Kyntronics
Innovation in Motion

CONNECT TROUBLESHOOTING GUIDE

DRIVE AND COMMUNICATION DEBUGGING

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REVISION HISTORY

Revision	Description of Change	Date (MM-DD-YYYY)	Revised by
A	Preliminary, created	8/1/2025	NW

TABLE OF CONTENTS

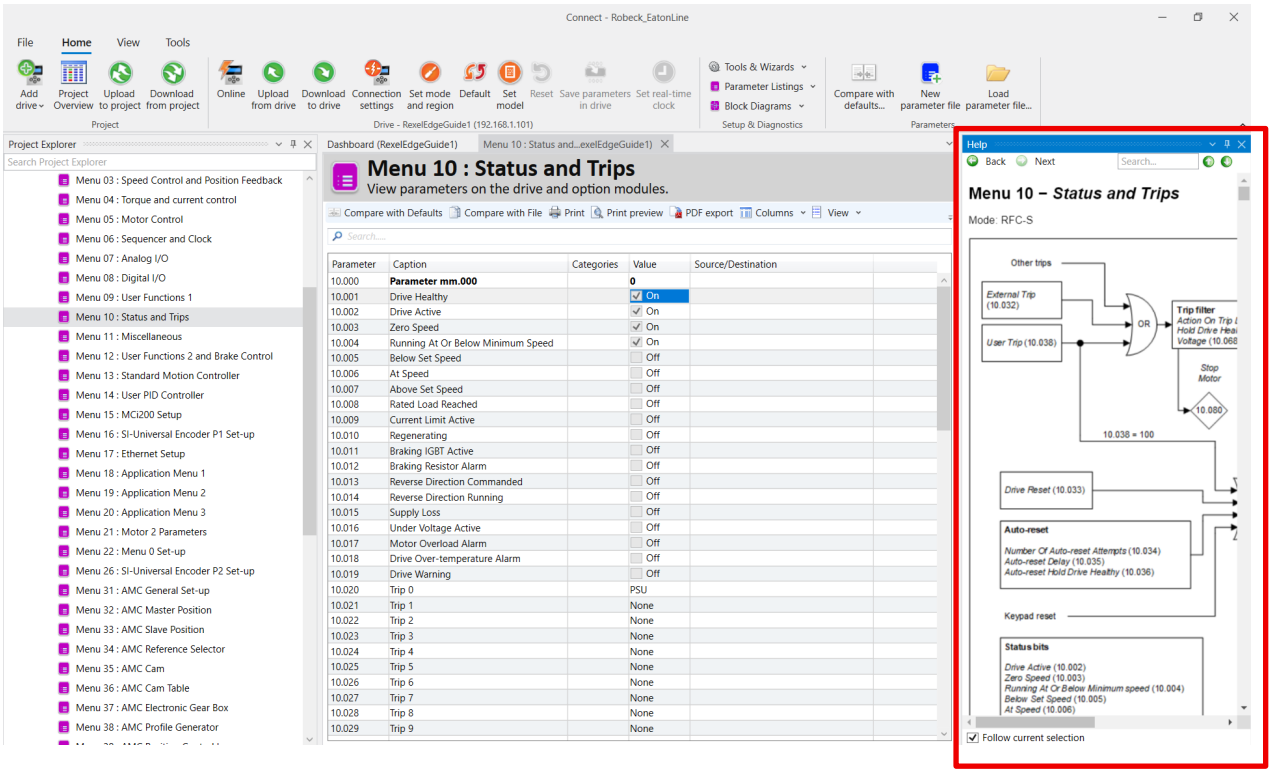
1 PURPOSE

To provide guidelines for troubleshooting Kyntronics Smart Hydraulic Actuator (SHA) through Nidec Connect.

2 CONNECT SOFTWARE FEATURES

2.1 Help Menu

The drive configuration software Connect has a built in Help window that can be used to understand menus, parameters, and errors/trips. Furthermore, the help menu is embedded throughout the Connect software and automatically displays relevant help depending on the surrounding context.

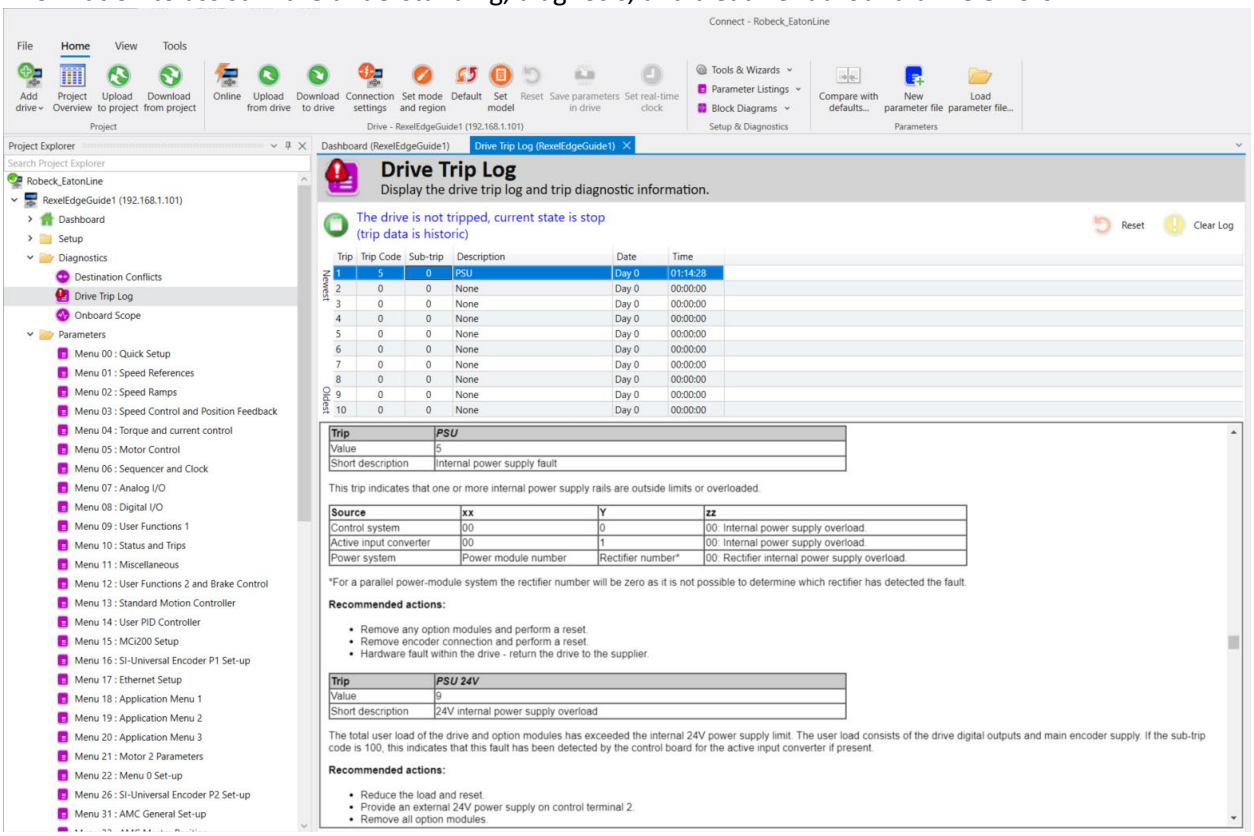


Custom menus, like MCi200 Menu 70 and 71 or Drive application menu 1-3, are set up by the user. As such, the help menu will only see these parameters as read or write, or both, integers or bits. Such menu parameters, that are used, are instead discussed in Kyntronics actuator manuals or Kyntronics connect startup guides.

The Help window can be found by clicking view in the toolbar and then selecting “Help”.

2.2 Drive Trip Log

Connect also has a built in Diagnostics section with a Drive Trip Log with attached trip diagnostic information to assist in the understanding, diagnosis, and treatment around drive errors.



3 FAULTS

The built-in (single digit) display will signal trip codes by scrolling in the form “E###-###”.
The first number is the trip code, and the second is the subtrip code.
Hardware faults are signaled in the form “HF-###”.

The optional display/keypad decodes most faults to a description in English.

The red Reset button on the keypad will clear a fault unless its cause persists, such as undervoltage.

Bit 15 in the COMMAND register performs the same function as the red Reset button on the keypad.

The FAULTCODE input register in the interface holds the current or last fault code reported by the drive.
It does not go to zero when the fault is cleared. (But the Faulted bit in STATUS does.)
Its value is a composite of two fault registers within the drive.

The MSW (top 16 bits) are the Trip Value, from drive menu 10.020.

The LSW (bottom 16 bits) are the Sub-Trip Value from menu 10.070.

The Nidec/CT M750 User Guide section 13.4 has 35 pages of trip codes. Here are the common ones:

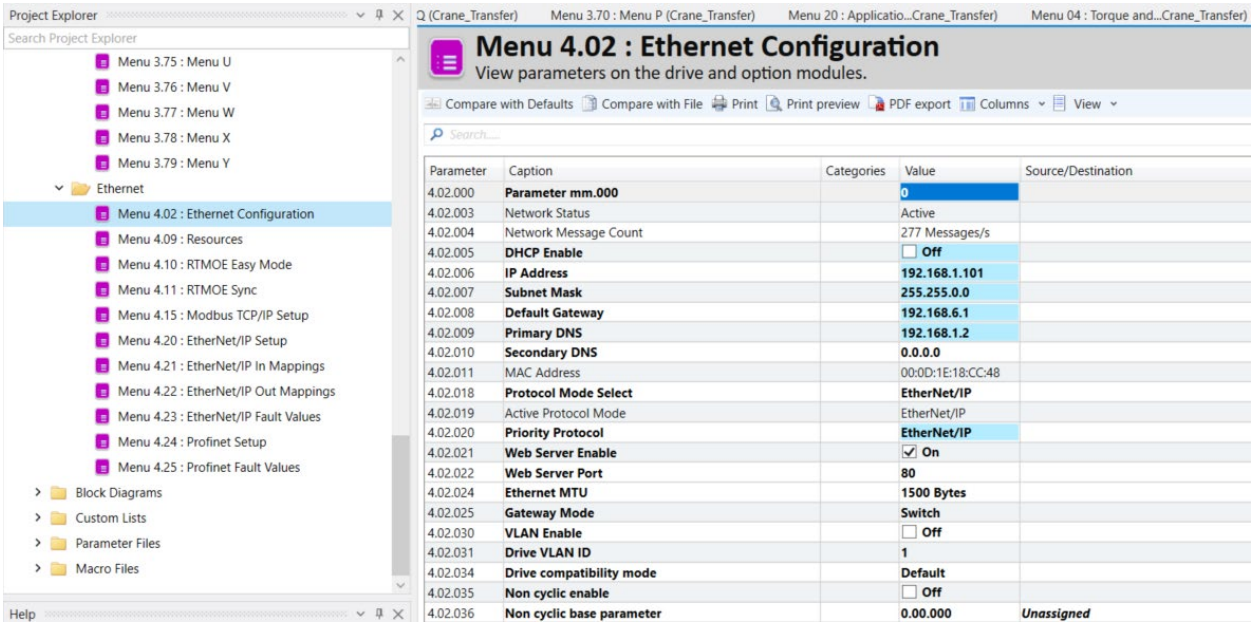
2 : OverVolts – Energy from an overhauling load or fast decel has raised the DC bus too high.
3 : Instantaneous Overcurrent – Cannot be reset for ten seconds.
6 : External Trip.3- Brake resistor thermal switch tripped, if equipped. See below.
19 : Brake R Too Hot – Energy dumped into the braking resistor during fast decels has overheated it.
20 : Motor Too Hot – This is estimated by a mathematical model; not a sensor.

The pump is supervised by a thermal switch, which is closed when the temperature is below the trip point. The thermostat is monitored by drive input 6, readable at menu 08.005. It should be high (on) when OK. If the thermostat trips, the keypad will announce this fault as User Trip 001 in the Drive Trip Log.
If you see this error during startup, verify the wiring of the PUMP THERMAL cable.
If you see this error on every powerup, and the reset button clears it, see section 16.4 of this manual.

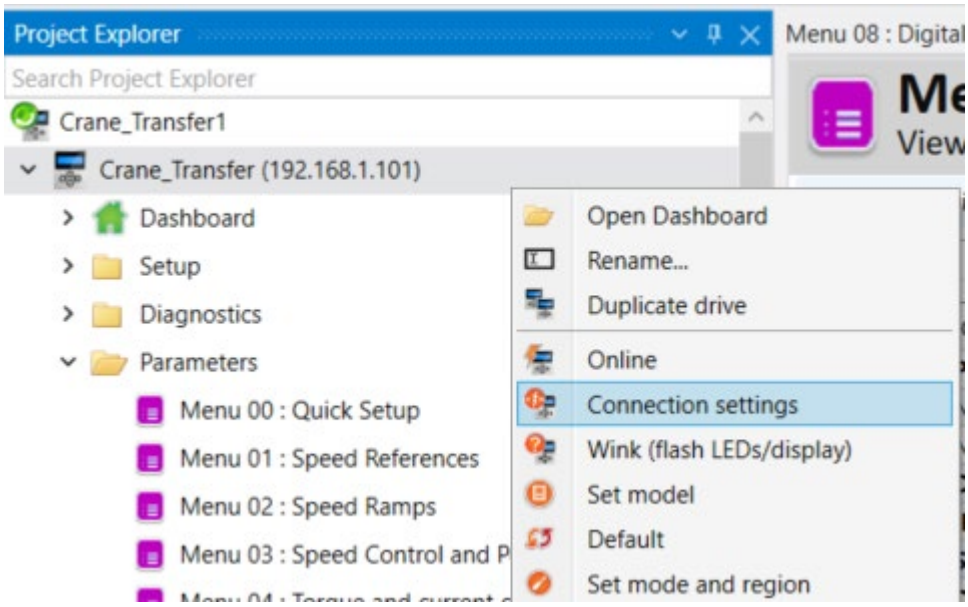
4 COMMUNICATIONS

4.1 Changing IP Address

To alter the IP address of a drive, there are two locations that need to be updated with the new IP address being used.



The first location is 4.02.006 in the ethernet interface section. M750 drives are menu 3 and M700 drives are menu 4 in the ethernet menu. This updates the drives communication address that it uses.



Here is the second location, Connection Settings, that needs to be updated with the new IP address. Right clicking on the drive and selecting the connection allows you to update the drive's IP address.

4.2 Ethernet IP

4.3 Real-Time Motion over Ethernet (RTMoE)

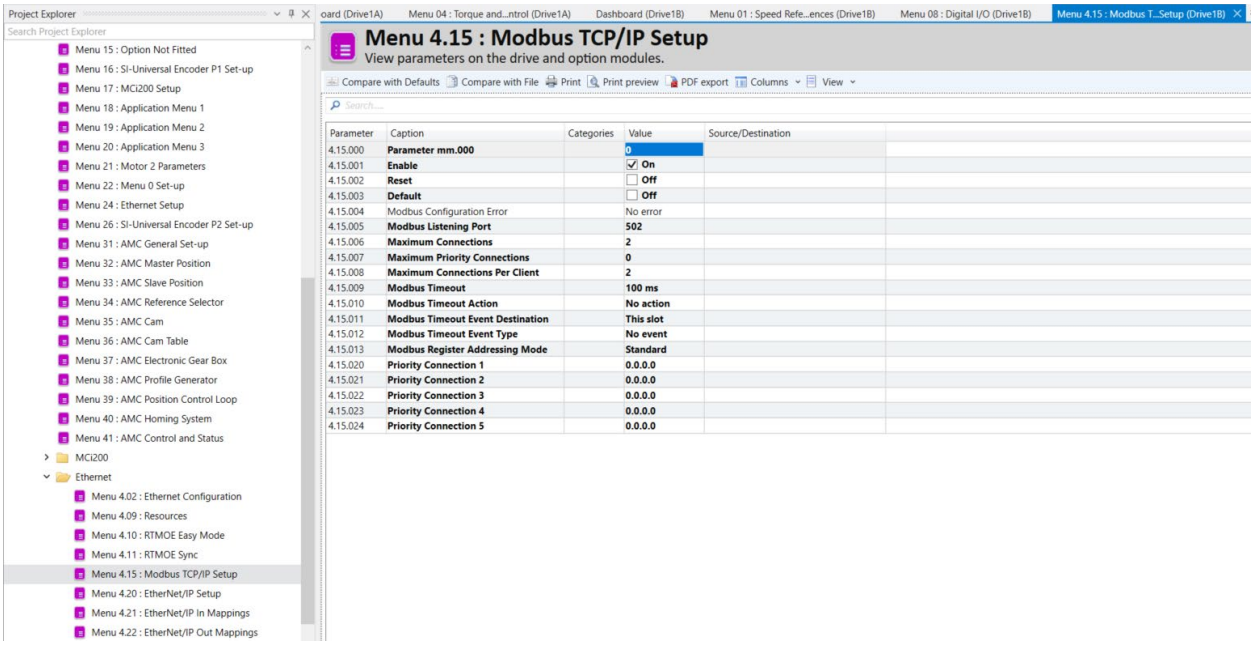
4.4 MODBUS Protocol

Instead of using ethernet IP or ProfiNet, MODBUS TCP/IP can be utilized, however some considerations must be made.

Usually Modbus is 16-bit, however, Connect presents its parameters as 32-bit words. So, a value from Connect, being 32-bit, will take up two Modbus registers (16-bit). One register being the upper word and the other being the lower word, the endianness should be considered depending on what the host expects: Hi-word versus Lo-word first.

Common mistakes:

1. Reading only one register from connect. This will only give half the value
2. Word mismatch: will need to word swap depending on what the host device expects.



Lastly verify Modbus is enabled and to increase the maximum connections and maximum connections per client if you are using many devices.

5 CUSTOM TRIP CODES AND ACTUATOR LIMITS MONITORING

Kyntronics Torque, Force and Absolute Position trip logic and monitoring, Revision A.

Logic was added to allow end users to setup specific custom torque, force and absolute position monitoring, which will then stop the unit with a custom trip code, when enabled.

Monitoring is set up using the following parameters, and each trip is individually enablable. This is optional logic, which can be used to help prevent over heating and over-pressuring the actuator.

GVL/Drive parameters and Trip details:

TRIP NOTES:

1. All positions and delta positions are in scaled units as DINTS, so typically MM*100 or INCH*1000; check with your specific TR-xxxx manual.
2. All times are in milliseconds, so a value of 1000 represents 1.0 seconds.
3. All torques are in percent *10 units, so a value of 875 represents 87.5% torque.
4. For Enables, use “1” to enable and “0” to disable.
5. All force values are in pounds, unless your TR manual or Loadcell uses scaling with different units.

6. The “MCiSlot” shown below varies by the CT drive type. For M75x drives, the Slot is 1, while for M70x drives the Slot is 3.

Position Encroachment on Endstop positions (or Toolstop positions, if the fixture prevents actual endstop from being reached). The RawMin/Max positions are the end (or tool) stop extreme reported positions. These values are affected by the ZeroOffset in drive menu 18, parameter 18.051. The GuardDelta is the offset from the min/max position where the trip will occur. Note that depending on the speed/force active at the time of the trip, the final stop position will likely be past the trip position.

Parameters used for encroachment trips (User Trips 70 and 71):
MCiSlot.74.011 RawMinPosn: DINT; minimum position in scaled units (mm*100 or inch*1000, typically)
MCiSlot.74.012 MinGuardDelta: DINT; the scaled units offset from the minimum position, where trip will occur.
MCiSlot.74.013 EnableMinPosn : DINT; Set to “1” to enable trip, or “0” to disable trip.

MCiSlot.74.014 RawMaxPosn : DINT; maximum position in scaled units
MCiSlot.74.015 MaxGuardDelta: DINT; the scaled units offset from the maximum position, where trip will occur
MCiSlot.74.016 EnableMaxPosn: DINT; Set to “1” to enable trip, or “0” to disable the trip.

Positive and Negative torque limit trips for normal and for HF trips, if using HSHF (High Speed, High Force) unit. If the trip is simply by torque percent and time, then the trips are 72 for MinTorque and 73 for MaxTorque.
MCiSlot.74.017 MinTorque : DINT; (negative) Torque limit, as a percent.
MCiSlot.74.018 MinTorqueTime : DINT; The time in milliseconds that the torque must exceed the MinTorque to cause the trip.
MCiSlot.74.019 MinTorqueEnable: DINT; Set to “1” to enable trip, or “0” to disable the trip.

MCiSlot.74.020 MaxTorque: DINT; (positive) Torque limit, as a percent.
MCiSlot.74.021 MaxTorqueTime: DINT; The time in milliseconds that the torque must exceed the MaxTorque to cause the trip.
MCiSlot.74.022 MaxTorqueEnable: MaxTorqueEnable : DINT; Set to “1” to enable trip, or “0” to disable the trip.

The torque limit trips (above) can optionally also include requiring the positional change to fall below a specified Delta over a specified time interval. When this position delta is enabled, then the User Trip codes will be 74 (min torque & position) and 75 (max torque & position).
MCiSlot.74.023 MinTorquePosnDelta: DINT; The minimum amount of positional change in scaled units.
MCiSlot.74.024 MinTorquePosnTime: DINT; The time in milliseconds to sample the positions for the delta change.
MCiSlot.74.025 MinTorquePosnEnable : DINT; Set to “1” to enable trip, or “0” to disable the trip.

MCiSlot.74.026 MaxTorquePosnDelta: DINT; The minimum amount of positional change in scaled units.
MCiSlot.74.027 MaxTorquePosnTime: DINT; The time in milliseconds to sample the positions for the delta change.
MCiSlot.74.028 MaxTorquePosnEnable: DINT; Set to “1” to enable trip, or “0” to disable the trip.

Positive and Negative torque limit trips for HS (High Speed) mode in HSHF units. If tripped only by exceeding torque over time, the trips are 78 and 79.
MCiSlot.74.029 HSMinTorque: DINT; (negative) Torque limit, as a percent.
MCiSlot.74.030 HSMinTorqueTime: DINT; The time in milliseconds that the torque must exceed the MinTorque to cause the trip.
MCiSlot.74.031 HSMinTorqueEnable: DINT; Set to “1” to enable trip, or “0” to disable the trip.

MCiSlot.74.032 HSMaxTorque: DINT; (positive) Torque limit, as a percent.
MCiSlot.74.033 HSMaxTorqueTime: DINT; The time in milliseconds that the torque must exceed the MinTorque to cause the trip.
MCiSlot.74.034 HSMaxTorqueEnable: DINT; Set to “1” to enable trip, or “0” to disable the trip.

If a minimum change of position is also enabled with the HS mode torque limits, then a trip only occurs if the torque is exceeded AND the change of position drops below this minimum position delta, over the specified time interval. These are trips 80 and 81.
MCiSlot.74.035 HSMinTorquePosnDelta: DINT; The minimum amount of positional change in scaled units.
MCiSlot.74.036 HSMinTorquePosnTime: DINT; The time in milliseconds to sample the positions for the delta change.
MCiSlot.74.037 HSMinTorquePosnEnable: DINT; Set to “1” to enable trip, or “0” to disable the trip.

MCiSlot.74.038 HSMaxTorquePosnDelta: DINT; The minimum amount of positional change in scaled units.
MCiSlot.74.039 HSMaxTorquePosnTime: DINT; The time in milliseconds to sample the positions for the delta change.
MCiSlot.74.040 HSMaxTorquePosnEnable: DINT; Set to “1” to enable trip, or “0” to disable the trip.

Extend and Retract force limit exceeded trips. Forces above the quoted value (or, quoted value + 10 to 20% of quoted value) for more than the time interval, will cause a trip. These are trips 82 and 83. The Retract Peak Force trip requires a retract pressure sensor (or a loadcell capable of measuring retract force, wired to a CT drive input), and the Extend Peak Force trip requires an extend pressure sensor (or a loadcell capable of measuring extend force, wired to a CT drive input)
MCiSlot.74.041 RetractPeakForce: DINT; The (negative) retract force value that must be exceeded.
MCiSlot.74.042 RetractPeakForceTime: DINT; The time in milliseconds the force must exceed the peak value to cause the trip.
MCiSlot.74,043 RetractPeakForceEnable: DINT; Set to “1” to enable trip, or “0” to disable the trip.

MCiSlot.74.044 ExtendPeakForce: DINT; The (positive) extend force value that must be exceeded.
MCiSlot.74.045 ExtendPeakForceTime: DINT; The time in milliseconds the force must exceed the peak value to cause the trip.
MCiSlot.74.046 ExtendPeakForceEnable: DINT; Set to “1” to enable trip, or “0” to disable the trip.

When a relief valve trips, the torque can be high, but the speed will also be high. These trips use parameters for a percent of the Max Speed (in RPMs) that must be exceeded in order to cause these trips. The command is checked, so pure force (command=9) uses the Force speed Min and Max values from the values in parameters MCiSlot.70.82 and 81; and non-Force commands use the normal motor

speed limits from MCiSlot.70.80 and 81. These settings work in conjunction with enabling the min/retract and max/extend torque thresholds discussed above.
NOTE: The torque delta position trips must be DISABLED in order to enable these trips.
These User Trips are 76 and 77.
MCiSlot.74.047 RetractSpeedPercentTrip: DINT; Value is a percent: a value of 80 means 80 percent of the max speed.
MCiSlot.74.048 RetractSpeedTripEnable: DINT; Set to “1” to enable trip, or “0” to disable the trip.

MCiSlot.74.049 ExtendSpeedPercentTrip: DINT; Value is a percent: a value of 80 means 80 percent of the max speed.
MCiSlot.74.050 ExtendSpeedTripEnable : DINT; Set to “1” to enable trip, or “0” to disable the trip.

The following trip checks for a minimum change of position in the given time window, anytime the actual speed (in rpm, using absolute value) is above the speed threshold. This is User Trip 84.
MCiSlot.74.051 SpeedRPMThreshold: DINT; Positive threshold speed value in RPM, which is compared to the absolute motor actual speed.
MCiSlot.74.052 SpeedPosnDelta: DINT; The minimum change of position in scaled units; falling below this value causes the trip.
MCiSlot.74.053 PosnTimeDelta : DINT; The time interval in milliseconds to check the change of position.
MCiSlot.74.054 SpeedPosnTripEnable : DINT; Set to “1” to enable trip, or “0” to disable the trip.

Numeric Listing of User Trip Codes

User Trip Codes, if enabled:

70 The minimum guard band position was reached; encroachment on the retract end stop position.
71 The maximum guard band position was reached; encroachment on the extend end stop position.

72 The minimum/retract torque threshold was exceeded; retract torque was too high, exceeding its time window.
73 The maximum/extend torque threshold was exceeded; extend torque was too high, exceeding its time window.

74 The minimum/retract torque threshold was exceeded; retract torque was too high, and with insufficient positional movement.
75 The maximum/extend torque threshold was exceeded; extend torque was too high, and with insufficient positional movement.

76 The minimum/retract torque threshold was exceeded; retract torque was too high, and retract RPM limit was also exceeded; likely tripped the retract relief valve.
77 The maximum/extend torque threshold was exceeded; extend torque was too high, and extend RPM limit was also exceeded; likely tripped the extend relief valve.

78 The minimum/retract torque threshold was exceeded in HighSpeed mode for HSHF unit; retract torque was too high, exceeding its time window.

79 The maximum/extend torque threshold was exceeded in HighSpeed mode for HSHF unit; extend torque was too high, exceeding its time window.

80 The minimum/retract torque threshold was exceeded in HighSpeed mode for HSHF unit; retract torque was too high, with insufficient positional movement.

81 The maximum/extend torque threshold was exceeded in HighSpeed mode for HSHF unit; extend torque was too high, with insufficient positional movement.

82 The minimum/retract Force threshold was exceeded; retract Force was too high, exceeding its time window.

83 The maximum/extend Force threshold was exceeded; extend Force was too high, exceeding its time window.

84 The change of position was too small during the time window, while the Speed in RPM was above the Speed setpoint.

6 FREQUENTLY ASKED QUESTIONS

6.1 Measured position not updating in connect?

Verify that the drive and communications are working before testing sensor issues. Usually when a sensor is not updating or displaying a large number, it can mean a couple different things.

1. Validate the sensor is receiving 24VDC
2. Validate that the sensor connector and that the wiring is secure and properly seated.
3. Verify that the position magnet is in a reasonable position on the waveguide, if it is on either extreme of the waveguide large values can be returned.

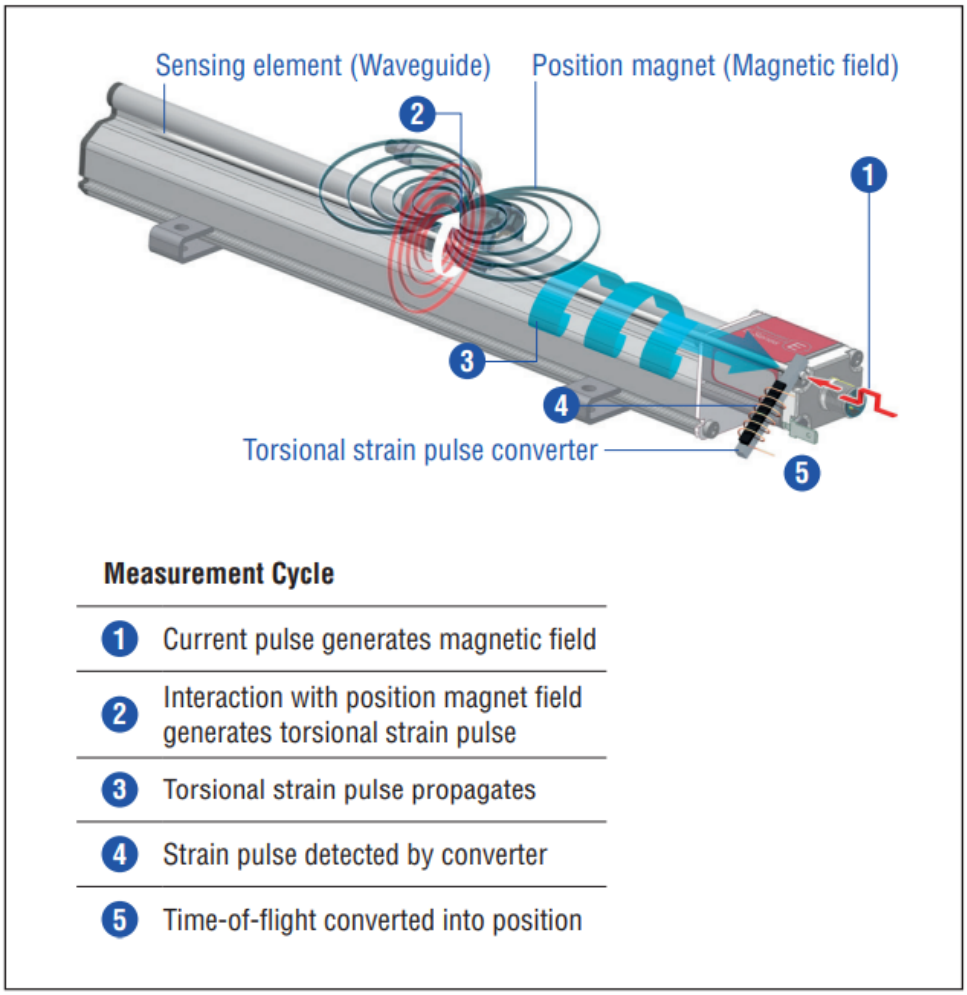


Fig. 1: Time-of-flight based magnetostrictive position sensing principle