Motoman XRC Controller

Fieldbus Interface Instruction Manual

Interbus-S, Profibus, Devicenet

Part Number: 148148-1CD
Revision: 0

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INTRODUCTION

1.1 About this Document

This manual pro vides instructions for the Fieldb us Interf ace XFB01 Board (AnyBus) and contains the following sections:

SECTION 1 – INTRODUCTION

General information about this manual, a list of reference documents, and customer service information.

SECTION 2 – SAFETY

Provides information for the safe use and operation of Motoman products.

SECTION 3 – OPTIONAL FUNCTION FIELDBUS INTERFACE BOARD (XFB01)

Provides detailed instructions to operate the Fieldbus Interface XFB01 Board.

1.2 Reference to Other Documentation

For additional information refer to the following:

- Concurrent I/O Parameters Manual for XRC 2001 (P/N 147626-1)
- Operator's Manual for General Purpose (P/N 142099-1)
- Operator's Manual for Handling (P/N 142100-1)
- Operator's Manual for Spot Welding (P/N 142101-1)
- Operator's Manual for Arc Welding (P/N 142098-1)
- Motoman UP6, XRC 2001 Manipulator Manual (P/N 145960-1)
- Motoman UP20, XRC 2001 Manipulator Manual (P/N 145965-1)
- Motoman UP50, XRC 2001 Manipulator Manual (P/N 145964-1)
- Motoman UP130/165, XRC 2001 Manipulator Manual (P/N 145967-1)

1.3 Customer Service Information

If you are in need of technical assistance, contact the Motoman service staff at (937) 847-3200. Please have the following information ready before you call:

- Robot Type (UP6, UP130, UP165, etc.)
- Application Type (welding, handling, etc.)
- Robot Serial Number (located on the back side of the robot arm)
- Robot Sales Order Number (located on back side of XRC controller)

NOTES

SECTION 2
SAFETY

2.1 Introduction

It is the purchaser's responsibility to ensure that all local, county, state, and national codes, regulations, rules, or laws relating to safety and safe operating conditions for each installation are met and followed.

We suggest that you obtain and review a copy of the ANSI/RIA National Safety Standard for Industrial Robots and Robot Systems. This information can be obtained from the Robotic Industries Association by requesting ANSI/RIA R15.06. The address is as follows:

Robotic Industries Association
900 Victors Way
P.O. Box 3724
Ann Arbor, Michigan 48106
TEL: (734) 994-6088
FAX: (734) 994-3338

Ultimately, the best safeguard is trained personnel. The user is responsible for providing personnel who are adequately trained to operate, program, and maintain the robot cell. **The robot must not be operated by personnel who have not been trained!**

We recommend that all personnel who intend to operate, program, repair, or use the robot system be trained in an approved Motoman training course and become familiar with the proper operation of the system.

This safety section addresses the following:

- Standard Conventions (Section 2.2)
- General Safeguarding Tips (Section 2.3)
- Mechanical Safety Devices (Section 2.4)
- Installation Safety (Section 2.5)
- Programming Safety (Section 2.6)
- Operation Safety (Section 2.7)
- Maintenance Safety (Section 2.8)

2.2 Standard Conventions

This manual includes information essential to the safety of personnel and equipment. As you read through this manual, be alert to the four signal words:

- DANGER
- WARNING
- CAUTION
- NOTE

Pay particular attention to the information pro vided under these headings which are defined bel w (in descending order of severity).

DANGER!

Information appearing under the DANGER caption concerns the protection of personnel from the immediate and imminent hazards that, if not avoided, will result in immediate, serious personal injury or loss of life in addition to equipment damage.

WARNING!

Information appearing under the WARNING caption concerns the protection of personnel and equipment from potential hazards that can result in personal injury or loss of life in addition to equipment damage.

CAUTION!

Information appearing under the CAUTION caption concerns the protection of personnel and equipment, software, and data from hazards that can result in minor personal injury or equipment damage.

NOTE: Information appearing in a NOTE caption provides additional information which is helpful in understanding the item being explained.

2.3 General Safeguarding Tips

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot must become familiar with the operation of this equipment. All personnel involved with the operation of the equipment must understand potential dangers of operation. General safeguarding tips are as follows:

- Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation of this robot, the operator's manuals, the system equipment, and options and accessories should be permitted to operate this robot system.
- Do not enter the robot cell while it is in automatic operation. Programmers must have the teach pendant when they enter the robot cell.
- Improper connections can damage the robot. All connections must be made within the standard voltage and current ratings of the robot I/O (Inputs and Outputs).
- The robot must be placed in Emergency Stop (E-STOP) mode whenever it is not in use.
- In accordance with ANSI/RIA R15.06, section 6.13.4 and 6.13.5, use lockout/tagout procedures during equipment maintenance. Refer also to Section 1910.147 (29CFR, Part 1910), Occupational Safety and Health Standards for General Industry (OSHA).

2.4 Mechanical Safety Devices

The safe operation of the robot, positioner, auxiliary equipment, and system is ultimately the user's responsibility. The conditions under which the equipment will be operated safely should be reviewed by the user. The user must be aware of the various national codes, ANSI/RIA R15.06 safety standards, and other local codes that may pertain to the installation and use of industrial equipment. Additional safety measures for personnel and equipment may be required depending on system installation, operation, and/or location. The following safety measures are available:

- Safety fences and barriers
- Light curtains
- Door interlocks
- Safety mats
- Floor markings
- Warning lights

Check all safety equipment frequently for proper operation. Repair or replace any non-functioning safety equipment immediately.

2.5 Installation Safety

Safe installation is essential for protection of people and equipment. The following suggestions are intended to supplement, but not replace, existing federal, local, and state laws and regulations. Additional safety measures for personnel and equipment may be required depending on system installation, operation, and/or location. Installation tips are as follows:

- Be sure that only qualified personnel familiar with national codes, local codes, and ANSI/RIA R15.06 safety standards are permitted to install the equipment.
- Identify the work envelope of each robot with floor markings, signs, and barriers.
- Position all controllers outside the robot work envelope.
- Whenever possible, install safety fences to protect against unauthorized entry into the work envelope.
- Eliminate areas where personnel might get trapped between a moving robot and other equipment (pinch points).
- Provide sufficient room inside the workcell to permit safe teaching and maintenance procedures.

2.6 Programming Safety

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot must become familiar with the operation of this equipment. All personnel involved with the operation of the equipment must understand potential dangers of operation. Programming tips are as follows:

- Any modifications of the controller PLC can cause severe personal injury or death, as well as damage to the robot! Do not make any modifications to the PLC. Making any changes without the written permission of Motoman will **VOID YOUR WARRANTY!**
- Some operations require standard passwords and some require special passwords. Special passwords are for Motoman use only. **YOUR WARRANTY WILL BE VOID** if you use these special passwords.
- Back up all programs and jobs onto a floppy disk whenever program changes are made. To avoid loss of information, programs, or jobs, a backup must always be made before any service procedures are done and before any changes are made to options, accessories, or equipment.
- The concurrent I/O (Input and Output) function allows the customer to modify the internal ladder inputs and outputs for maximum robot performance. Great care must be taken when making these modifications Double-check all modifications under every mode of robot operation to ensure that you have not created hazards or dangerous situations that may damage the robot or other parts of the system.
- Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation, manuals, electrical design, and equipment interconnections of this robot should be permitted to operate the system.

- Inspect the robot and work envelope to be sure no potentially hazardous conditions exist. Be sure the area is clean and free of water, oil, debris, etc.
- Be sure that all safeguards are in place.
- Check the E-STOP button on the teach pendant for proper operation before programming.
- Carry the teach pendant with you when you enter the workcell.
- Be sure that only the person holding the teach pendant enters the workcell.
- Test any new or modified program at low speed for at least one full cycle.

2.7 Operation Safety

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot must become familiar with the operation of this equipment. All personnel involved with the operation of the equipment must understand potential dangers of operation. Operation tips are as follows:

- Be sure that only trained personnel familiar with the operation of this robot, the operator's manuals, the system equipment, and options and accessories are permitted to operate this robot system.
- Check all safety equipment for proper operation. Repair or replace any non-functioning safety equipment immediately.
- Inspect the robot and work envelope to ensure no potentially hazardous conditions exist. Be sure the area is clean and free of water, oil, debris, etc.
- Ensure that all safeguards are in place.
- Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation, manuals, electrical design, and equipment interconnections of this robot should be permitted to operate the system.
- Do not enter the robot cell while it is in automatic operation. Programmers must have the teach pendant when they enter the cell.
- The robot must be placed in Emergency Stop (E-STOP) mode whenever it is not in use.
- This equipment has multiple sources of electrical supply. Electrical interconnections are made between the controller, external servo box, and other equipment. Disconnect and lockout/tagout all electrical circuits before making any modifications or connections
- All modifications made to the controller will change the way the robot operates and can cause severe personal injury or death, as well as damage the robot. This includes controller parameters, ladder, and I/O (Input and Output) modifications. Check and test all changes at slow speed.

2.8 Maintenance Safety

All operators, programmers, plant and tooling engineers, maintenance personnel, supervisors, and anyone working near the robot must become familiar with the operation of this equipment. All personnel involved with the operation of the equipment must understand potential dangers of operation. Maintenance tips are as follows:

- Do not perform any maintenance procedures before reading and understanding the proper procedures in the appropriate manual.
- Check all safety equipment for proper operation. Repair or replace any non-functioning safety equipment immediately.
- Improper operation can result in personal injury and/or damage to the equipment. Only trained personnel familiar with the operation, manuals, electrical design, and equipment interconnections of this robot should be permitted to operate the system.
- Back up all your programs and jobs onto a floppy disk whenever program changes are made. A backup must always be made before any servicing or changes are made to options, accessories, or equipment to avoid loss of information, programs, or jobs.
- Do not enter the robot cell while it is in automatic operation. Programmers must have the teach pendant when they enter the cell.
- The robot must be placed in Emergency Stop (E-STOP) mode whenever it is not in use.
- Be sure all safeguards are in place.
- Use proper replacement parts.
- This equipment has multiple sources of electrical supply. Electrical interconnections are made between the controller, external servo box, and other equipment. Disconnect and lockout/tagout all electrical circuits before making any modifications or connections
- All modifications made to the controller will change the way the robot operates and can cause severe personal injury or death, as well as damage the robot. This includes controller parameters, ladder, and I/O (Input and Output) modifications. Check and test all changes at slow speed.
- Improper connections can damage the robot. All connections must be made within the standard voltage and current ratings of the robot I/O (Inputs and Outputs).

MOTOMAN XRC
OPTIONAL FUNCTION
Fieldbus Interface Board

Upon receipt of the product and prior to initial operation, read these instructions thoroughly, and retain for future reference.

MOTOMAN ROBOTICS EUROPE
A subsidiary of YASKAWA Electric Corporation

MANUAL NO. MRS50250

Reference list

Operator's manual Basic programming
Maintenance manual MOTOMAN XRC
.....

Revision

990920
First release of this manual (Preliminary)

010309
Correcting of DeviceNet / DT-module setting.

010314
Correcting of DeviceNet / DT-module baudrate setting

Fieldbus interface Board

1. General

1.1 About this manual

This Instruction manual comprises information about:

✔ Installation

✔ Setup

This documents may not be copied without our written permission and the contents thereof must not be imparted to a third party nor be used for any unauthorized purpose.

The Fieldbus board is valid for both MOTOMAN XRC (Hereafter called XRC).

Text written in **BOLD** letters means command or button.
Text written in *ITALIC* means text shown on display.

1.2 Fieldbus interface kit comprises

✔ One Carrier board JANCD-MFB01

✔ One AnyBus® module

✔ One data disk for setup (not necessary for all types)

Bus type	Fieldbus kit, Motoman Part No.		
	32 I/O	64 I/O	DT
Interbus-S	347069-81	347069-82	347069-83
Profibus DP	347070-81	347070-82	347070-83
DeviceNet	347071-81	347071-82	347071-83

1.3 Safety

This equipment is constructed, produced and tested according to the laws of the Member States relating to machinery (98/37/EEC), the demands of the EMC-directives (89/336/EEC) and (93/68/EEC) and also the LVD-directives (73/23/EEC).

CE

Motoman Robotics Europe AB's responsibility does not cover errors or safety risks that may occur in equipment connected to the Motoman Robotics Europe AB machine, nor errors or safety risks that may occur in the machine caused by equipment connected to the Motoman Robotics Europe AB's machine.

External cables must be connected according to our cable connection guide, see separate document.

1.4 Manufacturer

Address	**Motoman** Robotics Europe AB Box 504 385 25 Torsås Sweden
Telephone:	+46 486 488 00
Telefax:	+46 486 414 10
Type:	JANCD-MFB01

1.5 Introduction

The purpose of this document is to provide instructions for users of the MOTOMAN Fieldbus Interface Board (hereafter referred to FBIB). This document is to provide support for configuration and usage of the FBIB. For information regarding fieldbus configuration and programming please refer to the AnyBus manuals or contact the supplier of the fieldbus master/scanner system.

This document is limited to the functionality of the FBIB and the connections to the MOTOMAN Robot Controller (hereafter referred to as XRC) and the fieldbus system via standard AnyBus modules. It is assumed that the reader has an understanding of the functionality of the XRC.

1.6 Terms

Throughout this document the term “user“ refers to the person or persons who are installing and programming the XRC system with an FBIB installed. The end-user of the robot equipment will be referred to as the customer.

As in all communication systems the terms “inputs“ and “outputs“ can be ambiguous, because their meaning depends on which end of the link that is being referenced. The convention in this document is that “inputs“ and “outputs“ are always being referenced from the XRC systems end of the link.

1.7 Fieldbus systems

Instead of using traditional wiring to distribute input and output signals, the automation industry more frequently relays on computer communications. By using communication systems cost for material, installation, documentation and maintenance can be greatly reduced. The communication system can also be used for more advanced features like connecting different control systems and to distribute the control functions to intelligent sub-systems, sensors and actuators.

The communication systems used for these tasks are commonly called a fieldbus system. Fieldbus systems are used in all sectors of automation: Factory automation, manufacturing automation, assembly automation, building automation, process automation, etc.

Fieldbus protocols are based on ISO Reference Model for Open System Interconnection (OSI-RM), ISO 7498. However, Fieldbus uses only layers 1, 2, 7 of OSI-RM, layer 3 through 6 are often bypassed for real-time purpose. There is also a new User Layer added on top of the Application Layer, where distributed control strategy is implemented and which makes Fieldbus much more than a communication network.

Different systems are used because of different technical requirements of the application. Those different requirements are different levels of bus systems, bus structures, real-time behaviour, amount of data being transferred, transmission media, distribution of power on the communication media. The difference between the technical demands and the fact that no system on the market fulfils all requirements has lead to a wide variety of different fieldbus systems.

A major problem is that many products need to be connected to many of the fieldbus systems on the market. The same product may have to be able to exchange data over some or all the available fieldbus systems and by doing this fulfilling different of the above mentioned requirements depending on the fieldbus system. One example are operator panels which must be able to connect on different levels of industrial network systems. In most applications on sensor/actuator level, in many applications on the process level but also on the factory network level.

1.8 AnyBus®[1]

When developing a product with a fieldbus interface special considerations has to be made to the communication system. This will most likely result in one product version for each supported fieldbus.

The AnyBus product is a series of small fieldbus modules. There is one AnyBus module for each fieldbus system. All electronics, software and control for the fieldbus is integrated on the module. All AnyBus modules uses the same standardised product interface. Since all AnyBus modules supports the standardised interface the modules can be interchanged with other AnyBus modules without having to change the product design. This standardised interface provide a way to design a product that supports all the major fieldbus systems in one and the same product version. This means that the product does not have to handle the fieldbus characteristics, all that is handled by the AnyBus module.

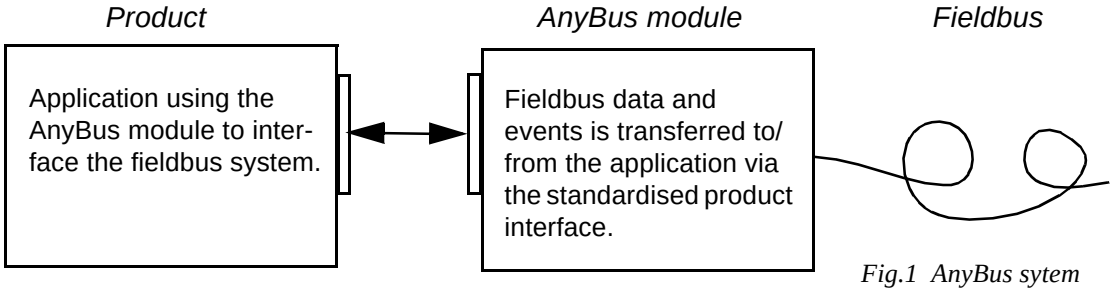


Fig.1 AnyBus sytem

The AnyBus modules are designed to fit into applications with different complexity levels. There are three different types of AnyBus modules depending on the amount of data that has to be handled. There will be an AnyBus for all major fieldbus system and the customer does not have to consider any fieldbus specific information, fieldbus dependent settings or installations for the design of an application product.

✔ AnyBus 32 I/O. 16 digital inputs and 16 digital outputs

✔ AnyBus 64 I/O. 32 digital inputs and 32 digital outputs

✔ AnyBus DataTransfer. 0-480 input bytes and 0-480 output bytes

1.9 Introduction to the Fieldbus Interface Board

The FBIB is designed to make it possible to connect the XRC to the most commonly used fieldbus systems on the market. The FBIB controls the exchange of data between the XRC and the AnyBus modules witch constitutes the fieldbus interface.

To achieve a flexible solution the FBIB can be equipped with the following slave modules within the AnyBus family.

✔ AnyBus 32 I/O module

✔ AnyBus 64 I/O module

✔ AnyBus DataTransfer module

The FBIB is also prepared to be equipped with AnyBus master modules.

1. AnyBus ® is a registered trade mark of HMS Fieldbus System AB, Halmstad, Sweden

1.10 Hardware comparability

The FBIB is electrically compatible with all current modules of XRC chassis that incorporate a MIF01 master module, with a JL-012 bus interface to a JARCR-XEB01. From the users point of view the FBIB will be used as a standard I/O board available for the XRC system.

The AnyBus interface fulfils the requirements for each fieldbus system according the specification. From the customers point of view the FBIB appears as a digital I/O slave node.

2. Installation

For installation guidlines refer to
“Maintenance manual - Installation and wiring, MRS51000”.

Warning!
To prevent electrical shock to personnel and to prevent equipment damage, ensure power to XRC controller is turned OFF before beginning the installation

Caution!
Follow the proper anti-static procedures to ensure that static electricity does not damage the FBIB.

Caution!
Never change any of the settings on the FBIB while controller power is ON.

3. Configurations and indications

3.1 Interface board overview

The FBIB is equipped with three switches.

a) I/O size configuration

b) Operation and set-up configuration

c) Master configuration (reserved for future use)

The configurations switches are read by the system software when the system is power-up (reset). Changing the switches with the power on has no effect until the board is restarted.

The board is also equipped with two indication LED's (Light Emitting Diode):

a) Power/reset indication

b) Board status indication.

The indications LED's are continuously updated during operation by the software.

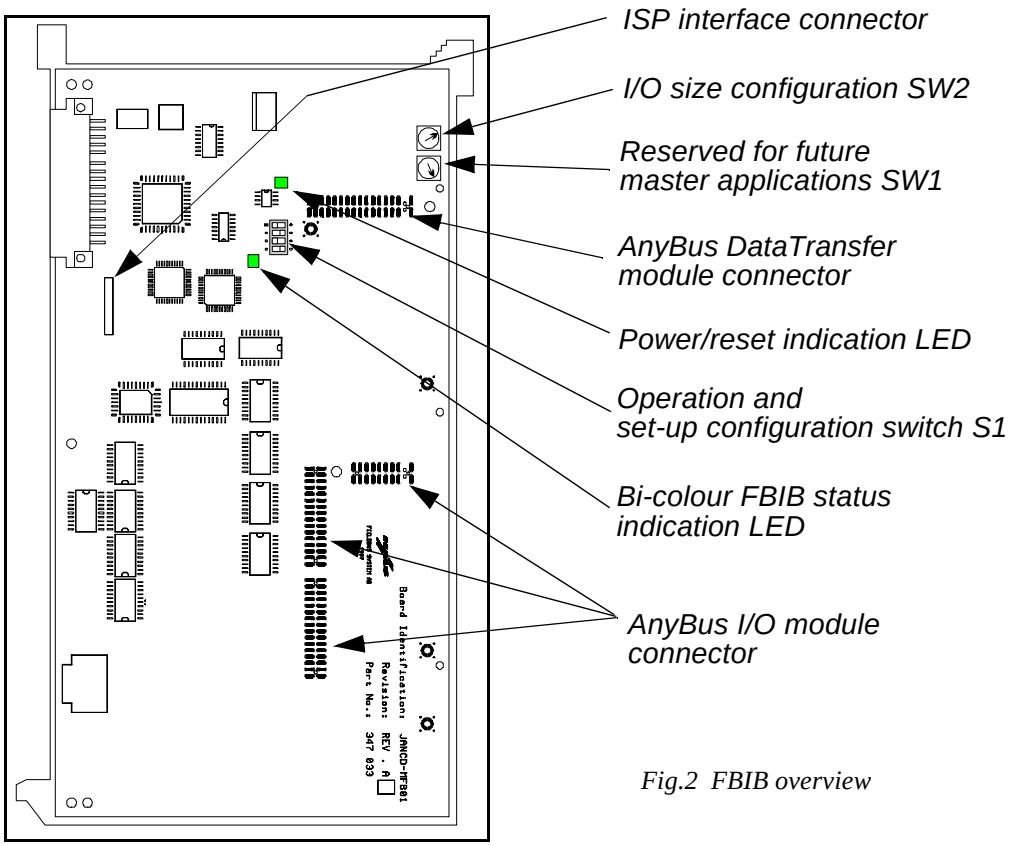


Fig.2 FBIB overview

3.2 Configurations

■ I/O size configuration SW2

The FBIB I/O size i.e. data amount transferred between the fieldbus and the XRC system, is configured with a hexadecimal rotary switch “SW2” with position indicators from 0 - F. The I/O size rotary switch is accessible from the FBIB front.

Switch position Hexadecimal indications	INPUT bits No. of input data bits to the XRC system	OUTPUT bits No. of output bits to the fieldbus system	No. of fieldbus I/O bits
0*	8	8	0 bits
1	16	16	8 bits
2	24	24	16 bits
3	32	32	24 bits
4	40	40	32 bits
5	48	48	40 bits
6	56	56	48 bits
7	64	64	56 bits
8	72	72	64 bits
9	80	80	72 bits
A	88	88	80 bits
B	96	96	88 bits
C	104	104	96 bits
D	112	112	104 bits
E**	120	120	112 bits
F**	120	120	112 bits

*)Only status transferred to XRC

**)Size automatically set to 120 I/O bits (112 fieldbus I/O) by the FBIB (same as setting D)

■ Operation and set-up configuration S1

The FBIB configuration for set-up and operation is done with a 4-pol dip switch “S1” present on the FBIB board. The configuration switch is not accessible from the FBIB front (see figure 2 for exact location).

Switch No.	Configuration description	
	ON-position	OFF-position
1*	AnyBus DataTransfer installed	AnyBus I/O module installed (type of module set by switch 2)
2*	AnyBus 32 I/O module	AnyBus 64 I/O module
3	Freeze inputs when fieldbus is stopped	Hold inputs when fieldbus is stopped. Default setting
4	Not used	

*)The default switch setting depends on the board configuration. The correct setting is made after production of the board.

■ *Master configurations*

One hexadecimal rotary switch with position indicators from 0 - F is reserved for future master applications. The rotary switch has no function and is not read by the FBIB software.

3.3 Indications

■ *Power LED*

The board is equipped with one green SMD (surface mounted) LED for FBIB power indication. The power LED is not visible from the FBIB front.

LED status	Indication
Lit green	Power (+5V) to FBIB electronics is OK
Turned off	No power supply to the FBIB electronics or FBIB in reset mode.

Note!
The power LED does not indicate the status of the isolated power supply to the bus interface of the AnyBus modules. The isolated bus power is generated from the XRC +24V via a DC/DC converter on the FBIB.

■ *Status indication LED*

The board is equipped with one bi-colour (red and green) SMD LED for FBIB status indication. The status LED is not visible from the FBIB front.

LED status	Indication
Turned-off	FBIB microprocessor not running.
Lit green	Initialisation of FBIB hardware and ANYBUS module.
Flashing green	Normal operation. Data exchange between XRC and fieldbus system.
Lit red	FBIB hardware fault detected.
Flashing red	Error detected in XRC interface (JL-012C chip) or ANYBUS module.
Lit orange (red and green)	Not valid. Microprocessor not running or FBIB reset.

■ *Fieldbus status indications*

The FBIB is not equipped with any indications for fieldbus communication or status. These indications are located on the AnyBus module. Please see appendix for the currently used AnyBus module.

3.4 AnyBus module interface

■ AnyBus 64 I/O and 32 I/O modules

The FBIB supports both the AnyBus 32 I/O module and the 64 I/O module. The same AnyBus connector is used for both I/O modules. Please see the AnyBus appendix for a detailed description of configuration and operation of the currently used AnyBus module.

■ AnyBus DataTransfer modules

The FBIB supports both the AnyBus DataTransfer module and the master modules available from HMS Fieldbus systems AB (software changes required). The same AnyBus connector is used for both modules. Please see the AnyBus appendix for a detailed description of configuration and operation of the currently used AnyBus module.

4. I/O map

The XRC system has the capability of supporting 144 input and 144 output signals. Depending on the application of the system, the number of userdefinable I/O points will vary.

The XRC I/O's follows a basic octal numbering system, i.e. each input or output group will occur in a grouping of eight.

4.1 Fieldbus input data map

The data received from the FBIB and the fieldbus appears in the XRC memory map according the tables below. The base address in the XRC where the data will appear depends on the installation. In the examples below the FBIB inputs are represented from address 2060.

Address	Contents								Description
	MSB							LSB	
2060	Module and network status								FBIB status information. See section 5.3 below.
2070	b7	b6	b5	b4	b3	b2	b1	b0	Fieldbus input byte 1 (b0 - b7)
2080	b15	b14	b13	b12	b11	b10	b9	b8	Fieldbus input byte 2 (b8 - b15)

Table above shows the memory map when the I/O size switch is set in position 2 i.e. total 24 input bits (16 fieldbus input bits).

Address	Contents								Description
	MSB							LSB	
2060	Module and network status								FBIB status information. See section 5.3 below.
2070	b7	b6	b5	b4	b3	b2	b1	b0	Fieldbus input byte 1 (b0 - b7)
2080	b15	b14	b13	b12	b11	b10	b9	b8	Fieldbus input byte 2 (b8 - b15)
2090	b23	b22	b21	b20	b19	b18	b17	b16	Fieldbus input byte 3 (b16 - b23)
2100	b31	b30	b29	b28	b27	b26	b25	b24	Fieldbus input byte 4 (b24 - b31)
2110	b39	b38	b37	b36	b35	b34	b33	b32	Fieldbus input byte 5 (b32 - b39)
2120	b48	b47	b46	b45	b44	b43	b41	b40	Fieldbus input byte 6 (b40 - b48)

Table above shows the memory map when the I/O size switch is set in position 6 i.e. total 56 input bits (48 fieldbus input bits).

4.2 Fieldbus output data map

The data transferred from the XRC to the FBIB and the fieldbus appears in the XRC memory map according the table below. The base address in the XRC where the data will appear depends on the installation. In the examples below the FBIB inputs are represented from address 3060.

Address	Contents								Description
	MSB							LSB	
3060	Reserved								Not available for use
3070	b7	b6	b5	b4	b3	b2	b1	b0	Fieldbus output byte 1 (b0 - b7)
3080	b15	b14	b13	b12	b11	b10	b9	b8	Fieldbus output byte 2 (b8 - b15)

Table above shows the memory map when the I/O size switch is set in position 2 i.e. total 24 output bits (16 fieldbus output bits).

Address	Contents								Description
	MSB							LSB	
3060	Reserved								Not available for use
3070	b7	b6	b5	b4	b3	b2	b1	b0	Fieldbus output byte 1 (b0 - b7)
3080	b15	b14	b13	b12	b11	b10	b9	b8	Fieldbus output byte 2 (b8 - b15)
3090	b23	b22	b21	b20	b19	b18	b17	b16	Fieldbus output byte 3 (b16 - b23)
3100	b31	b30	b29	b28	b27	b26	b25	b24	Fieldbus output byte 4 (b24 - b31)
3110	b39	b38	b37	b36	b35	b34	b33	b32	Fieldbus output byte 5 (b32 - b39)
3120	b48	b47	b46	b45	b44	b43	b41	b40	Fieldbus output byte 6 (b40 - b48)

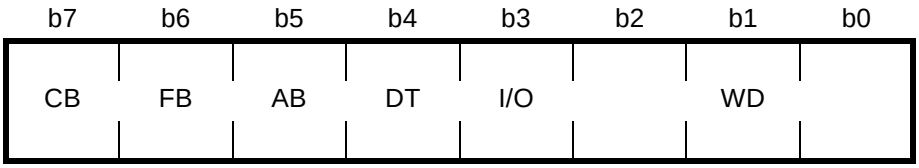
Table above shows the memory map when the I/O size switch is set in position 6 i.e. total 56 output bits (48 fieldbus output bits).

The first byte of output data is reserved for future use and is not accessed by the FBIB. This byte should not be used by the XRC program.

4.3 Module and network status

One byte of input status data is generated by the FBIB. The status byte contains information about the FBIB and the fieldbus environment. The byte is continuously updated by the software. The information available in this byte can be used by the XRC to monitor the FBIB and the fieldbus system.

The status byte contains the following information:



Bit no.	Name	Description
0 - 2	WD	Watchdog counter. These bits are incremented each 32 ms by the FBIB. This counter is LOW priority, which means that the time may be longer if the bus is occupied by other communication. The bits are incremented in the following way 0, 1, 2, 3, 4, 5, 6, 7, 0, ..
3	I/O	Indicates which type of ANYBUS I/O module that is installed. This indication is only valid if bit 5 is cleared. 0: 64 I/O module 1: 32 I/O module
4	DT	Indicates access status towards the ANYBUS DATATRANSFER module. 0: No access to DT after 10 attempts 1: Access to DT. The FBIB is was able to update the ANYBUS DATATRANSFER module
5	AB	Indicates type of ANYBUS module that is installed 0: ANYBUS DATATRANSFER module installed. 1: ANYBUS I/O module installed. See bit 3 for type of I/O module.
6	FB	Indicates fieldbus status. Only valid when a ANYBUS DATATRANSFER module is installed 0: Fieldbus running 1: Fieldbus is stopped or communication error detected
7	CB	Indicates FBIB status 0: Normal FBIB operation. No errors detected. 1: Internal FBIB error detected. FBIB not operating properly. One of the following fault have occured: *No interrupts from JL-012* or *Internal processor error.*

5. InterBus-S

5.1 General

■ Specifications

The media for the fieldbus is a shielded copper cable composed of three twisted pairs. Two of these pairs are used for the bus connection and in the last pair there is only one cable used. This cable is used for the ground connection of the bus. The maximum baudrate for the bus is 500 kbit/s and total amount of data for Inter-Bus-S is 4096 I/O points.

Three AnyBus modules are available for the InterBus-S.

✔ AB32-IBS

✔ AB64-IBS

✔ ABDT-IBS

■ Features supported by AnyBus-module

Regarding the fieldbus dependant parts on the AnyBus IBS module, the AnyBus modules are fully compatible with the InterBus-S specifications, which also includes the ID code for the AnyBus module 03 Hex (General I/O module).

5.2 I/O-modules

■ Indicator

The figure below shows how the LED indicators are placed depending on how they are mounted on the AnyBus module.

LED	Colour	Function
RC	Green	off: Incomming on: Normal operation
BA	Green	off: Bus not active on: Normal operation
ERR	Red	off: Normal operation on: Outgoing Remote Bus Not enable

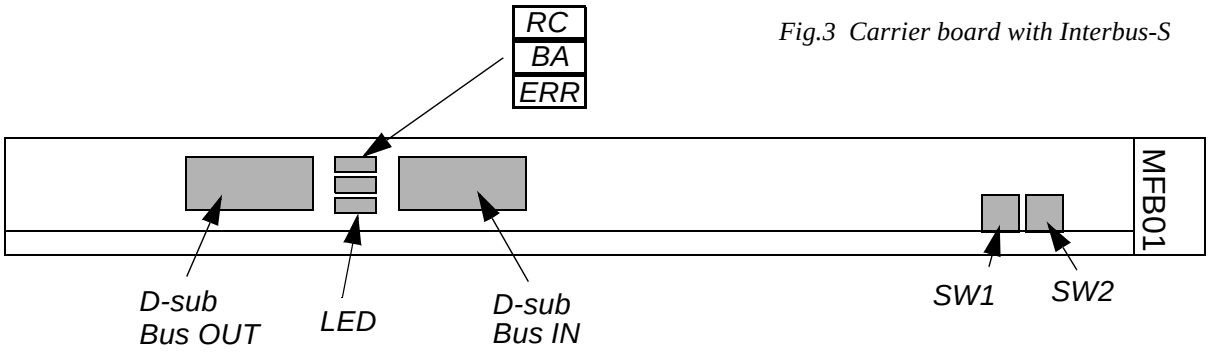


Fig.3 Carrier board with Interbus-S

■ Terminating last module

Module with D-SUB connection

Always connect the RBST to Vcc if it is not the last module on the Bus. If the RBST is not connected to Vcc on the output connector the AnyBus module will terminat itself.

BUS IN connector	
D-SUB	**Description**
1	DO1
6	/DO1
2	DI1
7	/DI1
3	GND
-	PE

BUS OUT connector	
D-SUB	**Description**
1	DO2
6	/DO2
2	DI2
7	/D12
3	GND
9	RBST
-	PE
5	VCC

5.3 DT-module

■ Features

The AnyBus module for Interbus is a remote bus slave. This slave node can be read and written to from an Interbus master. The AnyBus module for Interbus will not indicate communication to other nodes, it will only respond to incomming commands.

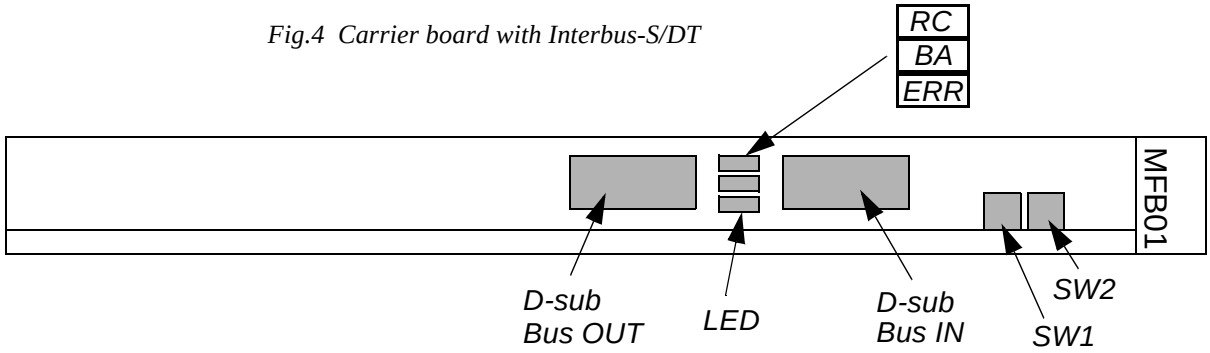
Via the host connector, the AnyBus-DT is connected to an application which get an instant connection to Interbus.

■ Indicator

The figure below shows how the LED indicators are placed depending on how they are mounted on the AnyBus module.

LED	Colour	Function
RC	Green	off: Incomming on: Normal operation
BA	Green	off: Bus not active on: Normal operation
ERR	Red	off: Normal operation on: Outgoing Remote Bus Not enable

Fig.4 Carrier board with Interbus-S/DT



■ Terminating last module

Module with D-SUB connection

Always connect the RBST to Vcc if it is not the last module on the Bus. If the RBST is not connected to Vcc on the output connector the AnyBus module will terminat itself.

BUS IN connector	
D-SUB	Description
1	DO1
6	/DO1
2	DI1
7	/DI1
3	GND
-	PE

BUS OUT connector	
D-SUB	Description
1	DO2
6	/DO2
2	DI2
7	/D12
3	GND
9	RBST
-	PE
5	VCC

6. Profibus-DP

6.1 General

■ Specifications

The media for the fieldbus is a shielded copper cable composed of a twisted pair. The baudrate for the bus is between 9.6 kbaud to maximum 12Mbaud. The total amount of data for Profibus-DP are for a maximum of 32 different modules (126 with a repeater), a maximum of 246 Byte out/module and maximum 246 Byte in/module.

Three AnyBus modules are available for the Profibus-DP.

✔ AB32-PDP

✔ AB64-PDP

✔ ABDT-PDP

■ Features supported by AnyBus module

All necessary fieldbus dependant parts are integrated on the AnyBus PDP module, including the ID code 1000 Hex (AB32-PDP) and 1001 Hex (AB64-PDP).

Optional features

It is possible to do an address update via the Profibus network, see part: Setting up the module.

6.2 I/O-modules

■ Indicator

The figure below shows how the LED indicators are placed on the AnyBus module.

LED	Colour	Function
PWR	Green	off: Power off on: Power is on
DIA		Not implemented
ERR	Red	off: Normal operation on: Bus off / error

■ Setting up the module

Before configuring the Profibus-DP module the node address has to be set. For the AnyBus module the address is to be set by means of the rotary switches, see figure.

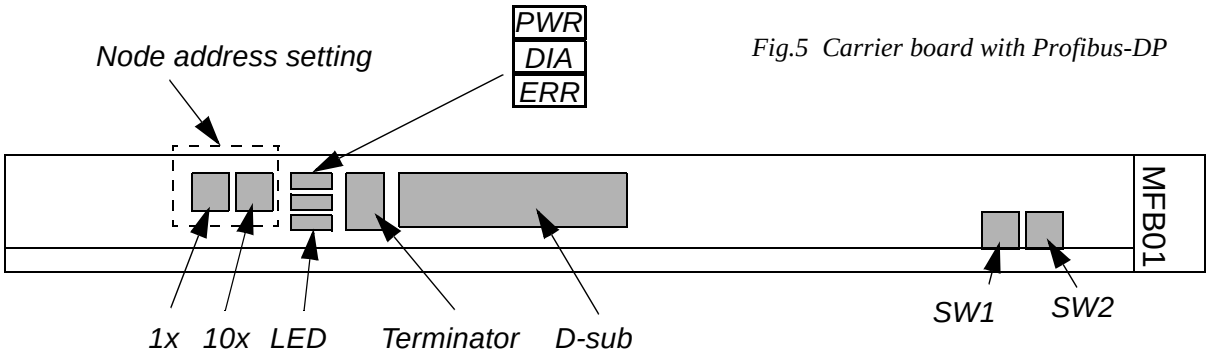


Fig.5 Carrier board with Profibus-DP

■ Baudrate

No setting of the baudrate has to be done for the Profibus-DP module. The module has Auto-Baudrate-Setting.

■ Terminating last module

The first and the last Profibus module has to be terminated if the bus shall work without problems. To do this on an AnyBus module just turn on the terminating switch. The address switches should be turned off on the rest of the modules in the network.

Fieldbus connector

D-SUB	Description
8	A-Line
3	B-Line
Housing	Shield
5	GND
6	Vcc
4	RTS

6.3 DT-module

■ Features

The AnyBus module for Profibus-DP is a slave node that can be read and written to from a Profibus-DP master. The AnyBus module for Profibus-DP will not initiate communication to other nodes, it will only respond to incomming commands.

The AnyBus-DT is connected to the application via the Host Connector. Via this connector the application have an instant connection to Profibus-DP.

■ Indicator

The figure below shows how the LED indicators are placed on the AnyBus module.

LED	Colour	Function
PWR	Green	off: Power off / on: Power is on
DIA		Not implemented
ERR	Red	off: Normal operation / on: Bus off / error

■ Setting up the module

Before configuring the Profibus-DP module the node address has to be set. For the AnyBus module the address is to be set by means of the rotary switches, see figure.

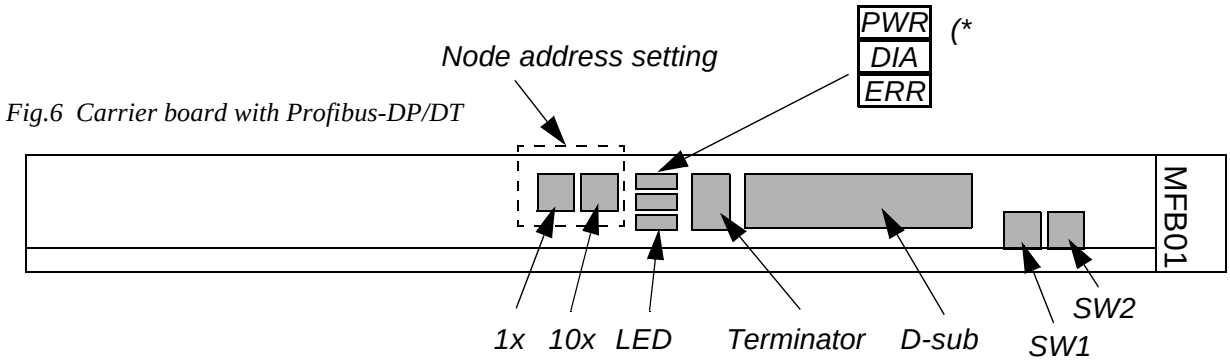


Fig.6 Carrier board with Profibus-DP/DT

**) For older version of DT-module PWR and DIA is switched.*

■ Baudrate

No setting of the baudrate has to be done for the Profibus-DP module. The module has Auto-Baudrate-Setting.

■ Terminating last module

The first and the last Profibus module has to be terminated if the bus shall work without problems. To do this on an AnyBus module just turn on the terminating switch. The address switches should be turned off on the rest of the modules in the network.

Fieldbus connector

D-SUB	Description
8	A-Line
3	B-Line
Housing	Shield
5	GND
6	Vcc
4	RTS

7. DeviceNet

7.1 General

■ Specifications

The media for the fieldbus is a shielded copper cable composed of one twisted pair and two cables for the external power supply. The baudrate can be changed between 125k, 250k and 500kbit/s, this is done with a DIP switch.

Three AnyBus I/O modules are available for the DeviceNet.

✔ AB32-DEV

✔ AB64-DEV

✔ ABDT-DEV

■ Features supported by AnyBus module

The AnyBus modules are group 2 only servers using the predefined master/slave connection set. The modules contain one explicit and one polled I/O-connection, with fixed I/O size.

The fielbus interface is powered from the BUS (V+/V-).

7.2 I/O-modules

■ Indicators

The figure beside shows how the LED indicators are placed depending on how they are mounted on the AnyBus module.

LED	Colour	Function
PWR (POWER)	Green	off: Power off on: Power is on
STAT (NETSTATUS)	Red/Green	Red, flashing: Recoverable fault Red, solid: Critical module fault Green, flashing: On-line but not connected Green, solid: On-line, link okay, connected
ADD (ADDRESS OVERWRITTEN)	Red	off: Address DIP switch is valid on: DIP switch not valid, address set via bus

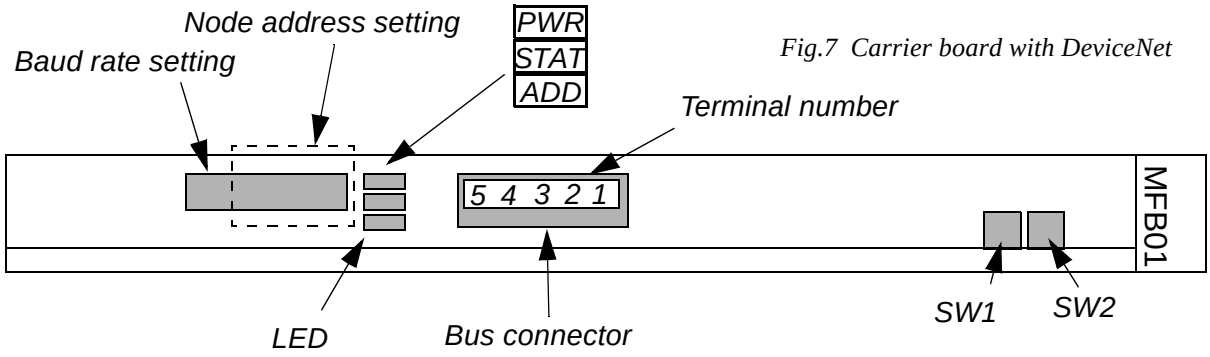


Fig.7 Carrier board with DeviceNet

■ Terminate module

Termination of the fieldbus requires a terminating resistor at each end of the field-bus. These resistors should have a value of 121 ohm.

■ *Setting up the module*

Before configuring the DeviceNet module the node address has to be set. For the AnyBus module the address is to be set by means of the binary switches, see figure.

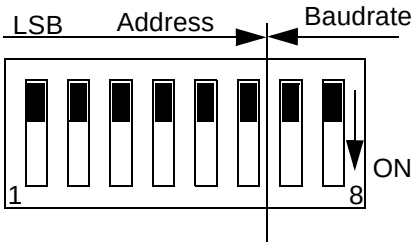
■ *Address setting*

The AnyBus module only supports node address and Baudrate setting via the DIP switch on the module. The address setting on the DP switch “S1” is binary coded with LSB to the left. The value on the DIP switch is default (value 0 up to 63 is available).

Switch No.		1	2	3	4	5	6
Binary code		1	2	4	8	16	32
Example of Addresses	1	1	0	0	0	0	0
	6	0	1	1	0	0	0
	37	1	0	1	0	0	1
	50	0	1	0	0	1	1
	63	1	1	1	1	1	1

■ *Baudrate*

Ther are three different baudrates for DeviceNet: 125k, 250k and 500 kbit/s. Choose one of them by setting the DIP switch before configuring.



Baudrate	Set DIP 7-8
125 k	00
250 k	10
500 k	01
Reserved	11

■ *Fieldbus connector BUS*

The table below shows the pin function of the fieldbus connector “BUS”. Other supported connectors are configured the same way as the screw terminal.

Screw terminal	Description
1	V-
2	CAN_L
3	Shield
4	CAN_H
5	V+

7.3 DT-modules

■ Features

The AnyBus module for DeviceNet is a slave node that can be read and written to from a DeviceNet master. The AnyBus module for DeviceNet will not initiate communication to other nodes. it will only respond to incomming commands. The AnyBus modules are group 2 only servers using the predefined master/slave connection set for poll and bit strobing.

Via the Host connector, the AnyBus DT is connected to an application which get a instant connection to DeviceNet.

■ Indicators

The figure beside shows how the LED indicators are placed depending on how they are mounted on the AnyBus module.

LED	Colour	Function
PWR (POWER)	Green	off: Power off on: Power is on
MOD (Module Status)	Red/Green	Red, flashing: Recoverable fault Red, solid: Critical module fault Green, flashing: Configuring Green, solid: Configured and NO module errors
NET (Network Status)	Red/Green	Red, flashing: Recoverable fault Red, solid: Critical module fault Green, flashing: On-line but not connected Green, solid: On-line, link okay, connected

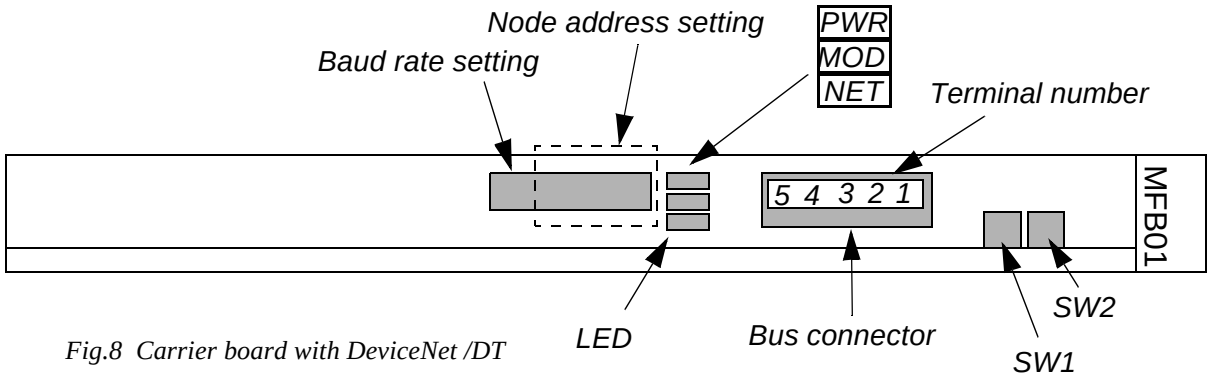


Fig.8 Carrier board with DeviceNet /DT

■ Terminate module

Termination of the fieldbus requires a terminating resistor at each end of the fieldbus. These resistors should have a value of 121 ohm.

■ Setting up the module

Before configuring the DeviceNet module the node address has to be set.
For the AnyBus module the address is to be set by means of the binary switches, see figure.

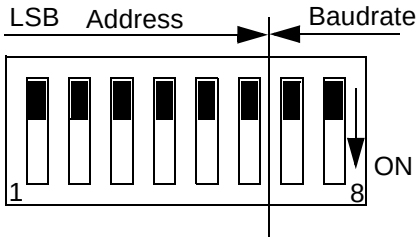
■ *Address setting*

The AnyBus module only supports node address and Baudrate setting via the DIP switch on the module. The address setting on the DP switch “S1” is binary coded with LSB to the left. The value on the DIP switch is default (value 0 up to 63 is available).

Switch No.		1	2	3	4	5	6
Binary code		1	2	4	8	16	32
Example of Addresses	1	1	0	0	0	0	0
	6	0	1	1	0	0	0
	37	1	0	1	0	0	1
	50	0	1	0	0	1	1
	63	1	1	1	1	1	1

■ *Baudrate*

Ther are three different baudrates for DeviceNet: 125k, 250k and 500 kbit/s. Choose one of them by setting the DIP switch before configuring.



Baudrate	Set DIP 7-8
125 k	00
250 k	01
500 k	10
Reserved	11

■ *Fieldbus connector BUS*

The table below shows the pin function of the fieldbus connector “BUS”. Other supported connectors are configured the same way as the screw terminal.

Screw terminal	Description
1	V-
2	CAN_L
3	Shield
4	CAN_H
5	V+

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