

SmartCrash[®] Force Measuring Element

Type 9350A33Q...

With Digital Data Output

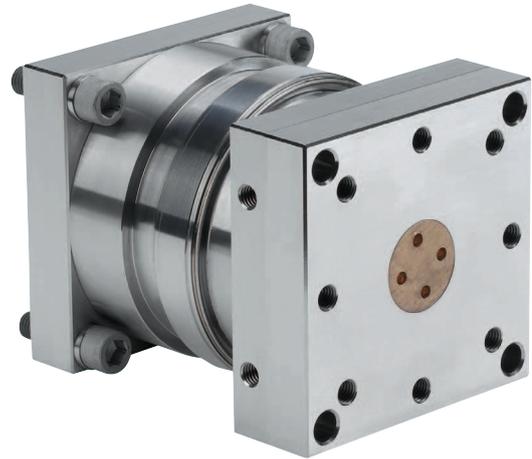
The piezoelectric SmartCrash force measuring element with integrated electronics is able to measure 3 orthogonal components F_x , F_y and F_z of dynamic forces in any direction. It is predestinated for measuring high dynamic impact forces e.g. during crash test procedures for automotive R&D. Each quartz force measuring element with integrated data acquisition and data storage is preloaded and calibrated.

- Wide measuring range
- High sensitivity
- Excellent linearity over total measuring range
- High rigidity/ natural frequency
- Easily mounted and removed from front
- Integrated data preprocessing and data storage
- Digital data output
- D-Sub 9 pin connector
- TEDS functionality (calibration data and automatic sensor identification)

Description

The SmartCrash force measuring element consists of top and base plate, piezoelectric quartz sensor and integrated electronics for data preprocessing and data storage. Each individual SmartCrash force measuring element measures 3 orthogonal forces. The piezoelectric sensor, integrated in the force measuring element, generates a force-proportional charge, which is amplified and processed. A complete data acquisition and storage module (MICRODAU[®]) is incorporated in each individual SmartCrash force measuring element. The charge signals are converted into a voltage signal, digitized by an A/D converter and stored. Each MICRODAU[®] module has a 16 MB flash memory for the acquired data. Before the actual measurement is performed, an automatic system check is carried out to check that the entire measuring chain is operating properly. The individual force measuring element is connected by a corresponding connection cable to the power supply and USB interface.

The SmartCrash force measuring element is supplied calibrated and ready to be used for taking measurements immediately after being mounted. The power supply for a SmartCrash force measuring element is provided by the power unit/industrial PC (controller).



Options

- Version with charge output (no built-in electronics) is available
- A weight optimized SmartCrash lightweight version for specific applications such as instrumented movable crash barriers respectively crash trolleys is available

Application

The SmartCrash force measuring element is used generally in the automotive R&D to instrument crash barriers, as well as drop towers, where high dynamic longitudinal and shear forces have to be measured quickly, easily and very precisely.

9350A_000-586e-09.10

Technical Data

Measuring range	F _x	kN	0 ... 500
	F _y	kN	-100 ... 100
	F _z	kN	-100 ... 100
Bending moments	M _y	kN·m	on request
	M _z	kN·m	on request
Linearity (FSO)		%	≤±0,5
Crosstalk (FSO) – [typical values]	x → y,z	%	≤±2 [≤±0,5]
	z ↔ y	%	≤±3 [≤±1,0]
	y,z → x	%	≤±3 [≤±2,0]
Operating temperature range		°C	0 ... 50
Natural frequency of the crash force element alone	F _x	Hz	≈4 000 ¹⁾
	F _y , F _z	Hz	≈1 700
Weight of standard element		kg	12,1
Material standard element			1.2316+S
Protection (IEC)			IP65

¹⁾ Mounted on foundation plate

Electronics

Selectable measuring ranges, 4 ... 100 %FS Measuring ranges specified for nominal sensor sensitivity F _x ≈ -0,65 pC/N, F _y , F _z ≈ -1,32 pC/N	F _x	kN	20 ... 500
	F _y	kN	4 ... 100
	F _z	kN	4 ... 100
Selftest signal		%FS	2 ... 50
Drift at 25 °C (lowest measuring range = FS _{low})		%FS _{low} /s	<0,004
Repeatability		%FS	<0,1 (typical 0,04)
Frequency range of charge amplifier (-3 dB)		kHz	≈0 ... >10
ADC resolution		Bit	16
Sampling rate (synchronous, per channel)		kHz	8 ... 20
Flash memory (per channel)		Samples	3 000 000 (150 s @ 20 kHz sampling rate)
Data processing	USB-Bus		1.1 full speed (12 MBaud)
Data processing (external: host controller, TCP/IP)	Ethernet	100 BaseT	
Power supply (per element)		VDC	5 (±5 %)
		mA	110 (max. 130)

Functions

Reset/Operate			all channels simultaneously
Test signal ON/OFF			all channels simultaneously
Measuring range setting			individually selectable ranges

Software interface for computer

- API DACORE®, DLL for CrashDesigner Plus

Application software (on request)

- Preparation and execution software CrashDesigner Plus
- Others on request

SmartCrash®, MICRODAU® and API DACORE® are registered trademarks of Kistler Holding AG.
CrashDesigner Plus is a product of Kistler Holding AG.



Fig. 1: Back view of crash force measuring element with 9 pin D-Sub connector

Ordering Key

Type 9350A33Q

SmartCrash Force Measuring Element
with digital data output

Version ...

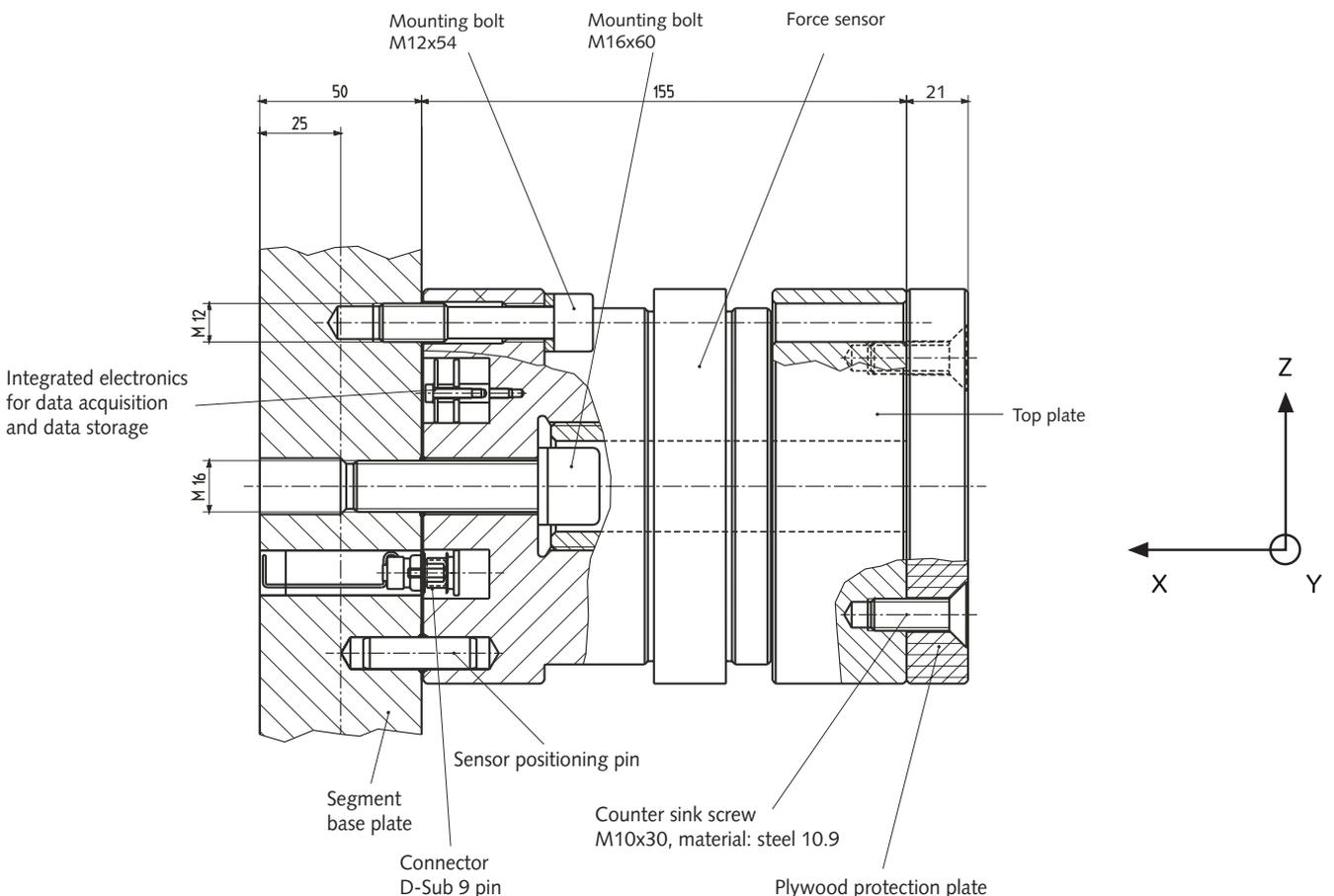


Fig. 2: SmartCrash® force measuring element

9350A_000-586e-09.10