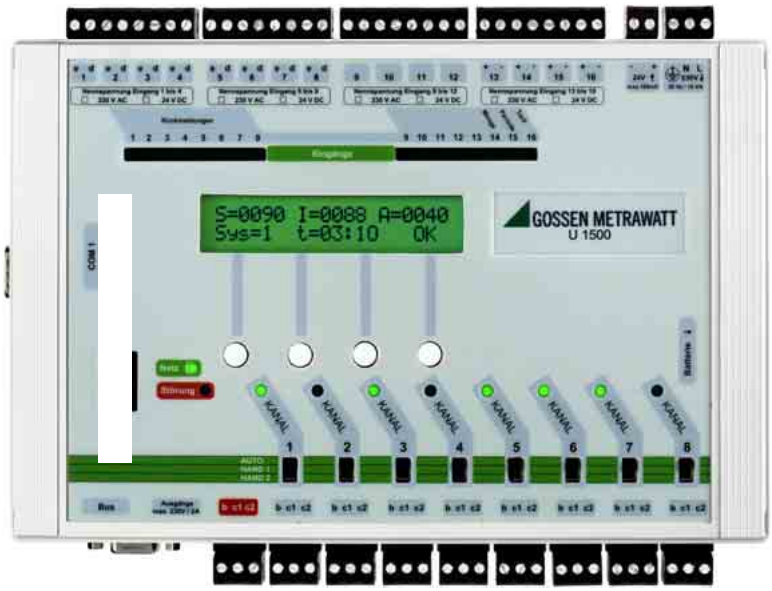
GOSSEN METRAWATT

# U1500
# Peak Load Optimizing System

3-349-249-03
2/11.03

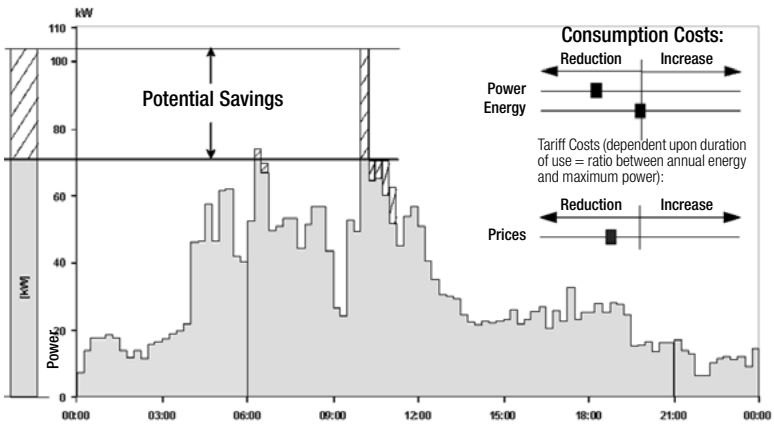
- Minimal interference in the production process thanks to combined trend-extrapolation process
- Can be expanded in steps for 8 to 64 optimizing channels
- Simultaneous optimization of various media, e.g. electrical power and gas
- Future oriented setpoint management with specification of the load profile for 7 days with 96 values each
- Inputs for operating feedback from power consumers
- Takes minimum and maximum making and breaking times of power consumers into consideration
- Special control programs for kitchen optimization




## Applications

As a rule, differentiation is made amongst energy costs (in € per kWh), current consumption, and power costs for the maximum power value (in € per kW) where electrical power prices for customers with special contracts are concerned. Opportunities for reducing short-term peak power, and thus power costs, are frequently taken advantage of to a limited extent only. As a rule, all electrical power consumers are installed with equal priority: They are switched on and off without any regard for the fact that other consumers may be in operation at the same time.

Power optimization assumes that starting up consumers which draw large amounts of power can frequently be postponed for a few minutes without significantly affecting operations. This applies in particular to power consumers which are capable of storing energy to a certain extent (e.g. heaters and refrigerators). These opportunities are taken advantage of by the optimizing system in order to minimize power consumption, and in turn power costs, through efficient use of all power consumers. Beyond this, integrated timer programs can also reduce energy costs and optimize operating sequences. Of course the system can also be used for cost oriented control of power consumers which require other forms of energy (e.g. gas).




# U1500
# Peak Load Optimizing System

## Optimizing Computer

With up to 8 optimizing channels

The U1500 optimizing computer controls electrical equipment in order to optimize the use of electrical energy. The reduction of mean power values invoiced by the power utility through the use of power optimization is one of the primary objectives of using the optimizing system. Beyond this, energy costs can be reduced through the us of integrated timer programs, and inhibiting functions are also available for limiting instantaneous power.

Comprehensive functions provided by the U1500 optimizing computer tackle all conceivable optimizing tasks. **Maximized savings with minimal influence on the production process** is accomplished by means of a special trend-extrapolation process and differentiated control strategies.

Power consumers are controlled individually with adherence to minimum and maximum making and breaking times. The system acquires power consumer operating states by means of binary operating feedback, and is thus capable of automatically recognizing critical production conditions (e.g. warm-up periods). Corrective measures are implemented by the computer in this case (e.g. modification of load shedding priorities), in order to prevent the respective piece of equipment from being shut down, or to reduce breaking time.

Control functions for kitchen power consumers and optional, peak-load driven control of in-house power generators are available as well. As opposed to many conventional maximum-demand monitors, the system is capable of exploiting new potential savings made possible by the liberalized power markets of the future by means of differentiated setpoint management (e.g. the use of program supply tariffs).

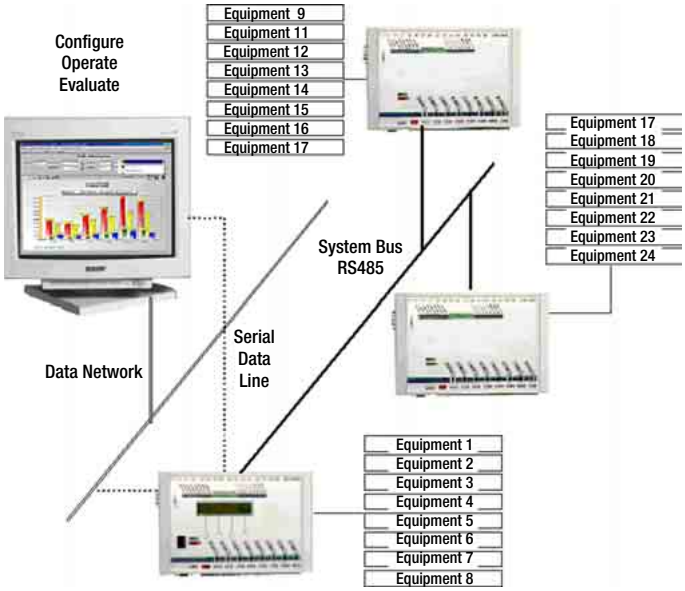
The optimization computer is configured and operated directly at the device with the help of an LCD and keypad, or via the serial interface with optional MS Windows™ software.

The U1500 A0 variant functions as an autonomous optimizing computer for 8 optimizing channels, and is not equipped with a system bus interface.

## Optimizing System

With up to 64 optimizing channels

A decentralized, expandable system with up to 64 channels can be created with the U1500 optimizing computer for mid-sized operations and large industrial applications.




The system consists of the following components which are connected via a system bus:

- U1500 A1 optimizing computer as a central unit with 8 optimizing channels. System configuration is accomplished with the help of the integrated LCD and keypad.
- U1500 A2 optimizing computer as a decentralized system expansion with 8 additional optimizing channels.

## Z302B Visualization Software

Visualization software for Microsoft® Windows™ for graphic evaluation of load characteristics, incoming binary and analog signals (e.g. operating feedback) and switching operations.

- Graphic representation of 15 minute mean values as load profiles
- Graphic representation of operating feedback signals and switching operations relative to load characteristics
- Graphic representation of daily, monthly and annual maximum values as a bar graph diagram

## General System Data

- Minimal interference in the production process thanks to extrapolation of power characteristics within the power utility's measuring period by means of a combined trend-extrapolation process. The disadvantages of pure trend calculation, time integration and PI control processes are avoided.
- Simultaneous optimization of various invoice items with a single optimizing computer (e.g. electrical power and gas)
- Inhibiting control for instantaneous power limiting
- Future oriented setpoint management (automatic setpoint adjustment, specified load profiles, up to 7 x 96 setpoints) and outstanding tariff flexibility
- Special control programs for kitchen optimization

### Electrical Power Billing

- Digital inputs for quantity pulse, power utility period signal and high and low tariff signals
- Combined pulse counting and interval measuring process for power calculation

### Optimizing Channels

8 optimizing channels, each including the following functions:

- Power consumer control with floating contact, load capacity for changeover relay: 250 V AC, 2 A
- Consumer-specific time requirements are taken into consideration, e.g. min. and max. making and breaking times.
- Critical production conditions are taken into consideration by means of automatic priority recognition, or external power requirement inputs
- Operating feedback and priority control via two binary inputs, 24 V DC or 230 V AC
- 7 cyclical timer programs
- Enabling by means of a manually operated switch
- Specified switching statuses in the event of system failure
- Assignment of differentiated shutdown priorities

## Inputs

- 16 digital inputs, 24 V DC, two groups, electrically isolated, each input can be reset to 230 V AC by means of a jumper, status LED, freely assignable functions
- All components are equipped with binary inputs for 230 V AC and 24 V DC signal voltages.

### Binary Inputs

| | |
|---|---|
| Reference potential | Potential-free |
| Electrical isolation | From input to input and<br>from input to rest of device |
| Signal coupling for input signals | via optocoupler |
| Input signal voltage | 0 signal:<br>3 V ... + 5 V (24 V DC) or<br>0 V ... 40 V (230 V AC)<br>1 signal:<br>+ 15 V ... + 30 V (24 V DC) or<br>164 V ... 253 V (230 V AC) |
| Input current per channel | at + 24 V DC: 8.0 mA typical |
| Status display | 1 green LED per input |
| Maximum cable length | Unshielded: 600 m<br>Shielded: 1000 m |

## Outputs

- Auxiliary voltage for external components:
  24 V DC, max. 100 mA
- 8 changeover relays for controlling power consumers:
  250 V AC, 2 A load capacity, status LED
- 1 changeover relay for fault signaling:
  250 V AC, 2 A load capacity, status LED

### Binary Outputs

| | | |
|---|---|---|
| Type | Changeover relay | |
| Electrical isolation | From output to output and<br>from output to rest of device | |
| Switching voltage | 12 V AC/DC ... 250 V AC/DC | |
| Switching current per relay | 230 V AC, 50 Hz:<br>24 V DC: | cos φ= 1.0, Imax = 2 A<br>$I_{max}$ = 2 A |
| Leakage current per contact with open contact | max. 1 mA | |
| Switching capacity | with alternating voltage<br>with direct voltage | max. 500 W<br>max. 50 W |
| Allowable lamp load | with alternating voltage<br>with direct voltage | max. 100 W<br>max. 25 W |
| Switching frequency with inductive load | max. 2 Hz | |
| Relay contact protection while switching inductive loads | Integrated varistor | |
| Status display | 1 green LED per output<br>1 red LED for fault signaling | |
| Contact service life | Mechanical > 4 x $10^7$<br>230 V AC, 2 A ohmic load, > 4 x $10^5$ | |

## Data Interfaces

### COM1 Port

Connection of a control and visualization PC via RS 232 or RS 485 interface (maximum distance: approx. 1200 m)

| | |
|---|---|
| Interface standard | RS 232 or RS 485<br>9-pin subminiature plug connector |
| Electrically isolated | from the mains, inputs and outputs, and the bus interface |
| Potential difference | Potential differences between COM1 and the connected device are not allowed. |

### Bus Interface

RS 485 system bus for the setup of decentralized optimizing systems, max. bus length 1200 m (not with U1500 A0)

| | |
|---|---|
| Interface standard | RS 485, 9-pin subminiature socket connector |
| Bus address | Selected via DIP switches |
| Electrically isolated | from the mains, inputs and outputs, and the COM1 port |

# U1500
# Peak Load Optimizing System

**Bus Cable**

| | |
|---|---|
| Type | 2 core, twisted with common shield |
| Cross-section | ≥ 0.22 square mm (24 AWG), recommended: 0.5 square mm |
| Twisting | > 10 twists per meter (symmetrically twisted) |
| Core insulation | Polyethylene (PE) |
| Resistance per core | < 100 Ω / km |
| Characteristic wave impedance | approx. 120 Ω (100 ... 150 Ω) |
| Capacitance between cores | < 150 nF/km |
| Terminating resistor | 120 Ω, can be activated with jumpers in the device |
| Bus length | max. 500 m, or 1.2 km with up to 2 repeaters |

## Options

Load dependent control of in-house power generators

## Operation

Menu-driven operation with LCD (2 lines of 20 characters each) and 4 multifunction keys (not with U1500 A2)

## Diagnosis

Cycle monitoring
Battery monitoring
Bus monitoring
RAM self-test during power-up
Quantity pulse and period signal monitoring for load optimizing function

## Power Supply

| | |
|---|---|
| Line voltage | 230 V AC (+10%, –15%) |
| Line frequency | 50 Hz ± 5% |
| Standby indicator | Green LED |
| Power consumption | max. 15 VA |
| Stored energy time | ≤ 0.5 mains periods, time between two power failures ≥ 1 s |
| Battery backed | RAM contents (configuration and measurement data) lithium, CR 2032, 3 V<br>> 300 hours under operating conditions<br>> 1000 hours at temperatures < 25 °C<br>approx. 5 months typically |

## Ambient Conditions (per DIN EN 61131-2)

| | |
|---|---|
| Operating temperature | 0° C ... +50° C |
| Storage temperature | –25° C ... +70° C |
| Relative humidity | 10% ... 90%, o condensation allowed |
| Atmospheric pressure | Operation: ≥ 800 hPa / ≤ 2000 m<br>Storage: ≥ 660 hPa / ≤ 3500 m |

## Electrical Safety

| | |
|---|---|
| Overvoltage category | II per DIN EN 61131, part 2 |
| Safety class | I |
| Fouling factor | 2 |

## Mechanical Design

| | |
|---|---|
| Protection | IP 20 per IEC 529 |
| Mounting | to top-hat rail per DIN EN 50022-35 (15 mm deep), or wall mount |
| Connectors | Removable terminal blocks with screw terminals, max. 2.5 square mm |
| Dimensions | W x H x D: 240 mm x 160 mm x 60 mm |
| Weight | 1.2 kg |

## Order Information

The following applies to the selection of order features:
Only one designation beginning with any given capital letter may be selected. If the capital letter is followed by zeros only, the designation need not be entered.

| Feature | Article Number / Feature Number |
|---|---|
| **Peak load optimizing system**, 8 optimizing channels | **U1500** |
| **Variant** | |
| Optimizing computer with display and keypad | A0 |
| Optimizing computer with display, keypad and system bus | A1 |
| System expansion with system bus | A2 |

**Accessories**

| Designation | Article Number |
|---|---|
| Visualization software for U1500 peak load optimizing system for Windows 95, 98, ME and 2000 | **Z302B** |



GOSSEN METRAWATT GMBH
Thomas-Mann-Str. 16-20
90471 Nürnberg • Germany
Member of GMC Instruments Group

Phone: +49-(0)-911-8602-0
Fax: +49-(0)-911-8602-669
E-mail: info@gmc-instruments.com
www.gmc-instruments.com

GOSSEN METRAWATT