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***DEDICATED DRIVE***

# **Fieldbus I/O board 2.0 Option**

**Instruction Manual – English**

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## **Option**

### **Instruction Manual – English**

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# Safety

## Instruction manual

Read this instruction manual first!

Since this option is a supplementary part of the variable speed drive, the user must be acquainted with the original instruction manual of the main product. All safety instructions, warnings, etc. as mentioned in this instruction manual are to be known to the user.

## Safety instructions

Read the safety instructions in the instruction manual for the product.

## Installation

Installation, commissioning, dismantling, making measurements, etc. of or on the main product may only be carried out by personnel who are technically qualified for the task. Installation must also be carried out in accordance with the local standards. Ensure that all necessary safety measures are taken.



**WARNING: Take all necessary safety precautions during installation and commissioning to prevent personal injuries, e.g. by an uncontrolled load.**

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## Opening the variable speed drive



**WARNING: Always switch off the mains supply before opening the variable speed drive and wait at least 5 minutes to allow the buffer capacitors to discharge.**

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Always take adequate precautions before opening the variable speed drive, even though the connections for the control signals and jumpers are isolated from the mains voltage.



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# 1 Introduction

This instruction manual describes the installation and operation of the Fieldbus I/O option board 2.0, which can be built into the products VFX 2.0 and FDU 2.0. Further on in this manual we refer to the main product.

The Fieldbus I/O option allows external equipment to exchange data and to control the products described in this manual. The Fieldbus I/O option acts as a slave in a master-slave configuration.

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There are many applications for this product. Those responsible for the use of this device must ensure that all necessary steps have been taken to verify that the application meets all performance and safety requirements including any applicable laws, regulations, codes and standards.

Because this option is a supplementary part of the main product, the user must be familiar with the original instruction manual of the main product. All safety instructions, warnings, etc. as mentioned in these instruction manuals are to be known to the user.

The following indications can appear in this manual. Always read these first and be aware of their content before continuing:

---

**NOTE: Additional information to avoid problems.**

---



**CAUTION:** Failure to follow these instructions can result in malfunction or damage to the variable speed drive.



**WARNING:** Failure to follow these instructions can result in serious injury to the user in addition to serious damage to the variable speed drive.



## **1.1 Users**

In general, we assume that the user has basic knowledge of communication systems. This instruction manual is intended for:

- Installation engineers
- Maintenance engineers
- Service engineers
- Programmers

## **1.2 Before starting**

The main product must be installed and ready for operation before the fieldbus option is installed. As well as this manual, have the manual for the main product ready since it contains additional information not covered here. These product manuals are referred to at various points through this manual.

This manual contains information on general network troubleshooting for your convenience. Please note that Emotron cannot support all general questions regarding your specific network issues/installations if they are not related to the main product or fieldbus option.

## **1.3 Delivery and unpacking**

Check for any visible signs of damage. Inform your supplier immediately if any damage is found. Do not install the option board if damage is found.

If the option board is moved from a cold storage room to the room where it is to be installed, condensation can form on it. Allow the option board to become fully acclimatised and wait until any visible condensation has evaporated before installing it in the main product.

## 1.4 Checking of contents

Pieces	Component
1	CD with configuration files
1	Fieldbus module
1	Option board to be mounted in the main product
1	Flat cable
1	Mounting material
1	Manual

## 1.5 Abbreviations used

GSD file	Profibus-specific configuration files in ASCII format containing information about the node characteristics, i.e. supported baud rates and other features.
Cyclic data	Information which is sent to and from a node at regular time intervals. Typically this information includes run/stop, reference and control values, etc., i.e. information which needs to be updated at all times. Cyclic data is sometimes denoted as process data.
Acyclic data	Information which is sent to and from a node at irregular time intervals. Typically this information includes configuration data, i.e. motor data setup. There is no need to send this type of information at cyclic intervals since it will not change.
Master	Central unit which controls the system, usually a PLC. In a profibus network, a master is also often called "active station".
Termination	Method of attenuating the signal at cable ends to avoid reflections. This is usually done with a simple resistor connection.
PE	Protective Earth. Installation point which is connected to the protective earth point of the mains supply.

## **1.6 Further information**

Further information about specific fieldbus system can be found on the Internet.

Profibus: [www.profibus.com](http://www.profibus.com)

DeviceNet: [www.odva.org](http://www.odva.org)

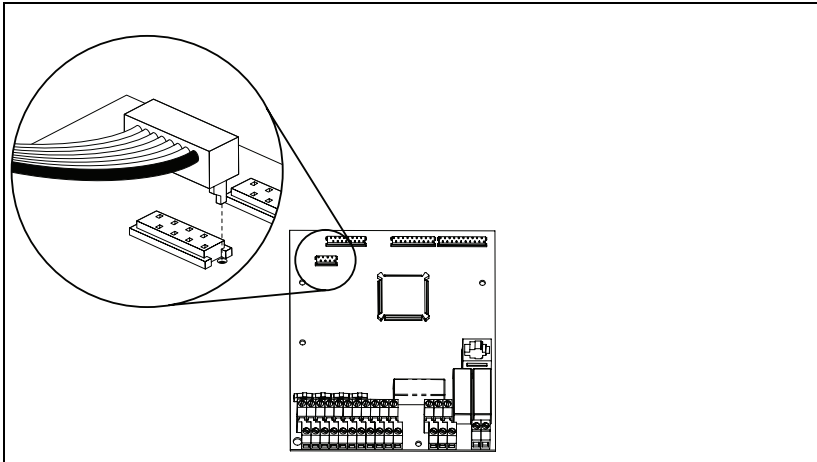
Specific information about Emotron options/products and configuration files can be found at: [www.emotron.com](http://www.emotron.com).

## 2. Installation

This chapter describes how to mount the option mounting plate and an option board in the main product. Up to three different option boards and one communication board can be mounted.

### 2.1 Polarisation of flat cables

The flat cable is marked with colour on one side and has a tap on the micro-match male contact. This side must be matched to the female micromatch contact on the control board and option board respectively, where a small hole in the board is located.



*Fig. 1 Polarisation of flat cable*



**CAUTION: Incorrect connection might cause damage to both the option and to the control board/external equipment.**

---

## 2.2 Mechanical mounting

Make sure that the main product has been switched off for at least five minutes to ensure that the capacitor bank is discharged before continuing with installation! Also make sure that no external equipment connected to the drive's interface is switched on.

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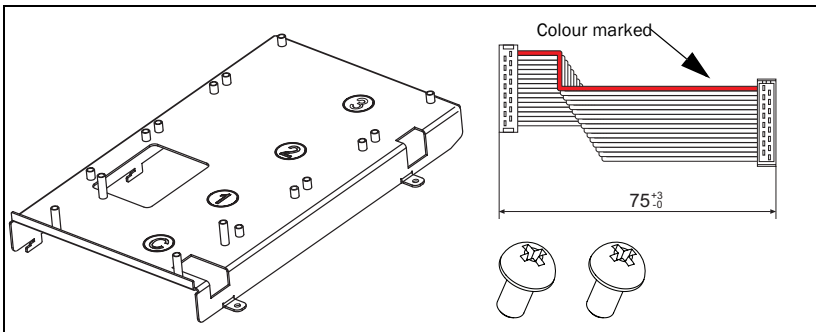
**NOTE: Correct installation is essential for fulfilling the EMC requirements and for proper operation of the module.**

---

### 2.2.1 Option mounting plate

Delivered with the option mounting kit

The option mounting plate must be mounted before any option can be installed. The mounting plate may already be installed in the main product. In that case go directly to section 2.3 on page 10 for further mounting instructions. The option mounting kit consists of the following:



*Fig. 2 Option mounting kit*

- One mounting plate with the slots marked C, 1, 2 and 3. C = communication option.
- 2 screws
- One 16-pole flat cable for connection to the control board when mounting option boards on position 1. This cable is not used when installing a communication option.

## Mounting

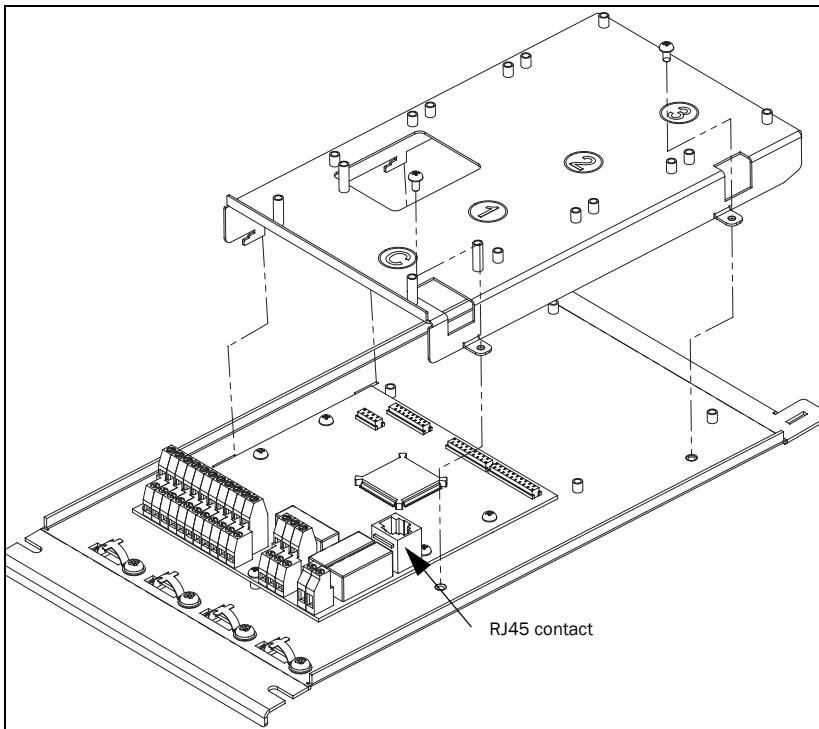
1. Make sure that the power supply is switched off for at least 5 minutes before opening the variable speed drive.
2. Open the door to the variable speed drive.
3. Jack the option mounting plate on to the control board mounting plate as shown in Fig. 3. It can only be turned in one direction.
4. Drag the option mounting plate towards the control board until the screw holes match. Keep the side with the screw holes tilted up slightly until the RJ45 contact fits into its hole.

---

**NOTE: Be careful not to damage the RJ45 contact (connection for the control panel), see picture below.**

---

5. Secure the plate with the two screws.



*Fig. 3 Mounting the option mounting plate on the control board*

## 2.3 Mounting the option board

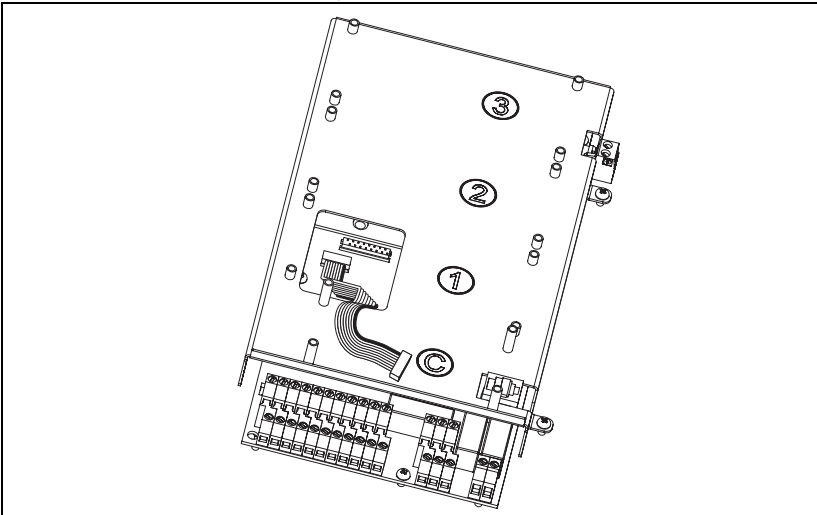
The communication option board is always mounted on the slot marked C on the mounting plate. In this example we assume that no other option board is installed.

### Delivered with the option board kit

- Option board and four screws.
- 8-pole flat cable for connection between the communication board and the control board.

### Mounting

1. Connect the 8-pole flat cable to the X4 connector on the control board with the cable downwards as in Fig. 4.



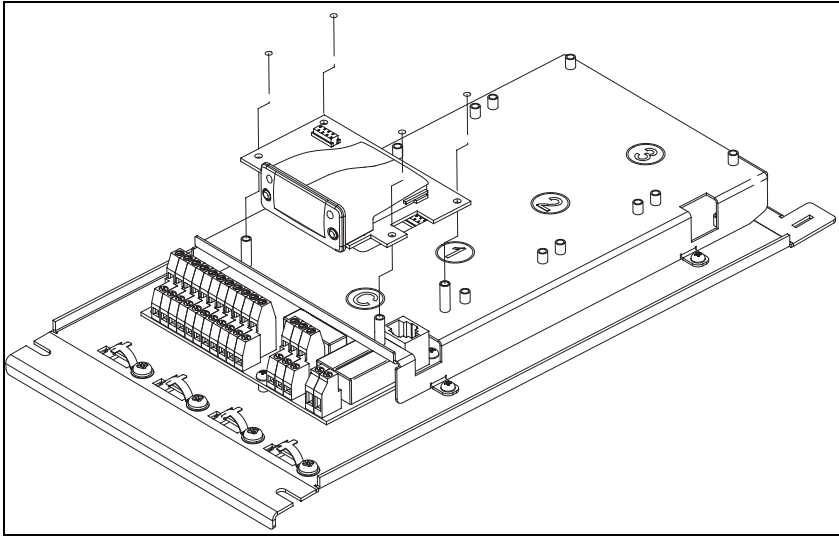
*Fig. 4 Flat cable connected to the control board*

---

**NOTE: The polarisation of the flat cable, see section 2.1 on page 7.**

---

- Put the option board on the spacers on the slot marked C. Fasten the board using the four screws.



*Fig. 5 Mounting the Fieldbus option board*

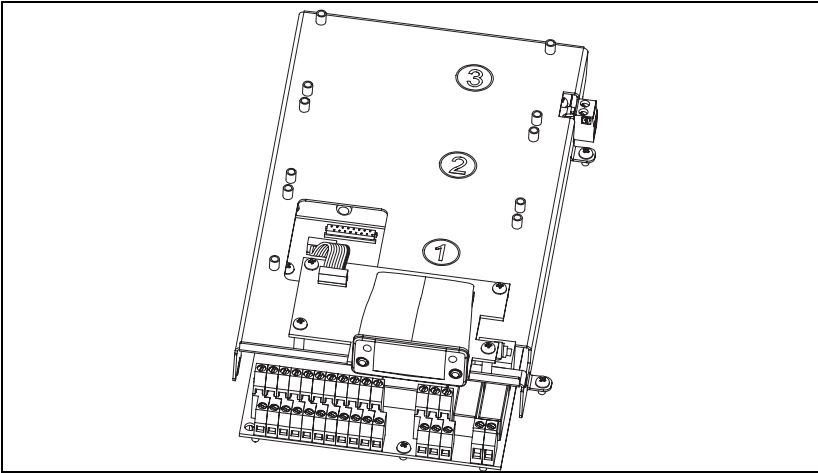
- Connect the other end of the 8-pole flat cable to the X2 connector on the option board. Make sure that the polarisation is correct as in section 2.1 on page 7.

---

**NOTE: Connect the micro match male contact to the option in the same manner as on the control board, i.e. the tap on the micro match contact must be fitted into the hole in the PCB.**

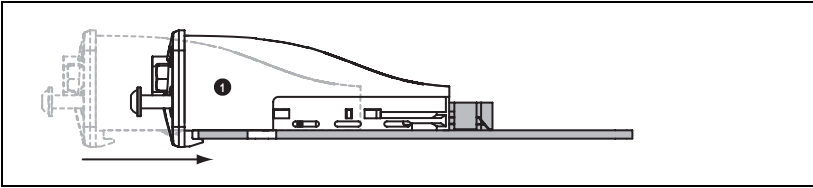
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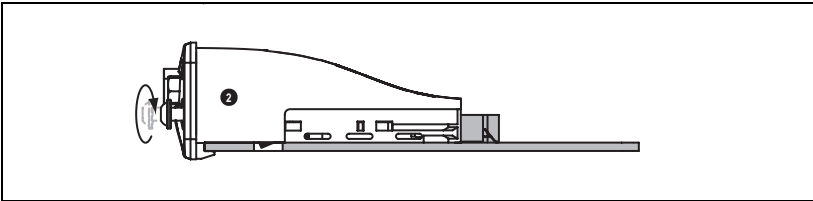


*Fig. 6 Flat cable connected to the option board*

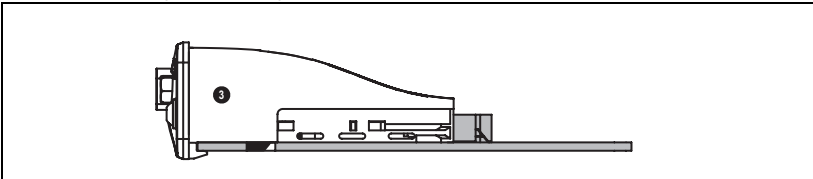
## 2.4 Inserting the fieldbus module on to the option board



1. Gently slide the fieldbus module into place. Make sure that the module slides on to the guides on the board and into the 50-pin Compact Flash contact. Do NOT use any force!



2. Make sure that the fieldbus module goes all the way in. Then tighten the two screws on the front of the module. The module is now locked to the board through fastening holes in the PCB.



## 2.5 Connecting the network cable

To make it easy to install and remove the network cable, there is an gland plate. This provides the option of exchanging the main product without breaking up the network (valid for both Profibus and DeviceNet).

### Installation

1. Pull the network cable(s) through the glands on the gland plate.
2. Adjust the length of the cable so it can reach the fieldbus module contact.
3. Attach the shield of the cable(s) according to the recommendation in the Shielding section.
4. Secure the cable to the glands and attach the gland plate to the inverter housing.

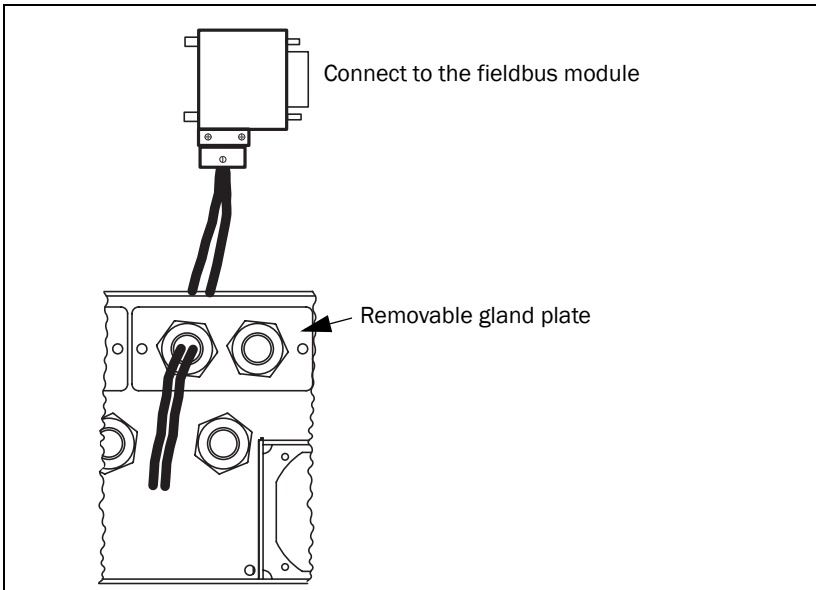
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**NOTE: There are no glands mounted on the gland plate at delivery.**

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**NOTE: The shielding clamp in the main product is not to be seen as a strain-relief. However, the glands on the gland plate do have this function.**

---



*Fig. 7 Connections through the gland plate*

## Removal

The gland plate makes it possible to remove the network cable without breaking the network.

1. Remove the D-sub contact from the fieldbus module.
2. Unscrew the shielding connection.
3. Unscrew the gland plate with glands.
4. Remove the cable(s) and contact through the hole of the gland plate.

## 2.6 Shielding

Connect the network cable shield firmly (low ohmic connection) to the mounting plate (PE) as in the picture below. The example shows installation with a Profibus cable, but the shielding concept is valid for the DeviceNet network as well.

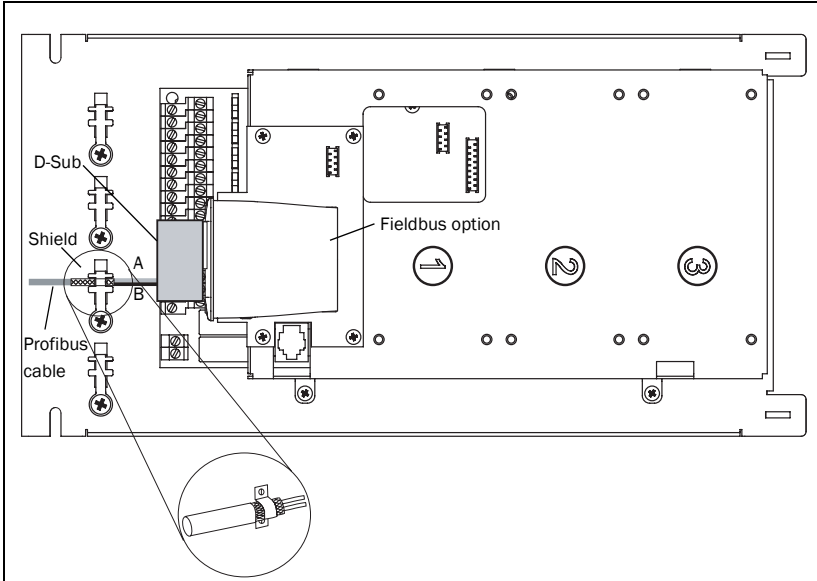


Fig. 8 Example: Emotron inverter installed with Profibus type A cable

The shield must end at the clamp. Only the A and B line should continue into the D-sub connector (valid for Profibus).

In most cases it is recommended that the shield be connected to PE at both ends. This will give a good attenuation of high frequency interference.

When the main product is installed in a cabinet, we recommend that the shield also be connected to the external shield DIN-rail (the DIN-rail is connected to a PE-rail). Note that the shield of the network cable should be kept whole. Connection should cover the largest area possible.

In environments with severe interference, optical signal transmission is the safest and cheapest solution. Moreover, this is usually the recommended media when communicating between buildings. Optical solutions have the advantages of being electrically insulated, lightweight and enable cable lengths of several kilometres to be used. They are also not susceptible to electromagnetic interference, which means that they can be installed along power cables. Please note that Emotron does not manufacture or sell fibre optical transmitters/solutions. These are, however, widely available on the market and may be used together with Emotron products.

An equipotential bonding system should be used when appropriate. The shield in cables may not be used for this purpose.

## 3 Fieldbus networks

### 3.1 General description

All fieldbus options available through Emotron are based on an open serial communication standard that enables data exchange between the main products (VSD) and a network controller (PLC master).

Advantages of using a serial communication network:

- Geographically distributed systems can be controlled from a central unit (master)
- Production data can be collected and analysed
- Smaller cable lengths (when compared to using analogue cables for every node)
- Centralized supervision/diagnostic
- Exchangeability of units when using a network standard
- Modular construction
- Easy to extend network when necessary
- Easy installation (less time needed)
- Documentation of network easy (when compared to analogue signals)
- More robust against interference when using digital signals (resending message)

The network controller/master (usually a PLC = programmable logic controller) polls the slave nodes (e.g. inverters/softstarters), which respond with a telegram over the network and perform commands sent by the master unit.

### 3.1.1 Status of the fieldbus module

At any given time, the module is considered to be operating in one out of seven states. The current status of the fieldbus module is presented in main product menu [2693].

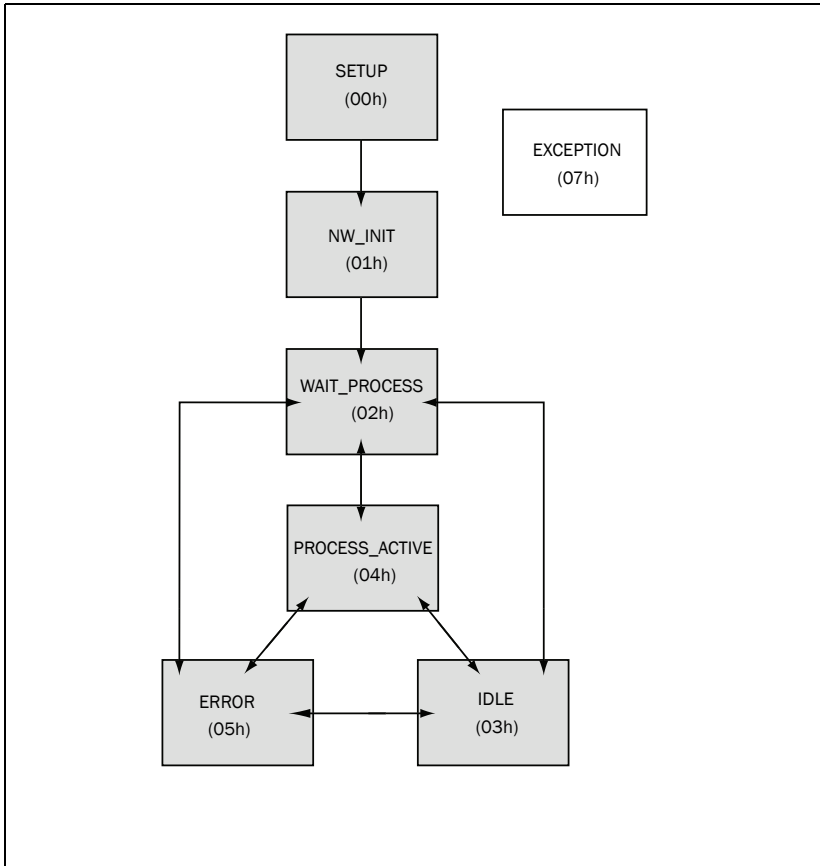


Table 1

State no.	State name	Description
00	SETUP	The module is not yet initialised. No exchange of process data.
01	NW_INIT	The module is currently performing network related initialisation tasks. No exchange of process data (ignored).
02	WAIT_PROCESS	The network process data is temporarily inactive (ignored).
03	IDLE	The network is in idle mode (network specific behaviour).
04	PROCESS_ACTIVE	The network process data channel is active, i.e. all process data is exchanged.
05	ERROR	There is at least one serious network error. Process data will be ignored.
07	EXCEPTION	Network communication is halted due to: - Invalid network configuration parameter - Timeout - etc. This status is not recoverable, which means that the module must be restarted (power off - power on) to be able to exchange network data again.

### 3.1.2 Common network problems

This section describes how to locate network-related problems in a Profibus network. However, the hints given apply to most standard fieldbus systems.

1. A and B wires crossed somewhere in the network (applies to RS485 physical interface fieldbus systems).
2. Network not terminated in the ends (of each segment).
3. Incorrect nodes (non-ending nodes) terminated.
4. Cable cut off.

A common method of finding network-related problems is to reduce the network step-by-step until the problem disappears. This can be done by disconnecting the outgoing profibus cable from a specific node and terminating at this point.

Furthermore, a simple multimeter can come in handy for measuring the resistance of the cable (checking connection).



The PLC-master system may also provide additional diagnostic information.

Has the correct \*.gsd file been installed?

There are also more advanced tools available on the market, so called "network analyzers" which can be used when encountering problems of a more difficult nature.

### 3.1.3 Troubleshooting using a multimeter

This section describes how to do simple measurements on a Profibus network. The technique is basically the same as for other fieldbuses but with different resistance values in cable/termination (please refer to your standard fieldbus documentation).

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**NOTE: The resistance measurements must be performed while the network is powered down.**

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- Check that the resistance between A&B wires (pins 3 and 8 in the D-sub connector) is approximately 100 ohm. The measured value depends on correct termination, cable type and total cable length.
- A very low value indicates a short circuit somewhere in the network.
- A Profibus cable has a resistance of approx. 50 ohm/km.
- Check if there is a short circuit between the shield and either the A or B wire. The resistance should be equal or higher than 10 kohm (but is likely to be much higher).
- Check if the shield is connected to the chassis and/or PE-din rail. Normally the resistance should be less than or equal to 10 ohm.
- Check that the A and B wire are not crossed.

### 3.1.4 Troubleshooting using menu system information

#### Checking internal communication

It is important to check that the internal communication between the control board and the fieldbus option is working. Consider the following issues:

1. Go through the page 31 in chapter 4 to make sure all settings are correct.
2. Check menu [2698] — is the timeout counter increasing? In this case it indicates problems with the internal communication between the control board and the fieldbus module.
3. Check that the flat cable between the control board and the fieldbus board is properly connected and polarized.

If all the above is normal, then it is likely that the problem lies outside the inverter. Continue with the next section “Checking external communication” on page 21.

#### Checking external communication

1. Check LED status of the fieldbus module — error indication? power on?
2. Check menu [2693] — state of fieldbus module
3. Check menu [2692] — SUP-bit — is the slave node supervised by a master?

#### Solutions to common problems

*Table 2*

<b>Problem</b>	<b>Solution</b>
The inverter does not accept any cyclic data commands.	Check that the inverter menu [2633] is set to RW (read/write). Check the PLC diagnostic messages. Check menu [2632] — cyclic data size. Is the same setting used with the PLC master?
The inverter ignores the reference value sent by the master.	Check menu [2699] — incoming process data.
The inverter does not start when given start command.	Check menu [2699] — incoming process data. Also check the ENABLE signal on the control board interface.

## 3.2 Recommendations for network installation

This section gives general installation recommendations.

- Always build your network so that it is possible to use the highest available baud rate for the network standard currently in use. This will make your installation robust and you can easily increase the baud rate in the future without replacing cables etc.
- Use the recommended cable for each network standard. Take environmental issues into account, such as cables resistant to oil, water, grease, temperature, UV radiation, etc.
- Avoid drop cables (valid for Profibus networks).
- Always use shielded cables.
- A general recommendation is to connect the cable shield to the PE at every cable end. Note that this might require an equipotential bonding system.
- Place the network cable as far away from power cables as possible. A distance of at least 20 cm is recommended.
- When crossing power cables, try doing this at a 90-degree angle. Avoid laying the network cable in parallel to the power cable.
- Do not twist, stretch or crimp any cables.
- Protect the cable from being damaged, e.g. by using cable channels.

## 3.3 Profibus

The profibus protocol is specified by the EN 50170 standard. There are three main communication profiles within Profibus:

1. Profibus-FMS (Fieldbus Message Specification)
2. Profibus-DP (Decentralised Periphery)
3. Profibus-PA (Process Automation)

The module supplied from Emotron only supports Profibus-DPV1.

The physical transmission medium of the bus is a twisted pair of cables (according to the RS-485 standard). Maximum length is 100-1200 metres (depending on the baud rate).

Up to 32 nodes can be connected in the same network segment without using repeaters. With repeaters it is possible to connect up to 127 nodes (including repeaters and master stations) in the network.

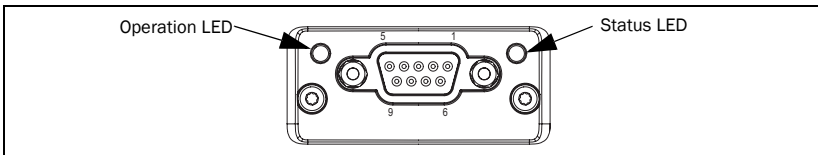
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**NOTE: Repeaters do not have a station address, but they count towards the maximum number of stations in each segment.**

---

When adding a new node to the network the master needs to be informed of the network change. This is done by installing a configuration file (\*.gsd). This file contains information about the new slave node's available functions.

### 3.3.1 Profibus fieldbus interface and LED indication



*Fig. 9 Module front view*

#### Operation LED description

*Table 3*

Status	Indication	Comment
Off	Not on-line/No power	
Green	On-line, data exchange	
Flashing green	On-line, clear	
Flashing red (1 flash)	Set-Prm service error	Master and slave configuration does not match.
Flashing red (2 flashes)	Chk_Cfg service error	Master and slave amount/type of data does not match.

## Status LED description

Table 4

Status	Indication	Comment
Off	No power or not initialised	Anybus state=SETUP or NW_INIT
Green	Initialised	Module has left the NW_INIT state
Flashing green	Initialised, diagnostic event(s) present	Extended diagnostic bit is set
Red	Exception error	Anybus status=EXCEPTION

## Profibus connector

This connector is galvanically isolated.

Table 5

Pin	Signal	Description
1		
2		
3	B line	Positive RxD/TxD, RS485 level
4	RTS	Request to send
5	GND Bus	Isolated ground
6	5 V Bus output	Isolated +5 V
7		
8	A line	Negative RxD/TxD, RS485 level
9	Shield	

+5V and GND Bus are used for termination purposes.

### 3.3.2 Cable type

There are a number of different Profibus cable types for different applications (e.g. food industry etc.). More information about these can be found in the IEC 1158-2 standard. However, the most commonly used Profibus cable is cable type A. This is described below:

#### Cable type A

Table 6

Cable design	shielded twisted pair
Surge Impedance	135-165 ohm
Loop Resistance	110 ohm/km
Core Diameter	0.64 mm
Core Cross Section	> 0.34 mm <sup>2</sup>
Capacitance per unit length	< 30 pF/m

The length of cable allowed depends on the baud rate used:

Table 7

Baud rate [kbit/s]	9.6	19.2	93.75	187.5	500	1,500	1,2000
Line length cable type A[m]	1,200	1,200	1,200	1,000	400	200	100

---

**NOTE: The length may be extended by using repeaters.**

---

The twisted pair consists of data lines "A" and "B". It is important not to cross these cables.

According to the standard:

A = Green wire

B = Red wire

### 3.3.3 Bus termination

Termination of the network is important to avoid signal reflections. The first and the last unit (in every segment) must be terminated in a Profibus network.

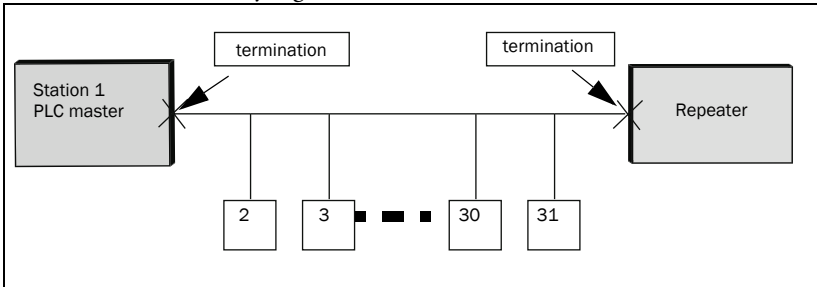


Fig. 10 Termination

#### Example

A profibus segment with 32 units (repeater is calculated as 1 unit even if it does not have an address). Termination is represented by an "X" at both ends in Fig. 10.

---

**NOTE: There is no termination switch on the fieldbus module itself. Therefore a standard Profibus D-sub with a built-in termination switch must be used.**

---

---

**NOTE: Do not terminate any nodes in the middle of the network line. This will cause the data signals to attenuate and with the worst case scenario being the network not working at all.**

---

### 3.3.4 Address setting

The module must be assigned to a unique node address (a.k.a device address) in order to communicate on the Profibus network. The valid setting range is from 0 to 125. The node address is set in menu [2631].

---

**NOTE: The main product must be switched off and back on again to enable the new address setting.**

---

### 3.3.5 Baud rate

The baud rate is automatically detected by the module.

### 3.3.6 Profibus Sync/Freeze functionality

The Profibus option from Emotron supports both sync and freeze which enables the user to synchronize the inputs (Freeze mode) or the outputs (Sync mode) of a group of nodes.

The FREEZE control freezes the physical input data present on one or more slaves simultaneously, like taking a snap shot. The selected slave(s) will stay frozen until an UNFREEZE command is issued.

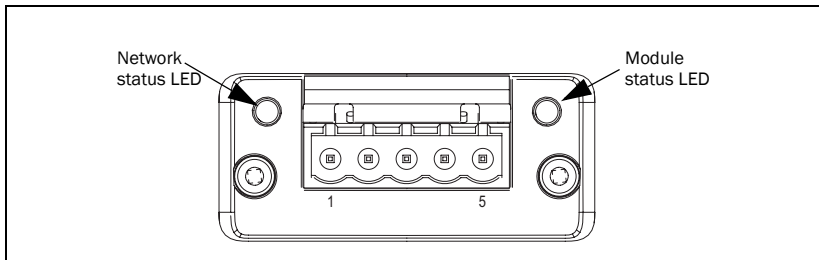
The SYNC control works much in the same way, it will lock the physical output data present on one or more slaves simultaneously. This data will remain static until an UNSYNC command or new SYNC command has been issued.

## 3.4 DeviceNet

DeviceNet is a low-cost communications network that can be connected to different industrial devices. Up to 64 nodes can be connected in the same network segment. DeviceNet is a standard open network – the specification, protocol and other useful information are available to anyone from ODVA's website [www.odva.org](http://www.odva.org). The bus topology used is linear (trunkline/dropline); power and signal are on the same network cable.

When adding a new node to your network you also need to inform the master of the network change. This is done by installing a configuration file (\*.eds). This file contains information about the new slave node's available functions.

### 3.4.1 DeviceNet fieldbus interface and LED indication



*Fig. 11 Module front view*



## Network status LED description

Table 8

<b>Status</b>	<b>Indication</b>	<b>Comment</b>
Off	Not on-line/No power	Check if main product configured to fieldbus mode. Check baud rate.
Green	On-line, one or more connections are established.	All Ok.
Flashing green (1 Hz)	On-line, no connections established.	Node has no master.
Red	Critical link failure.	Check for duplicate MAC ID and network power.
Flashing red (1 Hz)	One or more connections timed-out.	Check poll time of master.

## Module status LED description

Table 9

<b>Status</b>	<b>Indication</b>
Off	No power
Green	Operating in normal condition.
Flashing green (1 Hz)	Missing or incomplete configuration, device needs commissioning.
Red	Unrecoverable Fault(s).
Flashing red (1 Hz)	Recoverable Fault(s).

## DeviceNet connector

Table 10

Pin	Signal	Colour code	Description
1	V-	Black	Negative bus supply voltage
2	CAN_L	Blue	CAN low bus line
3	SHIELD	Bare	
4	CAN_H	White	CAN high bus line
5	V+	Red	Positive bus supply voltage

### 3.4.2 Cable type

Only use DeviceNet cables that meet or exceed ODVA specifications. For detailed information about DeviceNet installation, please see ODVA's cable recommendation documents on [www.odva.org](http://www.odva.org).

Table 11

Baud rate [kbit/s]	125	250	500
Thick trunk length, [m (ft)]	500 (1,640)	250 (820)	100 (328)
Thin trunk length, [m (ft)]	100 (328)	100 (328)	100 (328)
Flat trunk length, [m (ft)]	420 (1,378)	200 (656)	75 (246)
Maximum drop length, [m (ft)]	6 (20)	6 (20)	6 (20)
Cumulative drop length, [m (ft)]	156 (512)	78 (256)	39 (128)

### 3.4.3 Bus termination

You must terminate the trunk line at both ends with 121 Ohms, 1%, 1/4 W terminating resistors.

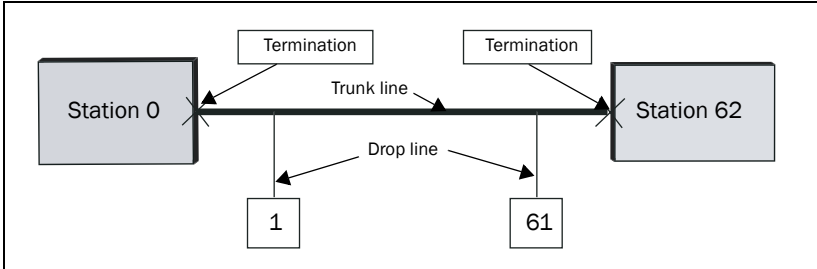


Fig. 12 Bus termination for DeviceNet

### 3.4.4 Address setting

The module must be assigned to a unique node address (a.k.a device address) in order to communicate on the DeviceNet network. The valid setting range is from 0 to 62 (63 is used for installed units as default, but is changed after installation).

---

**NOTE: The master PLC and a computer interface node will also allocate addresses.**

---

---

**NOTE: The main product must be switched off and back on again to enable the new address setting.**

---

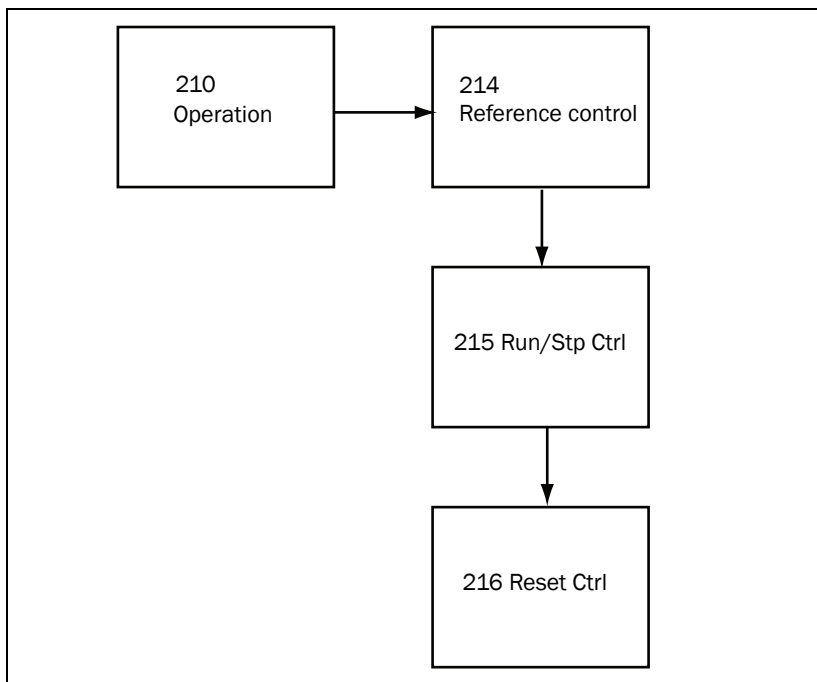
### 3.4.5 Baud rate

The baud rate is automatically detected by the module.

## 4 Operation

All menus are described in the instruction manual for the variable speed drive. The following two sections give an overview of parameters used for communication.

### 4.1 General communication menus



*Fig. 13 General operation menus*

For information about the general parameters, please see the instruction manual for the main product.

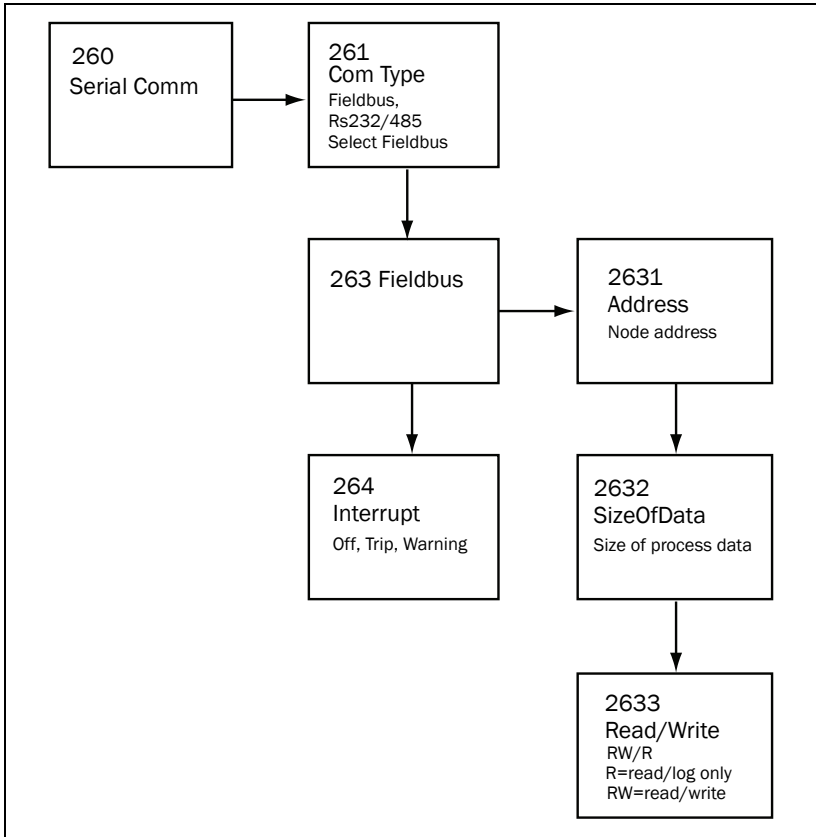


Fig. 14 General communication menus

## 4.2 Fieldbus menus

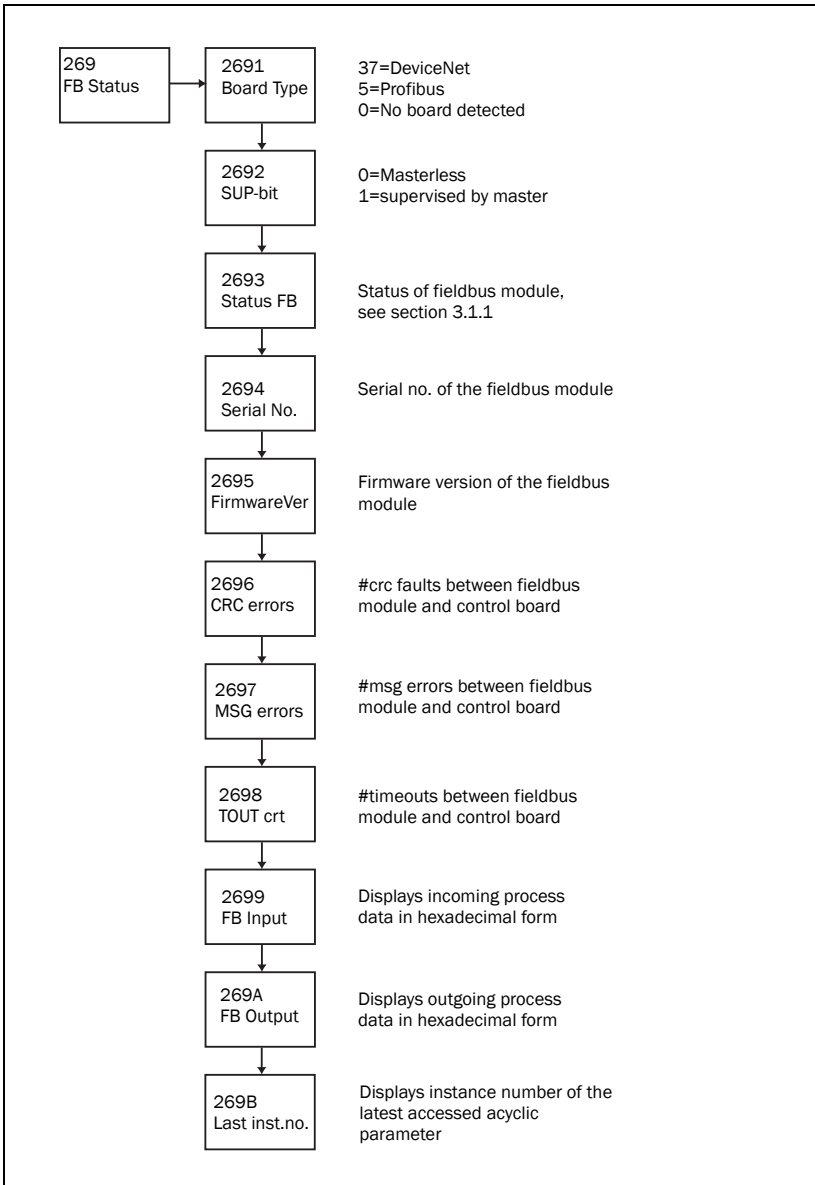
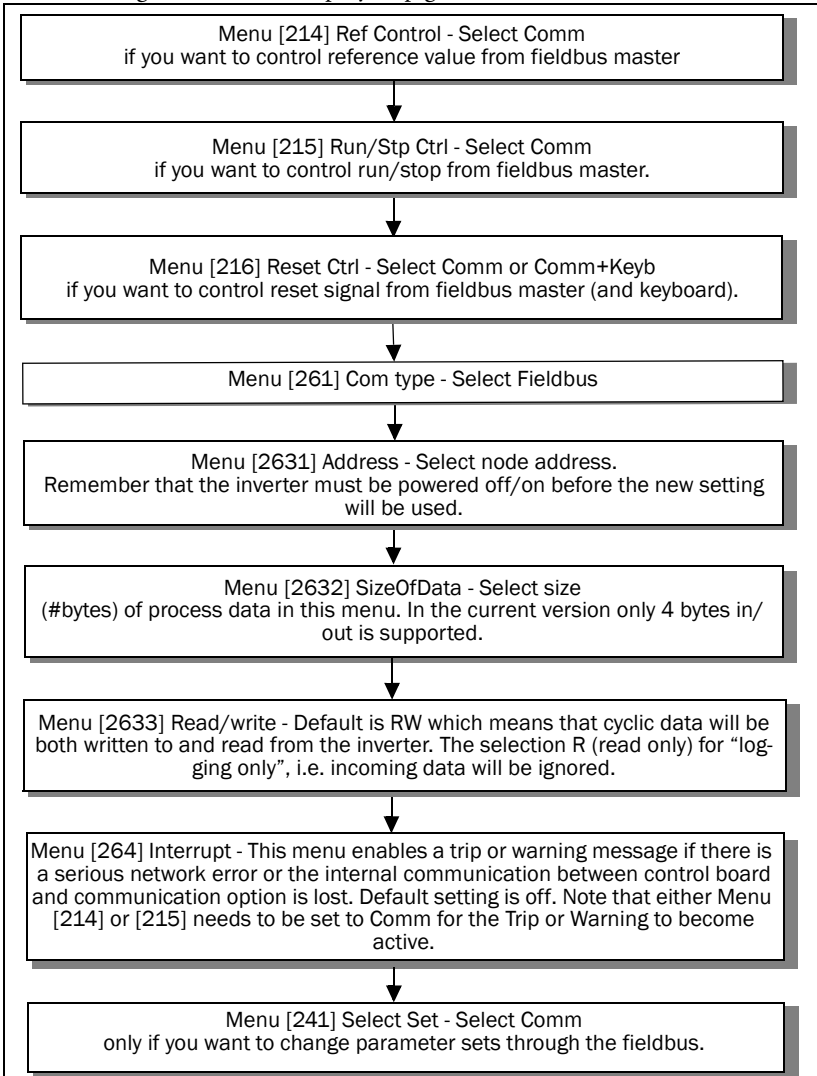


Fig. 15 Service menus

## 4.3 Quick Setup

The following flowchart is a step by step guide for advanced users.



*Fig. 16 Step by step guide*

Switch off the main product and wait for the lights to go off on the control panel. Switch on the main product again to use the new fieldbus settings.

## 5. Cyclic/Acyclic data

All of Emotron's current fieldbus options have been implemented in such a way that the scaling of all parameters (and cyclic data) are identical regardless of the type of fieldbus selected.

The difference lies within the fieldbus-specific method of retrieving parameter data. This is described in the following chapter.

### 5.1 Byte swapping

Different fieldbus systems may use different data formats called "Little endian" or "Big endian". Big endian means that the most significant byte comes first in a word.

#### Example

The decimal number 23041 is equal to 5A01 hex. It is stored as 5A01 in the big endian format which Profibus uses.

In a little endian system it would be stored as 015A.

The Emotron fieldbus option takes care of the necessary byte swapping needed to be compatible with each network standard. Note, however, that the PLC master may have a different data format than the fieldbus network, i.e. this may require you to perform byte swapping in the PLC.



## 5.2 Cyclic data (process data)

### 5.2.1 PLC configuration of modules/cyclic data

A cyclic input/output message of 4x1 byte is currently supported. This needs to be configured in your PLC system as follows:

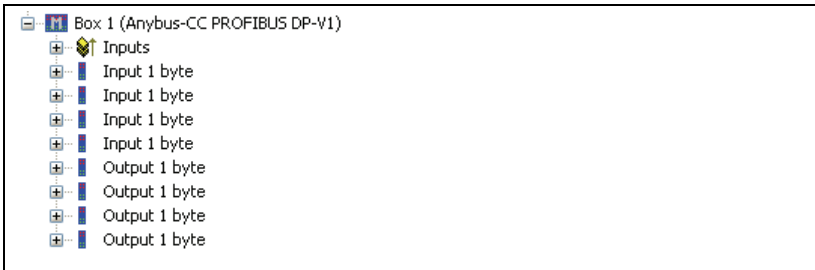
---

**NOTE: It is important to configure the PLC with the same order of in/out information and size type (e.g. word/byte) as the slave node has been set up with. If the node is not properly set up a configuration fault will occur.**

---

Selected configuration in menu [2632] 4-byte mode.

Module configuration in PLC as Input 4 x 1 byte, Output 4 x 1 byte.



*Fig. 17 Module configuration*

Example: In 4-byte mode it is important to map the modules in the correct order. The first 4 modules in the PLC should be mapped as "input" and of "byte" type. The last 4 modules should be mapped as "ouput" and be of "byte" type as well.

### 5.2.2 Replace an old fieldbus option

If you want to replace an inverter from Emotron containing the old fieldbus option ABIO-64 with a new one you are able to do so quite easily.

Do as follows:

1. Change the configuration file for the slave node.
2. Compare the process data content of ABIO-64 to the content in section 5.2.3 on page 37. Make the necessary changes in the PLC program by comparing the process data contents.

## 5.2.3 Module data mapping

### Request message to main product

Byte	Bit	Information type	Values	Comment
0	0	Run/stop	0=Stop 1=Run	Only active when 215 Run/Stop = Comm
	1-2	Run direction	Bit2/Bit1 00 = stop 01 = run right 10 = run left 11 = stop	If RunL/RunR set to same value, inverter will stop.
	3	Reset	Reset = 0->1	Only active when 216 Reset Ctrl = Comm
	4-7	Spare		
1	0-1	Drive mode	Bit1/Bit0 00 = Speed 01 = Torque 10 = V/Hz 11 = Value ignored	By selecting value 11, drive mode will be set from PPU.
	2-3	Parameter set	Bit3/Bit2 00 = Parset A 01 = Parset B 10 = Parset C 11 = Parset D	Only active when 241 Select set = Comm
	4-7	Spare		
2	0-7	Reference signal (continued next byte)		
3	0-1	Reference signal	10 bit value (bit 1 byte 3 most significant) = 0-1023d = 0-3FFh = 0-MaxFreq	Only active when 214 Ref Control = Comm
	2-7	Spare		

## Example

Byte 3 (MSB)	Byte 2	Byte 1	Byte 0 (LSB)
0x02	0x80	0x02	0x03

This means that the inverter is set to run right, no reset active, V/Hz mode, parameter set A used, reference value set to 0x280.

## Response message from main product

Byte	Bit	Information type	Values	Comment
0	0	Run/Stop status	0 = Stopped 1 = Running	
	1-2	Run dir status	Bit2/Bit1 00 = stop 01 = run right 10 = run left 11 = stop	
	3	Relay 1	0 = X2:32-X2:31 closed 1 = X2:32-X2:33 closed	
	4	Relay 2	0 = X2:42-X2:41 closed 1 = X2:42-X2:43 closed	
	5	DigOut 1	0 = 0V 1 = active	Depending on selection for DigOut1
	6	DigOut 2	0 = 0V 1 = active	Depending on selection for DigOut2
	7	Run Ctrl	0=run/stp by remote/key-board/option 1=run/stp by com	
1	0-1	Drive mode	Bit1/Bit0 00 = Speed 01 = Torque 10 = V/Hz (11 = Ignored)	

			6 bit value (bit 7 most significant) 0 = No trip 1 = Motor I2t 2 = PTC 3 = Motor lost 4 = Locked rotor 5 = Ext trip 6 = Mon MaxAlarm 7 = Mon MinAlarm 8 = Comm 9 = Error_09 10 = Deviation 11 = Pump 12 = Error 12 13 = Error 13 14 = Error 14 15 = Option 16 = Over temp 17 = Over Curr F 18 = Over Volt D 19 = Over Volt Gen 20 = Over Volt 21 = Over Speed 22 = Under Volt 23 = Power fault 24 = Desat 25 = Error 25 26 = Internal Error 27 = Ovolt m cut 28-31 = Spare	
	2-7	Error status		
2	0-7	AnOut 1	8 bit value (bit 7 most significant) 0-255h = 0-10 V	Speed is default
3	0-7	AnOut 2		Torque is default

## Example

Byte 3 (MSB)	Byte 2	Byte 1	Byte 0 (LSB)
0xFF	0x00	0x02	0x2B

This means that the main product is set to run right, relay 1 X2:32 - X2:33 is closed, relay 2 X2:42 - X2:41 is closed, DigOut 1 is high, DigOut is low, run control is set to run/stp by remote/keyboard/option, drive mode is V/Hz, no errors or warnings, AnOut 1 is at minimum level and AnOut 2 is at maximum level.

## 5.3 Acyclic data (parameters)

### 5.3.1 Fieldbus parameters

Profibus parameters can be set or read through the read/write services in the DPv1 protocol. Each parameter can be accessed through a unique slot/index. All available parameters are listed in the manual for the main product. For example, a change to one parameter may affect the value and the max/min limits of another parameter. Note that there might be interdependencies between two or more parameters. For further information, refer to the main product manual.

All parameters with DeviceNet instance number 4XXXX are readable/writable.

All parameters with DeviceNet instance number 3XXXX are read only.

## 5.4 EmoSoftCom – a configuration tool

EmoSoftCom is a PC program which can be used to configure the main product in an easy, user-friendly way. Simply install the program on your laptop or PC and connect the serial port to the product.

You will recognize all parameter settings in an expandible menu tree.

The RS232-cable can either be connected to the product using a serial communication option (isolated version available) or alternatively through a non-isolated 9-pole D-sub behind PPU (applies to VFX 2.0 and FDU 2.0 inverters).

EmoSoftCom also allows you to log and display information from the inverter. It may be used as a simple oscilloscope to examine signals. The parameter settings may be stored to your computer's hard drive, which may be re-used when replacing a unit or programming several units with the same setup.



## 6. Parameter sets and Trip log lists

Table 12 Trip log list

<b>Trip log list</b>	<b>DeviceNet Instance number</b>	<b>Profibus Slot/Index</b>
1	31101 to 31150	121/245 to 122/39
2	31151 to 31200	122/40 to 122/89
3	31201 to 31250	122/90 to 122/139
4	31251 to 31300	122/140 to 122/189
5	31301 to 31350	122/190 to 122/239
6	31351 to 31400	122/240 to 123/34
7	31401 to 31450	123/35 to 123/84
8	31451 to 31500	123/85 to 123/134
8	31501 to 31550	123/135 to 123/184

Table 13 Parameter set list

<b>Parameter sets</b>	<b>DeviceNet Instance number</b>	<b>Profibus Slot/Index</b>
A	43001 to 43529	168/16 to 170/178
B	44001 to 44529	172/140 to 174/158
C	45001 to 45529	176/120 to 178/138
D	46001 to 46529	180/100 to 182/118







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