

# Control Systems

## Critical Equipment Control DI-TRONICS® Model # CEC200-000

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 To efficiently provide fault-tolerant protection and maximum availability for a steam turbine-driven centrifugal compressor train, the critical equipment control system must be designed to maximize the availability of the performance monitoring functions while providing fault tolerant protection for the STC. The Dresser-Rand critical equipment control system integrates a two-out-of-three voting architecture based on its inherent ability to identify and compensate for a failed control system element or field device while enabling repair without process interruption.  
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### Introduction

The DI-TRONICS critical equipment control system 200 is an integrated triple modular redundant (TMR) solution for the steam turbine-driven centrifugal compressor train. The fault-tolerant implementation of this control system is based on extensive Dresser-Rand expertise and integrates vibration monitoring, temperature, steam flow and surge control into a reliable TMR control system package.

At the heart of the critical equipment control system is the Triconex TMR programmable logic controller (PLC) or Tricon Version 9.6 (or higher) PLC. The Tricon PLC is technologically advanced, flexible in configuration and can be programmed in many common program languages including ladder logic and function blocks. Steam turbine governor control and other high-level programs are developed in segregated function blocks to ensure the highest levels of reliability and system security.

Because the Tricon PLC is manufactured and used globally in thousands of critical applications, the critical equipment control system offers worldwide, off-the-shelf availability of replacement parts, as well as local technical assistance, training and support. The use of advanced packaging techniques provides easy access to internal panel components and the smaller panel offers a distinct advantage in areas with limited space. In addition, with features such as modular architecture, advanced diagnostics, hot module insertion and quick-connect field wiring, users are assured that their needs for flexibility and expansion will be met.

### Standard Configuration and System Features

The standard DI-TRONICS critical equipment control system is integrated into a freestanding enclosure and includes the Tricon V9.6 (or higher) PLC configured with the following standard features:

- Steam turbine governor
- Anti-surge control
- Capacity control
- Bearing temperature monitoring
- Bently Nevada 3500 radial vibration and axial position monitoring
- Oil system monitoring
- Start, stop, alarm and shutdown sequencing
- Inherent fault tolerance – no single point of failure
- Ability to operate with three, two, or one main processor before shutdown
- Fully implemented and transparent triplication
- Comprehensive system diagnostics
- Simple, on-line module replacement



For more information on [DI-TRONICS](#), contact:

**Dresser-Rand Control Systems**  
1202 West Sam Houston Pkwy. N.  
Houston, TX 77043  
Tel: (Int'l +1) 713-365-2630  
Fax: (Int'l +1) 713-365-2660

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For a complete list of D-R products and services, visit us at [www.dresser-rand.com](http://www.dresser-rand.com) or contact one of the following locations:

**Dresser-Rand  
Corporate Headquarters**

West8 Tower Suite 1000  
10205 Westheimer Road  
Houston, TX 77042 USA  
Tel: (Int'l +1) 713-354-6100  
Fax: (Int'l +1) 713-354-6110  
email: [info@dresser-rand.com](mailto:info@dresser-rand.com)

112, Avenue Kleber  
75784 – Paris Cedex 16  
Tel: (Int'l +33) 156 26 71 71  
Fax: (Int'l +33) 156 26 71 72  
email: [info@dresser-rand.com](mailto:info@dresser-rand.com)

**Regional Headquarters**

**The Americas**

Dresser-Rand  
West8 Tower Suite 1000  
10205 Westheimer Road  
Houston, TX 77042 USA  
Tel: (Int'l +1) 713-354-6100  
Fax: (Int'l +1) 713-354-6110

**EMEA**

(Europe, Middle East, Africa)  
Dresser-Rand S.A.  
31 Boulevard Winston Churchill  
Cedex 7013  
Le Havre 76080 France  
Tel: (Int'l +33) 2-35-25-5225  
Fax: (Int'l +33) 2-35-25-5366 / 5367

**Asia-Pacific**

Dresser-Rand Asia Pacific Sdn Bhd  
Unit 9-4, 9th Floor  
Bangunan Malaysian Re  
17 Lorong Dungun, Damansara Heights  
50490 Kuala Lumpur, Malaysia  
Tel: (Int'l +60) 3-2093-6633  
Fax: (Int'l +60) 3-2093-2622

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Form 2091

## Fault-Tolerant Operation

The TMR Tricon V9.6 (or higher) PLC is designed to identify and compensate for failed control system elements while allowing for on-line repair. To accomplish this high-integrity, error-free, uninterrupted process operation the critical equipment control system employs the following features and functions:

- Three isolated, parallel control systems
- Advanced diagnostics distributed throughout each system
- Two-out-of-three majority voting to eliminate single point failures

## System Communications

Communication with the Bently Nevada system and the client's master control system is made through a simplex Model 4119 Triconex Enhanced Intelligent Communication Module (EICM) providing RS-232/422 serial communication via MODBUS RTU protocol.

## System Options and Enhancements

The following options are available and will be quoted on request:

- LCD display
  - Pushbutton and lights
  - Ethernet communications
  - Honeywell DCS interface
  - Laptop PC (programming and maintenance)
  - Local operator panel NEMA 4X
  - DI-TRONICS HMI (panel-mounted or desktop)
  - Bently Nevada TDI interface
  - Steam turbine single extraction control
  - Throttling valve Servo position controllers
  - Extraction valve Servo position controllers
  - Two-out-of-three over-speed protection (provided by D-R or other manufacturer)
  - Intrinsic safety barriers
  - Additional anti-surge loop
  - Additional compressor case
  - Additional compressor case with intrinsic safety barriers
  - Additional compressor case with additional anti-surge loop
  - Client-witnessed test
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