



Ex – heating controller FRBL-2 type 1064

Installation- and operating instructions

Before installation and use read this manual!

General safety advice

This device must be installed and used by qualified personal. Safety regulations and this wiring and operating instructions must be strictly observed.

The regulations of DIN VDE 0100 must be observed.

It must be ensured that personal or other persons are not endangered.

For the intended use it must be assured, that the intended range of the unit is not exceeded (e.g. voltage, load current, ambient temperature).

The producer is not liable for damages by external forces or other damages through external factors!

Use only units from original packings and free of damage.

Manipulation of the unit is prohibited and excludes warranty. The unit may be repaired solely by the producer.

Description

Ex – heating controllers FRBL-2 type 1064 are used with resistance temperature sensors (PT100 DIN) for the temperature control and limitation of devices in flame proof areas.

The device also comprises the power section in form of a phase angle- and full-wave control. Flame proof according to RL94/9/EG, EN 60079-0, EN 60079-7, EN 60079-11, EN 60079-18 EN 60079-31 and EMI-shielding NAMUR NE21



Böhm Feinmechanik & Elektrotechnik
Am Schlörbach 14, D-38723 Seesen

Beheizungssteuerung FRBL-2 Baureihe 1064
Heating Controller FRBL-2 Type 1064

Baujahr/Year of manufacture : 2014
Fertigungs-Nr./Serial-No. : <Sernr>
U Nenn/U nom : 230V, -15%/+10%, 50..60Hz
I Nenn/I nom : 25A
externe Absicherung/
ext. circuit breaker : 25A Si-Automat. s. Bedienungsanleitung
Abschaltvermögen
Breaking capacity : 6kA, cosφ > 0,7
Arbeitsbereich/
Measuring range : 0...+450°C
T Umg./T amb. : -40...+40(+50°C)
Schutzgrad/Protection : IP64



0044



II 2 G Ex e ib [ib Gb] mb IIC T4 Gb

TÜV 03 ATEX 2078 II 2 D Ex tb IIIC IP 6X T90 °C Db

Meßkreis eigensicher / measuring circuit intrinsically safe: U_o= 6,3V, I_o= 22mA, P_o= 35mW
für Ex ib IIC gilt: max. C_o= 1,5µF, max. L_o= 10mH
für Ex ib IIB gilt: max. C_o= 8,2µF, max. L_o= 10mH

Nicht in explosionsfähiger Staubatmosphäre öffnen!

Not open in a location with explosive dust atmosphere!

General Mounting Instructions

- Device according to DIN IEC 100 protection class I
- EN 60079-14 has to be observed
- DIN VDE 0100 has to be observed, device must be fixed with all 4 fixing points to the support frame
- Any kind of device manipulation is impermissible
- Connect the PE terminal to the enclosure cover
- The terminal cover also serves as protection against contact and must be mounted during operation
- The cable glands connections must match the cables/lines
- Cables and lines must be firmly routed

Technical data are subject to change

12/14

Böhm Feinmechanik und Elektrotechnik, Am Schlörbach 14, 38723 Seesen-Rhüden
Tel. 05384/216, Fax 05384/296, e-mail: info@winter-ex.de, www.winter-ex.de



Ex – heating controller FRBL-2 type 1064

Installation- and operating instructions

Characteristics

- Application area II 2 G Ex e ib [ib Gb] mb IIC T4 Gb and D Ex tb IIIC IP 6X T90 °C Db
- Measuring range of temperature controller and temperature limiter 0...450°C
- Intrinsically safe and galvanic isolation connection of the Pt100 DIN EN 60751 resistance thermometer in 3- or 2-wire circuit
- Setting of the switching point by means of a screwdriver
- Green-LED-indication of the main contactors switching position
- Measured temperature value displayed with two 7-segment-LED-displays for temperature controller and temperature limiter
- Signalling of sensor break and sensor short-circuit
- Storing of faults
- Reset of the limiter at the device
- After power failure no reset required
- Power supply 230V~ 50/60 Hz
- No disadvantage effect to the power supply because of full wave control with SSR (solid-state relay)
- variable phase angle control for lower power with overload protection
- integrated load current metering
- Solid aluminium standard enclosure IP64 for mounting on base plate

Function

FRBL-2 type 1064 are main part of an electrical heating control witch is typically installed in flame proof areas. Temperature sensors work in an intrinsically safe electric circuit. Measured values are processed in separate micro controllers for temperature controller and temperature limiter.

1. Temperature Limiter

The indicated limit value is adjusted with the potentiometer **Set Point** to the desired value while the pushbutton **Set Point** is pressed.

As soon as the sensor temperature exceeds the set limit value, the load circuit is opened and interlocked (red LED on). The interlocking can be reset by an internal reset button or a customer-provided external button.

In case of a line break, short circuit or if no sensor (Pt100) has been connected, the load circuit is opened and interlocked.

If the supply voltage fails, the power supply of the circuit to be limited is also interrupted. After the supply voltage has been restored, the device returns to the condition it was in before the supply voltage failure. Temporarily occurring faults are stored and displayed (F1...F5). Reset of these faults is done with the interlock reset button.

2. Temperature Controller

Upon operation of the pushbuttons **T1** or **T2**, the corresponding set point is displayed.

The potentiometers **T1 Maintain temperature** and **T2 Alarmtemperature** allow for a separate setting of switching points.

heating switching point: set point **T1**, Maintain temperature

temperature alarm: set point **T2**, Alarmtemperature (alarm value)

In case of a line break or a short-circuit of the temperature sensor, the main circuit is opened and the fault is displayed. Temporarily occurring faults are stored and displayed (“**F1...F5**”).

Reset of these faults is done with the button **T2**.

Any fault in limiter or temperature controller is signalled with malfunction relay.

Technical data are subject to change

12/14



Ex – heating controller FRBL-2 type 1064

Installation- and operating instructions

3. Power control

The power control unit consists of a main relay, full wave control and phase angle control. The output power may be adjusted in 5% steps from 5% to 100% with full wave control or continuously variable with phase angle control. Adaptation to different trace heating cables and length is possible. The device has electronic overload protection which shuts off if the current is higher than 25A. Whenever the load circuit is energized in full wave control mode, for 3 seconds phase angle control is active to make overload sensing possible. The device is equipped with an internal self resetting temperature switch, which triggers at 90°C.

4. Current measuring

Two connectors offer a DC voltage which is proportional to the load current. 0...2.5V DC correspond to 0...25A RMS AC. Optional a certified analogue meter can be ordered.

Measuring Circuit Monitoring

With the FRBL-2, the temperature sensor systems of the controller and the limiter are both monitored in the same way.

Temporarily occurring faults are displayed as F1 to F5 until a reset is made with **T2** or **interlock reset**:

<i>Short-circuit of the sensor line or $T < -100^{\circ}\text{C}$</i>	<i>Internal signal - LED display flashes with “---” value External signal - Opens load circuit (limiter with interlocking)</i>
<i>Line break of the sensor line or $T > 532^{\circ}\text{C}$</i>	<i>Internal signal - LED display flashes with the “UUU” value External signal - Opens load circuit (limiter with interlocking)</i>
<i>Line break of the sensor line with 3-wire connection</i>	<i>Internal signal - LED display flashes with the “UU” value External signal - Opens load circuit (limiter with interlocking)</i>
<i>Sensor line $> 22\ \Omega$</i>	<i>Internal signal - LED display flashes with measured value External signal - Opens load circuit (limiter with interlocking)</i>
<i>LED-display shows “F1”</i>	<i>Temperature at limiter had exceeded the setpoint reset with Unlock button or button Set Point shows actual temperature</i>
<i>LED-display shows “F2”</i>	<i>Temperature limiter or controller had short-circuit of the sensor line reset with Unlock button or button T2</i>
<i>LED-display shows “F3”</i>	<i>Temperature limiter or controller had line break of the sensor line reset with Unlock, button or button T2</i>
<i>LED-display shows “F4”</i>	<i>Temperature limiter or controller had line break of the sensor line in 3-wire configuration reset with Unlock button or button T2</i>
<i>LED-display shows “F5”</i>	<i>Temperature limiter or controller had line resistance $> 22\ \Omega$ reset with Unlock button or button T2</i>

Tests

- Explosion protection:
 - EC-Type Examination Certificate TÜV 03 ATEX 2078 ben. Stelle 0044
 - Ex-proof general EN 60079-0:2009
 - Ex-proof intrinsic safety EN 60079-11:2007
 - Ex-proof increased safety EN 60079-7:2003
 - Ex-proof encapsulation EN 60079-18:2004
 - Ex-proof dust EN 60079-31:2009
- EMI shielding:
 - EMI-tested
 - Namur NE 21 Prüfkriterium A
- Additional test
 - each device checked after thermal treatment according to BÖHM confidential instruction BV 010403a

Technical data are subject to change

12/14

Böhm Feinmechanik und Elektrotechnik, Am Schlörlbach 14, 38723 Seesen-Rhüden
Tel. 05384/216, Fax 05384/296, e-mail: info@winter-ex.de, www.winter-ex.de



Ex – heating controller FRBL-2 type 1064

Installation- and operating instructions

Technical Data

Supply voltage	196 – 253V~ 50-60Hz
External protection:	25A circuit-breaker, type A, B, C (Siemens), or Z, B, C (ABB)
Overload protection	cut-off at app. 33A
Power consumption:	≤ 11VA (without load)
Mounting position:	Wall-mounting
Intrinsically safe measuring circuit	[Ex ib] IIC U _o = 6,3 V, I _o = 22 mA, max. C _o = 1,5 μF, max. L _o = 10 mH [Ex ib] IIB U _o = 6,3 V, I _o = 22 mA, max. C _o = 8,2 μF, max. L _o = 10 mH
Temperature sensor:	Resistance thermometer in industrial version Pt100 DIN
Temperature sensor connection:	3-wire configuration with automatic length adjustment up to max. 22Ω 2-wire configuration with manual length adjustment
Min. Load:	3Ω
Relay output alarm:	1 CO contact 5A, 250 V~, 100VA or 5A, 24 V DC, 100W
Limiter switching point shift related to the set point:	tripping value 2°C below the defined set point
Setting range Limiter and controller T1:	0...450°C
Setting range low alarm T2:	-30...+430°C
Switching point accuracy:	< 1K
Controller hysteresis:	2K
Ambient temperature: (customer-provided)	-20...+40°C Caution! Reset contacts are under voltage 230V~
Load current and ambient temperature	standard: 25A (-20...+40°C) extended: 25A (-40...+40°C) extended: 16A (-40...+50°C)
Enclosure:	aluminium, mounting on base plate
Degree of protection:	EN 60529 IP64
Terminals: (Conductor cross-section)	Infeed 0.5...6 mm ² Reset/rel. Output 0.2...4 mm ² Load output 0.5...6 mm ² Sensors 0.2...4 mm ²
Dimensions:	260 x 160 x 135mm
Weight:	app. 7,0 kg

Electrical Connection / Device Connections

Terminals F, 1:	fuse GS5 (use only if original fuse is blown)
Terminals L1, N, PE:	power supply 230 V~, 50/60 Hz
Terminals 1, 2:	load circuit
Terminals 3, 4, 5:	output group fault
Terminals 8, 9, 10:	thermistor Pt 100 controller, 3-wire connection, intrinsically-safe
Terminals 11, 12, 13:	thermistor Pt 100 limiter, 3-wire-connection, intrinsically-safe



Ex – heating controller FRBL-2 type 1064

Installation- and operating instructions

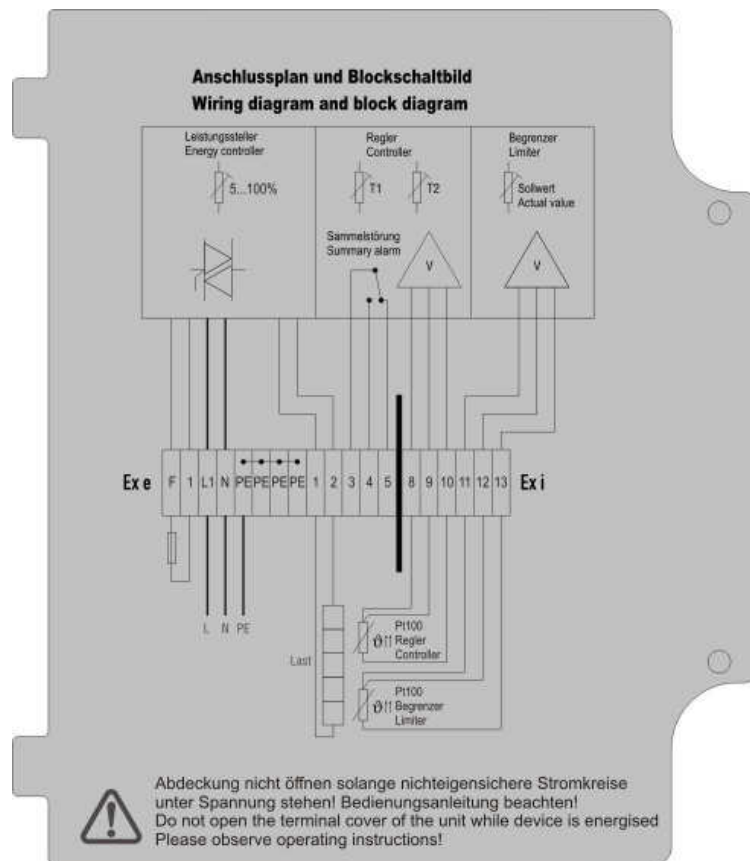


Fig. 1: Terminal cover:

Start up of temperature controller/limiter

Connections:

1. Connect temperature sensors (Pt100) at terminals 8 to 13.
(with 2-wire configuration bridge terminals 8 + 9 and 11 + 12)
Connect load to terminals 1 + 2.
2. If needed connect output group fault
3. Connect supply voltage.

Power control:

Set phase angle or full wave mode with switch.
Measuring connections. Set phase angle controller. Connect ammeter (optional) or Ex-voltmeter to current to 0% and full wave controller to 10%.
Turn on supply voltage.

Limiter:

Press button **Set Point** and set limit with screwdriver at potentiometer **Set Point**.
If temperature < limit, than press reset
red LED **Alarm** turns off, limiter closes load circuit

Temperature controller:

Set switchpoint Maintain temperature:

Press button **T1** and set switchpoint with screwdriver at potentiometer **T1 Maintain temperature**,
if temperature < switchpoint green LED turns on (heating is working)

Set switchpoint Alarmtemperature:

Press button **T2** and set switchpoint with screwdriver at potentiometer **T2 Alarmtemperature**,
switchpoint has to be < temperature, otherwise output group fault will be active.

Technical data are subject to change

12/14



Ex – heating controller FRBL-2 type 1064

Installation- and operating instructions

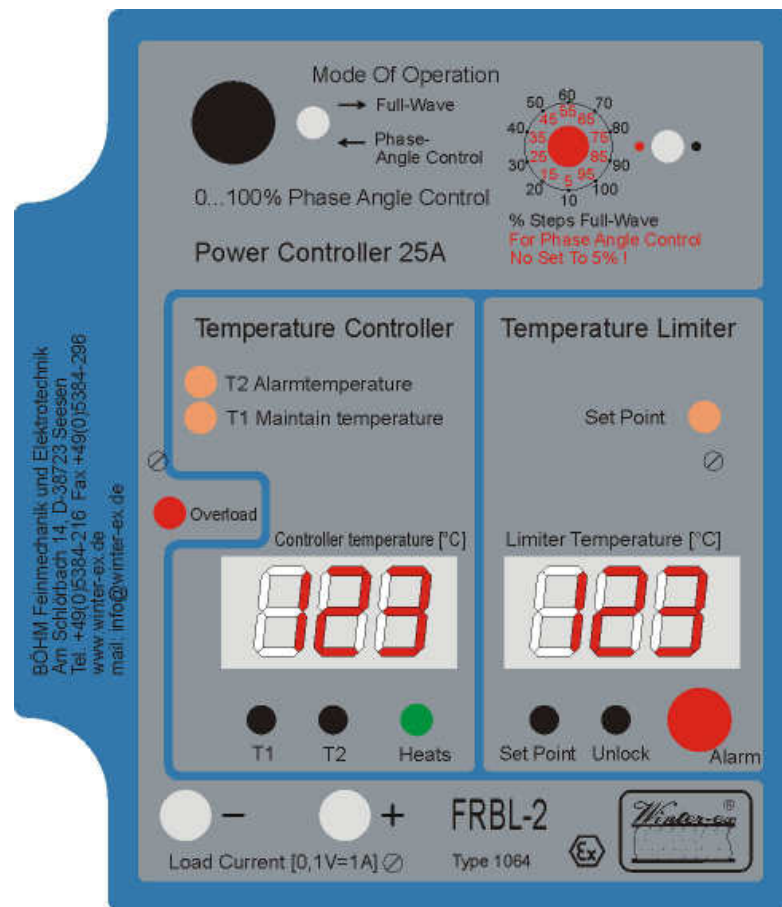


Fig.2: Front-Panel

Power control:

1. Full wave mode:

Set switch to red and “% Steps Full-Wave to“ 5%, read current at optional ammeter or Ex-voltmeter. Rise current with switch and ”% Steps Full-Wave to“ to desired value.

Attention: Display is slow because RMS-value is calculated!

If overload protection shall be used phase angle mode must be set as in pt. 2 to max. or less than the current as in full wave mode.

The optional ammeter display the current, a voltmeter displays 0.1V/A; i.e. 2,0V = 20A.

2. Phase angle mode:

Set full wave mode to 10% !

Rise current with Phase Angle Control from 0% to desired value.

Attention: Display is slow because RMS-value is calculated!

The optional ammeter display the current, a voltmeter displays 0.1V/A; i.e. 2,0V = 20A.

General:

Supply voltage:	230V
max. nominal current I _{max} :	25A
max. power P _{max} :	5,75kW with load R _L = 9,2Ω

No loads < 3Ω !

100% Steps:	P _{max}
for R _L > 9,2Ω:	P _{max} = 230V ² / R _L
for R _L < 9,2Ω:	P _{max} = 25A ² * R _L

Technical data are subject to change

12/14

Böhm Feinmechanik und Elektrotechnik, Am Schlörlbach 14, 38723 Seesen-Rhüden
Tel. 05384/216, Fax 05384/296, e-mail: info@winter-ex.de, www.winter-ex.de



Fig. 3: Cable gland

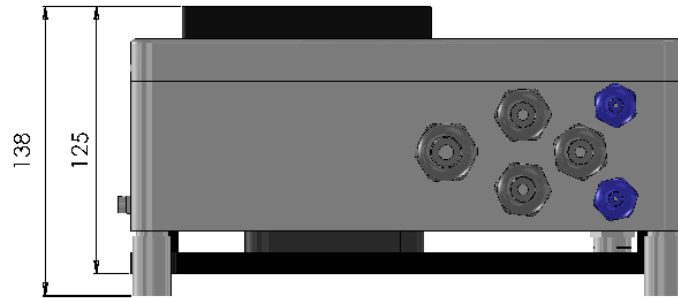


Fig. 4: Dimensions

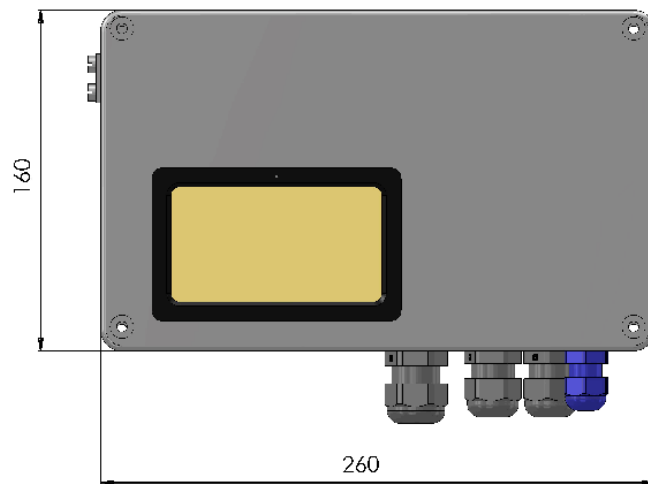


Fig. 5: Fixing

