Wind – rain evaluation device WRA 501

Please do not remove this document from the smoke and heat vent control unit housing.

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Technical Documentation

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WINDOWDRIVES
BSC TECHNOLOGY

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2 Device view

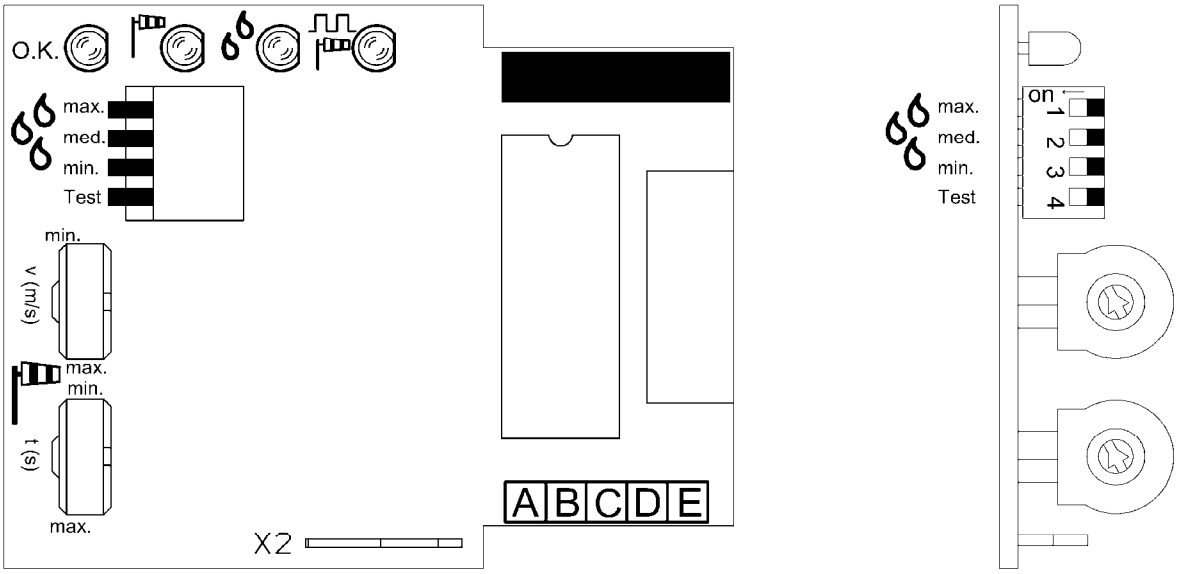


Figure 1: View of WR-MOD 501 (central module)

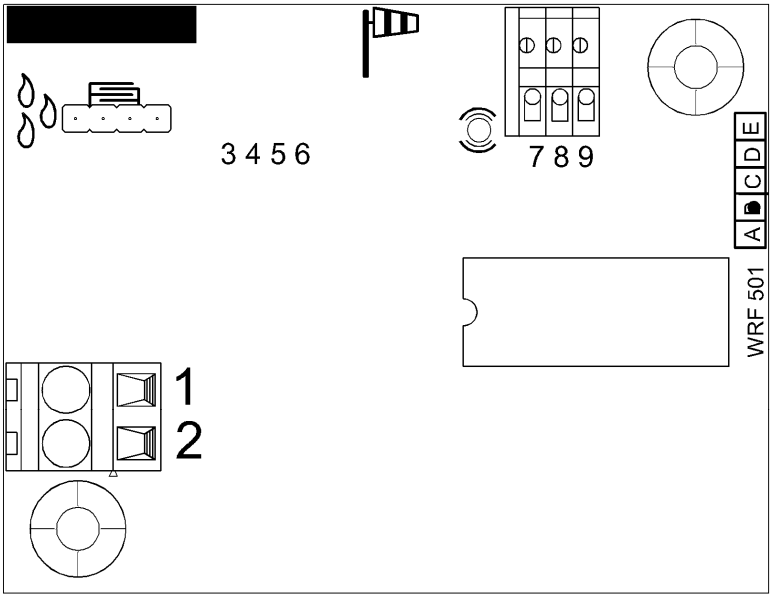


Figure 2: View of WRF 501 (wind- rain sensor board)

3 Installation

3.1 General

Installation, start-up, repair and maintenance of the components should only be performed 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
- VDE 0100, VDE 0108

Important warning

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

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

3.3 Intended use of the wind-rain evaluation device

The wind-rain evaluation device adds to the venting function of smoke and heat vent control units. The device controls the automatic closing of electrically operated vent units during rain, snow or wind. The wind-/ rain evaluation device consists of the wind-rain sensor WRF 501 and the wind-rain module WR-MOD 501.

3.4 The wind/rain sensor WRF 501

The figure below shows the wind – rain sensor WRF 501. It consists of a rain sensor and a wind wheel. The revolutions of the wind wheel are sensed by a hall sensor and the information sent to the wind/rain module WR-MOD 501. Rainfall is measured by means of conduction measurement between two electrodes (gold-plated to protect from weather). To prevent freezing and accelerate drying of the rain sensor, a heating resistance is installed beneath the electrodes. Electricity is supplied to the WR-MOD 501 in the central control unit by 2 conductors.

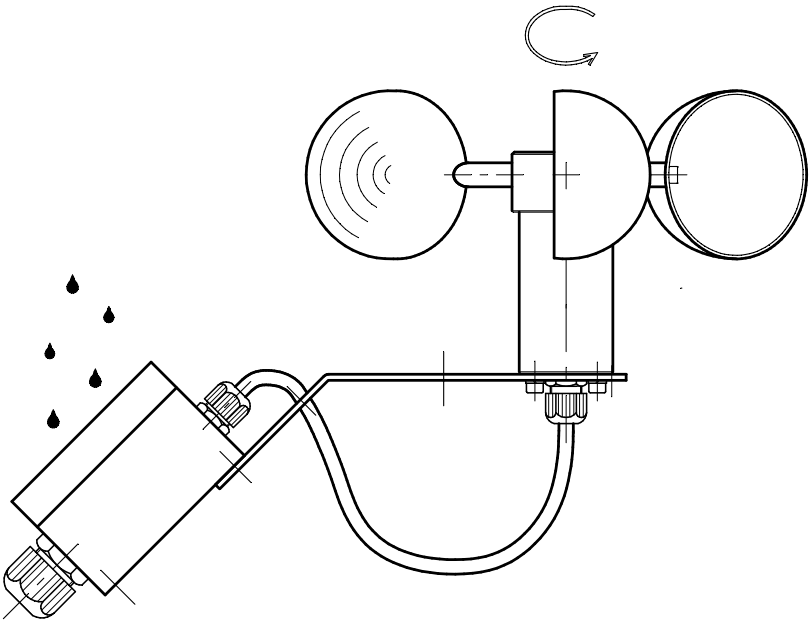


Figure 3: View of WRF 501 (wind- rain sensor)

3.5 Electrical connection

The electrical connection is made by 2 conductors.

For the connection diagram with conductor examples and electric wiring, see the circuit diagram in the annex to this document.

4 Functional description

The wind-/ rain evaluation device 501 is a retrofit kit for our smoke and heat vent control units of types:
2A-1-1; 5A-1-1
10A-4-1; 20A-4-1
15A-1-1; 30A-2-1; 60A-4-1; 75A-5-1 in 24V or 36V technology and
all modular smoke and heat vent control centers in 24V or 36V technology (except the „old“ withdrawable unit design).

Wind/rain is detected by the externally connected wind probe /rain sensor of the WRF 501. As long as no weather alarm is active, the daily ventilation of the connected smoke and heat vent control center is forbidden. If communication with the external WRF 501 is interrupted, the error state also forbids ventilation.

4.1 Settings of the WR-MOD

The wind- rain module WR-MOD 501 is equipped with many different setting options. Settings can be made at the following points:

- „Wind switch-on delay“ rotary potentiometer
- „Wind switching threshold“ rotary potentiometer
- „Rain sensitivity“ rain jumpers
- „Test“ jumper

The topmost jumper is without function.

All setting options are provided on the board of the wind/rain module. The figure below illustrates the different positions at which settings can be made:

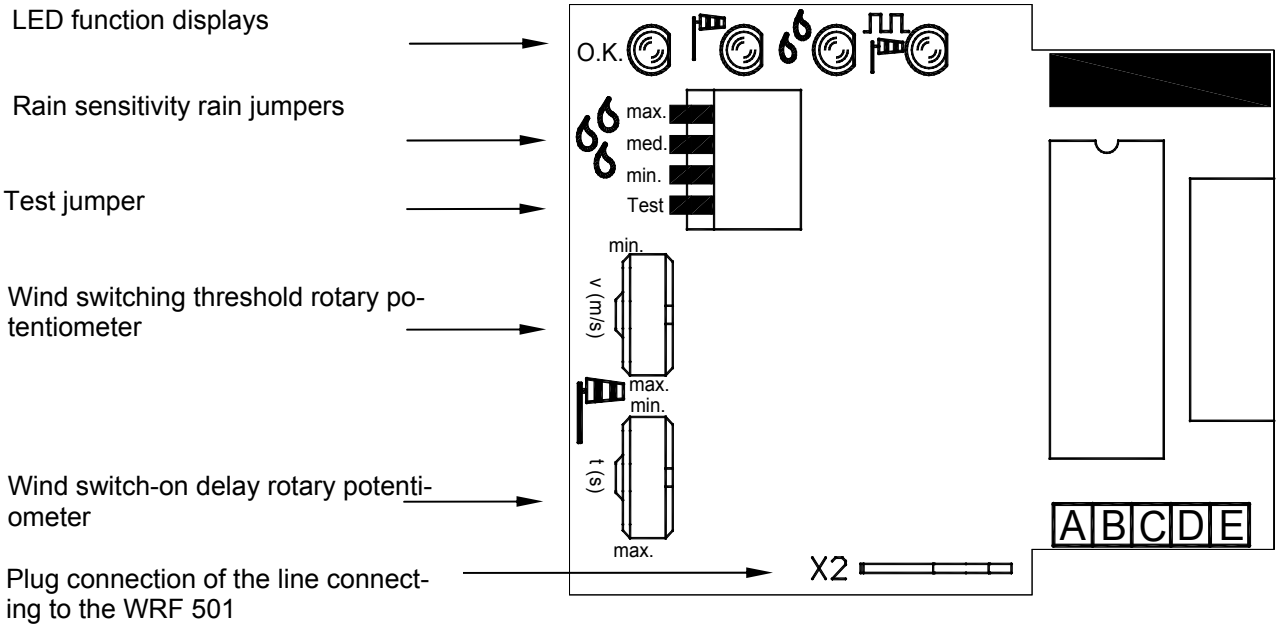
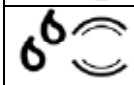


Figure 4: View of WR-MOD 501 (central module)

4.2 Displays at WR-MOD

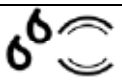
Pictogram	Function	LED colour	Operating state	Cause
	Operating display	Green	Constant light Blinks Off	Normal mode Test mode Error mode
	Wind release display	Red	Constant light Off	Active wind alarm No active wind alarm
	Rain trigger display	Yellow	Constant light Off Blinks	Active rain alarm No active rain alarm Functional disorder
	Wind pulse display	Green	Off Blinking pulse	Wind wheel not running Wind wheel running

4.3 Setting the wind switching threshold

Linear wind velocity can be set steplessly between 3 m/s and 10 m/s by turning the „wind switching threshold“ potentiometer.

Setting the switching threshold is only permitted after consultation with the supplier of the opening unit and should be adapted on site.

While the setting of the wind switching threshold is made, the present switching level is shown by the LED at the WR-MOD 501. The display goes black about 5 seconds after the last setting and the LEDs return to normal function. The possible settings are listed in the table below.

Wind velocity	LED				
					Potentiometer position
3m/s	●	●	☼	☼	
4m/s	●	☼	●	●	
5m/s	●	☼	●	☼	
6m/s	●	☼	☼	●	
7m/s	●	☼	☼	☼	
8m/s	☼	●	●	●	
9m/s	☼	●	●	☼	
10m/s	☼	●	☼	●	

☼ >> The LED flickers

● >> The LED is off

4.3.1 Setting the time by which the wind switching threshold is delayed

The time by which the wind switching threshold is delayed is set at the "wind switch-on delay“ rotary potentiometer on the circuit board. The delay can be set steplessly between 0s and– 30s.
The setting of the regression delay is firm at 5 minutes and cannot be changed.

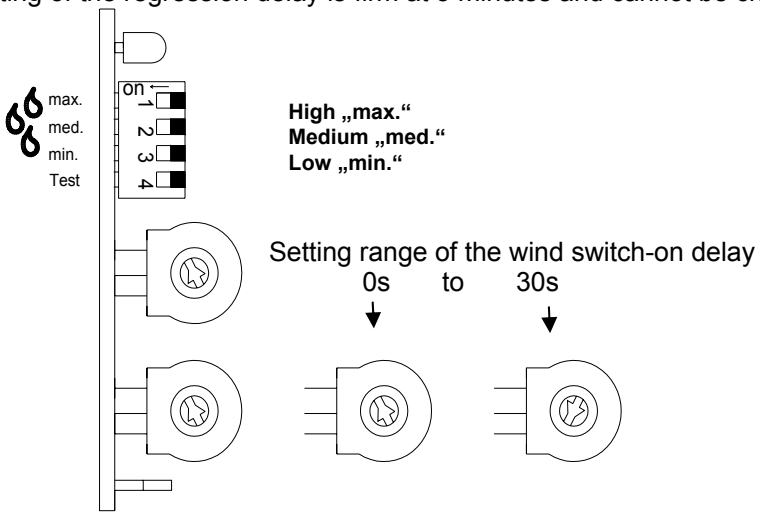


Figure 5: View of WR-MOD 501 switch-on delay

Explanation:
If a switching threshold of 5 m/s with a response delay of 15s is set, wind velocity of at least or more than 5 m/s must be detected by the WR-MOD at least for 15s to cause the device to trip. The undo the switching, wind velocity of less than 5 m/s must be detected at least for 5 minutes.

4.4 Setting the rain sensitivity

The jumpers for setting the rain sensitivity are located on the WR-MOD 501. Rain sensitivity settings are possible for low (min.) / medium (med.) or high (max.). If no jumper is installed on any of these settings (i.e., the three rain sensitivity levels), the „Rain LED“ blinks and the wind/rain module signals an error. If no rain sensor is connected, the „Rain LED“ blinks and an error message is set. Daily ventilation is forbidden in both cases.

The rain sensitivity setting can only be made on site according to local conditions.

4.4.1 Delay time for rain

The rain regression delay setting is 5 minutes and is firm, i.e., this settings cannot be changed.
The rain switch-on delay is Zero.

4.5 Special functions „Test“ switch

This is a function for start-up or maintenance. If this switch is „on“,
all signals from the WRF 501 are ignored. An active weather alarm is reset
so that a function test of the daily ventilation can be made without the effect of weather. The green „o.k.“ LED blinks while the module is in test mode. The wind-rain monitoring function is disabled during that time. When the switch setting is returned to „off“, the „O.K.“ LED gives constant light again and the weather monitoring function is enabled.

4.6 Module slot selection

The WR-MOD can be mounted in any slot; no specific slot is prescribed. In addition, the module should be connected to the power line supplying the wind/rain input of the smoke and heat vent control center.

The following terminals at the centers should be used.

Center type	Module terminal	Center terminals	
		Positive	Gnd
2A-1-1		5	6
5A-1-1		5	6
10A-4-1		22	15
20A-4-1		22	15
15A(10A)-1-1		46	27
30A(20A)-2-1		46	27
60A(40A)-4-1		46	27
75A(50A)-5-1		46	27
Modular equipment ZM		28	18

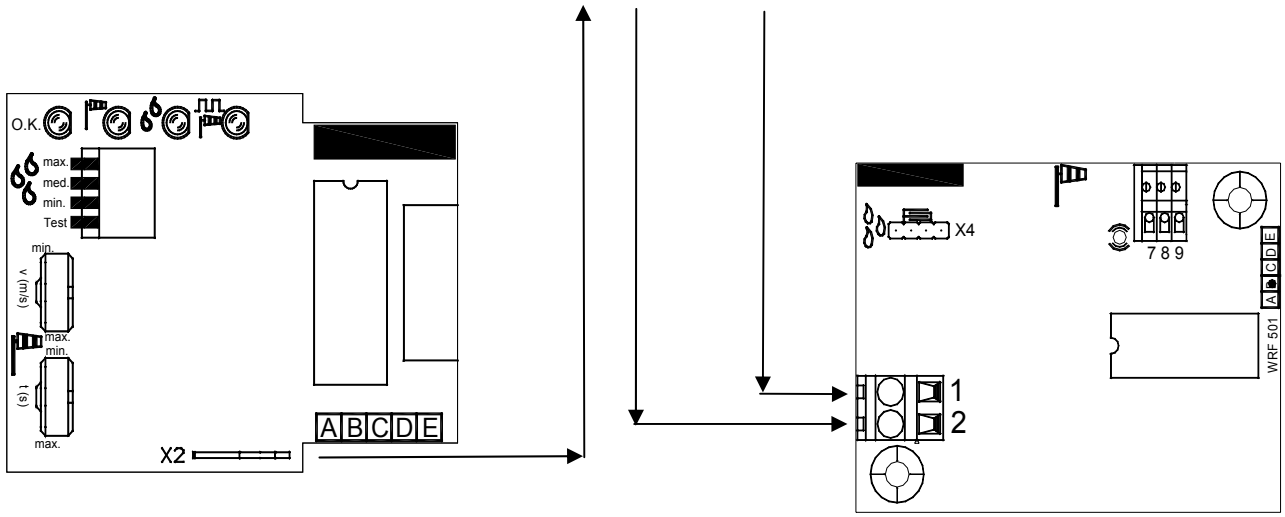


Fig. 6: Typical connection

For details of connection, please see the circuit diagrams.

Caution:
The module must only be mounted or removed when the smoke and heat vent control center is isolated electrically.

5 Operator action

The WR-MOD has several controls and displays. The displays inform the user of the operating state. Layout and position of the controls and displays is shown in the device view in chapter 2.

5.1 Displays at the module

The table below contains the different states of the module displays:

Display:	State:
„Operation“ LED (green) 	• Gives constant light in normal operation • Blinks when the test dip switch is enabled. • Extinguishes when power fails or the wind/rain evaluation device is defective. (Please consult the yellow „Rain“ LED for possible causes).
„Rain“ LED (yellow) 	• Gives constant light when tripped by rain • Extinguishes when the rain alert is disabled • Blinks in any of the following situations: - The separate signal line to the module is missing - The line to the WRF 501 is not working (line broken or short circuit). - The rain sensor cover is not connected to the WRF 501. - One of the rain sensitivity dip switches is not enabled. - **Note:** After a short circuit, it can take up to 10 minutes until the bimetal fuse enables the function again.
„Wind“ LED (red) 	• Gives constant light if tripped by wind • Extinguishes when there is no wind signal
„Pulse“ LED (green) 	• Blinks with each revolution of the wind wheel [display to check the Hall sensor] • No display when the wind wheel is not running

5.2 Default settings

Wind switching threshold	set to 3 m/s
Wind switch-on delay	set to approx 5 s
Rain sensitivity (jumper)	set to „max.“
Test jumper	Jumper mounted (i.e., normal mode)
Bottom jumper	Jumper not mounted (no function)

5.3 Settings that cannot be changed

Wind regression delay	setting firm at 5 min
Rain switch-on delay	setting firm at 0 s
Rain regression delay	setting firm at 5 min

5.4 Locating faults / troubleshooting

Display:	State:
„Operation“ LED (green) 	• Extinguishes if power fails Please check the power supply to the smoke and heat vent control center. • Extinguishes if a fault occurs in the wind-rain evaluation device (yellow „Rain“ LED blinks).
„Operation“ LED (green) 	• Blinks if the test dip switch is activated. Please switch off the test dip switch. As long as test mode is active, the wind/rain evaluation device is not active.
„Operation“ LED (green) 	• Blinks if a fault occurs in the external WRF Check the connection between: the WR-MOD 501 and the WRF 501. the WRF 501 and the rain sensor board. Check to see whether a dip switch for rain sensitivity is activated.

6 Proposed lines and dimensions

The line selection is governed by the cable gland at the sensor housing. The M20 gland used here has a sealing range from 5mm to 12mm cable diameter.
Consequently, the line proposal is as follows.

Cable type	Outside diameter	Conductors	Max. line length
NYM-J-3x1.5mm²	9.1mm	2	2000m
NYM-J-5x1.5mm²	9.1mm	2	2000m
I-Y(ST)Y 2x2x0.6mm	5.0mm	2	370m
I-Y(ST)Y 2x2x0.6mm	5.0mm	4 (2 conductors per signal)	740m
I-Y(ST)Y 4x2x0.6mm	7.0mm	2	370m
I-Y(ST)Y 4x2x0.6mm	7.0mm	4 (2 conductors per signal)	740m
I-Y(ST)Y 2x2x0.8mm	7.0mm	2	675m
I-Y(ST)Y 2x2x0.8mm	7.0mm	4 (2 conductors per signal)	1350m
I-Y(ST)Y 4x2x0.8mm	10.0mm	2	675m
I-Y(ST)Y 4x2x0.8mm	10.0mm	4 (2 conductors per signal)	1350m

7 Specifications

Type: Wind/rain evaluation device WRA 501
consisting of:
- Wind/rain module WR-MOD 501
- Wind/rain probe WRF 501
- Solo wall unit

Type: Insertion module for centers
2A-1-1, 5A-1-1, 10A-4-1, 20A-4-1,
15A-1-1, 30A-2-1, 60A-4-1, 75A-5-1
and all modular smoke and heat vent control centers

Temperature range: - 5°C to + 40°C

Rated voltage: 24V DC from the smoke and heat vent control center

Rated power: ≤ 2 W

Number of sensors: 1 x wind–/ rain probe WRF 501
Wind measuring principle: Pulse generator (Hall sensor)
Rain measuring principle: Conduction measurement between electrodes

Terminals:

Terminal connections in WRF 501: 1.5 mm² (fine wire), 2.5 mm² (solid)

7.1 Wind velocities

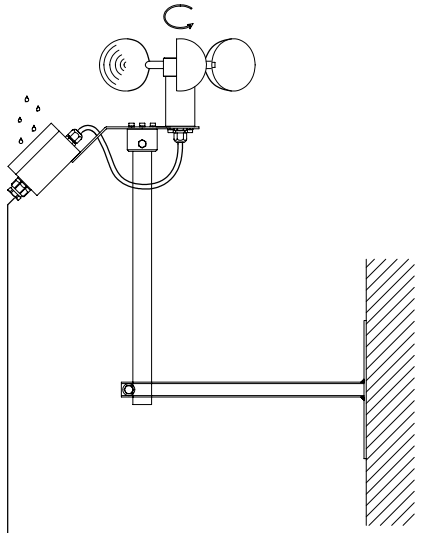
Wind characteristics			Velocities	
Beaufort strength	**Visible effect**	**Designation**	**[v=m/s]**	**[v=km/h]**
1	Wind direction can only be seen by the direction of smoke	Light air	0.3 – 1.5	1 – 5
2	Wind felt on face	Light breeze	1.6 – 3.3	6 – 12
3	Leaves constantly moving, light flags extended	Gentle breeze	3.4 – 5.4	12 – 19
4	Small twigs constantly moving, heavy flags extended	Moderate breeze	5.5 – 7.9	20 – 28
5	Larger twigs moving, wind in face uncomfortable	Fresh breeze	8.0 – 10.7	29 – 38
6	Large tree branches moving, wind whistling in wires	Strong breeze	10.8 – 13.8	39 – 49
7	Smaller trees moving, resistance felt walking against wind	Near gale	13.9 – 17.1	50 – 61
8	Large trees moving, branches breaking, strong resistance felt walking against wind	Gale	17.2 – 20.7	62 – 74
9	Light-weight objects are blown away, slates blown off roofs	Strong gale	20.8 – 24.4	75 – 88

Curcuid diagram from the Smoke and Heat Vent Control Unit with the integrated Wind- rain evaluation device WRA 501

Smoke and Heat Vent Control Unit with integrated Wind- rain module WR-MOD 501.

Attention:
The system must be isolated from voltage before any components are removed.!

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



Wind- rainsensor WRF 501

2

The wind- rainsensor WRF 501 is build with one M20 cable entrance fitting (Isolating area 5mm – 12mm). Following we show the cable possibilities for using.

Cable types:		max. cable length
NYM-J- 3 * 1,5mm² outside diameter 9,1mm	<	2000m
NYM-J- 5 * 1,5mm² outside diameter 10,8mm	<	2000m
I-Y(ST)Y 2*2*0,8mm (by single using) outside diameter 7,0mm	<	675m
I-Y(ST)Y 4*2*0,8mm (by double using) outside diameter 10,0mm	<	1350m
I-Y(ST)Y 2*2*0,6mm (by single using) outside diameter 5,0mm	<	370m
I-Y(ST)Y 4*2*0,6mm (by double using) outside diameter 7,0mm	<	740m

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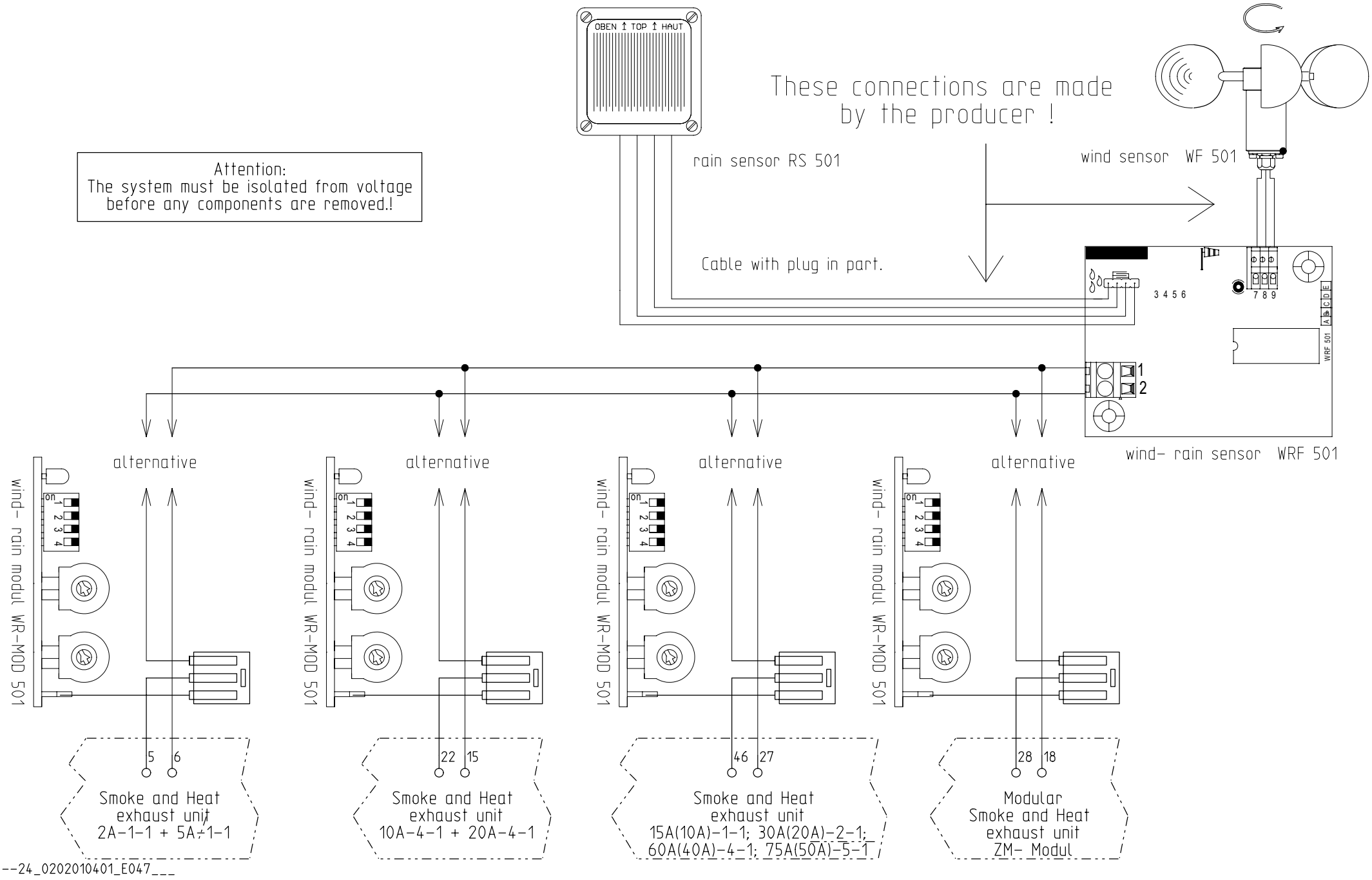
wind- rain evaluation device WRA 501 WR-MOD 501 & WRF 501	Circuit diagram overview	Auftrag:	Kommission:	Rev.: 08.10.2010	erstellt von: Arnold
		Datum: 23.04.2010		Blatt: 1	von 2



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			Datum: 23.04.2010		Blatt: 2	von 2