

DE-3000 SERIES

Configurable Safety Shutdown and Control System with Graphing Capabilities

- ✓ On-board cool down timer allows for proper engine unloading during scheduled shutdown
- ✓ Integrated lube proximity switch inputs allow easy configuration for dedicated lube monitoring
- ✓ Built-in linear speed control allows for linear suction pressure vs engine speed control
- ✓ Dedicated timer outputs with delay functionality for battery saving or like operations
- ✓ Alternative control strategy for simplified and reliable interface to popular OEM-provided engine controls. Configurable starting sequence.
- ✓ Selectable number of auto-start attempts. Safety warning and countdown timer visible on the enhanced display between start attempts.
- State-of-the-art control system specifically designed to protect, monitor and control critical rotating machinery, such as engine or motor-driven compressors, pumps and generators operating in harsh/hazardous areas
- Completely scalable and expandable system allowing for use across a range of low, medium, and high-spec applications
- Automatically and continuously optimizes compressor efficiency and throughput via speed and capacity control
- Integral auto-start functionality for unmanned or highly-cyclic applications
- All system inputs can be individually configured for:
 - Sensor Type: Analog transducer input, thermocouple input (type J or K) or digital (switch) input
 - Sensor Class: Class A, B or C logic
 - Digital Input Sensor Run/Fault Status: Normally-open or Normally-closed
- Large color-changing display offers optimal annunciation of all functions, including on-screen graphing
- ModBus-RTU compatible, and easily configurable via included Windows™-based terminal program

The DE-3000 Configurable Safety Shutdown and Control System uses state-of-the-art microcontrollers and surface-mount PCB assembly technology to provide users of compressors and other critical rotating equipment with a sophisticated, yet reliable, means of protecting and controlling both the prime mover and the load machine (compressor, pump, etc.). Incorporating an “intelligent” add-on board system, the DE-3000 system is fully scalable, allowing users to incorporate a single control system technology across a wide range of applications.

The base DE-3000 configuration offers a number of digital and analog outputs, as well as thirty (30) inputs that can be individually configured for use with switch contacts, thermocouples, or analog transducers. Using one of two different add-on terminal boards, medium and high-spec applications can be accommodated with up to sixty (60) configurable inputs, twenty (20) digital outputs, and four (4) user-adjustable, analog PID outputs. This approach also allows for a single control system to be used across a fleet of units, thus simplifying maintenance and part stocking requirements, along with system training requirements for operating personnel.

Ease of system setup and configuration sets the DE-3000 apart from other PLC-style or competitive controllers. USB-based connectivity to the device and an intuitive, Windows™-based terminal program for system configuration eliminates the need for any knowledge of ladder-logic or other functional programming languages. ModBus-RTU communications are fully supported for remote monitoring and/or control applications.



STANDARD DE-3000 SYSTEM
CERTIFIED
CLASS I, DIVISION 2,
GROUPS C and D

SPECIAL DIVISION 1 SYSTEM
CERTIFIED
CLASS I, DIVISION 1,
GROUP D



DE-3000 Description and Operation

The innovative, CSA-certified DE-3000 control system comprehensively starts, protects, monitors, and controls critical rotating equipment such as reciprocating engines, compressors, and pumps. This scalable and expandable microprocessor-based system includes a Display Module, Power Supply Module and Terminal Module(s). Each device is typically mounted in an associated control panel, with the Display Module installed for simple operator access, and the Power Supply and Terminal Module(s) DIN-rail mounted in the rear of the enclosure.

System Overview

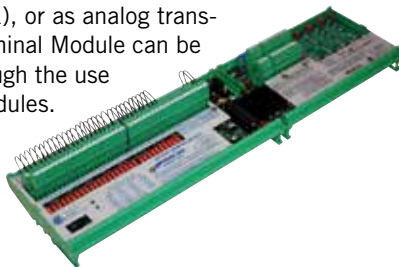
Display Module — System operating and application performance information such as engine speed, monitored pressures and temperatures, and the nature of detected alarms and shutdowns is available via a robust, sixteen position, sealed-membrane keypad and 128 x 64-pixel graphics display with multi-color backlighting. The backlight colors will change according to the condition of the engine. The backlight colors are as follows for the given engine conditions:

- RED: FAULT / STOP**
- GREEN: RUNNING**
- YELLOW: TIMERS ACTIVE**
- PURPLE: TEST MODE**

The display also has a graphing feature instead of a bar graph. Each analog channel (including speed) may be viewed. The graphing screen is updated every minute (which allows the user to see 90 minutes of past data on the screen) and shows the most recent data to the left of the screen. The last data is shown on the far right hand side of the screen. The graphing feature will allow the user to view trending on the panel. System configuration information is stored in non-volatile memory as are the associated system datalogs.

Power Supply Module — In addition to conditioning and routing the 12-24 VDC input power, the DE-3000 Power Supply Module also carries up to four (4) industry-standard, 0.6 inch, plug-in digital output modules. These optically-isolated, solid-state devices—including several Altronic-manufactured models—are typically used for on/off control of on-engine processes such as starting motors, fuel, and ignition firing.

Terminal Module(s) — All system digital and analog inputs and control outputs are routed through the DE-3000 Terminal Module. Unique to the DE-3000, all system inputs are individually configurable for use as discrete (switch) inputs, thermocouple inputs (J or K), or as analog transducer inputs. The base Terminal Module can be expanded substantially through the use of one of two Expansion Modules.



System Operation

The scalable and expandable nature of the DE-3000 allows it to be used on the simplest safety-shutdown-oriented applications, on mid-range applications with minimal or moderate auto-start or capacity control requirements, and on highly-complex units where a significant number of points must be monitored and functions controlled simultaneously.

Safety-Shutdown Functions — At its core, the DE-3000 is an annunciator which directly monitors parameters such as temperatures, pressures, speeds, and vibration levels against a set of pre-set alarm and shutdown thresholds. Once detected, the DE-3000 will take the necessary actions (as configured by the user) to alert the operator and/or shutdown the engine by interrupting the flow of fuel and disabling the ignition system.

Control Functions — Full auto-start capabilities, including crank-disconnect, are available in the DE-3000. On-board 4-20mA PID control outputs (up to four) and digital outputs (up to 20) offer a range of sophisticated capacity control options.

In a typical operation, the DE-3000 starts and warms-up the engine/compressor, raises it to load-carrying speed, and then automatically applies the load by actuating compressor slide valves or other capacity control devices. Should the control setpoint not be met at the minimum load-carrying speed, the compressor speed is automatically raised in an effort to meet the desired process pressure setpoint. This control strategy is governed by a number of user-adjustable load and speed limits which can inhibit the application of additional load beyond what is deemed to be safe, can force the system to shed load, and can shut the engine/compressor down in the event that a maximum speed is exceeded.



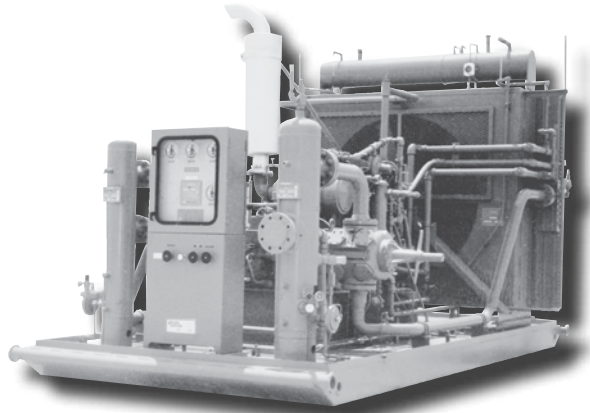
DE Series Data Logging and Communications

The DE Series products are designed to operate in a communication environment. The serial communications interfaces provide the user access to critical data, both locally and from remote locations, allowing predictive scheduled maintenance and/or dispatch of repair personnel with the correct parts. DE units can also initiate a call-out in the event of a fault. ModBus and ASCII protocols are supported.

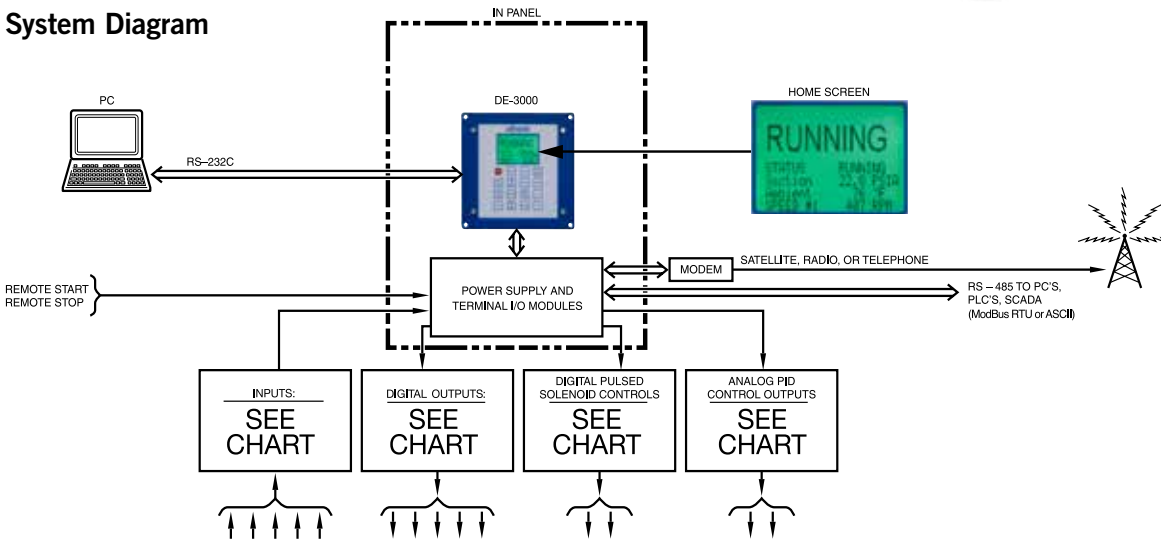
At the core of the DE Series communications functions are the data logs. These snapshots of data are taken at user-defined intervals and are a compilation of the analog values being monitored by the DE, plus unit speed, status, and complete information on the first fault that caused a system shutdown (identity, value, date, time). Using the Terminal Program, data log information can be downloaded locally to a portable PC or communicated remotely via telephone, satellite or radio. An integral data analysis/trending package that is included with the DE Terminal Software can display and graph this data for inspection and analysis.

System Configuration

The intuitive Terminal Software program operates on a “fill-in-the-blanks” basis whereby the application is not programmed, but configured. Using an application template as a guide, and connecting to a Windows™-based PC via USB connection, the operator selects the appropriate operating parameters and setpoints for each input channel, defines the performance of the digital and analog control outputs, configures the eleven (11) service meters, and establishes the frequency of system datalog sampling and recording. This approach puts application configuration and adjustment into the hands of an educated user by eliminating any complex ladder-logic based programming and revision in the field.



System Diagram

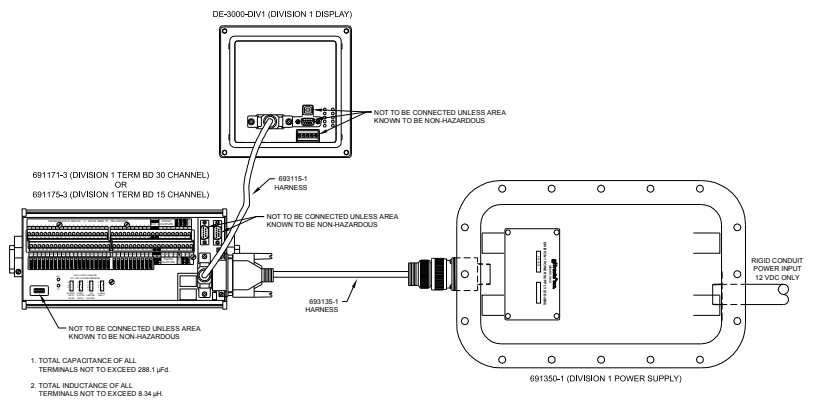


DISPLAY MODULE	1ST TERMINAL BOARD PART NO.	2ND TERMINAL BOARD PART NO.	DISCRETE INPUTS	ANALOG INPUTS	FREQUENCY (SPEED) INPUTS	DIGITAL OUTPUTS	ANALOG P.I.D. OUTPUTS
DE-3000	691171-1	—	30 configurable		1	12	2
DE-3000	691171-1	691175-2	45 configurable		2	16	4
DE-3000	691171-1	691171-2	60 configurable		2	20	4

NOTE: All inputs are configurable for discrete, analog or thermocouple input.

Special DE-3000 System for Use in Class I, Division 1, Group D Hazardous Areas

A special DE-3000 System has been developed for use in hazardous operating areas demanding Class I, Division 1, Group D certification. Using special DE-3000 Terminal Modules and a system Power Supply Module mounted with an integral barrier in an explosion-proof enclosure, this unique system is suitable for new applications requiring this higher level of hazardous area protection. It is also designed for a simple retrofit installation as a replacement for obsolete control systems, or where additional monitoring and/or control functionality is required without downgrading the hazardous area rating of the package.



To Order

DISPLAY MODULE

DE-3000 System.....	DE-3000
Division 1 DE-3000 System	DE-3000-DIV1

POWER SUPPLY MODULE

All Standard DE Systems.....	691122-1
Division 1 DE-3000 System (incl. Ex. Box)	691350-1

TERMINAL MODULE

DE-3000 System (Standard)	
First Terminal Module (30 input)	691171-1
Second Terminal Module (15 input)	691175-2
Second Terminal Module (30 input)	691171-2
DE-3000 System (Division 1)	
First Terminal Module (30 input)	691171-3
First Terminal Module (15 input)	691175-3

CABLE ASSEMBLIES

Display to Terminal Module (DB-25)	693115-1
Power Supply to Terminal Module (DB-25)	693115-1
(Standard DE-3000 Systems Only)	
Power Supply to Terminal Module.....	693135-1
(Div. 1 Certified DE-3000 System Only)	
Display Module RS-232 Port (DB-9)	693116-1
Expansion cable for optional added Terminal modules.....	693133-1

*Use only if Power Supply and Terminal Modules are mounted separately.

OUTPUT RELAY MODULES (common to all DE systems)

C.D. Fuel Valve/Ignition	691124
5-48 Vdc, 5.0 A.	691125
5-60 Vdc, 2.0 A.	691056
5-200 Vdc, 0.67 A.	691066
24-280 Vac, 2.0 A.	691065

Available Altronic Transducers

PRESSURE TRANSDUCERS

	Orifice Included
0-15 psia	691204-15
0-50 psia	691204-50 or 691204-50N-ST8
0-100 psia	691204-100 or 691204-100-ST8
0-300 psia	691204-300 or 691204-300N-ST8
0-500 psia	691204-500
0-100 psig/0-680 Kpa	691201-100 or 691204-100-ST8
0-300 psig/0-2040 Kpa	691201-300 or 691204-300-ST8
0-500 psig/0-3400 Kpa	691201-500 or 691204-500-ST8
0-1000 psig/0-6800 Kpa	691201-1000 or 691204-1000-ST8
0-2000 psig/0-136 bar	691201-2000 or 691204-2000-ST8
0-5000 psig/0-340 bar	691201-5000

TEMPERATURE TRANSDUCERS

Range: +5°F to 350°F / -15°C to 176°C (±3°F / ±2°C)	
1.75" length.....	691202-300
5.75" length.....	691203-300
Range: -40°F to 450°F / -40°C to 232°C (±6°F / ±4°C)	
1.75" length.....	691212-450
5.75" length.....	691213-450

TRANSDUCER CABLES

5 ft. length	693008-5
25 ft. length	693008-25
50 ft. length	693008-50

STANDARD DE-3000 CONTROL PANEL

DE-3000, CAT® Panel - Medium Pressure Transducer Kit (DWG: 5800-333-AL)	1013-6416-00
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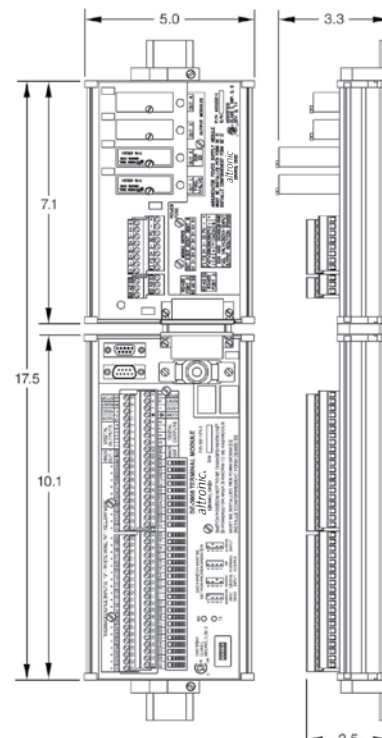
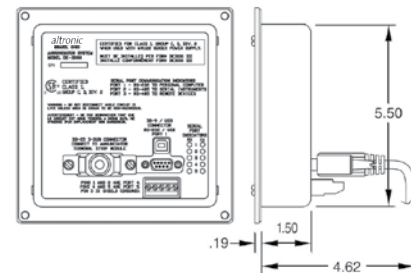
*Note: Custom control panel designs also available

General Specifications

COMMUNICATIONS PORTS	1 RS-232, 2 RS-485, USB
DISPLAY	128 x 64-pixel, alphanumeric, backlit
SCAN RATE	3 per second
AMBIENT TEMPERATURE	-40°C to +85°C (-40°F to +185°F)
POWER REQUIRED	12 to 24 Vdc, 15 watts max. (Std. DE)
POWER REQUIRED	12 Vdc, 15 watts max. (DIV 1 System)

HAZARDOUS AREA CERTIFICATION

Standard DE-3000 System: Class I, Division 2, Groups C and D
Special Division 1-Certified System: Class I, Division 1, Group D



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