This manual links to Knowledgebase Answer ID 1092901 for fault codes and parameters; download the spreadsheets now to ensure offline access.

iTRAK 5730 System

Bulletin Number 2198T

AB QUALITY

Allen-Bradley

by **ROCKWELL AUTOMATION**

Important User Information

Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.

	WARNING: Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.

	ATTENTION: Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.

IMPORTANT	Identifies information that is critical for successful application and understanding of the product.

Labels may also be on or inside the equipment to provide specific precautions.

	SHOCK HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.

	BURN HAZARD: Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.

	ARC FLASH HAZARD: Labels may be on or inside the equipment, for example, a motor control center, to alert people to potential Arc Flash. Arc Flash will cause severe injury or death. Wear proper Personal Protective Equipment (PPE). Follow ALL Regulatory requirements for safe work practices and for Personal Protective Equipment (PPE).

The following icon may appear in the text of this document.

	Identifies information that is useful and can help to make a process easier to do or easier to understand.

Chapter 3

Connect the iTRAK 5730 System

Chapter 4

Configure and Start Up the iTRAK 5730 System

Chapter 5

Troubleshoot the iTRAK 5730 System

Chapter 6

Maintenance

Notes:

This manual provides information and instructions for how to assemble, lift, mount, connect, configure, troubleshoot, and maintain an iTRAK® 5730 system. This manual is intended for engineers or technicians that implement the design, installation, and wiring of the iTRAK 5730 system. This manual is also intended for programmers that configure, operate, and maintain the iTRAK 5730 system with a programmable logic controller and EtherNet/IP™ network.

To learn more about the iTRAK 5730 system, contact your Rockwell Automation sales representative for information on available training courses.

Summary of Changes

This publication contains the following new or updated information. This list includes substantive updates only and is not intended to reflect all changes.

Topic	Page
Added UKCA certification information to the Safety Information section.	32

Conventions

These conventions are used throughout this manual: Bulleted lists provide information, not procedural steps. Numbered lists provide steps or hierarchical information.

Appropriate Use

Read and understand the safety instructions before using the iTRAK 5730 system.

> ⚠️ **ATTENTION:** Incorrect installation, operation, and maintenance of this product can cause personal injury or property damage. You are responsible for the product safety of your completed machinery. An incorrectly applied or installed iTRAK 5730 system can result in component damage or a reduction in product life.

Critical guidelines for appropriate use include:

- Hardware must remain in its original state; never make structural changes.
- Do not de-compile software or alter source codes.
- Do not use damaged or faulty components.
- Install the system in the manner that is described in this manual.
- Operate the system in the ambient conditions that are described in iTRAK 5730 System Technical Data, publication 2198T-TD002.

Notes:

Before You Begin Installation

Use this chapter to become familiar with the design, installation, and safety requirements for an iTRAK® 5730 system.

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About the iTRAK 5730 System

The iTRAK 5730 system is a modular, scalable, linear motor system. This system provides independent control of multiple movers on straight or curvilinear paths.

Table 1 - iTRAK 5730 System Features

Features	Specifications
Mover pitch	True 50 mm (1.97 in.)
Footprint	Track width: 420 mm (16.54 in.) Track length: 1034…9434 mm (40.71…371.42 in.) Additional dimensions are provided in <u>Approximate Dimensions on page 43</u>.
Orientation	Horizontal, vertical, or stand-up. Orientations are shown in <u>Figure 1 on page 13</u>.
Peak force	100 N (22.48 lbf)
Continuous force	36 N (8.09 lbf)
Maximum speed	5 m/s (16.4 ft/s)
Maximum payload weight for a single mover	4 kg (8.8 lb). When a mover is carrying a payload that is high within the 0…4 kg (0…8.8 lb) range, the mover must move at a low speed. The greater the weight of the payload, the lower the speed the mover can travel at.
Position loop update	250 µs
Repeatability	± 0.01 mm (0.0004 in.)
Maximum system size	64 logical sections, 128 movers, 8700 mm (342.52 in.) of straight rail length, 9434 mm (371.42 in.) of total length
Rail material	Stainless steel
IP rating	IP65 without infield cover, IP66 with infield cover
Safety	Integrated Safe Torque Off, SS1

The iTRAK 5730 system is built from a combination of the following modules and components:

- Straight motor modules
- Curved motor modules
- Connector modules
- Mounting rings
- Rectangular and flat rails
- Movers with mover and position magnets

A complete iTRAK 5730 system uses these components:

- Programmable logic controller (PLC)
- Input power components (branch circuit protection, disconnect, line filter, and functional safety)
- 24V SELV or PELV rated control power supply
- Kinetix® 5700 DC-bus power supply
- Kinetix 5700 iTRAK power supply
- Power cable (DC-bus and 24V control)
- Ethernet cable
- Lubrication system
- Infield covers (optional)

You can combine straight and curved motor modules to build multiple machine shapes and manage a wide variety of dynamic processes. Motor modules, movers, and connectors are modular and designed to accommodate system growth and varied power demands. The system can be expanded to more than 19 meters (62.3 feet).

The motor modules are integrated drive and motor coil units with feedback capability. Each motor module can operate and control multiple movers. Motor over-temperature protection is provided by temperature sensors that are embedded in the motor coils of the motor modules. The iTRAK 5730 system does not provide electronic motor over-temperature protection.

Power and network communication connections to the motor modules are provided by the connector modules. The power and control input connector module provides the power connection between the iTRAK power supply and a motor module and a communication connection from an EtherNet/IP™ network and a motor module. Additional connector modules provide additional power input and communication pass-through connections.

Movers provide the platform for your application effectors. Movers can be synchronized or independently controlled and positioned accurately on any point of the track.

The lubrication system intermittently applies lubricant to the rail system. The lubricant is distributed around the track by the mover track rollers. The lubrication system helps to prevent wear on the track and mover components and provides a smoother, quieter system.

The infield covers fit over the connector modules and connection wires and provide IP66 protection against water, dirt, and debris.

A customer-sourced mounting system is required to mount the iTRAK 5730. The are three recommended mounting orientations for the iTRAK 5730 system: horizontal, vertical, and stand-up.

Figure 1 - Mounting Orientations
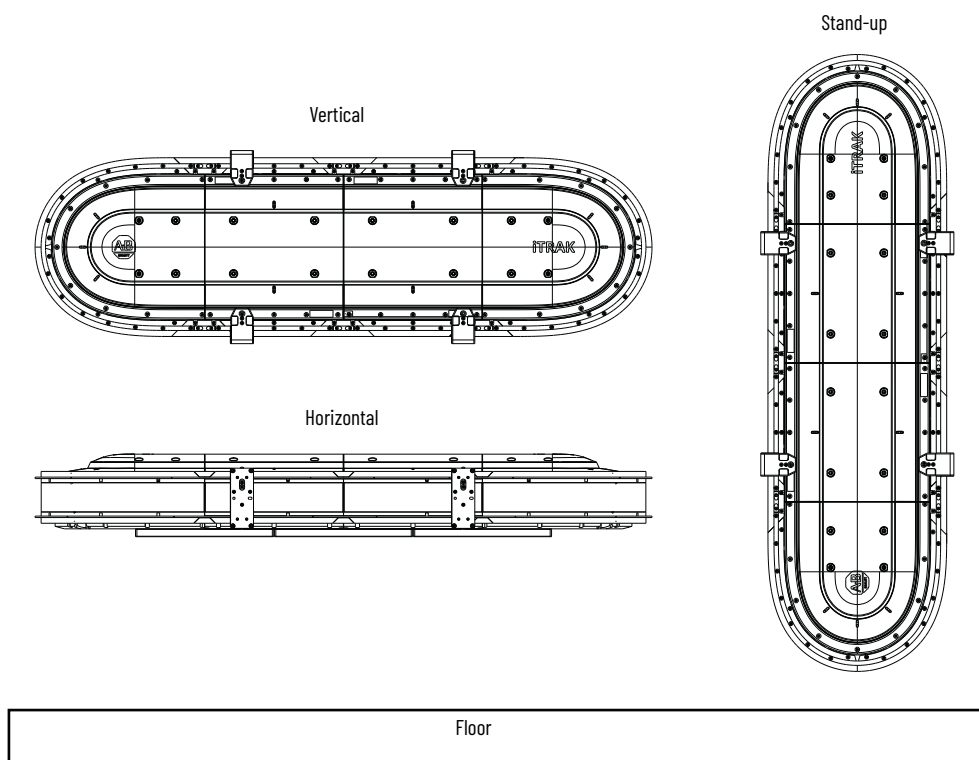
Figure 2 – Exploded View of the Servo and Mechanical Components of an iTRAK 5730 System
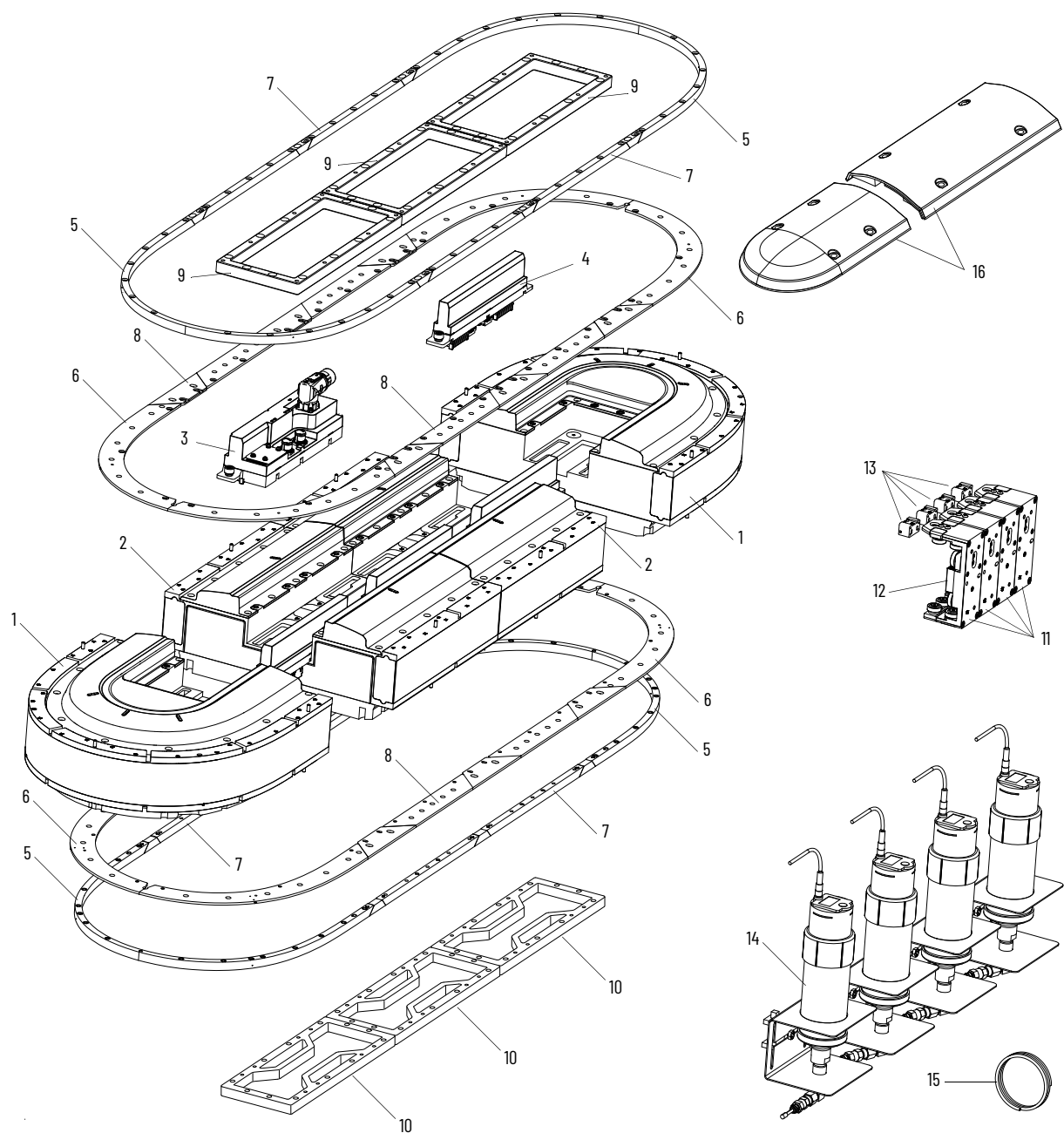
Item	Component
1	Curved motor module
2	Straight motor module
3	Power and control input connector module
—	Power with pass-through control connector module (not shown)
4	Power and control pass-through connector module
5	Top and bottom curved rectangular rail w/wedges
6	Top and bottom curved flat rail w/wedges
7	Top and bottom straight rectangular rail w/wedges
8	Top and bottom straight flat rail w/wedges

Item	Component
9	Mounting ring (top)
10	Mounting ring (bottom)
11	Mover
12	Mover magnet
13	Position magnets
14	Lubrication system pump (x4)
15	Lubrication system tube
16	Infield cover (straight and curved)

Table 2 - Electromechanical Components of an iTRAK 5730 System

iTRAK 5730 Component	Cat. No.	Description
Motor module	2198T-L20-T0303-A00-S2 (straight) 2198T-L20-T0309-D18-S2 (curved)	The motor module is an integrated drive and motor coil unit (referred to as a section in the firmware) with feedback capability.
Mounting ring	2198T-AS-01 (top) 2198T-AS-02 (bottom)	The mounting rings connect the motor modules and are used to mount and provide rigidity to the iTRAK 5730 system.
Rail system	2198T-BE-ST03, straight, 300 mm (11.8 in.) 2198T-BE-ST06, straight, 600 mm (23.6 in.) 2198T-BE-ST09, straight, 900 mm (35.4 in.) 2198T-BE-ED18, 180° curve, 900 mm (35.4 in.) nom	The flat and rectangular rails attach to the motor frame. This system of rails provides high-precision guidance for the mover track rollers.
Mover	2198T-VT0304-E	The movers are passive magnetic components. They move along the track in response to the magnetic fields generated by the motor modules. You attach your application end effector to the mover.
Mover magnet	2198T-M0304-A000-SS	Mover magnet plates can be used to build your own movers to optimize weight or bearing solutions. The mover magnet is included with the mover.
Position magnet	2198T-N1-0304, 2198T-NN-0304	Position magnets are used to actuate sensors in the track. These magnets are sold separately from the mover.

Table 3 - Power and Control Components of an iTRAK 5730 System

iTRAK 5730 Component	Cat. No.	Description
Power circuitry and components	2198-P*xxx* (DC-bus) 2198T-W25K-ER (iTRAK)	A Kinetix 5700 DC-bus power supply (2198) and Kinetix 5700 iTRAK power supply (2198T) provide the DC bus voltages that are required for the iTRAK 5730 motor modules. The Kinetix 5700 power supply is used with other Kinetix 5700 components and branch circuit protection.
Power and control input connector module	2198T-CT-CP	The power and control input connector module provides the power connection between the iTRAK power supply and a motor module and a communication connection from an EtherNet/IP network and a motor module. This module is used for the primary power and ground and Ethernet connections for your iTRAK 5730 system.
Power input with control pass-through connector module	2198T-CT-P	The power input with control pass-through connector module provides the power connection between the iTRAK power supply and a motor module. This module is used to provide an additional power source connection when a system requires an additional Kinetix 5700 iTRAK power supply. This module provides a pass-through Ethernet connection only. For more information on when multiple iTRAK power supplies are required, see <u>Provide Power to the iTRAK System</u> on page <u>71</u>.
Power and control pass-through connector module	2198T-CT	The power and control pass-through connector module provides continuous power between the motor modules and communication with the EtherNet/IP network.
Power cable	2198T-CHBFLS8-12AA06, 6 m (19.7 ft) 2198T-CHBFLS8-12AA09, 9 m (29.5 ft) 2198T-CHBFLS8-12AA12, 12 m (39.4 ft) 2198T-CHBFLS8-12AA15, 15 m (49.2 ft) 2198T-CHBFLS8-12AA30, 30 m (98.4 ft)	This cable provides DC-bus and control power from the iTRAK power supply to the power and control input and power input with control pass-through connector modules. Use only the cables that are referenced in this user manual.
EtherNet/IP communication cable	1585D-E8TGJM-1, 1 m (3.3 ft) 1585D-E8TGJM-2, 2 m (6.6 ft) 1585D-E8TGJM-3, 3 m (9.8 ft) 1585D-E8TGJM-5, 5 m (16.4 ft) 1585D-E8TGJM-10, 10 m (32.8 ft)	This M12 X-code Ethernet cable provides EtherNet/IP communication to the power and control input connector module and connected motor modules. Use only the cables that are referenced in this user manual.
Logix 5000® controller platform	Bulletin 1756, Bulletin 1769, Bulletin 5069	Integrated Motion on the EtherNet/IP network in ControlLogix® 5580, CompactLogix™ 5480, GuardLogix® 5580, and Compact GuardLogix 5380 controllers and Integrated Safety in Compact GuardLogix 5380 controllers. Linear, Device Level Ring (DLR), and star topologies are supported.
Studio 5000® environment	—	Studio 5000 Logix Designer® application, version 33 or later, provides support to program, commission, and maintain the ControlLogix, CompactLogix, GuardLogix, and Compact GuardLogix controller families that you use with the iTRAK 5730 system.

Table 4 - Accessory Components of an iTRAK 5730 System

iTRAK 5730 Component	Cat. No.	Description
Lubrication system	2198T-AL-SYS-4	The lubrication system supplies lubricant to the rail system.
Infield cover	2198T-AS-CD18-U (two curve covers) 2198T-AS-CA03-U (one straight cover) 2198T-AS-CD18 (two curve covers with Allen-Bradley® logo)	These covers provide additional protection for the connector modules and power and Ethernet cable connections on the modules.
Rail alignment tool	2198T-A08	This tool is used to align the rectangular rail segments during installation to help provide an accurate transition of movers on the track.
Mover loader tool	2198T-A09	This tool is used to install and remove a mover from the rail system.

The typical configuration for iTRAK 5730 system is shown in .

Catalog Number Explanations

The modular, scalable design of the iTRAK 5730 allows you to purchase an assembled system or individual components so you can build a system that is suited to your specific application.

Use the information in this section to understand and identify the iTRAK 5730 assembled system and individual component catalog numbers.

Assembled iTRAK 5730 System

These tables provide a catalog number explanation for an assembled iTRAK 5730 system.

For example: 2198T-S03H27000AD04008C-Q1234

2198T	-	S	03	H	270	000	D	04	008	C	-	Qxxxx
a		b	c	d	e	f	g	h	i	j		k

a	
Bulletin Number	
Code	**Description**
2198T	iTRAK Intelligent Track System

b	
Module Type	
Code	**Description**
S	Configured iTRAK 5730 system

c	
Module Coil Width	
Code	**Description**
03	30 mm (1.18 in.)

d	
Orientation	
Code	**Description**
H	Horizontal (both dimensions horizontal)
V	Vertical (short dimension vertical only)
S	Stand up (long dimension vertical only)

e	
Long Dimension (length)	
Code	**Description**
###	Curve center point width in decimeters

f	
Short Dimension (width)	
Code	**Description**
###	Curve center point width in decimeters
000	Oval
00A	Linear

g	
Mechanical Solution Style	
Code	**Description**
D	5730 stainless-steel rail

h	
Mover Magnet Stack Length	
Code	**Description**
04	38 mm (1.50 in.) (approx)

i	
Mover Quantity	
Code	**Description**
###	Number of movers

j	
Power and Control Configuration	
Code	**Description**
C	Kinetix 5700 iTRAK power supply and cables

k	
Customized	
Code	**Description**
Qxxxx	(Quote reference number)

Modular iTRAK 5730 System Components

All iTRAK 5730 system component catalog numbers begin with the Bulletin number 2198T followed by a character that represents one of these module types:

- C - Cable or connector
- L - Integrated linear drive/motor module (section)
- M - Mover magnet
- N - Position magnet
- V - Assembled mover

Motor Module (Section) Catalog Numbers

These tables provide an example catalog number explanation for a motor module.

For example: 2198T-L20-T0303-A00-S2

2198T	-	L	20	-	T	03	03	-	A	00	-	S2
a		b	c		d	e	f		g	h		i

a		b		c		d	
Bulletin Number		**Module Type**		**Nominal Voltage**		**Motor Orientation**	
Code	**Description**	**Code**	**Description**	**Code**	**Description**	**Code**	**Description**
2198T	iTRAK Intelligent Track System	L	Motor module (section)	20	200/400V bus	T	Transverse

e		f		g		h		i	
Motor Coil Width		**Motor Length**		**Radius Type**		**Arc Angle**		**Functional Safety**	
Code	**Description**	**Code**	**Description**	**Code**	**Description**	**Code**	**Description**	**Code**	**Description**
03	30 mm (1.18 in.)	03	300 mm (11.81 in.) [1]	A	Linear	00	Linear [1]	S2	Integrated Network Safe Stop 1
		09	900 mm (35.43 in.) [2]	D	Narrow spline	18	180° (diameter varies) [2]		

(1)   Only available for position g, code A.
(2)   Only available for position g, Code D.

Connector Module Catalog Numbers

These tables provide an example catalog number explanation for a connector module.

For example: 2198T-CT-CP

2198T	-	CT	-	CP
a		b		c

a	
Bulletin Number	
Code	**Description**
2198T	iTRAK Intelligent Track System

b	
Module Type	
Code	**Description**
CT	Connector terminal (between motor modules)

c	
Input Option	
Code	**Description**
CP	Communication and power inputs
P	Power input with communication pass-through
<blanks>	Communication and power pass-through

Assembled Mover Catalog Numbers

These tables provide an example catalog number explanation for an assembled mover.

For example: 2198T-VT0304-E

2198T	-	V	T	03	04	-	E
a		b	c	d	e		f

a	
Bulletin Number	
Code	**Description**
2198T	iTRAK Intelligent Track System

b	
Module Type	
Code	**Description**
V	Assembled mover

c	
Coil Orientation	
Code	**Description**
T	Transverse

d	
Coil Length	
Code	**Description**
03	30 mm (1.18 in.)

e	
Magnet Length	
Code	**Description**
04	38 mm (1.50 in.) (approx)

f	
Mover Identification	
Code	**Description**
E	57xx Design

Mover Magnet Plate Catalog Numbers

These tables provide an example catalog number explanation for a mover magnet plate.

For example: 2198T-M0304-A000-SS

2198T	-	M	03	04	-	A	000	-	SS
a		b	c	d		e	f		g

a	
Bulletin Number	
Code	**Description**
2198T	iTRAK Intelligent Track System

b	
Module Type	
Code	**Description**
M	Magnet plate

c	
Coil Length	
Code	**Description**
03	30 mm (1.18 in.)

d	
Magnet Length	
Code	**Description**
04	38 mm (1.50 in.) (approx)

e	
Direction of Curvature	
Code	**Description**
A	Outside of Neutral

f	
Radius of Section Curvature	
Code	**Description**
000	Flat

g	
Magnet Material	
Code	**Description**
SS	Stainless steel cover with potted interior

Position Magnet Catalog Numbers

These tables provide an example catalog number explanation for a position magnet.

For example: 2198T-N1-0304

2198T	-	N	1	-	0304
a		b	c		d

a	
Bulletin Number	
Code	**Description**
2198T	iTRAK Intelligent Track System

b	
Module Type	
Code	**Description**
N	Position magnet

c	
Magnet Type	
Code	**Description**
1	South pole
N	North pole

d	
Mounting Hardware	
Code	**Description**
0304	Pairs with 35 x 45 mm (1.38 x 1.77 in.) motor magnet plates

Motor Modules

Your iTRAK 5730 system can use two types of motor modules. Figure 3 shows the features of the straight motor module and Figure 4 shows the features of the curved motor module.

Figure 3 - 2198T-L20-T0303-A00-S2, Straight Motor Module
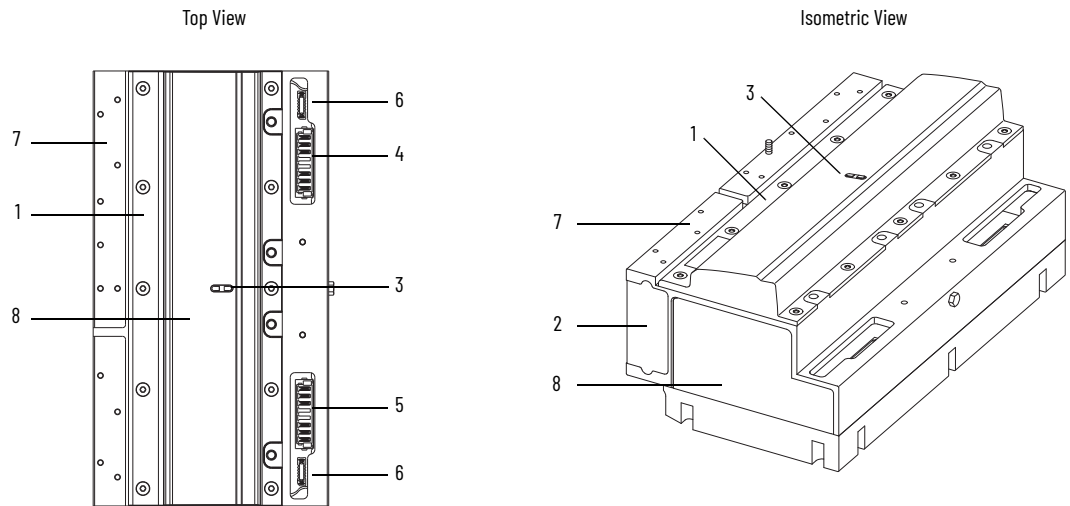
Figure 4 - 2198T-L20-T0309-D18-S2, Curved Motor Module
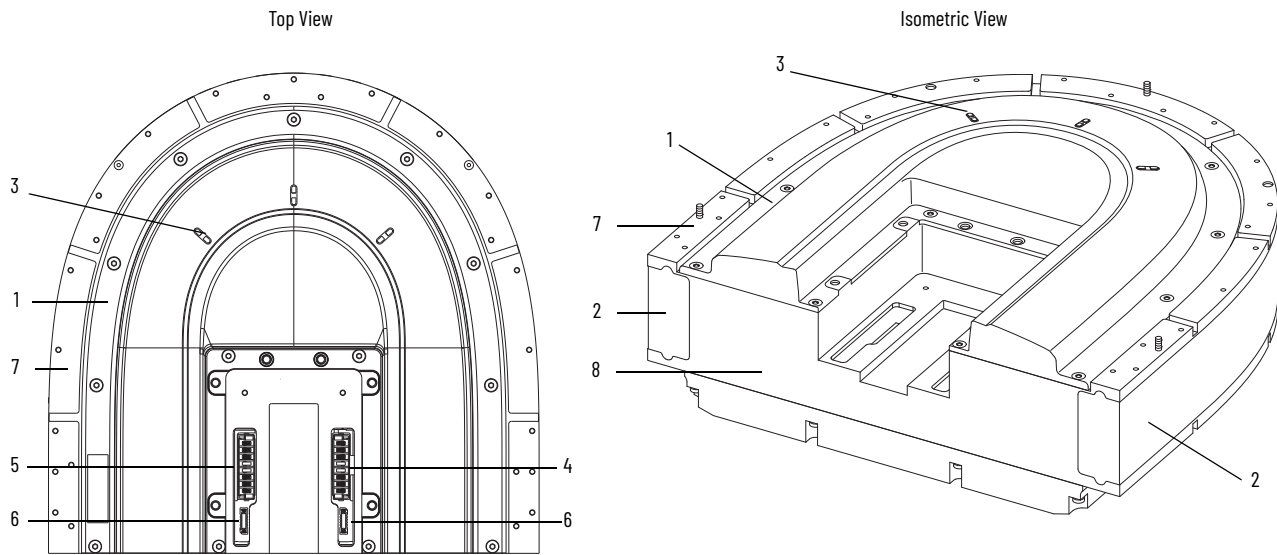
Motor Module Components

Item	Description	Item	Description
1	Mover position-magnet sensing area	5	Outgoing power bus connection (from connector module)
2	Motor coil assembly	6	Ethernet connector (from connector module)
3	Status indicators	7	Rectangular and flat rail mounting surface
4	Incoming power bus connection (from connector module)	8	Drive housing

Motor Module Status Indicators

The motor modules (2198T-L20-T0303-A00-S2 and 2198T-L20-T0309-D18-S2) contain the following status indicators. For a description of these status indicators, see Motor Module Status Indicators on page 126.

Top View
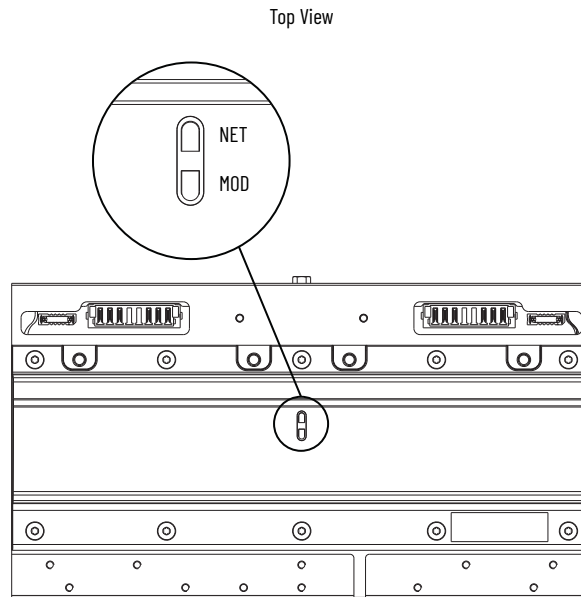
Straight Motor Module (Catalog Number 2198T-L20-T0303-A00-S2) shown.

Connector Modules

The iTRAK 5730 system can use three types of connector modules:

- Figure 5 shows the features of the power and control input connector module. This connector module provides a power source and Ethernet connection for the iTRAK 5730 system.
- Figure 6 shows the features of the power input with control pass-through connector module. This connector module provides a secondary power source connection and continuous Ethernet connection for the iTRAK 5730 system.
- Figure 7 shows the features of the power and control pass-through connector module. This connector module provides a continuous power bus and Ethernet connection for the iTRAK 5730 system.

Figure 5 - 2198T-CT-CP Power and Control Input Connector Module
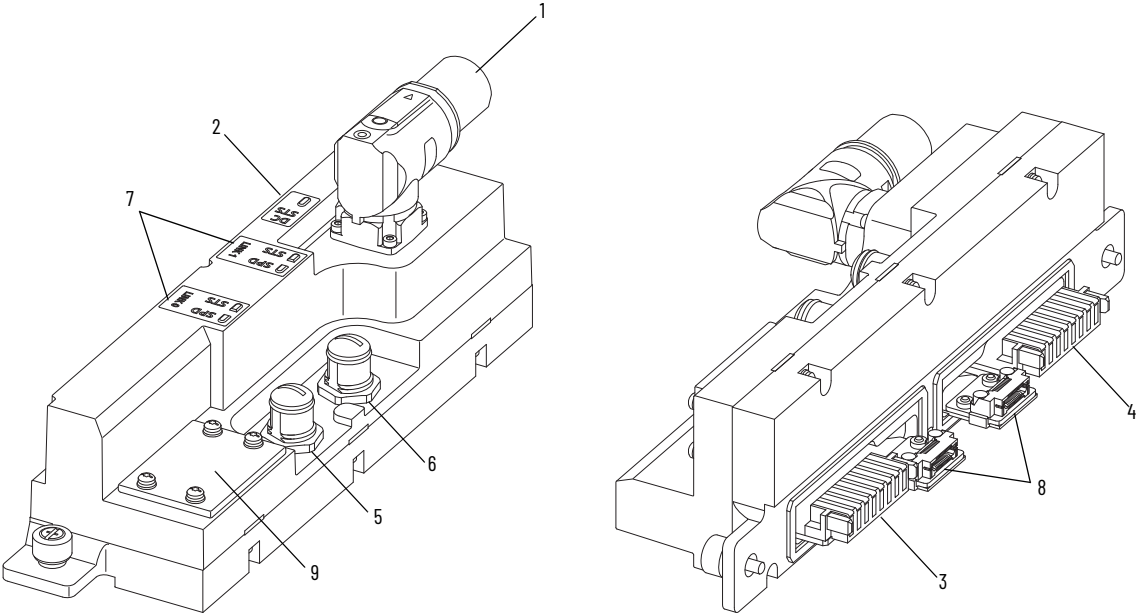
Power and Control Input Connector-module Components

Item	Description	Item	Description
1	Incoming power bus connector	6	Outgoing Ethernet network connector
2	Power status indicator	7	Network status indicators
3	Motor power and ground bus connector	8	Pass-through Ethernet network connectors
4	Motor power ground connector	9	EtherNet/IP address selectors and control DIP switch (below access cover) [1]
5	Incoming Ethernet network connector		

(1)   See Connect an EtherNet/IP Network to the iTRAK 5730 System on page 75 for details on these switches.

Figure 6 - 2198T-CT-P Power Input With Control Pass-through Connector Module
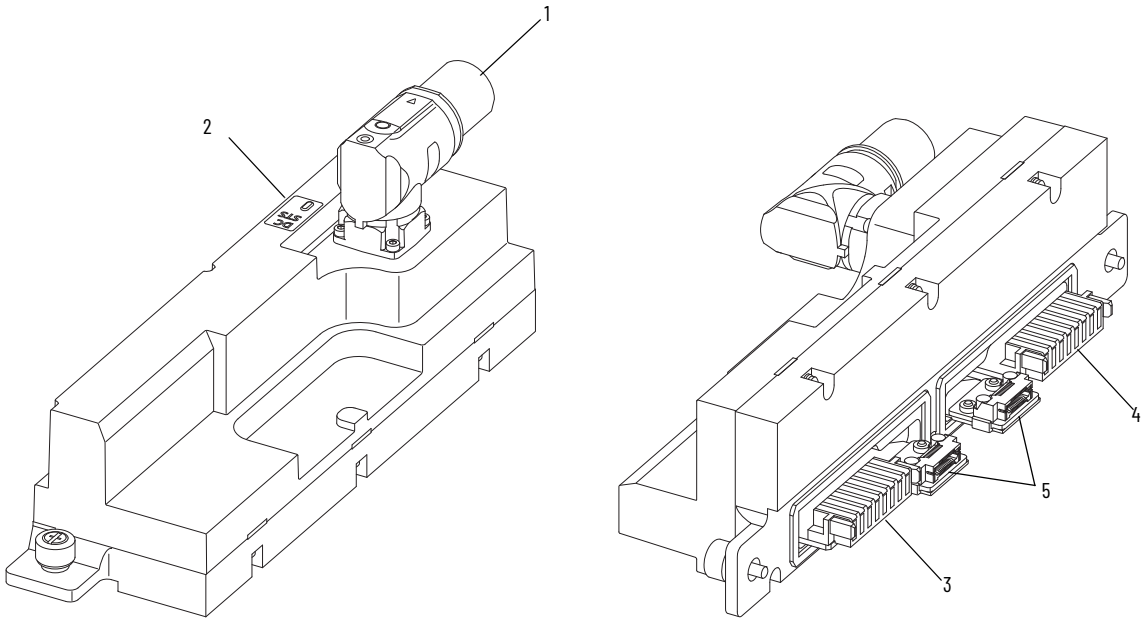
Power Input with Control Pass-through Connector-module Components

Item	Description	Item	Description
1	Incoming power bus connector	4	Ground connector
2	Power status indicator	5	Pass-through Ethernet network connectors
3	Motor power and ground bus connector		

Figure 7 - 2198T-CT Power and Control Pass-through Connector Module
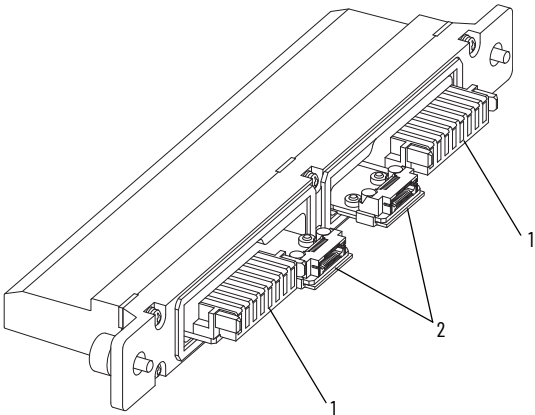
Power and Control Pass-through Connector-module Components

Item	Description	Item	Description
1	Motor power and ground bus connector	2	Pass-through Ethernet network connectors

Connector Module Status Indicators

The power and control input (2198T-CT-CP) and power input with control pass-through (2198T-CT-P) connector modules contain the following status indicators. These indicators provide a visual status of the power and communication connections. For a description of these status indicators, see Connector Module Status Indicators on page 128.
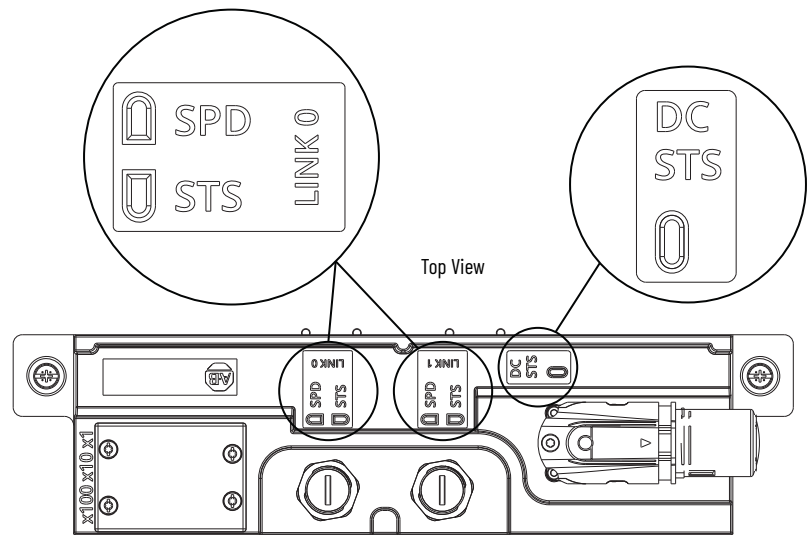
Power and Control Input Connector Module (Catalog Number 2198T-CT-CP) shown.

Mounting Rings

The mounting rings are used to connect motor modules and provide rigidity to the iTRAK 5730 system. Each mounting ring includes the hardware that is required to connect to the motor modules. An equal number of top and bottom mounting rings are required for installation.

IMPORTANT	To be sure that the mounting rings are secured to the connected motor modules and support the iTRAK system properly, you must use the fasteners that are provided with the kit. Customer-supplied fasteners can affect system operation and structural integrity.

Figure 8 - 2198T-AS-01 and 2198T-AS-02 Mounting Rings

Catalog Number 2198T-AS-01   Catalog Number 2198T-AS-02
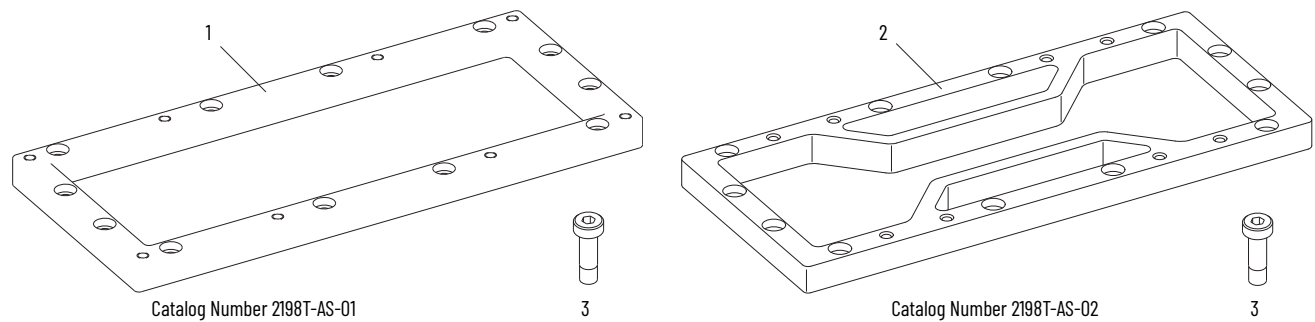
Mounting Ring Components

Item	Description
1	Top mounting ring
2	Bottom mounting ring

Item	Description
3	M6 Reamer bolt, 20 mm (0.79)

Rectangular and Flat Rails

The straight rectangular and flat rail kits are installed on the straight motor modules. Straight rectangular and flat rail kits are available in 300 mm (11.8 in.), 600 mm (23.6 in.), and 900 mm (35.4 in.) lengths. Each kit contains two straight rectangular rails and rectangular rail wedges and two straight flat rails and flat rail wedges. All mounting hardware is included with the kits.

IMPORTANT	To be sure that the rails are secured and aligned to the motor modules properly, you must use the fasteners that are provided with the kits. Customer-supplied fasteners can affect system operation.

Figure 9 - 2198T-BE-ST03, 2198T-BE-ST06, and 2198T-BE-ST09 Straight Rectangular and Flat Rails

300 mm (11.8 in.) Straight Rectangular and Flat Rail Kit
(Catalog Number 2198T-BE-ST03)
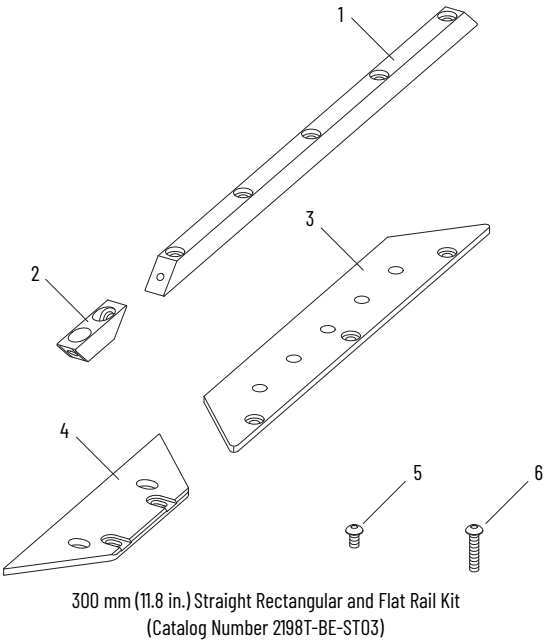
Straight Rectangular and Flat Rail Components

Item	Description	Item	Description
1	Straight rectangular rail	4	Straight flat rail wedge
2	Straight rectangular rail wedge	5	M4 Torx screw, 8 mm (0.31 in.)
3	Straight flat rail	6	M4 Torx screw, 20 mm (0.79 in.)

The curved rectangular and flat rails are installed on the curved motor modules. Curved rectangular and flat rails (2198T-BE-ED18) are approximately 900 mm (35.4 in.) long. Each kit contains two curved rectangular rails and straight rectangular rail wedges and four curved flat rails and two flat wedges. All mounting hardware is included with the kits. The kit also contains four O-rings, which are installed in cavities on the curved motor modules and curved rectangular rails. The O-rings provide a seal for lubrication ports.

Figure 10 – 2198T-BE-ED18 Curved Rectangular and Flat Rails
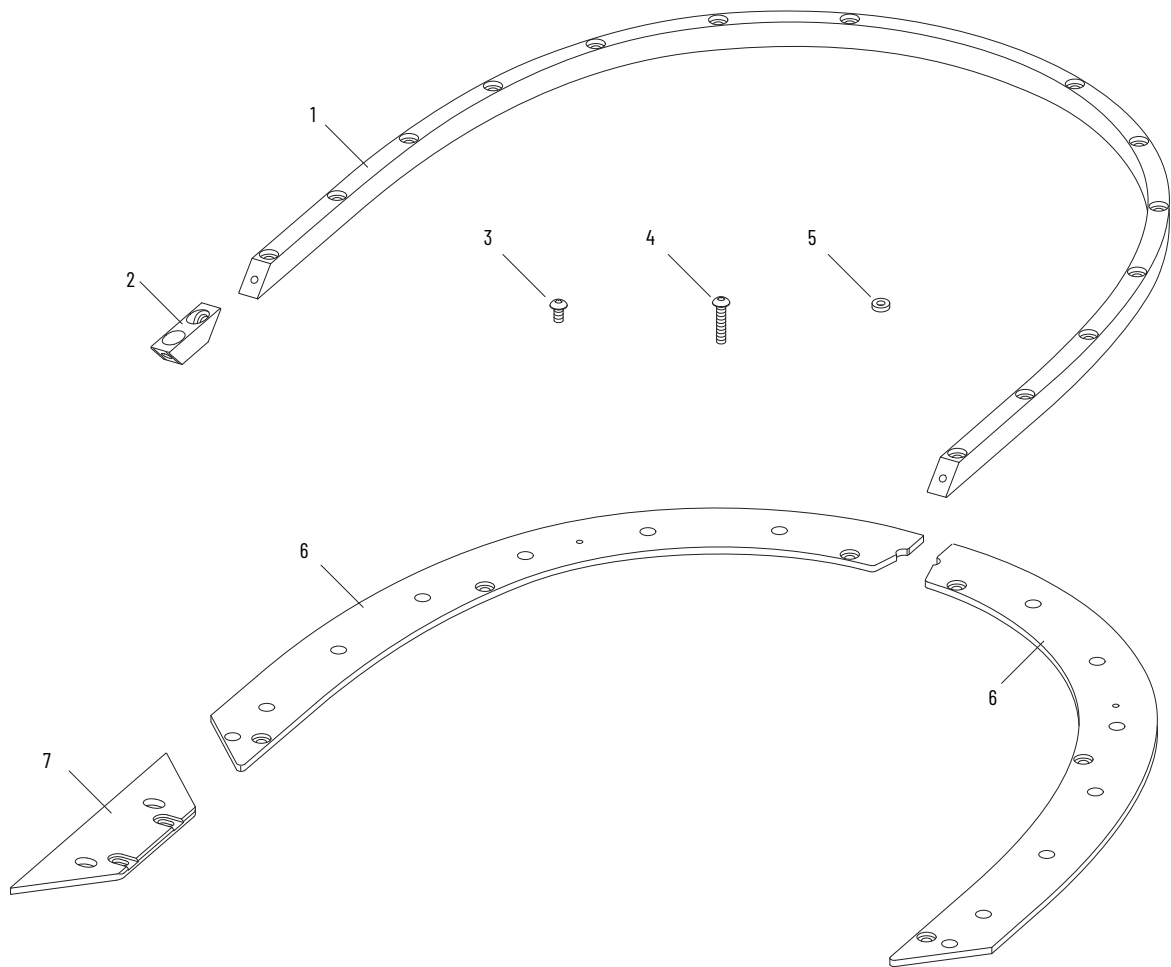
Curved Rectangular and Flat Rail Components

Item	Description
1	Curved rectangular rail
2	Straight rectangular rail wedge
3	M4 Torx screw, 20 mm (0.79 in.)
4	M4 Torx screw, 8 mm (0.31 in.)

Item	Description
5	O-ring
6	Curved flat rail
7	Straight flat rail wedge

Mover

Movers are 50 mm (2.0 in.) long, in the direction of travel. See the iTRAK 5730 System Technical Data, publication 2198T-TD002 for the force-speed curves. Do not exceed the force-speed parameters when programming your system.

> **ATTENTION:** A hazard of personal injury or equipment damage exists. An uninstalled mover must always have the motor-magnet protective cover (item 7 in Figure 11) installed. This cover should be removed only at the time of installation. Before handling a mover with a mover magnet installed, read the Safety Information that begins on page 32.

Figure 11 - 2198T-VT0304-E, Mover
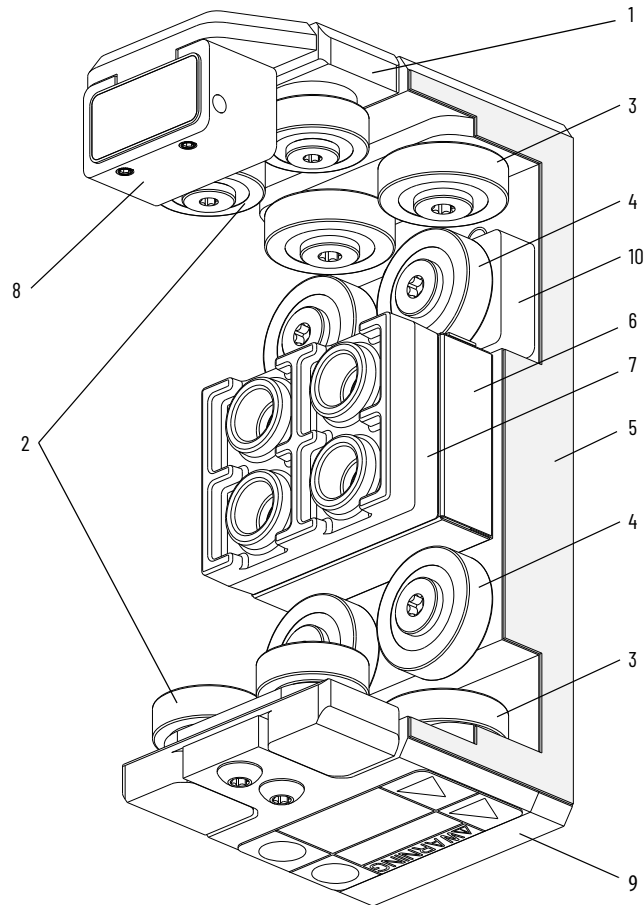
Assembled Mover Components

Item	Description	Item	Description
1	Horizontal bearing block	6	Motor magnet
2	Track roller, 19 mm (0.75 in.) horizontal set (x4)	7	Motor-magnet protective cover (removed at time of installation only)
3	Track roller, 22 mm (0.87 in.) horizontal set (x4)	8	Position feedback magnet assembly (north and south, sold separately from the mover)
4	Track roller, 22 mm (0.87 in.) vertical set (x4)	9	Mover chassis assembly
5	Bumper	10	Vertical bearing block

Power Supplies

Power is supplied to the iTRAK 5730 system by using a scalable Kinetix 5700 iTRAK power supply. See Provide Power to the iTRAK System on page 71 for more information on the required iTRAK power supply and system power requirements.

The iTRAK power supply is used in combination with a Kinetix 5700 DC-bus power supply as part of a Kinetix 5700 system.

- For Kinetix 5700 iTRAK power supply installation instructions, see the Kinetix 5700 iTRAK Power Supply and iTRAK Bus Conditioner Module Installation Instructions, publication 2198T-IN001.
- For Kinetix 5700 DC-bus power supply details and use, see the Kinetix 5700 Servo Drives User Manual, publication 2198-UM002.

When using the Kinetix 5700 iTRAK power supply, you must use firmware revision 12.001 or later. If you are using a Kinetix 5700 iTRAK power supply at lower firmware revisions, contact ICTSupport@ra.rockwell.com for assistance and selection.

Figure 12 - 2198T-W25K-ER iTRAK Power Supply
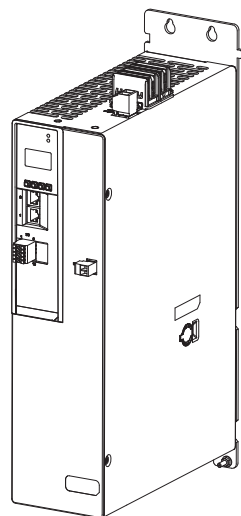
Programmable Controllers

The iTRAK 5730 is designed to work with the programmable controllers that are shown in Table 5.

Table 5 - Compatible Controllers

Platform	Controller	Compatible Firmware Revision
ControlLogix	5580	33.001 or later
CompactLogix	5380 [1]	33.001 or later
	5480	33.001 or later
GuardLogix	5580	33.001 or later
Compact GuardLogix	5380	33.001 or later

(1) The memory requirements and CPU utilization of typical iTRAK applications can reduce the possible catalog numbers available in these families. Work with Rockwell Automation application engineering to determine suitability.

Typical Communication Configurations

The iTRAK 5730 system supports linear, ring (Device Level Ring), and star Ethernet topologies, by using ControlLogix, GuardLogix, CompactLogix, or Compact GuardLogix controllers and Stratix® Ethernet switch (where applicable).

The power and control input connector module (cat. no. 2198T-CT-CP) provides ports for Ethernet network connections and contains rotary switches for defining a manual or dynamic IP address scheme that is used for your iTRAK 5730 system.

Linear Topology

The iTRAK 5730 connector modules include dual-port connectivity, however, if any device becomes disconnected, all devices downstream of that device lose communication. The devices in this example are connected by using linear topology.

Figure 13 – iTRAK 5730 System Linear Communication Installation

Ethernet Cable

Power Cable
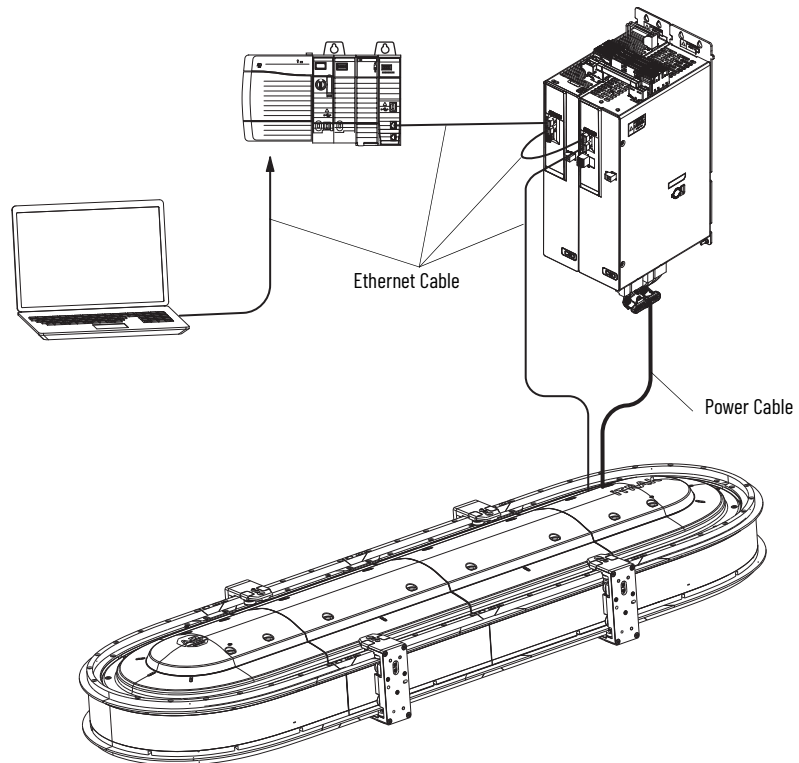
Device Level Ring Topology

Device Level Ring (DLR) is an EtherNet/IP protocol that is defined by ODVA. DLR provides a means to detect, manage, and recover from single faults in a ring-based network.

A DLR network includes the following types of ring nodes.

Node	Description
Ring supervisor	A ring supervisor provides these functions: • Manages traffic on the DLR network • Collects diagnostic information for the network A DLR network requires at least one node to be configured as ring supervisor. By default, the supervisor function is disabled on supervisor-capable devices.
Ring participants	Ring participants provide these functions: • Process data that is transmitted over the network. • Pass on the data to the next node on the network. • Report fault locations to the active ring supervisor. When a fault occurs on the DLR network, ring participants reconfigure themselves and relearn the network topology.
Redundant gateways (optional)	Redundant gateways are multiple switches that are connected to a DLR network and also connected together through the rest of the network. Redundant gateways provide DLR network resiliency to the rest of the network.

Depending on their firmware capabilities, both devices and switches can operate as supervisors or ring nodes on a DLR network. Only switches can operate as redundant gateways.

For more information about DLR, see the EtherNet/IP Device Level Ring Application Technique, publication [ENET-AT007](#).

Figure 14 - iTRAK 5730 System Ring Communication Installation
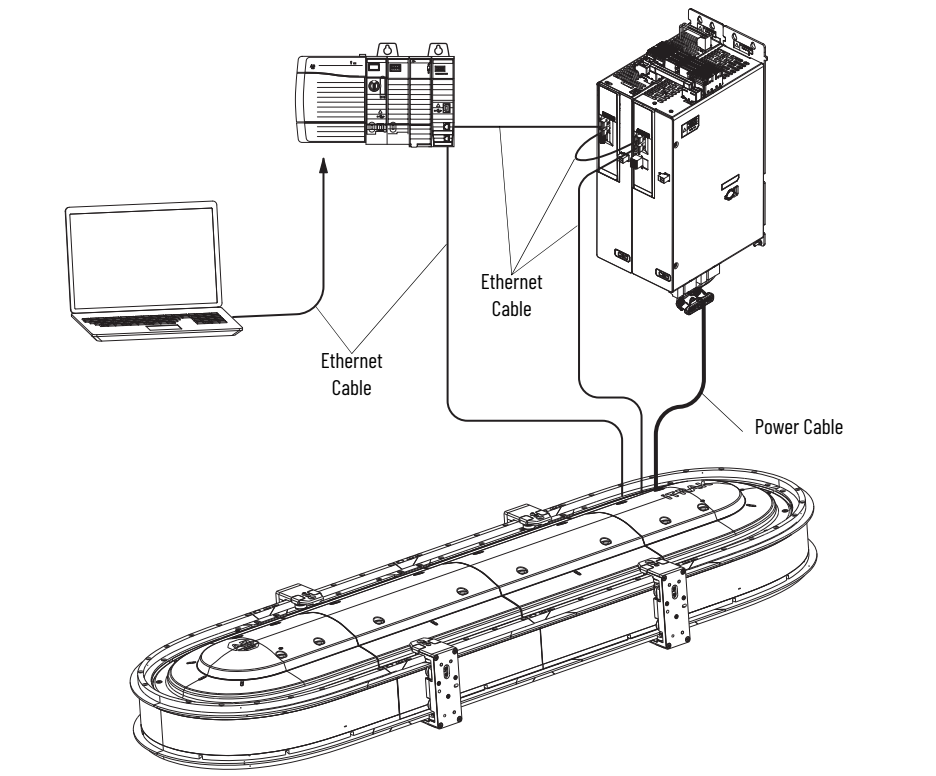
Star Topology

In a star topology, each device is connected directly to an Ethernet switch. In this example, the devices are connected by using star topology.

The iTRAK 5730 connector modules have dual ports, so linear topology is maintained from one module to another, but the iTRAK 5730 system and other devices operate independently. The loss of one device does not impact the operation of other devices.

Figure 15 - iTRAK 5730 System Star Communication Installation
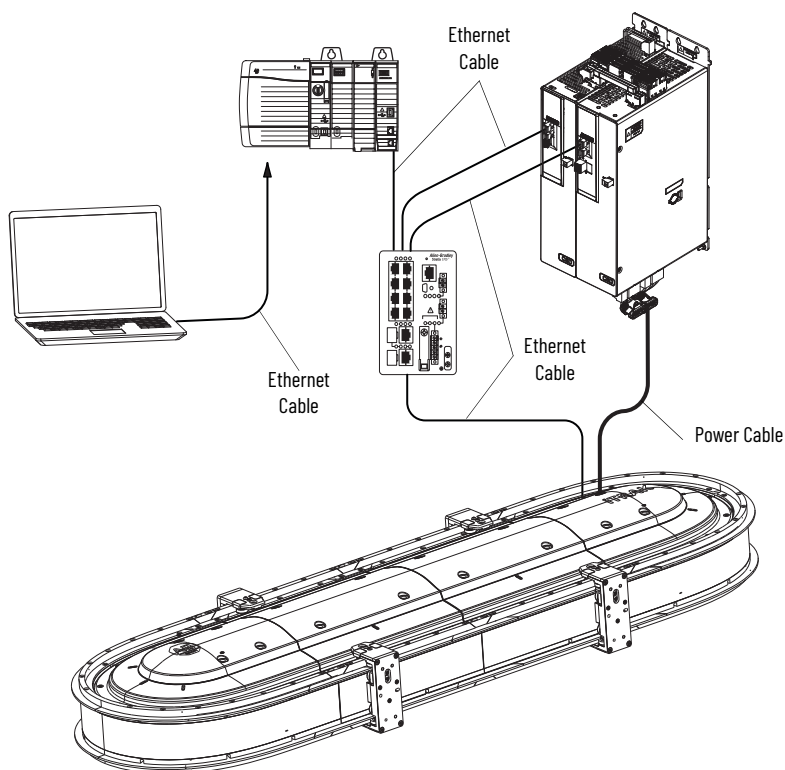
Safety Information

Follow all safety information that is presented in this section while working with or near an iTRAK 5730 system.

 SHOCK HAZARD: To avoid a shock hazard or personal injury, make sure that all power has been removed before proceeding. Complete lockout and tagout procedures to remove input power before servicing.

Before installation, read the General Assembly Instructions. For applicable installations, before working with an iTRAK 5730 system or components, review the declaration of conformity and declaration of incorporation that are appropriate for your installation. All certification information, including the following declarations of conformity and declarations of incorporation can be viewed at: rok.auto/certifications.

- EU:
  - EU Declaration of Conformity, Directive 2006/42/EC
  - 2198T Series iTRAK 5730 System without PCM - CE Declaration of Incorporation, publication 2198T-CT008
  - 2198T Kinetix iTRAK 5730 System with PCM - CE Declaration of Incorporation, publication 2198T-CT009
- UK:
  - UK Declaration of Conformity, Regulation 2008 No. 1597
  - 2198T Series iTRAK 5730 System without PCM - UK Declaration of Incorporation, publication 2198T-CT021
  - 2198T Kinetix iTRAK 5730 System with PCM - UK Declaration of Incorporation, publication 2198T-CT023

The iTRAK 5730 system is partially completed machinery. This machinery must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the relevant provisions of the Machinery Directive or UK Supply of Machinery (Safety) Regulations.

Risk Assessment

A risk assessment must be prepared for the installation of the machine, within its application conditions, and with the system components installed. As a result of the risk assessment, you must implement functions that monitor and provide for a higher-level measurement of personal safety. The safety regulations applicable to the installation of the machine must be considered. Unintended machine movements or other malfunctions are possible if safety devices are disabled, bypassed, or not activated.

General Assembly Instructions

Follow these overall assembly instructions during installation of your iTRAK 5730 system.

- When integrating the iTRAK 5730 system with tools and external machinery, see https://motionanalyzer.rockwellautomation.com/Products/iTrak for models and outline drawings.

- See the iTRAK 5730 System Technical Data, publication 2198T-TD002 for operational ratings. Do not exceed these ratings.

- The iTRAK 5730 system must only be used in the environment specified.

- See Chapter 2 - Track Installation and Kinetix 5700 iTRAK Power Supply and iTRAK Bus Conditioner Module Installation Instructions, publication 2198T-IN001 for system installation instructions.

- Although system components have IP65 protection (IP66 with infield cover in place), the mover track rollers exposure to water must be minimized, as they can corrode over time.

- Track rails must be lubricated. See Install the Lubrication System on page 63 for details.

- If necessary, additional precautions must be taken to help prevent excess lubrication from product contamination or external machinery.

- Power and data cables must be managed or located to help prevent trip hazards for machine operators.

- When you install tools on movers, consider that there can be high accelerations and forces, in particular when movers transition between straight and curved modules.
  - Consider the mass and center of gravity of the tools that are mounted to movers.
  - When you fasten tools and machinery to movers, use the two dowel pins, and four 5 mm (0.20 in.) screws. Be sure that the screws engage at least 10 mm (0.39 in.) of thread and the screw is locked in place.
  - When you load movers with product, be sure that they are fastened securely for all anticipated forces and accelerations.

- Do not install ferromagnetic material near the movers. Maintain a minimum distance of 50 mm (2.0 in.) for any installed ferromagnetic material.

- Help prevent the risk of operator contact with parts that move by the use of guards and protective devices. See Machine Guarding for more information.

- Complete all installation instructions as directed in this manual. The National Electrical Code (NEC) and local codes outline provisions for safe installation of electrical equipment.

> ⚠ **ATTENTION:** A hazard of personal injury or equipment damage exists. An E-stop is not provided with the iTRAK 5730 System. Consult your national and local electrical codes and provide an E-stop if necessary.

- Control systems must be designed and constructed in such a way as to help prevent hazardous situations from occurring. See Chapter 7 - iTRAK 5730 System Integrated Safety. Movers can fall when motor power is removed or servo control is disabled on vertical or stand-up iTRAK 5730 system installations.

> ⚠ **ATTENTION:** A hazard of equipment damage or personal injury exists. Movers can fall when motor power is removed or servo control is disabled on vertical or stand-up iTRAK 5730 system installations. Control systems must be designed and constructed in such a way as to help prevent hazardous situations from occurring. See Chapter 7 - iTRAK 5730 System Integrated Safety on page 173.

Machine Guarding

The movers, which contain application loads, can have high acceleration. The movers experience more acceleration in the curved sections of the track due to vector directional changes. Machine guards and safety enclosures must be implemented to offer protection to personnel. The shielding and enclosure must be designed to help protect against tangential projectiles along the system perimeter.

Avoid Accidents, Injury, and Property Damage

Follow these guidelines to help avoid accidents, injury, and property damage:

- Mount emergency stop switches in the immediate reach of the operator.
- Keep free and clear of the range of motion of the machine and the parts that move. Help prevent personnel from accidentally entering the range of motion by using:
    - Safety fences
    - Protective coverings
    - Safety guards
- Safety fences and protective coverings must be strong enough to resist the maximum kinetic energy of the system. See .
- Light barriers are not recommended without a detailed risk assessment, due to the high kinetic energy of the movers.
- Avoid the operation of high-frequency, remote control, and radio equipment near system electronics and the power supply cables. If the use of a high-frequency, remote control, or radio device is necessary, check that the device does not interfere or cause malfunctions in the machine operation. We recommend performing an electromagnetic compatibility test before putting the system into service.

Remove Power from the iTRAK 5730 System

1. Stop the motion of all movers.

2. If your system uses a vertical or stand-up mounting orientation (see Figure 1 on page 13), then when power is removed, any movers that are on the non-horizontal parts of the track fall. Take this consideration into account in your application design. To help prevent movers from falling, there are multiple actions that you can take before removing power:

   - For vertical orientations: You may be able to move all movers to horizontal parts of the track where they will not fall when power is removed.

   - For stand-up orientations: Move all movers so that they are grouped at the lowest point in the track. Make sure the highest mover on each side of the group is at the same height as the other, so that they are in equilibrium and will not move when power is removed.

   - For vertical or stand-up orientations: Mechanically secure the movers that are on non-horizontal parts of the track using an external brake, arrester, or clamp mechanism; use protective equipment such as heat protective gloves to avoid burn hazards while installing the mover securing mechanisms. See Protection Against Contact with Hot Parts on page 35.

3. Remove mains input power from the system.

4. Remove 24V DC control power from the system.

5. Before proceeding with installation or maintenance tasks, wait at least 5 minutes to avoid electric shock hazard, and whatever time is necessary for the system to cool to avoid burn hazard. Cooling can take up to 140 minutes.

Avoid Electrical Shock

SHOCK HAZARD: To avoid a shock hazard or personal injury, verify that all power has been removed before proceeding with installation or maintenance tasks. The motor modules and Kinetix 5700 iTRAK power supply require 5 minutes to discharge before you handle wire and cable connections.

Protection Against Contact with Hot Parts

BURN HAZARD: A burn hazard exists. Some components of the system have hot surfaces. To avoid personal injury, do not touch hot surfaces as indicated by a burn hazard label.

Temperatures of the motor-module stator covers can be higher than 60° C (140° F) during or after operation. After you remove power from the iTRAK 5730 system, motor modules can require up to 140 minutes to cool. Let the motor modules cool before you touch or service the system.

One exception to the rule to wait for cooling before touching the system is when removing power to a vertical or stand-up system. In this situation, you may want to install mechanical securing mechanisms onto the movers on the non-horizontal parts of the track before removing power, to help prevent them from falling when power is removed. Therefore, the system is still powered and hot while installing the mechanical securing mechanisms. To help prevent burns, use heat protective gloves and any other necessary protective equipment while installing the mechanical securing mechanisms. Also follow these precautions when removing the mechanical securing mechanisms, because power is on and the motors are producing heat during the removal of the mover securing mechanisms.

Protection Against Magnetic and Electromagnetic Fields During Installation and Use

The motor modules, when in use, and mover magnets pose a danger to persons with heart pacemakers, metal implants, and hearing aids.

> ⚠ **ATTENTION:** The mover uses strong magnets. There is a risk of health hazard for persons with heart pacemakers, metal implants, and hearing aids while in proximity of magnetic components and the magnetic field produced by components. The magnetic field that is generated can disrupt the functionality of an automatic implantable cardioverter defibrillator (AICD). People with cardiac pacemakers must not work near the iTRAK 5730 system.

> ⚠ **ATTENTION:** A pinch point hazard exists while installing a mover. A mover can have sudden and fast motion due to magnetic attraction. To avoid personal injury, do not put your fingers between the mover and the motor module.

Magnetic Field Strength

The iTRAK 5730 system movers contain components with strong magnetic fields. The motor modules also produce magnetic fields while movers are being commanded. This section provides the strength of the magnetic field for an uninstalled mover, an installed and enabled mover, and an uninstalled position magnet.

When motion is present on the system, the magnetic field does not exceed 0.05 mT at 500 mm (19.7 in.) in any direction from the track. Ferrous metals can influence the magnetic field direction and strength. For the most accurate data, measure the magnetic field strength on a track that is installed in its final configuration.

Figure 16 - Mover Magnetic Field Orientation
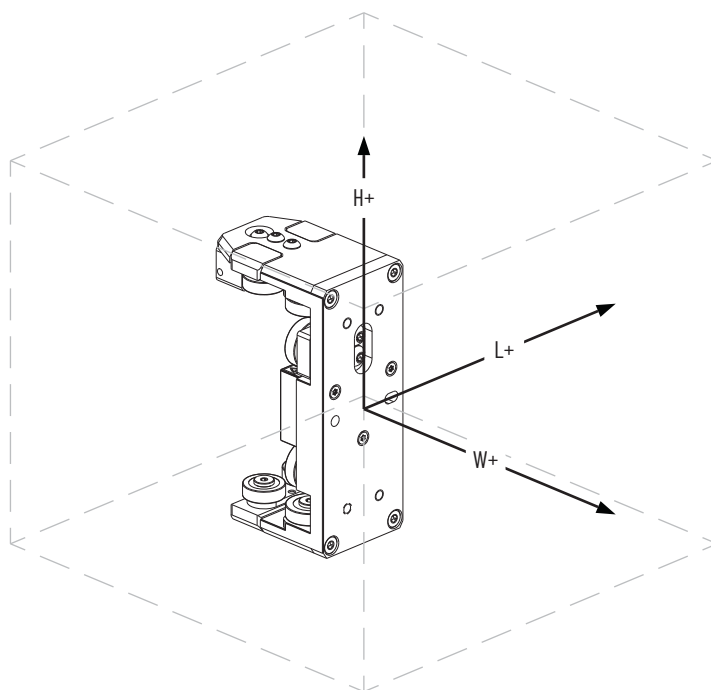
Table 6 lists the magnetic field strength at distances from the center point of an uninstalled mover. Maintain these minimum distances to avoid interaction with the magnetic field.

Table 6 - Magnetic Field Strength of an Uninstalled Mover

| Cat. No.	Magnetic Strength											
	0.05 mT				0.1 mT				0.5 mT			
	L (+/−) mm (in.)	W+ mm (in.)	W− mm (in.)	H (+/−) mm (in.)	L (+/−) mm (in.)	W+ mm (in.)	W− mm (in.)	H (+/−) mm (in.)	L (+/−) mm (in.)	W+ mm (in.)	W− mm (in.)	H (+/−) mm (in.)
2198T-VT0304-E	200 (7.9)	120 (4.7)	190 (7.5)	150 (6.0)	170 (6.7)	90 (3.5)	150 (6.0)	120 (4.7)	105 (4.1)	40 (1.6)	95 (3.7)	70 (2.8)

Table 7 lists the magnetic field strength at distances from the center point of a mover that is installed on a track. Maintain these minimum distances to avoid interaction with the magnetic field.

Table 7 - Magnetic Field Strength of an Installed Mover, Enabled at Zero Speed

Cat. No.	Magnetic Strength								
	0.05 mT			0.1 mT			0.5 mT		
	L (+/−) mm (in.)	W+ mm (in.)	H (+/−) mm (in.)	L (+/−) mm (in.)	W+ mm (in.)	H (+/−) mm (in.)	L (+/−) mm (in.)	W+ mm (in.)	H (+/−) mm (in.)
2198T-VT0304-E	230 (9.0)	90 (3.5)	85 (3.3)	180 (7.0)	60 (2.4)	70 (2.8)	110 (4.3)	25 (1.0)	66 (2.6)

Figure 17 - Position Magnet Field Orientation
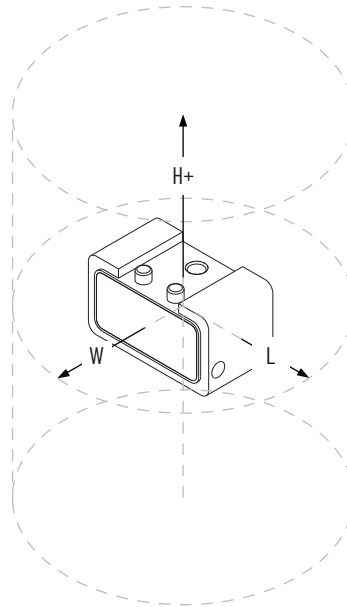
Table 8 lists the magnetic field strength at distances from the center point of an uninstalled position magnet. Maintain these minimum distances to avoid interaction with the magnetic field.

Table 8 - Magnetic Field Strength of an Uninstalled Position Magnet

Cat. No.	Magnetic Strength								
	0.05 mT			0.1 mT			0.5 mT		
	L mm (in.)	W mm (in.)	H (+/−) mm (in.)	L mm (in.)	W mm (in.)	H (+/−) mm (in.)	L mm (in.)	W mm (in.)	H (+/−) mm (in.)
2198T-N1-0304 2198T-NN-0304	130 (5.1)	100 (4.0)	100 (4.0)	105 (4.1)	85 (3.3)	85 (3.3)	65 (2.6)	50 (2.0)	50 (2.0)

Safe Magnet Handling

> ⚠ **ATTENTION:** The strong magnets on the mover can attract metal objects that are in its proximity. When you handle and install movers with motor magnetic plates, maintain a distance between the mover and ferrous metal mounting surfaces or structures.
> Maintenance personnel must avoid the use of metallic tools and secure items such as badge clips and other personal effects that could be attracted to the strong magnetic field.
> Strong magnets can erase magnetic media. Never let credit cards or electronic media contact or get near the mover and motor magnet or iTRAK 5730 system.

- The track creates strong magnetic fields while energized during operation.
- Persons with heart pacemakers, metal implants, or hearing aids must not enter these places:
  - Areas where the iTRAK 5730 system components are mounted, commissioned, and operated.
  - Areas where strong magnets are stored, repaired, or mounted.

Motor Magnet Protective Cover

Exposed or uninstalled motor magnet plates, whether they are mounted to a mover or freestanding, must always have the protective cover installed. The cover is only removed at the time of mover installation on the track system. The cover provides some protection for safe handling. Always handle an exposed motor magnet plate with caution.

- The motor magnet plate with a protective cover installed must be kept at least 305 mm (12 in.) away from other motor magnet plates and other ferrous metal parts such as hardware and tools.
- Magnet plates without a protective cover must be kept a minimum of 1 m (3.3 ft) away from other magnet plates and ferrous metal parts.

Figure 18 - Motor Magnet Plate and Protective Cover

Protective Cover   Motor Magnet Plate
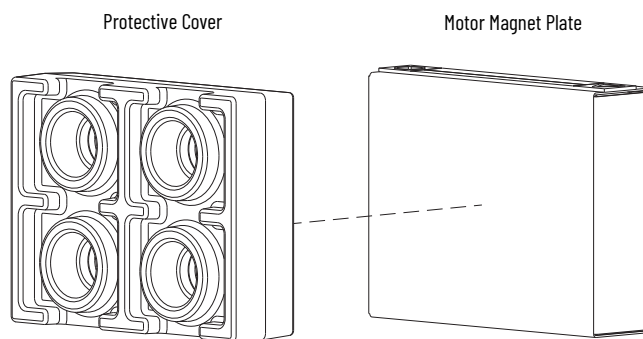
iTRAK 5730 System Installation

Use this chapter to assemble and mount an iTRAK® 5730 and install a lubrication system.

Topic	Page
Safety Information	39
Before You Begin	40
iTRAK System Components	41
Inspection	42
Approximate Dimensions	43
Assemble an iTRAK 5730 System	43
Mount the iTRAK 5730 Assembly	58
Install the Lubrication System	63
Optional Infield Covers	67

Consider the following when planning the location for your iTRAK 5730 installation:

- Overall finished assembly dimensions
- Future product expansion
- Alignment with other equipment
- Installation of safety guards
- System cable lengths
- Vibration free surfaces
- Operator access to iTRAK components and lubrication system

Safety Information

Before you begin assembly, read the .

⚠️	**ATTENTION:** To reduce the risk of injury and property damage, read the before you start the installation of the system.

⚠️	**WARNING:** Improper use or modification of system components, failure to follow the safety instructions, or disabling safety devices can result in property damage, injury, electric shock, or death.

Before You Begin

Review the information in this section before you begin assembly or maintenance on your iTRAK 5730 system.

Tools and Accessories

Table 9 provides a list of the tools that are required to assemble and install an iTRAK 5730 system.

Table 9 - Required Tools/Accessories

Tool	Details
Hex bit	4 mm
Hexagonal socket	10 mm (for optional infield covers)
Phillips bit	#2
Torx bit	T20
Torque wrench	Electronic or manual, 2.25…6.8 N•m (20…60 lb•in)
2x4 lumber (or similar)	Used to support the partially assembled system on the work surface. A 200 mm (7.9 in.) long section for each mounting ring in your system.
Lint free cloth	Used to clean system rail components
Isopropyl alcohol	Used to clean system rail components
Rail alignment tool (2198T-A08)	Used to align the rectangular rails for proper installation (recommended)
Mover loader tool (2198T-A09)	Used to install or remove movers (recommended)

Hardware Specification Table

The assembly illustrations throughout this section contain hardware specification tables (as shown here) that identify the following: sequence number (if necessary), type of fastener, fastener size, tool type and size, and final assembly torque.

Installation Workspace

Consider the following when preparing the installation workspace:

- The work surface must be flat, level, and clean
- The work surface must support the full assembled weight of the product
- An elevated work surface is recommended

General Handling Instructions

Rockwell Automation recommends that you follow these handling instructions for an assembled iTRAK 5730:

- Use properly rated equipment and hardware to lift and move the product.
- Qualified professionals must inspect all lifting equipment before it is used to move the product.
- All lifting cables or straps must meet or exceed the maximum weight capacity requirements.
- Wear appropriate personal protection equipment (PPE), including gloves, safety glasses, and safety shoes, when working with kit components and assembling the product.

Storage

If you must store motor and connector modules after you receive them, take the following precautions:

- Do not store the equipment outdoors
- Do not store the equipment in a corrosive or humid environment
- If opened, reseal and store the equipment in the shipping container
- Store the equipment in a clean and dry location

iTRAK System Components

This section identifies the modules and components that are required to assemble an iTRAK 5730. Use this section to verify that you have received the parts that are required for each kit in your installation.

Table 10 - iTRAK 5730 System Components

Kit Description	Catalog Number	Kit Contents	Weight [kg (lb)]	Quantity Required
Straight motor module	2198T-L20-T0303-A00-S2	300 mm (11.8 in.) long straight motor section	8.6 (18.8)	As required for the application
Curved motor module	2198T-L20-T0309-D18-S2	350 mm (13.8 in.) long, 900 mm (35.4 in.) total length, curvilinear motor section	21.0 (46.3)	As required for the application
300 mm (11.8 in.) Straight rail kit	2198T-BE-ST03	300 mm (11.8 in.) long: • 2 straight rectangular rails • 2 straight rectangular wedges • 2 straight flat rails • 2 straight flat wedges • 14 M4 x 8 mm Torx screws • 10 M4 x 20 mm Torx screws	1.0 (2.2)	One per system (recommended)
600 mm (23.6 in.) Straight rail kit	2198T-BE-ST06	600 mm (23.6 in.) long: • 2 straight rectangular rails • 2 straight rectangular wedges • 2 straight flat rails • 2 straight flat wedges • 20 M4 x 8 mm Torx screws • 20 M4 x 20 mm Torx screws	2.0 (4.4)	As required for the application
900 mm (35.4 in.) Straight rail kit	2198T-BE-ST09	900 mm (35.4 in.) long: • 2 straight rectangular rails • 2 straight rectangular wedges • 2 straight flat rails • 2 straight flat wedges • 26 M4 x 8 mm Torx screws • 30 M4 x 20 mm Torx screws	3.0 (6.6)	As required for the application

Table 10 - iTRAK 5730 System Components (Continued)

Kit Description	Catalog Number	Kit Contents	Weight [kg (lb)]	Quantity Required
Curved rail kit	2198T-BE-ED18	900 mm (35.4 in.) long x 35 mm (1.4 in.) diameter: • 2 curved rectangular rails • 2 curved rectangular wedges • 2 curved left, flat rails • 2 curved right, flat rails • 2 curved flat wedges • 4 lubrication system O-rings • 20 M4 x 8 mm Torx screws • 28 M4 x 20 mm Torx screws	2.9 (6.4)	One per curved motor section
Mover	2198T-VT0304-E	Fully assembled mover with motor magnet	0.7 (1.5)	As required for the application
Position magnet (south polarity)	2198T-N1-0304	Mover position sensor magnet	0.02 (0.04)	One per system, when a reference mover is specified. See step 4 of Continue iTRAK 5730 Motor Module Configuration on page 99 for more information.
Position magnet (north polarity)	2198T-NN-0304	Mover position sensor magnet	0.02 (0.04)	As required for the application, or one less than the total number of movers, when the position magnet cat. no. 2198T-N1-0304 is used.
Structural mounting ring kit (top)	2198T-AS-01	1 stainless-steel ring 10 M6 x 20 mm, hex head reamer screws 1 tube of Loctite 243	1.4 (3.0)	One top and one bottom mounting ring for every two straight motor modules in the system (includes the connection to a first curved motor module). And, one top and one bottom mounting ring for a second curved motor module.
Structural mounting ring kit (bottom)	2198T-AS-02	1 stainless-steel ring 10 M6 x 20 mm, hex head reamer screws 1 tube of Loctite 243	1.8 (4.0)	
Power and control input connector module	2198T-CT-CP	Connector module with power and Ethernet connection ports	0.8 (1.6)	One per system
Power input with control pass-through connector module	2198T-CT-P	Connector module with power connection port	0.7 (1.5)	As required for the application
Power and control pass-through connector module	2198T-CT	Connector module (pass-through only, no ports)	0.3 (0.7)	Enough to connect all motor sections
Lubrication system	2198T-AL-SYS-4	• 4 digitally activated pumps • 4 pump mounting brackets • 4 250 cc lubricant cartridges • 4 nickel-plated tube fittings • 4 fitting reducers, 1/4 x 1/8 in. FNPT • 4 90° elbow fittings, 1/4 in. MNPT • 4 straight nipple fittings, 1/4 in. NPT • 4 4 mm fittings, PTC, 1/8 in. MNPT • 4 4 mm fitting plugs • 4 check valves, 1/8 in. MNPT x 1/8 in. FNPT • 6 O-rings • 25 m (82 ft) 4 x 2.5 mm polymer tubing	6.7 (14.8)	One per system

Inspection

When you receive your iTRAK 5730 kits and components, inspect each kit for damage or missing items. If there is evidence of damage or loss, follow this procedure:

- Note on the delivery receipt that the equipment being received is damaged or parts are missing.
- Contact the carrier that made the delivery and schedule an inspection.
- Inform your local Rockwell Automation representative that the equipment is damaged or parts are missing.
- Retain all product packaging for review by the carrier.

Complete this additional inspection for all complete rail kits:

- Inspect and verify that there is no damage to the surfaces of the rectangular and flat rail components. Do not use a damaged rail component.

For further assistance, contact your Rockwell Automation representative.

Approximate Dimensions

Figure 19 provides the approximate dimensions of an assembled iTRAK 5730 system that includes two curved and two straight motor modules. Four movers shown for illustrative purposes.

Figure 19 - Assembled iTRAK 5730 Approximate Dimensions
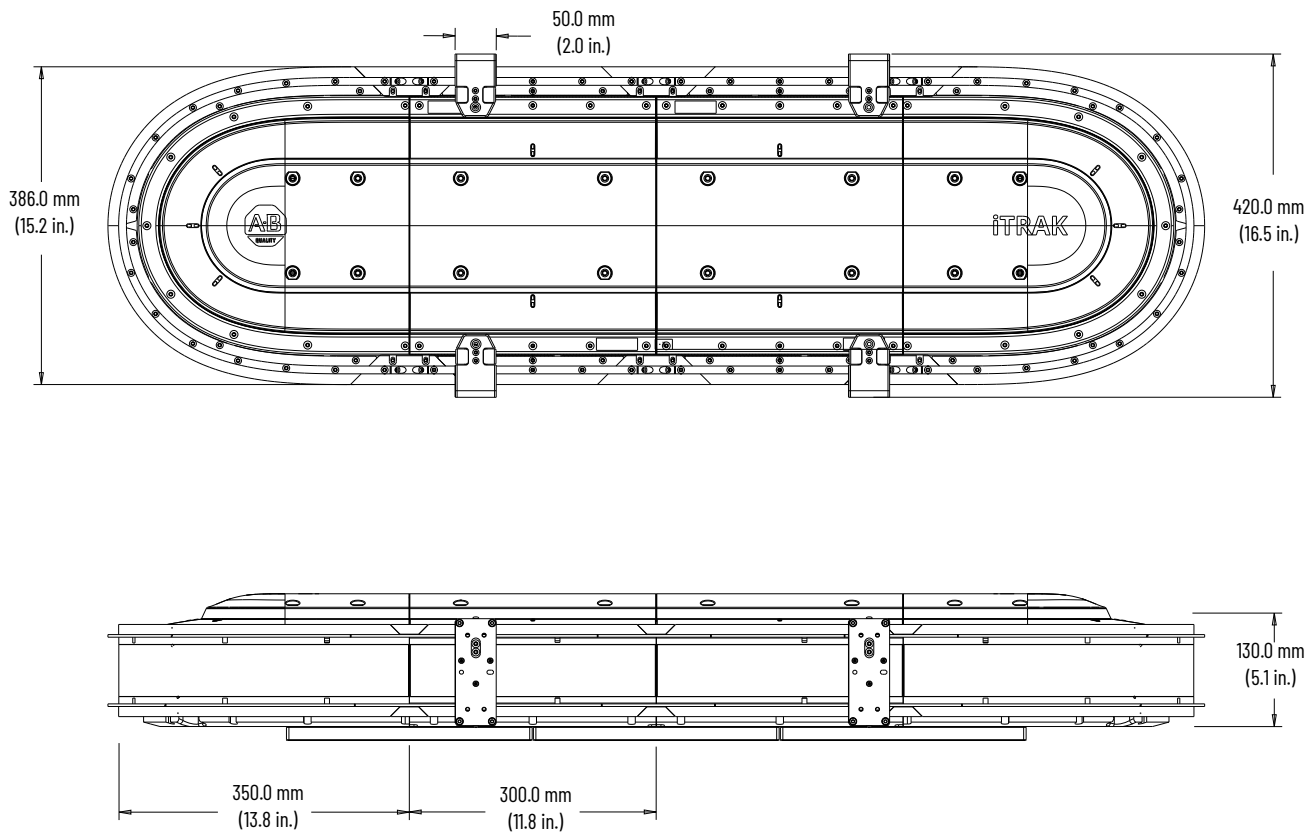
Assemble an iTRAK 5730 System

This section provides instructions to assemble an iTRAK 5730 system. This installation provides instructions for assembling a closed track iTRAK 5730 system, with a minimum of two curved and two straight motor modules. Your track can be made with more straight motor modules than are shown in these procedures, but the same instructions apply. If fewer curved or straight motor sections are desired, contact Rockwell Automation for details.

For this installation configuration, there are six main tasks to assembling your iTRAK 5730 system. For important information on lifting and mounting iTRAK 5730 assemblies, see Before You Begin on page 44 before you begin the assembly tasks.

Task	Page
Install Top Structural Mounting Rings	45
Install Bottom Structural Mounting Rings	48
Install Bottom Flat Rails and Flat Wedges	49
Install Bottom Rectangular Rails	52
Install Rectangular Wedges and Align Rectangular Rails	54
Install Top Rails, Wedges, and Connector Modules	56

Before You Begin

The iTRAK 5730 system requires installation of structural mounting rings and track rail assemblies on both surfaces of the motor modules. During assembly you are required to lift the partially assembled system and place the opposite side up to complete the installation of components. This procedure requires lifting equipment and hardware capable of supporting the full assembled weight of the product. To prepare the appropriately rated lifting equipment, you must calculate the full assembled weight of your iTRAK 5730 system. See Table 10 on page 41 for iTRAK 5730 components and kits weights.

> ⚠ **ATTENTION:** To avoid possible injury or equipment damage, follow local, national, and international codes, standards, regulations, or industry guidelines and your company safety procedures when you handle or lift a partially or fully assembled iTRAK 5730 system.

Each structural mounting ring contains eight holes that accept M6 x 16 mm hardware. The mounting ring holes can be used to secure the appropriate hardware to lift the assembly. The hole locations are identified in Figure 20 and Figure 21. The holes that are used for lifting are also used for mounting hardware installation.

Use a minimum of four mounting-ring lifting holes for every 2...6 straight motor module sections. Use a minimum of six mounting-ring lifting holes for every 8...12 straight motor module sections. Similarly, install the lifting hardware to one side of the rings only to lift and flip the partially or fully assembled system.

Figure 20 - Top Structural; Mounting Ring Lifting and Mounting Holes
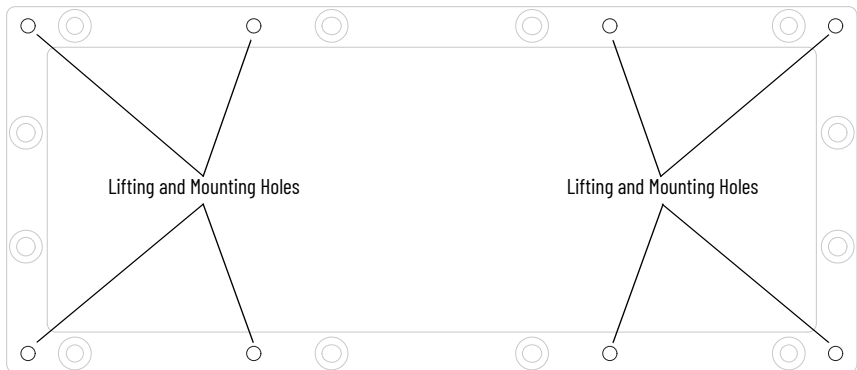
**Figure 21 - Bottom Structural Mounting Ring Lifting and Mounting Holes**
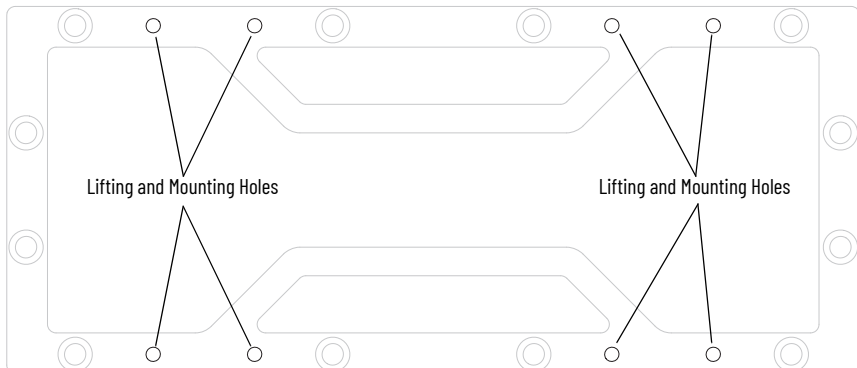
Install Top Structural Mounting Rings

1. With the upper surface facing up (side with status indicators), place a curved motor module on a flat and level work surface.

2. With the counter-bored holes visible (up), place a structural mounting ring into the inner motor module surface.

> **IMPORTANT** Apply Loctite 243 on the mounting-ring hardware thread area and food-grade lubricant on the shoulder area to reduce the risk of binding in rings.

3. Insert six M6 x 20 mm hex head reamer screws into the counter-bored holes on the mounting ring and finger-tighten each screw using the torque pattern that is shown in <u>step 4</u>.

4. Follow the sequence shown here to apply final torque to the 6 hex head screws.

4	⬡	M6 x 20 mm 4 mm 6.8 N·m (60 lb·in)

Primary Locating Hole.
Insert this hardware first.
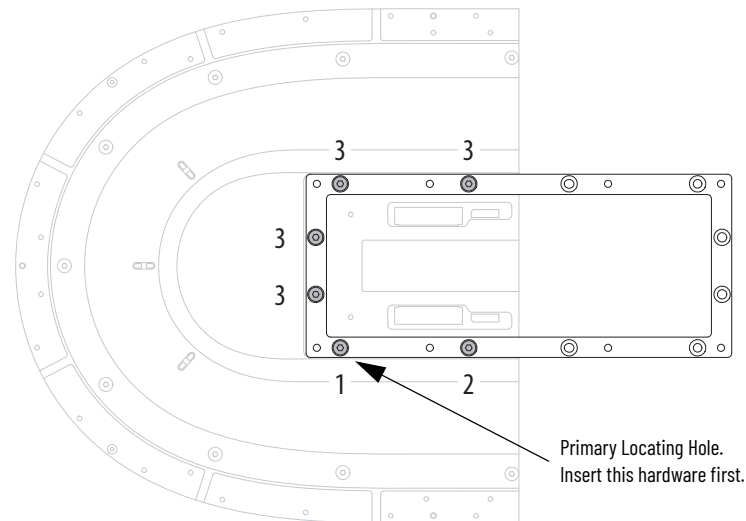
5. Place and align a straight motor module under the mounting ring next to the curved motor module.

6. Insert two M6 x 20 mm hex head reamer screws into the counter-bored holes on the mounting ring and finger-tighten each screw.

7. Follow the sequence shown here to apply final torque to the 2 hex head screws.

7	⬡	M6 x 20 mm 4 mm 6.8 N·m (60 lb·in)
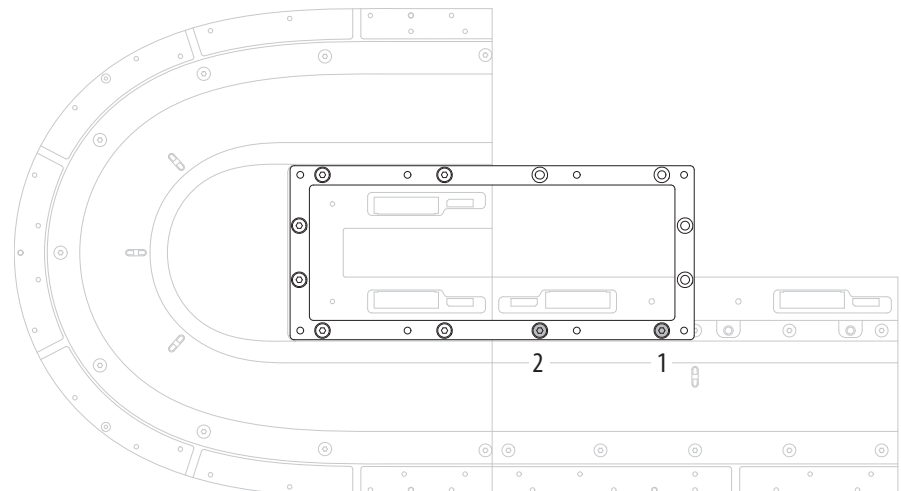
8. Repeat steps 5...7 to install a second straight motor module across from the first straight motor module.

| 8 | ⬡ | M6 x 20 mm
4 mm
6.8 N•m (60 lb•in) |
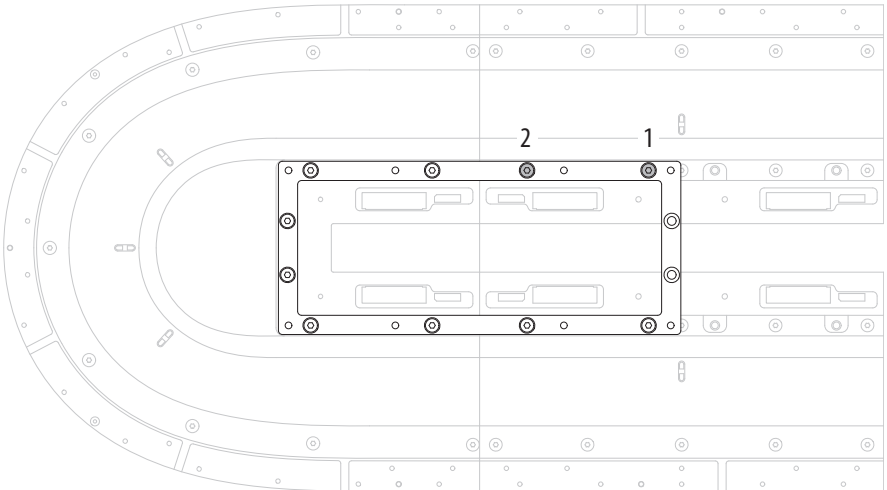
9. With the counter-bored holes visible (up), place a second structural mounting ring into the inner straight motor-module surfaces.

10. Insert four M6 x 20 mm hex head reamer screws into the counter-bored holes on the mounting ring and finger-tighten each screw.

11. Follow the sequence shown here to apply final torque to the 4 hex head screws.

| 11 | ⬡ | M6 x 20 mm
4 mm
6.8 N•m (60 lb•in) |
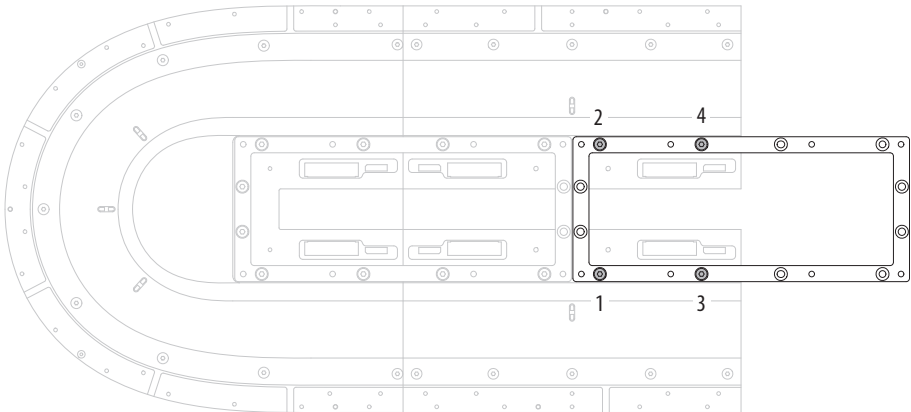
12. If additional straight motor modules are used, repeat steps 5...8 to install each module.

Install Closing Curved Motor Module

1. With the upper surface facing up (side with status indicators), place a second curved motor module on a flat and level work surface.

2. With the counter-bored holes visible (up), place a structural mounting ring into the inner curved motor module surface.

3. Insert six M6 x 20 mm hex head reamer screws into the counter-bored holes on the mounting ring and finger-tighten each screw.

4. Follow the sequence shown here to apply final torque to the 6 hex head screws.

4	⬡	M6 x 20 mm 4 mm 6.8 N•m (60 lb•in)

Primary Locating Hole.
Insert this hardware first.
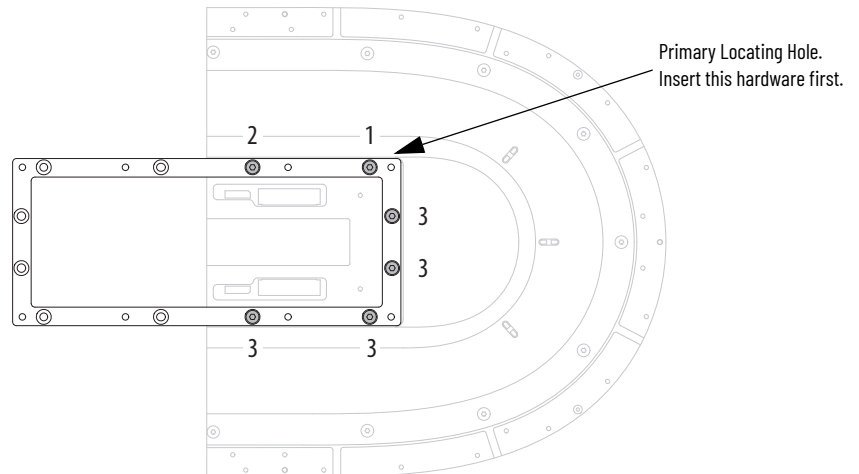
5. Place and align the second curved motor module with mounting ring next to the last pair of straight motor modules.

6. Insert four M6 x 20 mm hex head reamer screws into the open counter-bored holes on the mounting ring and finger-tighten each screw.

7. Follow the sequence shown here to apply final torque to the 4 hex head screws.

7	⬡	M6 x 20 mm 4 mm 6.8 N•m (60 lb•in)
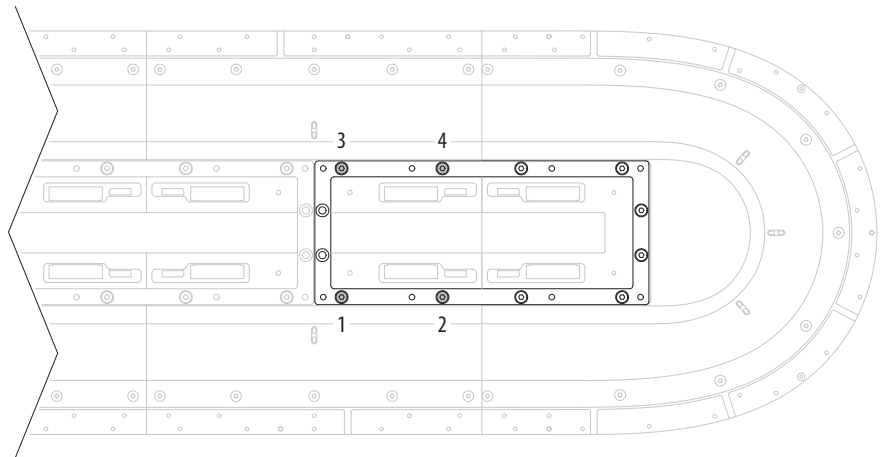
Install Bottom Structural Mounting Rings

IMPORTANT	The top and bottom structural mounting rings are separate and have different part numbers. Confirm you are installing the correct mounting ring.

1. Install and secure M6 x 16 mm rotary eyebolts into the appropriate holes on the structural mounting rings.

2. Secure the assembly in multiple locations along its length with the appropriately rated lifting equipment.

⚠️ **ATTENTION:** To guard against possible personal injury and equipment damage, take these precautions when lifting the iTRAK 5730 assembly:
- Inspect all lifting hardware for proper attachment before lifting the equipment.
- Do not allow any part of the equipment or lifting mechanism to contact electrically charged conductors or components.
- There is a risk of injury by improper handling. You can be injured by being crushed, cut, struck, or sheared while handling system components.
- Do not allow personnel or their limbs directly underneath the equipment when it is being lifted and mounted.

3. Slowly lift the assembly off the work surface to a level high enough to rotate the assembly only.

4. Place 2x4 supports flat on the work surface to allow for the assembly to rest on the installed structural mounting brackets.

5. Slowly rotate the assembly and lower it onto the 2x4 supports.

IMPORTANT	Apply Loctite 243 on the mounting-ring hardware thread area and food-grade lubricant on the shoulder area to reduce the risk of binding in rings.

6. With the counter-bored holes visible (up), place a structural mounting ring at each mounting location on the bottom of the motor modules.

7. Insert an M6 x 20 mm hex head reamer screw into each of the open counter-bored holes on the mounting rings and finger-tighten each screw.

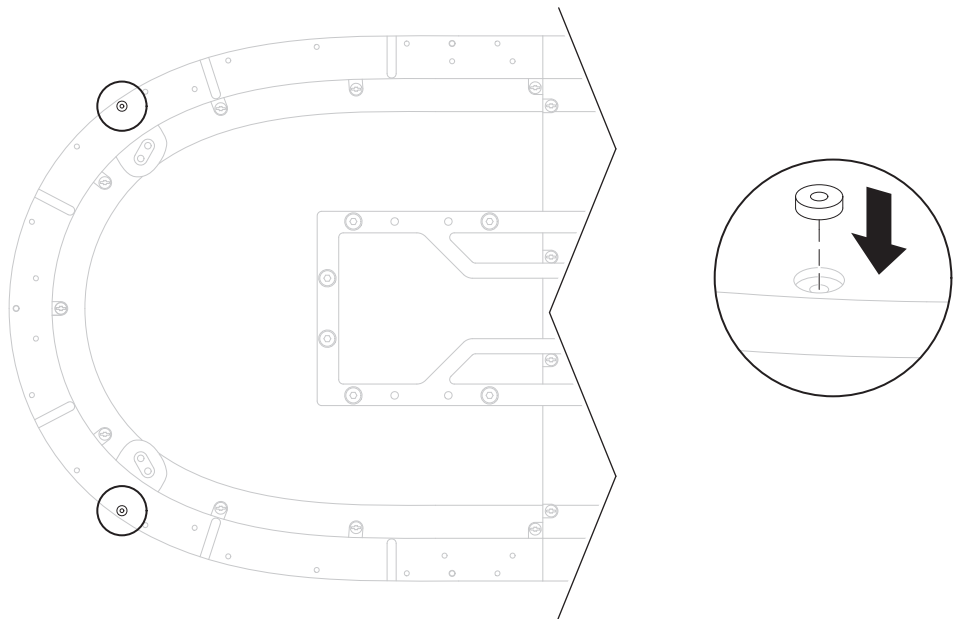8. Start at one end of the assembly and work to the opposite end to apply final toque to all screws.

8	⬡	M6 x 20 mm 4 mm 6.8 N•m (60 lb•in)
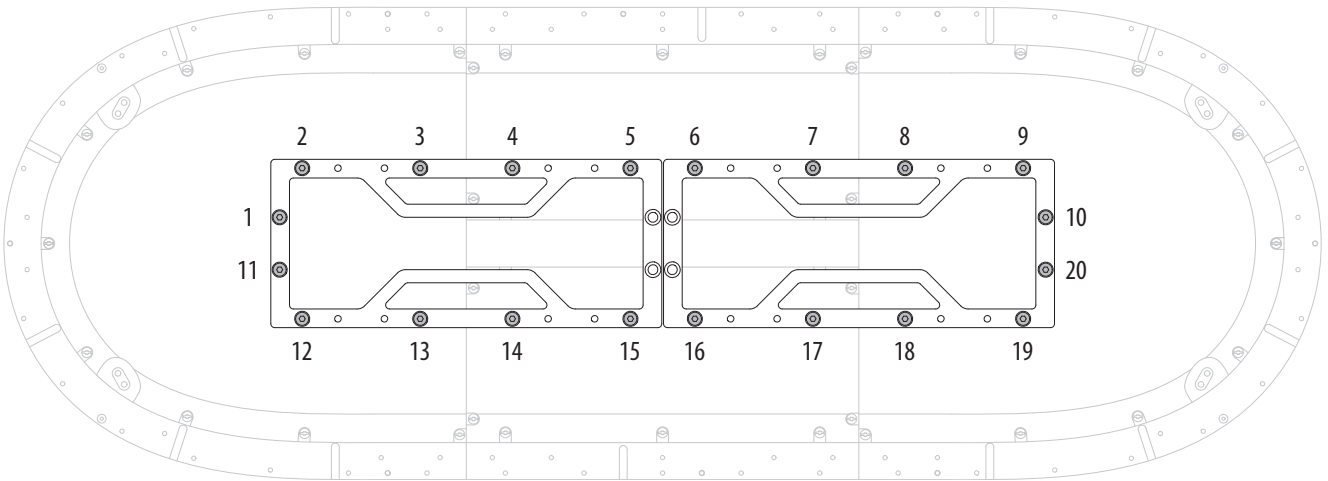
9. Place a rubber O-ring in each of the two lubrication system openings on each of the curved motor modules.

> A drop of oil can help to keep the rubber O-ring in place.

Install Bottom Flat Rails and Flat Wedges

1. Remove the protective end-caps from the rail components.
2. By using a lint free cloth and isopropyl alcohol, clean the surfaces of the rectangular and flat rails in the straight and curved rail kits.
3. With the counter-bored holes visible (up), place the curved flat rails on the surface of the curved motor modules and align the mounting holes.

> The motor modules contain pins along the surface that help to align the rails properly.

4. With the counter-bored holes visible (up), place a straight flat-rail wedge at the ends of each curved flat rail section.
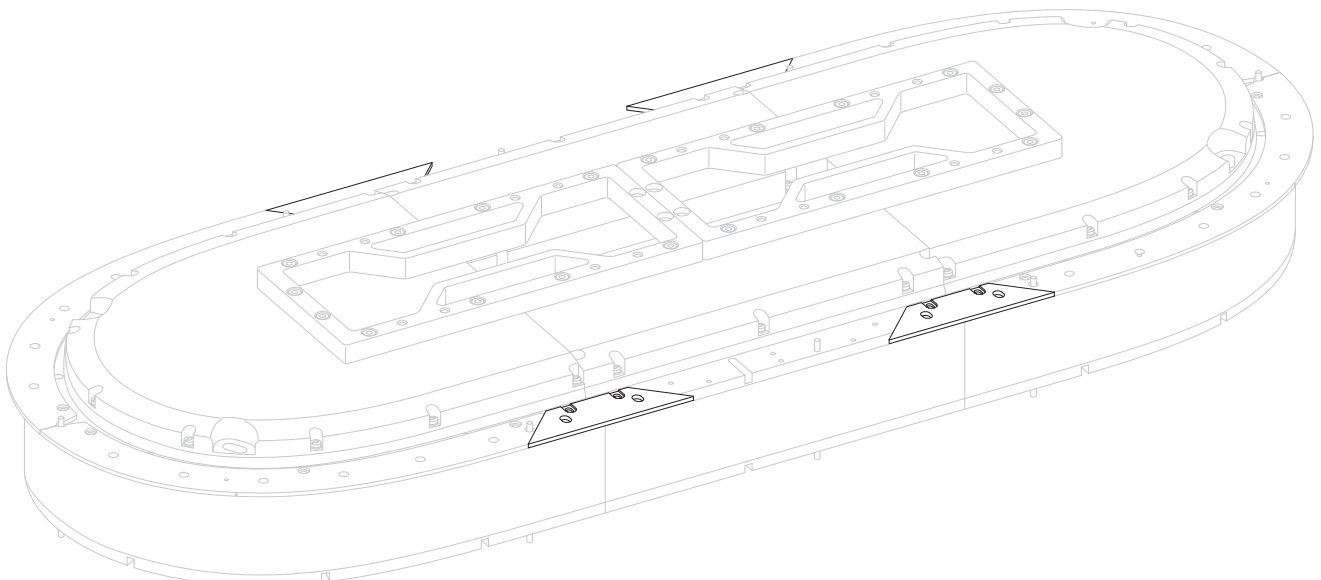
5. With the counter-bored holes visible (up), place the straight flat rail components on the motor modules.

6. Insert and finger-tighten an M4 x 8 mm Torx screw in each of the counter-board holes on the flat rail sections.
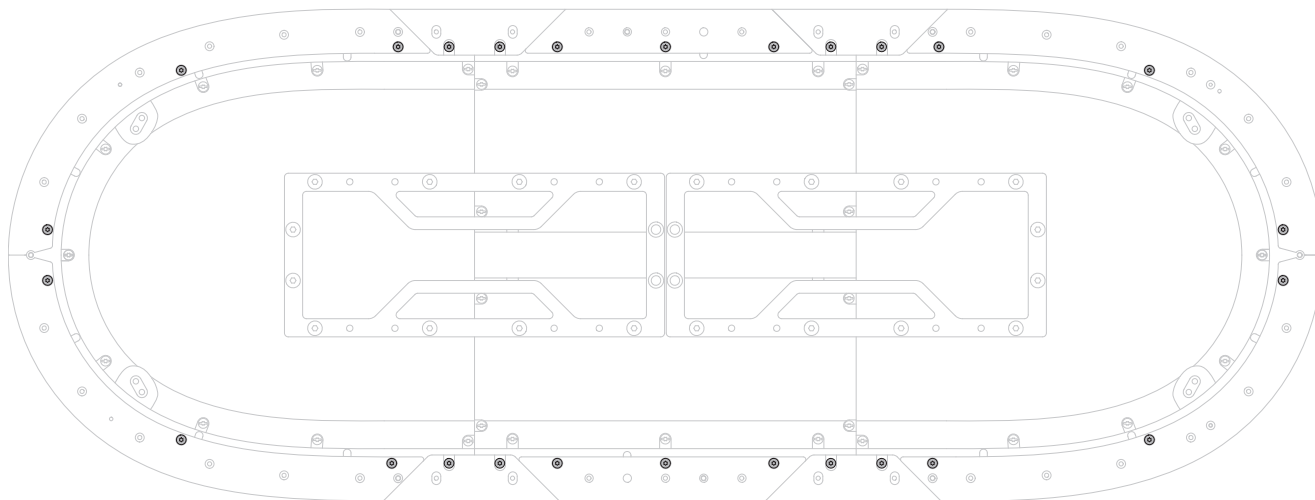

7. By using a T20 driver, tighten each of the M4 x 8 mm Torx screws until fully seated against the rail (do <u>not</u> apply final torque).

8. Loosen each of the M4 x 8 mm Torx screws one-half turn.

> The screw heads must remain in the counter-bore just below the surface of the flat rails. The screws must be loose enough to allow for rail alignment adjustments.

9. Begin with a long, straight flat-rail section next to a curve and move the rail inward or outward until it stops against the screw head.
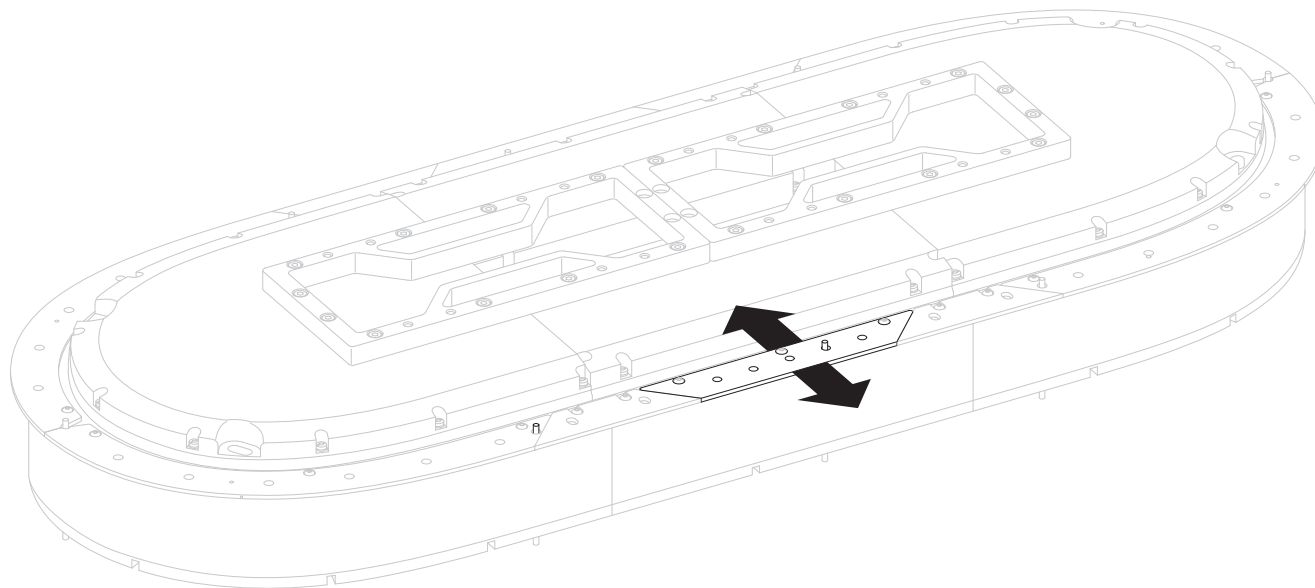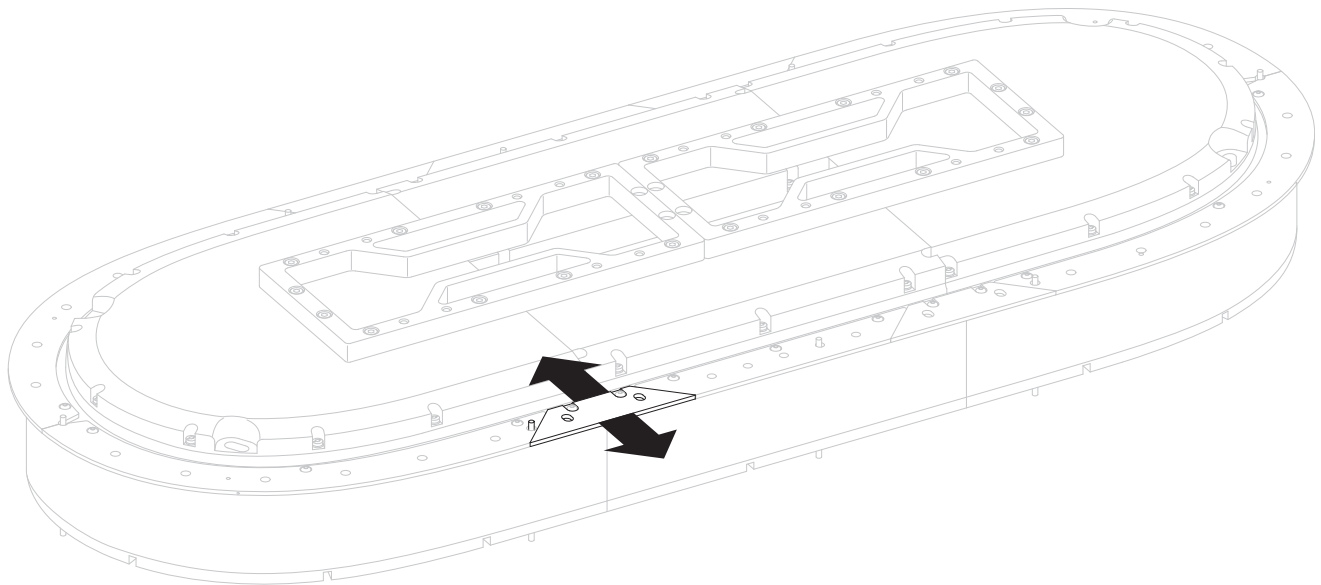

10. While holding the rail in place, hand-tighten the M4 x 8 mm Torx screws (do <u>not</u> apply final torque).

11. Position the long, straight flat-rail section across from the rail you positioned in step 9. Move the rail section in the same direction (inward or outward) as you did with the previous rail section.

12. While holding the rail in place, hand-tighten the M4 x 8 mm Torx screws (do <u>not</u> apply final torque).

13. On the same end of the rail system, align a flat rail wedge with the straight and curved rail sections on either side of the wedge.

IMPORTANT   There must be no gaps between the edges of the wedge and long rail sections and the outward facing edges must align.

Confirm that there is no gap   Outward edge must align

Incorrect   Correct
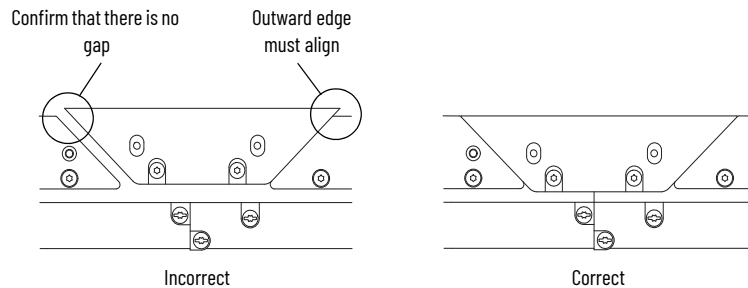
14. While holding the wedge rail in place, aligning the wedge with the curved flat rail and straight flat rail, hand-tighten the M4 x 8 mm Torx screws (do <u>not</u> apply final torque).

15. While holding the curved flat rail section in place, hand-tighten the M4 x 8 mm Torx screws (do <u>not</u> apply final torque).

16. Continue around the rail system, and repeat steps <u>11</u>...<u>15</u> for the remaining straight flat-rail, flat wedges, and curved flat-rail sections.

17. Check the entire rail system for gaps and/or misalignment and loosen any screws as necessary to align the rail system properly.

18. When all flat rails are in alignment, apply final torque to all screws.
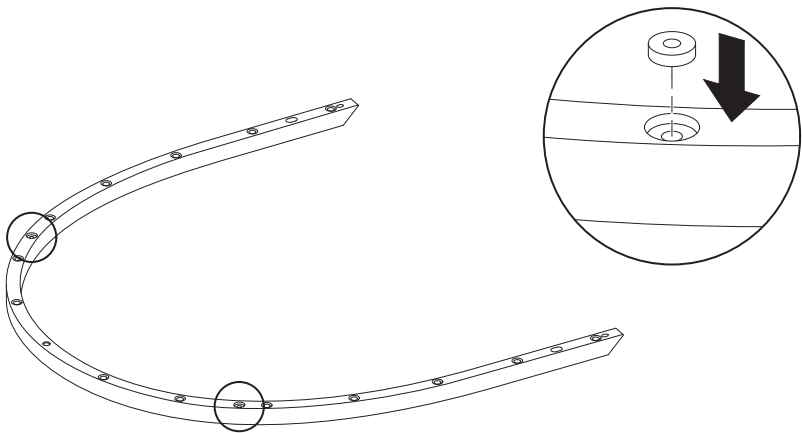
| 18 | ⊛ | M4 x 8 mm
T20
2.3 N•m (20 lb•in) |
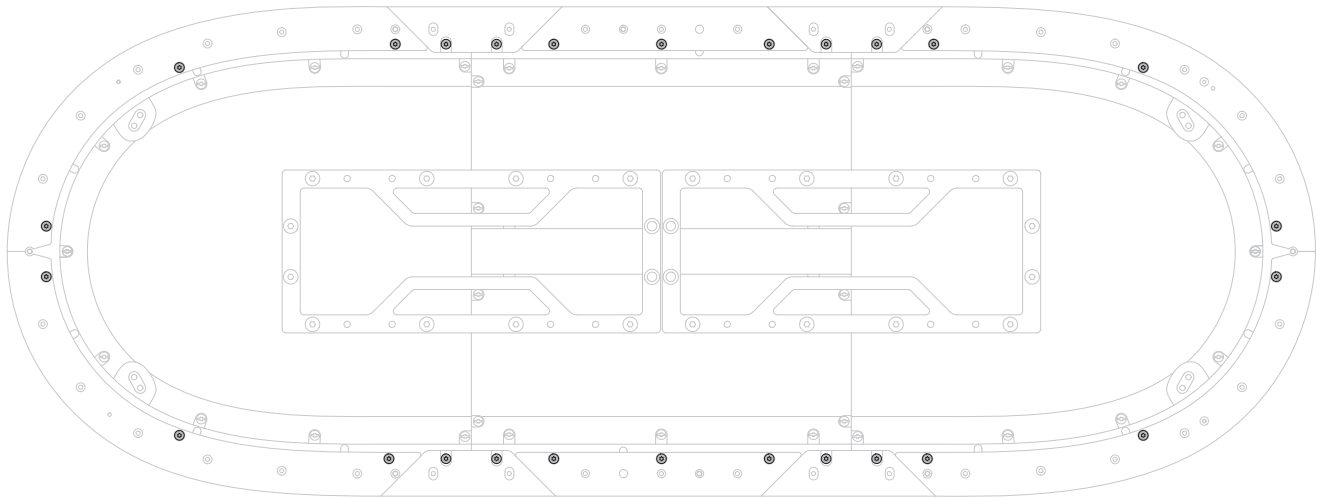
Install Bottom Rectangular Rails

1. Place and seat a rubber O-ring in each of the two lubrication system openings on a curved rectangular-rail section.

💡 A drop of oil can help to keep the rubber O-ring in place.
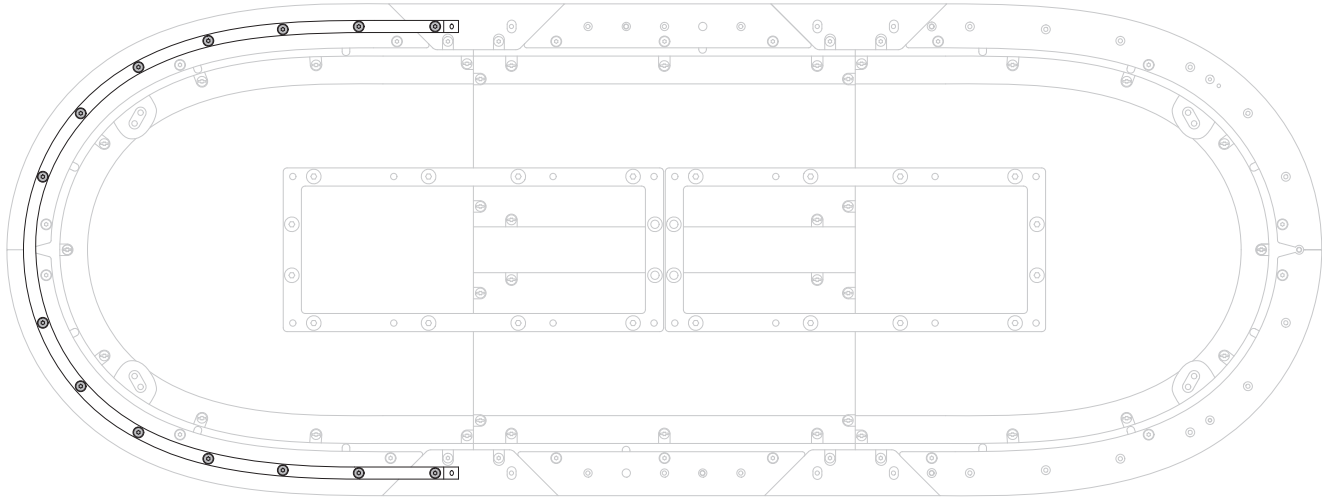
2. With the counter-bored holes visible (up), place a curved rectangular rail on the curved flat rail until it is fully seated against the flat rail below.

> The motor modules contain pins along the surface that are used to locate the rails properly.

3. Insert 14 M4 x 20 mm Torx head screws into the counter-bored holes on the rail and finger-tighten the screws.


4. Repeat steps 1...3 for the second curved rectangular-rail section.

5. With the counter-bored holes visible (up), place a straight rectangular rail on a straight flat rail until it is fully seated against the flat rail.

> The motor modules contain pins along the surface that are used to locate the rails properly.

6. Insert an M4 x 20 mm Torx head screw into the center counter-bored hole on the rail and tighten the screw until it is fully seated against the rail (do not apply final torque).

7. Loosen the screw one turn.

8. Repeat steps 5...7 for each straight rectangular rail.
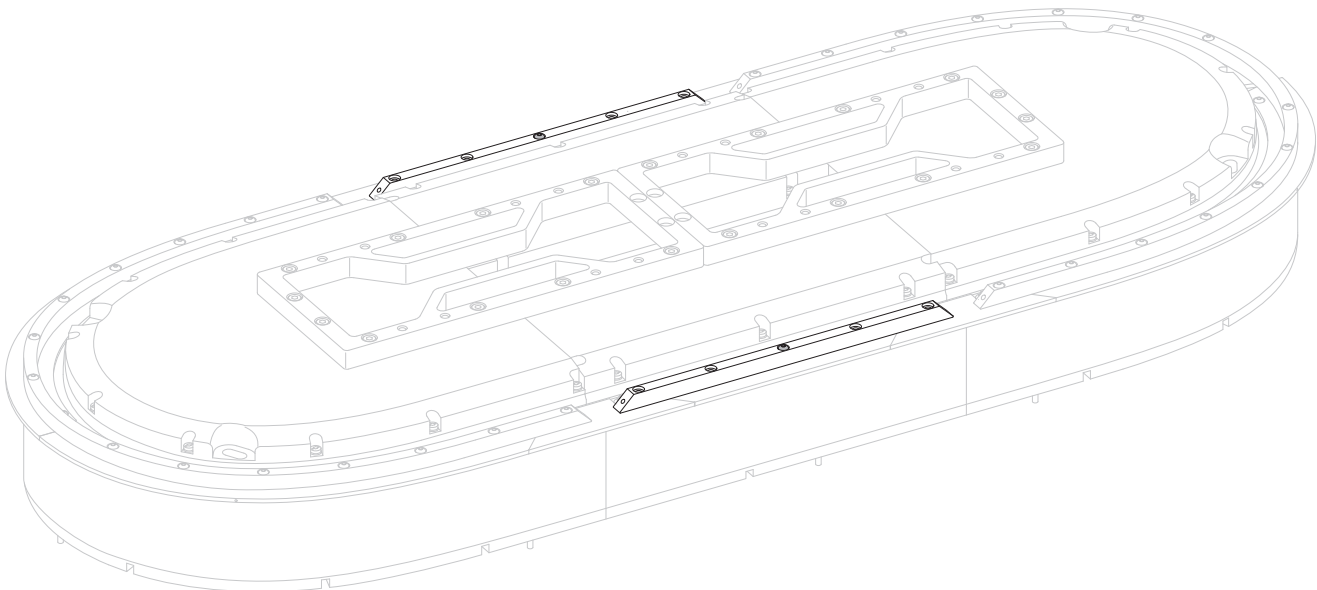
Install Rectangular Wedges and Align Rectangular Rails

| **IMPORTANT**	Start with the two wedges on each end of the curved sections first.

1. Begin with the gap between a curved and straight rail section, and, with the counter-bored holes visible (up), place a rectangular wedge in the gap between the rectangular rails.

2. Insert an M4 x 8 mm Torx head screw into the counter-bored holes on the wedge and finger-tighten the screws.
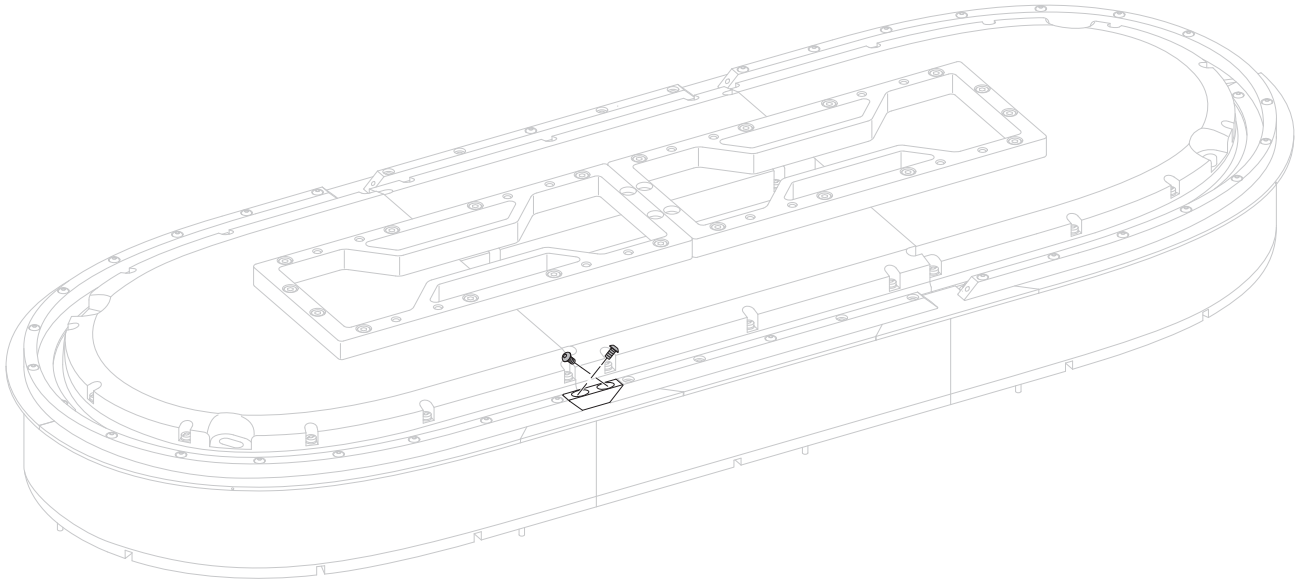
3. With the tool clamps unlocked, place the rail alignment tool (cat. no. 2198T-A08) over the center of the wedge.
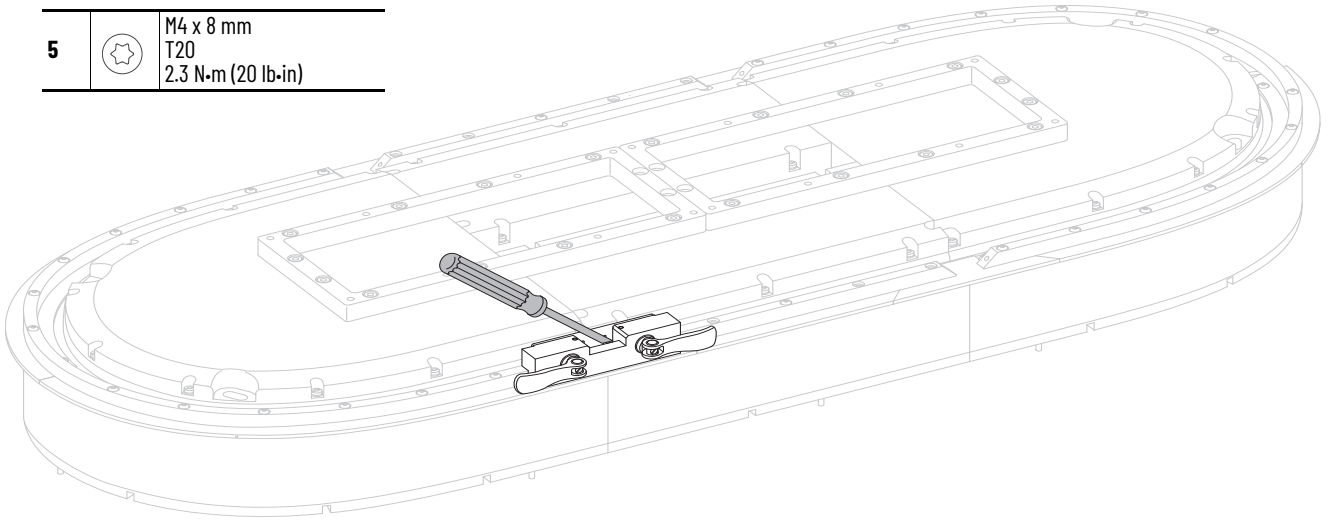
> Verify that you can access each of the screws in the wedge with the driver bit, without interference from the alignment tool.
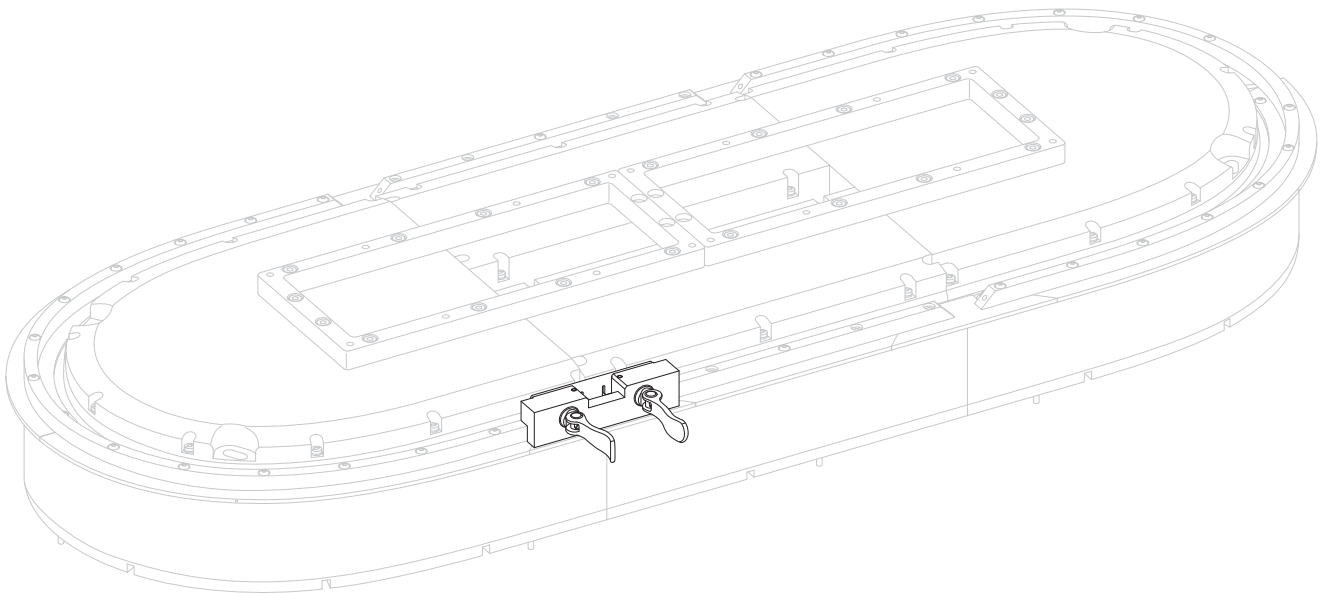
4. While you press downward on the rail alignment tool to verify that the tool is in full contact with the rails, lock the tool clamps.

5. Apply final torque to screws in the wedge.

| 5	✦	M4 x 8 mm T20 2.3 N•m (20 lb•in)

6. For the remaining wedges that are placed between a curved and straight rail section, repeat steps 1...5.

7. For the remaining wedges that are placed between straight rectangular-rail sections, repeat steps 1...5.

8. Follow the sequence shown here to apply final torque to the 14 Torx head screws for both curved sections.

8	✦	M4 x 20 mm T20 2.3 N•m (20 lb•in)
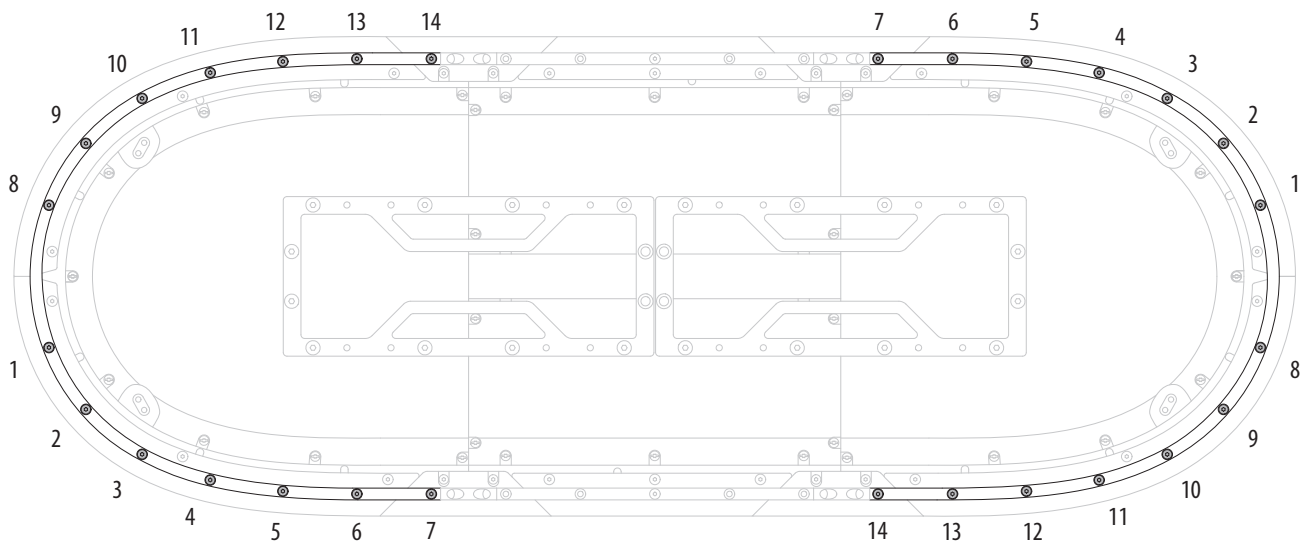
9. Insert M4 x 20 mm Torx head screws into the remaining counter-bored holes on the straight rectangular rails and apply final torque to all screws.

9	⊛	M4 x 20 mm T20 2.3 N•m (20 lb•in)
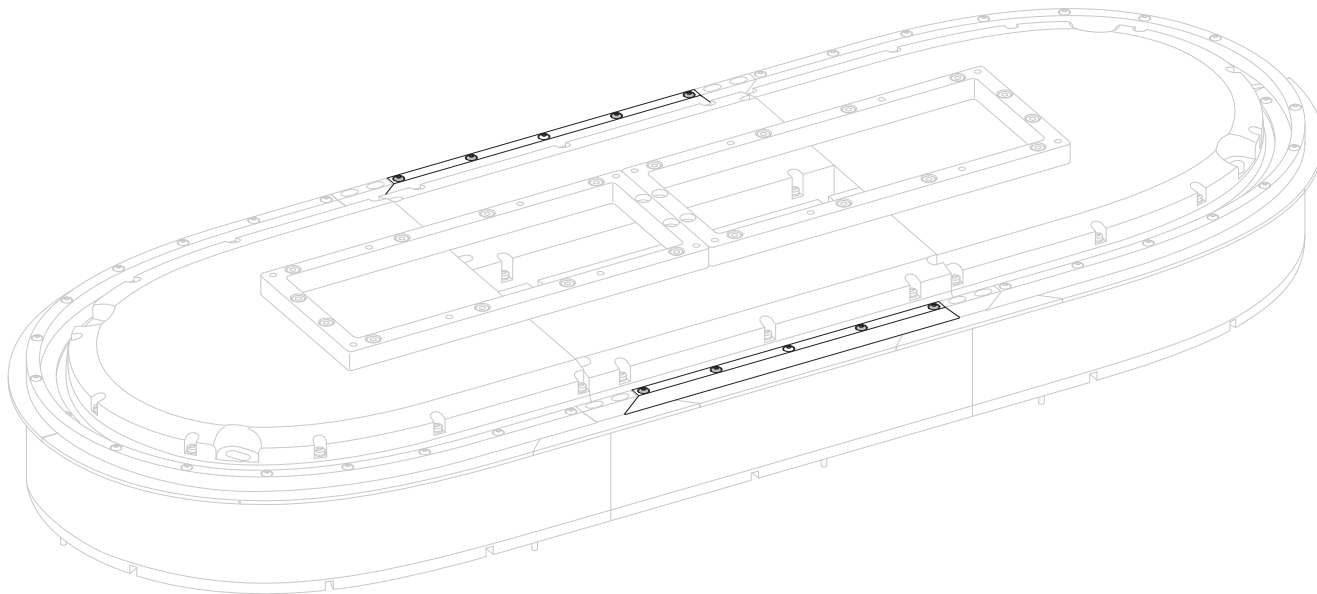
Install Top Rails, Wedges, and Connector Modules

1. Install and secure M6 x 16 mm rotary eyebolts into the available holes on the structural mounting rings.

2. Secure the assembly in multiple locations along its length with the appropriately rated lifting equipment.

> ⚠ **ATTENTION:** To guard against possible personal injury and equipment damage, take these precautions when lifting the iTRAK 5730 assembly:
> • Inspect all lifting hardware for proper attachment before lifting the equipment.
> • Do not allow any part of the equipment or lifting mechanism to contact electrically charged conductors or components.
> • Do not allow personnel or their limbs directly underneath the equipment when it is being lifted and mounted.

3. Slowly lift the assembly off the work surface to a level high enough to rotate the assembly only.

4. Remove the 2x4 supports from the work surface.

5. Slowly rotate the assembly and lower it onto the work surface.

6. To install the rail system on the top side of the system, repeat the steps as outlined in , , and .

> 💡 You can choose to install the connector modules before or after you have completed mounting the iTRAK 5730 assembly.

7. Align the connectors on the connector module with the connectors in the motor module and press it into place until firmly seated.
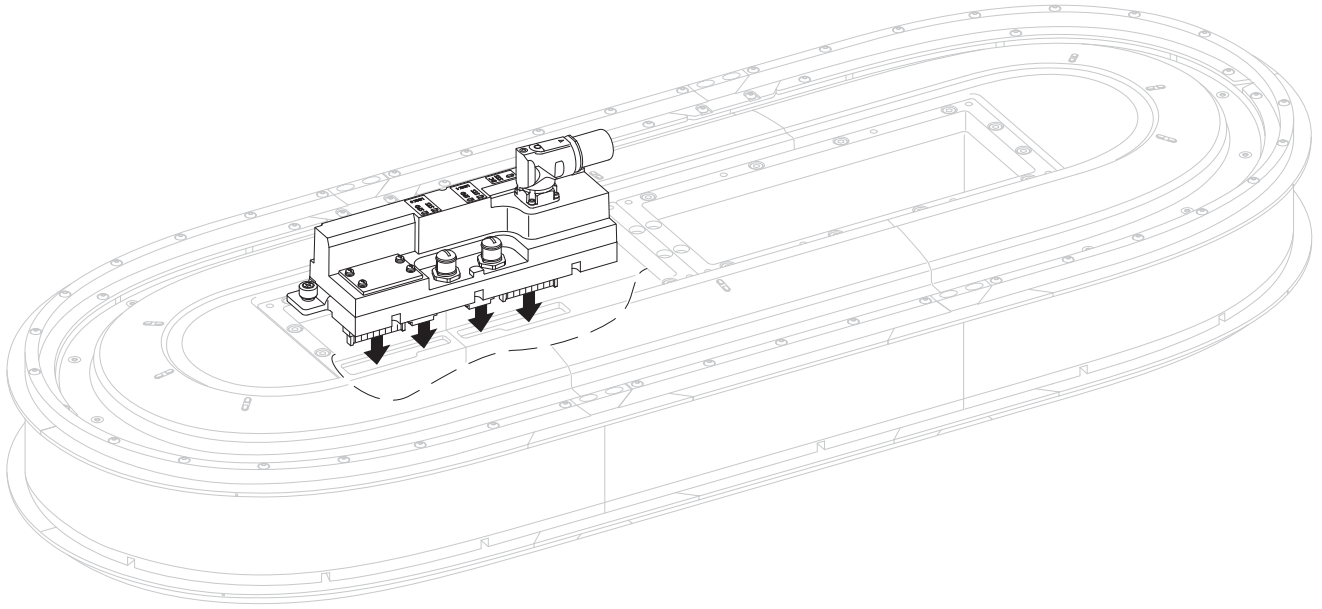
8. Apply final torque to the two captive Phillips head screws on the module.

9. Repeat steps 7...8 for the remaining connector modules.

8		M4 Retained Screw #2 Phillips 2.3 N•m (20 lb•in)
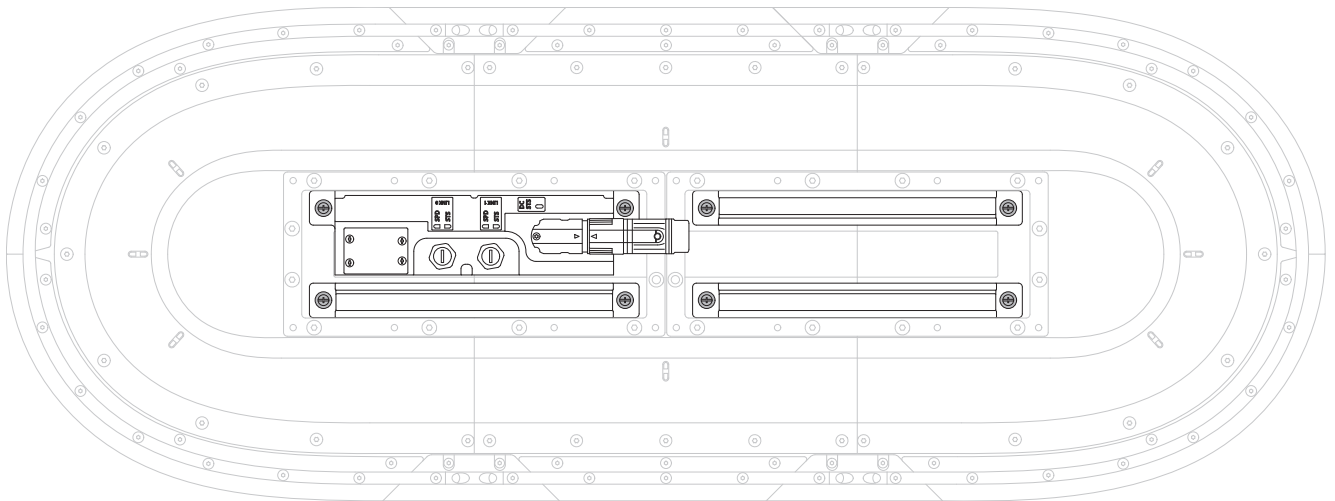
You have completed the iTRAK 5730 assembly. Next steps:

- Mount the iTRAK 5730 assembly - see page 58
- Install the lubrication system - see page 63
- Install the position magnets on the movers - see page 139
- Install the movers - see page 140
- Connect power and control cables - see page 74 and 78

Mount the iTRAK 5730 Assembly

Use the information in this section to prepare the iTRAK 5730 system for lifting and mounting. A customer-sourced mounting structure is required to mount the iTRAK 5730 in the desired position and location.

Choose the location for system components following these considerations:

- operator and maintenance access to movers and motor modules
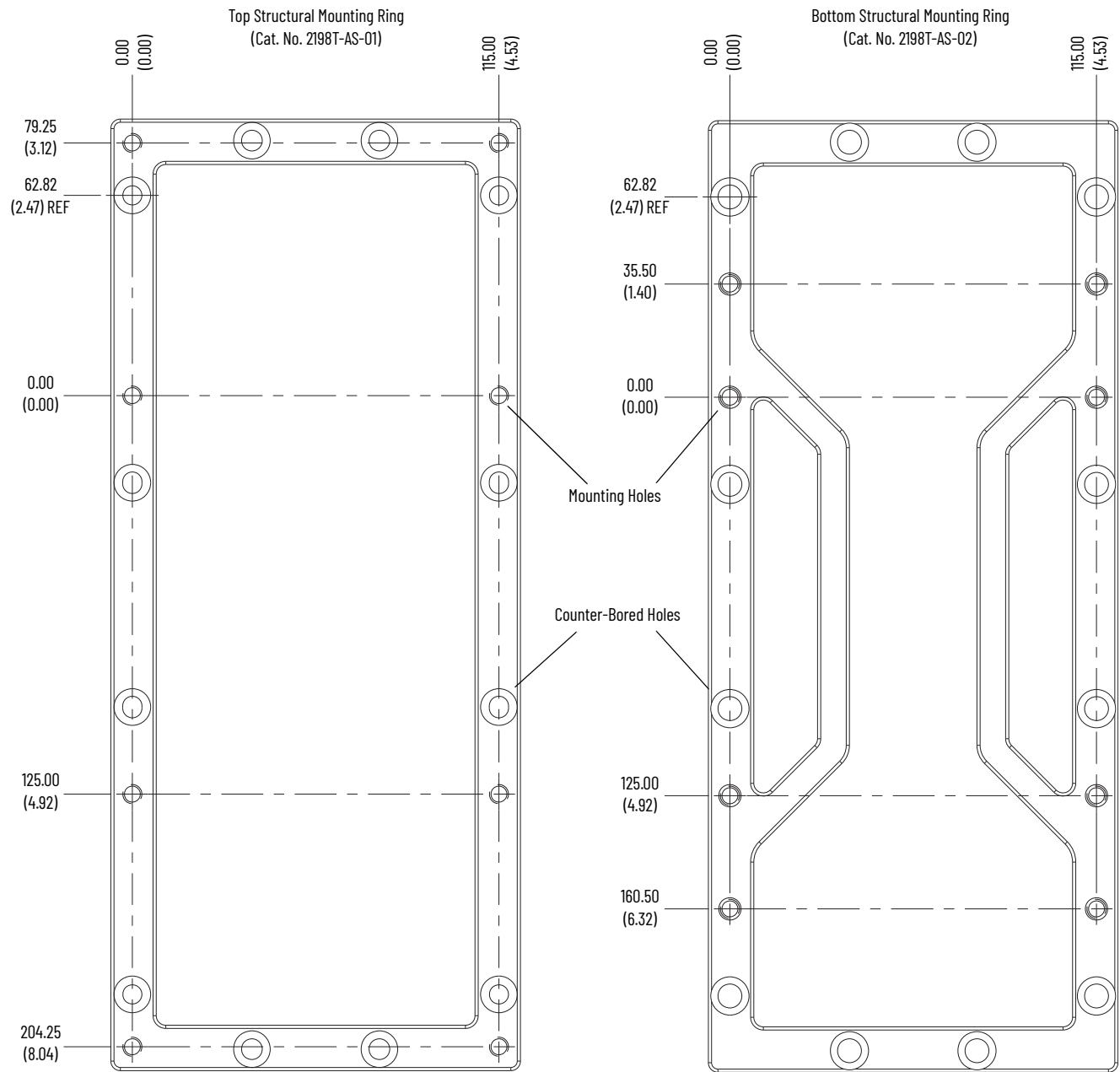- cable lengths
- vibration free surfaces

The iTRAK 5730 includes two structural mounting rings, the top mounting ring and the bottom mounting ring. Each mounting ring contains eight threaded mounting holes that accept M6 x 16 mm hardware. To connect the iTRAK 5730 to the customer-sourced mounting structure, attach one of the mounting rings to the structure using all eight mounting holes in the ring.

In high shock and vibration applications, it is especially important to use all eight mounting holes of a mounting ring. For these applications, you may consider attaching the other mounting ring to a mounting structure as well, if the application permits.

To allow the motor modules and rings to undergo maintenance without disassembly of the mounting structure, we recommend that the customer-sourced mounting system meet the following conditions:

- Allows access to the eight mounting holes in both the top and bottom mounting rings.
- Allows access to the 12 counter-bored holes in both the top and bottom mounting rings.

The mounting hole and counter-bored hole locations are shown in .

Figure 22 - Structural Ring Mounting Hole Pattern

Top Structural Mounting Ring
(Cat. No. 2198T-AS-01)

Bottom Structural Mounting Ring
(Cat. No. 2198T-AS-02)

0.00
(0.00)

115.00
(4.53)

0.00
(0.00)

115.00
(4.53)

79.25
(3.12)

62.82
(2.47) REF

62.82
(2.47) REF

35.50
(1.40)

0.00
(0.00)

0.00
(0.00)

Mounting Holes

Counter-Bored Holes

125.00
(4.92)

125.00
(4.92)

160.50
(6.32)

204.25
(8.04)

Dimensions are in millimeters and (inches).

ATTENTION: Installed connector modules extend approximately 0.54 mm (0.02 in.) above the surface of the top structural mounting rings. You must use a 1 mm (0.04 in.) or larger spacer between the top structural mounting rings and a mounting plate or similar mounting assembly when secured at a 90° angle to the connector modules. Failure to follow these instructions can result in equipment damage.

Side View   Connector Module

Mounting Ring

0.54 mm   0.54 mm
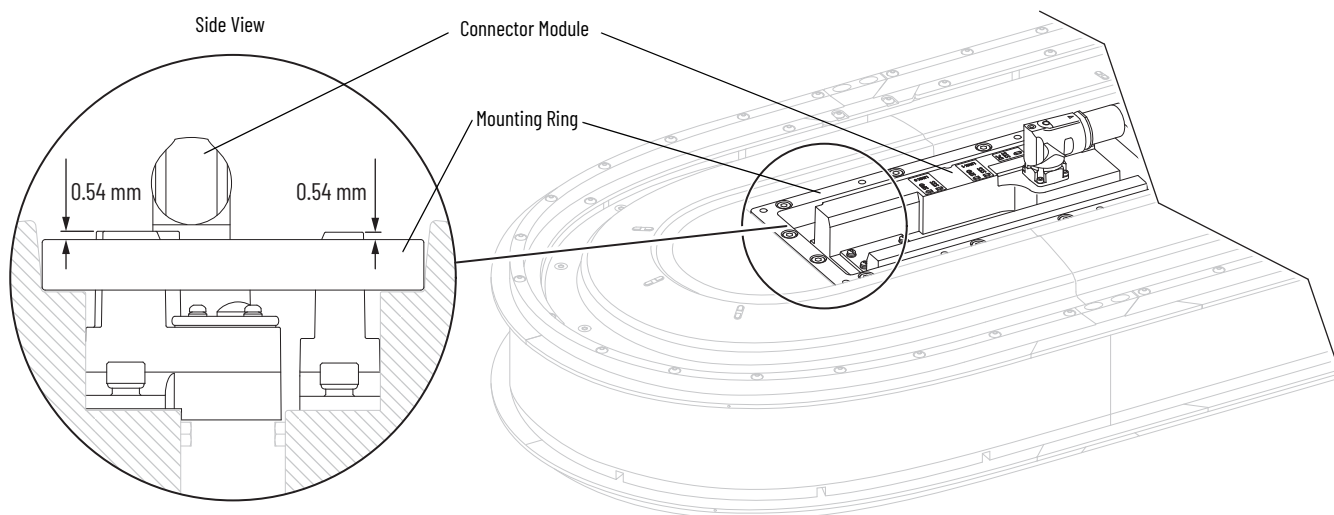
Grounding Requirements

To reduce the effects of electromagnetic interference (EMI), the iTRAK 5730 system must be mounted such that the mounting rings are bonded to earth ground.

If the mounting interface does not provide a low impedance path to earth ground, it is recommended that you connect the mounting rings to ground with a braided ground strap. Keep the braided ground strap as short as possible for optimum bonding. For large systems with multiple power input connector modules, it is recommended that these braided ground straps be connected to the mounting rings nearest to each power input connector module.

Before You Lift and Mount the iTRAK 5730 Assembly

Follow these guidelines to avoid personal injury or equipment damage.

> ⚠ **ATTENTION:** There is a risk of injury by improper handling. You can be injured by being crushed, cut, struck, or sheared while handling system components.

- Only qualified persons must work with components of the system or within their proximity.
- Observe the relevant statutory regulations of accident prevention.
- Use protective equipment such as hard hat, safety goggles, safety shoes, and safety gloves while handling the system.
- Proper transport, storage, mounting and installation, and care in operation and maintenance are prerequisites for optimal and safe operation of the system.
    - Use suitable equipment for mounting and transport.
    - Use proper tools and use special tools if specified.
    - Use hoist equipment and tools in the correct manner.
    - Avoid jamming and crushing by using safety measures.
    - Do not stand under loads.
- Use the components of the system only in the manner that is defined as appropriate. See Appropriate Use on page 10.
- Follow the safety regulations and requirements of the country in which the system is operated.
- Only operate if the national Electromagnetic Compatibility (EMC) regulations for the application are met.
- In accordance with EMC requirements, the machine or installation manufacturer is responsible for compliance with the limit values as prescribed in the national or local regulations.

Lift the iTRAK 5730 Assembly

To prepare the appropriately rated lifting equipment, you must calculate the full assembled weight of your iTRAK 5730 system. See Table 10 on page 41 for iTRAK 5730 components and kits weights.

> ⚠️ **ATTENTION:** To avoid possible injury or equipment damage, follow local, national, and international codes, standards, regulations, or industry guidelines and your company safety procedures when you handle or lift a partially or fully assembled iTRAK 5730 system. Do not lift or move the equipment by any means other than what is described in this publication.

The structural mounting rings (cat. no. 2198T-AS-01 and 2198T-AS-02) contain eight holes that can be used to secure the appropriate M6 x 16 mm hardware that is used to lift the assembly. The holes that are used for lifting hardware during installation are shown in Figure 20 on page 44 and Figure 21 on page 44.

Use a minimum of four lifting holes in the mounting rings for every 2…6 straight motor module sections. Use a minimum of six lifting holes for every 8…12 straight motor module sections. Similarly, install the lifting hardware to one side of the rings only to lift and flip the partially or fully assembled system.

Figure 23 - Lift the iTRAK System
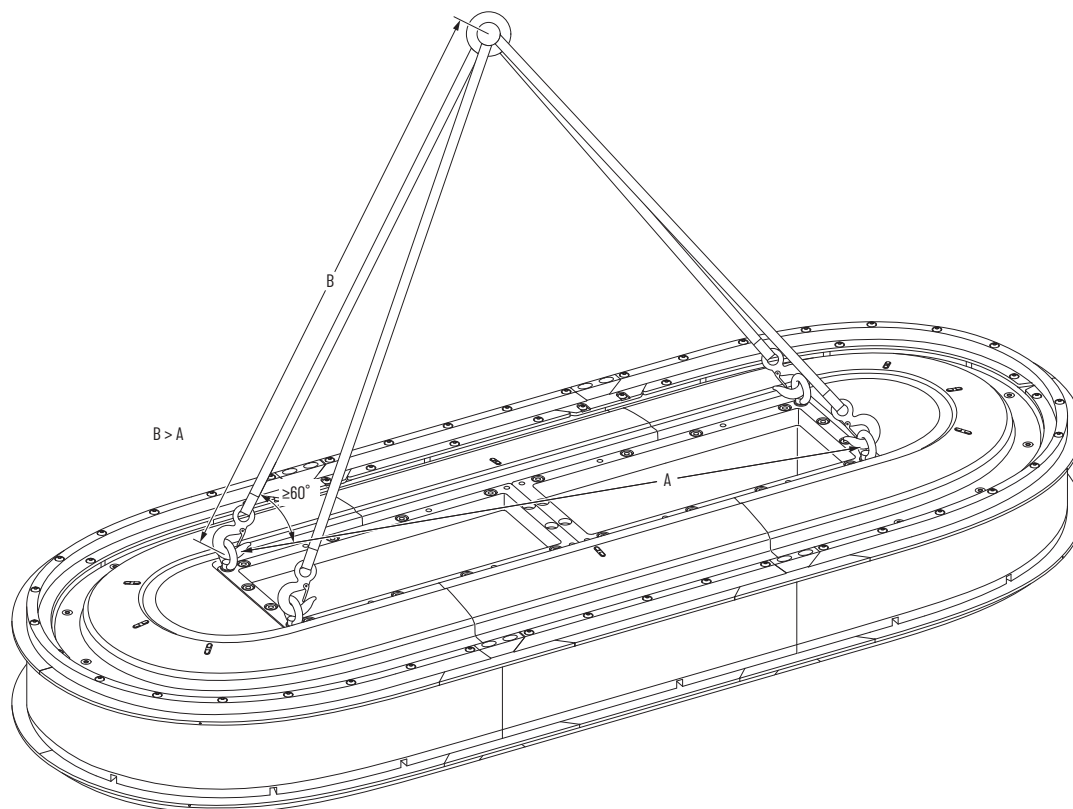
Install the Lubrication System

Contents of an iTRAK Lubrication System

The iTRAK 5730 Lubrication System, kit catalog number 2198T-AL-SYS-4, contains the following components.

Lubricant Pumps

Four lubricant pumps are included, one for each bearing rail, the top flat rail, bottom flat rail, top rectangular rail, and bottom rectangular rail. The assembled pumps have push-to-connect connectors with plugs. These plugs help prevent oil from leaking during shipment. You remove these plugs when you are ready to connect the tubes. The pump fittings contain a check valve to help prevent backflow when a replacement reservoir is installed.

Lubricant Tubes

Four 10 m (32.8 ft) long lubricant tubes are included in the kit to connect fittings on the remotely located pumps to fittings on the iTRAK.

iTRAK Fittings for Lubricant Tube Connections

Four in-line one-touch fittings (item 13 in) are provided. These fittings are used to connect the lubricant tubes to the iTRAK. The fittings screw onto the track bottom end plate at one or both ends of the track. The Curve Motors at the ends of the track are the only motors with lubricant bleed holes, and therefore the lubrication kits must connect to the ends of the track. Once the fittings are installed, connect the fittings to the pumps with the provided tubing.

Straight Fittings to Customize the Direction of Tubing

The lubrication system is assembled with right angle fittings by default. Additional straight hex nipple fittings are provided to let you redirect pump tubing. If your system requires straight exit from the pump, use the supplied straight fittings to replace the right angle fittings. Use Teflon tape for the tapered NPT threads.

*Lubricant Pump Reservoir Sealing Washer*

The reservoir uses a straight 1/4 BSPP thread. A sealing washer is supplied.

Required Quantity of iTRAK Lubrication Systems

The number of iTRAK Lubrication System per track may vary according to the length of the track. The general rule is as follows:

- Tracks with up to 4800 mm (188.98 in.) of straight length (16 straight motors): use one lubrication kit 2198T-AL-SYS-4.
- Tracks with more than 4800 mm (188.98 in.) of straight length (>16 straight motors): use two lubrication kits, one kit connected to one end of the track, the other kit connected to the other end of the track.

Figure 24 - Lubricant Pump Components
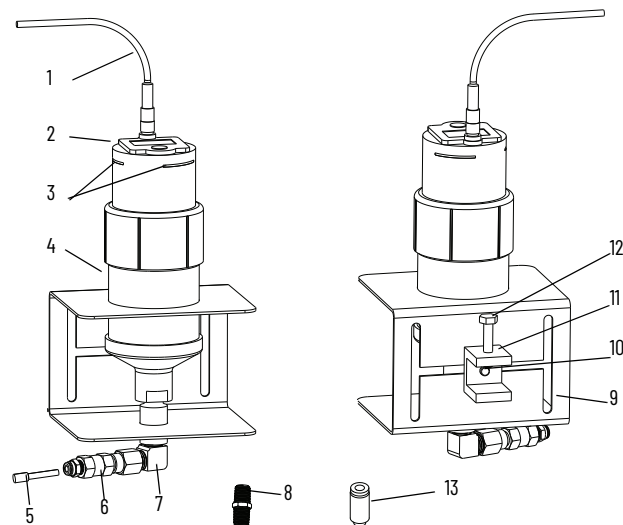
Item	Description	Item	Description
1	5 m (16.4 ft) Digital signal cable	8	Straight brass fitting [(1)]
2	Digitally activated pump	9	Mounting bracket
3	Pump status indicators	10	0.25...20 x 0.5 screw
4	Lubricant cartridge	11	Beam clamp
5	Plug	12	0.25...20 x 1.25 screw
6	Check valve	13	One-touch fitting M5
7	Brass elbow fitting		

(1) If your installation requires the tubing to exit the pumps vertically, you can replace the brass elbows with the two straight brass nipples that are supplied with the kit.

## Tools Required to Install Lubricant Pumps

- 7/16 in. open-end wrench
- M2.5 hex key

Mount the Lubricant Pumps and Connect Lubricant Tubes

To mount the lubricant pumps, complete these steps.

1. Choose a mounting position for each pump. Each pump must be located with the following constraints:

   - The mounting position must have a suitable mounting surface that allows the pump to be secured using its beam clamp (item 11 in Figure 24). The beam clamp can be positioned anywhere on the H pattern of the mounting bracket.

   - Each pump comes with 10 m (32.8 ft) of lubricant tube to connect the pump to the iTRAK 5730 system lubrication connectors, limiting the distance that the pump can be from the iTRAK 5730.

   - Power cable routing distance: Each pump comes with a 5.0 m (16.4 ft) power cable to connect it to the 24V I/O port of your controller.

   - Maintenance and monitoring: The location must be accessible for maintenance and visible for monitoring the pump status indicators.

   - Mounting clearance: Observe the clearance requirements in Figure 25.

Figure 25 - Lubricant Pump Mounting Dimensions and Clearances
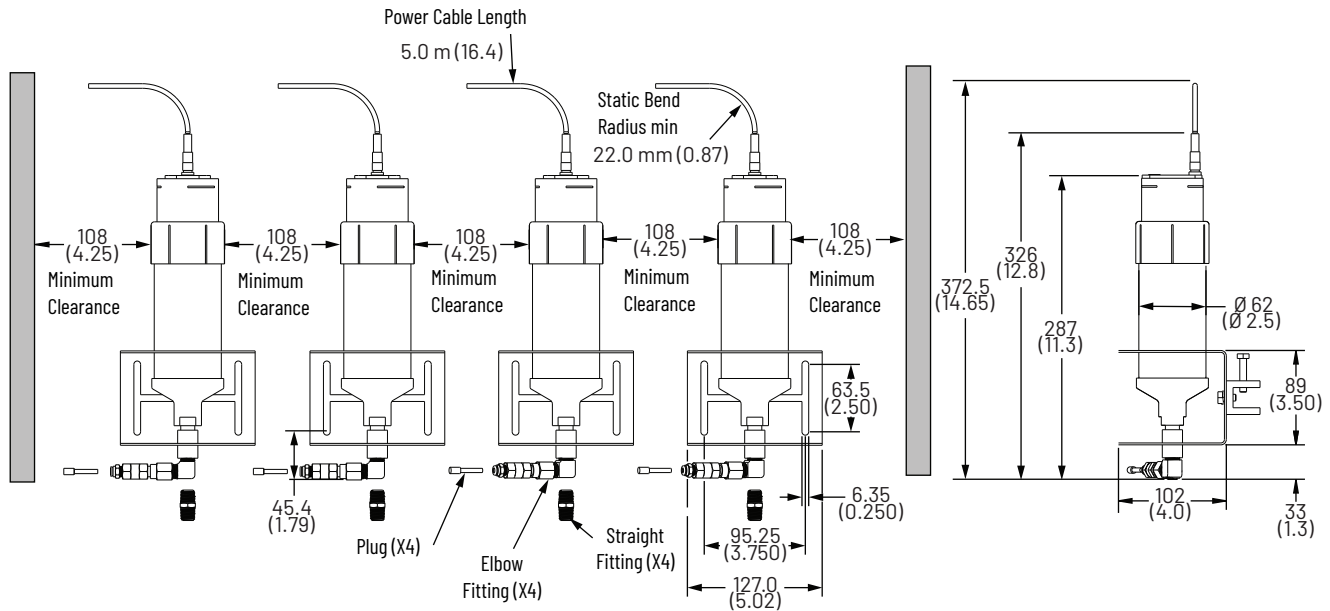
2. Secure all pumps in their mounting locations. Use the following steps for each pump:

   a. If necessary, adjust the position of the beam clamp within the H pattern of the mounting bracket to accommodate the attachment surface; use a 7/16 in. open-end wrench.

   b. Secure the lubricant pump to its mounting surface (such as a beam) using the beam clamp; use a 7/16 in. open-end wrench to tighten the clamp.

3. Without connecting the lubricant tubes, label, route, and secure the lubricant tubes that will later be used to connect the pumps to the lubrication connectors on the iTRAK 5730 system.

> ⚠ **ATTENTION:** For the following step, if you do not connect the lubricant tubes to the lubricant pump connector soon after removing the plug from the lubricant pump connector, oil may leak out of the lubricant pump and cause a slipping hazard.

4. For each lubricant pump, perform the following steps a and b in immediate succession. Do not wait between the two steps.

   a. To remove the plug (item 5 in Figure 24) from the lubricant pump connector, simultaneously pull back on the connector face and pull out the plug.

   b. Connect the lubricant tube to the lubricant pump connector.

Make Lubricant Tube Connections to the iTRAK

1. Screw all lubrication-connector-in-line-one-touch fittings into place in the track bottom end plate on either end or both ends of the track, applying Loctite thread locker to the fitting threads if this is a high vibration application. Some example fittings are shown as items 2...5 in <u>Figure 26</u>.

Figure 26 - Installing the Lubrication-connector-in-line-one-touch Fittings on the Bottom of the iTRAK 5730 System
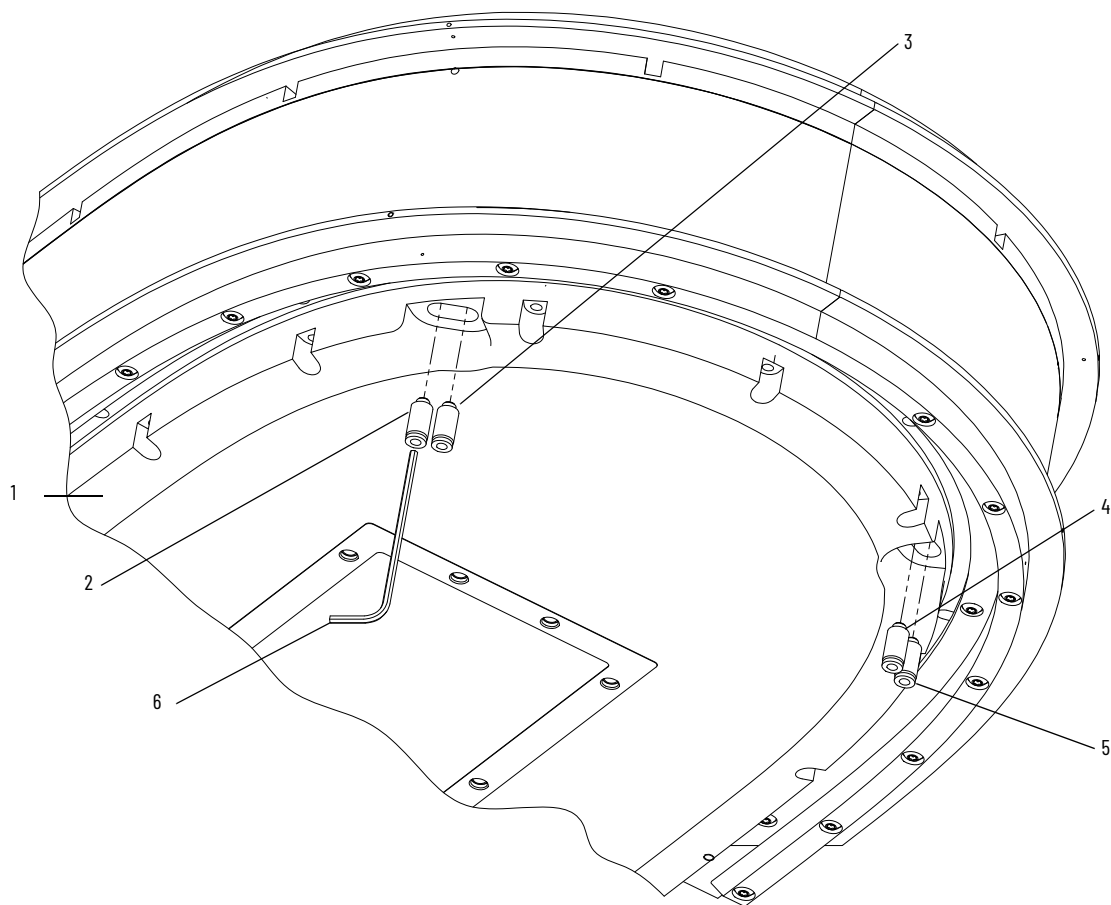
Item	Description
1	Track bottom end plate
2	Bottom flat rail one-touch fitting
3	Top flat rail one-touch fitting
4	Top rectangular rail one-touch fitting
5	Bottom rectangular rail one-touch fitting
6	M2.5 hex key

2. Select a lubricant tube that has already been routed and connected to a lubricant pump. Connect this lubricant tube to a lubrication-connector-in-line-one-touch fitting. This connection forms a continuous path for the lubricant from the pump to the rail lubricant bleed holes. Repeat this step for all fittings.

Fill the Lubricant Pump Reservoirs with Lubricant

The recommended lubricant to fill the reservoirs or cartridges is the standard H1 food safe oil: Kluber 4-UH1-68N.

Wire the Lubricant Pumps

Make the following connections.

After wiring the lubricant pumps, an initial coating of oil is required on the entire track before operating the iTRAK 5730 system. See <u>Lubrication on page 166</u>.

Configure the Lubrication System

See <u>Lubrication on page 166</u>.

Optional Infield Covers

The iTRAK 5730 system has optional infield section covers that provide additional ingress protection.

What You Need

- 10 mm hexagonal socket
- Loctite 243
- Infield Cover Kit

To install infield covers, complete these steps.

1. Apply Loctite 243 to the M6 x 35 hex head bolts.
2. Secure the curved infield cover to the assembly.
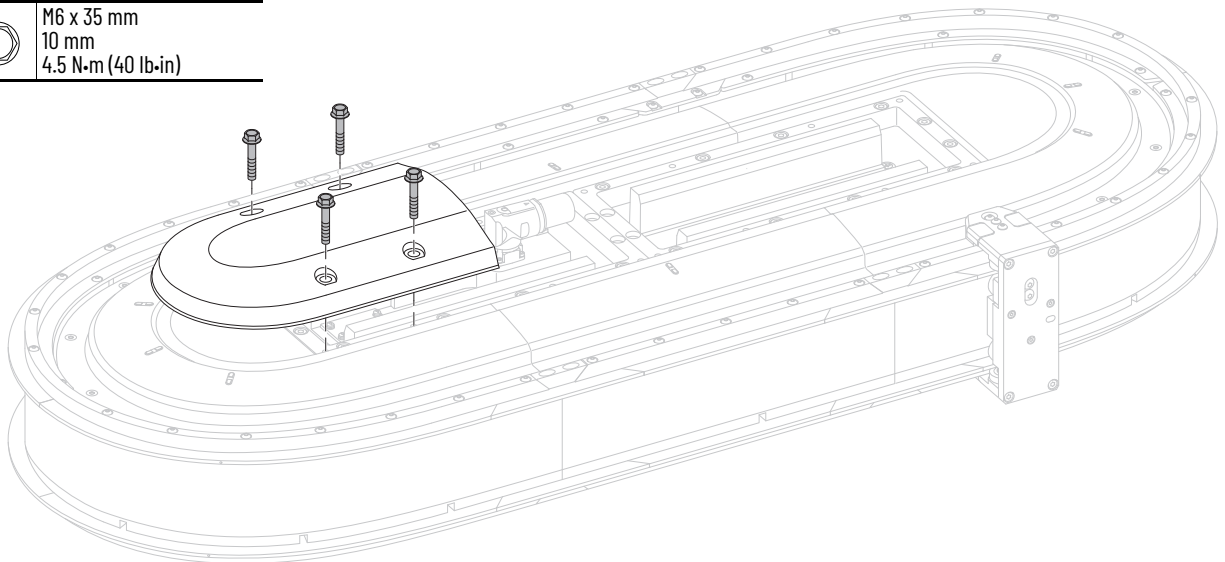
3. Repeat step 1 and step 2 for the remaining covers.

3	⬡	M6 x 35 mm 10 mm 4.5 N•m (40 lb•in)
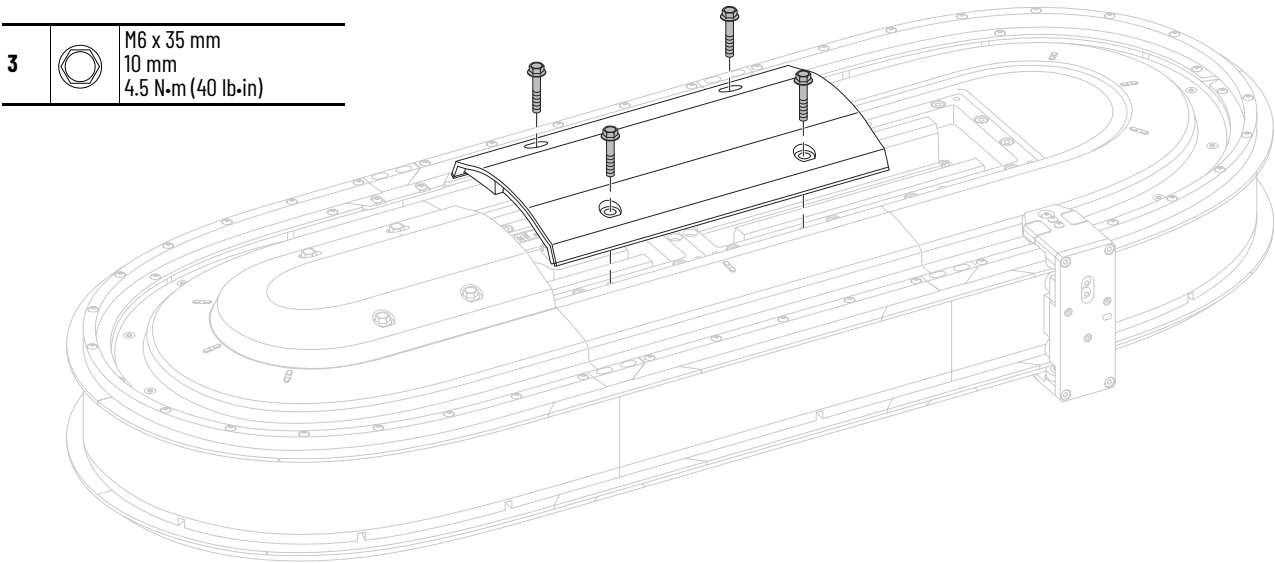
Connect the iTRAK 5730 System

This chapter provides information on how to connect your iTRAK® 5730 system components, make cable connections, and set your system IP addresses.

Topic	Page
Typical iTRAK 5730 System	70
Provide Power to the iTRAK System	71
Connect an EtherNet/IP Network to the iTRAK 5730 System	75

Use this chapter with the Kinetix® 5700 iTRAK Power Supply and iTRAK Bus Conditioner Module Installation Instructions, publication 2198T-IN001 to install and connect the Kinetix 5700 iTRAK power supply to an iTRAK 5730 system.

For detailed information on how to install a Kinetix 5700 iTRAK power supply into a Kinetix 5700 system, see the Kinetix 5700 Servo Drives User Manual, publication 2198-UM002. The Kinetix 5700 Servo Drives User Manual publication contains the information that is needed for using the other components of the Kinetix 5700 system, including:

- 2198-P*xxx* Kinetix 5700 DC-bus power supply
- Other Kinetix 5700 components that can be part of your Kinetix 5700 system
- Branch protection, disconnect, and line filter hardware
- Enclosure requirements
- Requirements for EMC and agency compliance
- Kinetix 5700 hardware mounting
- Bonding, wire routing, EMC considerations

Typical iTRAK 5730 System

Figure 27 provides a complete view of a typical iTRAK 5730 system that includes required and customer-supplied components, iTRAK solutions, and wiring.

Figure 27 - Typical iTRAK System with an iTRAK Power Supply
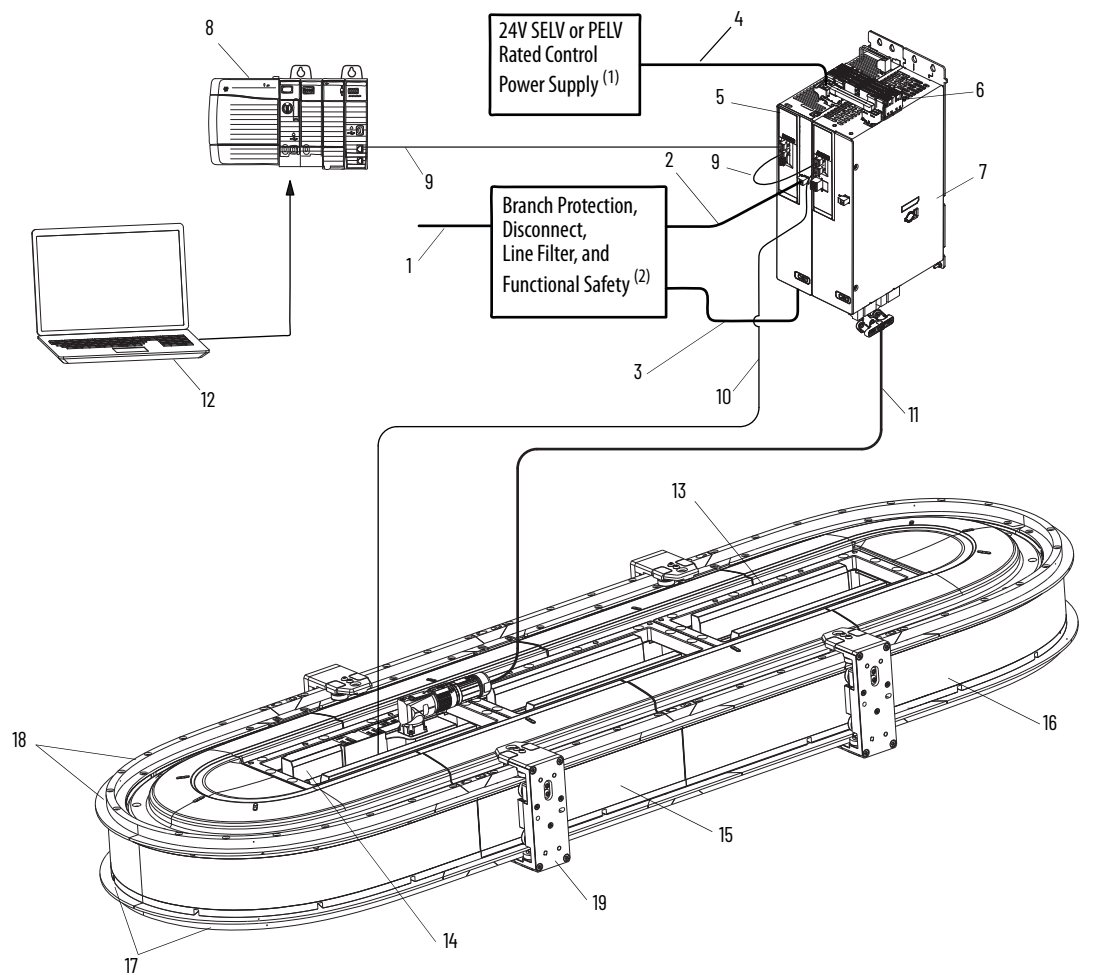
(1) In this example, 24V DC control power uses a shared-bus connection system between the Kinetix 5700 power supply and the Kinetix 5700 iTRAK power supply.

(2) See Kinetix 5700 Servo Drives User Manual, publication 2198-UM002, for more information on these components.

Item	Description
1	Mains power (460V nom)
2	Contactor enable signal line
3	Kinetix 5700 line voltage
4	24V control power
5	Kinetix 5700 DC-bus power supply
6	DC busbar 100 mm (3.94 in.) link
7	Kinetix 5700 iTRAK power supply (number of power supplies vary by system)
8	Programmable logic controller (PLC)
9	Machine Ethernet
10	Ethernet cable from the iTRAK power supply to connector module

Item	Description
11	Power cable (DC-bus and 24V DC)
12	Studio 5000® Programming Interface (not supplied with system)
13	Power and control pass-through connector module
14	Power and control input connector module
15	Straight motor module
16	Curved motor module
17	Bottom rectangular and flat rail systems
18	Top rectangular and flat rail systems
19	Mover

Provide Power to the iTRAK System

Follow the guidance and instructions in this section to plan and complete the power connections between the iTRAK power supply and the iTRAK 5730 system. See the iTRAK 5730 System Technical Data, publication 2198T-TD002, for detailed system power requirements.

You can use one iTRAK power supply to power up to 18 motor module sections, depending on current requirements and power cable length. You can use multiple iTRAK power supplies when your iTRAK system requires a higher current draw than can be supported by using one power supply. Use Table 11 and Table 12 to calculate your system current requirements.

Table 11 - Current Draw for Motor Modules

Motor Module Type	Motor Sections per Module	Current Draw at 24V DC
Straight (cat. no. 2198T-L20-T0303-A00-S2)	1	0.65 A
Curved (cat. no. 2198T-L20-T0309-D18-S2)	3	1.6 A

Table 12 – Number of Motor Module Sections Supported by a Kinetix 5700 iTRAK Power Supply

Cable Length [m (ft)]	Maximum Number of Motor Module Sections		
	Low Line (21.6V DC)	Nominal (24V DC)	High Line (26.4V DC)
3 (9.8)	18	18	18
6 (19.7)			
9 (29.5)			
12 (39.4)			
15 (49.2)[1]			
30 (98.4)[1]	10	14	

(1) Requires two iTRAK 5730 power supply power outputs and cables when 14 or more motor module sections are used.
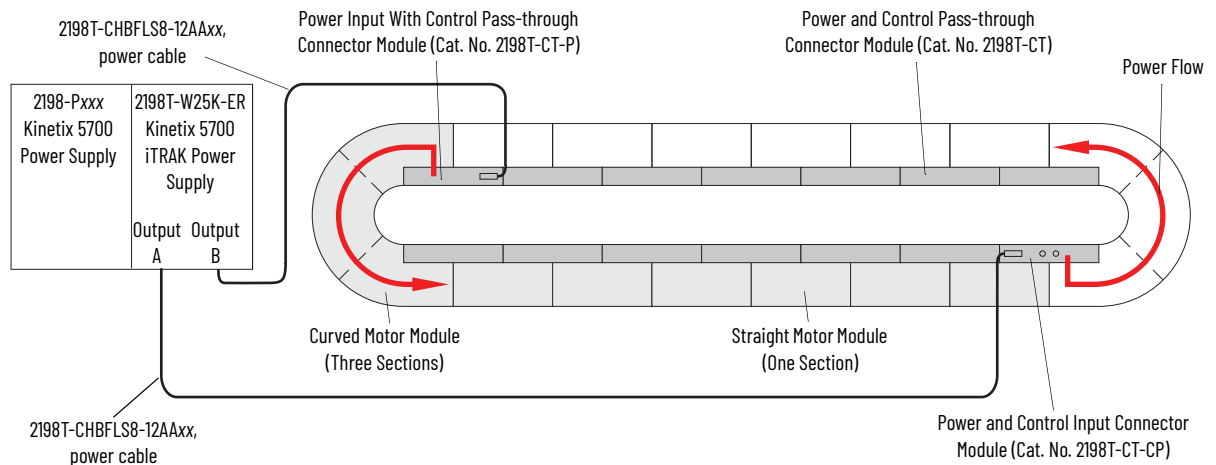
Connect Power to the iTRAK 5730 System

It is recommended that you install connector module catalog numbers 2198T-CT-CP and 2198T-CT-P, which connect DC-bus and 24V DC control power to the iTRAK 5730 system, on a curved motor module to provide maximum system power. Power, which is connected to the input power connector on the module, flows through the bottom output connector on the opposite end the module (as shown here). Connect the bottom output power connector to the input power connector on a curved motor module.

Power and Control Input Connector Module (Catalog Number 2198T-CT-CP) Shown.

Input Power Connector

DC-bus and 24V DC Control Power Flow

Connect this End to a Curved Motor Module

DC-bus and 24V DC Control Power Flow to Adjacent Motor Module

Ground Only from Adjacent Motor Module
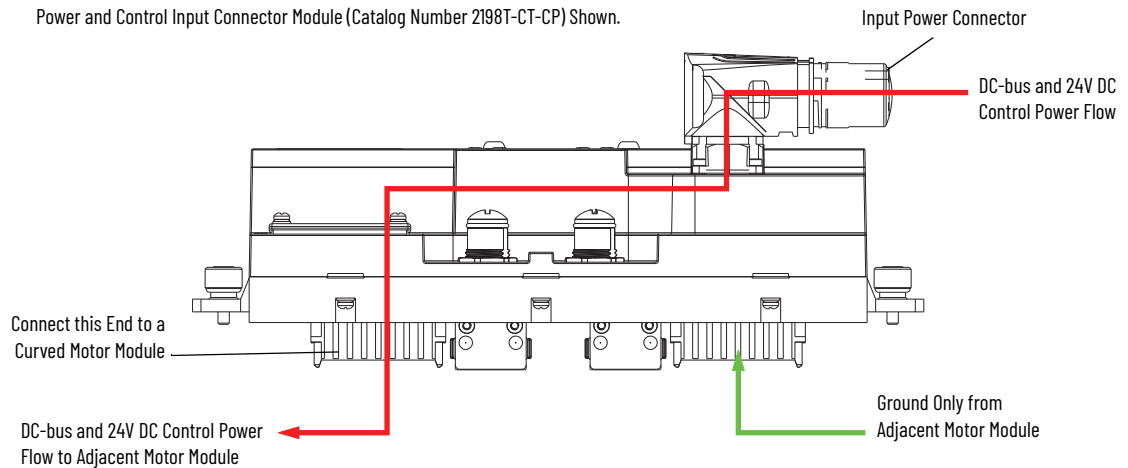
One iTRAK Power Supply

Figure 28 illustrates a typical system wiring diagram when using one iTRAK power supply. The power supply power output A is connected to a power and control input connector module. Power supply power output B is connected to power with a control pass-through connector. The power flow through the modules is shown in the diagram and identifies where the power connector modules are installed.

Figure 28 – Wire an iTRAK 5730 System with an iTRAK Power Supply

2198T-CHBFLS8-12AAxx, power cable

Power Input With Control Pass-through Connector Module (Cat. No. 2198T-CT-P)

Power and Control Pass-through Connector Module (Cat. No. 2198T-CT)

Power Flow

2198-Pxxx Kinetix 5700 Power Supply

2198T-W25K-ER Kinetix 5700 iTRAK Power Supply

Output A   Output B

Curved Motor Module (Three Sections)

Straight Motor Module (One Section)

Power and Control Input Connector Module (Cat. No. 2198T-CT-CP)

2198T-CHBFLS8-12AAxx, power cable

Multiple iTRAK Power Supplies

Follow these guidelines when using multiple iTRAK power supplies in an iTRAK system. A typical iTRAK 5730 system with two power supplies is shown in Figure 29.

The iTRAK power supply is not designed to have the output buses of multiple power supplies connected together to create one bus of higher current capacity.

⚠️ **ATTENTION:** To avoid personal injury and equipment damage, when multiple iTRAK power supplies are used, do not connect the DC output power bus on an iTRAK power supply to the DC output power bus on another iTRAK power supply.

When using multiple iTRAK power supplies, the system must be divided into separate electrical sections for each of the iTRAK power supplies. Use the following example to understand the use of multiple iTRAK power supplies for systems that require a higher current draw.

In this example, part of the track has a high-power demand, and the rest of the track has a lower power demand. In this case, iTRAK power supply 1 uses two power output connections (A, B) to provide power to the first eight motor sections (01...08). iTRAK power supply 2 uses one power output connection (A) to provide power to the remaining eight motor sections (09...16). The DC bus is electrically isolated between these two groups of motor modules. The power flow through the modules is shown in the diagram and identifies where the primary power connector modules are installed.

Figure 29 - Connecting Multiple iTRAK Power Supplies in a System
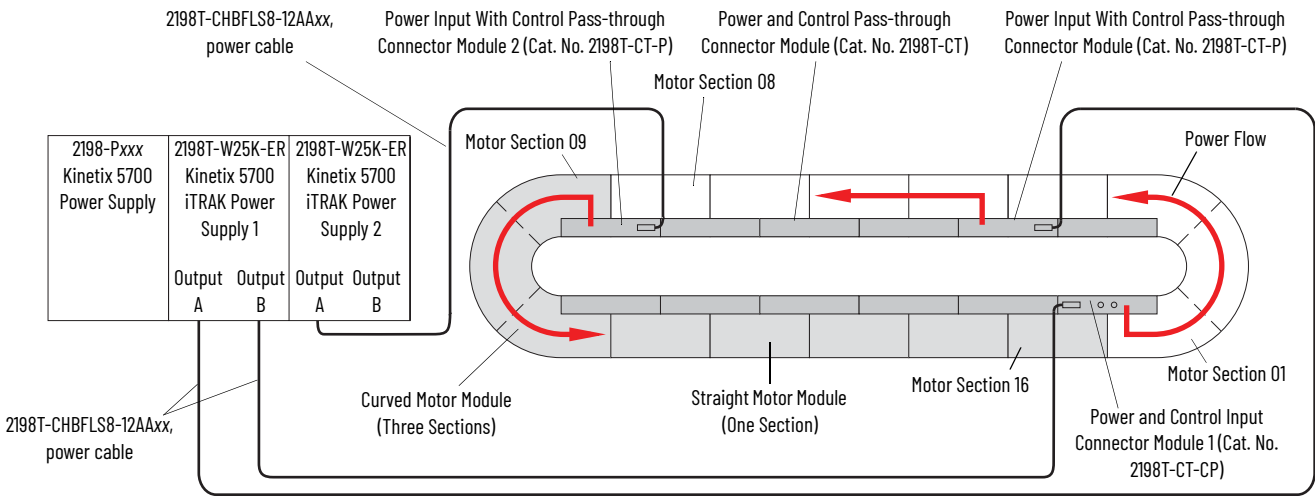
Connect the Power Cable

	SHOCK HAZARD: Do not make any cable connections when power is applied to any component in the iTRAK 5730 system. To avoid a shock hazard, verify that system power is not applied before you begin the procedures in this chapter.

Use an iTRAK 5730 power cable (cat. no. 2198T-CHBFLS8-12AA*xx*) to connect the output power from an iTRAK power supply to a power input connector module installed on the iTRAK 5730 system. Follow these steps to connect the power cable to a connector module.

1. Verify that power is disconnected from the iTRAK 5730 system.
2. Connect the iTRAK 5730 power cable to the iTRAK power supply. See the Kinetix® 5700 iTRAK Power Supply and iTRAK Bus Conditioner Module Installation Instructions, publication 2198T-IN001, for instructions.
3. Remove the protective cap from the power input connector on the connector module.
4. Verify that the cable connector outer housing is in the unlocked position.
5. Align the arrow on the cable connector with the arrow on the power input connector on the connector module.
6. Insert the cable connector into the power input connector on the connector module until it is fully seated.
7. Rotate the cable connector outer housing to the locked position.

Connect an EtherNet/IP Network to the iTRAK 5730 System

The iTRAK 5730 system is connected to an EtherNet/IP™ network by using a Bulletin 1585D M12 Xcode Ethernet cable (catalog number 1585D-E8TGJM-*xx*) connected to the power and control input connector module.

EtherNet/IP Address Rotary Switches

Every device in an EtherNet/IP network must have a unique IP address. The power and control input connector module (cat. no. 2198T-CT-CP) contains rotary switches (S1, S2, and S3) to enable Dynamic Host Configuration Protocol (DHCP) or set static EtherNet/IP addresses manually. Figure 30 identifies the location of the rotary switches. Table 13 describes the possible settings for the rotary switches S1, S2, and S3.

Figure 30 – EtherNet/IP Rotary Switches and DIP Switch Locations

S3 = Hundreds Position

S2 = Tens Position

S1 = Ones Position
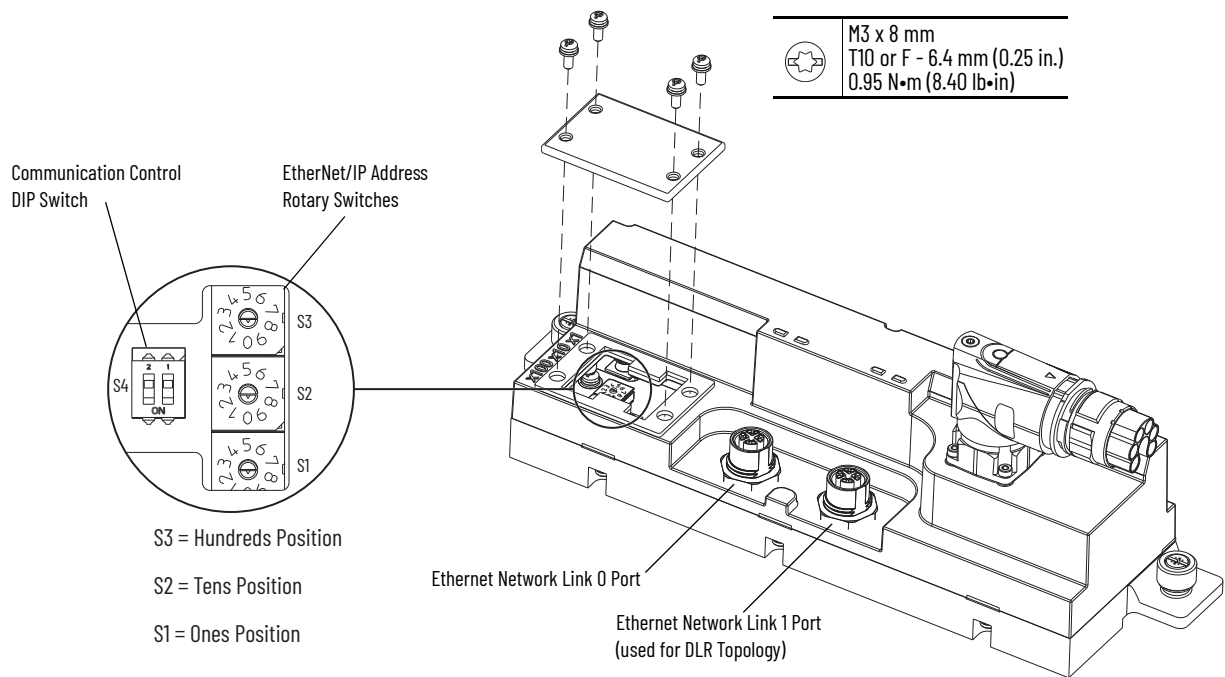
Table 13 – EtherNet/IP Rotary Switch Settings

Switch Setting	Function [1]
000	Used to disable Protected Mode on all downstream motor modules. See Protected Mode on page 83 for instructions on disabling Protected Mode.
001…254	Sets the last octet of the IP address to the value indicated (*xxx* in 192.168.1.*xxx*) on the connected motor module. Every subsequent motor module is assigned an IP address with the last octet incremented by one, moving counter-clockwise around the track.
888	A power cycle after the switches are set to 888 restores all factory default settings on all downstream motor module sections. Before you use this setting, read the first **IMPORTANT** statement on page 76 for critical functional safety considerations.
900	Used to enable Protected Mode on all downstream motor modules to prevent configuration changes. See Protected Mode on page 83 for instructions on enabling Protected Mode.
999	Sets the IP address on all downstream motor modules to a value determined by either DHCP or an address that is stored in nonvolatile memory. IP addresses can be changed through the Module Configuration dialog box in RSLinx® software. '999' is the default setting.
All other values	Reserved. Applying power to the iTRAK 5730 system with the switches set to a reserved value results in an "Illegal Address" exception on all downstream motor modules.

(1)   Downstream modules include all motor modules up to the next installed power and control input connector module (cat. no. 2198T-CT-CP).

IMPORTANT	Before changing the EtherNet/IP address rotary switch settings to 888, consider the following:
	• Restoring the factory default settings clears all functional safety configurations, resets safety ownership, and returns the motor module to the out-of-box-state.
	• Only authorized personnel should attempt to reset the safety ownership.
	• When the motor module returns to the out-of-box state, Safe Torque Off (STO) safety integrity is lost.

DHCP Configuration

The IP address rotary switches are set to '999' at the factory to enable DHCP. DHCP assigns IP address information from a pool of available addresses to newly connected devices (DHCP clients) in the network. You must use a BOOTP/DHCP software tool to set the IP addresses by using the hardware (MAC) addresses of the motor modules. The hardware address is on a label on the motor module.

With DHCP enabled, you must configure the IP address for each subsequent motor module in the Studio 5000 Logix Designer® application. IP addressing can also be changed through the Module Configuration dialog box in RSLinx® software. For more information about DHCP, see the Ethernet Reference Manual, publication ENET-RM002.

An Ethernet switch configured as a DLR ring supervisor can also act as a DHCP server to assign designated IP addresses to ring participants. Assignment of IP addresses is based on ring participant position. If a ring participant fails, a replacement device can be installed in the same position in the ring and automatically receive the same IP address as the replaced device.

Static IP Address Configuration

Manually set the rotary switches when working on a simple, isolated Ethernet network (for example, 192.168.1.*xxx*, where *xxx* is the last octet of the IP address). Switch S1 sets the '1's place, S2 the '10's place and S3 the '100's place.

IMPORTANT	Changes to the EtherNet/IP address rotary switches settings only take effect after a power cycle.

When setting static IP addresses, the switches set the last octet for the motor module to which the connector module is connected and above which the switches are located, as shown in . Every subsequent motor module is assigned an IP address with the last octet incremented by one, moving counter-clockwise around the track. For an example of an iTRAK 5730 system that uses two Ethernet networks and two power and control input connector modules, see .

Figure 31 - Static IP Address Configuration and Assignment
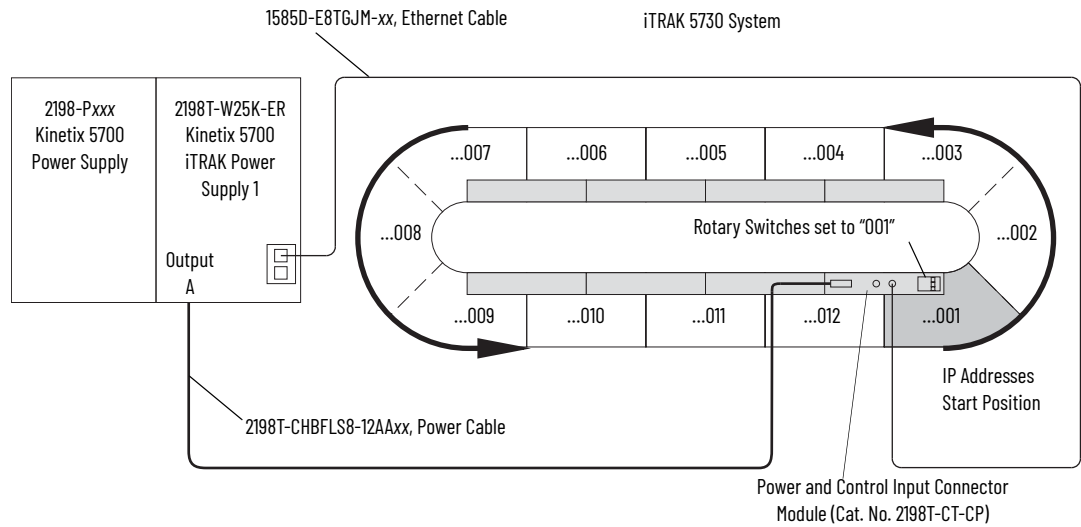
> **IMPORTANT**   The base IP address of the first motor module plus the total number of motor modules cannot exceed 254.

For access to the rotary switches, see <u>Figure 30 on page 75</u>. Always replace the protective cover before placing the iTRAK 5730 system into operation. For instructions on how to set the IP address manually on the power and control input connector module, see <u>Set the IP Address</u> on page <u>82</u>.

Communication Control DIP Switch

The communication control DIP switch (S4) is used to identify the backplane communication master for an iTRAK 5730 system and enables or disables access to the iTRAK 5730 diagnostic webpage. DIP switch S4 is contained on the power and control input connector module (cat. no. 2198T-CT-CP). See <u>Figure 30 on page 75</u> for switch location. <u>Table 14</u> identifies the possible switch settings.

Table 14 - Backplane Communication Control DIP Switch (S4) Settings

Switch	Position	Description
S4-1	ON	The power and control input connector module is the backplane communication master and initializes backplane communication for the entire track. 'ON' is the factory default setting.
	OFF	The power and control input connector module section is not the backplane communication master.
S4-2	ON	Enables access to the iTRAK 5730 diagnostic webpage.
	OFF	Disables access to the iTRAK 5730 diagnostic webpage. 'OFF' is the default setting.

> **IMPORTANT**   Verify that DIP switch S4-1 is set to "ON" for one power and control input connector module per system only.

> **IMPORTANT**   Changes to the DIP switch S4 settings only take effect after a power cycle.

Figure 32 provides an example of static IP addressing used in an iTRAK 5730 system with two Ethernet networks. In this example, the Kinetix 5700 iTRAK power supply 1 is on a separate Ethernet network from the Kinetix 5700 iTRAK power supply 2. The rotary switches on power and control input connector module 1 are set to "001". The rotary switches on power and control input connector module 2 must be set to "007" or greater.

DIP switch S4-1 on the power and control input connector module 1 is set to 'ON,' defining the module as the backplane communication master. DIP switch S4-1 on the power and control connector 2 must be set to "OFF."

Figure 32 - iTRAK 5730 System with Multiple Ethernet Networks and Static IP Addresses
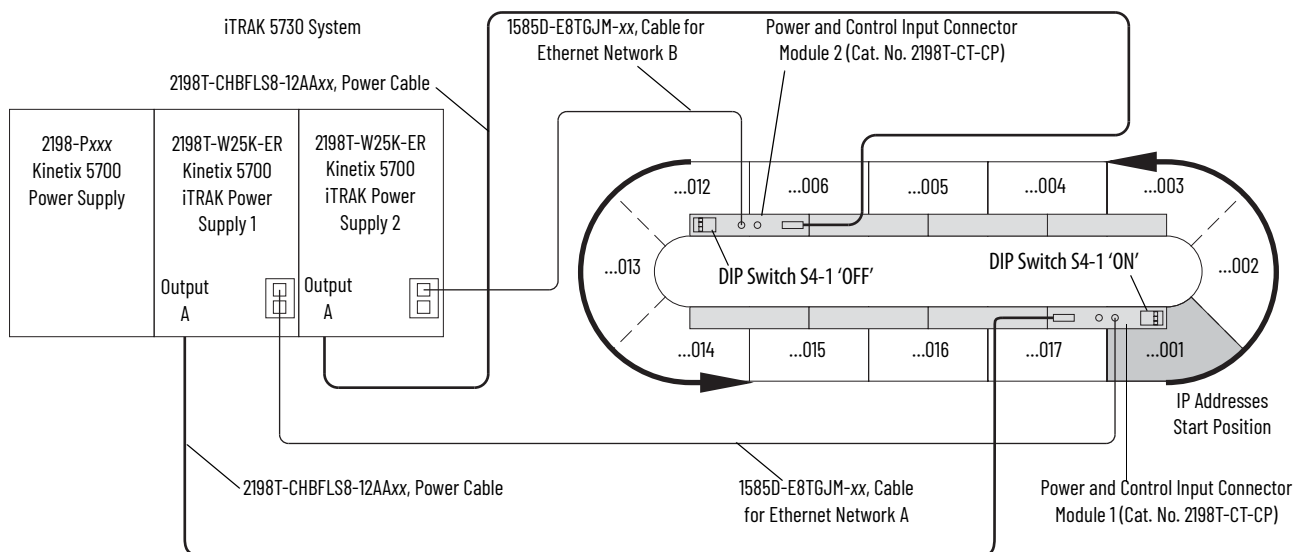
Connect the Ethernet Cable

Use the iTRAK machine Ethernet cable (cat. no. 1585D-E8TGJM-*xx*) to connect the Ethernet port from the iTRAK power supply to the iTRAK 5730 system. Follow these steps to connect the Ethernet cable to a connector module.

It is recommended that you connect the Ethernet cable to the connector module before installing the connector module on a motor module.

1. Remove the protective caps from the Ethernet ports on the connector module. If only one port is used, remove the protective cap from the Link 0 port only.

2. Verify that the connector pins are aligned and insert the Ethernet cable connector into the Ethernet connector on the connector module.

Connector Module Ethernet Port Connector   Ethernet Cable (cat. no. 1585D-E8TGJM-*xx*)
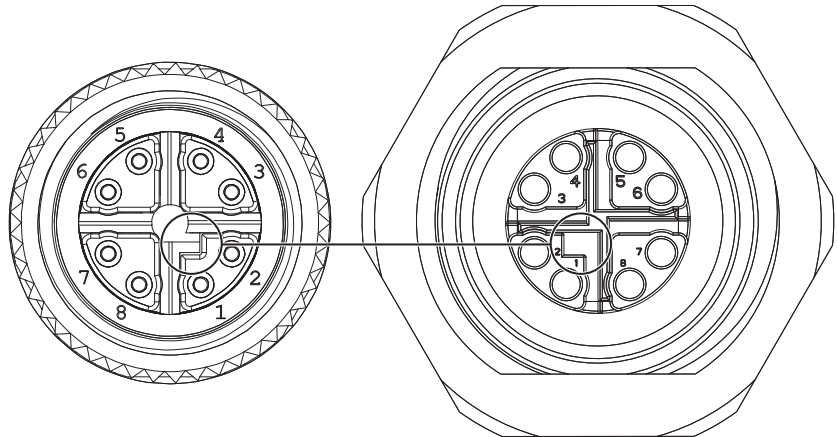
3. By turning the cable outer housing clockwise, secure the cable to the connector module mounting ring until the cable is fully seated.

Notes:

Configure and Start Up the iTRAK 5730 System

This chapter provides configuration and start-up procedures for your iTRAK®
5730 system with a Logix 5000® controller by using the Studio 5000 Logix
Designer® application.

Topic	Page
Studio 5000 Logix Designer	81
Configure the iTRAK 5730 System	82
Configure and Customize the Project File	84
Configure the Motion Group	105
Configure the Section Axis Properties	107
Download the Program	113
Apply Power to the iTRAK 5730 System	113
Understand Bus-sharing Group Configuration	114
Commission the iTRAK 5730 System	118
Tune the Axes	120

Studio 5000 Logix Designer

To configure your iTRAK 5730 system, use a personal computer and the Studio
5000 Logix Designer application, version 33 or later. For the rest of this
chapter, the Studio 5000 Logix Designer application is referred to as the
Studio 5000® application. For help with using the Studio 5000 application as it
applies to configuring the ControlLogix® or GuardLogix® controllers, see
Additional Resources on page 233.

We recommend you develop your application program by using the
standardized object-oriented Independent Cart Technology Libraries.
Independent Cart Technology Libraries are application-centric library objects
that are tested, documented, and life-cycle managed by Rockwell Automation
for use with the Studio 5000 Application Code Manager. You can access and
download the Independent Cart Technology Libraries on the Product
Compatibility and Download Center website, rock.auto/pcdc.

Configure the iTRAK 5730 System

You can include the iTRAK 5730 system in your Studio 5000 application by adding it to a configured EtherNet/IP™ module or controller under the I/O configuration tree. After setting network parameters, you can view the iTRAK 5730 system status information in the Studio 5000 environment and use it in your Studio 5000 application.

> Before you begin, make sure that you know the catalog numbers for the Kinetix® 5700 power supply, iTRAK 5730 power supply, Logix module and /or controller, and the iTRAK motor modules used in your motion control application.

Set the IP Address

You can choose between static IP addresses or DHCP. See Connect an EtherNet/IP Network to the iTRAK 5730 System on page 75 before you complete this procedure. This procedure is used to set static IP addresses for the motor modules in your iTRAK 5730 system. IP addresses are formatted to private IP address values of 192.168.1.*xxx*.

> The IP address rotary switches on the power and control input connector module are set to '999' with DHCP enabled at the factory.

Follow these steps to set the iTRAK 5730 system to static IP addresses on the power and control input connector module (cat. no. 2198T-CT-CP).

1. To access the rotary switches, remove the protective cover from the connector module chassis. For cover removal information, see EtherNet/IP Address Rotary Switches on page 75.

2. Set the rotary switches between 001...254 to configure the last octet of the IP address.

> The base address of the first motor module plus the total number of motor modules cannot exceed 254.

Settings are stored in nonvolatile memory. IP addressing can also be changed through the Module Configuration dialog box in RSLinx® software. Changes to the IP addressing take effect after power is cycled.

Protected Mode

The iTRAK 5730 system supports Protected Mode. When the system is in Protected Mode, the motor modules do not allow any configuration changes, resets, or firmware updates when a controller connection is open. Protected Mode is enabled by default.

Enable Protected Mode

To enable Protected Mode, follow these steps:
1. Set the rotary switches on the power and control input connector module to setting 900.
2. Apply power to the iTRAK 5730 system as described in <u>Apply Power to the iTRAK 5730 System on page 113</u>.
3. Verify that the status indicators provide these indications:
    *   The motor module Module (MOD) status indicators are flashing red
    *   The motor module Network (NET) status indicators are off
    *   The connector module Link (LINK 0/1) status indicators turn off
4. Remove power from the iTRAK 5730 system as described in <u>Remove Power from the iTRAK 5730 System on page 34</u>.
5. Set the switches on the power and control input connector module for normal operation.
6. Apply power to the iTRAK 5730 system as described in <u>Apply Power to the iTRAK 5730 System on page 113</u>.

All motor modules downstream of the power and control connector module are now in Protected Mode.

Disable Protected Mode

To disable Protected Mode, follow these steps:
1. Set the rotary switches on the power and control input connector module to setting 000.
2. Apply power to the iTRAK 5730 system as described in <u>Apply Power to the iTRAK 5730 System on page 113</u>.
3. Verify that the status indicators provide these indications:
    *   The motor module Module (MOD) status indicators are flashing red
    *   The motor module Network (NET) status indicators are off
    *   The connector module Link (LINK 0/1) status indicators turn off
4. Remove power from the iTRAK 5730 system as described in <u>Remove Power from the iTRAK 5730 System on page 34</u>.
5. Set the switches on the power and control input connector module for normal operation.
6. Apply power to the iTRAK 5730 system as described in <u>Apply Power to the iTRAK 5730 System on page 113</u>.

All motor modules downstream of the power and control connector module now have Protected Mode disabled.

Configure and Customize the Project File

These procedures assume that you have wired your iTRAK 5730 system. In this example, the GuardLogix® 5584ES safety controller dialog boxes are shown.

Configure the Controller

Follow these steps to configure the controller.

1. Apply power to your controller and open your Studio 5000 application.
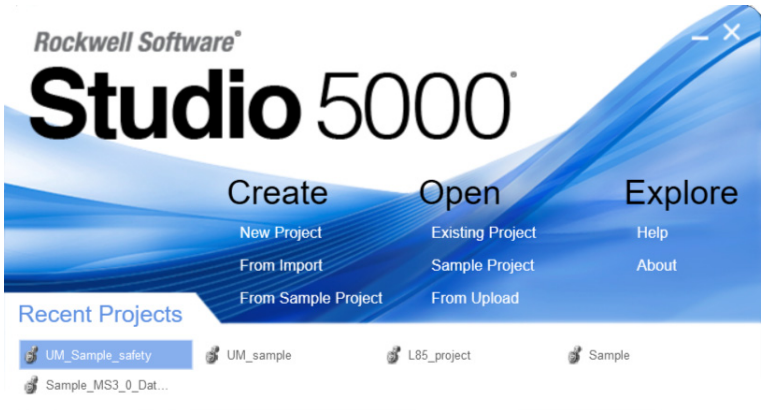
2. From the Create menu, choose New Project.

   The New Project dialog box appears.
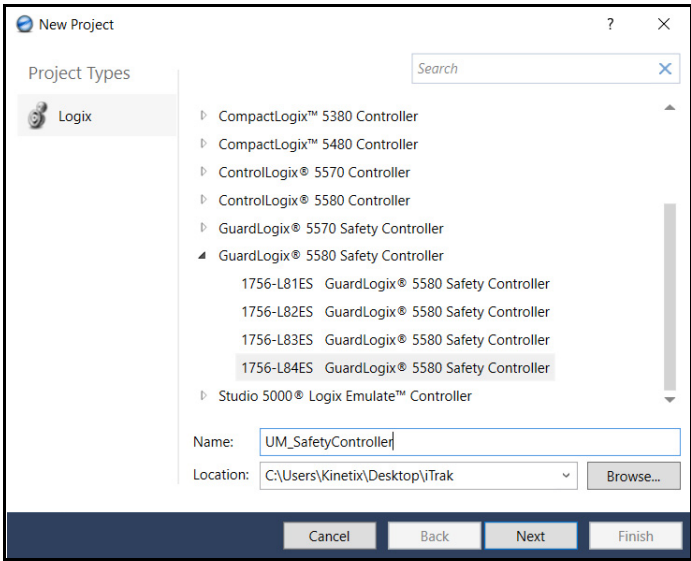
Example Module Properties Dialog Box with GuardLogix® Controller Selections
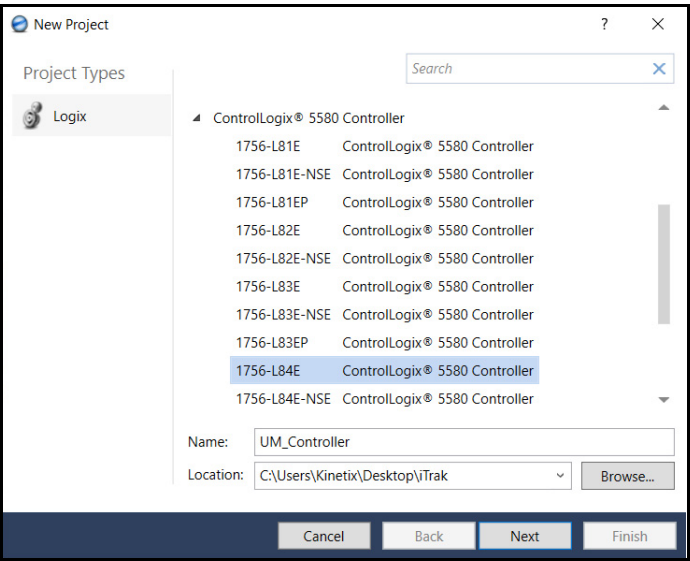
Example Module Properties Dialog Box with ControlLogix Controller Selections

IMPORTANT	If you are configuring a safety application, you must use a GuardLogix 5580 or Compact GuardLogix 5380 safety controller.

In this example, the typical dialog boxes for GuardLogix 5584ES controllers with embedded Ethernet are shown.

3. Expand the Logix 5000 controller family and select your controller.
4. Type the file Name.
5. Click Next.

The New Project dialog box appears.

6. From the Revision pull-down menu, choose your software version.
7. Click Finish.

The new controller appears in the Controller Organizer under the I/O Configuration folder.
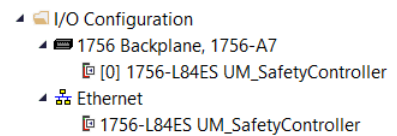
8. From the Edit menu, choose Controller Properties.

The Controller Properties dialog box appears.

9. Click the Date/Time tab.

10. Check Enable Time Synchronization.

    The motion modules set their clocks to the module that you assign as the Grandmaster.

> **IMPORTANT**   Check Enable Time Synchronization for all controllers that participate in CIP Sync™. The overall CIP Sync network automatically promotes a Grandmaster clock, unless the priority is set in Advanced.

---

11. Click OK.

Configure the Kinetix 5700 Power Supply

Follow these steps to configure a Kinetix 5700 DC-bus power supply.

1. Below the controller you created, right-click Ethernet and choose New Module.

   The Select Module Type dialog box appears.
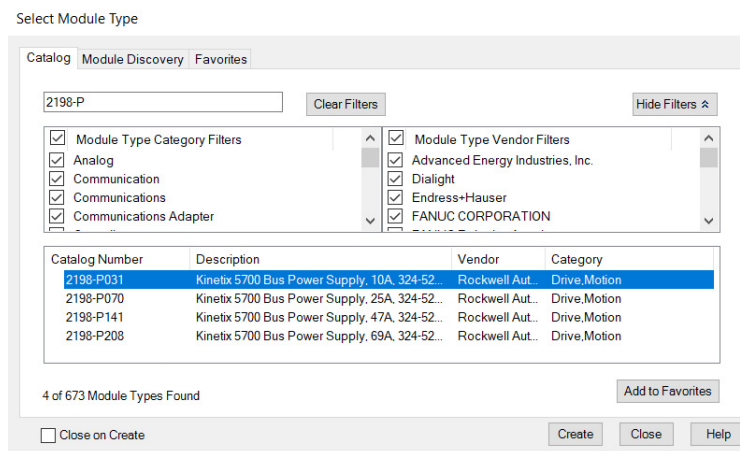
2. By using the filters, put a check in the Motion checkbox and the Allen-Bradley® checkbox.
3. Select your 2198-P*xxx* DC-bus power supply as appropriate for your hardware configuration.
4. Click Create.

The New Module dialog box appears.
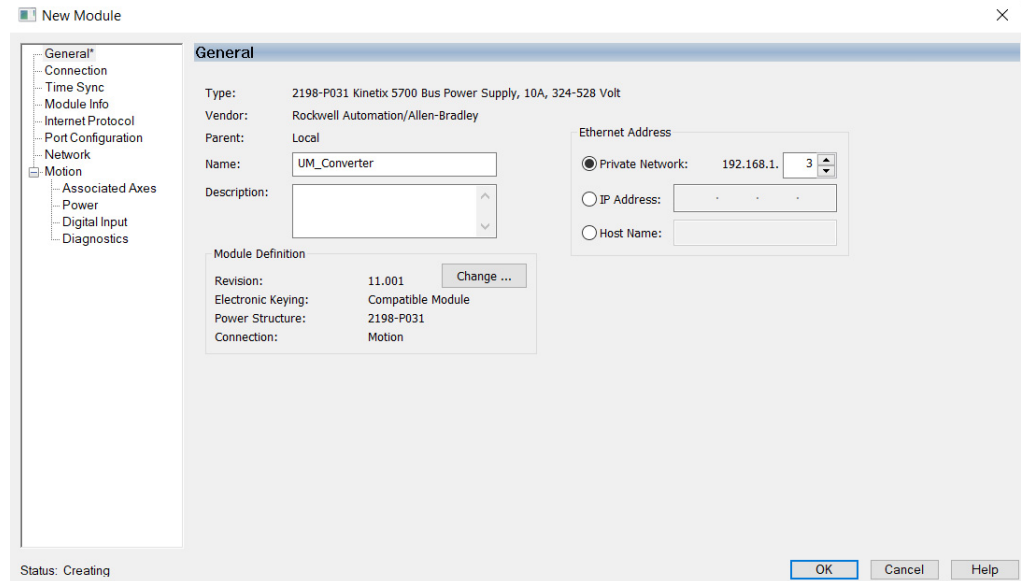
5. Configure the new module.
    a. Type the module Name.
    b. Select an Ethernet Address option.

        In this example, the Private Network address is selected.

    c. Enter the address of your 2198-P*xxx* DC-bus power supply.

        In this example, the last octet of the address is 3.

6. Click the Power category.
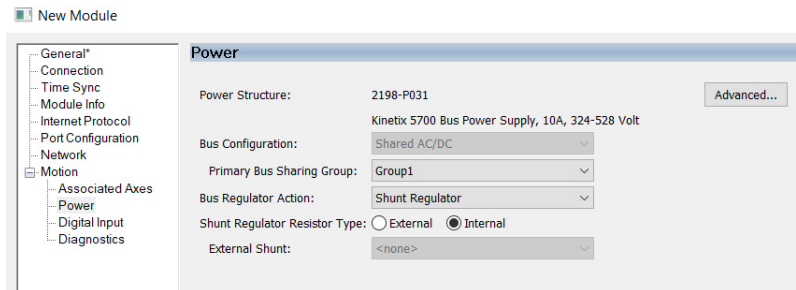
7. From the pull-down menus, choose the power options appropriate for your hardware configuration.

Attribute	Menu	Description
Bus Configuration	Shared AC/DC [1]	Applies to 2198-P*xxx* DC-bus power supply (converter) modules.
Bus-sharing Group [2]	• Group1 • Group2 • Group3…	Applies to any bus-sharing configuration.
Bus Regulator Action	Disabled	Disables the internal shunt resistor and external shunt option.
	Shunt Regulator	Enables the internal and external shunt options.

(1)   Shared AC/DC bus configuration is the default selection for DC-bus power supplies.
(2)   For more information on bus-sharing groups, see Understand Bus-sharing Group Configuration on page 114.

> ⚠️ **ATTENTION:** To avoid damage to equipment, all modules that are physically connected to the same shared-bus connection system must be part of the same Bus-sharing Group in the Studio 5000 application.

8. To close the New Module dialog box, click OK.

9. Your 2198-P*xxx* DC-bus power supply appears in the Controller Organizer under the Ethernet network in the I/O Configuration folder.

> ◢ ▢ I/O Configuration
>   ◢ ▭ 1756 Backplane, 1756-A7
>   🗔 [0] 1756-L84ES UM_SafetyController
>   ◢ 🖧 Ethernet
>   🗔 1756-L84ES UM_SafetyController
>   ⚡ 2198-P031 UM_Converter
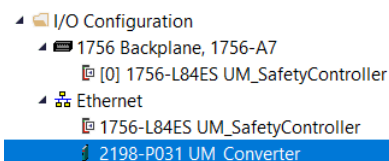
10. To close the Select Module Type dialog box, click Close.

11. Right-click the DC-bus power supply that you created in the Controller Organizer and choose Properties.

    The Module Properties dialog box appears.

> 💡 To configure the remaining DC-bus power supply properties, you must close the New Module dialog box and reopen it as the Module Properties dialog box.

12. Click the Digital Input category.
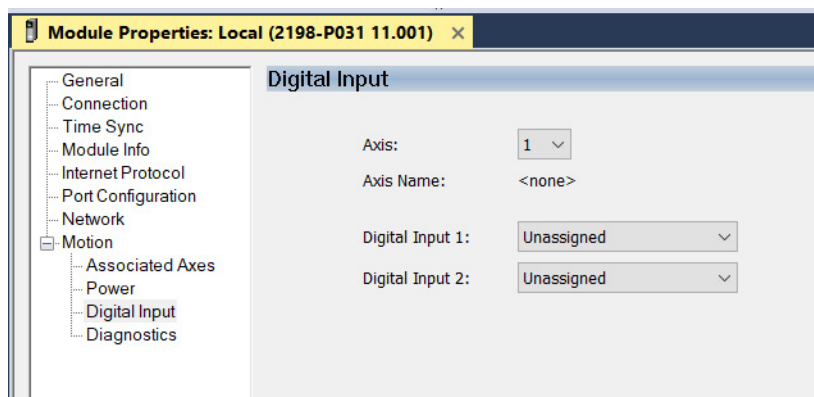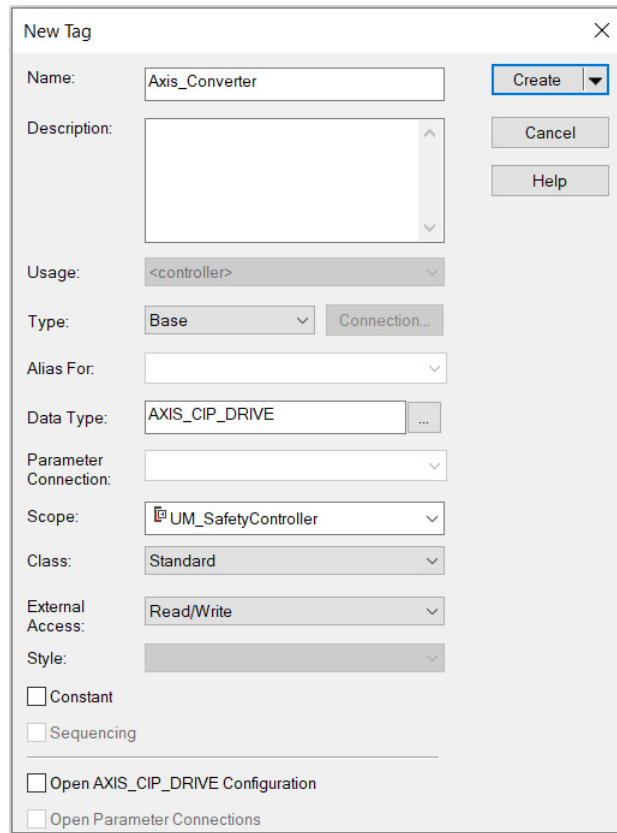
13. From the Digital Input pull-down menu, choose Bus Capacitor OK or Shunt Thermal Switch OK to monitor your capacitor module status or the shunt thermal switch, respectively, depending on your application.

14. Click the Associated Axes category.

15. Click New Axis.

    The New Tag dialog box appears.

16. Type the axis Name.

    AXIS_CIP_DRIVE is the default Data Type.

17. Click Create.

    The axis (Axis_Converter in this example) appears in the Controller Organizer under Motion Groups > Ungrouped Axes and is assigned as Axis_Converter.
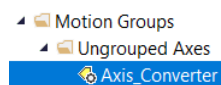
18. In the Module Properties dialog box, click Apply.

19. If you have multiple 2198-P*xxx* Kinetix 5700 DC-bus power supplies, repeat step 1…step 18, beginning on page 86. When you have completed adding your DC-bus power supply, continue with Configure the iTRAK 5730 Power Supply on page 90.

Configure the iTRAK 5730 Power Supply

Follow these steps to configure the iTRAK 5730 DC-bus power supply.

1. Below the controller you created, right-click Ethernet and choose New Module.

   The Select Module Type dialog box appears.
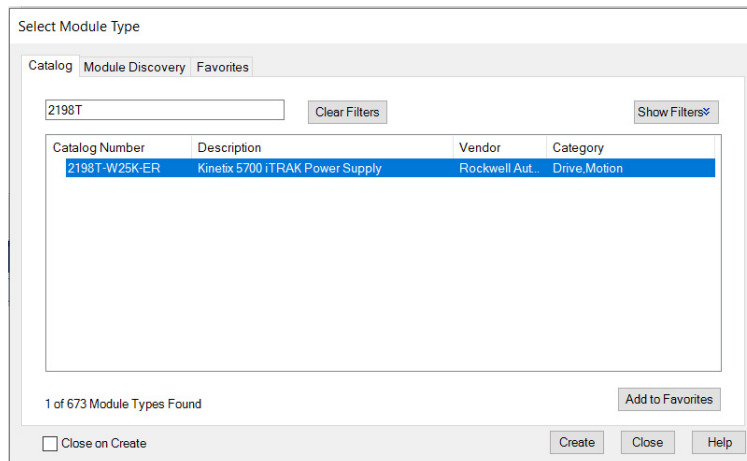
2. By using the filter, enter 2198T, and select the 2198T-W25K-ER Kinetix 5700 iTRAK Power Supply.

3. Click Create.

   The New Module dialog box appears.
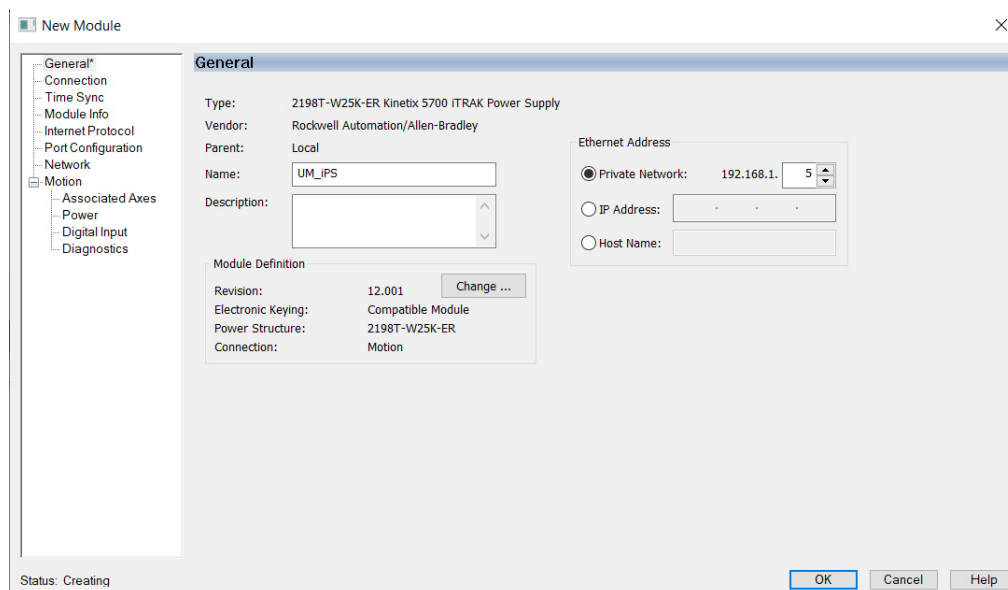
4. Configure the new module.

   a. Type the module Name.

   b. Select an Ethernet Address option. In this example, the Private Network address is selected.

   c. Enter the address of your 2198T-W25K-ER iTRAK DC-bus power supply. In this example, the last octet of the address is 5.

5. Click the Power category.
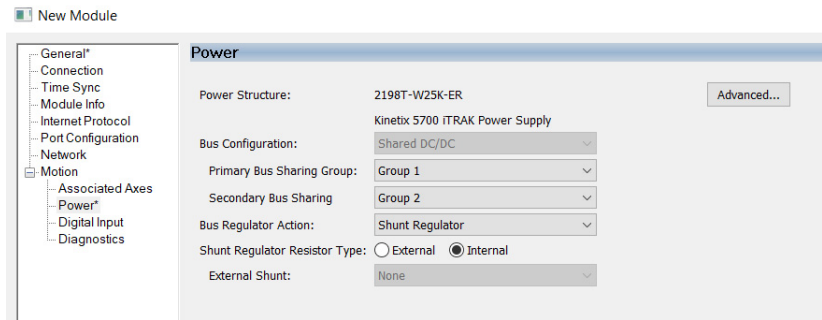
6. From the pull-down menus, choose the power options appropriate for your hardware configuration.

Attribute	Menu	Description
Bus Configuration	Shared DC/DC [1]	Applies to 2198T-W25K-ER iTRAK 5730 DC-bus power supply modules.
Primary Bus-sharing Group [2]	• Group1 • Group2 • Group3…	Applies to any primary bus-sharing configuration.
Secondary Bus-sharing Group [2]	• Group1 • Group2 • Group3…	Applies to any secondary bus-sharing configuration.
Bus Regulator Action	Disabled	Disables the internal shunt resistor and external shunt option.

(1) Shared DC/DC bus configuration is the default selection for iTRAK 5730 DC-bus power supplies.

(2) For more information on bus-sharing groups, see Understand Bus-sharing Group Configuration on page 114.

ATTENTION: To avoid damage to equipment, all modules that are physically connected to the same shared-bus connection system must be part of the same Bus-sharing Group in the Studio 5000 application.

7. To close the New Module dialog box, click OK.

8. Your 2198T-W25K-ER power supply appears in the Controller Organizer under the Ethernet network in the I/O Configuration folder.
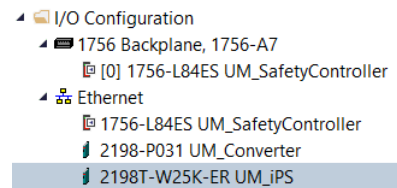
9. To close the Select Module Type dialog box, click Close.

10. Right-click the iTRAK power supply that you created in the Controller Organizer and choose Properties.

The Module Properties dialog box appears.

To configure the remaining DC-bus power supply properties, you must close the New Module dialog box and reopen it as the Module Properties dialog box.

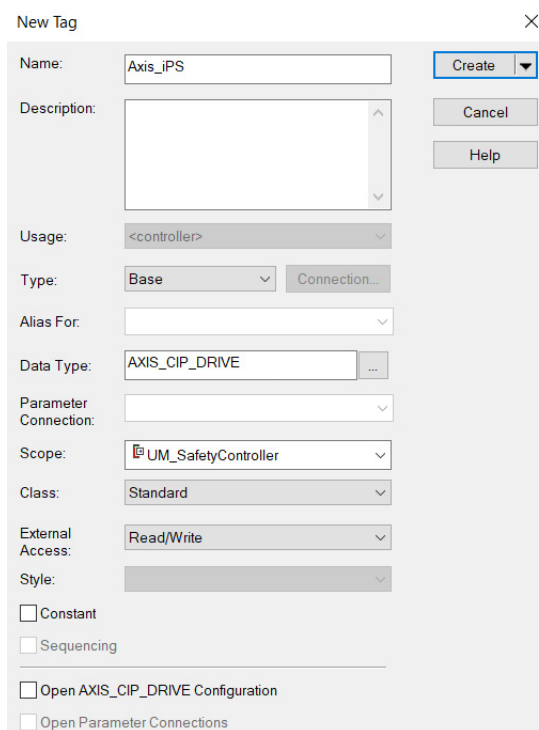11. Click the Digital Input category.
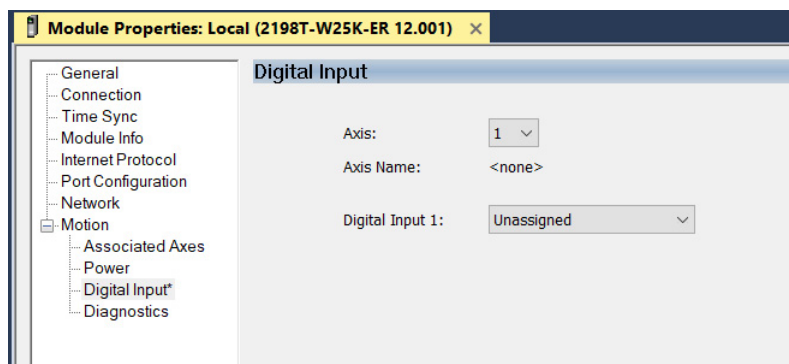
12. From the Digital Input pull-down menu choose Enable or Unassigned, depending on your application.

13. Click the Associated Axes category.
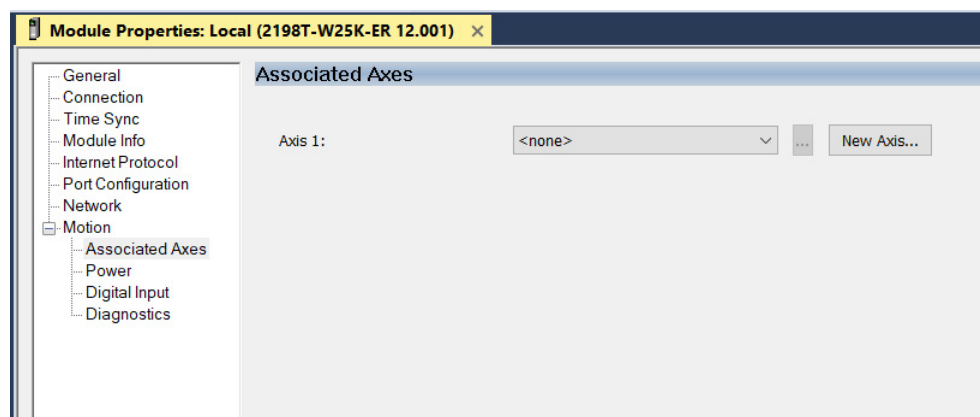
14. Click New Axis.

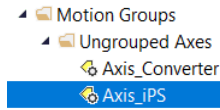The New Tag dialog box appears.

15. Type the axis Name.

AXIS_CIP_DRIVE is the default Data Type.

16. Click Create.

The axis (Axis_iPS in this example) appears in the Controller Organizer under Motion Groups > Ungrouped Axes and is assigned as Axis_iPS.

17. Click Apply.

Configure the iTRAK 5730 Motor Modules

Follow these steps to configure iTRAK 5730 motor modules.

> A curved motor module is composed of three individual sections. Each of the three curve sections must be added as a separate motor module and configured individually. You choose which section is assigned to the defined motor module later in this procedure.

1. Above the DC-bus power supply (converter) you created, right-click Ethernet and choose New Module.

The Select Module Type dialog box appears.
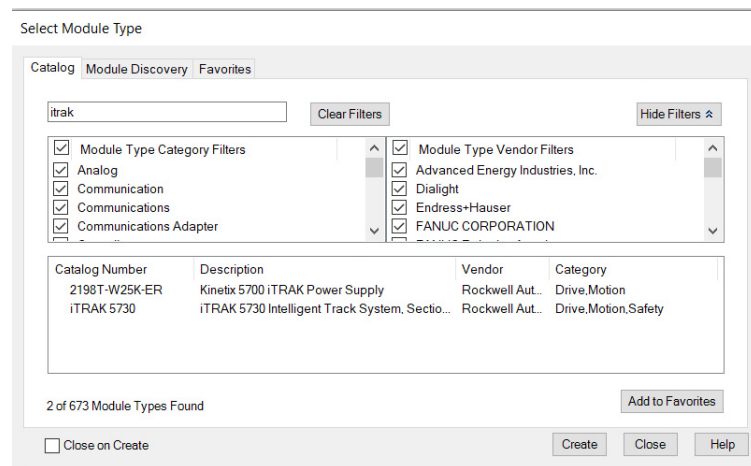
2. By using the filter, enter iTRAK, and select the iTRAK 5730 Intelligent Track System, Section.

3. Click Create.

The New Module dialog box appears.
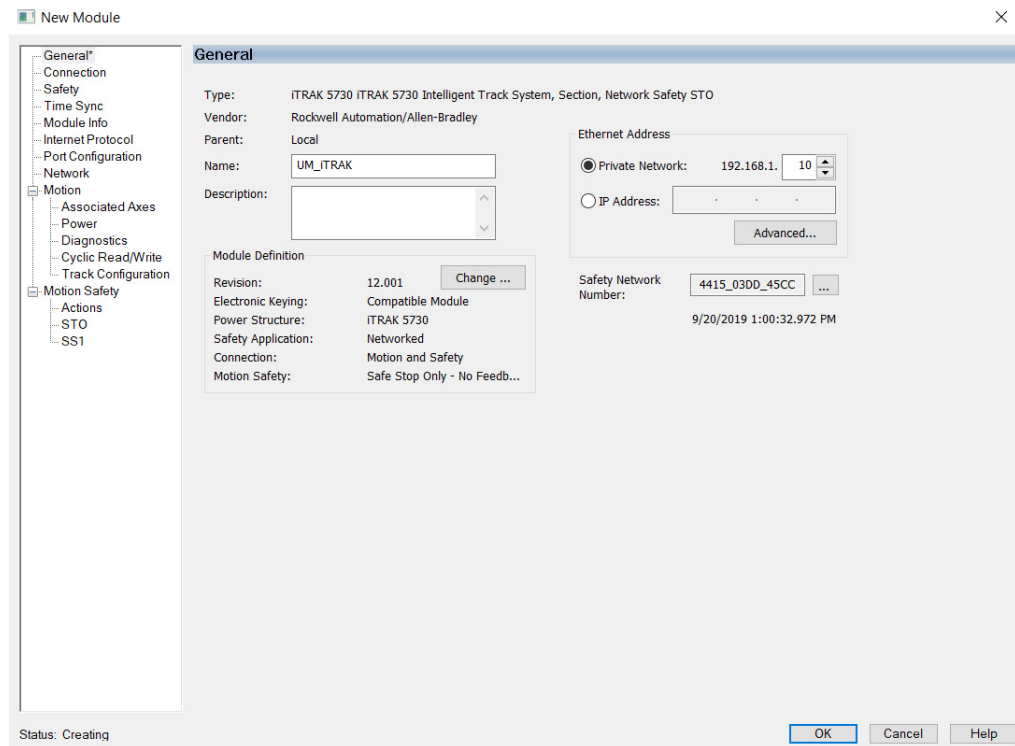
Example New Module Dialog Box with GuardLogix Controller Selections

4. Configure the new motor module properties.
    a. Type the module Name.
    b. Select an Ethernet Address option.

        In this example, the Private Network address is selected.

    c. Enter the address of your motor module.

        In this example, the last octet of the address is 10.

IMPORTANT   In addition to the motor module name and IP address, the motor
module is also given a number. You do not enter this number; it is
assigned automatically based on the position of the motor module
relative to the power and control input connector module. The first
motor module that is connected to the power and control input
connector module is numbered 0, the next motor module 1, and so on.
When a fault about a motor module appears, the fault text includes the
motor module number as the sub code at the end of the fault text. For
example, fault text "INIT FLT 28 - Sub Code 1" means that the second
motor module from the power and control input connector module is
affected.

---

    d. Click Advanced if using Network Address Translation with safety
        connection to add drive module configured IP address.

5. Under Module Definition click Change.

The Module Definition dialog box appears.

6. Define the motor module.

a. Select your Electronic Keying option from the pull-down menu (Compatible Module is the default setting).

b. From the Safety Application pull-down menu, choose between Safety Off or Networked for an integrated safety application.

c. From the Connection pull-down menu, choose the Connection mode for your motion application.

Connection Mode	Safety Options	Description
Motion and Safety	Integrated mode	Motion connections and integrated STO are managed by this controller.
Motion Only	Integrated mode, if there is a secondary safety controller	• Motion connections are managed by this controller. • Integrated STO is managed by another controller that has a Safety-only connection to the drive.
Safety Only	Integrated mode	• Integrated STO is managed by this controller. • Motion connections are managed by another controller that has a Motion-only connection to the drive.

When 'Safety' appears in the Connection mode, integrated safety is implied.

The default setting for Motion and Safety is 'Safe Stop Only - No Feedback.' The (SNN) field populates automatically when the connection mode includes an Integrated Motion and Safety or Safety-only connection.

7. To close the Module Definition dialog box, click OK.

8. Click the Power category.
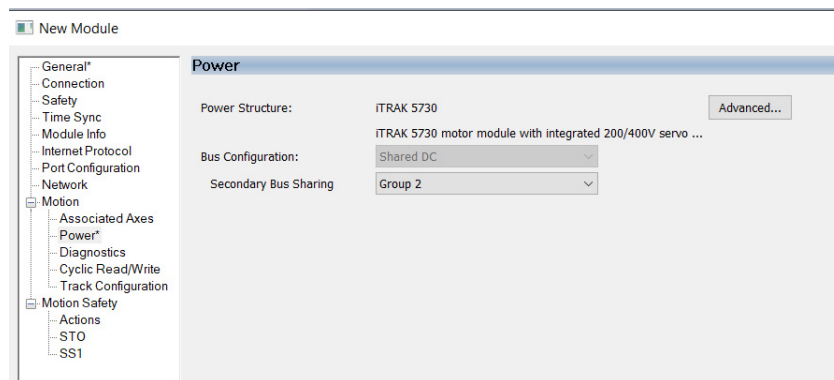
> **IMPORTANT**   The Studio 5000 application enforces shared-bus configuration rules for iTRAK 5730 motor modules.

9. From the Secondary Bus-sharing pull-down menu, choose the appropriate bus-sharing group for your hardware configuration. For information on bus-sharing groups, see Understand Bus-sharing Group Configuration on page 114.

> ⚠️ **ATTENTION:** To avoid damage to equipment, all modules that are physically connected to the same shared-bus connection system must be part of the same Bus-sharing Group in the Studio 5000 application.

10. To close the Module Properties dialog box, click OK.

11. To close the Select Module Type dialog box, click Close.

    Your iTRAK 5730 motor module appears in the Controller Organizer under the Ethernet network in the I/O Configuration folder.
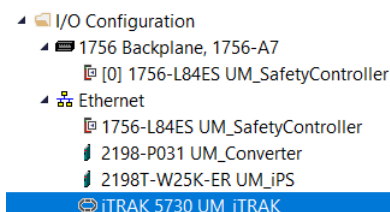
12. Right-click the motor module that you created in the Controller Organizer and choose Properties.

    The Module Properties dialog box appears.

    > 💡 To configure the remaining motor module properties, you must close the New Module dialog box and reopen it as the Module Properties dialog box.

    If your application includes integrated safety, continue with step 13. Otherwise, go to Continue iTRAK 5730 Motor Module Configuration on page 99.

13. Click the Safety category.
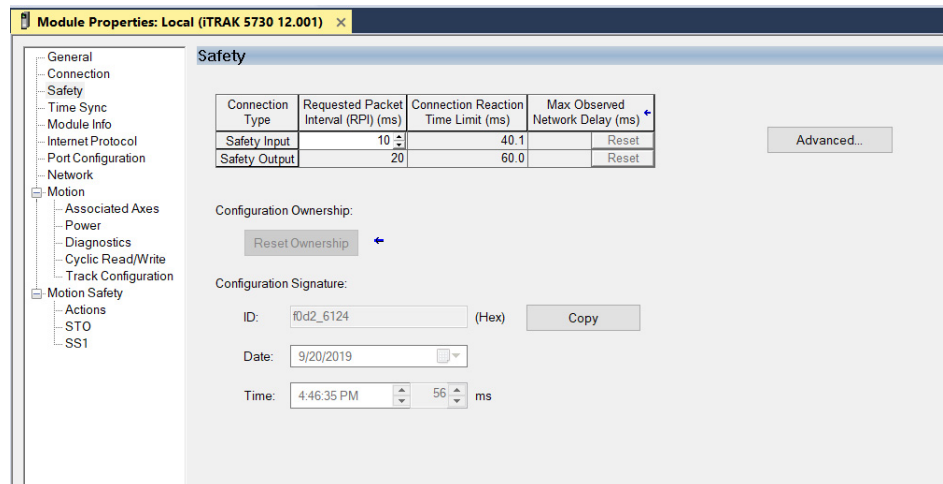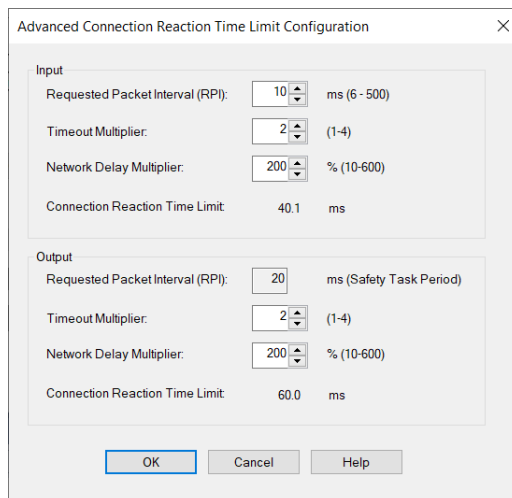
14. The connection between the owner and the iTRAK 5730 motor module is based on the following:

- Servo drive
- GuardLogix slot number
- GuardLogix
- Path from the GuardLogix controller to the motor module
- Configuration signature

If any differences are detected, the connection between the GuardLogix controller and the motor module is lost, and the yellow yield icon appears in the controller project tree after you download the program.

15. Click Advanced.

The Advanced Connection Reaction Time Limit Configuration dialog box appears.

Advanced Connection Reaction Time Limit Configuration   ✕

Input
Requested Packet Interval (RPI):   10   ms (6 - 500)

Timeout Multiplier: 2   (1-4)

Network Delay Multiplier: 200   % (10-600)

Connection Reaction Time Limit: 40.1   ms

Output
Requested Packet Interval (RPI):   20   ms (Safety Task Period)

Timeout Multiplier: 2   (1-4)

Network Delay Multiplier: 200   % (10-600)

Connection Reaction Time Limit: 60.0   ms

            OK   Cancel   Help

Analyze each safety channel to determine the appropriate settings. The smallest Input RPI allowed is 6 ms. Selecting small RPI values consumes network bandwidth and can cause spurious trips because other devices cannot get access to the network.

For more information about the Advanced Connection Reaction Time Limit Configuration, refer to Additional Resources on page 233 for the appropriate user manual for your GuardLogix or Compact GuardLogix controller.

16. To close the Advanced dialog box, click OK.
17. To save the Safety category parameters, click Apply.

Continue iTRAK 5730 Motor Module Configuration

Follow these steps to configure the axes for your iTRAK 5730 system motor modules.

1. Right-click the iTRAK 5730 motor module that you created and choose Properties.

    The Module Properties dialog box appears.

2. Select the Track Configuration category.
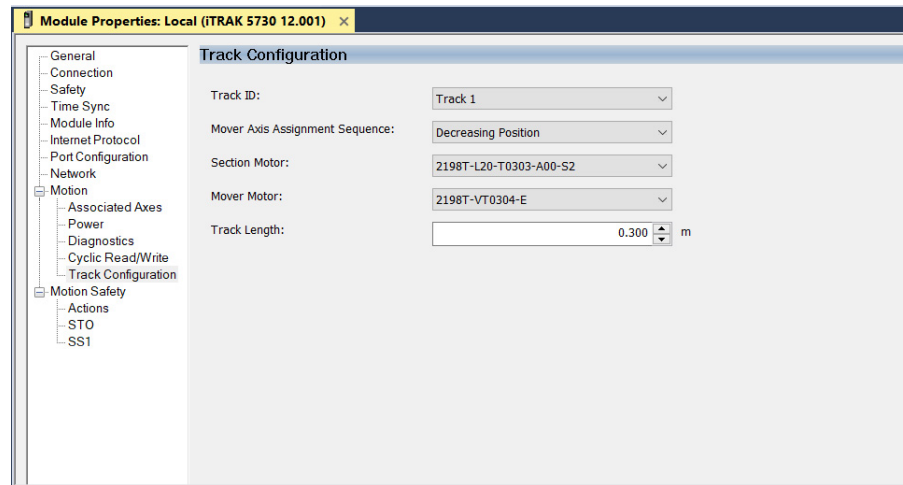
3. From the Track ID pull-down menu, select your Track ID.

    When multiple modules share the same Track ID, these modules are identified as being configured as a single "Track System." This Track ID allows the Studio 5000 application to validate the track system as a whole. Motor modules that specify a '0' or 'Not Specified' Track ID are not validated because they are treated as standalone sections when validating track systems.

4. From the Mover Axis Assignment Sequence pull-down menu, choose the Mover Axis Assignment Sequence for your motion application.

    This configuration parameter determines how the movers are assigned a number for identification purposes. When a fault about a mover appears, the fault text includes the mover number as the sub code at the end of the fault text. Movers can be numbered based on their position at the time of assignment relative to the track position 0, or relative to a reference mover. If a reference mover is used, it is designated as Mover 0 and is the only mover with a south pole position magnet (cat. no. 2198T-N1-0304) installed. This magnet electrically identifies it as the reference mover. For descriptions of the possible mover axis assignment sequences, see the following table, <u>Figure 33 on page 100</u>, and <u>Figure 34 on page 101</u>.

Mover Axis Assignment Sequence	Description
Decreasing Position	The motor module assigns movers on the track as decreasing sequential axis instances. The mover with the highest position value is the first mover (Mover 0), followed by movers with decreasing position values (Movers 1, 2, ...).
Increasing Position	The motor module assigns movers on the track as increasing sequential axis instances. The mover with the lowest position value is the first mover (Mover 0), followed by movers with increasing position values (Movers 1, 2, ...).
Decreasing Position from Reference Mover	The motor module assigns movers on the track as decreasing sequential axis instances based on the mover that is identified as the Reference Mover. The Reference Mover is the first mover (Mover 0), followed by the other movers (Movers 1, 2, ...) in the decreasing position direction from the Reference Mover. See Figure 34 on page 101.
Increasing Position from Reference Mover	The motor module assigns movers on the track as increasing sequential axis instances based on the mover that is identified as the Reference Mover. The Reference Mover is the first mover (Mover 0), followed by the other movers (Movers 1, 2, ...) in the increasing position direction from the Reference Mover. See Figure 34 on page 101.

Figure 33 - Examples of Mover Axis Assignment Sequences Based on Track Position
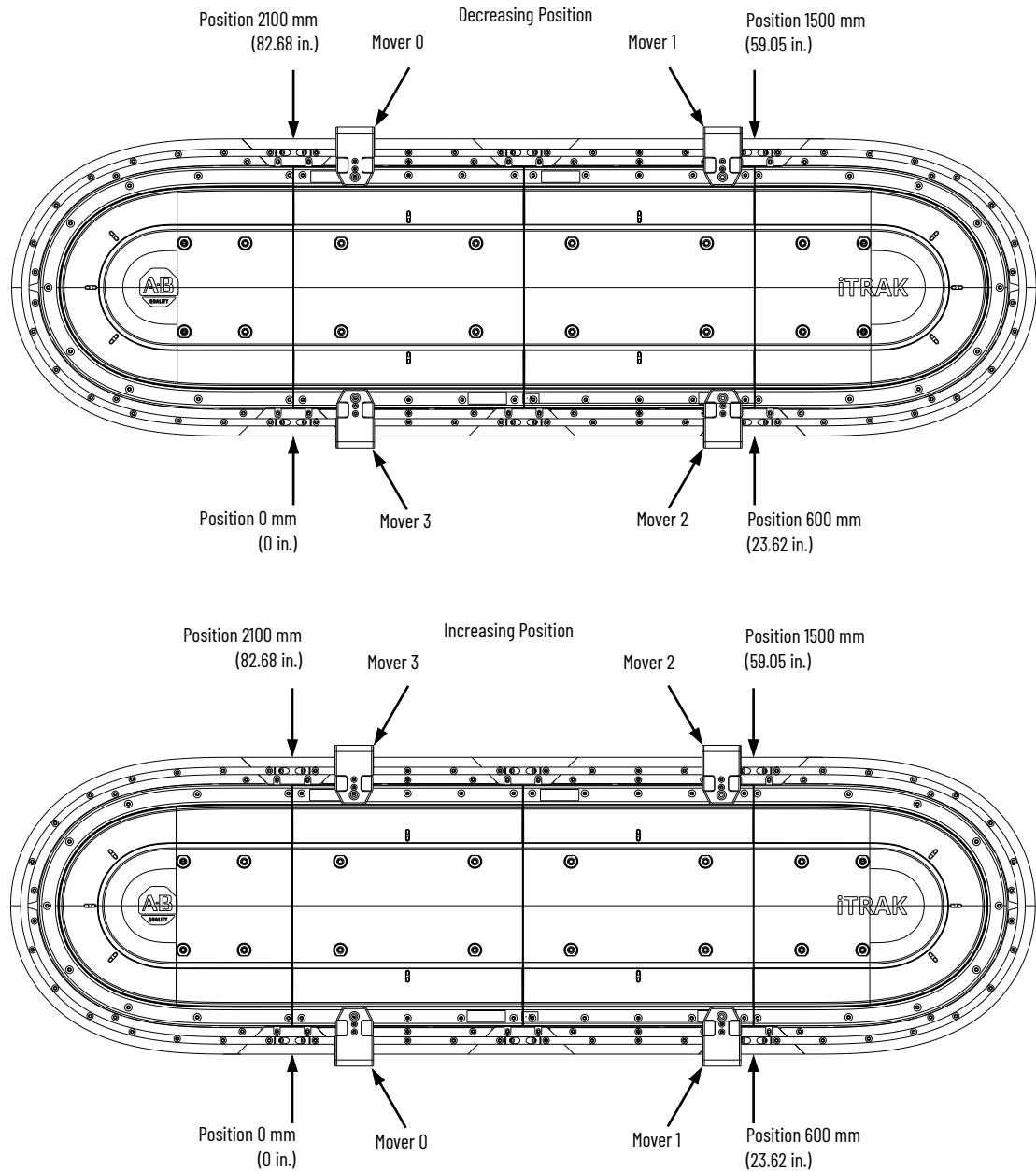
Figure 34 - Examples of Mover Axis Assignment Sequences Based on Reference Mover

Decreasing Position from Reference Mover

Position 2100 mm
(82.68 in.)   Mover 1   Mover 2   Position 1500 mm
(59.05 in.)

Position 0 mm
(0 in.)   Reference
Mover
(Mover 0)   Mover 3   Position 600 mm
(23.62 in.)

Increasing Position from Reference Mover

Position 2100 mm
(82.68 in.)   Mover 2   Mover 1   Position 1500 mm
(59.05 in.)

Position 0 mm
(0 in.)   Mover 3   Reference
Mover
(Mover 0)   Position 600 mm
(23.62 in.)
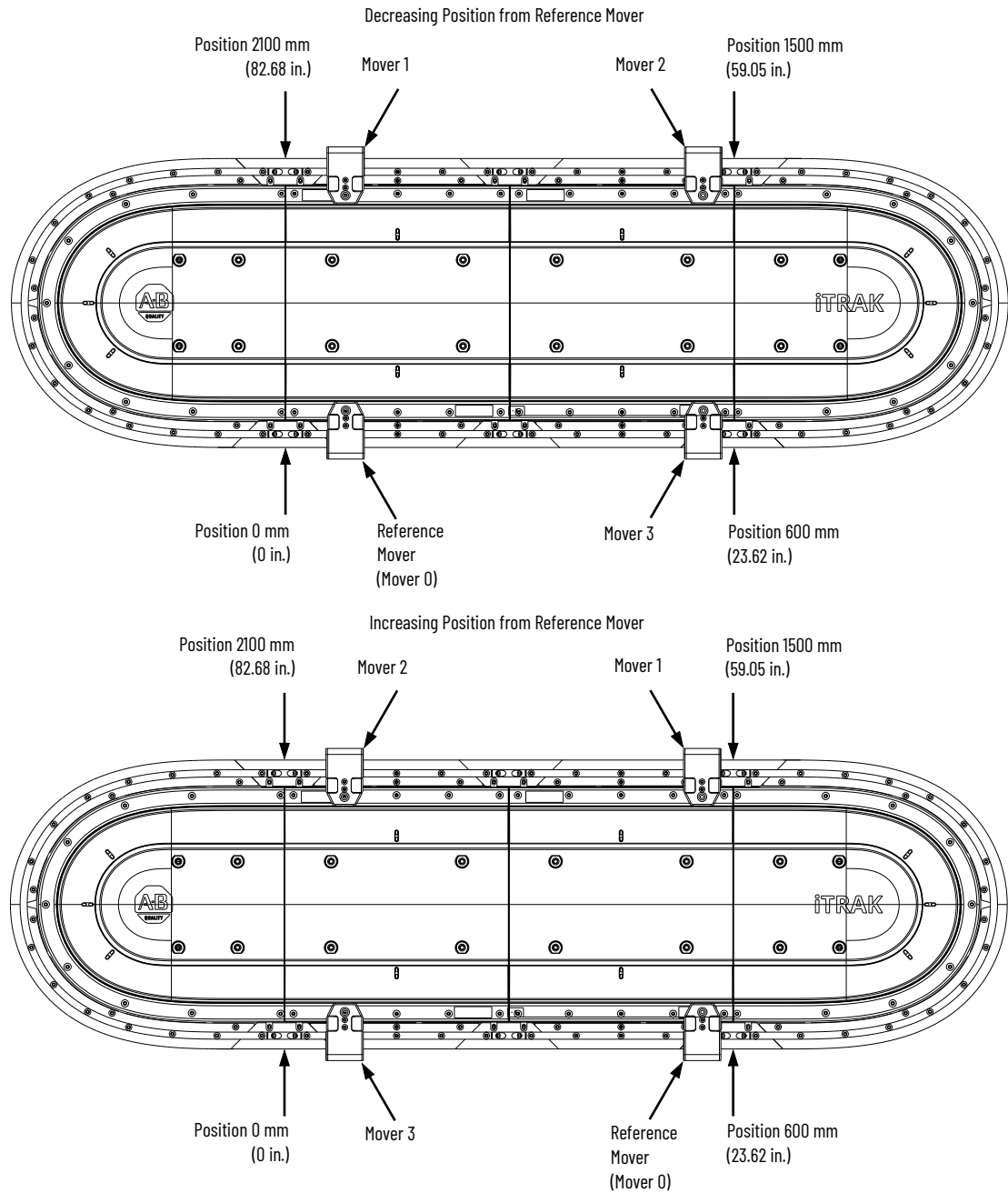
5. From the Section Motor pull-down menu, select the section motor that corresponds to your motor module.

> **IMPORTANT**   A curved motor module is composed of three individual sections: curve section A, curve section B, and curve section C. Each of the three curve sections must be added as a separate motor module and configured individually.

-   If your motor module is a straight section, select 2198T-L20-T0303-A00-S2
-   If your motor module is a curve section A, select 2198T-L20-T0309-D18-S2-A
-   If your motor module is a curve section B, select 2198T-L20-T0309-D18-S2-B
-   If your motor module is a curve section C, select 2198T-L20-T0309-D18-S2-C

Top View
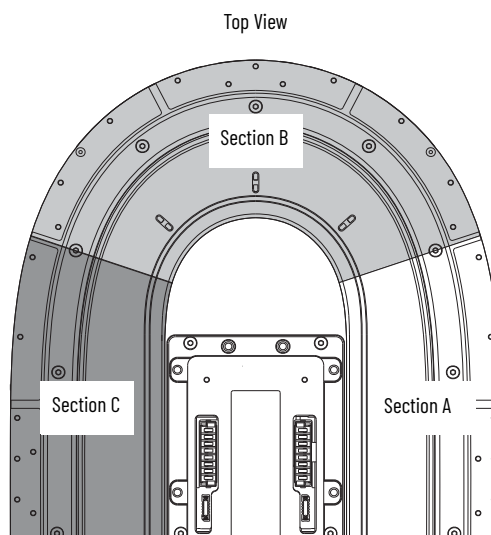
6. Enter the length of your track system in the Track Length field.

    Take into account that each curved motor module is composed of three sections and each straight motor module is one section. Use the following equation to determine the length of your track system:

    Length of track = Number of sections x 300 mm (11.8 in.)

7. To save your changes, click Apply.

8. Select the Associated Axes Category.
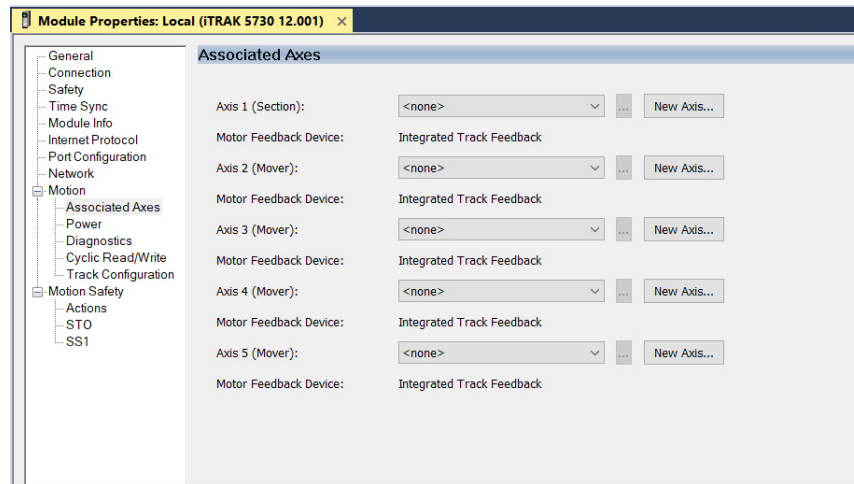
For each iTRAK 5730 motor module, five axes are possible; one section axis and up to four mover axes.

- Axis 1 is the section axis.
- Axis 2…Axis 5 are the mover axes.

IMPORTANT	All iTRAK 5730 motor modules must have an associated section axis.

9. Next to Axis 1 (Section), click New Axis.

The New Tag dialog box appears.
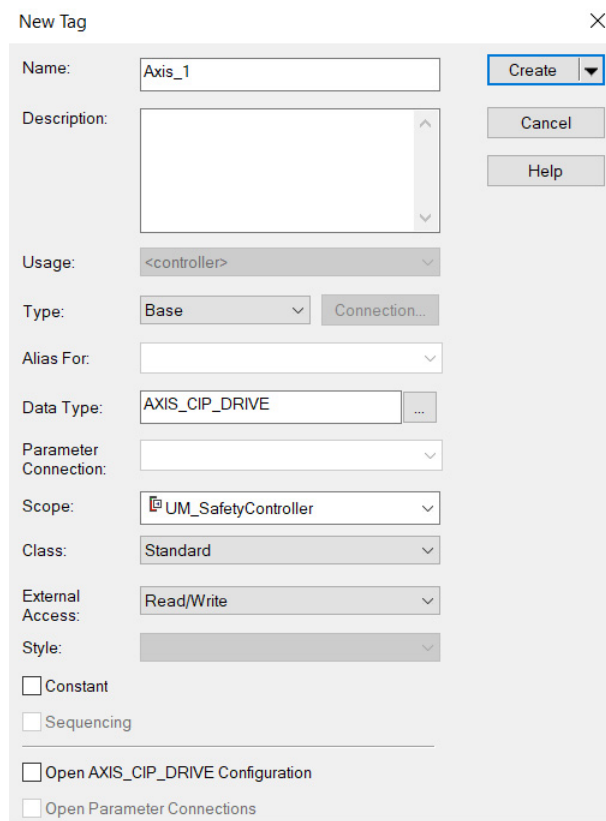
10. Type the axis Name.

AXIS_CIP_DRIVE is the default Data Type.

11. Click Create.

    The axis (Axis_1 in this example) appears in the Controller Organizer under Motion Groups> Ungrouped Axes and is assigned as Axis_1.
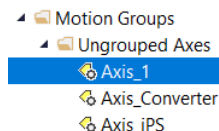
12. To configure a Mover axis, next to Axis *n* (Mover), click New Axis.

    > If a mover axis is not assigned to the motor axis, continue with .

    The New Tag dialog box appears.

13. Type the axis Name.

    AXIS_CIP_DRIVE is the default Data Type.

14. Click Create.

    The axis (Axis_2 in this example) appears in the Controller Organizer under Motion Groups> Ungrouped Axes and is assigned as Axis_2.
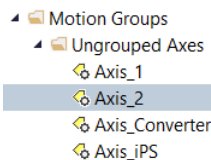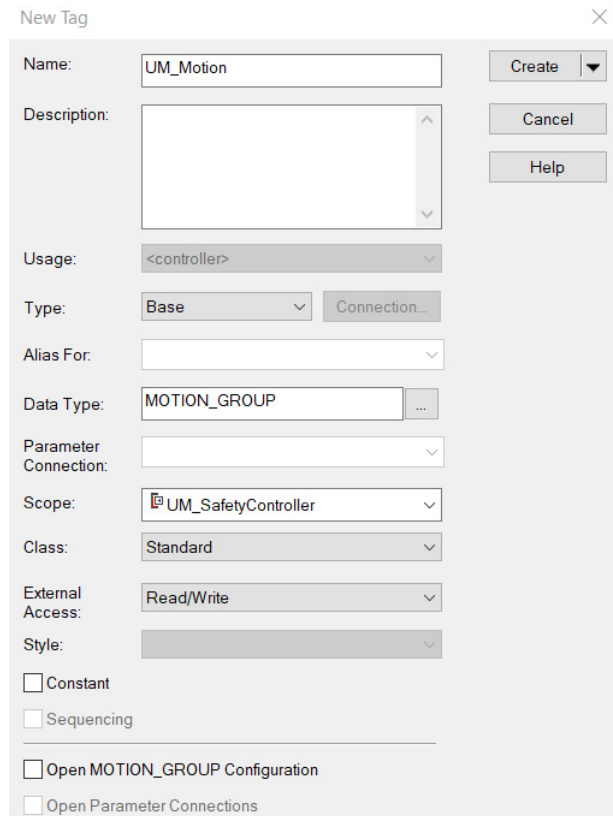
15. Click Apply.

16. If you have multiple movers, repeat step 12...step 15 for each mover.

Configure the Motion Group

Follow these steps to configure the motion group.

1. In the Controller Organizer, right-click Motion Groups and choose New Motion Group.

   The New Tag dialog box appears.

2. Type the new motion group Name.
3. Click Create.

   Your new motion group appears in the Controller Organizer under the Motion Groups folder.
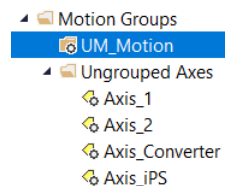
4. Right-click the new motion group and choose Properties.

The Motion Group Properties dialog box appears.
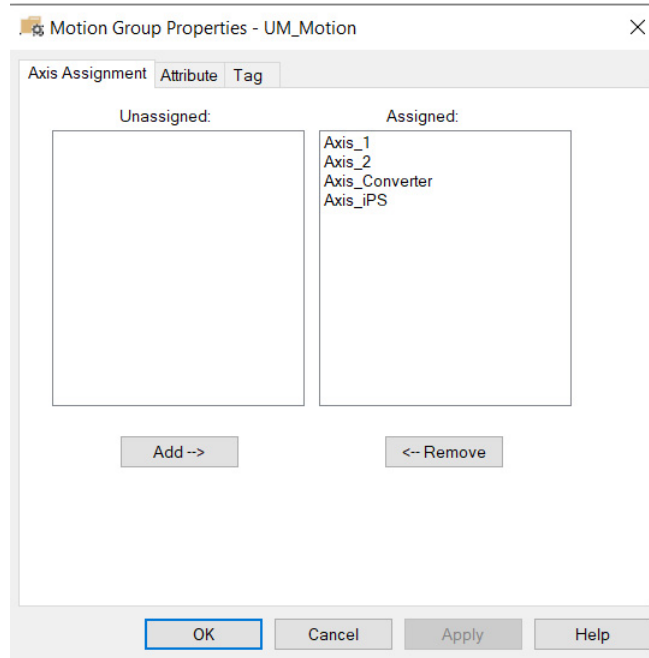
5. On the Axis Assignment tab, select and add each of your axes (created earlier) to the Assigned category.

6. Click the Attribute tab and edit the default values as appropriate for your application.

7. Click OK.

Your axes appear below the new motion group that you created earlier.
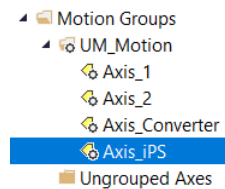
Configure the Section Axis Properties

Follow these steps to configure section axis properties.

1. In the Controller Organizer, right-click a section axis and choose Properties.

2. Select the General category.

   The General dialog box appears.
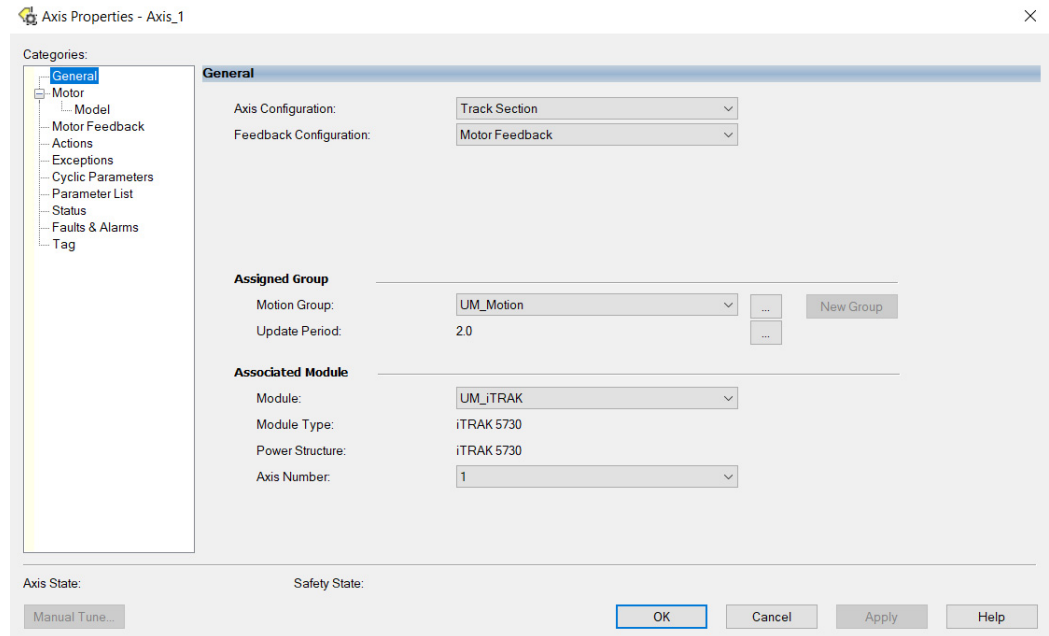
3. In the Associated Module section, in the Module pull-down menu, verify the name of the associated module.

   The iTRAK 5730 system catalog number appears in the Module Type and Power Structure fields.

4. Click Apply.

5. Select the Actions category.

    From this dialog box, you can program actions and change the action for exceptions (faults). For more information on configuration selections, see <u>iTRAK 5730 Motor Module and Mover Behavior on page 132</u>.
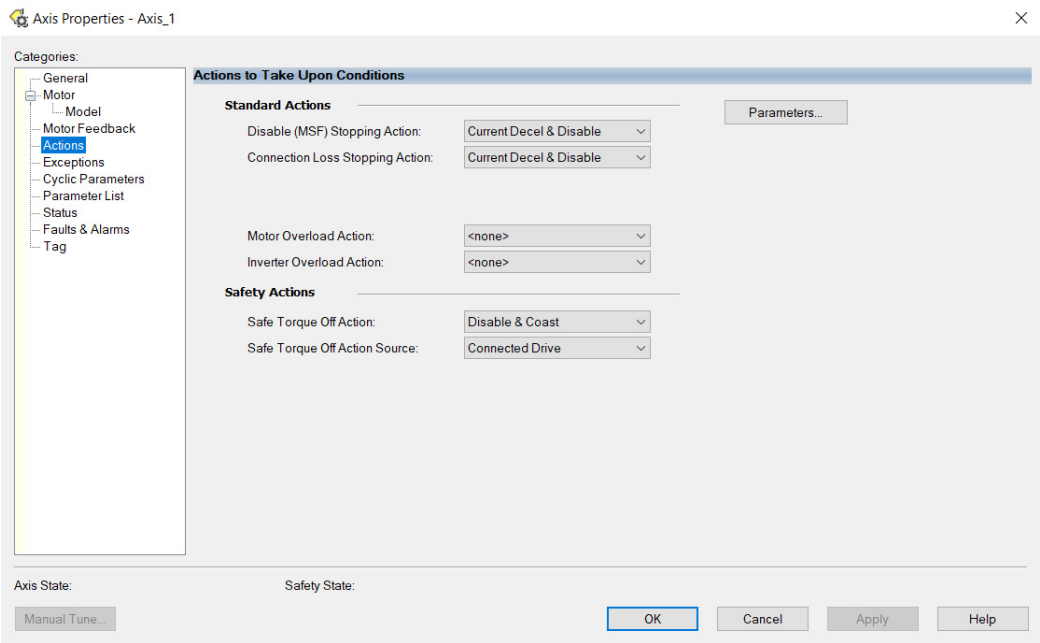
6. Select the Parameter List category.

    From this dialog box, you can change the values for different parameters as appropriate for your application.
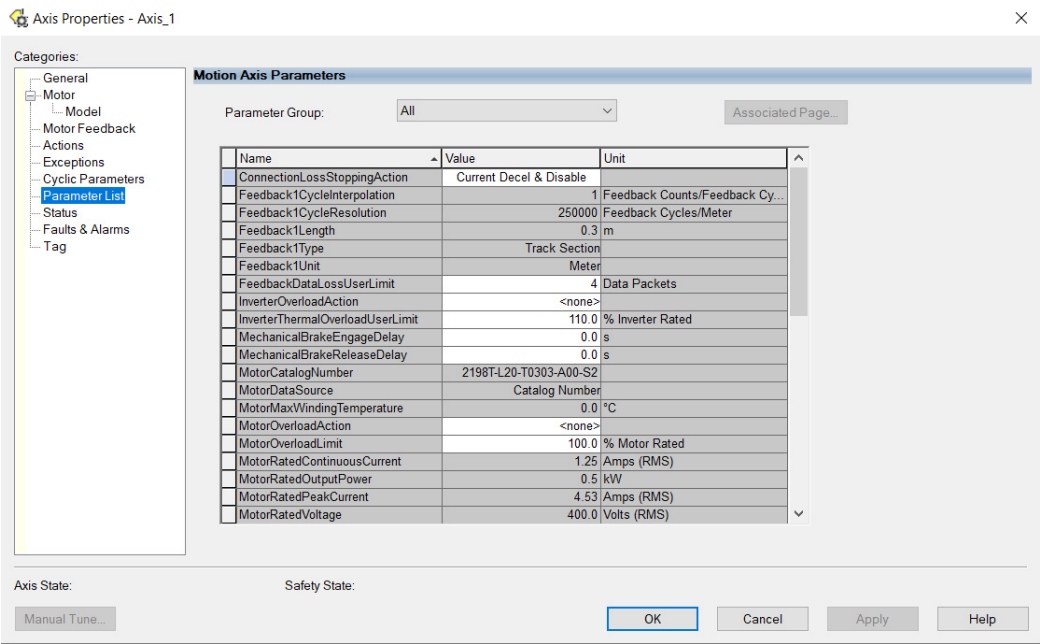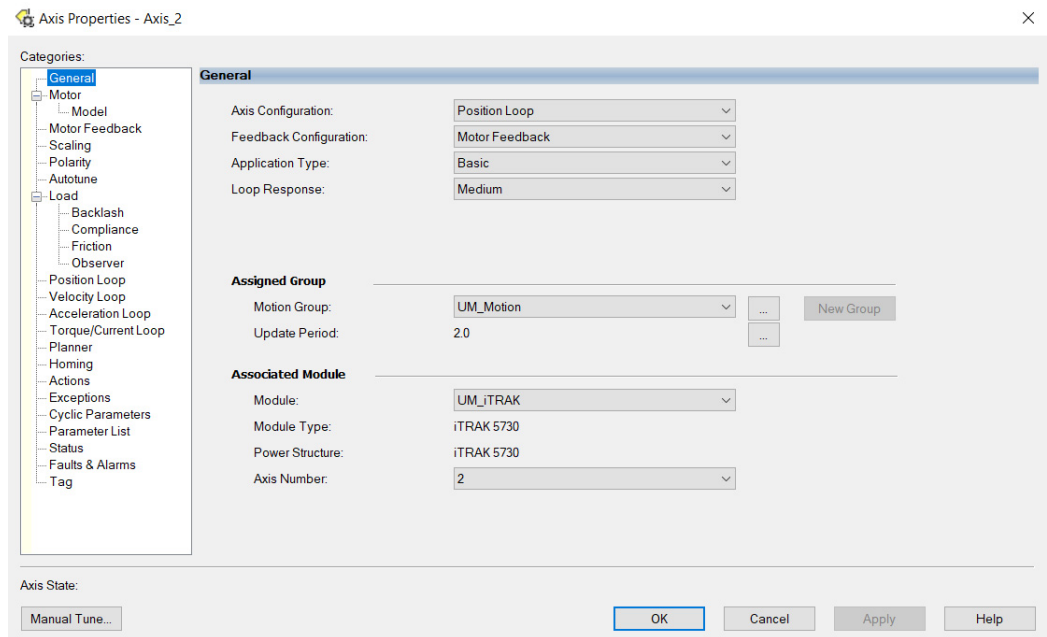

7. Click OK.
8. For each section axis, repeat <u>step 1</u>…<u>step 7</u>.

Configure the Mover Axis Properties

Follow these steps to configure mover axis properties.

1. In the Controller Organizer, right-click a mover axis and choose Properties.
2. Select the General category.

   The General dialog box appears.

3. In the General section, from the pull-down menus change configuration settings as needed for your application.

Attribute	Menu	Description
Axis Configuration	Position Loop	Position Control Mode, Closed Loop Control Method
	Torque Loop	Torque Control Mode, Closed Loop Control Method
Feedback Configuration	Motor Feedback	When Motor Feedback is selected, then commutation, acceleration, velocity, and position feedback signals are all derived from motor-mounted Feedback.

For more information on Control Modes, see the Integrated Motion on the EtherNet/IP Network Reference Manual, publication MOTION-RM003.

4. Choose an Application Type, if applicable.
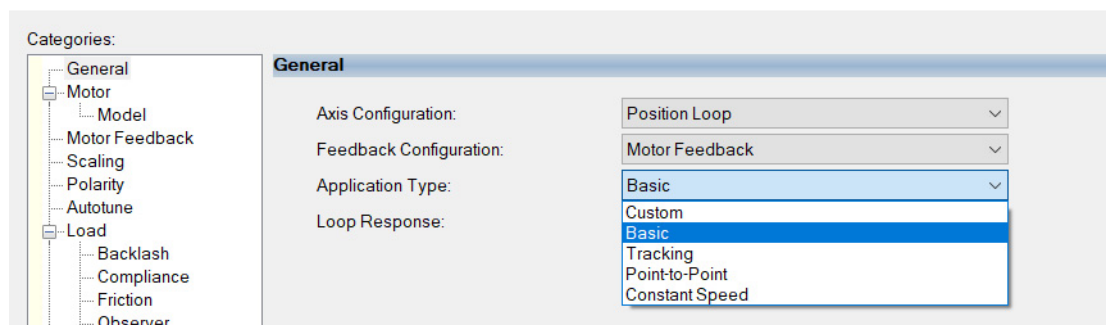
The Application Type determines the type of motion control application. This attribute is used to set the Gain Tuning Configuration Bits. This table lists the gains established based on application type.

Application Type	Kpi	Kvi	iHold	Kvff	Kaff	torqLPF
Custom[1]	–	–	–	–	–	–
Basic	No	No	No	Yes	No	Yes
Tracking	No	Yes	No	Yes	Yes	Yes
Point-to-Point	Yes	No	Yes	No	No	Yes
Constant Speed	No	Yes	No	Yes	No	Yes

(1) If you set the type to Custom, you can control the individual gain calculations by changing the bit settings in the Gain Tuning Configuration Bits Attribute.

5. Choose a Loop Response, if applicable.
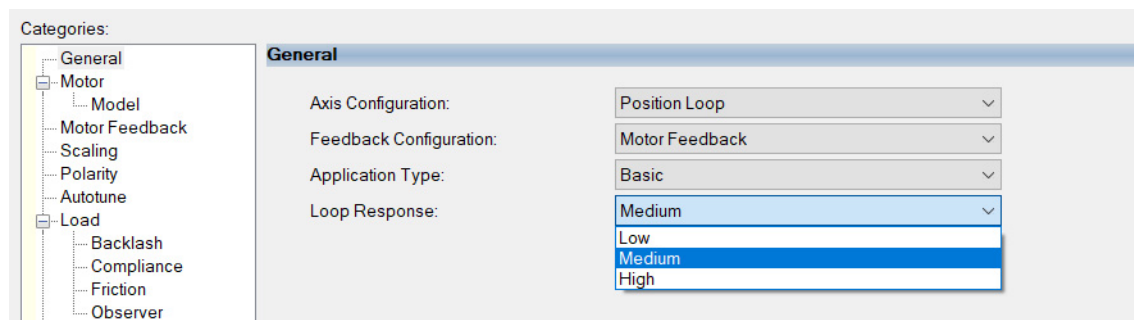
> Loop Response settings also impact the calculations that are made that can minimize the need for you to perform an Autotune or a Manual Tune. The loop response impacts the spacing between the position loop and the proportional and integral gains. This response impacts how aggressively a given profile is tracked.

6. In the Associated Module section, from the Module pull-down menu, verify the name of the associated module.

   The iTRAK 5730 system catalog number appears in the Module Type and Power Structure fields.

7. To save your changes, click Apply.

8. Select the Scaling Category and edit the default values as appropriate for your application.
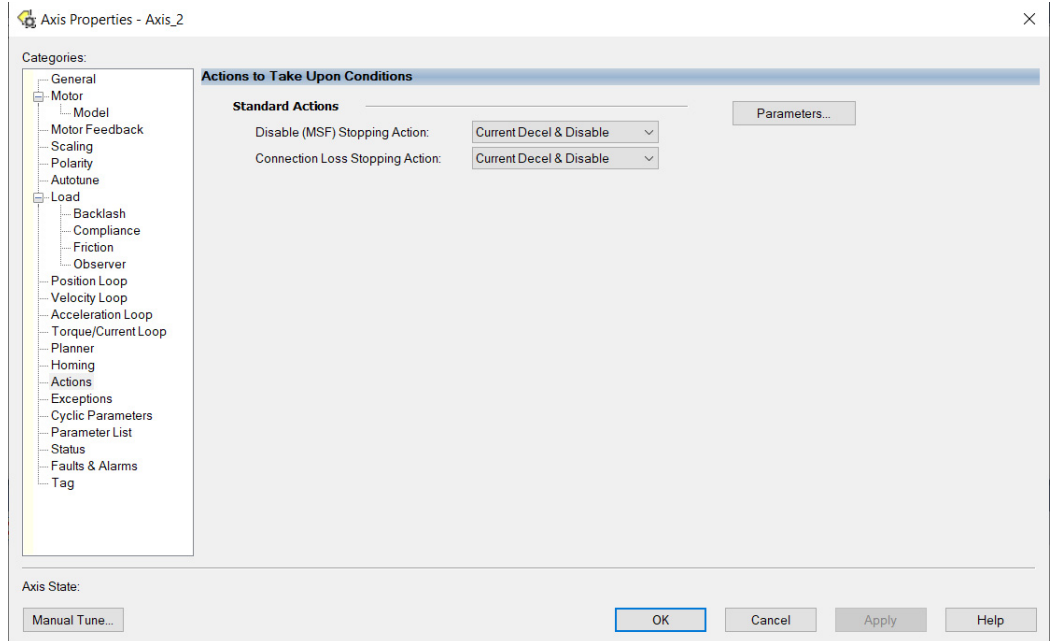

The Unwind value is the same as the overall length of your track.

9. To save any changes, click Apply.
10. Select the Load category and edit the default values as appropriate for your application.

11. To save any changes, click Apply.

12. Select the Actions category and program any actions and change the action for exceptions (faults) as appropriate for your application.

13. Select the Parameter List category and edit the values for different parameters as appropriate for your application.
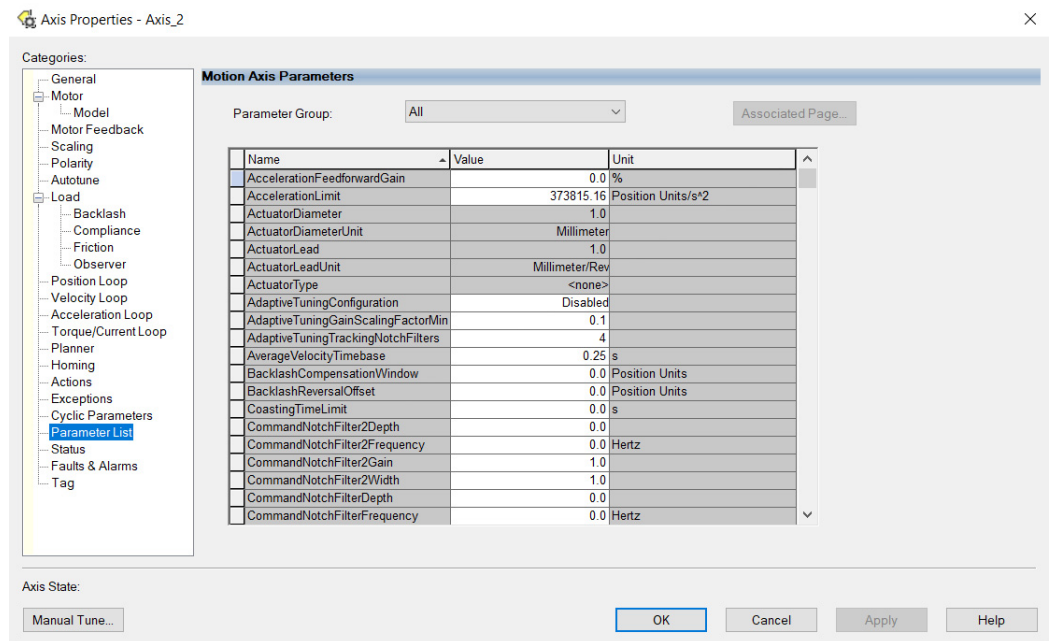
14. Click OK.

15. For each mover axis, repeat step 1...step 14.

Download the Program

After completing the Studio 5000 application and saving the file, you must download your program to the Logix 5000 processor.

Apply Power to the iTRAK 5730 System

You must complete the installation, power and control connections, and configuration for your iTRAK 5730 system before you complete this procedure.

SHOCK HAZARD: To avoid a hazard of electrical shock, complete all installation and power connections of the iTRAK 5730 system components before applying power. Once power is applied, connector terminals can have voltage present even when not in use.

Follow these steps to apply power to the iTRAK 5730 system.

1. Apply 24V DC control power.

   The motor module status indicators begin this startup sequence:

   a. During the start-up process, NET and MOD appear steady red.
   b. During the power-up sequence, NET flashes green, red, off, and MOD flashes green, red, green.
   c. When the startup sequence completes, NET appears steady green, MOD continues to flash green.

   If the startup sequence does not begin, check the 24V control power connections.

2. When the startup sequence completes, verify that the NET status indicator is steady green and the MOD status indicator is flashing green.

   a. Verify that the Kinetix 5700 DC-bus power supply axis-state is PRECHARGE.
   b. Verify the iTRAK power supply axis-state is PRECHARGE.

   If the DC-bus power supply and iTRAK power supply do not reach the specified axis state and the two status indicators are not steady green, refer to Interpret Status Indicators on page 126.

3. Apply mains input power and monitor the DC BUS voltage on the LCD display on the DC-bus power supply and iTRAK power supply.

   If the DC BUS does not reach the expected voltage level, check the three-phase input power connections.

   It can take as long as 1.8 seconds after input power is applied before the iTRAK 5730 motor modules can accept motion commands (does not apply to the iTRAK power supply).

   a. Verify that the DC-bus power supply axis-state is RUNNING.
   b. Verify that the iTRAK power supply axis-state is RUNNING.
   c. Verify that all motor module status indicators are steady green.

   If the DC-bus power supply or iTRAK power supply does not reach the specified axis state, refer to Fault Code Overview on page 124.

4. If the iTRAK system has not yet been commissioned, then before you apply a load to the track and movers, you must commission the iTRAK system. See, Commission the iTRAK 5730 System on page 118.

5. If all of the following statements are true, then perform step a:

    - The system uses a vertical or stand-up mounting orientation (to determine orientation, see Figure 1 on page 13).

    - The iTRAK system has previously been powered and run and then power was removed (power removal is covered in Remove Power from the iTRAK 5730 System on page 34).

    - To prevent movers from falling, mechanical securing mechanisms such as an external brake, arrester, or clamp mechanism, were used to secure movers before power was last removed.

    - You intend to use the iTRAK to move the movers before you remove power from the system.

    a. While the system is powered, and before attempting to move any movers, remove all mover securing mechanisms. Use protective equipment such as heat protective gloves to avoid burn hazards while removing the mover securing mechanisms. See Protection Against Contact with Hot Parts on page 35. If these mechanisms are removed while the system is not powered, the movers they secure will fall and may cause injury or damage.

Understand Bus-sharing Group Configuration

When configuring the Module Properties > Power category for each iTRAK 5730 motor module axis, you must assign the motor module to the appropriate bus-sharing (power) group. In other words, assign each motor module to the same secondary bus-sharing group as the iTRAK power supply to which it is physically connected.
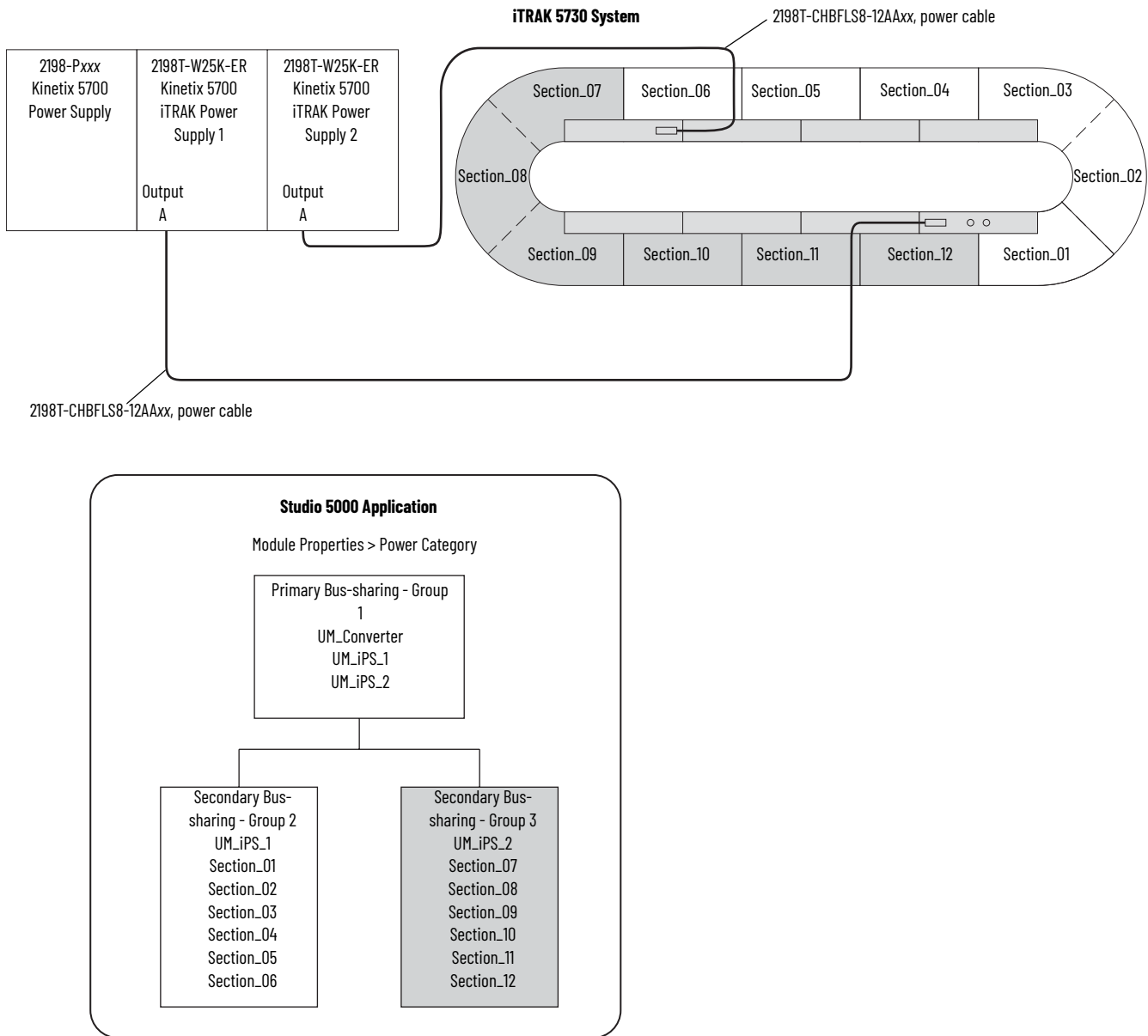
Bus-sharing Groups Example

In Figure 35, 12 iTRAK 5730 motor module sections are needed to support the motion application. All 12 section axes are configured in the same Motion group in the Studio 5000 application.

However, the 12 motor module sections are also configured as two bus-sharing groups. With two secondary bus-sharing groups, a fault on iTRAK Power Supply 1 only results in a Bus Power Sharing exception on motor modules in Secondary Bus-sharing Group 2. The fault has no effect on the operation of Secondary Bus-sharing Group 3 motor modules. However, a fault on the 2198-P*xxx* Kinetix 5700 Power Supply results in Bus Power Sharing exceptions on all motor modules in both secondary bus-sharing groups since both iTRAK Power Supplies are in Primary Bus-sharing Group 1 and cascade the exception to their respective secondary bus-sharing groups.

> ⚠️ **ATTENTION:** To avoid damage to equipment, all modules that are physically connected to the same shared-bus connection system must be part of the same Bus-sharing Group in the Studio 5000 application.

Figure 35 - Bus-sharing Groups Example

iTRAK 5730 System

2198T-CHBFLS8-12AA*xx*, power cable

| 2198-P*xxx* Kinetix 5700 Power Supply | 2198T-W25K-ER Kinetix 5700 iTRAK Power Supply 1 | 2198T-W25K-ER Kinetix 5700 iTRAK Power Supply 2 |

Output A

Output A

Section_07   Section_06   Section_05   Section_04   Section_03

Section_08   Section_02

Section_09   Section_10   Section_11   Section_12   Section_01

2198T-CHBFLS8-12AA*xx*, power cable

Studio 5000 Application

Module Properties > Power Category

Primary Bus-sharing - Group 1
UM_Converter
UM_iPS_1
UM_iPS_2

Secondary Bus-sharing - Group 2
UM_iPS_1
Section_01
Section_02
Section_03
Section_04
Section_05
Section_06

Secondary Bus-sharing - Group 3
UM_iPS_2
Section_07
Section_08
Section_09
Section_10
Section_11
Section_12

Configure Bus-sharing Groups

In both groups, the Bus Configuration for the iTRAK power supply is Shared DC/DC and the Bus Configuration for the iTRAK 5730 system is Shared DC.

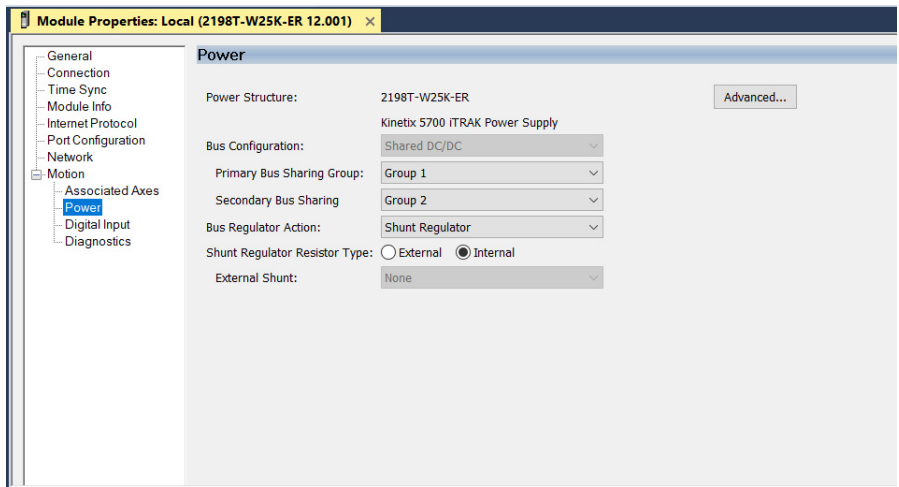**Figure 36 - Group 1 iTRAK 5730 Power Supply Configuration**

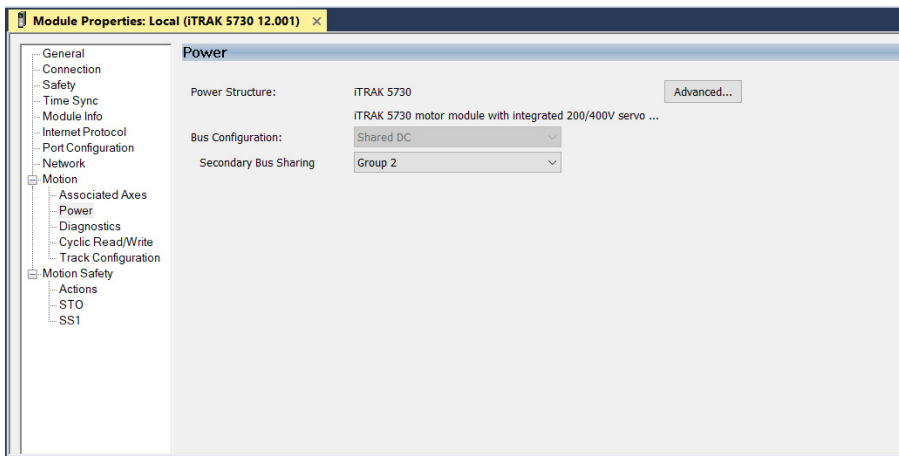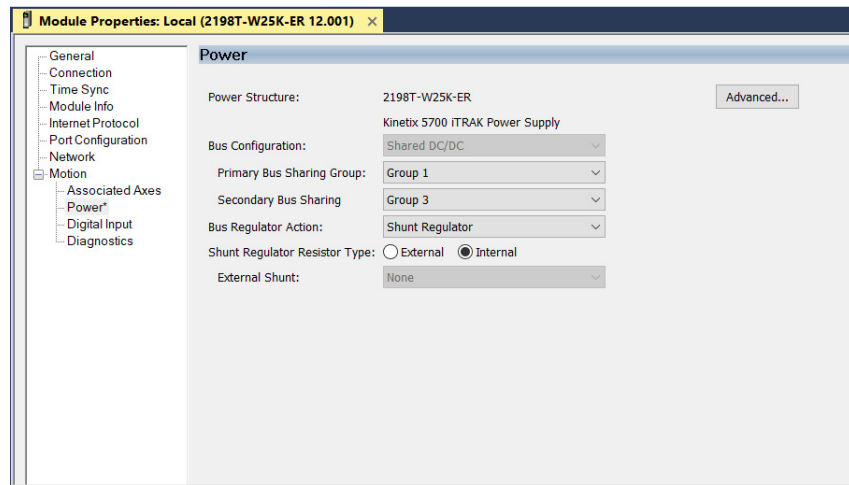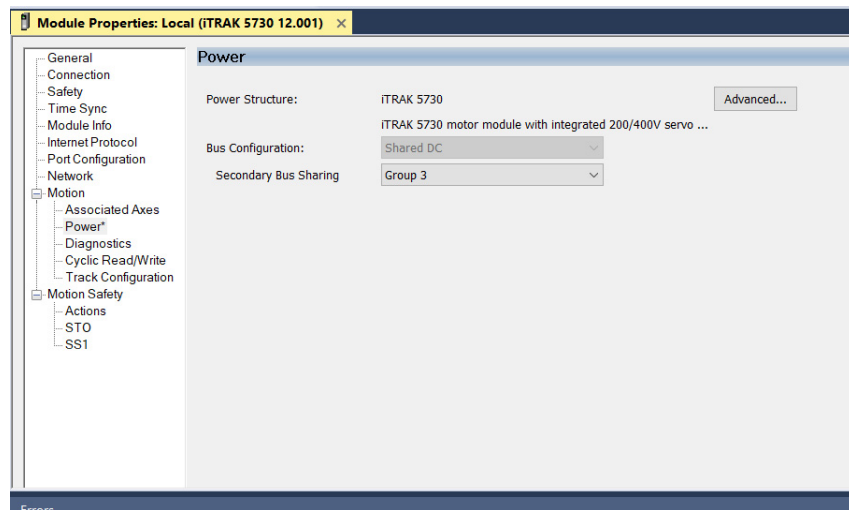**Figure 37 - Group 2 iTRAK 5730 System Configuration**

Figure 38 – Group 3 iTRAK Power Supply Configuration

Figure 39 – Group 3 iTRAK 5730 System Configuration

Commission the iTRAK 5730 System

The iTRAK 5730 system must be commissioned properly to provide accurate mover position feedback on the track system. This section provides instructions on how to establish smooth mover transitions between motor module sections.

Motor Module Section Gap Position Compensation

To control mover positions accurately on the track system, the motor modules monitor feedback from the mover position magnets. Motor module sections can report different absolute positions at the gap where modules adjoin. To reconcile the difference in the reported absolute positions, the motor module sections calculate a position compensation. The position compensation is applied to the boundaries between sections to produce smooth mover section-to-section transitions.

To calculate the position compensation, the motor module sections must identify the absolute position differences at all transitions as movers traverse the track. The calculated values for the position compensation are measured for each mover and stored in nonvolatile memory. After subsequent power cycles, each motor section reads nonvolatile memory and immediately applies the appropriate position compensation. Take the following into consideration when deciding whether to assign a reference mover:

- When you configure a reference mover, the correct sequence number and position compensation are applied automatically to each mover in the system after a power cycle.
- When you do not configure a reference mover, position accuracy across motor module gaps can be degraded after a power cycle.

> ⚠️ **ATTENTION:** A pinch point hazard exists. A mover can have sudden and fast motion due to magnetic attraction. To avoid personal injury, do not put your fingers between the mover and motor module.

> 💡 You can assign a reference mover and mover sequence numbers in the Mover Axis Assignment Sequence field in the Module Properties - Track Configuration dialog box. For descriptions of how the Mover Axis Assignment Sequence settings work, see page 99.

You must complete the procedure Calculate and Store Position Gap Compensation Values on page 119 in the following situations:

- After the initial iTRAK 5730 system installation is complete, and before the system is put into service
- After a motor module has been replaced
- After a mover has been replaced, or removed from or added to the track system
- After the 'Mover Axis Assignment Sequence' field selection has been changed

This procedure assumes that you have configured your iTRAK 5730 system, your Logix 5000 controller, and applied power to the system.

> **IMPORTANT**   Before you commission the iTRAK 5730, verify that the MOD and NET status indicators are operating as described in Interpret Status Indicators on page 126.

Calculate and Store Position Gap Compensation Values

Follow these steps to complete the section gap position-compensation procedure.

1. Enable the iTRAK system with an MSO instruction or motion direct command to all section and mover axes.
2. At a speed of approximately 0.5 m/s, run the movers around the track for 3...5 minutes.

> If a motor overspeed fault (FLT S04) occurs, reduce the speed to less than 0.5 m/s, and repeat step 2. If an overspeed fault persists, disable the section and mover axes and manually move the movers around the track. Each mover must be moved back and forth across the motor section gaps at least 2...3 times.

3. Disable the track system with an MSF instruction or motion direct command to all section and mover axes.
4. Save your project.

Previously stored values can make calculating new values problematic. If overspeed errors persist, complete these steps.

1. For all motor modules in the system, in the Track Configuration dialog box, change the 'Mover Axis Assignment Sequence' field.
2. Download the project to delete all position compensation values from nonvolatile memory.
3. For all motor modules, change the 'Mover Axis Assignment Sequence' field back to the original value.
4. Repeat the gap position compensation procedure.

Tune the Axes

This procedure assumes that you have configured your iTRAK 5730 system, your Logix 5000 controller, and applied power to the system.

IMPORTANT	Before you tune your axes, verify that the MOD and NET status indicators are operating as described in <u>Interpret Status Indicators</u> on page <u>126</u>.

For help with using the Studio 5000 application as it applies to tuning your axes with ControlLogix EtherNet/IP modules or CompactLogix 5370 controllers, see <u>Additional Resources on page 233</u>.

Tune the Axes with Load Observer

The load observer feature provides high-performance motion control without having to manually tune your axis. Using load observer with a default set of gains can yield high-performance right out of the box. Most of the time, there is no need to perform an autotune or further optimize gain settings.

Follow these steps to configure the iTRAK 5730 system for high performance by using the load observer feature.

1. Verify that the load is connected.

   Reattach the load if it was disconnected.

⚠	ATTENTION: If the iTRAK 5730 system has not been enabled before (new installation), verify that you have safeguards in place to safely remove power from the drive if there is an unstable situation where the drive can produce undesired motion.

2. Click the Autotune category in the mover Axis Properties dialog box.
   a. From the pull-down menu for Application Type, choose Custom.
   b. From the pull-down menu for Loop Response, choose Medium.
   c. From the pull-down menu for Load Coupling, choose Rigid settings.
   d. Verify that only the Velocity Feedforward box is checked.
   e. Uncheck the Torque Low Pass Filter box (that is checked by default).
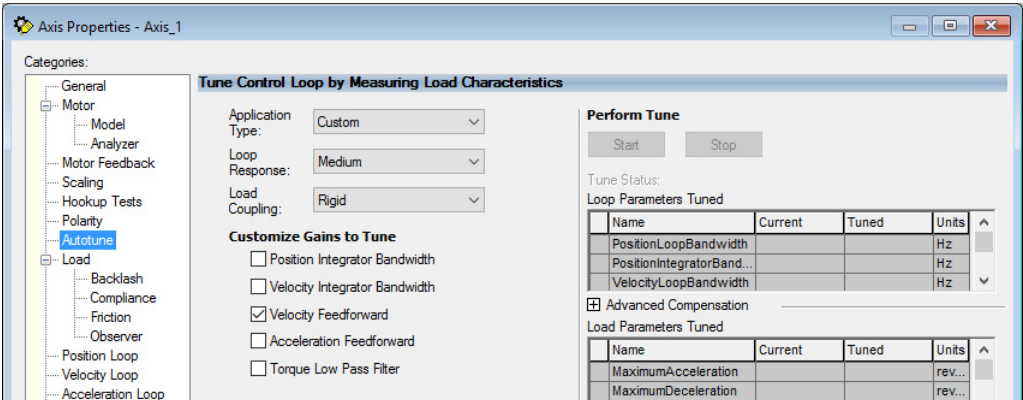
3. Click the Load category in the Axis Properties dialog box.
   a. Check Use Load Ratio.
   b. Set the Load Ratio = 0.
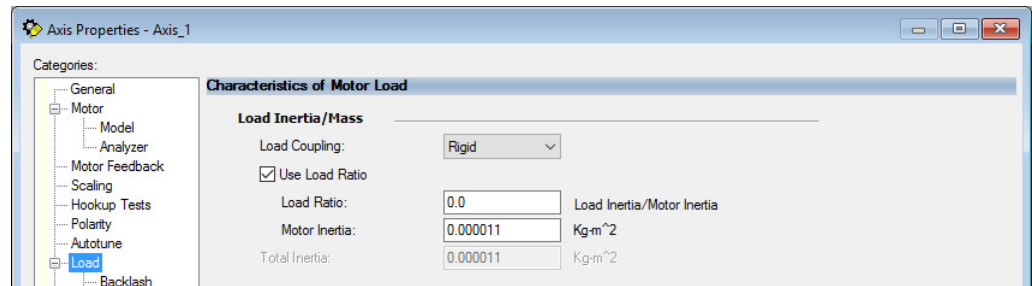
4. Click the Observer category in the Axis Properties dialog box.
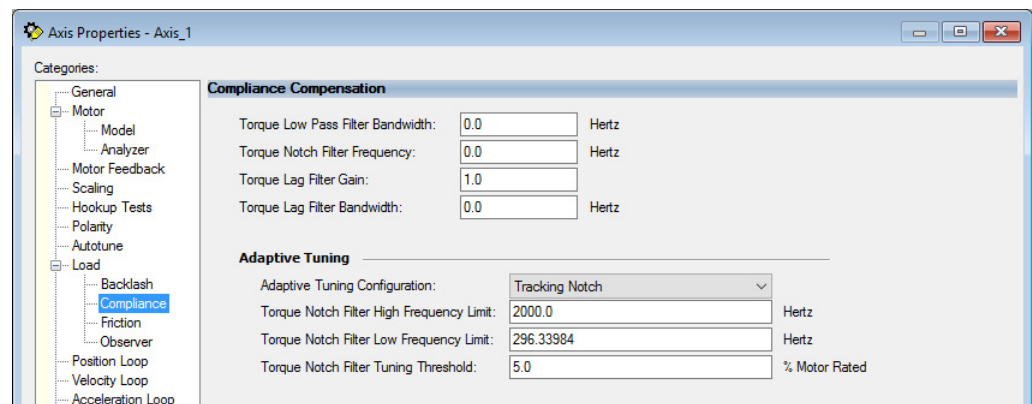   a. Verify that Load Observer with Velocity Estimate appears in the Configuration field.

   Load Observer is not available for Torque Loop control.
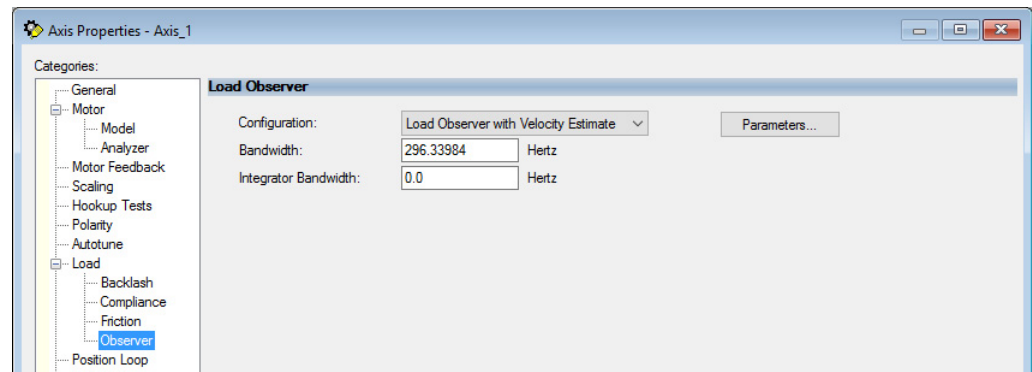
   b. Click Apply and click Yes to update all dependent attributes.
   c. The Load Observer Bandwidth and other gains are set automatically.
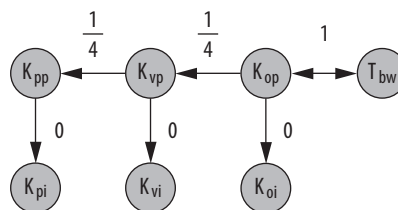
5. Click the Compliance category in the Axis Properties dialog box.

   d. Click Apply.

6. Enable the iTRAK 5730 system for a few seconds with an MSO instruction or motion direct command, followed by an MSF instruction or motion direct command, to make sure that no audible squealing noise is present.

> **IMPORTANT**   If an audible squealing noise is heard, go to Axis Properties > Load > Compliance category and set the Torque Notch Filter Frequency field (Hz) to remove the noise. See Motion System Tuning Application Techniques, publication [MOTION-AT005](#) (Compensating for High Frequency Resonances), for information on how to set the Torque Notch Filter Frequency field.

7. Repeat Tune the Axes with Load Observer for each axis.

Troubleshoot the iTRAK 5730 System

This chapter provides troubleshooting information for your iTRAK® 5730 system.

Safety Precautions

Observe the following safety precautions when troubleshooting your iTRAK 5730 system.

⚠ **ATTENTION:** Capacitors on the DC bus can retain hazardous voltages after input power has been removed. Before working on the system, measure the DC bus voltage to verify it has reached a safe level or wait the full time interval as indicated in the warning on the front of the module. Failure to observe this precaution could result in severe bodily injury or loss of life.

⚠ **ATTENTION:** Do not attempt to defeat or override the module fault circuits. You must determine the cause of a fault and correct it before you attempt to operate the system. Failure to correct the fault could result in personal injury and/or damage to equipment as a result of uncontrolled machine operation.

⚠ **ATTENTION:** Provide an earth ground for test equipment (oscilloscope) used in troubleshooting. Failure to ground the test equipment could result in personal injury.

Interpret Fault Codes

See the tables in this section to identify faults, potential causes, and the appropriate actions to resolve the fault. If the fault persists after attempting to troubleshoot the system, contact your Rockwell Automation® sales representative for further assistance.

ⓘ Knowledgebase Answer ID 1092901 iTRAK 5730 System Fault Codes has the fault codes. Download the spreadsheet from this public article.

You might be asked to log in to your Rockwell Automation web account, or create an account if you do not have one. You do not need a support contract to access the article.

Fault Code Overview

The fault code tables are designed to help you determine the source of the fault or exception. When a fault condition is detected, the motor section or mover performs the appropriate fault action and the fault is added to a persistent fault log (along with diagnostics data). If a fault condition is still active following a Fault Reset service, the fault is again written to the fault log.

However, there can be a delay before the fault is posted again. In a Studio 5000 Logix Designer® application (also called the Studio 5000® application), this delay results as the AxisFault tag on the axis being cleared until the fault is posted again. During this delay, the AxisState tag continues to indicate that the axis is faulted. Use the AxisState tag on the axis object only to determine if an axis is faulted.

Although software overtravel fault codes do not exist, software overtravel detection for the AXIS_CIP_DRIVE axis type is determined in the Logix 5000® controller. For more information, see Integrated Motion on the EtherNet/IP™ Network Reference Manual, publication [MOTION-RM003](#).

The iTRAK 5730 maintains a fault log of the last 128 faults. The fault log includes time stamps and is stored in persistent memory. However, the fault log cannot be cleared on the module.

Table 15 - Fault Code Summary

Fault Code Type [1] [2]	Description
FLT S*xx*	Standard runtime axis exceptions. The exception can apply to an individual axis or to all axes.
FLT M*xx*	Manufacturer-specific runtime axis exception. The exception can apply to an individual axis or to all axes.
INIT FLT S*xx*	Exceptions that prevent normal operation and occur during the initialization process.
INIT FLT M*xx*	
NODE FLT*xx*	Exceptions that can prevent normal operation and apply to the entire module and affect all axes.
NODE ALARM *xx*	Exceptions that can prevent normal operation, but do not result in any action other than reporting the alarm to the controller.
INHIBIT S*xx*	Conditions that prevent normal operation and indicate that the axis is prevented from being enabled.
INHIBIT M*xx*	
ALARM S*xx*	An underlying exception condition that does not result in any action other than reporting the alarm to the controller.
ALARM M*xx*	
SAFE FLT*xx*	Exception that is generated by a fault condition detected in the safety function.

(1) S*xx* refers to Standard exceptions.
(2) M*xx* refers to Manufacturer-specific exceptions.

> Fault codes triggered by conditions that fall outside factory set limits are identified by FL at the end of the display message. For example, FLT S07 – MTR OVERLOAD FL.
> Fault codes triggered by conditions that fall outside user set limits are identified by UL at the end of the display message. For example, FLT S08 – MTR OVERLOAD UL.

Mover Numbers in Fault Codes

When a fault about a mover appears, the fault text includes the mover number as the sub code at the end of the fault text. Movers are numbered based on which option you select for the Mover Axis Assignment Sequence configuration parameter, as described on .

Motor Module Numbers in Fault Codes

In addition to the motor module name and IP address, the motor module is also given a number. You do not enter this number; it is assigned automatically based on the position of the motor module relative to the power and control input connector module. The first motor module that is connected to the power and control input connector module is numbered 0, the next motor module 1, and so on. When a fault about a motor module appears, the fault text includes the motor module number as the sub code at the end of the fault text. For example, the fault text "INIT FLT 28 - Sub Code 1" means that the second motor module from the power and control input connector module is affected.

Interpret Status Indicators

Use the information in this section to identify the status of the motor and connector modules by using the status indicators.

IMPORTANT	Status indicators are not reliable for safety functions. Use status indicators only for general diagnostics during commissioning or troubleshooting. Do not attempt to use status indicators to determine operational status.

Motor Module Status Indicators

The iTRAK 5730 motor modules contain the following status indicators.
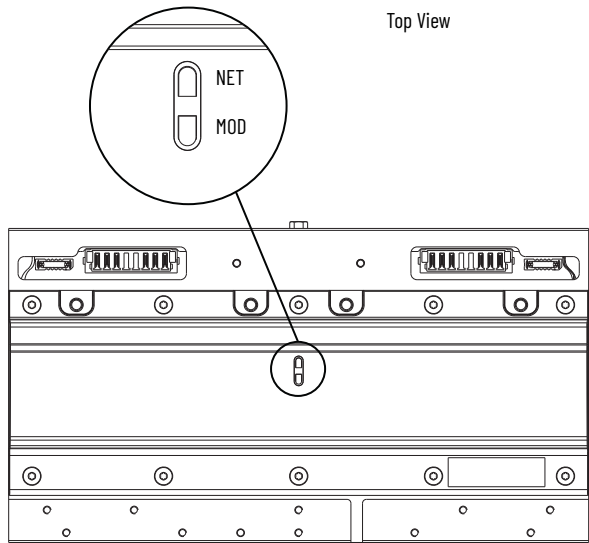
Straight Motor Module (Catalog Number 2198T-L20-T0303-A00-S2) Shown.

Table 16 – Network (NET) Status Indicator Descriptions

Condition	Status
Steady Off	There is no power applied to the motor module section or the IP address is not configured.
Flashing Green	No Motion or Safety connection is established, but the motor module section has obtained an IP address.
Steady Green	A Motion or Safety connection is established and no timeout has occurred. Normal operation.
Flashing Red	Connection timeout. One or more of the connections, for which this motor module section is the target, has timed out.
Steady Red	Duplicate IP address. The IP address that is specified is already in use.
Flashing Green/Red	Self-test. The motor module section performs a self-test during powerup. Once the self-test is complete, the Flashing Green/Red condition continues if the motor module section is processing a safety device ID proposal.

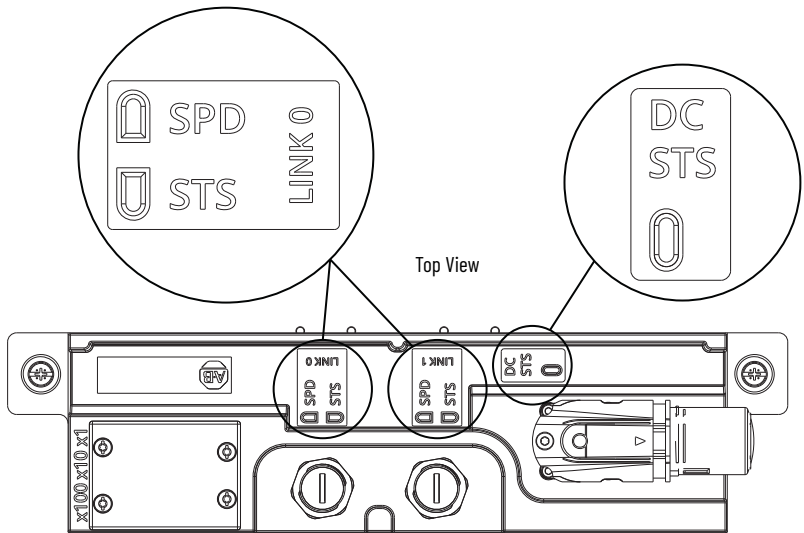**Table 17 - Module (MOD) Status Indicator Descriptions**

Condition	Status
Steady Off	There is no power applied to the motor module section.
Steady Green	The motor module section is operational. No faults or failures.
Flashing Green	Standby (motor module section not configured), Precharge (motor module section is configured), or one or more axes are inhibited or shut down.
Flashing Red	Major recoverable fault. The motor module section detected a recoverable fault. For example, an incorrect or inconsistent configuration occurred.
Steady Red	Major fault. The motor module section detected a nonrecoverable fault.
Flashing Green/Red	Self-test. The motor module section performs a self-test during powerup. Once the self-test is complete, the Flashing Green/Red condition continues if the motor module section is waiting for integrated STO safety configuration.

Table 18 - Network (NET) and Module (MOD) Combined Status Indicator Descriptions

Condition	Status
NET and MOD alternately Flashing Red	A firmware update is in progress. Control power must NOT be removed during this condition. As different segments of the section complete the firmware update the status indicators can momentarily exit the firmware update indication. Be sure that the non-firmware update condition is maintained for 1 minute before removing control power.
MOD Flashing Red alternating with NET Flashing Green	A firmware update is required.

Connector Module Status Indicators

The iTRAK 5730 power and control input and power input with control pass-through connector modules contain the following status indicators.

Power and Control Input Connector Module (Catalog Number 2198T-CT-CP) Shown.

Table 19 - LINK 0/1 Ethernet Link Speed (SPD) Status Indicator Descriptions [1]

Condition	Status
Steady Off	No connection or less than 100 Mbit
Steady On Yellow	100 Mbit

(1)   Present on the power and control (2198T-CT-CP) connector module only.

Table 20 - LINK 0/1 Ethernet Link/Activity (STS) Status Indicator Descriptions [1]

Condition	Status
Steady Off	No link
Steady On Green	Link established
Flashing Green	Network activity

(1)   Present on the power and control (2198T-CT-CP) connector module only.

Table 21 - DC Power (DC STS) Status Indicator Descriptions [1]

Condition	Status
Steady Off	24V DC control power is off and DC bus voltage is unknown
Steady On Green	24V DC control power is present and the DC bus voltage is < 50V DC
Steady On Amber	24V DC control power is present and the DC bus voltage is > 50V DC

(1)   Present on the power and control (2198T-CT-CP) and power with control pass-through (2198T-CT-P) connector modules only.

SHOCK HAZARD: To avoid a shock hazard or personal injury, verify that all power has been removed before proceeding with installation or maintenance tasks. The motor modules and Kinetix® 5700 iTRAK power supply require 5 minutes to discharge before you handle wire and cable connections.

Axis Troubleshooting

These conditions do not always result in a fault code, but can require troubleshooting to improve iTRAK 5730 performance.

Table 22 - Axis Troubleshooting

Condition	Potential Cause	Possible Resolution
Axis or system is unstable	Unintentionally in Torque mode.	Check to see what primary operation mode was programmed.
	Motor tuning limits are set too high.	Run Tune in the Studio 5000 application.
	Position loop gain or position controller accel/decel rate is improperly set.	Run Tune in the Studio 5000 application.
	Improper grounding or shielding techniques are causing noise to be transmitted into the position feedback interface, causing erratic axis movement.	Check wiring and ground.
	Mechanical resonance.	• Notch filter or output filter can be required (see the Axis Properties dialog box, Compliance tab in the Studio 5000 application). • Enable adaptive tuning. See <u>Tune the Axes</u> on page <u>120</u> for more notch filter information.
You cannot obtain the motor acceleration/deceleration that you want	Torque Limit limits are set too low.	Verify that torque limits are set properly.
	The system inertia is excessive.	• Check motor size versus application need. • Review servo system sizing.
	The system friction torque is excessive.	Check motor size versus application need.
	Available current is insufficient to supply the correct accel/decel rate.	• Check motor size versus application need. • Review servo system sizing.
	Acceleration limit is incorrect.	Verify limit settings and correct them, as necessary.
	Velocity Limit limits are incorrect.	Verify limit settings and correct them, as necessary.
Motor does not respond to a command	The axis cannot be enabled until stopping time has expired.	Disable the axis, wait the configured stopping time, and enable the axis.
	The motor module has malfunctioned.	Repair or replace the motor module.
	Primary operation mode is set incorrectly.	Check to see what primary operation mode was programmed.
	Velocity or torque limits are set incorrectly.	Check and properly set the limits.
No movement	The motor module connections are loose or open.	Check motor module connections.
	Foreign matter is lodged in the motor.	Remove foreign matter.
	The motor load is excessive.	Verify the servo system sizing.
	The mover bearings are worn.	Replace the mover for repair.
	The motor brake is engaged (if supplied).	• Check brake wiring and function. • Return the motor for repair.
Motor overheating	The duty cycle is excessive.	Change the command profile to reduce accel/decel or increase time.
	The mover is partially demagnetized causing excessive motor current.	Return the mover for repair.
Abnormal noise	Motor tuning limits are set too high.	Run Tune in the Studio 5000 application.
	Loose parts are present in the mover or section.	• Remove the loose parts. • Return motor for repair. • Replace motor module.
	There is insufficient lubrication on the track.	Adjust lubrication application rate or refill lubrication reservoirs.
	There is foreign debris on the rails.	Clean all rail surfaces and reapply lubricant.
	The rails are misaligned.	Realign all rails at transitions.
	The rail system is worn.	Replace damaged rails.
	A through bolt or coupling is loose.	Tighten bolts.
	The mover bearings are worn.	Return the mover for repair.
	Mechanical resonance.	Notch filter can be required (refer to Axis Properties dialog box, Compliance tab in the Studio 5000 application).
Undesired FLT M32 – TRACK STOP major faults when another axis on the track experiences a fault	The Track Stop exception is configured with an exception Action of Disable or Shutdown.	Change the Track Stop exception Action setting to Ignore or Alarm. Changing the Action setting to Ignore or Alarm allows axes to continue to run when another axis on the track experiences a major fault. Setting the Action to Alarm allows the Logix controller program to respond when a fault occurs. A possible response is to bring other axes to a controlled stop at specific locations. However, the ability to perform the desired response can be affected by the other faulted axis.

Table 22 - Axis Troubleshooting (Continued)

Condition	Potential Cause	Possible Resolution
Unexpected FLT M33 – LOST MOVER	A mover position magnet assembly is missing or damaged.	Inspect the movers for a missing or damaged position magnet.
	Magnetic interference has occurred.	Remove any foreign materials that can have interfered with the mover position-magnets magnetic field.
Unexpected FLT M34 – UNASSOCIATED MOVER	There are stray magnetic fields near the track.	Remove any magnetized or unmagnetized ferrous materials further away from the movers and track system. Maintain a minimum distance of 50 mm (2.0 in.) away from the movers for any installed ferromagnetic material.

Logix 5000 Controller and iTRAK System Behavior

By using the Studio 5000 application, you can configure how the iTRAK 5730 system responds when a module fault/exception occurs.

> The INIT FLT *xxx* faults are always generated after powerup, but before the axis is enabled, so the stopping behavior does not apply.
> NODE ALARM *xxx* faults do not apply because they do not trigger stopping behavior.

The iTRAK 5730 motor sections and movers support fault actions for Ignore, Alarm, Minor Fault, and Major Fault as defined in Table 23. They also support the configurable stopping actions as defined in the Table 25 on page 132.

Table 23 - iTRAK 5730 Module Exception Action Definitions

Exception Action	Definition
Ignore	The motor section or mover completely ignores the exception condition. For some exceptions that are fundamental to the operation of the planner, Ignore is not an available option.
Alarm	The motor section or mover sets the associated bit in the Motion Alarm Status word, but does not otherwise affect axis behavior. Like Ignore, if the exception is so fundamental to the motor section or mover, Alarm is not an available option. When an exception action is set to Alarm, the Alarm goes away by itself when the exceptional condition has cleared.
Minor Fault	The motor section or mover latches the exception condition, but does not execute any exception action.
Major Fault	The motor section or mover latches the exception condition and executes the configured exception action.

You can configure exception behavior in the Studio 5000 application from the Axis Properties dialog box, Actions category. These controller exception actions are mapped to the motor section or mover exception actions.

Table 24 - Studio 5000 Exception Action Definitions

Exception Action	Definition
Ignore	The controller completely ignores the exception condition. For some exceptions that are fundamental to the operation of the planner, Ignore is not an available option.
Alarm	The controller sets the associated bit in the Motion Alarm Status word, but does not otherwise affect axis behavior. Like Ignore, if the exception is so fundamental to the axis, Alarm is not an available option. When an exception action is set to Alarm, the Alarm goes away by itself when the exceptional condition has cleared.
Fault Status Only	Like Alarm, Fault Status Only instructs the controller to set the associated bit in the Motion Fault Status word, but does not otherwise affect axis behavior. However, unlike Alarm, an explicit Fault Reset is required to clear the fault once the exceptional condition has cleared. Like Ignore and Alarm, if the exception is so fundamental to the axis, Fault Status Only is not an available option.
Stop Planner	The controller sets the associated bit in the Motion Fault Status word and instructs the Motion Planner to perform a controlled stop of all planned motion at the configured maximum deceleration rate. An explicit Fault Reset is required to clear the fault once the exceptional condition has cleared. If the exception is so fundamental to the axis, Stop Planner is not an available option.
Disable	When the exception occurs, the associated bit in the Fault Status word is set and the axis comes to a stop by using the stopping action that is defined by the axis for the particular exception that occurred. If there is a fault, there is no controller-based configuration to specify what the stopping action is. The stopping action is device-dependent.
Shutdown	When the exception occurs, the axis comes to a stop by using the stopping action defined by the axis (as in Stop Drive) and the power module is disabled. An explicit Shutdown Reset is required to restore the axis to operation.

iTRAK 5730 Power Supply Behavior

See the iTRAK 5730 Power Supply Behavior section in Chapter 7 of the Kinetix 5700 Servo Drive User Manual, publication 2198-UM002, for details.

iTRAK 5730 Motor Module and Mover Behavior

For the iTRAK 5730 motor modules and movers, only selected exceptions are configurable. Table 25 provides a list and descriptions of the available configurable stopping actions.

Table 25 - Configurable Stopping Actions

Stopping Action	Description	
Current Decel & Hold [1]	Most control	The best available stopping action is the one that maintains the most control over the motor. However, not all faults support every stopping action.
Current Decel & Disable	Less control	
Disable & Coast	Least control	

(1)   This stop action is support by the movers only.

When a section axis is configured for Current Decel & Disable, the power structure remains enabled until the configured Stopping Time Limit expires. The configured Stopping Time Limit provides time for the Logix controller program to bring the movers to a controlled stop. The section does not initiate any stopping actions on mover axes during the configured Stopping Time Limit.

Table 26 provides a list and description of the available standard and safety actions and behaviors. Actions define the motor section or mover behavior in response to specific conditions. The Actions category includes Standard Actions and Safety Actions. See Standard Actions and Safety Actions on page 133 for detailed descriptions of these actions.

Table 26 - Actions Definitions

Action Category	Action Name	Action Trigger Condition	Available Actions
Standard	Disable (MSF) Stopping Action	Execution of an MSF motion instruction.	• Current Decel & Hold [1] • Current Decel & Disable • Disable & Coast
	Connection Loss Stopping Action	Loss of the motion connection (for example, inhibiting the module or a network cable disconnect).	• Current Decel & Disable • Disable & Coast
	Motor Overload Action [2]	Receiving MTR OVERLOAD fault.	• Current Foldback • None
	Inverter Overload Action [2]	Receiving INV OVERLOAD fault.	• Current Foldback • None
Safety	Safe Torque Off Action [2]	Transition from logic 0 to 1 of the SafeTorqueOffActiveStatus axis tag, which indicates a Safe Torque Off (STO) action was commanded.	• Current Decel & Disable • Disable & Coast
	Safe Torque Off Action Source [2]	Determines whether the connected motor module section or controller initiates the stopping sequence in response to a Safe Torque Off (STO) active condition in the Axis safety status attribute.	• Connected Drive • Running Controller

(1)   This action is supported by the movers only.
(2)   This action is supported by the motor sections only.

Standard Actions

When a controller connection loss (NODE FLT 06) occurs, it is possible that other node faults can occur first, triggering a fault action of Current Decel & Disable. Without knowing if NODE FLT 06 will occur first on a connection loss fault, we recommend that you do not change the default connection loss setting of Current Decel & Disable.

> Use DLR ring topology (see Device Level Ring Topology on page 30) for applications where the possibility of connection loss must be minimized.

Safety Actions

When the Safe Torque Off Action Source is set to "Running Controller," the connected motor module does not perform any stopping actions in response to a STO active condition. You must configure your Logix program to perform the desired stopping action in response to a STO active condition. A section axis configured to "Disable" remains enabled until the configured STO Delay expires and the iTRAK 5730 system enters the safe state.

When the Safe Torque Off Action Source is set to "Connected Drive," the connected motor module performs the configured Safe Torque Off Action. For an iTRAK 5730 motor module section, a "Current Decel & Disable" stopping action only maintains the enabled state of the section axis for the configured stopping time limit before activating the brake control bit and disabling the section axis. The motor module section does not initiate any action on movers.

Table 27, Table 28 on page 134, and Table 30 on page 135 provide the controlling attribute for programmable fault actions.

Table 27 – Motor Section and Mover Fault Behavior, FLT Sxx Fault Codes

Exception Fault Code	Exception Text	Section Axis						Mover Axis					
		Supported	Ignore	Alarm	Minor Fault	Major Fault	Best Available Stopping Action (applies to major faults)	Supported	Ignore	Alarm	Minor Fault	Major Fault	Best Available Stopping Action (applies to major faults)
FLT S03 – MTR OVERSPEED FL	Motor Overspeed Factory Limit Fault	–	–	–	–	–		X	–	–	–	X	Disable/Coast
FLT S04 – MTR OVERSPEED UL	Motor Overspeed User Limit Fault	–	–	–	–	–	Current Decel/Hold	X	X	X	X	X	
FLT S05 – MTR OVERTEMP FL	Motor Overtemperature Factory Limit Fault	X	–	–	–	X	Disable/Coast	–	–	–	–	–	
FLT S07 – MTR OVERLOAD FL	Motor Thermal Overload Factory Limit Fault	X	–	–	–	X	Disable/Coast	–	–	–	–	–	
FLT S08 – MTR OVERLOAD UL	Motor Thermal OverLoad User Limit Fault	X	X	X	X	X	Current Decel/Hold	–	–	–	–	–	
FLT S09 – MTR PHASE LOSS	Motor Phase Loss[1]	–	–	–	–	–		X	–	–	–	X	Disable/Coast
FLT S10 – INV OVERCURRENT	Inverter Overcurrent Fault	X	–	–	–	X	Disable/Coast	–	–	–	–	–	
FLT S11 – INV OVERTEMP FL	Inverter Overtemperature Factory Limit Fault	X	–	–	–	X	Disable/Coast	–	–	–	–	–	
FLT S13 – INV OVERLOAD FL	Inverter Thermal Overload Factory Limit Fault	X	–	–	–	X	Disable/Coast	–	–	–	–	–	
FLT S14 – INV OVERLOAD UL	Inverter Thermal Overload User Limit Fault	X	X	X	X	X	Current Decel/Hold	–	–	–	–	–	
FLT S22 – AC POWER LOSS	Converter AC Power Loss Fault	X	X	X	X	–	Current Decel/Disable	X	X	X	X	X	Current Decel/Disable
FLT S33 – BUS UNDERVOLT FL	Bus Undervoltage Factory Limit Fault	X	–	–	–	X	Current Decel/Disable	–	–	–	–	–	
FLT S34 – BUS UNDERVOLT UL	Bus Undervoltage User Limit Fault	X	X	X	X	X	Current Decel/Disable	–	–	–	–	–	
FLT S35 – BUS OVERVOLT FL	Bus Overvoltage Factory Limit Fault	X	–	–	–	X	Disable/Coast	–	–	–	–	–	
FLT S37 – BUS POWER LOSS	Bus Power Loss	X	X	X	X	X	Current Decel/Disable	–	–	–	–	–	
FLT S40 – BUS POWER SHARING	Bus Power Sharing Fault	X	X	X	X	X	Current Decel/Disable	X	X	X	X	X	Disable/Coast
FLT S45 – FDBK COMM FL	Motor Feedback Data Loss Factory Limit Fault	X	–	–	–	X	Disable/Coast	X	–	–	–	X	Disable/Coast
FLT S46 – FDBK COMM UL	Motor Feedback Data Loss User Limit Fault	X	X	X	X	X	Current Decel/Disable	–	–	–	–	–	
FLT S47 – FDBK DEVICE FAILURE	Feedback Device Failure	X	–	–	–	X	Disable/Coast	–	–	–	–	–	
FLT S54 – POSN ERROR	Excessive Position Error Fault	–	–	–	–	–		X	X	X	X	X	Disable/Coast
FLT S55 – VEL ERROR	Excessive Velocity Error Fault	–	–	–	–	–		X	X	X	X	X	Disable/Coast
FLT S56 – OVERTORQUE LIMIT	Overtorque Limit Fault	–	–	–	–	–		X	X	X	X	X	Current Decel/Hold
FLT S57 – UNDERTORQUE LIMIT	Undertorque Limit Fault	–	–	–	–	–		X	X	X	X	X	Current Decel/Hold

(1)   The Motor Phase Loss Fault occurs when an enabled mover is on a motor module that becomes disabled or travels onto an already disabled motor module.

Table 28 - Motor Section and Mover Fault Behavior, FLT Mxx Fault Codes

| Exception Fault Code | Exception Text | Section Axis | | | | | | Mover Axis | | | | | |
| | | Supported | Fault Action | | | | Best Available Stopping Action (applies to major faults) | Supported | Fault Action | | | | Best Available Stopping Action (applies to major faults) |
			Ignore	Alarm	Minor Fault	Major Fault			Ignore	Alarm	Minor Fault	Major Fault	
FLT M26 – RUNTIME ERROR	Runtime Error	X	–	–	–	X	Disable/Coast	X	–	–	–	X	Disable/Coast
FLT M27 - BACKPLANE COMM	Backplane Communication Error	X	–	–	–	X	Disable/Coast	X	–	–	–	X	Disable/Coast
FLT M28 – SAFETY COMM	Safety Module Communication Error	X	–	–	–	X	Disable/Coast	–	–	–	–	–	
FLT M32 - TRACK STOP	Track Stop[1]	X	X	X	X	X	Current Decel/Disable	X	X	X	X	X	Current Decel/Disable
FLT M33 - LOST MOVER	Lost Mover Association	–	–	–	–	–		X	–	–	–	X	Disable/Coast
FLT M34 - UNASSOCIATED MOVER	Unassociated Mover	X	–	–	–	X	Disable/Coast	–	–	–	–	–	

(1) Occurs on all axes when a major fault occurs on any axis. The subcode indicates the slot number of the section requesting the stop. Check all axes on that section to identify the primary fault.

Table 29 - Motor Section and Mover Fault Behavior, INIT FLT Mxx Fault Codes

Exception Fault Code	Exception Text	Description	Section Axis	Mover Axis
INIT FLT M14 - SAFETY FIRMWARE	Invalid Safety Firmware	The loaded Safety firmware is not compatible with the motor module firmware. See Appendix A on page 201 for instructions on how to upgrade the iTRAK 5730 firmware.	X	–
INIT FLT M20 – UNKNOWN MODULE	Unknown Module Fault	The product code of the power board is invalid.	X	X
INIT FLT M21 – FACTORY CONFIG nn	Factory Configuration Error	Factory configuration data is missing or invalid.	X	X
INIT FLT M22 - ILLEGAL ADDRESS	Illegal IP Address	The IP address rotary switches on the power and control input connector module are set to an invalid value. See EtherNet/IP Address Rotary Switches on page 75 for details on valid switch settings.	X	–
INIT FLT M25 - MOVER AXIS ASSIGNMENT ERROR nn	Mover-Axis Assignment Error	An error occurred when the movers were assigned to the mover axes. Subcodes: 01: Reference Mover not Found 02: Unexpected Reference Mover Found 03: Detected Fewer Movers than Configured 04: Detected More Movers than Configured 05: Inconsistent Mover Seq 06: Movers in Motion 07: Track Max Mover Count Exceeded	X	X
INIT FLT M26 - TRACK BACKPLANE COMMUNICATION nn	Backplane Communication Initialization Error	An error occurred while establishing backplane communication. Subcodes: 02: Too Many Sections on the Backplane 03: Slot Assignment Failure 04: Track Type Failure	X	X
INIT FLT M27 - UNASSOCIATED SECTION AXIS	Unassociated Section Axis	The motor module section that is associated with this mover axis has detected that no axis instance has been associated with Axis 1 (section axis). All iTRAK 5730 motor module sections must have an associated section axis.	–	X
INIT FLT M28 - TRACK CONFIGURATION	Track Configuration Error	A motor module section has not provided its axis and mover information to the rest of the track when expected. Possible causes of this occurrence include that the module is inhibited or has no axes associated.	X	X

Table 30 – Motor Section and Mover Fault Behavior, NODE FLT Fault Codes

Exception Fault Code	Exception Text	Section Axis						Mover Axis					
		Supported	Fault Action				Best Available Stopping Action (applies to major faults)	Supported	Fault Action				Best Available Stopping Action (applies to major faults)
			Ignore	Alarm	Minor Fault	Major Fault			Ignore	Alarm	Minor Fault	Major Fault	
NODE FLT 01 – LATE CTRL UPDATE	Control Connection Update Fault	X	–	–	–	X	Current Decel/Disable	X	–	–	–	X	Current Decel/Disable
NODE FLT 02 – PROC WATCHDOG	Processor Watchdog Fault	X	–	–	–	X	Disable/Coast	X	–	–	–	X	Disable/Coast
NODE FLT 03 – HARDWARE	Hardware Fault	X	–	–	–	X	Disable/Coast	X	–	–	–	X	Disable/Coast
NODE FLT 04 – DATA FORMAT ERROR	Data Format Error Fault	X	–	–	–	X	Disable/Coast	X	–	–	–	X	Disable/Coast
NODE FLT 05 – CLOCK SKEW FLT	Clock Skew Fault	X	–	–	–	X	Current Decel/Disable	X	–	–	–	X	Disable/Coast
NODE FLT 06 – LOST CTRL CONN	Lost Controller Connection Fault	X	–	–	–	X	Programmable per Connection Loss Stopping Action (see Table 26 on page 132).	X	–	–	–	X	Programmable per Connection Loss Stopping Action (see Table 26 on page 132).
NODE FLT 07 – CLOCK SYNC	Clock Sync Fault	X	–	–	–	X	Current Decel/Disable	X	–	–	–	X	Current Decel/Disable
NODE FLT 09 – DUPLICATE IP ADDRESS	Duplicate IP Address Fault	X	–	–	–	X	Disable/Coast	X	–	–	–	X	Disable/Coast

Notes:

Maintenance

This chapter contains information on how to maintain your iTRAK® 5730 system and install or replace components.

Topic	Page
Before You Begin	137
Preventive Maintenance	137
Install or Replace Components	138
Lubrication	166

Before You Begin

Before you attempt maintenance on the system, complete these tasks.

- Make sure that the movers are motionless.
- Disconnect electrical power to the system by using the master switch and lockout.

Preventive Maintenance

To prolong the life of your iTRAK 5730 system, clean the rail system and components. The frequency at which you clean the components depends on the machine usage, the environment in which they are used, and exposure to contaminants. You must determine through best engineering practices how often to perform the following procedure.

Before You Begin

⚠️ **ATTENTION:** Before attempting any service to an iTRAK 5730 system See Safety Information on page 32.

Rail System

Clean all rail surfaces.

1. Wipe the rails down with a lint free cloth.

   If necessary, use isopropyl alcohol on the lint-free cloth.

2. Apply a thin coat of Kluber oil (Kluber 4-UH1-68N) on all exposed rail surfaces.

Track Components

Clean the following surfaces with isopropyl alcohol and soft lint-free cloth.

- Position sensor
- Motor module coil

If there is ferrous debris on the magnet plates, remove them with the sticky side of duct tape or clay.

Install or Replace Components

The procedures in this section describe how to install or replace system components.

IMPORTANT	The iTRAK 5730 motor modules and safety-related system do not contain serviceable parts. No repair option is provided if there is a motor module anomaly. If there is a failure, replace the motor module.

Replacement Hardware

IMPORTANT	All hardware that is removed for service must either be replaced with new hardware from kit catalog number 2198T-BE-KITCON or have thread lock (such as Loctite 243) applied to the threads before the hardware is reinstalled.

Thread patches and thread lock on hardware that is removed for service can become worn during disassembly. If the hardware is reinstalled without having thread lock applied, it will not function correctly. Always apply thread lock, or replace with new hardware. Kit catalog number 2198T-BE-KITCON contains rail kit components that can be used to replace worn hardware.

2198T-BE-KITCON Contents

Component	Quantity
M4 x 8 mm Torx screws	20
M4 x 20 mm Torx screws	28
Rectangular rail wedge	2
Flat rail wedge	2

For a complete list of tools and accessories that are required for performing these procedures, see .

Procedure	Page
Install or Remove a Position Magnet Assembly	139
Install or Replace a Mover	140
Replace a Straight Motor Module	146
Replace a Curved Motor Module	151
Replace Top and Bottom Rectangular Straight Rails	154
Replace Top and Bottom Rectangular Curved Rails	155
Replace Top and Bottom Flat Straight Rails	157
Replace Top and Bottom Flat Curved Rails	159
Replace Top and Bottom Rectangular Wedges	161
Replace Top and Bottom Flat Wedges	162
Replace a Connector Module	164
Replace an Infield Cover	165

Install or Remove a Position Magnet Assembly

Use this procedure to install or remove a position magnet assembly.

Before You Begin

> ⚠️ **ATTENTION:** Before attempting any service to an iTRAK 5730 system. See <u>Safety Information on page 32</u>.

> ⚠️ **ATTENTION:** A hazard of personal injury or equipment damage exists. The motor magnet protective cover must be installed on a mover whenever the mover is not installed. Before handling a mover with a mover magnet installed, read <u>Safe Magnet Handling on page 37</u>.

What You Need

- T20 Torx bit
- Thread lock (such as Loctite 243)
- 2198T-N1-0304 (south) or 2198T-NN-0304 (north) position magnet assembly
- 2198T-VT0304-E, mover

> 💡 You can check the polarity by examining the color of the magnets or by using a compass.
> - The south position magnet is identified by the black anodized surface finish.
> - The north position magnet is identified by a clear anodized surface finish.

Position magnet assemblies can be replaced while the mover is on the track.

To remove a position magnet assembly, complete this task.

- Remove the M4 x 10 mm Torx screw that secures the position magnet assembly to the mover.

To install a position magnet assembly, complete these steps.

1. Clean the M4 x 10 mm Torx screw and apply fresh thread lock.
2. Place the position magnet onto the locator pins on the underside of the mover top plate.
3. Secure the position magnet assembly to the mover by using the M4 x 10 mm Torx screw supplied with the magnet.

3	⊛	M4 x 10 mm T20 2.8 N•m (25 lb•in)
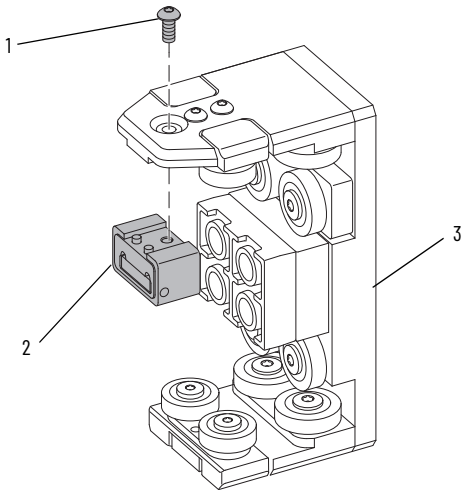
Item	Description
1	Torx head screw
2	Position magnet assembly
3	Mover

IMPORTANT	If you are using the Feedback1CalibrationOffset tag in the Motor Feedback Motion Axis Parameters to make fine adjustments to your mover position calibration, recalibrate the movers that have new position magnets.

Install or Replace a Mover

Use this procedure to install or replace a mover.

Before You Begin

⚠	**ATTENTION:** Before attempting any service to an iTRAK 5730 system. See <u>Safety Information on page 32</u>.

⚠	**ATTENTION:** A hazard of personal injury or equipment damage exists. The motor magnet protective cover must be installed on a mover whenever the mover is not installed. Before handling a mover with a mover magnet installed, read <u>Safe Magnet Handling on page 37</u>.

⚠	**ATTENTION:** A pinch point hazard exists while installing or removing a mover. A mover can have sudden and fast motion due to magnetic attraction. To avoid personal injury, do not put your fingers between the mover and the motor module.

Choose an accessible straight track section next to a curved section of the track where you can remove the top and bottom rectangular wedges and rails. A top flat rail must also be removed.

To replace a mover, position the mover over the curved motor module next to the selected straight motor module. Move all other movers off the selected straight section of the track.

What You Need

- Rail alignment tool (2198T-A08)
- Mover loader tool (2198T-A09)
- 4 mm hex driver
- Thread lock (such as Loctite 243)
- 2198T-VT0304-E, mover

To install or remove a mover, complete these steps.

1. On both ends of the straight rectangular rail that will be removed, remove all M4 x 8 mm hardware from the top and bottom rectangular wedges using a 4 mm hex driver. Remove the wedges.
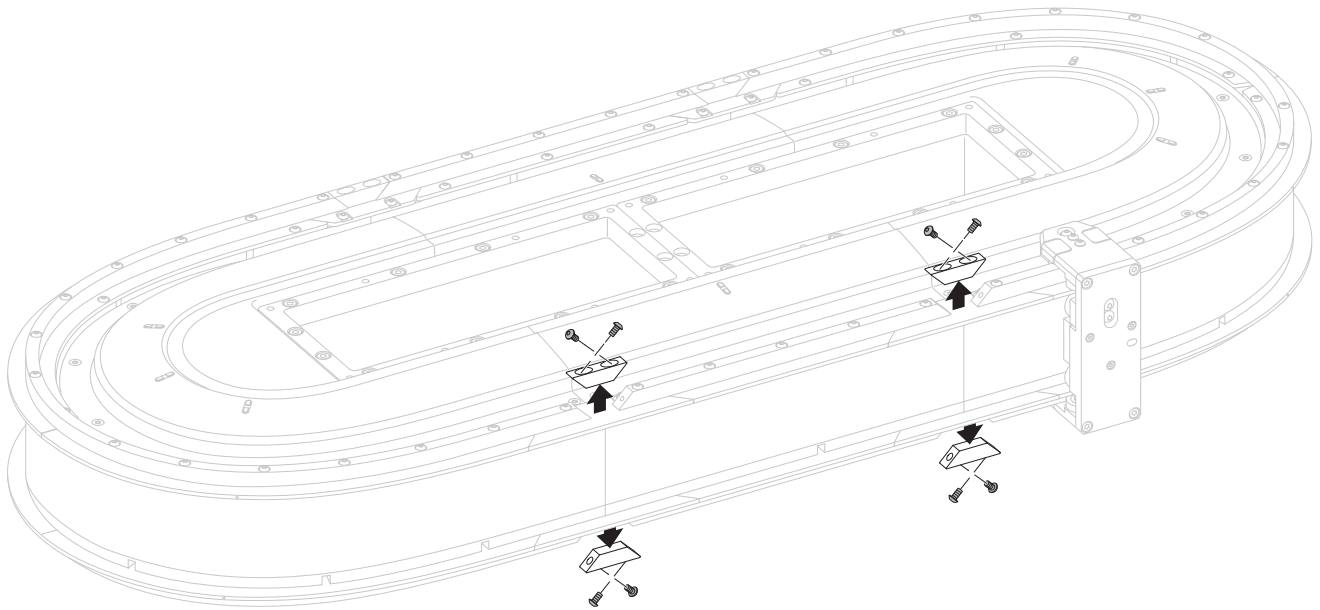
2. Remove the M4 x 20 mm screws from the top and bottom rectangular rails on the same section. Remove the rails.
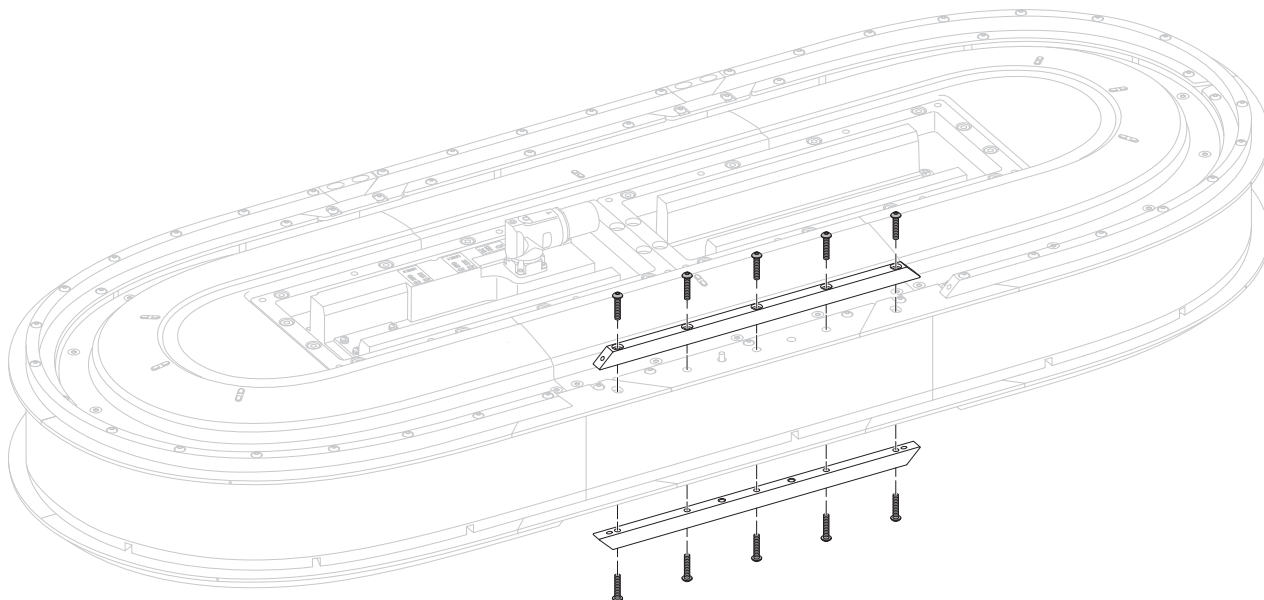
3. Remove the M4 x 8 mm screws from the top flat rail section.
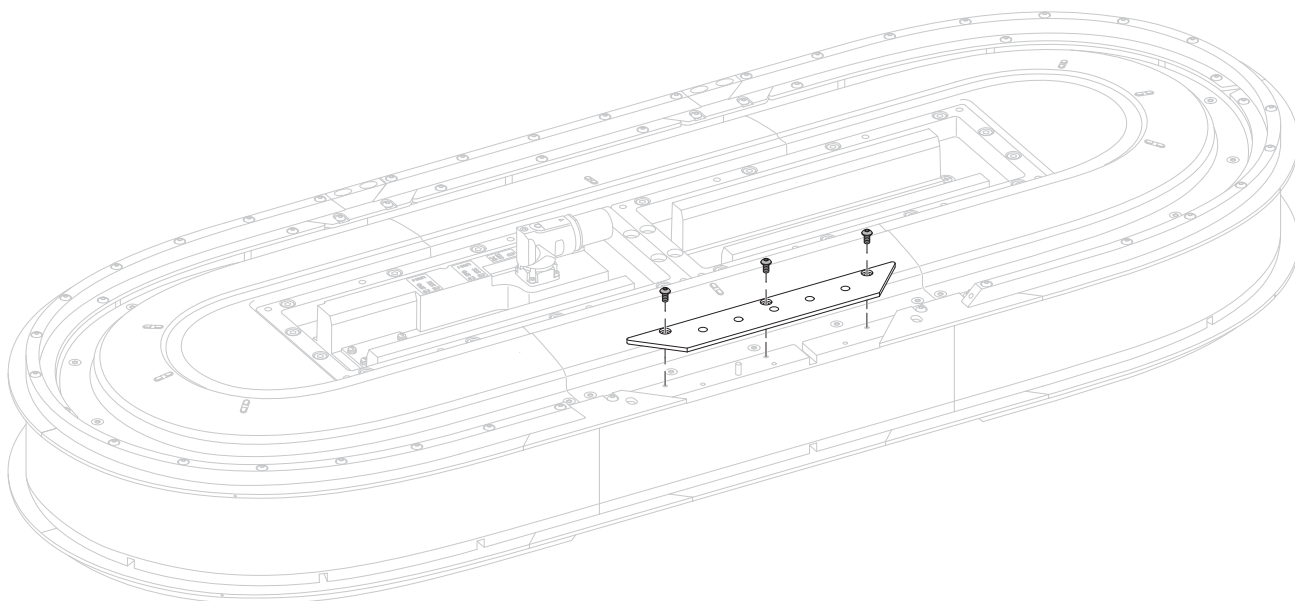
| **IMPORTANT** | Do not remove the bottom flat rail section. |

4. Place the mover loader tool against the rectangular rail section.
5. Secure the mover loader tool to the assembly using two M4 x 8 mm screws.
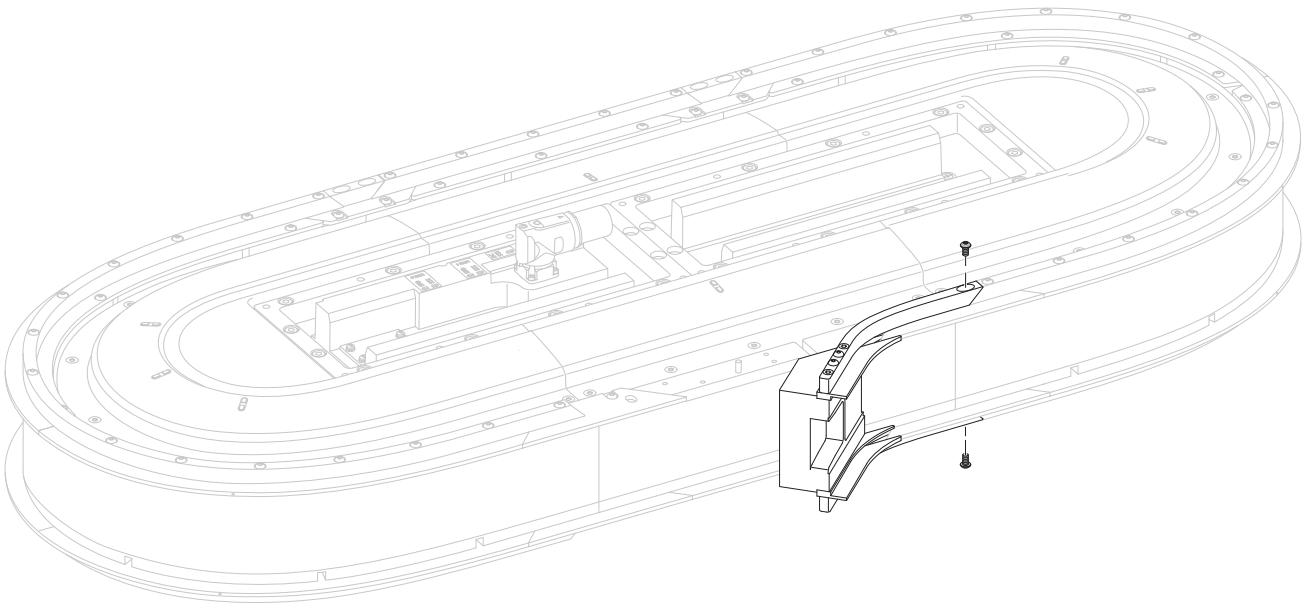
6. Install or replace your mover.

Install a Mover

- As you install a mover, the mover loader tool extracts the motor-magnet protective cover.

  There may be some resistance when pushing the mover across the tool/track interface.
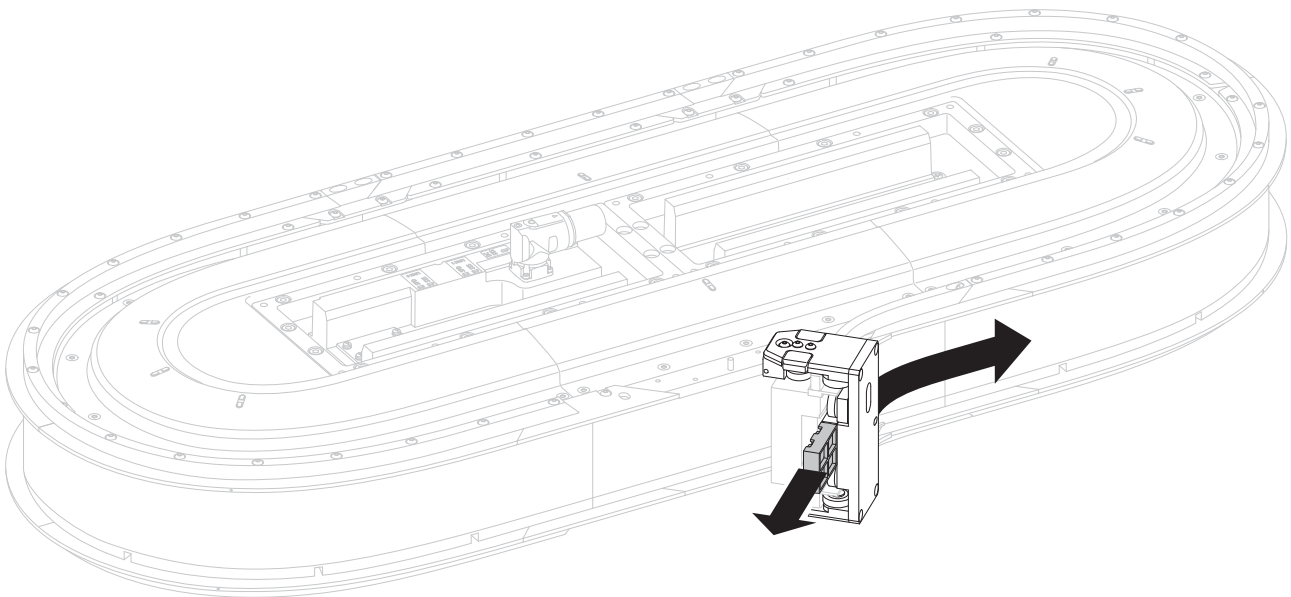
Remove a Mover

a. Place the motor-magnet protective cover in the loader tool.

b. The protective cover is secured to the motor magnet as you remove the mover from the track.

There may be some resistance when pushing the mover across the tool/track interface.
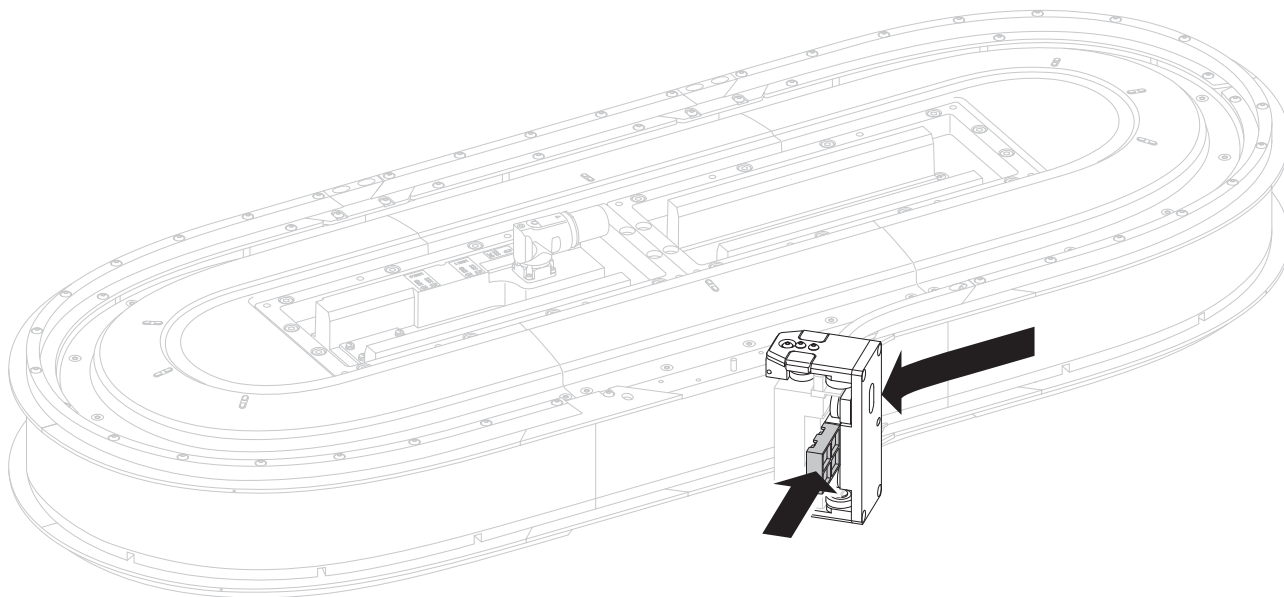
7. Remove the mover loader tool.

8. Clean the screws and apply fresh thread lock.

9. Replace and secure the flat rail by using the M4 x 8 mm Torx screws.

9	⬡	M4 x 8 mm T20 2.3 N•m (20 lb•in)
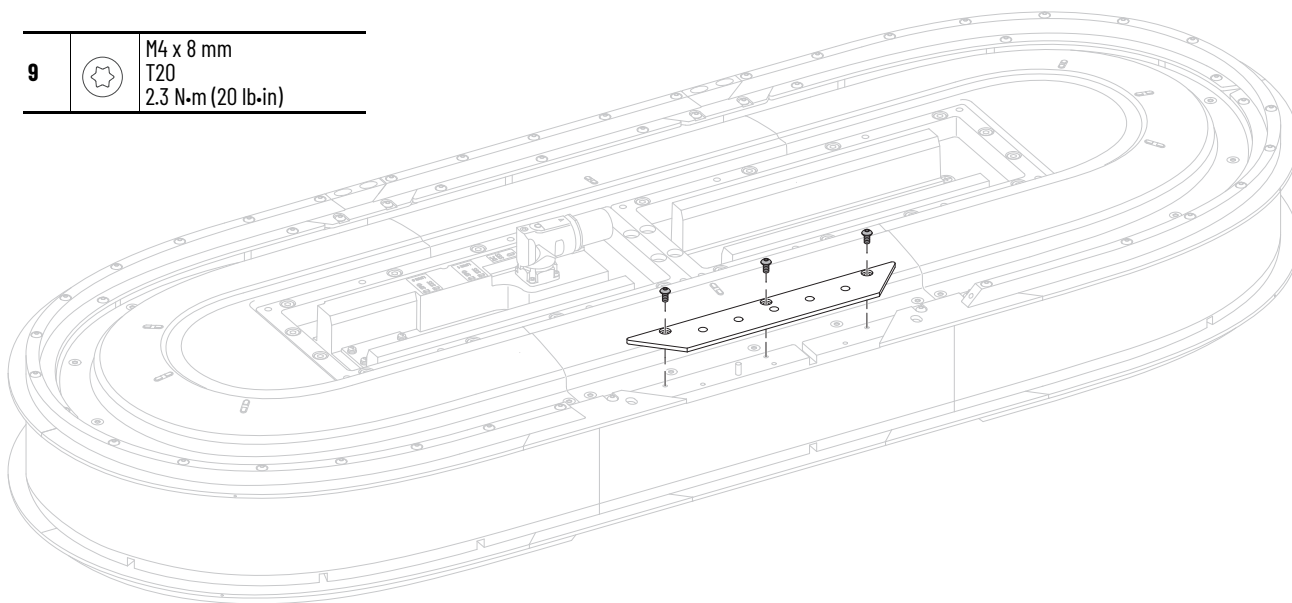
10. Replace the rectangular rails and tighten the middle hardware only.
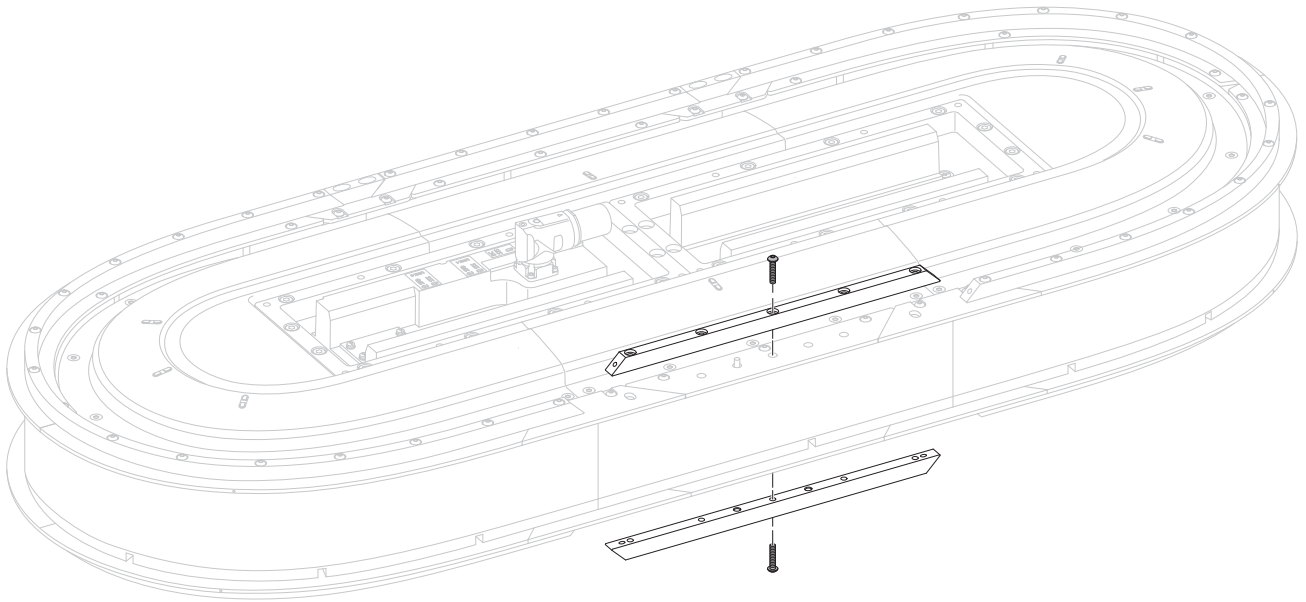
11. Replace rectangular wedges and hand-tighten all hardware.
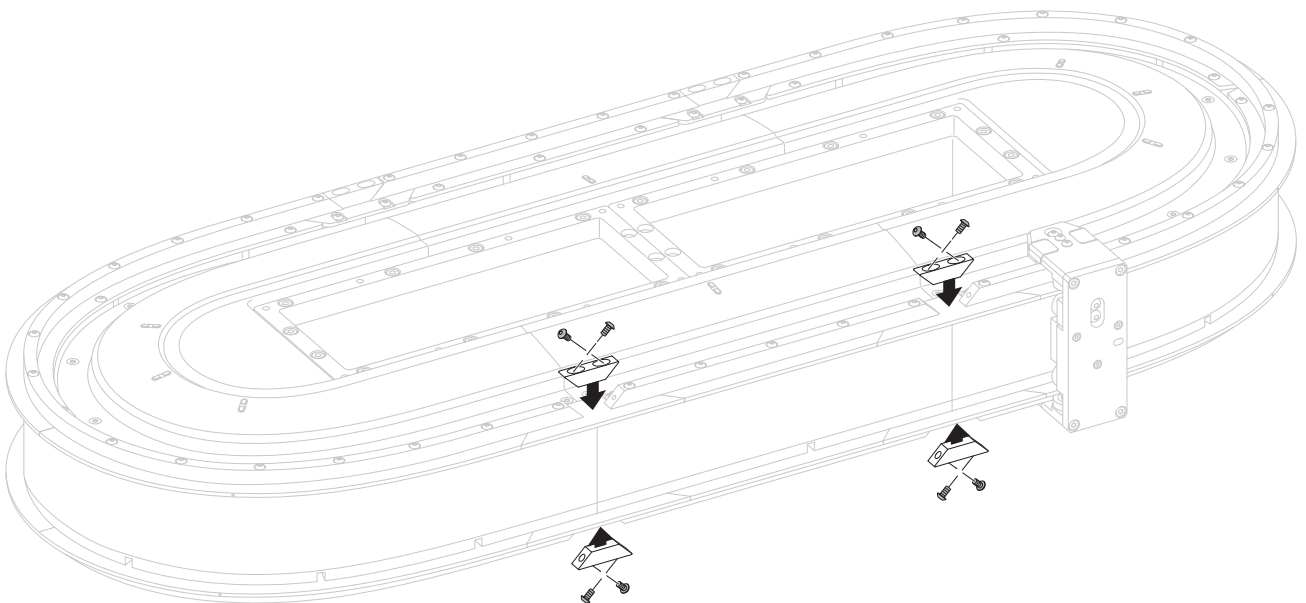
12. Align the rectangular wedges using the rail alignment tool and torque hardware to 2.3 N•m (20 lb•in).

13. Replace all rectangular rail hardware and torque to 2.3 N•m (20 lb•in).

Replace a Straight Motor Module

Use this procedure to replace a straight motor module.

IMPORTANT	The iTRAK 5730 motor modules and safety-related system do not contain serviceable parts. No repair option is provided if there is a motor module anomaly. If there is a failure, replace the motor module.

Before You Begin

⚠️ **ATTENTION:** Before attempting any service to an iTRAK 5730 system. See <u>Safety Information on page 32</u>.

What You Need

- 4 mm hex driver
- #2 Phillips bit
- Hard rubber mallet
- Thread lock (such as Loctite 243)
- 2198T-L20-T0303-A00-S2, straight motor module

To remove the straight motor module, complete these steps.

1. Move the movers away from the motor module that you want to replace.

   If you have to remove the movers, follow the steps in <u>Install or Replace a Mover on page 140</u>.

2. If the infield covers are installed, use a 10 mm hexagonal socket to remove the M6 x 35 mm hex head bolts and remove the covers.

3. Use a #2 Phillips bit to loosen the captive screws on the connector modules that are connected to the motor section that is being removed.

   Remove the modules and set aside.

4. Remove all M4 x 8 mm hardware from the top and bottom rectangular wedges from both sides of the motor module that is being removed and remove the wedges.
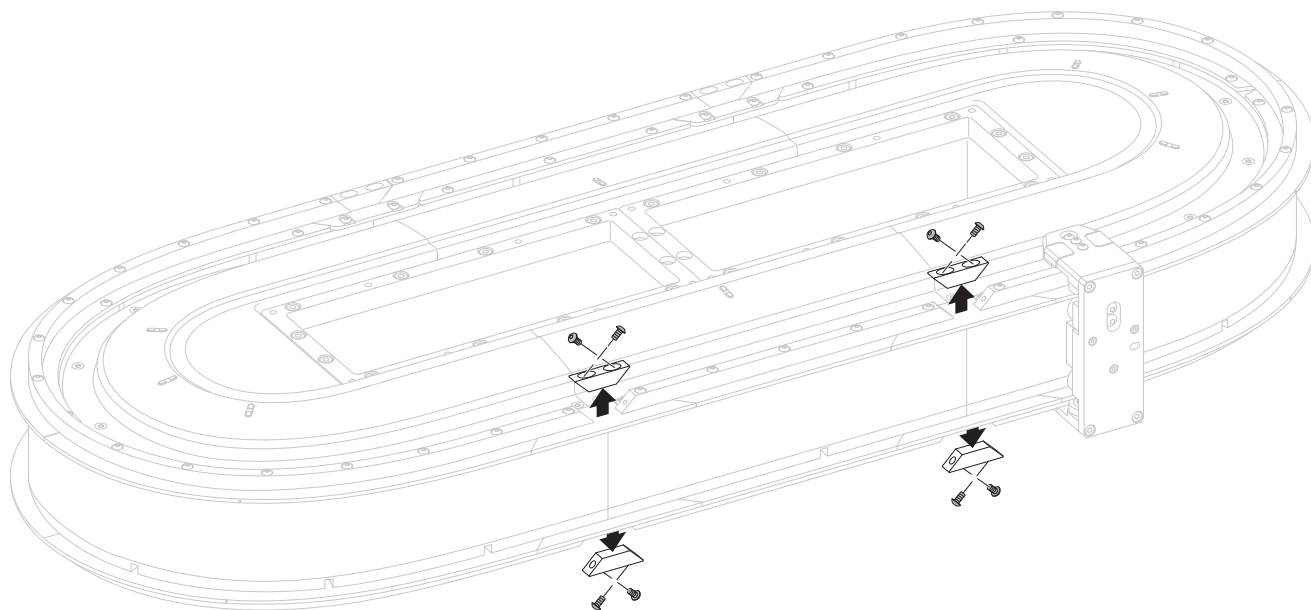
5. Remove the M4 x 20 mm screws from the top and bottom rectangular rails and remove the rails.
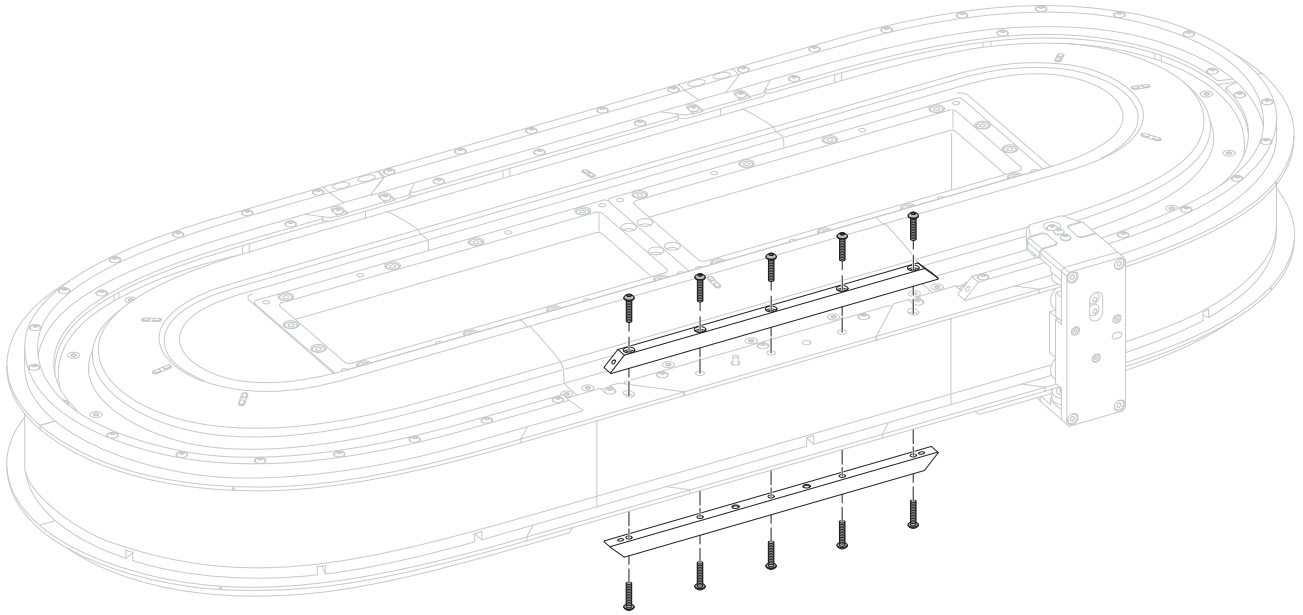
6. Remove the M4 x 8 mm screws from the top and bottom flat rail section and remove the rails.
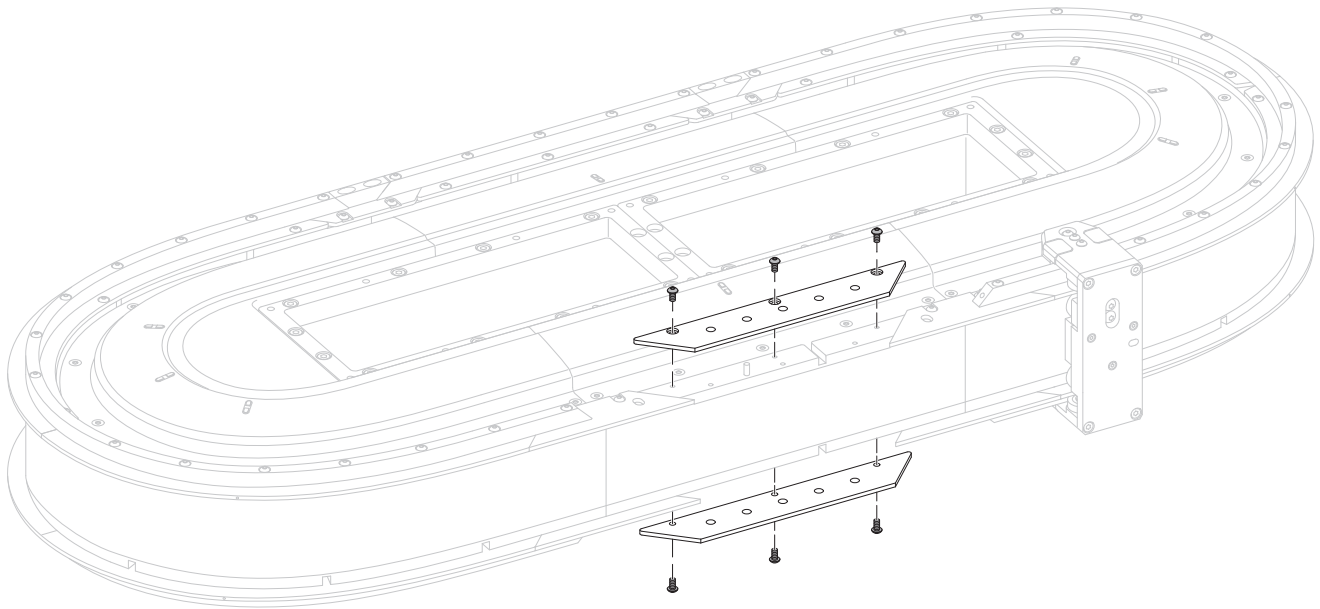
7. Remove the M4 x 8 mm hardware from the flat wedges on either side of the section being removed.
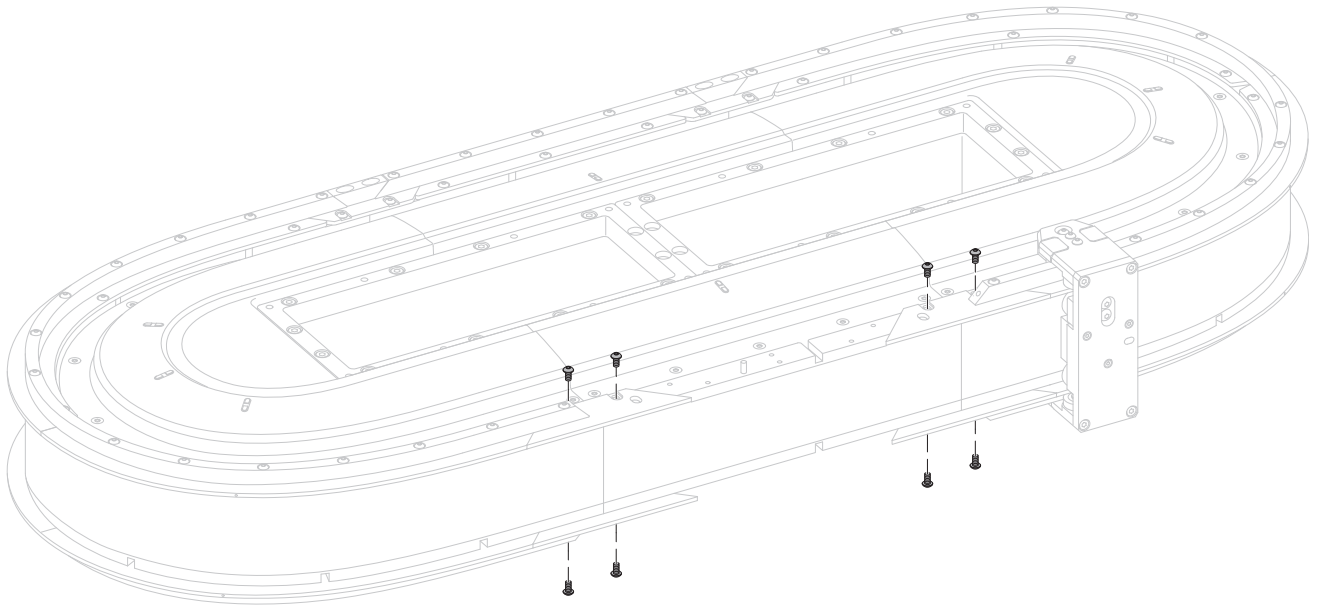
8. Remove the first M4 x 20 mm hardware from either side of the adjacent rectangular sections and remove the wedges.

> ⚠️ **ATTENTION:** The rail components are sharp. Wear appropriate PPE and handle the rails with care.
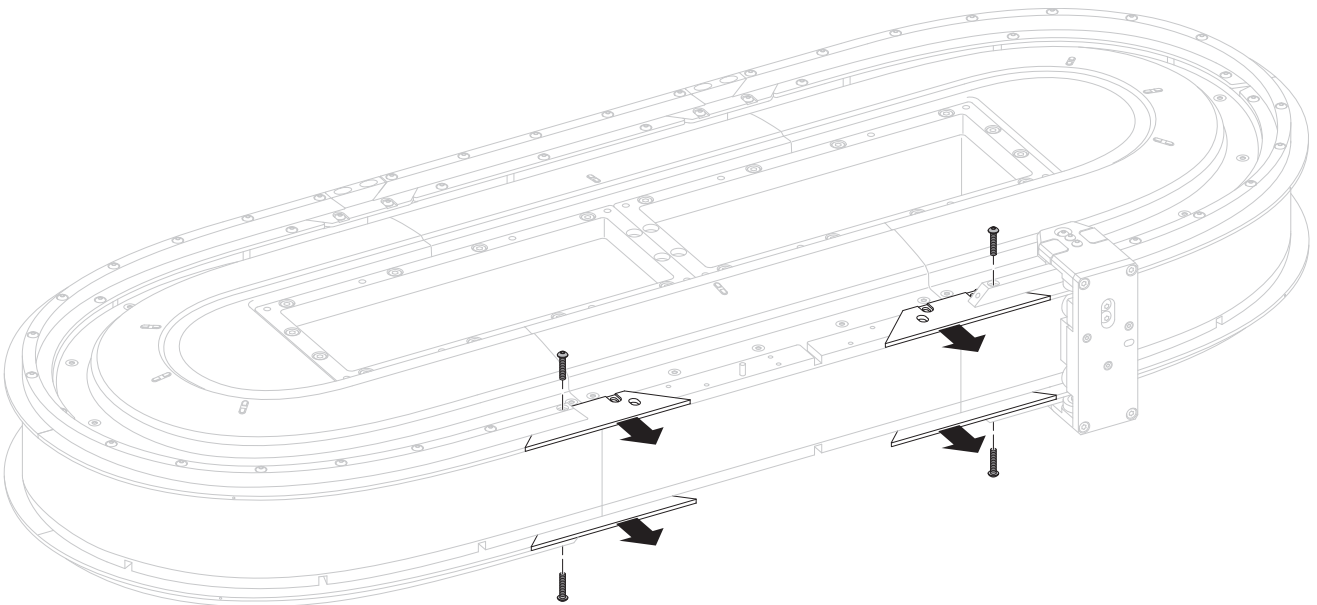
9. Remove the M6 x 20 mm screws from the two bottom structural mounting rings that are connected to the module being replaced. Retain the screws for reuse.
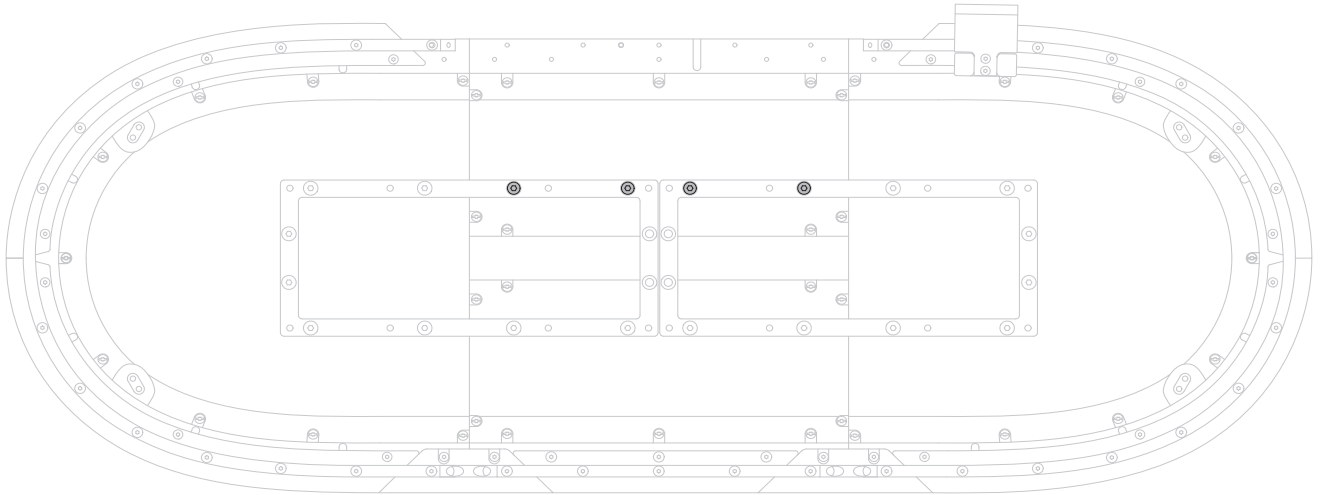
10. Remove M6 x 20 mm screws from the top structural mounting ring. Retain the screws for reuse.
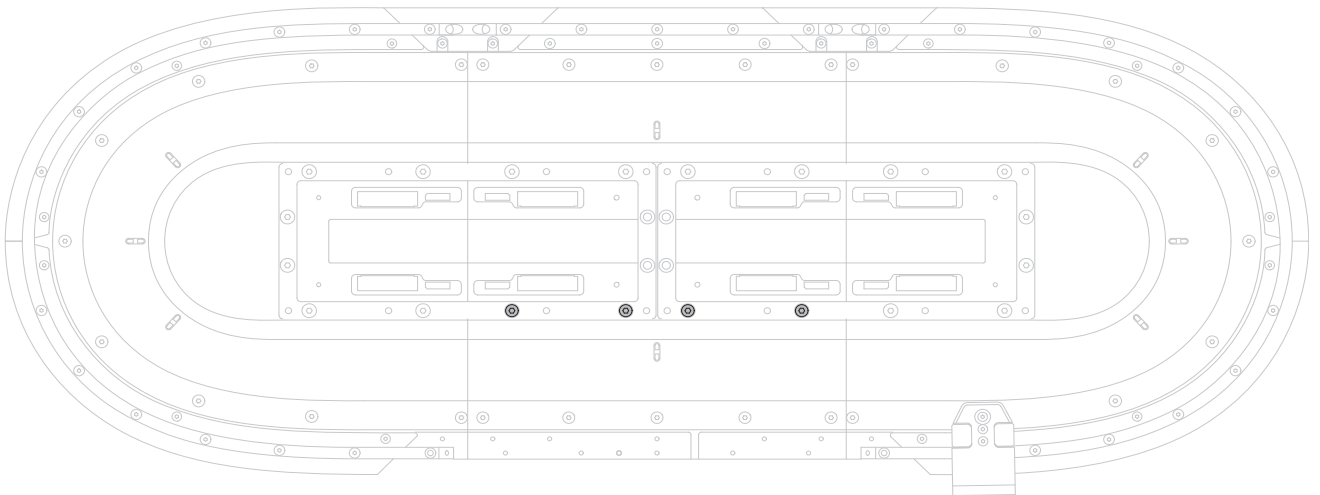
11. Carefully slide the module out of the system and replace with the new straight motor module section.

> If the motor module cannot be easily removed, loosen adjacent mounting ring bolts (but do not remove).
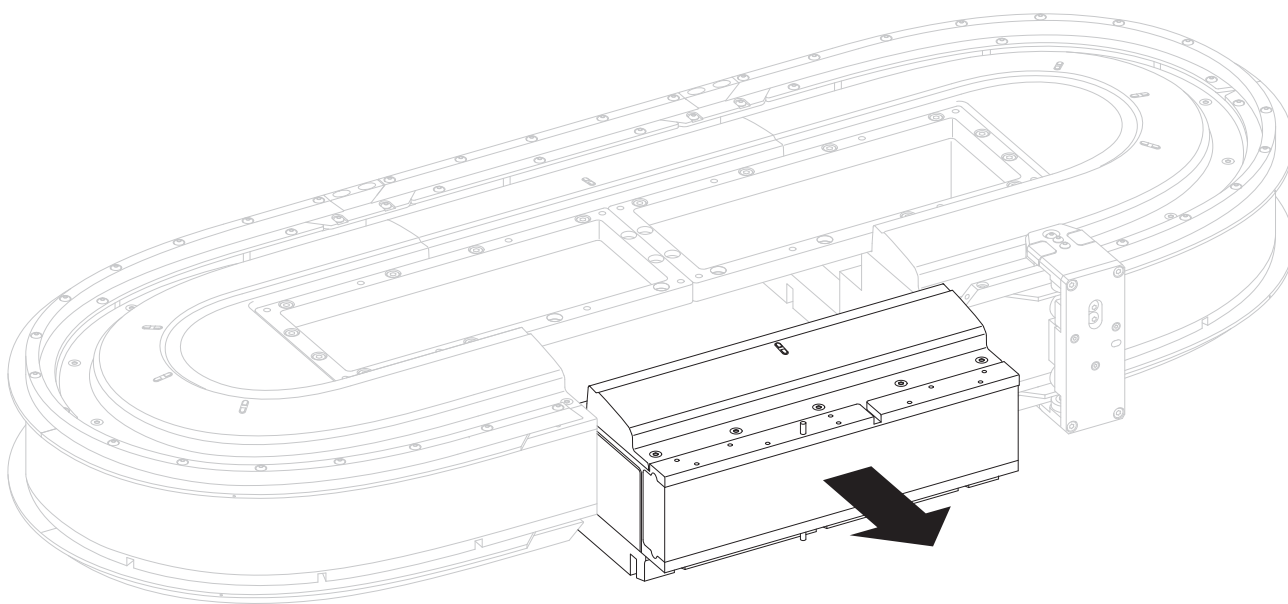
12. Reassemble the module in the reverse order of disassembly, using the following steps:

   a. See Install Top Structural Mounting Rings on page 45 to reinstall the top structural mounting ring.

   b. See Install Bottom Structural Mounting Rings on page 48 to reinstall the bottom structural mounting ring.

   c. See Install Bottom Flat Rails and Flat Wedges on page 49 to reinstall the bottom flat rails and wedges.

   d. See Install Bottom Rectangular Rails on page 52 to reinstall the bottom rectangular rails.

   e. See Install Rectangular Wedges and Align Rectangular Rails on page 54 to reinstall the rectangular wedges and to align the rails.

   f. See Install Top Rails, Wedges, and Connector Modules on page 56 to reinstall the top rails, wedges, and connector modules.

   g. See Optional Infield Covers on page 67 to reinstall the infield covers, if used.

> ⚠ **ATTENTION:** A hazard of personal injury or equipment damage exits. Safety function validation is required after initial installation or replacement of an iTRAK 5730 motor module that is configured for functional safety.

If you have replaced a straight motor module that was configured for Integrated Safety, see Understand Integrated Safety Motor Module Replacement on page 198.

Replace a Curved Motor Module

Use this procedure to replace a curved motor module.

IMPORTANT	The iTRAK 5730 motor modules and safety-related system do not contain serviceable parts. No repair option is provided if there is a motor module anomaly. If there is a failure, replace the motor module.

Before You Begin

⚠️ **ATTENTION:** Before attempting any service to an iTRAK 5730 system. See .

What You Need

- Rail alignment tool (2198T A08)
- 4 mm hex driver
- #2 Phillips bit
- Thread lock (such as Loctite 243)
- 2198T-L20-T0309-D18-S2, curved motor module

To remove the curved module, complete these steps.

1. Slide the movers away from the motor module that you want to replace.

   If you have to remove the movers, follow the steps in .

2. If the infield covers are installed, use a 10 mm hexagonal socket to remove the M6 x 35 mm hex head bolts and remove the covers.

3. Use a #2 Phillips bit to loosen the captive screws on the connector modules that are connected to the motor section that is being removed.

   Remove the modules and set aside.

4. Remove all M4 x 8 mm hardware from the top and bottom rectangular wedges on either side of the curved motor module that is being removed.

5. Remove all M4 x 20 mm hardware from the top and bottom rectangular rails from the curved motor module. Remove the rails.

IMPORTANT	Retain the O-rings for reuse.
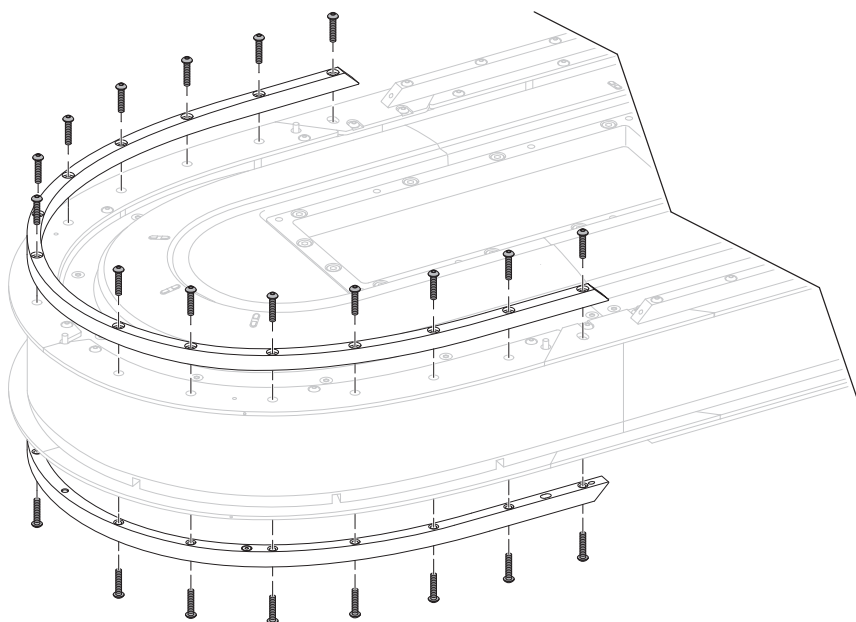
6. Remove all M4 x 8 mm hardware from the top and bottom flat rails from the curved motor module. Remove the flat rails.

IMPORTANT	Retain the O-rings for reuse.
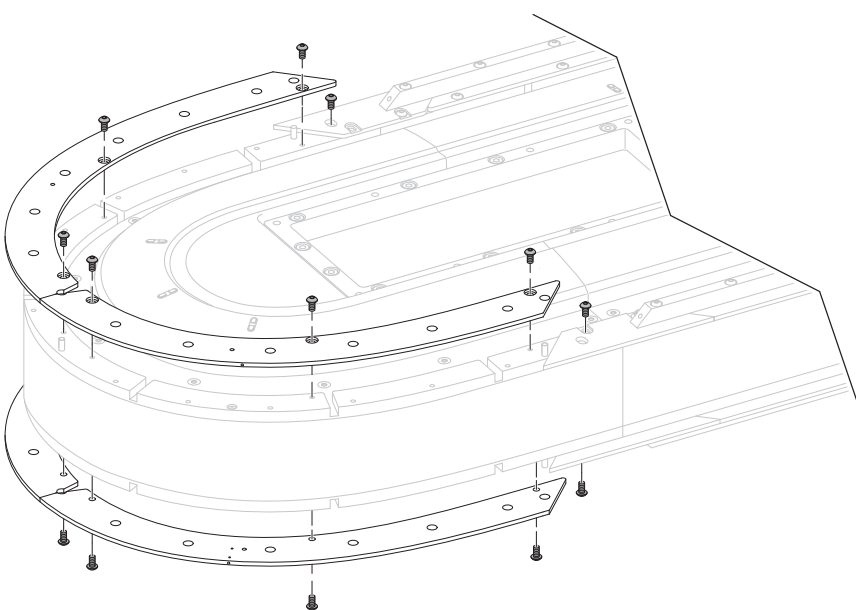
7. Remove the M6 x 20 mm screws from the top structural mounting ring. Retain the screws for reuse.
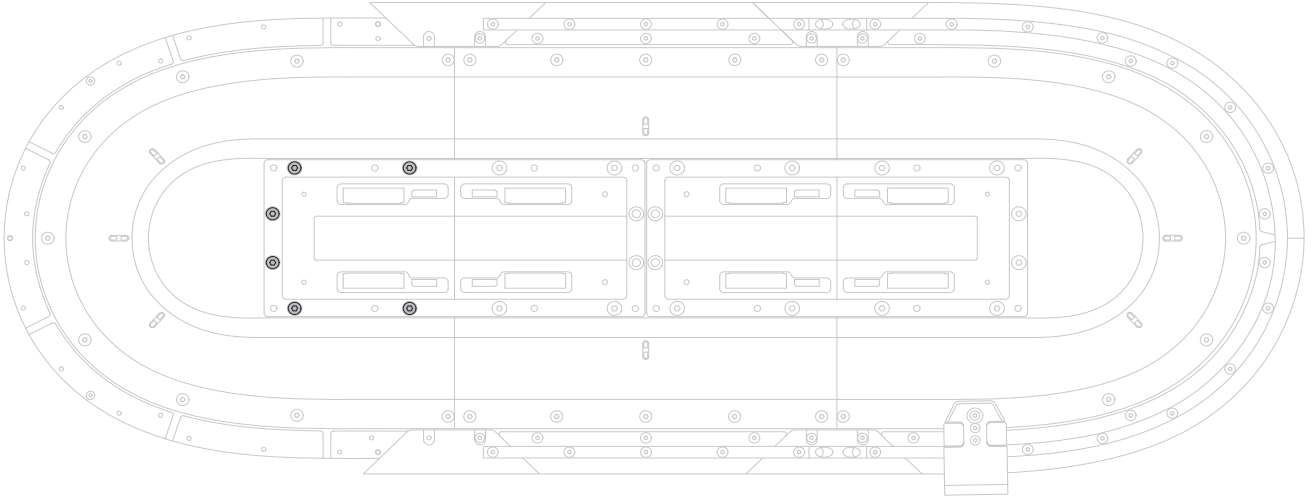
8. Remove the M6 x 20 mm screws from the bottom structural mounting ring. Retain the screws for reuse.
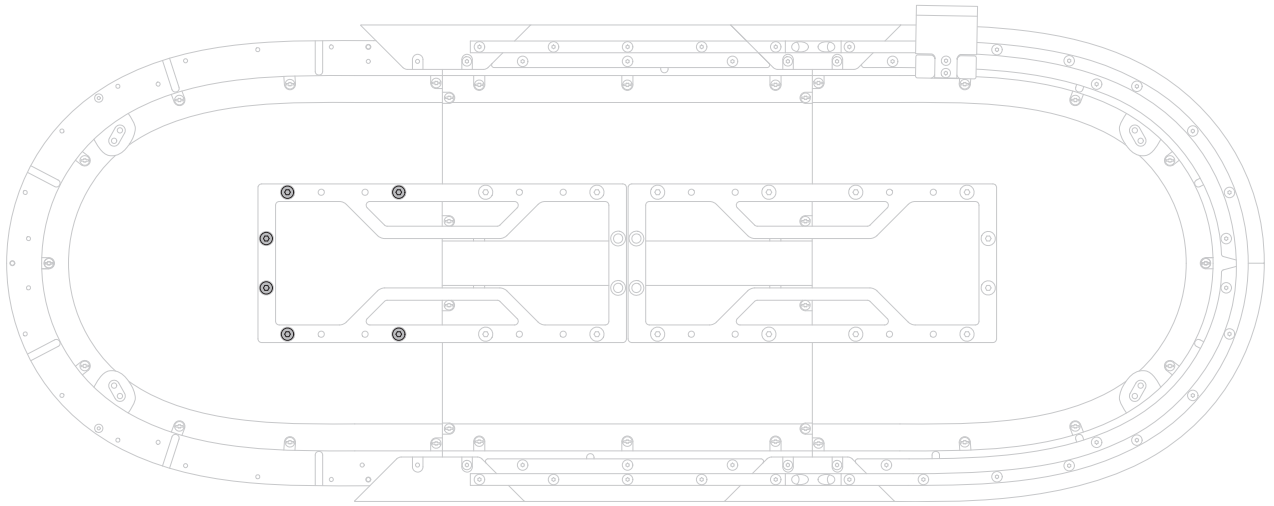
9. Remove the old motor module.

10. Place the new curved motor module and apply torque to the top and bottom structural mounting rings in the following order.

9	⬡	M6 x 20 mm 4 mm 6.8 N•m (60 lb•in)
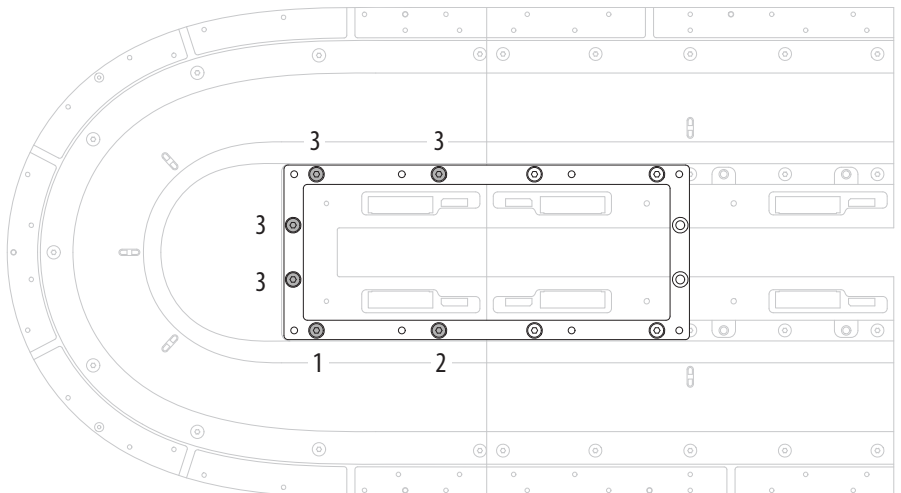
11. Reassemble the module in the reverse order of disassembly, using the following steps:

 a. See [Install Bottom Flat Rails and Flat Wedges on page 49](#) to reinstall the bottom flat rails and wedges.

 b. See [Install Bottom Rectangular Rails on page 52](#) to reinstall the bottom rectangular rails.

 c. See [Install Rectangular Wedges and Align Rectangular Rails on page 54](#) to reinstall the rectangular wedges and to align the rails.

 d. See [Install Top Rails, Wedges, and Connector Modules on page 56](#) to reinstall the top rails, wedges, and connector modules.

 e. See [Optional Infield Covers on page 67](#) to reinstall the infield covers, if used.

> ⚠ **ATTENTION:** A hazard of personal injury or equipment damage exits. Safety function validation is required after initial installation or replacement of an iTRAK 5730 motor module that is configured for functional safety.

If you have replaced a curved motor module that was configured for Integrated Safety, see [Understand Integrated Safety Motor Module Replacement on page 198](#).

Replace Top and Bottom Rectangular Straight Rails

The procedure to replace top or bottom rectangular straight rails are the same. You must also perform the rail alignment procedure. Follow these steps to replace top and bottom rectangular straight rails.

Before you Begin

> ⚠ **ATTENTION:** Before attempting any service to an iTRAK 5730 system. See [Safety Information on page 32](#).

What You Need

- 4 mm hex driver
- Thread lock (such as Loctite 243)
- Straight rail kit:
  - 2198T-BE-ST03, 300 mm (11.81 in.) straight rail kit
  - 2198T-BE-ST06, 600 mm (23.62 in.) straight rail kit
  - 2198T-BE-ST09, 900 mm (35.43 in.) straight rail kit

To remove the top and bottom rectangular rails, complete these steps.

1. Slide the movers away from the rail to be replaced.
2. On either side of the rectangular straight rail that is being replaced, remove the M4 x 8 mm Torx head screws from the rectangular wedges.
3. Remove the wedges.
4. Remove all M4 x 20 mm Torx head screws from the rectangular rail that is being replaced.

5. With the counter-bored holes visible (up), place a straight rectangular rail on a straight flat rail until it is fully seated against the flat rail below.

> The motor modules contain pins along the surface that are used to locate the rails properly.

6. Insert an M4 x 20 mm Torx head screw into the center counter-bored hole on the rail and tighten the screw until it is fully seated against the rail (do <u>not</u> apply final torque).
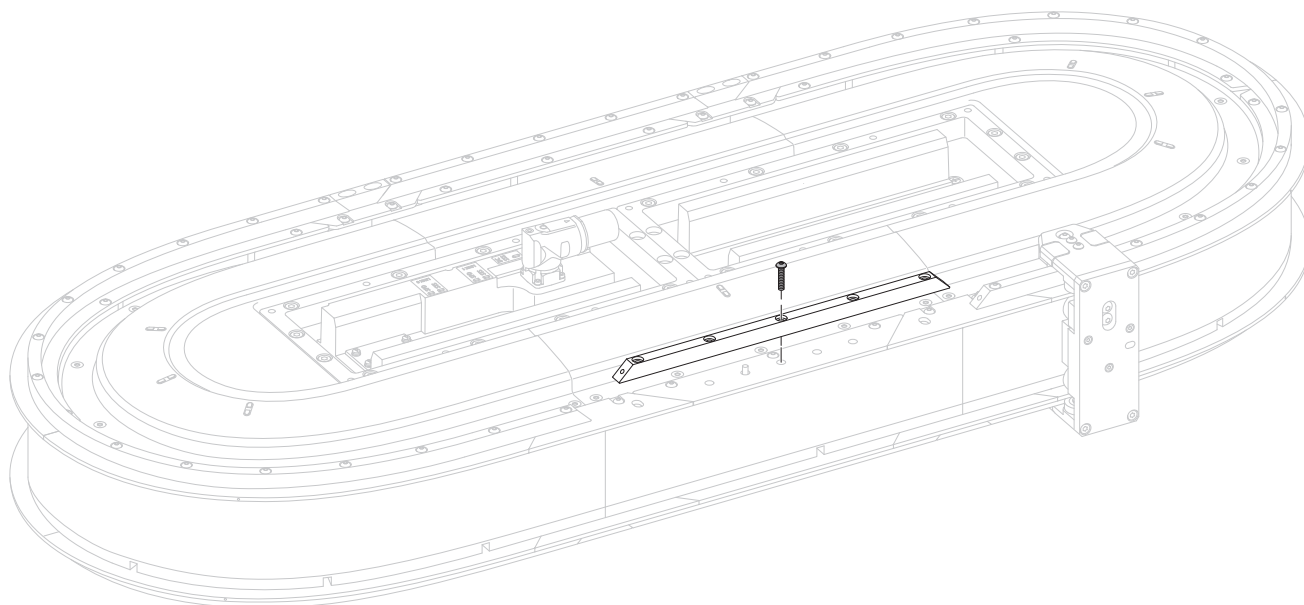
7. Loosen the screw one turn.
8. To align the new rectangular rail, complete the steps that are outlined in [Install Rectangular Wedges and Align Rectangular Rails on page 54](#).

IMPORTANT   If one end of the new rail is next to a curved section, insert and align that wedge first.

Replace Top and Bottom Rectangular Curved Rails

Follow these steps to replace top and bottom rectangular curved rails.

Before you Begin

⚠️ **ATTENTION:** Before attempting any service to an iTRAK 5730 system. See [Safety Information on page 32](#).

What You Need

- T20 Torx bit
- Thread lock (such as Loctite 243)
- 2198T-BE-ED18, curved rail kit

To remove the top and bottom rectangular curved rails, complete these steps.

1. Use a T20 Torx bit to remove hardware from the rectangular curved rail that is being replaced. Remove the rail.

2. Place and seat a rubber O-ring in each of the two lubrication system openings on a curved rectangular-rail section.

> 💡 A drop of oil can help to keep the rubber O-ring in place.
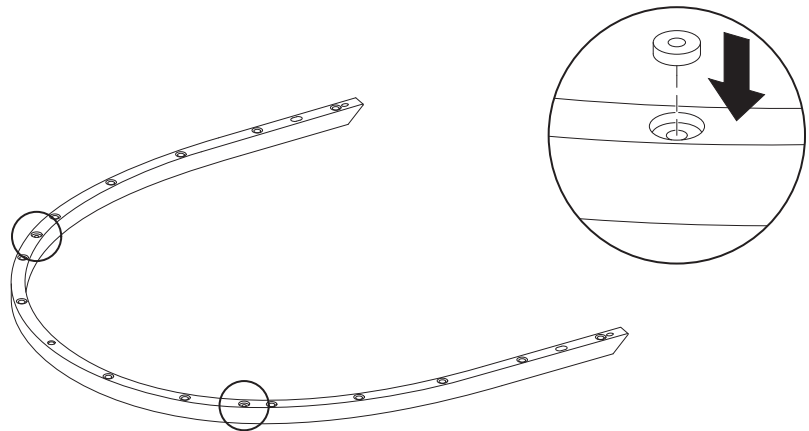
3. With the counter-bored holes visible (up) of the new rail, place on the curved rectangular rail until it is fully seated against the flat rail below.

> 💡 The motor modules contain pins along the surface that are used to locate the rails properly.

4. Insert 14 M4 x 20 mm Torx head screws into the counter-bored holes on the rail.

5. Follow the sequence shown here to apply final torque to the 14 Torx head screws.

5	⚙	M4 x 20 mm T20 2.3 N•m (20 lb•in)
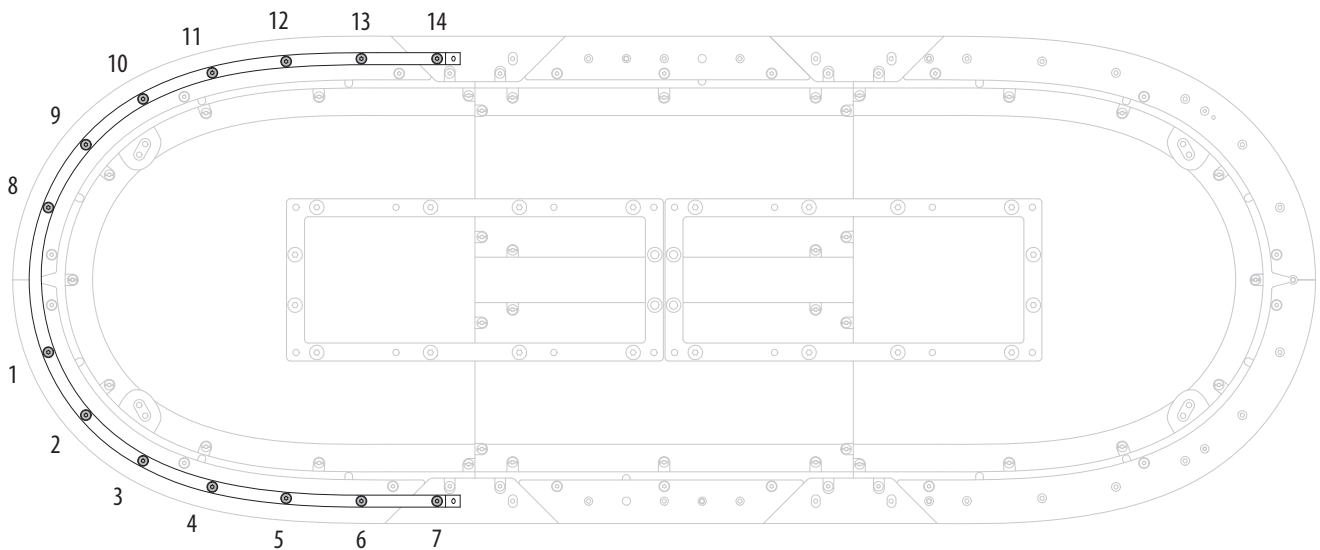
6. Perform the rail alignment procedure as outlined in .

Replace Top and Bottom Flat Straight Rails

Follow these steps to replace top and bottom flat straight rails.

Before you Begin

⚠ **ATTENTION:** Before attempting any service to an iTRAK 5730 system. See <u>Safety Information on page 32</u>.

What You Need

- T20 Torx bit
- Thread lock (such as Loctite 243)
- Straight rail kit
  - 2198T-BE-ST03, 300 mm (11.81 in.) straight rail kit
  - 2198T-BE-ST06, 600 mm (23.62 in.) straight rail kit
  - 2198T-BE-ST09, 900 mm (35.43 in.) straight rail kit

To remove the top and bottom flat straight rails, complete these steps.

1. Remove the hardware from the rectangular rail and rectangular wedges that are installed on the flat straight rail to be replaced.
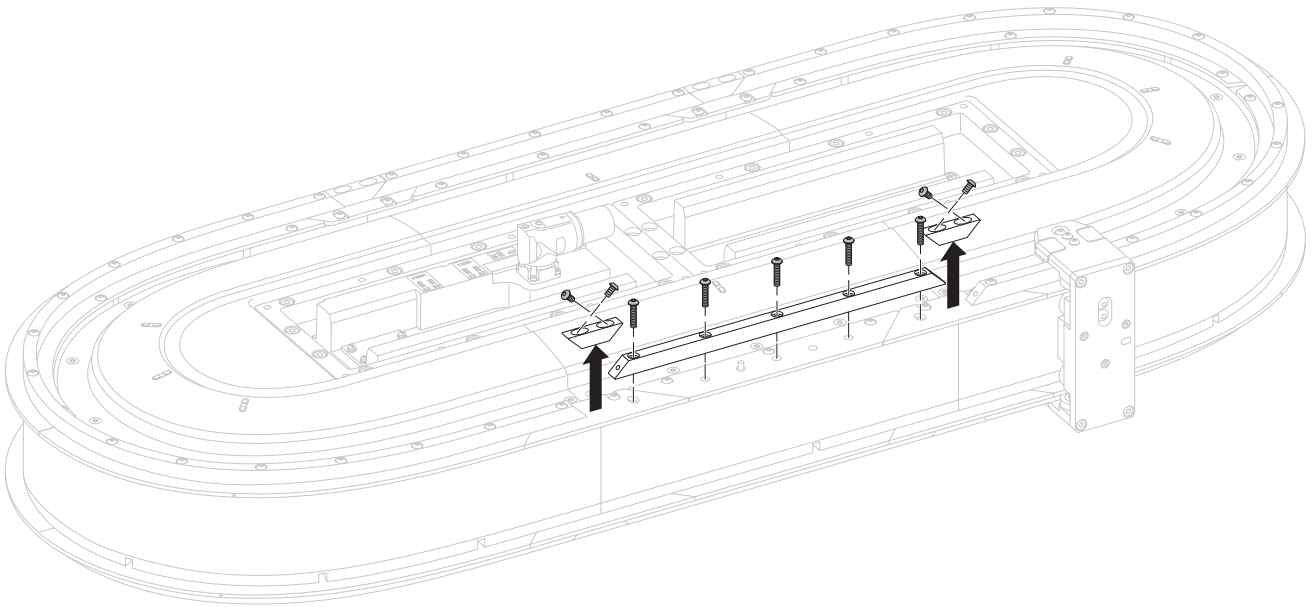
2. Remove the rectangular rails and wedges.
3. Remove the flat rail from the motor module.
4. Remove the protective end-caps from the replacement rail.
5. By using a lint free cloth and isopropyl alcohol, clean the surface of the replacement rail.
6. Loosen the hardware of the flat wedges on either side of the rail being replaced.

7. With the counter-bored holes visible (up), place the straight flat rail on the motor module.

8. Insert and finger-tighten an M4 x 8 mm Torx screw in each of the counter-board holes.

9. Loosen each of the M4 x 8 mm Torx screws one half of a turn.

> The screw heads should remain in the counter-bore just below the surface of the flat rails. The screws must be loose enough to allow for rail alignment adjustments.
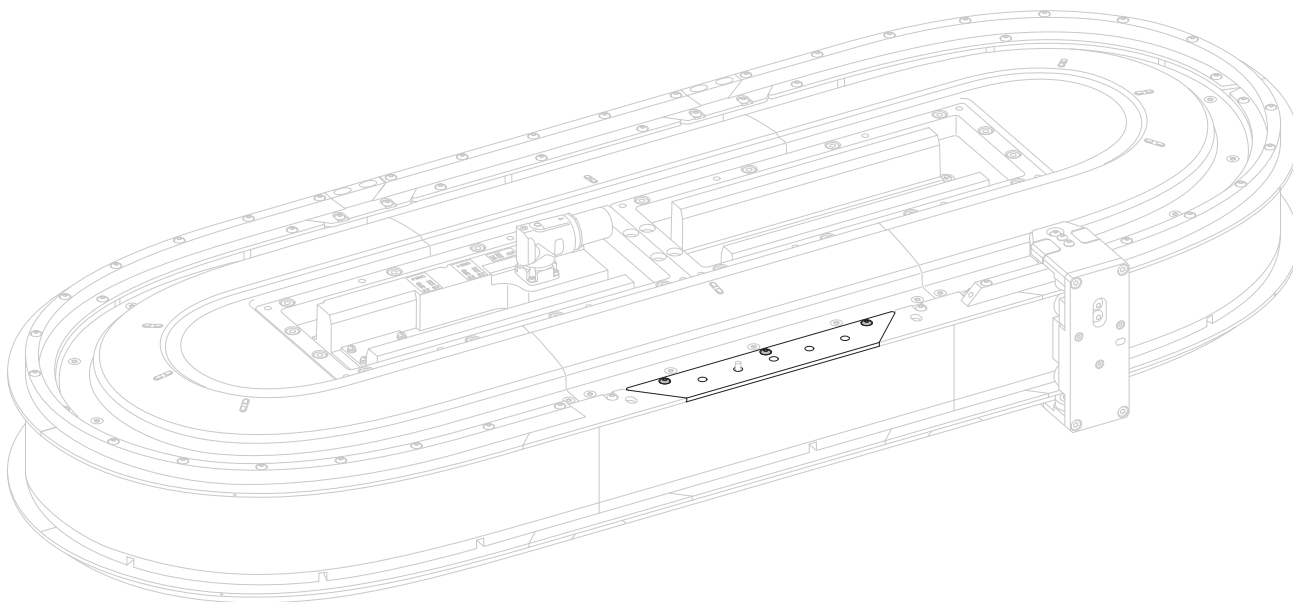
10. Move the rail inward or outward until it stops against the screw head.
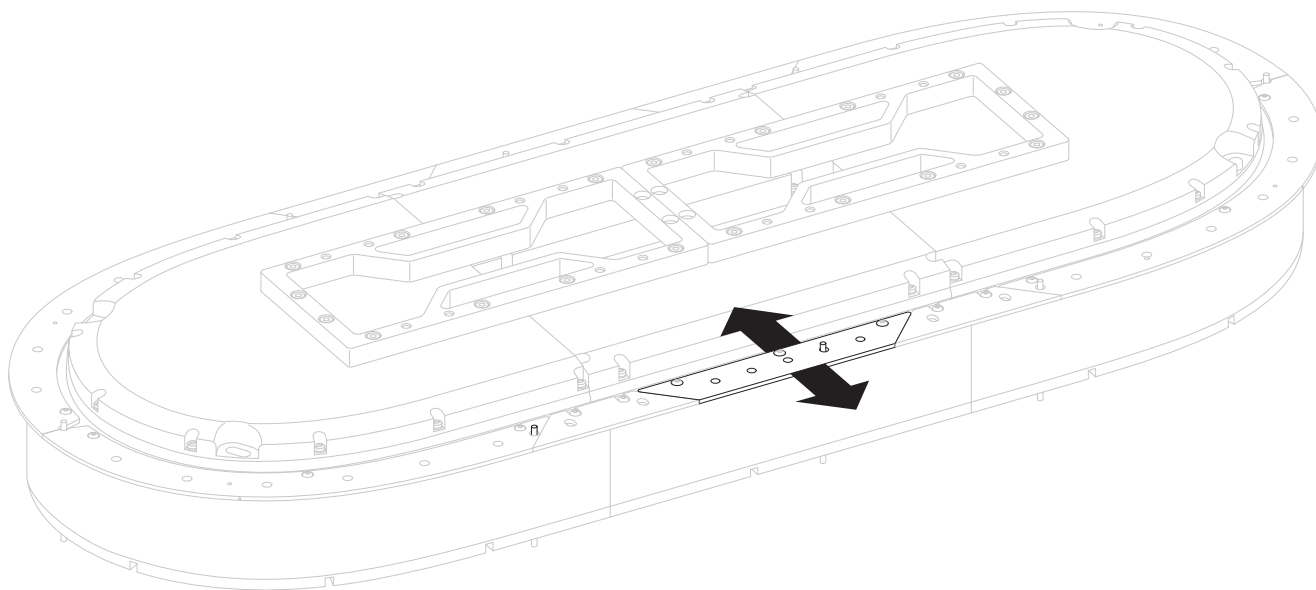
11. While holding the rail in place, hand-tighten the M4 x 8 mm Torx screws (do <u>not</u> apply final torque).

12. Align the two flat rail wedges with the straight rail section.
13. While holding the wedge rail in place, hand-tighten the M4 x 8 mm Torx screws (do <u>not</u> apply final torque).
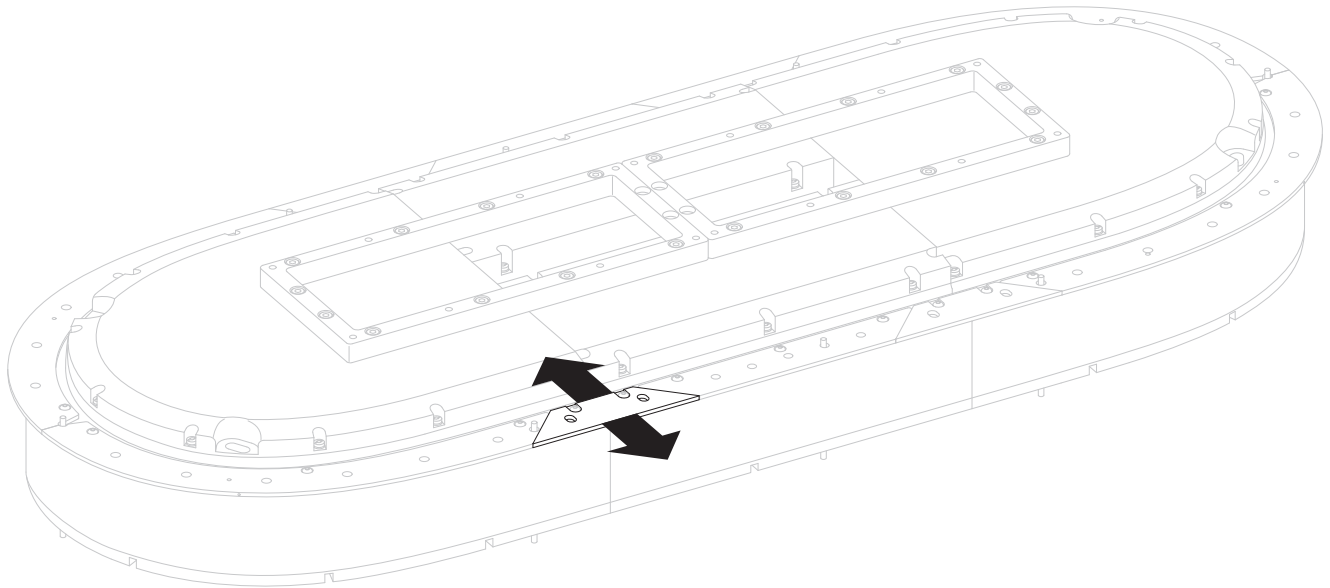
14. When all flat rails are in alignment, apply final torque to all screws.
15. Replace the rectangular rails and wedges as outlined in <u>Replace Top and Bottom Rectangular Straight Rails on page 154</u> and <u>Replace Top and Bottom Rectangular Wedges on page 161</u>

Replace Top and Bottom Flat Curved Rails

Follow these steps to replace top and bottom flat curved rails.

Before you Begin

⚠ **ATTENTION:** Before attempting any service to an iTRAK 5730 system. See <u>Safety Information on page 32</u>.

What You Need

- T20 Torx bit
- Thread lock (such as Loctite 243)
- Isopropyl alcohol
- 2198T-BE-ED18, curved rail kit

To remove the top and bottom flat curved rails, complete these steps.

1. Use a T20 Torx bit to remove hardware from the rectangular curved rail on the flat curved rail that is being replaced.

IMPORTANT   Do not lose the O-rings in the bottom of the curved rectangular rail.

2. Use a T20 Torx bit to remove hardware from the flat curved rail.
3. Remove the protective end-caps from the replacement rail.

4. By using a lint free cloth and isopropyl alcohol, clean the surface of the replacement rail.

5. Place a rubber O-ring in each of the two lubrication system openings on each of the curved motor modules.

> A drop of oil can help to keep the rubber O-ring in place.
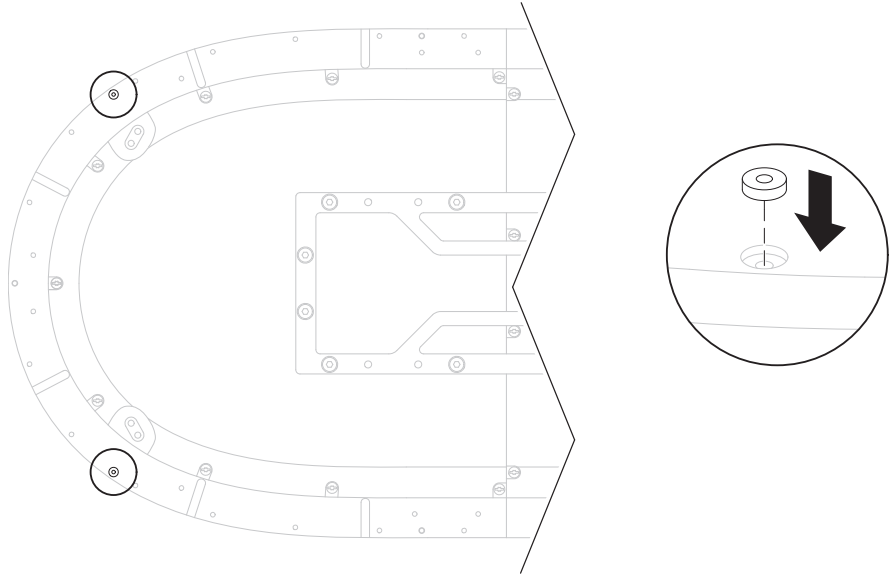
6. With the counter-bored holes visible (up), place the new curved flat rails on the surface of the curved motor modules and align the mounting holes.

> The motor modules contain pins along the surface that are used to locate the rails properly.

7. Apply final torque to curved flat rail hardware.

7	⬡	M4 x 8 mm T20 2.3 N•m (20 lb•in)
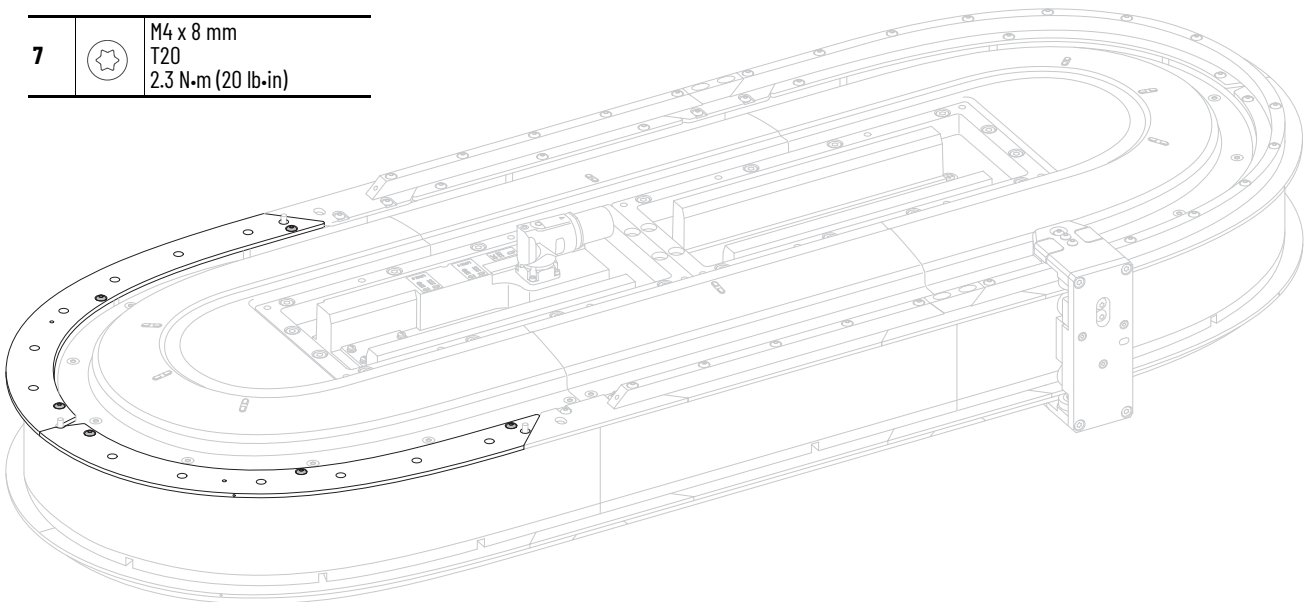
8. Replace the rectangular rails and wedges as outlined in <u>Replace Top and Bottom Rectangular Straight Rails on page 154</u> and <u>Replace Top and Bottom Rectangular Wedges on page 161</u>

Replace Top and Bottom Rectangular Wedges

Follow these steps to replace top and bottom rectangular wedges.

Before you Begin

> ⚠️ **ATTENTION:** Before attempting any service to an iTRAK 5730 system. See <u>Safety Information on page 32</u>.

What You Need

- T20 Torx bit
- Thread lock (such as Loctite 243)
- Isopropyl alcohol
- Rectangular wedge

To remove the top and bottom rectangular wedges, complete these steps.

1. Use a T20 Torx bit to remove the wedge hardware, and remove the wedge.
2. Place a rectangular wedge in the gap between the rectangular rails.
3. Insert an M4 x 8 mm Torx head screw into the counter-bored holes on the wedge and finger-tighten the screws.
4. With the tool clamps unlocked, place the rail alignment tool (cat. no. 2198T-A08) over the center of the wedge.

> 💡 Verify that you can access each of the screws in the wedge with the driver bit, without interference from the alignment tool.
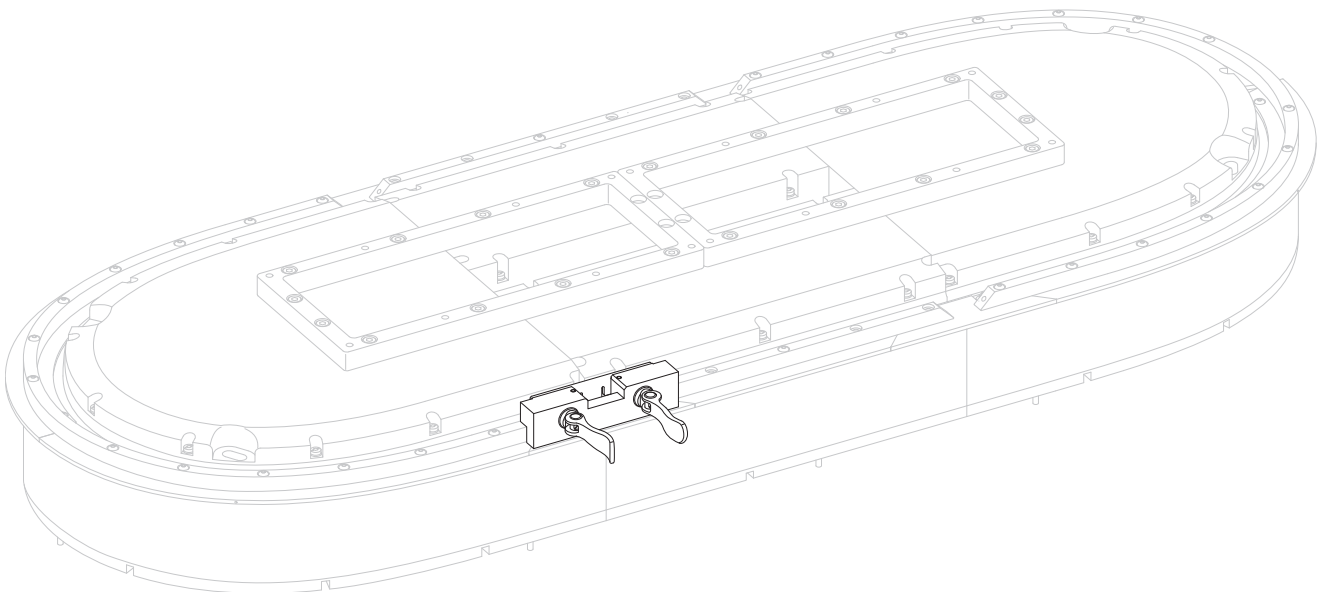
5. While you press downward on the rail alignment tool to ensure that the tool is in full contact with the rails, lock the tool clamps.

6. Apply final torque to screws in the wedge.

6	✶	M4 x 8 mm T20 2.3 N•m (20 lb•in)
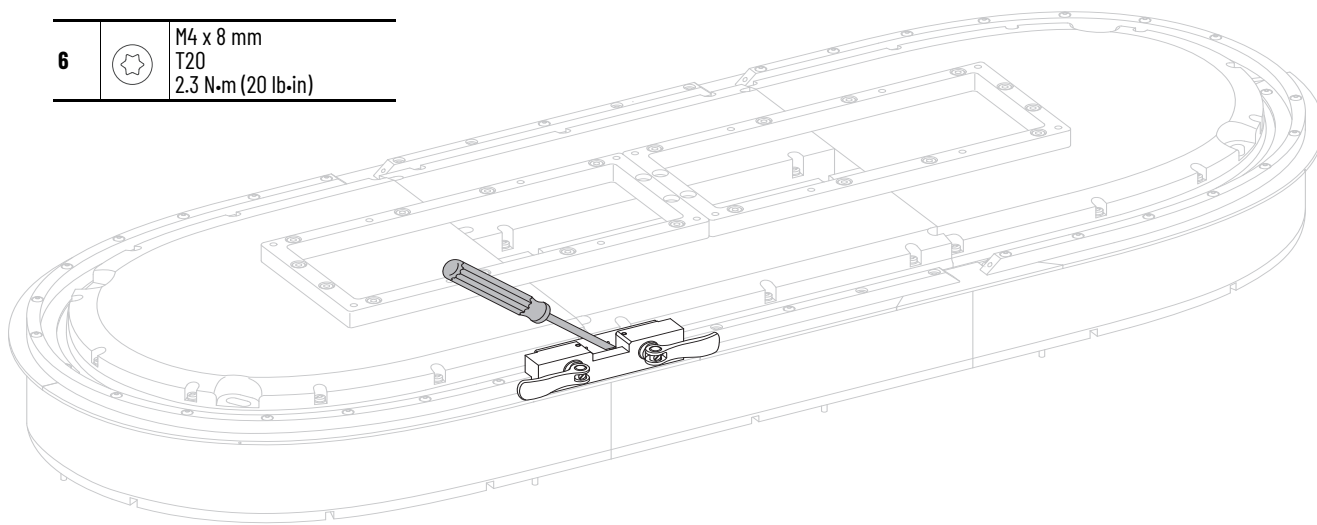
Replace Top and Bottom Flat Wedges

Follow these steps to replace top and bottom flat wedges.

Before you Begin

> ⚠️ **ATTENTION:** Before attempting any service to an iTRAK 5730 system. See <u>Safety Information on page 32</u>.

What You Need

- T20 Torx bit
- Thread lock (such as Loctite 243)
- Isopropyl alcohol
- Flat wedge

To replace the top and bottom flat wedges, complete these steps.

1. Use a T20 Torx bit to remove hardware from the rectangular curved rail on the flat wedge that is being replaced.

2. Use a T20 Torx bit to remove hardware from the flat wedge.

3. Remove the protective end-caps from the replacement rail.

4. By using a lint free cloth and isopropyl alcohol, clean the surface of the replacement rail.

5. With the counter-bored holes visible (up), place a straight flat-rail wedge on the motor module.

6. Bias the wedge rail to align with the flat rails on either side and hand-tighten the M4 x 8 mm Torx screws.
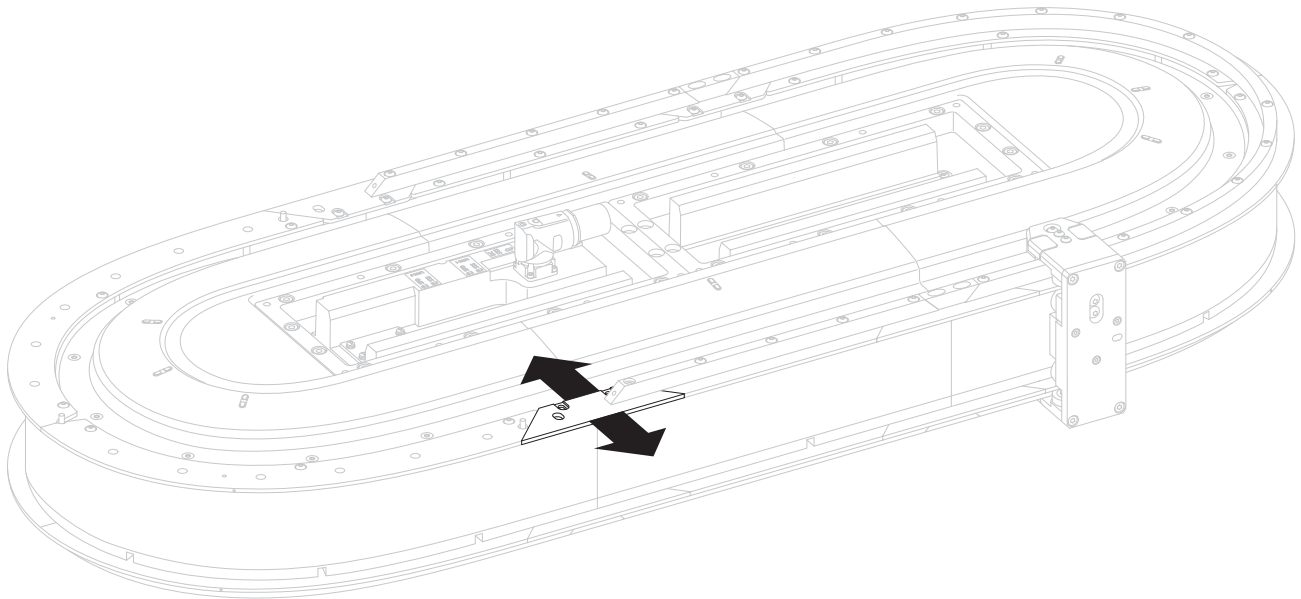
7. When all flat rails are in alignment, apply final torque to all screws.

7	⊛	M4 x 8 mm T20 2.3 N•m (20 lb•in)
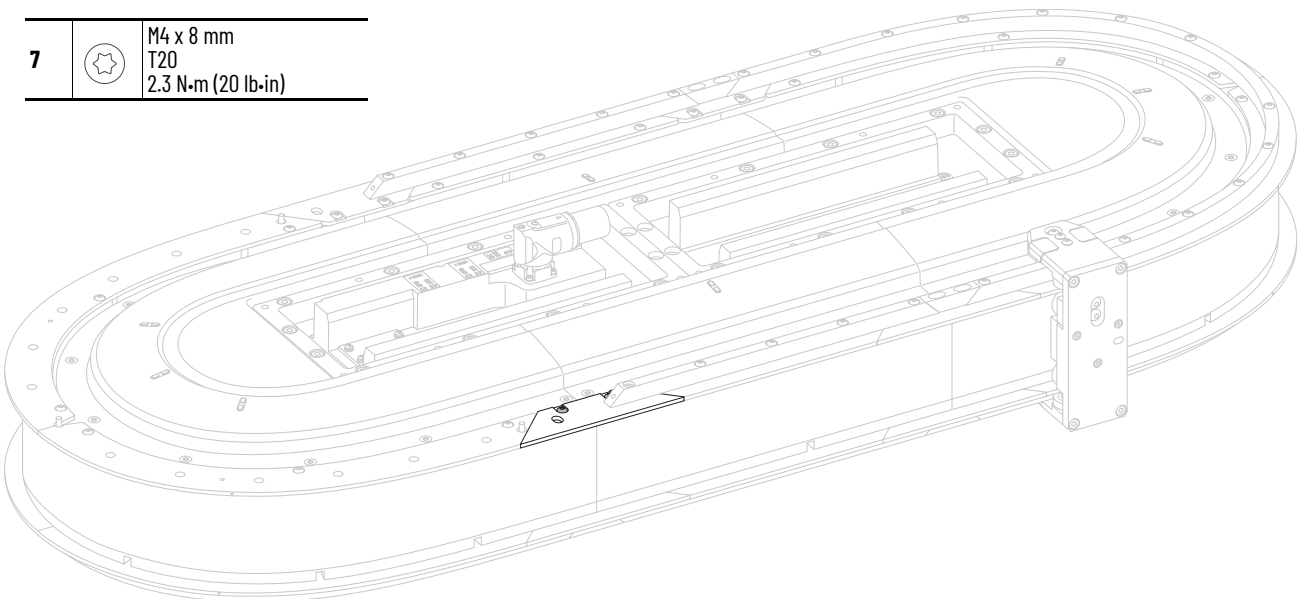
8. Replace the rectangular rails and wedges as outlined in and .

Replace a Connector Module

Use this procedure to replace a connector module.

Before You Begin

⚠️ **ATTENTION:** Before attempting any service to an iTRAK 5730 system. See <u>Safety Information on page 32</u>.

What You Need

- #2 Phillips bit
- Connector module:
  - 2198T-CT-CP, power and control input connector module
  - 2198T-CT-P, power input with control pass-through connector module
  - 2198T-CT, power and control pass-through connector module

To remove the connector module, complete these steps.

1. If necessary, remove the infield covers in the reverse order of installation. See <u>Optional Infield Covers</u> on page <u>67</u>.

2. If you are replacing a power and control input connector module (cat. no. 2198T-CT-CP) or power with control pass-through connector (cat. no. 2198T-CT-P), complete steps a and b.

   a. Rotate the power cable connector outer housing to the unlocked position.

   b. Remove the cable connector from the motor power connector on the connector module.

3. If you are replacing a power and control input connector module (cat. no. 2198T-CT-CP), complete steps a and b.

   a. Rotate the Ethernet cable outer housing counter-clockwise until it is free from the cable-connector mounting ring on the module.

   b. Remove the Ethernet cable from the connector on the connector module.

4. Use a #2 Phillips bit to loosen the captive screws on the connector module and remove the module.

8	⊕	M4 Retained Screw #2 Phillips 2.3 N•m (20 lb•in)
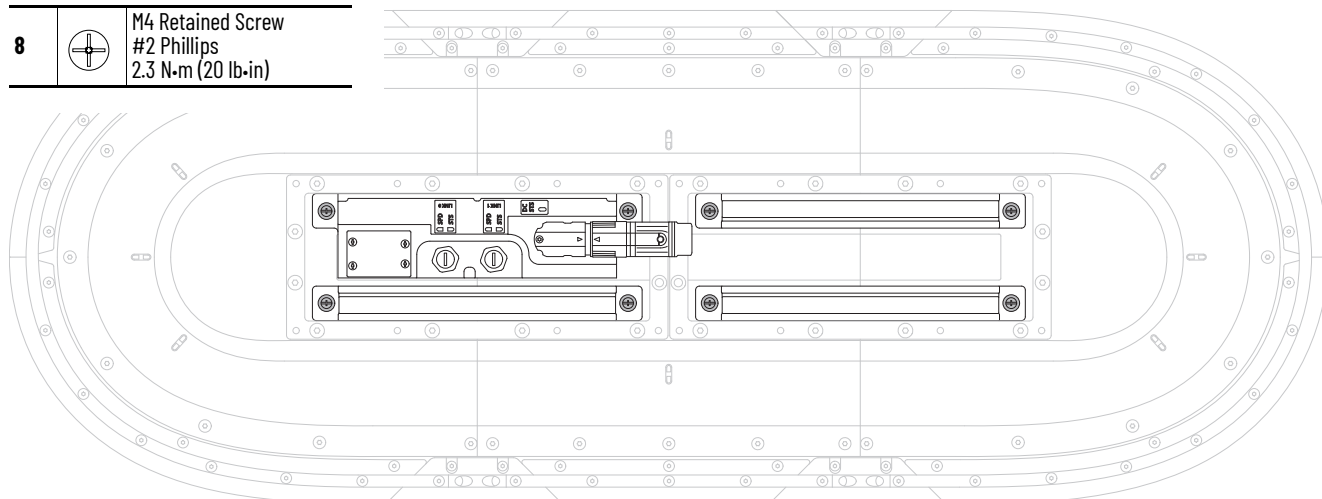
Replace an Infield Cover

Use this procedure to replace an infield cover.

Before You Begin

> ⚠️ **ATTENTION:** Before attempting any service to an iTRAK 5730 system. See <u>Safety Information on page 32</u>.

What You Need

- 10 mm hexagonal socket
- Thread lock (such as Loctite 243)
- Infield cover kit:
    - 2198T-AS-CD18-U, curve covers
    - 2198T-AS-CA03-U, straight cover
    - 2198T-AS-CD18, curve covers with Allen-Bradley® logo

To remove an infield cover, complete these steps.

1. Remove the M6 x 35 hex head bolts and remove the infield cover.
2. Repeat <u>step 1</u> for the remaining covers.

3	⬡	M6 x 35 mm 10 mm 4.5 N•m (40 lb•in)
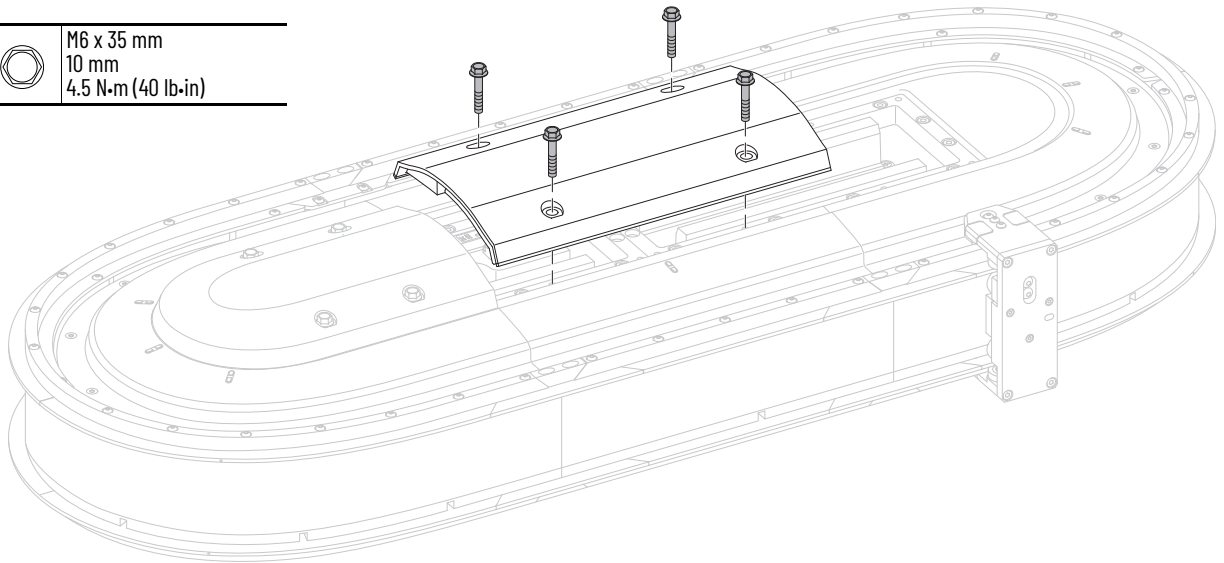
3. Apply thread lock to the M6 x 35 hex head bolts.
4. Secure the infield covers to the assembly.

Replace a Lubricant Cartridge

The lubricant pumps are manufactured by perma and are part of the perma STAR CONTROL product line. See the perma STAR CONTROL product line webpage. That webpage links to the perma STAR CONTROL operating instructions, perma publication 109301_STAR_CONTROL_PE_A01_int23. In the operating instructions, see the section "LC exchange". That section provides the steps to replace a lubricant cartridge.

Lubrication

The rail and rail bearings are an open system that requires a regular schedule of lubrication. To avoid breakdown of the bearings, the bearings must have a film of oil on them. Typical indications of bearing breakdown are discoloration and excessive wear on the inner and outer bearing surfaces. The time interval between applications of lubricant depends on the length of stroke, duty cycle, and environmental factors. Use 68 viscosity mineral oil, such as Kluber 4-UH1-68N, to lubricate the rails and bearings.

To provide a regular schedule of lubrication, we recommend that you use the iTRAK Lubrication System, catalog number 2198T-AL-SYS-4. Installation instructions for the lubrication system start on page 63. If you design and supply your own oil bleed system, you can use these installation instructions for guidance.

Once the iTRAK Lubrication System or customer provided oil bleed system is installed, see either Lubrication Using an iTRAK Lubrication System or Lubrication Using a Customer Provided Oil Bleed System on page 172.

Lubrication Using an iTRAK Lubrication System

Once the iTRAK lubrication system is installed and wired, use the following procedures to configure the lubrication system:

- Perform Initial Lubrication with an iTRAK Lubrication System on page 167
- Configure Normal Operation Lubrication with an iTRAK Lubrication System on page 170

Perform Initial Lubrication with an iTRAK Lubrication System

During first-time start or when the rails have been cleaned, complete the following steps.

1. See the perma STAR CONTROL product line webpage. That webpage links to the perma STAR CONTROL operating instructions, perma publication 109301_STAR_CONTROL_PE_A01_int23. In the operating instructions, see the section titled Configuration IMPULSE. Use the procedure in Configuration IMPULSE to configure each pump in the system as follows.

   a. Set the operation mode to IMPULSE mode.

   b. Set the size of the lubricant cartridge of the pump.

   c. Set the volume of oil dispensed per impulse to 0.7 cc (0.024 oz).

2. Download the lubrication-system-pump-control routine by clicking this link: Rxx_LubePump [ROUTINE].L5X.

3. Add an output module to the IO tree.
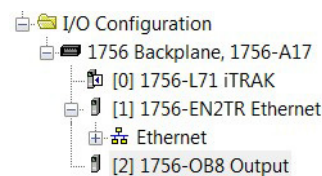
4. Import the lube pump control routine.

Lube Pump Control Routine Successfully Imported
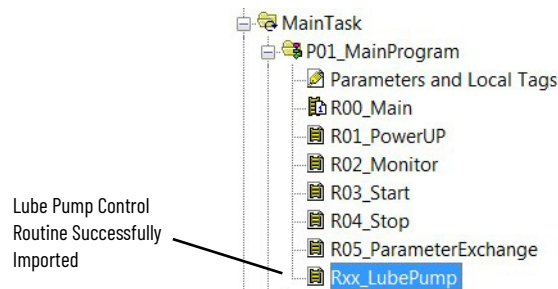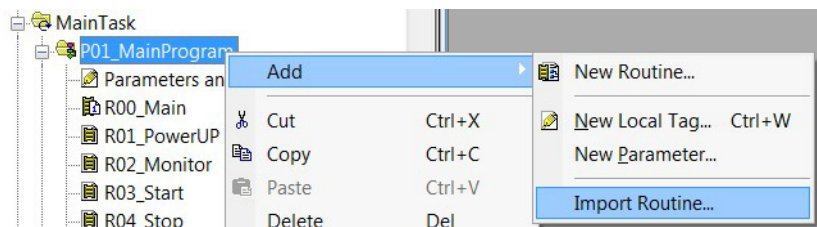
5. In the main routine, add a Jump to Subroutine (JSR) that jumps to the lube pump control routine.

```
                                              ┌─JSR──────────────────────┐
                                              │ Jump To Subroutine        │
                                              │ Routine Name  Rxx_LubePump │
                                              └───────────────────────────┘
```
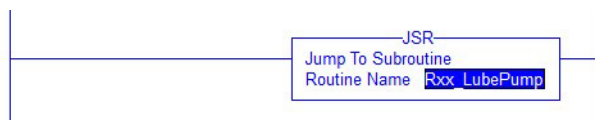
6. Open Parameters and Local Tags and search for Out_LubePump.

Name		Alias For	Base Tag	Usage	Data Type	Description	External Acces	Constant	Style	Connections	←
⊟ Out_LubePump				Output	DINT		Read/Write	☐	Decimal	{0:2} Connections	
Out_LubePump.0					BOOL		Read/Write		Decimal	Local:2:O.Data.0	
Out_LubePump.1					BOOL		Read/Write		Decimal	Local:2:O.Data.1	
Out_LubePump.2					BOOL		Read/Write		Decimal		

7. In the Connections column, configure connections for the outputs to the pumps.

8. Open Parameters and Local Tags and search for the following input parameters:
   - Inp_PrimePump - signal to start the sequence of lubricant dispensations for initial lubrication. Each dispensation in the sequence corresponds to one impulse to the pumps. The Inp_PrimePump signal is triggered from the PLC program or HMI.
   - Inp_PrimeTime - the number of seconds between each lubricant dispensation during initial lubrication.

Name		Alias For	Base Tag	Usage	Data Type	Description	External Acces	Constant	Style	Connections
Inp_PrimePump				Input	BOOL		Read/Write	☐	Decimal	
Inp_PrimeTime				Local	REAL	(time in seconds)	Read/Write	☐	Float	
Inp_RunPump				Input	BOOL		Read/Write	☐	Decimal	RunProduction
Inp_RunTime				Local	REAL	(time in seconds)	Read/Write	☐	Float	

9. Configure the Inp_PrimePump parameter as shown in the example in .

10. Configure the Inp_PrimeTime parameter as shown in the example in , with one addition; in the Description column, include the number of seconds between each lubrication dispensation during initial lubrication. The recommended value is 600 seconds (10 minutes).

11. To start the prime time, or initial lubrication sequence, trigger the first Inp-PrimePump lubrication dispensation using the PLC program or HMI.

12. While initial lubrication is underway, and a sequence of oil dispensations occurs on the interval in Inp_PrimeTime, monitor the rails at the oil application sites to see if oil has appeared on the rails. It may be hard to see if oil has appeared. You may need to feel the rails at the oil application sites.

13. Once oil appears on the rails, run the iTRAK 5730 system at 0.5 m/s mover velocity, while letting the Inp_PrimePump lubrication sequence continue to run.

> **IMPORTANT** It is important that you not run the iTRAK 5730 system too early, before oil has appeared on the rails. Only run the iTRAK 5730 system once oil has already begun to contact the rails. Running the system with no oil damages the rails.
>
> It is less important, but still a consideration, to avoid starting to run the iTRAK system too long after oil has appeared on the rails. If oil begins to appear on the rails and the lubrication system continues to pump out more oil without the movers moving, oil drips away and is wasted. Once oil appears on the rails, moving the movers allows the mover cams to distribute the oil onto the rails, helping prevent dripping from the application sites.

14. While the iTRAK 5730 system runs, the lubrication system continues to dispense 0.7 cc (0.024 oz) of lubricant onto each rail every 10 minutes. To determine whether each rail has been lubricated along the entire perimeter of the track, monitor the rails. It may be hard to see if each rail has been lubricated along the entire perimeter of the track. If so, you can check if the rails are fully lubricated as follows:

    a. Stop the motion of the movers.

    b. Select a test location on each rail that is farthest from the oil application sites.

    c. At the test location, on the surface of the rail that contacts the mover roller, touch the rail with a finger, and determine if it is adequately lubricated:

    - If oil is not present, there are signs of rusting, or most of the oil is black, more lubrication is required. If this is true, continue running the lubrication system and the iTRAK system to distribute more oil onto the tracks. It is normal for some oil to become black, so if a small percentage of the oils is black, it does not mean you have to add more lubricant to complete initial lubrication.

    - If oil is present on each rail, and the signs that more lubrication is required are not present, initial lubrication is complete.

15. Once initial lubrication is complete, end the Inp-PrimePump lubrication dispensation using the PLC program or HMI.

16. Proceed to configure normal operation lubrication.

Configure Normal Operation Lubrication with an iTRAK Lubrication System

The frequency of lubricant dispensations and the volume of lubricant dispensed during each dispensation during normal operation depend on many factors. These factors include length of track, number of movers, application motion profile, cleanliness of the operating environment, and other factors. Table 31 provides rough guidelines for the lubrication of each rail. Adjust the lubrication frequency and volume as needed for each individual system. Adjust the lubrication frequency and volume to maintain a thin film of oil that evenly coats the rail contact surfaces.

To allow the oil to coat the rails evenly, it is best to have a higher frequency of oil dispensations, with a lower volume of oil dispensed during each dispensation. Avoid over-oiling the rails to an extent that causes excessive oil splatter.

> **ATTENTION:** Systems with 16 or more movers may require higher volumes of lubrication than indicated in Table 31. For these systems, monitor the rails closely to help prevent rail damage while determining the proper lubrication schedule for the system.

Table 31 - Lubrication Guidelines[1]

Straight System Length mm (ft)[2]	Rail	Volume of Oil Dispensed Onto the Rail During Each Dispensation cc (oz)	Runtime Interval Between Dispensations
300…1200 (1.0…3.9)	Top rail	0.20 (0.007)	3 hours of runtime
	Each middle rail		
	Bottom rail		
1200…2400 (3.9…7.9)	Top rail	0.30 (0.010)	
	Each middle rail		
	Bottom rail		
2400…3300 (7.9…10.8)	Top rail	0.40 (0.014)	
	Each middle rail		
	Bottom rail		
3300…5100 (10.8…16.7)	Top rail	0.60 (0.020)	
	Each middle rail		
	Bottom rail		
5100…6300 (16.7…20.7)	Top rail	0.70 (0.024)	
	Each middle rail		
	Bottom rail		
6300…8700 (20.7…28.5)	Top rail	1.00 (0.034)	
	Each middle rail		
	Bottom rail		

(1)   The values in this table are guidelines. Your application may require a different volume of oil or frequency of dispensations.
(2)   The straight system length is the combined length of all straight rails in the track dived by two.

To program an iTRAK lubrication system with a normal operation lubrication schedule, perform the following procedure:

1.   Make sure that initial lubrication has been completed. See Perform Initial Lubrication with an iTRAK Lubrication System on page 167.

2. See the perma STAR CONTROL product line webpage. That webpage links to the perma STAR CONTROL operating instructions, perma publication 109301_STAR_CONTROL_PE_A01_int23. In the operating instructions, see the section titled Configuration IMPULSE. Use the procedure in Configuration IMPULSE to configure each pump in the system as follows.

   a. Set the operation mode to IMPULSE mode.

   b. Set the size of the lubricant cartridge of the pump.

   c. Set the volume of oil dispensed per impulse to a volume you think is appropriate for your system. It is recommended to use the volumes in Table 31 as a starting point. Volumes can be adjusted later if needed.

3. Open Parameters and Local Tags and search for the following input parameters:

   - Inp_RunPump - signal to start the sequence of lubricant dispensations for normal operation lubrication. Each dispensation in the sequence corresponds to one impulse to the pumps.

   - Inp_RunTime - the number of seconds of runtime between each lubricant dispensation during normal operation.

Name	⊞ △	Alias For	Base Tag	Usage	Data Type	Description	External Acces	Constant	Style	Connections
Inp_PrimePump				Input	BOOL		Read/Write	☐	Decimal	
Inp_PrimeTime				Local	REAL	(time in seconds)	Read/Write	☐	Float	
Inp_RunPump				Input	BOOL		Read/Write	☐	Decimal	RunProduction
Inp_RunTime				Local	REAL	(time in seconds)	Read/Write	☐	Float	

4. Configure the Inp_RunPump parameter as shown in the example in step 3. In the Connections column, make sure that there is a parameter connection to the RunProduction tag. This connection allows the sequence of Inp_RunPump/Inp_RunTime lubricant dispensations to be triggered when the set amount of runtime has elapsed.

5. Configure the Inp_RunTime parameter as shown in the example in step 3, with one addition; in the Description column, include the number of seconds of runtime between lubricant dispensations. The recommended value is 10,800 seconds (3 hours) of runtime.

6. Run the iTRAK 5730 system and monitor the rails every few minutes over the course of the period of runtime set in the Inp_RunTime parameter. Check to see if a thin film of oil is maintained throughout this period. If it is not, reduce the time in the Inp_RunTime parameter or increase the volume of oil dispensed during each dispensation. Continue to monitor the rails until an oil volume per dispensation and dispensation frequency can be established for the current application.

7. Check that oil dispensations occur on the Inp_RunTime parameter interval.

8. With the established oil volume per dispensation and dispensation frequency, and an estimate of runtime per day, you can calculate the system rate of oil consumption. With the oil consumption rate and the volume of oil in each lubricant cartridge, you can calculate how often you must replace lubricant cartridges. To ensure proper functioning and help prevent system damage, make sure to provide a regular supply of lubricant. See Replace a Lubricant Cartridge on page 166.

Lubrication Using a Customer Provided Oil Bleed System

Once the iTRAK lubrication system is installed and wired, use the following procedures to configure the lubrication system.

Perform Initial Lubrication with a Customer Provided Oil Bleed System

During first-time start or when the rails have been cleaned, complete these steps.

1. Run your lubrication system and monitor the rails at the oil application sites to see if oil has appeared on the rails. It may be hard to see if oil has appeared. You may need to feel the rails at the oil application sites.

2. Once oil appears on the rails, run the iTRAK 5730 system at 0.5 m/s mover velocity, while continuing to run the lubrication system.

IMPORTANT	It is important that you not run the iTRAK 5730 system too early, before oil has appeared on the rails. Only run the iTRAK 5730 system once oil has already begun to contact the rails. Running the system with no oil damages the rails.
	It is less important, but still a consideration, to avoid starting to run the iTRAK system too long after oil has appeared on the rails. If oil begins to appear on the rails and the lubrication system continues to pump out more oil without the movers moving, oil drips away and is wasted. Once oil appears on the rails, moving the movers allows the mover cams to distribute the oil onto the rails, helping prevent dripping from the application sites.

3. While the iTRAK system runs, use the lubrication system to dispense 0.7 cc (0.024 oz) of lubricant onto each rail every 10 minutes. Continue until each rail has been lubricated along the entire perimeter of the track. It may be hard to see if each rail has been lubricated along the entire perimeter of the track. If so, you can check if the rails are fully lubricated as follows:

   a. Stop the motion of the movers.

   b. Select a test location on each rail that is farthest from the oil application sites.

   c. At the test location, on the surface of the rail that contacts the mover roller, touch the rail with a finger, and determine if it is adequately lubricated:

   - If oil is not present, there are signs of rusting, or most of the oil is black, more lubrication is required. If this is true, continue running the lubrication system and the iTRAK system to distribute more oil onto the tracks. It is normal for some oil to become black, so if a small percentage of the oils is black, it does not mean you have to add more lubricant to complete initial lubrication.

   - If oil is present on each rail, and the signs that more lubrication is required are not present, initial lubrication is complete.

   d. Once initial lubrication is complete, proceed to configure normal operation lubrication.

Configure Normal Operation Lubrication with a Customer Provided Oil Bleed System

After initial lubrication has been completed, configure a schedule of lubrication for normal operation of the iTRAK 5730 system. See the general information paragraphs and tables on .

iTRAK 5730 System Integrated Safety

Use this chapter to become familiar with the safe stop functions that are integrated with the iTRAK® 5730 system motor modules.

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Safe Torque Off Function	178
Safe Torque Off (STO) Specifications	180
Understand Safe Torque Off (STO) Behavior in an iTRAK 5730 System	182
Timed SS1 Stopping Function	182
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Replace an Integrated Safety Motor Module in a GuardLogix System	199

The iTRAK 5730 system motor modules (catalog numbers 2198T-L20-T03*xx-xxx*-S2) are equipped for integrated Safe Torque Off and timed SS1 stopping functions over the EtherNet/IP™ network. Section-based safety functions operate in the motor modules and are activated through the network safety connection.

Certification

The TÜV Rheinland group has certified the iTRAK 5730 motor modules (catalog numbers 2198T-L20-T03*xx-xxx*-S2) with support for Safe Torque Off and Timed SS1 safety functions. These safety functions are for use in safety-related applications up to Performance Level e (PLe) per ISO 13849-1, and Category 3, SIL 3 per IEC 61508, EN/IEC 61800-5-2, and SIL CL 3 EN/IEC 62061. Removing the motion-producing power is considered to be the safe state.

For product certifications currently available from Rockwell Automation, go to website rok.auto/certifications.

Important Safety Considerations

You, the system user, are responsible for the following:

- Validation of any sensors or actuators that are connected to the system
- Completing a machine-level risk assessment
- Certification of the machine to the desired ISO 13849-1 Performance Level or EN/IEC 62061 SIL level
- Project management and proof testing performed in accordance with ISO 13849-1

Safety Application Requirements

Safety application requirements include evaluating probability of failure rates (PFH), system reaction time settings, and functional verification tests that fulfill SIL 3 criteria. See Probability of Dangerous Failure Per Hour on page 175 for more PFH information.

Creating, recording, and verifying the safety signature is also a required part of the safety application development process. Safety signatures are created by the safety controller. The safety signature consists of an identification number, date, and time that uniquely identifies the safety portion of a project. The safety portion of a project includes all safety logic, safety data, and safety I/O configuration.

For safety system requirements, including information on the safety network number (SNN), verifying the safety signature, and functional verification tests, see the GuardLogix® 5580 and Compact GuardLogix 5380 Controller Systems Safety Reference Manual, publication 1756-RM012.

IMPORTANT	You must read, understand, and fulfill the requirements that are detailed in publication 1756-RM012 before operating a safety system that uses a GuardLogix controller and motor module.

Category 3 Requirements According to ISO 13849-1

Safety-related parts are designed with these attributes:

- A single fault in any of these parts does not lead to the loss of the safety function.
- A single fault is detected whenever reasonably practicable.
- Accumulation of undetected faults can lead to the loss of the safety function and a failure to remove motion-producing power from the motor.

Stop Category Definition

You must complete a risk assessment to determine the selection of a stop category for each stop function.

- Stop Category 0, as defined in EN/IEC 60204-1 or Safe Torque Off (STO) as defined by EN/IEC 61800-5-2, is achieved with immediate removal of power to the actuator, which results in an uncontrolled coast-to-stop.
- Stop Category 1, as defined in EN/IEC 60204-1 or Safe Stop 1 (Timed SS1) as defined by EN/IEC 61800-5-2, is achieved with power available to the machine actuators to achieve the stop. Power is removed from the actuators when the configured stop is achieved.

Performance Level (PL) and Safety Integrity Level (SIL)

For safety-related control systems, Performance Level (PL), according to ISO 13849-1, and Safety Integration Level (SIL), according to EN/IEC 61800-5-2, include a rating of the systems ability to perform its safety functions. All safety-related components of the control system must be included in both a risk assessment and the determination of the achieved levels.

See the ISO 13849-1, IEC 61508, and EN/IEC 62061 standards for complete information on requirements for PL and SIL determination.

Probability of Dangerous Failure Per Hour

Safety-related systems are classified as operating in a High-demand/ continuous mode. The SIL value for a High-demand/continuous mode safety-related system is directly related to the probability of a dangerous failure occurring per hour (PFH) within the type B 1oo2 architecture.

The PFH calculation is based on the equations from IEC 61508, and shows worst-case values. Table 32 provides data for a 20-year proof test interval and demonstrates the worst-case effect of various configuration changes on the safety parameters data.

Table 32 - Safety Parameters for 20-year Proof Test Interval

Attribute	Value
PFH (1e-9/h)	3.63
MTTFd (years)	110
HFT	1

A straight motor module (catalog number 2198T-L20-T0303-A00-S2) is composed of one logical section. A curved motor module (catalog number 2198T-L20-T0309-D18-S2) is composed of three logical sections within a single module as shown in . The PFH value in Table 32 applies to each logical section of the curved motor module individually.

Figure 40 - Curved Motor Module Logical Sections

Top View

Section B

Section C

Section A
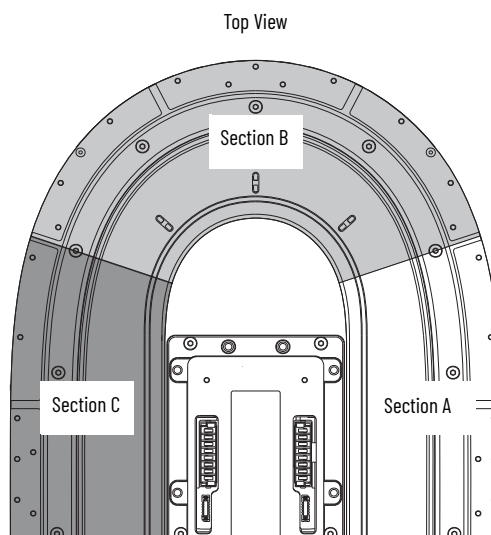
| IMPORTANT | Determination of safety parameters is based on the assumptions that the system operates in high-demand/continuous mode and that the safety function is tested at least once every 3 months as per SIL 3, PLe category 3. |

Out-of-Box State

The iTRAK 5730 motor modules ship in the out-of-box state.

> ⚠ **ATTENTION:** In the out-of-box state, the STO function allows motion-producing power unless an integrated safety connection configuration has been applied to the motor module at least once.

In the out-of-box state, you can configure iTRAK 5730 motor modules in the following ways:

- Without a GuardLogix 5580 or Compact GuardLogix 5380 safety controller for a standard application
- With a GuardLogix 5580 or Compact GuardLogix 5380 safety controller when the STO function is not required

Out-of-Box State Support

After the integrated safety connection configuration is applied to the iTRAK 5730 motor module at least once, you can restore the motor module to the out-of-box state.

Use a GuardLogix 5580 or Compact GuardLogix 5380 safety controller and follow these steps to restore your iTRAK 5730 motor module to the out-of-box state.

1. Right-click the iTRAK 5730 motor module that you created and choose Properties.

```
▲ 🗐 I/O Configuration
   ▲ 🖴 1756 Backplane, 1756-A4
        🔃 [0] 1756-L84ES CIP_Safety_Controller
     ▲ 🗍 [1] 1756-EN3TR ENET_1
        ▲ 🖧 Ethernet
             🖡 2198T-W25K-ER iPS
             🔗 iTRAK 5730 Section1
             🔗 iTRAK 5730 Section2
             🗍 1756-EN3TR ENET_1
```
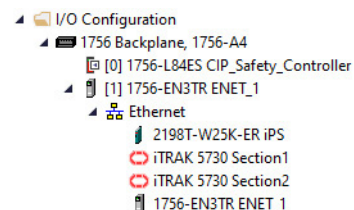
2. In the Module Properties dialog box, click the Connection tab.

The Connection tab appears.
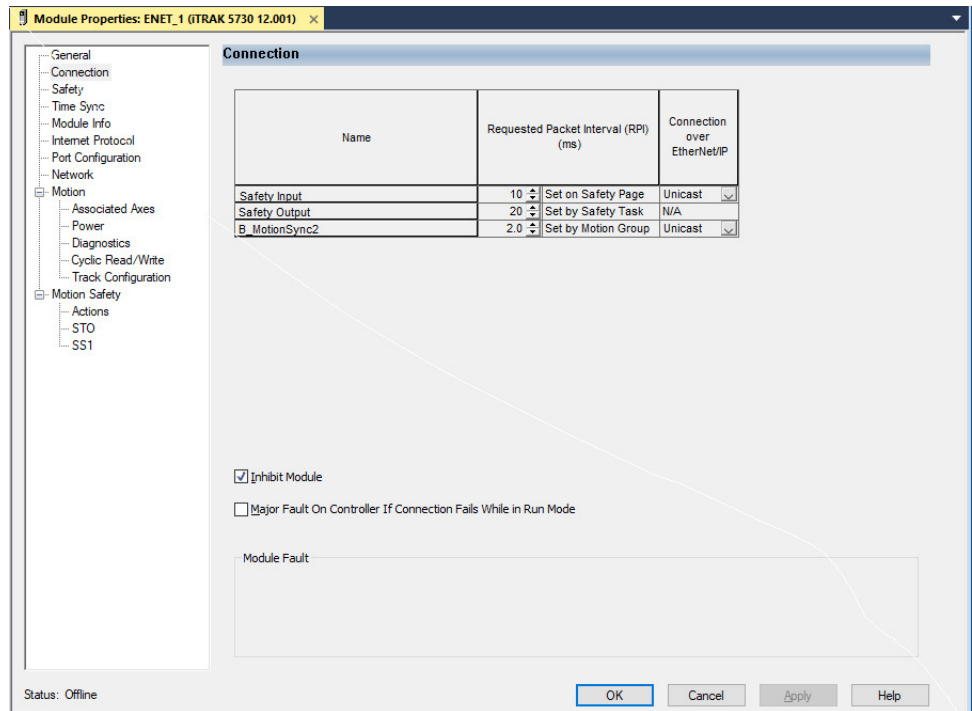
3. Check Inhibit Module.
4. Click Apply.
5. Click the Safety tab.

The Safety tab appears.
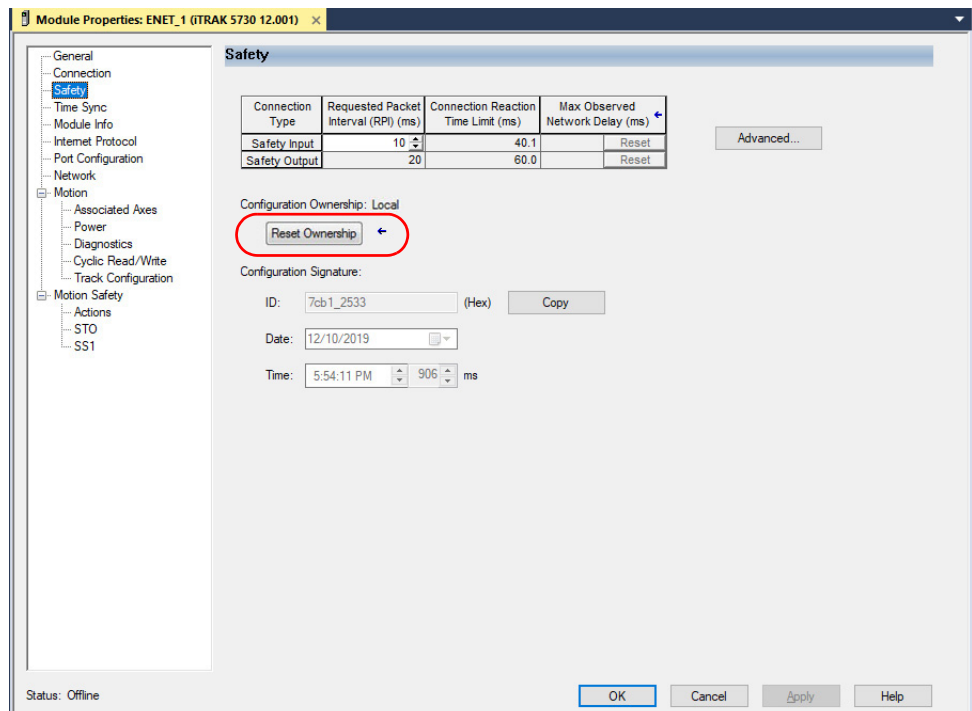
6. In the Configuration Ownership field, click Reset Ownership.

IMPORTANT	Only authorized personnel should use the Reset Ownership function.

If any active connection is detected, the reset is rejected.

7. Cycle power.

The motor module is in the out-of-box state.

IMPORTANT	If power to the motor module is not cycled after step 6, the module does not transition to the out-of-box state and maintains STO function.

IMPORTANT	When the motor module returns to the out-of-box state, STO safety integrity is lost.

Safe Torque Off Function

The Safe Torque Off (STO) function, when used with suitable safety components, provides protection according to ISO 13849-1 (PLe), Category 3 or according to IEC 61508, EN/IEC 61800-5-2, and EN/IEC 62061 (SIL CL 3). All components in the system must be chosen and applied correctly to achieve the desired level of operator safeguarding.

The STO feature is designed to safely turn off all output-power transistors. You can use the STO feature in combination with other safety devices to achieve Stop Category 0 and protection-against-restart as specified in EN/IEC 60204-1.

⚠️	**ATTENTION:** The STO feature is designed to restrict motion-producing power on the drive system or affected area of a machine. The STO feature does not provide electrical safety.

⚡	**SHOCK HAZARD:** In STO mode, hazardous voltages can still be present at the drive. To avoid an electric shock hazard, disconnect power to the system and verify that the voltage is zero before performing any work on the drive.

⚠️	**ATTENTION:** Personnel responsible for the application of safety-related programmable electronic systems (PES) shall be aware of the safety requirements in the application of the system and shall be trained in using the system.

Safe Torque Off (STO) Function Operation

The STO function provides a method, with sufficiently low probability of failure, to force the power-transistor control signals to a disabled state. When the command to execute the STO function is received from the GuardLogix controller, all drive output-power transistors are released from the ON-state. This release from the ON-state results in a condition in which the drive coasts. Disabling the power transistor output does not provide mechanical isolation of the electrical output that is required for some applications.

The iTRAK 5730 motor module response time to a request of the STO function is less than 10 ms. The response time to a request is the delay between the time that the motor module receives the integrated safety packet with an STO request, and the time when the function begins to execute.

The safety function execution time is the amount of time for the safety function to complete execution. The safety function execution time depends on user configurations of the safety function and the periodic rate at which the motor module executes the safety function. The motor module executes the safety function at a periodic rate of 3 ms.

The total safety function completion time can be considered as the safety function response time to request plus the safety function execution time. Table 33 provides a STO total safety function completion time example.

Table 33 - Safe Torque Off (STO) - Safety Function Completion Time Example

STO Response Time to Request (T_{RRT})		10 ms
STO Execution Time (T_{ET})	User-configurable STO Delay Time [1]	17 ms (rounded up to 18 ms)
Total STO Completion Time (T_{TCT})		28 ms

(1)   The user-configurable delay time is rounded up to the nearest integer multiple of 3 ms.

> **ATTENTION:** A hazard of personal injury or equipment damage exists. When these two conditions exist, a limited amount of mover movement can occur:
> • Two simultaneous faults occur in the IGBT circuit of an iTRAK motor module section
> • A mover is located within 33.8 mm (1.33 in.) of the affected coil

Safe Torque Off (STO) State Reset

The iTRAK 5730 motor modules support automatic restart only for exiting the STO state. Automatic restart indicates that torque is allowed only by transitioning the SO.STOOutput tag from 0 to 1. The SO.ResetRequest tag is used only for resetting safety faults.

> **IMPORTANT**   iTRAK 5730 motor modules enter the STO state if any STO function fault is detected.

Figure 41 provides a timing diagram for an automatic restart of an iTRAK 5730 motor module in an STO state.

Figure 41 - iTRAK 5730 Motor Module STO Timing Diagram
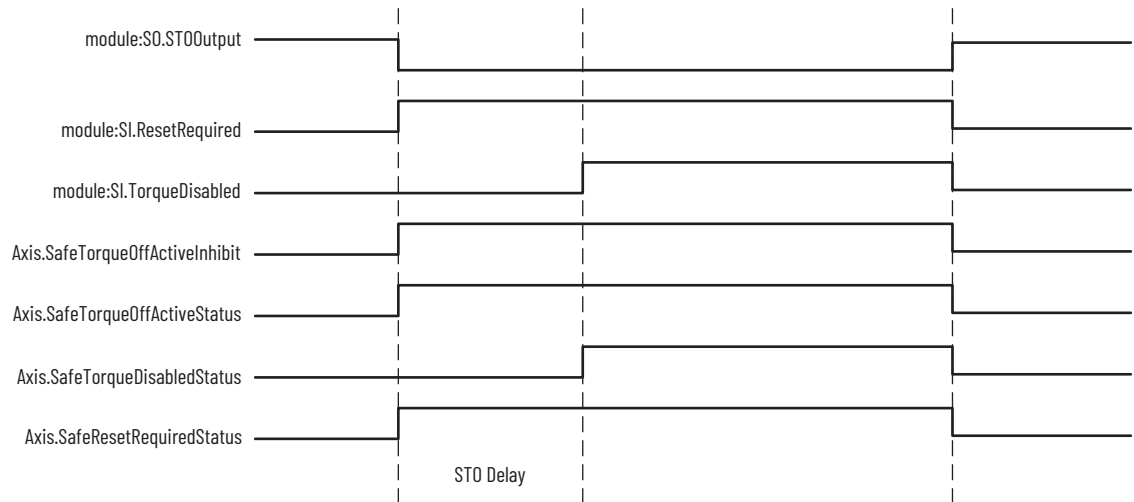
Safe Torque Off (STO) Specifications

This table provides specifications for the STO network.

Table 34 - Safe Torque Off (STO) Network Specifications

Attribute	Value	Studio 5000 Logix Designer® Tag Name
Safety connection RPI, min	6 ms	N/A
Input assembly connections	3	N/A
Output assembly connections	1	N/A
Integrated safety open request support	Type 1 and Type 2 requests	N/A
Axis safety status	Bit 0: Safety fault	Axis.SafetyFaultStatus
	Bit 1: Safety reset request	Axis.SafetyResetRequestStatus
	Bit 2: Safety Reset Required	Axis.SafetyResetRequiredStatus
	Bit 3: Safe Torque Off active	Axis.SafeTorqueOffActiveStatus
	Bit 4: Safe torque disabled	Axis.SafeTorqueDisabledStatus
	Bit 5...31: Undefined (0)	N/A
Axis safety faults	Bit 1: Safety core fault	Axis.SafetyCoreFault
	Bit 3: Safe Torque Off fault	Axis.SafeTorqueOffFault
	All others: Undefined (0)	N/A

Safe Torque Off (STO) Assembly Tags

In integrated STO mode, a GuardLogix 5580 or Compact GuardLogix 5380 safety controller commands the iTRAK 5730 Safe Torque Off function through the appropriate tag in the safety output assembly.

The SO.Command tags are sent from the GuardLogix safety output assembly to the iTRAK 5730 safety output assembly to control the Safe Torque Off function.

The SI.SafeStatus tags are sent from the iTRAK 5730 motor module axis to the GuardLogix safety input assembly and indicate the iTRAK 5730 safety control status.

The SI.ConnectionStatus tags indicate the safety input connection status.

Table 35 lists the safety tags that are added to the controller tags when a iTRAK 5730 motor module section axis is added to a GuardLogix I/O Configuration and the connection is configured for Motion and Safety or Safety Only.

IMPORTANT	The SO.STOOutput and SO.ResetRequest tag names change when Motion Safety in the Module Definition is configured as Safe Stop Only - No Feedback.

The attribute values in Table 35 are the Assembly Object attribute values.

Table 35 - iTRAK 5730 Integrated Safe Torque Off (STO) Specifications

Studio 5000 Logix Designer Tag Name	Attribute [bit]	Type	Description
SI.ConnectionStatus[1][2]	—	DINT	—
SI.RunMode	[0]	BOOL	Combinations of the RunMode and ConnectionFaulted states
SI.ConnectionFaulted	[1]	BOOL	
SI.SafeStatus[1][3]	—	SINT	—
SI.TorqueDisabled	[0]	BOOL	0 = Torque Permitted 1 = Torque Disabled
SI.SafetyFault	[6]	BOOL	0 = STO fault not present 1 = STO fault present
SI.RestartRequired	[7]	BOOL	0 = Reset is not required 1 = Reset is required
SO.Command[1][4]	—	SINT	—
SO.STOOutput	[0]	BOOL	0 = Disable Permit 1 = Permit Torque
SO.ResetRequest	[7]	BOOL	0 --> 1 = Reset STO fault

(1) Bits not listed are always zero.
(2) ConnectionStatus is determined by the Safety Validator in the GuardLogix controller.
(3) Status is sent from the drive to the controller using the integrated safety protocol.
(4) Commands are sent from the controller to the drive using the integrated safety protocol.

IMPORTANT	Only the data that is listed in Table 35 is communicated with SIL 3 integrity.

Safe Torque Off (STO) Mode

You can use the attribute STO Mode to check if an iTRAK 5730 motor module axis is in STO Bypass mode. STO Bypass mode is used to allow motion while commissioning or troubleshooting a system when Motion Direct Commands (MDC) are needed.

Table 36 - Safe Torque Off (STO) Mode: MSG

Parameter	Value	Description
Service Code	0x0E	Get attribute single
Class	0x5A	Safety stop functions
Instance	1	Motor-module safety instance associated with an axis
Attribute	0x104	STO mode
Data Type	SINT	Short integer

Table 37 - Safe Torque Off (STO) Mode: Values

Value	Definition
1	Normal operation
2	STO bypass mode

Understand Safe Torque Off (STO) Behavior in an iTRAK 5730 System

Similar to a multi-axis servo drive system, the STO function is requested for each individual section axis in an iTRAK 5730 system. Therefore, each motor module section in an iTRAK 5730 system must receive an STO request from the GuardLogix controller to place the entire iTRAK 5730 system into the STO state.

Depending on your application, particularly in large iTRAK 5730 systems, it can be desirable to define a safety zone within which the STO function is enabled on discrete motor module sections of the system. In this case, it is possible that movers that are in motion on an enabled motor module section can travel onto a motor module section that is in the STO state.

IMPORTANT	The STO function is configured for each motor module section (axis) independently. As a result, movers in motion on enabled motor module sections can travel onto a motor module section that is in the STO state. You must consider the consequences of active mover motion on enabled sections of an iTRAK 5730 system that are next to a motor module section that is in the STO state.

iTRAK 5730 System Safety Considerations

ATTENTION: A hazard of personal injury and equipment damage exists in an iTRAK system that does not enable the STO function on all motor module sections (axis). Consider an MSF stopping action of Coast to Stop and Disable or mechanical guards for motor module sections that are next to a motor module section that enables the STO function.

Functional Safety Considerations

ATTENTION: Before maintenance work can be performed in Program mode, the developer of the application must consider the implications of allowing motion through motion direct commands and should consider developing logic for run-time maintenance operations to meet the requirements of machine safety operating procedures.

ATTENTION: Motion is allowed when motion direct commands are used in Program mode and the STO function is not available. Motion direct commands issued when the controller is in Program mode causes the drive to bypass the STO Active condition. It is your responsibility to implement additional preventive measures to maintain safety integrity of the machinery during execution of motion direct commands in Program mode.

ATTENTION: To avoid personal injury and damage to equipment if there is an unauthorized access or unexpected motion during authorized access, return the controller to RUN mode and remove the key before leaving the machine unattended.

Timed SS1 Stopping Function

The Timed SS1 function meets the requirements of Performance Level e (PLe) per ISO 13849-1 and SIL CL 3 per IEC 61508, EN/IEC 61800-5-2, and EN/IEC 62061.

In Timed SS1 mode, the GuardLogix 5580 or Compact GuardLogix 5380 safety controller issues the SS1 command over the EtherNet/IP network and the iTRAK 5730 motor module section executes the SS1 command.

The Timed SS1 function commands the motor-module axis to stop in a fixed amount of time. The Timed SS1 function does not monitor the speed of the mover axis or whether a mover is stopped.

Setting the SS1 Request tag in the motor-module axis Safety Output Assembly initiates the Timed SS1 function. When the Timed SS1 function is initiated, these actions occur:

1. The motor-module axis receives the SS1 Request
2. The motor-module axis safety status is updated to SS1 Active (high = 1)
3. The controller stops the axis within the SS1 Max Stop Time
4. When the SS1 Max Stop Time expires, SS1 Complete transitions to high (1)
5. The STO function is performed

Safety Function Operation

The iTRAK 5730 motor module response time to a request of the SS1 function is less than 10 ms. The response time to a request is the delay between the time when the iTRAK motor module receives the integrated safety packet with an SS1 request and the time when the function begins executing.

The safety function execution time is the amount of time for the safety function to complete execution. The safety function execution time depends on the user configuration of the safety function and the periodic rate at which the iTRAK 5730 motor module executes the safety function. The iTRAK 5730 motor module executes the safety function at a periodic rate of 3 ms.

The total safety function completion time can be considered as the safety function response time to request plus the safety function execution time. Table 38 provides a Timed SS1 total safety function completion time example.

Table 38 - Timed Safe Stop (SS1) - Safety Function Completion Time Example

SS1 Response Time to Request (T_{RRT})		10 ms
SS1 Execution Time (T_{ET})	User-configurable SS1 Max Stop Time [1] [2]	19 ms (rounded up to 21 ms)
STO Execution Time (T_{ET})	User-configurable STO Delay Time [1]	17 ms (rounded up to 18 ms)
Total SS1/STO Completion Time (T_{TCT})		49 ms

(1) The user-configurable delay time is rounded up to the nearest integer multiple of 3 ms.
(2) Max Stop Time is configured on the SS1 page of the Module Properties and can be read via Attribute 291 (Class 0x5A). The maximum is 4,294,967,296 ms.

In this example, we describe how a motion and safety control system operates and how motion and safety tasks are coordinated. In typical motion and safety system applications, an E-stop switch is used to stop the system. In the following example, the switch is used to initiate the process that brings the axis to a controlled stop before removing power. This type of stop is called Stop Category 1. The motion task and motor module axis are responsible for bringing the axis to a Category 1 stop.

This sequence of events represents the steps that are required for a Timed SS1 safety function.

> The words *module*, *instance*, and *axis* (italic) in these steps represent the module, instance, and section axis name assigned in the Studio 5000 Logix Designer application (also called the Studio 5000® application).

1. The safety task reads the E-stop input and detects the switch actuation.
2. The safety task communicates an SS1 request by setting the bit: *module*:SO.SS1Request[*instance*] tag of the motor module axis motion-safety instance.
3. The motion-safety instance in the motor module axis communicates to the motor module axis motion core of the Axis Safety Status.
4. The motion core communicates with the motion controller running the motion task by updating the motion axis tag *axis*.SS1ActiveStatus.
5. The motion task controls the axis to bring the motor to a stop within the SS1 time limit.
6. When the configured SS1 time lapse has completed, the motion-safety core activates the STO function.

Series of events when an SS1 fault occurs.

1. If an SS1 fault occurs, STO Active goes high (1), and Torque Disabled goes high (1) immediately and ignores STO Delay.

   The safety instance detects a fault and activates the STO function within 6.0 ms of when the fault condition occurred.
2. Restart Required goes high (1) whenever an SS1 fault is present.
3. To reset the SS1 fault, SS1 Request must go low (0), followed by Reset (0-1 transition).

Figure 42 - Timed SS1 Normal Operation
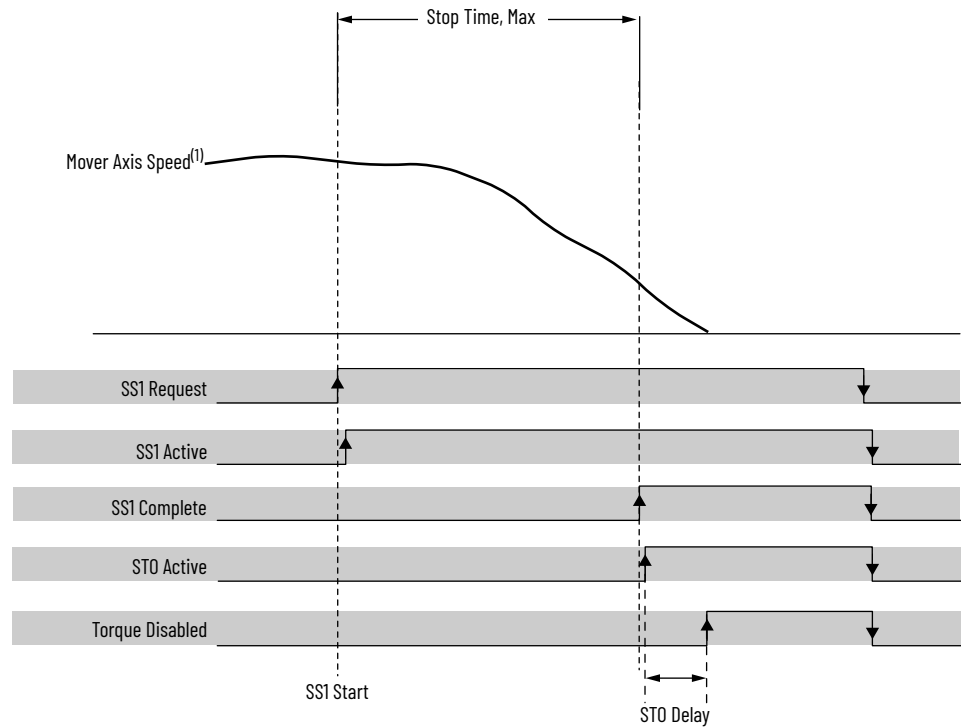
(1) Mover axis speed is independent of motor section axis safety control.

Attribute Name	Tag Name	Description	Value
SS1 Request	*module*:SO.SS1Request[*instance*]	An Output Assembly member that requests the motor module axis to initiate its Safe Stop 1 function.	0 – No Request 1 – Request
SS1 Active	*module*:SO.SS1Active[*instance*]	The SS1 Active attribute is set to Active when any bit in SS1 Activation is set.	0 – Not Active 1 – Active
SS1 Complete	Tag Name does not apply.	When the SS1 timer expires, the SS1 Complete bit is set, setting STO Active.	0 – Not Active 1 – Active
STO Active	*module*:SI.STOActive[*instance*]	When the SS1 timer expires, the STO Activation bit and SS1 Complete are set, setting STO Active.	0 – Not Active 1 – Active
Torque Disabled	*module*:SI.TorqueDisabled[*instance*]	When the drive output transistors are released from the ON state and force-producing power has been removed from the motor.	0 – Torque Permitted 1 – Torque Disabled

The Timed SS1 safety function design, which includes the STO function, has a SIL 3/PLe category 3 rating.

> The words *module* and *instance* (italic) in these tag names represent the module name and instance name that are assigned in the Studio 5000 application.

> **IMPORTANT**   If there is a malfunction, the most likely stop category is Stop Category 0. When designing the machine application, timing and distance must be considered for a coast-to-stop. For more information regarding stop categories, see EN/IEC 60204-1.

> **IMPORTANT**   If multiple safety functions are requested simultaneously, the first to reach the Safe Torque Off state takes precedence.

Timed SS1 Request Removed

This figure shows what happens when a Timed SS1 Request goes low (0) before completion.

Figure 43 – Timed SS1 Request Removed Before Completion
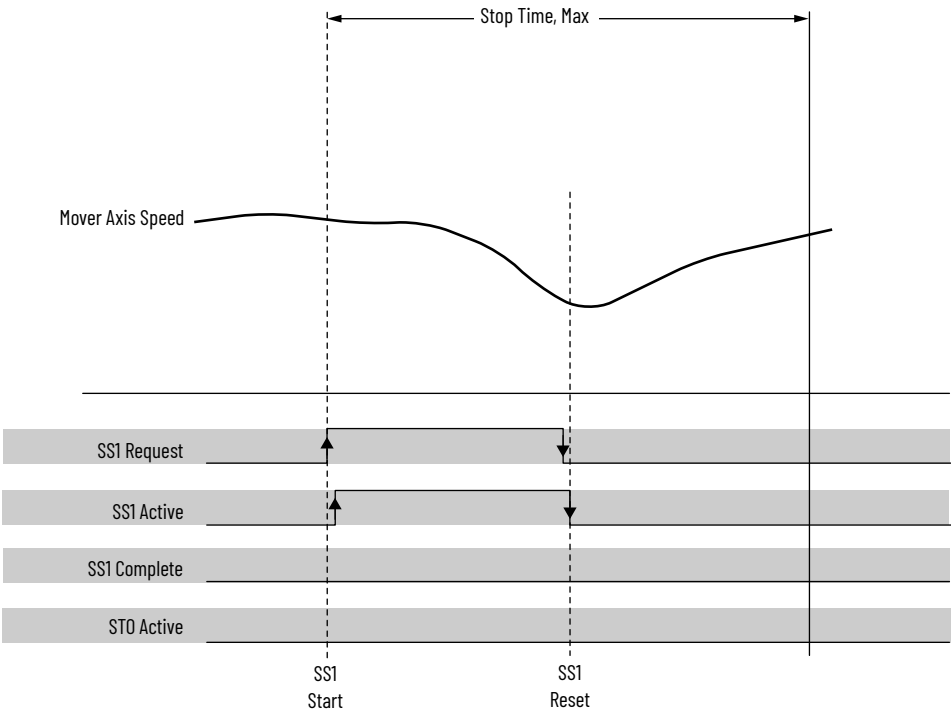
Attribute Name	Tag Name	Description	Value
SS1 Request	*module*:S0.SS1Request[*instance*]	An Output Assembly member that requests the motor module axis to initiate its Safe Stop 1 function.	0 – No Request 1 – Request
SS1 Active	*module*:S0.SS1Active[*instance*]	The SS1 Active attribute is set to Active when any bit in SS1 Activation is set.	0 – Not Active 1 – Active
SS1 Complete	Tag Name does not apply.	When the SS1 timer expires, the STO Activation bit SS1 Complete is set, setting STO Active to Disable Torque.	0 – Not Active 1 – Active
STO Active	*module*:SI.STOActive[*instance*]	When the SS1 timer expires, the STO Activation bit SS1 Complete is set, setting STO Active to Disable Torque.	0 – Not Active 1 – Active

> The words *module* and *instance* (italic) in these tag names represent the module name and instance name that are assigned in the Studio 5000 application.

Series of events when SS1 Request is removed before completion.

1. When SS1 Request goes low (0) before completion, SS1 function is reset and ready for another operation.
2. Main task reads the SS1 Active axis tag and resumes normal operation.

Motion Direct Commands in Motion Control Systems

You can use the Motion Direct Command (MDC) feature to initiate motion while the controller is in Program mode, independent of application code that is executed in Run mode. These commands let you perform various functions, for example, move an axis, jog an axis, or home an axis.

A typical use might involve a machine integrator testing different parts of the motion system while the machine is being commissioned. Another use might be a maintenance engineer, under certain restricted scenarios in accordance with safe machine operating procedures, wanting to move an axis (like a conveyor) to clear a jam before resuming normal operation.

> **ATTENTION:** To avoid personal injury or damage to equipment, follow these rules regarding Run mode and Program mode.
> - Only authorized, trained personnel with knowledge of safe machine operation should be allowed to use Motion Direct Commands
> - Additional supervisory methods, like removing the controller keyswitch, should be used to maintain the safety integrity of the system after returning the safety controller to RUN mode

Understand STO Bypass When Using Motion Direct Commands

If a Safety-only connection between the GuardLogix safety controller and the iTRAK 5730 motor module was established at least once after the module was received from the factory, the module does not allow motion while the safety controller is in Program mode by default.

This default setting is used because the safety task is not executed while the GuardLogix safety controller is in Program mode. This applies to applications running in a single-safety controller (with Motion and Safety connections). When an integrated safety motor module has a Motion connection to a standard controller and a separate Safety connection to a dual-safety controller, the standard controller can transition to Program mode while the safety controller stays in Run mode and continues to execute the safety task.

However, motor module systems are designed with a bypass feature for the STO function in single-safety controller configurations. You can use the MDC feature to allow motion while following all necessary and prescribed steps per machine safety operating procedures.

> **ATTENTION:** Consider the consequences of allowing motion by using MDC when the controller is in Program mode. You must acknowledge warning messages in the Studio 5000 application that warn of the module bypassing the STO function and unintended motion can occur. The integrated safety module does not respond to the request of STO function if MDC mode is entered.

> **ATTENTION:** It is your responsibility to maintain machine safety integrity while executing motion direct commands. One alternative is to provide ladder logic for Machine Maintenance mode that leaves the controller in Run mode with safety functions executing.

Studio 5000 Application Warning Messages

When the controller is in Run mode, executing safety functions, one or more motor modules follow the commands that they receive from the safety controller. Safety state = Running, Axis state = Stopped/Running, as shown in <u>Figure 44</u>.

Figure 44 - Safety State Indications When Controller is in Run Mode (safety task executing)
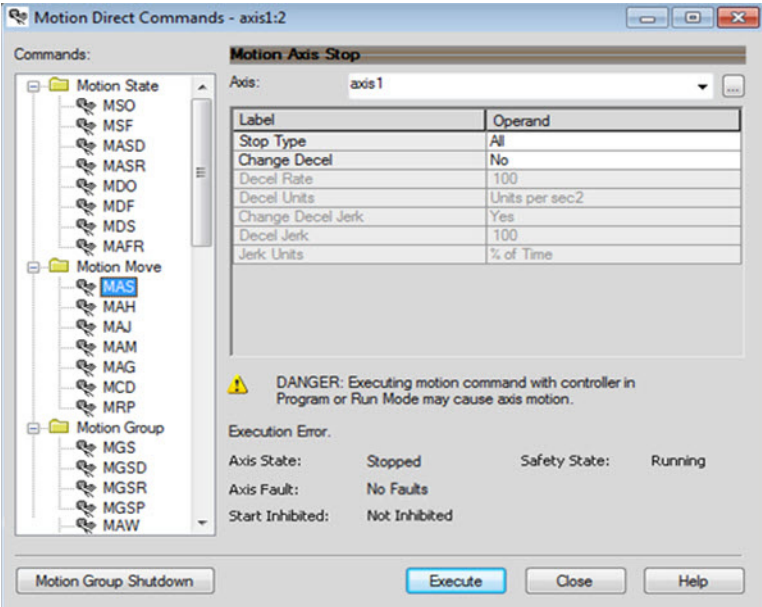
When the controller transitions to Program mode, the integrated safety motor modules are in the safe state (torque not permitted). Safety state = Not Running, Axis state = Start Inhibited, as shown in <u>Figure 45</u>).

Figure 45 - Safety State Indications After Controller Transitions to Program Mode
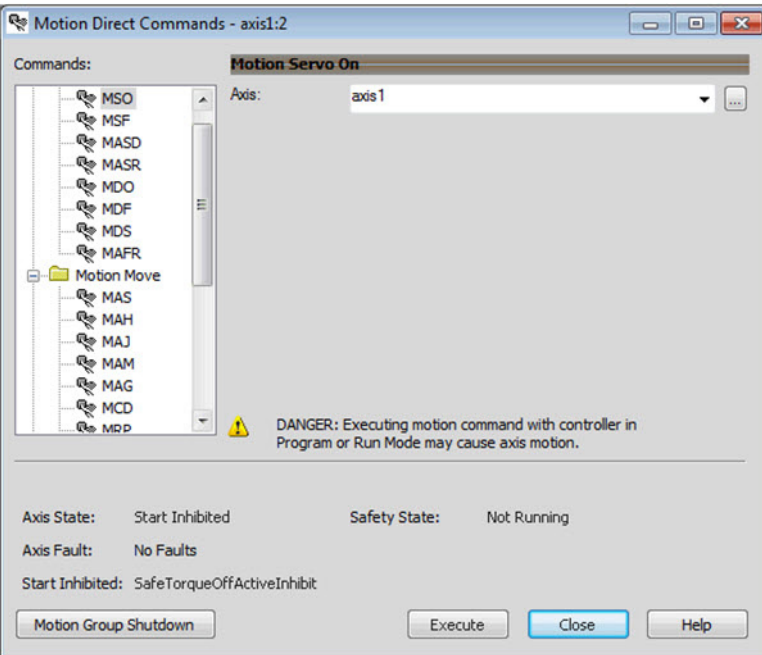
When you issue a motion direct command to an axis to produce torque in Program mode, for example MSO or MDS, with the safety connection present to the motor modules, a warning message is presented before the motion direct command is executed, as shown in Figure 46.

Figure 46 - STO Bypass Prompt When the Safety Controller is in Program Mode
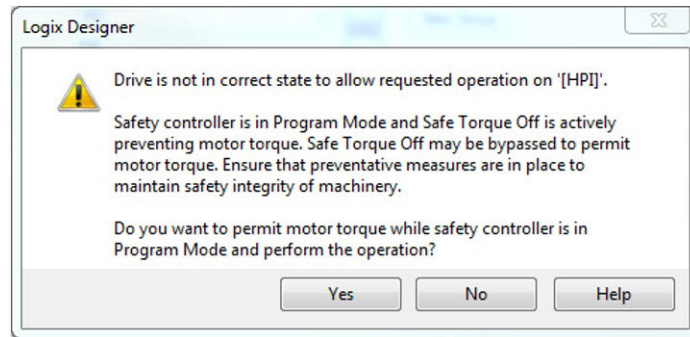
The warning in Figure 46 is displayed the first time a motion direct command is issued.

After you acknowledge the warning message by clicking Yes, torque is permitted by the motor modules and a warning message is indicated in the software as shown in Figure 47. Safety state = Not Running (torque permitted), Axis state = Stopped/Running, Persistent Warning = Safe Torque Off Bypassed.

IMPORTANT	Switch the controller to Run mode to exit Motion Direct Command mode with the STO function bypassed.

Figure 47 - Safety State Indications After Controller Transitions to Program Mode (MDC executing)
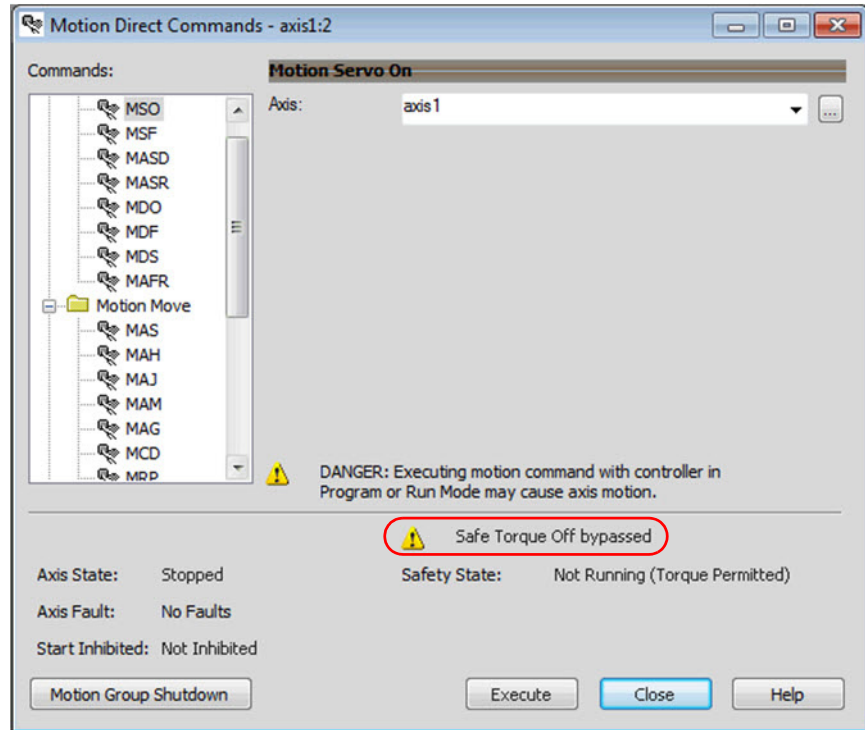
IMPORTANT	The persistent warning message text 'Safe Torque Off bypassed' appears when a motion direct command is executed.
	The warning message persists even after the dialog box is closed and reopened as long as the integrated safety motor modules are in STO Bypass mode.
	The persistent warning message is removed only after the integrated safety motor modules are restored to the safe state.

Torque Permitted in a Multi-workstation Environment

The warning in [Figure 48](#) displays to notify a second user working in a multi-workstation environment that the first user has placed the integrated safety motor modules in the STO state and that the current action is about to bypass the STO state and permit torque.

Figure 48 - STO Bypass Prompt When MDC is Issued in Multi-workstation Environment
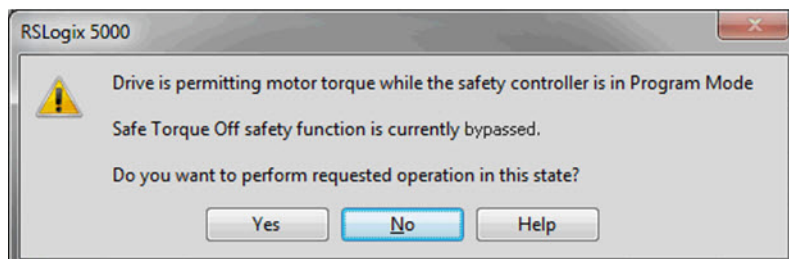
Warning Icon and Text in Axis Properties

In addition to the other warnings that require your acknowledgment, the Studio 5000 application also provides warning icons and persistent warning messages in other Axis Properties dialog boxes when the integrated safety motor modules are in STO Bypass mode.

Figure 49 - Axis and Safe State Indications on the Hookup Services Dialog Box
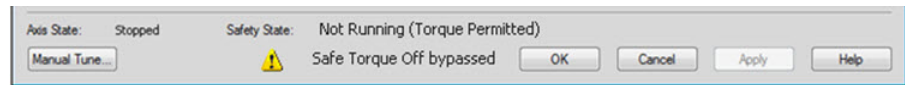
Figure 50 - Axis and Safe State Indications on Motion Direct Commands Dialog Box
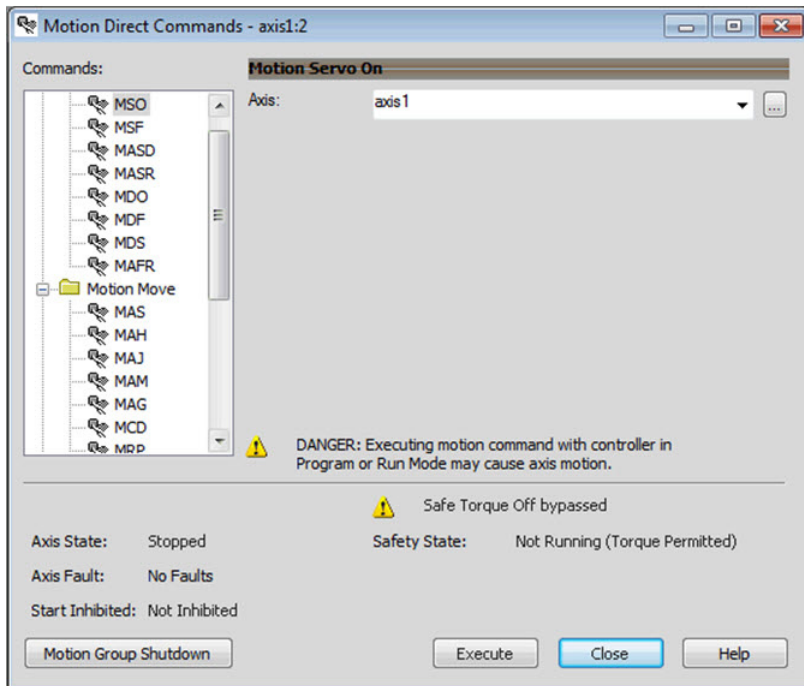
Figure 51 - Axis and Safe State Indications on the Motion Console Dialog Box
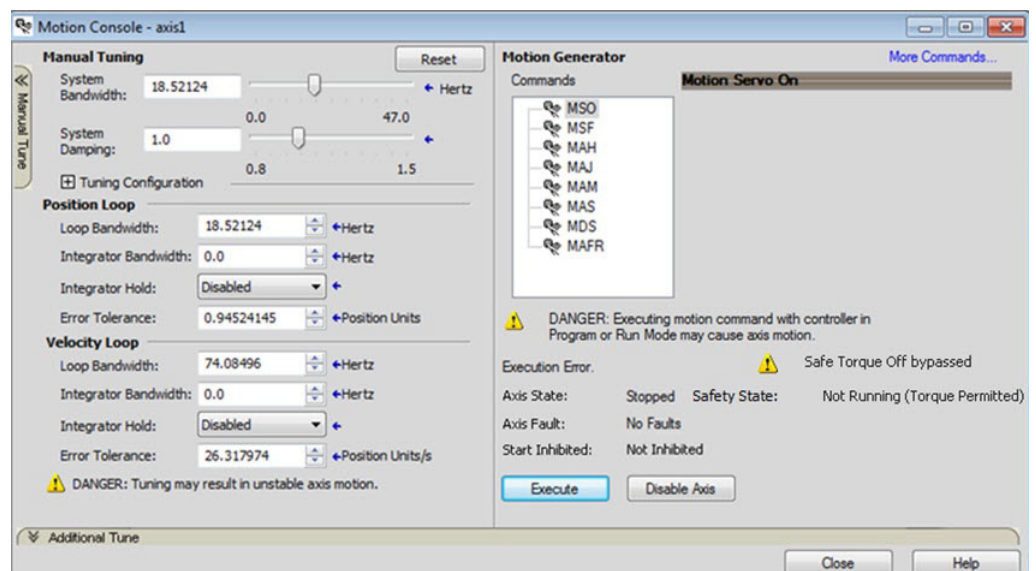
Explicit Messages

Use explicit messages to communicate with a drive and obtain additional fault, status, or configuration information that is not available in the Safety I/O Tag structure. Attribute data is useful for additional diagnostic information. An explicit message can be sent by any controller on the network and used to read any drive module attribute. See Table 42 on page 193 for the drive-module safety attribute names, and numbers to read the attribute values by using an MSG instruction. See Figure 52 on 193 to see how explicit messages are part of motion and safety communication.

When an explicit message is used, a class ID must be specified. The class ID identifies the safety object type in the drive module that is accessed.

Table 39 - Object Classes Available in Motion Safety Instances

Object Class	Object Instances
Safety Supervisor	1
Safe Stop Functions	1

> **IMPORTANT**   Explicit messages must not be used for any safety-related function.

Safety Supervisor State

In the motor module, the connection to the safety instance or instances is controlled by a safety supervisor. The supervisor status can be read by the motion controller through the motion connection and the safety controller through the Safety Input Assembly or by an explicit message.

The safety supervisor state provides information on the state of the integrated safety connection and the mode of operation. There is only one safety supervisor object per motor module.

Table 40 - Safety Supervisor State: MSG

Parameter	Value	Description
Service Code	0x0E	Get attribute single
Class	0x39	Safety supervisor
Instance	1	Motor-module safety instance associated with an axis
Attribute	0x0B	Device status
Data Type	SINT	Short integer

Table 41 - Safety Supervisor States

Value	Safety Supervisor State	Definition	Safety Mode
2	Configured (no safety connection)	No active connections	Integrated
4	Running	Normal running state	Integrated
7	Configuring	Transition state	Integrated
8	Not Configured	Awaiting safety controller ownership	Out-of-box
51	Not Configured (torque permitted)	Out-of-box state, safety not used	Out-of-box
52	Running (torque permitted)	STO bypass state	Integrated

Safe Monitor Network Communication

The safe monitor network executes motion and safety tasks by using the CIP™ protocol.

Figure 52 - Motion and Safety Connections
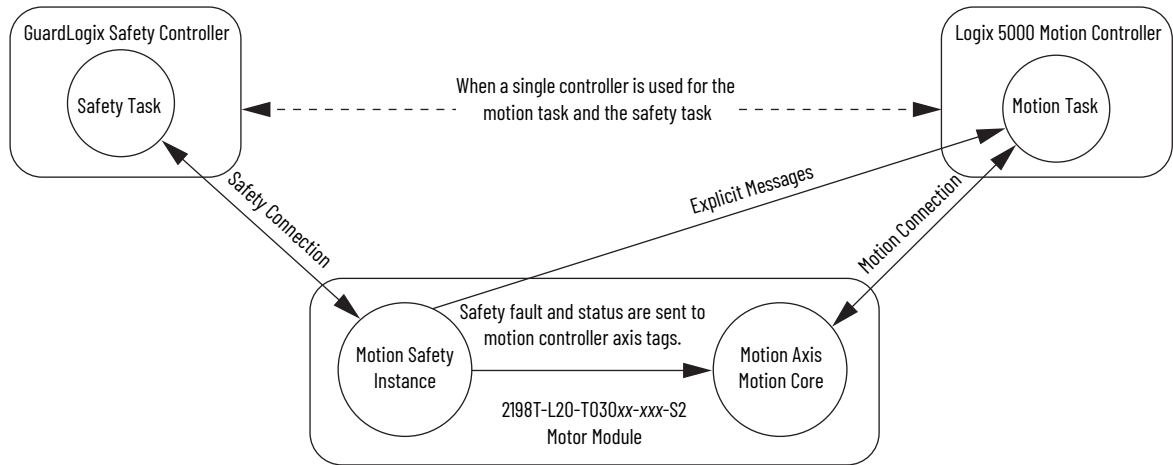
Motion Connection

The motion connection communicates motor module axis motion and safety status to the motion task. The motion connection also receives motion commands from the motion task in the motion controller. Data is exchanged at a periodic rate over the connection. To configure the motor-module axis motion connection Axis Properties in the Studio 5000 application, see Chapter 7 - iTRAK 5730 System Integrated Safety on page 173 for detailed instructions.

Some of the axis tags are updated from the fault and safety status that is provided by the safety instance in the motor module. The safety instance sends this status to the motion core and then on to the motion controller. Axis tags show the updated status. See Figure 52 on page 193 for an illustration on how status is sent to the motion controller.

> **IMPORTANT**   Axis tags are for status only and are not used by the safety function.

Table 42 - Motion Connection Axis Tags

Axis Tag Name (motion controller)	Motion Connection Attribute #	Data Type	Description	Safety Output Assembly Tag Name (safety controller)
Axis.AxisSafetyState	760	DINT	Motor module Safety Supervisor state. See the Safety Supervisor State on 192 for more details.	None
Axis.AxisSafetyStatus	761	DINT	Collection of bits indicating the status of the standard safety functions for the axis as reported by Motor Module Safety Instance.	See individual bits in Table 43 on 194.
Axis.AxisSafetyStatusRA	762	DINT	Collection of bits indicating the status of Rockwell Automation specific safety functions for the axis as reported by Motor Module Safety Instance.	See individual bits in Table 43 on 194.

Table 42 - Motion Connection Axis Tags (Continued)

Axis Tag Name (motion controller)	Motion Connection Attribute #	Data Type	Description	Safety Output Assembly Tag Name (safety controller)
Axis.AxisSafetyFaults	763	DINT	Collection of bits indicating the Safety Fault status of the drive-module safety instances and integrated safety functions.	See individual bits in <u>Table 43</u> on <u>194</u>.
Axis.AxisSafetyFaultsRA	764	DINT	Collection of bits indicating the safety fault status of Rockwell Automation safety functions.	See individual bits in <u>Table 43</u> on <u>194</u>.
Axis.AxisSafetyAlarms	753	DINT	Reserved for future use.	—

<u>Table 43</u> provides motion-connection axis tag names that are updated to show safety instance status or controller-based safety function status.

> The words *module*, *instance*, and *axis* (italic) in these tag names represent the module, instance, and axis name assigned in the Studio 5000 application.

Table 43 - Motion Connection Axis Tag Names

Axis Tag Name (motion controller)	Motion Connection Attribute Number	Data Type	Description	Safety Output Assembly Tag Name (safety controller)
Axis.AxisSafetyStatus	761	DINT	Collection of bits indicating the status of the standard safety functions for the axis as reported by Motor Module Safety Instance.	See individual bits below.
Axis.SafetyFaultStatus	[0]	BOOL	Any Safe Stop Fault occurring in the Safety Instance. 0 = Not Faulted 1 = Safety Fault	None
Axis.SafetyResetRequestStatus	[1]	BOOL	Indicates the state of the reset request output from the safety controller (in the safety output assembly) connected with the Motor-module Safety Instance. The value of *Axis*.SafetyResetRequestStatus is the reset input to the safety instance in the motor module. 0 = Reset Request OFF 1 = Reset Request ON	*module*:SO.ResetRequest[*instance*]
Axis.SafetyResetRequiredStatus	[2]	BOOL	Indicates that the drive-module safety instance that is associated with this *Axis* requires a reset of the safety function. 0 = Normal 1 = Reset Required	None
Axis.SafeTorqueOffActiveStatus	[3]	BOOL	Indicates that the state of the STO output from the safety controller, which is the STO input to the motor-module safety instance associated with this axis. 0 = STO Output Is active 1 = STO is not active, STO is not requested	*module*:SO.STOOuput[*instance*]
Axis.SafeTorqueDisabledStatus	[4]	BOOL	Indicates that the motor-module safety instance Torque Disabled Status. 0 = Axis power structure is not inhibited by the safety instance 1 = Axis power structure is inhibited	None
Axis.SS1ActiveStatus	[7]	BOOL	Indicates that the controller-based or the motor module-based SS1 function is active. 0 = SS1 Function is not Active 1 = SS1 Function is Active	*module*:SO.SSActive[*instance*]
Axis.SOSActiveStatus	[9]	BOOL	Indicates that the controller-based SOS function is active. 0 = SOS Function is not Active 1 = SOS Function is Active	*module*:SO.SOSActive[*instance*]
Axis.SOSStandstillStatus	[10]	BOOL	Indicates that the controller-based SOS function has detected standstill according to the function configuration. 0 = monitored axis is not at Standstill 1 = monitored axis is at standstill	*module*:SO.SOSLimit[*instance*]
Axis.SMTActiveStatus	[11]	BOOL	Always 0. This function is not available	None
Axis.SMTOvertemperatureStatus	[12]	BOOL	Always 0. This function is not available.	None
Axis.SSMActiveStatus	[16]	BOOL	For use with a controller-based SSM function.	*module*:SO.SSMActive[*instance*]

Table 43 - Motion Connection Axis Tag Names (Continued)

Axis Tag Name (motion controller)	Motion Connection Attribute Number	Data Type	Description	Safety Output Assembly Tag Name (safety controller)
Axis.SSMStatus	[17]	BOOL	For use with a controller-based SSM function.	*module*:SO.SSMStatus[*instance*]
Axis.SLAActiveStatus	[20]	BOOL	Always 0. This function is not available.	None
Axis.SLALimitStatus	[21]	BOOL	Always 0. This function is not available.	None
Axis.SDIActiveStatus	[22]	BOOL	Indicates that the controller-based SDI function is active. 0 = SDI Function is not Active 1 = SDI Function is Active	*module*:SO.SDIActive[*instance*]
Axis.SDILimitStatus	[23]	BOOL	Indicates that the controller-based SDI function detected motion greater than the limit in the unintended direction. 0 = Limit not reached 1 = Unintended motion	*module*:SO.SDILimit[*instance*]
Axis.SafePositiveMotionStatus	[24]	BOOL	Always 0. This function is not available.	None
Axis.SafeNegativeMotionStatus	[25]	BOOL	Always 0. This function is not available.	None
Axis.SCAActiveStatus	[26]	BOOL	For use with a controller-based SCA function.	*module*:SO.SCAActive[*instance*]
Axis.SCAStatus	[27]	BOOL	For use with a controller-based SCA function.	*module*:SO.SCAStatus[*instance*]
Axis.SLPActiveStatus	[28]	BOOL	Indicates that the controller-based SLP function is active. 0 = SLP Function is not Active 1 = SLP Function is Active	*module*:SO.SLPActive[*instance*]
Axis.SLPLimitStatus	[29]	BOOL	Indicates that the controller-based SLP function has detected the monitored axis position outside of the setpoint limits. 0 = axis position is within the limits 1 = axis position is outside of the limits	*module*:SO.SLPLimit[*instance*]
Axis.SafetyOutputConnectionClosedStatus	[30]	BOOL	Indicates the safety connection status from the controller to the motor module. 0 = connection open 1 = connection closed	None
Axis.SafetyOutputConnectionIdleStatus	[31]	BOOL	Indicates the safety connection status from the controller to the motor module. 0 = connection active 1 = connection idle	None
Axis.AxisSafetyStatusRA	762	DINT	Collection of bits indicating the status of Rockwell Automation specific safety functions for the axis as reported by Motor-module Safety Instance.	See individual bits below.
Axis.SafeBrakeIntegrityStatus	[0]	BOOL	Status of an external safety brake controlled by SBC instruction. The brake status, which can be either released or engaged, is undetermined. 0 = SBC fault 1 = No faults detected	*module*:SO.SBCIntegrity[*instance*]
Axis.SafeFeedbackHomedStatus	[1]	BOOL	Status of the controller-based SFX position homing function.	*module*:SO.SFHome[*instance*]
Axis.AxisSafetyFaults	763	DINT	Collection of bits indicating the Safety Fault status of the motor-module safety instances and integrated safety functions.	See individual bits below.
Axis.SafetyCoreFault	[0]	BOOL	Indicates that an internal fault occurred within the motor-module safety instance. If there are dual-axis inverters, both safety instances fault. 0 = Normal Operation 1 = Fault	None (use explicit message)
Axis.SafetyFeedbackFault	[2]	BOOL	Indicates that a fault occurred with the safety feedback or with the safety dual-channel feedback. 0 = Normal Operation 1 = Fault	None (use explicit message)
Axis.SafeTorqueOffFault	[3]	BOOL	Indicates that a fault occurred within the STO function of the motor-module safety instance. 0 = Normal Operation 1 = Fault	None (use explicit message)
Axis.SS1Fault	[4]	BOOL	Indicates that a fault occurred with the motor module-based or a controller-based SS1 function. 0 = Normal Operation 1 = Fault	*module*:SO.SSFault[*instance*]

Table 43 - Motion Connection Axis Tag Names (Continued)

Axis Tag Name (motion controller)	Motion Connection Attribute Number	Data Type	Description	Safety Output Assembly Tag Name (safety controller)
Axis.SSMFault	[16]	BOOL	Controller-based SSM fault. 0 = Normal Operation 1 = Fault	*module*:SO.SSMFault[*instance*]
Axis.SLSFault	[17]	BOOL	Controller-based SLS fault. 0 = Normal Operation 1 = Fault	*module*:SO.SLSFault[*instance*]
Axis.SLAFault	[18]	BOOL	Always 0. This function is not available.	—
Axis.SDIFault	[19]	BOOL	Controller-based SDI fault. 0 = Normal Operation 1 = Fault	*module*:SO.SDIFault[*instance*]
Axis.SCAFault	[20]	BOOL	Controller-based SCA fault. 0 = Normal Operation 1 = Fault	*module*:SO.SCAFault[*instance*]
Axis.SLPFault	[21]	BOOL	Controller-based SLP fault. 0 = Normal Operation 1 = Fault	*module*:SO.SLPFault[*instance*]
Axis.AxisSafetyFaultsRA	764	DINT	Collection of bits indicating the safety fault status of Rockwell Automation safety functions.	See individual bits below.
Axis.SFXFault	[1]	BOOL	Controller-based SFX fault. 0 = Normal Operation 1 = Fault	*module*:SO.SFXFault[*instance*]

Safety Connection

The safety controller communicates with the safety instances in the motor module over the safety connection. Cyclic data are passed in each direction over the safety connection that appears in Safety Controller tag structures that are called input and output assemblies. The safety connection cyclic rate is configured in the Studio 5000 application. The Safety Input Assembly tag structure is data from the motor module safety instances to the safety controller. The Safety Output Assembly tag structure is data from the safety controller to the motor module safety instances. There is only one safety assembly per motor module, so a different assembly structure is used for single-axis and dual-axis inverters.

Table 44 - Safety Input Assembly Tags

Safety Input Assembly Tag Name (input to safety controller)	Type/[bit]	Description
module:SI.ConnectionStatus	SINT	See individual bits in <u>Table 46</u> on <u>197</u>.
module:SI.StopStatus[*instance*]	SINT	See individual bits in <u>Table 46</u> on <u>197</u>.
module:SI.SafeStatus[*instance*]	SINT	See individual bits in <u>Table 46</u> on <u>197</u>.
module:SI.FunctionSupport[*instance*]	SINT	See individual bits in <u>Table 46</u> on <u>197</u>.

Table 45 - Safety Output Assembly Tags

Safety Output Assembly Tag Name (output to safety controller)	Type/[bit]	Description
module:SO.SafetyStopFunctions[*instance*]	SINT	See individual bits in <u>Table 47</u> on <u>198</u>.

Safety assembly tags are associated with a safety connection from a safety controller to a motor module. The data in these tags are communicated at the configured connection rate.

> The words *module* and *instance* (italic) in these tag names represent the module name and instance name that are assigned in the Studio 5000 application.

Data from the motor module to the safety controller is in the safety input assembly. Data from the safety controller to the motor module is in the safety output assembly.

Table 46 - Safety Input Assembly Tag Names

Safety Input Assembly Tag Name (input to safety controller)	Type/[bit]	Description
module:SI.ConnectionStatus	SINT	Collection of bits listed below.
module:SI.RunMode	[0]	Safety Connection 0= idle 1 = Run
module:SI.ConnectionFaulted	[1]	Safety Connection 0=normal 1= Faulted
module:SI.StopStatus[*instance*]	SINT	Collection of bits listed below.
module:SI.STOActive[*instance*]	[0]	Indicates STO function status. 0 = STO function not active 1 = STO function active
module:SI.SBCActive[*instance*]	[1]	Always 0
module:SI.SS1Active[*instance*]	[2]	Indicates drive-based SS1 active status. 0 = SS1 function not active 1 = SS1 function active
module:SI.SS2Active[*instance*]	[3]	Always 0
module:SI.SOSStandstill[*instance*]	[4]	Always 0
module:SI.SafetyFault[*instance*]	[6]	1 = Safe Stop Fault present
module:SI.RestartRequired[*instance*]	[7]	1 = Reset is required
module:SI.SafeStatus[*instance*]	SINT	Collection of bits listed below.
module:SI.TorqueDisabled[*instance*]	[0]	0 = Torque Permitted 1 = Torque Disabled
module:SI.BrakeEngaged[*instance*]	[1]	Always 0
module:SI.MotionStatus[*instance*]	SINT	Collection of bits listed below.
module:SI.MotionPositive[*instance*]	[0]	Always 0
module:SI.MotionNegative[*instance*]	[1]	Always 0
module:SI.FunctionSupport[*instance*]	SINT	Collection of bits listed below.
module:SI.PrimaryFeedbackValid[*instance*]	[0]	Always 0
module:SI.SecondaryFeedbackValid[*instance*]	[1]	Collection of bits listed below.
module:SI.DiscrepancyCheckingActive[*instance*]	[2]	Always 0
module:SI.SBCReady[*instance*]	[3]	Always 0
module:SI.SS1Ready[*instance*]	[4]	0 = Drive-based SS1 function is not configured or faulted 1 = Drive-based SS1 function is configured and ready for operation
module:SI.SS2Ready[*instance*]	[5]	Always 0
module:SI.SOSReady[*instance*]	[6]	Always 0

Table 47 - Safety Output Assembly Tag Names

Safety Output Assembly Tag Name (output to safety controller)	Type/ [bit]	Description
module:SO.SafetyStopFunctions[instance]	SINT	A collection of bits used to activate (request) safety functions as listed below.
module:SO.STOOutput[instance]	[0]	0 = Activate STO Function 1 = Permit Torque
module:SO.SBCOutput[instance]	[1]	Drive-based function not available, set to 0.
module:SO.SS1Request[instance]	[2]	0 = Remove SS1 Request 1 = Activate Drive-based SS1 Function
module:SO.SS2Request[instance]	[3]	Drive-based function not available, set to 0.
module:SO.SOSRequest[instance]	[4]	Drive-based function not available, set to 0.
module:SO.ResetRequest[instance]	[7]	0 -> 1 transition resets the drive-based Safe Stop function.

Troubleshoot the Safe Stop Function

ℹ️ Knowledgebase Answer ID 1092901 iTRAK 5730 System Fault Codes has the fault codes. Download the spreadsheet from this public article.

You might be asked to log in to your Rockwell Automation web account, or create an account if you do not have one. You do not need a support contract to access the article.

Understand Integrated Safety Motor Module Replacement

GuardLogix controllers retain the I/O device configuration onboard and are able to download the configuration to the replacement device.

IMPORTANT   If an iTRAK 5730 motor module was used previously, clear the existing configuration before installing it on a safety network by resetting the module to its out-of-box condition. See Out-of-Box State Support on page 176 for instructions.

You must reconfigure a replacement motor module that is part of an integrated safety network due to the unique SNN assigned to each device.

The device number and SNN compose the safety device's DeviceID. Safety devices require this more complex identifier to make sure that duplicate device numbers do not compromise communication between the correct safety devices. The SNN is also used to provide integrity when the configuration is initially downloaded to the motor module.

When the Studio 5000 application is online, the Safety tab of the Module Properties dialog box displays the current configuration ownership. When the opened project owns the configuration, 'Local' is displayed.

Configuration Ownership: Local

'Communication error' is displayed if the module read fails. See Replace an Integrated Safety Motor Module in a GuardLogix System on page 199 for integrated safety module replacement information.

Replace an Integrated Safety Motor Module in a GuardLogix System

When you replace an integrated safety motor module, you must configure the device properly and verify the operation of the replacement motor module.

> ⚠️ **ATTENTION:** During module replacement or functional test, the safety of the system must not rely on any portion of the affected motor module.

Two options for safety motor module replacement are available on the Safety tab of the Controller Properties dialog box in the Studio 5000 application:

- Configure Only When No Safety Signature Exists
- Configure Always

Figure 53 - Safety Motor Module Replacement Options
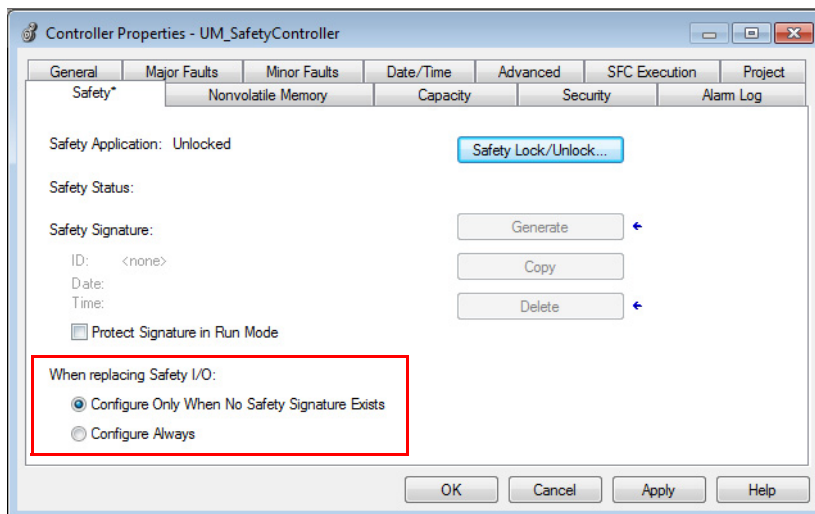
Configure Only When No Safety Signature Exists

This setting instructs the GuardLogix controller to automatically configure a safety motor module only when the safety task does not have a safety task signature, and the replacement module is in an out-of-box condition, meaning that an SSN does not exist in the safety module.

If the safety task has a safety task signature, the GuardLogix controller automatically configures the replacement CIP Safety™ I/O device only if the following is true:

- The device already has the correct SSN.
- The device electronic keying is correct.
- The node or IP address is correct.

For detailed information, see the 'Replace a Safety I/O Device' procedure in the user manual for the controller:

- ControlLogix 5580 and GuardLogix 5580 Controllers User Manual, publication 1756-UM543
- CompactLogix 5380 and Compact GuardLogix 5380 User Manual, publication 5069-UM001

Configure Always

When the Configure Always feature is enabled, the controller automatically checks for and connects to a replacement motor module that meets all of the following requirements:

- The controller has configuration data for a compatible motor module at that network address
- The motor module has an SNN that matches the configuration

> **ATTENTION:** Enable the Configure Always feature only if the entire integrated safety control system is not being relied on to maintain SIL 3 behavior during the replacement and functional testing of an iTRAK 5730 system.
> If other parts of the integrated safety control system are being relied upon to maintain SIL 3, make sure that the controller's Configure Always feature is disabled.
> It is your responsibility to implement a process to make sure that proper safety functionality is maintained during device replacement.

> **ATTENTION:** Do not place any devices in the out-of-box condition on any integrated safety network when the Configure Always feature is enabled, except while following the device replacement procedure in the appropriate user manual for your Logix 5000® controller:
> - ControlLogix 5580 and GuardLogix 5580 Controllers User Manual, publication 1756-UM543
> - CompactLogix 5380 and Compact GuardLogix 5380 User Manual, publication 5069-UM001

Update the iTRAK 5730 System Firmware

This appendix provides procedures to update your iTRAK 5730® system firmware.

Topic	Page
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Update Your Firmware	203
Verify the Firmware Update	213

You can upgrade your iTRAK 5730 system firmware by using ControlFLASH Plus™ or ControlFLASH™ software. To upgrade the firmware, you must configure your communication software (such as RSLinx® software), select the motor module to upgrade, and complete the firmware upgrading procedure.

> We recommend that you use ControlFLASH Plus software for firmware updates. See the ControlFLASH Plus Quick Start Guide, publication CFP-QS001, for more information.

Before You Begin

For firmware updates, you must use the software versions shown in Table 48.

Table 48 - iTRAK 5730 System Requirements

Description	Version
ControlFLASH software kit [1]	15.03.00 or later
ControlFLASH Plus software kit [1]	3.01 or later
FactoryTalk® Linx software [2]	6.00.00 or later
RSLinx software [3]	4.20.00 or later
Studio 5000 Logix Designer® application[4]	33.00.00 or later

(1) Download the ControlFLASH kit from the Product Compatibility and Download Center at: rok.auto/pcdc. For more ControlFLASH information (not iTRAK 5730 specific), refer to the ControlFLASH User Manual, publication 1756-UM105.
(2) Only required when using ControlFLASH Plus software.
(3) Only required when using ControlFLASH software.
(4) Also called the Studio 5000® application.

Gather the following information before you begin your firmware update.

- Network path to the targeted iTRAK 5730 modules you want to update.
- Catalog numbers of the targeted iTRAK 5730 modules you want to update.

IMPORTANT	All connector modules must be connected and secured to the motor modules. Control power must be connected to the power and control input connector module and power input with a control pass-through connector module (if used), before updating the firmware.

IMPORTANT	For the iTRAK 5730 system, the following status indicators must be flashing green: • Motor modules network (NET) and module (MOD) • Connector modules status (STS), speed (SPD), and DC status (DC STS)

⚠	**ATTENTION:** To avoid personal injury or damage to equipment during the firmware update due to unpredictable motor activity, do not apply three-phase AC or common-bus DC input power to the iTRAK system.

Inhibit the Module

You must inhibit the iTRAK 5730 module before performing the firmware update. Follow these steps to inhibit a module.

1. Open your Studio 5000 application.
2. Right-click the iTRAK 5730 module you configured and choose Properties.
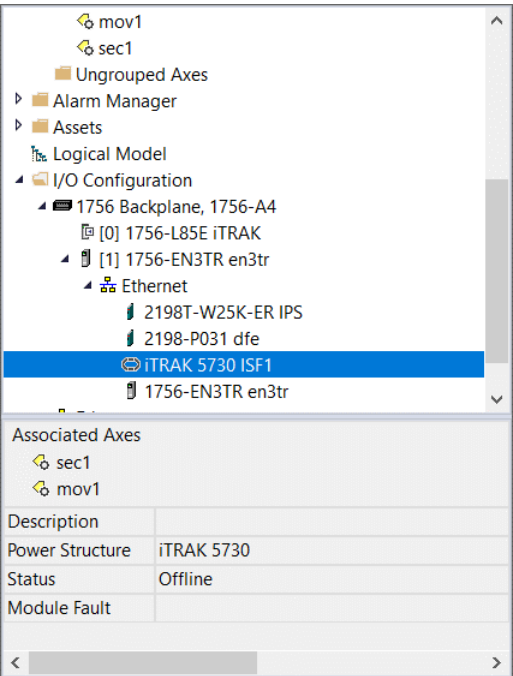
The Module Properties dialog box appears.

3. Select the Connection page.
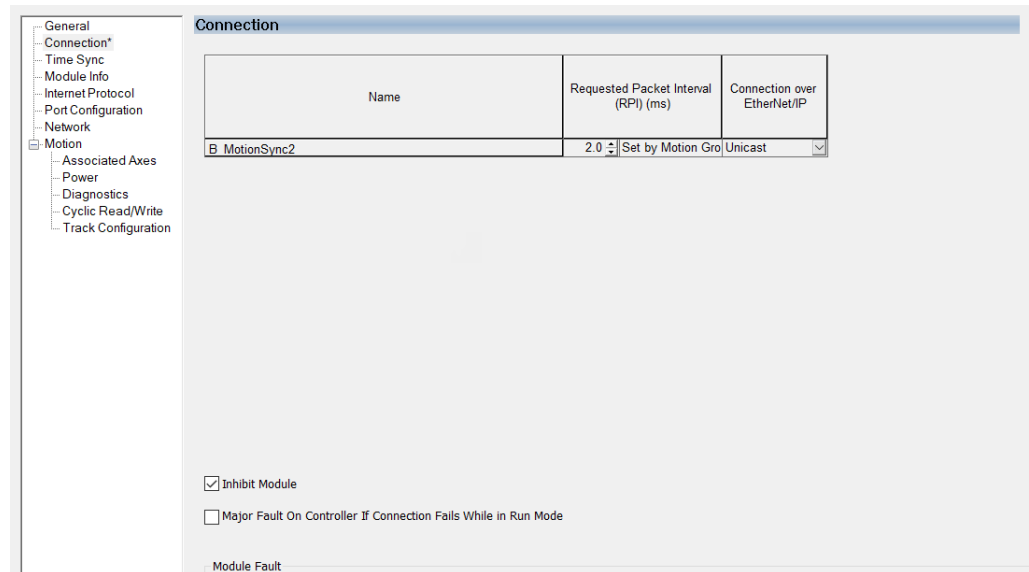
4. Check Inhibit Module.
5. Click OK.
6. Save your file and download the program to the controller.
7. Verify that the network (NET) and module (MOD) status indicators on the motor modules are flashing green.

Update Your Firmware

Use either ControlFLASH Plus or ControlFLASH to upgrade your firmware.

- To upgrade your firmware by using ControlFLASH Plus, see Use ControlFLASH Plus to Update Your iTRAK 5730 System Firmware.
- To upgrade your firmware by using ControlFLASH, see Use ControlFLASH to Update Your iTRAK 5730 System Firmware on page 208.

Use ControlFLASH Plus to Update Your iTRAK 5730 System Firmware

Follow these steps to select the iTRAK 5730 system module to upgrade.

1. Start ControlFLASH Plus.

    You can choose to select and upgrade the firmware for all motor modules in your system. In this procedure, only one module is selected for a firmware update.

2. On the Flash Devices page, if the device is not already present in 'Browsing from path,' complete these steps:

    a. click 🖧 .
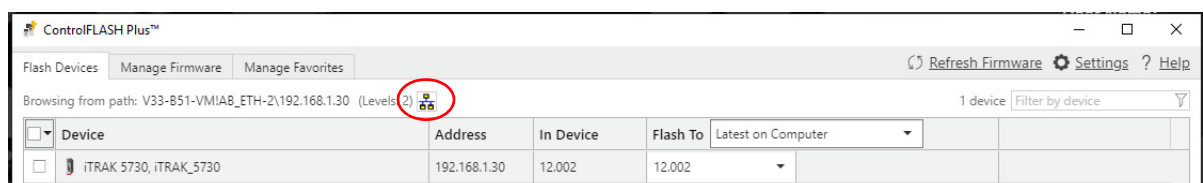
b. In the Network Browser dialog box, locate and select the device to upgrade.
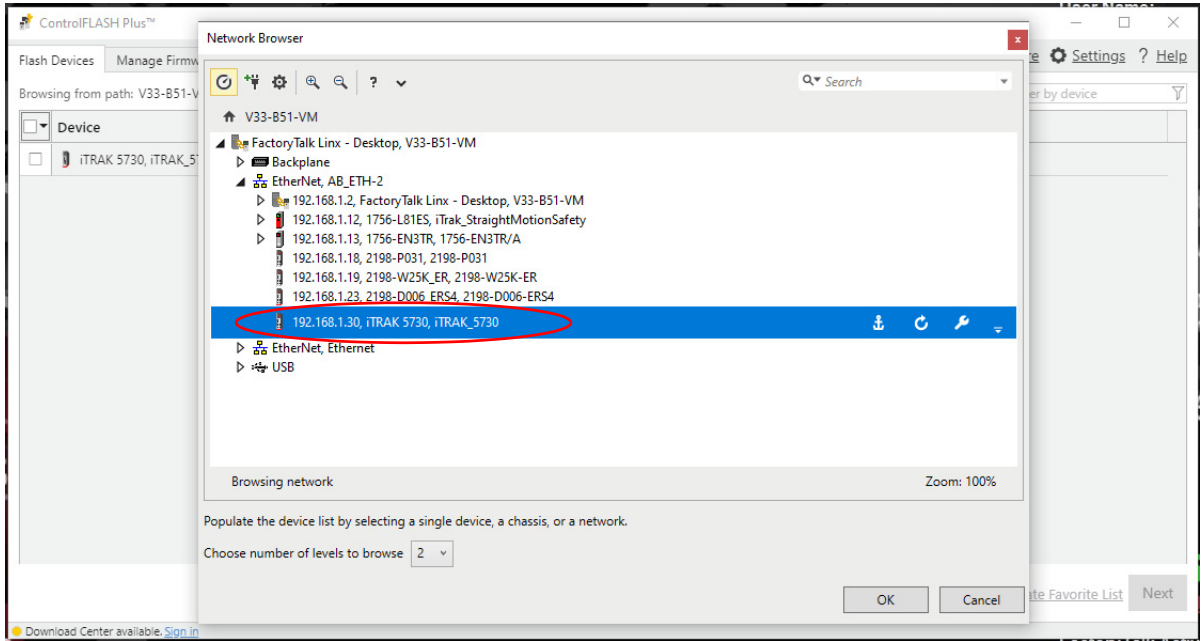
c. Click OK.

3. On the Flash Devices tab, verify that the checkbox to the left of the device is checked.
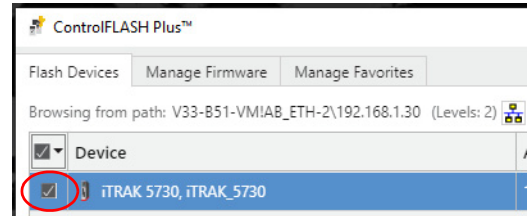
4. Choose the firmware version you want to use for the update using one of the following methods:
   - If you have already downloaded the firmware, then next to Flash To, choose Latest on Computer and select the version you want.
   - Next to Flash To, choose Latest from Download Center and select the version you want.
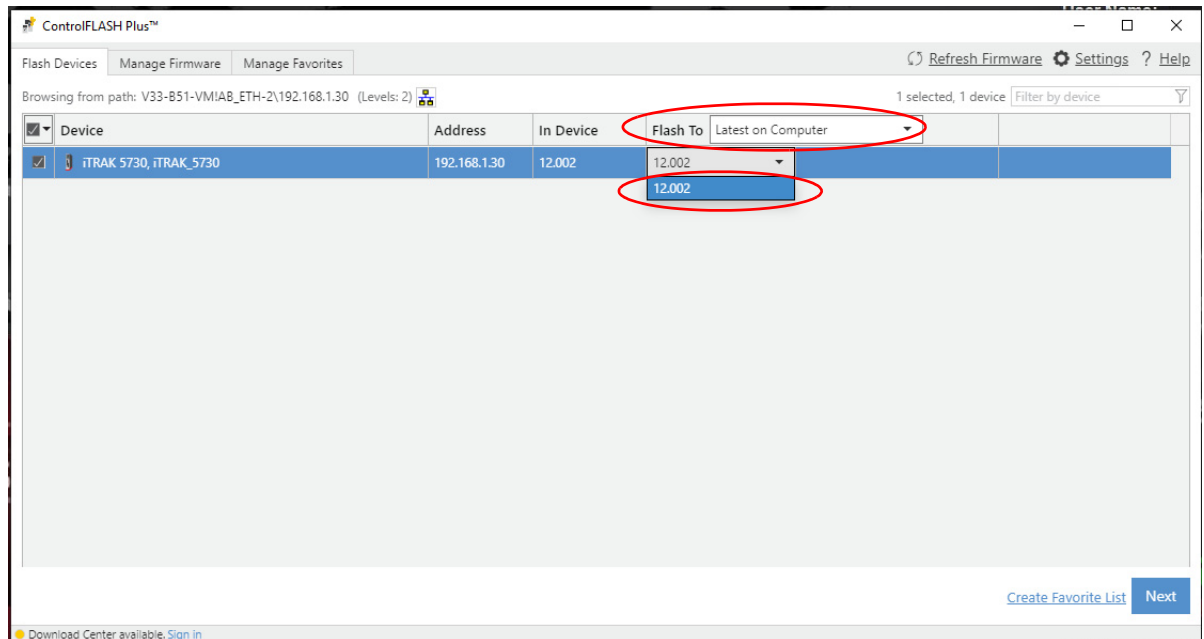
5. Click Next.
6. If a warning dialog box appears, read the warning, compete any recommendations, and click Close.
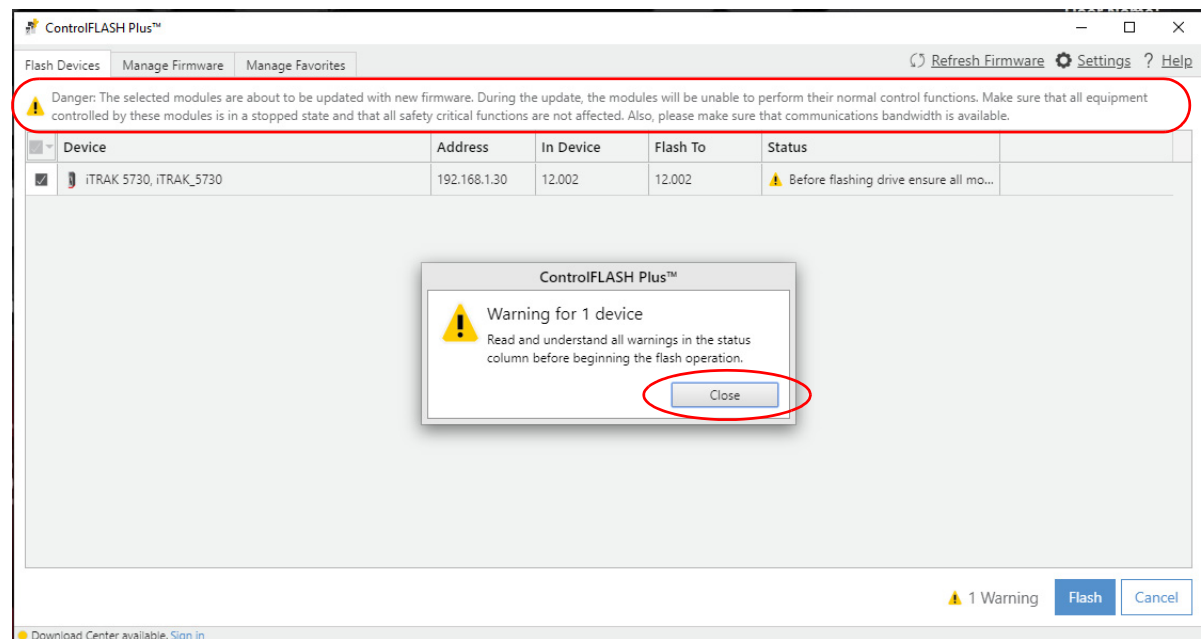
7. After acknowledging all warnings and confirming the desired revisions, click Flash.
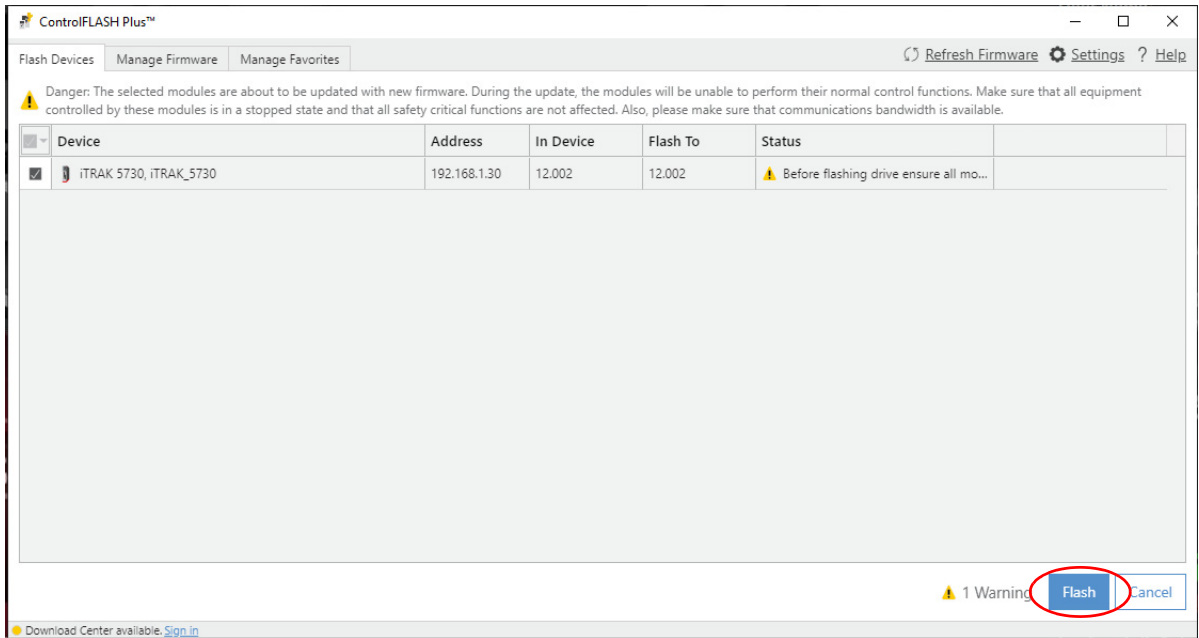
A progress bar appears to show the status of the firmware update.
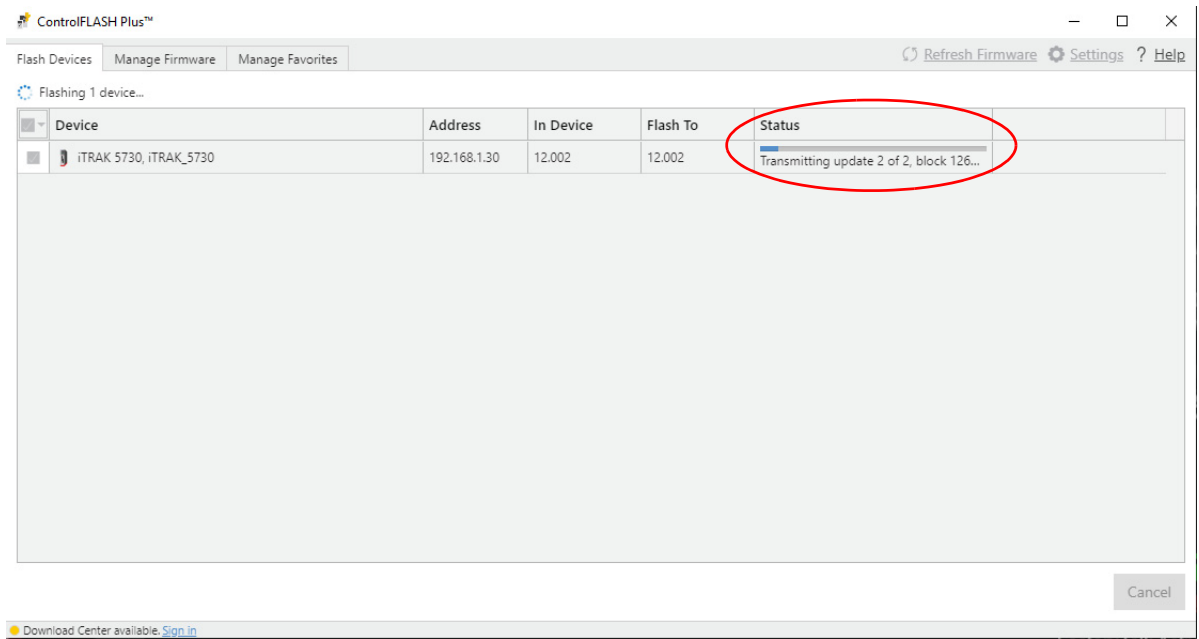
After the upgrade information is sent to the iTRAK, the iTRAK resets. During the reset, the module (MOD) and network (NET) status indicators on the motor modules change color from flashing green to steady red, or alternately flashing red.

After the download, the device will apply the new firmware and restart, which may take several minutes.

IMPORTANT	Do not cycle power to the iTRAK during this process. A power cycle results in an unsuccessful firmware update and an inoperable module.

After the device reboots, ControlFlash Plus will indicate success or failure of the update.
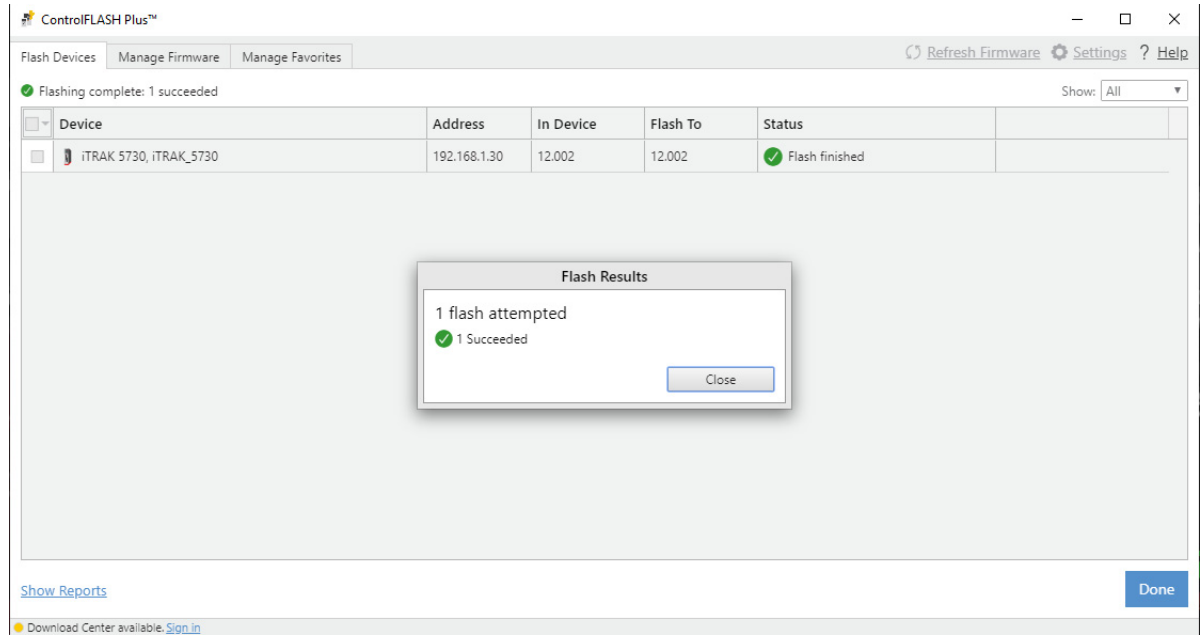
8. When the upgrade has completed, click Close.
9. To complete the process and close the application, click Done.

IMPORTANT	You must clear the Inhibit Module checkbox on the Connection page in the iTRAK 5730 Module Properties dialog box before resuming normal operation.

Use ControlFLASH to Update Your iTRAK 5730 System Firmware

Follow these steps to select the iTRAK 5730 system module to upgrade.

> When static IP addresses are assigned, it is recommended that you upgrade the firmware for the last module in the system. The last module is determined by the highest value of the last octet of the IP addresses. When the last module has been upgraded, continue to upgrade modules in descending IP address order.

Configure Your Communication Path with RSLinx

This procedure assumes that your communication method to the target device is the Ethernet network. It also assumes that any Ethernet communication module or Logix 5000® controller in the communication path has already been configured.

For more controller information, see .

Follow these steps to configure the communications path to the target device.

1. Open your RSLinx Classic software.
2. From the Communications menu, choose Configure Drivers.

   The Configure Drivers dialog box appears.
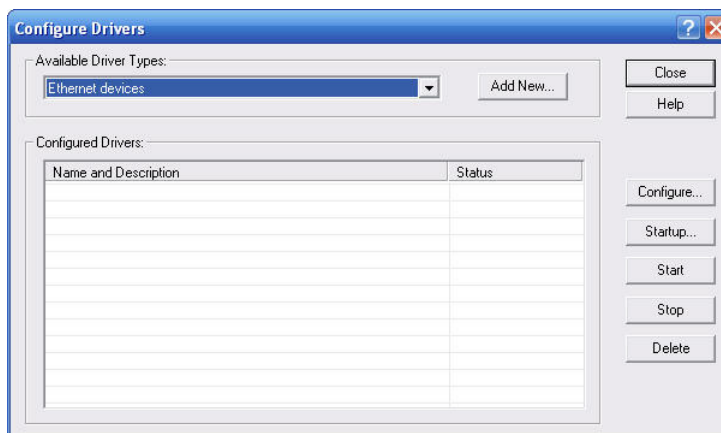
3. From the Available Driver Types pull-down menu, choose Ethernet devices.
4. Click Add New.

   The Add New RSLinx Classic Driver dialog box appears.
5. Type the new driver name.

6. Click OK.

The Configure driver dialog box appears.

7. Type the IP address of your Ethernet Module or Controller that bridges between the Ethernet network and the EtherNet/IP network.

8. Click OK.

The new Ethernet driver appears under Configured Drivers.
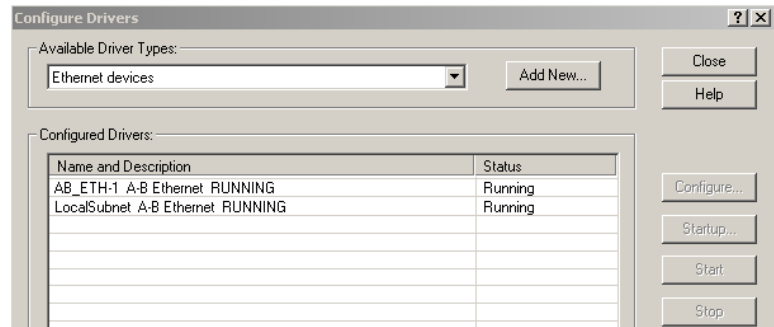
9. Click Close.

10. Minimize the RSLinx application dialog box.

Start the ControlFLASH Software

Follow these steps to start ControlFLASH and begin your firmware update.

1. In the Studio 5000 application, from the Tools menu, choose ControlFLASH.

> You can also open the ControlFLASH software by choosing Start > Programs > FLASH Programming Tools > ControlFLASH.

The Welcome to ControlFLASH dialog box appears.
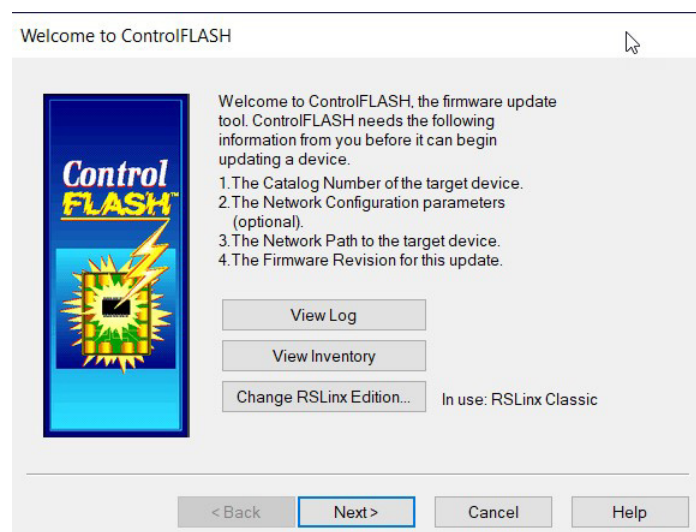
2. Click Next.

The Catalog Number dialog box appears.
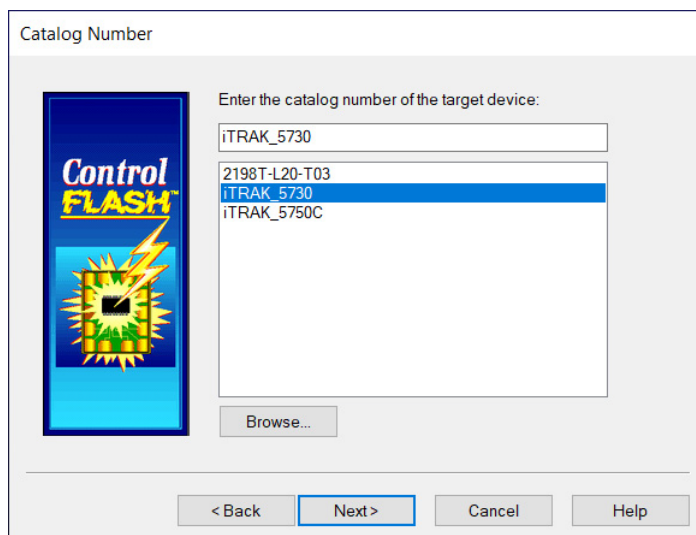
> If your catalog number does not appear, click Browse, select the monitored folder where the firmware kit (DMK files) is located. Click Add and OK.

3. Select your iTRAK module.

    In this example, the iTRAK 5730 is selected.

4. Click Next.

    The Select Device to Update dialog box appears.
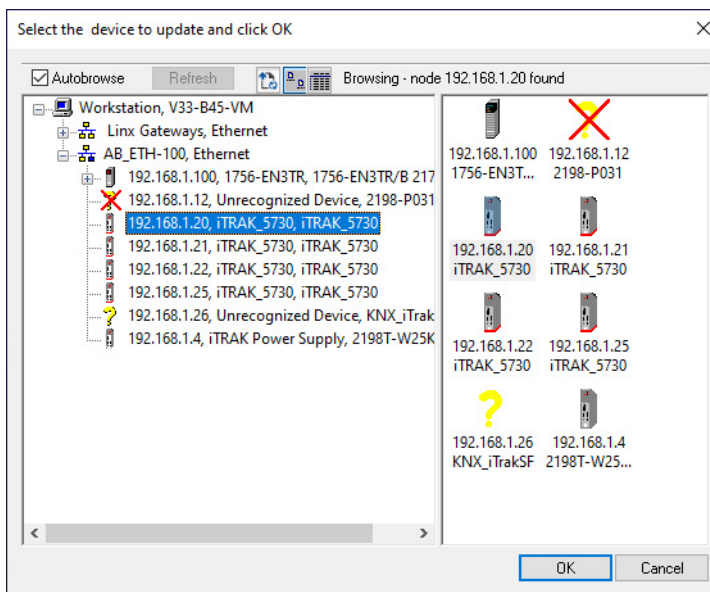
5. Expand your Ethernet node, Logix backplane, and EtherNet/IP network module.
6. Select the iTRAK 5730 system to upgrade.
7. Click OK.

The Firmware Revision dialog box appears.
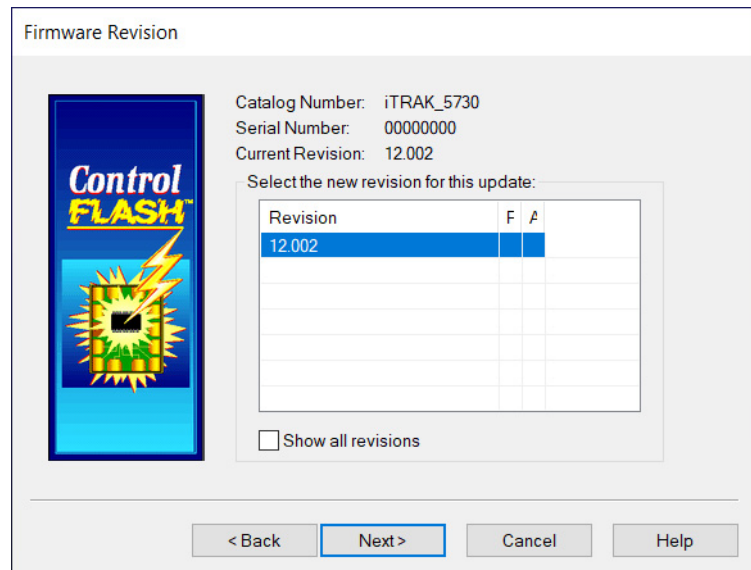
8. Select the firmware revision to upgrade.
9. Click Next.

The Summary dialog box appears.
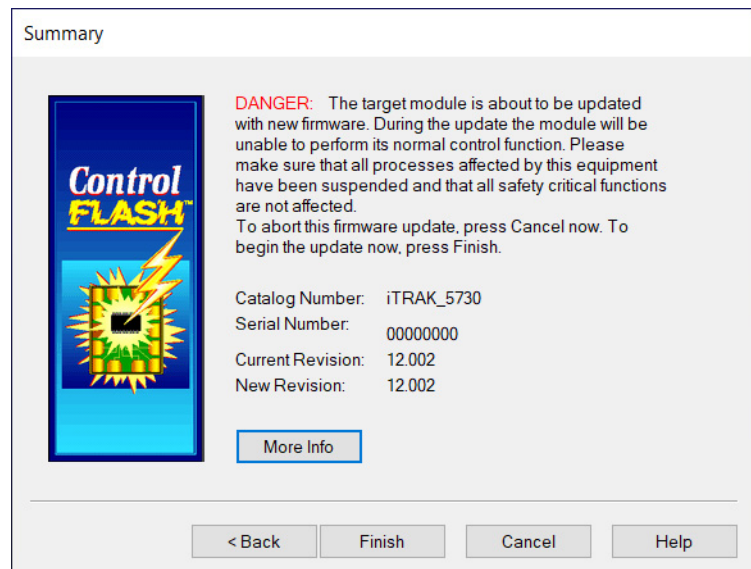
10. Confirm the device catalog number and firmware revision.
11. Click Finish.

This ControlFLASH warning dialog box appears.
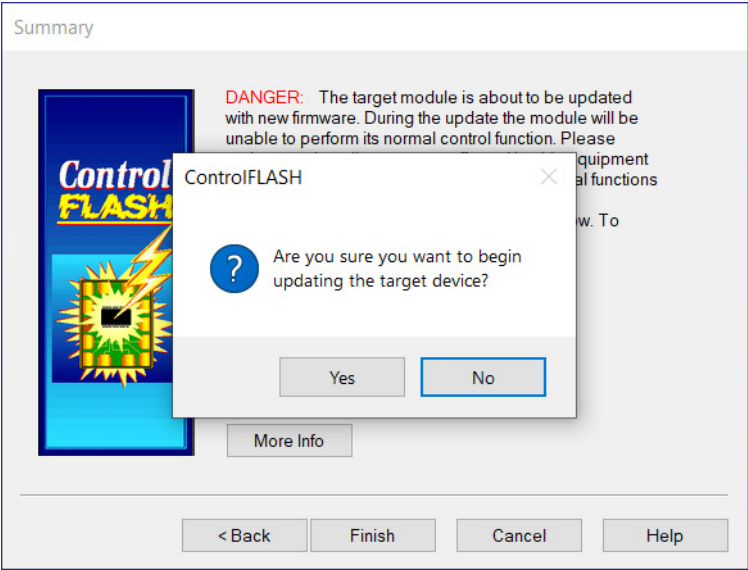
12. To complete the update now, click Yes.

This ControlFLASH warning dialog box appears.
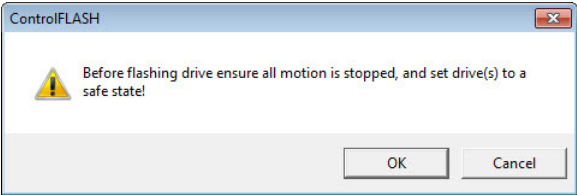
13. Acknowledge the warning and click OK.

The Progress dialog box appears
and updating begins.
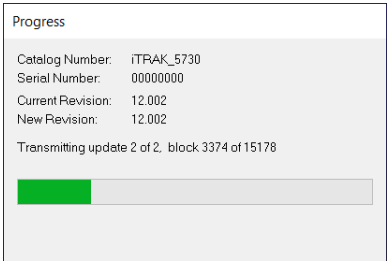
After the upgrade information is
sent to the iTRAK, the iTRAK
resets. During the reset, the
module (MOD) and network
(NET) status indicators on the
motor modules change color
from flashing green to steady
red, or alternately flashing red.
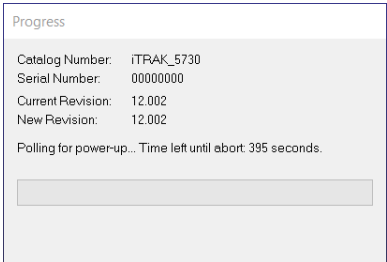
14. Wait for the Progress dialog box to time out.

    It is normal for this process to take several minutes.

IMPORTANT	Do not cycle power to the iTRAK during this process. A power cycle results in an unsuccessful firmware update and an inoperable module.

15. Verify that the module (MOD) and network (NET) status indicators on the motor modules are flashing green.
16. Verify that the Update Status dialog box appears and indicates success or failure as described in the following table and image.

Upgrading Status	If
Success	Update complete appears in a green Status dialog box, then go to <u>step 17</u>.
Failure	Update failure appears in a red Status dialog box, then refer to the ControlFLASH User Manual, publication <u>1756-UM105</u> for troubleshooting information.
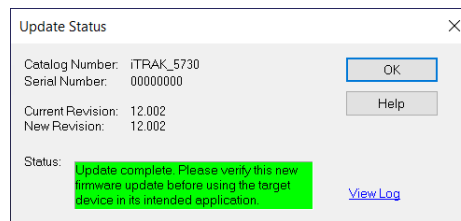
17. Click OK.

IMPORTANT	You must clear the Inhibit Module checkbox on the Connection page in the iTRAK 5730 Module Properties dialog box before resuming normal operation.

Verify the Firmware Update

Follow these steps to verify that your firmware update was successful.

💡	Verifying the firmware update is optional.

1. Open your RSLinx software.
2. From the Communications menu, choose RSWho.
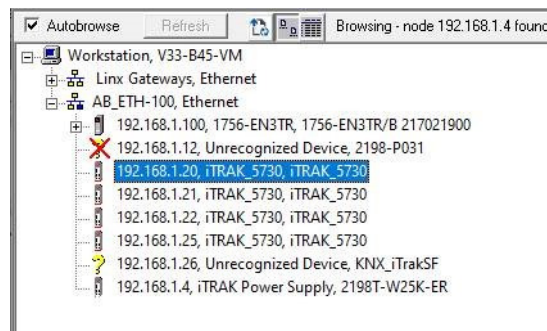
3. Expand your Ethernet node, Logix backplane, and EtherNet/IP network module.
4. Right-click the iTRAK 5730 module and choose Device Properties.

The Device Properties dialog box appears.
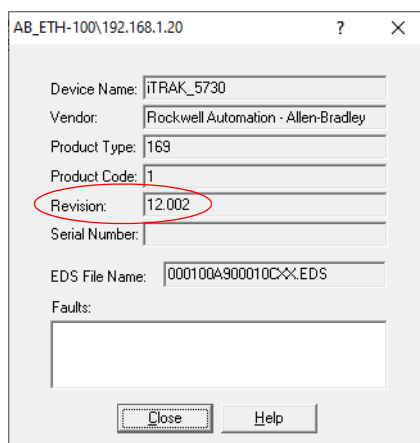
5. Verify the new firmware revision level.

6. Click Close.

High-speed Data Logging Service

This appendix provides instructions for how to use the high-speed data logging service of the iTRAK® 5730 system.

Topic	Page
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iTRAK System Data Logging Parameters	223

The high-speed data logging service, when used with the iTRAK 5730 system, allows you to log up to 40,000 data points for one to four channels. The sample period of the data logging service can be as low as the Servo Update Rate of the iTRAK module (250 µS). This service can be accessed through message instructions.

For more information regarding the use of the data logging service, sample code, and Add-On instructions, see Knowledgebase Answer ID QA34226.

Configure and Use the Message Instruction

Follow these steps to configure and use the high-speed data logging service with a message instruction.

1. In your Studio 5000 Logix Designer® project, open the routine where you want to implement data logging.
2. Create a Message instruction.
3. Right click the Message instruction and select New Tag…

   The New Parameter or Tag dialog box appears.

4. Type the tag name.

5. Click Create.

6. Open the Configuration dialog box by clicking the ellipsis (…) next to the tag name.

The Message Configuration dialog box appears.

7. On the Configuration tab, set these configuration parameters:
   - Message Type: CIP Generic
   - Service Type: Custom
   - Service Code: $3A_{HEX}$
   - Instance: Axis Instance that you want log data from
   - Class: 42_{HEX}
   - Attribute: 0
   - Source Element: a tag of data type DINT[10]
   - Source Length: 40 bytes (each DINT consists of 4 bytes)

   Axis Instance 1 is the section axis, and axis instances 2…5 are mover axes 1…4.

8. The DINT[10] array in the message configuration can be set as follows:

a. Create a User-Defined Data Type (UDT) to enter the data logging configuration.

The data structure of a data logging request is shown in this table:

Parameter	Type	Description	Value
Trigger type	USINT	Specifies the type of trigger operation that is performed on the designated attribute. When Signal is selected, the data logger triggers based on the value of the specified attribute relative to the Trigger Level. Attribute can be of integer or floating-point data type. When Boolean is selected, the data logger triggers based on a Boolean state of the attribute or attribute bit.	Enumeration: 0 = Signal 1 = Boolean 2...255 = reserved
Trigger Mode	USINT	Enumerated mode of operation for the triggering algorithm: • A positive (+) Edge Trigger looks for an attribute value transition relative to the Trigger Level. • A Level Trigger simply monitors the current attribute value relative to the Trigger Level.	Enumeration: 0 = Immediate 1 = "+" Edge Trigger 2 = "-" Edge Trigger 3 = ">=" Level Trigger 4 = "<=" Level Trigger 5...255 = reserved
Trigger Source	UINT	ID of the attribute whose value is used to trigger data logging.	—
Trigger Bit	USINT	The attribute bit number whose value is evaluated to trigger data logging. This parameter is only applicable to Boolean trigger types. A value of 0 applies to the least significant bit of the attribute.	—
Pre-store Samples	USINT	The percentage of the data log buffer dedicated to pre-store samples before the trigger event. The remaining buffer is filled with samples after the trigger event. The pre-store range that is allowed is from 0... 100%. Trigger events are detected until the data buffer is sufficiently full.	—
Capture Size	UINT	Specifies the number of samples to store in the data log arrays. Capture Size applies to each Data Log array. Capture Size is limited to the size of the data log array. This value is applied to the attribute, Data Capture Size.	—
Trigger Level	LREAL	The value of the trigger source that causes a trigger event. The units for this value are determined by the selected Trigger source. If a Boolean trigger type is selected, the Trigger Level is set to either 0 or 1.	Attribute-dependent units
Sample Period	LINT	Time period between samples stored in the data buffer. This value shall be an integer multiple of the minimum sample period of the device. For example, if the device can acquire data at 250 µS, the choices shall be 250 µS, 500 µS, 750 µS, and so on.	Nanoseconds
Data Source 1	UINT	ID of attribute to store in associated data log.	—
Data Source 2	UINT	ID of attribute to store in associated data log.	—
Data Source 3	UINT	ID of attribute to store in associated data log.	—
Data Source 4	UINT	ID of attribute to store in associated data log.	—

Parameter	Type	Description	Value
Data Source 5	UINT	ID of attribute to store in associated data log.	
Data Source 6	UINT	ID of attribute to store in associated data log.	Not supported. iTRAK currently supports 4 channels.
Data Source 7	UINT	ID of attribute to store in associated data log.	
Data Source 8	UINT	ID of attribute to store in associated data log.	

  b. Copy this UDT to the DINT[10] with a COP instruction before using it in the Message instruction.

  c. Convert the Trigger Level from Real to LREAL and copy the value into the DINT[10] array.

  The trigger level is an LREAL in the iTRAK module. However, LREAL is not a data type supported in the Studio 5000 Logix Designer application. Thus, you must convert the trigger level that is entered in the UDT as a REAL data type to a DINT data type in a format equivalent to an LREAL data type. This conversion must be performed before arming the data logging function using a COP instruction and three BTD instructions:
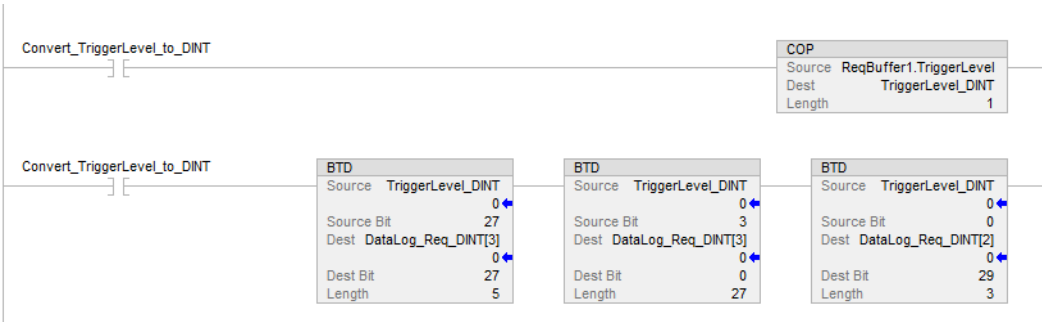
9. On the Communication tab, set the path to the module you want to log data from using the Message Path Browser.
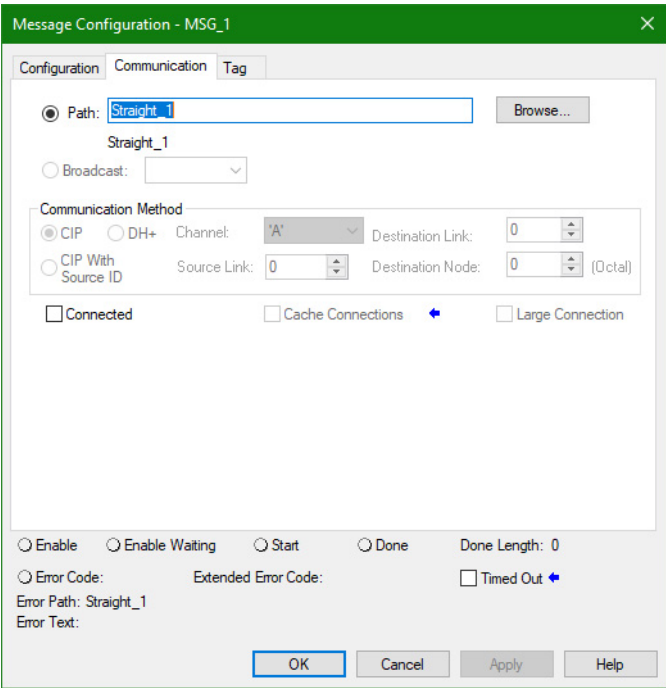
10. Click OK.

Data Logging Status (Attribute ID = 940) identifies the status of the data collection process. This attribute can be set to one of the following values:

- 0 = Inactive
- 1 = Buffering
- 2 = Buffered and Armed
- 3 = Triggered and Collecting
- 4 = Collected

11. Use these configuration parameters in the message instruction to read Data Logging Status from the iTRAK module:

- Message Type: CIP Generic
- Service Type: Get Attribute Single
- Service Code: E_{HEX}
- Instance: Axis Instance that you want log data from
- Class: 42_{HEX}
- Attribute: $3AC_{HEX}$
- Destination Element: a tag of data type DINT

Data Trigger Time Stamp (Attribute ID = 941) identifies the time stamp that is associated with the data logging trigger event in nanoseconds.

12. Use these configuration parameters in the message instruction to read Data Trigger Time Stamp from the iTRAK module:

- Message Type: CIP Generic
- Service Type: Get Attribute Single
- Service Code: E_{HEX}
- Instance: Axis Instance that you want log data from
- Class: 42_{HEX}
- Attribute: $3ADH_{HEX}$
- Destination Element: a tag of data type LINT

Data Trigger Index (Attribute ID = 942) identifies the index of the data point associated with the data logging trigger event. The trigger index is from 0…39999. For example, if the Pre-store Sample is 10% and the Capture Size is 32000, the Trigger Index would be 3199.

13. Use these configuration parameters in the message instruction to read Data Trigger Index from the iTRAK module:
    - Message Type: CIP Generic
    - Service Type: Get Attribute Single
    - Service Code: E_{HEX}
    - Instance: Axis Instance that you want log data from
    - Class: 42_{HEX}
    - Attribute: $3AE_{HEX}$
    - Destination Element: a tag of data type DINT

The sampled real-time data are stored in general-purpose array attributes. The iTRAK 5730 system currently supports only four data channels and the log data from each channel is stored in these attributes:

- Data Log 1 (Attribute ID = 943)
- Data Log 2 (Attribute ID = 944)
- Data Log 3 (Attribute ID = 945)
- Data Log 4 (Attribute ID = 946)

14. Use these configuration parameters in the message instruction to read Log Data from the iTRAK module:
    - Message Type: CIP Generic
    - Service Type: Get Attribute Single
    - Service Code: E_{HEX}
    - Instance: Axis Instance that you want log data from
    - Class: 42_{HEX}
    - Attribute: Attribute ID of the data log channel you want log data from in Hex.
        - Data Log 1 = 3AFHEX
        - Data Log 2 = 3B0HEX
        - Data Log 3 = 3B1HEX
        - Data Log 4 = 3B2HEX
    - Destination Element: a tag of data type REAL[40000]

15. Click OK.

iTRAK System Data Logging Parameters

The attributes that are listed in the following table can be used as Data Source and Trigger Source parameters.

Table 49 - Data Logging Parameters

Attribute ID	Attribute Name	Read or Write	Mover Axis	Section Axis
483	Acceleration Feedback	R	Y	N
452	Acceleration Feedforward Command	R	Y	N
460/216	Acceleration Feedforward Gain	W	Y	N
367	Acceleration Fine Command	R	Y	N
482	Acceleration Reference	R	Y	N
844	Adaptive Tuning Gain Scaling Factor	R	Y	N
522	Current Limit Source	R	N	Y
620/266	DC Bus Voltage	R	N	Y
636	Inverter Capacity	R	N	Y
801	Load Observer Acceleration Estimate	R	Y	N
806	Load Observer Bandwidth	W	Y	N
807	Load Observer Integrator Bandwidth	W	Y	N
802	Load Observer Torque Estimate	R	Y	N
635/259	Motor Capacity	R	N	Y
521	Operative Current Limit	R	N	Y
603	Output Power	R	Y	N
436/131	Position Error	R	Y	N
1402	Position Feedback1	R	Y	N
365	Position Fine Command	R	Y	N
442	Position Integrator Bandwidth	W	Y	N
437	Position Integrator Output	R	Y	N
443	Position Lock Tolerance	W	Y	N
441	Position Loop Bandwidth	W	Y	N
438	Position Loop Output	R	Y	N
432	Position Reference	R	Y	N
431	Position Trim	W	Y	N
496	System Inertia	W	Y	N
495	Torque Estimate	R	Y	N
504/332	Torque Limit Negative	W	Y	N
505/333	Torque Limit Positive	W	Y	N
502	Torque Low Pass Filter Bandwidth	W	Y	N
843	Torque Low Pass Filter Bandwidth Estimate	R	Y	N
792	Torque Notch Filter 2 Frequency Estimate	R	Y	N
793	Torque Notch Filter 2 Magnitude Estimate	R	Y	N
794	Torque Notch Filter 2 Width Estimate	R	Y	N
795	Torque Notch Filter 3 Frequency Estimate	R	Y	N
796	Torque Notch Filter 3 Magnitude Estimate	R	Y	N
797	Torque Notch Filter 3 Width Estimate	R	Y	N
798	Torque Notch Filter 4 Frequency Estimate	R	Y	N
799	Torque Notch Filter 4 Magnitude Estimate	R	Y	N
800	Torque Notch Filter 4 Width Estimate	R	Y	N
841	Torque Notch Filter Frequency Estimate	R	Y	N

Table 49 - Data Logging Parameters (Continued)

Attribute ID	Attribute Name	Read or Write	Mover Axis	Section Axis
842	Torque Notch Filter Magnitude Estimate	R	Y	N
791	Torque Notch Filter Width Estimate	R	Y	N
492	Torque Reference	R	Y	N
493	Torque Reference Filtered	R	Y	N
494	Torque Reference Limited	R	Y	N
491	Torque Trim	W	Y	N
1240…1251	Track Section Coil 1-12 Current Feedback	R	N	Y
1260…1271	Track Section Coil 1-12 Capacity	R	N	Y
455/135	Velocity Error	R	Y	N
454/134	Velocity Feedback	R	Y	N
433	Velocity Feedforward Command	R	Y	N
440/215	Velocity Feedforward Gain	W	Y	N
366	Velocity Fine Command	R	Y	N
462	Velocity Integrator Bandwidth	W	Y	N
456	Velocity Integrator Output	R	Y	N
458	Velocity Limit Source	R	Y	N
461	Velocity Loop Bandwidth	W	Y	N
457	Velocity Loop Output	R	Y	N
469	Velocity Low Pass Filter Bandwidth	W	Y	N
453	Velocity Reference	R	Y	N
451	Velocity Trim	W	Y	N

History of Changes

This appendix contains the new or updated information for each revision of this publication. These lists include substantive updates only and are not intended to reflect all changes. Translated versions are not always available for each revision.

2198T-UM003C-EN-P

2198T-UM003C-EN-P, September 2022

Change
Changed hardware torque value for flat rail installation.
Changed hardware torque value for top and bottom flat curved rail installation.
Changed hardware torque value for top and bottom flat wedge installation.

2198T-UM003B-EN-P

2198T-UM003B-EN-P, September 2022

Change
Added the system features table.
Changed the description of mounting orientations.
Added the Remove Power from the iTRAK® 5730 System section.
Changed the Protection Against Contact with Hot Parts section.
Changed hardware torque value for bottom flat rail and flat wedge installation.
Changed hardware torque value for rectangular wedge installation.
Added to the mounting section.
Changed lubrication information.
Changed the Number of Motor Module Sections Supported by a Kinetix® 5700 iTRAK Power Supply table.
Changed the Wire an iTRAK 5730 System with an iTRAK Power Supply diagram.
Added content about motor module numbers.
Changed the explanation of mover axis assignment.
Changed the Apply Power to the iTRAK 5730 System section.
Added section on mover numbers in fault codes.
Changed hardware torque value for installing position magnet onto the mover.

Notes:

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Additional Resources

These documents contain additional information concerning related products from Rockwell Automation. You can view or download publications at rok.auto/literature.

iTRAK 5730 and Kinetix System Resources

These resources provide information about the iTRAK® 5730 system and related Kinetix® products.

Resource	Description
iTRAK 5730 System Technical Data, publication 2198T-TD002	Product specifications for Rockwell Automation® iTRAK 5730 system components, with performance, environmental, certifications, load force, and dimension drawings.
Kinetix 5700, 5500, 5300, and 5100 Servo Drives Specifications Technical Data, publication KNX-TD003	Provides product specifications for Kinetix Integrated Motion over the EtherNet/IP network and EtherNet/IP networking servo drive families.
Kinetix 5700 iTRAK Power Supply and iTRAK Bus Conditioner Module Supply Installation Instruction, publication 2198T-IN001	Provides information for wiring and connecting the Kinetix 5700 iTRAK power supply to the iTRAK system.
3D CAD Models of iTRAK Components available at https://motionanalyzer.rockwellautomation.com/Products/iTrak	Provides 2D outline, assembly, and system drawings, STEP files for the movers and motor modules, and hyper links to complete system STEP files.
Independent Cart Technology Libraries, available on the Product Compatibility and Download Center website, rok.auto/pcdc	Provides standardized object-oriented libraries for iTRAK systems.
System Design for Control of Electrical Noise Reference Manual, publication GMC-RM001	Information, examples, and techniques that are designed to minimize system electrical noise failures.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, rok.auto/certifications	Provides declarations of conformity, certificates, and other certification details.

Programmable Controllers Resources

These resourced provide information about programmable controllers.

Resource	Description
ControlLogix® 5580 and GuardLogix® 5580 Controllers User Manual, publication 1756-UM543	Provides information about designing a system, operating a ControlLogix or GuardLogix-based controllers system, and developing applications.
GuardLogix 5580 and Compact GuardLogix 5380 Controller Systems Safety Reference Manual, publication 1756-RM012	Describes the GuardLogix 5580 and Compact GuardLogix 5380 controller systems, which are type-approved and certified for use in safety applications.
CompactLogix™ 5480 Controllers User Manual, publication 5069-UM002	Provides information on how to use CompactLogix 5480 controllers.
Compact GuardLogix 5380 Controllers User Manual, publication 5069-UM001	Provides information on how to install, configure, program, and use CompactLogix and Compact GuardLogix controllers.
Integrated Motion on the EtherNet/IP Network Reference Manual, publication MOTION-RM003	Provides information on the AXIS_CIP_DRIVE attributes and the Studio 5000 Logix Designer® application Control Modes and Methods.
Logix 5000™ Controllers Motion Instructions Reference Manual, publication MOTION-RM002	Provides a programmer with details about motion instructions for use with Logix 5000 controllers.

EtherNet/IP Resources

These resourced provide information about EtherNet/IP systems.

Resource	Description
EtherNet/IP Network Devices User Manual, publication ENET-UM006	Describes how to configure and use EtherNet/IP devices to communicate on the EtherNet/IP network.
EtherNet/IP Device Level Ring Application Technique, publication ENET-AT007	Describes Device Level Ring (DLR) topologies, configuration considerations, and diagnostic methods.
Integrated Motion on the EtherNet/IP Network Configuration and Startup User Manual, publication MOTION-UM003	Provides information on configuring and troubleshooting your ControlLogix and CompactLogix EtherNet/IP network modules.

Rockwell Automation Support

Use these resources to access support information.

Technical Support Center	Find help with how-to videos, FAQs, chat, user forums, Knowledgebase, and product notification updates.	rok.auto/support
Local Technical Support Phone Numbers	Locate the telephone number for your country.	rok.auto/phonesupport
Technical Documentation Center	Quickly access and download technical specifications, installation instructions, and user manuals.	rok.auto/techdocs
Literature Library	Find installation instructions, manuals, brochures, and technical data publications.	rok.auto/literature
Product Compatibility and Download Center (PCDC)	Download firmware, associated files (such as AOP, EDS, and DTM), and access product release notes.	rok.auto/pcdc

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Waste Electrical and Electronic Equipment (WEEE)

At the end of life, this equipment should be collected separately from any unsorted municipal waste.

Rockwell Automation maintains current product environmental compliance information on its website at rok.auto/pec.

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