# Unison Mosaic

## Hardware

# Installation Guide

**Revision I**

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## SECTION 1 - WELCOME

Thank you for purchasing an ETC product, we hope that it fulfills your expectations and provides a lifetime of reliable service.

If you have any questions or require technical support please contact:

ETC Support

### 1.1 - OVERVIEW

The Unison Mosaic control solution has two complementary parts: the installed Controllers and Remote Devices, and the Designer software which runs on any personal computer and is only required when creating or modifying the presentation.

This guide is primarily intended as a reference for the Unison Mosaic hardware installation. For Designer software help please refer to the on-line documentation (once installed, see below) .

### 1.2 - SOFTWARE INSTALLATION

- Microsoft Windows (see the website for supported OS):

Download the appropriate installer from the ETC Website and run the Installer.

- Apple Macintosh (see the website for supported OS):

Download the appropriate installer from the ETC Website and run the Installer.

## SECTION 2 - MSC

### 2.1 - MSC INSTALLATION

The Mosaic Show Controller (MSC) is 100% solid state and has been qualified to operate in a dry environment within a temperature range of 0°C to 50°C (32°F to 122°F). Sealed IP65 rated consumer units are available for outdoor use, please consult your Unison Mosaic distributor or representative.

Since the units require no user intervention once installed they are suitable for remote installation with all configuration and management taking place over an Ethernet network. However it is recommended that access can be gained in the unlikely event of a hardware failure.

> **NOTE:** This equipment is not suitable for use in locations where children are likely to be present.

### 2.2 - MSC LAYOUT

The following drawing illustrates the layout of the MSC, refer to the following sections for details:
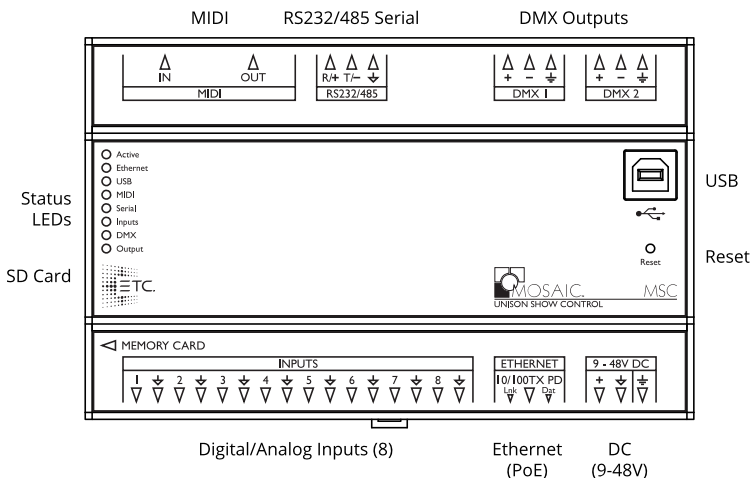


### 2.3 - MSC VERSIONS

There are three versions of the MSC available: MSC 1, MSC 2 and MSC 4. The MSC 1 supports 512 DMX channels, the MSC 2 supports 1024 channels and the MSC 4 supports 2048 channels (of which 1024 channels are eDMX only). All can be used as

a stand-alone controller or co- operatively, via an Ethernet network, to form a scalable system.

## 2.4 - POWER SUPPLY

The MSC can be powered in two different ways:

- DC power (9 to 48V)

A limited power source approved to UL60950-1 2nd Edition, CAN/CSA C22.2 No. 60950- 1.07 2nd Edition MUST be used, with an output voltage of 9 to 48V DC.

Such a power supply can be connected directly to the MSC using the DC Input connector. The pins on this connector are marked:

+ Positive input (9 to 48V DC)

⏚ Signal ground (0V)

⏚ Chassis ground (earth)

> The power supply should be connected to the Positive and Signal ground inputs, ensuring the polarity is correct. Where possible, use a 12V (minimum) supply in preference to a 9V supply to ensure some headroom.

The MSC will typically consume 4W.

- Power-over-Ethernet (PoE)

A standard (802.3af) Power-over-Ethernet switch may be used to provide both power and a network connection to the MSC using a single cable.

The MSC operates as a PoE Class 2 device (3.84-6.49W) and will typically consume 4W.

| **NOTE:** | Power should only be applied using one of the above methods. Redundant operation using both sources is not supported. |
|---|---|
| **NOTE:** | Power must not be disconnected when uploading project data nor during bootloader/firmware updates to the MSC as corruption of the data or software may occur, perhaps even rendering the unit inoperable. |

## 2.5 - GROUNDING

The MSC is designed to be mounted on a grounded (earthed) DIN-rail and a dedicated Chassis ground (earth) terminal is also provided which should be connected to a suitable earth.

Additionally, the Signal ground can be tied to Chassis ground to provide a suitable reference but this is not generally recommended.

If in any doubt at all, or if you have unusual power supply or grounding/earthing requirements, then please consult ETC Technical Services.

## 2.6 - REALTIME CLOCK BATTERY

The MSC's internal realtime clock is battery-backed to ensure operation when the unit is not powered. The battery should last for at least 10 years and is easily replaced when necessary, replacement battery: Renata CR2032 Lithium Button Cell.

| **CAUTION:** | Risk of explosion if battery replaced by incorrect type. Dispose of used batteries according to the manufacturer's instructions. |
|---|---|

| **ATTENTION:** | Il y a un danger d'explosion s'il y a un remplacement incorrect de batterie. Mettre au rebut les batteries usages conformement aux instructions du fabricant. |
|---|---|

## 2.7 - MEMORY CARD

The MSC is shipped with a 2GB SD Memory Card which should be sufficient for most projects since the MSC's data storage is extremely efficient, even with a multitude of imported media files. However, a larger capacity card could of course be fitted if required.

As only the project's programming data resides on the card, the card is also a convenient way to backup data for archiving; the Designer project file for example.

Furthermore, in the event of MSC hardware failure, simply moving the card into a replacement unit with identical or more recent firmware is sufficient to get the project up and running again.

## 2.8 - STATUS LEDS

The ETC logo will illuminate when power is applied to the MSC. The red LEDs on the front of the MSC indicate the unit's current status.

The Active LED illuminates once the boot up procedure has completed and is indicative of a fully functional unit.

The Ethernet LED indicates Unison Mosaic-related network activity (not network link, see Ethernet port later) while the remaining LEDs indicate communication on the various ports of the MSC.

The Output LED indicates that a valid project file has been loaded from the memory card and that playback & data output has started.

The DMX LED indicates that valid DMX512 data is being output from the DMX ports.

## 2.9 - ERROR CODES

Additionally the red status LEDs are used to indicate any boot failures of the MSC that prevent the unit from going active.

Error codes are indicated by double flashing the Ethernet, USB, and MIDI LEDs, followed by a 1 second pause. The Active LED will also be off.

The bottom four LEDs indicate the error:

- Serial on solid - memory card missing (insert or replace memory card)
- Digital on solid - memory card corrupt (format or replace memory card)
- DMX on solid - hardware failure (contact our support)
- Serial & Input on solid - coprocessor failure (contact our support)

## 2.10 - RESET SWITCH

The MSC may be reset by inserting a small blunt object into the reset hole on the front of the MSC to depress the reset switch. The switch should be held for at least one second.

**NOTE:** The reset must not be operated when uploading project data nor during bootloader/firmware updates to the MSC as corruption of the data or software may occur, perhaps even rendering the unit inoperable.

## 2.11 - WATCHDOG

The internal "watchdog" is enabled by default to reset automatically the MSC in case of a software crash as a result of either a coding error ("bug") or a random electromagnetic event such as a power brown-out or spike, nearby lightning strike or static discharge. Please refer to the Designer Help to learn how to disable this feature (not recommended).

## 2.12 - PORTS

- RS232/RS485 Serial Port

   The serial port's protocol (RS232 or RS485), data rate and format settings (baud, parity, stop bits, etc.) are configured using Designer.

In RS232 mode, the port operates in full duplex with the following pinout:

R/+  Receive

T/-  Transmit

$\perp$  Signal ground

In RS485 (and DMX In) mode, the port operates in half duplex with the following pinout:

R/+  Data +

T/-  Data -

$\perp$  Signal Ground

The serial port is not isolated from the MSC's power supply. If isolation is required, it must either be provided by the connected device or a separate isolator should be used.

• MIDI Input and Output

The MIDI input and output connectors are standard 5 pin DIN connections. They may beconnected directly to any standard MIDI device.

• DMX Outputs

Two DMX outputs are provided. An MSC 1 will output on both the same DMX universe data, an MSC 2 and MSC 4 will output a separate universe on each. The pins on these connectors are marked:

+   Data + ('Hot' or 'True')

-   Data - ('Cold' or 'Complement')

$\perp$ Chassis ground (shield)

To make up a cable to a 5 pin XLR the following connections should be made:

|        | MSC:     | 5 pin XLR: |
|--------|----------|------------|
| Data + | +        | 3          |
| Data - | -        | 2          |
| Shield | $\perp$  | 1          |

The DMX ports are by default not isolated from the MSC's ground connection which is the recommended configuration for driving isolated inputs - the majority of DMX receivers.

If required this may be changed by removing the top cover of the MSC and removing the jumper marked 'JP1', located to the right of the DMX ports. The two DMX ports will then be optically isolated from the MSC's internal circuitry although not from each other.

• Digital/Analog Inputs

The MSC features 8 digital/analog inputs on one 16 way connector. To connect an input signal to the MSC one connection should be made to the desired input pin, marked '1' to '8', and the other should be made to the adjacent signal ground pin.

The inputs can be individually configured via Designer to operate in one of three modes:

**Contact closure:** An external volt-free switch may be connected between the input pin and the signal ground pin.

In this mode, the input pin is internally pulled-up to 5V via a 2.2Kohm resistor, so the switch only needs to be rated at 5V, 2.5mA or greater.

**Digital input:** An external voltage source (such as a 12VDC trigger output) may be connected between the input pin and the signal ground pin.

In this mode, the input pin is internally pulled down to 0V via a 202.1Kohm resistor and the maximum input voltage supported is 24VDC.

The MSC may be configured to specify what the 'high' and 'low' threshold voltages are. This facility can be used to provide 'Schmitt trigger' action.

**Analog input:** An external voltage source (such as a 0-10V analog signal) may be connected between the input pin and the signal ground pin.

In this mode, the input pin is internally pulled down to 0V via a 202.1Kohm resistor and the maximum input voltage supported is 24VDC.

The MSC may be configured to specify what the input voltage range is. Voltages inside this range are reported as 0% to 100%.

In all modes, the maximum rated input voltage is 24VDC. The inputs should never be driven with a higher voltage nor negative voltage or damage may occur.

SECTION 2 - MSC

In all modes, all signal ground pins are connected together internally. The digital/analog inputs are not isolated from each other nor the MSC's power supply. If isolation is required, it must either be provided by the connected device or a separate isolator should be used.

- Ethernet

A standard 10/100TX Ethernet connection may be made to the MSC. As the MSC supports Power-over-Ethernet (PoE), a PoE switch or midspan injector can be used. The LEDs on the RJ45 jack itself are useful for debugging the Ethernet installation:

The Lnk LED will illuminate when an Ethernet link has been established.

The Dat LED will illuminate to indicate Ethernet traffic (not just Unison Mosaic-relevant).

- USB

The USB port may be used to connect the MSC to a PC to upload project data and update the MSC's internal operating software.

**NOTE:** Ports and third party equipment can be damaged when plugging or unplugging an energised system (hot-plugging). It is therefore advisable to remove power before making or breaking port connections.

# SECTION 3 - MTPC

## 3.1 - MTPC INSTALLATION

The Tessera Panel Controller (MTPC) is a fully fledged Controller in its own right with an integrated touch screen user interface. It can also share its user interface with other Unison Mosaic Controllers when operating as part of a system across an Ethernet network.

The units are designed to be permanently installed into UK double-gang or custom back boxes (supplied separately). The units are 100% solid state and have been qualified to operate in a dry environment within a temperature range of 0°C to 50°C (32°F to 122°F).

The following diagram illustrates a typical installation:



BACK BOX: 35mm (1.5") or deeper, remove or bend flat the top and bottom tabs if present

BEZEL & ELECTRONICS: mounts flush to the wall, ensure that the back box cutout is not oversized
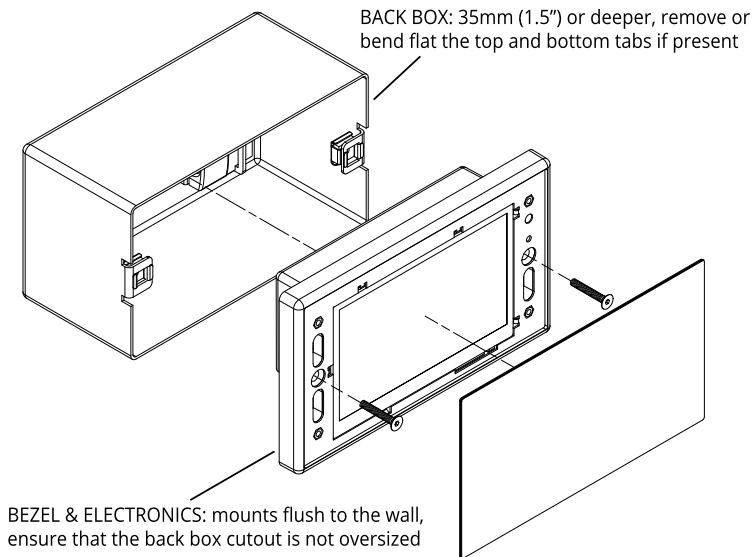
Carefully remove the protective films from the front of the liquid crystal display and the magnetic overlay before final assembly.

## 3.2 - MTPC LAYOUT

The following drawing illustrates the layout of a MTPC, refer to the following sections for details:
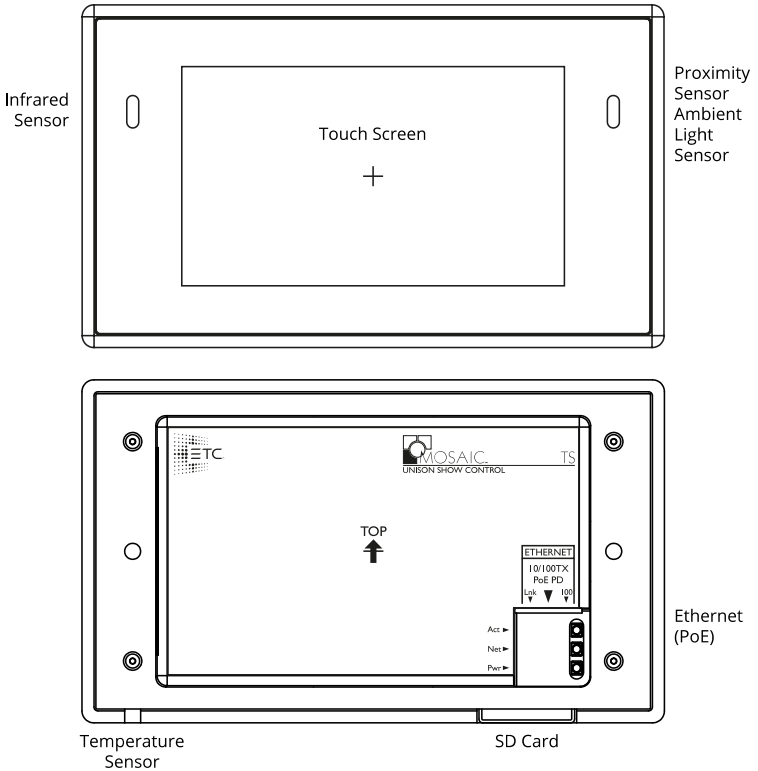


## 3.3 - POWER SUPPLY

- Power-over-Ethernet (PoE)

A standard (802.3af) Power-over-Ethernet switch should be used to provide both power and a network connection to the MTPC using a single cable. Alternatively, if a PoE switch is not available, a PoE midspan injector could be used.

Alternatively, the TPC-RIO can be used to provide power and a data connection to the MTPC.

A limited power source approved to UL60950-1 2nd Edition, CAN/CSA C22.2 No. 60950- 1.07 2nd Edition MUST be used, with an SELV output voltage.

The MTPC operates as a PoE Class 2 device (3.84-6.49W) and will typically consume 4W.

**NOTE:** Power must not be disconnected during firmware updates to the MTPC as corruption of the software may occur, perhaps even rendering the unit inoperable.

## 3.4 - REALTIME CLOCK BATTERY

The MTPC's internal realtime clock is battery-backed to ensure operation when the unit is not powered. The battery should last for at least 10 years and is easily replaced when necessary, replacement battery: Renata CR2032 Lithium Button Cell.

**CAUTION:** Risk of explosion if battery replaced by incorrect type. Dispose of used batteries according to the manufacturer's instructions.

**ATTENTION:** Il y a un danger d'explosion s'il y a un remplacement incorrect de batterie. Mettre au rebut les batteries usages conformement aux instructions du fabricant.

## 3.5 - MEMORY CARD

The MTPC is shipped with a 2GB SD Memory Card which should be sufficient for most projects since the MTPC's data storage is extremely efficient, even with a multitude of imported media files. However, a larger capacity card could of course be fitted if required.

As only the project's programming data resides on the card, the card is also a convenient way to backup data for archiving; the Designer project file for example.

Furthermore, in the event of MTPC hardware failure, simply moving the card into a replacement unit with identical or more recent firmware is sufficient to get the project up and running again.

### 3.6 - STATUS LEDS
The LEDs on the rear of the unit provide the following status information:

Pwr: Power - illuminates when the unit is correctly powered.

Act: Active - illuminates once the boot up procedure has completed and is indicative of a fully functional unit.

Net: Network - illuminates when the unit is sending or receiving Unison Mosaic-related data.

Lnk: Link - illuminates once the unit has established an Ethernet link.

100: 100BASE-TX - illuminates when the Ethernet link is operating at 100Mbit/s.

The LEDs on the front of the unit (under the overlay) provide the following status information:

Pwr: Power - illuminates when the unit is correctly powered.

Act: Active - illuminates once the boot up procedure has completed and is indicative of a fully functional unit.

Eth: Ethernet - illuminates when the unit is sending or receiving Unison Mosaic-related data.

Out: Output - indicates that a valid project file has been loaded from the memory card and that playback & data output has started.

### 3.7 - ERROR CODES
Additionally the red status LEDs are used to indicate any boot failures of the MTPC that prevent the unit from going active. These codes are outlined below and in all cases the Active LED will be off (Power LED will remain on):

- Ethernet & Output double flashing - memory card missing (insert or replace card)
- Ethernet & Output triple flashing - Internal flash error (contact our support)

### 3.8 - RESET SWITCH
The MTPC may be reset by removing the magnetic overlay and pressing the reset switch. The switch should be held for at least one second.

**NOTE:** The reset must not be operated during firmware updates to the MTPC as corruption of the software may occur, perhaps even rendering the unit inoperable.

### 3.9 - CONFIG SWITCH

The MTPC may be placed in a configuration mode by removing the magnetic overlay and pressing the config switch, refer to Designer Help for instructions.

### 3.10 - WATCHDOG

An internal "watchdog" will automatically reset the MTPC in case of a software crash as a result of either a coding error ("bug") or a random electromagnetic event such as a power brown-out or spike, nearby lightning strike or static discharge.

### 3.11 - LEARNING IR RECEIVER

The MTPC may be taught to recognise different IR codes from a standard infra red remote control, refer to Designer Help for instructions.

### 3.12 - TEMPERATURE SENSOR

The Temperature Sensor can be used to measure the ambient temperature around the MTPC.

**NOTE:** The Temperature Sensor cutout is not a release catch and attempting to use it as such will result in damage to the unit, perhaps even rendering the unit inoperable.

# SECTION 4 - TPC-RIO

## 4.1 - TPC-RIO INSTALLATION

The TPC-RIO is designed to be permanently installed in a central control room/cupboard or DIN consumer unit for remote deployment. The enclosure and mounting complies with DIN43880 and EN60715 (35/7.5 rail) respectively.

The units are 100% solid state and have been qualified to operate in a dry environment within a temperature range of 0°C to 50°C (32°F to 122°F). Sealed IP65 rated consumer units are available for outdoor use, please consult your Unison Mosaic distributor or representative.

Since the units require no user intervention once installed they are suitable for remote installation with all configuration and management taking place over an Ethernet network. However it is recommended that access can be gained in the unlikely event of a hardware failure.

**NOTE:**   The TPC-RIO should be installed within a fire enclosure. Any SELV parts or wires inside the cabinet should not touch the mains connector of the TPC-RIO.

**NOTE:**   This equipment is not suitable for use in locations where children are likely to be present.

## 4.2 - TPC-RIO LAYOUT

The following drawing illustrates the layout of an TPC-RIO, refer to the following sections for details:
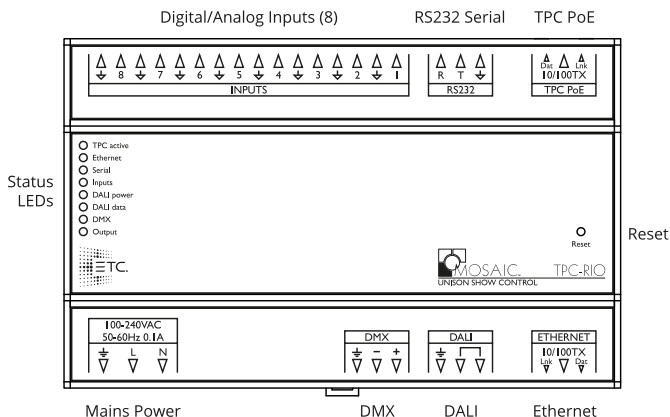
## 4.3 - POWER SUPPLY

The TPC-RIO is mains powered via a 100-240V fused switch mode power supply unit compatible with all worldwide mains supply standards; 100-240VAC 50/60Hz.

The TPC-RIO will typically consume a maximum of 10W.

> **NOTE:** Power must not be disconnected when uploading project data nor during bootloader/firmware updates to the TPC-RIO or MTPC as corruption of the data or software may occur, perhaps even rendering the unit inoperable.

> **CAUTION:** The TPC-RIO is a permanently connected device. A readily accessible two-pole disconnect device with at least 3mm contact separation shall be incorporated in the building installation wiring.

> **ATTENTION:** Le TPC-RIO est un équipement connecté en permanence. Un dispositif de déconnexion à deux pôles facilement accessible avec au moins une séparation de contact de 3mm doit être incorporé au câblage d'installation du bâtiment.

## 4.4 - GROUNDING

The TPC-RIO must be correctly grounded to electrical safety earth at all times.

## 4.5 - STATUS LEDS

The ETC logo will illuminate when power is applied to the TPC-RIO. The red LEDs on the front of the TPC-RIO indicate the unit's current status.

The MTPC active LED will light continuously once the TPC-RIO has connected to a project running on a MTPC.

The Ethernet LED indicates Unison Mosaic-related network activity (not network link, see Ethernet port later) while the remaining LEDs indicate communication on the various ports of the TPC-RIO.

The Output LED indicates that a valid project file has been loaded from the memory card on the connected MTPC and that playback & data output has started.

The DMX LED indicates that valid DMX512 data is being output from the DMX port.

## 4.6 - ERROR CODES

Additionally the red status LEDs are used to indicate any boot failures to the TPC-RIO that prevent the unit from going active. Error codes are displayed by a repeating pattern of flashing all four LEDs a number of times in succession, followed by a 1 second pause:

| | |
|---|---|
| 1 flash: | Invalid firmware version (reload firmware from Designer) |
| 2 flashes: | Invalid device type or serial number |
| 3 flashes: | Internal memory test error |
| 4 flashes: | Unable to perform factory restore due to corrupt factory firmware |
| 5 flashes: | Current firmware is corrupt, no valid firmware versions available to restore |
| 6 flashes: | Restored firmware is corrupt |

Codes 2 through 6 indicate a hardware error; please consult your distributor, representative or ETC Technical Services for assistance.

## 4.7 - RESET SWITCH

The TPC-RIO may be reset by inserting a small blunt object into the reset hole on the front of the TPC-RIO to depress the reset switch. The switch should be held for at least one second. This will not reset the connected MTPC.

**NOTE:** The reset must not be operated when uploading project data nor during bootloader/firmware updates to the TPC-RIO or MTPC as corruption of the data or software may occur, perhaps even rendering the unit inoperable.

## 4.8 - PORTS

- RS232 Serial Port

The serial port's data rate and format settings (baud, parity, stop bits, etc.) are configured using Designer.

The port operates in full duplex with the following pinout:

R/+ Receive

T/- Transmit

⏚ Signal ground

The serial port is not isolated from the TPC-RIO's power supply. If isolation is required, it must either be provided by the connected device or a separate isolator should be used.

- DMX Output

The pins on this connector are marked:

- +  Data + ('Hot' or 'True')
- -  Data - ('Cold' or 'Complement')
- ⏚  Chassis ground (shield)

To make up a cable to a 5 pin XLR the following connections should be made:

|  | TPC-RIO: | 5 pin XLR: |
|---|---|---|
| Data + | + | 3 |
| Data - | - | 2 |
| Shield | ⏚ | 1 |

The DMX port is isolated from the TPC-RIO's ground connection.

- Digital/Analog Inputs

The TPC-RIO features 8 digital/analog inputs on one 16 way connector. To connect an input signal to the TPC-RIO, one connection should be made to the desired input pin, marked '1' to '8', and the other should be made to the adjacent signal ground pin.

The inputs can be individually configured via Designer to operate in one of three modes:

**Contact closure:** An external volt-free switch may be connected between the input pin and the signal ground pin.

In this mode, the input pin is internally pulled-up to 5V via a 2.2Kohm resistor, so the switch only needs to be rated at 5V, 2.5mA or greater.

**Digital input:** An external voltage source (such as a 12VDC trigger output) may be connected between the input pin and the signal ground pin.

In this mode, the input pin is internally pulled down to 0V via a 2Mohm resistor and the maximum input voltage supported is 24VDC.

The TPC-RIO may be configured to specify what the 'high' and 'low' threshold voltages are. This facility can be used to provide 'Schmitt trigger' action.

**Analog input:** An external voltage source (such as a 0-10VDC analog signal) may be connected between the input pin and the signal ground pin.

In this mode, the input pin is internally pulled down to 0V via a 2Mohm resistor and the maximum input voltage supported is 24VDC.

The TPC-RIO may be configured to specify what the input voltage range is. Voltages inside this range are reported as 0% to 100%.

In all modes, the maximum rated input voltage is 24VDC. The inputs should never be driven with a higher voltage nor negative voltage or damage may occur.

In all modes, all signal ground pins are connected together internally. The digital/analog inputs are not isolated from each other nor the TPC-RIO's power supply. If isolation is required, it must either be provided by the connected device or a separate isolator should be used.

- DALI

A DALI bus interface is provided on a 3 way connector:

DALI bus (polarity insensitive)

DALI bus (polarity insensitive)

⏚ Chassis ground (for optional shield)

The DALI data LED will indicate valid data on the bus.

**NOTE:** DALI bus requires a dedicated DALI bus power supply to function, the DALI power LED will illuminate solidly to indicate suitable (9-26V) power. The LED will be off for no power or flash to indicate out of range power.

- MTPC PoE

Specifically designed to provide power and data to a connected MTPC. The LEDs on the RJ45 jack itself are useful for debugging the connection between the TPC-RIO and a MTPC:

The Lnk LED will illuminate when an Ethernet link has been established.

The Dat LED will illuminate to indicate Ethernet traffic between the TPC-RIO and a MTPC.

**NOTE:** MTPC PoE port is designed to work with the MTPC alone. Connecting any other Unison Mosaic or third party devices to this port could damage the device and/or the TPC-RIO.

- Ethernet

A standard 10/100TX Ethernet connection may be made to the TPC-RIO. The LEDs on the RJ45 jack itself are useful for debugging the Ethernet installation:

The Lnk LED will illuminate when an Ethernet link has been established.

The Dat LED will illuminate to indicate Ethernet traffic (not just Unison Mosaic-relevant).

**NOTE:** Ports and third party equipment can be damaged when plugging or unplugging an energised system (hot-plugging). It is therefore advisable to remove power before making or breaking port connections.

# SECTION 5 - MSC X

## 5.1 - MSC X INSTALLATION

The Mosaic Show Controller X (MSC X) is designed to be rack mounted in a central control room for fixed installations or flight cased for touring applications. The 2U enclosure and 19" rack mounting complies with IEC 60297.

The unit is largely solid state and has been qualified to operate in a dry environment within a temperature range of 0°C to 50°C (32°F to 122°F).

**NOTE:** Particular attention must be paid to cooling; under no circumstances should the airflow to the heat sinks be restricted and a rack fan cooling unit should be considered when multiple units are stacked together to maintain the correct ambient temperature.

**NOTE:** This equipment is not suitable for use in locations where children are likely to be present.

Since the unit requires no user intervention once installed it is suitable for remote installation with all configuration and management taking place over an Ethernet network. However it is recommended that access can be gained in the unlikely event of a hardware failure.

The MSC X is fitted with fan filters mounted on the front panel of the product. Should the filters become clogged, they need to be replaced. Please contact ETC Technical Services for further information.

## 5.2 - MSC X LAYOUT

The following drawings illustrate the layout of the MSC X, refer to the following sections for details:
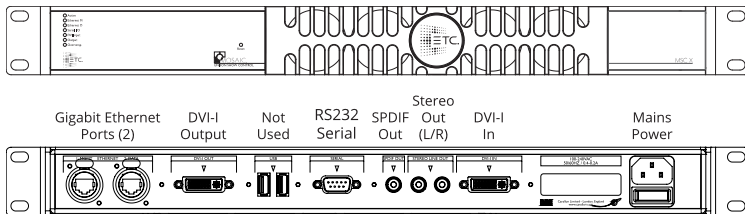


## 5.3 - MSC X VERSIONS

There are multiple versions of the MSC X that differ only in the maximum number of control channels that can be accommodated. For example, the MSC 20 can

control 20 DMX universes (10,240 channels) while the MSC 100 can control 100 DMX universes (51200 channels).

The MSC X can be used as a stand-alone controller or co-operatively with other Unison Mosaic Controllers and Remote Devices, via an Ethernet network, to form a scalable system.

## 5.4 - POWER SUPPLY

The MSC X is mains powered via a fused, universal input power supply unit (PSU) compatible with all worldwide mains supply standards; 100-250V 50/60Hz. The replacement fuse should be a 250V rated 1A T (anti-surge) 20mm cartridge type only.

The MSC X will consume 40W typical (50W maximum).

| **NOTE:** | Power must not be disconnected when uploading project data nor during bootloader/firmware updates to the MSC X as corruption of the data or software may occur, perhaps even rendering the unit inoperable. |
| --- | --- |

| **CAUTION:** | For pluggable equipment, the socket outlet shall be installed near the equipment and shall be easily accessible. |
| --- | --- |

| **ATTENTION:** | En cas d'équipement enfichable, la prise doit être montée près de l'équipement et doit offrir un accès facile. |
| --- | --- |

## 5.5 - GROUNDING

The MSC X must be correctly grounded to electrical safety earth at all times.

## 5.6 - REALTIME CLOCK BATTERIES

The MSC X's internal realtime clock is battery-backed to ensure operation when the unit is not powered. The batteries should last for at least 10 years and are easily replaced when necessary, replacement battery: Renata CR2032 Lithium Button Cell.

| **CAUTION:** | Risk of explosion if battery replaced by incorrect type. Dispose of used batteries according to the manufacturer's instructions. |
| --- | --- |

| **ATTENTION:** | Il y a un danger d'explosion s'il y a un remplacement incorrect de batterie. Mettre au rebut les batteries usages conformement aux instructions du fabricant. |
| --- | --- |

## 5.7 - MEMORY CARD

The MSC X is shipped with a 4GB Type I Compact Flash card which should be sufficient for most projects since the MSC X's data storage is extremely efficient, even with a multitude of imported media files. However, a larger capacity card could of course be fitted if required.

As only the project's programming data resides on the card, the card is also a convenient way to backup data for archiving; the Designer project file for example.

Furthermore, in the event of MSC X hardware failure, simply moving the card into a replacement unit is sufficient to get the project up and running again.

## 5.8 - STATUS LEDS

The ETC logo will illuminate when power is applied to the MSC X. The red LEDs above indicate the unit's current status.

The Active LED flashes throughout the boot up procedure and lights solidly once this has been completed and is indicative of a fully functional unit.

The Ethernet LEDs indicates Unison Mosaic-related network activity (not network link) while other LEDs indicate communication on the various ports of the MSC X.

The Output LED indicates that a valid project file has been loaded from the memory card and that playback & data output (eDMX & DVI) has started.

The Overtemp LED will illuminate if the processor core(s) reaches 95°C (203°F) indicating a fault in the system's cooling, typically caused by raised ambient temperatures. Consult the web interface's home page to monitor the system temperatures and take remedial action.

## 5.9 - ERROR CODES

Error codes are indicated by double flashing of the Ethernet M, Ethernet D, and Serial I/O LEDs, followed by a 1 second pause. The Active LED will also be off.

The bottom four LEDs indicate the error:

- DVI Input on solid - memory card missing (insert or replace memory card)
- Output on solid - memory card corrupt (format or replace memory card)
- Overtemp on solid - hardware failure (contact our support)

Main board errors can usually be resolved by running the MSC X Recovery Tool on a PC. This may format the SSD and reinstall the firmware. In such a case all project data will be erased and so an upload will be required to restore programming.

## 5.10 - RESET SWITCH

The MSC X may be reset by inserting a small blunt object into the reset hole on the front panel to depress the reset switch. The switch should be held for at least one second.

**NOTE:** The reset must not be operated when uploading project data nor during bootloader/firmware updates to the MSC X as corruption of the data or software may occur, perhaps even rendering the unit inoperable.

## 5.11 - WATCHDOG

The internal "watchdog" is enabled by default to reset automatically the MSC X in case of a software crash as a result of either a coding error ("bug") or a random electromagnetic event such as a power brown-out or spike, nearby lightning strike or static discharge. Please refer to the Designer Help to learn how to disable this feature (not recommended).

## 5.12 - PORTS

- Ethernet 1 - MGMT

A standard 10/100/1000BASE-T Ethernet connection may be made to this port for management and networking to other Unison Mosaic Controllers and Remote Devices.

- Ethernet 2 - DATA

A standard 10/100/1000BASE-T Ethernet connection may be made to this port to output data to lighting fixtures using Ethernet protocols (eDMX) such as sACN, ArtNet and KiNET.

- DVI-I Output

A standard DVI connection may be made to this port to route output data to the lighting fixtures using the Digital Video Interface.

- RS232 Serial Port

The serial ports may be connected directly to a PC using a null modem cable. Other devices may require different cables depending on their pinout. The serial port is a 9 pin male D connector with the following pinout:

1: DCD

2: Receive data (RXD)

3: Transmit data (TXD)

4: DTR

5: Signal ground

6: DSR

7: RTS

8: CTS

9: RI

The serial port is not isolated from the MSC X's power supply. If isolation is required, it must either be provided by the connected device or a separate isolator should be used.

- DVI-I Input

A standard DVI connection may be made to this port to route video data to a Live Video Preset within the project. Requires the Controller to be the DVI variant.

- USB

This port is not supported at the time of writing (refer to the current Designer Help).

- SPDIF Out

A standard RCA coaxial cable may be connected for digital audio output from the Controller. 2-channel PCM audio is supported.

- Stereo Line Out

Two RCA connectors are provided for analog stereo audio output.

**NOTE:** Ports and third party equipment can be damaged when plugging or unplugging an energised system (hot-plugging). It is therefore adviseable to remove power before making or breaking port connections.

# SECTION 6 - ATLAS

## 6.1 - ATLAS INSTALLATION

The Mosaic Atlas Controller (Atlas) is designed to be rack mounted in a central control room for fixed installations or flight cased for touring applications. The 1U enclosure and 19" rack mounting complies with IEC 60297.

The unit is largely solid state and has been qualified to operate in a dry environment within a temperature range of 0°C to 50°C (32°F to 122°F).

**NOTE:** Particular attention must be paid to cooling; under no circumstances should the airflow to the heat sinks be restricted and rack fan cooling unit should be considered when multiple units are stacked together to maintain the correct ambient temperature.

**NOTE:** This equipment is not suitable for use in locations where children are likely to be present.

Since the unit requires no user intervention once installed it is suitable for remote installation with all configuration and management taking place over an Ethernet network. However it is recommended that access can be gained in the unlikely event of a hardware failure.

The Atlas is fitted with fan filters mounted on the front panel of the product. Should the filters become clogged, they need to be replaced. Please contact ETC Technical Services for further information.

## 6.2 - ATLAS LAYOUT

The following drawings illustrate the layout of the Atlas, refer to the following sections for details:
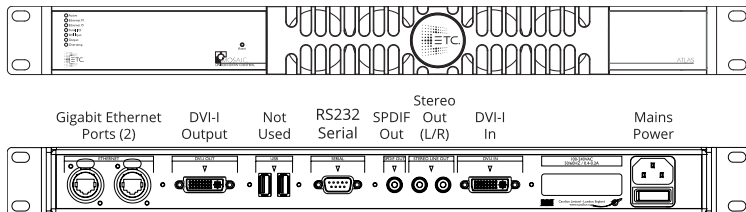
## 6.3 - ATLAS VERSIONS

There are multiple versions of the Atlas that differ only in the maximum number of control channels that can be accommodated. For example, the Atlas 50 can control 50 DMX universes (25,600 channels) while the Atlas 1500 can control 1500 DMX universes (768,000 channels).

The Atlas can be used as a stand-alone controller or co-operatively with other Unison Mosaic Controllers and Remote Devices, via an Ethernet network, to form a scalable system.

## 6.4 - POWER SUPPLY

The Atlas is mains powered via an internally fused, universal input power supply unit (PSU) compatible with all worldwide mains supply standards; 100-240V 50/60Hz. The Atlas will consume 40W typical (50W maximum).

| NOTE: | Power must not be disconnected when uploading project data nor during firmware updates to the Atlas as corruption of the data or software may occur, perhaps even rendering the unit inoperable. |
|---|---|

| CAUTION: | For pluggable equipment, the socket outlet shall be installed near the equipment and shall be easily accessible. |
|---|---|

| ATTENTION: | En cas d'équipement enfichable, la prise doit être montée près de l'équipement et doit offrir un accès facile. |
|---|---|

## 6.5 - GROUNDING

The Atlas must be correctly grounded to electrical safety earth at all times.

## 6.6 - REALTIME CLOCK BATTERIES

The Atlas's internal realtime clock is battery-backed to ensure operation when the unit is not powered. The batteries should last for at least 10 years and are easily replaced when necessary, replacement battery: Renata CR2032 Lithium Button Cell.

| CAUTION: | Risk of explosion if battery replaced by incorrect type. Dispose of used batteries according to the manufacturer's instructions. |
|---|---|

| ATTENTION: | Il y a un danger d'explosion s'il y a un remplacement incorrect de batterie. Mettre au rebut les batteries usages conformement aux instructions du fabricant. |
|---|---|

## 6.7 - MEMORY STORAGE

The Atlas is shipped with a 128GB SSD which should be sufficient for most projects since the Atlas's data storage is extremely efficient, even with a multitude of imported media files.

## 6.8 - STATUS LEDS

The ETC logo will illuminate when power is applied to the Atlas. The red LEDs above indicate the unit's current status.

The Active LED flashes throughout the boot up procedure and lights solidly once this has been completed and is indicative of a fully functional unit.

The Ethernet LEDs indicates Unison Mosaic-related network activity (not network link) while other LEDs indicate communication on the various ports of the Atlas.

The Output LED indicates that a valid project file has been loaded from the memory card and that playback & data output (eDMX & DVI) has started.

The Overtemp LED will illuminate if the processor core(s) reaches 95°C (203°F) indicating a fault in the system's cooling, typically caused by raised ambient temperatures. Consult the web interface's home page to monitor the system temperatures and take remedial action.

## 6.9 - ERROR CODES

Additionally the red status LEDs are used to indicate any boot failures of the Atlas that prevent the unit from going active.

Error codes are indicated by double flashing the Ethernet M, Ethernet D and Serial I/O LEDs, followed by a 1 second pause.

The bottom three LEDs indicate the error:

- DVI Input - No SSD detected
- Output - Corrupt SSD - recover from USB
- Overtemp - Invalid hardware type

## 6.10 - RESET SWITCH

The Atlas may be reset by inserting a small blunt object into the reset hole on the front panel to depress the reset switch. The switch should be held for at least one second.

**NOTE:** The reset must not be operated when uploading project data nor during bootloader/firmware updates to the Atlas as corruption of the data or software may occur, perhaps even rendering the unit inoperable.

### 6.11 - WATCHDOG

The internal "watchdog" is enabled by default to reset automatically the Atlas in case of a software crash as a result of either a coding error ("bug") or a random electromagnetic event such as a power brown-out or spike, nearby lightning strike or static discharge. Please refer to the Designer Help to learn how to disable this feature (not recommended).

### 6.12 - PORTS

- Ethernet 1 - MGMT

A standard 10/100/1000BASE-T Ethernet connection may be made to this port for management and networking to other Unison Mosaic Controllers and Remote Devices.

- Ethernet 2 - DATA

A standard 10/100/1000BASE-T Ethernet connection may be made to this port to output data to lighting fixtures using Ethernet protocols (eDMX) such as sACN, ArtNet and KiNET.

- DVI-I Output

This port is not supported at the time of writing (refer to the current Designer Help).

- RS232 Serial Port

The serial ports may be connected directly to a PC using a null modem cable. Other devices may require different cables depending on their pinout. The serial port is a 9 pin male D connector with the following pinout:

1: DCD

2: Receive data (RXD)

3: Transmit data (TXD)

4: DTR

5: Signal ground

6: DSR

7: RTS

8: CTS

9: RI

The serial port is not isolated from the Atlas's power supply. If isolation is required, it must either be provided by the connected device or a separate isolator should be used.

- DVI-I Input

A standard DVI connection may be made to this port to route video data to a Live Video Preset within the project.

- USB

This port is not supported at the time of writing (refer to the current Designer Help).

- SPDIF Out

A standard RCA coaxial cable may be connected for digital audio output from the Controller. 2-channel PCM audio is supported.

- Stereo Line Out

Two RCA connectors are provided for analog stereo audio output.

**NOTE:** Ports and third party equipment can be damaged when plugging or unplugging an energised system (hot-plugging). It is therefore adviseable to remove power before making or breaking port connections.

## SECTION 7 - ATLAS PRO

### 7.1 - ATLAS PRO INSTALLATION

The Mosaic Atlas Controller Pro (Atlas Pro) is designed to be rack mounted in a central control room for fixed installations or flight cased for touring applications. The 2U enclosure and 19" rack mounting complies with IEC 60297.

The unit is largely solid state and has been qualified to operate in a dry environment within a temperature range of 0°C to 50°C (32°F to 122°F).

| | |
|---|---|
| **CAUTION:** | Particular attention must be paid to cooling; under no circumstances should the airflow to the heat sinks be restricted and rack fan cooling unit should be considered when multiple units are stacked together to maintain the correct ambient temperature. |

| | |
|---|---|
| **ATTENTION:** | Une attention toute particulière doit être portée au refroidissement; en aucun cas, le flux d'aire vers les dissipateurs de chaleur ne doir être restreint et une unité de refroidissement du venrilateur en rack doit être envisagée lorsque plusieurs unités sont empilées ensemble pour maintenir la température ambiante corrrecte. |

Since the unit requires no user intervention once installed it is suitable for remote installation with all configuration and management taking place over an Ethernet network. However it is recommended that access can be gained in the unlikely event of a hardware failure.

The Atlas Pro is fitted with fan filters mounted on the front panel of the product. Should the filters become clogged, they need to be replaced. Please contact ETC Technical Services for further information.

| | |
|---|---|
| **NOTE:** | This equipment is not suitable for use in locations where children are likely to be present. |

## 7.2 - ATLAS PRO LAYOUT

The following drawings illustrate the layout of the Atlas Pro, refer to the following sections for details:
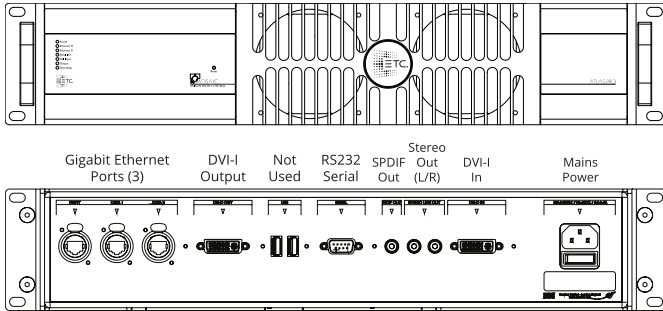


## 7.3 - ATLAS PRO VERSIONS

There are multiple versions of the Atlas Pro that differ only in the maximum number of control channels that can be accommodated. For example, the Atlas Pro 50 can control 50 DMX universes (25,600 channels) while the Atlas Pro 3000 can control 3000 DMX universes (1,536,000 channels).

The Atlas Pro can be used as a stand-alone controller or co-operatively with other Unison Mosaic Controllers and Remote Devices, via an Ethernet network, to form a scalable system.

## 7.4 - POWER SUPPLY

The Atlas Pro is mains powered via an internally fused, universal input power supply unit (PSU) compatible with all worldwide mains supply standards; 100-240V 50/60Hz. The Atlas Pro will consume 40W typical (100W maximum).

| NOTE: | Power must not be disconnected when uploading project data nor during firmware updates to the Atlas Pro as corruption of the data or software may occur, perhaps even rendering the unit inoperable. |
|---|---|

| CAUTION: | For pluggable equipment, the socket outlet shall be installed near the equipment and shall be easily accessible. |
|---|---|

| ATTENTION: | En cas d'équipement enfichable, la prise doit être montée près de l'équipement et doit offrir un accès facile. |
|---|---|

### 7.5 - GROUNDING

The Atlas Pro must be correctly grounded to electrical safety earth at all times.

### 7.6 - REALTIME CLOCK BATTERIES

The Atlas Pro's internal realtime clock is battery-backed to ensure operation when the unit is not powered. The batteries should last for at least 10 years and are easily replaced when necessary, replacement battery: Renata CR2032 Lithium Button Cell.

| **CAUTION:** | Risk of explosion if battery replaced by incorrect type. Dispose of used batteries according to the manufacturer's instructions. |
|---|---|

| **ATTENTION:** | Il y a un danger d'explosion s'il y a un remplacement incorrect de batterie. Mettre au rebut les batteries usages conformement aux instructions du fabricant. |
|---|---|

### 7.7 - MEMORY STORAGE

The Atlas Pro is shipped with a 512GB SSD which should be sufficient for most projects since the Atlas Pro's data storage is extremely efficient, even with a multitude of imported media files.

### 7.8 - STATUS LEDS

The ETC logo will illuminate when power is applied to the Atlas Pro. The red LEDs above indicate the unit's current status.

The Active LED flashes throughout the boot up procedure and lights solidly once this has been completed and is indicative of a fully functional unit.

The Ethernet LEDs indicates Unison Mosaic-related network activity (not network link) while other LEDs indicate communication on the various ports of the Atlas Pro.

The Output LED indicates that a valid project file has been loaded from the memory card and that playback & data output (eDMX & DVI) has started.

The Overtemp LED will illuminate if the processor core(s) reaches 95°C (203°F) indicating a fault in the system's cooling, typically caused by raised ambient temperatures. Consult the web interface's home page to monitor the system temperatures and take remedial action.

### 7.9 - ERROR CODES

Additionally the red status LEDs are used to indicate any boot failures that prevent the unit from going active.

Error codes are indicated by double flashing the Ethernet M, Ethernet D and Serial I/O LEDs, followed by a 1 second pause.

The bottom three LEDs indicate the error:

- DVI Input - No SSD detected
- Output - Corrupt SSD - recover from USB
- Overtemp - Invalid hardware type

## 7.10 - RESET SWITCH

The Atlas Pro may be reset by inserting a small blunt object into the reset hole on the front panel to depress the reset switch. The switch should be held for at least one second.

**NOTE:** The reset must not be operated when uploading project data nor during bootloader/firmware updates to the Atlas Pro as corruption of the data or software may occur, perhaps even rendering the unit inoperable.

## 7.11 - WATCHDOG

The internal "watchdog" is enabled by default to reset automatically the Atlas Pro in case of a software crash as a result of either a coding error ("bug") or a random electromagnetic event such as a power brown-out or spike, nearby lightning strike or static discharge. Please refer to the Designer Help to learn how to disable this feature (not recommended).

## 7.12 - PORTS

- Ethernet 1 - Management

A standard 10/100/1000BASE-T Ethernet connection may be made to this port for management and networking to other Unison Mosaic Controllers and Remote Devices.

- Ethernet 2 - Data

A standard 10/100/1000BASE-T Ethernet connection may be made to this port to output data to lighting fixtures using Ethernet protocols (eDMX) such as sACN, ArtNet and KiNET.

- Ethernet 3 - Data

A standard 10/100/1000BASE-T Ethernet connection may be made to this port to output data to lighting fixtures using Ethernet protocols (eDMX) such as sACN, ArtNet and KiNET.

Note: The two data ports must not be connected to the same physical network.

- DVI-I Output

A standard DVI connection may be made to this port to route output data to the lighting fixtures using the Digital Video Interface.

- RS232 Serial Port

The serial ports may be connected directly to a PC using a null modem cable. Other devices may require different cables depending on their pinout. The serial port is a 9 pin male D connector with the following pinout:

1: DCD

2: Receive data (RXD)

3: Transmit data (TXD)

4: DTR

5: Signal ground

6: DSR

7: RTS

8: CTS

9: RI

The serial port is not isolated from the Atlas Pro's power supply. If isolation is required, it must either be provided by the connected device or a separate isolator should be used.

- DVI-I Input

A standard DVI connection may be made to this port to route video data to a Live Video Preset within the project.

- USB

This port is not supported at the time of writing (refer to the current Designer Help).

- SPDIF Out

A standard RCA coaxial cable may be connected for digital audio output from the Controller. 2-channel PCM audio is supported.

- Stereo Line Out

Two RCA connectors are provided for analog stereo audio output.

**CAUTION:** Ports and third party equipment can be damaged when plugging or unplugging an energised system (hot-plugging). Remove power before making or breaking port connections.

**ATTENTION:** Les ports et l'équipement d'un tiers peuvent être endommagés lors du branchement ou du débranchement d'un système sous tension (branchement à chaud). Enlever l'alimentation avant d'établir ou de rompre les connexions de port.

# SECTION 8 - MRIO

## 8.1 - MRIO INSTALLATION

The Remote Input/Output Devices (MRIO) are ancillary devices that provide additional input and output interfaces to a system. As such, they can not be used on their own but must have at least one Controller present on an Ethernet network to function.

The units are designed to be permanently installed in a control room/cupboard or DIN consumer unit. The enclosure and mounting complies with DIN43880 and EN60715 (35/7.5 rail) respectively.

The units are 100% solid state and have been qualified to operate in a dry environment within a temperature range of 0°C to 50°C (32°F to 122°F). Sealed IP65 rated consumer units are available for outdoor use, please consult your Unison Mosaic distributor or representative.

**NOTE:**  This equipment is not suitable for use in locations where children are likely to be present.

## 8.2 - MRIO LAYOUT

The following drawing illustrates the layout of a Remote Input/Output Device, refer to the following sections for details:
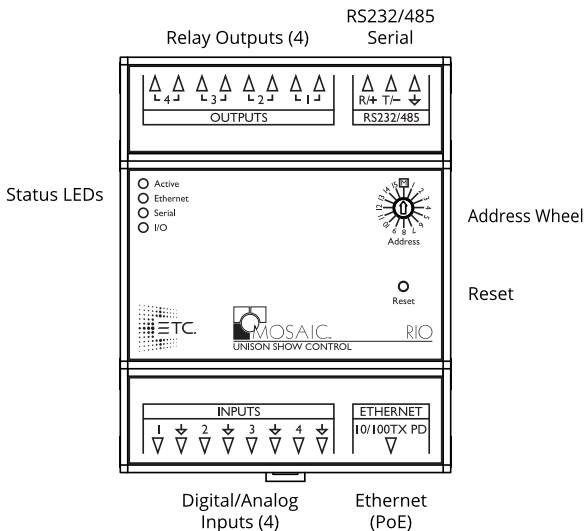
### 8.3 - MRIO VERSIONS

There are five versions of the MRIO available:

MRIO 80: 8 digital/analog inputs & RS232/485/DMX serial port.

MRIO 44: 4 digital/analog inputs, 4 relay outputs & RS232/485/DMX serial port (shown above).

MRIO 08: 8 relay outputs & RS232/485/DMX serial port.

MRIO A: Balanced stereo audio/timecode input & MIDI input/output ports.

MRIO D: DALI bus interface.

### 8.4 - POWER SUPPLY

- Power-over-Ethernet (PoE)

A standard (802.3af) Power-over-Ethernet switch should be used to provide both power and a network connection to the MRIO using a single cable. Alternatively, if a PoE switch is not available, a PoE midspan injector could be used.

The MRIO operates as a PoE Class 1 device (0.44-3.84W) and will typically consume 1.5W .

**NOTE:** Power must not be disconnected during firmware updates to the MRIO as corruption of the software may occur, perhaps even rendering the unit inoperable.

### 8.5 - GROUNDING

The MRIO is designed to be mounted on a grounded (earthed) DIN-rail, no dedicated Chassis ground (earth) terminal is provided.

The PoE connection (power and data) is completely isolated from all the MRIO's ports but the ports are not isolated from each other (except relay outputs, MRIO 44 and MRIO 08 only).

### 8.6 - STATUS LEDS

The ETC logo will illuminate when power is applied to the MRIO. The red LEDs on the front of the MRIO indicate the unit's current status.

The Active LED flashes slowly once the boot up procedure has completed to indicate a fully functional unit. Once the MRIO has connected to a project running on a Controller, the Active LED will light continuously.

The Ethernet LED indicates Unison Mosaic-related network activity (not network link, see Ethernet port later) while the remaining LEDs indicate communication on the various ports of the MRIO.

## 8.7 - ERROR CODES

Additionally the red status LEDs are used to indicate any boot failures of the MRIO that prevent the unit from operating. Error codes are displayed by a repeating pattern of flashing all four LEDs a number of times in succession, followed by a 1 second pause:

| | |
|---|---|
| 1 flash: | Invalid firmware version (reload firmware from Designer) |
| 2 flashes: | Invalid device type or serial number |
| 3 flashes: | Internal memory test error |
| 4 flashes: | Unable to perform factory restore due to corrupt factory firmware |
| 5 flashes: | Current firmware is corrupt, no valid firmware versions available to restore |
| 6 flashes: | Restored firmware is corrupt |

Codes 2 through 6 indicate a hardware error; please consult your distributor, representative or ETC Technical Services for assistance.

## 8.8 - ADDRESS WHEEL

Multiple RIOs may be used on a single network. Each MRIO is uniquely identified by its type (80, 44, 08 or A) and an address setting.

Wheel settings '1' to '15' directly set the MRIO's address to the corresponding number . Up to 15 of each type may be addressed in this way. For systems with more than 15 RIOs of a single type, the manual ('M') setting should be used to allow identification using the MRIO's serial number rather than the address.

## 8.9 - RESET SWITCH

The MRIO may be reset by inserting a small blunt object into the reset hole on the front of the MRIO to depress the reset switch. The switch should be held for at least one second.

**NOTE:** The reset must not be operated during firmware updates to the MRIO as corruption of the software may occur, perhaps even rendering the unit inoperable.

### 8.10 - WATCHDOG

An internal "watchdog" will automatically reset the MRIO in case of a software crash as a result of either a coding error ("bug") or a random electromagnetic event such as a power brown-out or spike, nearby lightning strike or static discharge.

### 8.11 - PORTS

- Digital/Analog Inputs (MRIO 80 and MRIO 44 only)

The MRIO features 8 (MRIO 80) or 4 (MRIO 44) digital/analog inputs on two (MRIO 80) or one (MRIO 44) 8 way connectors. To connect an input signal to the MRIO, one connection should be made to the desired input pin, marked '1' to '8' (MRIO 80) or '1' to '4' (MRIO 44), and the other should be made to the adjacent common pin.

The MRIO inputs can be individually configured to operate in one of three modes:

**Contact closure:** An external volt-free switch may be connected between the input pin and the signal ground pin.

In this mode, the input pin is internally pulled-up to 5V via a 2.2Kohm resistor, so the switch only needs to be rated at 5V , 2.5mA or greater.

**Digital input:** An external voltage source (such as a 12VDC trigger output) may be connected between the input pin and the signal ground pin.

In this mode, the input pin is internally pulled down to 0V via a 2Mohm resistor and the maximum input voltage supported is 24VDC .

The MRIO may be configured using Designer to specify what the 'high' and 'low' threshold voltages are. This facility can be used to provide 'Schmitt trigger' action.

**Analog input:** An external voltage source (such as a 0-10VDC analog signal) may be connected between the input pin and the signal ground pin.

In this mode, the input pin is internally pulled down to 0V via a 2Mohm resistor and the maximum input voltage supported is 24VDC .

The MRIO may be configured using Designer to specify what the input voltage range is. Voltages inside this range are reported as 0% to 100%.

In all modes, the maximum rated input voltage is 24VDC . The inputs should never be driven with a higher voltage nor negative voltage or damage may occur.

- Relay Outputs (MRIO 08 and MRIO 44 only)

The MRIO features 8 (MRIO 08) or 4 (MRIO 44) relay outputs on two (MRIO 08) or one (MRIO 44) 8 way connectors.

The MRIO relays are rated at 48V (AC or DC), 250mA. This comparatively low rating is due to the use of solid-state relays to ensure silent operation and long-term reliability.

All relay outputs are fully isolated from each other (1kV) and all other ports.

**NOTE:** An external power supply is required to power the relay outputs. An external PSU can be used to power one or more relay outputs.

- RS232/RS485/DMX Serial Port (MRIO 80, MRIO 44 and MRIO 08 only)

The serial port's protocol (RS232 or RS485), data rate and format settings (baud, parity, stop bits, etc.) are configured using Designer. The port can additionally be configured to output 96 channels of DMX512 control data (RDM is not supported).

In RS232 mode, the port operates in full duplex with the following pinout:

R/+ Receive

T/- Transmit

⏚ Signal ground

In RS485 & DMX modes, the port operates in half duplex with the following pinout:

R/+ Data +

T/- Data -

⏚ Signal Ground

- MIDI Input and Output (MRIO A only)

The MIDI input and output connectors are standard 5 pin DIN connections. They may be connected directly to any standard MIDI device.

- Analog Audio Input (MRIO A only)

Balanced stereo audio input is provided @ 0dBV line level on a 6 way connector:

**+**
**ⓇⓇ** Balanced audio right channel +

Balanced audio right channel - (tie to ground for unbalanced)

⏚ Signal ground

**+**
**Ⓛ** Balanced audio left channel +

Balanced audio left channel - (tie to ground for unbalanced)

⏚ Signal ground

The audio input can also accept linear time code (LTC) such as SMPTE/EBU on either channel but not both, configured using Designer. The Audio / LTC LED will indicate peak for audio and valid for time code.

- DALI (MRIO D only)

A DALI bus interface is provided on a 3 way connector:

⌐ DALI bus (polarity insensitive)
⌐ DALI bus (polarity insensitive)

⏚ Chassis ground (for optional shield)

The DALI data LED will indicate valid data on the bus.

**NOTE:** The DALI bus requires a dedicated DALI bus power supply to function, the DALI power LED will illuminate solidly to indicate suitable (9-26V) power. The LED will be off for no power or flash to indicate out of range power.

- Ethernet

A standard 10/100TX Ethernet connection must be made to the MRIO. A Power-overEthernet (PoE) switch or midspan injector is required to operate the MRIO. The LEDs on the RJ45 jack are useful for debugging the Ethernet installation:

The Lnk LED will illuminate when an Ethernet link has been established.

The Dat LED will illuminate to indicate Ethernet traffic (not just Unison Mosaic-relevant).

**NOTE:** Ports and third party equipment can be damaged when plugging or unplugging an energised system (hot-plugging). It is therefore advisable to remove power before making or breaking port connections.
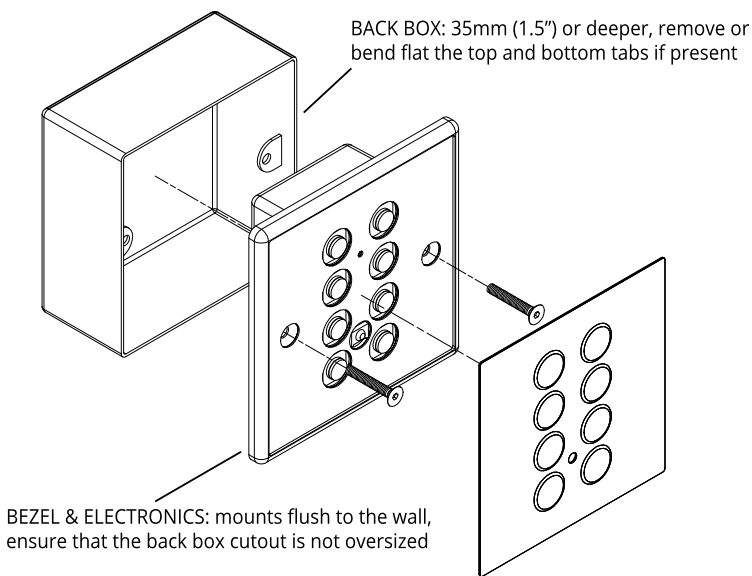
## SECTION 9 - BPS

### 9.1 - BPS INSTALLATION

The Button Panel Stations (BPS) are ancillary devices that provide user interfaces to a system. As such, they can not be used on their own but must have at least one Controller present on an Ethernet network to function.

The units are designed to be permanently installed into UK or US single-gang back boxes (supplied separately). The units are 100% solid state and have been qualified to operate in a dry environment within a temperature range of 0°C to 50°C (32°F to 122°F).

The following drawing illustrates a typical installation (UK shown):



BACK BOX: 35mm (1.5") or deeper, remove or bend flat the top and bottom tabs if present

BEZEL & ELECTRONICS: mounts flush to the wall, ensure that the back box cutout is not oversized

### 9.2 - BPS VERSIONS

The BPS has a slimline bezel with magnetic overlay, in various bezel and overlay colours.

The BPS is available in two sizes:

    UK - UK Single gang back box

    US - US Single gang back box

## 9.3 - BPS LAYOUT

The following drawing illustrates the layout of a Unison Mosaic Button Panel Station (UK shown with overlay removed), refer to the following sections for details:

Reset Switch (under overlay)



IR Receiver
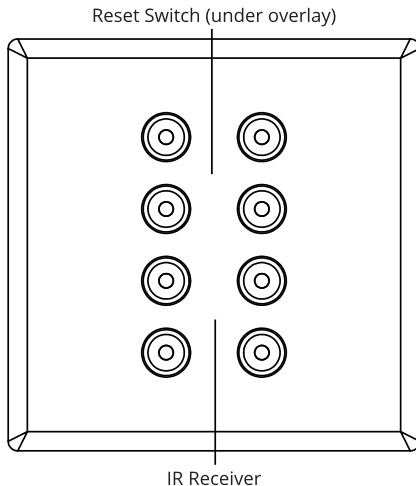
## 9.4 - POWER SUPPLY

- Power-over-Ethernet (PoE)

A standard (802.3af) Power-over-Ethernet switch should be used to provide both power and a network connection to the BPS using a single cable. Alternatively, if a PoE switch is not available, a PoE midspan injector could be used.

The BPS operates as a PoE Class 1 device (0.44-3.84W) and will typically consume 1.5W .

**NOTE:** Power must not be disconnected during firmware updates to the BPS as corruption of the software may occur, perhaps even rendering the unit inoperable.

## 9.5 - STATUS LEDS

The LEDs on the rear of the unit provide the following status information:

| | |
|---|---|
| Pwr: | Power - illuminates when the unit is correctly powered. |
| Act: | Active - illuminates once the boot up procedure has completed and is indicative of a fully functional unit. |
| Net: | Network - illuminates when the unit is sending or receiving Unison Mosaic-related data. |
| Lnk: | Link - illuminates once the unit has established an Ethernet link. |
| 100: | 100BASE-TX - illuminates when the Ethernet link is operating at 100Mbit/s. |

## 9.6 - ERROR CODES

Additionally the red status LEDs are used to indicate any boot failures of the BPS that prevent the unit from operating. Error codes are displayed by a repeating pattern of flashing both LEDs a number of times in succession, followed by a 1 second pause:

| | |
|---|---|
| 1 flash: | Invalid firmware version (reload firmware from Designer) |
| 2 flashes: | Invalid device type or serial number |
| 3 flashes: | Internal memory test error |
| 4 flashes: | Unable to perform factory restore due to corrupt factory firmware |
| 5 flashes: | Current firmware is corrupt, no valid firmware versions available to restore |
| 6 flashes: | Restored firmware is corrupt |

Codes 2 through 6 indicate a hardware error; please consult your distributor, representative or ETC Technical Services for assistance.

## 9.7 - ADDRESS WHEEL

Multiple BPSs may be used on a single network. Each BPS is uniquely identified by its address setting.

Wheel settings '1' to '15' directly set the BPS's address to the corresponding number . Up to 15 BPSs may be addressed in this way. For systems with more, the

manual ('M') setting should be used to allow identification using the BPS's serial number rather than the address.

## 9.8 - RESET SWITCH

The BPS may be reset by removing the magnetic overlay and inserting a small blunt object into the reset hole to depress the reset switch. The switch should be held for at least one second.

**NOTE:** The reset must not be operated during firmware updates to the BPS as corruption of the software may occur, perhaps even rendering the unit inoperable.

## 9.9 - WATCHDOG

An internal "watchdog" will automatically reset the BPS in case of a software crash as a result of either a coding error ("bug") or a random electromagnetic event such as a power brown-out or spike, nearby lightning strike or static discharge.

## 9.10 - LEARNING IR RECEIVER

The BPS may be taught to recognise up to 8 different IR codes from a standard infra red remote control. When a key on the remote control is pressed during normal operation, the BPS will react as though one of its 8 buttons has been pressed.

### 9.10.1 - TO ENTER LEARN MODE:

1. Enter by holding down the bottom two (or only two) buttons while pressing and releasing reset.
   - The buttons will display a clockwise chase sequence.
2. Release the two buttons.
   - Each button will flash quickly (4Hz) if an IR code has been learnt, or slowly (1Hz) if not.
   - No network communication will operate while in Learn Mode.
   - Learn Mode will automatically exit after 60 seconds of inactivity.

### 9.10.2 - TO LEARN AN IR CODE:

1. Briefly press and release a single button which should learn the IR code
   - The button will start flashing rapidly (8Hz) and the other buttons will extinguish.
2. Within ten seconds, point the IR remote at the BPS and press and hold the desired key.
   - The buttons will display a clockwise chase sequence when the IR code has been learnt.

3. Release the key on the IR remote.
   - The button now will be flashing quickly (4Hz) to indicate that it has an IR code stored.

### 9.10.3 - TO ERASE AN IR CODE:

1. Press and hold for three seconds the button which should erase its IR code.
   - The buttons will display a clockwise chase sequence when the IR code has been erased.
2. Release the button.
   - The button will now be flashing slowly (1Hz) to indicate that it has no IR code stored.

### 9.10.4 - TO TEST AN IR CODE:

1. Point the IR remote at the BPS and press and hold the key to test.
   - The button(s) that has learnt this code will illuminate solidly, all others will extinguish.
2. Release the key and test the others.

### 9.10.5 - TO EXIT LEARN MODE:

1. Press the reset button or wait for 60 seconds.
   - The buttons will now revert to normal operation.
   - Network communication will resume.

Note that the BPS does not have to be part of a networked Unison Mosaic system to learn IR codes, all that is required is PoE power and the donor IR remote control.
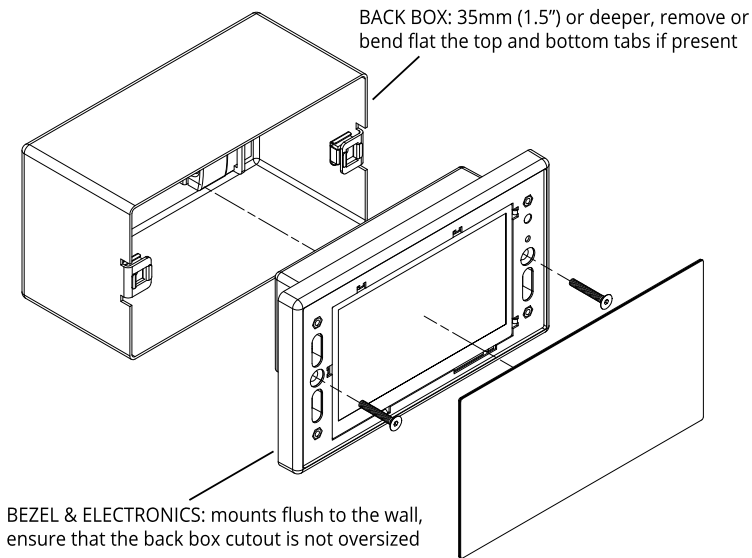
# SECTION 10 - M-TS

## 10.1 - M-TS INSTALLATION

The Touchscreen Station (M-TS) is an interface device with an integrated touch screen user interface. It is an ancillary device that provides a user interface to a system. As such, they can not be used on their own but must have at least one Controller present on an Ethernet network to function.

The units are designed to be permanently installed into UK double-gang or custom back boxes (supplied separately). The units are 100% solid state and have been qualified to operate in a dry environment within a temperature range of 0°C to 50°C (32°F to 122°F).

The following diagram illustrates a typical installation:



BACK BOX: 35mm (1.5") or deeper, remove or bend flat the top and bottom tabs if present

BEZEL & ELECTRONICS: mounts flush to the wall, ensure that the back box cutout is not oversized

Carefully remove the protective films from the front of the liquid crystal display and the magnetic overlay before final assembly.

## 10.2 - M-TS LAYOUT

The following drawing illustrates the layout of a Unison Mosaic Touchscreen Station, refer to the following sections for details:
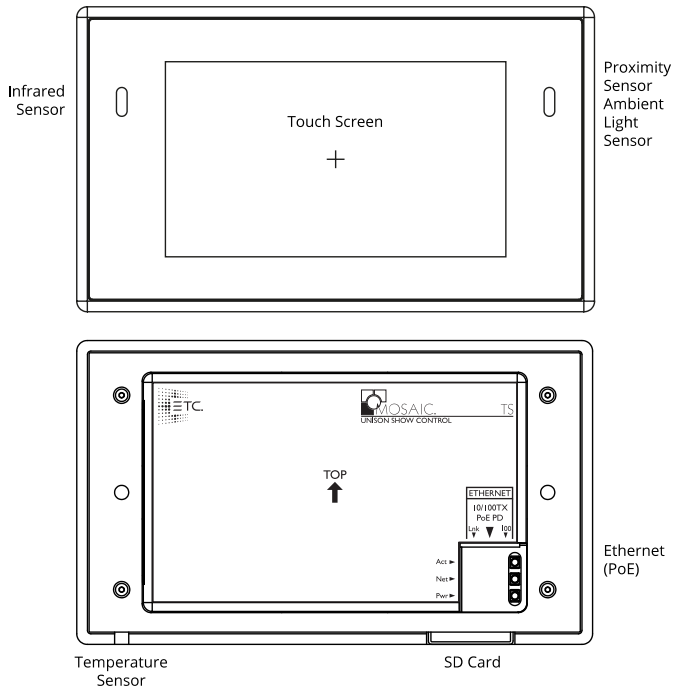


## 10.3 - POWER SUPPLY

- Power-over-Ethernet (PoE)

A standard (802.3af) Power-over-Ethernet switch should be used to provide both power and a network connection to the M-TS using a single cable. Alternatively, if a PoE switch is not available, a PoE midspan injector could be used.

A limited power source approved to UL60950-1 2nd Edition, CAN/CSA C22.2 No. 60950- 1.07 2nd Edition MUST be used, with an SELV output voltage.

The M-TS operates as a PoE Class 2 device (3.84-6.49W) and will typically consume 4W.

**NOTE:**   Power must not be disconnected during firmware updates to the M-TS as corruption of the software may occur, perhaps even rendering the unit inoperable.

## 10.4 - REALTIME CLOCK BATTERY

The M-TS's internal realtime clock is battery-backed to ensure operation when the unit is not powered. The battery should last for at least 10 years and is easily replaced when necessary, replacement battery: Renata CR2032 Lithium Button Cell.

**CAUTION:**   Risk of explosion if battery replaced by incorrect type. Dispose of used batteries according to the manufacturer's instructions.

**ATTENTION:**   Il y a un danger d'explosion s'il y a un remplacement incorrect de batterie. Mettre au rebut les batteries usages conformement aux instructions du fabricant.

## 10.5 - MEMORY CARD

The M-TS is shipped with a 2GB SD Memory Card. In the event of M-TS hardware failure, simply moving the card into a replacement unit with identical or more recent firmware is sufficient to get the device up and running again.

## 10.6 - STATUS LEDS

The LEDs on the rear of the unit provide the following status information:

Pwr:  Power - illuminates when the unit is correctly powered.

Act:   Active - illuminates once the boot up procedure has completed and is indicative of a fully functional unit.

Net:   Network - illuminates when the unit is sending or receiving Unison Mosaic-related data.

Lnk:   Link - illuminates once the unit has established an Ethernet link.

100:   100BASE-TX - illuminates when the Ethernet link is operating at 100Mbit/s.

The LEDs on the front of the unit (under the overlay) provide the following status information:

Pwr:  Power - illuminates when the unit is correctly powered.

Act:   Active - illuminates once the boot up procedure has completed and is indicative of a fully functional unit.

Eth: Ethernet - illuminates when the unit is sending or receiving Unison Mosaic-related data.

Out: Output - not currently used (except for error codes).

## 10.7 - ERROR CODES

Additionally the red status LEDs are used to indicate any boot failures of the M-TS that prevent the unit from going active. These codes are outlined below and in all cases the Active LED will be off (Power LED will remain on):

- Ethernet & Output double flashing - memory card missing (insert or replace card)
- Ethernet & Output triple flashing - internal flash error (contact our support)

## 10.8 - RESET SWITCH

The M-TS may be reset by removing the magnetic overlay and pressing the reset switch. The switch should be held for at least one second.

**NOTE:** The reset must not be operated during firmware updates to the M-TS as corruption of the software may occur, perhaps even rendering the unit inoperable.

## 10.9 - CONFIG SWITCH

The M-TS may be placed in a configuration mode by removing the magnetic overlay and pressing the config switch, refer to Designer Help for instructions.

## 10.10 - WATCHDOG

An internal "watchdog" will automatically reset the M-TS in case of a software crash as a result of either a coding error ("bug") or a random electromagnetic event such as a power brown-out or spike, nearby lightning strike or static discharge.

## 10.11 - LEARNING IR RECEIVER

The M-TS may be taught to recognise different IR codes from a standard infra red remote control, refer to Designer Help for instructions.

## 10.12 - TEMPERATURE SENSOR

The Temperature Sensor can be used to measure the ambient temperature around the M-TS.

**NOTE:** The Temperature Sensor cutout is not a release catch and attempting to use it as such will result in damage to the unit, perhaps even rendering the unit inoperable.

## SECTION 11 - NET

### 11.1 - NET INSTALLATION

The Unison Mosaic 2+4 port Power-over-Ethernet Switch (NET) is designed to be permanently installed in a central control room/cupboard or DIN consumer unit for remote deployment. The enclosure and mounting complies with DIN43880 and EN60715 (35/7.5 rail) respectively.

This guide relates to units with serial numbers greater than 021001. For a legacy NET with a lower serial number please refer to earlier versions of this installation guide.

The unit is 100% solid state and has been qualified to operate in a dry environment within a temperature range of 0°C to 50°C (32°F to 122°F). Sealed IP65 rated consumer units are available for outdoor use, please consult your Unison Mosaic distributor or representative.

**NOTE:** This equipment is not suitable for use in locations where children are likely to be present.

### 11.2 - NET LAYOUT

The following drawing illustrates the layout of the NET, refer to the following sections for details:

PoE Ethernet Outputs (4)

Status LEDs

Ethernet Ports          48V DC input
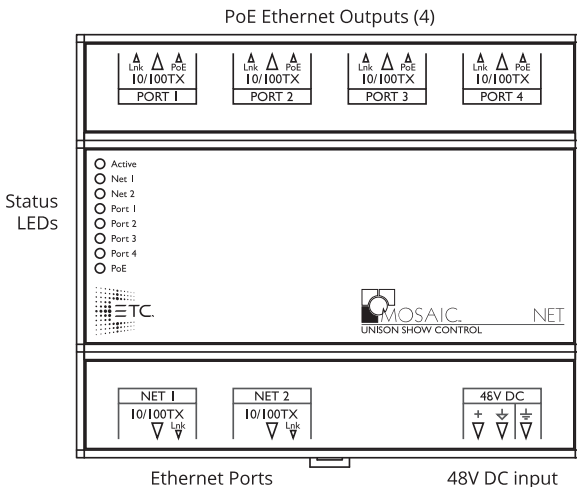
## 11.3 - POWER SUPPLY

- DC power (48V)

A limited power source approved to UL60950-1 2 Edition, CAN/CSA C22.2 No. 60950nd1.07 2 Edition MUST be used, with an output voltage of 48V DC.

Such a power supply can be connected directly to the NET using the DC Input connector. The pins on this connector are marked:

+  Positive input (48V DC)

↓ Signal ground (0V)

⏚ Chassis ground (earth)

The power supply should be connected to the Positive and Signal ground inputs, ensuring the polarity is correct.

## 11.4 - POWER SUPPLY CHOICE & POE LOADING

The power supply must provide 48V, with an appropriate current and power rating for the devices.

The NET is capable of powering up to four IEEE 802.3af Class 1,2 and 3 and IEEE 802.3at Class 4 (Type 2) devices, the power supply required can be calculated using the table below:

| Class | Example Unison Mosaic Devices | Maximum PSU Power Consumption |
|---|---|---|
| 1 | MRIOs, BPS | 4W |
| 2 | MSC, MTPC, M-TS | 7W |
| 3 | None | 15.4W |
| 4 | None | 30W |

E.g. to power 1 MSC, 1 MTPC and 2 MRIOs, the minimum required power would be:

$7+7+(2*4) = 22$ W

PoE Ports include overcurrent protection for the detected PoE class

Multiple NETs may be powered by a single power supply provided its rating is increased accordingly.

## 11.5 - GROUNDING
The NET is designed to be mounted on a grounded (earthed) DIN-rail and a dedicated Chassis ground (earth) terminal is also provided which should be connected to a suitable earth.

## 11.6 - STATUS LEDS
The ETC logo will illuminate when power is applied to the NET. The red LEDs on the top of the NET indicate the unit's status:

| | |
|---|---|
| Active: | Indicates that the unit is functional. |
| Ethernet 1-2: | Illuminates when the link has been established and toggles off to indicate data. |
| Port 1-4: | Illuminates when the link has been established and toggles off to indicate data. |
| PoE: | Indicates any activity on PoE Ports. |

## 11.7 - PORTS

- Ethernet and PoE Ports

The NET includes 2 standard 10/100TX ports for communication with non-PoE devices, and 4 PoE capable 10/100TX ports to provide power and communicaiton to PoE powered devices. The LEDs on the RJ45 port itself are useful for debugging the Ethernet installation:

Green (solid for link, flash for data)

Yellow (solid for PoE, slow flash for PoE detect error, fast flash for current error)

## SECTION 12 - OPTO

### 12.1 - OPTO INSTALLATION

The Unison Mosaic 1+4 port DMX512 Repeater (OPTO) is designed to be permanently installed in a central control room/cupboard or DIN consumer unit for remote deployment. The enclosure and mounting complies with DIN43880 and EN60715 (35/7.5 rail) respectively.

The unit is 100% solid state and has been qualified to operate in a dry environment within a temperature range of 0°C to 50°C (32°F to 122°F). Sealed IP65 rated consumer units are available for outdoor use, please consult your Unison Mosaic distributor or representative.

**NOTE:** This equipment is not suitable for use in locations where children are likely to be present.

### 12.2 - OPTO LAYOUT

The following drawing illustrates the layout of the OPTO, refer to the following sections for details:



Optically Isolated DMX Outputs
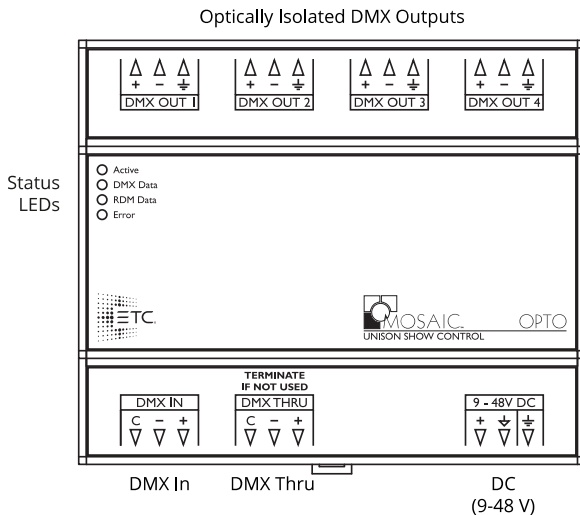
## 12.3 - POWER SUPPLY

- DC power (9 to 48V)

A limited power source approved to UL60950-1 2 Edition, CAN/CSA C22.2 No. 60950nd1.07 2 Edition MUST be used, with an output voltage of 9 to 48V DC.

Such a power supply can be connected directly to the OPTO using the DC Input connector . The pins on this connector are marked:

+   Positive input (9 to 48V DC)

⤓   Signal ground (0V)

⏚   Chassis ground (earth)

The power supply should be connected to the Positive and Signal ground inputs, ensuring the polarity is correct.

The OPTO will typically consume 4W with all ports fully loaded.

## 12.4 - GROUNDING

The OPTO is designed to be mounted on a grounded (earthed) DIN-rail and a dedicated Chassis ground (earth) terminal is also provided which should be connected to a suitable earth.

## 12.5 - STATUS LEDS

The ETC logo will illuminate when power is applied to the OPTO. The red LEDs on the top of the OPTO indicate the unit's status:

| | |
|---|---|
| Active: | Indicates that the unit is functional. |
| DMX data: | Illuminates when DMX data is being routed (input to all ports). |
| RDM data: | Illuminates when RDM data is being routed (a port to input). |
| Error: | Flashes to indicate an error condition. |

## 12.6 - DMX THRU TERMINATION

If the DMX Thru connection is not being used to daisy-chain to other DMX devices then the supplied termination resistor MUST be fitted to ensure data integrity.

## 12.7 - DMX & RDM GUIDELINES

The OPTO is compatible with the DMX512, DMX512(1990), DMX512-A and RDM 1.0 standards and care should be taken to ensure that your cabling, wiring topology and termination also complies with these standards.

Such compliance is beyond the scope of this document but a good resource is "Recommended Practice in DMX 512" by Adam Bennette which is available through PLASA and USITT .

## SECTION 13 - LED-X

### 13.1 - LED-X INSTALLATION

The Unison Mosaic LED Drivers (LED-x) are ancillary devices that provide direct LED control. As such, they can not be used on their own but must have at least one Controller (MSC 1/2/4) or Remote Input/Output Device (MRIO 80/44/08) present to provide the DMX control data.

The units are designed to be permanently installed in a central control room/cupboard or DIN consumer unit for remote deployment. The enclosure and mounting complies with DIN43880 and EN60715 (35/7.5 rail) respectively.

The units are 100% solid state and have been qualified to operate in a dry environment within a temperature range of 0°C to 50°C (32°F to 122°F). Sealed IP65 rated consumer units are available for outdoor use, please consult your Unison Mosaic distributor or representative.

**NOTE:** This equipment is not suitable for use in locations where children are likely to be present.

### 13.2 - LED-X LAYOUT

The following drawing illustrates the layout of the LED-x, refer to the following sections for details:
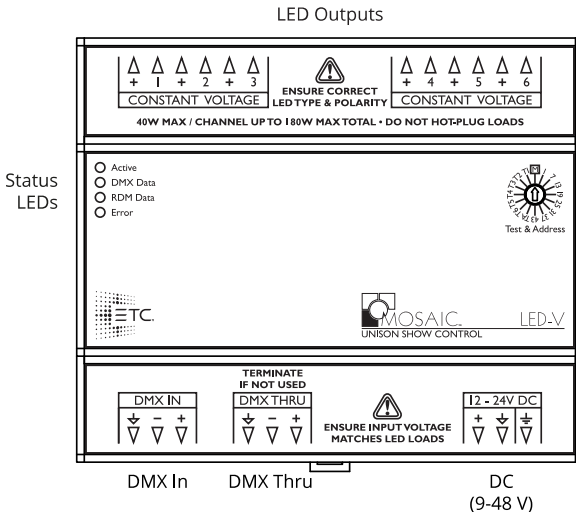
## 13.3 - LED-X VERSIONS

There are four versions of the LED-x available:

LED-V: 6 channel constant voltage LED driver (shown above), 12-24V DC input.

LED-C 350: 6 channel constant 350mA current LED driver, 15-48V DC input.

LED-C 500: 6 channel constant 500mA current LED driver, 15-36V DC input.

LED-C 700: 6 channel constant 700mA current LED driver, 15-24V DC input.

## 13.4 - POWER SUPPLY

- DC power (12 to 48V dependant on version and LED loading)

A limited power source approved to UL60950-1 2 Edition, CAN/CSA C22.2 No. 60950nd1.07 2 Edition MUST be used, with an output voltage of 12 to 48V DC.

Such a power supply can be connected directly to the LED-x using the DC Input connector . The pins on this connector are marked:

+ Positive input (9 to 48V DC)

↓ Signal ground (0V)

⏚ Chassis ground (earth)

The power supply should be connected to the Positive and Signal ground inputs, ensuring the polarity is correct.

The LED-x will consume 200W maximum with all channels fully loaded at full intensity.

## 13.5 - GROUNDING

The LED-x is designed to be mounted on a grounded (earthed) DIN-rail and a dedicated Chassis ground (earth) terminal is also provided which should be connected to a suitable earth.

## 13.6 - STATUS LEDS

The ETC logo will illuminate when power is applied to the LED-x. The red LEDs on the top of the LED-x indicate the unit's status:

Active: Indicates that the unit is functional.

DMX data: Illuminates when DMX data is being received.

RDM data: Illuminates when RDM data is being transmitted.

Error: Flashes to indicate an error condition.

### 13.7 - DMX THRU TERMINATION

If the DMX Thru connection is not being used to daisy-chain to other DMX devices then the supplied termination resistor MUST be fitted to ensure data integrity.

### 13.8 - DMX & RDM GUIDELINES

The LED-x is compatible with the DMX512, DMX512(1990), DMX512-A and RDM 1.0 standards and care should be taken to ensure that your cabling, wiring topology and termination also complies with these standards.

Such compliance is beyond the scope of this document but a good resource is "Recommended Practice in DMX 512" by Adam Bennette which is available through PLASA and USITT .

### 13.9 - TEST & ADDRESS WHEEL

Wheel settings '1' to '43' directly set the LED-x's DMX start address to the corresponding channel number. Alternatively, use the managed ('M') setting to set the DMX start address via the RDM protocol (see Designer Help for details) in which case the LED-x can be addressed to any DMX channel number.

Wheel settings 'T1' to 'T6' and 'TA' provide test facilities for the installer by bringing the corresponding channel or all channels to 25%. The DMX control data is ignored when testing channels in this way. Note that there is a small delay (0.5sec) in the response of the wheel to avoid intermediate settings taking effect.

### 13.10 - LED FIXTURE TYPES (LOW VOLTAGE ARCHITECTURAL ONLY)

LED fixtures are totally unlike conventional lighting fixtures due to the behaviour of the semiconducting Light Emitting Diode (LED) itself:

- Correct polarity must be observed to avoid "breakdown"
- Specified forward voltage (Vf) must at least be applied (the LED will "drop" Vf)
- Specified drive current (If) must be carefully maintained
- Dimming is achieved by "chopping" the drive current, typically by PWM
- Thermal management is critical for long life and reliability, choose your fixtures well

LED fixtures typically comprise either one or more LEDs in a module ("light engine") or as an array on a substrate, commonly a flexible "tape" that can be cut to the desired length. This is the first important distinction to make since the former require a constant current driver (the fixture is just LEDs) and the latter a constant voltage driver (the fixture includes current control electronics):
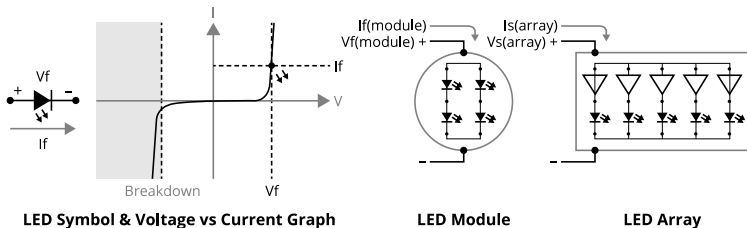
**LED Symbol & Voltage vs Current Graph**    **LED Module**    **LED Array**

So before you can select the correct LED driver you must determine the fixture type and then gather the drive characteristics from the manufacturer:

LED MODULE - CONSTANT CURRENT DRIVE

- Module forward current If(module) which is typically 350, 500 or 700mA
- Module forward voltage Vf(module) which is module power divided by If (module)

LED ARRAY - CONSTANT VOLTAGE DRIVE

- Array supply voltage Vs(array) which is typically 12 or 24V
- Array power dissipation Ps(array) which is determined by its size/length (eg. Watt/metre)

Colour changing fixtures just have multiple instances of these LED arrangements, one for each colour, typically three (RGB) so requiring three driver/DMX channels to control. Note that with colour changing LED fixtures the anodes (+) are connected together and the cathodes (-) individually driven since LED current switching occurs on the negative side. Beware colour coded cables as there is no standard coding system.

## 13.11 - FIXTURE GANGING

It is often desirable to gang fixtures together onto one driver/DMX channel and here again the fixture type determines how this is done and what needs to be determined:

LED MODULE - GANG IN SERIES

- All modules must have the same forward current If(module) to be ganged
- Determine the total forward voltage drop Vf(total) by summing the Vf (module)s
- It is helpful to end up with similar Vf(total)s for each gang of arrays

LED ARRAY - GANG IN PARALLEL

- All arrays must have the same supply voltage Vs(array) to be ganged
- Determine the total power load Ps(total) by summing the Ps(array)s
- It is helpful to end up with similar Ps(total)s for each gang of arrays

## 13.12 - LED-X VERSION & POWER SUPPLY SELECTION

Once you have determined the fixture types, drive characteristics and ganging requirements you can select the appropriate drivers & power supplies:

LED MODULE - GANG IN SERIES - CONSTANT CURRENT

- Use the LED-C 350, 500 or 700 for 350, 500 or 700mA If(module) drive respectively
- Choose a power supply such that Vin is slightly greater (2-3V) than the maximum Vf(total)
- The more that Vin exceeds Vf(total) per channel then the worse the fficiency

LED ARRAY - GANG IN PARALLEL - CONSTANT VOLTAGE

- Use the LED-V ensuring that each channel load is 40W maximum or 180W in total
- Choose a power supply such that Vin equals Vs(array)
- Choose a power supply capable of supplying the total load, sum of each Ps(total)
- Long cables decrease efficiency, split up large arrays to avoid visible drooping

That all being said, ganging is an iterative process based on zoning requirements and driver & power supply choices with the highest system efficiency and lowest cost being the overall target. It is often sensible to start with the constant voltage power supply requirement and use that for the constant current supply as well to standardise on a power supply but this is not a requirement. You should also not balk at selecting the LED fixtures themselves to fit into your overall system.

Further, consider distributing the LED drivers & power supplies to be close to the fixtures themselves to minimise cabling and cable losses (constant voltage) and maximise flexibility, particularly when it comes to refits. Finally it is advisable to use multiple low-power power supplies, perhaps one per 6 channel driver, rather than a centralised high-power approach.

## COMPLIANCE

The ETC product range is manufactured to the highest quality in compliance with the following international standards:

### ENCLOSURE AND MOUNTING

- EN60715: Top hat section (TH) 35-7.5mm & 35-15mm DIN rail.
- DIN 43 880: Built-in equipment for electrical installations; Frame size 1.
- IEC 60297: 2U 19" rack mounting enclosure.
- IP40 rated.

### ELECTROMAGNETIC COMPATIBILITY

- 2014/30/EU (EMC)
- 2014/35/EU (LVD)

### SAFETY

- UL 60950-1 and CAN/CSA C22/2 No. 60950-1

### ENVIRONMENTAL

- 2011/65/EEC (RoHS)
- 2012/19/EU (WEEE)