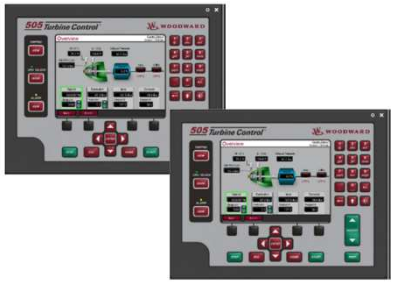
WOODWARD

Product Specification **03468**
(Revision A, 4/2020)

505DR Redundant Steam Control

Applications



The 505DR® dual-redundant steam turbine control is a state-of-the-art digital control platform designed to reliably control and protect single valve and single-extraction steam turbines with the advantage of dual redundancy for maximum turbine reliability and availability. Redundancy is managed at the operating system level using Woodward's RTN (Real Time Network), allowing ultra-fast changeovers and "bumpless" transitions.

This controller utilizes the same unique PID structure as the proven 505XT, making it ideal for controlling parameters such as speed, load, extraction header pressure, exhaust header pressure or tie-line power. Features like Opti-Tune self-tuning PID and Ratio Limiter are carried over to the Dual Redundant version.

The controller includes the following turbine protection functions to insure that the turbine and its driven load (compressor, pump, generator) is operated within its design limits:

- 3 Critical speed avoidance bands
- Overspeed anticipation and shutdown protection
- Configurable under or over pressure shutdown logic
- Minimum and maximum speed and load settings
- Maximum low pressure stage overpressure limits
- Minimum high pressure stage flow limits

Ethernet and serial communications allow easy integration into the plant control or process control system. The 505DR may be configured with an optional integrated user interface including an 8.4 inch multi-lingual graphical display.

Description

Like the MicroNet Plus, the 505XT system assigns one control as System Controller (Syscon) which actively controls the turbine. The second unit is configured as Backup. The system automatically assess the heath of the Syscon and will initiate a fast switchover when a failure occurs. Switchover can also be initiated manually. The system tightly synchronizes software states and memory from the Syscon to the Backup, insuring that control outputs remains steady with no effect on turbine operation (a true "bumpless" transition).

If the optional HMI version is selected, the displays and keypads are redundant (inputs from either keypad will command the Syscon, and the displays can be independently selected to show different screens.

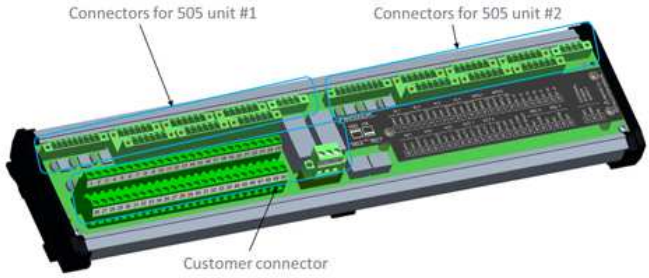
- Dual-redundant for maximum turbine availability
- Fast switchover, Bumpless transition
- Proven 505XT steam core supports single valve and extraction turbines
- On-line software changes
- On-Line repairable
- Optional integrated HMI
- Multi-language display
- Optional FTM eases multiplexing of redundant signals
- Same hardware platform as the 505XT control
- Interfaces to all major DCS systems
- Achilles Cybersecurity Certification

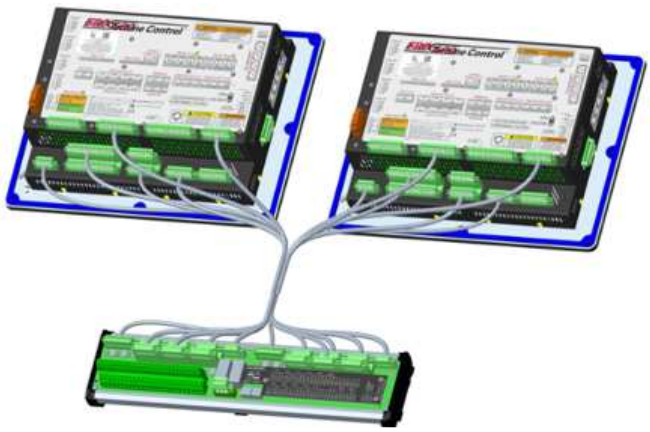
Description, Continued

For example, one screen could display the speed and speed settings and the other could display a steam map.

Woodward's optional RemoteView program allows remote monitoring or control from any networked PC. This can be used with either the rear-panel mount version (as the primary HMI) or as an additional remote display with the HMI version.

An optional FTM (Field Termination Module) allows easy multiplexing of redundant signals and facilitates quick installation and commissioning.





Cost-Effective Design

The 505DR is a highly efficient redundant turbine control. It includes the turbine control, system sequencer, operator control panel and first out indicator. This design minimizes external devices and wiring and eases troubleshooting.

Like the 505XT, the 505DR is fully field configurable (by knowledgeable personnel under password control) and minor functional changes can be made on-line while the turbine is operating.

Communications

The 505DR can communicate directly with plant DCS and/or operator control panels using Modbus TCP or OPC communications. Serial communication with RS-232 or RS-485 and ASCII or RTU Modbus is also supported.

Control

PIDs are available to perform process control or act as limiters, including Speed/Load dynamics, Extraction/Admission Pressure, Cascade, Auxiliary, Inlet Header, Exhaust Header and Rotor Acceleration.

System Protection

- Integral Overspeed protection logic & test capability
- First out indication on 15 shutdown inputs
- External alarm indications, 15 inputs
- Stuck in critical speed band logic
- Bumpless transfer between control modes and during Syscon switchover
- Password security for operations and configuration

Control Specifications

INPUTS

- Power: LV models: 18-32 Vdc
  HV Models 88-264 Vac & 90-150Vdc
- Speed: 2 Passive MPUS or Active Proximity probes (0.5 – 32000 Hz)
- Discrete Inputs: 19 Configurable contact inputs (option to add 16 using LinkNet HT)
- Analog Inputs: 8 Configurable 4-20 mA (option to add 16 inputs or 8 RTD inputs using LinkNet HT)

OUTPUTS

- Valve/Actuator Drivers:
  2 Actuator outputs, 4-20 ma or 20-200 mA
- Discrete outputs:
- 7 Configurable relay outputs (option to add 16 additional discrete outputs using LinkNet HT modules)
- Analog outputs:
  6 Programmable 4-20 mA outputs (option to add 4 additional inputs using LinkNet HT modules)

COMMUNICATIONS

- Ethernet: 3 ports (Modbus TCP or OPC)
- Serial: 1 port (ASCII or RTU, RS-232 or RS-485)
- CAN: 4 ports which support LinkNet HT, VariStroke & Power Management devices

Operating Conditions

- -25 to +65C ambient air temperature
- Humidity: Lloyd's ENV2 Test #1
- Dry Heat: Lloyd's ENV3
- Salt Fog: US MIL-STD-810, method 509.2 proc. 1
- Shock: US MIL-STD-810C, method 516.2-1 proc. 1B
- Vibration: Lloyd's ENV2 Test #1
- Particulate pollution resistance: IEC 60664-1 Degree 2
- IEC 60068-2-60 Part 2.60 Methods 1 and 4
- Gaseous pollution resistance: coating withstands NO2, CO2, SO2 and H2S
- Battelle Labs Class III (IEC60721-3-3 classification 3C1 and 3C2)

Regulatory Compliance

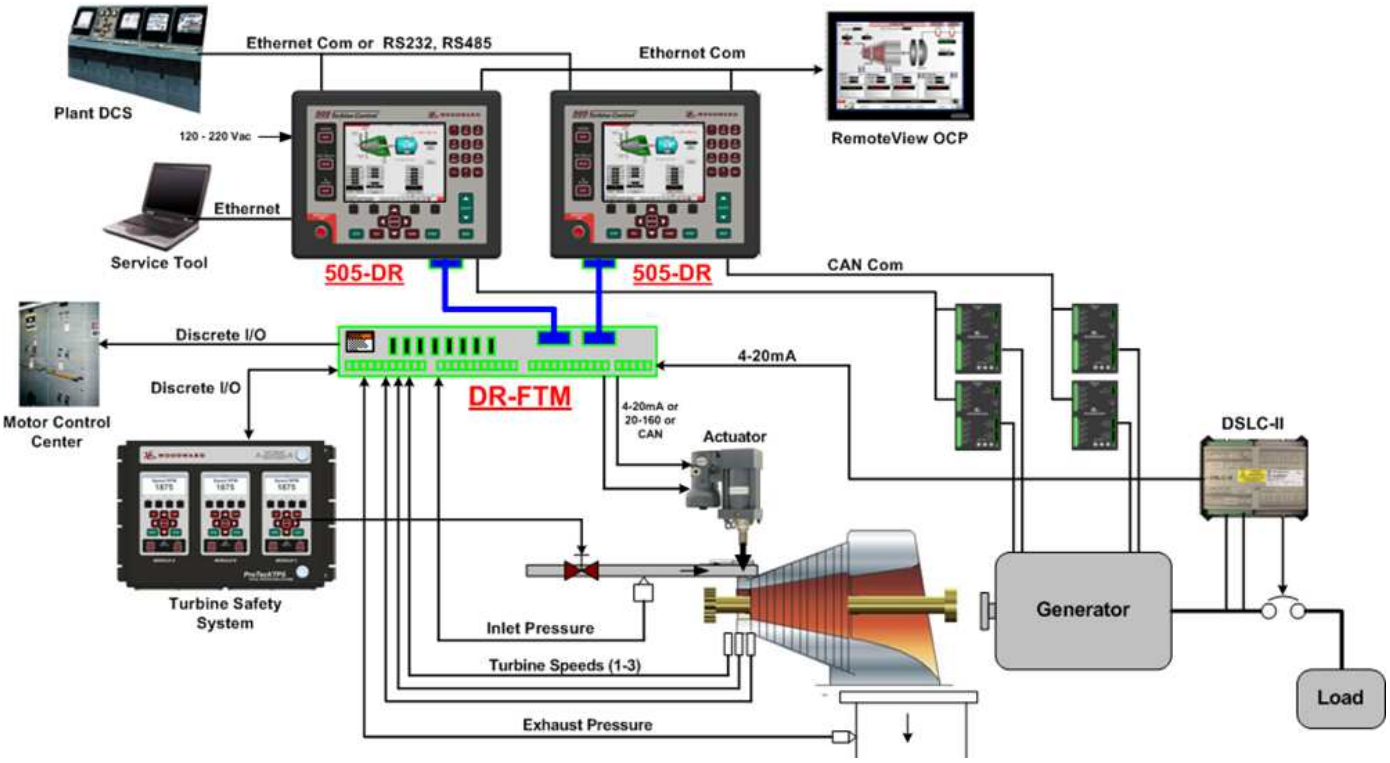
European Compliance

- EMC Directive: 2014/30/EU Council Directive LVD Directive: 2014/35/EU Council Directive
- ATEX Directive: 2014/34/EU Council Directive - *Pending*
- IECEx Ex ic nA nC IIC T4 Gc: Certificate IECEx CSA 15.0020X - *Pending*

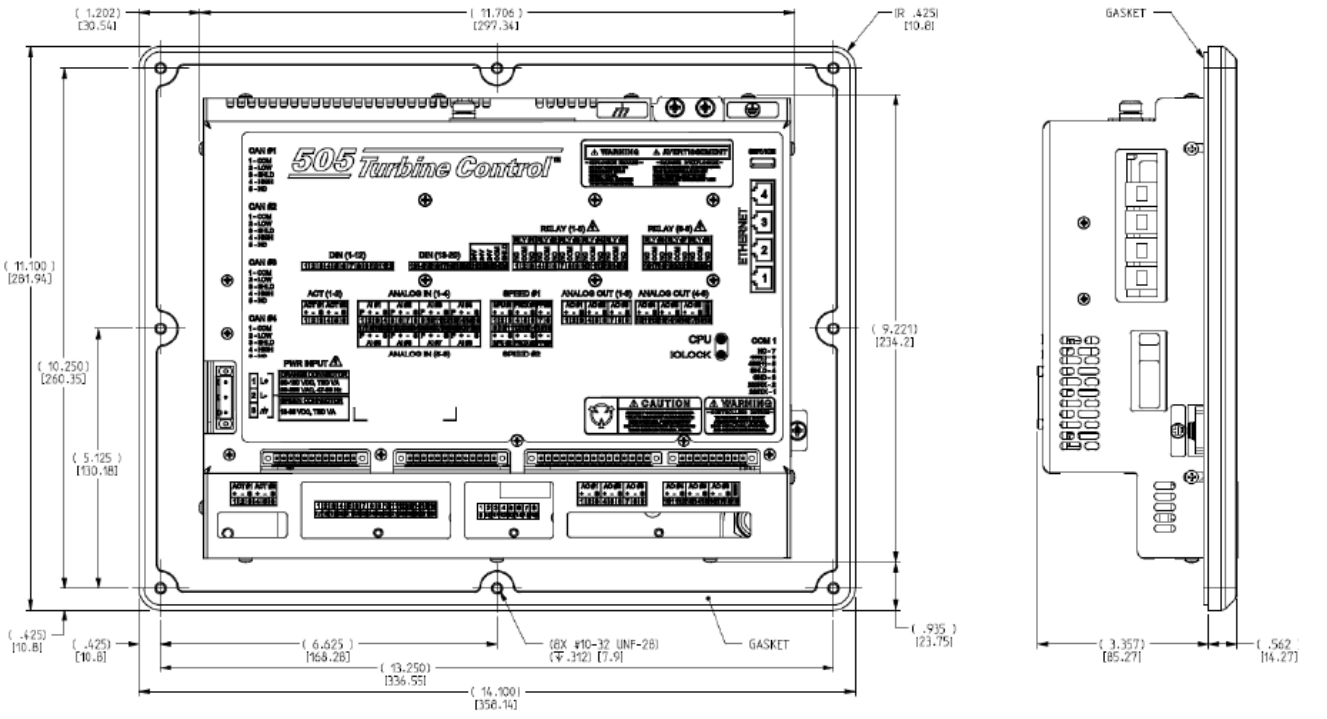
North American Compliance

- CSA Listed for Ordinary Locations Certificate 70217045 (LR79276)
- CSA Listed for Class I, Div 2, Groups A,B,C and D, T4 at +70C: Certificate 70006135 (LR79276) - *Pending*

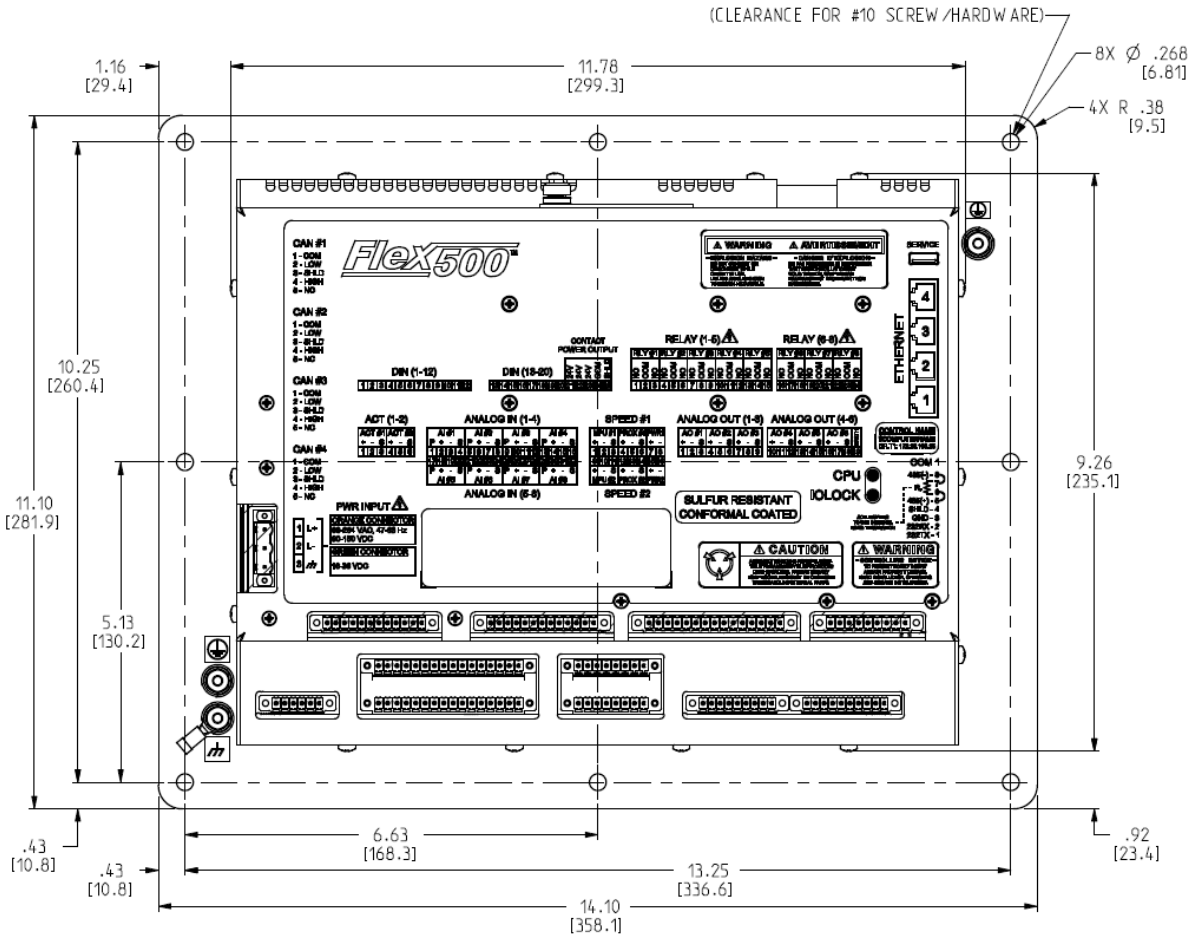
Example 505DR Screens



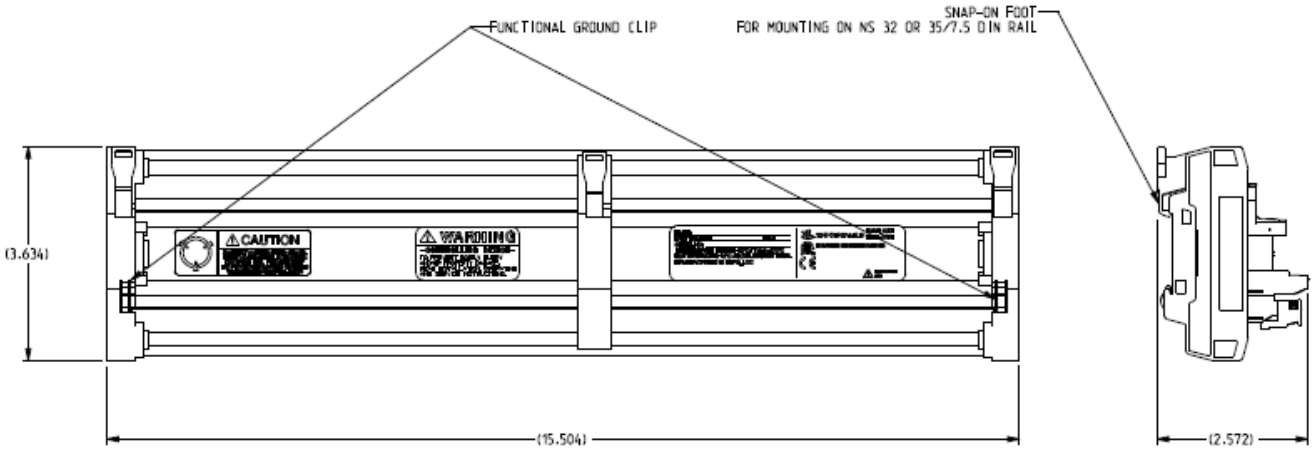
Typical 505DR® System



Unit Dimensions (Integrated HMI versions)



Unit Dimensions (Rear panel mount versions, no HMI)



Unit Dimensions (FTM)

WOODWARD

PO Box 1519, Fort Collins CO 80522-1519, USA
1041 Woodward Way, Fort Collins CO 80524, USA
Phone +1 (970) 482-5811
Email and Website—www.woodward.com

Woodward has company-owned plants, subsidiaries, and branches, as well as authorized distributors and other authorized service and sales facilities throughout the world. Complete address / phone / fax / email information for all locations is available on our website.

For more information contact: