

# iSTAT M2x3



## High Performance Measurement Centre

The iSTAT M2x3 is a high accuracy multifunction configurable measurement centre designed to meet the requirements of both utility and industrial applications.

The M2x3 models are:

- M233 Communicating Measurement Centre
- M253 Communicating Network Analyser

## High Accuracy Measurements

The iSTAT M2x3 family provides high sampling rates and true RMS measurements to give accurate readings under various harmonic conditions. The measurement accuracy of 0.2% and Class 0.5S Energy are suitable for many measurement applications. With the easy to install standardized DIN panel mounting and I/O and communications options, most requirements can be met using the M2x3 range including power quality analysis.

## Key Features

The iSTAT M2x3 range provides:

- An economical choice for measurements, with a range of options to ensure measurement optimal to the application
- Easy software based setup using QDSP software to decrease commission and ongoing maintenance effort
- Programmable input scaling which can support applications for single and 3-phase installations as well as multiple I/O options programmable to produce required functions
- Multiple communications options (Serial RS232/RS485; Ethernet and USB) and protocol support (Modbus RTU/TCP; DNP3) for easy communications and SCADA integration

## Key Benefits

- High accuracy 0.2% (Class 0.5S) energy measurements
- Easy to use, QDSP software based configuration to decrease commission and ongoing maintenance effort
- Multiple communications options (Serial RS232/RS485; Ethernet and USB) and protocol support (Modbus RTU/TCP; DNP3) for easy communications and SCADA integration



GE VERNOVA

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.

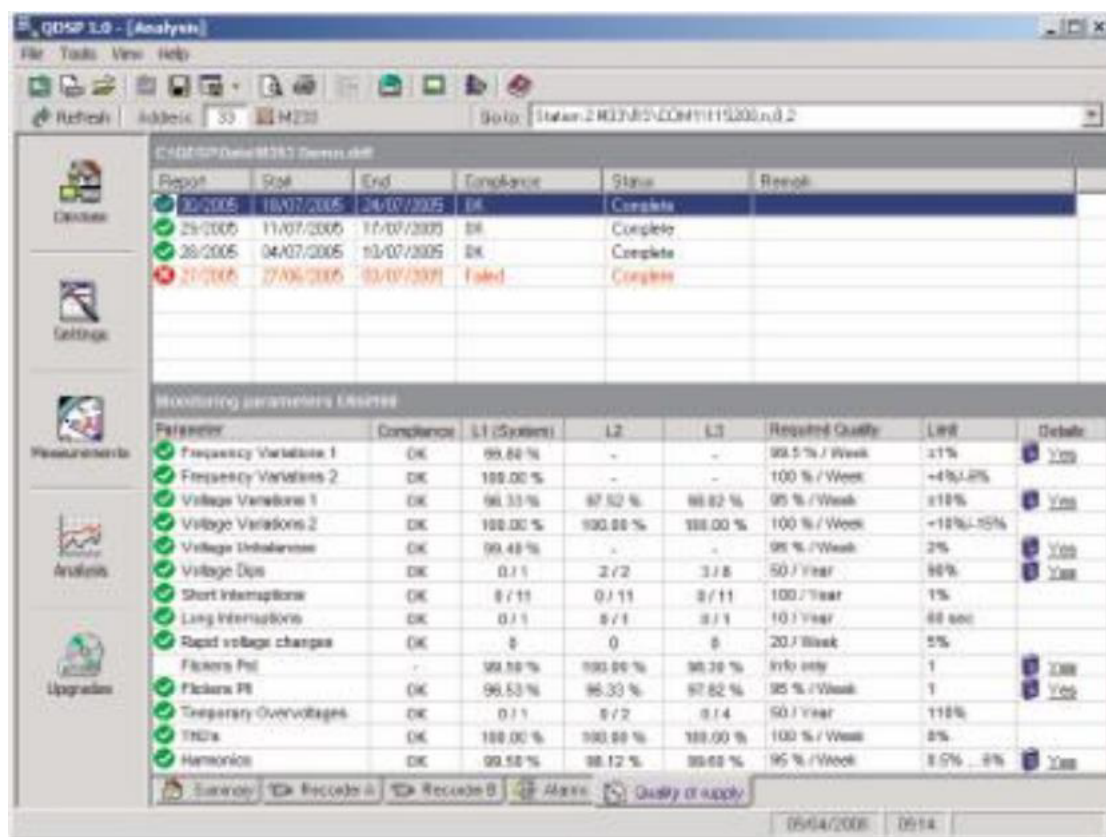


Fig 1 Power Quality compliance

## M2x3 Family

### M233 - Communicating measurement centre

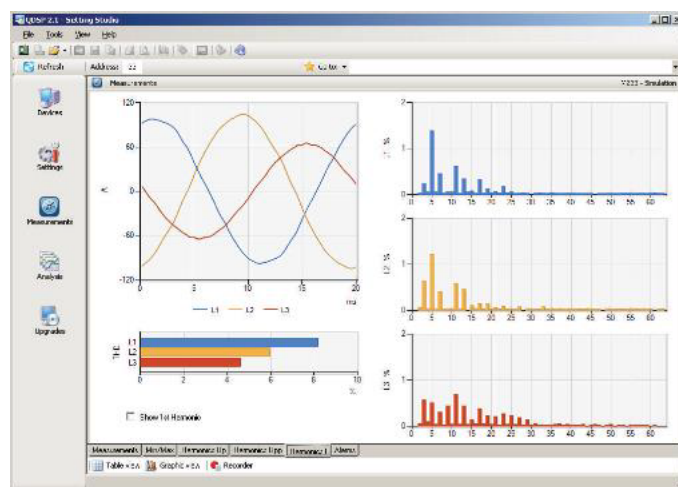
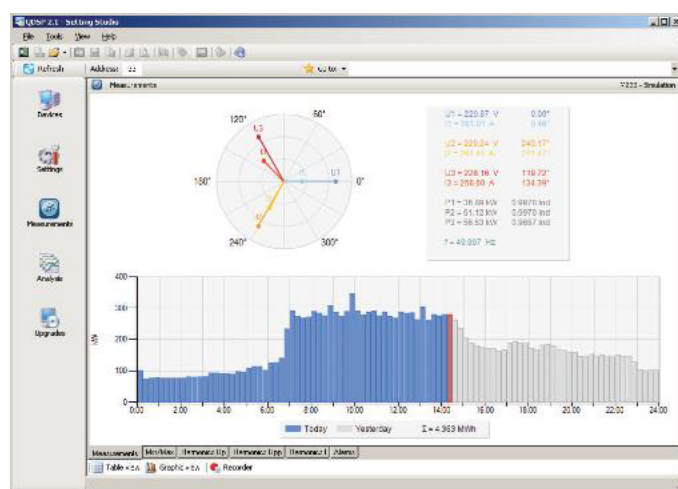
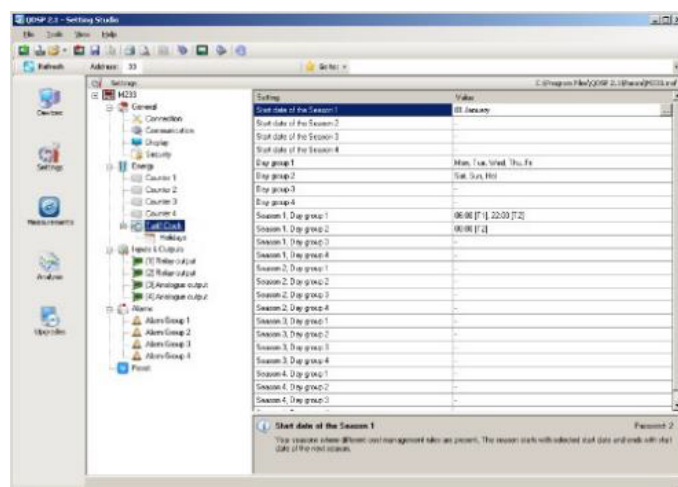
The M233 is a Class 0.2 measurement centre which measures multiple parameters of an electrical system. The measured and calculated values can be viewed on the display, output as an analogue signal, used to generate a relay alarm output or made available to a SCADA system. The M233 can also input analogue process signals from ancillary plant which can be converted to real values and made available in the same way.

The M233 also provides class 0.5S accurate energy measurement and has 4 energy counters that can be selected from all four quadrants. The provision of pulse energy outputs and tariff inputs means the M233 can be used in most secondary metering applications. The M233 also includes comprehensive energy cost measurement functionality, using the tariff structure and the real time clock it is able to calculate energy costs. The tariff structure allows the definition of up to 4 tariffs, 4 seasons and 4 day groups within each season as well as 20 additional holidays. For each tariff an energy cost can be defined.

The M233 has multiple communication port options, RS232/RS485, Ethernet or USB using MODBUS RTU or TCP, with the possibility of having a secondary RS232 or RS485 port.

The M233 is not only a comprehensive measurement device it also has hardware interfaces that can be used to monitor and control ancillary equipment. The hardware options include tariff and digital inputs, alarm and pulse outputs, analogue inputs and outputs, and watchdog outputs.

The M233 is programmed using the QDSP software which can also be used to remotely read and display most of the measurements available from the unit.

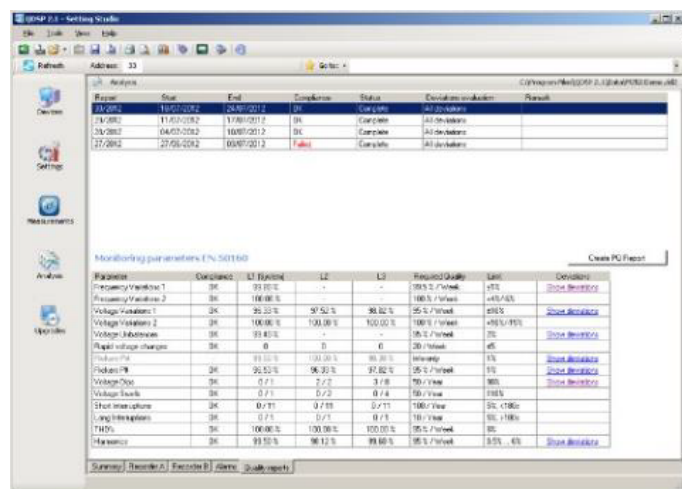




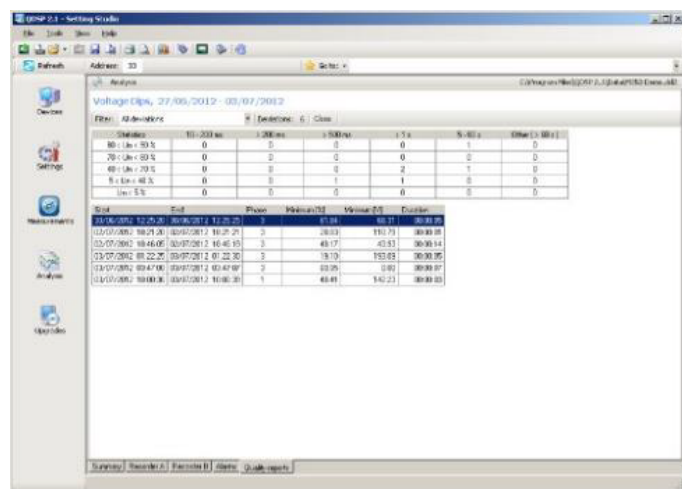
## M253 - Power quality monitoring

The M253 is a class 0.2 communicating network analyser with the same features and recorder capabilities as the M243. In addition the M253 includes Power Quality measurements and compliance monitoring to EN50160.

The M253 measures or monitors for frequency deviations, voltage deviations, voltage dips, voltage interruptions, voltage unbalance, overvoltage, fast voltage changes, flicker intensity, THD and harmonics. The M253 as standard compares the power quality values against the European compliance specification EN50160 and stores the compliance and deviation data required. The default compliance values used are for EN50160 but the values can be adjusted to suit the requirements of the utility.



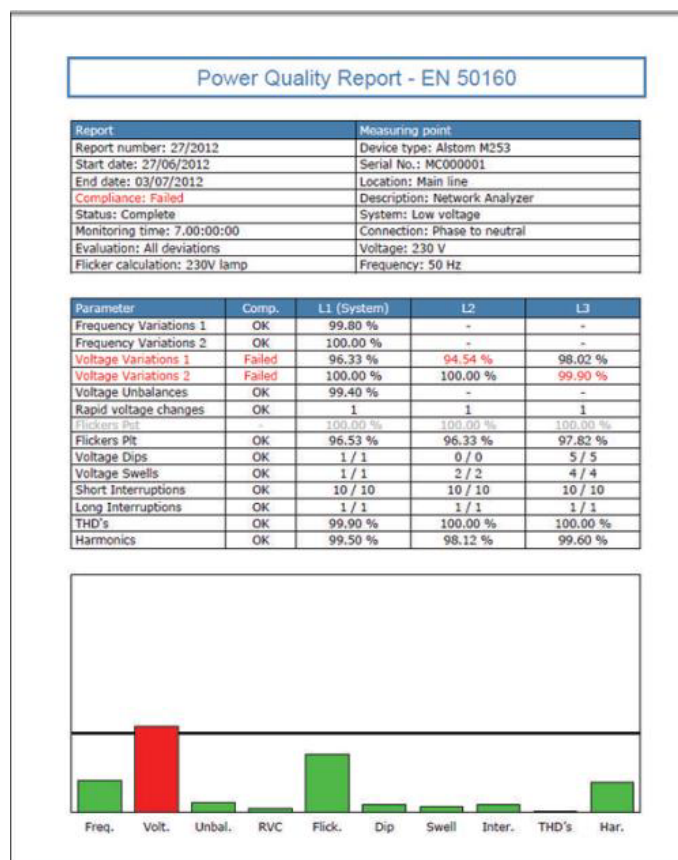
Parameter	Compliance	L1 System	L2	L3	Frequency Quality	Limit	Deviation
Frequency Variations 1	OK	99.80 %	-	-	100 % / 100 %	400 / 400	Good Deviation
Frequency Variations 2	OK	100.00 %	-	-	100 % / 100 %	400 / 400	Good Deviation
Voltage Variations 1	OK	99.80 %	99.80 %	99.80 %	25 % / 100 %	400 / 400	Good Deviation
Voltage Variations 2	OK	100.00 %	100.00 %	100.00 %	100 % / 100 %	400 / 400	Good Deviation
Voltage Unbalance	OK	99.80 %	-	-	100 % / 100 %	400 / 400	Good Deviation
Rapid voltage changes	OK	0	0	0	20 / 100 %	400 / 400	Good Deviation
Flickers Pst	OK	99.80 %	99.80 %	99.80 %	100 % / 100 %	400 / 400	Good Deviation
Flickers Plt	OK	99.80 %	99.80 %	99.80 %	100 % / 100 %	400 / 400	Good Deviation
Voltage Dips	OK	0 / 1	0 / 1	0 / 1	100 % / 100 %	400 / 400	Good Deviation
Short Interruptions	OK	0 / 1	0 / 1	0 / 1	100 % / 100 %	400 / 400	Good Deviation
Long Interruptions	OK	0 / 1	0 / 1	0 / 1	100 % / 100 %	400 / 400	Good Deviation
THD's	OK	100.00 %	100.00 %	100.00 %	100 % / 100 %	400 / 400	Good Deviation
Harmonics	OK	99.80 %	99.80 %	99.80 %	100 % / 100 %	400 / 400	Good Deviation



Start	End	Phase	Minimum V	Voltage %	Duration
13/07/2012 10:25:00	13/07/2012 10:25:01	1	20.0	20.0	0.000
13/07/2012 10:25:01	13/07/2012 10:25:02	2	20.0	20.0	0.000
13/07/2012 10:25:02	13/07/2012 10:25:03	3	20.0	20.0	0.000
13/07/2012 10:25:03	13/07/2012 10:25:04	4	20.0	20.0	0.000
13/07/2012 10:25:04	13/07/2012 10:25:05	5	20.0	20.0	0.000
13/07/2012 10:25:05	13/07/2012 10:25:06	6	20.0	20.0	0.000

The M253 assigns 2MB of the memory to recording power quality data for a period of up to 3 years. The measurement data recorder memory is therefore 6 MB.

The power quality compliance settings are configured using the QDSP software which also downloads and displays the compliance details for each reporting period along with the details of all deviations. The power quality status summary can be printed out. The QDSP software can also produce an EN50160 report for each reporting period.



## Comprehensive Measurements

The M2x3 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.

The M2x3 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.

2x3 measure and display the voltage and current harmonics 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 2/3 Hz (Railway), 50/60 Hz (electrical networks) or 400 Hz (marine/airport).

TABLE 1: MEASUREMENTS	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 Features

The M2x3 has a large, easy to read display that can be customised by the user to show desired information. The screens can also be configured and set to refresh and scroll automatically. Demonstration screens show the M2x3 features and assist with commissioning.

Electrical connections are simplified through autoranging on voltage and current input circuits; connection warnings as well as 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 5A 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) allows the M2x3 to be installed on using many existing AC or DC auxiliary voltage supplies that are available in the substation.

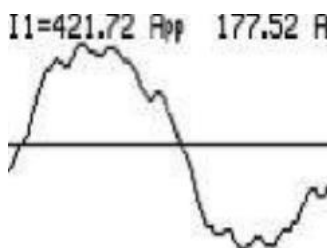
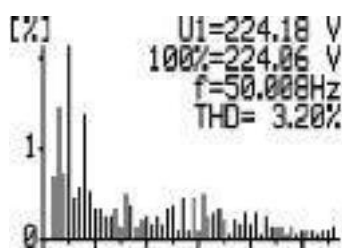


Fig 4 Examples of M2x3 display

## Communications Memory Cards

The M2x3 has the facility to transfer data and load settings off line by using a memory card. There is a card slot on the front of the M2x3 where an SD or MMC card can be inserted.

## Communications

The M2x3 are communicating measurement centres and are always supplied fitted with at least one communications port. As standard, an RS232/RS485 port is supplied, but this can be replaced by an Ethernet (RJ11) and/or USB (Type B) port.

The RS232/RS485 port can be supplied with a DSUB connector or terminals. The second RS485 or RS232 port option (COM2) allows two independent communications connections to be used simultaneously. The COM2 port uses the location and screw terminals of the 2nd hardware port. The communication ports are 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 or TCP 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 analogue outputs (current) for use in any application. The alarm contacts and digital inputs allow the possibility of building simple control systems. The analogue inputs are available in 3 versions, +/- 20 mA, +/- 10 V and Pt 100 / Pt 1000 / Resistance.

## Product Dimensions

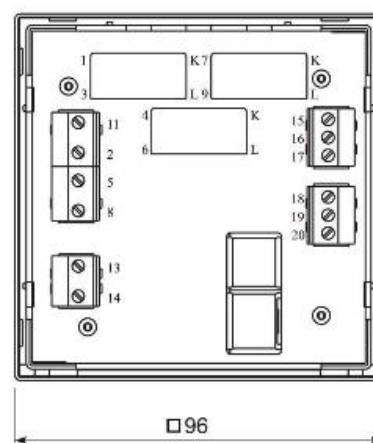
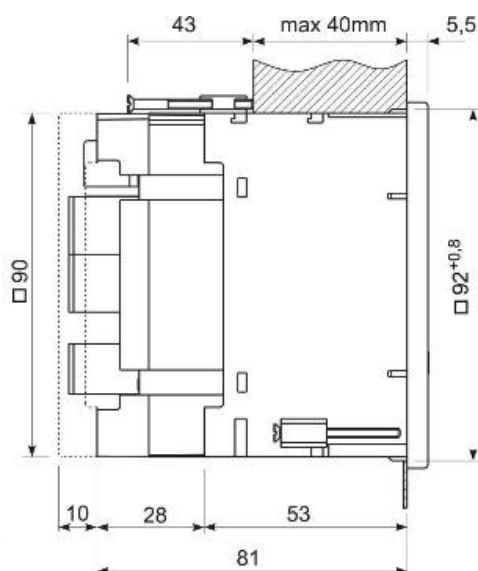


TABLE 2: HARDWARE	M233	M253
Auto-range V & I inputs	•	•
MMC memory card slot	•	•
Universal Power Supply	•	•
Recorder memory		8 MB

COMMUNICATIONS OPTIONS	M233	M253
RS232/RS485	•	•
USB	•	•
Ethernet & USB	•	•
2nd RS232 or RS485 port	•	•
Modbus RTU/TCP and DNP3	•	•

HARDWARE MODULES OPTIONS (2 MODULES PER M2x3)	M233	M253
2 energy pulse outputs	•	•
2 tariff inputs	•	•
2 alarm outputs	•	•
2 analogue outputs	•	•
2 digital inputs	•	•
2 analogue inputs	•	•
2 pulse inputs	•	•
1 watchdog + 1 alarm output	•	•

MODEL TYPE M2x3		X	2	?	U	Y	?	C	?	?	0	A
Communicating Measurement Centre	M233											
Network Recorder	M243											
Network Analyser	M253											
<b>Electrical Network</b>												
Menu configurable		x										
<b>Class / Accuracy</b>												
Class 0.2 Measured, Class 0.5S Active Energy			2									
<b>Display</b>												
LED display, Green/Yellow				G								
<b>Auxiliary Supply</b>												
Universal Power Supply (40-276Vac and 24-300Vdc)					U							
<b>Memory Card</b>												
Memory Card Slot - Fitted						Y						
<b>Communications</b>												
Ethernet (RJ45) + USB (Type B)							E					
Serial RS232/RS485 DB9							S					
Serial RS232/RS485 (wired terminals)							T					
USB (Type B0)							U					
<b>Protocol</b>												
Modbus RTU/TCP								C				
<b>Input/Output Module 1</b>												
Not Fitted									N			
2 x Alarm contact (48 Vac/dc @ 1A Max)									A			
1 x Bistable Alarm contact (48 Vac/dc @ 1A Max)									B			
2 x Analogue Outputs									L			
2 x Pulse Outputs (40 Vac/dc @ 30 mA Max)									P			
1 x Watchdog+ Alarm (48 Vac/dc @ 1A Max)									W			
2 x Analogue Input - resistance (Pt100 - Pt1000)									R			
2 x Analogue Input-voltage (-10 ... 0 ... 10 V)									V			
2 x Analogue Input - current (-20 ... 0 ... 20 mA)									C			
2 x Tariff Inputs 230 Vac ±20%									T			
2 x Tariff Inputs 110 Vac ±20%									U			
2 x Digital Input 230 Vac/dc ±20%									F			
2 x Digital Input 110 Vac/dc ±20%									G			
2 x Pulse Inputs (5 ... 48 Vdc)									K			
<b>Module 2</b>												
Not Fitted									N			
2 x Alarm contact (48 Vac/dc @ 1A Max)									A			
1 x Bistable Alarm contact (48 Vac/dc @ 1A Max)									B			
2 x Analogue Outputs									L			
2 x Pulse Outputs (40 Vac/dc @ 30 mA Max)									P			
1 x Watchdog+ Alarm (48 Vac/dc @ 1A Max)									W			
2 x Analogue Input - resistance (Pt100 - Pt1000)									R			
2 x Analogue Input - voltage (-10 ... 0 ... 10 V)									V			
2 x Analogue Input - current (-20 ... 0 ... 20 mA)									C			
2 x Digital Input 230 Vac/dc ±20%									F			
2 x Digital Input 110 Vac/dc ±20%									G			
2 x Pulse Inputs (5 ... 48 Vdc)									K			
2nd rear port (COM2), - RS232									2			
2nd rear port (COM2), - RS45									4			
<b>Design Suffix</b>											0	A

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