

BATTLE CARD

# COBOTS

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## SOLUTION OVERVIEW

Collaborative robots, or cobots, are lower power industrial robots that are designed to work alongside human staff. For this they are equipped with sensors and functions to detect and avoid collisions, and to stop or slow down their operation when humans are in proximity. A cobot system typically consists of the following components:

1. A cobot arm that moves the end effector to the desired position in the desired time. It is made up of joints and links and has usually 6 degrees of freedom.
2. The end effector, that carries out the cobot's tasks. It is an interchangeable tool allowing the cobot for example to pick and place objects, dispense glue or sealants along a path, or perform assembly steps such as screw driving.

3. A control cabinet (or a smaller control box in case of smaller cobots) where all electric signals come together. It gets input from the cobot's sensors and sends out commands to control the cobot's movements.

The LCM series of enclosed AC-DC power supplies (ranging from 300 to 3000 W) is our main product offering for cobots. Used in robot control cabinets, the LCM converts and distributes power to sensors, motors and the processing components of the robotic system.

Note: Electric motors that operate the robots' joints are inductive loads that generate back-EMF. This effect results in a voltage that opposes the supply voltage. In order to handle this effect and prevent faulty output power regulation, the output circuits of LCM1500 were modified.

### Target Markets/Customers

Cobots can be segmented by payload, reach and footprint in relation to their own weight. Higher payloads and longer reaches are indicators for higher power consumptions and the need for a more powerful power supply.

Known and leading manufacturers of cobots are:

- FANUC, CRX series
- Yaskawa, HC series
- ABB, YuMi/GoFa/SWIFTI series
- Universal Robots, UR series
- TechMan Robot, TM series
- AUBO, iV series
- Doosan, H-, M-, A-series
- KUKA, LBR series

### Where to Avoid

No restrictions known.

### Audience – who to engage and when

- Manufacturers of various industrial robot types: cobots, scara, delta, polar, etc.
- Functions: director and manager levels in technical sourcing/purchasing, engineering, and product management
- When to engage: in early design stages or when manufacturers have completed their designs and start to look for the required components.

### Business Benefits

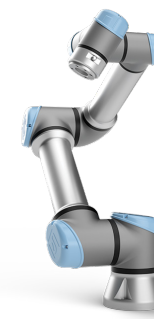
Sourcing the power supply from AE allows the cobot manufacturer to focus his expertise and resources on his core competencies rather than splitting them up for an own development, which ultimately leads to time and cost savings

In case of a power supply failure, replacement can be ordered quickly without the need of finding and fixing root causes of an own developed and produced device, that would lead to more delay for the end user and to dissatisfaction

The cobot manufacturer can benefit from ongoing R&D and product improvements carried out by AE, and can pass on new market requirements to us



LCM Series



Robotic Arm

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## Qualifying Questions

- What is the available input power and what are the power requirements of your robot (voltage, current, frequency, phase)?
- How is the operating environment of the cobot, do you require the power supply to have a specific IP rating?
- What safety standards must the power supply comply to, for example protection against overcurrents and short circuit currents
- What is the lifetime of the cobot, and how long must spare parts be available?
- What are size and weight limitations for the power supply?
- Are remote monitoring/setting capabilities required

### INTERNAL CONTACTS



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### INTERNAL CONTACTS



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## Customer Challenges

1. Cobots are often designed to be more compact and lightweight than other articulated robots, so that they can be integrated into existing workplaces. The power supply therefore must be equally compact while still being able to dissipate the heat and work reliably.
2. Another important factor is the cost effectiveness of the cobot, because this is a key decision criterion for the end user. An efficient power supply contributes here to lower operational costs.
3. Long operation hours in different operating conditions make a durable and reliable power supply necessary, because a power supply failure would lead to a costly downtime or even a dangerous situation when load bearing parts are de-energized.
4. In order to be able to approach the promising market for cobots in medical tech applications, the relevant approvals are necessary. Components like power supplies with this approval therefore give manufacturers the certainty of being able to obtain approval for the entire system.



## Key Features & Specs (high-level differentiators)

1. 12 Watts per cubic inch - Advantageous when there is a limitation to available installation space in the control cabinet
2. Industrial/Medical Safety Approvals - Facilitates use in many industries and geographies, and obtaining respective approvals for the entire cobot
3. Latest CCC approvals - Required to import, sell and use in China, which is the world's largest robot end user market
4. 89 to 93% typical full-load efficiency lower heat development not only contributes to lower operating costs but also has a positive effect on the service life of the components
5. Smart cooling fan - Running at variable speeds considering the load condition and cooling requirement, reduces wear and increases lifetime

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## COMPETITIVE ANALYSIS

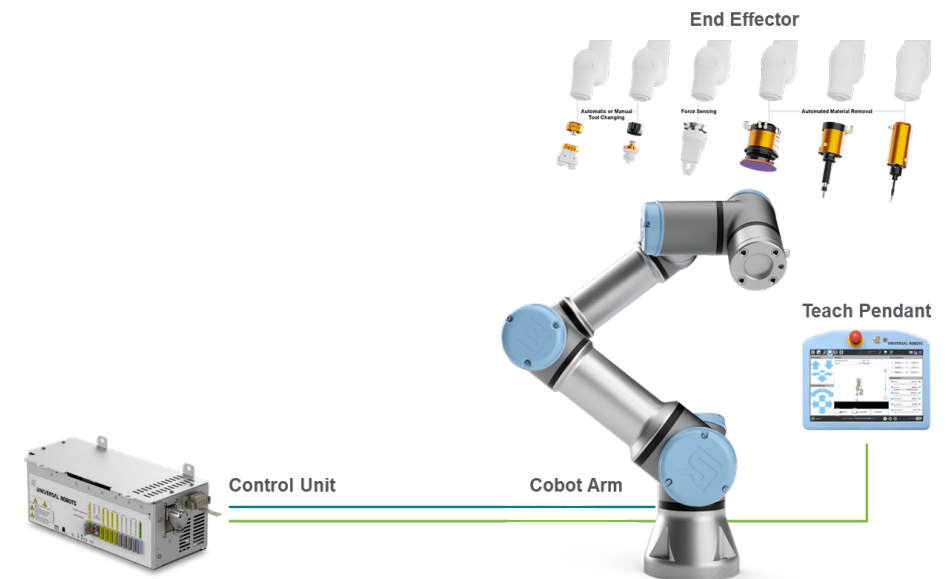
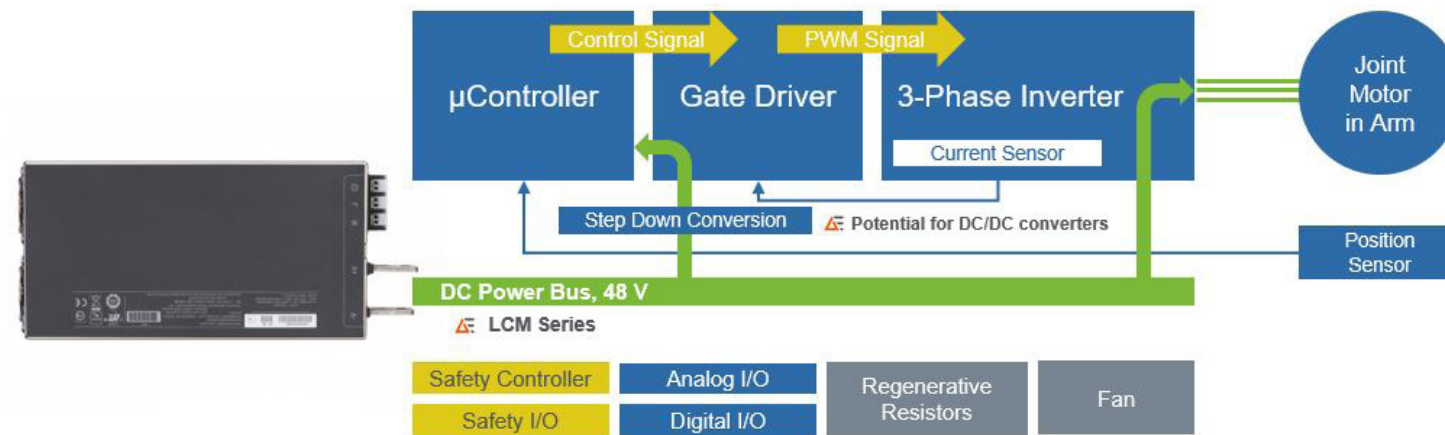
Competitor	Meanwell
Their Positioning & Selling Points	<ul style="list-style-type: none"><li>▪ Broad range of use cases from factory automation over laser processing machines to telecommunication equipment</li><li>▪ Active PFC 0.95 (typ. 230 VAC)</li><li>▪ Broad range of output voltages 5V / 12V / 15V / 24V / 27V / 48 V</li></ul>
Our Differentiation	<ul style="list-style-type: none"><li>▪ Medical safety approval (ANSI/AAMI ES60601-1:2005 / IEC 60601-1 safety standard)</li><li>▪ Power Factor: 0.99 typ.</li><li>▪ Broader range of output voltages 5V (optional) / 12V / 15V / 24V / 28V / 36V / 48V</li></ul>
Comparative Positioning	<ul style="list-style-type: none"><li>▪ Supports the industry’s efforts to develop medical cobot use cases</li><li>▪ Increased efficiency leading to lower operating costs and improved voltage stability, reducing fluctutations that may lead to component &amp; system malfunctions</li><li>▪ Allowing for a wider variety of components that can be powered without the need of additional conversion</li></ul>



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## ADDITIONAL REFERENCES

### Block Diagram



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## Cross-Selling Opportunities

Many manufacturers of classic industrial robots and cobots also offer AGV/AMR. This can result in further potential about the battery charging stations of the mobile robots. Refer to the AGV Robotics battlecard for more information.

