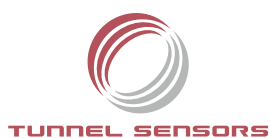




CROSSFLOW

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Open path ultrasonic
air flow monitor for tunnels



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About CROSSFLOW

CROSSFLOW is a cross bore air velocity monitor designed to measure air speed and direction in multi-lane and bi-directional tunnels. A pair of transceivers are mounted and aligned on either side of the bore. CROSSFLOW emits an ultrasonic pulse and measures the sound waves time in flight in each direction. The difference between these flight times is used to determine the velocity of air within the tunnel which can then be used as part of the tunnel's ventilation and energy management system.

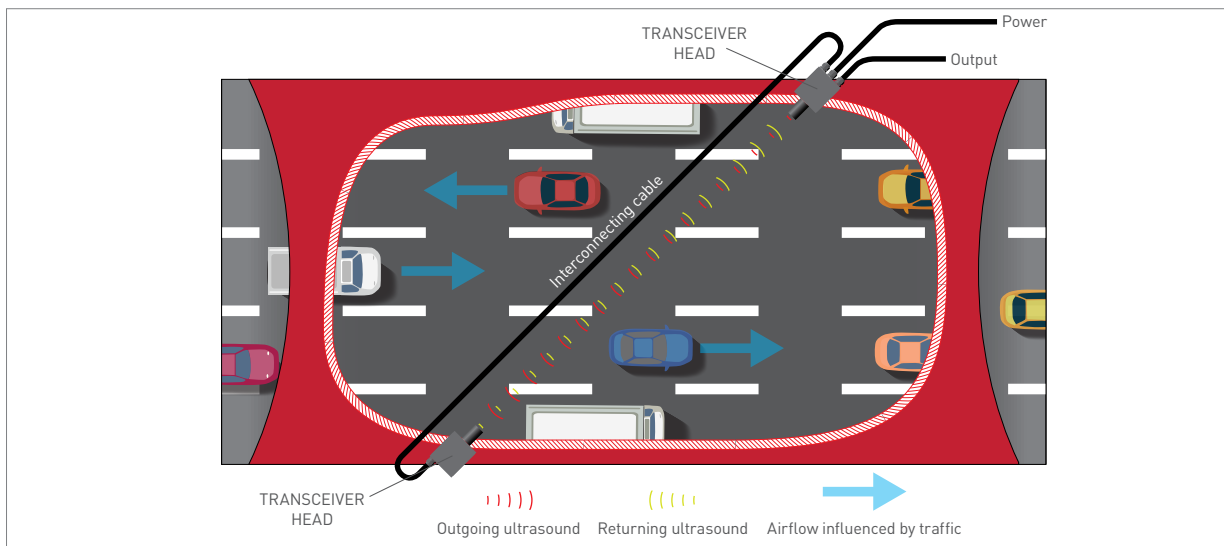
CROSSFLOW provides a reliable long term solution that's simple to install whilst requiring minimal service and maintenance. Plug and socket connectors help to decrease the installation time, whilst an IP67 rating and the use of stainless steel ensures that CROSSFLOW can withstand the harsh environments and aggressive cleaning cycles found in tunnels.

Features

- Open path ultrasound measurement technique using time of flight differential
- No moving parts, wear items or other components requiring routine replacement
- Range of on-board outputs with no need for separate control unit
- PC utility software included
- IP67 rated 316 stainless steel enclosure
- Separate alignment brackets with latched sensor attachment
- High quality plug and socket connectors for external connections.

Benefits of CROSSFLOW

- Long measurement path delivering representative measurements across wide and bi-directional tunnels
- No requirement for on-site calibration or re-calibration
- Measurement unaffected by temperature, pressure or humidity
- Long service intervals with no drift and low long term maintenance requirements
- Flexible interface options to suit all tunnels
- Robust design suitable for harsh tunnel environments and regular tunnel washing
- Plug and play sensor heads can be replaced quickly and easily, if required.



System components

- Two transceivers (TRX) - one master and one slave
- Pre-terminated interconnecting cable (TRX to TRX)
- Pre-terminated interface cables (2m)
- Quick release mounting/alignment brackets
- Acoustic collimating tubes
- Utility software package – PC based, Windows compatible
- Optional TSCU operator interface/control unit
- Optional PSU / junction box/combined termination unit.

“ We have developed a good working relationship and received excellent service throughout the installation and commissioning period. Since then, the instruments have performed very well. ”

Tunnel Sensors: Solutions and accessories for atmospheric monitoring in tunnels

Technical specification

Parameter	Comment
Measuring principle	Ultrasonic transit time (open path)
Measuring path	5...25 m
Measuring range	± 20 m/s (user configurable)
Measuring angle	30...60°
Accuracy	±0.1 m/s

Power

Voltage	+24 Vdc (90...260 Vac with optional PSU)
Nominal current consumption	1.0 A

Interface options

Serial comms	ModBus RTU via RS485 (isolated) External USB
Analogue output (two)	0/2/4...20.0 mA (isolated and scalable)
Relay contacts (three)	3A @ 30 Vdc

Physical

Ambient operating temperature	-25...+55 °C (air temperature around the heads)
Ambient operating humidity	0...100 %
Ingress protection	IP67
Materials Enclosure Transceiver	316 stainless steel Flame retardant UL rated polycarbonate
Dimensions	200 x 200 x 160 mm (each measuring head)
Weight	3.5 kg

Compliance & design

Electrical compliance	CE mark 2014/30/EU 2006/95/EC (electromagnetic radiation) (low voltage)
Design life	> 20 years
MTBF	> 10 years
Warranty	24 months



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- Designed specifically for tunnels
- Reliable ultrasonic transit time measurement
- No moving parts or wear items, low maintenance
- Range of on-board outputs, the control unit (TSCU) is optional.
- Separate alignment brackets with latched sensor attachment
- High quality plug and socket connectors for external connections

CROSSFLOW is a cross bore air flow monitor designed to measure air speed and direction in multi-lane and bi-directional tunnels. The monitor consists of a pair of transceivers which are mounted and aligned on either side of the bore. The transceivers both emit ultrasonic pulses and measure the sound waves time in flight in each direction. The difference between these flight times is used to determine the flow of air within the tunnel. This can then be used as part of the tunnel's ventilation and energy management system.

CROSSFLOW is a self-contained intelligent analyser with on-board industry standard SCADA/PLC interface options, such as 0/2/4-20 mA outputs, alarm relay contacts and a choice of serial communications protocols. As such the CROSSFLOW has no need for a separate control unit although one is available as an option. As a standalone instrument the CROSSFLOW can be set-up and controlled using the utility software supplied, installed on a PC or laptop and connected via the USB connector.

CROSSFLOW can also be paired with a TSCU operator interface (Tunnel Sensors Control Unit), which is a remotely located control unit with a display, keypad and full range of interface capabilities to match those found in the CROSSFLOW itself. Since the TSCU has all the same interface abilities as the CROSSFLOW, interface connections can be made directly to the TSCU (which can be positioned at a convenient accessible location) and/or to the CROSSFLOW. This versatility offers the flexibility to accommodate a wide range of wiring schemes.

The CROSSFLOW monitor has no moving parts and no regular service requirement, making it a very reliable "fit and forget" monitor. The instrument performs a number of self-checking and diagnostic routines, which in the unlikely event of a problem, can identify the fault and report it via the service alarm relay and/or serial comms.

CROSSFLOW provides a reliable long term solution that is simple to install whilst requiring minimal service and maintenance. Plug and socket connectors and latched alignment brackets help to decrease the installation and maintenance time. An IP67 rating and the use of stainless steel ensures that CROSSFLOW can withstand the harsh environments and aggressive cleaning cycles found in tunnels.



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All technical details and specifications are subject to change without notice

Specification:

Measurement Performance (air flow)

No.	Parameter	Units	Min	Max	Comment
1	Measuring Principle				Ultrasonic transit time (open path)
2	Measuring Path	m	5	25	
3	Measurement Range	m/s mph	-20 -45	+20 +45	User selectable (also available as ft/min or kph)
4	Measuring Angle	deg	30	60	
3	Resolution	m/s		0.1	Display resolution
4	Accuracy	%	-2	+2	Relative to reading
5	Lower Detection Limit	m/s		0.1	
6	Damping	seconds	1	999	User selectable (response time ~3x damping)

Measurement Performance (air temperature)

No.	Parameter	Units	Min	Max	Comment
7	Measuring Principle				RTD
8	Measurement Range	°C	-20	+70	User selectable (also available as °F)
9	Resolution	°C		0.1	Display resolution
10	Accuracy	°C	-0.5	+0.5	
11	Damping	seconds	1	999	User selectable (response time ~3x damping)

Power

12	Voltage	Vdc		+24	
13	Voltage Tolerance	%	-10	+10	
14	Nominal Current Consumption	mA		300	
15	Power Up Current Consumption	mA		300	

Interface Options

16	Serial Outputs				ModBus RTU via RS485 External USB
17	Analogue Outputs (two)	mA	0 / 2 / 4	20	Isolated and scalable (user selected)
18	Digital Relay Contacts (three)	A	0	3	@30Vdc (signal level and data valid)

Physical

19	Ingress Protection			IP67	
20	Operating Temperature	°C	-20	+55	
21	Operating Humidity	%		100	
22	Operating Pressure	hPa	600	1100	
23	Regulatory Compliance				2014/30/EU (Electromagnetic Radiation) 2006/95/EC (Low Voltage)
24	Materials Transceiver Enclosure				Powder coated stainless steel
25	Dimensions	mm	96 x 158 x 197		Each head (without collimating tube)
26	Weight	kg		2.5	Each head
27	Warranty	Months	24		Return to base warranty. Extensions available