

Modifiable and efficient power supplies for collaborative robots

The Opportunity

Collaborative robots are a rapidly growing subsegment of industrial robots. Compared to conventional articulated robots they work with lower payloads, speeds and forces, and prioritize safety over performance and throughput. This enables cobots to operate in close proximity to human workers. The reduced need for a heavy and stable base, strong links and joints and powerful motors allows for more lightweight and compact designs.

Cobots often use a centralized AC/DC power supply unit that provides a common DC bus at 48 V. This bus is used to distribute power for example to the individual motors located in each of the cobot's joints.

The power requirements are significantly determined by

- the payload at the wrist, that is the overall weight that the cobot needs to move and it breaks down into the end of arm tooling plus the weight of a possible workpiece that is being handled
- the complexity of the movement, that means: are all joint motors simultaneously actuated when positioning and aligning the payload? how fast are the movements?

It is unlikely that all joint motors run at full power at the same time, but peak power demands that can occur during more dynamic movements are a critical variable that needs to be considered, in addition to the continuous draw of power.

Our Solution(s)

Table 1.

AC/DC Single Output	LCM	LCC	AIF11WAC
Power Output	300, 600, 1000, 1500 and 3000 W	250, 600, 1200 W	500 W
Operating Input Range	90 to 264 Vac and 180 to 264 Vac	90 to 264 Vac	90 to 264 Vac
Output Voltage	9.6 to 57.6 Vdc and 72 Vdc	10.8 to 54 Vdc	48 Vdc
Cooling	Variable Speed Fans	Conduction, IP64 or IP65	Conduction
Operational Temperature	-40 to 70°C	-40 to 85°C	-40 to 85°C

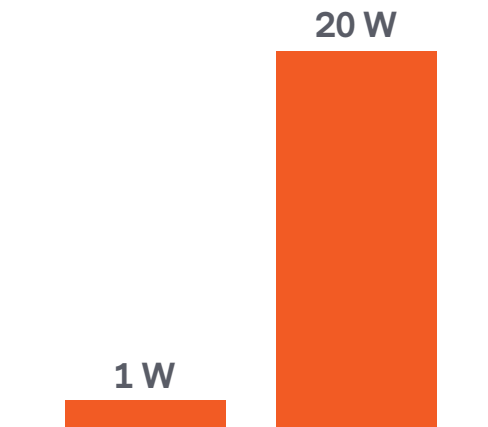
Single output power supplies are ideal for collaborative robots that require a reliable, efficient and consistent source of power at a specific voltage. Their simplicity and cost effectiveness makes them a preferred choice for many use cases in industrial operating environments.

The LCM series’ digital control enables us fast modifications to suit the exact needs of your collaborative robot. The high MTBF value of 500,000 hours under normal operating conditions, contributes to the 24/7 use of the cobot in a 3-shift manufacturing setup.

Housed in a robust metal case, the LCC series is ideal for collaborative robots used in low-noise working environments or where dust in the environment could be an issue. The lack of fans allows for a compact footprint and makes them especially interesting for smaller cobots where control functions are integrated in a more space restricted base.

If your cobot faces even more severe space restrictions Advanced Energy also offers AC-DC full brick modules for diverse applications, like the 500 W AIF11 AC-DC module, which accepts 90 to 264 VAC input and converts it to 48 DC. Ideal for lower power cobots.

Low standby power consumption is another crucial factor in collaborative robots. When numerous cobots are deployed, even small amounts of standby power can significantly increase overall operating costs. AE solutions minimize energy waste during idle. For example, while the standard version of the LCM1500 -an AC-DC power supply with a power output of 1500 W- has a power consumption of approximately 20 W, a version modified for use in collaborative robots only consumes 1 W.



To power various components in the control system that require different voltage levels, DC/DC converters can be employed. These converters efficiently step down the voltage from the common DC bus to specific levels, needed by electronics or additional components like fans etc.

Table 2.						
DC/DC PCB Mount	AEE	AET	ASA	ATA	AXA	AYA
Power Output	15, 40 and 50 W	20, 25 and 30 W	6 and 10 W	3, 6, 8 and 10 W	10, 20 and 25 W	3 W
Input Range	Wide input: 9 to 36 Vdc or 18 to 75 Vdc					
Output Voltage	Multiple outputs 3.3, 5, 12, 15, 24 Vdc and ±12, ±15 Vdc					
Efficiency	up to 89%					
Operational Temp.	-40 to 85°C					

Advanced Energy produces a range of small isolated DC-DC converters, specifically designed for low power industrial applications

Your Benefits

The low entry barriers for end users make collaborative robots one of the fastest growing automation solutions that can be used in a large number of applications among multiple industries.

For cobot manufacturers innovation and speed to market are key for success. Advanced Energies large and reliable power conversion portfolio and deep technical expertise allow to focus resources on quickly developing those innovations, without spending resources for in-house power developments. Our experienced FAEs are ready to guide you through technical details of the implementation and support you at every step.

Should it be the case that there is no suitable product in the extensive standard portfolio, we also offer the possibility to modify standard devices according to the requirements of your cobot.

These modifications can be relatively simple changes to the firmware of a device to maintain or achieve required values or modifications to the hardware itself, such as different connectors, or other mounting options -or- more complex changes like adding interfacing capabilities with specific bus protocols or modify enclosures to match your needs.



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ABOUT ADVANCED ENERGY

Advanced Energy (AE) has devoted more than four decades to perfecting power for its global customers. We design and manufacture highly engineered, precision power conversion, measurement and control solutions for mission-critical applications and processes.

Our products enable customer innovation in complex applications for a wide range of industries including semiconductor equipment, industrial, manufacturing, telecommunications, data center computing, and medical. With deep applications know-how and responsive service and support across the globe, we build collaborative partnerships to meet rapid technological developments, propel growth for our customers, and innovate the future of power.

PRECISION | POWER | PERFORMANCE | TRUST

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