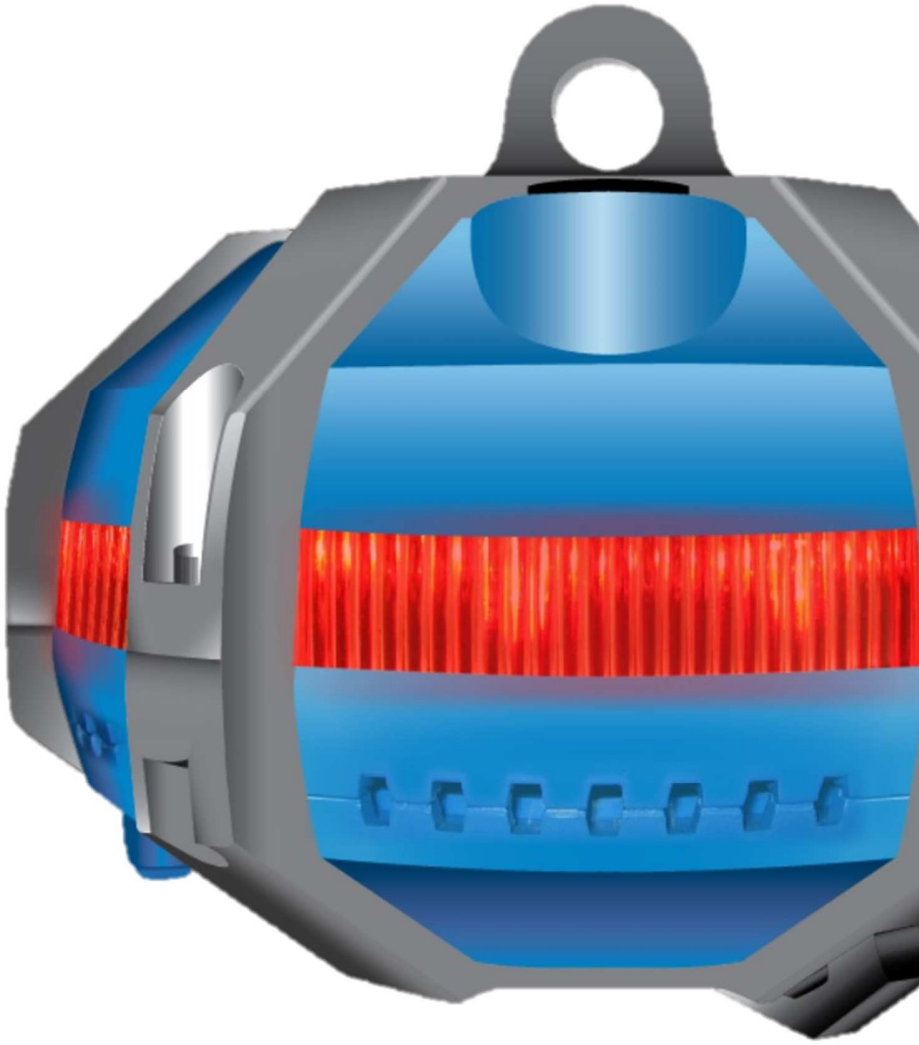
P50

Environmental Monitor



Version 4.7

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INTRODUCTION

Purpose

The purpose of this manual is to provide the user with a comprehensive guide to understanding the use, set-up, and the configuration of the P50 Environmental Monitor to enable the user to obtain best results from the P50.

About

The P50 is a state of the art Environmental Monitor which offers multiple environmental monitoring sensors and utilizes the very latest in intelligent technology to achieve excellent accuracy and is approved and certified compliant for use in explosive atmospheres (Group I) Underground mines and (Group II) Surface

Sensors

The following sensors are available in configuration on the P50 and can be specifically setup to operate in varying environmental climates depending on your requirements;

- Air Velocity
- Methane(CH4)
- Carbon Monoxide(CO)
- Carbon Dioxide(CO2)
- Oxygen(O2)
- Barometric Pressure
- Humidity
- Ambient Temperature
- Volatile Organic Compounds(VOC)
- Hydrogen sulphide (H2S)
- Hydrogen (H2)
- Smoke (MOS) (NOT Recommended)

**Although the P50 can be fitted with a MOS sensor we do not recommend this options for the P50, we therefor recommend a dedicated MOS sensor such as our S16 monitor.

The P50 is South African manufactured and is certified to the International Standards and Compliance IEC (SANS) 10086-2:2006.

HMI

The P50 operates as a user friendly device with real time data available to the user. All the measurements and data are available on the 16x2 OLED display, audio/visual indicator and RS485 network. All parameters are adjustable via personal computer. Modbus RTU is standard on all devices which allow communication to the control room.

Audio

The P50 uses a 93dB audible device configured to sound at pre-set alarm levels depending on the customer's requirements.

Visual

The visual indication is visible 360° around the unit. Four colours, red, green, yellow and blue, are standard on all models. Red and green are default for alarm and no alarm conditions respectively. Alarms can however be mapped to any of the four colours.

WARRANTY

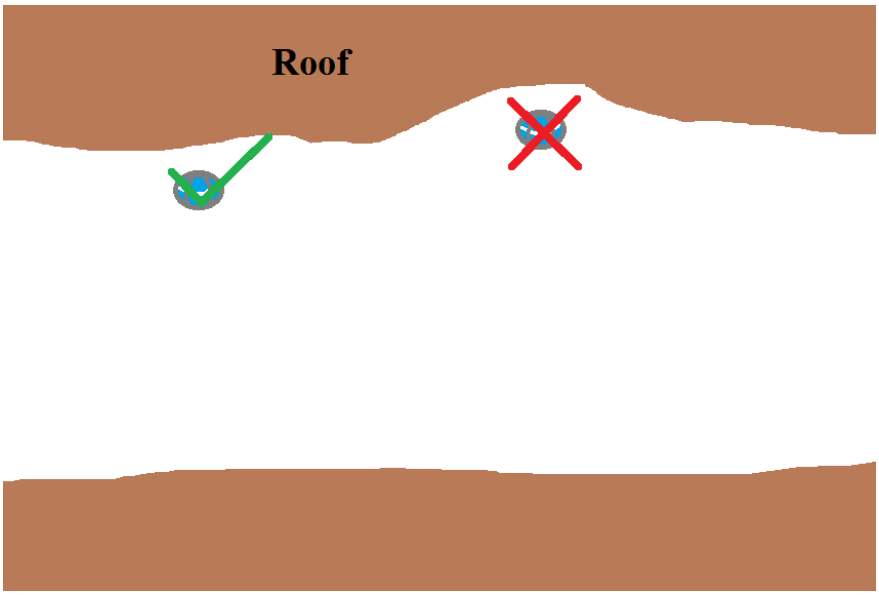
The P50 carries a one year limited warranty on all parts and labour.

BEST INSTALLATION PRACTICE

This section of the manual is intended as a **guideline only** for the installation of the P50 environmental sensor as shown in a typical underground operation.

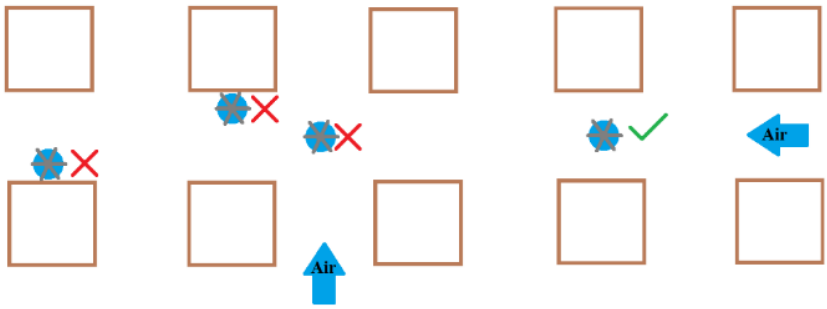
This guideline does not supersede local authority or rules for your environment as installations are required to be approved by the authoritative person responsible for the ventilation/environmental monitoring where the device is to be located.

Figure 1 – A typical mine installation – Roof Position



The P50 should be installed as illustrated above, that it is correctly positioned from the roof in order to measure the air velocity and should not be hung in a roof cavity as this will cause inaccurate readings due to improper flow or air.

Figure 2 – Path Position



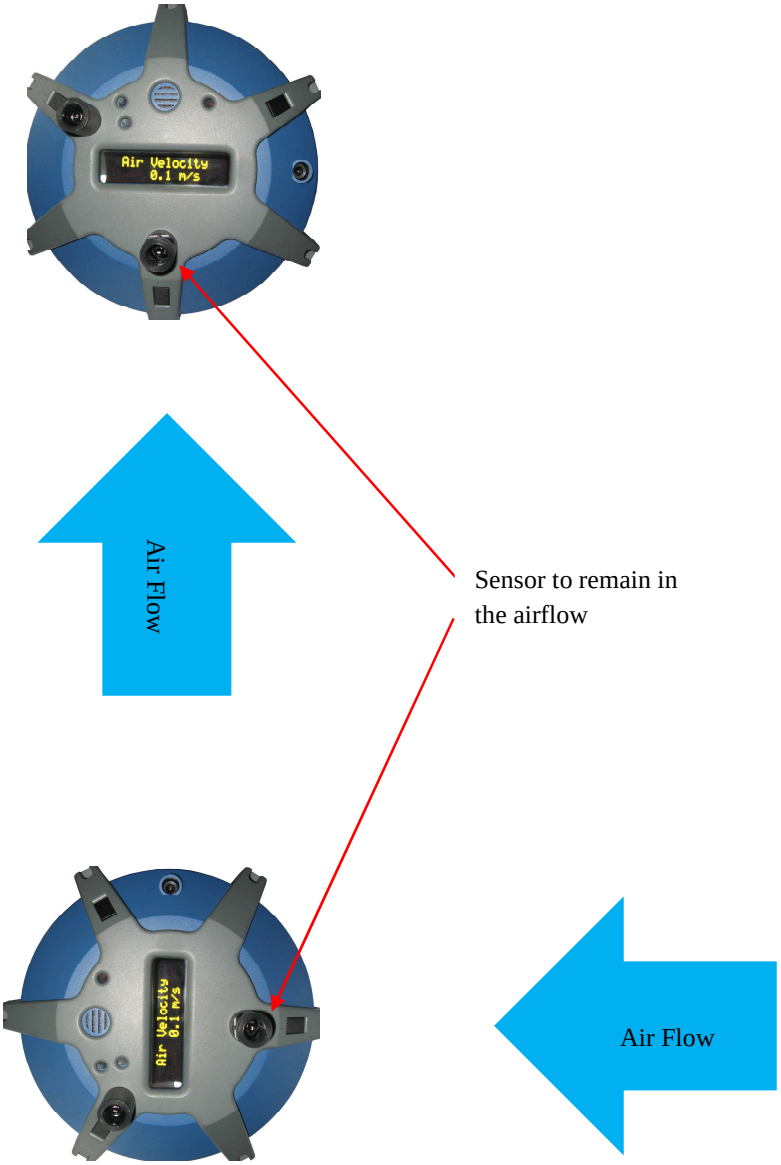
The P50 should not be mounted to close to either side of the ventilation path, or where cross flows could influence the reading.

Figure 3 – Installation Attitude

When the P50 is hung it should be hung as level as possible.

Figure 4 – Directional Position

For optimal Velocity readings the P50 should be positioned ensuring the Sensor indicated is positioned in the airflow



SAFETY INFORMATION

- Only a certified electrician is allowed to carry out the electrical installation
- Dangerous voltages can occur on the connectors, even if the auxiliary voltage has been disconnected
- Breaking the seal on the fixing screws of the device will result in a loss of warranty
- Electrical safety regulations must always be followed

SENSORS

Air Velocity

Two embedded platinum sensors are used to ensure long term reliable operation in harsh conditions. Digital signal processing ensures accurate air velocity measurements over the full specified temperature range.

Specifications

- Sensor range 0 to 5 m/s
- Operating range 0 to 5 m/s (Type A Model)
- Operating range 0 to 10 m/s (Type B Model)
- Operating temperature range -10˚C to 50˚C
- Response time 30 sec

Methane (CH4) P50

High quality sensors are used to ensure long term reliability and accurate measurements. The sensor has an effective range of 0 to 100%, but to ensure a better resolution the CH4 sensor is optimized to measure a range of 0 to 5%.

Specifications

- Sensor Range 0 to 100%
- Operating range 0 to 5%
- Operating temperature range -20˚C to 50˚C
- Response time < 20 sec

Methane (CH4) P51

High quality sensors are used to ensure long term reliability and accurate measurements. The sensor has an effective range of 0 to 1000000ppm, but to ensure a better resolution the CH4 sensor is optimized to measure a range of 0 to 50000ppm.

Specifications

- Sensor Range 0 to 1000000ppm
- Operating range 0 to 50000ppm
- Operating temperature range -20˚C to 50˚C
- Response time < 20 sec

Carbon Monoxide (CO)

The CO sensor offers low drift long term stability with fast response. To allow for better resolution the CO sensor is set to measure from 0 to 1 000 ppm.

Specifications

- Sensor range 0 to 2 000ppm
- Operating range 0 to 1 000ppm
- Operating temperature range -20˚C to 55˚C
- Response time <10 sec

Carbon Dioxide (CO2)

The NDIR (Non Dispersive Infra-red) CO2 sensor technology offers long term accurate and fast response for CO2 detection.

Specifications

- Sensor range 0 to 50 000ppm
- Operating range 0 to 50 000ppm
- Operating temperature range -20˚C to 50˚C
- Response time < 35sec

Oxygen (O2)

The oxygen sensor measures the full range accurately and consistently

Specifications

- Sensor range 0 to 30%
- Operating range 0 % to 30%
- Operating temperature range -20˚C to 50˚C
- Response time < 15 sec

Barometric pressure

A high accuracy pressure sensor is used to measure absolute barometric pressure.

Specifications

- Sensor range 300 to 1100mB
- Operating range 300 to 1000mB
- Operating temperature range -20˚C to 80˚C
- Response time 60 sec

Humidity

The humidity sensor has long term stability measuring in a range of 0 to 100% RH (Normal Operating Range and is condensation resistant)

Specifications

- Sensor range 0 to 100%RH
- Normal Operating range 0 to 100%RH
- Normal Operating temperature range -40˚C to125˚C
- Response time 8 sec
- Accuracy 10-90%RH@+/-1.7%RH

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Ambient temperature

The ambient temperature sensor has long term stability measuring in a range of 0 to 100% RH (Normal Operating Range and is condensation resistant)

Specifications

- Sensor range -40˚C to 125˚C
- Normal Operating range 20˚C to 60˚C
- Operating temperature range -40˚C to 125˚C
- Response time 30 sec
- Accuracy 5˚C – 50˚C @+/-0.3%˚C

Volatile Organic Compound (VOC)

VOC's are measured utilizing Photo Ionization technology, allowing for accurate repeatable measurements

Specifications

- Sensor range 100ppm to 6000 ppm
- Operating range 100ppm to 500 ppm
- Operating temperature range -40˚C to 55˚C
- Response time 5 sec

Hydrogen Sulphide (H2S)

High quality sensors are used to ensure long term reliability and accurate measurements. The sensor has an effective range of 0 to 100ppm.

Specifications

- Sensor Range 0 to 100ppm
- Operating range 0 to 100ppm
- Operating temperature range -20˚C to 50˚C
- Response time < 20 sec

Hydrogen (H2)

High quality sensors are used to ensure long term reliability and accurate measurements. The sensor has an effective range of 0 to 1000ppm.

Specifications

- Sensor Range 0 to 1000ppm
- Operating range 0 to 1000ppm
- Operating temperature range -20˚C to 50˚C
- Response time < 20 sec

Smoke (MOS)

High quality sensors are used to ensure long term reliability and accurate measurements. The sensor has an effective range of 0 to 100%.

Specifications

- Sensor Range 0 to 100%
- Operating range 0 to 100%
- Operating temperature range -20˚C to 50˚C
- Response time < 20 sec

Note 1: Sensor range refers to the actual; range that the sensor has been utilized for. Operating range refers to the range that the unit has been calibrated to, this allows for the unit to more accurately measure in the calibrated range.

MODELS

Intrinsic safe Ex ia

The P50 is approved for use in hazardous locations including underground mines.
The operating voltage range is 9 to 20VDC powered from an intrinsic safe power supply.

Non-intrinsic safe

The P50 is also available as a non-intrinsic safe version* for use in non-hazardous locations.
The non-intrinsic safe version is available with an operating voltage range of 9 to 48VDC or 115/240VAC.

* See ordering information

Battery Backup

All models include battery backup to ensure operation in case of a power failure. The backup battery is maintenance free and is automatically charged when connected to the supply line.

Power Off

In order to save battery power the P50 will shut down when the external power is removed and the P50 unit is placed upside down. The P50 will resume normal operation when the external power is restored regardless of the orientation of the P50.

Ordering information

Model	Intrinsic safe	Operating Voltage	Part No
P50 Ex ia	Yes	9 to 20VDC	P50ExiaM10
P50 non-IS	No	9 to 48VDC	P50nonExiaM20
P50 Mains	No	85 to 265VAC	P50MainsM30

APPROVALS

Marking:

Type: P50 Sensor

Ex rating: Ex ia 1 (-20°C to +50°C)

IA No: MASC M/11-437X

Serial No: (See validity of report)

Ingress Protection: IP65

Safety Parameters:

Connector P5

Ui = 18V Li =0

Ii = 3A Ci =0

Pin 3 w.r.t 4

Ui = 18V

Uo = 5.88V

Ci = Neglected

Po = 20mW

Co = 1000uF @ 5.88V

Io = 13.7mA

Lo = 2.48H

ELECTRICAL SPECIFICATIONS

Description	Min	Nom	Max	Unit
Operating voltage Exia	9	12	18	VDC
Operating Voltage non IS	9	12/24	48	VDC
Operating Voltage Mains	85	115/240	265	VAC
Current Consumption	95	180	350	mA
Battery Backup	4	6	8	hours
Battery capacity	2200	2200	4400	mAh
Battery Voltage	3.6	3.7	4.2	VDC
RS485 baud rate	2400	9600	57600	Bps
Local alarm		93		dB
Relay Contacts P50 220V	95	220	250	VAC
Relay Contacts P50 220V			2	A
Relay Contacts P50 Exia	9	12	18	VCD(Ex)
Relay Contacts			2	A (Ex)

Connections

P50-EXIA

	Grey Cable	Ningi Cable
0V	Yellow	Blue
12V	1	Red
RS485 A/+	2	Green
RS485 B/-	3	Orange
COM 1	4	Purple
N/O 1	5	Purple
COM 2	6	Grey
N/O 2	7	Grey

220V

	Grey Cable	Ningi Cable
220V Neutral	Yellow	Blue
220V Live	1	Red
RS485 A/+	2	Green
RS485 B/-	3	Orange
COM 1	4	Purple
N/O 1	5	Purple
COM 2	6	Grey
N/O 2	7	Grey

COMMUNICATIONS

The P50 utilises an Isolated RS485 communication setup standard on all models. The Modbus RTU protocol is used for all real time data and configuration settings.

Modbus RTU

All sensor readings and configuration settings are available via the RS485 Modbus RTU network. Some registers are password protected.

Coils 10 000

Register	Description	Min	Max
00033	Slave reset	0	1
00034	Default(Use with care)	0	1
00038	Set Time	0	1
00039	Save settings	0	1

Input Registers 30 000

Register	Description	Min	Max	Divide	Unit
30001-32	User defined	-	-	-	-
30049[1]	CH4	0	50	10	%
30049[1]	VOC	0	1000	1	ppm
30050	CO	0	10000	1	ppm
30050[2]	H2S	0	100	1	ppm
30050[2]	H2	0	1000	1	ppm
30051	Smoke(MOS)	0	1000	10	%
30053	O2	0	300	10	%
30059	CO2	0	50 000	1	ppm
30055	Barometric pressure	300	1100	1	mBar/hPa
30056	Supply Voltage	0	400/2500	10	VDC
30062	Air Velocity	0	100	10	m/s
30063	Humidity	0	1000	10	%
30064	Ambient Temperature	0	80		˚C
30115	Communication counter	0	255	-	Count
30116	Real time clock (high byte)	0	65535	-	Unix
30117	Real time clock (low byte)	0	65535	-	Unix

1: 30049 is used for CH4 or for VOC dependent on the model being used.

2: 30050 is used for CO, H2S or H2 dependent on the model being used.

Alarm Trigger

The alarm triggers are hardware readable registers that allow for a SCADA system to determine if the head has triggered an alarm condition. The alarm trigger register is a bitwise register indicating if the P50 is in an alarm condition, zero indicating no alarm condition. The alarm register bits are only active when the alarm levels has been set on the P50.

Register	**Description**
30097	CH4
30098	CO
30099	MOS
30101	O2
30103	Baro
30104	Supply
30107	CO2
30110	WS
30111	Hum
30112	Amb
30113	Status Word

Status Word Bit Conditions

Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8
-	-	-	-	-	-	-	-
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
-	CPU Reset	RTC Operation Error	Watch dog reset	RTC Battery Error	RTC sync Error	RTC Task Error	Power on reset

Holding register 40 000 (P16 compatible mode)

Register	Description	Min	Max	DEF	R/W	Unit	PWord
40001	Air Velocity	0	100		R	m/s/10	-
40002	CH4/VOC	0	50		R	%/10	-
40003	CO	0	1000		R	ppm	-
40004	Vin (Supply Voltage)	0	400		R	VDC/10	-
40005	Ambient Temperature	0	80		R	°C	-
40009	Mode	0	65535		R	-	-
40010	WS Alarm	0	100	10	R	m/s/10	-
40011	WS Delay	0	9999	30	R	Sec/10	-
40012	CH4/VOC Alarm	0	50	14	R	%/10	-
40013	CH4/VOC Delay	0	9999	30	R	Sec/10	-
40014	CO Alarm	0	1000	130	R	ppm	-
40015	CO Delay	0	9999	30	R	Sec/10	-
40016	Power Down Delay	0	9999	240	R	Min	-
40017	Address	0	247	247	R	-	-
40018	Baud Rate	9600	9600	9600	R	bps	-
40019	Parity	0	0	0	R	-	-
40020	ID 4	0	65535	-	R	-	-
40021	ID 3	0	65535	-	R	-	-
40022	ID 2	0	65535	-	R	-	-
40023	ID 1	0	65535	-	R	-	-
40024	System	0	65535	-	R	-	-
40025	Comms Counter	0	255	0	R	Sec	-
40026	CO Raw	0	4096	-	R	-	-
40027	CH4/VOC Raw	0	4096	-	R	-	-
40028	WS Raw	0	4096	-	R	-	-
40029	Barometric pressure	300	1100	-	R	mBar/hPa	-

Holding register 40 000 (P50)

Register	Description	Min	Max	DEF	R/W	Unit	Pass Word Level
40129	CH4/VOC Delay Up	0	65535	300	R/W	Sec/10	2
40130	CO Delay Up	0	65535	300	R/W	Sec/10	2
40131	Smoke Delay Up	0	65535	300	R/W	Sec/10	2
40133	O2 Delay Up	0	65535	300	R/W	Sec/10	2
40139	CO2 Delay Up	0	65535	300	R/W	Sec/10	2
40142	WS Delay Up	0	65535	300	R/W	Sec/10	2
40145	CH4/VOC Alarm	0	65535	10	R/W	%/10	2
40146	CO Alarm	0	65535	130	R/W	ppm	2
40147	Smoke Alarm	0	65535	500	R/W	%/10	2
40149	O2 Alarm	0	65535	170	R/W	%/10	2
40155	CO2 Alarm	0	65535	10000	R/W	ppm	2
40158	WS Alarm	0	65535	5	R/W	m/s/10	2
40161	CH4/VOC Delay Down	0	65535	100	R/W	Sec/10	2
40162	CO Delay Down	0	65535	100	R/W	Sec/10	2
40163	Smoke Delay Down	0	65535	100	R/W	Sec/10	2
40165	O2 Delay Down	0	65535	100	R/W	Sec/10	2
40171	CO2 Delay Down	0	65535	100	R/W	Sec/10	2
40174	WS Delay Down	0	65535	100	R/W	Sec/10	2
40511	Baud Rate	9600	9600	9600	R		-
40513	Serial no. High	0	65535	Ser. H	R	-	-
40514	Serial no. Low	0	65535	Ser. L	R	-	-
40515	Hardware Model	-	-	50	R	-	-
40516	Firmware Version	0	100	Ver	R	-	-
40517	Set Time High	0	65535	-	R/W	Unix H	1
40518	Set Time Low	0	65535	-	R/W	Unix L	1
40519	Last Calibration Date High	0	65535	30	R	Unix H	-
40520	Last Calibration Date Low	0	65535	130	R	Unix L	-
40521	Next Calibration Date High	0	65535	30	R	Unix H	-
40522	Next Calibration Date Low	0	65535	240	R	Unix L	-
40525	Hardware Configuration [1]	0	65535	-	R	Sensors	-
40526	Address	0	247	247	R/W	-	1
40528	Power On Delay	0	65535	9600	R	Sec	-

40539	Power Down Delay	0	65535	0	R	Min	-

[1] Hardware Configuration register bitwise. Bit set if sensor is fitted

BIT	*15 -12*	*12*	*11*	*10*	*9*	*8*	*7*	*6*	*5*	*4*	*3*	*2*	*1*	*0*
Sensor	*Spare*	*NH3*	*H2S*	*H2*	*MOS*	*Amb*	*Hum*	*Bar*	*VOC*	*O2*	*CO2*	*CH4*	*CO*	*WS*

MAINTENANCE PROCEDURES

Calibration
To ensure the correct operation and legal compliance, the P50 is to be submitted for calibration on a 6 monthly basis.

The calibration includes a detailed functionality check and all gas sensors are tested and certified to comply with the required operational specifications.

Bump test
A bump test unit is available for the periodic on site verification of functionality of the unit. The bump test unit is utilised to inject gas into the device for a functional test of the unit.

The Equipment required for the periodic bump testing of a P50 is;

1. P50Bumptest Unit
   This is an extendable pole with a gas hood mounting, housing a specially made silicon gas hood, allowing the effective injection of gas into the P50 gas chamber
2. Approved Certified calibration gas
   The correct concentration of gas is essential in ensuring that the bump test can be performed correctly.
3. Approved flow regulator
   The approved flow regulator is fitted to the gas cylinder and connected to the gas hood via a flexible gas hose. The correct gas flow is also essential in ensuring that the gas is delivered to the P50 correctly.

The correct method for bump testing is to;

1. Connect the regulator to the gas cylinder and ensure there is sufficient gas to perform the bump test.
2. Ensure there are no kinks, twists, or holes in the gas pipe.
3. Ensure the gas pipe is correctly fitted to the gas hood.
4. Extend the pole to a comfortable length in order for the P50 to fit correctly and securely into the gas hood.
5. Ensure that the person holding the pole is standing in a comfortable and safe manner.
6. Open the regulator allowing the gas to flow into the P50 gas chamber
7. Allow gas to flow until a reading is displayed on the screen.

The units warranty will be rendered void if the correct equipment and procedures are not followed with the bump test.

A maximum bump test interval of once a week and a minimum bump test interval of once a month is recommended.

Maintenance

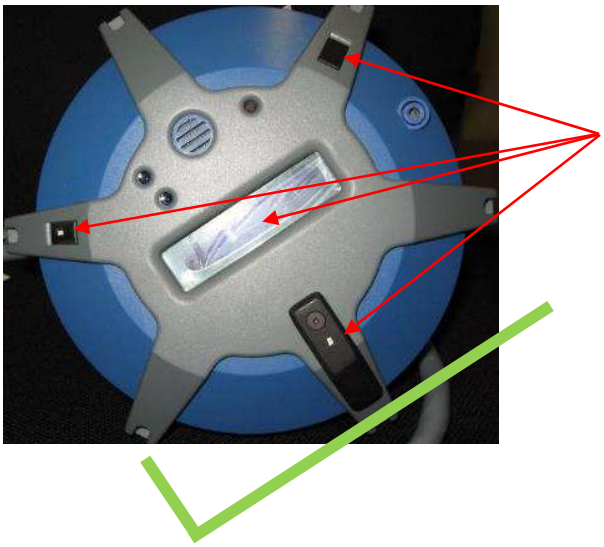
The P50 includes no user serviceable parts and the warranty will be rendered void if the unit is opened or tampered with in any way.

The IS certification will be rendered void if the unit is opened by anyone other than the manufacturer, or if there is physical damage to the unit.

The only maintenance and care that can be done on the unit is to wipe it down with a damp lint free cotton cloth.

When the P50 is wiped down with a damp cloth particular attention should be paid to ensuring that the velocity sensors are clean and free of dirt, as indicated in the diagram below.

Figure 5 – Maintenance of your P50



Ensure that these points are Wiped clean

Dirt and built up of debris will impact on accuracy of readings

FAULT FINDING

General

1. Ensure there is no damage to the unit, this will void the warranty and the IS approval where applicable
2. Ensure the correct cable is used, IS certification will indicate the correct cable for IS installations. For non-IS installations, the incorrect cable will result in larger voltage drops and the unit may not function as intended.
3. Ensure that all terminations are done correctly and are secure
4. Ensure the correct power source is utilized especially for IS installations
5. Minimum measured voltage required at the head with the head connected and operational is 9.5V
6. Ensure cable is free of any damage

Velocity readings differ

1. Ensure the Sensors are free of any dust and dirt
2. Ensure that the sensor position is correct according to figures 1-4 below
3. Comparative reading taken in incorrect position

Communication problems

1. Ensure that communication barriers are functional
2. Ensure the earth on the communication barrier is connected to a high quality earth
3. Ensure that the terminations are correct and secure
4. Ensure no damage on the cable
5. Determine if the gateway, where used, has its termination on or off, can be swapped to test.
6. A Ningi 485 Filter can be added to the gateway to clean up communication, termination on the gateway may need to be changed.
7. Ensure the Earth on the Ningi 485 Filter, where used, is connected to a high quality earth

TERMS AND CONDITIONS

Product Agreement

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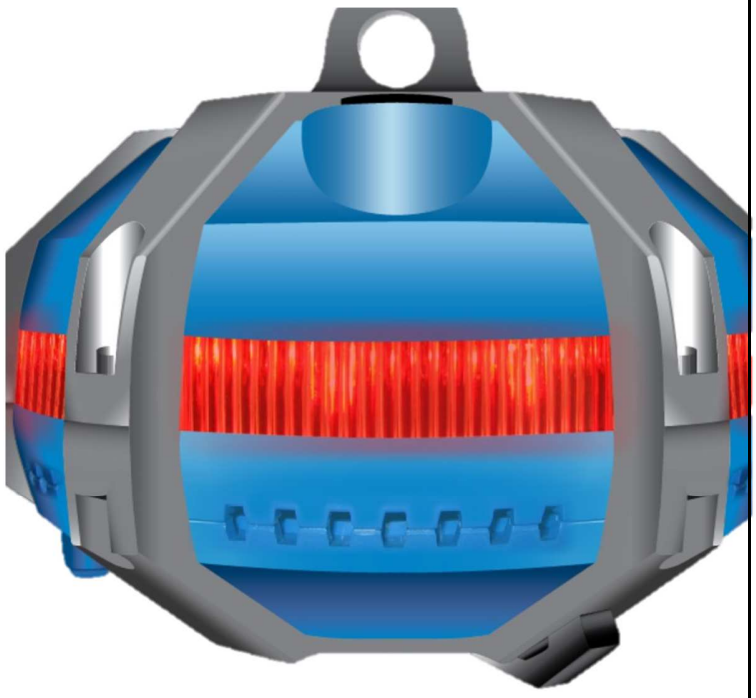
ANNEXURE A

P50 Risk Assessment and Product Risk Register



P50 Risk Assessment and Risk Minimization

RISK ASSESSMENT INTRODUCTION

Purpose of the Risk Assessment

The intent and purpose of this Product Risk Assessment and Risk Minimization document is to aid and assist the product owner in the safe operation of the P50 Environmental Monitor and to identify and outline any known risks associated with not only the product itself but also its associated operational functionality.

Our overall objective as Ningi Services is to offer a safe and reliable monitoring device and service to which our customers can feel confident that the operation of the P50 complies and meets the highest standards as well as delivering the most accurate data.

About Risk Minimization – P50 Product Risk Register

We are aware that all devices whether mechanical or electrical have the potential during their operational lifecycle to experience some kind of dysfunctionality if not maintained and/or upgraded with necessary physical or programming upgrades which as a result may display incorrect or a total loss of data.

By default there are many thousands of possibilities for dysfunctionality so to simplify this list we have categorized possible generic conditions of which have known associated risks are identified, with their possible causes and probable solutions to achieve their desired operational outcome, this list is identified as the P50 Product Risk Register, the P50 Product Risk Register as named RSK-NS-P50 together with this document as named P50 Risk Assessment; collectively forms part of and should be used in conjunction with the P50 Product Manual document.

RISK IDENTIFICATION

The following list by association is the possible risks identified with the P50 holistically, its operational, or physical functionality.

Corrective or mitigated actions and methodology of managing such risks are documented herein to indicate a systematic process to ensure that legislative compliance and best quality of service can be obtained within a reasonable and practicable timeframe and/or cost to suit both manufacturer and customer.

RISKS

- Standards and Compliance
- Regulatory Risks
- Hazard Identification
- Data Analysis
- Incident Investigation
- Follow up or feedback

STANDARDS AND COMPLIANCE

The P50 Environmental Monitor is compliant with the applicable sections as required by the South African Mine Health and Safety Act and legislative under general SANS 1515 in addition to the following applicable by sensor configuration not less than the following additional test criteria as indicated in;

- SANS 50054-20
- SANS 60079-29-1
- IEC 60079-29-1

The P50 is certified compliant to the following which is a required condition according to ARP 0108:2007 in that all EPA used in underground mines (Group I) and on surface (Group II) shall be covered by an IA certificate.

- SANS 10086-2:2006

The P50 fully complies and is certified to form part of a system loop approval which is regulated by the above SANS 10086-2 standard.

IDENTIFIED REGULATORY RISK

It is common in the field of engineering and production that changes is regulatory, legislative or compliance are enforced with the intention of enhancing safer working conditions and environments, these changes are important however can impact on the production cycle of the business if pre-engagement is not adopted in preparation for these changes.

The potential for consequences in production and delivery are great if the awareness of regulatory changes is not pre-empted and prepared for, typical risks to the production cycle are;

- Breach in environmental legislation
- Compromised Health and Safety at Work conditions
- Enforced production close-down and potential prosecution
- Loss in productivity

With the addition to the above it is recommended that local bylaws and environmental risks and legislation are adhered to at all times, similarly it is recommended that a separate environmental and safety at work assessments are carried out throughout by the appropriate qualified/professional persons or as required by SANS 1515 whichever is the appropriate current legislative action.

HAZARD IDENTIFICATION

Hazard identification as key areas include but not limited to the following;

- Injury or death to persons
- Exceeded environmental emissions levels
- Volatile Organic Compounds (VOC's)
- Poisonous gases
- Explosive gases
- Toxicity in process or production wastes

DATA ANALYSIS

Inclusive or applicable to the appropriate legislative action; data analysis should by principle be analyzed regularly as indicated by local instruction or defined by legislation if indicated as such.

Data analysis should include frequent comparison checks of the P50 environmental monitor readings against previous readings recorded and checked for variation, the results can be matched against the product specifications as defined by sensor type which can be found in the P50 environmental monitor product manual.

During the data analysis checking process if any data or sensor readings are found to be incorrect or ambiguous then refer to the associated risk register as found together with this document and is named RSK-NS-P50. The appropriate action as indicated in RSK-NS-P50 should then be followed as the best course of action.

Data analysis includes a relevant and up to date calibration certificate for each P50 environmental monitor.

INCIDENT INVESTIGATION

Incident investigation shall commence where the risk assessment and risk register steps have been followed and exhausted to no avail.

The incident investigation shall engage all elements of the incident and the process shall follow whichever course is necessary to produce the required outcome which will lead to full close-out of the investigation immediately preceded by a full investigation report to follow.

Ningi Services - P50 - Product Risk Register

Document Number - RSK-NS P50 Risk Register V0

No.	Risk Definition	Risk Response	Objective	Risk Level							
				Logical Base		*Initial Risk*		*1st Follow Up*		*2nd Follow Up*	
RSK-NS0001	Device readings out of specification	Refer to Product manual installation guidelines and Maintenance sections	To maintain device readings within technical specifications	**Likelihood**	Medium	**Likelihood**		**Likelihood**		**Likelihood**	
				impact	High	**impact**		**impact**		**impact**	
				Risk level	High	**Risk level**		**Risk level**		**Risk level**	
RSK-NS0002	Device readings out of specification (Compliant with RSK-NS0001)	Contact Ningi Services Technical response team - Possible device fault	To maintain device readings within technical specifications	**Likelihood**	Low	**Likelihood**		**Likelihood**		**Likelihood**	
				impact	Medium	**impact**		**impact**		**impact**	
				Risk level	Low	**Risk level**		**Risk level**		**Risk level**	
RSK-NS0003	Device not operational or faulty	Refer to Product manual fault finding section - Contact Ningi Services technical response team	To maintain a fully operational monitoring system at all times	**Likelihood**	Low	**Likelihood**		**Likelihood**		**Likelihood**	
				impact	High	**impact**		**impact**		**impact**	
				Risk level	Low	**Risk level**		**Risk level**		**Risk level**	
RSK-NS0004	Unexpected readings from device	Check configuration colour code for device installation type	Install correctly configured device for correct location type	**Likelihood**	Medium	**Likelihood**		**Likelihood**		**Likelihood**	
				impact	High	**impact**		**impact**		**impact**	
				Risk level	High	**Risk level**		**Risk level**		**Risk level**	
RSK-NS0005	The alarm indications are inefficient	Specific alarm levels can be configured at the request of the customers requirements	Alarm levels to operate at the customers specific requirements	**Likelihood**	Low	**Likelihood**		**Likelihood**		**Likelihood**	
				impact	Medium	**impact**		**impact**		**impact**	
				Risk level	Medium	**Risk level**		**Risk level**		**Risk level**	
RSK-NS0006	The product technical support is insufficient	Refer to technical support management	To maintain full product support for our customers	**Likelihood**	Low	**Likelihood**		**Likelihood**		**Likelihood**	
				impact	High	**impact**		**impact**		**impact**	
				Risk level	High	**Risk level**		**Risk level**		**Risk level**	
RSK-NS0007	The device overall functionality does not meet requirements	Possible incorrect product choice - Refer to technical support team and raise specific requirements	Install correctly configured device for correct location type	**Likelihood**	Low	**Likelihood**		**Likelihood**		**Likelihood**	
				impact	Medium	**impact**		**impact**		**impact**	
				Risk level	Medium	**Risk level**		**Risk level**		**Risk level**	
RSK-NS0008	The holistic operational solution does not meet requirements	Refer to technical support management	To maintain full product support for our customers	**Likelihood**	Low	**Likelihood**		**Likelihood**		**Likelihood**	
				impact	High	**impact**		**impact**		**impact**	
				Risk level	High	**Risk level**		**Risk level**		**Risk level**	

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