Exertherm® MCC Modbus Solution (MMS)
Data Sheet (also applies to V2 units)

EXERTHERM®
24x7 Thermal Monitoring

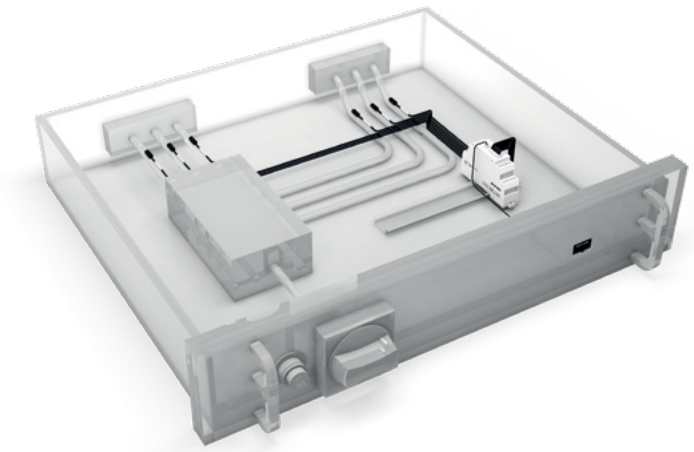
System overview

Within the electrical infrastructure the critical Motor Control Centres (MCC) represent a major source of failure. These failures are caused by a number of different factors including:

- the impact of constant thermal cycling on the joints;
- weakening of spring-type connectors (jaws);
- the high number of site made terminations; and
- the effect of these factors is multiplied by difficulty in maintaining these locations.

As the world leader in thermal monitoring of electrical and mechanical infrastructure we developed the unique Exertherm MCC Modbus Solution. This gives you the ability to permanently thermally monitor these critical connections, via specifically designed[1] measurement techniques for this challenging MCC application.

MCC 'In-drawer' Thermal Monitoring



Unique 'in-drawer' solution

Situated completely within the drawer, the thermal Sensors are attached to the incoming and outgoing cables (or busbar) at the rear of the drawer/bucket. The ability of the system to fit within the drawer/bucket is of particular advantage where this is removable. The output from the Sensors is analysed by the MCC Modbus Datacard (MMD) two alarm modes a) failing or compromised terminations and b) phase imbalance.

Key Features

- Quick and Easy fit to any MCC
- Fits inside drawer
- 'In-drawer' solution disconnects & removes with drawer
- Supplied in kit form per MCC drawer
- Multiple sensor looms lengths available
- Warning and Critical thermal alarms
- Phase imbalance alarm for motors
- Monitors critical connections at rear of drawer
- Drawer mounted LED provides local visual condition status
- Dry contact relay alarm enables remote alarm on client network.
- Alarms and Temperature Data available in Modbus protocol for pass through to client system
- Used with Aggregator "gateway" enables network connection of all sensors in MCC column via single modbus device

[1] Patent information available at www.Exertherm.com/patents

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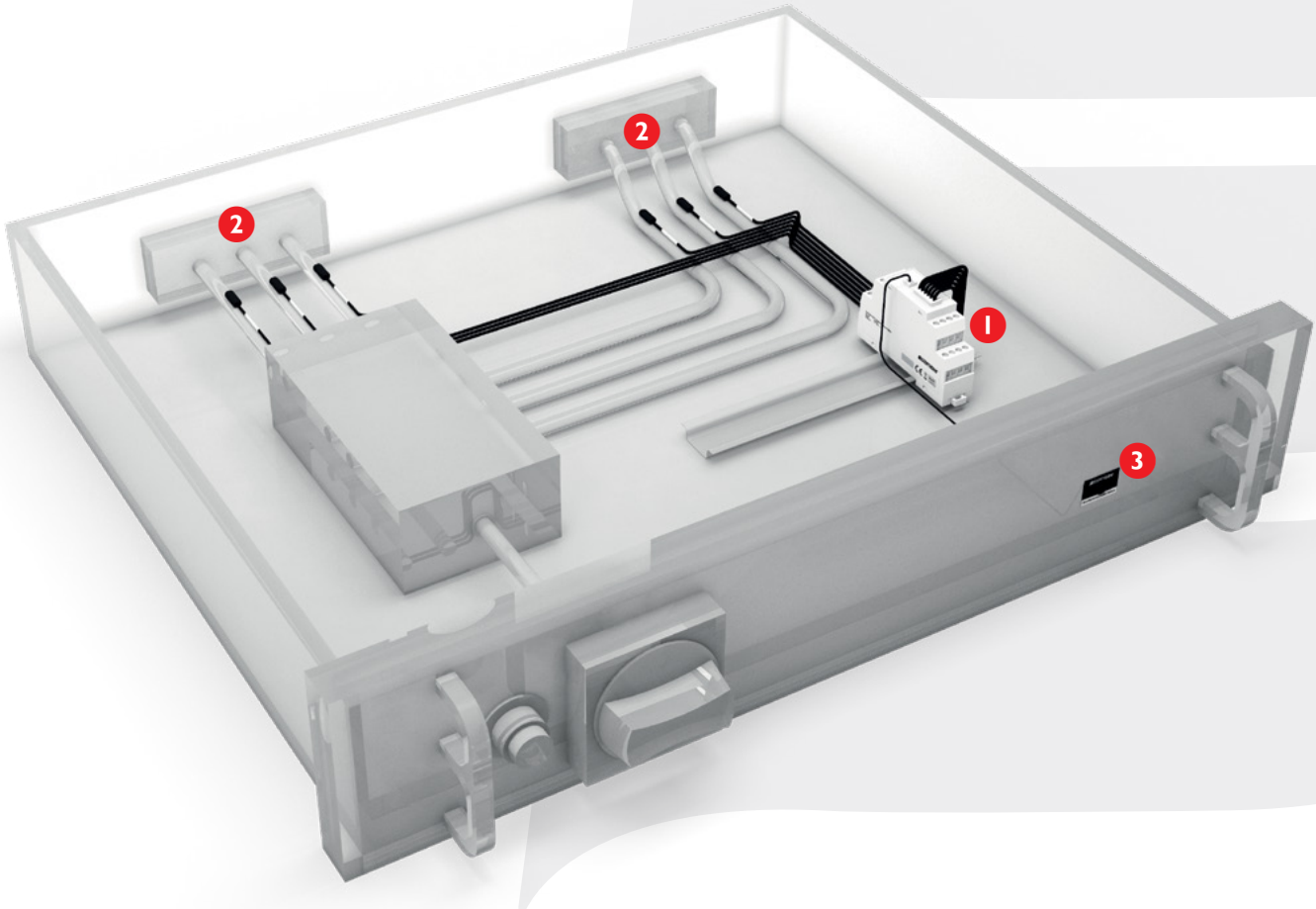
MMS Kit / Components

The Exertherm MMS solution is supplied as a complete 'in-drawer' kit, containing the following components:

1. **MCC Modbus Datacard (MMD):** The data from the Sensors is collected in the DIN rail mounted Datacard and converted to Modbus protocol for onward transmission. It connects to the MCC Sensor Loom (MSL) via a factory fitted connector. It also connects to the LED light unit (MLU) via the factory fitted connector. It requires power of 24VDC. The MMD is pre-programmed with factory default alarm & device address settings but the Client can use the DIP switches to set their own.Connection to a network is quick and easy enabling both remote alarms and pass through of raw data to client host system (e.g. BMS, SCADA) for storage, trending and further integration.
2. **MCC Sensor Loom (MSL):** The MSL contains 6 thermal sensors pre-labelled for connection on the incoming and outgoing cables within the drawer using the high temperature cable ties supplied. The MSL has a factory fitted connector which connects the loom to the MMD. Sensor looms come in optional 30, 60, 100 or 170cm lengths, which can be specified at time of ordering.
3. **MCC LED unit (MLU):** Fitted to the front of the drawer the MLU show the status of the MMS, any alarms and location of the fault.

MCC Modbus Aggregator (MMA): The MMA is a data aggregator and gateway for all MMDs in a single column. The MMA provides a single connection for up to 31 MMDs onto a network. MMA's can be daisy chained together within a switchboard to form a Modbus network which can connect to client network



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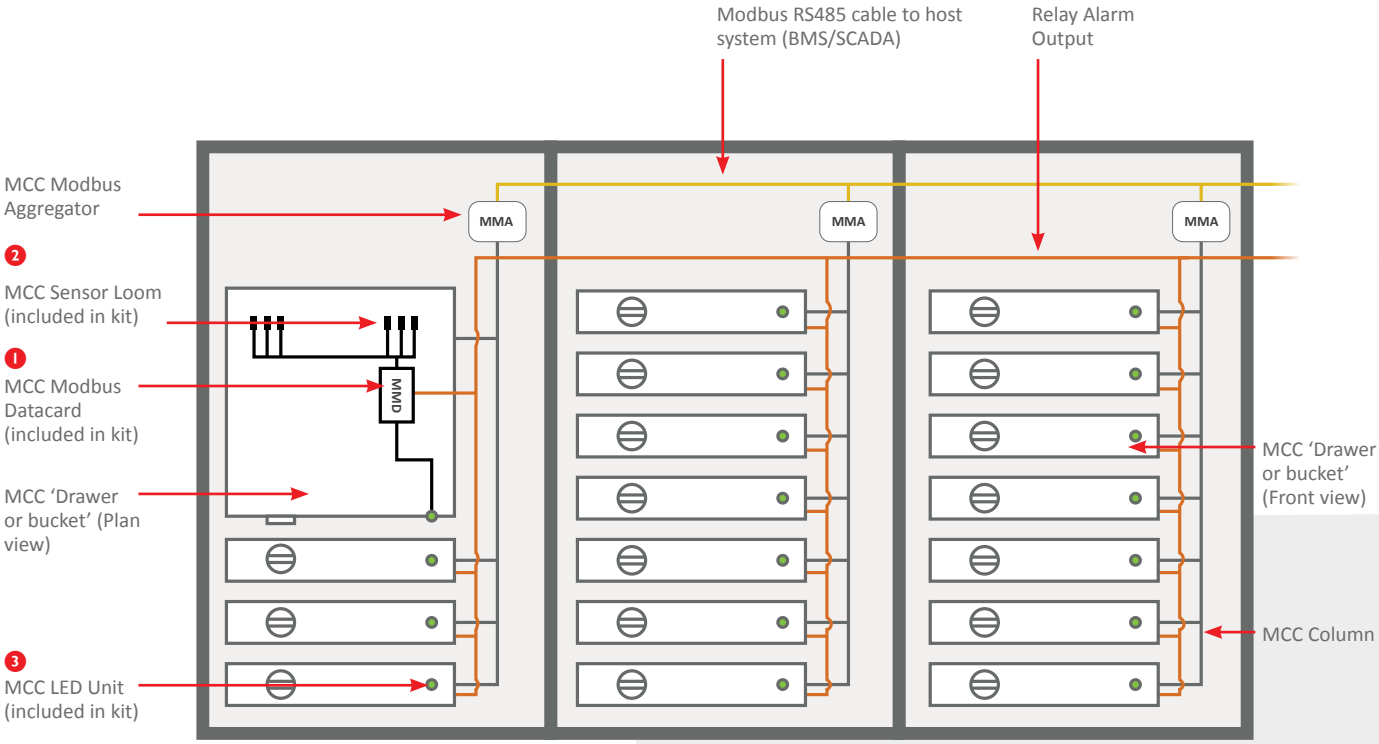
MCC Modbus Solution (MMS) Topology



Alarms

For compromised terminations there are two alarms generated:

- Warning level
- Critical level

There is also a Phase imbalance alarm which is generated when, if connected to circuits controlling motors, there is difference in the temperature between the phases. A 10°C differential can identify a phase imbalance which, if not rectified can half the life of the motor.

These alarms are visible via an external LED (MLU) status light on the front of the drawer, which provides system status, alarm type and location. The alarms are also available via a relay contact (remote alarm) and Modbus communication to a client network.

Connectivity

The connectivity diagram above illustrates:

- Remote dry contact relay wiring (orange)
- Modbus 485 wiring connection from MMD to MMA (black)
- Modbus 485 wiring connection between multiple MMA to SCADA/BMS outstation (yellow)
- The MMA acts as a gateway/single connection point for all MMDs in a column/switchboard (max 31 MMDs per MMA)

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Technical Data

MCC Modbus Datacard (also for MMD -VB v2)	
Input voltage	12 - 24 VDC
Input Voltage Tolerance	±10%
Maximum current consumption	100 mA
Field Bus protocol	Modbus RS485 , 2 wire
IP Rating	30 (not UL evaluated)
Dimensions (mm)	98 x 57 x 17.5
Weight	55g
Mounting	DIN rail
Configuration	via DIP switches
Accuracy	Dependent on accuracy of input devices
Sampling rate	1 s
Housing Material	PA - UL 94 V0
Safety Protection	Class III
Isolation	RS-485 500V
Function	Temperature monitoring, alarm generation
Relay type	KEMET EC2-3/5NU or compatible
Relay function	Normally Open/Normally Closed
Relay Output current (resistive load)	2A
Relay rated voltage	24VAC/24VDC derived from double isolated mains circuit source of Overvoltage Cat. II up to 300Vac
Relay minimum load	10 uA, 10 mVDC
Relay life expectancy	$1 * 10^8$
Relay response time	2 ms
Relay contact protection	For inductive loads

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

MCC LED Unit (MLU)	
LED Viewing Angle	for HLMP-4000 65°
Cable type	UL2464
Cable rating	80°C
Cable length	100 cm

MCC Sensor Loom (MSL)	
Sensor type	Epoxy coating NTC MF52 (or similar)
Output cable	TPE AWG24 (or similar)
Cable Rating	2500V AC 1s
Cable length	Optional 30, 60, 100 & 170cm
Housing Material	TPE
Connector	Molex 43025-1200 or equivalent

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

Cable Tie	
Flammability Rating	UL94 - V2
Military Specification	23190E
Working Temperature	-40 to 120°C (135°C for 1000h)

MCC Modbus Aggregator (MMA)	
Input voltage	12 - 24 VDC
Input Voltage Tolerance	±10%
Maximum current consumption	100 mA
Field Bus protocol	Modbus RS485, 2 wire
IP Rating	30
Dimensions (mm)	98 x 57 x 22.5
Weight	55g
Mounting	DIN rail
Configuration	via DIP switches
Sampling rate	30s
Housing Material	PA - UL 94 V0
Safety Protection	Class III
Isolation	Slave RS-485 500V
Function Modbus	Gateway

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