N&Z Instrumentation & Control

OVER 65 YEARS SERVICE TO SOUTHERN AFRICAN INDUSTRY

NEGRETTI & ZAMBRA

65 Years

WATER | MINING | INDUSTRIAL

65 Years

ATI Analytical Technology, Inc. · Entech Design, Inc. · Fuji Electric · FOURTEC · Greyline Precision Flow Measurement

ISOIL Industria · ITT Conoflow · MAXX · PERMA PURE Protect Life · pulsar Measurement

Rototherm · SIERRA · www.nz.co.za · ThermoFisher Scientific · vBAct

VOLUME 16

WaMSS Data and Information Management System

1. Isoil battery powered magnetic flow meter with built-in data transmission.
2. Mechanical flow meter with pulse output.
3. Water Quality monitor.
4. Smart loggers with built-in data transmission for:
   • Mechanical Flow Meters • Line Pressure • Reservoir Level • Analyzers • Other Sensors.
5. Data transmission on the GSM network.
6. WaMSS Scada System. Web based.
7. Data from field sensors are imported into SQL database.
8. Reports are automatically compiled and emailed according to user's schedule.
9. Management has key information at their fingertips and can compile adhoc reports.
10. Users receive regular reports so they can take action quickly.
11. On-The-Go monitoring
12. Data Relay to other applications.

Automatic Meter Reading (AMR) - Bulk water metering

Bulk water meters bill a surprisingly large Rand amount over the meter's lifespan. They bill many times their cost. So it makes sense to select a technology which is not prone to under-billing. It's sound financial logic to use the most reliable and accurate bulk meters available because the cost of the meter is insignificant when compared to the savings.

The Isoil battery powered meters send you flow totals and flow rates on a daily bases.
This eliminates the cost of manual meter-reading and the risk of reading errors.
The Isoil battery powered mag meter has been established in South Africa with an installed base of over 1 000 meters.

The Isoil mag meter measures and logs flow rates and totals

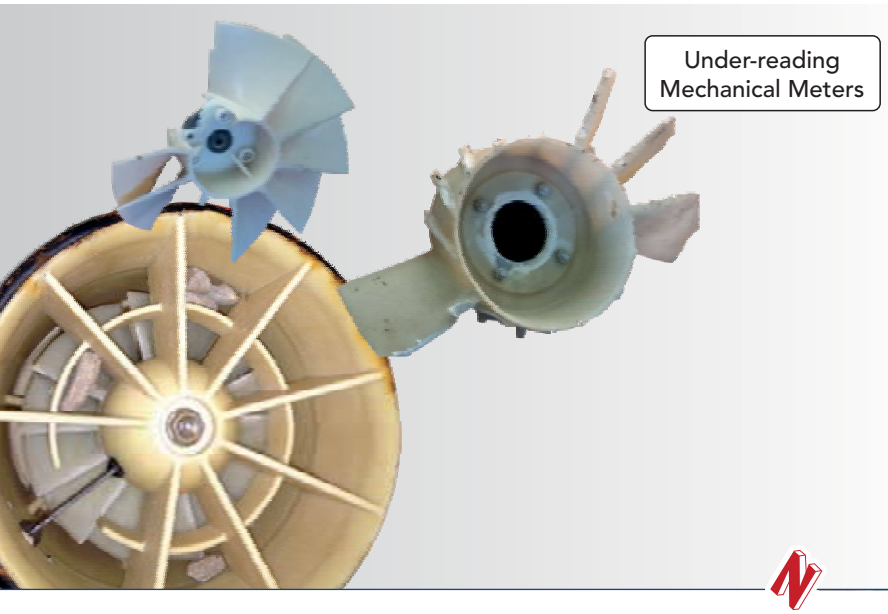
The on-board modem sends the information directly to the WaMSS information system which compiles reports and automatically emails them to your pc, tablet or cell.

- Accuracy: ± 0,4%
- Battery Life: Typically 3 to 7 years
- Seamlessly integrates into the WaMSS Data and Information Management System

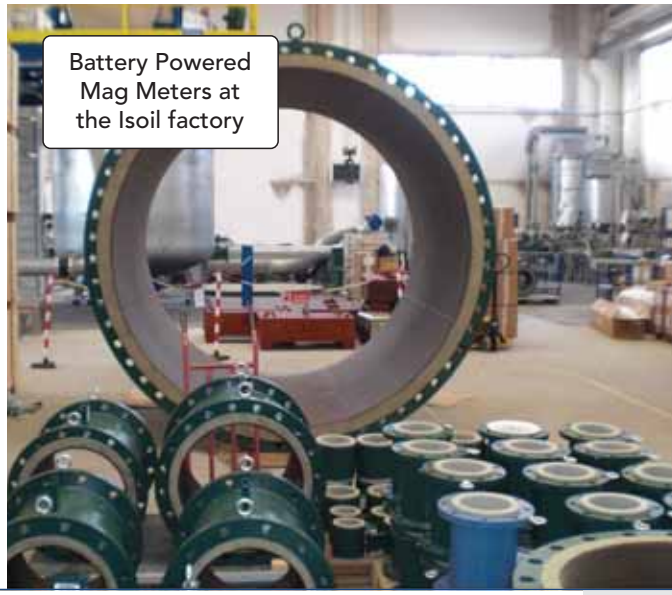
You always have reliable flow, billing and maintenance information at your fingertips

With Battery Powered Mag meters you don't under-bill & don't give away water for free!

Isoil's battery powered mag meters have no moving parts so they are extremely reliable. They are not affected by wear, corrosion, debris build-up or catastrophic failure. So there is no under-reading as with mechanical meters.



Under-reading Mechanical Meters



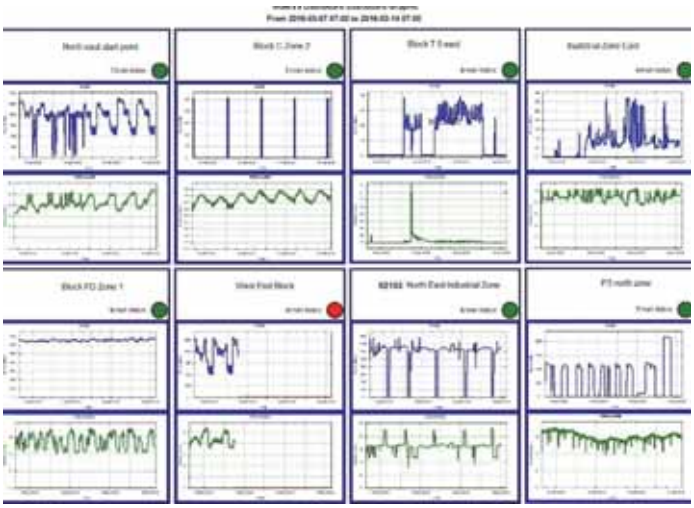
Battery Powered Mag Meters at the Isoil factory

WaMSS Data and Information Management System

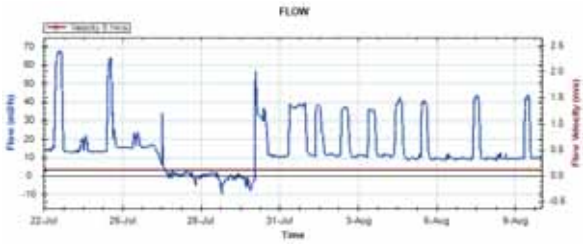
WaMSS is a simple-to-use tool for logging, planning and implementation. It is the ideal tool for water demand management and water conservation implementation. It delivers continual performance monitoring and trending and automatically emails reports of key performance parameters. You can also quickly compile special reports.

Web-based WaMSS is fully designed, written and operated in South Africa for South African conditions. There are more than 40 major clients using the WaMSS including Department of Water & Sanitation, water boards, municipalities, mines and other industries.

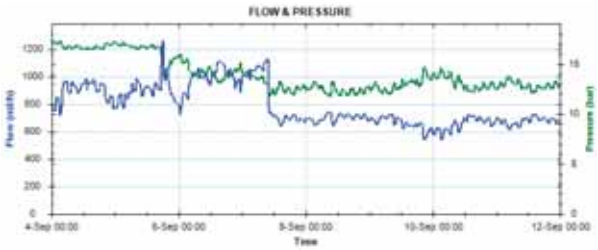
Dashboard Report for Management Oversight



Flow Trends



Line Pressure and Flow Trends



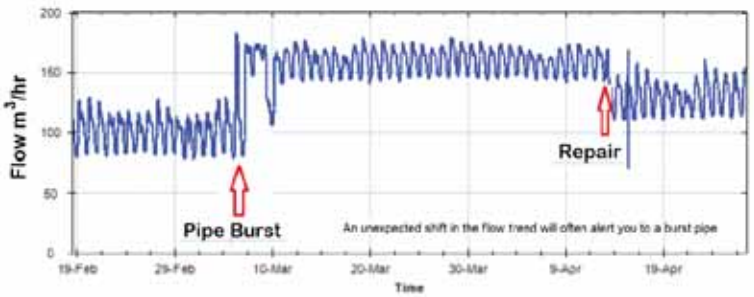
SQL Database with Automatic Export to other Applications

Date & Time	Positive Totalizer	Unit	Negative Totalizer	Unit	Flow Rate	Unit	Pressure	Unit
2014/06/04 00.30	777305,00	m3	0,00	m3	311,90	m3/h	22,63	bar
2014/06/04 00.45	777384,00	m3	0,00	m3	312,90	m3/h	22,72	bar
2014/06/04 01.00	777462,00	m3	0,00	m3	313,50	m3/h	22,80	bar
2014/06/04 01.15	777540,00	m3	0,00	m3	313,80	m3/h	22,78	bar
2014/06/04 01.30	777619,00	m3	0,00	m3	314,00	m3/h	22,75	bar
2014/06/04 01.45	777697,00	m3	0,00	m3	313,70	m3/h	22,73	bar
2014/06/04 02.00	777776,00	m3	0,00	m3	314,00	m3/h	22,73	bar
2014/06/04 02.15	777854,00	m3	0,00	m3	314,00	m3/h	22,75	bar
2014/06/04 02.30	777933,00	m3	0,00	m3	315,60	m3/h	22,84	bar

On-The-Go Monitoring

Case Study: Leak Detection through Flow Logging

Flow logging is a very powerful tool which reveals flow characteristics, giving valuable information on the probability of existing leaks, pipe bursts, system design, operations and pumping strategy.
Flow is logged by "Smart" battery powered flow meters with built-in GPRS communications. The data is sent by GPRS to the WaMSS Scada which automatically emails flow trends to you. The flow trends alert you to unusual operations. Alternatively we fit a "smart" logger to an existing meter or use temporary clamp-on portable meters.



Flow Trend

Automatic Billing Report for a batch of meters

WaMSS Billing Report:	Northfields mining		Group: West Region		Cost per m3: R18
Period:	00:00:00 30/08/2024	to	00:00:00 30/09/2024		

Metering Point Name	Current Period Positive Flow m3	Current Period Negative Flow m3	Current Period Nett Flow m3	Current Period Full data set?	Current Period Monetary Value R
BOREHOLE 3	1,704	0	2	Y	R30 672
Dam Gate	731	0	731	Y	R13 158
Security	5,351	7	5	Y	R96 192
Reservoir 243	13,692	0	14	Y	R246 456
Booster Pump 12	11,092	0	11	Y	R199 656

Detailed Metering Report, per meter

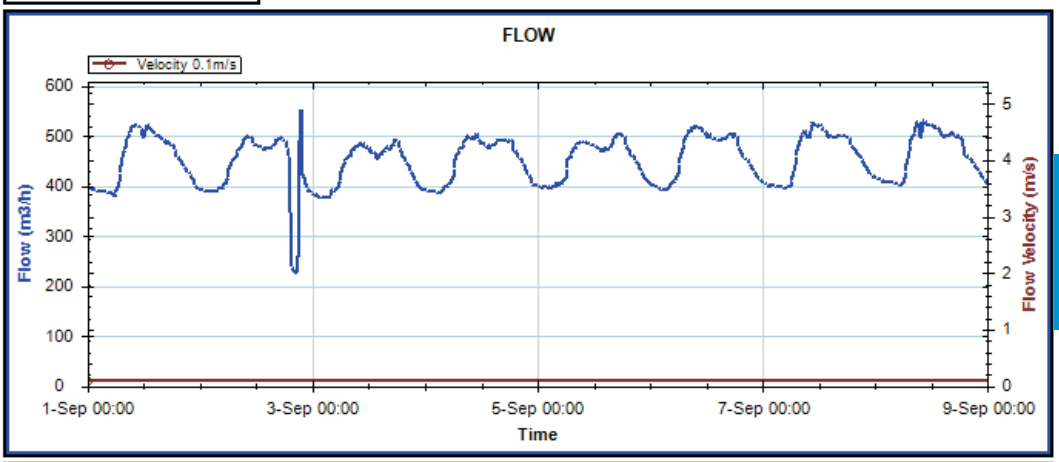
Meter ID	Metering Point	Consumer Name
143329	EASTERN DIRECT FEED	JOHANNESBURG WATER

Dates selected:
24-09-01 00:00 - 24-09-09 00:00
Data available: 769 readings
24-09-01 00:00 - 24-09-09 00:00
Data graphed: 769 readings
24-09-01 00:00 - 24-09-09 00:00

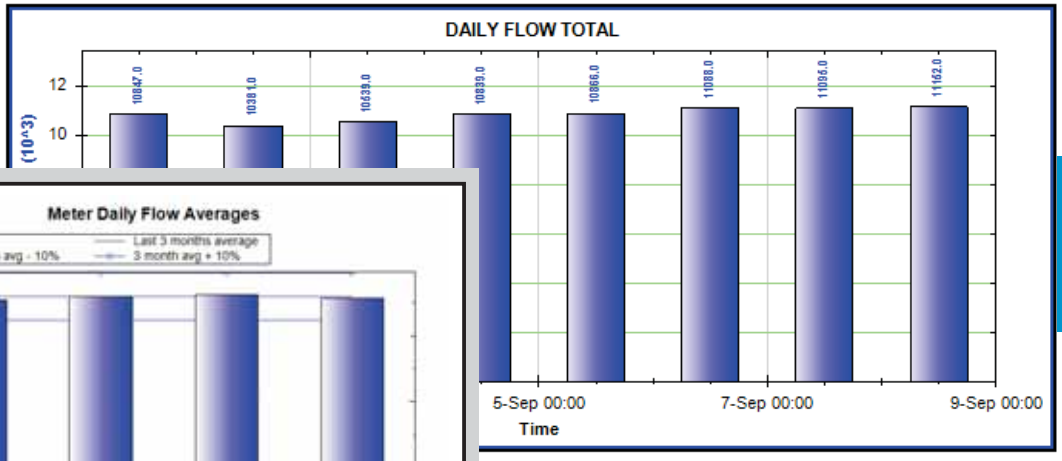
FlowTotals	Unit	Start	End	Total
POS - Flow	m3	3674015.00	3760822.00	86807.00
NEG - Flow	m3	1.00	1.00	0.00
NET - Flow	m3	3674014.00	3760821.00	86807.00

Measurement	Unit	Minimum	Maximum	Average
Flow - Flow	m3/h	225.10	554.00	452.00

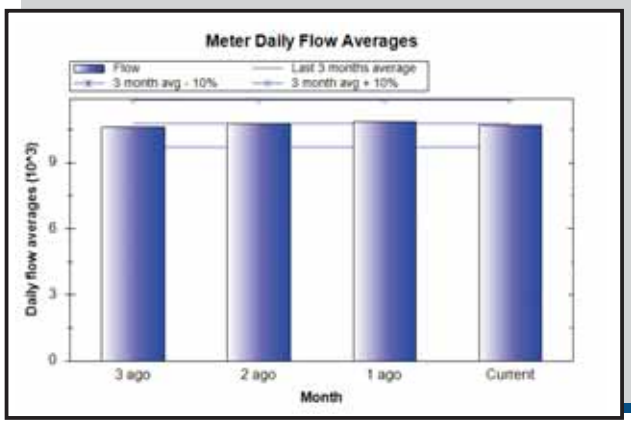
Meter Reading Report



Trends Flow Rate; Line Pressure; Level



Daily Flow Totals Report



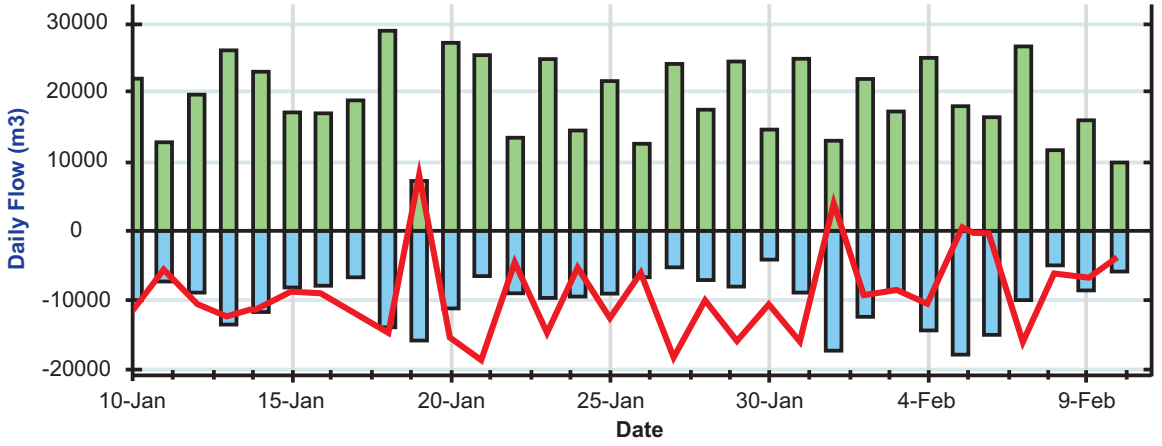
Monthly Comparison report

Water Loss Report

Water Loss Group	Start Date	End Date
South East Zone	2024/09/01 00:00	2024/10/23 23:59

WATER LOSS

Loss	Incoming	Outgoing	Loss	Unit	Data from	Data to
48.9%	232296.00	118805.00	113491.00	*	2024-09-01 00:00	2024-10-23 06:00



INCOMING

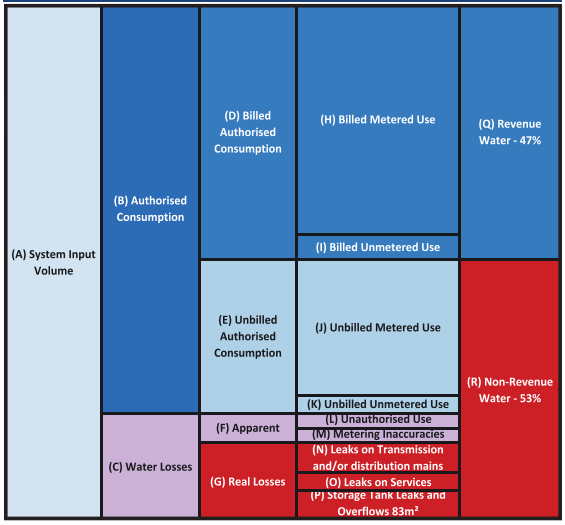
#	Meter	Flow	Unit	Date from	Date to
1	47505D - Bulk supply	612894.00	m3	2012/01/10 00:15	2012/02/10 23:45
2	52675D - WK T-off	-459.00	m3	2012/01/10 00:15	2012/02/10 23:45
	TOTAL INCOMING	612435.00	m3	2012/01/10 00:15	2012/02/10 23:45

OUTGOING

#	Meter	Flow	Unit	Date from	Date to
1	52676D - Industrial park	98331.00	m3	2012/01/10 00:15	2012/02/10 23:45
2	45678D - South sector	135455.00	m3	2012/01/10 00:15	2012/02/10 23:45
3	52680D - WK domestic	202.00	m3	2012/01/10 00:15	2012/02/10 23:45
4	52681D - WK irrigation	82335.00	m3	2012/01/10 00:15	2012/02/10 23:45
	TOTAL OUTGOING	316323.00	m3	2012/01/10 00:15	2012/02/10 23:45

Reservoir Network Mimic

International Water Association (IWA) Water Balance



On-Site Flow meter Verification

The flow meters accuracy is of great importance. Enterprises must comply with their internal operations requirements, QA procedures and external audits.

N&Z has an experienced team and the necessary certified equipment to provide measurement compliance certificates. We have carried out thousands of flow meter totalization verifications for the water supply industry, mines, factories, agricultures, etc. We verify all brands of flow meters and technologies. Our flow verifications are also used for pump performance certification. The quickest and lowest cost verification is comparing the flow velocity as measured by the installed flow meter compared to our certified test meter. A more through procedure is flow totalization comparisons which could be from a 30 minute duration to 24 hours or more.

Please contact us to discuss your verification requirements.

VERIFICATION CERTIFICATE

N&Z Instrumentation & control

VERIFICATION CERTIFICATE No:			ResA 230424-01		
Date of Verification:	2024-04-23	Certificate Date:	2024-04-24	Validity:	1 Year

CUSTOMER NAME:	Deep Valley Municipality	CUSTOMER REF:	PO 018943

INSTRUMENT BEING VERIFIED			
MANUFACTURER:	Isoil	TAG NO.:	Res Inlet
MODEL No:	MV255	SERIAL No:	AEZ013985

VERIFICATION RESULTS	
MASTER METER	INSTRUMENT BEING VERIFIED
Totalizer at start 0 m³	Totalizer at start: 5907714 m³
Totalizer at end: 600.20 m³	Totalizer at end: 5908332 m³
Totalized: 600.20 m³	Totalized: 618 m³
Meter is over reading by 3.0 %	

LOCATION:	Pipe Material:	PVC		Outside Diameter:	280 mm	
South deep RO backfill	Wall Thickness:	25.4 mm	Sensor Spacing:	194.9 mm	Z/V:	V

MASTER METER *			
MANUFACTURER	MODEL	SERIAL No.	CERTIFICATE No.
FUJI	FSSC1YY1-YY (Primary) S10B4-00Y (Secondary)	N1C1789 N0P0653T	U21UC9838-1

** This is to certify that the instrument has been verified by the Escom Flow Metrology laboratory, which is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.*

The values in use are correct in this certificate at the time of verification. Subsequently, the accuracy will depend on factors such as use, handling, temperature, shock, etc. E&OE

Verified by: Francois van Wyk *Approved by:* Andries Schreur

Signature: *Signature :*

Johannesburg: Tel (011) 435-1080 info@nandz.co.za www.nz.co.za

Flow Meter Total on Left Compared to Test Meter on the right

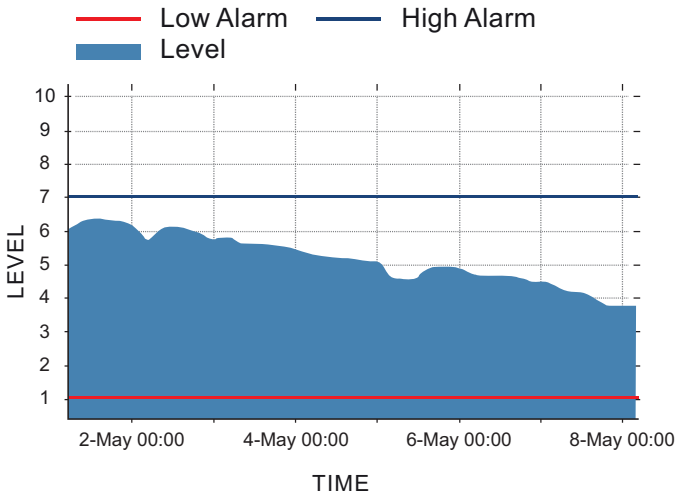
Reservoir level measurement and management is an essential part of reliable water delivery to users

"Having water in the reservoir is like having money in the bank" – but equally an over flowing reservoir is a waste of money!

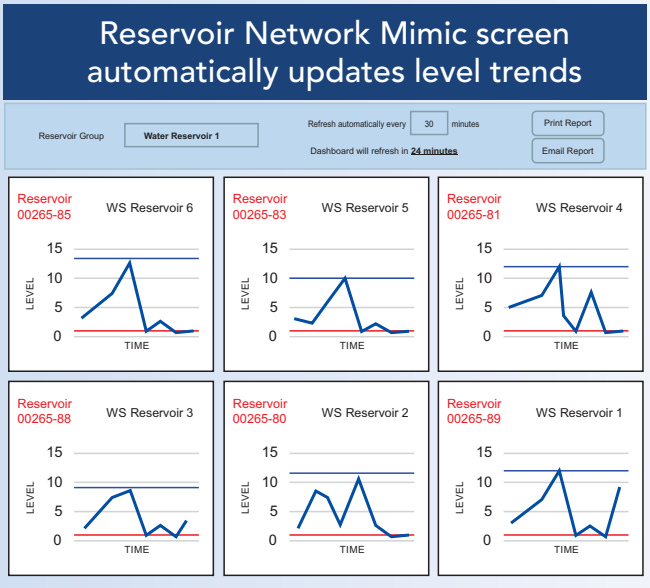
The water level is measured by a pressure sensor, ultrasonic sensor or radar sensor.

The level sensor connects to the WaMSS Smart Logger or Isoil battery powered magnetic flow meter. The level measurement is sent by GPRS to the WaMSS data and information management system. WaMSS trends the reservoir level. These reservoir level trends enable you to manage your water distribution by understanding the operation and taking action timeously. The mimic screen displays a number of level trends which are all automatically updated at regular intervals.

Reservoir Level Trend



Reservoir Network Mimic screen automatically updates level trends



Radar Sensor for non-contact water level measurement

Pressure sensor for water level measurement

SMART BATTERY POWERED DATA LOGGERS FOR FLOW, LEVEL, PRESSURE, ETC.

The **FLP4 WaMSS Logger** is a smart battery powered logger for flow, level, pressure, etc. It is the hardware component of the WaMSS Data and Information Management System. Major applications are Water Conservation and Water Demand Management solutions.

	 Model:	**Flow, Level, Pressure, etc. Loggers**	
		Number of Inputs	
		FLP4	**FLP4-2A**
Pulse input (flow) • Compatible with electronic or mechanical pulse sources. • Sensing window eliminates relay bounce errors. • Pulse frequency up to 15Hz.		**2**	**1**
Analogue input (pressure, level or other parameters) • Isolated 4-20mA input ports with independent 24V loop powering options. Sleep function for power conservation.		**1**	**2**
Power Supply • Battery power: Standard high power alkaline batteries - three D cells. At least 5 years operation in standard configuration. • External Power Supply: 12V DC, auto changeover to battery.			
Modem Technology UDP/IP with automatic switching between 4G, LTE, EDGE and GPRS			
Logger Configuration and diagnostics Via Bluetooth, which maintains the integrity of the enclosure.			
Logger fully configurable remotely via GSM link or SMS.			
Data logging interval Selectable from 1 minute to 24 hours.			
Data Transmission interval • When battery or externally powered, selectable from 1 minute to 1 week. • When externally powered, on-line streaming of data measurements.			
Housing • Glass filled Polycarbonate enclosure – IP68 (1.2m deep, 7 days when correctly installed). • Glass fill for UV stability.			
The complete **WaMSS** Data and Information Management System consists of this FLP Smart logger and integrated web based software. It delivers automatically emailed reports of flow, pressure, level daily flow totals, water balances, or other parameters, etc.			
GPS coordinates of logger location programmable into logger.			
Operating environment -20 to 80°C. RH less than 90%, not condensing.			
Manufactured and supported in South Africa.			

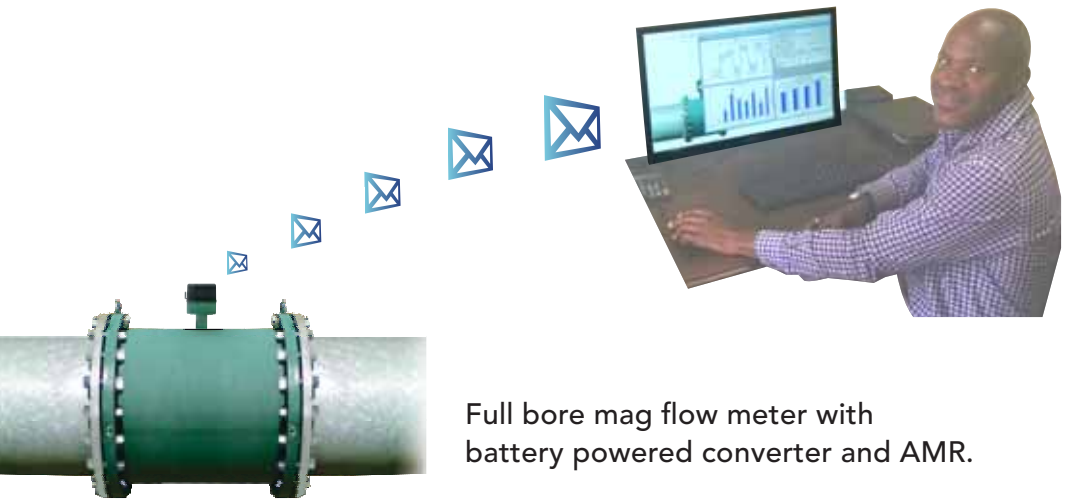
Isoil Magnetic Flow meters for Water applications

Isoil is a specialist magnetic flow meter manufacturer focusing on challenging applications in the water and mining industries.
Isoil's unique coil technology makes their flow sensor extremely sensitive and at the same time having a high signal-to-noise ratio. As a result Isoil mag meters are now widely used for both mains powered and battery powered applications in more than 34 countries worldwide.

Water

Isoil's battery powered mags meters have major accuracy and reliability advantages over mechanical meters and are now widely used for water metering and management by the Department of Water and Sanitation, South African Water Boards, Municipalities and many mining groups. The battery powered GPRS module sends flow measurements directly to the associated WaMSS Data management system giving a complete AMR (Automatic Meter Reading) and billing solution.

The Isoil insertion meter costs less than the full bore model and can be installed while the pipe is under pressure with no interruption to the flow.



Full bore mag flow meter with battery powered converter and AMR.

Insertion flow meter and battery-powered converter.

Full bore flow meters at the Isoil factory.

Every Isoil mag meter is wet calibrated at an ISO17025 approved flow laboratory- Libra.
Libra calibrates sensors up to DN3000 with an impressive flow of 4m³/s

https://youtube/WkPUgfqB2Tg

Mining Water Management

Isoil insertion meters

Water management in mining is extremely important for dewatering, water reclamation, dust control, etc. The Isoil mag meter is very suitable as it performs well with all types of mine water including water with abrasive entrained solids. The Isoil battery powered model is widely used because measuring points are often far from power sources. The Isoil meter sends data files of flow rate and flow totals to the WaMSS data management system. WaMSS automatically produces flow trends, flow totals and billing reports. It also provides water level and pressure reports This means you don't have to run signal wires to the mag meter and gives complete freedom to measure anywhere where there is GSM network coverage.

The WaMMS information system delivers automatic reports on flow rate trends, flow totals, dam and reservoir levels covering daily, weekly or monthly periods.

Mining Slurries and Process

The Isoil mag meter is widely used in South Africa to measure slurries, particularly in gold and platinum mines. Isoil's unique coil technology and high performance converters with noise filtering functionality ensure excellent performance in all mining and process applications.

A variety of different linings and electrodes ensure extended lifespan in the harshest environments including, HCl, Cyanide, Caustic and Slurry.

Slurry mag meters

Mining Slurry

Recommended lining and materials for various applications.

	Lining			Sensor Electrode Material			
Liquid	PTFE	Abral	PFA	AISI316L	Hastelloy C276	Tantalum	Platinum
Abrasive liquids		•		•	•		
Strong acids	•		•				•
Weak acids (no HF)	•		•			•	
Strong bases	•		•				•
Weak bases	•		•				•

Flow meters often operate in challenging environments of heat, vibration, temperature cycling, flooding, etc. While the Isoil Mag Flow Meters have given many years of reliable service even in these different conditions, it is important to monitor that there has been no degradation in measurement accuracy.

Isoil meters have optional Built In Verification (BIV) which automatically checks the meter at preset intervals, typically one hour. The BIV function measures critical perameters such as coil resistance, current rise time, electrodes voltages, etc. The BIV function gives an early warning of when you need to physically go to the meter and carry out a "hands on" inspection and maintenance.

This automatic remote monitoring saves costs especially when there is a big install base of meters. It's also extremely useful in billing applications as it gives you early warning of maintenance required, possibly meter replacement etc.

Benefits of BIV :

- Critical applications and high value billing meters require more frequent verification. With automatic BIV you can set the verification interval to meet your operational priorities.
- BIV does not interrupt the flow metering in any way.
- Reduces the need for site visits.
- No need for external reference devices.

BIV Built In Verification Report

ISOMAG The friendly magmeter

Filename:BIV_143411_2020_06_19_14_17_03

Customer Information	Meter Information
Customer	**Sensor**
Name: North-West Water Board	Serial num: 03V0030141
Operator	Diameter: 100mm
Name – S Rebalu	**Converter**
Code: 16395	Serial num: 950V014237
Analyzed Time Interval	Circ. Board ID: 143411
From: 2019/12/19	**Site Details**
To: 2020/06/19	Location: Vereening East
	Alias: Plot Three Rivers

IsoBIV Information

IsoBIV Software ver: ver. 1.0 0.11
Ved Bound: +/-0.3 Vec Bound: +/-1

Total test result: PASS

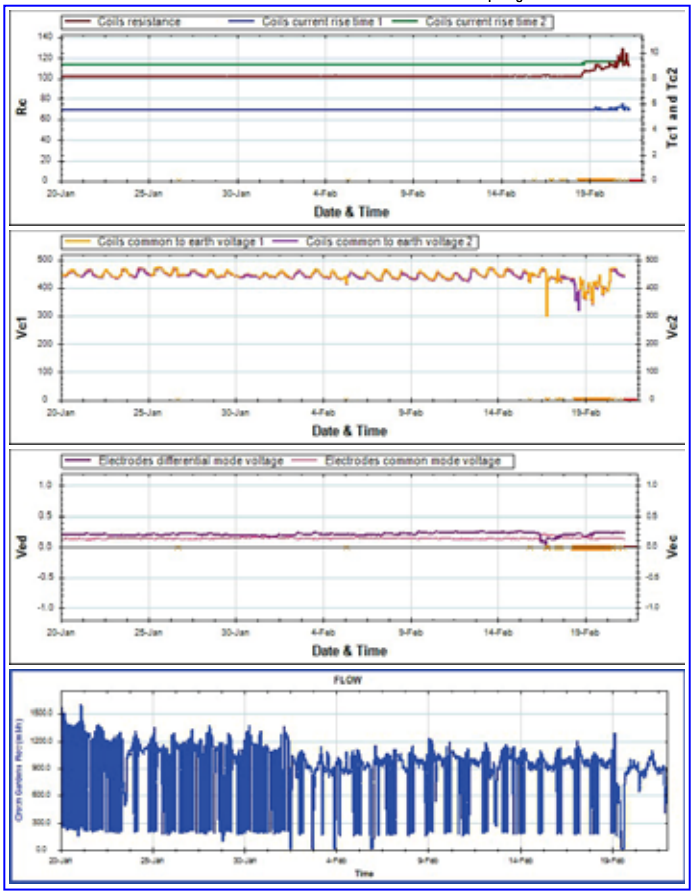
TEST DETAILS	
Measure	**Result**
Coils Resistance	PASS
TC1 Time	PASS
TC2 Time	PASS
C1 Earth Voltage	PASS
C2 Earth Voltage	PASS
Electrodes Differential Mode Voltage	PASS
Electrodes Common Mode Voltage	PASS
System Error Codes	PASS

DECLARATION

These tests verify that regarding the above measurements no reported errors have been found.

BIV Trends

Report generated: 2022-04-05 15:14



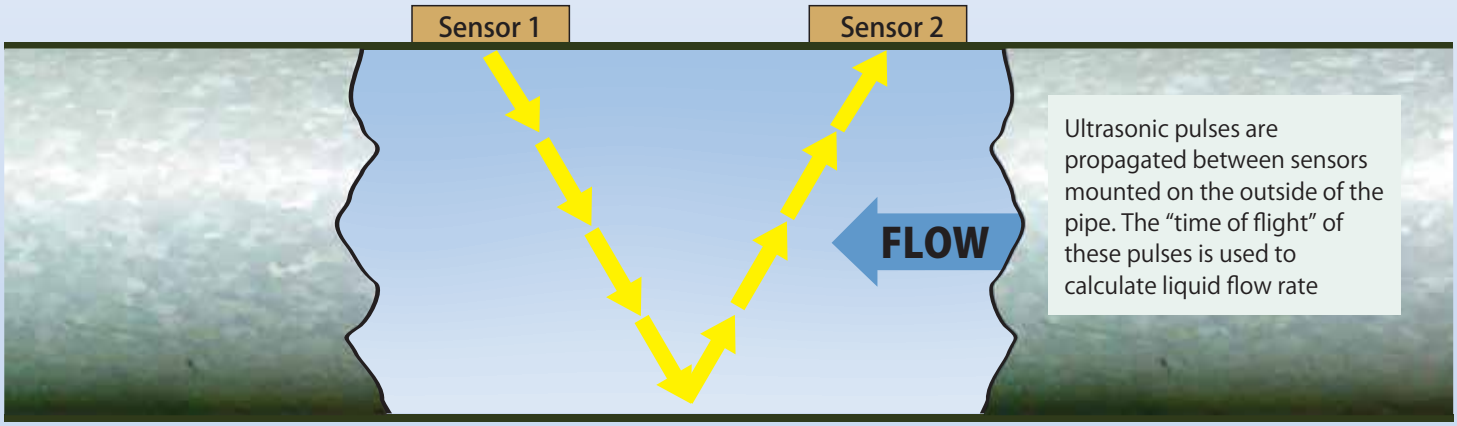
Non-contact, Non-invasive Flow Measurement

Ultrasonic flow meters do not come into contact with the fluid at all. They are easy to install, commission and maintain. Installation requires no plant downtime. Ideal for both portable and fixed applications, line size has little influence on price.

- **With no obstruction to flow, no pressure drop and no maintenance, the cost of ownership is extremely low.**
- **Portable flow meters are widely used for flow surveys or for checking the accuracy of existing flow meters.**
- **Fixed units are easy to install as they do not require any plant down time or changes to existing piping.**

Fuji is a pioneer in portable ultrasonic flow metering. Their many years of experience results in a meter which works reliably in difficult applications. The built-in verification function which Fuji pioneered gives you full confidence in your measurement accuracy. Normal operating accuracies are between ±0.5% to ±1% of readings. Accuracies of up to ±0.23% can be achieved where the pipe is sound and the dimensions are precisely known. The meter is suitable for pipes from 13 to 6,000mm.

Fuji Time of Flight Ultrasonic Flow Meters - How it works



Ultrasonic pulses are propagated between sensors mounted on the outside of the pipe. The "time of flight" of these pulses is used to calculate liquid flow rate

► Portaflow – Hand-Held Portable Clamp-on flow meter

The PortaFlow has a large, clear LCD display for flow rate, totalized flow in both directions, site details and diagnostics. Flow data can also be downloaded PC to produce report. There are hundreds of Fuji Portaflows operating in South Africa mainly for flow surveys and testing existing meters.

Calibrated at Eskom's SANAS-approved laboratory to an accuracy of +0.30% RMS (certificate UO8UC9065-1)

Permanent Ultrasonic Clamp-on Flow meter

Clamp-on Time of Flight Ultrasonic Flow Meters make cost effective permanent installations. They are easy to install as they as they do not require any plant downtime or changes to existing piping.
Flow data, system parameters and diagnostics are shown on the 16 letter, 2 line LCD display, flow velocity is transmitted by a 4-20mA output and flow volume by pulses;.
The RS-232C interface gives efficient connection to PC's, networks, telemetry, etc.

Specifications

- Range: 0 to ± 0.3 to ± 32 m/s
- Accuracy: ± 1,0%
- Output: 4-20mA
  Pulses
  Alarms
  Modbus
- Pipe size: 25 to 6000mm

Verification of Fuji Clamp On Ultrasonic Flow Meters

The performance of ultrasonic flow meters is highly dependent on the installation, for example the mounting and alignment of the sensors, flow conditions, etc. The Fuji Ultrasonic Flowmeter Verification is a tool for you to ensure that the installation and application are sound.

The initial Verification Report provides a benchmark for subsequent verifications. The Verification Report records the quantitative measurement of key application parameters and the Received Wave form, This report is suitable for QA purposes.

Virtually any ultrasonic flow meter will work well in near-ideal conditions such as a flow lab. However real-life applications are much more challenging and only sophisticated ultrasonic meters with powerful algorithms give reliable results in these circumstances. So it is very important that the meter installation is benchmarked and subsequently verified.

There are many hundreds of Fuji Ultrasonic Flow Meters operating in South Africa with on-board verification functions.

ULTRASONIC FLOWMETER BENCHMARK & VERIFICATION CERTIFICATE

CUSTOMER	**Eastern Cape Water Works**		
PLANT:	**Final Product**	**ID NO:**	**122345-01**
CONVERTER MODEL NO:	**FSVEBY11-SYYYB-E**	SERIAL NO:	**N8F0414T**
SENSOR MODEL NO:	FSSE1YYY1-YY	SERIAL NO:	
SOFTWARE VERSION NO:	Ver.14B 11	LOADER SOFTWARE VERSION NO:	3.0.0E

Setting Unit	Setting Value		Setting Unit	Setting Value	
Pipe Outer Diameter:	751.00	[mm]	Range Kind [unit]:	FLOW RATE [ML/d]	
Pipe Material:	CARBON STEEL		Damping:	25.0	[sec]
Wall Thickness:	18.50	[mm]	Range Type:	SINGLE	
Lining Material:	NO LINING		Full Scale1:	140	[ML/d]
Lining Thickness:	0.00	[mm]	Full Scale2:	0	[ML/d]
Kind of Fluid:	WATER		Hysteresis:	10.00	[%]
Sound Velicity in Fluid:	1000	[m/s]	Burnout(current):	HOLD	
Dynamic viscosity coefficient:	1.0038	[E-6m2/s]	Burnout Timer:	10	[sec]

DESCRIPTION		Benchmark	Verification1	Verification2	Verification3
Benchmark verification: [Date]		2018/08/22	2019/01/25	2020/02/18	
Benchmark verification: [Time]		11:02:49	08:54:23	12:24:37	
Sensor spacing: Verified by measurement,being	[mm]	644,63	644.63	644.63	
Zero adjustment:[set zero / clear]		Set Zero			
Measurement method:[Method1 / Method2 / Method3]		METHOD 2	METHOD 2	METHOD 3	
Trigger level:[auto / manual]		AUTO	AUTO	AUTO	
Trigger level -Up:	[%]	25,00	25.00	25.00	
Trigger level -Down:	[%]	25,00	25.00	25.00	
Measured fluid velocity:	[m/s]	1467,6	1504.5	1510.1	
Transit time T0C:	[usec]	1114	1114	1114	
Transit time -Up T1:	[usec]	1097,839	1076.694	1073.564	
Transit time -Down T2:	[usec]	1097,842	1076.691	1073.552	
Average transit time T0:	[usec]	1097,840	1076.692	1073.558	
Transit time difference DT:	[nsec]	2,7694	-2.1667	-12.7563	
Reynolds number Re:		3483	2754	16224	
Flow velocity V:	[m/s]	0,003	-0.002	-0.021	
Signal power -Up (should be > 44%):	[%]	47,24	47.12	47.12	
Signal power -Down (should be > 44%):	[%]	47,76	47.66	47.66	
Signal Peek -Up (should be between 5528 and 6758):		6077	6074	6073	
Signal Peek -Down (should be between 5528 and 6758):		6060	6059	6008	
Receive wave form: Amplitude function [Yes / No]		Yes	Yes	Yes	
Receive wave form: Noise level (From -1200digit to +1200digit)		Yes	Yes	Yes	
Internal Fault Detection [pass / fail]		Pass	Pass	pass	
Receive Wave Form [pass / fail]		Pass	Pass	Pass	

VERIFICATION RESULT: PASS [X] FAIL [ ]

The test results verify that this meter is / is not functioning within normal working limits and is consistent with the benchmark.

Next verification due: [ ]

INSPECTOR: NAME _____ SIGNATURE _____ DATE _____

CUSTOMER	The Client name		
PLANT:	(Plant Name)	**ID NO:**	(Meter ID)
CONVERTER MODEL NO:	**FSVEBY11-SYYYB-E**	SERIAL NO:	**N8F0414T**
SENSOR MODEL NO:	FSSE1YYY1-YY	SERIAL NO:	
SOFTWARE VERSION NO:	Ver.14B 11	LOADER SOFTWARE VERSION NO:	3.0.0E

INTERNAL FAULT DETECTION

No	ERROR	DESCRIPTION	STATUS B N	B F	V1 N	V1 F	V2 N	V2 F	V3 N	V3 F
1	E1:Device error1	Backup memory failure.	*		*		*			
2	E1:Device error2	Measuring circuit error.	*		*		*			
3	E2:Data collection error	Ultrasonic send,receive signals not detected.	*		*		*			
4	E2:Window scanning	Receiving signal not in scan window.	*		*		*			
5	E2:No received signal	No ultrasonic receiving signal waveform.	*		*		*			
6	E2:Received signal error	The status of received waveform is poor.	*		*		*			
7	E2:Received signal range over	Receiving signal waveform is outside the appropriate range.	*		*		*			
8	E2:Calculation failure	The value of detected measurement data is abnormal.	*		*		*			
9	E4:Range over	Analog output and total output exceed the range.	*		*		*			

B : Benchmark, V1 : Verification1, V2 : Verification2, V3 : Verification3, N : NORMAL, F : FAIL

SETTING ENVIRONMENT

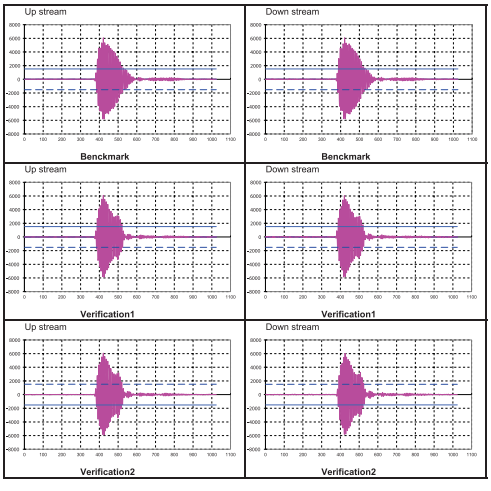
Setting place:			
Converter:	☐ Outdoor / ☑ Indoor	☐ Exposure / ☑ Panel inside	
Sensor:	☐ Outdoor / ☐ Indoor /	☑ Underground	
Length of straight pipe:	Up stream: D,	Down stream: D	
Mounting:	☑ V method /	☐ Z method	
Mounting position:	☑ Horizontal (deg.) /	☐ Vertical	
Environment:			
Converter Moisture:	☐ Yes / ☑ No	Induction: ☐ Yes / ☐ No	
Sensor Moisture:	☐ Yes / ☑ No		
Power supply:	☑ 100V to 240V AC /	☐ 10 to 30V DC Meas Voltaige: V	
Pice water stoppage: (Zero adjisument)	☐ Yes / ☐ No		

Comments:

Next verification due: [ ]

INSPECTOR: NAME _____ SIGNATURE _____ DATE _____

RECEIVED WAVE FORM

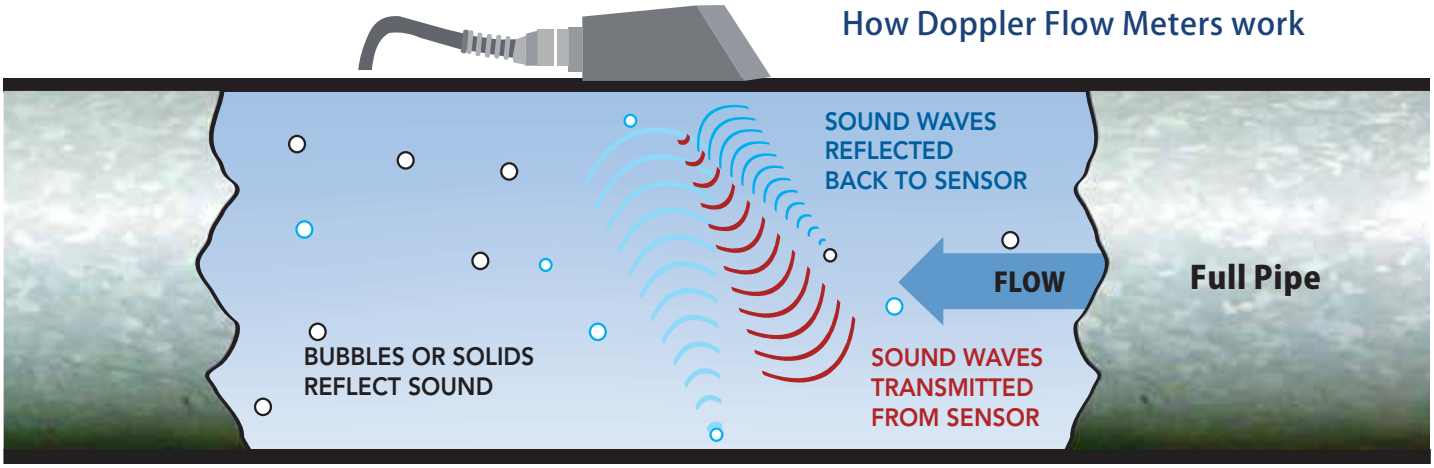


DFM

The Pulsar (Greyline) DFM non-contact Doppler flow meters measure flow from outside the pipe with a clamp-on sensor.

The DFM is ideal for slurries and liquids with air bubbles or solids in Full Pipes.
The only setup required is to enter the internal pipe diameter. Flow velocity and flow totalization is available on the LCD display. These measurements are logged and the data files are available via a USB-C flash drive. Use our free software to display, manipulate, analyse or export the data.
Suitable for pipes from 12,7mm to 4,5m and flow velocities from 0.03 to 12m/sec, accuracy is typically ±2%, with ±0.1% repeatability.
The DFM has a 4-20mA flow rate output, a 26 million point data logger and 2 output relays.

How Doppler Flow Meters work



The Pulsar (Greyline) PDFM portable non-contact flow meter.

The PDFM has the same measurement performance as the DFM above, in a portable format.
The PDFM is powered by rechargeable lithium batteries which give up to 15 hours continuous operation. The "sleep-logging" mode gives 30 day's data at 5 minute intervals on a single charge.
The Pulsar PDFM is ideal for checking the performance of installed flow meters, spot checks and temporary data logging

PDFM

These Greyline products have been upgraded and integrated into the Pulsar Measurement range. N&Z is Authorized distributor for the Pulsar Measurement range.

pulsar MEASUREMENT

Measure flow in open Channels or Partially full pipes

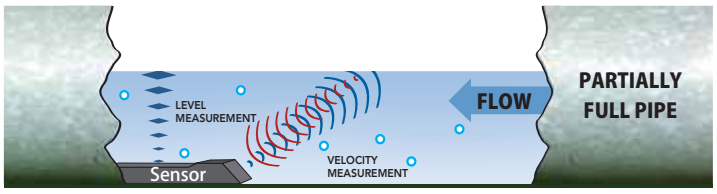
There are many requirements to measure flow in open channels or partially full pipes. These include storm water run-off, waste water, effluent and general surface water management. The traditional method is to relate the water level to flow rate with or without a primary device such as a weir or flume. The disadvantage of these methods are that any downstream blockage cause dramatic over-reading.
The Area Velocity method is recommended for flow measurements in partially filled pipes and open channels. It is even suitable for irregular channels.
N&Z has a range of area velocity flow meter systems to meet your specific application requirements.

How Area Velocity Flow Meters work

- Water level in the channel is measured by an ultrasonic sensor mounted at the bottom of the channel, or externally by a sensor mounted above the water.
- Flow velocity is measured by a submersed Doppler sensor, or a Radar sensor mounted externally above the channel.
- These level and velocity measurements, combined with the stored data of the geometry of the channel, gives volumetric flow.

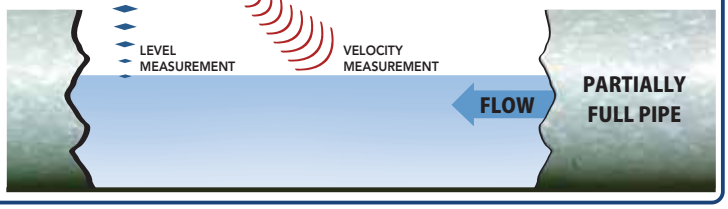
Area Velocity Flow Meter (AVFM)

The AVFM dedicated package has a single submerged sensor. The level measurement is ultrasonic and velocity measurement is Doppler.



Non-Contact AVFM System

The Non-Contact AVFM system has a combined sensor mounted above the liquid surface. The level is measured with an ultrasonic or Radar sensor. Velocity is measured using a Radar sensor mounted at 45°



► Area Velocity Flow Meter (AVFM)

The Pulsar AVFM is a self contained Area Velocity flow meter. The Submersed Doppler flow sensor measures flow velocity up to 6m/s. The built-in ultrasonic level sensor measures head from 26mm. An external non-contact ultrasonic level sensor is also available. The AVFM has three 4-20mA outputs for flow, level and velocity, and optional on-board data logger with USB output. There are hundreds of Pulsar (Greyline) Area Velocity Flow Meters operating in South Africa.

► Non-Contact AVFM System

Application specific area velocity flow meters are built by selecting the appropriate flow velocity and level sensors, and also the most suitable electronics platform. The sensor is mounted above the liquid at a 45° angle. The Radar sensor measures flow in channels up to 1,5m wide and velocities between 0,3m/s and 6m/s.
Various other velocity sensors are used for specific application environments such as foam or surface ripples. Typically the velocity sensor is mounted on the same bracket as the level sensor to give a neat compact installation. Various flow computing systems are used depending on the display, output and interface required. The FlowCERT is the most widely used as it has on board data logging, 4-20mA outputs and alarm/control relays.

► MantaRay

Pulsar (Greyline) MantaRay is a battery powered Area Velocity Flow Meter used for site surveys. It measures flow velocity and water level and calculates flow. These measurements are available on the display, via 4-20mA output and on-board data logger. Using a 15 minute sample interval the on-board batteries will deliver a logging period of 2 months.

► REFLECT
2-Wire Radar Level Sensors

- 2-wire, 4-20mA output, FMCW radar technology.
- Available in 8 and 20 meter measurement ranges.
- ±2mm measurement accuracy and 6° beam angle.
- Easy installation using REFLECTTILT LED indicators and BReez mounting adapter.
- Embedded DATEM software for repeatable measurement in the most challenging environments.
- Intuitive and user-friendly Bluetooth interface for configuration.
- User-definable Bluetooth range with secure browser-based app.
- Communicates with FDT framework applications via Device Type Manager (DTM)
- ATEX approval as standard.
- HART communication.

► dBi INTELLIGENT TRANSDUCERS
Non-contacting Intelligent Ultrasonic Transducers

- 2 wire, loop-powered, 4-20mA output.
- Strong signal to noise ratio & excellent resolution.
- Proprietary echo processing technology (DATEM) for
- greater measurement accuracy.
- Communicates with FDT framework applications via Device
- Manager (DTM).
- Narrow beam angle for tight line of sight
- Range up to 15 m.
- ATEX & cFMus approvals.
- Choice of HART, Modbus, & Profibus communication.

► IMP RANGE
Compact, Loop-powered Ultrasonic Measurement

- Combined transducer & controller.
- Range up to 10 m.
- Calibrate without compromising the IP67 rating.
- Simple, menu-led setup using built-in display & keypad.
- High power & narrow beam angles for accurate & reliable level measurement.
- ATEX option.

N&Z is Authorized distributor for the Pulsar Measurement range.

Level Sensors and Controller

dB TRANSDUCER SERIES
Non-contacting Ultrasonic Sensors

- Proprietary echo processing technology (DATEM) for greater measurement accuracy.
- Strong signal to noise ratio & excellent resolution.
- Integral temperature compensation applications.
- Narrow beam angle for tight line of sight.
- Cable extensions up to 1,000m.
- Range up to 40m.
- ATEX & cFMus approvals.

dBR RADAR SERIES
Non-contacting Radar Sensors

- Perfect for applications with changing atmospheric conditions or heavy vapours or fumes.
- Strong signal to noise ratio & excellent resolution.
- Extremely low power consumption.
- Minimal installation costs with no interruption to service.
- Narrow beam angle.
- Dynamically tracks level with proprietary echo processing technology (DATEM).
- Range up to 16m.
- Maintenance-free.
- ATEX approved.

Flow and Level Controllers

ULTRA 4
Advanced Ultrasonic Level, Flow, Volume, & Pump

- Multi-function display for easy setup & configuration.
- On screen monitoring with echo profiles and trend graphs.
- Built-in volume calculations from standard tank shapes or calibration
- curves.
- On-board Micro SD card extends data logging.
- Operates with all dB & dBR transducers up to 40m range.

FLOWCERT, MICROFLOW, & dBMACH3
Non-contacting, Area-Velocity Flow Monitoring

- 1-year log at 10-minute intervals.
- Modbus RTU & Profibus options.
- Can be used stand-alone or as part of a complete flow meter system
- Non-contacting so no interruption to process.
- Minimal installation costs & maintenance-free.
- Accuracy maximized at zero blanking distance.
- Solar radiation protection for utilization of internal temperature & enhanced reliability.
- For channels over 1.2m wide use multiple MicroFlow sensors with the Ultimate Controller.
- ATEX approval.

Water Quality Monitors - ATI

ATI has been a leading manufacturer of reliable water quality monitors for more than two decades. There is an extensive installed base of ATI monitors at Water Boards and municipalities in South Africa, supplied by N&Z and with strong support from the ATI factory.

ATI is also a pioneer in remote water quality monitoring using "Smart" sensors in a multi-parameter system which also had the benefit of minimum water consumption.

Parameters Measured by ATI Water Monitors					
Ammonia	Residual Chlorine	Total Chlorine	Chlorine dioxide	Conductivity	Dissolved oxygen
Fluoride	Hydrogen Peroxide	Ozone	Peracetic Acid	Permanganate	pH/ORP
Sulphide	Sulphite	Suspended solids	Turbidity	Auto Clean Option	

Water Quality Monitoring – Potable Water

ATI monitors have a proven track record in South Africa for the "Big 5" of potable water measurement: pH, conductivity, turbidity, chlorine and ammonia.

Measure Residual Chlorine Without Reagents

Water reticulation systems can achieve optimal disinfection and minimal chlorine dosing by measuring residual chlorine on-line.

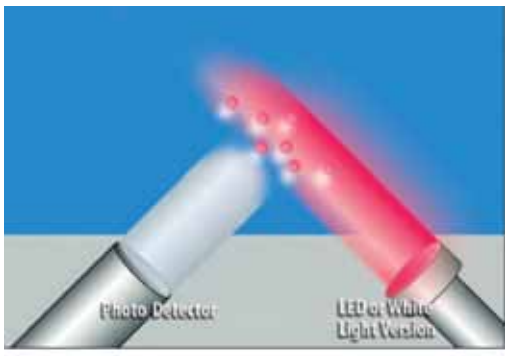
ATI's sensor measures residual chlorine directly, usually without the need for pre-sample treatment. So you get dependable measurements without the need for expensive chemicals or time consuming maintenance.
Two sensors are available – one for free chlorine and the second for chloramine (combined chlorine) measurement in chlorine/ammonia dosing.

Reliable Turbidity Measurement

ATI's Turbidity Monitor is designed to meet the needs of both municipal drinking water systems and industrial water treatment for reliable, low-range turbidity measurement.

Using an infrared light source and a 90° scatter measurement, the system provides high sensitivity measurement with unmatched zero stability.

Turbidity ranges of 0 – 20 or 0 – 200 NTU are available, while the display has a resolution down to 0.001 NTU.



Ammonia Measurement

ATI has made a breakthrough in on-line moitoring with their Model Q46 which is easier to operate and less expensive than standard systems but with a higher degree of reliability – and at a lower cost.

The Q46 measures Total Ammonia and Monochloramine concentrations; the Free Ammonia concentration is derived from these values.

The simple chemical system uses inexpensive reagents and has a fast response time to 90% in 3 minutes.

Water Quality Monitoring – Waste Water

There have been numerous applications of ATI monitors in waste water application in Southern Africa since 1997, many with ATI's auto-cleaning option.

Dissolved Oxygen - Auto-clean Option

ATI's patented AutoClean Air Wash system is very effective in wastewater and effluent where rapid sensor fouling is a major problem. This system blasts the surface of the sensing membrane clean, giving many months of maintenance-free operation.

Calibration is quick and accurate using ambient air and barometric pressure as references.

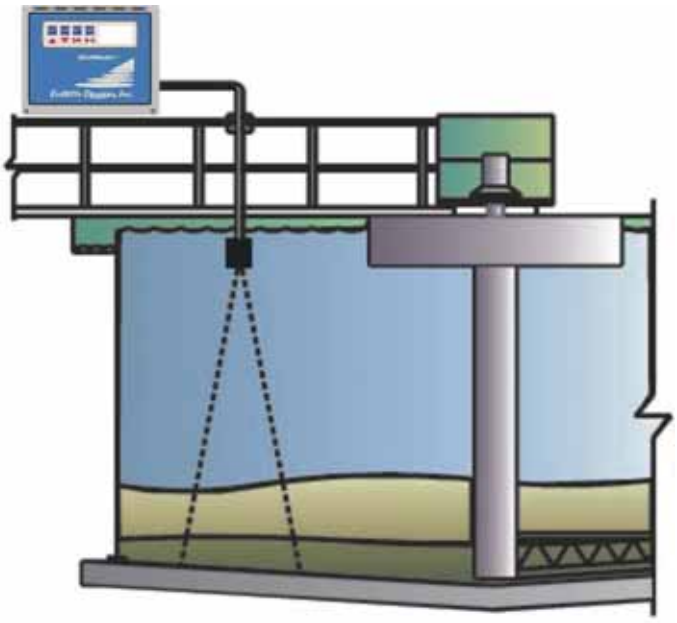
Automatic Water Quality Monitoring at Remote Sites

MetriNet

The MetriNet system is ideal for measuring water quality at remote sites and transmitting the data to our WaMSS Scada or other software.
MetriNet measures up to 8 parameters; each parameter is measured by its own node which can be calibrated in your laboratory and simply plug into the MetriNet on site.
The system has minimal service and water requirements.
The Scada provides a complete monitoring and alarming facility and automatic data transfer to other software systems.

Parameters Measured by ATI 's MetriNet				
Free Chlorine	Combined Chlorine	Total Chlorine	Turbidity	pH
Conductivity	ORP	Dissolved Oxygen	Fluoride	Dissolved Ozone
Chlorine Dioxide	Peracetic Acid	Hydrogen Peroxide	Pressure	

Sludge Level Measurement



► Sludge Level Measurement

Sludge Level Detection for clarifiers and thickeners.

Measuring sludge blankets in clarifiers or thickeners is challenging, but the EcoSmart has proved to be very reliable in South African applications.

The Smart sensor is mounted under water and an ultrasonic beam gives continuous sludge level measurements. The optional self-cleaning wiper removes bubbles, slime and other material accumulations from the sensor to provide reliable operation in hostile environments.

Automatic Liquid Samplers

► Automatic Liquid Samplers

AUTOMATIC LIQUID SAMPLERS have become the standard way to monitor contamination in sewers, storm water, rivers and dams.

Advantages of automatic liquid sampling:

- Samples are collected at specified intervals.
- Eliminates multiple trips to monitoring site.
- Eliminates hazardous manhole entry.
- Better site history data.
- Reliable and representative sampling.

We supply a variety of samplers for sequential or composite bottle sampling. They are easily programmed and give reliable sampling. Configurations include portable samplers, wall-mounted samplers and also vacuum dosing systems.

► Fuji Differential, Gauge & Absolute Pressure Transmitter

NOW EVEN EASIER TO USE

Fuji's new transmitters are now even easier to use. You don't need a communicator to set up and calibrate the transmitters. This functionality is now built-in, and is easily accessed via the 3 push buttons on the optional digital indicator. However you can still set up the transmitter with the Fuji or any other Hart communicator. Fuji's patented "floating cell" sensor is the heart of this reliable range of pressure and differential pressure transmitters which have a highly successful track record worldwide and in Southern Africa.

USER-FRIENDLY FUNCTIONS:

The LCD displays the measurement in engineering units or percent, or alternates between the two.

Use the Check Terminals to measure the mA loop current without breaking the loop or disturbing your plant.

Simulate current output in 0.1 mA increments. This is very useful for commissioning, loop checks, or checking receiving instruments.

There is an external screw to set the Zero. This function can be locked out.

The Guard Code prevents unauthorized tampering with the settings.

Diagnostics: displays historic maximum and minimum temperatures or cell and electronics.

Accuracy: ±0.065% of span as standard, +0.04% as option.

Fuji transmitters can be "dry" calibrated (i.e. without a reference pressure) to the same accuracy as "wet" calibration.

Stability: ± 0.1% of upper range limit (URL) for 10 years for most models.

A built-in arrester protects the electronics from lightning surges.

The "advanced Floating Cell" design reduces total measurement error in actual field applications by protecting the pressure sensor against changes in temperature, static pressure and overpressure.

Conform to SIL (Safety Integrity Level), Single mode 2.

In addition to Linear and Square Root, the output signal is programmable. (Up to 14 points).

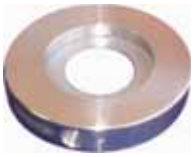
Hart communication to PCs, PLCs or DCSs using Fuji's software, AMS, FDT/DTM, HartExplorer or Pacware.

Fuji transmitters have bilingual communications to speak both Fuji protocol and HART. Any HART compatible devices can communicate with the transmitters.

Fuji has become a standard-setter in Southern Africa due to its superb performance, long-term stability, excellent pricing, support and quick delivery from large stock held in Johannesburg.

► Orifice Plates, Averaging Pitot Tubes and Manifolds

We supply a full range of Orifice Plates, Integral Orifices and Primary Devises for liquid and gas flow measurement.



Gas Mass Flow Measurement and Control

► Gas Mass Flow Meter - Thermal

Sierra's Quadratherm - is the most accurate thermal flow meter in the world. It measures gas mass flow with excellent accuracy and long-term stability. The patented mass velocity sensor measures mass flow directly of inert gases, flammable gases and corrosive gases. It is inherently superior to methods which measure volume and correct for temperature and pressure.

The meter has built-in calibrations for air, argon, carbon dioxide, chlorine, digester gas, helium, hydrogen, methane, nitrogen, oxygen and propane. It can be calibrated for any other gas or mixture at Sierra's in-house, independently certified flow laboratory.

The meter has a built-in facility to perform field validation of the flow calibration. The QuadraTherm has outputs for mass flow, temperature and pressure.

► Vortex Flow Meter

Sierra Vortex Flow Meter - is ideal for saturated or superheated steam, gas and liquids. It measures and has outputs for Mass flow rate; Volumetric flow rate; Temperature; Pressure and Density.

Accuracies are typically: ±0.1% to ±0.2% of reading and the turn down ratio is typically 30:1.

Both Vortex meters and Thermal meters are available in full bore and insertion models.

► Gas Mass Flow Meter / Controller

Select from 10 pre-programmed gases!

Sierra's Mass-Trak meters measure and controls the flow of any clean gas, including toxic or corrosive gases, in any range from 0 – 4 standard cubic centimeters per minute to 0 – 1,000 standard litres per minute.
The all-digital Smart-Trak Sierra is pre-programmed for ten commonly used gases. Simply select air, argon, carbon monoxide, methane, helium, hydrogen, oxygen, nitrogen or nitrous oxide. The stainless steel construction is suitable for any clean gas and its small footprint facilitates drop-in replacement of any mass flow controller.

The Sierra Smart-Trak is a very reliable mass flow meter/controller.

Zirconia Oxygen Analysers

Zirconia Oxygen Analysers Affordable O_2 Monitoring

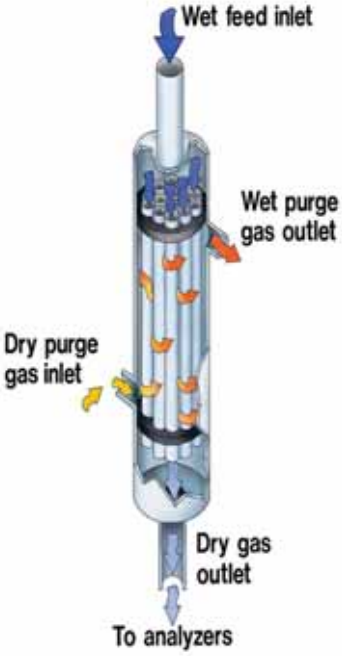
Continuous measurement of oxygen concentration in combustion or exhaust gases can improve fuel efficiency and minimise the environmental impact of industrial boilers and furnaces. Fuji, a long-standing manufacturer of gas analysers, supplies a low-cost and robust oxygen analyser for these applications. The Fuji analyser can be set from 0 - 2% to 0 - 50% oxygen, and operates at a linearity of ±2% and a repeatability of better than 1% of full scale.
Besides the attractive pricing, the unit has simple, one-touch calibration. A 2% oxygen standard is used in low point calibration, and normal atmospheric air can be used for span calibration. The zirconia sensor is detachable from the guide tube for easy maintenance and sensor replacement. An automatic blow-down function reduces maintenance requirements.

Fuji Environmental and Industrial Gas Analysers

Fuji Gas Analysers

Fuji Gas Analysers features high accuracy, multiple functions and simple operations. They are easy to maintain and offer excellent long-term stability. For example, a typical NDIR gas analyser can measure CO/CO2, or SO2/NOx. With the additional of zirconia oxygen detector, up to three gases can be accurately monitored simultaneously.

Gas Sample Preparation & Boiler Water Quality



Gas Analyser

Gas Analysers require a clean, dry sample to produce accurate and reliable results. Filters remove entrained particles, but removing moisture from a sample without affecting the analytes is not so simple.
Perma Pure's gas dryers are a superior alternative. They have no moving parts, require no maintenance, and continuously and highly selectively remove water from gas samples without affecting analytes, reaching final dew points as low as -45°C.

Monitoring Boiler Feed Water Quality

On-line measurements have become increasingly important in managing the quality of boiler feed water. Thermo Scientific's range of analyzers is designed to meet your critical measurement needs for contaminants such as sodium, silica and calcium hardness. Orion's advanced electrode technology and robust electronics are suitable for accurate measurements of de-ionised water containing extremely low levels of contaminants.

I/P Converter

Conoflow's Gt210 Converter

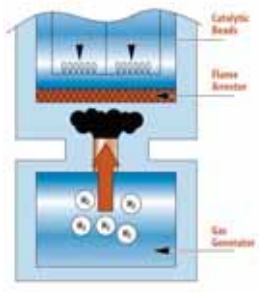
Conoflow's Gt210 Converter has become an industry standard for reliable yet low-cost current to pressure conversion (I - P converter). Used widely in control loops, the GT210 converts the controller's 4 – 20 mA signal to an output of 20 – 100 kPa to actuate a pneumatic valve.
This versatile converter, weighing only 770g, accepts an air supply between 140 and 600 kPa and has an overall linearity of ±0.75% of span. The transducer can be mounted in any position and the range and zero adjustments are accessible from the front. The output signal is field-reversible by simply reversing the input leads. The Gt210 is approved for hazardous area operation (Class 1, Div .1) and incorporates a pneumatic volume booster for fast actuation. The Conoflow GT210 has a long, successful track record in South Africa, and is supplied to valve manufacturers, OEMs and end-users.

Toxic and Combustible Gas Detectors

Parameters Measured by ATI Gas Detectors						
NH_3 - Ammonia	CO – Carbon Monoxide	H_2 - Hydrogen	NO – Nitric Oxide	O_2 - Oxygen	HC_2H -Acetylene	GeH_4 – Germane
$COCl_2$ - Phosgene	Br_2 – Bromine	Cl_2 – Chlorine	ClO_2 – Chlorine Dioxide	F_2 – Fluorine	NO_x – Oxides of Nitrogen	AsH_3 – Arsine
I_2 - Iodine	HX – Acid Gases	C_2H_4O – Ethylene Oxide	C_2H_6O – Alcohol	O_3 – Ozone	$(CH_3)_2NH$ – Dimethylamine	PH_3 - Phosphine
CH_4 – Methane (combustible gas)	H_2O_2 – Hydrogen Peroxide	HCl – Hydrogen Chloride	HCN – Hydrogen Cyanide	HF – Hydrogen Fluoride	HBr – Hydrogen Bromide	SiH_4 – Silane
H_2S – Hydrogen Sulphide	NO_2 - Nitrogen Dioxide	SO_2 – Sulphur Dioxide	H_2Se – Hydrogen Selenide	B_2H_6 – Diborane	HCHO – Formaldehyde	

Toxic or Combustible Gas Detection With Auto Test

ATI'S TWO-WIRE GAS DETECTION TRANSMITTERS are simple and reliable. They provide a LCD display of gas concentration and give a 4-20mA output with Modbus and Hart options. These universal transmitters accept sensors for more than 29 different toxic or combustible gases.
The nature of gas alarming requires a system which will seldom operate at alarm levels but must always have this capability. ATI's unique Auto-Test facility daily confirms the system's functional capability, without the expense and difficulty of regularly sending a technician to test each transmitter. So with ATI you can be confident that your alarm system will not let you down!



Gas Leak Detection

RELIABLE AND ACCURATE GAS LEAK DETECTION is critical in maintaining safety in areas where toxic gases could be present.

The PortaSens gas leak detector is a versatile tool for performing regular leak checks in gas storage areas, around process equipment and piping, or in confined spaces prior to entry. Designed for easy one-hand operation, the detector contains an internal sample pump and a flexible sampling wand to allow pinpoint location of the source of leakage. The display has large characters for easy visibility in poor light.

A unique feature is its ability to measure a variety of different gases by simply inserting the appropriate sensor for that gas. So one detector can be used to measure over 30 different gases or vapors. In addition, sensors can be changed quickly and easily, without the need for calibration.

MAGNETIC FLOW METER SELECTION GUIDE

Meter Diameter mm	Flow Velocity 0.1m/sec	Flow Velocity 0.4m/s	Flow Velocity 5m/sec	Flow Velocity 10m/s
3	3 l/h	10 l/h	130 l/h	250 l/h
6	10 l/h	40 l/h	500 l/h	1,000 l/h
10	28 l/h	120 l/h	1,400 l/h	2,800 l/h
15	64 l/h	240 l/h	3,200 l/h	6,000 l/h
20	113 l/h	500 l/h	5,700 l/h	11,500 l/h
25	0.2 m^3/h	0.7 m^3/h	9 m^3/h	18 m^3/h
32	0.3 m^3/h	1.2 m^3/h	14 m^3/h	29 m^3/h
40	0.4 m^3/h	1.8 m^3/h	23 m^3/h	45 m^3/h
50	0.7 m^3/h	2.8 m^3/h	35 m^3/h	72 m^3/h
65	1.2 m^3/h	4.8 m^3/h	60 m^3/h	120 m^3/h
80	1.8 m^3/h	7.2 m^3/h	90 m^3/h	180 m^3/h
100	2.8 m^3/h	11 m^3/h	140 m^3/h	280 m^3/h
125	4 m^3/h	18 m^3/h	220 m^3/h	450 m^3/h
150	6 m^3/h	25 m^3/h	320 m^3/h	640 m^3/h
200	11 m^3/h	45 m^3/h	570 m^3/h	1,130 m^3/h
250	18 m^3/h	70 m^3/h	890 m^3/h	1,770 m^3/h
300	25 m^3/h	100 m^3/h	1,270 m^3/h	2,520 m^3/h
350	35 m^3/h	138 m^3/h	1,730 m^3/h	3,450 m^3/h
400	45 m^3/h	180 m^3/h	2,260 m^3/h	4,500 m^3/h
450	60 m^3/h	228 m^3/h	2,870 m^3/h	5,720 m^3/h
500	70 m^3/h	284 m^3/h	3,540 m^3/h	7,100 m^3/h
600	100 m^3/h	408 m^3/h	5,090 m^3/h	10,200 m^3/h
700	140 m^3/h	560 m^3/h	6,930 m^3/h	14,000 m^3/h
800	180 m^3/h	720 m^3/h	9,050 m^3/h	18,000 m^3/h
900	230 m^3/h	920 m^3/h	11,460 m^3/h	23,000 m^3/h
1000	280 m^3/h	1,140 m^3/h	14,140 m^3/h	28,500 m^3/h
1200	400 m^3/h	1,600 m^3/h	20,400 m^3/h	40,000 m^3/h
1400	550 m^3/h	2,200 m^3/h	27,700 m^3/h	55,000 m^3/h
1600	725 m^3/h	2,880 m^3/h	36,200 m^3/h	72,000 m^3/h
1800	915 m^3/h	3,640 m^3/h	45,800 m^3/h	91,000 m^3/h
2000	1,130 m^3/h	4,500 m^3/h	56,700 m^3/h	113,000 m^3/h
2400	1,630 m^3/h	6,400 m^3/h	80,000 m^3/h	160,000 m^3/h

1.. This Meter Selection Guide is an "engineering guide" showing the relationship between Meter Diameter, Flow Velocity and Flow Rate. It is not a specification sheet.

2.. For convenience the table has four columns with velocities from 0.1m/sec to 10m/sec. For different flow rates interpolate between columns.

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