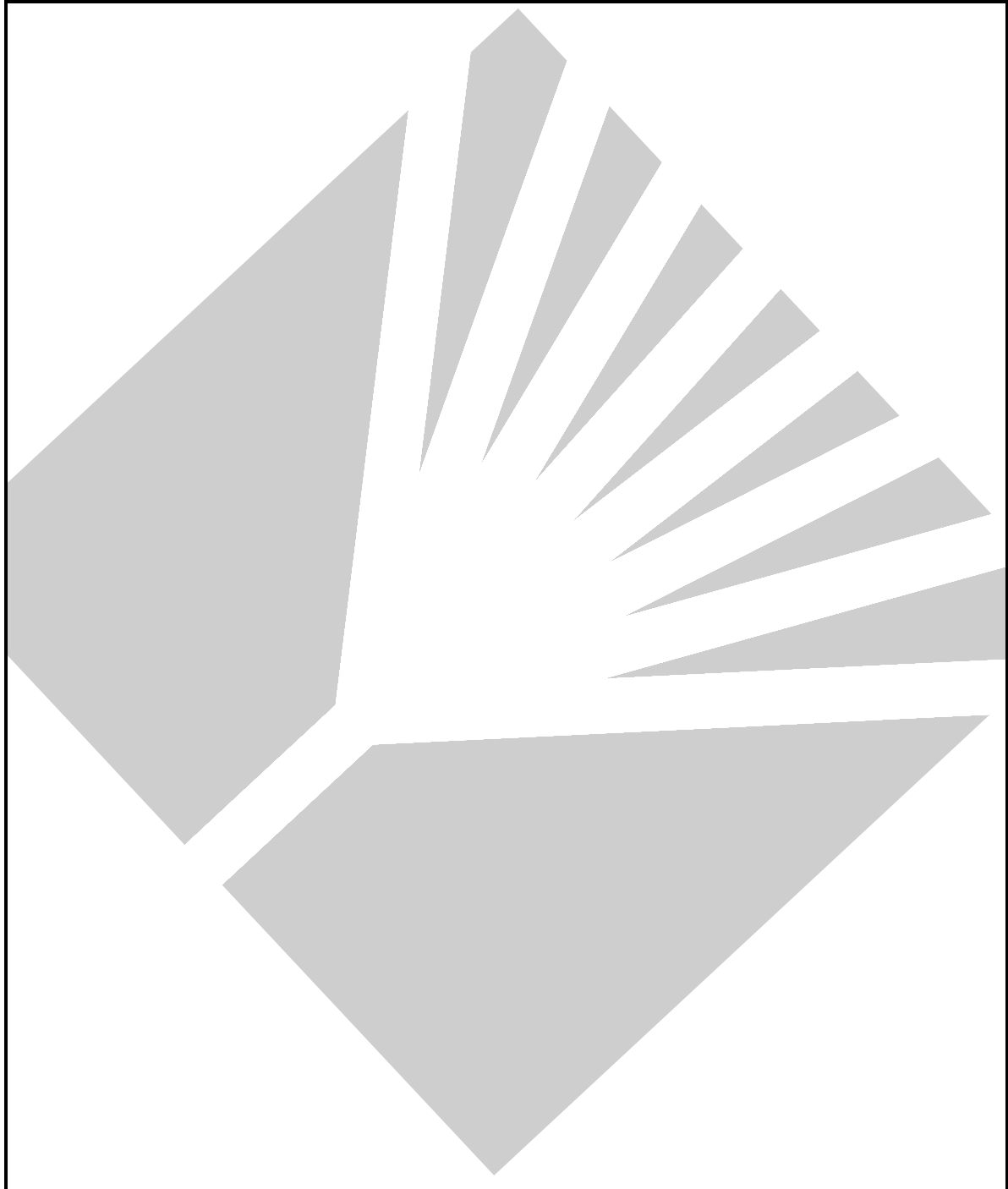


MTL8000

Process I/O for Process Control



8512 – HART Interface module

Instruction Manual



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1 Introduction

This instruction manual describes the procedures for installing, connecting, checking and maintaining the 8512-IF-HA HART Interface module.

Section 2 describes the product; section 3 provides information on configuration; section 4 covers the installation and connection and section 5 covers fault finding and maintenance.

2 Description

The 8512-IF-HA enables HART® devices connected to MTL's 8000 series modules, to communicate with instrument management software - like Fisher Rosemount's AMS and Applied System Technologies' Cornerstone™ software - running on a PC workstation. The instrument management software can obtain access to the HART parameters of field devices because of the HART passthrough capabilities of the MTL8000 BIM. With AMS or Cornerstone software, the system provides access to all of the smart features of HART® devices; calibration and maintenance history for individually addressable devices; and an instrument database. The hardware and software requirements can be referred to in the appropriate AMS or Cornerstone software product catalogue/ user manuals.

Instrument management software, typically, allows the user to monitor, configure, calibrate and maintain any HART devices connected to an MTL8000 network. The PC workstation connects to the remote 8512 units via an RS485, 2-wire, multidrop network which is capable of supporting up to 31 individual devices.

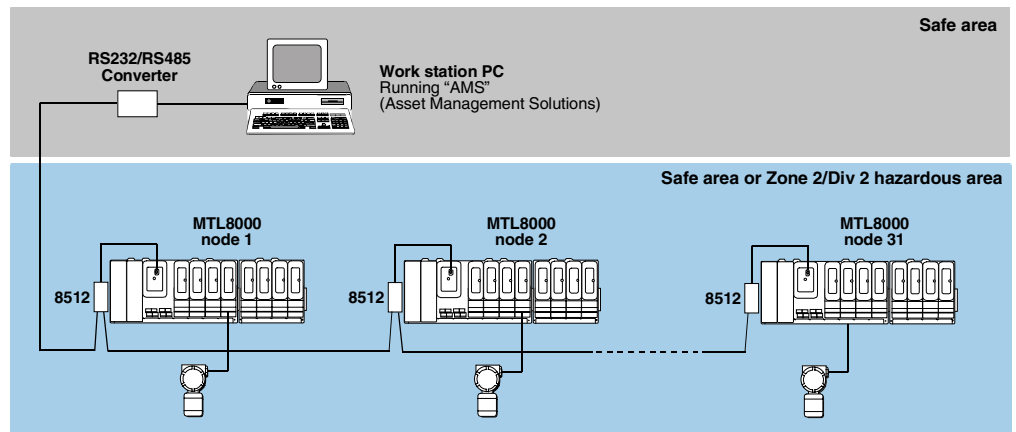


Figure 1 – Locations of 8512-IF-HA units in MTL8000 architecture

A single MTL8000 node can support up to 32 I/O modules. So, if a node was fully populated with 8-channel HART AI or AO modules, up to 256 HART devices could be connected to a single node.

With one 8512 unit per node and 31 available addresses on an RS485 serial link up to 7936 HART devices can be connected to the instrument management software running on a PC.

i.e. 8 channels per I/O module x 32 I/O modules x 31 communication modules = 7,936

The workstation software gives a user access to all of the smart features of HART devices. Records can be generated and updated automatically, in accordance with ISO9000 quality standards. This results in considerable time savings in the collection and management of maintenance information and, in addition, users are able to benefit from the standardisation of operator test and calibration procedures as well as increased accuracy.

The network parameters (poll address, baud rate, etc.) for the 8512 can be programmed remotely using configuration software that runs on the same PC as the instrument management software.

The 8512 may be installed in safe areas or Zone 2 or Div 2 hazardous areas.

3 Configuration

Configuration software is required to set up the network parameters for the 8512 so that it can communicate with the instrument maintenance software. This is provided with version 1.51, or later, of the 8450 BIM configuration software. It is installed at the same time and can be run on the same PC as the instrument management software. This means that 8512 units can also be configured remotely, if required, on the same RS485 network as the one used for maintenance. The parameters required to be set in the unit are as follows:

- The unit's poll address on the RS485 network
- The required instrument management software protocol
- The required baud rate - to suit the PC running the instrument management software

3.1 The configuration software

A conventional "installation wizard" enables the software to be installed in any convenient location on a PC. When the configuration software application is run, the following dialog box is displayed.

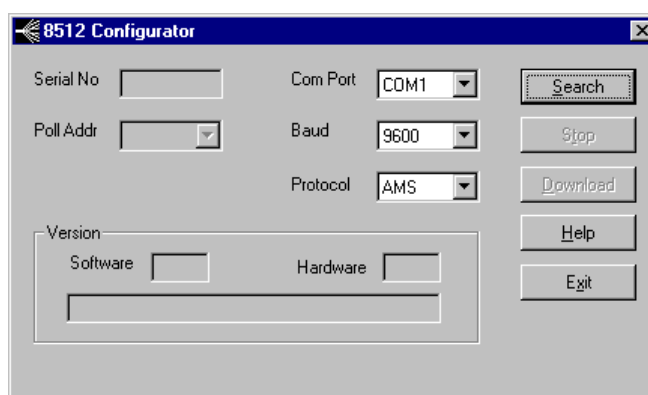


Figure 2 – Configurator main screen

The meaning of each field is defined here.

Serial number

The serial number is a unique 10-digit number coded into each 8512 unit and printed on the case of the unit. When the software is communicating with a specific unit, the unit's serial number is displayed, otherwise this field is greyed out.

Poll address

RS485 permits 32 device addresses on a single network. The host address is always 0 and the 8512 units can have addresses from 1 to 31. The default is address 31.

When the software is communicating with a specific unit the unit's poll address number is displayed, otherwise this field may be greyed out.

Protocol

The 8512 works with different instrument management software packages, most typically, AMS and Cornerstone. Two options are available from the drop down Protocol list box: "AMS" for AMS software and "MTL" for AST-Cornerstone software. The default is AMS.

Baud Rate

This defines the data rate for the RS485 network. Naturally, the 8512 unit and the host PC's serial-port must use the same rate. The choices here are: 9600, 19200 and 38400 baud. The default is 9600.

Com Port

This tells the PC which of its ports to use to communicate with the units *during configuration*. The options are COM1 to COM 4 and the default is COM 1.

In addition there are five control buttons on the right of the dialog box:

Search	Use this to search for any 8512 units connected to the RS485 network.
Stop	Click to halt an Auto search
Download	This will download the settings shown on screen to the current 8512 unit. It can also be used to save a copy of the unit's configuration details to a .csv file.
Help	Basic guidance notes on using the configuration software.
Exit	Close the configurator application.

3.2 Configuring an 8512 unit

In order to configure a unit, a communication dialog must be set up between it and the PC. This requires three configurator settings: the PC Com port identity, the baud rate and the unit's poll address. The “**Com port**” field entry can be set to correspond to the one used on the PC but the baud rate and the network poll address of the unit may not always be known. Finding these parameters is dealt with below.

Configuring an 8512 can be carried out locally; for example on the bench, or remotely via the RS485 network. Local configuration is recommended, as it is usually more convenient and it also enables the user to confirm also that a unit is fully operational before it is installed out on the site.

Note: All new units have a default poll address of 31 so remote installation of more than one unit will cause confusion on the network.

3.2.1 Configuring a unit locally

The following “bench equipment” will be required:

- A power supply with an output anywhere between 20 – 35 V DC (135 mA max.)
- A PC running the 8512 configurator software
- An external RS232/RS485 converter – or an internal PC card with an RS485 output

Referring to Figure 12 for terminal assignments, connect the 8512 to the power supply and make the serial-data connection from the PC to the 8512 via the RS485 converter, or the RS485 card where used. Power up the 8512 and run the configuration software on the PC.

3.2.2 Configuring a unit remotely

The 8512 will need to obtain its power from the (remote) field supply and it is assumed that the RS485 network is already in place to service the instrument maintenance software. Run the configuration software and set the COM Port field to suit the PC port that is connected to the network.

3.3 Communicating with a new 8512 unit

A new 8512 module contains a poll address of 31 as a factory default, so the software should be instructed to search specifically for address 31. To do this, start by clicking the Search button.

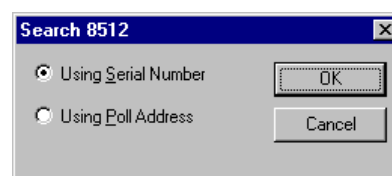


Figure 3 - Search options

Ensure the “Search 8512 with Poll Address” option is selected and click the OK button. This will open the dialog box where the unit’s poll address can be specified for the search.

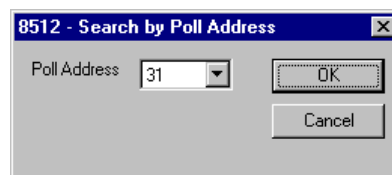


Figure 4 - Poll address for searching

Select 31 from the drop down list and click OK. The main screen will then show details similar to Figure 5.

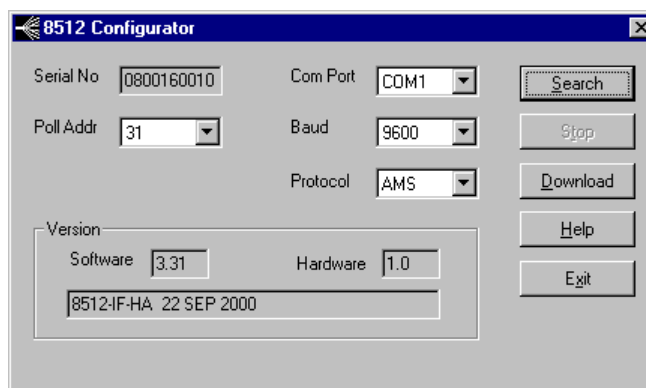


Figure 5 - Current settings of a unit

This screen shows the current settings of the unit and is ready for any changes (see 3.1).

3.4 Communicating with a previously configured 8512 unit

A previously configured 8512 unit may contain any one of the 31 poll addresses and so a search needs to be carried out for its current address. In addition to an unknown address, it may also have been used at a different baud rate!

One way to find the poll address of an unknown unit is to do a search (see previous section) on *any* poll address. Follow the instructions above to get to the poll address entry box (Figure 4), then select, say, address “1”. If the actual address happens to be “1” and the baud rate has also been set correctly, then it will be recognised immediately; if not, the software will respond by offering to do an Auto Search for any units on the network.

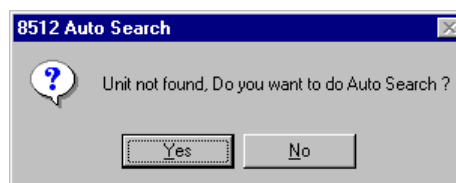


Figure 6 - Offering to do Auto Search

To cancel this option click **No**, otherwise click **Yes** and the configurator will step through all of its communication options until it establishes communication with the connected unit (see also section 3.5.3). The progress of the search is indicated at the bottom of the dialog box (see **Figure 7**).

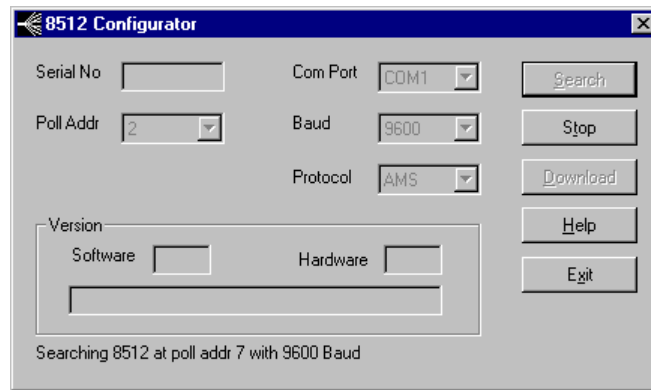


Figure 7 - Auto Search in progress

When the unit is found, the settings are displayed in the same way as shown in Figure 5 and can be modified as required.

3.5 Search methods

The above examples illustrate the use of the configurator's search facilities. There are two basic methods of searching:

- Searching by poll address
- Searching by serial number

plus the Auto Search that is offered when either of the above methods fails.

3.5.1 Searching for a unit by Poll Address

This method of searching enables a user to select an 8512 by its poll address. The network is searched for the 8512 unit with user selected poll address and enables a search to be carried out for rest of the 1-31 addresses.

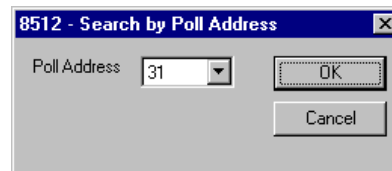


Figure 8 - Search by poll address

3.5.2 Searching for a unit by Serial Number

If a search by serial number is chosen, then the serial number is requested in the following dialog box:

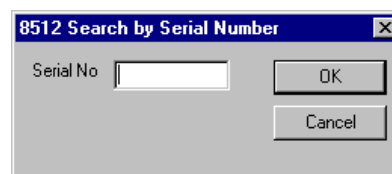


Figure 9 - Search by serial number

The serial number is a unique 10-digit number coded into each 8512 unit and printed on the case of the unit. Enter the serial number and click OK.

3.5.3 Auto Search

The Auto Search is offered when either of the above search methods is unable to locate the given target address, or serial number.

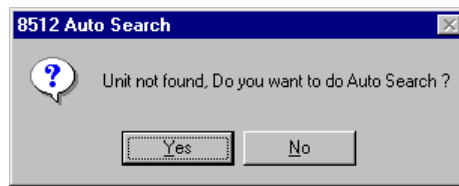


Figure 10 - The Auto Search

If the offer to search is accepted, it will step through all of the poll addresses (1–31) at a baud rate of 9600, then repeat this at 19,200 and 38,400 in turn, until the unit is identified and its details displayed.

3.6 Downloading the configuration to the device

When the configurator has found the unit and the required parameters (section 3.1) have been entered, the information should be saved to the 8512 unit for future use. Click the **Download** button to send the parameters to the 8512 to update it. When the configurator has completed this download, the user is offered a chance to record all of the saved parameter to a comma separated, (.csv) ASCII, text file. If the user clicks the **Yes** button a standard Windows **Save As...** dialog box is provided for the user to select a name and location for the file.

The information saved in the file includes:

- | | | |
|------------------------|-----------------------|--------------------------|
| • Serial number | • Poll Address | • H/W Ver. |
| • Date | • Protocol | • S/W Ver. |
| • Time | • Baud | • Version Details |

3.7 Saving a configuration to ASCII file

The **Download** button (see above section) can also be used to record the unit's details to file *before* any configuration changes.

Click the **Download** button when the unit's configuration details have been displayed. Although this causes its existing details to be downloaded to it, no changes will occur. The offer to save the configuration details is then displayed. Click the **Yes** button and choose a name and location for the .csv text file.

Note: If the same file name is chosen when downloading the *new* configuration, the new details will be appended to the previous ones rather than overwriting them.

4 INSTALLATION

4.1 Overview

A plan should be devised for the installation of the 8512 units. Each unit has the same default parameters so, if they are installed “as supplied” throughout the network, they will be indistinguishable from each other. The method recommended in the previous section is to identify the serial number and set the basic parameters of each new unit “on the bench”, using the configuration software (see Section 3.2.1). By doing this, each 8512 unit is uniquely identified and can then be allocated to a specific site location.

4.2 Precautions

Installation must always be carried out in accordance with local standards, codes of practice, and site regulations.

In particular, check that all of the hazardous-area equipment complies with the descriptive system document.

If in doubt, refer to the certificate or catalogue for clarification of any aspects of hazardous area installation or, contact MTL or your local MTL representative for assistance.

4.3 Permitted locations for 8512

The 8512 can be installed in:

- Class I , Div 2, Groups A,B,C & D T4 hazardous locations
- Zone 2, IIC, T4 hazardous areas.

4.4 Specific requirements for 8512

The 8512 unit is certified as non-arcing. Consequently, terminals must not be disconnected while a circuit is live, unless the location is known to be non-hazardous. Non-arcing field circuits must not be worked upon while they are energised.

The source of supply voltages to non-arcing field circuits must be isolated before any work is attempted. If the means of isolation is in hazardous area, it must be appropriately protected.

For 8512 system documentation refer to MTL/SCI08- 512-01 Issue 1.

4.5 Mounting

The 8512 units can be mounted directly onto T- or G- Section DIN rail (to DIN46277). Overall and detailed dimensions are shown in Figure 11.

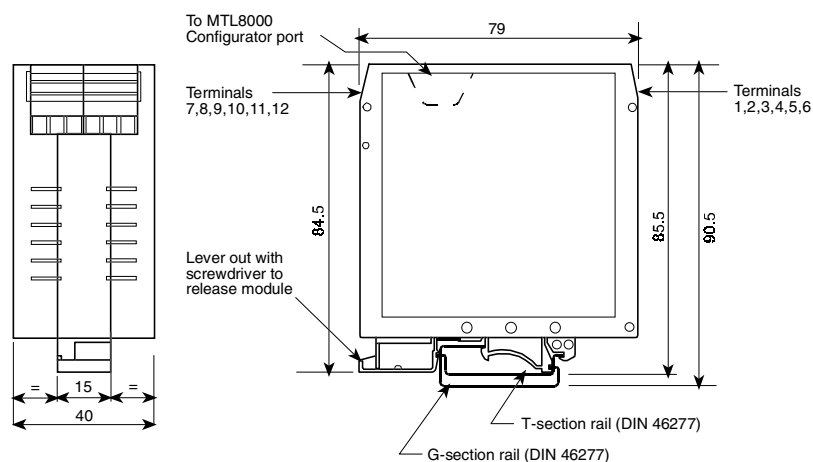


Figure 11 - Dimensions of the 8512

4.6 Wiring details

Refer to the circuit diagram shown below for wiring details.

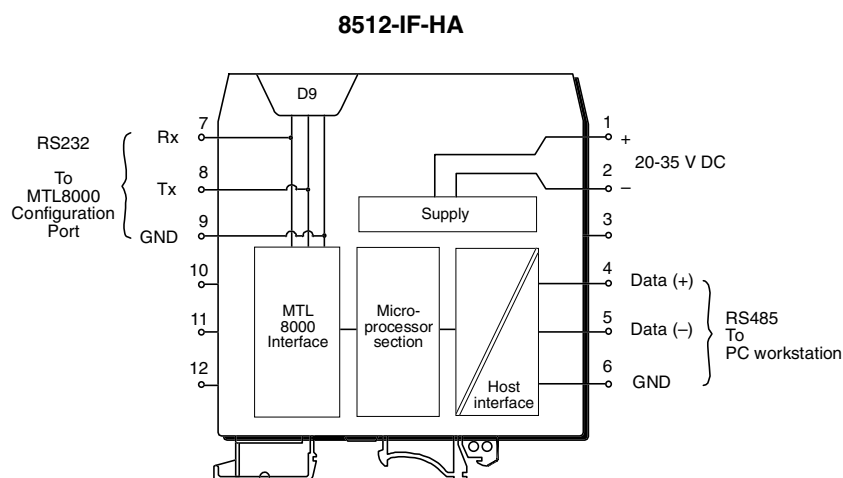


Figure 12 - Circuit of 8512

4.6.1 Host connections

Terminals 4, 5 and 6 connect to the maintenance workstation via an RS485 link. Up to thirty-one 8512 units can be multidropped to a single workstation. The PC workstation will require either, an external RS485 to RS232 interface converter to connect the network to its COM port, or an internal card that provides an RS485 port for external connections. For details refer to the instrument management software requirement specifications.

4.6.2 BIM connections

The 8512 can be connected to the BIM by either of two methods:

- using terminals 7, 8 and 9, or
- the 9-pin, D-type connector on the top of the unit with cable supplied

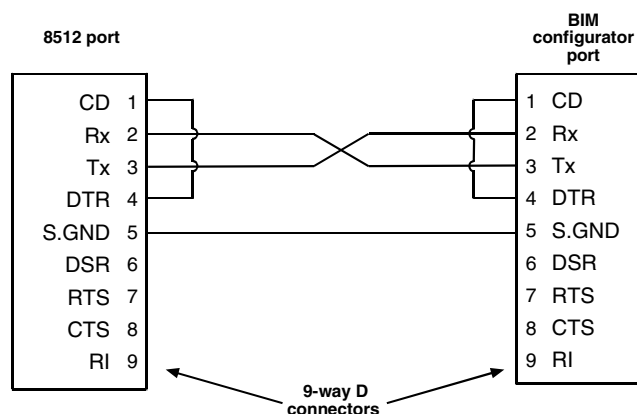


Figure 13 - BIM configuration cable connections

Use of this cable without changing the BIM setting (see section 5.1) will prevent the BIM from adopting a failsafe state on LAN failure. Screened cables should be used for the link and the cable screens should be properly earthed.

4.6.3 Power connections

Connect the power supply 20 – 35V DC to terminals 1 and 2.

5 System implementation

Once the 8512 has been configured to a known set of communication parameters and installed in a node, the system configuration can be checked.

5.1 8512 communication with the BIM

The BIM requires a specific LAN setting in order for it to operate correctly with the 8512. This is achieved using the 8450 BIM configuration software. See “!Comms” command in the “Configurator Parameter Files” section of instruction manual - INM8450. **If the BIM is not configured in this way the HART devices will not be recognised.**

The configuration-port parameters of the MTL8000 BIM are auto detected by the 8512 during the power-on startup. The auto-detect cycle tries a range of baud rates (1200, 2400, 4800, 9600, 19200) and parity settings (Odd, Even, None) to establish communications. The auto detect cycle will re-try a second time if it is not successful the first time. If it is still unsuccessful, it comes out of auto-detect mode.

Note: The BIM will not be auto-detected if its baud rate is set to 14,400.

The 8512 restarts auto-detect activity if a timeout occurs (2 min.) or if unexpected data is received from the BIM. It can also be re-initiated by a) power recycling, b) issuing an 8512 reset from the host PC or c) by communicating to any of the HART instrument loops from the host PC. The detected baud rate is stored in non-volatile RAM and used as the default value.

If the 8512 and the BIM are powered from the same supply, the data received during power-up may be incomplete, even if they were previously synchronised to the same communication parameters. In this case, the 8512 will run its auto-detect to re-establish communications.

Once communication is established with the BIM, the 8512 scans the MTL8000 HART I/O modules to identify whether there are HART instruments connected and to update its database. This length of time required for this process depends upon the number of MTL8000 HART modules and HART instruments connected. During this process it is advisable not to connect/scan the 8512 from the host, as this may update the host with an incomplete database.

The BIM will go into failsafe mode if the configuration port is left unconnected and there is no LAN traffic. (The delay period for this to happen is decided by the “Comms Lost Timeout” setting of the BIM.) If the BIM goes into failsafe, communication between the 8512 and the BIM is not reliable and a power recycle of the BIM is required with the configuration cable connected.

5.2 8512 communication with the host PC

The instrument management software can be connected to the network when all of the 8512 units on the network have been configured as explained in sec 3.3.

5.3 Status LEDs

Two status LED's are provided to indicate the communication status.

Host	8512 to host PC communications
MTL8000	8512 to BIM communications

The behaviour of the two LEDs can be understood from the following table:

LED activity	Description
Off	No communication
On	Incomplete frame - will be cleared during next successful communication
Pulsing	Communication in progress
Both pulsing	Power-up cycle

6 Fault finding and routine maintenance

6.1 Maintenance Precautions

Follow the precautions specified in Sections 4.1, 4.3 & 4.4 to preserve the integrity of the device and system when it used within hazardous areas.

6.2 Fault Finding

When fault finding, carry out the following steps as needed.

- Check 8512 LED status - refer to section 5.3.

If both LEDs pulse during power-up and then extinguish, communication is not taking place with the BIM. The **Host 8000** LED should pulse for at least 20 seconds after power-up as the 8512 gathers information about the modules installed at the node.

- Check 8512/BIM system implementation - refer to section 5.1.
- Confirm that BIM is configured for 8512 use - refer to section 5.1.

If a faulty unit requires replacement observe the guidelines indicated in section 6.1.

6.3 Routine maintenance:

In keeping with good work practices, it is advisable to check the general condition of the installation occasionally to make sure that no deterioration has occurred. It is suggested that the following items be checked at least once every two years (more frequently for particularly harsh environments).

1. Confirm that modules are of the types specified in the relevant documentation and are mounted in the correct position.
2. Confirm that cable screens continue to be properly earthed.

The MTL Instruments Group plc

Measurement Technology Limited

Power Court, Luton, Bedfordshire
England LU1 3JJ
Tel: +44 (0)1582 723633 Fax: +44 (0)1582 422283
E-mail: enquiry@mtl-inst.com

MTL Incorporated

9 Merrill Industrial Drive, Hampton, NH 03842 USA
Tel: +1 800 835 7075, +1 603 926 0090 Fax: +1 603 926 1899
Or
8576 Wellington Road, Manassas VA 20109 USA
Tel: +1 703 361 0111 Fax: +1 703 368 1029
E-mail: info@mtlnh.com

MTL Canada Safety Instrumentation

20 Regan Road, Unit 17
Brampton, Ontario L7A 1C3
Canada
Tel: +1 905 840 7850 Fax: +1 905 840 7852
E-mail: cinfo@mtlnh.com

MTL Instruments

PO Box 7392, Abu Dhabi
UAE
Tel: +971 2 766316 Fax: +971 2 723837
E-mail: mtlgulf@mtl-inst.com

MTL Instruments Limited

MTL Systems Pvt Limited

No.3 Old Mahabalipuram Road
Sholinganallur, Chennai 600119
India
Tel: +91 (0)44 496 0552 Telefax: +91 (0)44 496 0477 Fax: +91 (0)44 496 1657
E-mail: mds.engg@mtlindia.sprintpg.ams.vsnl.net.in
mtlsys@md3.vdn.net.in

MTL Instruments Pty Limited

9 Vinnicombe Drive
PO Box 1441, Canning Vale
Western Australia 6155
Tel: +61 (0)8 9455 2994 Fax: +61 (0)8 9455 2805
E-mail: enquiries@mtlaus.com.au

MTL Instruments Pte Limited

150 Kampong Ampat
#06-01 KA Centre
Singapore 368324
Tel: +65 487 7887 Fax: +65 487 7997
E-mail: sales@mtlsing.com.sg

MTL Instruments KK

10th Floor, Takanawa Meiko Building
2-15-19 Takanawa, Minato-ku, Tokyo 108
Tel: +81 (0)3 5420 1281 Fax: +81 (0)3 5420 2405
E-mail: sales@mtlkk.co.jp

MTL Instruments GmbH

Hellersbergstrasse 2, D-41460 Neuss
Germany
Tel: +49 (0)2131 168016 Fax: +49 (0)2131 168652
E-mail: info@mtl.de

MTL Instruments sarl

Bâtiment SILIC 4, 1 rue des Vergers, 69760 Limonest
France
Tel: +33 (0)4 78 64 98 32 Fax: +33 (0)4 78 35 79 41
E-mail: info@mtl-inst.fr

MTL Instruments BV

MTL Systems BV

de Houtakker 33, 6681 CW Bommel
The Netherlands
Tel: +31 (0)48 1450250 Fax: +31 (0)48 1450260
E-mail: info@mtlbenelux.com

MTL Instruments BVBA

Derbystraat 379, Blok G
9051 Sint-Denijs-Westrem, Gent
Belgium
Tel: +32 (0)9 242 8844 Fax: +32 (0)9 242 8868
E-mail: info@mtlbenelux.com

Group web site: <http://www.mtl-inst.com>

Members of The MTL Instruments Group plc



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