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Siemens S7 MPI

5.29 Siemens S7 MPI

5.29.1 General Information

TesiMod operator terminals can be connected in simple way to all controllers that support the Siemens protocol S7 MPI. The protocol Siemens S7 MPI enables the communication of an operator terminal with up to 8 other MPI participants simultaneously. The operator terminal has client - functionality for communication with the controller.

5.29.1.1 Hardware

TesiMod operator terminals are connected to the MPI bus via a MPI special interface. In this case attend to the rulles for the setup of a MPI bus system. Because the operator terminals do not offer a termination this must be performed external.

5.29.2 Protocol Parameters

5.29.2.1 Parameter Baud Rate

The baud rate in the operator terminal is firmly set to 187.5 kBit. In the S7-software the baud rate must be set correspondingly.

5.29.2.2 Parameter Delay Until Connection Setup

This parameter specifies the time the operating terminal waits before initiating communication.
Permitted values are in the range of 5 s to 255 s.
The default value is 5 s.

5.29.2.3 Parameter MPI - Address of the Terminal

This parameter indicates the station number for the operator terminal.
Permitted values are in the range of 3 to 126.
The default value is 3.

The MPI - address of the operator terminal can be changed during the operation. For this purpose it is necessary to install the **ComSlaveNr** system variable in an arbitrary I/O - mask. After a change of the MPI - address the operator terminal must the be switched off and on again.
By a further download of the application the value is overlaid again by the value that was specified in TSwin.

5.29.2.4 Parameter Maximum MPI - Address in the MPI Bus

This parameter indicates the highest number of a station within the MPI bus structure to be able to occur. This value must be identical for all participants within the bus structure.

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5.29.2.5 Parameter Connection List

The operator terminal can maintain simultaneously 8 connections with communication-capable modules at the MPI bus.
The connection list consists of 8 lines for the connections and 4 columns for the connection parameters.

MPI - address	indicates the address of the communication module	
Segment-ID	indicates the subnet in a S7-300/400 controller	default value = 1
Slot	indicates the slot number of the module	default value = 0
Rack number	indicates the rack number	default value = 0

With a direct connection, without subnet, only the MPI - address is to be indicated. All other entries can be left on the default values.

5.29.3 Data Types

Direct user access is possible to the following data types: Values that are designated with xxx are dependent on either the expansion of the controller and on the controller type.

Type	Description	From	To	DB Type	From	To	Access
Z	Counter	0	xxx				Read-Only
T	Timer	0	xxx				Read-Only
E	Input Bit	0.0	xxx.7				
EB	Input Byte	0	xxx				
EW	Input Word	0	xxx				
ED	Input Double Word	0	xxx				
A	Output Bit	0.0	xxx.7				
AB	Output Byte	0	xxx				
AW	Output Word	0	xxx				
AD	Output Double Word	0	xxx				
M	Flag Bit	0.0	xxx.7				
MB	Flag Byte	0	xxx				
MW	Flag Word	0	xxx				
MD	Flag Double Word	0	xxx				
DB	Data Block (Bit)	1	255	DBX	0.0	8191.7	
DB	Data Block (Byte)			DBB	0	8191	
DB	Data Block (Word)			DBW	0	8190	
DB	Data Block (Double Word)			DBD	0	8188	

Table 5.29-1: Data types

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5.29.3.1 Examples of the Variable List

The examples of the following table are supposed to clarify the input of addresses into the variable list of the TSwin.

Variable Name	Address	Connection
Example1	M 10.3	2
Example2	MB 10	3
Example3	MD 5	8
Example4	DB 10 DBB 20	1
Example5	DB 15 DBX 36.7	1

Table 5.29-2: Example of variable list in TSwin

5.29.3.2 Orientation of the Data Types

a) Alphanumeric texts
Alphanumeric texts are stored in the memory byte for byte in ascending address order.

b) Counter
Here is distinguished, whether this variable is assigned to a counter address or another PLC address.

Counter address
During the access on counter addresses the count value is interpreted in the binary format and the control bits of the counter are disabled. Therefore this access should be read-only to prevent deleting the control bits.
The count value is interpreted BCD coded so that it can be transferred within the PLC - program by means of the akku into the counter. This service should be used for the indirect writing of counter start values since the dates are available in Siemens format.

c) Timer
Timer functions consist of a time value and a time base. The terminal operates with imaginary unsigned 4-byte variables, even though the data stored in the PLC comprise only 2 bytes.
When read-accessing the timer, the terminal converts the time value and time base into a termanl-internal unsigned 4-byte number, wich represents the time value in reference to the time base of 0.01 seconds.
Example.: The time base setting 10 (time base is 1.0 seconds) and time value of 999 are represented or edited respectively, in the terminal by the value 99900. Scaling of this value to other value ranges is possible by specifying a factor and divisor within the variabe definition.
Before writing a timer variable to the PLC, the time value and the smallest possible time base are formed from the terminal-internal unsigned 4-byte value.
Further is distinguished, whether this variable was assigned to a timer or another PLC address.

Timer address
During the access on zimer addresses the time value is interpreted in binary format. This service should be used only in read mode in order not to delete the control bits of the timer.

All other addresses
The time value is interpreted BCD coded. This service should be used for the indirect writing of timer start values since the dates are available in Siemens format.

d) Floating decimal
These dates are interpreted in the IEEE floating point format.

e) Binary variables with 1, 2 or 4 length byte
Data with a length of 2 bytes are interpreted in the PLC-conformal byte order for words.
Data with a length of 4 bytes are interpreted in the PLC-conformal byte order for long words.

5.29.4 Poll Area

The poll area must be in the flag area or in a data block and can either be byte or word-structured (MB, MW, DBB, DBW).

Example: Byte-structured poll area starting at MB12

Byte Address	Reference	Description
Byte Address + 0	MB12	Write Coordination Byte
Byte Address + 1	MB13	Message Channel High Byte
Byte Address + 2	MB14	Message Channel Low Byte
Byte Address + 3	MB15	Function Keys LED 1 to 4
Byte Address + 4	MB16	Function Keys LED 5 to 8
Byte Address + 5	MB17	Function Keys LED 9 to 12
Byte Address + 6	MB18	Function Keys LED 13 to 16
Byte Address + 7	MB19	Function Keys LED 17 to 20
Byte Address + 8	MB20	Function Keys LED 21 to 24
Byte Address + 9	MB21	Function Keys LED 25 to 28
Byte Address + 10	MB22	Function Keys LED 29 to 32

Table 5.29-3: Byte-structured poll area

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Example: Word-structured poll area starting at MW20

Word Address	Reference	High Byte	Low Byte
Word Address + 0	MW20	Write Coordination Byte	Reserved
Word Address + 1	MW21	Message Channel High Byte	Message Channel Low Byte
Word Address + 2	MW22	Function Keys LED 1 to 4	Function Keys LED 5 to 8
Word Address + 3	MW23	Function Keys LED 9 to 12	Function Keys LED 13 to 16
Word Address + 4	MW24	Function Keys LED 17 to 20	Function Keys LED 21 to 24
Word Address + 5	MW25	Function Keys LED 25 to 28	Function Keys LED 29 to 32

Table 5.29-4: Word-structured poll area

5.29.5 Parallel message system

The range for the parallel message system must be in the flag area or in a data block and can either be byte or word-structured (MB, MW, DBB, DBW).

Example: Word-structured message system starting at MW10

Word Address	Reference	High Byte	Low Byte
Word Address + 0	MW10	Messages 0 to 7	Messages 8 to 15
Word Address + 2	MW12	Messages 16 to 23	Messages 24 to 31
Word Address + 4	MW14	Messages 32 to 39	Messages 40 to 47

Table 5.29-5: Word-structured message system

5.29.6 Physical Interfacing

Pin	Designation	Function
1	nc	not connected
2	nc	not connected
3	RxD/TxD-P	Receive / Transmit Data Plus
4	CNTR-P	Controller Signal for Repeater Plus
5	DGND	Data Reference Potential
6	VP	Power Supply for the Termination Resistors Plus
7	nc	not connected
8	RxD/TxD-N	Receive / Transmit Data Minus
9	CNTR-N	Controller Signal for Repeater Minus

Table 5.29-6: Pin assignment X2 MPI interface

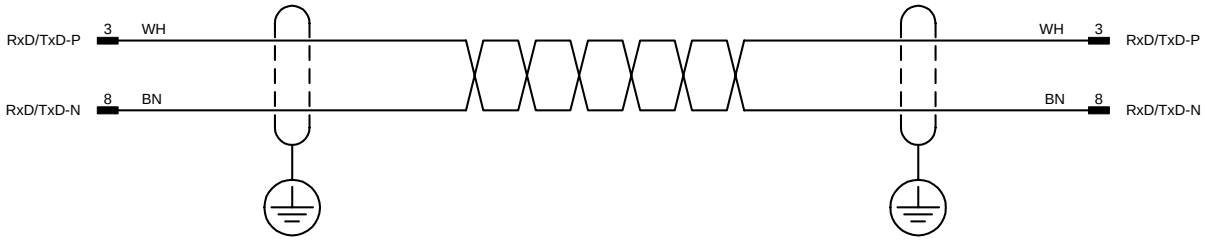
5.29.6.1 Connecting Cable MPI

In general all cables which correspond to the following parameters can be used:
- Loop resistance of 110 Ohm/km
- Operations capacity 30 nF/km
- Surge impedance 150 Ohm

The maximum length of a segment must not exceed 50 m.
You take further specifications of the installation from the handbook please
Installation manual S7-400, M7-400, C79000-G7000-C400-01
from the Siemens company.

TesiMod
Operator terminal

Siemens PLC
S7-MPI



D-Subminiature
Male Connector
9-polig

D-Subminiature
Male Connector
9-polig

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5.29.7 Error Messages

The following error messages are indicated at the operator terminal as COMMUNICATION ERROR.

During the connection set up process:

Code 50 CONNECTION SETUP
Subcode
- 10 NOT_IN_LAS ..... Addressed station is not at the bus
- 20 ABLEHNUNG ..... Connection interrupted by remote station

During the transmission of the telegram:

Code 60 TELEGRAMM_SENDEN
Subcode
- 10 REQUEST_QUEUE_VOLL
- 20 KEIN_CREDIT

Code 61 CONF_STATUS_FC
Subcode
- 1/33/49 ..... SAP is locked. If this error occurs, it is to be checked whether all participants in the bus have set the same maximum MPI address.
- 2/34/50 ..... No resource available to send data
- 3/35/51 ..... No Service activates

Code 62 CONF_STATUS_SPC2
Subcode
- 159 No access possible
- 175 Double token recognized
- 191 Response buffers too small

Code 70 DISCONNECT REMOTE ..... The connection was interrupted by the controller.

Code 80 SPCINT_ERROR ..... Reported error by interrupt
Subcode
- < 256 Contains interrupt bit of low byte
- >255 Contains interrupt bit of high byte

Code 90 TELEGRAMM_EMPFANGEN
Subcode
- 10 INDICATION_TIMEOUT ..... The addressed station does not answer within 5 seconds
- 20 INDICATION_INVALID_DATA ..... The data are invalid

Code 100 PDU_BEZIEHUNG_AUFBAU ..... Error class in the high byte, error code in the low byte

Code 110 PDU_VARIABLE_LESEN ..... Error class in the high byte, error code in the low byte

Code 111 PDU_VARIABLE_LESEN
Subcode
- 01 Hardware faults
- 03 Object access is not allowed
- 05 Invalid address
- 06 Data type is not supported
- 07 Data type not consistent (Type >< Data type)
- 10 Object does not exist or wrong field length

Code 120 PDU_VARIABLE_SCHREIBEN
Subcode ..... Error class in the high byte, error code in the low byte

Code 121 PDU_VARIABLE_SCHREIBEN ..... Error class in the high byte, error code in the low byte

Subcode
- 01 Hardware faults
- 03 Object access is not allowed
- 05 Invalid address
- 06 Data type is not supported
- 07 Data type not consistent (Type >< Data type)
- 10 Object does not exist or wrong field length

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