required.

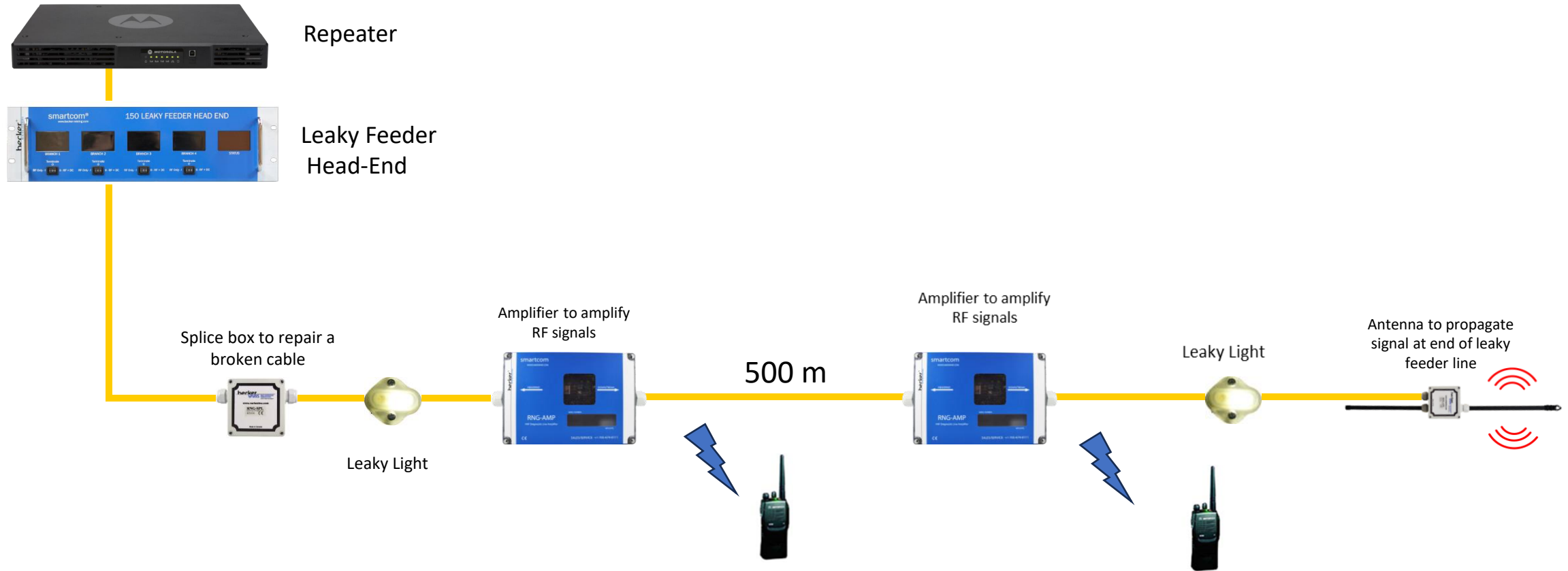


Leaky Light

A patented self-contained Lighting and safety device for your Leaky Feeder System. Powered by your leaky Feeder cable that can function as a stand alone or redundant lighting system. Leaky Light can also be programmed to indicated an exit in an emergency event.

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Leaky Feeder System Diagram Becker Mining South Africa Leaky Feeder Essential



Applications

- **Basic Two-Way Communications with exceptional proven voice clarity.**
- **500m spacings between amplifiers.**
- **Leaky Light (Optional) as a cost-effective lighting system.**

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Becker Mining South Africa Leaky Feeder Remote Diagnostics

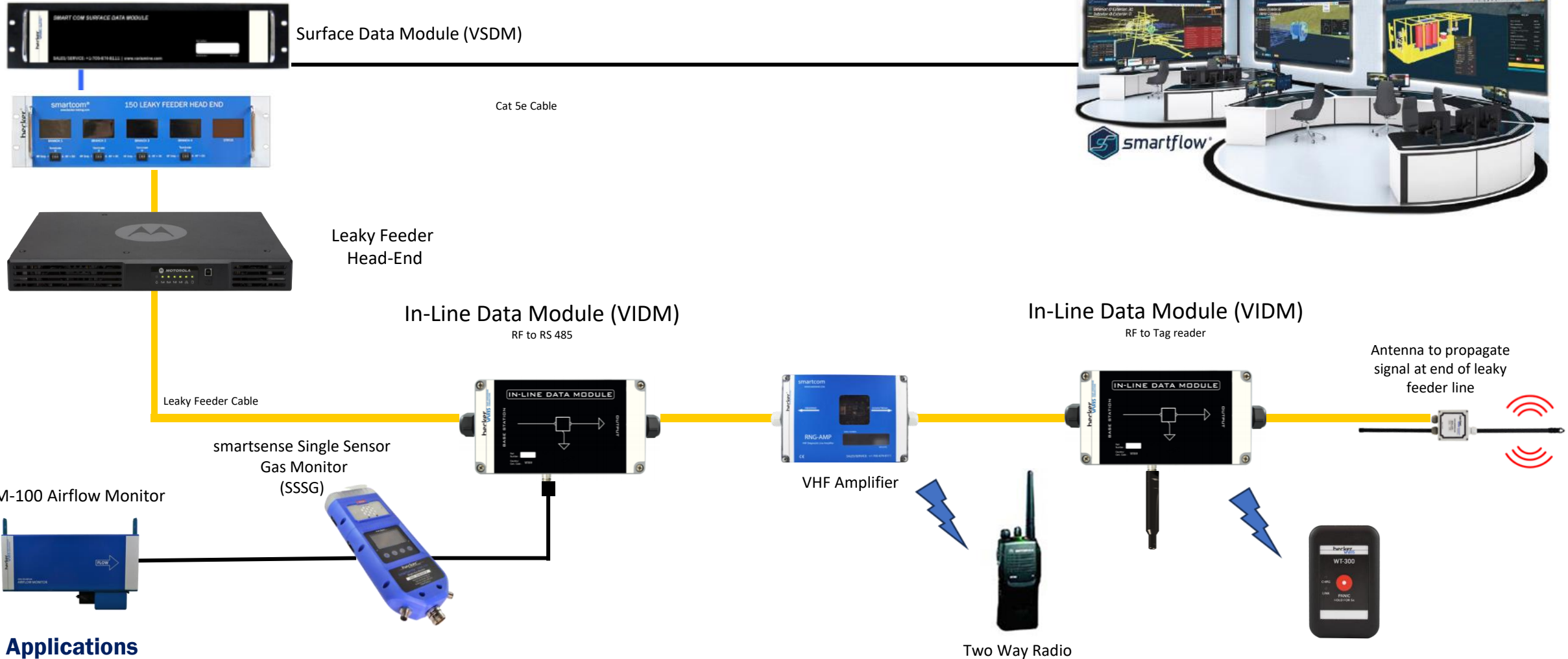


Applications

- **Remote Diagnostics for System Monitoring and Predictive Maintenance.**
- **Basic Two-Way Communications with exceptional proven voice clarity.**
- **500m spacings between amplifiers.**
- **Leaky Light (Optional) as a cost-effective lighting system.**

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Becker Mining South Africa Data Over Leaky Feeder

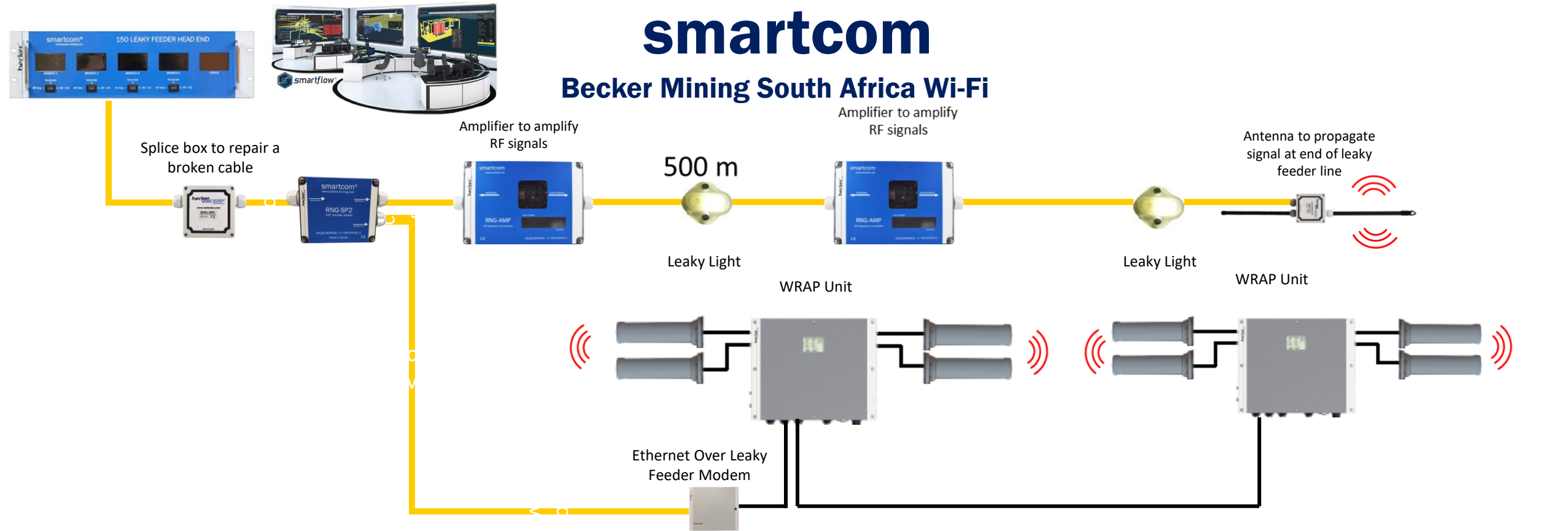


Applications

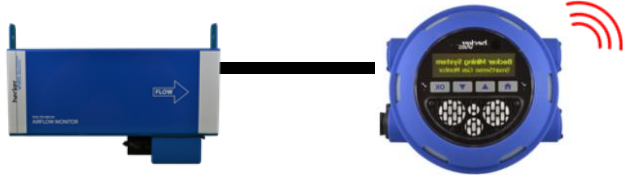
- **Basic Two-Way Communications with exceptional proven voice clarity.**
- **Remote Diagnostics for System Monitoring and Predictive Maintenance with 500m spacings between amplifiers.**
- **Data Over Leaky Feeder for Telemetric Data retrieval to Smartflow.**

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Becker Mining South Africa Wi-Fi



Air velocity Sensor



Smartsense Multiple Gas Sensor



Vehicle Tracking



Personnel Tracking



Client Device Connectivity



Personnel Tracking

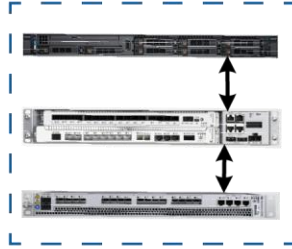
Applications

- **Data with Digital Voice**
- **RFID with Tagging and Tracking over Wi-Fi.**
- **Real time feedback from all intelligent devices.**

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Becker Mining South Africa LTE Over Leaky Feeder

BASE
STATION



SERVER

BASEBAND

BASEBAND INTERCONNECT

BASE BAND UNIT (BBU)



LTE-RI-x

350 m

350 m

350 m

350 m

350 m

350 m



smartflow



End Of Line



LTE Amplifier



LTE Amplifier



LTE Amplifier



LTE Amplifier



End Of Line

smartcom

Becker Mining South Africa LTE Over Leaky Feeder

- The new LTE Leaky Feeder Offering from Becker Mining Systems brings an effective alternative to enabling LTE connectivity in mines. Becker Mining Systems LTE Amplifiers offer a robust, cost effective alternate to installing expensive remote radio units at short intervals.
- The UBDA800A0ZZA1ZWW# offers 45MHz of bandwidth in the upstream and downstream, with 10MHz separation between bands.
- Becker Mining Systems' LTE Amplifiers are also available for other bands. 2-year component and workmanship warranty. Mine-wide LTE Band 5 signal distribution
- Reduced cost compared to traditional implementations in mines.
- Easy installation and maintenance
- Input Impedance – 50 Ohm
- Protection Class – IP66



Smartflow Leaky Feeder Monitoring Module

Leaky Feeder systems are crucial in environments where reliable communication is essential, particularly in challenging conditions like underground mining where traditional communication methods might fail, a leaky feeder system maintains a stable connection allowing conditions for safety and coordination.

In case of emergencies, having a reliable communication system ensures that all personnel can receive and send messages during evacuation events or responding to incidents.



Smartflow® Leaky Feeder Monitoring System is a tool that enables us to manage and maintain the performance of a leaky feeder communication network.

In collaboration with Varis systems **Smartflow®** is able to pull data from **Varis Smartcom** catalogue into a 3D Web interface where you can graphically identify all your leaky feeder network components and monitor real time data allowing immediate fault location, identify attenuation levels, read voltage by each amplifier and more.

This system is used to continuously oversee the performance and health of the leaky feeder network providing the following features:

- **Signal Monitoring:** Checks the strength and quality of the signals being transmitted and received along the leaky feeder cable.
- **Health and Performance:** Monitors the physical and operational status of the cable, detecting issues like damage or degradation.
- **Alerts and Diagnostics:** Provides real-time alerts if there are problems, such as signal loss or interference, and helps diagnose and troubleshoot these issues.
- **Data Logging:** Records performance data over time, which can be used for maintenance planning, performance analysis, and system optimization.

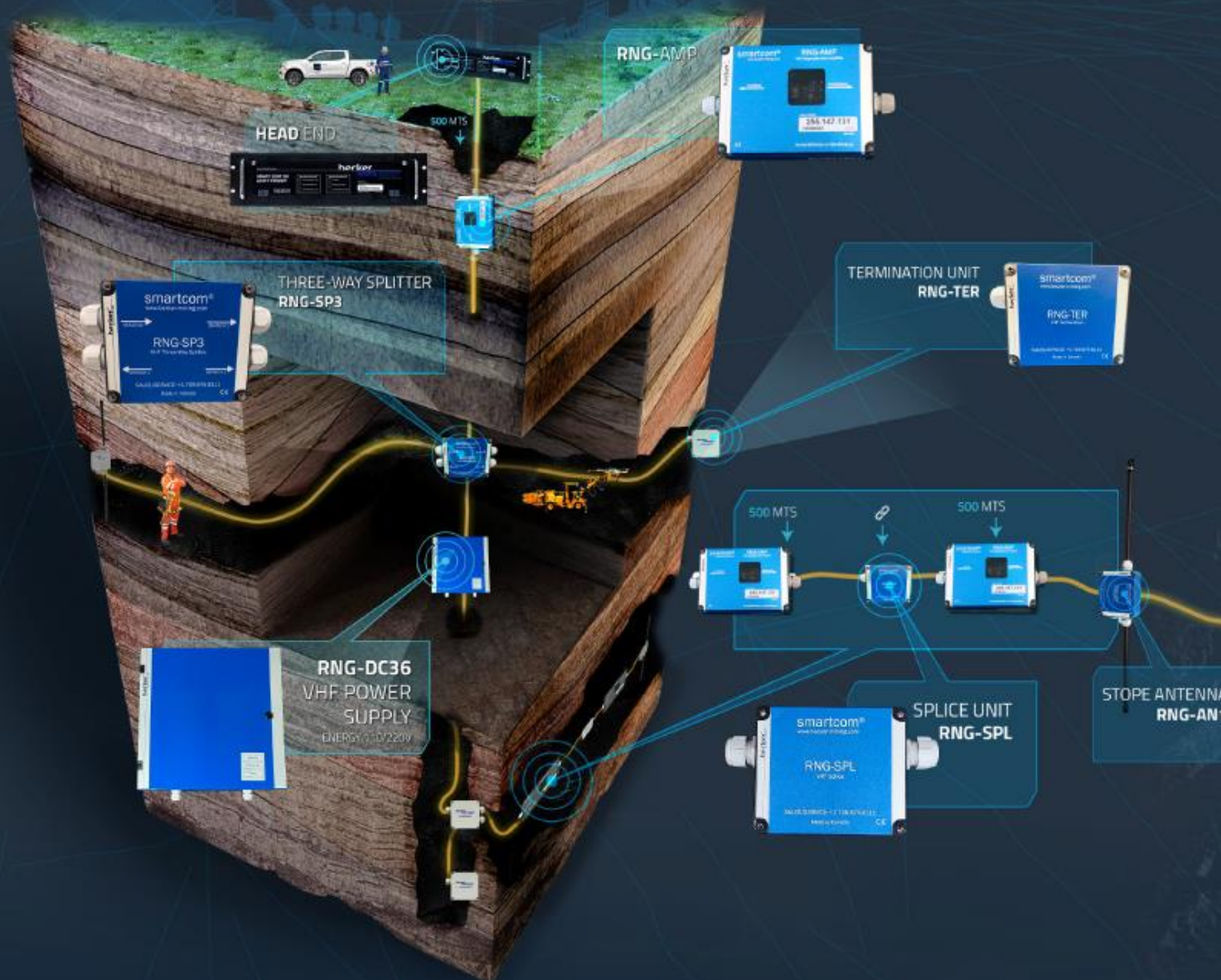


2 servers



Monitoring Center

smartflow® Leaky Feeder



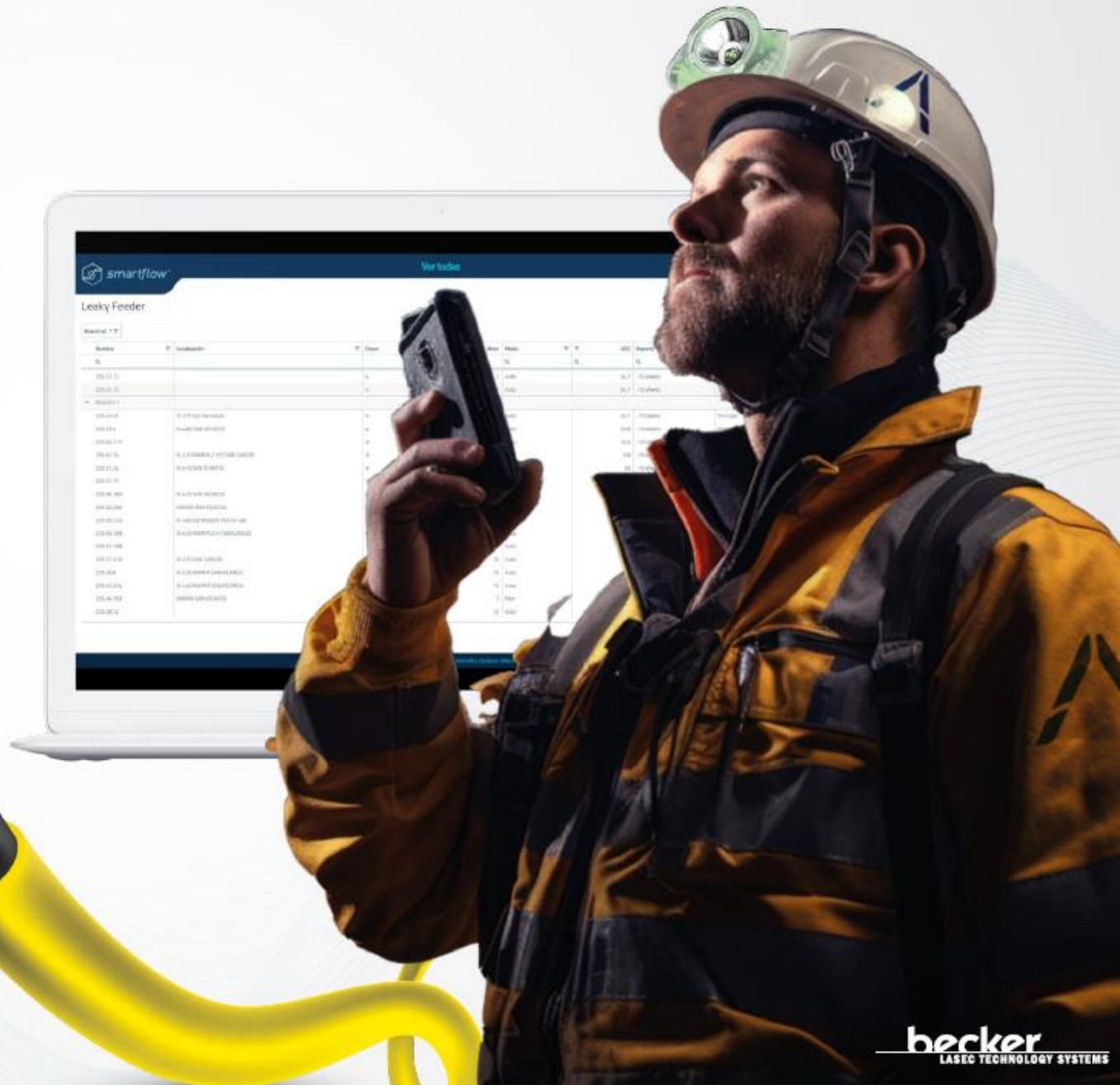
The Smartflow® Leaky Feeder monitoring module makes the maintenance of Varis brand Leaky Feeder Networks, more predictive and interactive, showing the network in a single-line diagram in a 3D Web interface, allowing the immediate location of faults, identifying the levels of attenuation, voltage for each amplifier showing the points of attention and correction, this tool is essential for the oportune maintenance of a Leaky Feeder network.



BENEFITS

Having a powerful tool for leakyfeeder monitoring networks like Smart flow provides your organization the following benefits:

- **Enhanced Safety:** Ensures continuous communication in critical environments, helping with emergency response and coordination.
- **Operational Efficiency:** Help in proactive maintenance and reduces downtime by identifying problems early.
- **Regulatory Compliance:** Assists in meeting safety and communication standards required by regulations.
- **Improved Performance:** Provides insights that can lead to better system performance and reliability.



Leaky Feeder System Reporting

Leaky Feeder

Amplifier 649
 Splitter SP2 289
 Splitter SP3 19
 Antenna 7
 Power source 16v 23
 Power source 36v 0
 Splice 2
 DPC 61
 Batteries 0
 Termination box 38
 Manual splice 5
 Ris-Bar 0

Total wiring 1mts.

Group

Name	Description	Down	Attenuator	Mode	VDC	Report
255.102.215	38 Teal 380-530	4	11	Auto	12.5	6 min 14 s
255.108.114	420 Offices 440-590	3	9	Auto	11.5	7 min 16 s
255.102.102	38 Sap 290-540	9	15	Auto	10.6	5 min 59 s
255.105.106	32 Emerald 310-500	4	9	Auto	11.2	3 min 5 s
255.105.63	45 Emerald 280-520	4	12	Auto	33.4	2 min 6 s
255.102.163	32 Emerald 320-500	4	7	Auto	11.5	2 min 29 s
255.104.94	38 Emerald 290-500	4	2	Auto	9.7	5 min 53 s
255.108.120	420 Offices 440-590	4	4	Auto	11.5	1 h 3 min 56 s
255.104.193	45 Emerald 330-510	5	11	Auto	35	34 min 22 s
255.106.231	50 White 370-500	4	10	Auto	30.8	30 min 58 s
255.107.31	45 Teal 350-530	3	13	Auto	9.8	11 min 36 s
255.105.117	41 Emerald 290-520	2	14	Auto	10.6	7 min 49 s
255.104.190	48 Emerald 320-520	2	9	Auto	34.1	7 min 12 s
255.102.188	45 Emerald 310-510	4	8	Auto	34.7	14 min 37 s
255.102.189	41 Emerald 310-520	4	8	Auto	11	15 min 25 s
255.104.91	32 Emerald 280-520	3	13	Auto	11.8	5 min 24 s
255.102.161	48 Teal 340-530	-2	9	Auto	31.3	97 h 18 min 31 s
255.106.229	48 Mint Ent 410-580	5	13	Auto	11.5	9 min 10 s
255.103.149	48 Yellow 410-540	3	8	Auto	8.6	1 min 46 s
255.103.176	50 Emerald 340-520	4	4	Auto	31	12 h 2 min 19 s



Leaky Feeder - Devices quantity

Devices	Total
Power source 16v	23
Amplifiers	1042
Assigned amplifiers	649
Not assigned amplifiers	393
Splitter SP2	572
Splitter SP3	19
Antenna	7
Splice	2
DPC	61
Termination box	38
Manual splice	5
Wire damage	8
Tower	0
Cabinet	0
LTE Card	0
Total wiring	105418mts.

Branch:
 Level:
 Description:
 ID:

1
 2
 3
 4

Name	Amplifier	History	Description	Down	Attenuator
255.102.215	🚫	📄	38 Teal 380-530	4	11
255.108.114	🚫	📄	420 Offices 440-590	3	9
255.102.102	🚫	📄	38 Sap 290-540	9	15
255.105.106	🚫	📄	32 Emerald 310-500	4	9

10 | 20 | 50 | 100

Page 1 of 3 (0 Amplifiers) | 1 | 2 | 3

Drag and drop elements in the map

255.154.164
100m

POWER SOURCE

Shapes



Head End



Amplifier



Splitter SP2



Splitter SP3



Antenna



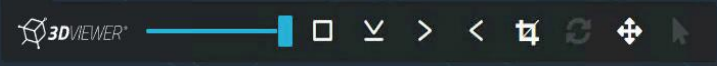
Power source 16v



Power source 36v



Splice



Mexico:

- Capstone Copper: Cozamin
- Coeur Mining: Palmarejo Independencia
- Fresnillo PLC: Fresnillo Mine Juanicipio Mine
- Grupo México: Charcas Mine San Martin Mine Santa Barbara Mine
- Newmont Gold: Peñasquito Mine
- Pan American Silver: La Colorada
- Grupo Peñoles: Velardeña Sabinas Mine Tizapa Mine Capela Mine
- First Majestic: Primero Mining



We are currently implementing projects in:

- Canada
- Peru
- Argentina
- France

Australia:

- Fitzroy: Ironbark
- Peabody: Wambo
- BHP: Olympic Dam



50  smartflow[®] modules have been implemented in mines around the world and we continue integrating more units.



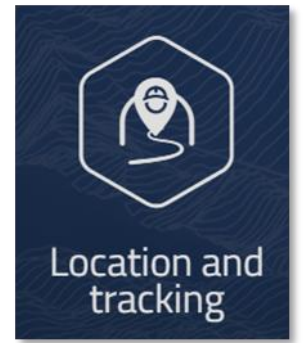
Thank you for your time.
Presenters: Team Becker Mining South Africa.

Becker Mining South Africa Missing Person Locator Systems

know-how | performance | reliability

Missing Person Locator Systems

Powered by Smartflow



Overview

SmartFlow is a comprehensive digital mine management solution designed to enhance safety, operational efficiency, and sustainability within mining operations. Integrating cutting-edge technologies, it provides real-time monitoring, predictive analytics, and decision automation, ensuring streamlined workflows, improved resource management, and heightened safety protocols.

SmartFlow integrates various modules - such as personnel and asset tracking, telemetry, energy management, and communications - into one unified platform, offering full visibility and control over surface and underground operations.



Missing Person Locator Systems

Surface and Underground Tracking Location Modules

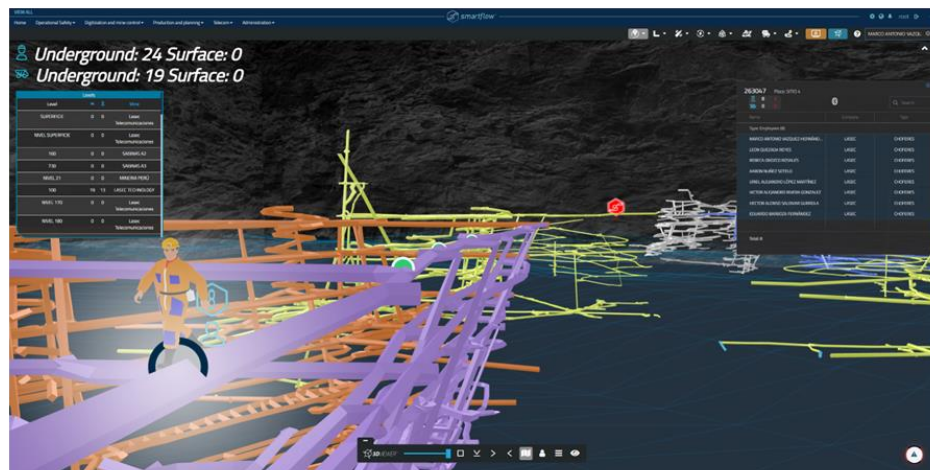
These modules provide real-time tracking and location services for personnel and mobile equipment underground. They support full evacuation management and detect man-down incidents.

Historical traceability records are maintained, allowing easy access to **logged data** and **locator devices** for retrieval and custom report generation.

The system integrates with a variety of technologies such as **VHF** , **UHF** , **Wi-Fi** , **LTE** and various other wireless technologies to ensure efficient evacuation signaling. It also includes access control with HR integration. Beacon and marker-triggered points enhance safety and operational oversight.

The Smartflow surface module adds GPS functionality to tracking with on-map positioning using Google Maps and other web service applications that provide maps, satellite, and aerial views with the ability to overlay mine site-specific imagery with geo-referenced data.

Missing Person Location Systems combined with Smartflow are the essential tool assisting with a mine's **emergency preparedness and response strategy**.



Missing Person Locator Systems

Surface and Underground Tracking Location Modules

Features

3D Viewer: The module provides a 3D viewer interface that displays real-time tracking and location data. The intuitive and visually appealing interface allows users to interact with the system effortlessly and obtain actionable information.

Intuitive and User-Friendly Software: SmartFlow's Surface Tracking and Location module is designed to be intuitive, friendly, and easy to use. The software's interface and navigation make it accessible for operators with varying levels of technical expertise.

Graphics Motion: The module utilizes graphics motion to visualize the movements and positions of personnel and equipment on the surface. This graphical representation enhances situational awareness and provides a clear understanding of the operational landscape.



Missing Person Locator Systems

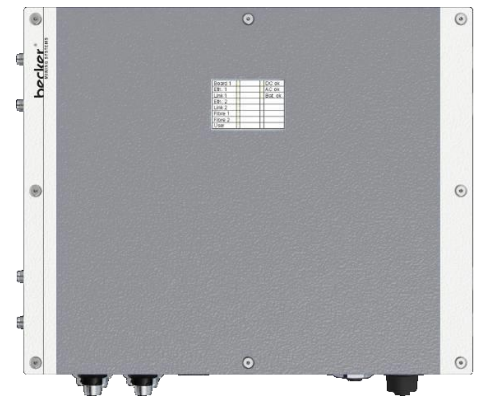
Surface and Underground Missing Person Locator Technologies.

Backbone Technology Options

Leaky Feeder: Leaky Feeder offers a range of solutions for Missing Person Locator systems, utilizing its capabilities in various technologies. These include its application in LTE Over Leaky Feeder Solutions, the integration of Bluetooth Amplifiers for tracking Bluetooth beacons, and its RF Tagging and Tracking functionalities.

Wi-Fi: Wi-Fi additionally offers a range of solutions for Missing Person Locator systems, utilizing its capabilities in various technologies. These include its application with the integration of Wi-Fi Tracking with Wi-Fi tracking devices.

GPS: The module utilizes graphics motion to visualize the movements and positions of personnel and equipment on the surface. This graphical representation enhances situational awareness and provides a clear understanding of the operational landscape and location of all personnel.



Missing Person Locator Systems

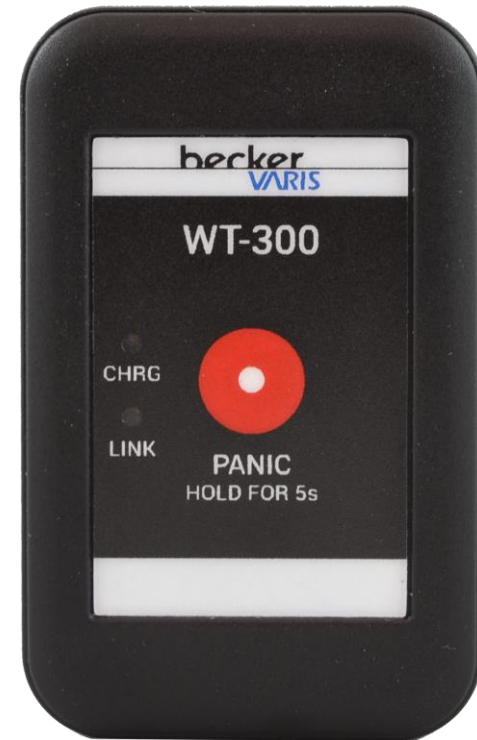
Smart Tag

Wi-Fi Personnel Tag

The WT-301 Personnel Tag is a battery-powered tracking device, with a panic button and LED, which is charged wirelessly. It has a 3-Axis accelerometer providing motion detection for freefall and man down scenarios. It is also equipped with a vibration motor and alarm.

smartcom – Wi-Fi Tag

- Battery Powered (chargeable) with wireless charging
- Panic Button and Panic LED
- 3 Axis Accelerometer sensor for motion detection, free fall and inactivity (man down feature)
- Omni Directional Internal Antenna
- Buzzer, Vibration Motor and RED LED for Alarms
- 802.11 b/g/n



Missing Person Locator Systems

Wi-Fi Vehicle Tag

Wi-Fi Vehicle Tag

Using our 3D Based smartflow software platform, the WT-301 and WT-403 allow for real-time personnel and asset tracking, as well as Panic Broadcast for mine evacuation.

The WT-403 Vehicle Tag is a vehicle-powered tracking device with a panic feature and LED.

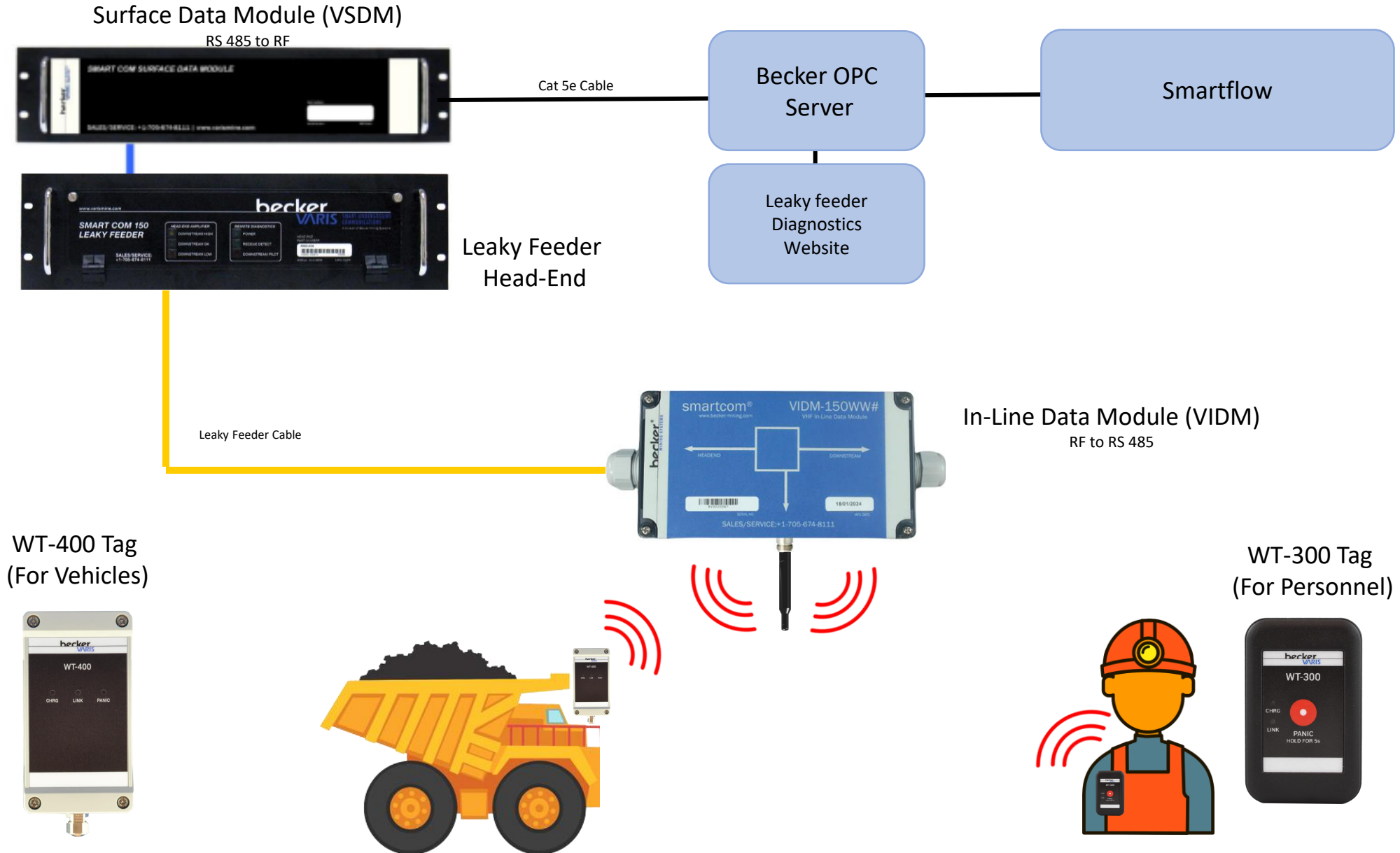
smartcom – Wi-Fi Vehicle Tag

- Battery Charging and battery full LED indication
- Inactivity Detection and Impact (collision) Alert
- Connected to network LED indication
- Temperature Alarms
- Battery Alarm at <20%
- Customizable SSID, network and AP Settings
- Omni Directional Internal Antenna
- 7 Days Battery Life



smartcom

Tagging & Tracking Over Leaky Feeder



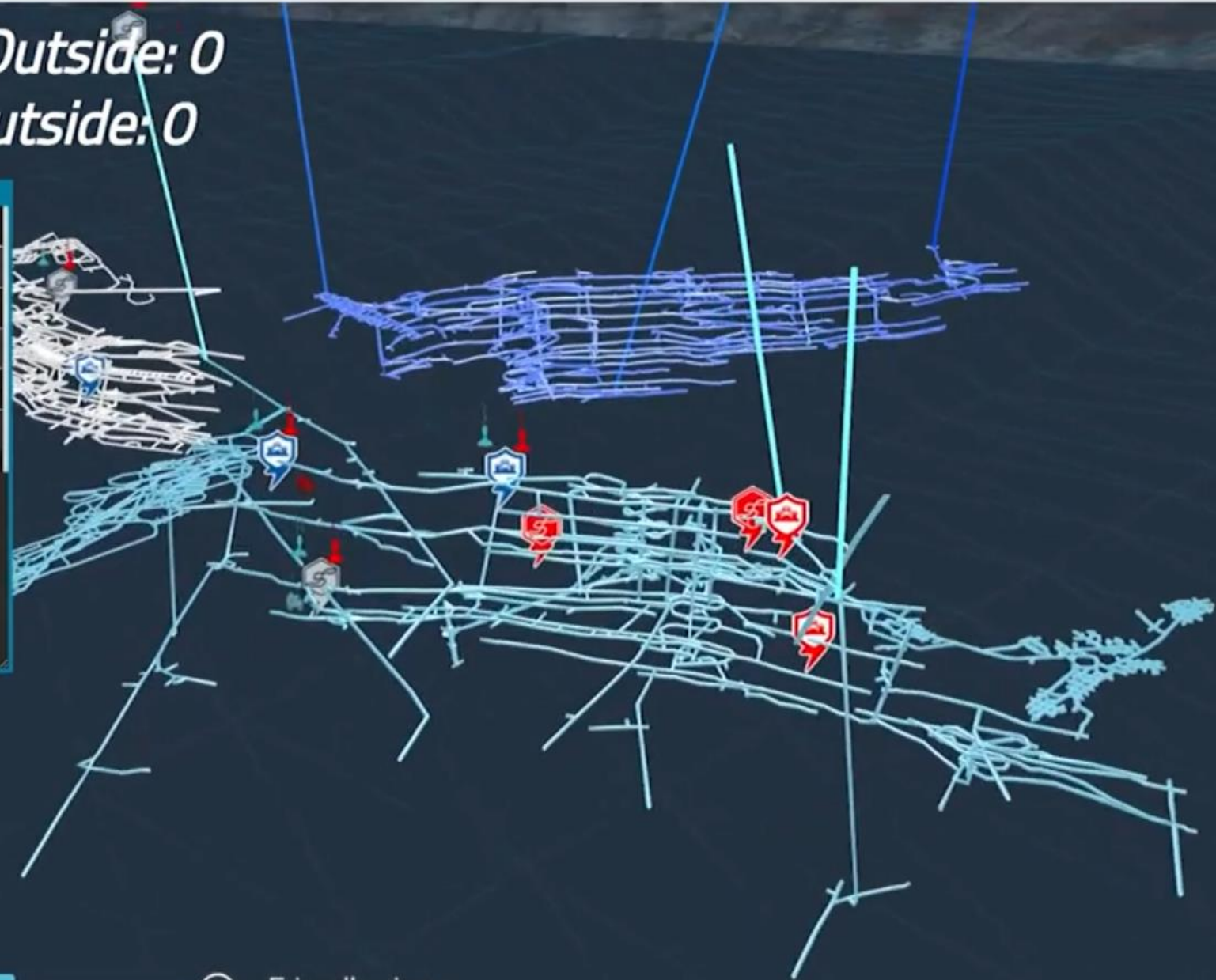


Inside: 52 Outside: 0



Inside: 2 Outside: 0

Levels			
Level			Mine
NIVEL 300	1	42	MINA CALERA
NIVEL 320	0	0	MINA ZACATECAS
NIVEL PRUEBA A	0	0	MINA PRUEBA A
Segundo Nivel	1	10	MINA ZACATECAS
Primer Nivel	0	0	MINA ZACATECAS



Mexico:

- Capstone Copper: Cozamin
- Coeur Mining: Palmarejo Independencia
- Fresnillo PLC: Fresnillo Mine Juanicipio Mine
- Grupo México: Charcas Mine San Martin Mine Santa Barbara Mine
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- Pan American Silver: La Colorada
- Grupo Peñoles: Velardeña Sabinas Mine Tizapa Mine Capela Mine
- First Majestic: Primero Mining



We are currently implementing projects in:

- Canada
- Peru
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Australia:

- Fitzroy: Ironbark
- Peabody: Wambo
- BHP: Olympic Dam



LEAKY FEEDER

4



DISPATCH CENTER

12



INSIDE MINE LOCATION

13



COLLISION AWARENESS

5



GAS MONITORING

3



ENERGY

3



TELEMETRY

4



PRODUCTION

4

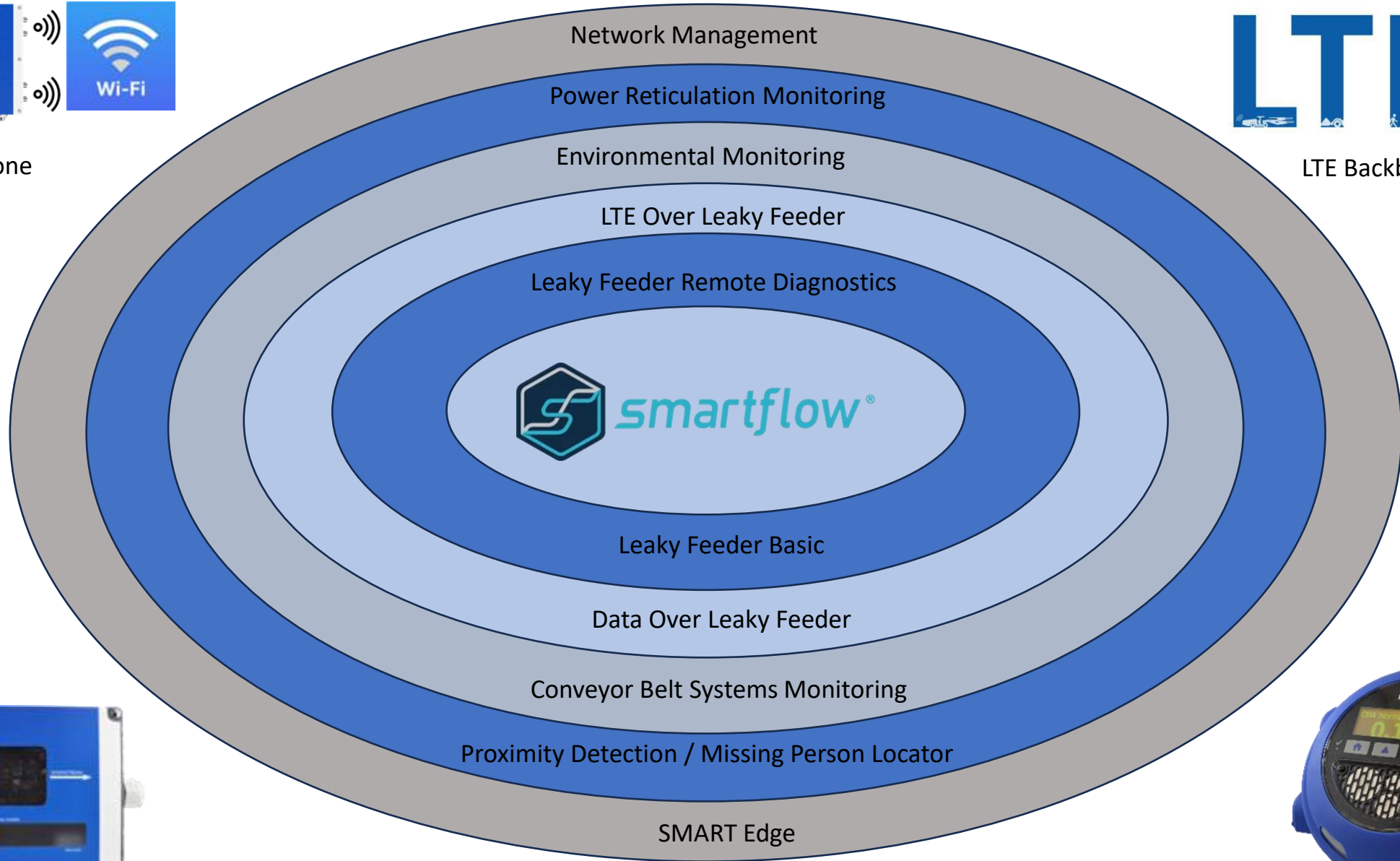
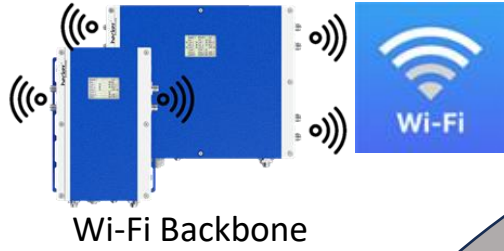


VENTILATION

2

50  smartflow[®] modules have been implemented in mines around the world and we continue integrating more units.

Smartflow System Integration





Thank you for your time.

Presenters: Team Becker Mining South Africa.

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+27 11 617 6300

Becker Mining South Africa - Non-Flameproof Enclosures

Presenters:

know-how | performance | reliability

Non-Flameproof Enclosures

Non-flameproof enclosures are not designed to be used in hazardous or explosive atmospheres (e.g., those containing flammable gases, vapors, or dust) unless they are part of a system designed to ensure safety by other means.

Non-Flameproof Enclosures are manufactured from epoxy powder coated steel of 1.6mm to 5mm thick. These products can also be custom designed to meet customer requirements for 380V, 525V, 690V, 1100V .

The following panels are manufactured to the customer specifications and according to the highest quality:

Distribution panels

PLC panels

Motor Control Centers

Variable speed drive panels up to 1100V

Winch panels

Soft starter panels up to 1100V

Direct online starter panels

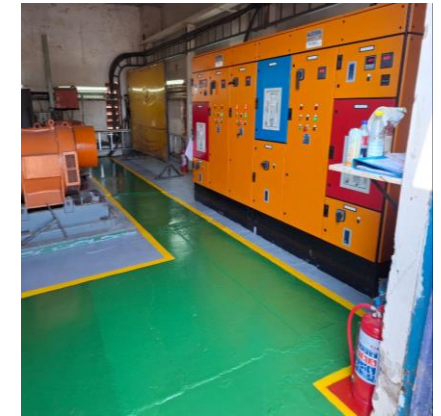
Pump panels

Pump monitoring panels

Gulley boxes

Belt drive panels

Flitting panels



Non-Flameproof Enclosures

Flitting panels are designed to provide a mobile power source for any mining equipment under ground where needed. For example, to tram machines, mobile pumps for water removals and various mining equipment.

Size of Flitting Panels:

- 90kW 1000V Flitting with M20 relay and vacuum contactors
- 90kW 1000V Flitting with M20K relay and vacuum contactors
- 90kW 1000V Flitting with M550 relay and vacuum contactors
- 90kW 1000V Flitting with Probeck relay and vacuum contactors
- 90kW-147kW 1000V Flitting with LA250 overload
- 147W 1000V Flitting with NK200 overload



Non-Flameproof Enclosures

A gully box, also known as a cable junction box, is a protective enclosure used in mining and industrial settings to manage and isolate multiple electrical connections, particularly in exposed or underground locations. These boxes are crucial for ensuring safety and efficiency in electrical distribution systems.

Key Features and Applications:

- Gully boxes can be flameproof for hazardous environments or non-flameproof, depending on the application.
- They are available in various voltage ratings, such as 525V and 1000VAC, to accommodate different electrical systems.
- They can house incomer units e.g., 250A or 300A and starter units for motors, offering control and protection features.
- Modular plug-in systems allow for easy customization and expansion of the electrical network.
- Gully boxes must comply with relevant health, safety, and environmental regulations.
- Proper accessibility to gully boxes is crucial for maintenance and operation.
- Specific locations may be unsuitable for gully box installations, as per regulations.



Non-Flameproof Enclosures

We provide a unique gully rig system for mining and industrial applications:

Modular Plug-in System Boxes, commonly known in the mining industry as Gully Boxes. The system is unique in flexibility with ease of installation, does not require isolation for adding or removing of units. Starters of up to 110kW can be installed with various options of control. Incomer 250 Amp / 300 Amp. Left- or Right-hand progression.

Feeders to: Please note we will require the Volts and Amps

- Fan Starters
- Drill Rigs
- Lightning + Small Power Systems
- Pump Starters Green
- Ventilation Fans
- Welding Plugs
- Winch starters

NB!! Make sure about the cable termination are required

- Gland
- Blanking plates
- Straight to terminals



Non-Flameproof Enclosures

An MCC panel, or Motor Control Center panel, is an electrical enclosure that houses motor control units, circuit breakers, and other components used to manage and protect electric motors in industrial settings. Essentially, it's the central "brain" that controls and monitors the operation of multiple motors, ensuring efficient and safe performance.

Key Functions:

Motor Control:

MCC panels contain motor starters, contactors, overload relays, and other devices to start, stop, and protect motors.

Power Distribution:

They also include busbars for distributing power to the various motor control units within the panel

Protection:

MCC panels incorporate safety features like circuit breakers and overload relays to prevent damage from electrical faults such as short circuits and overloads.

Control and Monitoring:

They often include components like PLCs, HMIs, and metering equipment for remote and on-site control and monitoring.

Applications:

They are commonly found in large industrial and commercial buildings with numerous motors, such as manufacturing plants, power stations, and water treatment facilities





Thank you for your time.
Presenters: Team Becker Mining South Africa.

Becker Mining South Africa - Probeck Motor Protection Relay

Presenters:

know-how | performance | reliability

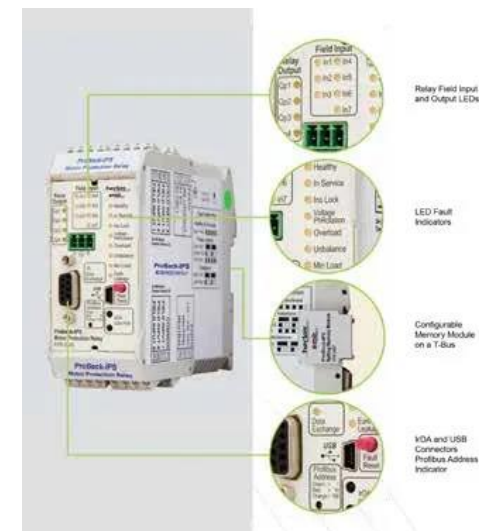
Probeck Relay

The ProBeck-IPS Relay is a three-phase motor protection relay. It is a micro-controller-based precision instrument with protection, advanced control features and starter logic. The relay is designed to cater for the low voltage motor protection market. The current transformers, including the core balance current transformers are external.



Protection Features:

- Thermal Overload
- Locked Rotor
- Running Stall – Jam
- Vectorial Stall - Start Stall
- Unbalanced Current
- Single Phasing
- Minimum Load – Underload - Dry Run
- Earth Fault
- Short-circuit
- Starts per Hour Limitation
- Overvoltage – Undervoltage
- Phase Rotation
- Over Frequency – Under Frequency
- Insulation Lock-out



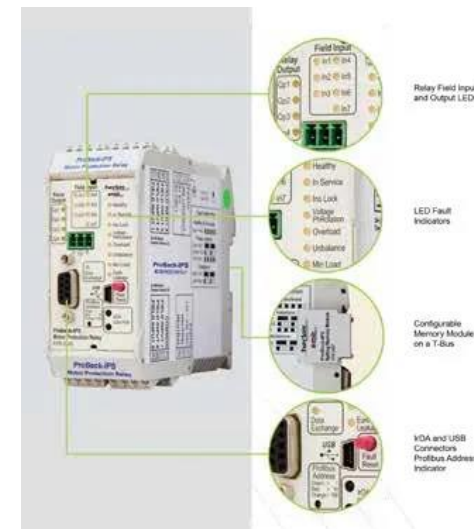
Probeck Relay

Configurable Automation Features

- Timers
- Real Time Clock (24 Hour)
- Starter Controller Logic
- Logic Function Blocks
- 7 Field Inputs
- Motor Parameter Calculator
- 4 Programmable Outputs
- 3 Phase Recorder
- On-board Simulator for Training/ Commissioning
- Multiple Communication Protocols

Management Features:

- Power Factor Measurement
- Power Consumption Measurement
- Statistical Data
- 1400 Event Records with time and date stamp
- 35 Last Fault Records with time and date stamp
- SMS Notification
- Motor Protection Integrated.
- SCADA Visualization Capable.
- Over current (overload) detection.
- Unbalanced phase current detection.
- Underload (minimum load) detection.
- Single phase (phase loss) detection.
- Motor Recognition.
- Run stall detection.
- Frozen contact / vacuum loss < 1M Ohm across open contactor or any phase.
- Integrated Pilot Wire.
- Performs self-test on start-up.

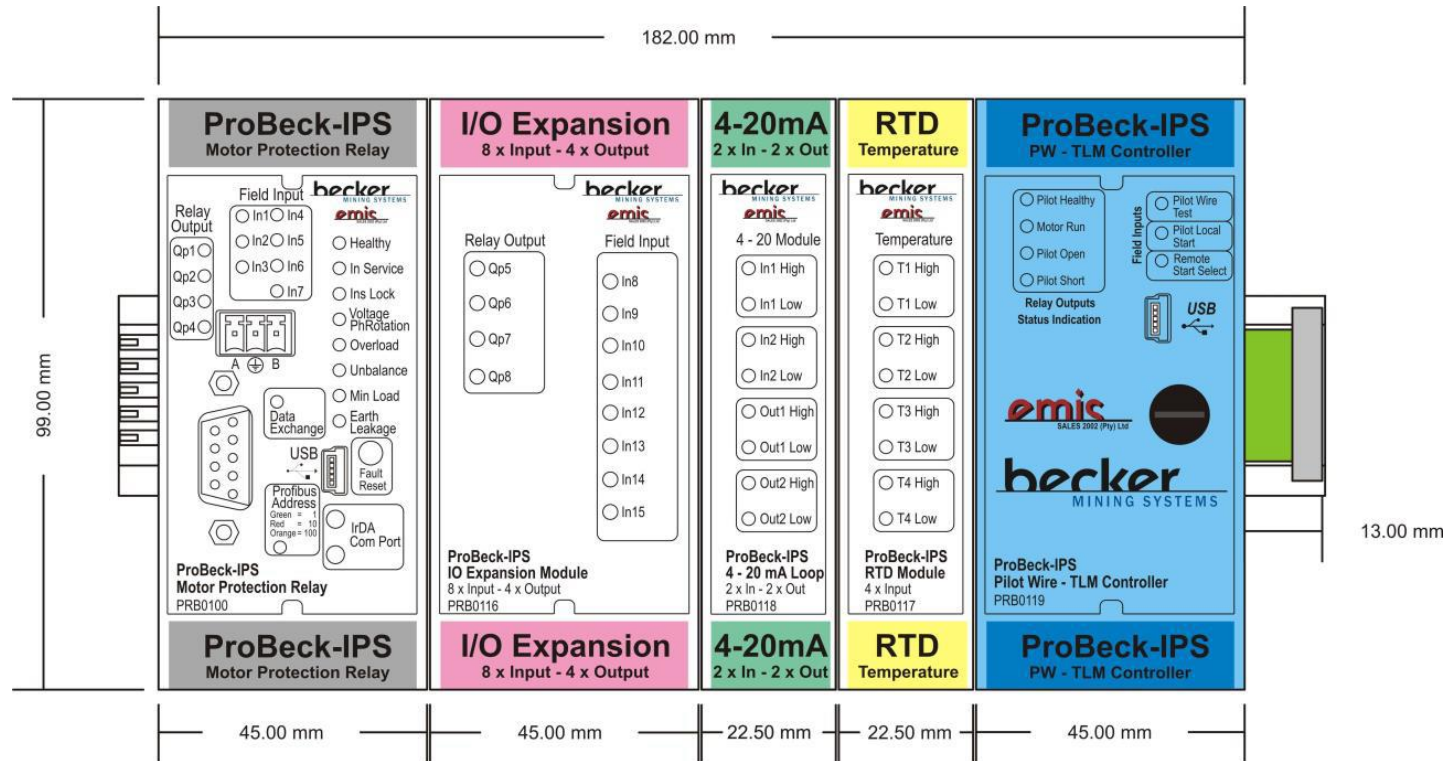
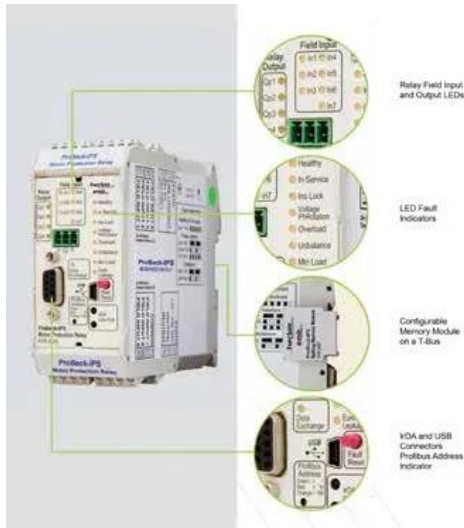


Probeck Relay



Expansion Modules:

- I/O Expansion – 8x Inputs and 4x Outputs
- 4-20mA – 2x Inputs and 2x Outputs
- RTD Temperature
- PW- TLM Controller





Thank you for your time.
Presenters: Team Becker Mining South Africa.

Becker Mining South Africa – Projects and Services

Presenters:

know-how | performance | reliability

Electrical Project Services

The project service division has dedicated installation teams on various sites with an accident-free record for the past 5 years. Our qualified personnel are dedicated, reliable and on time.

- Supply and installation of conveyor protection pullkey systems
- Installation and commissioning of PLC and instrumentation equipment for conveyors and plant
- Trench work for instrumentation and power cables to customer standards
- Lightning protection and earthing of pullkey systems and substations
- Supply and install fibre cable networks, cameras, network switches
- SCADA systems and control room equipment , UPS backup inverters etc.
- Installation of electrical panels and medium voltage transformers
- After sales maintenance contracts



Electrical Project Services

Project services experience for the past 5 years

- Installation of 1500 pullkeys, conveyor instrumentation on approximately 60 overland conveyors
- Installation of MCC and PLC panels on various sites
- More than 30 kilometers of cable trench work on various sites
- Complete lighting projects on conveyors, substations and plants
- Supply and installation of approximately 50 plant cameras and networks
- Underground coal mining project including conveyor starter panels, plc networks to SCADA control room
- Substation construction including 11kV to 400V Transformer
- Over 70km of cable installations

Mechanical and Civil Construction Site Work

- Mechanical and civil work on substation
- Trenching as per customer requirements
- Supply and install safety handrails for conveyors and plant
- Install lighting poles for flood lights
- Camera mast installation
- Conveyor structure and substation earthing
- Installation of safety signs and boards
- Supply of all pump systems as well as installation and maintenance





Thank you for your time.
Presenters: Team Becker Mining South Africa.

Becker Mining South Africa – Smartsense

Presenters:

know-how | performance | reliability

Introduction to SmartSense

Becker Mining Systems' **SmartSense®** is an **advanced atmospheric and environmental monitoring solution** designed primarily for the mining industry. It helps ensure workplace safety by **detecting dangerous gas levels and environmental conditions** in real time, protecting personnel and operations.

SmartSense integrates multiple sensors into a modular system, allowing flexible installation — from single-point monitoring to **mine-wide environmental networks** controlled centrally.

Purpose and Importance

- **Safety First:** Protects workers by identifying hazardous atmospheric conditions.
- **Operational Continuity:** Prevents productivity losses due to unsafe environments.
- **Regulatory Compliance:** Meets strict safety and environmental monitoring standards.

Core Components of SmartSense Gas Monitoring Units

- **Fixed Monitor (SSFM-100):** Multi-gas unit capable of monitoring up to *four gases* in one compact monitor.
- **Single Gas Monitor (SSSG-100):** Hot-swappable modular gas sensors for customized monitoring.
- **Communication Units:** MCU-100 communication hub connects sensors to networks via Modbus, Wi-Fi, LTE, etc.
- **Airflow Sensor:** SSFM-100-AIRFLOW for continuous airflow measurement using a vortex sensing method.
- **Particulate Monitoring:** Optional particulate matter sensors for dust and particulate analysis.

This makes SmartSense a valuable tool for **modern, safety-oriented mining operation**



Environmental Factors Monitored

SmartSense is capable of monitoring a wide range of **environmental and atmospheric parameters**, including:

- **Gases:** The system detects both toxic and combustible gases commonly found in mining environments:
- **Oxygen (O₂)** – Measures oxygen concentration to ensure safe breathable air.
- **Carbon Monoxide (CO)** – Toxic gas from machinery and combustion.
- **Methane (CH₄)** – Flammable gas, especially in coal mining.
- **Carbon Dioxide (CO₂)** – Asphyxiant gas at high concentrations.
- **Hydrogen Sulfide (H₂S)** – Highly toxic and corrosive gas.
- **Nitrogen Dioxide (NO₂)** – Harmful exhaust gas from heavy equipment.
- **Additional gases (optional modules):** such as Sulphur Dioxide (SO₂), Ammonia (NH₃), Propane (C₃H₈), etc., depending on sensor modules chosen.

Environmental Parameters In addition to gases, SmartSense monitors:

- **Ambient Temperature** – Detects thermal conditions.
- **Humidity** – Measures moisture for safe working conditions.
- **Barometric Pressure** – Helps adjust gas sensor readings for accuracy.
- **Airflow / Air Velocity** – Ensures sufficient ventilation in real time.



Alarm and Safety Features

SmartSense units include advanced safety alerts:

Programmable Alarms:

- Three distinct alarm setpoints
- Short-Term Exposure Limit (STEL) and Time-Weighted Average (TWA) tracking display
- Local audible/visual alerts + remote system notifications

Data Logging & Diagnostics:

- Stores calibration history
- Alarm history for post-event analysis
- Self-diagnostics for system health

Integration and Connectivity

SmartSense integrates seamlessly with:

- Mine communication networks (Modbus RTU, OPC, RS-485)
- Mine management and visualization platforms (e.g., Smartflow)
- This enhances real-time decision-making and central oversight.

Summary

Becker Mining's SmartSense is a **comprehensive and flexible environmental monitoring solution** that:

- Monitors critical gases and environmental factors
- Enhances worker safety and operational efficiency
- Provides robust alarms and data logging
- Integrates into broader mine systems





Thank you for your time.
Presenters: Team Becker Mining South Africa.