Function block library

Modbus_RTU_9

for PLCnext Engineer

Documentation for
PHOENIX CONTACT function blocks
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This documentation is available in English only.

Table of Contents

1 Installation hint

If you did not specify a different directory during **library** installation all data in the MSI file will be unpacked to

c:\Users\Public\Documents\Phoenix Contact Libraries\PLCnext Engineer (former: PC Worx Engineer)

Please copy the library data to your PLCnext Engineer (former: PC Worx Engineer) working library directory.

If you did not specify a different directory during **PLCnext Engineer** installation the default PLCnext Engineer working library directory is

c:\Users\Public\Documents\PLCnext Engineer\Libraries (former: PC Worx Engineer\Libraries)

2 General information

Modbus is a communication protocol used for serial communication. It is a master/slave protocol. Only one master is connected to the bus at a time. In addition, one or more slaves (247, maximum) are connected to the same serial bus.

Modbus communication is always initiated by the master. The master sends a request, then the slave specified in the request responds. It is possible to send a request to all slaves (broadcast). The slaves will never transmit data without receiving a request from the master. In addition, the slaves do not communicate with each other. The master initiates only one Modbus transaction at a time.

There are four data types stored in a Modbus device memory: discrete inputs (bits), coils (bits), holding registers (16-bit registers), and input registers (16-bit registers).

3 Change notes

Library version	Library build	PLCnext Engineer version	Change notes	Supported PLCs
9	20200422	>= 2020.0 LTS	MB_AXL_F_RSUNI_Master & MB_AXL_SE_RS485_Master: • Modified activate and deactivate procedure. • xActive = TRUE if all internal FBs are active.	AXC F 1152 (1151412) AXC F 2152 (2404267) AXC F 3152 (1069208)
9	20200408	>= 2020.0 LTS	MB_RTU_Master: • Modified timeout handling. • Deactivation after PD-Timeout. MB_RTU_FCx: • New timeout between FC and Modbus_Master. New function blocks: • MB_AXL_F_RSUNI_Master • MB_AXL_F_RSUNI_Slave • MB_IL_232E_Master • MB_IL_232E_Slave • MB_IL_232P_Master • MB_IL_232P_Slave • MB_IL_485P_Master • MB_IL_485P_Slave • MB_IL_485E_Master • MB_IL_485E_Slave MB_RTU_Master / Slave and MB_AXL_RS_UNI_RCV / SND transfered to MB_RTU_AXL_F_RSUNI_Master / Slave	AXC F 1152 (1151412) AXC F 2152 (2404267) AXC F 3152 (1069208)

8	20200227	>= 2020.0 LTS	MB_RTU_Master: • Enable communication after error without FB restart. MB_RTU_FC (all FCs) and MB_RTU_Master: • Resetting the FC by resetting the MB_RTU_Master. • At deactivation request of the master or FC during execution of a Modbus request wait for response or timeout before deactivation. MB_RTU_FC (all FCs) • Additional check of the Modbus response for validity (inside the FC). Response is consistent with the request. • Modified Error handling. MB_AXL_RS_UNI_SND and MB_AXL_RS_UNI_RCV: • Modified timeout and Error handling. New function blocks: • MB_AXL_SE_RS485_Master • MB_AXL_SE_RS485_Slave • MB_IL_UNI07_Master • MB_IL_UNI07_Slave • MB_IL_UNI15_Master • MB_IL_UNI15_Slave • MB_IL_UNI31_Master • MB_IL_UNI31_Slave	AXC F 1152 (1151412) AXC F 2152 (2404267) AXC F 3152 (1069208)
7	20191002	2019.0 LTS 2019.3 2019.6 2019.9	Adapted to 2019.9	AXC F 2152 (2404267)
6	20190723	2019.0 LTS 2019.3 2019.6	Adapted to 2019.6	AXC F 2152 (2404267)

5	20190701	2019.0 LTS 2019.3	MB_RTU_Master: • Improved handshakes between master and serial driver. MB_RTU_FC23: • Runtime error: "Error while accessing indirect variable address" MB_RTU_FC (all FCs): • Operating FC stops when other FCs are deactivated MB_AXL_RS_UNI_SND: • Bugfix: "Communication error after FB reset during send or receive phase." • Bugfix: "Inter-character time bigger than Modbus specification allows. Communication errors with slow CPU cycle-times or high bussystem cycle-times." MB_AXL_RS_UNI_RCV: • Bugfix: "Communication error after FB reset during send or receive phase."	AXC F 2152 (2404267)
4	20190226	2019.0 LTS	Supports “Allow extended identifiers” = ON	AXC F 2152 (2404267)
4	20190219	2019.0 LTS	Modbus_RTU_4: • Adapted to PLCnext Engineer 2019.0 LTS	AXC F 2152 (2404267)
3	20180928	7.2.3	Adapted to PLCnext Engineer 7.3	AXC F 1050 (2404701) AXC F 2152 (2404267)

2	20180508	7.2.2	Converted from PC Worx 6 Modbus_RTU_1 library. New functionalities: • New udtDiag output at all function blocks for better diagnostics. • Master and Slave function blocks with integrated driver are no longer encrypted for better diagnostics. MB_RTU_Master_2: • "Array out of index" error message with enabled xAuto_CRC input is corrected. • "xNDR stays true after function block is deactivated during send request" error is fixed. • "Execution error of following FCs, if previous FC is in error" error is fixed. MB_RTU_FC1,2,3,4,23: • New diagnostic for"broadcast on reading FBs not possible". MB_RTU_FC2_2: • "Reading wrong count of bits" error is fixed. MB_RTU_FC23_2: • "Reading one register less than requested" error is fixed MB_RTU_FC*_2 (all FCs): • Correction in polltimer execution interval • "wDiagCode goes to 16#0000 after xDone" error is fixed • "Function code invalid" diag code is changed from 16#C110 to 16#C100	AXC F 1050 (2404701) AXC F 2152 (2404267)
1	-	-	Phoenix Contact internal version	-

New version number: Functional changes of at least one function block, incompatibilities (e.g. change of library format)

New build number: No functional changes, but changes in the MSI file (e.g. documentation update, additional examples)

4 Function blocks

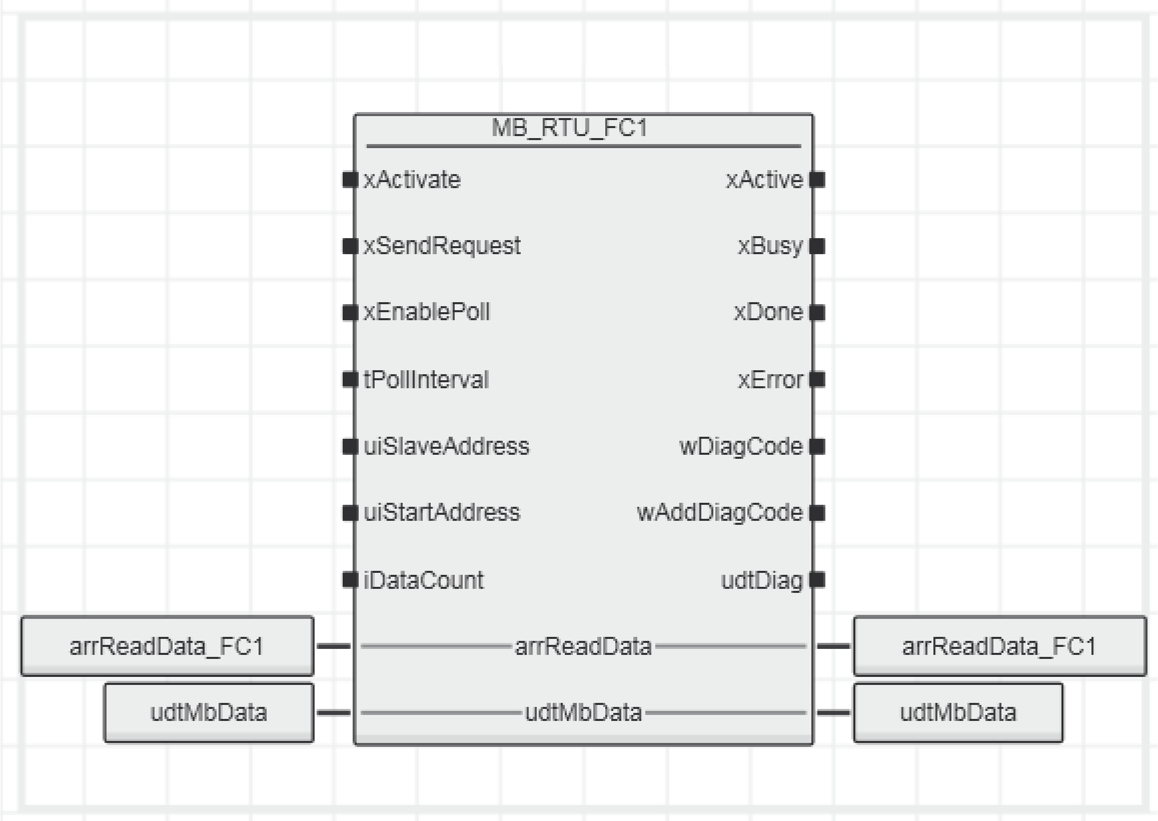
Function block	Description	Version	Supported articles	License
MB_RTU_FC1	This function block reads the status of discrete outputs from a Modbus slave.	6	-	none
MB_RTU_FC2	This function block reads discrete inputs from a Modbus slave.	6	-	none
MB_RTU_FC3	This function block reads holding registers from a Modbus slave.	6	-	none
MB_RTU_FC4	This function block reads input registers from a Modbus slave.	6	-	none
MB_RTU_FC5	This function block writes a single output bit of a Modbus slave.	6	-	none
MB_RTU_FC6	This function block writes a single holding register of a Modbus slave.	6	-	none
MB_RTU_FC15	This function block writes multiple output bits of a Modbus slave.	6	-	none
MB_RTU_FC16	This function block writes multiple holding registers of a Modbus slave.	6	-	none
MB_RTU_FC23	This function block writes or reads multiple holding registers of a Modbus slave.	6	-	none
MB_RTU_DiagInfo_EN	This optional function block displays diagnostic messages of the Modbus master as clear text in English.	3	-	none
MB_IL_UNI07_Master	This block runs the sending operations via the IB IL RS UNI-PAC (2700893) module.	2	IB IL RS UNI-PAC (2700893)	none
MB_IL_UNI07_Slave	This block runs the sending operations via the IB IL RS UNI-PAC (2700893) module.	2	IB IL RS UNI-PAC (2700893)	none
MB_IL_UNI15_Master	This block runs the sending operations via the IB IL RS UNI-PAC (2700893) module.	2	IB IL RS UNI-PAC (2700893)	none
MB_IL_UNI15_Slave	This block runs the sending operations via the IB IL RS UNI-PAC (2700893) module.	2	IB IL RS UNI-PAC (2700893)	none
MB_IL_UNI31_Master	This block runs the sending operations via the IB IL RS UNI-PAC (2700893) module.	2	IB IL RS UNI-PAC (2700893)	none
MB_IL_UNI31_Slave	This block runs the sending operations via the IB IL RS UNI-PAC (2700893) module.	2	IB IL RS UNI-PAC (2700893)	none
MB_AXL_SE_RS485_Master	This block runs the sending operations via the AXL SE RS485 (1088128) module.	2	AXL SE RS485 (1088128)	none
MB_AXL_SE_RS485_Slave	This block runs the sending operations via the AXL SE RS485 (1088128) module.	2	AXL SE RS485 (1088128)	none

MB_AXL_F_RSUNI_Master	This block runs the sending operations via the AXL F RS UNI 1H (2688666) module.	1	AXL F RS UNI 1H (2688666)	none
MB_AXL_F_RSUNI_Slave	This block runs the sending operations via the AXL F RS UNI 1H (2688666) module.	1	AXL F RS UNI 1H (2688666)	none
MB_IL_232E_Master	This block runs the sending operations via the IB IL RS 232-ECO (2702141) module.	1	IB IL RS 232-ECO (2702141)	none
MB_IL_232E_Slave	This block runs the sending operations via the IB IL RS 232-ECO (2702141) module.	1	IB IL RS 232-ECO (2702141)	none
MB_IL_232E_Master	This block runs the sending operations via the IB IL RS 232-PRO-PAC (2878722) / IB IL RS 232-PRO (2878515) module.	1	IB IL RS 232-PRO-PAC (2878722) OR IB IL RS 232-PRO (2878515)	none
MB_IL_232E_Slave	This block runs the sending operations via the IB IL RS 232-PRO-PAC (2878722) / IB IL RS 232-PRO (2878515) module.	1	IB IL RS 232-PRO-PAC (2878722) OR IB IL RS 232-PRO (2878515)	none
MB_IL_485E_Master	This block runs the sending operations via the IB IL RS 485-ECO (2702795) module.	1	IB IL RS 485-ECO (2702795)	none
MB_IL_485E_Slave	This block runs the sending operations via the IB IL RS 485-ECO (2702795) module.	1	IB IL RS 485-ECO (2702795)	none
MB_IL_485P_Master	This block runs the sending operations via the IB IL RS 485/422-PRO-PAC (2863627) / IB IL RS 485/422-PRO (2863707) module.	1	IB IL RS 485/422-PRO-PAC (2863627) OR IB IL RS 485/422-PRO (2863707)	none
MB_IL_485P_Slave	This block runs the sending operations via the IB IL RS 485/422-PRO-PAC (2863627) / IB IL RS 485/422-PRO (2863707) module.	1	IB IL RS 485/422-PRO-PAC (2863627) OR IB IL RS 485/422-PRO (2863707)	none

5 MB_RTU_FC1

This function block reads the status of discrete outputs from a Modbus slave.

5.1 Function block call



5.2 Input parameters

Name	Type	Description
xActivate	BOOL	Block activation (TRUE = Active).
xSendRequest	BOOL	A send request to the master block is activated with a rising edge. A falling edge deletes current Modbus errors and resets the block outputs.
xEnablePoll	BOOL	Cyclical polling is started with a rising edge. A falling edge deactivates the polling. Input xSendRequest triggers an additional request and should be deactivated during poll mode. Note that the outputs xDone and xError are only one cycle true.
tPollIntervall	TIME	If xEnablePoll is activated, then transmission is cyclical in the time interval of the specified value.
uiSlaveAddress	UINT	The input specifies the address of the slave to be communicated with (1 to 255).
uiStartAddress	UINT	The input specifies the start address of the bit to be read on the slave.
iDataCount	INT	The input specifies the number of bits to be read on the slave (1 to 2000).

5.3 Output parameters

Name	Type	Description
xActive	BOOL	TRUE: Function block is active. FALSE: Function block is not active.
xBusy	BOOL	TRUE: The block is busy with the service execution.
xDone	BOOL	Request is sent and response from slave is successfully received.
xError	BOOL	TRUE: An error has occurred. For details refer to wDiagCode and wAddDiagCode.
wDiagCode	WORD	Diagnostic code. Refer to diagnostics table.
wAddDiagCode	WORD	Additional diagnostic code. Refer to diagnostics table.
udtDiag	MB_UDT_RTU_FC_DIAG	Structure with internal variables for Diagnostic

5.4 Inout parameters

Name	Type	Description
arrReadData	arrModbus2_X_1_2000	The parameter contains the requested Modbus data.
udtMBData	udtModbus2_Data	The block communicates via this structure with the FC blocks.

5.5 Diagnosis

The diagnostics contains diagnostic codes on the FC blocks of the library. Modbus errors are indicated at the respective FC block and need to be reset there. Thus the communication in a Modbus network is not disturbed by an error in a request to a slave. An error at the FC block is deleted by a reset of the send input or by renewed activation of the block.

Modbus exception codes are sent by the respective slave and contain messages specific for Modbus.

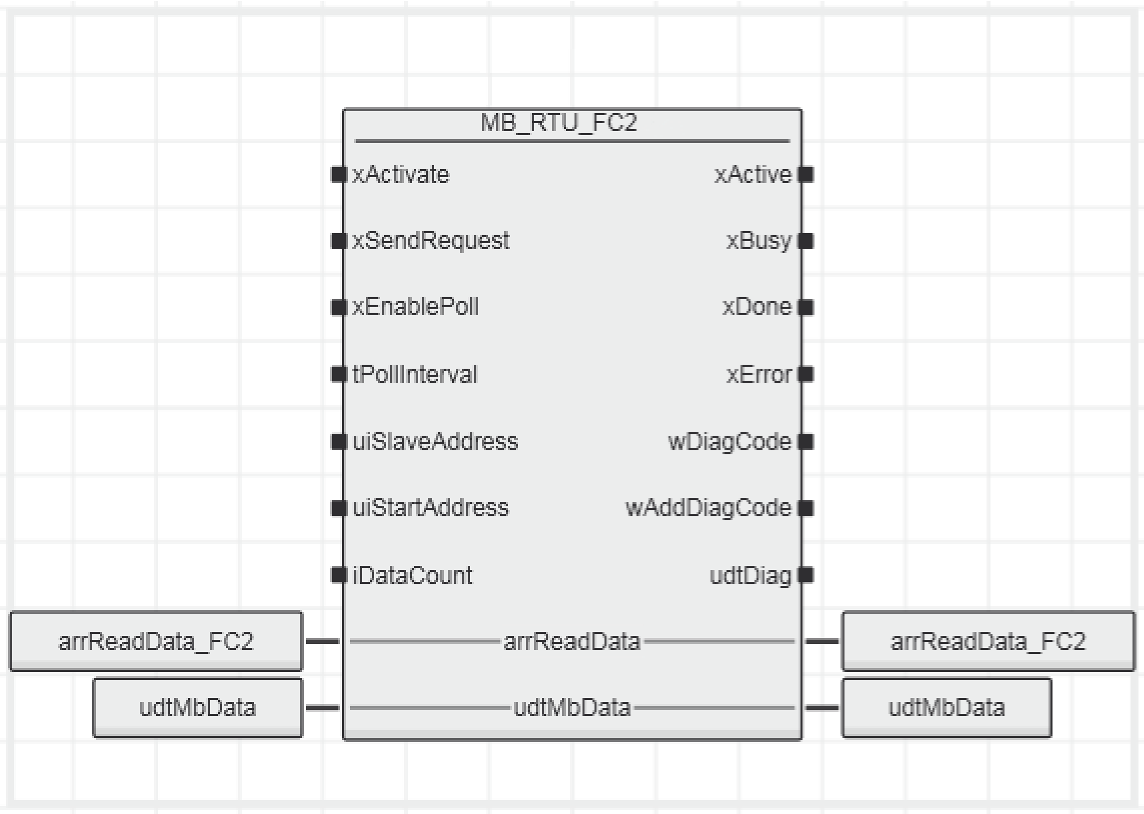
wDiagCode	wAddDiagCode	Description
16#0000		Block is not activated.
16#8000		Block is active and operating without errors.
16#8300		Block executes a service.
16#C100		Error during configuration (displayed on the FC block).
	16#0001	Slave address is outside the valid range.
	16#0002	Number of the requested data amount invalid (iDataCount).
	16#0003	Function code invalid.
	16#0004	Broadcast not possible. FC supports reading function.
16#C110		Error in the Modbus (displayed on the FC block).
	16#0001	Timeout on master block.
	16#0002	Checksum (CRC) invalid.
16#C120		Modbus Exception Code (shown at the FC block).
	16#0001	Exception Code 1 (Illegal Function).
	16#0002	Exception Code 2 (Illegal Data Address).
	16#0003	Exception Code 3 (Illegal Data Value).
	16#0004	Exception Code 4 (Server Device Failure).
	16#0005	Exception Code 5 (Acknowledge).
	16#0006	Exception Code 6 (Server Device Busy).
	16#0008	Exception Code 8 (Memory Parity Error).
	16#000A	Exception Code 10 (Gateway Path Unavailable).
	16#000B	Exception Code 11 (Gateway Target Device Failed To Respond).
16#C130		Invalid Response.
	16#0001	Slave address of Response invalid.
	16#0002	Function code of Response invalid.
	16#0003	Length of Response invalid.
16#C416		Internal timeout.
	16#0001	Timeout between FC and Modbus_Master.

These diagnostic codes, as well as xError, are reset by a falling edge of xActivate or xSendRequest on an FC block.
The block displays the diagnosis of the master block and thus also the diagnosis of the serial blocks. These errors must be reset by deactivating the affected blocks. For errorcodes 16#C010 - 16#C060 refer to serial block diagnostic.

6 MB_RTU_FC2

This function block reads discrete inputs from a Modbus slave.

6.1 Function block call



6.2 Input parameters

Name	Type	Description
xActivate	BOOL	Block activation (TRUE = Active).
xSendRequest	BOOL	A send request to the master block is activated with a rising edge. A falling edge deletes current Modbus errors and resets the block outputs.
xEnablePoll	BOOL	Cyclical polling is started with a rising edge. A falling edge deactivates the polling. Input xSendRequest triggers an additional request and should be deactivated during poll mode. Note that the outputs xDone and xError are only one cycle true.
tPollIntervall	TIME	If xEnablePoll is activated, then transmission is cyclical in the time interval of the specified value.
uiSlaveAddress	UINT	The input specifies the address of the slave to be communicated with (1 to 255).
uiStartAddress	UINT	The input specifies the start address of the bit to be read on the slave.
iDataCount	INT	The input specifies the number of bits to be read on the slave (1 to 2000).

6.3 Output parameters

Name	Type	Description
xActive	BOOL	TRUE: Function block is active. FALSE: Function block is not active.
xBusy	BOOL	TRUE: The block is busy with the service execution.
xDone	BOOL	Request is sent and response from slave is successfully received.
xError	BOOL	TRUE: An error has occurred. For details refer to wDiagCode and wAddDiagCode.
wDiagCode	WORD	Diagnostic code. Refer to diagnostics table.
wAddDiagCode	WORD	Additional diagnostic code. Refer to diagnostics table.
udtDiag	MB_UDT_RTU_FC_DIAG	Structure with internal variables for Diagnostic

6.4 Inout parameters

Name	Type	Description
arrReadData	arrModbus2_X_1_2000	The parameter contains the requested Modbus data.
udtMBData	udtModbus2_Data	The block communicates via this structure with the FC blocks.

6.5 Diagnosis

The diagnostics contains diagnostic codes on the FC blocks of the library. Modbus errors are indicated at the respective FC block and need to be reset there. Thus the communication in a Modbus network is not disturbed by an error in a request to a slave. An error at the FC block is deleted by a reset of the send input or by renewed activation of the block.

Modbus exception codes are sent by the respective slave and contain messages specific for Modbus.

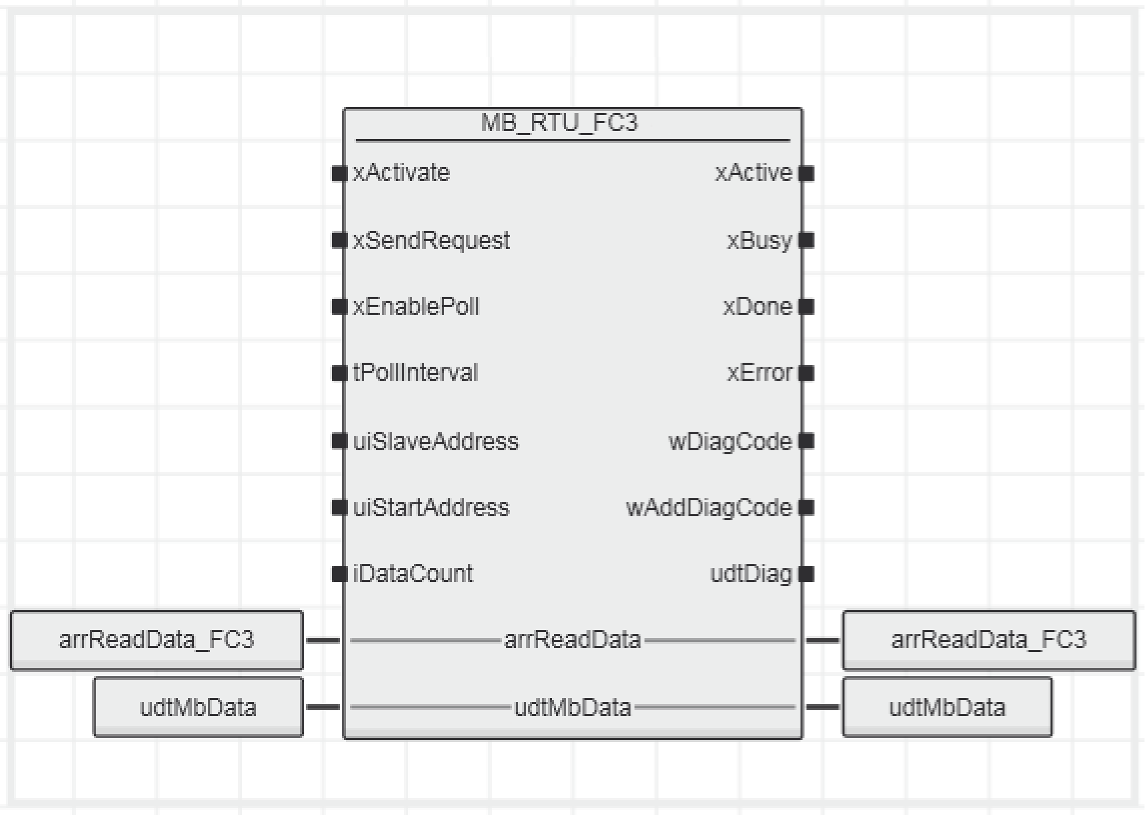
wDiagCode	wAddDiagCode	Description
16#0000		Block is not activated.
16#8000		Block is active and operating without errors.
16#8300		Block executes a service.
16#C100		Error during configuration (displayed on the FC block).
	16#0001	Slave address is outside the valid range.
	16#0002	Number of the requested data amount invalid (iDataCount).
	16#0003	Function code invalid.
	16#0004	Broadcast not possible. FC supports reading function.
16#C110		Error in the Modbus (displayed on the FC block).
	16#0001	Timeout on master block.
	16#0002	Checksum (CRC) invalid.
16#C120		Modbus Exception Code (shown at the FC block).
	16#0001	Exception Code 1 (Illegal Function).
	16#0002	Exception Code 2 (Illegal Data Address).
	16#0003	Exception Code 3 (Illegal Data Value).
	16#0004	Exception Code 4 (Server Device Failure).
	16#0005	Exception Code 5 (Acknowledge).
	16#0006	Exception Code 6 (Server Device Busy).
	16#0008	Exception Code 8 (Memory Parity Error).
	16#000A	Exception Code 10 (Gateway Path Unavailable).
	16#000B	Exception Code 11 (Gateway Target Device Failed To Respond).
16#C130		Invalid Response.
	16#0001	Slave address of Response invalid.
	16#0002	Function code of Response invalid.
	16#0003	Length of Response invalid.
16#C416		Internal timeout.
	16#0001	Timeout between FC and Modbus_Master.

These diagnostic codes, as well as xError, are reset by a falling edge of xActivate or xSendRequest on an FC block.
The block displays the diagnosis of the master block and thus also the diagnosis of the serial blocks. These errors must be reset by deactivating the affected blocks. For errorcodes 16#C010 - 16#C060 refer to serial block diagnostic.

7 MB_RTU_FC3

This function block reads holding registers from a Modbus slave.

7.1 Function block call



7.2 Input parameters

Name	Type	Description
xActivate	BOOL	Block activation (TRUE = Active).
xSendRequest	BOOL	A send request to the master block is activated with a rising edge. A falling edge deletes current Modbus errors and resets the block outputs.
xEnablePoll	BOOL	Cyclical polling is started with a rising edge. A falling edge deactivates the polling. Input xSendRequest triggers an additional request and should be deactivated during poll mode. Note that the outputs xDone and xError are only one cycle true.
tPollIntervall	TIME	If xEnablePoll is activated, then transmission is cyclical in the time interval of the specified value.
uiSlaveAddress	UINT	The input specifies the address of the slave to be communicated with (1 to 255).
uiStartAddress	UINT	The input specifies the start address of the bit to be read on the slave.
iDataCount	INT	The input specifies the number of bits to be read on the slave (1 to 2000).

7.3 Output parameters

Name	Type	Description
xActive	BOOL	TRUE: Function block is active. FALSE: Function block is not active.
xBusy	BOOL	TRUE: The block is busy with the service execution.
xDone	BOOL	Request is sent and response from slave is successfully received.
xError	BOOL	TRUE: An error has occurred. For details refer to wDiagCode and wAddDiagCode.
wDiagCode	WORD	Diagnostic code. Refer to diagnostics table.
wAddDiagCode	WORD	Additional diagnostic code. Refer to diagnostics table.
udtDiag	MB_UDT_RTU_FC_DIAG	Structure with internal variables for Diagnostic

7.4 Inout parameters

Name	Type	Description
arrReadData	arrModbus2_W_1_125	The parameter contains the requested Modbus data.
udtMBData	udtModbus2_Data	The block communicates via this structure with the FC blocks.

7.5 Diagnosis

The diagnostics contains diagnostic codes on the FC blocks of the library. Modbus errors are indicated at the respective FC block and need to be reset there. Thus the communication in a Modbus network is not disturbed by an error in a request to a slave. An error at the FC block is deleted by a reset of the send input or by renewed activation of the block.

Modbus exception codes are sent by the respective slave and contain messages specific for Modbus.

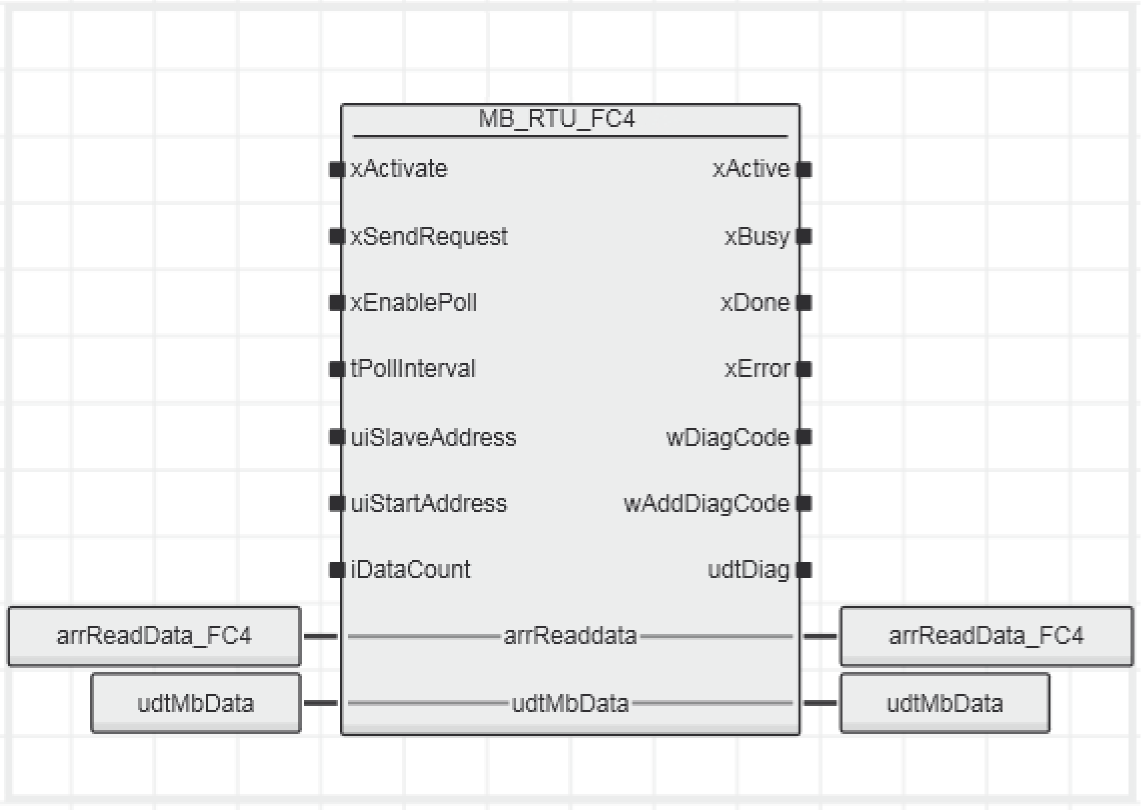
wDiagCode	wAddDiagCode	Description
16#0000		Block is not activated.
16#8000		Block is active and operating without errors.
16#8300		Block executes a service.
16#C100		Error during configuration (displayed on the FC block).
	16#0001	Slave address is outside the valid range.
	16#0002	Number of the requested data amount invalid (iDataCount).
	16#0003	Function code invalid.
	16#0004	Broadcast not possible. FC supports reading function.
16#C110		Error in the Modbus (displayed on the FC block).
	16#0001	Timeout on master block.
	16#0002	Checksum (CRC) invalid.
16#C120		Modbus Exception Code (shown at the FC block).
	16#0001	Exception Code 1 (Illegal Function).
	16#0002	Exception Code 2 (Illegal Data Address).
	16#0003	Exception Code 3 (Illegal Data Value).
	16#0004	Exception Code 4 (Server Device Failure).
	16#0005	Exception Code 5 (Acknowledge).
	16#0006	Exception Code 6 (Server Device Busy).
	16#0008	Exception Code 8 (Memory Parity Error).
	16#000A	Exception Code 10 (Gateway Path Unavailable).
	16#000B	Exception Code 11 (Gateway Target Device Failed To Respond).
16#C130		Invalid Response.
	16#0001	Slave address of Response invalid.
	16#0002	Function code of Response invalid.
	16#0003	Length of Response invalid.
16#C416		Internal timeout.
	16#0001	Timeout between FC and Modbus_Master.

These diagnostic codes, as well as xError, are reset by a falling edge of xActivate or xSendRequest on an FC block.
The block displays the diagnosis of the master block and thus also the diagnosis of the serial blocks. These errors must be reset by deactivating the affected blocks. For errorcodes 16#C010 - 16#C060 refer to serial block diagnostic.

8 MB_RTU_FC4

This function block reads input registers from a Modbus slave.

8.1 Function block call



8.2 Input parameters

Name	Type	Description
xActivate	BOOL	Block activation (TRUE = Active).
xSendRequest	BOOL	A send request to the master block is activated with a rising edge. A falling edge deletes current Modbus errors and resets the block outputs.
xEnablePoll	BOOL	Cyclical polling is started with a rising edge. A falling edge deactivates the polling. Input xSendRequest triggers an additional request and should be deactivated during poll mode. Note that the outputs xDone and xError are only one cycle true.
tPollIntervall	TIME	If xEnablePoll is activated, then transmission is cyclical in the time interval of the specified value.
uiSlaveAddress	UINT	The input specifies the address of the slave to be communicated with (1 to 255).
uiStartAddress	UINT	The input specifies the start address of the bit to be read on the slave.
iDataCount	INT	The input specifies the number of bits to be read on the slave (1 to 2000).

8.3 Output parameters

Name	Type	Description
xActive	BOOL	TRUE: Function block is active. FALSE: Function block is not active.
xBusy	BOOL	TRUE: The block is busy with the service execution.
xDone	BOOL	Request is sent and response from slave is successfully received.
xError	BOOL	TRUE: An error has occurred. For details refer to wDiagCode and wAddDiagCode.
wDiagCode	WORD	Diagnostic code. Refer to diagnostics table.
wAddDiagCode	WORD	Additional diagnostic code. Refer to diagnostics table.
udtDiag	MB_UDT_RTU_FC_DIAG	Structure with internal variables for Diagnostic

8.4 Inout parameters

Name	Type	Description
arrReadData	arrModbus2_W_1_125	The parameter contains the requested Modbus data.
udtMBData	udtModbus2_Data	The block communicates via this structure with the FC blocks.

8.5 Diagnosis

The diagnostics contains diagnostic codes on the FC blocks of the library. Modbus errors are indicated at the respective FC block and need to be reset there. Thus the communication in a Modbus network is not disturbed by an error in a request to a slave. An error at the FC block is deleted by a reset of the send input or by renewed activation of the block.

Modbus exception codes are sent by the respective slave and contain messages specific for Modbus.

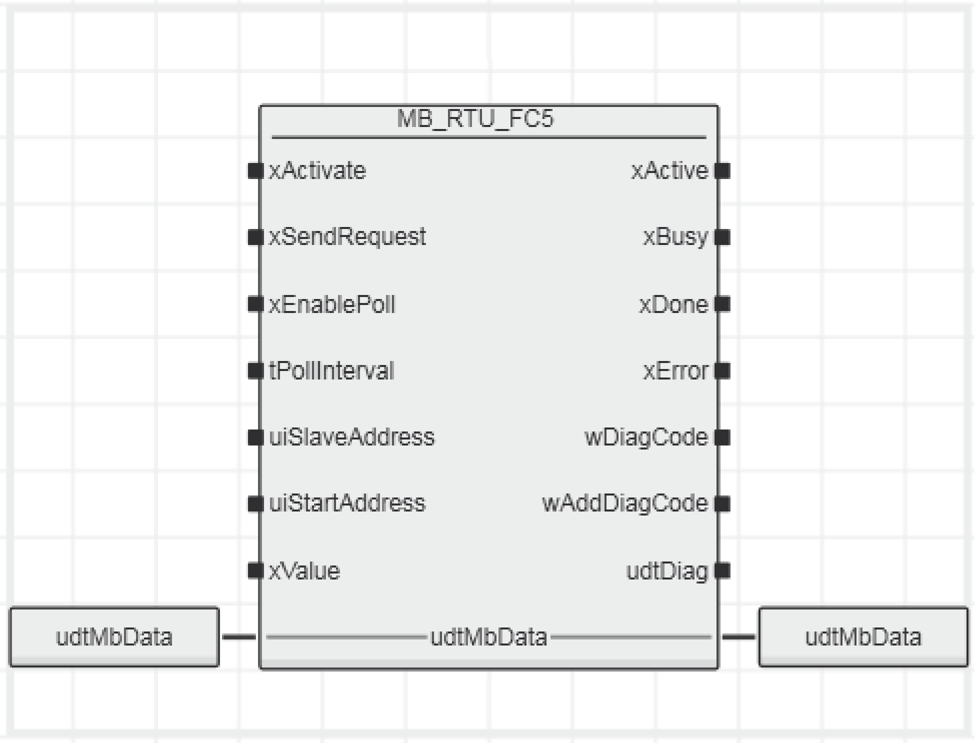
wDiagCode	wAddDiagCode	Description
16#0000		Block is not activated.
16#8000		Block is active and operating without errors.
16#8300		Block executes a service.
16#C100		Error during configuration (displayed on the FC block).
	16#0001	Slave address is outside the valid range.
	16#0002	Number of the requested data amount invalid (iDataCount).
	16#0003	Function code invalid.
	16#0004	Broadcast not possible. FC supports reading function.
16#C110		Error in the Modbus (displayed on the FC block).
	16#0001	Timeout on master block.
	16#0002	Checksum (CRC) invalid.
16#C120		Modbus Exception Code (shown at the FC block).
	16#0001	Exception Code 1 (Illegal Function).
	16#0002	Exception Code 2 (Illegal Data Address).
	16#0003	Exception Code 3 (Illegal Data Value).
	16#0004	Exception Code 4 (Server Device Failure).
	16#0005	Exception Code 5 (Acknowledge).
	16#0006	Exception Code 6 (Server Device Busy).
	16#0008	Exception Code 8 (Memory Parity Error).
	16#000A	Exception Code 10 (Gateway Path Unavailable).
	16#000B	Exception Code 11 (Gateway Target Device Failed To Respond).
16#C130		Invalid Response.
	16#0001	Slave address of Response invalid.
	16#0002	Function code of Response invalid.
	16#0003	Length of Response invalid.
16#C416		Internal timeout.
	16#0001	Timeout between FC and Modbus_Master.

These diagnostic codes, as well as xError, are reset by a falling edge of xActivate or xSendRequest on an FC block.
The block displays the diagnosis of the master block and thus also the diagnosis of the serial blocks. These errors must be reset by deactivating the affected blocks. For errorcodes 16#C010 - 16#C060 refer to serial block diagnostic.

9 MB_RTU_FC5

This function block writes a single output bit of a Modbus slave.

9.1 Function block call



9.2 Input parameters

Name	Type	Description
xActivate	BOOL	Block activation (TRUE = Active).
xSendRequest	BOOL	A send request to the master block is activated with a rising edge. A falling edge deletes current Modbus errors and resets the block outputs.
xEnablePoll	BOOL	Cyclical polling is started with a rising edge. A falling edge deactivates the polling. Input xSendRequest triggers an additional request and should be deactivated during poll mode. Note that the outputs xDone and xError are only one cycle true.
tPollIntervall	TIME	If xEnablePoll is activated, then transmission is cyclical in the time interval of the specified value.
uiSlaveAddress	UINT	The input specifies the address of the slave to be communicated with (1 to 255).
uiStartAddress	UINT	The input specifies the start address of the bit to be read on the slave.
xValue	BOOL	The status of the input is written in the memory to be written.

9.3 Output parameters

Name	Type	Description
xActive	BOOL	TRUE: Function block is active. FALSE: Function block is not active.
xBusy	BOOL	TRUE: The block is busy with the service execution.
xDone	BOOL	Request is sent and response from slave is successfully received.
xError	BOOL	TRUE: An error has occurred. For details refer to wDiagCode and wAddDiagCode.
wDiagCode	WORD	Diagnostic code. Refer to diagnostics table.
wAddDiagCode	WORD	Additional diagnostic code. Refer to diagnostics table.
udtDiag	MB_UDT_RTU_FC_DIAG	Structure with internal variables for Diagnostic

9.4 Inout parameters

Name	Type	Description
udtMBData	udtModbus2_Data	The block communicates via this structure with the FC blocks.

9.5 Diagnosis

The diagnostics contains diagnostic codes on the FC blocks of the library. Modbus errors are indicated at the respective FC block and need to be reset there. Thus the communication in a Modbus network is not disturbed by an error in a request to a slave. An error at the FC block is deleted by a reset of the send input or by renewed activation of the block.

Modbus exception codes are sent by the respective slave and contain messages specific for Modbus.

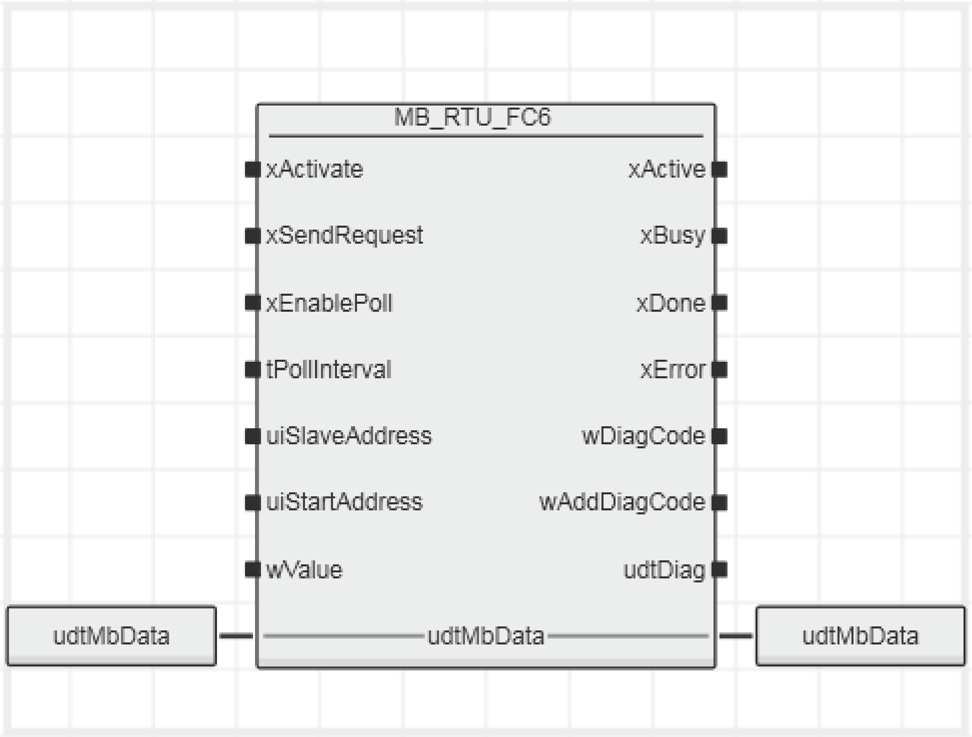
wDiagCode	wAddDiagCode	Description
16#0000		Block is not activated.
16#8000		Block is active and operating without errors.
16#8300		Block executes a service.
16#C100		Error during configuration (displayed on the FC block).
	16#0001	Slave address is outside the valid range.
	16#0002	Number of the requested data amount invalid (iDataCount).
	16#0003	Function code invalid.
	16#0004	Broadcast not possible. FC supports reading function.
16#C110		Error in the Modbus (displayed on the FC block).
	16#0001	Timeout on master block.
	16#0002	Checksum (CRC) invalid.
16#C120		Modbus Exception Code (shown at the FC block).
	16#0001	Exception Code 1 (Illegal Function).
	16#0002	Exception Code 2 (Illegal Data Address).
	16#0003	Exception Code 3 (Illegal Data Value).
	16#0004	Exception Code 4 (Server Device Failure).
	16#0005	Exception Code 5 (Acknowledge).
	16#0006	Exception Code 6 (Server Device Busy).
	16#0008	Exception Code 8 (Memory Parity Error).
	16#000A	Exception Code 10 (Gateway Path Unavailable).
	16#000B	Exception Code 11 (Gateway Target Device Failed To Respond).
16#C130		Invalid Response.
	16#0001	Slave address of Response invalid.
	16#0002	Function code of Response invalid.
	16#0003	Length of Response invalid.
16#C416		Internal timeout.
	16#0001	Timeout between FC and Modbus_Master.

These diagnostic codes, as well as xError, are reset by a falling edge of xActivate or xSendRequest on an FC block.
The block displays the diagnosis of the master block and thus also the diagnosis of the serial blocks. These errors must be reset by deactivating the affected blocks. For errorcodes 16#C010 - 16#C060 refer to serial block diagnostic.

10 MB_RTU_FC6

This function block writes a single holding register of a Modbus slave.

10.1 Function block call



10.2 Input parameters

Name	Type	Description
xActivate	BOOL	Block activation (TRUE = Active).
xSendRequest	BOOL	A send request to the master block is activated with a rising edge. A falling edge deletes current Modbus errors and resets the block outputs.
xEnablePoll	BOOL	Cyclical polling is started with a rising edge. A falling edge deactivates the polling. Input xSendRequest triggers an additional request and should be deactivated during poll mode. Note that the outputs xDone and xError are only one cycle true.
tPollIntervall	TIME	If xEnablePoll is activated, then transmission is cyclical in the time interval of the specified value.
uiSlaveAddress	UINT	The input specifies the address of the slave to be communicated with (1 to 255).
uiStartAddress	UINT	The input specifies the start address of the bit to be read on the slave.
wValue	WORD	The status of the input is written in the memory to be written.

10.3 Output parameters

Name	Type	Description
xActive	BOOL	TRUE: Function block is active. FALSE: Function block is not active.
xBusy	BOOL	TRUE: The block is busy with the service execution.
xDone	BOOL	Request is sent and response from slave is successfully received.
xError	BOOL	TRUE: An error has occurred. For details refer to wDiagCode and wAddDiagCode.
wDiagCode	WORD	Diagnostic code. Refer to diagnostics table.
wAddDiagCode	WORD	Additional diagnostic code. Refer to diagnostics table.
udtDiag	MB_UDT_RTU_FC_DIAG	Structure with internal variables for Diagnostic

10.4 Inout parameters

Name	Type	Description
udtMBData	udtModbus2_Data	The block communicates via this structure with the FC blocks.

10.5 Diagnosis

The diagnostics contains diagnostic codes on the FC blocks of the library. Modbus errors are indicated at the respective FC block and need to be reset there. Thus the communication in a Modbus network is not disturbed by an error in a request to a slave. An error at the FC block is deleted by a reset of the send input or by renewed activation of the block.

Modbus exception codes are sent by the respective slave and contain messages specific for Modbus.

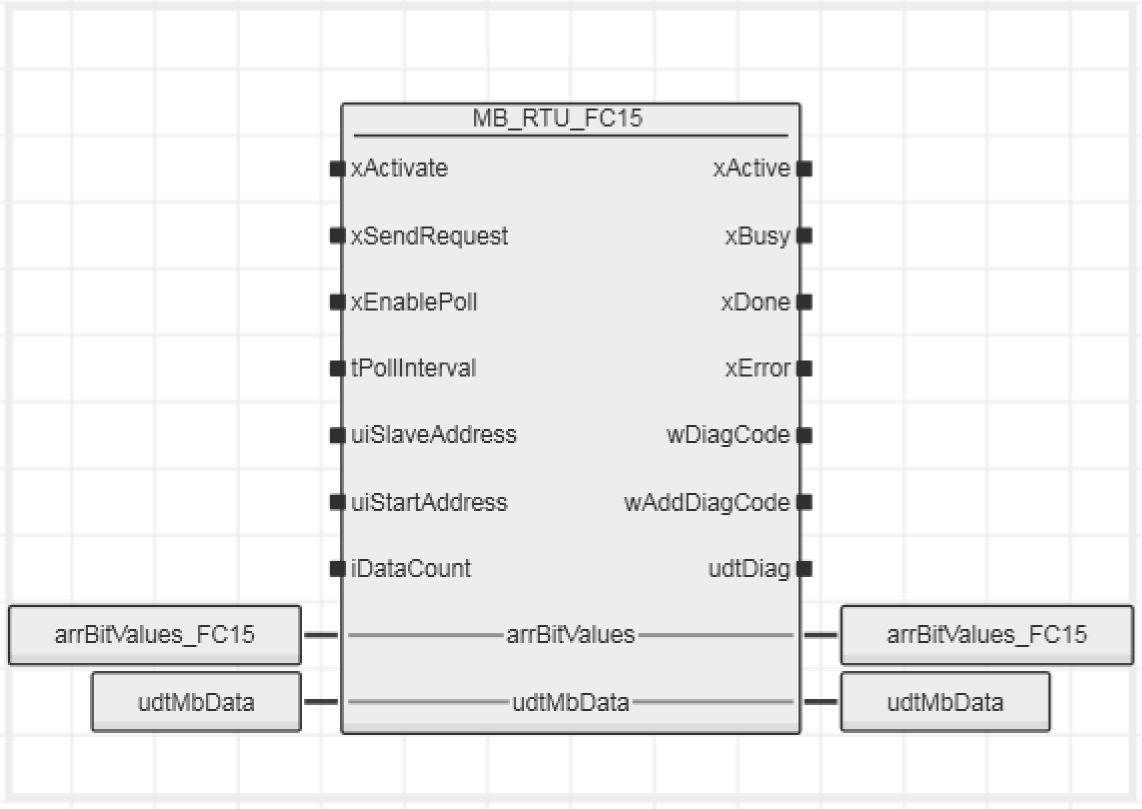
wDiagCode	wAddDiagCode	Description
16#0000		Block is not activated.
16#8000		Block is active and operating without errors.
16#8300		Block executes a service.
16#C100		Error during configuration (displayed on the FC block).
	16#0001	Slave address is outside the valid range.
	16#0002	Number of the requested data amount invalid (iDataCount).
	16#0003	Function code invalid.
	16#0004	Broadcast not possible. FC supports reading function.
16#C110		Error in the Modbus (displayed on the FC block).
	16#0001	Timeout on master block.
	16#0002	Checksum (CRC) invalid.
16#C120		Modbus Exception Code (shown at the FC block).
	16#0001	Exception Code 1 (Illegal Function).
	16#0002	Exception Code 2 (Illegal Data Address).
	16#0003	Exception Code 3 (Illegal Data Value).
	16#0004	Exception Code 4 (Server Device Failure).
	16#0005	Exception Code 5 (Acknowledge).
	16#0006	Exception Code 6 (Server Device Busy).
	16#0008	Exception Code 8 (Memory Parity Error).
	16#000A	Exception Code 10 (Gateway Path Unavailable).
	16#000B	Exception Code 11 (Gateway Target Device Failed To Respond).
16#C130		Invalid Response.
	16#0001	Slave address of Response invalid.
	16#0002	Function code of Response invalid.
	16#0003	Length of Response invalid.
16#C416		Internal timeout.
	16#0001	Timeout between FC and Modbus_Master.

These diagnostic codes, as well as xError, are reset by a falling edge of xActivate or xSendRequest on an FC block.
The block displays the diagnosis of the master block and thus also the diagnosis of the serial blocks. These errors must be reset by deactivating the affected blocks. For errorcodes 16#C010 - 16#C060 refer to serial block diagnostic.

11 MB_RTU_FC15

This function block writes multiple output bits of a Modbus slave.

11.1 Function block call



11.2 Input parameters

Name	Type	Description
xActivate	BOOL	Block activation (TRUE = Active).
xSendRequest	BOOL	A send request to the master block is activated with a rising edge. A falling edge deletes current Modbus errors and resets the block outputs.
xEnablePoll	BOOL	Cyclical polling is started with a rising edge. A falling edge deactivates the polling. Input xSendRequest triggers an additional request and should be deactivated during poll mode. Note that the outputs xDone and xError are only one cycle true.
tPollIntervall	TIME	If xEnablePoll is activated, then transmission is cyclical in the time interval of the specified value.
uiSlaveAddress	UINT	The input specifies the address of the slave to be communicated with (1 to 255).
uiStartAddress	UINT	The input specifies the start address of the bit to be read on the slave.
iDataCount	INT	The input specifies the number of bits to be read on the slave (1 to 1968).

11.3 Output parameters

Name	Type	Description
xActive	BOOL	TRUE: Function block is active. FALSE: Function block is not active.
xBusy	BOOL	TRUE: The block is busy with the service execution.
xDone	BOOL	Request is sent and response from slave is successfully received.
xError	BOOL	TRUE: An error has occurred. For details refer to wDiagCode and wAddDiagCode.
wDiagCode	WORD	Diagnostic code. Refer to diagnostics table.
wAddDiagCode	WORD	Additional diagnostic code. Refer to diagnostics table.
udtDiag	MB_UDT_RTU_FC_DIAG	Structure with internal variables for Diagnostic

11.4 Inout parameters

Name	Type	Description
arrBitValues	arrModbus2_X_1_1968	The array of 1968 bits contains the desired values of the addressed bits.
udtMBData	udtModbus2_Data	The block communicates via this structure with the FC blocks.

11.5 Diagnosis

The diagnostics contains diagnostic codes on the FC blocks of the library. Modbus errors are indicated at the respective FC block and need to be reset there. Thus the communication in a Modbus network is not disturbed by an error in a request to a slave. An error at the FC block is deleted by a reset of the send input or by renewed activation of the block.

Modbus exception codes are sent by the respective slave and contain messages specific for Modbus.

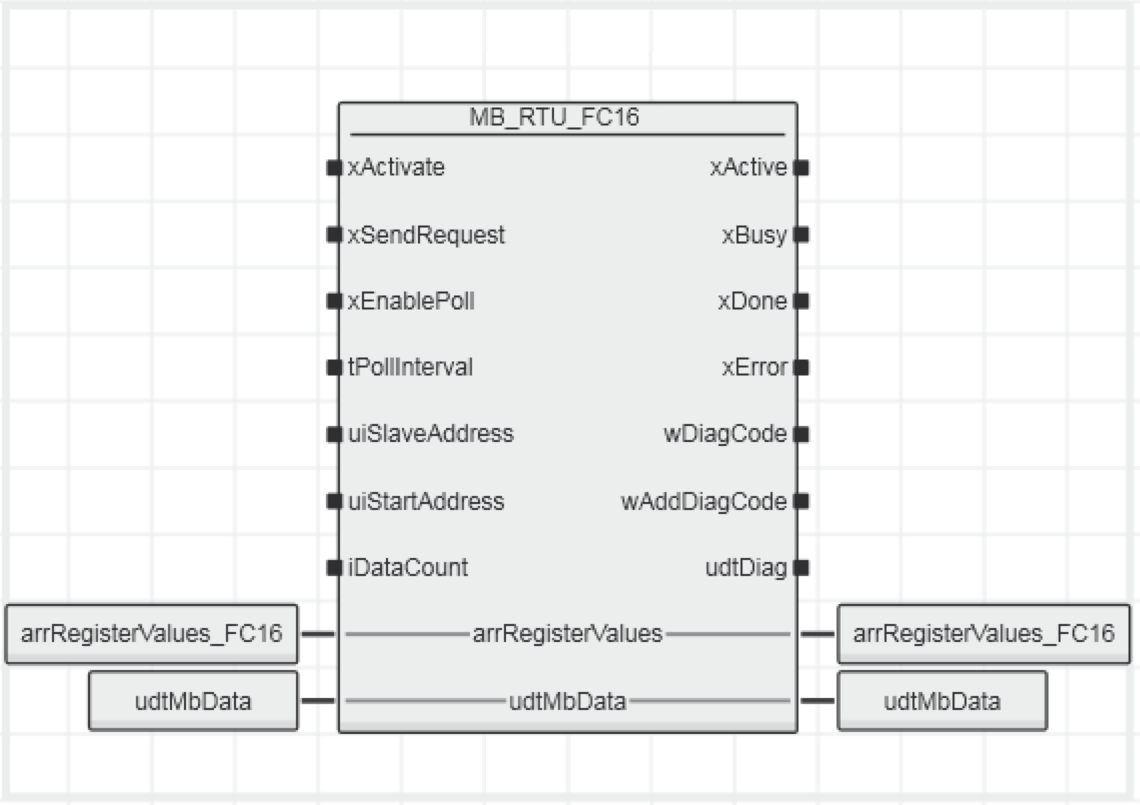
wDiagCode	wAddDiagCode	Description
16#0000		Block is not activated.
16#8000		Block is active and operating without errors.
16#8300		Block executes a service.
16#C100		Error during configuration (displayed on the FC block).
	16#0001	Slave address is outside the valid range.
	16#0002	Number of the requested data amount invalid (iDataCount).
	16#0003	Function code invalid.
	16#0004	Broadcast not possible. FC supports reading function.
16#C110		Error in the Modbus (displayed on the FC block).
	16#0001	Timeout on master block.
	16#0002	Checksum (CRC) invalid.
16#C120		Modbus Exception Code (shown at the FC block).
	16#0001	Exception Code 1 (Illegal Function).
	16#0002	Exception Code 2 (Illegal Data Address).
	16#0003	Exception Code 3 (Illegal Data Value).
	16#0004	Exception Code 4 (Server Device Failure).
	16#0005	Exception Code 5 (Acknowledge).
	16#0006	Exception Code 6 (Server Device Busy).
	16#0008	Exception Code 8 (Memory Parity Error).
	16#000A	Exception Code 10 (Gateway Path Unavailable).
	16#000B	Exception Code 11 (Gateway Target Device Failed To Respond).
16#C130		Invalid Response.
	16#0001	Slave address of Response invalid.
	16#0002	Function code of Response invalid.
	16#0003	Length of Response invalid.
16#C416		Internal timeout.
	16#0001	Timeout between FC and Modbus_Master.

These diagnostic codes, as well as xError, are reset by a falling edge of xActivate or xSendRequest on an FC block.
The block displays the diagnosis of the master block and thus also the diagnosis of the serial blocks. These errors must be reset by deactivating the affected blocks. For errorcodes 16#C010 - 16#C060 refer to serial block diagnostic.

12 MB_RTU_FC16

This function block writes multiple holding registers of a Modbus slave.

12.1 Function block call



12.2 Input parameters

Name	Type	Description
xActivate	BOOL	Block activation (TRUE = Active).
xSendRequest	BOOL	A send request to the master block is activated with a rising edge. A falling edge deletes current Modbus errors and resets the block outputs.
xEnablePoll	BOOL	Cyclical polling is started with a rising edge. A falling edge deactivates the polling. Input xSendRequest triggers an additional request and should be deactivated during poll mode. Note that the outputs xDone and xError are only one cycle true.
tPollIntervall	TIME	If xEnablePoll is activated, then transmission is cyclical in the time interval of the specified value.
uiSlaveAddress	UINT	The input specifies the address of the slave to be communicated with (1 to 255).
uiStartAddress	UINT	The input specifies the start address of the bit to be read on the slave.
iDataCount	INT	The input specifies the number of bits to be written on the slave (1 to 123).

12.3 Output parameters

Name	Type	Description
xActive	BOOL	TRUE: Function block is active. FALSE: Function block is not active.
xBusy	BOOL	TRUE: The block is busy with the service execution.
xDone	BOOL	Request is sent and response from slave is successfully received.
xError	BOOL	TRUE: An error has occurred. For details refer to wDiagCode and wAddDiagCode.
wDiagCode	WORD	Diagnostic code. Refer to diagnostics table.
wAddDiagCode	WORD	Additional diagnostic code. Refer to diagnostics table.
udtDiag	MB_UDT_RTU_FC_DIAG	Structure with internal variables for Diagnostic

12.4 Inout parameters

Name	Type	Description
arrRegisterValues	arrModbus2_W_1_123	The array of 123 words contains the desired values of the addressed register.
udtMBData	udtModbus2_Data	The block communicates via this structure with the FC blocks.

12.5 Diagnosis

The diagnostics contains diagnostic codes on the FC blocks of the library. Modbus errors are indicated at the respective FC block and need to be reset there. Thus the communication in a Modbus network is not disturbed by an error in a request to a slave. An error at the FC block is deleted by a reset of the send input or by renewed activation of the block.

Modbus exception codes are sent by the respective slave and contain messages specific for Modbus.

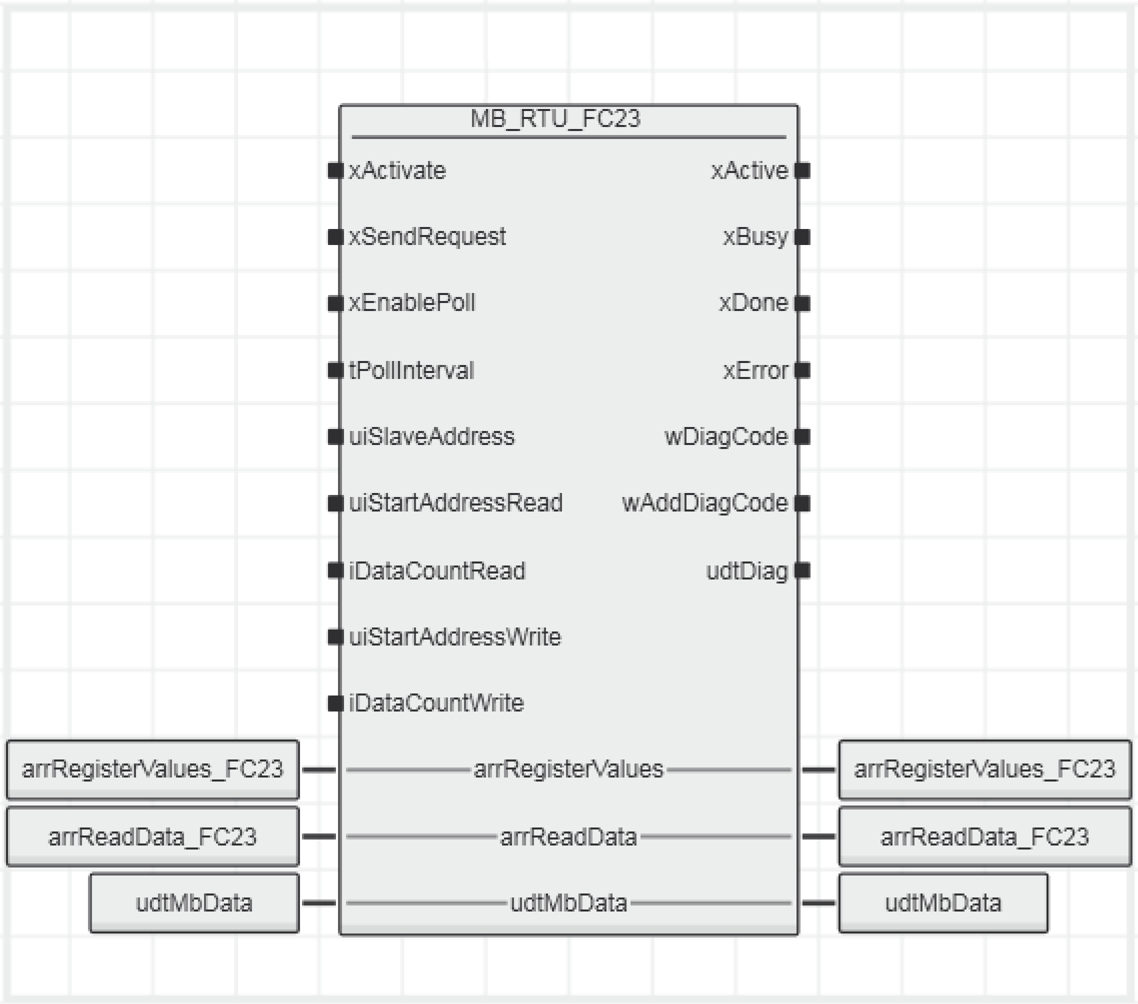
wDiagCode	wAddDiagCode	Description
16#0000		Block is not activated.
16#8000		Block is active and operating without errors.
16#8300		Block executes a service.
16#C100		Error during configuration (displayed on the FC block).
	16#0001	Slave address is outside the valid range.
	16#0002	Number of the requested data amount invalid (iDataCount).
	16#0003	Function code invalid.
	16#0004	Broadcast not possible. FC supports reading function.
16#C110		Error in the Modbus (displayed on the FC block).
	16#0001	Timeout on master block.
	16#0002	Checksum (CRC) invalid.
16#C120		Modbus Exception Code (shown at the FC block).
	16#0001	Exception Code 1 (Illegal Function).
	16#0002	Exception Code 2 (Illegal Data Address).
	16#0003	Exception Code 3 (Illegal Data Value).
	16#0004	Exception Code 4 (Server Device Failure).
	16#0005	Exception Code 5 (Acknowledge).
	16#0006	Exception Code 6 (Server Device Busy).
	16#0008	Exception Code 8 (Memory Parity Error).
	16#000A	Exception Code 10 (Gateway Path Unavailable).
	16#000B	Exception Code 11 (Gateway Target Device Failed To Respond).
16#C130		Invalid Response.
	16#0001	Slave address of Response invalid.
	16#0002	Function code of Response invalid.
	16#0003	Length of Response invalid.
16#C416		Internal timeout.
	16#0001	Timeout between FC and Modbus_Master.

These diagnostic codes, as well as xError, are reset by a falling edge of xActivate or xSendRequest on an FC block.
The block displays the diagnosis of the master block and thus also the diagnosis of the serial blocks. These errors must be reset by deactivating the affected blocks. For errorcodes 16#C010 - 16#C060 refer to serial block diagnostic.

13 MB_RTU_FC23

This function block writes or reads multiple holding registers of a Modbus slave.

13.1 Function block call



13.2 Input parameters

Name	Type	Description
xActivate	BOOL	Block activation (TRUE = Active).
xSendRequest	BOOL	A send request to the master block is activated with a rising edge. A falling edge deletes current Modbus errors and resets the block outputs.
xEnablePoll	BOOL	Cyclical polling is started with a rising edge. A falling edge deactivates the polling. Input xSendRequest triggers an additional request and should be deactivated during poll mode. Note that the outputs xDone and xError are only one cycle true.
tPollIntervall	TIME	If xEnablePoll is activated, then transmission is cyclical in the time interval of the specified value.
uiSlaveAddress	UINT	The input specifies the address of the slave to be communicated with (1 to 255).

uiStartAddressRead	UINT	The input specifies the start address of the data to be read on the slave.
iDataCountRead	INT	The input specifies the amount of data to be read on the slave (1..125).
uiStartAddressWrite	UINT	The input specifies the start address of the data to be written on the slave.
iDataCountWrite	INT	The input specifies the amount of the data to be written on the slave (1..121).

13.3 Output parameters

Name	Type	Description
xActive	BOOL	TRUE: Function block is active. FALSE: Function block is not active.
xBusy	BOOL	TRUE: The block is busy with the service execution.
xDone	BOOL	Request is sent and response from slave is successfully received.
xError	BOOL	TRUE: An error has occurred. For details refer to wDiagCode and wAddDiagCode.
wDiagCode	WORD	Diagnostic code. Refer to diagnostics table.
wAddDiagCode	WORD	Additional diagnostic code. Refer to diagnostics table.
udtDiag	MB_UDT_RTU_FC_DIAG	Structure with internal variables for Diagnostic

13.4 Inout parameters

Name	Type	Description
arrRegisterValues	arrModbus2_W_1_123	The array of 123 words contains the desired values of the addressed register.
arrReadData	arrModbus2_W_1_125	The parameter contains the requested Modbus data.
udtMBData	udtModbus2_Data	The block communicates via this structure with the FC blocks.

13.5 Diagnosis

The diagnostics contains diagnostic codes on the FC blocks of the library. Modbus errors are indicated at the respective FC block and need to be reset there. Thus the communication in a Modbus network is not disturbed by an error in a request to a slave. An error at the FC block is deleted by a reset of the send input or by renewed activation of the block.

Modbus exception codes are sent by the respective slave and contain messages specific for Modbus.

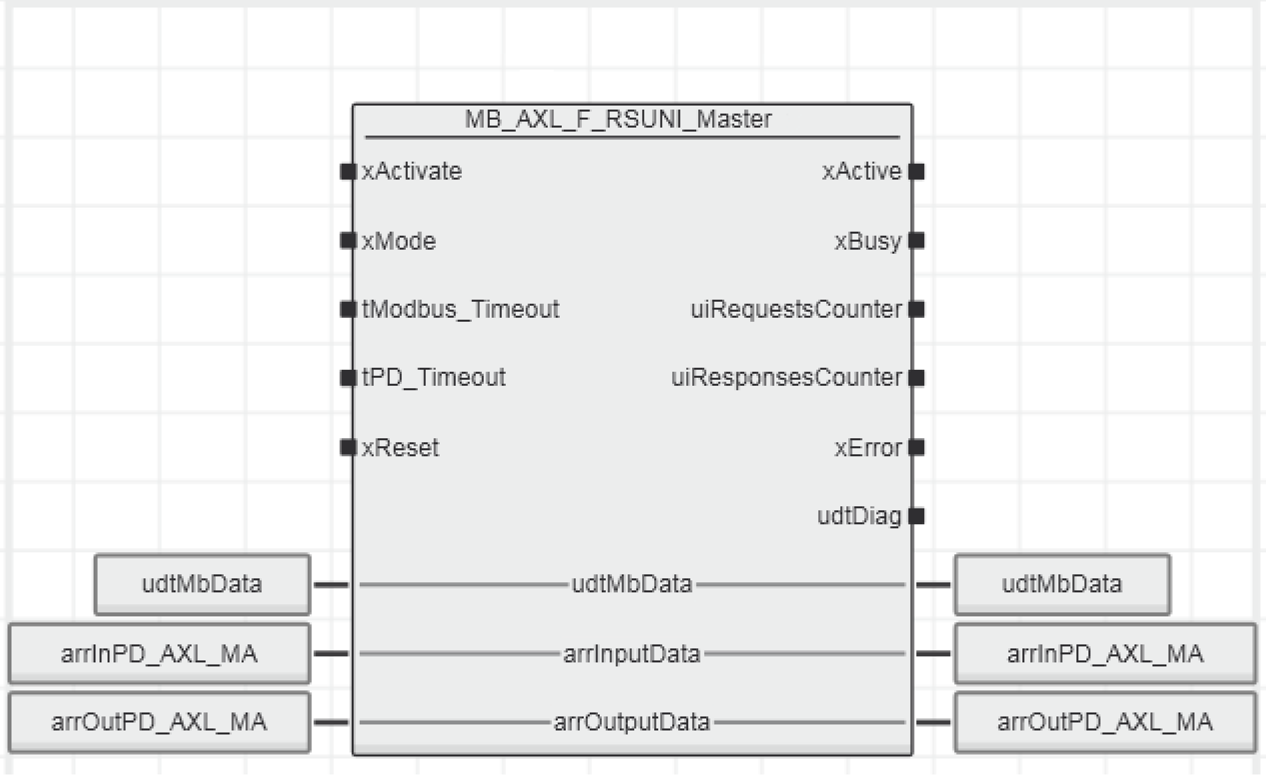
wDiagCode	wAddDiagCode	Description
16#0000		Block is not activated.
16#8000		Block is active and operating without errors.
16#8300		Block executes a service.
16#C100		Error during configuration (displayed on the FC block).
	16#0001	Slave address is outside the valid range.
	16#0002	Number of the requested data amount invalid (iDataCount).
	16#0003	Function code invalid.
	16#0004	Broadcast not possible. FC supports reading function.
16#C110		Error in the Modbus (displayed on the FC block).
	16#0001	Timeout on master block.
	16#0002	Checksum (CRC) invalid.
16#C120		Modbus Exception Code (shown at the FC block).
	16#0001	Exception Code 1 (Illegal Function).
	16#0002	Exception Code 2 (Illegal Data Address).
	16#0003	Exception Code 3 (Illegal Data Value).
	16#0004	Exception Code 4 (Server Device Failure).
	16#0005	Exception Code 5 (Acknowledge).
	16#0006	Exception Code 6 (Server Device Busy).
	16#0008	Exception Code 8 (Memory Parity Error).
	16#000A	Exception Code 10 (Gateway Path Unavailable).
	16#000B	Exception Code 11 (Gateway Target Device Failed To Respond).
16#C130		Invalid Response.
	16#0001	Slave address of Response invalid.
	16#0002	Function code of Response invalid.
	16#0003	Length of Response invalid.
16#C416		Internal timeout.
	16#0001	Timeout between FC and Modbus_Master.

These diagnostic codes, as well as xError, are reset by a falling edge of xActivate or xSendRequest on an FC block.
The block displays the diagnosis of the master block and thus also the diagnosis of the serial blocks. These errors must be reset by deactivating the affected blocks. For errorcodes 16#C010 - 16#C060 refer to serial block diagnostic.

14 MB_AXL_F_RSUNI_Master

This function block is used to implement a Modbus Master for the specified module type. Accordingly the function blocks are connected inside. The required parameters have to be parameterized on this function block. The associated parameter description refers to the description of the included function blocks.

14.1 Function block call



14.2 Input parameters

Name	Type	Description
xActivate	BOOL	Block activation (TRUE = Active).
xMode	BOOL	TRUE: AXL F RS UNI Module parameterized in Modbus RTU mode. FALSE: AXL F RS UNI Module parameterized in Transparent mode.
tModbus_Timeout	TIME	The block monitors the communication to the serial driver block. The default value: TIME#5s (if input is 0s). The input is copied by xActivate or xReset if there is a rising edge.
tPD_Timeout	TIME	Timeout for processdata communication. The input is copied by xActivate or xReset if there is a rising edge. Default: TIME#2s
xReset	BOOL	The input resets the block. All connected FC blocks are reset as well.

14.3 Output parameters

Name	Type	Description
xActive	BOOL	TRUE: Function block is active. FALSE: Function block is not active.
xError	BOOL	TRUE: An error has occurred. For details refer to udtDiag strucure “wDiagCode” and “wAddDiagCode”.
xBusy	BOOL	TRUE: The block is busy with the service execution.
uiRequestsCounter	UINT	Shows the number of requests transmitted.
uiResponsesCounter	UINT	Shows the number of responses received.
udtDiag	MB_UDT_AXL_RSUNI_DIAG_MASTER	Structure with internal structures for Diagnostic

14.4 Inout parameters

Name	Type	Description
udtMBData	udtModbus2_Data	The block communicates via this structure with the FC blocks.
arrInputAddress	MB2_RSUNI_ARR_B_0_xx	IN process data.
arrOutputAddress	MB2_RSUNI_ARR_B_1_xx	OUT process data.

14.5 Diagnosis

14.5.1 MB_RTU_Master

wDiagCode	wAddDiagCode	Description
16#0000		Block is not activated.
16#8000		Block is active and operating without errors.
16#8100		HW Reset phase to delete serial driver error

14.5.2 MB_AXL_RS_UNI_REC

wDiagCode	wAddDiagCode	Description
16#0000	16#0000	Block is not activated.
16#8000	16#0000	Block is active and operating without errors.
16#C030		Error when receiving.
	16#0010	Timeout when receiving.
	16#0030	uiRcvLength is larger than the memory available in the receive buffer.
	16#0040	uiRcvLength <> 0 for end-to-end protocol.
	16#0060	Communication error when receiving.
	16#0070	Error could not acknowledged.
16#C040		Error in intermediate storage.
	16#0010	Timeout in intermediate storage.
16#C050	16#0000	Error from module: • Failure of the peripheral voltage • Invalid parameter for specified command

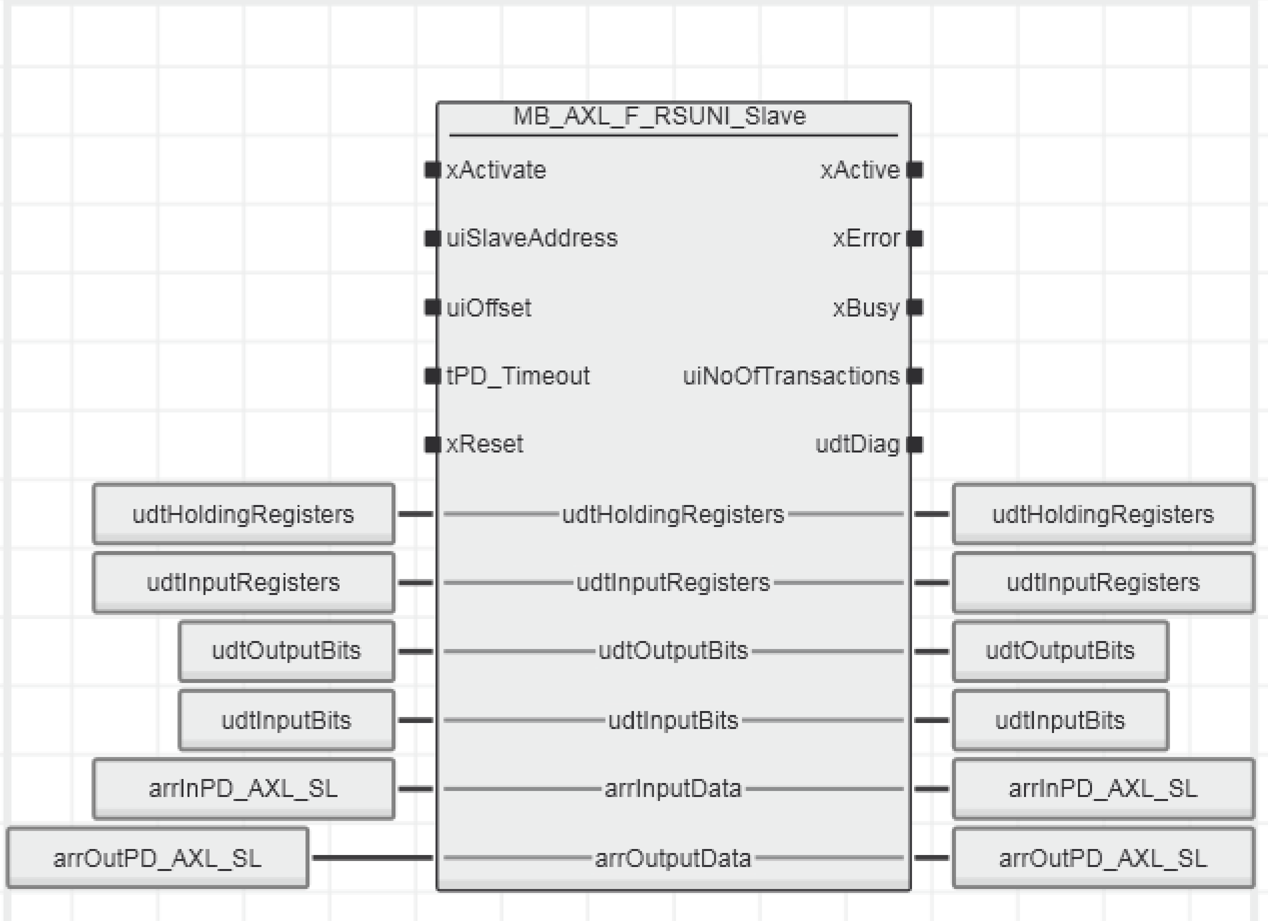
14.5.3 MB_AXL_RS_UNI_SND

wDiagCode	wAddDiagCode	Description
16#0000	16#0000	Block is not activated.
16#8000	16#0000	Block is active and operating without errors.
16#C020		Error when sending.
	16#0010	Timeout when sending.
	16#0020	Maximum size exceeded when sending.
	16#0060	Data send error in module.
	16#0070	Error could not acknowledged.
16#C030		Error when receiving.
	16#0060	Communication error when receiving.
16#C040		Error in intermediate storage.
	16#0010	Timeout in intermediate storage.
16#C050	16#0000	Error from module: • Failure of the peripheral voltage • Invalid parameter for specified command

15 MB_AXL_F_RSUNI_Slave

This function block is used to implement a Modbus Slave for the specified module type. Accordingly the function blocks are connected inside. The required parameters have to be parameterized on this function block. The associated parameter description refers to the description of the included function blocks.

15.1 Function block call



15.2 Input parameters

Name	Type	Description
xActivate	BOOL	Block activation (TRUE = Active).
uiSlaveAddress	UINT	The input specifies the address of the slave to be communicated with (1 to 255).
uiOffset	UINT	The start address is increased by this value. If the input uiOffset has the value 2000, then the register with address 3 in the request will be addressed with the address 2003 (2000 + 3).
tPD_Timeout	TIME	Timeout for processdata communication. The input is copied by xActivate or xReset if there is a rising edge. Default: TIME#2s
xReset	BOOL	The input resets the block. All connected FC blocks are reset as well.

15.3 Output parameters

Name	Type	Description
xActive	BOOL	TRUE: Function block is active. FALSE: Function block is not active.
xError	BOOL	TRUE: An error has occurred. For details refer to udtDiag strucure “wDiagCode” and “wAddDiagCode”.
xBusy	BOOL	TRUE: The block is busy with the service execution.
uiNoOfTransactions	UINT	Number of processed requests
udtDiag	MB_UDT_AXL_RSUNI_DIAG_SLAVE	Structure with internal structures for Diagnostic

15.4 Inout parameters

Name	Type	Description
udtHoldingRegisters	MB_RTU_w_0_1999	Array with 2000 words representing the holding registers. The address range is 0-1999. Function codes: 3,6 and 16
udtInputRegisters	MB_RTU_w_2000_2999	Array with 1000 words representing the input registers. The address range is 2000-2999. Function code: 4
udtOutputBits	MB_RTU_x_3000_3999	Array of 1000 bits representing the digital outputs. The address range is 3000-3999. Function codes: 1,5 and 15
udtInputBits	MB_RTU_x_4000_4999	Array of 1000 bits representing digital inputs. The address range is 4000-4999. Function code: 2
arrInputAddress	MB2_RSUNI_ARR_B_0_xx	IN process data.
arrOutputAddress	MB2_RSUNI_ARR_B_1_xx	OUT process data.

15.5 Diagnosis

15.5.1 MB_RTU_Slave

wDiagCode	wAddDiagCode	Description
16#0000	16#0000	Block is not activated.
16#8000	16#0000	Block is active and operating without errors.

15.5.2 MB_AXL_RS_UNI_REC

wDiagCode	wAddDiagCode	Description
16#0000	16#0000	Block is not activated.
16#8000	16#0000	Block is active and operating without errors.
16#C030		Error when receiving.
	16#0010	Timeout when receiving.
	16#0030	uiRcvLength is larger than the memory available in the receive buffer.
	16#0040	uiRcvLength <> 0 for end-to-end protocol.
	16#0060	Communication error when receiving.
	16#0070	Error could not acknowledged.
16#C040		Error in intermediate storage.
	16#0010	Timeout in intermediate storage.
16#C050	16#0000	Error from module: • Failure of the peripheral voltage • Invalid parameter for specified command

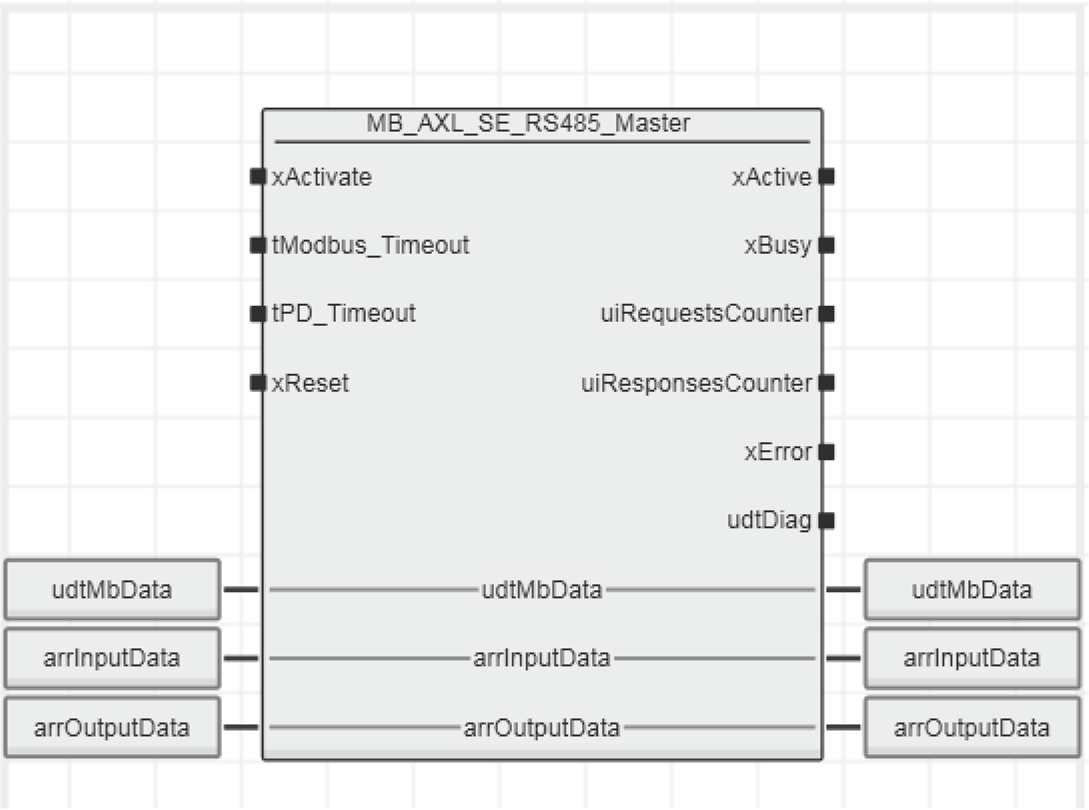
15.5.3 MB_AXL_RS_UNI_SND

wDiagCode	wAddDiagCode	Description
16#0000	16#0000	Block is not activated.
16#8000	16#0000	Block is active and operating without errors.
16#C020		Error when sending.
	16#0010	Timeout when sending.
	16#0020	Maximum size exceeded when sending.
	16#0060	Data send error in module.
	16#0070	Error could not acknowledged.
16#C030		Error when receiving.
	16#0060	Communication error when receiving.
16#C040		Error in intermediate storage.
	16#0010	Timeout in intermediate storage.
16#C050	16#0000	Error from module: • Failure of the peripheral voltage • Invalid parameter for specified command

16 MB_AXL_SE_RS485_Master

This function block is used to implement a Modbus Master for the specified module type. Accordingly the function blocks are connected inside. The required parameters have to be parameterized on this function block. The associated parameter description refers to the description of the included function blocks.

16.1 Function block call



16.2 Input parameters

Name	Type	Description
xActivate	BOOL	Block activation (TRUE = Active).
tModbus_Timeout	TIME	The block monitors the communication to the serial driver block. The default value: TIME#5s (if input is 0s). The input is copied by xActivate or xReset if there is a rising edge.
tPD_Timeout	TIME	Timeout for processdata communication. The input is copied by xActivate or xReset if there is a rising edge. Default: TIME#2s
xReset	BOOL	The input resets the block. All connected FC blocks are reset as well.

16.3 Output parameters

Name	Type	Description
xActive	BOOL	TRUE: Function block is active. FALSE: Function block is not active.
xError	BOOL	TRUE: An error has occurred. For details refer to udtDiag strucure “wDiagCode” and “wAddDiagCode”.
xBusy	BOOL	TRUE: The block is busy with the service execution.
uiRequestsCounter	UINT	Shows the number of requests transmitted.
uiResponsesCounter	UINT	Shows the number of responses received.
udtDiag	MB_UDT_AXL_SE_RS485_DIAG_MASTER	Structure with internal structures for Diagnostic

16.4 Inout parameters

Name	Type	Description
udtMBData	udtModbus2_Data	The block communicates via this structure with the FC blocks.
arrInputAddress	MB2_RSUNI_ARR_B_0_xx	IN process data.
arrOutputAddress	MB2_RSUNI_ARR_B_1_xx	OUT process data.

16.5 Diagnosis

16.5.1 MB_RTU_Master

wDiagCode	wAddDiagCode	Description
16#0000		Block is not activated.
16#8000		Block is active and operating without errors.
16#8100		HW Reset phase to delete serial driver error

16.5.2 MB_AXL_RS_UNI_REC

wDiagCode	wAddDiagCode	Description
16#0000	16#0000	Block is not activated.
16#8000	16#0000	Block is active and operating without errors.
16#C030		Error when receiving.
	16#0010	Timeout when receiving.
	16#0030	uiRcvLength is larger than the memory available in the receive buffer.
	16#0040	uiRcvLength <> 0 for end-to-end protocol.
	16#0060	Communication error when receiving.
	16#0070	Error could not acknowledged.
16#C040		Error in intermediate storage.
	16#0010	Timeout in intermediate storage.
16#C050	16#0000	Error from module: • Failure of the peripheral voltage • Invalid parameter for specified command

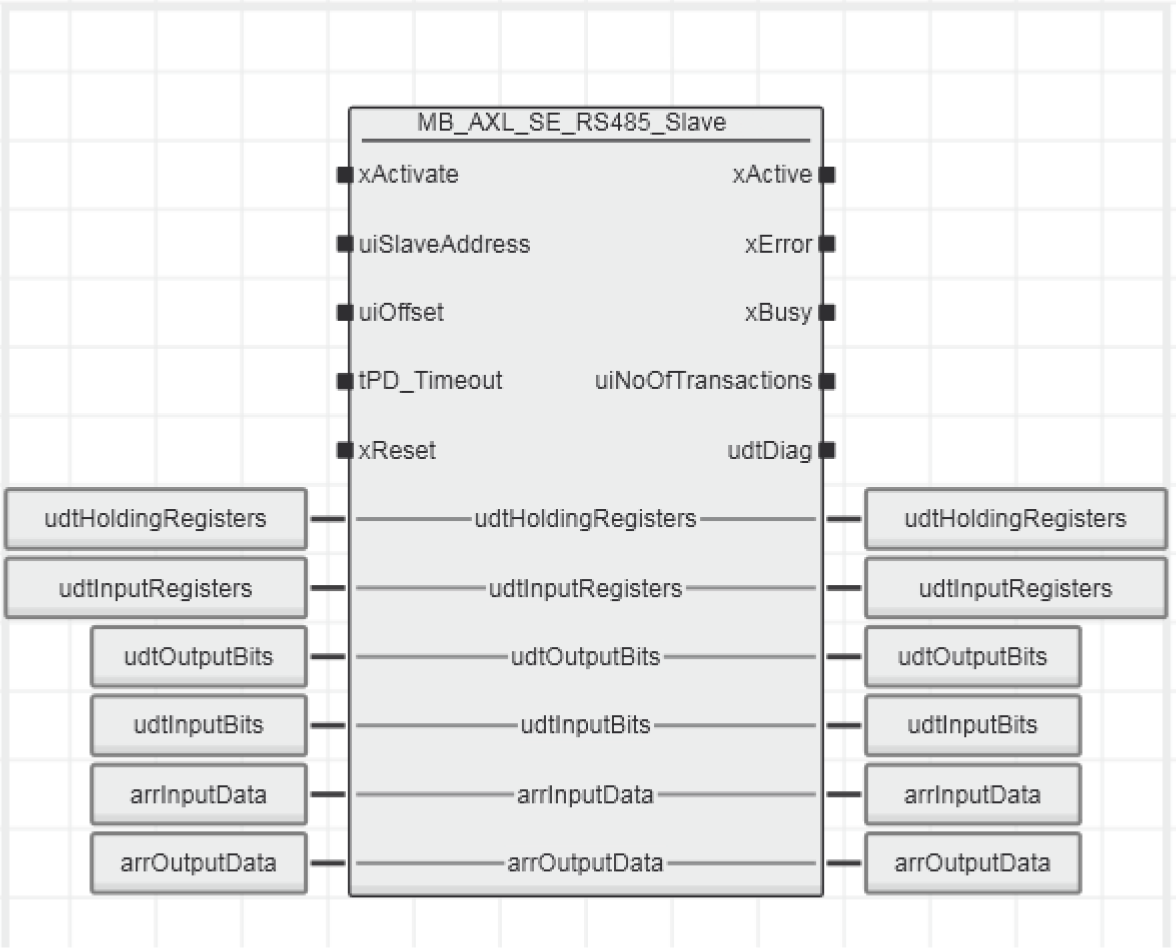
16.5.3 MB_AXL_RS_UNI_SND

wDiagCode	wAddDiagCode	Description
16#0000	16#0000	Block is not activated.
16#8000	16#0000	Block is active and operating without errors.
16#C020		Error when sending.
	16#0010	Timeout when sending.
	16#0020	Maximum size exceeded when sending.
	16#0060	Data send error in module.
	16#0070	Error could not acknowledged.
16#C030		Error when receiving.
	16#0060	Communication error when receiving.
16#C040		Error in intermediate storage.
	16#0010	Timeout in intermediate storage.
16#C050	16#0000	Error from module: • Failure of the peripheral voltage • Invalid parameter for specified command

17 MB_AXL_SE_RS485_Slave

This function block is used to implement a Modbus Slave for the specified module type. Accordingly the function blocks are connected inside. The required parameters have to be parameterized on this function block. The associated parameter description refers to the description of the included function blocks.

17.1 Function block call



17.2 Input parameters

Name	Type	Description
xActivate	BOOL	Block activation (TRUE = Active).
uiSlaveAddress	UINT	The input specifies the address of the slave to be communicated with (1 to 255).
uiOffset	UINT	The start address is increased by this value. If the input uiOffset has the value 2000, then the register with address 3 in the request will be addressed with the address 2003 (2000 + 3).
tPD_Timeout	TIME	Timeout for processdata communication. The input is copied by xActivate or xReset if there is a rising edge. Default: TIME#2s
xReset	BOOL	The input resets the block. All connected FC blocks are reset as well.

17.3 Output parameters

Name	Type	Description
xActive	BOOL	TRUE: Function block is active. FALSE: Function block is not active.
xError	BOOL	TRUE: An error has occurred. For details refer to udtDiag strucure “wDiagCode” and “wAddDiagCode”.
xBusy	BOOL	TRUE: The block is busy with the service execution.
uiNoOfTransactions	UINT	Number of processed requests
udtDiag	MB_UDT_AXL_SE_RS485_DIAG_SLAVE	Structure with internal structures for Diagnostic

17.4 Inout parameters

Name	Type	Description
udtHoldingRegisters	MB_RTU_w_0_1999	Array with 2000 words representing the holding registers. The address range is 0-1999. Function codes: 3,6 and 16
udtInputRegisters	MB_RTU_w_2000_2999	Array with 1000 words representing the input registers. The address range is 2000-2999. Function code: 4
udtOutputBits	MB_RTU_x_3000_3999	Array of 1000 bits representing the digital outputs. The address range is 3000-3999. Function codes: 1,5 and 15
udtInputBits	MB_RTU_x_4000_4999	Array of 1000 bits representing digital inputs. The address range is 4000-4999. Function code: 2
arrInputAddress	MB2_RSUNI_ARR_B_0_xx	IN process data.
arrOutputAddress	MB2_RSUNI_ARR_B_1_xx	OUT process data.

17.5 Diagnosis

17.5.1 MB_RTU_Slave

wDiagCode	wAddDiagCode	Description
16#0000	16#0000	Block is not activated.
16#8000	16#0000	Block is active and operating without errors.

17.5.2 MB_AXL_RS_UNI_REC

wDiagCode	wAddDiagCode	Description
16#0000	16#0000	Block is not activated.
16#8000	16#0000	Block is active and operating without errors.
16#C030		Error when receiving.
	16#0010	Timeout when receiving.
	16#0030	uiRcvLength is larger than the memory available in the receive buffer.
	16#0040	uiRcvLength <> 0 for end-to-end protocol.
	16#0060	Communication error when receiving.
	16#0070	Error could not acknowledged.
16#C040		Error in intermediate storage.
	16#0010	Timeout in intermediate storage.
16#C050	16#0000	Error from module: • Failure of the peripheral voltage • Invalid parameter for specified command

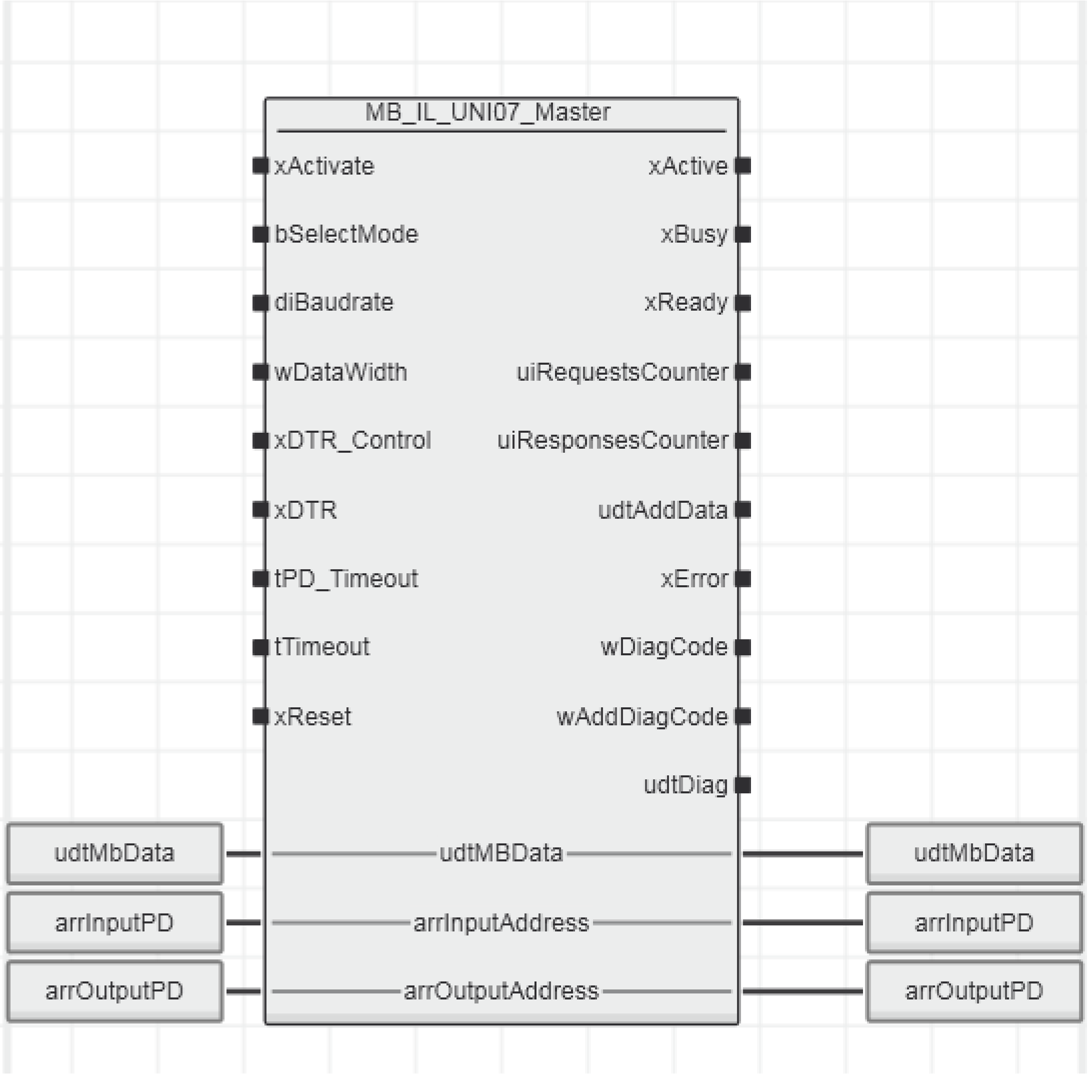
17.5.3 MB_AXL_RS_UNI_SND

wDiagCode	wAddDiagCode	Description
16#0000	16#0000	Block is not activated.
16#8000	16#0000	Block is active and operating without errors.
16#C020		Error when sending.
	16#0010	Timeout when sending.
	16#0020	Maximum size exceeded when sending.
	16#0060	Data send error in module.
	16#0070	Error could not acknowledged.
16#C030		Error when receiving.
	16#0060	Communication error when receiving.
16#C040		Error in intermediate storage.
	16#0010	Timeout in intermediate storage.
16#C050	16#0000	Error from module: • Failure of the peripheral voltage • Invalid parameter for specified command

18 MB_IL_UNI07_Master

This function block is used to implement a Modbus Master for the specified module type. Accordingly the function blocks are connected inside. The required parameters have to be parameterized on this function block. The associated parameter description refers to the description of the included function blocks.

18.1 Function block call



18.2 Input parameters

Name	Type	Description
xActivate	BOOL	Block activation (TRUE = Active).
bSelectMode	BYTE	0 hex = RS-232 1 hex = RS-485 2 hex = RS-422
diBaudrate	DINT	Here, the baud rate can be specified freely from 110 baud to 262143 baud. Standard values are 110, 300, 600, 1200, 1800, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 250000.
wDataWidth	WORD	Write the code for the data width combination to the low byte. If you wish to use a data width different from the standard combination, then write value 0xF to the low byte and your desired value to the high byte. The combinations can be found in the data sheet. Direct specification: Bit15 to Bit8 Code: Bit7 to Bit0 0 hex = 7 data bits, even, 1 stop bit 1 hex = 7 data bits, odd, 1 stop bit 2 hex = 8 data bits, even, 1 stop bit 3 hex = 8 data bits, odd, 1 stop bit 4 hex = 8 data bits, none, 1 stop bit 5 hex = 7 data bits, none, 1 stop bit 6 hex = 7 data bits, even, 2 stop bits 7 hex = 7 data bits, odd, 2 stop bits 8 hex = 8 data bits, even, 2 stop bits 9 hex = 8 data bits, odd, 2 stop bits A hex = 8 data bits, none, 2 stop bits B hex = 7 data bits, none, 2 stop bits C hex = 8 data bits, constant at 0, 1 stop bits D hex = 8 data bits, constant at 1, 1 stop bits E hex = 6 data bits, none, 1 stop bits F hex = Reserved
xDTR_Control	BOOL	FALSE: The DTR signal is controlled automatically. TRUE: The DTR signal is controlled by the user.

xDTR	BOOL	The DTR signal is controlled. Only active if the corresponding mode is activated (implemented via the parameterization blocks).
tPD_Timeout	TIME	Timeout for processdata communication. The input is copied by xActivate or xReset if there is a rising edge. Default: TIME#2s
tTimeout	TIME	The block monitors the communication to the serial driver block. The default value: TIME#5s (if input is 0s). The input is copied by xActivate or xReset if there is a rising edge.
xReset	BOOL	The input resets the block. All connected FC blocks are reset as well.

18.3 Output parameters

Name	Type	Description
xActive	BOOL	TRUE: Function block is active. FALSE: Function block is not active.
xBusy	BOOL	TRUE: The block is busy with the service execution.
xReady	BOOL	The block is ready to execute services. When executing services, this parameter is FALSE.
uiRequestsCounter	UINT	Shows the number of requests transmitted.
uiResponsesCounter	UINT	Shows the number of responses received.
udtAddData	MB2_COM_UDT_R485P_DATA_V1	Structure with additional status variables. This structure can be decoded by the IL_RS485P_AddData_V1_1x block.
xError	BOOL	TRUE: An error has occurred. For details refer to wDiagCode and wAddDiagCode.
wDiagCode	WORD	Diagnostic code. Refer to diagnostics table.
wAddDiagCode	WORD	Additional diagnostic code. Refer to diagnostics table.
udtDiag	MB_UDT_IL_UNI_MASTER_DIAG	Structure with internal structures for Diagnostic

18.4 Inout parameters

Name	Type	Description
udtMBData	udtModbus2_Data	The block communicates via this structure with the FC blocks.
arrInputAddress	MB2_RSUNI_ARR_B_0_xx	IN process data.
arrOutputAddress	MB2_RSUNI_ARR_B_1_xx	OUT process data.

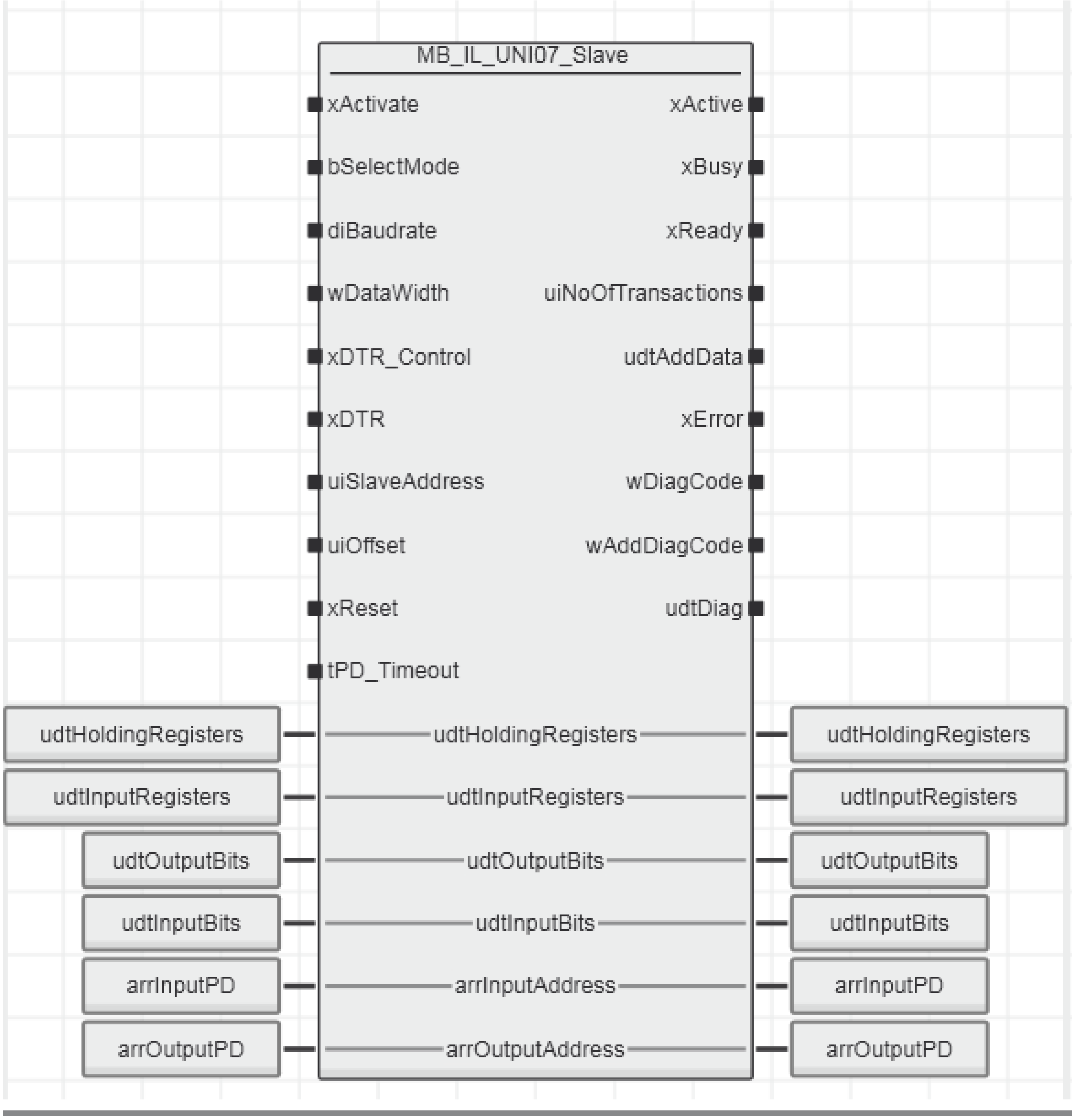
18.5 Diagnosis

wDiagCode	wAddDiagCode	Description
0000hex		Block is not activated.
8000hex		Block is active and operating without errors.
8100hex		HW Reset phase to delete serial driver error
16#C010		Incorrect parameters.
	16#0010	Baud rate.
	16#0020	Data width.
	16#0030	Protocol.
	16#0040	Interface.
	16#0050	Terminal configuration error.
	16#0060	Communication error.
	16#0070	Communication error during reset of module.
	16#0080	xReceive and xSend inputs are set at the same time.
	16#0090	xReceive input is set during send procedure.
	16#0100	xSend input is set during receive procedure.
16#C020		Error when sending.
	16#0020	Maximum size exceeded.
	16#0060	Communication error when sending.
16#C030		Error when receiving.
	16#0030	uiRcvLength is longer than the memory available in the receive buffer.
	16#0040	uiRcvLength <> 0 for end-to-end protocol.
	16#0060	Communication error when receiving.

19 MB_IL_UNI07_Slave

This function block is used to implement a Modbus Slave for the specified module type. Accordingly the function blocks are connected inside. The required parameters have to be parameterized on this function block. The associated parameter description refers to the description of the included function blocks.

19.1 Function block call



19.2 Input parameters

Name	Type	Description
xActivate	BOOL	Block activation (TRUE = Active).
bSelectMode	BYTE	0 hex = RS-232 1 hex = RS-485 2 hex = RS-422
diBaudrate	DINT	Here, the baud rate can be specified freely from 110 baud to 262143 baud. Standard values are 110, 300, 600, 1200, 1800, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 250000.
wDataWidth	WORD	Write the code for the data width combination to the low byte. If you wish to use a data width different from the standard combination, then write value 0xF to the low byte and your desired value to the high byte. The combinations can be found in the data sheet. Direct specification: Bit15 to Bit8 Code: Bit7 to Bit0 0 hex = 7 data bits, even, 1 stop bit 1 hex = 7 data bits, odd, 1 stop bit 2 hex = 8 data bits, even, 1 stop bit 3 hex = 8 data bits, odd, 1 stop bit 4 hex = 8 data bits, none, 1 stop bit 5 hex = 7 data bits, none, 1 stop bit 6 hex = 7 data bits, even, 2 stop bits 7 hex = 7 data bits, odd, 2 stop bits 8 hex = 8 data bits, even, 2 stop bits 9 hex = 8 data bits, odd, 2 stop bits A hex = 8 data bits, none, 2 stop bits B hex = 7 data bits, none, 2 stop bits C hex = 8 data bits, constant at 0, 1 stop bits D hex = 8 data bits, constant at 1, 1 stop bits E hex = 6 data bits, none, 1 stop bits F hex = Reserved
xDTR_Control	BOOL	FALSE: The DTR signal is controlled automatically. TRUE: The DTR signal is controlled by the user.

xDTR	BOOL	The DTR signal is controlled. Only active if the corresponding mode is activated (implemented via the parameterization blocks).
uiSlaveAddress	UINT	The input specifies the address of the slave to be communicated with (1 to 255).
uiOffset	UINT	The start address is increased by this value. If the input uiOffset has the value 2000, then the register with address 3 in the request will be addressed with the address 2003 (2000 + 3).
xReset	BOOL	The input resets the block. All connected FC blocks are reset as well.
tPD_Timeout	TIME	Timeout for processdata communication. The input is copied by xActivate or xReset if there is a rising edge. Default: TIME#2s

19.3 Output parameters

Name	Type	Description
xActive	BOOL	TRUE: Function block is active. FALSE: Function block is not active.
xBusy	BOOL	TRUE: The block is busy with the service execution.
xReady	BOOL	The block is ready to execute services. When executing services, this parameter is FALSE.
uiNoOfTransactions	UINT	Number of processed requests
udtAddData	MB2_RSUNI_UDT_DATA_V1	Structure with variables for diagnostics
xError	BOOL	TRUE: An error has occurred. For details refer to wDiagCode and wAddDiagCode.
wDiagCode	WORD	Diagnostic code. Refer to diagnostics table.
wAddDiagCode	WORD	Additional diagnostic code. Refer to diagnostics table.
udtDiag	MB_UDT_IL_UNI_SLAVE_DIAG	Structure with internal structures for Diagnostic

19.4 Inout parameters

Name	Type	Description
udtHoldingRegisters	MB_RTU_w_0_1999	Array with 2000 words representing the holding registers. The address range is 0-1999. Function codes: 3,6 and 16
udtInputRegisters	MB_RTU_w_2000_2999	Array with 1000 words representing the input registers. The address range is 2000-2999. Function code: 4
udtOutputBits	MB_RTU_x_3000_3999	Array of 1000 bits representing the digital outputs. The address range is 3000-3999. Function codes: 1,5 and 15
udtInputBits	MB_RTU_x_4000_4999	Array of 1000 bits representing digital inputs. The address range is 4000-4999. Function code: 2
arrInputAddress	MB2_RSUNI_ARR_B_0_xx	IN process data.
arrOutputAddress	MB2_RSUNI_ARR_B_1_xx	OUT process data.

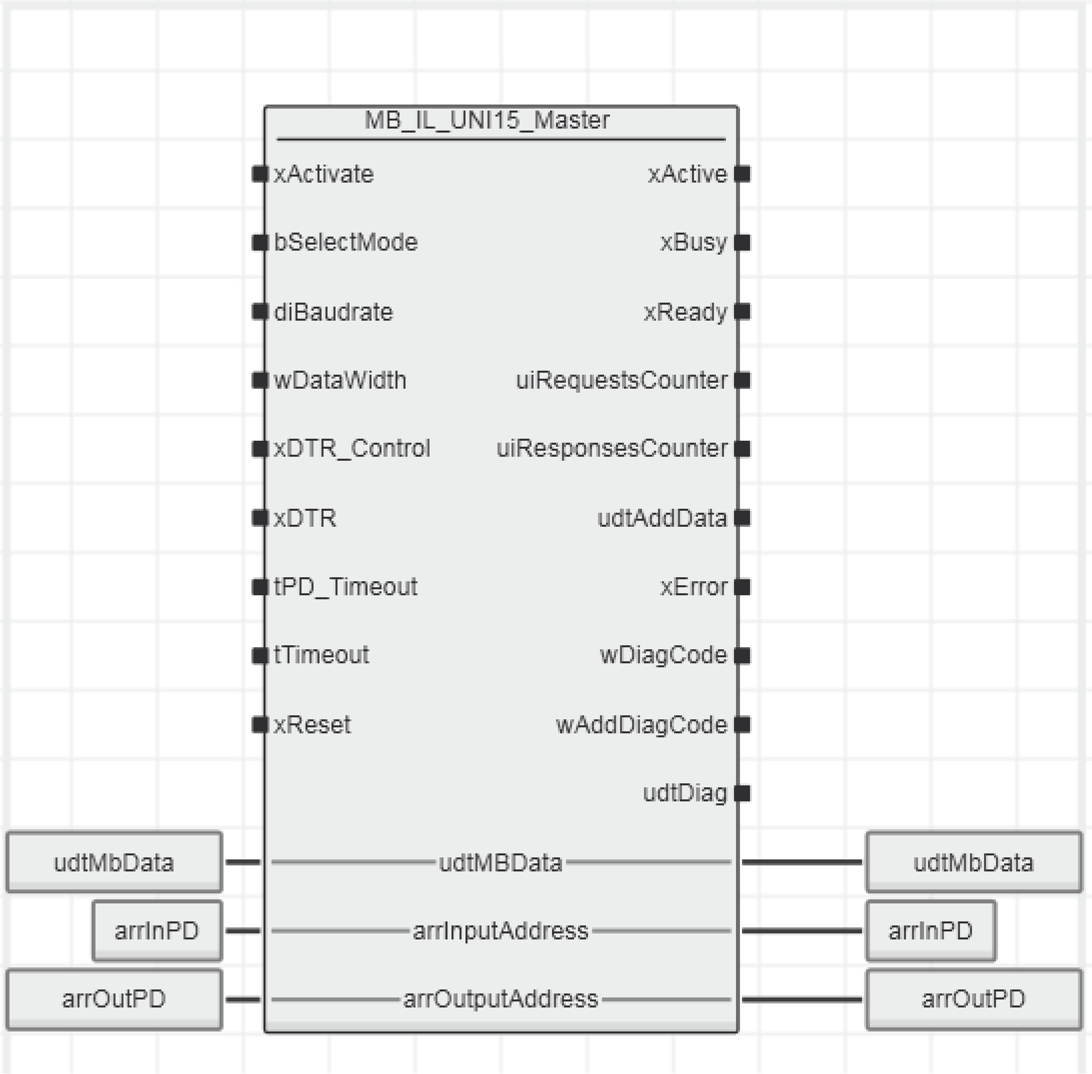
19.5 Diagnosis

wDiagCode	wAddDiagCode	Description
0000hex		Block is not activated.
8000hex		Block is active and operating without errors.
16#C010		Incorrect parameters.
	16#0010	Baud rate.
	16#0020	Data width.
	16#0030	Protocol.
	16#0040	Interface.
	16#0050	Terminal configuration error.
	16#0060	Communication error.
	16#0070	Communication error during reset of module.
	16#0080	xReceive and xSend inputs are set at the same time.
	16#0090	xReceive input is set during send procedure.
	16#0100	xSend input is set during receive procedure.
16#C020		Error when sending.
	16#0020	Maximum size exceeded.
	16#0060	Communication error when sending.
16#C030		Error when receiving.
	16#0030	uiRcvLength is longer than the memory available in the receive buffer.
	16#0040	uiRcvLength <> 0 for end-to-end protocol.
	16#0060	Communication error when receiving.

20 MB_IL_UNI15_Master

This function block is used to implement a Modbus Master for the specified module type. Accordingly the function blocks are connected inside. The required parameters have to be parameterized on this function block. The associated parameter description refers to the description of the included function blocks.

20.1 Function block call



20.2 Input parameters

Name	Type	Description
xActivate	BOOL	Block activation (TRUE = Active).
bSelectMode	BYTE	0 hex = RS-232 1 hex = RS-485 2 hex = RS-422

diBaudrate	DINT	Here, the baud rate can be specified freely from 110 baud to 262143 baud. Standard values are 110, 300, 600, 1200, 1800, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 250000.
wDataWidth	WORD	Write the code for the data width combination to the low byte. If you wish to use a data width different from the standard combination, then write value 0xF to the low byte and your desired value to the high byte. The combinations can be found in the data sheet. Direct specification: Bit15 to Bit8 Code: Bit7 to Bit0 0 hex = 7 data bits, even, 1 stop bit 1 hex = 7 data bits, odd, 1 stop bit 2 hex = 8 data bits, even, 1 stop bit 3 hex = 8 data bits, odd, 1 stop bit 4 hex = 8 data bits, none, 1 stop bit 5 hex = 7 data bits, none, 1 stop bit 6 hex = 7 data bits, even, 2 stop bits 7 hex = 7 data bits, odd, 2 stop bits 8 hex = 8 data bits, even, 2 stop bits 9 hex = 8 data bits, odd, 2 stop bits A hex = 8 data bits, none, 2 stop bits B hex = 7 data bits, none, 2 stop bits C hex = 8 data bits, constant at 0, 1 stop bits D hex = 8 data bits, constant at 1, 1 stop bits E hex = 6 data bits, none, 1 stop bits F hex = Reserved
xDTR_Control	BOOL	FALSE: The DTR signal is controlled automatically. TRUE: The DTR signal is controlled by the user.
xDTR	BOOL	The DTR signal is controlled. Only active if the corresponding mode is activated (implemented via the parameterization blocks).
tPD_Timeout	TIME	Timeout for processdata communication. The input is copied by xActivate or xReset if there is a rising edge. Default: TIME#2s
tTimeout	TIME	The block monitors the communication to the serial driver block. The default value: TIME#5s (if input is 0s). The input is copied by xActivate or xReset if there is a rising edge.
xReset	BOOL	The input resets the block. All connected FC blocks are reset as well.

20.3 Output parameters

Name	Type	Description
xActive	BOOL	TRUE: Function block is active. FALSE: Function block is not active.
xBusy	BOOL	TRUE: The block is busy with the service execution.
xReady	BOOL	The block is ready to execute services. When executing services, this parameter is FALSE.
uiRequestsCounter	UINT	Shows the number of requests transmitted.
uiResponsesCounter	UINT	Shows the number of responses received.
udtAddData	MB2_COM_UDT_R485P_DATA_V1	Structure with additional status variables. This structure can be decoded by the IL_RS485P_AddData_V1_1x block.
xError	BOOL	TRUE: An error has occurred. For details refer to wDiagCode and wAddDiagCode.
wDiagCode	WORD	Diagnostic code. Refer to diagnostics table.
wAddDiagCode	WORD	Additional diagnostic code. Refer to diagnostics table.
udtDiag	MB_UDT_IL_UNI_MASTER_DIAG	Structure with internal structures for Diagnostic

20.4 Inout parameters

Name	Type	Description
udtMBData	udtModbus2_Data	The block communicates via this structure with the FC blocks.
arrInputAddress	MB2_RSUNI_ARR_B_0_xx	IN process data.
arrOutputAddress	MB2_RSUNI_ARR_B_1_xx	OUT process data.

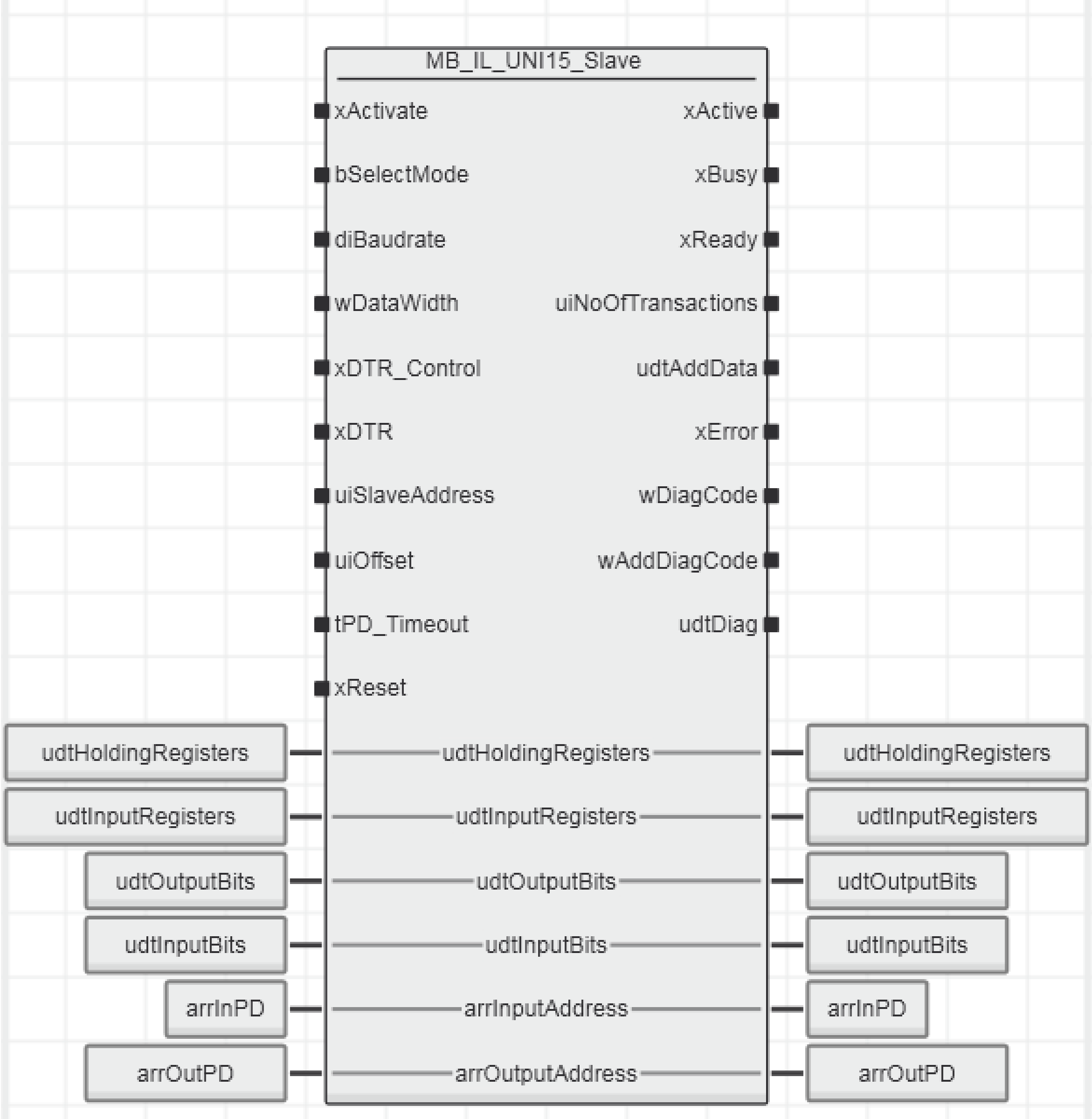
20.5 Diagnosis

wDiagCode	wAddDiagCode	Description
0000hex		Block is not activated.
8000hex		Block is active and operating without errors.
8100hex		HW Reset phase to delete serial driver error
16#C010		Incorrect parameters.
	16#0010	Baud rate.
	16#0020	Data width.
	16#0030	Protocol.
	16#0040	Interface.
	16#0050	Terminal configuration error.
	16#0060	Communication error.
	16#0070	Communication error during reset of module.
	16#0080	xReceive and xSend inputs are set at the same time.
	16#0090	xReceive input is set during send procedure.
	16#0100	xSend input is set during receive procedure.
16#C020		Error when sending.
	16#0020	Maximum size exceeded.
	16#0060	Communication error when sending.
16#C030		Error when receiving.
	16#0030	uiRcvLength is longer than the memory available in the receive buffer.
	16#0040	uiRcvLength <> 0 for end-to-end protocol.
	16#0060	Communication error when receiving.

21 MB_IL_UNI15_Slave

This function block is used to implement a Modbus Slave for the specified module type. Accordingly the function blocks are connected inside. The required parameters have to be parameterized on this function block. The associated parameter description refers to the description of the included function blocks.

21.1 Function block call



21.2 Input parameters

Name	Type	Description
xActivate	BOOL	Block activation (TRUE = Active).
bSelectMode	BYTE	0 hex = RS-232 1 hex = RS-485 2 hex = RS-422
diBaudrate	DINT	Here, the baud rate can be specified freely from 110 baud to 262143 baud. Standard values are 110, 300, 600, 1200, 1800, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 250000.
wDataWidth	WORD	Write the code for the data width combination to the low byte. If you wish to use a data width different from the standard combination, then write value 0xF to the low byte and your desired value to the high byte. The combinations can be found in the data sheet. Direct specification: Bit15 to Bit8 Code: Bit7 to Bit0 0 hex = 7 data bits, even, 1 stop bit 1 hex = 7 data bits, odd, 1 stop bit 2 hex = 8 data bits, even, 1 stop bit 3 hex = 8 data bits, odd, 1 stop bit 4 hex = 8 data bits, none, 1 stop bit 5 hex = 7 data bits, none, 1 stop bit 6 hex = 7 data bits, even, 2 stop bits 7 hex = 7 data bits, odd, 2 stop bits 8 hex = 8 data bits, even, 2 stop bits 9 hex = 8 data bits, odd, 2 stop bits A hex = 8 data bits, none, 2 stop bits B hex = 7 data bits, none, 2 stop bits C hex = 8 data bits, constant at 0, 1 stop bits D hex = 8 data bits, constant at 1, 1 stop bits E hex = 6 data bits, none, 1 stop bits F hex = Reserved
xDTR_Control	BOOL	FALSE: The DTR signal is controlled automatically. TRUE: The DTR signal is controlled by the user.

xDTR	BOOL	The DTR signal is controlled. Only active if the corresponding mode is activated (implemented via the parameterization blocks).
uiSlaveAddress	UINT	The input specifies the address of the slave to be communicated with (1 to 255).
uiOffset	UINT	The start address is increased by this value. If the input uiOffset has the value 2000, then the register with address 3 in the request will be addressed with the address 2003 (2000 + 3).
tPD_Timeout	TIME	Timeout for processdata communication. The input is copied by xActivate or xReset if there is a rising edge. Default: TIME#2s
xReset	BOOL	The input resets the block. All connected FC blocks are reset as well.

21.3 Output parameters

Name	Type	Description
xActive	BOOL	TRUE: Function block is active. FALSE: Function block is not active.
xBusy	BOOL	TRUE: The block is busy with the service execution.
xReady	BOOL	The block is ready to execute services. When executing services, this parameter is FALSE.
uiNoOfTransactions	UINT	Number of processed requests
udtAddData	MB2_RSUNI_UDT_DATA_V1	Structure with variables for diagnostics
xError	BOOL	TRUE: An error has occurred. For details refer to wDiagCode and wAddDiagCode.
wDiagCode	WORD	Diagnostic code. Refer to diagnostics table.
wAddDiagCode	WORD	Additional diagnostic code. Refer to diagnostics table.
udtDiag	MB_UDT_IL_UNI_SLAVE_DIAG	Structure with internal structures for Diagnostic

21.4 Inout parameters

Name	Type	Description
udtHoldingRegisters	MB_RTU_w_0_1999	Array with 2000 words representing the holding registers. The address range is 0-1999. Function codes: 3,6 and 16
udtInputRegisters	MB_RTU_w_2000_2999	Array with 1000 words representing the input registers. The address range is 2000-2999. Function code: 4
udtOutputBits	MB_RTU_x_3000_3999	Array of 1000 bits representing the digital outputs. The address range is 3000-3999. Function codes: 1,5 and 15
udtInputBits	MB_RTU_x_4000_4999	Array of 1000 bits representing digital inputs. The address range is 4000-4999. Function code: 2
arrInputAddress	MB2_RSUNI_ARR_B_0_xx	IN process data.
arrOutputAddress	MB2_RSUNI_ARR_B_1_xx	OUT process data.

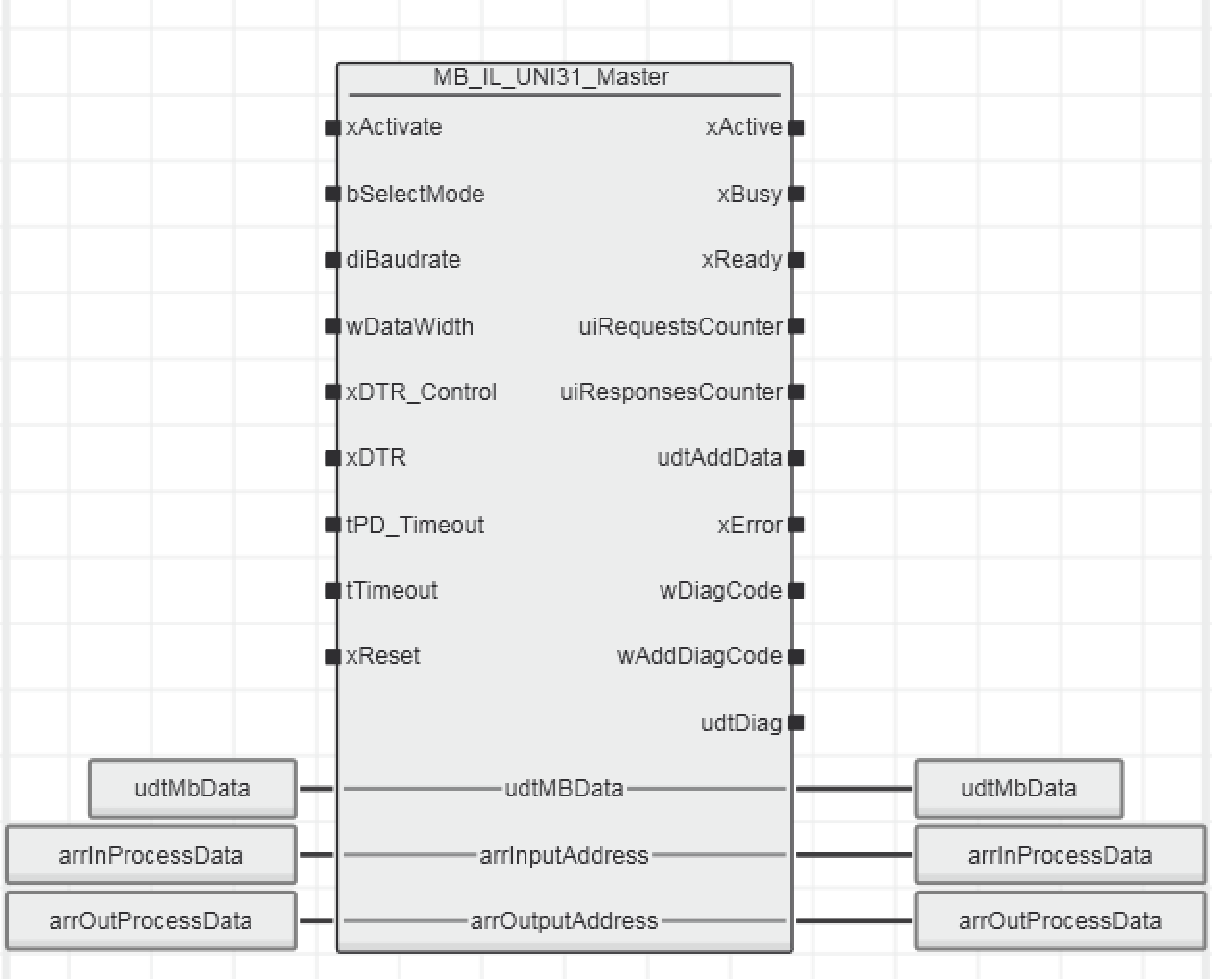
21.5 Diagnosis

wDiagCode	wAddDiagCode	Description
0000hex		Block is not activated.
8000hex		Block is active and operating without errors.
16#C010		Incorrect parameters.
	16#0010	Baud rate.
	16#0020	Data width.
	16#0030	Protocol.
	16#0040	Interface.
	16#0050	Terminal configuration error.
	16#0060	Communication error.
	16#0070	Communication error during reset of module.
	16#0080	xReceive and xSend inputs are set at the same time.
	16#0090	xReceive input is set during send procedure.
	16#0100	xSend input is set during receive procedure.
16#C020		Error when sending.
	16#0020	Maximum size exceeded.
	16#0060	Communication error when sending.
16#C030		Error when receiving.
	16#0030	uiRcvLength is longer than the memory available in the receive buffer.
	16#0040	uiRcvLength <> 0 for end-to-end protocol.
	16#0060	Communication error when receiving.

22 MB_IL_UNI31_Master

This function block is used to implement a Modbus Master for the specified module type. Accordingly the function blocks are connected inside. The required parameters have to be parameterized on this function block. The associated parameter description refers to the description of the included function blocks.

22.1 Block call



22.2 Input parameters

Name	Type	Description
xActivate	BOOL	Block activation (TRUE = Active).
bSelectMode	BYTE	0 hex = RS-232 1 hex = RS-485 2 hex = RS-422
diBaudrate	DINT	Here, the baud rate can be specified freely from 110 baud to 262143 baud. Standard values are 110, 300, 600, 1200, 1800, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 250000.
wDataWidth	WORD	Write the code for the data width combination to the low byte. If you wish to use a data width different from the standard combination, then write value 0xF to the low byte and your desired value to the high byte. The combinations can be found in the data sheet. Direct specification: Bit15 to Bit8 Code: Bit7 to Bit0 0 hex = 7 data bits, even, 1 stop bit 1 hex = 7 data bits, odd, 1 stop bit 2 hex = 8 data bits, even, 1 stop bit 3 hex = 8 data bits, odd, 1 stop bit 4 hex = 8 data bits, none, 1 stop bit 5 hex = 7 data bits, none, 1 stop bit 6 hex = 7 data bits, even, 2 stop bits 7 hex = 7 data bits, odd, 2 stop bits 8 hex = 8 data bits, even, 2 stop bits 9 hex = 8 data bits, odd, 2 stop bits A hex = 8 data bits, none, 2 stop bits B hex = 7 data bits, none, 2 stop bits C hex = 8 data bits, constant at 0, 1 stop bits D hex = 8 data bits, constant at 1, 1 stop bits E hex = 6 data bits, none, 1 stop bits F hex = Reserved
xDTR_Control	BOOL	FALSE: The DTR signal is controlled automatically. TRUE: The DTR signal is controlled by the user.

xDTR	BOOL	The DTR signal is controlled. Only active if the corresponding mode is activated (implemented via the parameterization blocks).
uiSlaveAddress	UINT	The input specifies the address of the slave to be communicated with (1 to 255).
uiOffset	UINT	The start address is increased by this value. If the input uiOffset has the value 2000, then the register with address 3 in the request will be addressed with the address 2003 (2000 + 3).
tPD_Timeout	TIME	Timeout for processdata communication. The input is copied by xActivate or xReset if there is a rising edge. Default: TIME#2s
tTimeout	TIME	The block monitors the communication to the serial driver block. The default value: TIME#5s (if input is 0s). The input is copied by xActivate or xReset if there is a rising edge.
xReset	BOOL	The input resets the block. All connected FC blocks are reset as well.

22.3 Output parameters

Name	Type	Description
xActive	BOOL	TRUE: Function block is active. FALSE: Function block is not active.
xBusy	BOOL	TRUE: The block is busy with the service execution.
xReady	BOOL	The block is ready to execute services. When executing services, this parameter is FALSE.
uiRequestsCounter	UINT	Shows the number of requests transmitted.
uiResponsesCounter	UINT	Shows the number of responses received.
udtAddData	MB2_COM_UDT_R485P_DATA_V1	Structure with additional status variables. This structure can be decoded by the IL_RS485P_AddData_V1_1x block.
xError	BOOL	TRUE: An error has occurred. For details refer to wDiagCode and wAddDiagCode.
wDiagCode	WORD	Diagnostic code. Refer to diagnostics table.
wAddDiagCode	WORD	Additional diagnostic code. Refer to diagnostics table.
udtDiag	MB_UDT_IL_UNI_MASTER_DIAG	Structure with internal structures for Diagnostic

22.4 Input and output parameters

Name	Type	Description
udtMBData	udtModbus2_Data	The block communicates via this structure with the FC blocks.
arrInputAddress	MB2_RSUNI_ARR_B_0_xx	IN process data.
arrOutputAddress	MB2_RSUNI_ARR_B_1_xx	OUT process data.

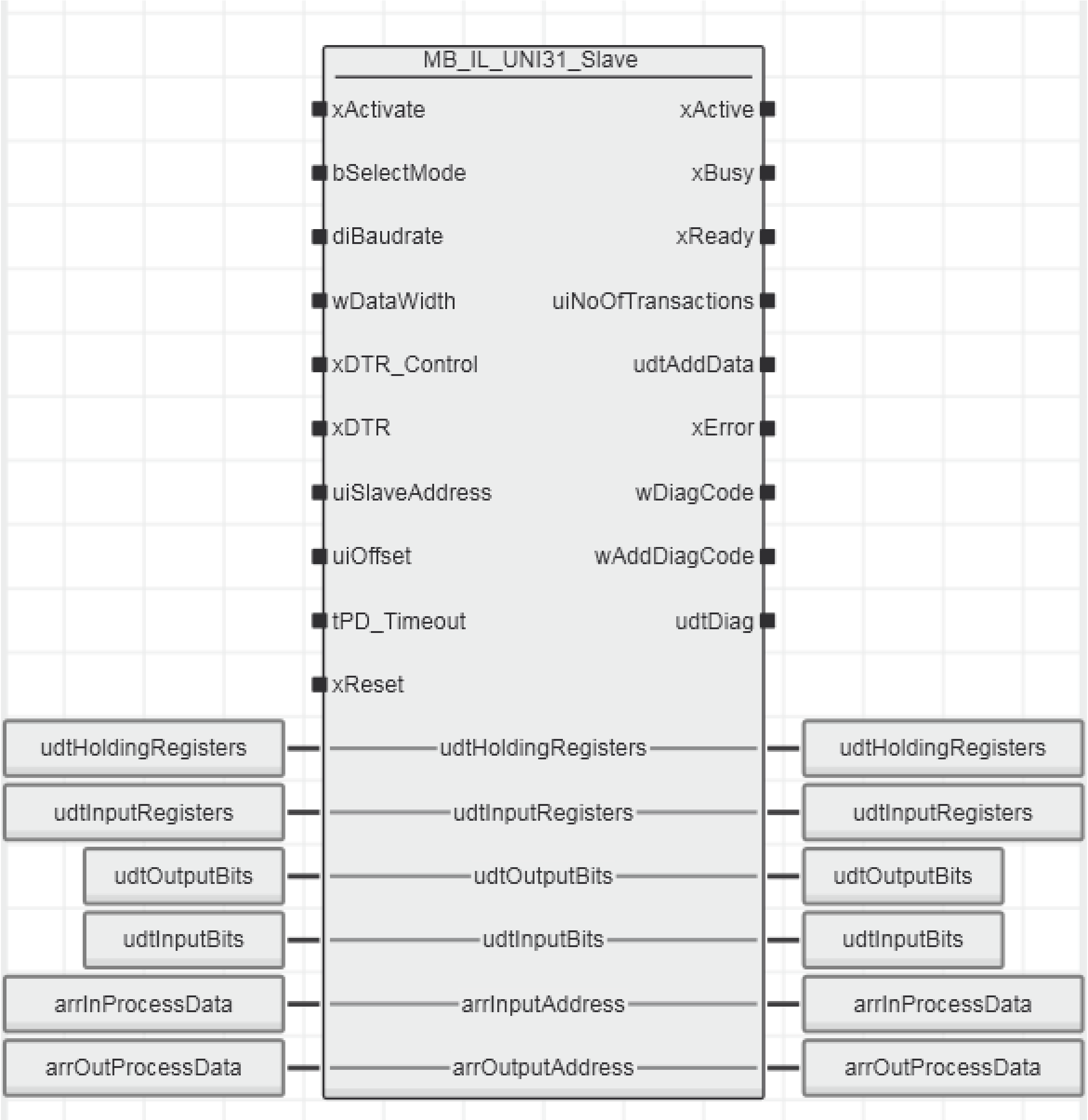
22.5 Diagnostic

wDiagCode	wAddDiagCode	Description
0000hex		Block is not activated.
8000hex		Block is active and operating without errors.
8100hex		HW Reset phase to delete serial driver error
16#C010		Incorrect parameters.
	16#0010	Baud rate.
	16#0020	Data width.
	16#0030	Protocol.
	16#0040	Interface.
	16#0050	Terminal configuration error.
	16#0060	Communication error.
	16#0070	Communication error during reset of module.
	16#0080	xReceive and xSend inputs are set at the same time.
	16#0090	xReceive input is set during send procedure.
	16#0100	xSend input is set during receive procedure.
16#C020		Error when sending.
	16#0020	Maximum size exceeded.
	16#0060	Communication error when sending.
16#C030		Error when receiving.
	16#0030	uiRcvLength is longer than the memory available in the receive buffer.
	16#0040	uiRcvLength <> 0 for end-to-end protocol.
	16#0060	Communication error when receiving.

23 MB_IL_UNI31_Slave

This function block is used to implement a Modbus Slave for the specified module type. Accordingly the function blocks are connected inside. The required parameters have to be parameterized on this function block. The associated parameter description refers to the description of the included function blocks.

23.1 Block call



23.2 Input parameters

Name	Type	Description
xActivate	BOOL	Block activation (TRUE = Active).
bSelectMode	BYTE	0 hex = RS-232 1 hex = RS-485 2 hex = RS-422
diBaudrate	DINT	Here, the baud rate can be specified freely from 110 baud to 262143 baud. Standard values are 110, 300, 600, 1200, 1800, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 250000.
wDataWidth	WORD	Write the code for the data width combination to the low byte. If you wish to use a data width different from the standard combination, then write value 0xF to the low byte and your desired value to the high byte. The combinations can be found in the data sheet. Direct specification: Bit15 to Bit8 Code: Bit7 to Bit0 0 hex = 7 data bits, even, 1 stop bit 1 hex = 7 data bits, odd, 1 stop bit 2 hex = 8 data bits, even, 1 stop bit 3 hex = 8 data bits, odd, 1 stop bit 4 hex = 8 data bits, none, 1 stop bit 5 hex = 7 data bits, none, 1 stop bit 6 hex = 7 data bits, even, 2 stop bits 7 hex = 7 data bits, odd, 2 stop bits 8 hex = 8 data bits, even, 2 stop bits 9 hex = 8 data bits, odd, 2 stop bits A hex = 8 data bits, none, 2 stop bits B hex = 7 data bits, none, 2 stop bits C hex = 8 data bits, constant at 0, 1 stop bits D hex = 8 data bits, constant at 1, 1 stop bits E hex = 6 data bits, none, 1 stop bits F hex = Reserved
xDTR_Control	BOOL	FALSE: The DTR signal is controlled automatically. TRUE: The DTR signal is controlled by the user.

xDTR	BOOL	The DTR signal is controlled. Only active if the corresponding mode is activated (implemented via the parameterization blocks).
uiSlaveAddress	UINT	The input specifies the address of the slave to be communicated with (1 to 255).
uiOffset	UINT	The start address is increased by this value. If the input uiOffset has the value 2000, then the register with address 3 in the request will be addressed with the address 2003 (2000 + 3).
tPD_Timeout	TIME	Timeout for processdata communication. The input is copied by xActivate or xReset if there is a rising edge. Default: TIME#2s
xReset	BOOL	The input resets the block. All connected FC blocks are reset as well.

23.3 Output parameters

Name	Type	Description
xActive	BOOL	TRUE: Function block is active. FALSE: Function block is not active.
xBusy	BOOL	TRUE: The block is busy with the service execution.
xReady	BOOL	The block is ready to execute services. When executing services, this parameter is FALSE.
uiNoOfTransactions	UINT	Number of processed requests
udtAddData	MB2_RSUNI_UDT_DATA_V1	Structure with variables for diagnostics
xError	BOOL	TRUE: An error has occurred. For details refer to wDiagCode and wAddDiagCode.
wDiagCode	WORD	Diagnostic code. Refer to diagnostics table.
wAddDiagCode	WORD	Additional diagnostic code. Refer to diagnostics table.
udtDiag	MB_UDT_IL_UNI_SLAVE_DIAG	Structure with internal structures for Diagnostic

23.4 Input and output parameters

Name	Type	Description
udtHoldingRegisters	MB_RTU_w_0_1999	Array with 2000 words representing the holding registers. The address range is 0-1999. Function codes: 3,6 and 16
udtInputRegisters	MB_RTU_w_2000_2999	Array with 1000 words representing the input registers. The address range is 2000-2999. Function code: 4
udtOutputBits	MB_RTU_x_3000_3999	Array of 1000 bits representing the digital outputs. The address range is 3000-3999. Function codes: 1,5 and 15
udtInputBits	MB_RTU_x_4000_4999	Array of 1000 bits representing digital inputs. The address range is 4000-4999. Function code: 2
arrInputAddress	MB2_RSUNI_ARR_B_0_xx	IN process data.
arrOutputAddress	MB2_RSUNI_ARR_B_1_xx	OUT process data.

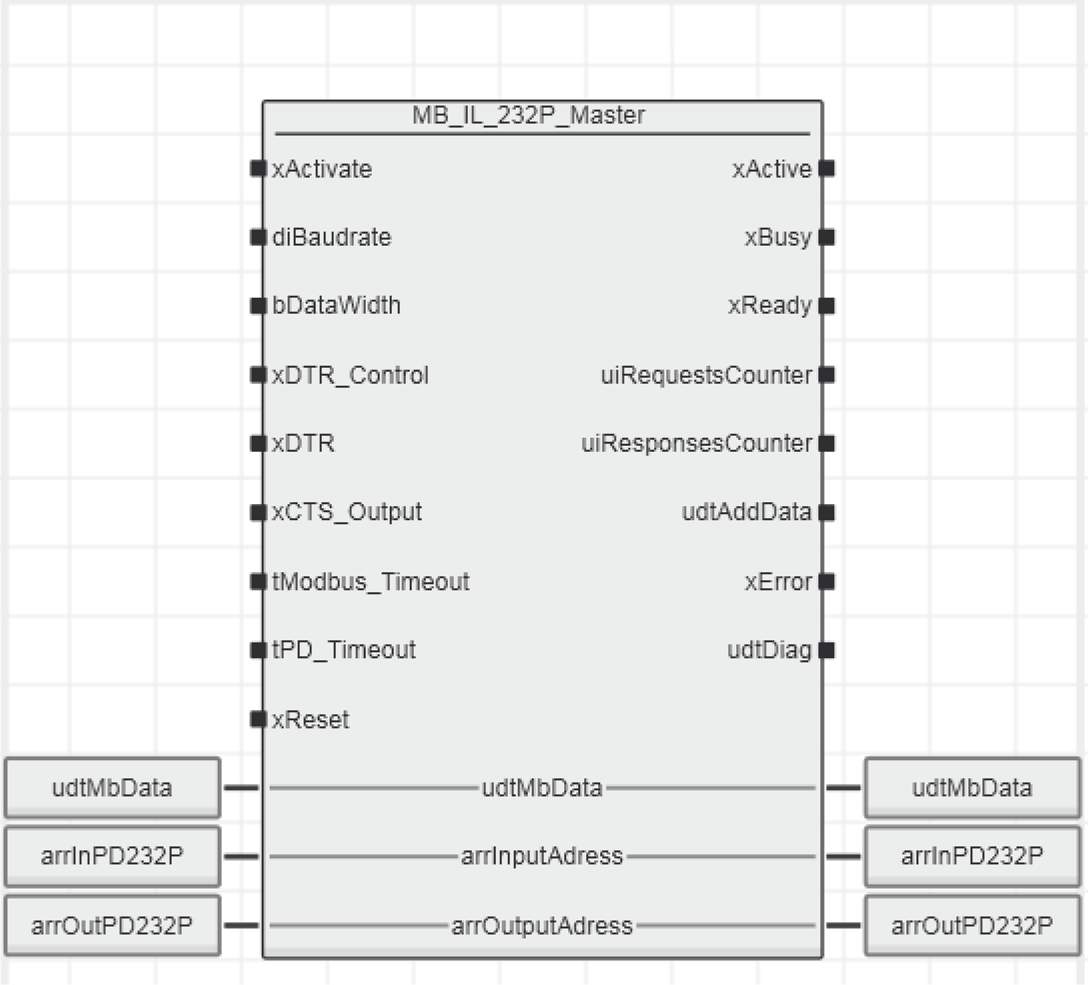
23.5 Diagnostic

wDiagCode	wAddDiagCode	Description
0000hex		Block is not activated.
8000hex		Block is active and operating without errors.
16#C010		Incorrect parameters.
	16#0010	Baud rate.
	16#0020	Data width.
	16#0030	Protocol.
	16#0040	Interface.
	16#0050	Terminal configuration error.
	16#0060	Communication error.
	16#0070	Communication error during reset of module.
	16#0080	xReceive and xSend inputs are set at the same time.
	16#0090	xReceive input is set during send procedure.
	16#0100	xSend input is set during receive procedure.
16#C020		Error when sending.
	16#0020	Maximum size exceeded.
	16#0060	Communication error when sending.
16#C030		Error when receiving.
	16#0030	uiRcvLength is longer than the memory available in the receive buffer.
	16#0040	uiRcvLength <> 0 for end-to-end protocol.
	16#0060	Communication error when receiving.

24 MB_IL_232P_Master

This function block is used to implement a Modbus Master for the specified module type. Accordingly the function blocks are connected inside. The required parameters have to be parameterized on this function block. The associated parameter description refers to the description of the included function blocks.

24.1 Function block call



24.2 Input parameters

Name	Type	Description
xActivate	BOOL	Block activation (TRUE = Active).
diBaudrate	DINT	Baud rate in the range from 110 baud to 500 kbaud.
bDataWidth	BYTE	0 hex = 7 data bits, even, 1 stop bit 1 hex = 7 data bits, odd, 1 stop bit 2 hex = 8 data bits, even, 1 stop bit 3 hex = 8 data bits, odd, 1 stop bit 4 hex = 8 data bits, none, 1 stop bit 5 hex = 7 data bits, none, 1 stop bit 6 hex = 7 data bits, even, 2 stop bits 7 hex = 7 data bits, odd, 2 stop bits 8 hex = 8 data bits, even, 2 stop bits 9 hex = 8 data bits, odd, 2 stop bits A hex = 8 data bits, none, 2 stop bits B hex = 7 data bits, none, 2 stop bits
xDTR_Control	BOOL	FALSE: The DTR signal is controlled automatically. TRUE: The DTR signal is controlled by the user.
xDTR	BOOL	The DTR signal is controlled. Only active if the corresponding mode is activated (implemented via the parameterization blocks).
xCTS_Output	BOOL	FALSE: CTS signal is not output. TRUE: CTS signal is output.
tModbus_Timeout	TIME	The block monitors the communication to the serial driver block. The default value: TIME#5s (if input is 0s). The input is copied by xActivate or xReset if there is a rising edge.
tPD_Timeout	TIME	Timeout for processdata communication. The input is copied by xActivate or xReset if there is a rising edge. Default: TIME#2s
xReset	BOOL	The input resets the block. All connected FC blocks are reset as well.

24.3 Output parameters

Name	Type	Description
xActive	BOOL	TRUE: Function block is active. FALSE: Function block is not active.
xBusy	BOOL	TRUE: The block is busy with the service execution.
xReady	BOOL	The block is ready to execute services. When executing services, this parameter is FALSE.
uiRequestsCounter	UINT	Shows the number of requests transmitted.
uiResponsesCounter	UINT	Shows the number of responses received.
udtAddData	MB2_COM_UDT_R232P_DATA_V1	Structure with additional status variables. This structure can be decoded by the IL_RS232P_AddData_V1_1x block.
xError	BOOL	TRUE: An error has occurred. For details refer to wDiagCode and wAddDiagCode.
udtDiag	MB_UDT_IL_232P_MASTER_DIAG	Structure with internal structures for Diagnostic

24.4 Inout parameters

Name	Type	Description
udtMBData	udtModbus2_Data	The block communicates via this structure with the FC blocks.
arrInputAddress	MB2_COM_ARR_B_1_12	IN process data.
arrOutputAddress	MB2_COM_ARR_B_1_12	OUT process data.

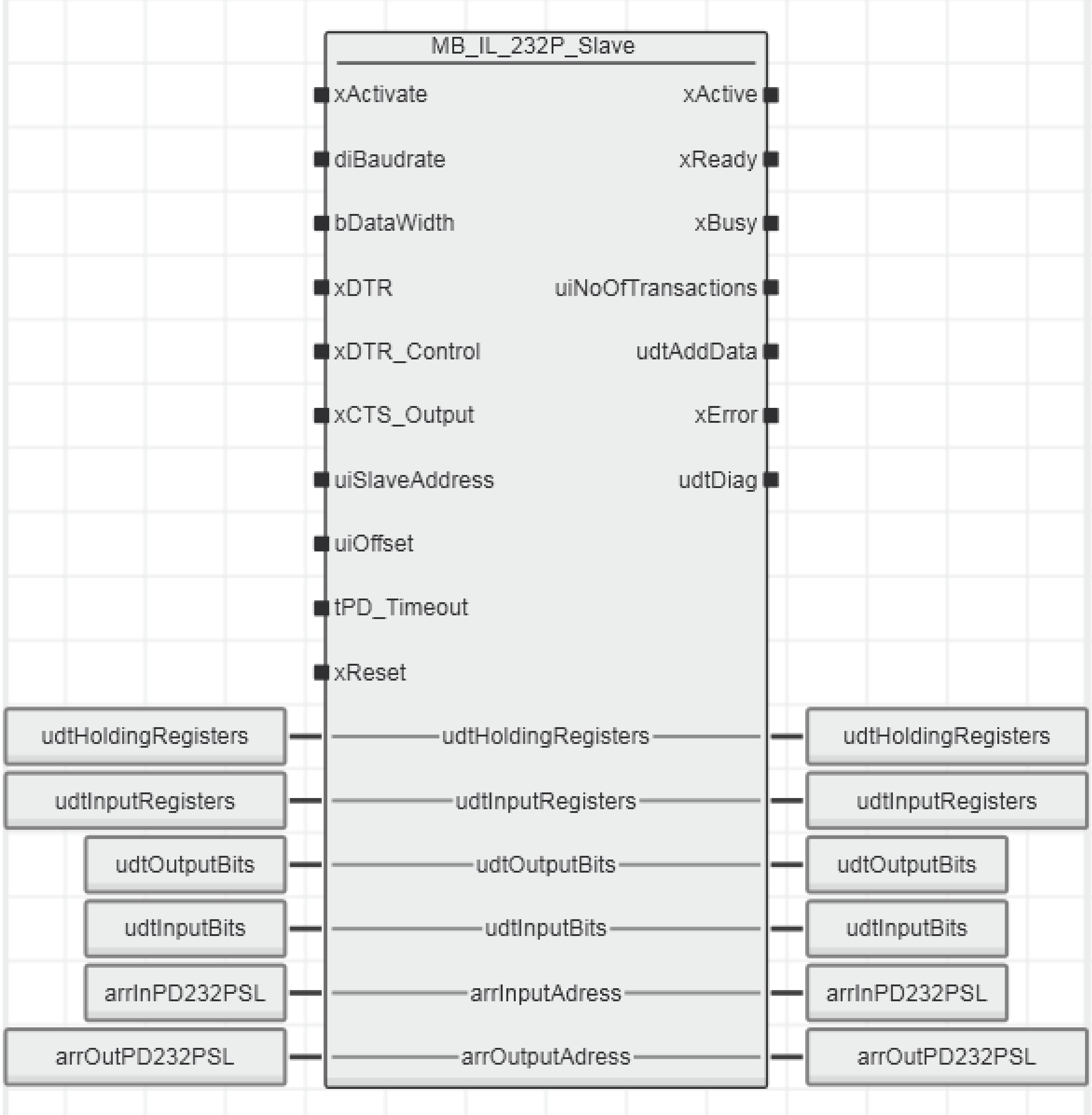
24.5 Diagnosis

wDiagCode	wAddDiagCode	Description
0000hex		Block is not activated.
8000hex		Block is active and operating without errors.
8100hex		HW Reset phase to delete serial driver error
16#C010		Incorrect terminal type connected.
	16#00XX	Read terminal type.
	16#FFFF	Terminal is not responding.
16#C020		Incorrect parameter.
	16#0010	Baud rate.
	16#0020	Data width.
	16#0030	Protocol.
	16#0040	Terminal configuration error.
	16#0100	xReceive and xSend inputs are set at the same time.
	16#0110	xReceive input is set during send procedure.
	16#0120	xSend input is set during receive procedure.
16#C030		Error when sending.
	16#0010	Timeout when sending.
	16#0020	Maximum size when sending exceeded.
	16#0030	uiSendLength too large.
16#C040		Error when receiving.
	16#0010	Timeout when receiving.
	16#0020	Maximum size when receiving exceeded.
	16#0030	uiRcvLength too large.
	16#0040	uiRcvLength <> 0 for the end-to-end, 3964R, and dual buffer protocols.
16#C050		3964R protocol error.
	16#0010	Error when sending a 3964R telegram.
	16#0020	Error when receiving a 3964R telegram.

25 MB_IL_232P_Slave

This function block is used to implement a Modbus Slave for the specified module type. Accordingly the function blocks are connected inside. The required parameters have to be parameterized on this function block. The associated parameter description refers to the description of the included function blocks.

25.1 Function block call



25.2 Input parameters

Name	Type	Description
xActivate	BOOL	Block activation (TRUE = Active).
diBaudrate	DINT	Baud rate in the range from 110 baud to 500 kbaud.
bDataWidth	BYTE	0 hex = 7 data bits, even, 1 stop bit 1 hex = 7 data bits, odd, 1 stop bit 2 hex = 8 data bits, even, 1 stop bit 3 hex = 8 data bits, odd, 1 stop bit 4 hex = 8 data bits, none, 1 stop bit 5 hex = 7 data bits, none, 1 stop bit 6 hex = 7 data bits, even, 2 stop bits 7 hex = 7 data bits, odd, 2 stop bits 8 hex = 8 data bits, even, 2 stop bits 9 hex = 8 data bits, odd, 2 stop bits A hex = 8 data bits, none, 2 stop bits B hex = 7 data bits, none, 2 stop bits
xDTR	BOOL	The DTR signal is controlled. Only active if the corresponding mode is activated (implemented via the parameterization blocks).
xDTR_Control	BOOL	FALSE: The DTR signal is controlled automatically. TRUE: The DTR signal is controlled by the user.
xCTS_Output	BOOL	FALSE: CTS signal is not output. TRUE: CTS signal is output.
uiSlaveAddress	UINT	The input specifies the address of the slave to be communicated with (1 to 255).
uiOffset	UINT	The start address is increased by this value. If the input uiOffset has the value 2000, then the register with address 3 in the request will be addressed with the address 2003 (2000 + 3).
tPD_Timeout	TIME	Timeout for processdata communication. The input is copied by xActivate or xReset if there is a rising edge. Default: TIME#2s
xReset	BOOL	The input resets the block. All connected FC blocks are reset as well.

25.3 Output parameters

Name	Type	Description
xActive	BOOL	TRUE: Function block is active. FALSE: Function block is not active.
xBusy	BOOL	TRUE: The block is busy with the service execution.
xReady	BOOL	The block is ready to execute services. When executing services, this parameter is FALSE.
uiNoOfTransactions	UINT	Number of processed requests
udtAddData	MB2_COM_UDT_R232P_DATA_V1	Structure with additional status variables. This structure can be decoded by the IL_RS232P_AddData_V1_1x block.
xError	BOOL	TRUE: An error has occurred. For details refer to wDiagCode and wAddDiagCode.
wDiagCode	WORD	Diagnostic code. Refer to diagnostics table.
wAddDiagCode	WORD	Additional diagnostic code. Refer to diagnostics table.
udtDiag	MB_UDT_IL_232P_SLAVE_DIAG	Structure with internal structures for Diagnostic

25.4 Inout parameters

Name	Type	Description
udtHoldingRegisters	MB_RTU_w_0_1999	Array with 2000 words representing the holding registers. The address range is 0-1999. Function codes: 3,6 and 16
udtInputRegisters	MB_RTU_w_2000_2999	Array with 1000 words representing the input registers. The address range is 2000-2999. Function code: 4
udtOutputBits	MB_RTU_x_3000_3999	Array of 1000 bits representing the digital outputs. The address range is 3000-3999. Function codes: 1,5 and 15
udtInputBits	MB_RTU_x_4000_4999	Array of 1000 bits representing digital inputs. The address range is 4000-4999. Function code: 2
arrInputAddress	MB2_COM_ARR_B_1_12	IN process data.
arrOutputAddress	MB2_COM_ARR_B_1_12	OUT process data.

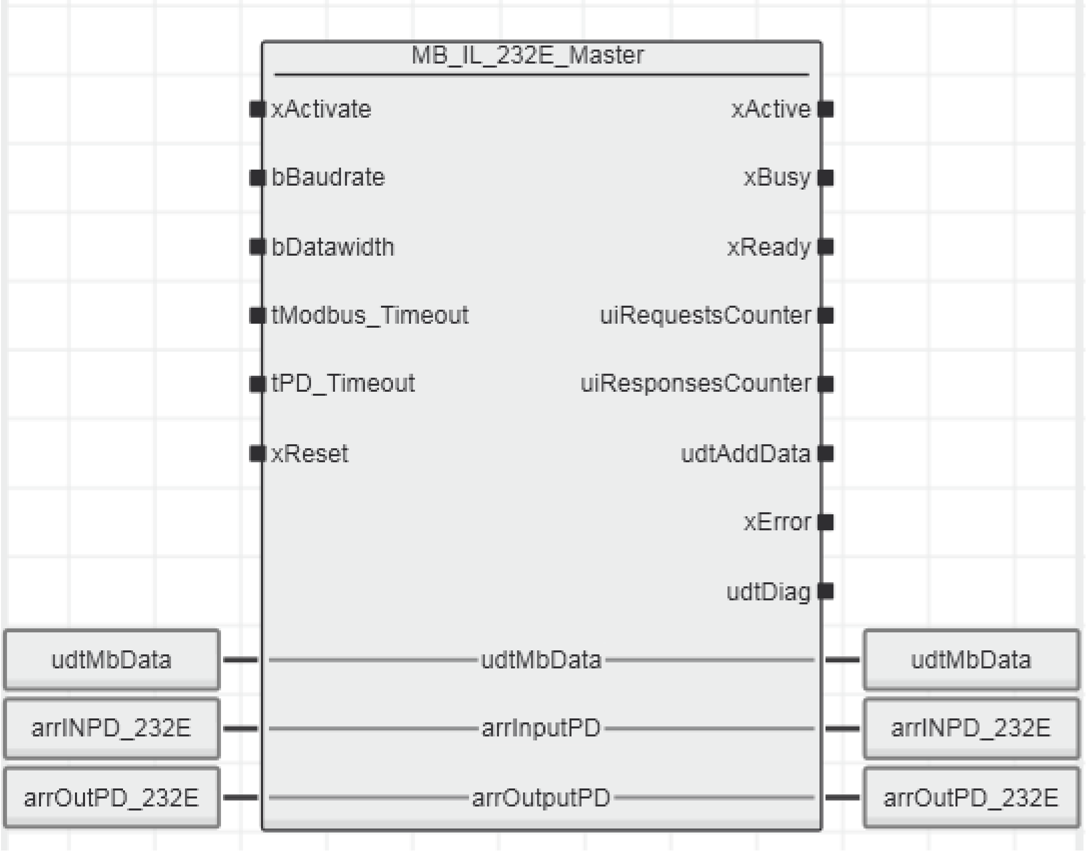
25.5 Diagnosis

wDiagCode	wAddDiagCode	Description
0000hex		Block is not activated.
8000hex		Block is active and operating without errors.
16#C010		Incorrect terminal type connected.
	16#00XX	Read terminal type.
	16#FFFF	Terminal is not responding.
16#C020		Incorrect parameter.
	16#0010	Baud rate.
	16#0020	Data width.
	16#0030	Protocol.
	16#0040	Terminal configuration error.
	16#0100	xReceive and xSend inputs are set at the same time.
	16#0110	xReceive input is set during send procedure.
	16#0120	xSend input is set during receive procedure.
16#C030		Error when sending.
	16#0010	Timeout when sending.
	16#0020	Maximum size when sending exceeded.
	16#0030	uiSendLength too large.
16#C040		Error when receiving.
	16#0010	Timeout when receiving.
	16#0020	Maximum size when receiving exceeded.
	16#0030	uiRcvLength too large.
	16#0040	uiRcvLength <> 0 for the end-to-end, 3964R, and dual buffer protocols.
16#C050		3964R protocol error.
	16#0010	Error when sending a 3964R telegram.
	16#0020	Error when receiving a 3964R telegram.

26 MB_IL_232E_Master

This function block is used to implement a Modbus Master for the specified module type. Accordingly the function blocks are connected inside. The required parameters have to be parameterized on this function block. The associated parameter description refers to the description of the included function blocks.

26.1 Function block call



26.2 Input parameters

Name	Type	Description
xActivate	BOOL	Block activation (TRUE = Active).
bBaudrate	BYTE	0 hex = Baudrate 110 1 hex = Baudrate 300 2 hex = Baudrate 600 3 hex = Baudrate 1200 4 hex = Baudrate 1800 5 hex = Baudrate 2400 6 hex = Baudrate 4800 7 hex = Baudrate 9600 8 hex = Baudrate 15625 9 hex = Baudrate 19200 A hex = Baudrate 38400 B-F hex = reserved
bDataWidth	BYTE	0 hex = 7 data bits, even, 1 stop bit 1 hex = 7 data bits, odd, 1 stop bit 2 hex = 8 data bits, even, 1 stop bit 3 hex = 8 data bits, odd, 1 stop bit 4 hex = 8 data bits, none, 1 stop bit 5 hex = 7 data bits, none, 1 stop bit 6 hex = 7 data bits, even, 2 stop bits 7 hex = 7 data bits, odd, 2 stop bits 8 hex = 8 data bits, even, 2 stop bits 9 hex = 8 data bits, odd, 2 stop bits A hex = 8 data bits, none, 2 stop bits B hex = 7 data bits, none, 2 stop bits
tModbus_Timeout	TIME	The block monitors the communication to the serial driver block. The default value: TIME#5s (if input is 0s). The input is copied by xActivate or xReset if there is a rising edge.

tPD_Timeout	TIME	Timeout for processdata communication. The input is copied by xActivate or xReset if there is a rising edge. Default: TIME#2s
xReset	BOOL	The input resets the block. All connected FC blocks are reset as well.

26.3 Output parameters

Name	Type	Description
xActive	BOOL	TRUE: Function block is active. FALSE: Function block is not active.
xBusy	BOOL	TRUE: The block is busy with the service execution.
xReady	BOOL	The block is ready to execute services. When executing services, this parameter is FALSE.
uiRequestsCounter	UINT	Shows the number of requests transmitted.
uiResponsesCounter	UINT	Shows the number of responses received.
udtAddData	MB2_RSUNI_UDT_DATA	Structure with variables for diagnostics
xError	BOOL	TRUE: An error has occurred. For details refer to wDiagCode and wAddDiagCode.
udtDiag	MB_UDT_IL_232E_MASTER_DIAG	Structure with internal structures for Diagnostic

26.4 Inout parameters

Name	Type	Description
udtMBData	udtModbus2_Data	The block communicates via this structure with the FC blocks.
arrInputAddress	MB2_COM_ARR_B_1_14	IN process data.
arrOutputAddress	MB2_COM_ARR_B_1_14	OUT process data.

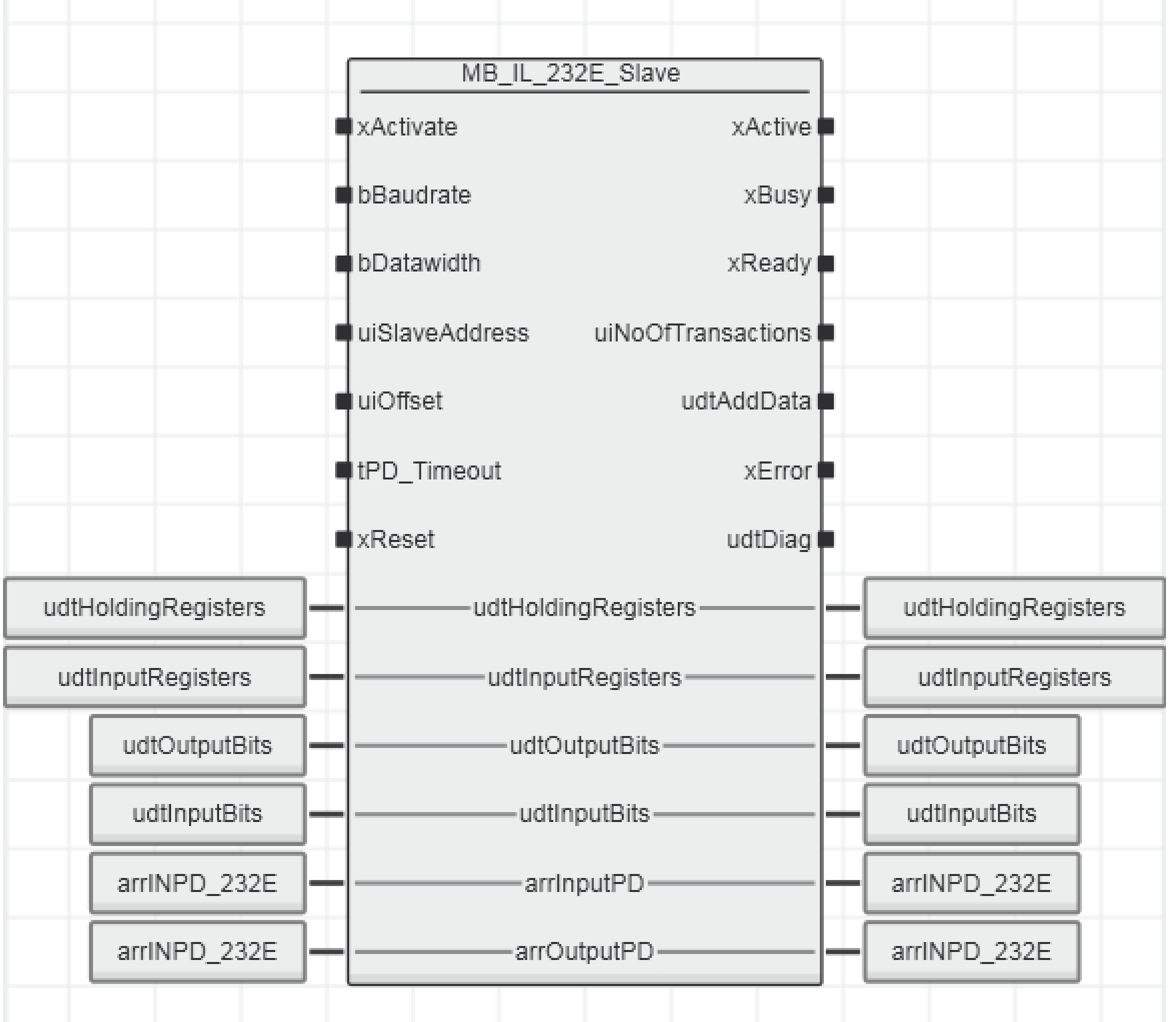
26.5 Diagnosis

wDiagCode	wAddDiagCode	Description
0000hex		Block is not activated.
8000hex		Block is active and operating without errors.
8100hex		HW Reset phase to delete serial driver error
16#C010		Incorrect terminal type connected.
	16#00XX	Read terminal type.
	16#FFFF	Terminal is not responding.
16#C020		Incorrect parameter.
	16#0010	Baud rate.
	16#0020	Data width.
	16#0030	Protocol.
	16#0040	Terminal configuration error.
	16#0100	xReceive and xSend inputs are set at the same time.
	16#0110	xReceive input is set during send procedure.
	16#0120	xSend input is set during receive procedure.
16#C030		Error when sending.
	16#0010	Timeout when sending.
	16#0020	Maximum size when sending exceeded.
	16#0030	uiSendLength too large.
16#C040		Error when receiving.
	16#0010	Timeout when receiving.
	16#0020	Maximum size when receiving exceeded.
	16#0030	uiRcvLength too large.
	16#0040	uiRcvLength <> 0 for the end-to-end, 3964R, and dual buffer protocols.
16#C050		3964R protocol error.
	16#0010	Error when sending a 3964R telegram.
	16#0020	Error when receiving a 3964R telegram.

27 MB_IL_232E_Slave

This function block is used to implement a Modbus Slave for the specified module type. Accordingly the function blocks are connected inside. The required parameters have to be parameterized on this function block. The associated parameter description refers to the description of the included function blocks.

27.1 Function block call



27.2 Input parameters

Name	Type	Description
xActivate	BOOL	Block activation (TRUE = Active).
bBaudrate	BYTE	0 hex = Baudrate 110 1 hex = Baudrate 300 2 hex = Baudrate 600 3 hex = Baudrate 1200 4 hex = Baudrate 1800 5 hex = Baudrate 2400 6 hex = Baudrate 4800 7 hex = Baudrate 9600 8 hex = Baudrate 15625 9 hex = Baudrate 19200 A hex = Baudrate 38400 B-F hex = reserved
bDataWidth	BYTE	0 hex = 7 data bits, even, 1 stop bit 1 hex = 7 data bits, odd, 1 stop bit 2 hex = 8 data bits, even, 1 stop bit 3 hex = 8 data bits, odd, 1 stop bit 4 hex = 8 data bits, none, 1 stop bit 5 hex = 7 data bits, none, 1 stop bit 6 hex = 7 data bits, even, 2 stop bits 7 hex = 7 data bits, odd, 2 stop bits 8 hex = 8 data bits, even, 2 stop bits 9 hex = 8 data bits, odd, 2 stop bits A hex = 8 data bits, none, 2 stop bits B hex = 7 data bits, none, 2 stop bits
uiSlaveAddress	UINT	The input specifies the address of the slave to be communicated with (1 to 255).
uiOffset	UINT	The start address is increased by this value. If the input uiOffset has the value 2000, then the register with address 3 in the request will be addressed with the address 2003 (2000 + 3).

tPD_Timeout	TIME	Timeout for processdata communication. The input is copied by xActivate or xReset if there is a rising edge. Default: TIME#2s
xReset	BOOL	The input resets the block. All connected FC blocks are reset as well.

27.3 Output parameters

Name	Type	Description
xActive	BOOL	TRUE: Function block is active. FALSE: Function block is not active.
xBusy	BOOL	TRUE: The block is busy with the service execution.
xReady	BOOL	The block is ready to execute services. When executing services, this parameter is FALSE.
uiNoOfTransactions	UINT	Number of processed requests
udtAddData	MB2_RSUNI_UDT_DATA	Structure with variables for diagnostics
xError	BOOL	TRUE: An error has occurred. For details refer to wDiagCode and wAddDiagCode.
udtDiag	MB_UDT_IL_232E_SLAVE_DIAG	Structure with internal structures for Diagnostic

27.4 Inout parameters

Name	Type	Description
udtHoldingRegisters	MB_RTU_w_0_1999	Array with 2000 words representing the holding registers. The address range is 0-1999. Function codes: 3,6 and 16
udtInputRegisters	MB_RTU_w_2000_2999	Array with 1000 words representing the input registers. The address range is 2000-2999. Function code: 4
udtOutputBits	MB_RTU_x_3000_3999	Array of 1000 bits representing the digital outputs. The address range is 3000-3999. Function codes: 1,5 and 15
udtInputBits	MB_RTU_x_4000_4999	Array of 1000 bits representing digital inputs. The address range is 4000-4999. Function code: 2
arrInputAddress	MB2_COM_ARR_B_1_14	IN process data.
arrOutputAddress	MB2_COM_ARR_B_1_14	OUT process data.

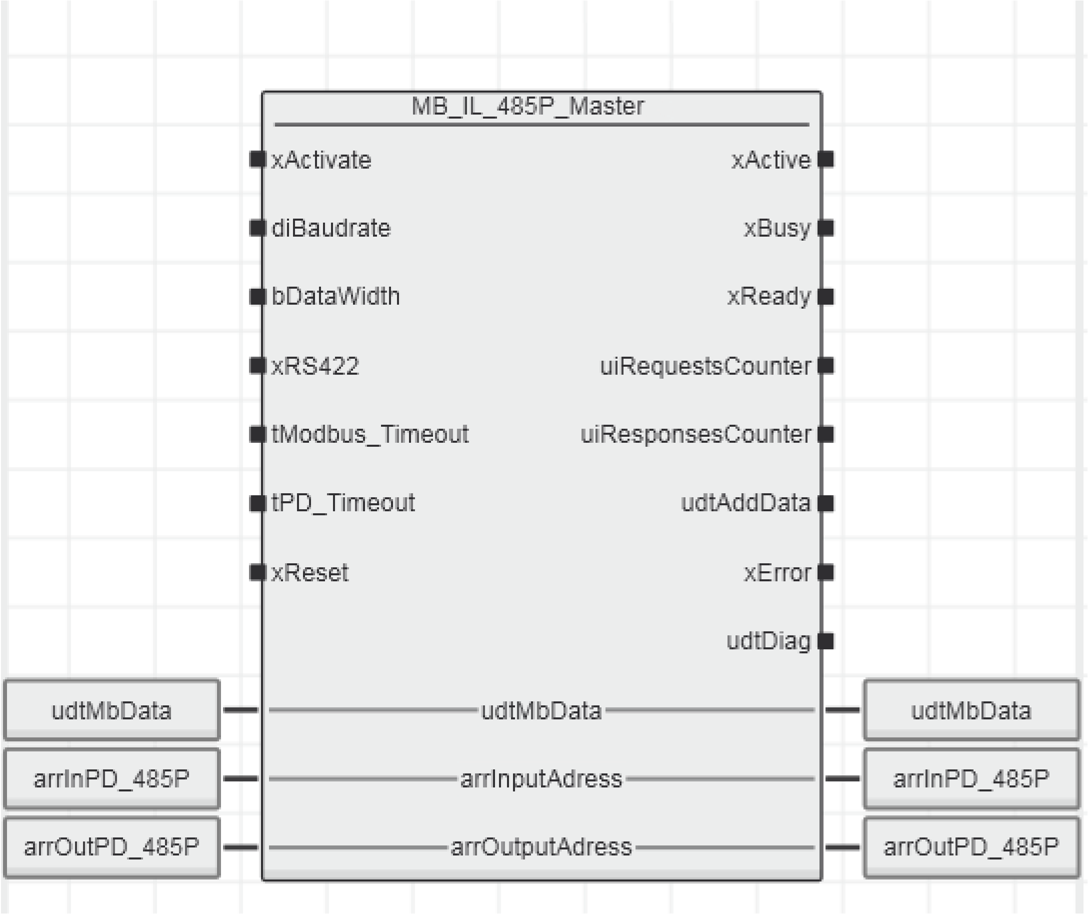
27.5 Diagnosis

wDiagCode	wAddDiagCode	Description
0000hex		Block is not activated.
8000hex		Block is active and operating without errors.
16#C010		Incorrect terminal type connected.
	16#00XX	Read terminal type.
	16#FFFF	Terminal is not responding.
16#C020		Incorrect parameter.
	16#0010	Baud rate.
	16#0020	Data width.
	16#0030	Protocol.
	16#0040	Terminal configuration error.
	16#0100	xReceive and xSend inputs are set at the same time.
	16#0110	xReceive input is set during send procedure.
	16#0120	xSend input is set during receive procedure.
16#C030		Error when sending.
	16#0010	Timeout when sending.
	16#0020	Maximum size when sending exceeded.
	16#0030	uiSendLength too large.
16#C040		Error when receiving.
	16#0010	Timeout when receiving.
	16#0020	Maximum size when receiving exceeded.
	16#0030	uiRcvLength too large.
	16#0040	uiRcvLength <> 0 for the end-to-end, 3964R, and dual buffer protocols.
16#C050		3964R protocol error.
	16#0010	Error when sending a 3964R telegram.
	16#0020	Error when receiving a 3964R telegram.

28 MB_IL_485P_Master

This function block is used to implement a Modbus Master for the specified module type. Accordingly the function blocks are connected inside. The required parameters have to be parameterized on this function block. The associated parameter description refers to the description of the included function blocks.

28.1 Function block call



28.2 Input parameters

Name	Type	Description
xActivate	BOOL	Block activation (TRUE = Active).
diBaudrate	DINT	Here, the baud rate can be specified freely up to 500 000. Standard values are 110, 300, 600, 1200, 1800, 2400, 4800, 9600, 19200, 38400
bDataWidth	BYTE	0 hex = 7 data bits, even, 1 stop bit 1 hex = 7 data bits, odd, 1 stop bit 2 hex = 8 data bits, even, 1 stop bit 3 hex = 8 data bits, odd, 1 stop bit 4 hex = 8 data bits, none, 1 stop bit 5 hex = 7 data bits, none, 1 stop bit 6 hex = 7 data bits, even, 2 stop bits 7 hex = 7 data bits, odd, 2 stop bits 8 hex = 8 data bits, even, 2 stop bits 9 hex = 8 data bits, odd, 2 stop bits A hex = 8 data bits, none, 2 stop bits B hex = 7 data bits, none, 2 stop bits
xRS422	BOOL	FALSE: RS485 TRUE: RS422
tModbus_Timeout	TIME	The block monitors the communication to the serial driver block. The default value: TIME#5s (if input is 0s). The input is copied by xActivate or xReset if there is a rising edge.
tPD_Timeout	TIME	Timeout for processdata communication. The input is copied by xActivate or xReset if there is a rising edge. Default: TIME#2s
xReset	BOOL	The input resets the block. All connected FC blocks are reset as well.

28.3 Output parameters

Name	Type	Description
xActive	BOOL	TRUE: Function block is active. FALSE: Function block is not active.
xBusy	BOOL	TRUE: The block is busy with the service execution.
xReady	BOOL	The block is ready to execute services. When executing services, this parameter is FALSE.
uiRequestsCounter	UINT	Shows the number of requests transmitted.
uiResponsesCounter	UINT	Shows the number of responses received.
udtAddData	MB2_COM_UDT_R485P_DATA_V1	Structure with additional status variables. This structure can be decoded by the IL_RS485P_AddData_V1_1x block.
xError	BOOL	TRUE: An error has occurred. For details refer to wDiagCode and wAddDiagCode.
udtDiag	MB_UDT_IL_485P_MASTER_DIAG	Structure with internal structures for Diagnostic

28.4 Inout parameters

Name	Type	Description
udtMBData	udtModbus2_Data	The block communicates via this structure with the FC blocks.
arrInputAddress	MB2_COM_ARR_B_1_12	IN process data.
arrOutputAddress	MB2_COM_ARR_B_1_12	OUT process data.

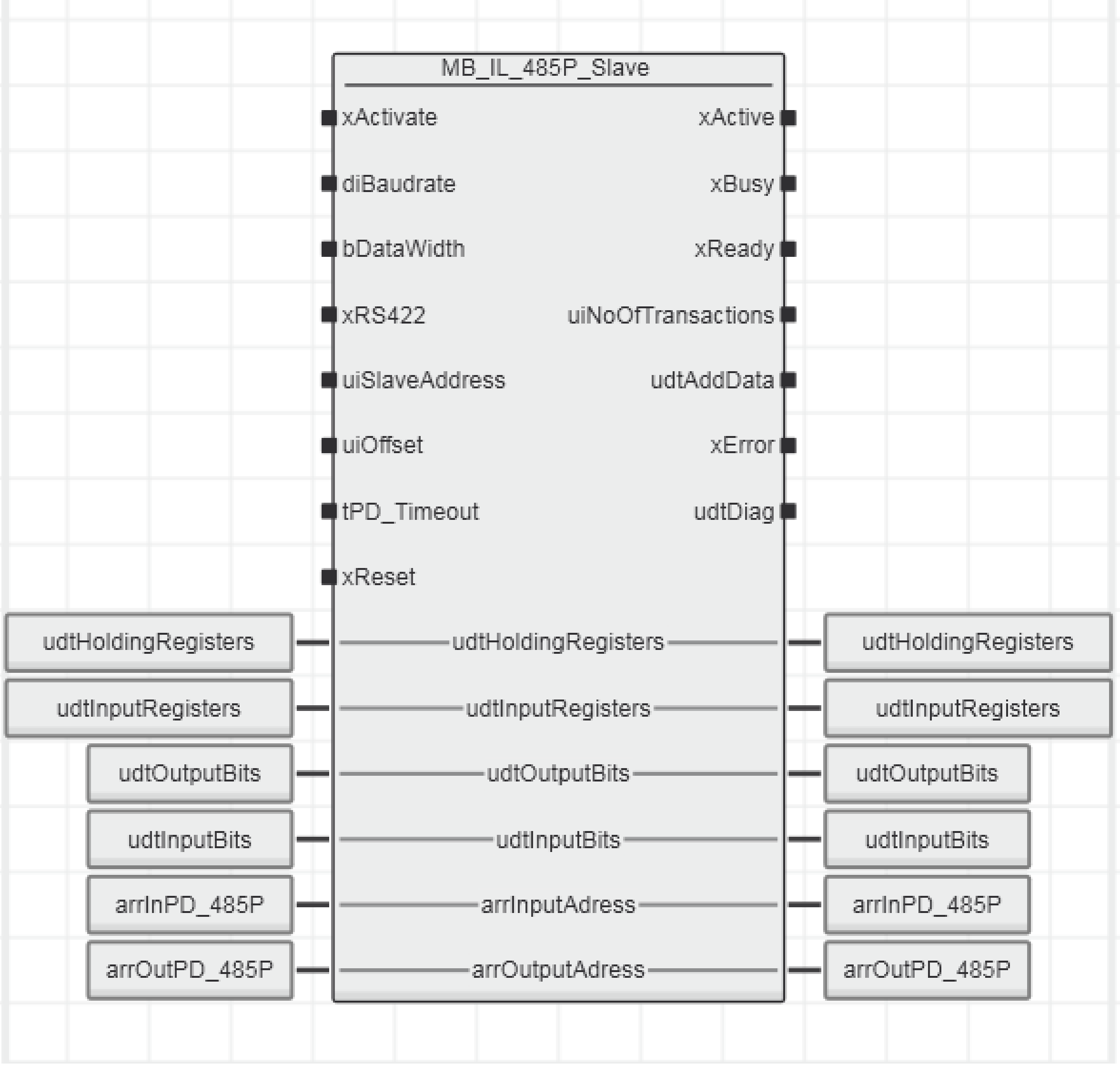
28.5 Diagnosis

wDiagCode	wAddDiagCode	Description
0000hex		Block is not activated.
8000hex		Block is active and operating without errors.
8100hex		HW Reset phase to delete serial driver error
16#C010		Incorrect terminal type connected.
	16#00XX	Read terminal type.
	16#FFFF	Terminal is not responding.
16#C020		Incorrect parameter.
	16#0010	Baud rate exceeded.
	16#0020	Data width.
	16#0030	Protocol.
	16#0040	Terminal error.
	16#0050	Baudrate <= 0.
	16#0070	Terminal configuration error.
	16#0100	xReceive and xSend inputs are set at the same time.
	16#0110	xReceive input is set during send procedure.
	16#0120	xSend input is set during receive procedure.
16#C030		Error when sending.
	16#0010	Timeout when sending.
	16#0020	Maximum size when sending exceeded.
	16#0030	uiSendLength exceeded.
	16#0040	uiSendLength > 255 with 3964R-Protocol.
16#C040		Error when receiving.
	16#0010	Timeout when receiving.
	16#0020	Maximum size when receiving exceeded.
	16#0030	uiRcvLength exceeded.
	16#0040	uiRcvLength <> 0 for the end-to-end, 3964R, and dual buffer protocols.
16#C050		3964R protocol error.
	16#0010	Error when sending a 3964R telegram.
	16#0020	Error when receiving a 3964R telegram.

29 MB_IL_485P_Slave

This function block is used to implement a Modbus Slave for the specified module type. Accordingly the function blocks are connected inside. The required parameters have to be parameterized on this function block. The associated parameter description refers to the description of the included function blocks.

29.1 Function block call



29.2 Input parameters

Name	Type	Description
xActivate	BOOL	Block activation (TRUE = Active).
diBaudrate	DINT	Here, the baud rate can be specified freely up to 500 000. Standard values are 110, 300, 600, 1200, 1800, 2400, 4800, 9600, 19200, 38400
bDataWidth	BYTE	0 hex = 7 data bits, even, 1 stop bit 1 hex = 7 data bits, odd, 1 stop bit 2 hex = 8 data bits, even, 1 stop bit 3 hex = 8 data bits, odd, 1 stop bit 4 hex = 8 data bits, none, 1 stop bit 5 hex = 7 data bits, none, 1 stop bit 6 hex = 7 data bits, even, 2 stop bits 7 hex = 7 data bits, odd, 2 stop bits 8 hex = 8 data bits, even, 2 stop bits 9 hex = 8 data bits, odd, 2 stop bits A hex = 8 data bits, none, 2 stop bits B hex = 7 data bits, none, 2 stop bits
xRS422	BOOL	FALSE: RS485 TRUE: RS422
uiSlaveAddress	UINT	The input specifies the address of the slave to be communicated with (1 to 255).
uiOffset	UINT	The start address is increased by this value. If the input uiOffset has the value 2000, then the register with address 3 in the request will be addressed with the address 2003 (2000 + 3).
xReset	BOOL	The input resets the block. All connected FC blocks are reset as well.
tPD_Timeout	TIME	Timeout for processdata communication. The input is copied by xActivate or xReset if there is a rising edge. Default: TIME#2s
xReset	BOOL	The input resets the block. All connected FC blocks are reset as well.

29.3 Output parameters

Name	Type	Description
xActive	BOOL	TRUE: Function block is active. FALSE: Function block is not active.
xBusy	BOOL	TRUE: The block is busy with the service execution.
xReady	BOOL	The block is ready to execute services. When executing services, this parameter is FALSE.
uiNoOfTransactions	UINT	Number of processed requests
udtAddData	MB2_COM_UDT_R485P_DATA_V1	Structure with additional status variables. This structure can be decoded by the IL_RS485P_AddData_V1_1x block.
xError	BOOL	TRUE: An error has occurred. For details refer to wDiagCode and wAddDiagCode.
udtDiag	MB_UDT_IL_485P_SLAVE_DIAG	Structure with internal structures for Diagnostic

29.4 Inout parameters

Name	Type	Description
udtHoldingRegisters	MB_RTU_w_0_1999	Array with 2000 words representing the holding registers. The address range is 0-1999. Function codes: 3,6 and 16
udtInputRegisters	MB_RTU_w_2000_2999	Array with 1000 words representing the input registers. The address range is 2000-2999. Function code: 4
udtOutputBits	MB_RTU_x_3000_3999	Array of 1000 bits representing the digital outputs. The address range is 3000-3999. Function codes: 1,5 and 15
udtInputBits	MB_RTU_x_4000_4999	Array of 1000 bits representing digital inputs. The address range is 4000-4999. Function code: 2
arrInputAddress	MB2_COM_ARR_B_1_12	IN process data.
arrOutputAddress	MB2_COM_ARR_B_1_12	OUT process data.

29.5 Diagnosis

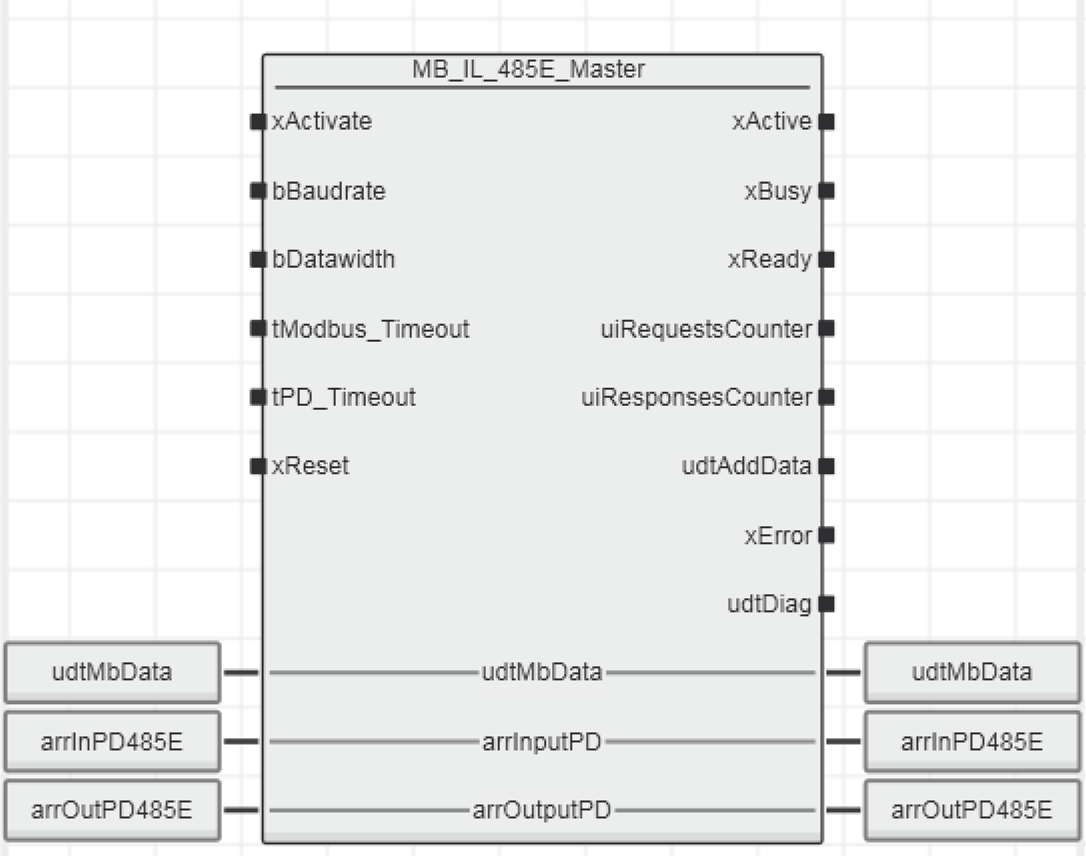
wDiagCode	wAddDiagCode	Description
0000hex		Block is not activated.
8000hex		Block is active and operating without errors.
16#C010		Incorrect terminal type connected.
	16#00XX	Read terminal type.
	16#FFFF	Terminal is not responding.
16#C020		Incorrect parameter.
	16#0010	Baud rate exceeded.
	16#0020	Data width.
	16#0030	Protocol.

	16#0040	Terminal error.
	16#0050	Baudrate <= 0.
	16#0070	Terminal configuration error.
	16#0100	xReceive and xSend inputs are set at the same time.
	16#0110	xReceive input is set during send procedure.
	16#0120	xSend input is set during receive procedure.
16#C030		Error when sending.
	16#0010	Timeout when sending.
	16#0020	Maximum size when sending exceeded.
	16#0030	uiSendLength exceeded.
	16#0040	uiSendLength > 255 with 3964R-Protocol.
16#C040		Error when receiving.
	16#0010	Timeout when receiving.
	16#0020	Maximum size when receiving exceeded.
	16#0030	uiRcvLength exceeded.
	16#0040	uiRcvLength <> 0 for the end-to-end, 3964R, and dual buffer protocols.
16#C050		3964R protocol error.
	16#0010	Error when sending a 3964R telegram.
	16#0020	Error when receiving a 3964R telegram.

30 MB_IL_485E_Master

This function block is used to implement a Modbus Master for the specified module type. Accordingly the function blocks are connected inside. The required parameters have to be parameterized on this function block. The associated parameter description refers to the description of the included function blocks.

30.1 Function block call



30.2 Input parameters

Name	Type	Description
xActivate	BOOL	Block activation (TRUE = Active).
bBaudrate	BYTE	0 hex = Baudrate 110 1 hex = Baudrate 300 2 hex = Baudrate 600 3 hex = Baudrate 1200 4 hex = Baudrate 1800 5 hex = Baudrate 2400 6 hex = Baudrate 4800 7 hex = Baudrate 9600 8 hex = Baudrate 15625 9 hex = Baudrate 19200 A hex = Baudrate 38400 B-F hex = reserved

bDataWidth	BYTE	0 hex = 7 data bits, even, 1 stop bit 1 hex = 7 data bits, odd, 1 stop bit 2 hex = 8 data bits, even, 1 stop bit 3 hex = 8 data bits, odd, 1 stop bit 4 hex = 8 data bits, none, 1 stop bit 5 hex = 7 data bits, none, 1 stop bit 6 hex = 7 data bits, even, 2 stop bits 7 hex = 7 data bits, odd, 2 stop bits 8 hex = 8 data bits, even, 2 stop bits 9 hex = 8 data bits, odd, 2 stop bits A hex = 8 data bits, none, 2 stop bits B hex = 7 data bits, none, 2 stop bits C hex = 8 data bits, constant at 0, 1 stop bits D hex = 8 data bits, constant at 1, 1 stop bits E hex = 6 data bits, none, 1 stop bits F hex = Reserved
tModbus_Timeout	TIME	The block monitors the communication to the serial driver block. The default value: TIME#5s (if input is 0s). The input is copied by xActivate or xReset if there is a rising edge.
tPD_Timeout	TIME	Timeout for processdata communication. The input is copied by xActivate or xReset if there is a rising edge. Default: TIME#2s
xReset	BOOL	The input resets the block. All connected FC blocks are reset as well.

30.3 Output parameters

Name	Type	Description
xActive	BOOL	TRUE: Function block is active. FALSE: Function block is not active.
xBusy	BOOL	TRUE: The block is busy with the service execution.
xReady	BOOL	The block is ready to execute services. When executing services, this parameter is FALSE.
uiRequestsCounter	UINT	Shows the number of requests transmitted.
uiResponsesCounter	UINT	Shows the number of responses received.
udtAddData	MB2_RSUNI_UDT_DATA_V1	Structure with variables for diagnostics
xError	BOOL	TRUE: An error has occurred. For details refer to wDiagCode and wAddDiagCode.
udtDiag	MB_UDT_IL_485E_MASTER_DIAG	Structure with internal structures for Diagnostic

30.4 Inout parameters

Name	Type	Description
udtMBData	udtModbus2_Data	The block communicates via this structure with the FC blocks.
arrInputAddress	MB2_COM_ARR_B_1_14	IN process data.
arrOutputAddress	MB2_COM_ARR_B_1_14	OUT process data.

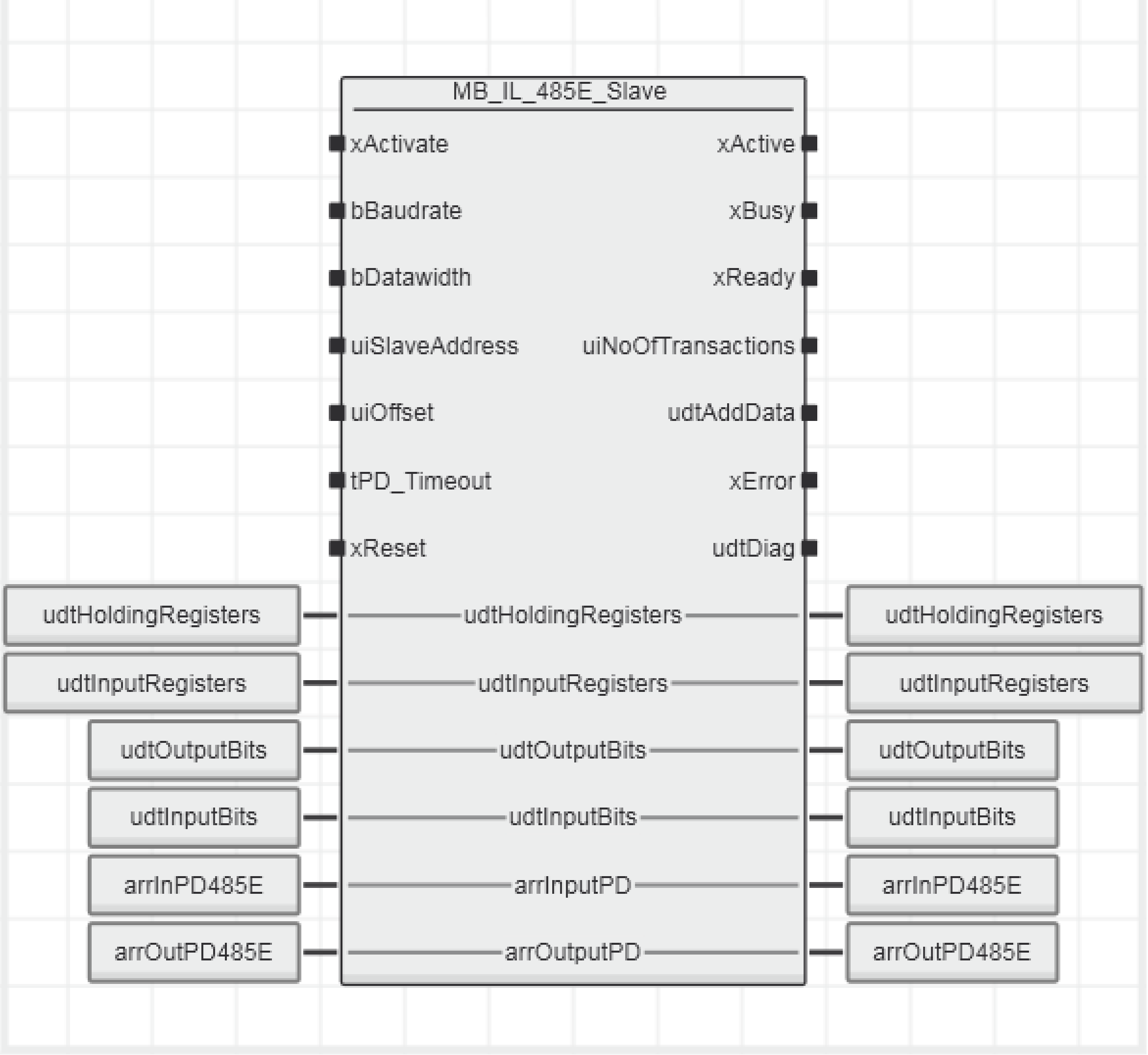
30.5 Diagnosis

wDiagCode	wAddDiagCode	Description
0000hex		Block is not activated.
8000hex		Block is active and operating without errors.
8100hex		HW Reset phase to delete serial driver error
16#C010		Incorrect parameters.
	16#0010	Baud rate.
	16#0020	Data width.
	16#0050	Terminal configuration error.
	16#0060	Communication error.
	16#0080	xReceive and xSend inputs are set at the same time.
	16#0090	xReceive input is set during send procedure.
	16#0100	xSend input is set during receive procedure.
16#C020		Error when sending.
	16#0020	Maximum size exceeded.
	16#0060	Communication error when sending.
16#C030		Error when receiving.
	16#0030	uiRcvLength is larger than the memory available in the receive buffer.
	16#0060	Communication error when receiving.

31 MB_IL_485E_Slave

This function block is used to implement a Modbus Slave for the specified module type. Accordingly the function blocks are connected inside. The required parameters have to be parameterized on this function block. The associated parameter description refers to the description of the included function blocks.

31.1 Function block call



31.2 Input parameters

Name	Type	Description
xActivate	BOOL	Block activation (TRUE = Active).
diBaudrate	DINT	Here, the baud rate can be specified freely up to 500 000. Standard values are 110, 300, 600, 1200, 1800, 2400, 4800, 9600, 19200, 38400
bDataWidth	BYTE	0 hex = 7 data bits, even, 1 stop bit 1 hex = 7 data bits, odd, 1 stop bit 2 hex = 8 data bits, even, 1 stop bit 3 hex = 8 data bits, odd, 1 stop bit 4 hex = 8 data bits, none, 1 stop bit 5 hex = 7 data bits, none, 1 stop bit 6 hex = 7 data bits, even, 2 stop bits 7 hex = 7 data bits, odd, 2 stop bits 8 hex = 8 data bits, even, 2 stop bits 9 hex = 8 data bits, odd, 2 stop bits A hex = 8 data bits, none, 2 stop bits B hex = 7 data bits, none, 2 stop bits C hex = 8 data bits, constant at 0, 1 stop bits D hex = 8 data bits, constant at 1, 1 stop bits E hex = 6 data bits, none, 1 stop bits F hex = Reserved
uiSlaveAddress	UINT	The input specifies the address of the slave to be communicated with (1 to 255).
uiOffset	UINT	The start address is increased by this value. If the input uiOffset has the value 2000, then the register with address 3 in the request will be addressed with the address 2003 (2000 + 3).
xReset	BOOL	The input resets the block. All connected FC blocks are reset as well.
tPD_Timeout	TIME	Timeout for processdata communication. The input is copied by xActivate or xReset if there is a rising edge. Default: TIME#2s
xReset	BOOL	The input resets the block. All connected FC blocks are reset as well.

31.3 Output parameters

Name	Type	Description
xActive	BOOL	TRUE: Function block is active. FALSE: Function block is not active.
xBusy	BOOL	TRUE: The block is busy with the service execution.
xReady	BOOL	The block is ready to execute services. When executing services, this parameter is FALSE.
uiNoOfTransactions	UINT	Number of processed requests
udtAddData	MB2_RSUNI_UDT_DATA_V1	Structure with variables for diagnostics
xError	BOOL	TRUE: An error has occurred. For details refer to wDiagCode and wAddDiagCode.
udtDiag	MB_UDT_IL_485E_SLAVE_DIAG	Structure with internal structures for Diagnostic

31.4 Inout parameters

Name	Type	Description
udtHoldingRegisters	MB_RTU_w_0_1999	Array with 2000 words representing the holding registers. The address range is 0-1999. Function codes: 3,6 and 16
udtInputRegisters	MB_RTU_w_2000_2999	Array with 1000 words representing the input registers. The address range is 2000-2999. Function code: 4
udtOutputBits	MB_RTU_x_3000_3999	Array of 1000 bits representing the digital outputs. The address range is 3000-3999. Function codes: 1,5 and 15
udtInputBits	MB_RTU_x_4000_4999	Array of 1000 bits representing digital inputs. The address range is 4000-4999. Function code: 2
arrInputAddress	MB2_COM_ARR_B_1_14	IN process data.
arrOutputAddress	MB2_COM_ARR_B_1_14	OUT process data.

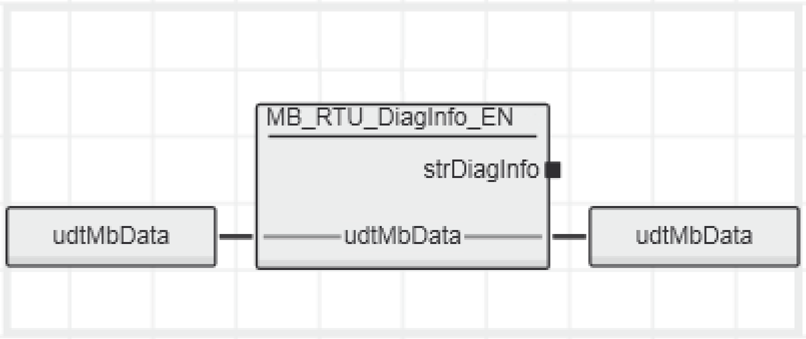
31.5 Diagnosis

wDiagCode	wAddDiagCode	Description
0000hex		Block is not activated.
8000hex		Block is active and operating without errors.
16#C010		Incorrect parameters.
	16#0010	Baud rate.
	16#0020	Data width.
	16#0050	Terminal configuration error.
	16#0060	Communication error.
	16#0080	xReceive and xSend inputs are set at the same time.
	16#0090	xReceive input is set during send procedure.
	16#0100	xSend input is set during receive procedure.
16#C020		Error when sending.
	16#0020	Maximum size exceeded.
	16#0060	Communication error when sending.
16#C030		Error when receiving.
	16#0030	uiRcvLength is larger than the memory available in the receive buffer.
	16#0060	Communication error when receiving.

32 MB_RTU_DiagInfo_EN

If there is an error, this block shows the diagnostics of the master block as a text in English. The source code of the block can be read and modified. To show the diagnostic messages in other languages, copy the block and translate the diagnostic text into the desired language. The text output (strDiagInfo) is limited to 80 characters.

32.1 Function block call



32.2 Input parameters

None

32.3 Output parameters

Name	Type	Description
strDiagInfo	STRING	If there is an error, the variable shows the description for the current wDiagCode and wAddDiagCode in English.

32.4 Inout parameters

Name	Type	Description
udtMbData	udtModbus2_Data	The block communicates via this structure with the FC blocks.

33 Examples

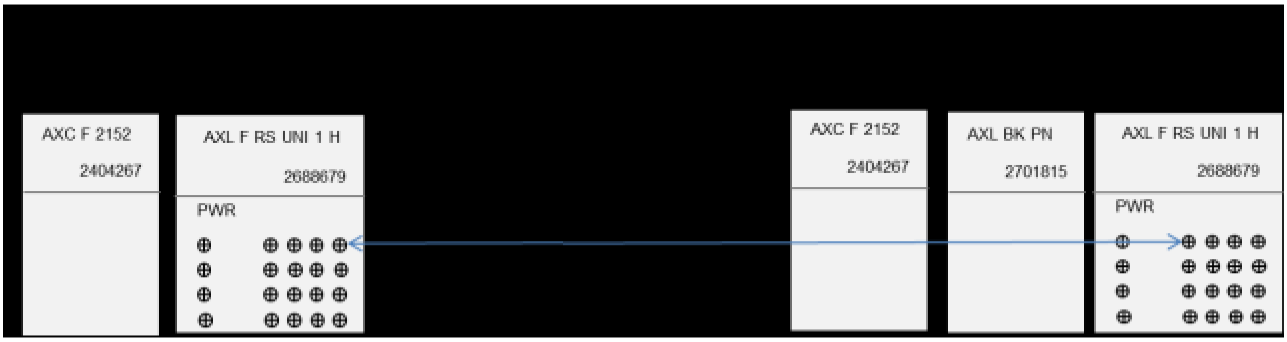
For the startup instruction of the Modbus_RTU function block please find the following examples:

- MB_RTU_9_EXA_AXL_MA.pcwex
- MB_RTU_9_EXA_AXL_SL.pcwex
- MB_RTU_9_EXA_IL_MA.pcwex
- MB_RTU_9_EXA_IL_SL.pcwex

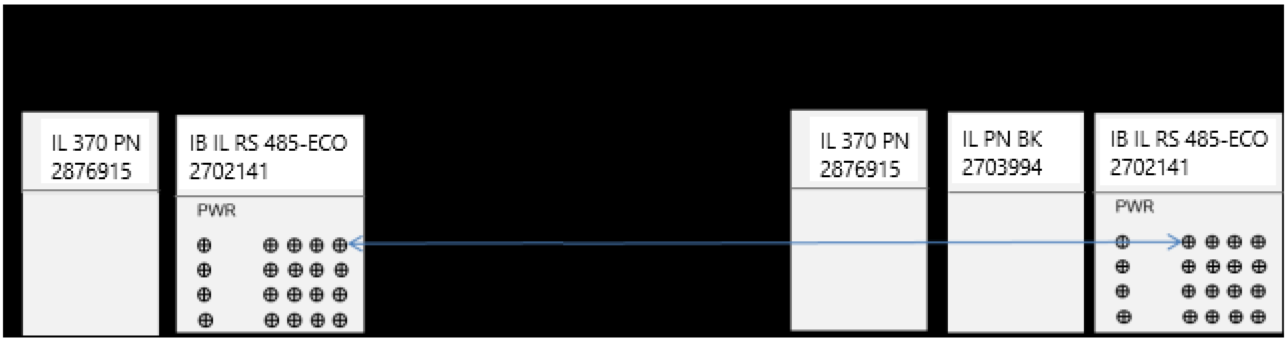
These examples are located in the “Examples” folder of the unzipped msi file of the library.

They describes the communication between Modbus_Master and Modbus_Slave.

The serial interface from example 1 (Modbus_RTU Master) must be connected with the serial interface from example 2 (Modbus_RTU Slave) via RS485 (two wires and termination at each end).



Example 3 (Modbus_RTU Master) must be connected with the serial interface from example 4 via RS485 (two wires and termination at each end).



33.1 Example 1: Modbus_RTU AXL master functionality

33.1.1 Plant

For this example, the following hardware is used:

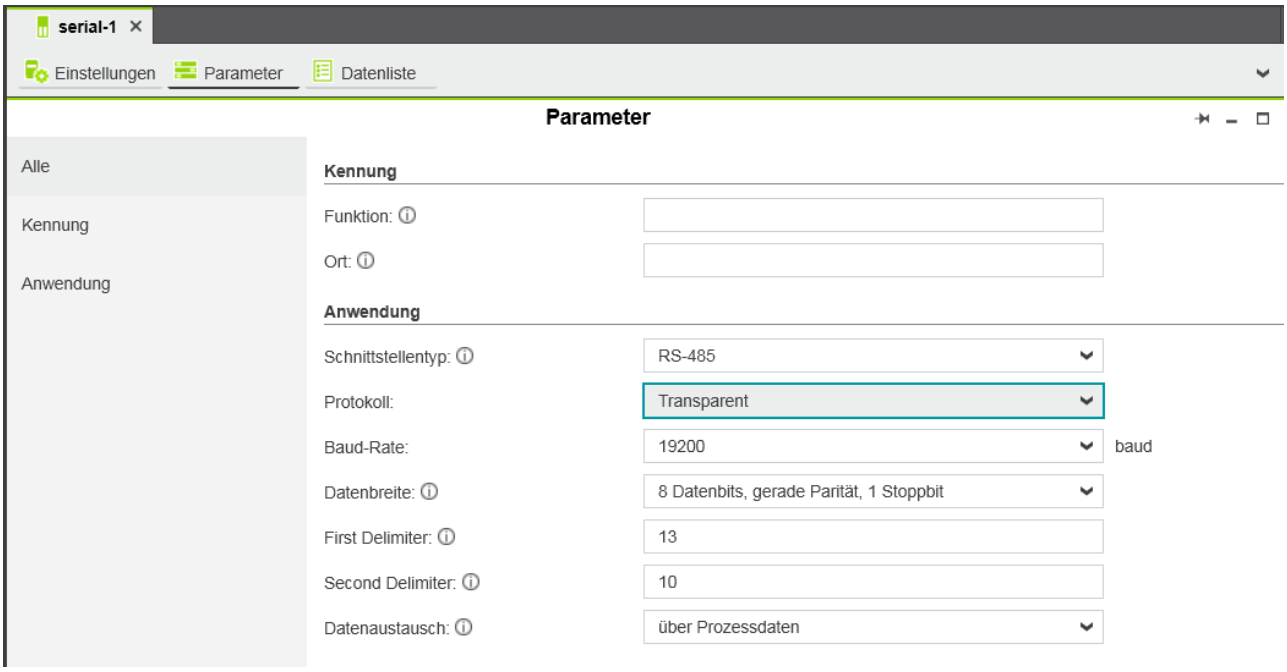
- AXC F 2152 (2404267)
- AXL F RS UNI 1H (2688666)

33.1.2 Modbus master with AXL F RS UNI 1H (2688666)

This project shows one example for the startup of MB_AXL_F_RSUNI_Master function block.

AXL F RS UNI 1H startup parameters:

If the xMode input is activated, the selected protocol must be "Modbus RTU". If the xMode input is deactivated, the selected protocol must be "Transparent".



Kennung

Funktion:

Ort:

Anwendung

Schnittstellentyp: RS-485

Protokoll: Transparent

Baud-Rate: 19200 baud

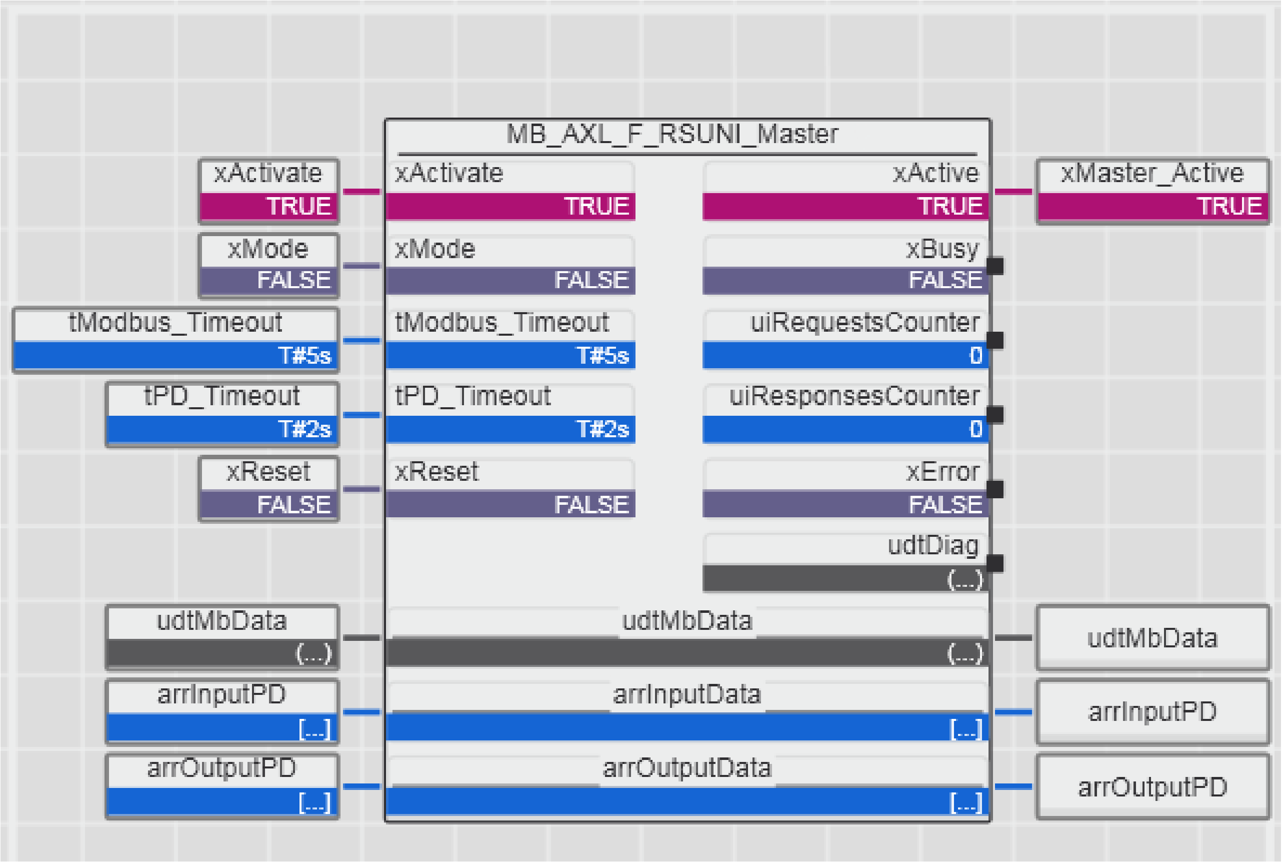
Datenbreite: 8 Datenbits, gerade Parität, 1 Stoppbit

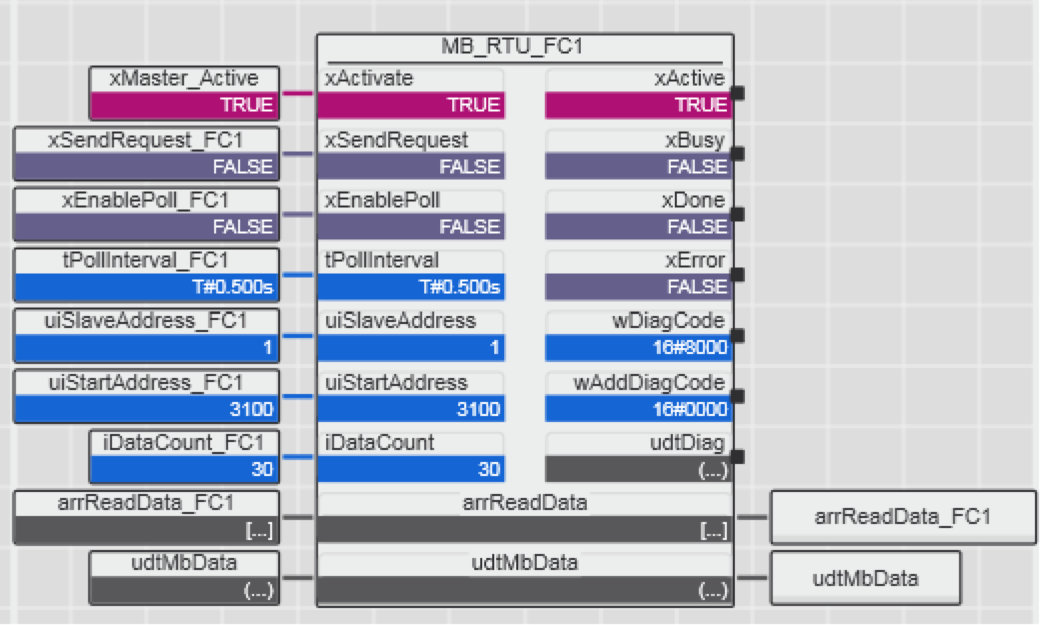
First Delimiter: 13

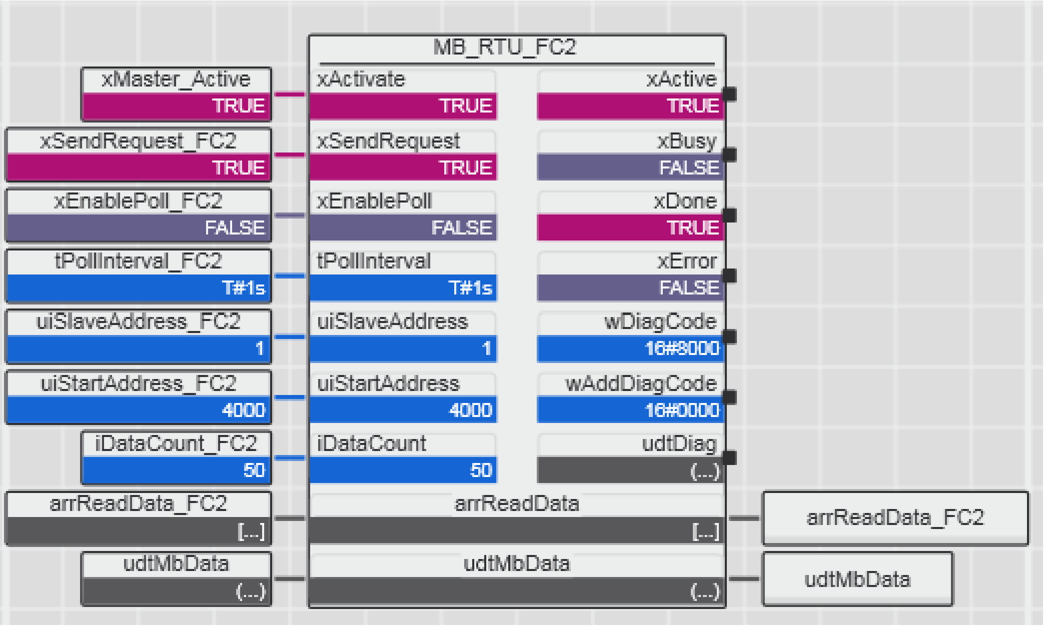
Second Delimiter: 10

Datenaustausch: über Prozessdaten

MB_AXL_F_RSUNI_MASTER:







Creating structures:

The Modbus master as well as the FC blocks are connected with each other via a structure.

33.2 Example 2: Modbus_RTU AXL slave functionality

33.2.1 Plant

For this example, the following hardware is used:

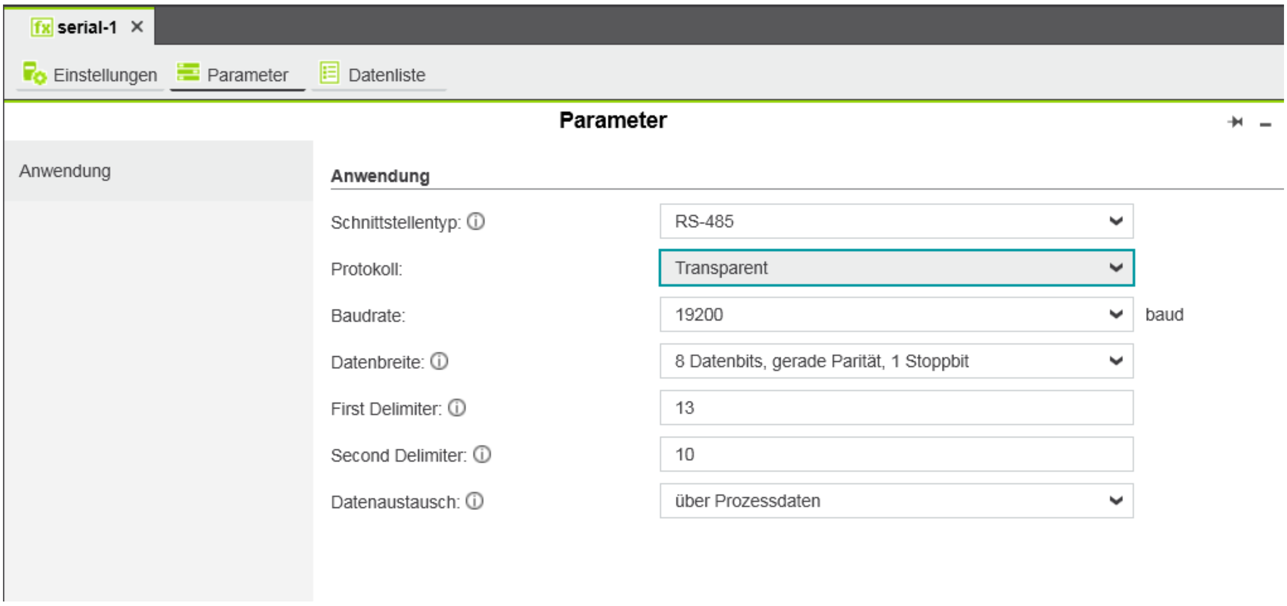
- AXC F 2152 (2404267)
- AXL F BK PN (2701815)
- AXL F RS UNI 1H (2688666)

33.2.2 Modbus slave with AXL F RS UNI 1H (2688666)

This project shows one example for the startup of MB_AXL_F_RSUNI_Slave function block.

AXL F RS UNI 1H startup parameters:

The selected protocol must be "Transparent".



Schnittstellentyp: RS-485

Protokoll: Transparent

Baudrate: 19200 baud

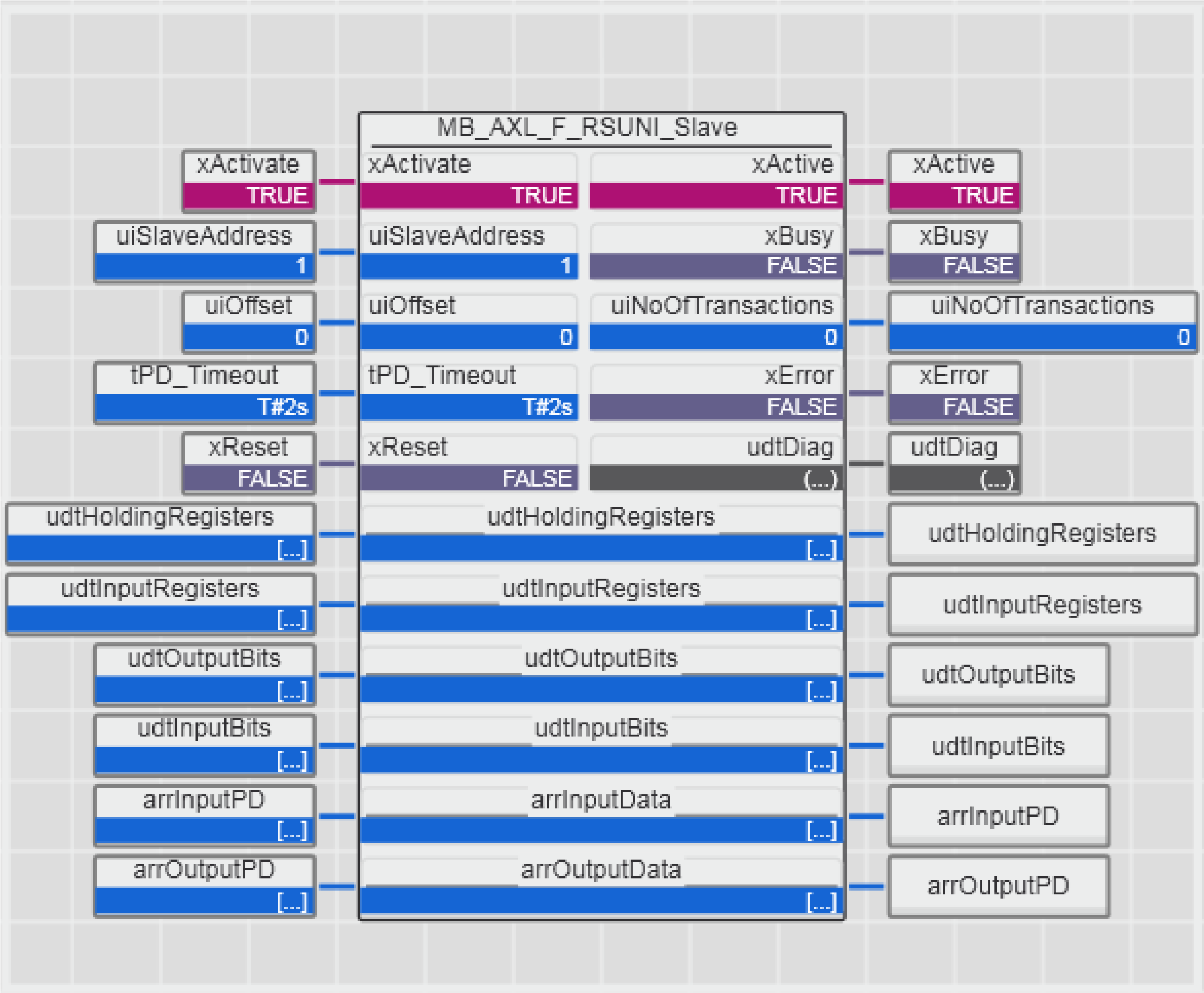
Datenbreite: 8 Datenbits, gerade Parität, 1 Stoppbit

First Delimiter: 13

Second Delimiter: 10

Datenaustausch: über Prozessdaten

MB_AXL_F_RSUNI_SLAVE:



33.3 Example 3: Modbus_RTU IL master functionality

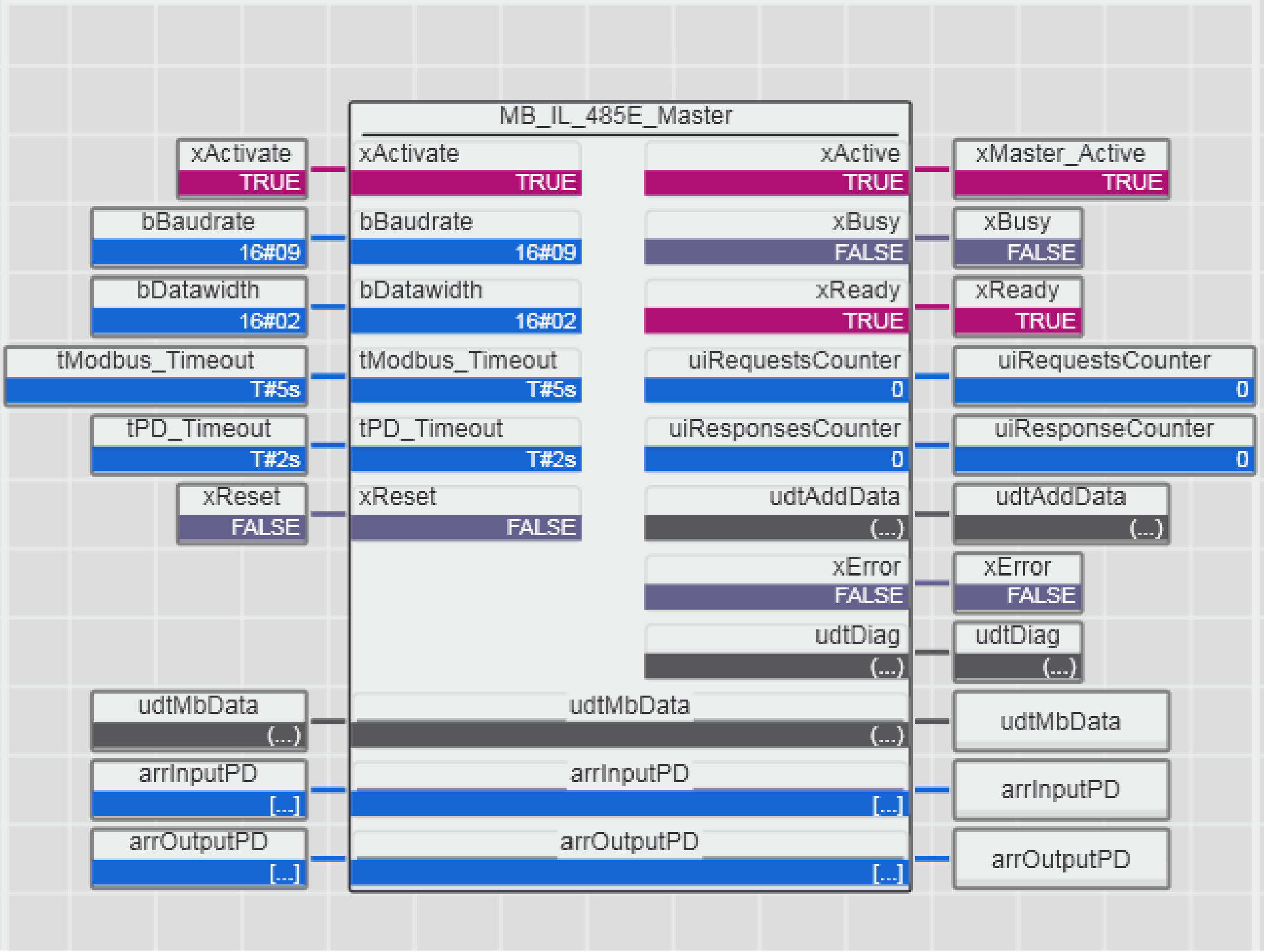
33.3.1 Plant

For this example, the following hardware is used:

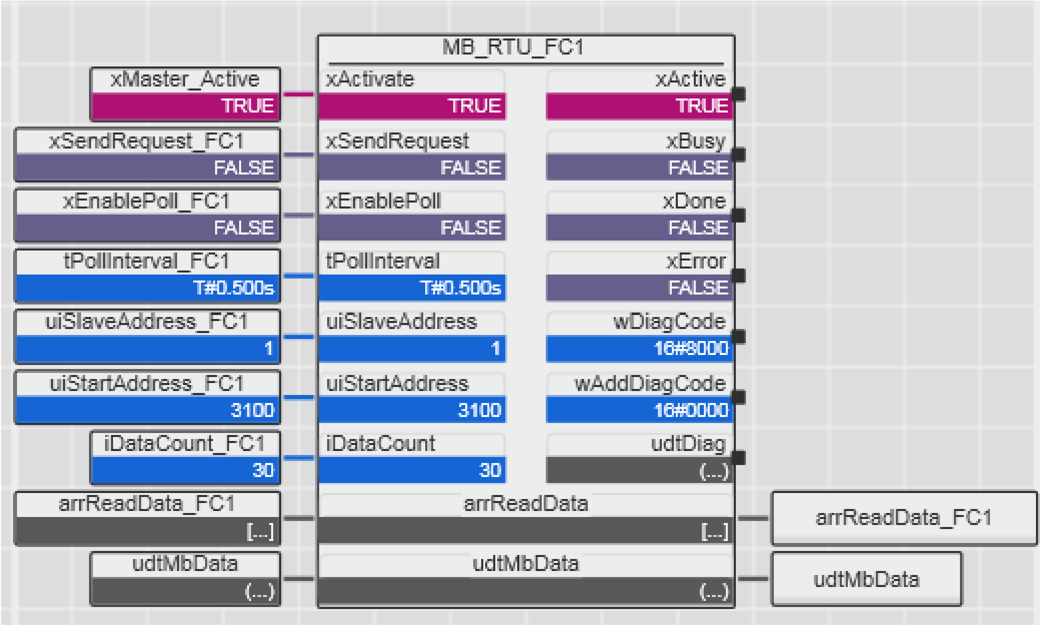
- AXC F 2152 (2404267)
- AXC F IL ADAPT (1020304)
- IB IL RS 485-ECO (2702795)

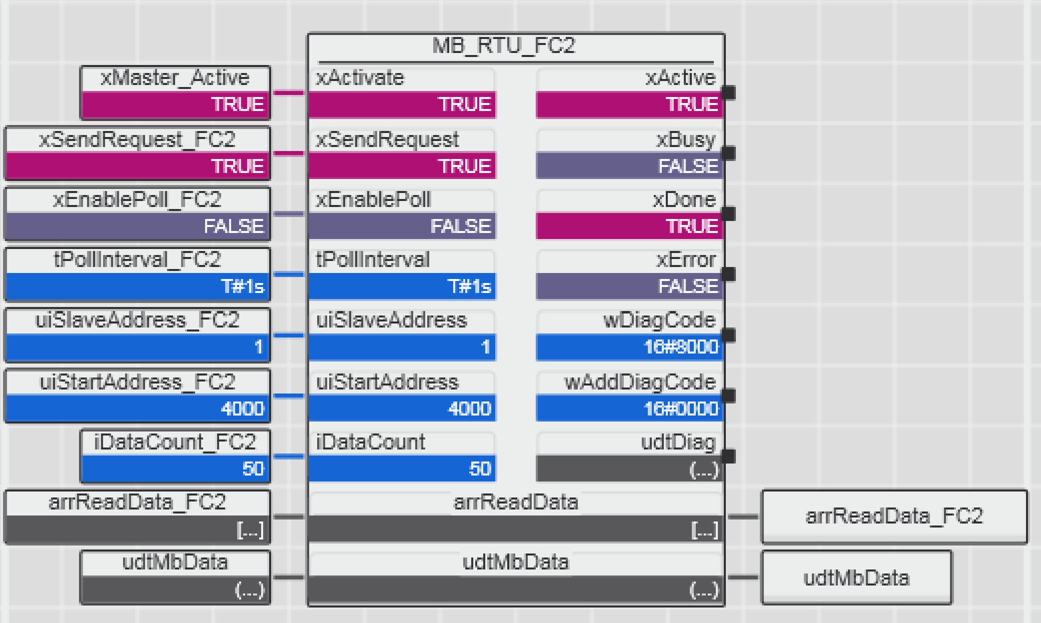
33.3.2 Modbus master with IB IL RS 485-ECO (2702795)

MB_IL_485E_MASTER:



```
                         MB_IL_485E_Master
xActivate         TRUE   xActivate         TRUE   xActive            TRUE   xMaster_Active     TRUE
bBaudrate        16#09   bBaudrate        16#09   xBusy             FALSE   xBusy             FALSE
bDatawidth       16#02   bDatawidth       16#02   xReady             TRUE   xReady             TRUE
tModbus_Timeout   T#5s   tModbus_Timeout   T#5s   uiRequestsCounter     0   uiRequestsCounter     0
tPD_Timeout       T#2s   tPD_Timeout       T#2s   uiResponsesCounter    0   uiResponseCounter     0
xReset           FALSE   xReset           FALSE   udtAddData          (...)  udtAddData         (...)
                                                  xError            FALSE   xError            FALSE
                                                  udtDiag            (...)  udtDiag            (...)
udtMbData        (...)   udtMbData                                  (...)   udtMbData
arrInputPD       [...]   arrInputPD                                 [...]   arrInputPD
arrOutputPD      [...]   arrOutputPD                                [...]   arrOutputPD
```





Creating structures:

The Modbus master as well as the FC blocks are connected with each other via a structure.

33.4 Example 4: Modbus_RTU IL slave functionality

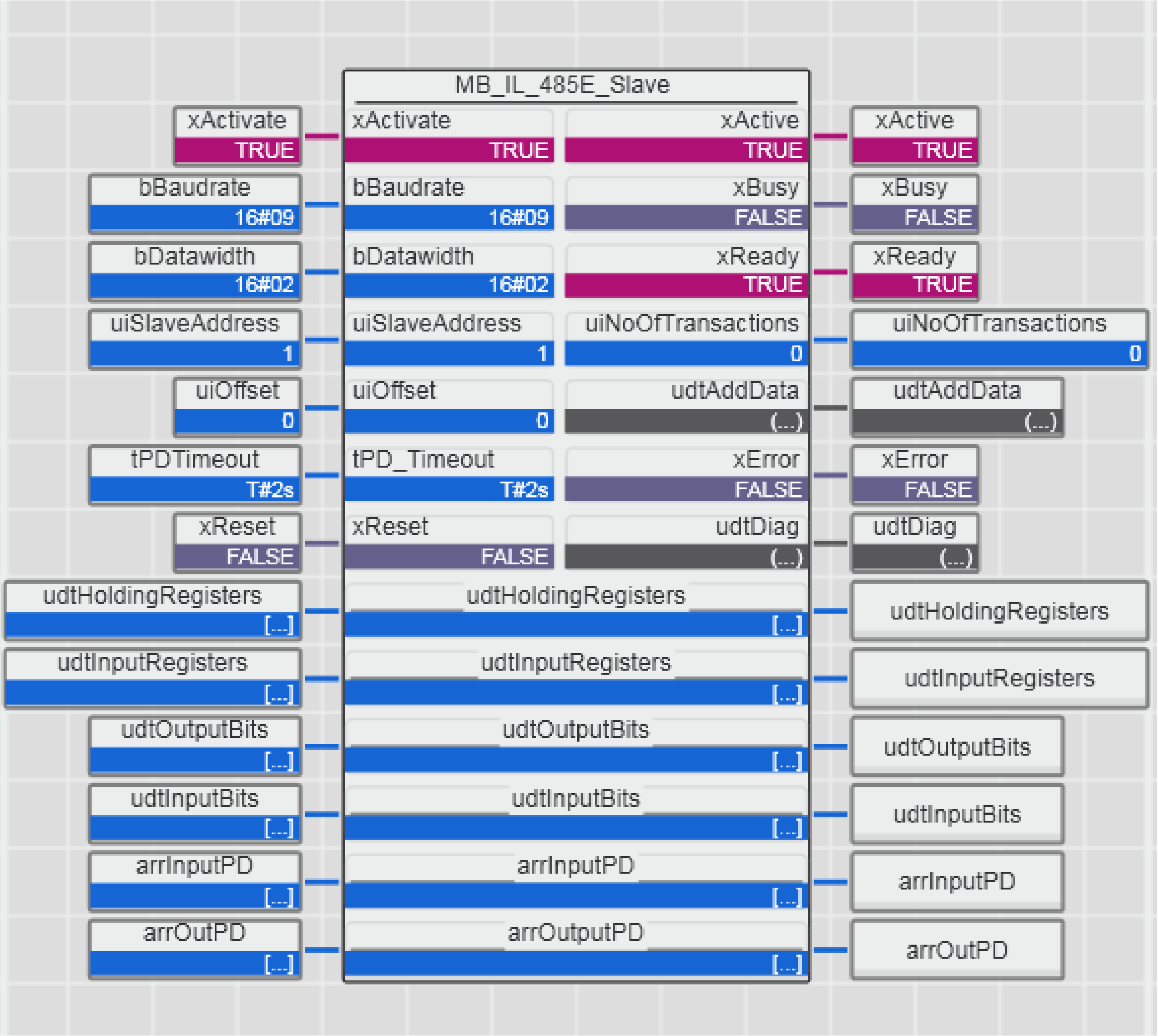
33.4.1 Plant

For this example, the following hardware is used:

- AXC F 2152 (2404267)
- AXL F BK PN (2701815)
- IB IL RS 485-ECO (2702795)

33.4.2 Modbus slave with IB IL RS 485-ECO (2702795)

MB_IL_485E_SLAVE:



34 Appendix

34.1 Data types

```
TYPE
    arrModbus2_W_1_126      : ARRAY [1..126]    OF WORD;
    arrModbus2_W_1_125      : ARRAY [1..125]    OF WORD;
    arrModbus2_W_1_123      : ARRAY [1..123]    OF WORD;
    arrModbus2_B_1_330      : ARRAY [1..330]    OF BYTE;
    arrModbus2_X_1_2000     : ARRAY [1..2000]   OF BOOL;
    arrModbus2_X_1_1968     : ARRAY [1..1968]   OF BOOL;
    arrModbus2_X_1_16       : ARRAY [1..16]     OF BOOL;

    arrModbus2_w_0_1999     : ARRAY [0..1999]       OF WORD;
    arrModbus2_x_3000_3999  : ARRAY [3000..4015]    OF BOOL;
        (*additional 16 bits were added to avoid out of range
        error when processing the last 16 bits*)
    arrModbus2_x_4000_4999  : ARRAY [4000..5015]    OF BOOL;
        (*additional 16 bits were added to avoid out of range
        error when processing the last 16 bits*)
    arrModbus2_w_2000_2999  : ARRAY [2000..2999]    OF WORD;
    arrModbus2_w_0_124      : ARRAY [0..124]        OF WORD;
    arrModbus2_x_0_15       : ARRAY [0..15]         OF BOOL;
    arrModbus2_B_0_256      : ARRAY [0..257]        OF BYTE;

    udtModbus2_Data : STRUCT
        (* Modbus Handling *)
        (* Send Modbus request *)
        xSendRequest        : BOOL;
            (* Indicates FC wants to send a Modbus request *)
        xNDR                : BOOL; (* New modbus response received *)
        xBusy               : BOOL; (* FC only operates if not busy *)
        xReset              : BOOL; (* Reset from input on master FB *)
        tTimeout            : TIME; (* input tTimeout of the Modbus_Master FB*)
        (* General Modbus data *)
        uiSlaveAddress      : UINT; (* Address of the Modbus slave *)
        iFunctionCode       : INT;  (* Function Code by the Master *)
        uiStartAddress      : UINT;
            (* Starting address in the Modbus register table *)
        iSndDataCount       : INT;  (* Required data length from FC *)
        iExpDataCount       : INT;  (* Expected data length depending
            of the function code number OF bits or words *)
        uiRcvdDataCount     : UINT; (* Received bytes from Serial IF
            / UINT for the range higher than 127 *)
        arrData             : arrModbus2_W_1_125;  (* modbus telegram *)
        (* Failure handling (master outputs) *)
        xMasterActive       : BOOL; (* interface is ready *)
        xMasterBusy         : BOOL; (* interface is busy *)
        xMasterError        : BOOL; (* error indication *)
        wMasterDiagCode     : WORD; (* diagnostics code *)
        wMasterAddDiagCode  : WORD; (* additional diagnostics code *)
        xMB_Error           : BOOL; (* Exception Code Response *)
        xFC_Busy            : BOOL; (* FC catches bit IF request and not
            xFC_Busy *)
    END_STRUCT;

(* Diagnostic structures udtDiag *)

    MB_UDT_RTU_MASTER_DIAG : STRUCT
        iState          : INT;
        wDiagCode       : WORD;
        wAddDiagCode    : WORD;
```

```
END_STRUCT;

MB_UDT_RTU_SLAVE_DIAG : STRUCT
    iState          : INT;
    wDiagCode       : WORD;
    wAddDiagCode    : WORD;
END_STRUCT;

MB_UDT_RTU_REC_DIAG : STRUCT
    iState          : INT;
    wDiagCode       : WORD;
    wAddDiagCode    : WORD;
    bControlByte0   : BYTE;
    bStatusByte0    : BYTE;
END_STRUCT;

MB_UDT_RTU_SND_DIAG : STRUCT
    iState          :   INT;
    wDiagCode       :   WORD;
    wAddDiagCode    :   WORD;
    bControlByte0   :   BYTE;
    bStatusByte0    :   BYTE;
END_STRUCT;

MB_UDT_RTU_FC_DIAG : STRUCT
    iState          : INT;
    wDiagCode       : WORD;
    wAddDiagCode    : WORD;
END_STRUCT;

MB_UDT_AXL_SE_RS485_DIAG_MASTER : STRUCT
    udtMB_AXL_RS_UNI_REC_Diag   :   MB_UDT_RTU_REC_DIAG;
    udtMB_AXL_RS_UNI_SND_Diag   :   MB_UDT_RTU_SND_DIAG;
    udtMB_RTU_Master_Diag       :   MB_UDT_RTU_MASTER_DIAG;
END_STRUCT;

MB_UDT_AXL_SE_RS485_DIAG_SLAVE : STRUCT
    udtMB_AXL_RS_UNI_REC_Diag   :   MB_UDT_RTU_REC_DIAG;
    udtMB_AXL_RS_UNI_SND_Diag   :   MB_UDT_RTU_SND_DIAG;
    udtMB_RTU_Slave_Diag        :   MB_UDT_RTU_SLAVE_DIAG;
END_STRUCT;

    MB_UDT_ILRSUNI_DIAG :
STRUCT
    iState          :   INT;
    wDiagCode       :   WORD;
    wAddDiagCode    :   WORD;
END_STRUCT;
MB_UDT_IL_UNI_SLAVE_DIAG    :
STRUCT
    udtMB_ILRSUNI_Diag      :   MB_UDT_ILRSUNI_DIAG;
    udtMB_RTU_Slave_Diag    :   MB_UDT_RTU_SLAVE_DIAG;
END_STRUCT;
MB_UDT_IL_UNI_MASTER_DIAG   :
STRUCT
    udtMB_ILRSUNI_Diag      :   MB_UDT_ILRSUNI_DIAG;
    udtMB_RTU_Master_Diag   :   MB_UDT_RTU_MASTER_DIAG;
END_STRUCT;
MB_UDT_ILRS232P_DIAG    :
STRUCT
    iState          :   INT;
    wDiagCode       :   WORD;
    wAddDiagCode    :   WORD;
END_STRUCT;
```

```
MB_UDT_IL_232P_MASTER_DIAG  :
STRUCT
    udtMB_ILRS232P_Diag     :   MB_UDT_ILRS232P_DIAG;
    udtMB_RTU_Master_Diag   :   MB_UDT_RTU_MASTER_DIAG;
END_STRUCT;
MB_UDT_IL_232P_SLAVE_DIAG   :
STRUCT
    udtMB_ILRS232P_Diag     :   MB_UDT_ILRS232P_DIAG;
    udtMB_RTU_Slave_Diag    :   MB_UDT_RTU_SLAVE_DIAG;
END_STRUCT;
MB_UDT_ILRS232ECO_DIAG  :
STRUCT
    iState          :   INT;     (*Current state of statemachine*)
    wDiagCode       :   WORD;    (*Diag Code*)
    wAddDiagCode    :   WORD;    (*Additional Diag Code*)
END_STRUCT;
MB_UDT_IL_232E_MASTER_DIAG  :
STRUCT
    udtMB_ILRS232E_Diag     :   MB_UDT_ILRS232ECO_DIAG;
    udtMB_RTU_Master_Diag   :   MB_UDT_RTU_MASTER_DIAG;
END_STRUCT;
MB_UDT_IL_232E_SLAVE_DIAG   :
STRUCT
    udtMB_ILRS232E_Diag     :   MB_UDT_ILRS232ECO_DIAG;
    udtMB_RTU_Slave_Diag    :   MB_UDT_RTU_SLAVE_DIAG;
END_STRUCT;
MB_UDT_ILRS485P_DIAG    :
STRUCT
    iState          :   INT;
    wDiagCode       :   WORD;
    wAddDiagCode    :   WORD;
END_STRUCT;
MB_UDT_IL_485P_MASTER_DIAG  :
STRUCT
    udtMB_ILRS485P_Diag     :   MB_UDT_ILRS485P_DIAG;
    udtMB_RTU_Master_Diag   :   MB_UDT_RTU_MASTER_DIAG;
END_STRUCT;
MB_UDT_IL_485P_SLAVE_DIAG   :
STRUCT
    udtMB_ILRS485P_Diag     :   MB_UDT_ILRS485P_DIAG;
    udtMB_RTU_Slave_Diag    :   MB_UDT_RTU_SLAVE_DIAG;
END_STRUCT;
MB_UDT_ILRS485ECO_DIAG  :
STRUCT
    iState          :   INT;
    wDiagCode       :   WORD;
    wAddDiagCode    :   WORD;
END_STRUCT;
MB_UDT_IL_485E_MASTER_DIAG  :
STRUCT
    udtMB_ILRS485E_Diag     :   MB_UDT_ILRS485ECO_DIAG;
    udtMB_RTU_Master_Diag   :   MB_UDT_RTU_MASTER_DIAG;
END_STRUCT;
MB_UDT_IL_485E_SLAVE_DIAG   :
STRUCT
    udtMB_ILRS485E_Diag     :   MB_UDT_ILRS485ECO_DIAG;
    udtMB_RTU_Slave_Diag    :   MB_UDT_RTU_SLAVE_DIAG;
END_STRUCT;
MB_UDT_AXL_RSUNI_DIAG_MASTER : STRUCT
    udtMB_AXL_RS_UNI_REC_Diag   :   MB_UDT_RTU_REC_DIAG;
    udtMB_AXL_RS_UNI_SND_Diag   :   MB_UDT_RTU_SND_DIAG;
    udtMB_RTU_Master_Diag       :   MB_UDT_RTU_MASTER_DIAG;
END_STRUCT;
MB_UDT_AXL_RSUNI_DIAG_SLAVE : STRUCT
```

```
        udtMB_AXL_RS_UNI_REC_Diag   :   MB_UDT_RTU_REC_DIAG;
        udtMB_AXL_RS_UNI_SND_Diag   :   MB_UDT_RTU_SND_DIAG;
        udtMB_RTU_Slave_Diag        :   MB_UDT_RTU_SLAVE_DIAG;
    END_STRUCT;
END_TYPE
 (* AXL RS UNI *)
TYPE
    (* *** AXL F RS UNI 1H *** *)

    (* Input and output array for processdata of the module *)
    MB2_AXL_RSUNI2_ARR_B_0_19 : ARRAY [0..19] OF BYTE;

    (* Buffer for temporary saving of received data *)
    MB2_AXL_RSUNI2_ARR_B_1_17 : ARRAY [1..17] OF BYTE;

    (* Maximum buffer for outgoing user data *)
    MB2_AXL_RSUNI2_ARR_B_1_1023 : ARRAY [1..1023] OF BYTE;

    (* Maximum buffer for incoming user data *)
    MB2_AXL_RSUNI2_ARR_B_1_4096 : ARRAY [1..4096] OF BYTE;

    (* Status of the serial interface *)
    MB2_AXL_RSUNI2_UDT_STATUS : STRUCT
        xErrorModule        : BOOL; (*Error in module - peripheral fault or
            invalid command*)

        (* additional status OF the module *)
        xDSR                : BOOL; (* TRUE -> Data set ready. Opposite
            side is ready for communication *)
        xDCD                : BOOL; (* TRUE -> Data carrier detect. Opposite
            side detecting incoming data *)

        (*status OF the receiving part OF the module*)
        xErrorRcv           : BOOL; (* TRUE -> Error during data receive
            operation OF the module *)
        xRcvBufferFull      : BOOL; (* TRUE -> Receive buffer of module
            full *)
        xRcvBufferNotEmpty  : BOOL; (* TRUE -> Receive buffer of module not
            empty *)

        (* status of the sending part OF the module *)
        xErrorSend          : BOOL; (* TRUE -> Error during data send
            operation of the module *)
        xSendBufferFull     : BOOL; (* TRUE -> Send buffer of module full *)
        xSendBufferNotEmpty : BOOL; (* TRUE -> Send buffer of module not
            empty *)

        uiRcvBufferModule   : UINT; (* Number OF characters in the receive
            buffer of the module *)
        wFirmwareVersion    : WORD; (* Firmware version OF the module *)
    END_STRUCT;

    (* counter of the serial interface *)
    MB2_AXL_RSUNI2_UDT_COUNTER : STRUCT
        uiRcvCharValid      : UINT; (* Number OF valid received characters *)
        uiRcvCharInvalid    : UINT; (* Number OF invalid received characters *)
        uiSendChar          : UINT; (* Number OF sent characters *)
    END_STRUCT;

    MB2_AXL_RSUNI2_UDT_IF   : STRUCT
        xActive                     : BOOL; (* TRUE -> Serial Driver is
            Activated *)
        xReady                      : BOOL; (* TRUE -> Serial IL Driver is
            Ready to send / receive *)
        xEndToEnd                   : BOOL; (* TRUE -> End to end protocoll is
            used for communication *)
        xAck                        : BOOL; (* TRUE -> Acknowledge incoming
            errors *)
        xAutoAck                    : BOOL; (* TRUE -> Reset communication
            errors automatically *)
        xDTR                        : BOOL; (* TRUE -> Turn on DTR function of
            module *)
        xReadStatusCounter          : BOOL; (* TRUE -> Read status counters of
            the module *)
        xSend                       : BOOL; (* TRUE -> Send send request to
            module *)
        uiSendLength                : UINT; (* Number of bytes to be sent *)
        xResetRecBuf                : BOOL; (* TRUE -> Reset receive buffer of
            function block *)
        uiRcvLength                 : UINT; (* Number of characters to be read
            in *)
        xFBSending                  : BOOL; (* Function block in sending mode *)
        xFBReceiving                : BOOL; (* Function block in receiving
            mode *)

        udtStatusCounter            : MB2_AXL_RSUNI2_UDT_COUNTER;
            (* Structure containing status counters *)
        udtStatusSerialInterface    : MB2_AXL_RSUNI2_UDT_STATUS;
            (* Structure containing status OF serial interface *)
        xStatusFailure              : BOOL; (* Receive or send error
            existing *)
        xRcvBufferNotEmpty          : BOOL; (* TRUE -> Receive buffer
            containing data *)
        xRecBufFull                 : BOOL; (* TRUE -> Software receive buffer
            full *)
        xReadCounterDone            : BOOL; (* Finished reading in status
            counter same cycle *)
        xSendDone                   : BOOL; (* Finished sending of data same
            cycle *)
        xNDR                        : BOOL; (* Finished reading of data same
            cycle *)
        uiRcvDataLength             : UINT; (* Number of read in characters *)

        tTimeout                    : TIME; (* Timeout value for timeout in
            case of freezed receiving, sending, buffering operation *)
        arrRcvData                  : MB2_AXL_RSUNI2_ARR_B_1_4096;
            (* Array containing received data *)
        arrSendData                 : MB2_AXL_RSUNI2_ARR_B_1_1023;
            (* Array containing data to be sent *)

        (* Mirroring for observing in Modbus Master FB *)

        xActive_REC                 : BOOL;
        xBusy_REC                   : BOOL;
        xError_REC                  : BOOL;
        wDiagCode_REC               : WORD;
        wAddDiagCode_REC            : WORD;

        xActive_SND                 : BOOL;
        xBusy_SND                   : BOOL;
        xError_SND                  : BOOL;
        wDiagCode_SND               : WORD;
        wAddDiagCode_SND            : WORD;

        xComSerial_IL               : BOOL; (* TRUE: Inline Module *)
        xRCV_ComSerial_IL           : BOOL; (* xReceive for Inline modules *)
    END_STRUCT;
```

```
    MB2_RSUNI_UDT_PARA_V2       :
    STRUCT
        bSelectMode         :   BYTE;
        xDTR_Control        :   BOOL;
        diBaudrate          :   DINT;
        wDatawidth          :   WORD;
        bErrorPattern       :   BYTE;
        bSecondDelimeter    :   BYTE;
        bFirstDelimeter     :   BYTE;
        bProtocol           :   BYTE;
        bDummy1             :   BYTE;
        bDummy2             :   BYTE;
    END_STRUCT;
        MB2_RSUNI_UDT_DATA_V1       :
    STRUCT
        xDCD                :   BOOL;
        xDSR                :   BOOL;
        xRcvBufferNotEmpty  :   BOOL;
        xRcvBufferFull      :   BOOL;
        xSendBufferFull     :   BOOL;
        xSendBufferNotEmpty :   BOOL;
        wRcvBufferHW        :   WORD;
        wRcvBufferSW        :   WORD;
        wRcvCounter         :   WORD;
        wRcvCounterFailed   :   WORD;
        wSendCounter        :   WORD;
        wFWVersion          :   WORD;
        iState              :   INT;    (*Current state of statemachine*)
        wDiagCode           :   WORD;   (*Diag Code*)
        wAddDiagCode        :   WORD;   (*Additional Diag Code*)
    END_STRUCT;
END_TYPE

TYPE
    (* Common arrays *)

    MB2_COM_ARR_B_1_12      : ARRAY [1..12] OF BYTE;

    MB2_COM_ARR_B_1_128     : ARRAY [1..128] OF BYTE;

    MB2_COM_ARR_B_1_330     : ARRAY [1..330] OF BYTE;

    MB2_COM_ARR_B_1_2048    : ARRAY [1..2048] OF BYTE;

    MB2_RSUNI_ARR_B_1_14    : ARRAY [1..14] OF BYTE;
    MB2_RSUNI_ARR_B_1_30    : ARRAY [1..30] OF BYTE;
    MB2_RSUNI_ARR_B_1_62    : ARRAY [1..62] OF BYTE;
    MB2_RSUNI_ARR_B_1_256   : ARRAY [1..256] OF BYTE;

END_TYPE

TYPE
    MB2_COM_UDT_RS232P_PARA :               (* Padding-Bytes *)
    STRUCT
        diBaudrate          :   DINT;
        bDataWidth          :   BYTE;
        bErrorPattern       :   BYTE;
        xDTR_Control        :   BOOL;
        xCTS_Output         :   BOOL;
        bFirstDelimeter     :   BYTE;
        bSecondDelimeter    :   BYTE;
        bProtocol           :   BYTE;
        bDummy1             :   BYTE;
    END_STRUCT;
```

```
MB2_COM_UDT_RS232P_DATA_V1  :
STRUCT
    xCTS                :   BOOL;
    xErrorRcv3964R      :   BOOL;
    xErrorSend3964R     :   BOOL;
    xRcvBufferFull      :   BOOL;
    xSendBufferFull     :   BOOL;
    xSendBufferNotEmpty :   BOOL;
    uiRcvCounter        :   UINT;
    wFWVersion          :   WORD;
END_STRUCT;

(* Additional Diagnostics *)
MB2_RSUNI_UDT_DATA      :
STRUCT
    xDCD                :   BOOL;
    xDSR                :   BOOL;
    xRcvBufferNotEmpty  :   BOOL;
    xRcvBufferFull      :   BOOL;
    xSendBufferFull     :   BOOL;
    xSendBufferNotEmpty :   BOOL;
    wRcvBufferHW        :   WORD;
    wRcvBufferSW        :   WORD;
    wRcvCounter         :   WORD;
    wRcvCounterFailed   :   WORD;
    wSendCounter        :   WORD;
    wFWVersion          :   WORD;
    iState              :   INT;     (*Current state of statemachine*)
    wDiagCode           :   WORD;    (*Diag Code*)
    wAddDiagCode        :   WORD;    (*Additional Diag Code*)
END_STRUCT;
MB2_COM_UDT_RS485P_PARA_V1  :                (* Padding-Bytes *)
STRUCT
    diBaudrate          :   DINT;
    bDataWidth          :   BYTE;
    bErrorPattern       :   BYTE;
    xOutputTyp          :   BOOL;
    bFirstDelimeter     :   BYTE;
    bSecondDelimeter    :   BYTE;
    bProtocol           :   BYTE;
    bDummy1             :   BYTE;
    bDummy2             :   BYTE;
END_STRUCT;
MB2_COM_UDT_RS485P_DATA_V1  :
STRUCT
    xErrorRcv           :   BOOL;
    xErrorSend          :   BOOL;
    xRcvBufferFull      :   BOOL;
    xSendBufferFull     :   BOOL;
    xSendBufferNotEmpty :   BOOL;
    uiRcvCounter        :   UINT;
    wFWVersion          :   WORD;
END_STRUCT;
MB2_RSUNI_UDT_DATA_V1       :
STRUCT
    xDCD                :   BOOL;
    xDSR                :   BOOL;
    xRcvBufferNotEmpty  :   BOOL;
    xRcvBufferFull      :   BOOL;
    xSendBufferFull     :   BOOL;
    xSendBufferNotEmpty :   BOOL;
    wRcvBufferHW        :   WORD;
    wRcvBufferSW        :   WORD;
    wRcvCounter         :   WORD;
```

```
        wRcvCounterFailed   :   WORD;
        wSendCounter        :   WORD;
        wFWVersion          :   WORD;
        iState              :   INT;    (*Current state of statemachine*)
        wDiagCode           :   WORD;   (*Diag Code*)
        wAddDiagCode        :   WORD;   (*Additional Diag Code*)
    END_STRUCT;
END_TYPE
```

35 Support

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