

Input/output card  
for Interbus-S

# **MP 926**

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## Safety instructions

Please read the following safety instructions carefully before installing and using the card.

- The intended use of the card (“purpose”) is described in this documentation and must be observed.
- The card may only be installed by a skilled electrician.  
The national regulations concerning
  - Prevention of accidents
  - Installation of electrical and mechanical systems
  - Radio interference suppressionmust be observed.
- The technical data of the card, in particular the ambient conditions, must be taken into account.
- The card should only be operated by trained personnel.
- Warranty will be voided by unauthorized modifications.
- Before installing accessories, please contact your BERGER LAHR Technical Consultant.
- The safety symbols and safety instructions on the card and in the documentation manual must be strictly observed.

## Explanation of symbols



### **ATTENTION**

*Indicates danger of damaging the card or other system components, with a potential consequential danger of injuries.*

### **DANGER**

*Indicates an immediate hazard for persons.*



### **DANGER**

*Shock hazard due to high voltage at component.*



### **DANGER**

*Hazard due to high temperatures at component.*



### **ATTENTION**

*ESD warning (Electro Static Discharge). The PC board or component may only be touched in an electrostatically protected environment.*



### **NOTE**

*Important or additional information on the card or on the documentation.*

**This documentation includes the following information which is required for operating the MP 926 input/output card:**

- the MP 926 input/output card for Interbus-S;**
- the RS 485 HS serial interface of the series 300 devices;**
- the additional functions of the BPRO3 programming system for the MP 926 input/output card.**

**The functions of the OED3 programming interface for the MP 926 input/output card are described in the OED3 documentation.**

1 General description

**Purpose** The MP 926 input/output card (fig. 1) is provided with 16 inputs and 16 outputs which can be addressed from a BERGER LAHR series 300 positioning unit with RS 485 HS interface or from a controller with Interbus-S master interface.

The MP 926 input/output card is provided with an Interbus-S slave interface. Communication is effected through a two-line remote bus.

**Connections** An interface cable is used as the link from the Interbus-S master interface on the controller to the Remote-in connector on the card (item 1). An additional card can be attached through the Remote-out connector (item 2).

**Supply voltage** The supply voltage is connected to the terminals 24V and GND (item 3). The second terminal pair is intended for extending the supply voltage line.

**Inputs and outputs** The inputs and outputs are terminated on the two terminal strips:  
 16 inputs I0 to I15 (item 4)  
 16 outputs Q0 to Q15 (item 5)

The signal states of the inputs and outputs are indicated by red LEDs (item 6).

**LEDs** Four LEDs (item 7) indicate the following status conditions after initialization of the Interbus-S system:

- RD (red) lights up if no other card is connected.
- RC (green) lights if the controller input wiring is correct; does not light when an Interbus-S reset occurs.
- BA (green) lights up when an Interbus-S transmission takes place.
- U (green) lights when the card is ready for operation.

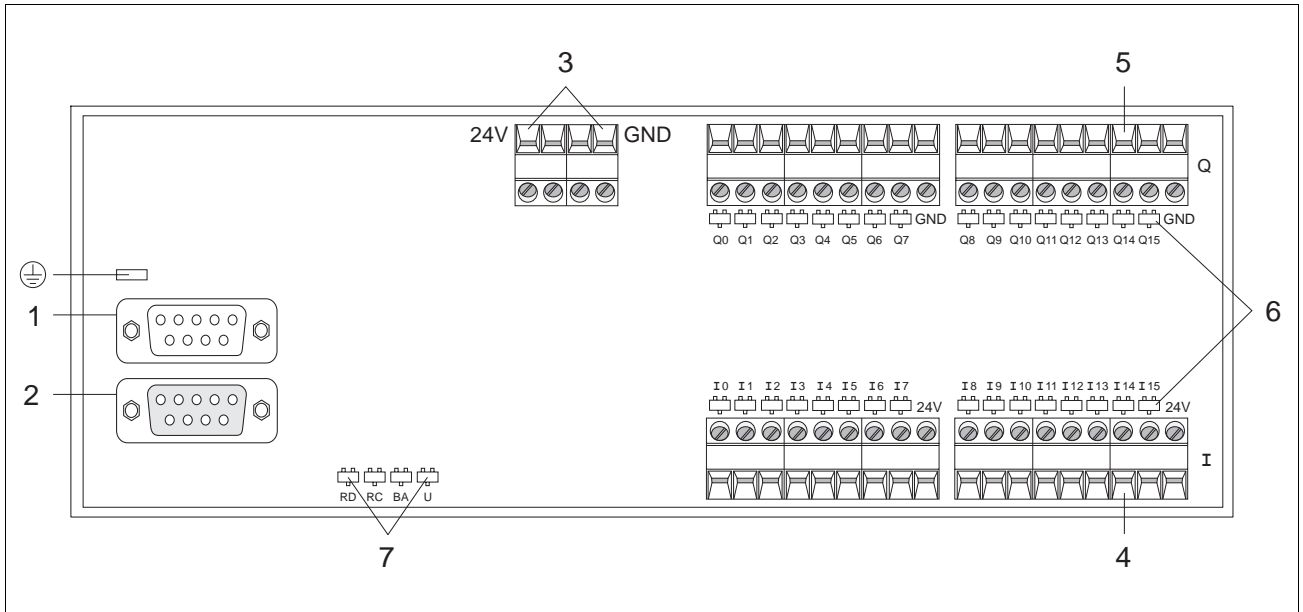


Fig. 1 MP 926 input/output card

## 2 Technical data

### Electrical data

Signal voltage	24 VDC
Operating voltage	20 VDC to 30 VDC
Maximum power consumption	400 mA
Maximum ripple voltage	2 V <sub>SS</sub>

### Electrical characteristics of the inputs

Typical signal voltage level	24 V
Maximum signal voltage level	30 V
Typical input current at 24 V	7 mA
Turn-on voltage	15 V
Settling time t <sub>E</sub>	1.0 to 1.5 ms

### Electrical characteristics of the outputs

Short-circuit protected, inductive loadability	
Maximum voltage	30 V
Maximum switching current	400 mA
Maximum voltage drop at 400 mA	2 V

### Mechanical data

Dimensions	approx. 225 x 80 x 32 mm
Weight	approx. 300 g
Maximum cable length between card and Interbus-S master interface	400 m

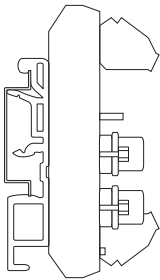
### Ambient conditions

Storage temperature	-25°C to +70°C
Operating temperature	0°C to 55°C
Humidity class	F acc. to DIN 40040
Noise immunity acc. to IEC 801-4	Severity 3
Overvoltage stability acc. to VDE 0160	Class 2

## 3 Scope of supply

Qty.	Designation	Order number
1	MP 926 incl. set of connectors	62020926000
1	MP 926 documentation	—

4 Assembly



With the foot, the MP 926 input/output card can be latched to the commonly used DIN EN mounting rails.

5 Wiring

5.1 Input/output card(s)



**DANGER**  
The supply voltage must be disconnected whenever wiring work is carried out.

- Solder the litz wires to the connectors.

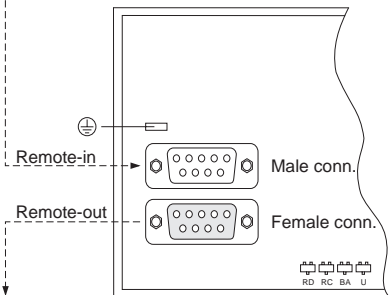
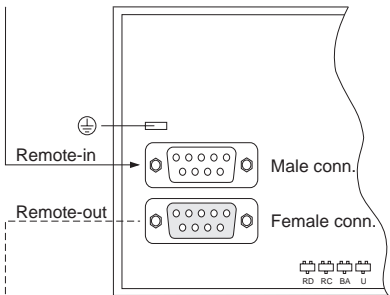
Remote-in connector

Pin	Signal	Meaning
1	TPDO1	Received data
2	TPDI1	Transmitting data
3	GND	Signal ground
4	–	–
5	–	–
6	$\overline{\text{TPDO1}}$	Inverted received data
7	$\overline{\text{TPDI1}}$	Inverted transmitting data
8	–	–
9	–	–

If another card is used, connect Remote-out to the Remote-in connector of the second card. Pins 5 and 9 on the Remote-out connector must be bridged.

Remote-out connector

Pin	Signal	Meaning
1	TPDO2	Transmitting data
2	TPDI2	Received data
3	GND	Signal ground
4	–	–
5	+5VDC	Supply voltage
6	$\overline{\text{TPDO2}}$	Inverted transmitting data
7	$\overline{\text{TPDI2}}$	Inverted received data
8	–	–
9	RBST	Additional card detection input



2. Connector assembly:

- Push the shield back and fix with a cable tie.
- Insert two hexagon head bolts into the connector shell.
- Place the connector into the connector shell.
- Fasten the cable and the shield to the connector shell with screws, providing for strain relief.



**ATTENTION**

***Ensure good electrical contact between the shield and the connector shell.***

***Connect the shield on both ends.***

- Assemble the two parts of the connector shell with two screws.

3. Fasten the connector to the card with screws.

4. Connect protective ground contact to protective ground using a short line (e.g. at PE terminal for DIN EN mounting rails).

5. Connect the inputs and outputs (see fig. 2).



**NOTE**

***All signal circuits are internally grounded via a 1 Mohm bleed resistor.***

6. Connect the voltage supply (see fig. 2).



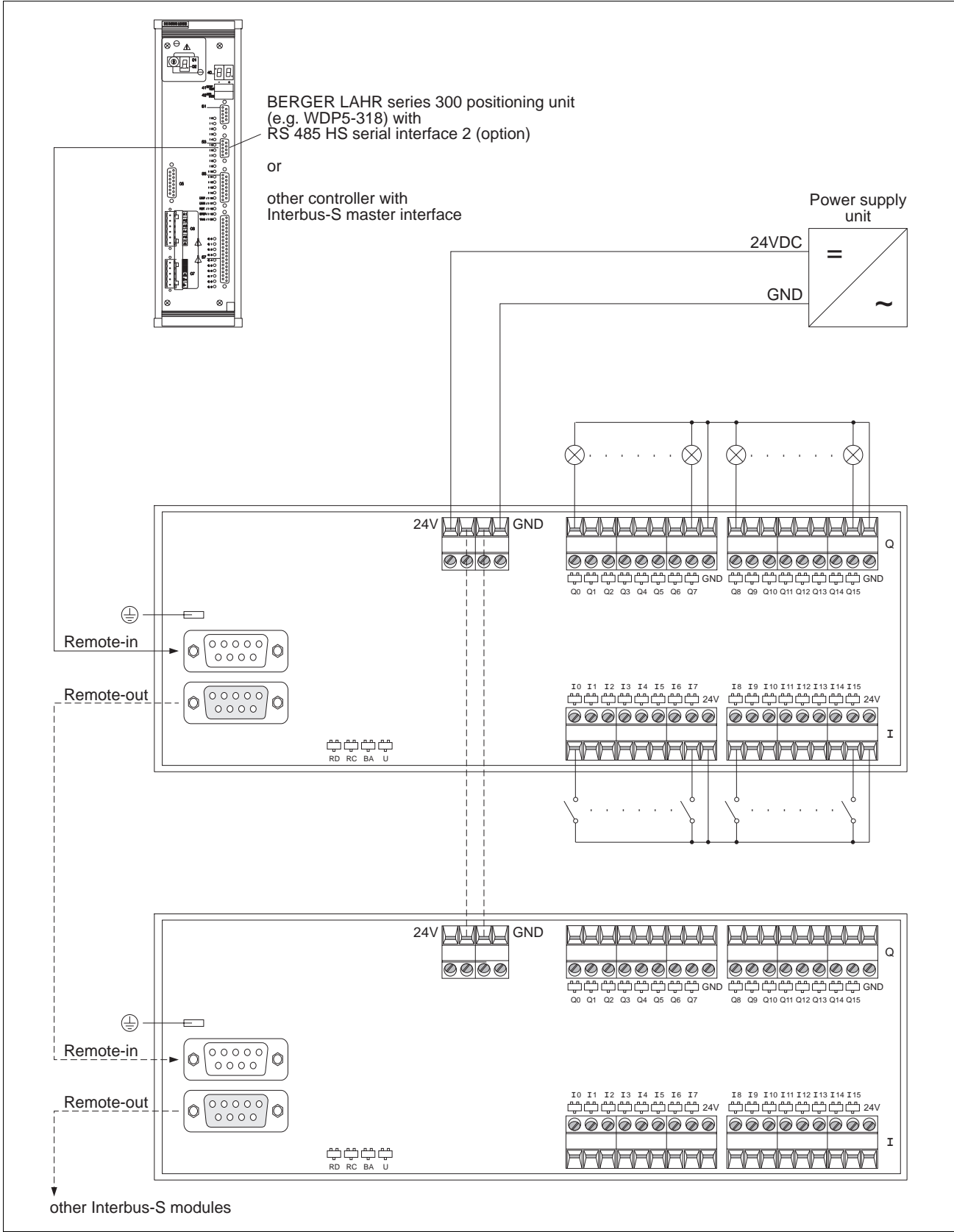


Fig. 2 MP 926 wiring layout

## 5.2 RS 485 HS serial interface

If a series 300 unit is equipped with the RS 485 HS serial interface, a two-line remote bus can be used for addressing the MP 926 input/output cards. The remote bus must not have any bus terminals branching to a periphery bus.

### Technical data

System requirements:

- Series 300 unit with RS 485 HS serial interface
- Maximum number of input/output cards
  - with series 300 operating system version 2.02 4 max.
  - from series 300 operating system version 2.03 10 max.
- BPRO3 programming system from version 3.11  
or
- OED3 programming interface from version 1.05

Update time

1 station (2-byte data)	approx. 4 ms
10 stations (20-byte data)	approx. 17 ms

Maximum cable length

400 m

### Wiring

1. Solder the litz wires to the connector as illustrated in fig. 3 and 4.

Pin	Signal	Meaning
1, 6	–	–
2, 7	GND	Supply voltage ground,
3	$\overline{\text{TPDO1}}$	Inverted transmitting data →
4	$\overline{\text{TPDI1}}$	Inverted received data ←
5	–	–
8	TPDO1	Transmitting data →
9	TPDI1	Received data ←

← Input      → Output

2. Push the shield back and fix with a cable tie.
3. Insert two hexagon head bolts (fig. 5) into the connector shell.
4. Place the connector into the connector shell.
5. Fasten the cable and the shield to the connector shell with screws, providing for strain relief.



#### **ATTENTION**

**Ensure good electrical contact between the shield and the connector shell. Connect the shield on both ends.**

- 6. Insert two caps into the unused cable entries.
- 7. Assemble the two parts of the connector shell with two screws.
- 8. Fasten the connector to the controller front panel with screws.

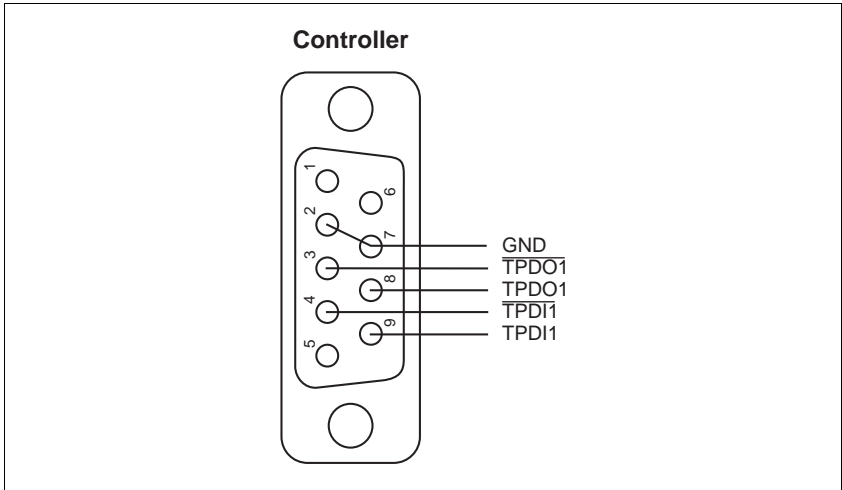


Fig. 3 Interface connector - device end

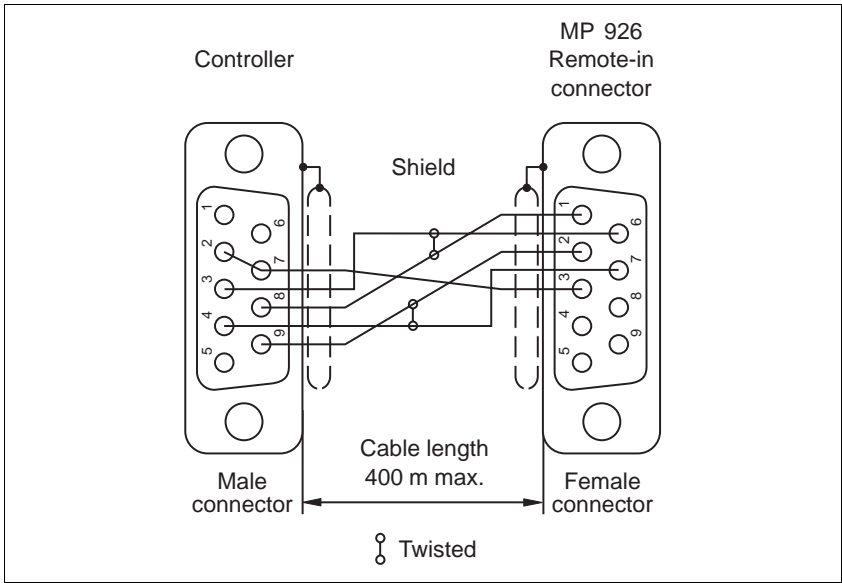


Fig. 4 Wiring the controller with the card

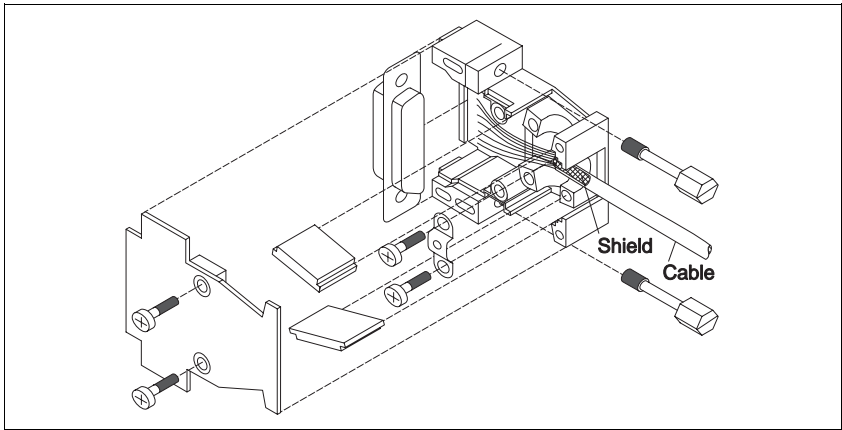


Fig. 5 Interface connector assembly

## 6 Setup

1. Switch off the positioning unit/controller.
2. Connect Remote-in to the controller's RS 485 HS interface.
3. Switch on the card's voltage supply.
  - The LED RD lights up.
  - If LED U is lit, this means "ready for operation".
4. Switch on the positioning unit/controller.
5. The LED RD goes out if another card or another Interbus-S module is connected.

## 7 Programming with BPRO3

The following Interbus-S functions are included in the BPRO3 controller library for use with the MP 926 input/output card.

### Initializing and starting

The "ibsm\_init" function initializes the card and starts Interbus-S mode. At the same time, the flag ranges for the external inputs and outputs are determined.

The external inputs and outputs are mapped in the controller's flag area (see fig. 6). Addresses can be freely assigned for the input and output ranges.



#### NOTE

*Ensure that the ranges do not overlap and that they do not include any unused flag words.*

Input/output updating is not synchronized with the PLC cycle. This means that any changes to the outputs are immediately transferred to the MP 926 input/output card; any changes to the inputs are immediately effective in the controller input area.

Input and output data can be accessed by bits, bytes or words.

### Statistics

The "getstatistic" function can be used for retrieving statistics.

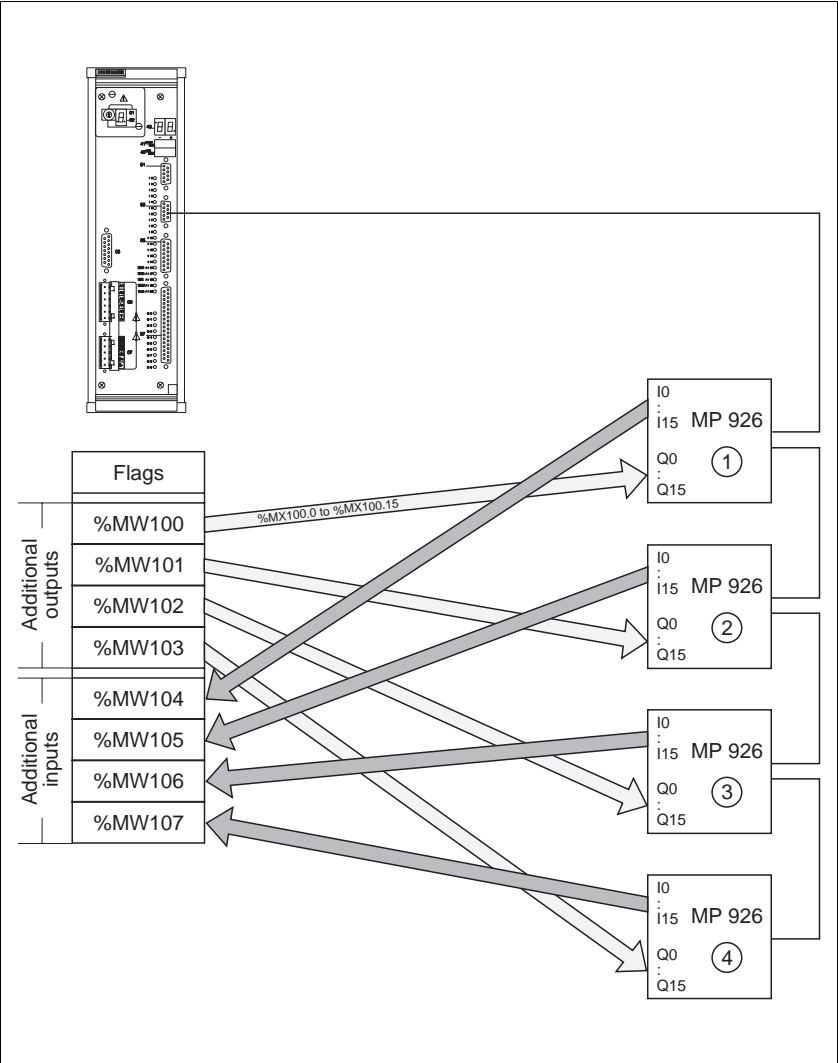


Fig. 6 Flag ranges for external inputs and outputs

**ibsm\_init, Interbus-S mode initialization**

**Description:**

The manufacturer-defined function "ibsm\_init" is used for initializing the serial interface c2 (RS 485 HS) as an Interbus-S interface. This involves specifying the number of Interbus-S stations and the flag addresses for the input and output data.

**Block header:**

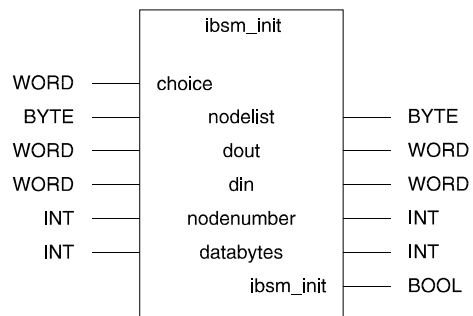
Name:            ibsm\_init  
 Type:            CONTROLLER\_FUN

VAR\_INPUT  
 choice           WORD  
 VAR\_END

VAR\_OUTPUT  
 ibsm\_init        BOOL  
 VAR\_END

VAR\_IN\_OUT  
 nodelist         BYTE  
 dout             WORD  
 din              WORD  
 nodenumber      INT  
 databytes        INT  
 VAR\_END

**FBD representation**



**Parameter:**

**Value/constant:**

**Description:**

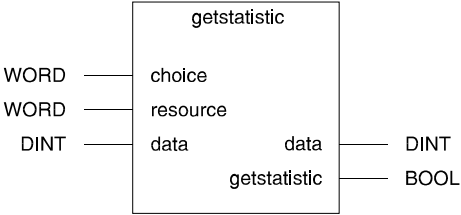
choice:	0	No function
nodelist:	–	Interbus-S station; 11-byte array: 10 bytes correspond to each station. The list must end with a zero (end-of-list identifier).
dout:	–	Position of the output data in the controller flag area
din:	–	Position of the input data in the controller flag area
nodenumber:	Value	Number of stations found in the ring
databytes:	Value	Number of data bytes found in the ring

<b>Programming example:</b>		<b>Comment:</b>
VAR		
nodelist	ARRAY(1...11) OF BYTE	1,1,1,1,0,0,0,0,0,0
nodenumber	INT	0
databytes	INT	0
VAR_END		
ld	0	Specify the flag range for four input/output cards
ibsm_init	nodelist(1),%MW100,%MW104,nodenumber,databytes	
jmpn	error	
<b>Function result:</b>		
TRUE: Function successfully executed. The “databytes” output variable contains the number of data bytes found in the ring. The number should correspond to the number of input and output data elements reserved in the flag area.		
FALSE: The Interbus-S could not find the number of stations specified in “nodelist”. The “nodenumber” variable specifies the last station found. Any subsequent station does not exist or is faulty. If “nodenumber” is equal to zero, the serial interface may be defective or not available.		

**Programming examples for addressing the external inputs and outputs:**

ld	%MX104.5	Read input bit I5 from card 1
ld	%MW106	Read input word I0 to I15 from card 3
ld	TRUE	Set output bit Q14 of card 2
st	%MX101.14	
ld	16#4711	Set output word Q0 to Q15 of card 4
st	%MW103	
ld	16#FF	Set output byte Q0 to Q7 of card 3
st	%MB205	

**getstatistic, Retrieving statistics information**

<p><b>Description:</b> The manufacturer-defined function “getstatistic” is used for retrieving statistics information.</p>		
<p><b>Block header:</b></p> <p>Name: getstatistic Type: CONTROLLER_FUN</p> <p>VAR_INPUT choice WORD resource WORD VAR_END</p> <p>VAR_OUTPUT getstatistic BOOL VAR_END</p> <p>VAR_IN_OUT data DINT VAR_END</p>		<p><b>FBD representation</b></p> 
<p><b>Parameter:</b></p> <p>choice:</p> <p>resource:</p> <p>data:</p>	<p><b>Value/constant:</b></p> <p>stat_cycles stat_errors stat_crcerr stat_lbterr stat_moderr</p> <p>m2</p> <p>Value</p>	<p><b>Description:</b></p> <p>Number of data cycles Total number of errors Number of checksum errors Number of loop backward errors Number of module errors</p> <p>Interbus-S interface</p> <p>Statistic value selected with the “choice” parameter</p>
<p><b>Programming example:</b></p> <pre> VAR   sdata      DINT VAR_END  ld          stat_errors getstatistic m2,sdata jmpn       error ld          sdata gt         0 jmpc       ibsm_error           </pre>	<p><b>Comment:</b></p> <p>0</p> <p>Retrieve the total number of errors</p>	
<p><b>Function result:</b> If the function is executed successfully (TRUE), the requested statistics value is stored in the “data” variable.</p>		



**System constants**

The system constants are WORD data type and include a defined bit pattern. The name of a system constant can be modified.

<b>System constant name</b>	<b>Meaning</b>	<b>Bit pattern</b>
m2	Interbus-S interface	16#6D01
stat_crcerr	Number of checksum errors	16#0003
stat_cycles	Number of data cycles	16#0001
stat_errors	Total number of errors	16#0002
stat_lbterr	Number of loop backward errors	16#0004
stat_moderr	Number of module errors	16#0005



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**Proposals  
Improvements**

**MP 926**

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