Airport Ground Handling Systems

The OEM and Installers Guide to Control Components for Airport Ground Support Equipment (GSE)

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Everything under control.

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About c3controls

Since 1976 c3controls (c3controls.com) has provided OEMs and electrical equipment builders a comprehensive portfolio of industrial control products that meet the most demanding applications. By maintaining strict control over the development and manufacturing of all products, c3 can provide customers extraordinary value through unmatched quality, competitive pricing, same-day shipping and a lifetime product warranty. This vertically integrated approach coupled with a direct sales model brings c3 closer to the end-user, fostering a degree of innovation that leads the industry.

Glossary of Terms

Apron:
Also called the ramp, this paved area is where aircraft park for boarding, loading, and servicing — the hub of ground operations.

Baggage Handling System (BHS):
The airport network of conveyors, scanners, and sorters that moves luggage from check-in to the aircraft and back to passengers on arrival.

Cart:
A non-motorized trailer used for transporting baggage or cargo, typically towed in trains by tugs.

Catering Truck:
A high-lift truck that delivers meals and galley supplies. Its scissor lift raises catering staff and carts to the aircraft door.

Conveyor:
A belt system, often vehicle-mounted, for loading and unloading baggage between ground level and aircraft cargo holds.

Control Panel:
The enclosure housing switches, relays, and protective devices that operate ground handling equipment such as loaders, conveyors, and jetbridges.

De-ice / Anti-Ice Vehicles:
Trucks that spray heated glycol-based fluids to remove or prevent ice buildup on aircraft, ensuring safe winter operations.

eGSE / EV – Electric Ground Support Equipment:
Battery-powered versions of tugs, loaders, GPUs, and other GSE. They reduce emissions, noise, and maintenance costs.

Gate Equipment:
Systems at terminal gates, such as jetbridges, ground power, and pre-conditioned air units, that service aircraft and passengers.

Ground Power Unit (GPU):
Provides 400 Hz electrical power to aircraft when engines and the APU are off, running onboard systems without fuel burn.

Ground Support Equipment (GSE):
The vehicles and machinery used to service aircraft between flights, including tugs, loaders, conveyors, and service trucks.

Jetbridge:
An enclosed, movable bridge connecting the terminal to the aircraft door for safe boarding and deplaning. Commonly called a Jetway.

Lavatory Service Truck:
A vehicle that removes waste from aircraft lavatories and replenishes them with clean water and disinfectant.

Loader:
Lift equipment for moving baggage containers, pallets, or freight into aircraft. Includes belt loaders that use conveyors to load luggage. Sometimes called transporters.

Pilot Devices:
Push buttons, selector switches, and indicator lights that allow operators to control and monitor ground equipment.

Portable Water Truck:
A service vehicle that replenishes an aircraft's potable water supply for galleys and lavatories.

Pre-Conditioned Air (PCA) System:
Supplies cooled or heated air from ground systems to the aircraft cabin, reducing reliance on onboard systems.

Sorter:
Automated equipment in baggage systems that directs luggage to the correct flight using barcodes or RFID tags.

Tug:
A vehicle used to maneuver aircraft and tow baggage carts. Also called a tractor, tugs include pushback tugs for aircraft and baggage tugs for cart trains.

Market Outlook

Airport ground handling is the unseen engine of modern aviation. From the moment an aircraft parks on the apron, a network of services and systems keeps operations moving — including tugs, loaders, conveyors, service trucks, ground power units, and pre-conditioned air systems. Together, these elements enable fast passenger boarding, accurate baggage transfer, and critical aircraft servicing to ensure on-time departures. As global passenger and cargo volumes rise, airports and operators demand more reliable, efficient, and sustainable solutions to keep pace.

The ground handling industry is well-positioned for growth, supported by steady increases in air travel and ongoing airport modernization. One of its greatest strengths lies in its indispensable role: without efficient ground handling, no airline can maintain its schedules. However, the sector faces weaknesses in the form of high capital costs and reliance on manual labor, which can slow adoption of new systems. Opportunities are abundant, particularly in the shift toward electric ground support equipment and smarter, automated solutions inside baggage handling systems. At the same time, threats like supply chain disruptions, rising energy costs, and tighter environmental regulations put pressure on operators and OEMs alike. The future of ground handling will be shaped by those who can adapt quickly, innovate reliably, and deliver durable equipment that meets evolving standards.

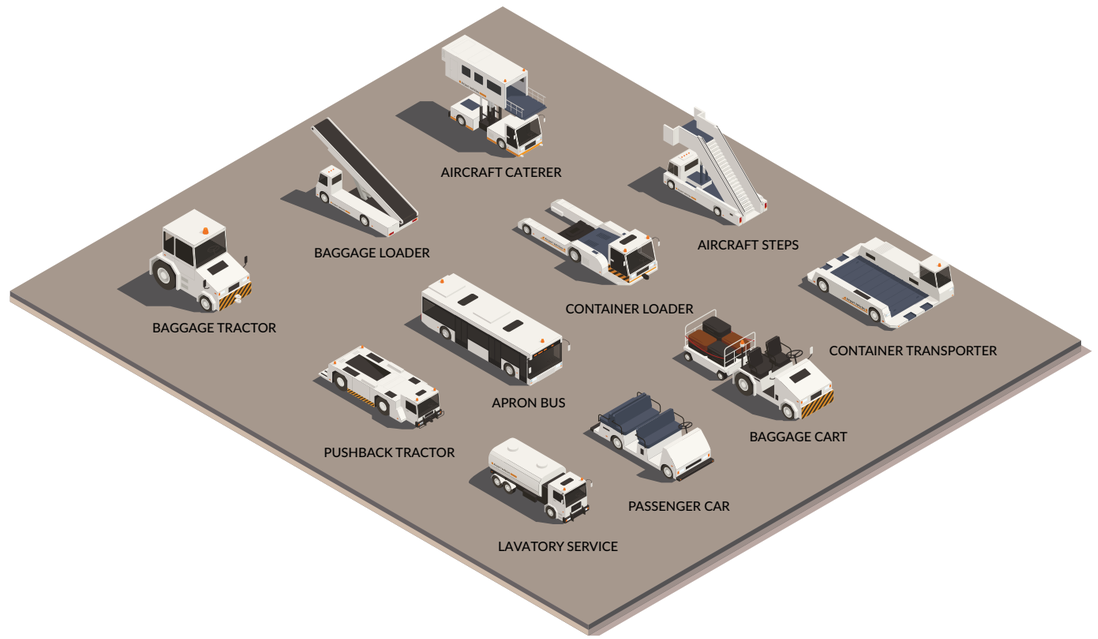
In this dynamic environment, OEMs need dependable electrical components to power the control systems inside their equipment — this is where c3controls makes the difference. For 50 years, c3controls has specialized in building high-quality industrial control products engineered for demanding environments in airport operations. Our vertical integration enables faster production, better cost control, and quicker adaptation to industry needs. That means lightning-fast delivery and support for products powering:

- **Jetbridge and gate equipment controls**
- **Tugs, loaders, and baggage systems**
- **PCA systems & GPUs**
- **Service vehicles**
- **& more!**

With more than 17 million product configurations and a UL508A-certified panel shop, c3controls is ready to help you design the next generation of ground handling equipment. Partner with us today and discover how our controls can improve reliability, efficiency, and turnaround performance — keeping your operations on time and prepared for the future.

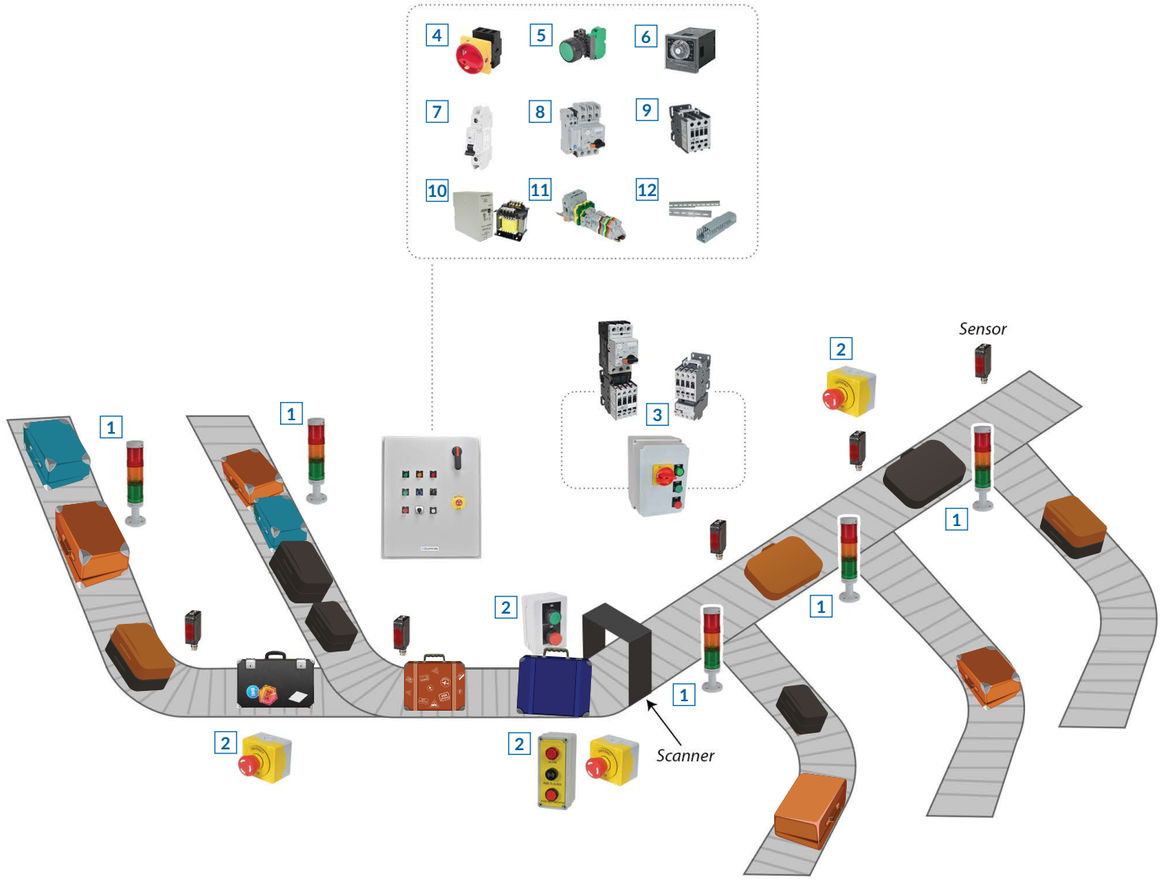
Airport GSE Isometric

Here are a few examples of airport ground support vehicles.



Application Overview

c3controls has components for all sorts of GSE applications. Here's a look at one:



Baggage Handling System (BHS)

For illustration purposes only. Other solutions may be applicable depending on your application design requirements.

1 	**Tower Lights**	Stackable design for up to 5 modules in a single assembly	Mounting options in three styles: 50mm direct mount, 50mm panel-mount short base, and 50mm panel-mount tall base	Voltage options available in 24V AC/DC, 120V AC, and 240V AC	Three styles of illumination: continuous, flashing and rotary	Continuous or intermittent sound modules with 80dB or 100dB sound output
2 	**Control Stations**	Available as standard pre-configured assemblies of 30mm, 22mm IEC and 22mm NEMA	Enclosure constructions in Polycarbonate, Polyester, and Die Cast Aluminum	Operator options in both non-illuminated and illuminated	Each assembly comes with laminated, laser engraved legend plates	Fully assembled and ready to use out of the box
3 	**Direct-On-Line Starters** (+enclosed)	Open-style starters consist of either a Contactor & Overload Relay, or a Motor Protection Circuit Breaker & Contactor	Enclosed starters come pre-wired with a variety of pilot device options	Factory assemblies provide the convenience of a single catalog number and shorter control panel bill of material		
4 	**UL 508 Disconnect Switches** (+enclosed)	Door mount, panel-base mount, and panel mount with integral operator	Certified for use in Manual Motor Controller applications suitable as Motor Disconnects	16 - 125 Amps in 3, 4, and 5 pole configurations	Variety of operating handle styles and colors rated for Type 1, 2, 3, 3R, 4/4X, 12, and 13, IP55 and IP65	ABS plastic, polycarbonate, and carbon steel enclosures with Type 1, 4X, 12, 13 and IP65 ratings
5 	**Pilot Devices**	Modular range of 30mm, 22mm, 16mm, and 13mm	Type 1, 2, 3, 3R, 4/4X, 12, and 13	Non-Illuminated, Illuminated and Keyed Operators in both maintained and momentary operations	Color-coded, snap-on contact blocks with angled captive screws and pressure plates	Full voltage, multi-voltage, resistor, and dual input light units in a wide range of voltages up to 600VAC/VDC
6 	**Electronic Timing Relays**	Compact design, sizes in 17.5mm, 22.5mm, and 45mm wide	Single, dual and multi-functions	Easily select operating modes and timing ranges with accessible setting dials and DIP switches.	DIN Rail, Panel, Socket, and enclosure door mountings	Voltage inputs 20-240 VAC and 12-240 VDC
7 	**Miniature Circuit Breakers**	UL 489 & UL 1077	1, 2 and 3 Pole combinations	10kA SCCR @ 480Y/277VAC	Current ratings up to 63 Amps	B, C and D curve ratings
8 	**Motor Protection Circuit Breakers**	Multi-Function: Manual Motor Controller, Motor Disconnect, Group Motor Installations	50kA SCCR @ 480V	Self-protected Type E up to 50kA @ 460V	FLC up to 32 Amps	Trip Class 10 Thermal and Magnetic Elements
9 	**IEC Contactors**	9 to 105 Amps	100kA SCCR @ 480V and 600V with Class J fuses	AC and DC - electronic coil control on DC devices	Integral auxiliary	Up to 75 HP @ 400V (55kW @ 400V)
10 	**Power Supplies**	Control Circuit Transformers: 120V to 480V on primary side, 24V on secondary side	Control Circuit Transformers: Ideal for Class 2, Class 3, and general purpose applications	Control Power Transformers: Open-type ranging from 50 to 5000VA, and features Class H insulation system on all variants	Industrial Power Supplies: Output power range from 60W to 480W, and adjustable voltage options in 12, 24 and 48V	Industrial Power Supplies: DC OK relay contacts are standard on 240W and 480W
11 	**Power Supplies**	Screw Clamp, Spring Clamp, and Miniature	5mm - 25mm widths	25 - 230 Amps	Feed Through, Ground, Multi-Conductor, Double & Triple Level, Fuse Holder, Power Distribution, and more	DIN Rail mounting; snap-on, snap-off assembly
12 	**Wire Duct & DIN Rail**	Wire Duct: 13 dimensions from 25mm wide up to 80mm, and up to 2m in length	Wire Duct: Narrow and Wide Slot	DIN Rail: 35mm rails in steel and aluminum	DIN Rail: 1m (3.28ft) or 2m (6.56ft) lengths	DIN Rail: Standard package quantities, or pallet options available

c3controls Product Portfolio

Our 17 million+ product configurations deliver durability and reliability—even in the most punishing environments—meeting and exceeding global standards for quality and safety.

Industry White Papers

Product professionals AND subject experts!
Check out c3controls' extensive library of white papers:

Industrial Pilot Devices Explained

Discover the essential guide to industrial pilot devices at c3controls. Learn about their types, functions, and applications in automation systems. Equip yourself with... Read now for more!

READ WHITEPAPER

Key Components of Industrial Control Panels

Discover the essential components of industrial control panels at c3controls, including switches, relays, circuit breakers, and more. Learn how these... Read now for more!

READ WHITEPAPER

Replacing VFDs with Motor Starters

Learn about the benefits of replacing variable frequency drives (VFDs) with motor starters in certain applications. Read now for more!

READ WHITEPAPER

Selecting and Installing Machine Tower Lights

Learn how to choose and install machine tower lights for optimal visibility and safety. This c3controls whitepaper covers selection criteria, mounting tips, and best... Read now for more!

READ WHITEPAPER

Understanding SCCR

It's critical to ensure that electrical panels are designed and built with the proper SCCR to maintain the system. Learn how to calculate it here!

READ WHITEPAPER

Material Handling Applications Overview

Get an overview of the different types of material handling applications and the industrial controls that are used in each.

READ WHITEPAPER

Why choose c3controls

Integrated Manufacturing

Vertical integration is the cornerstone of c3controls as it places innovation, development, design, manufacturing, testing, and shipping all within our control. With Everything Under Control, we can ensure the highest quality and customer satisfaction.

Innovation

Product innovation is in our DNA. We approach our products as solutions. Unlike our competition, our business model allows us to provide customers with premium controls without the premium price.

Same-Day Shipping

Reduce inventory. Improve cash-flow. Save money. Our customers enjoy peace of mind knowing they'll get what they need, when they need it. Our promise, guaranteed!

Limited Lifetime Warranty

With total control over engineering and manufacturing, we are able to guarantee the highest quality products on the market—products free of defects in material, workmanship, and design.

Advantage Pricing

Total control means lower overhead and direct sales. For our customers, this translates to savings of up to 40+% on c3controls premium products.

Customer First

Commitment to the success of our customers is a core value and the driving force behind all we do. We promise concierge style service that makes doing business easy, personalized, and responsive.

Notes

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