



## SAAV

Model 001

Inspired by feedback from customers, SAAV has been designed to enable faster and simpler installation with direct installation in casing sizes from 47 mm to 100 mm inside diameter, as well as 27 mm ID conduit. SAAV can be installed<sup>1</sup> into existing casings, even those that are too distorted for conventional use, eliminating the need to drill new boreholes when converting from manual to automated monitoring.

SAAV's new joint design enables the instrument to zigzag into various casing sizes. A spring box at the top holds the joints firmly in contact with the casing, without any grout in the casing. This cyclical installation method is unique to SAAV (patent pending). Our software has been updated with a new algorithm which tracks the casing's medial axis in 3D resulting in traditional inclinometer plots.

For situations where the SAAV is not required to reach all the way to the bottom of the casing, we offer silent segments for SAAV. Silent segments have no sensors inside and are connected at the far, non-cable end of the SAAV to increase the total length of the array. This innovation is useful when SAAV is installed into existing casings where the shear zones are known to be well above the bottom of the hole or to accommodate for casing depths that are not well known at time of order.

SAAV contains upgraded MEMS sensors that reduce power consumption and improve resolution.

Related products: SAA232, SAA232-5, SAA Field Power Unit, SAAUSB

# SPECIFICATIONS



## PHYSICAL PROPERTIES

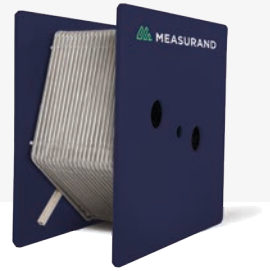
SEGMENT LENGTH	500 mm (joint center to joint center)
STANDARD LENGTH OF SAAV	Up to 150 m (500 mm segments)
CUSTOM LENGTH OF SAAV	Over 150 m (Contact Measurand for details)
CONDUIT & CASING INSIDE DIAMETERS	27 mm, 47 mm to 100 mm
LENGTH OF UNSENSORIZED NEAR CABLE END SEGMENT	500 mm
LENGTH OF FIBERGLASS EXTENSION	1 m or 2 m
LENGTH OF COMMUNICATION CABLE	Standard 15 m
WEIGHT	0.6 kg/m
MINIMUM AXIAL COMPRESSION TO PROVIDE SNUG FIT IN CASING	30 kgf
MAXIMUM JOINT BEND ANGLES	90°
STORAGE TEMPERATURE	-40°C to 60°C
INSTALLATION TEMPERATURE	-20°C to 60°C
OPERATING TEMPERATURE	-35°C to 60°C polynomial temperature algorithm corrected
WATERPROOF TO	2000 kPa (200 m Water)
POWER REQUIREMENTS	12 VDC at 1.8 mA/segment

# STATIC SHAPE MEASUREMENTS

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ANGULAR RANGE OF MEMS SENSORS	$\pm 360^\circ$ (software selection required for 2D/3D modes)
RANGE OF 3D MODE (VERTICAL)	$\pm 60^\circ$ with respect to vertical
DEFORMATION ACCURACY <sup>1,2,3</sup>	$\pm 1.5$ mm for 32 m ShapeArray
RESOLUTION OF SINGLE SEGMENT	+/- 1 arcsecond <sup>4</sup>
AZIMUTH ERROR IN JOINTS	$< \pm 0.01^\circ$
LONG-TERM RELIABILITY MTBF <sup>5</sup>	38 years for 32 m ShapeArray

# NOTES



<sup>1</sup> One-sigma value, based on cyclical installation in 59 mm ID casing. Accuracy degrades as square root of length.

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

<sup>3</sup> Specification is for 3D mode within  $\pm 20^\circ$  of vertical. Vertical accuracy degrades with angular deviation from the vertical.

<sup>4</sup> RMS, calculated from published noise figure of sensor (verified by Measurand Inc.), and bandwidth of system using highest AIA setting of 25,600 samples.

<sup>5</sup> Conservatively based on longevity data for electronic components used in ShapeArray, a) assuming total system failure if any single component fails, b) system powered on 100% of the time, c) ambient 6 deg C, d) internal temperature rise of 8 deg C above ambient due to 100% powered-on duty, and e) a benign ambient environment typical of geotechnical instrumentation. MTBF will increase for more typical duty cycles (not powered on 100% of the time). At higher temperatures, MTBF will decrease (e.g. by ~half at 52 deg C). MTBF is based on "MIL-HDBK-217F Notice 2" performed by, ALD/SoHaR.

# SPRING BOX ASSEMBLY



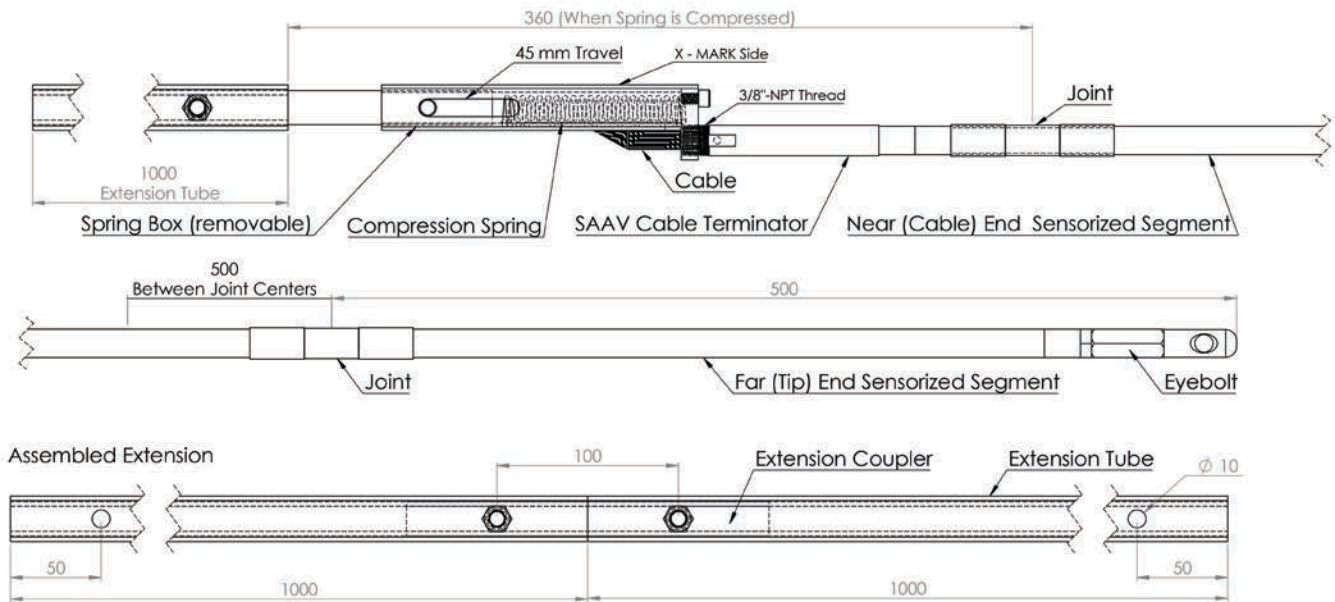
Capped SAAV length = Extension Tube (125 mm min) + Spring Box/Cable Terminator (360 mm) + Sensorized Length - Packing

Packing = Zigzags reduce the length by approx. 2 mm/segment in 70 mm inclinometer casing, and approx. 3.5/segment in 85 mm inclinometer casing.

Extension Tubes: Two 1000 mm Extension Tubes are included. Additional Extension Tube kits are sold separately.

Sensorized length = Near cable end sensorized segment through far tip end sensorized segment.

Sensorized tolerance on measurement: +/- 2 mm unless otherwise stated.



# 27 MM ID CONDUIT ADAPTER ASSEMBLY



Capped SAAV length = PEX Length (80 mm min) + Conduit Adaptor/Cable Terminator (300 mm) + Sensorized Length - Packing (0.5 mm / segment)

Included 1500 mm PEX. PEX extension kits sold separately.

Sensorized length = Near cable end sensorized segment through far tip end sensorized segment.

Sensorized tolerance on measurement: +/- 2 mm unless otherwise stated.

