

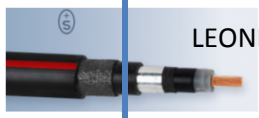
POWER TECHNOLOGIES™

Private Limited

GEORGE LIM & JASON CHIA

Driving Business Performance™

22kV



LEONI 22kV MV FR

TX

Active Power
GENSTART

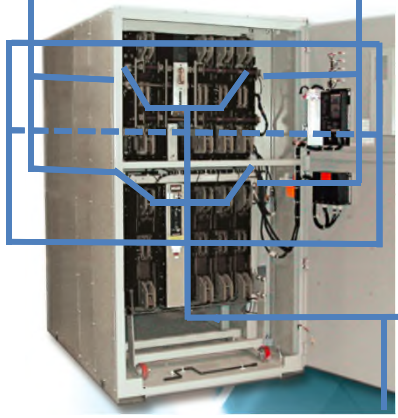


G

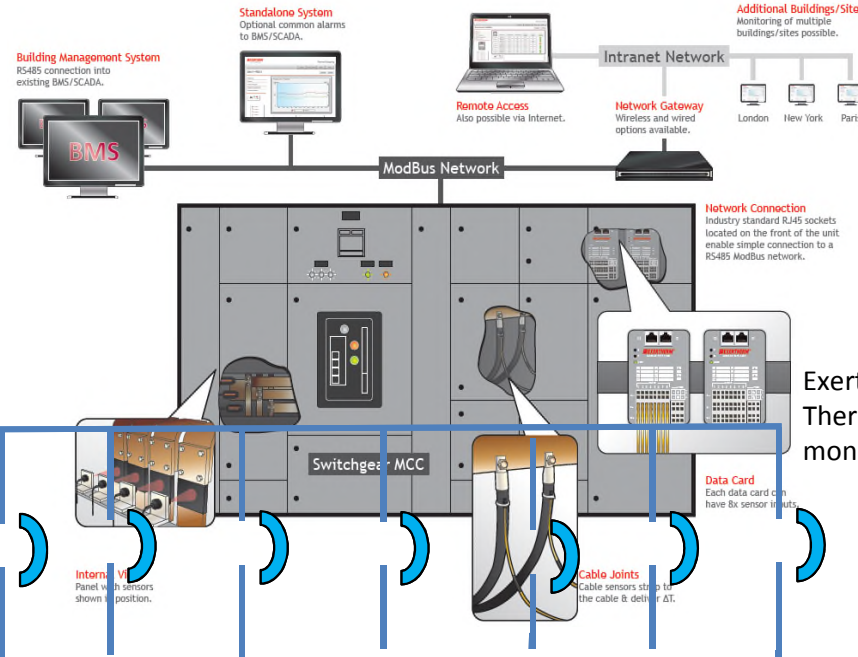


DIESEL FUEL TANK

Algae-X Fuel
Conditioning



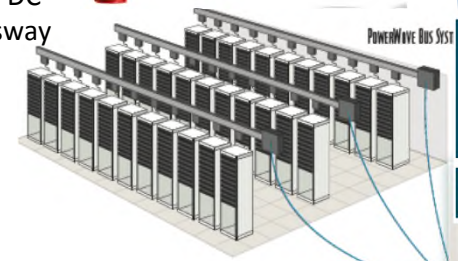
GE CTTS ByPass ATS



Exertherm 24x7
Thermal
monitoring

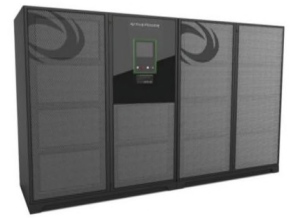


PDI DC
Busway





PDI BCMS



Active Power
CSUPS

GE ATS





Simplex Load Bank

A Complete System

More than a box of parts



CleanSource UPS



Switchboards



ATS



Regulatory & Safety



Air-Conditioning



Lighting



PH.OS Software



Smart Display



Diesel Generator

Active Power Proprietary & Confidential-2012 Active Power, Inc.

EXERTHERM™
24x7 Thermal Monitoring

EXERTHERM LOADMAP™
24x7 Low Load Protection

24x7 Thermal Monitoring

The Next Technology Step



QHi - Group
SYSTEMS DIVISION

POWER TECHNOLOGIES™
Private Limited

> 24x7 Thermal Monitoring Agenda

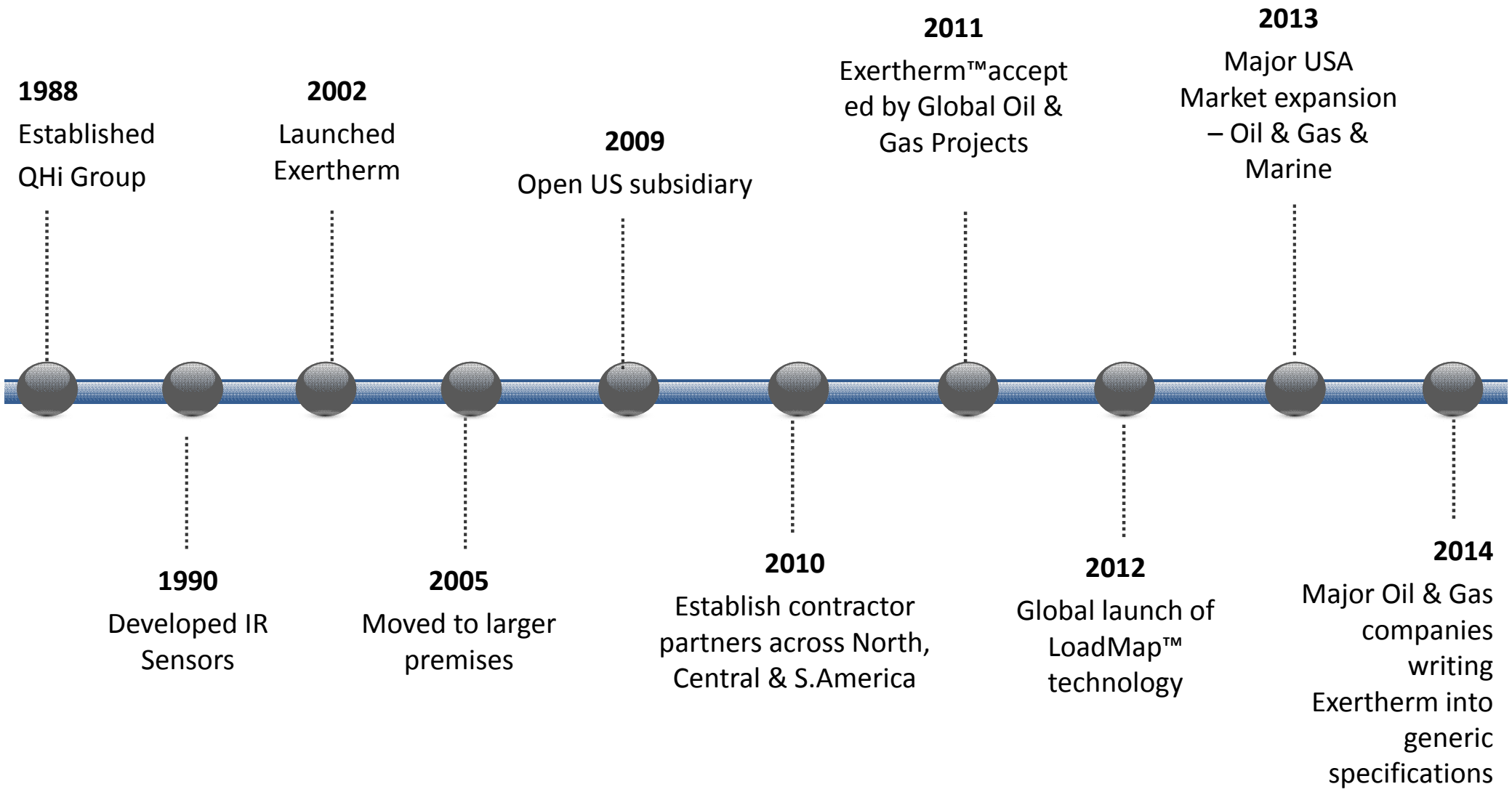
- Who is QHi?
- The Problem
- The Solution – 24x7 Thermal Monitoring
- Integration & Software Options
- Benefits & Value



QHi - Group
SYSTEMS DIVISION

POWER TECHNOLOGIES™
Private Limited

Who is QHi-Group ?



QHi - Group SYSTEMS DIVISION

POWER TECHNOLOGIES Private Limited

EXERTHERM™
24x7 Thermal Monitoring

> 24x7 Thermal Monitoring Agenda

- ✓ Who is QHi?
- **The Problem**
- The Solution – 24x7 Thermal Monitoring
- Integration & Software Options
- Benefits & Value



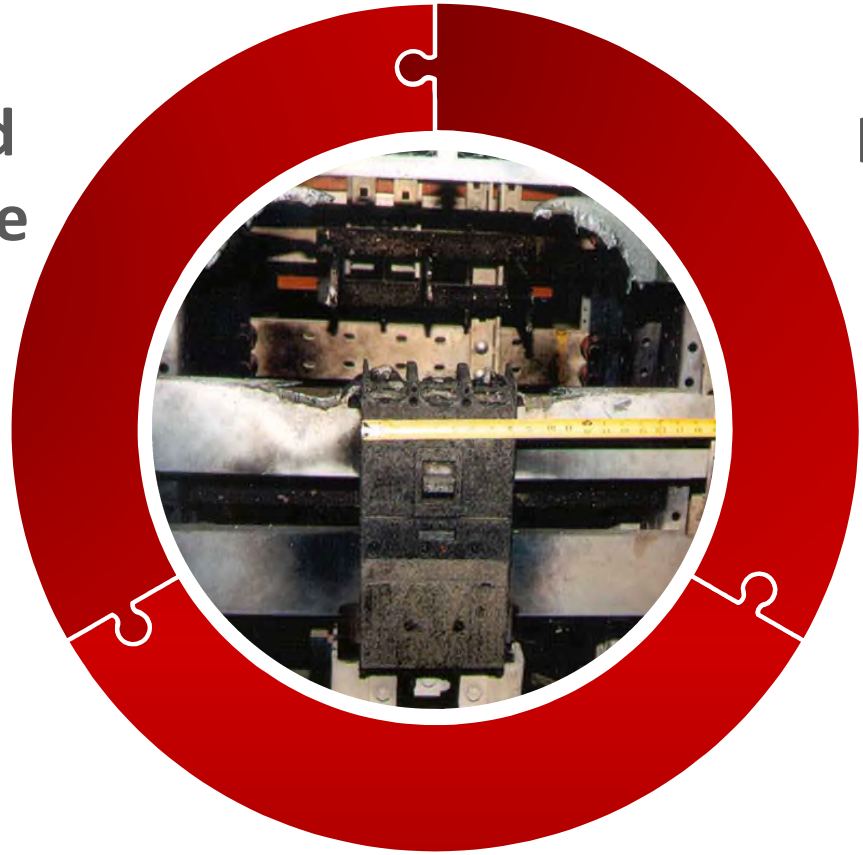
QHi - Group
SYSTEMS DIVISION

POWER TECHNOLOGIES™
Private Limited

EXERTHERM™
24x7 Thermal Monitoring

FAULTY JOINT =

Increased Resistance



Increased Heat

Increased Oxidation

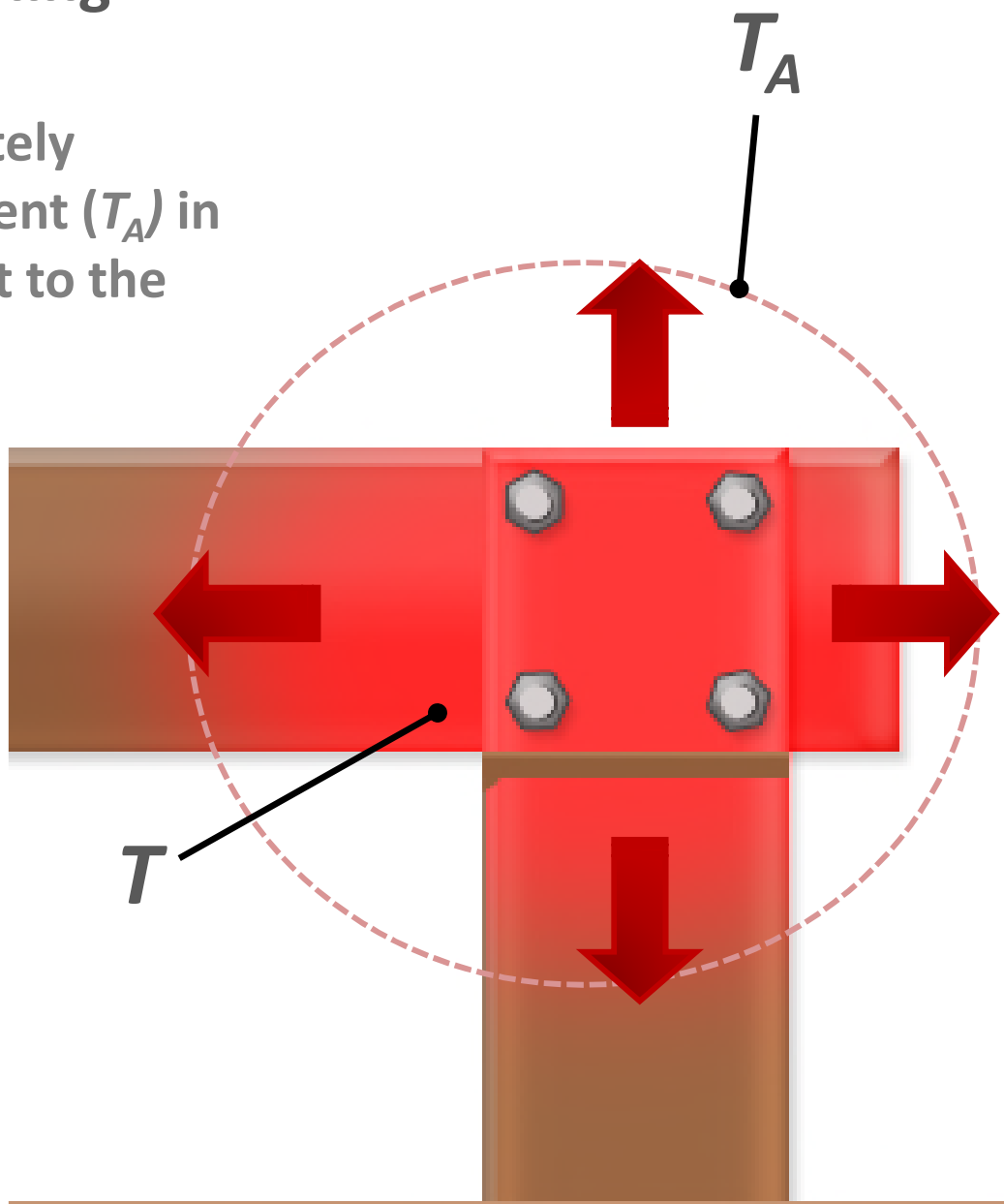
EXERTHERM™
24x7 Thermal Monitoring

Detection of Compromised Joints…

ΔT (Delta T) & Newton's Law of Cooling

The conductor temperature (*T*) will infinitely increase to a value necessary above ambient (T_A) in order to dissipate the extra energy as heat to the surrounding ambient.

- Therefore the compromised joint will heat due to the increase in resistance allowing us to measure Delta T
- Absolute would not alert this problem!



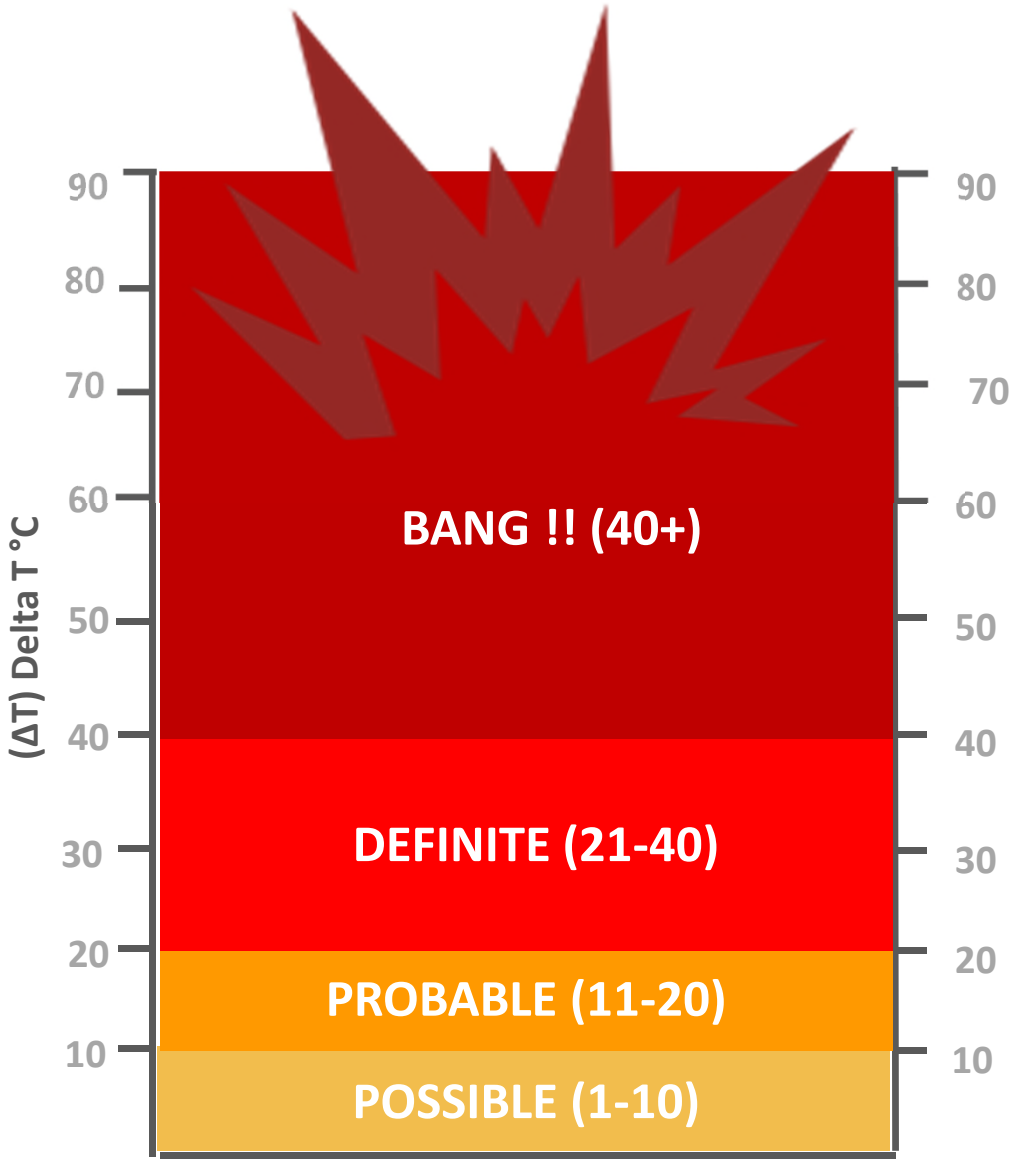
QHi - Group SYSTEMS DIVISION
POWER TECHNOLOGIES™ Private Limited

NETA Alarm Thresholds

EXERTHERM™
24x7 Thermal Monitoring

NETA Table 10.18
Suggested Actions based on Temperature Rise

Temperature difference (ΔT) based upon comparisons between component & ambient air temperatures	Recommended Action
>40°C	Major discrepancy; repair immediately
21°C – 40°C	**Monitor continuously** until corrective measures can be accomplished
11°C – 20°C	Indicates probable deficiency; repair are time permits
1°C – 10°C	Possible deficiency; warrant investigation



NETA at 100% Circuit Load

QHi - Group SYSTEMS DIVISION
POWER TECHNOLOGIES™ Private Limited

EXERTHERM™
24x7 Thermal Monitoring

> 24x7 Thermal Monitoring Agenda

- ✓ Who is QHi?
- ✓ The Problem
- • The Solution – 24x7 Thermal Monitoring
- • Integration & Software Options
- • Benefits & Value



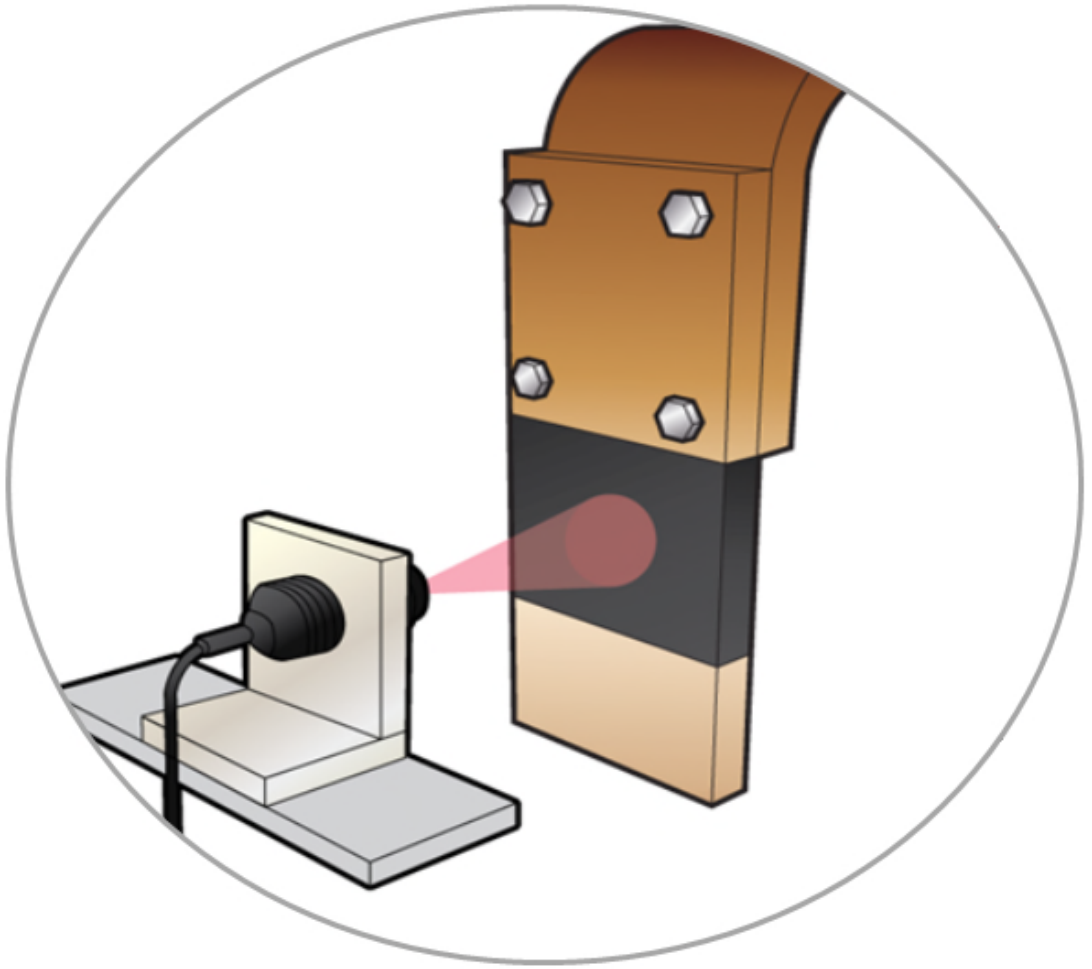
QHi - Group
SYSTEMS DIVISION

POWER TECHNOLOGIES™
Private Limited

EXERTHERM™
24x7 Thermal Monitoring

24x7 Thermal Monitoring:

The Solution:



- INFRARED
- DELTA T
- NON-POWERED
- NON-CONTACT

QHi - Group
SYSTEMS DIVISION

POWER TECHNOLOGIES™
Private Limited

EXERTHERM™ 24x7 Thermal Monitoring

Where to monitor – LV

Exertherm Modbus Datacard connects to eight sensors

IR sensors monitor the Vertical/Horizontal busbar

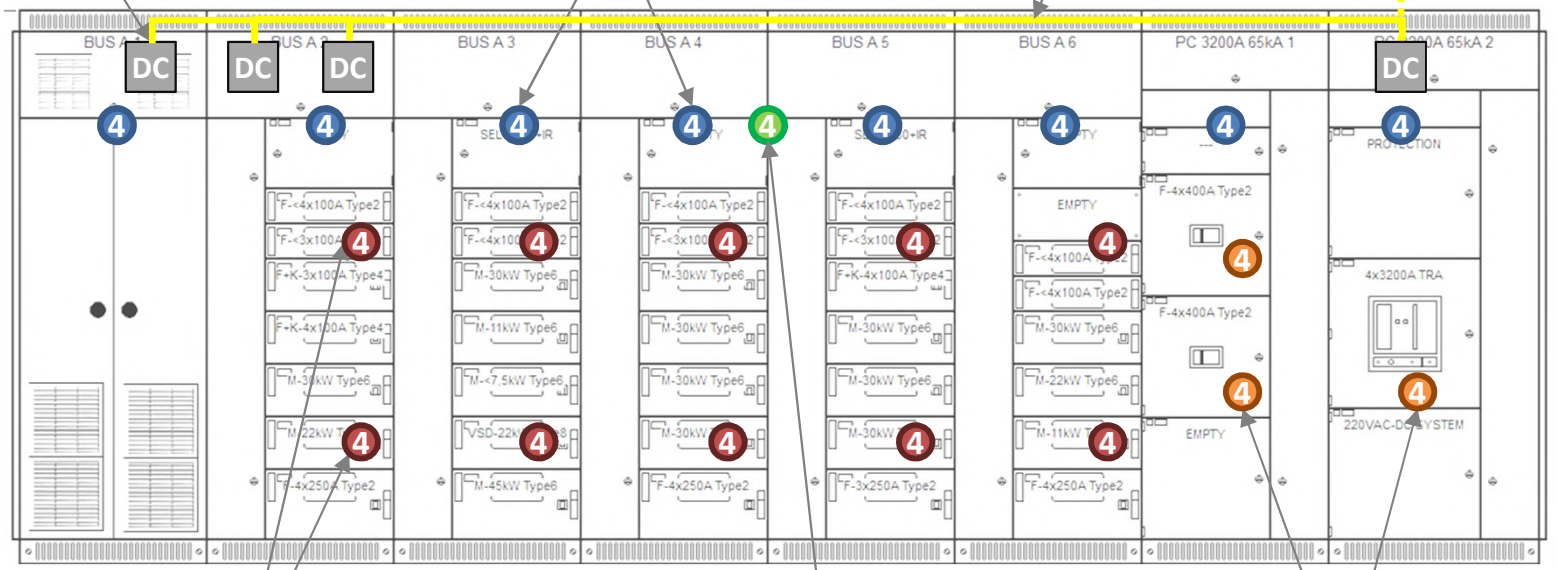
'n' data cards daisy-chain to form a Modbus network

Exertherm Vision Processor *'Full User Interface'*

EVP

EAM

Exertherm Alarm Module *'Alarms via relays'*



IR sensors monitor the Vertical busbar in MCC sections.

IR sensors monitor the shipping splits (if required)

IR sensors monitor the Air Circuit Breakers (incoming & outgoing)

QHi - Group SYSTEMS DIVISION

POWER TECHNOLOGIES™ Private Limited

EXERTHERM™ 24x7 Thermal Monitoring

Where to monitor – MV

Exertherm Modbus Datacard connects to eight sensors

IR sensors monitoring the Vertical/Horizontal busbar joints 'above' the ACB.

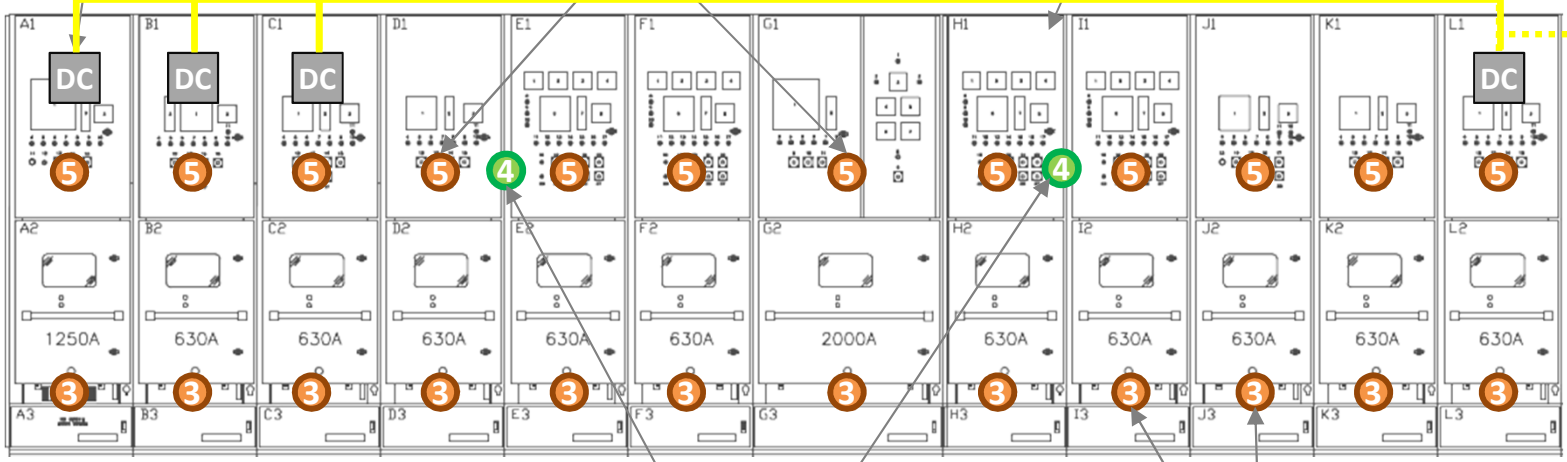
'n' data cards daisy-chain to form a Modbus network

Exertherm Vision Processor *'Full User Interface'*

EVP

EAM

Exertherm Alarm Module *'Alarms via relays'*

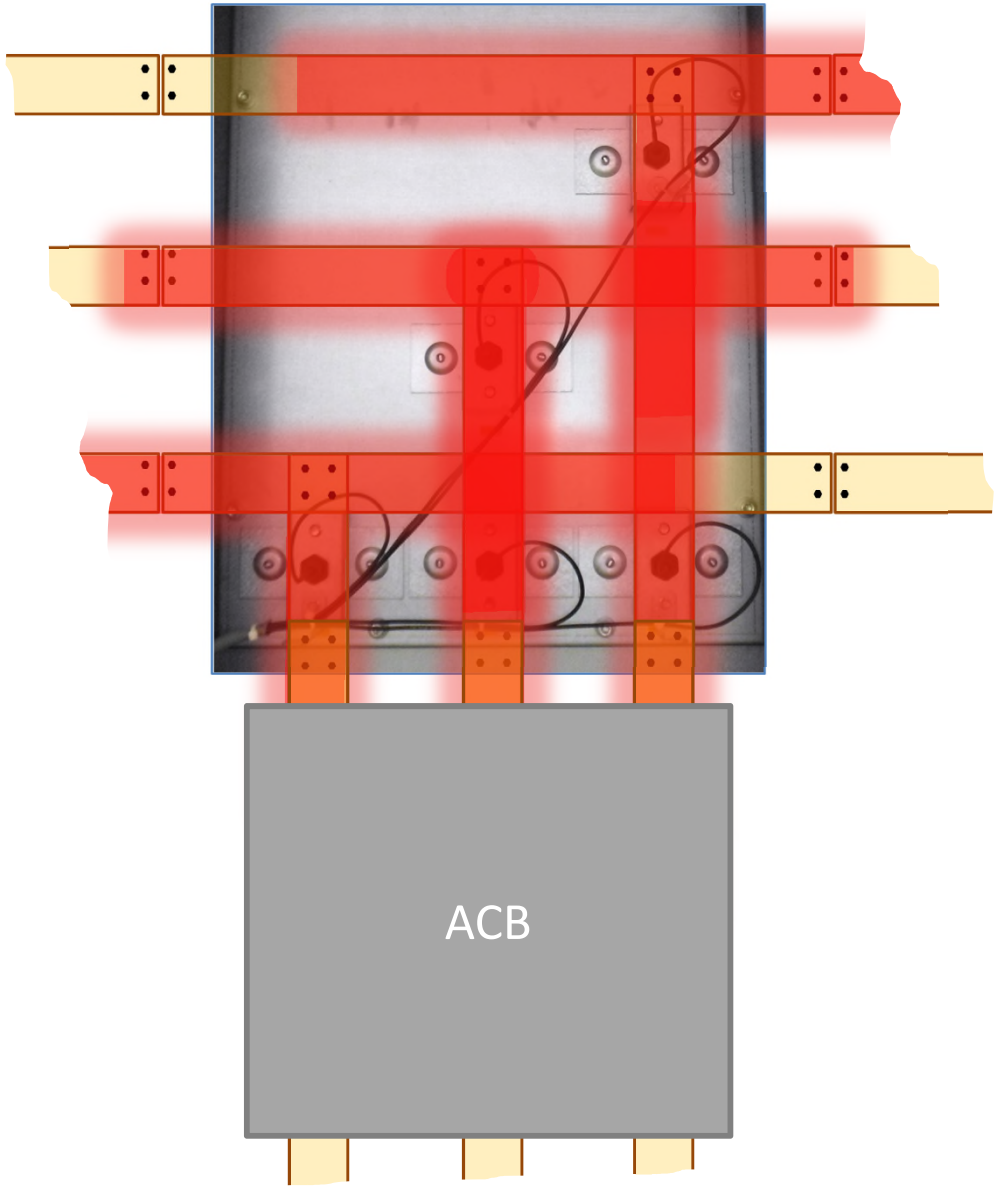


IR sensors monitor the shipping splits (if required)

IR sensors monitor the Air Circuit Breakers (incoming & outgoing)

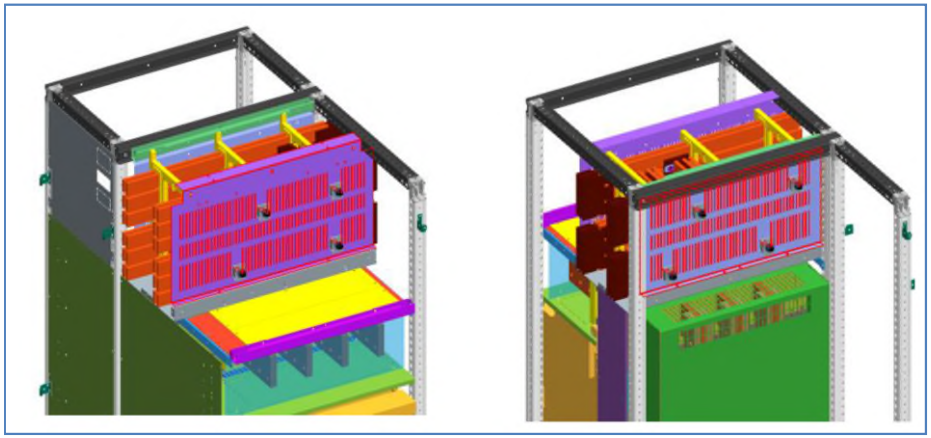
EXERTHERM™ 24x7 Thermal Monitoring

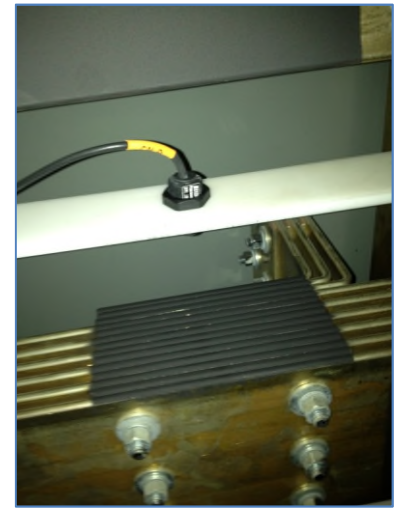
Where to monitor – optimising sensors

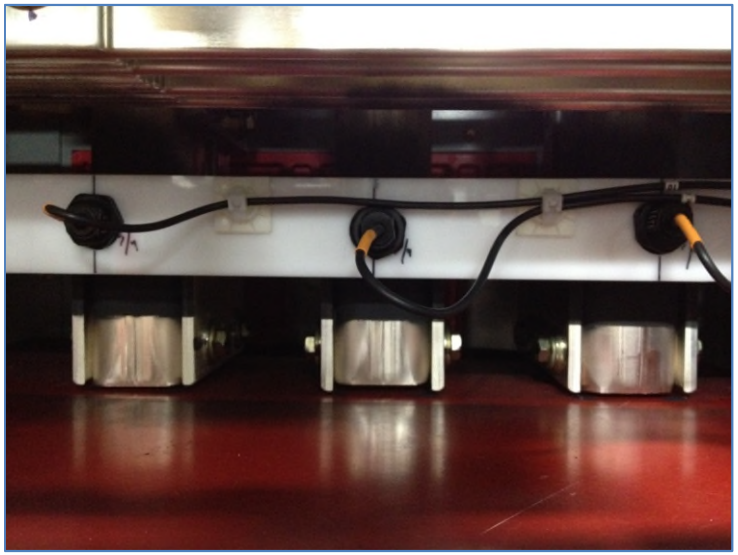


EXERTHERM™
24x7 Thermal Monitoring

Where to monitor – real life examples



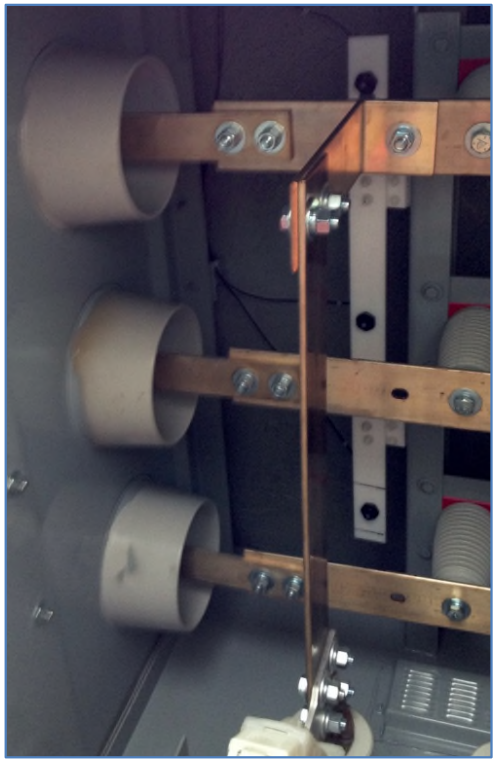




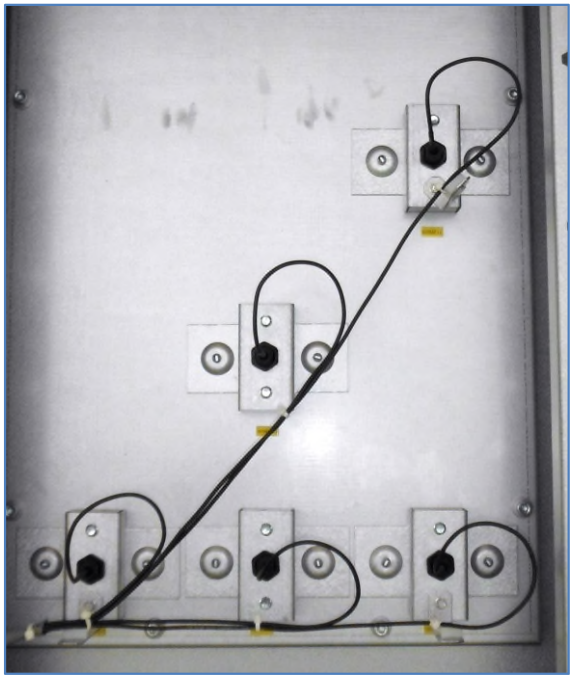


EXERTHERM™ 24x7 Thermal Monitoring

Where to monitor – real life examples







EXERTHERM LOADMAP™ 24x7 Low Load Protection

Identifying the hidden problem…

Load to Alarm (Risk) Threshold…

How applicable are generic set alarm thresholds when considering mission critical facilities operating at low loads?



Circuits operating at low loads means compromised joints are 'hidden' BUT still exist

At 30% Load the equivalent Alarm Level is 3.6°C

Based on Delta T 40°C @ 100%

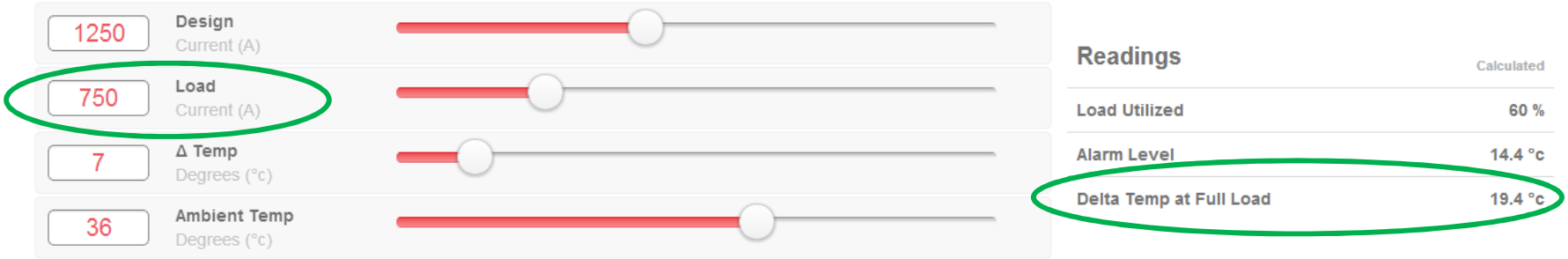
A compromised joint may not reach globally accepted Delta T alarm thresholds of 20 – 40°C till it's too late!

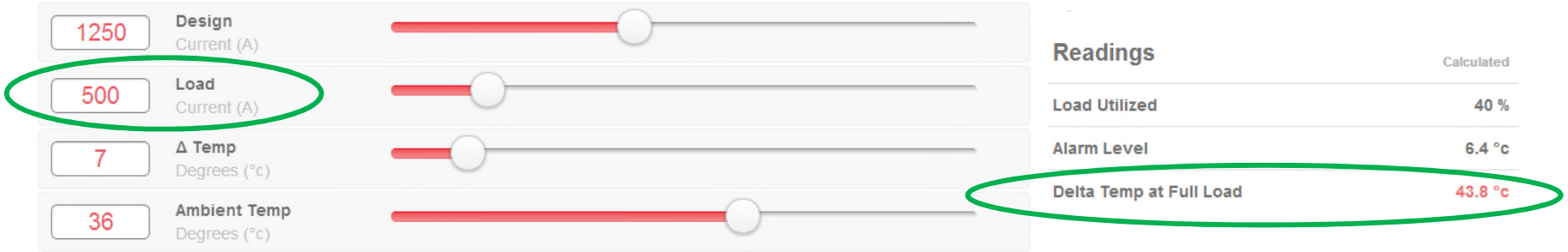
POWER TECHNOLOGIES™ Private Limited

EXERTHERM LOADMAP™ 24x7 Low Load Protection

Knowing the Load/Current is critical…







QHi - Group SYSTEMS DIVISION

POWER TECHNOLOGIES™ Private Limited

> 24x7 Thermal Monitoring Agenda

- ✓ Who is QHi?
- ✓ The Problem
- ✓ The Solution – 24x7 Thermal Monitoring
- • **Integration & Software Options**
- • Benefits & Value



QHi - Group SYSTEMS DIVISION

POWER TECHNOLOGIES Private Limited

EXERTHERM™
24x7 Thermal Monitoring

What to do with the data…?

Software Options:

Third Party Software



Local Alarm Option



Integrated Low Load Protection

EXERTHERM LOADMAP™
24x7 Low Load Protection

The Exertherm System....

❶ Infrared Sensors

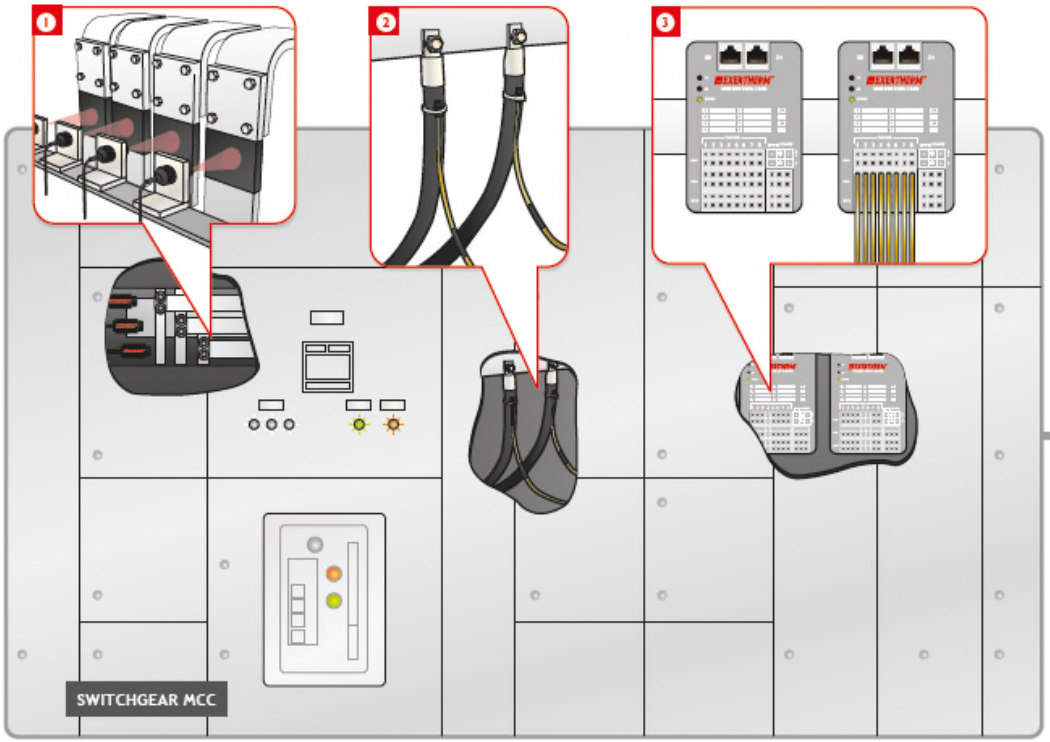
Our small, non-contact, plastic IR Sensors have lifetime calibration and require no external power. These are placed within the enclosure to directly monitor key connections through ΔT measurement.

❷ Cable Sensors

Our patented cable sensors strap to the cable monitors to monitor cable joints through ΔT measurement.

❸ Datacards

Our Datacards facilitate the collection of data from the IR or Cable sensors (8 per data card) and transmit it to the host system via the ModBus protocol. They feature RJ45 sockets for easy integration and connection to your RS485 Modbus network.



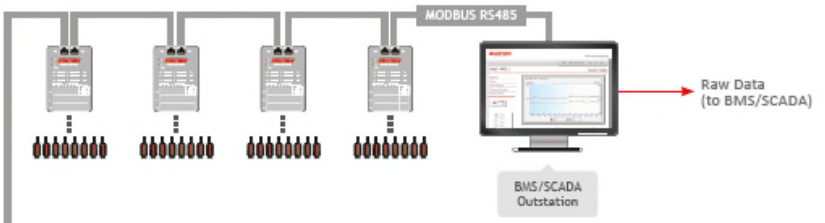
INSIDE THE PANEL

OUTSIDE THE PANEL

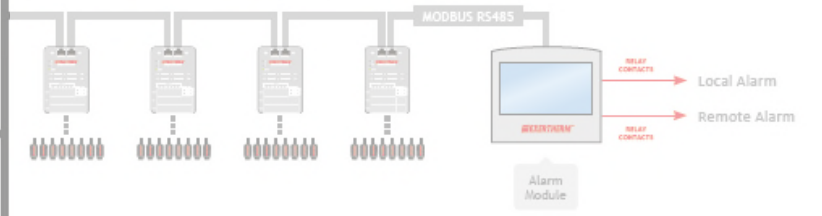
MODBUS NETWORK

❹ Integration Options

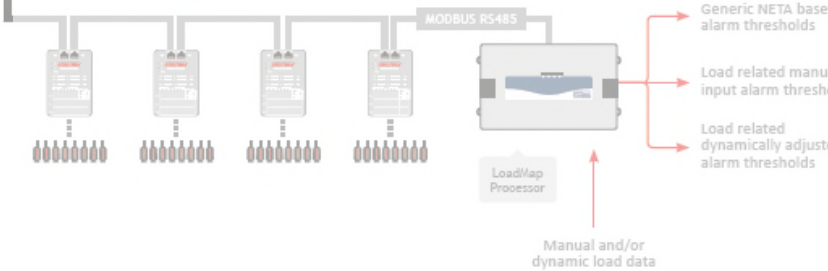
A - Exertherm® Raw Data Transfer



B - Exertherm® Alarm Module



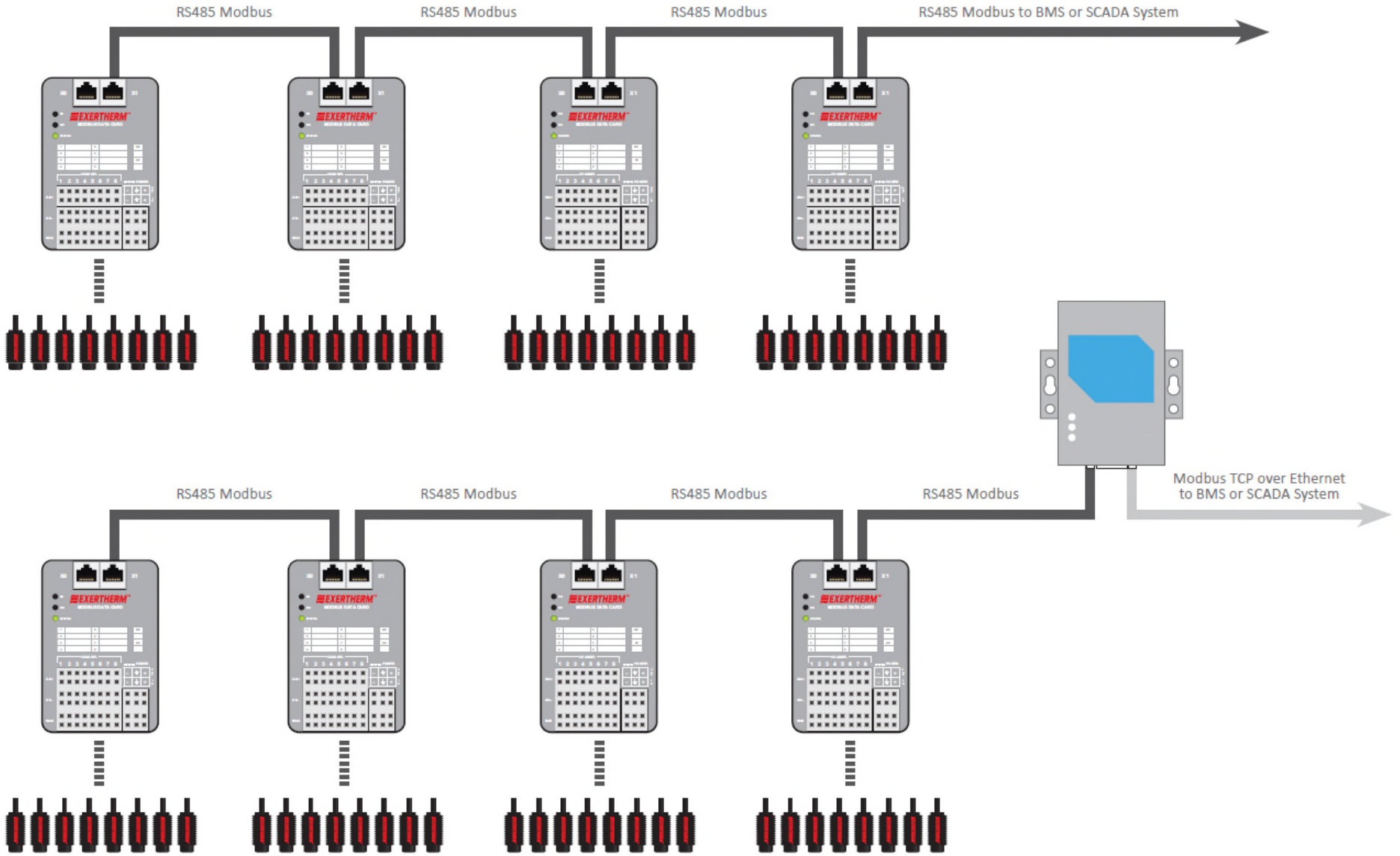
C - LoadMap® Software



POWER TECHNOLOGIES™
Private Limited

Integration Options

1. Exertherm Raw Data Transfer to BMS/SCADA Topology



POWER TECHNOLOGIES Private Limited

The Exertherm System....

① Infrared Sensors

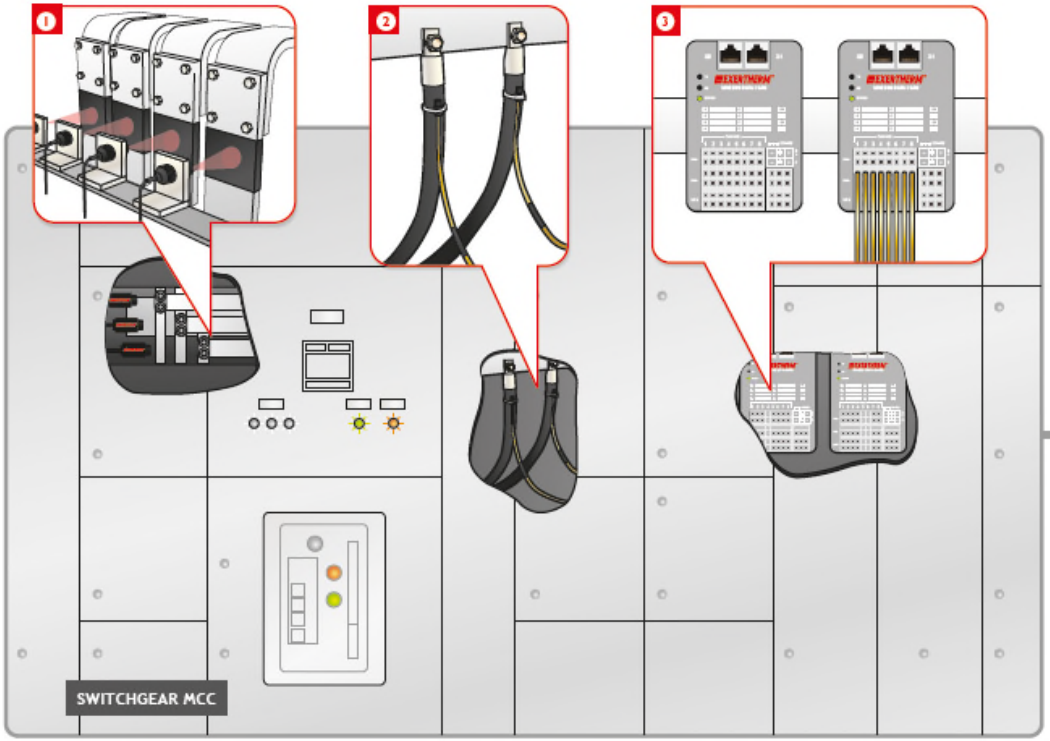
Our small, non-contact, plastic IR Sensors have lifetime calibration and require no external power. These are placed within the enclosure to directly monitor key connections through ΔT measurement.

② Cable Sensors

Our patented cable sensors strap to the cable monitors to monitor cable joints through ΔT measurement.

③ Datacards

Our Datacards facilitate the collection of data from the IR or Cable sensors (8 per data card) and transmit it to the host system via the ModBus protocol. They feature RJ45 sockets for easy integration and connection to your RS485 Modbus network.



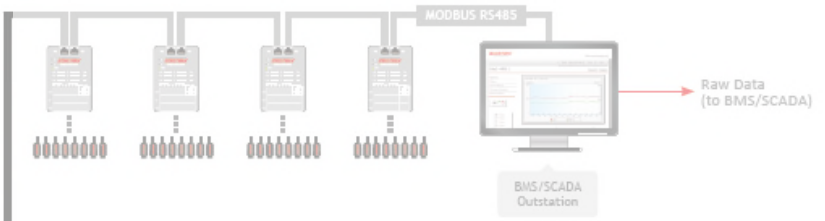
INSIDE THE PANEL

OUTSIDE THE PANEL

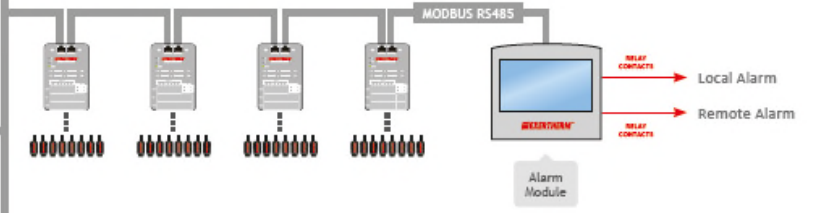
MODBUS NETWORK

④ Integration Options

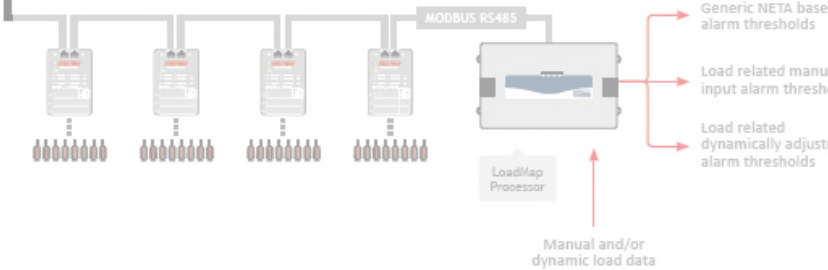
A - Exertherm® Raw Data Transfer



B - Exertherm® Alarm Module



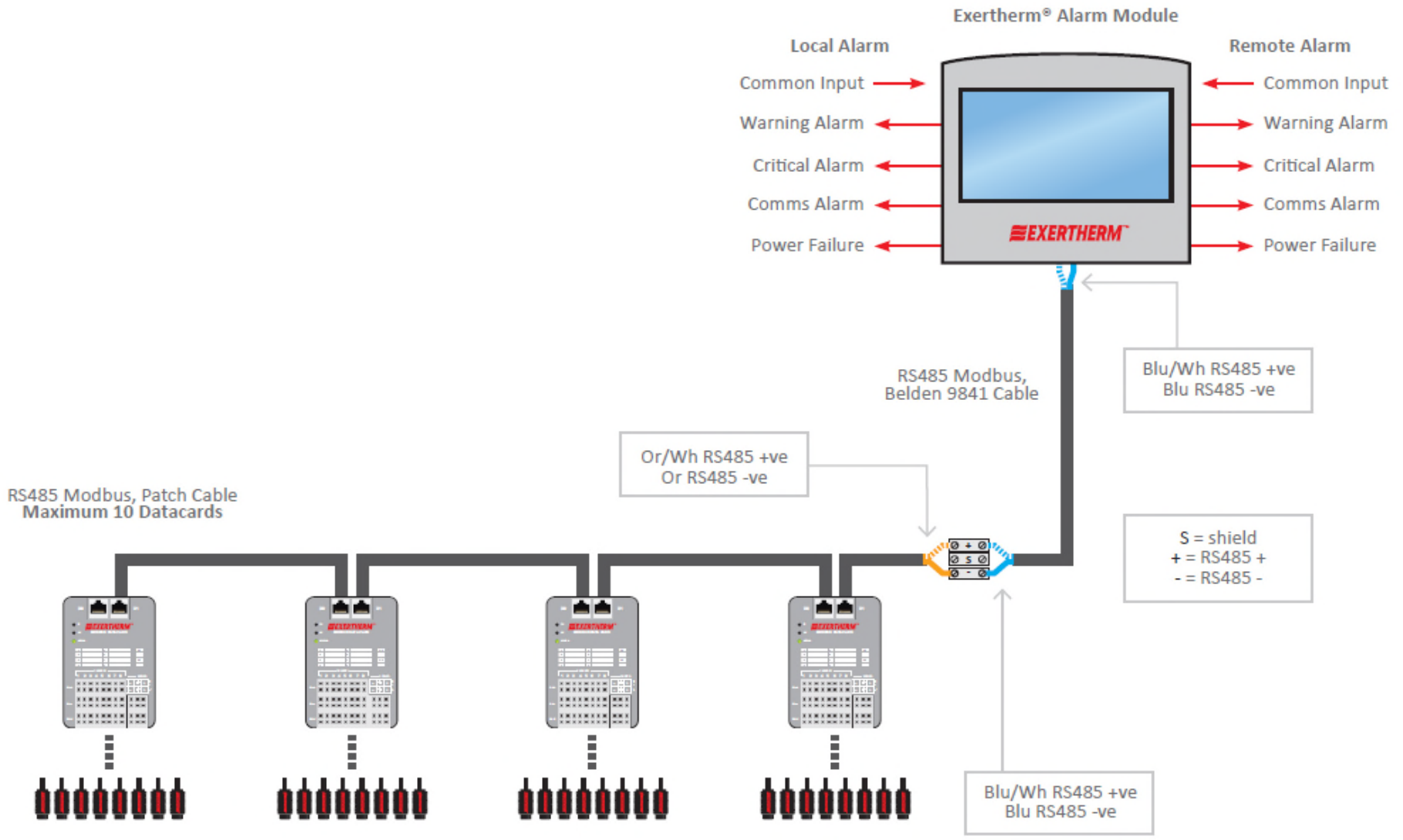
C - LoadMap® Software



POWER TECHNOLOGIES™
Private Limited

Integration Options

2. Exertherm Alarm Module Topology



The Exertherm System....

❶ Infrared Sensors

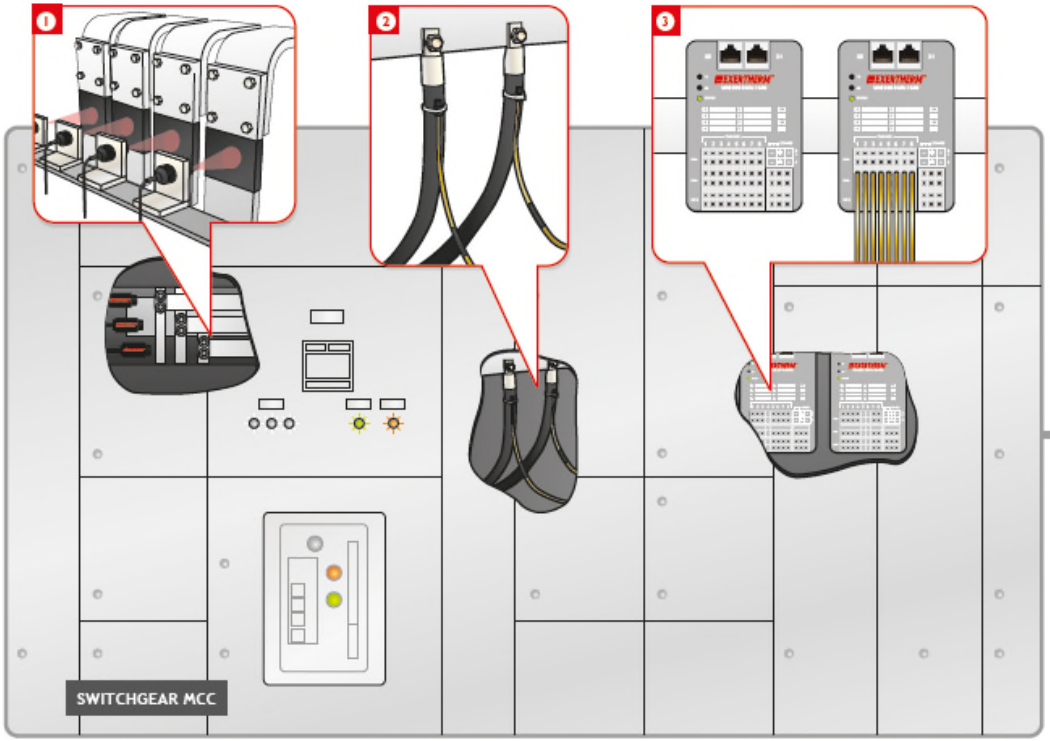
Our small, non-contact, plastic IR Sensors have lifetime calibration and require no external power. These are placed within the enclosure to directly monitor key connections through ΔT measurement.

❷ Cable Sensors

Our patented cable sensors strap to the cable monitors to monitor cable joints through ΔT measurement.

❸ Datacards

Our Datacards facilitate the collection of data from the IR or Cable sensors (8 per data card) and transmit it to the host system via the ModBus protocol. They feature RJ45 sockets for easy integration and connection to your RS485 Modbus network.



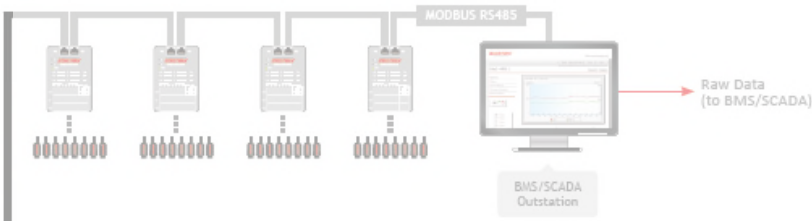
INSIDE THE PANEL

OUTSIDE THE PANEL

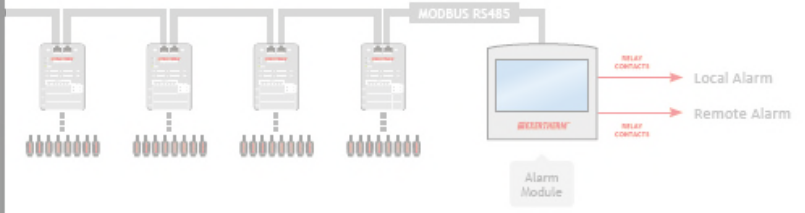
MODBUS NETWORK

❹ Integration Options

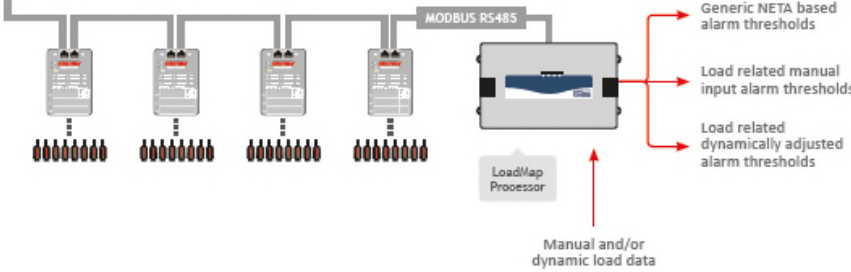
A - Exertherm® Raw Data Transfer



B - Exertherm® Alarm Module



C - LoadMap® Software



POWER TECHNOLOGIES™
Private Limited



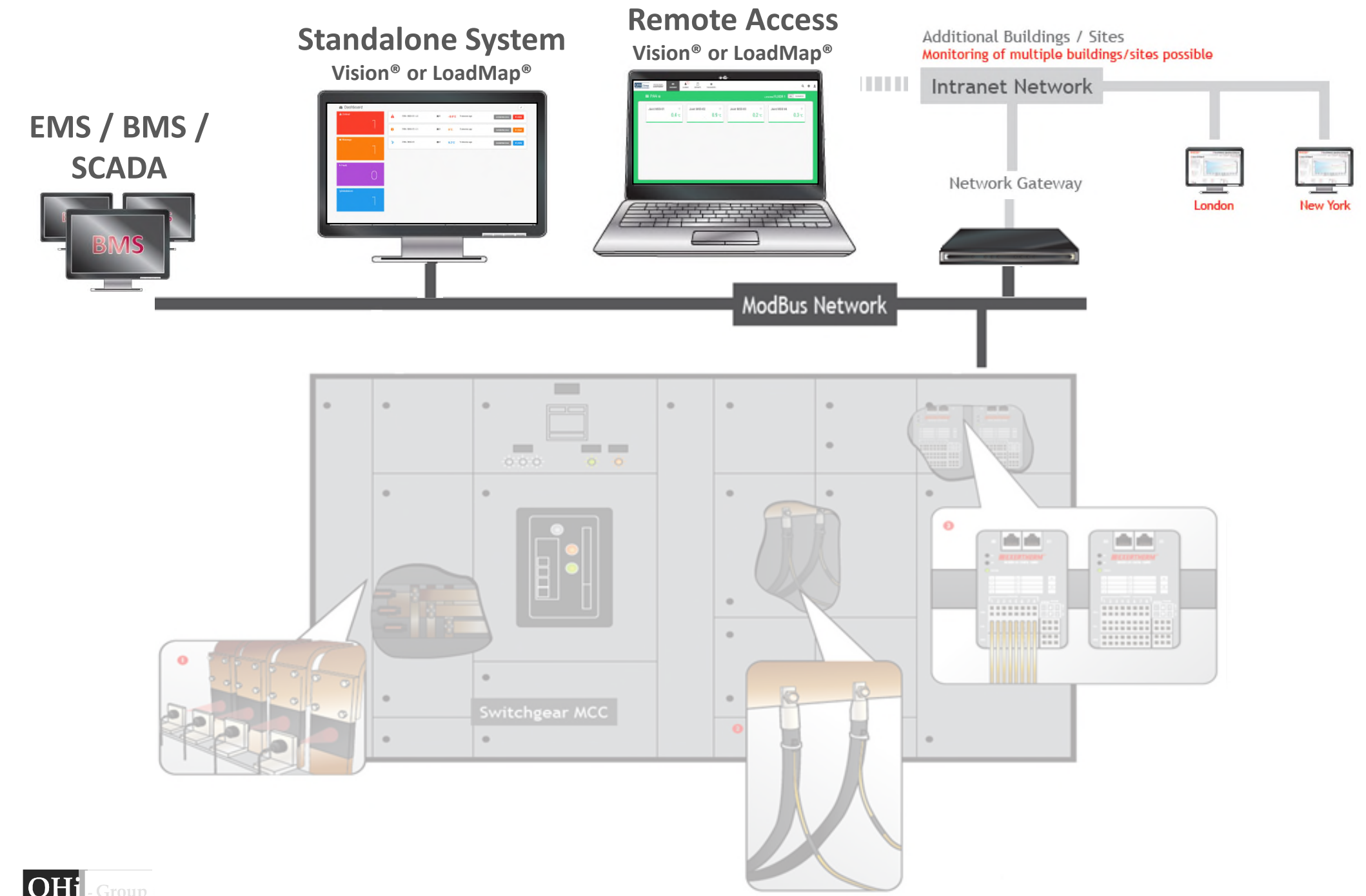
EXERTHERM LOADMAP™

24x7 Low Load Protection

QHi - Group
SYSTEMS DIVISION

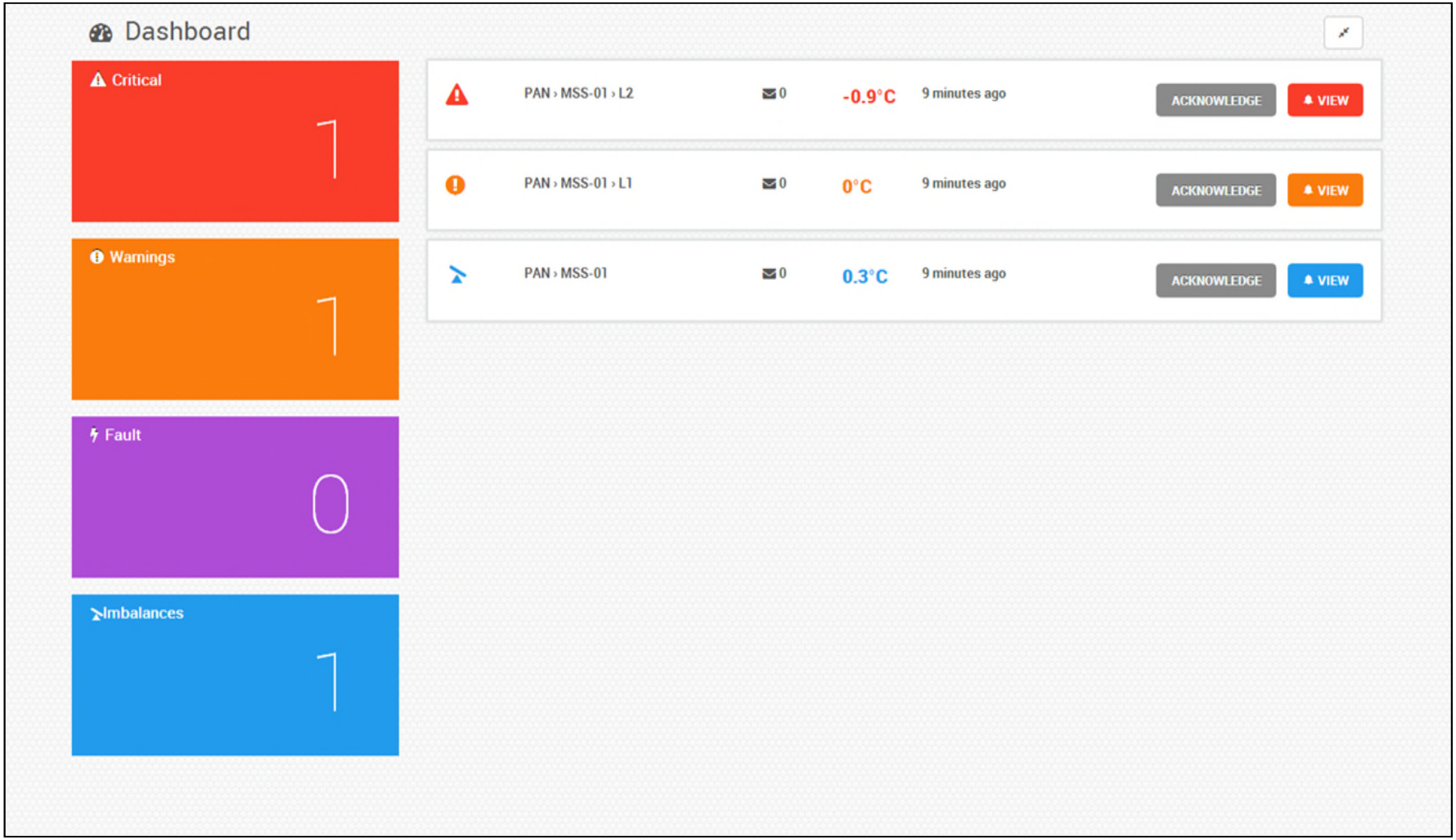
POWER TECHNOLOGIES™
Private Limited

Vendor Neutral Integration Options:



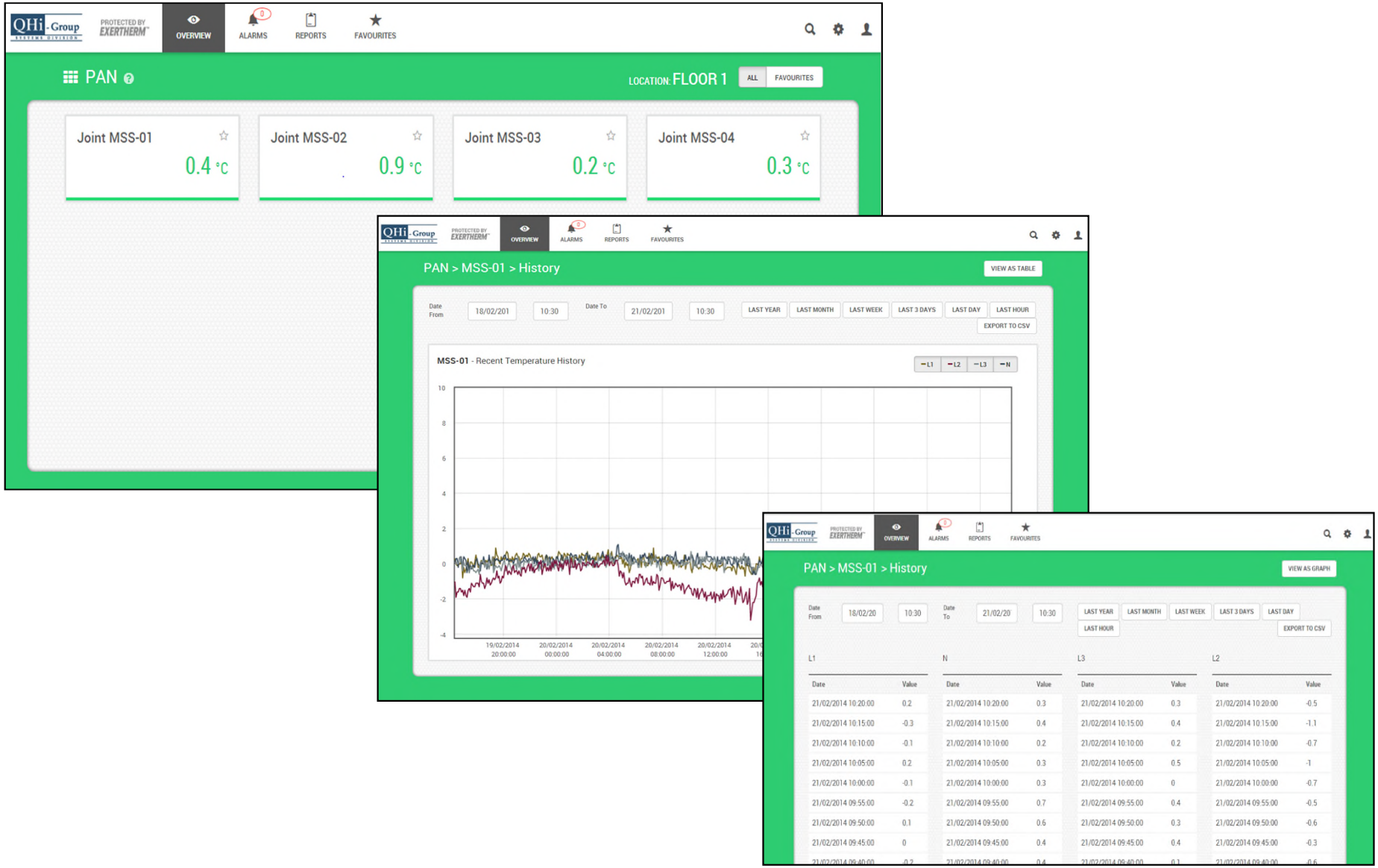
Exertherm Vision incorporating LoadMap

Features / benefits:



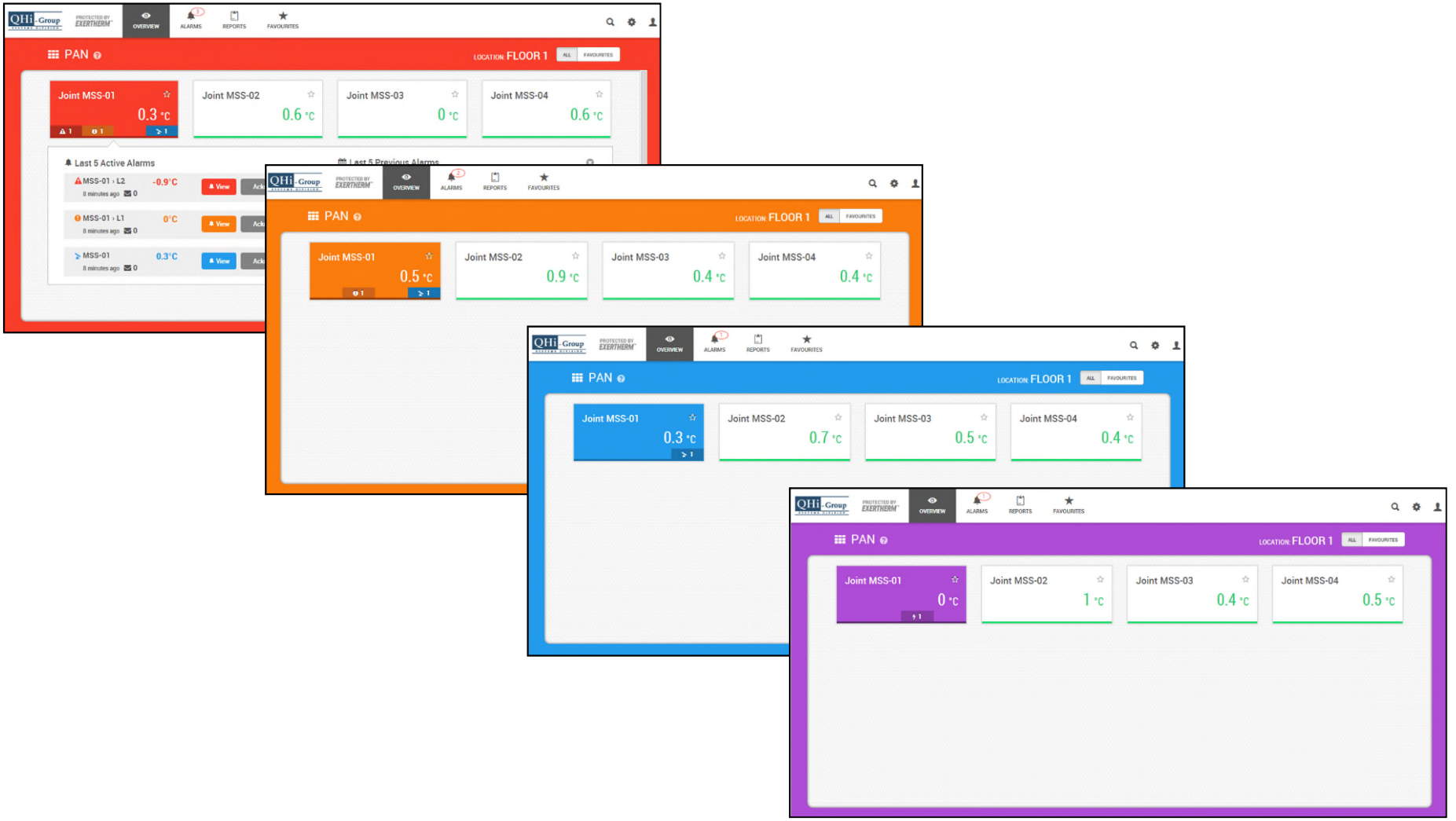
Exertherm Vision incorporating LoadMap

Features / benefits:



Exertherm Vision incorporating LoadMap

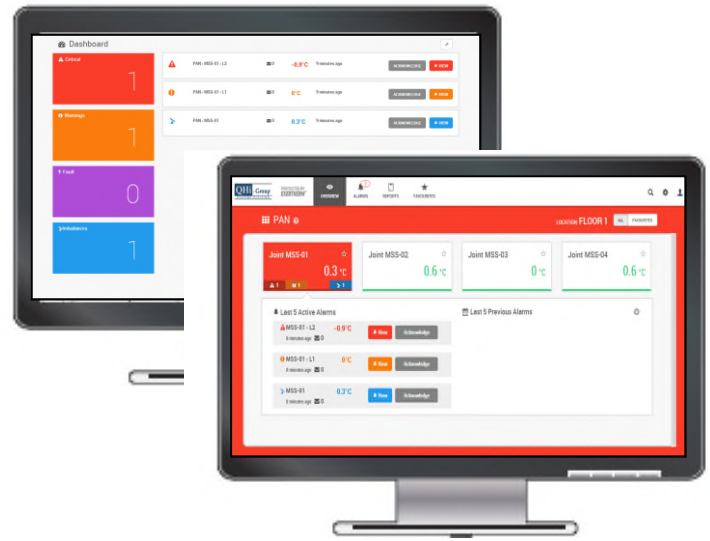
Features / benefits: alarm status



EXERTHERM LOADMAP™
24x7 Low Load Protection

Exertherm LoadMap
24x7 Thermal Monitoring Software…

- Solid State pre-loaded processor device
- Embedded Web based GUI
- Fully user configurable
- License free



QHi - Group SYSTEMS DIVISION
POWER TECHNOLOGIES™ Private Limited

> 24x7 Thermal Monitoring Agenda

- ✓ Who is QHi-Group ?
- ✓ The Problem
- ✓ The Solution – 24x7 Thermal Monitoring
- ✓ Integration & Software Options
- • **Benefits & Value**



QHi - Group SYSTEMS DIVISION

POWER TECHNOLOGIES Private Limited

EXERTHERM LOADMAP™ 24x7 Low Load Protection

EXERTHERM™ 24x7 Thermal Monitoring

The Performance Gap…

	Current Technology	‘Best Practice’ Technology
Inspection	1 /8760 = <0.01% available time.	**Permanent Monitoring (8760/8760)**

EXERTHERM LOADMAP™ 24x7 Low Load Protection

How to solve the problem…

Dynamic Low Load Protection…



Detects & identifies ‘Hidden’ problems



Verifies commissioning data



Verify load switching capability
A + B Scenario



Verify bus temp within IEC / ANSI regs
+
Manufacturer approvals



Asset Integrity Management – long term knowledge of joints

POWER TECHNOLOGIES™ Private Limited

EXERTHERM LOADMAP™ 24x7 Low Load Protection
EXERTHERM™ 24x7 Thermal Monitoring

Benefits of Exertherm®....

Continuous Thermal Monitoring with dynamic low load protection has addressed the challenges of the actual versus perceived levels of protection. Benefits include…



Risk Mitigation / Reduction

Operator + Facility Safety

Condition Based Maintenance

Asset Integrity Management

Financial

POWER TECHNOLOGIES™ Private Limited

The Solution – 24x7 Thermal Monitoring

EXERTHERM™
24x7 Thermal Monitoring

Features & Benefits:

Sensors Inside

LoadMap

Real-time Data 24x7

Improved Maintenance



Data is Integrated

Lifetime Calibration

Pre-set Alarms

Increased Safety

Trend Analysis

QHi - Group SYSTEMS DIVISION

POWER TECHNOLOGIES Private Limited

EXERTHERM™
24x7 Thermal Monitoring

Global Mission Critical Acceptance…

















































Exertherm® 24x7 Thermal Monitoring is the missing link between **Power Reliability** and **Facility Safety**



POWER TECHNOLOGIES™ Private Limited

EXERTHERM™
24x7 Thermal Monitoring

EXERTHERM LOADMAP™
24x7 Low Load Protection

Thank You



QHi - Group
SYSTEMS DIVISION

POWER TECHNOLOGIES™
Private Limited