

Function Block



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0.15€ TTC/min

Reference	MTCP_ETN_Server
Revision	2.6
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+ Support	http://support-omron.fr/

Modbus TCP Server for ETN unit n°0

Function	Modbus TCP Server dedicated to CS/CJ1W-ETN21 Unit n°0
Symbol	
File	MTCP_ETN_Server.zip
PLC	<ul style="list-style-type: none"> - CJ1xx-V3 + CJ1W-ETN21 et CJ2H/M + CJ1W-ETN21 - CP1H + CJ1W-ETN21 - CS1xx + CS1W-ETN21
Conditions of use	<p>The FB Modbus TCP server provides some read/write features in accordance with the specifications defined by the Modbus organization.</p> <p>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.</p>
Restriction of use	The ETN21 unit should be set to No 0. The FB uses the logical port N°1 and the socket uses the TCP Port number 502
Principe	<p>The FB MTCP_ETN_Server waits for a client connection as soon as the EN input is active. If the ETN21 card is not in LISTEN or ESTABLISHED mode for a period of 10s, the FB restarts the ETN21 unit.</p> <p>The ConnectionTimeout input variable is used to check during this delay (in seconds) that no exchange has taken place. In this case the connection is reset, and the server returns to LISTEN mode.</p> <p>If the client uses the Reset method (TCP RST flag) to disconnect, the server disconnects the client and then returns to LISTEN mode.</p> <p>The Reset_Unit input acts on the A501.00 to restart the card if necessary.</p>

Read/write coils are executed in CIO area.
 exemple : address Modbus 162 → CIO 10.02
 Read/write registers are executed in DM area.
 exemple : address Modbus 162 -> D0162

Supported command list

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

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	CIO1500-1524	For more details see : Socket Service from W421
Parameter Area	D3000-D30099	

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 Variables

Name	type	Range	Description
EN	Bool	OFF, ON	Enable FB execution
Reset_Unit	Bool	OFF, ON	Restart ETN21 (Unit n°0)
Reset_Counter	Bool	OFF, ON	Reset the reception counter
ConnexionTimeout	UINT	0-9999	0 : no control 1-9999 : delay (in seconds) checking for communication. If no exchange, the connection is reset.

Output Variables

Name	type	Range	Description
ENO	Bool	OFF, ON	Server operational and listening for a client connection
Connected	Bool	OFF, ON	Client connected
IP_Client	UINT	0 - 00FF	Last field of client IP address
TCP_Status	Word	0 - 000A	0: closed 1:Listen 4: Established 5:Close Wait A: Time Wait
rror	Bool	OFF, ON	Error Socket service or Modbus Exception
Error_Code	Bool	OFF, ON	Error code (see socket switch error code below)
Except_Counter	UINT	0 - FFFF	Counter of exception error
Recv_Counter	UINT	0 - FFFF	Counter of good & bad received request

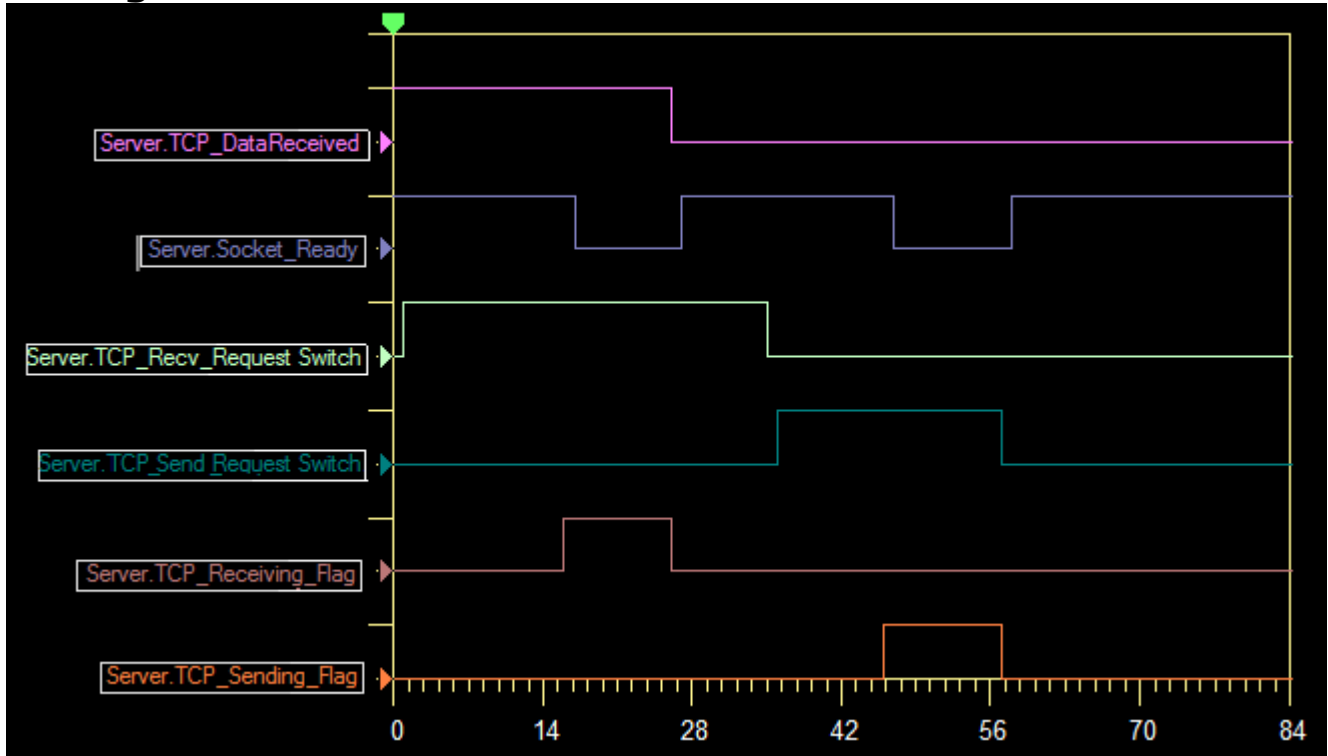
Socket switch error code

Socket	Description
0020	Connection with remote socket broken during send (EPIPE).
003E	Internal buffer cannot be obtained due to high reception traffic
0042	ICMP data received (EMSGSIZE).
0044	ICMP data received (ENOPROTOOPT).
0045	Error in communications with remote node (ECONNABORTED).
004B	Error in communications with remote node (ECONNRESET).
0053	Comm Error with remote node (ETIMEDOUT) or remote node does not exist.
0066	Internal memory cannot be obtained; cannot execute.
0080	Open request timed out.
0081	The specified socket was closed during open processing.
0082	Connection could not be established with specified remote node.
0302	CPU Unit error
1100	Number of receive bytes not in allowable 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 00.
110C	Request switch turned ON during another processing
2210	Specified socket has not been connected.
2211	Unit is busy: cannot execute.
220F	Specified socket is already open or already processing an open request
2607	Specified Socket Service Parameter Area is already being used for another socket

Modbus Error code

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

Timing chart



PLC cycle time = 1ms

ANNEXE

Modbus protocol

I/O memory area (CIO) Read Multiple Coils

Example: read 19 bits (CIO 0001.04 to 0002.06)

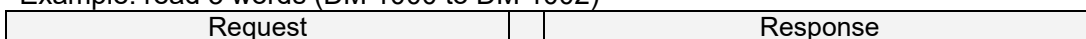
Request		Response	
	Data		Data
Function Code	0x01	Function Code	0x01
Starting Address(H)	0x00	Byte Count	0x03
Starting Address(L)	0x14	Coil Status 27-20	0xCD
Quantity of Coils(H)	0x00	Coil Status 35-28	0x6B
Quantity of Coils(L)	0x13	Coil Status 38-36	0x05

	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	<i>31</i> ₁	<i>30</i> ₀	<i>29</i> ₁	<i>28</i> ₁	<i>27</i> ₁	<i>26</i> ₁	<i>25</i> ₀	<i>24</i> ₀	<i>23</i> ₁	<i>22</i> ₁	<i>21</i> ₀	<i>20</i> ₁	19	18	17	16
2CH	47	46	45	44	43	42	41	40	39	<i>38</i> ₁	<i>37</i> ₀	<i>36</i> ₁	<i>35</i> ₀	<i>34</i> ₁	<i>33</i> ₁	<i>32</i> 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)



	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 bytes/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	