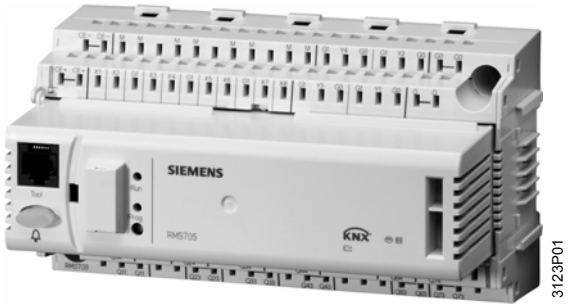



Synco™ 700

# Switching and Monitoring Device RMS705

- **Freely configurable unit thanks to extended configuration choices**
- **Additional universal inputs for indication and monitoring /alarming**
- **Data acquisition: Pulse counter (for display only), hours run counter, data trending, event logger (e.g. for the legionella function)**
- **Choice of switching and monitoring functions in combination with logic operations**
- **Lead / lag control of pumps, fans, motors, refrigeration machines, etc., with automatic changeover**
- **3 basic universal controllers**
- **Unit can be extended with extension modules type RMZ785 and RMZ787**
- **Menu-driven operation with separate plug-in type or detached operator unit**
- **Konnex bus connection facility for operation and process information**

## Use

- Switching and monitoring of plant components in heating, ventilation or refrigeration plant
- For non-standard applications

The RMS705 offers extended configuration choices to allow free configurations within the scope of the available function blocks and, for this reason, does not provide any predefined standard applications.
As with all types of Synco™ 700 devices, once an application is created, it can be archived in the form of readable parameter sets to be reused as an adapted or identical application for other plant.

**Universal inputs**

8 to 28 *) universal inputs for:

- Passive or active analog input signals of various measuring variables (°C, %, g/kg, kJ/kg, W/m$^2$, bar, mbar, m/s, Pa, ppm, BTU, without unit, pulse)
- Digital input signals (potential-free contacts)

*) When using extension modules: 1 x RMZ787 + 2 x RMZ785

**Additional I/Os via extension modules**

Additional inputs and outputs can be provided for extending the unit's functionality.
A **maximum of 3 extension modules per RMS705** can be connected. Suited are the following types of modules:

- Maximum 2 universal modules type RMZ785 (8 UI)
- Maximum 2 universal modules type RMZ787 (4 UI, 4 DO)

As a maximum, each RMS705 has:

- 28 universal inputs (Ni1000, Pt1000, T1, DC 0...10 V, 0…1000 Ω, digital, pulses)
- 14 control output relays
- 4 modulating outputs DC 0...10 V

**Data acquisition**

**Pulse counter** (for display only, not for billing purposes)
4 counters are available for acquiring consumption values.
Pulses from gas, hot water, cold water and electricity meters can be handled.

- Pulse counting (Wh, kWh, MWh, kJ, MJ, GJ, ml, l, m$^3$, heat cost units, BTU, without unit)

**Hours run meters**
There are 4 hours run meters showing:

- The total number of operating hours
- Maintenance messages (with adjustable interval)
- The number of operating hours since the last maintenance visit

**Trend display of data**
4 independent trend channels are available for recording measuring variables.
In addition to the local inputs of the unit, it is also possible to log room temperatures and the outside temperature delivered via the KNX bus.

**Event logger** (e.g. for the legionella function)
4 event loggers are available; they are used for recording events and for monitoring their scheduled occurrence.

- Logging the last 10 events per logger with time of day and date stamp when "Limit value on" and "Limit value off" are reached
- Saving the maximum or minimum value during the period of time the event occurs
- Selectable fault status message when the minimum or maximum
  - event cycle time is crossed
  - event duration is exceeded

**Switching and monitoring functions**

**Fault status block**
A fault status block is available featuring:

- 20 fault status inputs, configurable via universal inputs (analog and digital) and fault status messages delivered via the KNX bus
- Fault indication with red LED, acknowledgement via button
- 2 relay outputs, configurable as fault relays
- 1 digital input, for the external reset of fault status messages

**7-day time switches**

Six 7-day time switches provide the following functions:

- 6 switch-on or switch-off times per day, configurable relay output
- Yearly time switch with automatic summer- / wintertime changeover
- Operation selector (AUTO, ON, OFF), can be configured for manual control
- Configurable holiday and special day program
- From other 7-day time switches via the KNX bus as slaves (sending not possible)

**Logic function blocks**

10 freely configurable logic function blocks are available; they are used for handling several logically connected universal input variables.

- Configurable AND, NAND, OR, NOR, EXOR and EXNOR logic functions
- Adjustable switch-on and switch-off delays
- Adjustable minimum on and off times
- Operation selector (AUTO, ON, OFF), configurable for manual control

**Comparators**

2 comparators are available; they are used for comparing 2 analog input signals. Output signal with adjustable switch-on and switch-off delays and adjustable minimum on and off times.

**Universal motor blocks**

6 universal motor blocks are available; they are used for controlling and monitoring motors:

- 1-speed motors (pumps, fans)
- 2-speed motors (fans)
- Twin motors (twin pumps)
- Precommand for dampers or valves installed upstream
- Adjustable times
- Motor kick and switching on at low outside temperatures
- Hours run counter per motor block

**Rotary step switches**

2 rotary step switches are available affording selectable step switch characteristics per block:

- Linear step switch
- Binary step switch
- Flexible step switch
- With stepwise precommand, switching and modulating outputs
- Lead / lag control of pumps, fans, motors, refrigeration machines, etc., with automatic changeover
- Adjustable times

**Control functions**

**Universal controllers**

There are 3 universal controllers as PID sequence controllers each with 2 sequence outputs (1 heating sequence and 1 cooling sequence).

- Control to an absolute variable or a differential
- Individually adjustable heating and cooling setpoints (or upper and lower setpoints)
- Adjustable control timeout

Setpoints

- Universal shift: Setpoint can be shifted depending on another variable, or it can be adapted via a remote setpoint adjuster

**Bus functions**

- Display of fault status messages from other devices via bus
- Output of a common fault status message of all devices on the bus to a fault relay
- Time synchronization
- Delivery and adoption of outside temperature signal

- Forwarding the yearly clock data (time of day, weekday, date, summer- / wintertime changeover) to another controller, or reception of the yearly clock data from another controller
- Reception of the 7-day program from another controller
- Forwarding the yearly program for holidays / special days to another controller or reception of the yearly program for holidays / special days from another controller
- Reception and forwarding of a demand signal (hot or chilled water) for the primary controller or the heat source or refrigeration machine
- Reception and evaluation of refrigeration demand signals if configured as a primary controller or refrigeration machine

**2-pipe system for heating / cooling**
If a 2-pipe system for heating / cooling is used, the heating / cooling changeover signal received via a digital input can be handled by the unit and forwarded to other bus users via the KNX bus.

**Demand for heat and refrigeration**
Collection, evaluation and forwarding of heat and refrigeration requests from and via the KNX bus. Also configurable are the following:
- Modulating output (e.g. for demand-dependent setpoint shift of a refrigeration machine)
- Relay output (e.g. for switching a refrigeration machine)
- Demand-dependent setpoint shift acting on the primary controller
- Adjustable setpoint boost when used in connection with a primary controller

**Service and operating functions**
- Outside temperature simulation
- Wiring test
- Data backup
- Display of setpoints and actual values

## Type summary

**Switching and Monitoring device**

| *Type reference* | *Universal inputs* | *Positioning outputs DC 0...10 V* | *Switching outputs* | *Languages loaded* |
|---|---|---|---|---|
| **RMS705-1** | 8 | 4 | 6 | **de**, fr, it, es |
| **RMS705-2** | 8 | 4 | 6 | **de**, fr, nl, en |
| **RMS705-3** | 8 | 4 | 6 | da, fi, no, sv |
| **RMS705-4** | 8 | 4 | 6 | pl, cs, hu, ru, sk |
| **RMS705-5** | 8 | 4 | 6 | el, ro, sl, sr, hr |

**Accessories**

| | *Description* | *Type reference* | *Data Sheet* |
|---|---|---|---|
| Operator / service units | Operator unit, plug-in type | **RMZ790** | N3111 |
| | Operator unit, detached | **RMZ791** | N3112 |
| | Service tool | **OCI700.1** | N5655 |
| Extension modules | Universal module with 8 universal inputs | **RMZ785** | N3146 |
| | Universal module with 4 universal inputs and 4 relay outputs | **RMZ787** | N3146 |
| | Module connector for detached extension modules | **RMZ780** | N3138 |

## Ordering and delivery

When ordering, please give name and type reference of the switching and monitoring device, e.g.: Switching and monitoring device **RMS705-2**.
The products listed under "Accessories" must be ordered as separate items.

## Equipment combinations

The table below contains the different types of devices that can be used in connection with the RMS705 and the extension modules:

| *Type of device* | *Type reference* | *Data Sheet* |
|---|---|---|
| Setpoint adjuster, passive | BSG21.1 | N1991 |
| Setpoint adjuster, active | BSG61 | N1992 |
| Sensors, passive | All types of sensors using a sensing element LG-Ni 1000, Pt 1000, T1 (PTC) | N1721...N1847, N1713 |
| Sensors, active | All types of sensors<br>– operating on AC 24 V<br>– having a DC 0…10 V output | N1821, N1850...N1962 |
| Monitors | QAF81..., QAF64...,<br>QFA81, QFM81,<br>QFA1000, QFA1001,<br>QFX21, QXA2000,<br>QBM81... | N1284, N1283,<br>N1513, N1514,<br>N1518,<br>N1541, N1542<br>N1552 |
| Signal converter and Processor for absolute humidity and enthalpy | SEZ220 | N5146 |
| Variable speed drives | SED2… | N5192 |
| Transformers | SEM62.2 | N5536 |

## Product documentation

| *Type of document* | *Document no.* |
|---|---|
| Description of Synco™700 product range | **CE1S3110en** |
| Basic Documentation (detailed description of all functions) | **CE1P3123en** |
| Installation Instructions (mounting and commissioning) G3140 | **74 319 0398 0** |
| Operating Instructions (**de**, fr, it, es) B3123x1 | **74 319 0502 0** |
| Operating Instructions (**de**, fr, nl, en) B3123x2 | **74 319 0503 0** |
| Data Sheet "Konnex Bus KNX" | **CE1N3127en** |
| Basic Documentation "Communication via Konnex bus for devices of the Synco™700 range and RXB room controllers" | **CE1P3127en** |
| CE Declaration of Conformity | **CE1T3110xx** |
| Environmental Declaration | **CE1E3110en01** |

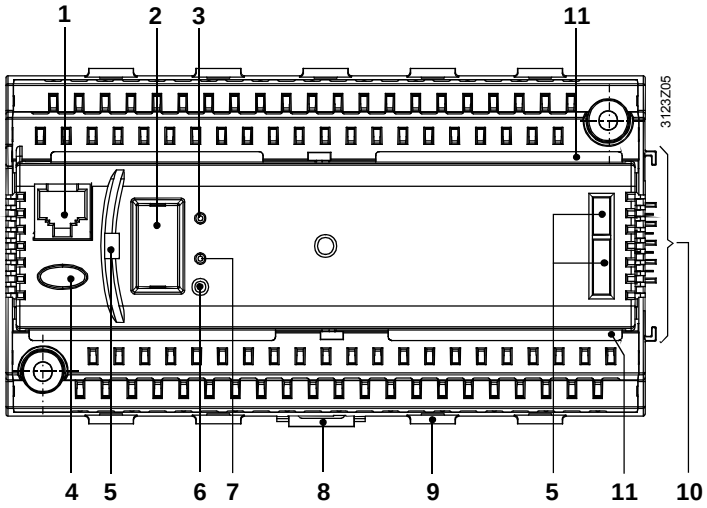
## Technical design

With the help of the RMZ790 or RMZ791 operator unit, the RMS705 permits free configuration of applications.
For detailed information about the functions, refer to Basic Documentation CE1P3123en.

## Mechanical design

The RMS705 switching and monitoring unit consists of insert and terminal base. The terminal base has 2 terminal levels and carries the connecting elements (electrical and mechanical) for an extension module. The insert with the printed circuit boards is plugged into the terminal base.
The unit can be mounted on a top hat rail (conforming to EN 60 715-TH35-7.5) or directly on the wall.
Operation takes place via the plug-in type or detached operator unit (refer to section "Accessories").

### Operation, indication and connecting elements




*Legend*

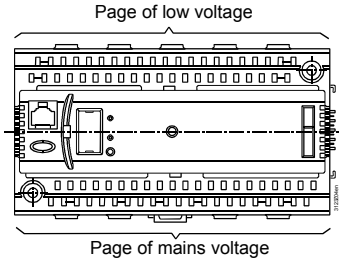
1 Connection facility for service tool (RJ45 connector)
2 Removable protective cover with connection facility for operator unit
3 LED "RUN" for indicating the unit's operating state:
*LED on:* Power on, use and peripheral devices ok
*LED off:* No power or wrong use / peripheral devices faulty
4 Button "🔔" with LED (red) for indicating a fault status message and its acknowledgement:
*LED flashing:* Fault status message, ready for acknowledgement
*LED on:* Fault status message still pending but not yet reset
*LED off:* No fault status message pending
*Press button:* Acknowledgement or resetting of fault
5 Fixing holes for plug-in type operator unit RMZ790
6 Programming button "Prog": Learning button for changing between normal mode and addressing mode for adopting the physical device address (tool required)
7 Programming LED "Prog" for indicating "Normal mode" (LED off) or addressing mode (LED on) for adopting the physical device address
8 Catch for fitting the unit to a top hat rail
9 Fixing facility for a cable tie (cable strain relief)
10 Electrical and mechanical connecting elements for extension module
11 Rest for terminal cover

## Engineering notes

- 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 60 742 or EN 61 558-2-6; they must be suited for 100 % duty
- Fuses, switches, wiring and earthing must be in compliance with local regulations
- Sensor wires should not be run parallel to mains carrying wires that power fans, actuators, pumps, etc.
- A maximum of 3 extension modules per RMS705 can be connected (possible combinations, see chapter “Functions”)

## Mounting and installation notes

- The RMS705 and extension modules are designed for:
  - Mounting in a standard cabinet conforming to DIN 43 880
  - Wall mounting on an existing top hat rail (to EN 60715-TH35-7.5)
  - Wall mounting with 2 fixing screws
  - Flush panel mounting
- Not permitted are wet or damp spaces. The permissible environmental conditions must be observed
- If operation shall not take place inside the control panel, the detached operator unit type RMZ791 should be used (in place of plug-in type RMZ790)
- Disconnect the system from power supply prior to mounting the unit
- **The insert must not be removed from the terminal base!**
- If extension modules are used, they must be fitted to the right of the RMS705 observing the correct order in accordance with the internal configuration
- There is no electrical wiring required between the individual extension modules or between the modules and the RMS705. The electrical connections are automatically established when attaching the modules. If it is not possible to arrange all extension modules side by side, the first of the detached modules must be connected to the last module or to the unit via the RMZ780 module connector. In that case, the cumulated cable length must not exceed 10 meters




- The connection terminals for protective extra low-voltage (sensors and data bus) are located in the upper section of the unit, those for mains voltage (actuators and pumps) at the bottom
- Each terminal (spring cage terminal) can accommodate only 1 solid wire or 1 stranded wire. To make the connections, the cables must be stripped for 7 to 8 mm. To introduce the cables into the spring cage terminals and to remove them, a screw driver size 0 or 1 is required. Cable strain relief can be provided with the help of the fixing facility for cable ties
- The RMS705 can be removed from the set of modules on the rail only after the module directly attached to it has been removed
- The unit is supplied complete with Installation and Operating Instructions

## Commissioning notes

- The configuration and parameters of the standard applications offered by the RMS705 can be changed any time by service staff who have been trained by **HVAC Products** and who have the required access rights, either locally with the RMZ790 or RMZ791 operator unit or online / offline with the service tool
- During the commissioning process, the application is deactivated, the outputs are in a defined off state, and no process and alarm signals are delivered to the bus
- On completion of configuration, the unit automatically makes a new start
- When leaving the commissioning pages, the peripheral devices connected to the universal inputs (including the extension modules) are automatically tested and identified. If, at a later stage, a peripheral device is missing, a fault status message will be delivered
- The operator unit can be removed, plugged in or connected during operation
- If adaptions to specific plants are required, they must be recorded and the documentation kept inside the control panel
- For the procedure to be followed when starting up the plant for the first time, refer to the Installation Instructions

## General notes

Maintenance

The RMS705 switching and monitoring device is maintenance-free (no battery changes, no fuses). The unit should only be cleaned with a dry cloth.

Repair

The unit cannot be repaired on site.

Disposal

The RMS705 switching and monitoring device is subject to 2002/96/EEC regulations (WEEE, Waste of Electrical and Electronic Equipment).

*"The device must be disposed of as electronic scrap in compliance with the European directive 2002/96/EEC (WEEE) and not together with municipal waste. The relevant national regulations must be observed using the correct disposal channels. Local and currently valid legislation must be complied with."*

## Technical data

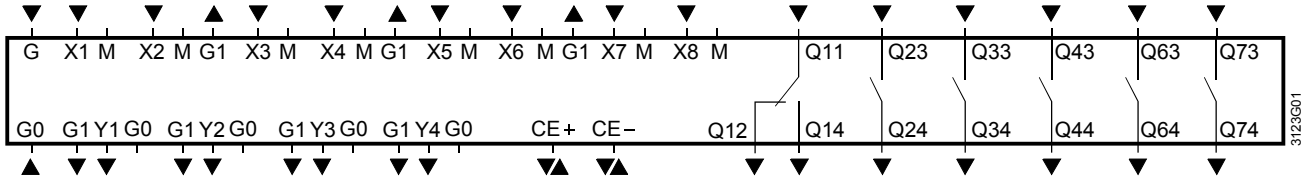
| | | |
|---|---|---|
| **Power supply (G, G0)** | Rated voltage | AC 24 V ±20 % |
| | Safety extra low-voltage (SELV) / protective extra low-voltage (PELV) to | HD 384 |
| | Requirements for external safety isolating transformer (100 % duty, max. 320 VA) to | EN 60 742 / EN 61 558-2-6 |
| | Frequency | 50/60 Hz |
| | Power consumption (without modules) | 12 VA |
| | Supply line fusing | max. 10 A |
| **Functional data** | Backup of clock | 48 h typically, min. 12 h |
| **Universal inputs** | Number | refer to "Type summary" |
| Measured value inputs (X...) | Sensors | |
| | Passive | LG-Ni 1000, T1, Pt 1000<br>2x LG-Ni 1000 (averaging),<br>0…1000 Ω, |
| | Active | DC 0...10 V |
| Status inputs (X...) | Contact sensing | |
| | Voltage | DC 15 V |
| | Current | 5 mA |
| | Requirements for status contacts | |
| | Signal coupling | potential-free |
| | Type of contact | maintained contact |
| | Insulating strength against mains potential | AC 3750 V to EN 60 730 |
| | Requirements for impulse contacts | shielded cables recommended |
| | Signal coupling | potential-free |
| | Type of contact | impulse contact |
| | Mechanical signal source (Reed contact) | |
| | Max. pulse frequency | 25 Hz |
| | Min. pulse duration | 20 ms (incl. max. 10 ms bounce time) |
| | Electronic signal source | |
| | Max. pulse frequency | 100 Hz |
| | Min. pulse duration | 5 ms |
| | Insulating strength against mains potential | AC 3750 V to EN 60 730 |
| | Perm. resistance | |
| | Contacts closed | max. 200 Ω |
| | Contacts open | min. 50 kΩ |
| **Outputs** | Number of positioning and switching outputs | refer to "Type summary" |
| Positioning outputs Y... | Output voltage | DC 0...10 V |
| | Output current | ±1 mA |
| | Max. load | continuous short-circuit |
| ⚠ Switching outputs AC 230 V (Q1x...Q7x) | External supply line fusing | |
| | Non-renewable fuse (slow) | max. 10 A |
| | Automatic line cutout | max. 13 A |
| | Release characteristic | B, C, D to EN 60 898 |
| | Relay contacts | |
| | Switching voltage | max. AC 250 V<br>min. AC 19 V |
| | AC current | max. 4 A res., 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: |
| | At 0.1 A res. | 2 x $10^7$ switching cycles |
| | At 0.5 A res. | 4 x $10^6$ switching cycles (NO)<br>2 x $10^6$ switching cycles (changeover) |
| | At 4 A res. | 3 x $10^5$ switching cycles (NO)<br>1 x $10^5$ switching cycles (changeover) |
| | Red. factor with ind. loads (cos φ = 0.6) | 0.85 |
| | Insulating strength | |
| | Between relay contacts and system electronics (reinforced insulation) | AC 3750 V to EN 60 730-1 |
| | Between neighboring relay contacts (operational insulation) Q1⇔Q2; Q3⇔Q4; Q6⇔Q7 | AC 1250 V to EN 60 730-1 |
| | Between relay groups (reinforced insulation) (Q1, Q2) ⇔ (Q3, Q4) ⇔ (Q6, Q7) | AC 3750 V to EN 60 730-1 |
| Power supply external devices (G1) | Voltage | AC 24 V |
| | Current | max. 4 A |
| **Interfaces** | Konnex bus | |
| | Type of interface | Konnex-TP1 |
| | Bus loading number | 2.5 |
| | Decentral bus power supply (can be switched off) | 25 mA |
| | Short-time power failure to EN 50 090-2-2 | 100 ms (with extension module) |
| | Extension bus | |
| | Connector specification | 4 contacts SELV / PELV |
| | Number of plug-in cycles | max. 10 |
| | Service tool connection facility | RJ45 connector |
| **Perm. cable lengths** | For passive measuring and positioning signals | (Measuring errors can be corrected |
| | Type of signal | on "Settings / Inputs" menu) |
| | LG-Ni 1000, T1 | max. 300 m |
| | Pt 1000 | max. 300 m |
| | 0...1000 Ω | max. 300 m |
| | Contact sensing (status and impulse contacts) | max. 300 m |
| | For DC 0...10 V measuring and control signals | refer to the Data Sheet of the device delivering the signal |
| | For Konnex bus | max. 700 m |
| | Type of cable | 2-core unshielded, twisted pairs |
| | For switching outputs (Q1x…Q7x) | max. 300 m |
| **Electrical connections** | Connection terminals | spring cage terminals |
| | For solid wires | dia. 0.6 mm ... 2.5 $mm^2$ |
| | For stranded wires without ferrules | 0.25...2.5 $mm^2$ |
| | For stranded wires with ferrules | 0.25...1.5 $mm^2$ |
| | Konnex bus connection facility | not interchangeable |
| **Protective data** | Degree of protection of housing to IEC 60 529 | IP 20 (when mounted) |
| | Safety class to EN 60 730 | suited for use in equipment of safety class II |
| **Environmental conditions** | Operation to | IEC 60 721-3-3 |
| | Climatic conditions | class 3K5 |
| | Temperature (housing and electronics) | 0...50 °C |
| | Humidity | 5...95 % r.h. (non-condensing) |
| | 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 |
| **Classification to EN 60 730** | 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-grey) |
| | Insert | | Polycarbonate, RAL 7035 (light-grey) |
| | Packaging | | corrugated cardboard |
| **Standards** | Product safety | | |
| | Automatic electrical controls for household and similar use | | EN 60 730-1 |
| | Special requirements for energy controllers | | EN 60 730-2-11 |
| | Electrical System Technology for Homes and Buildings (ESHG) | | EN 50 090-2-2 |
| | Electromagnetic compatibility | | |
| | Immunity | industrial sector | EN 61 000-6-2 |
| | Emissions | domestic sector, light industry | EN 61 000-6-3 |
| | Home and Building Electronic Systems (HBES) | | EN 50 090-2-2 |
| | CE conformity | | |
| | EMC directive | | 89/336/EEC |
| | Low-voltage directive | | 73/23/EEC |
| | conformity to | | |
| | Australian EMC Framework | | Radio Communication Act 1992 |
| | Radio Interference Emission Standard | | AS/NZS 3548 |
| Weight | Without packaging | | 0.49 kg |

## Connection diagrams

### Internal diagram




*Legend*

| | |
|---|---|
| G, G0 | Operating voltage AC 24 V |
| G1 | Output voltage AC 24 V for powering external active devices |
| M | Measuring neutral for signal input |
| G0 | System neutral for signal output |
| X1...X8 | Universal signal inputs for<br>LG-Ni 1000, 2 x LG-Ni 1000 (averaging), T1, Pt 1000, 0…1000 Ω,<br>DC 0...10 V, pulse, contact sensing (potential-free) |
| Y1...Y4 | Control or status outputs, analog DC 0...10 V |
| Q... | Potential-free relay outputs for AC 24...230 V |
| CE+ | Konnex bus data line, positive |
| CE– | Konnex bus data line, negative |

*Notes*

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

## Connection diagrams

Examples:

Connections on the measuring side

*Diagram 1:*
Measuring section with passive sensor

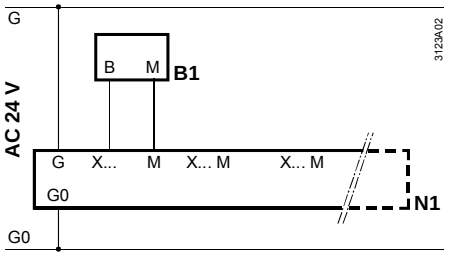



*Diagram 2:*
Measuring section with active sensor and signal source

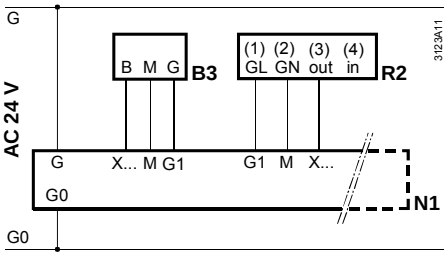
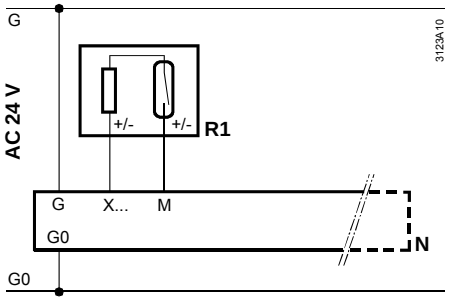



*Diagram 3:*
Measuring section with pulse source




*Recommendation:* Use shielded cables

Connections on the switching and monitoring side

Diagram *4:*
Multiple use of sensors (B1, N2), external changeover of operating mode (S6*)*

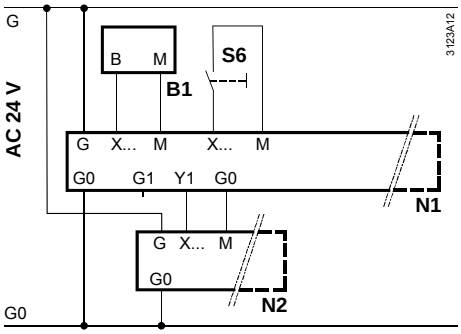
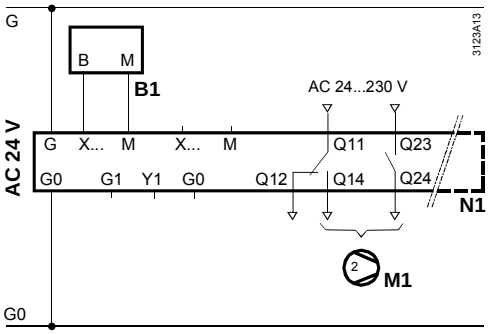



Diagram *5:*
Connection of a 2-speed fan



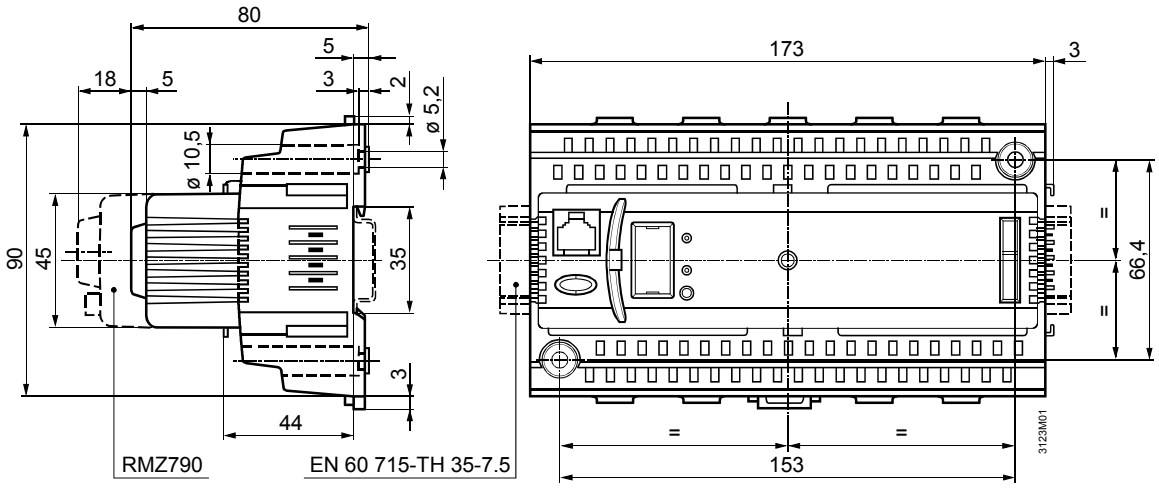

*Legend to connection diagrams 1 through 5*

| | | | |
|---|---|---|---|
| N1 | RMS705 | R1 | Reed pulse source |
| N2 | Universal controller RLU210 | R2 | Setpoint adjuster BSG61 |
| B1 | Duct temperature sensor QAM21.20… | S6 | H/C changeover switch (manual) |
| B3 | Duct temperature sensor QAM2161.040 | M1 | 2-speed fan |

*Note*

For the required internal configuration of the RMS705, refer to Basic Documentation CE1P3123en.

## Dimensions




Dimensions in mm