GE
Grid Solutions






# iSTAT M2x3

## Comprehensive Measurement Centre Family

The M2x3 is a high accuracy multifunction configurable measurement centre designed to meet the requirements of the high and medium voltage utility and low voltage industrial markets throughout the world.

### High Accuracy Measurements

With a wide range of analog, digital and communications options the M2x3 can be used in many applications, from a stand alone meter through to an ethernet data device connected to a SCADA network. High sampling rates and true RMS measurement give accurate readings under all harmonic conditions.

Measurement accuracy of 0.2% and Class 0.5S Energy are suitable for all applications. The standard DIN panel mounting case combined with the I/O and communications options mean that most requirements can be met from the M2x3 range.

### M2x3 Family

- M233 Communicating Measurement Centre
- M243 Communicating Network Recorder
- M253 Communicating Network Analyser

The iSTAT M2x3 is an economical choice for measurements, with a range that allows the user to tailor the measurement centre and its measured functions to the application.

The iSTAT M2x3 range is easy to set and connect and minimises the chance of an incorrect setting by using a setup wizard tohelp the operator configure the device.

The iSTAT M2x3 has fully programmable input scaling which can be set to match any site application for single and 3-phase installations. The iSTAT M2x3 has multiple I/O options which are fully programmable to produce the required function.

The iSTAT M2x3 has multiple communications port options - RS232, RS485, ethernet and USB - allowing it to be engineered into most applications.

The iSTAT M2x3 has multiple protocols allowing configuration of MODBUS RTU, MODBUS TCP and DNP3 based systems to interface with a wide range of RTUs and SCADA systems.

The iSTAT M2x3 uses the QDSP setting software that is used across the entire range of programmable iSTAT measurement products supplied by GE.

## Key Benefits

- High accuracy measurements
- Easily configured
- Multi line display
- Multiple I/O options
- Multiple communications options
- Multiple protocols
- Wrong connection and set up wizards

Imagination at work

| Features | Benefits |
|---|---|
| Programmable measurement centre with keypad and display. | Easy programming and clear display of data, with customisable displays. |
| 0.2% measurement accuracy, true RMS. | High accuracy measurements of any electrical network regardless of distortion. |
| Class 0.5S Energy measurement, combined with tariff inputs, tariff structure, real time clock and energy pulse outputs. | Able to perform high accuracy energy measurement and management functions. |
| Auto-range voltage and current inputs, up to 500 V and 5 A. | Easy to specify the measurement centre for any application, including when full details are not available. |
| RS232, RS485, ethernet and USB communications. | Communications ports available increase system design options. |
| MODBUS RTU and TCP and DNP3 protocols. | Multiple protocols allow connection to most remote energy management systems. |
| Up to 4 analog outputs can be fitted. | Analog outputs for up to 4 measurement quantities can be supplied from the same unit, reducing the number of devices required. |
| Digital inputs and alarm outputs. | Digital I/O increases the range of applications that the measurement centre can be used for. |
| Universal Power Supply. | Power supply to suit all site requirements. |
| Configuration using QDSP software. | Easy to use software allowing fast configuration. |
| Optional second RS485 or RS232 communications port. | Extends the communications systems options available to the customer. |
| Multimedia cards (MMC). | MMC used for offline settings and local data transfer. |
| Wrong connection and setup wizards. | Assists basic configuration. |

## iSTAT

THE standard measurement platform

"iSTAT M2x3" Front of panel metering

- Simple to fit
- Simple to set
- Simple to connect
- Advanced Technology
- Economical

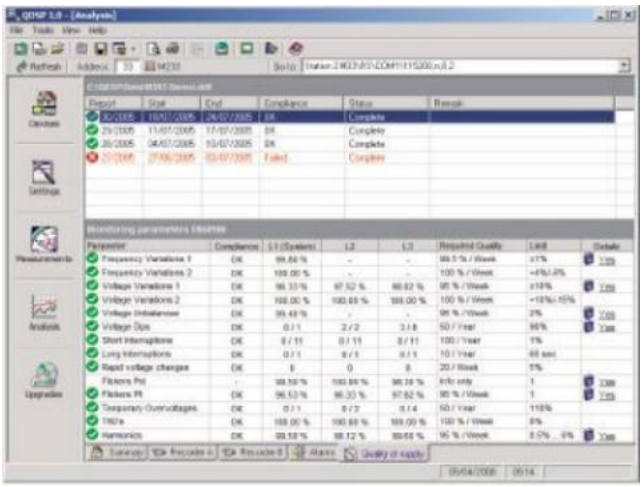

*Fig 1 Power Quality compliance*

## M2x3 Family

### Communicating Measurement Centre

The M233 is a Class 0.2 measurement centre which includes serial, USB or ethernet communications. The M233 measures multiple parameters of an electrical system and includes class 0.5S accurate energy measurement with a tariff structure and real time clock. The M233 can be used for secondary metering applications. Hardware options include tariff and digital inputs, alarm relays, pulse outputs and analog outputs.

### Communicating Network Recorder

The M243 is a class 0.2 communicating network recorder with the same measurement capabilities as an M233. In addition, the M243 has a 4MB recorder which allows three data recorders to be programmed: two for measurements and one for alarms.

The recorders allow up to 32 different electrical parameters and 32 alarms to be monitored. The M243 can be used to monitor the status of plant or an electrical power system and log the required data.

### Power Quality Monitoring

The M253 is a class 0.2 communicating network analyser with the same measurement and recorder capabilities as an M243. In addition the M253 includes Power Quality Compliance monitoring to EN50160 with an overall memory capacity of 8 MB, allowing 3 years of power quality data to be stored.

### Comprehensive Measurements

The M2x3 range includes a suite of over 140 measurements, instantaneous and calculated, which are summarised in Table 1. The measurements can be displayed on the LCD and can be downloaded via the communications, if fitted.

The M2x3 range can operate as an energy counter, with a tariff structure and a real time clock allowing the calculation of energy costs. This allows up to 4 seasons and 4 day groups within each season, with energy costs defined for each (16 different cost periods), as well as 20 additional holidays. The M2x3 has 4 energy counters that can be selected from all four quadrants.

The M233 and M243 measure and display the voltage and current harmonics up to the 31st, with the M253 measuring up to the 63rd. In addition the M253 measures and calculates the Power Quality values required by EN 50160. All of the Power Quality values can be accessed via the communications.

The M2x3 has a wide measuring frequency range from 16 Hz to 400 Hz, which allows use in many applications: 16 2/3Hz (Railway), 50/60 Hz (Electrical networks) or 400 Hz (Marine/Airport).

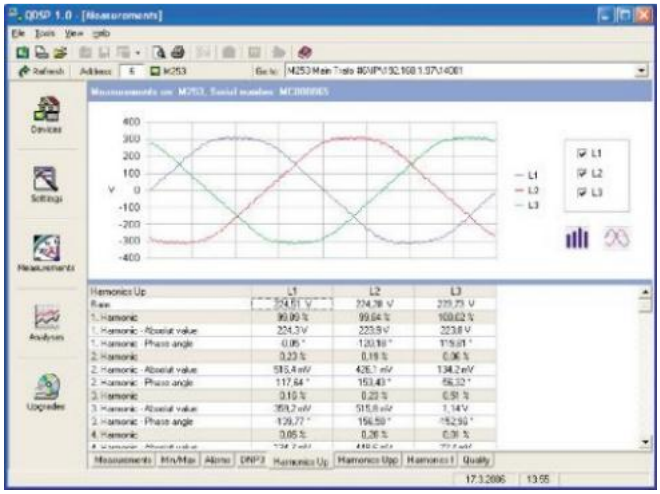

*Fig 2 Harmonic measurement*

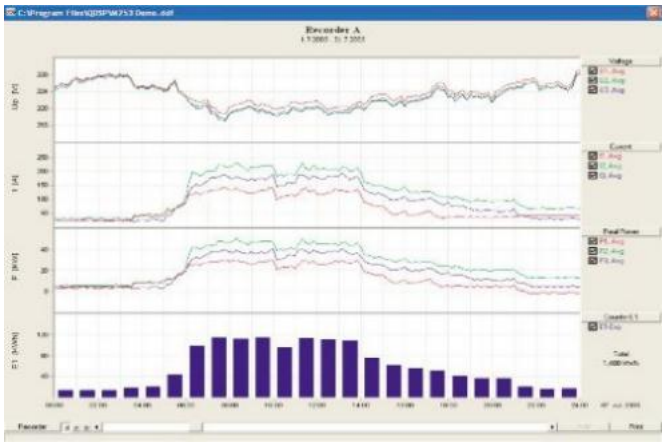

*Fig 3 Trend data recorder*

| Table 1: Measurement | M233 | M243 | M253 |
|---|---|---|---|
| V, I, P, Q, S, PF, PA, F, co | • | • | • |
| Energy (Class 0.5S) | • | • | • |
| Maximum demand | • | • | • |
| Minimum values: V, I, P, Q, S, PF, PA, F, cos | • | • | • |
| Maximum values: V, I, P, Q, S, PF, PA, F, cos | • | • | • |
| THD (actual, min, max) | • | • | • |
| Harmonics | up to 31st | up to 31st | up to 63rd |
| Power Quality | | | • |

## User friendly design

The M2x3 has a large display that can be customised by the user to show the information that they want displayed. The screens can be configured and set to refresh and scroll automatically. Demonstration screens show the M2x3 features and assist with commissioning. Connection is simplified by the use of auto-ranging on voltage and current input circuits, wrong connection warnings and a setup wizard. The CT and VT secondary values do not need to be specified at the time of order as these are configured within the M2x3. The autoranging uses 5 A and 500 V as the maximum nominal secondary values.

The use of universal power supplies (20/300 Vdc and 48/276 Vac, 40 to 70 Hz) means that the M2x3 can be used with any AC or DC auxiliary voltage supplies that are available in the substation.

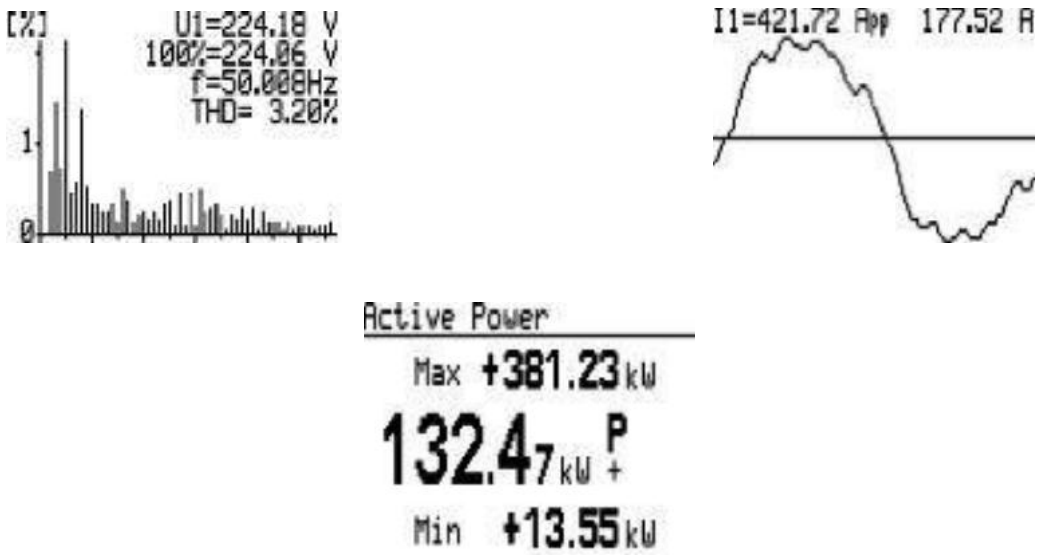


*Fig 4 Examples of M2x3 display*

## Communications

### Multimedia Card (MMC)

The M2x3 range has the facility to transfer data and load settings off line by using a multimedia card (MMC). There is a card slot on the front of the M2x3 where the MMC is fitted.

### Communications

The M233, M243 and M253 are communicating measurement centres and are always supplied fitted with at least one communications port. As standard, an RS232/RS485 port via a DSUB connector is supplied, but this can be replaced by an ethernet (RJ11) and/or USB (Type B) port.

The second RS485 or RS232 port option (COM2) allows two independent serial communications connections to be used simultaneously. The COM2 port uses the location and screw terminals of the 2nd hardware port.

The communications port is used for programming with the QDSP software in addition to any connection required for the application. All measurements and calculated values are available for download.

All communications ports use MODBUS RTU/TCP and DNP3 protocols to transmit measurement values to a control system. The measurement centre automatically detects which protocol is being used.

### Hardware Modules

The M2x3 has two hardware module slots which can be used for a range of different I/O modules, depending on the product version as shown in table 2.

Pulsed energy contacts and tariff inputs are available for use with energy management systems and analog outputs (current) for use in any application. The alarm contacts and digital inputs allow the possibility of building simple control systems.

| Table 2: Hardware | M233 | M243 | M253 |
|---|---|---|---|
| Auto-range V & I inputs | • | • | • |
| MMC memory card slot | • | • | • |
| Universal Power Supply | • | • | • |
| Recorder memory | | 4 MB | 8 MB |
| **Communications Options** | | | |
| RS232/RS485 | • | • | • |
| USB | • | • | • |
| Ethernet & USB | • | • | • |
| 2nd RS232 or RS485 port | • | • | • |
| Modbus RTU/TCP and DNP3 | • | • | • |
| **Hardware Module Options (2 Modules per M2x3)** | | | |
| 2 energy contacts | • | • | • |
| 2 tariff inputs | • | • | • |
| 2 alarm contacts | • | • | • |
| 1 bi-stable alarm contact | • | • | • |
| 2 analog outputs | • | • | • |
| 2 digital inputs | • | • | • |

**iSTAT M2x3 Family**

- Advanced communications features
- Serial or Ethernet
- MODBUS or DNP3

## Energy management and power quality applications

The M2x3 includes comprehensive cost measurements. It has a tariff structure and a real time clock that enables it to calculate energy costs. This allows up to 4 seasons and 4 days within each season to be configured, as well as 20 additional holidays (see figures 5, 6 and table 3). The M2x3 has 4 energy counters that can be selected from all four quadrants.

## Communicating network recorder

The measurements from an electrical system provide data for system analysis, load planning and maximum demand analysis. The M243 provides two data recorders logging up to 16 measurements per recorder (maximum 32) using 4MB of internal memory (see figure 3). In addition, a third recorder can be used to record the status of the 32 programmable alarms. The recorder is managed using the QDSP Professional software.

## Power Quality Monitoring

The M253 is designed to comply with the EN50160 standard for quality of supply monitoring. It has 8MB memory that will record up to 3 years of power quality data in addition to the data logging applications. The M253 monitors for frequency deviations, voltage deviations, voltage dips, voltage interruptions, voltage unbalance, overvoltage, fast voltage changes, flicker intensity, THD and harmonics. The data recorder and EN 50160 power quality reports are managed using QDSP Professional software.

## Ordering Guide – M233, M243, M253

From the table on next page

- Form a 15 character Cortec Order Number by selecting the 4 character model (Mxxx).
- Then choose a character(?) for the options.

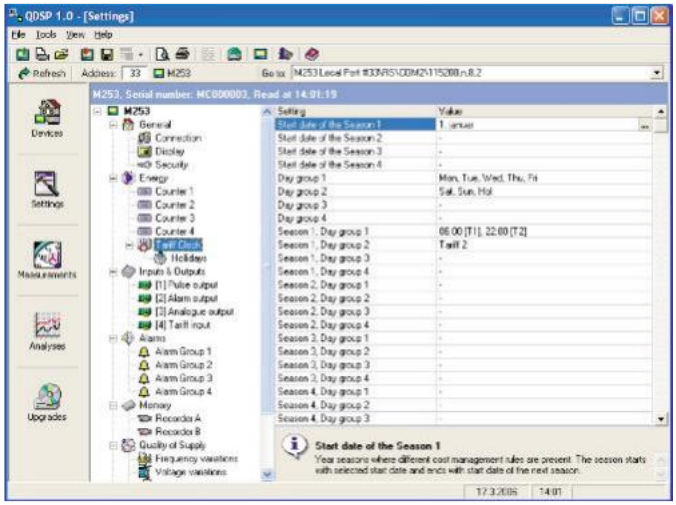


*Fig 5 Tariff structure*

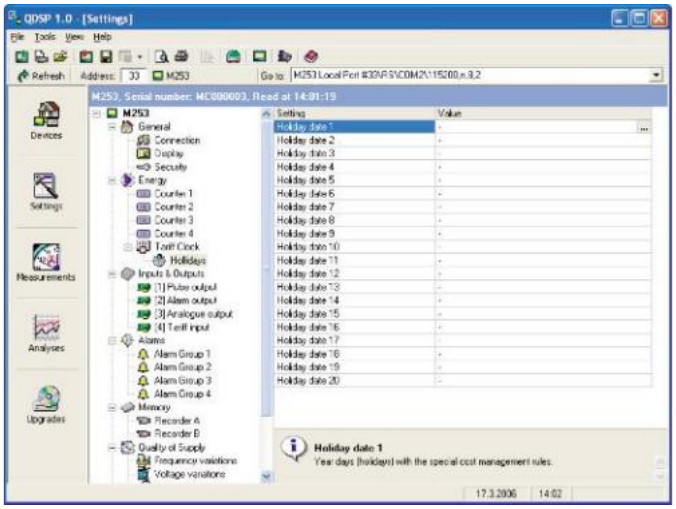


*Fig 6 Holiday allocation*

Table 3: Energy Management and Power Quality Appilcations

| | M233 | M243 | M253 |
|---|---|---|---|
| Tariff clock | • | • | • |
| Cost management | • | • | • |
| Programmable alarms | • | • | • |
| Alarm recorder | | • | • |
| Measurement recorder | | • | • |
| Power Quality EN 50160 | | | • |
| QDSP software | • | • | • |
| 4 energy counters | • | • | • |
| Real time clock | • | • | • |

**iSTAT M2x3 Family**
Comprehesive Solutions

- Cost management
- Trend data
- Power quality compliance

| Model type M2?3 | | X | 2 | ? | U | Y | ? | C | ? | ? | 0 | A |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Communicating Measurement Centre | M233 | | | | | | | | | | | |
| Network Recorder | M243 | | | | | | | | | | | |
| Network Analyser | M253 | | | | | | | | | | | |
| **Electrical Network** | | | | | | | | | | | | |
| Menu configurable | | X | | | | | | | | | | |
| **Accuracy** | | | | | | | | | | | | |
| 0.2% measured values (energy class 0.5S) | | | 2 | | | | | | | | | |
| **Display** | | | | | | | | | | | | |
| Green/Yellow | | | | G | | | | | | | | |
| Red/Black | | | | X | | | | | | | | |
| **Auxiliary Voltage** | | | | | | | | | | | | |
| Universal Power Supply (40-276Vac and 24-300Vdc) | | | | | U | | | | | | | |
| **Multi-Media Card Slot** | | | | | | | | | | | | |
| Fitted | | | | | | Y | | | | | | |
| **Communications** | | | | | | | | | | | | |
| Serial RS232/RS485 | | | | | | | S | | | | | |
| USB | | | | | | | U | | | | | |
| Ethernet & USB | | | | | | | E | | | | | |
| **Protocol** | | | | | | | | | | | | |
| MODBUS and DNP3 (auto-detect) | | | | | | | | C | | | | |
| **Rear port configuration** | | | | | | | | | | | | |
| **Module 1** | | | | | | | | | | | | |
| Not fitted | | | | | | | | | N | | | |
| 2 x Alarm contact | | | | | | | | | A | | | |
| 2 x Analogue Output | | | | | | | | | L | | | |
| 2 x Pulse energy contacts | | | | | | | | | P | | | |
| 2 x Tariff inputs 230 VAC | | | | | | | | | T | | | |
| 2 x Tariff inputs 110 VAC | | | | | | | | | U | | | |
| 2 x Digital Inputs 230 VAC/DC | | | | | | | | | F | | | |
| 2 x Digital Inputs 110 VAC/DC | | | | | | | | | G | | | |
| 1 x Bistable Alarm contact | | | | | | | | | B | | | |
| **Module 2** | | | | | | | | | | | | |
| Not fitted | | | | | | | | | | N | | |
| 2 x Alarm contact | | | | | | | | | | A | | |
| 2 x Analogue Output | | | | | | | | | | L | | |
| 2 x Pulse energy contacts | | | | | | | | | | P | | |
| 2 x Digital Inputs 230 VAC/DC | | | | | | | | | | F | | |
| 2 x Digital Inputs 110 VAC/DC | | | | | | | | | | G | | |
| 1 x Bistable Alarm contact | | | | | | | | | | B | | |
| 2nd rear port (COM2), RS 232 | | | | | | | | | | 2 | | |
| 2nd rear port (COM2), RS 485 | | | | | | | | | | 4 | | |
| **Factory defaults** | | | | | | | | | | | 0 | A |

## Download QDSP Standard

QDSP STANDARD is available free of charge from
www.GridSolutions.com/grid/qdsp

This software is used to set and configure the M2x3 family of measurement centres.

QDSP PROFESSIONAL is required for Recorder and Power Quality functions on the M243 and M253 and should be ordered if required.

Once installed, both of these software applications can be automatically upgraded via an internet link.


For more information please contact
GE
Grid Solutions

**Worldwide Contact Center**

Web: www.GEGridSolutions.com/contact
Phone: +44 (0) 1785 250 070


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Imagination at work