SIEMENS

Synco™ 700

KNX

Boiler Sequence Controller   RMK770

- **Modular controller for sequencing up to 6 boilers, for boiler temperature, heating circuit and precontrol; supplied with 18 programmed multiboiler plants**
- **Menu-driven operation with separate operator unit (plug-in type or detached)**
- **KNX bus connection facility for operation and process information**

Use

Types of buildings
- Office and administrative buildings
- Commercial buildings and shops
- Schools
- Hospitals
- Industrial buildings and workshops
- Apartment blocks and terraced houses

Types of plant
- Heat generation with a maximum of 6 boilers
- Heating sections of ventilation and air conditioning plant
- Distribution zones of ventilation and air conditioning plant
- Heating systems with own heat generation
- Basic load heating systems

Building Technologies

Functions

General functions

- Maximum of 7 control systems with modulating outputs (3-position or DC 0…10 V):
  - Modulating burner
  - Heating circuit with mixing valve
  - Precontrol with mixing valve
  - Maintained boiler return temperature with mixing valve
- Control of a maximum of 7 pumps (single or twin pumps)
- 18 programmed multiboiler plants integrated
- Freely configurable inputs for measuring signals and extra operating functions
- Fault status indication with red LED, acknowledgement with button. In addition, 2 relay outputs can be configured as fault relays, plus 4 universal inputs as fault status signal inputs

Boiler sequence control

- Acquisition and evaluation of the main flow and main return temperature
- Sequence control of a maximum of 6 boilers
- The boiler sequence (lead boiler) can be defined as follows:
  - Automatically: The lead boiler changes automatically based on selectable parameters (boiler sequence mode "Auto")
  - Manually: Selection is made via the operator unit
  - Via signals at the digital inputs
- 3 fault inputs, preconfigured for overpressure, underpressure and shortage of water
- Acquisition and evaluation of the heat requisition signals (via KNX bus, external setpoint, external DHW requisition, and frost protection)

Control of the boiler temperature – general functions

- Boiler temperature control of a maximum of 6 boilers, with separate settings for each boiler
- Individual operation; boiler 1 can be switched to independent operation

Control of the boiler temperature – functions per boiler

- Boiler temperature control with 1-stage, 2-stage or modulating burner
- Modulating burner with 3-position or DC 0…10 V control, with check back signal
- Acquisition of the flue gas temperature, with limit value alarm
- Acquisition of the pump flow
- Maximum and minimum limitation of the boiler temperature
- Maintained boiler return temperature without or with separate mixing valve (3-position or DC 0…10 V)
- Control of a shutoff valve, with check back signal
- Selection of boiler operating mode
- Limitation of the minimum burner running time and return temperature
- Protective boiler startup
- Release of boilers
- Flue gas measuring mode (boiler test mode, chimney sweep function)
- 3 fault inputs, preconfigured for overpressure, underpressure and shortage of water
- Burner hours run counter and burner start counter

Heating circuit control

- Weather-compensated flow temperature control, optionally:
  - Without mixing valve, without circulating pump (only setpoint compensation)
  - Without mixing valve, with circulating pump (pump circuit)
  - With mixing valve, with circulating pump (mixing circuit)
- Adjustable setpoint of the room operating modes Comfort, Precomfort, Economy and Protection
- 7-day program with a maximum of 6 switching points per day
- Adjustable room temperature influence
- Optimum start / stop control
- Boost heating and quick setback

- Room model for room functions without room temperature sensor
- Automatic heating limit for demand-dependent control of the heating system with adjustable heating limits for Comfort and Economy mode
- Automatic changeover to summer operation (heating off)
- Maximum limitation of the room temperature
- Minimum and maximum limitation of the flow temperature
- Maximum limitation of the return temperature
- Limitation of the rate of flow temperature increase
- Valve overrun, valve kick
- Pump overrun, pump kick
- Outside temperature-dependent frost protection for the plant
- Frost protection for the building
- Remote operation with multifunctional room unit via KNX bus
- Heating circuit connection to the main header or precontrolled header

Precontrol

- Acquisition and evaluation of heat requisitions (via KNX bus, external setpoint, external DHW requisition, and frost protection)
- Demand-compensated precontrol through control of the mixing valve (3-position or DC 0…10 V) or of the system pump in the main flow
- Minimum and maximum limitation of the flow temperature
- Maximum limitation of the return temperature
- Maintained boiler return temperature with or without dedicated mixing valve

Data acquisition

Consumption values

Four meters are available for acquiring consumption values.
- Suited for handling pulses delivered by gas, hot water, cold water and electricity meters
- Pulse counting in Wh, kWh, MWh, kJ, MJ, GJ, ml, l, m^3, heat cost units, BTU, or with no unit

Trend data display

Four independent trend channels available to log measured values for a set period. KNX bus room temperature and outside air temperatures can be logged in addition to logical device inputs.

Use of extension modules

Extension modules are used on applications where the number of inputs or outputs do not suffice for the number of functions required:

Type reference	Number of universal inputs	Number of analog outputs	Relay outputs	
			N.O. contact	Changeover contact
RMZ785	8	–	–	–
RMZ787	4	–	3	1
RMZ788	4	2	1	1
RMZ789	6	2	2	2

A maximum of 3 extension modules can be used, irrespective of the type of module.

Bus functions

- Room operator unit with its functions
- Display of fault status messages from other devices on the bus
- Delivery of common fault status messages of all devices on the bus to a fault relay
- Time synchronization
- Passing on and adoption of outside temperature signals
- Sending yearly clock data (time of day, weekday, date, summer- / wintertime changeover) to some other controller, or reception of the yearly clock data from another controller

	• Sending the 7-day or yearly program for holidays / special days to some other controller, or reception of the 7-day or yearly program for holidays / special days from another controller
Service and operating functions	• Wiring test • Boiler test mode • Simulation of the outside temperature • Display of setpoints, actual values and active limitations • Data protection
Note	For a detailed description of all functions of the RMK770 boiler sequence controller, refer to the Basic Documentation P3132.

Type summary

Boiler sequence controller

Type of boiler sequence controller	Type reference	Data Sheet
Boiler sequence controller (languages loaded: de, fr, it, es)	**RMK770-1**	N3132
Boiler sequence controller (languages loaded: de, en, fr, nl)	**RMK770-2**	N3132
Boiler sequence controller (languages loaded: sv, fi, no, da)	**RMK770-3**	N3132
Boiler sequence controller (languages loaded: pl, cs, sk, hu, ru, bg)	**RMK770-4**	N3132
Boiler sequence controller (languages loaded: sr, hr, sl, ro, el, tr)	**RMK770-5**	N3132

Operator and service units

	Type reference	Data Sheet
Operator unit (plug-in type)	**RMZ790**	N3111
Operator unit (detached)	**RMZ791**	N3112
Bus operator unit	RMZ792	N3113
Service tool	**OCI700.1**	N5655

Accessories

	Type reference	Data Sheet
Module connector for detached extension modules	**RMZ780**	N3138

For information about extension modules, refer to section "Functions".

Ordering

When ordering, please give type references according to the above list.
The required operator unit must be ordered as a separate item.
Extension modules, sensors, actuators, valves and room units, etc., must also be ordered separately.

Equipment combinations

Suitable sensors

Type of sensor	Sensing element	Type reference	Data Sheet
Outside sensor	LG-Ni 1000	**QAC22**	N1811
Strap-on temperature sensor	LG-Ni 1000	**QAD22**	N1801
Immersion temperature sensor	LG-Ni 1000	**QAE212…**	N1781
Cable temperature sensor	LG-Ni 1000	**QAP21.3**	N1832
Room temperature sensor	LG-Ni 1000	**QAA24**	N1721
Room temperature sensor	LG-Ni 1000	**QAA64**	N1722
Flue gas temperature sensor	Pt 1000	**FGT-PT1000**	N1846

Suitable room units

Type of room unit	Type reference	Data Sheet
Room temperature sensor with setpoint adjuster	**QAA25**	N1721
Room temperature sensor with setpoint readjuster	**QAA27**	N1721
Room unit with KNX interface	**QAW740**	N1633

Suitable remote setpoint adjusters

Type of setpoint adjuster	Type reference	Data Sheet
Remote setpoint adjuster, 0…1000 Ω signal	**BSG21.1**	N1991
Remote setpoint readjuster, ±3 K	**BSG21.5**	N1991

Suitable actuators	All types of electromotoric and electrohydraulic actuators from Siemens

All types of electromotoric and electrohydraulic actuators from Siemens
- operating on AC 24…230 V
- featuring 3-position control, or
- DC 0…10 V control

can be used.

For detailed information about actuators and valves, refer to Data Sheets
N4000…N4999.

Product documentation

Type of documentation	Classification number
Product Range Description	**S3110**
Basic Documentation	**P3132**
Installation Instructions	**G3133**
Operating Instructions	**B3133**
CE Declaration of Conformity	**T3110**
Environmental Declaration	**E3110…01**

Technical design

Mode of operation

The RMK770 boiler sequence controller is supplied complete with 18 programmed standard applications including heat sources with 2 boilers. Some of them necessitate extension modules. All types of plant can be matched to specific requirements, such as additional boilers, primary controller, heating circuit or twin pumps.

When commissioning the system, the relevant plant type must be entered whereupon all associated functions, terminal assignments, settings and displays will automatically be activated. Parameters that are not required will be deactivated.

In addition, an empty application is provided.

With the help of the operator unit, the boiler sequence controller facilitates the following:
- Activation of a programmed application
- Modification of a programmed application
- Free configuration of applications
- Optimization of settings

For more detailed information, refer to the Basic Documentation P3132.

Control loops

The RMK770 can control a maximum of 6 boilers, 1 heating circuit and 1 precontrol circuit. The controlled heating circuit can be operated parallel to or in series with the primary controller.
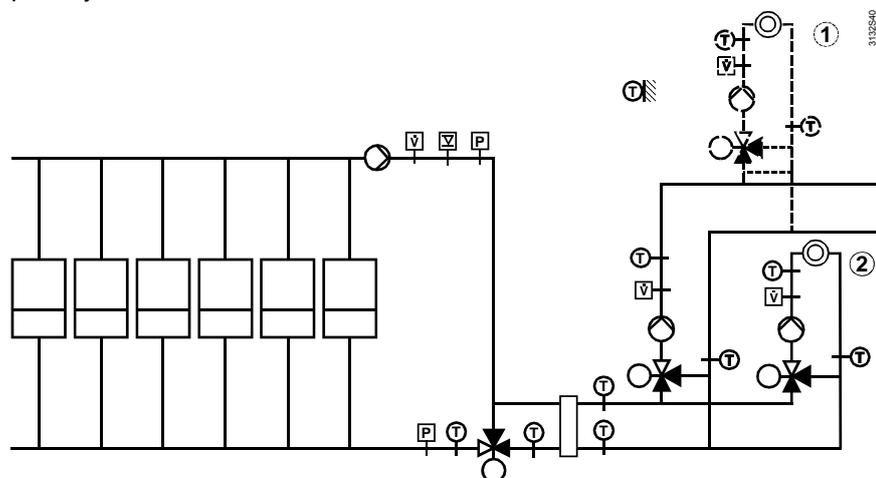
Ⅴ	Flow switch	①	Heating circuit in series with the primary controller
Ⅴ	Level switch	②	Heating circuit parallel to the primary controller
Ⅴ	Pressure switch		

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Siemens
Building Technologies

Boiler sequence controller RMK770

CE1N3132en
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Boiler sequence control

Plant types

The individual plant types for boiler sequence control are characterized as follows:
- There is a total of 6 **hydraulic circuits**. These are listed in section "Types of hydraulic circuits" (plant types K1.x … K6.x)
- For each type of hydraulic circuit, the **burner type** for boiler temperature control can be selected for each boiler:
  - 1-stage burner (plant type Kx.1), optionally a modulating burner with DC 0…10 V control
  - 2-stage burner (plant type Kx.2)
  - Modulating burner (plant type Kx.3) with 3-position control
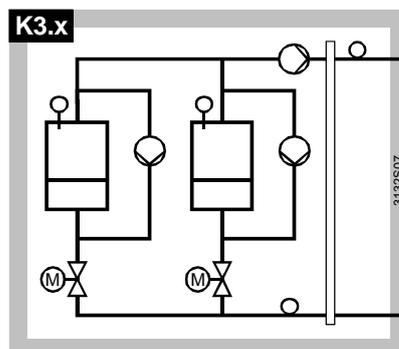
Types of hydraulic circuits
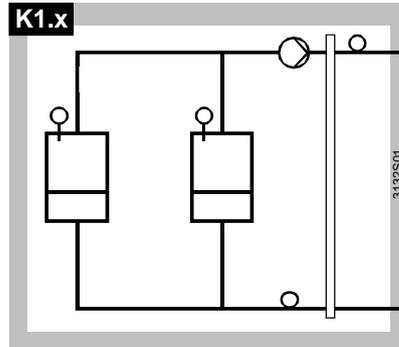
K1.x

3132S01
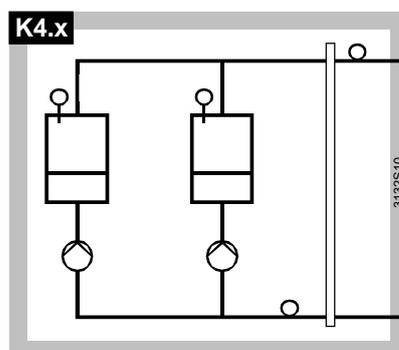
Multiboiler plant with
- 1 main pump in the common boiler flow

K2.x

3132S04
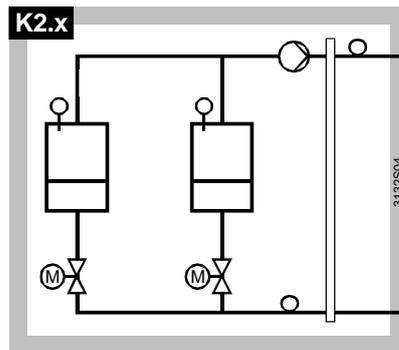
Multiboiler plant with
- 1 main pump in the common boiler flow
- 1 shutoff valve in the return of each boiler

K3.x

3132S07
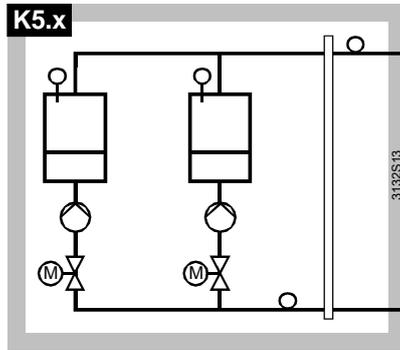
Multiboiler plant with
- 1 main pump in the common flow
- 1 bypass pump per boiler
- 1 shutoff valve in the return of each boiler

K4.x

3132S10
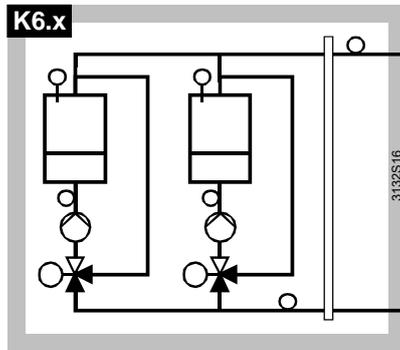
Multiboiler plant with
- 1 pump in the return of each boiler

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K5.x

Multiboiler plant with
- 1 pump in the return of each boiler
- 1 shutoff valve in the return of each boiler

K6.x

Multiboiler plant with
- 1 shutoff valve in the return of each boiler
- Maintained boiler return temperature of each boiler (modulating or 3-position control)

Variants

To ensure optimum plant operation, all programmed plant types are configured with boiler sensor, main flow sensor and main return sensor. Following must be observed:
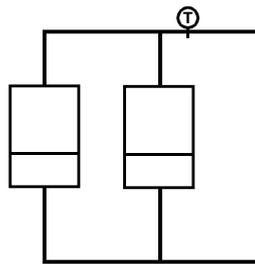
If no boiler sensor is installed, use of a main flow sensor is mandatory.
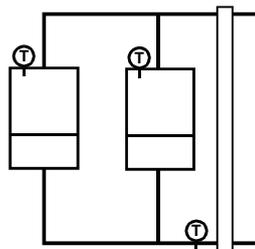
If a pressureless header is used, it is recommended to install a main return sensor.
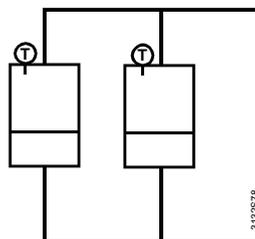
If no main flow sensor is installed, the controller adopts the measured value from the boiler sensor of the current lead boiler. Hence, the boiler sequence can be controlled with no need for using a main flow sensor.
This variant can only be used on dual boiler plant.

Control loops

In addition to boiler sequence control and boiler temperature control (boilers 1…6), the RMK770 provides the following control functions:

- Control of a heating circuit in the form of weather-compensated flow temperature control
- Demand-dependent precontrol

Heating circuit control

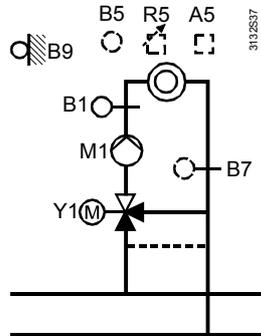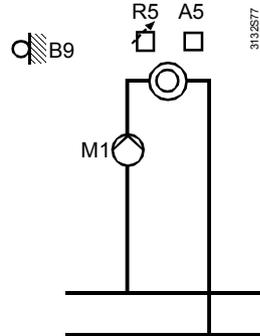| Weather-compensated heating circuit control	Weather-compensated pump heating circuit control	Generation of a weather-compensated flow temperature setpoint

A5 Room unit (optional)
B1 Flow temperature sensor
B5 Room temperature sensor (optional)
B7 Room temperature sensor (optional, for maximum limitation)
B9 Outside sensor
M1 Heating circuit pump
R5 Remote setpoint adjuster (optional)
Y1 Mixing valve

A5 Room unit (optional)
B9 Outside sensor
M1 Heating circuit pump
R5 Remote setpoint adjuster (optional)
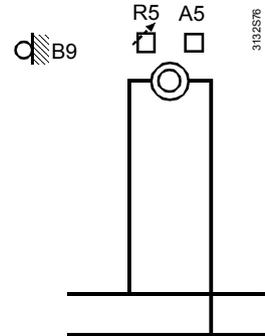
A5 Room unit (optional)
B9 Outside sensor
R5 Remote setpoint adjuster (optional)

Precontrol
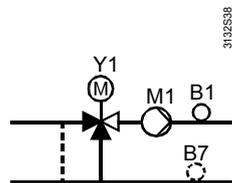
With mixing valve   With system pump
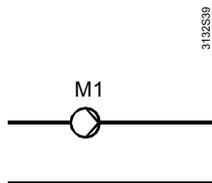
B1 Flow temperature sensor
B7 Return temperature sensor (optional, for maximum limitation)
M1 System pump
Y1 Mixing valve

Extension modules

Extension modules are used depending on the plant's complexity, ensuring that a sufficient number of inputs and outputs are available.

Mechanical design

Makeup

The RMK770 boiler sequence controller consists of terminal base and insert. It has a plastic housing with the printed circuit boards, 2 terminal levels and carries the connecting elements (electrical and mechanical) for 1 extension module.
The unit can be fitted to a top hat rail conforming to EN 60 715-TH 35-7.5, or can be mounted directly on a wall.
Operation is facilitated via a plug-in type or detached operator unit (refer to "Type summary").

Operating, display and connecting elements
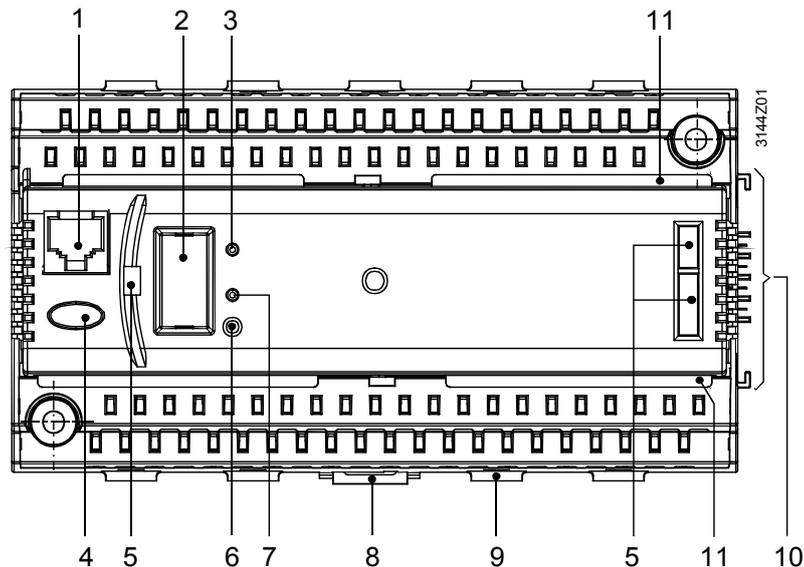
1 Connection facility for service interface (RJ45 socket)
2 Connection facility for operator unit (with removable cover)
3 LED (green) for indication of operation
4 Fault button with LED (red) for indication of faults and for resetting
5 Openings for plug-in type operator unit RMZ790
6 Button for assigning the device address
7 LED (red) for indication of the programming process
8 Mounting facility for fitting the unit to a top hat rail
9 Fixing facility for a cable tie
10 Electrical and mechanical connecting elements for extension module
11 Rest for the terminal cover

Engineering notes

- The RMK770 can be used in connection with a **maximum of 3** extension modules
- The unit operates on AC 24 V. Operating voltage must conform to the requirements of SELV / PELV (safety extra low-voltage)
- The transformers used must be safety isolating transformers featuring double insulation to EN 60742 and EN 61558-2-6; they must be suited for 100 % duty
- Fuses, switches, wiring and grounding must be in compliance with local safety regulations for electrical installations
- Sensor wires should not be run parallel to mains carrying cables powering actuators, pumps, etc.
- To define the details of configuration and to generate the plant connection diagrams, the following pieces of documentation are helpful:
  − Configuration diagrams (contained in the Basic Documentation P3132)
  − Application Sheets
- The reference room for control with a room temperature sensor should be the room that cools down quickest. That room must not be equipped with thermostatic radiator valves; manual valves must be locked in their fully open position

Mounting and installation notes

- Controller and extension modules are designed for:
  − Mounting in standard control cabinets conforming to DIN 43880
  − Wall mounting on an existing top hat rail (EN 50022-35×7,5)
  − Wall mounting with 2 fixing screws
  − Flush panel mounting
- Not permitted are wet or damp spaces. The permissible environmental conditions must be observed
- If the RMK770 shall not be operated inside a control panel, the detached RMZ791 operator unit can be used in place of the RMZ790 plug-in type
- Prior to mounting the RMK770, the system must be disconnected from power supply

Kleinspannungsseite

Netzspannungsseite
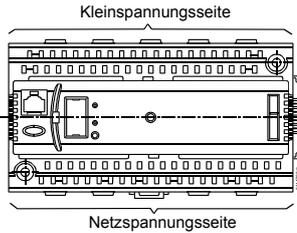
- **The insert of the RMK770 must not be removed from the terminal base!**
- If extension modules are used, they must be attached to the right side of the RMK770 in the correct order and in accordance with the internal configuration
- The extension modules require no wiring between them or from the modules to the RMK770. The electrical connections are made automatically when attaching the modules. If it is not possible to arrange all required universal modules side by side, the first of the detached modules must be connected to the previous module or to the RMK770 using the RMZ780 module connector. In that case, the maximum cable length is 10 m
- All connection terminals for protective extra low-voltage (sensors, data bus) are located in the upper half of the unit, those for mains voltage (actuators and pumps) at the bottom
- Each terminal (spring cage terminals) can accommodate only 1 solid wire or 1 stranded wire. To connect the cables, the insulation must be stripped for 7 to 8 mm. To introduce the cables into the spring cage terminals and to remove them, a screwdriver of size 0 or 1 is required
- Cable strain relief can be provided with the help of the fixing facility for cable ties
- The unit is supplied complete with Installation Instructions and Operating Instructions

Commissioning notes

- Configuration and parameters of the standard applications programmed in the RMK770 can be changed any time locally by personnel trained by Siemens who have the respective access rights to the RMZ790 or RMZ791 operator unit, or online or offline using the service tool
- During the commissioning process, the application remains switched off and the outputs are in a defined off state. During that time, no process and alarm signals will be delivered to the bus
- On completion of the configuration, the unit will automatically be restarted
- When leaving the commissioning pages, the peripheral devices (including the extension modules) connected to the universal inputs will automatically be checked and identified. If, later, a peripheral device is missing, a fault status message will be output
- The operator unit can be removed and plugged in or connected while the RMK770 is in operation
- Adaptations required due to specific plant conditions must be recorded and the relevant document should be stored in the control panel
- The procedure to be followed when starting up the plant for the first time is described in the Installation Instructions

Disposal notes

The largest plastic parts carry material identifications conforming to ISO/DIS 11469 to facilitate environment-compatible disposal.

Technical data

Power supply (G, G0)	Operating voltage	AC 24 V ±20 %
	Safety extra low-voltage / protective extra low-voltage (SELV / PELV) to	HD 384
	Requirements for external safety isolating transformer (100 % duty, max. 320 VA) to	EN 60742 / EN 61558-2-6
	Frequency	50/60 Hz
	Power consumption (excl. modules)	12 VA
	Supply line fusing	max. 10 A

Functional data	Reserve of clock	
	Typically	48 h
	Minimum	12 h

Analog inputs **X1…X8**	Sensors	
	Passive	1 or 2 LG-Ni 1000, T1, Pt 1000
	Active	DC 0…10 V
	Signal sources	
	Passive	0…2500 Ω
	Active	DC 0…10 V

Digital inputs **X1…X8, D1, D2**	Contact sensing	
	Voltage	DC 15 V
	Current	5 mA
	Requirements for status and impulse contacts	
	Signal coupling	potential-free
	Type of contact	maintained or impulse contacts
	Insulating strength against mains potential	AC 3750 V to EN 60730
	Permissible resistance	
	Contacts closed	max. 200 Ω
	Contacts open	min. 50 kΩ

Positioning output Y1, Y2	Output voltage	DC 0…10 V
	Output current	$\pm$1 mA
	Max. load	continuous short-circuit

⚠ **Switching outputs Q1x…Q7x**

	External supply line fusing	
	Wire fuse (slow)	max. 10 A
	Automatic line cutout	max. 13 A
	Release characteristic	B, C, D to EN 60898
	Cable length	max. 300 m
	Relay contacts	
	Switching voltage	max. AC 250 V / min. AC 19 V
	AC current	max. 4 A ohm., 3 A ind. (cos φ = 0.6)
	At 250 V	min. 5 mA
	At 19 V	min. 20 mA
	Switch-on current	max. 10 A (1 s)
	Contact life at AC 250 V	guide values:
	0.1 A (res.)	2×10^7 cycles
	N.O. contact at 0.5 A (res.)	4×10^6 cycles
	Changeover contact at 0.5 A (res.)	2×10^6 cycles
	N.O. contact at 4 A (res.)	3×10^5 cycles
	Changeover contact at 4 A (res.)	1×10^5 cycles
	Reduction factor at ind. (cos φ = 0.6)	0.85
	Insulating strength	
	between relay contacts and system electronics (reinforced insulation)	AC 3750 V to EN 60730-1
	between neighboring relay contacts (operational insulation) Q1$\Leftrightarrow$Q2; Q3$\Leftrightarrow$Q4; Q5$\Leftrightarrow$Q6$\Leftrightarrow$Q7	AC 1250 V to EN 60730-1
	between relay groups (reinforced insulation) (Q1, Q2) $\Leftrightarrow$ (Q3, Q4) $\Leftrightarrow$ (Q5, Q6, Q7)	AC 3750 V to EN 60730-1

Power supply external devices (G1)	Voltage	AC 24 V
	Current	max. 4 A

Interfaces	KNX bus	
	Type of interface	KNX-TP1
	Bus loading number	2.5
	Bus power supply (decentral, can be switched off)	25 mA
	Power failure of short duration to EN 50 090-2-2	100 ms with 1 extension module
	Extension bus	
	Connector specification	4 contacts SELV / PELV
	Number of plugging cycles	max. 10
	Service tool connection facility	RJ45

Perm. Cable lengths	For passive measuring and positioning signals*	
	LG-Ni 1000	max. 300 m
	0…1000 Ω	max. 300 m
	1000…1235 Ω	max. 300 m
	Contact sensing	max. 300 m
	For DC 0…10 V measuring and control signals	refer to the documentation of the signal-delivering device
	For KNX bus	max. 700 m
	Type of cable	2-core, unshielded, twisted pairs

* Measuring errors can be corrected via the "Settings > Inputs" menu

Electrical connections	Connection terminals	spring cage terminals
	Solid wires	dia. 0.6 mm…2.5 mm^2
	Stranded wires without ferrules	0.25…2.5 mm^2
	Stranded wires with ferrules	0.25…1.5 mm^2
	Connection facility for KNX bus	wires cannot be interchanged

Protective data	Degree of protection of housing to IEC 60 529	IP20 (when built in)
	Safety class to EN 60730	device suited for use in equipment of class II

Environmental conditions	Operation to	IEC 60721-3-3
	Climatic conditions	class 3K5
	Temperature (housing with electronics)	0…50 °C
	Humidity	5…95 % r. h. (noncondensing)
	Mechanical conditions	class 3M2
	Transport to	IEC 60 721-3-2
	Climatic conditions	class 2K3
	Temperature	$-25…+70$ °C
	Humidity	<95 % r. h.
	Mechanical conditions	class 2M2

Classifications to EN 60730	Mode of operation, automatic controls	type 1B
	Degree of contamination, controls' environment	2
	Software class	A
	Rated surge voltage	4000 V
	Temperature for ball-pressure test of housing	125 °C

Materials and colors	Terminal base	Polycarbonate, RAL 7035 (light-gray)
	Controller insert	Polycarbonate, RAL 7035 (light-gray)
	Packaging	corrugated cardboard

Standards	Product safety	
	Automatic electrical controls for household and similar use	EN 60730-1
	Special requirements for energy controllers	EN 60730-2-11
	Electromagnetic compatibility	
	For use in industrial and domestic environments	
	Immunity	EN 60730-1
	Emissions	EN 60730-1
	Home and Building Electronic System (HBES)	EN 50090-2-2
	CE conformity to	
	EMC directive	2004/108/EC
	Low-voltage directive	2006/95 EC
	ℭ conformity to	
	Australian EMC Framework	Radio Communication Act 1992
	Radio Interference Emission Standard	AS / NZS 3548
	Environmental compatibility	
	The environmental product declaration E3110x01 contains data on environmentally compatible product design and assessments (RoHS compliance, materials composition, packaging, environmental benefit, disposal)	ISO 14001 (Environment) ISO 9001 (Quality) SN 36350 (Environmentally compatible products) RL 2002/95/EG (RoHS)

Weight	Net weight excl. packaging	0.490 kg

Connection diagram

CE+	KNX bus data line (positive)	
CE−	KNX bus data line (negative)	
D1, D2	Status or impulse contact	
G, G0	Operating voltage AC 24 V	
G0	System neutral for signal output	
G1	Output voltage AC 24 V for powering external active sensors, signal sources, and monitors	
M	Measuring neutral for signal input	
N1, N2	Spark suppression device for 3-position actuators	
Q1…, Q4…	Potential-free relay outputs (changeover) for AC 24…230 V	
Q2…, Q3…, Q5…, Q6…, Q7…	Potential-free relay outputs (N.O. contacts) for AC 24…230 V	
X1…X8	Universal signal inputs for LG-Ni 1000, 2× LG-Ni 1000 (averaging), T1, Pt 1000, DC 0…10 V, 0…1000 Ω (setpoint), 1000…1175 Ω (relative setpoint), contact sensing (potential-free)	
Y1, Y2	Control or status outputs DC 0…10 V	

Notes
- Each terminal (spring cage terminals) can accommodate only 1 solid wire or 1 stranded wire
- Double terminals are internally interconnected

Connection examples

Low-voltage connections
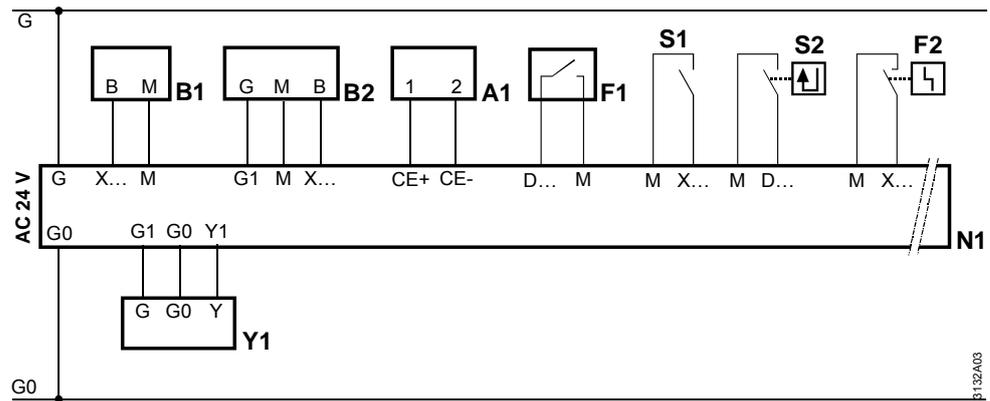
A1	KNX device
B1	Passive sensor (setpoint adjuster)
B2	Active sensor (setpoint adjuster)
F1	Fault contact (e.g. thermostat)
F2	Fault contact (e.g. pressure switch), on the burner
N1	RMK770 boiler sequence controller
S1	Manual switch, service switch, etc.
S2	Operational signal, e.g. from the burner or shutoff valve
Y1	Actuator with DC 0…10 V control input

Connection of 3-position actuators
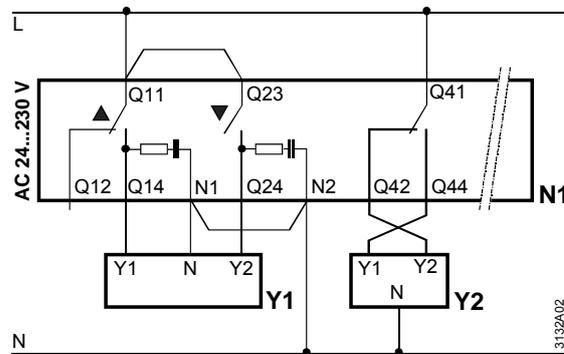
N1	RMK770 boiler sequence controller
Y1	3-position actuator for mixing valve
Y2	3-position actuator for shutoff valve

Connection of 1 twin pump or 2 single pumps
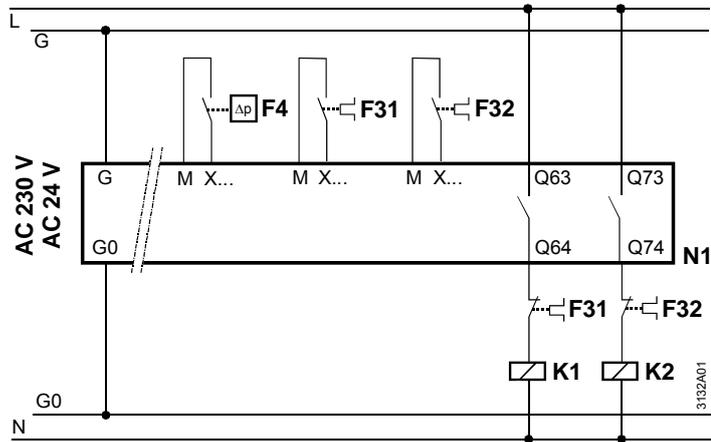
F31, F32   Overcurrent release contact
F4   Pressure switch
K1   Motor contactor for pump
K2   Motor contactor for pump
N1   RMK770 boiler sequence controller

Connection of safety loop for a 2-stage burner
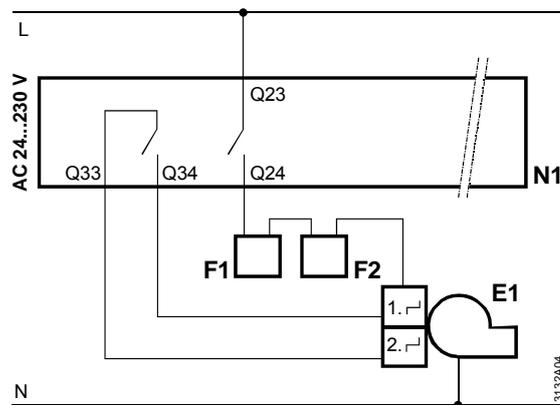
E1   2-stage burner
F1   Limit thermostat
F2   Safety limit thermostat
N1   RMK770 boiler sequence controller

Connection of safety loop for a modulating burner
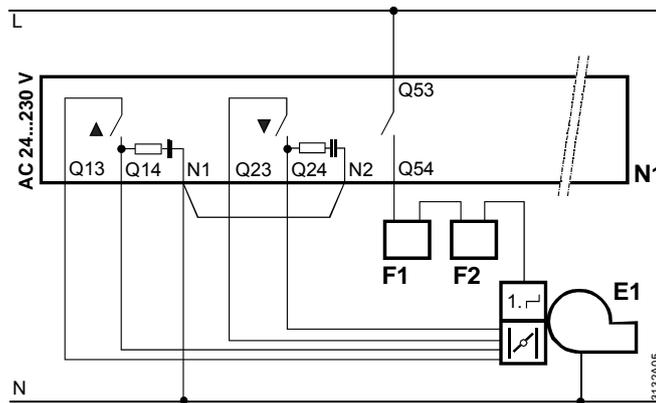
E1   Modulating burner
F1   Limit thermostat
F2   Safety limit thermostat
N1   RMK770 boiler sequence controller

Overview of the programmed plant types

Plant type	Description	Plant diagram
K1.1	Functions: • Boiler temperature control with 1-stage burner; optionally with modulating burner using DC 0…10 V control • Control of the main flow or main return temperature • Control of the main pump	K1.1 — N.X3, N.Q2, N.X6, N.Q5, N.Q7, N.X1, N.X2, 3132S19
K1.2	Functions: • Boiler temperature control with 2-stage burner • Control of the main flow or main return temperature • Control of the main pump	K1.2 — N.X3, N.Q2/N.Q3, N.X6, N.Q5/N.Q6, N.Q7, N.X1, N.X2, 3132S20
K1.3	Functions: • Boiler temperature control with modulating burner using 3-position control • Control of the main flow or main return temperature • Control of the main pump This requires extension module type RMZ789	K1.3 — N.X3, N.Q2/A9.Q1/A9.Q2, N.X6, N.Q5/A9.Q3/A9.Q4, N.Q7, N.X1, N.X2, 3132S21
K2.1	Functions: • Boiler temperature control with 1-stage burner; optionally with modulating burner using DC 0…10 V control • Control of the shutoff valve in the boiler return • Control of the main flow or main return temperature • Control of the main pump	K2.1 — N.X3, N.Q2, N.X6, N.Q5, N.Q1, N.Q4, N.Q7, N.X1, N.X2, 3132S22
K2.2	Functions: • Boiler temperature control with 2-stage burner • Control of the shutoff valve in the boiler return • Control of the main flow or main return temperature • Control of the main pump	K2.2 — N.X3, N.Q2/N.Q3, N.X6, N.Q5/N.Q6, N.Q1, N.Q4, N.Q7, N.X1, N.X2, 3132S23

Plant type	Description	Plant diagram
K2.3	Functions: • Boiler temperature control with modulating burner using 3-position control • Control of the shutoff valve in the boiler return • Control of the main flow or main return temperature • Control of the main pump This requires extension module type RMZ789	K2.3 N.Q7 N.X1 N.X3 N.X6 N.Q2 A9.Q1 A9.Q2 N.Q5 A9.Q3 A9.Q4 N.Q1(M) N.Q4(M) N.X2 3132S24
K3.1	Functions: • Boiler temperature control with 1-stage burner; optionally with modulating burner using DC 0…10 V control • Control of the shutoff valve in the boiler return • Control of the boiler bypass pump • Control of the main flow or main return temperature • Control of the main pump	K3.1 N.Q7 N.X1 N.X3 N.X6 N.Q2 N.Q3 N.Q5 N.Q6 N.Q1(M) N.Q4(M) N.X2 3132S25
K3.2	Functions: • Boiler temperature control with 2-stage burner • Control of the shutoff valve in the boiler return • Control of the boiler bypass pump • Control of the main flow or main return temperature • Control of the main pump This requires extension module type RMZ787	K3.2 N.Q7 N.X1 N.X3 N.X6 1. 2. N.Q2 N.Q3 A7.Q1 1. 2. N.Q5 N.Q6 A7.Q2 N.Q1(M) N.Q4(M) N.X2 3132S26
K3.3	Functions: • Boiler temperature control with modulating burner using 3-position control • Control of the shutoff valve in the boiler return • Control of the boiler bypass pump • Control of the main flow or main return temperature • Control of the main pump This requires extension module type RMZ789	K3.3 N.Q7 N.X1 N.X3 N.X6 N.Q2 A9.Q1 A9.Q2 N.Q3 N.Q5 A9.Q3 A9.Q4 N.Q6 N.Q1(M) N.Q4(M) N.X2 3132S27
K4.1	Functions: • Boiler temperature control with 1-stage burner; optionally with modulating burner using DC 0…10 V control • Control of the boiler return pump • Control of the main flow or main return temperature	K4.1 N.X1 N.X3 N.X6 N.Q2 N.Q5 N.Q1 N.Q4 N.X2 3132S28

Plant type	Description	Plant diagram
K4.2	Functions: • Boiler temperature control with 2-stage burner • Control of the boiler return pump • Control of the main flow or main return pump	
K4.3	Functions: • Boiler temperature control with modulating burner using 3-position control • Control of the boiler return pump • Control of the main flow or main return temperature This requires extension module type RMZ789	
K5.1	Functions: • Boiler temperature control with 1-stage burner; optionally with modulating burner using DC 0…10 V control • Control of the boiler return pump • Control of the shutoff valve in the boiler return • Control of the main flow or main return temperature	
K5.2	Functions: • Boiler temperature control with 2-stage burner • Control of the boiler return pump • Control of the shutoff valve in the boiler return • Control of the main flow or main return temperature This requires extension module type RMZ787	
K5.3	Functions: • Boiler temperature control with modulating burner using 3-position control • Control of the boiler return pump • Control of the shutoff valve in the boiler return • Control of the main flow or main return temperature This requires extension module type RMZ789	

Plant type	Description	Plant diagram
K6.1	Functions: • Boiler temperature control with 1-stage burner; option-ally with modulating burner using DC 0…10 V control • Controlled maintained boiler return temperature, with 3-position control (optionally with DC 0…10 V control) • Control of the boiler circuit pump • Control of the main flow or main return temperature Depending on the plant's complexity, an extension module type RMZ789 is required:	

Boiler temperature control	Maintained boiler return temperature 3-position	Maintained boiler return temperature DC 0…10 V
1-stage burner	RMZ789	None
Modulating DC 0…10 V	RMZ789	RMZ789

Plant type	Description	Plant diagram
K6.2	Functions: • Boiler temperature control with 2-stage burner • Controlled maintained boiler return temperature, with 3-position control (optionally with DC 0…10 V control) • Control of the boiler circuit pump • Control of the main flow or main return temperature If 3-position control is used for maintained boiler return temperature, extension module type RMZ789 is required	
K6.3	Functions: • Boiler temperature control with modulating burner using 3-position control • Controlled maintained boiler return temperature, with 3-position control (optionally with DC 0…10 V control) • Control of the boiler circuit pump • Control of the main flow or main return temperature This requires 2 extension modules type RMZ789	

Explanations:
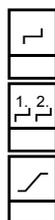
 = Boiler with 1-stage burner

 = Boiler with 2-stage burner

 = Boiler with modulating burner

N	=	Connection terminals of the RMK770
X1	=	Configurable input at the RMK770
Q1	=	Relay terminals Q11, Q12 and Q14
Q2	=	Relay terminals Q23 and Q24
A7	=	Connection terminals of RZM787 extension module
A9	=	Connection terminals of RZM789 extension module
A9(2)	=	Connection terminals of second RZM789 extension module

Dimensions

80

5

18 5

3 2

ø 5,2

ø 10,5

90

45

35

44

RMZ790

EN 60 715-TH 35-7.5

173

3

66,4

=

=

=

=

153

Dimensions in mm