

# 310SV

## Single Valve Steam Turbine Governor



[www.tri-sen.com](http://www.tri-sen.com)



### Description

The 310SV is single-valve configurable controller that provides automatic start-up sequencing, speed control, and process control for a steam turbine driving a mechanical load.

### Applications

The 310SV is designed for use on a variety of mechanical load applications including process pumps, blowers/fans, compressors, paperline drives and others.

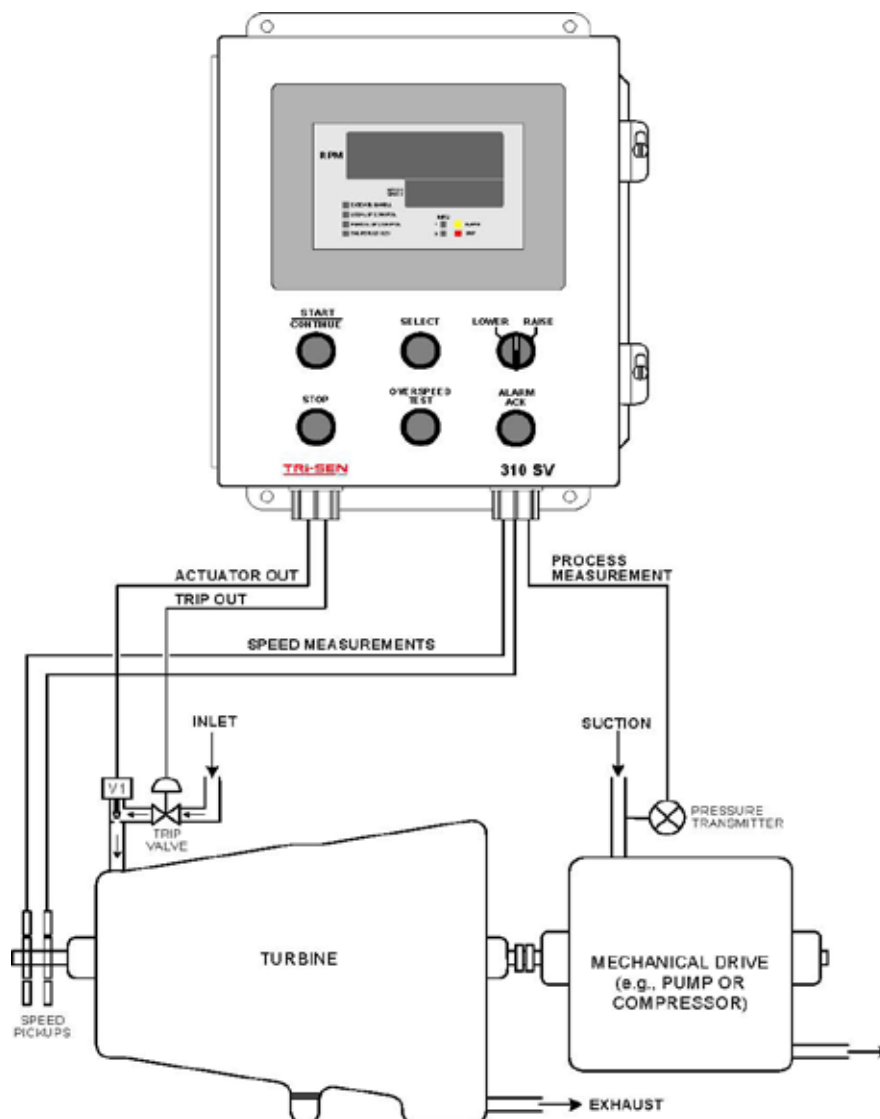
### Features

- The 310SV continues the Tri-Sen tradition of flexible, configurable I/O for turbomachinery controllers.
- Six flexible, digital I/O points, each configurable as a digital input or output by selecting the corresponding plug-in module. Input and output modules are available with a comprehensive range of voltages and current specifications to meet the requirements of almost any application.
- User may choose from 17 input functions and 18 output functions (including nozzle valve control) for each flexible digital I/O point.
- The 310SV includes five separate remote digital inputs that can each be configured from a list of 17 input functions. The remote digital inputs make it easy to connect a group of 24V DC digital inputs from a remote control panel with configurable functions like start, stop, speed raise/lower, halt, continue, idle/run, and alarm acknowledge
- Completely automatic turbine startup
- Eight configurable speed bands, each with separate ramp rates and idle times
- Critical speed band avoidance
- Startup, Run, Droop, and Overspeed Test tuning constants for the Speed PID
- Process PID for control of process suction or discharge measurements
- Local and remote speed and process setpoint control
- Rugged front panel operator interface
- Flexible, configurable I/O
- Modbus serial data communications
- Powerful PC configurator



### Typical Configuration

The 310SV is a fully integrated and configurable controller designed to startup, run, and protect one-valve steam turbines. The controller is suited to control steam turbines driving mechanical type loads, such as pumps, fans, compressors, and so on. In addition to speed control, the 310SV provides cascade control for controlling process variables such as suction/discharge pressure, or suction flow. This diagram shows a typical steam turbine application driving a mechanical type load.



## Specifications

### Inputs

- Pulse Inputs: 2 inputs, 20 - 20,000 Hz
- Analog Inputs: 2 inputs, 4 - 20mA
- Remote Digital Inputs: 5 inputs, 24V DC

### Outputs

- Analog Outputs: 2 outputs, 4 - 20 mA
- Actuator Output: 1 output, 0 - 20 mA (800 ohm load) or 0 - 160 mA (100 ohm load)

### Input/Outputs

- 6 flexible digital input/output points
  - ✓ Inputs – 24 V DC, 120 V AC, 240 V AC
  - Outputs – 24 V DC (3.5 A), 200V DC (1.0 A) 120 V AC (3.5 A), 240 V AC (3.5 A)

### Power Supply

- 24 VDC input, or
- 120/240 VAC input

### Display

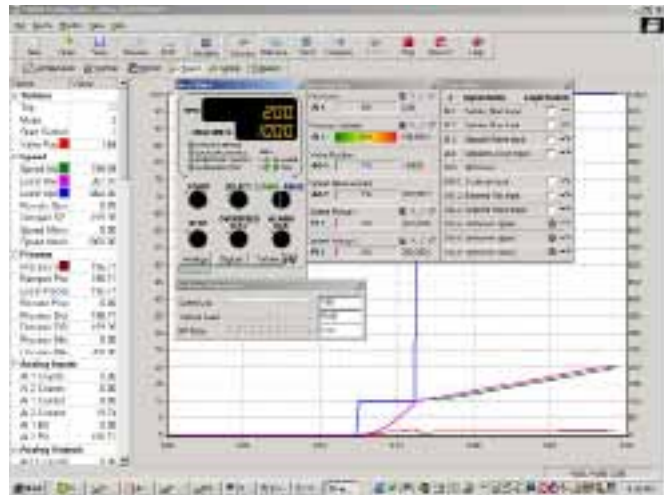
- The enclosure, front panel display and rugged pushbuttons and selector switch are all rated NEMA 4 for outdoor installations. Alternate hazardous area enclosures are available as well.

### Environmental Specifications

- Temperature: -25°C to 57°C (AC power version), -25°C to 65°C (DC power version) Certifications

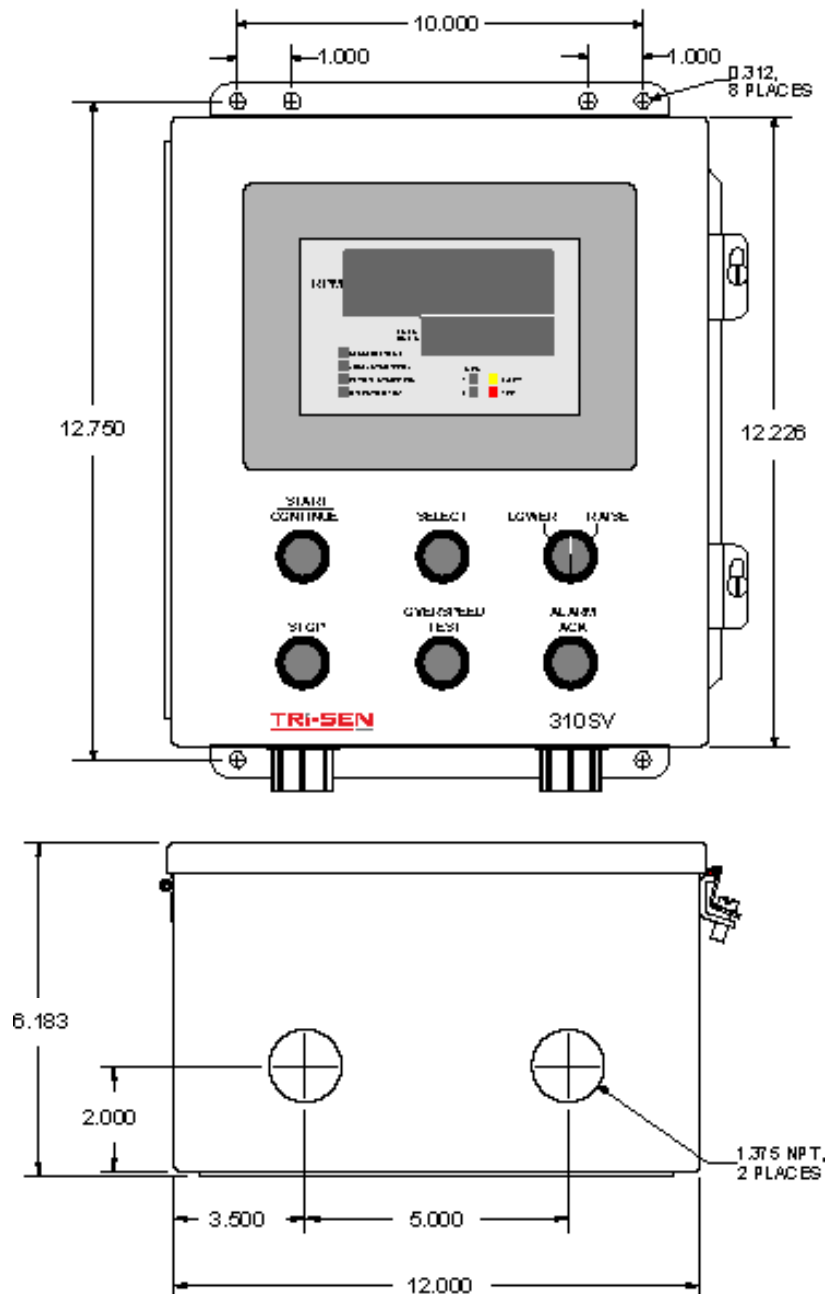
### Certifications

- CSA, UL
- CE, ATEX pending (Call Tri-Sen for update)



### Dimensions

- 12L x 12H x 6D (304L x 304H x 152D mm)



## Ordering Information

<u>Model Number</u>	<u>Description</u>
<b>Controls</b>	
3000745-100	310SV Steam Turbine Controller AC power (95-132 and 187-260V AC)
3000745-300	310SV Steam Turbine Controller DC power (18-32V DC)
3000745-400	310SV Steam Turbine Controller AC Power (95-132 and 187-260V AC), NEMA 4X with Z-Purge, Surface Mount Housing
3000745-500	310SV Steam Turbine Controller DC Power (18-32V DC), NEMA 4X with Z-Purge, Surface Mount Housing
3000745-401	310SV Steam Turbine Controller AC Power (95-132 and 187-260V AC), NEMA 4X with Vortex Cooler, Surface Mount Housing
3000745-501	310SV Steam Turbine Controller DC Power (18-32V DC), NEMA 4X with Vortex Cooler, Surface Mount Housing
3000745-402	310SV Steam Turbine Controller AC Power (95-132 and 187-260V AC), NEMA 4X Flush Mount Housing
3000745-502	310SV Steam Turbine Controller DC Power (18-32V Dc), NEMA 4X Flush Mount Housing
3000745-403	310Sv Steam Turbine Controller AC Power (95-132 and 187-260V AC), NEMA 4X Surface Mount Housing
3000745-503	310SV Steam Turbine Controller DC Power (18-32V DC), NEMA 4X , Surface Mount Housing

### Configurator License

3000746-100	310SV Configurator License (includes PC Configurator Software and User's Guide In PDF format)
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#### 310SV Note:

##### Configurator License

- The PC Configurator software is required to configure the 310SV. However only one Configurator License is required for a single site. The software can be loaded on multiple PC's at the same site. The PC should be provided separately with Windows® 98, Windows Me, Windows NT® 4.0, Windows 2000, or Windows XP.

### Documentation

9700083-002	310SV User Guide
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### Flexible Digital I/O Modules

Customer must use the 310SV Configuration sheet to choose selectable I/O modules from list below:

1600053-100	Digital Input Module, 90-140V AC/DC (70G-IAC5)
1600053-020	Digital Input Module, 3-32V DC (70G-IDC5)
1600053-030	Digital Input Module, 3-32V DC fast (70G-IDC5B)
1600053-200	Digital Input Module, 240 VAC (70G-IAC5A)
1600054-020	Relay 5VDC out 100VDC/120VAC-Line Reds (70G-ODC5R)
1600054-060	Digital Output Module, 3-60V DC (70G-ODC5)
1600054-100	Digital Output Module, 24-140V AC (70G-OAC5)
1600054-200	Digital Output Module, 4-120 VDC (70G-ODC5A)
1600054-250	Digital Output Module, 240 VDC (70G-OAC5A)
7023-0002	Dry Contact Relay (70G-ODC5 RLY)
7026-0007	Dry Contact Relay (70G-OAC5 RLY)

### Configuration Services

310SV Application Configuration (Please contact Tri-Sen for 310SV configuration service)

### Spares

1600057-910	Assy PCB Main Board 310SV
1600070-001	Power Supply, 310SV
1600057-920	Display Board, 310SV

### Configuration Specification Sheet (page 1)

Date: \_\_\_\_\_

Customer: \_\_\_\_\_

Customer Order Number: \_\_\_\_\_

Tri-Sen Order Number: \_\_\_\_\_

Customer Contact (Name & Phone) \_\_\_\_\_

End User (Name & Location): \_\_\_\_\_

A separate 310SV configuration specification sheet must be completed for each 310SV configuration. For example, if one order includes an AC power 310SV and a DC power 310SV, or if multiple 310SV's in the order have different Flexible Digital Input/Output module configurations, then a separate form must be completed for each 310SV power type and Flexible Digital Input/Output module configuration.

How many units in this order will be the same power type and have the same Flexible Digital Input/Output module configuration as shown below? \_\_\_\_\_

SELECTION	PART NUMBER	DESCRIPTION
<input type="checkbox"/>	3000745-100	310SV Steam Turbine Controller AC Power (95-132 and 187-260V AC) (Includes 6 Flexible Digital I/O modules. Select from list provided.)
<input type="checkbox"/>	3000745-300	310SV Steam Turbine Controller DC Power (18-32V DC) (Includes 6 Flexible Digital I/O modules. Select from list provided.)
<input type="checkbox"/>	3000745-400	310SV Steam Turbine Controller AC Power (95-260V), NEMA 4X with Z-Purge, Surface Mount Housing
<input type="checkbox"/>	3000745-500	310SV Steam Turbine Controller DC Power (18-30V), NEMA 4X with Z-Purge, Surface Mount Housing
<input type="checkbox"/>	3000745-401	310SV Steam Turbine Controller AC Power (95-262V), NEMA 4X with Vortex Cooler, Surface Mount Housing

## Configuration Specification (page 2)

SELECTION	PART NUMBER	DESCRIPTION
<input type="checkbox"/>	3000745-501	310SV Steam Turbine Controller DC Power (18-30V), NEMA 4X with Vortex Cooler, Surface Mount Housing
<input type="checkbox"/>	3000745-402	310SV Steam Turbine Controller AC Power (95-260V), NEMA 4X, Flush Mount Housing
<input type="checkbox"/>	3000745-502	310SV Steam Turbine Controller DC Power (18-30V), NEMA 4X, Flush Mount Housing
<input type="checkbox"/>	3000745-403	310SV Steam Turbine Controller AC Power (95-260V), NEMA 4X, Surface Mount Housing
<input type="checkbox"/>	3000745-503	310SV Steam Turbine Controller DC Power (18-30V), NEMA 4X, Surface Mount Housing
<input type="checkbox"/>	3000746-100	310SV Configurator License (Includes PC Configurator software and User's Guide on CD format. The PC Configurator software is required to configure the 310SV. However, the user only needs to purchase one configurator License for a single site. The software can be loaded on multiple PC's at the same time. The PC should be provided separately with Windows ®98. Windows Me, Windows NT® 4.0 or Windows 2000.

For the 310SV selected, on the next page, choose the type of Flexible Digital Input/Output module for each of the six modules Slots in the left hand table. Choose the desired number of spare modules, if any, in the right hand table. The part numbers and descriptions of each module code are given in the table at the bottom of the page.

## Configuration Specification Sheet (page 3)

MODULE CODE SELECTIONS	FLEXIBLE DIGITAL INPUT/ OUTPUT MODULE SLOT	SPARE QUANTITY	MODULE CODE
	M1	<input type="checkbox"/>	A
	M2	<input type="checkbox"/>	B
	M3	<input type="checkbox"/>	C
	M4	<input type="checkbox"/>	D
	M5	<input type="checkbox"/>	E
	M6	<input type="checkbox"/>	F

MODULE CODE	PART NUMBER	DESCRIPTION
A	160053-100	Digital Input Module- 90-140V AC/DC (70G-IAC5)
B	160053-020	Digital Input Module- 3-32V DC (70G-IDC5)
C	160053-030	Digital Input Module- 3-32V DC Fast (70G-IDC5B)
D	160054-100	Digital Output Module- 24-140V AC (70G-OAC5)
E	160054-060	Digital Output Module- 3-60V DC (70-ODC5)
F	160054-200	Digital Output Module- 4-160V DC (70G-ODC5A)