

MagneMover LITE Quick Start Guide

Catalog Numbers 700-1308-XX, 700-1708-XX, 700-1708-XX-AC,
700-1560-00, 700-1458-01, 700-1663-00, 700-1561-00, 700-1664-00,
700-1738-02, 700-1740-03, 700-1525-00, 700-1528-00, C920600,
MMI-MML-250M-NR-SER-SYNCAC

 **MagneMotion**

A Rockwell Automation Company

Quick Start

Original Instructions

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).



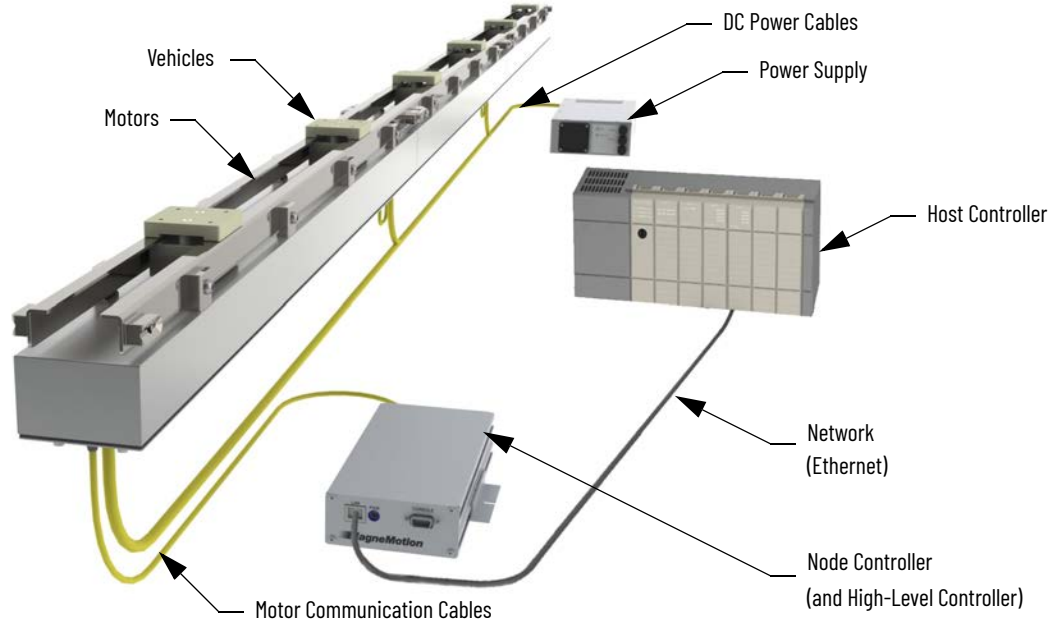
MAGNETIC FIELD HAZARD: Indicates that a strong magnetic field is present that could cause personal injury.

This quick start guide provides a reference for installing the MagneMover® LITE components in a transport system.

Transport System Components Overview

This section identifies the components of a MagneMover LITE transport system as shown in [Figure 1](#).

Figure 1 - Simplified View of the MagneMover LITE Transport System Components

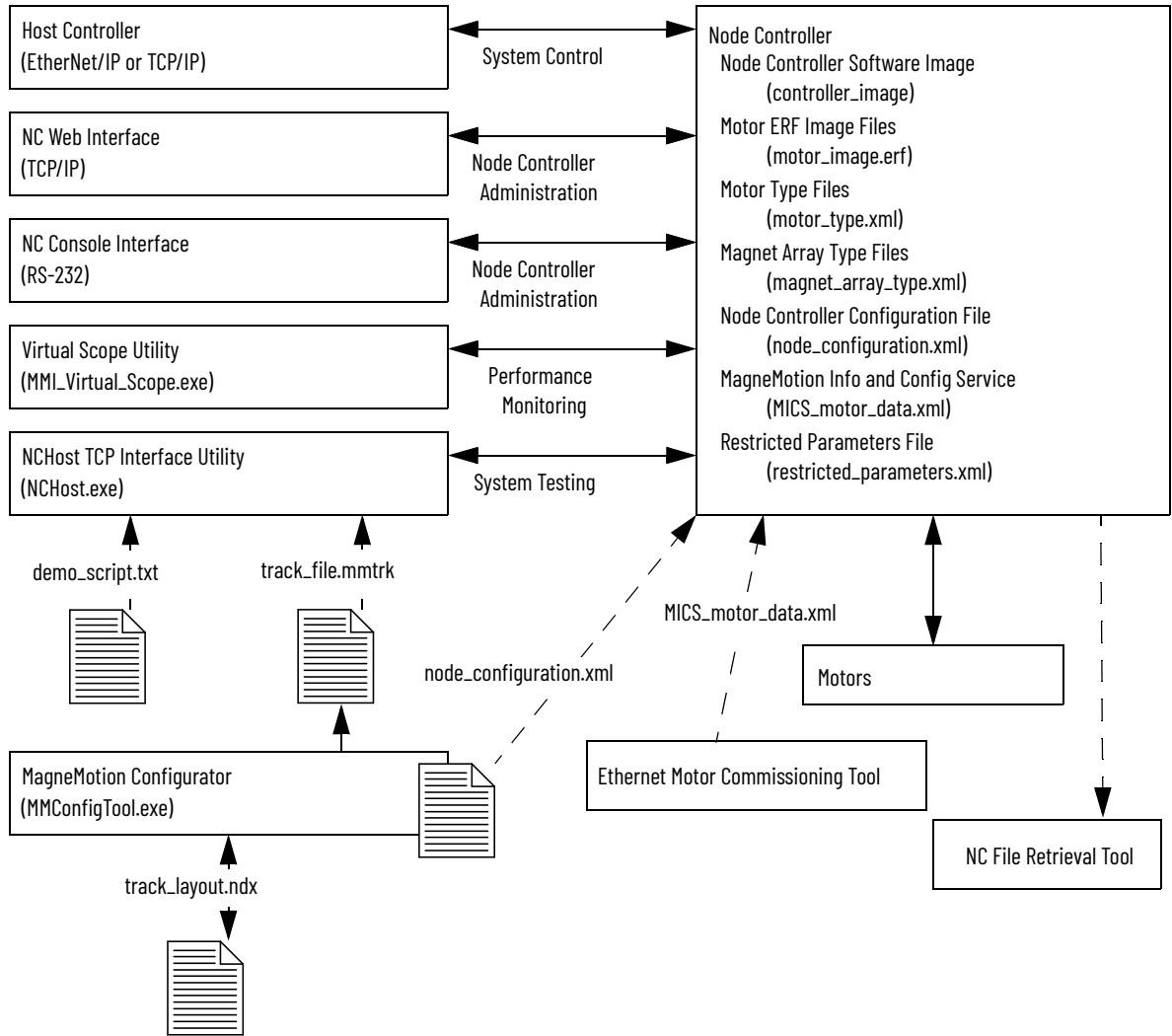


- **DC Power Cables and Communication Cables** – Distributes DC power to the motors and carries communications, such as RS-422 or Ethernet, between the components of the transport system.
- **High-Level Controller (HLC)** – Software application that is enabled on one node controller. This application handles all communication with the user-supplied host controller and directs communication as appropriate to individual node controllers.
- **Host Controller** – User-supplied controller for control and monitoring of the MagneMotion® transport system using either TCP/IP or EtherNet/IP™ communications.
- **Motor** – Refers to the MagneMover LITE linear synchronous motor (LSM).
- **Network** – Ethernet network providing communication (TCP/IP or EtherNet/IP) between the host controller and the HLC (TCP/IP is used between node controllers).
- **Node Controller (NC)** – Coordinates motor operations and communicates with the HLC. Several types of node controllers are available. All node controllers support Ethernet communication with the host controller and the motors, and depending on the model, provide up to 12 RS-422 ports for communication with the motors. Some node controller models also provide Digital I/O and/or Serial I/O for external devices such as switches, E-stops, light stacks, and interlocks. See [Transport System Overview](#) for node definitions.
- **Power Supply** – Provides DC power to the motors.
- **Vehicle (Puck) with Magnet Array** – Carries a payload through the MM LITE™ transport system as directed. The magnet array is mounted to the vehicle (puck) facing the motors and interacts with the motors, which move each vehicle independently.

Transport System Software Overview

Several software applications are used to configure, test, and administer a MagneMotion transport system as shown in [Figure 2](#). See [MagneMover LITE Quick Start Process Diagram](#) for the reference manuals for these applications.

Figure 2 - Simplified View of Transport System Software Organization



- **NC Web Interface** – A web based software application that is supplied by MagneMotion and resident on the node controllers, for administration of the transport system components.
- **NC Console Interface** – A serial communication software application that is supplied by MagneMotion and resident on the node controllers, for administration of the node controller.
- **Virtual Scope Utility** – A Windows software application that is supplied by MagneMotion to monitor and record the change of motor performance parameters. These parameters are displayed as waveforms to analyze the performance of the motors.
- **NCHost TCP Interface Utility** – A Windows[®] software application that is supplied by MagneMotion to move vehicles for test or demonstration purposes. This application supports system testing without the host controller to verify that vehicles move correctly before integrating a transport system into a production environment.
- **MagneMotion Configurator Utility (Configurator)** – A Windows software application that is supplied by MagneMotion to create or change the Node Controller Configuration File. The MM LITE version is also used to create or change the Track File and Track Layout File for MagneMover LITE transport systems.
- **Demo Script** – A text file (*demo_script.txt*) uploaded to the NCHost TCP Interface Utility to move vehicles on the transport system for test or demonstration purposes.
- **NC File Retrieval Tool** – A Windows software application that is supplied by MagneMotion to download configuration and operation files from the specified HLC and all node controllers in the transport system.
- **Ethernet Motor Commissioning Tool** – A Windows software application that is supplied by MagneMotion to create and edit MagneMotion Information and Configuration Service (MICS) files.

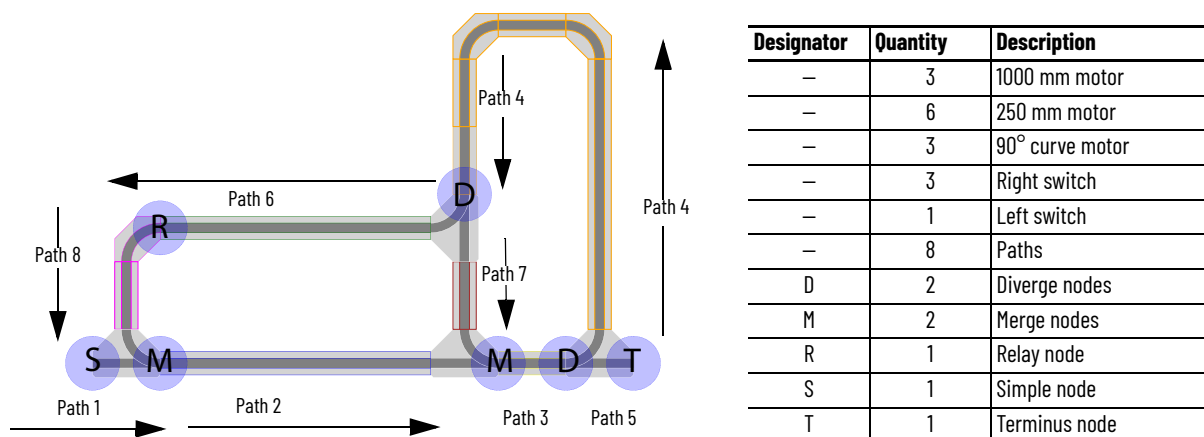
- **Node Controller Software Image File** (IMG file) – The software file for the node controllers (*controller_image*), includes the node controller and HLC applications. The Node Controller Software Image file is uploaded to all node controllers in the transport system.
- **Motor ERF Image Files** (ERF file) – The software files for the MagneMotion motors (*motor_image.erf*). The Motor ERF Image files are uploaded to all node controllers in the transport system and then programmed into all motors.
- **Restricted Parameters File** – An XML file (*restricted_parameters.xml*) that provides access to restricted configuration elements for specific transport systems. The Restricted Parameters file is uploaded to HLC. For the development of a custom Restricted Parameters file for a specific transport system, see [Rockwell Automation Support](#) on the back cover.
- **Motor Type Files** – XML files (*motor_type.xml*) that contain basic information about the specific MagneMotion motor types being used. The Motor Type files are uploaded to all node controllers in the transport system.
- **Magnet Array Type File** – An XML file (*magnet_array_type.xml*) that contains basic information about the specific MagneMotion magnet array type that is used on the vehicles in the transport system. The Magnet Array Type file is uploaded to all node controllers in the transport system.
- **Node Controller Configuration Files** (Configuration file) – An XML file (*node_configuration.xml*) that contains all parameters for the components in the transport system. Multiple Node Controller Configuration Files can be uploaded to all node controllers in the transport system, but only one is active.
- **MagneMotion Information and Configuration Service (MICS) File** – An XML file (*MICS_motor_data.xml*) that contains the network topology parameters for the transport system when using Ethernet communication with the motors. The file includes the MAC address of each motor and the location of each motor on a path. The MICS file is uploaded to all node controllers in the transport system.
- **Track Layout File** – An XML file (*track_layout.ndx*) that contains all parameters for the graphical representation of a MagneMover LITE transport system. The Track Layout file is used by the Configurator to generate the Node Controller Configuration File and the Track file for MagneMover LITE systems.
- **Track File** – A text file (*track_file.mmtrk*) that contains graphical path and motor information about the transport system. The Track file is used by the NCHost TCP Interface Utility to provide a graphical representation of the transport system to monitor system operation. The Track file is created for MagneMover LITE transport systems using the MagneMotion Configurator.

IMPORTANT Modifications to the Image or Type files could cause improper operation of the transport system.

Transport System Overview

The MagneMover LITE components consist of a set of basic building-blocks that provides an easy to assemble and implement transport system. The modular nature of the MM LITE components makes it easy to implement layout or control changes. Motors, switches, vehicles, and nodes are used to build the transport system. All Paths must begin with a node and are not allowed to overlap. Each Path has a unique identifier in the Node Controller Configuration File and is controlled by the Node Controller. Refer to MagneMover LITE Configurator User Manual, publication [MMI-UM008](#) for additional information on creating Paths.

Figure 3 - Sample MM LITE Transport System Layout Showing Available Nodes



Nodes define the beginning of all paths and the connections between Paths. See [Figure 3](#) for examples of some MM Lite nodes.

- **Simple Node** – Defines the beginning of a Path (i.e., there is no other Path connecting at this point).
- **Relay Node** – Connects the end of a Path to the beginning of a Path.
- **Terminus Node** – Defines the end or beginning of a Path where vehicles (pucks/movers) move to or from the MagneMover LITE transport system.
- **Gateway Node** – Connects a Path in one HCL Control Group in a transport system to a Path in another HLC Control Group within the same transport system.
- **Merge Node** – Connects the ends of two Paths to the beginning of another Path.
- **Diverge Node** – Connects the end of one Path to the beginning of two other Paths.
- **Merge-Diverge Node** – Connects the ends of two Paths to the beginning of two other Paths.

MagneMover LITE Quick Start

Use this quick start guide as a reference when installing or servicing the MagneMover LITE components in a transport system. Follow these steps to gain operation of the transport system with the aid of the MagneMotion manuals. See [MagneMover LITE Quick Start Process Diagram](#) for a list of available publications.



Make sure that all components and complete design specifications, including the physical layout of the transport system, are available before starting to install or test the MM LITE transport system.

To get started:

1. Download the software for the MagneMover LITE transport system from rok.auto/pcdc.



The minimum requirements for running MagneMotion software applications are Microsoft® Windows® 7 with .NET 4.0. An Ethernet port (web interface) and an optional RS-232 port (console interface) are required to connect to the node controllers.

Communication for running the memory interface for the optional Sync option requires an Allen-Bradley® ControlLogix® controller using an EtherNet/IP connection.

2. Install the components of the MM LITE transport system as described in the following sections of the MagneMover LITE User Manual, publication [MMI-UM002](#).
 - a. Prepare the facility for the installation:
 - *Chapter 2, Safety Guidelines.*
 - *Chapter 3, Design Guidelines.*
 - *Chapter 4, Specifications and Site Requirements.*
 - b. Prepare the components for installation and install:
 - *Chapter 5, Installation.*
3. Install the node controllers as described in the Node Controller Hardware User Manual, publication [MMI-UM013](#).
 - *Chapter 5, Installation.*
4. Follow [step a...step e](#) to install the MagneMover LITE Configurator on a computer for user access as described in these sections of the MagneMover LITE Configurator User Manual, publication [MMI-UM008](#).
 - a. Create a graphical representation of the transport system to define the components and their relationships in the system and save it as a Track Layout File (*track_layout.ndx*).
 - *Chapter 2, Using the MagneMover LITE Configurator.*
 - *Chapter 3, Transport System Layout.*
 - b. Add required transport system components to the track layout:
 - *Chapter 3, Layout the Motors and Switches.*
 - *Chapter 3, Locate and Define the Nodes.*
 - c. Add optional transport system components to the track layout:

- *Chapter 3, Identify Direction of Forward Motion.*
 - *Chapter 3, Locate the Precision Locators.*
 - *Chapter 3, Define Vehicles (Pucks).*
 - *Chapter 3, Locate System Legs.*
 - *Chapter 3, Dimension the Layout.*
 - *Chapter 3, Add Descriptive Text.*
 - *Chapter 3, Define Node Controllers.*
 - *Chapter 3, Define Ethernet Hardware.*
- d. Automatically create the Node Controller Configuration File (node_configuration.xml) from the Track Layout File to define the components and operating parameters of the transport system.
- *Chapter 3, Generate Configuration Files.*
- e. Refine the automatically generated Note Controller Configuration File as described in these sections:
- *Chapter 4, Transport System Configuration.*
 - *Chapter 4, Set EtherNet/IP for a PLC, when using a programmable controller (typically an Allen-Bradley ControlLogix controller) to control the transport system.*
 - *Chapter 4, Define HLC Control Groups, when the transport system is subdivided into smaller transport systems (Control Groups) with multiple host controllers and multiple HLCs and where Gateway Nodes are used to transfer vehicles from one Control Group to another.*
 - Set Configurator Options as described in these sections:
 - *Chapter 4, Station Insert Mode.*
 - *Chapter 4, Show Per Motor Control Loop Parameters.*
 - *Chapter 4, Use Advanced Parameters.*
 - *Chapter 4, Create and Edit Simulated Vehicles.*
 - *Chapter 4, European Number Formatting.*
 - Define each transport system component that is used in the transport system as described in these sections:
 - *Chapter 4, Create and Edit Paths.*
 - *Chapter 4, Define and Edit Motors and Vehicles.*
 - *Chapter 4, Create and Edit Nodes.*
 - *Chapter 4, Define and Edit Node Controllers.*
 - *Chapter 4, Create and Edit Stations.*
 - *Chapter 4, Create and Edit Single Vehicle Areas.*
 - *Chapter 4, Define and Edit E-Stops.*
 - *Chapter 4, Define and Edit Interlocks.*
 - *Chapter 4, Define and Edit Light Stacks.*
 - *Chapter 4, Create the Track File (track_file.mmtrk) to provide a transport system graphic when using the NCHost TCP Interface utility.*
5. Set the IP address for each node controller and specify the node controller to be used as the HLC as described in the Node Controller Interface User Manual, publication [MMI-UM001](#).
- a. *Chapter 2, Run the Node Controller Web Interface.*
 - b. *Chapter 2, Setting Node Controller IP Addresses.*
 - c. *Chapter 2, Node Controller Function Assignment.*
- Use the web interface to upload the configuration, image, and type files to each node controller as described in the Node Controller Interface User Manual, publication [MMI-UM001](#).
- d. *Chapter 2, Changing Node Controller Software Image Files.*
 - e. *Chapter 2, Node Controller Configuration File.*
 - f. *Chapter 2, Motor Type Files.*

g. *Chapter 2, Magnet Array Type Files.*



Restart the node controller after uploading the Motor Type files or Magnet Array Type files.
Restart the node controller after uploading the MICS file when using Ethernet motor communication.

h. *Chapter 2, Motor ERF Image Files.*

6. When using motors with Ethernet communication as described in the MagneMover LITE User Manual, publication [MMI-UM002](#), create and upload the MICS file (see *MICS File Format* in Chapter 3) and provision the motors (see *System Power-up* in Chapter 5).
7. Program the motors using the Motor ERF Image files as described in the MagneMover LITE User Manual, publication [MMI-UM002](#) (see *Motor Software Installation* in Chapter 5). Reference the Node Controller Interface User Manual, publication [MMI-UM001](#), and the NCHost TCP Interface Utility User Manual, publication [MMI-UM010](#).
8. If using the LSM Synchronization option, install the components of the option on the transport system as described in the following sections of the LSM Synchronization Option User Manual, publication [MMI-UM005](#).
 - a. Prepare the transport system for the installation:
 - *Chapter 2, Safety.*
 - *Chapter 4, Specifications and Site Requirements.*
 - b. Prepare the components for installation and install:
 - *Chapter 5, Installation.*
 - *Chapter 6, Operation.*

Configure the SYNC IT™ controller for operation as described in *SYNC IT Controller Configuration* in Chapter 4.

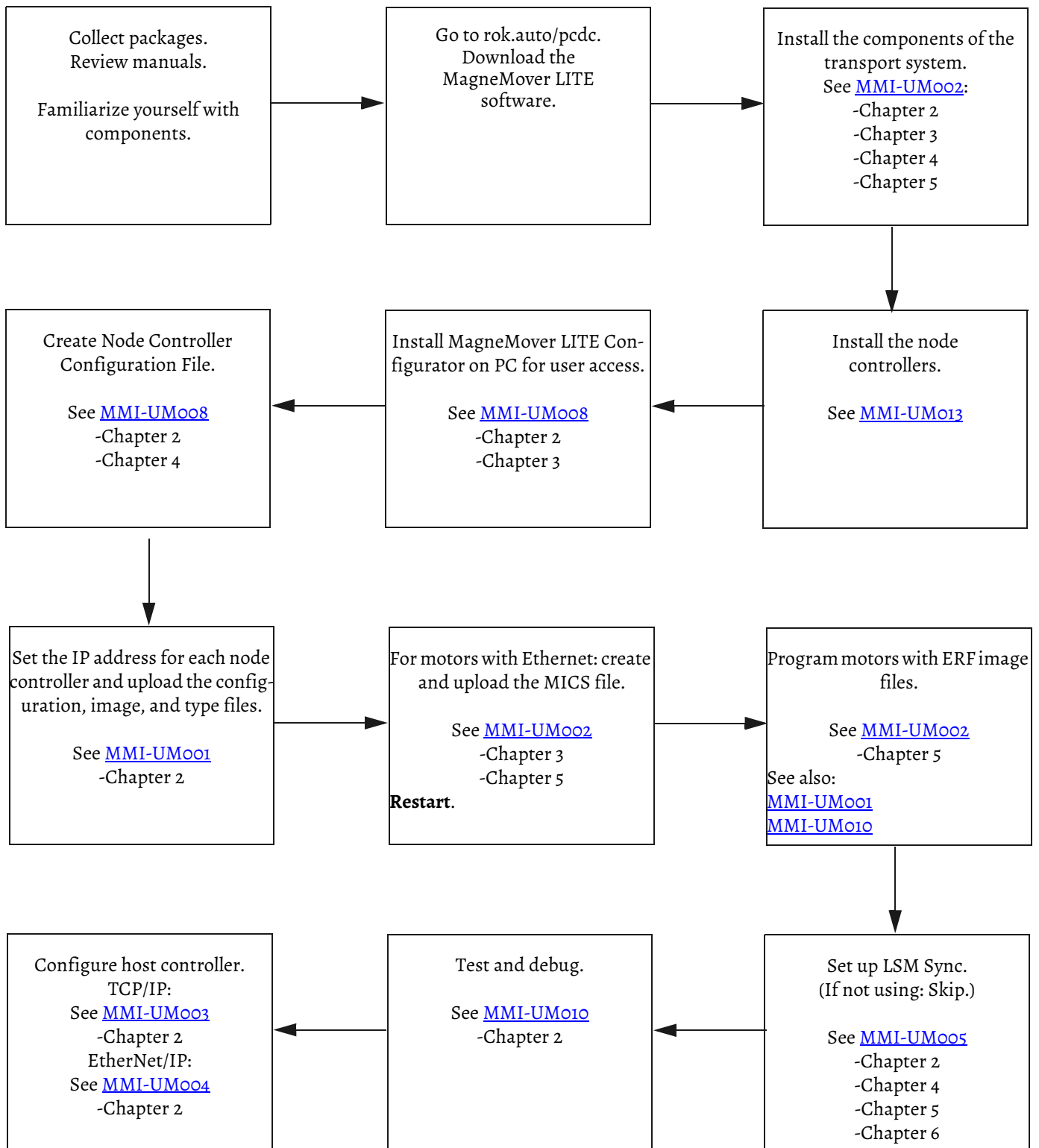
9. Test and debug the transport system by using the NCHost TCP Interface Utility and Demo Scripts as described in the NCHost TCP Interface Utility User Manual, publication [MMI-UM010](#). These scripts provide an easy method to verify proper operation and make adjustments such as refining the control loop tuning.



The NCHost TCP Interface Utility is for test and verification trials only. The host controller must be used to control the transport system after verification of functionality

- a. *Chapter 2, Running the NCHost TCP Interface Utility.*
 - b. *Chapter 2, Connecting to the Transport System.*
 - c. *Chapter 2, Testing the Transport System – Host Commands.*
 - d. *Chapter 3, Testing the Transport System – Demo Scripts.*
10. Configure the host controller for transport system control as required to meet the material movement needs of the facility where the system is installed. When using TCP/IP communications, see the Host Controller TCP/IP Communication Protocol User Manual, publication [MMI-UM003](#). When using EtherNet/IP communications, it is recommended to use the Independent Cart Technology Libraries at rok.auto/pcdc. For additional information on EtherNet/IP communications, see Host Controller EtherNet/IP Communication Protocol User Manual, publication [MMI-UM004](#).
 - *Chapter 2, Connecting to the Transport System.*
 - *Chapter 2, Running the Transport System.*
 - *Chapter 2, Monitoring Transport System Status.*
 - *Chapter 2, Moving Vehicles.*

Figure 4 - MagneMover LITE Quick Start Process Diagram



For additional information, see Independent Cart Technology Libraries at rok.auto/pcdc.

Additional Resources

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

Resource	Description
Node Controller Interface User Manual, publication MMI-UM001	Describes the node controller user interfaces, which are used to configure and administer the node controllers that are used with MagneMotion transport systems.
MagneMover LITE User Manual, publication MMI-UM002	Describes how to install, operate, and maintain the MagneMover LITE transport system and all options.
Host Controller TCP/IP Communication Protocol User Manual, publication MMI-UM003	Describes the communication protocol used between the MagneMotion high level controller and a host controller using a TCP/IP interface.
Host Controller EtherNet/IP Communication Protocol User Manual, publication MMI-UM004	Describes the communication protocol used between the MagneMotion high level controller and a host controller using an EtherNet/IP interface.
LSM Synchronization Option User Manual, publication MMI-UM005	Describes how to install, operate, and maintain the LSM Synchronization Option, which is used to synchronize motion between MagneMotion transport systems and other systems.
MagneMover LITE Configurator User Manual, publication MMI-UM008	Describes the MagneMover LITE Configurator that is used to maintain the Node Controller Configuration File, which defines the MagneMover LITE transport system.
NCHost TCP Interface Utility User Manual, publication MMI-UM010	Describes the NCHost TCP Interface Utility and Demo Scripts, which are used to run a MagneMotion transport system for testing and debugging.
Virtual Scope Utility User Manual, publication MMI-UM011	Describes the MagneMotion Virtual Scope utility, which displays motor performance parameters as waveforms to analyze transport system performance.
Node Controller Hardware User Manual, publication MMI-UM013	Describes how to install and maintain the MagneMotion node controllers, which are used to monitor vehicles and control the motors of a MagneMotion transport system.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website: rok.auto/certifications	Provides declarations of conformity, certificates, and other certification details.
Product Compatibility and Download Center website: rok.auto/pcdc	Rockwell Automation software download center.

You can view or download publications at rok.auto/literature.

Rockwell Automation Support

Use these resources to access support information.

Technical Support Center	Find help with how-to videos, FAQs, chat, user forums, and product notification updates.	rok.auto/support
Knowledgebase	Access Knowledgebase articles.	rok.auto/knowledgebase
Local Technical Support Phone Numbers	Locate the telephone number for your country.	rok.auto/phonesupport
Literature Library	Find installation instructions, manuals, brochures, and technical data publications.	rok.auto/literature
Product Compatibility and Download Center (PCDC)	Download firmware, associated files (such as AOP, EDS, and DTM), and access product release notes.	rok.auto/pcdc

Documentation Feedback

Your comments help us serve your documentation needs better. If you have any suggestions on how to improve our content, complete the form at rok.auto/docfeedback.

Waste Electrical and Electronic Equipment (WEEE)



At the end of life, this equipment should be collected separately from any unsorted municipal waste.

Rockwell Automation maintains current product environmental compliance information on its website at rok.auto/pec.





Allen-Bradley, ControlLogix, expanding human possibility, MagneMotion, MagneMover, MML, Rockwell Automation, and SYNC IT are trademarks of Rockwell Automation, Inc.

Microsoft® and Windows® are registered trademarks of Microsoft Corporation.

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 EEE Yönetmeliğine Uygundur

Connect with us.    

rockwellautomation.com ————— expanding **human possibility**™

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