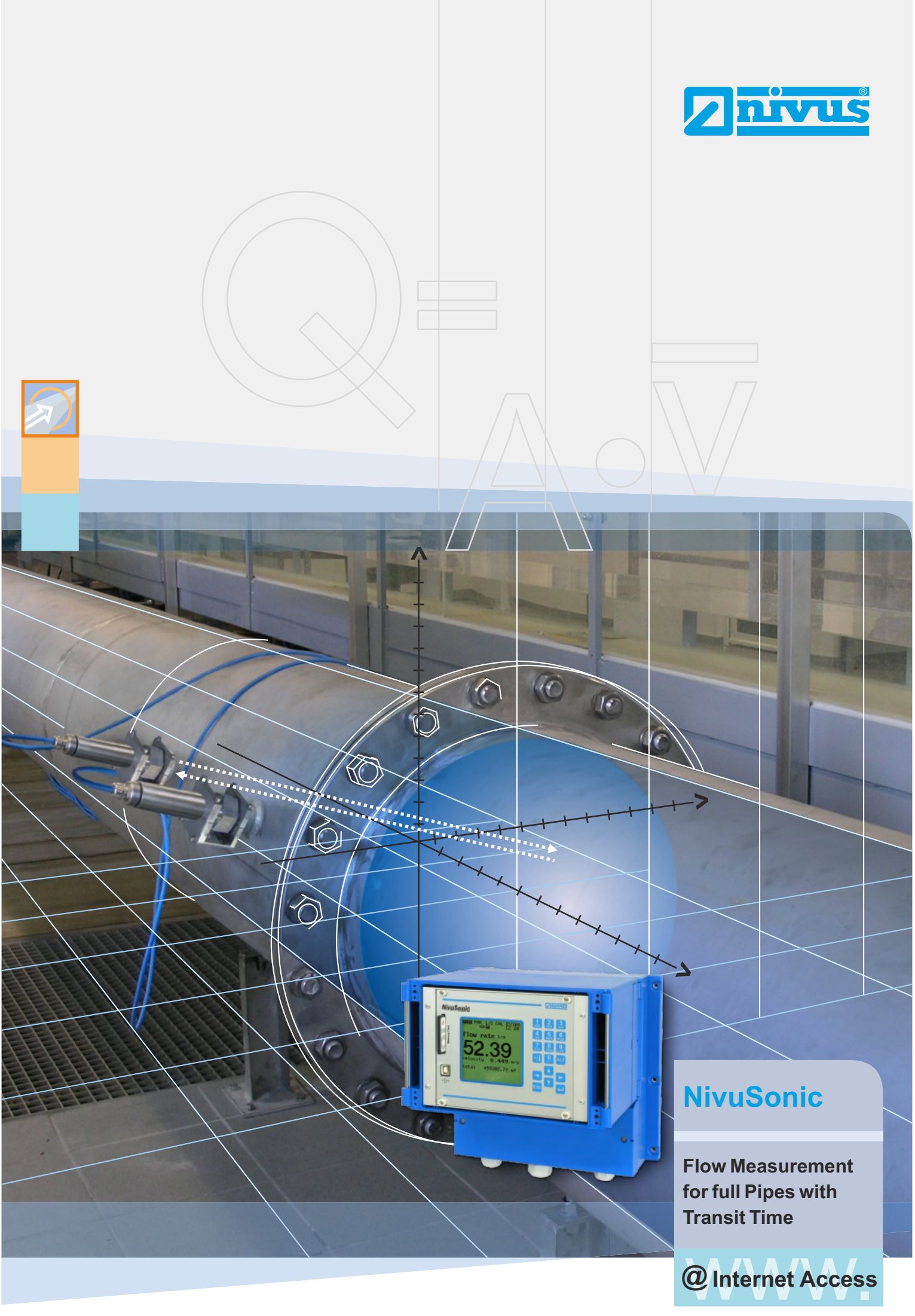
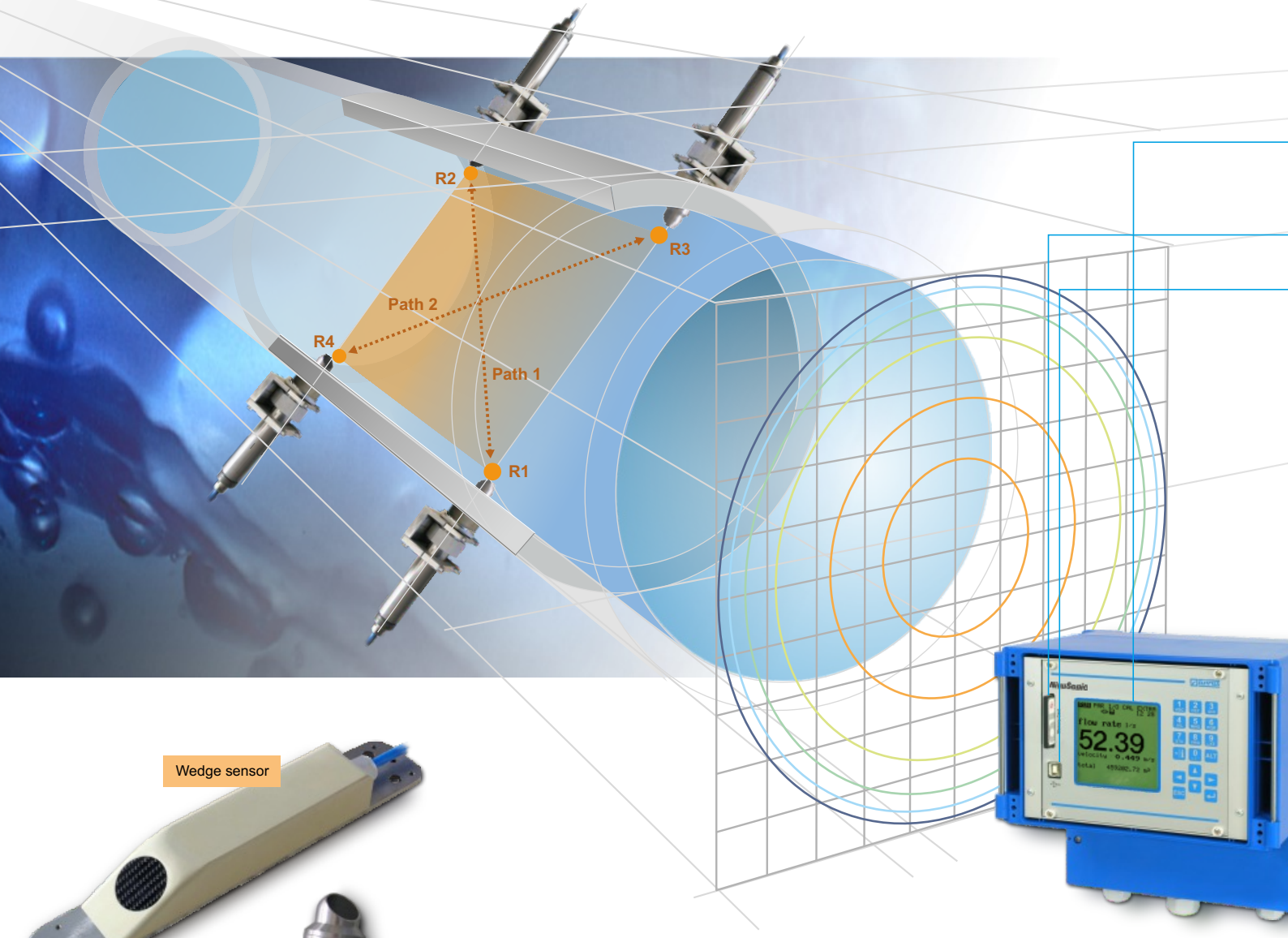


NivuSonic

Flow Measurement for full Pipes with Transit Time

@ Internet Access

How, where, how much? **A constant flow of information!**



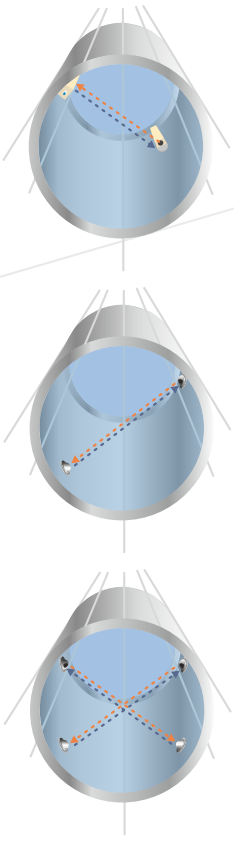
Wedge sensor


Pipe sensor

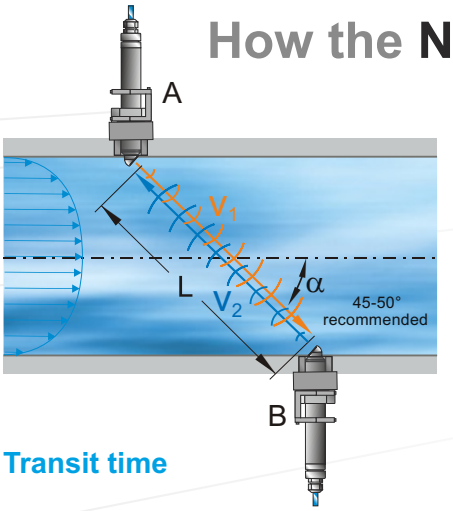
The NivuSonic is a permanent measurement system for continuous flow measurement in a range from clear to polluted media of various consistencies.
The NivuSonic utilises the transit time method. In contrast to other measurement methods (e.g. leading edge) transit time determination using signal correlation ensures increased operational reliability. Measurements can be implemented even in heavily polluted media at a constant level of accuracy.

NivuSonic has been developed to be a cost effective solution for measurements in full pipes. Using 2 measurement paths, the unit provides very accurate results at fully developed flow profiles in pipes. Appropriate sensors can be installed even during operation at low installation costs.

- ultrasonic transit time measurement with up to 2 measurement paths
- measurement in a range of clear to heavily polluted water
- measurement in full pipes
- easy and multilingual programming in dialog mode
- large, back-lit graphic display
- storage of all measurement data on compact flash card
- worldwide communication
- online connection/data transmission and remote maintenance via Internet
- a distance of up to 300 m between sensor and transmitter is possible by using an adapter box



How the NivuSonic measures



Transit time

The NivuSonic measurement principle is based on detecting the transit time of ultrasonic signals between two sensors (A and B). The transit time in flow direction t_1 is shorter than it is against the flow direction t_2. The difference between both transit times is proportional to the average flow velocity along the measurement path v_m.

$$v_m = \frac{c^2}{2 \cdot L \cdot \cos\alpha} \cdot \left(\frac{1}{t_1} - \frac{1}{t_2}\right)$$

c = velocity of sound
t_1 = time from A to B, t_2 = time from B to A

The system calculates the average cross-sectional area velocity v_A from the path velocity v_m and indicates it directly on the display.
Flow in full pipes is going to be calculated by using the general equation of continuity:

$$Q = A \cdot v_A$$

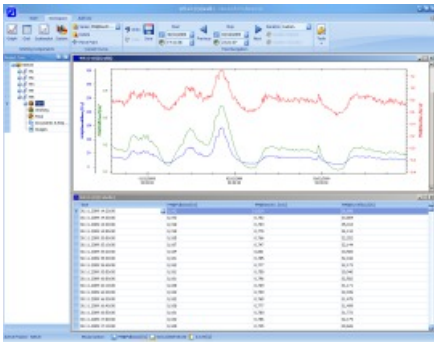
A = cross-sectional area
$\mathbf{v_A}$ = average flow velocity in cross-sectional area

Operation

The NivuSonic consistently follows the intelligent dialog mode operation philosophy known from other NIVUS units. It is very easy to put the system into operation since the large graphic display and the menu structure are clearly laid out for the various applications.

Evaluation

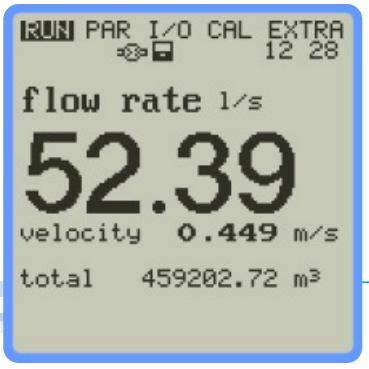
The further processing of data is carried out using the NIVUS standard software NivuSoft.



Communication

In order to meet the requirements of state-of-the-art measurement systems, the NivuSonic provides communication options for remote maintenance, remote diagnostics and data transfer using various communication channels under www.nivus.com

- Measurement online
- Internet Portal D2W - Device to Web



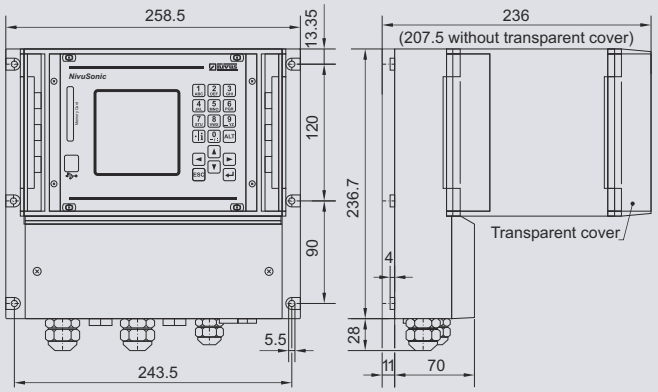
Direct flow rate indication on the display.

Easy parameter setting due to clear program structure.

D2W Internet Portal - data management with many possibilities

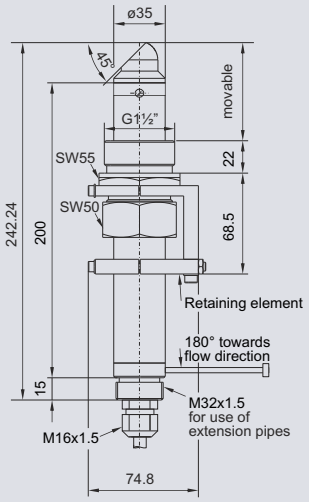
Specifications

Transmitter

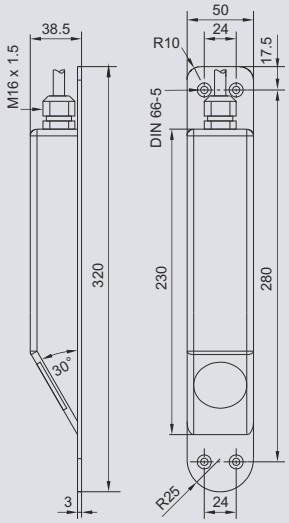


Dimensions in **mm**

Pipe sensor



Wedge sensor



Dimensions in **mm**

Transmitter

Power supply	100 to 240 V AC, +10 % /-15 %, 47 to 63 Hz or 9 to 36 V
Power consumption	max. 48 VA
Wall mount enclosure	• material: Polycarbonate • protection: IP 65, if lid is closed and locked • weight: approx. 3700 g
Operating temperature	-20° C to +50° C
Storage temperature	-30 °C to +70 °C
Max. humidity	80 %, non-condensing
Display	back-lit graphic display, 128 x 128 pixels
Operation	18 keys, multilingual dialog mode (German, English, French, Italian, Spanish, Polish, Czech and Danish)
Inputs	• 2 sensor pairs connectable directly or via adapter box
Outputs	• 4 x 0/4 - 20mA, load 500 Ohm, 12 bit resolution, accuracy 0.1% • 5 relays (SPDT), maximum load up to 230V AC / 2 A (cos φ 0,9) • RJ45 for Internet communication
Data memory	compact flash card up to 128 MB
Data transmission	via compact flash card, Modbus TCP via Ethernet with integrated web server, connection to networks (LAN/WAN, Internet), Internet via Ethernet or optional internal ISDN, GPRS or analog modem
Sensor Mounting Accessories	
Tapping saddle	for pipes with inner diameters from 100 to 800 mm
Stop ball valve	for pipe sensor removal from pressureless pipes
Welding nozzle	straight construction (90°) for pipe sensors
Retractable fitting	for pipe sensors under process conditions

Sensor

Measurement principle: Ultrasonic transit time	
Flow velocity measurement	
Measurement range	flow velocity ±20 m/s
Inner pipe diameter	0.2 m to 12 m (DN 200 to DN 12000)
Measurement uncertainty	• flow velocity ($v_{average}$) ± 0.1 % of measurement value within the path • flow (Q): ± 0.5 % depending on measurement and ambient conditions • offset velocity < ± 5mm/s
Number of paths	1 or 2 measurement paths
Measurement frequency	1 MHz
Protection	IP 68
Operating temperature	-20° C to +50° C
Operating pressure	pipe sensor: max. 16 bar (with retaining element)
Cable length	10/15/20/30/50/100 m (extension option: sensors connectable to adapter box, cable length between adapter box and transmitter max. 200 m)
Outer cable diameter	8.5 mm
Sensor types	• pipe sensor with retaining element • wedge sensor with ground plate
Medium contacting materials	• pipe sensor: stainless steel 1.4571, NBR, CFK (Carbon), HDPE • wedge sensor: stainless steel 1.4571, CFK (Carbon), PPO GF30, PA, Polyurethane
Temperature measurement via sound velocity in the medium	
Measurement range	0° C to +60° C
Measurement uncertainty	±1 K

You can find more information in the instruction manual on www.nivus.com

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