

AZIMUTH

DIRECTIONAL SENSORS & QDT MODULES

Client comments

“...just some quick field feedback, these sensors are good, very stable downhole.” *Conroe, Tx*

“...I was just looking at these two new sensors on the bench today, I gotta say it’s a nice looking no blemish product.” *Calgary, AB*

“...I want to thank you and your team for providing us with a solid system.” *Houston, Tx*

“...I just finished roll testing the first sensor. It checks out very tight. I am impressed.” *Calgary, AB*

Index

QDT MODULES

How our QDT Modules fit perfectly into your toolstring	4
XDM-35A Directional Module.....	5
MPU-35A Master Processing Unit.....	6
INC-35A Continuous INC Module.....	7

SENSORS

DIRECTIONAL SENSORS

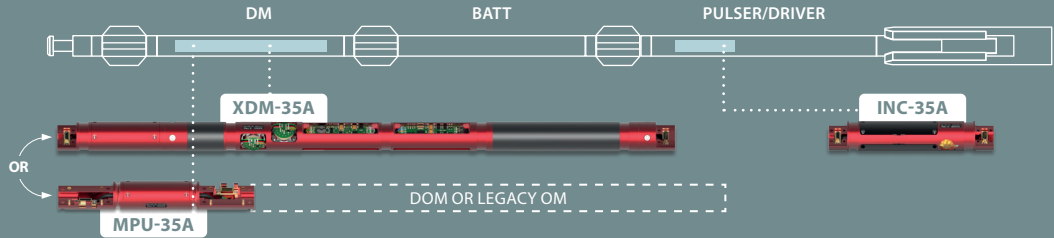
AOM-35A Analogue Orientation Module.....	8
DOM-35A/ DOM-35D Digital Orientation Module.....	9
IOM-35A/IOM-35D Integrated Orientation Module.....	10
MAG-031A Precision 2-Axis Magnetometer System	11
NBM-19A Near Bit Inclination Module	12
NBM-19B Near Bit Continuous INC Module.....	13

ANCILLARY EQUIPMENT

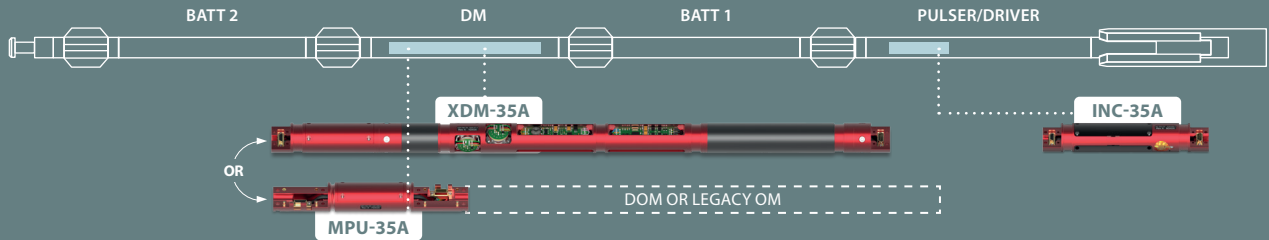
Gamma Calibrator	14
OMI Orientation Module Interface	14
USB IOM Module Interface	14

How our QDT Modules fit perfectly into your toolstring.

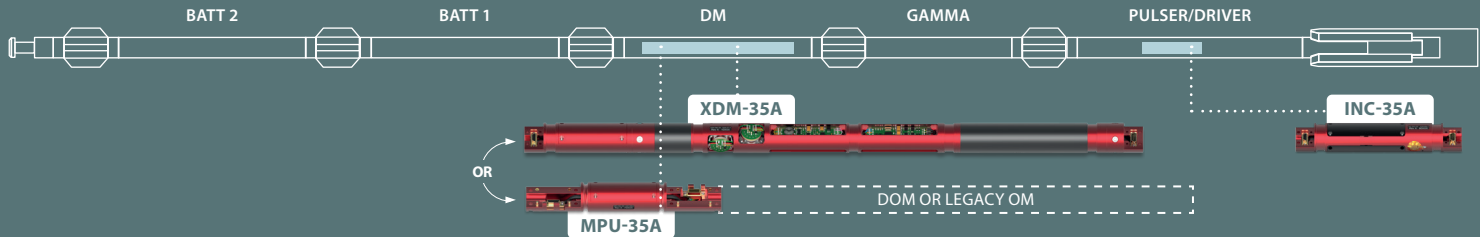
SHORT



MEDIUM



LONG



XDM-35A

185°C NEW

DIRECTIONAL MODULE

The XDM-35A is the latest Directional Module development from Azimuth, incorporating the entire MPU and TPS functionality for Tensor based MWD systems within a single integrated module. Qualification and calibration to 185C ensures performance in the most demanding 'hot-hole' conditions. Proprietary 200C 'Flux-Gate' Magnetometers and 190C Accelerometers ensure the sensor is designed to operate reliably at 185DegC, providing accurate and repeatable measurements - including Rotational and Continuous INC/AZI.

Combined with the latest features of a fully integrated MPU for QBus support and M-Ary telemetry, the unit delivers a highly integrated and cost-effective solution for the user. At a total length of 29.2", the unit integrates both the MPU and TPS, eliminating separate elements and their associated cost and interfacing. The XDM-35A sensor is qualified and tested under the same rigorous conditions expected of all Azimuth sensors and is fully compatible with existing Tensor based MWD systems.

The module is available with temperature ratings of 185, 175 or 150DegC.

Products

A378-484-8	Directional Module, XDM-35A-150
A741-866-0	Directional Module, XDM-35A-175
A919-573-6	Directional Module, XDM-35A-185

M-Ary Mud Pulse Encoding

Continuous Inc/Azi

High-Speed Telemetry

Azimuthal Gamma

Features

- Single chassis design
- Low power consumption
- QBus compatible
- CANBus for fast download
- Flow/Rotary Downlink
- Dual Gamma supported
- 3-Axis Shock/Vibration
- RPM & Stick/Slip Detection
- Voltages/Currents/Events logging
- Gamma power switching
- Deep sleep mode for in-collar loadout with INC/RPM wake-up
- Generic variables for 3rd party connectivity
- Alternative communications: UART/RS-485
- 18-50VDC Input Voltage
- Customisation available

Applications

- Low power consumption
- 24-Bit ADC for high quality surveys
- High shock and vibration specification
- 190C/185C Quartz-Flex accelerometers
- 200C Precision Fluxgate Magnetometers
- Independent mag/accel switching for power saving
- On-board coefficients

Benefits

- MWD/LWD Borehole Survey
- Geothermal applications
- Tensor/QDT Toolstring Compatible



MPU-35A

185°C NEW

MASTER PROCESSING UNIT

The MPU-35A is the latest development from Azimuth, incorporating the MPU and TPS functionality for Tensor based MWD systems within a short chassis. Qualification and calibration to 185C ensures performance in the most demanding 'hot-hole'- applications.

Fully compatible with QDT-based orientation modules including Azimuth's DOM-35A sensors.

Combined with the latest features such as high speed telemetry and CAN bus for fast download, QBus support and M-Ary telemetry, the unit delivers the latest features with a cost-effective upgrade path from legacy modules to the user.

The MPU-35A module is qualified and tested under the same rigorous conditions expected of all Azimuth sensors and is fully compatible with existing Tensor based MWD systems.

Products

A341-698-3 Master Processing Unit, MPU-35A-185

M-Ary Mud Pulse Encoding

Continuous Inc/Azi

High-Speed Telemetry

Azimuthal Gamma

MWD Features

- Short chassis
- Low power consumption
- QBus compatible
- CANBus for fast download
- Flow/Rotary Downlink
- Dual Gamma supported
- 3-Axis Shock/Vibration
- RPM & Stick/Slip Detection
- Voltages/Currents/Events logging
- Gamma power switching
- Deep sleep mode for in-collar loadout with INC/RPM wake-up
- Generic variables for 3rd party connectivity
- Alternative communications: UART/RS-485
- 18-50VDC Input Voltage
- Customisation available

Applications

- MWD/LWD Borehole Survey
- Geothermal applications
- Tensor/QDT Toolstring compatible



INC-35A NEW

CONTINUOUS INC MODULE

The INC-35A is the result of in-house development of Azimuth's proprietary Continuous INC hardware and processing algorithm, coupled with Tensor/QDT Compatible bus (QBus) communications.

Designed to be placed anywhere in the Tensor/QDT compatible string, or more frequently in close proximity to the Pulser Driver, the module is designed to provide accurate Static and Dynamic Inclination measurements closer to the bit.

As part of Azimuth's extended vibration range, the unit has been qualified to 50Grms vibration and rated to 2000g shock.

In addition to Tensor/QDT compatibility and support for qBus Generic Variables, the module provides TTL/RS485 and CanBus communications interfaces.

Precision Continuous INC

QBus Compatible

50Grms/2000G Rating

Ultra-short unit (8.0")

Features

- Low power consumption
- CANBus/TTL/RS485/QBus
- Generic variables compatible
- Auto Survey Mode (Flow)
- Data Broadcast Mode
- Next Level Continuous INC
- 12-40VDC Input Voltage
- Customisation available
- 24-Bit Data Acquisition

Applications

- Near Bit INC applications
- Near Pulser Configuration
- Continuous Near Bit INC data



Products

A248-669-3 Continuous INC Module, INC-35A-150

AOM-35A

ANALOGUE ORIENTATION MODULE

The AOM-35A is a premium, high accuracy 3-axis borehole surveying instrument designed for extreme downhole oilfield environments. Qualified to high temperature and drilling shock and vibration levels, the instrument is designed for reliability under the most demanding of environments.

The sensor utilises TruMag™, a novel 3-axis flux-gate magnetometer design and high grade quartz-hinge accelerometers for excellent precision and stability. Proprietary high reliability electronics packaging and printed circuit board mounting, provide an extremely robust instrumentation assembly with industry leading performance.

Products

A231-393-5	Analogue Orientation Module, AOM-35A-150
A163-488-6	Analogue Orientation Module, AOM-35A-175

Features

- Proprietary high stability/accuracy flux-gate magnetometers
- Low power consumption
- Modular assemblies for ease of maintenance
- Robust and reliable assembly
- Analogue or digital options available
- Mechanical and electrical interfaces engineered to suit application
- Compatible versions for major MWD systems

Applications

- MWD/LWD Borehole Surveying
- Direct replacement of existing sensors
- OEM implementation in LWD systems
- Wireline directional surveying

Benefits

- Increased accuracy and stability
- Highly integrated and robust assembly
- Custom options
- Experienced and dedicated support team
- Collaborative approach to meet customers' needs



DOM-35A/DOM-35D (MEMS)

DIGITAL ORIENTATION MODULE

The DOM-35A is a precision Digital Orientation Module, designed for direct compatibility with existing Tensor MWD systems and after-market replacement modules. The sensor is available in 150 and 175°C options and is designed to meet the most demanding and extreme conditions downhole. You can rely on Azimuth's consistent high quality sensor performance when you need it most.

The sensor is based around high-grade quartz-hinge Accelerometers and an ultra-stable proprietary Magnetometer design, known as TruMag™ - the performance of which is unmatched in stability over temperature, shock and vibration. Coupled with high-temperature electronics and highly robust packaging, Azimuth delivers a premium Orientation Module, thoroughly tested and with industry leading performance – ready to improve your reliability in hole.

The DOM-35D is a highly ruggedised MEMS version of the sensor and is available to a 150°C temperature rating.

Products

A791-714-3	Digital Orientation Module, DOM-35A-150
A933-954-3	Digital Orientation Module, DOM-35A-175
A235-814-1	Digital Orientation Module, DOM-35D-150 (MEMS)

Features

- Rugged chassis design
- Reliable 175°C operation
- Ultra-stable proprietary Magnetometers
- High-temperature surface mount electronics
- On-board Analog to Digital Converter
- On-board EEPROM K-Factor storage
- Low power consumption
- Independent Mag and Accel switching

Applications

- Drop-in Tensor replacement
- MWD/LWD Borehole Surveying
- OEM implementation in new MWD systems

Benefits

- Increased MTBF
- Reliable operation in 'hothole' environment
- Experienced and dedicated support team
- Industry leading accuracy and stability
- Improved asset utilization and less 'down-time'



IOM-35A/IOM-35D (MEMS)

INTEGRATED ORIENTATION MODULE

The IOM-35A is the latest in a series of high accuracy Orientation Modules from Azimuth. It incorporates a full processing unit to provide fully corrected and computed results in an easy-to-use manner for the customer.

The sensor utilises a proprietary flux-gate magnetometer design and high grade quartz-hinge accelerometers (MEMS for IOM-35D) for excellent precision and stability. High reliability electronics packaging and printed circuit board mounting, provide an extremely robust assembly with industry leading performance.

The unit communicates through a simple serial RS232, RS485 or CanBus interface, and is designed for extreme downhole oilfield environments. Qualified for high temperature and extreme shock and vibration levels, the sensor provides reliability under the most demanding of conditions.

Products

A326-275-3	Integrated Orientation Module, IOM-35A-150
A153-181-7	Integrated Orientation Module, IOM-35A-175
A883-536-9	Integrated Orientation Module, IOM-35B-150
A449-542-8	Integrated Orientation Module, IOM-35B-175
A945-977-7	Integrated Orientation Module, IOM-35D-150

Features

- Serial TTL/RS485 or CanBus Interface
- Continuous INC/AZI
- Integrated microprocessor and fully computed angles
- Low power consumption
- Proprietary serial communications protocol
- Robust and reliable assembly
- Programmable communications protocol
- Mechanical and electrical interfaces engineered to suit application
- INC, AZI, TF, MTF, Temp, Gt, Ht, RPM and Rotation detection

Applications

- MWD/LWD Borehole Surveying
- Direct replacement of existing sensors
- OEM implementation in LWD systems
- Wireline directional surveying

Benefits

- Increased accuracy and stability
- Highly integrated and robust assembly
- Fully computed data
- Experienced and dedicated support team
- Simple interfacing for integration into MWD system
- Reliable 'hot-hole' performance (150, 175 and 185 DegC options available)

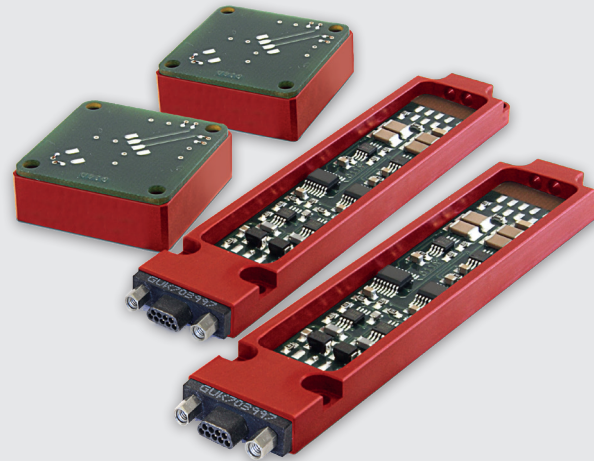


MAG-031A

PRECISION 2-AXIS MAGNETOMETER SYSTEMS

The Mag-031A are precision 2-Axis Flux-Gate Magnetometer Systems designed for use in high temperature and high shock and vibration environments for Dynamic Azimuthal scanning applications. When combined with MWD Survey information, the Magnetometer System can be used to accurately log sensor data Azimuthally whilst drilling.

The 2-Axis system consists of two single-axis Magnetometers, a Dual Channel Processing Board and a single Dual Channel Excitation Board. Specified for operation at a continuous temperature of 175°C, and a survival temperature of 185°C, the System operates from single +5V power supply with power consumption of less than 250mW.



Products

A464-112-4	Magnetometer System, Mag-031A
A574-521-4	Magnetometer System, Mag-031B, Digital

Features

- Easy implementation for Azimuthal scanning
- Simple +5V power supply
- Low power consumption
- Robust sensor and electronics design
- High Temperature qualified
- Full calibration record provided
- Small footprint

NBM-19A

NEAR BIT INCLINATION MODULE

The Near Bit Orientation Module is the latest in a range of Azimuth sensors specifically aimed at advancing the technology of downhole directional measurements for the MWD market.

This sensor provides accurate and repeatable Inclination measurements using the latest in proprietary Azimuth MEMS Accelerometer technology. Packaged robustly in a small footprint (0.75" x 6.0" nom.), the sensor is designed to withstand the rigours of Near Bit shock and vibration.

The Near Bit Module is qualified to 150°C (302F), and tested under the same rigorous conditions expected of all Azimuth sensors. Available in both 'Static Inc' and 'Continuous Inc' forms, the module provides accurate Inclination measurements close to the bit, in a form which can be easily accommodated in annular type subs.

Products

A727-474-7 Near Bit Inclination Module, NBM-19A-150

Features

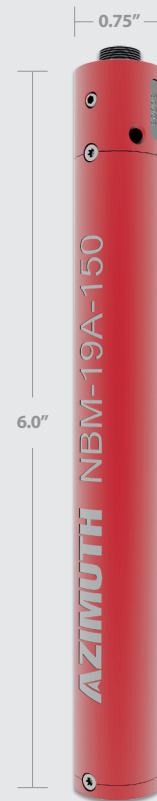
- Ultra-small form
- Continuous INC option
- Low power consumption
- High-shock and vibs specification
- Robust MEMS Accelerometers
- Accurate, repeatable Inclination measurements
- Calculated INC output
- Serial Communication
- Programmable filters
- Full 3-Axis Accelerometers
- 24-Bit Resolution
- Constant data 'Streaming' option

Applications

- Near Bit Systems
- Rotary Steerable Systems
- Instrumented Motor Implementations

Benefits

- Increased robustness near bit
- Reduced cost
- Reduced 'downtime'
- Precision measurements close to bit
- Ease of implementation (form)



NBM-19B NEW

NEAR BIT CONTINUOUS INC MODULE

The NBM-19B is an Ultra-small (0.75" x 6.0" Nom.) Dynamic Inclination Module delivering 'next-level' Continuous INC accuracy. The sensor employs 3-axes of highly ruggedised MEMS devices and 24-Bit data acquisition to delivery industry leading Continuous INC precision. Azimuth's proprietary dynamic algorithm has been honed for high shock (up to 50G rms) and high torque applications at any angle from vertical to horizontal.

The module provides fully computed outputs or raw axes if required. Communications mode and data frequency is fully user configurable and the unit is fully supported with an accompanying PC Software application.

The NBM-19B module is qualified and tested under the same rigorous conditions expected of all Azimuth sensors.

Features

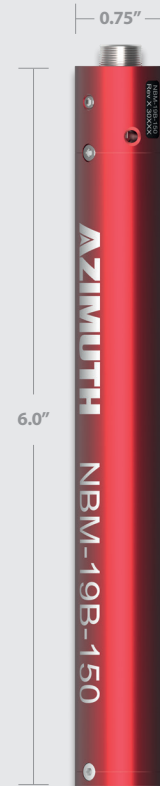
- Small Form
- Low power consumption
- Computed outputs
- TTL/RS232 Communications
- Survey Accuracy Static INC
- 24-Bit Resolution
- Cont_INC Data Streaming
- Ruggedised MEMS Accelerometers
- 3-Axes Accelerometers

Applications

- Near Bit Systems
- Instrumented Motors
- Rotary Steerable Systems
- Near Pulser Configurations

Benefits

- Next level Continuous INC Accuracy
- Extended Range: 50G rms vibration rating
- 0.1° Degree Cont_INC Accuracy
- Ultra-miniature size



Products

A228-227-3 Near Bit Continuous INC Module, NBM-19B-150

Gamma Calibrator

The Azimuth Gamma Calibrator provides an easy and convenient method to maintain the accuracy and calibration of your Gamma sensors within specification.

The calibrator is made from a particular Granite with a wide activity spectrum typical of many downhole formation conditions. The unit is traceable to API specification, easily transportable and requires no radiation control for use or shipping.

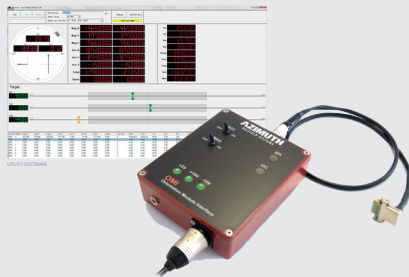
Products	
A744-866-1	Gamma Calibrator, Granite



Orientation Module Interface (OMI)

The Orientation Module Interface is designed for testing and evaluation of Digital Orientation Modules (Tensor type) operating on an SPI interface platform. Used in combination with a digital sensor, it provides facilities to quickly troubleshoot, conduct roll tests or reprogram the EEPROM containing the calibration coefficients within the sensor. The provision to reprogram the EEPROM memory allows greater flexibility for the user when operating multiple processor unit types.

Products	
A498-452-4	Orientation Module Interface Unit, OMI



USB IOM Module Interface

The USB IOM Module Interface is designed to be used for communication with Azimuth Integrated Orientation Modules. The module provides a USB to RS232/RS485 or CanBus conversion, and a 30V power output derived from the USB.

The unit requires no additional power and comes with an associated software application for IOM configuration, testing and settings adjustment.

Products	
A842-995-5	IOM Interface Unit, USB





"We are running your tools in the hole on four rigs now...

...and having great success.

We really like how they perform."

MWD Service Company
Calgary, AB



Contacts

UK

Contact: Victor Allan

Azimuth Oilfield Systems Ltd.
Unit 1 Kintore Business Park
Kintore, Aberdeenshire
AB51 0YQ
United Kingdom

T. +44 (0)1224 773635
E. sales@azimuthmwd.com

China

Contact: Margaret Xu

Suite 12A4
Building BXin Tian Di Mansion
Xibahe South Road #1
Chaoyang District
Beijing 100028

T. +86 10 64466471
F. +86 10 64466469
M. +86 13901148909
E. margaretxu@126.com

Canada

Contact: Fred Appaix

Sales and Support
Representative
Calgary
AB Canada

M. +1 (403) 542 9233
E. fappaix@azimuthmwd.com