

Fan ready

Lenze i500
fan solutions



No challenge is too great nor single application too small. From industrial agriculture to OEMs to general HVAC installations, Lenze i500 fan solutions are hard at work. Versatile and robust, our industrial drives are cost effective and low maintenance. Our focus is on variable speed airflow and temperature 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. NEMA 4X models also feature an optional, lockable disconnect switch to service the motor right at the fan. 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.



The i500 cabinet and protec drives feature 12-Bit analog inputs for PID control with both Sleep and Preset speed override functions. Applications for temperature control with purging (or de-icing) can all easily be controlled.

S-ramp and dual acceleration/deceleration ramp rates can be utilized to minimize overshoot in high inertia fan applications.

With a wide range of communication options, i500 is also ready to integrate into your choice of upper level controls vendor:

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

Input Voltage/Power:

- 120 V • 230 V • 400/480 V • 600 V
- 0.33 hp (0.25 kW) to 175 hp (132 kW)

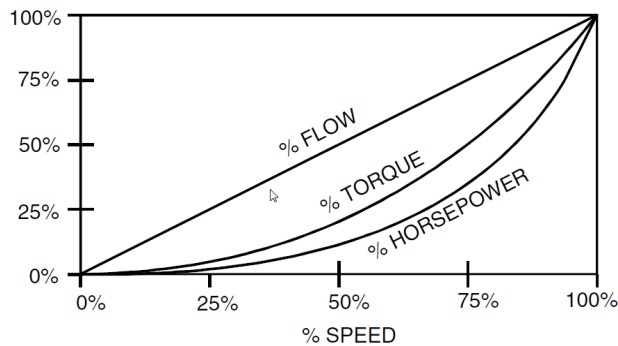
Features:

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

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Fans

Fans are used in a wide range of commercial, industrial and municipal applications. Fans are sized for the maximum airflow condition, however most of the time 100% of the system's capacity is not required. Significant energy savings can be accomplished by simply taking advantage of the affinity laws.



To do this, i500 drives can use a quadratic V/Hz profile to reduce the voltage supplied to the motor as a function of speed following the curve defined by the affinity law (following the torque curve). Dampers are another common flow control method. Compared to a damper, the lower power requirements of the i500 VFD provide a greater energy savings. Following the affinity laws, operating at 75% flow reduces power demand by over 50% with an i500 drive.



i500 supports both AC induction as well as PMAC motors, making it perfect to support the industry's trend of high pole count direct motor mounted energy-efficient fan designs.

i500 has a flying restart function, so a windmilling fan can easily be started by the drive.

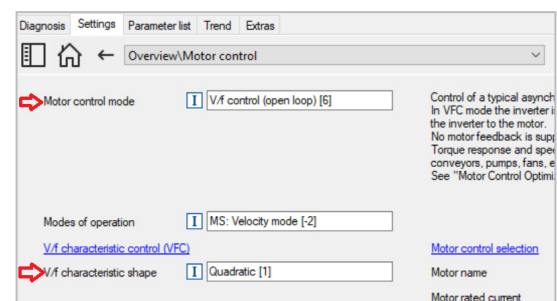
The i500 can also detect a loss of load from the motor, so belt break detection on axial fans can easily be accomplished.

Technical Details

Motor Control mode for the type of motor utilized:

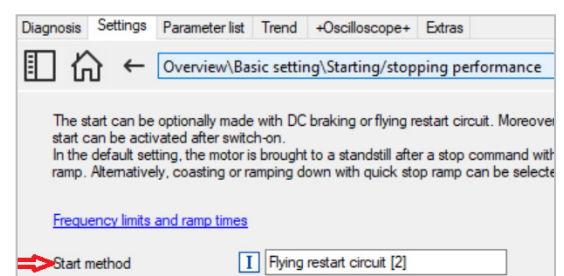
For fans with AC induction motors, set the "Motor control mode" (P300.000) = "V/f control (open loop) [6]" and also set "V/f characteristic shape" (P302.000) = "Quadratic [1]" to take full advantage of the energy savings for fans with AC Induction motors.

For fans with PMAC motors, "Motor control mode (P300:000)" should be set to "Sensorl. Contr. (SLSM-PSM) [8]."



Flying Restart to Start a Windmilling Fan:

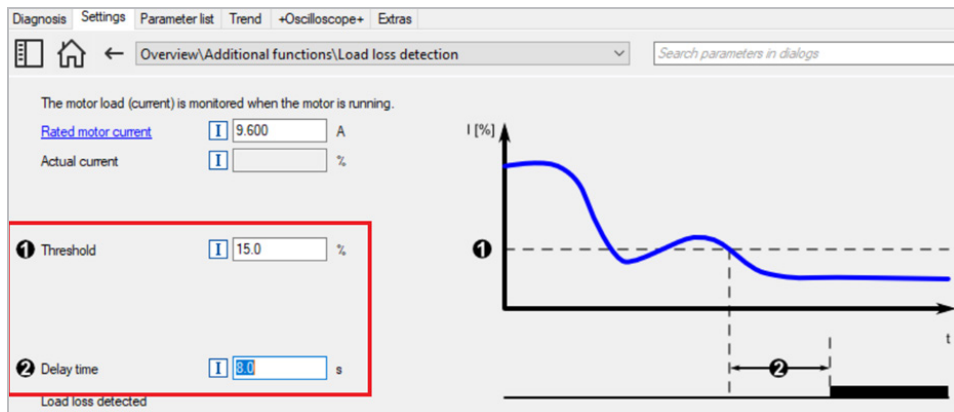
Set "Start method (P203:001)" = "Flying restart circuit [2]" in order to configure the drive to be able to start a windmilling fan.



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Belt Break Detection for Axial Fans:

To trigger a fault for a belt break condition with an axial fan, set the "Load loss detection: Threshold (P710:001)" = the percentage of motor rated current lower than that which is used by the fan when running at minimum speed in the application (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 configured Sleep delay time in PID applications). Finally set the "Load loss detection: Error response (P710:003)" = "Fault [3]."



| Parameter list | Address | Display parameter | Name | Value | Unit |
|--------------------------|------------|-------------------|-------------------------------------|-----------|------|
| Group 0 - Favorites | | | | | |
| Group 1 - Diagnostics | 0x4006.001 | P710.001 | Load loss detection: Threshold | 15.0 | % |
| Group 2 - Basic settings | 0x4006.002 | P710.002 | Load loss detection: Delay time | 8.0 | s |
| Group 3 - Motor control | 0x4006.003 | P710.003 | Load loss detection: Error response | Fault [3] | |
| Group 4 - I/O setting | | | | | |

Basic PID Setup:

PID applications are either "normal acting" or "reverse acting." If an increase in the speed of the fan results in an increase in the process variable (such as temperature in a basic heating application), then the process is "normal acting." If an increase in the speed of the fan results in a decrease in the monitored process variable (such as temperature in a basic cooling application), then the PID application is "reverse acting." Set the "Operating mode (P600:001)" for either "Normal operation [1]" or "Reverse operation [2]" as appropriate for the application. Next you need to program which drive analog input will be used as the monitored process variable. Set "PID process variable (P600:002)" 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 also program that desired set point value in "Preset 1 (P451.001)."

Program AI1 for the range of the monitored signal so that both the "Min PID value (P430:004)" and the "Max PID value (P430:005)" to match the signal range of the analog sensor used to monitor the process variable. Enter this value in PID units (so if the sensor was 0-10VDC = 32-120 degrees F, set P43x:004 = 32.0 and P43x:005 = 120.0).

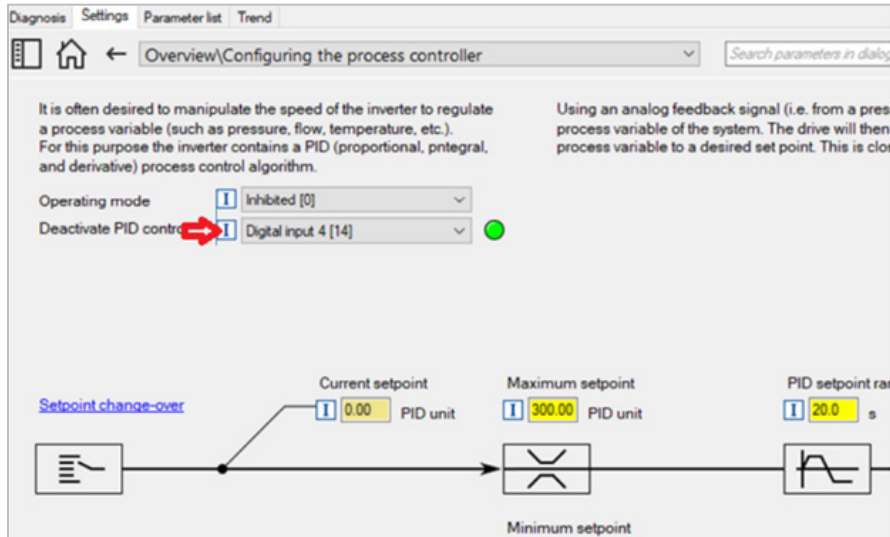
The PID loop must then be tuned on the running system for the application. A common approach to PID tuning is the following:

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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Purge:

To set up a digital input to perform a purge (preset speed override) in a PID application: First, set "Deactivate PID controller (P400:045)" = to the desired Digital Input to trigger the Purge (i.e. "DI4 [14]").



Next, set "Activate preset (bit 0) (P400:018)" to be triggered by the same Digital Input to trigger the purge (i.e. "DI4 [14]"). Finally, set the Purge speed (i.e. 60Hz) in "Preset 1 (P450:001)."

