

DR\_1\_T2O\_IO\_ROBOT\_STATE : T(Robot)->O(PLC) - IO & Robot State (36 bytes)

bit byte	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Group				
0	ControlBox Digital Input 1-16																ControlBox Digital Output 1-16																I/O				
4	AIO type(In0, In1, Out0, Out1)				Reserved																																
8	Analog Input 0 (float)																																				
12	Analog Input 1 (float)																																				
16	Analog Output 0 (float)																																				
20	Analog Output 1 (float)																																				
24	Tool Digital Input				Reserved												Tool Digital Output				Reserved																
28	Controller Major Version								Controller Minor Version								Controller Patch Version								Reserved								Robot				
32	Robot State								Reserved								SO	SS	ES	DTBP	PBP	Reserved															

**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.

SO = SERVO_ON_ROBOT
SS = SAFETY_STOPPED
ES = EMERGENCY_STOPEED
DTBP = DIRECT_TEACH_BUTTON_PRESSED
PBP = POWER_BUTTON_PRESSED

DR\_2\_T2O\_JOINT\_STATE : T(Robot)->O(PLC) - Joint State (144 bytes)

bit byte	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Group
0															Joint 1 Position [degree]														Joint				
4															Joint 2 Position [degree]																		
8															Joint 3 Position [degree]																		
12															Joint 4 Position [degree]																		
16															Joint 5 Position [degree]																		
20															Joint 6 Position [degree]																		
24															Joint 1 Velocity [degree/sec]																		
28															Joint 2 Velocity [degree/sec]																		
32															Joint 3 Velocity [degree/sec]																		
36															Joint 4 Velocity [degree/sec]																		
40															Joint 5 Velocity [degree/sec]																		
44															Joint 6 Velocity [degree/sec]																		
48															Joint 1 Motor Current [A]																		
52															Joint 2 Motor Current [A]																		
56															Joint 3 Motor Current [A]																		
60															Joint 4 Motor Current [A]																		
64															Joint 5 Motor Current [A]																		
68															Joint 6 Motor Current [A]																		
72															Joint 1 Motor Temperature [°C]																		
76															Joint 2 Motor Temperature [°C]																		
80															Joint 3 Motor Temperature [°C]																		
84															Joint 4 Motor Temperature [°C]																		
88															Joint 5 Motor Temperature [°C]																		
92															Joint 6 Motor Temperature [°C]																		
96															Joint 1 Torque [Nm]																		
100															Joint 2 Torque [Nm]																		
104															Joint 3 Torque [Nm]																		
108															Joint 4 Torque [Nm]																		
112															Joint 5 Torque [Nm]																		
116															Joint 6 Torque [Nm]																		
120															Joint 1 External Torque [Nm]																		
124															Joint 2 External Torque [Nm]																		
128															Joint 3 External Torque [Nm]																		
132															Joint 4 External Torque [Nm]																		
136															Joint 5 External Torque [Nm]																		
140															Joint 6 External Torque [Nm]																		

DR\_3\_T2O\_TASK\_STATE : T(Robot)->O(PLC) - Task State (96 bytes)

bit byte	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Group
0	Task Position X [mm] (in base frame)																										TCP						
4	Task Position Y [mm] (in base frame)																																
8	Task Position Z [mm] (in base frame)																																
12	Task Orientation A [degree] (in base frame)																																
16	Task Orientation B [degree] (in base frame)																																
20	Task Orientation C [degree] (in base frame)																																
24	Task Velocity X [mm/sec] (in base frame)																																
28	Task Velocity Y [mm/sec] (in base frame)																																
32	Task Velocity Z [mm/sec] (in base frame)																																
36	Task Angular Velocity RX [degree/sec] (in base frame)																																
40	Task Angular Velocity RY [degree/sec] (in base frame)																																
44	Task Angular Velocity RZ [degree/sec] (in base frame)																																
48	Tool Offset Length X [mm] (in tool frame)																																
52	Tool Offset Length Y [mm] (in tool frame)																																
56	Tool Offset Length Z [mm] (in tool frame)																																
60	Tool Offset Degree A [degree] (in tool frame)																																
64	Tool Offset Degree B [degree] (in tool frame)																																
68	Tool Offset Degree C [degree] (in tool frame)																																
72	Task External Force X [N] (in base frame)																																
76	Task External Force Y [N] (in base frame)																																
80	Task External Force Z [N] (in base frame)																																
84	Task External Moment X [Nm] (in base frame)																																
88	Task External Moment Y [Nm] (in base frame)																																
92	Task External Moment Z [Nm] (in base frame)																																

\* A-B-C notation means Euler Z-Y-Z

DR\_4\_T2O\_BIT\_GPR(General Purpose Register) : T(Robot)->O(PLC) - Bit General Purpose Register (8 bytes)

bit byte	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Group
0	Bit Output Register 0-31																															Bit Registers	
4	Bit Output Register 32-63																																

DR\_5\_T2O\_INT\_GPR(General Purpose Register) : T(Robot)->O(PLC) - Int General Purpose Register (96 bytes)

bit byte	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Group
0																	Int Output Register 00																Int Registers
4																	Int Output Register 01																
8																	Int Output Register 02																
12																	Int Output Register 03																
16																	Int Output Register 04																
20																	Int Output Register 05																
24																	Int Output Register 06																
28																	Int Output Register 07																
32																	Int Output Register 08																
36																	Int Output Register 09																
40																	Int Output Register 10																
44																	Int Output Register 11																
48																	Int Output Register 12																
52																	Int Output Register 13																
56																	Int Output Register 14																
60																	Int Output Register 15																
64																	Int Output Register 16																
68																	Int Output Register 17																
72																	Int Output Register 18																
76																	Int Output Register 19																
80																	Int Output Register 20																
84																	Int Output Register 21																
88																	Int Output Register 22																
92																	Int Output Register 23																

DR\_6\_T2O\_FLOAT\_GPR(General Purpose Register) : T(Robot)->O(PLC) - Float General Purpose Register (96 bytes)

bit byte	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Group
0																	Flaot Output Register 00											Flaot Registers					
4																	Flaot Output Register 01																
8																	Flaot Output Register 02																
12																	Flaot Output Register 03																
16																	Flaot Output Register 04																
20																	Flaot Output Register 05																
24																	Flaot Output Register 06																
28																	Flaot Output Register 07																
32																	Flaot Output Register 08																
36																	Flaot Output Register 09																
40																	Flaot Output Register 10																
44																	Flaot Output Register 11																
48																	Flaot Output Register 12																
52																	Flaot Output Register 13																
56																	Flaot Output Register 14																
60																	Flaot Output Register 15																
64																	Flaot Output Register 16																
68																	Flaot Output Register 17																
72																	Flaot Output Register 18																
76																	Flaot Output Register 19																
80																	Flaot Output Register 20																
84																	Flaot Output Register 21																
88																	Flaot Output Register 22																
92																	Flaot Output Register 23																

DR\_7\_O2T\_IO\_CONTROL : O(PLC)->T(Robot) - IO Control (12 bytes)

bit byte	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Group
0	ControlBox Digital Output 1-16																Tool Digital Output				Reserved	AO type	Reserved						I/O				
4	Analog Output 0 (float)																																
8	Analog Output 1 (float)																																

DR\_8\_O2T\_BIT\_GPR(General Purpose Register) : O(PLC)->T(Robot) - Bit General Purpose Register (8 bytes)

bit byte	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Group
0	Bit Input Register 0-31																Bit Registers																
4	Bit Input Register 32-63																																



DR\_9\_Q2T\_INT\_GPR(General Purpose Register) : O(PLC)->T(Robot) - Int General Purpose Register (96 bytes)

bit byte	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Group
0																	Int Input Register 00										Int Registers						
4																	Int Input Register 01																
8																	Int Input Register 02																
12																	Int Input Register 03																
16																	Int Input Register 04																
20																	Int Input Register 05																
24																	Int Input Register 06																
28																	Int Input Register 07																
32																	Int Input Register 08																
36																	Int Input Register 09																
40																	Int Input Register 10																
44																	Int Input Register 11																
48																	Int Input Register 12																
52																	Int Input Register 13																
56																	Int Input Register 14																
60																	Int Input Register 15																
64																	Int Input Register 16																
68																	Int Input Register 17																
72																	Int Input Register 18																
76																	Int Input Register 19																
80																	Int Input Register 20																
84																	Int Input Register 21																
88																	Int Input Register 22																
92																	Int Input Register 23																

DR\_10\_O2T\_FLOAT\_GPR(General Purpose Register) : O(PLC)->T(Robot) - Float General Purpose Register (96 bytes)

bit byte	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Group
0																	Float Input Register 00											Float Registers					
4																	Float Input Register 01																
8																	Float Input Register 02																
12																	Float Input Register 03																
16																	Float Input Register 04																
20																	Float Input Register 05																
24																	Float Input Register 06																
28																	Float Input Register 07																
32																	Float Input Register 08																
36																	Float Input Register 09																
40																	Float Input Register 10																
44																	Float Input Register 11																
48																	Float Input Register 12																
52																	Float Input Register 13																
56																	Float Input Register 14																
60																	Float Input Register 15																
64																	Float Input Register 16																
68																	Float Input Register 17																
72																	Float Input Register 18																
76																	Float Input Register 19																
80																	Float Input Register 20																
84																	Float Input Register 21																
88																	Float Input Register 22																
92																	Float Input Register 23																