

FROMENT SIGMA LOAD CONTROL LOAD BANK CONTROL

A Froment load bank with Sigma load control and instrumentation is the leader in simplicity, ease of use and accuracy.

Sigma brings cost effective solutions to today's power testing requirements which can require high level instrumentation, data capture and verification.

Sigma Control Options

Load banks fitted with the Sigma 2 Hardware provide the maximum flexibility in load control and instrumentation.

- Load bank mounted Decade Switches, for quick and easy load section.
- Robust Intelligent Hand-held Terminal (IHT) for remote operation with full 3-phase instrumentation.
- Sigma PC software for enhanced load control, graphical displays and results storage.
- Modbus interface provides integration with PLC, HMI or SCADA systems.
- Site Load Correction (SLC) automatically prevents the problems associated with light loading.
- Sigma Instrumentation System (SIS) for Medium Voltage (MV) and High Voltage (HV) testing.

State-of-the-art Sigma 2 Hardware

The Sigma load bank module is installed with Voltage and Current Transformers (VTs & CTs) in the Froment load bank. It is the Sigma control interface for all the functions within the load bank.

- Robust purpose designed microprocessor-based module with industrial connectors and LED status display.
- 24Vdc supply voltage with 24Vdc input and outputs.
- Large flash memory allows remote upgrading and space for configuration data and calibration maps.
- Non-volatile RAM provides 500 event history log time stamped by on-board real time clock.
- Element on-time balancing provides for enhanced element life and insulation resistance.
- Usage counters provide information on individual contactor operation, element run times, overall power-on time, load-on time and kWh.
- Load monitoring checks each phase for faulty contactors, blown fuses or faulty elements. Faults are logged with visual indication via blinking stop lamp and warning code.
- Automatic detection senses the supply-on-test voltage, frequency, phase and phase rotation.
- Load correction facility compensates for any voltage drop on supply.
- The load bank is protected against over-voltage.
- The load bank cooling fan automatically starts and stops as required.

Decade Switch Control

Decade switch control provides straightforward manual control with the ability to upgrade to full Sigma control and instrumentation.

- Quick and easy load selection via decade switches with load accept and reject buttons, provide the easiest of user interfaces.
- Works with single or three phase supply-on-test.
- Indicator lamps show current status of load bank operation, load control and status of the supply-on-test.
- Load step resolutions of 0.1kW, 1kW or 10kW depending on load bank size.

Intelligent Hand-held Terminal (IHT) and Sigma PC software

Both the Intelligent Hand-held Terminal (IHT) and the Sigma PC Software provides enhanced load control and instrumentation.

- Fast and accurate testing with maximum efficiency. IHT or PC control is automated and easy to use.
- All instrumentation measurements are made using high accuracy voltage and current transformers located within the load bank. This information is processed digitally, using high speed sampling of the raw data. This provides full three-phase, high speed, true rms measurements with high update rates to class 0.5 accuracy
- Calculation of rated line current and kilowatts.
- No need for any pre-calculations.
- Load step resolutions down to 0.1kW or kVAr with fully adjustable leading and lagging power factors.
- Comprehensive overload and stall protection is provided, based on the rating of the supply-on-test.
- Performs transient load tests.
- Automated load control provides multiple timed load steps including manual override and cyclic testing.
- In-built test editors allow easy setup of load including % load, power factor and time.
- Manual control via selection of kW, % load, or kVA.
- Simple plug / socket connections allow multiple Froment Sigma load banks of differing capacities and combination: resistive, inductive or combined may be connected and controlled from one Intelligent Hand-held terminal (IHT) or PC.
- Operation up to a kilometre from load bank.
- Multilingual user interfaces include English, French, German, Spanish and Italian.



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Intelligent Hand-Held Terminal (IHT)

The IHT provides full load control and three-phase instrumentation.

Hardware

- Robust hand-held terminal housed in industrial polycarbonate / polyamide enclosure with pvc hand grips providing IP65 protection.
- Membrane keyboard and back-lit graphic LCD.
- Operation and Data Capture.
- Display pages show all the main electrical parameters.
- The displays are designed to simplify the testing, setup and adjustment of gen-sets and UPS systems.
- Large display of voltage and frequency assist with initial set up.



- When carrying out full-load testing, one page shows all the true rms three-phase measurements of voltage (V), frequency (Hz), current (A), power (both kW and kVA) and power factor (Cos φ).



- For transient-response testing, the voltage and frequency of the last load change are captured and displayed on the dynamic graph including maximum and minimum data.



- The status line includes the elapsed time since the last load was applied.
- Load selection is displayed in a 'popup' window over the instrumentation while the load is being changed.



Proofloader PC Software

Proofloader PC software is a Windows™ based alternative to the Intelligent Hand-held Terminal (IHT). It provides further enhanced load control along with transient speed instrumentation, full data acquisition reporting with graphical displays, real time data such as crest factor recovery times and % errors necessary for testing to ISO8528.

Proofloader PC software is the solution for witness testing, product verification, medium and high voltage testing.

Used with the Sigma Instrumentation System (SIS) it provides a means of directly measuring actual Medium and High Voltage electrical parameters.

A typical layout showing windows customised with digital meters, real time analogue graphs and control dialogs. A number of pre-customised screen layouts are included with the standard installation and can be modified by the user.

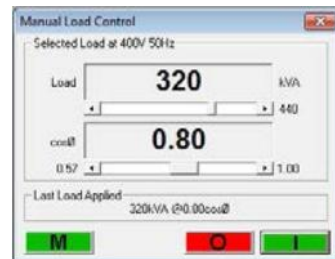


Hardware

To run Sigma Proofloader PC software, an industry standard laptop, desktop or rack mounted PC is required running Windows 7, Vista™ or Windows XP™. This can be supplied if required with the software fully installed and configured.

Operation and Data Capture

- Load is selected by clicking and dragging the sliders on the Manual Load Control dialogue. Load is applied by simply pressing the green accept button.



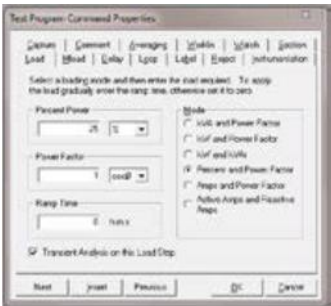
- Load can be expressed as a percentage of supply, or actual load in kW or kVA and power factor.
- Different load modes supported include kVA and power factor; % power and power factor; or current and power factor.
- Adaptive and Predictive load-correction modes ensure the correct load is applied even if the voltage or frequency droops.
- Continuous power and current instrumentation ensures no blank meters on load change events.
- Supply properties include ratings, alternator, engine, customer and additional notes are saved with the test results for future reference or can be saved as a template.

FROMENT SIGMA LOAD CONTROL

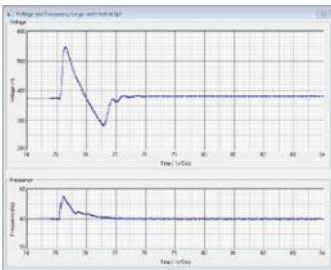
LOAD BANK CONTROL



- Automatic load control gives the ability to run test programs. Test programs are created using the Test Program Editor.



- Test programs support load ramping (load applied gradually over the time entered), delay instructions, looping and data capture control. The test program can be verified by single-stepping each command.
- Watches can be set to monitor instrumentation values, stop test programs and drop the load if required.
- Data capture can be controlled manually or automatically from a test program. The data is saved along with the supply details.
- Quick start wizard guides you through the setup for a manual or automatic test.
- Transient data capture at a high instrumentation speed of up to 50 readings per second for voltage and frequency data.
- Real-time graphical displays of up to 1 second per division, with automatic trigger on a load change.



- Transient, Heat Run and Summary reports can be printed from results. Transient data is analysed to calculate voltage and frequency recovery times along with maximum deviations, according to IS08528.
- Print reports on your own company-headed paper.
- Result data can be exported for analysis using other software packages.
- Any combination and number of meters and graphs can be displayed on customisable 'front-panel' windows.
- User-defined formulas for meter display, watches and reporting.

Sigma Instrumentation System (SIS)

Housed in a watertight equipment case the SIS is designed to monitor three-phase electrical supplies primarily during proving trials. The unit provides a means of directly measuring the actual medium or high voltage electrical parameters including power, voltage, current and frequency.



Sigma controlled load banks are used to test low voltage gen-sets up to 690V. When testing Medium Voltage (MV) or High Voltage (HV) gen-sets, Low Voltage (LV) Sigma load banks can be used in conjunction with suitably rated power transformers.

Power measurements on LV systems cannot provide accurate gen-set readings due to transformer losses. By 'daisy chaining' the SIS into the load bank group using the standard Sigma plug / socket connections automatically reverts the instrumentation displayed on Proofloader PC software from the internal load bank LV readings to the external inputs into the SIS.

Normal load test functions and operation within Proofloader PC software are maintained to ensure comprehensive testing.

Hardware

- Sigma 2 instrumentation with switched input voltage selection.
- Individual input sockets, one for voltage and two for current (1 x 1A and 1 x 5A for connection to external current transformers).
- Typically either the 1A or 5A will be used dependent on system current transformer (CT) ratios.
- Operates from a 200-250V AC 50/60Hz single phase mains supply.
- IP67 equipment case 470 x 385 x 180mm.

Sigma Modbus Interface

Industry wide serial communications protocol allows integration of a Sigma 2 load bank with gen-set control system, test cell automation and building supervisory and monitoring systems through PLC, HMI or SCADA systems.

- Accessible directly from RS232 serial port on Sigma 2 module within load bank where conversion to Ethernet or RS485 is also possible.
- Please see Sigma 2 Modbus Interface technical data sheet for further information.

Sigma Site Load Correction (SLC)

Automatically maintains the required level of loading on the gen-set to prevent problems associated with light loading.

- External Current Transformers (CTs) are connected to the Sigma control system to provide site load information.
- When site load increases the load provided by the load bank decreases. When site load decreases load provided by the load bank increases.
- The maximum load level required on the gen-set is set within Sigma and may be adjusted by an external decade switch that gives up to twelve individual load steps.
- Each load step is applied only when site load is continuously below that of the load step threshold for a predetermined time. Load steps are released when site load increases above the present selected load step.