

Winder ready

Lenze i500
winder solutions



No challenge is too great nor single application too small. From material processing and converting to textiles to OEMs, Lenze i500 winder solutions are hard at work. Versatile and robust, our industrial drives are cost effective and low maintenance. Our focus is on torque and precision speed control so whatever your specific application requires, Lenze has the drive to match form, fit and function.

i500 drives are available in IP20, NEMA 1 as well as NEMA 4X versions ready to mount where you need them. IP20 models feature zero side clearance mounting requirement, and a minimal cabinet depth (only 5.12 in (130 mm) up to 15 hp) allowing optimal cabinet design. NEMA 4X protec models also feature an optional, lockable disconnect switch to service the motor right at the machine. Being group-installation rated, the i500 protec also offers greater flexibility of installation to simplify your layout, while meeting your national and local electrical code requirements.



Dancer applications are simple with i500 cabinet and protec drives' PID control and 12-bit analog input resolution. Programmable torque and speed limits also ensure kinematic energy can be safely managed. Motor load monitoring and analog signal alarm levels also easily enable web brake detection.

Waste winder applications can easily be solved with i500's sensorless vector motor control (SLVC) mode.

400/480V i500 models feature DC bus access, making them suitable for use on both motoring and regenerating axis.

i500 models offer an optional Safe Torque Off (STO) module rated for SIL 3 (EN IEC 62061/EN IEC 61508) and Performance Level e (EN ISO 13849-1) for easy and cost-effective integration into your safety system's most stringent requirements.



To maximize energy efficiency for winder solutions, the i500 motec is integrated with a regenerative energy feedback mode that reduces energy consumption in dynamic braking, transfers excess regenerative energy directly back onto mains, and simplifies engineering and system costs – no brake resistor required.



i500 models also feature support of 24V HTL encoders allowing for extremely precise speed control for challenging winder applications. That, combined with its wide variety of communication options, makes the i500 ready to integrate into your choice of upper level controls vendor:

- CANopen
- EtherCAT
- EtherNet/IP
- IO-Link
- Modbus
- PROFIBUS
- PROFINET
- Modbus TCP/IP
- POWERLINK

Input Voltage/Power:

- 120 V • 230 V • 400/480 V • 600 V
- 0.33 hp (0.25 kW) to 150 hp (110 kW)

Features:

- Programmability
- Sequencer mode
- Parameters grouped by function
- Hassle-free installation
- Quick commissioning
- Diagnostics
- Quick reset to default or OEM settings

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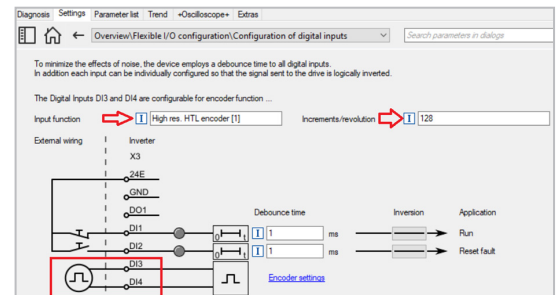
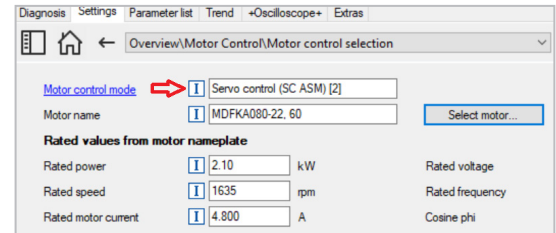
Technical Details

Motor Control mode:

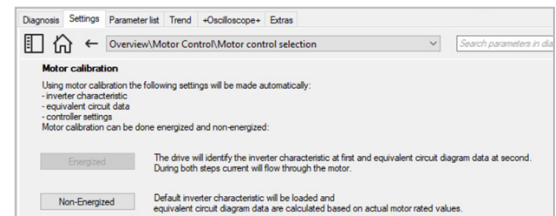
For AC induction motors with no feedback (i.e. for waste winders or for dancer-controlled winders) set the "Motor control mode (P300:000)" = "Sensorless vector (SLVC) [4]."

For AC induction motors with 24V HTL encoder feedback (i.e. for winders with upper-level controls used in complex applications) "Motor control mode (P300:000)" should be set to "Servo Control (SC-ASM) [2]."

The 24V HTL encoder must also be configured in this case. Wire to DI3 and DI4, set "Input function (P410:002)" to "High resolution HTL encoder [1]," and enter the encoder's number of pulses per revolution (PPR) into "Increments/revolution (P341:001)."

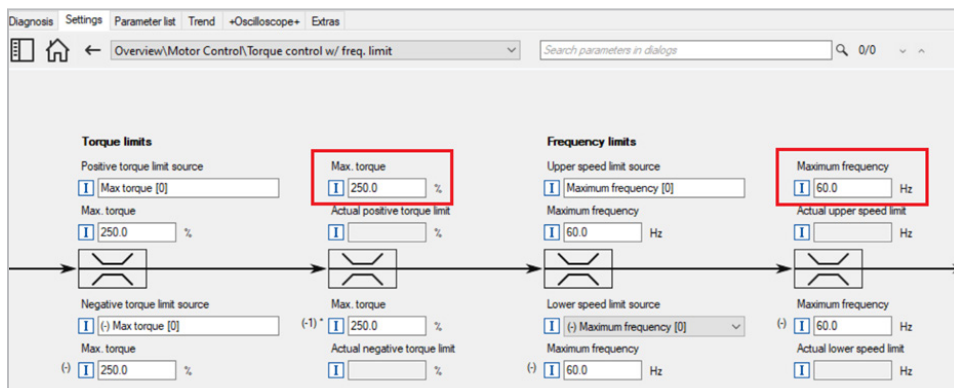


In both cases, the motor data must also be entered, and the motor must be calibrated. It is recommended to perform an Energized calibration.



Torque Control with Frequency Limits:

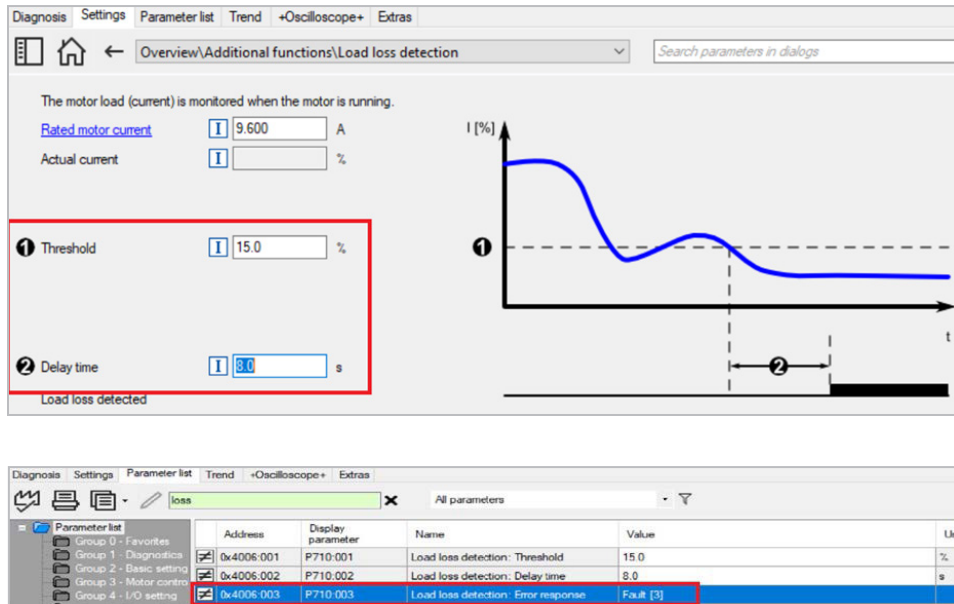
The drive may either have its mode "Operation Mode (P301:000)" set to run in default velocity mode "MS: Velocity mode [-2]" or for torque control "MS: Torque mode [-1]." When the drive is configured to run in torque control = the motor maximum and minimum torque and frequency can both be limited. These can be set as constant values or changed dynamically when taken as commands from network communications or analog inputs. For most applications with constant limits, simply set "Max. torque (P326:000)" to the percent of motor rated torque and set "Maximum frequency (P211:000)" to the maximum speed in Hz at which you want the application limited to run. The drive will then observe both limits.



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Web Break Detection for Winder Applications Not Using Dancer Control:

To trigger a fault for a web break condition with a winder, without a dancer, set the "Load loss detection: Threshold (P710:001)" = the percentage of motor rated current lower than that which is used by the winder when running at minimum speed in the application with the web intact (i.e. 15.0%). Set the "Load loss detection: Delay time (P710:002)" to a period of several seconds (at least twice that of the startup time of the application). Finally, set the "Load loss detection: Error response (P710:003)" = "Fault [3]."



Basic PID Setup for Dancer Controlled Winders:

PID applications are either "normal acting" or "reverse acting." If an increase in the speed of the winder results in an increase in the signal from the dancer (i.e. web tension increases as belt speed increases), then the process is "normal acting." Set the "Operating mode (P600:001)" for either "Normal operation [1]" or "Reverse operation [2]" as appropriate for the application. Next, we need to program which drive analog input will be used with the dancer. Set "PID process variable (P600:002)" either equal to "Analog input 1 [1]" and wire the monitored analog signal to AI1.

Next set "Default set point source (P201:002)" to "PID preset 1 [11]" and program that desired set point value in "Preset 1 (P451:001)."

Program AI1 for the range of the monitored signal both the "Min PID value (P430:004)" and the "Max PID value (P430:005)" to match the signal range of the dancer's analog sensor. Enter this value in PID units (so if the sensor was 0-100%, set P43x:004 = 0.0 and P43x:005 = 100.0).

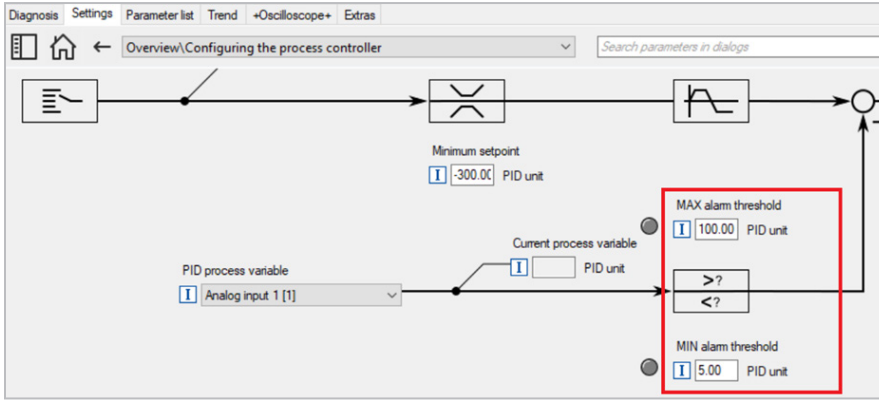
The PID loop must then be tuned on the running system for the application. A common approach to PID tuning is the following:

1. Set the reset time for the I component to 6000 ms in "PID I-component (P602.000)" to deactivate the I component. With this setting and the default setting of "PID D-component (P603.000)," the process controller operates as P controller.
2. Increase gain of the P component step-by-step in "PID P-component (P601.000)" until the system becomes unstable (oscillates).
3. Reduce the gain again until the system is stable again (stops oscillating).
4. Reduce the gain by another 15 %.
5. Set reset time for the I component in "PID I-component (P602.000)." With this setting it should be noted that a too-low reset time may cause overshoots, especially in case of high steps of the system deviation.

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Web Break Detection for Dancer Controlled Winders:

Web brake detection for dancer controller winders is possible by checking the dancer position. The “PID process variable” can be checked with the “MIN alarm threshold (P608:001)” and “MAX alarm threshold (P608:002).” For most applications, set “MIN alarm threshold (P608:001)” to a value below the normal range of the dancer’s signal while loaded (i.e. 5.00).



The signal can be used in PLC (Via DO or network). To configure DO1 to annunciate a web break set “Digital output 1 (P420:002)” to “PID MIN alarm active [75].”

