

WAGO  **SYSTEM** **750**

Library for Building Automation



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

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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:	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
Name of library:		PowerMeasurement_01.lib	
Applicable to:		Programmable fieldbus controller (not 750-812 / 814 / 815 / 816)	
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#15s
x750_493_000_001		BOOL	Switching over from 1 A to 5 A measurement module Default setting = FALSE
xSaveEnergyConsumption		BOOL	The energy consumption is saved to the EEPROM by a positive edge ahead of time.
xDelete EnergyConsumptionL1		BOOL	The energy consumption of the first phase is deleted by a positive edge.
xDelete EnergyConsumptionL2		BOOL	The energy consumption of the second phase is deleted by a positive edge.
xDelete EnergyConsumptionL3		BOOL	The energy consumption of the third phase is deleted by a positive edge.
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 typRegister750_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 [V] Resolution = 0.1
.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.
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
awCurrent	ARRAY[1..3] OF WORD	Current (rms value) [A] Resolution = 0.001
awVoltage	ARRAY [1..3] OF WORD	Voltage (rms value) [V] Resolution = 0.1
aiPowerFactor	ARRAY [1..3] OF INT	Power factor Resolution = 0.01

aiEffectivePower	ARRAY [1..3] OF INT	Effective power [W] Resolution = 0.1
adwEnergyConsumption	ARRAY [1..3] OF DWORD	Energy consumption (the resolution depends on the scaling factor)
awMaxCurrent	ARRAY [1..3] OF WORD	Maximum current [A] Resolution = 0.001
awMaxVoltage	ARRAY [1..3] OF WORD	Maximum voltage [V] Resolution = 0.1
awMinCurrent	ARRAY [1..3] OF WORD	Minimum current [A] Resolution = 0.001
awMinVoltage	ARRAY [1..3] OF WORD	Minimum voltage [V] Resolution = 0.1

Graphical display:

Fb750_493_Master3Phase	
-xEnable	xReady-
-tCycleTime	abError-
-x750_493_000_001	awCurrent-
-xSaveEnergyConsumption	awVoltage-
-xDeleteEnergyConsumptionL1	aiPowerFactor-
-xDeleteEnergyConsumptionL2	aiEffectivePower-
-xDeleteEnergyConsumptionL3	adwEnergyConsumption-
-abIn_Data_750_493	awMaxCurrent-
-abOut_Data_750_493 ▶	awMaxVoltage-
-typConfig3Phase ▶	awMinCurrent-
	awMinVoltage-

Configuration interface:

Configuration 3-Phase Power Measurement Module 750-493

Register values L1

Scaling factor energy level:

Undervoltage threshold:

Devisor for current transformer ratio:

Time for deleting min / max values:

Mode of operation

L1 L2 L3

Energy consumption measurement inverted ☐ ☐ ☐

Automatic deleting of min.- and max. values ☒ ☒ ☒

Register values L2

Scaling factor energy level:


Undervoltage threshold:

Devisor for current transformer ratio:

Time for deleting min / max values:

Sampling time

Measuring cycle period:

 All configuration parameters will be set to factory default

Register values L3

Scaling factor energy level:

Undervoltage threshold:

Devisor for current transformer ratio:

Time for deleting min / max values:

Status Configuration

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.

The input **"x750_493_000_001"** adjusts the scaling of the measured values to the 5 A variant of the 3-phase power measurement module.

The module registers the energy consumption in the RAM and saves these values to the EEPROM in 15-minute cycles. A positive edge at the **"xSaveEnergyConsumption"** writes the energy consumption in EEPROM ahead of time.

A positive edge at the **"xDeleteEnergyConsumptionL1"**, **"xDeleteEnergyConsumptionL2"** or **"xDeleteEnergyConsumptionL3"** inputs deletes the energy consumption of the respective phase.

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 **"awCurrent"**, **"awVoltage"**, **"aiPowerFactor"**, **"aiEffectivePower"**, **"adwEnergyConsumption"**, **"awMaxCurrent"**, **"awMaxVoltage"**, **"awMinCurrent"** and **"awMinVoltage"**.

NOTE:

- 1.) The maximum energy consumption that can be recorded with the 750-493 module (1 A) is independent of the 65535 unit. With the 750-493 module (5 A), the maximum energy consumption that can be recorded is 5 x 65535 (327675).
- 2.) A positive edge at the **"xEnable"** input sets the following operation mode settings automatically:
 - Simple process image
 - The DC filter is bypassed
 - User scaling is activated

1-Phase Power Measurement (Fb750_493_Master1Phase)

WAGO-I/O-PRO CAA Library Elements			
Category:		Building automation	
Name:		Fb750_493_Master1Phase	
Type:		Function:	Function block <input checked="" type="checkbox"/> Program <input type="checkbox"/>
Name of library:		PowerMeasurement_01.lib	
Applicable to:		Programmable fieldbus controller (not 750-812 / 814 / 815 / 816)	
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#15s
x750_493_000_001		BOOL	Switching over from 1 A to 5 A measurement module Default setting = FALSE
xSaveEnergyConsumption		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.
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		typConfig 3Phase	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 [V] Resolution = 0.1
.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
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
wCurrent	WORD	Current (rms value) [A] Resolution = 0.001
wVoltage	WORD	Voltage (rms value) [V] Resolution = 0.1
iPowerFactor	INT	Power factor Resolution = 0.01
iEffectivePower	INT	Effective power [W] Resolution = 0.1
dwEnergyConsumption	DWORD	Energy consumption (the resolution depends on scale factor)
wMaxCurrent	WORD	Maximum current [A] Resolution = 0.001
wMaxVoltage	WORD	Maximum voltage [V] Resolution = 0.1
wMinCurrent	WORD	Minimum current [A] Resolution = 0.001
wMinVoltage	WORD	Minimum voltage [V] Resolution = 0.1

Graphical display:

Fb750_493_Master1Phase	
xEnable	xReady
tCycleTime	bError
x750_493_000_001	wCurrent
xSaveEnergyConsumption	wVoltage
xDeleteEnergyConsumption	iPowerFactor
abIn_Data_750_493	iEffectivePower
abOut_Data_750_493 ▶	dwEnergyConsumption
typRegister750_493 ▶	wMaxCurrent
	wMaxVoltage
	wMinCurrent
	wMinVoltage

Configuration interface:


Configuration 750-493

Register values

Scaling factor energy level: mWh
Undervoltage threshold: 100 * 0,1V
Devisor for current transformer ratio: 1 : 5
Time for deleting min / max values: 2000 ms
Measuring cycle period: 50 ms

Mode of operation

Energy consumption measurement inverted ☐
Automatic deleting of min.- and max. values ☒


All configuration parameters will be set to factory default

Factory settings

Read configuration

Write configuration

Status

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.

Input **"x750_493_000_001"** adjusts the scaling of the measured values to the 5 A variant of the 3-phase power measurement module.

The module registers the energy consumption in the RAM and saves these values to the EEPROM in 15-minute cycles. A positive edge at the **"xSaveEnergyConsumption"** writes the power consumption in EEPROM ahead of time.

The energy consumption is deleted by a positive edge at the **"xDeleteEnergyConsumption"** 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:

abIn_Data_750_493 = Input **AT %IB0** : ARRAY [0..3] OF BYTE;

abOut_Data_750_493 = Output **AT %QB0** : 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 **"wCurrent"**, **"wVoltage"**, **"iPowerFactor"**, **"iEffectivePower"**, **"dwEnergyConsumption"**, **"wMaxCurrent"**, **"wMaxVoltage"**, **"wMinCurrent"** and **"wMinVoltage"**.

NOTE:

- 3.) The maximum energy consumption that can be recorded with the 750-493 module (1 A) is independent of the 65535 unit. With the 750-493 module (5 A), the maximum energy consumption that can be recorded is 5 x 65535 (327675).
- 4.) A positive edge at the **"xEnable"** input sets the following operation mode settings automatically:
 - Simple process image
 - The DC filter is bypassed
 - User scaling is activated



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