

## Si-TEC *Xtend* CGC/TGC

### DATA SHEET

#### Models

Si-TEC *Xtend* Recip Control is available in two variations:

- ✓ **CGC** – Co-Generation Control
- ✓ **TGC** – Total Generator Control



#### Description

Si-TEC (Smart Integrated Turbine & Engine Control) is the world's only digital governor fully integrated with an automatic synchroniser and kW/kVAr control, and was developed by Dawson Technology Pty Ltd in 1991, which now operates under the name of Heinzmann Australia Pty Ltd as part of the HEINZMANN Group.

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

Designed for use with all sizes of generators, the Si-TEC *Xtend* can be used for islanded or co-generation (mains/grid parallel) applications on diesel and gas reciprocating engines, steam turbines and gas turbines.

#### Key features

- Precise speed governing
- Dual MPU for redundancy
- Automatic engine start up sequence (including pre-heat/purge, crank, start fuel limiting and speed ramping)
- Driving wide range of actuators (incl. HEINZMANN all-electric)
- Wide range of PIDs
- Boost pressure limiting
- Interfacing wide range of AVR systems
- Auto synchronising
- kW control & load share
- kVAr/PF control & load share
- Flexible configuration
- User-friendly tuning software (pcTune)
- Extensive system diagnostics
- Optional I/O expansion

## Features

- Precise speed governing typically within 0.1 % of operating (rated) speed at steady state
- Dual MPU (or prox.) speed sensors for redundancy
- Automatic start/stop sequence initiated by a single logic input to give fuel limited "Guaranteed Start"
- Typically interfaces with all-electric actuators that provide "instantaneous" position feedback
- Capable of driving wide range of actuators including electro-hydraulic (e.g. 0-200 mA, Solenoid, etc.) and EFI engine systems (4-20 mA, 0-5 V, +/-3 V & PWM)
- Multiple and wide range PIDs (includes 5x speed PIDs, kW PID, process PID, voltage bias control, synchronising control, kVAr/PF control, etc.)
- Multi-point "Boost Pressure" limiting curve
- Grouping Control logic allows "Bumpless" transfer from single bus to split bus applications (& vice versa)
- Extensive I/Os that may be expandable via CAN bus (e.g. remote digital I/Os, thermo-couples, etc.)
- Noise and harmonic issues eliminated by design
- 3-phase AC RMS voltage and current sensing
- Smart self-tuning torsional filtering
- Configurable alarms can be multi-functional
- Bump® feature to optimise tuning of governor

- Accumulated data recording of engine running hours, kW hours, kVAr hours, etc.
- Extensive diagnostic functions
- Engine monitoring via Opal Generator Annunciator

## Application range

- Power generation applications where up to 24 generators can be paralleled together. Multiple groups can be combined via GSM modules.
- Single or multiple GSM's for more complex applications, e.g. multiple bus and/or feeders
- Co-generation operation – parallel to the grid for:
  - Soft "bumpless" transfer of loads
  - Peak shaving – set max. limit for import power
  - Base Loaded to the grid
  - Export excess power to the grid
  - Prime power – only export to grid
- Systems requiring high quality power based upon precise frequency and calculations of active and reactive power
- Generating sets in sugar, mining and general industry, mining sites and townships, rural & remote communities, hospitals, commercial buildings, marine & shipping, defence & telecommunications facilities as well as oil & gas industry

## Synchroniser

- Digitally integrated with governor
- Better than 10 secs (typically within 5 secs for 0.1 Hz, 1.0 % Volts & 5° phase match) for most applications
- Phase rotation check during synchronising
- Integrated independent "Sync Check" hardware (3-ph bus & gen check)
- Optional "Permissive" synchronising function
- Intelligent "Dead Bus" detection and closure
- Menu adjustable synchronising parameters

- kW limiting based on temperature, boost pressure, etc. (via 4-20 mA signal)
- Adjustable load/unload ramp rates
- Multi-mode kW & kVAr power factor control
- AVR bias to directly interface wide range of AVRs (digital outputs or +/- 8.4 VDC) for PF sharing/control
- 4-20 mA and Modbus RS-485 referencing available
- Power factor or kVAr control when base loaded
- Vector disturbance feature senses loss of grid within 40 mSec to maintain full operation of station

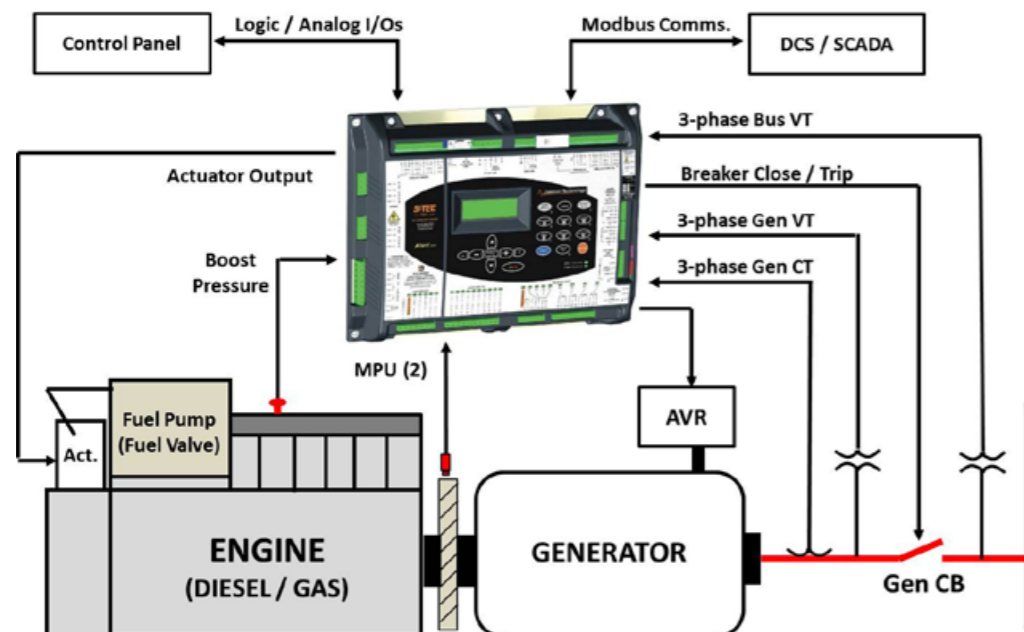
## Display features via opal generator annunciator

- 4x 20 character LCD display, with "back-light flash" feature for active alarms
- Metering of essential generator information (e.g. voltage, frequency, real power and power factor)
- Multiple "Short-Cut" keys to display useful data (e.g. peak hold, running hours, control status & alarms)
- Engine monitoring parameters including oil pressure, water temperature, oil temperature, crank battery. Various alarms and shutdown conditions (e.g. low oil pressure, high water temperature, overspeed, etc.).

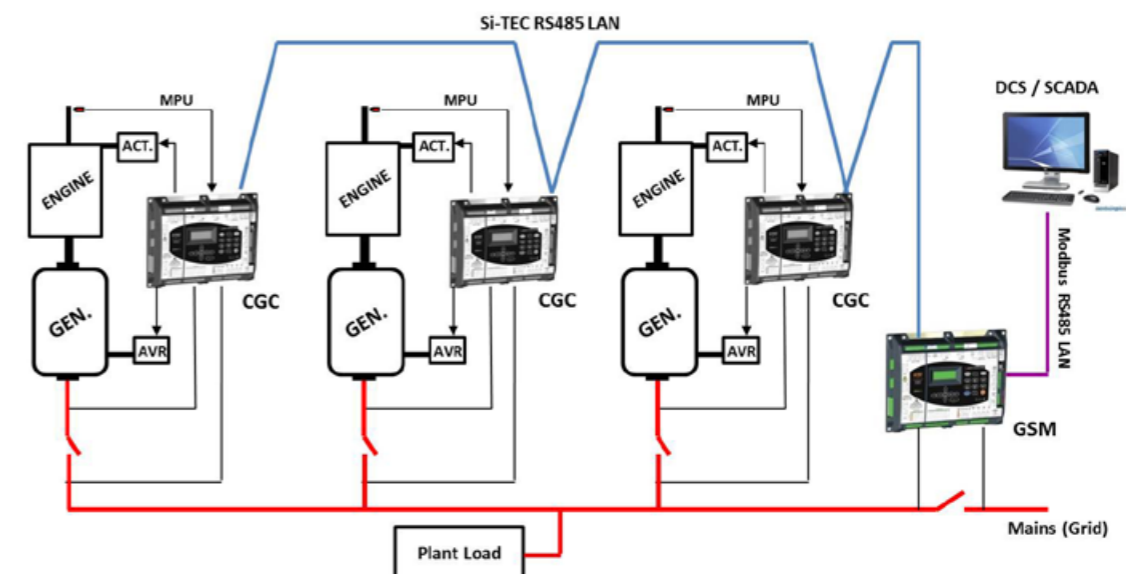
## Load sharing and load control

- Digitally integrated with governor
- Automatic and isochronous (islanded) kW and kVAr load sharing
- Load sharing accuracy to better than 0.5 %
- True RMS AC measurement (3-phase voltage & current) better than 0.25 % accuracy
- Optimum control of active power (kW) and reactive power (kVAr/PF) when grid paralleled
- "Bumpless" transfer of active and reactive power

## Si-TEC Xtend recip interface



## Si-TEC Xtend CGC used for mains (grid) parallel application



## I/O features

- 16 logic inputs, with LED status indication, of which 12 are user defined for a wide variety of uses, including, "Rated Speed", "Fast Rate", "Sequence Hold", "Base Load", "Overspeed Test (Auto)", etc.
- 9 relay outputs, with LED status indication, of which 8 are user defined for control or alarm functions

Typical control functions include:

- "Fuel Solenoid"
- "Engine Cranking"
- "Engine Pre-Heat/Pre-Lube"
- "Generator C/B", etc.

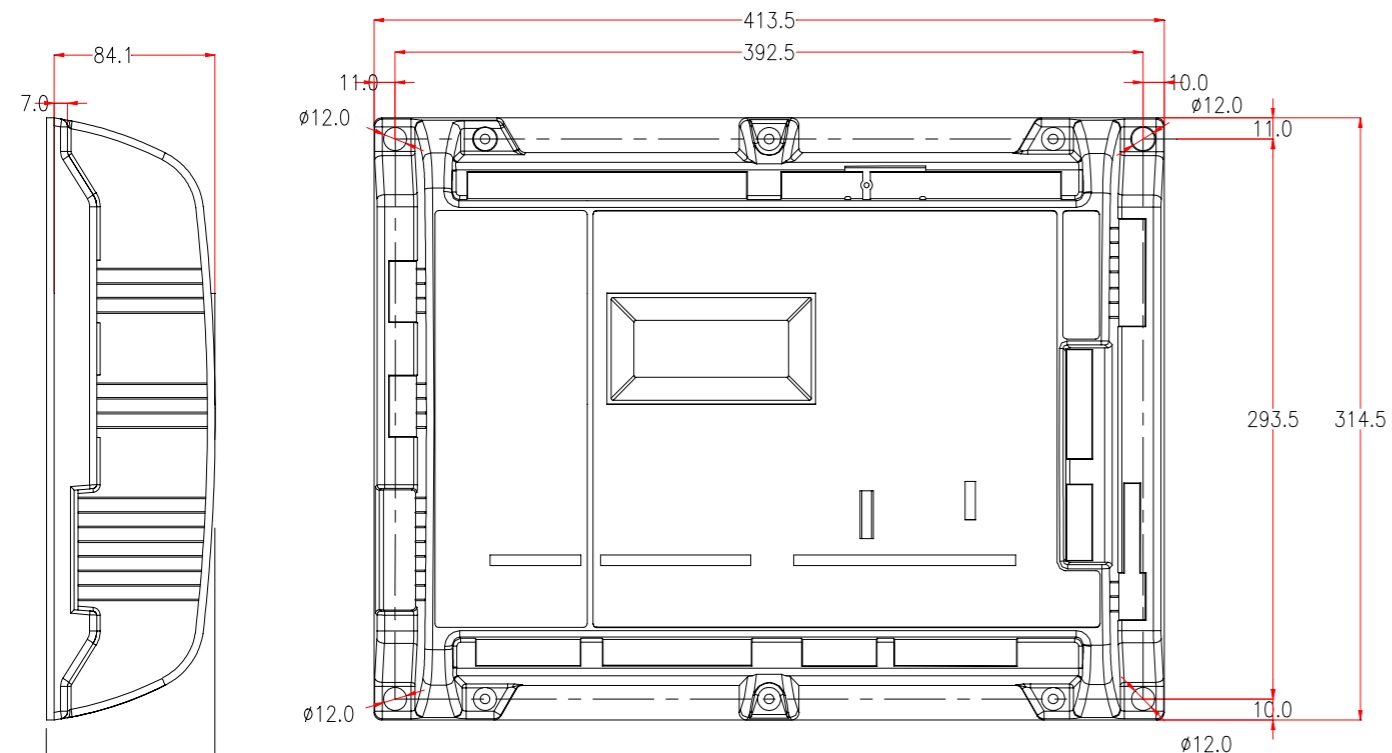
Typical alarm functions include:

- "Reverse Power"
- "Reverse kVAr"
- "High kW load"
- "High/Low Frequency"
- "High/Low Voltage"
- "Phase out of balance"
- "Vector Disturbance" etc.

- Individual output relays can have multiple functions by combining alarms
- Each "alarm" can be selected to directly "Trip" the Generator C/B
- 4 analogue inputs (3x 4-20 mA, 1 x RTD) for user selectable applications. E.g. kW, kVAr, PF & base load references, engine temp, etc.
- 3 analogue outputs (4-20 mA) for direct driving user applications, E.g. kW, kVAr, PF, RPM meters, actuator position & fuel % indication
- I/O connections utilise plug-in terminal strips
- Further I/Os expansion is possible via CAN bus

## Dimensional drawing

### Si-TEC Xtend Physical



Notes:  
Provide 30mm clearance between module and cable ducts on 4 sides.  
Use 4 only M6 x 12 Pan Head ZP Mount Screws (Dimensions are in mm)

## Communications

- RS-232 Diagnostic port for Si-TEC support software
- "Customer RS-485 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 up to 24 Si-TEC Xtend modules of any type combination
- "CAN Bus" port for CGC to Opal & RIO interface

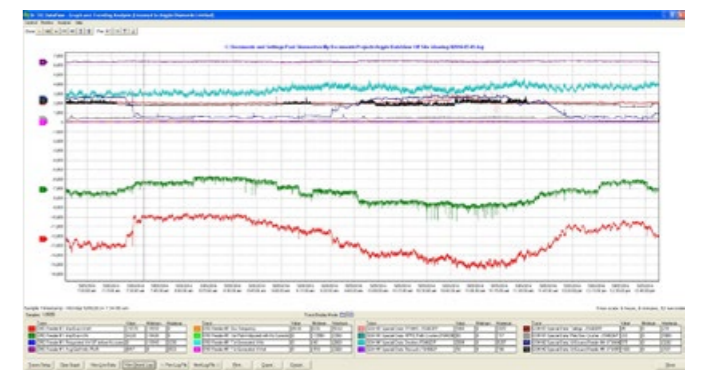
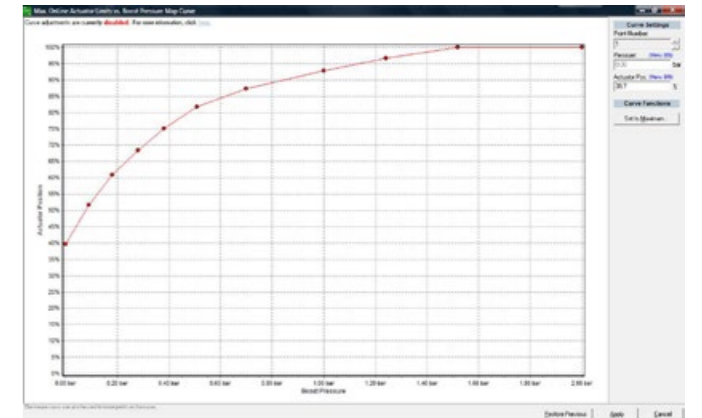
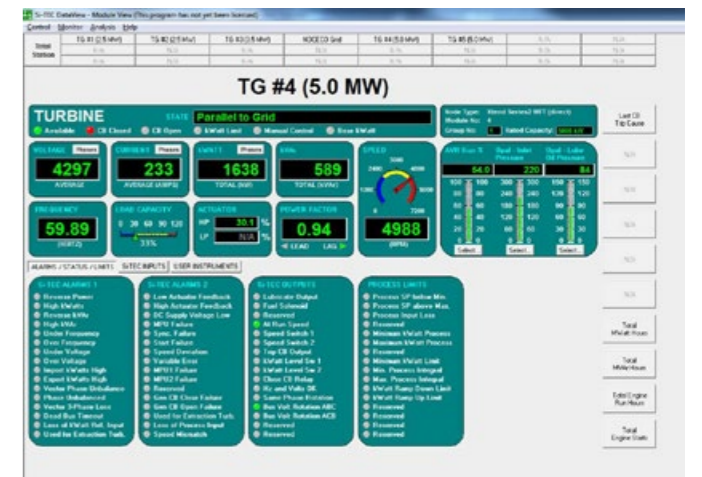
## Software tools (Windows® based)

### Si-TEC pcConfigure

- Allow storage & retrieval of set point parameters to & from a Si-TEC Xtend module via a PC
- Graphical configuration of "Boost Pressure" mapping & linearisation curve
- 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
- Software interface via PC or remote access

### Si-TEC pcTune

- Allows generator tuning to be performed remotely and in a controlled environment
- Allows generator 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
- Other displays include "Digital Instrument Panel", "System Overview" and "Live Steam Map"
- Data can be sent by email
- Data can be printed for archival records
- Software interface via PC or remote access



### Si-TEC DataView

- High speed power station monitoring system for PC, configurable for up to 24 nodes (including CGC, GSM, ADG, temp scanner, feeders, etc.)
- Includes extensive data logging (up to 100 data per node), event recording, and archiving (up to several years).
- Data extracted via Modbus RS-485 or Ethernet (Modbus TCP/IP)
- Exporting of log file via CSV format for up to 20 parameters
- Operates independent of PLC/SCADA

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**Heinzmann Australia Pty Ltd**  
10 Virginia Street  
Geebung, QLD 4034, Australia

Phone: +61 7 3868 3333  
E-Mail: [info.au@heinzmann.com](mailto:info.au@heinzmann.com)  
[www.heinzmann.com.au](http://www.heinzmann.com.au)