

Transportation Attitude Reference System Ruggedized Inertial Measurement Unit (IMU)

DESCRIPTION

The Transportation Attitude Reference System (TARS-IMU) is a packaged sensor array designed to report vehicle angular rate, acceleration, and attitude data for demanding applications in industries such as heavy-duty, off-highway transportation.

The TARS-IMU enables autonomous vehicle characteristics and enhances efficiency and productivity by reporting key data required to automate and monitor movements of vehicle systems and components. The sensor fusion algorithm may be customized for specific vehicle applications via on-board firmware, allowing movement data to be filtered for extraneous environment and vehicle movements.

With two sensor models for different power levels, the TARS-IMU accommodates both 5 V and 9 V to 36 V vehicle power systems. Communication is transmitted using industry standard CAN J1939 connectivity. As a standard, TARS-IMU is calibrated on aerospace-grade rate tables at the factory to provide enhanced calibration consistency between units.

Customization

The TARS-IMU may be customized to best meet application needs using the TARS Configurator Tool (TCT) software to change selected parameters such as broadcast rate, orientation, filter settings, etc. This tool creates a unique personality file which is then uploaded to the TARS-IMU for implementation.

DIFFERENTIATION

- **Flexible.** On-board firmware customizes the TARS-IMU to the specific vehicle for its designed application.
- **Durable.** With top-of-the-line sealing (IP67, IP69K), the TARS-IMU is ruggedized to withstand harsh or heavy-duty applications.
- **Convenient.** The TARS-IMU is delivered with customizable firmware that allows manufacturers to use a single part number across vehicles and applications. If preferred, the TARS-IMU may be pre-configured at the Honeywell factory for immediate installation out of the box.

VALUE TO CUSTOMERS

- Designed to allow vehicle manufacturers and end users to increase efficiency with the automation of repetitive movements and complex tasks
- Enables precise movement, actuation, and guidance over severe terrain and vehicle grades
- Enhances safety through monitoring and guidance capabilities to promote the productivity of operators

POTENTIAL APPLICATIONS

- Equipment control
- Linkage tracking
- Bucket control
- Work monitoring
- Vehicle stability control
- Operator assisted control
- Performance and output control
- Linear position



FEATURES

- High performance IMU reports vehicle angular rate, acceleration and inclination data (6 degrees of freedom, see Figure 1)
- Ruggedized PBT thermoplastic housing design for many demanding applications and environments (IP67 and IP69K certified)
- Advanced filtering of raw sensor data to minimize unwanted noise and vibration promotes positioning accuracy
- Supports 5 V and 9 V to 36 V vehicle power systems
- Operating temperature of -40°C to 85°C [-40°F to 185°F]
- Customizable via TCT software available on the web
- Reduced power consumption
- Small form-factor
- Optional metal guard for added protection



TARS-IMU joins Honeywell's venerated sensor portfolio, adding to the ever-increasing connected and intelligence driven capabilities that Honeywell offers. TARS-IMU is built to withstand the demanding applications in industries like off-highway transportation and beyond.

TRANSPORTATION ATTITUDE REFERENCE SYSTEM, TARS SERIES

FIGURE 1. SIX DEGREES OF FREEDOM

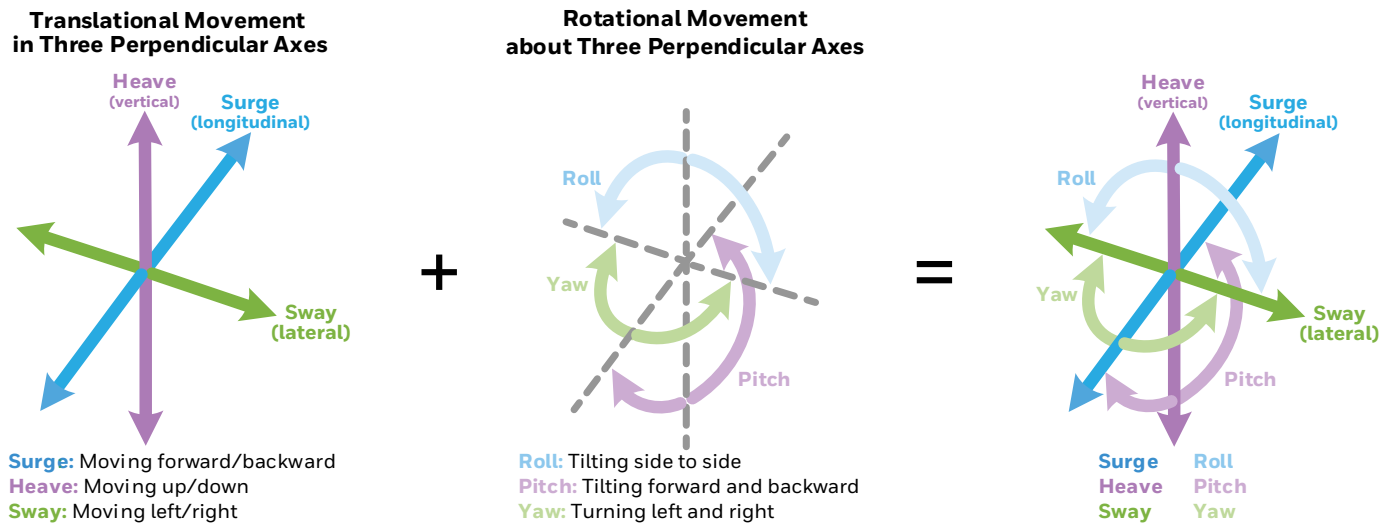


TABLE 1. SENSOR SPECIFICATIONS

CHARACTERISTIC	MIN.	TYP.	MAX.	UNIT
Gyroscope 3 axis performance				
Range ¹	-245	-	+245	deg/s
Resolution	-	8.75	-	mdps
In-run bias stability	-	1	-	mdps
Noise density	-	4	-	mdps/√Hz
Offset (0°C to 50°C)	-	±0.8	-	deg/s
Offset (-40°C to 85°C)	-	±1.6	-	deg/s
Accelerometer 3 axis performance				
Range ¹	-78.48	-	+78.48	m/s ²
Resolution ²	-	0.01	-	m/s ²
In-run bias stability	-	50	-	μg
Noise density	-	65	-	μg/√Hz
Offset (0°C to 50°C)	-	±0.05	-	m/s ²
Offset (-40°C to 85°C)	-	±0.15	-	m/s ²
Inclination (pitch and roll)				
Range ¹	-85	-	+85	deg
Resolution	-	0.014	-	deg
Static error (0°C to 50°C)	-	±0.3	-	deg
Static error (-40°C to 85°C)	-	±0.9	-	deg
Translational acceleration error	-	±0.5	-	deg
Centripetal acceleration error	-	±0.5	-	deg

¹ Sensors are calibrated in the following ranges: ±60 deg/s for angular rate, ±9.80665 m/s² for acceleration, and ±30 deg for pitch and roll. Calibrated ranges may be extended to maximums shown with deviation to performance specifications.

- Angular rate outputs per PGN 61482; Z-down convention required by J1939.
- Acceleration outputs per PGN 61485; Z-up convention required by J1939.
- Pitch and roll outputs per PGN 61481; Z-down convention required by J1939.

² Accelerometer resolution is limited by the J1939 protocol.

TRANSPORTATION ATTITUDE REFERENCE SYSTEM, TARS SERIES

TABLE 5. ENVIRONMENTAL SPECIFICATIONS ¹	
CHARACTERISTIC	PARAMETER
Operating temperature	-40°C to 85°C [40°F to 185°F]
Storage temperature ²	-40°C to 105°C [40°F to 221°F]
Housing	PBT thermoplastic
Random vibration	10 hours at 25 Grms per MIL-STD-810, Method 514.7, Procedure I, Annex D, Category 20, 5 Hz to 500 Hz (flat spectrum)
Mechanical shock	50 g 11 ms half-sine, 3 each direction, 18 total, pulse per MIL-STD-202, Method 213
Chemical compatibility	diesel fuel, hydraulic oil, ethylene glycol, motor oil, brake fluid, urea nitrogen, liquid lime, NPK fertilizer, ammonium hydroxide, alkaline degreaser, transmission oil, power steering fluid, and axle oil
Moisture resistance	per MIL-STD-202, Method 106 (10 cycles, 24 hours/cycle)
Thermal shock	250 cycles, -40°C to 85°C, 73 min dwell
Salt spray	5 % salt solution, 96 hours
Ingress protection	IP67, IP69K (DIN40050-1993) with mating connector installed
RoHS	compliant
REACH	compliant
UV rating	housing material meets outdoor suitability requirements per UL746C F1 rating

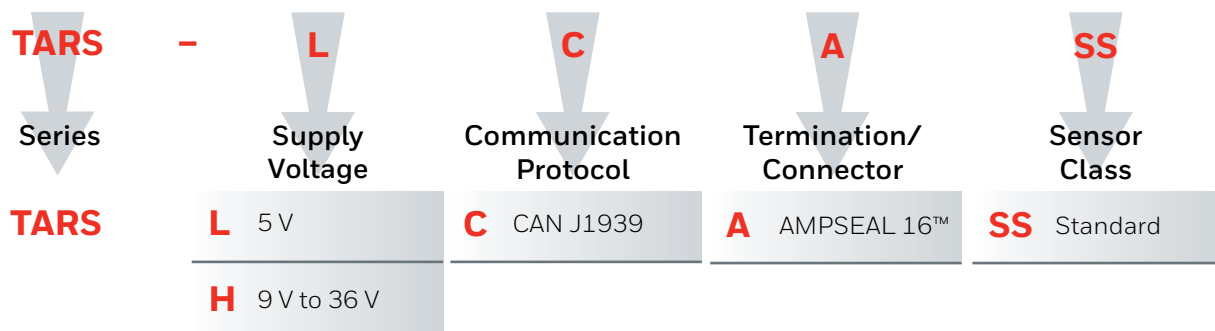
¹ For environmental conditions not covered by product specification, consult with Honeywell Engineering.

² In installed condition; otherwise, maximum storage temperature is 85°C [185°F].

TABLE 6. INSTALLATION SPECIFICATIONS	
CHARACTERISTIC	PARAMETER
Mating connector	AMPSEAL 16™ Series: 776487-1 for 18-16 AWG conductors or 776524-1 for 20-18 AWG conductors
CAN termination	120 ohm termination resistor, not included in TARS-IMU unit
Weight	170 g approx.
Mounting direction	+Z
Mounting bolt	M8, installation torque 20 Nm ±2 Nm

TABLE 7. ORDER GUIDE	
PART NUMBER	DESCRIPTION
TARS-LCASS	TARS Series Inertial Measurement Unit, 5 V supply voltage, CAN J1939 protocol, AMPSEAL 16™ Series connector
TARS-HCASS	TARS Series Inertial Measurement Unit, 9 V to 36 V supply voltage, CAN J1939 protocol, AMPSEAL 16™ Series connector

FIGURE 2. PRODUCT NOMENCLATURE



ADDITIONAL MATERIALS

The following associated literature is available at sps.honeywell.com/ast:

- Product range guide
- Product installation instructions
- Application information
- CAD models
- Product images

WARRANTY/REMEDY

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship during the applicable warranty period. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgment or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items that Honeywell, in its sole discretion, finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While Honeywell may provide application assistance personally, through our literature and the Honeywell web site, it is buyer's sole responsibility to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this writing. However, Honeywell assumes no responsibility for its use.

FOR MORE INFORMATION

Honeywell Advanced Sensing Technologies services its customers through a worldwide network of sales offices and distributors. For application assistance, current specifications, pricing or the nearest Authorized Distributor, visit sps.honeywell.com/ast or call:

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AMPSEAL 16™ is a trademark of Tyco Electronics Services GMBH.

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WARNING PERSONAL INJURY

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury.

WARNING MISUSE OF DOCUMENTATION

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

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