

# Library Description

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Building



Automation



WAGO-I/O-  
PRO V2.3



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## MpBus\_03.lib

### CODESYS V2.3 Module for MP-Bus

Version 1.0.3

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## Number Notation

Table 1: Number Notation

Number System	Example	Comment
Decimal	100	Normal notation
Hexadecimal	0x64	C notation
Binary	'100' '0110.0100'	In quotation marks, nibble separated by a period

## Font Conventions

Table 2: Font Conventions

Font Type	Explanation
<i>italic</i>	Names of paths and files are displayed in italics, e.g.: <i>C:\Programs\WAGO-I/O-CHECK</i>
<b>Menu</b>	Menu options are displayed in bold, e.g., <b>Save</b>
>	A “greater than” symbol between two names denotes the selection of a menu option, e.g.: <b>File &gt; New</b>
<b>Input</b>	Descriptions of input or optional fields are displayed in bold, e.g.: <b>Start of measurement range</b>
“Value”	Input or selection values are displayed in quotation marks, e.g.: Enter the value “4mA” under <b>Start of measurement range</b> .
[Button]	Button labels within the dialogs are bold and enclosed in square brackets, e.g.: <b>[Input]</b>
[Key]	Key labels on the keyboard are displayed in bold and enclosed in square brackets, e.g.: <b>[F5]</b>

## Symbols

**DANGER****Warning against personal injury!**

Indicates a high-risk, imminently hazardous situation which, if not avoided, will result in death or serious injury.

**DANGER****Do not work on components while energized!**

Indicates a high-risk, imminently hazardous situation which, if not avoided, will result in death or serious injury.

**WARNING****Warning against personal injury!**

Indicates a moderate-risk, potentially hazardous situation which, if not avoided, could result in death or serious injury.

**CAUTION****Warning against personal injury!**

Indicates a low-risk, potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

**NOTICE****Warning: Damage to property!**

Indicates a potentially hazardous situation which, if not avoided, may result in damage to property.

**ESD****Warning: Damage to property caused by electrostatic discharge (ESD)!**

Indicates a potentially hazardous situation which, if not avoided, may result in damage to property.

**Note****Important note!**

Indicates a potential malfunction but one which will not result in damage to property if not avoided.

**Information****Additional information**

Refers to additional information which is not an integral part of this documentation (e.g., the Internet).

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The sample applications described in this documentation represent concepts, that is, technically feasible applications. Whether these concepts can actually be implemented depends on various guidelines. For example, different versions of the hardware or software components can require different handling than that described here. Therefore, the descriptions contained in this documentation do not form the basis for assertion of a certain product characteristic.

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# 1 Communication

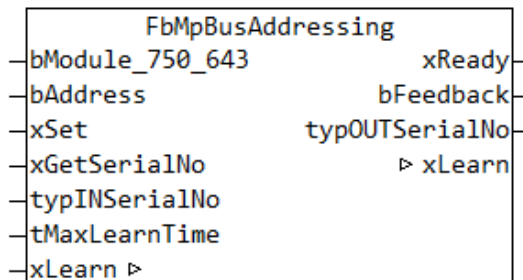
## 1.1 Master (FbMpbusMaster\_750\_643)

WAGO-I/O-PRO Library Elements			
Category:		Building technology	
Name:		FbMpbusMaster_750_643	
Type:		Function <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
Name of library:		MpBus_03.lib	
Applicable to:		See Release Note	
Input parameter:		Data type:	Comment:
bModule_750_643		BYTE	Specifies which MP-Bus Master Module is to be addressed at the controller; counting is from left to right.
Return value:		Data type:	Comment:
bFeedback		BYTE	Status feedback output
Graphical illustration:			
<div><div>FbMpbusMaster_750_643</div><div><div>bModule_750_643</div><div>bFeedback</div></div></div>			
Function description:			
<p>The <b>FbMpbusMaster_750_643</b> function block is used for communication with the 750-643 MB-Bus Module for all controllers.</p> <p>It detects all queued commands of the additional MP-Bus modules currently in the program and ensures their execution.</p> <p>To address the function block to the required MP-Bus module, the corresponding module index must be entered as a constant at the “<b>bModule_750_643</b>” input. The controller detects the connected MP-Bus modules independently and counts them starting with 1 from the left.</p> <p>The “<b>bFeedback</b>” output reads out the status for diagnostic purposes.</p>			

## 1.2 Addressing (FbMpBusAddressing)

WAGO-I/O-PRO Library Elements			
Category:		Building technology	
Name:		FbMpBusAddressing	
Type:		Function <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
Name of library:		MpBus_03.lib	
Applicable to:		See Release Note	
Input parameter:		Data type:	Comment:
bModule_750_643		BYTE	Specifies which MP-Bus Master Module is to be addressed at the controller; counting is from left to right.
bAddress		BYTE	Slave address Value range 1 ... 8 (16)
xSet		BOOL	A rising edge at this input starts the addressing via the input of the serial number.
xGetSerialNo		BOOL	A rising edge at this input initiates reading of the serial number.
typINSerialNo		typSerialNo	The serial number of the slave to be addressed consists of the following parts:
wYearAndWeek		WORD	Year and week
wDayAndNumber		WORD	Day and sequential number
bTypeID		BYTE	Identification of the device family
bTestStation		BYTE	Test station
tMaxLearnTime		TIME	Maximum duration of the learning mode. Default setting = t#120s
Input/output parameters:		Data type:	Comment:
xLearn		BOOL	A TRUE signal at this input causes the function module to wait for the service pin message from a slave.
Return value:		Data type:	Comment:
xReady		BOOL	Status of the communication TRUE = communication complete FALSE = active communication with a slave
bFeedback		BYTE	Output error code: See table in the appendix
typOUTSerialNo		typSerialNo	Output of the serial number received



**Graphical illustration:****Function description:**

The connected MP-Bus drive is assigned a unique MP-Bus address by using the **“FbMpBusAddressing”** function module. The addressing can be performed in two different ways.

**MP-Bus addressing type 1****(semi-automatic addressing by activating the service pin):**

The desired MP participant address is entered at the **“bAddress”** input.

Switch the **“xLearn”** input to the TRUE signal, so that the module goes into learning mode. Then trigger the signal at the MP-Bus drive for sending the device ID (see operating instructions for the drives). If the address assignment was successful, the **“xLearn”** input is reset by the module.

If no service pin is activated at one of the connected drives within the parameterizable time **“tMaxLearnTime”** or if communication is interrupted, the learning mode is automatically exited and an error message is output at the **“bFeedback”** output.

**MP-Bus addressing type 2****(addressing via manual entry of the serial number):**

The desired MP-Bus address is entered at the **“bAddress”** input.

The serial number of the drive to be addressed is entered at the **“typINSerialNumber”** input (serial number is on the drive's name plate).

A rising edge at the **“xSet”** input triggers the command for addressing the drive via the specified serial number. If the command is not correctly acknowledged by the slave, an error message is output at the **“bFeedback”** output.

A rising edge at the **“GetSerialNo”** input starts the query command for the serial number. The query is directed at the drive with the address specified at the input **“bAddress”**. The queried serial number is displayed at the **“typOUTSerialNo”** output.

The **“xReady”** output signal indicates whether the function block has completed the transmission process or if it is still actively connected to one of the slaves.

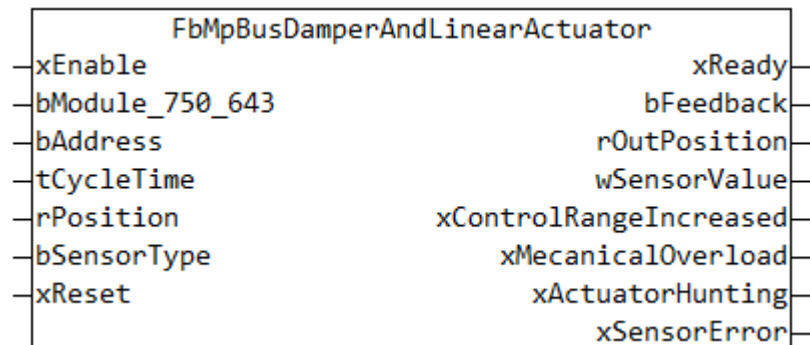
To address the function block to the required MP-Bus module, the corresponding module index must be entered as a constant at the **“bModule\_750\_643”** input. The controller detects the connected MP-Bus modules independently and counts them starting with 1 from the left.

## 2 Actuators

### 2.1 Damper/Linear Actuator (FbMpBusDamperAndLinearActuator)

WAGO-I/O-PRO Library Elements			
Category:		Building technology	
Name:		FbMpBusDamperAndLinearActuator	
Type:		Function <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
Name of library:		MpBus_03.lib	
Applicable to:		See Release Note	
Input parameter:		Data type:	Comment:
xEnable		BOOL	A TRUE signal at this input starts the transmission process.
bModule_750_643		BYTE	Specifies which MP-Bus Master module is to be addressed at the controller. Counting is from left to right.
tCycleTime		TIME	Time for cyclical query of the drive Value range t#1s – t#60s Default setting = t#5s
bAddress		BYTE	Slave address value range 1 ... 8
rPosition		REAL	Input actuating signal Value range 0 ... 100 [%]
bSensorType		BYTE	The parameter value at this input specifies the sensor type used: 0 = no sensor connected 1 = switch (0/1) 2 = active sensor signal 0 to 32 V 3 = PT1000, 850 ... 1600 Ohm 4 = Ni1000, 850 ... 1600 Ohm 5 = Ni1000 L&S, 850 ... 1600 Ohm 6 = NTC, 100 ... 60000 Ohm
xReset		BOOL	A rising edge resets the error message from the MP-Bus drive.
Return value:		Data type:	Comment:
xReady		BOOL	Communication status TRUE = communication complete FALSE = active communication with a slave
bFeedback		BYTE	Output error code See table in the appendix
rOutPosition		REAL	Actual drive position [%]
wSensorValue		WORD	Output signal of the sensor [raw value]
xControlRangeIncreased		BOOL	Error message control range increased
xMechanicalOverload		BOOL	Error message mechanical overload

xActuatorHunting	BOOL	Error in regulation behavior: drive oscillates here and there
xSensorError	BOOL	Error, sensor signal is outside of the value range.

**Graphical illustration:****Function description:**

This module serves to query and control the rotary damper and linear actuator with MP-bus interface from BELIMO (e.g., NM, AM, GM, LF, AF, NV, AV, NVS, AVS).

A rising edge at the “**xEnable**” input starts the transmission and query process at the drive addressed via the “**bAddress**” input. If the input signal “**xEnable**” is permanently switched to the TRUE signal, then communication occurs cyclically. The “**tCycleTime**” input parameter determines the cycle time.

The setpoint for the rotational angle of the damper or for the stroke of the valve drive is specified by the “**rPosition**” input value and sent to the drive. The current position of the drive is read by the function block and provided at the “**rOutPosition**” output.

Since most MP-Bus drives support the connection to multiple types of sensors, the sensor type must be communicated to the module via the “**bSensorType**” input.

The sensor value read is displayed at the “**wSensorValue**” output.

The switch status (sensor type 1) is evaluated as follows:

1 : open  
0 : closed

For active sensors (0 – 32 V), the measurement value is depicted as follows:  
“**wSensorValue**” 0 – 32000 mV.

The following auxiliary functions can be used for temperature sensors:

**Fu\_Ni1000** (-25 ... 95 °C)  
**Fu\_Ni1000\_LuS** (-30 ... 115 °C)  
**Fu\_NTC5K** (-20 ... 145 °C)  
**Fu\_Pt1000** (-35 ... 155 °C)

The functions are components of the MpBus\_03.lib.

The output signal “**xReady**” indicates whether the function block has completed the transmission process or if it is still connected to one of the slaves.

Communication errors with the drive in question are displayed at the **“bfeedback”** output. If the module detects a fault (e.g., range exceeded) of the sensor signal, then the **“xSensorError”** output signal is set to the TRUE signal.

Three possible error states of the actuator are indicated via separate outputs at the function module. These concern the following errors:

- (1) TRUE signal at the **“xControlRangeIncreased”** output indicates that the control range of the drive has increased or that the end position has been exceeded.
- (2) TRUE signal at the **“MechanicalOverload”** output means that the required target position could not be reached, e.g., due to mechanical overload.
- (3) TRUE signal at the **“xActuatorHunting”** output indicates that there are control oscillations. In this state, the control signal of the drive oscillates back and forth.

A rising edge at the **“xReset”** input resets the error messages.

To address the function block to the required MP-Bus module, the corresponding module index must be entered as a constant at the **“bModule\_750\_643”** input. The controller detects the connected MP-Bus modules independently and counts them starting with 1 from the left.

**Note:** The **“xActuatorHunting”** error message can only be permanently cleared by resetting the internal operating hours counter for the drive. This reset is possible if the relationship between runtime and total operating time does not exceed a particular value.

## 2.2 Rotary Drive Zones (FbMpBusDamperAndValveActuator\_MPL)

WAGO-I/O-PRO Library Elements			
Category:		Building technology	
Name:		FbMpBusDamperAndValveActuator_MPL	
Type:		Function <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
Name of library:		MpBus_03.lib	
Applicable to:		See Release Note	
Input parameter:		Data type:	Comment:
xEnable		BOOL	A TRUE signal at this input starts the transmission process.
bModule_750_643		BYTE	Specifies which MP-Bus Master Module is to be addressed at the controller; counting is from left to right.
bAddress		BYTE	Slave address value range 1 ... 8 (16)
tCycleTime		TIME	Time for cyclical query of the drive Value range t#1s ... t#60s Default: t#5s
rPosition		REAL	Control input Value range 0 ... 100 [%]
Return value:		Data type:	Comment:
xReady		BOOL	Communication status TRUE = communication complete FALSE = active communication with a slave
bFeedback		BYTE	Output error code See table in the appendix
rOutPosition		REAL	Actual drive position [%]
Graphical illustration:			
<div><div>FbMpBusDamperAndValveActuator_MPL</div><div><div>xEnable</div><div>bModule_750_643</div><div>bAddress</div><div>tCycleTime</div><div>rPosition</div></div><div><div>xReady</div><div>bFeedback</div><div>rOutPosition</div></div></div>			

**Function description:**

This module serves to query and control the rotary drive zone using the MP-bus interface from BELIMO (e.g., CQ24A).

A rising edge at the **“xEnable”** input starts the transmission and query process at the drive addressed via the **“bAddress”** input. If the **“xEnable”** input signal is permanently switched to the TRUE signal, then communication occurs cyclically. The **“tCycleTime”** input parameter determines the cycle time.

The setpoint for the rotational angle is specified by the **“rPosition”** input value and sent to the drive. The current position of the drive is read by the function block and provided at the **“rOutPosition”** output.

The output signal **“xReady”** indicates whether the function block has completed the transmission process or if it is still connected to one of the slaves.

**Note:** When using MPL valve actuators exclusively, up to 16 of the devices can be operated on the MP-Bus Master (750-643). The MpBus\_03.lib library, Version V2.8 or higher must be used.

## 2.3 Control Ball Valve with Energy Monitoring (FbMpBusEnergyValve)

WAGO-I/O-PRO Library Elements			
Category:		Building technology	
Name:		FbMpBusEnergyValve	
Type:		Function <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
Name of library:		MpBus_03.lib	
Applicable to:		See Release Note	
Input parameter:		Data type:	Comment:
xEnable		BOOL	A TRUE signal at this input starts the transmission process.
bModule_750_643		BYTE	Specifies which MP-Bus Master Module is to be addressed at the controller; counting is from left to right.
bAddress		BYTE	Slave address value range 1 ... 8
tCycleTime		TIME	Time for cyclical query of the drive Value range t#1s ... t#60s Default: t#5s
rSetRelativeSetpoint		REAL	Relative setpoint default [%]
bSetOverride		BYTE	Manual operation Value range: 1 ... 6
Return value:		Data type:	Comment:
xReady		BOOL	Communication status TRUE = communication complete FALSE = active communication with a slave
bFeedback		BYTE	Output error code See table in the appendix
rRelativeSetpoint		REAL	Actual value [%]
bOverride		BYTE	Override operation
rRelativePosition		REAL	Valve position [%]
rAbsolutePosition		REAL	Valve opening angle [°]
rRelativeFlow		REAL	Flow rate difference [%]
rAbsoluteFlow		REAL	Flow rate [l/min]
rTemperature1		REAL	Return temperature [°C]
rTemperature2		REAL	Supply temperature [°C]
rDeltaTemperature		REAL	Temperature difference [°C]
rPower		REAL	Output [kW]
rCoolingEnergy		REAL	Cooling energy [kWh]
rHeatingEnergy		REAL	Heating energy [kWh]
xTemperatureSensorT1_Error		BOOL	Return temperature sensor unavailable/short circuit/broken
xTemperatureSensorT2_Error		BOOL	Supply temperature sensor unavailable/short circuit/broken
xFlowSensorError		BOOL	Flow sensor error

WAGO-I/O-PRO Library Elements		
xMechanicalOverload	BOOL	Mechanical overload
<b>Graphical illustration:</b>		
<div style="border: 1px solid black; padding: 10px; margin: 10px;"> <div style="text-align: center; font-weight: bold;">FbMpBusEnergyValve</div> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>—xEnable</p> <p>—bModule_750_643</p> <p>—bAddress</p> <p>—tCycleTime</p> <p>—rSetRelativeSetpoint</p> <p>—bSetOverride</p> </div> <div style="width: 45%; text-align: right;"> <p>—xReady</p> <p>—bFeedback</p> <p>—rRelativeSetpoint</p> <p>—bOverride</p> <p>—rRelativePosition</p> <p>—rAbsolutePosition</p> <p>—rRelativeFlow</p> <p>—rAbsoluteFlow</p> <p>—rTemperature1</p> <p>—rTemperature2</p> <p>—rDeltaTemperature</p> <p>—rPower</p> <p>—rCoolingEnergy</p> <p>—rHeatingEnergy</p> <p>—xTemperatureSensorT1_Error</p> <p>—xTemperatureSensorT2_Error</p> <p>—xFlowSensorError</p> <p>—xMechanicalOverload</p> </div> </div> </div>		



#### Function description:

This module serves to query and control the control ball valve using the MP-bus interface from BELIMO (e.g., P6..EV).

A rising edge at the **“xEnable”** input starts the transmission and query process at the control ball valve addressed via the **“bAddress”** input. If the input signal **“xEnable”** is permanently switched to the TRUE signal, then communication occurs cyclically. The **“tCycleTime”** input parameter determines the cycle time.

The setpoint for the rotational angle or for the flow rate is specified by the **“rSetRelativeSetpoint”** input value and sent to the control ball valve.

The actual position of the control ball valve is read by the function block and provided at the **“rRelativePosition”** output. The **“rAbsolutePosition”** output shows the current opening angle of the valve.

The flow rate of the valve can be read at the **“rAbsoluteFlow”** output. The **“rAbsoluteFlow”** output shows the flow rate difference as a percentage value.

The control ball valve can be controlled in manual operation at the **“bSetOverride”** output. The current control signal can be over-ridden using manual operation. The value range for **“bSetOverride”** is documented in the data sheet (Data Pool Values) of the BELIMO drive.

#### Example:

- **“bSetOverride”** = “1” -> Auto: no manual override.
- **“bSetOverride”** = “2” -> Open: valve is closed.
- **“bSetOverride”** = “3” -> Open: valve is opened completely.
- **“bSetOverride”** = “6” -> Stop: the drive continues in the current position.

The **“rDeltaTemperature”** output indicates the temperature difference between the return temperature **“rTemperature1”** and the supply temperature **“rTemperature2”**.

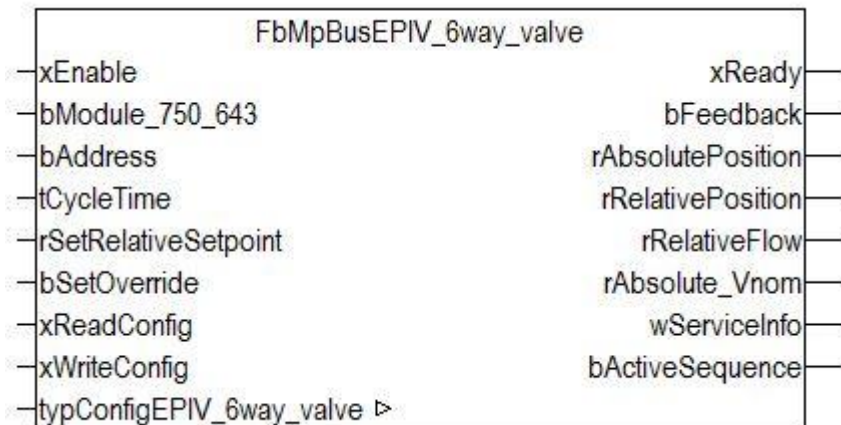
The power consumed is indicated at the **“rPower”** output. The heating/cooling energy consumed is indicated at the **“rHeatingEnergy”** or the **“rCoolingEnergy”** output.

Displays of the current error messages are indicated at the **“xTemperatureSensorT1\_Error”**, **“xTemperatureSensorT2\_Error”**, **“xFlowSensorError”** and **“xMechanicalOverload”** outputs.

The **“xReady”** output signal indicates whether the function block has completed the transmission process or if it is still actively connected to one of the slaves.

## 2.4 6-way EPIV (FbMpBusEPIV\_6way\_valve)

WAGO-I/O-PRO Library Elements			
Category:		Building technology	
Name:		FbMpBusEPIV_6way_valve	
Type:		Function <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
Name of library:		MpBus_03.lib	
Applicable to:		See Release Note	
Input parameter:		Data type:	Comment:
xEnable		BOOL	A TRUE signal at this input starts the transmission process.
bModule_750_643		BYTE	Specifies which MP-Bus Master Module is to be addressed at the controller; counting is from left to right.
bAddress		BYTE	Slave address value range 1 ... 8
tCycleTime		TIME	Time for cyclical query of the drive Value range t#1s ... t#60s Default: t#5s
rSetRelativeSetpoint		REAL	Relative setpoint default [%]
bSetOverride		BYTE	Manual operation Value range: 0 ... 5
xReadConfig		BOOL	A rising edge initiates reading out of the configuration parameters.
xWriteConfig		BOOL	A rising edge initiates writing of the configuration parameters.
Input/output parameters:		Data type:	Comment:
typConfigEPIV_6way_valve		typConfigEPIV_6way_valve	Configuration parameters
. rVmax_Seq_1		REAL	Vmax sequence 1 Value range 0 ... 100 [%]
. rVmax_Seq_2		REAL	Vmax sequence 2 Value range 0 ... 100 [%]
Return value:		Data type:	Comment:
xReady		BOOL	Communication status TRUE = communication complete FALSE = active communication with a slave
bFeedback		BYTE	Output error code See table in the appendix
rAbsolutePosition		REAL	Absolute Position [°]
rRelativePosition		REAL	Relative Position [%]
rRelativeFlow		REAL	Relative Flow Rate [%]
rAbsolute_Vnom		REAL	Nominal Flow Rate [l/h]

WAGO-I/O-PRO Library Elements		
wServiceInfo	WORD	Status- und Serviceinformation:  Bit00 (1) = Bit01 (2) = Bit02 (4) = Error flow Sensor Bit03 (8) = Actuator can't move Bit04 (16) = Flow with closed valve Bit05 (32) = Airbubbles Bit06 (64) = Flow not reached Bit07 (128) = Bit08 (256) = Bit09 (512) = Gear disengaged Bit10 (1024) = Bit11 (2048) =
bActiveSequence	BYTE	Active sequence 0=Sequence1 (0..33%) 1=Sequence2 (66..100 %) 2=Dead zone (34..65%)
Graphical illustration:		
		
Function description:		
<p>The module is used to query and control an EPIV (<u>E</u>lectronic <u>P</u>ressure-<u>I</u>ndependent <u>V</u>alve) 6-way zone valve using the MP-Bus interface from BELIMO (e.g., type EP015R-R6+BAC)).</p> <p>A rising edge at the <b>“xEnable”</b> input starts the transmission and query process at the zone valve addressed at the <b>“bAddress”</b> input. If the input signal <b>“xEnable”</b> is permanently switched to the TRUE signal, then communication occurs cyclically. The <b>“tCycleTime”</b> input parameter determines the cycle time.</p> <p>The relative setpoint is specified at the <b>“rSetRelativeSetpoint”</b> input.</p> <p>Manual override is possible by the value at the <b>“bSetOverride”</b> input. The value range for <b>“bSetOverride”</b> is documented in the data sheet (Data Pool Values) of the BELIMO drive.</p>		

**WAGO-I/O-PRO Library Elements**

The following values can be used:

- **"bSetOverride"="0"** -> Auto: no manual override.
- **"bSetOverride"="1"** -> Sequence 1 valve opened (Pos. 0 %)
- **"bSetOverride"="2"** -> Sequence 2 valve opened (Pos. 100 %)
- **"bSetOverride"="3"** -> Valve closed (Pos. 50 %)
- **"bSetOverride"="4"** -> Sequence 1 Vmax
- **"bSetOverride"="5"** -> Sequence 2 Vmax

A rising edge at the **"xReadConfig"** input causes a readout of the configuration parameters. The read values are written to the linked variable at the **"typConfigEPIV\_6way\_valve"** input. The values of the configuration parameters are written to the zone valve by a rising edge at the **"xWriteConfig"** input.

The module returns the following return values for the zone valve:

- Absolute position of the drive in [°] (**"rAbsolutePosition"**)
- Relative position of the drive in [%] (**"rRelativePosition"**)
- Relative flow rate in [%] from Vmax (Vmax1 or Vmax2) (**"rRelativeFlow"**)
- Nominal volume in [l/h] (**"rAbsolute\_Vnom"**)
- Status information of the zone valve (**"wServiceInfo"**)
- Display of the active sequence (**"bActiveSequence"**)

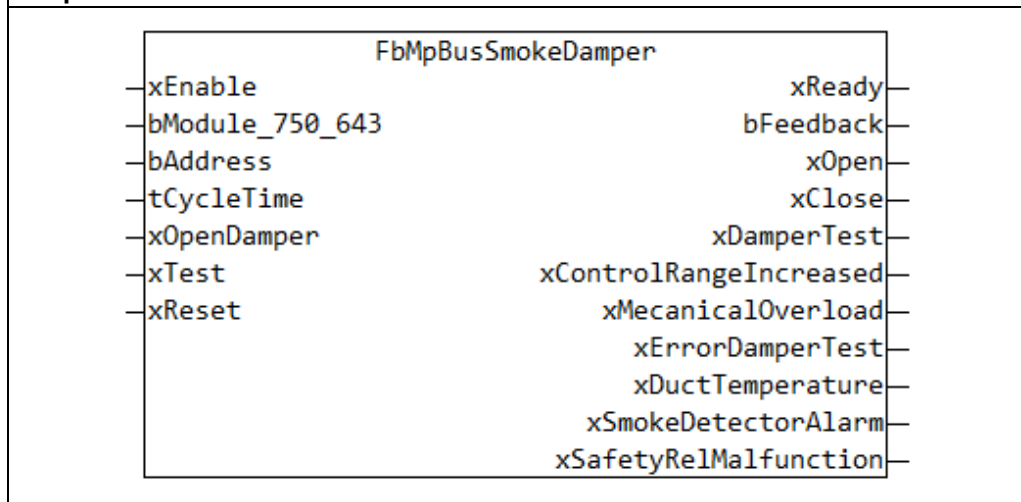
The **"xReady"** output signal indicates whether the function block has completed the transmission process or if it is still actively connected to one of the slaves.

## 2.5 Smoke and Fire Protection Damper (FbMpBusSmokeDamper)

**Note:** in Switzerland, there are no safety regulations for fire protection dampers. If the MP-Bus Master module is used for this application outside of Switzerland, it cannot be used in a way that it is essential to safety.

WAGO-I/O-PRO V2.3 Library Elements			
Category:		Building technology	
Name:		FbMpBusSmokeDamper	
Type:		Function <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
Name of library:		MpBus_03.lib	
Applicable to:		See Release Note	
Input parameter:		Data type:	Comment:
bModule_750_643		BYTE	Specifies which MP-Bus Master Module is to be addressed at the controller; counting is from left to right.
xEnable		BOOL	A TRUE signal at this input starts the transmission process.
tCycleTime		TIME	Time for cyclical query of the drive Value range 1 s ... 30 s Default setting = t#1s
bAddress		BYTE	Slave address value range 1 ... 8
xOpenDamper		BOOL	Signal for opening and closing the fire protection damper. FALSE = closed TRUE = open
xTest		BOOL	Start of the fire protection test run
xReset		BOOL	A rising edge resets the initial error message.
Return value:		Data type:	Comment:
xReady		BOOL	Status of the communication TRUE = communication complete FALSE = active communication
bFeedback		BYTE	Output error code See table in the appendix
xOpen		BOOL	The fire protection damper is open.
xClose		BOOL	The fire protection damper is closed.
xDamperTest		BOOL	Test run fire protection damper active
xControlRangeIncreased		BOOL	Error message: "control range increased" The stored control angle was exceeded by more than 10 %.

xMechanicalOverload	BOOL	Error message "mechanical overload"
xErrorDamperTest	BOOL	Damper error detected during periodic test of the fire protection damper
xDuctTemperature	BOOL	Channel interior temperature (72 °C) has been exceeded.
xSmokeDetectorAlarm	BOOL	External smoke sensor has triggered alarm.
xSafetyRelMalfunction	BOOL	Safety-relevant fault

**Graphical illustration:**

**Function description:**

This module handles the query and control of the BELIMO smoke and fire protection drives with spring return (e.g., BF24TL).

A rising edge at the **“xEnable”** input starts the transmission and query process at the drive addressed via the **“bAddress”** input. If the **“xEnable”** input signal is permanently switched to the TRUE signal, then communication occurs cyclically. The **“tCycleTime”** input parameter determines the cycle time.

The **“xOpenDamper”** input signal controls the opening and closing of the fire protection damper. The TRUE signal at the **“xOpenDamper”** input causes the drive to open the damper by means of the override function. In this case, the drive runs until it reaches the adapted end position or **“Override 100 %”** (runtime 140 s).

Due to an increasing slope on the input **“xTest,”** the fire protection damper test run is carried out. The test includes passing through the entire angle range of the damper from the lower to the upper end stop. If the damper does not reach the end position within a nominal runtime, a **“xMechanicalOverload”** error message appears.

Via the output **“xDamperTest”** there is an indication of whether the fire protection damper test run is currently active.

The **“xOpen”** and **“xClose”** outputs indicate whether the drive is in the open or closed position.

The **“xReady”** output signal indicates whether the function block has completed the transmission process or if it is still actively connected to one of the slaves.

Communication errors with the drive in question are displayed at the **“bfeedback”** output.

A rising edge at the **“xReset”** input resets the error messages.

To address the function block to the required MP-Bus module, the corresponding module index must be entered as a constant at the **“bModule\_750\_643”** input. The controller detects the connected MP-Bus modules independently and counts them starting with 1 from the left.

The drive for the fire protection damper monitors the following error states, which are signaled by the controller:

- (1) **“xControlRangeIncreased”** indicates that the drive angle of rotation has been exceeded by more than 10° (e.g., in case of linkage break). As soon as the stop is in the correct location again, the error message is deleted.
- (2) **“xMechanicalOverload”** indicates that the angle of rotation is smaller with respect to the adaptation (e.g., obstacle in the damper or stuck damper). This error also occurs if the drive's mechanical end switch does not close in the closed position.
- (3) **“xErrorDamperTest”** indicates a “damper operability error”; if the damper is in the open position, then the drive moves the valve slowly every 24 hours, i.e., with spring force and motor brake once 7 seconds back and then open again using motor force. If the drive achieves less than a 5° angle change during this time, an error message is generated.

**Note:** *the damper mobility test is started every 24 hours. The error message is automatically deleted following the next successful test run.*

- (4) **“xDuctTemperature”** indicates the fault that the internal duct temperature is too high. Internal duct temperature > 72°C. The thermoelectric trigger mechanism in the channel has been triggered. Only after changing out the channel temperature fuse can this fault be acknowledged.
- (5) **“xSmokeDetectorAlarm”** indicates a smoke detector alarm  
The fire detector contact of the (optionally) closed smoke detector has opened.
- (6) **“xSafetyRelMalfunction”** indicates a safety-related malfunction  
An ambient operating temperature > 72°C or a motor temperature > 85°C triggers this fault message. The drive is then moved into the “emergency” position. The message can only be reset in the factory by BELIMO.

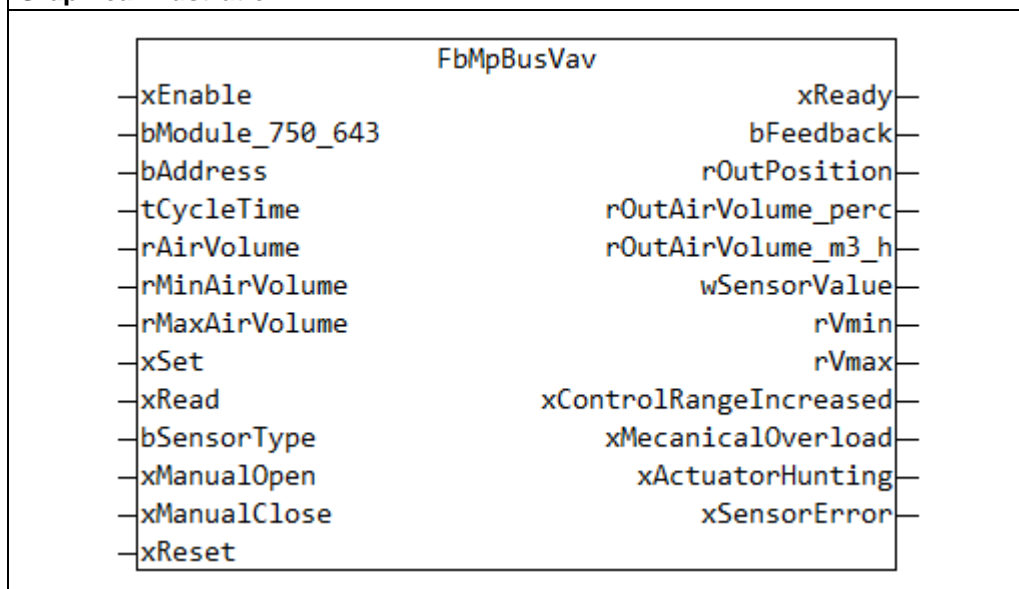
**Note:** For safety reasons, a timeout monitoring is implemented in the drives for the fire protection dampers. *If the function module sends an override command to the drive, the bus monitoring in the drive is activated. At this point, if the drive does not receive a command from the function module within 60 seconds, it closes. When communication is re-established, the setpoint of the controller applies once again.*



## 2.6 VAV und 2-way EPIV (FbMpBusVav)

WAGO-I/O-PRO V2.3 Library Elements			
Category:		Building technology	
Name:		FbMpBusVav	
Type:		Function <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
Name of library:		MpBus_03.lib	
Applicable to:		See Release Note	
Input parameter:	Data type:	Comment:	
xEnable	BOOL	A TRUE signal at this input starts the transmission process.	
bModule_750_643	BYTE	Specifies which MP-Bus Master Module is to be addressed at the controller; counting is from left to right.	
tCycleTime	TIME	Time for cyclical query of the drive Value range 1 s ... 60 s Default setting = t#5s	
bAddress	BYTE	Slave address value range 1 ... 8	
rAirVolume	REAL	Input target value volume flow Value range 0 ... 100 [%]	
rMinAirVolume	REAL	Minimum limit volume flow Value range 0 ... 100 [%] of V <sub>max</sub>	
rMaxAirVolume	REAL	Maximum limit volume flow Value range 20 ... 100 [%] of V <sub>nom</sub> (nominal volume flow) Default setting = 30	
xSet	BOOL	A rising edge triggers transmission of the parameter values for V <sub>min</sub> and V <sub>max</sub> .	
xRead	BOOL	A rising edge triggers the reading of the parameter values.	
bSensorType	BYTE	The parameter value at this input specifies the sensor type used: 0 = no sensor connected 1 = switch (0/1) 2 = active sensor signal 0 to 32 V 3 = PT1000, 850 ... 1600 Ohm 4 = Ni1000, 850 ... 1600 Ohm 5 = Ni1000 L&S, 850 ... 1600 Ohm 6 = NTC, 100 ... 60000 Ohm	
xManualOpen	BOOL	Override control OPEN Manual control of the drive position OPEN	
xManualClose	BOOL	Override control CLOSED Manual control of the drive position CLOSED	
xReset	BOOL	A rising edge resets the error message from the MP-Bus drive.	

Return value:	Data type:	Comment:
xReady	BOOL	Status of the communication TRUE = communication complete FALSE = active communication with a slave
bFeedback	BYTE	Output error code See table in the appendix
rOutPosition	REAL	Actual drive position [%]
rOutAirVolume_perc	REAL	Actual value volume flow [%]
rOutAirVolume_m3_h	REAL	Current volume flow [m³/h]
wSensorValue	WORD	Output signal of the sensor [mVolt] Value range 0 ... 32000
rVmin	REAL	Feedback parameter Minimal volume flow [%]
rVmax	REAL	Feedback parameter Maximum volume flow [%]
xControlRangeIncreased	BOOL	Error message: "control range increased" The saved control angle was exceeded by more than 10 %.
xMechanicalOverload	BOOL	Error message mechanical overload
xActuatorHunting	BOOL	Error in regulation behavior Drive oscillates back and forth.
xSensorError	BOOL	Error, sensor signal is outside of the value range.

**Graphical illustration:**

#### Function description:

This module handles the query and control of the BELIMO VAV regulator (e.g., NMV-D2M).

A rising edge at the **"xEnable"** input starts the transmission and query process at the drive addressed via the **"bAddress"** input. If the input signal **"xEnable"** is permanently switched to the TRUE signal, then communication occurs cyclically. The **"tCycleTime"** input parameter determines the cycle time.

The setpoint for the volume quantity is specified via the value of the **"rAirVolume"** input. The volume flow quantity can be limited using the two input parameters **"rMinAirVolume"** ( $V_{\min}$ ) and **"rMaxAirVolume"** ( $V_{\max}$ ).

The minimum limitation " $V_{\min}$ " is specified depending on the value of the maximum limitation " $V_{\max}$ ". The value for the maximum limitation is specified depending on the nominal volume flow ( $V_{\text{nom}}$ ). The nominal volume flow is specified by the box manufacturer.

A rising edge signal at the **"xSet"** input causes the transmission of the **"rMinAirVolume"** and **"rMaxAirVolume"** values to the drive. A rising edge at the **"xRead"** input causes the reading of these values from the drive. They are available at the module as output variables **"rVmin"** and **"rVmax"**.

The current position of the drive **"rOutPosition"** and the actual value of the volume flow in percent **"rOutAirVolume\_perc"** (with respect to the nominal volume of the volume flow regulator) are read out of the function block and displayed. Another important variable that is read out of the drive regulator is the current volume flow in  $\text{m}^3/\text{h}$  **"rOutAirVolume\_m3\_h"**. This value depends on the nominal volume flow, which is stored in the device as a parameter.

Since most BELIMO drives support connection to multiple types of sensors, the sensor type must be communicated to the module via the **"bSensorType"** input.

The sensor value read is displayed at the **"wSensorValue"** output.

The switch status (sensor type 1) is evaluated as follows:

1 : open  
0 : closed

For active sensors (0 ... 32 V), the measurement value is depicted as follows:  
**"wSensorValue"** 0 ... 32000 mV.

The following auxiliary functions can be used for temperature sensors:

**Fu\_Ni1000** (-25 ... 95 °C)  
**Fu\_Nil1000\_LuS** (-30 ... 115 °C)  
**Fu\_NTC5K** (-20 ... 145 °C)  
**Fu\_Pt1000** (-35 ... 155 °C)

The functions are components of the MpBus\_03.lib.

Three possible error states of the actuator are indicated via separate outputs at the function module. These concern the following errors:

- (1) TRUE signal at the **“xControlRangeIncreased”** output indicates that the control range of the drive has increased or that the end position has been exceeded.
- (2) TRUE signal at the **“xMechanicalOverload”** output means that the required target position could not be reached, e.g., due to mechanical overload.
- (3) TRUE signal at the **“xActuatorHunting”** output indicates that there are control oscillations. In this state, the control signal of the drive oscillates back and forth.

The **“xReady”** output signal indicates whether the function block has completed the transmission process or if it is still actively connected to one of the slaves.

Communication errors with the drive in question are displayed at the **“bfeedback”** output. If the module detects a fault (e.g., range exceeded) of the sensor signal, then the **“xSensorError”** output signal is set to the TRUE signal.

A rising edge at the **“xReset”** input resets the error messages.

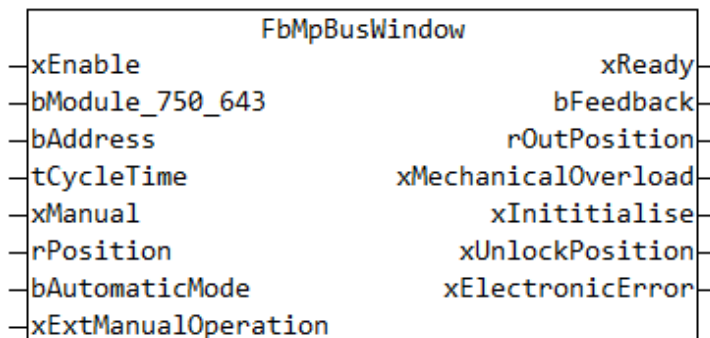
It is possible to override the input setpoint for the volume flow using the **“xManualOpen”** and **“xManualClose”** input signals and to move the drive into the open or closed position using the so-called override control.

To address the function block to the required MP-Bus module, the corresponding module index must be entered as a constant at the **“bModule\_750\_643”** input. The controller detects the connected MP-Bus modules independently and counts them starting with 1 from the left.

## 2.7 Window Ventilation System (FLS) (FbMpBusWindow)

WAGO-I/O-PRO V2.3 Library Elements		
Category:	Building technology	
Name:	FbMpBusWindow	
Type:	Function <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
Name of library:	MpBus_03.lib	
Applicable to:	See Release Note	
Input parameter:	Data type:	Comment:
xEnable	BOOL	A TRUE signal at this input starts the transmission process.
bModule_750_643	BYTE	Specifies which MP-Bus Master Module is to be addressed at the controller; counting is from left to right.
tCycleTime	TIME	Time for cyclical query of the drive Value range 1 s ... 60 s Default setting = t#5s
bAddress	BYTE	Slave address Value range 1 ... 8
xManual	BOOL	If TRUE, then the “bAutomaticMode” input applies. If FALSE, then the “rPosition” input applies.
rPosition	REAL	Position for override control [%] (sensors off) Possible positions: 0, 10, 20, 40, 60, 80 and 100 %
bAutomaticMode	BYTE	Automatic mode (sensors on): 0: “fully automated” 1: “closed” 2: “low ventilation” 3: “medium ventilation” 4: “high ventilation” 5: “open”
xExtManualOperation	BOOL	Activate external operation TRUE = manual operation possible
Return value:	Data type:	Comment:
xReady	BOOL	Status of the communication TRUE = no communication FALSE = active communication
bFeedback	BYTE	Output error code See table in the appendix
rOutPosition	REAL	Actual drive position [%] Possible positions: 0, 10, 20, 40, 60, 80 and 100 %

xMechanicalOverload	BOOL	Error message drive blocked
xInitialise	BOOL	Initialization or unlocking triggered
xUnlockPosition	BOOL	Device in unlock position
xElectronicError	BOOL	Electronic error

**Graphical illustration:****Function Description:**

This function module serves to control the FLS window ventilation system.

A rising edge at the “**xEnable**” input starts the transmission and query process at the drive addressed via the “**bAddress**” input. If the “**xEnable**” input signal is permanently switched to the TRUE signal, then communication occurs cyclically. The “**tCycleTime**” input parameter determines the cycle time.

The “**xManual**” input is used to distinguish between automatic mode and override. If “**xManual**” = TRUE, the control value for “**bAutomaticMode**” is used; otherwise, the value for “**rPosition**” is used. During override, the sensor (rain sensor) is deactivated via “**rPosition**”.

Setpoints for the override:

0...0.9 % → closed  
 1...10.9 % → gap opening  
 11...29.9 % → 20 % open  
 30...49.9 % → 40 % open  
 50...69.9 % → 60 % open  
 70...89.9 % → 80 % open  
 90...100 % → 100 % open

Automatic mode:

0: “fully automated”  
 1: “closed”  
 2: “low ventilation”  
 3: “medium ventilation”  
 4: “high ventilation”  
 5: “open”

The operation of manual switches or remote controls is enabled using the **“xExtManualOperation”** input.

To address the function block to the required MP-Bus module, the corresponding module index must be entered as a constant at the **“bModule\_750\_643”** input. The controller detects the connected MP-Bus modules independently and counts them starting with 1 from the left.

The **“xReady”** output signal indicates whether the function block has completed the transmission process or if it is still actively connected to one of the slaves.

Communication errors with the drive in question are displayed at the **“bfeedback”** output.

The current position of the drive is read by the function block and provided at the **“rOutPosition”** output.

Four possible error states of the FLS are indicated at the function module via separate outputs. These include the following errors:

- (1) TRUE signal at the **“xMechanicalOverload”** output means that the required target position could not be reached, e.g., due to blockage of the window.
- (2) Signal TRUE at the **“xInitialise”** output indicates that the initialization or unlocking was triggered.
- (3) TRUE signal at the **“xUnlockPosition”** output indicates that the FLS is in the unlock position.
- (4) Signal TRUE at the **“xElectronicError”** output means that there is an electronic error and that the drive must be reprogrammed or replaced.

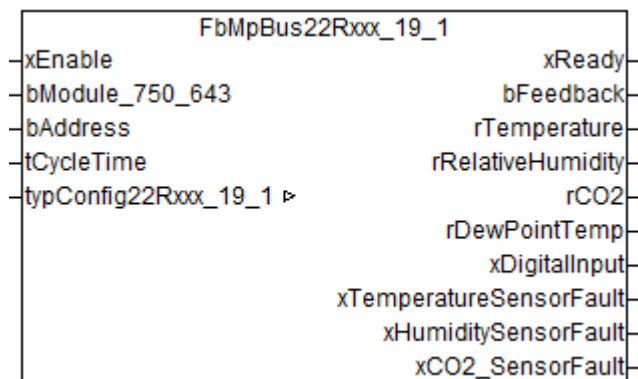
## 3 Sensors

### 3.1 Room-Sensor (FbMpBus22Rxxx\_19\_1)

WAGO-I/O-PRO V2.3 Library Elements			
Category:		Building technology	
Name:		FbMpBus22Rxxx_19_1	
Type:		Function <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
Name of library:		MpBus_03.lib	
Applicable to:		See Release Note	
Input parameter:		Data type:	Comment:
xEnable		BOOL	A TRUE signal at this input starts the transmission process.
bModule_750_643		BYTE	Specifies which MP-Bus Master Module is to be addressed at the controller; counting is from left to right.
tCycleTime		TIME	Time for cyclical query of the drive Value range 1 s ... 30 s Default setting = t#1s
bAddress		BYTE	Slave address value range 1 ... 8
Input/output parameters:		Data type:	Comment:
typConfig22Rxxx_19_1		typConfig22Rxxx_19_1	Configuration parameters
. rOffsetTemperature		REAL	Offset for the temperature sensor
. rOffsetHumidity		REAL	Offset for the humidity sensor
. rOffsetCO2		REAL	Offset for the CO2 sensor
. rOffsetDewPointTemp		REAL	Offset for the Dew point temperature
. bUnitTemperature		BYTE	Temperature unit (0=°C, 1=°F) Default: 0
.bSensorType		BYTE	Profile type of the sensor 2= 22RT-19-1, 3= 22RH-19-1, 4= 22RTM-19-1 Default: 4
. xReadConfig		BOOL	Read configuration parameters
. xWriteConfig		BOOL	Write configuration parameters
Return value:		Data type:	Comment:
xReady		BOOL	Status of the communication TRUE = communication complete FALSE = active communication
bFeedback		BYTE	Output error code See table in the appendix
rTemperature		REAL	Output of the temperature
rRelativeHumidity		REAL	Output of the humidity [%]
rCO2		REAL	Output of the CO2 measurement [ppm]
rDewPointTemp		REAL	Output of the dew point



<b>WAGO-I/O-PRO V2.3 Library Elements</b>		
xDigitalInput	BOOL	Status of the digital input of the room sensor
xTemperatureSensorFault	BOOL	Temperature sensor defective/unavailable
xHumiditySensorFault	BOOL	Humidity sensor defective/unavailable
xCO2_SensorFault	BOOL	CO <sub>2</sub> sensor defective/unavailable

**Graphical illustration:****Function description:**

This module serves to query a room sensor with an MP-bus interface from BELIMO (22R...-19-1) for measuring temperature, humidity and CO<sub>2</sub>.

To address the function block to the required MP-Bus module, the corresponding module index must be entered as a constant at the **"bModule\_750\_643"** input. The controller detects the connected MP-Bus modules independently and counts them starting with 1 from the left.

A rising edge at the **"xEnable"** input starts the transmission and query process at the drive addressed via the **"bAddress"** input. If the **"xEnable"** input signal is permanently switched to the TRUE signal, then communication occurs cyclically. The **"tCycleTime"** input parameter determines the cycle time.

The sensor can be configured with **"typConfig22Rxxx\_19\_1"**.

The temperature value read is displayed at the **"rTemperature"** output.

The current humidity, CO<sub>2</sub>, and dew point of the room are indicated at the **"rRelativeHumidity"**, **"rCO2"**, and **"rDewPointTemp"** outputs respectively.

**"xDigitalInput"** displays the actual status of the digital input of the room sensor.

Three possible error states of the combination sensor are indicated at the outputs:

- **"xTemperatureSensorFault"** indicates that the temperature sensor is defective or unavailable.
- **"xHumiditySensorFault"** indicates that the humidity sensor is defective/unavailable.
- **"xCO2\_SensorFault"** indicates that the CO<sub>2</sub> sensor is defective/unavailable.

The **"xReady"** output signal indicates whether the function block has completed the transmission process or if it is still actively connected to one of the slaves.

Communication errors with the drive in question are displayed at the **"bfeedback"** output.

## 3.2 P-Sensor (FbMpBusP\_Sensor)

WAGO-I/O-PRO V2.3 Library Elements			
Category:		Building technology	
Name:		FbMpBusP_Sensor	
Type:		Function <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
Name of library:		MpBus_03.lib	
Applicable to:		See Release Note	
Input parameter:		Data type:	Comment:
xEnable		BOOL	A TRUE signal at this input starts the transmission process.
bModule_750_643		BYTE	Specifies which MP-Bus Master Module is to be addressed at the controller; counting is from left to right.
tCycleTime		TIME	Time for cyclical query of the drive Value range 1 s ... 30 s Default setting = t#1s
bAddress		BYTE	Slave address value range 1 ... 8
bSensorType		BYTE	Selection of the sensor type used at the Y input: 0 = voltage (0.001 V) 1 = resistance (0.1 Ohm) 2 = switch contact
Return value:		Data type:	Comment:
xReady		BOOL	Status of the communication TRUE = communication complete FALSE = active communication
bFeedback		BYTE	Output error code See table in the appendix
rDifferentialPressure		REAL	Output of the differential pressure [Pa]
wSensorValue		WORD	Output signal of the sensor [raw value]
xMaintenance		BOOL	Maintenance message
xSensorError		BOOL	Fault message (sensor defective)
xErrorPressure		BOOL	AD converter pressure defective
xErrorY_Input		BOOL	AD converter Y input defective
Graphical illustration:			
<div><div>FbMpBusP_Sensor</div><div><div>xEnable</div><div>bModule_750_643</div><div>bAddress</div><div>tCycleTime</div><div>bSensorType</div></div><div><div>xReady</div><div>bFeedback</div><div>rDifferentialPressure</div><div>wSensorValue</div><div>xMaintenance</div><div>xSensorError</div><div>xErrorPressure</div><div>xErrorY_Input</div></div></div>			

**Function description:**

This module serves to query a P sensor for differential pressure measurements.

To address the function block to the required MP-Bus module, the corresponding module index must be entered as a constant at the **"bModule\_750\_643"** input. The controller detects the connected MP-Bus modules independently and counts them starting with 1 from the left.

A rising edge at the **"xEnable"** input starts the transmission and query process at the drive addressed via the **"bAddress"** input. If the **"xEnable"** input signal is permanently switched to the TRUE signal, then communication occurs cyclically. The **"tCycleTime"** input parameter determines the cycle time.

Since the pressure sensor supports connection to multiple types of sensors, the sensor type must be communicated to the module via the **"bSensorType"** input.

0 = Y input measures voltage (in 0.001 V)

1 = Y input measures resistance (in 0.1 Ohm)

2 = Y input for switch contact option

The sensor value read is displayed at the **"wSensorValue"** output.

The differential pressure at the P-sensor is displayed at the **"rDifferentialPressure"** output.

Five possible error states of the sensor are indicated at the outputs:

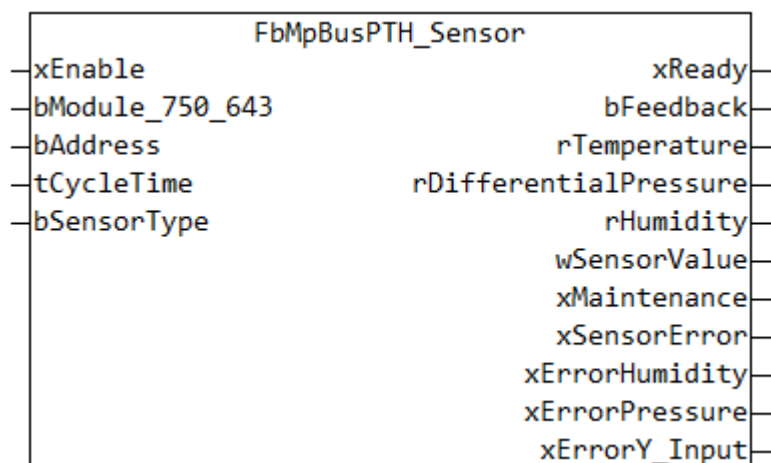
- (1) **"xMaintenance"** indicates a maintenance message from the sensor.
- (2) **"xSensorError"** means that the sensor is defective.
- (3) **"xErrorHumidity"** indicates that the temperature/humidity sensor is defective.
- (4) **"xErrorPressure"** indicates that the AD converter of the pressure sensor is defective.
- (5) **"xErrorY\_Input"** indicates that the AD converter of the Y input is defective.

The **"xReady"** output signal indicates whether the function block has completed the transmission process or if it is still actively connected to one of the slaves.

Communication errors with the drive in question are displayed at the **"bfeedback"** output.

### 3.3 PTH Combination Sensor (FbMpBusPTH\_Sensor)

WAGO-I/O-PRO V2.3 Library Elements			
Category:		Building technology	
Name:		FbMpBusPTH_Sensor	
Type:		Function <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
Name of library:		MpBus_03.lib	
Applicable to:		See Release Note	
Input parameter:		Data type:	Comment:
xEnable		BOOL	A TRUE signal at this input starts the transmission process.
bModule_750_643		BYTE	Specifies which MP-Bus Master Module is to be addressed at the controller; counting is from left to right.
tCycleTime		TIME	Time for cyclical query of the drive Value range 1 s ... 30 s Default setting = t#1s
bAddress		BYTE	Slave address value range 1 ... 8
bSensorType		BYTE	Selection of the sensor type used at the Y input: 0 = voltage (0.001 V) 1 = resistance (0.1 Ohm) 2 = switch contact
Return value:		Data type:	Comment:
xReady		BOOL	Status of the communication TRUE = communication complete FALSE = active communication
bFeedback		BYTE	Output error code See table in the appendix
rTemperature		REAL	Output of the temperature [°C]
rDifferentialPressure		REAL	Output of the differential pressure [Pa]
rHumidity		REAL	Output of the humidity [%RH]
wSensorValue		WORD	Output signal of the sensor [raw value]
xMaintenance		BOOL	Maintenance message
xSensorError		BOOL	Fault message (sensor defective)
xErrorHumidity		BOOL	Sensor (temperature/humidity) defective
xErrorPressure		BOOL	AD converter pressure defective
xErrorY Input		BOOL	AD converter Y input defective

**Graphical illustration:****Function description:**

This module serves to query a PTH combination sensor for differential pressure, temperature and humidity measurements.

A rising edge at the “**xEnable**” input starts the transmission and query process at the drive addressed via the “**bAddress**” input. If the “**xEnable**” input signal is permanently switched to the TRUE signal, then communication occurs cyclically. The “**tCycleTime**” input parameter determines the cycle time.

Since the PTH sensor supports connection to multiple types of sensors, the sensor type must be communicated to the module via the “**bSensorType**” input.

0 = Y input measures voltage (in 0.001 V)

1 = Y input measures resistance (in 0.1 Ohm)

2 = Y input for switch contact option

The sensor value read is displayed at the “**wSensorValue**” output.

The “**xReady**” output signal indicates whether the function block has completed the transmission process or if it is still actively connected to one of the slaves.

Communication errors with the drive in question are displayed at the “**bfeedback**” output.

The current temperature, humidity and differential pressure of the PTH Combination Sensor are displayed at the “**rTemperature**”, “**rHumidity**” and “**rDifferentialPressure**” output.

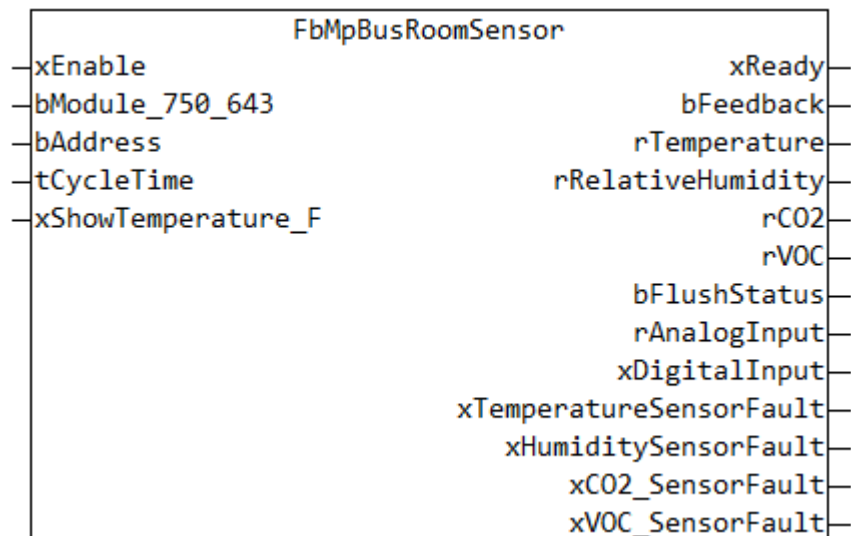
Five possible error states of the sensor are indicated at the outputs:

- (1) “**xMaintenance**” indicates a maintenance message from the sensor.
- (2) “**xSensorError**” means that the sensor is defective.
- (3) “**xErrorHumidity**” indicates that the temperature/humidity sensor is defective.
- (4) “**xErrorPressure**” indicates that the AD converter of the pressure sensor is defective.
- (5) “**xErrorY\_Input**” indicates that the AD converter of the Y input is defective.

To address the function block to the required MP-Bus module, the corresponding module index must be entered as a constant at the “**bModule\_750\_643**” input. The controller detects the connected MP-Bus modules independently and counts them starting with 1 from the left.

### 3.4 Room-Combination-Sensor (FbMpBusRoomSensor)

WAGO-I/O-PRO V2.3 Library Elements			
Category:		Building technology	
Name:		FbMpBusRoomSensor	
Type:		Function <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
Name of library:		MpBus_03.lib	
Applicable to:		See Release Note	
Input parameter:		Data type:	Comment:
xEnable		BOOL	A TRUE signal at this input starts the transmission process.
bModule_750_643		BYTE	Specifies which MP-Bus Master Module is to be addressed at the controller; counting is from left to right.
tCycleTime		TIME	Time for cyclical query of the drive Value range 1 s ... 30 s Default setting = t#1s
bAddress		BYTE	Slave address value range 1 ... 8
xShowTemperature_F		BOOL	Displays output temperature in °F.
Return value:		Data type:	Comment:
xReady		BOOL	Status of the communication TRUE = communication complete FALSE = active communication
bFeedback		BYTE	Output error code See table in the appendix
rTemperature		REAL	Output of the temperature
rRelativeHumidity		REAL	Output of the humidity [%]
rCO2		REAL	Output of the CO2 measurement [ppm]
rVOC		REAL	Output of the VOC measurement
bFlushStatus		BYTE	Status of the VOC measurement 0: good air quality 1: poor air quality
rAnalogInput		REAL	Analog input voltage [V]
xDigitalInput		BOOL	Digital input signal
xTemperatureSensorFault		BOOL	Temperature sensor defective/unavailable
xHumiditySensorFault		BOOL	Humidity sensor defective/unavailable
xCO2_SensorFault		BOOL	CO2 sensor defective/unavailable
xVOC_SensorFault		BOOL	VOC sensor defective/unavailable

**Graphical illustration:****Function description:**

This module serves to query a room-combination sensor with an MP-bus interface from BELIMO (e.g., MS24A-Rxx-MPX) for measuring temperature, humidity, CO<sub>2</sub>, and VOC.

To address the function block to the required MP-Bus module, the corresponding module index must be entered as a constant at the **"bModule\_750\_643"** input. The controller detects the connected MP-Bus modules independently and counts them starting with 1 from the left.

A rising edge at the **"xEnable"** input starts the transmission and query process at the drive addressed via the **"bAddress"** input. If the **"xEnable"** input signal is permanently switched to the TRUE signal, then communication occurs cyclically. The **"tCycleTime"** input parameter determines the cycle time.

The temperature value read is displayed at the **"rTemperature"** output. If the **"xShowTemperature\_F"** input is set to TRUE, then the temperature is output in °F. Otherwise, the temperature value is displayed in °C.

The current humidity, CO<sub>2</sub>, and VOC measurements, and the air quality are indicated at the **"rRelativeHumidity"**, **"rCO2"**, **"rVOC"** and **"bFlushStatus"** outputs respectively.

Four possible error states of the combination sensor are indicated at the outputs:

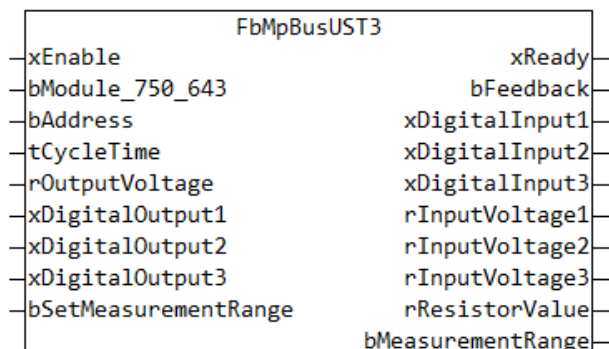
- **"xTemperatureSensorFault"** indicates that the temperature sensor is defective or unavailable.
- **"xHumiditySensorFault"** indicates that the humidity sensor is defective/unavailable.
- **"xCO2\_SensorFault"** indicates that the CO<sub>2</sub> sensor is defective/unavailable.
- **"xVOC\_SensorFault"** indicates that the VOC sensor is defective/unavailable.

The **"xReady"** output signal indicates whether the function block has completed the transmission process or if it is still actively connected to one of the slaves. Communication errors with the drive in question are displayed at the **"bfeedback"** output.



### 3.5 UST-3 Signal Transmitter (FbMpBus\_UST3)

WAGO-I/O-PRO V2.3 Library Elements			
Category:		Building technology	
Name:		FbMpBusUST3	
Type:		Function <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
Name of library:		MpBus_03.lib	
Applicable to:		See Release Note	
Input parameter:		Data type:	Comment:
xEnable		BOOL	A TRUE signal at this input starts the transmission process.
bModule_750_643		BYTE	Specifies which MP-Bus Master module is to be addressed at the controller. Counting is from left to right.
tCycleTime		TIME	Time for cyclical query of the drive Value range 1 s ... 30 s Default setting = t#1s
bAddress		BYTE	Slave address value range 1 ... 8
rOutputVoltage		REAL	Target voltage analog output 1 [V]
xDigitalOutput1		BOOL	Relay output 1
xDigitalOutput2		BOOL	Relay output 2
xDigitalOutput3		BOOL	Relay output 3
bSetMeasurementRange		BYTE	Definition of the measurement ranges
Return value:		Data type:	Comment:
xReady		BOOL	Status of the communication TRUE = communication complete FALSE = active communication
bFeedback		BYTE	Output error code See table in the appendix
xDigitalInput1		BOOL	Status digital input 1
xDigitalInput2		BOOL	Status digital input 2
xDigitalInput3		BOOL	Status digital input 3
rInputVoltage1		REAL	Voltage analog input 1 [V]
rInputVoltage2		REAL	Voltage analog input 2 [V]
rInputVoltage3		REAL	Voltage analog input 3 [V]
rResistorValue		REAL	Resistance value analog input 2 [Ω]
bMeasurementRange		BYTE	Display of the defined measurement ranges

**Graphical illustration:****Function description:**

This module serves to communicate with the UST-3 signal transmitter.

A rising edge at the **“xEnable”** input starts the transmission and query process at the drive addressed via the **“bAddress”** input. If the **“xEnable”** input signal is permanently switched to the TRUE signal, then communication occurs cyclically. The **“tCycleTime”** input parameter determines the cycle time.

The **“rOutputVoltage”** input specifies the voltage for the analog output.

The three relays at the UST-3 device can be controlled using the **“xDigitalOutput1”**, **“xDigitalOutput2”** and **“xDigitalOutput3”** inputs.

Since the UST3 signal transmitter supports different measurement ranges, the measurement range of the analog inputs is defined via the **“bSetMeasurementRange”** input and for checking it is displayed at the **“bMeasurementRange”** output.

Bit 0 = 0 -> Voltage analog channel 1 (0 ... 11 V)

Bit 0 = 1 -> Voltage analog channel 1 (0 ... 3 V)

Bit 1 = 0 -> Voltage analog channel 2 (0 ... 11 V)

Bit 1 = 1 -> Voltage analog channel 2 (0 ... 3 V)

Bit 3.2 = 01 -> Resistance value range (0 ... 5 kOhm)

Bit 3.2 = 00 -> Resistance value range (0 ... 20 kOhm)

Bit 3.2 = 10 -> Resistance value range (0 ... 262 kOhm)

Bit 4 = 0 -> Voltage analog channel 3 (0 ... 11 V)

Bit 4 = 1 -> Voltage analog channel 3 (0 ... 3 V)

Bit 7 = 0 -> no resistance measurement

Bit 7 = 1 -> voltage source for resistance measurement

The **“xReady”** output signal indicates whether the function block has completed the transmission process or if it is still actively connected to one of the slaves.

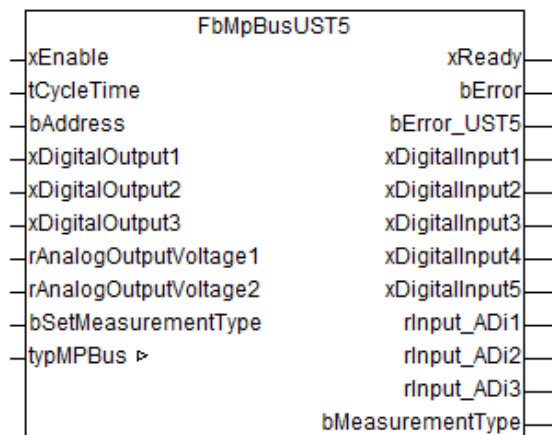
Communication errors with the drive in question are displayed at the **“bfeedback”** output.

The status or measurement values for the digital and analog inputs are displayed at the **“xDigitalInput1”**, **“xDigitalInput2”**, **“xDigitalInput3”**, **“rInputVoltage1”**, **“rInputVoltage2”**, **“rInputVoltage3”** and **“rResistorValue”** outputs respectively.

To address the function block to the required MP-Bus module, the corresponding module index must be entered as a constant at the **“bModule\_750\_643”** input. The controller detects the connected MP-Bus modules independently and counts them starting with 1 from the left.

## 3.6 UST-5 Signal Transmitter (FbMpBus\_UST5)

WAGO-I/O-PRO V2.3 Library Elements			
Category:		Building technology	
Name:		FbMpBusUST5	
Type:		Function <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
Name of library:		MpBus_03.lib	
Applicable to:		See Release Note	
Input parameter:		Data type:	Comment:
xEnable		BOOL	A TRUE signal at this input starts the transmission process.
bModule_750_643		BYTE	Specifies which MP-Bus Master Module is to be addressed at the controller; counting is from left to right.
tCycleTime		TIME	Time for cyclical query of the drive Value range 1 s ... 30 s Default setting: t#1s
bAddress		BYTE	Slave address value range 1 ... 8
xDigitalOutput1		BOOL	Relay output 1
xDigitalOutput2		BOOL	Relay output 2
xDigitalOutput3		BOOL	Relay output 3
rAnalogOutputVoltage1		REAL	Target voltage analog output 1 [V]
rAnalogOutputVoltage2		REAL	Target voltage analog output 2 [V]
bSetMeasurementType		BYTE	Measurement type
Return value:		Data type:	Comment:
xReady		BOOL	Communication status: TRUE = Communication completed FALSE = Active communication
bFeedback		BYTE	Output error code See table in the appendix
bFeedback_UST5		BYTE	Output error code for the device See device data sheet
xDigitalInput1		BOOL	Status digital input 1
xDigitalInput2		BOOL	Status digital input 2
xDigitalInput3		BOOL	Status digital input 3
xDigitalInput4		BOOL	Status digital input 4
xDigitalInput5		BOOL	Status digital input 5
rInput_ADi1		REAL	Input signal 1
rInput_ADi2		REAL	Input signal 2
rInput_ADi3		REAL	Input signal 3
bMeasurementType		BYTE	Displays the defined measurement

**Graphical illustration:****Function description:**

This module serves to communicate with the UST-5 signal transmitter.

A rising edge at the **“xEnable”** input starts the transmission and query process at the drive addressed via the **“bAddress”** input. If the **“xEnable”** input signal is permanently switched to the TRUE signal, then communication occurs cyclically. The **“tCycleTime”** input parameter determines the cycle time.

To address the function block to the required MP-Bus module, the corresponding module index must be entered as a constant at the **“bModule\_750\_643”** input. The controller detects the connected MP-Bus modules independently and counts them starting with 1 from the left.

The **“rAnalogOutputVoltage1”** and **“rAnalogOutputVoltage2”** inputs specify the voltage for the AO1 and AO2 analog outputs respectively.

The three relays (DO1 to DO3) at the UST-5 device can be controlled using the **“xDigitalOutput1”**, **“xDigitalOutput2”** and **“xDigitalOutput3”** inputs.

The status of the digital inputs is displayed at the **“xDigitalInput1”**, **“xDigitalInput2”**, **“xDigitalInput3”**, **“xDigitalInput4”** and **“xDigitalInput5”** outputs. Since the UST5 signal transmitter supports different measurement ranges, the measurement types of the analog inputs (ADi1 to ADi3) are defined via the **“bSetMeasurementType”** input and displayed to check for accuracy at the **“bMeasurementType”** output.

Bit 0 and Bit 1= 2#00 -> Voltage measurement analog channel ADi1 (value in 1mV)

Bit 0 and Bit 1= 2#01 -> Resistance measurement analog channel ADi1 (value in 0.1 Ohm)

Bit 0 and Bit 1= 2#10 -> Switch, 0 = open, 1 = closed

The measured value of analog channel ADi1 is displayed at the **“rInput\_ADi1”** output.

Bit 2 and Bit 3= 2#00 -> Voltage measurement analog channel ADi2 (value in 1 mV)

Bit 2 and Bit 3= 2#01 -> Resistance measurement analog channel ADi2 (value in 0.1 Ohm)

Bit 2 and Bit 3= 2#10 -> Switch, 0 = open, 1 = closed

The measured value of analog channel ADi2 is displayed at the **“rInput\_ADi2”** output.

Bit 4 and Bit 5= 2#00 -> Voltage measurement analog channel ADi3 (value in 1 mV)

Bit 4 and Bit 5= 2#01 -> Resistance measurement analog channel ADi3 (value in 0.1 Ohm)

Bit 4 and Bit 5= 2#10 -> Switch, 0 = open, 1 = closed

The measured value of analog channel ADi3 is displayed at the **“rInput\_ADi3”** output.

#### **Example:**

Channel ADi1 specifies the voltage measurement and Channel ADi2 yields the resistance measurement. Channel ADi3 is a switch. The **“bSetMeasurementType”** input thus has the value **“2#00100100”** = **“16#24”**.

The output **“xReady”** indicates whether the function block has completed the transmission process or if it is still connected to one of the slaves. Communication errors with the drive in question are displayed at the **“bfeedback”** output.

## 4 Resistance Characteristic Curves

### 4.1 Ni1000, Ni1000L&S, Pt1000, NTC5K and NTC10K (e.g., Fu\_NI1000)

WAGO-I/O-PRO V2.3 Library Elements													
Category:		Building technology											
Name:		Fu_Ni1000 Fu_Ni100_LuS Fu_NTC5K Fu_NTC10K Fu_Pt1000											
Type:	Function <input checked="" type="checkbox"/>	Function block <input type="checkbox"/>	Program <input type="checkbox"/>										
Name of library:		MpBus_03.lib											
Applicable to:		See Release Note											
Input parameter:	Data type:	Comment:											
wOhm	WORD	Measurement value of the connected resistance sensors											
Return value:	Data type:	Comment:											
Fu_NI1000	REAL	Converted temperature value [°C].											
Graphical illustration:													
<div><div>Fu_PT1000</div><div>wOhm</div></div>													
Function Description:													
<p>The “wSensorValue” output of the MP-Bus function modules supplies the current resistance of the temperature sensor. This function serves to convert the measured resistance value into a temperature value.</p> <p>If the “wSensorValue” output is linked to the “wOhm” input, then the corresponding function converts the resistance value into a temperature value.</p> <p>Conversion modules are available for the following resistances:</p> <table><tr><td>Fu_Ni000</td><td>(Ni1000)</td></tr><tr><td>Fu_Ni1000_LuS</td><td>(Ni1000 Landis &amp; Staefa)</td></tr><tr><td>Fu_NTC5K</td><td>(NTC 5 KΩ)</td></tr><tr><td>Fu_NTC10K</td><td>(NTC 10 KΩ)</td></tr><tr><td>Fu_Pt1000</td><td>(Pt1000)</td></tr></table>				Fu_Ni000	(Ni1000)	Fu_Ni1000_LuS	(Ni1000 Landis & Staefa)	Fu_NTC5K	(NTC 5 KΩ)	Fu_NTC10K	(NTC 10 KΩ)	Fu_Pt1000	(Pt1000)
Fu_Ni000	(Ni1000)												
Fu_Ni1000_LuS	(Ni1000 Landis & Staefa)												
Fu_NTC5K	(NTC 5 KΩ)												
Fu_NTC10K	(NTC 10 KΩ)												
Fu_Pt1000	(Pt1000)												

## 5 MP-Raw Data

### 5.1 Query Data Storage (FbMpBus\_PEEK)

WAGO-I/O-PRO V2.3 Library Elements			
Category:		Building technology	
Name:		FbMpBus_PEEK	
Type:		Function <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
Name of library:		MpBus_03.lib	
Applicable to:		See Release Note	
Input parameter:		Data type:	Comment:
bModule_750_643		BYTE	Specifies which MP-Bus Master Module is to be addressed at the controller; counting is from left to right.
bAddress		BYTE	Slave address value range 1 ... 8
wStartAddress		WORD	Start address for the memory
bNumberOfBytes		BYTE	Number of data to be read in bytes Value range = 0 ... 7 %
Input/output parameters:		Data type:	Comment:
xPEEK		BOOL	A TRUE signal at this input starts the query.
Return value:		Data type:	Comment:
abData		ARRAY [1..7] OF BYTE	Data to be received. Max. 7 data bytes
bFeedback		BYTE	Output error code See table in the appendix
Graphical illustration:			
<div><div>FbMpBus_PEEK</div><div><div>bModule_750_643</div><div>abData</div></div><div><div>bAddress</div><div>bFeedback</div></div><div><div>wStartAddress</div><div>▷ xPEEK</div></div><div><div>bNumberOfBytes</div><div></div></div><div><div>xPEEK ▷</div><div></div></div></div>			

**Function description:**

This module serves to query the data storage of a device with an MP-Bus interface.

The query process is carried out using a PEEK command at the corresponding data storage. The query begins at the start address for the data storage specified at the **“wStartAddress”** input. The number of data bytes to be read is specified at the **“bNumberOfBytes”** input. Up to 7 data bytes can be queried per read process.

**Example:**

The input values for the UST5 transmitter (Di, ADi1, ADi2, ADi3) are queried (see figure below). The UST5 has the address 8.

Adresse	Name	Beschreibung	Bytes	Read
0x0001	Digitale Eingänge	Bit 0 Di1 Bit 1 Di2 Bit 2 Di3 Bit 3 Di4 Bit 4 Di5 Bit 5...7 unbenutzt	1	X
0x0002	Eingang ADi1	Wert des Eingang ADi1 als Spannung, Widerstandswert oder Schaltkontakt: Spannung 0..10.000 V (in mV) Widerstand 0..2000.0 Ohm (in 0.1Ohm) Schalter 0..1	2	X
0x0004	Eingang ADi2	Wie Eingang ADi1	2	X
0x0006	Eingang ADi3	Wie Eingang ADi1	2	X

The following specifications are required to execute the query process:

**“bAddress”** = 8

**“wStartAddress”** = “16#0001”

**“bNumberOfBytes”** = “7”

Setting the **“xPEEK”** variable to TRUE starts the query process at the device addressed using the **“bAddress”** input. If the query process was successful or aborted, then the **“xPEEK”** input is reset by the module.

The **“abData”** array contains the data that was read. An array index is available for each data storage value.

**“abData[1]”** = Digital input value

**“abData[2]”** = Input value ADi1 high byte

**“abData[3]”** = Input value ADi1 low byte

**“abData[4]”** = Input value ADi2 high byte

**“abData[5]”** = Input value ADi2 low byte

**“abData[6]”** = Input value ADi3 high byte

**“abData[7]”** = Input value ADi3 low byte

The **“xReady”** output signal indicates whether the function block has completed the transmission process or if it is still actively connected to one of the slaves.



## 5.2 Write Data Storage (FbMpBus\_POKE)

WAGO-I/O-PRO V2.3 Library Elements		
Category:	Building technology	
Name:	FbMpBus_POKE	
Type:	Function <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
Name of library:	MpBus_03.lib	
Applicable to:	See Release Note	
Input parameter:	Data type:	Comment:
bModule_750_643	BYTE	Specifies which MP-Bus Master Module is to be addressed at the controller; counting is from left to right.
bAddress	BYTE	Slave address value range 1 ... 8
wStartAddress	WORD	Start address for the memory
bNumberOfBytes	BYTE	Number of data to be written in bytes. Value range = 0 ... 4 %
abData	ARRAY [1..4] OF BYTE	Write data Max. 4 data bytes
Input/Output Parameter:	Data type:	Comment:
xPOKE	BOOL	A TRUE signal at this input starts the write process.
Return value:	Data type:	Comment:
bFeedback	BYTE	Output error code See table in the appendix
Graphical illustration:		
<div><div>FbMpBus_POKE</div><div><div>bModule_750_643</div><div>bFeedback</div><div>bAddress</div><div>▷ xPOKE</div><div>wStartAddress</div><div>bNumberOfBytes</div><div>abData</div><div>xPOKE ▷</div></div></div>		

**Function description:**

This module serves to write in the data storage of a device with an MP-Bus interface.

The write process is carried out using a POKE command at the corresponding data storage. The writing begins at the start address of the data storage specified at the **“wStartAddress”** input. The number of data bytes to be written is specified at the **“bNumberOfBytes”** input.

**Example:**

The output values of the UST5 transmitter (Do, ADo1, ADo2) are queried (see figure below). The UST5 has the address 8.

Adresse	Name	Beschreibung	Bytes	Read	Write
0x0010	Digitaler Ausgang	Bit 0 Do1 Bit 1 Do2 Bit 2 Do3 Bit 3...7 unbenutzt	1	X	X
0x0011	Analog Ausg. Ao1	Analoge Ausgangsspannung Ao1 Wert 0...200 -> 0...10V	1	X	X
0x0012	Analog Ausg. Ao2	Analoge Ausgangsspannung Ao2 Wert 0...200 -> 0...10V	1	X	X

The following specifications are required to execute the query process:

**“bAddress”** = 8

**“wStartAddress”** = “16#0010”

**“bNumberOfBytes”** = “3”

The **“abData”** array contains the write data bytes. An array index is available for each data storage value.

**“abData[1]”** = Digital output value

**“abData[2]”** = Output value ADo1

**“abData[3]”** = Output value ADo2

**“abData[4]”** = 0

Setting the **“xPOKE”** variable to TRUE starts the write process at the device addressed at the **“bAddress”** input. If the write process is successful or aborted, then the **“xPOKE”** input is reset by the module.

The **“xReady”** output signal indicates whether the function block has completed the transmission process or if it is still actively connected to one of the slaves.

## 5.3 Query Process/Configuration Data (FbMpBusGetDataPoolValues)

WAGO-I/O-PRO V2.3 Library Elements			
Category:		Building technology	
Name:		FbMpBusGetDataPoolValues	
Type:		Function <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
Name of library:		MpBus_03.lib	
Applicable to:		See Release Note	
Input parameter:		Data type:	Comment:
bModule_750_643		BYTE	Specifies which MP-Bus Master Module is to be addressed at the controller; counting is from left to right.
wID		WORD	Identification number of the data register
bAddress		BYTE	Slave address value range 1 ... 8
Input/Output Parameter:		Data type:	Comment:
xGet		BOOL	A TRUE signal at this input starts the query.
Return value:		Data type:	Comment:
abDataPool		ARRAY [1.. MAX_DA TAPOO] OF BYTE	Data to be received. Max. 30 data bytes.
bFeedback		BYTE	Output error code See table in the appendix
Graphical illustration:			
<div><div>FbMpBusGetDataPoolValues</div><div><div>bModule_750_643</div><div>abDataPool</div><div>wID</div><div>bFeedback</div><div>bAddress</div><div>xGet</div><div>xGet ▸</div></div></div>			

**Function description:**

This module serves to query the process/configuration data of a device with an MP-Bus interface.

The process/configuration data are stored in a so-called *Data-Pool-Values* data register. Each data register is designated with an identification number, which must be specified for each query at the **"wid"** input.

Setting the **"xGet"** variable to TRUE starts the query process at the device addressed using the **"bAddress"** input. If the query process is successful or is aborted, then the **"xGet"** input is reset by the module. The query process is carried out by the MP\_Get\_Data and the MP\_Get\_NextBlock commands at the corresponding data register.

**Example:**

The temperature of the MS24A-R08-MPX room sensor is queried (see figure below). The room sensor has the address 3.

	ID	Name	Description	Size	Access
<b>Process</b>	11	SensErrState	Error status of the sensors Bit 0: temperature sensor fault Bit 1: humidity sensor fault Bit 2: CO <sub>2</sub> sensor fault Bit 3: VOC sensor fault  The flag is reset automatically, if the error condition disappears.	1	R
	12	-	-	-	-
	13	-	-	-	-
	14	SensTempC	Temperature in °C Unit: 0.01 °C Range: 0.00 ... 50.00 °C	2	R

The following specifications are required to execute the query process:

**"bAddress"** = 3

**"wid"** = "14"

The **"abDataPool"** array contains the data to be read. An array index is available for each data storage value. Since the temperature value is the size of 2 bytes, then only the first two elements of the array are evaluated.

**"abDataPool[1]"** = Temperature value high byte

**"abDataPool[2]"** = Temperature value low byte

The **"xReady"** output signal indicates whether the function block has completed the transmission process or if it is still actively connected to one of the slaves.

## 5.4 Write Process Data (FbMpBusSetDataPoolValues)

WAGO-I/O-PRO V2.3 Library Elements			
Category:		Building technology	
Name:		FbMpBusSetDataPoolValues	
Type:		Function <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
Name of library:		MpBus_03.lib	
Applicable to:		See Release Note	
Input parameter:		Data type:	Comment:
bModule_750_643		BYTE	Specifies which MP-Bus Master Module is to be addressed at the controller; counting is from left to right.
abDataPool		ARRAY [1.. MAX_DA TAPool] OF BYTE	Write data. Max. 30 data bytes.
wID		WORD	Identification number of the data register
bSize		BYTE	Size of the data register to be written
bAddress		BYTE	Slave address value range 1 ... 8
Input/Output Parameter:		Data type:	Comment:
xSet		BOOL	A TRUE signal at this input starts the write process.
Return value:		Data type:	Comment:
bFeedback		BYTE	Output error code See table in the appendix
Graphical illustration:			
<div><div>FbMpBusSetDataPoolValues</div><div><div><div>bModule_750_643</div><div>wID</div><div>bAddress</div><div>bSize</div><div>abDataPool</div><div>xSet ▷</div></div><div><div>bFeedback</div><div>▷ xSet</div></div></div></div>			

**Function description:**

This module serves to write the process data for a device with an MP-Bus interface.

The process data are stored in a so-called *Data-Pool-Values* data register. Each data register is designated by an identification number, which must be specified during writing by using the “**wID**” input. The size of the data register to be written is specified at the “**bSize**” input.

**Example:**

The setpoint of the P6065W800EV-BAC control ball valve is written (see figure below). The control ball valve has the address 4.

	ID	Name	Description	Size	Access
<b>Process</b>	11	-			
	12	ErrorState	Error status of the device Bit 0: temperature sensor T1 error Bit 1: temperature sensor T2 error Bit 2: flow sensor error Bit 3: mechanical overload  The flag is reset automatically, if the error condition disappears.	2	R
	13	-			
	20	SpRel	Relative Setpoint in % Datatype: uint16 Unit: 0.01 % Range: 0 ... 10'000 (0 ... 100 %)	2	R/W

The following specifications are required to execute the write process:

“**bAddress**” = “4”

“**wID**” = “20”

The “**abDataPool**” contains the write data bytes. An array index is available for each data storage value. Since the target value is the size of 2 bytes, then only the first two elements of the array are registered and the “**bSize**” input is specified with the value “2”.

“**abDataPool**[1]” = setpoint high byte

“**abDataPool**[2]” = setpoint low byte

Setting the “**xSet**” variable to TRUE starts the write process at the device addressed using the “**bAddress**” input. If the write process is successful or is aborted, then the “**xSet**” input is reset by the module. The write process is carried out by MP\_Set\_Data and MP\_Set\_NextBlock commands at the corresponding data register.

The “**xReady**” output signal indicates whether the function block has completed the transmission process or if it is still actively connected to one of the slaves.

## 5.5 Writing Configuration Data (FbMpBusConfigDataPoolValues)

WAGO-I/O-PRO V2.3 Library Elements			
Category:		Building technology	
Name:		FbMpBusConfigDataPoolValues	
Type:		Function <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
Name of library:		MpBus_03.lib	
Applicable to:		See Release Note	
Input parameter:		Data type:	Comment:
bModule_750_643		BYTE	Specifies which MP-Bus Master Module is to be addressed at the controller; counting is from left to right.
abDataPool		ARRAY [1.. MAX_DA TAPOO] OF BYTE	Write data. Max. 30 data bytes.
wID		WORD	Identification number of the data register
bSize		BYTE	Size of the data register to be written
bAddress		BYTE	Slave address value range 1 ... 8
dwPassword		DWORD	Device password; for many devices, the default password is "16#0000".
Input/output parameters:		Data type:	Comment:
xConfig		BOOL	A TRUE signal at this input starts the write process.
Return value:		Data type:	Comment:
bFeedback		BYTE	Output error code See table in the appendix
Graphical illustration:			
<div><div>FbMpBusConfigDataPoolValues</div><div><div><div>bModule_750_643</div><div>bFeedback</div><div>wID</div><div>▷ xConfig</div><div>bAddress</div><div>bSize</div><div>dwPassword</div><div>abDataPool</div><div>xConfig ▷</div></div></div></div>			

**Function description:**

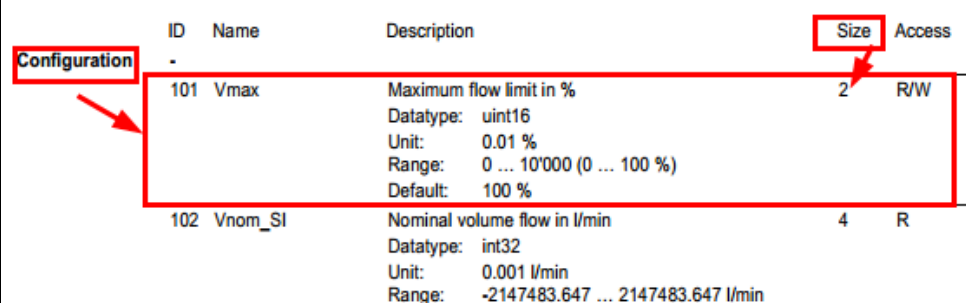
This module serves to write the configuration data of a device with an MP-Bus interface.

The configuration data are stored in a so-called *Data-Pool-Values* data register. Each data register is designated with an identification number, which must be specified during the write process using the “**wID**” input. The size of the data register to be written is specified at the “**bSize**” input.

Writing the configuration data is password protected. The password can be entered at the “**dwPassword**” input in order to enable access for writing the configuration data. The release is carried out by the MP-Log-in command.

**Example:**

The upper limit of the flow rate ( $V_{\max}$ ) of the P6065W800EV-BAC control ball valve is configured (see figure below). The control ball valve has the address 4 and the preset password is “16#0000”.



ID	Name	Description	Size	Access
101	Vmax	Maximum flow limit in % Datatype: uint16 Unit: 0.01 % Range: 0 ... 10'000 (0 ... 100 %) Default: 100 %	2	R/W
102	Vnom_SI	Nominal volume flow in l/min Datatype: int32 Unit: 0.001 l/min Range: -2147483.647 ... 2147483.647 l/min	4	R

The following specifications are required to execute the configuration:

“**bAddress**” = “4”

“**wID**” = “101”

“**dwPassword**” = “16#0000”

The “**abDataPool**” contains the write data bytes. An array index is available for each data storage value. Since the upper limit value is the size of 2 bytes, only the first two elements of the array are registered and the “**bSize**” input is specified with the value “2”.

“**abDataPool**[1]” = Limiting value high byte

“**abDataPool**[2]” = Limiting value low byte

By setting the “**xSet**” to “TRUE”, the configuration on the device addressed via the “**bAddress**” input starts. If the configuration is successful or is aborted, then the “**xConfig**” input is reset by the module. The configuration is carried out by MP\_Set\_Data and MP\_Set\_NextBlock commands at the corresponding data register.

The “**xReady**” output signal indicates whether the function block has completed the transmission process or if it is still actively connected to one of the slaves.



## 6 Appendix

### 6.1 Error codes

Layer 7 codes:	
11	Unknown command
12	Command not permitted (e.g., no access rights)
13	Error during command execution
14	Parameter error, invalid value
15	Invalid ID (Data Pool Values)
16	Invalid data width
17	Invalid block number (Data Pool Values)
18	Internal bus not ready.
Code:	
225	External master active
226	No 24 V supply.
227	Timeout module communication (no response from the module)
228	Timeout in learning mode
229	Transaction error
230	Invalid sensor (e.g., bSensorType = 8 for FbMpBusVav)
231	Invalid address (less than 1 or greater than 8)
232	Ring storage is full (job list full).
233	Address already exists.
234	Measurement voltage UST3 incorrect (5 V -> 11 V)
235	MP-Bus module was not recognized in process image.
236	Null pointer
237	Internal bus error
238	Invalid command
250	Timeout in learning mode (from module)
251	Bus error
253	Module error
254	Receive error
255	Transmission error

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