1. INSTALLATION - MECHANICAL

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.

![Diagram of MLC 9000+ installation space](image)

**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 ventilation and to accommodate wiring bend radii to enclosure trunking or conduits. Allow sufficient slack in all cables inside the trunking to permit movement 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.

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### 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
4. Second Loop Controller Module
5. Third Loop Controller Module etc.

Refer to Loop Module installation instructions

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.

![Diagram of installing a Bus Module](image)

**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.

![Diagram of removing a Bus Module](image)

**Figure 3 Removing a Bus Module**

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### 2. INSTALLATION - ELECTRICAL (GENERAL)

#### 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).

![Diagram of power input connections](image)

**Figure 4 Bus Module Connections**

**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)

<table>
<thead>
<tr>
<th>Pin No.</th>
<th>Signal / Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Receive Data</td>
</tr>
<tr>
<td>2</td>
<td>Transmit Data</td>
</tr>
<tr>
<td>3</td>
<td>No connection</td>
</tr>
<tr>
<td>4</td>
<td>Signal Ground</td>
</tr>
</tbody>
</table>

![Diagram of configuration port](image)
3. INSTALLATION – ELECTRICAL (FIELDBUS PORT)

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 standard RS485. Pin connections are shown on the right. The Common connection is provided for termination of screened (shielded) cable.

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 120 ohm 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-.

The SHIELD connection is provided for termination of screened (shielded) cable.

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.

3.3 PROFIBUS – BM240-PB Bus Module only

This enables the Bus Module to be 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).

3.4 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 via RJ45 connector that conforms to CAT 5 cabling and 568A, 568B wiring sequences. The BM250 supports 10BaseT and 100BaseT.

4. BUS MODULE SPECIFICATION

<table>
<thead>
<tr>
<th>Configuration Port:</th>
<th>All Bus Modules</th>
<th>PROFIBUS Port:</th>
<th>PROFIBUS-P: BM240-PB only</th>
<th>CANopen Port: BM230-DN only</th>
<th>Ethernet/IP Port: BM250-EL only</th>
<th>PROFINET Port: BM250-ET only</th>
<th>CANopen Port: BM250-CO only</th>
<th>MODBUS TCP Port: BM250-MT only</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Red) Tx/Rx+ (A)</td>
<td></td>
<td>This is a port 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 RJ45 port. The PROFIBUS address can be set in the range 0 to 126 (default = 127).</td>
<td>This is a port for connection to a PROFIBUS-P bus module. 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.</td>
<td>This port is for connection to a DeviceNet master device. Data rate and MAC ID are configurable via the RJ45 port. The MAC ID can be set in the range 0 – 63 (default = 63).</td>
<td>This port is for connection to a CANopen network. Data Rate 125kbps, 250kbps, 500kbps or 1024kbps. MAC ID 1 – 127 (Defaults 125kbps, ID 1). Configured using the MLC9000+ Workshop software, via the configuration port.</td>
<td>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.</td>
<td>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.</td>
<td>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 MLC9000+ Workshop software, via the configuration port.</td>
</tr>
<tr>
<td>(White) Tx/Rx– (B)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Green) Common</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ENVIRONMENTAL

<table>
<thead>
<tr>
<th>Operating Conditions</th>
<th>Ambient Temperature: 0°C to 50°C Relative Humidity: 30% to 90% non-condensing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage Conditions</td>
<td>Ambient Temperature: -25°C to 80°C Relative Humidity: 30% to 90% non-condensing</td>
</tr>
<tr>
<td>Safety Considerations</td>
<td>Pollution Degree 2, Installation Category II. Indoor use only</td>
</tr>
<tr>
<td>Altitude</td>
<td>≤2000m</td>
</tr>
</tbody>
</table>

Certificate Awaiting Certification from MODBUS Organization

APPROVALS DeviceNet

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

APPROVALS PROFINET

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

APPROVALS PROFIbus

EMC standard EN61326-1998.