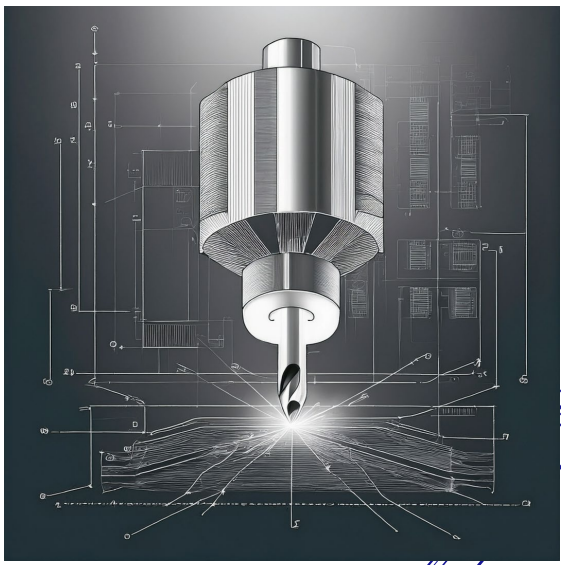
FUTURESWISS

LIVE TOOL SOLUTIONS

LTM 7700 OPERATION MANUAL

Live Tool Monitor



Rev A 8/2025

LTM 7700 Operation Manual

Thank you for purchasing the LTM 7700 Live Tool Monitoring system.

The LTM 7700 Live Tool Monitoring system is designed for use with any NSK/Nakanishi Industrial style motors and spindles used primarily on CNC lathes, robots, NC lathes and special purpose machines.

The LTM 7700 Live Tool Monitoring system will monitor high speed motor/spindle tool condition while in operation. The 7700 will communicate with the host machine to alert it when there is a worn or broken tool.

This manual is for initial setup and operation of the LTM 7700 Live Tool Monitoring system. And should be kept in a place where a user can refer to for reference at any time.

Contents

1 IMPORTANT INSTRUCTIONS AND WARNING

Refer to NSK/Nakanishi Controller manual for safe handling and electrical connections before operation of the NSK/Nakanishi controller.

2 BASIC PACKAGE

When opening the package, check if it includes all items listed in " Table.1 Packing List Contents ".

In the event of any shortage, please contact Futureswiss Int. (see the " 4. CONTACT US " section) or your local dealer.

Table. 1 Packing List Contents:

1) Live Tool Monitor.
2) Power Cable with Circuit Breaker
3) Motor I/O Cable

3 WARRANTY INFORMATION

Futureswiss International (FS) warrants to the original use purchaser of the FS manufactured product packed in the original carton that will repair or replace, free of charge, excluding return shipping costs, any such product which under normal use and service proves defective in material or workmanship, as determined by inspection, within 6 months from date of purchase provided the claimed defective product, or part thereof, is promptly returned to the factory or Customer Service Center with transportation charges prepaid.

This warranty does not cover failure of parts or components due to normal wear or damage or wear which in the judgment of FS is due to negligence, accident, substitution of non-FS parts, faulty installation or tampering.

This warranty does not cover ingress of coolant, or moisture introduced via compressed air system, or from external source due to lack of compressed air.

If FS inspection discloses no defect in material or workmanship, repair or replacement and return will be made at customary charges.

Equipment not covered by FS warranty: Accessories or components of equipment sold by FS that are not manufactured by FS are subject to the warranty, if any, of their manufacturer. FS will provide the purchaser with reasonable assistance in making such claims.

The foregoing warranty supersedes, voids and is in lieu of all or any other warranties, expressed or implied, and no warranty of merchantability or fitness for particular purpose is intended or made. FS sole obligation and the original use purchaser's sole remedy is as stated above and in no event shall FS be liable for any special, direct, indirect, incidental, consequential or other damages or expenses of any nature, including, without limitation, loss of profits or production time incurred by the original use purchaser or any other party.

4 CONTACT US

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Web: www.FutureSwiss.com

5 FEATURES

The LTM Live Tool Monitoring system performs transparently to the Host machine and the NSK/Nakanishi controller.

LTM 7700 Live Tool Monitoring system will monitor 4 separate tool conditions during operation.

1) Tool is cutting nominally
2) Tool is starting to wear and will need attention soon but is still cutting in the high nominal range.
3) Tool is still cutting but is beyond maximum nominal range, and could be making a bad part
4) Tool is broken and needs to be replaced.

The operator has control over the level that the Error and Warning signals are generated.

The LTM will output an Error signal when the tool is broken, beyond nominal range or the NSK/Nakanishi controller is generating an Error signal.

The LTM will output a Warning signal when the tool is getting worn and will need attention soon or when the NSK/Nakanishi controller generates a Warning signal.

Warning and Error signals follow the same protocol as the NSK/Nakanishi Warning and Error signals.

2 motor/spindles can be monitored on the same controller if supported by the controller.

There are multiple screens for each motor/spindle to monitor tool load via a graph page.

Optional light tower available to visually signal tool conditions.

6 SPECIFICATIONS

System power is from Host machine I/O power supply of 24VDC. @1 amp

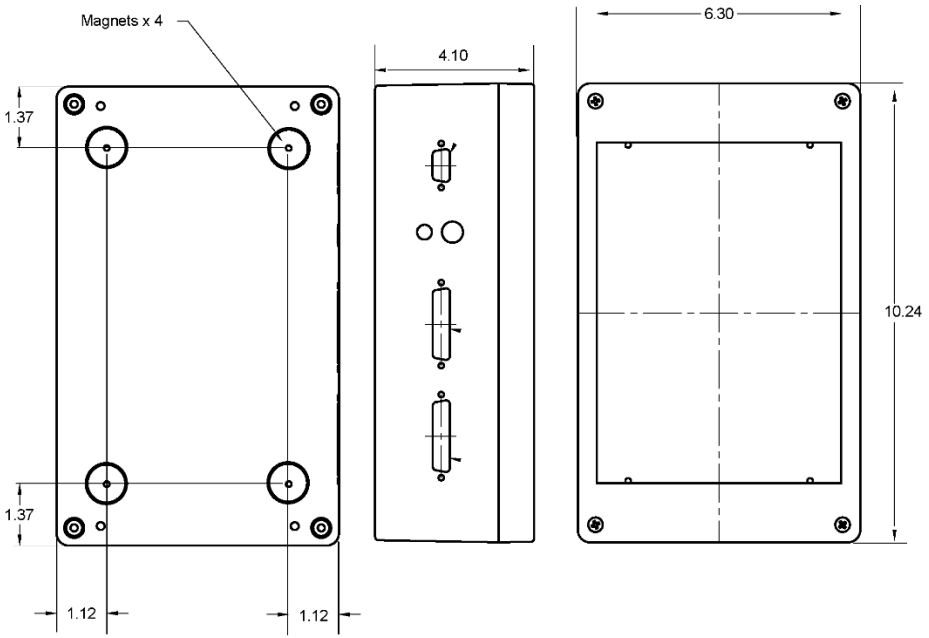
All I/O signals and power functions are limited to 24VDC. And circuits are protected internally.

7 COMPATIBILITY

LTM 7700 Live Tool Monitoring system is compatible with NSK/Nakanishi Controller models, E3000C, E3000i, iSpeed3, iSpeed5, E2000, E4000.

8 MOUNTING AND DIMENSIONS

LTM 7700 Live Tool Monitoring system is mounted to the Host machine cabinet via a Magnetic base. The magnetic base is IP50 protected against external hazards.



9 POWER CONNECTION

System power is from Host machine I/O power supply of 24VDC 1 amp.

Use the power cord provided to connect 24VDC to the Host machine I/O power supply.

Black wire is 24V Common, Red wire is 24V Positive.

No other power supply will function properly and may cause damage or malfunction of the LTM or NSK/Nakanishi controller which will automatically void the warranty.

All I/O signals and power functions are limited to 24VDC. And circuits are protected internally.

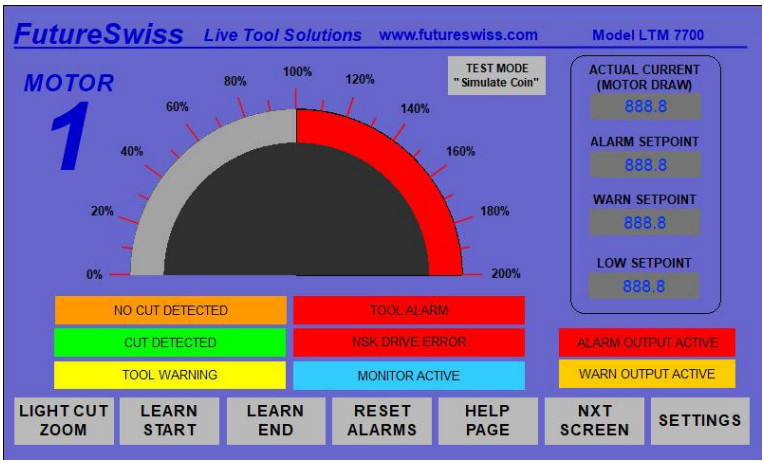
10 HOST MACHINE TO LTM

HOST MACHINE TO LTM TO NSK/NAKANISHI CONTROLLER CONNECTION AND SETUP

1) Do not connect LTM to Host machine or NSK/Nakanishi Controller.
2) Initial procedure is to hook up and test Host Machine to NSK/Nakanishi controller per Electrical Connection as directed in the NSK/Nakanishi Controller manual.
3) Test all functions to the NSK/Nakanishi controller to confirm proper Motor/spindle operation remotely via Host machine I/O.
4) Remove the DB25 cable from the front panel of the NSK/Nakanishi controller and install it on the LTM “Machine I/O” DB25 input.
5) Using the provided 3-foot DB25 interface cable connect the LTM “Motor I/O” DB25 output connecter to the NSK/Nakanishi front Panel I/O DB25 connecter.
6) With LTM power “OFF” Test all functions to the NSK/Nakanishi controller to confirm proper Motor/spindle operation remotely via Host machine I/O. Every function except the Warning and Error outputs from the NSK/Nakanishi controller should work the same as when the LTM is absent.
7) With LTM power “ON” Test all functions to the NSK/Nakanishi controller to confirm proper Motor/spindle operation remotely via Host machine I/O. Every function including the Warning and Error outputs from the NSK/Nakanishi controller should work the same as when the LTM is absent.

11 OPERATION PROCEDURES

1) At initial power up the Alarms will need to be reset using the “Reset Alarms” button
2) Press the “settings” button and confirm the default settings are as shown below
   a) 20 Alarm Limit Gain
   b) 10 Warn Limit Gain
   c) 2 Lo Limit Gain
   d) 2000 Coin Timer
   e) 100 Sampling Rate (MS)
3) Press the “Save Data” button to store settings. These settings can be changed based on the sensitivity of the monitoring required.
4) Press the “Exit” button to return to the Home page.
5) When Host machine Setup is complete and the operator is ready to begin continuous production, press the “Learn Start” button to initiate the Learn sequence. This process will establish the base parameters to be monitored for tool wear.
6) Start the Host machine in continuous production “run” mode. The LTM will Learn the parameters and store them in memory upon completion of the first part cycle.
7) The LTM will automatically begin monitoring tool wear with part cycle #2.
8) If the optional light bar is used a Green light will indicate tool is cutting nominally. (Good)



12 DETAILED DESCRIPTION - BUTTON FUNCTIONS AND SCREEN LABELS

Main Screen Button functions:

Light Cut Zoom: Changes Main screen meter from 200% to 25%.

Learn Start: To start Learn cycle on the first part of a production run.

Learn End: Manually end the Learn sequence that is in progress. Learn End will happen automatically when motor is shut off.

Reset Alarms: Manually reset the alarms on LTM. Does not reset NSK controller alarms.

Help Page:

NXT Screen: Scroll to the next screen

Settings: Scroll to Settings screen

Main Screen Labels:

No Cut detected: Normal tool cut not detected, sends Error output to machine and sets Red Traffic light ON.

Cut Detected: Normal Tool cut has been detected and sets Green traffic light ON.

Tool Warning: Tool cut load reaches Warn Setpoint, sends Warning output to machine and sets Yellow Traffic light ON

Tool Alarm: Tool cut load reaches Alarm Setpoint, sends Error output to machine and sets Red traffic light ON

NSK Drive Error: Indicates when the NSK controller has registered a Warning or Error.

Monitor Active: LTM is actively monitoring the tool load.

Actual Current Motor Draw: Displays the Current motor draw during Monitor active.

Alarm Setpoint: Actual point Load will trigger Alarm output, set during Learn cycle.

Warn Setpoint: Actual point Load will trigger Warning output, set during Learn cycle.

Low Setpoint: Actual idle Load point to trigger Cut detected, set during Learn cycle

Settings Screen Button Functions:

Alarm Limit Gain %: Used to set a percentage above initial learned max motor load to trigger the Tool Alarm Label (Red). Indicating a worn/bad (but not broken) tool. User settable based on actual/projected tool life. Default 20%

Warn Limit Gain %: Used to set a percentage above initial learned max motor load to trigger the Tool Warning Label (Yellow) Indicating a wearing or worn (but not broken) tool. User settable based on actual/projected tool life. Default 10%

Low Limit Gain %: Used to set sensitivity for broken tool detection. User settable for minimum load above initial learned min motor load output. Default 2%

Coin Timer (MS): Sets delay from Enable to Monitor active. Default 2 seconds

Sampling Rate: Sets monitoring sample frequency during Monitor Active. Default 300MS

Save Data: To store Settings in memory.

Parameters: Scroll to Parameters screen.

Help: Scroll to Help Page

Prev Screen: Scroll back to previous screen

Settings Pg.2 Scroll to Settings page 2 for Motor 2 settings.

Exit: Scroll back to Main screen.

Settings Screen Labels:

All Labels on the Settings screen are as described and based on Learned data during Learn cycle.

Graph Screen:

Clear Screen: Clears present data

Graph scaling: Auto scaling based on actual readings.

Learn Start: To start Learn cycle on the first part of a production run.

Learn End: Manually end the Learn sequence that is in progress. Learn End will happen automatically when motor is shut off.

Reset Alarms: Manually reset the alarms on LTM. Does not reset NSK controller alarms.

Prev Screen: Scroll back to previous screen

Settings Pg.2 Scroll to Settings page 2 for Motor 2 settings.

14 ALARM DESCRIPTION

1) **No Cut Detected:** Tool is broken or did not cut. Error signal triggered (pin 8) to alert Host machine a tool the tool is broken or did not cut and will turn the optional light stack to Red.
2) **Cut Detected:** Tool is cutting nominally and will turn the optional Light stack to Green
3) **Tool Warning:** Tool load has exceeded the Warn Limit Gain. Warning signal triggered (pin20) to alert Host machine. Will turn the optional light stack to yellow. Tool may need to be changed, or part quality monitored closely by the operator.
4) **Tool Alarm:** Tool Load has exceeded the Alarm Limit Gain% and the tool is no longer cutting properly. . Error signal is triggered (pin 8) to alert Host machine a tool the tool is bad/dull and did not cut nominally and will turn the optional light stack to Red.
5) **NSK Drive error:** when the NSK drive outputs a Warning (pin 20) or Error (pin8) signal the signals will be sent on the appropriate pin to the Host machine indicating an NSK drive Warning (pin8) or Error (pin20) has occurred. The Error or Warning details will be displayed on the NSK Drive front panel.