**Technical Data**

Original Instructions

# QuickStick Motors Technical Data

Catalog Numbers 700-1433-02, 700-1433-03,
MMI-QS-S10E10, MMI-QS-S10E05, MMI-QS-S10E03


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# Summary of Changes

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

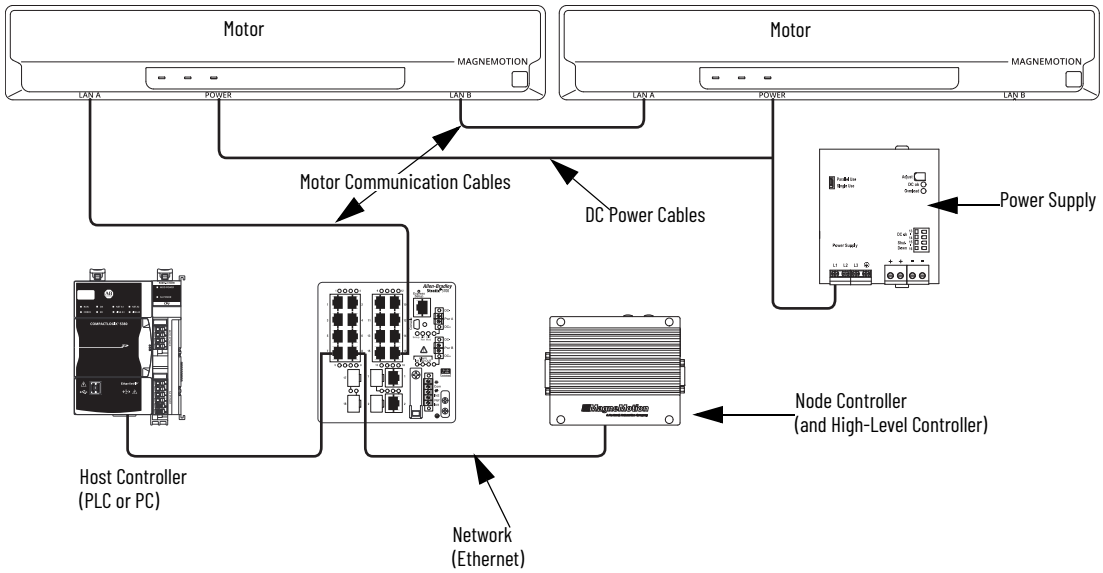
| Topic | Page |
|---|---|
| QS 100 technical information from publication MMI-TD001 was added to this publication. | throughout |
| Added empirical units. | (see change bars) |
| Swapped LAN A and LAN B labels in Figure 8. | 11 |
| QS_100 covered magnet array information from publication MMI-TD047 was added to this publication. | 21 |

# About the QuickStick Motors

QuickStick® systems consist of modules that include linear synchronous motors that are mounted to user-designed support structures, permanent magnet arrays attached to user-designed vehicles, controllers, and power supplies. The QuickStick transport system is an intelligent design that provides fast, precise motion, and positioning and tracking of vehicles in an Independent Cart transport system. The QuickStick transport system consists of an integrated linear synchronous motor, a position sensing system, control electronics, and independent inverter drives.

A typical QuickStick 150 transport system is shown in Figure 1.

**Figure 1 - QuickStick 150 Connection Overview**




The QuickStick transport system consists of the following components:

- QuickStick motors, which contain independently controlled motor sections to provide thrust to vehicle magnet arrays.
- User-supplied vehicles.
- Magnet arrays.
- Node controllers, which interface to the host controller and route vehicle commands to the motors.
- User-supplied DC power supplies, which are the propulsion/control input to the QuickStick motor.
- Host controller, which may be a Logix PLC (programmable logic controller) or generic TCP/IP connection.
- The QuickStick 150 motors have a three bi-color light-emitting diode (LED) indicator which specifies power and system health.

The QuickStick motor has three connections, one power connector where propulsion input power and control input power are provided, and two communication connections, which may be used to daisy-chain communication along the path of the motor.

The QuickStick motor has the intelligence to sense vehicle position, generate a move profile that is based on a vehicle command from the host, provide closed loop position and velocity control of the vehicle motion, and provide closed loop current control to generate thrust to the vehicle. Additionally, the QuickStick motor hands off vehicle control to its upstream and downstream neighboring motors to move the vehicle through the system.

Node controllers handle multiple paths of QuickStick motors and handle the vehicle transition at these path boundaries (nodes). The node controllers poll for periodic status of vehicles and motor health to interface to the host controller.

The distributed motion control architecture that the QuickStick transport system provides allows for scalable systems with hundreds of motors and vehicles while minimizing the control burden from the host controller.

The QuickStick transport system allows multiple movers to be present on one motor at a time. This is achieved by creating individual sections, known as blocks, which can independently provide thrust to the vehicle magnet array. For independent control of vehicles, no block can have more than one magnet array over the motor section.

- The 1 m version has 10 blocks, each 96 mm (3.78 in.) in length.
- The 0.5 m version has 5 blocks, each 96 mm (3.78 in.) in length.
- The 0.3 m version has 3 blocks, each 96 mm (3.78 in.) in length.

The 0.3 m version is only available in the QS 150 motor.

The QuickStick 150 motor is backward compatible with the QuickStick 100 motor and magnet arrays, and connects to the existing node controllers via Ethernet.

*Exposed Materials*

| Exposed Materials QuickStick 150 | |
|---|---|
| **Component** | **Materials** |
| Cover Housing | PLENCO™ 08218 |
| Chassis | Aluminum 6061-T6 |
| Hardware (screws) | 300-series screws with Buna-N O-ring |
| Hardware (T-nut) | Galvanized steel with stainless steel spring |
| Ethernet Connectors | Copper alloy nickel plated/Buna-N O-ring/copper alloy gold plated/nylon/brass nickel plated |
| Power Connectors | Zinc die cast with black epoxy/copper alloy gold plated/neoprene gasket |

| Exposed Materials QuickStick 100 |
|---|
| **Materials** |
| Aluminum 6063-T6 |
| 304 stainless steel |
| TGIC (tri-glycidyl isocyanurate) powder coat |
| VHB (very high bonding) conformable foam with acrylic adhesive |
| The motor has exposed D-style connectors and must not be located where harsh conditions exist |

# Motor Features

The QuickStick motors can be mounted in any orientation: right side up, sideways, upside down, and vertically. The motors have a required direction, with an upstream end and a downstream end. The QuickStick motors must always be installed with the upstream end of one motor following the downstream end of the previous motor. Forward vehicle motion on the QuickStick motors is from upstream to downstream, however vehicles can move backwards (downstream to upstream) if necessary.

If the motor is mounted on an incline or vertically, the motor will not hold a vehicle in place during startup, restarts, or if power is lost.

**Table 1 - QuickStick Motor Features (1)**

| Attribute | QuickStick 150 | QuickStick 100 |
|---|---|---|
| Motor Type | Linear Synchronous Motors (LSM) | |
| Logic Power | 48V DC at 0.2 A | |
| Propulsion Power | 48...72V DC | 48V DC |
| Continuous Thrust per Cycle (3) | 4.07 N/A/cycles | |
| Ride-through (2) Hold-up Time | 2 ms | |
| Peak Thrust per cycle (3) | 29.2 N/cycle | 19.8 N/cycle |
| Attractive force per cycle (3) | 58.8 N/cycle | |
| Rated Speed (max velocity) | 4 m/s (8.95 mph) | 2.5 m/s (4.47 mph) |
| Magnetic Cycle Length | 48 mm | |
| Paint Color | Black | Gray |
| Acceleration (max) | 24 $m/s^2$ (2.45 g) payload dependent | |
| Number of Independent Inverters (See Table 2) | 1 m: 10 three phase inverters<br>0.5 m: 5 three phase inverters<br>0.3 m: 3 three phase inverters | 1 m: 10 three phase inverters<br>0.5 m: 5 three phase inverters |
| Servo Repeatability (4) | ± 0.05 mm at specified gap and friction | ± 0.50 mm at specified gap and friction |
| Maximum Payload | Determined by magnet array length and support structure | |
| Typical Applications | Material handling system | |

**Table 1 - QuickStick Motor Features (1) (Continued)**

| Attribute | QuickStick 150 | QuickStick 100 |
|---|---|---|
| Ingress Protection (IP) Rating | IP66 and IP67 (5) | Designed for IP54<br>Designed for IP65 with mated gland connectors |
| Compatible Node Controllers | NC-LITE, NC-E, NC-S | NC-LITE, NC-S |
| Compatible Power Cables | MMI-QS-CPSS-00XX000, MMI-QS-CPSS-00AA*xxx*,<br>MMI-QS-CPDS-14AF*xxx*, MMI-QS-CPDR-14AF*xxx*,<br>MMI-QS-CPCS-00XX000, MMI-QS-CPAS-14AA*xxx*,<br>MMI-QS-CPTS-10AA*xxx*, MMI-QS-CPRS-00XX000 | 700-1635-00, 700-1640-*xx*, 700-1686-*xx* |
| Compatible Magnet Arrays | MMI-QS-M*xxxx-x* | |
| Compatible Power Supplies | 1606-XLS | |
| Compatible Ethernet Switches | Stratix® 2000, Stratix 2500, Stratix 5700 | – |
| Compatible Communication Cables | 1585D-M4TBDM-*x* (Motor-to-motor)<br>1585D-M4TBJM-*x* (Motor to node controller)<br>1585J-M8TBJM-*x* (Node controller to switch) | 700-0663-xx, 700-0757-xx, 700-1367-xx, 100-2090-xx |
| Communication Type | Ethernet | RS-422 |
| MTBF (mean time between failures) | See MMI-AT002 | |

(1) Performance varies based on payload, acceleration, velocity, and vehicle density.
(2) Rrepresents a short-term removal of power (0…2 ms max) the power supply remains in regulation (at specified load and input voltage) without registering a fault when used with a 1606-XLS power supply.
(3) 3 mm vehicle gap, typical.
(4) Repeatability is dependent on the size of the gap between the motor and the vehicle-mounted magnet array and varies based on track and vehicle design/structure. Repeatability is not applicable over the gaps between motors.
(5) IP66/IP67 is only ingress protected when connectors are mated or when caps are present and are tightened to 11 lb•in (1.24 N•m).

**Table 2 - Independent Motor Inverters (motor blocks)**

| Motor Type | Stator Length | Block Length | No. Blocks | Internal Gap |
|---|---|---|---|---|
| QS 150 and QS 100 | 1.0 m | 96 mm | 10 | 9 mm |
| QS 150 and QS 100 | 0.5 m | | 5 | |
| QS 150 | 0.3 m | | 3 | |

## Before you Begin

Before designing a QuickStick transport system, review the following information and the MagneMotion® QuickStick and QuickStick HT Design Guide, publication MMI-RM001.

- Transport system application
- Desired throughput
- Maximum payload
- Total transport length
- Transport topography
- Station dwell time
- Vehicle length

### *Thrust Force Calculations (Required and Attractive Thrust)*

All performance information is dependent on the motor type, length, and magnet array used. See the MagneMotion QuickStick and QuickStick HT Design Guide, publication MMI-RM001 for information on force calculations.

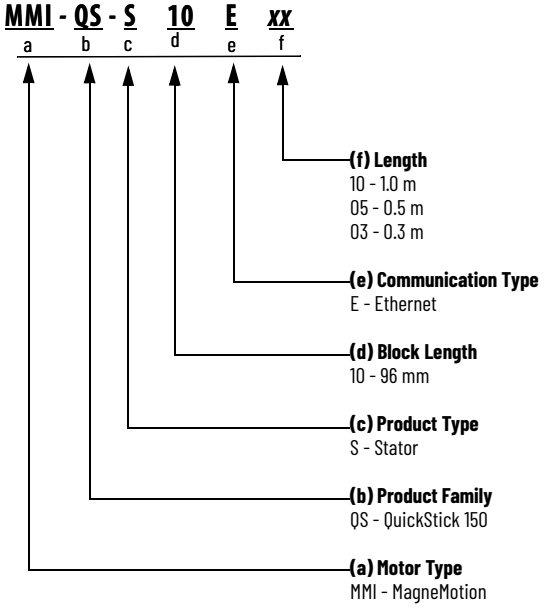
Several variables determine the thrust available or required from the motors to move a vehicle:

- Magnet array length (in cycles)
- Vehicle gap (distance between the magnet array that is attached to the vehicle and the motor)
- Friction or drag between the vehicle and the guideway
- Motor gap (physical distance between motors)
- Required acceleration
- Mass to be moved through the transport system
- Friction or drag between the vehicle and the guideway

# Catalog Number Explanations

Use the catalog number diagrams that follows to understand the configuration of the QuickStick 100 and QuickStick 150 motors. For questions regarding product availability, contact your distributor.

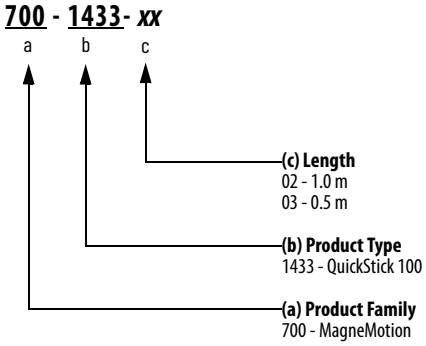
## QuickStick 150 Motors




Lower-case letters shown under the catalog number indicate the catalog number position.

| Available Catalog Numbers |
|---|
| MMI-QS-S10E10 |
| MMI-QS-S10E05 |
| MMI-QS-S10E03 |

## QuickStick 100 Motors




Lower-case letters shown under the catalog number indicate the catalog number position.

| Available Catalog Numbers |
|---|
| 700-1433-02 |
| 700-1433-03 |

# Mechanical Specifications

**Table 3 - QuickStick Motor Environmental Ratings**

| Category | QuickStick 150 | QuickStick 100 |
|---|---|---|
| Motors | Operating temperature: -10…+50 °C (14…122 °F)<br>Storage temperature: -10…+60 °C (14…140 °F) | Operating temperature: 0…50 °C (32…122 °F)<br>Storage temperature: -10…+60 °C (14…140 °F) |
| Relative Humidity | 85% max (relative, non-condensing) | |
| Derating at High Altitude | When operating in a high altitude environment with lower air pressure, the operating temperature range must be derated compared to that of sea level. | |
| Shock | 15 g peak, 11 ms duration; 5 g peak 30 ms duration | |
| Vibration | 2 g from 55…500 Hz | |

# QuickStick 150 Motors

These performance specifications apply to all QuickStick 150 motors.

**Table 4 - QuickStick 150 Motor Specifications**

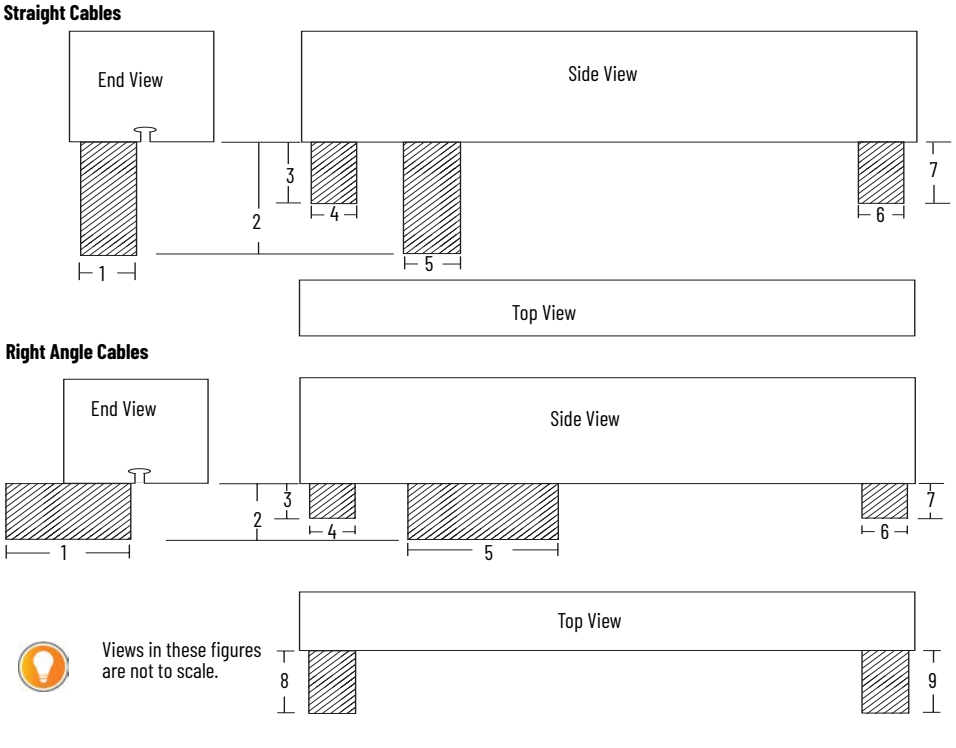
| Attribute | Units | Symbol | Motor Catalog | | |
|---|---|---|---|---|---|
| | | | MMI-QS-S10E10 | MMI-QS-S10E05 | MMI-QS-S10E03 |
| Current, peak | $A_{0-pk}$ | $I_p$ | 7.5 A | 7.5 A | 7.5 A |
| Current, continuous | $A_{0-pk}$ | $I_c$ | 2.0 A | 2.0 A | 2.0 A |
| Weight (appx.) | kg (lb) | | 15.0 (33.00) | 7.7 (17.00) | 5.1 (11.24) |
| Approximate Dimensions | mm (in.) | | 87.0 W x 978.0 L x 82.5 H (3.43 W x 38.50 L x 3.25 H) | 87.0 W x 498.0 L x 82.5 H (3.43 W x 19.61 L x 3.25 H) | 87.0 W x 306.0 L x 82.5 H (3.43 W x 12.05 L x 3.25 H) |

## *Cable Mounting Clearances - QuickStick 150*

The figure below provides approximate cable mounting clearance information for the QuickStick 150 motors. Dimensions are shown in millimeters (inches). Dimensions are not intended to be used for manufacturing purposes.

**Figure 2 - Cable Connector Mounting Clearance**

| Item | Dimension mm (in.) |
|---|---|
| **Straight Cables** | |
| 1 | 31.8 (1.3) |
| 2 | 203.2 (8.0) |
| 3 | 88.9 (3.5) |
| 4 | 25.4 (1.0) |
| 5 | 31.8 (1.3) |
| 6 | 88.9 (3.5) |
| 7 | 25.4 (1.0) |
| **Right Angle Cables** | |
| 1 | 88.9 (3.5) |
| 2 | 57.2 (2.3) |
| 3 | 38.1 (1.5) |
| 4 | 25.4 (1.0) |
| 5 | 203.2 (8.0) |
| 6 | 25.4 (1.0) |
| 7 | 38.1 (1.5) |
| 8 | 63.5 (2.5) |
| 9 | 63.5 (2.5) |




## *Motor Dimensions - QuickStick 150*

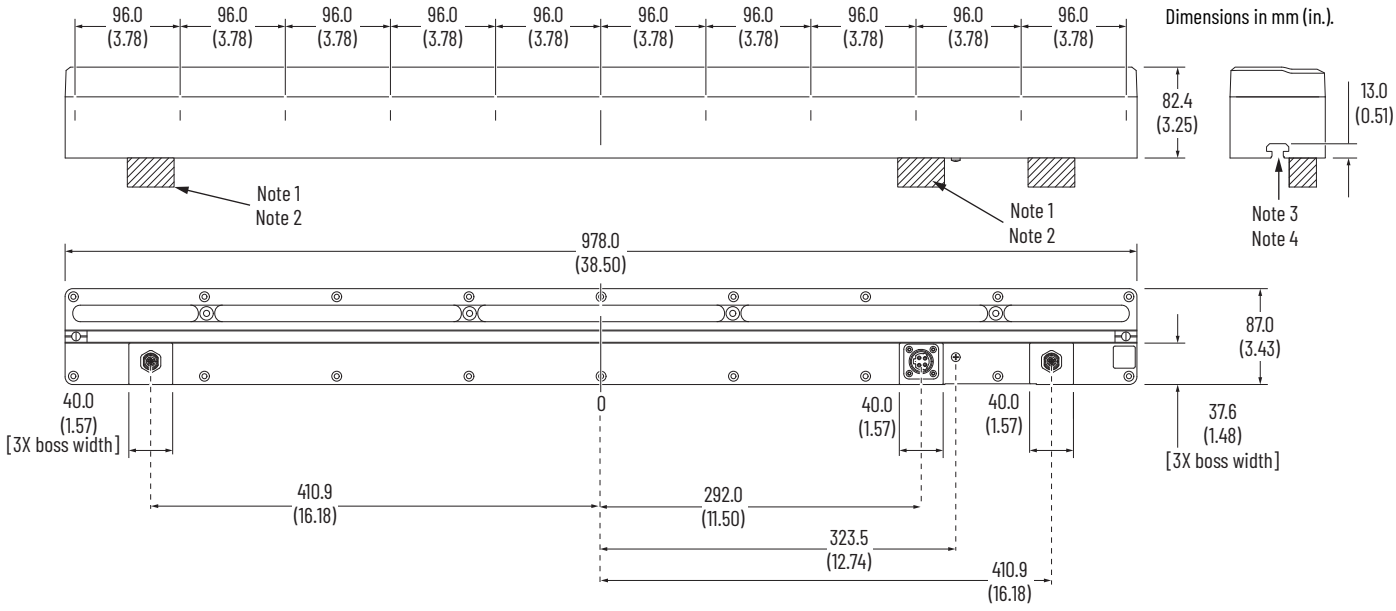
Refer to this table for notes in Figure 3...Figure 5. See the mechanical drawings and models from the product configurator website to access dimension tolerances, https://configurator.rockwellautomation.com/.

| Note | Description |
|---|---|
| 1 | Shading indicates clearance needed for power and communication cable connector, and wire bend radius. See Cable Mounting Clearances - QuickStick 150. |
| 2 | The centerline dimension for each connector is measured from the centerline of the motor. |
| 3 | T-slot accommodates Bosch™ 10 mm T-slot hardware (e.g. M8x1.25 mm; 10 mm T-block and spring Bosch Rexroth™ p/n: 3842528735 or 3842516669). |
| 4 | Do not allow mounting slot to protrude beyond top surface of the T-nut when fully torqued. |

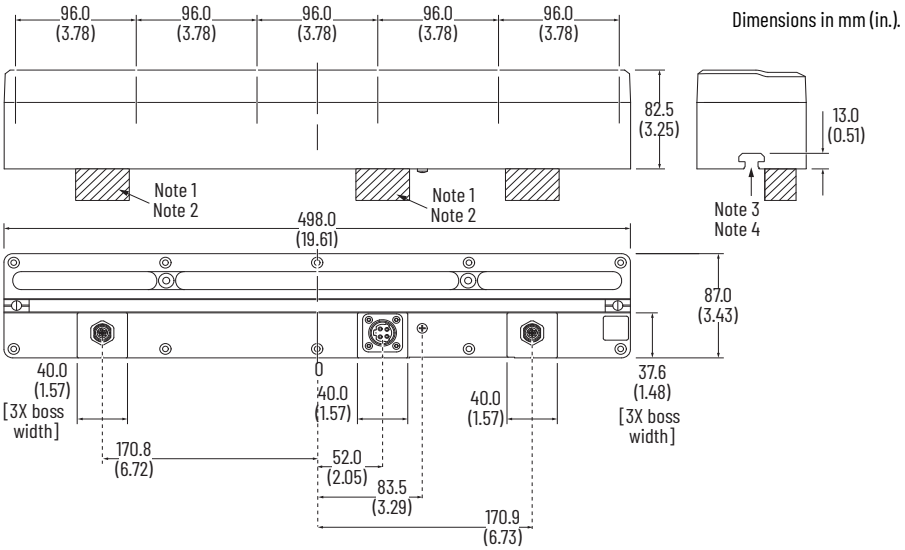
QuickStick 150 motor components are designed to metric dimensions. Inch dimensions are conversions from millimeters. Dimensions without tolerances are for reference. Dimensions are not intended to be used for manufacturing purposes.

The QuickStick 150 motor envelope is backward compatible to the QuickStick 100 motor.

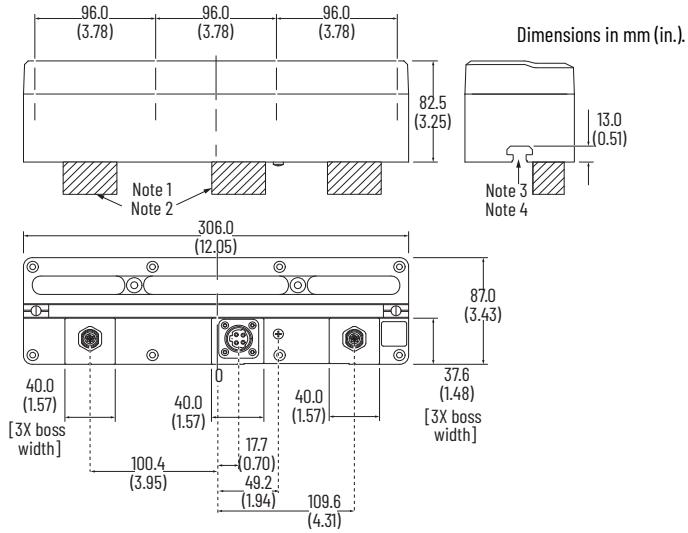
## Figure 3 - (MMI-QS-S10E10) Mechanical Drawing 1.0 Meter Motor




## Figure 4 - (MMI-QS-S10E05) Mechanical Drawing 0.5 Meter Motor




## Figure 5 - (MMI-QS-S10E03) Mechanical Drawing 0.3 Meter Motor



## QuickStick 100 Motors

These performance specifications apply to all QuickStick 100 motors. Dimensions are shown in millimeters (inches). Dimensions are not intended to be used for manufacturing purposes.

**Table 5 - QuickStick 100 Motor Specifications**

| Attribute | Units | Symbol | Motor Catalog | |
|---|---|---|---|---|
| | | | 700-1433-02 | 700-1433-03 |
| Current, peak | $A_{0-pk}$ | $I_p$ | 5 A | 5 A |
| Current, continuous | $A_{0-pk}$ | $I_c$ | 2 A | 2 A |
| Weight (appx.) | kg (lb) | | 13.2 (29.1) | 6.6 (14.6) |
| Approximate Dimensions | mm (in.) | | 87.0 W x 82.5 H x 978.0 L<br>(3.43 W x 3.25 H x 38.5 L) | 87.0 W x 82.5 H x 498.0 L<br>(3.43 W x 3.25 H x 19.6 L) |

*Motor Dimensions - QuickStick 100*

Refer to this table for notes in Figure 6...Figure 7. See the mechanical drawings and models from the product configurator website to access dimension tolerances, https://configurator.rockwellautomation.com/.

| Note | Description |
|---|---|
| 1 | Shading indicates clearance needed for power and communication cable connector, and wire bend radius. |
| 2 | The centerline dimension for each connector is measured from the centerline of the motor. |
| 3 | T-slot accommodates Bosch 10 mm T-slot hardware (e.g. M8x1.25 mm; 10 mm T-block and spring Bosch p/n: 3842528735 or 3842516669). |
| 4 | Do not allow mounting slot to protrude beyond top surface of the T-nut when fully torqued. |

**Figure 6 - (700-1433-02) Mechanical Drawing 1 Meter Motor**

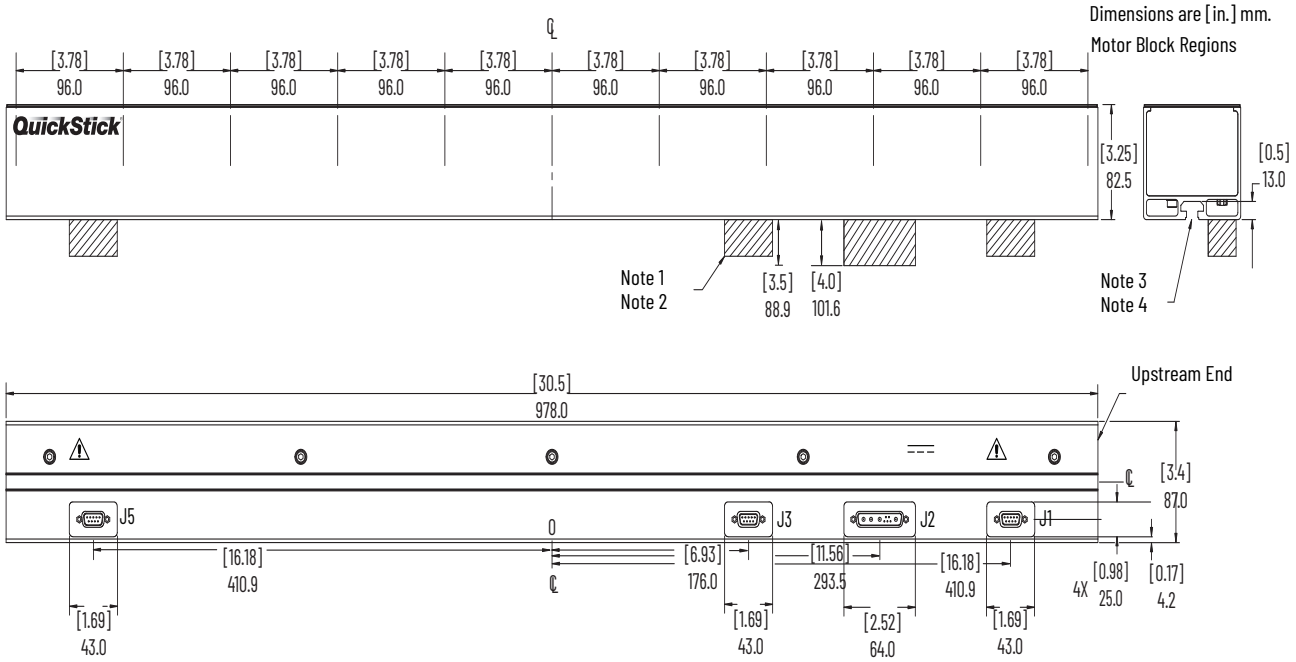
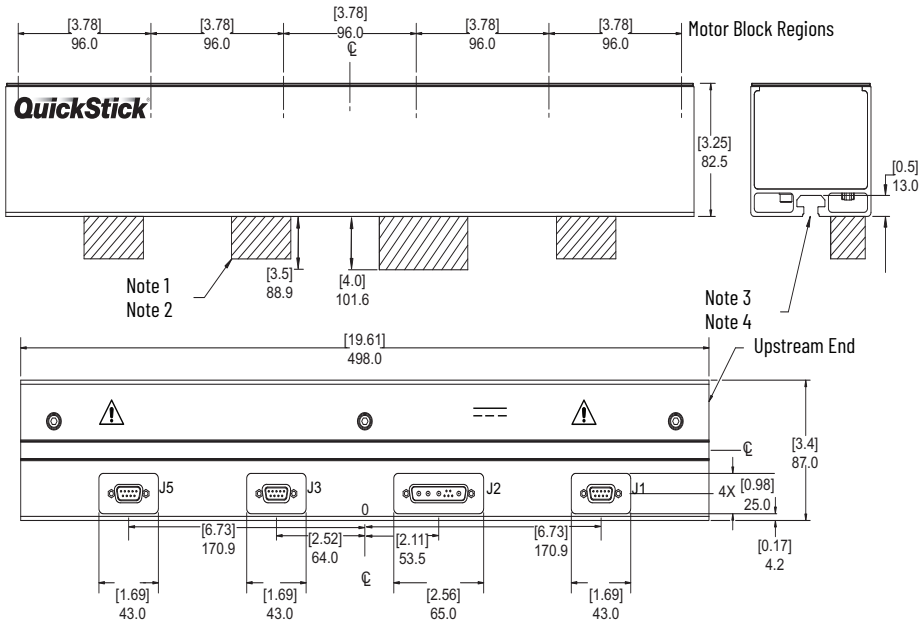


**Figure 7 - (700-1433-03) Mechanical Drawing 0.5 Meter Motor**




# Electrical Specifications

- Control power should be applied before bus voltage.
- Short circuit protection helps prevent a short due to an inverter shoot-through. Output short circuit protection is not needed due to internal connections to the motor. The product supports short circuit detection through a feature of the inverter gate drivers.

**ATTENTION:** Risk of equipment damage exists. Do not incorrectly wire the control or propulsion power supplies.

**Table 6 - Electrical Specifications**

| Attribute | QuickStick 150 | QuickStick 100 |
|---|---|---|
| Control Input Power (1) | 48V DC ±10% | 48V DC ±10% |
| Input Propulsion Power (2) | 48...72V DC ±10% (43...79V DC) | 48V DC ±10% |
| Stall Current | 1.5 A | 2.0 A |
| Maximum Regenerated Power | See QuickStick and QuickStick HT Design Guide, publication MMI-RM001 for information on power regeneration. | |
| Lowest Propulsion Power | 43V DC | |
| Maximum Propulsion Bus Voltage | 83V DC | 59V |
| Operating Voltage (not for direct connection to AC line) | 48...72V DC | 48V DC |
| Nominal DC Bulk Capacitance (per inverter) | > 100 µF | |
| Motor Control Power (max power) | 1 m – 10 W<br>48V DC ±10%, 0.5 A max | 1 m – 10 W<br>48V DC ±10%, 2 A typical, 5 A max |
| | 0.5 m – 5 W<br>48V DC ±10%, 0.5 A max | 0.5 m – 5 W<br>48V DC ±10%, 1 A typical, 2.5 A max |
| | 0.3 m – 5 W<br>48V DC ±10%, 0.5 A max | – |
| Propulsion Inverter Output Current, Continuous (0-pk) | 2.0 A | |
| Propulsion Inverter Output Current, Peak (0-pk) | 7.5 A | 5.0 A |
| Vehicle – Propulsion Power (3) | Variable | |
| Stall Threshold Current | 4 A | |
| Active Stall Time-out Current | 5 seconds (time when the drive has not moved the load more than one cycle) | |

(1) The number of cycles per minute the control input power is allowed to apply and remove from the drives must not exceed 1 cycle every 10 seconds.
(2) The number of cycles per minute the propulsion bus input power is allowed to apply and remove from the drives must not exceed three cycles every 1 min.
(3) The motor draws maximum power when the vehicle is moving at maximum acceleration and velocity. Contact Rockwell Automation Support for help with determining the correct power supply size based on the motor application and size of the magnet array.

**IMPORTANT** The motors draw additional power when the vehicle is moving or accelerating. The amount of additional power that is drawn depends on the velocity and acceleration of the vehicle, the number of vehicles accelerating, and the magnet array length.

- All power wiring must be sized to carry the full load and have proper circuit protection.
- The propulsion power input uses a PTC (positive temperature coefficient) resistor to limit inrush current upon application of power. The PTC is only used for inrush current limiting and is bypassed in normal operation. Limit cycling of the propulsion power to 30 seconds between each turn on and 10 seconds between turn off and turn on (power cycle).
- When using separate power sources for logic and propulsion power, the propulsion power and control power returns must be tied to ground.
  - For QS 100: If only propulsion power is supplied to the motors, connection to logic power is automatically made within the motor.
  - Required for QS 150 / optional for QS 100: Providing a separate power source for the logic power allows the motors to be programmed and configured without enabling the propulsion power.

**ATTENTION:** Risk of product and equipment damage. Never disable propulsion power by switching the propulsion input pin of the motor from the DC power source directly to ground. Switching the input to ground produces large current spikes that can damage the electronics.

- Any user-supplied power supply must meet local regulations and requirements.
- Do not plug or unplug the power cables if the power supply is turned on.

## QuickStick 150 Motors

**IMPORTANT** Typical power depends on load demand from vehicles.

- See (MMI-QS-S10E10) Mechanical Drawing 1.0 Meter Motor on page 8 for the mechanical drawing.
- See (MMI-QS-S10E05) Mechanical Drawing 0.5 Meter Motor on page 8 for the mechanical drawing.
- See (MMI-QS-S10E03) Mechanical Drawing 0.3 Meter Motor on page 8 for the mechanical drawing.

**Figure 8 - Motor Electrical Connections**

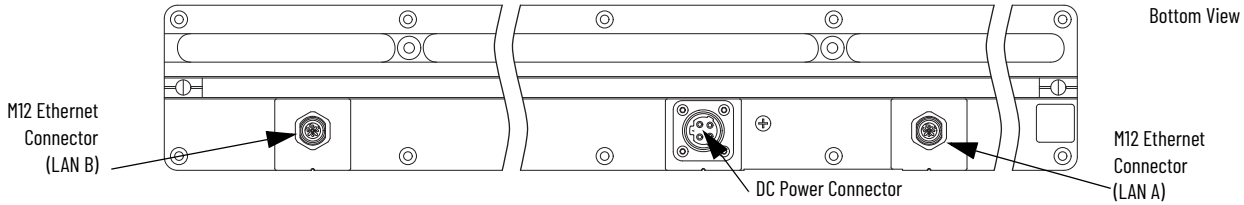



**Table 7 - Motor Connections**

| Label | Description | Connector Type |
|---|---|---|
| – | Input DC Power (1) | M24 |
| LAN A (2) | Ethernet | M12 |
| LAN B (2) | Ethernet | M12 |

(1) See Catalog Number Explanation - QuickStick 150 Power Cables and Figure 10...Figure 12 for cable types.
(2) See Communication Cables – QuickStick 150 for cable types.

**Table 8 - Motor Side Power Connector Pinout (1)**

| Pin | Description |
|---|---|
| 1 | DC Return |
| 2 | 48V DC Control |
| 3 | 48V DC Propulsion |
| 4 | PE (ground) |

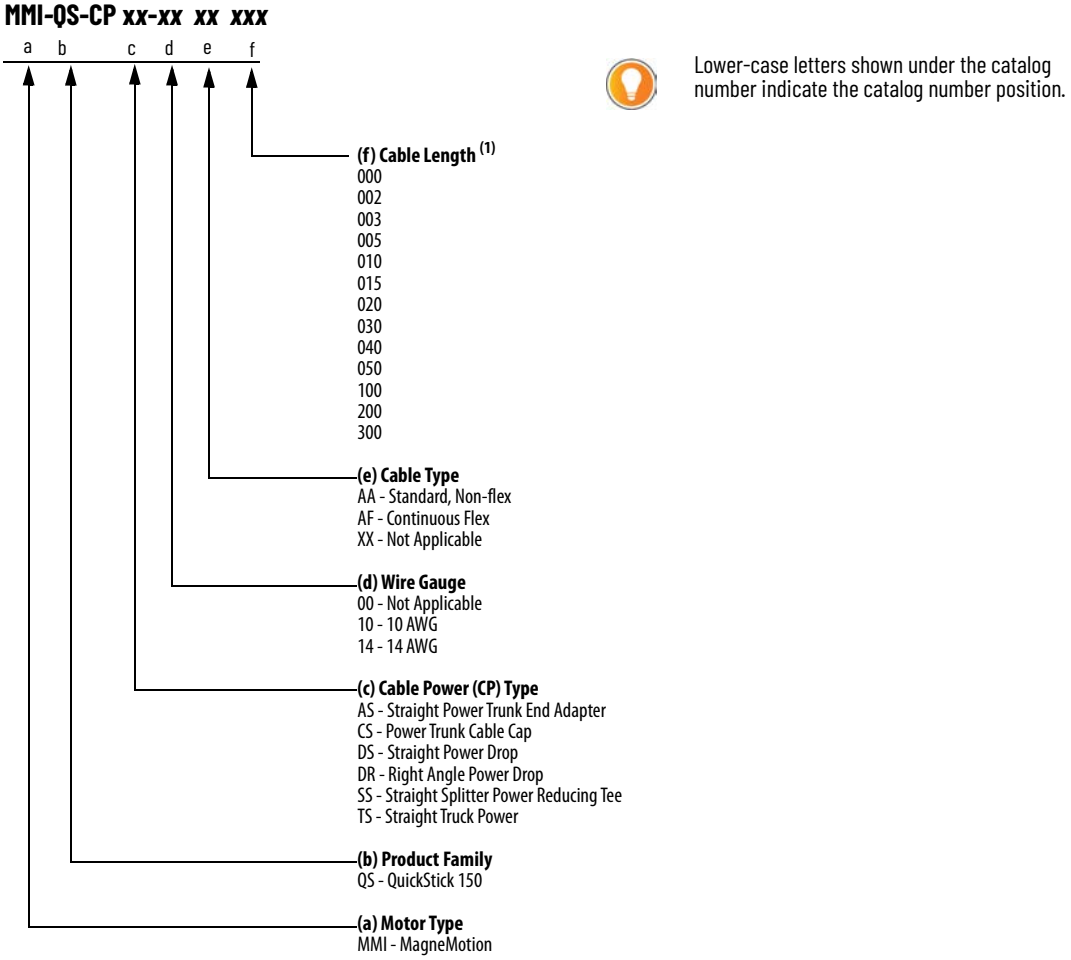
(1) The propulsion power input connector provides a connection to the protective earth (PE), this is tied to the case internally. The case must also have a separate ground connection.

**Table 9 - Ethernet Connector Pinouts**

| Pin | Description |
|---|---|
| 1 | TX+ |
| 2 | RX+ |
| 3 | RX- |
| 4 | TX- |

*Catalog Number Explanation - QuickStick 150 Power Cables*

Catalog numbers consist of various characters, each of which identifies a specific option for that component. Use the catalog number diagram that follows to understand the configuration of your QuickStick 150 motor power cables. For questions regarding product availability, contact your distributor.



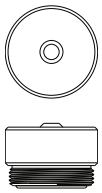

(1) Cable length is in decimeters, a decimeter is 0.1 m (e.g. cable length (f) 100 = 100 x 0.1 m = 10 m cable.

## *Motor Power Cables — QuickStick 150*

The QS 150 motor uses a trunk cable (from motor to motor or back to the power supply) and drop cables, shown in Figure 10...Figure 12, which provides power to the motors. This drop cable and tee connects the motor power to a nearby trunk cable. Each wire in the cable are labeled for identification.

For additional information related to motor power cable usage, see the QuickStick 150 User Manual, publication MMI-UM047. Dimensions are shown in millimeters (inches). Dimensions are not intended to be used for manufacturing purposes.

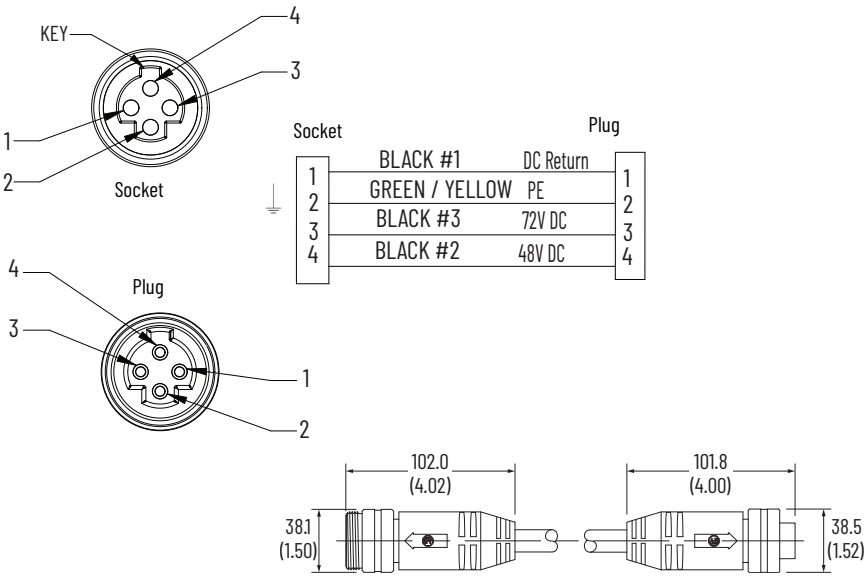
### Figure 9 - Power Trunk Cap (MMI-QS-CPCS-00XX000)



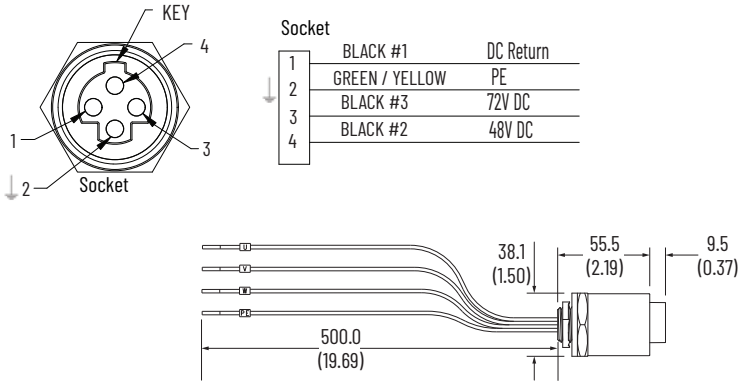
### Figure 10 - Power Trunk Cables

**(MMI-QS-CPTS-10AAxxx)**

Dimensions are in mm (in.).




**(MMI-QS-CPRS-00XX000)**



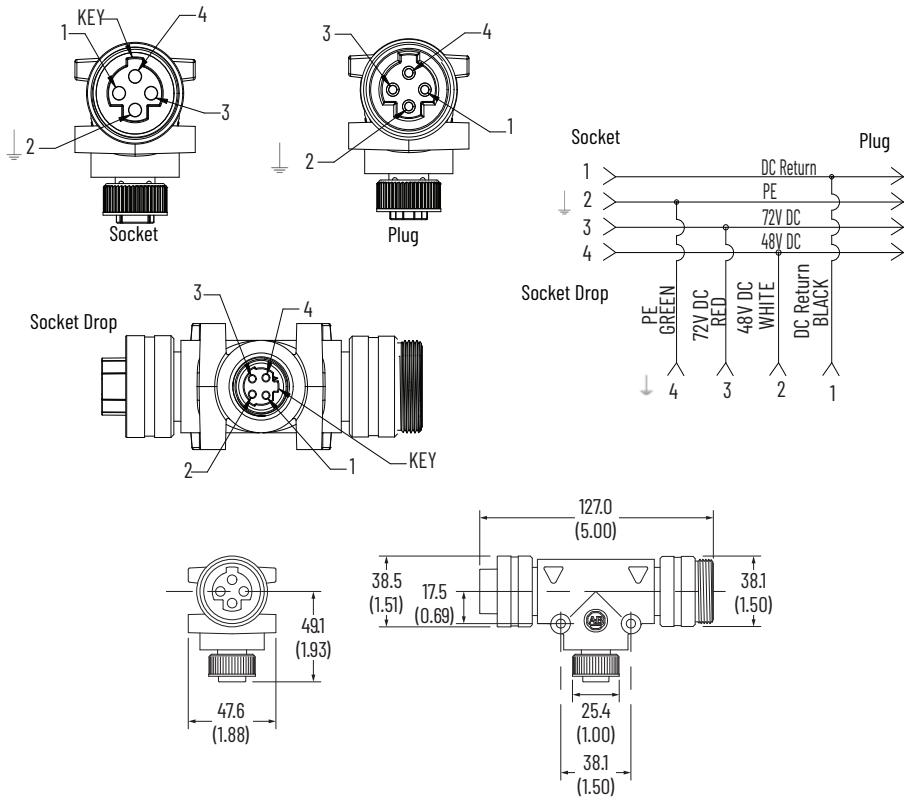

| | |
|---|---|
| **Mechanical** | |
| Couping Nut Housing | Black anodized aluminum/black PVC (polyvinyl chloride). |
| Insert | Black PVC |
| Cable Diameter | 19.68 mm ± 0.5 (0.775 in. ± 0.12 in.) |
| Bend Radius | Not to exceed 10 times the cable diameter |
| **Electrical** | |
| Contacts | Copper alloy with gold over nickel plating |
| Cable Rating | 100V DC |
| Assembly Rating | 4-pin, 10 AWG, 100V at 32 A |
| Short Circuit Current Rating (SCCR) | Trunk end: 32 A suitable for use on a circuit capable of delivering not more than 15,000 rms symmetrical amperes at 480Y/277V AC maximum when protected by cat. no. 1496-D circuit breaker not rated more than 96V / 100 A |
| **Environmental** | |
| Enclosure Rating (1) | IP66/IP67 |
| Operating Temperature | UL type TC 600V 90 °C (194 °F) dry, 75 °C (167 °F) wet, exposed run (ER) or MTW 600V 90 °C (194 °F) or STOOW 105 °C (221 °F) 600V - CSA STOOW 600V FT2 |

(1) To ensure IP66/IP67 ratings, tighten cable collars to 11 lb•in (1.24 N•m).

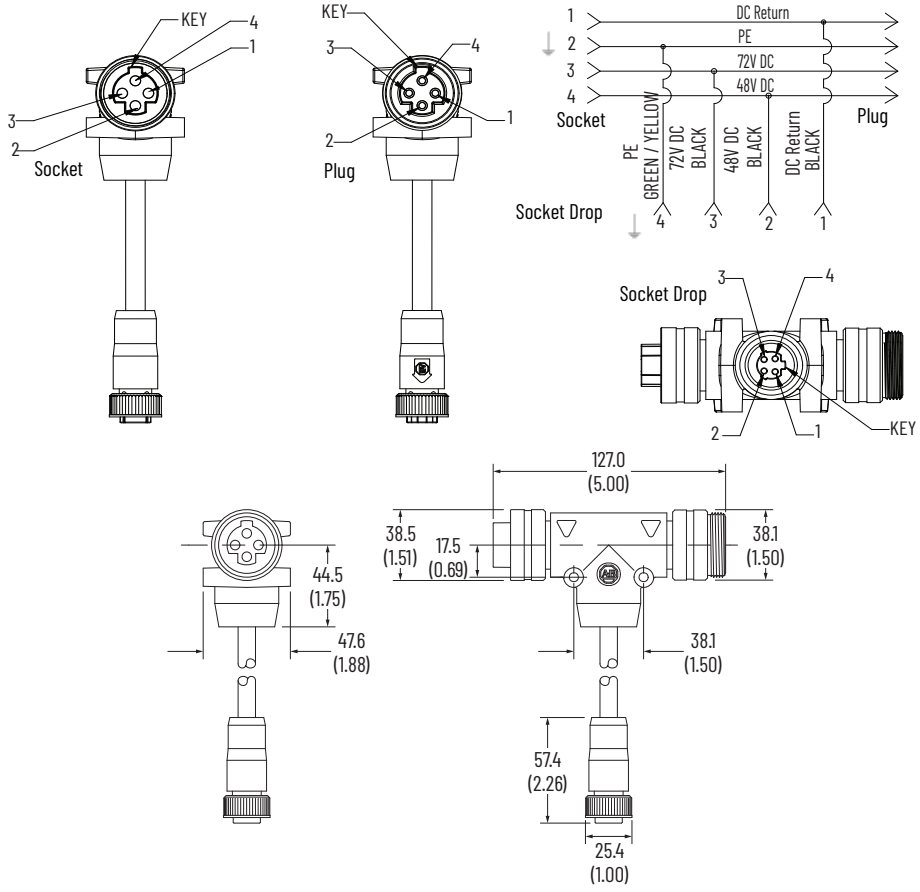
## Figure 11 - Power Reducing Tee and Cable

### Tee (MMI-QS-CPSS-00XX000)

Dimensions are in mm (in.).




### Tee Cable (MMI-QS-CPSS-00AA*xxx*)



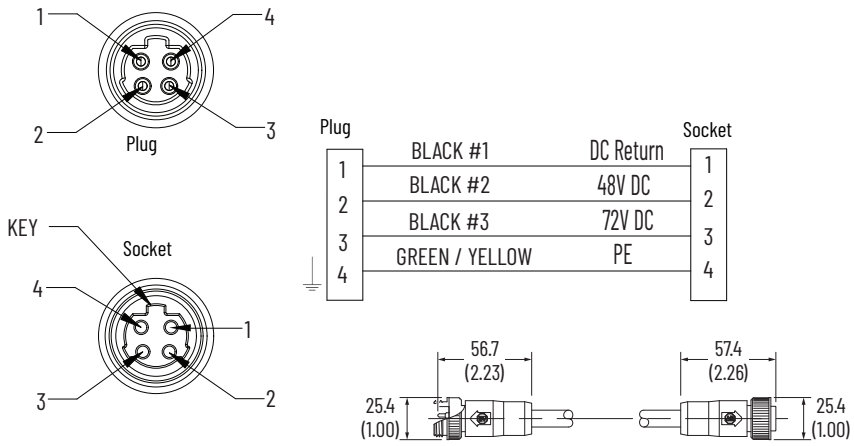

| | |
|---|---|
| **Mechanical** | |
| Couping Nut Housing | Black anodized aluminum (trunk), black zinc die cast (drop)/ black PVC |
| Insert | Black PVC |
| Cable Diameter [1] | 10.16 mm (0.4 in) |
| Bend Radius [1] | 101.6 mm (4.0 in) |
| **Electrical** | |
| Contacts | Copper alloy with gold over nickel plating |
| Cable Rating | 100V DC |
| Assembly Rating | Trunk tee: 32 A<br>Reducing tee: trunk 32 A<br>Drop 15 A reducer: 15 A |
| Short Circuit Current Rating (SCCR) | Reducing tee: 32 A<br>suitable for use on a circuit capable of delivering not more than 15,000 rms symmetrical amperes at 480Y/277V AC maximum when protected by cat. no. 1496-D circuit breaker not rated more than 96V / 100 A |
| **Environmental** | |
| Enclosure Rating [2] | IP66/IP67 |
| Operating Temperature | UL type TC 100V<br>90 °C (194 °F) dry, 75 °C (167 °F) wet, exposed run (ER), or<br>MTW 100V 90 °C (194 °F) or<br>STOOW 105 °C (221 °F) 100V -<br>CSA STOOW 100V FT2 |

(1) These values only apply to the MMI-QS-CPSS-00AA*xxx*.
(2) To ensure IP66/IP67 ratings, tighten cable collars to 11 lb•in (1.24 N•m).

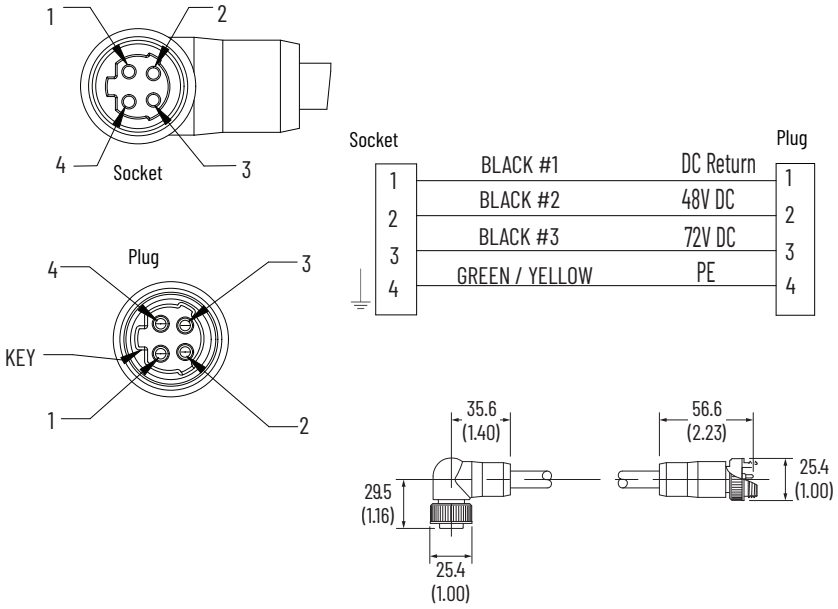
## Figure 12 - Power Drop Cables

Dimensions are in mm (in.).

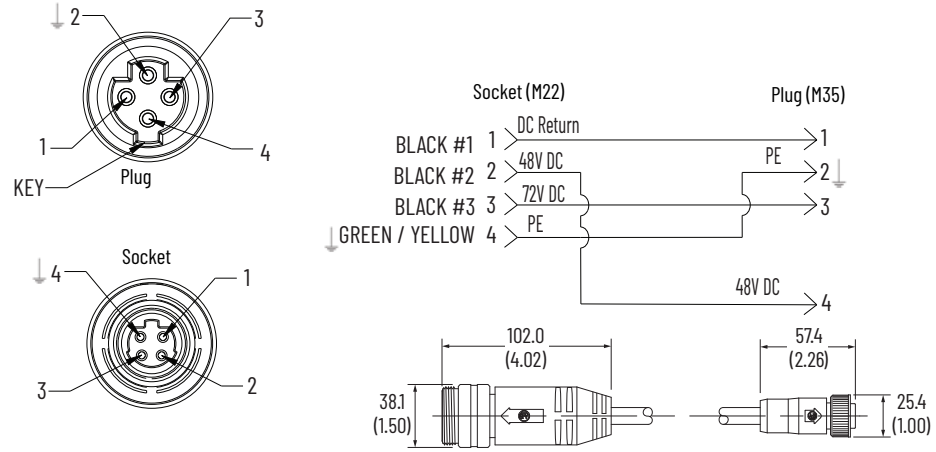
### (MMI-QS-CPDS-14AF*xxx*)




### (MMI-QS-CPDR-14AF*xxx*)




### (MMI-QS-CPAS-14AAxxx)




| **Mechanical** | |
|---|---|
| Couping Nut Housing | Black anodized aluminum/black PVC |
| Insert | Black PVC |
| Cable Diameter | 14.7 mm ± 0.5 mm (0.58 in. ± 0.12 in.) with four 14 AWG conductors |
| Bend Radius | Not to exceed 10 times the cable diameter |
| Flex Rating | 10 million cycles |
| **Electrical** | |
| Contacts | Brass with gold over nickel plating |
| Cable Rating | 100V DC |
| Assembly Rating | 4-pin, 14 AWG, 100V at 15 A |
| Short Circuit Current Rating (SCCR) | Drop cable: 32 A suitable for use on a circuit capable of delivering not more than 15,000 rms symmetrical amperes at 480Y/277V AC maximum when protected by cat. no. 1496-D circuit breaker, not rated more than 96V /100 A |
| **Environmental** | |
| Enclosure Rating (1) | IP66/IP67 |
| Operating Temperature | UL type TC 100V 90 °C (194 °F) dry, 75 °C (167 °F) wet, exposed run (ER) or MTW 100V 90 °C (194 °F) or STOOW 105 °C (221 °F) 100V - CSA STOOW 100V FT2 |

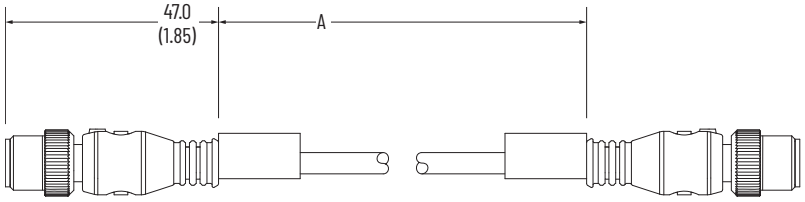
(1) To ensure IP66/IP67 ratings, tighten cable collars to 11 lb•in (1.24 N•m).

## *Communication Cables – QuickStick 150*

The Ethernet cables shown in Figure 13...Figure 15 are typically available in lengths [A] of 0.3...80.0 m (0.98...262.5 ft). See Ethernet Media Technical Data, publication 1585-TD001 for additional information.

For questions regarding product availability, contact your distributor. Dimensions are shown in millimeters (inches). Dimensions are not intended to be used for manufacturing purposes.

**Figure 13 - Communication Cable Assembly (1585D-M4TBDM-*x*)**




Dimensions are in mm (in.).

[A] =
0.3...80.0 m
(0.98...262.5 ft)

**Figure 14 - Communication Cable Assembly (1585D-M4TBJM-*x*)**

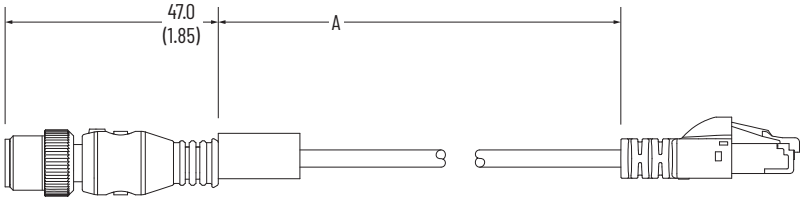
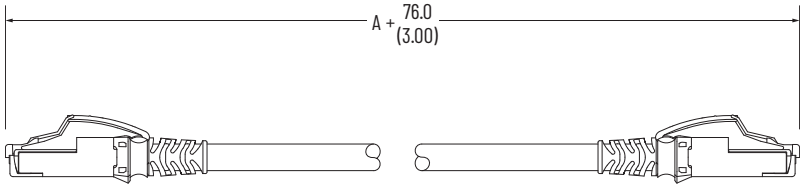



**Figure 15 - Communication Cable Assembly (1585J-M8TBJM-*x*)**

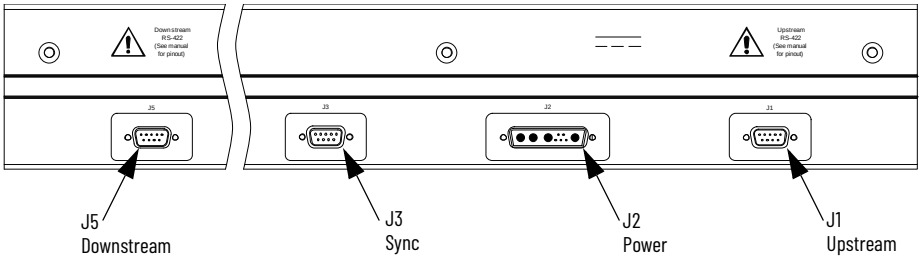


# QuickStick 100 Motors

**IMPORTANT** Typical power depends on load demand from vehicles.

- See Electrical Specifications on page 10 for the mechanical drawing.
- See (700-1433-02) Mechanical Drawing 1 Meter Motor on page 9 for the mechanical drawing.
- See (700-1433-03) Mechanical Drawing 0.5 Meter Motor on page 10 for the mechanical drawing.

### Figure 16 - Motor Electrical Connections




### Table 10 - Motor Connections

| Label | Description | Connector Type |
|---|---|---|
| J1 (1) | RS-422, upstream communications | DE-9, socket |
| J2 (2) | Power, 43...55.5V DC, 48V DC nominal<br>1 m motor – 2 A, 5 A max<br>0.5 m motor – 1 A, 2.5 A max | DB-9W4, plug |
| J3 | External synchronization | DE-9, socket |
| J5 (3) | RS-422, downstream communications | DE-9, plug |

(1) See Communication Cables – QuickStick 100 for cable types.
(2) See Catalog Number Explanation - QuickStick 100 Power Cables and Figure 17 for cable types.
(3) RS-422 Connector Communication Cable, see QuickStick 100 User Manual, publication MMI-UM006.

### Table 11 - Motor Side Power Connector Pinout

| Pin | Description |
|---|---|
| A1 | GND (PE) |
| A2 | 48V DC logic |
| A3 | 48V DC propulsion |
| A4 | 48V DC return |

| Pin | Description |
|---|---|
| 1 | – |
| 2 (1) | 48V DC logic |
| 3 | – |
| 4 (1) | 48V DC logic return |
| 5 (1) | GND (PE) |

(1) Pins 2, 4, and 5 provide connections for logic power. For existing installations, there is no need to change the power wiring. However, for new designs it is recommended that all power connections to the motor be made to pins A1...A4 only.

*Catalog Number Explanation - QuickStick 100 Power Cables*

Catalog numbers consist of various characters, each of which identifies a specific option for that component. Use the catalog number diagram that follows to understand the configuration of your QuickStick 100 motor power cables. For questions regarding product availability, contact your distributor.

For additional information related to motor power cable usage, see the QuickStick 100 User Manual, publication MMI-UM006. Dimensions are shown in millimeters (inches). Dimensions are not intended to be used for manufacturing purposes.

**700 - *xxxx* - 00**

a b c

**(c) Cable Length**
00 - 2 meters

**(b) Product Family**
1640 - QS 100 External Power Supply Cable Assembly (water resistant)
1635 - QS 100 External Power Supply Cable Assembly

**(a) Motor Type**
700 - MagneMotion

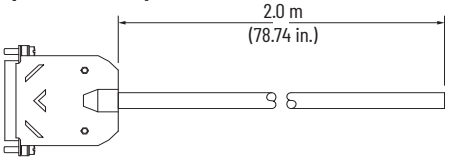
Not all cable are available in all lengths. Contact your local distributor for available lengths.

Lower-case letters shown under the catalog number indicate the catalog number position.

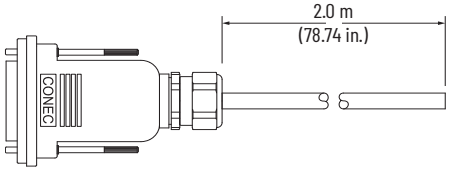
**Figure 17 - Power Cable Assembly**

| Pin | Description | Color |
|---|---|---|
| A1 | GND (PE) | Green |
| A2 | +48V DC Logic | White |
| A3 | +48V DC Propulsion | Red |
| A4 | 48V Return | Black |
| 1 | No connect | – |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |

**(700-1635-*xx*)**




**(700-1640-*xx*) Water Resistant**



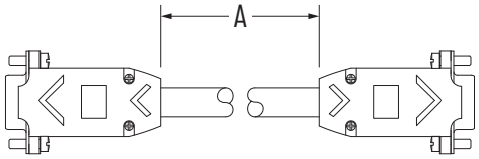

| | |
|---|---|
| **Mechanical** | |
| Couping Nut Housing | Tin plated steel |
| Insert | Green PBTP |
| Cable Diameter | 9.5 mm (0.38 in.) |
| Bend Radius | 95.5 mm (3.76 in.) |
| **Electrical** | |
| Contacts | Gold over nickel plating |
| Cable Rating | 100V DC |
| Assembly Rating | 4-wire, 16 AWG, 100V at 12 A |
| Short Circuit Current Rating (SCCR) | 12 A Suitable for use on a circuit capable of delivering not more than 15,000 RMS symmetrical amperes at 480Y/277V AC maximum when protected by Cat. No. 1496-D circuit breaker not rated more than 96V / 100 A |
| **Environmental** | |
| Enclosure Rating (1) | Designed for IP54<br>Designed for IP65 with gland connectors |
| Operating Temperature | 0...50 °C (32...122 °F) |

(1) To ensure IP66/IP67 ratings, tighten cable collars to 11 lb•in (1.24 N•m).

## *Communication Cables – QuickStick 100*

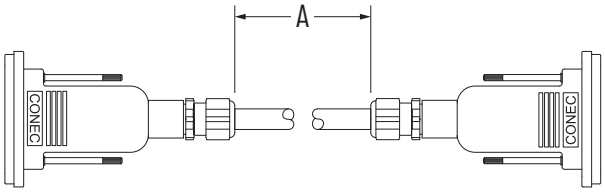
For questions regarding product availability, contact your distributor. For information related communication and RS-422 cables for the QuickStick 100, see the QuickStick 100 User Manual, publication MMI-UM006 and Figure 18...Figure 21. Dimensions are shown in millimeters (inches). Dimensions are not intended to be used for manufacturing purposes.

**Figure 18 - Communication Cable Assembly (700-0663-*xx*)**



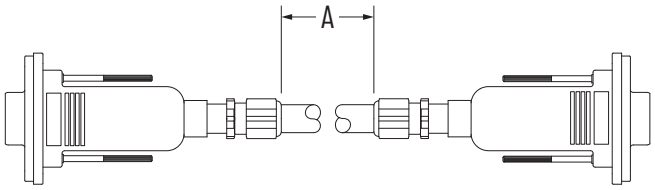

| Cat. No. | Description | Length [A] m (ft) |
|---|---|---|
| 700-0663-00 | Communication cable, flex | 3.2 (10.33) |
| 700-0663-01 | | 5.0 (16.40) |
| 700-0663-02 | | 20.0 (65.62) |

**Figure 19 - Extension Communication Cable, Water Resistant (700-0757-*xx*)**



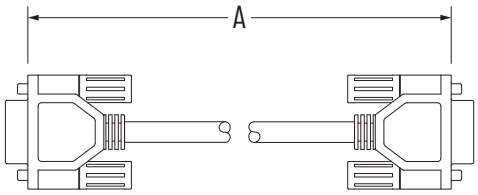

| Cat. No. | Description | Length [A] m (ft) |
|---|---|---|
| 700-0757-00 | Extension communication cable, plug/socket, water resistant | 1.0 (3.28) |
| 700-0757-01 | | 5.0 (16.40) |
| 700-0757-02 | | 1.8 (5.91) |
| 700-0757-03 | | 7.6 (25.00) |
| 700-0757-04 | | 10.0 (32.80) |
| 700-0757-05 | | 12.0 (39.37) |

**Figure 20 - Communication Cable, Flex, Water Resistant (700-1367-*xx*)**




| Cat. No. | Description | Length [A] m (ft) |
|---|---|---|
| 700-1367-00 | Communication cable, flex, water resistant | 3.2 (10.33) |
| 700-1367-01 | | 5.0 (16.40) |

**Figure 21 - Extension Communication Cable (100-2090-*xx*)**




| Cat. No. | Description | Length [A] m (ft) |
|---|---|---|
| 100-2090-00 | Extension communication cable, Plug/socket | 0.91 (3.0) |
| 100-2090-01 | | 1.83 (6.0) |
| 100-2090-02 | | 3.05 (10.0) |
| 100-2090-03 | | 4.57 (15.0) |
| 100-2090-04 | | 7.62 (25.0) |
| 100-2090-05 | | 15.24 (50.0) |

# Regulatory Compliance

See rok.auto/certifications for current product certifications.

Other sections of this manual may include additional regulatory information. These components comply with the regulations from the organizations that are indicated in Table 12.

**ATTENTION:** It is the responsibility of the end user/third party integrator to make sure that the installed QuickStick 150 transport system complies with the appropriate facility, local, and national regulations.

**Table 12 - QuickStick Regulatory Information**

| Organization | Regulations | |
|---|---|---|
| | QuickStick 150 | QuickStick 100 |
| CE (Conformité Européenne) – The European safety requirements | • European Union 2014/30/EU EMC Directive compliant with EN 61326-1 "Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements"<br>• European Union 2014/35/EU Low Voltage Directive compliant with EN 61010-1 "Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements"<br>• European Union 2014/35/EU Restriction of Hazardous Substances (RoHS) Directive compliant with EN IEC 63000 "Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances" | |
| cULus | UL Recognized to U.S. and Canadian safety standards (UL 61010-1, File E466939) | |
| China RoHS | Restriction of Hazardous Substances (RoHS) Directive SJ/T11363-2006, SJ/T11365/2006 | |
| REACH | Registration, Evaluation and Authorization of Chemicals (REACH) Regulation 1907/2006 | |
| EU WEEE | EU Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC as amended by 2003/108/EC | |
| KCC | Korean Registration of Broadcasting and Communications Equipment, compliant with:<br>• Article 58-2 of Radio Waves Act, Clause 3<br>• Registration number: R-REM-RAA-MMI | |
| RCM | Australian Radiocommunications Act, compliant with:<br>• Radiocommunications Act: 1992 (including Amendments up to 2017)<br>• Radiocommunications (Electromagnetic Compatibility) Standard: 2017<br>• Radiocommunications Labeling (Compliance Labeling - Incidental Emissions) Notice: 2017 | |
| UKCA | 2016 No. 1091: Electromagnetic Compatibility Regulations (EMC)<br>2016 No. 1101: Electrical Equipment (Safety) Regulations (LV)<br>2012 No. 3032: Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations (RoHS) | |
| Morocco | Arrêté ministériel n° 6404-15 du 1 er muharram 1437 (15 octobre 2015)<br>Arrêté ministériel n° 6404-15 du 29 ramadan 1436 (16 juillet 2015) | |

The QuickStick components are CE-compliant. To determine if a specific component is CE-compliant, check for the CE marking on the component.

The QuickStick components are UL Recognized in Canada and the United States. To determine if a specific component is UL Recognized, check for the UL Recognized Mark on the component. Some examples of the Mark may not display the 'C' and 'US'.

# QuickStick Magnet Array

The magnet array is enclosed using a stainless steel cover and is attached to the vehicle with standard hardware and acts as the QuickStick motor secondary to move payloads through the track system. The magnetic attractive force present per magnet cycle and the required thrust must be accounted for with the QuickStick motors, see Table 13. Guidance on how to calculate thrust and attractive force are available in the MagneMotion QuickStick and QuickStick HT Design Guide, publication MMI-RM001.

**Table 13 - Standard Covered Magnet Array Features**

| Attribute | Description |
|---|---|
| Magnet Array Motion | Up to five magnet arrays in motion or in queue per meter length [150 mm (5.9 in.)] |
| Magnet Array Width (1) | Two widths: 78.0 mm (3.07 in.) and 128.6 mm (5.06 in.). |
| Magnet Array Length (1) | Lengths from 3...20 cycles long [142.5 mm...958.5 mm (5.6 in....37.7 in.)] |
| Exposed Materials | Base plate (back iron) is zinc-plated steel |
| | The magnet array is enclosed in a stainless steel cover. |

(1) See Table 15 for magnet array mechanical specifications.

## Specifications - Magnet Array

- Propulsive force applied to the vehicle scales with the magnet array coverage and motor to magnet gap.
- All vehicles on a continuous track system must be the same length and use the same type of magnet array.
- Thrust force and attractive force curves for determining the appropriate magnet array for a specific application are available in the MagneMotion QuickStick and QuickStick HT Design Guide, publication MMI-RM001.
- All precautions for handling high-strength neodymium magnets must be observed when using these magnet arrays. Refer to your local regulations and requirements for specifications.

See the QuickStick 150 User Manual, publication MMI-UM047 or the QuickStick 100 User Manual, publication MMI-UM006 for information on handling magnet arrays.

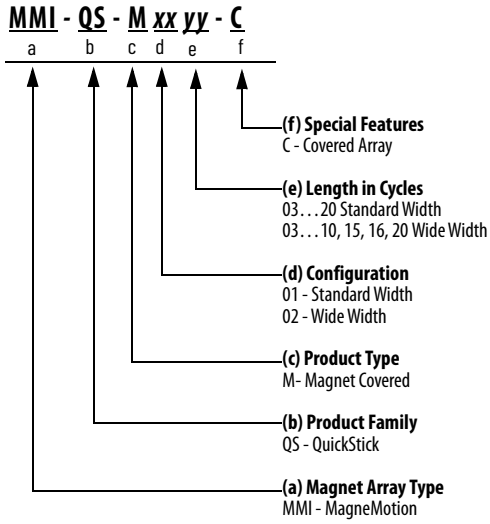
See Table 15 on page 22 for magnet weights.

**Table 14 - Magnet Array Environmental Ratings**

| Category | Description |
|---|---|
| Magnet Array | Operating: 0...50 °C (32...122 °F)<br>Storage: -18...+50 °C (0...122 °F) |
| | QuickStick motors support a minimum of 1.0 mm and maximum 10 mm air gap to standard covered arrays (MMI-QS-M*xxx*-*x*). |
| Relative Humidity | 85% Maximum (relative, noncondensing) |

## Catalog Number Explanation - Magnet Array

Catalog numbers consist of various characters, each of which identifies a specific option for that component. Use the catalog number diagram to understand the configuration of the magnet array.




Lower-case letters shown under the catalog number indicate the catalog number position.

# Mechanical Specifications - Magnet Array

Contact Rockwell Automation Techical Support for current detail drawings or visit the product configuration website https://configurator.rockwellautomation.com/.

Stainless-steel covered magnet arrays are available in two widths: Standard width (-01) is 78.0 mm (3.07 in.) and Wide width (-02) is 128.6 mm (5.06 in.). Both widths are available in lengths from 3 cycles to 20 cycles. See Table 15.

Figure 22 shows a MMI-QS-M0303-C, standard width, 3 cycle array for reference. The quantity and locations of the mounting holes vary based on the size of the array.

## *Covered Magnet Arrays*

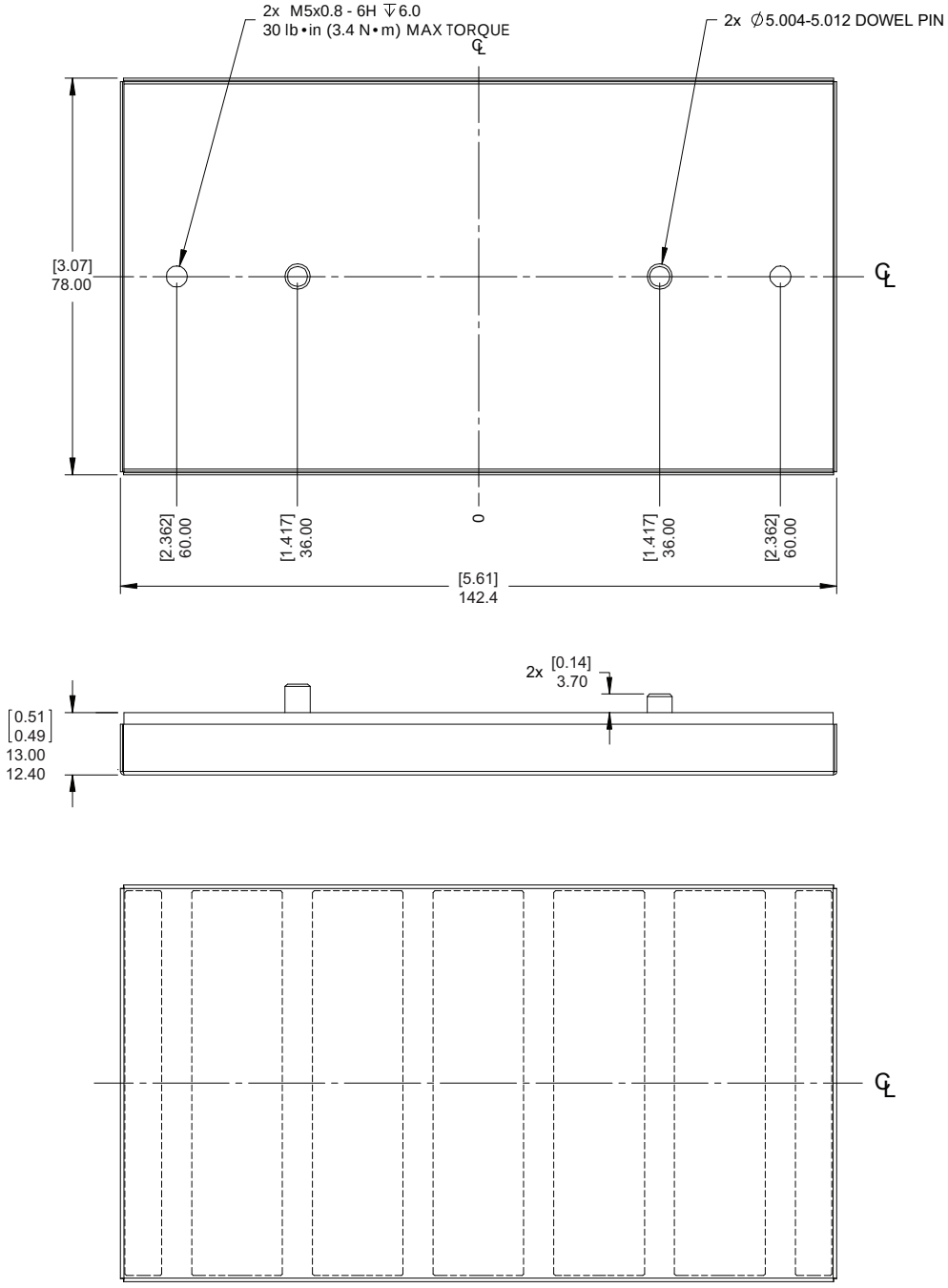
Dimensions are shown in millimeters (inches). Dimensions are not intended to be used for manufacturing purposes.

**Table 15 - Covered Magnet Array Lengths and Weights**

| Cycles Length | Catalog Number (1) | Length mm (in.) | 78.0 mm (3.07 in.) Standard Width (-01) | 128.6 mm (5.06 in.) (2) Wide Width (-02) |
|---|---|---|---|---|
| | | | Weight kg (lb) | Weight kg (lb) |
| 03 | MMI-QS-Mxx03-C | 142.4 (5.6) | 0.9 (2.1) | 1.5 (3.4) |
| 04 | MMI-QS-Mxx04-C | 190.5 (7.5) | 1.2 (2.7) | 2.0 (4.5) |
| 05 | MMI-QS-Mxx05-C | 238.5 (9.4) | 1.6 (3.4) | 2.5 (5.6) |
| 06 | MMI-QS-Mxx06-C | 286.5 (11.3) | 1.9 (4.1) | 3.1 (6.7) |
| 07 | MMI-QS-Mxx07-C | 334.5 (13.2) | 2.2 (4.8) | 3.6 (7.9) |
| 08 | MMI-QS-Mxx08-C | 382.5 (15.1) | 2.5 (5.5) | 4.1 (9.0) |
| 09 | MMI-QS-Mxx09-C | 430.5 (16.9) | 2.8 (6.2) | 4.6 (10.1) |
| 10 | MMI-QS-Mxx10-C | 478.5 (18.8) | 3.1 (6.9) | 5.1 (11.2) |
| 11 | MMI-QS-M0111-C | 526.5 (20.7) | 3.4 (7.4) | – |
| 12 | MMI-QS-M0112-C | 574.5 (22.6) | 3.7 (8.1) | – |
| 13 | MMI-QS-M0113-C | 622.5 (24.5) | 4.0 (8.8) | – |
| 14 | MMI-QS-M0114-C | 670.5 (26.4) | 4.3 (9.5) | – |
| 15 | MMI-QS-Mxx15-C | 718.5 (28.3) | 4.7 (10.4) | 7.6 (16.8) |
| 16 | MMI-QS-M0116-C | 766.5 (30.2) | 5.0 (11.0) | 8.0 (17.6) |
| 17 | MMI-QS-M0117-C | 814.5 (32.1) | 5.3 (11.7) | – |
| 18 | MMI-QS-M0118-C | 862.5 (34.0) | 5.6 (12.3) | – |
| 19 | MMI-QS-M0119-C | 910.5 (35.9) | 5.9 (13.0) | – |
| 20 | MMI-QS-Mxx20-C | 958.5 (37.8) | 6.2 (13.7) | 10.2 (22.4) |

(1) In the catalog number the *xx* represents the width (-01) or -(02).
(2) Wide magnet arrays are typically used when motors are arranged in a curve to provide better motor coverage.

## Figure 22 - Covered Magnet Array Mechanical Drawing




Weight: See Table 15.

Dimensions are [in.] mm.

## Notes:

# Additional Resources

These documents contain additional information concerning related products from Rockwell Automation. You can view or download publications at rok.auto/literature.

| Resource | Description |
|---|---|
| MagneMotion QuickStick and QuickStick HT Design Guide, publication MMI-RM001 | This manual explains how to design and configure the track layout and QuickStick® transport system. |
| QuickStick Motor Migration Guide, publication MMI-RM002 | This manual explains how to migrate from a QuickStick 100 motor to a QuickStick 150 motor. |
| MagneMotion System Configurator User Manual, publication MMI-UM046 | This manual explains how to use the MagneMotion® Configurator to create and modify the Node Controller Configuration File (Configuration File) for the QuickStick (QS) transport system. |
| MagneMotion Node Controller Interface User Manual, publication MMI-UM001 | This manual explains how to use the supplied interfaces to configure and administer node controllers that are used with transport systems. This manual also provides basic troubleshooting information. |
| MagneMotion Node Controller Hardware User Manual, publication MMI-UM013 | This manual explains how to install and maintain the node controllers that are used with MagneMover® LITE™ and QuickStick transport systems. |
| MagneMotion LSM Synchronization Option User Manual, publication MMI-UM005 | This manual explains how to install, operate, and maintain the linear synchronous motor (LSM) synchronization option for use with transport systems. |
| MagneMotion NCHost TCP/IP Interface Utility User Manual, publication MMI-UM010 | This manual explains how to use the NCHost TCP/IP Interface Utility to run a transport system for testing and debugging. This manual also explains how to develop Demo Scripts to automate vehicle motion for that testing. |
| MagneMotion Virtual Scope Utility User Manual, publication MMI-UM011 | This manual explains how to install and use the MagneMotion Virtual Scope utility. This utility provides real-time feedback of the change in Linear Synchronous Motor performance parameters. |
| MagneMotion Host Controller TCP/IP Communication Protocol User Manual, publication MMI-UM003 | These manuals describe the communication protocols between the high level controller and a host controller. These manuals also provide basic troubleshooting information. |
| MagneMotion Host Controller TCP/IP Communication Protocol User Manual, publication MMI-UM004 | |
| Power Supply Reference Manual 1606-XLS960F-3, publication 1606-RM032 | The manual provides the specifications for the 1606 power supplies. |
| QuickStick 100 User Manual, publication MMI-UM006 | This manual explains how to install, operate, and maintain the QuickStick 100 transport system. This manual also provides information about basic troubleshooting. |
| QuickStick 150 User Manual, publication MMI-UM047 | This manual explains how to install, operate, and maintain the QuickStick 150 motors and magnet arrays. This manual also provides information about basic troubleshooting. |
| EtherNet/IP Network Devices User Manual, publication ENET-UM006 | Describes how to configure and use EtherNet/IP devices to communicate on the EtherNet/IP network. |
| Ethernet Reference Manual, publication ENET-RM002 | Describes basic Ethernet concepts, infrastructure components, and infrastructure features. |
| System Security Design Guidelines Reference Manual, publication SECURE-RM001 | Provides guidance on how to conduct security assessments, implement Rockwell Automation products in a secure system, harden the control system, manage user access, and dispose of equipment. |
| UL Standards Listing for Industrial Control Products, publication CMPNTS-SR002 | Assists original equipment manufacturers (OEMs) with construction of panels, to help ensure that they conform to the requirements of Underwriters Laboratories. |
| American Standards, Configurations, and Ratings: Introduction to Motor Circuit Design, publication IC-AT001 | Provides an overview of American motor circuit design based on methods that are outlined in the NEC. |
| Industrial Components Preventive Maintenance, Enclosures, and Contact Ratings Specifications, publication IC-TD002 | Provides a quick reference tool for Allen-Bradley® industrial automation controls and assemblies. |
| Safety Guidelines for the Application, Installation, and Maintenance of Solid-state Control, publication SGI-1.1 | Designed to harmonize with NEMA Standards Publication No. ICS 1.1-1987 and provides general guidelines for the application, installation, and maintenance of solid-state control in the form of individual devices or packaged assemblies incorporating solid-state components. |
| 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 (PCDC) website, rok.auto/pcdc | Get help determining how products interact, check features and capabilities, and find associated firmware updates to download. |

## Rockwell Automation Support

Use these resources to access support information.

| | | |
|---|---|---|
| **Technical Support Center** | Find help with how-to videos, FAQs, chat, user forums, Knowledgebase, and product notification updates. | rok.auto/support |
| **Local Technical Support Phone Numbers** | Locate the telephone number for your country. | rok.auto/phonesupport |
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| **Product Compatibility and Download Center (PCDC)** | Download firmware, associated files (such as AOP, EDS, and DTM), and access product release notes. | rok.auto/pcdc |

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



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