HEINZMANN®

Advanced digital governor for steam turbines

Si-TEC *Xtend* ADG

DATA SHEET

Models

Si-TEC *Xtend* ADG (Advanced Digital Governor) Turbine Control is available in 2 variations:

ADG-T

For single steam turbine drive applications

ADG-TT

For tandem (dual) steam turbine drive applications

Description

The Si-TEC *Xtend* ADG (Advanced Digital Governor) is a steam turbine control designed for mechanical drive applications (i.e. pumps, fans, shredders, mills, etc.). The ADG was originally developed in 1991 and has since then proven to be the ultimate in steam turbine governing control, with its many features and wide range of speed PID's the Si-TEC ADG has become the standard choice for many steam turbine operators.

With more than 4000 systems now in operation throughout Australia, Asia & internationally, the Si-TEC *Xtend* control provides a further enhancement of this already successful product.

The Si-TEC range of integrated digital governing controls is internationally recognised as providing the highest level of governing control, and for a wide range of applications including steam turbines, and for reciprocating engine (diesel or gas) applications.

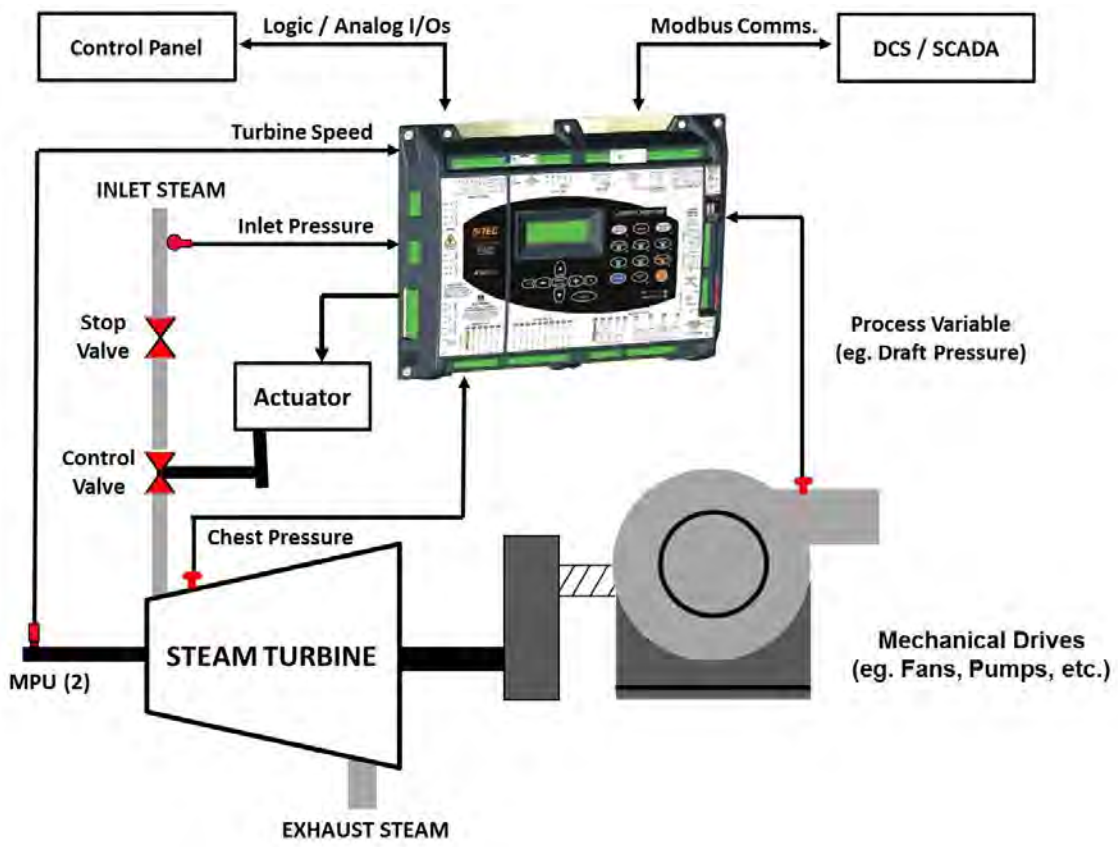
Key features

- Precise speed governing
- Dual MPU for redundancy
- Automatic turbine start sequence
- Driving wide range of actuators (incl. HEINZMANN all-electric)
- Wide range of PIDs
- Process control (for variable speed applications)
- Mechanical load sharing (dual drives)
- Load share linearization curve (dual drives)
- Flexible configuration
- User-friendly tuning software (PC tune)
- Extensive system diagnostics
- Optional I/O expansion

ADG features

- Precise speed governing typically within 0.1 % of operating (rated) speed at steady state
- Automatic start/stop sequence initiated by a single
- logic input to give "Guaranteed Start"
- Multiple and wide range PIDs
- Typically interfaces with all-electric actuators, that provide "Instantaneous" position feedback
- Dual MPU or proximity sensors for redundancy
- Rapid start cycle "Hot Start" for warm turbine
- "Temperature Hold Function" during turbine starting sequence, based on casing temperature (RTD input)
- Noise and harmonic issues eliminated by design
- Detection at lower speeds (through proximity sensor)
- Controlled "Over Speed" trip testing
- Configurable alarms can be multi-functional
- Bump features to optimise tuning
- Extensive diagnostic functions
- User selected 4-20 mA inputs and outputs
- User selected relay outputs
- External I/O interface to PLC/DCS/SCADA etc.
- Expandable I/Os – Digital, analogue and thermocouple
- Configuration using Si-TEC keypad or via computer
- RS232 communications port for configuration, tuning and diagnostics
- Modbus RS485 port for interface to DCS, SCADA, etc. for remote monitoring and control
- Si-TEC LAN RS485 port for communications between Si-TEC *Xtend* modules
- Process control (e.g. suction pressure control, discharge pressure control, level control, etc.)
- Opal Turbine Annunciator – remote display/ annunciator unit interface via CAN bus port for monitoring and/or protection

Si-TEC Xtend ADG single drive application



Application range

- Wide range of mechanical drives including pumps, compressors, mills, shredders, fans, blowers etc.
- Single turbine variable speed governing control referenced from internal or external set points
- Single turbine constant speed governing control referenced from internal set points
- Multiple turbines driving a common shaft (tandem)
- Process control – for variable speed applications

Control

- Operating speed can be references from:
  - Digital set point (raise/lower)
  - External 4-20 mA input
  - via Modbus communications
- Menu set minimum and maximum operating speeds
- Speed ramp rates used when changing set point
- Multiple speed PIDs
- Process control PID

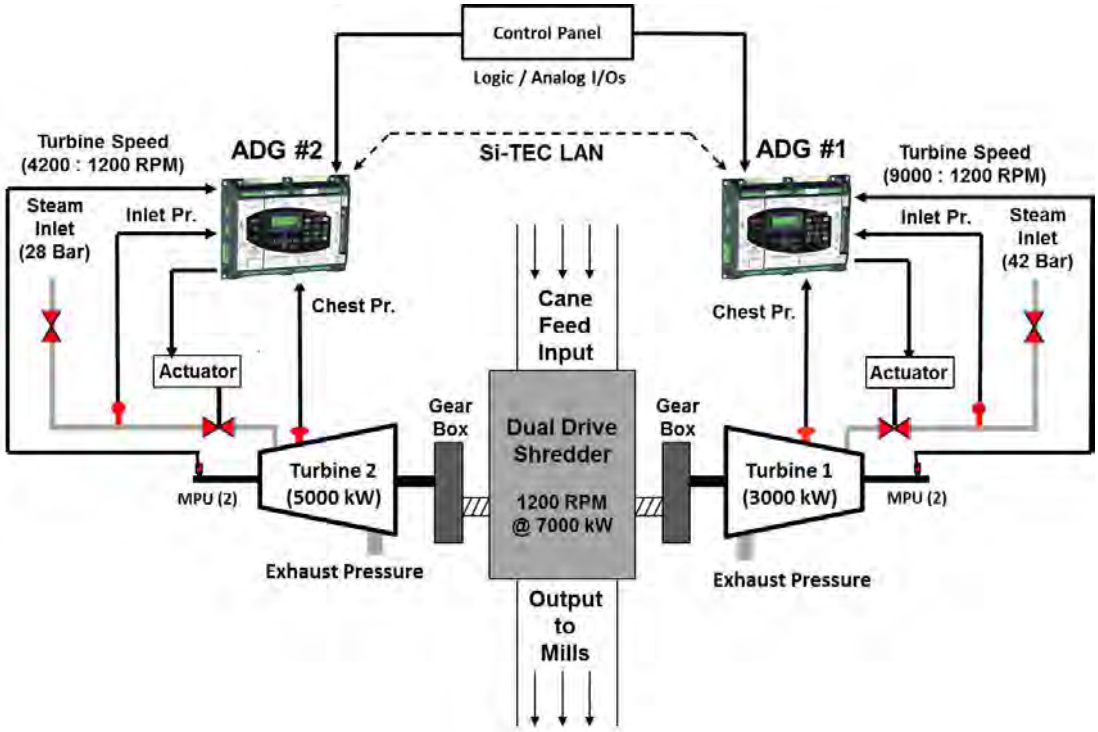
Turbine start up

- Pre-lube and baring relay output – available
- Relay output for isolation valve (main steam valve) control - available
- Preset warm up stages for start sequence
- Shortened warm up sequence for warm turbines
- Quick start for turbines at operational temperatures
- Remote 4-20 mA start speed referencing - available
- Two critical speed ranges – operation in all warm up modes
- Normal and fast speed ramp rates for start up

Display features

- 4 x 20 character display, with "back-light flash" feature for active alarms
- Extensive multi-level menus for easy & quick access
- Enhanced keypad for menu navigation
- Special keys to jump to selected menu locations
- Peak hold values
- Full system details can be displayed on menus
- Display of accumulated data

Si-TEC Xtend ADG tandem (dual) drive application

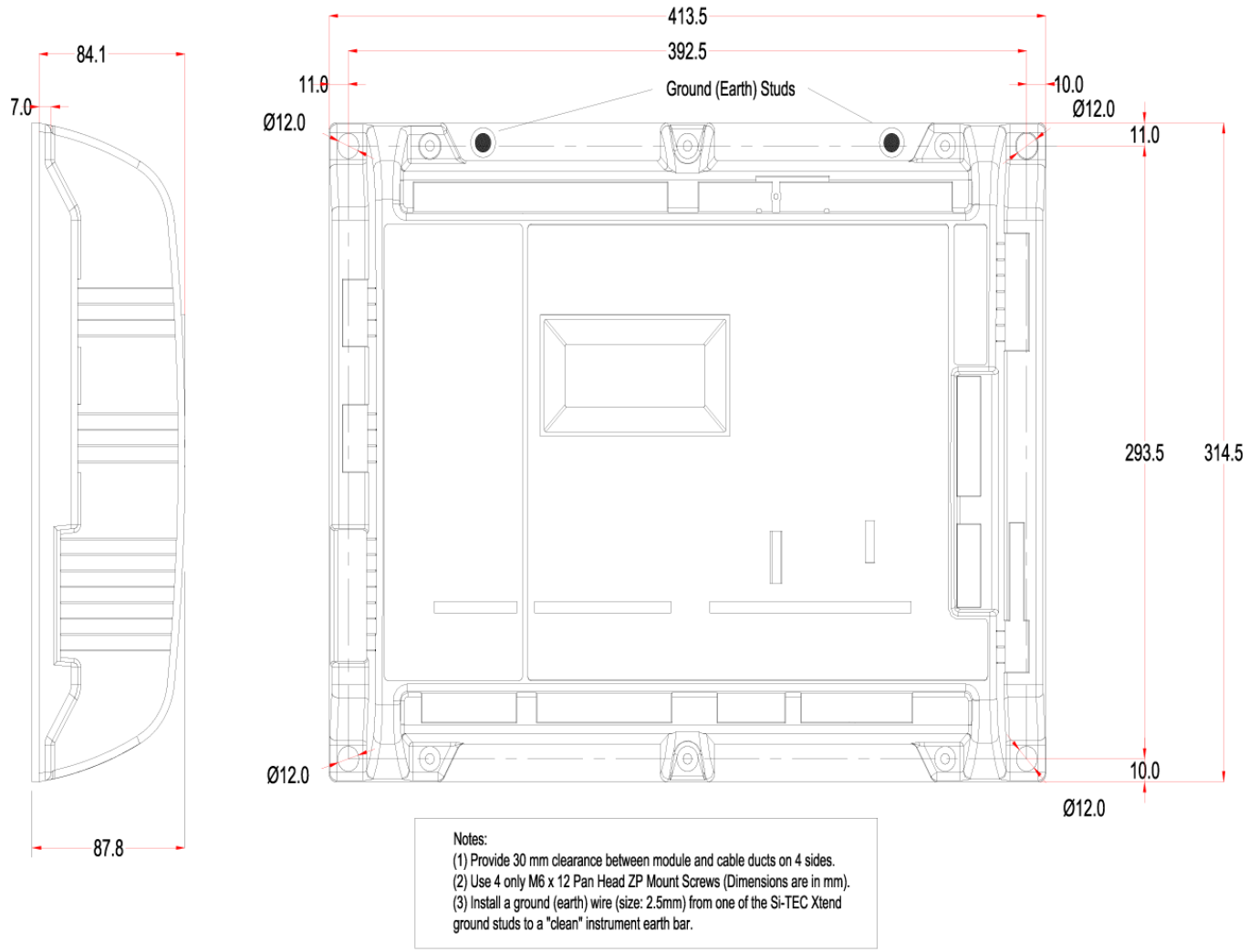


I/O features

- Actuator drivers for
  (a) all electric actuators to 6 to 180 Nm
  (with non contact - positive position feedback)
  (b) 4-20 mA
  (c) 0-200 mA
  (d) 0-10 amp
  (e) 0-5 Volt
  (f) PWM
- 16 logic inputs, with LED status indication, of which 13 are user defined for a wide variety of uses, including, “Rated Speed”, “Fast Rate”, “Sequence Hold”, “Overspeed Test (Auto)”, “Process Control” etc.
- 8 relay outputs, with LED status indication, which are user defined for control, status, or alarm functions
- Individual output relays can have multiple functions by combining alarms
- 4 analogue inputs (3 x 4-20 mA, 1 x RTD) for user defined applications, e.g. speed reference, steam pressures, process control, etc.
- 3 analogue outputs (4-20 mA) used defined
- I/O connections utilise plug-in terminal strips
- Expansion I/O on local module “CAN bus” port for additional 16 x logic inputs, 4 x relay outputs and 4 x analogue inputs, 32 x thermocouple etc.
- Selected I/O can be monitored and driven via “Modbus”
- First up alarming and alarm history

Dimensional drawing

Si-TEC Xtend physical outline with dimensions



Notes:
(1) Provide 30 mm clearance between module and cable ducts on 4 sides.
(2) Use 4 only M6 x 12 Pan Head ZP Mount Screws (Dimensions are in mm).
(3) Install a ground (earth) wire (size: 2.5mm) from one of the Si-TEC Xtend ground studs to a "clean" instrument earth bar.

Communications

- RS485 – Modbus RTU/ASCII for monitoring & control
- RS485 – Si-TEC LAN for inter-module communications
- RS232 – for set up, tuning and diagnostics
- RS232 Diagnostic port for Si-TEC support software
- Optional "User RS485 LAN" has read/write facility for a wide range of registers. Standard LAN protocols are "Modbus" RTU and ASCII
- "Si-TEC LAN" for inter-module communications for 2 Si-TEC *Xtend* ADG modules for tandem (dual) drive applications
- "CAN" bus port for special applications

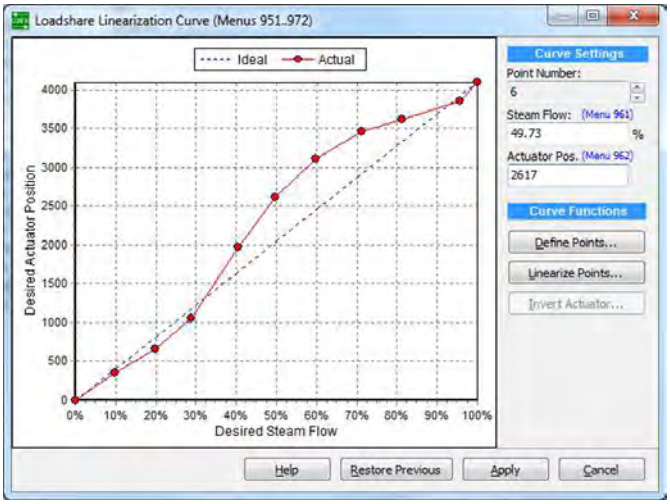
Software tools (Windows® based)

pcConfigure

- Allow storage & retrieval of set point parameters to and from a Si-TEC *Xtend* module via a PC
- Operates in a safe controlled environment
- Saves all set point parameters to disk
- Data can be sent by email
- Data can be printed for archival records
- Menu driven set-up & alarm configuration

pcTune

- Allows turbine and process control to be precisely tuned. Remote diagnostics/tuning may also be performed.
- Allows turbine tuning to be performed with increased accuracy in true engineering values
- Provides 100 % repeatable results
- Recovery characteristics tested by inducing errors and recording results graphically
- 16 traces of user selected digital values can be selected for display
- Multiple PID tuning menus
- Digital instrument panel included



Si-TEC DataView

- High speed turbine monitoring system for PC, configurable for up to 24 nodes
- Includes extensive data logging (up to100 data per node), event recording, and archiving (up to several years)
- Data extracted via Modbus RS485 or Ethernet (Modbus TCP/IP) via „Datahub"
- Exporting of log file via CSV format for up to 20 parameters
- Operates independent of PLC/SCADA

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