MANUAL

MJK PROFIBUS MANUAL 1311

PROFIBUS

Profibus Communication Module

a xylem brand

Table of Contents

1. Introduction

Thank you for choosing MJK PROFIBUS communication module. We have done our outmost to design and manufacture a high quality product that should satisfy your requirements.

The MJK modem and communication modules is easy to install in MJK Mag-Flux, SuSix and Oxix units and to put into service. However, read this manual first to learn more about the specifications, how to install and how to operate the equipment.

The equipment must be handled and operated as instructed by the manufacturer, MJK Automation A/S, to ensure stable operation.

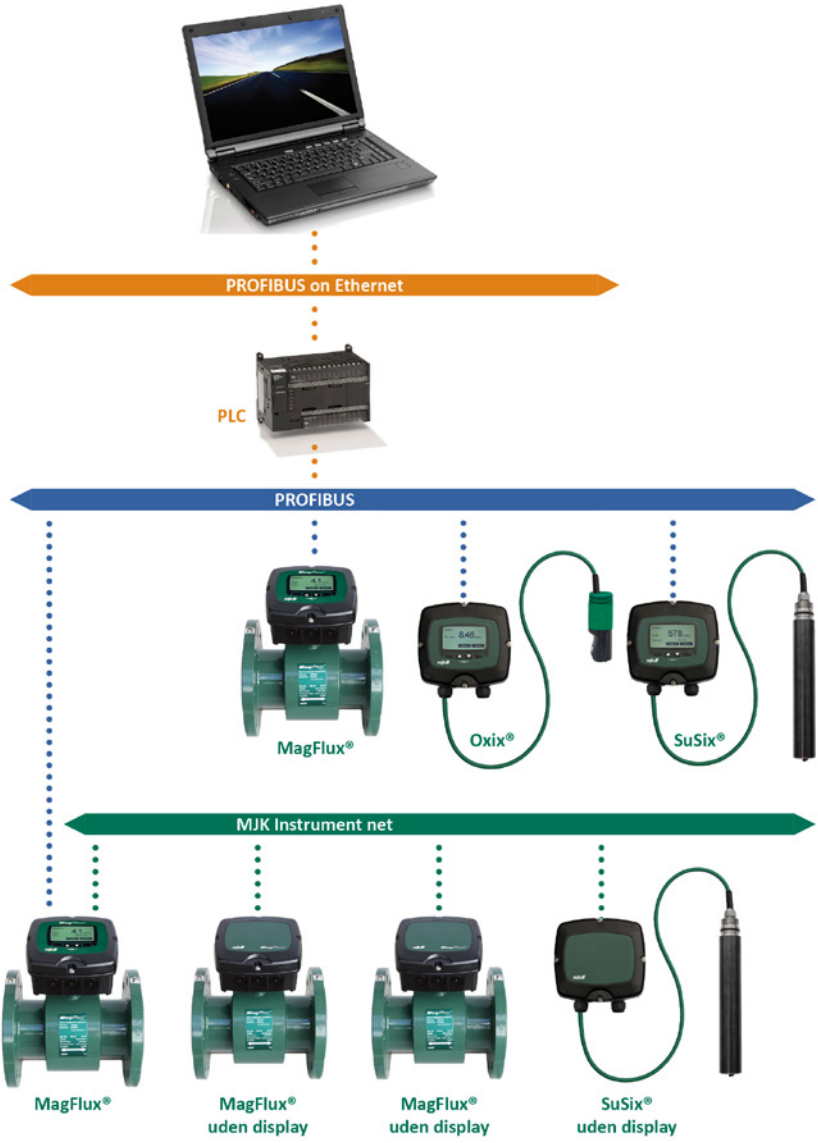
The MJK modem and communication modules can be obtained in several different versions supporting standard communication types and protocols like PSTN, GSM, GPRS, RS 232, RS 485, Modbus RTU, Profibus PA and Bluetooth. This manual covers Modbus RS 485.

You can always contact your local representative or the MJK hot line for advice and guidance:

- Tel.: +45 45 56 06 56 E-mail: mjk@mjk.com

Visit our web site at **www.mjk.com** to learn more about MJK Automation A/S, our products and the people behind them.

1.1 MJK Profibus Communication Overview



The Profibus communications module is transporting information from the individual MJK instrument such as Magflux.

The firmware of the display unit will automatically recognize the mounted communication module, and configuration menus will automatically be visible allowing connection to a PLC unit and other units.

Profibus is also creating a simple way of connecting up to 4 MJK instruments in a rapid communicating network, without additional equipment.

2. Profibus Communication Modules

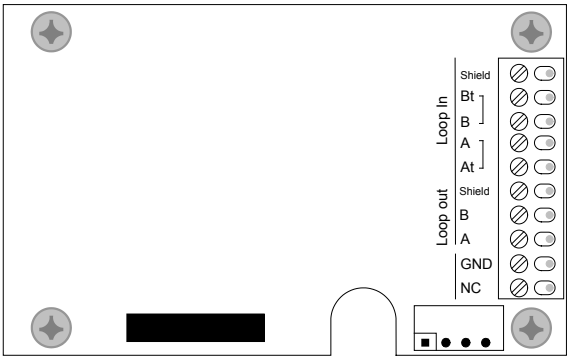


Figure 1. Profibus Communication Module

2.1 Version Requirements

The following software, firmware and hardware versions (or higher) are required for displays without an installed communication module:

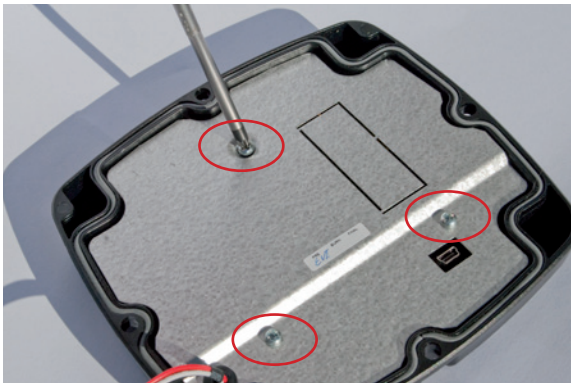
- Converter HW ver.: 807000
- Converter FW ver.: 845500-001
- Display HW ver.: 807056 (HW5)
- Display FW ver.; 841018-003
- Text file ver.: 841519-002
- MJK-Field Link ver.: 840110-051

2.2 Technical Specifications

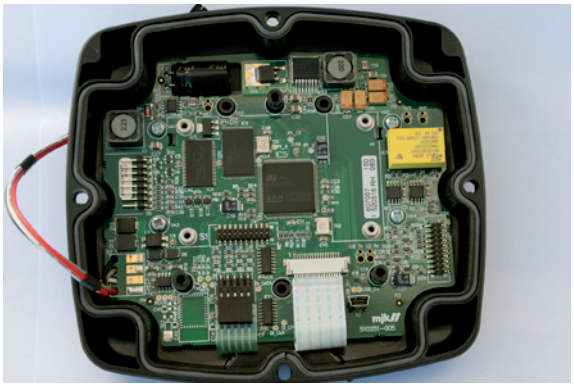
Profibus Communications unit	
Mounting	On backside of display unit
Dimensions	51 x 82 mm (H x W)
Connectors	Two 5-position plugable screw terminal
Temperature	-20 to +60 °C
LEDs	LEDs for “Rx”, “Tx”, “3V3”, “µc” and “prof”
Power consumption	Approx. 0.75 VA
Com. type	RS 485
Baud rate	Up to 12MB
Modbus ID offset	0 - 240
Protocol	Modbus RTU

The corresponding GSD File allows 244Bytes reading and 244Bytes writing to the converter.

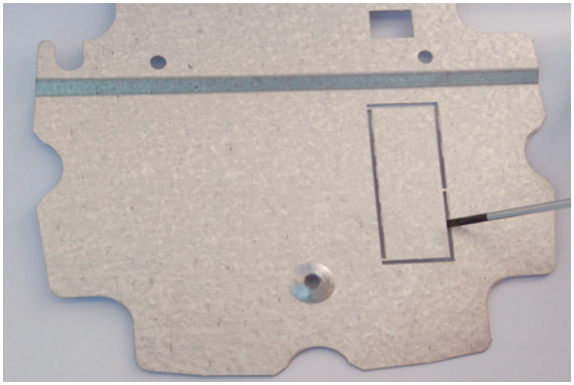
2.3 Mouting PROFIBUS



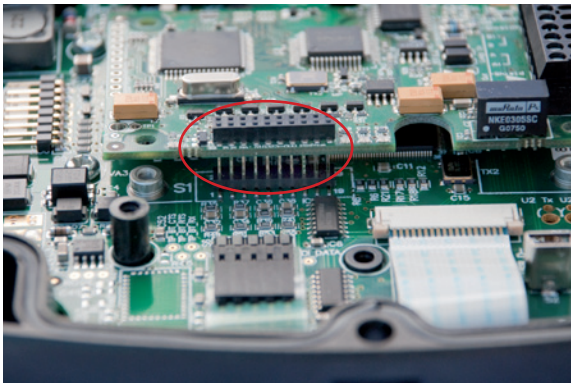
1. Dismount screws



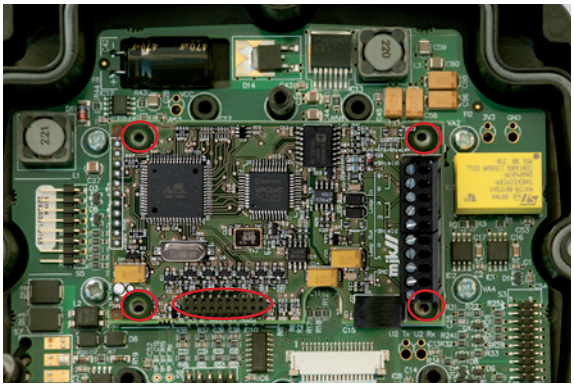
2. Remove back plate



3. Remove lid using screw-driver

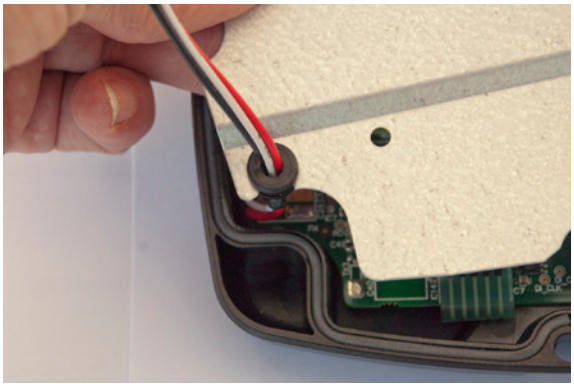


4. Align pins with contacts

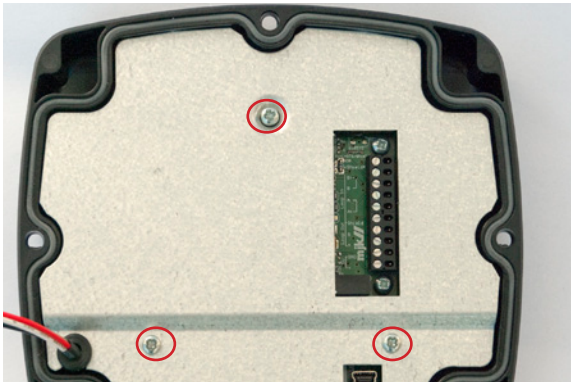


5. Check all pins are in place in the PROFIBUS slot and placing for screws

6. Secure module using 4 screws

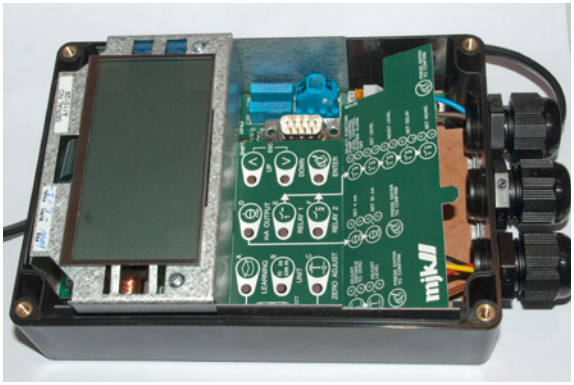


7. Ensure rubber protection for cable are in place

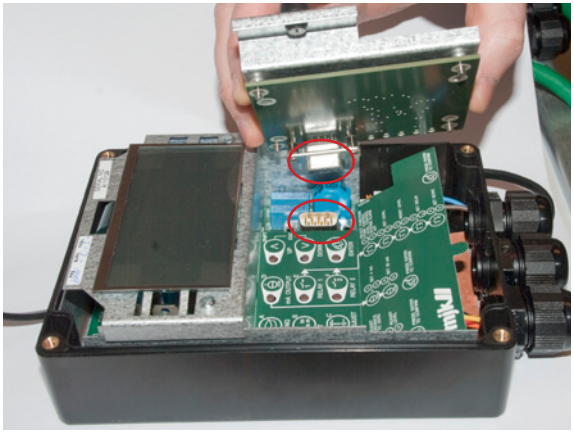


8. Remount back and secure using the screws

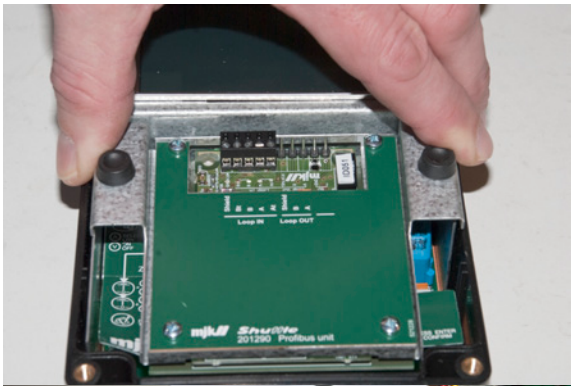
2.3.5 Mounting PROFIBUS on Shuttle



1. Remove front plate

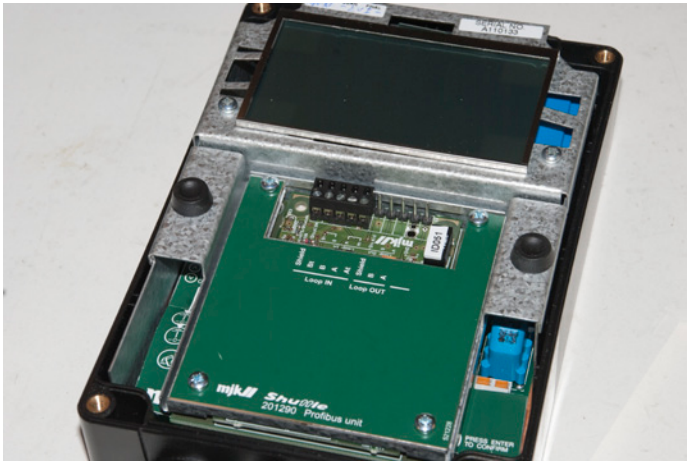


2. Align connectors



3. Push Profibus in place

4. Remount frontplate



2.4 LED Signals

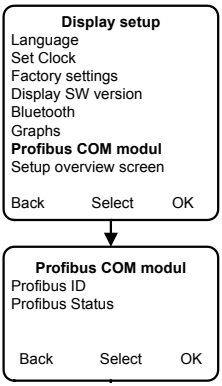
LED signals	
RX	Indicating that the module receives data from the display (Modbus Master)
TX	indicating that the module sends data to display (Modbus Master)
3V3	There is supply to the module from the display
prof	Indication of Profibus status Off = No DP Exchange / on = DP Exchange
uC	Indication of the module's status (LED is lit for 1/4s and 1/4s break, end signified by a break in 2s)
OFF	uC is not running

Status - LED signals (blinks per sequence)	
1	Profibus data exchange OK
2	Init Profibus in progress
3	Waiting for Profibus parameter
4	Waiting for Profibus configuration
5	Basic hardware Okay, //5 error
10	Profibus Data exchange is not ready
11	Profibus not offline error
12	Profibus DP Error
30	Fatal Error in Profibus hardware (Check connections and hardware. turn off power else replace Profibus module)

2.5 Configuration Remarks

The connected units on the Profibus COM module have unique assigned IDs built as follows:

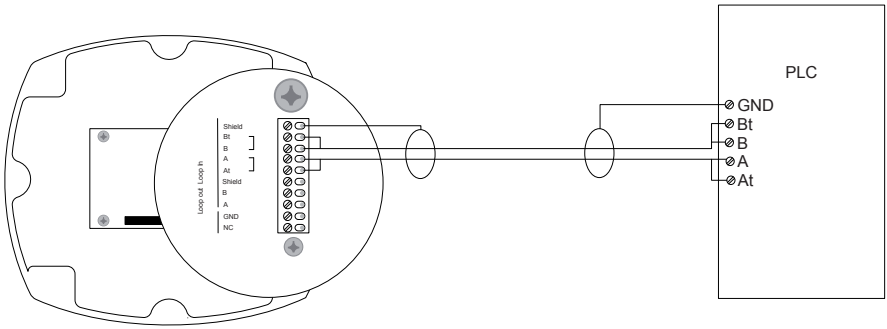
- SRO Modbus ID = Instrument Modbus ID + Modbus ID offset
- ID 0 (broadcast) cannot be used (a broadcast is used for synchronous transmission of messages to all connected units).
- Available registers are limited to the measured value registers of the indi vidual units. Configuration settings cannot be accessed.
- The PLC time-out on the Modbus must be set to 5 seconds from the SCADA system or the master PLC unit.
- COM module configuration/setup is executed from the “Display Setup/ Profibus COM module” menu (see below).
- The “Profibus COM module” option in the display menu automatically appears, when a communication module is connected to the display.



2.6 Connection Examples

2.6.1 One Connected Unit

This example illustrates connection, termination and ID configuration of a single unit with a communication module and a PLC.

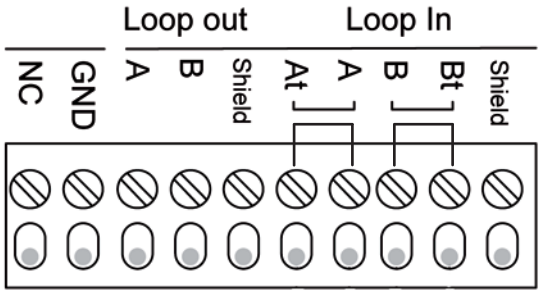


ID settings

205547 Profibus Default ID = 99

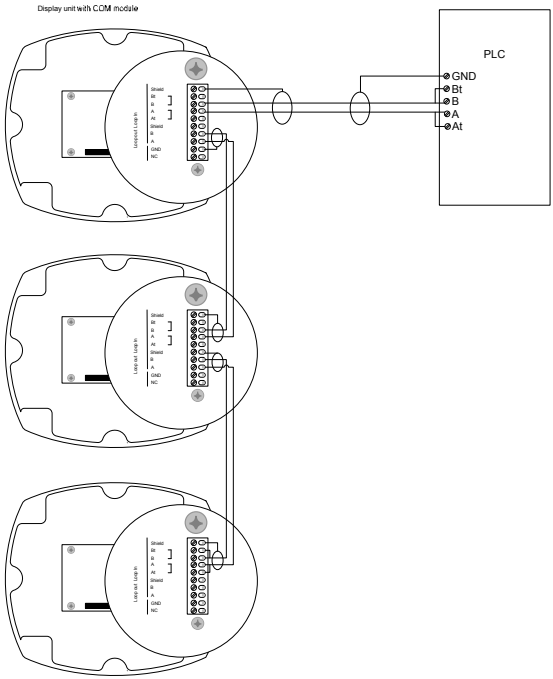
Termination

Modbus RS 485 communication requires bus termination. Therefore the connected COM module's termination dip switch is set in "ON" position.



2.6.2 Three Connected Units

This example illustrates connection, termination and ID configuration of three units each with a communication module and a PLC.



ID settings

Three Connected Units

Unit #1 ID=1

Unit #2 ID=2

Unit #3 ID=3

Default ID setting is 99

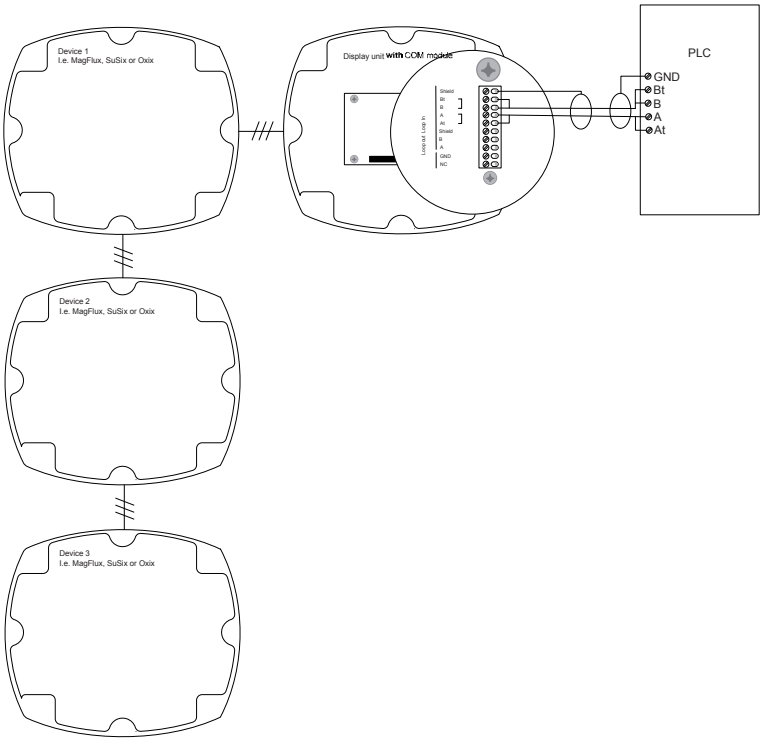
Termination

Profibus communication requires bus termination. If the PLC is terminated, Unit #3 requires Connection between A to At, and B to Bt

If, on the other hand, the PLC is **NOT** terminated, Unit #1 must also have Connection between A to At, and B to Bt

2.6.3 Three Connected Units and One Common Display

This example illustrates connection and ID configuration of for example three MagFlux units without display, one common, remote display unit with a communication module and a PLC unit.



ID settings

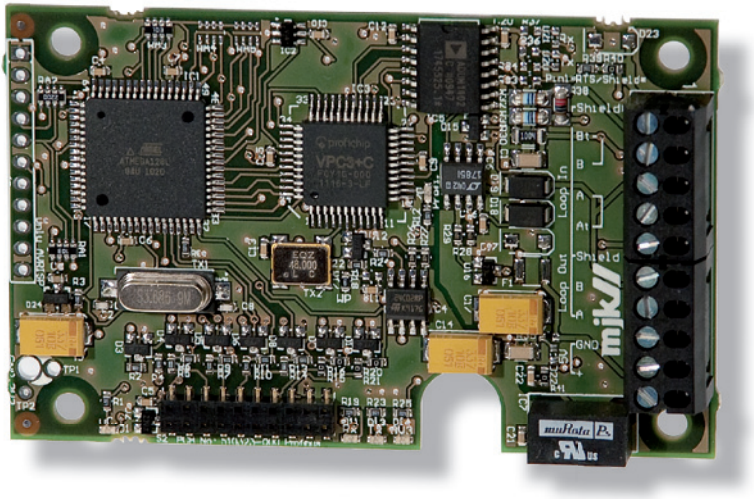
205547 Profibus Default ID = 99

Termination

Profibus communication requires Connection between A to At, and B to Bt

3. Order Numbers

Order number	Communication Module
205547	Profibus DP-V0 communications module



4. Register Lists

4.1 MagFlux Register List

- Date: 2009-03-10
- Firmware: 842009-001
- Protocol: Modbus RTU
- Transfer rate: 9600 baud
- Format for serial com: 1-Startbit, 8-Databits, 1-Parity (Even), 1-Stopbit
- Password: OFF (default)
- To set up the converter, use the MagFlux Display Unit

When a MagFlux Converter is connected to an external master, for example a PLC or an HMI interface, the MagFlux Display Unit can not be used simultaneous on the RS 485 communication port.

Support only Read is ”func. 03 (0x03) Read Holding Registers” or ”func. 04 (0x04) Read Input Registers” and write ”func. 16 (0x10) Write Multiple registers”

See register tables on the following pages.

Profibus					
"Offset Read Default"			Register name	Explanations	Device measure-ment Location
LowB	HighB	Type #	Status Com. Modul		Modbus adr.
0	1	B16	Profibus module - Control	Not implemted only reseved for Future use!!!!!	None - Done by profibus module
2	3	B16	Profibus module - Status	"{ On = 1 & Off = 0 } Bit 1 = Subnet(modbus) Rx Missing Alarm"	None - Done by profibus module
4	5	U16	Profibus module - Modbus Rx Counter	Subnet(modbus) RX Counter	None - Done by profibus module
6	7	U16	Profibus module - Modbus Tx Counter	Subnet(modbus) TX Counter	None - Done by profibus module
8	9	B16	Device Status	"Display device status for subnet(modbus) {Bit1 Device detected (Detected = 1)} {Bit2 Device Error (Error on = 1)} Bit 1..2 Device 1 Bit 3..4 Device 2 Bit 5..6 Device 3 Bit 7..8 Device 4 Reseved 9 - 16"	"None - Updated by Display (Modbus Master)"
LowB	HighB	Type #	MagFlux1 (Device 1)		
10	11	B16	System Error bit 1-16	See MagFlux Modbus Documentation	1001
12	13	B16	Alarm / Sensor Error	See MagFlux Modbus Documentation	1002
14	15	F32 {Low}	Flow now	Flow now [m3/sek]	600
16	17	F32 {High}	-	-	601
18	19	U64{1}	Total Forward Flow1 - LS word	Forward Total [mm3]	604
20	21	U64{2}	Total Forward Flow1 - 2	-	605
22	23	U64{3}	Total Forward Flow1 - 3	-	606
24	25	U64{4}	Total Forward Flow1 - MS word	-	607
26	27	U64{1}	Total Reverse Flow1 - LS word	Reverse Total [mm3]	610
28	29	U64{2}	Total Reverse Flow1 - 2	-	611
30	31	U64{3}	Total Reverse Flow1 - 3	-	612
32	33	U64{4}	Total Reverse Flow1 - MS word	-	613

Profibus					
"Offset Read Default"		Type	Register name	Explanations	Device measure-ment Location
LowB	HighB	#	Status Com. Modul		Modbus adr.
			MagFlux2 (Device 2)		
34	35	B16	System Error bit 1-16	See MagFlux Modbus Documentation	1001
36	37	B16	Alarm / Sensor Error	See MagFlux Modbus Documentation	1002
38	39	F32 {Low}	Flow now	Flow now [m3/sek]	600
40	41	F32 {High}	-	-	601
42	43	U64{1}	Total Forward Flow1 - LS word	Forward Total [mm3]	604
44	45	U64{2}	Total Forward Flow1 - 2	-	605
46	47	U64{3}	Total Forward Flow1 - 3	-	606
48	49	U64{4}	Total Forward Flow1 - MS word	-	607
50	51	U64{1}	Total Reverse Flow1 - LS word	Reverse Total [mm3]	610
52	53	U64{2}	Total Reverse Flow1 - 2	-	611
54	55	U64{3}	Total Reverse Flow1 - 3	-	612
56	57	U64{4}	Total Reverse Flow1 - MS word	-	613
LowB	HighB	#	MagFlux3 (Device 3)		
58	59	B16	System Error bit 1-16	See MagFlux Modbus Documenta-tion	1001
60	61	B16	Alarm / Sensor Error	See MagFlux Modbus Documenta-tion	1002
62	63	F32 {Low}	Flow now	Flow now [m3/sek]	600
64	65	F32 {High}	-	-	601
66	67	U64{1}	Total Forward Flow1 - LS word	Forward Total [mm3]	604
68	69	U64{2}	Total Forward Flow1 - 2	-	605
70	71	U64{3}	Total Forward Flow1 - 3	-	606
72	73	U64{4}	Total Forward Flow1 - MS word	-	607

Profibus					
"Offset Read Default"		Type	Register name	Explanations	Device measure-ment Location
LowB	HighB	#	Status Com. Modul		Modbus adr.
74	75	U64{1}	Total Reverse Flow1 - LS word	Reverse Total [mm3]	610
76	77	U64{2}	Total Reverse Flow1 - 2	-	611
78	79	U64{3}	Total Reverse Flow1 - 3	-	612
80	81	U64{4}	Total Reverse Flow1 - MS word	-	613
LowB	HighB		MagFlux4 (Device 4)		
82	83	B16	System Error bit 1-16	See MagFlux Modbus Documenta-tion	1001
84	85	B16	Alarm / Sensor Error	See MagFlux Modbus Documenta-tion	1002
86	87	F32 {Low}	Flow now	Flow now [m3/sek]	600
88	89	F32 {High}	-	-	601
90	91	U64{1}	Total Forward Flow1 - LS word	Forward Total [mm3]	604
92	93	U64{2}	Total Forward Flow1 - 2	-	605
94	95	U64{3}	Total Forward Flow1 - 3	-	606
96	97	U64{4}	Total Forward Flow1 - MS word	-	607
98	99	U64{1}	Total Reverse Flow1 - LS word	Reverse Total [mm3]	610
100	101	U64{2}	Total Reverse Flow1 - 2	-	611
102	103	U64{3}	Total Reverse Flow1 - 3	-	612
104	105	U64{4}	Total Reverse Flow1 - MS word	-	613

4.2 Oxix / SuSix Register List

- Date: 2009-03-10
- Firmware: 846001
- Protocol: Modbus RTU
- Transfer rate: 9600 baud
- Format for serial com: 1-Startbit, 8-Databits, 1-Parity (Even), 1-Stopbit
- Password: OFF (default)
- To set up the converter, use the SuSix/Oxix Display Unit

When a SuSix/Oxix Converter is connected to an external master, for example a PLC or an HMI interface, the SuSix/Oxix Display Unit can not be used simultaneous on the RS 485 communication port.

Support only Read is ”func. 03 (0x03) Read Holding Registers” or ”func. 04 (0x04) Read Input Registers” and write ”func. 16 (0x10) Write Multiple registers”

Profibus					
“Offset Read Default”		Type	Register name	Explanations	Device measure-ment Location
LowB	HighB	#	Status Com. Modul		Modbus adr.
LowB	HighB	#	Susix / Oxix 1 (Device 1)		
106	107	B16	System Error bit 1-16	See SuSix / Oxix Modbus Docu-mentation	1001
108	109	B16	Alarm Error	See SuSix / Oxix Modbus Docu-mentation	1002
110	111	B16	Sensor Error	See SuSix / Oxix Modbus Docu-mentation	1003
112	113	F32 {Low}	Susix / Oxix Primary Value	“Warning unit is depended on con-verter settings Susix Turbidity - NTU / Solid - mg/l Oxix % or mg/l”	606
114	115	F32 {High}	-	-	607
116	117	F32 {Low}	Susix / Oxix Sec-ondary Value	“Susix Standard deviation turbidity / solid [%] Oxix temperature grader °C”	608
118	119	F32 {High}	-	-	609

Profibus					
"Offset Read Default"		Type	Register name	Explanations	Device measure-ment Location
LowB	HighB	#	Status Com. Modul		Modbus adr.
LowB	HighB	#	Susix / Oxix 2 (Device 2)		
120	121	B16	System Error bit 1-16	See SuSix / Oxix Modbus Docu-mentation	1001
122	123	B16	Alarm Error	See SuSix / Oxix Modbus Docu-mentation	1002
124	125	B16	Sensor Error	See SuSix / Oxix Modbus Docu-mentation	1003
126	127	F32 {Low}	Susix / Oxix Primary Value	"Warning unit is depended on con-verter settings Susix Turbidity - NTU / Solid - mg/l Oxix % or mg/l"	606
128	129	F32 {High}	-	-	607
130	131	F32 {Low}	Susix / Oxix Sec-ondary Value	"Susix Standard deviation turbidity / solid [%] Oxix temperature grader °C"	608
132	133	F32 {High}	-	-	609
LowB	HighB	#	Susix / Oxix 3 (Device 3)		
134	135	B16	System Error bit 1-16	See SuSix / Oxix Modbus Docu-mentation	1001
136	137	B16	Alarm Error	See SuSix / Oxix Modbus Docu-mentation	1002
138	139	B16	Sensor Error	See SuSix / Oxix Modbus Docu-mentation	1003
140	141	F32 {Low}	Susix / Oxix Primary Value	"Warning unit is depended on con-verter settings Susix Turbidity - NTU / Solid - mg/l Oxix % or mg/l"	606
142	143	F32 {High}	-	-	607
144	145	F32 {Low}	Susix / Oxix Sec-ondary Value	"Susix Standard deviation turbidity / solid [%] Oxix temperature grader °C"	608
146	147	F32 {High}	-	-	609

Profibus					
"Offset Read Default"		Type	Register name	Explanations	Device measurement Location
LowB	HighB	#	Status Com. Modul		Modbus adr.
LowB	HighB	#	Susix / Oxix 4 (Device 4)		
148	149	B16	System Error bit 1-16	See SuSix / Oxix Modbus Documentation	1001
150	151	B16	Alarm Error	See SuSix / Oxix Modbus Documentation	1002
152	153	B16	Sensor Error	See SuSix / Oxix Modbus Documentation	1003
154	155	F32 {Low}	Susix / Oxix Primary Value	"Warning unit is depended on converter settings Susix Turbidity - NTU / Solid - mg/l Oxix % or mg/l"	606
156	157	F32 {High}	-	-	607
158	159	F32 {Low}	Susix / Oxix Secondary Value	"Susix Standard deviation turbidity / solid [%] Oxix temperature grader °C"	608
160	161	F32 {High}	-	-	609

4.3 mA Bus Converter Register List

- Date: 2009-03-10
- Firmware: 846001
- Protocol: Modbus RTU
- Transfer rate: 9600 baud
- Format for serial com: 1-Startbit, 8-Databits, 1-Parity (Even), 1-Stopbit
- Password: OFF (default)
- To set up the converter, use the SuSix/Oxix Display Unit

When a SuSix/Oxix Converter is connected to an external master, for example a PLC or an HMI interface, the SuSix/Oxix Display Unit can not be used simultaneous on the RS 485 communication port.

Support only Read is ”func. 03 (0x03) Read Holding Registers” or ”func. 04 (0x04) Read Input Registers” and write ”func. 16 (0x10) Write Multiple registers”

Profibus					
“Offset Read Default”		Type	Register name	Explanations	Device measure-ment Location
LowB	HighB	#	Status Com. Modul		Modbus adr.
LowB	HighB	#	mA Bus Converter (Device 1)		
162	163	B16	System Error bit 1-16	See mA Bus Converter Documentation	1001
164	165	B16	Alarm Error 1	See mA Bus Converter Documentation	1002
166	167	B16	Alarm Error 2	See mA Bus Converter Documentation	1003
168	169	B16	Digital input Bit 1-16	See mA Bus Converter Documentation	200
170	171	F32 {Low}	mA 1 Scaled	See mA Bus Converter Documentation	300
172	173	F32 {High}	-	-	301
174	175	F32 {Low}	mA 2 Scaled	See mA Bus Converter Documentation	304
176	177	F32 {High}	-	-	305

Profibus					
"Offset Read Default"		Type	Register name	Explanations	Device measure-ment Location
LowB	HighB	#	Status Com. Modul		Modbus adr.
LowB	HighB	#	mA Bus Converter (Device 2)		
178	179	B16	System Error bit 1-16	See mA Bus Converter Documentation	1001
180	181	B16	Alarm Error 1	See mA Bus Converter Documentation	1002
182	183	B16	Alarm Error 2	See mA Bus Converter Documentation	1003
184	185	B16	Digital input Bit 1-16	See mA Bus Converter Documentation	200
186	187	F32 {Low}	mA 1 Scaled	See mA Bus Converter Documentation	300
188	189	F32 {High}	-	-	301
190	191	F32 {Low}	mA 2 Scaled	See mA Bus Converter Documentation	304
192	193	F32 {High}	-	-	305
LowB	HighB	#	mA Bus Converter (Device 3)		
194	195	B16	System Error bit 1-16	See mA Bus Converter Documentation	1001
196	197	B16	Alarm Error 1	See mA Bus Converter Documentation	1002
198	199	B16	Alarm Error 2	See mA Bus Converter Documentation	1003
200	201	B16	Digital input Bit 1-16	See mA Bus Converter Documentation	200
202	203	F32 {Low}	mA 1 Scaled	See mA Bus Converter Documentation	300
204	205	F32 {High}	-	-	301
206	207	F32 {Low}	mA 2 Scaled	See mA Bus Converter Documentation	304
208	209	F32 {High}	-	-	305

Profibus					
"Offset Read Default"		Type	Register name	Explanations	Device measure-ment Location
LowB	HighB	#	Status Com. Modul		Modbus adr.
		#	mA Bus Converter (Device 4)		
210	211	B16	System Error bit 1-16	See mA Bus Converter Documentation	1001
212	213	B16	Alarm Error 1	See mA Bus Converter Documentation	1002
214	215	B16	Alarm Error 2	See mA Bus Converter Documentation	1003
216	217	B16	Digital input Bit 1-16	See mA Bus Converter Documentation	200
218	219	F32 {Low}	mA 1 Scaled	See mA Bus Converter Documentation	300
220	221	F32 {High}	-	-	301
222	223	F32 {Low}	mA 2 Scaled	See mA Bus Converter Documentation	304
224	225	F32 {High}	-	-	305

4.4 Shuttle Register List

SHUTTLE				
"Offset Read Default"		Type	Register name	Explanations
LowB	HighB	#	Status Com. Module	
		#	Shuttle	
226	227	B16	Status Error bit 1-16	0 = OFF, 1 = ON Bit 1: Measurement OK (No delay) Bit 2: Measurement Error (Inversed Measurement OK 1 min ON Delay) Bit 3: Sensor Error (Inversed Measurement OK 10min ON Delay) Bit 4:Temperature Error (if not between -50° and 80° and has 1min ON delay)
228	229	S16	Signal quality	Signal Quality [%] 0(Error) - 100%(Highest / best)
230	231	S32 {Low}	Level	Level -2E9 - 2E9 [mm]
232	233	S32 {High}		-
234	235	S32 {Low}	Distance to surface	Distance to surface -2E9 - 2E9 [mm]
236	237	S32 {High}		-
238	239	S16	Temperature	Teperature (Error if not between -50° and 80°C)

Liability

MJK Automation A/S is liable to the common rules of Danish law on product liability. However, the liability is reduced to coverage of our public liability insurance of products. To the extent where nothing else follows in lines of invariable rules of law, we are not liable for loss of profits and working deficits or other indirect losses.

Changes

As our products are developed continuously, we reserve the right to make any alterations without prior notice.

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