

Tritex II

EtherNet/IP - Add on Instruction

2/10/2017

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Glossary of terms

AOI	Rockwell Add-On Instruction is intended to be used to encapsulate commonly used functions.
InOut parameter	An InOut parameter defines data that can be used as both input and output data during the execution of the instruction. Because InOut parameters are always passed by reference, their values can change from external sources during the execution of the Add-On Instruction
Modbus Alias	Represents the Tritex II Modbus Parameter ID. For example in T2CON parameter 'Module' defines bit 2 as Define Home with an alias of '4316.10'. This implies this bit is mapped to Tritex II Modbus parameter ID '4316 bit 10'. If a alias is without decimal "4316" this imply the AOI parameter is mapped to the entire Modbus Parameter.

Tritex II AOI Instruction

This document outlines Exlar AOI User Instructions. These AOI are intended to be used with an Exlar Tritex II with EtherNet/IP adaptor. The AOI was created using Allen-Bradley RSLogix5000 version 20.01 and is intended for use with RSLogix5000 version 20.01 or greater

1. Features

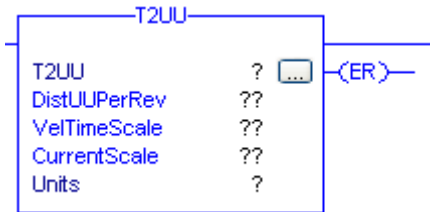
The AOI will provided a simplify method for the user to perform operation and retrieve status of the drive. They work in conjunction with a set of Tritex II drive files which contain necessary translation tables. The following are function the user could execute with the AOI.

- User Units (T2UU)
Converts user units
- Control Drive (T2CON)
Instruction initiates command (Enable, Home etc) and Motion commands (Stop, Pause etc.)
- Drive Status (T2STA)
Instruction blends returns drive status (homed, enabled etc.) with positional information
- Jog operation (T2JOG)
Command Jog operation and associated parameters.
- Move operation (T2MOV)
Controls one complete move operation Primary and Secondary
- Host Control (T2HC)
Enable and run Host Control

2. AOI's

2.1.User Units (T2UU)

The instruction establishes the values used to convert user units into drive units. It supplies the essential values needed to perform conversion. The Unit parameter output must be linked to all Exlar AOI that contain Unit parameter input.

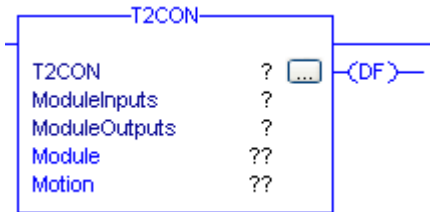


Required	Parameter	Type	Usage	Format	Description	Modbus Alias
X	DistUUPerRev	REAL	Input	Tag	Distance User Units Per Rev	---
X	¹ VelTimeScale	INT	Input	Tag	Velocity Time User Units 0 = Seconds 1 = Minutes	---
X	CurrentScale	INT	Input	Tag	Current Scaling 0 = AMPS 1 = % of Config.CurrentLimit – Modbus ID 5108	---
X	Units	Real[4]	Output	Tag	Point to Conversion Unit	---
	ER	BOOL	Output		Instruction error is Active 1: DistUUPerRev is equal to zero	---

¹Effects both velocity and acceleration units

2.2.Control (T2CON)

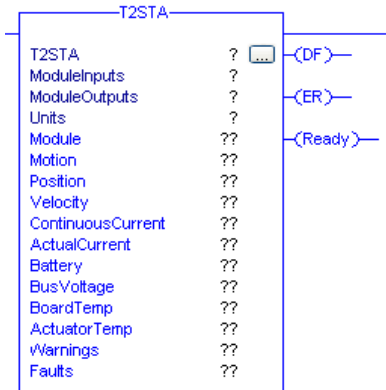
Use the instruction send commands to drive.



Required	Parameter	Type	Usage	Format	Description	Modbus Alias
X	ModuleInputs	INT[101]	InOut	Tag	Point to Input Connection Assembly	---
X	ModuleOutputs	INT[101]	InOut	Tag	Point to Output Connection Assembly	---
	Module	INT	Input	Immediate or Tag	Module Commands	---
					Bit.0: Enable Momentary The drive will try to enable on the rising edge.	4316.00
					Bit.1: Enable Maintained The drive will be enabled if bus power is applied and there are no active faults	4316.01
					Bit.2: Define Home Defines the current position as home	4316.10
					Bit.3: Brake Override Force actuator brake relay to be activated, releasing the brake. This input is honored whether or not the drive is enabled and overrides the normal brake behavior	4316.14
					Bit.4: Fault Reset The rising edge will clear any faults active	4316.15
	Motion	INT	Input	Immediate or Tag	Motion Commands	
					Bit.0: Stop Motion Forces the drive to decelerate using STOP deceleration and hold position. The drive will be forced into a position mode of operation if necessary	4317.02
					Bit.1: Pause Move If any move is executing, the PAUSE input event will force the drive to decelerate to zero command velocity using the current motion's deceleration and hold position until PAUSE is removed. If no move is active, the PAUSE input event has no effect	4317.03
					Bit.2: Initiate Home Move The rising edge of the HOME input event initiates the Home Move	4317.08
					Bit.3: Emergency Move (Dedicated Move)	4317.10
	DF	BOOL	Output		One or more Drive Fault are active	104.03

2.3. Status (T2STA)

Use the instruction to retrieve drive status.



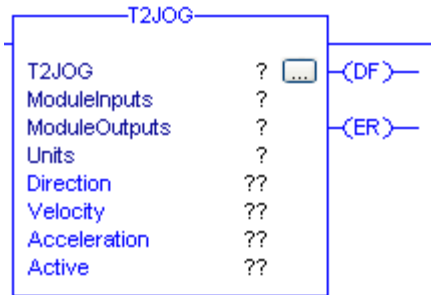
Required	Parameter	Type	Usage	Format	Description	Modbus Alias
X	ModuleInputs	INT[101]	InOut	Tag	Point to Input Connection Assembly	---
X	ModuleOutputs	INT[101]	InOut	Tag	Point to Output Connection Assembly	---
X	Units	Real[4]	InOut	Tag	Point to T2UU AOI	---
	DF	BOOLEAN	Output		1: A Drive Fault is active	104.03
	Ready	BOOLEAN	Output		1: The <i>READY</i> flag is set when both the <i>ENA</i> and <i>HOMED</i> flags are active indicating that the drive is homed and enabled.	104.02
	ER	BOOLEAN	Output		A Instruction error is Active 1: T2UU error is active	---
	Module	INT	Output	Immediate or Tag	Module Status Bit.0: Enable Bit.1: Homed Bit.2: Ready The <i>READY</i> flag is set when both the <i>ENA</i> and <i>HOMED</i> flags are active indicating that the drive is homed and enabled. Bit.3: Fault Bit.4: Warning Bit.5: Fault or Warning	--- 104.00 104.01 104.02 104.03 104.04 104.05
	Motion	INT	Output	Immediate or Tag	Motion Status Bit.0: Stopped Active Bit.1: Paused Active Bit.2: Jogged active Bit.3: Jog Positive Active Bit.4: Jog Negative Active Bit.5: Initiate Home Move Active Bit.6 : EMOVE (Emergency Move) Dedicated Move Active Bit.7: Move active Bit.8: In Position active	--- 105.00 105.01 105.02 105.03 105.04 105.05 105.08 105.09 105.12

Parameters (T2STA) - continued

Required	Parameter	Type	Usage	Format	Description	Modbus Alias
	Position	REAL	Output	Immediate or Tag	User Units – Position	378
	Velocity	DINT	Output	Immediate or Tag	User Units - Velocity	356
	ContinuousCurrent	REAL	Output	Immediate or Tag	User Units - Continuous Current (Units is based on T2UU CurrentScale configuration)	565
	ActualCurrent	REAL	Output	Immediate or Tag	User Units - Actual Current (Units is based on T2UU CurrentScale configuration)	567
	Battery	INT	Output	Immediate or Tag	Hall Battery Voltage	8
	BusVoltage	INT	Output	Immediate or Tag	Bus Voltage (filter)	571
	BoardTemp	INT	Output	Immediate or Tag	Board Temperature °C	11
	ActuatorTemp	INT	Output	Immediate or Tag	Actuator Temperature °C	15
	Warning	INT	Output	Immediate or Tag	Drive Warnings Bit.0: IPK – Peak Current Bit.1: C – Continuous Current Bit.2: POS – Position Tracking Bit.3: MV – Move Termination Bit.4: VLOW – Low DC Bus Voltage Bit.5: VHIGH – High DC Bus Voltage Bit.6: FE – Positional Following Error Bit.7: BT – Board Temperature Bit.8: AT – Actuator Temperature Bit.9: LOS – Loss of Signal Bit.10: COM – Communications Bit.11: IH – Hardware Over current Bit.12: HB – Absolute Hall Board Battery Bit.13: UP – User Parameters Bit.14: FP – Factory Parameters Bit.15: RS – Restart	7 7.00 7.01 7.02 7.03 7.04 7.05 7.06 7.07 7.08 7.09 7.10 7.11 7.12 7.13 7.14 7.15
	Faults	INT	Output	Immediate or Tag	Drive Faults (<i>Reference Warning for bits</i>)	6

2.4. JOG (T2JOG)

Use the instruction to move an a drive at a constant speed until you tell it to stop.

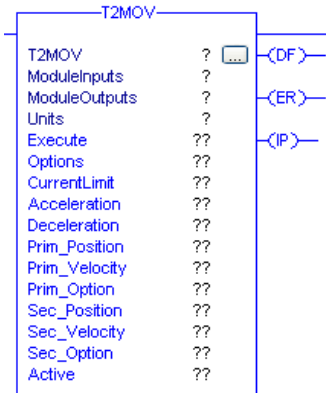


Parameters (T2JOG)

Required	Parameter	Type	Usage	Format	Description	Modbus Alias
X	ModuleInputs	INT[101]	InOut	Tag	Point to Input Connection Assembly	---
X	ModuleOutputs	INT[101]	InOut	Tag	Point to Output Connection Assembly	---
X	Units	Real[4]	InOut	Tag	Point to T2UU AOI	---
	Direction	INT	Input	Immediate or Tag	Direction Bit.0: Jog Plus Bit.1: Jog Minus	4317.4 4317.5
	Velocity	INT	Input	Immediate or Tag	Jog Velocity (User Units)	6022
	Acceleration	INT	Input	Immediate or Tag	Jog Acceleration (User Units)	6026
	ER	BOOL	Output		A Instruction error is Active 1: T2UU error is active	---
	DF	BOOL	Output		A Drive Fault is active	104.03
	Active	INT	Output	Immediate or Tag	Status information Bit.0: Jog Plus active Bit.1: Jog Minus active Bit.2: The <i>STOPPED</i> flag is active while the <i>STOP</i> input event is active Bit.3: The <i>READY</i> flag is set when both the <i>ENA</i> and <i>HOMED</i> flags are active indicating that the drive is homed and enabled.	111.4 111.5 105.2 104.2

2.5. Move (T2MOV)

Use the instruction to execute an drive move operation. The user can specify the position as well as the desired velocity, acc/decel for the primary and secondary move. The instruction moves an axis to either a specified absolute position or by a specified incremental distance specified in user units.



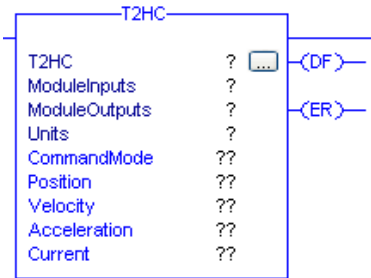
Required	Parameter	Type	Usage	Format	Description	Modbus Alias
X	ModuleInputs	INT[101]	InOut	Tag	Point to Input Connection Assembly	---
X	ModuleOutputs	INT[101]	InOut	Tag	Point to Output Connection Assembly	---
X	Units	Real[4]	InOut	Tag	Point to T2UU AOI	---
	Execute	INT	Input	Immediate or Tag	Move 0 Control Bit.0: Move 0 Maintained Bit.1: Move 0 Momentary	--- 4318.0 4319.0
	Options	INT	Input	Immediate or Tag	Move 0 Options Bit.0: Secondary Motion Enable	--- 6100.0
	Current Limit	REAL	Input	Immediate or Tag	Current Limit – Units is based on T2UU CurrentScale configuration	6101
	Acceleration	INT	Input	Immediate or Tag	Acceleration	6102
	Deceleration	INT	Input	Immediate or Tag	Deceleration	6500
	Prim Position	REAL	Input	Immediate or Tag	Primary Position	6108
	Prim Velocity	INT	Input	Immediate or Tag	Primary Velocity	6110
	Prim Option	INT	Input	Immediate or Tag	Primary Move Options %000 = Absolute Position %001 = Incremental %010 = Unlimited (+) %011 = Unlimited (-) %100 = Absolute (+) only %101 = Absolute (-) only Bit.3: Limit maximum Current Bit.4: Terminate on Current Limit Bit.5: Fault if terminated by current limit	--- 6106.0 6106.1 6106.2 6106.4 6106.8 6106.12

Parameters (T2MOV) - continued

Required	Parameter	Type	Usage	Format	Description	Modbus Alias
	Sec Position	REAL	Input	Immediate or Tag	Secondary Position	6114
	Sec Velocity	INT	Input	Immediate or Tag	Secondary Velocity	6116
	Sec Option	INT	Input	Immediate or Tag	Secondary Option	---
					%000 = Absolute Position	6112.0
					%001 = Incremental	6112.1
					%010 = Unlimited (+)	6112.2
					%011 = Unlimited (-)	6112.2
					%100 = Absolute (+) only	6112.2
					%101 = Absolute (-) only	6112.2
					Bit.3: Limit maximum Current	6112.4
					Bit.4: Terminate on Current Limit	6112.8
					Bit.5: Fault if terminated by current limit	6112.12
	ER	BOOL	Output		A Instruction error is Active 1: T2UU error is active	---
	DF	BOOL	Output		A Drive Fault is active	104.03
	IP	BOOL	Output		Move 0 In Position	108.0
	Active	INT	Output		Status information	---
					Bit.0: Ready The <i>READY</i> flag is set when both the <i>ENA</i> and <i>HOMED</i> flags are active indicating that the drive is homed and enabled.	104.2
					Bit.1: Move 0 In Position	108.0
					Bit.2: Move 0 active	107.0

2.6.Host Control (T2HC)

Use instruction to control drives Host Control Option.



Parameters (T2HC)

Required	Parameter	Type	Usage	Format	Description	Modbus Alias
X	ModuleInputs	INT[101]	InOut	Tag	Point to Input Connection Assembly	---
X	ModuleOutputs	INT[101]	InOut	Tag	Point to Output Connection Assembly	---
X	Units	REAL[4]	InOut	Tag	Point to T2UU AOI	---
	CommandMode	INT	Input	Immediate or Tag	Direct Host Control 0 = Disabled 5 = Position 6 = Velocity 7 = Current	4303
	Position	REAL	Input	Immediate or Tag	Target Position	4304
	Velocity	INT	Input	Immediate or Tag	Velocity Limits	4306
	Acceleration	INT	Input	Immediate or Tag	Acceleration Limits	4308
	Current	REAL	Input	Immediate or Tag	Current Units is based on T2UU CurrentScale configuration	4310
	ER	BOOL	Input		A Instruction error is Active 1: T2UU error is active or Invalid CommandMode	---
	DF	BOOL	Input		A Drive Fault is active	104.03

3. Exlar Tritex Expert Translation Tables

All Tritex functionality is parameter based. This allows listing of any parameters associated with every functional capability of the Tritex. The EtherNet/IP mapping allows up to 101 Inputs and 101 Outputs.

For AOI functionality a defined parameters list was created to identify Read Parameters from the EtherNet/IP Host or Write Parameters to the Host. These translation tables are integrated in Exlar Expert software and are located in the “Generic EIP Drive file. For more information concerning tables, refer to Exlar Expert software manual.

Output Mapping (PLC Inputs)		
	Modbus ID	Description
0	¹ <Reserved>	
1	104	Status.IO.OutputEventsStatus
2	108	Status.IO.OutputEventsMoveInPosition
3	105	Status.IO.OutputEventsMotion
4	107	Status.IO.OutputEventsMoveActive
5	378	Status Position Feedback (low)
6		Status Position Feedback (High)
7	7	Status.Mode,SoftFaults (Warnings)
8	6	Status.Mode.HardFault (Faults)
9	356	Status Velocity Display (Low)
10		Status Velocity Display (High)
11	567	Status Current Display
12	565	Status Current Continuous
13	5108	Config.CurrentLimit
14	8	Status.Voltage.HallBattery
15	571	Status.Voltage.Vbus
16	11	Status.Temperature.Board
17	15	Status.Temperature.Actuator
18		
19		
20		
21		
22		
23-100		

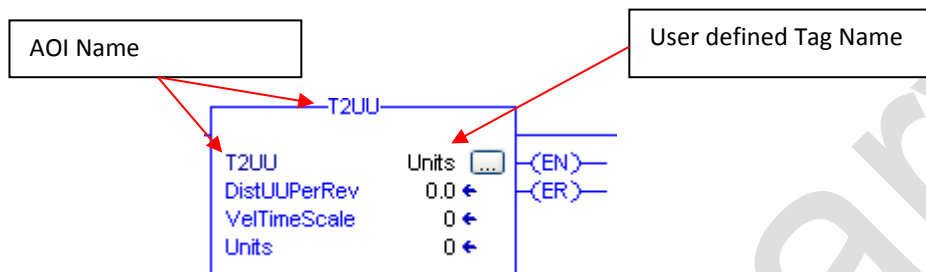
¹Word is used by EIP module to return its status, reference Appendix for more information.

	Input Mapping (PLC Outputs)	
	Modbus ID	Description
0	¹ <Reserved>	
1	4316	Control.InputEvents.Mode
2	4318	Control.InputEvents.ModeLevel
3	4317	Control.InputEvents.Motion
4	4303	Control.Host.CommandMode
5	4304	Control.Host.Postion(Low)
6		Control.Host.Postion(High)
7	4306	Control.Host.Velocity(Low)
8		Control.Host.Velocity(High)
9	4308	Control.Host.Acceleration(Low)
10		Control.Host.Acceleration(High)
11	4310	Control.Host.Current
12	4319	Control.InputEvents.moveEdge
13	6022	Jog Slow
14		Jog Slow
15	6026	Jog Acceleration
16		Jog Acceleration
17	6100	Move 0 – Options
18	6101	Move 0 – Current Limits
19	6102	Move 0 – Acceleration (Low)
20		Move 0 – Acceleration (High)
21	6500	Move 0 – Deceleration (Low)
22		Move 0 – Deceleration (High)
23	6106	Move 0 – Primary - Options
24		<open>
25	6108	Move 0 – Primary – Position (Low)
26		Move 0 – Primary – Position (High)
27	6110	Move 0 – Primary – Velocity (Low)
28		Move 0 – Primary – Velocity (High)
29	6112	Move 0 – Secondary - Options
30		<open>
31	6114	Move 0 – Secondary – Position (Low)
32		Move 0 – Secondary – Position (High)
33	6116	Move 0 – Secondary – Velocity (Low)
34		Move 0 – Secondary – Velocity (High)
35		
36		
37		
38 - 100		

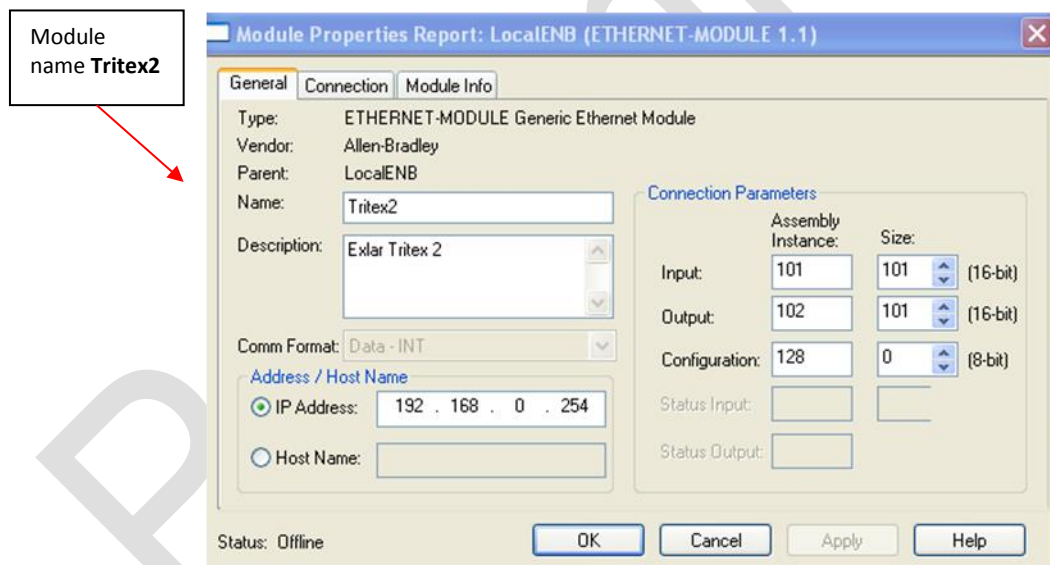
¹Bit 0 of word is used by EIP module to permit Outputs to be updated, reference Appendix for more information.

4. Appendix

4.1.AOI outline



4.2.How to associate Module Input/Outputs to AOI



After you define and configure the actuator, RSLogix5000 will generate the controller Tags associated to the module. If the AOI needs Module IO, it must be linked to the module controller tags.

[-] Tritex2:0	{...}	AB:ETHERNET_MODULE_INT_202Bytes:0:0
[+] Tritex2:0.Data	{...}	INT[101]
[-] Tritex2:1	{...}	AB:ETHERNET_MODULE_INT_202Bytes:1:0
[+] Tritex2:1.Data	{...}	INT[101]

AOI

ModuleOutputs

ModuleInputs

4.3.EIP Module Reserve Words

The EIP first word for both Inputs and output are reserved for control and status information; allowing only 100 word input and output data available for parameter data. These words are not accessible by Tritex.

PLC Output word	
Description	Description
Run / Idle	Enable Output Update 0 : Idle - Tritex Output Tables are not updated 1: Run - Tritex Output Tables are updated

Controls whether Outputs are sent from EIP module to main board

PLC Input word		
Description	Bit	Description (bit Definition)
EIP module communication status	0	Error – a Modbus error is active the EtherNet/IP - Extended Module Status (Attribute 101) contains additional error information. If a valid message is received – Error bit is cleared.
	1	Error – communication between EIP timed-out (was previously established)
	2	Error – communication with EIP cannot be established at all
	3 – 7	Reserve
	8	EIP module is currently active at factory defaults
	9	EIP module has a new configuration that will take effect upon reset
	10 - 15	Reserve

Returns communication status between EIP module and main board

4.4.Additional Reference

- Tritex II EtherNetIP Option manual
- Tritex II Parameters Manual
- Logix5000 Controllers Add-On Instruction by Rockwell Automation
1756-PM010E-EN-P – September 2012
http://literature.rockwellautomation.com/idc/groups/literature/documents/pm/1756-pm010_-en-p.pdf