

PRECISION IN MOTION

Powering the future of collaborative robots

Collaborative robots (cobots) have evolved far beyond simple pick-and-place machines; they are now sophisticated multi-mission platforms working shoulder-to-shoulder with humans across assembly lines, logistics, and precision manufacturing. For engineers, the challenge lies in developing next-generation cobots that deliver superior force control, efficiency, safety, and longevity across both large and small robotic joints. This requires significant advancements in critical areas such as current sensing, position sensing, gate driving, and power management.

Current sensing is essential for motor protection, torque feedback, and power distribution throughout each joint. Magnetic position sensing provides a contactless, compact alternative to costly optical encoders, ensuring that vibration and electromagnetic interference from nearby motors will not compromise accuracy. Gate drivers and power ICs must support 12V-to-48V platforms while meeting stringent SIL II/III functional safety requirements. Allegro offers a comprehensive portfolio of sensors, gate drivers, and power ICs designed to support these functions across collaborative, industrial, and service robot platforms.

What you can achieve with Allegro solutions

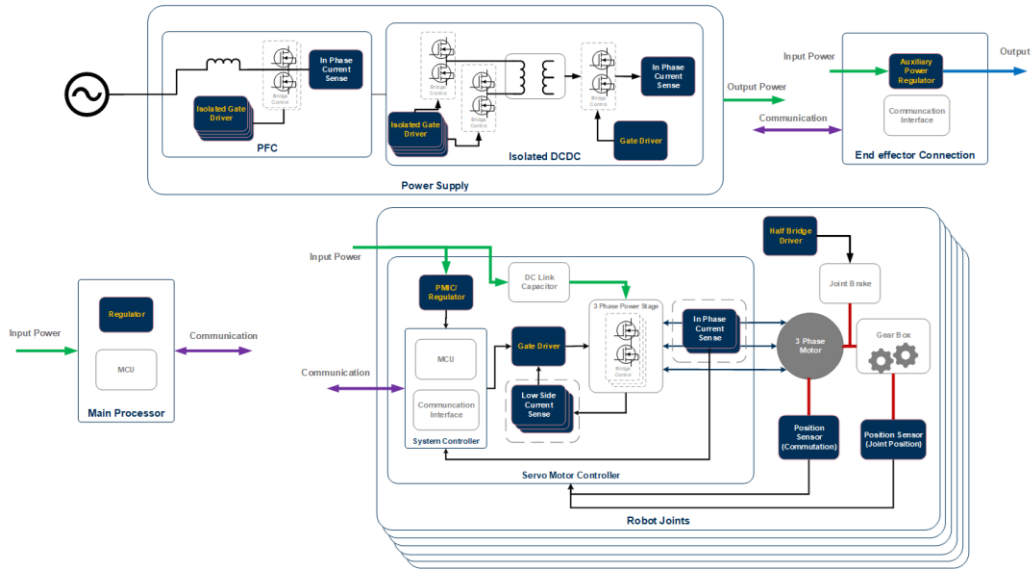
- **Superior Joint Precision:** Allegro's high-resolution magnetic position sensors deliver >18-bit effective resolution, providing a compact, stray-field immune alternative to optical encoders. Integrated calibration drives autonomous accuracy, enabling smooth, repeatable motion in every joint.
- **48V High-Safety Architecture:** Lossless current sensors and robust gate drivers with 80–100V absolute maximum ratings — enables SIL-Ready and full SIL II/III (IEC 61508) compliant systems without sacrificing power density or compactness.
- **Reduced System Cost and Size:** Highly integrated, ultra-compact DFN-packaged current sensors and stray-field immune position ICs, reduce component count and PCB area. Lower BOM cost from Allegro's power ICs and magnetic sensors replacing optical encoders simplifies design, lowering overall system cost.



As cobots scale to meet ever-increasing demands for payload capacity, range of motion, and safety certification, the underlying sensing and drive technologies become increasingly critical.

Allegro MicroSystems' advanced magnetic current sensors, high-resolution position sensors, gate drivers, and power management ICs provide the precision, reliability, and robustness required for consistent performance in demanding industrial and collaborative environments.

Block Diagram



Key Products and Solutions

Subsystem	Component	Allegro Parts	Key Differentiator
Servo Motor Controller	PMIC/Regulator	APM81815 (Pre-Regulator)	Highest performance 48V pre-regulator on the market
		A81411 (PMIC)	Fully integrated PMIC, reduces external components
	48V Gate Driver	AMT49100 (3-Phase)	48V, 3x low-side current sense amplifiers, ASIL
		A89500 (Half-Bridge)	100V absolute max, 3x3 mm DFN package
	In Phase Current Sensor	ACS39402 (TMR, <30A)	±1.0% sns (-40 to +125°C), ±10 to ±30A, 8.6mm ² package
		ACS71240 (Hall, <50A)	±1.0% sns (-40 to +125°C), ±10 to ±50A, 3x3 mm package
		ACS37220 (Hall, 50-200A)	±1.4% sns (-40 to +150°C), ±50 to ±200A, 4x4 mm package
Robot Joints	Half Bridge Driver	A89500 (48V)	100V absolute max, 3x3 mm DFN package
		A4950 (12V)	For 12V brake system, allows for individual control of FETs
		A3942/4 (HS/LS)	High Side/Low Side Drivers for holding brake systems
	Motor Commutation	A33023 (Hall, SFI)	12-bit resolution, stray field immune
	Joint Position Sensor	A17803 (Inductive, SFI)	>18-bit resolution (with 2x), Ideal to replace higher cost optical encoder solutions
		CT310 (TMR)	17.5-bit resolution, 2x2 mm package
Power Conversion	Isolated Gate Driver	AHV85311 (SiC FET)	1.5kV (8kV absolute maximum), >2x PCB reduction
	Current Sensor	ACS71240 (Hall, <50A)	±1.0% sns (-40 to +125°C), ±10 to ±50A, 3x3 mm package
	48V Gate Driver	AMT49100 (3-Phase)	48V, 3x low-side current sense amplifiers, ASIL
End Effector	Auxiliary Regulator	APM81815 (Pre-Regulator)	Highest performance 48V pre-regulator on the market
Main Processor	Regulator		



To learn more about the Allegro family of products and to explore available design resources, visit [allegromicro.com](https://www.allegromicro.com)