

## Control Panels & Electrical Systems Integration Specification Guide



**Process Automation can benefit from knowledge of how to specify and select control panels & systems integration components. The Carotek Industrial Control Panels and Systems Integration Specification Guide outlines considerations in process automation components selection.**

### [What Process Control Panels Are Used For](#)

A control panel is generally a flat, vertical apparatus where control or monitoring instruments are displayed. These panels are one part of a process automation system. Modern control panels are driven by LCD touch screens and customized software, with embedded controllers such as programmable logic controllers (PLCs), fanless PCs, and programmable automation controllers (PACs).

Industrial control panels are as customized as their applications and environments, the processes they control, and the systems they integrate. Generally, they are used for systems integration to automate a range of processes, including system startup, monitoring, and shut-down. Ordinarily, each control panel controls a number of pieces of equipment to run the entire process.

Nearly any industrial process can be a candidate for process automation. Some examples of where process control panels are beneficial include:

- Metal working machine tools
- Plastic injection molding machinery
- Access control systems
- Motor control systems
- Packaged pumping systems
- Factory automation equipment
- HVAC systems

## Control System Design and Development Process

Designing industrial control panels can be a complex process, due to the need to meet all applicable regulatory standards and safety requirements. A general design process for process automation systems follows these steps:



1. Gather technical requirements and the sequence of operation or functional specification. This should take into account process goals, existing equipment and environment specifications, and system operator needs.
2. Weigh design requirements and specifications.
3. Source components that are suited for the application (as needed). Verify that the components have the ratings necessary for the application (UL, CSA, ATEX).
4. Prepare schematics of the control panel to make sure the components are wired correctly, as well as a physical layout.

5. Select and order the enclosure to meet requirements.
6. Implement the solution including installation, commissioning, and training. This may involve integration of existing components, PCL/HMI software development, custom computer screens for operator interfaces, custom report generation software, annotated documentation, installation and operator documentation, training, and engineering drawings.

## Elements of Process Automation Component Selection

The process for industrial control panel & systems integration specification and selection often requires iterative design and collaboration between plant process experts and vendors. The following information should be gathered to facilitate the process of specifying process automation component systems.

1. Required codes, ratings, and customer/industry certifications. These often include:
  - UL label. UL508A (UL 60947-4), and possibly UL 698 or UL 1203 (hazardous)
  - Electrical codes including NEC Art. 409, NFPA 79, NEMA 4X environmental rating, NEC Short Circuit Current Rating (SCCR), and local electrical codes

2. Location of the panel – indoors or outdoors, shade or direct sunlight, in a corrosive or hazardous area
3. Minimum and maximum ambient temperature
4. Humidity, dust, vibration, and other environmental challenges
5. Labeling and tagging requirements



Some environments need thermal management to preserve the performance and service life of critical electronics. These control systems require a specialized thermal management system. After reviewing thermal management challenges, a thermal management control panel can be designed to regulate temperature within the environment. For thermal control panel sizing and selection, the system must take into account the size of the enclosure, target temperature range, temperature outside the cabinet, and ambient conditions outside the enclosure.

Carotek offers local product inventory, expertise, and support for Pfannenberger thermal management products.

Control panels & systems integration supplier selection should take into account the capabilities of that supplier to specify and deliver on the design requirements correctly. Carotek's Control Panels and Systems Integration Group can design, fabricate, develop software (Both PLC and HMI) and assist with start-up on your next automation project. We can fabricate custom PLC control cabinets to meet your unique needs. We will build control systems to go into your existing process systems or your production facilities. We also build control systems as part of our complete Packaged Process Skid Fabrication Services. When you place an order with Carotek you're not just ordering parts, you're getting an engineered solution.

**Contact Carotek for expert control panel specification, design and component selection assistance. You can browse our selection of [Control Panels](#) to research some options for your application.**

Carotek is a recognized industry leading fabricator and solutions provider for Electrical Systems Integration & Control Panels for Process Automation. We have a 15,000 sq. ft. Dedicated Panel Shop with another 5,000 sq. ft. available in Charlotte, NC with a 5 ton bridge crane.

- Authorized Integrator for most major PLC and HMI Manufacturers
- Experience with all major brands of DC Drives and AC Variable Frequency Drives
- Systems fabricated to your design
- AutoCAD Electrical generated drawings
- All systems tested prior to shipment
- **UL/cUL 508A, UL 698 and UL 1203 Certified**