

XT40 - High Performance Power Supplies for Motor Applications

Motors are everywhere in industrial applications. Many run on AC, but there is a growing trend towards utilizing more DC motors, especially in conveyor systems. DC motors have certain advantages, with safety and speed control being a couple of them. It is very common to have decentralized power supplies up and down a conveyor line, so the need for a powerful supply that can fit into a compact enclosure is required. PULS has come up with the perfect solution for motors.

What is the XT40?

The PULS XT40 family of semi-regulated 3-phase, 960 watt power supplies has a unique and innovative design for producing 24VDC from 3-phase power, especially for power systems. Models are available with 24, 36, 48 and 72VDC output voltages. Using a semi-regulated resonant converter enabled PULS to develop a very compact design

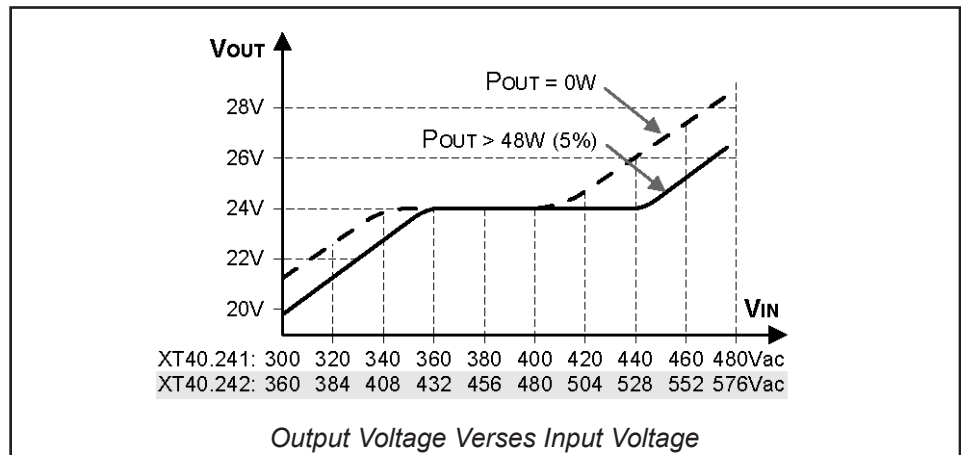


with extremely high efficiency and only a small compromise in some output features that will be discussed later in this article. These limitations are not critical for motors or power applications.

What is Semi-Regulated?

In order for a power supply to be considered fully regulated, the output voltage must be stable within a specific input voltage range. Per the

However, if you examine the output voltage graph based on a 480VAC input voltage, the output voltage is fully regulated between 432 and 528VAC. Input voltages do not often vary by this range, but when the input voltage does go outside this range the output voltage can either increase or decrease, which can affect the load. Because motors have a large inertia when operating, a small change in output voltage does not greatly change



IEC standard, a fully regulated supply must have a tolerance of $\pm 10\%$. Most manufacturers design for a much wider range so that momentary dips or rises in the input voltage do not affect the output voltage. Although the XT40 input voltage has a tolerance of $\pm 10\%$, the design of the input stage allows some fluctuations in the output voltage when outside the $\pm 10\%$ range. This is why PULS refers to the XT40 as a semi-regulated supply. The first reaction by most users is that a semi-regulated supply will not work in their application because the output voltage will not be stable.

the speed of the motor. By design, the XT40 does not have the wide range input like other PULS 3-phase supplies, so two different models are available for each voltage and current range. One unit is rated for a nominal input voltage of 400VAC and the other for a nominal input of 480VAC.

Key Features

The XT40 is extremely compact with a width of only 96mm and weighs 1.4kg. Even with the small size the XT40 is up to 96% efficient with only 45W of heat loss. This allows the unit to be mounted in a small enclosure without

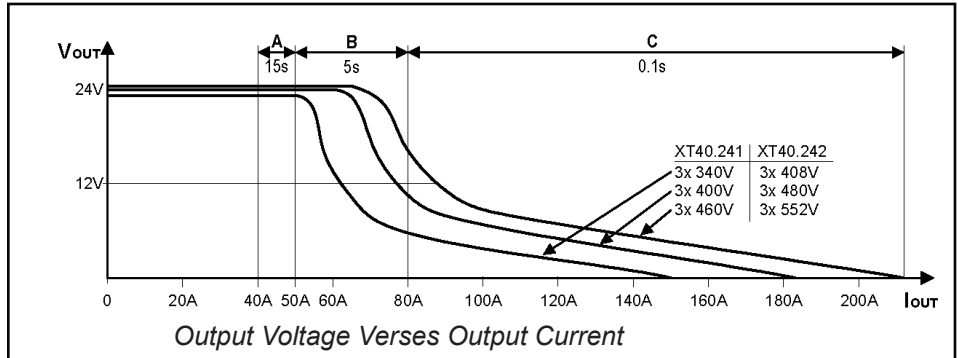
The PULS Advantage

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the fear of excess heat affecting the operation of the unit. There is also no need for additional cooling. The unique design of the XT40 does not use electrolytic capacitors on the input stage resulting in a near zero inrush current when the unit is energized. Also included on the input side is a high power factor. When combined with the high efficiency this produces a very low input current. The active input transient blocker prevents high voltage spikes such as those produced from VDE 0160 event. A VDE 0160 spike can occur when a fuse, circuit breaker, or contactor opens up under load. When this event happens, a large voltage spike up to 1300V is transmitted up and down the AC power lines affecting the adjacent connected equipment. The XT40 blocks these transients protecting itself from any damage. The output can deliver 125% peak power capability with no change in the output voltage. Motors can be difficult to start with standard power supplies, especially under load, but the XT40 was designed to handle these demands. In addition to the

125% reserve power, the XT40 can deliver up to twice the rated current for a short period of time, with a change in the output voltage. Extremely high currents will shut the unit down to protect the output stage of the supply.

level in ripple can be expected. Power devices are not as effected by ripple as are control devices. The XT40 was designed to be better suited for motors and that is why a higher ripple is acceptable in these applications. The hold up time is also lower than the standard PULS supplies



Limitations

With the design of the XT40 being focused on motors, there are a few compromises in output characteristics. These do not have a drastic effect on a motor load or power application. Besides the slight variance in output regulation that can occur with a high or low input voltage, an increased

designed for control applications. As discussed earlier, a spinning motor has momentum and therefore does not require the same hold up time when there is a small dip in the output voltage.

Overall Cost Savings

Motors are not the only usage for the XT40 but are designed for any high consumption applications where precise regulation is not required. The XT40 is the lowest cost 960W 3-phase supply available. The extremely small size and light weight allow for a small enclosure and lower installation and transportation cost. The low input current and small losses save energy and lower the cooling and ventilation requirements. These overall cost savings in this compact form has not been available before the PULS XT40.

	PULS XT40 Motor Power Supply	PULS Fully Regulated Power Supply	Transformer Power Supply
Input voltage range	+	++	-
Inrush current surge	++	+	-
Hold-up time	-	+	-
Phase-loss operation	-	+	-
Efficiency	+++	++	-
Output voltage regulation	+	++	-
Output adjustment range	-	++	-
Ripple & noise voltage	-	++	-
Error diagnostics	++	++	-
Harmonic distortion (PFC)	+	+	-
EMC	++	++	+
Ease of installation	++	++	-
Size	+++	++	-
Weight	+++	+	-
	+++...very, very good	++...very good	+...good -...poor

Comparison of the Various Topologies