Communication systems for mining
A powerful transformation
The Funke + Huster Fernsig (FHF) brand is evolving. Our products, part of Eaton’s Crouse-Hinds’ portfolio, are now united with Eaton’s leading range of reliable, efficient and safe electrical power management solutions. Combined, we provide the world’s largest portfolio of electrical equipment for explosive, classified and industrial areas. With unsurpassed product reliability and quality, industry-leading innovation and product efficiency, and products designed and certified for global specifications, Eaton’s Crouse-Hinds’ solutions, including FHF products, set the standard for safety in high consequence harsh and hazardous environments.

Discover today’s Eaton
With more than 100 years of experience in electrical power management, we have the expertise to see beyond today. From groundbreaking products to turnkey design and engineering services, critical industries around the globe count on Eaton.

Eaton’s electrical business offers end-to-end solutions to better
- Meet the demands of new construction projects
- Modernize aging infrastructure
- Manage energy consumption
- Protect people, equipment and data

We work closely with our customers to understand and solve the challenges they face today and those that come tomorrow. Our proven technologies increase productivity, reduce energy consumption and help us all build a more sustainable world.

At Eaton, that’s how we’re powering business worldwide.

Rely on the names you trust for the safety you need
FHF has a new look as Crouse-Hinds by Eaton, but the products and technologies you trust remain unchanged. With over a century of experience in harsh and hazardous areas, you can rely on Eaton’s Crouse-Hinds Business for communication and signaling solutions designed for large scale mining projects.

Energizing a world that demands more.

Mining solutions

SHAFT & VERTICAL
- Shaft signaling, communication and control system for cage and skip winder
- Mine radio systems for vertical and inclined shafts
- Mechanical shaft knocker system
- Retractable guide rail systems
- Decking process system for cages
- Loading and unloading systems for skips
- Mine car circulation system with rotary tippler
- Rope force measurement system for skip and cage
- Signaling system for shaft sinking process
- Remote control radio system for grab cranes
- Cascade dewatering system for the shaft sinking phase
- Signaling system for emergency hoisting winch / platform hoisting winch

AUTOMATION & REMOTE CONTROL
- Automation systems for main pump systems
- Automation systems for main cooling systems
- Automation systems for high pressure pump systems
- Automation and intercom systems with stop and interlocking for belt conveyors
- Intercom systems with stop and interlocking for chain conveyors
- Remote control systems for shield support transport
- Remote control systems for monorail transport systems

MONITORING & CALIBRATION
- Gas monitoring systems
- Power shut down systems when CH4 > 1.5%
- Remote calibration systems for sensors
- Automation system for air gates

RESCUE
- Powerless telephone system for rescue teams

HAULAGE
- Monitoring systems for rail haulage
- Automation system for rail switch
- Mine radio system for rail haulage

DATA COMMUNICATION
- Data communication systems via copper cable
- Data communication systems via fiber optics
- Data communication systems via Profibus DP
- Data communication systems via Ethernet

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Intrinsically safe shaft signaling system

Features

- Independent telephone system, power supply of the accumulators for telephones from surface
- Emergency signal and interlock system with safety coupler as separate safety circuit
- Loudspeaker system for voice and signaling transmission
- Intrinsically safe data communication system
- Profibus DP 93.75 kBD via copper cable
- Data communication system with Profibus DP 12 MBaud via fibre optic cable
- Sensors and actors for loading and dumping process in underground and surface
- Shaft cable with intrinsically safe circuits for signals, communication and process data transmission between surface and underground
- In the event of main power failure, loudspeaker and telephone systems stay operational
Intrinsically safe shaft signaling system

- Power supply -127 B
- Single stroke signal
- Emergency signal
- Desk
- Interfaces to the winder automation system
- Automation box head rope inspection
- Telephone
- Single stroke signal
- Emergency signal
- Magnetic switch
- 5 VDC / 12 VDC
- Automation box IST3
- Terminal box IKV3
- Remote control box for men riding
- Remote control box for material
- Telephone
- Single stroke signal
- Emergency signal
- Gate light
- Level 15 m
- Level 0 m
- Level 1000 m
- Level 1050 m

EATON’S CROUSE-HINDS  FHF Funke + Huster Fernsig - Mining Solutions
Integrated electrical equipment for shafts

Signaling system for skip winder

Features
- Integrated electrical equipment for shafts with intrinsically safe subsystems for signaling, mine radio, shaft knocker and charging/discharging
Features

- Frequency 27/35 MHz, 21 channels (5 operating channels), duplex voice and data transmission
- Transmission power 50 mW/channel, transmission with leaky feeder or antennas
- Modular design, serial transmission 2.4 kbd, FFSK, hamming distance D=4, UART frames
- Master/slave function, parallel and serial interface (Profibus DP)

- Signals from/to cages
- Single stroke, emergency, destination keys, start to move, lock switch, limit switch, door switch, slack rope switch
- Analogue signal for rope tension
- Depth indication in the cage
- Total voice communication in the shaft
Intrinsically safe micro computer Z51-ZM-22

QVIS – visualization system for HMI systems and PC panels
Graphical user interfaces for HMI and PC systems with integrated control panel software or drivers for external control systems.

Features
- 32 bit operating system
- Optimized network controller
- Universal communication platform
- Migration strategy from fieldbus to real-time Ethernet
- Single-processor solution with integrated communication controllers
- Open technology for application
- Real time kernel
- IEC 61131 programming system: Multiprog 5.0
Gas monitoring system

IS data communication system ZM51
Transmits data for methane, carbon monoxide, dust concentrations and air velocity

Features

- Modular system with digital/analogue modules
- Data bus via copper cable (twisted pair) or fiber optic ring
- Modems 1.2 kbd, 4.8 kbd, 19.2 kbd
- Distances up to 20, 14, 8.5 km (Cu - PE Isolation)
- Low power consumption of outstations
- Easy to configure outstations
- Line monitored digital inputs
- Cyclic check with analogue reference value
- UPS for the outstations
- Separate local fieldbus for power shut down function
- Redundant power shut down stations
- Output relay contacts for energy shut down function
- Remote calibration commands from surface
Intrinsically safe data communications via Profibus DP

**OPBM04 - Features**
- Optical Profibus RS 485 multiplexer
- 4x RS485; for example Profibus DP
- Redundant fibre optic lines transmission rate max. 4x 187.5 kbit/s
- Transmission half duplex, fiber single mode 9/125 μm
- Bidi version available, optical budget 17dB
- LWL connector E2000 or SC (Bidi)
- Transmission distance: > 15 km (0.4 dB/km)
- Wavelength 1300 nm or 1310/1500 nm (Bidi)
- Line length according to Profibus
- I M1 Ex ia I Ma

**Z51-ZM22 - Features**
- 32 bit operating system
- ZM51 I/O bus connector
- Power supply 5 VDC
- 1x serial RS232 interface
- CAN 2.0 interface (optional)
- Profibus DP interface (Slave)
- Profibus DP interface (Master)
- 2x Ethernet – TCP/IP interface
- Connector for TFT color display
- IEC 61131 programming system Multiprog 5.0

**Z51-AB22 - Features**
- TFT display, LED backlight
- Resolution: 640 x 480 (pixels)
- 5.7 inch LCD module
- 262 K colors
- Response time: 18 ms

**Z51-AB22 - Features**
- Power supply: 5 V
- Power consumption: 1.8 W
- Visualization system QViS
- Connector for Z51-ZM22
Intrinsically safe data communications via Ethernet TCP/IP

OSM01 - Features

- Managed Ethernet ring switch
- 6x 10/100TX (RJ45) + 2x 100FX (E2000)
- IEEE 802.3 10Base-T, 802.3u 100Base-Tx/1000Base-Fx
- RJ45 Auto MDI/MDI-X function
- Bidi optic (available)
- Store and forward switching architecture
- Power supply 5 VDC
- Web management GUI
- IGMP
- SNTP/SMTP
- VLAN / 802.1 QTag VLAN
- DHCP Client

Features

- SNMP, web management, RMON
- Optical budget: 17dB
- Optical connectors E2000
- Distance: > 15 km
- Wavelength: 1310 nm
- Alarm contact
- Single mode: 9/125 μm
- Temperature: -20°C to +55°C
- I M1 Ex ia op is I Ma

Via copper and fiber optic cable with managed Ethernet ring switch
Features

- Intrinsically safe optical transport system OTS01 for communication of production data to the surface dispatcher system
- Supply with 127 VAC / 12 VDC
- IS power supply dNG3
- Ex / non Ex - separation of the IS substation with media converter
- 10/100Base-TX to 100Base-FX
- Auto - negotiation 10/100MBit/s at the TP Port
- Auto MDI/MDI-X crossover at the TP Port
- Single mode 9/125 μm, Wavelength: 1310 nm, transmission path: 20 km, optical connection E2000, 8° angle polish connector
- Optical switch dOS01 up to 8 optical (Ethernet/ TCP/IP) communication connection
- Internal 8 port Ethernet switch with up to 6 copper ports and 2 fibre optic ports
- 8 port managed
- Power supply: 127 VAC
Intrinsically safe Ex ia/ib I M2 (M1) data communication system
Features

- Using corresponding telephone couplers, this fully intrinsically safe analogue telephone is equipped with comfort features, alarm and emergency call function, and is usable as a local battery phone in shaft applications.
- Analogue telephone with tone (DTMF) dial function, dial from phone book, redial function.
- Access/lock with pin, hands-free mode, open listening, break-key, terminal function.
- Flash key, two different output contacts (optocoupler) for actuation of additional optical or acoustical signaling devices for call signal or alarm signal.
- Output for external loudspeaker (call signal, alarm announcement), input for external.
- Output for intrinsically safe signal (blink) light iBL1.
Intrinsically safe alarm telephone system TA1

**Features**

- ATAR with operating system SuSE-Linux version 10.0
- Graphic-based user menu KDE version 3.4, LINUX Kernel 2.6.13
- TCP/IP connection of one client with two servers
- Each server manages up to 240 alarm telephones
- Transmission of alarm announcements using TCP/IP connection by audio streaming

- Intrinsically safe telephone circuits corresponding to category/explosion protection mode I M1 EEx ia I
- Transmission of alarm announcements to all, to groups or to single alarm telephones
- Transmission of pre-defined alarm announcements, recording of alarm events, of cyclic telephone battery check and measure of the subscriber line quality
- Emergency call detection processing and recording
Loudspeaker systems for haulage equipment

L111, L112 & L120
Features
- Voice communication, signaling and pre-start warning along conveyors on faces and roadways as well as the stopping and interlocking of the drive installations to prevent restarting
- Modular system design
- Robust technology
- Integrated stop switches with encoding unit for identification
- Connection of external misalignment switches or pull rope switches
- Tones for stop function, pre-start warning and line faults
- Power supply 12 VDC; supply range 8–12 VDC
- LF connection to surface
- Serial interfaces of the main unit
- Charge – LED
- Accumulator 8.4 V
- High volume 105 dB(A)
- Good intelligibility
- Push to talk button, signal button, central unit call button
- LF transmission level -6 dB
- Adjustable volume
- Adjustable microphone
- Loudspeaker testing capability
- Diagnosis
- Line monitoring
- Monitoring by < 8 VDC
- ATEX Ex I M1/M2 SYST EEx ia/ib I
- GOST POCC DE. ME 92.B02053
- GOST POCC DE. ME 92.B02013
Loudspeaker system L111
for voice communication & signaling

Features

- Modular system design
- Robust technology
- Four wire system line
- Polarity interchangeable
- Tones for stop, pre-start warning and cable failure
- Variable pre-start warning tones
- Power supply: 12 VDC
- Supply range: 8–12 VDC
- Line monitored by ≥8 VDC
- Charge-LED
- Accumulator: 8.4 V, 200 mAh
- High volume: 105 dB(A)
- Good intelligibility
- Push to talk button, signal button, central unit call button
- LF transmission level: -6 dB
- Adjustable volume
- Adjustable microphone
- Line monitoring
- Plug and play connectors
- LF connection to surface
Loudspeaker system L112 with emergency drive stop

Features

- Voice communication, signaling and pre-start warning along chain conveyors, on faces and belt conveyors, on roadways, as well as emergency shut down function of the drive
- Integrated stop switch in LV30S
- Integrated encoding circuit for identification
- Connection of up to 2 external misalignment switches or pull rope switches
- Power supply: 12 VDC
- Supply range: 8-12 VDC
- Line monitored by 8 V Charge-LED
- Accumulator: 8.4 V, 200 mAh
- Communication interfaces
- High volume 105 dB(A) good intelligibility
- Push to talk button, signal button, central unit call button
- LF transmission level: -6 dB
- Adjustable volume
- Adjustable microphone
- Line monitoring
- Plugable connectors
- LF connection to surface
Loudspeaker system L120 with stop and interlocking of the drives

Features

- Voice communication, signaling and pre-start warning along conveyors, on faces and roadways, as well as the stopping and interlocking of drive installations to prevent restarting
- Modular system design
- Robust technology
- 8 pole pluggable connectors
- Tones for stop function, pre-start warning and line faults
- Power supply: 12 VDC
  Supply range: 8-12 VDC
- Maximum number of components per system: 125
- LF connection to surface
- Serial interfaces Profibus/TCP/IP of the main unit
- Charge – LED
- Accumulator: 8.4 V, 1100 mAh
- High volume: 105 dB(A) and good intelligibility
- Push to talk button, signal button, central unit call button, info button
- LF transmission: level -6 dB
- Adjustable volume
- Adjustable microphone
- Switch monitoring diagnosis
- Line monitoring: monitored by ≥8 VDC