# MTL4840 HART

# *maintenance system*

Instruction Manual

# Contents                                    Page

### Symbols

This publication includes Warnings, Cautions and Information issues where appropriate to point out safety-related or other important information.  The corresponding symbols should be interpreted as follows:

**WARNING:** these indicate where there is a danger of personal injury or death.

**CAUTION:** these indicate the presence of a hazard which could result in equipment or property damage.

**INFORMATION (NOTE):** these alert the reader to pertinent facts and conditions.

Although Caution hazards are associated with equipment or property damage, it should be understood that use of damaged equipment could, under certain operational conditions, result in degraded process performance and even personal injury or death. The user is urged therefore, to comply fully with all Caution notices.
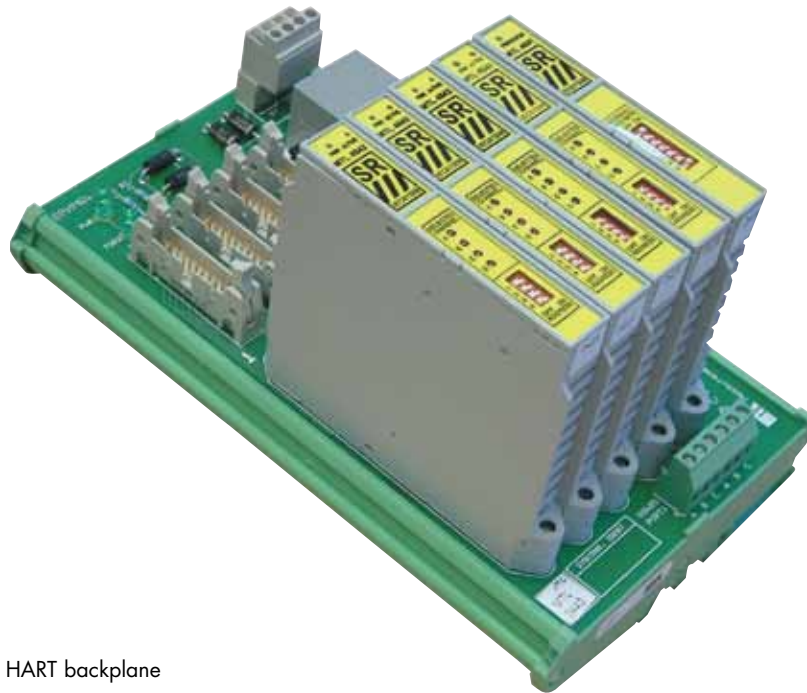
# MTL4840 HART maintenance system



**Figure 1.1** - BPHM64 HART backplane

## 1. INTRODUCTION

This instruction manual describes the procedures for installing, connecting, checking and maintaining the MTL4840 HART® maintenance system, which is a simple interface between smart devices in the field and HART instrument management software running on a PC.

The following sections are outlined here.

Section 2 describes the system and the solutions available

Section 3 covers some safety aspects.

Section 4 deals with installing the backplanes

Section 5 describes installing and configuring the modules

Section 6 provides information on fault finding, and maintenance

Section 7 introduces software for the MTL4840 System.

See the MTL web site *(www.mtl-inst.com*) for the full specifications of the MTL4840 system components and accessories, and of the MTL4000 Series isolators.

## 2 DESCRIPTION

The MTL4840 HART Maintenance System enables a user to calibrate, configure and maintain an entire network of 'smart' field devices from a single workstation.

The key elements that make this possible are the MTL4841 communications module and the MTL4842 HART interface module. These two modules provide the multiplexing for the individual field devices, making each one addressable and identifiable.

The other important element is the terminal circuit board that simplifies the interconnection of all these devices to the MTL484x modules. A range of terminal boards and backplanes has been designed to suit the more standard applications but custom versions can also be designed to suit individual OEMs and their applications.

The MTL4841and MTL4842 use the compact plug-in style of the MTL4000 Series of intrinsically safe isolating interface units. This provides a quick and easy installation method onto the backplanes.

The system is organised in multiples of 16 (sixteen). The MTL4842 HART interface module can handle up to sixteen field devices. The MTL4841 communications module is the next "layer", which can

manage up to sixteen of the MTL4842 modules, making a possible total of 256 HART devices per MTL4841 module.

The MTL4841 modules are then connected via an RS485/RS232 converter to the host PC. Depending upon the management software running on the PC, up to 31 of the MTL4841 modules could be connected to it, making a potential device count of 7,936! See Figure 2.1 for a diagram of this structure.

In addition to this standard configuration, the MTL4840 system will support the multi-drop connection of HART devices. With up to fifteen HART devices on a single loop, it is possible to expand the capacity of each backplane (and consequently the system).

For intrinsically safe applications, consideration must be given to the safety parameters for each loop. For further information, please refer to MTL or your local representative.

### 2.1 General purpose or IS?

The MTL HART Management System can be used to control and maintain field devices that are located in a safe area or a hazardous areas.

**For safe areas**, HART Connection Units (HCUs - and their related HMUs - see Section 2.3.1) provide the necessary terminals to connect up to 16 field devices, with organised links to the MTL4842 interface module.

**Hazardous-area field devices** can be handled through backplane-mounted, IS isolating interfaces (BPxH). Having the isolators mounted on a backplane dramatically reduces the amount of hand wiring required and therefore reduces the number of potential wiring errors. The hazardous-area wiring terminates on the isolating modules, *not the backplane*, consequently the backplanes do not need IS certification.

### 2.2 Generic or custom?

A range of generic connection units is available for both input and output field-device wiring. These are not designed for any particular DCS type and may be used universally.

The alternative is to choose a connection unit or backplane that integrates with the type of DCS being used on the plant. The key advantage of this method is the use of a DCS's specific connector type, which simplifies the wiring of the connection units into the system.
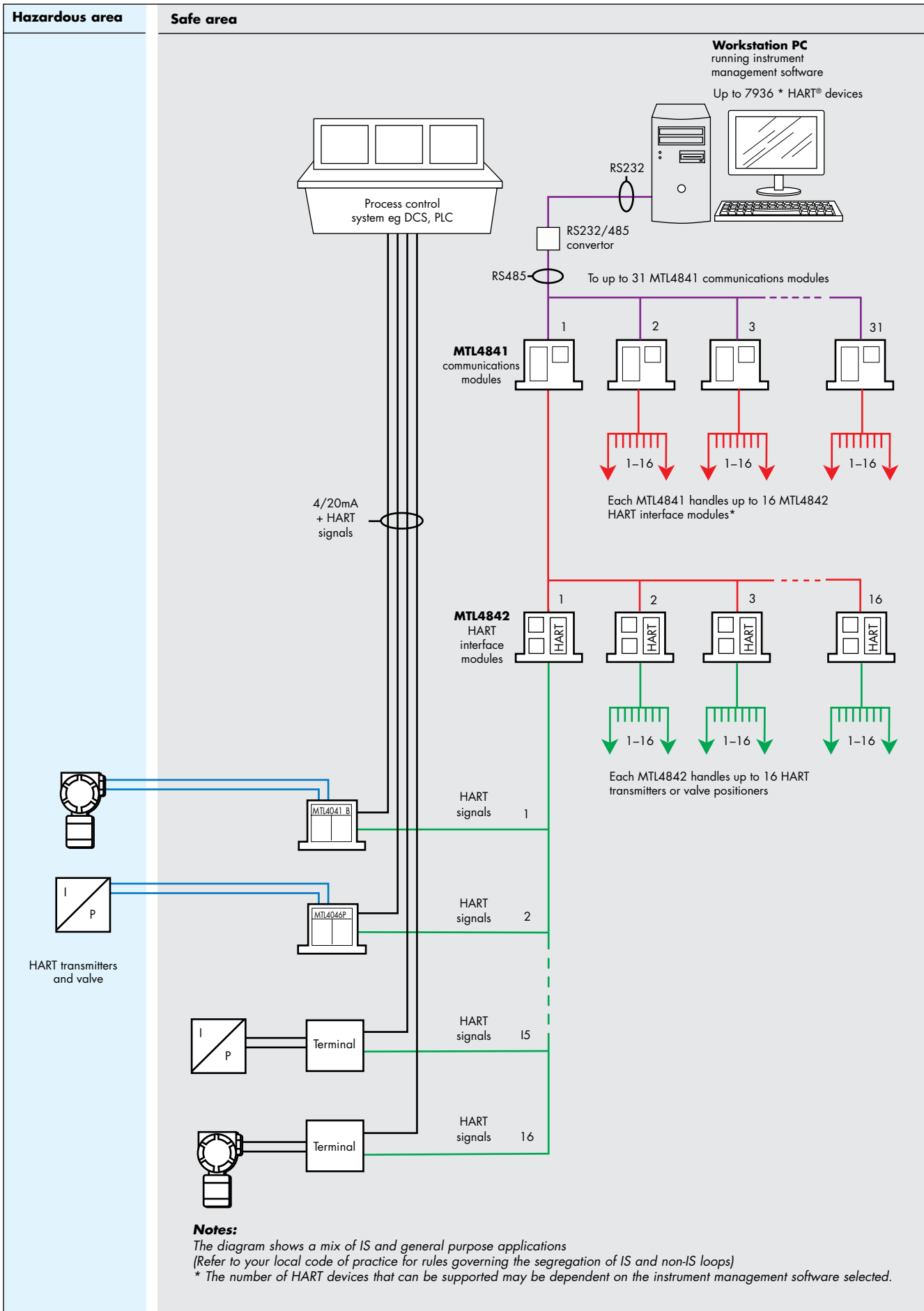
| Hazardous area | Safe area |
|---|---|



**Figure 2.1** - System Overview ( typical installation)          *HART® is a registered trademark of the HART Communication Foundation*

Various solutions are available to suit individual DCS types and a listing of the currently available connection units and backplanes is given in Appendix A.

## 2.3 Large or small scale application?

The MTL HART maintenance solution is capable of addressing several thousand field devices, but most real world applications are significantly smaller than this. MTL has also devised a simple, integrated solution (HMUxx) that is proving popular for smaller installations of up to 32 devices.

### 2.3.1 Up to 32 field loops

The HMU range of connection units (see Section 4.6) is designed for applications where a smaller footprint is required and there is only a small number of HART signals to be connected.

The type of HART signal defines the type of HMU that will be used:

**HMU16** Provides connections for up to 16 AI signals

**HMU32** Provides connections for up to 32 AI signals

**HMU16AO** Provides connections for up to 16 AO signals

**HMU32AO** Provides connections for up to 32 AO signals

Each HMU accommodates one MTL4841 communications module and one, or two - as appropriate, MTL4842 multiplexer modules, each of which can handle 16 signals.

This method can be expanded to accommodate more signals but, depending on the amount of expansion required, it would probably be better to use the method described next for more than 32 loops.

### 2.3.2 More than 32 field loops

For larger installations, the system should probably be based on the BPHM64 HART interface - see Section 4.2. This unit will accommodate one MTL4841 communications module and up to four MTL4842 multiplexer modules to accommodate a total of 64 signals. However, the MTL4841 can manage a total of 16 MTL4842 modules, i.e. 256 signals, so three more BPHM64 carriers can be linked to the first, each fitted with four MTL4842 modules.

Further expansion is possible by repeating this structure up to 30 times. The overall method is illustrated in Figure 2.1. See Section 5.3.1 for configuration details.

## 2.4 Connection methods

There are three basic methods of interfacing to the HART signals:

a) via a connection unit

b) via an I/O module backplane

c) via a HART + I/O module backplane

A connection unit - see Figure 2.2 - has one set of screw terminals for the field devices and another set of screw terminals for connection to the main system.
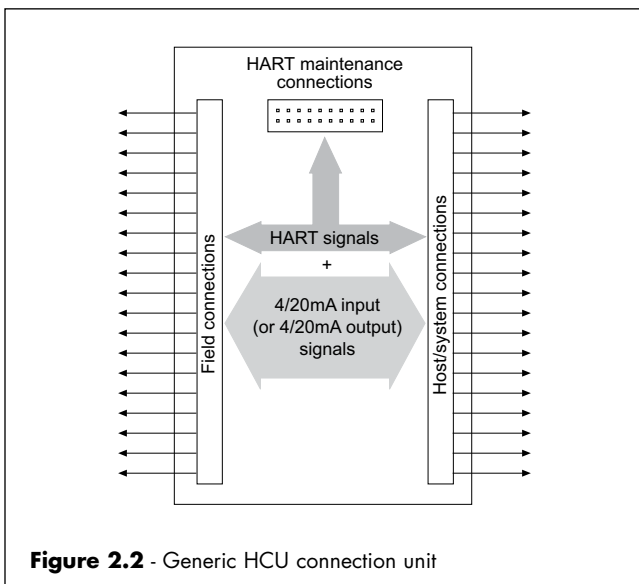


**Figure 2.2** - Generic HCU connection unit

The HART signals, for routing to the maintenance system, are derived from those passing through the connection unit. The connection unit method is used for field devices in non-hazardous areas.

The second method of getting the HART signals for the maintenance system is to pick them off the backplane (Figure 2.3) used to accommodate intrinsic safety isolators, e.g. MTL4000 Series units.
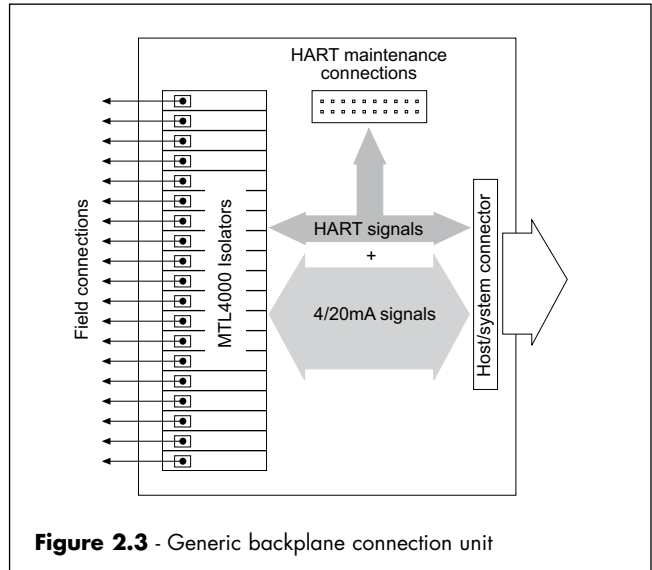


**Figure 2.3** - Generic backplane connection unit

The backplane can be customised to provide a host/system connector that best suits the user's choice of DCS or PLC.

In these two cases the derived HART signals are then multiplexed together for transmission to the maintenance system - see Section 5 for configuration information.

Finally, backplanes are available that not only have the I/O modules, similar to the one above, but can also accommodate the required MTL4842 and MTL4841 modules (for up to 32 channels) and provide RS485 ports to link to the management system. See Section 4.7 for further details.

## 3 SAFETY INFORMATION

Before beginning the installation of any of this equipment it is **IMPORTANT that the information in this section is read and understood**.

### 3.1 Precautions - General

⚠ **WARNING** **Units MUST NOT be installed in a hazardous area unless certified and marked for this purpose or unless protected by a locally accepted explosion-proof technique.**

- Make sure all installation work is carried out in accordance with local standards, codes of practice, and site regulations.

- Check that the hazardous-area equipment complies with the descriptive system document.

- If in doubt, refer to the certificate/catalogue for clarification of any aspects of intrinsic safety or contact MTL, or your local representative, for assistance.

- Check that the interface unit(s) functions(s) are correct for the application.

### 3.2 Precautions - BPHM64

The BPHM64 is FM-Approved as non-incendive for use in Class I, Division 2, Groups A,B,C and D hazardous locations.

⚠ **WARNING** **WARNING - EXPLOSION HAZARD. DO NOT REMOVE OR REPLACE FUSES UNLESS POWER HAS BEEN DISCONNECTED OR THE AREA IS KNOW TO BE NON-HAZARDOUS.**
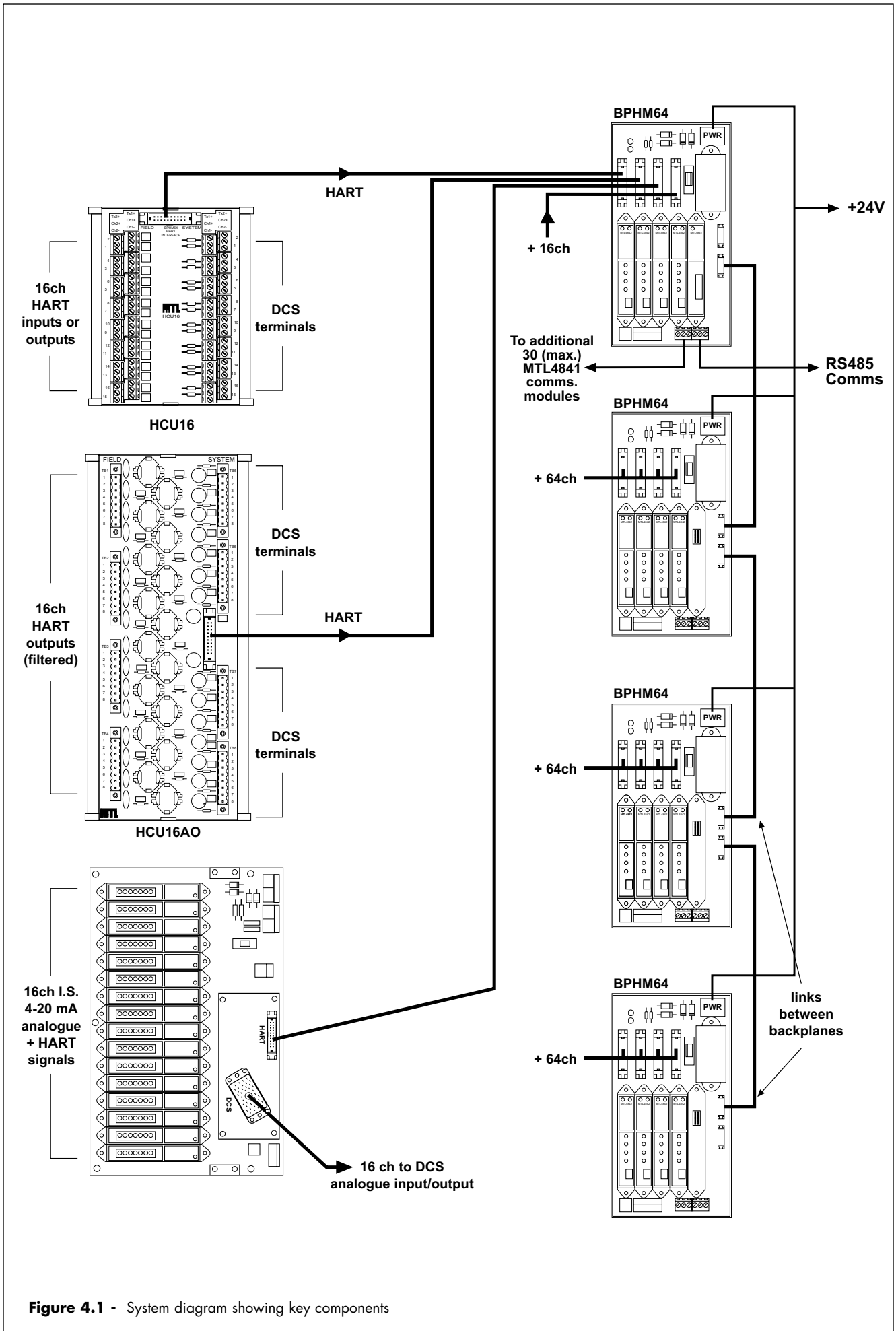
**Figure 4.1 -** System diagram showing key components

# 4    INSTALLATION

## 4.1    System overview

See Figures 2.1 and 4.1.

## 4.2    BPHM64 HART backplane

For medium to large scale installations, the BPHM64 HART backplane is the method of choice to handle the HART maintenance signals passing to and from the field devices.
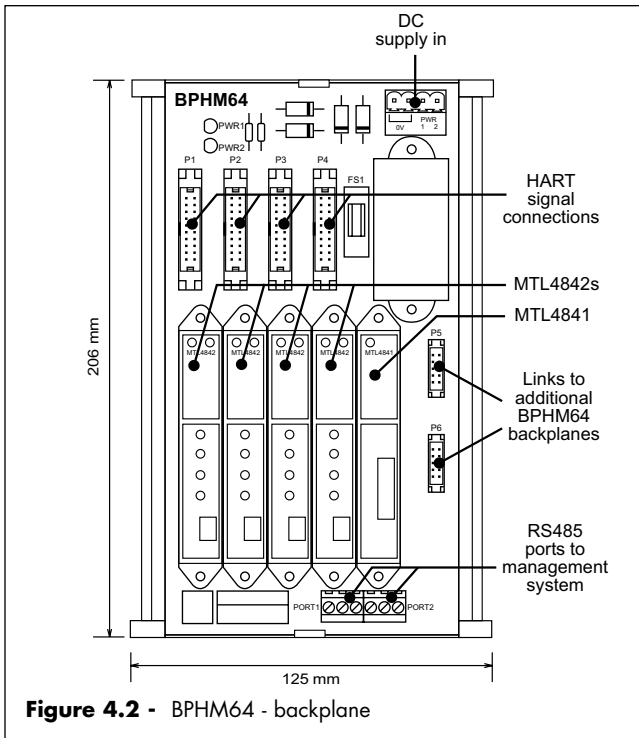


**Figure 4.2 -** BPHM64 - backplane

The backplane accommodates 1 x MTL4841 and up to 4 x MTL4842 modules. However, an MTL4841 can support up to 16 x MTL4842 modules and so the system has been designed to expand easily by interconnecting an additional three BPHM64 backplanes. Note that the other BPHM64 backplanes only require MTL4842 modules, not MTL4841 modules (see Figure 4.1).

### 4.2.1    Mounting

The BPHM64 is designed for mounting in a control room equipment cabinet and is supplied fitted on a carrier suitable for T or G section DIN-rail mounting in any orientation.

Weight (excluding modules):     296g

Weight (per module)     100g approx.

Footprint dimensions:     See Figure 4.2

Height (modules fitted):     116mm from top of DIN rail

### 4.2.2    DC power connections

The BPHM64 has a removable, 4-way, screw-clamp terminal connector that provides redundant 24V dc supply connections.

Power requirements:    Voltage:    21–35V dc

Current:    72mA @ 24V dc

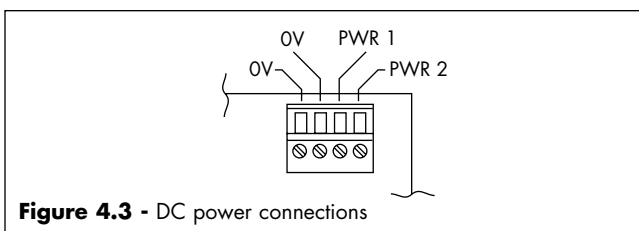Connect the dc power to the board as shown in Figure 4.3.



**Figure 4.3 -** DC power connections

### 4.2.3    HART signal connections

Each of the four MTL4842 modules has a DIN41651 20-way ribbon cable connector (**P1**–**P4**) beside it. Each one provides 16 signal connections and 4 ground returns to the module. These connectors receive the HART signals coming from either connection units or backplanes equipped with similar DIN41651 connectors. See Section 4.12 for cabling recommendations and limits. MTL can provide 20-way cables in a range of different lengths on request.

Connect the ribbon cables to the appropriate connector for the corresponding MTL4842 module.

### 4.2.4    Link to other BPHM64 backplanes

Up to four boards may be linked together to provide a total of sixteen MTL4842 modules under one MTL4841 communications module (see Figure 4.1). 10-way connectors **P5** and **P6** (Figure 4.2) are used to link the additional BPHM64 backplanes together.

See Section 4.12 for cabling recommendations and limits. MTL can provide 10-way cables in a range of different lengths on request.

### 4.2.5    MTL48xx modules fitting and configuration

MTL4842 modules may be fitted in any position that corresponds with a HART signal cable. See Section 5 for details.

### 4.2.6    RS485 communication connections

Two RS485 ports are provided on the board - see Figure 4.2. These are used to connect the BPHM64 backplane to the PC running the maintenance software and to onward link to MTL4841 communications modules on other backplanes.

Full details of this communications link are provided in Sections 4.12.3 and 4.12.4.

## 4.3    HCU16 HART connection unit

The HCU16 HART connection unit - see Figures 4.4 & 4.5 - provides a connection interface between the field wiring and the onward link to the host/system control for non-hazardous areas. It also provides a take-off point for the HART signals to the maintenance system.

Connections to the field signals and the system are via screw-clamp terminals and the link to the BPHM64 is via a 20-way ribbon cable.

Each channel has three terminals: +ve, -ve and a transmitter supply terminal (Tx +) – see Figure 4.5. The HART signal has to be terminated with an impedance of approximately 240Ω. Positions are provided on the circuit board to fit parallel resistors (normally 250Ω), or an appropriate series resistor to raise the impedance if it is < 240Ω. This unit can be used with analogue outputs if the system's current signal is compatible with HART communications.

The HCU16 is supplied fitted in a carrier for DIN rail mounting. The footprint of the carrier is 150 x 125mm and the height from the top face of T-section DIN rail is approximately 55mm.
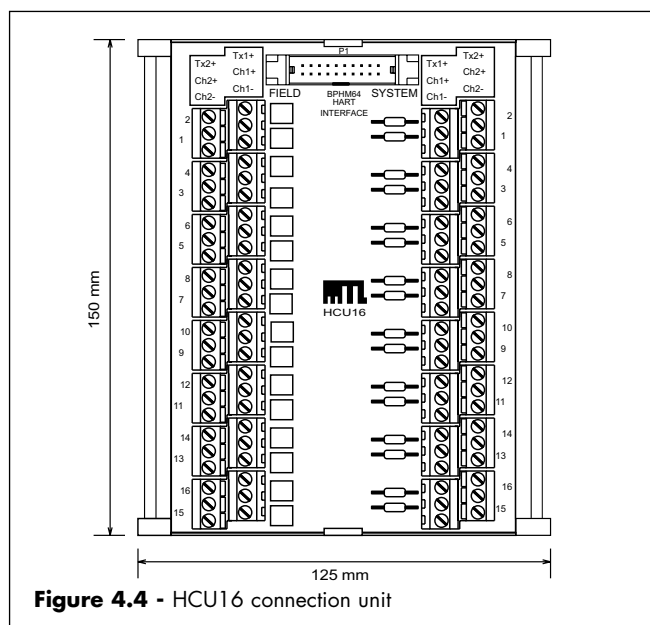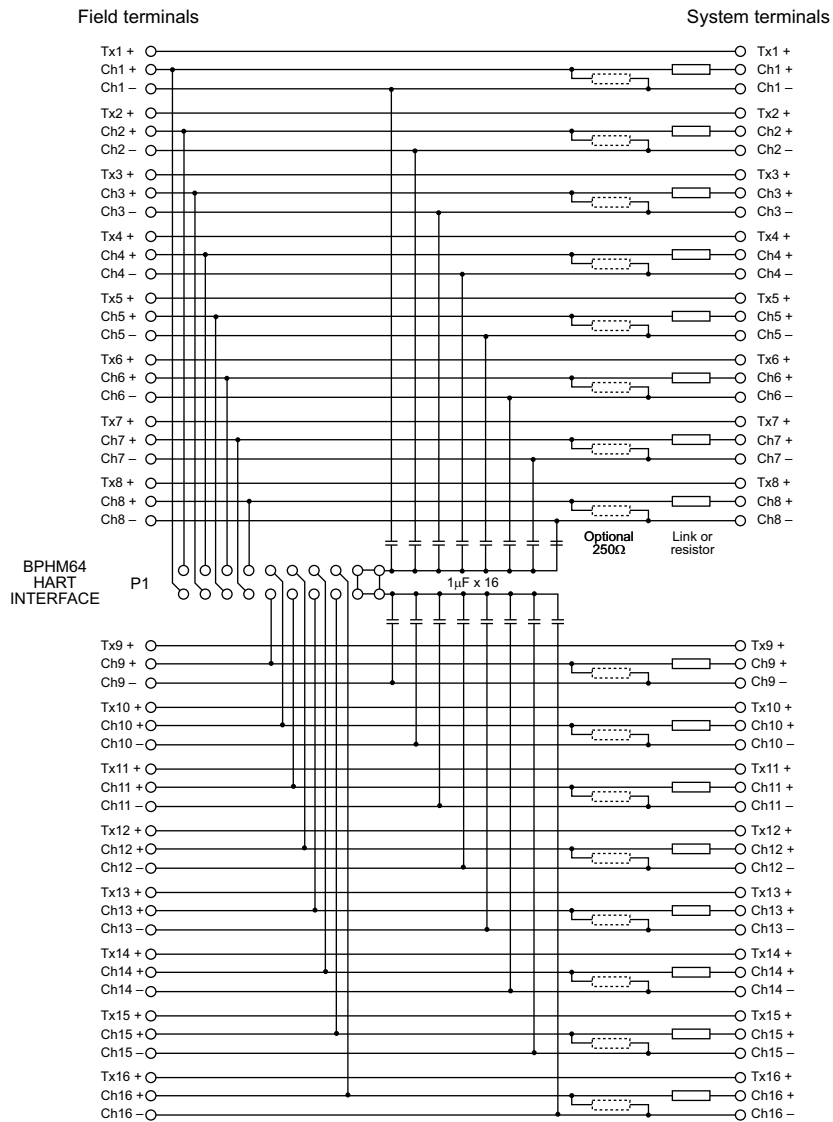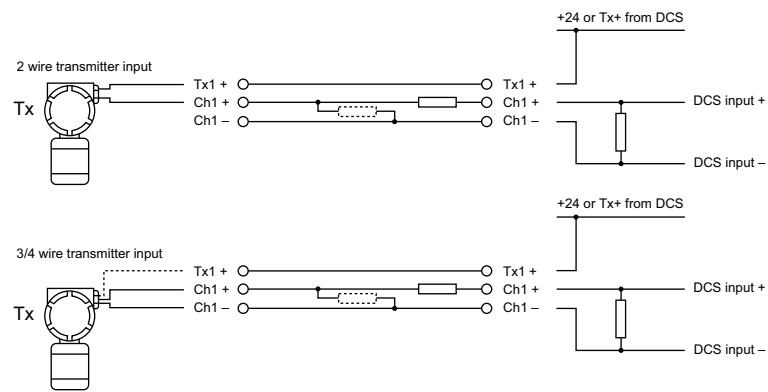


**Figure 4.4 -** HCU16 connection unit

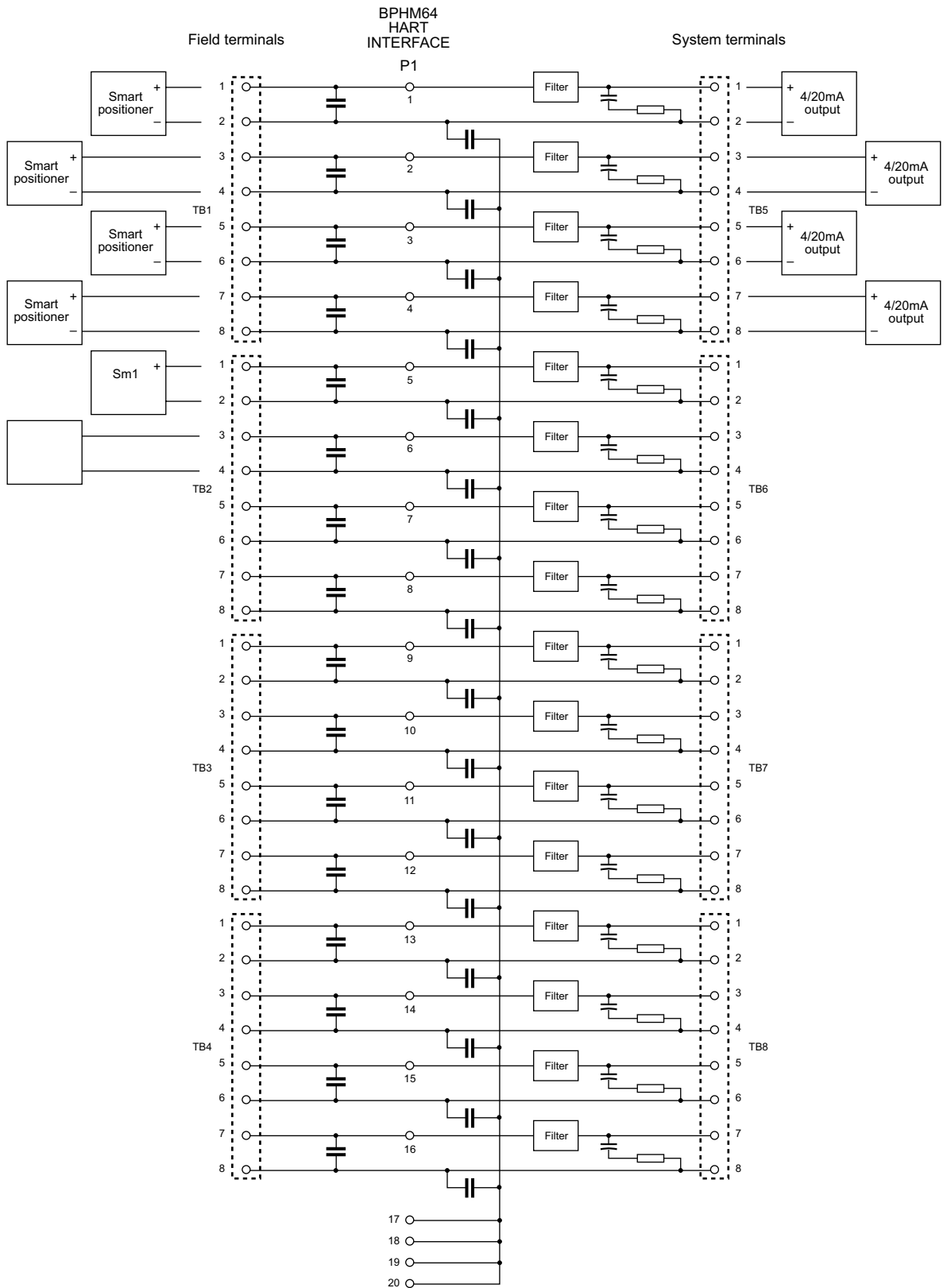**Figure 4.5 -** Schematic of HCU16 connection unit

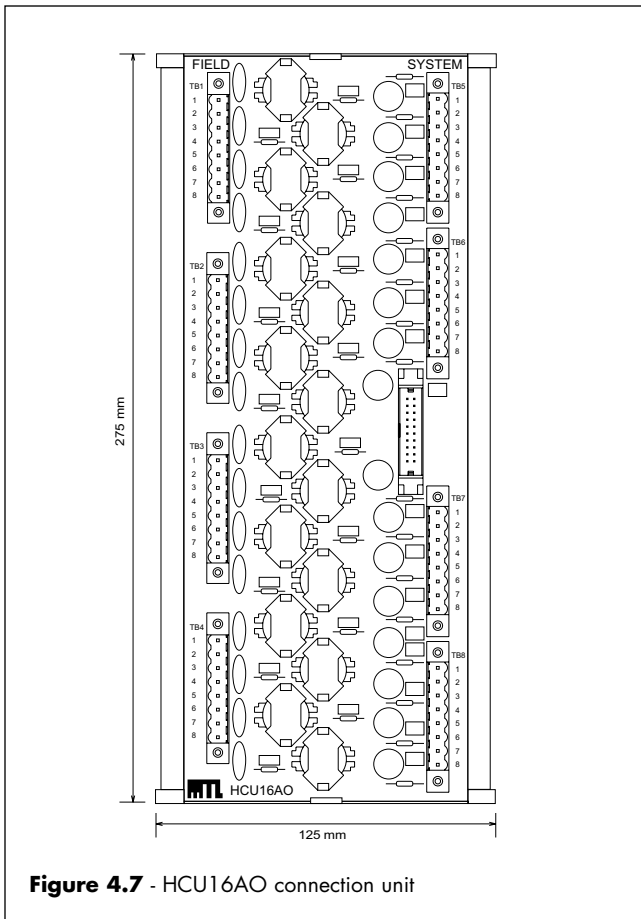**Figure 4.6 -** Schematic of HCU16AO connection unit

**Figure 4.7** - HCU16AO connection unit

## 4.4    HCU16AO HART connection unit

Many systems have 4-20mA analogue outputs that are not compatible with HART data because their impedance is normally too low for the HART to operate correctly. In addition, the noise generated by the analogue output can sometimes interfere with the HART data, or sometimes the HART signal can even affect the stability of the current signal.

The HCU16AO HART connection unit - see Figure 4.6 & 4.7 - enables HART signals to be used in current output loops, in non-hazardous areas. It has 16 isolated channels, each with a low-pass filter in series with the current signal from the system. This has virtually no effect on the 4-20mA signals but presents a suitable high impedance (> 240Ω) to the HART signals for their detection and measurement.

As with the HCU16, the HART data is transferred to the BPHM64 HART multiplexer interface via a 20-way ribbon cable.

Field and system connections are made via pluggable 8-way, screw-clamp terminals, in 4 groups of 4 channels.

The HCU16AO is supplied in a carrier for DIN rail mounting.

Overall footprint of carrier: 275 x 125mm.

Height from top of DIN rail to top of screw connectors: 58mm

## 4.5    MTL customised backplanes

MTL has a range of customised backplanes that accept MTL4000 Series isolators. These have been produced for various types of DCS and PLC equipment and have system connectors that suit the equipment type. Many are fitted with a DIN41651 20-way ribbon cable connector to enable the backplane to be connected to a HART maintenance system. See Appendix A or check with MTL for availability.

Other types of backplane are available that have provision for the inclusion of an MTL4841 and one or two MTL4842 modules on the backplane itself. These are dealt with in Section 4.7.

## 4.6    HMU HART Backplanes

The HMU range of connection units is designed for applications where a smaller footprint is required or where only a small number of HART signals need to be connected. They are based on a HART control board combined with one or two of the HCU16 or HCU16AO boards. Consult Figures 4.5 and 4.6 for field and system connections to these backplanes.

An HMU backplane uses one MTL4841 module and one or two MTL4842 modules to suit the number of signal channels supported. The type and number of HART signals handled depends on the HMU model chosen, as shown below.

**HMU16**      provides connection for up to 16 AI signals

**HMU32**      provides connection for up to 32 AI signals

**HMU16AO**  provides connection for up to 16 AO signals

**HMU32AO**  provides connection for up to 32 AOsignals

HMUs are supplied on a DIN-rail mounting carrier - see Figure 4.8 - and may be mounted anywhere in the cabinet in any orientation.

### 4.6.1    DC power connections

Each HMU backplane has DC **POWER** terminals for the connection of a (nominal) 24V dc supply.

Power requirements:    Voltage:    21–35V dc

Current:    72mA @ 24V dc

Connect the dc power to the board as shown in Figure 4.8. Observe polarity.

### 4.6.2    Links to other HMU backplanes

HMU backplanes may be linked together to provide a total of sixteen MTL4842 modules under **one** MTL4841 communications module. (Consequently, other HMUs do not need an MTL4841 module to be fitted.) 10-way connectors **P1** and **P2** - see Figure 4.8 - are used to link the additional HMU backplanes together.

See Section 4.12 for cabling recommendations and limits. MTL can provide 10-way cables in a range of different lengths on request.

Up to 16 may be connected in this way but the sum of all the interconnecting **cable lengths** between the first and last unit **must not exceed four (4) metres**.

### 4.6.3    MTL48xx modules fitting and configuration

See section 5.1 for details.

+-----------------------------------------------------+
| **IMPORTANT**                                       |
| Please note the position used for the MTL4842 module for the HMU16 and the HMU16AO in Figure 4.8. |
+-----------------------------------------------------+

### 4.6.4    RS485 communication connections

Two RS485 ports are provided on the board - see Figure 4.8. These are used to connect the HMU backplane to the PC running the maintenance software and, possibly, to onward link to MTL4841 communications modules on other backplanes.

Full details of this communications link are provided in Section 4.8.x.
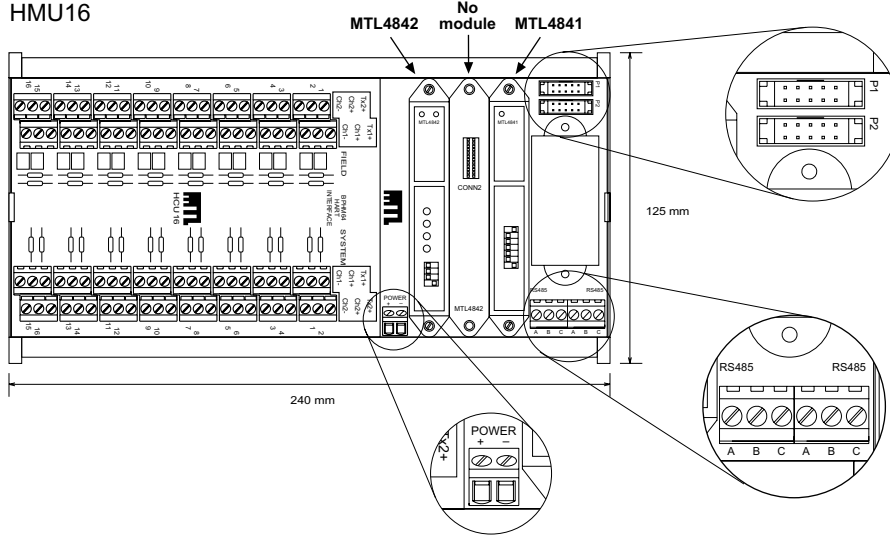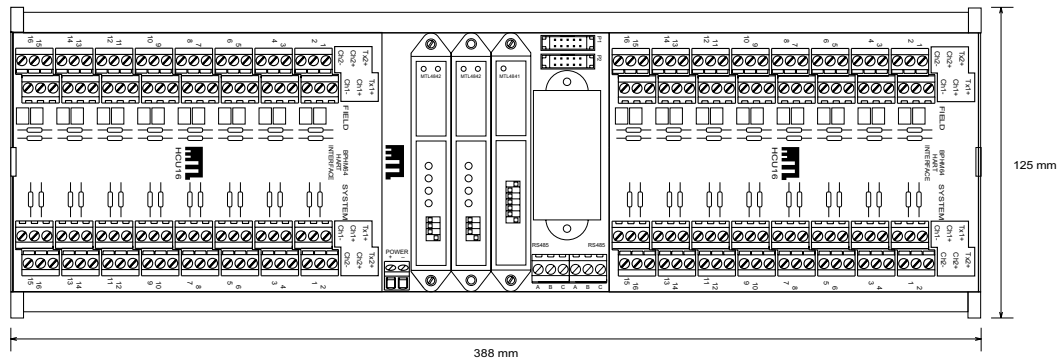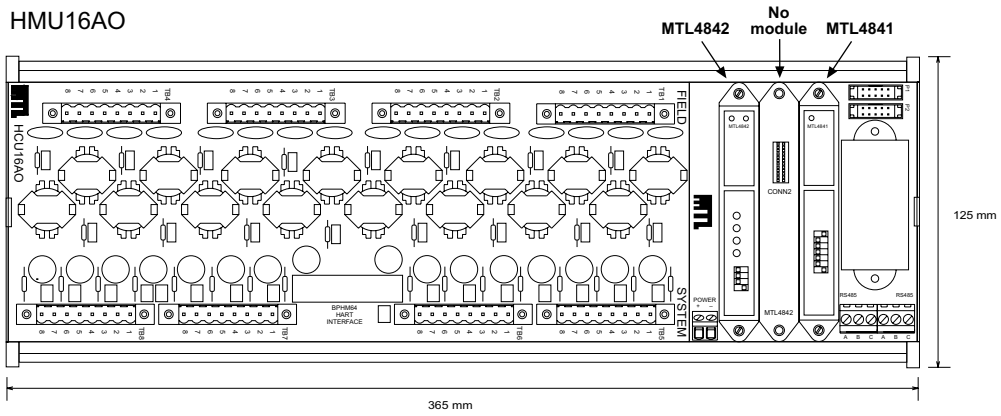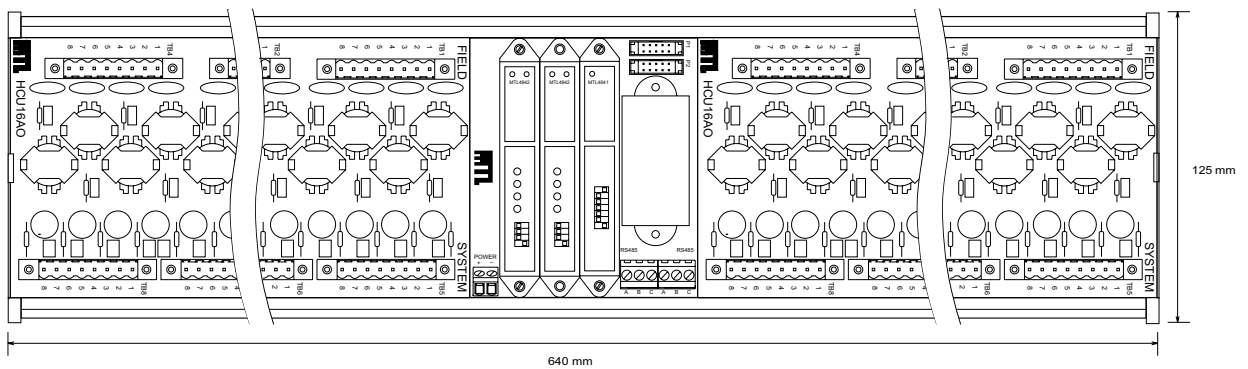
**Figure 4.8** - HMU HART backplanes

All dimensions in mm

## 4.7 BPMH and BPSH Backplanes

### 4.7.1 BPMH16 and BPSH16 backplanes

The BPMH16 and BPSH16 backplanes are designed to carry:

- 16 x MTL4041A/B/P isolators, 16 x MTL4046/C/P isolators, or a mixture of these isolators
- 1 x MTL4841 communications module
- 1 x MTL4842 HART interface module.

The hazardous area connections from the field devices go directly to the isolator modules.

The safe area connections to the control system are as follows:

- BPMH16 - Elco 8016 38-pin male connector
- BPSH16 - screw-clamp connectors (2 per module).

### 4.7.2 VMPH16 mounting plate

To meet EMC requirements, the above backplanes must be mounted on a VMPH16 mounting plate or on the metal surface of a cabinet or panel. See Figure 4.11 for mechanical details.

The VMPH16 has threaded inserts (marked 'A' in Figure 4.11) and is supplied with six mounting screws to enable the backplane to be mounted onto it.

### 4.7.3 BPSH16-32 backplane

The BPSH16-32, MTL4000 Series HART backplane is designed primarily for use with 16 (sixteen) of the MTL4044 dual-channel analogue input modules. This backplane can also be used with the MTL single channel isolators but not all 32 HART monitoring channels can be used in this configuration.

A BPSH16-32**R** version is also available, fitted with 250 ohms input resistors connected across the safe area control system connections.

The hazardous area connections from the field devices go directly to the isolator modules.

Screw terminals are provided for the safe area interface to the control system.

### 4.7.3 DC power connections

The BPxH16 backplanes have redundant power supply connections and each supply input connector has dual pins for daisychaining the supply. See Section 4.xx for connection details.

**Power**  Voltage:  21–35V dc

Current:  1.35A ( 1.55A for BPSH16-32)

### 4.7.4 HART signal connections

The HART signals are routed to the MTL4842 module(s) by the backplane and require no further connections.

### 4.2.5 Links between backplanes

Additional boards may be linked together to provide a total of sixteen MTL4842 modules under one MTL4841 communications module. Two 10-way connectors are provided (next to the MTL4841 module) to link backplanes together, in the same way as shown in Figure 4.2.

See Section 4.8 for cabling recommendations and limits. MTL can provide 10-way cables in a range of different lengths on request.

### 4.7.6 MTL48xx modules fitting and configuration

See section 5 for details.

### 4.7.7 RS485 communication connections

Two RS485 ports are provided on each board. These are used to connect the BPHM64 backplane to the PC running the maintenance software and to onward link to MTL4841 communications modules on other backplanes.

Full details of this communications link are provided in Section 4.8.x.

## 4.8 Backplane mounting

### 4.8.1 Using mounting plate VMPH16

Attach the backplane to the VMPH16 mounting plate using the screws provided. Use mounting centres 'D' - shown in figure 4.11 - to attach plate to required surface or structure.

### 4.8.2. Surface mounting
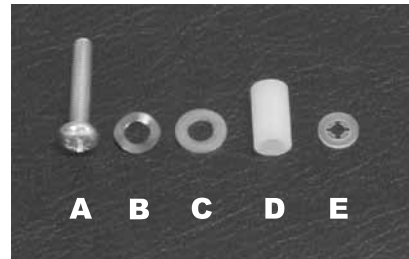


**Figure 4.9** - SMS01 mounting kit components

Surface mounting kit (type SMS01) is available for this purpose. SMS01 contains 40 sets of the components shown in Figure 4.9.

**Prepare panel**

Refer to Figure 4.11.

a) Prepare holes in the mounting surface at the centres shown. Thread these (M4) if retaining nuts will not be used.
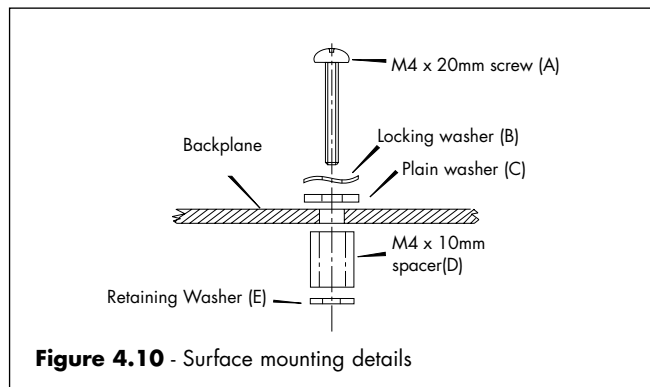


**Figure 4.10** - Surface mounting details

**Fit backplane**

Refer to figures 4.9 and 4.10.

a) Select an M4 x 20mm screw (A).
b) Place a locking washer (B) and a plain washer (C) over it.
c) Insert the screw through a fixing hole on the baseplate.
d) Fit a 10mm spacer (D) and retain it with washer (E).
e) Repeat steps a) to d) for the other five (5) mounting holes.
f) Attach the baseplate using the prepared panel holes. Retain the screws with a suitable nut if the holes are not tapped.
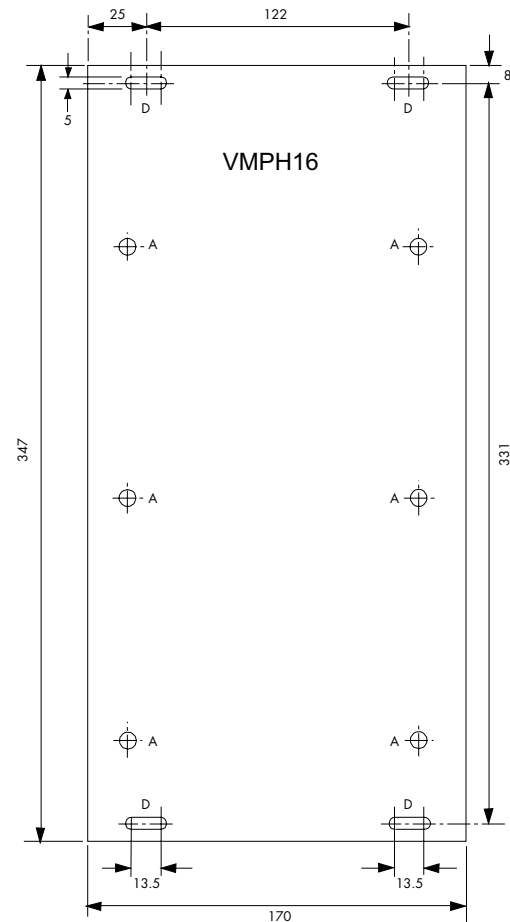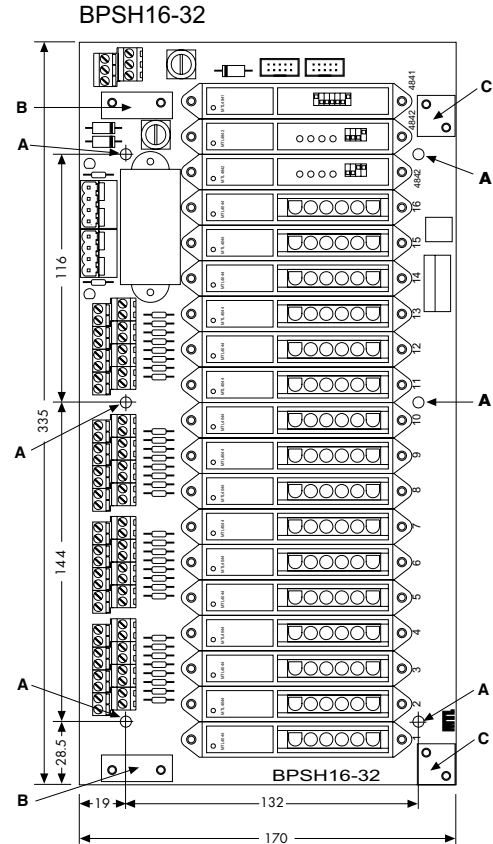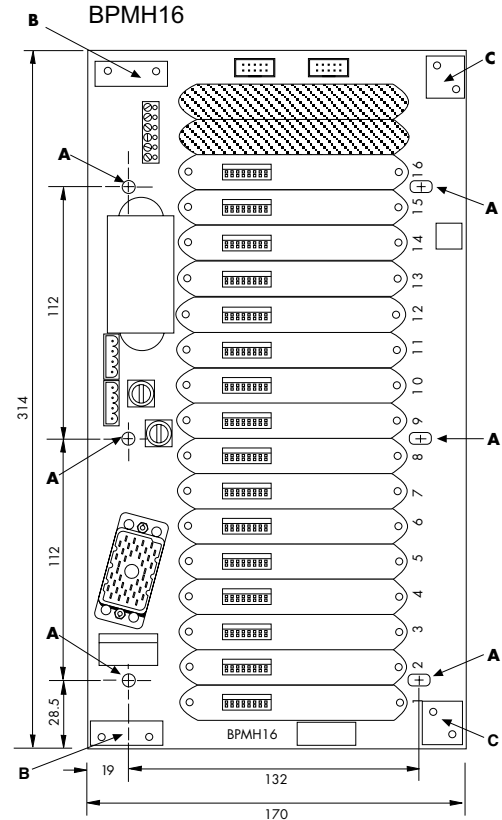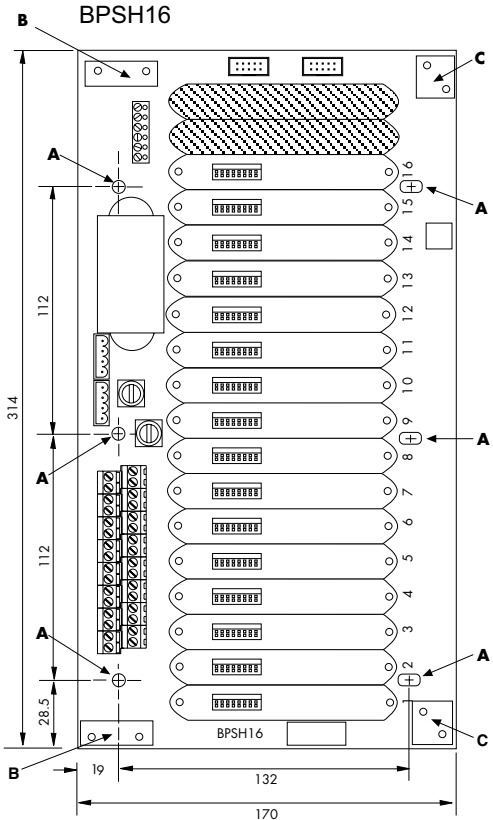
A = Backplane mounting holes
B = Tagging strip (TSK18) mounting areas
C = Earth rail (ERK18) mounting areas
D = Mounting plate fixing holes

**Figure 4.11** - BPxx backplanes and VMPH16 mounting plate

'A' holes are fitted with threaded inserts to accept the mounting screws supplied.

All dimensions in mm

### 4.8.3 DIN-rail mounting – with DIN-rail mounting kit DMK01 & mounting plate VMPH16

DIN-rail mounting kits (type DMK01 or DMK04) are available for this purpose. DMK01 contains 40 sets of the components shown in Figure 4.12, while DMK04 contains 4 sets of these components.
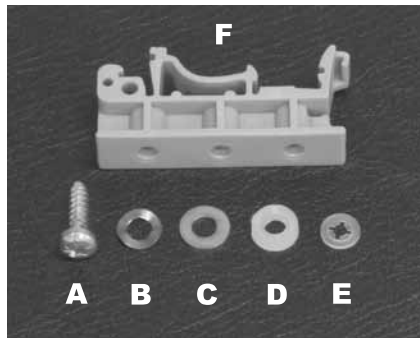


**Figure 4.12** - DMK0x mounting kit components

**Fit backplane**

Refer to figures 4.12 and 4.13.

a) Select a mounting screw (A).

b) Place a locking washer (B) and a plain washer (C) over it.

c) Insert the screw through a fixing hole on the baseplate.

d) Fit a spacer (D) and retain it with washer (E).

e) Repeat steps a) to e) for the other five (5) mounting holes.

f) Fit the mounting feet (F) onto the DIN-rail in roughly the correct positions.

g) Offer up the baseplate to the mounting feet on the DIN rail, locate the screws into the middle holes in the feet and secure each in turn. Return to tighten each screw before finishing.
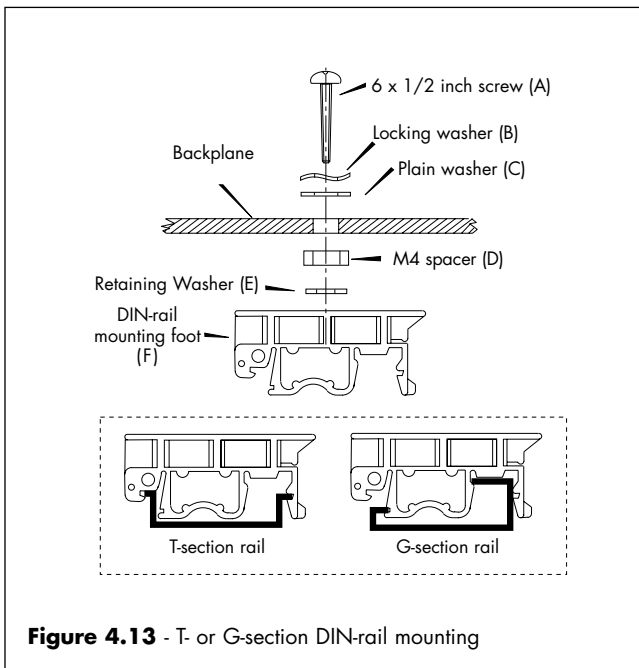


**Figure 4.13** - T- or G-section DIN-rail mounting

## 4.9 Backplanes – identification and tagging

A rectangular area for identification is provided on each backplane see Figure 4.11. In addition, tagging strips are available (TSK18) for mounting over the backplane safe-area connections. Two areas - marked 'B' in Figure 4.11 - are provided with threaded inserts for attaching the tagging strip mounting posts.
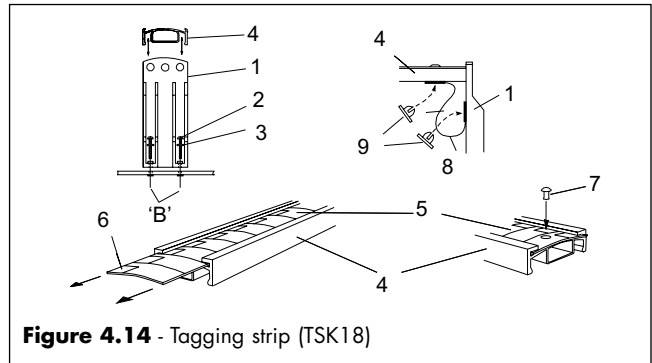


**Figure 4.14** - Tagging strip (TSK18)

Mount the tagging strip to the backplanes as follows:-

Attach each tagging strip mounting post (1) with two M3 x 12 mounting screws (2) and washers (3).

Attach colour coding labels (6) onto tag label (5).

Mark tag label (5) with tag references.

Slide tag label (5) into tag strip holder (4) and retain with plastic retaining rivet (7).

Attach plastic retaining tie (8) with two plastic rivets (7).

Clip tag strip holder (4) onto mounting posts (1) by pushing downwards.

## 4.10 Backplane earth rails

Optional earth rail kits are available (ERK18) - see Figure 4.15. Cable screens from hazardous-area circuits or spare pairs from a multicore cable can be connected to the terminals on the earth rails. These are mounted on the backplane at the same height as the tops of the module, close to the hazardous-area connectors. Earth rails are attached using the following procedure:-
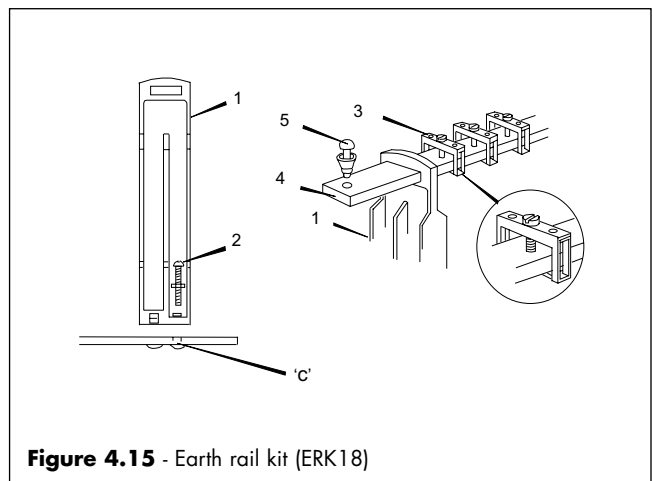


**Figure 4.15** - Earth rail kit (ERK18)

Locate the earth rail mounting positions - marked 'C' in Figure 4.11 - at each end of the backplane .

Attach each mounting post (1) with two M3 x 12 mounting screws and washers (2).

Fit the earth terminals (3) onto the rail (4).

Insert the ends of the earth rail into the slots at the tops of the mounting posts.

Finally, insert the plastic retaining rivets (5) into each end of the rail.

## 4.11    Backplanes – connections

Safe-area circuit connections are made to the backplane in one of two ways – either by multiway connectors (BPMH16) or by screw clamp terminals (BPSH16 & BPSH16-32). The following sections explain the methods for connecting these two types.

Power supply and data connections are also made to the backplanes. See section 4.5.3 for power connections and 4.5.4 for data connections.

### 4.11.1    BPMH16 – multiway connector

The BPMH16 backplane is provided with a 38-way Elco male connector for the 16 safe-area circuits. The mating female connector can be obtained as an accessory (MTL part number ELC38).

The ELC38 consists of the following Elco parts:

Connector part no.:              58-8016-038-000-059

Crimps (39 pieces) part no.:    60-8017-0513-00-339

The connection procedure is:-

Check pin assignment for the MTL4041A/B/P as per figure 4.17.

Check pin assignments for the MTL4046/C/P as per figure 4.18.

Using the crimps provided, make the appropriate connections to the mating half of the multiway Elco connector according to the pin assignments detailed in Table 4.1 and Figure 4.16.

Complete connector tag label and attach to the backplane (optional).

Plug multiway connector onto the backplane and secure with its locking screw.

**Please note**: Module pins 9 and 12 are linked on the backplane.

**Table 4.1 -**  Multiway connections for MTL4041A/B/P and MTL4046/C/P

| Elco pin ident. | BPMH16 module and pin ident. | | Elco pin ident. | BPMH16 module pin configuration | |
|---|---|---|---|---|---|
| A | Module 1 | 9 & 12 | U | Module 9 | 9 & 12 |
| B | | 11 | V | | 11 |
| C | Module 2 | 9 & 12 | W | Module 10 | 9 & 12 |
| D | | 11 | X | | 11 |
| E | Module 3 | 9 & 12 | Y | Module 11 | 9 & 12 |
| F | | 11 | Z | | 11 |
| H | Module 4 | 9 & 12 | AA | Module 12 | 9 & 12 |
| J | | 11 | BB | | 11 |
| K | Module 5 | 9 & 12 | CC | Module 13 | 9 & 12 |
| L | | 11 | DD | | 11 |
| M | Module 6 | 9 & 12 | EE | Module 14 | 9 & 12 |
| N | | 11 | FF | | 11 |
| P | Module 7 | 9 & 12 | HH | Module 15 | 9 & 12 |
| R | | 11 | JJ | | 11 |
| S | Module 8 | 9 & 12 | KK | Module 16 | 9 & 12 |
| T | | 11 | LL | | 11 |
| | | | | **Power sense** | |
| | | | MM | PWR 1 power status | |
| | | | NN | 0 V | |
| | | | PP | PWR 2 power status | |
| | | | RR | 0 V | |
| | | | SS | Module power status | |
| | | | TT | 0 V | |
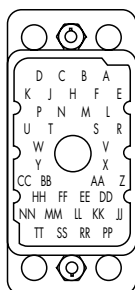


**Figure 4.16** - Multiway connector (ELC38)
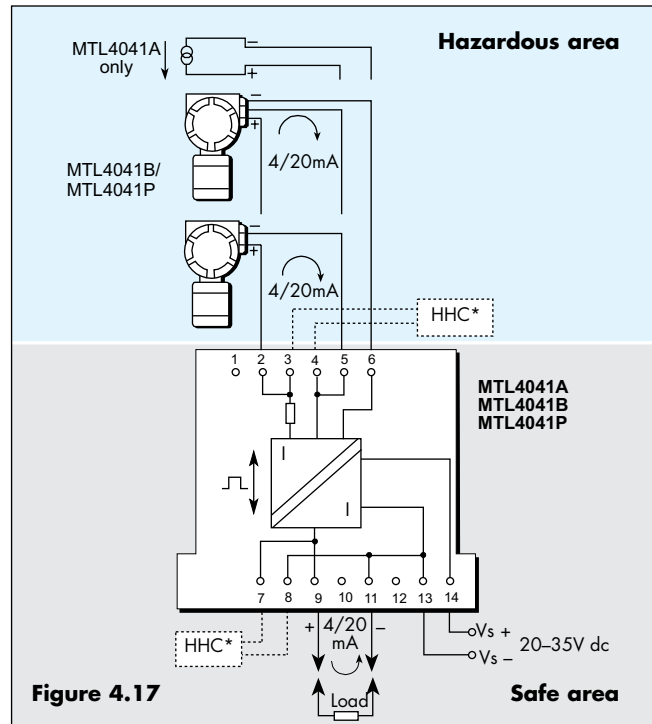


**Figure 4.17**

| Terminal | Function |
|---|---|
| 2 | Tx supply +ve |
| 3 | Optional HHC connection +ve |
| 4 | Optional HHC connection -ve |
| 5 | Current input -ve |
| 6 | Common |
| 7 | Optional HHC connection +ve |
| 8 | Optional HHC connection -ve |
| 9 | Output +ve |
| 11 | Output -ve |
| 13 | Supply -ve |
| 14 | Supply +ve |



**Figure 4.18**

* Hand held communicator
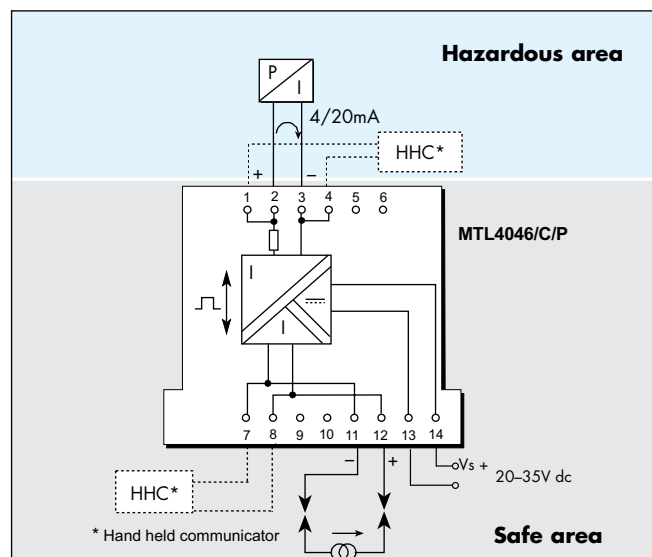
| Terminal | Function |
|---|---|
| 2 | Optional HHC connection +ve |
| 3 | Output +ve |
| 4 | Output -ve |
| 5 | Optional HHC connection -ve |
| 7 | Optional HHC connection -ve |
| 8 | Optional HHC connection +ve |
| 11 | Input -ve |
| 12 | Input +ve |
| 13 | Supply -ve |
| 14 | Supply +ve |

### 4.11.2  BPSH16 & BPSH16-32 - screw-clamp terminals

In the case of the screw-clamp terminal backplanes, each module position is provided with a 2-way split-level terminal block for safe area signals.

The connection procedure is:-

Check pin assignments for the MTL4041B/P as per Figure 4.17.

Check pin assignments for the MTL4046P as Figure 4.18

Make the appropriate connections to the safe-area terminals in accordance with Table 4.2 and Figure 4.19.

Maximum wire gauge is 2.5mm$^2$ (12 AWG) and wire entry for each terminal is from side of block.

**Notes**

1.  To pass HART data, input terminal 11 or 12 must be referenced to the backplane power supply.

2.  Module pins 9 and 12 are linked on the backplane.

**Table 4.2 -** Screw terminal connections for MTL4041B/P and MTL4046P

| Safe area terminal | BPMH16 module and pin ident. | | Safe area terminal | BPMH16 module and pin ident. | |
|---|---|---|---|---|---|
| 1+ | Module 1 | 9 & 12 | 9+ | Module 9 | 9 & 12 |
| 1− | | 11 | 9− | | 11 |
| 2+ | Module 2 | 9 & 12 | 10+ | Module 10 | 9 & 12 |
| 2− | | 11 | 10− | | 11 |
| 3+ | Module 3 | 9 & 12 | 11+ | Module 11 | 9 & 12 |
| 3− | | 11 | 11− | | 11 |
| 4+ | Module 4 | 9 & 12 | 12+ | Module 12 | 9 & 12 |
| 4− | | 11 | 12− | | 11 |
| 5+ | Module 5 | 9 & 12 | 13+ | Module 13 | 9 & 12 |
| 5− | | 11 | 13− | | 11 |
| 6+ | Module 6 | 9 & 12 | 14+ | Module 14 | 9 & 12 |
| 6− | | 11 | 14− | | 11 |
| 7+ | Module 7 | 9 & 12 | 15+ | Module 15 | 9 & 12 |
| 7− | | 11 | 15− | | 11 |
| 8+ | Module 8 | 9 & 12 | 16+ | Module 16 | 9 & 12 |
| 8− | | 11 | 16− | | 11 |
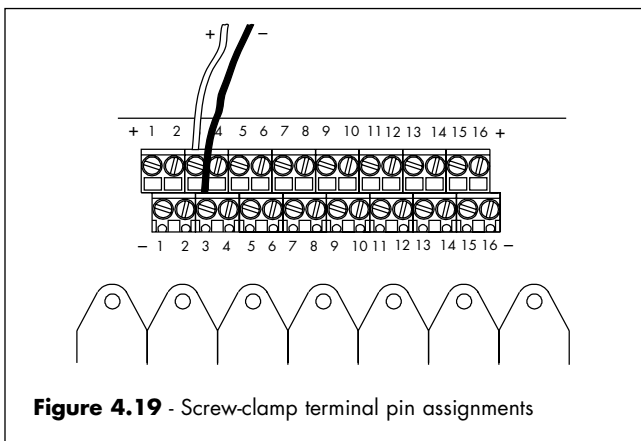


**Figure 4.19** - Screw-clamp terminal pin assignments

### 4.11.3  Power supply connections

All of the BPxH backplanes have provision for dual, redundant 24V dc power supplies. The supplies have individual, screw-terminal, plug-in connectors and two LEDs are provided on the backplane to indicate which supplies are operational. A series diode in each supply input means that the higher of the two voltage supplies is used and there is an automatic switch-over of supplies if one fails.

The BPMH16 backplane has three monitor points that sense the two individual power supply voltages and also the final output voltage after the series diodes. These are provided on the Elco multipin connector (see Table 4.1) via 10kΩ series protective resistors to provide the process system with status indications.
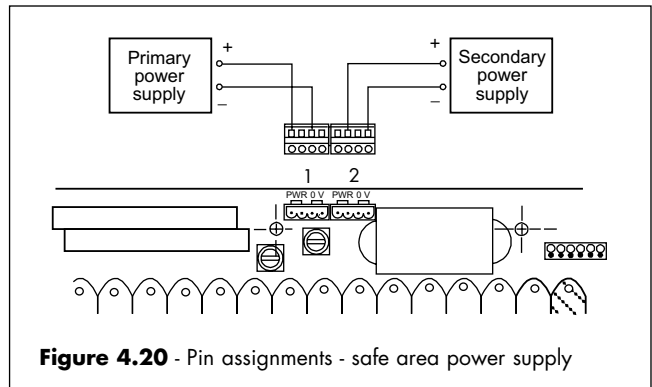


**Figure 4.20** - Pin assignments - safe area power supply

Connect each of the two power supply connectors to the independent supply sources according to the terminal assignments shown in Figure 4.20.

The maximum wire size is 2.5mm$^2$ (12AWG).

Plug the connectors into the sockets on the backplanes.

The backplane has two fuses: FS1 protects the isolators and FS2 protects the MTL4841 and MTL4842 modules. Ratings for these fuses are:

> FS1:    2A        (MTL fuse kit FUS16)
>
> FS2:    250mA   (MTL fuse kit FUS02)

### 4.11.4.  Safe area – ring-mained power supplies

A "ring main" system can be used to distribute power to the backplanes. This permits individual backplanes to be taken out of service without affecting supplies to other backplanes. Two or more backplanes can be removed, provided they are neighbours, without disrupting the supply to other backplanes. Make the connections as shown in Figure 4.21.

> **Note:** Backplanes can be ring-mained providing the maximum circuit current does not exceed 12A. Wire sizes up to 2.5mm$^2$ (12AWG) can be used and should be chosen according to load and voltage drop.
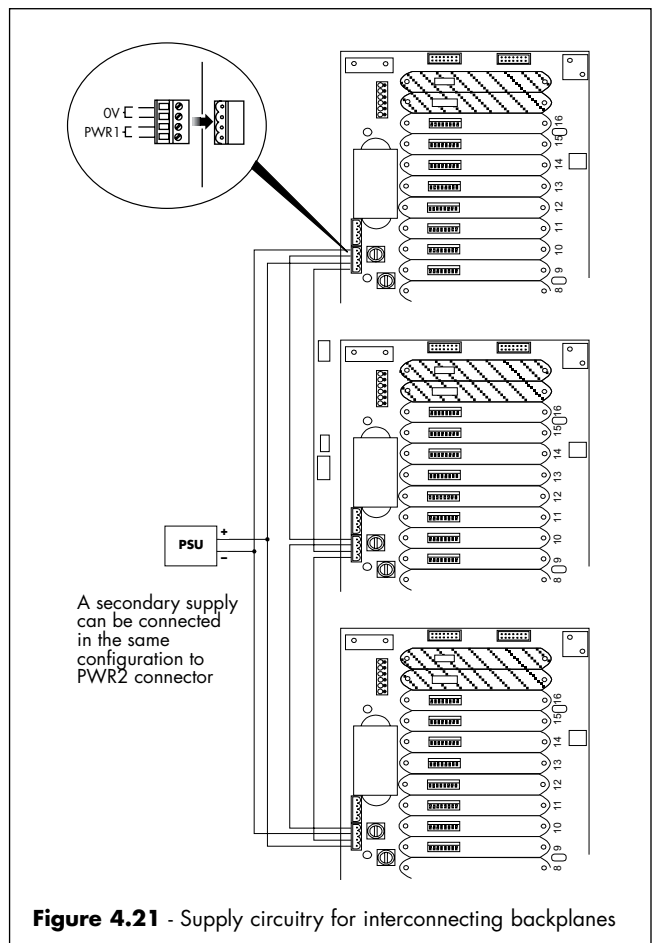


**Figure 4.21** - Supply circuitry for interconnecting backplanes

## 4.12   Cabling recommendations

### 4.12.1   HART signals cable

HART signal cables are used to connect the BPHM64 backplane with a HART connection unit or an IS backplane. This connection is made with a 20-way ribbon cable.

**20-way HART ribbon cables**

| Connector type | 20-way DIN41651 bump polarised |
|---|---|
| Cable | 0.05 inch pitch standard ribbon |
| Maximum length | 15m/50ft |

Standard lengths of this 20-way cable are available from MTL using the part number HM64RIB20-x.x, where the x.x denotes lengths between 0.5 and 6.0 metres.

### 4.12.2   Backplane interface bus

The interface bus provides a connection between a single MTL4841 communications module and up to 16 MTL4842 HART interface modules/backplanes. This connection is made via a ten-way ribbon cable.

| Connector type | 10-way DIN41651 bump polarised |
|---|---|
| Cable | 0.05 inch pitch standard ribbon |
| Maximum length | 4m/13ft (between modules 1 and 16) |

**10-way HART ribbon cables**

Standard lengths of this 10-way cable are available from MTL using the part number HM64RIB10-x.x, where the x.x denotes lengths between 0.5 and 4.0 metres.

*Note: The ribbon cables connecting the HCUs or MTL4000 backplanes to the BPHM64 and interface Bus cables are not suitable for running outside of the cabinet or under control room floors. Generally this will not be necessary, as to maintain integrity, each group of cabinets would interface their HART signals via independent MTL4841 communication modules. Each MTL4841 module is linked by standard communications cables suitable for RS485 data at 9.6, 19.2 or 38.4 kbaud.*

### 4.12.3   RS485 connection

**The RS485 physical layer**

Most PCs running instrument maintainance software masters use RS232C for serial communication; however, this interface type does not allow the communications network to extend beyond 10 to 20 metres in length.

MTL have chosen to use an RS485 serial interface, which includes tri-state operation, and allows network lengths of up to 1000 metres and operates with data rates between 1200 baud and 39.4 kbaud when used with the MTL4841. RS485 also allows the simple parallel connection of a number of units.

*Note: When an RS232 master is used, a data converter must be inserted.*

**The RS485 serial interface standard**

For the purposes of this document RS485 can be regarded as a 2-wire, half-duplex, differential, multi-drop (32 nodes), communications standard. The RS485 standard defines the characteristics of the drivers and receivers that can be connected to the bus. It does not define the cabling or connectors used, nor does it specify a particular data rate or signal format.

**Terminations**

RS485 interfaces should ideally be provided with a 'matched' termination to prevent reflections and ringing of the signal on the bus cabling. The termination is usually a simple resistive terminator, with an impedance that matches the characteristic of the cable - this will normally be in the range of 100 - 200Ω.

**Biasing**

When no communication is taking place, the bus is in an undefined, floating state and, consequently, noise on the bus may be decoded as real characters. Well-written software should discard most of these characters, but the system may be further protected by biasing the bus to a known state and thereby preventing the reception of 'false' characters.

MTL4841 communication modules from MTL have no built-in facility for terminating or biasing the network; as this is often provided by the RS232/RS485 converter.

### 4.12.4   RS485 2-wire interconnection

The MTL4840 system uses a 2-wire connection as shown below:
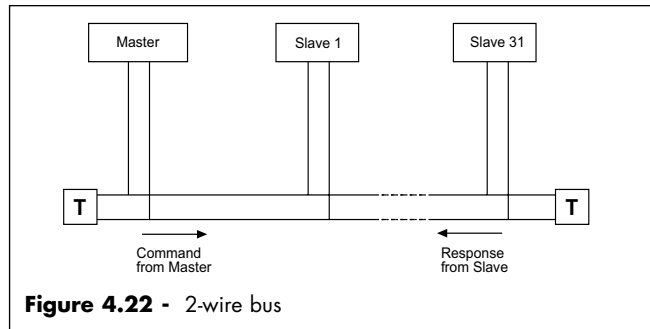


**Figure 4.22 -** 2-wire bus

This 2-wire bus uses the same pair of wires to transmit queries from the master and responses from the slave.

The MTL4841 communications module connects to the maintenance workstation via a 2-wire link, accessible from the RS485 Port connections on the backplane. Up to 31 MTL4841 modules (slaves) can be connected to a single Master maintenance workstation, as shown in Figure 4.22.
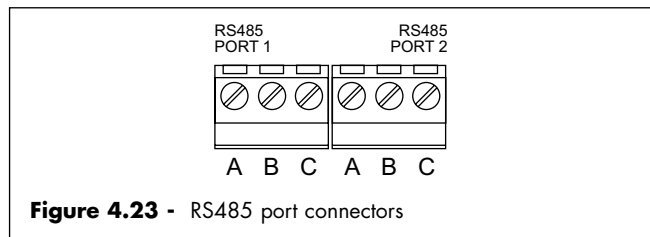


**Figure 4.23 -** RS485 port connectors

Connect the bus to the backplane as follows using a screened cable, for example Belden 8132 or 9841.

*   Connect the two cores of the RS485 cable to screw terminals A & B of **Port 1** on the backplane - see Figure 4.23.
*   Connect the cable screen to terminal C.
*   If multiple backplanes are to be connected, use Port 2 to loop to Port 1 of the next backplane. To avoid spending time in troubleshooting, it is suggested that the same colour convention is used for all connections to backplane terminals A and B, e.g. red to A, black to B.

***Note:*** *No damage will occur if the signalling lines are connected with the wrong polarity. The system will not operate in this case but all that has to be done is to reverse the two connections to make it operate correctly.*

### 4.12.5   Data converters

Many RS232/485 data converters are available but the one that has received the most extensive testing and which is recommended for use with the MTL4841 is the **Westermo MA45 RS232/485**.

Follow the manufacturers instructions for setting up the RS232 connection to the controlling PC. The RS485 connection should be configured to suit the MTL4841 settings, which are discussed in Section 5 of this manual.

# 5 MODULES

## 5.1 MTL4841 and 4842 – installation

Place the MTL4841 over its connector, in the position marked on the backplane. Ensure that the module is not tilted, which could damage the connector pins, then press it carefully to the backplane. All safe-area circuit and power connections are made through this connector.

Tighten the two (captive) mounting screws.

Repeat this procedure for the MTL4842 module(s) **but please note:**

---
**When fitting the MTL4842 module on the HMU16 and HMU16AO backplanes, DO NOT place the MTL4842 beside the MTL4841 - see Figure 4.8**

---

## 5.2 Isolator modules (if used)

If the backplane accommodates isolators, refer to instruction manual INM4000 for information on wiring hazardous-area connectors for MTL4000 Series isolators.

Position each isolator module in its appropriate location on the backplane as shown in Figure 5.1. Ensure that the module is not tilted, which could damage the connector pins, then press it carefully to the backplane. All safe-area circuit and power connections are made through this connector.

Tighten the two (captive) mounting screws (A) to hold the isolator in postion.

Insert the hazardous area connector into the top of the module as shown.
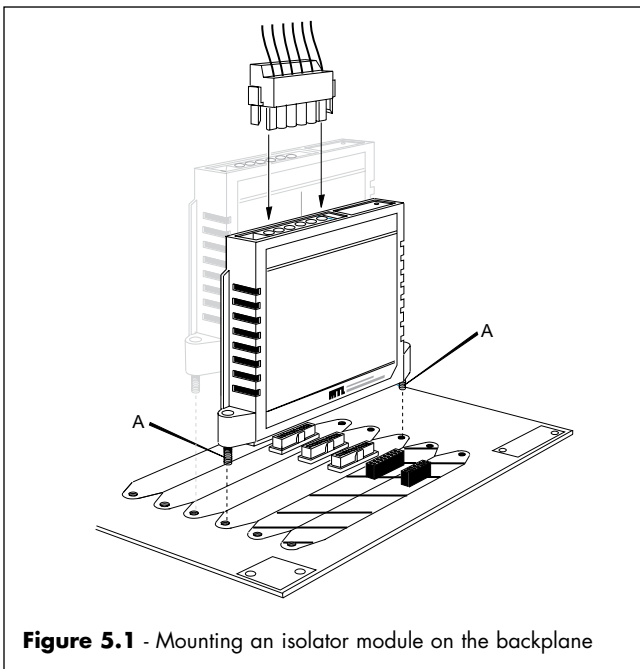


**Figure 5.1** - Mounting an isolator module on the backplane

## 5.3 Modules – setting and configuration

### 5.3.1 MTL4841 – setting and configuration

The baud rate for the RS485 interface is selected using switches A & B top of the MTL4841 communications module. Set the switches to one of the options given here.

| Switches | | Baud rate |
|---|---|---|
| **A** | **B** | |
| ON | OFF | 1200 |
| OFF | ON | 9600 |
| ON | ON | 19200 |
| OFF | OFF | 38400 |

**Table 5.1** - MTL4841 address switch setting options

| Switch Number | | | | | |
|---|---|---|---|---|---|
| **1** | **2** | **3** | **4** | **5** | **Address** |
| ON | OFF | OFF | OFF | OFF | 1 |
| OFF | ON | OFF | OFF | OFF | 2 |
| ON | ON | OFF | OFF | OFF | 3 |
| OFF | OFF | ON | OFF | OFF | 4 |
| ON | OFF | ON | OFF | OFF | 5 |
| OFF | ON | ON | OFF | OFF | 6 |
| ON | ON | ON | OFF | OFF | 7 |
| OFF | OFF | OFF | ON | OFF | 8 |
| ON | OFF | OFF | ON | OFF | 9 |
| OFF | ON | OFF | ON | OFF | 10 |
| ON | ON | OFF | ON | OFF | 11 |
| OFF | OFF | ON | ON | OFF | 12 |
| ON | OFF | ON | ON | OFF | 13 |
| OFF | ON | ON | ON | OFF | 14 |
| ON | ON | ON | ON | OFF | 15 |
| OFF | OFF | OFF | OFF | ON | 16 |
| ON | OFF | OFF | OFF | ON | 17 |
| OFF | ON | OFF | OFF | ON | 18 |
| ON | ON | OFF | OFF | ON | 19 |
| OFF | OFF | ON | OFF | ON | 20 |
| ON | OFF | ON | OFF | ON | 12 |
| OFF | ON | ON | OFF | ON | 22 |
| ON | ON | ON | OFF | ON | 23 |
| OFF | OFF | OFF | ON | ON | 24 |
| ON | OFF | OFF | ON | ON | 25 |
| OFF | ON | OFF | ON | ON | 26 |
| ON | ON | OFF | ON | ON | 27 |
| OFF | OFF | ON | ON | ON | 28 |
| ON | OFF | ON | ON | ON | 29 |
| OFF | ON | ON | ON | ON | 30 |
| ON | ON | ON | ON | ON | 31 |

**MTL4841 address switch**

Up to 31 MTL4841 communications modules can be connected to a single maintenance workstation. Each MTL4841 must be configured with a unique address by using the five switches located on the top of the module. See Table 5.1 for settings.

**Table 5.2** - MTL4842 address switch setting options

| Switch Number | | | | |
|---|---|---|---|---|
| **1** | **2** | **3** | **4** | **Address** |
| ON | OFF | OFF | OFF | 1 |
| OFF | ON | OFF | OFF | 2 |
| ON | ON | OFF | OFF | 3 |
| OFF | OFF | ON | OFF | 4 |
| ON | OFF | ON | OFF | 5 |
| OFF | ON | ON | OFF | 6 |
| ON | ON | ON | OFF | 7 |
| OFF | OFF | OFF | ON | 8 |
| ON | OFF | OFF | ON | 9 |
| OFF | ON | OFF | ON | 10 |
| ON | ON | OFF | ON | 11 |
| OFF | OFF | ON | ON | 12 |
| ON | OFF | ON | ON | 13 |
| OFF | ON | ON | ON | 14 |
| ON | ON | ON | ON | 15 |
| OFF | OFF | OFF | OFF | 16 |

### 5.3.2 MTL4842 – setting and configuration

Up to 16 MTL4842 HART interface modules can be connected to a single MTL4841 communications module. Each MTL4842 must be configured with a unique address by using the four switches located on the top of the module. Table 5.2 shows the switch settings for the individual addresses.

### 5.3.3 Operation at power-up

The MTL4840 system is controlled by a host computer running instrument management software. Although the software is needed to operate the system, some checks can be made on the correct functioning of the hardware in isolation. These checks are made by observing the operation of the LEDs on top of the MTL4841 and MTL4842.

#### Self-test checks

When power is applied to the MTL4841 and MTL4842, the following events should happen:

*   The green PWR LED on these modules will light.

*   The red ACTIVE LED on the MTL4842 will light to show that it is being addressed by the MTL4841.

*   LEDs A to D light in sequence as shown in table 5.3, as the MTL4842 scans once around all the loop addresses 1 to 16.

The sequence is repeated with each MTL4842.

**Table 5.3**

| LED | Loop address | | | | | | | | | | | | | | | |
|-----|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|
|     | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| A | ○ | ● | ○ | ● | ○ | ● | ○ | ● | ○ | ● | ○ | ● | ○ | ● | ○ | ● |
| B | ● | ○ | ○ | ● | ● | ○ | ○ | ● | ● | ○ | ○ | ● | ● | ○ | ○ | ● |
| C | ● | ● | ● | ○ | ○ | ○ | ○ | ● | ● | ● | ● | ○ | ○ | ○ | ○ | ● |
| D | ● | ● | ● | ● | ● | ● | ● | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ● |

● = off    ○ = on

**Note:** *Address 16 is shown by all four LEDs being extinguished.*

Following this, the MTL4841 enters either the scanning mode or the scanning disabled mode.

The 'standard' MTL4841 module is delivered in MTL/Cornerstone mode and has a default setting of "scanning enabled". The MTL4841-AMS is delivered preconfigured to AMS mode and in this mode the default is "scanning disabled". In either case the instrument maintenance software can be used to change the MTL4841's scanning mode.

#### Scan list

Each loop connected to an MTL4842 is added to the scan list if a HART device is detected on power up or if the instrument maintenance software resets the MTL4841. Loops can be added individually or removed from the scan list using the "loop rebuild" facility in the instrument maintenance software.

#### Scanning enabled

The MTL4841 scans continuously round all loops on the scan list indicated by the MTL4842 LED sequence.

#### Scanning disabled

One MTL4842 indicates the last loop addressed by the MTL4841.

## 6 FAULT FINDING AND ROUTINE MAINTENANCE

### 6.1 Maintenance precautions

Most codes of practice permit live maintenance on intrinsically safe devices and systems, provided that precautions are taken to preserve the integrity of the device or system. During live maintenance of MTL4000 modules, the hazardous-area connectors that plug into the tops of the modules are likely to be removed, so the cables that connect into the hazardous-area connectors must be reasonably flexible in order to allow connectors to be inserted and removed easily from the module tops.

When a hazardous area connector is unplugged, care must be taken to ensure that it is not laid in a position where it could come into contact with the backplane or backplane components. The backplane is connected to safe-area circuits and is therefore not intrinsically safe. An unprotected connector could by-pass the essential segregation between the safe-area and hazardous-area circuits. This can be avoided in one of the following ways:

a)  By plugging the connector into an MTL4099 dummy isolator or other uninstalled MTL4000 module directly upon removal (but NOT into any other module mounted on the backplane).

b)  By providing some method of securing the connector temporarily so that it cannot touch the backplane or the safe-area circuits.

### 6.2 Fault finding

When fault finding, carry out the following steps as far as is necessary:

1)  Check the condition of the installation to make sure that no damage or deterioration has occurred.

2)  Check that one, or more, of the backplane power LEDs is ON. If not, check the power supply fuse and, if necessary, change it. The rating is:
    BPMH16/BPSH16 : 2A (Fuse kit FUS16).

3)  Check that the power LEDs on the MTL4841/4842 modules are ON. If not, check power supply fuse FUS2. Its rating is 250mA.

4)  Exchange potentially faulty isolator modules as follows.
    a)  Unplug the hazardous-area connector.
    b)  Unscrew and remove the module from the backplane.
    c)  Plug-in and secure the replacement unit on the backplane.
    d)  Replace the hazardous-area connector.

Potentially faulty modules should be tested in workshop conditions, using the following procedure:

a)  Connect a power supply to a spare BPS backplane (refer to section 4.11.3)

b)  Plug the suspect module into any position on the backplane.

c)  Carry out the test procedure described in the appropriate section for the particular module in instruction manual INM4000.

5)  If an MTL4841 is changed, the Cornerstone software does not recognise a replacement device until either:

a)  the node name (stored within the new MTL4841) is made the same as that of the removed device, using the software.

b)  the network is restarted; when the software will adopt automatically the node name of the replacement device.

## 6.3 Routine maintenance

It is advisable to check the general condition of the installation occasionally to make sure that no damage or deterioration has occurred. The following should be checked at least once every two years (more frequently for particularly harsh environments):

1. Modules are of the types specified in the relevant documentation and are mounted in the correct positions on the associated backplanes.

2. Modules and hazardous area connectors are correctly and legibly tagged; that the connectors are plugged into the matching modules and that the tag details given comply with the relevant documentation.

3. Modules and hazardous area connectors are securely plugged into their matching sockets.

4. All connections to the backplane, and to the hazardous area connectors, are properly made.

5. Connecting cables to backplanes and to the hazardous area connectors are of the specified type and rating. They should be correctly routed and segregated and not frayed or otherwise damaged.

6. Cable screens are properly earthed

**CAUTION** **Caution:** *It is strongly recommended that users only undertake the tests and routine maintenance described in sections 6.2 and 6.3.*

*If a module is faulty, repairs or modifications* **MUST NOT** *be made as these may affect the intrinsic safety of the module. For repair or replacement, any faulty units or backplanes should be returned to the MTL Group company or the representative from which they were purchased.*

## 7 SOFTWARE CONNECTIVITY

### 7.1 Introduction

The MTL HART system provides access from a PC to the HART field devices for configuration, diagnostics and the monitoring of device performance. HART devices may be selected for regular status monitoring, and an alert issued if the status changes.

In addition, MTL's HART connection system supports dedicated software packages for valve positioners to optimise valve maintenance schedules.

### 7.2 Communication modes

The MTL4841 supports two communication modes:

- MTL mode and
- Arcom mode

to suit the various types of Instrument Management Software package available.

MTL mode is used by Applied System Technologies Cornerstone software and several valve manufacturers diagnostic software.

Arcom mode is used by Emerson AMS software and also several valve manufacturers diagnostic software.

MTL4841s are therefore available in the following formats.

| Part Number | Configuration mode | Software package |
|---|---|---|
| MTL4841 | MTL mode | Cornerstone<br>Valvelink (stand alone)<br>HART OPC server<br>Fieldcare<br>FDM |
| MTL4841-AMS | Arcom mode | AMS suite Ver1.4 - 6.2<br>Fieldcare (with DTM*)<br>Pactware (with DTM*)<br>FDM (with DTM*) |
| MTL4841-AMSv7 | Arcom PLUS mode | AMS suite Ver 7 or later |
| MTL4841-PRM | Arcom mode | PRM |

Standard MTL4841's are shipped pre-configured to MTL mode. Units ordered as MTL4841-AMS are pre-configured to Arcom mode and have AMS written on the batch code label for identification.

*\* Some software packages based on the FDT Specification will require the MTL4840 communications DTM.*

*This can be downloaded free of charge from the MTL website at: www.mtl-inst.com/products/soft-tools/soft_tools.htm*

### 7.3 Software setup

Having connected the MTL4841/MTL4842 system, as described in this manual, set up the software as described in the software user's manual.

# APPENDIX A

In addition to a comprehensive range of *generic* MTL4000 Series backplanes, MTL has also developed a very wide range of custom backplanes to meet the requirements of its customers. The following listing is provided to illustrate the breadth of generic and custom types created to meet the needs for individual system manufacturers and their DCS models.

The listing also includes a range of HART connection boards, explained earlier, to suit both general and custom requirements.

Many applications can benefit from simplified wiring and connection techniques, so we recommend that you contact your local MTL representative who will be able to explain how we can find a solution for your particular requirement.

The listing was complete at the time of publication but further models may have been added since then.

## MTL4000 Series, HART enabled backplanes

| | |
|---|---|
| BPM08-2AI | Generic |
| BPM08-2AV | Generic |
| BPM16-2AI | Generic |
| BPM16-2AV | Generic |
| BPM16-AIO | Generic |
| BPM16-AV | Generic |
| BPM08-SC2AI | Generic |
| BPM08-SC2AI(I) | Generic |
| BPM16-2AV | Generic |
| BPM16-2AI | Generic |
| BPM16-2AV | Generic |
| BPM32-SCAIO | Generic |
| BPM32-SCAIR | Generic |
| BPHM64 | Generic |
| BPHM64-CC | Generic |
| BPMH16-M | Generic |
| BPMH16U | Generic |
| BPSH16 | Generic |
| BPSH16-32 | Generic |
| BPSH16-32R | Generic |
| BAC-ABBAIO-L | ABB |
| BAC-ABBAIO-R | ABB |
| BAC-INFI90AIH | ABB |
| BAC-INFI90AOH | ABB |
| BAC-ISTA002 | ABB |
| BPM32-ABAI | Allen Bradley |
| BP-FBM201 | Foxboro |
| BP-FBM201/4/37 | Foxboro |
| BP-FBM204 | Foxboro |
| BP-FBM204-S | Foxboro |
| BP-FBM205 | Foxboro |
| BP-FBM211 | Foxboro |
| BP-FBM214 | Foxboro |
| BPCAB-FBM214/215 | Foxboro |
| BPM04-FBM201 | Foxboro |
| BPM04-FBM214 | Foxboro |
| BPM08-FBM211 | Foxboro |
| BPM16-FBM211 | Foxboro |
| BPM16-FBM214/215 | Foxboro |
| BPM32A-FBM201/4 | Foxboro |
| BPM32A-FBM211 | Foxboro |
| BPM32B-FBM201/4 | Foxboro |
| BPM32B-FBM211 | Foxboro |
| BPM8-FBM201/4/37 | Foxboro |
| FBM201HCU | Foxboro |
| FBM204HCU | Foxboro |
| BPHIMA-16AI | HIMA |
| BPHIMA-16AI-R | HIMA |
| BPHIMA-16AIO | HIMA |
| BPHIMA-16-2AI | HIMA |
| BP-GHAI-3700 | Honeywell |
| BP-GHAI01 | Honeywell |
| BP-GHAI05 | Honeywell |
| BP-GHAI16 | Honeywell |
| BP-GHAO21 | Honeywell |
| BPHM64-A | Honeywell |
| BPHM64-ACC | Honeywell |
| BPM08-FMAI | Honeywell Plantscape |
| BPM08-FMAICC | Honeywell Plantscape |
| BPM08-FMAIO | Honeywell Plantscape |
| BPM16-FMAI | Honeywell Plantscape |
| BPM16-FMAICC | Honeywell Plantscape |
| BPM16-FMAO | Honeywell Plantscape |
| BPM16-FMAOCC | Honeywell Plantscape |
| BPM16-FMAIF | Honeywell Plantscape |
| BV-GHAI01 | Honeywell PMIO |
| BV-GHAI05 | Honeywell PMIO |
| BC-GHAI11 | Honeywell PMIO |
| BC-GHAO11 | Honeywell PMIO |
| BC-THAI11 | Honeywell PMIO |
| BC-THAO11 | Honeywell PMIO |
| BP-THOX12 | Honeywell PMIO |
| BU-GHAI11 | Honeywell PMIO |
| BU-GHAI11-HON | Honeywell PMIO |
| BU-GHAI11CC | Honeywell PMIO |
| BU-GHAO11 | Honeywell PMIO |
| BU-GHAO11CC | Honeywell PMIO |
| BU-THAI11 | Honeywell PMIO |
| BU-THAI11CC | Honeywell PMIO |
| BU-THAO11 | Honeywell PMIO |
| BU-THAO11CC | Honeywell PMIO |
| BAC-16HDAI | Honeywell SMS |
| FC-GIMTLAI-1620m | Honeywell SMS |
| FC-GIMTLAO-420M | Honeywell SMS |
| FC-GIMTLRT-1620M | Honeywell SMS |
| FS-GIMTLAI-1620M | Honeywell SMS |
| FS-GIMTLAO-420M | Honeywell SMS |
| FS-GIMTLRT-1620M | Honeywell SMS |
| BACH-16HDAI | Honeywell SMS |
| BPICS-AI | ICS |
| BPICS-AI-CC | ICS |
| BPICS-16AI | ICS |
| BPICS-16AI-CC | ICS |
| BPICS-2AI | ICS |
| BPICS-2AI-CC | ICS |
| ICSFTA-8AI | ICS |
| ICSFTA-8AI-CC | ICS |
| ICSFTA-AI250 | ICS |
| ICSFTA-AI250-CC | ICS |
| BPM32-MPCAI | Siemens Moore |
| BPM32-MPHFM | Siemens Moore |

| | |
|---|---|
| BPM32-MPSAM | Siemens Moore |
| BPSN-08-AI | Simrad Norge |
| BPSN-16-AIH | Simrad Norge |
| BPM16-2AI3700 | Triconex |
| BPM16-AI3700-L | Triconex |
| BPM16-AI3700-R | Triconex |
| BPM32-AIH3700 | Triconex |
| BPM32-AIH3704E | Triconex |
| HCU3700/ISOREP | Triconex |
| BPYOK-AI | Yokogawa Centum CS |
| BPYOK-AI(16) | Yokogawa Centum CS |
| BPYOK-AIO | Yokogawa Centum CS |
| BPYOK-MA | Yokogawa Centum CS |
| BPYOK-MA(16) | Yokogawa Centum CS |
| BPY-MA | Yokogawa Centum CS |
| AMC80HCU | Yokogawa Centum CS |
| AMM11HCU | Yokogawa Centum CS |
| BPYR3-AAI135/835 | Yokogawa Centum R3 |
| BPYR3-AAI141 | Yokogawa Centum R3 |
| BPYR3-AAI841 | Yokogawa Centum R3 |
| BPYR3-AI | Yokogawa Centum R3 |
| BPYR3-AIO | Yokogawa Centum R3 |
| BPYR3-AV | Yokogawa Centum R3 |
| BPYR3-AVO141 | Yokogawa Centum R3 |
| BPYR3-AVO841 | Yokogawa Centum R3 |
| BPYR3-MA | Yokogawa Centum R3 |
| BPYR3-MA(V) | Yokogawa Centum R3 |
| BPYR3-MA841 | Yokogawa Centum R3 |
| AAB841HCU | Yokogawa Centum R3 |
| AAV141HCU | Yokogawa Centum R3 |
| BPY-RS-AI16-KS | Yokogawa Prosafe |
| BPY-RS-SAI16-KS | Yokogawa Prosafe |
| BPY-RS-AI16V-KS | Yokogawa Prosafe |
| BPY-RS-AO8-KS | Yokogawa Prosafe |
| BPY-RS-SAI16V-KS | Yokogawa Prosafe |

## HART connection and maintenance units

| | |
|---|---|
| HCU08 | Generic |
| HCU08RF | Generic |
| HCU16 | Generic |
| HCU16AI | Generic |
| HCU16AIO | Generic |
| HCU16AO | Generic |
| HMU16 | Generic |
| HMU16-P250 | Generic |
| HMU16-S200 | Generic |
| HMU16-S240 | Generic |
| HMU16AO | Generic |
| HMU32 | Generic |
| HCU-FBM211 | Foxboro |
| HCU1492AI | Honeywell Plantscape |
| HCU1492AI-CC | Honeywell Plantscape |
| HCU1492AIR | Honeywell Plantscape |
| HCU1492AIR-CC | Honeywell Plantscape |
| HCU1492AO | Honeywell Plantscape |
| HCU1492AO-CC | Honeywell Plantscape |
| HCU16HDAI | Honeywell SMS |
| HCU16-P250 | Honeywell SMS |
| HCU16-S150 | Honeywell SMS |
| HCU16-S200 | Honeywell SMS |
| HCU16-S240 | Honeywell SMS |
| HCU-MPCAM | Siemens Moore |
| HCU-MPCAI | Siemens Moore |
| HCU-MPSAM | Siemens Moore |
| HCU-SM331RAI | Siemens S7 |
| HCU-SM332RAO | Siemens S8 |
| HCU3700/3703E | Triconex |
| HCU3700/3703EB | Triconex |
| HCU3700/ISOREP | Triconex |
| HCU3704E | Triconex |
| HCU3805E | Triconex |
| HCU-FTA3700 | Triconex |

21

**AUSTRALIA**
MTL Instruments Pty Ltd,
205-209 Woodpark Road, Smithfield,
New South Wales 2164, Australia
Tel: + 61 1300 308 374 Fax: + 61 1300 308 463
E-mail: mtlsalesanz@eaton.com

**CHINA**
Cooper Electric (Shanghai) Co. Ltd.
Room 2001, China Life Tower, 16 Chao Yang Men Wai Street,
Chao Yang District, Beijing, China 100020
Tel: + 86 10 5980 0231 Fax: + 86 10 8562 5725
E-mail: mtl-cn@eaton.com

**FRANCE**
MTL Instruments sarl,
7 rue des Rosiéristes, 69410 Champagne au Mont d'Or
France
Tel: + 33 (0)4 37 46 16 70 Fax: +33 (0)4 37 46 17 20
E-mail: mtlfrance@eaton.com

**GERMANY**
MTL Instruments GmbH,
Heinrich-Hertz-Str. 12, 50170 Kerpen, Germany
Tel: + 49 (0)22 73 98 12- 0 Fax: + 49 (0)22 73 98 12- 2 00
E-mail: mtlgmbh@eaton.com

**INDIA**
MTL India,
No.36, Nehru Street, Off Old Mahabalipuram Road
Sholinganallur, Chennai- 600 119, India
Tel: + 91 (0) 44 24501660 /24501857 Fax: + 91 (0) 44 24501463
E-mail: mtlindiasales@eaton.com

**ITALY**
MTL Italia srl,
Via A. Meucci, 10, I-20094 Corsico (MI), Italy
Tel: + 39 (0)2 61802011 Fax: + 39 (0)2 61294560
E-mail: chmninfo@eaton.com

**JAPAN**
Cooper Crouse-Hinds Japan KK,
MT Building 3F, 2-7-5 Shiba Daimon, Minato-ku,
Tokyo, Japan 105-0012
Tel: + 81 (0)3 6430 3128 Fax: + 81 (0)3 6430 3129
E-mail: mtl-jp@eaton.com

**BeNeLux**
MTL Instruments BV
Terheijdenseweg 465, 4825 BK Breda
The Netherlands
Tel: +31 (0) 76 7505360 Fax: +31 (0) 76 7505370
E-mail: mtl.benelux@eaton.com

**NORWAY**
Norex AS
Fekjan 7c, Postboks 147,
N-1378 Nesbru, Norway
Tel: +47 66 77 43 80 Fax: +47 66 84 55 33
E-mail: info@norex.no

**SINGAPORE**
Cooper Crouse-Hinds Pte Ltd
No 2 Serangoon North Avenue 5, #06-01 Fu Yu Building
Singapore 554911
Tel: + 65 6 645 9888 Fax: + 65 6 487 7997
E-mail: sales.mtlsing@eaton.com

**SOUTH KOREA**
Cooper Crouse-Hinds Korea
12F, Vision Tower, 707-2 Yeoksam-Dong Gangnam-Gu,
Seoul 135-080, South Korea.
Tel: +82 2 538 3481 Fax: +82 2 538 3505
E-mail: mtl-korea@eaton.com

**UNITED ARAB EMIRATES**
Cooper Industries/Eaton Corporation
Office 205/206, 2nd Floor SJ Towers, off. Old Airport Road,
Abu Dhabi, United Arab Emirates
Tel: +971 2 44 66 840 Fax: +971 2 44 66 841
E-mail: mtlgulf@eaton.com

**UNITED KINGDOM**
Measurement Technology Limited,
Great Marlings, Butterfield, Luton
Beds LU2 8DL
Tel: + 44 (0)1582 723633 Fax: + 44 (0)1582 422283
E-mail: mtlenquiry@eaton.com

**AMERICAS**
Cooper Crouse-Hinds MTL Inc.
3413 N. Sam Houston Parkway W.
Suite 210, Houston TX 77086, USA
Tel: + 1 281-571-8065 Fax: + 1 281-571-8069
E-mail: mtl-us-info@eaton.com

---

# Crouse-Hinds
by **E·T·N**

**EUROPE (EMEA):**
+44 (0)1582 723633
mtlenquiry@eaton.com

**THE AMERICAS:**
+1 800 835 7075
mtl-us-info@eaton.com

**ASIA-PACIFIC:**
+65 6 645 9888
sales.mtlsing@eaton.com

The given data is only intended as a product
description and should not be regarded as a legal
warranty of properties or guarantee. In the interest
of further technical developments, we reserve the
right to make design changes.