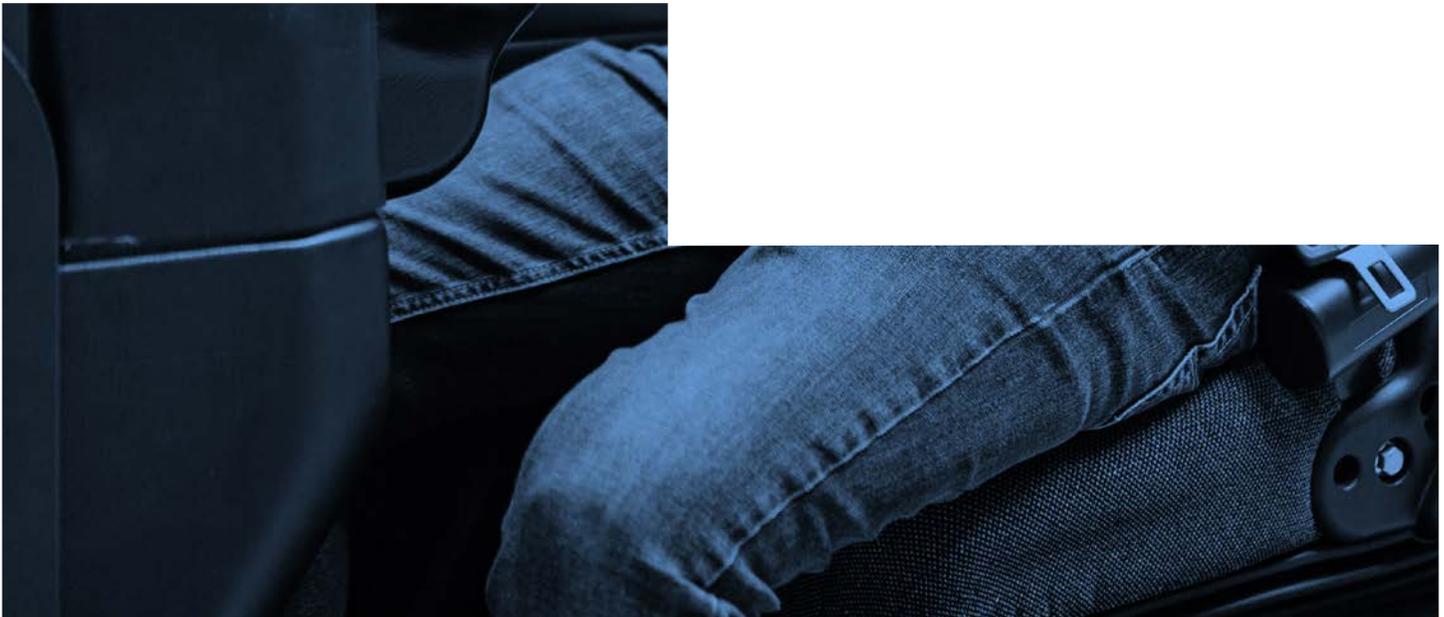


OPERATOR CONTROLS OVERVIEW BROCHURE



WHY SENSATA

Sensata Technologies is a global industrial technology company striving to create a cleaner, more efficient, electrified and connected world. Through its broad portfolio of sensors, electrical protection components and sensor-rich solutions which create valuable business insights, Sensata helps its customers address increasingly complex engineering and operating performance requirements.

With more than 21,000 employees and global operations in 13 countries, Sensata serves customers in the automotive, heavy vehicle & off-road, industrial, and aerospace markets.

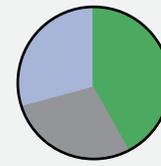
Our Industrial Operator Controls products deliver high-performance solutions equipment OEMs rely on.

- Extremely precise and thoughtfully designed human-machine interfaces.
- Expertise in ergonomics and control layout to maximize operator comfort.
- Rich experience developing devices for harsh and mission-critical applications like aerospace, agriculture, construction and industrial vehicles.

Our controls are also highly customizable. With our worldwide network of technical experts, we can work with you, engineer-to-engineer, to tailor the right solutions for your most demanding applications.

Fast Facts

2022 Net Revenues: \$4B



- Americas 42%
- Europe 26%
- Asia 32%

47,000+

different products manufactured

1.1B

devices shipped each year, each highly engineered

21,000+

employees worldwide

16

countries with business centers and manufacturing sites

MARKET TRENDS IN OPERATOR CONTROLS AND MATERIAL HANDLING

A number of trends within the material handling market are having a direct impact on the operator controls components OEMs need to meet the needs of tomorrow's designs.

Electrification – The shift in the market toward lithium-ion and other fast-charging battery technologies has ushered in a new wave of electric forklifts and other industrial vehicles. No longer limited by the long charging times and other downsides of lead-acid batteries, new designs feature more integrated high voltage contactors and battery management systems to improve equipment reliability and utilization.

Driver Assistance and Autonomy – The material handling segment is also embracing a wave of driver assistance and autonomy-based technologies, as the growth of eCommerce continues to push the industry toward more autonomous vehicles. Features such as radar object detection and auto-braking are setting the stage toward those next stages.

Telematics – Vehicles designs are also adapting to become more and more connected through telematics and other data platforms – delivering information on maintenance, equipment status, and more through digital interfaces.



DRIVING DIFFERENTIATED VALUE WITH SENSATA INDUSTRIAL OPERATOR CONTROLS

Design Partnership to Drive Success

Sensata's Operator Controls Group works with our OEM customers in a collaborative design process to develop best-in-market haptics and perception using existing components as well as the newest technologies on the market.

Our team leverages products which are both field-proven and cost-effective—allowing for true design differentiation and value.

Technical Capabilities

Our technical labs enable faster product design and technical support for our customers, and is accredited per ISO/IEC 17025:2005. In addition, Sensata has in-house rapid prototype capabilities used for parts design, manufacturing development, and test fixtures - as well as a complete mechanization department.

Team to Drive Engagement across the Globe

Sensata's Industrial Operator Controls Team is dedicated to developing solutions for material handling and aerial work platform equipment, with engineering, design resources and production plants located around the world to effectively support our global customers.



JOYSTICKS



AJ11
SINGLE AXIS

Features

- Contactless Hall-effect sensing technology
- Life greater than 5 million cycles
- Integrated temperature compensation



SAL2
SINGLE AXIS

Features

- Contactless sensing with hall-effect technology
- Redundant sensing; 2 sensors per axis
- Life greater than 10 million cycles (without detent option)



AJ3
DUAL AXIS

Features

- Life greater than 5 million cycles
- 2 sensors per axis
- Integrated temperature compensation



AJN
DUAL AXIS

Features

- Redundant sensing; 2 sensors per axis
- Life greater than 10 million cycles (without detent option)
- Integrated temperature compensation



AJ21
DUAL AXIS

Features

- Rugged design with life of > 7.5 million cycles
- CANopen Output
- IP67 Protection level



AJ22
DUAL AXIS

Features

- Compact Dual-Axis Design
- EN1175 standard compliant
- Flexible custom modifications

CUSTOM HAND CONTROL SOLUTIONS

Sensata's dedicated operator controls development team has the technical and application expertise to deliver customized products to satisfy your unique needs. Starting with proven technologies and standardized system modules, our engineers can develop custom operator controls to meet your performance, quality, reliability and serviceability requirements.

To learn more about our custom capabilities, please contact us.



GRIPS

Compatible with our joystick offerings, Sensata offers a range of single and multifunction grip options.

These grips' ergonomic shape and operation make them ideal for mounting on hydraulic levers, electronic joysticks, pilot hydraulic joysticks, hydrostatic levers and more.

Grips are available in both standard configurable versions and custom designs.

| STANDARD GRIPS



| CUSTOM GRIPS (Representative Examples Shown)



ROCKERS

Sensata's extremely durable rockers and switches are designed for use in dashboards and armrests to put robust control at the operator's fingertips.

Both switch rockers and analog rockers are available with a variety of options.

| SWITCH ROCKERS



| ANALOG ROCKERS



VEHICLE CONTROLLERS



K500
SCISSOR LIFT - ESSENTIAL

Features

- Four push button switches with LED backlit indicators
- Direction control switches integrated in the joystick grip
- LCD Display for an easy setting and control
- Support CAN & USB



K600
SCISSOR LIFT - ADVANCED

Features

- CAN communication port, Bluetooth module
- Design complies to BS EN 280-2013 and IEC61508 system level
- Multi language display
- Six push button switches with LED backlit indicators



K610
SCISSOR LIFT - PREMIUM

Features

- CoDeSys platform, module design and user-friendly software
- 3 PWM channels with current feedback and closed-loop control
- Support analog current & analog voltage multiplex Input
- 2 Isolated CAN channels



K120
ROUGH TERRAIN SCISSOR LIFT

Features

- CoDeSys platform, module design and user friendly software
- Visual debug interface and online diagnostic.
- 8 channels PWM with current feedback and closed-loop control
- 70+ I/O port



U900
I/O MODULES

Features

- 100+ channel IOs and 2 channel CAN output
- Support Analog current & Analog voltage multiplex Input
- 12 channels PWM with current feedback and closed-loop control
- 8 channels PWM with current status feedback

MOTOR CONTROLLERS



M701
DC PUMP

Features

- Rated Current: 320A (2mins), 150A (1hour)
- Rate Voltage: 24V
- IP65 Ingress protection
- Compact size and low power consumption



M730
AC MOTOR (3 IN 1)

Features

- Integrated automotive-level design
- Rated Current: 2*200A + 300A(2min), 2*80A+167A(1hour)
- CAN communication

SENSATA'S FULL MATERIAL HANDLING SOLUTION

Sensata delivers a broad range of material handling solutions to enable our customers to take their designs to the next level. Looking beyond our operator controls products, our team deeply understands material handling equipment – delivering a set of solutions that make these vehicles safer, easier to use and better connected, with technologies such as:

- Industry-leading pressure, temperature, and position sensors for optimal operations and stability control
- Advanced telematics to turn vehicle data into actionable intelligence
- Battery management and high-voltage contactors to support next-generation EV technology
- Radar sensing and autonomy solutions to improve safety



THE TOTAL SOLUTION PROVIDER FOR INDUSTRIAL VEHICLES



Joysticks



Lift Control Systems



Diesel and Hybrid Engine



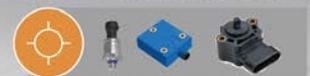
Motor Controllers



Telematics and Safety



Operator and Stability Control



Electrification: Battery Management Systems



sensata.com/material-handling



THE SENSATA ADVANTAGE

When designing equipment like lift trucks, aerial work platforms, and automated guided vehicles (AGVs), rely on our high-performance products and dedicated service teams to help you meet safety requirements — and exceed customers' expectations.



ABOUT US

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