Shanghai YMIN Electronics Co., Ltd.

Capacitor Solutions, Ask YMIN for your Applications

Respond quickly and accurately to customer needs

AI SERVER
SPECIAL CAPACITOR APPLICATION MANUAL

V2025.10

Telephone: 400 900 1922
Email: ymin-sale@ymin.com
Website: www.ymin.com
Address: No. 258, Guangcun Road, Yangwang Economic Park, Nanqiao Town, Fengxian District, Shanghai

Table of contents

Industrial robot controller

■ Development Trends and Technical Requirements

An industrial robot controller is the "brain" of a robot system, responsible for controlling the robot's movement, performing tasks, and collaborating with other equipment. With the continuous advancement of industrial technology, the development trends of industrial robot controllers are mainly reflected in aspects such as intelligence, improved precision, enhanced real-time performance, openness and programmability, and networking.

1) Intelligent	With the development of artificial intelligence (AI) technology, industrial robot controllers will become more intelligent, possessing self-learning and adaptive capabilities. Robot controllers will not only complete predetermined tasks but also make autonomous decisions based on environmental changes, optimizing work efficiency.
2) High precision and high reliability	The precision requirements for industrial robot controllers are increasing, especially in operations requiring micron-level precision. Robots need more precise controllers to achieve complex movements. To ensure the stability of robots under long-term, high-load operation, controller reliability becomes a critical factor.
3) Integrated and modular	Controller integration is increasing. The integration of functional units makes the system more compact and smaller, while reducing the failure rate. Modular design makes the system more flexible, facilitates upgrades and maintenance, and enhances system scalability.

■ Recommended Products

Supercapacitor

Liquid aluminum electrolytic capacitor

■ Supercapacitor

SDB series

- 85℃ 1000H rating / Voltage range: 0~3V
- High voltage / Wide temperature range / High power density / High energy density

■ Recommended Selection

Rated Voltage (Surge Voltage) (V)	Nominal capacity (F)	Product dimensions ΦD*L (mm)	ESR (mΩ)	LC (μA)	Product Part Number	Minimum Packaging Quantity
3.0 (3.15)	10	12.5*20	50	20	SDB3R0L1061320	100

SDM series

- 85℃ 1000H rating / Voltage range: 25~27V
- Module type / High voltage / Wide temperature range / High power density / High energy density

■ Recommended Selection

Rated Voltage (Surge Voltage) (V)	Nominal capacity (F)	Product dimensions ΦD*L (mm)	Product Part Number
25 (25.15)	0.33	77*18*23	SDM25V0.33FRYA
27 (27.15)	1.0	87*25*28	SDM27V1.0FRYA

■ Liquid aluminum electrolytic capacitor

V3M series

- 105℃ 2000H rating / Voltage range: 6.3~160V
- Miniaturization / Low impedance / High capacitance / Large ripple current

■ Recommended Selection

Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Product dimensions ΦD*L (mm)	Tan (120HZ)	ESR (mΩ)	Rated ripple current (mV/100kHz)	LC (μA)	Product Part Number	Minimum Packaging Quantity
25 (28.8)	33	4*5.8	0.14	2000	160	8.25	V3MA0581E330MVTM	2000

LKE series

- 105℃, 10000H rating / Voltage range: 10~250V
- Shock resistant / Low ESR / High ripple current / Withstands ultra-high current surge

■ Recommended Selection

Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Product dimensions ΦD*L (mm)	Tan (120HZ)	ESR (mΩ)	Rated ripple current (mA/100kHz)	LC (μA)	Product Part Number	Minimum Packaging Quantity
63 (113)	1000	14.5*25	0.09	44	2500	630	LKEU2501J102MF	80
80 (130)	1000	14.5*27	0.09	48	2380	800	LKEU2701K102MF	60
100 (150)	560	14.5*25	0.09	42	2150	560	LKEU2502A561MF	80
120 (170)	560	14.5*27	0.09	36	2350	672	LKEU2702K561MF	60

LKL series

- 130℃ 3000H rating / Voltage range: 10~450V
- High temperature resistance / High capacity / Low ESR

■ Recommended Selection

Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Product dimensions ΦD*L (mm)	Tan (120HZ)	ESR (mΩ)	Rated ripple current (mA/100kHz)	LC (μA)	Product Part Number	Minimum Packaging Quantity
25 (75)	3300	14.5*25	0.14	24	3470	825	LKLU2501E332MF	80
35 (85)	2200	14.5*25	0.12	18	2520	770	LKLU2501V222MF	80
50 (100)	1200	14.5*25	0.10	70	2460	600	LKLU2501H122MF	80
50 (100)	1500	14.5*27	0.10	50	2520	750	LKLU2701H152MF	60

Industrial robot power module

■ Development Trends and Technical Requirements

With the continuous advancement of industrial robot technology, power modules are playing an increasingly important role in robot systems. Power modules not only need to provide stable power support, but also require higher efficiency, smaller size, longer lifespan, and enhanced intelligence. The following are the development trends and technical requirements for industrial robot power modules.

1) High efficiency and energy saving — With increasing demands for energy efficiency and environmental protection, industrial robot power modules will evolve towards higher efficiency and lower energy consumption. High-efficiency power modules can reduce energy waste, improve overall system efficiency, and lower robot energy consumption.

2) High-frequency switching and miniaturization — As switching frequencies increase, power modules will become more compact. High-frequency switching power supply technologies (such as DC-DC converters) will offer higher power density and smaller size, adapting to space-constrained industrial robot applications.

3) Reliability and long lifespan — Industrial environments place extremely high demands on the reliability and stability of power modules. Power modules will increasingly focus on high-reliability design to cope with the challenges of high loads, high temperatures, and high humidity in harsh environments, extending service life and reducing maintenance frequency.

■ Recommended Products

Liquid aluminum electrolytic capacitor

■ Liquid aluminum electrolytic capacitor

LKX series

- 105℃, 12000H rating / Voltage range: 35~450V Small size,
- large capacity / Low ESR / Low temperature rise / High ripple resistance

■ Recommended Selection

Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Product dimensions ΦD*L (mm)	Tan (120HZ)	ESR (mΩ)	Rated ripple current (mA/100kHz)	LC (μA)	Product Part Number	Minimum Packaging Quantity
420 (470)	150	16*40	0.15	350	1800	1270	LKXI4002T151MF	176

KCM series

- 105℃ 4000H rating / Voltage range: 400~500V
- Small size, large capacity / Low ESR / Low temperature rise / High ripple resistance

■ Recommended Selection

Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Product dimensions ΦD*L (mm)	Tan (120HZ)	ESR (mΩ)	Rated ripple current (mA/100kHz)	LC (μA)	Product Part Number	Minimum Packaging Quantity
450 (500)	120	12.5*50	0.18	300	1000	820	KCML5002W121MF	280

LKL series

- 130℃ 3000H rating / Voltage range: 10~450V Small size,
- large capacity / Low ESR / Low temperature rise / High ripple resistance

■ Recommended Selection

Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Product dimensions ΦD*L (mm)	Tan (120HZ)	ESR (mΩ)	Rated ripple current (mA/100kHz)	LC (μA)	Product Part Number	Minimum Packaging Quantity
450 (500)	33	12.5*20	0.20	3100	730	310	LKLL2002W330MF	100
450 (500)	56	14.5*25	0.20	2200	950	520	LKLU2502W560MF	80
500 (550)	22	12.5*20	0.20	2100	620	230	LKLL2002H220MF	100
500 (550)	47	14.5*25	0.20	2300	660	480	LKLU2502H470MF	80

Industrial robot servo motor driver

■ Development Trends and Technical Requirements

Servo motor drivers play a crucial role in industrial robots, responsible for precisely controlling the speed, position, and torque of the motor. With the continuous development of industrial robot technology, servo motor drivers are constantly improving in terms of performance, intelligence, and integration.

1) High power density, miniaturized	To meet the stringent space requirements of industrial robots, servo motor drivers are evolving towards higher power density and miniaturization. By employing high-efficiency power semiconductors, optimized circuit design, and thermal management technologies, drivers can deliver greater power output within a smaller footprint while maintaining low energy loss.
2) High speed, high precision	As robot workloads, movement speeds, and precision requirements increase, servo motor drivers must provide higher control accuracy, faster response times, and greater stability. The application of high-frequency control technology, ultra-high-resolution encoders, and high-speed data processing chips enables drivers to achieve higher-precision positioning and dynamic control.
3) Integrated, multifunctional	Industrial robot servo motor drivers will gradually integrate more functions. For example, drivers may not only handle motor control but also integrate position sensors, temperature monitoring, overload protection, current/voltage monitoring, and communication interfaces, reducing the number of external components, simplifying system structure, and improving system reliability and stability.

■ Recommended Products

Multilayer polymer solid aluminum electrolytic capacitor

Conductive polymer tantalum Electrolytic capacitor

■ Multilayer polymer solid aluminum electrolytic capacitor

MPD28 series

- 105℃ 2000H rating / Voltage range: 2~100V
- Vibration resistant / Miniaturized / Thin design / High ripple resistance

■ Recommended Selection

Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Product dimensions ΦD*L (mm)	Tan (120HZ)	ESR (mΩ)	Rated ripple current (mA/100kHz)	LC (μA)	Product Part Number	Minimum Packaging Quantity
80 (92)	6.8	7.3*4.3*2.8	0.1	40	3200	55	MPD6R8M1KD28040R	3000
100 (115)	4.7	7.3*4.3*2.8	0.1	40	3200	47	MPD4R7M2AD28040R	3000

MPU41 series

- 105℃ 2000H rating / Voltage range: 2~80V
- Vibration resistant / Miniaturized / Thin design / High ripple resistance

■ Recommended Selection

Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Product dimensions ΦD*L (mm)	Tan (120HZ)	ESR (mΩ)	Rated ripple current (mA/100kHz)	LC (μA)	Product Part Number	Minimum Packaging Quantity
80 (92)	27	7.2*6.1*4.1	0.1	40	3200	216	MPU270M1KU41040R	1500

■ Conductive polymer tantalum electrolytic capacitor

TPD40 series

- 105℃ 2000H rating / Voltage range: 35~100V High capacity
- / High stability / Ultra-high withstand voltage 100V max

■ Recommended Selection

Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Product dimensions ΦD*L (mm)	Tan (120HZ)	ESR (mΩ)	Rated ripple current (mA/100kHz)	LC (μA)	Product Part Number	Minimum Packaging Quantity
100 (115)	12	7.3*4.3*4.0	0.1	75	2310	120	TPD120M2AD40075RN	2000

Humanoid robot controller

■ Development Trends and Technical Requirements

As robots with similar appearance and behavioral patterns to humans, humanoid robots have particularly complex control systems. They require precise coordination of various joints, sensors, actuators, and other components, and must be able to simulate human movement, perception, and decision-making. Therefore, the development trends and technical requirements of humanoid robot controllers are particularly prominent, involving aspects such as intelligence, high precision, real-time response, and multi-task collaboration.

1) Real-time response High-bandwidth data processing	Humanoid robots need to process data from various sensors and make decisions in real time when interacting with their environment. Therefore, the controller must possess powerful real-time data processing capabilities and support high-speed data transmission.
3) High speed and high precision	Humanoid robots require highly precise motion control, especially when performing complex actions (such as walking, running, and lifting objects), demanding extremely high precision and ultra-fast response speeds from the controller. With improvements in controller hardware performance and algorithm optimization, humanoid robot controllers will be able to achieve millisecond-level response times and sub-millimeter-level precise control.

■ Recommended Products

Liquid aluminum electrolytic capacitor

Polymer solid aluminum electrolytic capacitor

■ Liquid aluminum electrolytic capacitor

VKM series

- 105℃, 10000H lifespan / Voltage range: 10~500V
- Small size, large capacity / Low leakage current / Ultra-long lifespan / High ripple current

■ Recommended Selection

Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Product dimensions ΦD*L (mm)	Tan (120HZ)	ESR (mΩ)	Rated ripple current (mA/100kHz)	LC (μA)	Product Part Number	Minimum Packaging Quantity
350 (400)	33	12.5*17	0.15	3600	960	241	VKML1702V330MV	200

■ Polymer solid aluminum electrolytic capacitor

VPC series

- 105℃ 2000H rating / Voltage range: 2~25V High capacity /
- High stability / Ultra-high withstand voltage 100V max

■ Recommended Selection

Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Product dimensions ΦD*L (mm)	Tan (120HZ)	ESR (mΩ)	Rated ripple current (mA/100kHz)	LC (μA)	Product Part Number	Minimum Packaging Quantity
2.5 (2.9)	820	6.3*5.8	0.08	10	3500	500	VPCC0580E821MVTM	1200
6.3 (7.2)	680	8*9	0.08	8	5600	857	VPCD0900J681MVTM	500
16 (18.4)	270	6.3*7.7	0.08	12	4000	648	VPCC0771C271MVTM	900

Humanoid robot power module

■ Development Trends and Technical Requirements

With the continuous advancement of humanoid robot technology, power modules are playing an increasingly crucial role in robot systems. Besides providing a stable and reliable power supply, power modules also need to possess higher efficiency, a more compact size, a longer lifespan, and a higher level of intelligence to meet the performance and functional requirements of modern humanoid robots.

1) High reliability and long lifespan	Humanoid robots often operate in dynamic, high-load, and high-vibration environments, therefore power modules must possess extremely high reliability and stability. By selecting high-quality components, enhancing thermal management capabilities, and strengthening shock and vibration resistance, power modules can extend their lifespan and significantly reduce failure rates and maintenance frequency, thereby improving the overall reliability of the robot system.
2) High-frequency switching and miniaturization	As the requirements for robot size and weight become increasingly stringent, high-frequency switching technology for power modules will become key to future development. This necessitates power modules offering higher power density and achieving smaller dimensions. This compact design not only saves valuable space, allowing power modules to be integrated into more compact humanoid robot structures, but also reduces module weight, improving the robot's mobility and efficiency.

■ Recommended Products

Liquid aluminum electrolytic capacitor

■ Liquid aluminum electrolytic capacitor

LKX series

- 105℃, 12000H rating / Voltage range: 35~450V Small size,
- large capacity / Low ESR / Low temperature rise / High ripple resistance

■ Recommended Selection

Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Product dimensions ΦD*L (mm)	Tan (120HZ)	ESR (mΩ)	Rated ripple current (mA/100kHz)	LC (μA)	Product Part Number	Minimum Packaging Quantity
420 (470)	150	16*40	0.15	350	1800	1270	LKXI4002T151MF	176

KCM series

- 105℃ 4000H rating / Voltage range: 400~500V
- Small size, large capacity / Low ESR / Low temperature rise / High ripple resistance

■ Recommended Selection

Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Product dimensions ΦD*L (mm)	Tan (120HZ)	ESR (mΩ)	Rated ripple current (mA/100kHz)	LC (μA)	Product Part Number	Minimum Packaging Quantity
450 (500)	120	12.5*50	0.18	300	1000	820	KCML5002W121MF	280

LKL series

- 130℃ 3000H rating / Voltage range: 10~450V Small size,
- large capacity / Low ESR / Low temperature rise / High ripple resistance

■ Recommended Selection

Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Product dimensions ΦD*L (mm)	Tan (120HZ)	ESR (mΩ)	Rated ripple current (mA/100kHz)	LC (μA)	Product Part Number	Minimum Packaging Quantity
450 (500)	33	12.5*20	0.20	3100	730	310	LKLL2002W330MF	100
450 (500)	56	14.5*25	0.20	2200	950	520	LKLU2502W560MF	80
500 (550)	22	12.5*20	0.20	2100	620	230	LKLL2002H220MF	100
500 (550)	47	14.5*25	0.20	2300	660	480	LKLU2502H470MF	80

Humanoid robot servo motor driver

■ Development Trends and Technical Requirements

As robots with similar appearance and behavioral patterns to humans, humanoid robots have particularly complex control systems. They require precise coordination of various joints, sensors, actuators, and other components, and must be able to simulate human movement, perception, and decision-making. Therefore, the development trends and technical requirements of humanoid robot controllers are particularly prominent, involving aspects such as intelligence, high precision, real-time response, and multi-task collaboration.

1) Miniaturization and integration	In the future, servo motor drives will evolve towards high integration and miniaturization, striving to reduce size and weight, and improve the overall portability and compactness of the system.
2) High efficiency and low power consumption	Humanoid robots typically need to operate for extended periods, therefore servo motor drives must have low power consumption to extend the robot's runtime. Simultaneously, high-efficiency drives can reduce heat generation and improve system stability.
3) High precision and high responsiveness	Humanoid robots require precise motion control, such as walking, running, jumping, and picking up objects; servo motor drives must provide high precision and rapid response capabilities.

■ Recommended Products

Multilayer polymer solid aluminum electrolytic capacitor

Polymer Hybrid Power Aluminum Electrolytic Capacitor

■ Multilayer polymer solid aluminum electrolytic capacitor

MPD28 series

- 105℃ 2000H rating / Voltage range: 2~100V
- Vibration resistant / Miniaturized / Thin design / High ripple resistance

■ Recommended Selection

Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Product dimensions ΦD*L (mm)	Tan (120HZ)	ESR (mΩ)	Rated ripple current (mA/100kHz)	LC (μA)	Product Part Number	Minimum Packaging Quantity
80 (92)	6.8	7.3*4.3*2.8	0.1	40	3200	55	MPD6R8M1KD28040R	3000
100 (115)	4.7	7.3*4.3*2.8	0.1	40	3200	47	MPD4R7M2AD28040R	3000

MPU41 series

- 105℃ 2000H rating / Voltage range: 2~80V
- Vibration resistant / Miniaturized / Thin design / High ripple resistance

■ Recommended Selection

Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Product dimensions ΦD*L (mm)	Tan (120HZ)	ESR (mΩ)	Rated ripple current (mA/100kHz)	LC (μA)	Product Part Number	Minimum Packaging Quantity
80 (92)	27	7.2*6.1*4.1	0.1	40	3200	216	MPU270M1KU41040R	1500

■ Polymer hybrid aluminum electrolytic capacitor

VHX series

- 105℃ 2000H rating / Voltage range: 16~100V
- Low ESR / High permissible surge current / Small size with large capacity

■ Recommended Selection

Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Product dimensions ΦD*L (mm)	Tan (120HZ)	ESR (mΩ)	Rated ripple current (mA/100kHz)	LC (μA)	Product Part Number	Minimum Packaging Quantity
80 (92)	100	10*10.5	0.08	35	1800	80	VHXE1051K101MVCG	500
100 (115)	47	10*10.5	0.08	40	1800	47	VHXE1052A470MVCG	500

VHT series

- 125℃, 4000H rating / Voltage range: 16~100V
- Low ESR / High permissible surge current / Small size, large capacity

■ Recommended Selection

Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Product dimensions ΦD*L (mm)	Tan (120HZ)	ESR (mΩ)	Rated ripple current (mA/100kHz)	LC (μA)	Product Part Number	Minimum Packaging Quantity
100 (115)	10	6.3*7.7	0.1	50	900	10	VHTC0772A100MVCG	900

VHM series

- 125℃, 4000H rating / Voltage range: 16~100V
- Low ESR / High permissible surge current / Small size, large capacity

■ Recommended Selection

Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Product dimensions ΦD*L (mm)	Tan (120HZ)	ESR (mΩ)	Rated ripple current (mA/100kHz)	LC (μA)	Product Part Number	Minimum Packaging Quantity
100 (115)	22	8*10.5	0.10	40	1800	22	VHMD1052A220MVCG	500
100 (115)	39	10*10.5	0.10	30	2000	39	VHME1052A390MVCG	500