acoem

VECTA

Combined CO, NO_2, NO & Visibility Monitor for Tunnels - Single Point

The VECTA tunnel monitor is a single sensor solution for measuring two toxic gases (CO, NO_2 or NO) and visibility within a traffic tunnel, rail tunnel or other confined space.

The toxic gas monitoring uses plug-in, pre-calibrated Gas Sensor Modules containing electrochemical cells. The electrochemical cells contain an electrolyte that is gradually consumed during use, influenced mostly by the level of gas in the atmosphere, the ambient temperature and the humidity. Therefore, the Gas Sensor Modules require replacement or recalibration every 12 months to ensure accuracy of response. The Gas Sensor Modules are pre-calibrated plug-in units which can be quickly and conveniently replaced, which means calibration gases are not required. Replacement Gas Sensor Modules are available from Acoem Tunnel Sensors.

The visibility is measured using light scattering which provide provides a sensitive measurement over the standard road tunnel visibility range of 0 to 15 km^{-1}. However, the visibility monitor has a very high dynamic range and so can also be used as a dry smoke monitor with an optical extinction measurement range of up to 4000 km^{-1}.

The VECTA also measures the ambient temperature and humidity, measurements are compensated for both factors to ensure stable readings across all conditions.

The VECTA can measure up to eight (8) parameters simultaneously. This not only minimises capital cost but also minimises the requirements for cabling, installation and start-up.

The VECTA is available in a range of variants depending on the combination of toxic gases to be measured.

Model	Vis	CO	NO_2	NO
VECTA-0	✓			
VECTA-1	✓	✓		
VECTA-2	✓	✓		✓
VECTA-3	✓	✓	✓	
VECTA-4	✓		✓	✓
VECTA-6	✓		✓	

Having been designed specifically for tunnel environments, the VECTA is of rugged construction using powder coated 316L stainless steel to achieve an IP66 / NEMA 4 protection rating. This instrument can withstand the corrosive atmosphere and regular tunnel washing that the tunnel environment endures.

The VECTA has been designed for ease of use and to minimise tunnel maintenance by using an automatic zero level correction function. The instrument also performs detailed self-diagnosis to provide information on any instrument faults as well as warnings that should be checked at the next scheduled maintenance. The routine maintenance is typically every 6 months consisting of an instrument check and clean.
In the unlikely event of a faulty instrument the use of cable sockets, makes it very easy to remove and/or replace a head.

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

Benefits

- Direct in-situ single point measurement of two toxic gases (CO, NO2 or NO) and Visibility.
- Toxic gases measured using pre-calibrated plug-in electrochemical Gas Sensor Modules.
- Visibility measured using the light scatter technique.
- High quality 316L stainless steel construction ensuring a long service life.
- Gas detection compatible with EN 50545-1:2011
- Plugs and sockets enable simpler installation and easier maintenance.

Specification

Gas Measurement

Item	Parameter	Units	Min	Max	Comment
1	**Measurement Method**	Electrochemical cell (pre-calibrated plug-in module)			
2	**Number of Gas Monitoring Ports**		0	2	Selectable
3	**Available Gas Monitoring Cells**	CO, NO_2 or NO			Other gases available on request
4	**Response Time (T90)**	s		60	
5	**Measurement Range** CO NO_2 NO	ppm	 0 0 0	 300 5 100	User configurable
6	**Resolution** CO NO_2 NO	ppm		 0.1 0.001 0.1	Display resolution
7	**Detection Limit** CO NO_2 NO	ppm		 2 0.02 1	
8	**Accuracy** CO NO_2 NO	%		 ±2 ±3 ±3	Percentage of the Reading

Visibility Measurement

9	**Measurement Method**	Light scattering			
10	**Measurement Range**	km^{-1}	0	15 (4000)	Tunnel visibility (smoke detection)
11	**Resolution**	km^{-1}		0.1	
12	**Detection Limit**	km^{-1}		0.2	
13	**Accuracy**	%		±5	Percentage of reading
14	**Response time (T_{90})**	s		60	With the visibility damping set <20sec.

Power

15	**Voltage**	Vdc	+24		
16	**Voltage Tolerance**	%	-15	+15	
17	**Nominal Current Consumption**	A		1	
18	**Power Up Current Consumption**	A		1	

acoem

Interface Options

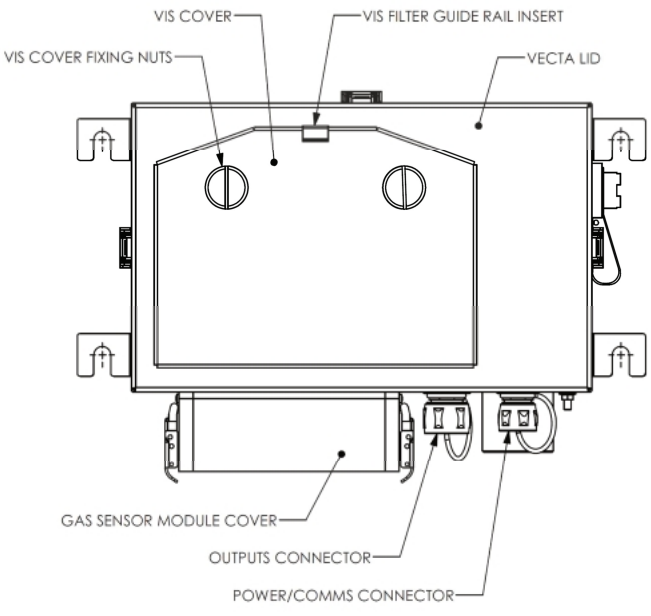
Item	Parameter	Units	Min	Max	Comment
19	**Serial outputs**	ModBus RTU via RS485, external USB			
20	**Analogue Output (four)**	mA	0 / 2 / 4	20	Isolated and scalable (user selected)
21	**Digital Relay Contacts (five)**	A	0	3	@30Vdc (signal level and data valid)

Physical

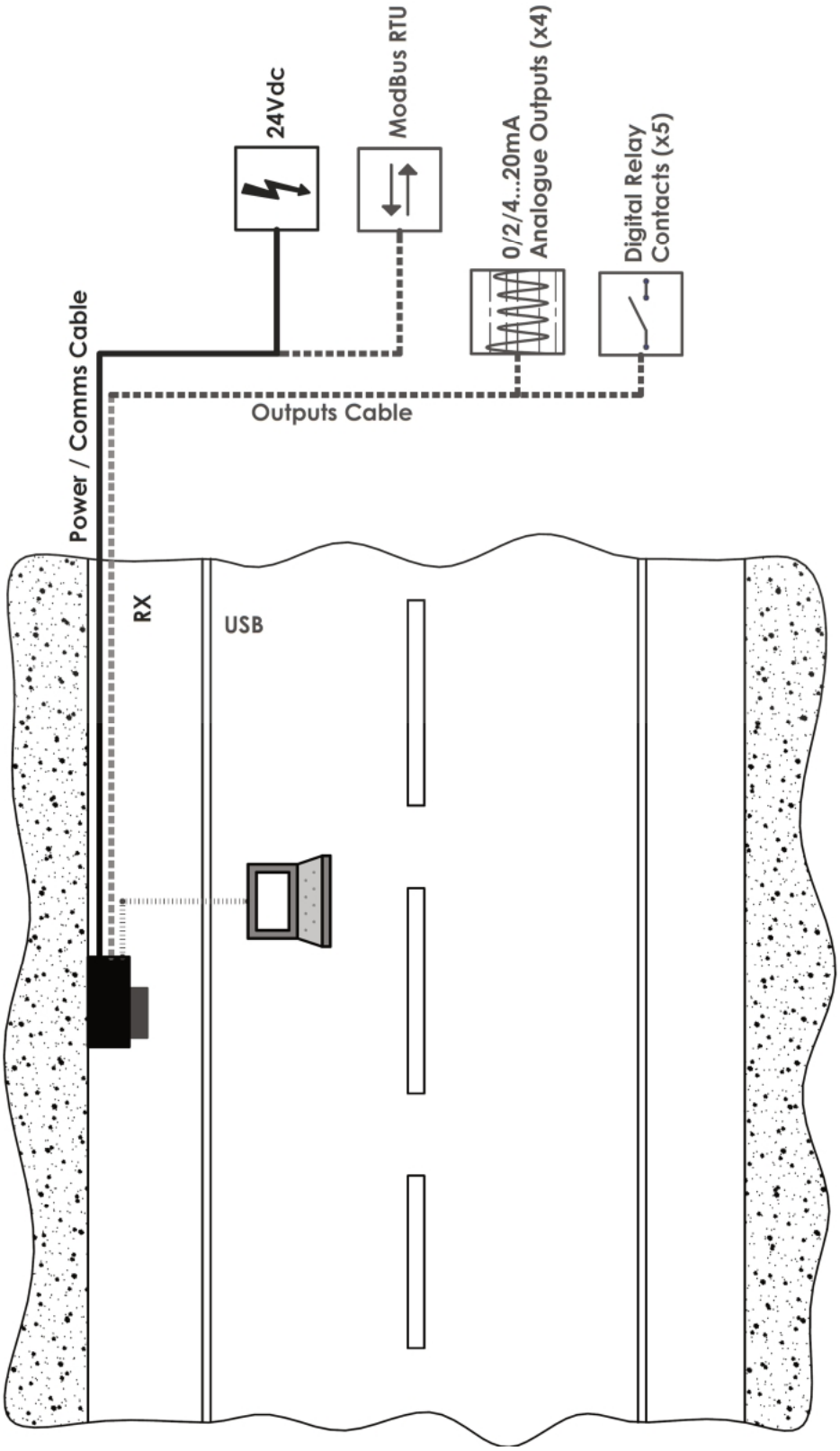
22	**Ingress Protection**			IP66	
23	**Operating Temperature**	°C	-20	+15	
24	**Operating Humidity**	%	15	90	Non condensing
25	**Material**		AISI/SAE 316L stainless steel		
26	**Dimensions**	mm	365 x 205 x 203		
27	**Weight**	kg		6.5	

Compliance & Design

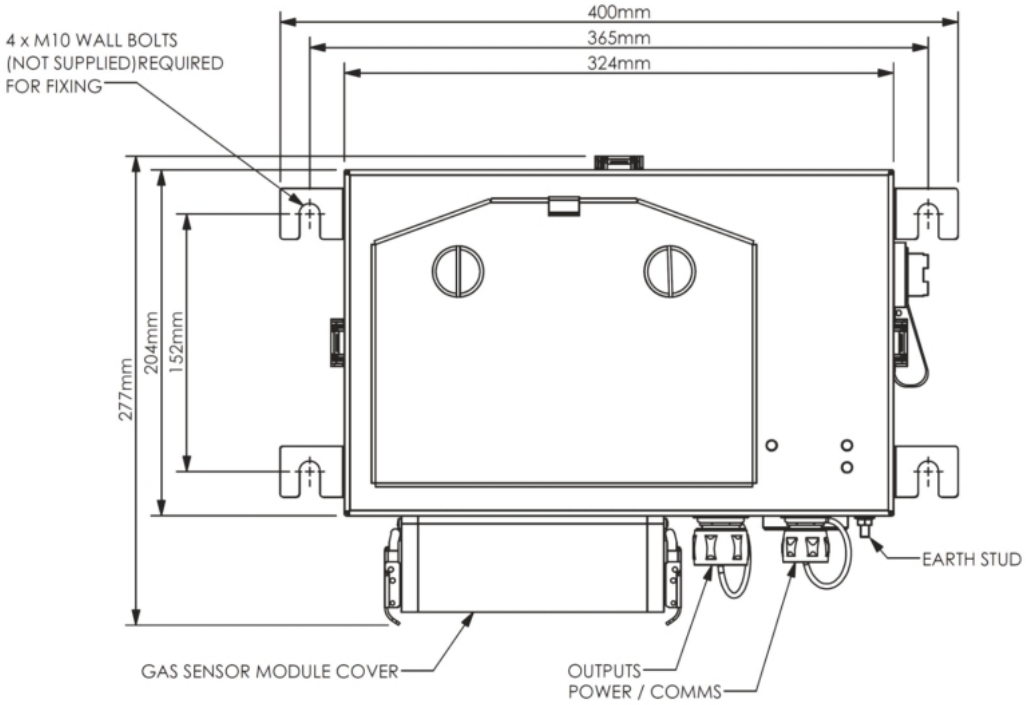
28	**Regulatory Compliance**				2014/30/EU (Electromagnetic Radiation) 2014/35/EU (Low Voltage)
29	**MTBF**	Years	20		
30	**Warranty** VECTA Gas Sensor Module	Months	24 6		Return to base

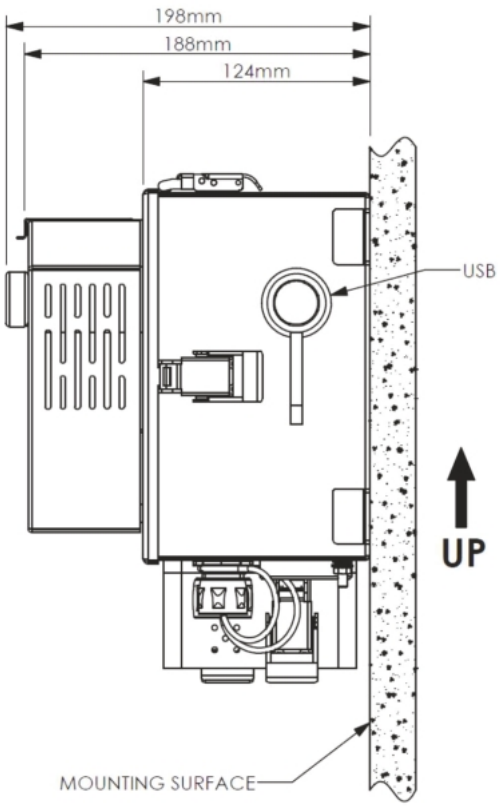


Installation Overview



Dimensions (mm)





Options & Accessories

Description	Order Code	Notes
VECTA Instrument 	TSL-VECTA-0 TSL-VECTA-1 TSL-VECTA-2 TSL-VECTA-3 TSL-VECTA-4 TSL-VECTA-6	Visibility only Visibility and CO Visibility, CO & NO Visibility, CO & NO_2 Visibility, NO_2 & NO Visibility and NO_2
Replacement Gas Sensor Modules	TSL-VE-GSM-CO TSL-VE-GSM-NO2 TSL-VE-GSM-NO	CO Sensor Module (0 - 300ppm) NO_2 Sensor Module (0 - 5ppm) NO Sensor Module (0 - 100ppm) Other gases available on request.
Cable	CBL-099 CBL-098	7-core screened LSZH cable 20-core screened LSZH cable
Cable Assemblies 	CBL-103 CBL-104 CBL-105 CBL-106 CBL-158 CBL-192	Power / comms cable - 10m length Outputs cable - 10m length Power / comms cable - 20m length Outputs cable -20m length Interconnecting cable - 20m length Interconnecting cable - 15m length
Combined Termination Unit 	TSL-CTU	Local cable termination unit for VECTA electrical connections, based on a choice of DIN rail terminals - see separate datasheet for details.
	TSL-CTU-P	Local termination unit with integral 24V PSU for VECTA electrical connections, based on a choice of DIN rail terminals and a 75W PSU - see separate datasheet for details.

Description	Order Code	Notes
Large Combined Termination Unit 	TSL-CTU-L1	Large local termination unit for VECTA electrical connections, with circuit board mounted two-part terminals - see separate datasheet for details.
	TSL-CTU-L1-P	Large local termination unit with integral 24V PSU for VECTA electrical connections, with circuit board mounted two-part terminals and a 75W PSU - see separate datasheet for details.
Audit Filter Kit 	TSL-VE-AFK-V TSL-VE-AFK-VG	Span Vis Check filter only Span Vis Check filter & Gas Hood

Note that the actual part may differ from the above representative pictures.

acoem
CREATING ENVIRONMENTS OF POSSIBILITY

acoem.com