Function Block

Référence	MTCP_ETN Client
Révision	2.3
Auteur	JP Viskovic
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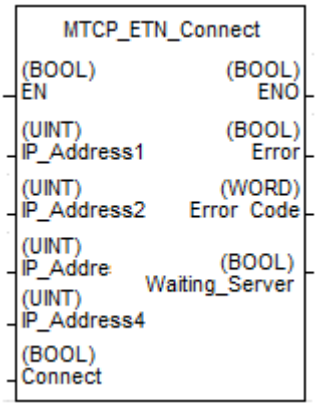
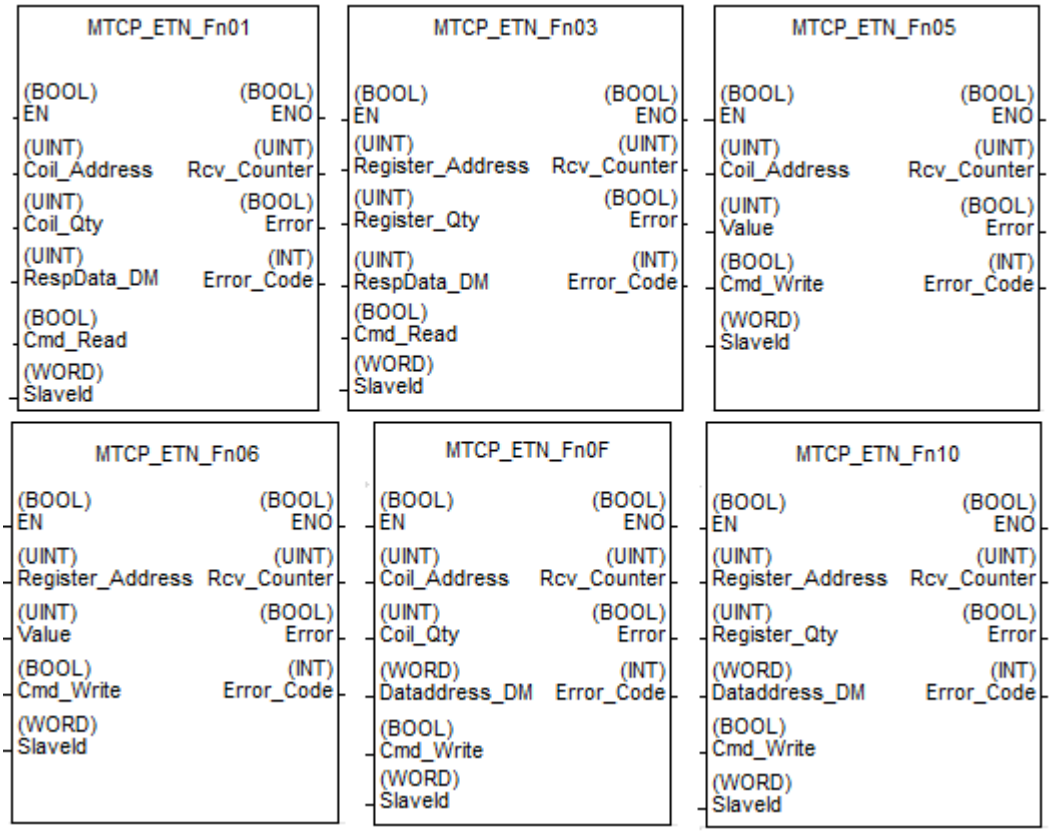
+ Support	http://support-omron.fr/

OMRON ELECTRONICS S.A.S.
14 Rue de Lisbonne
93561 Rosny-sous-Bois cedex

N° Indigo 0 825 825 679
0 . 15€ TTC/mn

Function Block Modbus TCP Client dedicated to ETN21 Unit n°0

Function	Modbus TCP client for CS/CJ1W-ETN21 Unit N°0
Connexion	
Read/write Fn	
File	MTCP_ETN_Client.zip
PLC	- CJ1xx-V3 + CJ1W-ETN21 et CJ2H/M + CJ1W-ETN21 - CS1xx + CS1W-ETN21
Restriction of use	**The ETN21 unit should be set to No 0** **The FB use socket n° 1 and TCP Port number 502**

Conditions of use	The FB Modbus TCP Client provides some read/write features in accordance with the specifications defined by the Modbus organization. The Modbus TCP Client function block is offered 'as is' and may serve as a basis for development. Users should previously test its adequacy to the final application. Omron could not be held responsible in case of malfunction.
Principe	The function block MTCP_ETN_Connect establish the connection with a remote Modbus TCP server when Connect input is activated. ENO output could allow execution of read/write FB via the EN input. List of read/write functions provided :

Code	Modbus Function	Function Block
0x01	Read coils	MTCP_ETN_Fn01
0x02	Read Input Status	MTCP_ETN_Fn02
0x03	Read Holding Registers	MTCP_ETN_Fn03
0x04	Read Input Registers	MTCP_ETN_Fn04
0x05	Write Single Coil	MTCP_ETN_Fn05
0x06	Write Single Register	MTCP_ETN_Fn06
0x0F	Write Multiple Coils	MTCP_ETN_Fn0F
0x10	Write Multiple Registers	MTCP_ETN_Fn10

Memory Area used

by the FB

Type	address	Descriptions
send	D32500-D32506	Zone de consignation de la requête
receive	D32510–D32642	Zone de réception de la réponse

Flags and commands related to ETN21 unit n° 0

Type	address	Descriptions
Flags/command	CIO1500 - CIO1524	More détails : Socket Service de W421
Parameters	D 30000 - D30099	

1- I/O variable of MTCP_ETN_Connect

Input Variables

Name	type	range	Description
EN	Bool	OFF, ON	FB Activation
IP_Address1	UINT	00 - FF	IP Address of the server (byte 1,2,3,4)
IP_Address2			
IP_Address3			
IP_Address4			
Connect	Bool	OFF, ON	Request to connect to the server
Waiting_Server	Bool	OFF, ON	ON: waiting for the synchronization from the server

Output Variables

Name	type	Range	Description
ENO	Bool	OFF, ON	ON : Connected to the server
Error	Bool	OFF, ON	Error flag
Error_Code	UINT	0 - FFFF	Error Code returned by the socket switch or Modbus TCP server (see error code list below).

2- Input Variables of FB MTCP_ETN_Fn01, Fn03, Fn05, Fn06, Fn0F et Fn10

MTCP_ETN_Fn01 MTCP_ETN_Fn02	type	range	Description
EN	Bool	OFF, ON	FB Activation (ENO of FB Connect)
Coil_Address	UINT	0 - FFFF	Address of 1rst coil
Coil_Qty	UINT	0 - 00FF	Number of coils
RespData_DM	UINT	0 - FFFF	Destination of data (DM area)
Cmd_Read	Bool	OFF, ON	Read Command
SlaveID	Word	0- 255	Slave number (00=FF by default)

MTCP_ETN_Fn03 MTCP_ETN_Fn04	type	range	Description
EN	Bool	OFF, ON	FB Activation (ENO of FB Connect)
Register_Address	UINT	0 - FFFF	Address of 1rst register
Register_Qty	UINT	0 - 00FF	Number of registers
RespData_DM	UINT	0 - FFFF	Destination of data (DM area)
Cmd_Read	Bool	OFF, ON	Read Command
SlaveID	Word	0- 255	Slave number (00=FF by default)

MTCP_ETN_Fn05	type	range	Description
EN	Bool	OFF, ON	FB Activation (ENO of FB Connect)
Coil_Address	UINT	0 - FFFF	Address of the coil
Value	Bool	OFF, ON	ON/OFF value to be written
Cmd_Write	Bool	OFF, ON	Writye command
SlaveID	Word	0- 255	Slave number (00=FF by default)

MTCP_ETN_Fn06	type	range	Description
EN	Bool	OFF, ON	FB Activation (ENO of FB Connect)
Register_Address	UINT	0 - FFFF	Address of the register
Value	UINT	0 - FFFF	Value to write
Cmd_Write	Bool	OFF, ON	Write command
SlaveID	Word	0- 255	Slave number (00=FF by default)

MTCP_ETN_Fn0F	type	range	Description
EN	Bool	OFF, ON	FB Activation (ENO of FB Connect)
Coil_Address	UINT	0 - FFFF	Address of 1rst coil
Coil_Qty	UINT	0 - 00FF	Number of coil to write
DataAddress_DM	UINT	0 - FFFF□	Source of data (DM area)
Cmd_Write	Bool	OFF, ON	Read Command
SlaveID	Word	0- 255	Slave number (00=FF by default)

MTCP_ETN_Fn10	type	range	Description
EN	Bool	OFF, ON	FB Activation (ENO of FB Connect)
Register_Address	UINT	0 - FFFF	Address of 1rst register
Register_Qty	UINT	0 - 00FF	Number of registers
DataAdress_DM	UINT	0 - FFFF	Source of data (DM area)
Cmd_Write	Bool	OFF, ON	Write command
SlaveID	Word	0- 255	Slave number (00=FF by default)

3- Output Variables of FB MTCP_ETN_Fn01, Fn03, Fn05, Fn06, Fn0F et Fn10

Name	type	Range	Description
ENO	Bool	OFF, ON	ON : Server Connected
Rcv_Counter	UINT	0 - FFFF	Reception counter
Error	Bool	OFF, ON	Execution error flag
Error_Code	UINT	0 - FFFF	Error Code returned by the socket switch or Modbus TCP server (see error code list below).

Error Code returned by the Modbus TCP server (Modbus exception response)

Code	Description
0001	ILLEGAL FUNCTION
0002	ILLEGAL DATA ADDRESS
0003	ILLEGAL DATA VALUE

Error Code returned by the TCP Socket switch OpenActive, Send and Receive

2607	Socket already in use
0302	CPU Unit error: cannot execute
1100	Number bytes to send/receive not in allowed range
1101	The area designation of the Send/Receive Data address is not in allowable range
1103	The bit number in the Send/Receive data address is not in allowable range
110C	Request switch turned ON during other processing
220F	Specified socket is already processing a SEND request
2210	The specified socket is not connected
2211	Unit is busy: cannot execute
2606	Specified socket is already open as UDP socket
2607	Specified socket service parameter area is already being used by another socket
0020	Connection with remote socket broken during Send (EPIPE)
003E	Internal buffer cannot be obtained due to high reception trafic
0045	Error in communication with remote node
004B	Error communication with remote node (again)
004E	Remote IP address parameter error (ET unreach)
0051	Remote IP address parameter error (Host unreach)
0053	Error communication with remote HOST
0080	Receive request Timed out
0081	Specified socket was closed during receive processing

ANNEXE

Modbus protocol

I/O memory area (CIO) Read Multiple Coils

Example: read 19 bits (CIO 0001.04 to 0002.06)

Request			Response	
	Data			Data
Function Code	0x01		Function Code	0x01
Starting Address(H)	0x00		Byte Count	0x03
Starting Address(L)	**0x14**		Coil Status 27-20	0xCD
Quantity of Coils(H)	0x00		Coil Status 35-28	0x6B
Quantity of Coils(L)	0x13		Coil Status 38-36	0x05

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0CH	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1CH	31 *1*	30 *0*	29 *1*	28 *1*	27 *1*	26 *1*	25 *0*	24 *0*	23 *1*	22 *1*	21 *0*	20 *1*	19	18	17	16
2CH	47	46	45	44	43	42	41	40	39	38 *1*	37 *0*	36 *1*	35 *0*	34 *1*	33 *1*	32 *0*
3CH	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48

Italic characters show the ON/OFF(1/0) status of its bit condition.

Reads registers in I/O memory area

Example: read 3 words (DM 1000 to DM 1002)

Request			Response	
	Data			Data
Function Code	0x03		Function Code	0x03
Starting Address(H)	0x03		Byte Count	0x06
Starting Address(L)	0xE8		Register Value(H)DM1000	0xAB
Quantity of Registers(H)	0x00		Register Value(L) DM1000	0x12
Quantity of Registers(L)	0x03		Register Value(H)DM1001	0x56
			Register Value(L) DM1001	0x78
			Register Value(H)DM1002	0x97
			Register Value(L) DM1002	0x13

DM	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1000	A				B				1				2			
1001	5				6				7				8			
1002	9				7				1				3			

Writes single coil.

Example: write 1 coil. (CIO 0002.02 ON)

Request			Response	
	Data			Data
Function Code	0x05		Function Code	0x05
Output Address(H)	0x00		Output Address(H)	0x00
Output Address(L)	0x22		Output Address(L)	0x22
Output Value(H)	0xFF		Output Value(H)	0xFF
Output Value(L)	0x00		Output Value(L)	0x00

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0CH	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1CH	31 *1*	30 *0*	29 *1*	28 *1*	27 *1*	26 *1*	25 *0*	24 *0*	23 *1*	22 *1*	21 *0*	20 *1*	19	18	17	16
2CH	47	46	45	44	43	42	41	40	39	38 *1*	37 *0*	36 *1*	35 *0*	34 *1*	33 *1*	32 *0*
3CH	63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48

Italic characters show the ON/OFF(1/0) status of its bit condition.

Writes single register.

Example: write &h3AC5 to DM 2000.

Request			Response	
	Data			Data
Function Code	0x06		Function Code	0x06
Register Address(H)	0x07		Register Address(H)	0x07
Register Address(L)	0xD0		Register Address(L)	0xD0
Register Value(H)	0x3A		Register Value(H)	0x3A
Register Value(L)	0xC5		Register Value(L)	0xC5

DM	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
2000	3				A				C				5			
2001																
2002																

Writes registers.

Example: write 2 words into DM1000-1001.

Request			Response	
	Data			Data
Function Code	0x10		Function Code	0x10
Starting Address(H)	0x03		Starting Address(H)	0x03
Starting Address(L)	0xE8		Starting Address(L)	0xE8
Quantity of Registers(H)	0x00		Quantity of Registers(H)	0x00
Quantity of Registers(L)	0x02		Quantity of Registers(L)	0x02
Byte Count	0x04			
Registers Value(H)	0x3A			
Registers Value(L)	0xC5			
Registers Value(H)	0x97			
Registers Value(L)	0x13			

DM	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1000	3				A				C				5			
1001	9				7				1				3			

Writes Multiple coils.

Example: In the case of writing 10 bits (xxxx xx11 1100 1101) to CIO 0001.04.

(X = ignored.)

Request			Response	
	Data			Data
Function Code	0x0F		Function Code	0x0F
Starting Address(H)	0x00		Starting Address(H)	0x00
Starting Address(L)	0x13		Starting Address(L)	0x13
Quantity of Outputs(H)	0x00		Quantity of Outputs(H)	0x00
Quantity of Outputs(L)	0x0A		Quantity of Outputs(L)	0x0A
Byte Count	0x02			
Output Value(H)	0x3A			
Output Value(L)	0x01			

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0CH	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1CH	31 *0*	30 *0*	29 *0*	28 *1*	27 *0*	26 *0*	25 *1*	24 *1*	23 *1*	22 *0*	21 *1*	20 *0*	19 *0*	18 *0*	17 *0*	16 *0*

Italic characters show the ON/OFF(1/0) status of its bit condition.