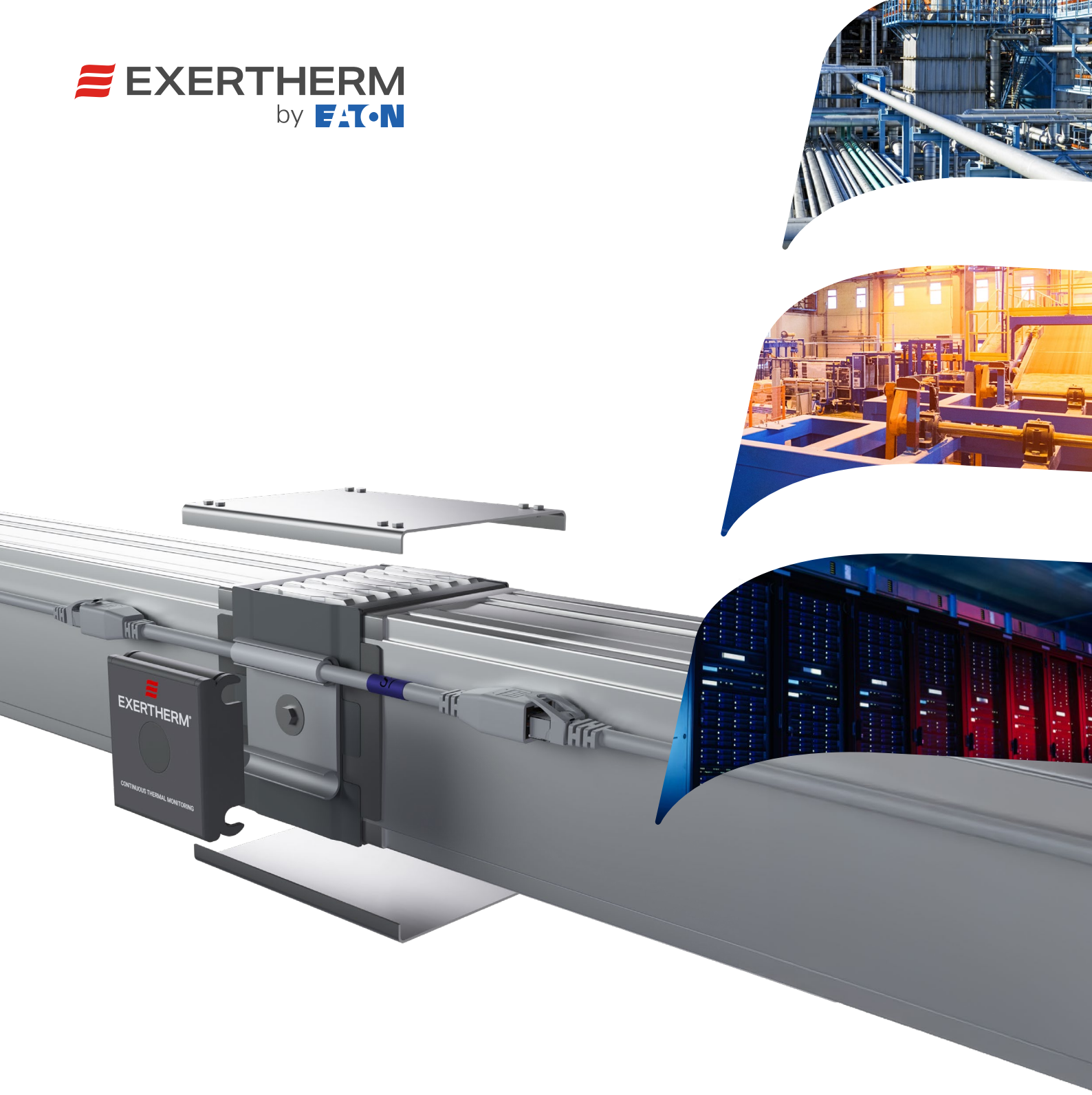
EXERTHERM by EATON



Build in Greater Resilience in Your Power Distribution Systems

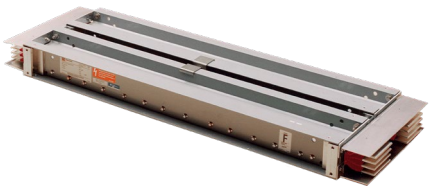
Prevent bus duct failures before they become catastrophic with 24x7 hotspot detection thermal sensors

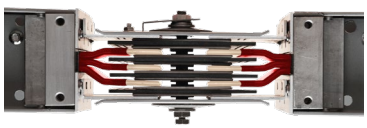
BR-130-3-EN

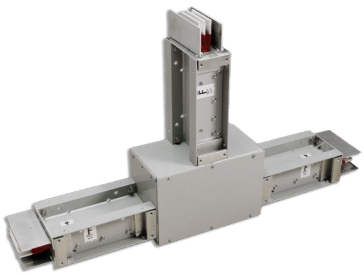
Bus duct power distribution
Improve operational efficiency

Rising urbanization and infrastructure development in industrial facilities, commercial complexes and modern residential building construction are major growth areas. Advanced electrical asset maintenance and monitoring solutions help reduce outages and unnecessary expenditure.

Following the trend of large-scale, wide-range energy supply, bus duct is the advanced alternative to routing power using cables. Quick to install and easy to upgrade, bus duct is a safe and reliable alternative for electrical power distribution.







Bus duct connections
Weak spots in power distribution

An essential metric for assessing the state of electrical connections in power distribution networks is temperature. A hotspot in an electrical connection or bus duct joint is a potential sign of failure.

These joints are typically the weak spots and vulnerable to several detrimental factors with effects that put stress on the joints, making them become loose and the connections corroded. Compromised joints will result in hotspots with the temperature rise in proportion to the severity of the fault.

Electrical connections and bus duct joint are subject to wear and tear over time leading to hotspots or loose connections as a result of environmental and power factors including overload phase imbalance, corrosions, ageing and poor electrical connections. These hotspots are symptoms of compromised electrical connections and bus duct joints that can lead to power outages.

When a bus duct joint fails, it's important to address the problem as soon as possible to prevent costly downtime, minimize damage and help schedule necessary preventative maintenance. This can be efficiently achieved by continuously monitoring the bus duct joints to detect any potential fault before it occurs.

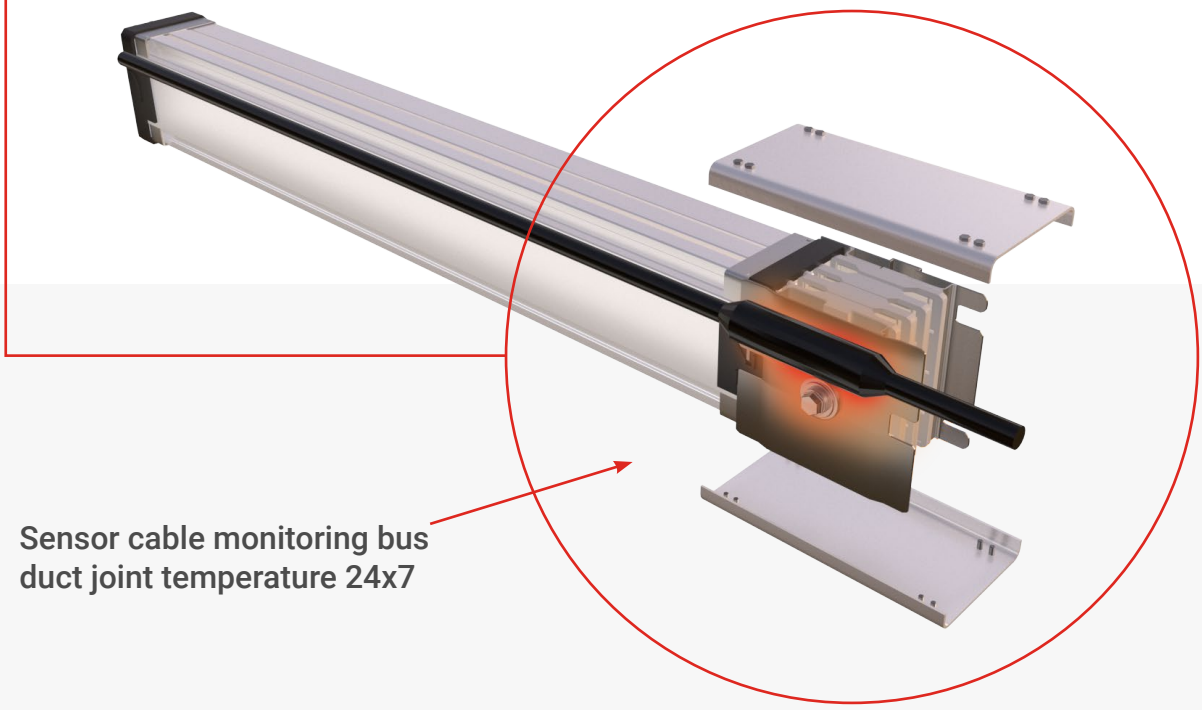
Further damage and the possibility of a fire or explosion can be caused by connections that deteriorate and fail because of their increased resistance and rising temperature.

Measure bus duct temperature
Detect critical changes early

Excessive heat within a bus duct can indicate overloading or poor connections, leading to overheating. Overheating can cause insulation damage, increasing the risk of electrical faults, short circuits, or even fires.

Bus duct joints often carry high electrical loads and susceptible to failure due to mechanical stress like vibrations from factors like seismic activity causing slight movements in bus duct joints. Also, these joints are subject to thermal expansion and contraction leading to loose joints, which can increase resistance or create gaps due to changes in load or environmental temperatures.

Exertherm's Bus Duct Monitoring Solution helps prevent failures by continuously monitoring the temperature of the bus duct connections, providing early warning of potential issues before they occur.



Sensor cable monitoring bus duct joint temperature 24x7

Intelligent monitoring sensors

Exertherm's Bus Duct Monitoring Solution is an 'always on' warning system to detect critical temperature rise and reduce the risk of power loss.

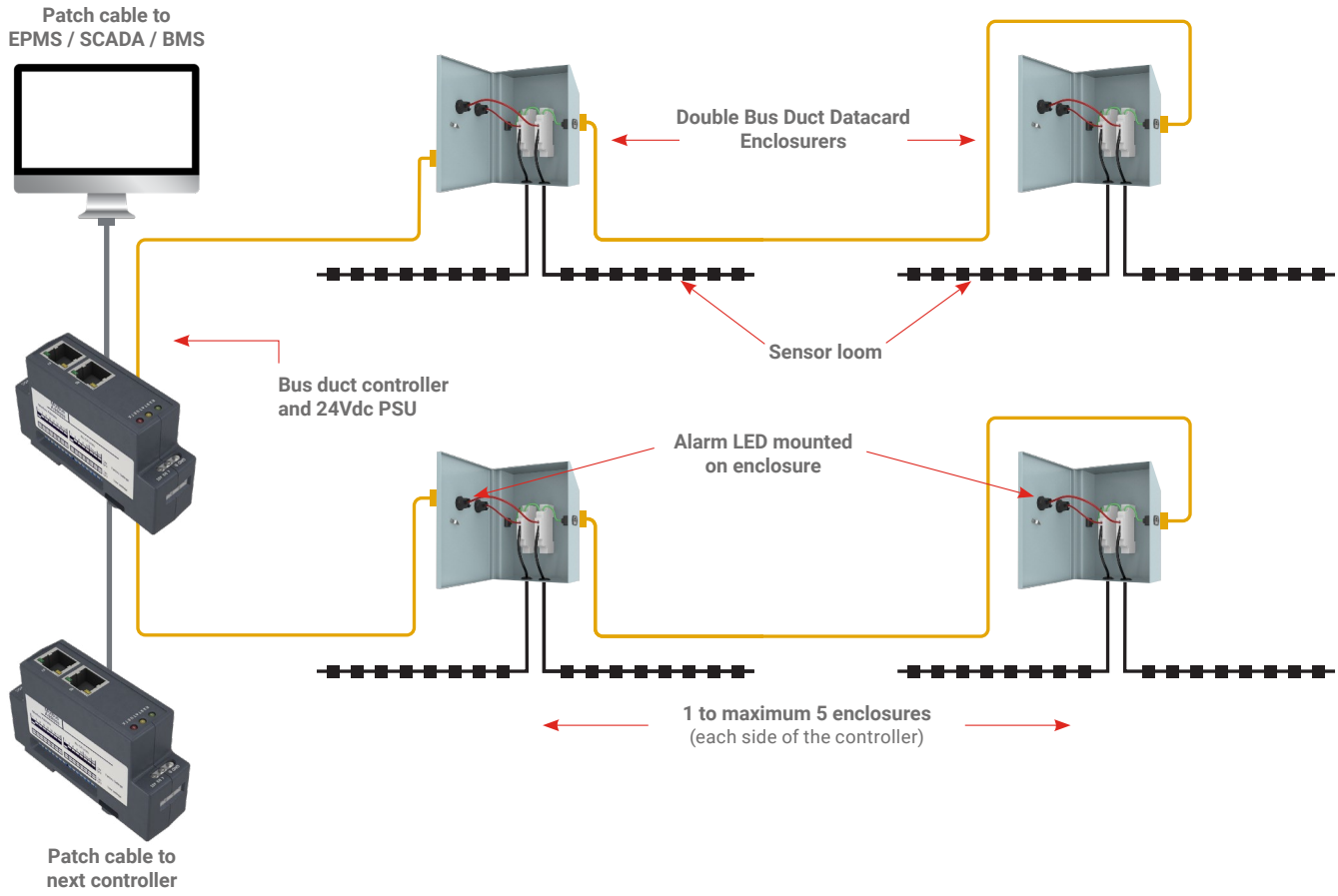
It matches the modularity of bus duct for electrical power distribution to provide an early warning for pre-emptive maintenance purposes.

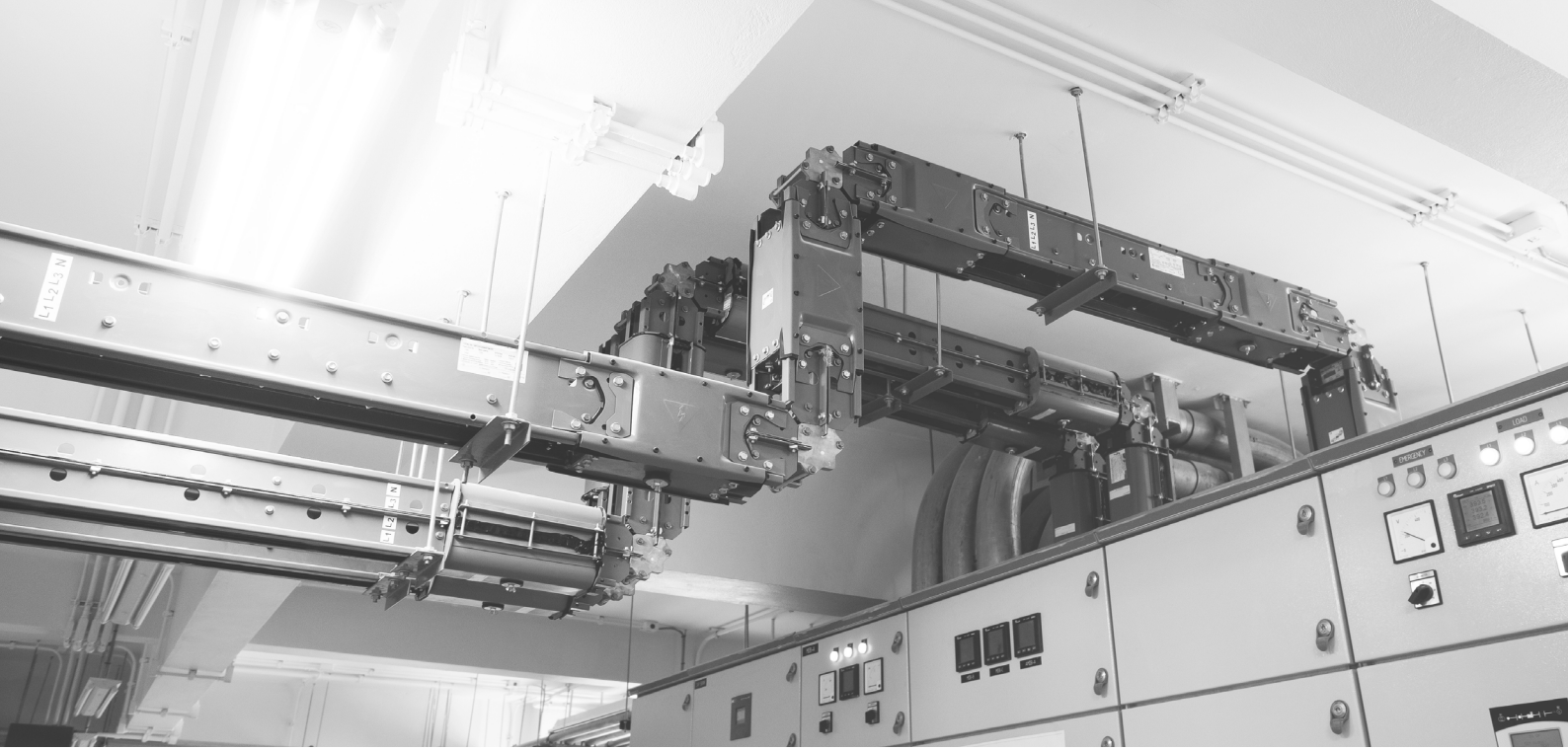
Thermal sensor loom (eight sensors) is attached to the joints along sections of bus duct, the sensor loom is then connected to a Bus Duct Modbus Datacard.

Output from the sensors is analysed by modbus datacard for two alarm modes:
1. compromised terminations
2. critical high

For any compromised terminations, there are three alarms generated, and these alarms are visible via an external LED status light on the front of the enclosure, which provides system status, alarm type and location. The alarms are also available via a Modbus Serial RS485 communication to a client network.

Bus Duct Monitoring Solution - Enclosures and Controller Network:





Preventive bus duct failure

Why scan joints for less than 0.0001% of their life when you can monitor all of them, 24x7?

Exertherm's Bus Duct Monitoring Solution is user-configurable for three different alarm conditions.

Users can configure these settings via the second set of DIP-switches (Odd man out, High and Average) located on the side of the Bus Duct Datacard.

For compromised joints, there are 3 alarms generated:

1	**'Odd Man Out'**	triggered when the difference between any 1 sensor and the sensor on either side exceeds the warning level threshold for more than 60 seconds.
2	**Average**	triggered when the difference between any 1 sensor and the average of all other sensors exceeds the average level threshold for more than 60 seconds.
3	**High**	triggered if any of the 8 sensors along the loom exceeds the set maximum temperature for more than 60 seconds

All alarms are visible both on the Bus Duct Datacard, via the remote LED indicator and also available via Modbus serial communication to a client network, giving users a call to action on a specific joint that is potentially faulty and needs attention before a more serious problem occurs.

Product specification

Exertherm Bus Duct Solutions are supplied as a complete kit containing the following components:

Component 1
Bus Duct Datacard

The data from the sensors is collected in the DIN rail mounted Datacard and converted to Modbus protocol for onward transmission enabling both remote alarms and pass through of raw data to client host system (e.g. EPMS / BMS) for storage, trending and further integration.

Component 2
Bus Duct Sensor Modular Cable

The sensor cable contains 8 thermal sensors pre-labelled S1 through to S8, which are clipped on the bus duct joints using C-clips built onto the bus duct.

Component 3
Bus Duct Alarm LED

The LED unit is connected to the Bus Duct Datacard via the pre-wired 3 way connector. This allows visual indication of alarm severity and location remote from the Bus Duct Datacard.

Benefits for industries

Organizations

- Discover the sensors that help keep electrical power flowing
- Reduce CAPEX and OPEX costs by eliminating the need for thermographic inspection
- Improve personnel safety across your facility by minimizing the need for staff interaction with faulty assets
- Detect potential costly faults in advance and improve asset ROI

Engineers

- Extend asset life with predictive maintenance
- Eradicate the need to manually check connection hotspots in hard-to-reach places
- Become proactive rather than remain reactive to asset issues
- Accurately monitor asset temperature ahead of potential disruptions or failure

Operators

- Continuously monitor the temperature of critical electrical connections
- Detect compromised joints before they become a serious problem
- Save cost by avoiding unplanned electrical outages
- Get real-time alarms and alert notifications

Key features

Simple installation

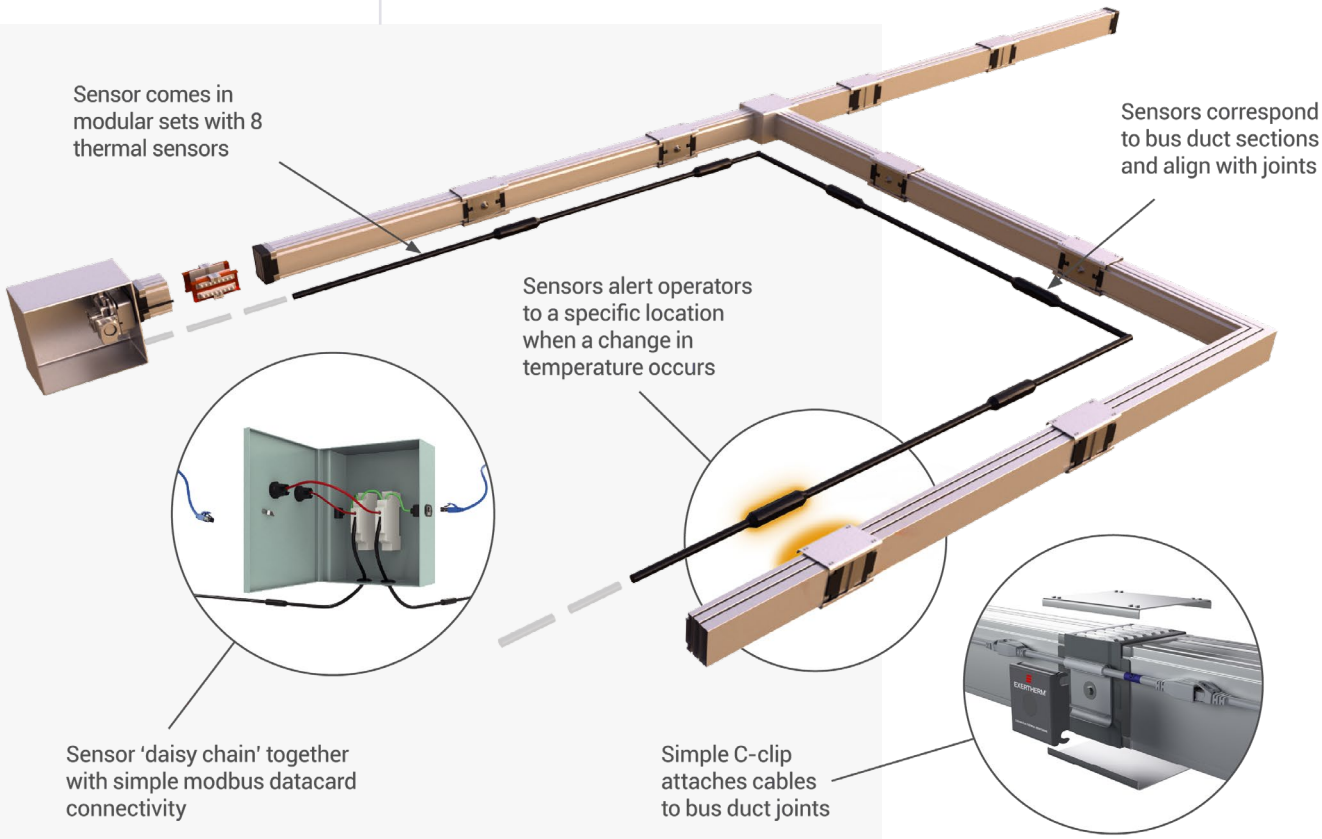
- Works straight out of the box
- Attaches quickly and easily
- Sensors fit directly to joints
- No complex commissioning

Data integration

- Digitally transform electrical assets
- Provides 24x7 temperature and alarm data
- Modbus 485 data taken direct to EPMS/BMS
- Monitor trends over time

Flexible solution

- Modular build for easy upgrade and expansion
- Install at the same time as bus duct
- Fits complex bus duct systems
- Maintenance free



Technical data

Bus Duct Datacard - Serial	
Input voltage	12 - 24 VDC
Input Voltage Tolerance	±10%
Maximum current consumption	30 mA
Field Bus protocol	Modbus RS485 , 2 wire
Baudrates	9k6, 19k2, 38k4, 57k6
IP Rating	30 (not UL evaluated)
Dimensions (mm)	95 x 60 x 26
Weight	80g
Mounting	DIN rail
Configuration	via DIP switches
Accuracy	Dependent on accuracy of input devices
Sampling rate	1 s
Housing Material	ABS - UL 94 V0
Safety Protection	Class III
Isolation	RS-485 500V
Function	Temperature monitoring, alarm generation

Environmental	
Operating Range (temp)	-20 to 70°C
Storage Temp	5 to 40°C
Humidity (RH)	0-95% non condensing
Storage	Store protected from dust and direct sunlight
Pollution	Degree 2
Altitude	Up to 2000m

Bus Duct LED Unit	
LED Viewing Angle	for HLMP-4000 65°
Cable type	UL2464
Cable rating	-80°C
Cable length	100 cm

Bus Duct Sensor - Modular	
Sensor type	Epoxy coating NTC MF52 (or similar)
Output cable	AWM 20327 AWG24 105°C
Cable Rating	2500V AC 1s
Cable length	30cm (0.98 feet)
Housing Material	TPE
Connector	RJ50 (male)

Environmental	
Operating Range (temp)	-40 to 110°C
Storage Temp	5 to 40°C
Humidity (RH)	0-95% non condensing
Storage	Store protected from dust and direct sunlight

Patch Cable	
Cable type	PVC UL20167 (Grey)
Output cable	AWG24 TS/9C
Cable Length	50cm/100cm/200cm/300cm

4 Pole Aggregator - Serial	
Input voltage	12 - 24 VDC
Input Voltage Tolerance	±10%
Maximum current consumption	30 mA
Field Bus protocol	Modbus RS485, 2 wire
Baudrates	9k6, 19k2, 38k4, 57k6
IP Rating	30
Dimensions (mm)	98 x 60 x 26
Weight	80g
Mounting	DIN rail
Configuration	via DIP switches
Sampling rate	30s
Housing Material	ABS – UL 94 V0
Safety Protection	Class III
Isolation	Slave RS-485 500V
Function Modbus	Gateway

Environmental	
Operating Range (temp)	-10 to 105°C
Storage Temp	5 to 40°C
Humidity (RH)	0-95% non condensing
Storage	Store protected from dust and direct sunlight

EXERTHERM by EATON

Why choose Exertherm?

A rise in temperature is the main symptom of a faulty joint or connection that can result in major power failure in your mission critical environment. Exertherm Continuous Thermal Monitoring (CTM) solutions enable fault detection and predictive analysis of electrical assets.

We provide a complete solution for LV switchgear/MV switchgear, bus duct, MCC, dry transformers, increasing efficiency and performance of your electrical infrastructure as an integral part of your predictive maintenance plan and IIoT strategy.

Our products help by providing valuable asset data for transformation, continuous improvement, and increased personnel safety by negating the need to interact with potentially dangerous electrical assets.

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