

Function Block

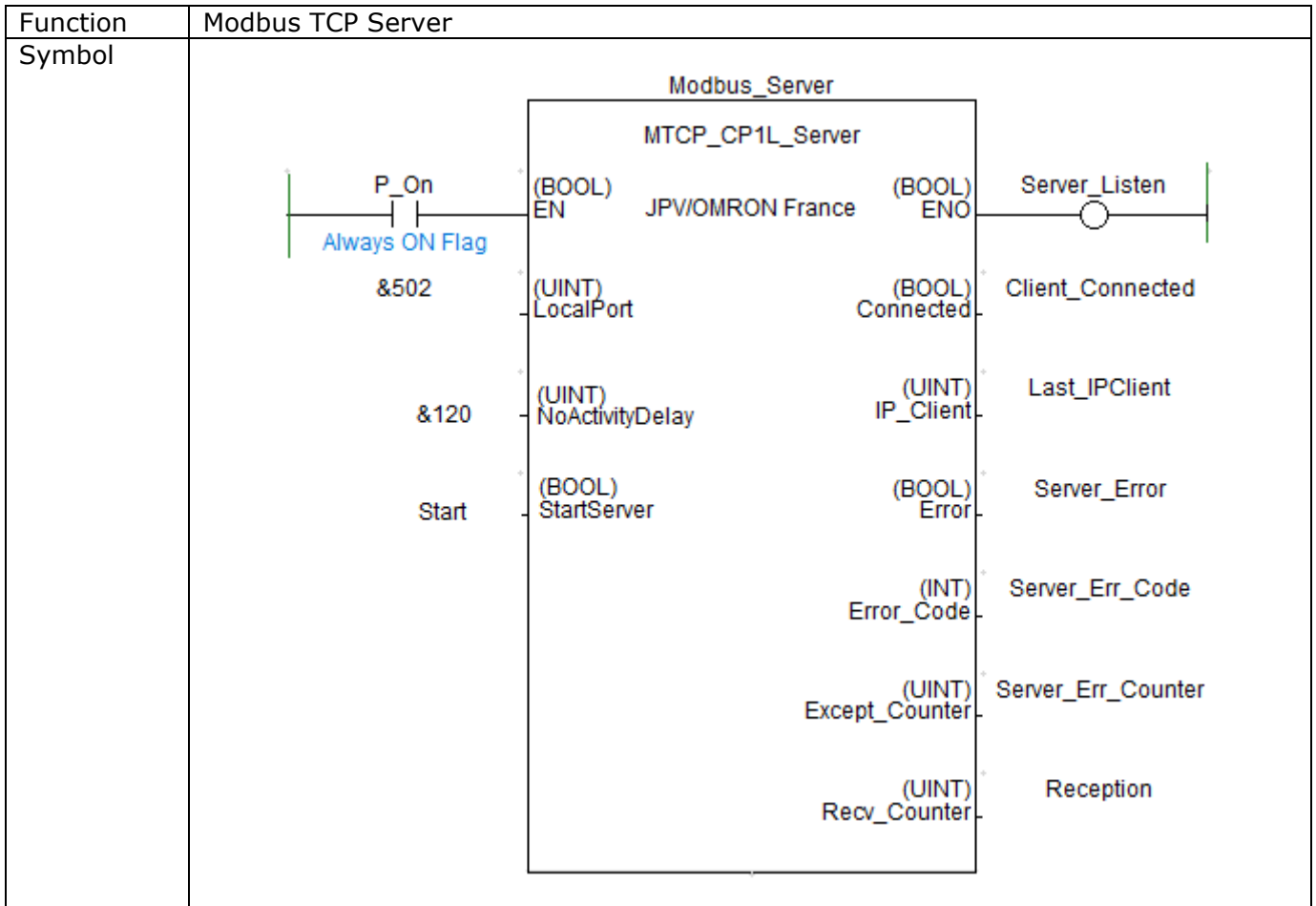


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Référence	MTCP_CP1L_Server
Révision	2.6
Auteur	JP Viskovic
Date	11/12/2019
+ Support	http://support-omron.fr/

Modbus TCP Server for CP1L series



File [MTCP_CP1L_Server.zip](#)

PLC CP1L-EL, CP1L-EM

Conditions of use

The FB Modbus TCP server provides some read/write features in accordance with the specifications defined by the [Modbus organization](#).

Restrictions :

- The FB MTCP_CP1L_Server support only one client connection
- Le FB MTCP_CP1L_Server is intended to facilitate data exchange not related to the control or the safety of machine.

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 FB MTCP_CP1L_Server is listening for a client connection as soon as the StartServer input is activated.

TCP TIME-WAIT:

When a TCP connection is closed, the socket pair is placed in a known as TIME-WAIT state, which ensures that a new connection does not use the same protocol, source IP address, destination IP address, source port and destination port, until a period of time sufficient flows to ensure that any segment that may have been incorrectly routed or delayed are not delivered unexpectedly. The duration of the interval during which the socket pair cannot be reused is specified in RFC 793 as equal to 2 MSL (twice the maximum lifetime of a segment), or four minutes (CP1L 2mn) . To avoid this delay, use another local port on the client side (the server is fixed on port 502).

If the disconnection occurs on client side, the CP1L cannot detect it. Then a 'NoActivity_Delay' has been added to restart the server in case of no received request during the connection.

Supported command list

Code	Function	Name in MODBUS
0x01	***** NOT SUPPORTED *****	Read Coils
0x02	***** NOT SUPPORTED *****	Read Discrete Inputs
0x03	I/O memory area (DM) Read Multiple Registers	Read Holding Registers
0x04	I/O memory area (CIO) Read Multiple Registers	Read Input Registers
0x05	I/O memory area Write Single Coil (CIO)	Write Single Coil
0x06	I/O memory area (DM) Write Single Register	Write Single Register
0x08	Echo back test	Diagnostic
0x0F	***** NOT SUPPORTED *****	Write Multiple Coils
0x10	I/O memory area (DM) Write Multiple Registers	Write Multiple Registers
0x17	Read Write Multiple Registers	Read Write Registers

The FB uses socket N°1 and TCP port 502

Memory Map

Used by the function Block

Type	range	Descriptions
Send/Receive Area	D32500-32767	store request and prepare response

Socket service flag & command switch

Type	range	Descriptions
Flag/command	A567-A572	For more details see : Socket Service from W516
Parameter Area	D32400-D32437	

PLC area accessible by the Modbus TCP request

Address	MODBUS	PDU	Corresponding CS/CJ's address
Coils	1- 65536	0 - 65535	0-65535 (CIO 0.00- 4095.15)
Input Registers	1- 6144	0 - 6143	0-6143 (CIO 0 - CIO6143)
Holding Registers	1- 32768	0 - 32767	0-32767 (D0 - D32767)

Input Variable

Name	type	Range	Description
EN	Bool	OFF, ON	Enable FB execution
LocalPort	UINT	1-65535	Local port number (default value 502)
NoActivity_Dealy	UINT	0-9999	0: No control, function deactivated >0: Delay to restart the server in case of no request received during that time (when connected only)
StartServer	Bool	OFF, ON	ON: open socket in passive mode (listen) OFF: close the socket

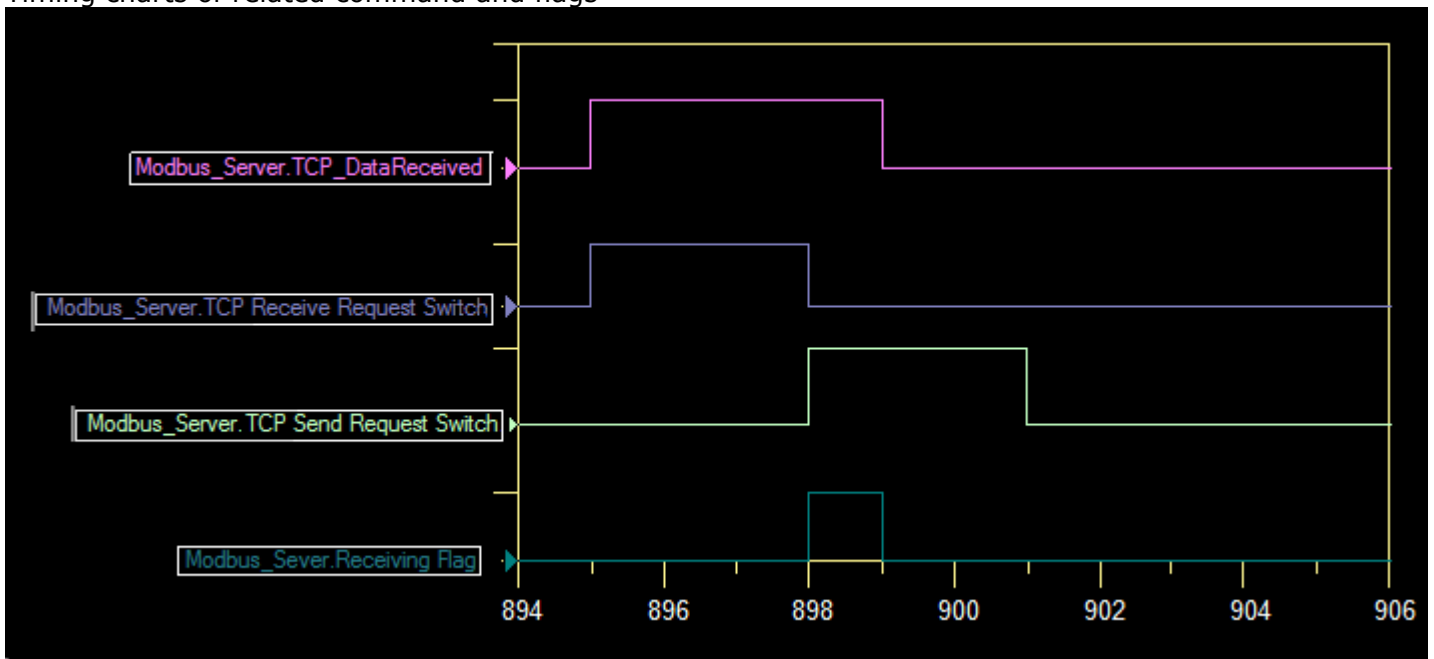
Output Variables

Name	type	Range	Description
ENO	Bool	OFF, ON	Server operational and listening for a client connection
Connected	Bool	OFF, ON	Client connected (last field of IP address)
IP_Client	UINT	0-9999	
Error_Code	Bool	OFF, ON	See code error list bellow
Except_Counter	UINT	0 - FFFF	Counter of exception error
Recv_Counter	UINT	0 - FFFF	Counter of received request (any)

[Socket services Error Codes](#) are returned prior to Modbus exception error

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

Timing charts of related command and flags



PLC Cycle time: 1ms

Etherway utility software can help to debug Modbus TCP communication and can be found here:

<https://www.support-omron.fr/recherche/?r=etherway>

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	31₁	30₀	29₁	28₁	27₁	26₁	25₀	24₀	23₁	22₁	21₀	20₁	19	18	17	16
2CH	47	46	45	44	43	42	41	40	39	38₁	37₀	36₁	35₀	34₁	33₁	32₀
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.

Read and Write multiple registers Fn17

Example: read registers 1 & 2 (1001-2002) and write CAFE into register 0003.

Requête		Réponse	
	Donnée		Donnée
Function Code	0x17	Fonction Code	0x17
Starting Address(H) to read	0x00	Nbre of byte	0x04
Starting Address(L) to read	0x01	Valeur du registre 1 (poids faible)	0x10
Quantity of Registers(H) to read	0x00	Valeur du registre 1 (poids fort)	0x01
Quantity of Registers(L) to read	0x02	Valeur du registre 2 (poids faible)	0x20
Starting Address(H) to write	0x00	Valeur du registre 2 (poids fort)	0x02
Starting Address(L) to write	0x03		
Nbre of registers (H) to write	0x00		
Nbre of registers (L) to write	0x01		
Nbre of byted'octets à écrire	0x02		
1ère valeur (poids fort)	0xCA		
1ère valeur (poids faible)	0xFE		

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0000			3				A				C				5	
0001			1				0				0				1	
0002			2				0				0				2	
0003			C				A				F				E	