MD100m for Electricity Utilities

Empowering the Control Room; CGI's approach to delivering SCADA RTUs to electricity utilities in Australia has been one of collaborative product evolution

We provide resilient building blocks that allow our clients to customise the physical architecture of a distributed control system and provide the flexibility for innovative modelling, control and data capture. We have a unique focus on local service excellence in design, manufacture, project delivery and support, which in turn has resulted in the retention of key clients for over 20 years. These strong partnerships foster product currency, evolution and the innovation necessary to meet current and future business requirements as electricity utilities transform and seek to adopt increasingly intelligent, automated and data-centric grid solutions.

Use Cases

The MD100m provides a flexible, scalable and economical solution with the capability to support many different scenarios common to electricity utilities. This provides the potential to significantly reduce complexity, substation cabling and lifecycle costs resulting in an intuitive solution that is easier to engineer, operate and maintain.

Use cases may include, but are not limited to, the following:

- DER Constraint Manager – generators & batteries
- Battery Energy Storage Systems (BESS)
- Community battery solutions, pole-top and pad/skid mounted
- Substation Management Unit (SMU)
- Substation RTU or Distributed Intelligent Unit (DIU)
- Power Transformer Manager – dynamic & predictive thermal models
- Condition Monitoring IED – switchyard capable
- Gateway or Protocol Converter
- Intelligent Grid Solutions
- Local webserver HMI (HTTPS)
- Transformer Auto Voltage Regulation
- Audio Frequency Load Control
- VT Auto Changeover
- Remote I/O or Marshalling IED (Battery, Security - Building / Gates)
- Low Voltage network monitoring (4G, CAT M1 or CAT 1)
- IIoT Gateway and EoN node (MQTT + Sparkplug B)
- IEEE2030.5 (DOE communications) coming soon

Logic for individual use cases can be either custom developed, or ported from existing client solutions, thereby maintaining inherent Intellectual Property.

Key features

- Modular and scalable, click-together
- High-performance and power-efficient
- Small footprint of W 25mm x H 115mm x D 135mm (per module)
- Cybersecurity: hardened OS, firewall, authentication, cryptography, encryption, aligning with IEC-62443
- Application / solution flexibility IEC61131-3 languages, distributed database, real-time SCL
- WebHMI (HTTPS)
- Open-source operating system provides abundant customisation capabilities
- Industry standard protocols
- Operating temp -20ºC to 75ºC
- Power range 24 – 125 V DC
- Conformal Coating (optional)
- Mounting: DIN rail NS 35/7.5
- Wiring: 5mm-pitch, up to 2.5mm2

Regulatory compliance
- Safety: IEC 61010-1, IEC 61010-2-201
- EMI: CISPR 32/EN55032 Class A
- EMC: IEC 61000.6.5 Interface type 4
- Power station, Substation environments: IEC 61000-4-2/4-3/4-4/4-5/4-6/4-8 IEC 61000-4-16/4-17/4-18/4-29

Physical platform

Assembly is easy, simply snap the DIN rail bus connectors together to form the backplane, then plug in the required modules. This concept also allows for individual module removal.

Minimal configuration

The base arrangement is a Processor and a Power Supply module, giving a footprint of just 50mm (W) on the DIN rail (2 modules).

Maximum configuration

The maximum configuration is the above plus ten modules with the maximum number of analogue based modules not exceeding three due to power limitations.

Field wiring

To ease installation and maintenance effort, all terminal blocks are plug compatible so that field wiring can be completed in advance, which also enables the replacement of modules without disruption.

Communications Architecture

The MD100m supports two Ethernet and three serial ports that can be used to meet any number of different communications architectures. Additional flexibility is provided by SFP based Ethernet allowing a choice of different physical transceivers (TX, T, FX or SX).

Data Modelling

For power system applications where fast, event driven processing is required, CGI's distributed database and Sequential Control Logic (SCL) based Substation Management System is recommended. At the heart of this system is the object-based model of the substation where updates are performed following a change of state, rather than via cyclic logic such as IEC61131-3 (supported but not preferred). The change of state processing can then trigger control logic to start or ripple changes to higher level objects. Our approach simplifies control logic via pre-processed object data and avoids the performance-impacting recalculation of equipment states on each logic cycle.

Distributed Processing & Control Logic

The ability to distribute the database allows it to be hosted on multiple nodes. Distribution is automatically propagated to each node. Each node can be configured as required to view data in other nodes that make up the Substation Management System.

This distribution of data extends to the control logic where control routines can be specified to execute in a particular node. This allows the processing to be carried out at the lowest level, reducing physical cabling infrastructure, increasing overall processing power as well as allowing logic to continue running on failure of some devices.

This allows access to view data for (and send commands to) other parts of the substation as an integrated system. This greatly simplifies routines that require information from many IEDs in the system such as transformer AVR with multiple transformers.

MODULES

Available MD100m modules include:

Power Supply
- 24 to 125 V DC range
- 20 Watt

Processor
- ARM Cortex A5
- 2 x SFP Ethernet ports
- 3 x Serial (1 x RS485, 2 x RS232)
- Console and USB port
- 4 x Digital Inputs
- Micro SD card (optional)

4G Modem
- Serial RS232 (RJ45) input
- CAT M1 or CAT 1

Digital Input
- 16 Channel
- Range 0 – 125 V DC
- Max current <2mA
- Input threshold 36 V (default)

Digital Output
- 16 Channel (solid-state)
- Rated voltages up to 125 V DC
- Rated current 300mA continuous

Mixed Digital Input / Output
- 8 Input Channels (as above)
- 8 Output Channels (as above)

Analogue Input
- 8 Channel
- ±10V, 0-10V, ±5V, 0-5V
- 0-20mA, 4-20mA, 0-10mA, ±10mA
- RTD 100Ω, 1000Ω, 2, 3 or 4-wire
- Thermocouples J, K, T and S type

Analogue Output
- 8 Channel
- ±10V, 0-10V, ±5V, 0-5V
- 0-20mA, 4-20mA, 0-10mA

Mixed Analogue Input / Output
- 5 Input Channels (as above)
- 3 Output Channels (as above)

CGI works collaboratively with our clients and is committed to the continuous improvement of the design and performance of CGI's products. While every effort is made to ensure the information provided in this brochure is accurate, specifications are subject to change without notice.

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