

WAGO → I/O → **SYSTEM 750**

Library for Building Automation



Function Block Description for 3-Phase Power Measurement Module 750-493

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Every conceivable measure has been taken to ensure the accuracy and completeness of this documentation. However, as errors can never be fully excluded, we always appreciate any information or suggestions for improving the documentation.

We wish to point out that the software and hardware terms, as well as the trademarks of companies used and/or mentioned in the present manual, are generally protected by trademark or patent.

WAGO-I/O-PRO CAA library for building automation

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Important Notes

To ensure quick installation and start-up of the units, we strongly recommend that the following information and explanations are carefully read and adhered to.

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Intended Use

For each individual application, the components are supplied from the factory with a dedicated hardware and software configuration. Modifications are only admitted within the framework of the possibilities documented in this document. All other changes to the hardware and/or software and the non-conforming use of the components entail the exclusion of liability on part of WAGO Kontakttechnik GmbH & Co. KG.

Please direct any requirements pertaining to a modified and/or new hardware or software configuration directly to WAGO Kontakttechnik GmbH & Co. KG.

Scope of Validity

This application note is based on the stated hardware and software of the specific manufacturer as well as the associated documentation. This application note is therefore only valid for the described installation. New hardware and software versions may need to be handled differently.

Please note the detailed description in the specific manuals.

Function Blocks

3-Phase Power Measurement (Fb750_493_Master3Phase)

WAGO-I/O-PRO CAA Library Elements		
Category:	Building automation	
Name:	Fb750_493_Master3Phase	
Type:	Function: <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
Name of library:	PowerMeasurement_03.lib	
Applicable to:	See release note	
Appropriate library:	mod_com.lib	
Input parameter:		
Data type:	Comment:	
xEnable	BOOL	Enabling for reading measured values Default setting = TRUE
tCycleTime	TIME	Time for cyclic polling of measured values Default setting = t#1s
wCurrentTransformerRatio L1	WORD	Divisor for current transformer ratio 1:X Default setting = 1
wCurrentTransformerRatio L2	WORD	Divisor for current transformer ratio 1:X Default setting = 1
wCurrentTransformerRatio L3	WORD	Divisor for current transformer ratio 1:X Default setting = 1
bModule_750_493	BYTE	Specifies which 3-Phase Power Measurement module 750-493 is to be addressed at the controller. Counting from left to right. Default setting = 1
Input/output parameter:		
Data type:	Comment:	
typConfig3Phase	typConfig 3Phase	Configuration parameter of 750-493 module
.typConfig3Phase	ARRAY [1..3] OF typRegister 750_493	Configuration parameter for the respective phase.
.typModeSetting	typMode Setting	Operation mode settings
.UserScalingActivated	BOOL	User scaling is used. (1: transformer ratio divisor)
.WatchdogTimerNot Active	BOOL	Deactivation of watchdog timer
.FlexibleProcessImage	BOOL	Flexible process image activated.
.DC_FilterBypassed	BOOL	DC filter is bypassed.
.EnergyConsumption Inverted	BOOL	Energy consumption measurement inverted (generating operation).

.AutomaticDeleting MinMaxValues	BOOL	Automatic deletion of minimum and maximum current and voltage values activated.
.ScalingFactorEnergy Level	WORD	Scaling factor for measuring energy level.
.UndervoltageThreshold	WORD	Undervoltage threshold [0.1 V]
.DivisorForTransformer Ratio	WORD	Divisor for transformer ratio. Must be activated via "UserScalingActivated".
.TimeForDeletingMinMax Values	WORD	Time constants for automatic deletion of min. and max. values [ms]. "AutomaticDeleting MinMaxValues" must be activated. Resolution = 10
.MeasuringCycleTime	WORD	Measuring cycle time [ms]
.ReadConfig	BOOL	Start reading register values.
.WriteConfig	BOOL	Start writing register values.
.FactoryDefault	BOOL	Reset module to factory default
.ErrorConfig	BOOL	Error while reading or writing registers.
.xSaveEnergy Consumption	BOOL	The energy consumption is saved to the EEPROM by a positive edge ahead of time.
.xDeleteEnergy Consumption	BOOL	The energy consumption is deleted by a positive edge.
.xDeleteMinCurrent	BOOL	The minimum current is deleted by a positive edge.
.xDeleteMaxCurrent	BOOL	The maximum current is deleted by a positive edge.
.xDeleteMinVoltage	BOOL	The minimum voltage is deleted by a positive edge.
.xDeleteMaxVoltage	BOOL	The maximum voltage is deleted by a positive edge.
.xDeleteMinMaxValues	BOOL	All minimum and maximum values are deleted by a positive edge.
Return value:		
Data type:	Comment:	
xReady	BOOL	Read status of measured values TRUE = Read procedure deactivated FALSE = Read procedure activated
abError	ARRAY [1..3] OF BYTE	Error evaluation: 0x00: No error 0x01: Undervoltage threshold undershot 0x02: Communication timeout 0x03: Rated current is not identified 0x04: 750-493 module is not identified
adwCurrent	ARRAY [1..3] OF DWORD	Current (rms value) [mA]
adwMinCurrent	ARRAY [1..3] OF DWORD	Minimum current [mA]

adwMaxCurrent	ARRAY [1..3] OF DWORD	Maximum current [mA]
adwVoltage	ARRAY [1..3] OF DWORD	Voltage (rms value) [0.1 V]
adwMinVoltage	ARRAY [1..3] OF DWORD	Minimum voltage [0.1 V]
adwMaxVoltage	ARRAY [1..3] OF DWORD	Maximum voltage [0.1 V]
adiPowerFactor	ARRAY [1..3] OF DINT	Power factor [0.01]
adiEffectivePower	ARRAY [1..3] OF DINT	Effective power [0.1 W]
adwApparentPower	ARRAY [1..3] OF DWORD	Apparent power [0.1 VA]
adwEnergyConsumption	ARRAY [1..3] OF DWORD	Energy consumption [Wh]
rTotalEnergyConsumption	REAL	Total energy consumption [kWh]

Graphical display:

Fb750_493_Master3Phase	
xEnable	xReady
tCycleTime	abError
wCurrentTransformerRatioL1	adwCurrent
wCurrentTransformerRatioL2	adwMinCurrent
wCurrentTransformerRatioL3	adwMaxCurrent
bModule_750_493	adwVoltage
typConfig3Phase ▶	adwMinVoltage
	adwMaxVoltage
	adiPowerFactor
	adiEffectivePower
	adwApparentPower
	adwEnergyConsumption
	rTotalEnergyConsumption

Configuration interface:

Configuration 3-Phase Power Measurement Module 750-493

<p>Register values L1</p> <p>Undervoltage threshold: <input type="text" value="100 * 0,1V"/></p> <p>Time for deleting min / max values: <input type="text" value="2000 ms"/></p> <p>Register values L2</p> <p>Undervoltage threshold: <input type="text" value="100 * 0,1V"/></p> <p>Time for deleting min / max values: <input type="text" value="2000 ms"/></p> <p>Register values L3</p> <p>Undervoltage threshold: <input type="text" value="100 * 0,1V"/></p> <p>Time for deleting min / max values: <input type="text" value="2000 ms"/></p> <p> All configuration parameters will be set to factory default <input type="button" value="Factory settings"/></p> <p>Status Configuration</p> <p><input type="button" value="Status L1"/> <input type="button" value="Status L2"/> <input type="button" value="Status L3"/></p> <p style="text-align: center;"><input type="button" value="Read configuration"/></p>	<p>Mode of operation <input type="checkbox"/> L1 <input type="checkbox"/> L2 <input type="checkbox"/> L3</p> <p>Energy consumption measurement inverted <input type="checkbox"/></p> <p>Automatic deleting of min.- and max. values <input type="checkbox"/></p> <p>DC filter is bypassed <input type="checkbox"/></p> <p>Sampling time</p> <p>Measuring cycle period: <input type="text" value="50 ms"/></p> <p>Delete measured values</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>L1</th> <th>L2</th> <th>L3</th> </tr> </thead> <tbody> <tr> <td>Minimum current</td> <td><input type="button" value="Delete"/></td> <td><input type="button" value="Delete"/></td> <td><input type="button" value="Delete"/></td> </tr> <tr> <td>Maximum current</td> <td><input type="button" value="Delete"/></td> <td><input type="button" value="Delete"/></td> <td><input type="button" value="Delete"/></td> </tr> <tr> <td>Minimum voltage</td> <td><input type="button" value="Delete"/></td> <td><input type="button" value="Delete"/></td> <td><input type="button" value="Delete"/></td> </tr> <tr> <td>Maximum voltage</td> <td><input type="button" value="Delete"/></td> <td><input type="button" value="Delete"/></td> <td><input type="button" value="Delete"/></td> </tr> <tr> <td>All min. max. values</td> <td><input type="button" value="Delete"/></td> <td><input type="button" value="Delete"/></td> <td><input type="button" value="Delete"/></td> </tr> <tr> <td>Energy consumption</td> <td><input type="button" value="Delete"/></td> <td><input type="button" value="Delete"/></td> <td><input type="button" value="Delete"/></td> </tr> </tbody> </table> <p style="text-align: center;"><input type="button" value="Write configuration"/></p>		L1	L2	L3	Minimum current	<input type="button" value="Delete"/>	<input type="button" value="Delete"/>	<input type="button" value="Delete"/>	Maximum current	<input type="button" value="Delete"/>	<input type="button" value="Delete"/>	<input type="button" value="Delete"/>	Minimum voltage	<input type="button" value="Delete"/>	<input type="button" value="Delete"/>	<input type="button" value="Delete"/>	Maximum voltage	<input type="button" value="Delete"/>	<input type="button" value="Delete"/>	<input type="button" value="Delete"/>	All min. max. values	<input type="button" value="Delete"/>	<input type="button" value="Delete"/>	<input type="button" value="Delete"/>	Energy consumption	<input type="button" value="Delete"/>	<input type="button" value="Delete"/>	<input type="button" value="Delete"/>
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Energy consumption	<input type="button" value="Delete"/>	<input type="button" value="Delete"/>	<input type="button" value="Delete"/>																										

Function description:

The **Fb750_493_Master3Phase** function block allows measured values to be cyclically read out and the configuration of the 3-Phase Power Measurement Module to be changed.

Cyclic polling of the measured values is performed if the **"xEnable"** input is TRUE. The **"tCycleTime"** input parameter determines the cycle time.

If the timeout time is exceeded or the undervoltage threshold is undershot, the **"abError"** output indicates an error code for the respective phase.

Using transformers for current measurement, the current transformer ratio can per phase be entered via the **"wCurrentTransformerRatioLx"** input. The current transformer ratio is always 1 : X.

The 3-Phase Power Measurement module with which this function block must communicate is selected at input **"bModule_750_493"**.

The structure variable **"typConfig3Phase"** contains all configuration parameters for the 3-Phase Power Measurement Module. The configuration interface is stored in the **Config3Phase750_493** for convenient configuration of the 3-Phase Power Measurement Module.

The function block reads out the measured values when output "**xReady**" is FALSE. Output "**xReady**" only refers to the reading out of measured values and is not considered when configuring the module.

The last read-out values are displayed at outputs "**adwCurrent**", "**adwMinCurrent**", "**adwMaxCurrent**", "**adwVoltage**", "**adwMinVoltage**", "**adwMaxVoltage**", "**adiPowerFactor**", "**adiEffectivePower**", "**adwApparentPower**" and "**adwEnergyConsumption**".

Output "**rTotalEnergyConsumption**" indicates the energy consumption for all three phases.

NOTE:

- 1.) The 3-Phase Power Measurement module 750-493 can record up to 4294 kWh * transmission ratio. (overrun of the energy consumption at the earliest after 2.13 years).
- 2.) The 3-Phase Power Measurement module 750-493/000-001 can record up to 21470 kWh * transmission ratio. (overrun of the energy consumption at the earliest after 2.13 years).
- 3.) Maximum current transformer ratio:
750-493 -> 1:1000 (transmission ratio 1000)
750-493/000-001 -> 5:1000 (transmission ratio 200)
- 4.) A positive edge at the "**xEnable**" input disables both user scaling (transformer ratio in the module) and scaling factor (scaling for energy consumption).
- 5.) When the current transformer ratio is changed afterwards, it is absolutely necessary to delete the energy consumption.

3-Phase Power Measurement IPC (Fb750_493_Master3Phase_IPC)

WAGO-I/O-PRO CAA Library Elements		
Category:	Building automation	
Name:	Fb750_493_Master3Phase_IPC	
Type:	Function: <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
Name of library:	PowerMeasurement_03.lib	
Applicable to:	See release note	
Input parameter:	Data type:	Comment:
xEnable	BOOL	Enabling for reading measured values Default setting = TRUE
tCycleTime	TIME	Time for cyclic polling of measured values Default setting = t#1s
wCurrentTransformerRatio L1	WORD	Divisor for current transformer ratio 1:X Default setting = 1
wCurrentTransformerRatio L2	WORD	Divisor for current transformer ratio 1:X Default setting = 1
wCurrentTransformerRatio L3	WORD	Divisor for current transformer ratio 1:X Default setting = 1
abIn_Data_750_493	ARRAY [0..11] OF BYTE	Input array of 750-493 3-phase power measurement module
Input/output parameter:	Data type:	Comment:
abOut_Data_750_493	ARRAY [0..11] OF BYTE	Output array of 750-493 3-phase power measurement module
typConfig3Phase	typConfig 3Phase	Configuration parameter of 750-493 module
.typConfig3Phase	ARRAY [1..3] OF typRegister 750_493	Configuration parameter for the respective phase.
.typModeSetting	typMode Setting	Operation mode settings
.UserScalingActivated	BOOL	User scaling is used. (1: transformer ratio divisor)
.WatchdogTimerNot Active	BOOL	Deactivation of watchdog timer
.FlexibleProcessImage	BOOL	Flexible process image activated.
.DC_FilterBypassed	BOOL	DC filter is bypassed.
.EnergyConsumption Inverted	BOOL	Energy consumption measurement inverted (generating operation).
.AutomaticDeleting MinMaxValues	BOOL	Automatic deletion of minimum and maximum current and voltage values activated.
.ScalingFactorEnergy Level	WORD	Scaling factor for measuring energy level.

.UndervoltageThreshold	WORD	Undervoltage threshold [0.1 V]
.DivisorForTransformer Ratio	WORD	Divisor for transformer ratio. Must be activated via "UserScalingActivated".
.TimeForDeletingMinMax Values	WORD	Time constants for automatic deletion of min. and max. values [ms]. "AutomaticDeleting MinMaxValues" must be activated. Resolution = 10
.MeasuringCycleTime	WORD	Measuring cycle time [ms]
.ReadConfig	BOOL	Start reading register values.
.WriteConfig	BOOL	Start writing register values.
.FactoryDefault	BOOL	Reset module to factory default
.ErrorConfig	BOOL	Error while reading or writing registers.
.xSaveEnergy Consumption	BOOL	The energy consumption is saved to the EEPROM by a positive edge ahead of time.
.xDeleteEnergy Consumption	BOOL	The energy consumption is deleted by a positive edge.
.xDeleteMinCurrent	BOOL	The minimum current is deleted by a positive edge.
.xDeleteMaxCurrent	BOOL	The maximum current is deleted by a positive edge.
.xDeleteMinVoltage	BOOL	The minimum voltage is deleted by a positive edge.
.xDeleteMaxVoltage	BOOL	The maximum voltage is deleted by a positive edge.
.xDeleteMinMaxValues	BOOL	All minimum and maximum values are deleted by a positive edge.
Return value:		
Data type:		
Comment:		
xReady	BOOL	Read status of measured values TRUE = Read procedure deactivated FALSE = Read procedure activated
abError	ARRAY [1..3] OF BYTE	Error evaluation: 0x00: No error 0x01: Undervoltage threshold undershot 0x02: Communication timeout 0x03: Rated current is not identified

adwCurrent	ARRAY [1..3] OF DWORD	Current (rms value) [mA]
adwMinCurrent	ARRAY [1..3] OF DWORD	Minimum current [mA]
adwMaxCurrent	ARRAY [1..3] OF DWORD	Maximum current [mA]
adwVoltage	ARRAY [1..3] OF DWORD	Voltage (rms value) [0.1 V]
adwMinVoltage	ARRAY [1..3] OF DWORD	Minimum voltage [0.1 V]
adwMaxVoltage	ARRAY [1..3] OF DWORD	Maximum voltage [0.1 V]
adiPowerFactor	ARRAY [1..3] OF DINT	Power factor [0.01]
adiEffectivePower	ARRAY [1..3] OF DINT	Effective power [0.1 W]
adwApparentPower	ARRAY [1..3] OF DWORD	Apparent power [0.1 VA]
adwEnergyConsumption	ARRAY [1..3] OF DWORD	Energy consumption [Wh]
rTotalEnergyConsumption	REAL	Total energy consumption [kWh]

Graphical display:

Fb750_493_Master3Phase_IPC	
xEnable	xReady
tCycleTime	abError
wCurrentTransformerRatioL1	adwCurrent
wCurrentTransformerRatioL2	adwMinCurrent
wCurrentTransformerRatioL3	adwMaxCurrent
abIn_Data_750_493	adwVoltage
abOut_Data_750_493 ▶	adwMinVoltage
typConfig3Phase ▶	adwMaxVoltage
	adiPowerFactor
	adiEffectivePower
	adwApparentPower
	adwEnergyConsumption
	rTotalEnergyConsumption

Configuration interface:

Configuration 3-Phase Power Measurement Module 750-493

<p>Register values L1</p> <p>Undervoltage threshold: <input type="text" value="100 * 0,1V"/></p> <p>Time for deleting min / max values: <input type="text" value="2000 ms"/></p> <hr/> <p>Register values L2</p> <p>Undervoltage threshold: <input type="text" value="100 * 0,1V"/></p> <p>Time for deleting min / max values: <input type="text" value="2000 ms"/></p> <hr/> <p>Register values L3</p> <p>Undervoltage threshold: <input type="text" value="100 * 0,1V"/></p> <p>Time for deleting min / max values: <input type="text" value="2000 ms"/></p>	<p>Mode of operation</p> <p>L1 <input type="checkbox"/> L2 <input type="checkbox"/> L3 <input type="checkbox"/></p> <p>Energy consumption measurement inverted <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>Automatic deleting of min.- and max. values <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p>DC filter is bypassed <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <hr/> <p>Sampling time</p> <p>Measuring cycle period: <input type="text" value="50 ms"/></p> <hr/> <p>Delete measured values</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td></td> <td style="text-align: center;">L1</td> <td style="text-align: center;">L2</td> <td style="text-align: center;">L3</td> </tr> <tr> <td>Minimum current</td> <td style="text-align: center;">Delete</td> <td style="text-align: center;">Delete</td> <td style="text-align: center;">Delete</td> </tr> <tr> <td>Maximum current</td> <td style="text-align: center;">Delete</td> <td style="text-align: center;">Delete</td> <td style="text-align: center;">Delete</td> </tr> <tr> <td>Minimum voltage</td> <td style="text-align: center;">Delete</td> <td style="text-align: center;">Delete</td> <td style="text-align: center;">Delete</td> </tr> <tr> <td>Maximum voltage</td> <td style="text-align: center;">Delete</td> <td style="text-align: center;">Delete</td> <td style="text-align: center;">Delete</td> </tr> <tr> <td>All min. max. values</td> <td style="text-align: center;">Delete</td> <td style="text-align: center;">Delete</td> <td style="text-align: center;">Delete</td> </tr> <tr> <td>Energy consumption</td> <td style="text-align: center;">Delete</td> <td style="text-align: center;">Delete</td> <td style="text-align: center;">Delete</td> </tr> </table>		L1	L2	L3	Minimum current	Delete	Delete	Delete	Maximum current	Delete	Delete	Delete	Minimum voltage	Delete	Delete	Delete	Maximum voltage	Delete	Delete	Delete	All min. max. values	Delete	Delete	Delete	Energy consumption	Delete	Delete	Delete
	L1	L2	L3																										
Minimum current	Delete	Delete	Delete																										
Maximum current	Delete	Delete	Delete																										
Minimum voltage	Delete	Delete	Delete																										
Maximum voltage	Delete	Delete	Delete																										
All min. max. values	Delete	Delete	Delete																										
Energy consumption	Delete	Delete	Delete																										

All configuration parameters will be set to factory default

Status Configuration

Function description:

The **Fb750_493_Master3Phase_IPC** function block allows measured values to be cyclically read out and the configuration of the 3-Phase Power Measurement Module to be changed.

Cyclic polling of the measured values is performed if the **"xEnable"** input is TRUE. The **"tCycleTime"** input parameter determines the cycle time.

If the timeout time is exceeded or the undervoltage threshold is undershot, the **"abError"** output indicates an error code for the respective phase.

Using transformers for current measurement, the current transformer ratio can per phase be entered via the **"wCurrentTransformerRatioLx"** input. The current transformer ratio is always 1 : X.

The **"abIn_Data_750_493"** and **"abOut_Data_750_493"** inputs contain the input or output array for the data of the 3-Phase Power Measurement Module. The variables at these inputs must be linked to the corresponding hardware address. The address depends on the position at which the module is installed.

Example:

abIn_Data_750_493 = Input **AT %IB0** : ARRAY [0..11] OF BYTE;

abOut_Data_750_493 = Output **AT %QB0** : ARRAY [0..11] OF BYTE;

The structure variable **"typConfig3Phase"** contains all configuration parameters for the 3-Phase Power Measurement Module. The configuration interface is stored in the **Config3Phase750_493** for convenient configuration of the 3-Phase Power Measurement Module.

The function block reads out the measured values when output "**xReady**" is FALSE. Output "**xReady**" only refers to the reading out of measured values and is not considered when configuring the module.

The last read-out values are displayed at outputs "**adwCurrent**", "**adwMinCurrent**", "**adwMaxCurrent**", "**adwVoltage**", "**adwMinVoltage**", "**adwMaxVoltage**", "**adiPowerFactor**", "**adiEffectivePower**", "**adwApparentPower**" and "**adwEnergyConsumption**".

Output "**rTotalEnergyConsumption**" indicates the energy consumption for all three phases.

NOTE:

- 1.) The 3-Phase Power Measurement module 750-493 can record up to 4294 kWh * transmission ratio. (overrun of the energy consumption at the earliest after 2.13 years).
- 2.) The 3-Phase Power Measurement module 750-493/000-001 can record up to 21470 kWh * transmission ratio. (overrun of the energy consumption at the earliest after 2.13 years).
- 3.) Maximum current transformer ratio:
750-493 -> 1:1000 (transmission ratio 1000)
750-493/000-001 -> 5:1000 (transmission ratio 200)
- 4.) A positive edge at the "**xEnable**" input disables both user scaling (transformer ratio in the module) and scaling factor (scaling for energy consumption).
- 5.) When the current transformer ratio is changed afterwards, it is absolutely necessary to delete the energy consumption.

1-Phase Power Measurement (Fb750_493_Master1Phase)

WAGO-I/O-PRO CAA Library Elements		
Category:	Building automation	
Name:	Fb750_493_Master1Phase	
Type:	Function: <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
Name of library:	PowerMeasurement_03.lib	
Applicable to:	See release note	
Appropriate library:	mod_com.lib	
Input parameter:		
	Data type:	Comment:
xEnable	BOOL	Enabling for reading measured values Default setting = TRUE
tCycleTime	TIME	Time for cyclic polling of measured values Default setting = t#1s
wCurrentTransformerRatio	WORD	Divisor for current transformer ratio 1:X Default setting = 1
bModule_750_493	BYTE	Specifies which 3-Phase Power Measurement module 750-493 is to be addressed at the controller. Counting from left to right. Default setting = 1
bPhase	BYTE	Specification, which Phase should be measured. Default setting = 1
Input/output parameter:		
	Data type:	Comment:
typRegister750_493	typRegister750_493	Configuration parameters of 750-493 module
.typModeSetting	typModeSetting	Operation mode settings
.UserScalingActivated	BOOL	User scaling is used. (1: transformer ratio divisor)
.WatchdogTimerNotActive	BOOL	Deactivation of watchdog timer
.FlexibleProcessImage	BOOL	Flexible process image activated
.DC_FilterBypassed	BOOL	DC filter is bypassed
.EnergyConsumptionInverted	BOOL	Energy consumption measurement inverted (generating operation).
.AutomaticDeletingMinMaxValues	BOOL	Automatic deletion of minimum and maximum current and voltage values activated
.ScalingFactorEnergyLevel	WORD	Scaling factor for measuring energy level

.UndervoltageThreshold	WORD	Undervoltage threshold [0.1 V]
.DivisorForTransformer Ratio	WORD	Divisor for transformer ratio. Must be activated via "UserScalingActivated"
.TimeForDeletingMinMax Values	WORD	Time constants for automatic deletion of min. and max. values [ms]. "AutomaticDeletingMinMaxValues" must be activated. Resolution = 10
.MeasuringCycleTime	WORD	Measuring cycle time [ms]
.ReadConfig	BOOL	Start reading register values
.WriteConfig	BOOL	Start writing register values
.FactoryDefault	BOOL	Reset module to factory default
.ErrorConfig	BOOL	Error while reading or writing registers
.xSaveEnergy Consumption	BOOL	The energy consumption is saved to the EEPROM by a positive edge ahead of time.
.xDeleteEnergy Consumption	BOOL	The energy consumption is deleted by a positive edge.
.xDeleteMinCurrent	BOOL	The minimum current is deleted by a positive edge.
.xDeleteMaxCurrent	BOOL	The maximum current is deleted by a positive edge.
.xDeleteMinVoltage	BOOL	The minimum voltage is deleted by a positive edge.
.xDeleteMaxVoltage	BOOL	The maximum voltage is deleted by a positive edge.
.xDeleteMinMaxValues	BOOL	All minimum and maximum values are deleted by a positive edge.
Return value:		
Data type:		
Comment:		
xReady	BOOL	Read status of measured values TRUE = Read procedure deactivated FALSE = Read procedure activated
bError	BYTE	Error evaluation: 0x00: no error 0x01: Undervoltage threshold undershot 0x02: Communication timeout 0x03: Rated current is not identified 0x04: 750-493 module is not identified
dwCurrent	DWORD	Current (rms value) [mA]
dwMinCurrent	DWORD	Minimum current [mA]
dwMaxCurrent	DWORD	Maximum current [mA]
dwVoltage	DWORD	Voltage (rms value) [0.1 V]
dwMinVoltage	DWORD	Minimum voltage [0.1 V]
dwMaxVoltage	DWORD	Maximum voltage [0.1 V]
diPowerFactor	DINT	Power factor [0.01]
diEffectivePower	DINT	Effective power [0.1 W]
dwApparentPower	DWORD	Apparent power [0.1 VA]
dwEnergyConsumption	DWORD	Energy consumption [Wh]

Graphical display:

Fb750_493_Master1Phase

xEnable tCycleTime wCurrentTransformerRatio bModule_750_493 bPhase typRegister750_493 ▶	xReady bError dwCurrent dwMinCurrent dwMaxCurrent dwVoltage dwMinVoltage dwMaxVoltage diPowerFactor diEffectivePower dwApparentPower dwEnergyConsumption
--	---

Configuration interface:

Configuration 750-493

<p style="text-align: center; margin: 0;">Register values</p> <p>Undervoltage threshold: <input style="width: 80px;" type="text" value="100 * 0,1V"/></p> <p>Time for deleting min / max values: <input style="width: 80px;" type="text" value="2000 ms"/></p> <p>Measuring cycle period: <input style="width: 80px;" type="text" value="50 ms"/></p>	<p style="text-align: center; margin: 0;">Delete measured values</p> <p>Minimum current <input style="width: 40px;" type="button" value="Delete"/></p> <p>Maximum current <input style="width: 40px;" type="button" value="Delete"/></p> <p>Minimum voltage <input style="width: 40px;" type="button" value="Delete"/></p> <p>Maximum voltage <input style="width: 40px;" type="button" value="Delete"/></p> <p>All min. max. values <input style="width: 40px;" type="button" value="Delete"/></p> <p>Energy consumption <input style="width: 40px;" type="button" value="Delete"/></p>
<p style="text-align: center; margin: 0;">Mode of operation</p> <p>Energy consumption measurement inverted <input type="checkbox"/></p> <p>Automatic deleting of min.- and max. values <input type="checkbox"/></p> <p>DC filter is bypassed <input type="checkbox"/></p>	<div style="background-color: #00FF00; text-align: center; padding: 5px; margin: 5px 0;">Status</div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="text-align: center;"> <p style="font-size: 8px;">All configuration parameters will be set to factory default</p> <input style="width: 80px;" type="button" value="Factory settings"/> </div> <div style="text-align: center;"> <input style="width: 80px;" type="button" value="Read configuration"/> </div> <div style="text-align: center;"> <input style="width: 80px;" type="button" value="Write configuration"/> </div> </div>

Function description:

The **Fb750_493_Master1Phase** function block allows the measured values of one phase to be cyclically read out and the configuration of one phase of the 3-Phase Power Measurement Module to be changed.

Cyclic polling of the measured values is performed if the **"xEnable"** input is TRUE. The **"tCycleTime"** input parameter determines the cycle time.

If the timeout time is exceeded or the undervoltage threshold is undershot, the **"bError"** output indicates an error code.

Using transformers for current measurement, the current transformer ratio can be entered via the **"wCurrentTransformerRatio"** input. The current transformer ratio is always 1 : X.

The 3-Phase Power Measurement Module with which this function block must communicate is selected at input **"bModule_750_493"**. The phase of the power measurement module is determined by the **"bPhase"** input.

The structure variable **"typRegister750_493"** contains all configuration parameters for one phase of the 3-Phase Power Measurement Module. The configuration interface **Config1Phase750_493** is stored in the library for convenient configuration of the 3-Phase Power Measurement Module.

The function block reads out the measured values when output **"xReady"** is FALSE. Output **"xReady"** only refers to the reading out of measured values and is not considered when configuring the module.

The last read-out values are displayed at outputs **"adwCurrent"**, **"adwMinCurrent"**, **"adwMaxCurrent"**, **"adwVoltage"**, **"adwMinVoltage"**, **"adwMaxVoltage"**, **"adiPowerFactor"**, **"adiEffectivePower"**, **"adwApparentPower"** and **"adwEnergyConsumption"**.

NOTE:

- 1.) The 3-Phase Power Measurement module 750-493 can record up to 4294 kWh * transmission ratio. (overrun of the energy consumption at the earliest after 2.13 years).
- 2.) The 3-Phase Power Measurement module 750-493/000-001 can record up to 21470 kWh * transmission ratio. (overrun of the energy consumption at the earliest after 2.13 years).
- 3.) Maximum current transformer ratio:
 750-493 -> 1:1000 (transmission ratio 1000)
 750-493/000-001 -> 5:1000 (transmission ratio 200)
- 4.) A positive edge at the **"xEnable"** input disables both user scaling (transformer ratio in the module) and scaling factor (scaling for energy consumption).
- 5.) When the current transformer ratio is changed afterwards, it is absolutely necessary to delete the energy consumption.

1-Phase Power Measurement IPC (Fb750_493_Master1Phase_IPC)

WAGO-I/O-PRO CAA Library Elements		
Category:	Building automation	
Name:	Fb750_493_Master1Phase_IPC	
Type:	Function: <input type="checkbox"/>	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
Name of library:	PowerMeasurement_03.lib	
Applicable to:	See release note	
Input parameter:	Data type:	Comment:
xEnable	BOOL	Enabling for reading measured values Default setting = TRUE
tCycleTime	TIME	Time for cyclic polling of measured values Default setting = t#1s
wCurrentTransformerRatio	WORD	Divisor for current transformer ratio 1:X Default setting = 1
bPhase	BYTE	Specification, which Phase should be measured. Default setting = 1
abIn_Data_750_493	ARRAY [0..3] OF BYTE	Input array for one channel of the 3-phase power measurement module
Input/output parameter:	Data type:	Comment:
abOut_Data_750_493	ARRAY [0..3] OF BYTE	Output array for one channel of the 3-phase power measurement module
typRegister750_493	typRegister 750_493	Configuration parameters of 750-493 module
.typModeSetting	typMode Setting	Operation mode settings
.UserScalingActivated	BOOL	User scaling is used. (1: transformer ratio divisor)
.WatchdogTimerNot Active	BOOL	Deactivation of watchdog timer
.FlexibleProcessImage	BOOL	Flexible process image activated
.DC_FilterBypassed	BOOL	DC filter is bypassed
.EnergyConsumption Inverted	BOOL	Energy consumption measurement inverted (generating operation).
.AutomaticDeleting MinMaxValues	BOOL	Automatic deletion of minimum and maximum current and voltage values activated
.ScalingFactorEnergy Level	WORD	Scaling factor for measuring energy level
.UndervoltageThreshold	WORD	Undervoltage threshold [0.1 V]
.DivisorForTransformer Ratio	WORD	Divisor for transformer ratio. Must be activated via "UserScalingActivated"

.TimeForDeletingMinMax Values	WORD	Time constants for automatic deletion of min. and max. values [ms]. "AutomaticDeletingMinMaxValues" must be activated. Resolution = 10
.MeasuringCycleTime	WORD	Measuring cycle time [ms]
.ReadConfig	BOOL	Start reading register values
.WriteConfig	BOOL	Start writing register values
.FactoryDefault	BOOL	Reset module to factory default
.ErrorConfig	BOOL	Error while reading or writing registers
.xSaveEnergy Consumption	BOOL	The energy consumption is saved to the EEPROM by a positive edge ahead of time.
.xDeleteEnergy Consumption	BOOL	The energy consumption is deleted by a positive edge.
.xDeleteMinCurrent	BOOL	The minimum current is deleted by a positive edge.
.xDeleteMaxCurrent	BOOL	The maximum current is deleted by a positive edge.
.xDeleteMinVoltage	BOOL	The minimum voltage is deleted by a positive edge.
.xDeleteMaxVoltage	BOOL	The maximum voltage is deleted by a positive edge.
.xDeleteMinMaxValues	BOOL	All minimum and maximum values are deleted by a positive edge.
Return value:		
Data type:		
Comment:		
xReady	BOOL	Read status of measured values TRUE = Read procedure deactivated FALSE = Read procedure activated
bError	BYTE	Error evaluation: 0x00: no error 0x01: Undervoltage threshold undershot 0x02: Communication timeout 0x03: Rated current is not identified
dwCurrent	DWORD	Current (rms value) [mA]
dwMinCurrent	DWORD	Minimum current [mA]
dwMaxCurrent	DWORD	Maximum current [mA]
dwVoltage	DWORD	Voltage (rms value) [0.1 V]
dwMinVoltage	DWORD	Minimum voltage [0.1 V]
dwMaxVoltage	DWORD	Maximum voltage [0.1 V]
diPowerFactor	DINT	Power factor [0.01]
diEffectivePower	DINT	Effective power [0.1 W]
dwApparentPower	DWORD	Apparent power [VA] Resolution = 0,1
dwEnergyConsumption	DWORD	Energy consumption [Wh]

Graphical display:

Fb750_493_Master1Phase_IPC	
xEnable	xReady
tCycleTime	bError
wCurrentTransformerRatio	dwCurrent
bPhase	dwMinCurrent
abIn_Data_750_493	dwMaxCurrent
abOut_Data_750_493 ▶	dwVoltage
typRegister750_493 ▶	dwMinVoltage
	dwMaxVoltage
	diPowerFactor
	diEffectivePower
	dwApparentPower
	dwEnergyConsumption

Configuration interface:

Configuration 750-493

Register values	Delete measured values
Undervoltage threshold: <input type="text" value="100 * 0,1V"/>	Minimum current <input type="button" value="Delete"/>
Time for deleting min / max values: <input type="text" value="2000 ms"/>	Maximum current <input type="button" value="Delete"/>
Measuring cycle period: <input type="text" value="50 ms"/>	Minimum voltage <input type="button" value="Delete"/>
	Maximum voltage <input type="button" value="Delete"/>
	All min. max. values <input type="button" value="Delete"/>
	Energy consumption <input type="button" value="Delete"/>
Status	
<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;"> <p>Mode of operation</p> <p>Energy consumption measurement inverted <input type="checkbox"/></p> <p>Automatic deleting of min.- and max. values <input type="checkbox"/></p> <p>DC filter is bypassed <input type="checkbox"/></p> </div> <div style="text-align: center;"> <p> All configuration parameters will be set to factory default <input type="button" value="Factory settings"/></p> </div> </div>	
<input type="button" value="Read configuration"/> <input type="button" value="Write configuration"/>	

Function description:

The **Fb750_493_Master1Phase_IPC** function block allows the measured values of one phase to be cyclically read out and the configuration of one phase of the 3-Phase Power Measurement Module to be changed.

Cyclic polling of the measured values is performed if the **“xEnable”** input is TRUE. The **“tCycleTime”** input parameter determines the cycle time.

If the timeout time is exceeded or the undervoltage threshold is undershot, the **“bError”** output indicates an error code.

Using transformers for current measurement, the current transformer ratio can be entered via the **“wCurrentTransformerRatio”** input. The current transformer ratio is always 1 : X.

The phase of the power measurement module is determined by the **"bPhase"** input. The **"abIn_Data_750_493"** and **"abOut_Data_750_493"** inputs contain the input or output array for the data of one phase of the 3-Phase Power Measurement Module. The variables at these inputs must be linked to the corresponding hardware address. The address depends on the position at which the module is installed.

Example:

„bPhase“ = 1

abIn_Data_750_493 = Input Phase 1 **AT %IB0** : ARRAY [0..3] OF BYTE;
 abOut_Data_750_493 = Output Phase 1 **AT %QB0** : ARRAY [0..3] OF BYTE;

„bPhase“ = 2

abIn_Data_750_493 = Input Phase 2 **AT %IB4** : ARRAY [0..3] OF BYTE;
 abOut_Data_750_493 = Output Phase 2 **AT %QB4** : ARRAY [0..3] OF BYTE;

„bPhase“ = 3

abIn_Data_750_493 = Input Phase 3 **AT %IB8** : ARRAY [0..3] OF BYTE;
 abOut_Data_750_493 = Output Phase 3 **AT %QB8** : ARRAY [0..3] OF BYTE;

The structure variable **"typRegister750_493"** contains all configuration parameters for one phase of the 3-Phase Power Measurement Module. The configuration interface **Config1Phase750_493** is stored in the library for convenient configuration of the 3-Phase Power Measurement Module.

The function block reads out the measured values when output **"xReady"** is FALSE. Output **"xReady"** only refers to the reading out of measured values and is not considered when configuring the module.

The last read-out values are displayed at outputs **"adwCurrent"**, **"adwMinCurrent"**, **"adwMaxCurrent"**, **"adwVoltage"**, **"adwMinVoltage"**, **"adwMaxVoltage"**, **"adiPowerFactor"**, **"adiEffectivePower"**, **"adwApparentPower"** and **"adwEnergyConsumption"**.

NOTE:

- 1.) The 3-Phase Power Measurement module 750-493 can record up to 4294 kWh * transmission ratio. (overrun of the energy consumption at the earliest after 2.13 years).
- 2.) The 3-Phase Power Measurement module 750-493/000-001 can record up to 21470 kWh * transmission ratio. (overrun of the energy consumption at the earliest after 2.13 years).
- 3.) Maximum current transformer ratio:
 750-493 -> 1:1000 (transmission ratio 1000)
 750-493/000-001 -> 5:1000 (transmission ratio 200)
- 4.) A positive edge at the **"xEnable"** input disables both user scaling (transformer ratio in the module) and scaling factor (scaling for energy consumption).
- 5.) When the current transformer ratio is changed afterwards, it is absolutely necessary to delete the energy consumption.



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