MLC 9000+ BUS COMMUNICATIONS MODULE INSTALLATION MANUAL 59325-1

⚠️ **CAUTION:** Installation and configuration should be performed only by personnel who are technically competent to do so. Local Regulations regarding electrical installation & safety must be observed.

1. INSTALLATION - MECHNICAL

1.1 GENERAL DESCRIPTION

The MLC 9000+ System - comprising one or more Bus Module each with up to eight Loop Modules - is designed for installation in an enclosure which is sealed against the ingress of dust and moisture. The enclosure must contain sufficient length of 35mm Top-Hat DIN mounting rail to accommodate the system modules (see below) plus an extra 50mm of rail to permit modules to be separated for removal/replacement. The space required by the MLC 9000+ modules is shown below.
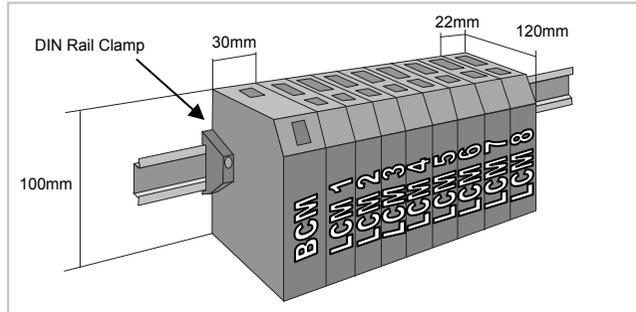
NOTE: An additional 60mm of space is required above and below the system modules to permit ventilation and to accommodate wiring bend radii to enclosure trunking or conduits. Allow sufficient slack in all cables inside the trunking to permit "hot" swapping of modules (i.e. modules to be removed/replaced whilst the system is under power).

⚠️ **WARNING:** The maximum of eight Loop Module's per Bus Module must not be exceeded.

It is recommended that (a) some means of preventing unauthorised access to the enclosure interior (e.g. lockable doors) is provided, and (b) that a suitable DIN rail clamp be used, once the MLC 9000+ system is fully installed, to prevent the system from moving on the DIN rail.

1.2 VENTILATION

Under normal circumstances, no forced ventilation is required and the enclosure need not contain ventilation slots, but temperatures within the enclosure must be within specification.

1.3 INSTALLING THE BUS MODULE

The MLC 9000+ system is installed in the following order:
1. Bus Communications Module
2. Interconnect Module(s)
3. First Loop Controller Module   } Refer to Loop Module installation
4. Second Loop Controller Module   } instructions
5. Third Loop Controller Module etc..... }

To install the Bus Module follow the instructions below:

⚠️ **CAUTION:** Ensure that the power has been removed from all equipment currently in the enclosure before installing the Bus Module
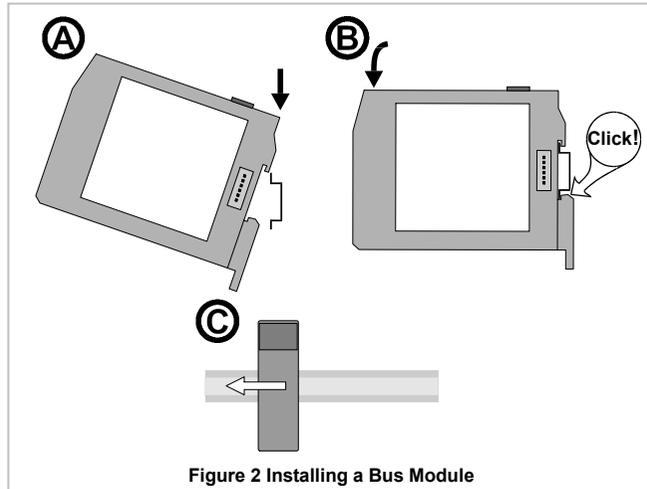
Figure 2 Installing a Bus Module

1.4 REMOVING THE BUS MODULE

⚠️ **CAUTION:** Ensure that the power has been removed from all equipment currently in the enclosure before uninstalling the Bus Module
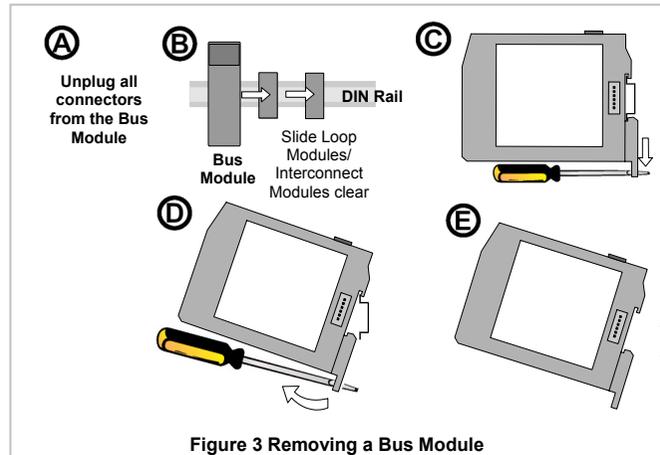
Figure 3 Removing a Bus Module

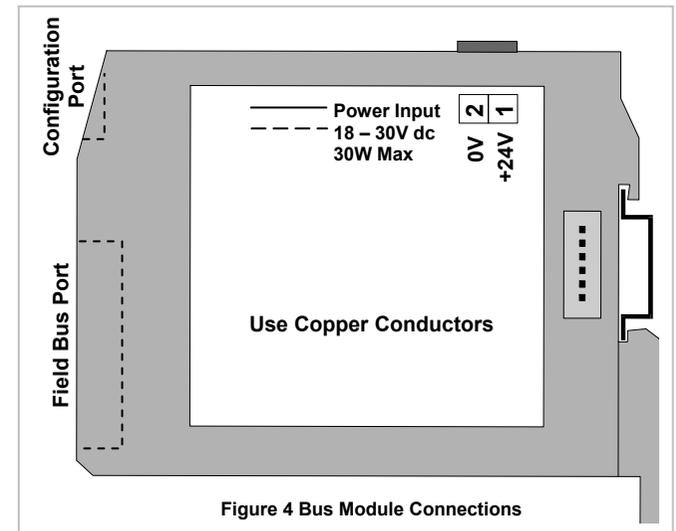## 2. INSTALLATION – ELECTRICAL (GENERAL)

Figure 4 Bus Module Connections

2.1 POWER INPUT

The system requires a power input of 18 - 30V DC and has a maximum power consumption of 30W. It is recommended that the power supply is connected via a two-pole isolating switch (preferably situated near the System) and a 2A slow-blow fuse or a 2A Type C MCB (see Figure 5).
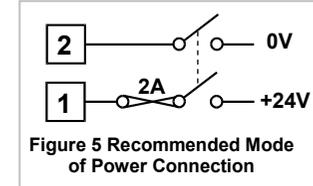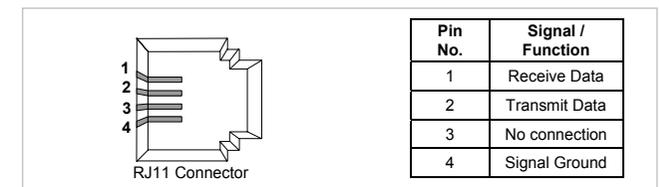
Figure 5 Recommended Mode of Power Connection

⚠️ **CAUTION:** The system is designed for installation in an enclosure, which provides adequate protection against electric shock. Local regulations regarding electrical installation and safety should be rigidly observed. Consideration should be given to prevention of access to the power terminations by unauthorised personnel.

2.2 CONFIGURATION PORT

This connects the Bus Module to a local PC for configuration. The configuration port uses the point to point connection specification RS232. Pin connections are shown on the right. This port can only be used for configuration purposes only using the MLC 9000+ configuration software. (Part number MLC 9000-AN111)

| Pin No.	Signal / Function
1	Receive Data
2	Transmit Data
3	No connection
4	Signal Ground

RJ11 Connector

3.1 MODBUS – BM220-MB Bus Module only

This connects the Bus Module to a MODBUS master device (local operator interface/display or multi-drop PC operator and configuration network). The Modbus Fieldbus port uses the multi-drop connection connection standard RS485. Pin connections are shown on the right. The Common connection is provided for termination of screened (shielded) cable.

- ◼ (Red) Tx/Rx+ (A)
- ☐ (White) Tx/Rx– (B)
- ◼ (Green) Common

### 3.2 CANopen/DEVICENET – BM230-CO or DN Bus Modules only

Both the CANopen and DeviceNet fieldbus protocols use the same CAN hardware standard. When installed with the CANopen firmware (BM230-CO) the Bus Module can be connected to a CANopen enabled master device. CANopen compliant cables and connectors must be used when connecting to the network. When installed with the DeviceNet firmware (BM230-DN) the Bus Module can be connected to a DeviceNet enabled master device. DeviceNet compliant cables and connectors must be used when connecting to the network. Both CANopen and DeviceNet networks must be terminated with 121ohm resistors between CAN_L and CAN_H at each physical end of the CAN network. A separate 24V power supply should be used to power the network between V+ and V-. Terminal connections are shown on the right.
The **SHIELD** connection is provided for termination of screened (shielded) cable.

- ◼ V+ (Red)
- ☐ CAN_H (White)
- SHIELD
- ◼ CAN_L (Blue)
- ◼ V- (Black)
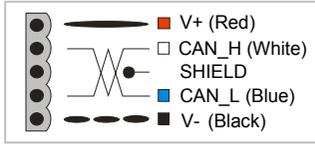
Note: Most DeviceNet communication problems are caused by incorrect wiring and power supply selection if any problems are encountered the DeviceNet website has guidelines on wiring a DeviceNet system. (www.odva.org)

3.3 PROFIBUS – BM240-PB Bus Module only

This enables the Bus Module to be connected to a PROFIBUS-DP master device (local operator interface/display, PLC or multi-drop PC operator and configuration network). PROFIBUS compliant cables and connectors must be used when connecting to a network. Pin connections are shown on the right. For more information on PROFIBUS consult the PROFIBUS website (www.profibus.com)

- 3 **RxD/TxD+**
- 4 **CNTR-P**
- 5 **DGND**
- 6 **VP**
- 7 **RxD/TxD-**
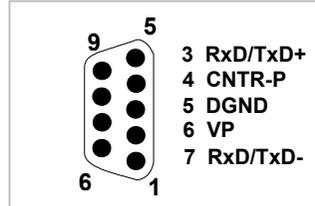
3.4 ETHERNET/IP & MODBUS TCP/IP – BM250-MT or EI Bus Modules only

This connects the Bus Module to an Ethernet/IP or MODBUS TCP/IP enabled master device (local operator interface/display, PLC or multi-drop PC operator and configuration network). The connection is via RJ45 connector that conforms to CAT 5 cabling and 568A, 568B wiring sequences. The BM250 supports 10BaseT and 100BaseT.

Pin No.	568A	568B
1	WHITE/green	WHITE/orange
2	GREEN/white	ORANGE/white
3	WHITE/orange	WHITE/green
4	BLUE/white	BLUE/white
5	WHITE/blue	WHITE/blue
6	ORANGE/white	GREEN/white
7	WHITE/brown	WHITE/brown
8	BROWN/white	BROWN/white

For full information on configuration of the communication interface consult the MLC 9000+ User Manual (part number 59327).

GENERAL	
Configuration Port: (All Bus Modules)	This is a local port for connection to an RS232 port on a PC for local operator configuration. It has EIA-232-E (RS232) compatible inputs and outputs for TxD and RxD and provides facilities via the MLC 9000+ Workshop Software to configure the MLC 9000+ system.
MODBUS Port: (BM220-MB only)	This is an optional RS485 port for connection to a MODBUS master device. Data rate and format are configurable via the RS232 port. MODBUS RTU protocol is supported, using an RS485 physical layer. The load is no greater than one-quarter unit load. The data rate is selectable from 4800, 9600 or 19200 Baud. It is factory-set to 9600 Baud. Parity is selectable from none, even or odd. The base address can be set in the range 1 - 247 (default = 96) Node addressing, data rate and character format are selectable via the MLC 9000+ Workshop Software running on the PC connected to the RS232 Port.
DeviceNet Port: (BM230-DN only)	This is a port for connection to a DeviceNet master device. Data rate and MAC ID are configurable via the configuration port. The data rate is selectable from (in kbps) 125, 250 or 500. It is factory-set to 125kbps. The MAC ID can be set in the range 0 - 63 (default = 63).
PROFIBUS Port: (BM240-PB only)	This port is for connection to a PROFIBUS DP network. The PROFIBUS data rate is automatically detected and set by the Bus Module. The PROFIBUS interface can communicate at the following data rates; 9.6kbps, 19.2kbps, 45.45kbps, 93.75kbps, 187.5kbps, 500kbps, 1.5Mbps, 3Mbps, 6Mbps, 12Mbps. PROFIBUS address and byte order are configurable via the RS232 port. The PROFIBUS address can be set in the range 0 to 126 (126=default).
Ethernet/IP Port: (BM250-EI only)	This port is for connection to an Ethernet/IP network. 10/100BaseT, user definable IP address, MAC ID 0 – 63 (Default ID 63) Configured using the MLC9000+ Workshop software, via the configuration port
MODBUS/TCP Port: (BM250-MT)	This port is for connection to an MODBUS/TCP network 10/100BaseT, user definable IP address Configured using the MLC9000+ Workshop software, via the configuration port
CANopen Port: (BM230-CO)	This port is for connection to an CANopen network Data Rate 125kbps, 250kbps, 500kbps or 1024kbps. MAC ID 1 – 127 (Defaults 125kbps, ID 1). Configured using the MLC 9000+ Workshop software, via the configuration port
Supply Voltage	18 to 30V DC (including ripple) 30W maximum

ENVIRONMENTAL	
Operating Conditions	Ambient Temperature: 0°C to 55°C Relative Humidity: 30% to 90% non-condensing
Storage Conditions	Ambient Temperature: -20°C to 80°C Relative Humidity: 30% to 90% non-condensing

APPROVALS MODBUS	
EMC standard	EN61326-1.
Safety	Complies with EN61010-1 and UL 3121-1.
Certification	Awaiting Certification from the MODBUS organization

APPROVALS DeviceNet	
EMC standard	EN61326-1.
Safety	Complies with EN61010-1 and UL 3121-1.
Certification	Awaiting Certification from the ODVA

APPROVALS PROFIBUS	
EMC standard	EMC EN61326:1998.
Safety	Complies with EN61010-1:1995 and UL 3121-1:1998.
Certification	Awaiting Certification from PROFIBUS Organisation

APPROVALS Ethernet/IP	
EMC standard	EMC EN61326:1998.
Safety	Complies with EN61010-1:1995 and UL 3121-1:1998.
Certification	Awaiting Certification from ODVA

APPROVALS MODBUS TCP/IP	
EMC standard	EMC EN61326:1998.
Safety	Complies with EN61010-1:1995 and UL 3121-1:1998.
Certification	Awaiting Certification from the MODBUS organisation

APPROVALS CANopen	
EMC standard	EMC EN61326:1998.
Safety	Complies with EN61010-1:1995 and UL 3121-1:1998.
Certification	Awaiting Certification from CiA

PHYSICAL	
Dimensions	Height - 100mm; Width - 30mm; Depth - 120mm
Mounting	Directly mounted on 35mm x 7.5mm Top Hat DIN rail (EN50022, DIN46277-3)
Connectors	Power input: 2-way 5.08mm Combicon type RS232 port: 6-way RJII Type BM220 port: 3-way 5.08mm Combicon type BM230 port: 5-way 5.08mm Combicon type BM240 port: 9-way D-type BM250 port: RJ45 Type
Weight	0.21kg