



				DATASHEET	
TYPE	P000012.02	DESCRIPTION	MotorBOSS Motor Protection Module MK2	D000012.100	1.2.0

SUMMARY

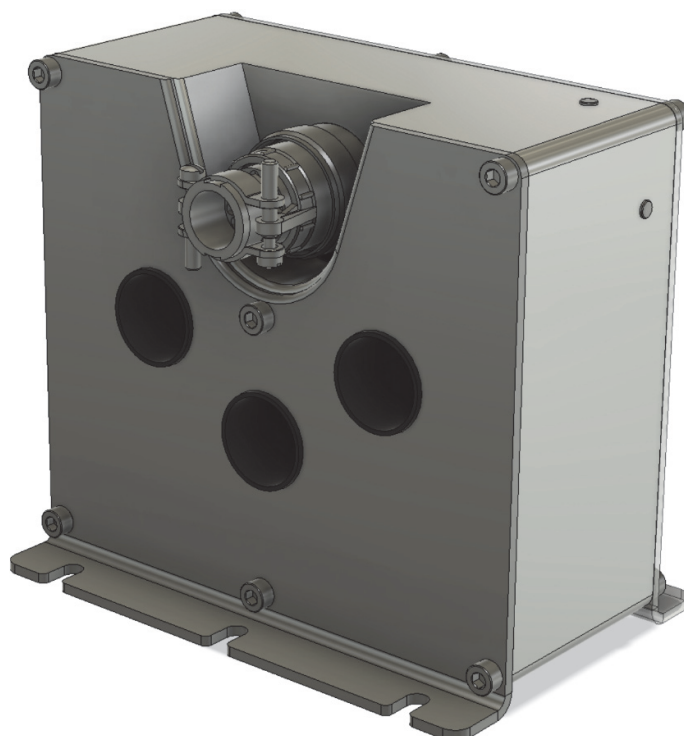
The MotorBOSS Motor Protection Module (MPM) is designed to switch 3-phase contactors used in mobile mining and construction machinery or other heavy stationary plant and to monitor and/or protect the connected load.

Created to easily integrate into any control system with minimal CAN based communication overhead, MotorBOSS is highly configurable.

Two modes of operation allow the users control system to select either 'Managed Mode' (default) using NEMA class thermal rating protection curves and other forms of motor protection or 'Transducer Mode' whereby all measurements are 'reported' allowing the host system to manage motor protection using alternative algorithms.

Instrumented Safety Notes:

MotorBOSS is designed to switch the LINE and NEUTRAL of the contactor coil to provide electronic and electrical redundant switching.



MECHANICAL	
Housing	Plated 6061 aluminium enclosure. Plated mild steel mounting flanges.
Dimensions – Space Claim	(H) 151mm x (W) 167mm x (D) x 112mm TOTAL SPACE CLAIM
Dimensions – Mounting Centres	(D) 95mm x (W) 127mm
Mass	3.3kg
Installation	4 (minimum) or 6 (maximum) x M6 x 12mm
	Recommended Max. Torque = 11Nm
ENVIRONMENTAL	
IP Rating	N/A
Temperature Rating – Component	-25°C..+85°C
Temperature Rating – Ambient Operating	-25°C..+70°C



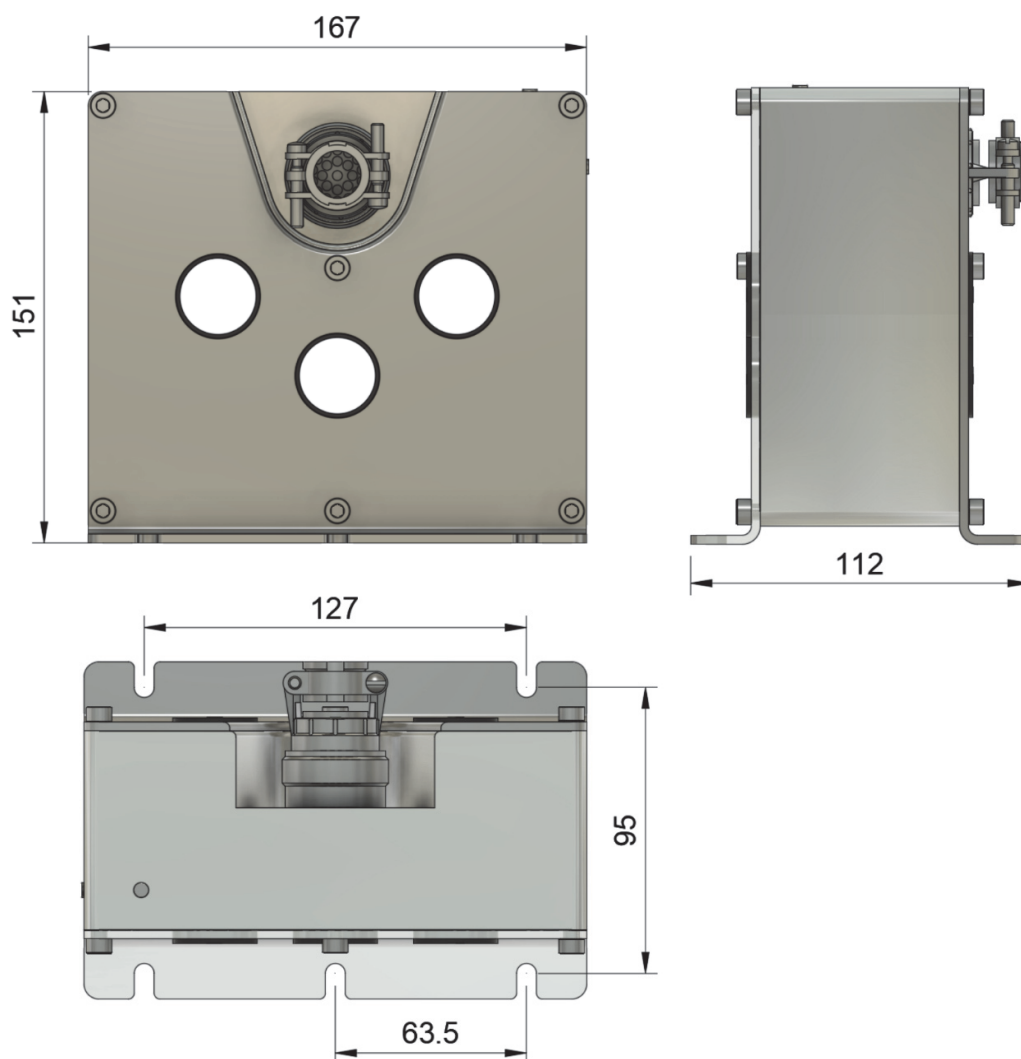
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SUPPLY / INTERFACE	
Voltage / Power	18..30 VDC
Dissipation	< 10 W
Polarity Safe	YES
Network	CAN 2.0B
Coil Voltage	85VAC – 240VAC
INPUTS	
Voltage	1 x Line Sense Input – Triggers Warning at 85VAC (110V) or 190V (240V)
Insulation	To 3.3kV when using insulated conductors
AC/DC Current (50/60Hz)	To 600A using 3 x Fast Response Hall Effect Current Transducers
Resistance	2 x PT100 Temperature
Outputs	
Relays	2 x Safety Contact(s) (Internal)
Relays	2 x Solid State Line / Active Contact(s)
	2 x Solid State Neutral Contact(s)
	All SSR contacts are 240VAC / 2A continuous rated, make/break 1000VA. All Mechanical Safety Contacts are 240VAC / 6A continuous. All internal and/or loom wiring is rated to 300V or higher. Recommended upstream breaker 2P 6A D Curve.
REGION OF ORIGIN	
Design & Manufacture	Australia



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Mechanical Dimensions





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Electrical Interface

The electrical interface comprises one (1) x Souriau 23 pole female connector. The 110V/240V conductors are internally sheathed inside the main loom sheath to provide redundant insulation.

Pin	SIGNAL	DESCRIPTION
X22-A	SUPPLY	110VAC Active (IN)
X22-B	SUPPLY	110VAC Active (OUT)
X22-C	SUPPLY	110VAC Neutral (IN)
X22-D	SUPPLY	110VAC Neutral (OUT)
X22-E	OUTPUT	110VAC Contactor Coil Active
X22-F	OUTPUT	110VAC Contactor Coil Neutral
X22-G	OUTPUT	110VAC Auxiliary Active
X22-H	SUPPLY	24VDC (IN)
X22-J	SUPPLY	24VDC (OUT)
X22-K	SUPPLY	0VDC (IN)
X22-L	SUPPLY	0VDC (OUT)
X22-M	COMMS	CAN HIGH (IN)
X22-N	COMMS	CAN HIGH (OUT)
X22-P	COMMS	CAN LOW (IN)
X22-R	COMMS	CAN LOW (OUT)
X22-S	INPUT	PT100 COMMON SINK
X22-T	INPUT	PT100 #1 SOURCE
X22-U	INPUT	PT100 #2 SOURCE
X22-V	INPUT	NODE ID SINK
X22-W	INPUT	NODE ID SELECT 0
X22-X	INPUT	NODE ID SELECT 1
X22-Y	INPUT	NODE ID SELECT 2
X22-Z	INPUT	NODE ID SELECT 3



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Node ID & Baud Rate

The MotorBOSS's Node ID is determined by a combination of NODE ID pins connected to the NODE ID SINK in accordance with the table below and are terminated in the mating connector assembly.

The default BAUD rate is configured to 125kbs but can be modified internally via dipswitch when necessary and supports 125kb, 250kb, 500kb and 1Mbit.

Notes:

To activate a specific NODE ID SELECT input, it must be connected to X22-V – the NODE ID SINK.

NODE ID	X22-V SINK	X22-Z	X22-Y	X22-X	X22-W
0	WIRE TO				
1	WIRE TO				■
2	WIRE TO			■	
3	WIRE TO			■	■
4	WIRE TO		■		
5	WIRE TO		■		■
6	WIRE TO		■	■	
7	WIRE TO		■	■	■
8	WIRE TO	■			
9	WIRE TO	■			■
10	WIRE TO	■		■	
11	WIRE TO	■		■	■
12	WIRE TO	■	■		
13	WIRE TO	■	■		■
14	WIRE TO	■	■	■	
15	WIRE TO	■	■	■	■

OTHER NOTES:

While NODE ID 0 is a valid address, it is recommended that '0' be considered illegal to promote detection of failure modes – i.e. an open circuit NODE ID SINK.



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CAN 2.0B Message Definition

The following summarizes the CAN communication messages required of the control system to interact with the MotorBOSS.

MSG: CONTROL				
ORIGIN	PLC			
ID	0x0003100 + NODE ID			
FREQ	50ms			
BYTE	MASK	TYPE	DESCRIPTION	UOM
0	0x01	BYTE	COMMAND – Master Enable CLOSE – Active ¹	ON/OFF
	0x02	BYTE	COMMAND – Master Enable CLOSE – Neutral	ON/OFF
	0x04	BYTE	-	-
	0x08	BYTE	-	-
	0x10	BYTE	-	-
	0x20	BYTE	-	-
	0x40	BYTE	-	-
	0x80	BYTE	-	-
1	0x01	BYTE	COMMAND – Contactor CLOSE – Active ^{FORWARD}	ON/OFF
	0x02	BYTE	COMMAND – Contactor CLOSE – Neutral	ON/OFF
	0x04	BYTE	COMMAND – Contactor CLOSE – Active ^{REVERSE}	-
	0x08	BYTE	-	-
	0x10	BYTE	-	-
	0x20	BYTE	-	-
	0x40	BYTE	-	-
	0x80	BYTE	-	-
2	0x01	BYTE	COMMAND – Master Error Override A	ON/OFF
	0x02	BYTE	COMMAND – Master Error Override B	ON/OFF
	0x04	BYTE	COMMAND – Master Error Acknowledge	ON/OFF
	0x08	BYTE	-	-
	0x10	BYTE	-	-
	0x20	BYTE	-	-
	0x40	BYTE	-	-
	0x80	BYTE	COMMAND – Send Config Status	ON/OFF
3	-	BYTE	COMMAND COUNTER ²	0..127
4	-	-	-	-
5	-	-	-	-
6	-	UINT16	CRC ^{MSB}	INTEGER
7	-		CRC ^{LSB}	

¹ The most significant bits of BYTE 0 and BYTE 1 must always be encoded at ZERO to guard against errant memory write. If any of these bits are encoded at ONE, the MPM will be inhibited.

² The control system must increment the COMMAND COUNTER each time a message is transmitted. If the MPM receives a new message with the same COMMAND COUNTER value as that received previously, a CAN INTEGRITY error flag will be set and all outputs disabled. All 'Latching Errors' must be acknowledged by the control system prior to attempting new commands.



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Configuration Messages

The MotorBOSS will not switch to the 'READY' state until it has received ALL 4 configuration messages.

MSG: CONFIGURE #1				
ORIGIN	PLC			
ID	0x0003110 + NODE ID			
FREQ	ON DEMAND			
BYTE	MASK	TYPE	DESCRIPTION	UOM
0	0x01	BYTE	Action – Mode – Managed	ON/OFF
	0x02	BYTE	Action – Mode – Transducer	ON/OFF
	0x04	BYTE	Action – Noise Floor Compensate	ON/OFF
	0x08	BYTE	Action – Motor Was Cooling	ON/OFF
	0x10	BYTE	-	-
	0x20	BYTE	-	-
	0x40	BYTE	-	-
	0x80	BYTE	-	-
1	0x01	BYTE	Setting – Disable Thermal Protection	ON/OFF
	0x02	BYTE	Setting – Disable Stall Protection	ON/OFF
	0x04	BYTE	Setting – Disable Current Imbalance Protection	ON/OFF
	0x08	BYTE	Setting – Disable Under Load Protection	ON/OFF
	0x10	BYTE	-	-
	0x20	BYTE	-	-
	0x40	BYTE	-	-
	0x80	BYTE	Setting – Disable Over/T Protection Sensor #1	ON/OFF
2	0x01	BYTE	Setting – Disable Over/T Protection Sensor #2	ON/OFF
	0x02	BYTE	Setting – Temperature Mode Sensor #1 – Thermostat	ON/OFF
	0x04	BYTE	Setting – Temperature Mode Sensor #2 – Thermostat	ON/OFF
	0x08	BYTE	Setting – Enable Thermal Model Temperature Biasing	ON/OFF
	0x10	BYTE	-	-
	0x20	BYTE	-	-
	0x40	BYTE	-	-
	0x80	BYTE	-	-
3	-	BYTE	Setting – Temperature Trip Sensor #1	10..150 °C
4	-	BYTE	Setting – Temperature Trip Sensor #2	10..150 °C
5	-	BYTE	Setting – Temperature Trip Warning / Reset	1..20 °C
6	-	UINT16	CRC ^{MSB}	INTEGER
7	-		CRC ^{LSB}	



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Setting – Managed Mode

When Managed Mode = 1 (mutually exclusive with Transducer Mode), the MPM will actively protect and automatically control the contact outputs in accordance with motor protection status.

Setting – Transducer Mode

When Transducer Mode = 1 (mutually exclusive with Managed Mode), the MPM disables local motor protection logic thereby allowing the control system to utilize alternative logic.

Setting – Noise Floor Compensate

The MPM incorporates an option to compensate for the electrical noise floor in the hall effect sensor and associated electronic elements allowing the MPM to eliminate nuisance low level readings. This is hardcoded to a level of 3A whereby any current below 3A (when deactivated) will not be reported.

Setting – Temperature Trip Warning / Reset

The MPM incorporates automatic temperature limit trip functionality and warning / reset logic when using Managed Mode. The 'Temperature Trip Warning / Reset' value is used as a 'WARNING' setpoint when temperature is rising towards the 'Temperature Trip' setting. Additionally, after having reached the 'Temperature Trip' setpoint, it is subsequently used as a 'RESET' setpoint requiring temperature to fall below prior to allowing restart.



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TYPE	P000012.02	DESCRIPTION	MotorBOSS Motor Protection Module MK2	D000012.100	1.2.0

MSG: CONFIGURE #2					
ORIGIN	PLC				
ID	0x0003120 + NODE ID				
FREQ	ON DEMAND				
BYTE	MASK	TYPE	DESCRIPTION	UOM	
0	-	BYTE	Setting – Thermal Curve NEMA10, NEMA15, NEMA20, NEMA30	10, 15, 20 or 30	
1	-	BYTE	Setting – Thermal Time Current Coefficient	0..100 %	
2	0x01	BYTE	Setting – Thermal Trip Active	0 or 1	
	0x02	BYTE	-	-	
	0x04	BYTE	-	-	
	0x08	BYTE	-	-	
	0x10	BYTE	-	-	
	0x20	BYTE	-	-	
	0x40	BYTE	-	-	
	0x80	BYTE	-	-	
3	-	BYTE	Setting – Motor Service Factor	100..125 %	
4	-	UINT16	Setting – Motor Full Load Current ^{MSB}	0..300A	
5	-		Setting – Motor Full Load Current ^{LSB}		
6	-	UINT16	CRC ^{MSB}	INTEGER	
7	-		CRC ^{LSB}		

Setting – Thermal Curve

When selecting thermal rating protection ‘curves’, the user should consult motor manufacturer data. Numerous IEEE papers and standards³ provide guidance on thermal rating protection noting that induction motors require protection against cyclic and steady state loads.

When using NEMA curves, a NEMA 10 curve offers the highest level of thermal rating protection but may not be suitable for certain types of motors – FANS and TRACTION motors specifically. For motors that exhibit long acceleration times (FANS are notable examples) or motors that are frequently started/stopped (TRACTION), alternative curves may be required to suit duty and minimize nuisance tripping. The selection of these curves should take into account the motor manufacturer’s thermal damage curves and service factor rating (if defined).

The MPM’s default option is to support NEMA heating curves 10, 15, 20 and 30 and these equate as follows:

Curve	Time
NEMA 10	Trip in 10s @ 6 x FLA ⁴
NEMA 15	Trip in 15s @ 6 x FLA
NEMA 20	Trip in 20s @ 6 x FLA
NEMA 30	Trip in 30s @ 6 x FLA

³ IEEE Paper 1430428 and IEEE Std C37.96

⁴ All quoted NEMA trip times assume start from cold curve.



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IMPORTANT:

Experiencing a thermal rating overload for a motor is an *abnormal* outcome and should not be considered 'routine'. Frequent overloading can reduce winding life by as much as 50%. To improve motor operating life, the MPM implements a slower than standard cooling curve whereby 300 seconds is required to return 50% of Thermal Capacity Used (TCU).

Setting – Thermal Cooling

The control system *must* continuously store the flag 'STATUS – TRIP THERMAL RATING EXCEEDED' (refer STATUS #1 message) to record that a cooling period is active. If power is lost during a cooling period, the control system restores this information accordingly along with the Thermal Time Current Coefficient.

Setting – Thermal Time Current Coefficient

At power up, the MPM defaults the 'Time Current Coefficient' value to 100%. When using Managed Mode, the control system *must* continuously store this dynamically changing value (published in the MOTOR CURRENTS message) in non-volatile memory during operation.

When power is applied and 'startup' configuration is executed, the PLC must restore this value to the MPM.

This approach also allows the control system to monitor the 'real' time difference between power down and power up and compensate the TCC value accordingly.

Setting – Motor Service Factor

When selecting the motor service factor, this value is typically derived from motor manufacturer data. Where no data is available, the 'service factor' should be set to 100% unless temperature biasing is applied. For temperature biasing to be utilized, PT100s must be installed in the motor.

Setting – Motor Full Load Current

Each motor has an associated 'nameplate' rating designating its operational characteristics. One of the most important ratings is Full Load Current which is expressed in AMPS and determines the maximum current at which the motor can run continuously without overload.



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TYPE	P000012.02	DESCRIPTION	MotorBOSS Motor Protection Module MK2	D000012.100	1.2.0

MSG: CONFIGURE #3					
ORIGIN		PLC			
ID		0x0003130 + NODE ID			
FREQ		ON DEMAND			
BYTE	MASK	TYPE	DESCRIPTION	UOM	
0	-	UINT16	Setting – Stall Trip Current ^{MSB}	0..550 A	
1	-		Setting – Stall Trip Current ^{LSB}		
2	-	UINT16	Setting – Stall Acceleration Period ^{MSB}	0..2000 ms	
3	-		Setting – Stall Acceleration Period ^{LSB}		
4	-	UINT16	Setting – Stall Trip Period ^{MSB}	0..2000 ms	
5	-		Setting – Stall Trip Period ^{LSB}		
6	-	UINT16	CRC ^{MSB}	INTEGER	
7	-		CRC ^{LSB}		

Setting – Stall Trip Current

Stall Trip is designed to detect a stalled rotor typically due to either mechanical or external forces. When this current level is reached, the MPM will deactivate contactor outputs if the acceleration period and stall trip period timers have expired.

Setting – Stall Acceleration Period

Induction motors characteristically have an acceleration period whereby at the application of power to the stator windings, the rotor needs an amount of time to accelerate to rated speed – typically within 2 seconds with the exception of motors with high inertia loads (e.g. FANS).

During this acceleration period, current draw can be in the order of 6-10 times the full load rating. As such, the MPM includes the option to configure the acceleration period during which time, the typical inrush current can be safely ignored.

Setting – Stall Trip Period

Once the motor's acceleration period has expired, the MPM will continuously compare load current to the 'Stall Trip Current' setting. When exceeded, the MPM will deactivate the contactor outputs after the 'Stall Trip Period' timer has expired.



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MSG: CONFIGURE #4					
ORIGIN		PLC			
ID		0x0003140 + NODE ID			
FREQ		ON DEMAND			
BYTE	MASK	TYPE	DESCRIPTION	UOM	
0	-	UINT16	Setting – Under Load Trip Current ^{MSB}	0..550 A	
1	-		Setting – Under Load Trip Current ^{LSB}		
2	-	UINT16	Setting – Under Load Trip Period ^{MSB}	1000..5000 ms	
3	-		Setting – Under Load Trip Period ^{LSB}		
4	-	BYTE	-	-	
5	-	BYTE	-	-	
6	-	UINT16	CRC ^{MSB}	INTEGER	
7	-		CRC ^{LSB}		

Setting – Under Load Trip Current

Under Load Trip is designed to detect an unexpectedly low current. This value is commonly specified on the motor nameplate but where not available, can be determined by disconnecting the shaft load and monitoring the reported current when running. This protection feature ensures that the motor is operating within expected factory tolerance.

It additionally manages for risks associated with operating motor contactors while the line supply is isolated given the potential for an unexpected motor start if the upstream line isolation is re-engaged while powered.

Setting – Under Load Trip Period

When running, the MPM will continuously compare load current to the 'Under Trip Current' setting. When load is reporting below this setting, the MPM will deactivate the contactor outputs after the 'Under Current Trip Period' timer has expired.



				DATASHEET	
TYPE	P000012.02	DESCRIPTION	MotorBOSS Motor Protection Module MK2	D000012.100	1.2.0

MSG: CONFIGURE #5					
ORIGIN		PLC			
ID		0x0003150 + NODE ID			
FREQ		ONCE ON POWER UP			
BYTE	MASK	TYPE	DESCRIPTION	UOM	
0	-	UINT32	Lot Identification Number ^{MSB}	INTEGER	
1	-		Lot Identification Number		
2	-		Lot Identification Number		
3	-		Lot Identification Number ^{LSB}		
4	-	BYTE	Lot Identification Number Sequence	0..100	
5	-	UINT24	ID HASH KEY ^{MSB}	INTEGER	
6	-		ID HASH KEY		
7	-		ID HASH KEY ^{LSB}		

Setting – Lot Identification Number

This message is intended for factory use only to assign a 'Lot ID Number'. The MPM will only accept this message once after power up and therein reject all subsequent messages until power is cycled. To set or change the Lot ID Number, the 24bit 'ID HASH KEY' must correlate with the 'Lot ID Number' which is generated with a dedicated factory utility tool.



				DATASHEET	
TYPE	P000012.02	DESCRIPTION	MotorBOSS Motor Protection Module MK2	D000012.100	1.2.0

MSG: STATUS #1				
ORIGIN	MotorBOSS			
ID	0x0003200 + NODE ID			
FREQ	100ms			
BYTE	MASK	TYPE	DESCRIPTION	UOM
0	0x01	BYTE	Status – Mode Managed	FLAG
	0x02	BYTE	Status – Mode Transducer	FLAG
	0x04	BYTE	Status – Configuration	FLAG
	0x08	BYTE	Status – Ready	FLAG
	0x10	BYTE	Status – Running	FLAG
	0x20	BYTE	Status – Override Requested	FLAG
	0x40	BYTE	-	-
	0x80	BYTE	-	-
1	0x01	BYTE	Status – Warning Module Temperature	FLAG
	0x02	BYTE	Status – Warning 110V Supply Low or Missing	FLAG
	0x04	BYTE	Status – Warning Temperature Sensor #1	FLAG
	0x08	BYTE	Status – Warning Temperature Sensor #2	FLAG
	0x10	BYTE	-	-
	0x20	BYTE	-	-
	0x40	BYTE	-	-
	0x80	BYTE	-	-
2	0x01	BYTE	Status – Trip Active	FLAG
	0x02	BYTE	Status – Trip Thermal Rating Exceeded	FLAG
	0x04	BYTE	Status – Trip Stall	FLAG
	0x08	BYTE	Status – Trip Current Imbalance	FLAG
	0x10	BYTE	Status – Trip Under Load	FLAG
	0x20	BYTE	Status – Trip Over Temperature #1	FLAG
	0x40	BYTE	Status – Trip Over Temperature #2	FLAG
	0x80	BYTE	-	-
3	0x01	BYTE	Requested – Close Master Enable Active	FLAG
	0x02	BYTE	Requested – Close Master Enable Neutral	FLAG
	0x04	BYTE	Requested – Close Contactor Active ^{FORWARD}	FLAG
	0x08	BYTE	Requested – Close Contactor Neutral	FLAG
	0x10	BYTE	Requested – Close Contactor Active ^{REVERSE}	FLAG
	0x20	BYTE	-	-
	0x40	BYTE	-	-
	0x80	BYTE	-	-
4	0x01	BYTE	Status – Master Enable Active Closed	FLAG
	0x02	BYTE	Status – Master Enable Neutral Closed	FLAG
	0x04	BYTE	Status – Contactor Active Closed ^{FORWARD}	FLAG
	0x08	BYTE	Status – Contactor Neutral Closed	FLAG
	0x10	BYTE	Status – Contactor Active Closed ^{REVERSE}	FLAG
	0x20	BYTE	-	-
	0x40	BYTE	-	-
	0x80	BYTE	-	-



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MSG: STATUS #1 Continued				
ORIGIN	MotorBOSS			
ID	0x0003200 + NODE ID			
FREQ	100ms			
BYTE	MASK	TYPE	DESCRIPTION	UOM
5	0x01	BYTE	Error – Error Active	FLAG
	0x02	BYTE	Error – CAN Timeout	FLAG
	0x04	BYTE	Error – CAN Packet Integrity	FLAG
	0x08	BYTE	Error – Configuration Invalid	FLAG
	0x10	BYTE	Error – Command Invalid	FLAG
	0x20	BYTE	Error – Node ID Changed	FLAG
	0x40	BYTE	Error – Node ID Illegal	FLAG
	0x80	BYTE	Error – Module Temperature High	FLAG
6	0x01	BYTE	Error – Critical ADC Faulty	FLAG
	0x02	BYTE	Error – Critical Module Temperature Faulty	FLAG
	0x04	BYTE	Error – Critical Hall Effect Sensor 1 Faulty	FLAG
	0x08	BYTE	Error – Critical Hall Effect Sensor 2 Faulty	FLAG
	0x10	BYTE	Error – Critical Hall Effect Sensor 3 Faulty	FLAG
	0x20	BYTE	Error – Critical PT100 #1 – Faulty	FLAG
	0x40	BYTE	Error – Critical PT100 #2 – Faulty	FLAG
	0x80	BYTE	-	-
7	0x01	BYTE	Error – Critical Watchdog Reset	FLAG
	0x02	BYTE	Error – Firmware Issue Type #1	FLAG
	0x04	BYTE	Error – Firmware Issue Type #2	FLAG
	0x08	BYTE	-	-
	0x10	BYTE	-	-
	0x20	BYTE	-	-
	0x40	BYTE	-	-
	0x80	BYTE	-	-

Status – Mode Managed

This flag indicates that the MPM has been successfully configured to operate in ‘MANAGED MODE’ whereby the MPM will manage motor protection. This flag is mutually exclusive with ‘TRANSDUCER MODE’.

Status – Mode Transducer

This flag indicates that the MPM has been successfully configured to operate in ‘TRANSDUCER MODE’ whereby the MPM will only monitor motor operation. This flag is mutually exclusive with ‘MANAGED MODE’.

Status – Configuration

This flag indicates that the MPM is undergoing or waiting for Configuration. The MPM will remain in ‘Configuration’ until all configuration messages have been received and authenticated as valid.



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Status – Ready

This flag indicates that the MPM has completed configuration and is 'READY' to command.

Status – Running

This flag indicates that the MPM has closed at least one relay contact.

Status – Override Requested

This flag indicates that the MPM has acknowledged the command to 'Override' any non-critical trip conditions.

Status – Override Requested

This flag indicates that the MPM has acknowledged the command to 'Override' any non-critical trip conditions.

Status – Warning Module Temperature

This flag indicates that the MPM has reached the WARNING limit for module temperature which is 65C.

Status – Warning 110V Supply Low or Missing

This flag indicates that the MPM has determined that the 'rated' control voltage is below minimum threshold. (85V for 110V variants or 185V for 240V variants). Note: The MPM can still be commanded to close contacts under these conditions.

Status – Warning Temperature Sensor #1

This flag indicates that the MPM is enabled to monitor temperature on RTD #1 and has determined that the RTD temperature is above the configured WARNING threshold.

Status – Warning Temperature Sensor #2

This flag indicates that the MPM is enabled to monitor temperature on RTD #2 and has determined that the RTD temperature is above the configured WARNING threshold.



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TYPE	P000012.02	DESCRIPTION	MotorBOSS Motor Protection Module MK2	D000012.100	1.2.0

MSG: MANUFACTURING				
ORIGIN	MotorBOSS			
ID	0x0003210 + NODE ID			
FREQ	1 Second			
BYTE	MASK	TYPE	DESCRIPTION	UOM
0	-	BYTE	Version Major	0..99
1	-	BYTE	Version Minor	0..99
2	-	BYTE	Version Defect	0..99
3	-	UINT32	Lot Identification Number ^{MSB}	INTEGER
4	-	UINT32	Lot Identification Number	
5	-	UINT32	Lot Identification Number	
6	-	UINT32	Lot Identification Number ^{LSB}	
7	-	BYTE	Lot Identification Number Sequence	INTEGER



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TYPE	P000012.02	DESCRIPTION	MotorBOSS Motor Protection Module MK2	D000012.100	1.2.0

MSG: MOTOR CURRENTS					
ORIGIN		MotorBOSS			
ID		0x0003220 + NODE ID			
FREQ		100ms			
BYTE	MASK	TYPE	DESCRIPTION	UOM	
0	-	UINT16	Phase A Current ^{MSB}	0..600 A	
1	-		Phase A Current		
2	-	UINT16	Phase B Current ^{MSB}	0..600 A	
3	-		Phase B Current		
4	-	UINT16	Phase C Current ^{MSB}	0..600 A	
5	-		Phase C Current		
6	-	UINT8	Thermal Time Current Coefficient	0..100 %	
7	-	-	-	-	

MSG: TEMPERATURE					
ORIGIN		MotorBOSS			
ID		0x0003230 + NODE ID			
FREQ		500ms			
BYTE	MASK	TYPE	DESCRIPTION	UOM	
0	-	INT16	PT100 Temperature #1 ^{MSB}	°C	
1	-		PT100 Temperature #1		
2	-	INT16	PT100 Temperature #2 ^{MSB}	°C	
3	-		PT100 Temperature #2		
4	-	UINT16	PT100 Resistance #1 ^{5 MSB}	Ω	
5	-		PT100 Resistance #1		
6	-	UINT16	PT100 Resistance #2 ^{MSB}	Ω	
7	-		PT100 Resistance #2		

⁵ Resistance is transmitted in x 10 format where 1000 = 100.0 ohms.



				DATASHEET	
TYPE	P000012.02	DESCRIPTION	MotorBOSS Motor Protection Module MK2	D000012.100	1.2.0

MSG: STATUS CONFIG					
ORIGIN		MPM			
ID		0x0003240 + NODE ID			
FREQ		500ms CONDITIONAL			
BYTE	MASK	TYPE	DESCRIPTION	UOM	
0	-	UINT16	Configure #1 Message CRC ^{MSB}	INTEGER	
1	-		Configure #1 Message CRC		
2	-	UINT16	Configure #2 Message CRC ^{MSB}	INTEGER	
3	-		Configure #2 Message CRC		
4	-	UINT16	Configure #3 Message CRC ^{MSB}	INTEGER	
5	-		Configure #3 Message CRC		
6	-	UINT16	Configure #4 Message CRC ^{MSB}	INTEGER	
7	-		Configure #4 Message CRC		

The STATUS CONFIG message is transmitted whenever the 'Send Config Status' command is set or when CONFIG #1, #2, #3 or #4 messages are received. Each of the respective CONFIG message CRCs are included in this message to provide the PLC with confirmation that ALL the CONFIG messages have been received as expected by echoing the respective configuration message CRC segments.

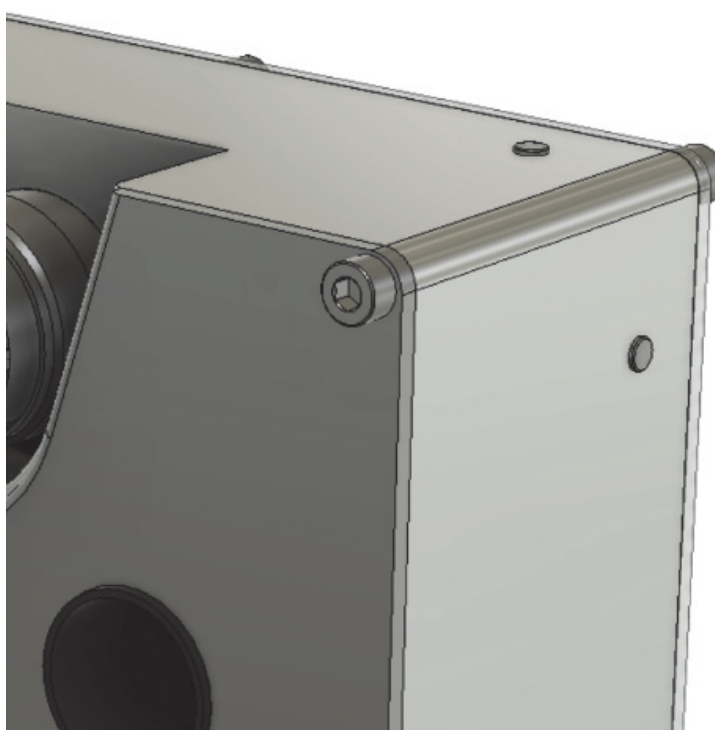


				DATASHEET	
TYPE	P000012.02	DESCRIPTION	MotorBOSS Motor Protection Module MK2	D000012.100	1.2.0

Control Basics

The MPM incorporates an external LED mounted TOP and SIDE that indicates basic module status and relay activation status.

PRIORITY	LED INDICATION	STATE CONDITION
1	RED – FLASH	CRITICAL FAULT CONDITION. INTERNAL FAULT CONDITION, REQUIRES SERVICING.
2	RED	OFFLINE. ATLEAST ONE MISSING MESSAGE FROM THE PLC.
3	GREEN – FLASH	ONLINE – CONFIGURATION PENDING. WAITING FOR PLC TO COMPLETED MPM CONFIGURATION.
4	MAGENTA	ONLINE – CONFIGURATION COMPLETE. COMMANDED to OPEN <i>BUT</i> SWITCHING SUPPLY LOW OR MISSING. (WARNING)
5	GREEN	ONLINE – CONFIGURATION COMPLETE. COMMANDED to OPEN, SWITCHING SUPPLY AVAILABLE / READY.
6	BLUE	ONLINE – CONFIGURATION COMPLETE. COMMANDED to CLOSE





				DATASHEET	
TYPE	P000012.02	DESCRIPTION	MotorBOSS Motor Protection Module MK2	D000012.100	1.2.0

Recommendation

To promote higher diagnostic coverage for safety rated applications, it is recommended the host PLC sequence the command of the ACTIVE and NEUTRAL relays to obtain a continuous proof check of operation by monitoring actuator response. This approach enables the host to include this component in a safety instrumented system.

It is also recommended that the 110V supply be upstream protected with a 2P 6A C-Curve circuit breaker to ensure the switching contact make/break ratings are not exceeded in the event of downstream short-circuit.

Monitoring – Voltage

The MotorBOSS monitors the 110VAC or 240VAC supply. When voltage is below the expected minimum (85VAC or 200VAC respectively) a WARNING is flagged in the STATUS message for the Host PLC to action as required.

Monitoring – PT100 Temperature

The MotorBOSS is designed to deliberately limit measurable temperature range to between -30°C and 190°C for the purpose of accuracy and intended application.

Monitoring – Thermostats

When motors (or other devices) have thermostats installed in lieu of PT100 devices, the control system integrator must install a 100 Ohm 1W, 1% resistor in series to support monitoring operation.

In this instance, a value of 0°C or 100ohms (slightly higher taking into account impedance across the thermostat) will be reported when the thermostat is closed (normal operation) and a TRIP condition will be reported if the thermostat has opened due to temperature (or wiring based fault). Additionally, the control system must configure the MPM to use 'Thermostat Mode' as required otherwise an RTD ERROR will be reported.

Other Notes:

The PT100 supply is infallibly limited to deliver less than 1mA of source current (less than that used for data lines) and is ground referenced making it compliant with the requirements of QLD Recognised Standard 1 with respect to ELV Earth Leakage.

Zero Crossing Solid State Relays (SSRs)

The MotorBOSS incorporates zero-crossing solid state relays. Accordingly, the switching of the relay from a non-conducting to a conducting state occurs when AC voltage reaches the zero-crossing point of the sine-wave. This approach *minimises* surge current through the coil load during initial operation (increasing coil life) and reduces the level of conducted emissions that are placed back onto the supply.

IMPORTANT NOTICE

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