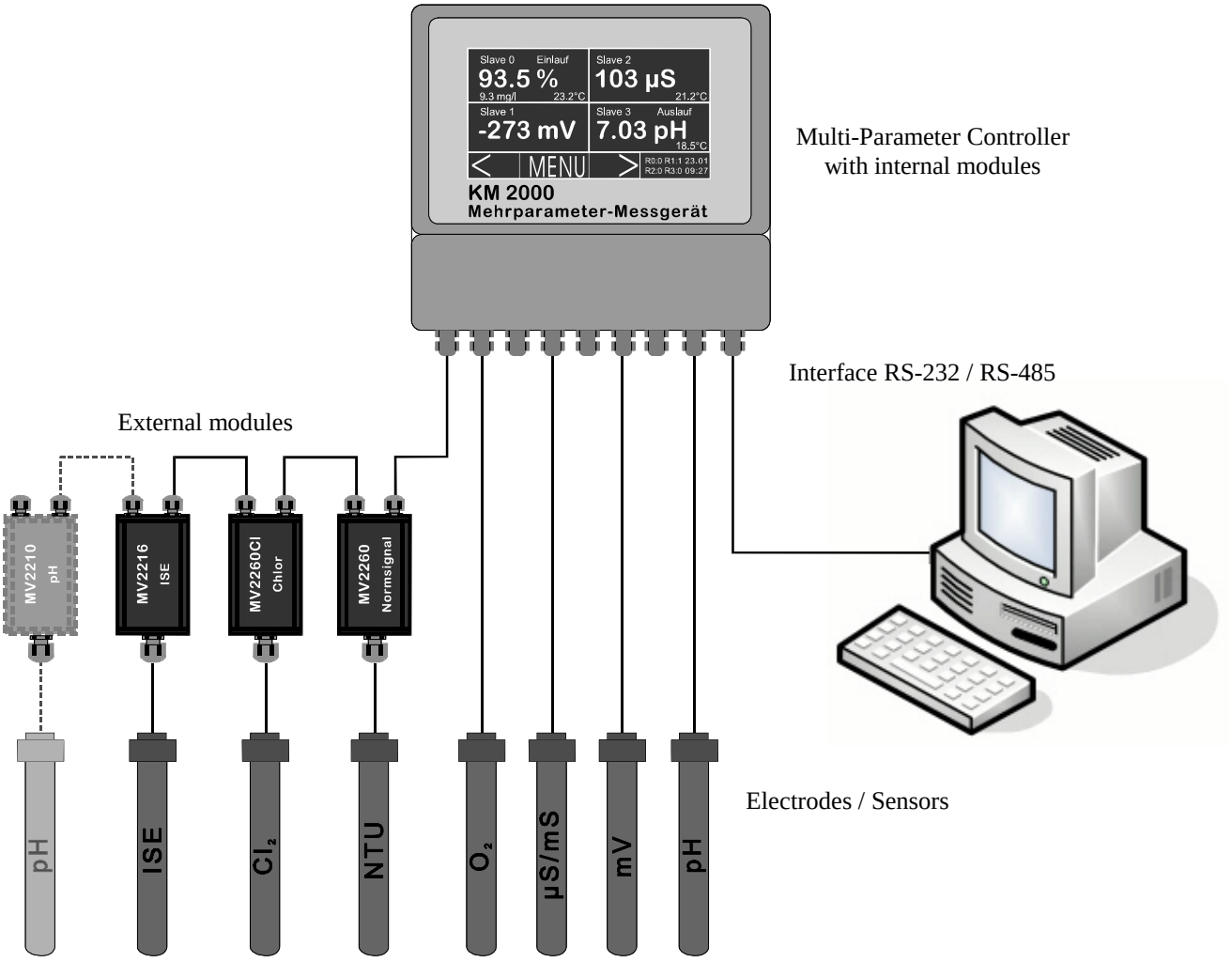
Process Multi-Parameter System KM 2000

System Structure

The KM 2000 Multi-Parameter System features nearly unlimited possibilities to application-specific configuration in relation to the number of measuring points, flexible arrangement, measured parameters, data evaluation and transmission as well as high economic efficiency, high data safety, correct high quality documentation and open system structure for installation and extension. Measuring modules evaluate pH value, conductivity, oxygen content, redox potential (ORP), temperature, chlorine content, turbidity and other parameters. Active modules are used for data transmission and control.

- **Modular system structure with measuring & active modules**
- **Controller KM 2000 as central unit with high availability for basic components, up to four internal measuring modules, data logging system, log-bock and touch-screen display for simultaneous displaying of up to 4 parameters**
- **Easy system extension by plug & play connection of external measuring and active modules**
- **Interface RS-232 / RS-485 prepared for modem operation, PC visualisation software program, SMS service**
- **Complete system solution**



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Multi-Parameter Controller KM 2000
The Multi-Parameter Controller is the central basic unit of the modular system and is prepared for insertion of up to 4 internal measuring modules in any combination. The clearly arranged strip compartment of the KM 2000 with plug-in terminals connects power supply, sensors, interface and relay outputs. The basic unit KM 2000 features the following functions.

- **Touch-screen display with one display sheet for up to four main measuring parameters inclusive associated temperature, calculated secondary measuring parameters as well as an individual description with status indications and international easily understood pictographs**
- **Automatic calibration procedures and temperature compensation methods**
- **4 limit relays for simple alarm, regulating and controller functions; washing contact with adjustable timer function for automatic control of rinsing or cleaning process systems**
- **Controller module with two independent PID controllers for comfortable and pretentious control of peripherals e.g. control of valves, motors or pumps**
- **Definition of adjustable limit bands for each parameter for sensor diagnosing (permissible parameter range)**
- **Transmission of data, status information and information about compliance with the adjusted limit bands via serial bi-directional interface RS-232 or RS-485**
- **Remote transmission of data and status information via GSM modem; SMS info about status information ands actual measured values**
- **Data logging system with high capacity as circular or limited storage with adjustable sample time**
- **Data recorder to give an overview about the development of the value within the last 24 hours displayed on the screen for each main measuring parameter**
- **Definition, displaying and transmission of 4 virtual parameters created by means of mathematical operations between the measured parameters (i.e. difference measurement, pH compensation for free chlorine)**

In accordance with the customer's order, the KM 2000 controller comes complete configured and pre-adjusted.

External Measuring and Active Modules
Besides the four internal measuring modules, further external measuring modules up to a maximum of 12 can be connected each other and to the KM 2000 controller at any sequence and choice. Because of this the external measuring modules can be used as pre-amplifiers for apart separated measuring points too. All measuring modules offer a temperature measurement in connection with a temperature sensor Pt 1000. The association of the temperature measurement to automatic temperature compensation of the parameters is free selectable by the user. Beside a main measuring parameter each measuring module calculates or measures so called secondary measuring parameters, which can be selected for displaying (compare with specifications table measuring modules). Active modules are interface modules for data outputs, DAC modules for analogue current outputs 0(4) … 20 mA and relay modules for switching, alarm, timer and control tasks. Up to four external DAC modules with four 0(4)...20 mA current outputs each are available to utilise all measured values (also virtual ones) as current signals for further processing. To expand the four internal relay outputs to overall 12 relay outputs, up to two external relay modules with four relay outputs each are available. The KM 2000 controller provides the power supply for the measuring and active modules and recognises all modules connected by plug & play automatically.

Sensors, Electrodes and Housings
The Multi-Parameter Measuring System KM 2000 features easy connection of conventional electrochemical electrodes and sensors (pH and redox combination and separated electrodes, conductivity cells, oxygen sensors etc.) with respect to their specific properties and functions. Because of this, the complete program of electrodes, sensors and housings is available for use with the measuring system KM 2000. Special modules with current or voltage input, linear characteristic and galvanic isolation are used for connection with sensors with integrated electronics, instruments or analysers (chlorine measuring sensors, flow or level sensors etc. or instruments with analogue output signal).

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Data Transmission and Data Evaluation

PC Software Program KM2000Reader

Each KM 2000 comes with a simple software program KM2000Reader to read out and configure the data logger via RS-232 interface in connection with a PC, laptop, or PDA (special software for PDA).

PC Monitoring Software Program MVremote

The software program MVremote represents a new generation and a new way of looking at water monitoring data management and features easy and comfortable evaluation, graphical analysis, scaling, export and storing time-series data that the KM 2000 transmits via interface RS-232 or RS-485 directly to a PC or laptop. The measured data can be taken over continuously on-line with selectable time sequence as well as periodically by reading out the data logging system. Up to 16 measured parameters inclusive the accompanying temperature values are simultaneously verified and graphically displayed as time-series data, exported, incorporated and operated into other computer spreadsheet programs.
PC hard and software requirements:
PC with min. 32 MB RAM and 30 MB HDD; graphical resolution min. 600 x 800; MS Windows 95 or higher; min. one free serial interface RS-232

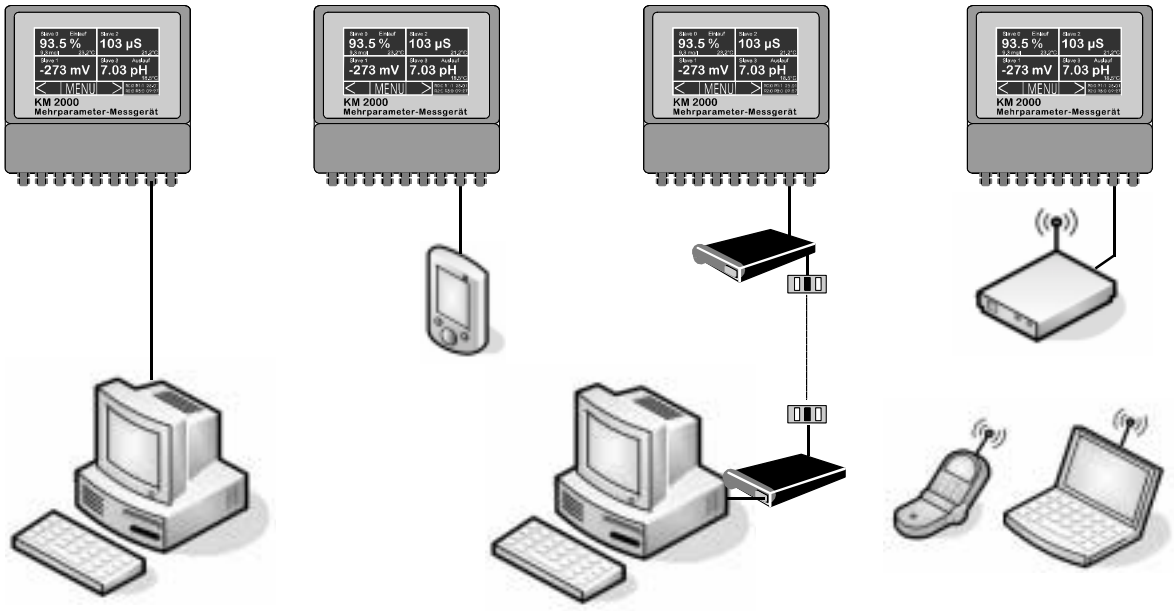
Data Transmission by Modem

Read out of the data logging system via telephone connection

The Multi-Parameter Controller KM 2000 is completely prepared for connection with a GSM or analogue modem by means of a direct communication between the serial interface and the modem (AT command set). The software program MVremote makes possible to arrange a data connection to the KM 2000 for reading out the data logging system and storing the data on the connected PC for further evaluation.

SMS service and SMS request service

SMS service features transmission of status indications about the relation of specified measured data to their individual defined limit band via SMS to a mobile phone. In this case the KM 2000 is connected with a GSM modem. The SMS message contains information about the parameter which limits are passed as well as free selectable information describing the location of the instrument KM 2000.
The SMS request service makes possible to transmit measured data directly via SMS to a mobile phone. Therefore the KM 2000 connected with a GSM modem should get a defined short message (SMS). After receiving this the KM 2000 itself sends a message too containing all on the KM 2000 actual displayed data to the telephone number pre-adjusted in the KM 2000 / SMS service.



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Specifications

Multi-Parameter Controller KM 2000

Power supply	115 / 230 V AC (-15/+10 %); 48...63 Hz, app. 25 VA (special version 24 V DC)
Ambient temperature	-10 ...+55 °C
Display	touch screen display 240 x 128 pixels, back-lighted
Menu languages	German, English, Chinese
Data transmission	serial interface RS-232 (prepared for modem operation) or RS-485 (RS-422)
Controller outputs	4 floating relay outputs; I ≤ 5 A, U ≤ 250 V AC resistive load for limit or alarm functions; one of them as relay with timer function (washing contact; time interval adjustable 1…9999 hours)
Data storage	integrated data logging system for approx. 50,000 values incl. date and time
Log-bock	approx. 200 activities incl. date and time
Enclosure	extremely rugged aluminium case for wall mounting with separated strip compartment, protection IP 65 (NEMA 4X); dimensions look at drawings
Electrical connections	screw and clip terminals, plug able
Electromagnetic compatibility	89/336/EEC, EN 61326 class B, NAMUR NE 21
Measuring modules	four internal measuring modules in any combination; inputs isolated; storage of calibration data, sensor supervision by individually adjustable limit bands; manual and automatic temperature compensation; detailed specification see table
Active modules	Analogue Current Output Module DAC 2000: 4 current outputs 0(4)…20 mA, scaleable, resolution 10 bit Controller Module PID 2000: 2 adjustable PID controllers with analogue, pulse or frequency output

External Measuring and Active Modules

Power supply	12 ... 24 V AC/DC (supplied by the controller KM 2000)
Ambient temperature	-10 ...+55 °C
Cable connection	power and data transmission between the modules and to the controller KM 2000 via screened 4-wires bus cable; max. 1,000 m (depends from the number of nodes and their arrangement)
Enclosure	aluminium profile case, protection IP 65 (NEMA 4X); dimensions look at drawings
Electrical connections	internal screw terminals, plug able
Electromagnetic compatibility	89/336/EEC, EN 61326 class B, NAMUR NE 21
Measuring modules	up to 12 external measuring modules in any combination; inputs isolated; storage of calibration data, sensor supervision by individually adjustable limit bands; manual and automatic temperature compensation; detailed specification see table
Active modules	Analogue Current Output Module DAC 2000 CAN: 4 current outputs 0(4)…20 mA, scaleable, resolution 10 bit Relay Module REL 2000 CAN: 4 floating relay outputs; I ≤ 3 A, U ≤ 250 V AC or 30 V DC resistive load for limit or alarm functions

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Measuring Modules

Internal Module	External Module	Main Measuring Parameter range	resolution	Secondary Measuring Parameters	Temperature range / resolution	Electrodes / Sensors
MVM 2210	**MV 2210**	pH value pH 0...14	pH 0.01	electrode voltage in mV	-10…130 °C 0.1 °C	pH combination & separated electrodes, temperature sensor Pt 1000
MVM 2215	**MV 2215**	redox potential (ORP) -2000…+2000 mV	1 mV	redox(ORP) voltage in relation to the standard hydrogen electrode	-10…130 °C 0.1 °C	redox(ORP) combination & separated electrodes, temperature sensor Pt 1000
MVM 2216	**MV 2216**	ion concentration acc. sensor specification (ISE) and calibration		electrode voltage in mV	-10…130 °C 0.1 °C	ion selective combination & separated electrodes ISE), Pt 1000
MVM 2220	**MV 2220**	conductivity 0…200 µS/cm 0…2 mS/cm 0…20 mS/cm 0…100 mS/cm automatic range selection	0.1 µS/cm 1 µS/cm 0.01 mS/cm 0.1 mS/cm	salinity 2…42 g/kg resistance	-10…130 °C 0.1 °C	conductive 2-electrode sensor; temperature sensor Pt 1000
MVM 2230	**MV 2230**	O_2 saturation 0…120 %	0.1 %	O_2 concentration 0…20 mg/l	-10…130 °C 0.1 °C	membrane covered amperometric O_2 sensor, temperature sensor Pt 1000
MVM 2260 Cl	**MV 2260 Cl**	concentration (chlorine, chlorine dioxide etc.) 0…2 (10) mg/l	0.01 mg/l	sensor current in mA	-10…130 °C 0.1 °C	sensor for disinfections measurement (i.e. chlorine), temperature sensor Pt 1000
MVM 2260 A	**MV 2260 A**	DC voltage input signal linear characteristic 0…5 V DC			-10…130 °C 0.1 °C	instrument or sensor with DC voltage output
MVM 2260 B	**MV 2260 B**	DC current input signal linear characteristic 0(4)…20 mA			-10…130 °C 0.1 °C	instrument or sensor with DC current output
MVM 2270	**MV 2270**	flow 0...100 l/h acc. sensor specification	0.1 l/h	frequency in Hz		vane flow sensor

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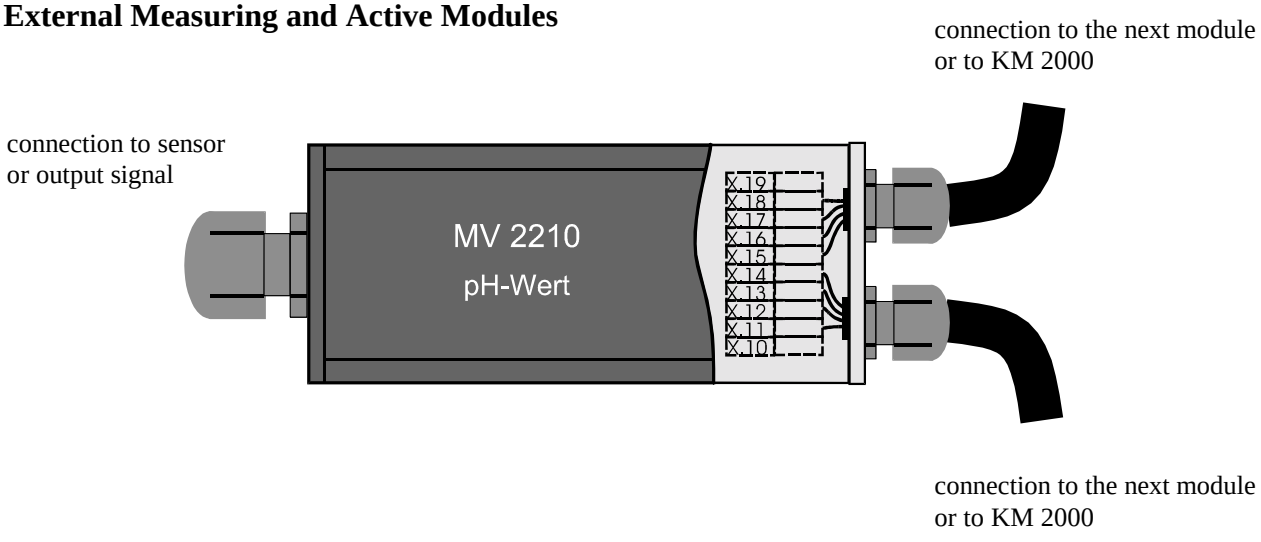
Construction

Multi-Parameter Controller KM 2000

External Measuring and Active Modules



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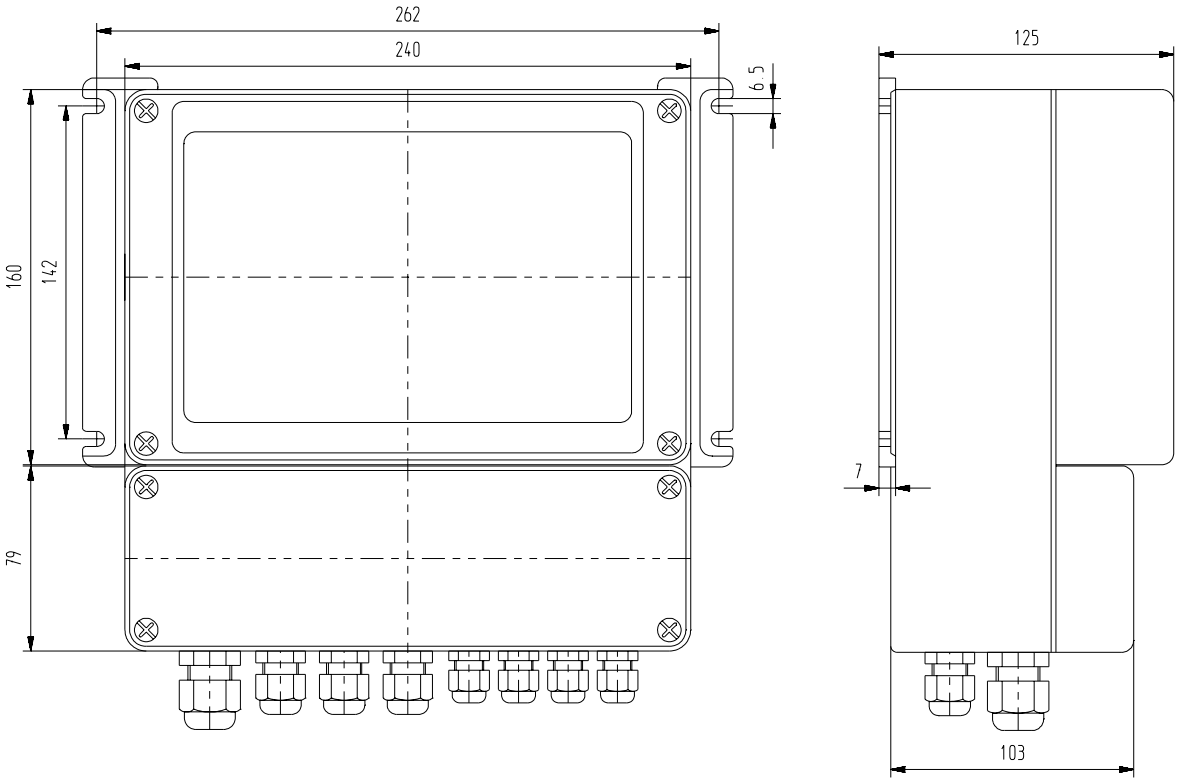
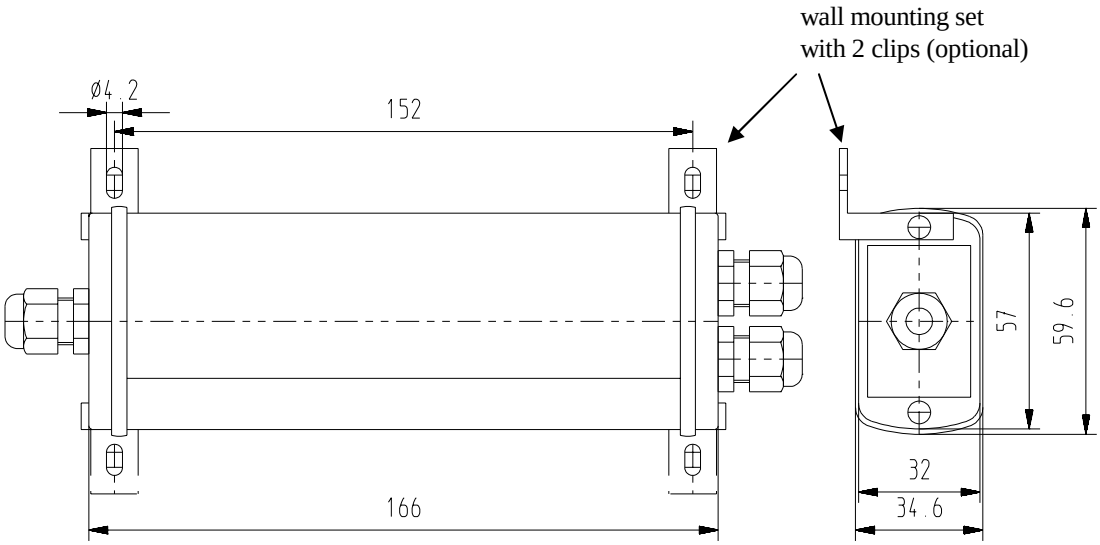
Drawings of the enclosures (dimensions in mm)

Multi-Parameter Controller KM 2000



External Measuring and Active Modules



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Application Examples

Application	Measured parameters	Measuring range	Control outputs	KM 2000 int. modules	Output signal Interface	External modules (optionally)	Probe Assembly	Sensors
Drinking Water Quality Monitoring	pH value redox pot.(ORP) conductivity total chlorine temperature	pH 0...14 -2000...2000 mV 0...2 mS/cm 0...2 mg/l 5...45 °C	limit & alarm relay outputs or PID controller i.e. for chlorine	MVM 2210 MVM 2215 MVM 2220 MVM 2260 Cl DAC 2000	RS-232 / RS-485 additionally 4 x 0(4)…20 mA, data logger	MV 2270 for flow MV 2260 for turbidity instrument	flow-through housing for mounting in a pipe	pH Combination Electrode EGA 173 Redox Comb. Electrode EMC 173 Conductivity Cell LTG 1/23 Chlorine Sensor CP 2
Waste Water Treatment Plant	pH value redox pot.(ORP) conductivity diss. oxygen temperature	pH 0...14 -2000...2000 mV 0 ... 20 mS/cm 0...20 mg/l -5...50 °C	limit & alarm relay outputs or PID controller i.e. for aeration	MVM 2210 MVM 2215 MVM 2220 MVM 2230 DAC 2000	4 x 0(4)…20 mA RS-232 / RS-485, data logger	MV 2230 for additionally oxygen measurements	immersion housing for mounting in a channel, tank or basin	pH Combination Electrode EGA 173 Redox Comb. Electrode EMC 173 Conductivity Cell LVC 1/23 Dissolved Oxygen Sensor MF 39
Water Quality Monitoring Station (surface water)	pH value conductivity diss. oxygen turbidity temperature	pH 0...14 0...20 mS/cm 0...20 mg/l 2...100 NTU -5...50 °C	limit & alarm relay outputs	MVM 2210 MVM 2220 MVM 2230 MVM 2260 A	RS-232 / RS-485 additionally 4 x 0(4)…20 mA, data logger		immersion housing for mounting in a channel, tank or basin	pH Combination Electrode EGA 173 Conductivity Cell LVC 1/23 Dissolved Oxygen Sensor MF 39 Turbidity Probe SSN-T
Raw, Waste & Process Water Monitoring System	pH value redox pot.(ORP) conductivity diss. oxygen temperature	pH 0...14 -2000...2000 mV 0 ... 20 mS/cm 0...20 mg/l -5...50 °C	limit & alarm relay outputs or PID controller i.e. for filtration, dosing	MVM 2210 MVM 2215 MVM 2220 MVM 2230 DAC 2000	4 x 0(4)…20 mA RS-232 / RS-485, data logger	MV 2270 for flow MV 2260 for turbidity instrument	flow-through housing for mounting in a pipe	pH Combination Electrode EGA 153 Redox Comb. Electrode EMC 33 Conductivity Cell LVC 1/23 Dissolved Oxygen Sensor MF 39
Swimming Pool Water Monitoring System acc. DIN 19643	pH value redox pot.(ORP) free chlorine total chlorine temperature	pH 0...14 -2000...2000 mV 0...2 mg/l 0...2 mg/l 5...45 °C	limit & alarm relay outputs or PID controller i.e. for chlorine	MVM 2210 MVM 2215 MVM 2260 Cl MVM 2260 Cl	RS-232 / RS-485 additionally 4 x 0(4)…20 mA, data logger	MV 2270 for flow MV 2220 for conductivity	flow-through housing for mounting in a pipe	pH Combination Electrode EGA 150 Redox Comb. Electrode EMC 33 Chlorine Sensor CL 4 Chlorine Sensor CP 2 Temperature Sensor Pt 1000