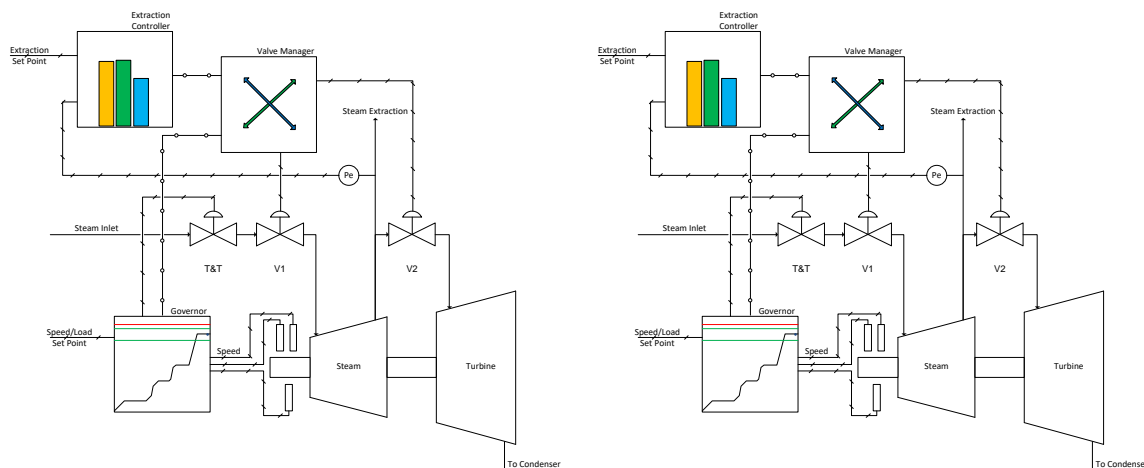




Tri-STIG Triplicated 4 Steam Turbine Integrated Governor

The TMC SIL Certified Triplicated 4 Steam Turbine Integrated Governor (Tri-STIG) provides a cost efficient bombproof** solution for Steam Turbines, which can be operated from anywhere, on a plate.



The Tri-STIG has extremely high availability, 2oo3 Triple Modular Redundant architecture, allowing module replacement and design modifications even with the Turbine running.

The TMC Tri-STIG controls up to 4 Steam Turbines which can be Condensing, Extraction, Double Extraction, Admission, Induction, Inlet Pressure, Back Pressure or a combination.

The TMC Tri-STIG includes 4 Start Curves per Turbine, each with 4 Idles and 3 Critical Bands.

The Tri-STIG uses TMC 3D control technology and includes the following control per turbine:

- Speed
- Load
- Cascade
- Auxiliary
- Extraction
- Double Extraction
- Admission
- Induction
- Inlet Pressure
- Back Pressure

The TMC Tri-STIG has the following I/O:

4 off	16 off	16 off	16 off	6 off
4 to 20mA Analogue Outputs	4 to 20mA Analogue Inputs	24VDC 3A Digital Outputs	24VDC Digital Inputs	Speed Inputs

This I/O can be chosen for the following per Turbine duties:

4 to 20mA Analogue Outputs	4 to 20mA Analogue Inputs	24VDC 3A Digital Outputs	24VDC Digital Inputs	Speed Inputs
Inlet Valve 1	Pressure PV	Tripped = OC	Trip = OC	Speed 1
Inlet Valve 2	Pressure SP	Alarm = OC	Reset = CC	Speed 2
Inlet Valve 3	2 nd Pressure PV	Tripped = CC	Start = CC	Speed 3
Inlet Valve 4	2 nd Pressure SP	Alarm = CC	Raise = CC	Speed 4
Extraction Valve 1	Auxiliary PV	Stopped = CC	Lower = CC	Speed 5
Extraction Valve 2	Auxiliary SP	Running = CC	Stop = OC	Speed 6
Extraction Valve 3	Cascade SP	Idle 1 = CC	Hold = CC	
2 nd Extraction Valve 1		Idle 2 = CC	Continue = CC	
2 nd Extraction Valve 2		Idle 3 = CC	Cold = CC	
Admission Valve 1		Idle 4 = CC	Cool = CC	
Admission Valve 2		Cascade = CC	Warm = CC	
Admission Valve 3		Cold = CC	Hot = CC	
Induction Valve 1		Cool = CC	Remote = CC	
Induction Valve 2		Warm = CC		
Induction Valve 3		Hot = CC		
Speed PV		Remote = CC		
Speed SP		On Load = CC		
Pressure PV		Speed SW1 = CC		
Pressure SP		Speed SW1 = OC		
2 nd Pressure PV		Speed SW2 = CC		
2 nd Pressure SP		Speed SW2 = OC		
Auxiliary PV				
Auxiliary SP				
Cascade SP				

The same duty can be selected for 2 or more Analogue Outputs for Turbines with valves working in parallel.

The TMC Tri-STIG is Safety Integrity Level (SIL) certified to SIL2 or 3. I/O Redundancy is used to achieve SIL loops for the system by assigning multiple I/O points to have the same duty, for example typically:

- A SIL2 Speed control loop requires 2 off Speed Probes and a SIL2 Tri-STIG.
- A SIL2 Extraction control loop requires 2 off Pressure Transmitters and a SIL2 Tri-STIG.
- A SIL3 Speed control loop requires 3 off Speed Probes and a SIL3 Tri-STIG.
- A SIL3 Extraction control loop requires 3 off Pressure Transmitters and a SIL3 Tri-STIG.

For the Tri-STIG loop to meet a SIL its complete design including field instrumentation integrity requires consideration. Application specific SIL Studies* are available for the TMC Tri-STIG.

SIL and non-SIL functions are segregated allowing them to be performed within the same Tri-STIG. The TMC Tri-STIG can also be used even if there is no SIL requirement, providing the benefits of 2oo3 availability.

The Tri-STIG is supplied on a mounting plate designed to be easily retrofitted in to an existing panel. It can be supplied in a range of panels and other types of enclosures*.

The TMC Tri-STIG is available with a range of Human Machine Interfaces from Lamps, Switches, Dials and Meters* though to PC based SCADA Systems*, DCS systems* and the internet. Remote monitoring is available through an inbuilt HMI web server. The Tri-STIG can be monitored using any device that has a web browser. The TMC Tri-STIG can send emails and SMS text messages to inform operators of process critical events. Industrial wireless connections* minimise the time needed for instrument loop checks.

The Tri-STIG includes First Up Lock Out Trips, a one scan resolution Last Trip Snapshot of Key Parameters and a historic log of the last nine Trips. This information is an invaluable tool to help operators rapidly pinpoint Trip causes, minimising down time.

The Core Control Application Software can be easily modified to control pretty much any Steam Turbine.

The TMC Tri-STIG is fully flexible and can be expanded with the addition of I/O modules*. Multiple Tri-STIGs can be Peer to Peer*** connected together to create larger systems.

The TMC Tri-STIG can accommodate Auxiliary Control*, Emergency Shutdown Systems*, Fire & Gas* and be combined with TMC Tri-ASCC Core Control Application Software to provide Integrated Train Control for a Steam Turbine Compressor Set*.

Zener Barriers*, Galvanic Isolators*, Interposing Relays* and Position Controllers* can be supplied in addition as required by the application.

Part Number	Description
0020-003	SIL2 Tri-STIG Triplicated 4 Steam Turbine Integrated Governor
0021-003	SIL3 Tri-STIG Triplicated 4 Steam Turbine Integrated Governor
0022-003	HMI-STIG 15" Panel Mounted Colour Touch Screen

Power Consumption

System Power 36 w at 24 VDC (19.2 to 30.0 VDC)****

Max Field Power 27 w at 24 VDC (19.2 to 30.0 VDC)

Communications

3 off Modbus RTU, RS232 OR RS422, Slave

Communications alternatives are available with the addition of a communications Module*.

Operating Temperature: -20 to 70 DegC****

Relative humidity: 5 to 95% non-condensing****

Dimensions: H 810 mm W 500 mm D 200 mm****

Weight: 22 kg****

For enquiries and further information on Tri-STIG, ASCC or Gas Turbine Control please contact TMC Technical Sales by emailing techsales@turbomachinerycontrols.com.

* Not included in 0020-003, 0021-003 or 0022-003.

** The Tri-STIG has a high environmental specification and fault tolerance making it virtually bomb proof.

*** Peer to Peer is available with the addition of a Communication Module*.

**** Excluding Human Machine Interface.