

**SAAV EXTEND**

Measurand's unique technology, developed over 25 years, makes ShapeArray™ the only patented geotechnical monitoring instrument of its kind.

ShapeArray gives you a more detailed picture of subsurface movement with unparalleled durability relative to deformation.

This automated, inclinometer-style instrument has set a new standard for ease of installation and data collection.

**PATENTED PRODUCTS. DATA YOU TRUST.**



MEASURAND

# SAAV EXTEND

Measurand's latest innovation—SAAV Extend—addresses the challenges of continual deformation monitoring during the raising of tailings dams.

Inspired by direct feedback from clients in the tailings and mine waste sectors, SAAV Extend provides a continual deformation profile throughout multiple dam raises with unparalleled ease of installation and data interpretation.



# CONNECTABLE. SAAV EXTEND.



INITIAL INSTALLATION

DAM RAISE

COMPLETED DAM LIFT

## MONITOR DAM LIFT OPERATIONS

SAAV Extend is a modular ShapeArray system that scales along with your project's scope.

SAAV Extend includes a top assembly that connects to a base assembly that creates a continuous deformation profile of a borehole.

When it is time to raise the tailings dam, SAAV Extend Lift Extension segments can be added between the top and base assemblies to increase the total sensorized length.

SAAV Extend's connectors are keyed to ensure azimuth is maintained as Lift Extension segments are added in the field.

# SAAV EXTEND

Connect sensorized segments in the field for a continuous deformation profile.



**Segment Length:**

500 mm

**Installation:**

Vertical

**Applications:**

Permanent/Temporary

## PHYSICAL PROPERTIES

SEGMENT LENGTH	500 mm (Joint centre to joint centre)
CONDUIT & CASING OUTSIDE DIAMETERS	70 mm or 85 mm inclinometer casing
SAAV EXTEND OUTSIDE DIAMETER	49 mm
MIN. LENGTH OF SAAV EXTEND LIFT EXTENSION SEGMENT	1 m
MAX. COMBINED LENGTH OF SAAV EXTEND	Up to 200 m (500 mm segments)
TENSILE STRENGTH	113 kgf (SAAV joint weakest point) 320 kgf (Connector)
WATERPROOF TO	2000 kPa (200 m Water)
CONNECTOR RATINGS FOR WATER PRESSURE	Mated: 7000 kPa (700 m water) Open face: 1400 kPa (140 m water)
POWER REQUIREMENTS	12 VDC (12–16.5) at 1.8 mA/segment 12 VDC (12–16.5) at 0.4 mA/segment (low power mode)
SYSTEM PRECISION <sup>123</sup>	± 0.5 mm for 30 m ShapeArray
SEGMENT PRECISION <sup>4</sup>	± 0.0005° (0.01 mm/m) (68% confidence interval) ± 0.0050° (0.09 mm/m) (99.7% confidence interval)

<sup>1</sup> One-sigma value, based on a six-month cyclical installation. Accuracy degrades as square root of length.

<sup>2</sup> Value based on Average in Array (AIA) setting of 1000 samples.

<sup>3</sup> Specification is for 3D mode within ± 20° of vertical. Vertical accuracy degrades with angular deviation from the vertical.

<sup>4</sup> Sample size for segment precision is 540,000 readings. Data was collected for 3 different positions within +/- 10° of the X, Y, and Z axes. Figures provided fall within 99.7% confidence interval (3-sigma value).



## KEY TAKEAWAYS

### **ShapeArray that grows with your monitoring strategy**

SAAV Extend will always have a sensorized length that is right for your needs. Individual sensor segments are 500 mm each and can be combined up to a total sensorized length of 200 m.

### **Simple installation in the field**

SAAV Extend's hand-tight threaded connectors allow clients to easily add sections of lift extension segments without additional tools. Adding new lift extension segments is as simple as twisting, while keyed alignment marks on the connectors maintain the ShapeArray's azimuth.

### **Total control to monitor the zone of interest**

Clients can use silent segments first introduced with SAAV, in addition to SAAV Extend's lift extension segments to target the total sensorized length towards the geologic zone of interest.



## **A connectable ShapeArray design that is just as durable as SAAV**

Designed specifically for the rigors of tailings dam safety monitoring, SAAV Extend is submersible up to a depth of 200 m. SAAV Extend has the same 38-year MTTF as any ShapeArray that Measurand manufactures. It also has the same temperature tolerances and tensile strength, so clients can trust SAAV Extend in as wide a range of environments as existing SAAV models.

### **Real-time measurements in real-world conditions**

You cannot guarantee pristine conditions in the field when you need to perform your ShapeArray installation. That's why SAAV Extend's connectors have a 300-psi open-face pressure rating. You can connect segments in the rain without worrying about damaging your instruments.

# ANATOMY OF SAAV EXTEND



## TOP ASSEMBLY

The top assembly is the brain of the SAAV Extend that locks the instrument into standard inclinometer casing with Measurand's patented cyclical installation method.

# ANATOMY OF SAAV EXTEND



## LIFT EXTENSION SEGMENTS

Lift extension segments added between the top assembly and base array connect to form the SAAV Extend's total sensorized length.

# ANATOMY OF SAAV EXTEND



## BASE ARRAY

The base array refers to the sensorized segments at the bottom of the borehole after the initial installation.



PATENTED PRODUCTS.  
DATA YOU TRUST.

# TELL US ABOUT YOUR PROJECT

Measurand designs and manufactures superior monitoring products. All ShapeArray instruments are manufactured in Measurand's high-capacity ISO 9001:2015 certified facility. Measurand's staff of experts is ready to help, from sales to installation to support.



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