

# Maximum Demand Control

Maximum Controller



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## EM-MC 2200 Maximum Controller

The contemporary styling of the EM-MC 2200 Maximum Controller accentuates its user-friendly energy management technology. It reduces power demand peaks with new additional functions. The self-adapting target demand function provides dynamic adjustment to the site's monthly operating characteristics. Reducing target demand at the beginning of the accounting period, together with automatic self-adaptation, enables additional savings to be made in months with lower demand peaks.

Designed to work as a stand-alone unit, the EM-MC 2200 is the ideal solution for small to medium-sized industrial and commercial operations, office buildings and hotels. With the FRAKO Starkstrom-bus or an ethernet interface it can be integrated into a FRAKO Energy Management System.

Switching off loads by intelligent terminals (Modbus over IP) or timers is only one of the helpful new features of the EM-MC 2200.

This is an investment with a short payback time even in the deregulated energy market, since exceeding the specified power peak limit still results in extra costs that can be avoided.

### Description

Special contract customers whose demand exceeds the agreed maximum (subscribed demand) will face increased costs through entering a higher demand category.

### Do you know how many measurement intervals there are in a year?

There are some 35 000 measurement intervals in a year, or about 2 900 in a month. As a rule, the calculation determining the price paid for power in a given month is based on the measurement interval with the greatest demand in that month.

The Maximum Controller EM-MC 2200 can help you to stay within

the set limits, since this unit cuts demand peaks by shedding those loads assigned a low priority or not considered absolutely essential. Loads are switched off for a short time whenever the subscribed demand appears likely to be exceeded. An individual order of priorities for switching loads off ensures that normal operation can continue without disruption despite this load shedding. The result: Instead of having to pay a higher maximum demand charge, the subscribed demand can even be reduced – and thus save costs!

The modular construction of the EM-MC 2200 makes it both simple and inexpensive to install. It is upgradable at any time by software updates and connecting local EMD 1101 add-on units.

Operation is of proven simplicity with a clear, menu-driven operator dialogue in plain language at the EM-FD 2500 display or by accessing the instrument from a PC.

The scope of supply includes the Device Manager software. This is used to enter and modify parameters and to display—or when needed print out—daily demand curves, load operating times and all basic and load-specific settings.

- Control of demand to limit the average power consumption in a

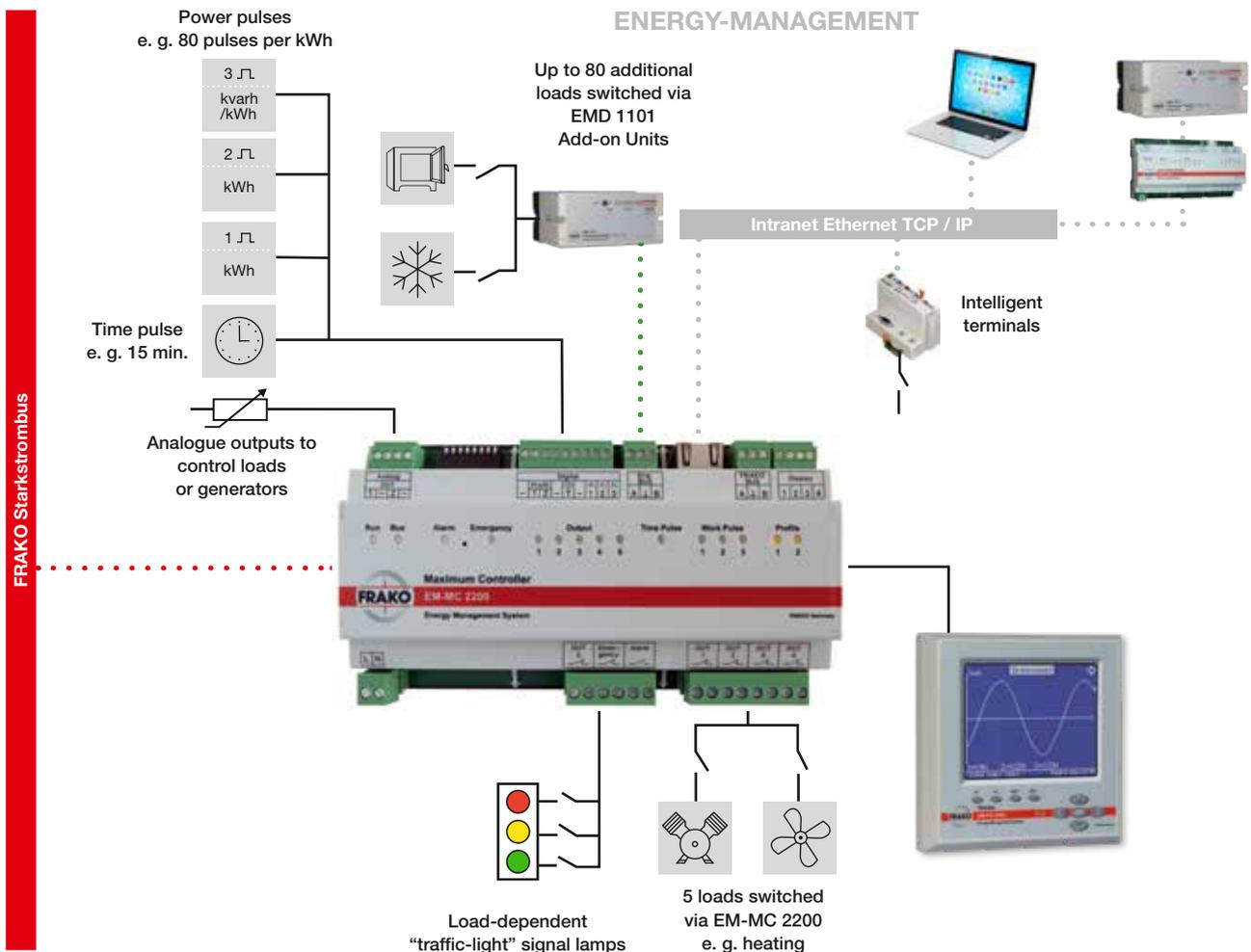
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given interval to the set target demand. This is achieved by temporarily switching off individual loads

- Monitoring of demand peaks: if demand is too high, loads are immediately switched off to prevent the circuit breaker tripping
- Power-dependent control application point to prevent unnecessary load shedding at the start of the measurement
- Individual adjustment of the connected loads to suit operating conditions by setting priorities, min./max. OFF times and min. ON times per channel
- 4 profiles can be activated. Target demand and peak power, together with the load parameters priority, power, min./max. OFF times, min. ON times and priority type (time or power priority), can be set for each profile
- To make best use of seasonal demand fluctuations, the self-adapting target demand adjusts itself dynamically to suit the operating conditions of the month concerned. Reducing the target demand at the beginning of the accounting period combined with automatic self-adaptation makes additional savings possible in months with low peak loads
- Formation of switching channel groups for strict compliance with the set priorities
- 'Traffic light' function: 3 switching channels can be used for signal lamps as a visual guide to demand conditions
- Emergency load-shedding mode for keeping within maximum demand even with critical load constellations

- Connection of any desired Modbus TCP device with digital outputs to switch off loads (e.g. WAGO fieldbus controller with I/O terminals, SIEMENS PAC4200 with DI/DO module, plus many more). It is a prerequisite that the function codes 5 or 6 are supported.
- Timer for switching loads to a time schedule or to set time-scheduled target demands or profiles
- Storage of the following data in a ring memory:
  - Average values per interval over 20 000 intervals including the target power applicable at the end of the interval and time stamp
  - Daily maximum values over 500 days including time stamp
  - Monthly maximum values over 48 months
  - 10 000 switching cycles
- Configuration and presentation of momentary and historical measurement readings using the Device Manager software (included in scope of supply)
- Display of measurement readings and the power factor triangle (trend curve) via an integrated web interface or an EM-FD 2500 display, an optional graphic display instrument connected to the EM-MC 2200 Maximum Controller by a 4-core cable. Up to 7 additional EM devices can be viewed on one EM-FD 2500 display.



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### • Inputs:

- 3 inputs for active energy pulses or 2 for active and 1 for reactive energy pulses. These can be added, subtracted or used as meters. The self-adapting target demand function can be reset via a volt-free contact
- 1 input for time pulse; interval duration adjustable from 1 to 1 440 minutes
- 2 inputs for activating the 4 profiles. These adjust the target demand and/or the settings of the connected loads to suit site-specific factors such as regular and off-peak tariffs. Profile switching can be by the internal timer or an input to the EMF 1102 Cost Centre and Alarm Unit

### • Outputs:

- 5 switching and 1 emergency load-shedding channel in the basic instrument (decentralized extendability: up to 85 switching channels possible by means of EMD 1101 add-on units, each with 8 relay contacts)
- 1 alarm contact to signal faults (alarm signal also possible at any desired output)
- 2 analogue outputs for 2 measurement readings (momentary, trend, target or corrective power, capacity utilization or remaining time) as 0/4–20 mA or 0–10 V signals, or for infinitely variable control of loads; fed by internal power supply

### • Interfaces:

- RS-485 bus, FRAKO Starkstrombus protocol to connect to the FRAKO Energy Management System
- RS-485 extension bus to connect EMD 1101 add-on units
- Ethernet (RJ 45 jack) with the following functions:
  - Communication with the EMD 1101 add-on unit or the EMF 1102 Cost Centre and Alarm Unit via the PQM 1588
  - Output of switching commands also via Modbus TCP
  - Communication with the PQM 1588 Central Unit
  - Communication with the configuration software at the PC

- The software (Device Manager) for configuring and displaying the saved measurement readings via Ethernet is included with the instrument

### Easy installation with the DIN rail-mounted enclosure

The EM-MC 2200 is housed in an enclosure with a pin strip

underneath it.

This system, consisting of pin and socket strips and DIN rail bus connectors, enables the individual modules to be easily fitted and connected to one another.

All connections are also available at external terminals for conventional wiring. Use of the 16-pin DIN rail bus connector provides automatic contact from instrument to instrument.

The bus connector enables the FRAKO Starkstrombus, extension bus and display bus to be connected. The pin and socket strips on

the DIN rail ensure quick and easy installation of the instruments in parallel.

It is possible to plug individual instruments in or remove them without dismantling the modular assembly.

### Data display on the EM-FD 2500

The EM-FD 2500 display has been developed as a physically sepa-



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rate LCD display and operator panel to work with all FRAKO Energy Management devices of the new generation that require this, such as the EM-PQ 2300 and EM-MC 2200 instruments. The display is connected to the EM instrument via 4 terminals: two wires for the instrument power supply and two for data transfer. A maximum of 8 instruments can be connected to a common display bus, with a bus length of up to 40 m to the display. The display is mounted on the control cabinet door or wall through a  $\varnothing 22.5$  mm hole, thus greatly simplifying installation. Its orientation is fixed by a screw through the wall into a threaded bush. Alternatively, the display can also be mounted in any available 144 x 144 mm cut-out. For this purpose suitable adapters are available.

### Data display via the integrated web interface



- Web server for the configuration and online display of all measurement readings
- Each user at any PC can view the most important measurement data via the intranet.

### Device Manager –

### Clear overview and straightforward programming

#### • Configuration

Configuration of the EM-MC 2200 is divided into two areas termed setting and configuration to distinguish them:

##### – Setting:

Setting covers all those adjustments that are necessary when commissioning the instrument itself or introducing add-on units.

##### – Configuration:

Configuration covers those adjustments that may have to be changed during ongoing operation.

The loads can be configured in a table giving a clear overview.

Settings for the individual profiles can be hidden, if desired, to simplify this overview. Channels can be copied and their settings adopted in total or per channel for all profiles.

#### • Trend display

Device Manager is a convenient tool for displaying real-time parameters such as momentary power, cumulative power, the remaining time in the current measurement interval and the power triangle. In addition, the statuses of the loads, the current profile (regular/off-peak tariff) and the limit settings are displayed. Any alarms or faults present are immediately apparent.

#### • Switched status log

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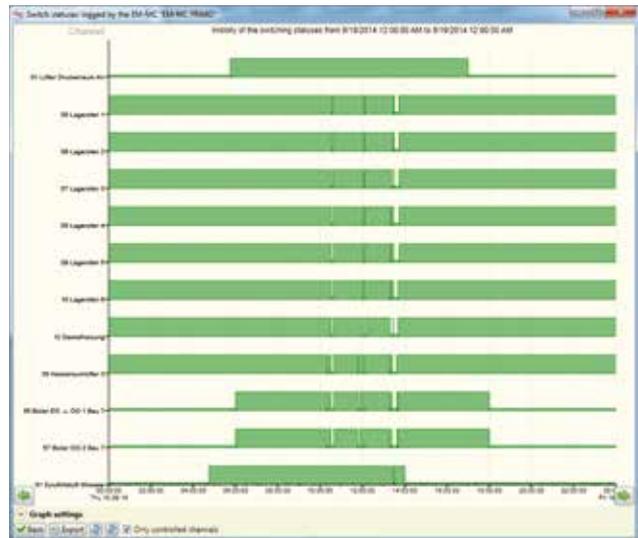
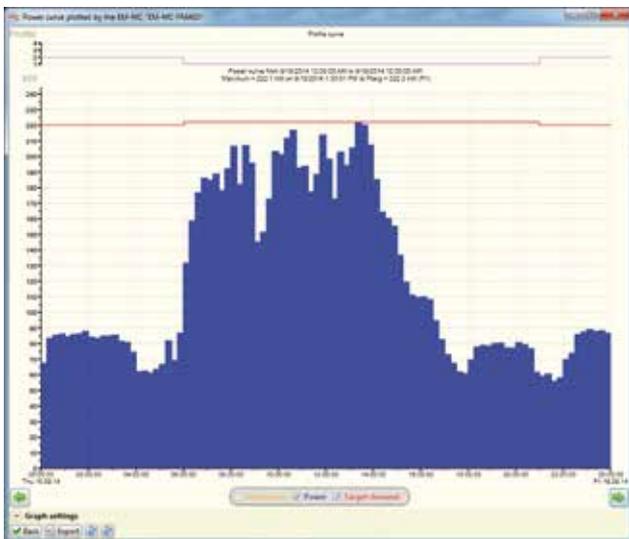
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The switched status log offers a graphical display of the last 10 000 changes in the switched status of up to 85 controlled switching channels.

- **Documentation**

The power demand in every measurement interval over the past 200 days is displayed as a chart and documented. Similarly, the demand peaks of the past 500 days and the past 48 months are saved, as are the switched statuses of up to 10 000 switching cycles. It is also no problem to export these recorded data to a spreadsheet program such as Excel.

- **Timer**



A weekly timer function is incorporated in the EM-MC 2200. This makes up to 400 switching times available, in order to change the status of switching channels to 'Permanently ON', 'Permanently OFF' or 'Controlled' at scheduled times. In the 'Controlled' condition, the EM-MC 2200 controls the actual condition of the load through the target demand control function and the peak demand monitoring function.

In addition, the profile and the target demand can be controlled by the timer.

### Technical Data

Power supply	
Supply voltage	100 V – 253 V AC or 100 V – 230 V DC
Frequency	45 up to 65 Hz
Power consumption	7 W / 18 VA
Overcurrent protection	Max. 2 A external fuse required
Inputs	
General	<ul style="list-style-type: none"> <li>• S0 interfaces (DIN 43864) to connect volt-free contacts</li> <li>• Voltage with contact open: 15 V</li> <li>• Max. line resistance: 800 Ohm</li> <li>• Short circuit current: 18 mA</li> <li>• Pulse frequency: 0.1 to 20 Hz</li> </ul>
3 Pulse inputs	To acquire the power data from 3 meters with pulse outputs. Input 3 can also be used for the acquisition of reactive power data.
1 Time pulse input	1...1 440 minutes
2 Profile switch inputs	To select from 4 profiles
Measurement data storage	

	256 MB onboard flash memory
Outputs	
5 Relay contacts (switching channels)	Bistable, 250 V / 2 A AC or 30 V / 2 A DC
1 Relay contact (emergency load shedding)	Bistable, 250 V / 2 A AC or 30 V / 2 A DC
1 Alarm contact	NC 250 V / 2 A AC or 30 V / 2 A DC
1 Extension bus interface	<ul style="list-style-type: none"> <li>• To connect up to 10 EMD 1101</li> <li>• Modbus TCP output instruments (fieldbus instruments, function code 5)</li> </ul>
2 Analogue outputs	0-10 V / 0-20 mA / 4-20 mA + Steuerung-Verbraucher
'Traffic light' signal lamps	Visual guide to demand conditions

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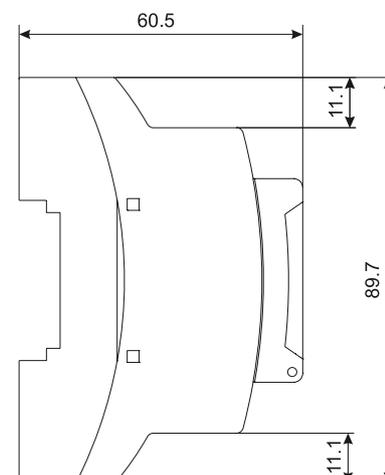
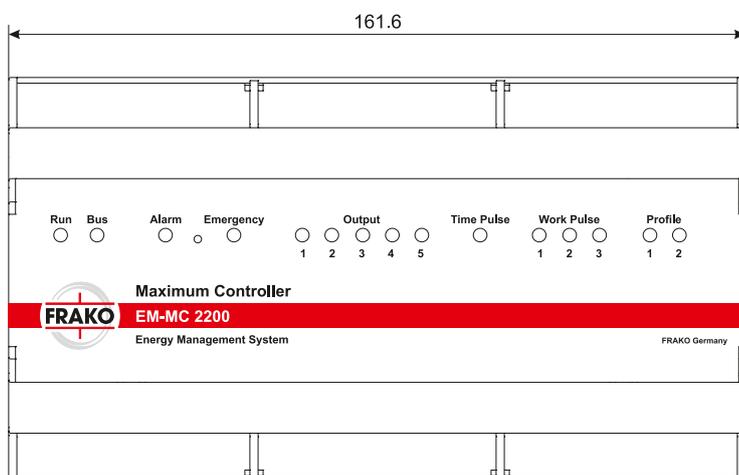
## Technical Data

Interfaces	
1 FRAKO Starkstrombus interface	To connect to the FRAKO Energy Management System
1 Display bus interface	Optional connection of to up to 2 external EM-FD 2500 display instruments
Web server / E-mail / SNMP	• / • / •
Display and operation, connections	
User interface Art.-No. 20-30240	Operation via external EM-FD 2500 display instrument
Alarm system	•
Timer function	•
Annunciators	15 LEDs
Connections	Pin and socket strips; max. core cross section: max. 1.5 mm <sup>2</sup>
Mechanical construction	
Dimensions	161.6 x 89.7 x 60.5 mm (W x H x D)
Ingress protection	IP30 (enclosure), IP10 (terminals)
Weight	Approx. 0.4 kg
Protection class	Class II according to EN 61010
Enclosure	Flame retardant UL 94-V0
Mounting	On standard 35 mm DIN rail according to EN 50022
Operating conditions	
Ambient temperature	0 °C up to +45 °C
Article No.	20-20071

## Technical Data

PC requirements to run Device Manager	
Hardware	<ul style="list-style-type: none"> <li>• PC: CPU mit with at least 2 GHz</li> <li>• 1 Gbyte RAM</li> <li>• 200 Mbyte free hard disc space</li> </ul>
Software	<ul style="list-style-type: none"> <li>• Microsoft® Windows® XP, SP 2 with installed .NET-Framework 3.5</li> <li>• Microsoft® Windows® 7 (32 or 64 Bit)</li> <li>• Microsoft® Windows® 2008 Server R2</li> </ul> <p>* Registered trademark of Microsoft Corporation</p>

## Dimensions



All dimensions in mm

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Switching Module



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## EMD 1101 Switching Module

Switching module with 8 switching channels for connection to the extension bus or the FRAKO Starkstrombus.

The extension module with 8 switching channels can be connected selectively to:

- Maximum Controller EM-MC 2200 or Maximum Demand Controller EML 1101
- System Timer EMT 1101 via FRAKO Starkstrombus

### Description

- Display of the switching status via LED
- LED display for bus access
- Definition of the switching status (on/off) of the individual switching channels in case of a failure.

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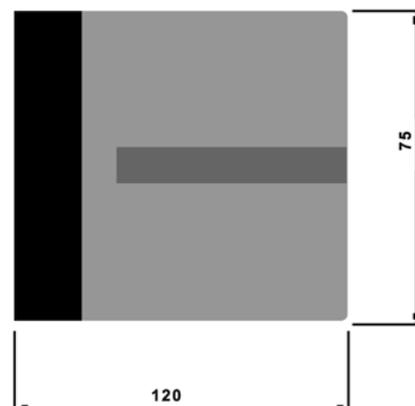
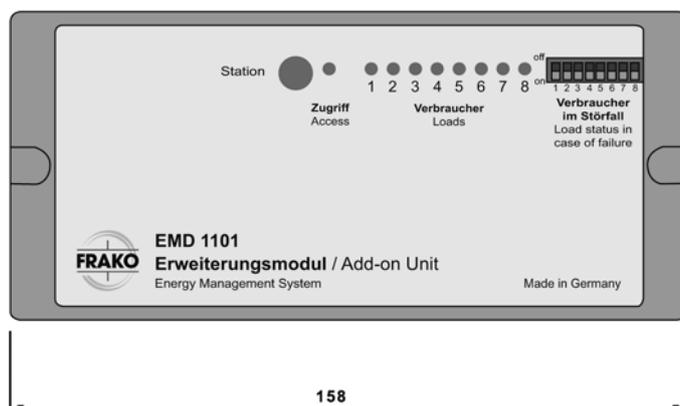
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## Technical Data

Power supply	
Mains voltage	230 V AC -15 % up to +10 %
Frequency	45 up to 65 Hz
Power consumption	4 VA
Fuse protection	Max. 2 A external prescribed
Outputs	
8 switching channels	Normal open contact 250 V AC / 4 A
1 extension bus / FRAKO Starkstrombus	2-wire-fieldbus, RS-485
Operating elements	8-fold DIP switching series, 10-level rotary switch
Display elements	9 LEDs
Connections	Via plug-in connector blocks within housing; conductor cross-section: max. 2.5 mm <sup>2</sup>
Mechanical construction	
Dimensions	158 x 75 x 120 mm (W x H x D)
Ingress protection	IP40
Version	Protection class 2 according to DIN EN 61010
Housing	Flammability to UL94-V0 (according to the manufacturer)
Installation	Screw mounting or on standard rail 35 mm according to DIN EN 50022
Weight	Approx. 0.8 kg
Operating conditions	
Ambient temperature	0 up to +45 °C
Storage temperature	-20 up to +60 °C
Article-No.	20-21002

## Dimensions



Dimensional drawing EMD 1101

All dimensions in mm