



- **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 several 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.

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	
5	Resolution	m/s		0.1	Display resolution
6	Accuracy	%	-2	+2	Relative to reading
7	Lower Detection Limit	m/s		0.1	
8	Damping	seconds	1	999	User selectable (response time ~3x damping)

Measurement Performance (air temperature)

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

Power

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

Interface Options

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

Physical

21	Ingress Protection			IP67	
22	Operating Temperature	°C	-25	+55	
23	Operating Humidity	%		100	
24	Operating Pressure	hPa	600	1100	
25	Regulatory Compliance				2014/30/EU (Electromagnetic Radiation) 2014/35/EU (Low Voltage)
26	Materials Transceiver Enclosure				Powder coated stainless steel (ASI316)
27	Dimensions	mm	96 x 158 x 197		Each head (without collimating tube)
28	Weight	kg		2.5	Each head
29	Warranty	Months	24		Return to base warranty. Extensions available