



Sensorik for industrial areas

EASY - SAFE – SMART

- Easy plug-in mounting
- Quick and safe installation
- Junction box integrated
- No variants only one basic unit
- Enhanced temperature range $-40^{\circ}\text{C} \dots +70^{\circ}\text{C}$
- Degree of protection IP66
- Analog outputs switchable between mA and V
- Outputs calibrated and scaled
- Integrated display
- Onsite parameterization
- LED status indication
- Low power input $<3\text{ W}$
- Cable length from the transducer to the sensor up to 100 m
- Highly resistant against corrosion



TR.Nc + IY.Nc Manual

BA.Nc-0001.02.EN

**Assembly and installation instructions for safe use of transducer TR.Nc
with mA/V output and sensors IY.Nc for Temperature, Humidity, Dew point
Differential pressure, Volume flow measurement**



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1. General

The manual is included in the delivery and serves to ensure proper handling and optimum functioning of the device. The manufacturer offers no guarantee for this publication and is not liable for any improper handling of the products described. For this reason, the manual has to be read before operation. In addition, all personnel who are involved in the transport, setup, operation, maintenance and repair are to be familiar with this manual. This manual may not, without the prior written consent of the manufacturer be used for competition purposes and will not be passed on to third parties. Copies for personal use are permitted. This documentation may contain technical inaccuracies or typographical errors. The information shall be revised periodically and is subject to modifications. The manufacturer reserves the right to modify or alter the product described at any given time.

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SYMBOLS



This sign shows Safety notes.

Safety notes must be followed. Failure to observe may result in personal injury or property damage. The manufacturer assumes no liability.

SAFETY NOTES



Installation, electrical connection, maintenance and commissioning may only be performed by trained specialist.



Avoid excessive mechanical loads and improper use.



Switch off power when mounting and dismounting



The display loses contrast and brightness in the cold conditions. Regenerates when the temperature rises to its original state.

2. Product description

A basic unit TR.Nc and various sensors of the series IY.Nc solve a variety of measurement tasks. The sensors are available for multi-functionality, high accuracy and simple assembly.

The following sensors are available

- Temperature
- Temperature and humidity, dew point
- Differential pressure, volume flow
- Special sensors on request

In addition, the feelers/probes allow an on-site commissioning and the LCD display serves as an on-site value measurement. The integrated terminal box ensures a direct electrical connection.

Due to the modular concept, separation of electronics and mounting plate, a simple, easy installation and commissioning is guaranteed.

Options such as different sensor cables for difficult installation conditions supplement the product portfolio. Calibration of the measuring chain are made as easy as possible by the design of the device.

MEASUREMENT PRINCIPLE

The physical unit is detected in the series sensors IY.Nc. The measured value is digitally processed. The transfer to the transmitter TR.Nc is carried out by an "intelligent" protocol that enables easy-to-change sensors and is open for future sensors.

The robust, interference-free signal from the sensor to transmitter allows even in harsh industrial environments to transfer up to 100 m.

In this TR.Nc transmitter, this signal is converted into freely scalable analog outputs. You can choose between voltage and current outputs which can be set by software menu.

APPLICATIONS

TR.Nc & IY.Nc-P .. Volumetric flow measurement

The differential pressure sensor measures the pressure drop in the ventilation duct, eg. B. via an orifice plate or a measuring cross, as a measure of the volume flow. In volume flow controllers for variable volume flow (VAV), the pressure value is used to control the damper position within a closed control loop and enables demand-dependent ventilation.

TR.Nc & IY.Nc-P .. Pressure monitoring channel

The opening and closing of ventilation flaps leads to pressure changes in air ducts. The fan is controlled as needed to maintain a constant duct pressure for efficient ventilation.

TR.Nc & IY.Nc-P .. Pressure monitoring room

In air-conditioned rooms, the supply and exhaust air should be controlled so that pressure differences between individual zones or in relation to the environment are minimized. In cleanrooms, however, a constant overpressure must be ensured to prevent the ingress of uncleaned air. In laboratories and hospitals, it is a constant negative pressure, which prevents the spread of germs and dangerous substances.

TR.Nc & IY.Nc-P .. Filter monitoring

Dirty air filters increase the pressure loss in ventilation ducts and systems, which requires more fan power and increases energy costs. An electronic filter monitor with integrated differential pressure sensor measures the pressure drop across the filter and triggers a message to change the filter in good time, as well as defects such as a cracked filter can be detected.

INTENDED USE

The device is used in the HVAC industry for technical ventilation. The device is approved according to the harmonized safety standards and in compliance with all manufacturer information that is necessary for the safe operation of the devices, protective systems and devices. Please note the legal requirements of engineering or professional practice. If instructions are not followed, the operating license will expire.

FORESEEABLE MISAPPLICATION

The manufacturer has integrated a maximum of safety to prevent property damage and personal injury. The limits and threats are mentioned. Use outside of the technical data formulated in the user manual is not permitted.

3. Technical Data

TR.Nc TRANSDUCER

SUPPLY		
Voltage	20 – 28,8	V AC/DC
Frequency	50 – 60	Hz
Power input/consumption	3 / 5	W / VA
Protection class / overvoltage category / pollution degree	III / 2 / II	extra-low voltage
OUTPUTS		
Voltage / current selectable	0 – 10 / 0 – 20	V DC / mA
Accuracy	0,1	% FS
Influence of temperature	< 0,01	%/K
Effect of load	0,1/100	%/Ohm
DISPLAY / LED		
LCD, backlight	128 x 64	pixel
LED red / green	Status indication	
HOUSING		
Corrosion durability	On- and Offshore	With high salinity
Ingreased protection	IP66	
GENERAL		
Terminal cross-section	0,08 – 2,5 0,25 – 1,5	mm without end sleeve mm with end sleeve
Cable connections M20x1,5	6 - 13	Ø mm
Dimensions H x W x D	175 x 110 x 56	mm
Weight	800	g
MATERIALS		
Housing	Plastic	
Front plate, Screws	Stainless steel	
Seals	EPDM	
Cable connection, Sensor connection M12	brass plated	
APPLICATION		
Ambient- and storage temperature	-40 ... +70	°C
Humidity, without condensation	0 ... 100	%rH
Mounion position	any, recommendation vertical	

IY.Nc-P-... DIFFERENTIAL PRESSURE / VOLUME FLOW

TYPES	RANGE	MIN. ADJ.	MAX. PRESSURE	ACCUR. MAX / TYP	
IY.Nc-P-0060	-60 ... +60	18	7000 (1 psi)	<2,5 % / <0,5 %	Pa
IY.Nc-P-0100	-100 ... +100	30	7000 (1 psi)	<2,5 % / <0,5 %	Pa
IY.Nc-P-0250	-250 ... +250	75	7000 (1 psi)	<1,25 % / <0,5 %	Pa
IY.Nc-P-0600	-600 ... +600	180	7000 (1 psi)	<1 % / <0,5 %	Pa
IY.Nc-P-1000	-1.000 ... +1.000	300	7000 (1 psi)	<1 % / <0,5 %	Pa
IY.Nc-P-2500	-2.500 ... +2.500	750	35.000 (5 psi)	<1 % / <0,5 %	Pa
IY.Nc-P-4000	2.500 ... +2.500	1.200	35.000 (5 psi)	<1 % / <0,5 %	Pa
IY.Nc-P-10000	10.000 ... +10.000	3.000	35.000 (5 psi)	<1 % / <0,5 %	Pa
other pressure ranges on request					
ACCURACY					
Long term stability 1.000 h / 25 °C				0,5	%
Sampling rate				0,1	s
SUPPLY					
Via M12 interface to TR.Nc					V
HOUSING					
Corrosion resistance	On- and Offshore				With high salinity
MATERIALS					
Housing	Plastic				Halogene free
Front plate	Plastic				
Screws	Stainless steel				
Seals	EPDM				
tube connection	brass plated				
APPLICATION					
Ambient- and storage temperature	-40 ... +85				°C
Humidity, without condensation	0 ... 95				%rH
Mounion position	any, recommendation vertical				
Delivery	Sensor, 1 m cable m/f, screws				

IY.Nc -RT / RTH-... TEMPERATURE / TEMPERATURE HUMIDITY DEW POINT (Room)

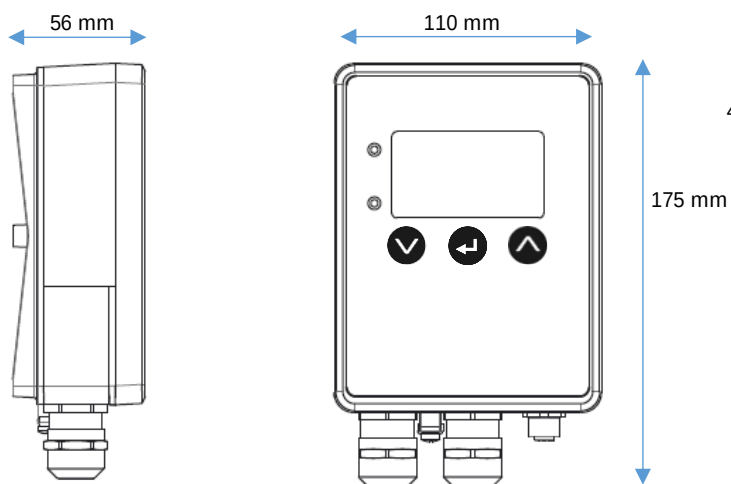
TYPES AND MEASUREMENT RANGE		
IY.Nc-RT	Room Temperature feeler/probe	-40 ... +125 °C
IY.Nc-RTH	Room Temperature-humidity feeler/probe	-40 ... +125 / 0 ... 100 °C / %RH
ACCURACY		
Accuracy temperature @ 0 ... 60 °C		< 0,5 °C
Accuracy temperature @ -40 ... 0, @ 60 ... 125 °C		< 0,5 °C + 0,03°C/K
Accuracy humidity		2,0 % FS
Accuracy humidity < 20%RH; >80%RH		5,0 % FS
Hysteresis		1,0 %
Long term stability 1.000 h / 25 °C		0,5 %
SUPPLY		
Via M12 interface to TR.Nc		
MATERIALS		
Thermowell, end cap		Stainless Steel
Seals		EPDM
Sensor connection M12		brass plated
APPLICATION		
Ambient-, storage temperature		-40 ... +125 °C
Humidity, without condensation		0 ... 100 %RH
Mounting position		Any, recommendation vertical

IY.Nc -DT / DTH-... TEMPERATURE / TEMPERATURE HUMIDITY DEW POINT (Duct)

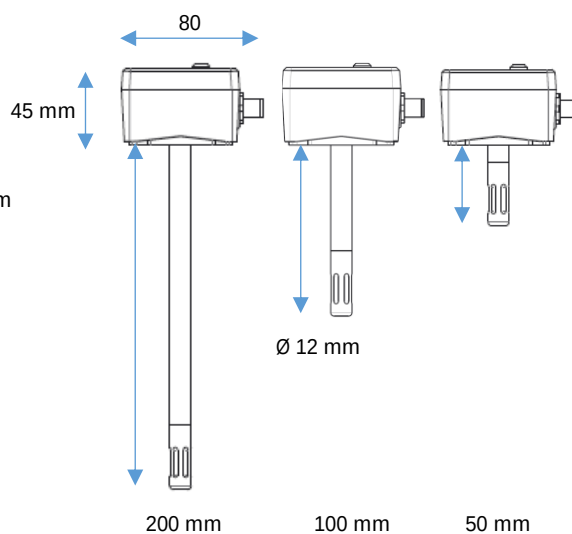
TYPES AND MEASUREMENT RANGE		
IY.Nc-DT-50	Duct Temperature Probe 50 mm	-40 – 125 °C
IY.Nc-DT-100	Duct Temperature Probe 100 mm	-40 – 125 °C
IY.Nc-DT-200	Duct Temperature Probe 200 mm	-40 – 125 °C
IY.Nc-DT-370	Duct Temperature Probe 370 mm	-40 – 125 °C
IY.Nc-DTH-50	Duct Temperature Humidity Probe 50 mm	-40 – 125 / 0 – 100 °C / %RH
IY.Nc-DTH-100	Duct Temperature Humidity Probe 100 mm	-40 – 125 / 0 – 100 °C / %RH
IY.Nc-DTH-200	Duct Temperature Humidity Probe 200 mm	-40 – 125 / 0 – 100 °C / %RH
IY.Nc-DTH-370	Duct Temperature Humidity Probe 370 mm	-40 – 125 / 0 – 100 °C / %RH
ACCURACY		
Accuracy temperature max.		< 0,5 °C
Accuracy temperature @ -40 ... 0, @ 60 ... 125 °C		< 0,5 °C + 0,03°C/K °C/K
Accuracy humidity total error band		2,0 % FS
Accuracy humidity < 20%RH; >80%RH		5,0 % FS
Hysteresis		1,0 %
Long term stability 1.000 h / 25 °C		0,5 %
SUPPLY		
Via M12 interface to TR.Nc		V
MATERIALS		
Housing	Plastic	
Screws	Stainless Steel	
Seals	EPDM	
Sensor connection M12	brass nickel plated	
APPLICATION		
Ambient-, storage temperature	-40 ... +125	°C
Humidity, without condensation	0 ... 100	%RH
Mounting position	any, recommendation vertical	

4. Dimension

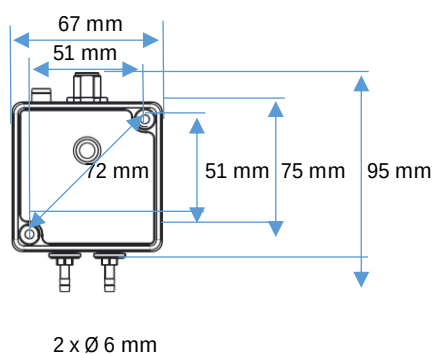
TR.Nc (TRANSMITTER/MESSUMFORMER)



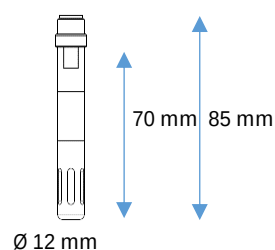
IY.Nc-D.... (DUCT/KANAL)



IY.Nc-P.... (PRESSURE/DRUCK)



IY.Nc-R.... (ROOM/RAUM)

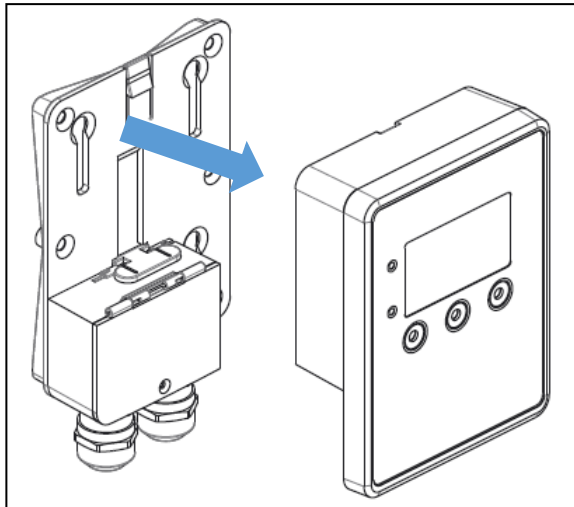
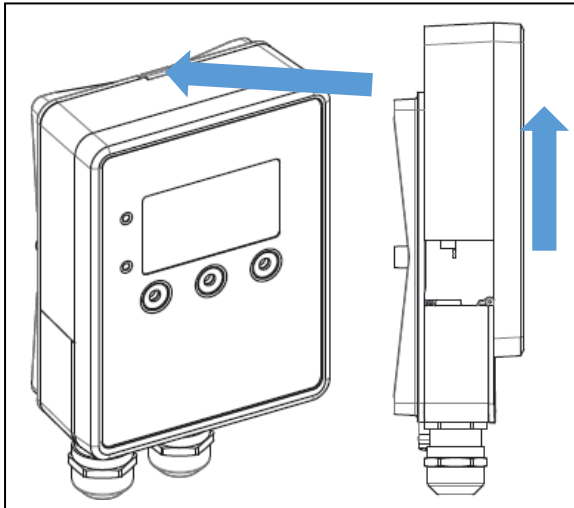


5. Assembly / Installation

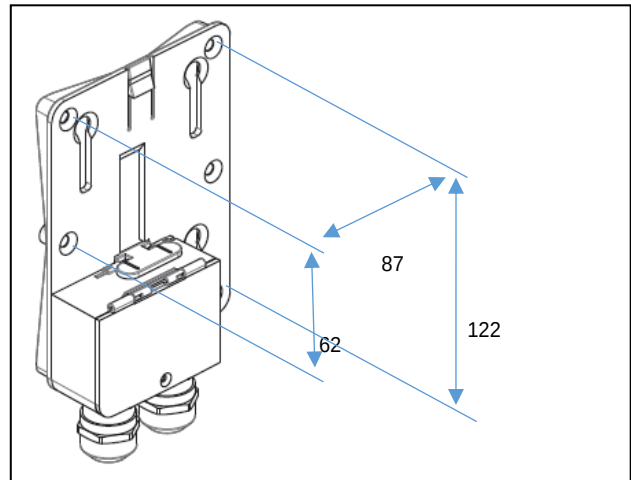
UNLOCK ELECTRONIC



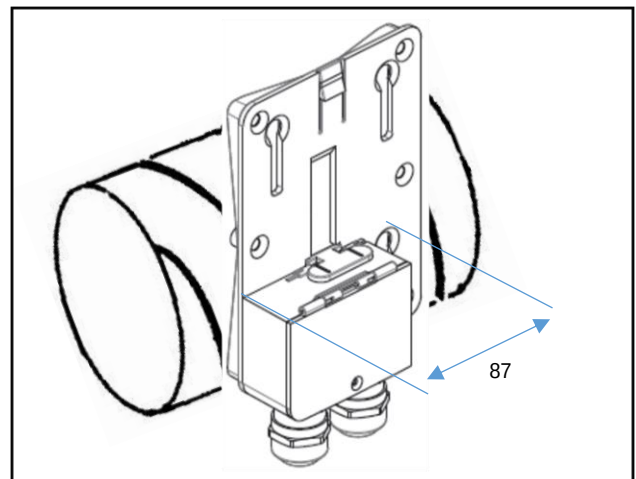
- Switch off power and check
- Press down release tab carefully
- Slide electronic module up and
- Remove forward



WALL MOUNTING



DUCT MOUNTING



MOUNTING FRAME

- Drill holes according to the drilling plan (see illustration)
- Mount base frame with delivered screws.
- Make sure when mounting that the mounting frame is not under strain or sags
- For outdoor mounting make sure that no water accumulates or frost can form

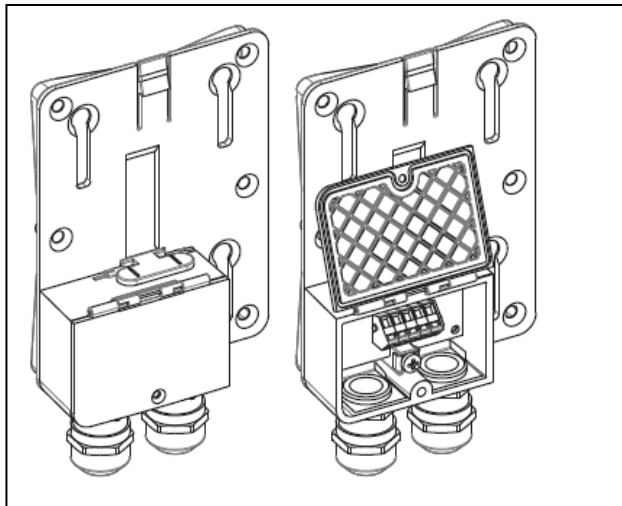
ELECTRICAL CONNECTION

The integrated electrical connection box protection enables direct contact to the supply and the analog outputs. Pursuant to IEC61010, the power supply is to be protected with a fuse > 1 A and < 10 A.

- Switch off power and check
- Unlock electronic part
- Remove M3 screw from cover
- Open cover
- Remove protection of the cable connection
- Insert cable
- Strip cable (6 mm)
- Open clamp by pressing gently with a screwdriver
- Slide wire/s in
- Remove screwdriver
- Close cover
- Tighten cable screws
- Close unused opening with blind plugs

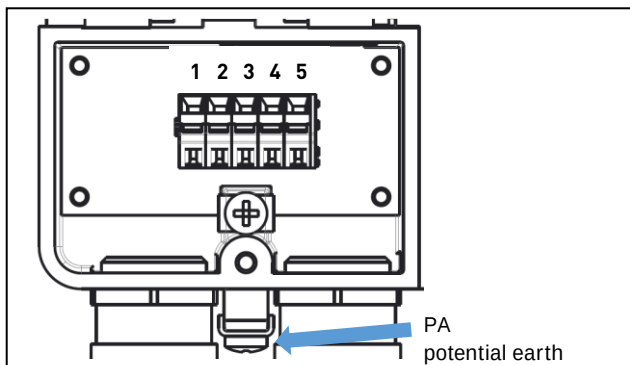


The equipotential bonding (PA) of the sensor and the PA of the transmitter must be connected to the same point.



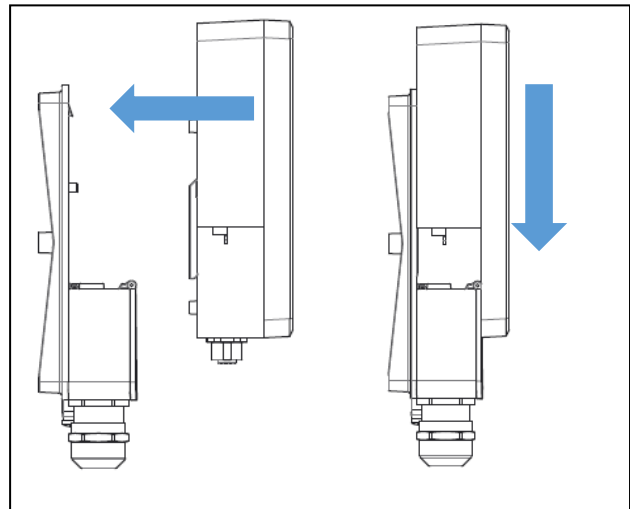
WIRING DIAGRAM

- Terminal 1(+), 2(-) Supply
- Terminal 3, 4 (GND) Channel 1
- Terminal 5, 4 (GND) Channel 2

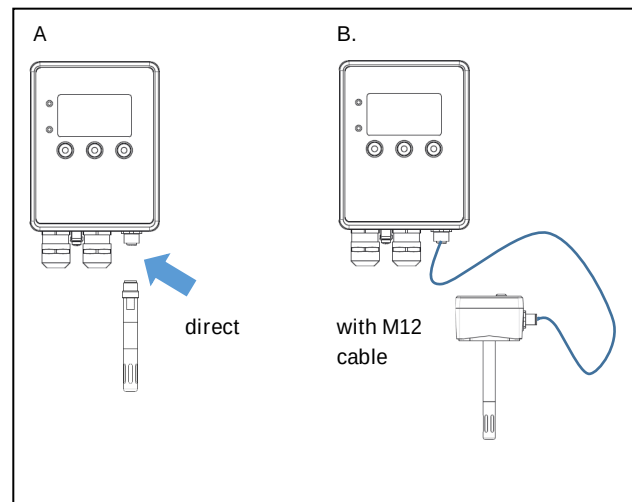


LOCK ELECTRONIC

- Attach electronic part
- Lock by sliding together



MOUNTING PROBE



A Installation of a fixed probe/feeler:

- The transducer must be installed so that the feeler/probe is facing down!

B Mounting a remote probe/feeler:

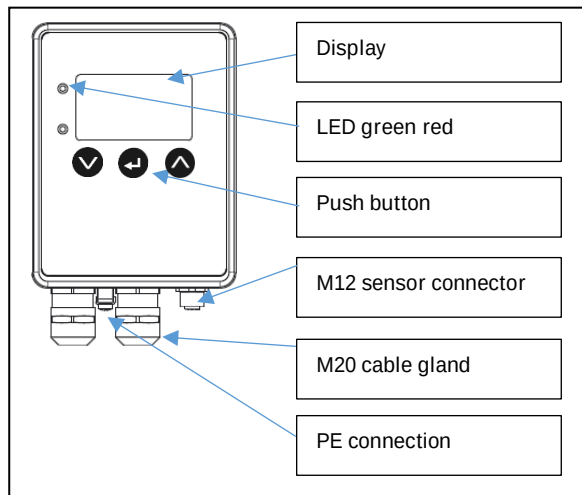
- The probes can be placed up to 100 m by means of a pluggable connection cable
- The probe/feeler must be mounted so that no moisture can enter. If possible, a drip should be fitted for each assembly
- The connection cable must be shielded

6. Commissioning

Make sure that the device is properly installed in accordance with the preceding chapters and has been connected and the power supply with the specifications on the nameplate.

- Turn on the power supply.
- Display switches to normal
- Sensor data loads
- LED lights green when probe/feelers connected and within the set measuring range.

7. Operation



8. Dismantling

- Disconnect power and check
- Press down release tab carefully
- Slide out electronics module
- Open the terminal box
- Remove cable

9. Calibration analog outputs

The TR.Nc has the menu item "Output calibration" a function in the analog outputs can be checked / calibrated.

In parameterization mode (see Chapter 10) can be preselected volts or milliamps. Using the arrow keys, you can now define the desired output value at the outputs.

Based on the measurement results can be the deviation setpoint / actual value in the simplest way.

$$\text{deviation in \%} = \frac{\text{setpoint} - \text{actual value}}{\text{scale value}} \times 100 \%$$

Setpoint value	via the menu
Actual value	value analog output
Scale value	most 10V or 20mA

e.g.

$$\text{deviation in \%} = \frac{12 \text{ mA} - 11,95 \text{ mA}}{20 \text{ mA}} \times 100 \% = 0,25 \%$$

10. Parameterization

	ACTION	DISPLAY	ACTION	DISPLAY	ACTION	DESCRIPTION	ACTION
PARAMETER MODE							
	⬅					Push 3 seconds	
LANGUAGE SETTING							
	⬆ ⬇ ⬆	D Deutsch GB English F Francais E Espanol I Italiano	⬅			Select using keys desired language press enter	
SENSOR SETTING							
⬇	⬅	Output mA / Volt	⬅	mA Volt	⬇ ⬆	Select mA or Volt at the output channels 1 / 2	⬅
	⬇	Select sensor	⬅	temperature relative humidity dew point pressure	⬇ ⬆	Select sensor for next steps	⬅
	⬇	Select unit	⬅	°C, °F, K, °Ra, %rF, % rH Pa, mbar, ...	⬇ ⬆	Define unit	⬅
	⬇	Measurement range	⬅	0,00 100	⬇ ⬆	Measuring range lower - upper limit	⬅
	⬇	Offset	⬅	0,000	⬇ ⬆	Set Offset	⬅
	⬇	Select channel	⬅	Channel 1 Channel 2	⬇ ⬆	Which channel should be output	⬅
	⬇	Output range	⬅	4,00 20,00	⬇ ⬆	Scaling from - to	⬅
	⬇	Output	⬅	normal invers Namur	⬇ ⬆	Output signal in case of Failure Faulty ≤ 3,6 mA ≥ 21 mA	⬅
	⬇	Sensor error	⬅	0 20 Namur	⬇ ⬆	Output signal in case of Failure Faulty ≤ 3,6 mA ≥ 21 mA	⬅
	⬇	Damping	⬅	1 50	⬇ ⬆	1 = no damping 50 = 5 seconds	⬅
	⬇	Zero compensation	⬅		⬇ ⬆	Pressure connection short circuit	⬅
	⬇	k-Factor	⬅	1 10000	⬇ ⬆	k=0 no VAV measurement	⬅
				back to main			
FACTORY SETTING							
⬇	⬅	Factory settings		Load factory settings Back to main menu	⬇ ⬆		⬅
OUTPUT CALIBRATION							
⬇	⬅	Output		mA Volt	⬇ ⬆	Set values are to be measured on channel 1 and 2	⬅
		Value		0,0 20,0			
PASSWORD							
⬇	⬅	Password	⬅	0 0 0 0	⬇ ⬆		⬅
		Save Password		Yes / no			
DISPLAY							
⬇	⬅	Display	⬅	Light on Light off	⬇ ⬆		⬅
SAVE							
	⬅	Save	⬅	Save Discard Back to main menu	⬇ ⬆		⬅

CALCULATION K-FACTOR BY USING SR.VA-200

The k factor is calculated as following

$$k = s \cdot \sqrt{\frac{2 \cdot R \cdot T}{\rho_0}} \cdot A \cdot 3600$$

$$k = 4646 \cdot A \quad \text{simplified at room temperature and NN 0 m}$$

k = k Factor (input in the menu)

s = correction factor of pitot tube SR.Va 1,0025

A = Area of duct in m²

R = Gas constant for air 287 J/kgK

T = Temperature in K = 273 + Ta

ρ_0 = air density in kg/m³ at +22°C and 0 m NN = 1,204 kg/m³

VAV MEASUREMENT

The Air volume is calculated as following

$$Q \left[\frac{m^3}{h} \right] = k \cdot \sqrt{\Delta p}$$

Q = Air Volume m³/h

k = k Factor (Input menu)

Δp = Differential pressure [Pa]

11. Error Message

No Display / LED

- Check power supply
- Check if mounting frame and electronics are locked

No output signal

- Check power supply (LED red/green)
- Check wiring
- Check parameterizing

Red LED

- Reading out of range
- Sensor line break

12. Maintenance

The device is maintenance free annual function testing and regular cleaning of dust and dirt with a damp cloth is recommended.

13. Repair

Return of a device to claim services. The installation and operation of the Sensor series in accordance with this manual are very unproblematic. Should the unlikely event occur that a device has to be returned for repair or testing to our service department, a return form is provided under "service address" on the last page.

14. Disposal

Every year, thousands of tons of polluting electronic components land on landfills around the world. To ensure the best possible disposal or recovery of electronic components, the European Union has adopted the WEEE Directive. (Waste Electrical and Electronic Equipment) Please return these products directly to us at the end of their lifecycle so that we can dispose of them properly. The WEEE is an important contribution to the environment and we are happy to help protect the environment with this disposal concept.

15. Accessories Spare Parts

MA.Pa-06

FM.Pa

FK.Va-10

SC.Pu-01

SC.Pu-05

SC.Pu-10

CS.Ms-M12FM

KL.Ms-20

GW.Va-M5-G1/8

GW.Va-M5-G1/4

CR.Va-1/8-6

CR.Va-1/8-8

SR.Va-200

connection tube and 2 m PVC hose

filter to reduce humidity in pressure tubes

filter cap pore size 10 µm

1 m M12 cable for remote measurement

5 m M12 cable for remote measurement

10 m M12 cable for remote measurement

M12 shielded connector for cable confection

Female / male connector

Cable glands M20x1,5 Ms/Ni

M5 thread enlargement to G1/8"

M5 thread enlargement to G1/4"

1/8" clamp fitting to 6 mm tube V4A

1/8" clamp fitting to 8 mm tube V4A

Pitot tube length 200 mm incl. adapter for pressure gauging for volume air flow measurement

Others on request

Revision Status

VERSION	DATE	SUPPLEMENT / CHANGE / NOTE
01	2018-04-19	First Edition
02	2020-01-01	Company name, corrections

EN

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EU Konformitätserklärung EU Declaration of Conformity Déclaration de Conformité UE

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erklärt als Hersteller in alleiniger Verantwortung, dass das Produkt
declares as manufacturer under sole responsibility that the product
déclare sous sa seule responsabilité en qualité de fabricant que le produit

TR.Nc
IY.NC

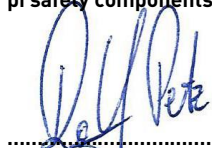
den Vorschriften folgender Europäischer Richtlinien durch Anwendung harmonisierter Normen entspricht:
conforms with the provisions of the following European Directives by applying the harmonised standards:
est conforme aux prescriptions des Directives Européennes suivantes par l'application des normes harmonisées :

Richtlinien/Directives/Directives		Normen/Standards/Normes	
2014/35/EU	(LVD)	EN 61010-1+A1 EN 60529	(2010) + (2019) (2012)
2014/30/EU	(EMC)	EN 61326-1 EN 61326-2-3	(2006) (2006)
2012/19/EU	(WEEE)		
2011/65/EU	(RoHS)	EN 50581	(2012)

NAMUR Empfehlung/recommendation/ recommandation

NE21
NE43

Nürnberg, 01. Januar 2020
pi safety components GmbH & Co. KG



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