

## 11.1 Inputs

### 11.1.1 Analog input 1 (actual value)

For resistance sensor, thermocouples or standard signals with 2<sup>nd</sup> order digital filter (configurable).

#### Resistance sensor

In 2-wire or 3-wire circuit:

Type	Measurement range
Pt100, Pt1000, IEC 751	-200...+850 °C (-328...+1562 °F)
Ni100, Ni1000, DIN 43760	-60...+250 °C (-76...+482 °F)
LG-Ni1000	-50...+160 °C (-58...+320 °F)

**Line resistance:** < 30 Ω

#### Line compensation

Not required with 3-wire circuit.

When using a resistance sensor in a 2-wire circuit, line compensation can only be made by means of the offset correction.

#### Thermocouples

Type	Measurement range
Fe-CuNi «J»	-200...+1000 °C (-328...+1832 °F)
NiCr-Ni «K»	-200...+1372 °C (-328...+2502 °F)
Cu-CuNi «T»	-200...+400 °C (-328...+752 °F)
NiCrSi-NiSi «N»	-100...+1300 °C (-148...+2372 °F)
Pt-RhPt «S»	0...1768 °C (-32...3214 °F)
Pt-RhPt «R»	0...1768 °C (-32...3214 °F)
Pt-RhPt «B»	0...1820 °C (32...3308 °F)

**Cold-junction temperature:** Internal

#### Standard signals

Signal	Internal resistance $R_i$ Voltage drop $\Delta U_e$
DC 0...10 V	$R_i = 2 \text{ M}\Omega$
DC 0...1 V	$R_i = 2 \text{ M}\Omega$
DC 0...20 mA	$\Delta U_e = < 1 \text{ V}$
DC 4...20 mA	$\Delta U_e = < 1 \text{ V}$

Sampling time: 210 ms

### 11.1.2 Analog input 2 (external setpoint, setpoint shift)

Resistance measured value 0...1 kΩ standard signals without linearization.

#### Resistance potentiometer

With 2-wire circuit

$R = 0...1 \text{ k}\Omega$

#### Standard signals

Signal	Internal resistance $R_i$ Voltage drop $\Delta U_e$
DC 0...10 V	$R_i = 2 \text{ M}\Omega$
DC 0...20 mA	$\Delta U_e = 1 \text{ V}$
DC 4...20 mA	$\Delta U_e = 1 \text{ V}$

Sampling time: 630 ms

## 11.1.3 Analog input 3 (outside temperature)

For resistance sensor in a 2-wire circuit, with fixed filter time constants (21 h 18 min for weather-dependent setpoint enable)

### Resistance sensor

Type	Measurement range
Pt1000, IEC 751	-200...+850 °C (-328...+1562 °F)
Ni1000, DIN 43760	-60...+250 °C (-76...+482 °F)
LG-Ni1000	-50...+160 °C (-58...+320 °F)

Sampling time: 6 seconds

### 11.1.4 Binary input «D1»

Potential-free contact for changeover of operating mode:

- Modulating burner, when contact is open, LED on the front is not lit
- 2-stage burner, when contact is closed, LED on the front is lit

### 11.1.5 Binary input «D2»

Potential-free contact for the following functions, depending on the configuration:

- No function
- Setpoint shift
- Setpoint changeover

## 11.2 Outputs

4 relay outputs, 1 analog output (optional) and a transducer supply are provided as standard.

### 11.2.1 Output 1 (release of burner)

Relay output (N.O. contact)

**Contact rating:** AC 24...240 V, 2 A at p.f. ( $\cos \varphi$ ) > 0.6  
**Contact life:** > 2 x 10<sup>5</sup> switching cycles at nominal load  
**Internal contact protection:** Varistor S07K275

### 11.2.2 Output 2, 3 (3-position output)

2 relay outputs (N.O. contacts) with a common pole, for controlling element open / close

**Contact rating:** AC 24...240 V, 2 A at  $\cos \varphi > 0.6$   
**Contact life:** > 2 x 10<sup>5</sup> switching cycles at nominal load  
**Internal contact protection:** RC combination (C = 2.5 nF, R = 100 Ω)

### 11.2.3 Output 4 (limit comparator)

Relay output (N.O. contact)

**Contact rating:** AC 24...240 V, 2 A at  $\cos \varphi > 0.6$   
**Contact life:** > 2 x 10<sup>5</sup> switching cycles at nominal load  
**Internal contact protection:** Varistor S07K275

## 11.2.4 Output 5, analog output (option) (angular positioning)

Analog output electrically isolated from the analog inputs:  
 $\Delta U < AC\ 30\ V$ ,  $\Delta U < DC\ 50\ V$

Standard signals	Load, burden
DC 0...10 V (short-circuit proof)	Load = > 500 $\Omega$
DC 0...20 mA	Burden = < 500 $\Omega$
DC 4...20 mA	Burden = < 500 $\Omega$

**Accuracy:**  $\pm 0.25\ \%$   $\pm 50\ \text{ppm/K}$

## 11.2.5 Transducer supply

DC 24 V, 30 mA (short-circuit proof)

## 11.2.6 Interface RS-485 (optional)

**Baud rate:** 4,800 baud, 9,600 baud or 19,200 baud  
**Protocol:** Modbus  
**Unit address:** 1...99

Galvanic separation between supply voltage, analog inputs and outputs.

⇒ Section 4.3 «Galvanic separation»

## 11.3 General ratings

**Weight:** approx. 430 g  
**Data backup:** EEPROM  
**Mains supply:** AC 110...240 V +10 % / -10 %, 48...63 Hz  
**Power consumption:** Max. 10 VA  
**Electrical connection:** at the rear, via plug-in screw terminal strips, angled at 45°  
**Electrical safety:** to EN 60730  
**Case:** mounting depth 130 mm  
plastic body with rear panel, self-extinguishing  
flammability class: UL94 V0  
seal between case and control panel

## 11.3.1 Measuring accuracy

**Resolution:** > 15 bit

Measuring accuracy	Ambient temperature error
Resistance sensor:	
≤ 0.05 %	≤ 50 ppm / K
Thermocouples:	
≤ 0.25 %	≤ 100 ppm / K
Standard signals:	
≤ 0.1 %	≤ 100 ppm / K

Values include linearization tolerances.

## 11.3.2 Monitoring of measuring circuit

Transducer	Probe break	Short-circuit
Resistance sensor	X	X
Thermocouples	X	-
DC 0...10 V	-	-
DC 0...20 mA	-	-
DC 4...20 mA	X	X

- = is **not** detected

X = is detected, and «-1999» appears on the display

⇒ Chapter 10 «What to do if...»

## 11.3.3 Environmental conditions

**Permissible ambient temperature range:**

-20...+50 °C

**Permissible storage temperature range:**

-40...+70 °C

**Climatic conditions:**

Relative humidity ≤ 95 % (noncondensing)

**Degree of protection to EN 60529:**

Front IP 65

Rear IP 20

**Electromagnetic compatibility (EMC):**

To NAMUR recommendation NE 21, EN 50 081 part 1, EN 50 082 part 2

## 12. Actual settings

### 12.1 Process data

Parameter	Display	Value range	Factory setting	Setting
Setpoint 1 <sup>1)</sup>	<b>SP1</b>	SPL-SPH	0	
Setpoint 2 (option) <sup>1)</sup>	<b>SP2</b>	SPL-SPH	0	
Digital setpoint shift (optional) <sup>1)</sup>	<b>dSP</b>	SPL-SPH	0	
Outside temperature (optional)	<b>tA</b>	⇒ Section 8.1 «C111 inputs»	-	
Predefinition of external setpoint <sup>1)</sup>	<b>SP.E</b>	SPL-SPH	-	

<sup>1)</sup> Setting of the decimal places has an impact on these parameters

### 12.2 Parameter level

Parameter	Display	Value range	Factory setting	Setting
Limit value of limit comparator <sup>1)</sup>	<b>AL</b>	-1999...+9999 digit	0	
Switching differential for limit comparator <sup>1)</sup>	<b>HYS t</b>	0...999.9 digit	1	
Proportional band <sup>1)</sup>	<b>Pb.1</b>	0.1...999.9 digit	10	
Derivative time	<b>dt</b>	0...9999 s	80	
Integral action time	<b>rt</b>	0...9999 s	350	
Dead band (neutral zone) <sup>1)</sup>	<b>db</b>	0...999.9 digit	1	
Controlling element running time	<b>tt</b>	10...3000 s	15 s	
Switch-on threshold burner / stage II <sup>1)</sup>	<b>H Y S 1</b>	0...-199.9 digit	-5	
Switch-off level stage II <sup>1)</sup>	<b>H Y S 2</b>	0... HYS3 digit	3	
Upper switch-off threshold <sup>1)</sup>	<b>H Y S 3</b>	0...999.9 digit	5	
Response threshold	<b>q</b>	0...999.9	0	
Heating curve slope	<b>H</b>	0...4	1	
Parallel displacement <sup>1)</sup>	<b>P</b>	-90...+90	0	

<sup>1)</sup> Setting of the decimal place has an impact on these parameters

### 12.3 Configuration level

Parameter	Display	Factory setting	Setting
Analog input 1, 2 and 3; setpoint changeover / shift	<b>C111</b>	9030	
Limit comparator; controller type; setpoint 1; locking	<b>C112</b>	0010	
Unit address; decimal place / unit, signal for out-of-range	<b>C113</b>	0110	
Measured value range start analog input 1 <sup>1.</sup>	<b>SCL</b>	0	
Measured value range analog input 1 <sup>1.</sup>	<b>SCH</b>	100	
Measured value range analog input 2 <sup>1.</sup>	<b>SCL2</b>	0	
Measured value range analog input 2 <sup>1.</sup>	<b>SCH2</b>	100	
Lower setpoint limit <sup>1.</sup>	<b>SPL</b>	0	
Upper setpoint limit <sup>1.</sup>	<b>SPH</b>	100	
Actual value correction, analog input 1 <sup>1.</sup>	<b>OFF1</b>	0	
Actual value correction, analog input 2 <sup>1.</sup>	<b>OFF2</b>	0	
Actual value correction, analog input 3 <sup>1.</sup>	<b>OFF3</b>	0	
Filter time constant for digital filter, analog input 1	<b>dF1</b>	1	
Filter time constant for digital filter, weather-dependent setpoint shift	<b>dF3</b>	1278	
Lower working range limit <sup>1.</sup>	<b>oLLo</b>	-1999	
Upper working range limit <sup>1.</sup>	<b>oLHi</b>	9999	
Bus watchdog timer	<b>dtT</b> <sup>2.</sup>	30	

<sup>1.</sup> Setting of the decimal place has an impact on these parameters

<sup>2.</sup> Parameter is visible at all units. Functions useable only with RWF40.0X2B97

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