Function Block

Reference	**MTCP_NJ_Client**
Revision	**1.9**
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Date	**21/10/2016**
+ Support	http://support-omron.fr/

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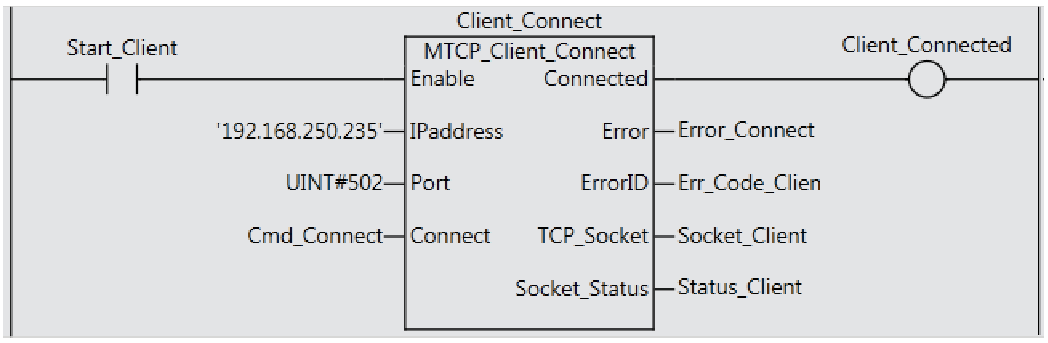
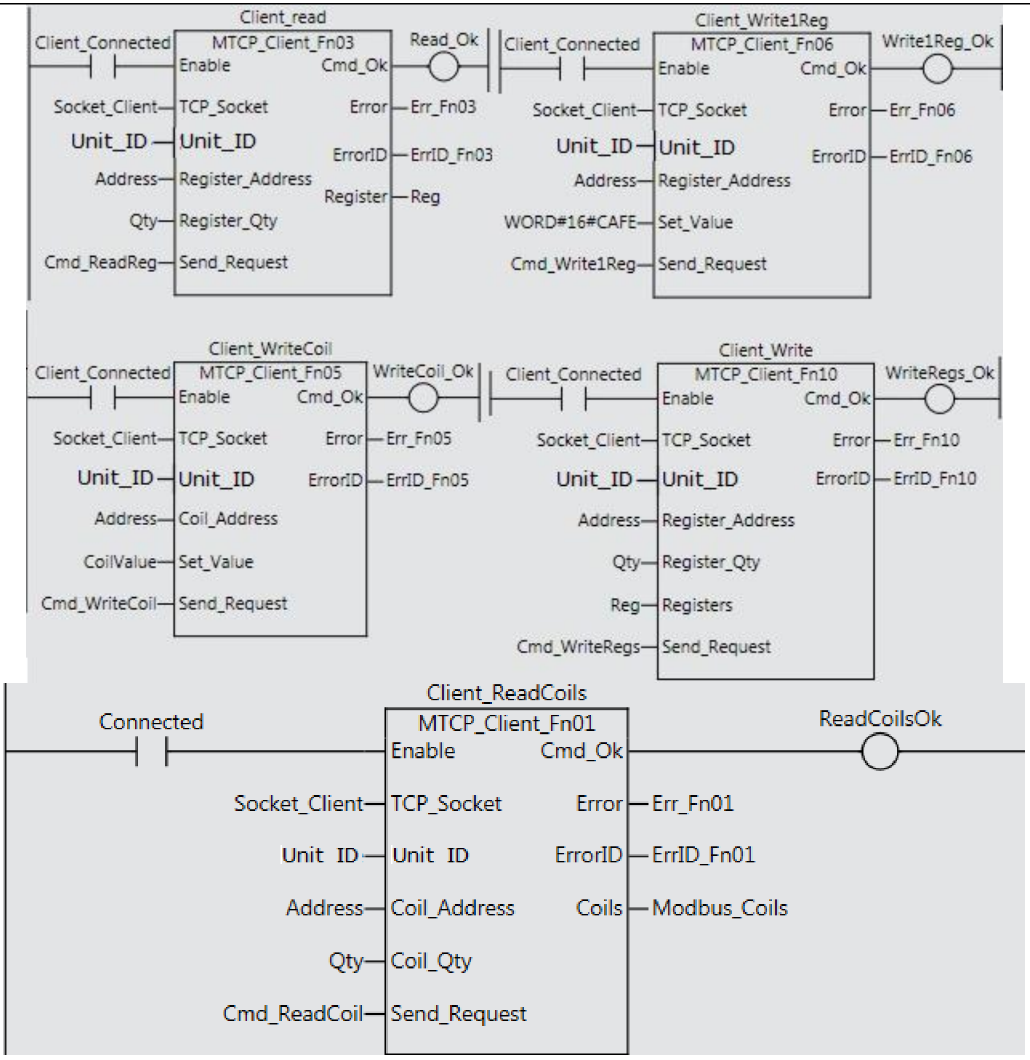
Modbus TCP Client for NJ Controller

Function	Modbus TCP client for Built-in Ethernet Port of NJ Controller
Connexion	 Client_Connect MTCP_Client_Connect Start_Client Enable Connected Client_Connected '192.168.250.235' IPaddress Error Error_Connect UINT#502 Port ErrorID Err_Code_Clien Cmd_Connect Connect TCP_Socket Socket_Client Socket_Status Status_Client
Read/write Fn	 Client_read MTCP_Client_Fn03 Client_Connected Enable Cmd_Ok Read_Ok Socket_Client TCP_Socket Error Err_Fn03 Unit_ID Unit_ID ErrorID ErrID_Fn03 Address Register_Address Register Reg Qty Register_Qty Cmd_ReadReg Send_Request Client_Write1Reg MTCP_Client_Fn06 Client_Connected Enable Cmd_Ok Write1Reg_Ok Socket_Client TCP_Socket Error Err_Fn06 Unit_ID Unit_ID ErrorID ErrID_Fn06 Address Register_Address WORD#16#CAFE Set_Value Cmd_Write1Reg Send_Request Client_WriteCoil MTCP_Client_Fn05 Client_Connected Enable Cmd_Ok WriteCoil_Ok Socket_Client TCP_Socket Error Err_Fn05 Unit_ID Unit_ID ErrorID ErrID_Fn05 Address Coil_Address CoilValue Set_Value Cmd_WriteCoil Send_Request Client_Write MTCP_Client_Fn10 Client_Connected Enable Cmd_Ok WriteRegs_Ok Socket_Client TCP_Socket Error Err_Fn10 Unit_ID Unit_ID ErrorID ErrID_Fn10 Address Register_Address Qty Register_Qty Reg Registers Cmd_WriteRegs Send_Request Client_ReadCoils MTCP_Client_Fn01 Connected Enable Cmd_Ok ReadCoilsOk Socket_Client TCP_Socket Error Err_Fn01 Unit_ID Unit_ID ErrorID ErrID_Fn01 Address Coil_Address Coils Modbus_Coils Qty Coil_Qty Cmd_ReadCoil Send_Request
File	MTCP_NJ.zip

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_NJ_Connect establish the connection with a remote Modbus TCP server when Connect input is activated. Connected output could allow execution of read/write FB via the Enable input. List of read/write functions provided :

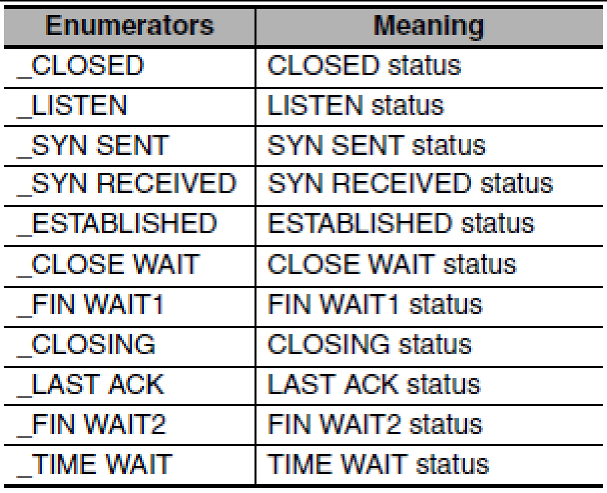
Code	Modbus Function	Function Block
0x01	Read Coils	MTCP_Client_Fn01
0x02	Read Discret Inputs	MTCP_Client_Fn02
0x03	Read Holding Registers	MTCP_Client_Fn03
0x04	Read Input Registers	MTCP_Client_Fn04
0x05	Write Single Coil	MTCP_Client_Fn05
0x06	Write Single Register	MTCP_Client_Fn06
0x10	Write Multiple Registers	MTCP_Client_Fn10

1- I/O variable of MTCP_Client_Connect

Input Variables

Name	type	range	Description
Enable	Bool	OFF, ON	FB Activation
IPaddress	STRING	n.n.n.n	IP Address of the server
Port	UINT	0-65535	Remote port n° on server (502 by default
Connect	Bool	OFF, ON	Request to connect to the server

Output Variables

Name	type	Range	Description
Connected	Bool	OFF, ON	ON : Connected to the server
Error	Bool	OFF, ON	Error flag
ErrorID	UINT	0 - 65535	Error Code returned by the socket or Modbus TCP server (see error code list below).
TCP_Socket	_sSocket	Structure	DstAdr, Handle and SrcAdr
Socket_Status	_eCONNECTION_STATE		

Enumerators	Meaning
_CLOSED	CLOSED status
_LISTEN	LISTEN status
_SYN SENT	SYN SENT status
_SYN RECEIVED	SYN RECEIVED status
_ESTABLISHED	ESTABLISHED status
_CLOSE WAIT	CLOSE WAIT status
_FIN WAIT1	FIN WAIT1 status
_CLOSING	CLOSING status
_LAST ACK	LAST ACK status
_FIN WAIT2	FIN WAIT2 status
_TIME WAIT	TIME WAIT status

2- Input Variables of FB MTCP_Client_Fn03, Fn04, Fn05, Fn06 and Fn10

MTCP_Client_Fn01 MTCP_Client_Fn02	type	range	Description
Enable	Bool	OFF, ON	FB Activation (use Connected output of FB connect)
TCP_Socket	_sSocket	structure	Handle of the socket used (given by the FB Connect)
Unit_ID	BYTE	00-FF	Unit Identifier (255 by default)
Coil_Address	WORD	0 - FFFF	Address of 1rst coil/discret input
Coil_Qty	WORD	0 - 00FF	Number of coils/discret inputs
Send_Request	Bool	OFF, ON	Read Command

MTCP_Client_Fn03	type	range	Description
Enable	Bool	OFF, ON	FB Activation (use Connected output of FB connect)
TCP_Socket	_sSocket	structure	Handle of the socket used (given by the FB Connect)
Unit_ID	BYTE	00-FF	Unit Identifier (255 by default)
Register_Address	WORD	0 - FFFF	Address of 1rst register
Register_Qty	WORD	0 - 00FF	Number of registers
Send_Request	Bool	OFF, ON	Read Command

MTCP_Client_Fn05	type	range	Description
Enable	Bool	OFF, ON	FB Activation (use Connected output of FB connect)
TCP_Socket	_sSocket	structure	Handle of the socket used (given by the FB Connect)
Unit_ID	BYTE	00-FF	Unit Identifier (255 by default)
Coil_Address	WORD	0 - FFFF	Address of the coil
Set_Value	Bool	OFF, ON	ON/OFF value to be written
Send_Request	Bool	OFF, ON	Write command

MTCP_Client_Fn06	type	range	Description
Enable	Bool	OFF, ON	FB Activation (use Connected output of FB connect)
TCP_Socket	_sSocket	structure	Handle of the socket used (given by the FB Connect)
Unit_ID	BYTE	00-FF	Unit Identifier (255 by default)
Register_Address	WORD	0 - FFFF	Address of the register
Set_Value	WORD	0 - FFFF	Value to write
Send_Request	Bool	OFF, ON	Write command

MTCP_Client_Fn10	type	range	Description
Enable	Bool	OFF, ON	FB Activation (use Connected output of FB connect)
TCP_Socket	_sSocket	structure	Handle of the socket used (given by the FB Connect)
Unit_ID	BYTE	00-FF	Unit Identifier (255 by default)
Register_Address	WORD	0 - FFFF	Address of 1rst register
Register_Qty	WORD	0 - 00FF	Number of registers
Registers	ARRAY	0 - FFFF	Source of data (Array of 128 WORD)
Send_Request	BOOL	OFF, ON	Write command

3- Output Variables of FB MTCP_Client_Fn03, Fn04, Fn05, Fn06 and Fn10

Name	type	Range	Description
Cmd_Ok	Bool	OFF, ON	ON : Command executed
Error	Bool	OFF, ON	Execution error flag
ErrorID	WORD	0 - FFFF	Error Code returned by the socket or Modbus TCP server (see error code list below).
Register (Fn03 & Fn04 only)	ARRAY		Read values are returned in an array of 128 WORD

Error Code returned

Code		Description
0001	Modbus Exception	ILLEGAL FUNCTION
0002		ILLEGAL DATA ADDRESS
0003		ILLEGAL DATA VALUE
2000	Socket error	Local IP Address Setting Error
2001		TCP/UDP Port Already in Use
2002		Address Resolution Failed
2003		Status Error
2004		Local IP Address Not Set
2006		Socket Timeout
2007		Socket Handle Out of Range
2008		Socket Communications Resource Overflow

Precautions in Using Socket Services

9-7-1 Precautions for UDP and TCP Socket Services

• Communications processing are sometimes delayed when multiple functions of the built-in Ether-Net/IP port are used simultaneously or due to the contents of the user program.
• Communications efficiency is sometimes reduced by high communications traffic on the network line.
• The close processing for a close request instruction discards all of the buffered send and receive data for the socket. For example, send data from a send request instruction immediately before the close processing is sometimes not sent.
• After a socket is open, the built-in EtherNet/IP port provides a receive buffer of 9,000 bytes per TCP socket and 9,000 bytes per UDP socket to enable data to be received at any time. If the receive buffer is full, data received by that socket is discarded. Make sure that the user application always executes receive requests to prevent the internal buffer from becoming full.

9-7-2 Precautions for UDP Socket Services

• The destination IP address can be set to a broadcast address for a UDP socket to broadcast data to all nodes on the network. However, in this case, the maximum length of send data is 1,472 bytes. Data lengths broken into multiple fragments (1,473 bytes or more in UDP) cannot be sent.
• For UDP socket, controls to confirm the reliability of communications, such as the confirmation of send data, are not performed. To improve the reliability of communications when you use UDP sockets, make sure the user program confirms that data is sent and resends data when necessary.

9-7-3 Precautions for TCP Socket Services

• If the TCP socket is closed on the remote node without warning during communications (i.e., if the connection is closed), the socket at the local node must also be closed. You can use the Read TCP Socket Status instruction (SktGetTCPstatus) to see if the connection is closed. Immediately close the socket at the local node if the TCP socket at the remote node is closed.
• If the remote node’s TCP socket closes without warning, the data to send may remain in the buffer at the local node. The remaining data is discarded in the local node’s TCP close processing. The steps that are required in applications to avoid this include sending data from the sending node that permits closing and closing the socket only after checking the remote node.
• While open processing is performed for a TCP socket, a port that was closed first cannot be opened again for 60 seconds from the time the close processing is performed for the remote socket. However, this is not true if you specified 0 (automatic assignment by the Unit) as the port for the SktTCPConnect instruction.
• You can use *Connect* from another socket to open a connection to a socket that was opened with

Accept. A connection is not opened if you try to use *Connect* from another socket to open a connection to a socket that was opened with *Connect*. Also, a connection is not opened if you attempt to use *Accept* from another socket to open a socket that was opened with *Accept*. Furthermore, you cannot use *Connect* from more than one other node to establish multiple connections with a single TCP socket that was opened with *Accept* on the built-in EtherNet/IP port.

• You can use the keep-alive function for TCP sockets at the built-in EtherNet/IP port. The keep alive function checks whether a connection is normally established when no data is sent or received for a certain period on the communications line where the connection was established. The built-in EtherNet/IP port responds to checks from other nodes even if keep alive is not specified.