Wind/rain detector
WRM 401/C

Technical Documentation

BSC Technology GmbH
Dr.-Köhl-Straße 6
D-95119 Naila

Telephone (main number)
+49 9282 48731-0

Fax (main number)
+49 9282/48731-29

windowdrives.com

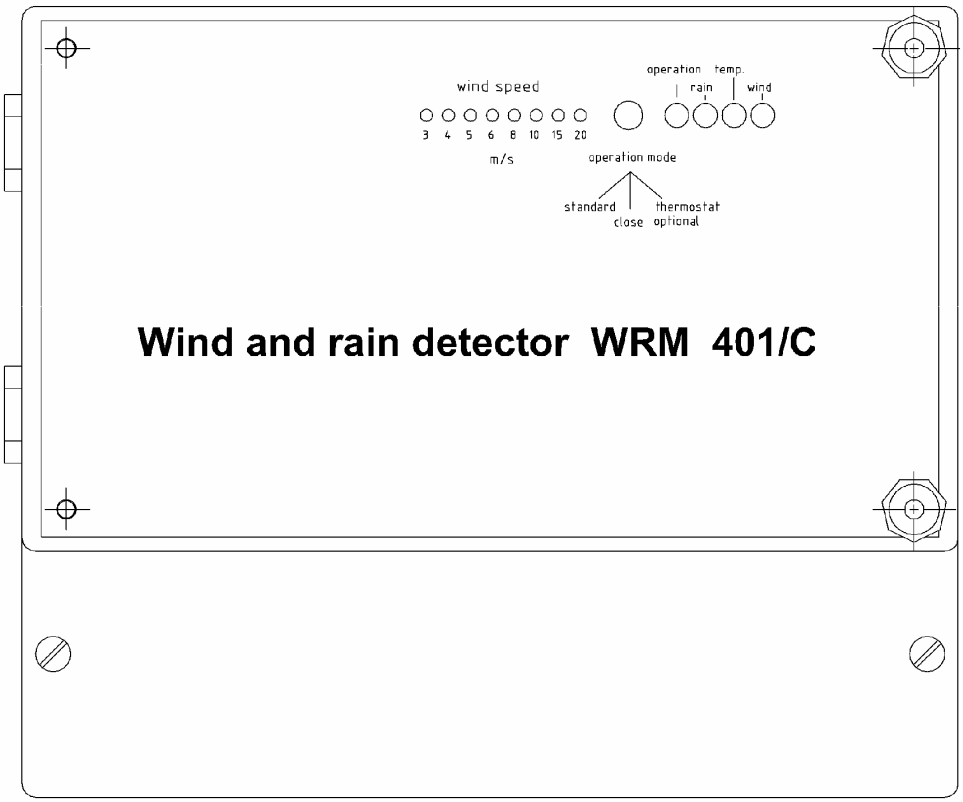
mail: info@bsc-technology.de

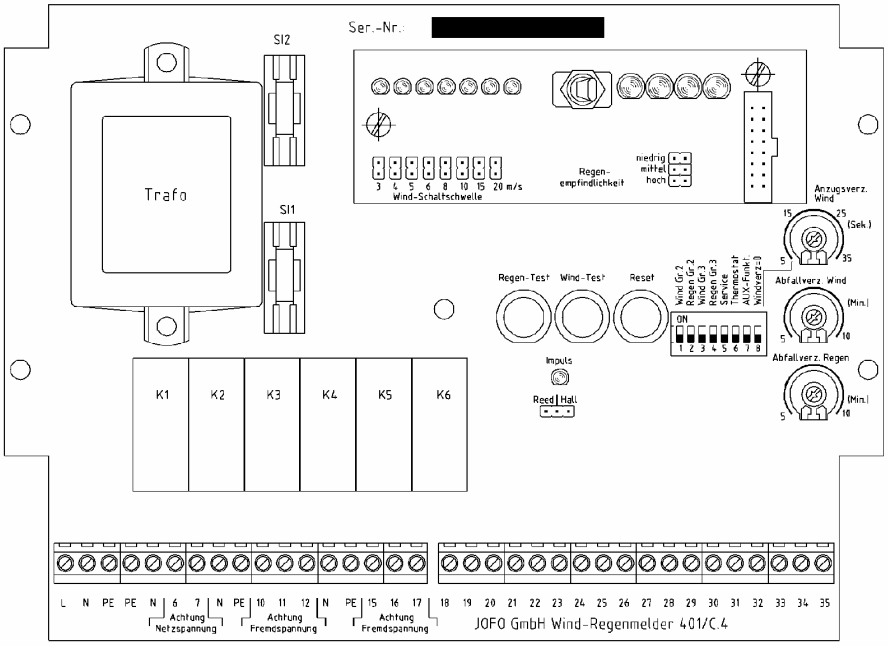
WINDOWDRIVES
BSC TECHNOLOGY

1 Contents

Page

2 Equipment diagram





3 Installation

3.1 General

Installation, commissioning, repair and maintenance of the wind/rain detector WRM 401/C may only be carried out by trained specialists.

3.2 Regulations and installation instructions

The following regulations and instructions must be observed during installation, cabling and commissioning work:

- national building regulations
- guideline ZH 1/494 for power-operated windows, doors and gates
- VDE 0100, VDE 0108
- the rules of the responsible power supply company
- the control unit should be installed in a location that allows unobstructed access to the control unit for subsequent maintenance and repair work
- the housing must be fastened to the wall

3.3 Accident prevention regulations

The general accident prevention regulations, the accident prevention regulations for power-operated windows, doors and gates, and the VDE installation regulations must be obeyed at all times.

Important warning
The system must be isolated from voltage before any components are removed.

- **first disconnect the 230 V mains voltage**

3.4 Design of the wind/rain detector WRM 401/C

The wind/rain detector WRM 401/C automatically closes electrically operated windows, blinds and ventilation units on the onset of rain, snow or wind. The electrical drives / ventilation units (valves) to be connected can be looped into 3 ventilation lines. There are 3 ventilation lines available for this purpose:

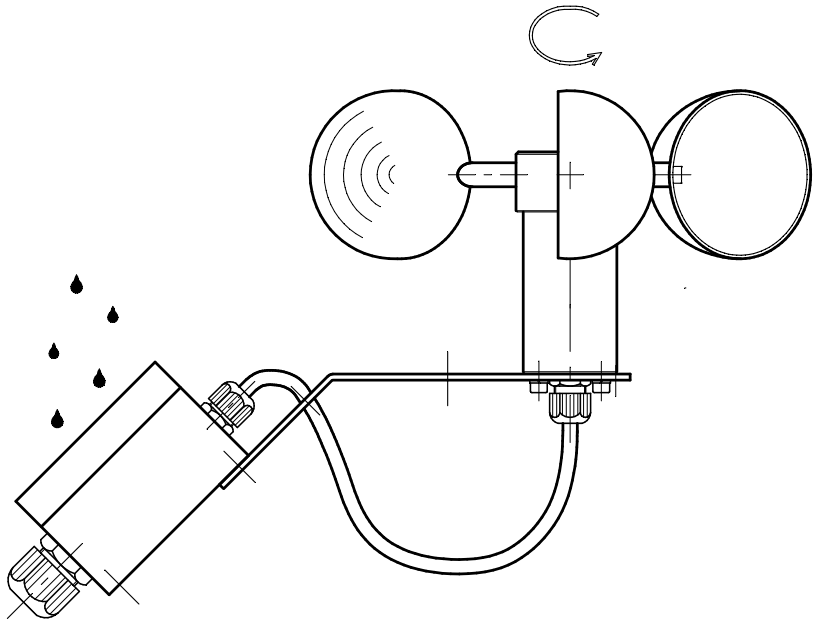
- Ventilation line 1: charged 230 V AC 50 Hz (breaking capacity 8A)
- Ventilation line 2: floating changeover contact (breaking capacity 8A)
- Ventilation line 3: floating changeover contact (breaking capacity 8A)

Its range of functional features make the wind/rain detector WRM 401/C suitable for use as a complete ventilation controller. For this purpose, the following components can be connected directly to the wind/rain detector WRM 401/C.

- any number of ventilation pushbuttons (double rocker without mutual interlock) on each motor line
- 1 x wind/rain sensor WRF 401
- 1 x additional rain sensor RS 401
- 1 x room thermostat (see 4.8)
- 1 x external mode selector switch (see 4.8)
- 1 x timer (see 4.8)
- 1 x “Close control unit“ switch (see 4.8)
- the system can be expanded by connecting the additional relay 301/8 (contact duplication)

3.5 The wind/rain sensor WRF 401/C

The following illustration shows the wind/rain sensor WRF 401/C. It consists of a rain sensor and a wind wheel for wind measurement. The wheel rotations are detected by Hall sensors and transferred to the wind/rain detector. The rain measurement process makes use of a resistivity measurement between two electrodes (rendered weather-proof by gold-plating). To prevent the rain sensor from freezing and accelerate the drying process, a heat resistor (470 Ω) is fitted below the electrodes.
The electrical connection makes use of 5-strand cables (2 strands wind measurement / 3 strands rain measurement).



3.6 Power connection

Power is supplied by connecting a 3-strand cable (L1, N, PE) to a 230V AC mains. It is imperative that the wind/rain detector WRM 401/C is afforded external fuse protection, as Phase L1 is transferred unprotected to motor group 1.

The connection diagram and wiring arrangement can be found in the wiring diagrams at the Annex.

It should be noted that the first motor group is charged. The other 2 motor groups have zero-potential and can be used for connecting to the control units of external wind/rain systems and to building control systems. Each motor group has an input for an external ventilation pushbutton [operating voltage 24V DC]. The wind/rain detector WRM 401/C also has a thermostat input and/or an input for an external mode selector switch or a ‘Close control unit’ switch.

4 Functional description

The wind/rain detection process makes use of the wind and/or rain sensor of the WRF 401 designed for external connection. Alternatively, ventilation can be controlled through a thermostat or ventilation pushbutton, both designed for external connection.
In the case of motor groups 2 and 3, dip switches on the board provide an indication as to whether the respective motor group is to actuate in dependence of rain only, wind only, wind and rain or neither of the two. Motor group 3 has in principle a wind/rain priority. This wind/rain priority applies in all operating modes.
3 different operating modes can be selected using the '**Standard / Closed / Thermostat optional** mode selector switch.

4.1 "Standard" operating mode

In "Standard" mode, the connected motor openers / ventilation units can be opened only with the aid of the ventilation pushbuttons connected to the ventilation pushbutton input. In the absence of actuation by wind/rain, the motor groups are opened, closed and stopped when the ventilation pushbutton is pressed.
Switching function of double rocker switch without mutual interlock:

- "open" switch pressed once only → moves to 'open' end position
- "closed" switch pressed once only → moves to "closed" end position
- "open" and "closed" switch pressed simultaneously → stop
- several connected ventilation pushbuttons pressed simultaneously (to locking) → stop

When the wind/rain detector is idle, the relay contacts are in the "closed" position. If there are no ventilation pushbuttons connected (ventilation pushbuttons – input not assigned), the motors cannot be opened.

If there are no external ventilation pushbuttons connected directly to the wind/rain detector (ventilation pushbuttons – input not assigned), a jumper must be inserted between terminals 23 / 24, 26 / 27 and 29 / 30 to ensure the actuation process. This situation occurs when pneumatic switching cabinets or control units for 24V wind/rain systems are connected. If the ventilation pushbuttons are integrated directly into the motor group, the jumper must again be inserted between terminals 23 / 24, 26 / 27 and 29 / 30.
In addition, a switch for the "Close control unit" function can be connected to terminals 34 / 35. This function must be set using the dip switches and ensures on actuation that all motor groups have priority closing.

4.2 "Closed" operating mode

In "Closed" mode, all motor groups (switching contacts) are in the closed position. In this operating mode, the system cannot be actuated through the ventilation switch or a room thermostat.

4.3 "Thermostat optional" operating mode

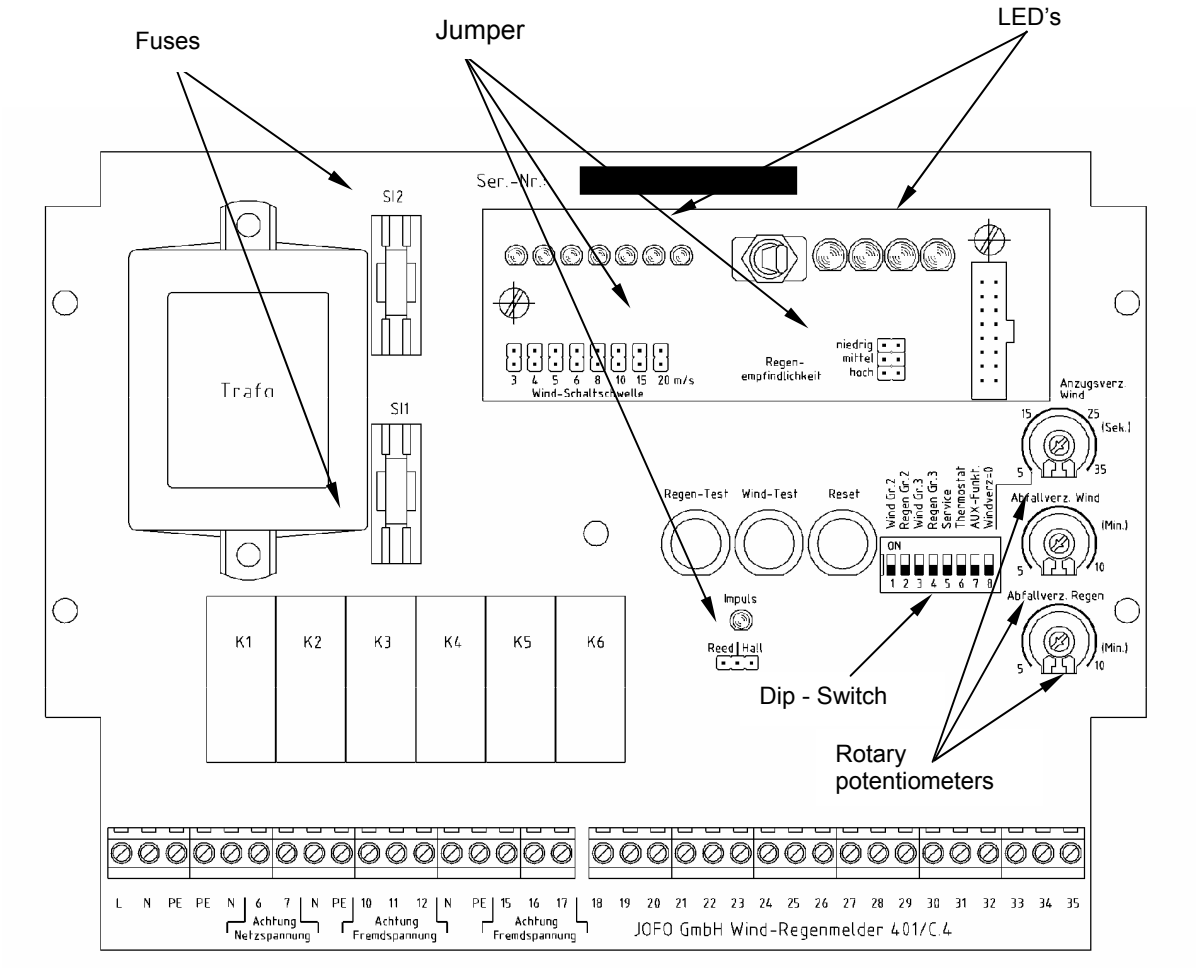
In "Thermostat optional" mode, all 3 motor groups are opened and closed by means of an externally connected room thermostat, timed thermostat or a timer. An external manual/automatic switch can also be connected to terminals 34 / 35. The switch is selected by means of a dip switch and deselects the mode selector switch integrated into the cover of the wind/rain detector WRM 401/C.
As with "Standard" mode, a "Close control unit" switch can also be connected to terminals 34 / 35. The function ("Standard – Thermostat optional" or "Close control unit") is selected by means of the dip switch on the board.

4.4 Setting the rain/wind detector system

The rain/wind detector system RM – WM/A is fitted with a number of functions. This Section describes the different configurations: Settings can be configured at the following positions:

- “Wind acceleration delay” potentiometer
- “Wind deceleration delay” potentiometer
- “Rain deceleration delay” potentiometer
- Dip switch 8 times
- Jumpers – “wind – switching threshold” series
- Jumpers – “rain sensitivity” series
- Jumper – “Heat output”
- Jumper – “Reed / Hall”

All potential configurations are present on the board of the wind/rain detector system RM – WM/A. The following illustration shows the different positions at which the settings can be configured.



4.5 Setting the wind switching threshold

The jumper series for setting the wind speed switching threshold are accommodated below the LED displays for wind speed. Wind speed can be set in 6 stages from 3 m/s to 10 m/s. An inserted jumper indicates the set switching threshold.

The switching threshold can be set only in consultation with the manufacturer of the opening unit and must be modified locally.

4.5.1 Setting delay times for wind

The board has two rotary potentiometers for setting the wind deceleration and acceleration delays. The acceleration delay can be set infinitely from 5s to 35s. The deceleration delay can be set infinitely from 5min to 10min.

Explanation
If a switching threshold of 5 m/s is set with an acceleration delay of 15s and a deceleration delay of 5 min, a wind force of greater than or equal to 5 m/s must be detected for at least 15s before the WRM 401C will actuate. For actuation on wind deceleration, a wind speed of less than 5 m/s must be detected for at least 5 minutes.

4.6 Setting rain sensitivity

The jumper series (vertical series) for setting rain sensitivity are accommodated below the large LED displays. Rain sensitivity can be set to 3 stages (low / medium / high) using a jumper. If there is no jumper inserted, the “rain LED” flashes and the wind/rain detector WRM 401/C will detect a fault. In this case, all motor groups will switch over to “CLOSED”.

The rain sensitivity setting can only be modified locally in line with local conditions.

4.6.1 Setting delay times for rain

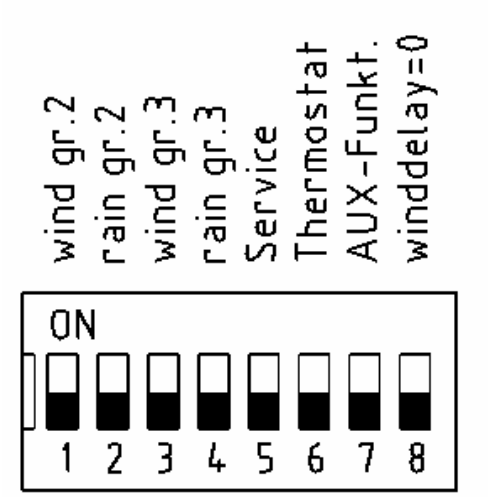
The board has one rotary potentiometers for setting the rain deceleration delay. The deceleration delay can be set infinitely from 5 min to 10 min. The rain acceleration delay is equal to zero.

4.7 Selecting the wind measurement principle

The “Reed / Hall” jumper can be used to select the measuring principle for wind evaluation. The standard equipment of the wind/rain sensor WRF 401/C includes a Hall sensor for speed detection. However, for compatibility reasons, a wind/rain sensor WRF 401 with reed contact can be connected for speed detection.
If a previous sensor model WRF 401/B (with reed contact) is connected to the wind/rain detector WRM 401/C, the jumper must be inserted on the left. In all other cases, the jumper must be inserted on the right.

4.8 Special functions (dip switch)

Various special functions can be set on the wind/rain detector WRM 401/C using a dip switch series (8 dip switches). The following illustration shows the dip switches:



Function:	Dip switch no.:	ON	OFF
Motor group 2 switches to “closed” on wind actuation.	1	x	
Motor group 2 does **not** switch to “closed” on wind actuation.	1		x
Motor group 2 switches to “closed” in rain.	2	x	
Motor group 2 does **not** switch to “closed” in rain.	2		x
Motor group 3 switches to “closed” on wind actuation.	3	x	
Motor group 3 does **not** switch to “closed” on wind actuation.	3		x
Motor group 3 switches to “closed” in rain.	4	x	
Motor group 3 does **not** switch to “closed” in rain.	4		x
Service switch “ON”: No motor group responds to detection of rain or wind → green LED – operation flashing.	5	x	
Service switch “OFF”: All motor groups respond again to detection of wind or rain	5		x
The connected thermostat, timed thermostat or timer has an opener contact.	6		x
The connected thermostat, timed thermostat or timer has a closer contact.	6	x	
A “Close control unit” switch is connected to terminals 34 / 35	7		x
A mode selector switch is connected to terminals 34 / 35 ***The internal mode selector switch is deselected.***	7	x	
The wind acceleration delay is set to 0s.	8	x	
The wind acceleration delay corresponds to the setting on the rotary potentiometer.	8		x

5 Operator action

The wind/rain detector WRM 401/C has several control and display elements. The display elements serve to indicate the operating status of the WRM 401/C. The different control elements can be used to select the operating mode and wind or rain can be simulated.
The arrangement and/or positions of the control and display elements can be found in the diagram of the board in section 2.

5.1 Control elements

The following table shows an overview of the various functions accommodated by the different control elements.

Operator action:	Function:
Mode selector switch in “Standard“ position	• The commands to open and close the motor groups are given by the ventilation pushbuttons.
Mode selector switch in “Closed“ position	• All motor groups reverse into closed direction • Cannot be opened by the ventilation pushbuttons or thermostat.
Mode selector switch in “Thermostat optional” position	• The open and close commands are given by a room thermostat, timed thermostat or timer. • Cannot be opened by the ventilation pushbuttons.
“Rain test” pushbutton	• Simulates rain when pressed. • All participating groups move to CLOSED position. • The rain LED comes on. • The set rain deceleration delay is active → the rain test is ended after a preset time.
“Wind test” pushbutton	• Simulates wind when pressed. • All participating groups move to CLOSED position. • The entire wind display (red LEDs) comes on. • The wind LED comes on. • The set wind deceleration delay is active → the wind test is ended after a preset time.
”Reset” pushbutton	• When pressed, ends the wind and rain tests and resets the rain deceleration delay.

5.2 Display elements

The following table shows an overview of the various display states of the different display elements:

Display:	State:
”Operation” LED (green)	• Lights up permanently in mains operation. • Extinguishes on mains failure of faulty SI1 or SI3 fuse. • Flashes when dip switch no. 5 is in “ON” position → service switch.
“Rain” LED (yellow)	• Lights up permanently on rain actuation. • Flashes on malfunction (no jumper inserted for setting rain sensitivity and/or rain sensor fuse faulty).
“Temperature” LED (yellow)	• Lights up permanently when thermostat is triggered (set temperature exceeded). • Responds only in “Thermostat optional” mode.
“Wind” LED (red)	• Lights up permanently on wind actuation.
“Pulse” LED (red) [on the board / not routed outside]	• Flashes twice per rotation of the wind wheel [check indicator for the Hall sensor]. • **Does not** function if a reed contact sensor is connected.
“Wind speed” LEDs (red)	• Displays the current wind speed.

5.3 Fuses on the board

Fuse:	Function:	Rating:
SI 1	Primary transformer protection	63 mA neutral
SI 2	Rain sensor protection	250 mA neutral
SI 3	Secondary transformer protection	250 mA neutral

5.4 State at time of delivery

Wind switching threshold	set to 5 m/s
Rain sensitivity	set to high
Wind acceleration delay	set to 5 s
Wind deceleration delay	set to 5 min
Rain deceleration delay	set to 5 min
Reed/Hall jumper	jumper inserted for operating a Hall sensor
Heat output jumper	jumper inserted → full heat output
Dip switch no. 1	ON
Dip switch no. 2	ON
Dip switch no. 3	ON
Dip switch no. 4	ON
Dip switch no. 5	OFF
Dip switch no. 6	OFF
Dip switch no. 7	OFF
Dip switch no. 8	OFF
0 Ω Resistance on terminal 23-24, 26-27 and 29-30	
Mode selector switch in STANDARD position	

6 Technical data

Model:	Wind/rain detector WRM 401/C
Housing:	Plastic housing Dimensions W/H/D: 213/180/98 [mm] Colour: grey, similar to RAL 7035 with transparent cover
Protection classification:	IP 54
Temperature range:	- 5°C to + 40°C
Rated voltage:	230 V AC / 50 Hz
Rated power:	= 8 W
Vent line breaking capacity:	Max. 8 A rated current e.g. : Max. of 8 230 V / AC / 0.9 A motor openers
Number of vent lines:	3 can be altered if additional relay 301/8 is connected
No. of ventilation pushbuttons	any number double rocker without mutual interlock
Number of sensors:	1 x wind/rain sensor WRF 401/C 1 x additional rain sensor RS 401 Measuring principle for wind: Pulse generator (Hall sensor or reed contact) Measuring principle for rain: Resistivity measurement between the electrodes

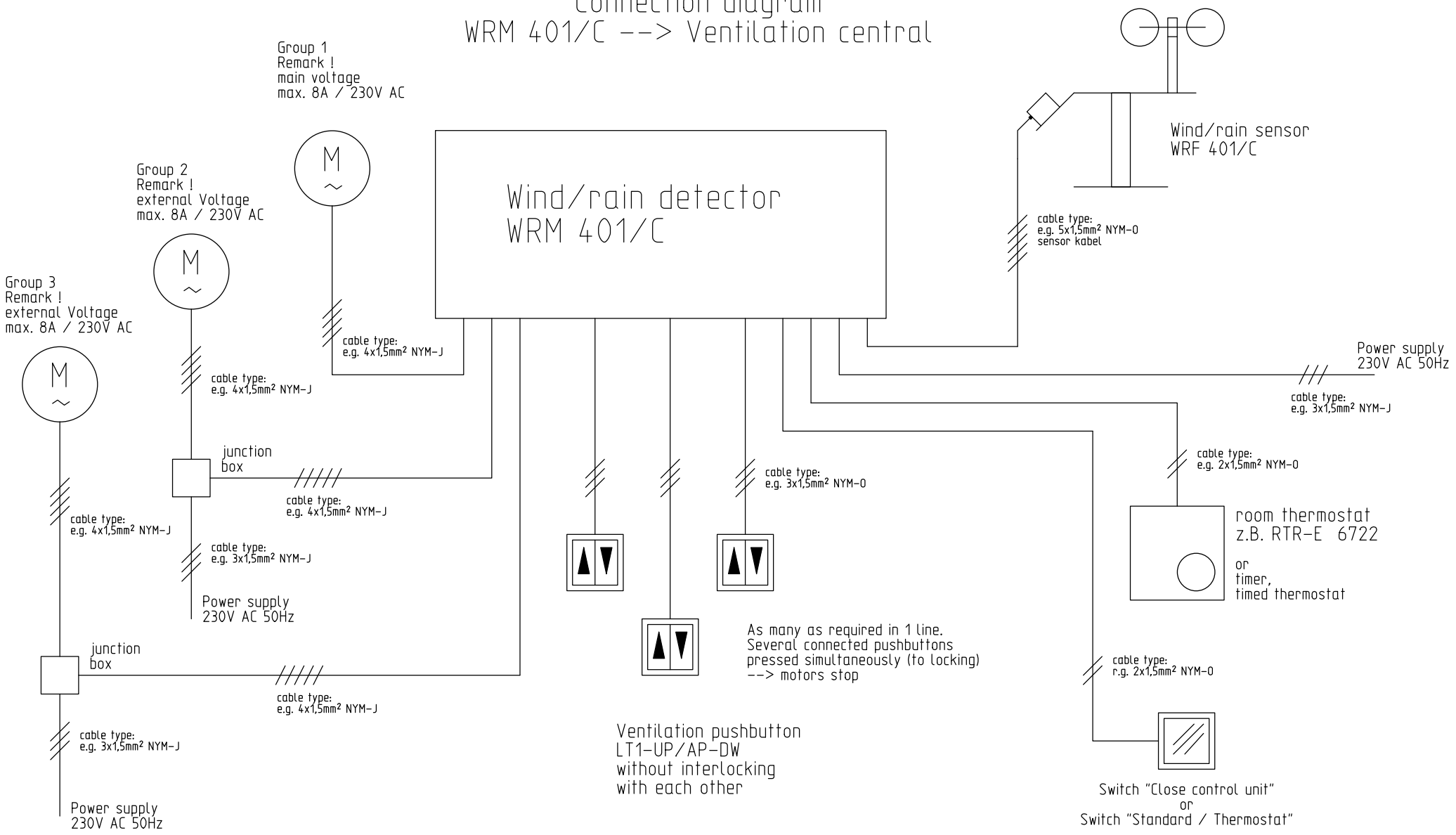
Terminals:

Motor terminals:	1.5 mm² (fine-wire), 2.5 mm² (solid)
Mains connection terminals:	1.5 mm² (fine-wire), 2.5 mm² (solid)
Other terminals:	1.5 mm² (fine-wire), 2.5 mm² (solid)

6.1 Wind speeds

Wind key data			Speeds	
Force acc. to Baufort	Visible effect	Designation	[v=m/s]	[v=km/h]
1	Wind direction detectable only from drifting smoke	light air	0.3 – 1.5	1 – 5
2	Wind felt on face	light breeze	1.6 – 3.3	6 – 12
3	Leaves moved, light flags stretched	gentle breeze	3.4 – 5.4	12 – 19
4	No branches moved, heavy flags stretched	moderate breeze	5.5 – 7.9	20 – 28
5	Large branches moved, wind in face unpleasant	fresh breeze	8.0 – 10.7	29 – 38
6	Large branches moved, wind sings	strong wind	10.8 – 13.8	39 – 49
7	Light trees moved, perceptible resistance when walking into wind	stiff wind	13.9 – 17.1	50 – 61
8	Large trees are moved, branches broken, significant resistance when walking into wind	stormy wind	17.2 – 20.7	62 – 74
9	Light objects moved from their position, roof damage	storm	20.8 – 24.4	75 – 88

Connection diagram
WRM 401/C --> Ventilation central

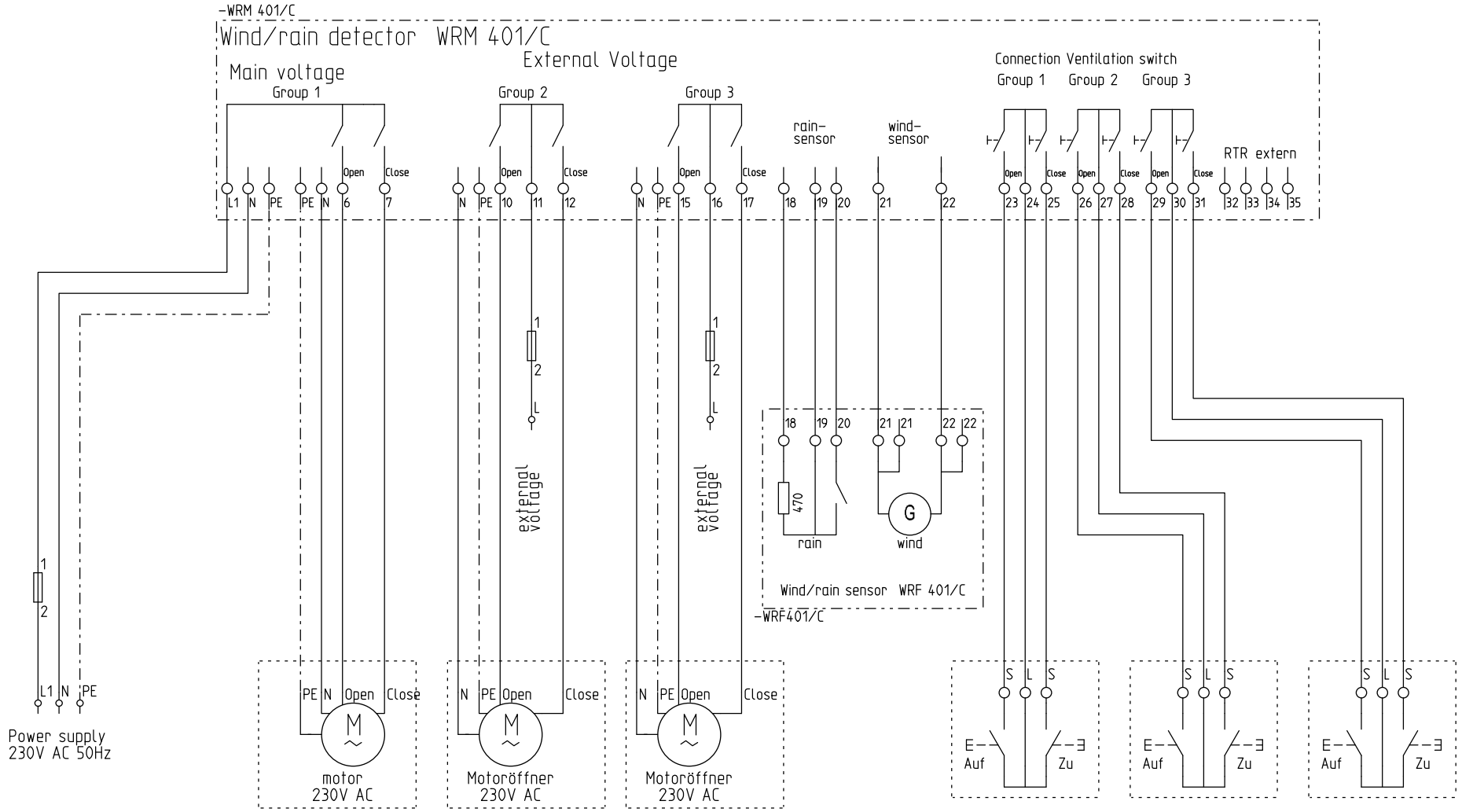


Cable types are only proposals !!
Please notice the installation instructions !!
Technical modifications reserved !!

--24_0202010401_E019___

	Wind/rain detector WRM 401/C	Connection diagram Ventilation central	Auftrag:	Kommission:	Rev.: 24.08.2015	erstellt von: Krause
			Datum: 10.01.2003		Blatt: 2	von 11

Connection of 230V motors
(Ventilation switches are directly connected)



Group 1:
interconnected with
main voltage
max. 8A / 230V AC

Group 2:
external voltage
max. 8A / 230V AC

Group 3:
external voltage
max. 8A / 230V AC

Ventilation pushbutton
LT1-UP/AP-DW
without interlocking
with each other

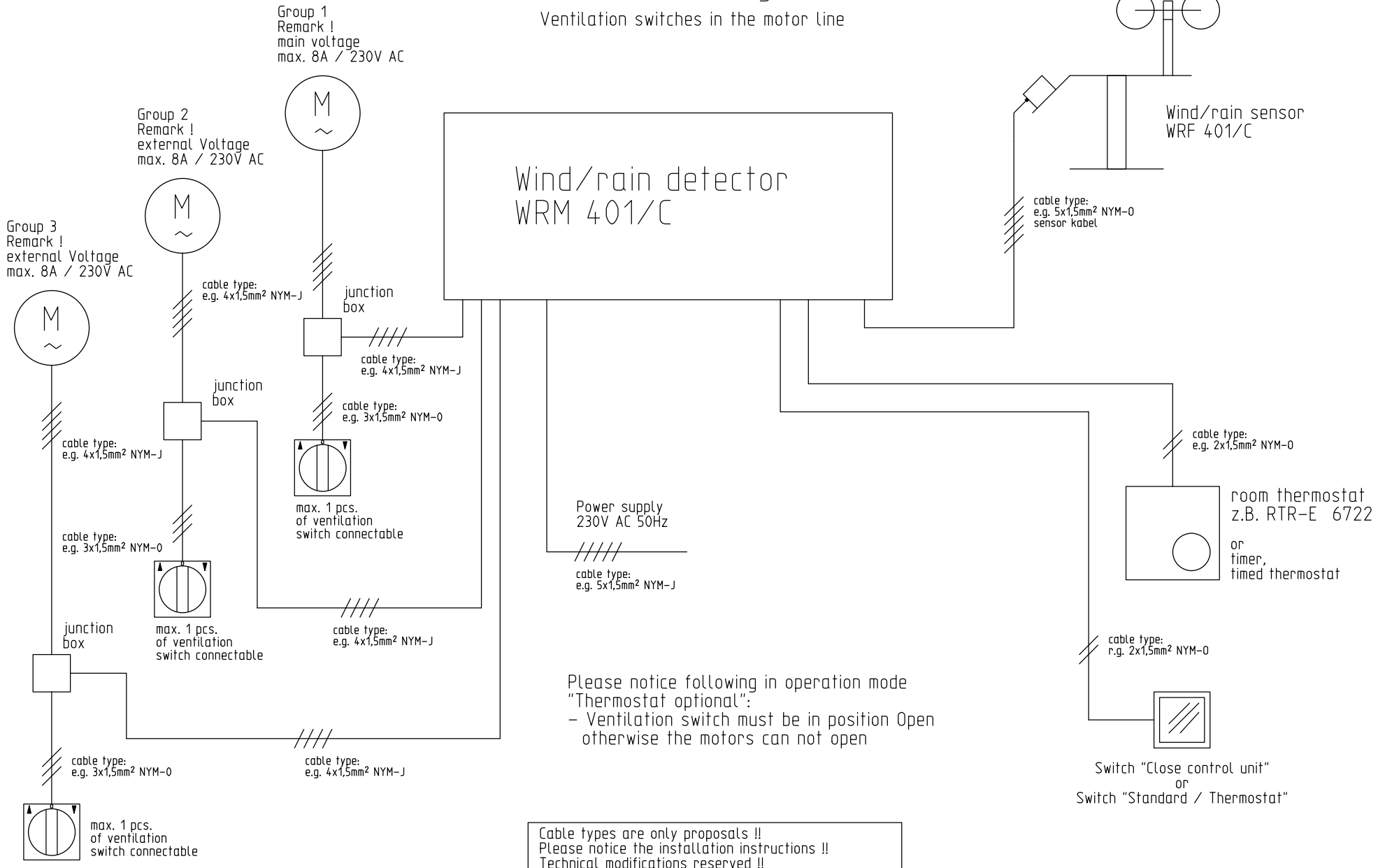
As many as required in 1 line.
While pushing both buttons
simultaneously motors will stop.

--24_0202010401_E019___

	Wind/rain detector WRM 401/C	Connection motors switches directly connected	Auftrag:	Kommission:	Rev.: 24.08.2015	erstellt von: Krause
			Datum: 10.01.2003		Blatt: 3	von 11

Connection diagram

Ventilation switches in the motor line



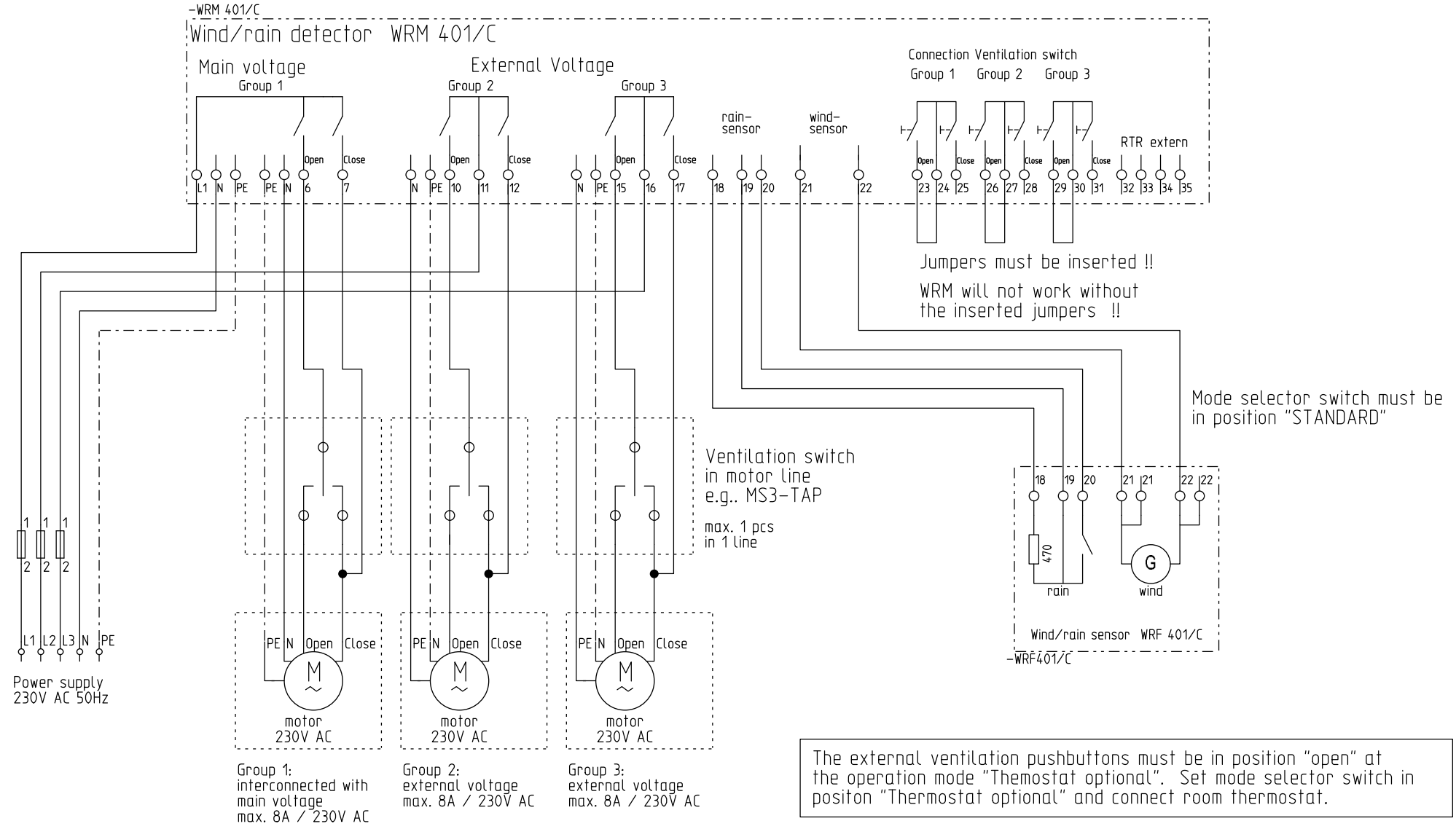
Please notice following in operation mode
"Thermostat optional":
- Ventilation switch must be in position Open
  otherwise the motors can not open

Cable types are only proposals !!
Please notice the installation instructions !!
Technical modifications reserved !!

--24_0202010401_E019___

	Wind/rain detector WRM 401/C	Connection diagram switches in motor line	Auftrag:	Kommission:	Rev.: 24.08.2015	erstellt von: Krause
			Datum: 10.01.2003		Blatt: 4	von 11

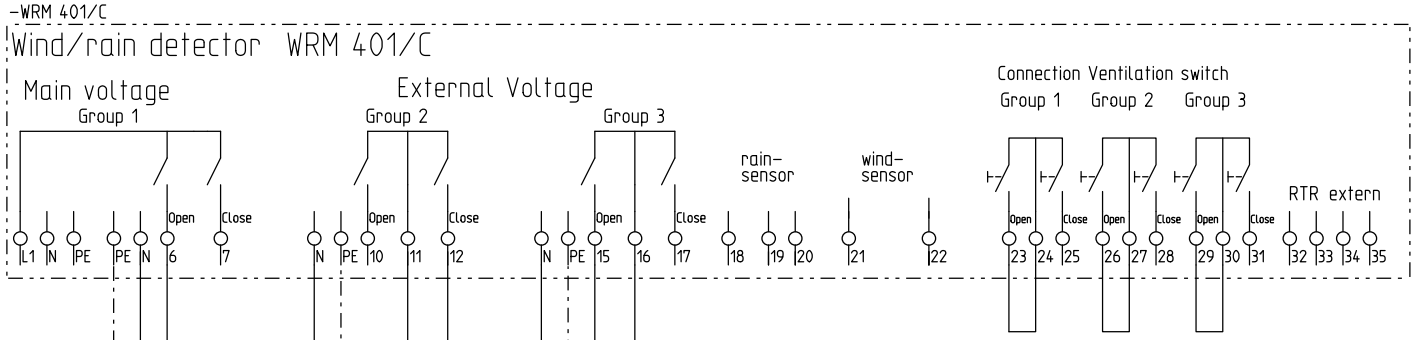
Connection of 230V motors
(Ventilation switches in the motor line)



--24_0202010401_E019___

	Wind/rain detector WRM 401/C	Connection 230V motors switches in motor line	Auftrag:	Kommission:	Rev.: 24.08.2015	erstellt von: Krause
			Datum: 10.01.2003		Blatt: 5	von 11

Connection of pneumatic switching cabinets



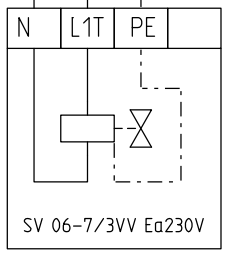
external Voltage !!

L

Jumpers must be inserted !!

WRM will not work without the inserted jumpers !!

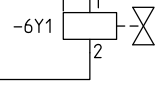
Mode selector switch must be in position "STANDARD"



model: P-RF-1-2

switch valve

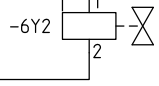
example:
valve control
electric open !!



TV 06-... Ez 230V~

pushbutton valve

example:
valve control
electric closed !!



MV 06-... Ea 230V~

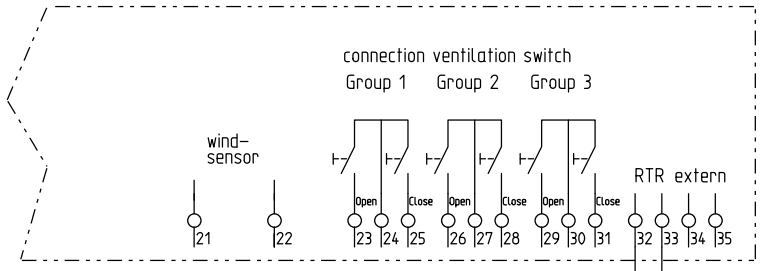
magnetic valve

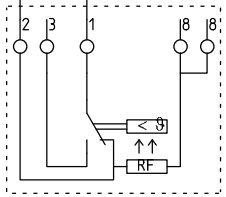
example:
valve control
electric open !!

--24_0202010401_E019___

	Wind/rain detector WRM 401/C	Connection of pneumatic switching cabinets	Auftrag:	Kommission:	Rev.: 24.08.2015	erstellt von: Krause
			Datum: 10.01.2003		Blatt: 6	von 11

room thermostat (opening contact)



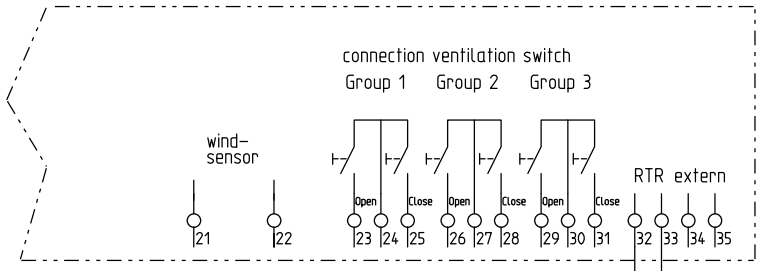


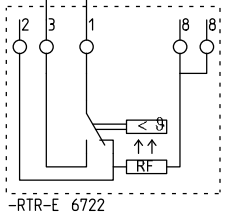
e.g. room thermostat
RTR-E 6722

Attention:

Dip switch no. 6 must be in position "OFF".
See also "Technical Documentation" chapter 4.9 "Special functions".

room thermostat (closing contact)





e.g. room thermostat
RTR-E 6722

Attention:

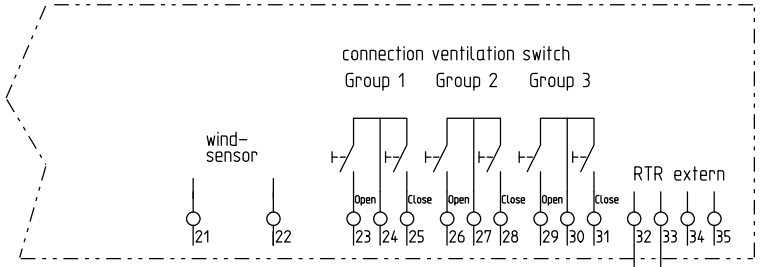
Dip switch no. 6 must be in position "ON".
See also "Technical Documentation" chapter 4.9 "Special functions".

Mode selector switch must be in position "Thermostat optional"

--24_0202010401_E019___

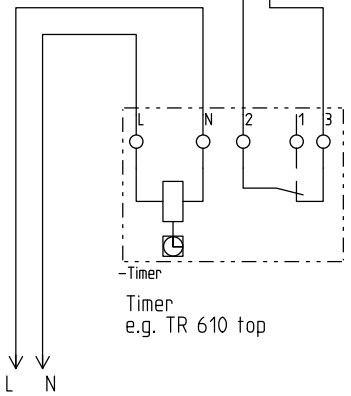
	Wind/rain detector WRM 401/C	room thermostat (opener) room thermostast (closing contact)	Auftrag:	Kommission:	Rev.: 24.08.2015	erstellt von: Krause
			Datum: 10.01.2003		Blatt: 7	von 11

Timer (opening contact)



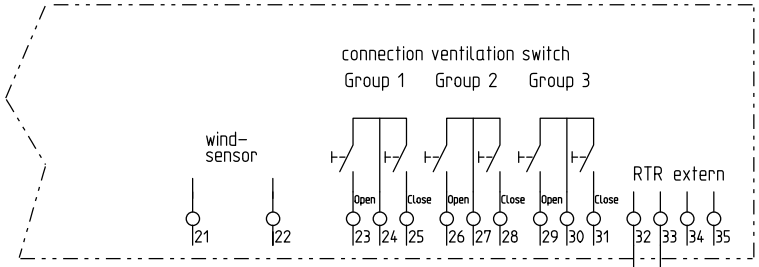
Attention:

Dip switch no. 6 must be in position "OFF".
See also "Technical Documentation" chapter 4.9 "Special functions".



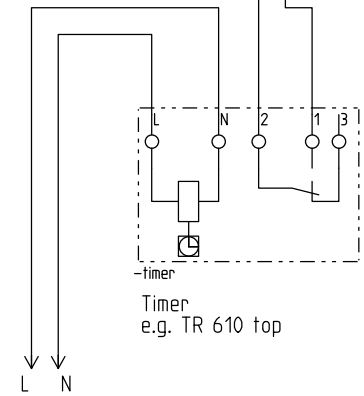
Power supply
230V AC 50Hz

Timer (closing contact)



Attention:

Dip switch no. 6 must be in position "ON".
See also "Technical Documentation" chapter 4.9 "Special functions".



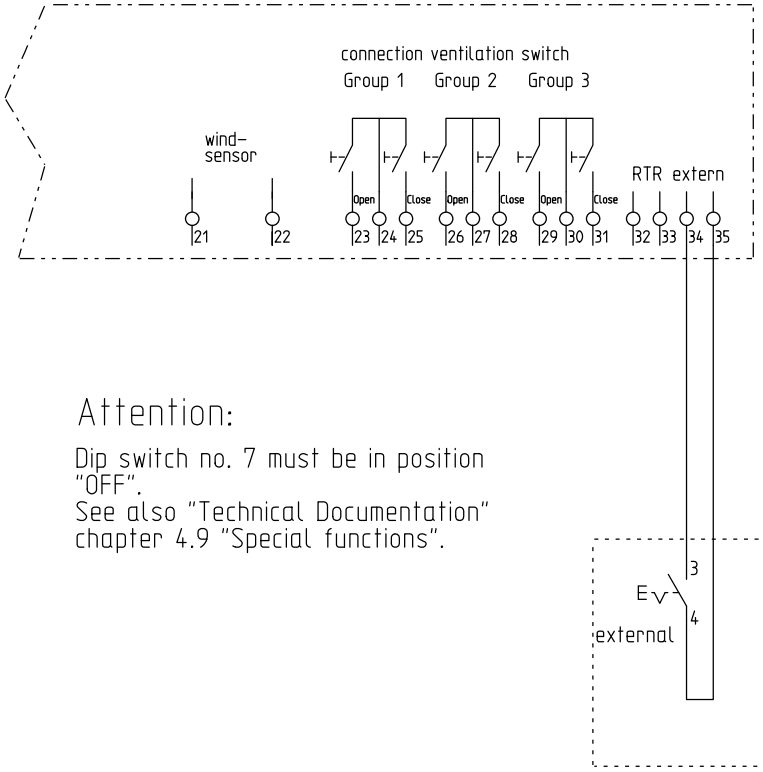
Power supply
230V AC 50Hz

Mode selector switch must be
in position "Thermostat optional"

--24_0202010401_E019___

	Wind/rain detector WRM 401/C	timer (opener) timer (closing contact)	Auftrag:	Kommission:	Rev.: 24.08.2015	erstellt von: Krause
			Datum: 10.01.2003		Blatt: 8	von 11

Connection "Close control unit" switch

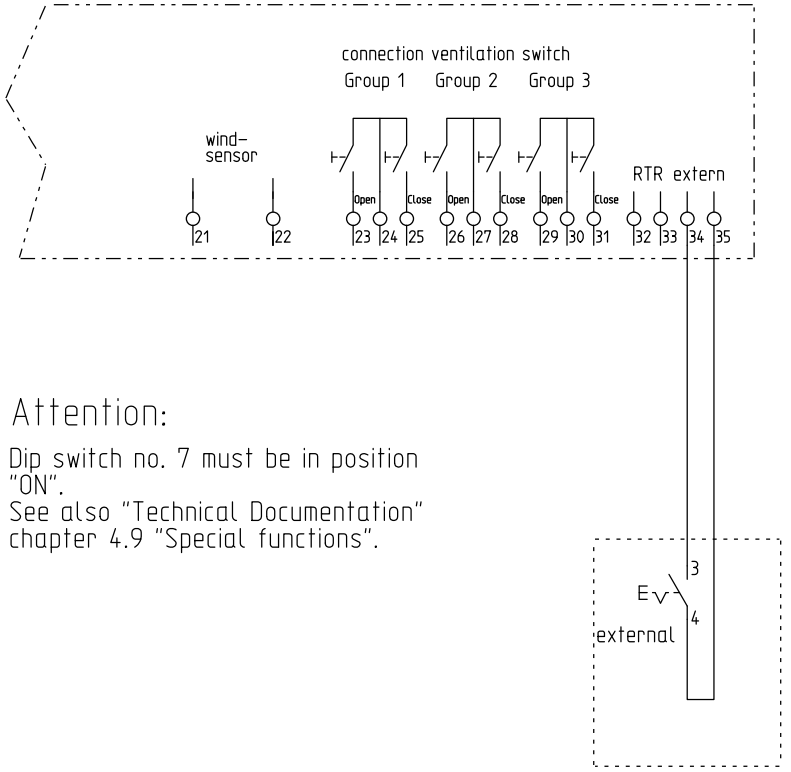


Attention:

Dip switch no. 7 must be in position "OFF".
See also "Technical Documentation" chapter 4.9 "Special functions".

If the contact is closed, all 3 motor groups are opened and closed by means of an externally connected room thermostat, timed thermostat or a timer.

Connection external mode selector switch



Attention:

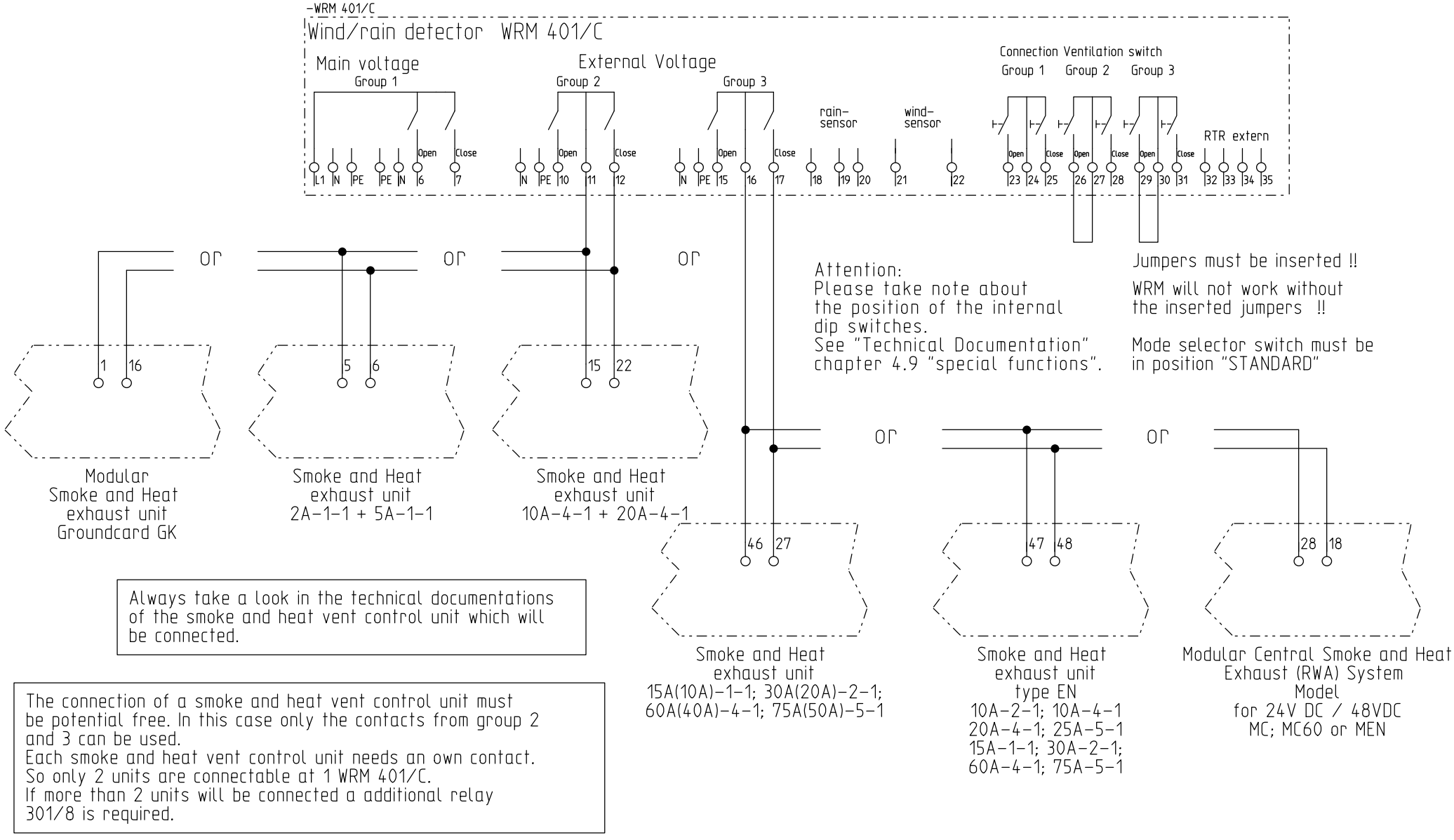
Dip switch no. 7 must be in position "ON".
See also "Technical Documentation" chapter 4.9 "Special functions".

If dip switch no. 7 is in position "ON", the internal mode selector switch is deselected. A closed contact means operation mode "Thermostat optional".

--24_0202010401_E019___

	Wind/rain detector WRM 401/C	Close control unit externally mode selector switch	Auftrag:	Kommission:	Rev.: 24.08.2015	erstellt von: Krause
			Datum: 10.01.2003		Blatt: 9	von 11

Connection of smoke and heat vent control units

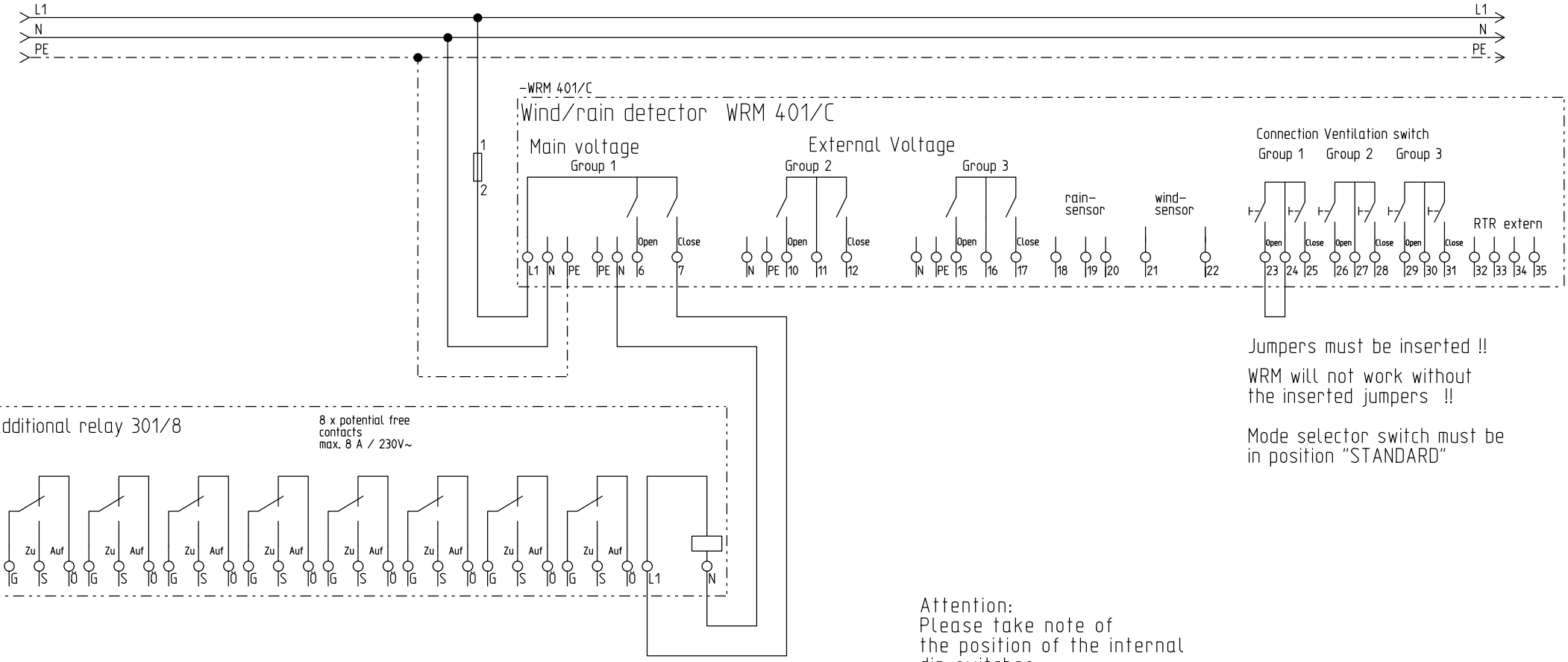


Always take a look in the technical documentations of the smoke and heat vent control unit which will be connected.

The connection of a smoke and heat vent control unit must be potential free. In this case only the contacts from group 2 and 3 can be used.
Each smoke and heat vent control unit needs an own contact.
So only 2 units are connectable at 1 WRM 401/C.
If more than 2 units will be connected a additional relay 301/8 is required.

--24_0202010401_E019___

	Wind/rain detector WRM 401/C	smoke and heat vent conrol units	Auftrag:	Kommission:	Rev.: 24.08.2015	erstellt von: Krause
			Datum: 10.01.2003		Blatt: 10	von 11



Jumpers must be inserted !!

WRM will not work without the inserted jumpers !!

Mode selector switch must be in position "STANDARD"

Attention:
Please take note of the position of the internal dip switches.
See "Technical Documentation" chapter 4.9 "special functions".

--24_0202010401_E019___

	Wind/rain detector WRM 401/C	Zusatzrelais 301/8	Auftrag:	Kommission:	Rev.: 24.08.2015	erstellt von: Krause
			Datum: 10.01.2003		Blatt: 11	von 11