OMRON

Application Library

OEN_Components 1.06.5

Sysmac Function Block Library for Panel Components

User’s Manual

Contents

Introduction

Thank you for using the Application Library: **OEN_Components**
Use it when programming with the automation software Sysmac Studio.
This manual contains information that is necessary to use the Library with Sysmac Studio.
Hereinafter, the function blocks are described as FB, functions as FNs.

1.1. Notice

This manual describes the necessary information to use the Application Library. Refer also to the user's manuals for Application Library, the *Sysmac Studio Version1 Operation Manual* (Cat.No. W504)

Please read and understand this manual before using the Library. Keep this manual in a safe place where it will be available for reference during operation.

1.2. Terms and Conditions Agreement

1 NO WARRANTY

1） The functions and function block Library is distributed as a sample in the hope that it will be useful, but without any warranty. It is provided “as is” without warranty of any kind, either expressed or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. The entire risk as to the quality and performance of the function block is with you. Should the function block prove defective, you assume the cost of all necessary servicing, repair or correction.

2） In no event unless required by applicable law the author will be liable to you for damages, including any general, special, incidental or consequential damages arising out of the use or inability to use the function block (including but not limited to loss of data or data being rendered inaccurate or losses sustained by you or third parties or a failure of the function block to operate with any other programs), even if the author has been advised of the possibility of such damages.

2 LIMITATION OF LIABILITY

1) OMRON SHALL HAVE NO LIABILITY FOR DEFECT OF THE SOFTWARE.
2) OMRON SHALL HAVE NO LIABILITY FOR SOFTWARE PARTS DEVELOPED BY THE USER OR ANY THIRD PARTY USING THE FUNCTION BLOCK DESCRIBED ON THIS MANUAL.

3 APPLICABLE CONDITIONS

USER SHALL NOT USE THE SOFTWARE FOR THE PURPOSE THAT IS NOT PROVIDED IN THE ATTACHED USER MANUAL.

4 CHANGE IN SPECIFICATION

The software specifications and accessories may be changed at any time based on improvements and other reasons.

5 ERRORS AND OMISSIONS

The information in this manual has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

1.3. Safety Precautions

Definition of Precautionary Information

The following notation is used in this manual to provide precautions required to ensure safe usage of OEN_Components Library.
The safety precautions that are provided are extremely important to safety. Always read and heed the information provided in all safety precautions.

The following notation is used.

⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. Additionally, there may be severe property damage.

⚠ Caution	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

Precautions for Safe Use

Indicates precautions on what to do and what not to do to ensure safe usage of the product.

Precautions for Correct Use

Indicates precautions on what to do and what not to do to ensure proper operation and performance.

Additional Information

Additional information to read as required.
This information is provided to increase understanding or make operation easier.

	The triangle symbol indicates precautions (including warnings). The specific operation is shown in the triangle and explained in text. This example indicates a general precaution.
	The filled circle symbol indicates operations that you must do. The specific operation is shown in the circle and explained in text. This example shows a general precaution for something that you must do.

Warning list

WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. Additionally, there may be severe property damage.

Emergency stop circuits, interlock circuits, hardware limit and similar safety measures must be provided in external control circuits.
Using this FB in a device, confirm that the program and FB operate properly. Design a program so that safety measures such as fail-safe circuits are implemented outside of the FB

Caution list

Caution	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

Confirming an operation of the control program, including this FB. Trial operation such as the concerned motor runs in low velocity is recommended.
Performing adjustment of the device controlled by the program with this FB, secure the safety of the machine.
Do not use this FB for the system with devices and versions not specified in this document. To use, contact your OMRON representative
If a Task Period Exceeded Error occurred by executing this FB, the CPU Unit shifts to an error state. Make sure to set the execution task period to an appropriate value by referring to the execution time of this FB.
Do not delete the instances from the program with online editing during an execution of this FB. Program communication will stop in error.
Make sure to set the input parameters of this FB appropriately in accordance with the actual device. Make settings as described in this manual.

Functions and FunctionBlocks

Applications

The **OEN_Components** is a set of functions and function blocks for panel components. If not notified, these function blocks are compatible with all Sysmac series PLCs.

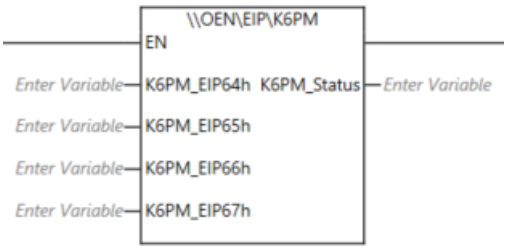
OEN_Components requires OEN_BaseBlocks Library to work properly.

1. *K6PM*

A Function to read data from K6PM temperature monitoring via Ethernet/IP. K6PM_Status includes data for all connected sensors.

https://industrial.omron.no/no/products/k6pm-th

1.1. FN Layout



1.2. Input Variables

Name	Data type	Description
EN	BOOL	Enable function
K6PM_EIP64h	OEN\nEIP\nK6PM\sK6PM_EIP64h	EIP variables containing network data
K6PM_EIP65h	OEN\nEIP\nK6PM\sK6PM_EIP65h	EIP variables containing network data
K6PM_EIP66h	OEN\nEIP\nK6PM\sK6PM_EIP66h	EIP variables containing network data
K6PM_EIP67h	OEN\nEIP\nK6PM\sK6PM_EIP67h	EIP variables containing network data

1.3. Output Variables

Name	Data Type	Description
Return	BOOL	
K6PM_Status	OEN\nEIP\nK6PM\sK6PM	Structure that holds the K6PM data

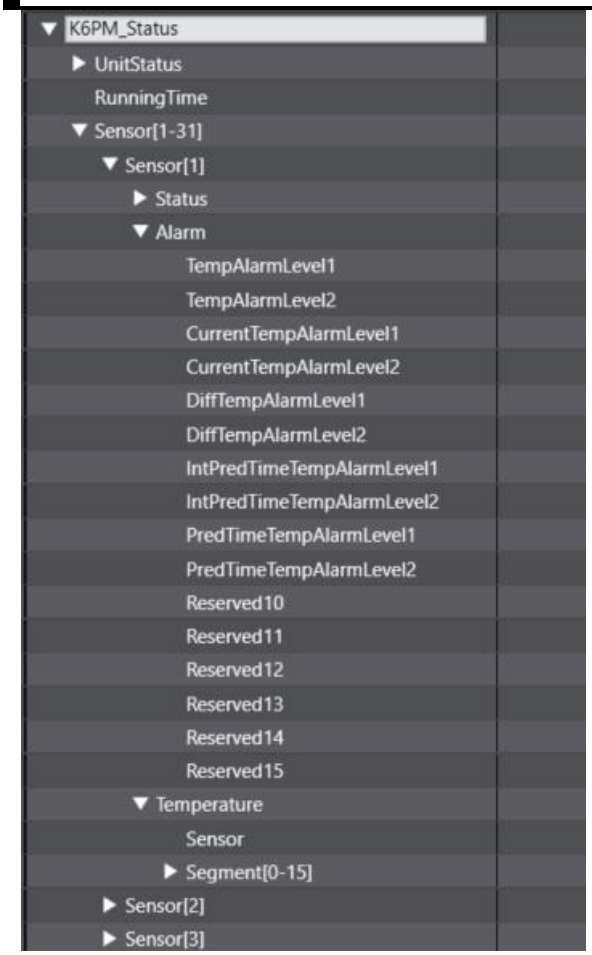
1.4. Revisions

Revision	In Library	Correction
1.0.0	1.06.4	

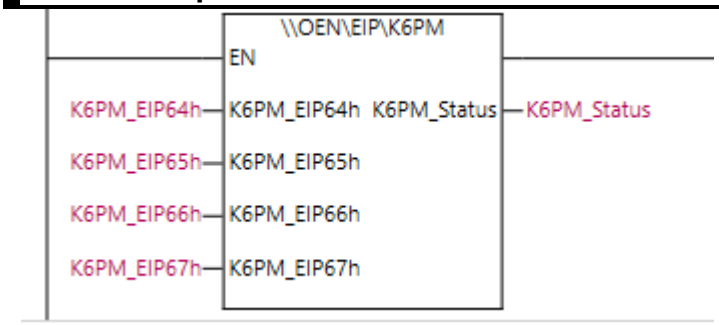
1.5. Credits

	Name
Omron - Norway	Kjell Baardsgaard

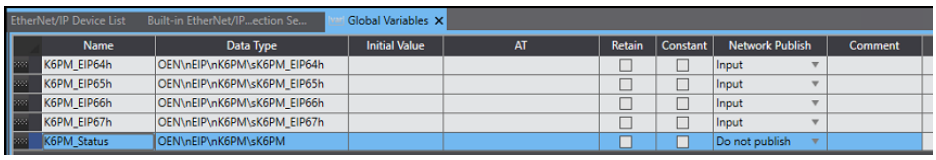
1.6. Structure



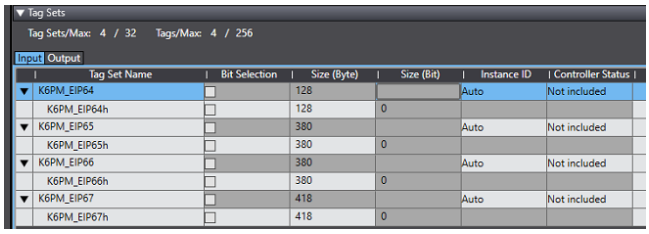
1.7. Example



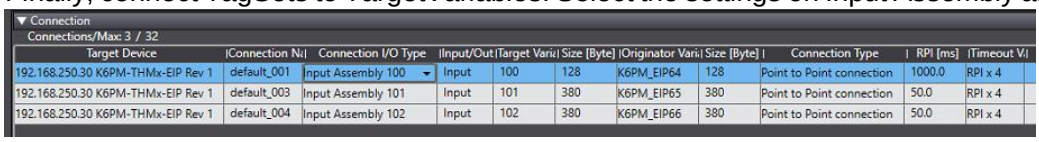
The 5 Global variables in the example are shown below. Note that the EIP variables have NetworkPublish=Input. There is no need to set up all the variables if you do not have a complete set of sensors (31pcs).



In EIP Connection Setup, create input tagset with the corresponding Global variable.



Finally, connect TagSets to TargetVariables. Select the settings on Input Assembly and RPI (1000ms).



RPI=Refresh rate. Should be set to 1000ms or more according to the Manual H231

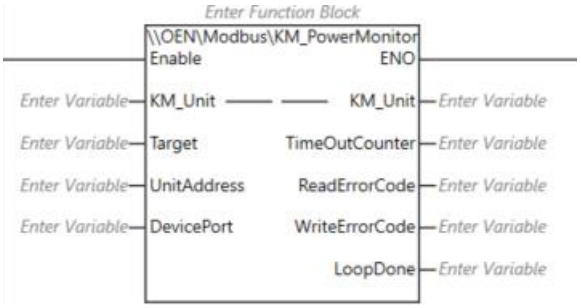
2. KM_PowerMonitor

DevicePort_Setup in OEN_BaseBlocks simplifies the setup of the DevicePort input on the KM_PowerMonitor which is an FB for communication with Omron's KM-N2 Power Monitor via ModbusRTU. The block continuously reads data from KM and updates the data structure **KM_Unit**. There are separate tags in the structure to transfer changes and reset accumulators.
If more than one KM is on the bus, you must create a sequence to avoid queuing messages. Use LoopDone and switch Target to step sequence.

Target can be a variable when multiple KM is connected to the same Modbus connection and is most easily used with **the FB Sequencer** in OEN_BaseBlocks which allows only one FB to be active at a time. When **Target**=**UnitAddress,** the function block will be run.

https://industrial.omron.no/no/products/km-n2

2.1. FB Layout



2.2. Input Variables

Name	Data type	Range	Description
Enable	BOOL		Enable function
Target	UINT	1..99	Value that has to be equal to UnitAddress to allow communication. Used when having several KM on the bus.
UnitAddress	UINT	1..99	Address that is set in the KM
DevicePort	_sDEVICE_PORT		Communication Port data. See example for easy setup.

2.3. In-Out Variables

Name	Data type	Description
KM_Unit	OEN\nModbus\sKM	Structure that holds KM Data

2.4. Output Variables

Name	Data Type	Description
ENO	BOOL	Enable is TRUE
TimeOutCounter	DINT	Counts communication errors
ReadErrorCode	WORD	Modbus Read Error Code
WriteErrorCode	WORD	Modbus Write Error Code
LoopDone	BOOL	KM Read/Write completed. Use it to Step to next KM.

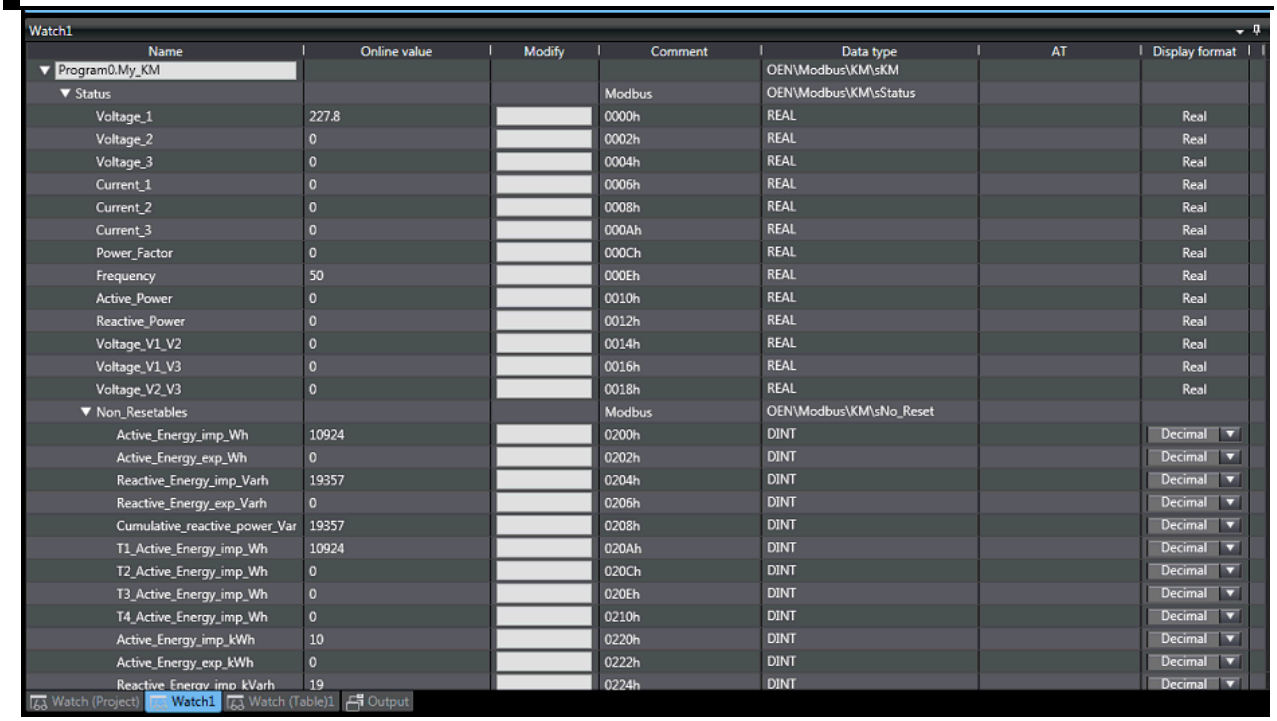
2.5. Revisions

Revision	In Library	Correction
1.4.0	1.06.4	
1.5.0	1.06.5	Added use of Enable. If Enable=FALSE, then Deviceport buffer is Cleared every second.

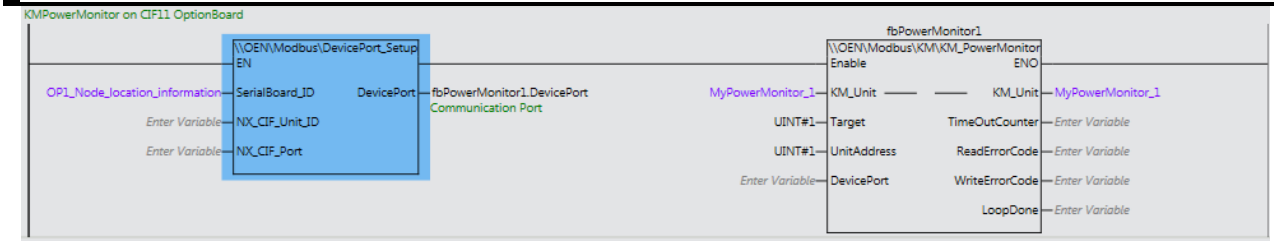
2.6. Credits

	Name
Omron - Norway	Kjell Baardsgaard

2.7. Structure



2.8. Example



Connectable OMRON Split-type Current Transformers (CTs)

Model	Rated primary current	Rated secondary current
KM20-CTN100	100 A	1 A
KM20-CTN250	250 A	
KM20-CTN500	500 A	

Note: The CT cable is connected to the CT (cable length: 1 m).

Make sure the output of the power transformer is 1A or 5A if you choose to use other types.

See Appendix A2 for a complete Guide how to use this Function Block.

3. *S8VK*

A Function to read data from an S8VK-X powersupply via Ethernet/IP. S8VK_EIP take care of raw data coming from S8VK-X. S8VK Status contains a more readable and scaled version of this data.

https://industrial.omron.no/no/products/s8vk-x

3.1. FN Layout

3.2. Input Variables

Name	Data type	Description
EN	BOOL	Enable function
S8VK_EIP	OEN\nEIP\sS8VK	Raw data from Ethernet/IP communication

3.3. Output Variables

Name	Data Type	Description
Return	BOOL	
S8VK_Status	OEN\nEIP\sS8VK	Structure that holds the S8VK data

3.4. Revisions

Revision	In Library	Correction
1.3.0	1.06.4	

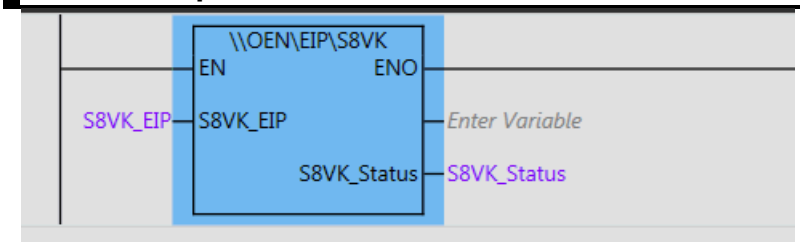
3.5. Credits

	Name
Omron - Norway	Kjell Baardsgaard

3.6. Structure

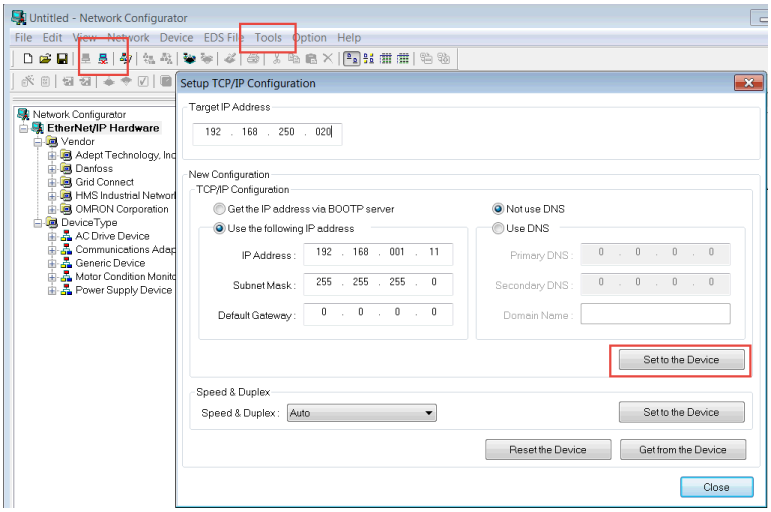
Name	Online value	Modify	Comment	Data type
S8VK_Status				OEN\EIP\sS8VK
MemoryError	False	TRUE FALSE		BOOL
Overheated	False	TRUE FALSE		BOOL
CurrentMeasuringError	False	TRUE FALSE		BOOL
VoltageMeasuringError	False	TRUE FALSE		BOOL
OverheatAlarm	False	TRUE FALSE		BOOL
FUL	True	TRUE FALSE		BOOL
HLF	False	TRUE FALSE		BOOL
DC_Voltage	24.200001		V	REAL
DC_Current	2		A	REAL
Current_Peak	3		A	REAL
ReplaceDate	2032-12-24		yyyy-mm-dd	DATE
PercentLeft	99.900002		%	REAL
TotalHours	10		h	REAL
ContinuousMinutes	376		min	REAL
S8VK_EIP				OEN\EIP\sS8VK_EIP

3.7. Example

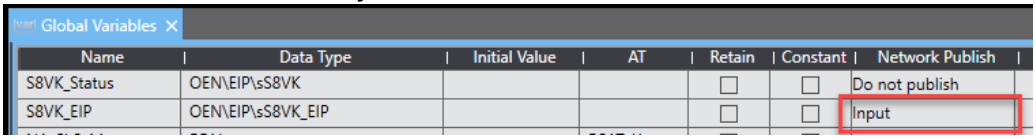


Put your PC in Subnet 192.168.250.

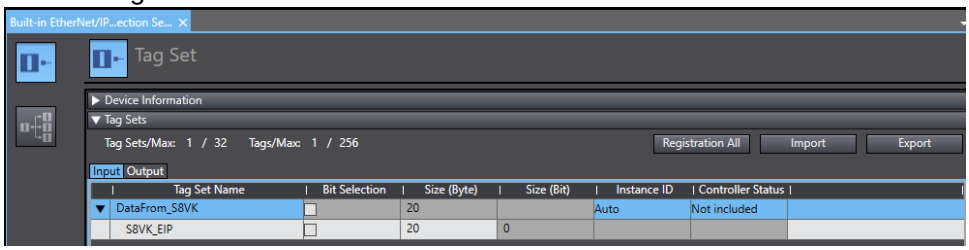
Set a new IP address (if necessary) on S8VK-X with Network Configurator.
Default is 192.168.250.20.



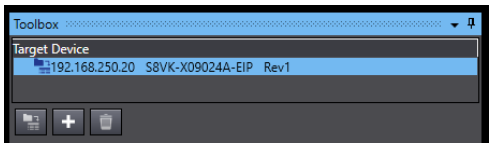
Create Global Variables in Sysmac Studio and edit these as shown below:



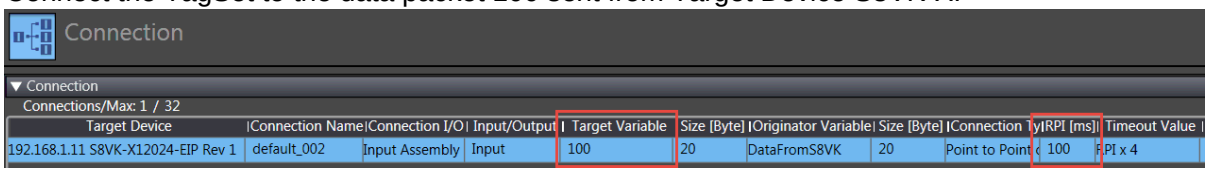
Create TagSet for EthernetIP:



Enter the correct Target corresponding to your Powersupply. Here you also insert the IP address of the S8VK-X.



Connect the TagSet to the data packet 100 sent from Target Device S8VK-X.



4. *Template*

text

4.1. FN Layout

4.2. Input Variables

Name	Data type	Valid Range	Default	Description
EN	BOOL		FALSE	Enable function

4.3. In-Out Variables

Name	Data type	Description

4.4. Output Variables

Name	Data Type	Description
ENO	BOOL	

4.5. Revisions

Revision	In Library	Correction
1.0.0	1.06.4	

4.6. Credits

	Name
Omron - Norway	Kjell Baardsgaard

4.7. Structure

4.8. Example

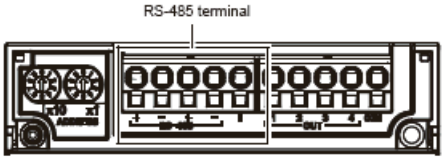
A2 – KM_PowerMonitor FB Guide

The information is taken from the following manuals:

3) **N200-E1-01A KM-N2-FLK Power Monitor Manual**
4) **W540-E1-03 NX-CIF Serial Communication Interface Manual**
5) **W578-E1-01 NX1P2 Hardware User Manual**

Connections

The picture shows the connection on KM-N2. Note the Modbus address wheels that can be set to #01. Place a short between 4-5 if you are not going to proceed to another component via 3 and 4.



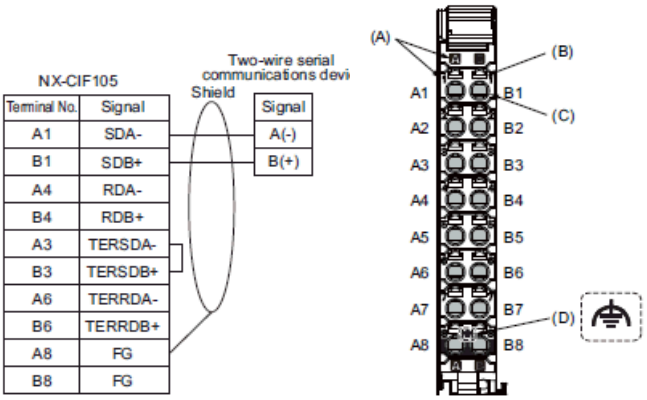
Terminal number	Terminal name	Description
1	RS-485+	+terminal for RS-485
2	RS-485−	−terminal for RS-485
3	RS-485+	RS-485+terminal (for crossover wiring)
4	RS-485−	RS-485−terminal (for crossover wiring)
5	RS-485 E	Terminating resistor for RS-485 (ON when shorted with terminal number 4)

.Terminal number 1 and 3 and terminal number 2 and 4 are electrically connected inside this product.

The image on the left shows the connection on the CIF11 module of NX1P2. The two shorts on the image are not required if you use DIPSW on the back of the module instead. They do the same thing.

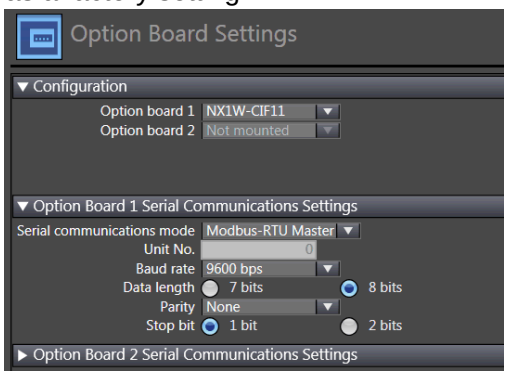
CIF11 SW	CIF11 No.	CIF12 SW	CIF12 No.	Setting		
SW1	1	SW1	1	ON	Terminating resistance provided	Select whether a terminating resistance is provided or not. The value of a terminating resistance is approximately 220 Ω.
				OFF	Terminating resistance not provided	
	2		2	ON	Two-wire type	Select the two-wire or four-wire type. To set the two-wire type, turn ON both No. 2 and No. 3 pins. To set the four-wire type, turn OFF both No. 2 and No. 3 pins.
				OFF	Four-wire type	
	3		3	ON	Two-wire type	
				OFF	Four-wire type	
	4		4	---	---	Not used.
	5	SW2	1	ON	RS control enabled	Select whether to enable the RS control for receive data. To prohibit the echo back, enable the RS control (ON).
				OFF	RS control disabled (continuous reception)	
	6		2	ON	RS control enabled	Select whether to enable the RS control for send data. For a four-wire, 1-to-N connection, enable the RS control (ON) if you connect the Unit to a device on the N side. For a two-wire connection, always enable the RS control (ON).
				OFF	RS control disabled (continuous transmission)	

If you wish to use NX-CIF105 instead, wire as shown below.

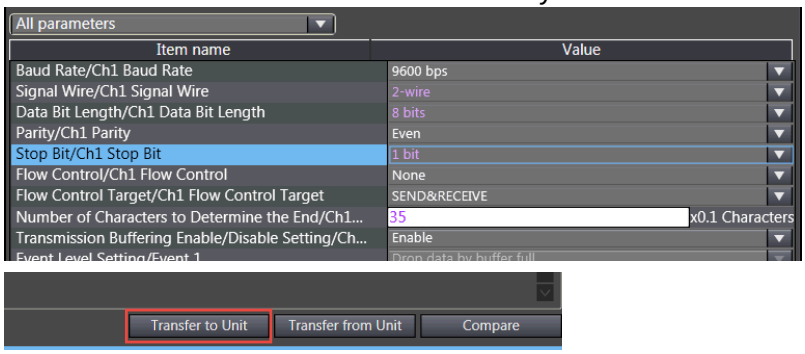


Note the end resistance that is switched on when you load A3 and B3. This is necessary to get stronger and more stable signal.

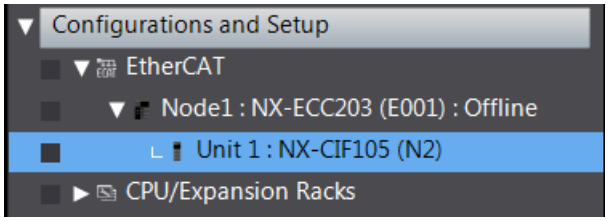
In NX1P2, we need to enter the CIF11 Option Board in the configuration. KM-N2-FLK has this setup as a factory setting:



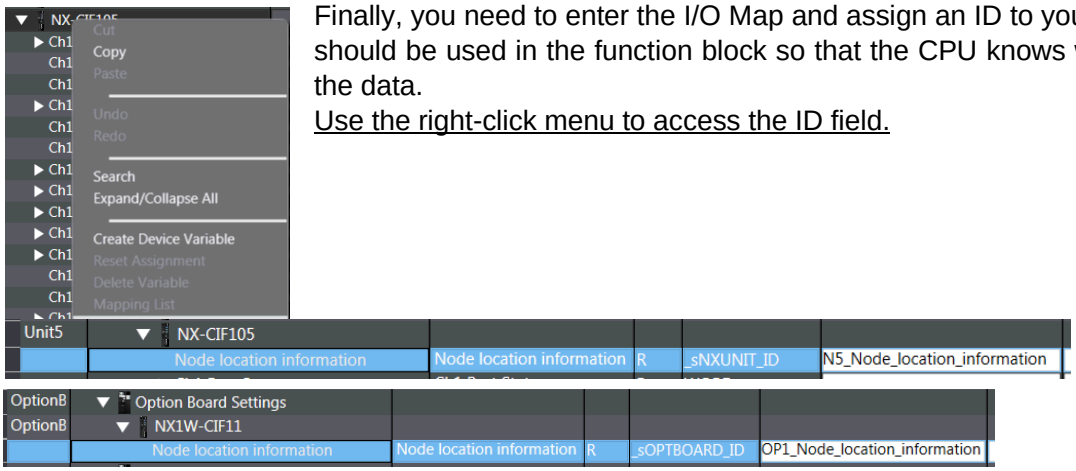
To use NX-CIF105, refer to the settings as shown below. Remember to transfer to NX-CIF105 when you're done.



NX-CIF105 can also be on an NX-EtherCATnode.

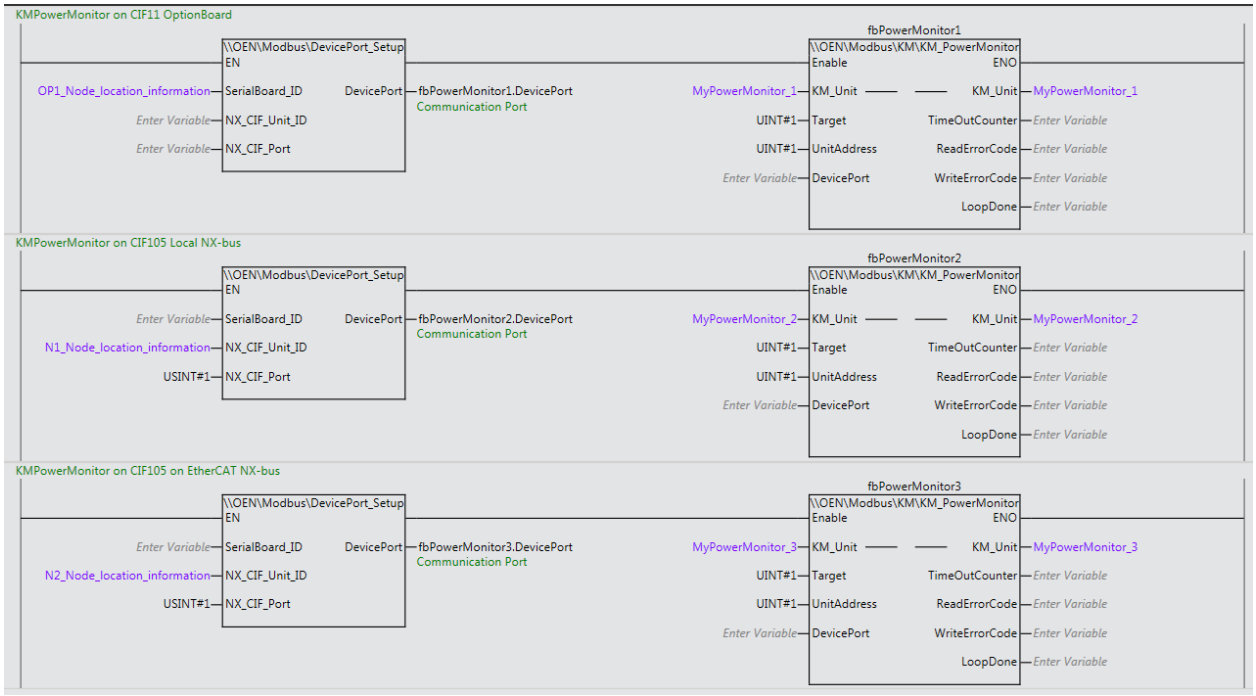


The function block cannot be used if NX-CIF105 is on an NX-Ethernet/IP node.

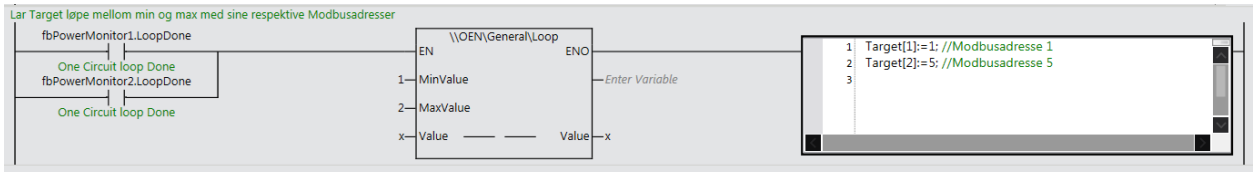


Finally, you need to enter the I/O Map and assign an ID to your CIF. This ID should be used in the function block so that the CPU knows where to send the data.
Use the right-click menu to access the ID field.

Create one of the following rungs based on the solution you have chosen for communication:

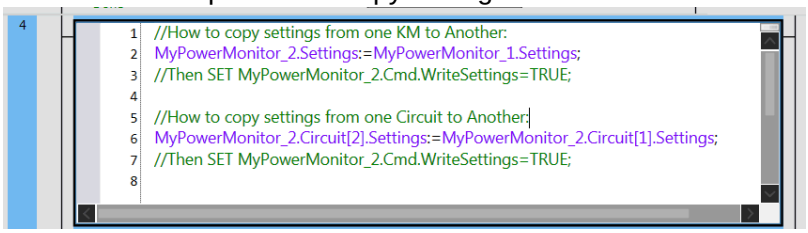


For example, if PowerMonitor1 and PowerMonitor2 had been connected to the same CIF, it could be resolved as follows:

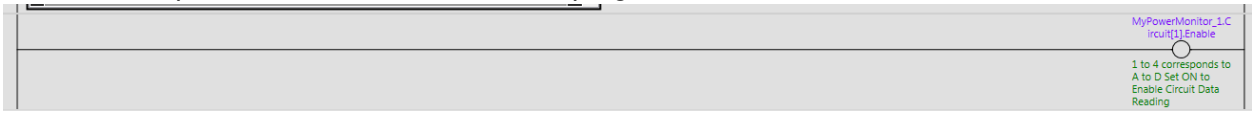


Target[x] and UnitAddress=1 then place the first function block and Target[x] and UnitAddress=5 on the second. **Note that Target[2] is set to #5 and not to #2 because KM-N2 uses a Modbus address for each active target transformer.**

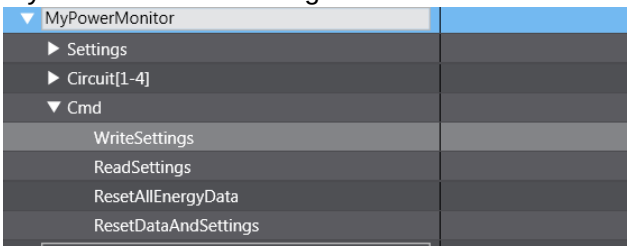
Here is an example how to copy settings:



Circuits to be polled must be "Enabled" in the program.



MyPowerMonitor is a large data structure. Below we see available commands:



Settings contains settings in KM. These can be changed with "WriteSettings" after they are read by activating "ReadSettings".
"ResetAllEnergyData" resets all dynamic counters in KM.
"ResetDataAndSettings" resets KM to factory setting.

All of these are automatically set to FALSE if the command was successful.

A complete overview of the data structure follows on the next pages.

Settings and Cmd for KM-N2-FLK:

MyPowerMonitor				OEN\Modbus\KM\sKM
Settings			Modbus	OEN\Modbus\KM\sCommon_Settings
UnitAddress			2002h R	UINT
Protocol			2200h RW	OEN\Modbus\KM\eProtocol
Comm_Speed			2202h RW	OEN\Modbus\KM\eComm_Speed
Data_Length			2204h RW	OEN\Modbus\KM\eDataLength
Stop_bit			2206h RW	OEN\Modbus\KM\eStopBit
Parity			2208h RW	OEN\Modbus\KM\eParity
Trans_Wait_Time			220Ah RW (ms)	UINT(0..99)
Pulse_Output_Units			220Ch RW	OEN\Modbus\KM\ePulseUnits
VT_ratio			220Eh RW	REAL
Conversion_Factor			2210h RW	REAL
Conversion_Units			2212h RW	STRING[4]
LCD_Off_Time			2214h RW	OEN\Modbus\KM\eLCD_offTime
Alarm			2218h RW	OEN\Modbus\KM\eOn_Off
Tariff			221Ah RW	OEN\Modbus\KM\eOn_Off
Current_Tariff			221Ch RW	OEN\Modbus\KM\eOn_Off
Model			2400h R	STRING[12]
Software			2406h R	STRING[10]
Status_Info			2408h R	DINT
Buffer_Size			240Ah R	UINT
Circuit[1-4]				ARRAY[1..4] OF OEN\Modbus\KM\sCircuit
Cmd				OEN\Modbus\KM\sCommands
WriteSettings				BOOL
ReadSettings				BOOL
ResetAllEnergyData				BOOL
ResetDataAndSettings				BOOL

Refer to the KM documentation for a description of Settings.

Status and Settings for Circuit[1]. The same goes for the other measuring circuits as well.

MyPowerMonitor				OEN\Modbus\KM\sKM
Settings			Modbus	OEN\Modbus\KM\sCommon_Settings
Circuit[1-4]				ARRAY[1..4] OF OEN\Modbus\KM\sCircuit
Circuit[1]			1 to 4 corresponds to A to D	OEN\Modbus\KM\sCircuit
Status			Modbus	OEN\Modbus\KM\sStatus
Voltage_1			0000h	REAL
Voltage_2			0002h	REAL
Voltage_3			0004h	REAL
Current_1			0006h	REAL
Current_2			0008h	REAL
Current_3			000Ah	REAL
Power_Factor			000Ch	REAL
Frequency			000Eh	REAL
Active_Power			0010h	REAL
Reactive_Power			0012h	REAL
Voltage_V1_V2			0014h	REAL
Voltage_V1_V3			0016h	REAL
Voltage_V2_V3			0018h	REAL
Non_Resetables			Modbus	OEN\Modbus\KM\sNo_Reset
Resetables			Modbus	OEN\Modbus\KM\sWith_Reset
Conversion_Value1			0300h	DINT
Conversion_Value2			0302h	DINT
TimeOutCounter			Modbus	DINT
Settings			Modbus	OEN\Modbus\KM\sCircuit_Settings
PhaseAndWire			2000h RW	OEN\Modbus\KM\ePhaseAndWire
CircuitAddress			2002h R	UINT
Pulse_Output			2010h RW	OEN\Modbus\KM\eOn_Off
Voltage_Selected			2012h RW	OEN\Modbus\KM\eVoltage
CT_sec_current			2014h RW	OEN\Modbus\KM\eCurrent
CT_prim_current			2016h RW	DINT(0..99999)
ResetEnergyData			1 to 4 corresponds to A to D	BOOL
Circuit[2]			1 to 4 corresponds to A to D	OEN\Modbus\KM\sCircuit
Circuit[3]			1 to 4 corresponds to A to D	OEN\Modbus\KM\sCircuit
Circuit[4]			1 to 4 corresponds to A to D	OEN\Modbus\KM\sCircuit
Cmd				OEN\Modbus\KM\sCommands

Refer to the KM documentation for a description of Status and Circuit Settings.

Circuit[n]: Log data that cannot be reset and log data that can be reset with "Cmd.ResetAllEnergyData"

Non_Resetables			Modbus	OEN\Modbus\KM\sNo_Reset
Active_Energy_imp_Wh			0200h	DINT
Active_Energy_exp_Wh			0202h	DINT
Reactive_Energy_imp_Varh			0204h	DINT
Reactive_Energy_exp_Varh			0206h	DINT
Cumulative_reactive_power_Varh			0208h	DINT
T1_Active_Energy_imp_Wh			020Ah	DINT
T2_Active_Energy_imp_Wh			020Ch	DINT
T3_Active_Energy_imp_Wh			020Eh	DINT
T4_Active_Energy_imp_Wh			0210h	DINT
Active_Energy_imp_kWh			0220h	DINT
Active_Energy_exp_kWh			0222h	DINT
Reactive_Energy_imp_kVarh			0224h	DINT
Reactive_Energy_exp_kVarh			0226h	DINT
Cumulative_Reactive_Power_kVarh			0228h	DINT
T1_Active_Energy_imp_kWh			022Ah	DINT
T2_Active_Energy_imp_kWh			022Ch	DINT
T3_Active_Energy_imp_kWh			022Eh	DINT
T4_Active_Energy_imp_kWh			0230h	DINT
Resetables			Modbus	OEN\Modbus\KM\sWith_Reset
Active_Energy_imp_Wh			0240h	DINT
Active_Energy_exp_Wh			0242h	DINT
Reactive_Energy_imp_Varh			0244h	DINT
Reactive_Energy_exp_Varh			0246h	DINT
Cumulative_reactive_power_Varh			0248h	DINT
T1_Active_Energy_imp_Wh			024Ah	DINT
T2_Active_Energy_imp_Wh			024Ch	DINT
T3_Active_Energy_imp_Wh			024Eh	DINT
T4_Active_Energy_imp_Wh			0250h	DINT
Active_Energy_imp_kWh			0260h	DINT
Active_Energy_exp_kWh			0262h	DINT
Reactive_Energy_imp_kVarh			0264h	DINT
Reactive_Energy_exp_kVarh			0266h	DINT
Cumulative_Reactive_Power_kVarh			0268h	DINT
T1_Active_Energy_imp_kWh			026Ah	DINT
T2_Active_Energy_imp_kWh			026Ch	DINT
T3_Active_Energy_imp_kWh			026Eh	DINT
T4_Active_Energy_imp_kWh			0270h	DINT

All 4 circuits have separate log data.

Refer to the KM documentation for a description of these variables.