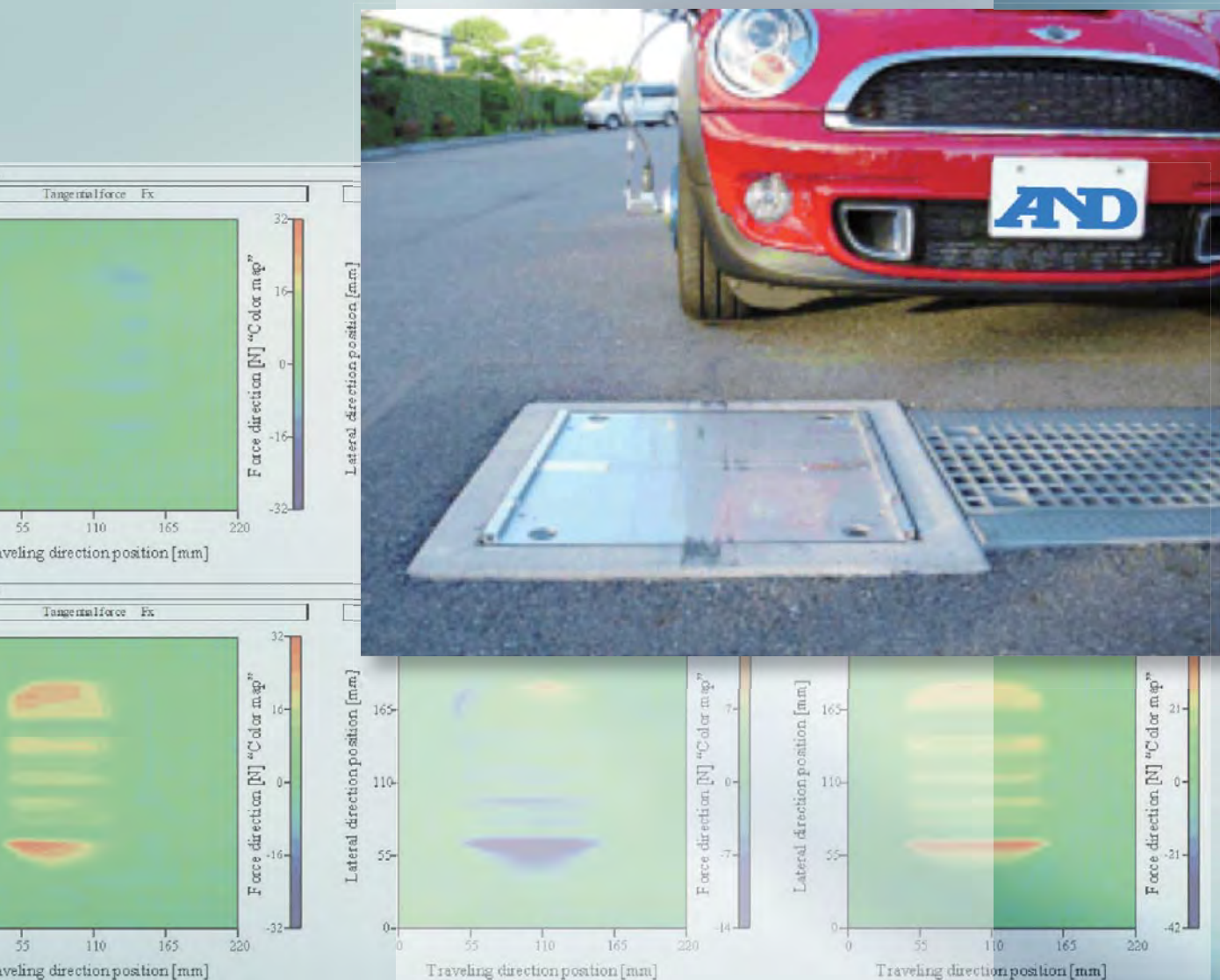


# Force Matrix Sensor **FMS** AD7822 series

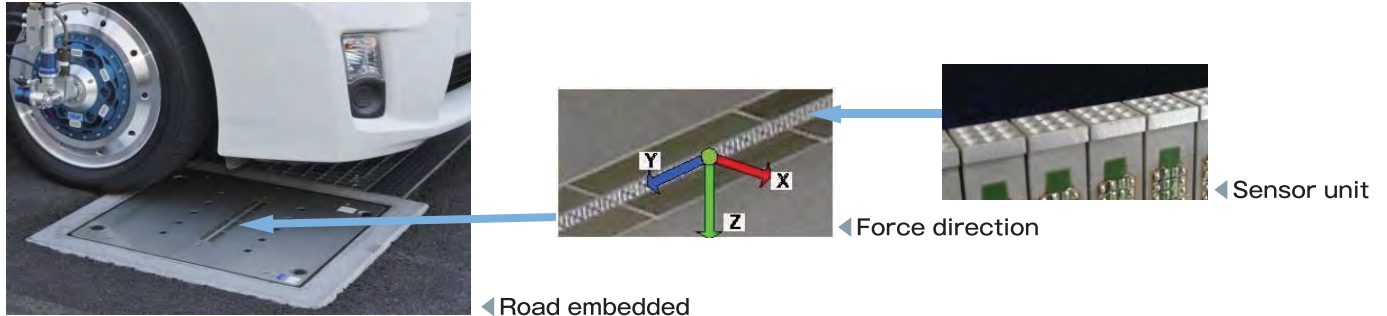
## Features

- Tire footprint force distribution measurement [Fx, Fy, Fz]
- High accuracy measurement:  $\pm 1\text{N}$  for all directions
- High resolution detection area (8mm $\times$ 8mm resolution, 40 sensors/row)
- High speed simultaneous data acquisition (100 ksps)



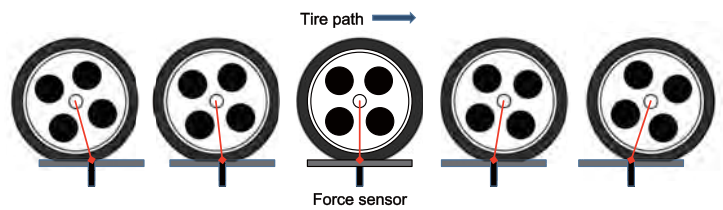
# FMS provides detailed force data for tire footprint analysis.

- Tire footprint force distribution measurement system for 3 component force [Fx, Fy, Fz]
- High resolution detection area with 8mm×8mm sensor head and 40 sensors/row.
- High speed simultaneous measurement for all signals (3 force×40 sensors) with 100 ksp/s. Fast enough to measure footprint forces with vehicle speed up to 400km/h
- High accuracy on force measurement (±1N) for all 3 components of force.



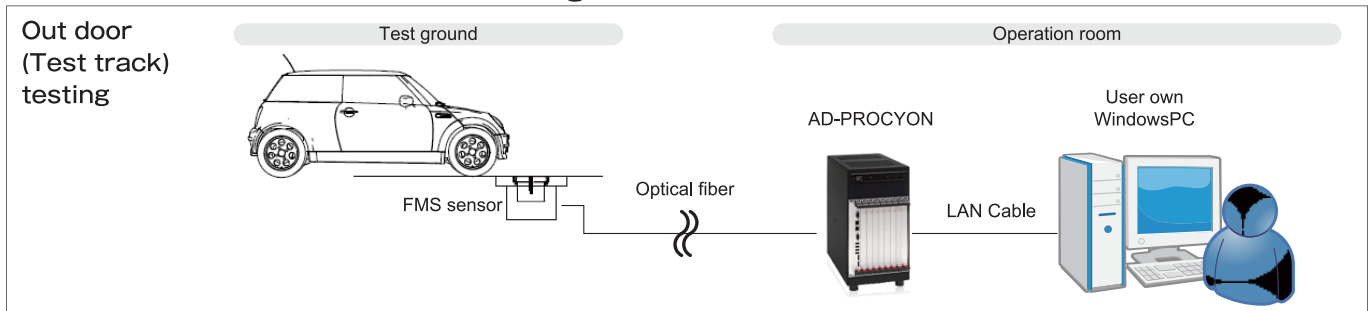
## Tire footprint measurement

Sensor bits are placed as array (line) and measure 3 components of force when vehicle tire goes over the sensor array. Data is measured in time base.



## System configuration

### Outdoor installation for vehicle testing



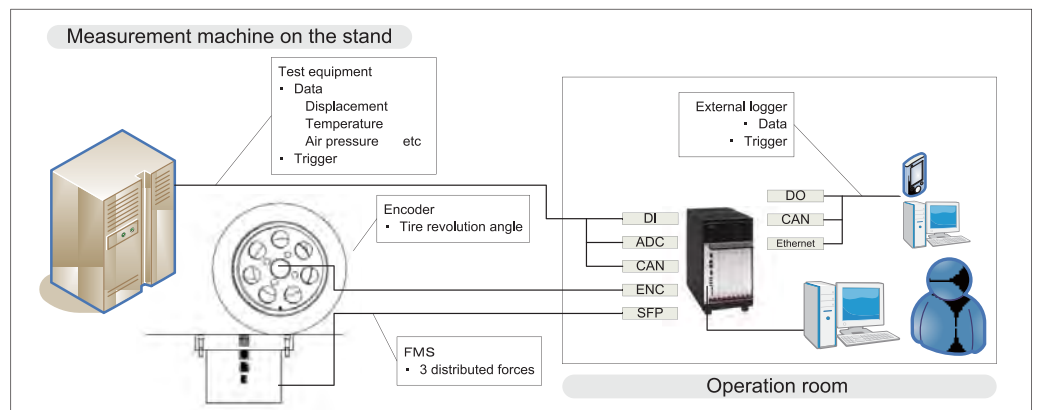
AD7822 consists of FMS sensor and AD-PROCYON DSP calculation unit.

- These two units are connected with optical fiber for high speed data transfer.
- Data is stored on the SSD memory installed inside the DSP and can be extracted via PC connection.
- PC application software is prepared for monitoring the measured data and parameter settings.

### Indoor installation for tire testing

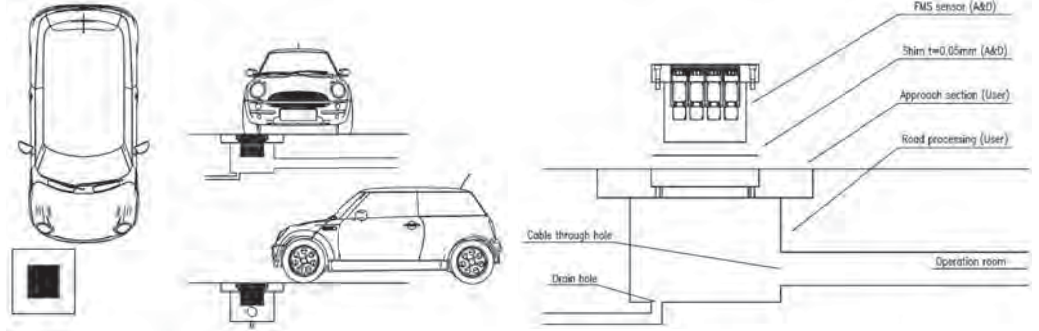
In the system below, the three components of tire footprint forces can be observed when the tire passes over the sensor at approximately 0.1 - 10km/h.

In general, testing rigs are equipped with various sensors therefore our high-end DSP system is equipped with CAN communication channels, analog input channels and encoder pulse input channel for synchronous data collection at 1-100ksp/s. It also has the capability for external sensor signal output as well as triggering functions for external data logger. PC based software allows the user to configure these settings



## Installation and construction

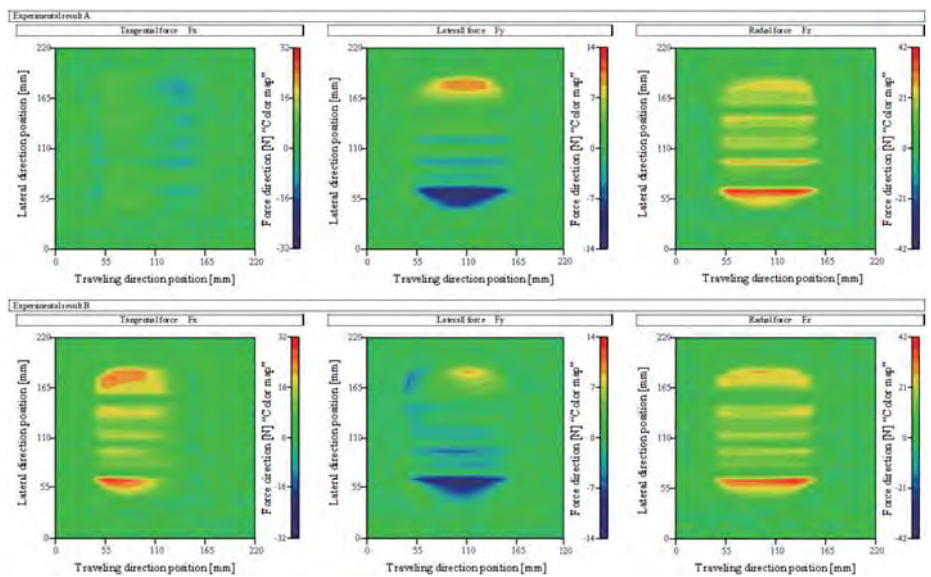
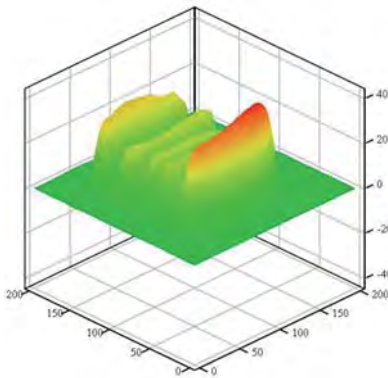
AD7822 is designed for installing it on a real road surface. In case of installation, construction at the road site by the user is required. Shown on the right is a figure for installing the sensor in the road surface. Sensor unit is indicated in grey.



## Measured data

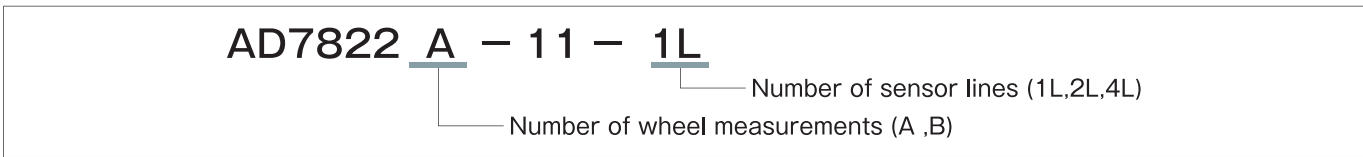
A sample of visual data of the 3 components of force ( $F_x$ ,  $F_y$ ,  $F_z$ ) when a vehicle passes over the FMS from left to right

- Comparison of coast down speeds (20km/h top, 60km/h bottom)

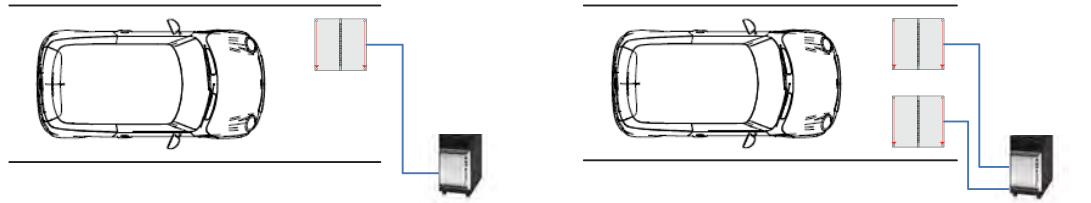


## Product line up

The AD7822 series has a number of different line-ups corresponding to different uses, such as the number of wheel measurements or sensor lines. An example of a selection code is shown below.



Number of Wheel measurements



▲ Single wheel application (AD7822A)

▲ Double wheels application (AD7822B)

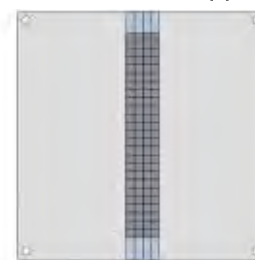
Sensor line application (A dummy sensor will be placed at the front and rear position of each sensor line to allow smooth entrance and exit.)



▲ 1 Line



▲ 2 Lines



▲ 4 Lines (limited to single wheel application)

## ■ Sensor specifications

### Sensor part specifications

Items		Specification
Size	Sensor head	7.5 mm × 7.5 mm
Measurement load	Longitudinal and lateral direction	50 N
	Vertical direction	100 N
Total accuracy (including linearity and hysteresis)		±1 N
Mechanical Resonance	Longitudinal / Lateral direction	7.6 kHz
	Vertical direction	95 kHz
Temperature effect	Zero	1%RO / 10degC
	Span	0.2% Load / 10 degC
Allowable load		300%
Temperature compensation range		-10 ~ 60 degC
Water proof		Drip-proof (can be used in rainy condition)
Data transfer		Max 100 ksp/s (kilo sample per sec)

## ■ DSP I/O specification

### External I/O specifications

Items		Specification
Ethernet	Number of channels	1
CAN	Number of channels	4
	Beau rate	125 k - 1 Mbps
Encoder pulse input	Number of channels	1
	Input format	Line driver differential input (A / B / Z phase)
	Maximim count number	-2, 147, 483, 648, ~ 2, 147, 483, 647
Analog input	Number of channels	2
	Input format	Single end
	Resolution	16 bit
	Input range	±10 V
Digital input	Number of channels	8
	Input format	Photo coupler input (supports current sink output)
	Operation input voltage level	DC 5 - 36V
Digital output	Number of channels	8
	Output format	Open collector output (Current sink type)
	Output level	DC 5 - 36V
External power supply voltege output	Number of power line	1
	Voltage	12 V
	Maximum curent	0.5 A

### Power supply specifications

Items	Specification
Votage	DC 24 V
Maximum power consumption	Less than 75 W per lin (40 sensors)

### Sensor Plate specifications

Items		Specification
Size	Sensor plate	498(W) × 498(D) × 80(H) mm
	Underground part	380(W) × 380(D) × 270(H) mm

### General specification

Items	Specification
Body scale	140(W) × 270(D) × 140(H) mm
Temperature range	0 - 40 °C
Humidity range	5 - 90 %RH
Storage temperature	-20 - 70 °C
Power supply	AC 90 - 264 V
Frequency	47 - 63 Hz
Maximum power output	120 W



**Safety Warning!**

● For proper use, read the instruction manuals carefully before use.

# AND

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● Appearances and/or specifications subject to improvement without notice.  
● Contents of this catalog last updated January 2013.

\*AD7822-ADCC-01-BP1-131005