SIGMATEK

# HZS 5420

## Basic Module Regulation Center

## Instruction Manual

Date of creation: 07.10.2016 | Version date: 21.08.2026 | Article number: 06-895-5420-E

**Publisher: SIGMATEK GmbH & Co KG**
**A-5112 Lamprechtshausen**
**Tel.: +43/6274/4321**
**Fax: +43/6274/4321-18**
**Email: office@sigmatek.at**
**WWW.SIGMATEK-AUTOMATION.COM**



## Translation of the Original Instruction

# Basic Module Regulation Center HZS 5420

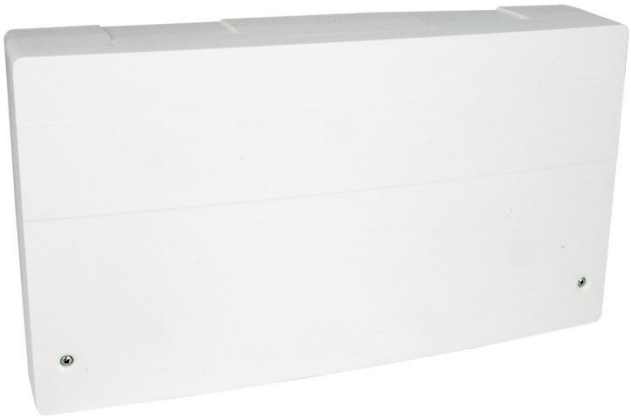
# 1 System Description

The HZS 5420 basic module regulation center is used for heat distribution in a modular heating system. All interfaces and connections for the heat distribution are located on the control board. Communication with the CPU (HZS 77x) and the control panel is established over the CAN bus.

The basic module regulation center is supplied with 230 V AV and thereby generates the internal +24 V voltage supply for the HZS 77x and 2x HZS 352.

The electronics of the basic module regulation center are implemented in a plastic housing, which is designed for wall mounting. Cable clamps provide strain relief in the housing with for the connected cables.

HZS 5420: Housing cover included
HZS 5420-L: without housing cover



# Contents

## 1.1 Configuration

- **Basic module regulation center supply:**
  - X1, 230 V AC (Weidmüller, 1x 3-pin)
  - Trafo 230 V/18 V/20 VA (for internal +24 V supply and +24 V supply for the HZS 352 with primary fuse with 400 mAT and secondary fuse with 1 AT)

- **Outgoing power supplies:**
  - X2, 230 V AC (Weidmüller, 1x 3-pin)
  - CAN-IN, +24 V DC for 7" operation device (Weidmüller, 1x 4-pin, incl. CAN bus)
  - CAN-OUT, +24 V DC for 2x HZS 532 (Weidmüller, 1x 4-pin, incl. CAN bus)

- **230 V AC Relay outputs with 6.3 AT fuse:**
  - X5, circulation pump (230 V AC/0.5 A//Weidmüller, 3-pin)
  - X7, buffer charging pump (230 V AC/1 A/Weidmüller, 3-pin)
  - X8, boiler pump (230 V AC/1.0 A//Weidmüller, 3-pin)
  - X9, HK1 via limit thermostat (230 V AC/3,5 A/Weidmüller, 5-pin) (with DI 230 V for back-reading)
  - X10, HK2 via limit thermostat (230 V AC/3,5 A/Weidmüller, 5-pin) (with DI 230 V for back-reading)
  - X11, mixer 1 OPEN/CLOSE (230 V AC/0,05 A/Weidmüller, 4-pin)
  - X12, mixer HK2 OPEN/CLOSE (230 V AC/0,05 A/AMP, 4-pin)
  - X13, mixer RLA OPEN/CLOSE (230 V AC/0,05 A/Weidmüller, 4-pin)

- **Relay outputs, potential-free without fuse:**
  - X28, request (230 V AC/3,5 A/Weidmüller, 3-pin)

- **+24 V DC digital inputs:**
  - X51, external request (+24 V/5 ms/5 mA/Weidmüller, 2-pin)
  - X58, boiler lock (+24 V/5 ms/5 mA/Weidmüller, 2-pin)
  - X60, disturbing pulse circulation (+24 V/5 ms/5 mA/Weidmüller, 2-pin)

- **Digital inputs +24 V/5 ms / frequency measurement input +24 V/1 kHz software-switchable:**
  - X59, flow impulse circulation (+24 V/5 mA/Weidmüller, 2-pin)

- **Analog Inputs**

| Connect-ors | Label | Sensor | Range | Resolution | Accuracy | Connector Pins |
|---|---|---|---|---|---|---|
| X31 | Boiler sensor | KTY81-110 resp. PT1000 | -30 ... +130 °C<br>-30 ... +180 °C (only PT1000) | 0.1 °C | ±0.5 % of measurement range | Weidmüller, 2-pin |
| X32 | Return sensor | KTY81-110 resp. PT1000 | -30 ... +130 °C<br>-30 ... +180 °C (only PT1000) | 0.1 °C | ±0.5 % of measurement range | Weidmüller, 2-pin |
| X35 | Buffer sensor 2 | KTY81-110 resp. PT1000 | -30 ... +130 °C<br>-30 ... +180 °C (only PT1000) | 0.1 °C | ±0.5 % of measurement range | Weidmüller, 2-pin |
| X36 | Buffer sensor 3 | KTY81-110 resp. PT1000 | -30 ... +130 °C<br>-30 ... +180 °C (only PT1000) | 0.1 °C | ±0.5 % of measurement range | Weidmüller, 2-pin |
| X37 | Flow sensor 2 | KTY81-110 resp. PT1000 | -30 ... +130 °C<br>-30 ... +180 °C (only PT1000) | 0.1 °C | ±0.5 % of measurement range | Weidmüller, 2-pin |
| X38 | Flow sensor 1 | KTY81-110 resp. PT1000 | -30 ... +130 °C<br>-30 ... +180 °C (only PT1000) | 0.1 °C | ±0.5 % of measurement range | Weidmüller, 2-pin |
| X39 | Boiler sensor | KTY81-110 resp. PT1000 | -30 ... +130 °C<br>-30 ... +180 °C (only PT1000) | 0.1 °C | ±0.5 % of measurement range | Weidmüller, 2-pin |
| X40 | Room sensor HK1 | KTY81-110 resp. PT1000 Connecta-ble<br>Resistance | 0-50 °C with 4x connection 500 resp. 0-40 °C 3x 200 Ω<br>704-3276 Ω | 0.1 °C<br>0.1 Ω | ±0.5 % of measurement range | Weidmüller, 2-pin |
| X41 | Room sensor HK2 | KTY81-110 resp. PT1000 Connecta-ble<br>Resistance | 0-50 °C with 4x connection 500 resp. 0-40 °C 3x 200 Ω<br>704-3276 Ω | 0.1 °C<br>0.1 Ω | ±0.5 % of measurement range | Weidmüller, 2-pin |
| X42 | External sensor | KTY81-110 resp. PT1000 | -30 ... +130 °C<br>-30 ... +180 °C (only PT1000) | 0.1 °C | ±0.5 % of measurement range | Weidmüller, 2-pin |

| | | | | | | |
|---|---|---|---|---|---|---|
| X43 | Circulation sensor | KTY81-110 resp. PT1000 | -30 ... +130 °C<br>-30 ... +180 °C (only PT1000) | 0.1 °C | ±0.5 % of measurement range | Weidmüller, 2-pin |
| X44 | Buffer sensor 1 | KTY81-110 resp. PT1000 | -30 ... +130 °C<br>-30 ... +180 °C (only PT1000) | 0.1 °C | ±0.5 % of measurement range | Weidmüller, 2-pin |

The analog inputs can be switched between the sensor types KTY81-110 and PT1000 via software and between the measuring ranges -30... +130 °C and -30... +180 °C (only PT1000).

- **Analog outputs**

| Connect-ors | Label | Sensor | Range | Resolution | Accuracy | Connector Pins |
|---|---|---|---|---|---|---|
| X56 | Boiler modulation | - | 10 V PWM | 8-bit | - | Weidmüller, 2-pin |
| | | | 0-10 V | 50 mV | ±1 % | |
| X57 | RLA | - | 10 V PWM | 8-bit | - | Weidmüller, 2-pin |
| | | | 0-10 V | 50 mV | ±1 % | |

The analog outputs can be switched between 10 V PWM and 0-10 V with software.

- **CAN bus interface**

  - CAN bus incoming (Weidmüller, 4-pin)
  - CAN bus outgoing (Weidmüller, 4-pin)
  - CAN bus termination is necessary when using it as end station
  - CAN bus station number can be set with a HEX coding switch (S1), this means that up to 16 basic module regulation centers can be connected in a CAN bus system.

- **Connectors**

  - Weidmüller LSF-SMT3.5/4/180 3.5 SW for digital +24 V inputs, analog inputs and CAN bus interface
  - Weidmüller LSF-SMT5.00/3/180 for 230 V AC supply and 230 V AC outputs

# 2 Technical Data

## 2.1 Controller Performance Data

| | |
|---|---|
| Controller | LPC11C24 |
| Controller frequency | 48 MHz |
| Interfaces | 1x CAN IN/OUT<br>1x JTAG |
| Internal program memory | 32-kbytes (Flash) |
| Internal data and/or program buffering (internal EEPROM) | 1-kbyte (Flash), no buffer battery required! |
| Memory for module identification and calibration data | 4-kbyte (Flash) |

## 2.2 Electrical Requirements

| | | |
|---|---|---|
| Power supply for the relay and internal electronics | 230 V AC ±10 % | |
| Power supply frequency | 50-60 Hz | |
| Electronics current consumption | typically 50 mA | maximum 115 mA |
| Current consumption of electronics and connected loads | maximum 5 A | |
| Current consumption of electronics and connected loads and outgoing supply 230 V AC | maximum 10 A | |
| Fuses | 400 mAT (F1) for primary transformer fuse<br>1.0 AT (F2) for secondary transformer fuse<br>6.3 AT (F3) for 230 V AC relay output | |

## 2.3 +24 V Supply for External Consumers

| | |
|---|---|
| Available current for external users (e.g. HZS 352) | maximum 500 mA |
| Connector | CAN IN/CAN OUT |

## 2.4 Digital Relay Output Specifications

| | |
|---|---|
| Number | 11 |
| Relay types | normally open |
| Relays | HF115FK/24-Z33(335) / alternative: RT 314024 |
| Switching range | 16.8-30 V DC |
| Switching current | typically 9 mA at +24 V |
| Switching time | < 10 ms |
| Switching power | see data sheet: Tyco Schrack RT1 series |
| Fuse | 6.3 AT |
| Terminal clamp | 3-pin Weidmüller LSF-SMT5.0/3/180 3.5 SW<br>4-pin Weidmüller LSF-SMT5.0/4/180 3.5 SW<br>5-pin Weidmüller LSF-SMT5.0/5/180 3.5 SW |

## 2.5 Digital Relay Output Potential-free Specifications

| | |
|---|---|
| Number | 1 |
| Relay types | Changeover contact potential-free |
| Relays | HF115FK/24-Z33(335) / alternative: RT 314024 |
| Switching range | 16.8-30 V DC |
| Switching current | typically 9 mA at +24 V |
| Switching time | < 10 ms |
| Switching power | see data sheet: Tyco Schrack RT1 series |
| Fuse | none |
| Terminal clamp | 3-pin Weidmüller LSF-SMT5.0/3/180 3.5 SW |

## 2.6 Relay HF115FK/24-Z33(335) Technical Data

# HF115FK MINIATURE HIGH POWER RELAY

c UL us
File No.:E134517

File No.:116934

File No.:CQC17002176308

**Features**

- Low height: 15.7 mm
- 16A switching capability
- 5kV dielectric strength (between coil and contacts)
- Creepage distance: 10mm
- Meeting reinforce insulation
- Flux proofed type
- Product in accordance to IEC 60335-1 available
- UL insulation system: Class F

## CONTACT DATA

| | | |
|---|---|---|
| Contact arrangement | 1A, 1C | 2A, 2C |
| Contact resistance 1) | 100mΩ max.(at 1A 6VDC) | |
| Contact material | $AgSnO_2$ | |
| Contact rating (Res. load) | 12A/16A 250VAC | 8A 250VAC |
| Max. switching voltage | 400VAC | |
| Max. switching current | 12A / 16A | 10A |
| Max. switching power | 3000VA / 4000VA | 2000VA |
| Mechanical endurance | $1 \times 10^7$ OPS | |
| Electrical endurance | H3(F)T type: $1 \times 10^5$ OPS (NO: 16A 277VAC, Resistive Load at 40°C, 1s on 9s off)<br>Z3(F)T type: $5 \times 10^4$ OPS (NO: 16A 250VAC, Resistive Load at 85°C, 1s on 9s off)<br>2Z4(F)T type: $5 \times 10^4$ OPS (NO: 8A 250VAC, Resistive Load at 85°C, 1s on 9s off)<br>Z33 type: $1 \times 10^5$ OPS (NO: 16A 277VAC, Resistive Load at 40°C, 1s on 9s off)<br>2Z43 type: $5 \times 10^4$ OPS (NO: 8A 277VAC, Resistive Load at 40°C, 1s on 9s off) | |

**Notes:** 1) The data shown above are initial values.

## COIL

| | |
|---|---|
| Coil power | Approx. 400mW(Standard type) |
| | Approx. 530mW(high power consumption type) |

## COIL DATA at 23°C

**Standard type**

| Nominal Voltage VDC | Pick-up Voltage VDC max. 1) | Drop-out Voltage VDC min. 1) | Max. Voltage VDC 2) | Coil Resistance Ω |
|---|---|---|---|---|
| 5 | 3.50 | 0.5 | 7.5 | 62 x (1±10%) |
| 6 | 4.20 | 0.6 | 9.0 | 90 x (1±10%) |
| 9 | 6.30 | 0.9 | 13.5 | 202 x (1±10%) |
| 12 | 8.40 | 1.2 | 18 | 360 x (1±10%) |
| 18 | 12.60 | 1.8 | 27 | 810 x (1±10%) |
| 24 | 16.80 | 2.4 | 36 | 1440 x (1±10%) |
| 48 | 33.60 | 4.8 | 72 | 5760 x (1±15%) |

## CHARACTERISTICS

| | | |
|---|---|---|
| Insulation resistance | | 1000MΩ (at 500VDC) |
| Dielectric strength | Between coil & contacts | 5000VAC 1min |
| | Between open contacts | 1000VAC 1min |
| | Between contact sets | 2500VAC 1min |
| Surge voltage (between coil & contacts) | | 10kV (1.2 x 50μs) |
| Operate time (at rated. volt.) | | 10ms max. |
| Release time (at rated. volt.) | | 5ms max. |
| Shock resistance * | Functional | $98m/s^2$ |
| | Destructive | $980m/s^2$ |
| Vibration resistance * | | 10Hz to 150Hz 10g/5g |
| Humidity | | 5% to 85% RH |
| Ambient temperature | | -40°C to 85°C |
| Termination | | PCB |
| Unit weight | | Approx. 13g |
| Construction | | Flux proofed |

**Notes:** 1) The data shown above are initial values.
2) * Index is not in relay length direction.

## COIL DATA at 23°C

**high power consumption type**

| Nominal Voltage VDC | Pick-up Voltage VDC max. 1) | Drop-out Voltage VDC min. 1) | Max. Voltage VDC 2) | Coil Resistance Ω |
|---|---|---|---|---|
| 5 | ≤3.50 | ≥0.5 | 7.5 | 47 x (1±10%) |
| 6 | ≤4.20 | ≥0.6 | 9.0 | 68 x (1±10%) |
| 9 | ≤6.30 | ≥0.9 | 13.5 | 153 x (1±10%) |
| 12 | ≤8.40 | ≥1.2 | 18 | 271 x (1±10%) |
| 18 | ≤12.60 | ≥1.8 | 27 | 611 x (1±10%) |
| 24 | ≤16.80 | ≥2.4 | 36 | 1086 x (1±10%) |
| 48 | ≤33.60 | ≥4.8 | 72 | 4347 x (1±15%) |

**Notes:** 1) The data shown above are initial values.
2)*Maximum voltage refers to the maximum voltage which relay coil could endure in a short period of time.

HONGFA RELAY
ISO9001, ISO/TS16949 , ISO14001, OHSAS18001, IECQ QC 080000 CERTIFIED 2018 Rev. 1.00

## 2.7 Technical Data RT314024 Relay

Tyco Electronics — General Purpose Relays — SCHRACK

**Power PCB Relay RT1**

**1-pin 12/16 A, 1 CO or 1 NO contact**
**DC or AC coil**
**Sensitive coil 400 mW**
**5 kV/10 mm coil contact, reinforced insulation**
**Ambient temperature 85°C (DC coil)**
**WG version: Product in accordance to IEC60335-1**
**RoHS compliant (Directive 2002/95/EC) as per product date code 0413**

F0144-B

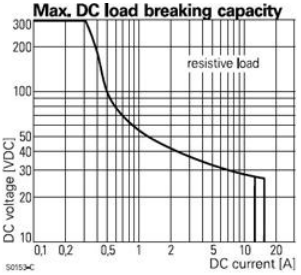
**Applications**
**Boiler control, timers, garage door control, POS automation, interface modules**

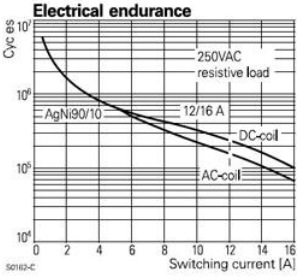
### Approvals

VDE REG.-Nr. 6106, cULus E214025, SP 14385, BEAB C0786, KEMA KEUR 98.4118.01,
Technical data of approved types on request

### Contact data

| | | |
|---|---|---|
| Contact configuration | 1 CO or 1 NO contact | |
| Contact set | single contact | |
| Type of interruption | micro disconnection | |
| Rated current | 12 A | 16 A |
| Rated voltage / max.switching voltage AC | 250/400 VAC | |
| Limiting continuous current | | UL: 20 A |
| Maximum breaking capacity AC | 3000 VA | 4000 VA |
| Limiting making capacity, max 4 s, df 10% | 25 A | 30 A |
| Contact material | AgNi 90/10, AgNi 90/10 gold plated | |
| Mechanical endurance DC coil | > 30 x $10^6$ cycles | |
| AC coil | > 10 x $10^6$ cycles | |
| Rated frequency of operation with / without load | 6 / 1200 $min^{-1}$ | |




### Contact ratings

| Type | Load | Cycles |
|---|---|---|
| RT314 | 16 A, 250 VAC, NO contact, 85°C, DF 10%, UL508 | 50x$10^3$ |
| RT314 | 16 A, 250 VAC, NC contact, 70°C, 30$min^{-1}$ | 53x$10^3$ |
| RT314 | 20 A, 250 VAC, NO contact, 85°C, UL508 | 6x$10^3$ |
| RT314 | 1000 W incandescent lamp, 250 VAC | 1.2x$10^3$ |
| RT314 | 10 A, 250 VAC, cosφ=0.6, CO contact, 70°C | 200x$10^3$ |
| RT314 | 5 A / 2 A, 250 VAC, cosφ=1, motor, NO contact, 10$min^{-1}$, 70°C | 1.1x$10^6$ |
| RT314 | 0.26 A / 0.01 A, 230 VAC, cosφ=0.38, valve, NO contact, 25$min^{-1}$ | 7.6x$10^6$ |
| RT314 | Pilot duty A300 (NO contact), B300 (CO/NC contact), UL508 | |
| RT314 | 1hp @ 240 VAC, 1/2hp @ 120 VAC, NO contact, UL508 | |
| RT314 | AC15, 6 A, 250 VAC, NO and NC contact, 85°C, EN60947-5-1 | |
| RT314 | DC13, 2 A / 24 VDC, 0.2 A / 250 VDC, NO and NC contact, 85°C, EN60947-5-1 | |

### Coil data

| | |
|---|---|
| Rated coil voltage range DC coil | 5...110 VDC |
| AC coil | 24...230 VAC |
| Coil power DC coil | typ 400 mW |
| AC coil | typ 0.75 VA |
| Operative range | 2 |
| Coil insulation system according UL1446 | class F |

## 2.8 Specifications for the +24 V DC Digital Inputs

| | | |
|---|---|---|
| Number | 3 | |
| Input voltage | typically +24 V | maximum +30 V |
| Signal level | low: < +5 V | high: > +15 V |
| Switching threshold | typically +11 V | |
| Input current | 5 mA at +24 V | |
| Input delay | typically 5 ms | |
| Fuse | 0,2 A PTC fuse | |
| Connector | 2-pin Weidmüller LSF-SMT_3.5/2/180_3.5_SW | |

## 2.9 Specification of Digital Input +24 V/Frequency Measurement Input +24 V

| | | | | |
|---|---|---|---|---|
| Number | 1 | | | |
| Operating mode | Digital Input (Default) | | Frequency Input | |
| Input voltage | typically +24 V | maximum +30 V | typically +24 V | maximum +30 V |
| Signal level | low: <+5 V | high: >+15 V | low: <+5 V | high: >+15 V |
| Switching threshold | typically +11 V | | typically +11 V | |
| Input current | 5 mA at +24 V | | 5 mA at +24 V | |
| Input delay | typically 5 ms | | typically 0.1 ms | |
| Input frequency | - | | 0-1 kHz | |
| Signal evaluation | - | | 1x | |
| Measured value | 0/1 | | 0-1000 | |
| Goal time | - | | 1 s | |
| Update | - | | 10 ms | |
| Protection | 0,2 A PTC fuse | | | |
| Connector | 2-pin Weidmüller LSF-SMT_3.5/2/180_3.5_SW | | | |

## 2.10 0-10 V Analog Outputs Specifications

| | | |
|---|---|---|
| Number | 2 | |
| Output voltage | 10 V PWM | 0 ...+10 V |
| Base frequency | 250 Hz | - |
| Output value | 0-255 | 0-10000 |
| Resolution | 8 bits (256d) | 50 mV |
| Accuracy | ±1 % of max. output value | |
| Output voltage capacity | maximum 10 mA | |
| Connector | 2-pin Weidmüller LSF-SMT_3.5/2/180_3.5_SW | |

## 2.11 Temperature Inputs KTY81-110/PT1000 Specifications

| | | | |
|---|---|---|---|
| Number | 10 | | |
| Measurement range | standard (default) | | extended |
| Sensor type | KTY81-110 | PT1000 | PT1000 |
| Measurement range | -30 … +130 °C | | -30 … +180 °C |
| Sensor range | 623.6-2023.4 Ω | 882.1-1498.3 Ω | 882,2-1684,8 Ω |
| Measurement value | -300 … +1300 | | -300 … +1800 |
| Resolution | 0.1 °C | | |
| Measurement precision | ±0.5 % of measurement range | | |
| Typical current measurement | < 0.3 mA | | |
| Input resistance | 33 kΩ | | |
| Input filter | 100 ms | | |
| Short-circuit and sensor break detection | yes | | |
| Connector | 2-pin Weidmüller LSF-SMT_3.5/2/180_3.5_SW | | |

## 2.12 Temperature Inputs KTY81-110 with 5-step resp. PT1000 with 4-step Connection Specifications

| | | | | | | |
|---|---|---|---|---|---|---|
| Number of channels | | 2 | | | | |
| Sensor type | | KTY81-110 | | PT1000 | | Resistance |
| Measurement range | | 0 ... +50 °C | | 0-40 °C | | 704-3276 Ω |
| Measurement value | | 0-500 | | 0-400 | | 7040-32760 |
| Resolution | | 0.1 °C | | | | 0.1 Ω |
| Sensor range | | 761-3261 Ω | | 996-1777 Ω | | - |
| Connection | Step 0: | 0 Ω | 761-1261 Ω | 0 Ω | 996-1193 Ω | - |
| | Step 1: | 500 Ω | 1261-1761 Ω | 197 Ω | 1193-1387 Ω | |
| | Step 2: | 1000 Ω | 1761-2261 Ω | 391 Ω | 1387-1580 Ω | |
| | Step 3: | 1500 Ω | 2261-2761 Ω | 584 Ω | 1580-1777 Ω | |
| | Step 4: | 2000 Ω | 2761-3261 Ω | | | |
| Measurement precision | | ±0.5 % of measurement range | | | | |
| Typical current measurement | | < 0.3 mA | | | | |
| Input resistance | | 33 kΩ | | | | |
| Input filter | | 100 msec | | | | |
| Short-circuit and sensor break detection | | yes | | | | |
| Connector | | 2-pin Weidmüller LSF-SMT_3.5/2/180_3.5_SW | | | | |

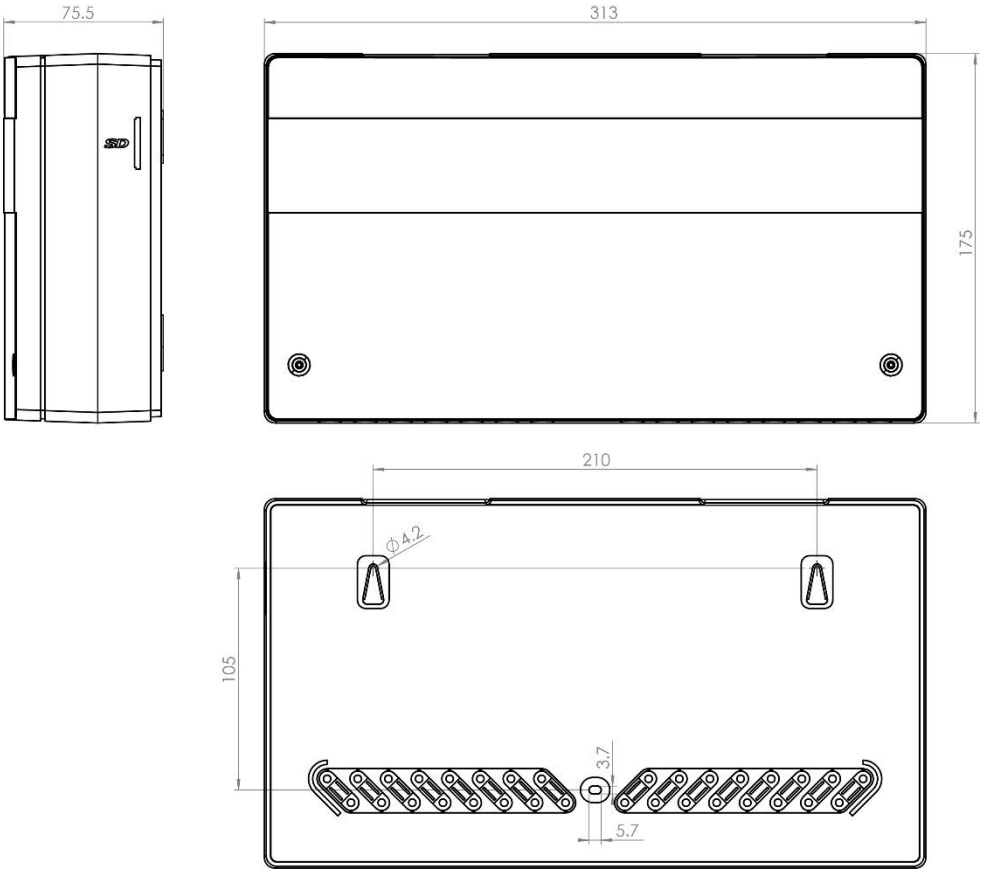
## 2.13 Miscellaneous

| | |
|---|---|
| Article number | 05-895-5420 (incl. housing cover)<br>05-895-5420-L (without housing cover) |
| Station number | can be set with HEX switch (S1), maximum of 16 participants possible |
| Dimensions | 313 x 175 x 75.5 mm (W x H x D) |

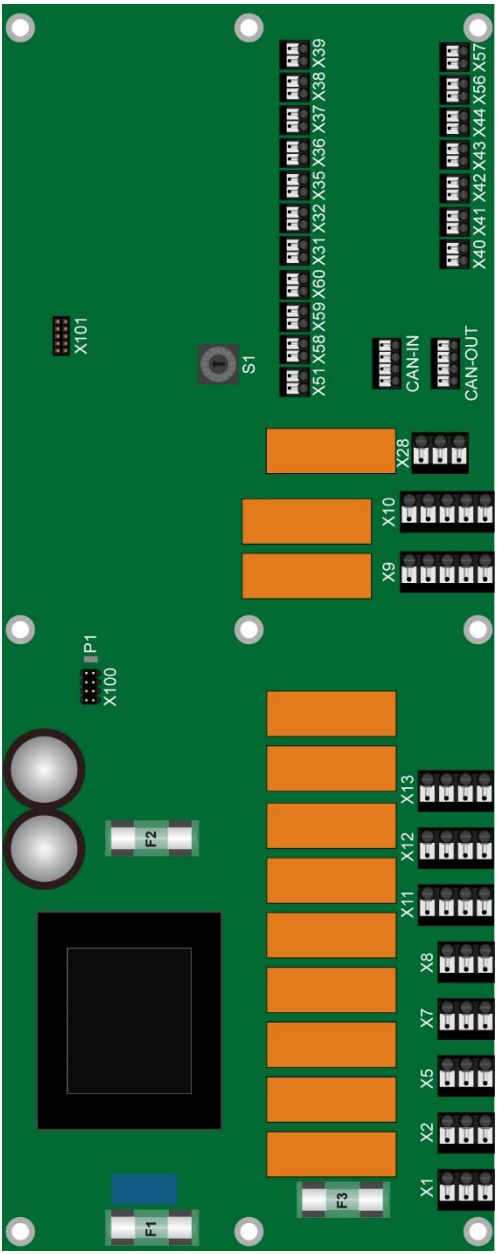
## 2.14 Environmental Conditions

| | | |
|---|---|---|
| Storage temperature | -20 ... +85 °C | |
| Environmental temperature | 0-60 °C | |
| Humidity | 0-95 %, non-condensing | |
| EMC resistance | in accordance with EN 61000-6-2 (industrial area) | |
| EMC noise generation | in accordance to EN 61000-6-3 (living area) | |
| Vibration resistance | EN 60068-2-6 | 3.5 mm from 5-8.4 Hz<br>1 g from 8.4-150 Hz |
| Shock resistance | EN 60068-2-27 | 150 m/s² |
| Protection type | EN 60529 | IP20 |

# 3 Mechanical Dimensions

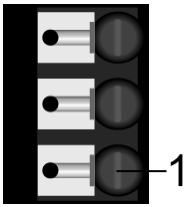


# 4 Connector Layout



## 4.1 230 V AC Supply Connector Pin Layout

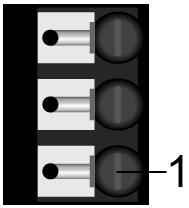
**X1: 230 V supply for the boiler function module (3-pin terminal Weidmüller RM 5)**




| Pin | Signal | Function |
|---|---|---|
| 1 | PE | protective ground wire PE |
| 2 | N | neutral line N |
| 3 | L | 230 V AC supply |

## 4.2 230 V AC Power Outlet Connector Layout

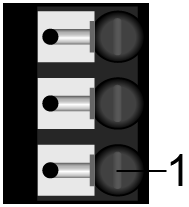
**X2: 230 V supply for the boiler function module (3-pin terminal Weidmüller RM 5)**




| Pin | Signal | Function |
|---|---|---|
| 1 | PE | protective ground wire PE |
| 2 | N | neutral line N |
| 3 | L | 230 V AC power outlet |

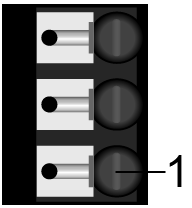
## 4.3 230 V AC Relay Output Connector Pin Assignment

**X5: 230 V AC relay output circulation pump (3-pin terminal Weidmüller RM 5)**



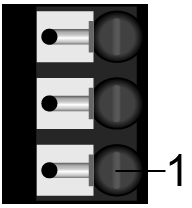

| Pin | Signal | Function |
|---|---|---|
| 1 | PE | protective ground wire PE |
| 2 | N | neutral line N |
| 3 | $L_{\text{circulation pump}}$ | 230 V AC relay output circulation pump |

### X7: 230 V AC relay output buffer charging pump (3-pin terminal Weidmüller RM 5)



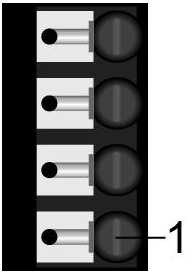

| Pin | Signal | Function |
|---|---|---|
| 1 | PE | protective ground wire PE |
| 2 | N | neutral line N |
| 3 | L_buffer loading pump | 230 V AC relay output buffer loading pump |

### X8 230 V AC relay output boiler pump (3-pin terminal Weidmüller RM 5)



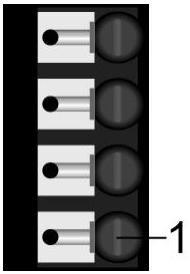

| Pin | Signal | Function |
|---|---|---|
| 1 | PE | protective ground wire PE |
| 2 | N | neutral line N |
| 3 | L_boiler pump | 230 V AC relay output boiler pump |

### X11: 230 V AC relay output mixer HK1 OPEN/CLOSE (4-pin terminal Weidmüller RM 5)



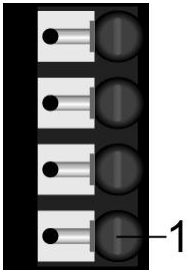

| Pin | Signal | Function |
|---|---|---|
| 1 | PE | protective ground wire PE |
| 2 | N | neutral line N |
| 3 | L1 | Relay output mixer HK1_open |
| 4 | L2 | Relay output mixer HK1_close |

### X12: 230 V AC relay output mixer HK2 OPEN/CLOSE (4-pin terminal Weidmüller RM 5)



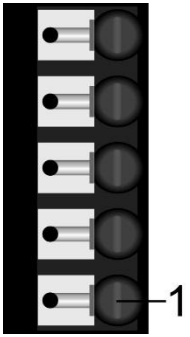

| Pin | Signal | Function |
|---|---|---|
| 1 | PE | protective ground wire PE |
| 2 | N | neutral line N |
| 3 | L1 | Relay output mixer HK2_open |
| 4 | L2 | Relay output mixer HK2_close |

### X13: 230 V AC relay output mixer RLA OPEN/CLOSE (4-pin terminal Weidmüller RM 5)



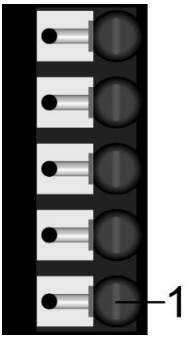

| Pin | Signal | Function |
|---|---|---|
| 1 | PE | protective ground wire PE |
| 2 | N | neutral line N |
| 3 | L1 | Relay output mixer RLA_open |
| 4 | L2 | Relay output mixer RLA_close |

### X9: 230 V AC relay output HK1 limit thermostat (5-pin terminal Weidmüller RM 5)



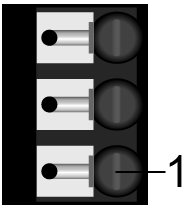

| Pin | Signal | Function |
|---|---|---|
| 1 | PE | protective ground wire PE |
| 2 | N | neutral line N |
| 3 | L | Relay output heating circle 1 |
| 4 | | Thermostat 1 - switch contact with back-reading (DI 1_230VAC) |
| 5 | | Phase over F3 |

**X10: 230 V AC relay output HK2 limit thermostat**
**(5-pin terminal Weidmüller RM 5)**




| Pin | Signal | Function |
|---|---|---|
| 1 | PE | protective ground wire PE |
| 2 | N | neutral line N |
| 3 | L | Relay output heating circle 1 |
| 4 | | Thermostat 2 - switch contact with back-reading (DI 2_230VAC) |
| 5 | | Phase over F3 |

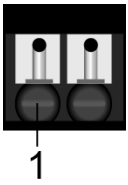
**X28: 230 V AC relay output with potential-free contact request**
**(3-pin terminal Weidmüller RM 5)**




| Pin | Signal | Function |
|---|---|---|
| 1 | NC | normally closed |
| 2 | C | common |
| 3 | No | Normally open |

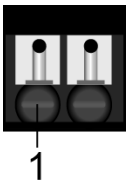
## 4.4 Connector layout for the digital inputs

### X51: Digital input external request (2-pin terminal Weidmüller RM 3.5)



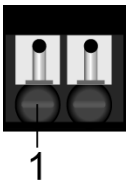

| Pin | Signal | Function |
|---|---|---|
| 1 | + 24 V1 | Supply +24 V1 DC |
| 2 | DI1 | Digital input 1 - external request |

### X58: Digital input boiler lock (2-pin terminal Weidmüller RM 3.5)



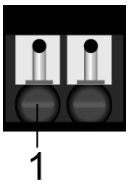

| Pin | Signal | Function |
|---|---|---|
| 1 | + 24 V1 | Supply +24 V1 DC |
| 2 | DI2 | Digital input 2 - boiler lock |

### X59: digital input / frequency measurement input flow impulse circulation (2-pin terminal Weidmüller RM 3.5)




| Pin | Signal | Function |
|---|---|---|
| 1 | + 24 V1 | Supply +24 V1 DC |
| 2 | DI3 | Digital input 3 - boiler error |

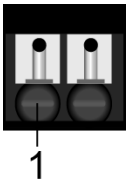
### X60: Digital input disturbing pulse circulation (2-pin terminal Weidmüller RM 3.5)




| Pin | Signal | Function |
|---|---|---|
| 1 | + 24 V1 | Supply +24 V1 DC |
| 2 | DI4 | Digital input 4 - disturbing pulse circulation |

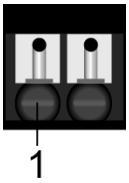
## 4.5 Connector Layout of Analog Inputs

### X31: Analog input boiler sensor (2-pin terminal Weidmüller RM 3,5)



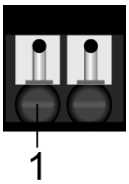

| Pin | Signal | Function |
|---|---|---|
| 1 | AGND | Analog ground |
| 2 | AI1 | Analog input 1 - boiler sensor |

### X32: Analog input return sensor (2-pin terminal Weidmüller RM 3.5)



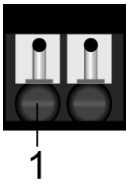

| Pin | Signal | Function |
|---|---|---|
| 1 | AGND | Analog ground |
| 2 | AI2 | Analog input 2 - return sensor |

### X35: Analog input buffer sensor 2 (2-pin terminal Weidmüller RM 3.5)



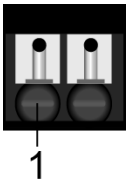

| Pin | Signal | Function |
|---|---|---|
| 1 | AGND | Analog ground |
| 2 | AI3 | Analog input 3 - buffer sensor 2 |

### X36: Analog input buffer sensor 3 (2-pin terminal Weidmüller RM 3.5)



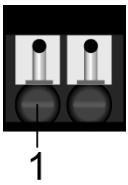

| Pin | Signal | Function |
|---|---|---|
| 1 | AGND | Analog ground |
| 2 | AI4 | Analog input 4 - buffer sensor 3 |

### X37: Analog input flow sensor 2 (2-pin terminal Weidmüller RM 3.5)



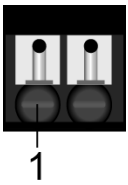

| Pin | Signal | Function |
|---|---|---|
| 1 | AGND | Analog ground |
| 2 | AI5 | Analog input 5 - flow sensor 2 |

### X38: Analog input flow sensor 1 (2-pin terminal Weidmüller RM 3.5)



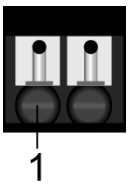

| Pin | Signal | Function |
|---|---|---|
| 1 | AGND | Analog ground |
| 2 | AI6 | Analog input 6 - flow sensor 1 |

### X39: Analog input boiler sensor (2-pin terminal Weidmüller RM 3.5)



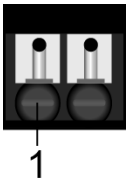

| Pin | Signal | Function |
|---|---|---|
| 1 | AGND | Analog ground |
| 2 | AI7 | Analog input 7 - boiler sensor |

### X40: Analog input room sensor HK1 (resistance decade) (2-pin terminal Weidmüller RM 3.5)



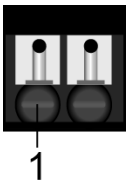

| Pin | Signal | Function |
|---|---|---|
| 1 | AGND | Analog ground |
| 2 | AI8 | Analog input 8 - room sensor HK1 |

### X41: Analog input return sensor HK2 (resistance decade) (2-pin terminal Weidmüller RM 3.5)



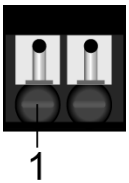

| Pin | Signal | Function |
|---|---|---|
| 1 | AGND | Analog ground |
| 2 | AI9 | Analog input 9 - room sensor HK2 |

### X42: Analog input external sensor (2-pin terminal Weidmüller RM 3.5)



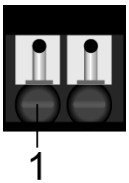

| Pin | Signal | Function |
|---|---|---|
| 1 | AGND | Analog ground |
| 2 | AI10 | Analog input 10 - external sensor |

### X43: Analog input circulation sensor (2-pin terminal Weidmüller RM 3.5)




| Pin | Signal | Function |
|---|---|---|
| 1 | AGND | Analog ground |
| 2 | AI11 | Analog input 11 - circulation sensor |

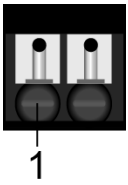
### X44: Analog input buffer sensor 1 (2-pin terminal Weidmüller RM 3.5)




| Pin | Signal | Function |
|---|---|---|
| 1 | AGND | Analog ground |
| 2 | AI12 | Analog input 12 - buffer sensor 1 |

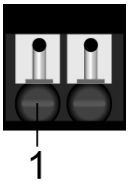
## 4.6 Analog Output Connector Layout

**X56: Analog output 0-10 V resp. PWM 0-10 V (switchable) boiler modulation (2-pin terminal Weidmüller RM 3.5)**




| Pin | Signal | Function |
|---|---|---|
| 1 | AGND | Analog ground |
| 2 | AO1 | Analog output 1 - boiler modulation |

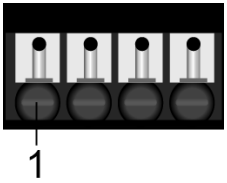
**X57: Analog output 0-10 V resp. PWM 0-10 V (switchable) RLA (2-pin terminal Weidmüller RM 3.5)**




| Pin | Signal | Function |
|---|---|---|
| 1 | AGND | Analog ground |
| 2 | AO2 | Analog output 2 - RLA |

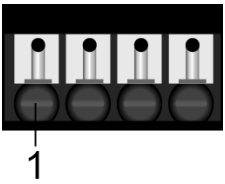
## 4.7 CAN Bus Connector Layout

**CAN IN: CAN bus IN (4-pin terminal Weidmüller RM 3.5)**




| Pin | Signal | Function |
|---|---|---|
| 1 | +24 V | 24 V power supply |
| 2 | CAN A | Bus line CAN A |
| 3 | CAN B | Bus line CAN B |
| 4 | GND | ground |

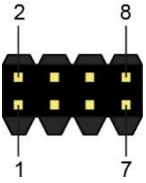
**CAN OUT: CAN bus OUT (4-pin terminal Weidmüller RM 3.5)**




| Pin | Signal | Function |
|---|---|---|
| 1 | +24 V | 24 V power supply |
| 2 | CAN A | Bus line CAN A |
| 3 | CAN B | Bus line CAN B |
| 4 | GND | ground |

## 4.8 Other Connector Layouts

**X100: JTAG (multi-pin strip RM 2.00, 8-pin connector plug)**

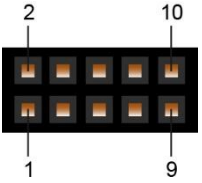



| Pin | Signal | Function |
|---|---|---|
| 1 | TDI | Test Data In |
| 2 | TMS | Test Mode Select |

| Pin | Signal | Function |
|---|---|---|
| 1 | GND | ground |
| 2 | ~~+24 V~~ | +24 V power supply |
| 3 | +5 V | +5 V power supply |
| 4 | +10 V | +10 V reference |
| 5 | n.c. | - |
| 6 | + 24 V1 | +3.3 V supply |
| 7 | +15 V | +15 V power supply |
| 8 | AGND | analog ground |
| 9 | -15 V | -15 V supply |
| 10 | GND | ground |

n.c. = do not use

**X101: Internal voltage test pin (socket strip connector RM 2.00, 10-pin connector plug)**



## 4.9 CAN Bus Station Number

**S1: HEX Coding switch**


With the HEX Coding switch, the station number (0-15) of the connected module is set.

**CAN Bus Station Number**

| SW | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Station | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |

# 5 Status LED P1

| LED Status | Definition |
|---|---|
| LED on | Controller is running, CAN bus communication with CPU active |
| LED blinks (1 Hz) | controller is running, CAN bus communication with CPU inactive |
| LED off | Controller not active, no supply |

# 6 Wiring Guidelines

The signals recorded by the analog inputs are very small in comparison to the digital signals. To ensure error-free operation, a careful wiring method must be followed:

- **The lines connected to the source of the analog signals must be as short as possible and parallel wiring to digital signal lines must be avoided.**
- **The signal lines must be shielded.**
- **230 V AC lines (power circuit and relay outputs etc.) must not be wired in parallel with analog and digital input lines.**

## 6.1 Digital Input Wiring Guidelines

The input filters used to suppress noise signals allow operation in harsh environmental conditions. A careful wiring method is also recommended to ensure error-free function.

The following guidelines should be observed:

- **Avoid parallel connections between input lines and load bearing or AC circuits.**
- **Correct wiring to mass**

## 6.2 General Information on the Relay Outputs

All relay coils are powered by the internal +24 V DC supply. The cross-sectional area of the relay outputs is designed for the maximum continuous current at 230 V AC for each connected load as stated in the relay output specifications. It is important to note that at high currents, thermal loads affect the wiring and with continuous over loading, can lead to a break down! High voltages can cause current leakage or arcing between different potentials!

To ensure error-free operation, a careful wiring method must be followed.

- **Avoid parallel wiring between input lines and load-bearing circuits.**

## 6.3 Wiring Guidelines for Analog In-/Outputs

The analog signals are very small in comparison to the digital signals. To ensure error-free operation, a careful wiring method must be followed.

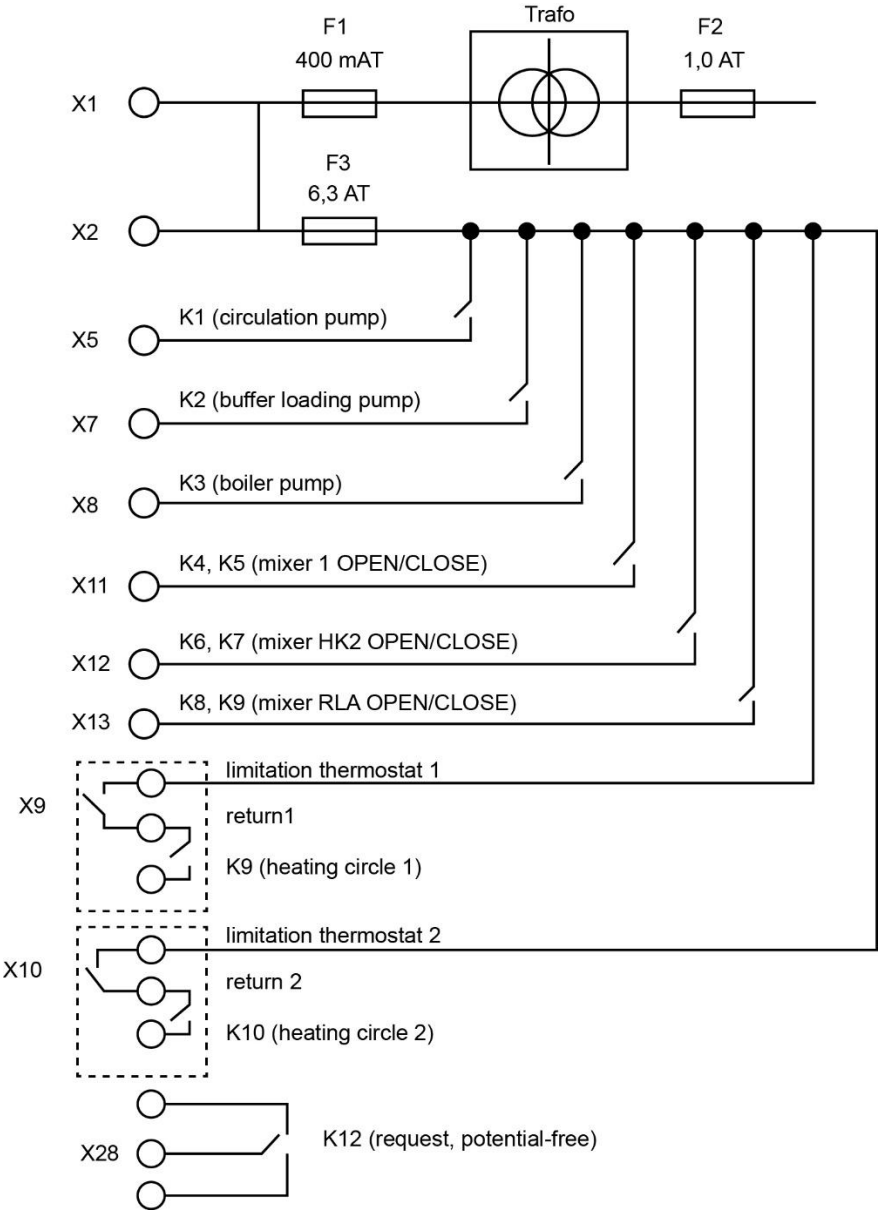
- **The connection lines to the source of the analog signals must be as short as possible and parallel wiring to digital signal lines or AC circuits must be avoided.**
- **The signal lines have to be shielded.**

## 6.4 CAN Bus Wiring Guidelines

For the CAN bus wiring, twisted pair shielded wires should be used. The cable shielding must be connected to ground either directly before the terminal over a large surface and with low Ohms (grounding clamps) or in the module with GND/ground.

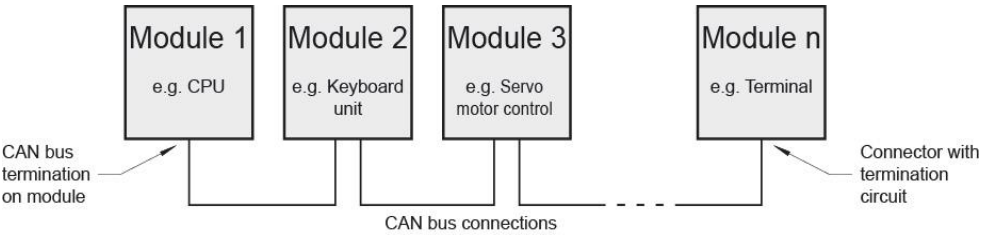
Noise signals can therefore be prevented from reaching the electronics and affecting the function.

## 6.5 Wiring Guidelines 230 V



# 7 CAN Bus Termination

In a CAN bus system, both end modules must be terminated. This is necessary to avoid transmission errors caused by reflections in the line.




If the external basic module HZS 5420 is an end unit, the termination must be made on the HZS 5420.

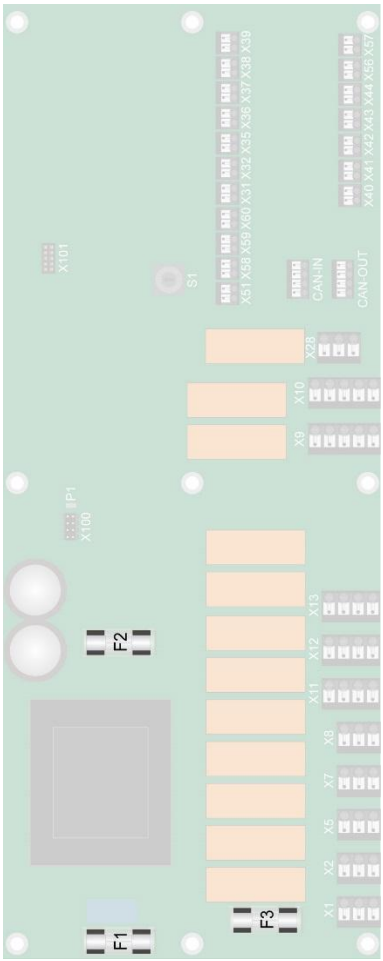
The CAN termination has a 120 Ω terminating resistor between CAN A and CAN B.

# 8 Fuses

**The fuses may only be exchanged by qualified personnel after the 230 V AC power supply has been disconnected! Current safety regulations and rules must be observed!**

The power supply for the electronics as well as all 230 V AC circuits is protected by micro fuses.

When changing the fuses, please refer to the following overview with the assignment of the fuses on the basic module regulation center:



The power supply for the electronics as well as all 230 V AC circuits is protected by micro fuses.

| Fuse | Value | Construction | Assignment |
|---|---|---|---|
| F1 | 0.4 AT | 5x 20 mm | Fuse for the primary side of the supply transformer T1/230 V AC |
| F2 | 1.0 AT | 5x 20 mm | Fuse for the secondary side of the supply transformer T1/230 V AC |
| F3 | 6.3 AT | 5x 20 mm | Fuse for the 230 V AC relay outputs |

**Additionally protected with self-resetting PTC fuses:**

| Fuse | Value | Label | Assignment |
|---|---|---|---|
| F4 | 0.2 A | + 24 V1 | +24 V1 output for digital inputs:<br>DI1 X51 External request<br>DI2 X58 Boiler lock<br>DI3 X59 Boiler error<br>DI4 X60 Disturbing pulse circulation |

The following derating of the PTC fuse must be incorporated over the temperature.

| Ambient temperature PTC | PTC fuse derating |
|---|---|
| 23 °C | 0.20 A |
| 40 °C | 0.17 A |
| 50 °C | 0.15 A |
| 60 °C | 0.14 A |

These PTC fuses are maintenance-free and can only be changed by SIGMATEK!

The PTC fuse remains high ohmic as long as current is applied. The PTC fuse provides continuous protection until the error is corrected or the current is removed. During self-reset, the PTC fuse resistance quickly returns to its output value

# Documentation Changes

| Change date | Affected page(s) | Chapter | Note |
|---|---|---|---|
| 25.10.2016 | 12 | Temperature Inputs Specifications<br>Emergency Operation | Resistance value added<br>removed |
| 03.11.2016 | 13<br>15 | Miscellaneous<br>Mechanical Dimensions | Mechnical Dimensions extended |
| 11.05.2017 | 5 | 1.1 Configuration | Changed primary and secondary fuse values |
| 16.02.2023 | 2<br>13 | 1 System Description<br>2.11 Micscellaneous | Version without housing cover added |
| | | 2.6 Relay HF115FK/24-Z33(335) Technical Data | Chapter added |
| 11.04.2025 | 5 | 1.1 Configuration | X59 is now configurable |
| | 6-7 | 1.1 Configuration | Temperature information extended |
| | 12 | 2.8 Specifications for the +24 V DC Digital Inputs | signal levels changed |
| | 12 | 2.9 Specification of digital input +24 V/frequency measurement input +24 V | New table |
| | 13 | 2.11 Temperature Inputs KTY81-110/PT1000 Specifications | Values adjusted and extended |
| | 22 | 4.4 Connector layout for the digital inputs | X59 connector designation adapted |
| 30.05.2025 | 32 | 6.5 Wiring Guidelines 230 V | Graphic corrected |
| 03.06.2025 | 8 | 2.2 Electrical Requirements | Outgoing supply 230 V AC added |
| 21.08.2026 | 8 | 2.3 +24 V Supply for External Consumers | Connector corrected |