

ShapeArray SAAV

Description

SAAV's patented cyclical installation method means it can be directly inserted into a range of casing sizes and widths, including both standard grooved inclinometer casings and smooth casing types, without assembly in the field. Measurand's software tracks the medial axis in the centre of the casing in 3D to produce traditional inclinometer plots.

Retrofit existing monitoring infrastructure

SAAV's narrow diameter, rugged joint design, and generous bend radius means ShapeArray can be installed where traditional inclinometers cannot. SAAV can zigzag into both new and existing casings, even those that are too distorted for conventional use, which saves time and money by eliminating the need to drill new boreholes when converting from manual to automated monitoring. A spring box at the top holds the joints firmly in contact with the casing, without any grout in the casing.

Focus on the zone of interest

Silent segments and extension tubes—two technologies specific to SAAV installed vertically/vertical SAAV installations—allow greater flexibility and control to place SAAV's sensorized segments in a zone of interest. 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. Extension tubes occupy space at the top if sensorized segments are not needed near the surface. Silent segments and extension tubes are 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 the time of order.

Perfect for detail-oriented monitoring

For certain monitoring situations, typically in urban construction environments critical infrastructure can be affected by even the slightest movements, clients may choose to install SAAV for in 27 mm ID conduit.

Convergence monitoring

SAAV sold for convergence monitoring applications is inserted into 21 mm ID PVC flex conduit at the factory and coiled onto its shipping reel. SAAV arrives ready to install directly to the tunnel wall with U-clamps.

Versatility

SAAV is designed to be as versatile as possible. SAAV can be configured for a specific installation type at the time of the order or converted in the field after purchase. SAAV is available in both 500 mm and 250 mm segment lengths, which allows clients to select the amount of spatial resolution they need.

PHYSICAL PROPERTIES

SEGMENT LENGTH	250 mm or 500 mm (joint center to joint center)
STANDARD LENGTH OF SAAV	Up to 150 m (500 mm segments) 50 m (250 mm segments) 30 m (convergence installation kit)
CUSTOM LENGTH OF SAAV	Over 150 m (Contact Measurand for details)
CONDUIT & CASING INSIDE DIAMETERS	27 mm, 47 mm to 100 mm
JOINT DIAMETER	19 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	0.5 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 12 VDC (12??16.5) at 0.4 mA/segment (low power mode)

STATIC SHAPE MEASUREMENTS

ITEM	SPECIFICATION
ANGULAR RANGE OF MEMS SENSORS	± 360° (software selection required for 2D/3D modes)
RANGE OF 3D MODE (VERTICAL) RESOLUTION	± 60° with respect to vertical 0.00067° (0.012 mm/m)
SYSTEM PRECISION ^{1,2,3}	± 0.5 mm for 30 m SAAV ± 0.0005° (0.01 mm/m) (68% confidence interval) ± 0.0050° (0.09 mm/m) (99.7% confidence interval)
SEGMENT PRECISION ⁴	± 0.01 mm/m (68% confidence interval) ± 0.03 mm/m (99% confidence interval)
SENSOR 24H STABILITY ⁵	< ±0.01°
AZIMUTH ERROR IN JOINTS	

¹ One-sigma value, based on a six-month cyclical installation. Accuracy value is a function of the square root of length ² Value based on AIA (Average in Array) setting of 1000 samples ³ Specification is for 3D mode within ± 20° of vertical. Vertical accuracy degrades with angular deviation from the vertical. ⁴ 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). ⁵ 24 h stability is the maximum change in the sensor readings in a 24 h period for an instrument installed in repeatability conditions. Sample size is 7,200 samples for each 24 h period reviewed.

SPECIFICATIONS