



LENZE I500 SERIES VFD:

FOCUS ON I550 PROTEC NEMA 4X (INDOOR/OUTDOOR)



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In this month's Newsletter from Power/mation, let's take a closer look at the i550 Protec NEMA 4X Drive from Lenze.



What exactly is NEMA 4X?

Before we delve into the i550 Protec NEMA 4X VFD from Lenze, let's talk a little about what NEMA 4X actually means as a rating for enclosures:

The National Electrical Manufacturer's Association (NEMA) defines NEMA 4X as follows:

Watertight. Must exclude at least 65 GPM of water from a 1 inch nozzle delivered from a distance not less than 10 feet for 5 minutes. Used outdoors on ship docks, in dairies, in wastewater treatment plants, and breweries. X (as 4X) indicates additional corrosion resistance. Shall be constructed of corrosion-resistant material.

This specification is adhered to by equipment enclosure manufacturers as NEMA 4X enclosures are used in harsh environments where corrosive materials and caustic cleaners are used. Applications include food, such as meat/poultry processing facilities, where total washdown with disinfectants occur repeatedly, and petro-chemical facilities, including offshore petroleum sites.

NEMA 4X can also be indoor only or outdoor only or both. The outdoor rating means the enclosure adheres to resistance to UV Light that can cause the enclosure to deteriorate over time due to sunlight exposure. Outdoor ratings also include resistance to ice forming, falling dirt and debris and windblown dust.

What is the Lenze i550 Protec?

The Lenze i550 ProTec is a VFD that has been packaged in a NEMA 4X Indoor/Outdoor Configuration. This type of enclosure offers exceptional protection against high pressure water jets from any direction and dust tightness for use in wet and dusty environments, as we learned in the requirements for a NEMA 4X Outdoor rating.

If your machine requires a lot of space, has a need for a modular design, or the space in the control cabinet is limited, the universally applicable i550 Protec and NEMA 4X degree of protection is the ideal solution for a decentralized installation close to the motor.

With a wide range of options, such as Fieldbus Comms, Extension box with Disconnect, Control Devices, and STO (Safe Torque Off), the i550 Protec is an excellent choice for many applications. This document will highlight the features of the i550 Protec as well as provide some examples of applications where the i550 Protec is an excellent fit.



Lenze i550 Protec Specifications

In order to be a good fit for many industries and applications, a VFD needs to be available in a wide range of input voltages and HP ranges. The Lenze i550 Protec offers just that, which can be seen in the tables below:

Technical data

1-phase mains connection 120 V
Rated data



Inverter			i550-P0.37/120-1	i550-P0.75/120-1	i550-P1.1/120-1
Rated power	P _{rated}	kW	0.37	0.75	1.1
Rated power	P _{rated}	hp	0.5	1	1.5

Technical data

1-phase mains connection 230/240 V
Rated data



Inverter			i550-P0.37/230-1	i550-P0.37/230-2	i550-P0.55/230-1	i550-P0.55/230-2
Rated power	P _{rated}	kW	0.37		0.55	
Rated power	P _{rated}	hp	0.5		0.75	

Inverter			i550-P0.75/230-1	i550-P0.75/230-2	i550-P1.1/230-1	i550-P1.1/230-2
Rated power	P _{rated}	kW	0.75		1.1	
Rated power	P _{rated}	hp	1		1.5	

Inverter			i550-P1.5/230-1	i550-P1.5/230-2	i550-P2.2/230-1	i550-P2.2/230-2
Rated power	P _{rated}	kW	1.5		2.2	
Rated power	P _{rated}	hp	2		3	

Technical data

3-phase mains connection 230/240 V
Rated data



Inverter			i550-P0.37/230-2	i550-P0.55/230-2	i550-P0.75/230-2	i550-P1.1/230-2
Rated power	P _{rated}	kW	0.37	0.55	0.75	1.1
Rated power	P _{rated}	hp	0.5	0.75	1	1.5

Inverter			i550-P1.5/230-2	i550-P2.2/230-2	i550-P3.0/230-3	i550-P4.0/230-3
Rated power	P _{rated}	kW	1.5	2.2	3	4
Rated power	P _{rated}	hp	2	3	4	5

Inverter			i550-P5.5/230-3	i550-P7.5/230-3	i550-P11/230-3	i550-P15/230-3
Rated power	P _{rated}	kW	5.5	7.5	11	15
Rated power	P _{rated}	hp	7.5	10	15	20

Inverter			i550-P18/230-3	i550-P30/230-3	i550-P45/230-3
Rated power	P _{rated}	kW	18.5	30	45
Rated power	P _{rated}	hp	25	40	60

Lenze i550 Protec Specifications

In order to be a good fit for many industries and applications, a VFD needs to be available in a wide range of input voltages and HP ranges. The Lenze i550 Protec offers just that, which can be seen in the tables below:



Technical data
3-phase mains connection 480 V
Rated data

Inverter			i550-P0.37/400-3	i550-P0.55/400-3	i550-P0.75/400-3	i550-P1.1/400-3
Rated power	P _{rated}	kW	0.37	0.55	0.75	1.1
Rated power	P _{rated}	hp	0.5	0.75	1	1.5
Inverter			i550-P1.5/400-3	i550-P2.2/400-3	i550-P3.0/400-3	i550-P4.0/400-3
Rated power	P _{rated}	kW	1.5	2.2	3	4
Rated power	P _{rated}	hp	2	3	4	5
Inverter			i550-P5.5/400-3	i550-P7.5/400-3	i550-P11/400-3	i550-P15/400-3
Rated power	P _{rated}	kW	5.5	7.5	11	15
Rated power	P _{rated}	hp	7.5	10	15	20
Inverter			i550-P18/400-3	i550-P22/400-3	i550-P30/400-3	i550-P37/400-3
Rated power	P _{rated}	kW	18.5	22	30	37
Rated power	P _{rated}	hp	25	30	40	50
Inverter			i550-P45/400-3	i550-P55/400-3	i550-P75/400-3	
Rated power	P _{rated}	kW	45	55	75	
Rated power	P _{rated}	hp	60	75	100	



Technical data
3-phase mains connection 600 V
Rated data

Inverter			i550-P0.75/600-3	i550-P1.5/600-3	i550-P2.2/600-3	i550-P4.0/600-3
Rated power	P _{rated}	kW	0.75	1.5	2.2	4
Rated power	P _{rated}	hp	1	2	3	5
Inverter			i550-P5.5/600-3	i550-P7.5/600-3	i550-P11/600-3	i550-P15/600-3
Rated power	P _{rated}	kW	5.5	7.5	11	15
Rated power	P _{rated}	hp	7.5	10	15	20
Inverter			i550-P18/600-3		i550-P22/600-3	
Rated power	P _{rated}	kW	18.5		22	
Rated power	P _{rated}	hp	25		30	

Lenze i550 Protec Specifications

The next feature to have to be a good fit for many industries and applications is a VFD needs to be available with a wide range of Industrial Communication Options. The Lenze i550 Protec offers just that.

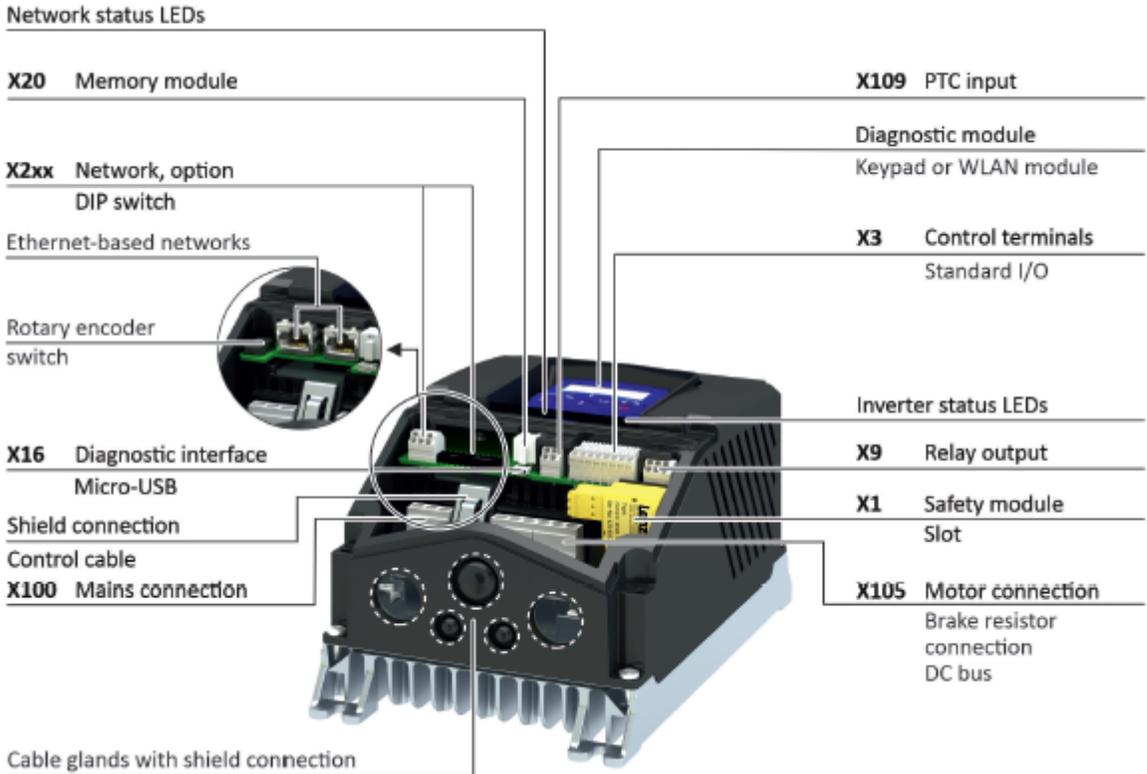
The i550 Protec is available with the following communication options:

	<p>EtherCAT® (Ethernet for Controller and Automation Technology) is an Ethernet-based fieldbus system which fulfils the application profile for industrial realtime systems EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany. Device descriptions for the download: XML/ESI files for Lenze devices</p>
	<p>EtherNet/IP™ (EtherNet Industrial Protocol) is an Ethernet-based fieldbus system that uses Common Industrial Protocol™ (CIP™) to exchange data. EtherNet/IP™ and Common Industrial Protocol™ (CIP™) are trademarks and patented technologies, licensed by the user organization ODVA (Open DeviceNet Vendor Association), Inc., USA. Device descriptions for the download: EDS files for Lenze devices</p>
	<p>PROFINET® (Process Field Network) is a real-time capable fieldbus system based on Ethernet. PROFINET® is a registered trademark and patented technology licensed by the PROFIBUS & PROFINET International (PI) user organisation. Device descriptions for the download: GSDML files for Lenze devices</p>
	<p>CANopen® is a communication protocol based on CAN. CANopen® is a registered community trademark of the CAN user organisation CiA® (CAN in Automation e. V.). Device descriptions for the download: EDS files for Lenze devices</p>
	<p>The Modbus protocol is an open communication protocol based on a client/server architecture and developed for the communication with programmable logic controllers. Further development is carried out by the international user organisation Modbus Organization, USA.</p>
	<p>IO-Link is the standardized IO technology (IEC 61131-9) for communication with sensors and actuators. Point-to-point communication is based on the 3-wire sensor and actuator connection without additional requirements concerning the cable material. IO-Link is a registered trademark. It may only be used by members of the IO-Link community and non-members that have purchased the corresponding license. Detailed information on the usage can be found in the IO-Link Community Rules at www.io-link.com.</p>

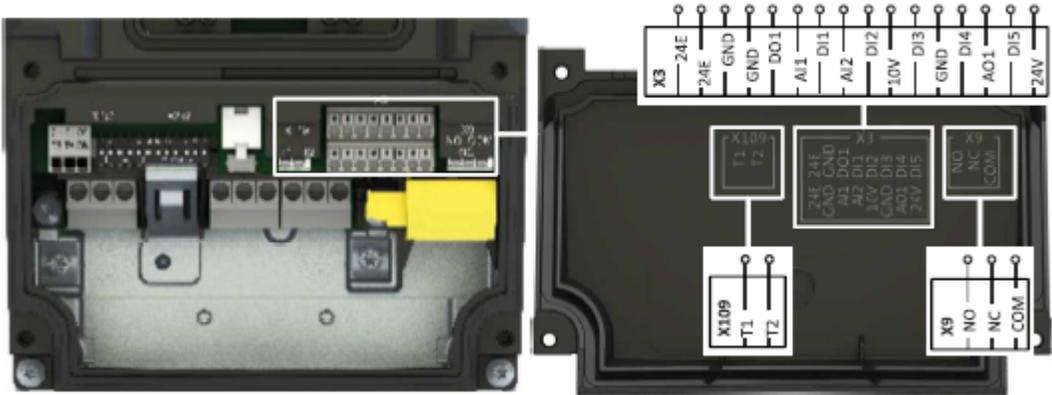
Lenze i550 Hardware Overview

The Lenze i550 Protec offers many built-in features to meet the requirements of demanding applications.

Features like STO (Safe Torque Off/Sil 3) and built-in HTL encoder interface allow the i550 Protec to solve many applications right out of the box. The i550 Protec is easy to install and connect to these features as shown below:



Control terminals



Lenze i550 Hardware Overview

The Lenze i550 Protec offers options like an extension box that can be fitted with a disconnect (repair switch), or a Run Forward/Run Reverse/Off Switch, or a speed pot, as well as many others as easily installed options.

This allows the i550 Protec to be a stand alone remote mounted motor controller, such as on a conveyor. The options and extension box can be seen here:

Accessories for i550 protec with extension box

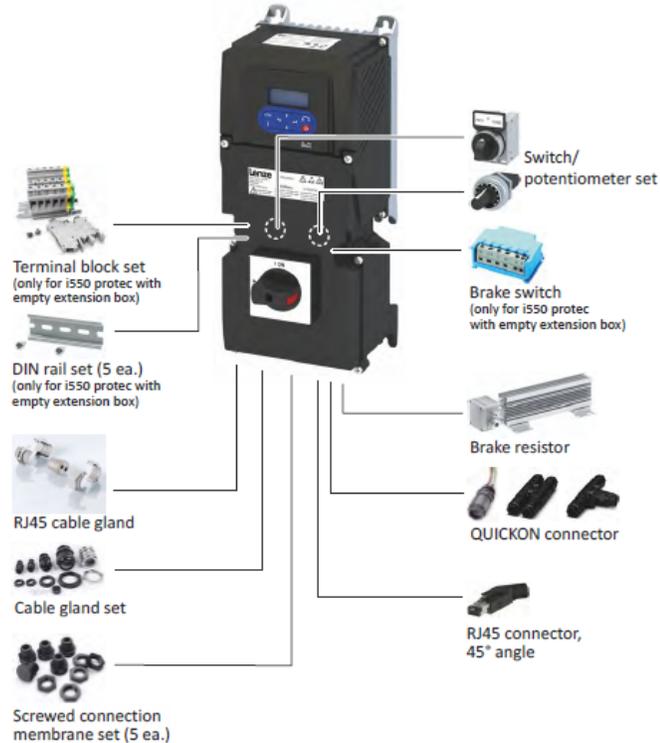


Figure with switch and potentiometer installed



Potentiometer



Control range:
0 ... 10 kΩ

Switch



0: OFF
REV: Run reverse
FWD: Run forward

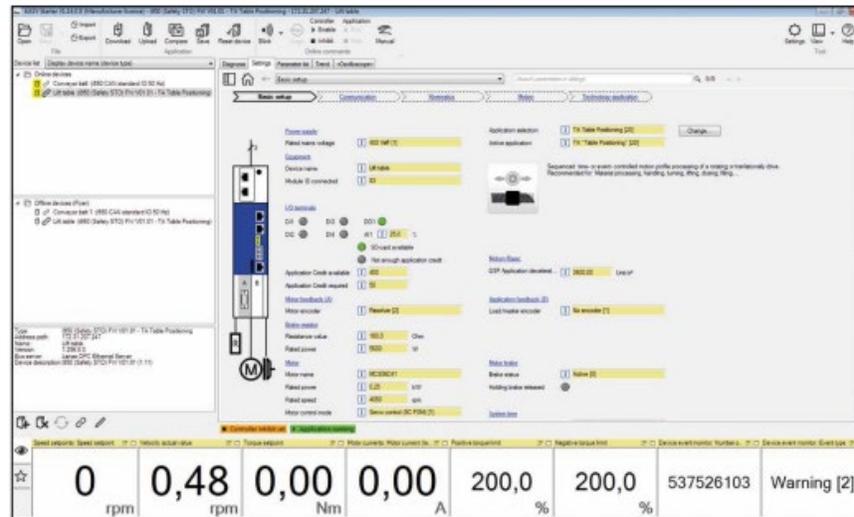
Lenze i550 Commissioning and Start Up Tools

The Lenze i550 Protec features quick and easy commissioning and start up tools:

Keypad: If the application only requires setting a few key parameters, then a simple keypad is all you need.

Easy Starter: A free software package that utilizes the built-in USB connector on the i550 Protec to provide a simple and easy to use engineering package.

SMART Keypad App for iPhone and Android: A cool feature offered with the i550 Protec is the WLAN module that can be used with the SMART Keypad App easily adapted for applications like conveyors.



Lenze i550 Application Examples

The Lenze i550 Protec will work in many applications.

Typical Industries where i550 Protec is a good fit:

- ✓ Textile Machines
- ✓ Material Handling
- ✓ Packaging
- ✓ Industrial Air Conditioning
- ✓ Construction Machines



Lenze i550 Application Examples

Pallet Conveyor Turntable Solution

- One i550 Protec for the Turning Drive
- One i550 Protec for the Roller Drive

Both mounted out on the Turntable



Lenze i550 Application Examples

Industrial AC Rooftop Unit

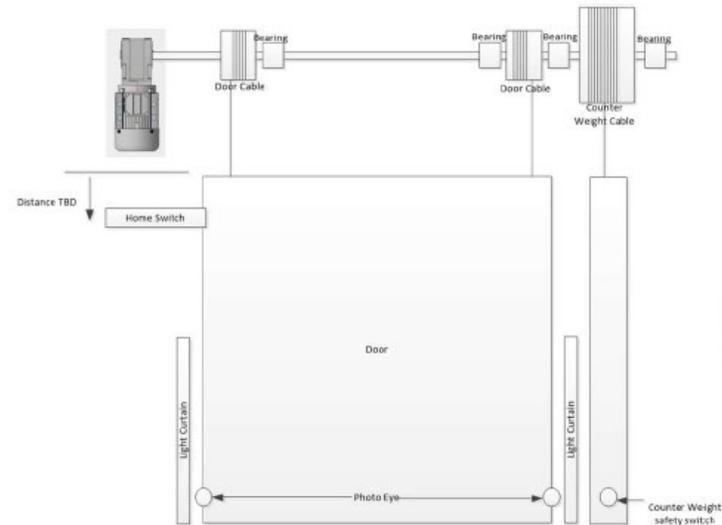
- The i550 Protec with the NEMA 4X rating for outdoor use can be mounted out in the environment local to the system



Lenze i550 Application Examples

Insulated Industrial Doors

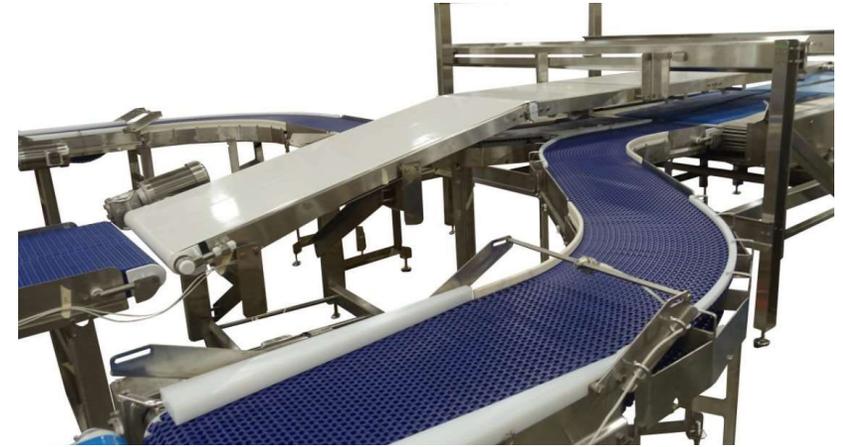
- The i550 Protec with the NEMA 4X rating used to operate industrial door systems.



Lenze i550 Application Examples

Conveying Systems in Food and Bev

- The i550 Protec with the NEMA 4X rating are used on conveyors in the Food and Beverage Industry due to the washdown rating that is able to handle the cleaning/washdown required.
- The i550 Protec is also capable of running PM Motors which are becoming more common due to energy efficiency.



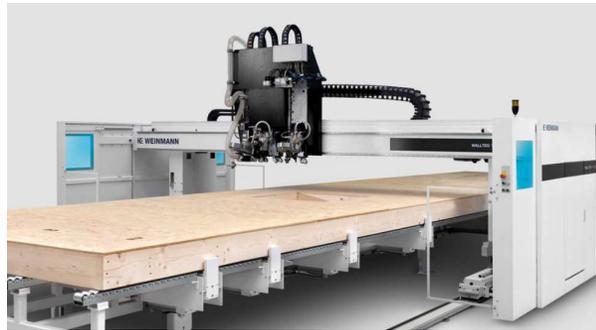
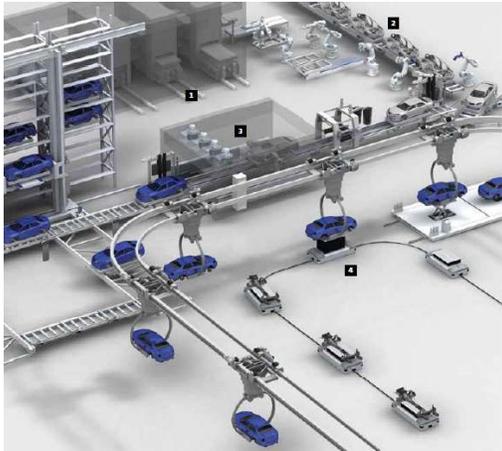
PMAC CONTROL

permanent-magnet motors offer higher power density and efficiency



Lenze i550 – Excellent option for Harsh Environments

As we have seen in this overview of the i550 Protec, this VFD is an excellent choice for harsh environments. Due to the flexibility and options available for the i550 Protec, the applications are basically unlimited.



And Many More!

Lenze i550 – Excellent option for Harsh Environments

Thanks to Lenze for the images and information used in this article.



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