



Emotron MSF 2.0 Fieldbus Option



Instruction manual
English

Valid for the following models:
EMOTRON Fieldbus

Fieldbus Option

Instruction Manual - English

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Safety

Instruction manual

It is important to be familiar with the softstarter to fully understand this instruction manual.

Technically qualified personnel

Installation, commissioning, demounting, making measurements, etc. of or on the Emotron products may only be carried out by personnel technically qualified for the task.

Installation

The installation must be made by authorised personnel and must be made according to the local standards.

Opening the softstarter



DANGER!
ALWAYS SWITCH OFF THE MAINS VOLTAGE BEFORE
OPENING THE UNIT.

Always take adequate precautions before opening the softstarter. Although the connections for the control signals and the jumpers are isolated from the mains voltage. Always take adequate precautions before opening the softstarter.

EMC Regulations

EMC regulations must be followed to fulfil the EMC standards.

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1. Quick Set-up

Following flowchart is a step by step guide for advanced users, with references to chapters with detailed information.

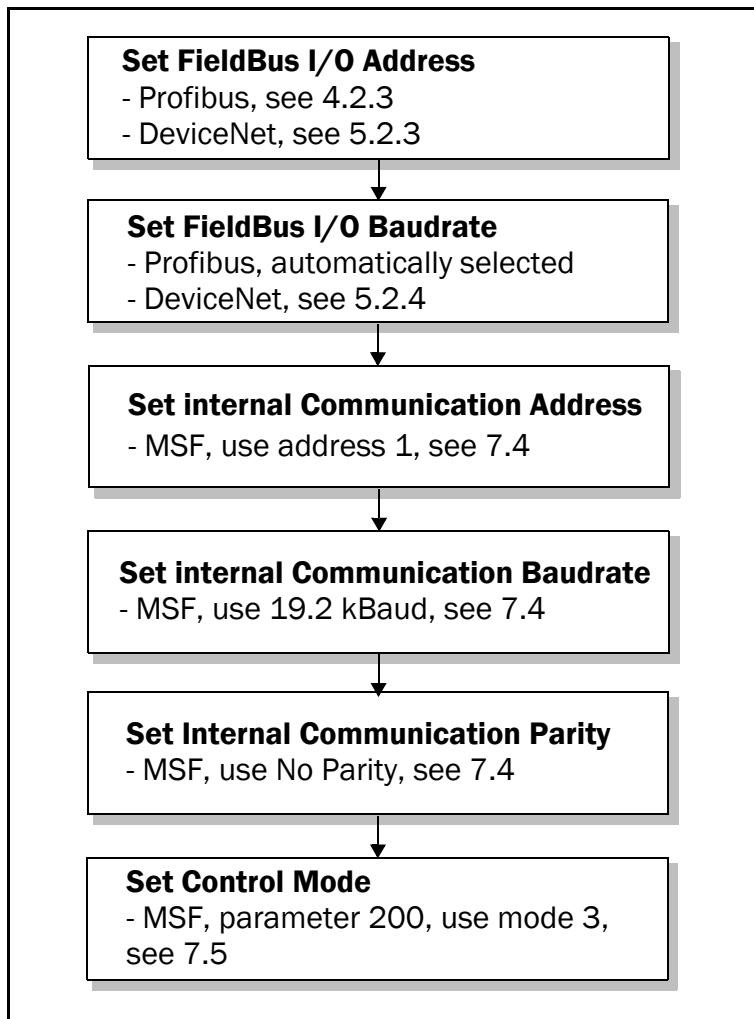


Fig. 1 Step by step guide.

2. General

2.1 Introduction

The FieldBus I/O interface allows external equipment to exchange data and run our products.

The FieldBus I/O interface acts as a slave in a master slave configuration.

Physical connection can be either RS-232 or one of the available fieldbuses.

2.2 Description.

This instruction manual describes the installation and operation of the FieldBus I/O option card, which can be built into the following products:

MSF 2.0 Softstarters:

MSF-017 - MSF-1400

Specific information about the softstarters is in chapter 7. page 19.

2.3 Users

This instruction manual is intended for:

- Installation engineers
- Designers
- Maintenance engineers
- Service engineers
- Programmers

2.4 Safety

Because this option is a supplementary part of the softstarter, the user must be familiar with the original instruction manual of the MSF 2.0 softstarter. All safety instructions, warnings etc. as mentioned in this instruction manual are to be known to the user.

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

NOTE: Additional information as an aid to avoiding problems.

CAUTION!

Failure to follow these instructions can result in malfunction or damage to the softstarter.

WARNING!

Failure to follow these instructions can result in serious injury to the user in addition to serious damage to the softstarter.

2.5 Delivery and Unpacking.

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

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

3. FieldBus I/O

3.1 Introduction

The FieldBus I/O Option consists of 2 parts. One part is an AnyBus I/O Module. This module is a third part and comes from HMS.

We have chosen to buy this part because of the complexity and amount of fieldbuses.

3.2 HMS

This is how HMS present themselves:

" HMS develops and supplies high tech electronics to quality conscious customers worldwide. HMS was one of the first companies to develop interfaces for all major fieldbus systems. Today, ten years later, we have expanded both the technology and our own skills. We are now one of the world's leading companies in the fieldbus technology sphere, and are the global leaders in embedded OEM fieldbus modules for industrial products. "

3.3 Interfaces of communication

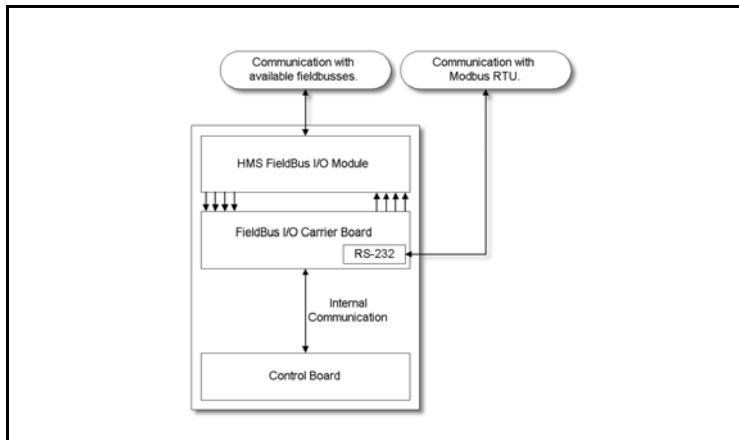


Fig. 2 Ways to communicate

3.4 Setting up

Several steps must be done for a complete set-up. Both FieldBus I/O Option and the softstarter must be set for a complete and working system. The FieldBus I/O Option is also divided into 2 parts; FieldBus and RS-232.

3.5 Description of Jumpers and LED's

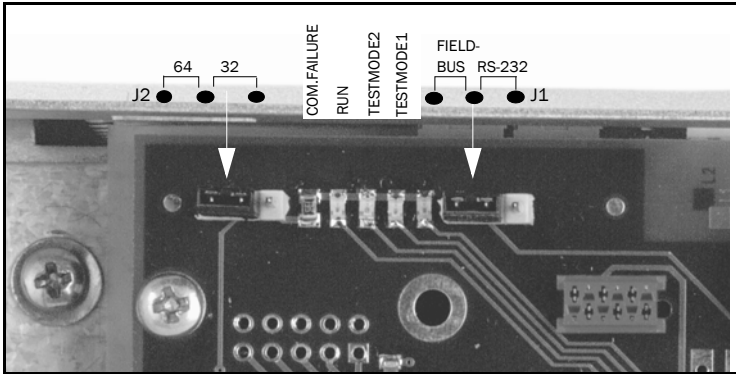


Fig. 3 Jumper 1

3.5.1 Mode

User can choose between RS-232 and FieldBus with jumper J1. It is not possible to communicate in both ways at the same time.

3.5.2 LED indication

Four LED's indicates what status the FieldBus I/O Option have.

LED 1 and 2 are only for internal use at production.

LED 3 (green) indicates that the FieldBus communication is working and running.

LED 4 (red) indicates that external communication is broken.

LED 3 and 4 (red and green) indicates that the FieldBus I/O Option is trying to achieve internal communication with the product. This state is seen when the product is started. If the product is not correct set the Fieldbus I/O Option will remain in this state.

3.6 Recommendation

We suggest that installation, cables and connectors must be followed as specified by each fieldbus organisation.

4. ProfiBus - Dp

4.1 Introduction

PROFIBUS-DP is designed for high-speed data communication at the device level. Here, central controllers (e.g., PLC's/PC's) communicate with their distributed field devices (I/O, drives, valves, etc.) via a high-speed serial link. Most of the data communication with these distributed devices is done in a cyclic manner. The functions required for these communications are specified by the basic PROFIBUS-DP functions in accordance with EN 50 170.

4.2 Setting up

Before commencing communication with the FieldBus I/O option, the option and the product will need some settings. For product settings information see the product specific chapters.

4.2.1 Picture of interface

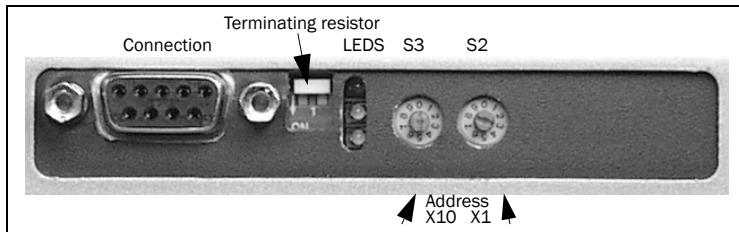


Fig. 4 Profibus interface.

4.2.2 Connection

Table 1 9-pin D-sub connector.

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

4.2.3 Address

Address can be set from 00 to 99 by rotary switches S2 and S3. To calculate the address, multiply S3's value by 10 and then add the values.

4.2.4 Baudrate

The baudrate is automatically selected from 9600 Baud to 12M Baud.

4.2.5 Termination

Termination of the fieldbus requires a terminating resistor at each end of the fieldbus. Switching S1 to ON can connect the termination resistor.

4.2.6 Led indication

Table 2 LED indication

Led	Colour	Function
Error	Red	Bus off/error
DIA	Green	Not implemented
Power	Green	Power on

5. DeviceNet

5.1 Introduction

DeviceNet is a low-cost communication link to connect industrial devices (such as limit switches, photo electric sensors, valve manifolds, motor starters, process sensors, bar code readers, variable frequency drives, panel displays and operator interfaces) to a network and eliminate expensive hardwiring. The direct connectivity provides improved communication between devices as well as important device-level diagnostics not easily accessible or available through hardwired I/O interfaces.

Before commencing communication with the FieldBus I/O option, the option and the softstarter will need some settings. For softstarter settings information, see chapter 7. on page 19.

5.2 Setting up

Before commencing communication with the FieldBus I/O option, the option will need some settings.

5.2.1 Picture of interface

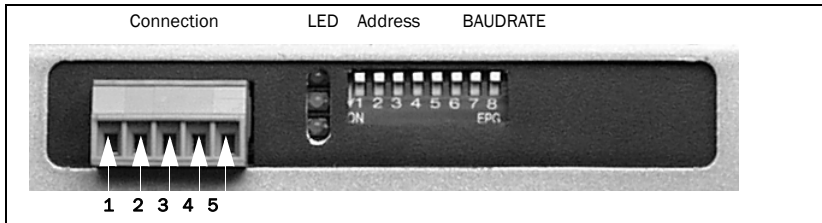


Fig. 5 DeviceNet interface.

5.2.2 Connection

Table 3 Connection

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

5.2.3 Address

The first 6 switches (DIP1-6) on the DIP switch selects the address. The address setting on the DIP switch is binary coded with LSB to the left.

5.2.4 Baudrate

There are three different baudrates for DeviceNet; 125k, 250k and 500kbit/s. Chose one of them by setting the switches (DIP 7-8) on the DIP switch before configuring.

Table 4 Baudrate

Baudrate (bit/s)	DIP 7-8
125k	00
250k	10
500k	01
Reserved	11

5.2.5 Termination

Termination of the fieldbus requires a terminating resistor at each end of the fieldbus. These resistors should have a value of 121 Ω . Connect resistor between screw terminal 2 and 4.

5.2.6 Led indication

Table 5 LED indication

Led	Colour	Function
Power	Green	Power on
Net 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
Address Overwritten	Red	Power on

6. RS-232

6.1 EmoSoftCom

This connection is mainly provided for the EmoSoftCom, a PC program. EmoSoftCom is a utility that will help customers to monitor and configure the MSF 2.0 softstarter.

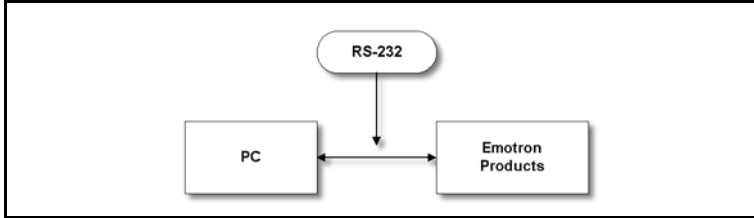


Fig. 6 RS-232 communication.

6.2 Modbus RTU and RS-232

For more information about this possibility, please see the Serial Communication Option Instruction Manual, which can be obtained from CG Drives & Automation.

6.3 Modes

To activate RS-232 communication mode, jumper must be in the RS-232 position. When jumper is in the FieldBus mode it is not possible to communicate with RS-232 and vice versa.

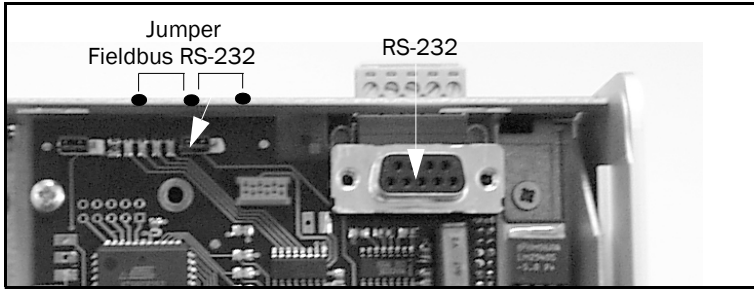


Fig. 7 RS-232 configuration.

6.4 RS-232 Connection

Table 6 RS-232 Connection

D-sub	Description
2	Tx
3	Rx
5	GND

7. Emotron MSF 2.0

NOTE: This chapter explains communication with fieldbus only.

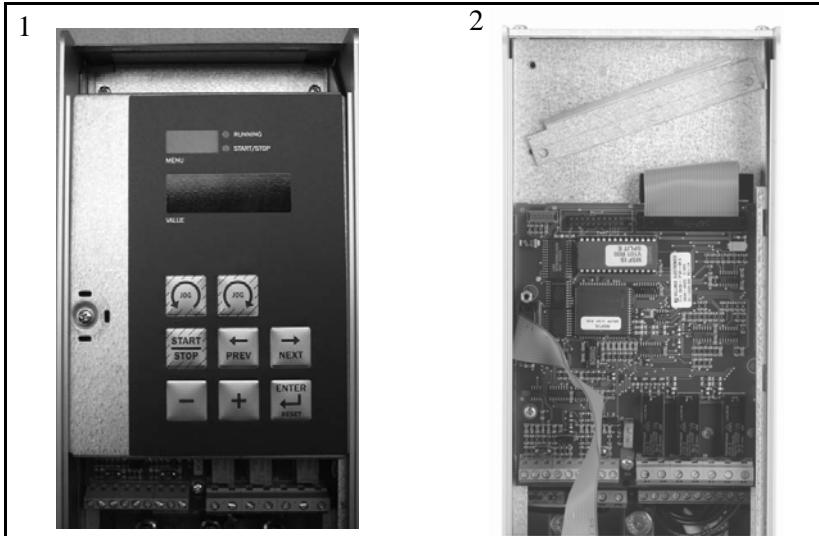
7.1 Response time

In normal case there is a 50-70ms response time. Due to variations in workload the response time can be up to 300ms.

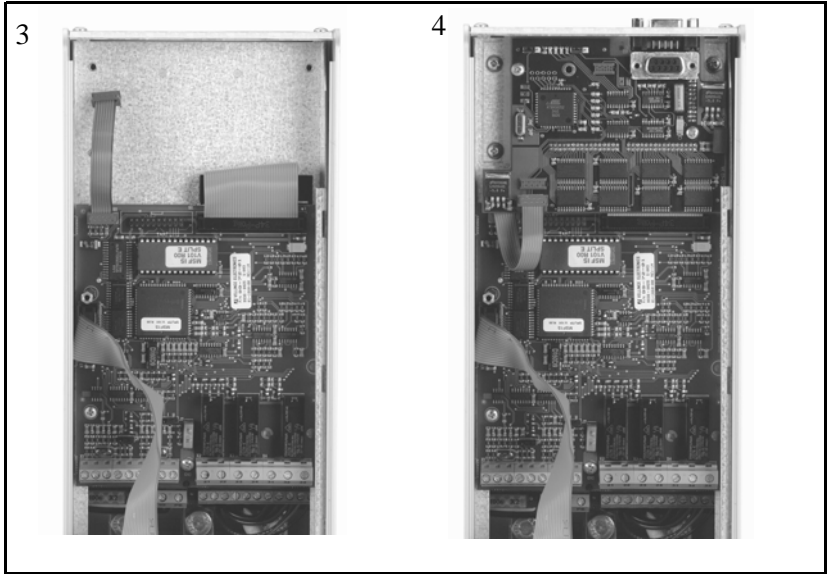
7.2 Installation in Emotron MSF-017 to MSF-145

The following figures show the installation of the FieldBus I/O option in Emotron MSF-017 to MSF-145.

Remove first the lid on the top side of the softstarter and then remove the control panel (1). Then remove the two screws and loosen the metal plate on the top (2).



Mount the option card according to the following pictures. Fasten the flat cable first (3) and then put the option card in position and fasten it with the screws again. Then connect the flat cable to the option card (4).

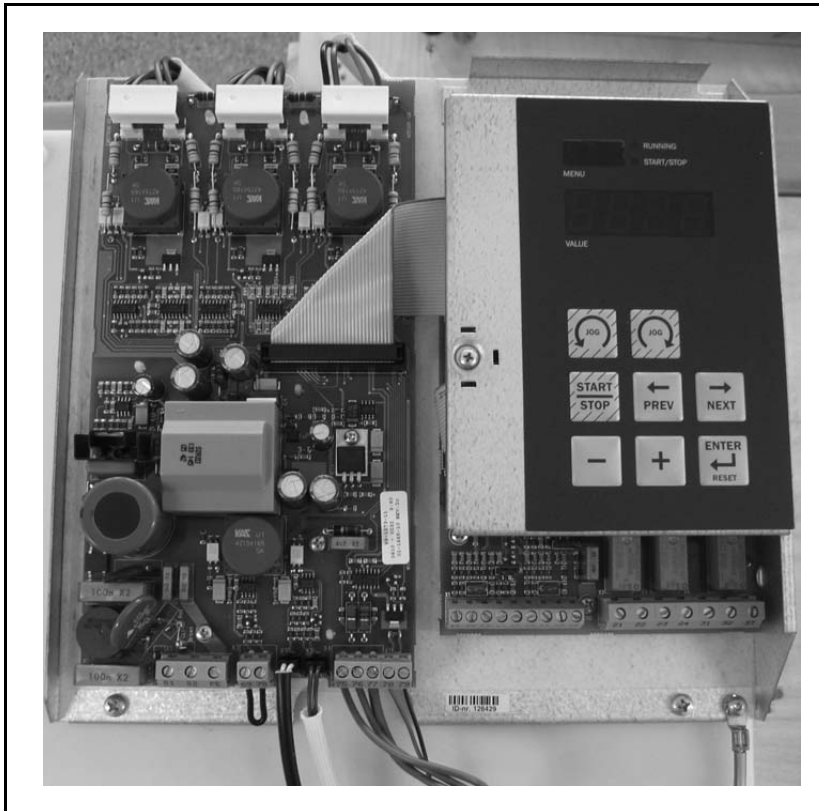


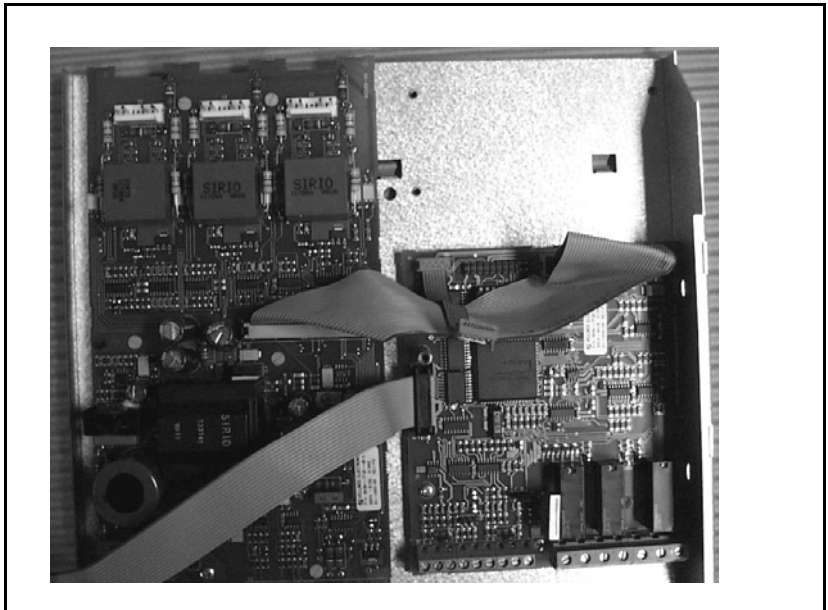
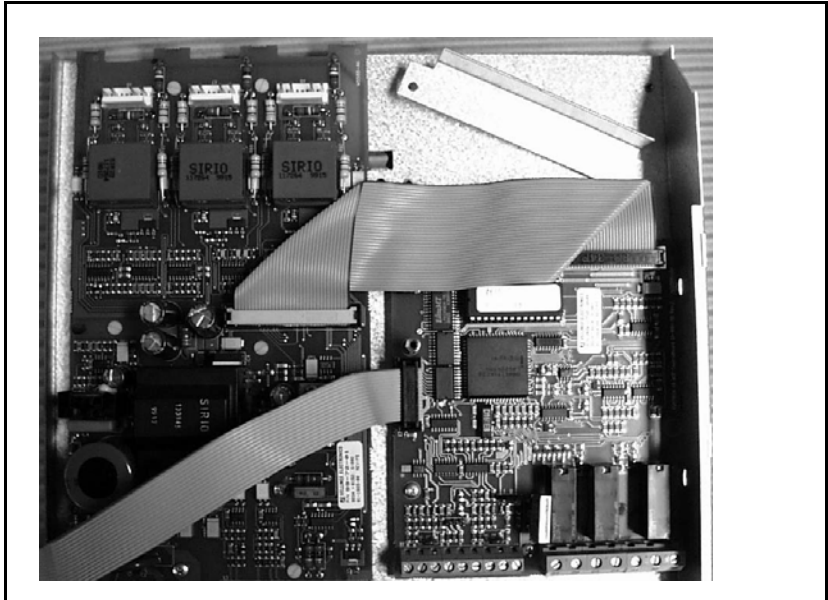
Put the control panel back on again (5).

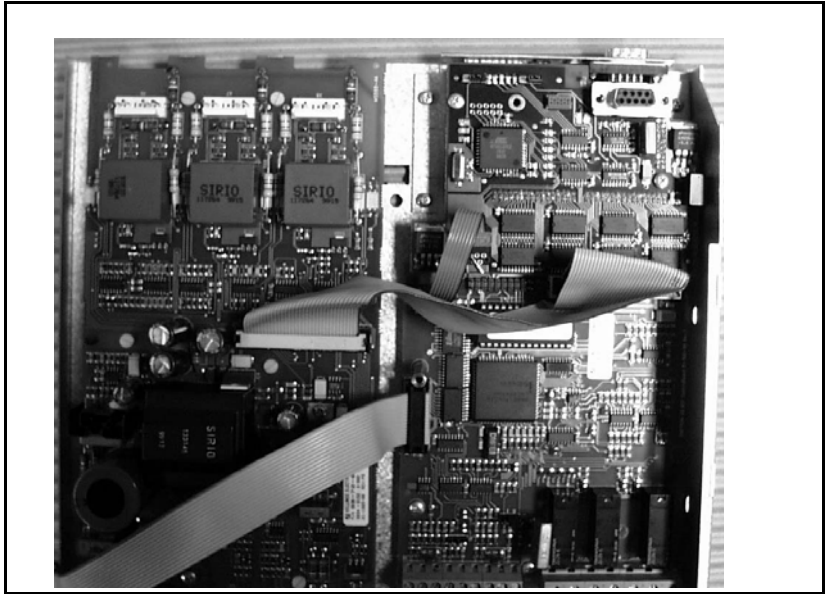


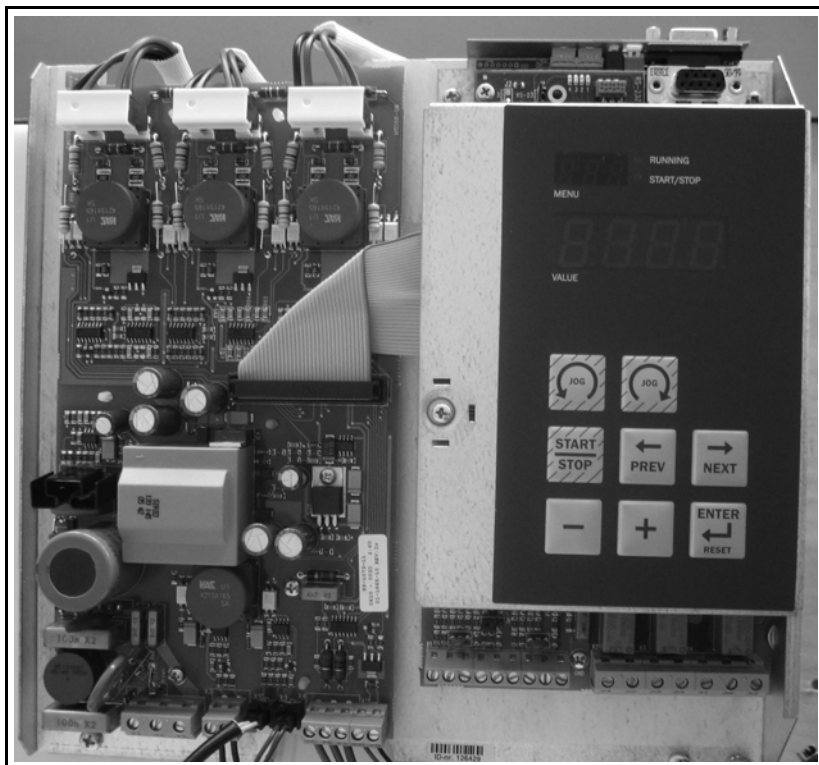
7.3 Installation in Emotron MSF-170 to MSF-1400

The following figures show the installation of the Fieldbus I/O option in Emotron MSF-170 to MSF-1400. Follow the instructions in section 7.2, page 19.









7.4 Set-up Communication Parameters

The following parameters have to be set-up on the softstarter:

- Unit address.
- Baud rate.
- Parity
- Behaviour when contact broken.

Setting up the communication parameter has to be done from the local MSF 2.0 control panel. For this purpose the softstarter has to be in control panel mode with the control source [200] set to 1 (Control panel) or 2 (Remote control) and the parameter set [240] set to any value but 0 (External control of parameter set). See also section 7.5, page 27.

Serial comm. unit address [270]

270	○ ○	Setting
Serial comm. unit address		
1		
Default:	1	
Range:	1-247	
1-247	Unit address.	

Serial comm. baudrate [271]

271	○ ○	Setting
Serial comm. baudrate		
9.6		
Default:	9.6 kBaud	
Range:	2.4 - 38.4 kBaud	
2.4-38.4	Baudrate.	

The baudrate has to be set to 19.2 kbaud for Fieldbus operation.

Serial comm. parity [272].

272	○ ○	Setting
Serial comm. parity		
0		
Default:	0	
Range:	0, 1	
0	No parity	
1	Even parity.	

Serial comm. broken alarm [273]

If the softstarter is configured for control via serial communications (menu [200] = 3) and the serial communication contact is broken during operation, an F15 alarm can be configured to occur. In this menu the alarm can be enabled and an action to be performed can be chosen. The following options are available:

OFF

Serial communication contact broken alarm is disabled.

WARNING

Alarm message F15 is shown in the display and relay K3 is activated (for default configuration of the relays). However, the motor is not stopped and operation continues. The alarm message will disappear and the relay will be reset when the fault disappears. The alarm may also be reset manually from the control panel.

COAST

Alarm message F15 is shown in the display and relay K3 is activated (for default configuration of the relays). The motor voltage is automatically switched off. The motor freewheels until it stops.

STOP

Alarm message F15 is shown in the display and relay K3 is activated (for default configuration of the relays). The motor is stopped according to the stop settings in menu [320] - [325].

BRAKE

Alarm message F15 is shown in the display and relay K3 is activated (for default configuration of the relays). The brake function is activated according to the braking method chosen in menu [323] and the motor is stopped according to the alarm brake settings in menu [326] - [327] (braking strength and braking time).

A serial communication broken alarm is automatically reset when a new start signal is given. The start signal can be given via control panel, remotely or via serial communication depending on the control source chosen in menu 200. Regardless of the chosen control source, it is always possible to initiate a reset via control panel.

<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="border: 1px solid black; padding: 2px;">273</div> <div style="border: 1px solid black; padding: 2px;">Setting</div> </div>	
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px;">o F F</div> <div style="text-align: left;"> <p>Serial comm. contact broken (alarm code F15)</p> </div> </div>	
Default:	2
Range:	oFF, 1, 2, 3, 4
oFF	Serial comm. contact broken disabled
1	Warning
2	Coast
3	Stop
4	Brake

7.5 Selection of control sources

Setting up the control source has to be done from the local MSF 2.0 control panel.

<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="border: 1px solid black; padding: 2px;">200</div> <div style="border: 1px solid black; padding: 2px;">Setting</div> </div>	
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px;"> <div style="border: 1px solid black; width: 20px; height: 20px; display: inline-block;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; display: inline-block;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; display: inline-block;"></div> <div style="border: 1px solid black; width: 20px; height: 20px; display: inline-block; text-align: center; vertical-align: middle;">2</div> </div> <div style="text-align: left;"> <p>Control source</p> </div> </div>	
Default:	2 (remote control)
Range:	1, 2, 3
1	Control panel.
2	Remote control.
3	Serial communication control.

In all control sources it is possible to readout all the bit map (see 7.8) information in the softstarter via serial communication.

7.6 Using serial comm. with Fieldbus

The source from where operation and parameter settings are made is selected in the control source parameter menu 200. When serial communication control source (menu 200=3) is selected, it is possible to:

- Operate the softstarter only via serial comm.
- Set-up parameters only via serial comm.
- Readout all bitmap information (see 7.8).
- Set-up the control source parameter from local MSF control panel.
- View all parameters from local MSF control panel.

7.7 Using serial communication with RS-232 Modbus RTU

The source from where operation and parameter settings are made is selected in the control source parameter menu 200 (see also the Serial Communication Manual which can be obtained from Emotron). When serial communication control source (menu 200=3) is selected, it is possible to:

- Operate the softstarter only via serial comm.
- Set-up parameters only via serial comm.
- Readout all view information and all parameters.
- Set-up the control source parameter from local MSF control panel.
- Inspect all parameters from local MSF control panel.

7.8 Map

7.8.1 Definitions

This is the definitions of bits and bytes.

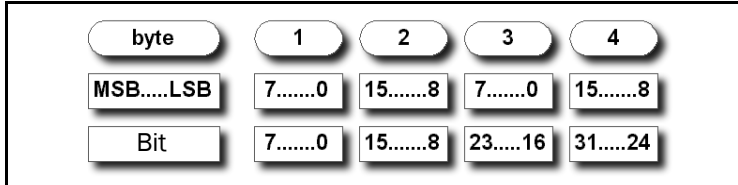


Fig. 8 Bytes.

Explanation:

- 0 -> 1 = edge triggered function, the switch from low to high activates the function once.
- 1 -> 0 = edge triggered function, the switch from high to low activates the function once.
- 1 = level triggered function which is active
- 0 = level triggered function which is not active

LSB (Least significant bit) has the lowest number for each function. For example: Parameter set = 1; bit 3=1, bit 4=0, bit 5=0

7.8.2 Request

Bit	Input to MSF	Setting	Comment	MSF Manual reference
0	Run / Stop	Run = 0 -> 1, Stop = 1 -> 0		
1	Alarm Reset	Reset = 0 -> 1		
2	Auto Set	Auto set = 0 -> 1	Sets the normal load for the load monitor.	See MSF manual

Bit	Input to MSF	Setting	Comment	MSF Manual reference
3	Parameter Set	BIT 5 4 3	Par set 0 = Parameter set selected via terminal 16 & 17.	See MSF manual
4		Par set 0 = 0 0 0		
5		Par set 1 = 0 0 1		
		Par set 2 = 0 1 0 Par set 3 = 0 1 1 Par set 4 = 1 0 0		
6	Jog Forward	Off = 0 On = 1	Only possible to use JOG function when softstarter is stopped	When using JOG function be sure not to overheat motor due to the decreased cooling. see MSF manual. menu [334] and [335] must be on.
7	Jog Reverse	Off = 0 On = 1	Only possible to use JOG function when softstarter is stopped	
8	View value selection	<u>BIT 12 11 10 9 8</u>	1=Current, menu [700]	Will not affect selected value for analogue output (terminal 19) see MSF manual
9		1 = 0 0 0 0 1	2=Line main voltage, [701]	
10		2 = 0 0 0 1 0	3=Output shaft power, [703]	
11		3 = 0 0 0 1 1	4=Power factor, [702]	
		4 = 0 0 1 0 0	5=Shaft torque, [705]	
12		5 = 0 0 1 0 1	6=Current phase L1, [708]	
		6 = 0 0 1 1 0	7=Current phase L2, [709]	
		7 = 0 0 1 1 1	8=Current phase L3, [710]	
		8 = 0 1 0 0 0	9=Line main voltage L1-L2, [711]	
		9 = 0 1 0 0 1	10=Line main voltage L1-L3, [712]	
		10=0 1 0 1 0	11=Line main voltage L2-L3, [713]	
		11=0 1 0 1 1	12=Used thermal capacity, [715]	
		12=0 1 1 0 0	13=Phase sequence, [714]	
		13=0 1 1 0 1	14=Input power	
	14=0 1 1 1 0			
13	Not used			
14	Not used			
15-31	Not used			

7.8.3 Response

Bit	Output from MSF	Setting	Comment	MSF Manual reference
0	Running/ Stopped	Running = 1, Stopped = 0		
1	Max pre- alarm status	Pre-alarm = 1 no pre-alarm =0		See MSF manual
2	Min pre- alarm status	Pre-alarm = 1 no pre-alarm=0		See MSF manual
3	Actual Parame- ter Set	BIT <u>5 4 3</u> Par set 1 = 0 0 1 Par set 2 = 0 1 0 Par set 3 = 0 1 1 Par set 4 = 1 0 0		See MSF manual
4				
5				
6	Operation mode	BIT <u>8 7 6</u> 1 = 0 0 1 2 = 0 1 0 3 = 0 1 1 4 = 1 0 0 5 = 1 0 1 6 = 1 1 0 7 = 1 1 1	1 = Voltage control 2 = Torque control 3 = Current limit control 4 = Voltage control with current limit 5 = Torque control with current limit 7 = Direct On-line	See MSF manual
7				
8				
9	Operation status	BIT <u>12 11 10 9</u> 1 = 0 0 0 1 2 = 0 0 1 0 3 = 0 0 1 1 4 = 0 1 0 0 5 = 0 1 0 1 6 = 0 1 1 0 7 = 0 1 1 1 8 = 1 0 0 0 9 = 1 0 0 1 10 = 1 0 1 0 11 = 1 0 1 1 12 = 1 1 0 0	1 = Stopped 2 = Stopped with alarm condition 3 = Run with alarm condition 4 = Run acceleration 5 = Run full voltage 6 = Run deceleration 7 = Run bypassed 8 = Run power factor control 9 = Brake 10 = Run at slow speed forward 11 = Run at slow speed reverse 12 = Standby (Waiting for analogue start/stop or autoreset)	
10				
11				
12				

Bit	Output from MSF	Setting	Comment	MSF Manual reference
13	control source	Serial comm. not active=0 Serial comm. active=1		
14	Autset status	Ready for new Autoset=0 New Autoset level OK=1	The Autoset status switch to low when input pin 2 is low.	
15	Alarm status	BIT 19 18171615	0 = No alarm	See MSF manual
16		0 = 0 0 0 0 0	F1 = Phase input failure	
17		F1 = 0 0 0 0 1	F2 = Motor protection	
18		F2 = 0 0 0 1 0	F3 = Softstarter overheated	
19		F3 = 0 0 0 1 1	F4 = Current limit start time expired	
		F4 = 0 0 1 0 0	F5 = Locked rotor	
		F5 = 0 0 1 0 1	F6 = Max power alarm	
	F6 = 0 0 1 1 0	F7 = Min power alarm		
	F7 = 0 0 1 1 1	F8 = Voltage unbalance		
	F8 = 0 1 0 0 0	F9 = Over voltage		
	F9 = 0 1 0 0 1	F10 = Under voltage		
	F10=0 1 0 1 0	F11 = Starts limitation		
	F11=0 1 0 1 1	F12 = Shorted thyristor		
	F12=0 1 1 0 0	F13 = Open thyristor		
	F13=0 1 1 0 1	F14 = Motor terminal open		
	F14=0 1 1 1 0	F15 = Serial com. broken		
	F15=0 1 1 1 1	F16 = Phase reversal alarm		
	F16=1 0 0 0 0	F17 = External alarm		
	F17=1 0 0 0 1			

Bit	Output from MSF	Setting	Comment	MSF Manual reference
20	View value	View value between 0 - 4000	FULL RANGE	Pn $T_n = \frac{P_n}{(N_n \cdot 2 \cdot \pi) / 60}$ Nn [rpm], set value in menu [213]
21			1 = Current, 5 X In [A], In set in menu [211]	
22			2= Line main voltage, 1,5 X Un[V], Un set in menu [210]	
23			3= Output shaft power, 1,5 X Pn [KW], set in menu [212]	
24			4= Power factor, 1.0	
25			5= Shaft torque, 2,5 x Tn	
26			6= Current phase L1, 5 X In [A], In set in menu [211]	
27			7= Current phase L2, 5 X In [A], In set in menu [211]	
28			8= Current phase L3, 5 X In [A], In set in menu [211]	
29			9= Line main, voltage L1-L2, 1,5 X Un[V], Un set in menu [210]	
30			10= Line main voltage L1-L3, 1,5 X Un [V], Un set in menu [210]	
31			11=Line main voltage L2-L3, 1,5 X Un [V], Un set in menu [210]	
			12=Used thermal capacity, 150 %	
			13=Phase seq., 1=321,2=123	
	14=Input power, 1,5 X Pn [kW or hp], Pn set in menu [212]			

7.9 Getting started - simple communication example

To obtain a connection to the MSF softstarter follow Quick Set-up in chapter 1. page 3 step by step. This example shows how to select a Parameter Set, select current as view value and to make a start.

- Set bit 4=1 to select Parameter Set 2, set all other bits to 0.
- Set bit 8=1 to select Current as view value.
- Set bit 0=1 to make a start.

The Bit Map in to MSF is now complete.

If everything went ok in the softstarter, the response in 'Pins Out MSF' will be as follows;

- Bit 0=1 Softstarter is running
- Bit 1-2=0, No Pre-alarms
- Bit 3=0, bit 4=1, bit 5=0, Actual Parameter Set is 2.
- Bit 6=0, bit 7=1, bit 8=0, default torque control.
- Bit 9=1, bit 10=0, bit 11=1, bit 12=0, Run acceleration.
- Bit 13=1, Serial comm. control source.
- Bit 14=0, No Auto Set.
- Bit 15-19=0, No alarm.
- Bit 31-20=00101000000=640, if nominal current is 17 A the actual current is $640/4000 \times 5 \times 17 = 13.6$ A

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