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Motion Calculate Transform Position (MCTP)

This information applies to the CompactLogix 5370, ControlLogix 5570, Compact GuardLogix 5370, GuardLogix 5570, Compact GuardLogix 5380, CompactLogix 5380, CompactLogix 5480, ControlLogix 5580, and GuardLogix 5580 controllers.

Important: You can also use this instruction with the following controllers:

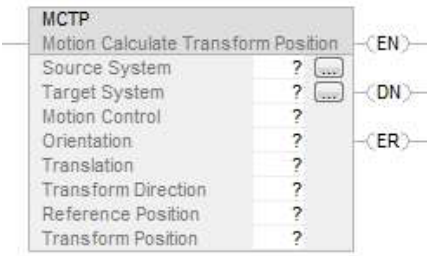
- 1756-L6 controllers
- 1756-L7S controllers
- 1769-L18ERM controllers
- 1769-L27ERM controllers
- 1769-L30ERM controllers
- 1769-L33ERM controllers
- 1769-L36ERM controllers

Use the MCTP instruction to calculate the position of a point in one coordinate system to the equivalent point in a second coordinate system.

Important: Tags used for the motion control attribute of instructions should only be used once. Re-use of the motion control tag in other instructions can cause unintended operation. This may result in damage to equipment or personal injury.

Available Languages

Ladder Diagram



Function Block

This instruction is not available in function block.

Structured Text

MCTP(Source System, Target System, Motion Control, Orientation, Translation, Transform Direction, Reference Position, Transform Position);

Operands

Ladder Diagram and Structured Text

Operand	Type	Format	Description
Source System	COORDINATE_SYSTEM	Tag	Cartesian coordinate system for Cartesian positions of the robot
Target System	COORDINATE_SYSTEM	Tag	Non-Cartesian coordinate system that controls the actual equipment
Motion Control	MOTION_INSTRUCTION	Tag	Control tag for the instruction.

Translation	REAL[3]	Array	Do you want to offset the target position along the X1, X2, or X3 axis?	
			If	Then
			No	Leave the array values at zero.
			Yes	Enter the offset distances into the array. Enter the offset distances in coordinate units. Put the offset distance for X1 in the first element of the array, and so on.
			Use an array of three REALs even if a coordinate system has only one or two axes.	

Operand	Type	Format	Description				
Transform Direction	DINT	Immediate	For Robot Type	To calculate	With the base turned to the	And the robot is	Select
			All	Cartesian Position	→	→	Forward
			Cartesian Delta 2D Delta 3D SCARA Delta	Joint Angles	→	→	Inverse
			Articulated Independent Articulated Dependent SCARA Independent	Joint Angles	Same Quadrant as the Point	Right Arm Configuration	Inverse Right Arm
						Left Arm Configuration	Inverse Left Arm
						Right Arm Configuration	Inverse Right Arm Mirror
					Opposite Quadrant from the Point	Left Arm Configuration	Inverse Left Arm Mirror
Reference Position	REAL[3]	Array	If the transform direction is:		Then enter an array that has the:		
			Forward		Joint Angles		
			Inverse		Cartesian Positions		
Transform Position	REAL[3]	Array	Array that stores the calculated position				

Enter the transform direction without spaces. For example, a transform direction of Inverse Left Arm is entered as InverseLeftArm.

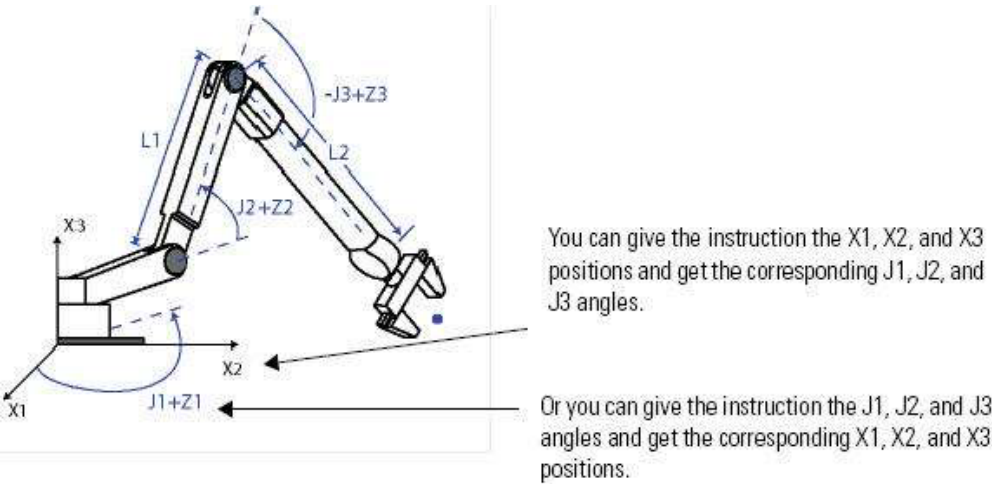
See *Structured Text Syntax* for more information on the syntax of expressions within structured text.

MOTION INSTRUCTIONS

- [master Driven Coordinated Control \(MDCC\)](#)
- [Motion Calculate Transform Position \(MCTP\)](#)
- [Motion Coordinated Change Dynamics \(MCCD\)](#)
- [Motion Coordinated Circular Move \(MCCM\)](#)
- [Motion Coordinated Transform with Orientation \(MCTO\)](#)
- [Motion Coordinated Path Move \(MCPM\)](#)
- [Motion Calculate Transform Position with Orientation \(MCTPO\)](#)
- [Motion Coordinated Linear Move \(MCLM\)](#)
- [Motion Coordinated Shutdown \(MCSD\)](#)
- [Motion Coordinated Shutdown Reset \(MCSR\)](#)
- [Motion Coordinated Stop \(MCS\)](#)
- [Motion Coordinated Transform \(MCT\)](#)
- [Speed, acceleration, deceleration, and jerk enumerations for coordinated motion](#)
- [Status Bits for Motion Instructions \(MCLM, MCCM\) when MDCC Is Active](#)
- [Change between master driven and time driven modes for Coordinated Motion instructions](#)
- [Choose a Termination Type](#)
- [Common Action Table for Slave Coordinate System and Master Axis](#)
- [Input and Output Parameters Structure for Coordinate System Motion Instructions](#)
- [Returned Calculated Data Parameter for Coordinated System Motion Instruction](#)
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MOTION_INSTRUCTION Data Type

To see if	Check if this bit is on	Data Type	Notes
The rung is true	EN	BOOL	Sometimes the EN bit stays on even if the rung goes false. This happens if the rung goes false before the instruction is done or an error has occurred. <div><div>Rung</div><div>EN</div><div>DN or ER</div></div>
The instruction is done.	DN	BOOL	
An error happened	ER	BOOL	Identify the error number listed in the error code field of the Motion control tag then, refer to Motion Error Codes.



The MCTP instruction is similar to the MCT instruction except the MCTP instruction doesn't start a transform. It calculates a position once each time you execute it.

Programming Guidelines

Follow these guidelines to use an MCTP instruction.

MCTP Instruction Guidelines

Guideline	Example and Notes
Toggle the rung from false to true to execute the instruction.	This is a transitional instruction. In a ladder diagram, toggle the Rung-condition-in from false to true each time you want to execute the instruction.
In structured text, condition the instruction so that it only executes on a transition.	In structured text, instructions execute each time they are scanned. Condition the instruction so that it only executes on a transition. Use either of these methods: <div>Qualifier of an SFC action</div> <div>Structured text construct</div>

Affects Math Status Flags

No

Major/Minor Faults

None specific to this instruction. See *Common Attributes* for operand-related faults.

Execution

• • • • •

Ladder Diagram

Condition/State	Action Taken
Prescan	The .EN, .DN, .ER, and .IP bits are cleared to false.
Rung-condition-in is false	The .EN bit is cleared to false if either the .DN or .ER bit is true.
Rung-condition-in is true	The .EN bit is set to true and the instruction executes.
Postscan	N/A

Structured Text

Condition/State	Action Taken
Prescan	See Prescan in the Ladder Diagram table.
Normal execution	See Rung-condition-in is false, followed by rung is true in the Ladder Diagram table.
Postscan	See Postscan in the Ladder Diagram table.

Error Codes

See *Motion Error Codes (.ERR)* for Motion Instructions.

Extended Error Codes

Use Extended Error Codes (EXERR) for more instruction about an error. See *Motion Error Codes (.ERR)* for Motion Instructions.

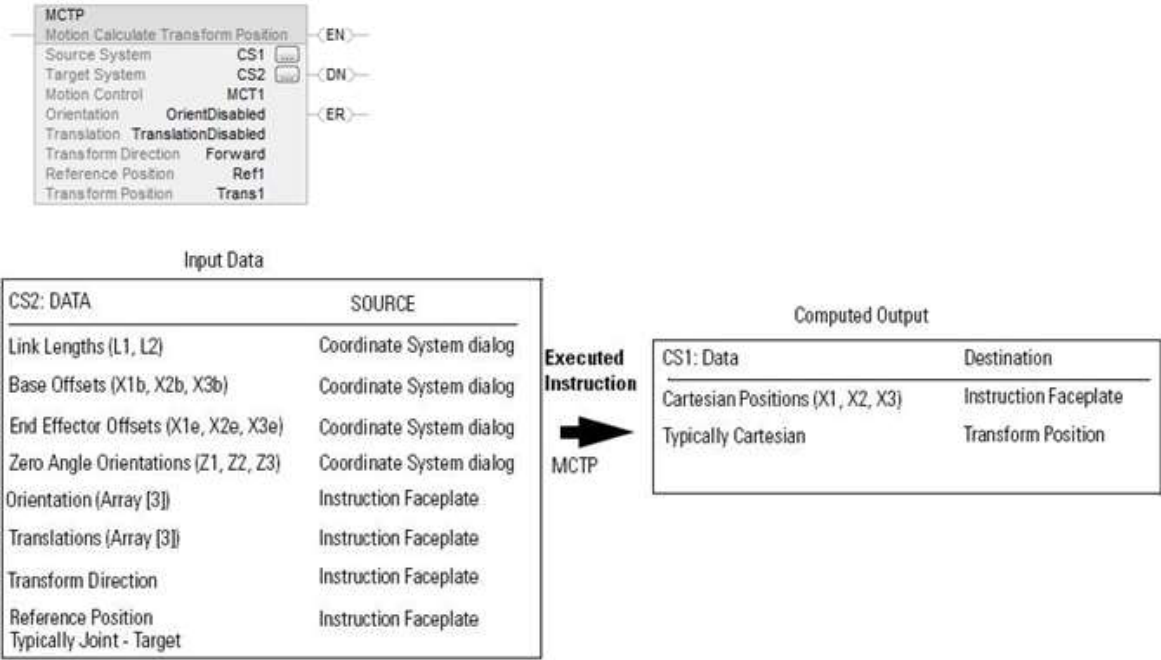
Changes to Status Bits

None

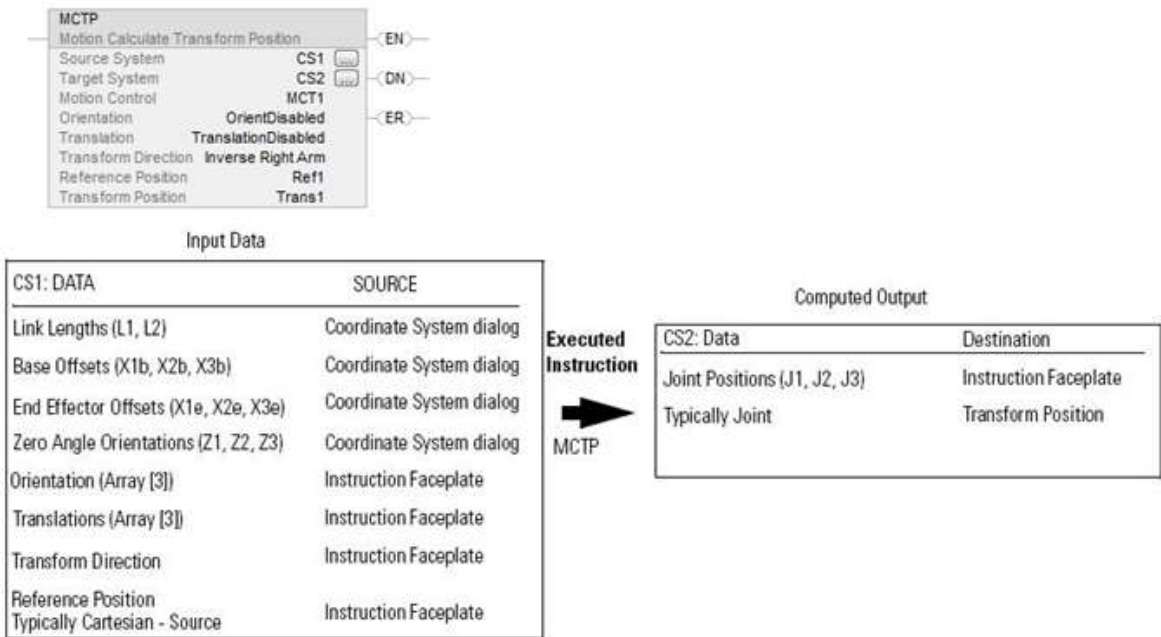
Data Flow of MCTP Instruction Between Two Coordinate Systems

The following illustrations show the flow of data when an MCTP Instruction is executed to perform a forward transformation and an inverse transformation. The CS1 indicator represents a Cartesian coordinate system containing X1, X2 and X3 axes as the source of the MCTP instruction. The CS2 indicator represents the joint coordinate system containing J1, J2 and J3 axes as the target of the MCTP instruction.

Data Flow When a Move is Executed with an MCTP Instruction - Forward Transform



Data Flow When a Move is Executed with an MCTP Instruction - Inverse Transform



Examples Ladder Diagram



Structured Text

MCTP(myMctpSourceSystem, myMctpTargetSystem, myMctpMotionControl, myMctpOrientation, myMctpTranslation, InverseRightArmMirror, myMctpReferencePos, myMctpTransformPos);

See also

- [Motion Error Codes \(.ERR\)](#)
- [Multi-Axis Coordinated Motion Instructions](#)
- [Common Attributes](#)
- [Structured Text Syntax](#)