

Rotation Speed Monitor / Speed Controller RC3 for Escalator Motors

Operating instruction



Version
RC3 F1
01.19

This document is part of the equipment and should therefore remain inside the control-cabinet (TÜV-regulation).

Status: 05.02.2021

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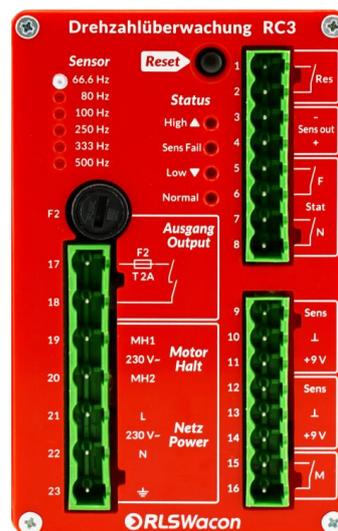
Rotation Speed Monitor / Speed Controller RC3 for Escalator Motors

VERSIONS / ORDER NUMBERS

Version for vertical installation (without mounting-clip)

available in different nominal rotation speed versions:

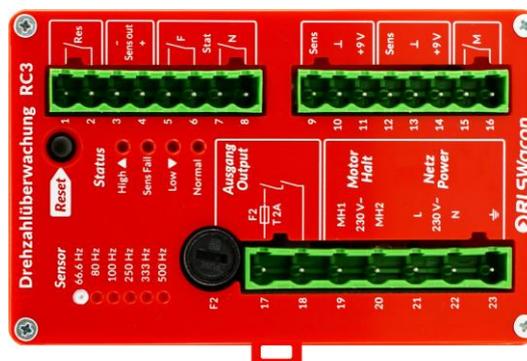
66 ² / ₃ Hz:	order number: 80-200 300
80 Hz:	order number: 80-200 303
100 Hz:	order number: 80-200 301
250 Hz:	order number: 80-200 302
333 Hz:	order number: 80-200 311
500 Hz:	order number: 80-200 315



Version for horizontal installation (including mounting-clip)

available in different nominal rotation speed versions:

66 ² / ₃ Hz	order number: 80-200 304
80 Hz	order number: 80-200 305
100 Hz	order number: 80-200 306
250 Hz	order number: 80-200 307
333 Hz	order number: 80-200 314
500 Hz	order number: 80-200 316



Rotation Speed Monitor / Speed Controller RC3 for Escalator Motors

- Switch off at fault
- Quad choice of sensor freq.: 662/3, 80, 100, 250, 333Hz
- Optical and inductive sensors usable
- Status outputs and optical display
- Compactly built
- Low power dissipation (5VA)
- TÜV- Sample listed to EN115:2008

GENERAL INFORMATION

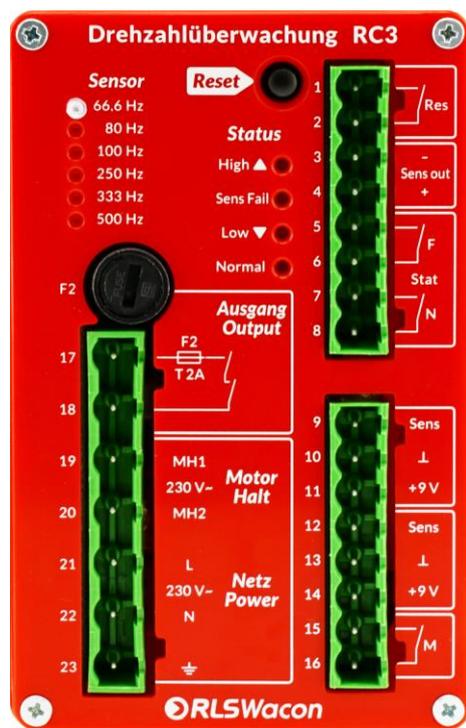
The rotationspeed monitor RC3 watches the motor rotation speed, and reacts by shutting the motor down if the motor speed is out of tolerance.

The speed sensors can be reflection light sensors or inductive proximity switch types.

The sensors power is supplied by the unit and therefore do not require an external power supply.

The unit can be set for 4 different nominal speeds.

To connect to the escalator controller, a potential free relay contact (Motor power relay M, contact closed = Motor Halt) is necessary. The output consists of 2 series connected, potential free working contacts 17 / 18, which form part of the safety system.



Front view

CONDITIONS FOR SWITCH OFF

- **Rotation too slow (under speed / LO)**
The „under speed“ range is defined as 0-19.5% of the nominal r.p.m.
The motor will be shut off if, after 2.6 sec. from the starting of the motor, the rotation speed is still in the „under speed“ region.
- **Reversal of travel**
The rotation speed range of 19.5% to 117% of the nominal r.p.m. is defined as the „Normal Rotation Speed“.
If the rotation speed falls into the „under speed“ region, the motor will be shut off.
- **Rotation too fast (over speed / HI)**
„Over speed“ is defined as more than 117% of the nominal r.p.m. Likewise if the rotation speed increases to „Over Speed“, the motor will be shut off.
- **Failure of sensor (SENS FAIL)**
If the sensor signals are not plausible or missing the motor will be shut off.

CONDITION DISPLAY AND OUTPUT

The first fault that causes shut off will be displayed. The condition signals are available as outputs through an 8-pole connector.

Rotation Speed Monitor / Speed Controller RC3 for Escalator Motors

TECHNICAL DATA

GENERAL

Relay output switch current: 2 A (8 A max.)
Supply voltage: 230 VAC +/- 10 %, 40 ... 60 Hz
Power dissipation: <5 VA
Ambient temperature range: -20 ... +65 °C

Regulation: EN 115:2008
EN 50081-1, EN 50082-1
DIN EN 12015
DIN EN 12016
EN 61508
EN 954-1

Dimensions (W x H x L): 64 * 104 * 135 mm
64 * 104 * 145 mm including connectors
64 * 104 * 152 mm including connectors and mountig-clip
(mountig-clip is only delivered when ordering the horizontal version)

SHUT OFF CONDITONS

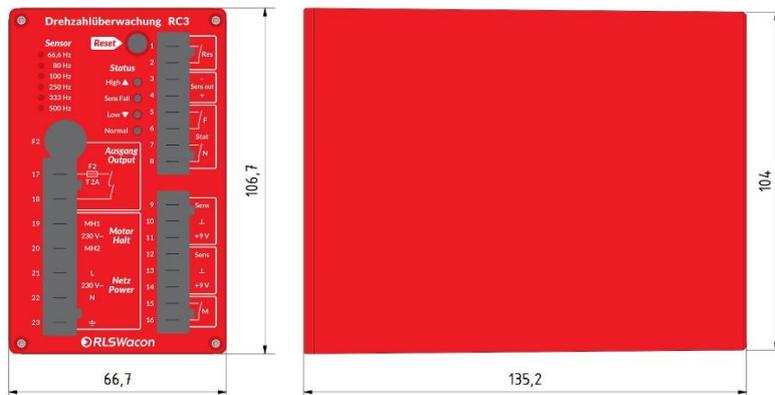
Rotation speed - too slow: <19,5 % nominal r.p.m. (shut off after 2,6 sec.)
Rotation speed - too fast: >117 % nominal r.p.m.
Reversal of travel: from > 19,5 % to <19,5 % nominal r.p.m.
(reduction from normal Rotation Speed)
Failure of sensor: Short circuit, open circuit, oscillating

SENSOR

Type: inductive sensor (e.g. NAMUR)
Sensor supply voltage: 9 VDC (max. 50 mA)
Nominal frequencies: (100 % r.p.m.): 66²/₃, 80, 100 oder 250 Hz

Please specify the nominal frequency when ordering!

HOUSING DIMENSIONS



Rotation Speed Monitor / Speed Controller RC3 for Escalator Motors



OPERATING

To operate the equipment two rotation sensors and a potential free contact from the motor relay are necessary.

The sensor inputs are compatible with the most used sensor systems (eg. inductive proximity switches, opto-switches etc.) that can be operated from a 9 VDC supply. 2-wire-sensors (current mode version) or 3-wire- sensors can be adapted.

The Potential free contact of the motor relay (M-contact) must be closed when the motor is switched off.

The contact carries a current of max. 20 mA.

If the motor relay contact „M“ must be operated with 230 VAC to prevent contact oxidation, the 230 VAC Motor Halt input MH1 / MH2 should be used. When the motor is switched off, the R.S.M. is not active.

**Only one pair of inputs (M or MH) must be used!
Usage of both inputs in parallel at the same time is not allowed!**

SELF-TEST

When the mains power is connected, the device carries out a self-test, lasting about 5 seconds.

During the self test, both sensors are inhibited and an internal sweep generator simulates the cut-off conditions Overspeed, Reversal of travel, Too Slow and Defective Sensors.

If the self-test is successful and the M-contact is closed, then the green LED „Normal“ will light, and the output relay will close its contacts (17 / 18). The motor can now be started - the R.S.M. is now active.

CUT-OFF CONDITIONS

Too slow

Within 2.6 seconds of starting the motor, the motor speed must have passed the lower tolerance level of 19.5% of the nominal r.p.m., otherwise the motor will be cut off. If cut-off occurs in this circumstance, the red LED „LO“ will light.

Reversal of Travel

if, at any time during the running of the motor, the motor speed drops below the lower tolerance level (19.5% nom. r.p.m.) the motor will be cut-off and the red LED „LO“ will light.

Too fast

If the upper tolerance level of 117 % of the nominal r.p.m. is exceeded, the motor will be cut-off. In this case the red LED „HI“ will light.

Defective sensor

Both revolution sensors are monitored for plausibility. In the event of missing or irrational sensor signals (open circuit, failure, etc.) the motor will be cut-off and the red LED „SENS FAIL“ will light. This LED will also light if the motor fails to run, when first switched on.

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FURTHER AVAILABILITY

In the case of failure (rotation failure, sensor failure, contact loss or internal failure) the output relay contacts (17 / 18) open and the motor will be cut-off.

The first failure to register will be displayed by one of the four LED's on the front panel.

Further availability of the equipment can now only be acquired by pressing the „Reset“ button, which starts the self-test.

Only if cut-off is due to one of the motor speed faults, the self-test can be successful, in which case the motor can be restarted.

In the case of cut-off through any other cause (defective sensor, internal fault, etc.), the fault must be repaired before restart of the motor is possible. If the M-contact is closed but the self-test is unsuccessful, (the green „Normal“ LED will not light after a delay of 3 seconds) an internal fault is present.

INPUT CONNECTOR

The 8-pole input connector carries the connections for both sensors and the motor-control contact „M“.

The „M“ input (15/16) is an auxiliary motor contact input, with a potential of 12 V. To prevent oxidation of the motor relay contact „M“, usage of the MH1 / MH2 (230V) input is highly recommended.

The simultaneous use of both inputs is not permitted!

Sensor connection (pins 9-14)

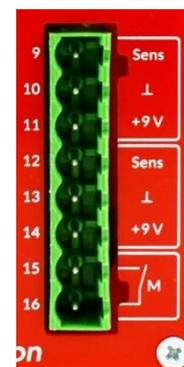
The sensor inputs can be fed by 2-wiresensors (current type, NAMUR) and / or 3-wire-sensors.

For 3-wire-sensors, a separate 9 VDC supply is available. This supply can be loaded with a maximum of 50 mA per output.

Shielded sensor cables must be used!

Input specifications for the sensor inputs (Pin 9 and12)

Input voltage, LOW level:	0..+6,5 V
Trigger level, negative:	+6,8 V
Input voltage, HIGH level:	+8..+9 V
Trigger level, positive:	+7,9 V
Input current, LOW level:	max. 9 mA (0V), min. 2,2 mA
Input current, HIGH level:	max. 1,0 mA
Input resistance:	1 kW
Voltage of Input Pins (open circuit):	+9 V
Cable Resistance (current type sensor)	max. 100 Ω



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THE 8-POLE INPUT CONNECTOR

Pin-No.	Signal-Name	Signal	Comments
9	SENSOR1	Sensor-Input1	+ pole of current type sensor output from 3-wire-sensor
10	GND	Sensor-GND	- pole of current type sensor used by 3-wire-sensor
11	+9V	Sensor supply voltage	used by 3-wire-sensor
12	SENSOR2	Sensor-Input2	+ pole of current type sensor output from 3-wire-sensor
13	GND	Sensor-GND	- pole of current type sensor used by 3-wire-sensor
14	+9V	Sensor supply voltage	used by 3-wire-sensor
15	M1	Optokoppler-input	potential free contact from motor relay (Motor Halt = contact closed)
16	M1	Optokoppler-Input	potential free contact from motor relay

Safety-Output (Pin 17/18 of 7-pole connector)

The „READY“ signal is carried through two (in series) connected output relay contacts to the escalator control. Only this contacts should be used for speed supervising! The contacts are protected by fuse F2 (2 A, slow blow).

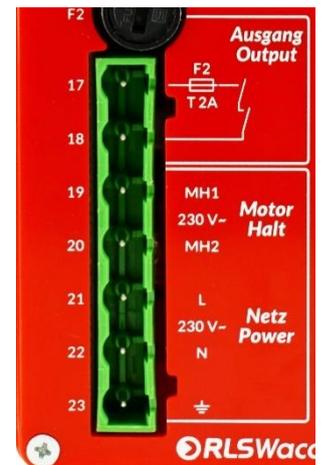
Status Input MOTOR HALT MH1 / MH2 (Pin 19/20 of 7-pole connector)

The motor relay contact must feed a voltage of 230 VAC +/- 10 %, 40-60 Hz (20 mA max.) to this input when motor is switched off (MOTOR HALT). When starting the motor, this voltage must be removed.

Mains Supply Input (Pin 21/22/23 of 7-pole connector)

The device is set up for a mains supply of 230 VAC and 40-60 Hz. The power dissipation is approx. 5 VA. The mains input is protected in the transformer primary section by fuse F1 (0.125 A, slow blow).

Pin 23 **must** be connected to mains earth! Operation without earth connection could lead to malfunctions!



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STATUS CONNECTOR

This 8-pole connector provides the equipment outputs and the remote Reset facility.

External RESET-Input (Pin 1/2)

To achieve a remote Reset, a potential free, make and then break switch should be employed.

Attention!

The Reset must not operated before the escalator has been properly checked out by qualified personel.

Output SENS OUT (Pin 3/4)

From this optocoupler output, the Signal Sensor 1 is available as follows:

Pin 3 = Emitter, Pin 4 = Collector of the transistor:

This signal must not be used for speed control!

Output FAIL a/b (Pin 5/6)

Output from a potential free solid state relay, normally open. Closes in event of fault.

Allowable switch voltage: min. 10 Volt, max. 400 V AC/DC

Allowable switch current: max. 100 mA AC/DC

Contact resistance: max. 30 Ω

Output NORMAL a/b (Pin 7/8)

Output from a potential free solid state relay, normally closed. Opens in event of fault.

Allowable switch voltage: min. 10 Volt, max. 400 V AC/DC

Allowable switch current: max. 100 mA AC/DC

Contact resistance: max. 30 Ω

THE 8-POLE CONNECTOR STATUS

Pin-No.	Signal	Comments
1	Reset –	Reset Input –
2	Reset +t	Reset Input +
3	Sensor Out –	Sensor Output Optokoppler –
4	Sensor Out +	Sensor Output Optokoppler +
5	FAIL a	Output contact, FAILURE a
6	FAIL b	Output contact, FAILURE b
7	NORMAL a	Output contact, NORMAL a
8	NORMAL b	Output contact, NORMAL b



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TECHNICAL DATA FOR THE STATUS SIGNALS

Remote Reset Input (Pin 1/2)

Pin 1:	control current source (100 Ω to earth)
Pin 2:	control relay coil
Type of input:	potential free contact
Supply Voltage:	max. 12V
Load current:	<20 mA
Reset contact close time:	min. 100 ms, max. 2 s.

Please note:

Externally applied power could damage the equipment.

Sensor Out (Pin 3/4)

Type of output:	Optocoupler, photo transistor Pin 3 = Emitter, Pin 4 = Collector
Insulation:	3750 VAC
Allowable switch voltage:	max. +70 VDC on pin 4 with respect to pin 3
Allowable switch current:	typically 10 mA
Switching time (on/off/on):	< 0.1 ms
Power dissipation:	max. 200 mW

Please note:

reversal of polarity will damage the device.

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FAIL a/b (Pin 5/6)

Type of output:	Potential free solid state relay (bidirectional MOS-FET) Potential free contact, normally opened, closed in event of fault
Insulation:	3750 VAC
Allowable switch voltage:	min. 10 Volt, max. 400 V AC/DC
Allowable switch current:	max. 100 mA AC/DC. Contact resistance max. 30 Ω
Power dissipation:	For both switches FAIL and NORMAL in summation max. 600 mW
Contact resistance:	max. 30 Ω (contact closed), min. 10 ¹⁰ Ω (contact open)

Please note:

Inductive loads may only be used in conjunction with appropriate protective devices. When switching an inductive load, the output must be protected against spurious voltage peaks that could exceed the allowable voltage specifications (e.g. varistor).

NORMAL a/b (Pin 7/8)

Type of output:	Potential free solid state relay (bidirectional MOS-FET) Potential free contact, normally closed, opened in event of fault
Insulation:	3750 VAC
Allowable switch voltage:	min. 10 Volt, max. 400 V AC/DC
Allowable switch current:	max. 100 mA AC/DC
Power dissipation:	For both switches FAIL and NORMAL in summation max. 600 mW
Contact resistance:	max. 30 Ω (contact closed), min. 10 ¹⁰ Ω (contact open)

Please note:

Inductive loads may only be used in conjunction with appropriate protective devices. When switching an inductive load, the output must be protected against spurious voltage peaks that could exceed the allowable voltage specifications (e.g. varistor). This contact will remain closed until a fault is registered, including during self-test after power-up or Reset.

