

Signals and Energy Data
multimax Energy Optimization System

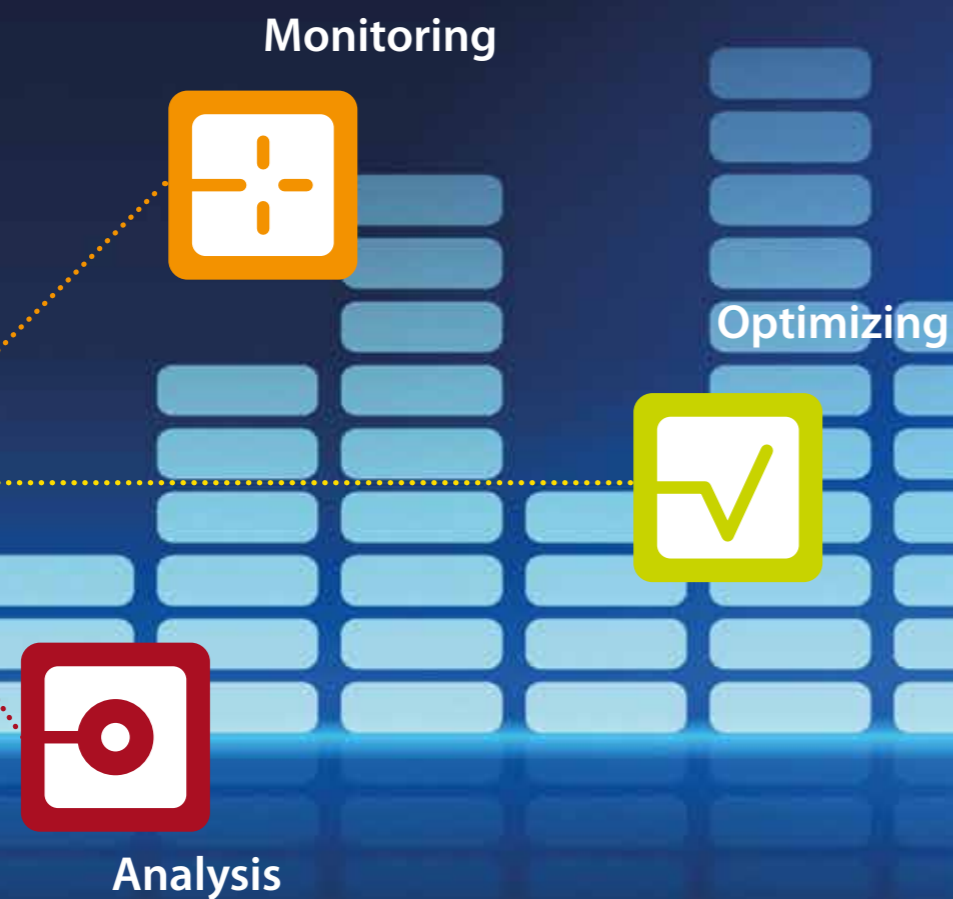
THE ENERGY VIRTUOSO!

The best choice for optimum performance and maximum cost savings



One System. Best Solutions.





Ensure that energy costs do not peak in your company.

Thanks to its modular concept and innovative **OptiEnergy** calculation procedure, **multimax** considerably increases the energy efficiency of your company.

Energy optimization system **multimax**



Average savings potential in the five-figure range

You may not be able to fully eliminate energy costs for power calculation, but can reduce them significantly by reducing consumption or creating a state of non-typical network usage or using an individual network charge.

The **multimax energy optimization system** monitors, controls, and optimizes the energy consumption behavior of connected consumers. While optimizing the operating process, the consumer properties and energy supply conditions are taken into account.

THE MULTIMAX FACTOR: HIGHLY FLEXIBLE AND EXTREMELY EFFICIENT.

The key to successful energy optimization is the perfect coordination of reliable product technology and flexible load control. The multimax energy optimization system can be adapted to plants of any size due to its modular design.



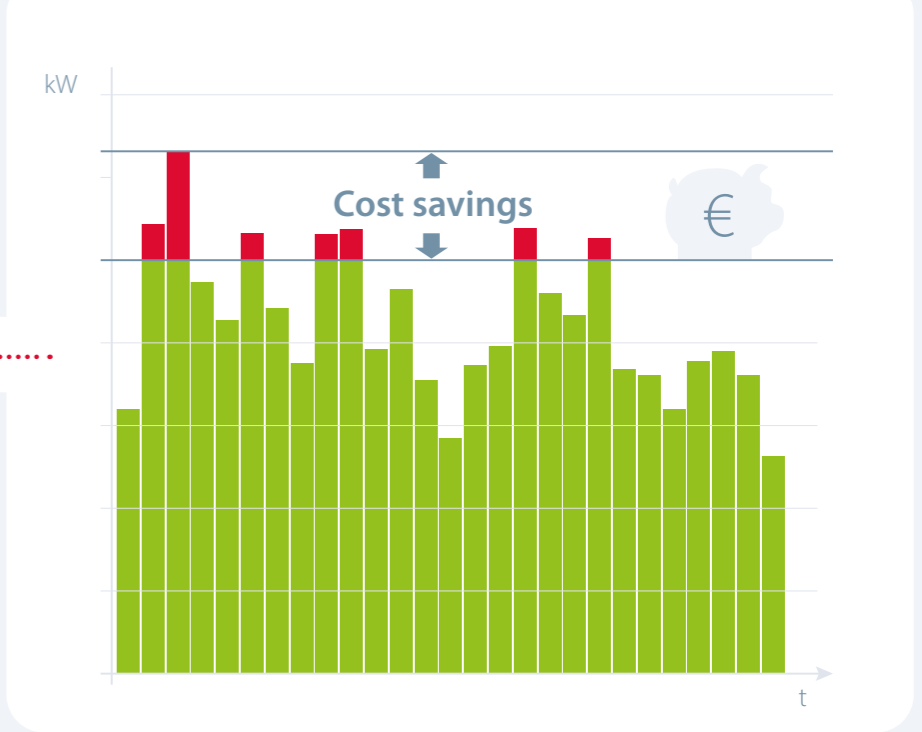
Modular system
With the **multimes** and **multisio** modules, you can expand the load management system to control up to 80 consumers.

Visualization
The **multimax IGW** is integrated into the network and runs immediately via Plug and Play, without installing any software. Analysis and programming can be performed from any PC with a default browser.

- Current
- State detection
- Gas
- Electrical power



Intelligent functions
Target value and instantaneous value monitoring, target value tracking, prewarning contact (alarm), timer programs, emergency shut-down, and much more.



Meter inputs with pulse totalizer function
multimax D6 can capture the values of up to 5 meters. You can connect additional meters with the **multisio D2-4DI** module.



Use the enormous savings potential wisely with our energy flow and consumption optimization measures.

Energy optimization is an important aspect of modern energy management. We will be happy to advise you personally.

Product advice:
+49 (0) 9122 6373-0
info@kbr.de

THE MULTIMAX METHOD: OUR MISSION: ENERGY OPTIMIZATION.

In the best case, corporate measures to increase energy efficiency go hand in hand with those to tap into load management potentials. The practical examples provided in the following demonstrate how you can use **multimax** for successful energy management.



Reducing consumption

The highest 15-minute period of reduced power will be calculated in the electricity bill. A power peak (inadvertent in most cases) can already cause yearly energy costs to rise significantly. The staff at a company are often unaware of the consequences of their actions when many machines are drawing full power from the network at the same time.



The KBR solution: KBR energy optimization runs in the background without impacting the production sequence. The optimized trend method enables the system to detect a potential power peak before it happens and adjust the power with the consumers that are connected. **multimax** can be used in any industry and in plants of any size.

The KBR recommendation
multimax D6 → p. 8



Consumer time control

An electroplating shop wants to reduce its power peak and automatically pre-heat its electroplating baths. For this task, weekend days, holidays and production downtimes must be considered.



The KBR solution: The electroplating baths are switched on and off using the timer programs in **multimax IGW**. The baths needed according to production requirements are heated before work starts. In the heating phase, the baths are optimized to ensure that there are no unnecessary load peaks. **multimax** also ensures that the set maximum value is not exceeded during operation either.

The KBR recommendation
multimax D6 → p. 8
multimax IGW → p. 18



Minimize the number of switching operations

The availability of the consumers that are to be included for energy optimization should be as high as possible. Unnecessarily switching operations should be avoided.



The KBR solution: Instead of the fixed feedback of "device connected," **multimes D4** measuring modules measure the instantaneous power and then send this data to the **multimax**. This way, the energy optimization unit utilizes the actual instantaneous power consumed. With this system, the number of switching operations can be considerably reduced.

The KBR recommendation
multimax D6 → p. 8
multimes D4 → p. 12




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multimax

Housing dimensions (H x W x D in mm)	90 x 105 x 61
Data display	LCD*
Interface	KBR eBus KBR module bus Modbus Display



* via display multimax F96-DS

Energy optimization system with trend calculation function

- Highlights**
- Current and gas supply optimization
 - Target value tracking for monthly and annual power price
 - Optimize power consumption trends and instantaneous value
 - Prewarning contact for alarm and emergency shut-down
 - Integrated temperature target value timer programs
 - Optimize standard, thermal, and controllable devices
 - Serial interface with eBus and Modbus protocol

An overview of the **technical details** is provided on page 12.

You may not be able to fully eliminate energy costs for power calculation, but you can reduce them significantly. Even a single carelessly produced power peak can send energy costs skyrocketing with far-reaching consequences. Whether the goal is to reduce power consumption or create a state of non-typical network usage or use an individual network charge, the **multimax** energy optimization system monitors, controls, and optimizes the energy consumption

behavior of connected electricity and gas consumers. While optimizing the operating process, the consumer properties and energy supply conditions are taken into account.

Note: Expansion modules are required for switching and feedback from devices.

Communication between the central unit and module is carried out via the module bus or the network.

Input and output configuration

DEVICE TYPE	multimax D6-ESMSBDS-5DI6RO1DO-5	
INPUTS	Pulse inputs (working and synchronization pulse)	5
	Target value switching (for floating contact)	3
OUTPUTS	Relay outputs	5 non-floating
	Maximum prewarning relay	yes
SERIAL INTERFACES	KBR eBus	yes
	KBR module bus	yes
	Modbus	yes
	KBR Display	yes
SOFTWARE SUPPORT	Intelligent gateway	yes
	visual energy	yes
POWER SUPPLY	Operating voltage	85 – 265 V AC/DC, 50/60 Hz
	Power consumption	15 VA
MECHANICAL DATA	Central unit: Modules and dimensions in mm (H x W x D)	6 modules (90 x 105 x 61 mm)
	Weight	Approx. 650 g
	Display	96 x 96 mm (visible 92 x 92 mm)

Other Features

- Optimization is better than switching: **multimax** can switch consumers according to demand thanks to its **analog signal outputs**
- Can be used in any industry and in plants of any size
- **Integrated programs** ensure that non-typical network usage is maintained or that the timer controls for systems work
- The feedback allows devices to be controlled optimally with **fewer switching operations**
- The instantaneous power consumption of the consumers is displayed, **increasing savings potential** and **reducing the number of interventions in the production process**
- By **linking multiple feedback values**, even sensitive consumers can be included in the optimization process (e.g., large thermal devices)
- Easy **visualization** thanks to the **intelligent Gateway**

multimax Technical details

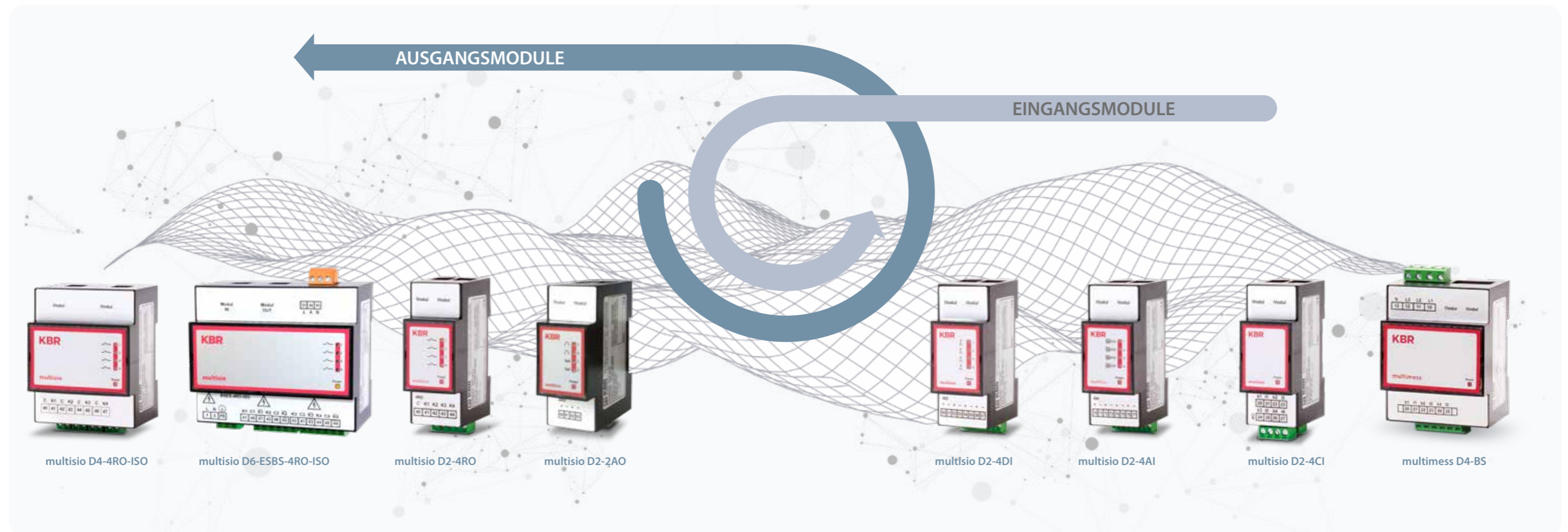


DEVICE TYPE	multimax D6-ESMSBDS-5DI6RO1DO-5
MENU AND STATUS DISPLAYS	Energy: W_{act} Trend power: P_{trend} Instantaneous power: P_{act} Cumulative power: P_{cum} Corrective power: P_{corr} Measurement period average value: P Maximum daily and monthly values: P_{day} and P_{mon} Switching operations, error and alarm messages
OPTIMIZATION LINES	32 lines (up to 80 devices)
EXPANSION MODULES	Management of up to 20 modules
SWITCHING PERFORMANCE	Self-optimizing (circular switching of equal stages) The priority can be adjusted for each optimization output
PERIOD DURATION	1, 10, 15, 30 or 60 minutes
SYNCHRONIZATION	Digital input, internal, bus, tariff
OPTIMIZATION CRITERIA	Target value control 3 target values can be programmed freely Target values can be controlled using timer programs Degree of optimization in % Stage power and start-up probability Priority switching (circular switching with the same priority) Measurement period time-out, minimum switch-on time, minimum and maximum switch-off time Non-typical network usage
MONITORING FUNCTIONS	Maximum prewarning if power is exceeded Automatic emergency shutdown of selected devices in the event of malfunction Target value tracking if power value is exceeded Counter and synchronous pulse monitoring Period-independent monitoring of maximum instantaneous power Communication monitoring between central unit and substation
DISPLAY	LCD (via multimax F96-DS display)
INSTANTANEOUS POWER MEASUREMENT	Pulse input Pulse summation function for multiple counters Direct measurement with multimes D4 additional module (transformer measurement)

DEVICE TYPE	multimax D6-ESMSBDS-5DI6RO1DO-5																																
MEMORY	Load profile memory for 40 days at 15 minute measurement periods Infinite active energy memory for high and low tariffs 2045 switching operation entries 4096 event memory entries (power failures, errors, programming actions, etc.) 512 operation logbook entries 512 timer program entries Memory can be read on the device memory can be read out via KBR eBus																																
TIME FUNCTIONS	10 internal timer programs (global eBus master timer programs are processed) Calendar function Daylight saving time Leap year adjustment																																
PASSWORD PROTECTION	Digit code																																
LINE PARAMETERS	<table border="1"> <tr> <td>Line name</td> <td></td> </tr> <tr> <td>Power</td> <td>0 to 9999 kW</td> </tr> <tr> <td>Priority</td> <td>01 to 32</td> </tr> <tr> <td>Type</td> <td>Standard, thermal device, controllable</td> </tr> <tr> <td>on switch-off</td> <td>open, closed</td> </tr> <tr> <td>active</td> <td>yes, no</td> </tr> <tr> <td>Mode</td> <td>Auto, On, Off</td> </tr> <tr> <td>Feedback type</td> <td>Enable, manual_On, manual_Off, priority, emergency_On, emergency_Off</td> </tr> <tr> <td>Switch off in event of error</td> <td>yes, no</td> </tr> <tr> <td>Period time-out</td> <td>0 to 999 minutes</td> </tr> <tr> <td>Lead time</td> <td>0 to 999 seconds</td> </tr> <tr> <td>Run-on time</td> <td>0 to 999 seconds</td> </tr> <tr> <td>Minimum on time/day</td> <td>0 to 24 hours</td> </tr> <tr> <td>Minimum on time</td> <td>0 to 999 minutes</td> </tr> <tr> <td>Minimum down time</td> <td>0 to 999 minutes</td> </tr> <tr> <td>Maximum off time</td> <td>0 to 999 minutes</td> </tr> </table>	Line name		Power	0 to 9999 kW	Priority	01 to 32	Type	Standard, thermal device, controllable	on switch-off	open, closed	active	yes, no	Mode	Auto, On, Off	Feedback type	Enable, manual_On, manual_Off, priority, emergency_On, emergency_Off	Switch off in event of error	yes, no	Period time-out	0 to 999 minutes	Lead time	0 to 999 seconds	Run-on time	0 to 999 seconds	Minimum on time/day	0 to 24 hours	Minimum on time	0 to 999 minutes	Minimum down time	0 to 999 minutes	Maximum off time	0 to 999 minutes
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Version: February 2021. Subject to change.





multisiso D4-4RO-ISO

Outputs: 4 x relays, isolated

Energy supply: About the module bus

Connection to energy optimization:
About the module bus

Construction type:
DIN rail installation, 4 horizontal pitch

Item no.: 14202

multisiso D6-ESBS-4RO-ISO

Outputs: 4 x relays, isolated

Energy supply: About the module bus

Connection to energy optimization:
Via Modbus or eBus

Construction type:
DIN rail installation, 6 horizontal pitch

Item no.: 24444

multisiso D2-4RO

Outputs: 4 x relays, non-floating

Energy supply: About the module bus

Connection to energy optimization:
About the module bus

Construction type:
DIN rail installation, 2 horizontal pitch

Item no.: 14190

multisiso D2-2AO

Outputs: 2 x analog (0–20 mA, 4–20 mA, 0–10 V)

Energy supply: About the module bus

Connection to energy optimization:
About the module bus

Construction type:
DIN rail installation, 2 horizontal pitch

Item no.: 14205

multisiso D2-4DI

Inputs: 4 x digital, isolated

Energy supply: About the module bus

Connection to energy optimization:
About the module bus

Construction type:
DIN rail installation, 2 horizontal pitch

Item no.: 14192

multisiso D2-4AI

Inputs: 4 x analog (0–20 mA, 4–20 mA, 0–10 V)

Energy supply: About the module bus

Connection to energy optimization:
About the module bus

Construction type:
DIN rail installation, 2 horizontal pitch

Item no.: 14193

multisiso D2-4CI

Inputs: 4 x current, 0–6 A

Energy supply: About the module bus

Connection to energy optimization:
About the module bus

Construction type:
DIN rail installation, 2 horizontal pitch

Item no.: 14185

multimes D4-BS

Inputs: 3 x current, 3 x voltage

Energy supply: About the module bus

Connection to energy optimization:
Via voltage input

Construction type:
DIN rail installation, 4 horizontal pitch

Item no.: 14166

multimax Application Examples



TASK: A kitchen appliance should be integrated into the optimization, but can only be optimized while it is heating up. The appliance is prepared for connection to the energy optimization system and has the connections: A | B | C | D.

SOLUTION: Requires a floating output (multisio D4-4RO-ISO or multisio D6-ESBS-4RO-ISO) and two inputs (e.g., multisio D2-4DI and two relay modules, item 24361). A control line measuring 5 x 1.5 mm² is laid between the kitchen appliance and the energy optimization system.

The bridge in the kitchen appliance between terminal [B] and [C] is taken out. Both feedbacks from the main switch ON/OFF [A] and the thermostat [B] are connected to the inputs. Terminal [C] is routed to the energy optimization output. The N conductor is connected to terminal [D].

When you program the output, choose a "thermal consumer" and enable the option "optimization in the heat-up phase."

You want to know how to make the best possible use of **multimax** for your specific case? We will be happy to present the suitable solutions to you.

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info@kbr.de



TASK: An air compressor should be integrated into the energy optimization system. When the pressure on the compressed air tank falls below a certain value, the compressor must be switched back on.

SOLUTION: The minimum pressure is supplied to the compressed air system as a floating contact. It is routed to an input on the multisio D2-4DI. If the minimum pressure is reported to the energy optimization system by this input while the compressor is switched off by the energy optimization system, it will immediately switch the compressor back on.



TASK: A consumer should be integrated into the energy optimization system. There is no switching input available for it.

SOLUTION: An output (multisio D4-4RO-ISO, multisio D6-ESBS-4RO-ISO) is connected into the power contactor control in series. The device can be switched off and connected without affecting the device's controls.



TASK: A system can only be optimized if a certain condition is met.

SOLUTION: The energy optimization system receives optimization permission via a floating or non-floating contact of the system. It is routed to an input (floating: multisio D2-4DI or non-floating: multisio D2-4DI with relay modules, item 24361, multimress D4-BS). The energy optimization input factors the feedback into its control.



TASK: The heat pumps should be included in the optimization process during an automatic operation. However, they have no constant power output and the actual power reduction value should be factored in to prevent any switching operations.

SOLUTION: The multimax energy control system receives dynamic feedback of the actual power reduction via the multimress D4-BS measuring devices installed on the heat pumps and factors that into its control optimization.



TASK: An energy optimization should be used in a single operation. The total power and trend power should also be indicated on a large display in production.

SOLUTION: The energy optimization system gives out both values via two analog outputs (module multisio D2-2AO). The display translates the two signals into power and displays them.



TASK: To prevent unnecessary shut-offs, the state of various consumers in a hotel (on/off) should be reported back to the energy optimization system.

SOLUTION: Floating or non-floating contacts are routed to inputs (floating: multisio D2-4DI or non-floating: multisio D2-4DI with relay modules, item 24361, multimress D4-BS). The energy optimization system can now capture the consumer's state.

multimax Application examples



TASK: A large industrial plant is prohibited by the network operator from feeding into the energy provider's medium voltage network with their PV system.

SOLUTION: The multimax energy control system functions in an "inverted" way, meaning that when energy recovery is detected, excess energy is buffered in a battery storage device. The battery storage device's charging capacity is controlled by a multisio D2-2AO analog output. When the battery storage device is full, the PV system inverters will be taken from the network one after the other.



TASK: The power of a refrigeration unit is dependent on multiple factors and fluctuates as a result. A fixed program for the unit's power cannot be created in the energy optimization system. However, it should be integrated into the optimization system without unnecessary shut-offs.

SOLUTION: The system's power consumption is measured with the multimes D4-B5 via current transformers. The measured value is continuously transmitted to the energy optimization system. This factors the consumer's instantaneous power consumption into its control strategy.



TASK: An existing generator should be integrated to reduce power peaks.

SOLUTION: A multisio D2-2AI is used to control the generator. An analog output signal controls the power generated by the generator.

Et voilà: with visual energy 5, you can now see the full savings potential in your energy data.

visualenergy 5

ENERGY IS VISIBLE AND COMPREHENSIBLE

- ✓ Contemporary and standard compliant energy data management system in accordance with ISO 50001
- ✓ Eligible for BafA funding
- ✓ Absolute plausibility of data confirmed by TÜV as unique selling point

ISO 50001

TÜV SÜD

One System. Best Solutions.



multimax IGW Analyze and Evaluate Data



Online Visualization and Energy Optimization Configuration

- Highlights**
- Plug and Play, no software installations necessary
 - Intuitive web browser operation
 - Multi-user system with user login
 - Operations calendar with timer functions

The power required for plants and buildings changes over the course of time. In order to get the maximum savings potential from an energy optimization system, it should be adapted to changing conditions in operation on a regular basis.

As a user, you should have the ability to perform analyses and adaptations without major effort. For this reason, we've developed a lucid operating concept that provides a clear and organized breakdown of the screen layout, similar to a car navigation system.

The KBR intelligent gateway is integrated into the network with an IP Address and runs immediately via Plug and Play, without installing any software. **multimax** can be analyzed and programmed from any computer in the network with a default browser.

Would you like some new functions? Update for your energy optimization system at the press of a button. Free and automatic installation. Update function in IGW.



Technical Data

DEVICE TYPE multimax IGW

DIMENSIONS:	Wall mounting on DIN rail 4 horizontal pitch (H x W x D) 90 x 71 x 61 mm	
POWER SUPPLY:	100 – 240 V AC/DC, 50/60 Hz	
INPUTS AND OUTPUTS:	RS 485 eBus-interface RS 485 Module bus-interface RJ12 TCP/IP-interface	USB interface HDMI interface SD card slot

User interfaces



LOGIN:

The user will be assigned permissions when they log in.

VIEWER: Can visualize and analyze historical data online.

STANDARD: Also has the ability to modify permission parameters and target values.

EXPERT: This login allows the user to modify system configurations and run updates.



OPERATIONS CALENDAR:

To keep machines and systems from running on standby, they can also be switched off outside of operating times and turned back on in time for use. The challenge is that there is no fixed pattern of work days. Using timers is not feasible on holidays, bank holidays, and even times of reduced work hours.

Ingenious features allow for the first time reliable, time-controlled reduction of consumption:

- Timer programs that rely on the types of day in the calendar.
- An infinite calendar with pre-defined, adjustable rules and individually definable day types.



MEASUREMENT PERIOD:

Current load period visualization. Current power, power consumption trends, and corrective power at a glance.



LOAD PROFILE:

Load profile level-time chart with instantaneous target value. Analyze historical values with a click. Views for day, week, month, or year.



SWITCHING OPERATIONS:

Analyze switching operations. When and how often which consumers were taken from the mains for optimization. An overview of all switching operations.



CONSUMERS:

Displays line statuses, programming, and manual operation (switching on and off) for connected consumers.



TIME PROGRAMS:

Easiest timer program creation. Shutting off systems during closures, switching on systems to pre-heat before shift begins, and much more.



SYSTEM CONNECTION:

Integrating the system into the existing infrastructure. With these interfaces, integration into the customer network takes no effort at all.



multimax as a Ready-to-use System



Complete Set: Energy Optimization System in a Wall Cabinet

- Highlights**
- Complete system in a wall cabinet
 - All components wired with terminals
 - Inputs and outputs already programmed in base module
 - Configure according to individual specifications
 - Integrated KBR eBUS and Modbus interface

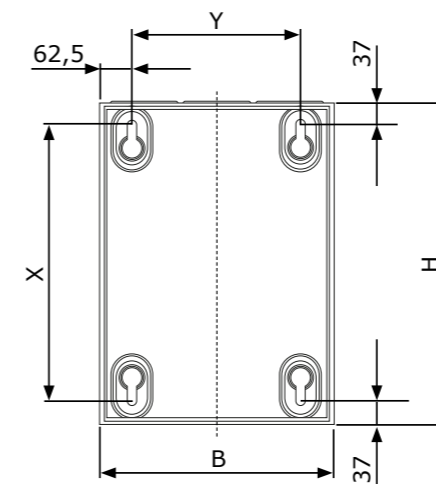
For in-depth information and technical details on the **multisio**, **multimes** and **multisys** expansion modules, please visit our website, www.kbr.de.
If you have any questions, feel free to call us: **+49 (0) 9122 6373-0**

The **multimax** system contains all the devices and components needed to optimize the respective outputs or digital feedback. The table on the right side shows the different configuration options.



System variant overview

MULTIMAX SET	OUTPUTS SWITCHING STAGES	INPUTS FEEDBACK	Item no.	HOUSING TYPE	Item no.
multimax SET-4RO-ISO-0DI	4	0	25687	CA13	14362
multimax SET-4RO-ISO-4DI	4	4	25688	CA13	14362
multimax SET-8RO-ISO-0DI	8	0	25689	CA13	14362
multimax SET-8RO-ISO-8DI	8	8	25690	CA13	14362
multimax SET-12RO-ISO-0DI	12	0	25691	CA13	14362
multimax SET-12RO-ISO-12DI	12	12	25692	CA23	14363
multimax SET-16RO-ISO-0DI	16	0	25693	CA23	14363
multimax SET-16RO-ISO-16DI	16	16	25694	CA23	14363
multimax SET-20RO-ISO-0DI	20	0	25695	CA25	14364
multimax SET-20RO-ISO-20DI	20	20	25696	CA25	14364
multimax SET-24RO-ISO-0DI	24	0	25697	CA25	14364
multimax SET-24RO-ISO-24DI	24	24	25698	CA25	14364
multimax SET-28RO-ISO-0DI	28	0	25699	CA23	14363
multimax SET-28RO-ISO-28DI	28	28	25700	CA26	14365
multimax SET-32RO-ISO-0DI	32	0	25701	CA23	14363
multimax SET-32RO-ISO-32DI	32	32	25702	CA26	14365



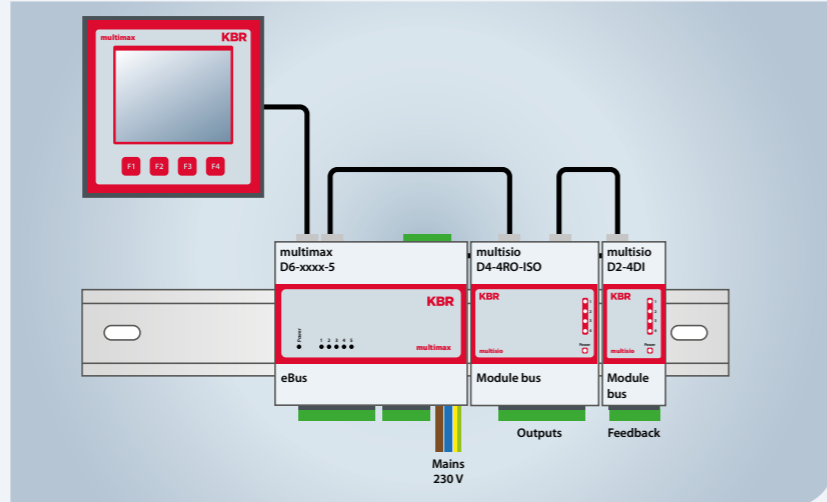
Housing type	H mm	W mm	Depth mm	X mm	Y mm
CA13	500	300	160	426	175
CA23	500	550	160	426	425
CA25	800	550	160	726	425
CA26	950	550	160	876	425



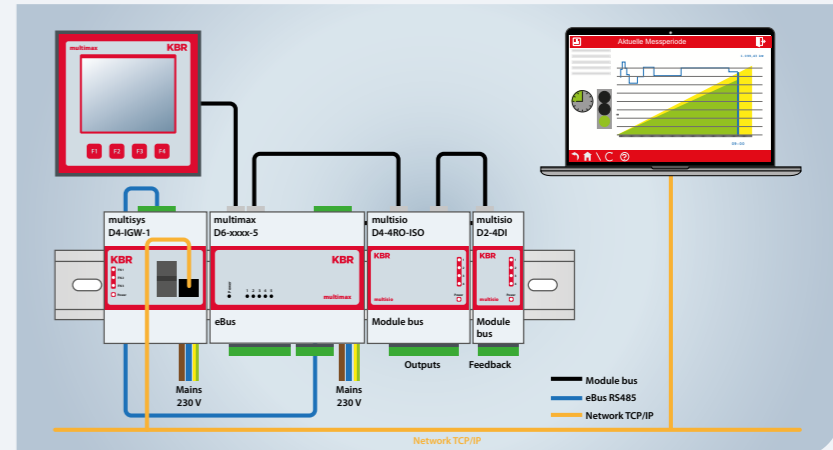
SETTING UP A MULTIMAX ENERGY OPTIMIZATION SYSTEM:

The modular nature of the system makes setup easy and adaptable to operating conditions. There are many options for setting up a multimax system. The minimum equipment includes the multimax base unit and the display. Here we show a couple of possibilities for how an energy optimization system can be integrated into operation. We would be happy to help you with your project.

The **multimax** base module is mounted on the DIN rail in the existing distribution. The display connects to the base unit and supplied with power by the enclosed module bus cable. The system can be expanded by 4 outputs and 4 inputs for each output and input module. The expansion modules are also supplied with power via the module bus cable.

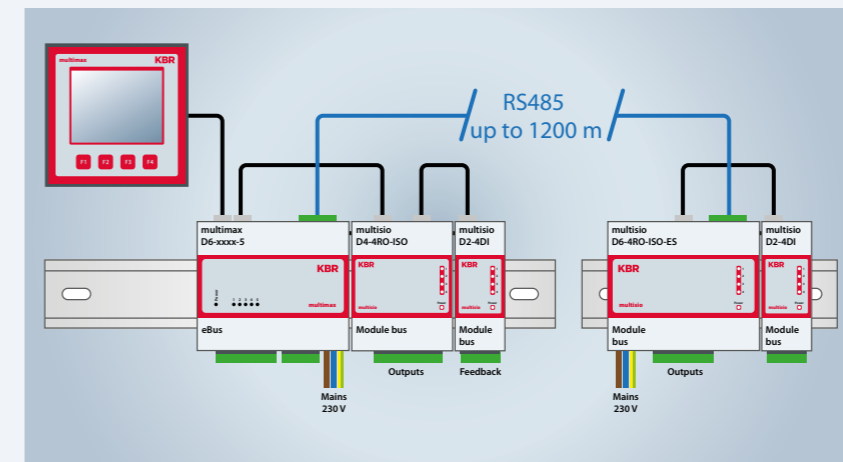


An **IGW** is needed to visualize energy optimization. This is mounted next to the **multimax** base unit and connected via a 3-core bus line. Now the Gateway needs to be connected to the internal network. Finally, after an IP Address has been assigned, the energy optimization system can now be accessed from any PC in the network.



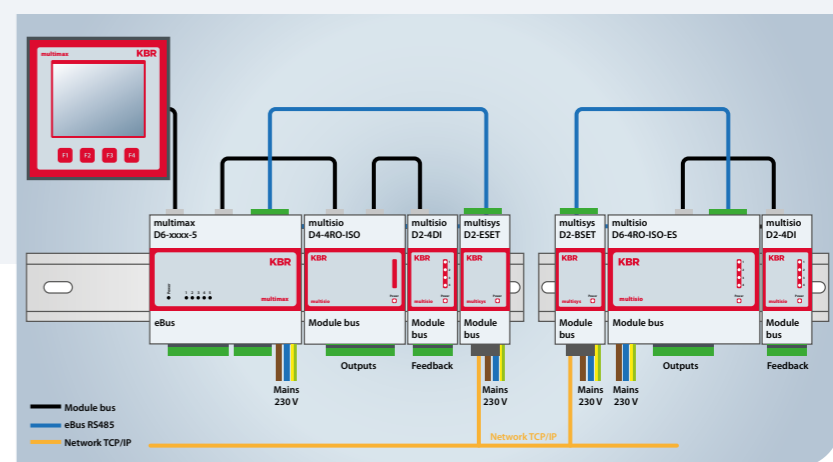
- Setup checklist:**
- designate a place to install the energy optimization system
 - decide the number and locations of sub-stations
 - determine the consumers that should be integrated into the energy optimization system
 - decide the consumers whose states should be reported back
 - connect the sub-stations via bus cables or network
 - energy pulse (power value from the energy provider, may be from own meter/measuring device)
 - synchronized pulse (15 minutes from the energy provider)

- Commissioning checklist:**
- system is installed and supplied with voltage
 - bus lines are routed between input and output modules
 - energy pulse is ready on the multimax base module
 - synchronized pulse is ready on the multimax base module
 - the electrical power consumption of the consumers is known
 - control lines are routed to the consumers
 - consumers are refitted for energy optimization



If a sub-station is required, it can be connected by an RS 485 bus line. A multisiso D6-ESBS-4RO-ISO is used as the output module in this case. Now, other modules can be connected to this module via a module bus cable.

Sub-stations can also be connected via the internal TCP/IP network in order to work over longer distances with ease. Only two Gateways multisys D2-ESET are required for this.



KBR is your reliable energy management partner.
With precision technology, efficient solutions and a comprehensive range of services, the KBR system helps companies in the plant engineering, industry or craft sectors maintain their technical edge.
For a sustainable and future-proof energy supply.

Our services:

- Planning and consulting
- Energy measuring devices
- Analysis software
- System integration
- Seminars & workshops
- First-class services from one source

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