

ModbusTCP Slave(Server)

Usage :

IP : Robot controller IP address

port : 502

Function Code

0x01	READ_COILS (read output bits)
0x03	READ_HOLDING_REGISTERS (read output registers)
0x05	WRITE_SINGLE_COIL (write output bit)
0x06	WRITE_SINGLE_REGISTER(write output register)
0x0F	WRITE_MULTIPLE_COILS (write multiple output bits)
0x10	WRITE_MULTIPLE_REGISTERS (write multiple output registers)

Error Code

MODBUS_EXCEPTION_ILLEGAL_FUNCTION (1)
MODBUS_EXCEPTION_ILLEGAL_DATA_ADDRESS (2)
MODBUS_EXCEPTION_ILLEGAL_DATA_VALUE (3)

Data Mapping Table

Note)

Coil and Holding Register support Read/Write attributes, therefore Modbus Master can be change the value of Addresses even defined as read only.

At Update Time column, refer as below:

1. Event means the value is updated by the event from user, task program, or robot.
2. 100ms means the value is updated periodically at 100ms.
3. Booting time means the value is updated during booting time only.

Coil

Address	R	W	Description	Update Time	Comment
0-15	*		ControlBox Digital Input(1-16)	Event	
16-31	*	*	ControlBox Digital Output(1-16)	Event	
32-37	*		Tool Digital Input(1-6)	Event	
38-43	*	*	Tool Digital Output(1-6)	Event	
260	*		Servo On Robot	Event	
261	*		Emergency Stopped	Event	
262	*		Safety Stopped	Event	
263	*		Direct Teach Button Pressed	Event	
264	*		Power Button Pressed	Event	
265	*		Safety Stopped requiring Recovery Mode	Event	

Holding Register

Address	R	W	Description	Update Time	Comment
0	*		ControlBox Digital Input(1~16)	Event	0b1111 1111 1111 1111
1	*	*	ControlBox Digital Output(1~16)	Event	0b1111 1111 1111 1111
4	*		ControlBox Analog Input 1	Event	float
5	*	*	ControlBox Analog Input 1 Type	Event	0 : Current, 1 : Voltage
6	*		ControlBox Analog Input 2	Event	float
7	*	*	ControlBox Analog Input 2 Type	Event	0 : Current, 1 : Voltage
16		*	ControlBox Analog Output 1	Event	float
17		*	ControlBox Analog Output 1 Type	Event	0 : Current, 1 : Voltage
18		*	ControlBox Analog Output 2	Event	float
19		*	ControlBox Analog Output 2 Type	Event	0 : Current, 1 : Voltage
20					
21	*		Tool Digital Input(1~6)	100msec	0b11 1111
22		*	Tool Digital Output(1~6)	100msec	0b11 1111
128-255	*	*	General purpose 16 bit registers		
256	*		Controller_Major_Version	Booting time	
257	*		Controller Minor Version	Booting time	
258	*		Controller Patch Version	Booting time	
259	*		Robot State		INITIALIZING = 0 / STANDBY=1 OPERATING=2 / SAFE OFF=3 TEACHING=4 / SAFE STOP=5 EMERGENCY STOP=6 / HOMING=7 RECOVERY=8 / SAFE STOP2=9 SAFE OFF2=10 / NOT READY=15
260	*		Servo On Robot	Event	
261	*		Emergency Stopped	Event	
262	*		Safety Stopped	Event	1: safety stopped 2 : safety stopped requiring recovery mode
263	*		Direct Teach Button Pressed	Event	
264	*		Power Button Pressed	Event	

Robot State information

INITIALIZING = 0	The initialization state for setting various parameters.
STANDBY=1	The default operational state waiting for a command
OPERATING=2	The operation state that automatically switches after receiving command.
SAFE OFF=3	The servo off state. This is robot stop state due to a function error or operation error.
TEACHING = 4	The direct teaching state
SAFE STOP =5	The safe stop state. This is robot stop state due to function error or operation error.
EMERGENCY STOP=6	The emergency stop state.
HOMING=7	The homing state. This is hardware alignment.
RECOVERY = 8	The recovery state to move the robot within the driving range.
SAFE STOP2 =9	Same as SAFE STOP state, but requires to enter recovery mode due to exceeding robot drive range.
SAFE OFF2 = 10	Same as SAFE OFF state, but requires to enter recovery mode due to exceeding robot drive range.

Address	R	W	Description	Update Time	Comment
270	*		Joint Position 1	100msec	[tenth of degree], signed Data
271	*		Joint Position 2	100msec	[tenth of degree], signed Data
272	*		Joint Position 3	100msec	[tenth of degree], signed Data
273	*		Joint Position 4	100msec	[tenth of degree], signed Data
274	*		Joint Position 5	100msec	[tenth of degree], signed Data
275	*		Joint Position 6	100msec	[tenth of degree], signed Data
280	*		Joint Velocity 1	100msec	[tenth of degree/s], signed Data
281	*		Joint Velocity 2	100msec	[tenth of degree/s], signed Data
282	*		Joint Velocity 3	100msec	[tenth of degree/s], signed Data
283	*		Joint Velocity 4	100msec	[tenth of degree/s], signed Data
284	*		Joint Velocity 5	100msec	[tenth of degree/s], signed Data
285	*		Joint Velocity 6	100msec	[tenth of degree/s], signed Data
290	*		Joint Motor Current 1	100msec	[mA]
291	*		Joint Motor Current 2	100msec	[mA]
292	*		Joint Motor Current 3	100msec	[mA]
293	*		Joint Motor Current 4	100msec	[mA]
294	*		Joint Motor Current 5	100msec	[mA]
295	*		Joint Motor Current 6	100msec	[mA]
300	*		Joint Motor Temperature 1	100msec	[°C]
301	*		Joint Motor Temperature 2	100msec	[°C]
302	*		Joint Motor Temperature 3	100msec	[°C]
303	*		Joint Motor Temperature 4	100msec	[°C]
304	*		Joint Motor Temperature 5	100msec	[°C]
305	*		Joint Motor Temperature 6	100msec	[°C]
310	*		Joint Torque 1	100msec	[N/m], signed data
311	*		Joint Torque 2	100msec	[N/m], signed data
312	*		Joint Torque 3	100msec	[N/m], signed data
313	*		Joint Torque 4	100msec	[N/m], signed data
314	*		Joint Torque 5	100msec	[N/m], signed data
315	*		Joint Torque 6	100msec	[N/m], signed data

Address	R	W	Description	Update Time	Comment
400	*		Task Position X	100msec	[tenth of mm], in base frame, signed data
401	*		Task Position Y	100msec	[tenth of mm], in base frame, signed data
402	*		Task Position Z	100msec	[tenth of mm], in base frame, signed data
403	*		Task Orientation A	100msec	[tenth of degree], in base frame, signed data
404	*		Task Orientation B	100msec	[tenth of degree], in base frame, signed data
405	*		Task Orientation C	100msec	[tenth of degree], in base frame, signed data
410	*		Task Velocity X	100msec	[tenth of mm/s], in base frame, signed data
411	*		Task Velocity Y	100msec	[tenth of mm/s], in base frame, signed data
412	*		Task Velocity Z	100msec	[tenth of mm/s], in base frame, signed data
413	*		Task Angular Velocity RX	100msec	[tenth of degree/s], in base frame, signed data
414	*		Task Angular Velocity RY	100msec	[tenth of degree/s], in base frame, signed data
415	*		Task Angular Velocity RZ	100msec	[tenth of degree/s], in base frame, signed data
420	*		Tool Offset Length X	Event	[tenth of mm], in tool frame, signed data
421	*		Tool Offset Length Y	Event	[tenth of mm], in tool frame, signed data
422	*		Tool Offset Length Z	Event	[tenth of mm], in tool frame, signed data
423	*		Tool Offset Degree A	Event	[tenth of degree], in tool frame, signed data
424	*		Tool Offset Degree B	Event	[tenth of degree], in tool frame, signed data
425	*		Tool Offset Degree C	Event	[tenth of degree], in tool frame, signed data
430	*		Task External Force X	100msec	[N], in base frame, signed data
431	*		Task External Force Y	100msec	[N], in base frame, signed data
432	*		Task External Force Z	100msec	[N], in base frame, signed data
433	*		Task External Moment X	100msec	[Nm], in base frame, signed data
434	*		Task External Moment Y	100msec	[Nm], in base frame, signed data
435	*		Task External Moment Z	100msec	[Nm], in base frame, signed data

*A-B-C notation meas Euler Z-Y-Z