



(Source: EOS)

Intelligent power supply simplifies the control cabinet

EOS offers sustainable production solutions based on industrial 3D printing for manufacturers worldwide. The independent company, established in 1989, is shaping the future of manufacturing by combining efficient production with trendsetting innovations and sustainable practices. Based on its platform-driven digital systems and integrated portfolio of materials, processes, and services, EOS is committed to meeting the needs of its customers while also acting responsibly for the planet.

Advantages of the SITOP PSU8600 power supply system for EOS GmbH

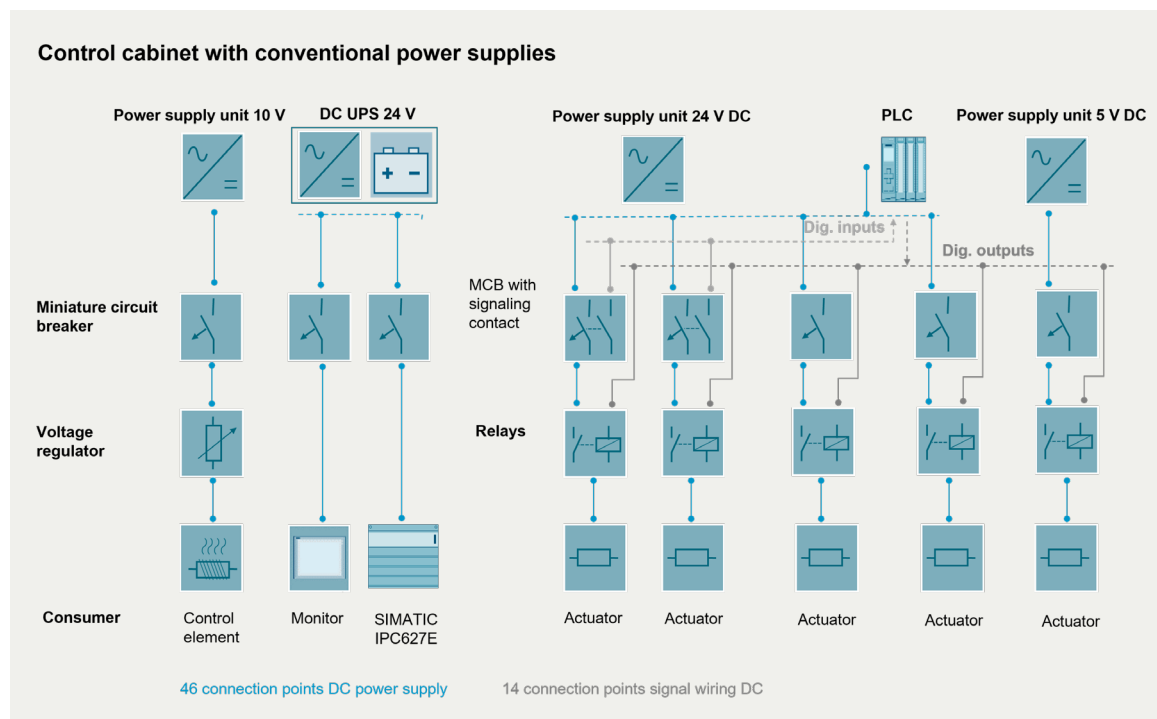
- Savings on material, space and labor
- Greater sustainability through reduced material use
- Reduced logistical effort due to fewer components
- Detection of overloads before a shutdown occurs to allow preventive maintenance
- Reliable detection of overloads and short circuits and switch-off of output to avoid a voltage dip
- Easy adaptation of the power supply via the software
- Transparency of the control circuit through measurement and visual monitoring of current and voltage values

Sustainable and profitable action – that's the motto of EOS, according to Florian Schiefer, Team Manager Logical Control at EOS. "We achieve that by developing appealing and targeted products but also by reducing costs and effort. The latter is exemplified by our use of the SITOP PSU8600 power supply system. We save on material, installation effort, and costs for every 3D printing machine. That's good for the environment and obviously also for our profitability.

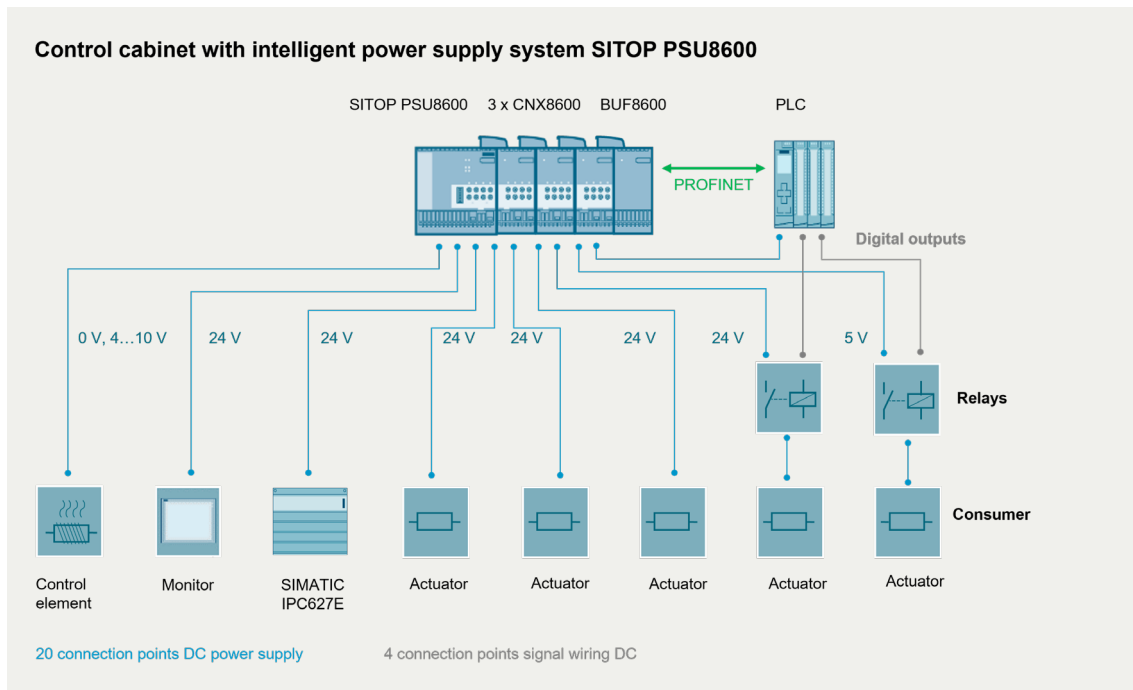
For example, we previously used different power supply units to supply three different direct voltages used in our machines and to supply a dynamically variable voltage required by an actuator. We also used a dedicated DC UPS for the industrial PC. Now one system takes care of all of that.

Another issue is machine reliability. We achieve that through continuous monitoring of the machine, including the control circuit. Previously, we protected each branch circuit with a circuit breaker equipped with a signal contact, which had to be wired to a digital PLC input. The PSU8600 power supply system comes with built-in line protection that is more reliable than electromechanical switches, since even slight overloads are detected by the electronics. While these may not seem critical in the beginning, they are often a harbinger of an eventual failure. Today, signals are transmitted via PROFINET without additional wiring effort.

But we are not just saving on material, space, and labor. If we want to customize a machine for a customer, we can often do so via the software alone. The power supply system can be reconfigured at the click of a mouse in the TIA Portal engineering tool," Schiefer said.



Control circuit of a 3D printing machine with separate power supply unit for each voltage level and electromechanical components for protection and switching operations.



Control circuit of the same 3D printing machine with the SITOP PSU8600 power supply system.

More than a power supply

“We first learned about the power supply system at the SPS trade fair in Nuremberg,” said Schiefer. It was the first power supply with a PROFINET connection and is still the only power supply system with comparable modular design and features.

“We recognized that the power supply system together with its extensive range of features is more than a power supply. The next step was to look at the direct voltage side of our control cabinets to verify the savings potential,” said Schiefer. “We could see that many of the functions we had implemented using additional devices are already integrated in the SITOP PSU8600 system. These include the protection and monitoring of the individual 24 V branch circuits. The outputs of the SITOP system already monitor the current for overload, and the channel status is communicated via PROFINET. That means we are not only spared the wiring of the circuit breaker for the 24 V branch circuit, but also the signal wiring,” Schiefer said.

SITOP PSU8600

The system consists of a 1- or 3-phase basic unit with two PROFINET or Ethernet/IP ports and one or four integrated outputs. The system can be expanded to up to 36 outputs using the CNX8600 expansion modules with four or eight outputs. SITOP BUF8600 buffer modules with capacitors or double-layer capacitors protect the direct voltage outputs from power failures lasting 100 ms up to several minutes. The UPS8600 DC UPS module and BAT8600 battery modules with lead or lithium ion phosphate (LiFePO₄) batteries bridge power failures lasting up to several hours. Diagnostic analysis of all current and voltage values and the power supply system status take place in real time over the communication interface. Parameterization of the power supply system can be performed via the communication interface, for example via PROFINET with TIA Portal or, when using open communication, via Industrial Ethernet or OPC UA with SITOP Manager. The integrated web server enables remote access.



The modular SITOP PSU8600 power supply system can be flexibly assembled without wiring effort: includes a communication-enabled basic unit, expansion modules for up to 32 additional outputs, buffer modules and a DC UPS module for bridging power failures.

EOS also appreciates the automatic switch-off feature that immediately switches off an output when a voltage dip is likely, such as if a short circuit occurs. The patented switch-off behavior with current and voltage measurement ensures that all other outputs continue to be supplied without power disturbance, meaning without a voltage dip. An automatic switch-off also takes place if the response threshold is exceeded for more than 5 seconds. This threshold can be set using a potentiometer on the device or via the software.

In addition to the current limit, it is possible to set the voltage of each output from 5 to 28 V using the potentiometer and from 4 to 28 V via the software, including dynamically during operation. "The fact that each output can be configured individually allowed us to eliminate two power supply units. Besides 24 volts we also need 5 volts for a fixed power supply and 10 volts for a voltage regulator that supplies a variable voltage from 5 to 10 volts. The ability to dynamically set a PSU8600 output via PROFINET eliminated the need for the 10 V power supply unit as well as the voltage regulator and an analog output for controlling it.

"In addition to the power supply for the 24 V control circuit, we were using an extra 24 V power supply with DC UPS. The 24 V backup supply was needed to protect the SIMATIC IPC in the event of a machine shutdown or power failure. Today, the

buffer module BUF8600 4 s/40 A performs this role in our machines. By focusing buffer energy to output 1 for the industrial PC, there is enough energy to perform a data backup and an orderly shutdown," Schiefer said.

Focused energy

If the power fails, the "Prioritization" function ensures that output 1 is supplied with voltage for as long as possible so that the energy stored in the buffer or battery modules can be used selectively for critical loads. To achieve this, all other outputs are switched off after 50% of the buffer module energy has been utilized. And speaking of switching off outputs: it is also possible to selectively switch off outputs during break times to save energy. Which branch circuits are switched off can be specified using the PROFINET protocol. During lunch breaks, for example, power can be supplied to just the controller or PC, allowing the machine to be started up quickly afterwards. All other loads can be switched off to save energy.

EOS utilizes this function to switch loads on and off that cannot be powered directly via the digital PLC outputs. "Previously, we used contactors to switch higher direct currents starting from 2 amperes. That is the maximum value supplied by a PLC output. An output of the SITOP PSU8600 switches up to 10 A or up to 20 A when two outputs are connected in parallel. This saves us up to five contactors and the associated wiring in the

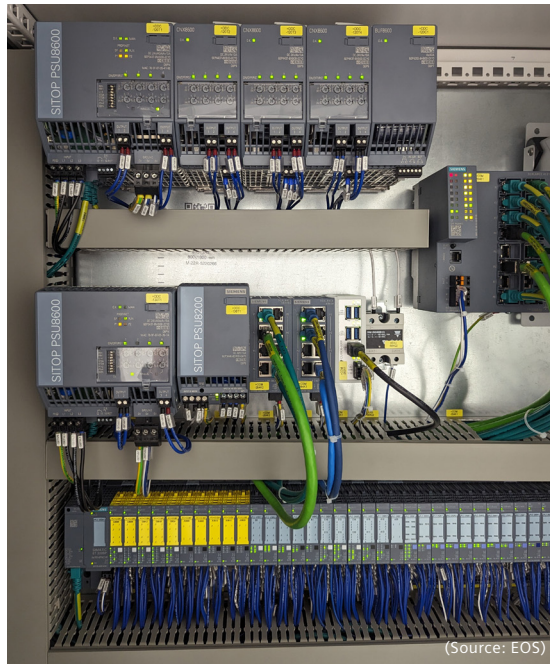
control cabinet. Because the PLC command is transmitted to the PSU directly via PROFINET, we don't need any more digital outputs for this," Schiefer said.

More flexible thanks to software

The PROFINET interface not only offers advantages during operation but also during engineering. Because the power supply system is integrated in the Siemens TIA Portal, the parameterization of the power supply can be changed at the click of a mouse. "For example, if we need to supply a new load with a different voltage, we can simply configure an available output of the PSU8600 in the TIA Portal. The engineering portal provides ready-made function blocks for this. Compared to use of an additional power supply unit, the effort involved is much less. This affects not only engineering but also logistics, installation, and documentation. Line protection is handled similarly. The current limit of each output of the power supply system is configured via the software. If circuit breakers were used, the circuit breaker type would have to be selected and ordered in advance," Schiefer said.

Everything under control

In addition to function blocks for parameterizing the power supply, ready-made faceplates for SIMATIC WinCC are also available. These enable visual monitoring of the status of the power supply and the current and voltage values of each output, for example. The energy flow into individual branch circuits can be monitored with these values and atypical current rises can be detected so that action can be taken in time to prevent a load outage. "We decided to make use of the continuous current and voltage measurements to allow preventive maintenance. In this way, the Siemens power supply system is helping us take another step toward digitalization and further improve the already high quality and reliability of our machines," Schiefer said.



The streamlined control cabinet of EOS GmbH with the SITOP PSU8600 power supply system (Source: EOS)

Presentation of EOS GmbH

On April 24, 1989, Dr. Hans J. Langer founded EOS GmbH – Electro Optical Systems in Gräfelfing, a small municipality south of Munich. This marked the first day in the history of a company shaped by pioneering spirit, conviction and courage. Today, EOS is a global leader in the industrial 3D printing of metals and plastics and offers integrated solutions in additive manufacturing.

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Corporate responsibility and sustainability – both internal and external – are the cornerstones of everything we do at EOS. The customer and the customer's requirements are at the center of this.

Security information

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept. For more information about industrial security, please visit www.siemens.com/industrialsecurity

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Florian Schiefer, Team Manager Logical Control, EOS GmbH (Source: EOS)

SITOP PSU8600 power supply system

- Modular system, consisting of a basic unit and optional expansion modules
- 1- and 3-phase basic units with one or four current-monitored outputs
- Communication interface with two ports for PROFINET, Industrial Ethernet, OPC UA or Ethernet/IP
- Engineering and diagnostics in TIA Portal, SITOP Manager or Ethernet/IP engineering tools, faceplates for SIMATIC WinCC and SIMATIC PCS 7
- Integrated web server (except PSU8600 Ethernet/IP)
- Output voltages can be set from 4 to 28 volts, including dynamically during operation
- Current thresholds can be set from 0.5 to 10 A, including dynamically during operation
- Outputs can be switched off and on
- Continuous current and voltage measurement for each output
- Efficiency 92%
- CNX8600 expansion modules for up to 32 additional selectively-monitored outputs
- Buffer modules BUF8600 100 ms/40 A, 300 ms/40 A, 4 s/40 A, and 10 s/40 A
- UPS8600 DC UPS module with BAT8600 battery module, lead or lithium ion phosphate (LiFePO₄) based