



SENSORS FOR RESEARCH & DEVELOPMENT



SWIFT® Evo SPINNING WHEEL INTEGRATED FORCE TRANSDUCER



www.PCB.com/SWIFT | SWIFT@PCB.com

 **PCB PIEZOTRONICS**™ INC.
MTS SYSTEMS CORPORATION

nbn Austria GmbH

nbn



SWIFT® HISTORY

Through the acquisition of PCB Piezotronics, Inc. in 2016, MTS Systems Corporation strengthened their leading position in the sensor and test segment. SWIFT Evo is the first joint project between the two companies, harnessing the engineering power of both entities to create the next generation of the innovative SWIFT wheel force transducers. Since the introduction of the SWIFT, this system has been employed in development programs of many of the world's vehicle makers, as well as their suppliers. Over 800 legacy SWIFT units are in use on the most demanding proving grounds. With a strong MTS/PCB® global team of experts we can simplify your testing with service for these legacy units, rental of new SWIFT Evo units*, and calibration of new and legacy products, making SWIFT Evo the best choice for both road and road simulator applications.

*Rentals are available from The Modal Shop Inc, a subsidiary of PCB Piezotronics, Inc.

EVOLVING TECHNOLOGY

SWIFT Evo technology provides superior, high quality measurements using an innovative 1-piece design that results in a high sensitivity wheel force transducer with excellent linear behavior and high overload capacity. Through the combined efforts of MTS and PCB, the SWIFT Evo series has evolved with improved thermal performance, additional electronic data information, and a new Graphical User Interface.

The SWIFT Evo is tested to SAE J267 and J328 requirements, assuring a long expected life period when properly maintained. The one-piece construction and MTS' patented flexure isolation reduce cross coupling and increases sensitivity for resolution of very small forces and moments.

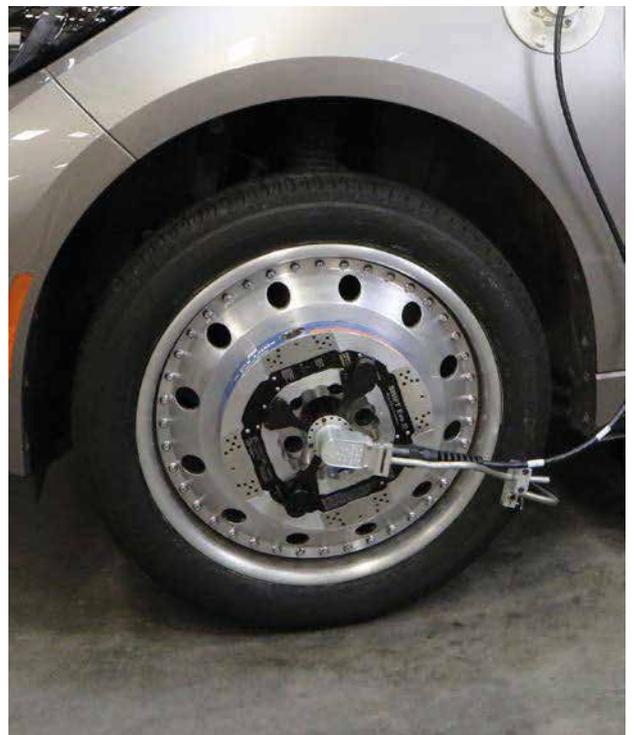


SAVE TIME & MONEY

Streamline your tests and save time on the proving ground or in the lab on a simulation rig. The ease of installation and inherent reliability of the rugged structure of the SWIFT Evo transducer, coupled with a new Graphical User Interface and Transducer Electronic Data Sheet (TEDS), which contains the critical calibration data, allows data to be delivered to your design team or test lab in hours, rather than days. Financial investment in SWIFT Evo technology can be recouped in as little as three vehicle data acquisition programs.

APPLICATIONS

- Road load data acquisition
- Laboratory simulation such as spindle coupled road simulation and other systems
- Tire tread wear and characterization testing
- Dynamic suspension characteristics measurements
- Supporting vehicle analysis needs such as computer model verification and NVH study





TECHNICAL DESIGN

The one-piece design of the SWIFT Evo transducer is machined from a solid, specially forged billet of high-strength aluminum or titanium with eight fully active bridges. All SWIFT Evo transducers use this efficient and robust design and construction approach. Advantages include:

- Stiff outer ring and flexure beam isolation – Results in a design that is insensitive to stiffness variation in mating with rims and road simulator fixtures. *Overall, an easier transducer design to use and work with.*
- One piece design, no bolted joints – Avoids micro slippage which can occur in bolted joints which is the largest contributor to hysteresis. Also enables efficient heat transfer across the structure minimizing temperature differentials in gaged areas. *A transducer that has excellent hysteresis performance and minimizes thermal impact.*
- Patented flexure isolation structure – Decouples the six components of measurement to reduce cross-coupling between measured axes, increases the sensitivity and reduces thermal response. *A transducer that has excellent accuracy.*
- Efficient mechanical design – Requires minimal gages in the structure improving reliability and robustness. *A transducer that has been proven to be robust and one that customers can rely on for many years to come.*

Aluminum versions are engineered for road load data acquisition applications. A titanium or steel version may be preferred (if available) in applications where higher loads are necessary, or where challenging high cycle durability requirements are anticipated. Performance specifications for all models and versions are located in the back of this brochure.

Since the SWIFT Evo transducer is adaptable to many wheel sizes and vehicle spindle configurations, one set of transducers can be used on a wide range of vehicles. Each version of the SWIFT Evo transducer provides high load capacity, as well as outstanding durability and accuracy. The universal application and flexibility of the SWIFT Evo transducer saves you time in your testing setup and changeover, in addition to having a range of sizes to meet all your testing needs.





EASE OF INSTALLATION

The SWIFT Evo transducer design was engineered for easy installation. It can be installed, connected, and ready for operation in just a few hours, saving time and effort versus traditional methods. MTS/PCB will custom design these components to meet your exact installation requirements while keeping differential weight at a minimum.



Mount the SWIFT Evo transducer to an adapted wheel



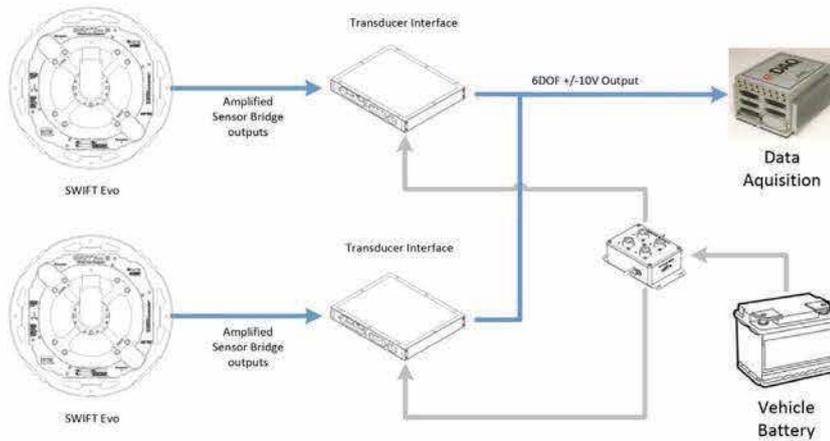
Set up data acquisition



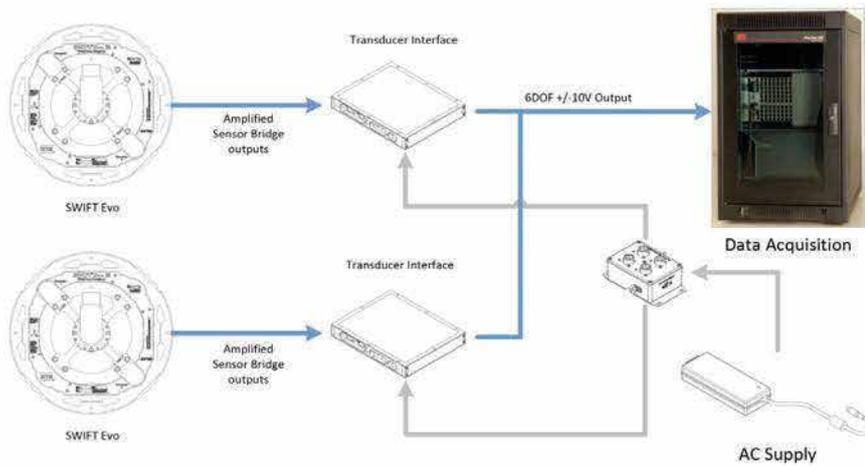
The SWIFT Evo transducer easily adapts to most vehicles



Road Load Data Acquisition Configuration



Durability Rig Data Acquisition Configuration

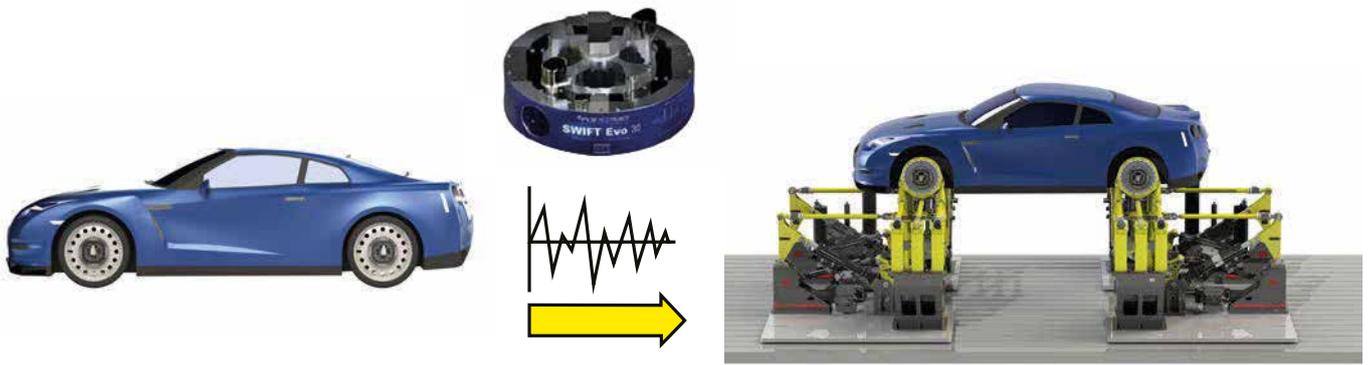


HOW IT WORKS

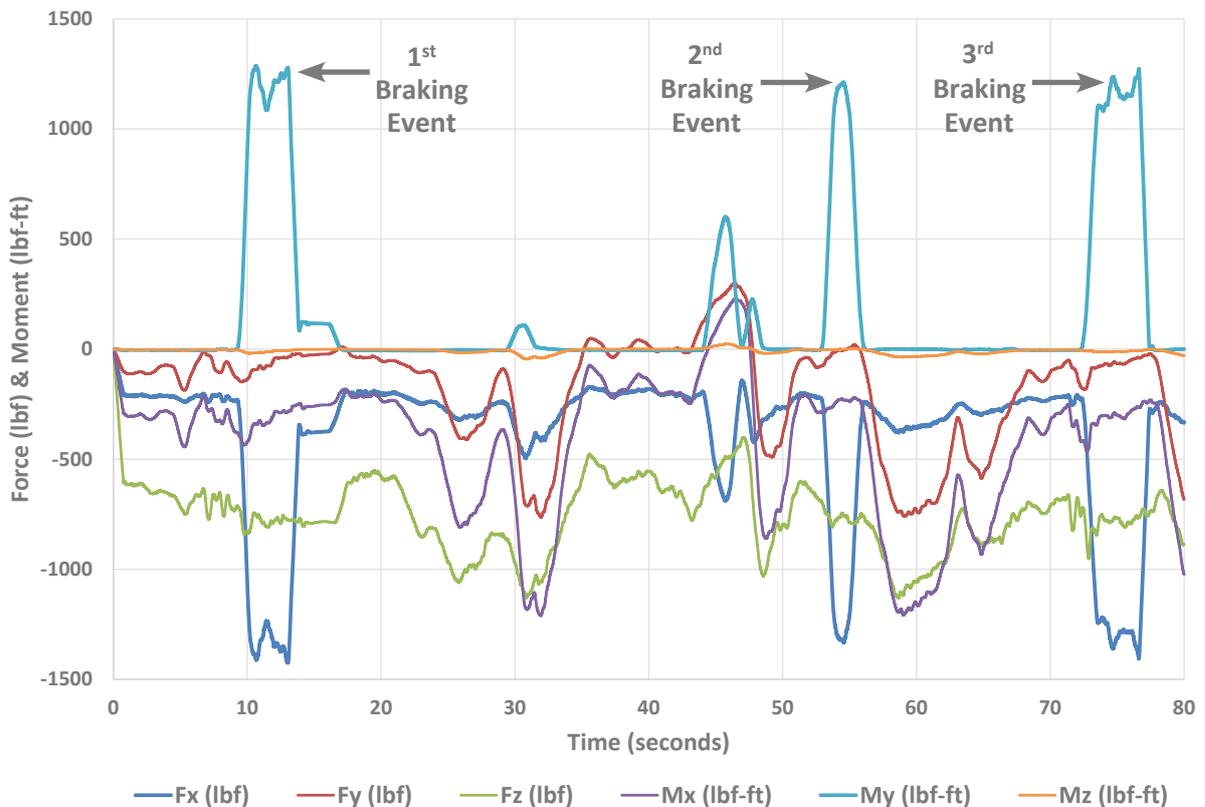
When using a SWIFT Evo sensor on a moving vehicle, the strain gage bridges within the transducer measure components of forces and moments, while an angular position transducer measures the relative position of the sensing bridges relative to the vehicle body. Analog electronics onboard the transducer condition the strain gage bridges to an amplitude level that permits low noise signal transmission.

This approach maximizes the signal-to-noise ratio of the data while the SWIFT Evo design provides you with high quality data, signal integrity, and superior synchronicity. The output from the Evo TI (Transducer Interface) is an analog high-level signal suitable for input to a multi-channel data acquisition system. The Evo TI (Transducer Interface) performs geometric strain bridge summation, cross-talk compensation and coordinate transformation to give outputs in the six loading axes in stationary vehicle coordinates.

SPINNING WHEEL INTEGRATED FORCE TRANSDUCER



HEAVY BRAKING DATA



Shown above is actual spindle load data taken with a SWIFT Evo sensor from heavy braking events.

The SWIFT Evo transducer measurement system employs the Evo TI to transform the measured wheel data to true spindle loads in real time. This maintains the accuracy of the measured loads while avoiding phase distortion and high noise levels. Enhanced performance is especially apparent at lower amplitudes and higher frequencies, allowing the accurate measurement of the loads critical for NVH or tire characterization studies.

The measured parameters are:

- Longitudinal force (Fx)
- Lateral force (Fy)
- Vertical force (Fz)
- Overturning moment (Mx)
- Driving/braking moment (My)
- Steering moment (Mz)
- Wheel rotational position



ONE TRANSDUCER, MULTIPLE WHEEL SIZES

The SWIFT Evo transducer design simply and inexpensively adapts to a wide variety of wheel rim and hub configurations while maintaining an overall mass comparable to the standard wheel. With five sizes available, you can employ the SWIFT Evo transducer on a wide range of vehicles.

Five standard sizes of SWIFT Evo transducers are available, covering a broad range of testing requirements:

- SWIFT Evo 10 for motorcycles, ATVs, and small vehicles
- SWIFT Evo 20 for small cars and high performance cars
- SWIFT Evo 30 for medium and large passenger cars and minivans
- SWIFT Evo 40 transducer for light trucks and sport-utility vehicles (SUVs)
- SWIFT Evo 45 for medium-duty trucks

The SWIFT Evo 10/20/30/40 transducers are available in aluminum and titanium versions. The SWIFT Evo 45 transducer is available in titanium only. Performance specifications are available in the back of this brochure. Custom wheel force transducers can be developed for applications that cannot be met by the standard SWIFT Evo product line. Additionally, PCB can design and manufacture custom rim and hub adapters to meet the installation requirements. Please contact PCB for more information on these applications.



SWIFT Evo 10



SWIFT Evo 20



SWIFT Evo 30



SWIFT Evo 40

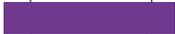


SWIFT Evo 45



DETERMINING THE CORRECT MODEL

To determine the correct SWIFT Evo transducer for your application, take the axle weight for the axle the SWIFT Evo is to be mounted on, and divide by two for the half axle weight. Select a SWIFT Evo for which the SAE rating table (below) meets or exceeds the half axle weight of the application. This will give the approximate load on the rim. All sensors have passed the SAE J267 or J328 specifications for rim design. See the chart below and consult with MTS/PCB to determine the exact SWIFT Evo model needed for your applications.

	Model	Material	Assembly Weight kg (lb)	Half Axle Durability Rating kg (lb)*
	SWIFT Evo 10	Ti	6.5 kg (14.3 lbs)	 725 kg (1,600 lbs)
	SWIFT Evo 20	Al	9.4 kg (20.7 lbs)	 420 kg (965 lbs)
	SWIFT Evo 20	Ti	11 kg (24.2 lbs)	 717 kg (1,580 lbs)
	SWIFT Evo 30	Al	13.1 kg (28.9 lbs)	 662 kg (1,460 lbs)
	SWIFT Evo 30	Ti	22.7 kg (50 lbs)	 1,089 kg (2,400 lbs)
	SWIFT Evo 40	Al	31.8 kg (70 lbs)	 1,225 kg (2,700 lbs)
	SWIFT Evo 40	Ti	36.3 kg (80 lbs)	 2,313 kg (5,100 lbs)
	SWIFT Evo 45	Ti	62 kg (137 lbs)	 3,629 kg (8,000 lbs)

* See specifications for complete information in English and Metric units.



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THE SWIFT Evo CONTINUES THE LONG TRADITION OF THE LEGENDARY SWIFT PRODUCT LINE WITH ENGINEERING ENHANCEMENTS MADE TO MAKE THE PRODUCT EVEN MORE ACCURATE, EASIER TO USE AND WITH THE SAME DURABILITY MAJOR AUTO MANUFACTURERS WORLDWIDE HAVE COME TO EXPECT FROM MTS AND PCB.

”

- Rick Meyer, Chief Engineer, Custom Transducers



GLOBAL CUSTOMER SERVICE

RENTAL

SWIFT Evo systems are available for rental, including all cables and the SWIFT Evo Transducer Interface Box, along with rims and hub adapters. The SWIFT Evo can be rented for various lengths of times to meet your testing needs. Please contact The Modal Shop Inc. at +1-513-351-9919 or SWIFT@pcb.com for rental information. The Modal Shop, Inc., is a subsidiary of PCB Piezotronics, Inc.

TRAINING

Technicians are available to assist with your setup of SWIFT Evo transducers. In addition, we can offer a SWIFT Evo training program that is designed to improve technician efficiency and maximize system performance. Expertly led training courses provide hands-on learning to make sure your technicians are thoroughly familiar with the SWIFT Evo system and know how to operate it properly.

CONSULTING

PCB offers a complete set of professional engineering services including test consulting. PCB experts will listen to your test objectives, analyze your situation, and create an action plan to specific system requirements. We can provide test designs, data collection, and results analysis, as well as help you develop long-range lab plans that support your testing goals.

WARRANTY

PCB builds some of the most rugged and reliable testing equipment on the market. PCB warrants its equipment to be free from defects in material and workmanship under normal use, given proper installation and maintenance, for 24 months from the date of shipment. Defective equipment may be repaired or replaced at our option. Visit www.pcb.com/Terms_Conditions to see full details of our limited warranty.

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CALIBRATION

Test labs must calibrate their testing equipment to help ensure data accuracy. SWIFT Evo transducers are calibrated at the MTS Metrology and Calibration Laboratory. This lab provides top-quality, quick turn-around calibration services for hundreds of SWIFT transducers per year and is accredited by the American Association for Laboratory Accreditation (A2LA Certificate Number 1044.1) to perform calibration in electrical, mechanical, dimensional, time/frequency, temperature/humidity, and vibration. The basis for this accreditation is the international standard for calibration laboratories, ISO/IEC 17025 “General Requirements for the Competence of Calibration and Testing Laboratories” and ANSI/NCSL Z540-1. Contact us to schedule a calibration of your SWIFT or SWIFT Evo transducer.

REPAIR

Making sure that equipment is ready for use when needed and test projects are completed on-time without unexpected breakdowns are important aspects of test lab management. But unexpected breakdowns occur. Whether it is a minor repair, or your transducer has serious damage, we can meet your service needs to get the unit repaired and back to your test laboratory quickly.

TRADE-IN

PCB offers a trade-in option on the SWIFT transducer (transducer only). In addition, we offer trade-in for competitors' Wheel Force Transducers (body only). Please contact us for complete details.

TECHNICAL SUPPORT

Support and assistance in answering technical questions that you may encounter with your SWIFT Evo system is available 24/7 by calling +1-716-684-0001.



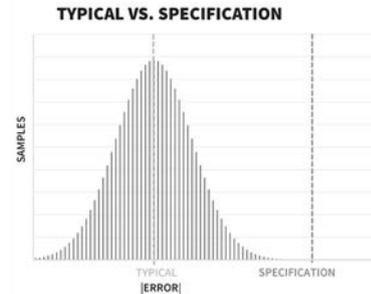
SWIFT Evo 10 MOTORCYCLE/ATV SPECIFICATIONS

MEASURED VALUE	UNITS	ALUMINUM SWIFT Evo 10A	TITANIUM SWIFT Evo 10T	
Maximum Calibrated Load Ratings:				
Fx	kN (lb)	12 (2,643)	20 (4,400)	
Fy	kN (lb)	7 (1,540)	12 (2,640)	
Fz	kN (lb)	12 (2,643)	20 (4,400)	
Mx	kN-m (lb-ft)	1.6 (1,180)	3 (2,235)	
My	kN-m (lb-ft)	2.2 (1,612)	3.5 (2,565)	
Mz	kN-m (lb-ft)	1.6 (1,180)	3 (2,235)	
Noise Level Peak to Peak (0-500 Hz)	N	4	6	
Maximum Usable RPM	RPM	2400*	2400*	
Maximum Speed (15 in. rolling radius)	kph (mph)	240 (150)	240 (150)	
Maximum Operating Temperature (measured at the spindle hub)	°C (°F)	125 (257)	125 (257)	
Shock Resistance; Each Axis	G	60	60	
SWIFT Evo Environmental Protection Rating		IP67		
Input Voltage Required	VDC	10-28		
Input Power Required per Transducer	W	6		
Output Voltage Full Scale Calibrated Load	VDC	±10		
SAE J328 Half Axle Rating	kg (lb)	250 (550)	420 (920)	
SAE Bending Moment Seen on Cell		1.45 (1,072.4)	4.76 (3,509.8)	
		Specification % (Typical Performance %**)		
Nonlinearity	Force	%FS	0.4 (0.2)	0.4 (0.2)
	Moment	%FS	0.7 (0.2)	0.7 (0.2)
Hysteresis	Force	%FS	0.2 (0.2)	0.2 (0.2)
	Moment	%FS	0.5 (0.2)	0.5 (0.2)
Crosstalk	Fy → Fx,Fz	%FS	0.6 (0.2)	0.6 (0.2)
	Fx ↔ Fz	%FS	0.6 (0.2)	0.6 (0.2)
	Fx,Fz → Fy	%FS	0.4 (0.2)	0.4 (0.2)
Assembly Weight Information:				
Transducer	kg (lb)	1.3 (2.8)	2.0 (4.5)	
Hub Adapter	kg (lb)	0.4 (0.8)	0.6 (1.4)	
Slip Ring Assembly	kg (lb)	0.4 (0.9)	0.5 (1.1)	
17" x 3.5"(10A)/10" x 5"(10T) Modified Rim	kg (lb)	5.4 (11.8)	2.4 (5.3)	
Modified Lug Nuts (Qty 5)	kg (lb)	0.4 (0.8)	0.1 (0.2)	
Sensor Mounting Fasteners	kg (lb)	0.5 (1.1)	0.8 (1.8)	
Total Weight	kg (lb)	8.3 (18.2)	6.5 (14.3)	
Reference Weight of Standard Unmodified 17" x 3.5" Rim and Lug Nuts (10A), and 10" x 5" (10T) and Lug Nuts	kg (lb)	3.1 (6.9)	1.8 (4.0)	
Weight Differential***	kg (lb)	5.2 (11.3)	4.7 (10.3)	
Minimum Rim Size	mm (in)	177.8 (7)	177.8 (7)	
Typical Lug Nut Bolt Circle Accomodated	mm	All		
Output Connector Type		BNC		
Auto Shunt Calibration		On Vehicle or Test Rig		

NOTES:

- Based on loads at the center of the transducer.
- Each SWIFT Evo transducer will be calibrated on an MTS calibration machine. MTS/PCB provides complete documentation of calibration values by serial number for each SWIFT Evo unit. Unique calibration values are stored electronically and transferred to the transducer interface box (Evo TI box) shipped with each SWIFT Evo system.
- Periodic recalibration services can be provided by MTS/PCB.
- MTS/PCB can manufacture rims designed in accordance with SAE J328 criteria.
- Proper rim design is essential for optimum performance.

Specifications are subject to change without notice.



*3000 rpm for tests lasting less than 30 minutes and 200 mph cooling air.

** "Typical Performance" listed is better than or equal to the median historical performance level.

*** Weight differential is calculated based on typical OEM alloy wheels versus rim and hub adaptors designed according to J328 load cases.

SWIFT Evo 20 SMALL CAR SPECIFICATIONS

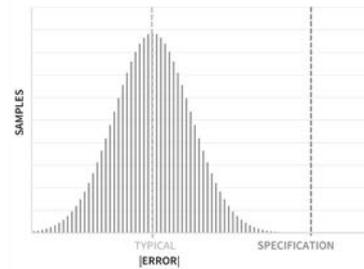
MEASURED VALUE		UNITS	ALUMINUM SWIFT Evo 20A	TITANIUM SWIFT Evo 20T
Maximum Calibrated Load Ratings:				
Fx		kN (lb)	21 (4,721)	30 (6,744)
Fy		kN (lb)	16 (3,597)	25 (5,620)
Fz		kN (lb)	21 (4,721)	30 (6,744)
Mx		kN-m (lb-ft)	4 (2,950)	6 (4,425)
My		kN-m (lb-ft)	5 (3,687)	8.5 (6,269)
Mz		kN-m (lb-ft)	4 (2,950)	6 (4,425)
Noise Level Peak to Peak (0-500 Hz)		N	4	6
Maximum Usable RPM		RPM	2400*	2400*
Maximum Speed (15 in. rolling radius)		kph (mph)	240 (150)	240 (150)
Maximum Operating Temperature (measured at the spindle hub)		°C (°F)	125 (257)	125 (257)
Shock Resistance; Each Axis		G	60	60
SWIFT Evo Environmental Protection Rating			IP67	
Input Voltage Required		VDC	10-28	
Input Power Required per Transducer		W	6	
Output Voltage Full Scale Calibrated Load		VDC	±10	
SAE J328 Half Axle Rating		kg (lb)	438 (965)	717 (1,580)
SAE Bending Moment Seen on Cell			2.7 (2,000)	7.3 (5,416)
Specification % (Typical Performance %**)				
Nonlinearity	Force	% FS	0.3 (0.15)	0.3 (0.15)
	Moment	% FS	0.5 (0.2)	0.5 (0.2)
Hysteresis	Force	% FS	0.2 (0.1)	0.2 (0.1)
	Moment	% FS	0.3 (0.2)	0.3 (0.2)
Crosstalk	Fy → Fx,Fz	% FS	0.4 (0.25)	0.4 (0.25)
	Fx ↔ Fz	% FS	0.5 (0.25)	0.5 (0.25)
	Fx,Fz → Fy	% FS	0.5 (0.3)	0.5 (0.3)
Assembly Weight Information:				
Transducer		kg (lb)	3.0 (6.7)	4.8 (10.5)
Hub Adapter		kg (lb)	1.0 (2.3)	1.0 (2.3)
Slip Ring Assembly		kg (lb)	0.5 (1.2)	0.5 (1.2)
15" x 6" Modified Rim		kg (lb)	4.1 (9.0)	4.1 (9.0)
Modified Lug Nuts (Qty 5)		kg (lb)	0.5 (1.1)	0.5 (1.1)
Sensor Mounting Fasteners		kg (lb)	0.4 (0.8)	0.4 (0.8)
Total Weight		kg (lb)	9.6 (21.1)	11.3 (24.9)
Reference Weight of Standard Unmodified 15" x 6" Rim and Lug Nuts		kg (lb)	10.0 (22.1)	10.0 (22.1)
Weight Differential***		kg (lb)	-0.4 (-1.0)	1.3 (2.8)
Minimum Rim Size		mm (in)	304.8 (12)	304.8 (12)
Typical Lug Nut Bolt Circle Accomodated		mm	98 to 150	
Output Connector Type			BNC	
Auto Shunt Calibration			On Vehicle or Test Rig	
Modal Properties: Frequency				
With Tire & Rim	Mx, My	Hz	325	
	Fy	Hz	610	
Without Tire & Rim	Mx, My	Hz	980	
	Fy	Hz	1,575	

NOTES:

- Based on loads at the center of the transducer.
- Each SWIFT Evo transducer will be calibrated on an MTS calibration machine. MTS/PCB provides complete documentation of calibration values by serial number for each SWIFT Evo unit. Unique calibration values are stored electronically and transferred to the transducer interface box (Evo TI box) shipped with each SWIFT Evo system.
- Periodic recalibration services can be provided by MTS/PCB.
- MTS/PCB can manufacture rims designed in accordance with SAE J328 criteria.
- Proper rim design is essential for optimum performance.

Specifications are subject to change without notice.

TYPICAL VS. SPECIFICATION



*3000 rpm for tests lasting less than 30 minutes and 200 mph cooling air.

** "Typical Performance" listed is better than or equal to the median historical performance level.

*** Weight differential is calculated based on typical OEM alloy wheels versus rim and hub adaptors designed according to J328 load cases.



SWIFT Evo 30 PASSENGER CAR SPECIFICATIONS

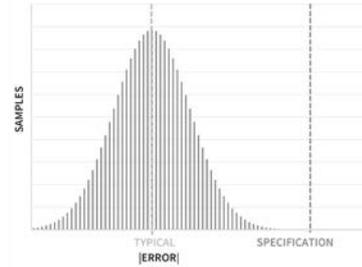
MEASURED VALUE		UNITS	ALUMINUM SWIFT Evo 30A	TITANIUM SWIFT Evo 30T
Maximum Calibrated Load Ratings:				
Fx		kN (lb)	28 (6,295)	50 (11,240)
Fy		kN (lb)	23 (5,171)	40 (8,992)
Fz		kN (lb)	28 (6,295)	50 (11,240)
Mx		kN-m (lb-ft)	5 (3,688)	9 (6,638)
My		kN-m (lb-ft)	7.5 (5,532)	13 (9,588)
Mz		kN-m (lb-ft)	5 (3,688)	9 (6,638)
Noise Level Peak to Peak (0-500 Hz)		N	3	5
Maximum Usable RPM		RPM	2400*	2400*
Maximum Speed (15 in. rolling radius)		kph (mph)	240 (150)	240 (150)
Maximum Operating Temperature (measured at the spindle hub)		°C (°F)	125 (257)	125 (257)
Shock Resistance; Each Axis		G	60	60
SWIFT Evo Environmental Protection Rating			IP67	
Input Voltage Required		VDC	10-28	
Input Power Required per Transducer		W	6	
Output Voltage Full Scale Calibrated Load		VDC	±10	
SAE J328 Half Axle Rating		kg (lb)	662 (1,460)	1,089 (2,400)
SAE Bending Moment Seen on Cell			4.1 (3,000)	11.3 (8,333)
Specification % (Typical Performance %**)				
Nonlinearity	Force	% FS	0.2 (0.15)	0.2 (0.15)
	Moment	% FS	0.3 (0.2)	0.3 (0.2)
Hysteresis	Force	% FS	0.2 (0.1)	0.2 (0.1)
	Moment	% FS	0.3 (0.2)	0.3 (0.2)
Crosstalk	Fy → Fx, Fz	% FS	0.25 (0.2)	0.25 (0.2)
	Fx ↔ Fz	% FS	0.3 (0.2)	0.3 (0.2)
	Fx, Fz → Fy	% FS	0.4 (0.2)	0.4 (0.2)
Assembly Weight Information:				
Transducer		kg (lb)	4.3 (9.4)	6.2 (13.7)
Hub Adapter		kg (lb)	1.3 (2.9)	1.3 (2.9)
Slip Ring Assembly		kg (lb)	0.6 (1.3)	0.6 (1.3)
16" x 7" Modified Rim		kg (lb)	4.1 (9.0)	9.8 (21.5)
Modified Lug Nuts (Qty 5)		kg (lb)	0.5 (1.1)	0.5 (1.1)
Sensor Mounting Fasteners		kg (lb)	1.1 (2.4)	1.1 (2.4)
Total Weight		kg (lb)	11.8 (26.1)	19.5 (42.9)
Reference Weight of Standard Unmodified 16" x 7" Rim and Lug Nuts		kg (lb)	12.2 (27.0)	12.2 (27.0)
Weight Differential***		kg (lb)	-0.4 (-0.9)	7.3 (15.9)
Minimum Rim Size		mm (in)	330.2 (13)	330.2 (13)
Typical Lug Nut Bolt Circle Accomodated		mm	100 to 130	
Output Connector Type			BNC	
Auto Shunt Calibration			On Vehicle or Test Rig	
Modal Properties: Frequency				
With Tire & Rim	Mx, My	Hz	385	425
	Fy	Hz	675	765
Without Tire & Rim	Mx, My	Hz	845	810
	Fy	Hz	1,255	1,445

NOTES:

- Based on loads at the center of the transducer.
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- Periodic recalibration services can be provided by MTS/PCB.
- MTS/PCB can manufacture rims designed in accordance with SAE J328 criteria.
- Proper rim design is essential for optimum performance.

Specifications are subject to change without notice.

TYPICAL VS. SPECIFICATION



*3000 rpm for tests lasting less than 30 minutes and 200 mph cooling air.

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*** Weight differential is calculated based on typical OEM alloy wheels versus rim and hub adaptors designed according to J328 load cases.

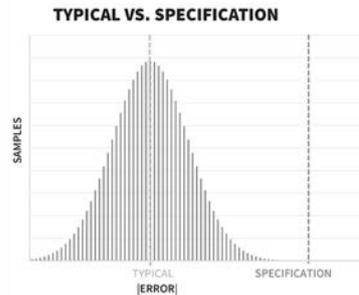
SWIFT Evo 40 LIGHT TRUCK SPECIFICATIONS

MEASURED VALUE		UNITS	ALUMINUM SWIFT Evo 40A	TITANIUM SWIFT Evo 40T
Maximum Calibrated Load Ratings:				
Fx		kN (lb)	40 (8,992)	60 (13,489)
Fy		kN (lb)	30 (6,744)	45 (10,116)
Fz		kN (lb)	40 (8,992)	60 (13,489)
Mx		kN-m (lb-ft)	9 (6,638)	15 (11,063)
My		kN-m (lb-ft)	13 (9,588)	20 (14,751)
Mz		kN-m (lb-ft)	9 (6,638)	15 (11,063)
Noise Level Peak to Peak (0-500 Hz)		N	4	6
Maximum Usable RPM		RPM	2400*	2400*
Maximum Speed (15 in. rolling radius)		kph (mph)	240 (150)	240 (150)
Maximum Operating Temperature (measured at the spindle hub)		°C (°F)	125 (257)	125 (257)
Shock Resistance; Each Axis		G	60	60
SWIFT Evo Environmental Protection Rating			IP67	
Input Voltage Required		VDC	10-28	
Input Power Required per Transducer		W	6	
Output Voltage Full Scale Calibrated Load		VDC	±10	
SAE J328 Half Axle Rating		kg (lb)	1,227 (2,700)	2,318 (5,100)
SAE Bending Moment Seen on Cell			8.2 (6,042)	21.9 (16,167)
Specification % (Typical Performance %**)				
Nonlinearity	Force	% FS	0.3 (0.15)	0.3 (0.15)
	Moment	% FS	0.5 (0.2)	0.5 (0.2)
Hysteresis	Force	% FS	0.2 (0.1)	0.2 (0.1)
	Moment	% FS	0.3 (0.2)	0.5 (0.2)
Crosstalk	Fy → Fx,Fz	% FS	0.2 (0.2)	0.2 (0.2)
	Fx ↔ Fz	% FS	0.3 (0.2)	0.3 (0.2)
	Fx,Fz → Fy	% FS	0.25 (0.2)	0.25 (0.2)
Assembly Weight Information:				
Transducer		kg (lb)	8.5 (18.8)	12.4 (27.3)
Hub Adapter		kg (lb)	2.3 (5.0)	3.7 (8.2)
Slip Ring Assembly		kg (lb)	0.6 (1.3)	0.6 (1.3)
17" x 8" Modified Rim		kg (lb)	11.1 (24.4)	13.0 (28.6)
Modified Lug Nuts (Qty 5)		kg (lb)	0.5 (1.1)	0.5 (1.1)
Sensor Mounting Fasteners		kg (lb)	1.8 (4.0)	1.8 (4.0)
Total Weight		kg (lb)	24.8 (54.6)	32.0 (70.5)
Reference Weight of Standard Unmodified 17" x 8" Rim and Lug Nuts		kg (lb)	14.9 (32.8)	14.9 (32.8)
Weight Differential***		kg (lb)	9.9 (21.8)	17.1 (37.7)
Minimum Rim Size		mm (in)	381 (15)	381 (15)
Typical Lug Nut Bolt Circle Accomodated		mm	107 to 170	
Maximum Spindle Bold Circle		mm (in)	170.5 (6.713)	170.5 (6.713)
Output Connector Type			BNC	
Auto Shunt Calibration			On Vehicle or Test Rig	
Modal Properties: Frequency				
With Tire & Rim	Mx, My	Hz	470	480
	Fy	Hz	740	770
Without Tire & Rim	Mx, My	Hz	810	775
	Fy	Hz	1,490	1,570

NOTES:

- Based on loads at the center of the transducer.
- Each SWIFT Evo transducer will be calibrated on an MTS calibration machine. MTS/PCB provides complete documentation of calibration values by serial number for each SWIFT Evo unit. Unique calibration values are stored electronically and transferred to the transducer interface box (Evo TI box) shipped with each SWIFT Evo system.
- Periodic recalibration services can be provided by MTS/PCB.
- MTS/PCB can manufacture rims designed in accordance with SAE J328 criteria.
- Proper rim design is essential for optimum performance.

Specifications are subject to change without notice.



*3000 rpm for tests lasting less than 30 minutes and 200 mph cooling air.
 ** "Typical Performance" listed is better than or equal to the median historical performance level.
 *** Weight differential is calculated based on typical OEM alloy wheels versus rim and hub adaptors designed according to J328 load cases.



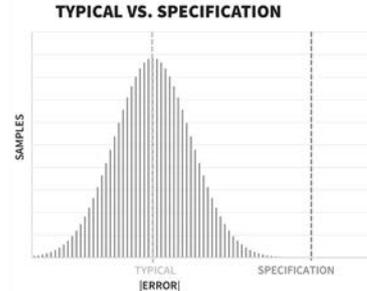
SWIFT Evo 45 MEDIUM TRUCK SPECIFICATIONS

MEASURED VALUE		UNITS	TITANIUM SWIFT Evo 45T
Maximum Calibrated Load Ratings:			
Fx		kN (lb)	120 (26,977)
Fy		kN (lb)	48 (10,791)
Fz		kN (lb)	120 (26,977)
Mx		kN-m (lb-ft)	28 (20,652)
My		kN-m (lb-ft)	30 (22,127)
Mz		kN-m (lb-ft)	28 (20,652)
Noise Level Peak to Peak (0-500 Hz)		N	8
Maximum Usable RPM		RPM	2400*
Maximum Speed (15 in. rolling radius)		kph (mph)	240 (150)
Maximum Operating Temperature (measured at the spindle hub)		°C (°F)	125 (257)
Shock Resistance; Each Axis		G	60
SWIFT Evo Environmental Protection Rating			IP67
Input Voltage Required		VDC	10-28
Input Power Required per Transducer		W	6
Output Voltage Full Scale Calibrated Load		VDC	±10
SAE J267 Half Axle Rating		kg (lb)	3,629 (8,000)
SAE Bending Moment Seen on Cell		kN-m (lb-ft)	23.3 (17,167)
		Specification % (Typical Performance %**)	
Nonlinearity	Force	% FS	0.40 (0.2)
	Moment	% FS	0.7 (0.2)
Hysteresis	Force	% FS	0.2 (0.2)
	Moment	% FS	0.3 (0.2)
Crosstalk	Fy → Fx, Fz	% FS	0.2 (0.2)
	Fx ↔ Fz	% FS	0.5 (0.2)
	Fx, Fz → Fy	% FS	0.9 (0.6)
Assembly Weight Information:			
Transducer		kg (lb)	10.7 (23.6)
Washer Plate		kg (lb)	4.1 (9.0)
Hub Adapter		kg (lb)	4.1 (9.1)
Slip Ring Assembly		kg (lb)	0.9 (2.0)
19.5" x 6.75" Modified Rim		kg (lb)	41.8 (92.2)
Modified Lug Nuts (Qty 5)		kg (lb)	0.5 (1.1)
Sensor Mounting Fasteners		kg (lb)	3.1 (6.8)
Total Weight		kg (lb)	65.3 (143.8)
Reference Weight of Standard Unmodified 15" x 6" Rim and Lug Nuts		kg (lb)	27.7 (61)
Weight Differential***		kg (lb)	37.6 (82.8)
Minimum Rim Size		mm (in)	444.5 (17.5)
Typical Lug Nut Bolt Circle Accomodated		mm	165 to 225
Output Connector Type			BNC
Auto Shunt Calibration			On Vehicle or Test Rig

NOTES:

- Based on loads at the center of the transducer.
- Each SWIFT Evo sensor will be calibrated on an MTS calibration machine. MTS provides complete documentation of calibration values by serial number for each SWIFT Evo unit. Unique calibration values are stored electronically and transferred to the transducer interface unit (TI box) shipped with each SWIFT Evo 45.
- Periodic recalibration services can be provided by MTS/PCB.
- MTS/PCB can manufacture rims designed in accordance with SAE J267 criteria.
- Proper rim design is essential for optimum performance.
- For applications involving non-listed wheel sizes, contact your PCB application engineer.
- Reference rim weights based on 19.5" x 6.75" truck rim with 5.5" offset, 10 hole 225mm bolt circle. Single wheel configuration.

Specifications are subject to change without notice.



*3000 rpm for tests lasting less than 30 minutes and 200 mph cooling air.
 ** "Typical Performance" listed is better than or equal to the median historical performance level.
 *** Weight differential is calculated based on typical OEM alloy wheels versus rim and hub adaptors designed according to J267 load cases.

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