

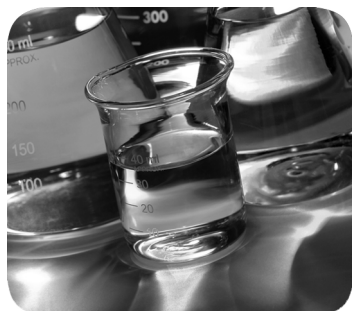
User Manual

Original Instructions

**Rockwell**  
**Automation**

# iTRAK System with TriMax Bearings

Bulletin 2198T



# 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.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

Reproduction of the contents of this manual, in whole or in part, without written permission of Rockwell Automation, Inc., is prohibited.

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).

---

## **Preface**

Summary of Changes .....	7
Conventions .....	7
Appropriate Use .....	7
Additional Resources .....	8

## **Chapter 1**

### **Start**

About the iTRAK System .....	9
Motor Module .....	12
Mover .....	14
Support Frame .....	15
Power Supply .....	16
iTRAK Bus Conditioner Module .....	16
Gateway .....	17
2198T-G02-xxx-E Gateway .....	17
2198T-G03-xxx-E Gateway .....	22
Digital USB I/O Module .....	26
Catalog Number Explanation .....	27
Safety Information .....	28
Risk Assessment .....	28
General Assembly Instructions .....	28
Machine Guarding .....	29
Avoid Accidents, Injury, and Property Damage .....	30
Avoid Electrical Shock .....	30
Pinch Point Hazard .....	30
Protection Against Contact with Hot Parts .....	31
Protection Against Magnetic and Electromagnetic Fields	
During Installation and Use .....	31
Safe Magnet Handling .....	34
Magnet Plate Keeper .....	34

## **Chapter 2**

### **Track Installation**

Install the Track .....	35
Before You Begin .....	35
Mount an Oval Track .....	36
Install the Lubrication System .....	41
What You Need .....	42
Mount the Lubricator Pumps .....	42
Wiring Lubrication Pump .....	43
Lubrication Pump Configuration .....	43

## **Chapter 3**

### **Connect Your iTRAK System to a Kinetix 5700 iTRAK Power Supply**

Typical iTRAK System with an iTRAK Power Supply .....	45
Wire the iTRAK System .....	48

Using Multiple iTRAK Power Supplies .....	48
Wire the Digital USB I/O Module .....	51
Wire the Gateway .....	52
Numbering the Motor Modules .....	53
Wire a 2918T-G02-xxx-E Gateway .....	54
Wire a 2918T-G03-xxx-E Gateway .....	55
Logix Designer Application Support .....	56

## **Chapter 4**

### **Power on Your System**

Before You Power On the Track .....	57
Identify Controller .....	57
Identify Firmware Revision .....	57
Configure and Customize Project File .....	58
Apply Power .....	58
Commission with Programming Manual .....	59

## **Chapter 5**

### **Maintenance**

Before You Begin .....	61
Preventive Maintenance .....	61
Cleaning .....	61
Add or Replace Components .....	62
Install or Remove a Position Magnet Assembly .....	62
Magnet Plate Assembly Installation .....	64
Install or Replace a Mover .....	66
Replace a Straight Motor Module .....	70
Replace a Curved Motor Module .....	72
Replace Mover Cam-follower Wheels and Flexures .....	80
Install Top and Bottom Straight Rails .....	87
Install Transverse Straight Rails .....	91
Replace or Install Top and Bottom Straight Bearing Rail with Lubrication Port .....	92
Install Curved Transverse Rail .....	94
Install a Top or Bottom Radial Curved Rail .....	95
Update Gateway Firmware .....	97
Firmware Update Troubleshooting .....	99
Downgrade Firmware .....	99
Update Motor Module Firmware .....	99
Lubrication .....	100
Initial Lubrication .....	101
Normal Operation Lubrication .....	101

## **Chapter 6**

### **Troubleshooting**

Errors Codes .....	103
--------------------	-----



<b>Functional Safety</b>	<b>Chapter 7</b>
	Important Safety Considerations ..... 111
	Category 3 Requirements according to EN ISO 13849-1 ..... 111
	Stop Category Definition ..... 112
	Performance Level and Safety Integrity Level (SIL)..... 112
	Safety Distance Calculations ..... 112
	Functional Safety Description ..... 112
	Considerations for Category 1 Stop..... 113
	Overall System Stopping Performance ..... 113
	Schematic and Block Diagrams ..... 114
	iTRAK Power Supply..... 114
<b>Compatibility</b>	<b>Chapter 8</b>
	Motor Modules ..... 115
	Movers and Magnets ..... 116
	Gateways ..... 116
	Power Supplies..... 116
	Controllers ..... 116
<b>Label Placement</b>	<b>Appendix A</b>
	Safety Labels ..... 117
	<b>Index</b> ..... 119

## Notes:

This manual provides installation instructions to mount, wire, and troubleshoot the iTRAK® system with TriMax bearings.

This manual is intended for engineers or technicians that are directly involved with the design, installation, and wiring of the iTRAK system, and programmers who are directly involved in the operation, field maintenance, and integration of this system with the EtherNet/IP™ communication module or controller.

If you do not understand the basics of the iTRAK system, contact your Rockwell Automation sales representative for information on available training courses.

## Summary of Changes

This manual contains new and updated information as indicated in the following table.

Topic	Pages
Corrected bolt size in step e	39
Corrected torque value in step f	39
Corrected torque value in step 7	68
Corrected torque value in step 9	69
Corrected torque value in step 21	86
Corrected pinout for Control Power signals	114

## 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 system and review [Safety Labels on page 117](#).



**ATTENTION:** Incorrect use of the products can cause personal injury and property damage.

---

- 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 System Technical Data, publication [2198T-TD001](#).

## Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

Resource	Description
iTRAK System Technical Data, publication <a href="#">2198T-TD001</a>	Product specifications for Rockwell Automation iTRAK system components, with performance, environmental, certifications, load force, and dimension drawings.
Kinetix® Servo Drives Specifications Technical Data, publication <a href="#">KNX-TD003</a>	Product specifications for Kinetix Integrated Motion over the EtherNet/IP network, Kinetix 5700 iTRAK Power Supply, Integrated Motion over sercos interface, EtherNet/IP networking, and component servo drive families.
Kinetix 5700 iTRAK Power Supply and iTRAK Bus Conditioner Module Supply Installation Instruction, publication <a href="#">2198T-IN001</a>	Provides information for wiring and connecting the Kinetix 5700 iTRAK power supply to the iTRAK system.
iTRAK System Programming Manual, publication <a href="#">2198T-PM001</a>	Provides information on how to commission and program an iTRAK system.
3D CAD Models of iTRAK Components 2198T-3DCAD.zip. <a href="https://motionanalyzer.rockwellautomation.com/Products/iTrak">https://motionanalyzer.rockwellautomation.com/Products/iTrak</a>	Provides 2D outline, assembly, and system drawings, STEP files for the movers and motor modules, and hyper links to complete systems STEP files.
ControlLogix® System User Manual, publication <a href="#">1756-UM001</a>	Details how to configure, program, and operate a 1756 ControlLogix® system, and provides technical specifications
System Design for Control of Electrical Noise Reference Manual, publication <a href="#">GMC-RM001</a>	Information, examples, and techniques that are designed to minimize system electrical noise failures.
Industrial Automation Wiring and Grounding Guidelines, publication <a href="#">1770-4.1</a>	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, <a href="http://rok.auto/certifications">rok.auto/certifications</a>	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at

<http://www.rockwellautomation.com/global/literature-library/overview.page>.

To order paper copies of technical documentation, contact your local Allen-Bradley® distributor or Rockwell Automation sales representative.

## Start

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

Topic	Page
About the iTRAK System	9
Motor Module	12
Mover	14
Support Frame	15
Power Supply	16
iTRAK Bus Conditioner Module	16
Gateway	17
Digital USB I/O Module	26
Catalog Number Explanation	27
Safety Information	28

### About the iTRAK System

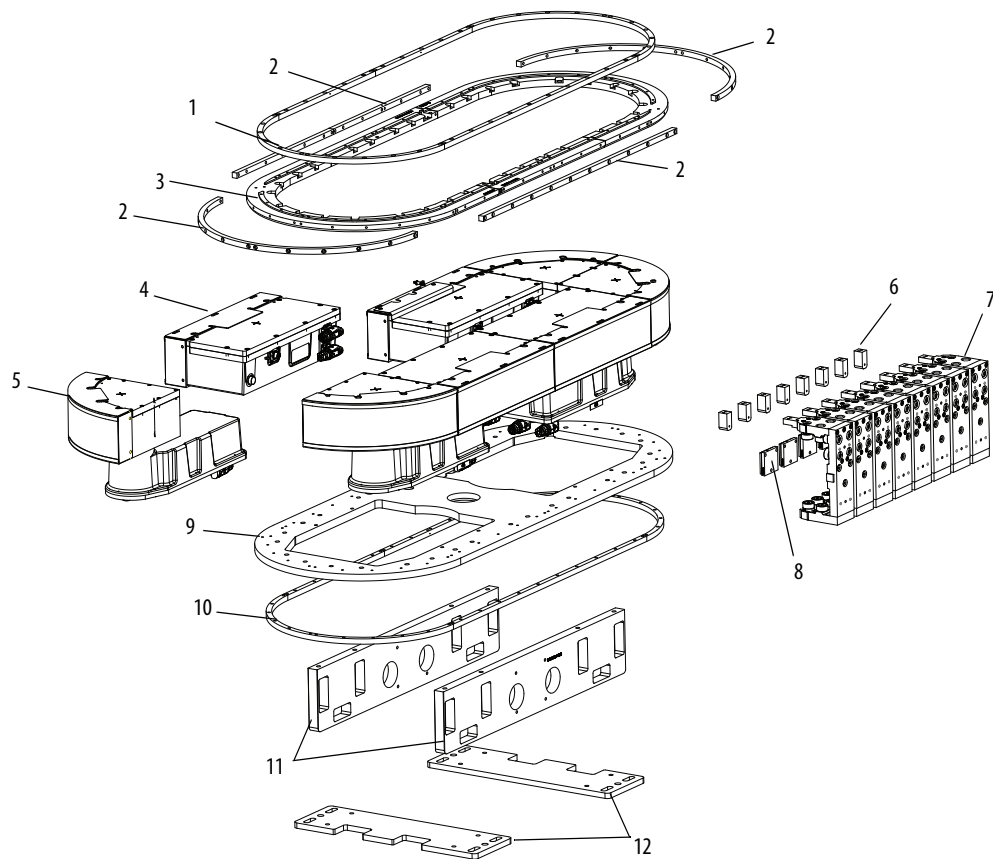
The iTRAK system is composed of motor modules, mounting plates, bearing rails, and movers. The motor modules are an integrated drive motor system with feedback. Mounting plates can be attached to the sides of motor modules and bearing rails can be attached to the mounting plates. Movers have independent linear motor magnets and cam followers, and multiple movers can be operated on a motor module at any time. Movers can be synchronized or independently controlled, however they are programmed.

The motor modules are available with both straight and curved motors, and more movers can be added as the system grows. The movers can be stopped and positioned on the curves with high accuracy. When the curves are applied to create an oval, new machine shapes and dynamic performances are possible. The iTRAK system can be arranged and mounted in many configurations, including horizontal carousel, vertical over-under, and stand-up configurations. The system is modular, scalable, and can be expanded to well over 10 meters. Even on large systems, each mover still retains independent servo control. The system can be also built into other geometries such as rectangles.

The iTRAK system can produce high speeds and high forces. The different combinations of magnet sizes and motor coil sizes produce nine different force speed options.

The gateway facilitates communication between the iTRAK system and controller and provides abstraction between physical and virtual mover axes. The iTRAK system requires a specialized power supply that converts three-phase AC power to the appropriate DC bus voltage. The USB I/O module provides discrete communications between the power supply and the gateway.

**Figure 1 - Exploded View of the Servo and Mechanical Components with TriMax Bearings**



Item	Description
1	Top bearing rail
2	Transverse bearing rail
3	Top frame plate
4	Straight motor modules
5	Curved motor modules
6	Position magnets

Item	Description
7	Movers
8	Mover magnets
9	Bottom frame plate
10	Bottom bearing rail
11	Spine bars
12	Mounting plate

**Table 1 - Electromechanical Components of an iTRAK System**

iTRAK System Component	Description
Motor module	The motor module is an integrated drive and motor coil unit; it is referred to as a section in the firmware. Motor modules are available in straight and curved shapes.
Track frame	The track frame is designed for your specific application. The track frame in combination with straight and curved modules, and bearing rails creates the track.
Bearing	The bearing rails attach to the track frame. They provide high precision guidance for the movers.
Mover	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 magnets (included in mover)	Mover magnet plates can be used to build your own movers to optimize weight or bearing solutions. They are normally included in the mover.
Position magnets	Position magnets are used to actuate sensors in the track. These magnets are typically sold separately from the mover, but are pre-installed on fully assembled systems.

**Table 2 - Power and Control Components of an iTRAK System**

iTRAK System Component	Description
Power circuitry and components	The iTRAK power supply connects to the Kinetix 5700 power supply and generates the voltages that are required for the iTRAK system from the full bus voltage. It is used with other Kinetix 5700 components and branch circuit protection.
Bus conditioner	The bus conditioner module is mounted near the iTRAK for each power cable. It incorporates additional filtering and capacitance to improve dynamic servo response and increase reliability of the system.
Power cables	The power bus cables are daisy chained between the motor modules. The number of motor modules on one daisy chain is system-dependent.
Gateway	The gateway provides communication interface between the Logix controller and all motor modules. It also provides more motion processing for the motor modules.
USB I/O	Executes discrete communication between the gateway and power components.
Communication cables	Each motor module in the system has a communication cable that is connected directly to the gateway. Use only the cables that are provided with your system and referenced in this user manual.
Logix controller platform	CompactLogix™ controller or ControlLogix® controller with Ethernet connection that supports Integrated Motion on EtherNet/IP™.
Studio 5000® environment	Studio 5000 Logix Designer® application, version 21 or later, provides support to program, commission, and maintain the CompactLogix™ and ControlLogix® controller families that you use with iTRAK system.

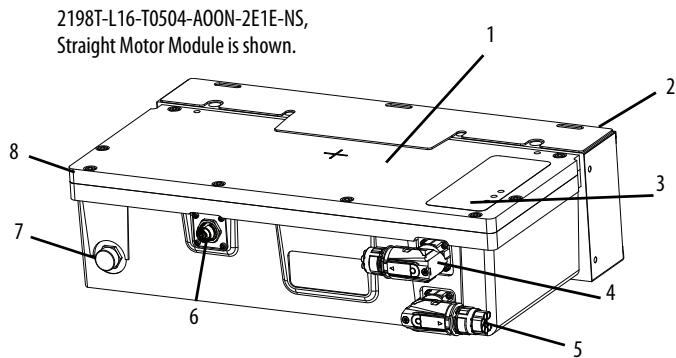
The typical configuration for iTRAK system is shown in [Typical iTRAK System with an iTRAK Power Supply on page 46](#).



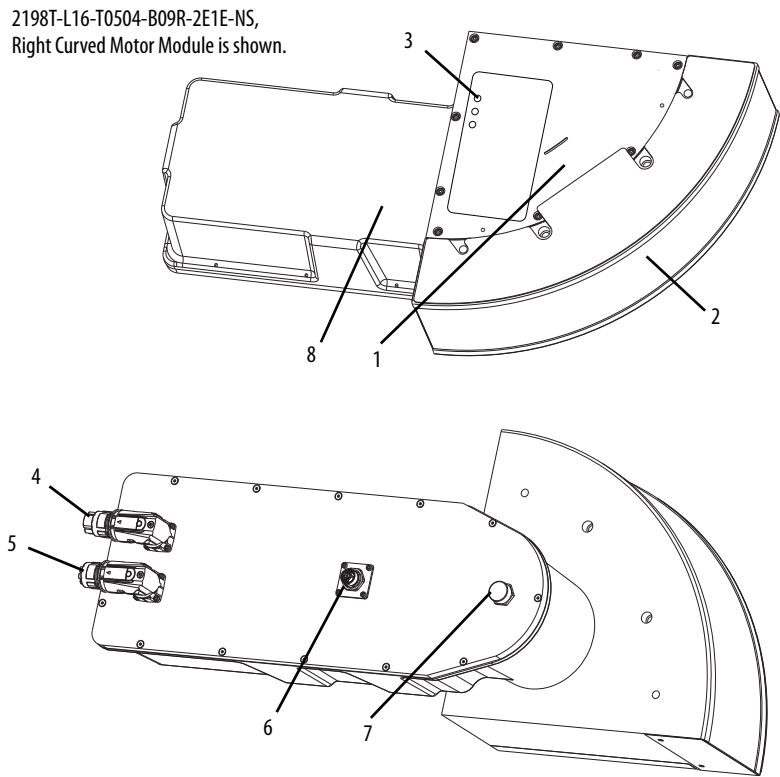
# Motor Module

Your system has two types of motor modules. [Figure 2](#) shows the features of the straight motor module and [Figure 3](#) shows the features of the curved motor module.

**Figure 2 - 2198T-L16-Txx04-A00N-2E1E-NS, Straight Motor Module**



**Figure 3 - 2198T-L16-Txx04-B09x-2E1E-NS, Curved Motor Module**



**Table 3 - Motor Module Component Description**

Item	Description	Item	Description
1	Position sensing surface	5	Incoming bus connector
2	Motor coil assembly	6	Communication connector
3	Motor module status indicator	7	Vent
4	Outgoing bus connector	8	Drive housing

Figure 4 - Series A Motor Module Status indicators

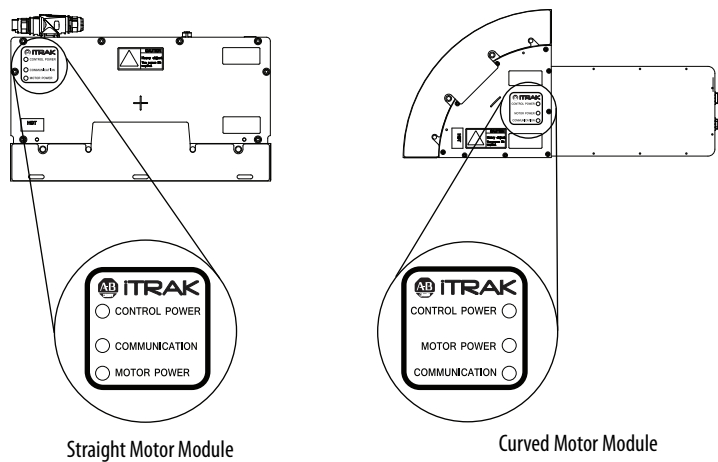


Table 4 - Series A Motor Module Status Indicator Description

Item	Color	Status
Control Power	Green	24V present.
Motor Power	Yellow	Motor bus power-on.
Communication	Green	Motor module is communicating.

Figure 5 - Series B Motor Module Status Indicators

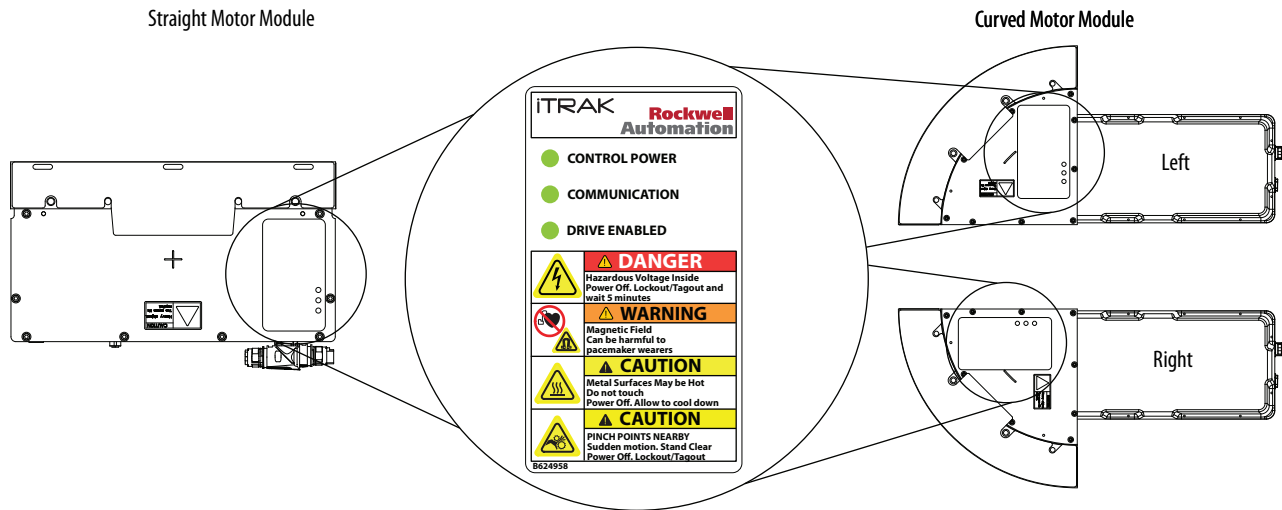


Table 5 - Series B Motor Module Status Indicator Description

Item	Color	Status
Control Power	Green	24V present.
Communication	Green	Motor module is communicating.
Drive Enable	Green	Motor module is enabled.

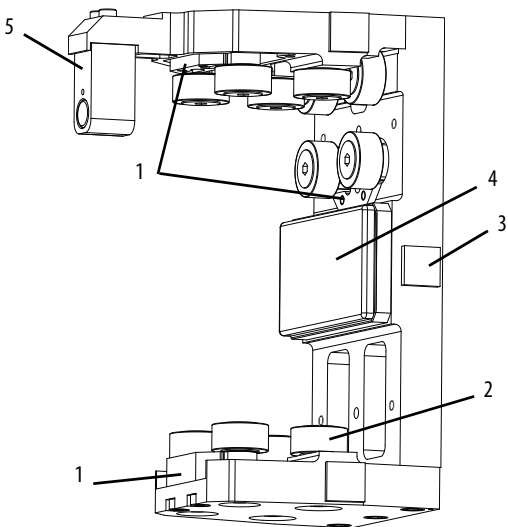
# Mover

Movers are available in nine sizes, each with their own force-speed curve. See the iTRAK System Technical Data, publication [2198T-TD001](#) for the force-speed curves. Do not exceed the force-speed parameters when programming your system. Your system only has one size of mover installed.



**ATTENTION:** See [Safety Information on page 28](#) before handling a mover.

Figure 6 - 2198T-VTxxxx-C, Mover



Shown here is a 2198T-VT0510-C mover and position magnet assembly. Your mover can look slightly different, but has similar components.

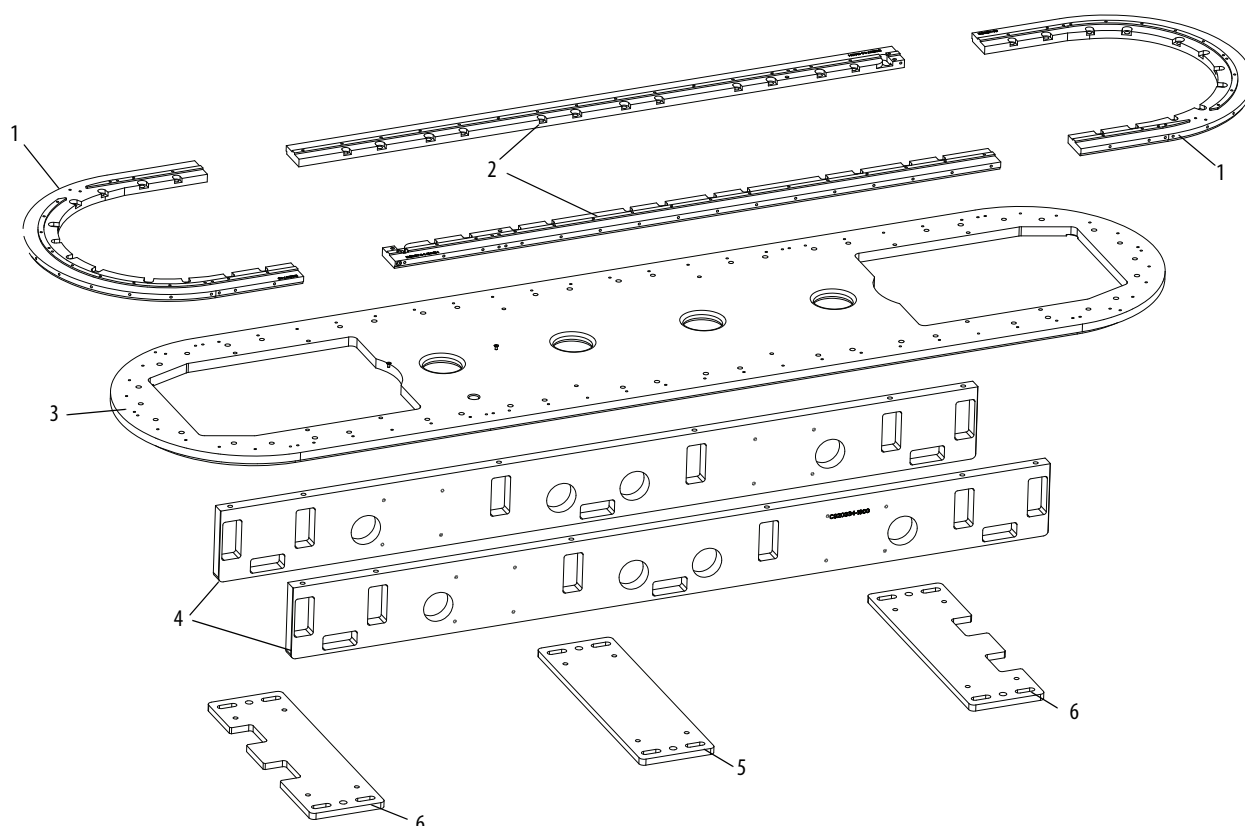
Item	Description	Item	Description
1	Flexure	4	Magnet assembly
2	Cam follower (x12) <sup>(1)</sup>	5	Position feedback magnet (sold separately from the mover)
3	Bumper (x3)		

(1) 2198T-xT05xx-C, 2198T-xT1050-C, 2198T-xT1010-C, and 2198T-xT1505-C movers have caged cam-follower wheels with mounting studs.  
2198T-xT1015-C, 2198T-xT1510-C, and 2198T-xT1515-C movers have full-complement cam-follower wheels with mounting studs.

## Support Frame

The iTRAK system track has a frame to support the motor modules and bearing rails. [Figure 7](#) shows the main components that are used to construct a single-base plate support structure.

**Figure 7 - Single Base Plate Support Structure**



Item	Description
1	Curved top plate
2	Straight top plate
3	Base plate
4	Spine bar
5	Mounting plate
6	Notched mounting plate

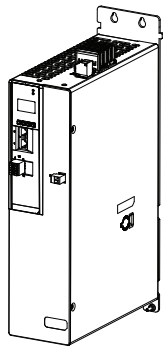
Systems that are greater than 2.4 m (8.2 ft) in length use a multi-plate design for items 2, 3, 4. See <https://ramotionanalyzer.blob.core.windows.net/3dmodels/2198T-3DCAD.zip> for more detail.

Rockwell Automation offers the iTRAK system with these plates for all standard orders, however, if you have experience, you can choose to build the iTRAK system yourself. If you build the iTRAK system yourself, you must develop your own plates.

# Power Supply

The iTRAK system is powered using a scalable Kinetix 5700 iTRAK power supply as part of a Kinetix 5700 system. Details and installation instructions on for the use of the power supply are covered in Kinetix 5700 iTRAK Power Supply and iTRAK Bus Conditioner Module Installation Instructions, publication [2198T-IN001](#).

**Figure 8 - iTRAK Power Supply**

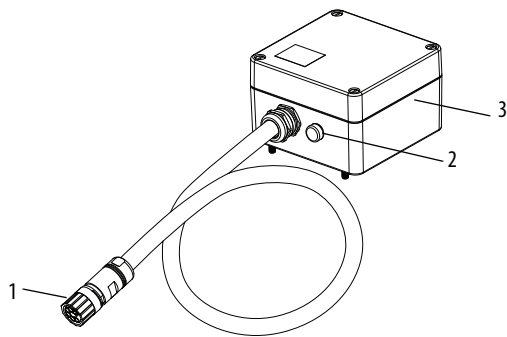


2198T-W25K-ER, Kinetix 5700 iTRAK power supply is shown.

# iTRAK Bus Conditioner Module

The bus conditioner module is mounted near the iTRAK for each power cable when using the iTRAK power supply. The packaging for the bus conditioner is intended to be mounted in the same environments as the iTRAK system. It incorporates additional filtering and capacitance to improve the dynamic servo response and increase reliability of the system.

**Figure 9 - 2198T-WBCMOD, iTRAK Bus Conditioner Module**



Item	Description
1	Cable and connector to track system
2	Vent
3	Module

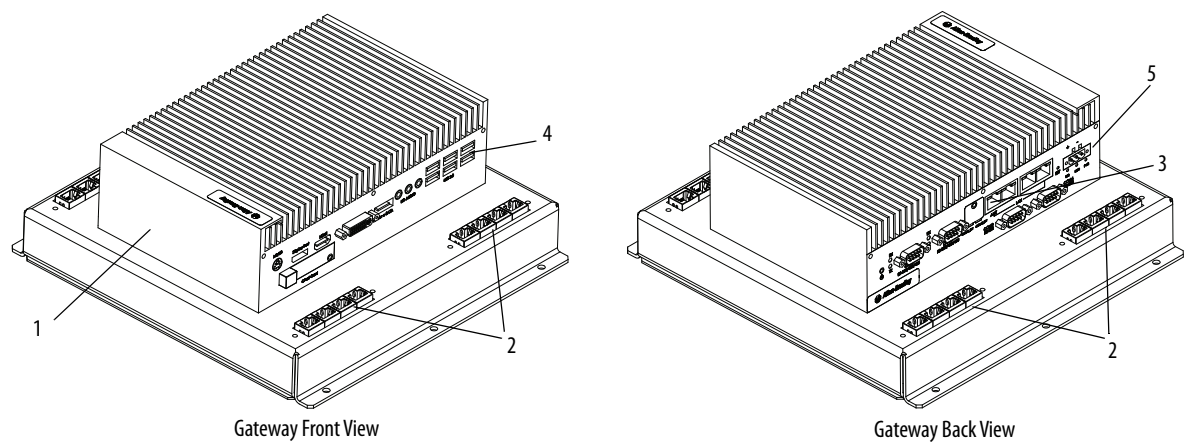
# Gateway

The gateway provides centralized motion processing and communication between the controller and the motor modules. This manual covers catalog numbers 2198T-G02-xxx-E and 2198T-G03-xxx-E gateways.

## 2198T-G02-xxx-E Gateway

This section describes the 2198T-G02-xxx-E gateway connectors and features.

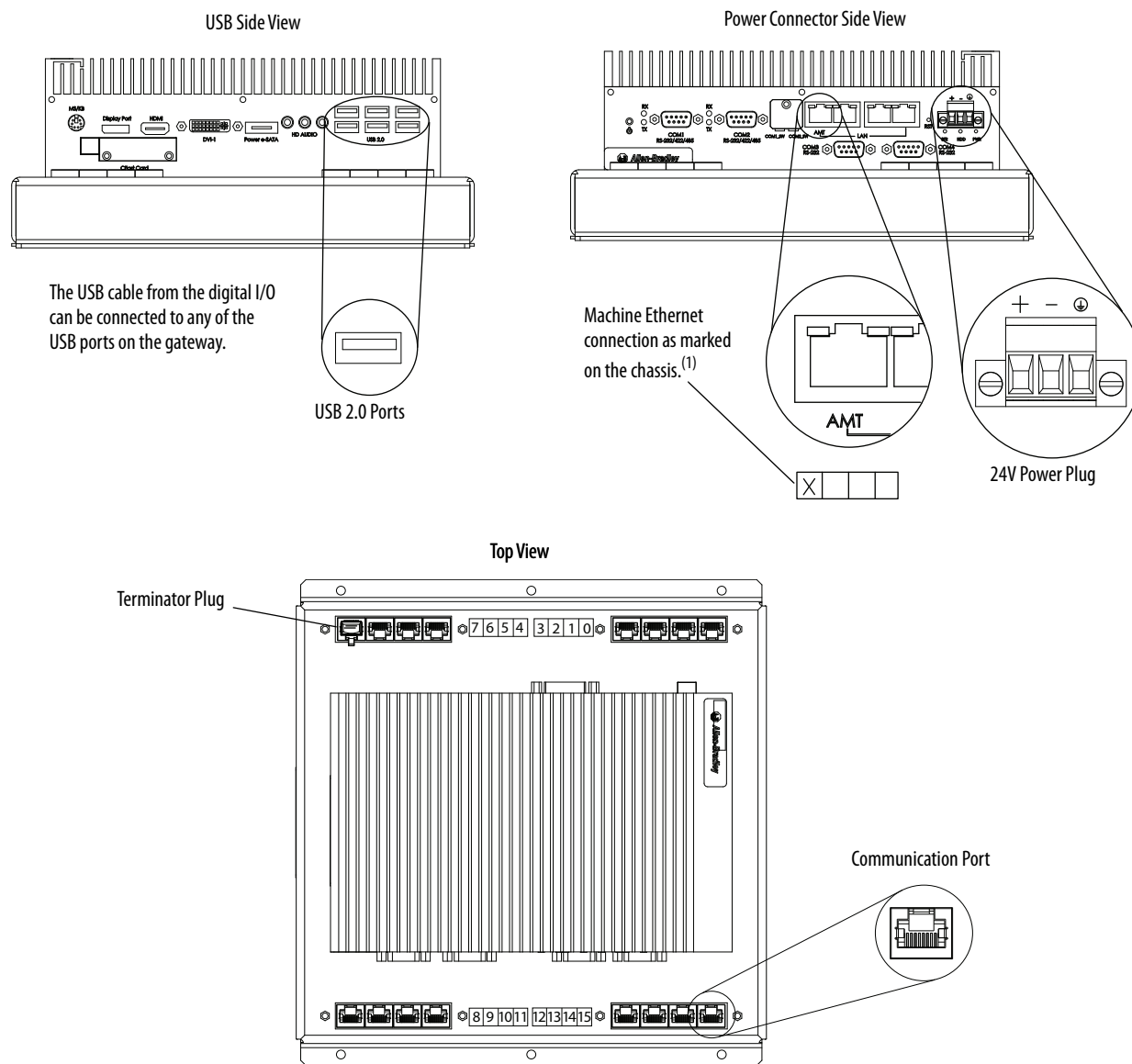
Figure 10 - 2198T-G02-016-E Gateway



Item	Description	Item	Description
1	Gateway computer	4	USB connections
2	Motor module communication connections	5	24V power input
3	Machine Ethernet connection (AMT)		

The gateway computer is dedicated to the control and coordination of the iTRAK motor modules and to provide an interface for them to the Logix system. Therefore, the only connector and ports that you can use on the gateway computer are the power input, one of the USB ports, and the Ethernet port (AMT) marked with an X. Do not use any other input or output on the gateway computer.

Figure 11 - 2198T-G02-016-E Gateway Ports and Power Connector

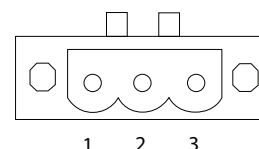


(1) Make only this connection. Do not use any other Ethernet ports for machine Ethernet.

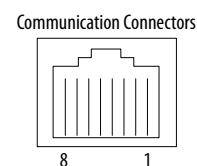
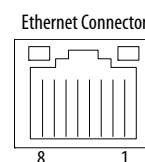


**Table 6 - 2198T-G02-xxx-E Gateway -Power Connector Pinout**

Pin	Signal	Description
1	V+	19...26V DC
2	V-	0V DC
3	Field Ground	Chassis Ground

**Table 7 - 2198T-G02-xxx-E Gateway Communication Port Pinout**

Pin	Signal	Description
1	+ TX	Transmit Port (+) Data Terminal
2	- TX	Transmit Port (-) Data Terminal
3	+ RX	Receive Port (+) Data Terminal
4	—	—
5	—	—
6	- RX	Receive Port (-) Data Terminal
7	—	—
8	—	—

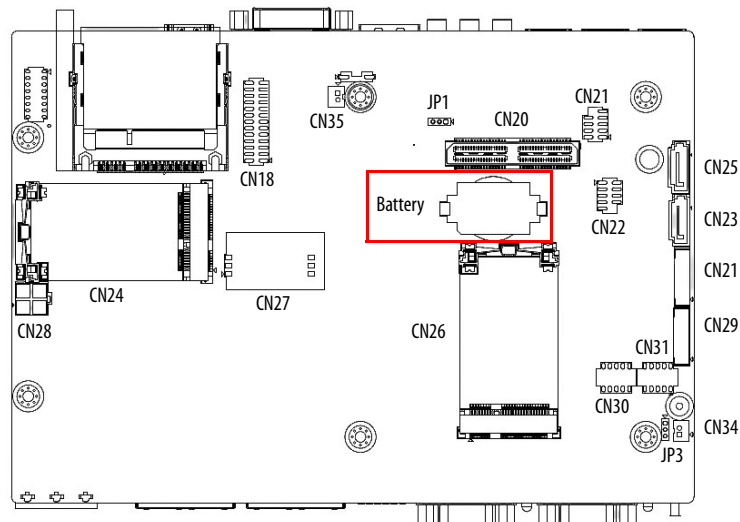


The AMT Ethernet port is for connection to the machine Ethernet, it is the only Ethernet port that can be used on gateway.

## Battery

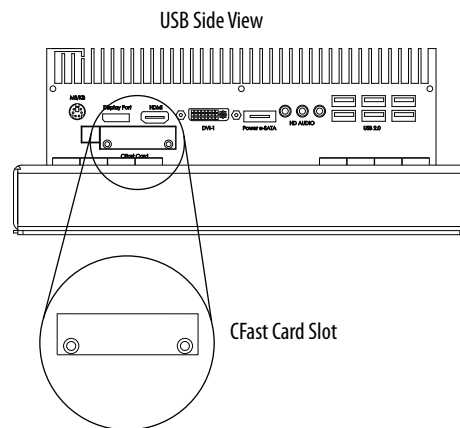
The 2198T-G02-xxx-E gateway uses a 3V BR2032 battery to maintain the BIOS settings and the system clock while the power is disconnected for a short time. Replace only with a BR2032 battery, do not use CR2032 battery as a replacement.

### Battery Location



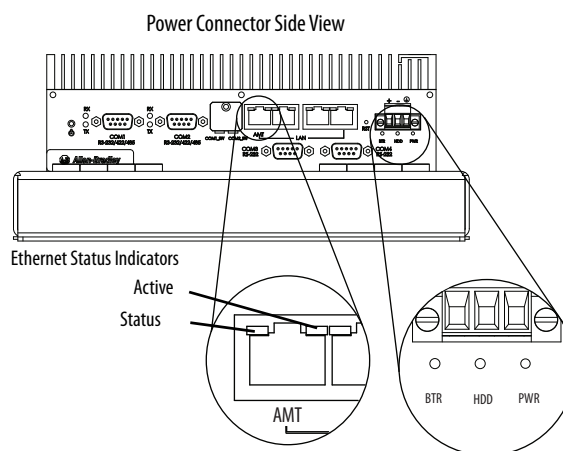
### 2198T-G02-xxx-E Gateway CFast Card

The 2198T-G02-xxx-E gateway includes a 4 Gb CFast card to store the operating system and Logix Designer application interface software. The gateway does not have a hard disk drive, The CFast card is the only media storage device. If you require a replacement CFast card contact Rockwell Automation support.



## 2198T-G02-xxx-E Gateway Status Indicators

The gateway uses the following status indicators: power, battery, and Ethernet (active and status).



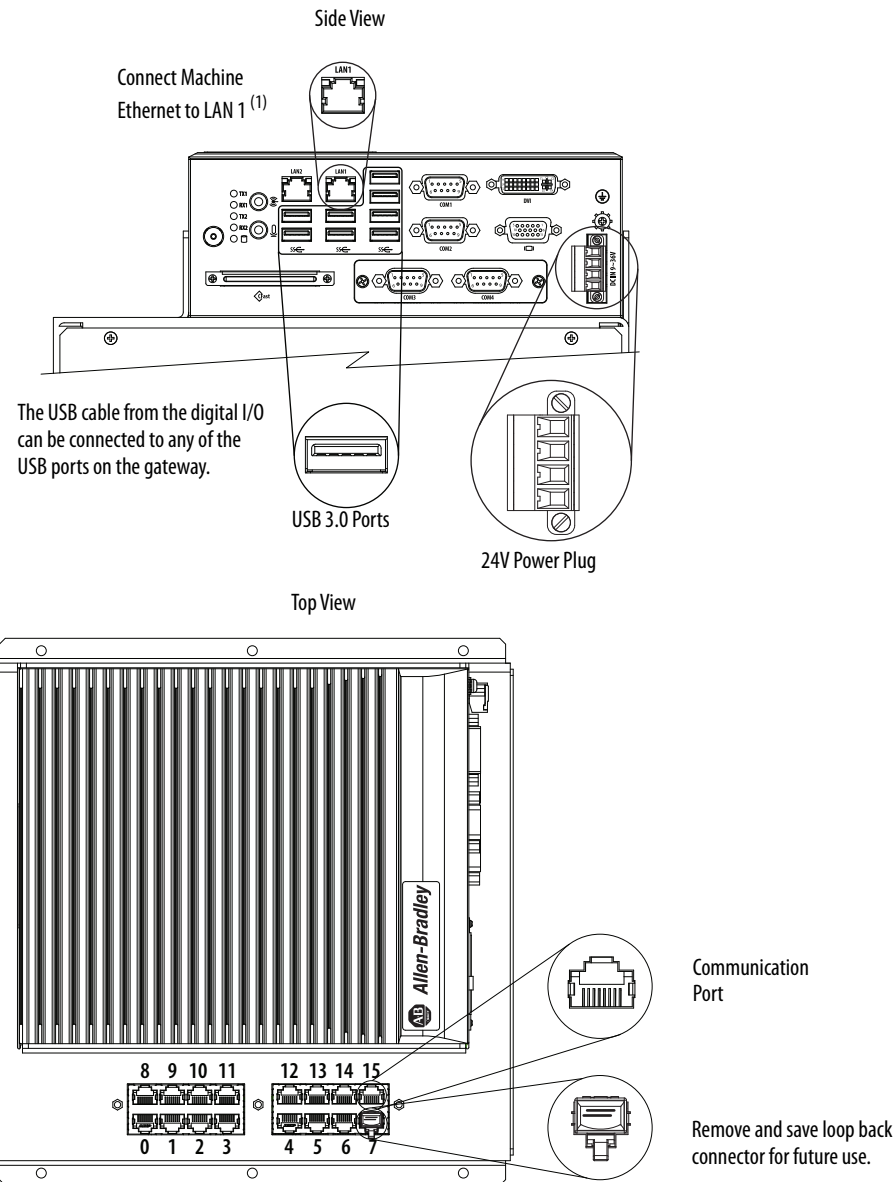
**Table 8 - Status Indicator Description**

Status Indicator	Status	Description
Ethernet status	Solid green	Ethernet connection is linked
Ethernet active	Blinking yellow	Transmitting and receiving data
BTR	Red	CMOS battery has gone below 2.3V
HDD	—	Not used
PWR	Green	Gateway is on
	Yellow	Gateway is in standby mode

## 2198T-G03-xxx-E Gateway

This section describes the 2198T-G03-xxx-E gateway connectors and features.

**Figure 12 - 2198T-G03-xxx-E Gateway - Ports and Power Connector**

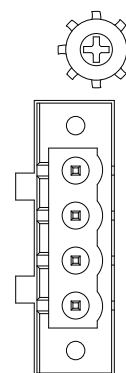


(1) Make only this connection. Do not use any other Ethernet ports for machine Ethernet.

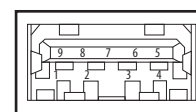
The gateway computer is dedicated to the control and coordination of the iTRAK motor modules and to provide an interface for them to the Logix system. Therefore, the only connector and ports that you can use on the gateway computer are the power input, one of the USB ports, and the Ethernet port LAN1. Do not use any other input or output on the gateway computer.

**Table 9 - 2198T-G03-xxx-E Gateway - Power Connector Pinout**

Pin	Signal	Description
1	V-	0V DC
2	V+	9...36V DC
3	V-	9...36V DC
4	V-	0V DC
Screw	Field Ground	Chassis Ground

**Table 10 - 2198T-G03-xxx-E Gateway - USB 3.0 Connector Pinout**

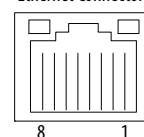
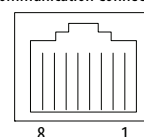
Pin	Signal	Description
1	VBUS	Power
2	D-	USB 2.0 differential pair
3	D+	
4	GND	Ground for power return
5	StdA_SSRX-	Super-speed receiver differential pair
6	StdA_SSRX+	
7	GND_DRAIN	Ground for signal return
8	StdA_SSTX-	Super-speed transmitter differential pair
9	StdA_SSTX+	



The USB ports comply with USB XHCI, Rev. 3.0.

**Table 11 - 2198T-G03-xxx-E Gateway -Communication Port and Ethernet Port Pinout**

Pin	Signal	Description
1	+ TX	Transmit Port (+) Data Terminal
2	- TX	Transmit Port (-) Data Terminal
3	+ RX	Receive Port (+) Data Terminal
4	—	—
5	—	—
6	- RX	Receive Port (-) Data Terminal
7	—	—
8	—	—

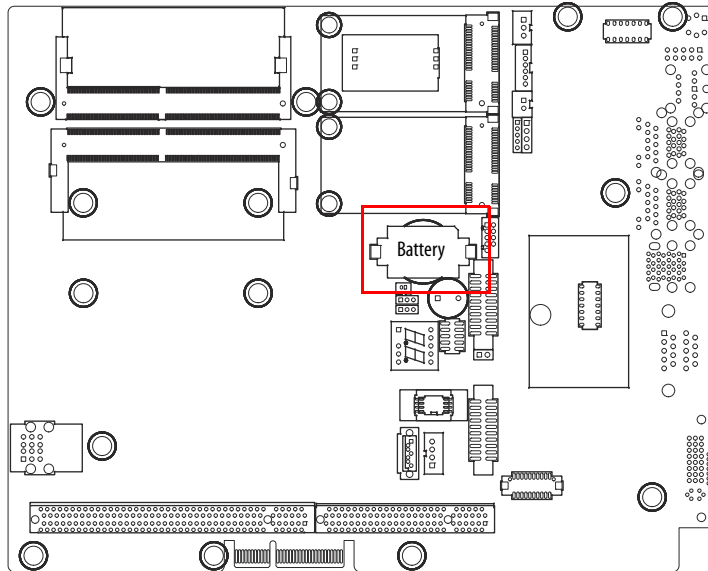
**Ethernet Connector****Communication Connectors**

The LAN 1 Ethernet port is for connection to the machine Ethernet, it is the only Ethernet port that can be used on gateway.

## Battery

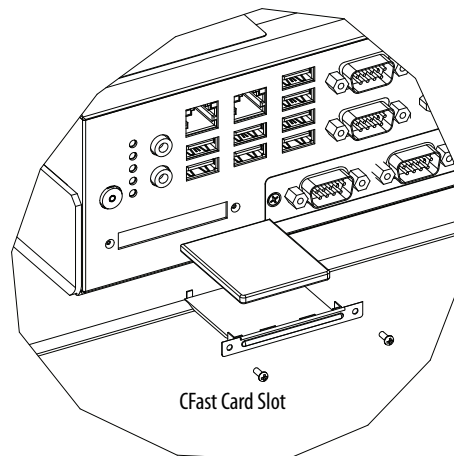
The 2198T-G03-xxx-E gateway uses a 3V BR2032 battery to maintain the BIOS settings and the system clock while the power is disconnected for a short time. Replace only with a BR2032 battery, do not use CR2032 battery as a replacement.

### Battery Location



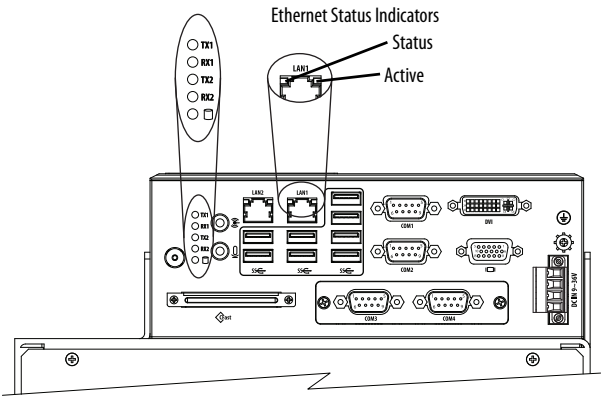
### 2198T-G03-xxx-E CFast Card

The 2198T-G03-xxx-E gateway includes a 4 Gb CFast card to store the operating system and Logix Designer application interface software. The gateway does not have a hard disk drive, The CFast card is the only media storage device. If you require a replacement CFast card contact Rockwell Automation support.



2198T-G03-xxx-E Gateway Status Indicators

The gateway uses the following status indicators: power, battery, and Ethernet (active and status).



Status Indicator Description

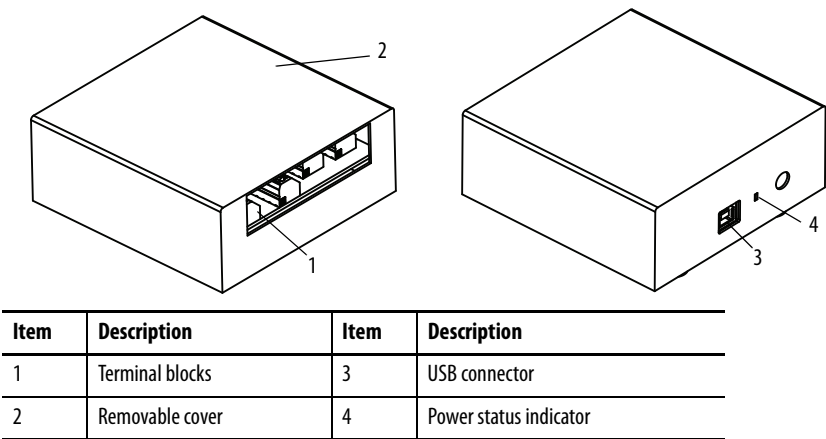
Status Indicator	Status	Description
Ethernet status	Solid green	Ethernet connection is linked
Ethernet active	Blinking yellow	Transmitting and receiving data
TX 1/2	-	Not used
RX 1/2	-	Not used
HDD(Ⓢ)	Yellow	SATA activity
PWR	Green	Gateway is on
	Red	Gateway is in standby mode



# Digital USB I/O Module

The digital USB I/O module provides an interface between the power supply that is used by your system and the gateway. This module must be included in your system when using Kinetix 5700 iTRAK power supply.

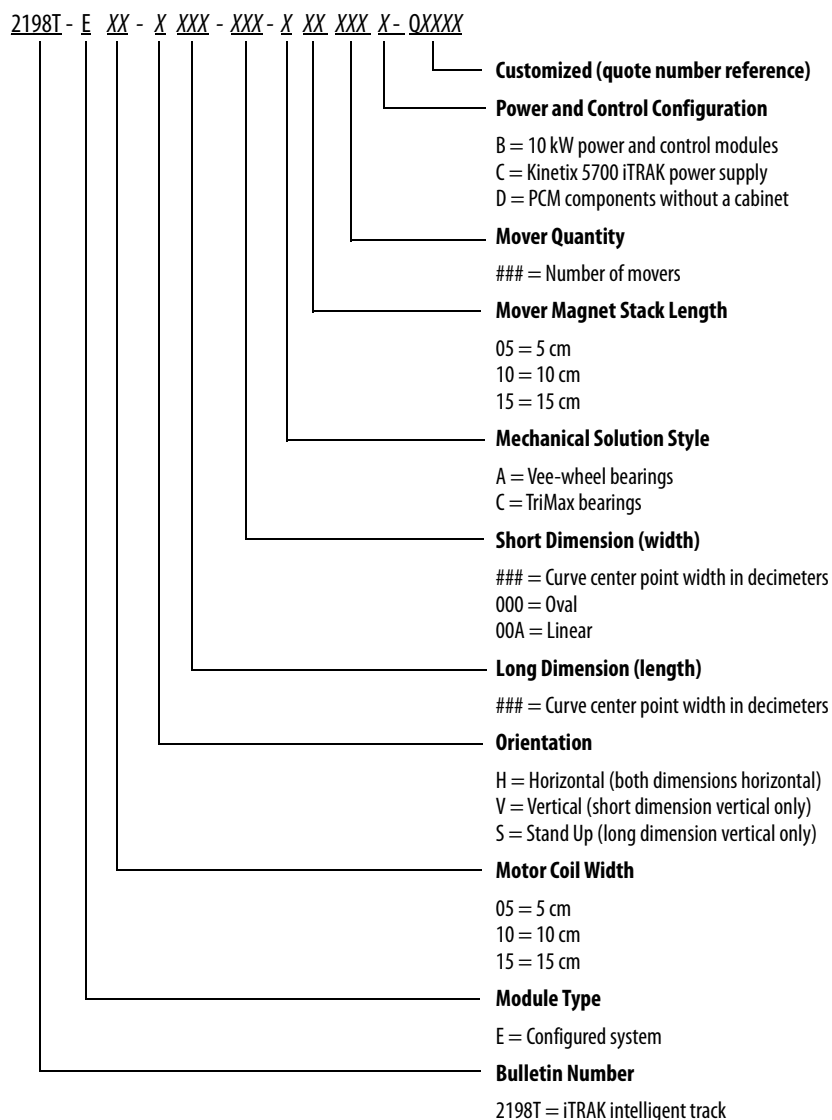
Figure 13 - 2198T-GUSB, Digital USB I/O Module



The status indicator indicates power and data transmissions. When the status indicator is in an illuminated steady green state, the module is successfully connected to the gateway computer and the operating system has detected and configured it. When the status indicator blinks continuously, there is data being transmitted over the USB bus.

## Catalog Number Explanation

Use the following key to identify your iTRAK system and its options.



## Safety Information

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



**ATTENTION:** Lockout and tagout input power before servicing.

Before working with iTRAK systems or components, review the EU Declarations of Incorporation, Directive 2006/42/EC that is appropriate for your installation and the [General Assembly Instructions](#).

- 2198T Kinetix iTRAK System without PCM - CE DoC, publication [2198T-CT004](#)

The iTRAK system is partly 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 relevant provisions of the Machinery Directive.

## 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 provide for functions that monitor and higher-level measurement for 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

- When integrating the iTRAK system to tools and external machinery, see <https://ramotionanalyzer.blob.core.windows.net/3dmodels/2198T-3DCAD.zip> for models and outline drawings.
- See the iTRAK System Technical Data, publication [2198T-TD001](#) for operational ratings. Do not exceed these ratings.
- The iTRAK 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. Larger iTRAK systems are shipped in multiple sections. Use the special assembly instructions that are provided with these section shipments.
- Although system components have IP65 protection, the mover cam followers and bearing rails exposure to water must be minimized, as they can corrode over time.
- Bearing rails must be lubricated. See [Install the Lubrication System](#).
- 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 curve modules.
  - Consider mass and center of gravity of tools that are mounted to movers.
  - When you fasten tools, and machinery to movers, use the two dowel pins, and four 5 mm screws. Be sure that the screws engage is 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 is 50 mm (2.0 in.) for any installation ferromagnetic material.
- Control systems must be designed and constructed in such a way as to help prevent hazardous situations from arising, see [Chapter 7 - Functional Safety](#). Movers can fall when motor power is removed or servo control is disabled on vertical or stand-up iTRAK system installations.
- Help prevent the risk of contact with parts that move by the use of guards and protective devices, see [Machine Guarding](#).

## Machine Guarding

The movers can have high acceleration and carry application loads. 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

- Mount emergency stop switches in the immediate reach of the operator.
- Keep free and clear of the range of motion of the machine and 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 maximum kinetic energy of the system, See [Machine Guarding on page 29](#).
- Light barriers are not recommended without detailed risk assessment, due to the high kinetic energy of the movers.
- After the drive power is switched off, prevent the fall of the vertical axes by:
  - Securing the vertical axes mechanically
  - Adding an external braking, arrester, or clamp mechanism
  - Having sufficient equilibrium of the vertical axes.
- Avoid the operation of high-frequency, remote control, and radio equipment near system electronics and their power supply leads. If the use of these devices is necessary, check that they do not interfere or cause malfunctions in the machine operation. We recommend performing an electromagnetic compatibility test before putting the system into service.

## Avoid Electrical Shock



**ATTENTION:** The motor modules, Kinetix 5700 iTRAK power supply, and the bus conditioner require 5 minutes to discharge before you handle wire and cable connections.

---



**ATTENTION:** Permanent magnets can act as generators when power is removed. The voltage that is generated is proportional to the speed of the movers. The electronics are designed to handle high voltages, however if the cables are not connected, the terminals can have voltage potential of up to 35 V/m/s.

---

## Pinch Point Hazard



**ATTENTION:** There is a pinch point hazard while installing a mover. A mover can have sudden and fast motion due to magnetic attraction. Do not put fingers between the mover and motor module.

---

---

## Protection Against Contact with Hot Parts

---



**BURN HAZARD:** Some components of the system have hot surfaces.

---

See [Safety Labels on page 117](#) for location of [Hot Surface](#) label.

- Do not touch hot surfaces such as brake resistors, heat sinks, power supply units, drive controllers, motors, windings, and laminated cores.
- Temperatures of the track motor-stator covers can be higher than 60 °C (140 °F) during or after operation.
- After powering down the motor modules, let them cool before touching. Motor modules can require 140 minutes to cool.
- After powering down switching chokes, power supply units, and drive controllers, let them cool for 15 minutes before touching.

## Protection Against Magnetic and Electromagnetic Fields During Installation and Use

See [Safety Labels on page 117](#) for location of motor module labels.

The motor modules, when in use, and permanent motors 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 magnetic-field produced by components. The magnetic field that is generated can disrupt the functionality of automatic-implantable cardioverter defibrillators (AICD). People with cardiac pacemakers must not work near the iTRAK system.

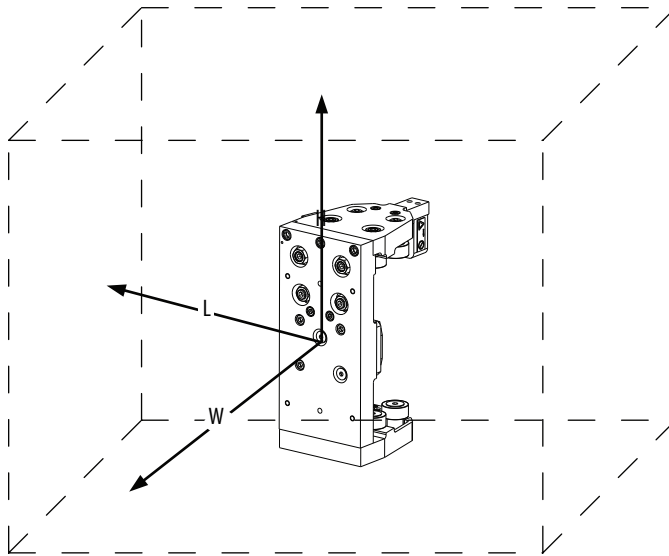
---

### *Magnetic Field Strength*

The movers of the iTRAK system contain components with strong magnetic fields. The motor modules also produce magnetic fields while movers are being commanded. This section shows the strength of the field for an enabled mover, uninstalled 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 14 - Mover Magnetic Field Orientation



To avoid the interaction with magnetic field, [Table 12](#) shows the magnetic field strength versus distances from the center point of an uninstalled mover.

Table 12 - Magnetic Field Strength of an Uninstalled Mover

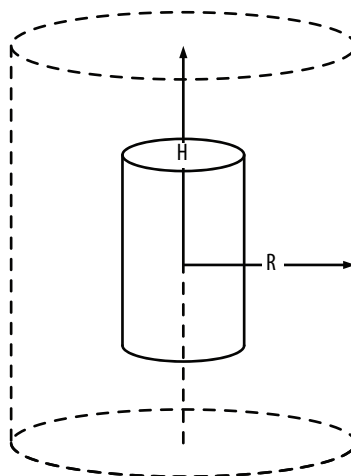
Cat. No.	Magnetic Strength											
	0.05 mT				0.1 mT				0.5 mT			
	L (+/-) mm (in.)	W+ mm (in.)	W- mm (in.)	H (+/-) mm (in.)	L (+/-) mm (in.)	W+ mm (in.)	W- mm (in.)	H (+/-) mm (in.)	L (+/-) mm (in.)	W+ mm (in.)	W- mm (in.)	H (+/-) mm (in.)
2198T-VT0505-x	180 (7.1)	145 (5.7)	310 (12.2)	90 (3.5)	140 (5.5)	120 (4.7)	130 (5.1)	70 (2.8)	90 (3.5)	65 (2.6)	95 (3.7)	55 (2.1)
2198T-VT0510-x	215 (8.5)	175 (6.9)	375 (14.8)	140 (5.5)	180 (7.1)	135 (5.3)	260 (10.2)	120 (4.7)	125 (4.9)	70 (2.8)	140 (5.5)	55 (2.1)
2198T-VT0515-x	220 (8.7)	190 (7.5)	320 (12.6)	140 (5.5)	190 (7.5)	145 (5.7)	190 (7.5)	130 (5.1)	140 (5.5)	70 (2.8)	100 (3.9)	50 (2.0)
2198T-VT1005-x	170 (6.7)	200 (7.9)	230 (9.1)	165 (6.5)	120 (4.7)	150 (5.9)	160 (6.3)	145 (5.7)	70 (2.8)	60 (2.4)	110 (4.3)	75 (3.0)
2198T-VT1010-x	230 (9.1)	200 (7.9)	360 (14.2)	165 (6.5)	200 (7.9)	150 (5.9)	255 (10.0)	150 (5.9)	150 (5.9)	70 (2.8)	135 (5.3)	80 (3.1)
2198T-VT1015-x	260 (10.2)	200 (7.9)	300 (11.8)	170 (6.7)	220 (8.7)	155 (6.1)	200 (10.0)	150 (5.9)	150 (5.9)	85 (3.3)	120 (4.7)	80 (3.1)
2198T-VT1505-x	180 (7.1)	255 (10.0)	310 (12.2)	240 (9.4)	140 (5.5)	180 (7.1)	190 (7.5)	220 (8.7)	90 (3.5)	65 (2.6)	125 (4.9)	95 (3.7)
2198T-VT1510-x	245 (9.6)	225 (8.9)	375 (14.8)	190 (7.5)	220 (8.7)	165 (6.5)	260 (10.2)	180 (7.1)	175 (6.9)	70 (2.8)	140 (5.5)	105 (4.1)
2198T-VT1515-x	300 (11.8)	210 (8.3)	320 (12.6)	200 (7.9)	250 (9.8)	165 (6.5)	210 (8.3)	170 (6.7)	160 (5.9)	85 (3.3)	140 (5.5)	110 (4.3)

To avoid the interaction with magnetic field, [Table 13](#) shows the magnetic field strength versus distances from the center point of a mover that is installed on a track.

**Table 13 - 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-VT0505-x	220 (8.7)	125 (4.9)	125 (4.9)	195 (7.7)	95 (3.7)	70 (2.8)	75 (3.0)	40 (1.6)	55 (2.2)
2198T-VT0510-x	250 (9.8)	95 (3.7)	130 (5.1)	210 (8.3)	60 (2.4)	120 (4.7)	120 (4.7)	20 (0.8)	55 (2.2)
2198T-VT0515-x	300 (11.8)	150 (5.9)	140 (5.5)	220 (8.7)	100 (3.9)	130 (5.1)	120 (4.7)	30 (1.2)	60 (2.4)
2198T-VT1005-x	330 (13.0)	125 (4.9)	170 (6.7)	175 (6.9)	95 (3.7)	130 (5.1)	75 (3.0)	40 (1.6)	70 (2.8)
2198T-VT1010-x	340 (13.4)	130 (5.1)	165 (6.5)	190 (7.5)	100 (3.9)	125 (4.9)	100 (3.9)	40 (1.6)	65 (2.6)
2198T-VT1015-x	360 (14.2)	130 (5.1)	170 (6.7)	290 (11.4)	105 (4.1)	130 (5.1)	130 (5.1)	40 (1.6)	105 (4.1)
2198T-VT1505-x	440 (17.3)	125 (4.9)	215 (8.5)	195 (7.7)	95 (3.7)	190 (7.5)	75 (3.0)	40 (1.6)	85 (3.3)
2198T-VT1510-x	430 (16.9)	165 (6.5)	200 (7.9)	210 (8.3)	140 (5.5)	130 (5.1)	120 (4.7)	60 (2.4)	70 (2.8)
2198T-VT1515-x	420 (16.5)	150 (5.9)	200 (7.9)	360 (14.2)	110 (4.3)	130 (5.1)	140 (5.5)	50 (2.0)	150 (5.9)

**Figure 15 - Position Magnet Magnetic Field Orientation**



**Table 14 - Magnetic Field Strength of an Uninstalled Position Magnet**

Cat. No.	Magnetic Strength					
	0.05 mT		0.1 mT		0.5 mT	
	R mm (in.)	H (+/-) mm (in.)	R mm (in.)	H (+/-) mm (in.)	R mm (in.)	H (+/-) mm (in.)
2198T-NN-318 2198T-NS-318	135 (5.3)	276 (10.9)	120 (4.7)	221 (8.7)	80 (3.1)	131 (5.2)



## Safe Magnet Handling



**ATTENTION:** The strong magnets of the mover can attract metal objects that are in its proximity. When you handle and install, maintain 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 personnel effect that could be attracted to the strong magnetic field.

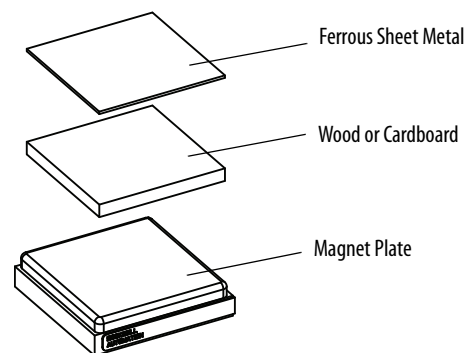
Strong magnets can erase magnetic media. Never let credit cards or electronic media contact or come near the mover or iTRAK system.

- The track creates strong magnetic fields while energized during operation.
- Persons with heart pacemakers, metal implants, or hearing aids must not enter the following areas.
  - Where components of the drive and control systems are mounted, commissioned, and operated.
  - Where parts of motors with permanent magnets are stored, repaired, or mounted.

## Magnet Plate Keeper

Exposed or uninstalled magnet plates, whether they are mounted to a mover or free-standing, must have a keeper that covers the entire magnet face. The keeper must consist of 5...10 mm (0.2...0.4 in.) wood or cardboard over the magnets and a 0.5...1.5 mm (0.02...0.06 in.) thick ferrous sheet metal over the wood or cardboard.

**Figure 16 - Magnet Plate Keeper**



Magnet plates that are covered with a keeper are fairly safe to handle. They must be kept at least 305 mm (12 in.) away from other magnet plates and other ferrous metal parts such as hardware and tools.

Magnet plates without keepers must be kept a minimum of 1 m (3.3 ft) away from other magnet plates and ferrous metal parts.

## Track Installation

Use this chapter to install an iTRAK® system track and lubrication system.

Topic	Page
Install the Track	35
Install the Lubrication System	41

Choose the location for system components following these considerations:

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



**ATTENTION:** Before you start the installation of the system, read the See [Safety Information on page 28](#) to reduce the risk of injury and property damage.



**WARNING:** Improper use of these components, failure to follow the safety instructions, tamper with the product, or disable the safety devices can result in property damage, injury, electric shock, or death.

## Install the Track

Use the following sections as guide for the installation of your pre-assembled track. Your track can be made with more or less motor modules than are shown in these procedures, but the same principles apply.

### Before You Begin



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

- Only qualified persons can 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, safety gloves while handling 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 7](#).
- 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 regulations.

## Mount an Oval Track

To mount the oval track or oval track sections, complete these steps.

1. Calculate the weight of the track or track section.

Frame Size	Weight, approx
50	123 kg/m (83 lb/ft)
100	156 kg/m (105 lb/ft)
150	189 kg/m (127 lb/ft)

---

**IMPORTANT** Be sure that the hoist machinery can lift the load.

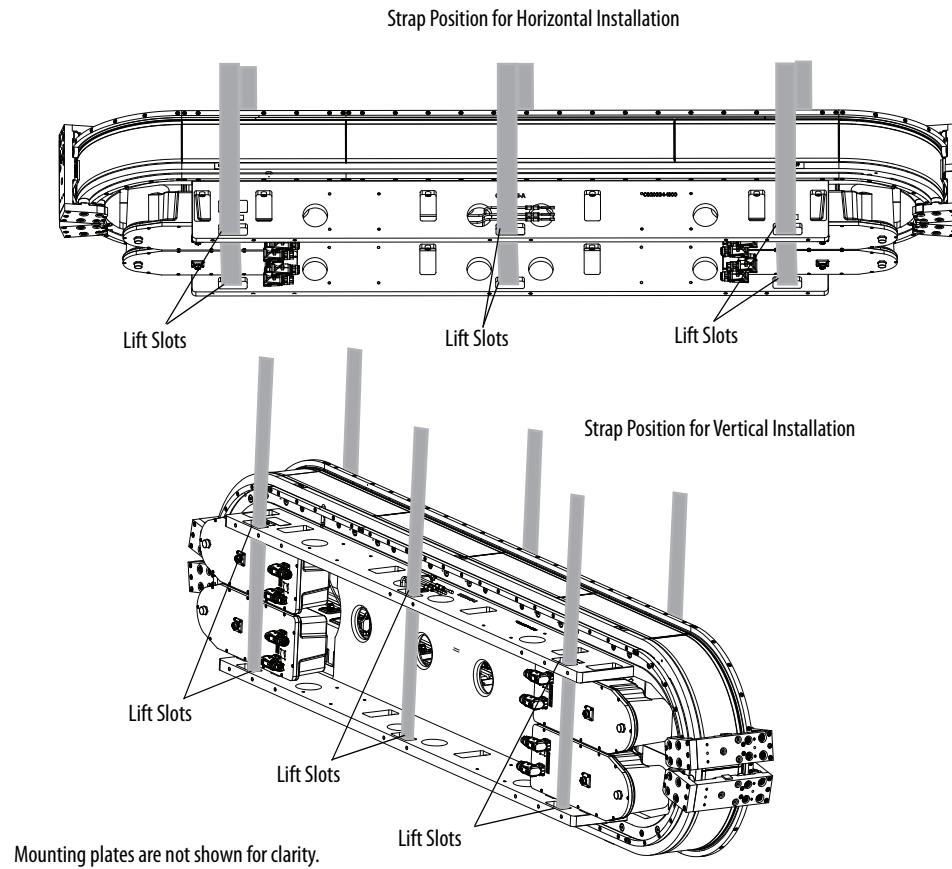
---

2. Make sure that the mounting surface supports the track evenly so that it is free of mechanical stress and distortion.

If mounting the iTRAK track directly to mounting surface, make sure that the mounting surface has a flatness of 0.05 mm per 300 x 300 mm (0.002 in. per 11.8 x 11.8 in.). For systems longer than 2400 mm (94.48 in.), we recommended that you use leveling feet between iTRAK mounting plates and the mounting surface.

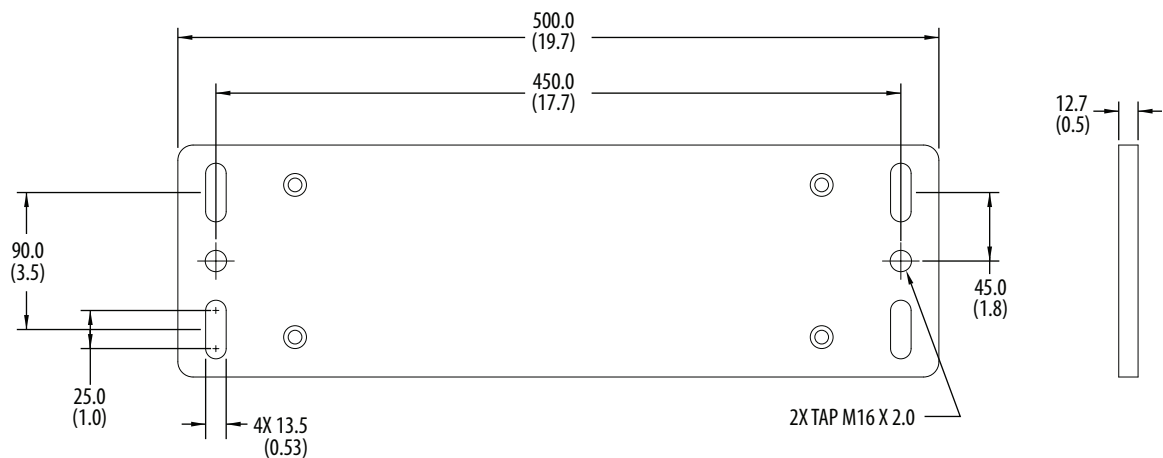
3. Unpack track sections within the crate so that the lift slots are easily accessible.

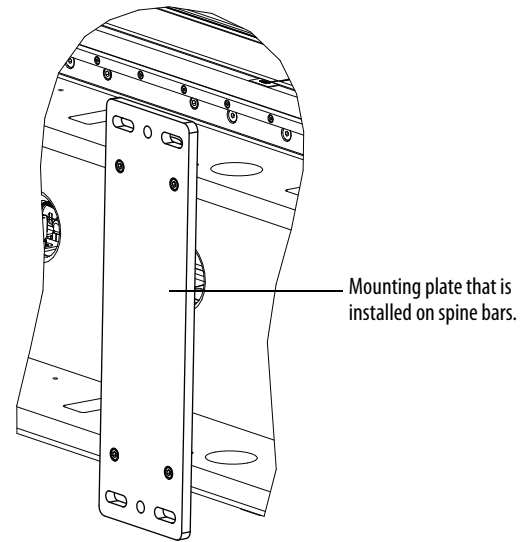
4. Thread straps through lift slots as necessary for your installation and secure them to hoist machinery.



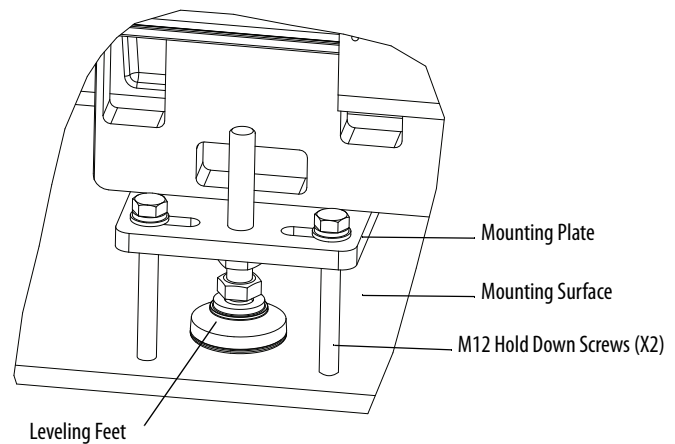
5. Lift and transfer track section to its intended location.

Mount by using the M16 x 2 threaded holes and the slots in mounting plate.



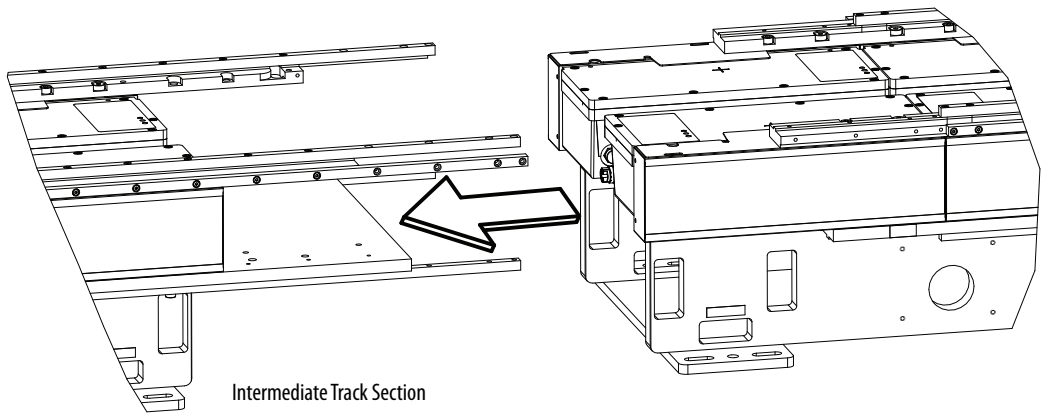


We recommend using leveling feet at each mounting point. For example, Misumi Adjuster Feet - Resin Rubber Type, Misumi part number AJPDR16-100E.

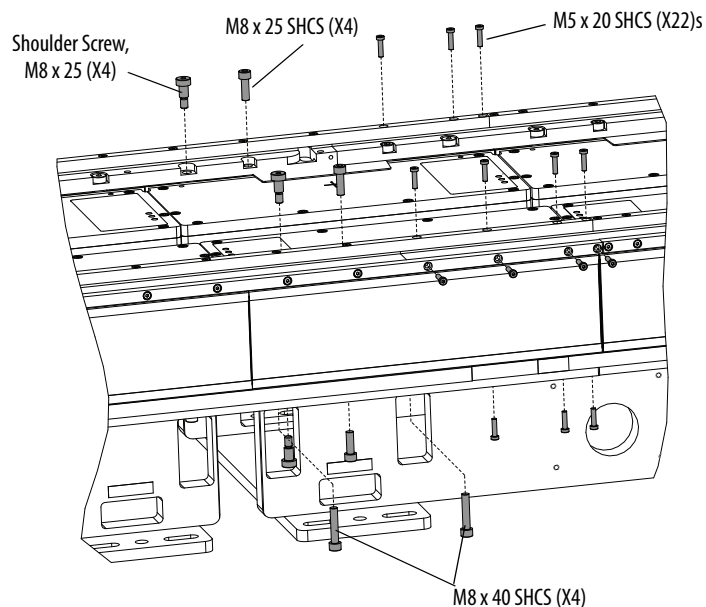


6. If your system was shipped multiple segments, do the following, otherwise skip to next step.
  - a. Apply Loctite 243 to all screws used in the following steps.

- b. Slide the intermediate track section into the left most curved section. When you slide the sections together, take care not to bend or distort the projecting rails.



- c. Attach the spine bar of the intermediate section to the bottom track plate of the curved left section by using M8 x 40 SHCS, do not tighten.
- d. Adjust intermediate section as necessary to allow the shoulder screw holes in the section and the motor module to align.
- e. Attach the motor module from the intermediate section to the left-most curved-section track bottom and top plates by using the stainless steel M8 x 25 socket head cap screws and shoulder screws, shoulder Ø10 x 20, thread M8 x 25.
- f. Torque motor module socket-head cap screws to 22 N•m (16.2 lb•ft). Torque shoulder screws to 13 N•m (9.6 lb•ft).
- g. Torque the M8 x 40 SHCS screw between the spine bar and intermediate section to 40 N•m (29.5 lb•ft).



- h. Clean the rail screws and apply Loctite 243.

- i. Attach the top and bottom rails by using the procedure [Install Top and Bottom Straight Rails on page 87](#).
- j. Attach the transverse rail by using the procedure [Install Transverse Straight Rails on page 91](#).

Bearing rails are scribed with the location identifiers. See mechanical installation diagram that is shipped with your system for placement.

7. Repeat [step 6](#) for each additional section.
8. Follow the guidelines in System Design for Control of Electrical Noise Reference Manual, publication [GMC-RM001](#), and Industrial Automation Wiring and Grounding Guidelines, publication [1770-4.1](#) to obtain proper low-impedance grounding for high-frequency electrical noise.

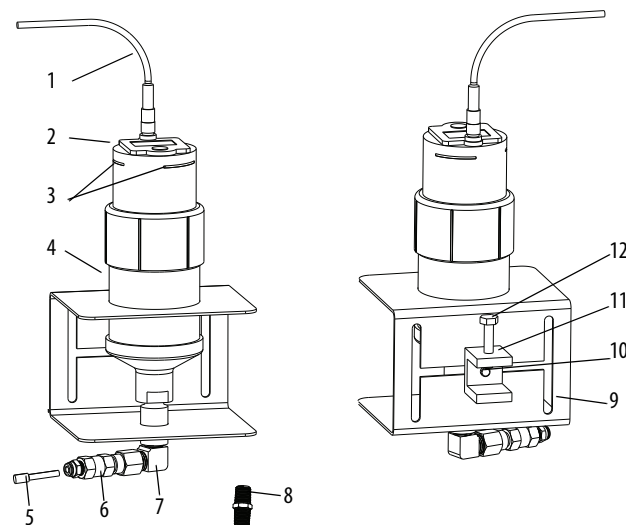
## Install the Lubrication System

The iTRAK lubrication system, catalog number 2198T-AL-SYS, comes with a coil of tube to connect system fittings to the remotely located pumps and system fittings. Three pump assemblies are included in the system; one is intended for each bearing 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.

The lubrication system is assembled with right angle fittings. 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.

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

**Figure 17 - Lubrication Pump Description**



Item	Description
1	5 m (16.4 ft) Digital signal cable
2	Digitally activated pump
3	Pump status indicators
4	Lubricant cartridge
5	Plug
6	Check valve

Item	Description
7	Brass elbow fitting
8	Straight brass fitting <sup>(1)</sup>
9	Mounting bracket
10	0.25-20 x 0.5 screw
11	Beam clamp
12	0.25-20 x 1.25 screw

(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.



## What You Need

7/16 in. open-end wrench

## Mount the Lubricator Pumps

To mount the lubricator pumps, complete these steps.

1. Locate a mounting position for the pumps.

The pump must be located within the 10 m (32.8 ft) of tube routing distance to the iTRAK system lubrication connectors and 5.0 m (16.4 ft) of the power cable routing distance to 24V I/O port of your controller. The location must be accessible for maintenance and visible for monitoring the pumps status indicators. Observe the clearance requirements that are shown in [Figure 18](#).

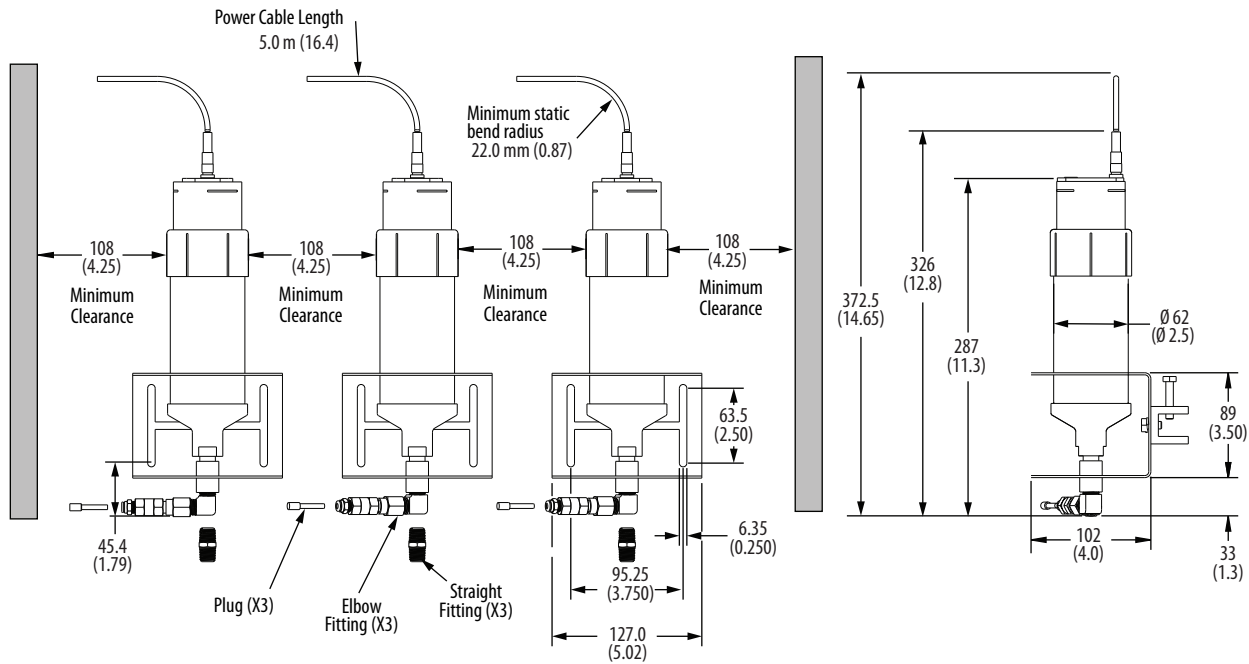
2. Adjust the beam clamp to accommodate the attachment surface by using a 7/16 in. open-end wrench.

The beam clamp can be positioned anywhere on the H pattern of the mounting clamp.

3. Attach the lubricator pumps to their mounting surface by the beam clamp by using 7/16 in. open-end wrench.
4. Label, route, and secure the tubes from the pumps to the lubrication connectors on the iTRAK system.
5. Remove the plug from the lubricator pump connector and immediately replace with the tubing.

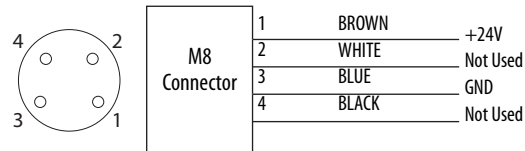
To remove the plug, pull back on the connector face and pull out the plug.

6. Repeat [step 5](#) for the two other pumps and at each connector on the iTRAK system.

**Figure 18 - Mounting Dimensions and Clearance**

## Wire Lubrication Pump

Connect the power cable the 24V I/O port of your controller.



An initial coating of oil is required on the entire track before operating the iTRAK and auto lubrication systems.

**IMPORTANT** The mover cams distribute the oil on the track. The movers must be in motion when the pump is activated, otherwise the oil drips away.

## Lubrication Pump Configuration

**Table 14 - Recommend Lubrication Pump Setting**

Feature	Setting
Mode	Impulse

See [Lubrication on page 100](#) to make tube connections, initial lubrication, and lubrication during normal operation.

## **Notes:**

## Connect Your iTRAK System to a Kinetix 5700 iTRAK Power Supply

This chapter contains information for wiring iTRAK® power supply, including connectivity to the motor modules, the USB I/O, and the gateway.

Use this chapter in conjunction with Kinetix® 5700 iTRAK Power Supply and iTRAK Bus Conditioner Module Installation Instructions, publication [2198T-IN001](#) to install and wire the Kinetix 5700 iTRAK power supply and iTRAK bus conditioner module.

Topic	Page
Typical iTRAK System with an iTRAK Power Supply	45
Wire the Digital USB I/O Module	51
Wire the Gateway	52
Logix Designer Application Support	56

The iTRAK power supply derives bus power for and distributes control power to the iTRAK system. It is a Kinetix 5700 component, and is designed to work with the 2198-Pxxx Kinetix 5700 power supplies as part of a Kinetix 5700 system.

### Typical iTRAK System with an iTRAK Power Supply

The iTRAK power supply interfaces to the gateway computer via a USB I/O module. The gateway sends enable and disable signals and clears faults for iTRAK power supply. The iTRAK power supply reports its status through a relay that the USB I/O monitors.

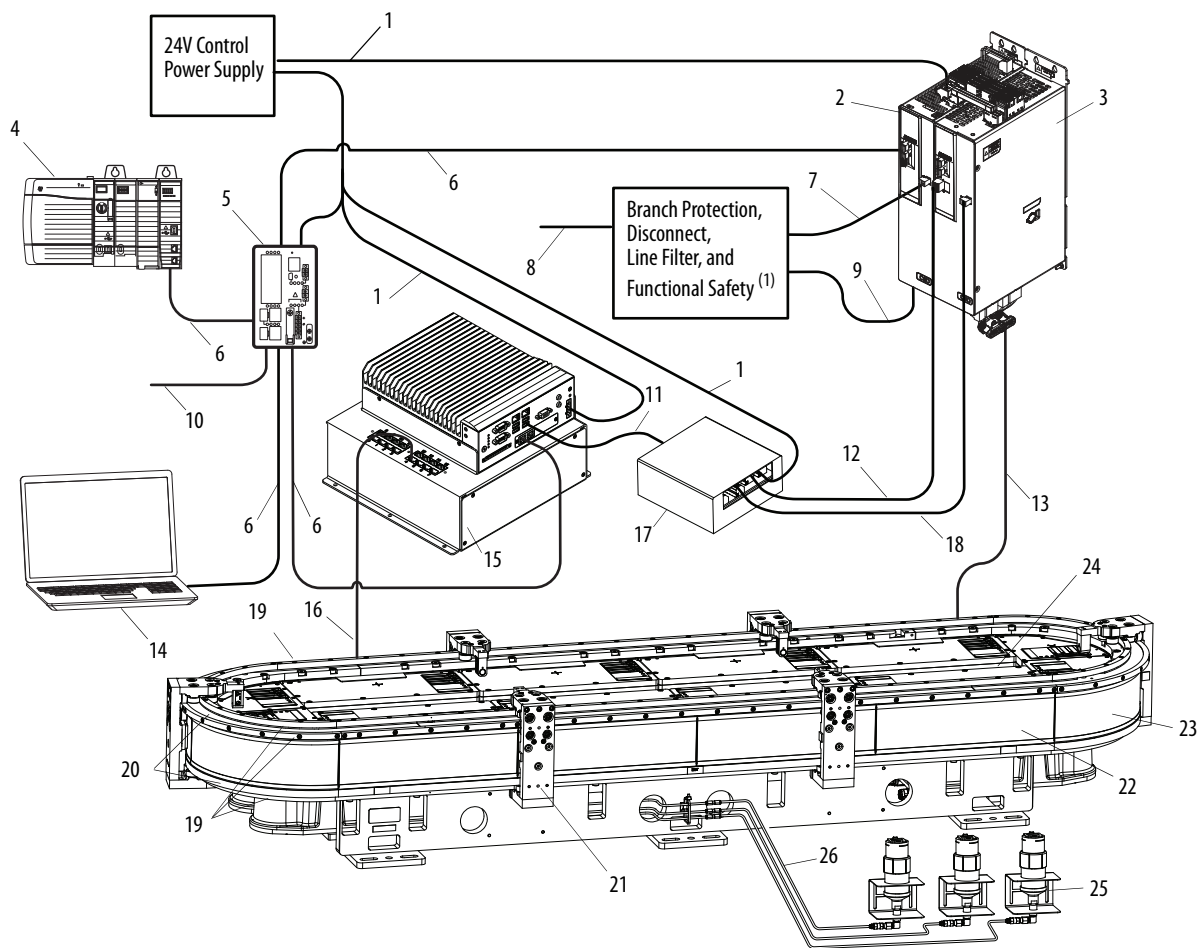
There is sample code for Logix Designer that provides code for the gateway computer to control the iTRAK power supply and interface to the rest of the Kinetix 5700 system. See [Logix Designer Application Support on page 56](#) for more information.



**ATTENTION:** The correct Logix Designer code must be used as instructed to control the iTRAK power supply and provide fault support to the Kinetix 5700 system. Failure to use the program can result in equipment damage.

Figure 19 is a full view of the system that includes customer supplied components, iTRAK solutions, and wiring.

Figure 19 - Typical iTRAK System with an iTRAK Power Supply



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

Item	Description
1	24V control power
2	Kinetix 5700 power supply
3	Kinetix 5700 iTRAK power supply
4	Controller
5	Managed Ethernet Switch
6	Machine Ethernet
7	Contactor enable signal line
8	Mains power (460V nominal)
9	Kinetix 5700 line voltage
10	Plant Ethernet
11	USB cable
12	iTRAK power supply I/O connections
13	Motor module power bus and control power (number of cables vary by system)

Item	Description
14	Studio 5000® Programming Interface (not supplied with system)
15	Gateway
16	Communication cable to motor module (one cable per motor module)
17	Digital USB I/O module
18	iTRAK ready connection
19	Bearing rails
20	Track frame
21	Mover
22	Straight motor module
23	Curved motor module
24	iTRAK bus conditioner (not visible mounted below track frame)
25	Lubrication pump (x3)
26	Lubrication tube

For detailed information on the installation and how to wire the 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 parts of the Kinetix 5700 system, including:

- 2198-Pxxx Kinetix 5700 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

As shown in [Figure 19](#), components of the iTRAK power supply based system include items that are listed in [Table 15](#).

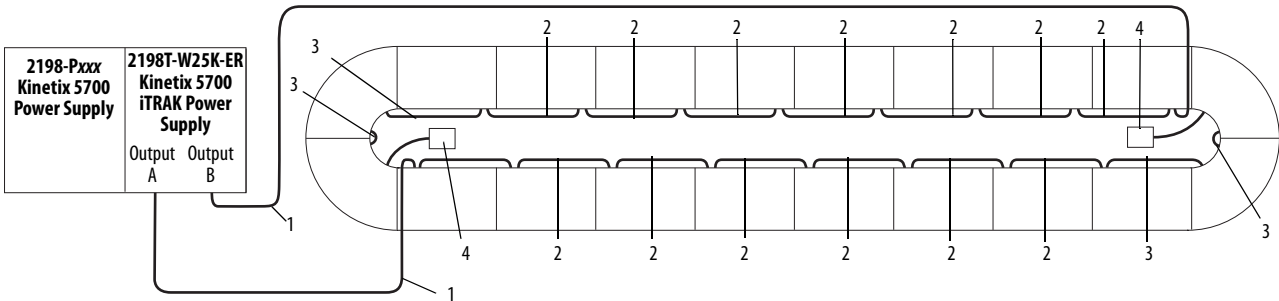
**Table 15 - Components of an iTRAK System Using an iTRAK Power Supply**

Item	Description
iTRAK track	Frame, bearings, motor modules, and movers.
iTRAK power supply, bus conditioner, and power cables	Creates bus voltages and distributes control power for the iTRAK system.
Kinetix 5700 power supply	Creates the bus voltage that is used by other Kinetix 5700 modules, including the iTRAK power supply.
Gateway and communication cables	Controls and coordinates iTRAK motor modules, provides an interface for them to the Logix system. In systems with an iTRAK power supply, the gateway also enables, disables, and clears the faults for the iTRAK power supply.
USB I/O module	The USB I/O module serves as the physical input and output interface between the iTRAK power supply and gateway computer.
Other Kinetix 5700 components and related hardware	Other components that are used in your Kinetix 5700 system and other hardware that is used for connecting the Kinetix 5700 system to three-phase input power, as needed for branch protection, filtering, contactor, and other functions.

### Wire the iTRAK System

An iTRAK power supply can power up to 20 series A or 32 series B motor modules depending on current requirements. See [Figure 20](#) for a typical layout on how to wire a system using one iTRAK power supply. Detailed wiring the connections to the iTRAK power supply are shown in [Figure 20 on page 48](#).

Figure 20 - Wiring an iTRAK System with an iTRAK Power Supply



Item	Description
1	2198T-CHBFLS8-12AAxx, iTRAK power supply to motor module cable
2	2198T-CHBP8S8-12P3, power cable
3	2198T-CHBP8S8-12P6, power cable
4	2198T-WBCMOD, iTRAK bus conditioner

Wiring the connections from multiple iTRAK power supplies is shown in [Figure 21 on page 49](#) and [Figure 22 on page 50](#).

See the Kinetix 5700 Servo Drives User Manual, publication [2198-UM002](#), for details on how to wire the rest of the Kinetix 5700 system. Information on how to wire to the iTRAK power supply is found in Kinetix 5700 iTRAK Power Supply and iTRAK Bus Conditioner Module, publication [2198T-IN001](#).

### Using Multiple iTRAK Power Supplies

Follow these guidelines when using multiple iTRAK power supplies in an iTRAK system.

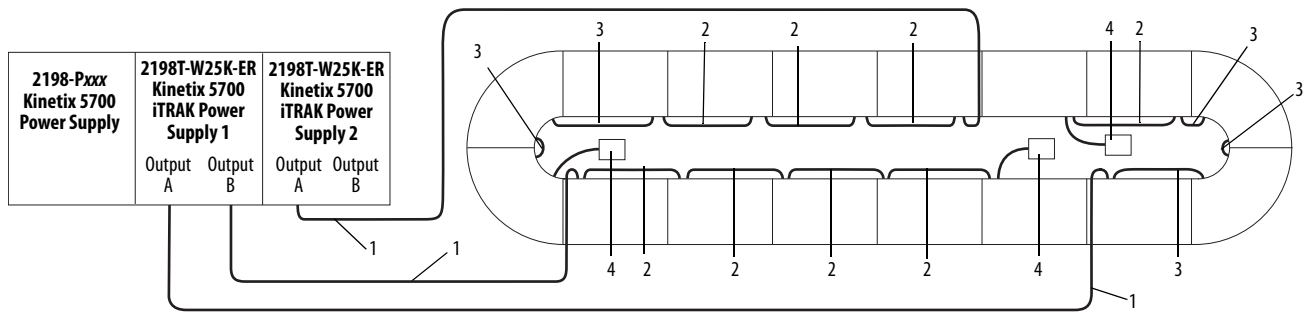
When using multiple iTRAK power supplies, the system must be parsed into separate electrical pieces for each of the iTRAK power supplies.

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.

**IMPORTANT** In systems that use multiple iTRAK power supplies, make sure that the output bus of one power supply is never connected to the output bus of another power supply.

Use the following scenario 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 powers the first group of ten motor modules, while iTRAK power supply 2 provides power to the remaining six motor modules. The DC buses of these two groups are electrically isolated from each other as shown in [Figure 21](#).

**Figure 21 - Connecting Multiple iTRAK Power Supplies in a System**



Item	Description
1	2198T-CHBFLS8-12AAxx, iTRAK power supply to motor module cable
2	2198T-CHBP8S8-12P3, power cable
3	2198T-CHBP8S8-12P6, power cable
4	2198T-WBCMOD iTRAK bus conditioner

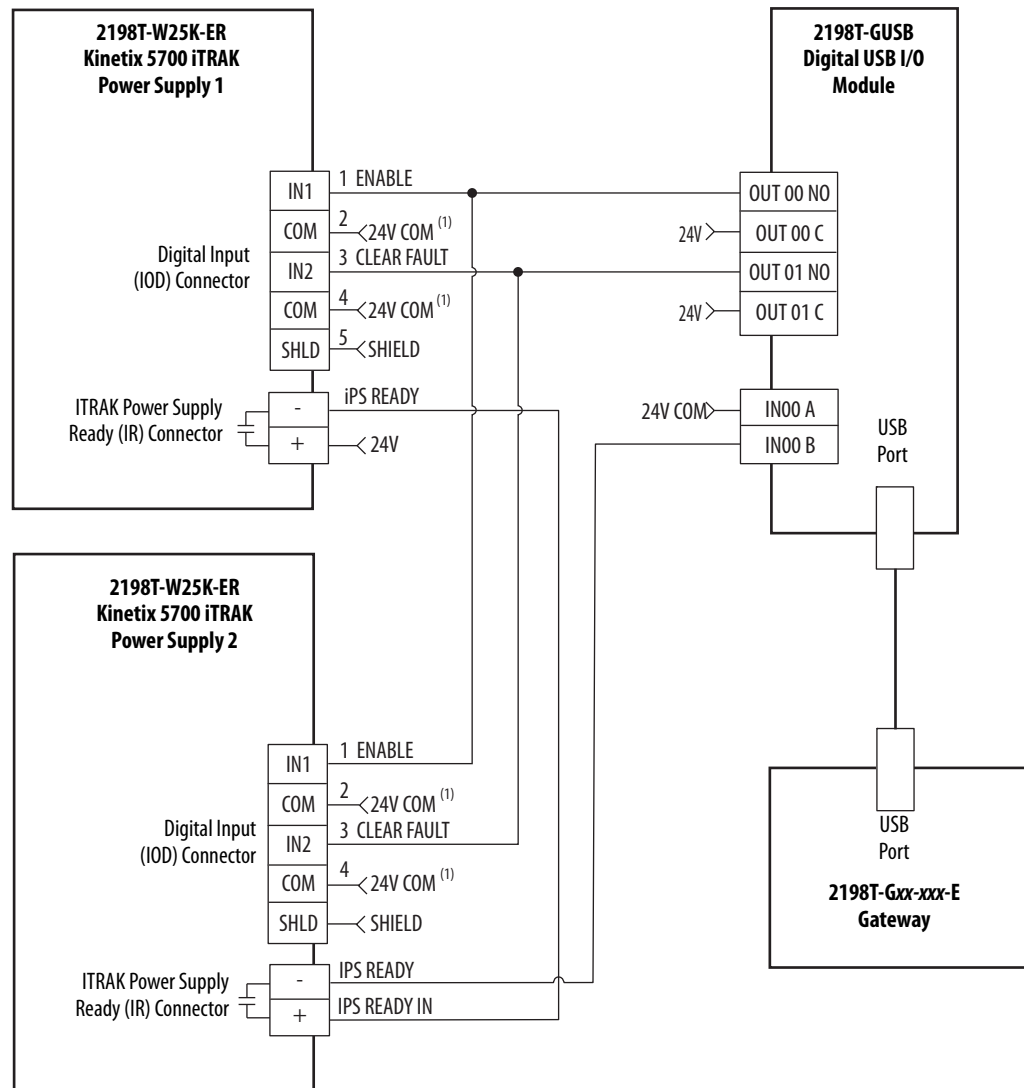


**ATTENTION:** Power from iTRAK power supply 1 must not be connected to the power from iTRAK power supply 2.

One gateway can interface to multiple iTRAK power supplies through the Digital USB I/O Module. When you use this configuration, connect the Enable and Clear Fault signals in parallel, and connect the IPS Ready signal in series through all iTRAK power supplies as shown in [Figure 22](#).



Figure 22 - Wiring Multiple iTRAK Power Supplies to the Digital USB I/O Module



(1) Only one connection to 24V Com is required for each iTRAK power supply. Either pin 2 or pin 4 must be connected, it is not necessary to connect both.

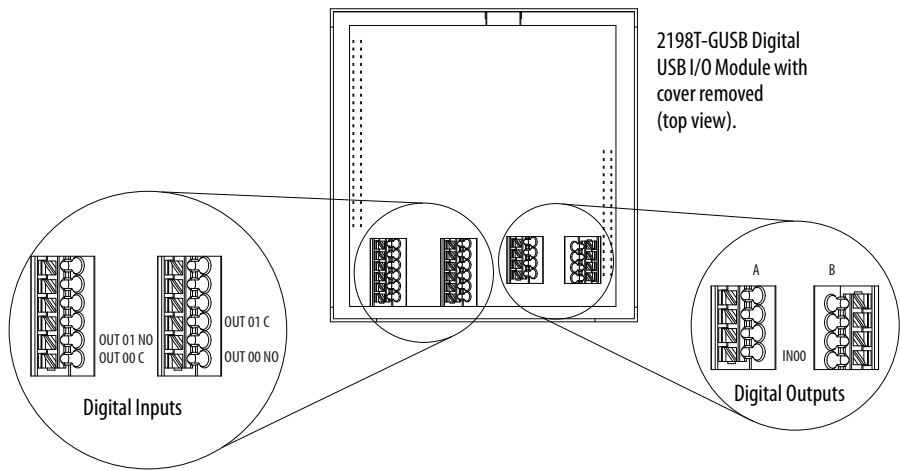
# Wire the Digital USB I/O Module

The digital inputs and output from the iTRAK power supply communicate with the gateway through the 2198T-GUSB Digital USB I/O Module.

To access the connectors, complete these steps.

- 1. Remove the four Phillips head screws that secure the cover.
- 2. Remove the cover.

**Figure 23 - 2198T-GUSB, Digital USB I/O Module Connector Wiring**

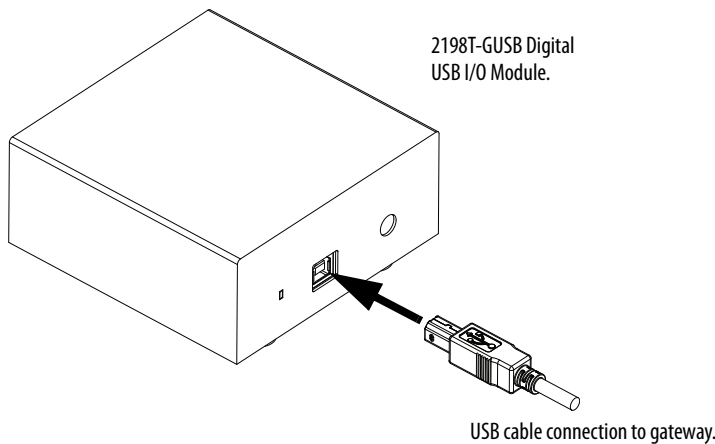


**Table 16 - Digital USB I/O Module Connector Specifications**

Description	Pin	Signal	Recommended Wire Size mm <sup>2</sup> (AWG)	Strip Length mm (in.)	Torque Value N·m (lb·in)
iTRAK power supply ready	IN00 A IN00 B	- +	0.14...2.5 (26...12)	9.0 (0.35)	N/A <sup>(1)</sup>
Digital inputs	OUT 00 NO OUT 00 C OUT 01 NO OUT 01 C	Enable COM Clear Fault COM	0.20...1.31 (24...16)		

(1) This connector uses spring tension to hold wires in place.

**Figure 24 - Connect the USB Cable**

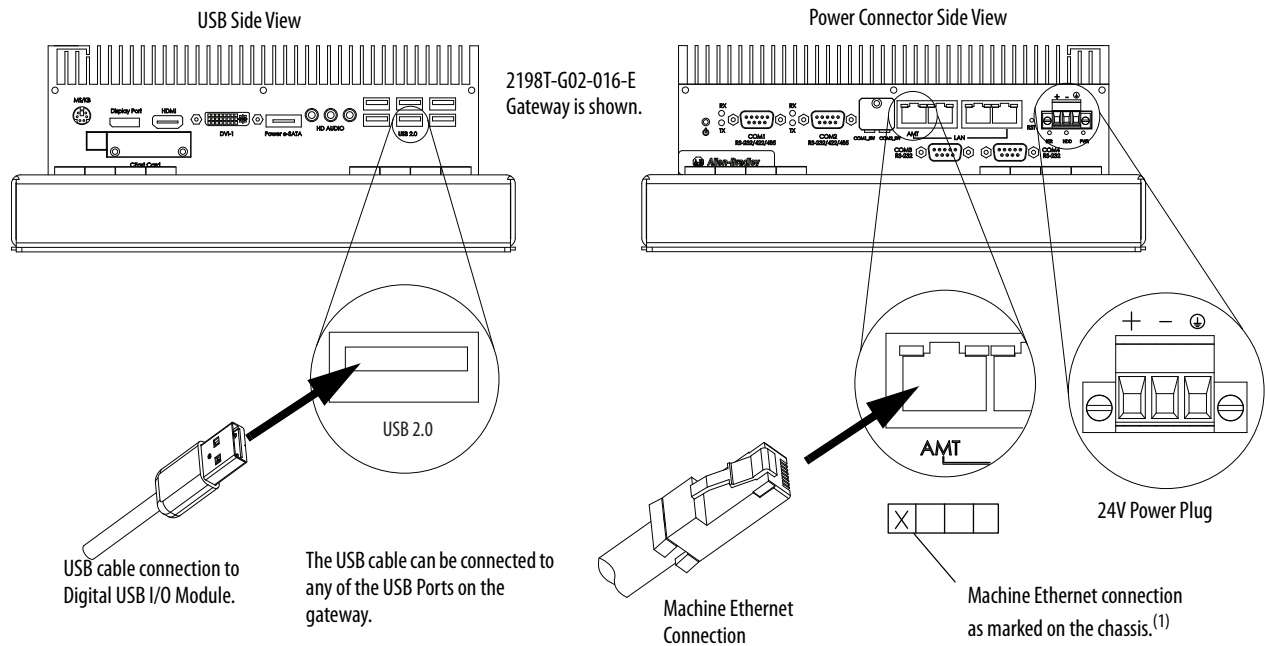


## Wire the Gateway

This manual covers wiring the 2198T-G02-xxx-E and the 2198T-G03-xxx-E gateway.

Wire the gateway with 24V power input, a machine Ethernet connection, the USB cable from the digital USB I/O module and a communication cable from each of the motor modules.

**Figure 25 - 2198T-G02-xxx-E Gateway USB, LAN, and 24V Power Plug Wiring**

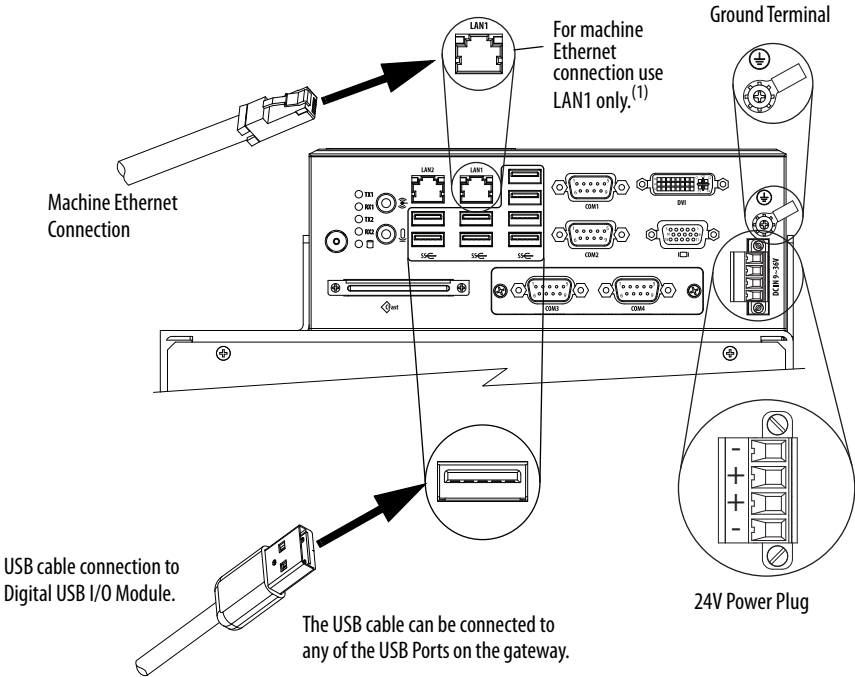


(1) Make only this connection. Do not use any other Ethernet ports for machine Ethernet.

**Table 17 - 2198T-G02-xxx-E Gateway 24V Power Plug Specifications**

Description	Pin	Signal	Recommended Wire Size mm <sup>2</sup> (AWG)	Strip Length mm (in.)	Torque Value N·m (lb·ft)
Gateway 24V Power Plug	+	24V	0.82 (18)	7 (0.25)	0.79 (0.58)
	-	24V Comm	0.82 (18)		
	GND	PE	2.08 (14)		

**Figure 26 - 2198T-G03-xxx-E Gateway USB, LAN, and 24V Power Plug Wiring**



(1) Make only this connection. Do not use any other Ethernet ports for machine Ethernet.

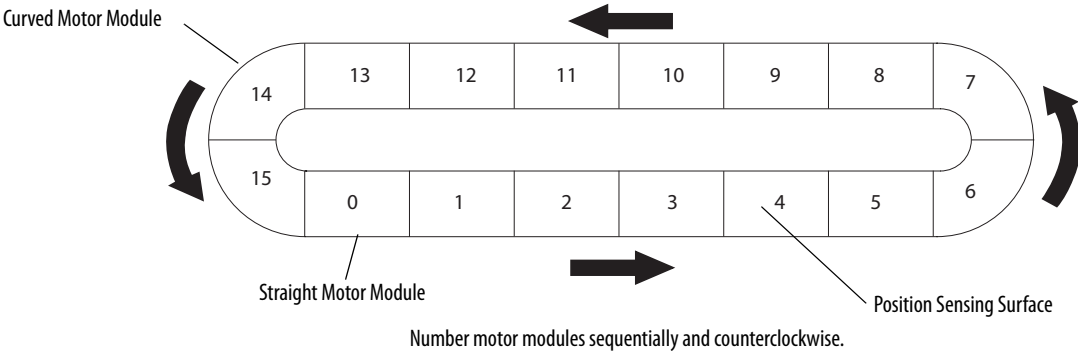
**Table 18 - 2198T-G03-xxx-E Gateway 24V Power Plug and Grounding Specifications**

Description	Pin	Signal	Recommended Wire Size mm <sup>2</sup> (AWG)	Strip Length mm (in.)	Torque Value N·m (lb·ft)
Gateway 24V Power Plug	+	24V	0.82 (18)	6 (0.24)	0.5 (0.368)
	-	24V Comm			
Ground Terminal	GND	PE			

## Numbering the Motor Modules

Motor module 0 can be any motor module in the system, but they must be sequentially numbered counterclockwise facing the position sensing surface.

**Table 19 - Numbering the Motor Modules - Example**



## Wire a 2918T-G02-xxx-E Gateway

To wire the motor modules to the 2918T-G02-xxx-E gateway, complete the following steps.

1. Remove the loopback connector from the number seven communication port.

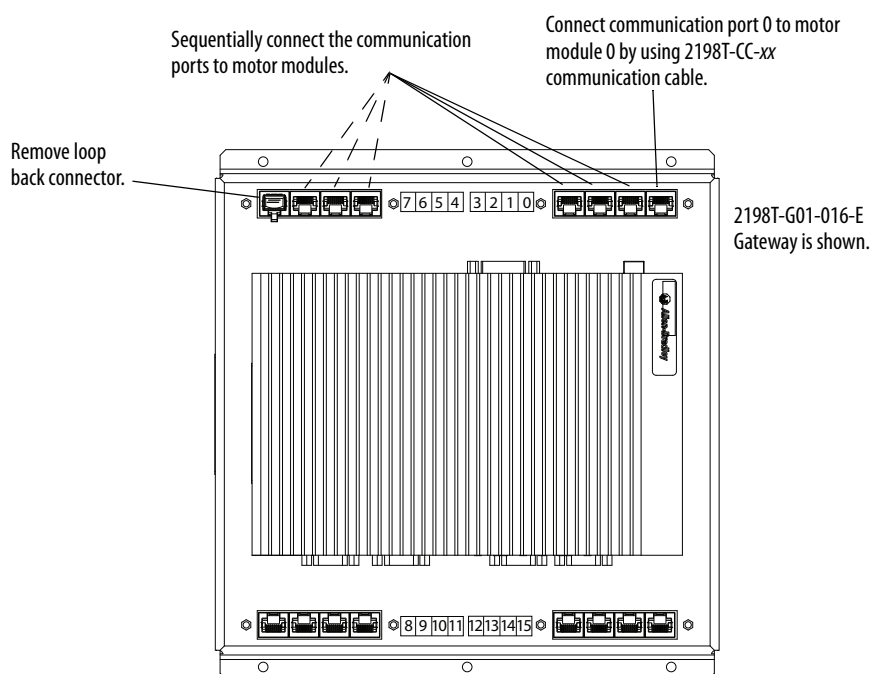
If the number of communication ports in your gateway is 16, 32, 48, or 64, and you have an equal number of motor modules in your system, you can discard the loop back connector. If it is not, save the loop back connector for use in [step 4](#).

2. Attach the 2198T-CC-xx communication cables.

Start by connecting motor module 0 to communication port 0.

3. Continue to make connections for each motor module by matching the motor module number, as numbered in [Numbering the Motor Modules](#), to the communication port number, until all motor modules are connected.
4. If the number of motor modules is not equal to 16, 32, 48, or 64, install the loop back connector in the next available communication port.

**Figure 27 - 2198T-G02-xxx-E Gateway to Motor Module Wiring**

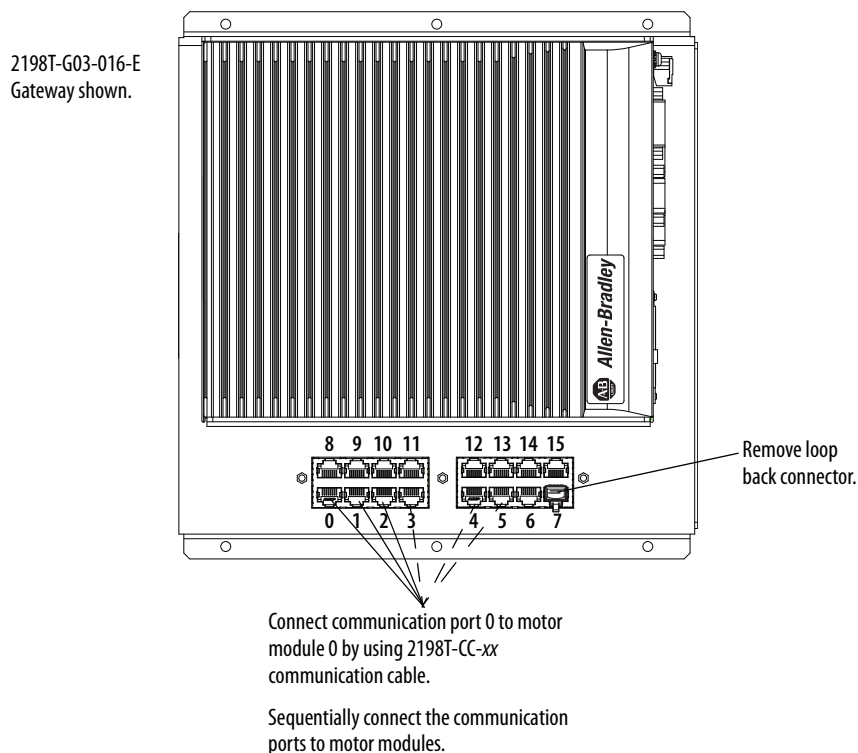


## Wire a 2918T-G03-xxx-E Gateway

To wire the motor modules to the 2918T-G03-xxx-E gateway, complete the following steps.

1. Remove the loopback connector from the number seven communication port.  
Store the loopback connector for future use.
2. Attach the 2198T-CC-xx communication cables.  
Start by connecting motor module 0 to communication port 0.
3. Continue to make connections for each motor module by matching the motor module number, as numbered in [Numbering the Motor Modules](#), to the communication port number, until all motor modules are connected.

**Figure 28 - 2198T-G03-xxx-E Gateway to Motor Module Wiring**



# Logix Designer Application Support

The Studio 5000 Logix Designer® application controller program necessary to support the iTRAK power supply is provided in the Pxx\_IPS\_Support program. The code performs the following functions.

- Sends the power supply type for iTRAK power supply to the gateway.
- Sends the DC-bus power supply DCBusUPStatus to the gateway. The bus up status is used by the gateway to gate the iTRAK power supply Enable signal.
- Monitors DC-bus power supply DCBusUnload in the sample code to trigger stopping actions.

The code also provides examples for disabling the iTRAK power supply via the gateway.

Name the DC-bus power supply axis DFE. If you use a name other than DFE, update the DFE tags to match the name that is given to the DC-bus power supply.

The Pxx\_IPS\_Support program version can be checked in Logix under controller tag FeatureRevision.

[-] iTRAK_IPSSupport	{...}
[-] iTRAK_IPSSupport.RunningIPSMde	1
[+] iTRAK_IPSSupport.POSTDone	0
[+] iTRAK_IPSSupport.FeatureRevision	6
[+] iTRAK_IPSSupport.IPS_FaultMessage	''
[-] iTRAK_IPSSupport.MinCompatibleFWVersion	{...}
[+] iTRAK_IPSSupport.MinCompatibleFWVersion....	1
[+] iTRAK_IPSSupport.MinCompatibleFWVersion....	103
[+] iTRAK_IPSSupport.MinCompatibleFWVersion....	35

**IMPORTANT**    You must import Pxx\_IPS\_Support program into the same task as the iTRAK\_IO code.



**ATTENTION:** The Studio 5000 Logix Designer application Pxx\_IPS\_Support program must be used as instructed to control the iTRAK power supply properly and provide required fault support to the Kinetix 5700 system. Failure to use this program code can result in equipment damage.

You can obtain the Studio 5000 Logix Designer controller ladder code by going to the Rockwell Automation Knowledgebase article [778917](#).

**IMPORTANT**    Do not add the iTRAK power supply to Logix I/O tree. If you do, unexpected results can occur.

## Power on Your System

Use this chapter to power on your system by using a Kinetix® 5700 system.

Topic	Page
Before You Power On the Track	57
Apply Power	58
Commission with Programming Manual	59

### Before You Power On the Track

To speed up the time it takes to commission your system, review the following.

#### Identify Controller

The controller that you use determines which type of Starter Project is best suited for your application. Consider the memory requirements, axis count, and motion task utilization when choosing the catalog number of controller. Integrated Architecture® Builder from Rockwell Automation can help you size the application and estimate which controller is properly suited for you; see Knowledgebase Article [1040301](#), How to size an iTRAK® in IAB? for more information.

#### Identify Firmware Revision

Each firmware revision is designed to operate with a paired version of the iTRAK\_IO Add-On Instruction. Identify which firmware revision of the iTRAK system you plan to use before starting your application code development. We recommend that you use the latest published firmware revision. Firmware revisions are available from the Rockwell Automation [Product Compatibility and Download Center](#).

To update your motor module firmware see [Update Motor Module Firmware on page 99](#).

If you plan to do a Factory Acceptance Test with Rockwell Automation, contact [ICTSupport@ra.rockwell.com](mailto:ICTSupport@ra.rockwell.com) to determine which firmware revision is planned for your visit.



## Configure and Customize Project File

When you download the firmware revision from the Rockwell Automation [Product Compatibility and Download Center](#), the software files for Studio 5000 Logix Designer® application are included. Choose the appropriate project file that is based on the features and controller for that firmware revision.

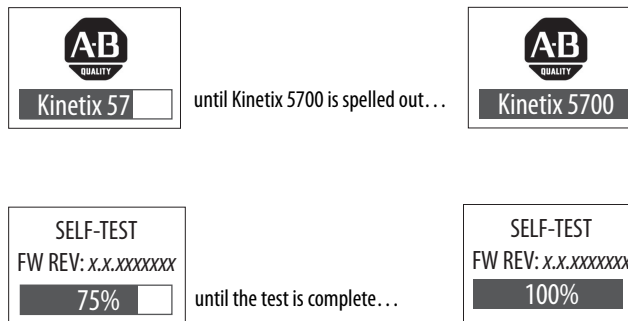
The iTRAK System Programming Manual, publication, [2198T-PM001](#) is available on the Rockwell Automation Literature Library. It includes detailed descriptions of the Starter Projects and the procedures to develop your own project file. After you have configured your project file according to the instructions in the programming manual, proceed with [Apply Power](#).

## Apply Power

To apply power to your Kinetix 5700 systems, complete these steps.

1. Energize your ControlLogix® or CompactLogix™ processor.
2. Download the ACD file to the controller.
3. Start the initialization sequence of the Kinetix 5700 system, motor modules, and the gateway by applying 24V control power to the gateway safety circuit, and motor modules, and Kinetix 5700 system.

On initial power-up, the drive performs a self-test. Upon successful completion, the firmware revision is displayed.

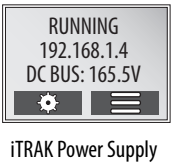


When the Kinetix 5700 power supply is ready, the contactor enable relay is closed so that main power can be applied to the Kinetix 5700 system bus.

4. Apply bus voltage.

The bus voltage is applied to the system when the appropriate commands are sent from the processor to the gateway. This action triggers the Kinetix 5700 iTRAK power supply via the USB I/O module. See the Motion Commands section of the iTRAK Programming Manual, publication [2198T-PM001](#), for more information.

When the high-voltage power completes initialization, the displays change to Running mode.



The DC BUS voltage that is displayed can differ depending on your system configuration.

- 5. To determine if the iTRAK system is ready for application of the bus voltage, monitor the status indicators from the gateway in Studio 5000 Logix Designer application.

There are two controller tags that indicate the status of the gateway and iTRAK power supply.

<input type="checkbox"/>	iTRAK_Control.Status	{ ... }
<input type="checkbox"/>	iTRAK_Control.Status.GatewayRunning	1
<input type="checkbox"/>	iTRAK_Control.Status.DCBusContactor	1

The iTRAK\_Control.Status.GatewayRunning indicates that the iTRAK system initialization is finished, and the gateway is ready to respond to requests from the controller.

The iTRAK\_Control.Status.DCBusContactor = 1 means the iTRAK high-voltage bus is closed, and the iTRAK power supply is providing high voltage to the iTRAK system.

**Commission with  
Programming Manual**

Configure, tune, and program the iTRAK system by following the instructions in the iTRAK Programming Manual, publication [2198T-PM001](#).

## **Notes:**

## Maintenance

This chapter contains information on how to care for your system, replace components, and update firmware.

Topic	Page
Before You Begin	61
Preventive Maintenance	61
Add or Replace Components	62
Update Gateway Firmware	97
Update Motor Module Firmware	99
Lubrication	100

### Before You Begin

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

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

### Preventive Maintenance

#### Cleaning

To prolong the life of your iTRAK® system, do the following cleaning procedures. The frequency in which to perform them is depended on the machine usage, the environment in which it is used, and the exposure to containments. 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 system See [Safety Information on page 28](#).

### *Bearing Rail*

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 bearing rail surfaces.

### *Track Components*

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

- position sensor
- top and bottom plates
- motor module coil

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

## **Add or Replace Components**

The following procedures show you how to install or replace system components.

### **Install or Remove a Position Magnet Assembly**

To install or remove a position magnet assembly, complete these steps.

#### *Before You Begin*



**ATTENTION:** Before attempting any service to an iTRAK system. See [Safety Information on page 28](#).

---

#### *What You Need*

- 2.5 mm hex driver
- Loctite 243
- 2198T-NN-318 or 2198T-NS-318, position magnet assembly
- 2198T-VTxxxx-x, mover

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

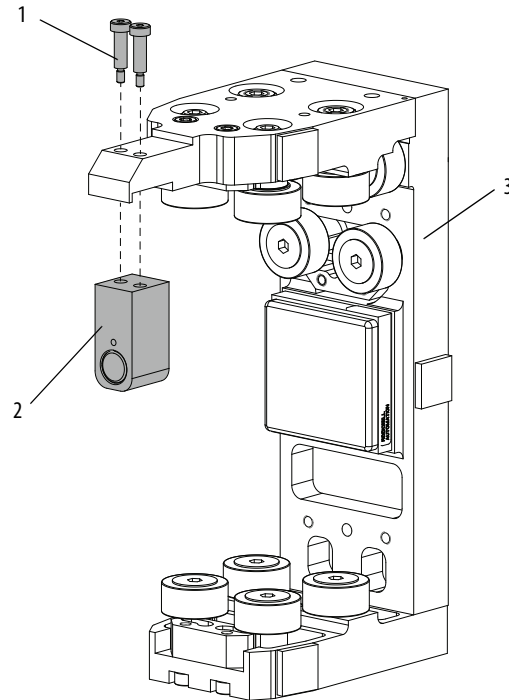
To remove a position magnet assembly, complete these steps.

Remove the shoulder-socket head cap screws that secure the position magnet assembly to the mover by using a 2.5 mm hex driver.

To install a position magnet assembly, complete these steps.

1. Clean shoulder socket-head cap screws and apply fresh Loctite 243.
2. Install position magnet assembly onto the mover with shoulder socket-head cap screws by using 2.5 mm hex driver, torque to 0.85 N•m (7.5 lb•in).
3. Check that the polarity of position magnets alternate between north and south on adjacent movers.

You can check the polarity by examining the color of the magnets or by using a compass.



Item	Description
1	Shoulder-Socket Head Cap Screws
2	Position Magnet Assembly
3	Mover

---

**IMPORTANT** If you are using the iTRAK\_Control.Data.MoverOffset tag, recalibrate the movers that have new position magnets.

---

## Magnet Plate Assembly Installation

Follow this procedure to install or remove a magnet plate assembly.

### Before You Begin



**ATTENTION:** Before attempting any service to an iTRAK system. See [Safety Information on page 28](#).



**ATTENTION:** If you are using your own design for a mover, make sure of the following.

- The mounting hardware is not too long that it protrudes past or pops through the magnet plate.
- Be sure to use all mounting holes. By using all mounting holes, the magnet maintains correct orientation of north-south magnet polarity.

### What You Need

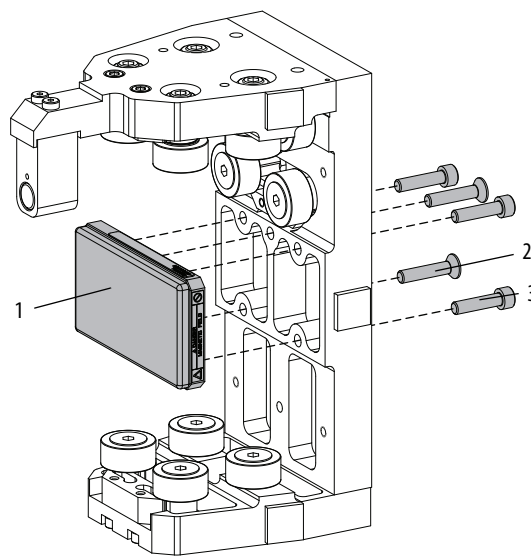
- 6 mm hex driver
- Loctite 243
- 2198T-Mxxxx-A000, magnet assembly
- M6 x 25 socket head cap screws and M6 x 30 flat head socket screws as shown in [Table 20](#).

**Table 20 - Screws Required for Mounting Magnet Plates**

Cat. No.	FHCS M6 x 30 Quantity	SHCS M6 x 25 Quantity
2198T-M0505-A000	3	-
2198T-M0510-A000	2	3
2198T-M0515-A000	2	3
2198T-M1005-A000	3	-
2198T-M1010-A000	2	3
2198T-M1015-A000	2	3
2198T-M1505-A000	2	3
2198T-M1510-A000	2	3
2198T-M1515-A000	2	3

To install a magnet plate assembly, complete these steps.

1. Remove mover by following the procedure in [Install or Replace a Mover on page 66](#).
2. Clean all screws and apply Loctite 243.
3. Install magnet plate assembly and torque M6 socket head cap screws to 9 N•m (6.6 ft•lb) and M6 flat head cap screws to 7 N•m (5.2 ft•lb).



Item	Description
1	Magnet plate assembly
2	Flat head cap screw
3	Socket-head cap screw

Install mover by following the procedure in [Install or Replace a Mover on page 66](#).



## Install or Replace a Mover

Follow this procedure to install or replace a mover.

### *Before You Begin*



**ATTENTION:** Before attempting any service to an iTRAK system. See [Safety Information on page 28](#).

---

Choose an accessible curved section of the track. Position the mover that you want to replace over a straight motor module next to the curved section. Move all other movers off the curved end of the track.

### *What You Need*

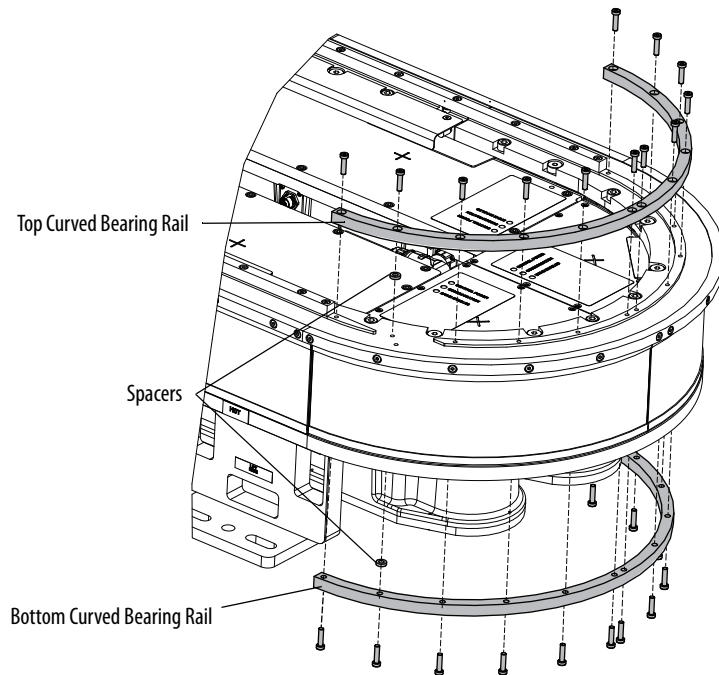
- Left and right straight-to-curved clamps from 2198T-A04 iTRAK alignment tool kit
- 4 mm hex driver
- Loctite 243
- 2198T-A03, pair of mover installation fixtures
- 2198T-VTxxxx-C, mover

To remove a mover, complete these steps.

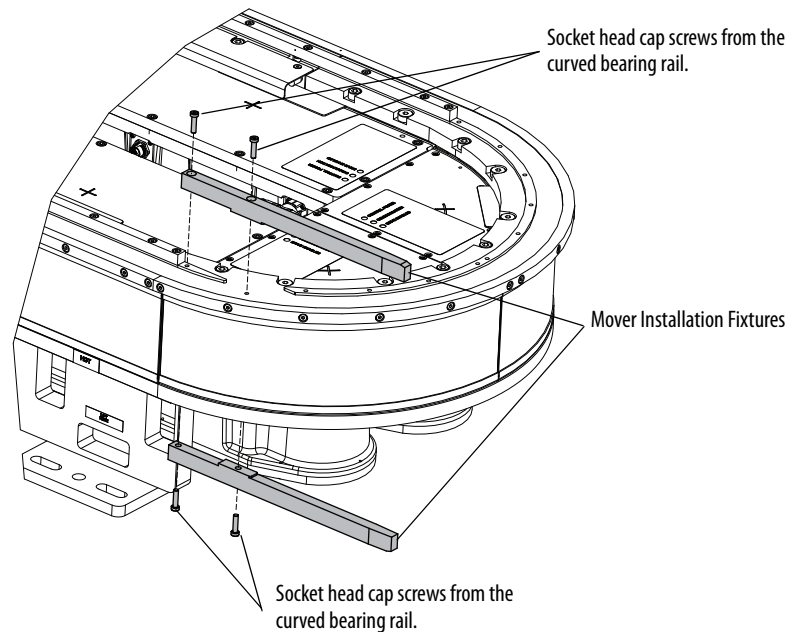
1. Remove the position magnet assembly by following the procedure [Install or Remove a Position Magnet Assembly on page 62](#).

2. Remove the socket head cap screws from the curved top and bottom bearing rails by using a 4 mm hex driver and remove the rail.

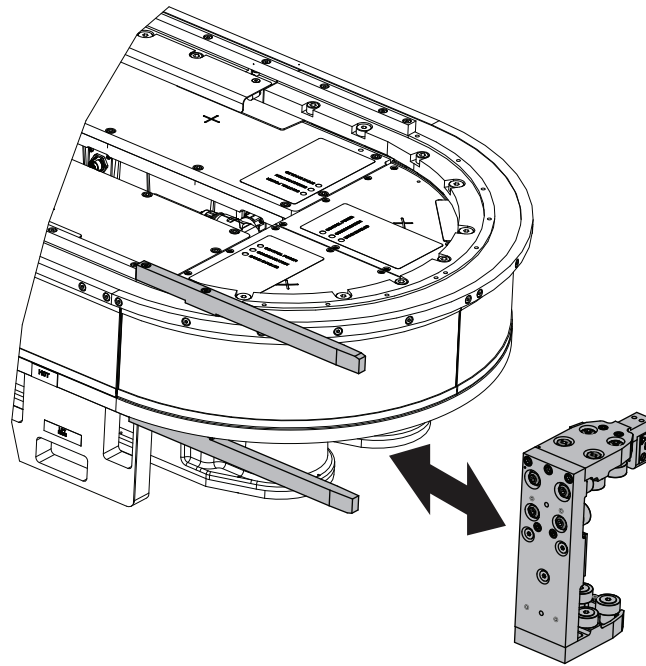
Be sure to save the two spacers with the screws.



3. Attach mover installation fixtures to the end of straight bearing rails by using two socket head cap screws from the curved bearing rail.

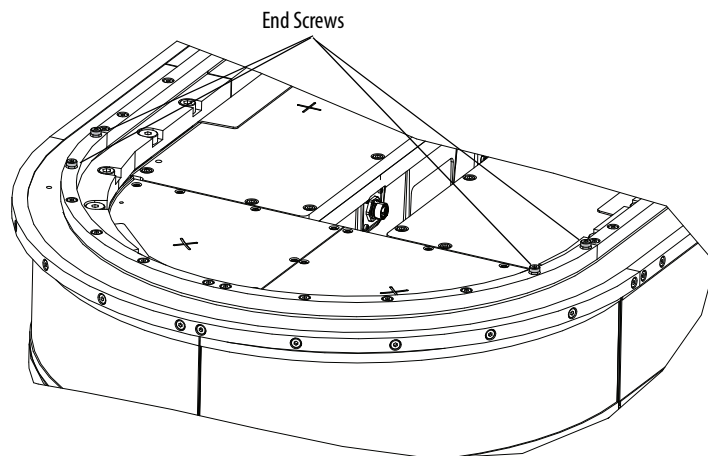


4. Install or replace your mover.

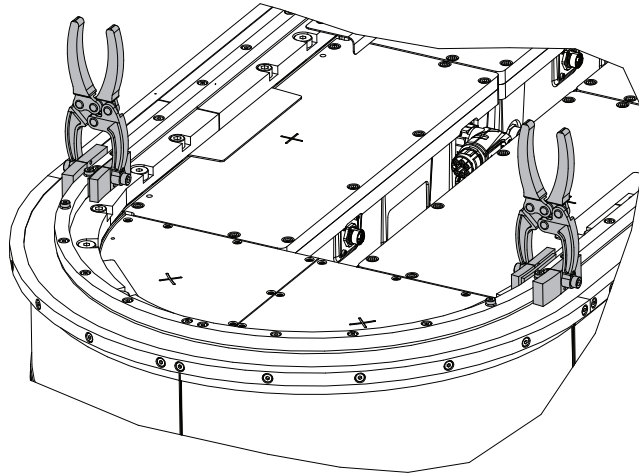


5. Remove the mover installation fixtures.
6. Clean all bearing rail screws and apply fresh Loctite 243.
7. Install the spacers and the top and bottom curved bearing rails.

Torque the middle screws to 9 N•m (6.6 lb•ft) by using 4 mm hex driver; leave the two screws on each end of the curved rail loose.



8. Apply the left and right straight-to-curved rail clamp as shown.



9. Torque the two screws under the clamp to 9 N•m (6.6 lb•ft) by using 4 mm hex driver.
10. Repeat steps [8](#) and [9](#) to the bottom rail.
11. Install the position magnet assembly by following the procedure [Install or Remove a Position Magnet Assembly on page 62](#).

## Replace a Straight Motor Module

Use this procedure to replace a straight motor module.

### Before You Begin



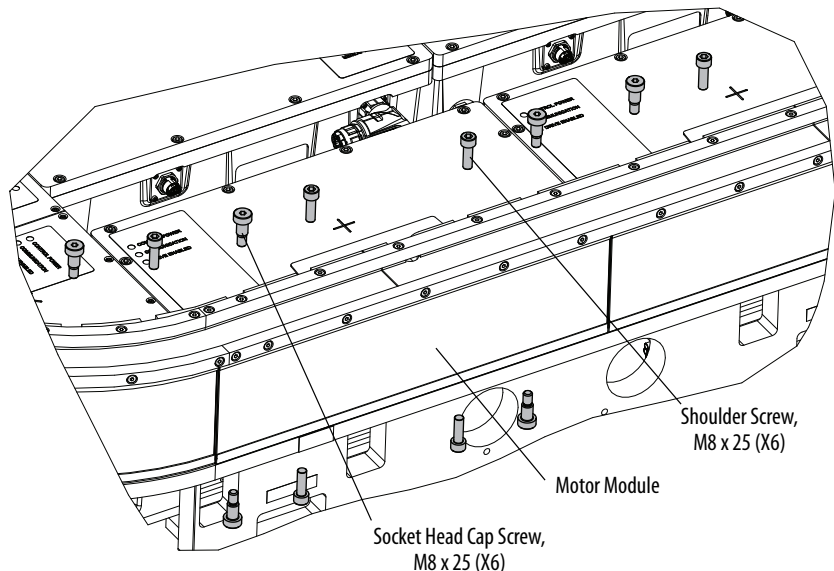
**ATTENTION:** Before attempting any service to an iTRAK system. See [Safety Information on page 28](#).

### What You Need

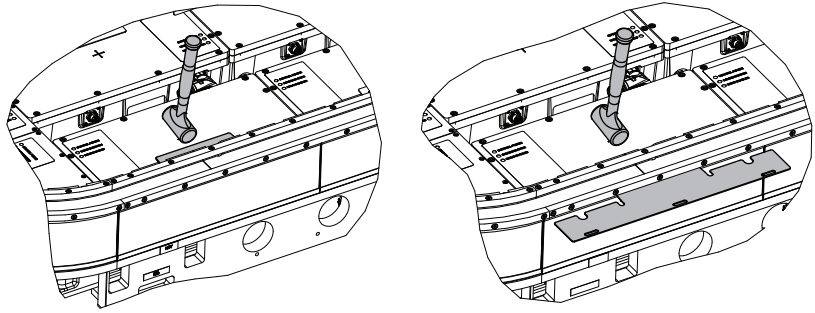
- 5 mm and 6 mm hex drivers
- Hard rubber mallet
- Left and right straight-to-curved clamps from 2198T-A04 alignment tool kit
- Loctite 243
- 2198T-L16-Txxx-A00N-2E1E-NS, straight motor module

To remove the straight motor module, complete these steps.

1. Remove the M8 x 25 socket head cap screws and shoulder screws, shoulder Ø20 x10, thread M8 x 25 that secures the motor module to the top and bottom frames.
2. Remove an addition two M8 x 25 and shoulder screws, shoulder Ø20 x10, thread M8 x 25 from the top of the adjacent motor modules.

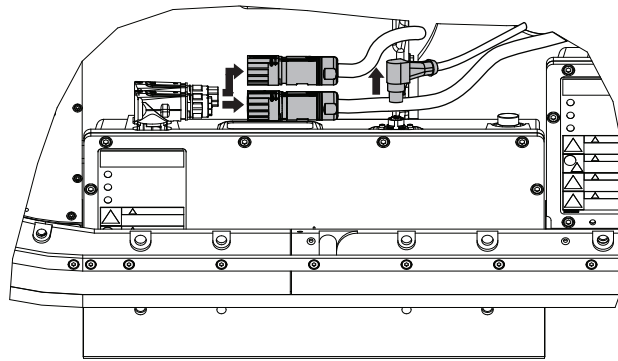


3. Use a hard rubber mallet to remove motor module shim.



**ATTENTION:** The straight motor modules can weigh up to approximately 25 kg (54 lb). Be sure to use a two man lift when moving the straight motor module.

4. Slide straight motor module less than half way out of the frame and disconnect the communication and power bus cables.



5. Remove the motor module.
6. Clean all screws and apply Loctite 243.
7. Install new module by reversing [step 5...step 1](#).
8. Torque shoulder screws to 13 N•m (9.6 lb•ft) and torque socket head cap screws to 22 N•m (16.2 lb•ft).
9. Update motor module firmware, see [Update Motor Module Firmware on page 99](#).

## Replace a Curved Motor Module

Use this procedure to replace a curved motor module.

### Before You Begin



**ATTENTION:** Before attempting any service to an iTRAK system. See [Safety Information on page 28](#).

### What You Need

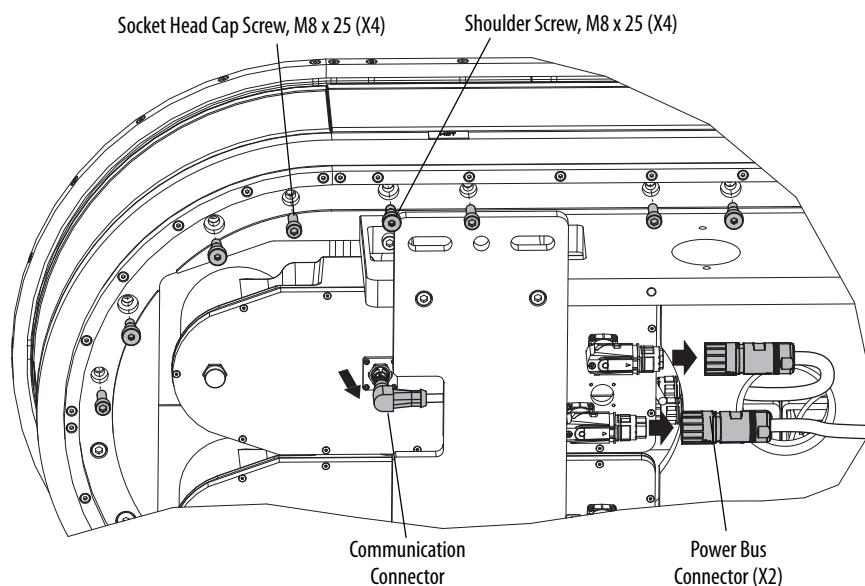
- Left and right straight-to-curved clamps from 2198T-A04 iTRAK alignment tool kit
- 3 mm, 5 mm, and 6 mm hex drivers
- Loctite 243
- 2198T-L16-Txxxx-B09x-2E1E-NS, curved motor module

To remove the curved module, complete these steps.

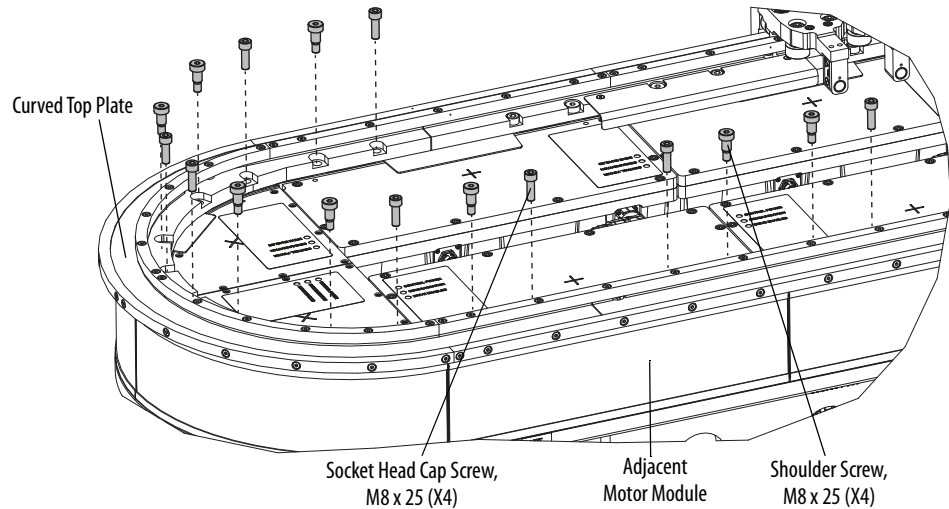
1. Move movers away from the area where the curved module is to be replaced and the adjacent motor module.

If you have to remove the movers follow steps in [Install or Replace a Mover on page 66](#).

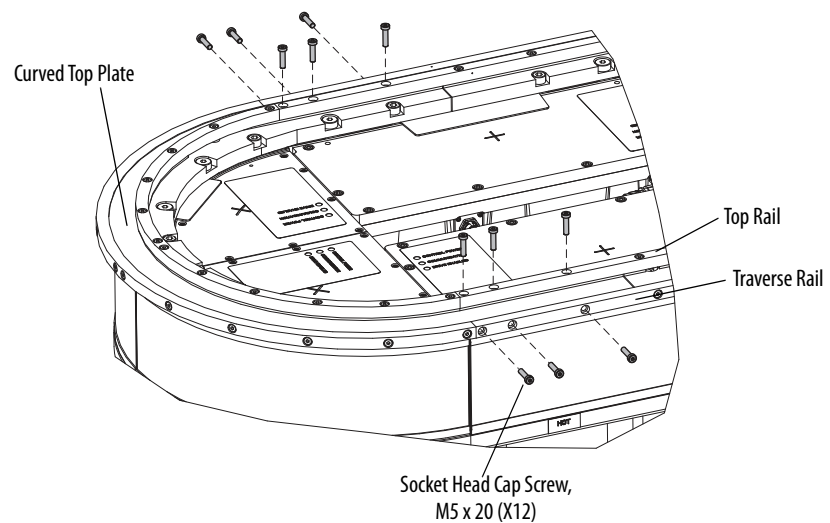
2. From the bottom of the track, remove the socket head cap screws M8 x 25 and shoulder screws, shoulder Ø20 x 10, thread M8 x 25 that secure the curved motor module that you are replacing and the adjacent straight motor module.
3. Disconnect the communication cable and power bus cables.



4. From the top of the track, remove the socket head cap screws M8 x 25 and shoulder screws, shoulder Ø20 x 10, thread M8 x 25 from the curved top plate, adjacent straight motor module, and two from the next adjacent motor module.

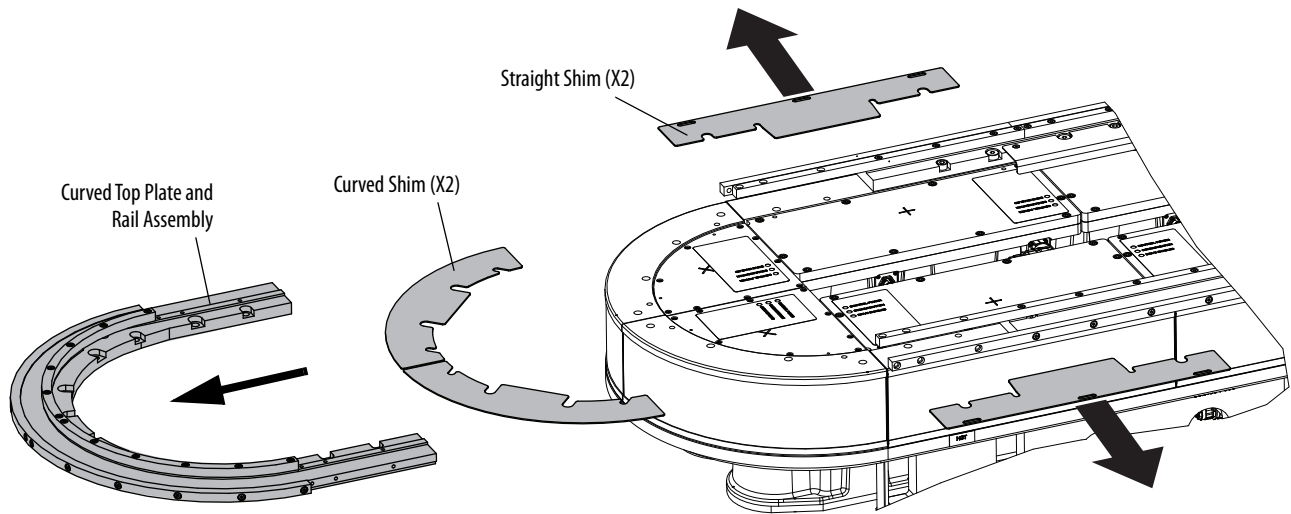


5. Remove the M5 x 20 socket head cap screws that secure the top and traverse rails to the curved top plate.

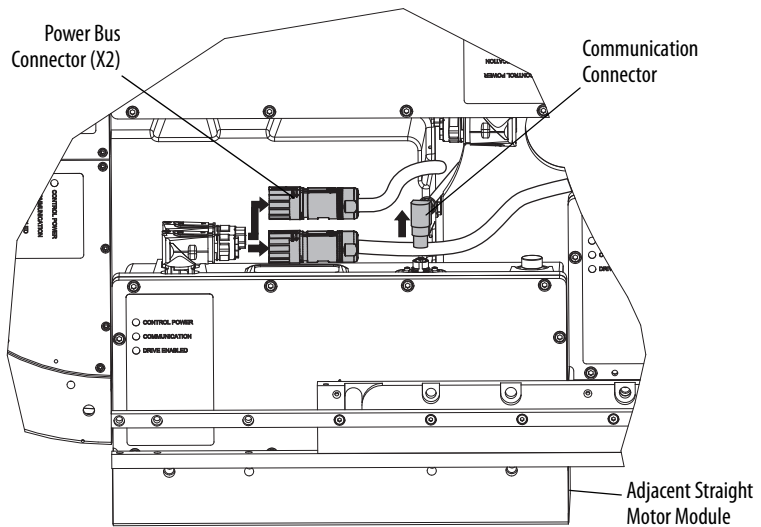




6. Remove the straight shims.
7. Slide the curved top plate and rail assembly off the track, and remove the curved shims.



8. Slide the adjacent straight motor module halfway off the base plate and disconnect the communication and power bus connectors.



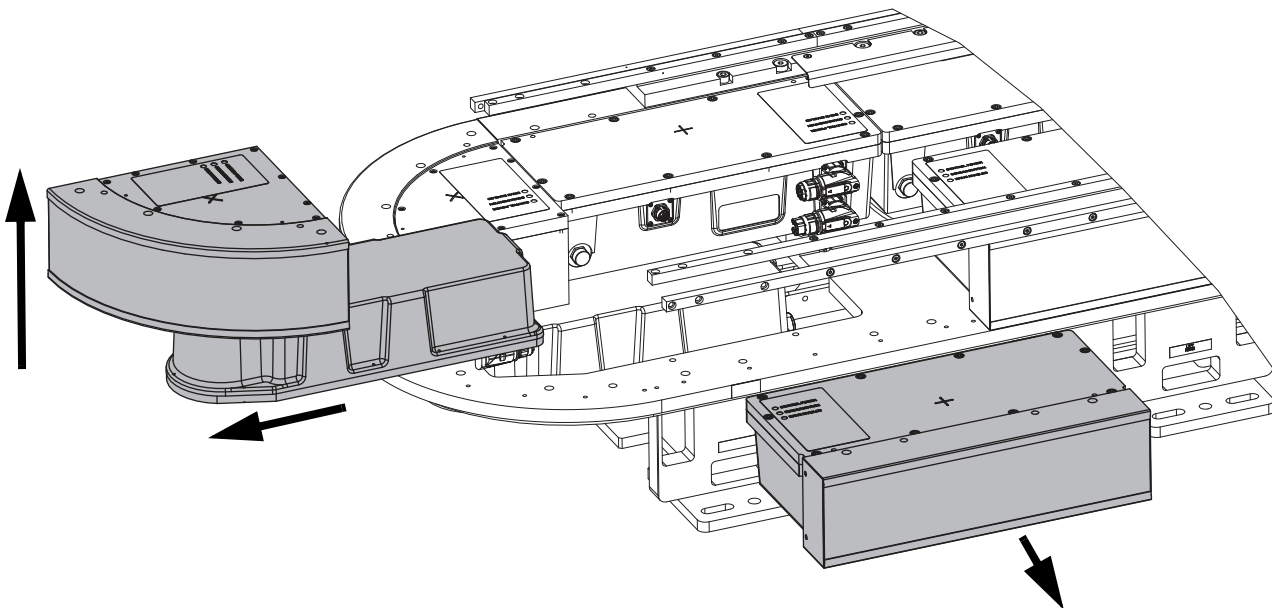
9. Remove the adjacent straight motor module.
10. Move the curved motor module towards the end of the track about 25.4 mm (1 in.) and lift straight up and out.



**ATTENTION:** The motor modules can weigh up to approximately 29 kg (64 lb). Be sure to use a two man lift when moving the motor module.



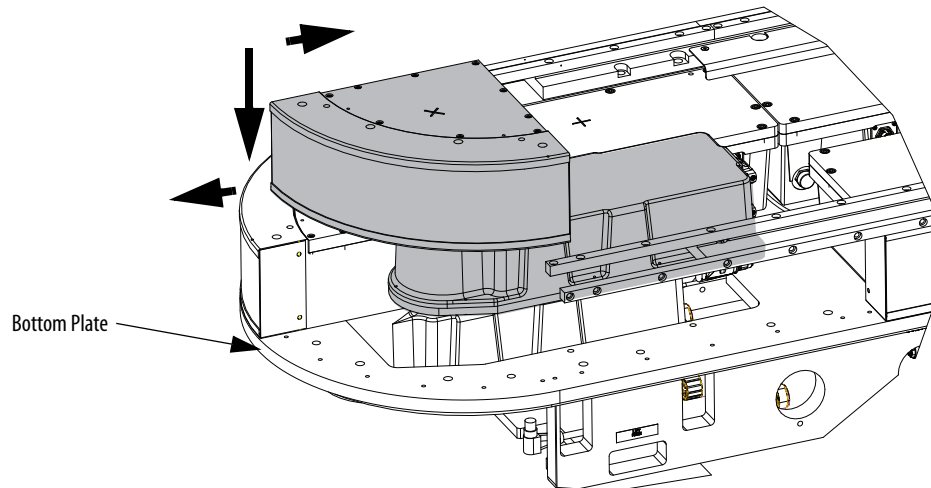
**ATTENTION:** You are exposed to pinch points between base plate and motor module when removing and installing the curved motor module.



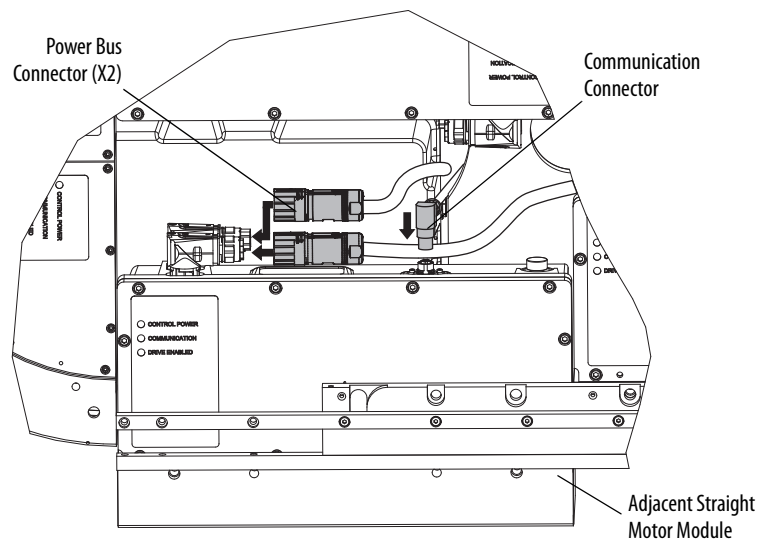
To install replacement curved module, complete these steps.

1. Clean base and curved top plates.
2. Clean all screws and apply Loctite 243.
3. Place the replacement curved motor module into its final position.

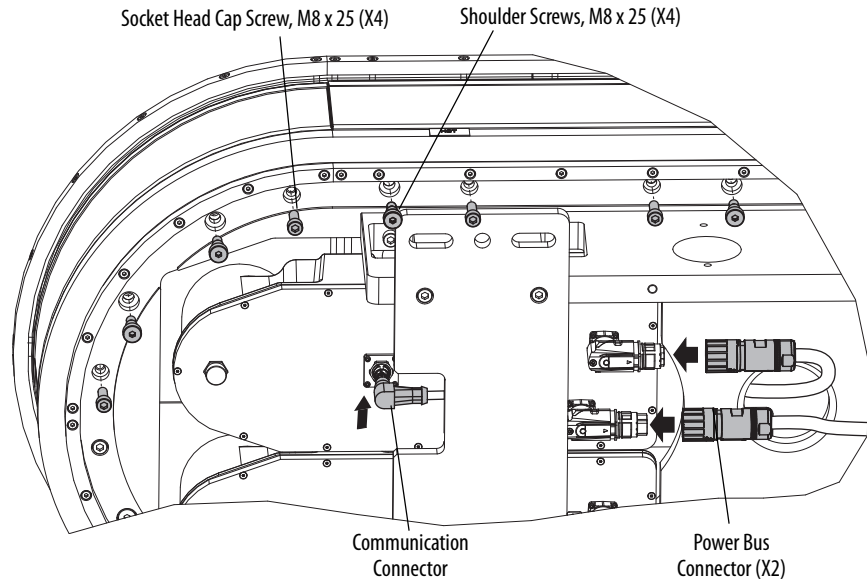
To place the curved motor module, position the module about 25 mm (1 in.) past the edge of the bottom plate, then slide back into position.



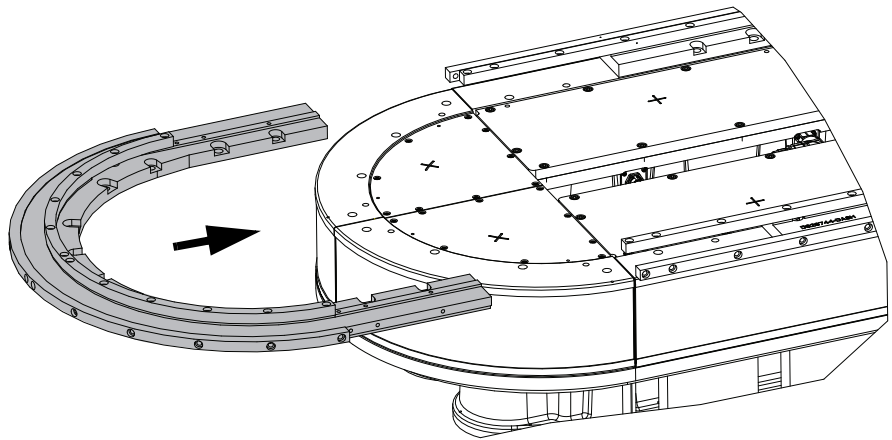
4. Slide straight motor module more than half way into position and connect the communication and power bus connectors, then slide into final position.



5. From the bottom of the track, attach the curved and straight motor modules to the base plate. Torque shoulder screws to 13 N•m (9.6 lb•ft) and torque M8 socket head cap screws to 22 N•m (16.2 lb•ft).
6. Connect the curved motor communication and power bus connectors.

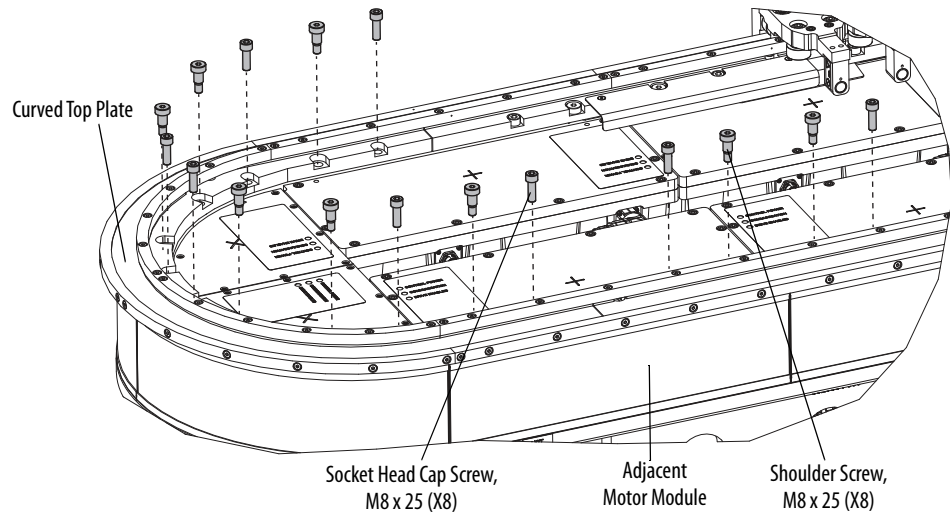


7. Slide into place the top curved plate and rail assembly.

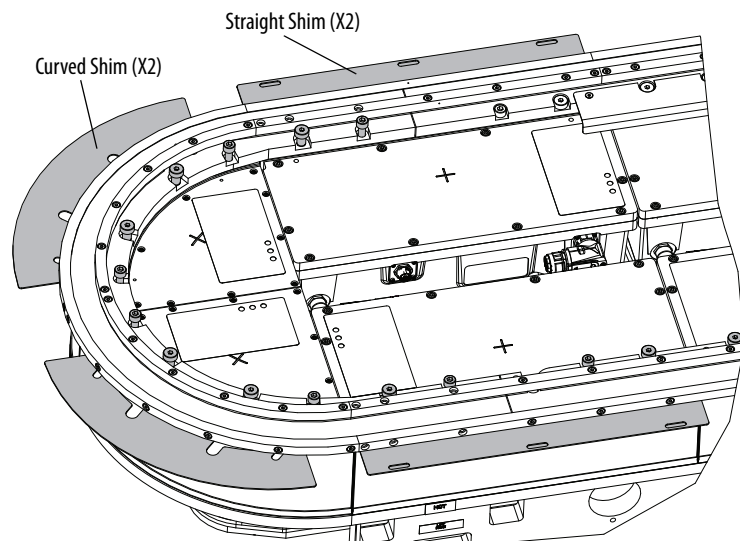


8. Loosely attach the all top plate shoulder screws and socket head cap screws.

The loosely placed screws assist with the alignment of the shims.

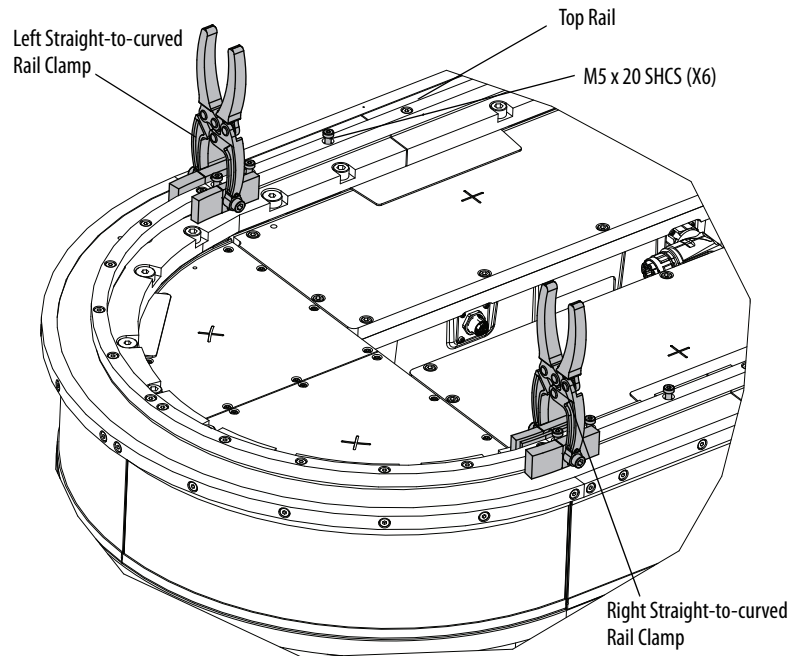


9. Slide the shims into place until they are flush with the motor modules.

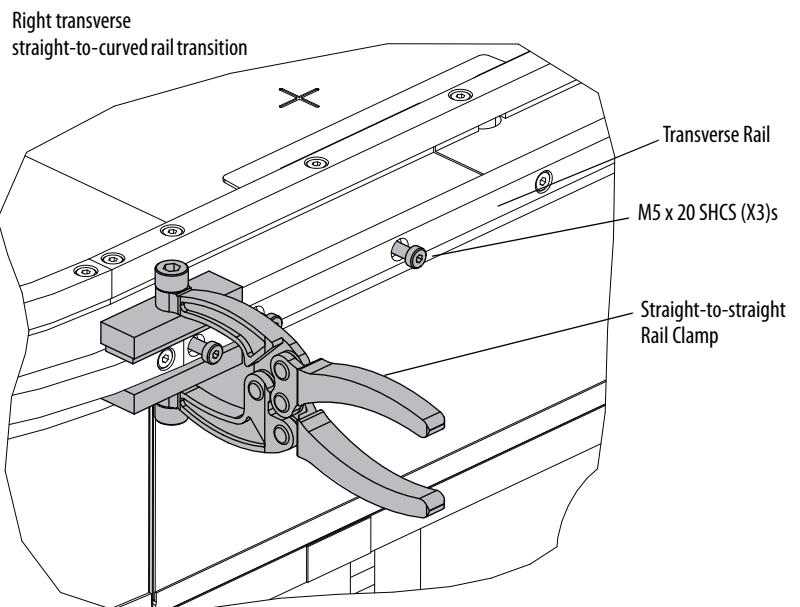


10. Torque shoulder screws to 13 N•m (9.6 lb•ft) and M8 socket head cap screws to 22 N•m (16.2 lb•ft).

11. Apply the left and right straight-to-curved rail clamp to the top rail as shown.



12. Install three M5 x 20 socket head cap screws and torque to 9 N•m (6.6 lb•ft).
13. Repeat steps 11 and 12 to the bottom rail.
14. Apply a straight-to-straight rail clamp to the left and right transverse straight-to-curved rail transitions.
15. Install three M5 x 20 socket head cap screw at each transition and torque to 9 N•m (6.6 lb•ft).



16. Update motor module firmware, see [Update Motor Module Firmware on page 99](#).

## Replace Mover Cam-follower Wheels and Flexures

Use this procedure to replace the cam-follower wheels and flexures on a mover.

### *Before You Begin*



**ATTENTION:** Before attempting any service to an iTRAK system. See [Safety Information on page 28](#).

---

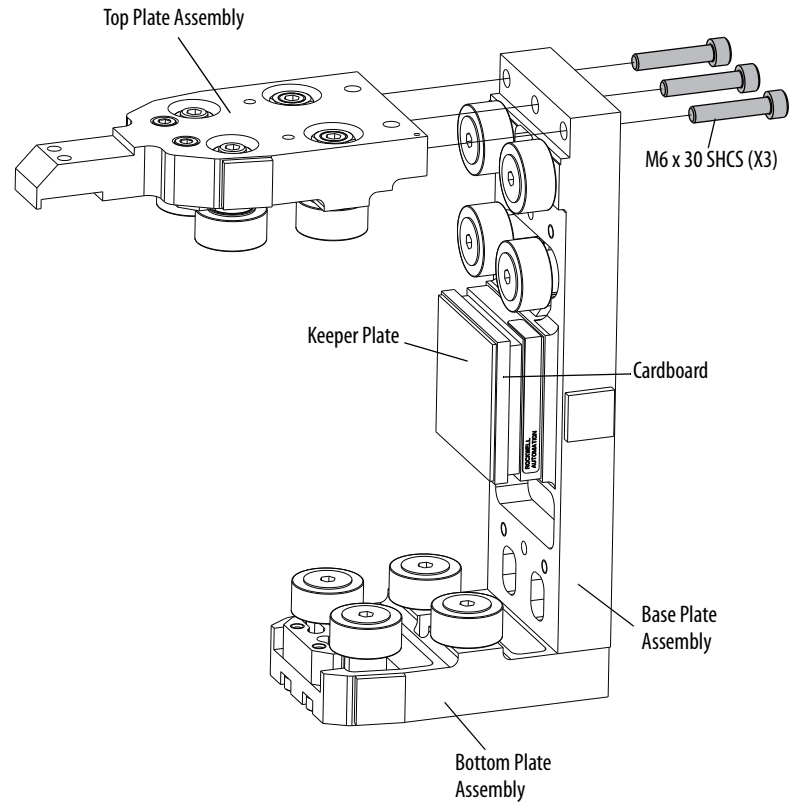
### *What You Need*

- 3 mm, 5 mm, and 6 mm hex drivers
- 14 mm socket driver and wrench
- Vise
- Arbor press or similar
- Hard rubber mallet
- Loctite 243
- 2198T-A05 iTRAK TriMax wheel preload tool
- 2198T-AV-WHL-Cx iTRAK TriMax wheel spare kit
- 2198T-AV-FLX-Cx iTRAK TriMax flexure spare kit
- Small rod 9 mm (0.35 in.) in diameter
- Flat metal plate approximately 50 x 50 mm (2.0 x 2.0 in.)

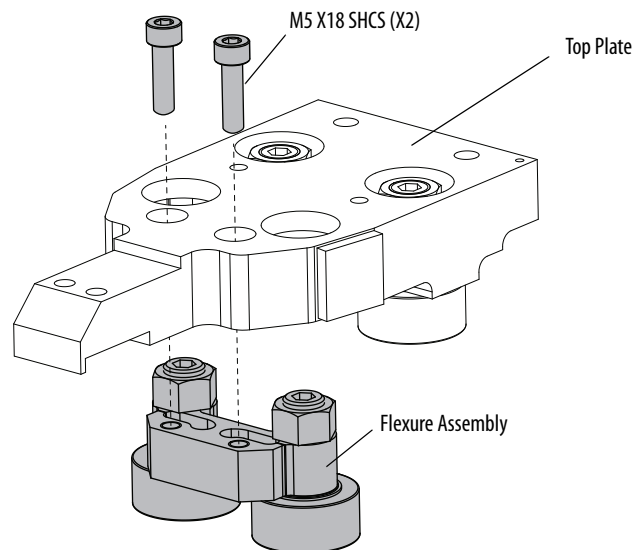
To remove the cam followers, complete these steps.

1. Follow [Install or Replace a Mover on page 66](#) to remove the mover from the track.
2. Cover the magnet plate with cardboard and a magnet keeper plate. See [Magnet Plate Keeper on page 34](#) for details.

3. Remove the top plate from the middle plate.



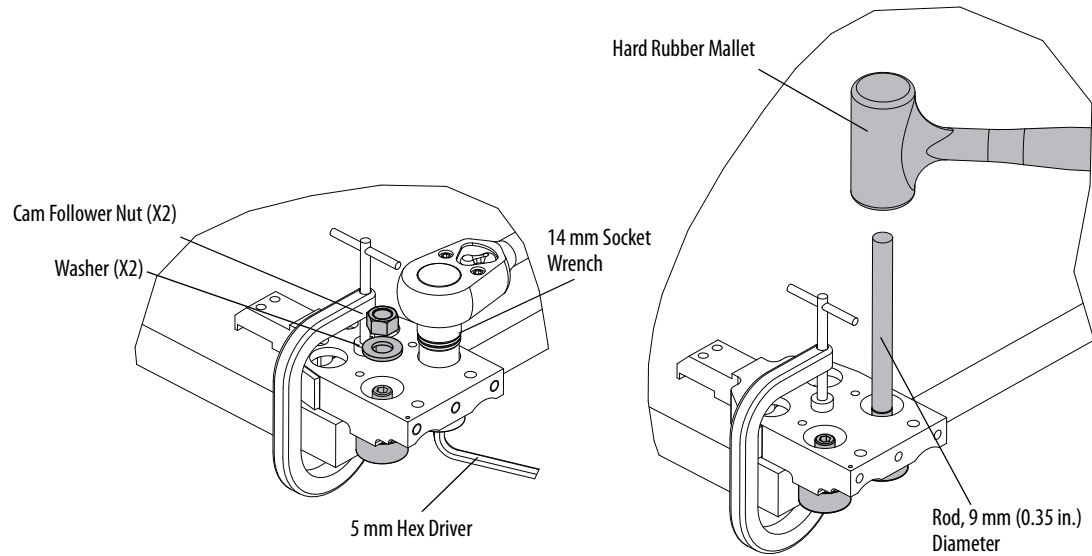
4. Remove the flexure assembly from the top plate.



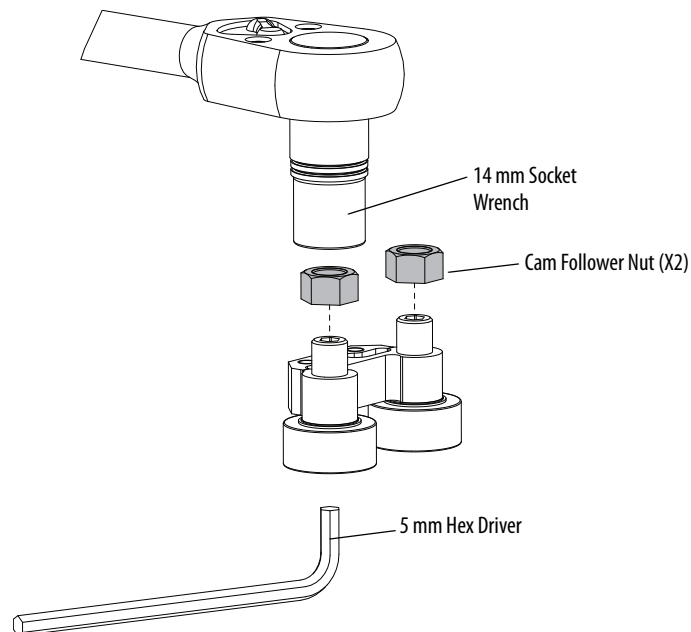
5. Clamp the top plate to a sturdy surface.
6. To remove the fixed cam follower nuts, use 14 mm socket wrench.  
To help prevent the cam follower shafts from turning, use a 5 mm hex driver on the opposite side.



7. Remove the washers.
8. To separate the cam followers from the top plate, tap the cam followers by using a hard rubber mallet and a small rod with a minimum of 9 mm (0.35 in.) in diameter.

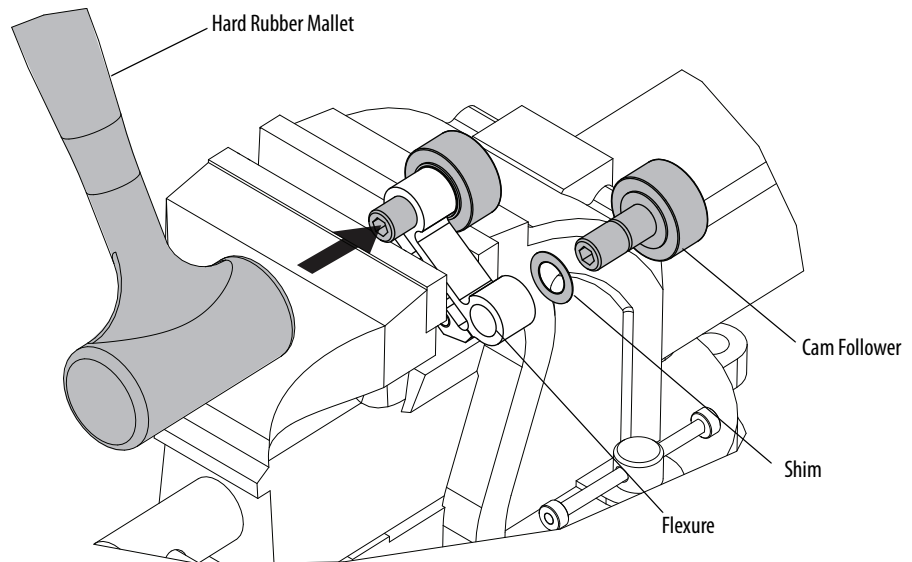


9. To remove the flexure cam-follower nuts, use 14 mm socket wrench. To help prevent the cam follower shafts from turning, use a 5 mm hex driver on the opposite side.



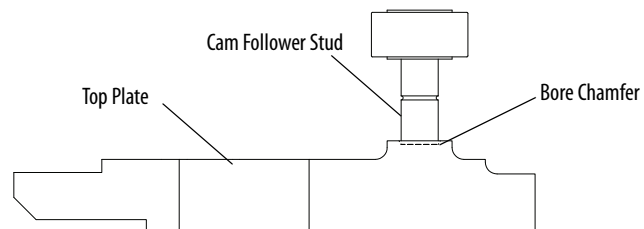
10. Place the flexure in a vise as shown.

11. To separate the cam followers and the shims from the flexure, use a hard rubber mallet to tap out the cam follower.

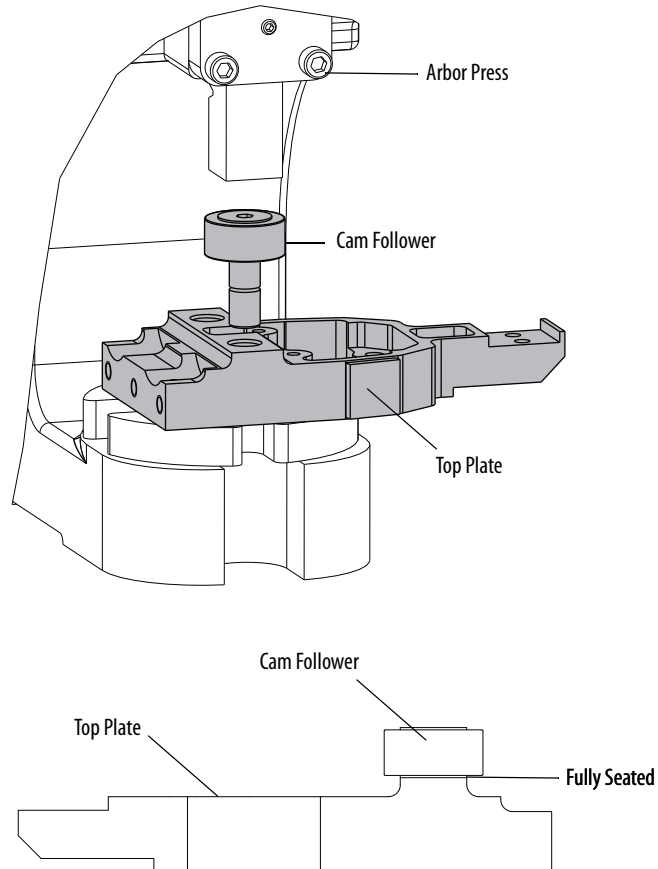


12. Position new cam follower stud into bore and engage with the fixed cam-follower bore chamfer.

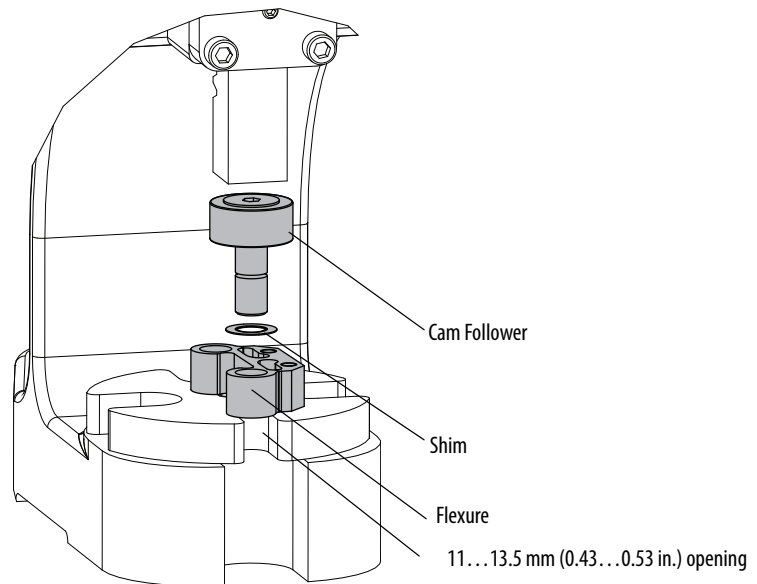
Make sure that stud is not cocked in relation to support surface.



13. By using an arbor press or similar, press head of cam follower stud until the stud side end cap is seated on the mover plate.

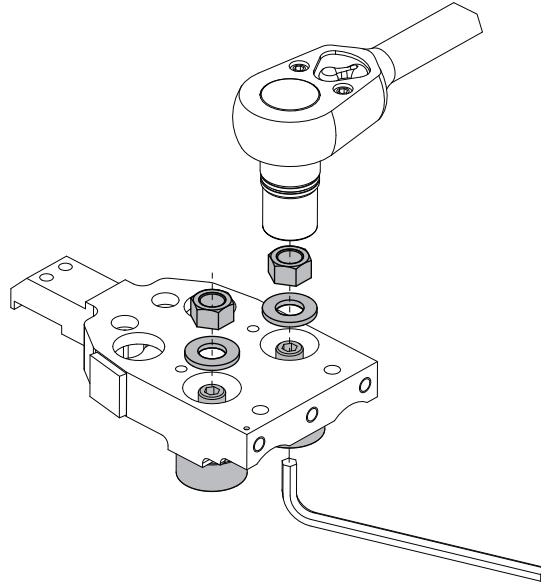


14. Position flexure on arbor press support plate and align to an 11...13.5 mm (0.43...0.53 in.) opening.



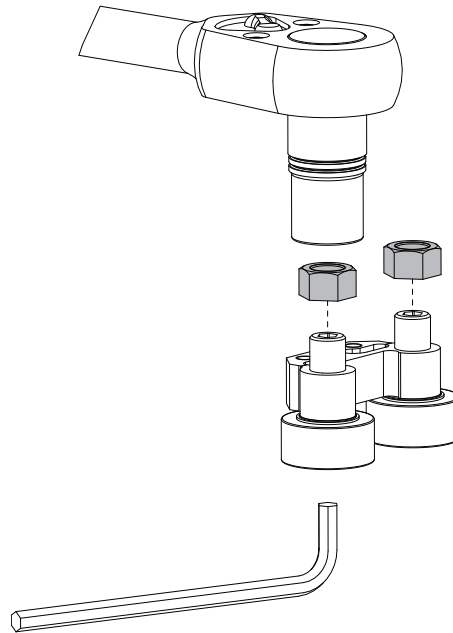
15. Place the washers over the fixed cam studs.
16. Apply fresh Loctite 243 and attach the nut to the fixed cam followers by using a 14 mm socket head driver.

Help prevent the cam follower from turning by using a 5 mm hex driver.

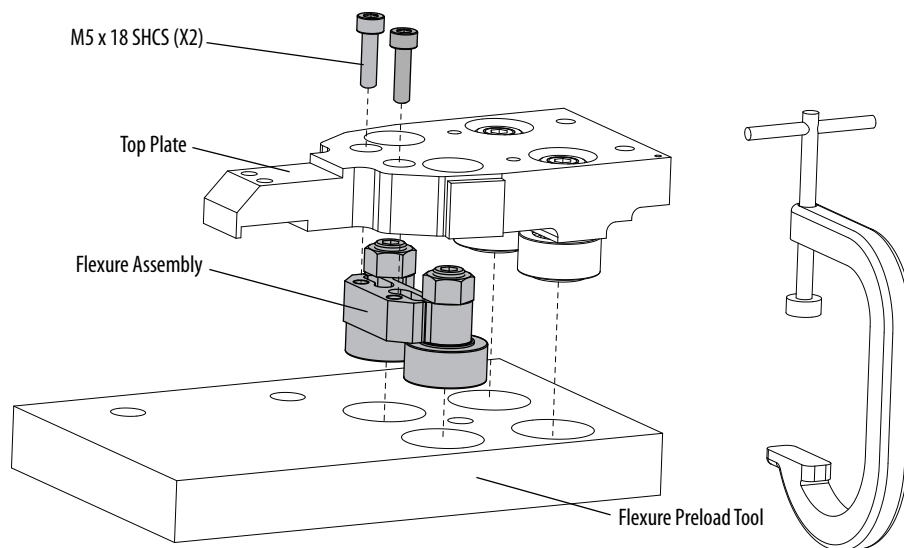


17. Apply fresh Loctite 243 to the flexure cam follower threads.
18. Attach the nuts to the flexure cam followers by using a 14 mm socket head driver and torque to 16 N•m (11.8 lb•ft).

Help prevent the cam follower from turning by using a 5 mm hex driver.



19. Place the flexure assembly and the top plate in the flexure preload tool as shown and clamp together.
20. Clean the two M5 x 18 socket head cap screws and apply fresh Loctite 243.
21. Attach the flexure assembly to the top plate with M5 x 18 socket head cap screws and torque to 9 N•m (6.6 lb•ft).



22. Repeat steps 4...21 for the middle and bottom plate cams.

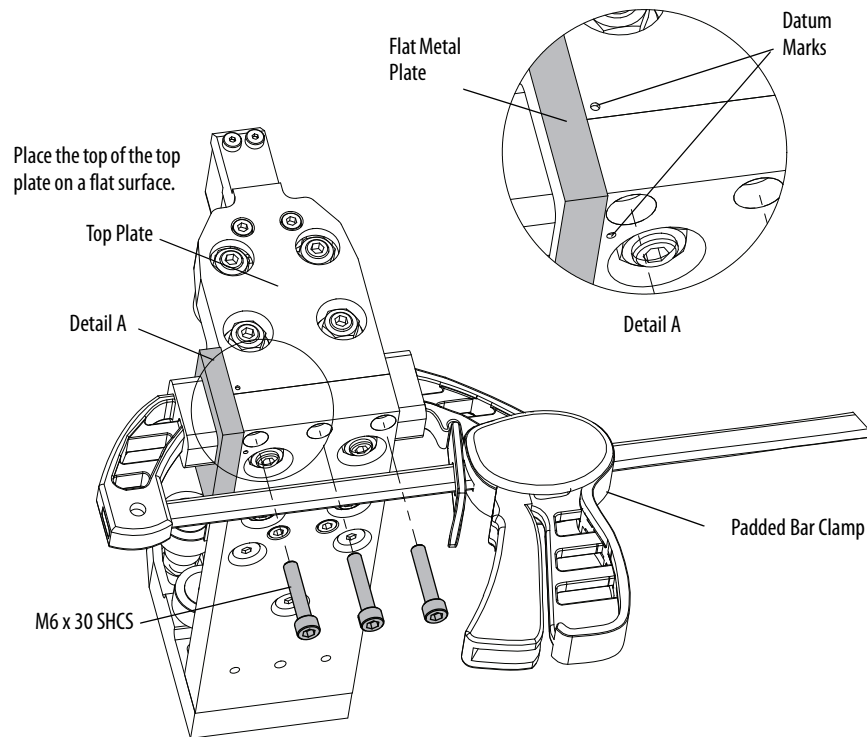
There is no need to separate the middle plate from the bottom plate to follow this procedure for these cams.



**ATTENTION:** Take care working near the magnet plate with the keeper. It can still have some attractive force.

23. Clean the M6 x 30 socket head cap screws and apply fresh Loctite 243.
24. Align the datum marks on the top plate and middle plate as shown.
25. Attach the top plate to the middle plate by using the M6 x 30 socket head cap screws, but do not tighten.
26. Place the top of the top plate on a flat surface and clamp the assemblies together by using a padded bar clamp.

27. Torque the M6 x 30 socket head cap screws to 16 N•m (11.8 lb•ft).



28. Remove the magnet keeper and cardboard.
29. Follow [Install or Replace a Mover on page 66](#) to install the mover on the track.

## Install Top and Bottom Straight Rails

Use this procedure to install top and bottom straight rails.

*Before You Begin*

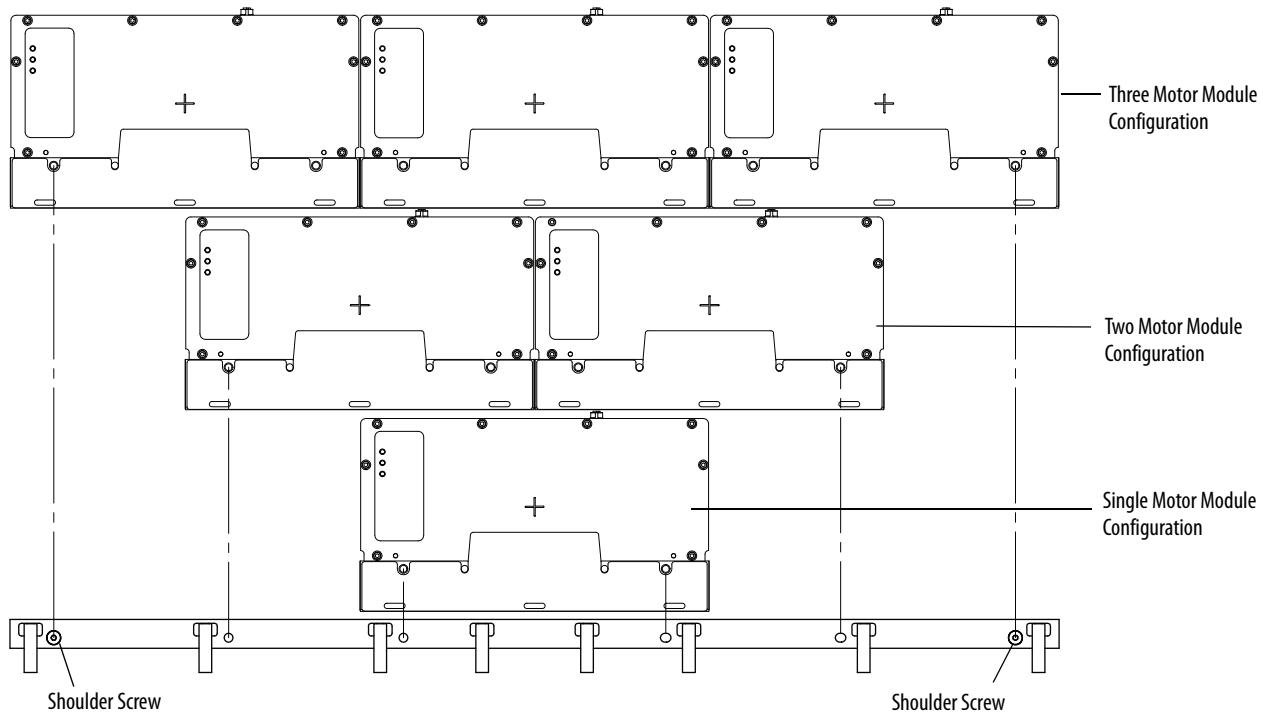


**ATTENTION:** Before attempting any service to an iTRAK system. See [Safety Information on page 28](#).

The straightening bar can be used with the track motor modules in any of three configurations that are shown in [Figure 29](#).

**Figure 29 - Straightening Bar Configurations**

The track top plate is not shown for clarity.



The straightening bar tool holes corresponded to the motor module shoulder-screw holes. Shoulder screws that are shown here are for three motor module configuration.

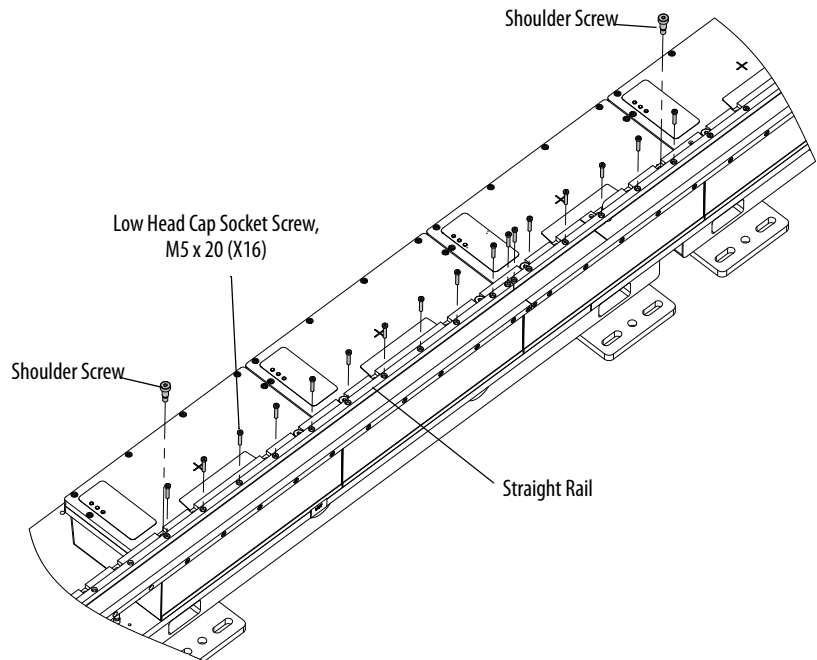
### *What You Need*

- M5 x 0.8 x 20 mm low head socket cap screws, as required
- A straight rail segment
- 3 mm, 4 mm, and 5 mm hex drivers
- Loctite 243
- 2198T-A06 iTRAK TriMax rail straightening tool

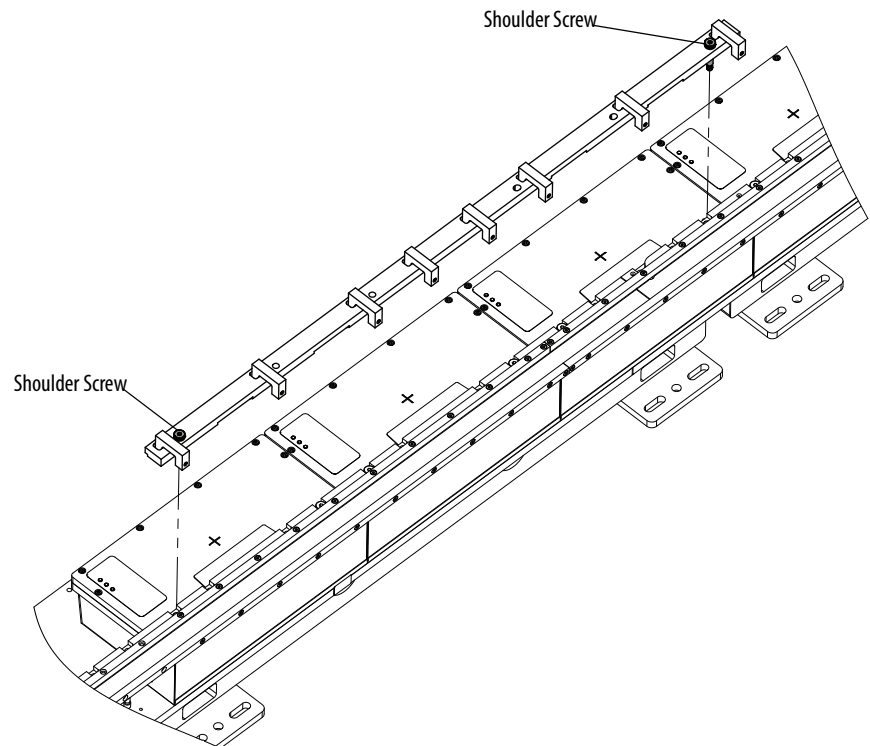
To install a top or bottom rail complete these steps.

1. Choose the rail configuration that you would like to install from [Figure 29](#).
2. Apply Loctite 243 to the M5 x 0.8 x 20 mm LHCS rail screws, as required.
3. Place straight rail loosely into position.
4. Lightly install rail screws, do not tighten.

5. Remove motor shoulder screws that correspond to the straightening bar left and right holes, the three module configuration is shown here.



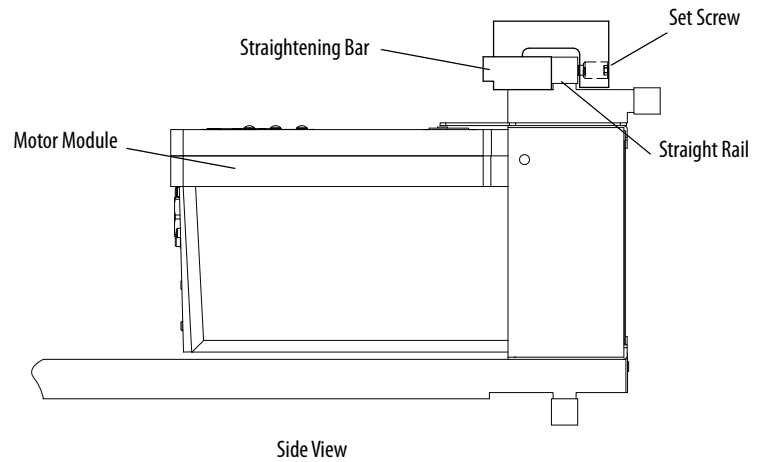
6. Mount the straightening bar on the track by using two shoulder screws.



7. To straighten and locate the rail, evenly tighten all straightening bar set screws, then torque to 13 N•m (9.6 lb-ft).

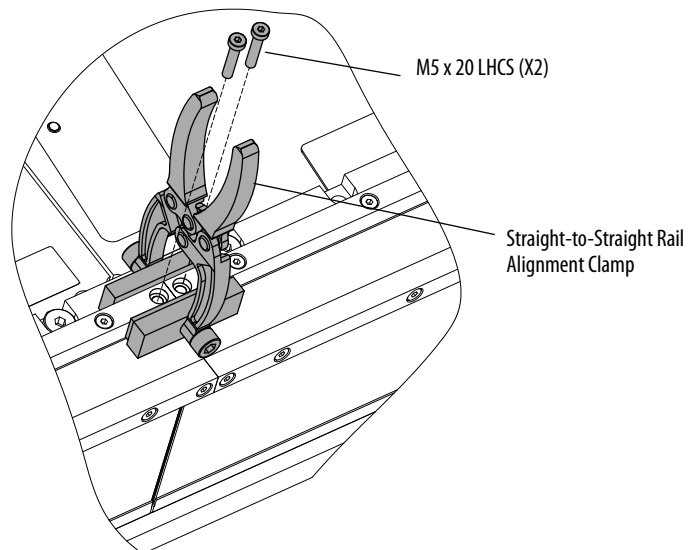


8. Torque all M5 x 20 LHCS rail screws to 9 N•m (6.6 lb•ft) except the right and left most screw.



9. Loosen the straightening bar set screws and remove the shoulder screw that is used to hold the straightening bar.
10. Remove straightening bar.
11. Clean and apply fresh Loctite 243 to the shoulder screw.
12. Reinstall shoulder screw for the motor modules and torque to 13 N•m (9.6 lb•ft).
13. Repeat steps 3...13 for additional straight rails.
14. Clamp the two adjacent-straight rails using tool straight-to-straight rail alignment clamp, as shown.

The clamp aligns bearing surfaces.



15. Tighten two M5 x 20 LHCS and torque to 9 N•m (6.6 lb•ft).

## Install Transverse Straight Rails

Use this procedure to install transverse straight rails.

### Before You Begin



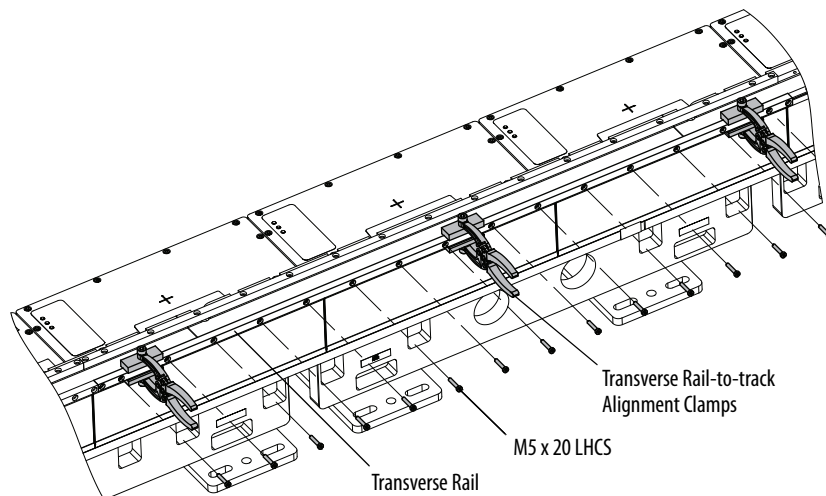
**ATTENTION:** Before attempting any service to an iTRAK system. See [Safety Information on page 28](#).

### What You Need

- M5 x 0.8 x 20 mm low head socket cap screws, as required
- A straight rail segment
- 4 mm hex driver
- Loctite 243
- Three transverse rail-to-track alignment clamps, from the 2198T-A04 iTRAK TriMax rail aligning tool kit

To install a transverse straight rail, complete these steps.

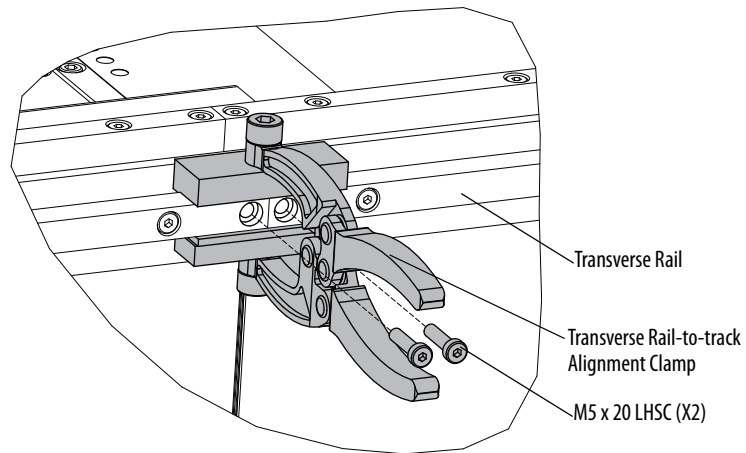
1. Clamp transverse rail to top plate by using three transverse rail-to-track alignment clamps as shown.
2. Check that the rail end faces are flush with adjacent rails.



3. Apply Loctite 243 to the M5 x 0.8 x 20 mm LHCS rail screws, as required.
4. Install M5 x 20 low-head socket cap screws from left to right and torque to 9 N•m (6.6 lb•ft).  
Do not install left most screw.
5. After each sets of three screws are installed, move left most clamp to the next set of three screws. Do not install right most screw.
6. If addition straight transverse rails are to be installed, repeat steps [1...5](#).

If multiple straight transverse rails were installed continue with the next step, otherwise go to [Install Curved Transverse Rail on page 94](#).

7. Place transverse rail-to-track alignment clamps at the joint where the transverse rail ends meet, as shown here.



8. Install M5 x 20 low-head socket cap screws to the ends of the rails and torque to 9 N•m (6.6 lb•ft).

## Replace or Install Top and Bottom Straight Bearing Rail with Lubrication Port

Use this procedure to replace or install top and bottom straight bearing rail with lubrication port.

### *Before You Begin*



**ATTENTION:** Before attempting any service to an iTRAK system. See [Safety Information on page 28](#).

### *What You Need*

- M5 x 0.8 x 20 mm low head socket cap screws, as required
- A straight bearing rail with lubrication port
- 2.5 mm, 3 mm hex drivers
- Loctite 243
- Straight-to-straight rail alignment clamp from the 2198T-A04 iTRAK TriMax rail aligning tool kit

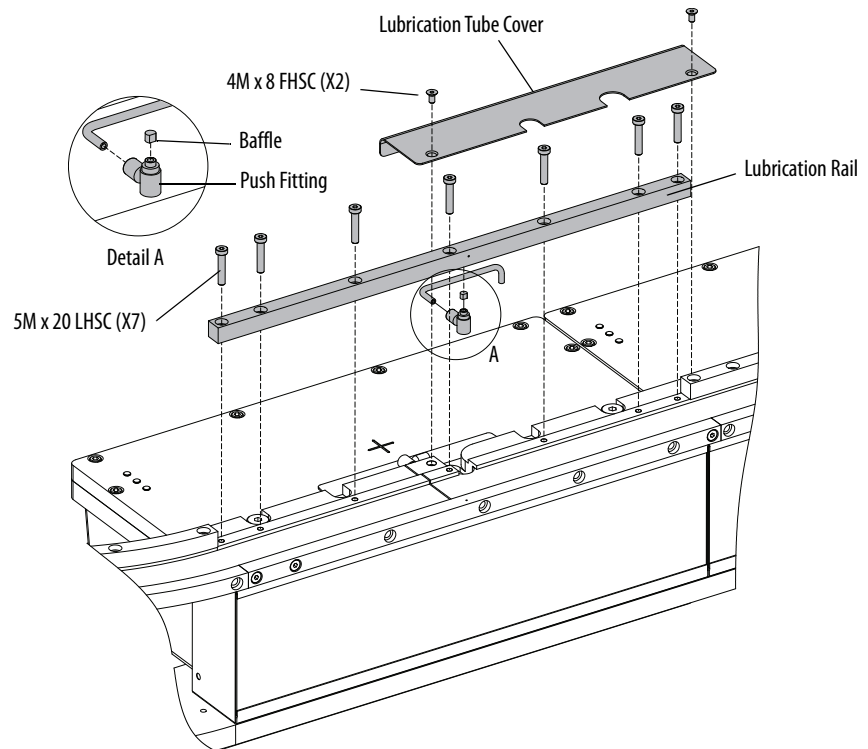
To remove a used lubrication rail, complete these steps.

1. Remove 4M x 8 flat head socket cap screws that secure the lubrication tube cover and remove lubrication tube cover. Push the rim of the quick release and remove the tubing from the fitting.

2. Remove the M5 x 0.8 x 20 mm low head socket cap screws that secure the lubrication rail to the track plate and remove the lubrication rail.
3. Remove the push fitting from lubrication rail by using a spanner wrench.
4. Remove the baffle from lubrication rail threaded hole.

To install a lubrication rail, complete these steps.

1. Install baffle into rail tapped hole, orient baffle with the flat side such that it faces the outside of the rail as shown.



2. Install the push fitting into the lubrication rail by using a spanner wrench.
3. Push the lubrication tube into quick release of the push fitting.
4. Install new rail by following the procedure [Install Top and Bottom Straight Rails on page 87](#).
5. Install lubrication cover with two M4 x 8 mm screws and torque to 4.5 N•m (3.32 lb•ft).

## Install Curved Transverse Rail

Use this procedure to install transverse curved rails.

### Before You Begin

Install transverse straight rails before you install the transverse curved rails.



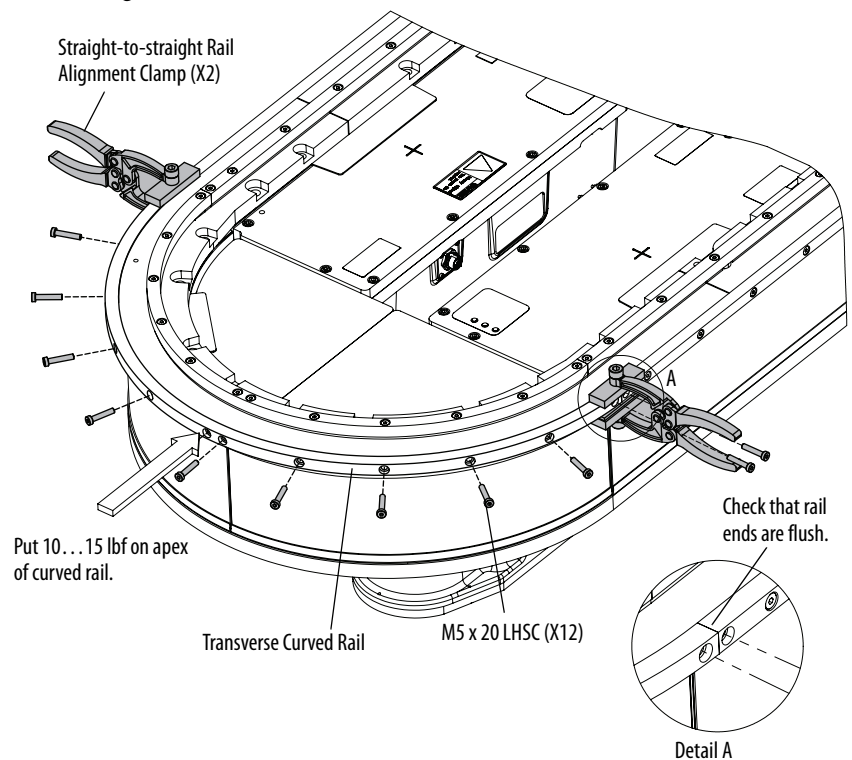
**ATTENTION:** Before attempting any service to an iTRAK system. See [Safety Information on page 28](#).

### What You Need

- M5 x 0.8 x 20 mm low head socket cap screw (X12)
- A transverse curved rail segment
- 4 mm hex driver
- Loctite 243
- Two straight-to-straight rail alignment clamps, from the 2198T-A04 iTRAK TriMax rail aligning tool kit

To install a transverse rail, complete these steps.

1. Loosen the two straight rail end screws that are next to curve.
2. Place curved rail in position.
3. Push apex of curved rail with 10...15 lbf so that rail faces are flush with straight rails, see detail A.



4. Maintain push force on apex and apply the straight-to-straight rail alignment clamp to the curve to straight joints.
5. Apply Loctite 243 to the M5 x 0.8 x 20 mm LHCS rail screws, as required.
6. Install the M5 x 20 mm low head socket cap screws and torque to 9 N•m (6.6 lb•ft).  
Start at the apex and work toward the rail ends and alternate sides.
7. Tighten the two straight rail M5 x 20 mm low head socket cap screws and torque to 9 N•m (6.6 lb•ft).
8. Release push force and clamp tools.

## Install a Top or Bottom Radial Curved Rail

Use this procedure to install a top or bottom radial curved rail.

### *Before You Begin*

Install top or bottom straight rails before you install the radial curved rails.



**ATTENTION:** Before attempting any service to an iTRAK system. See [Safety Information on page 28](#).

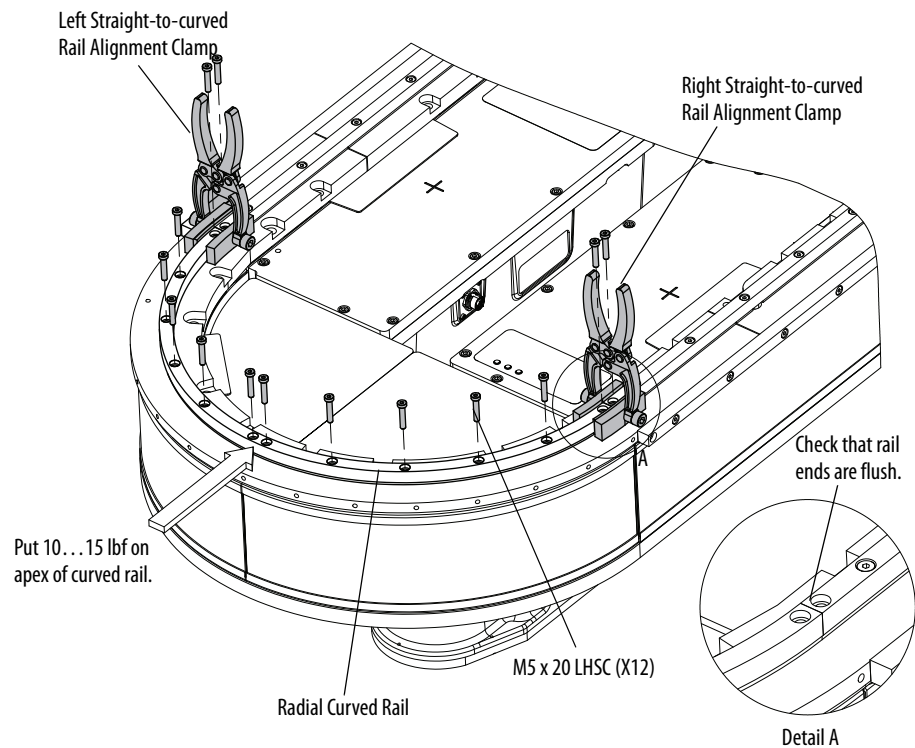
### *What You Need*

- M5 x 0.8 x 20 mm low head socket cap screw (X12)
- A radial curved rail segment
- 4 mm hex driver
- Loctite 243
- The straight-to-curved rail alignment clamp, from the 2198T-A04 iTRAK TriMax rail aligning tool kit

To install a top or bottom radial curved rail, complete these steps.

1. Loosen the two straight rail end screws that are next to curve.
2. Place radial curved rail in position.

3. Push apex of curved rail with 44...66 N(10.0...15.0 lbf) so that rail faces are flush with straight rails, see detail A.



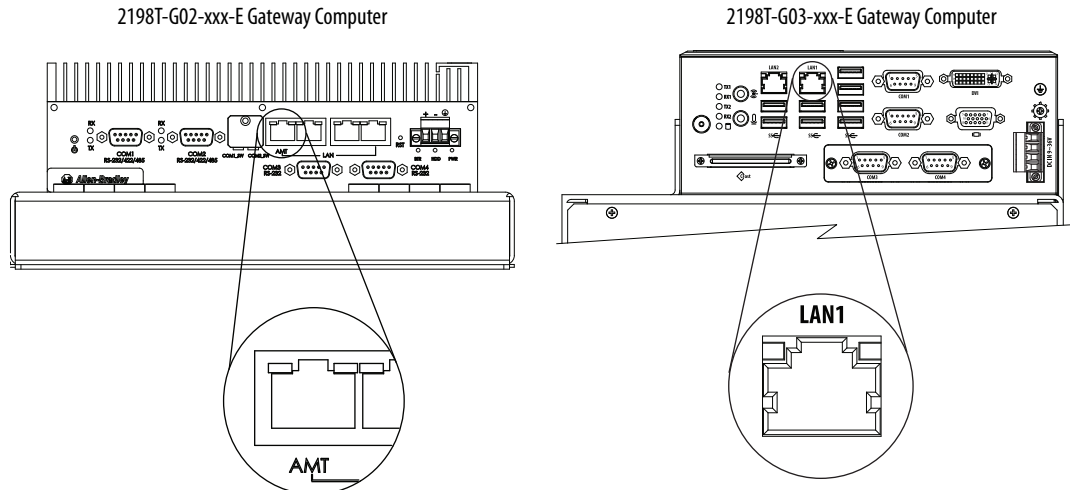
4. Maintain push force on apex and apply the left and right straight-to-curved rail alignment clamp to the ends of the curve-to-straight joints.
5. Apply Loctite 243 to the M5 x 20 mm LHCS rail screws, as required.
6. Install the M5 x 20 mm low head socket cap screws and torque to 9 N•m (6.6 lb•ft).  
Start at the apex and work toward the rail ends and alternate sides.
7. Tighten the straight rail M5 x 20 mm low head socket cap screws and torque to 9 N•m (6.6 lb•ft).
8. Release push force and clamp tools.

## Update Gateway Firmware

To update the firmware by using iTFlash, complete these steps.

1. Download the appropriate revisions of iTFlash from the [Rockwell Automation Product Compatibility and Download Center](#).
2. Make sure that your computer is connected to the gateway computer with an Ethernet cable.

Connect to the Ethernet port that is marked AMT on a 2198T-G02-xxx-E gateway computer, and LAN1 on a 2198TG03-xxx-E gateway computer.

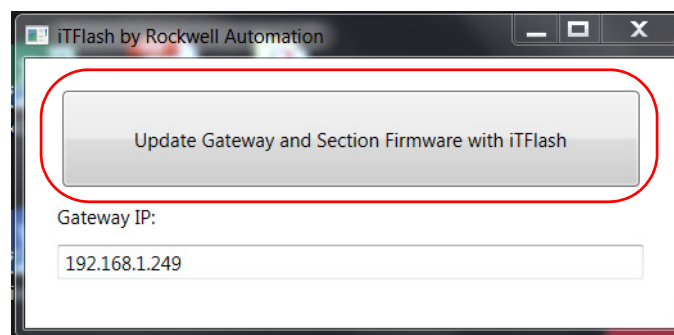


**TIP** You can validate that communications are properly established by pinging the gateway at its base IP address, typically 192.168.1.249.

3. Run iTFlash.exe on the computer.

**TIP** You can see a limited number of command prompt windows display briefly, then disappear. If a command prompt window asks for a Host Key stays displayed, answer y or yes to any security questions.

4. From the dialog box, change the base IP address if needed, and click Update Gateway and Section Firmware with iTFlash.



The software copies files to the system over the network. It can take up to ten minutes.



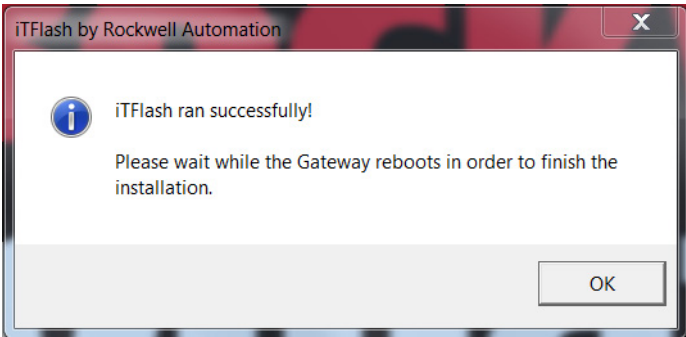
**TIP** If the dialog box has not appeared within 5 minutes of running iTFlash.exe, see the [Firmware Update Troubleshooting](#) section.



**ATTENTION:** Do not remove power during the process. If you remove power, you risk permanently damaging the motor module.

- 5. If you are changing to revision 1.099 or earlier, when the iTFlash Success dialog box is displayed, wait at least 1 minute, and cycle power on the gateway to restart it.

In revisions greater than 1.099, the gateway automatically restarts itself.



**TIP** If the iTFlash failed dialog box comes up, see the [Firmware Update Troubleshooting](#) section.

- 6. Wait the operating system (OS) and gateway to restart.

Gateway Cat. No.	No. OS Restarts	No. Gateway Restarts	Total Restart Time (m)
2198T-Gx1-xxx-E	2	1	15
2198T-Gx2-xxx-E	2	1	10

- 7. See iTRAK System Programming Manual, publication [2198T-PM001](#), for detail on Logix Designer application project file changes associated with firmware revisions.

## Firmware Update Troubleshooting

In some rare cases when iTFlash has been previously executed, extra steps can be required to complete the installation. If the operation failed, complete these steps.

1. Execute the iTFlash.exe file from a Command Prompt window.
2. Note the names of the files that the Command Prompt window indicates that they exist.
3. Find the location of the listed files on your system, and navigate to the enclosing directory.
4. Delete the enclosing directory and all of its contents.
5. Rerun the iTFlash.exe file. If a problem persists, contact Rockwell Automation Technical support at [ICTSupport@ra.rockwell.com](mailto:ICTSupport@ra.rockwell.com).

## Downgrade Firmware

If the currently installed firmware revision is revision 1.101, contact Rockwell Automation Technical support at [ICTSupport@ra.rockwell.com](mailto:ICTSupport@ra.rockwell.com). All other firmware revisions use the standard updating process to downgrade firmware.

## Update Motor Module Firmware

To update the firmware of a newly installed motor module, complete these steps.

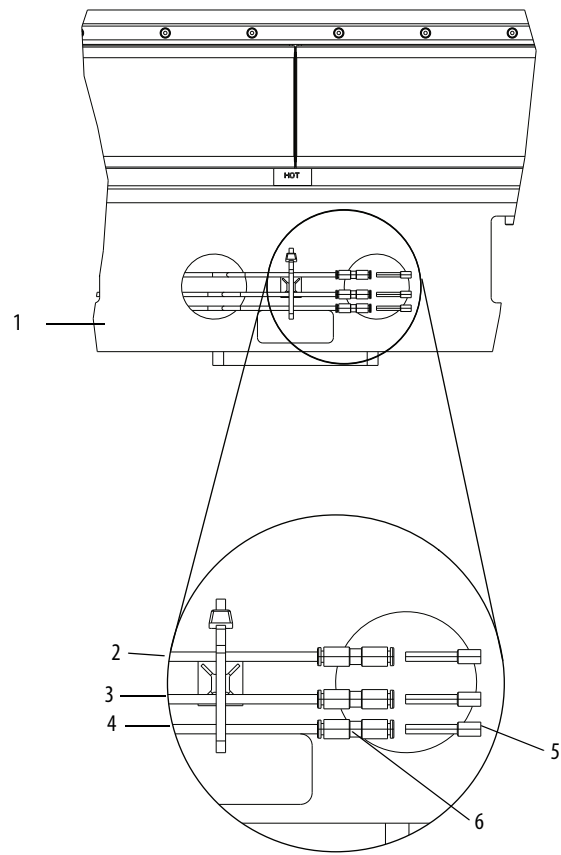
1. Disconnect the communication cable to the new motor module.
2. Power on the gateway.
3. To update all existing motor modules to 2198T-VTxx05-A firmware, toggle `Cmd.FlashSections50mm`.
4. Power down the gateway.
5. Plug in the communication cable for the new motor module.
6. Power on the gateway.
7. Toggle `Cmd.FlashSectionsxxxxmm` that correspond to the mover type you have. There are three types of movers:
  - 2198T-VTxx05-x
  - 2198T-VTxx10-x
  - 2198T-VTxx15-x

For troubleshooting, see Knowledgebase Article [600812](#).

# Lubrication

The bearings are an open system that requires continuous lubrication. To avoid breakdown of the lubrication, the bearings must have a film of oil on them. Typically indications of breakdown are discoloration and excessive wear on the inner and outer bearing surfaces. The interval to resupply the lubrication 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 bearing rails.

To provide continuous lubrication, we recommend that you use the iTRAK Lubrication System, catalog number 2198T-AL-SYS, installation instructions that start on [page 35](#). If you design and supply your own oil bleed system, you can use these installation instructions for guidance. The iTRAK system comes equipped tubing that is connected to the bleed points on the bearing rail.



Items	Description
1	Spine bar
2	Top rail lubrication tube
3	Transverse rail lubrication tube
4	Bottom rail lubrication tube
5	Plug
6	Straight push-to-connect tube connector

## Initial Lubrication

During first-time start or when rails have been cleaned, complete these steps.

1. Run system at 0.5 m/s mover velocity.
2. Pump at 0.7 cc (0.024 oz) increments every 10 minutes until the furthest rail section from the pump has become lubricated.

**TIP** The film of oil is thin and can be hard to see. Wipe the rail section that contacts the mover roller with a finger; you want to see a small amount of lubricant.

It is normal for some of the oil to become black, but you must not see signs of rusting or burnt grease, which is a sign of missing lubrication.

## Normal Operation Lubrication

Lubrication amounts and frequency during normal operation depend on many factors including length of track, number of movers, application motion profile, cleanliness of the operating environment and other factors. [Table 21](#) is a rough guideline that must be adjusted for each application to strike a balance between a thin film of oil on the rail contact surfaces and over lubrication that causes excess oil splatter. TriMax bearing system has three rails for each system. The values that are shown here are for each rail.

**Table 21 - Lubrication Examples**

System Length mm (ft)	Pump Volume cc (oz)	Time Interval in Hours
800...1200 (2.6...3.9)	0.10 (0.003)	4 hours
1200...2400 (7.9...7.9)	0.15 (0.005)	
2400...3200 (7.9...10.5)	0.20 (0.068)	
3200...5200 (10.49...17.1)	0.30 (0.010)	
5200...6400 (17.1...21.0)	0.35 (0.012)	
6400...10000 (21.0...32.8)	0.50 (0.017)	

The values in [Table 21](#) are guidelines only; monitor the rails every few hours until a quantity and frequency can be established for the current application. It is best to have a higher frequency with lower amounts of oil dispense to allow the oil to coat the rails evenly.

## Notes:

## Troubleshooting

Use the system reported errors in this section to diagnose iTRAK® system problems.

Topic	Page
Errors Codes	103

### Errors Codes

The iTRAK system can generate errors from the gateway or from the motor modules. The error codes are pushed from those devices to tags in the control structure. These error codes are in addition the Logix Designer application generated codes. Error codes from the motor module are displayed in iTRAK\_Control.Status tag.

The codes are created from the following tags.

**Table 22 - Error Code Tags**

Tag	Description
iTRAK_Control.Status.GatewayFaultCode	This tag contains the error codes from the gateway. In <a href="#">Table 23</a> it is referred to as the Gateway Code.
iTRAK_Control.Status.SectionFaultCode	This tag contains the error codes from the motor module. In <a href="#">Table 23</a> it is referred to as the Device Code.
iTRAK_Control.Status.FaultMessageLine1	This tag contains the first line of displayed text in the error code description.
iTRAK_Control.Status.FaultMessageLine2	This tag contains the second line of displayed text in the error code description.
iTRAK_Control.Status.SectionNumberFaulted	This tag indicates the motor module that failed.
iTRAK_Control.Status.SectionDeviceFaulted	This tag indicates if a motor module error is power-related or position related. 0 - position-related 1 - power-related
iTRAK_Control.Status.SectionFaultData	Helpful data to troubleshoot the error.

The error codes are described in [Table 23](#).

Table 23 - iTRAK System Error Codes

iTRAK_Control.Status. GatewayFaultCode	iTRAK_Control.Status. SectionFaultCode	Displayed Text	Description and Solution
3	20	ERR_VOLTS_LO: Section voltage is too low or off. Check Power Supply, Power Cables, Power Supply IO, etc. IF problem persists, Call FOR Service.	<p>This error indicates that the motor module has lost high voltage on one or both of its buses. The following are possible causes.</p> <ul style="list-style-type: none"> <li>• Loose cables</li> <li>• Module incorrectly wired</li> <li>• Power supply has faulted</li> </ul> <p>The iTRAK_Control.Status.SectionNumberFaulted tag contains the motor module that is reporting this fault.</p> <p>The iTRAK_Control.Status.SectionFaultData tag indicates the bus that has failed.</p> <p>If the iTRAK_Control.Status.SectionFaultData tag = 0, then the high-voltage rail is lower than 35V. 1, then the common rail is lower than 17V. 3, then the voltage of the common rail is less than ¼ of the high-voltage rail.</p> <p>Other values, then the PWM board in this motor module has no current, call for service.</p> <p>Check power supply and power cables. Reset power supply.</p>
	21	ERR_VOLTS_HI: Section voltage is too high. Emergency shunting has been activated. Check Power Supply AND Shunt Regulator. Call FOR service	<p>Check status indicator on the power supply and power cables. Reset power supply.</p> <p>There can be an issue with the power supply that is being reported by a motor module.</p> <p>The iTRAK_Control.Status.SectionNumberFaulted tag contains the motor module that is reporting this fault.</p> <p>If the iTRAK_Control.Status.SectionFaultData tag = 0, then the high-voltage rail is higher than 509V. 1, then the common rail is higher than 254V. 2, then the voltage of the common rail is greater than 9/10 of the high-voltage rail.</p> <p>Other values, then the voltage of motor module exceeds the safety range.</p>
9	0	Fault_FieldBusSys - Sign of Life between controller and gateway has been lost. Increase sync period AND check cables.	<p>This error indicates the EtherNet/IP™ connection between the controller and the gateway has dropped. The following are possible causes.</p> <ul style="list-style-type: none"> <li>• The time Sync of the Ethernet module is not configured for Time and Motion in the .acd file.</li> <li>• The controller is not configured for Time Synchronization in the .acd file.</li> <li>• The Ethernet connection to the gateway can need to be manually reset. <ul style="list-style-type: none"> <li>a. Unplug the Ethernet cable from the gateway.</li> <li>b. Cycle the power on the gateway, wait 3...4 minutes until the gateway powers up.</li> <li>c. Reconnect the Ethernet cable.</li> </ul> </li> <li>• Unshielded cables.</li> <li>• Bad switch.</li> <li>• Faulty hardware.</li> <li>• Overuse of Logix Designer application trending.</li> </ul> <p>Turn off application trending. Check cabling.</p> <p>The iTRAK_Control.Status.SectionNumberFaulted tag is not applicable for diagnostics. When this fault occurs, record the information and be prepared to provide it to Customer Support if requested.</p>

Table 23 - iTRAK System Error Codes (Continued)

iTRAK_Control.Status.GatewayFaultCode	iTRAK_Control.Status.SectionFaultCode	Displayed Text	Description and Solution
10	0	Headway Fault. Two movers cmd or actual pos is under headway setting. Increase amt	<p>This error indicates that at the end of the next Coarse Update Period two movers can crash into each other. The following are possible causes.</p> <ul style="list-style-type: none"> <li>Two motion commands are not synchronized to run in the same Coarse Update Period.</li> <li>A mover was applied over another mover.</li> <li>Tasks have overlapped and cannot finish in allocated time.</li> </ul> <p>The iTRAK_Control.Status.SectionNumberFaulted tag contains the motor module that is reporting this fault.</p> <p>If the iTRAK_Control.Status.SectionFaultData tag = 0, then the headway fault happened between mover 0 and the mover with the largest mover number.</p> <p>7, then the neighbor movers did not trigger the fault.</p> <p>Check for task overlaps. Verify proper motion instruction execution order.</p>
11	0 or 7	<p>Displayed Text varies according to the value of iTRAK_Control.Status.SectionNumberFaulted:</p> <p>Value 0: Wrong Number of movers reported. A mover has been lost on the system or the wrong number specified in the active axis tag. Check magnets or re-number with HMI tag.</p> <p>Value 7: iTRAK could not find all movers at their last reported positions. The movers have been automatically renumbered.</p>	<p>This error indicates the following.</p> <ul style="list-style-type: none"> <li>The number of movers exceeds the maximum number that is specified in the iTRAK_Control.Data.ActiveMovers tag.</li> <li>A mover was lost in the middle of the track.</li> <li>Movers have been moved when the gateway is off.</li> </ul> <p>If the iTRAK_Control.Status.SectionFaultData tag = 0, then the number of movers that are specified in the Logix Designer application doesn't match the number of movers actually found.</p> <p>To reset this fault, complete these steps.</p> <ol style="list-style-type: none"> <li>Correct the value in the iTRAK_Control.Data.ActiveMovers tag.</li> <li>Renumber the movers by latching iTRAK_Control.Cmd.RenumberMovers.</li> <li>Reset the fault by latching iTRAK_Control.Cmd.FaultReset</li> </ol> <p>If the iTRAK_Control.Status.SectionFaultData tag = 7, then upon start-up, the movers were not found in the same positions as they were when the track was shut down. The movers on the track have been automatically renumbered.</p> <p>Check position magnets. Check specified movers and licenses. Check track for debris.</p>
12	0	Fault_InternalComm - Data could not be written to sections.	<p>This error indicates that a motor module is not responding to commands. The following are possible causes.</p> <ul style="list-style-type: none"> <li>Low-voltage power loss</li> <li>Communication cables are not connected</li> <li>Communication cables are loose</li> <li>Electrical noise</li> </ul> <p>The iTRAK_Control.Status.SectionNumberFaulted tag contains the motor module that is reporting this fault.</p> <p>If the iTRAK_Control.Status.SectionFaultData tag = 0, then writing data to a motor module failed.</p> <p>1, then the motor module received too many communication errors.</p> <p>2, then the force command was not received or the neighborhood command was not received.</p> <p>This fault can cause the gateway to lose movers; therefore, the movers must be renumbered before clearing this fault.</p> <p>Check power connections. Cycle power.</p>
	2	ERR_OVERCURRENT_FAULT: Section has an overcurrent fault. Reset system.	<p>This error indicates that the current in the motor module has risen to an unacceptable level.</p> <p>The iTRAK_Control.Status.SectionNumberFaulted tag contains the motor module that is reporting this fault.</p> <p>The iTRAK_Control.Status.SectionDeviceFaulted tag is the PWM board number.</p> <p>The iTRAK_Control.Status.SectionFaultData tag is the bad coil.</p> <p>Verify that the sizing of system is correct. Reduce the acceleration and deceleration.</p>



Table 23 - iTRAK System Error Codes (Continued)

iTRAK_Control.Status. GatewayFaultCode	iTRAK_Control.Status. SectionFaultCode	Displayed Text	Description and Solution
12	6	ERR_WAYWARD_ISR: Section is reporting an Wayward ISR fault. Call FOR service.	This error indicates an electronics failure in a motor module. The iTRAK_Control.Status.SectionNumberFaulted tag contains the motor module that is reporting this fault. Replace the failed module.
	7	ERR_SENSOR_TIMEOUT: Section is reporting a sensor hardware fault. Call for service.	This error indicates a failure in the position sensing hardware. The iTRAK_Control.Status.SectionNumberFaulted tag contains the motor module that is reporting this fault. Replace the failed module.
	8	ERR_INVALID_PKT: Section received an invalid packet. Reset system.	This error indicates a failure in communication from the gateway to the motor module. The iTRAK_Control.Status.SectionNumberFaulted tag contains the motor module that is reporting this fault. If the iTRAK_Control.Status.SectionFaultData tag < 12, then the iTRAK_Control.Status.SectionFaultData tag has a gain that is 0. If the iTRAK_Control.Status.SectionFaultData tag ≥ 12, the section is not calibrated properly. Check the cable and reset the system.
	12	ERR_COMMUTATOR_TIMEOUT: Commutator could not finish in allocated time. Call FOR Software update.	This error indicates communication failure between the gateway and a motor module. The iTRAK_Control.Status.SectionNumberFaulted tag contains the motor module that is reporting this fault. The iTRAK_Control.Status.SectionDeviceFaulted tag = The PWM board number. Check the cable. Reset the system. Contact Rockwell Automation Technical Support for service.
	14	I2T Error: A coil or all coils have been on for too long for heat. ExtraData=Coil	This error indicates that there is something physically wrong with the track. The following are possible causes. <ul style="list-style-type: none"> <li>• The movers path is physically impeded</li> <li>• Bearings are binding</li> <li>• A motor module is loosely mounted</li> <li>• General over all performance is low</li> </ul> The iTRAK_Control.Status.SectionNumberFaulted tag contains the motor module that is reporting this fault. If the iTRAK_Control.Status.SectionFaultData tag < 12, then the coil with number equal to iTRAK_Control.Status.SectionFaultData is overheated, stop the system. If iTRAK_Control.Status.SectionFaultData tag = 12, then overcurrent has run for too long. Check track path and cables or reduce motion profile demands. To clear this fault properly, complete these steps. 1. Leave the iTRAK high voltage off for 5 minutes, Do not turn off the control voltage. 2. Check the track path. 3. Clear the fault and start the track 4. If the fault is reproduced, reduce motion profile demand.

Table 23 - iTRAK System Error Codes (Continued)

iTRAK_Control.Status. GatewayFaultCode	iTRAK_Control.Status. SectionFaultCode	Displayed Text	Description and Solution
12	15	ERR_CHECKSUM: Section communication error. Check comm. cable. Reset system.	<p>This error indicates a communication failure between the gateway and a motor module.</p> <p>The iTRAK_Control.Status.SectionNumberFaulted tag contains the motor module that is reporting this fault.</p> <p>If the iTRAK_Control.Status.SectionFaultData tag = 2, 4, 6, 7, 8, 9, 10, or 11, then iTRAK_Control.Status.SectionFaultData is the communications packet ID number on which the checksum error occurred.</p> <p>If the iTRAK_Control.Status.SectionFaultData tag = 3, then the packet is not from the gateway.</p> <p>5, then the packet that was received is not for this motor module.</p> <p>13, then the packet that was received is not good.</p> <p>14, then the size of the packets exceeds maximum size.</p> <p>100, then there were ten communication errors in a row.</p> <p>109...112, then check the communication cable shield and ground and all other potential interference on serial communication, Move noise producing devices such as transformers and AC drives away from the gateway. If the fault is reproduced, replace the motor module.</p> <p>Check the communication cable and reset the system.</p>
	16	ERR_POS_RANGE: Position Sensor error. Indicates electrical fault. Extra Data indicates which sensor. Call FOR service.	<p>This error indicates a failed position sensor.</p> <p>The iTRAK_Control.Status.SectionNumberFaulted tag contains the motor module that is reporting this fault.</p> <p>The iTRAK_Control.Status.SectionFaultData tag is the number of the sensor whose analog-to-digital converter is out of range.</p> <p>Replace the failed motor module.</p>
	17	ERR_CUR_RANGE: Current Sensor error. Indicates electrical fault.	<p>This error indicates a failed current sensor.</p> <p>The iTRAK_Control.Status.SectionNumberFaulted tag contains the motor module that is reporting this fault.</p> <p>The iTRAK_Control.Status.SectionFaultData tag contains the failed sensor.</p> <p>If iTRAK_Control.Status.SectionFaultData &lt; 20, then iTRAK_Control.Status.SectionFaultData is the number of the coil that has a failed sensor. This fault happens during run time.</p> <p>If iTRAK_Control.Status.SectionFaultData ≥ 20, then (iTRAK_Control.Status.SectionFaultData - 20) is the number of the coil that has a failed sensor. This fault happens during the power on self test.</p> <p>Replace the failed motor module.</p>
	18	ERR_PCB_TEMP: Drive overtemperature fault. Check mover bearings, venting, reduce motion profile demands. IF problem persists, call FOR service.	<p>This error indicates that the electrical boards are warm. This error is usually the result of failed mechanical part that caused the motor to over work and transfer heat.</p> <p>The iTRAK_Control.Status.SectionNumberFaulted tag contains the motor module that is reporting this fault.</p> <p>The iTRAK_Control.Status.SectionFaultData tag is the temperature of the device.</p> <p>Check mover bearings, vents, or reduce motion profile demands.</p>

Table 23 - iTRAK System Error Codes (Continued)

iTRAK_Control.Status. GatewayFaultCode	iTRAK_Control.Status. SectionFaultCode	Displayed Text	Description and Solution
12	20	ERR_VOLTS_LO: Section voltage is too low or off. Check Power Supply, Power Cables, Power Supply IO, etc. IF problem persists, Call FOR Service.	<p>This error indicates that the motor module has lost high voltage on one or both of its buses. The following are possible causes.</p> <ul style="list-style-type: none"> <li>• Loose cables</li> <li>• Module incorrectly wired</li> <li>• Power supply has faulted</li> </ul> <p>The iTRAK_Control.Status.SectionNumberFaulted tag contains the motor module that is reporting this fault.</p> <p>The iTRAK_Control.Status.SectionFaultData tag indicates the bus that has failed.</p> <p>If the iTRAK_Control.Status.SectionFaultData tag =</p> <p>0, then the high-voltage rail is lower than 35V.</p> <p>1, then the common rail is lower than 17V.</p> <p>3, then the voltage of the common rail is less than ¼ of the high-voltage rail.</p> <p>Other values, then the PWM board in this motor module has no current, call for service.</p> <p>Check power supply and power cables. Reset power supply.</p>
	21	ERR_VOLTS_HI: Section voltage is too high. Emergency shunting has been activated. Check Power Supply AND Shunt Regulator. Call FOR service	<p>This error indicates that the motor module voltage is too high.</p> <p>The iTRAK_Control.Status.SectionNumberFaulted tag contains the motor module that is reporting this fault.</p> <p>If the iTRAK_Control.Status.SectionFaultData tag =</p> <p>0, then the high-voltage rail is higher than 509V.</p> <p>1, then the common rail is higher than 254V.</p> <p>2, then the voltage of the common rail is greater than 9/10 of the high-voltage rail.</p> <p>Other values, then the voltage of motor module exceeds the safety range.</p> <p>Check power supply and power cables. Reset power supply.</p>
	22	ERR_PWRSTAGE_TEMP: Power stage is overtemperature. Check mover bearings, venting, reduce demands. IF problem persists, call FOR service.	<p>Power stage is overtemperature.</p> <p>The iTRAK_Control.Status.SectionNumberFaulted tag contains the motor module that is reporting this fault.</p> <p>The iTRAK_Control.Status.SectionFaultData tag is the amplifier module has reported this fault.</p> <p>Check mover bearings, how the machine is vented, or reduce demands.</p>
	23	ERR_ONE_BAD_COIL: Power on Self Test indicates at least one coil is bad. Extra data indicates Coil. System may still run. Call FOR service	<p>There is a bad coil.</p> <p>The iTRAK_Control.Status.SectionNumberFaulted tag contains the motor module that is reporting this fault.</p> <p>The iTRAK_Control.Status.SectionFaultData tag contains the number of the bad coil.</p>
	24	ERR_TOO_MANY_BAD_COILS: Power on Self Test indicates at multiple coils are bad. System will NOT run. Call FOR Service	<p>There are too many bad coils.</p> <p>The iTRAK_Control.Status.SectionNumberFaulted tag contains the motor module that is reporting this fault.</p> <p>The iTRAK_Control.Status.SectionFaultData tag contains the number of the first bad coil. Call service to replace the module.</p>
	25	N/A	<p>Nonvolatile memory operations failed.</p> <p>The iTRAK_Control.Status.SectionNumberFaulted tag contains the motor module that is reporting this fault.</p> <p>If the iTRAK_Control.Status.SectionFaultData tag =</p> <p>30, then the erase Hold Buffer failed.</p> <p>31, then the received data is too small, missed block, changed in the number of blocks, wrong block size, or wrong byte size.</p> <p>32, then the burn Hold Buffer failed.</p> <p>33, then the received data did not match.</p>
	Any other value.	Any other value.	Contact ICTSupport@ra.rockwell.com.

Table 23 - iTRAK System Error Codes (Continued)

iTRAK_Control.Status.GatewayFaultCode	iTRAK_Control.Status.SectionFaultCode	Displayed Text	Description and Solution
17	0	Position Window Err: a mover is outside its position window. Check or increase win	<p>This error indicates that a mover is no longer within the window between the command and actual position as specified by the position window tag in the HMI. The following are possible causes.</p> <ul style="list-style-type: none"> <li>• Mechanical failure</li> <li>• Over-aggressive programming</li> <li>• The following error set too low in the HMI.</li> </ul> <p>The iTRAK_Control.Status.SectionNumberFaulted tag contains the mover that is reporting this fault.</p> <p>Check or increase the position window.</p>
18	0	Sections are not connected correctly or too many movers reported or NOT communicating or wrong track length	<p>This error indicates that there is a difference in track length or number of active axes as downloaded from the control structure than what the gateway is reporting. The following are possible causes.</p> <ul style="list-style-type: none"> <li>• The control tags are set incorrectly.</li> <li>• The motor modules are improperly cabled.</li> <li>• Foreign magnetic material on the track is adding an extra mover.</li> <li>• If there is a newly installed motor module on the track, this error can indicate that the firmware in the newly installed motor module does not match the firmware for the mover type that is specified for that track.</li> </ul> <p>If the iTRAK_Control.Status.SectionNumberFaulted tag = 0, then the track length that is specified in iTRAK_Control.Data.TrackLength doesn't match the track length the gateway calculated.</p> <p>Otherwise, iTRAK_Control.Status.SectionNumberFaulted tag contains the motor module that has reported this fault.</p>
20	30	The iTRAK power supply has a fault. Check the iTRAK power supply screen and gateway terminal for details.	The iTRAK power supply is not in Running mode. Check the iTRAK power supply screen for more information and acknowledge the fault.
	31		The gateway failed to acknowledge the fault on the iTRAK power supply. Check the iTRAK power supply wiring and acknowledge the fault.
	32		The gateway failed to enable the iTRAK power supply. Check the iTRAK power supply wiring and acknowledge the fault.
	34		The wiring of the iTRAK power supply is incorrect. Check the wiring and reboot the gateway to clear the fault.
23	N/A	N/A	During the download of the user-specified External Force Compensation table, two adjacent entries were found to have the same position value, which is not permitted. You must change at least one of the position values, and re-trying the download of the External Force Compensation table.
	1	N/A	The External Force Compensation table contains more than six entries. Six entries is the maximum.
24	N/A	N/A	During the download of the user-specified External Current Limit table, two adjacent entries were found to have the same position value, which is not permitted. You must change at least one of the position values, and re-trying the download of the External Current Limit table.
	1	N/A	The External Current Limit table contains more than six entries. Six entries is the maximum.

Table 23 - iTRAK System Error Codes (Continued)

iTRAK_Control.Status. GatewayFaultCode	iTRAK_Control.Status. SectionFaultCode	Displayed Text	Description and Solution
25	1	N/A	Sub code 1. The velocity bandwidth is out of the range of 1 . . . 1000
	2	N/A	Sub code 2. The velocity integrator is out of the range of 1 . . . 2000.
	3	N/A	Sub code 3. The gain values are attempting to be applied to a motor module number that is not in the range of 0 . . . (Number of motor modules on the track - 1).
	4	N/A	Sub code 4. The gain values are attempting to be applied to a mover number that is not in the range of 0 . . . 15. Per-mover gains may be specified only for the first 16 movers on an iTRAK system.
26	0	Mover size mismatch, size of movers are not consistent on the track Check section types and set them to correct types, Call service for more details	There is an inconsistency between the size of the movers on the iTRAK system, and the firmware that is downloaded into one or more of the motor modules. Fix the error by toggling the appropriate iTRAK_Control.Cmd.FlashSections<x>mm controller tag.

## Functional Safety

The iTRAK® components do not have Safe Torque Off or any other features that are described in EN 61800-5-2. When combined into a system, implement safety functions to prevent motor actuation. Remove the AC power by using similar methods that are used for variable frequency drives that do not have Safe Torque Off. The safety function subsystem that is described here explains how to wire contactors for the successful removal of power to the iTRAK system.

Topic	Page
Important Safety Considerations	111
Category 3 Requirements according to EN ISO 13849-1	111
Stop Category Definition	112
Performance Level and Safety Integrity Level (SIL)	112
Safety Distance Calculations	112
Functional Safety Description	112
Considerations for Category 1 Stop	113
Overall System Stopping Performance	113
Schematic and Block Diagrams	114

### Important Safety Considerations

You 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 EN ISO 13849 performance level or IEC 62061 SIL level.
- Project management and proof tests in accordance with EN ISO 13849 or IEC 62061.

### Category 3 Requirements according to EN ISO 13849-1

Safety-related parts are designed with these attributes.

- One fault in any of these parts of the control system does not lead to the loss of the safety function.
- One fault is detected whenever reasonably practicable.
- Accumulation of undetected faults can lead to the loss of the safety function and a failure to remove power that produces motion from the motor.

## Stop Category Definition

Stop Category 0 as defined in IEC 60204 is achieved with immediate removal of power that produces actuator motion.

Stop Category 1 as defined in IEC 60204 is achieved with the delayed removal of power that produces actuator motion, to facilitate the controlled stoppage of elements that move.

## Performance Level and Safety Integrity Level (SIL)

For safety-related control systems, Performance Level (PL), according to EN ISO 13849-1, and SIL levels, according to IEC 61508 and IEC 62061. Include a rating of the ability of the system 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 EN ISO 13849-1, IEC 61508, and IEC 62061 standards for complete information on requirements for PL and SIL determination.

## Safety Distance Calculations

Detailed calculation of a proper safety distance is beyond the scope of this document, but here are some considerations to follow.

System safeguards must be in place such that a person cannot reach a hazardous motion before the safeguarding system has brought that hazardous motion to a halt. These issues are addressed in safety standards relevant to this application that are listed here.

- ISO 14119 Safety of machinery - Interlocking devices that are associated with guards - Principles for design and selection.
- ISO 13855 Safety of machinery - Positioning of safeguards regarding the approach speeds of parts of the human body.
- ANSI B11.19 Performance Criteria for Safeguarding.

## Functional Safety Description

The safety logic device, such as a configurable safety relay or programmable safety automation controller, monitors the safety input device, such as a door switch or emergency stop button, for commands, proper operation, and safety demands. The safety logic device must monitor itself for any internal faults.

When actuated, the safety logic device sends a safety stop command to the motion control device and start the configurable timer. During this time, the iTRAK system must decelerate to zero speed.

When the timer expires, power is removed from the safety output contactors that remove power that produces motion from the iTRAK system. If the track is in motion, it coasts to a stop.

The safety logic device must monitor the contactors for welded contacts via feedback from two normally closed contacts in a series, one from each contactor, in the reset circuit. If a contact is welded, the normally closed

contact is held open, which breaks the reset circuit. The system must not be restarted until appropriate measures have been taken.

## Considerations for Category 1 Stop

If there is a malfunction, it is possible that stop category 0 can occur. When designing the machine application, timing and distance must be considered for a coast to stop and the possibility of the loss of control of a vertical load. The malfunction that causes this condition maybe when a signal to the output contactor coil were to go low. A low can happen when a wire falls off or control power fails before the iTRAK system has a chance to come to a complete stop. Use additional protective measures if this occurrence can introduce unacceptable risks to personnel.

## Overall System Stopping Performance

ISO 14119 6.2.1 stipulates that the overall system stopping time for a hazardous machine that is safeguarded by an interlock must be less than the access time. If the overall system stopping performance is equal to or greater than the access time, an interlock with guard locking must be used, the distance from the safeguard to the hazard must be increased, or another, more suitable method must be used to safeguard the hazard.

The overall stopping performance of these applications is the sum of the following.

- Response time of the safety input device.
- Safety logic devices.
- Any delay that is configured in the safety logic devices.
- The safety reaction time of the output contactors used.
- The coast-to-stop time of the hazardous motion.

The response and reaction times can be taken from the product support literature.

---

**IMPORTANT** Determine the overall system stopping performance of a safeguarding system by actual system testing and measurement. The worst-case, overall system stopping performance from these tests and measurements must be used to evaluate the safety distance requirements.

---

The sum response and reaction time of the safety logic devices, output contactors, and worst-case, coast-to-stop portion of the overall system-stopping performance is the same regardless of the input device used.

It is useful to estimate how fast the hazardous motion must coast to a stop before the safeguarded system is available for testing.



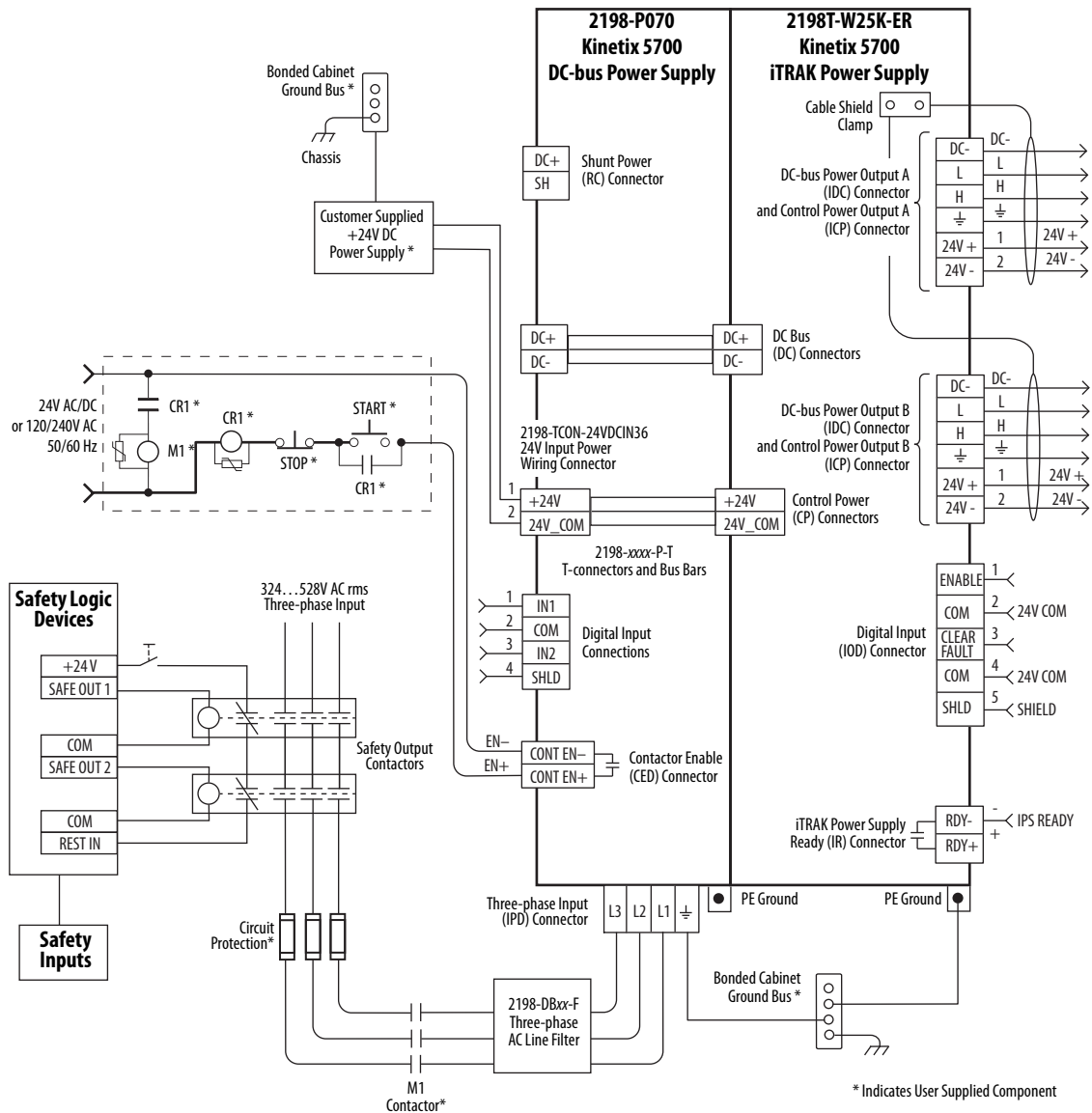
## Schematic and Block Diagrams

These simplified schematic diagrams are intended to inform qualified engineers on how to structure a safety system around the iTRAK system. They are not considered complete.

### iTRAK Power Supply

The block diagram that is shown in [Figure 30](#) is an outline schematic for the safety circuit to use with a system that uses an iTRAK power supply.

**Figure 30 - Kinetix® 5700 iTRAK Power Supply Safety Circuit Block Diagram**



## Compatibility

Use this chapter to determine compatibility between newer and older components of your iTRAK® system.

Topic	Page
Motor Modules	115
Movers and Magnets	116
Gateways	116
Power Supplies	116
Controllers	116

### Motor Modules

Bulletin 2198T iTRAK motor modules are compatible and can be mixed mechanically, regardless of the series.

- If you have any series B modules in your system, the minimum firmware revision for the entire system is 1.107.
- There are minor differences in labeling and appearance but the modules are functionally the same.

Bulletin IT3 iTRAK motor modules have limited compatibility with the Bulletin 2198T iTRAK motor modules.

- Bulletin IT3 iTRAK motor modules have higher cogging force in the motors and can require modifications to the tuning when replacing with Bulletin 2198T iTRAK motor modules.
- If a Bulletin 2198T iTRAK motor module is replacing a Bulletin IT3 iTRAK motor module, all similar modules that are adjacent must be replaced also.
  - If replacing one curve module, the adjacent curve module must be replaced also. The straights and opposite curve can stay.
  - If replacing a straight module, all of straight modules between the nearest curve modules must be replaced too. The opposite straights and curves can stay in the system.
- All modules must be updated to the same firmware revision that the newest module requires.
- Contact [ICTSupport@ra.rockwell.com](mailto:ICTSupport@ra.rockwell.com) before making any Bulletin IT3 to Bulletin 2198T migrations for additional support.

## Movers and Magnets

Mover magnets on a track must all be the same size and geometry. All mover magnets are compatible with all motor modules of the same frame size.

## Gateways

Two styles of gateways are supported for the iTRAK system.

Generation one gateways are compatible with all motor module types and firmware revisions.

Generation two gateways are compatible with all motor module types, from firmware revision 1.100 and later for tracks smaller than 16 motor modules and firmware revision 1.108 for larger tracks.

## Power Supplies

When using the Kinetix® 5700 iTRAK power supply, you must use firmware revision 1.110 or later and the associated ladder logic that is referenced in Knowledgebase Article [778917](#). If you are using a Kinetix 5700 iTRAK Power Supply at lower firmware revisions, contact [ICTSupport@ra.rockwell.com](mailto:ICTSupport@ra.rockwell.com) for assistance and sizing.

## Controllers

The iTRAK system is designed to work with the controllers that are shown in [Table 24](#).

**Table 24 - Compatible Controllers**

Platform	Controller
ControlLogix®	5580 <sup>(1)</sup>
	5570 <sup>(2)</sup>
CompactLogix™	5380 <sup>(1) (3)</sup>
	5370 <sup>(3)</sup>
	5480 <sup>(1)</sup>

(1) The minimum firmware revision to use these processors is 1.103.

(2) The communication to the gateway must be through 1756-ENxT modules capable of Integrated Motion on EtherNet/IP™.

(3) 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.

## Label Placement

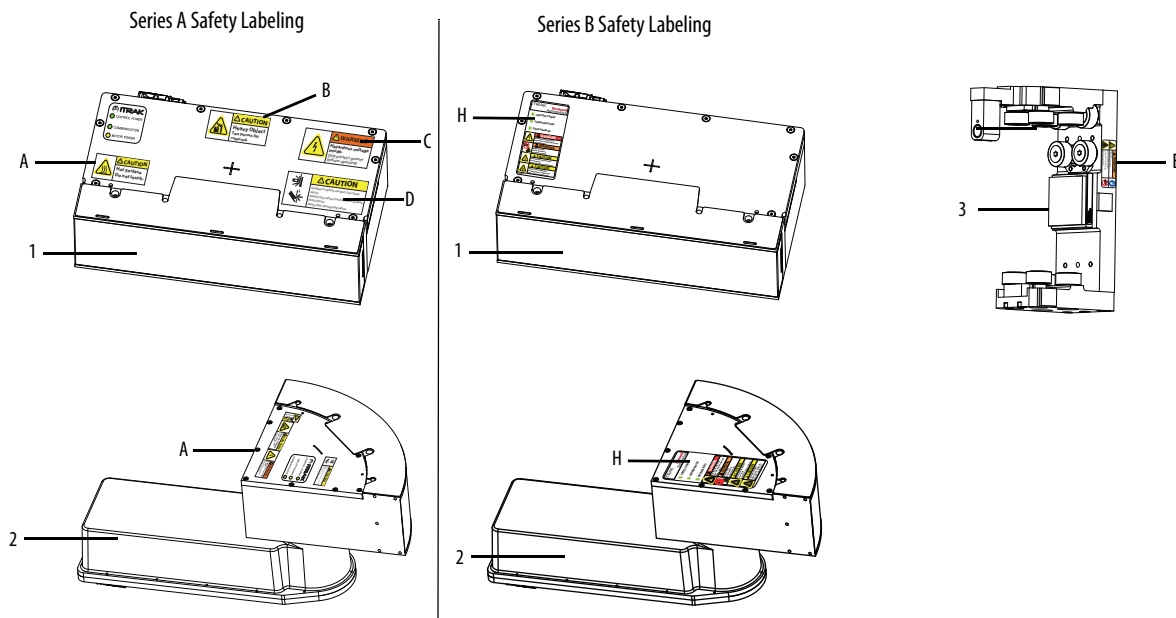
Use this chapter to understand the safety labels and what is on a safety label if it is illegible.

Topic	Page
Safety Labels	117

## Safety Labels

The following safety-identification labels are affixed to the iTRAK® system. To help prevent injury and damage to the system, review the safety labels, their details, and locations before using the system.




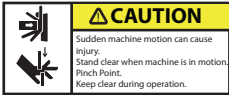
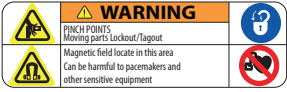
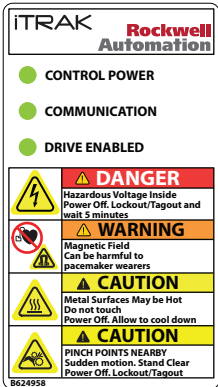
**Figure 31 - Safety Label Placement**



**Table 25 - System Components with Safety Labels**

Item	Component
1	Straight Motor Module
2	Curved Motor Module (left and right modules are labeled the same)
3	Mover

Table 26 - Safety Labels

Title	Component	Location	Label	Details
Hot Surface	Series A Motor Module	A		Indicates that the surface can be hot enough to burn if touched.
Heavy Object	Series A and B Motor Modules	B		Components with this label are 22.7 kg (50.0 lb) or more and require two people to lift.
Hazardous Voltage	Series A Motor Module	C		Do not open, motor module or right angle connectors while the cables are connected. Lockout/tagout if access to the motor module is required during maintenance.
Automated Machinery and Pinch Points	Series A Motor Module	D		Movers can make as sudden and unexpected movements while the system is powered. Lock-out/tag out before servicing.
Magnet and Pinch Points	Mover	E		<p>The mover uses strong magnets. The magnetic field that is generated can disrupt the functionality of automatic- implantable cardioverter defibrillators (AICD). People with cardiac pacemakers must not work near the iTRAK system. The strong magnets of the mover can attract metal objects that are in its proximity. When you handle and install maintain distance between the mover and ferrous metal mounting surfaces or structures.</p> <p>Maintenance personnel must avoid the use of metallic tools and secure items such as badge clips other personnel effect that could be attracted to the strong magnetic field.</p> <p>Strong magnets can erase magnetic media. Never let credit cards or electronic media contact or come near the mover or iTRAK system.</p> <p>Pinch points exist between adjacent movers and motor modules and movers. Keep your hands clear of a system under power.</p>
Unified Safety Label	Series B Motor Module	F		See <a href="#">Safety Information on page 28</a> for details on danger, warnings, and cautions on this label.

## Numerics

**1756-ENxT** 116  
**2198T-A01** 66  
**2198T-AL-SYS** 100  
     configuration 43  
     installation 41  
**2198T-CHBFLS8-12AAxx** 48, 49  
**2198T-CHBP8S8-12P3** 48, 49  
**2198T-CHBP8S8-12P6** 48, 49  
**2198T-G02-016-E** 17  
**2198T-GUSB** 26, 50, 51  
**2198T-Gxx-xxx-E** 50  
**2198T-L16-Txx04-A00N-2E1E-NS** 12  
**2198T-L16-Txx04-B09x-2E1E-NS**, 12  
**2198T-L16-Txxx-A00N-2E1E-NS** 70, 88, 91,  
     92, 94, 95  
**2198T-L16-Txxx-B09x-2E1E-NS** 72, 80  
**2198T-Mxxx-A000** 64  
**2198T-NN-318** 62  
**2198T-NS-318** 62  
**2198T-VTxxx-** 66  
**2198T-VTxxx-A** 14, 62  
**2198T-W25K-ER** 16, 50  
**2198T-WBCMOD** 16, 49

## A

**automatic implantable cardioverter  
 defibrillator (AICD)** 118

## B

**block diagram**  
     iTRAK power supply safety 114  
**bus conditioner** 46  
     description 11, 16  
     install 48  
     installation 49

## C

**cam-follower wheels** 80  
**cleaning** 61  
**commission** 59  
**compatibility** 116  
     controller 116  
     gateway 116  
     motor module 115  
     mover 116  
**component description**  
     curved motor module 12, 46  
     gateway 46  
     mover 14, 46  
     straight motor module 12, 46  
**connector locations**  
     digital USB I/O 51  
     gateway 52

## controller

compatibility 116  
 compatible models 116  
 fault 104  
 functional safety 112  
 minimum firmware 116

## D

### description

bearing rails 11  
 bus conditioner 11  
 motor module 11  
 mover 11  
 mover magnets 11  
 position magnets 11  
 power circuitry 11  
 track frame 11

## E

**error codes** 103

### Ethernet

machine Ethernet port 97

## F

### firmware

downgrade 99  
 update gateway 97  
 update motor module 99  
 update troubleshooting 99

## G

**gateway** 116  
     compatibility 116  
     wire 52

## I

### install

bus conditioner 48  
 cam-follower wheels 80  
 cam-follower wheels and flexures 80  
 curved motor module 72  
 flexures 80  
 lubrication system 41  
 magnet plate 64  
 mover 66  
 multiple iTRAK power supplies 48  
 multiple segments 38  
 position magnet 62  
 straight motor module 70  
 track 35

### installation

planning 35

### iTRAK power supply

multiple 48  
 safety circuit 114  
 status indicators 58, 59

**L****label**

- automated machinery 118
- series A motor module 13
- series B motor module 13
- strong magnets 31

**leveling feet** 38**lifting slots** 37**loop back connector** 54, 55**lubrication**

- first time 101
- frequency 101
- Kluber 4-UH1-68N 62
- straight nipple fittings 41

**lubrication pump**

- configuration 43
- installation 42
- mounting dimensions 43
- volume calculation 101
- wire 43

**lubrication system**

- install 41

**M****magnet plate**

- how to handle 34
- install 64
- magnetic field strength 31, 34

**magnetic plate**

- screws 64

**mechanical and servo components**

- track
  - components 10

**motor module**

- compatibility 115
- firmware update 99
- install
  - curved 72
  - straight 70
- numbering 53

**mount**

- track 35

**mounting holes** 37**mover**

- compatibility 116
- description 14
- installation 66
- magnetic field strength 31
- replace 66

**N****number motor modules** 53**P****position magnet**

- install 62
- magnetic field strength 33
- remove 62

**power supply**

- firmware 116

**R****remove**

- position magnet 62

**replace**

- curved motor module 72
- mover 66
- position magnet 62

**S****safety**

- automated machinery 118
- handling 35
- machine guarding 28
- risk assessment 28
- strong magnets 31

**series A**

- label 13

**series B**

- label 13

**status indicators**

- iTRAK power supply 58, 59
- series A motor module 13
- series B motor module 13

**T****track**

- install 35
- weight 36

**U****USB I/O**

- description 26
- wire 51

**W****warning**

- automatic implantable cardioverter  
defibrillator (AICD) 118
- powerful forces 118

**weight**

- track 36

**wire**

- gateway 52
- iTRAK power supply
  - multiple 49
  - single 48
- lubrication pump 43
- USB I/O 51

## Notes:







## Rockwell Automation Support

Use the following resources to access support information.

<b>Technical Support Center</b>	Knowledgebase Articles, How-to Videos, FAQs, Chat, User Forums, and Product Notification Updates.	<a href="https://rockwellautomation.custhelp.com/">https://rockwellautomation.custhelp.com/</a>
<b>Local Technical Support Phone Numbers</b>	Locate the phone number for your country.	<a href="http://www.rockwellautomation.com/global/support/get-support-now.page">http://www.rockwellautomation.com/global/support/get-support-now.page</a>
<b>Direct Dial Codes</b>	Find the Direct Dial Code for your product. Use the code to route your call directly to a technical support engineer.	<a href="http://www.rockwellautomation.com/global/support/direct-dial.page">http://www.rockwellautomation.com/global/support/direct-dial.page</a>
<b>Literature Library</b>	Installation Instructions, Manuals, Brochures, and Technical Data.	<a href="http://www.rockwellautomation.com/global/literature-library/overview.page">http://www.rockwellautomation.com/global/literature-library/overview.page</a>
<b>Product Compatibility and Download Center (PCDC)</b>	Get help determining how products interact, check features and capabilities, and find associated firmware.	<a href="http://www.rockwellautomation.com/global/support/pcdc.page">http://www.rockwellautomation.com/global/support/pcdc.page</a>

## Documentation Feedback

Your comments will help us serve your documentation needs better. If you have any suggestions on how to improve this document, complete the How Are We Doing? form at [http://literature.rockwellautomation.com/idc/groups/literature/documents/du/ra-du002\\_-en-e.pdf](http://literature.rockwellautomation.com/idc/groups/literature/documents/du/ra-du002_-en-e.pdf).

Rockwell Automation maintains current product environmental information on its website at <http://www.rockwellautomation.com/rockwellautomation/about-us/sustainability-ethics/product-environmental-compliance.page>.

Allen-Bradley, CompactLogix, ControlLogix, Integrated Architecture, iTRAK, Kinetix, Rockwell Software, Rockwell Automation, Studio 5000, and Studio 5000 Logix Designer are trademarks of Rockwell Automation, Inc.

EtherNet/IP is a trademark of ODVA, Inc.

Trademarks not belonging to Rockwell Automation are property of their respective companies.

Rockwell Otomasyon Ticaret A.Ş., Kar Plaza İş Merkezi E Blok Kat:6 34752 İçerenköy, İstanbul, Tel: +90 (216) 5698400

**[www.rockwellautomation.com](http://www.rockwellautomation.com)**

### Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444

Europe/Middle East/Africa: Rockwell Automation NV, Pegasus Park, De Kleetlaan 12a, 1831 Diegem, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640

Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

Publication 2198T-UM002C-EN-P - March 2019

Supersedes Publication 2198T-UM002B-EN-P - September 2018

Copyright © 2019 Rockwell Automation, Inc. All rights reserved. Printed in the U.S.A.