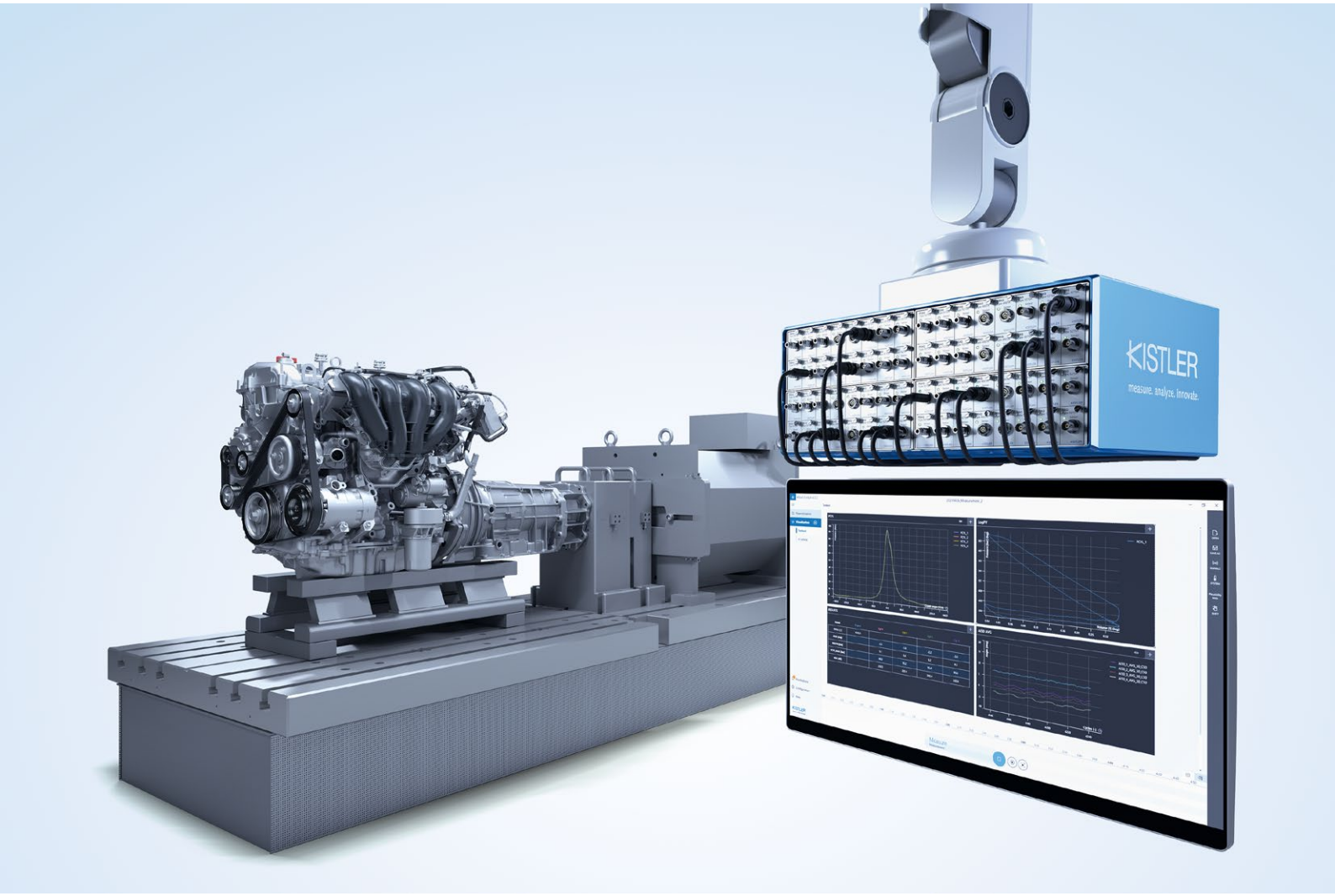
KISTLER

measure. analyze. innovate.

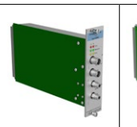


Pressure sensors and systems

Innovative solutions for engine combustion analysis

Signal conditioning

Signal conditioning platforms and amplifier modules

Multichannel						Amplifiers	
Signal conditioning platform	2852B			2853B			
Module / Application								
Type	5064E1	4665B1	2109A	5064E2	4665B2	2109A [2]	4624A	5018A
Cylinder pressure (piezoelectric)	■			■				■
pMax monitoring (analog/ digital)	■			■				
Sensor identification	■	■		■	■		■	■ [3]
Recording of cycles and working time	■			■				■ [3]
Fuel pressure (piezoresistive)		■			■		■	
Intake pressure (piezoresistive)		■			■		■	
Exhaust pressure (piezoresistive)		■			■		■	
Temperature measurement		■ [1]			■ [1]		■ [1]	
Voltage measurement			■			■		
Scope function			■			■		

[1] Sensor temperature measurement [2] In combination with Type 5746A5 adapter set for SCP Type 2853B [3] Only for Type 5018Axxx1

Powertrain analysis system

KiBox2

Combustion analysis

Technical data		Type 2895A
Analog channels		16, 64*
Digital inputs/output		8/8, 32*/32*
Input voltage range	V	-60...+60
ADC resolution	Bit	18
ADC sampling rate (per channel, MS/s)	MHz	flexible, max. 2.5
HW interfaces		Ethernet/WLAN/2xCAN-FD
Crank angle inputs		Analog/LVDS/RS422
Speed range	rpm	50...20 000
Min./Max. temperature	°C	-40...+70
Weight	kg	4 (w/o) amplifier modules
Dimensions (WxHxD)	mm	218x84x288
Key features		• Flexible measuring channel and SW application configuration • KID3 Bosch knock intensity detection • User formulas in real time • Latest generation signal processor and performance • XCP universal interface • Compatible with ETAS INCA, ATI Vision, Vector CANape
Characteristics		KiBox2 is a complete combustion analysis system for onboard and testbed applications, enabling visualization of combustion quality. Combustion parameters are conveniently integrated into the ECU calibration and test bench systems, and are synchronized with other measurement data.
Data sheet		003-572e

* cascaded KiBox

KiBox2 amplifiers/modules

Charge amplifier PEAQ for piezoelectric sensors	5075A1 5075A2*	003-572e
Piezoresistive amplifier PRAQ for piezoresistive sensors	4667A*	003-572e
Voltage interface VAQ for universal sensors	5270B	003-572e

Accessories

Crank angle encoder	2614D	003-547
Temperature conditioning system for water-cooled PE/PR sensors and power electronics in hybrid or EV	2621G	000-461
TDC sensor system	2629DK	003-334

* with PiezoSmart function

Connecting

Triboelectrically optimized cables

Connecting and extension cables

M3 pos.	M4 pos.	10-32 pos.	BNC pos.	BNC neg.	TRIAX neg.	
1989A3_1 (2) 1989A7_1 (4)						M3 pos.
1989A1_3 (1) 1989A3_3 (2) 1989A7_3 (4)	1929A_ (2) 1983AA_ (4)					M4 pos.
	1975A_ (2) 1983AB_ (4)	1967A_ (2)* 1969A_ (2) 1983AC_ (4)				10-32 pos.
			1601B_ (5)	1603B_ (5)		BNC pos.
1985A8S3_1 (2) 1985A8S7_1 (4)	1985A1S3_1 (2) 1985A1S7_1 (4)	1985A2S3_1 (2) 1985A2S7_1 (4)			1987B_ (3)	Triax pos. (PiezoSmart)
					1987BFT_ (3)	Fischer triax (PiezoSmart)

(1) PFA coaxial cable, green (-90 up to +200°C): characteristics of perfluoroalkoxy alkane (PFA) cable braiding include strength, even at very high temperatures, as well as excellent thermal stability and superb chemical resistance.

(2) PFA coaxial cable, steel braided (-55 up to +200°C): to protect the cable against mechanical damage, it is equipped with a flexible stainless steel braiding. In other respects, its design corresponds to the PFA/green version. * with ground insulation

(3) FPM triax cable, black (-20 up to +200°C): the fluoropolymer (FPM) material is characterized by high thermal and chemical resistance, particularly to hydrocarbons.

(4) FPM coaxial cable, oilproof IP68, black (-20 up to +200°C): the fluoropolymer (FPM) material is characterized by high thermal and chemical resistance, particularly to hydrocarbons. The cable is equipped with a liquid-tight connector which makes it robust and resistant to oils and fuels.

(5) PVC coaxial cable, black (-25 up to +85°C)

Adapters

For piezoelectric connecting cables

M4 neg.	10-32 neg.	10-32 pos.	BNC pos.	Triax neg.	
	1700A35		1706		M3 neg.
1700A23	1700A13	1700A31	1705	1704A3	M4 neg.
	1729A		1721	1704A2	10-32 neg.
				1704A1	BNC neg.
			1704A4		Triax pos.

Sensor selection guide

Piezoelectric sensors

Cylinder pressure

Small engines
(motorbikes, etc.))

Possibility of engine modification

- Yes
  - General purpose → Type 6054C
  - Thermodynamic → Type 6054C
  - Knock detection → Type 6054BRU56
  - Spark plug → Type 6113C/6115C
- No → Gasoline
  - Spark plug → Type 6113C/6115C

Medium-sized engines
(passenger cars, etc.))

Possibility of engine modification

- Yes
  - General purpose → Type 6054C/6124A/6044A
  - Thermodynamic → Type 6054C/6041C/6044A
  - Knock detection → Type 6054BRU56
  - Spark plug → Type 6113C/6115C/6118C
- No → Gasoline
  - Spark plug → Type 6113C/6115C/6118C
- No → Diesel
  - Glow plug → Type 6542Q → Type 6056B

Heavy-duty engines
(trucks, etc.))

- General purpose → Type 6054C/6124A/6044A
- Thermodynamic → Type 6061C/6067D
- Thermodynamic → Type 6054C/6041C/6044A

Racing engines

- General purpose → Type 6054BRU56
- Knock detection/onboard → Customized, on request

Piezoresistive sensors

Intake/exhaust/hydraulic pressure

Compact solution

- Intake/uncooled → Type 4017A/4007D
- Exhaust/water-cooled → Type 4049B

Highest accuracy

Intake/exhaust switching adapter water-cooled Type 7533B → Type 4011A

Transmitter/onboard

- without media temperature → Type 4080B
- with media temperature → Type 4080BT

Injection/high pressure

Sensor

Clamping adapter Type 6533

- ≤ 1,000 bar → Type 4065B
- ≤ 3,000/3,600 bar* → Type 4067E

* only common rail application

● = Dimensions ■ = Type

Piezoelectric sensors

Pressure measurement in combustion engines

Sensors, uncooled

Technical data		Type 6054C	Type 6052C
Measuring range	bar	0 ... 300	0 ... 250 (300)*
Sensitivity	pC/bar	-17	-20 (-18)*
Linearity	%	<± 0.3	<± 0.3 (<± 0.5)*
Sensor operating range	°C	-20 ... 350	-20 ... 350
Mounting size		M5x0.5	M5x0.5
Characteristics		• New compact M5 sensor • High accuracy and durability in one sensor • Excellent strain interference rejection • Multi-application sensor for the whole engine development process • Low cost of ownership thanks to long service life • High performance, with or without flameguard	• Compact, highly accurate sensor • Low thermal sensitivity shift over the whole engine operating map, compensated for acceleration • Ideal thermal shock behavior * (reinforced version)
Data sheet		003-458	000-552

Pressure measurement in the intake and exhaust systems

Low-pressure sensors DigitalSmart (DS series)

Technical data		Type 4017A	Type 4007D
Pressure range	bar	0...5/10/20/50	0...100/250
Temperature range	°C	-20 ... 140	25 ... 180
Dimensions		M5x0.5	M5x0.5
Characteristics		• World's smallest media-separated miniature pressure sensor • Ideal for gas exchange measurements and applications with limited space • ATEX certified for usage in hazardous areas • High durability thanks to excellent media compatibility	• Miniature pressure sensor for general pressure measurements • Ideal for applications with limited space
Application		• Intake/exhaust pressure • General pressure	• General pressure
Data sheet		003-599	003-300

Piezoelectric sensors

Pressure measurement in combustion engines

Sensors, uncooled

Type 6054BRU56

0 ... 400	
-10	
<± 0.4	
-20 ... 350	
M5x0.5	

- Compact M5 Sensor
- Rugged design with high natural frequency
- Suitable for knock detection
- Low cost of ownership thanks to long service life
- High performance, with or without flameguard

003-046

Type 6056B

0 ... 300	
-17	
<± 0.3	
-20 ... 350	
M5x0.5	

- Ideal for measurements with glow plug adapter Type 6542Q...
- Excellent strain interference rejection
- Minimal sensitivity shift over whole temperature range
- High durability

003-583

Type 6124A

0 ... 300	
-30	
<± 0.3	
-20 ... 350	
6.2 mm pluggable	

- Pluggable sensor with swivel nut for easy handling
- Ideal for direct mounting
- Insensitive to installation strain
- Minimal sensitivity change over whole temperature range

003-268

Type 6125C

0 ... 300	
-36 (33)*	
<± 0.4	
-20 ... 350	
6.2mm pluggable	

- Same characteristics as 6124A but additionally with ground isolation

* (reinforced version)

000-695

Type 6044A

0 ... 300	
-30	
<± 0.3	
-20 ... 350	
M8x0.75	

- Ideal for direct mounting
- Insensitive to installation strain
- Very small linearity error
- Minimal sensitivity shift over the whole temperature range
- Low cost of ownership thanks to long service life

003-399

Sensors, cooled

Type 6041C

0 ... 250	
-33	
<± 0.3	
-20 ... 350	
M8x0.75	

- Smallest water-cooled cylinder pressure sensor
- Excellent thermal stability over the whole engine operating range
- Very low linearity deviation
- Low thermal shock error under all conditions

000-591

Type 6061C

0 ... 250	
-26	
<± 0.3	
-20 ... 350	
M10x1	

- Water-cooled cylinder pressure sensor
- Excellent thermal stability over the whole engine operating range
- Very low linearity deviation
- Diaphragm optimized for thermal shock and durability

003-454

Type 6067D

0 ... 250	
-26	
<± 0.3	
-20 ... 350	
9.9 mm pluggable	

- Pluggable water-cooled cylinder pressure sensor for easy handling
- Ideal for direct mounting
- Insensitive to installation strain
- Same properties as 6061C

003-467

Type 7061C

0 ... 300	
-92	
<± 0.3	
-20 ... 350	
M14x1.25	

- Water-cooled cylinder pressure sensor
- Very high sensitivity
- Excellent thermal stability over the whole engine operating range
- Very low linearity deviation
- Ideal as a reference sensor

003-042

Measuring spark plugs

Type 6113C/6115C/6118C

0 ... 200	
-10	
<± 0.5	
-20 ... 350	
M10x1/M12x1.25/M14x1.25	

- Measuring spark plug with flush-mounted sensor for highest natural frequency
- High dielectric strength up to ignition voltages of 45 kV
- Application-specific geometries and heat values
- Serviceable thanks to modular structure

003-281/003-269/003-280

Glow plug adapter

Type 6542Q

for Type 6056B

- Glow plug adapter enables cylinder pressure measurement without separate measuring bore
- Design corresponding to existing glow plug bore
- High signal quality
- Standard sensor for different glow plug geometries
- With tip or tipless design

000-570

Optical

Type MMSP

0 ... 250
-10
<± 0.5
-20 ... 200
M10x1/M12x1.25/M14x1.25

- Multimeasuring spark plug with integrated high-temperature miniature pressure sensor and fiber optic system
- For pressure indication and optical combustion analysis in gasoline engines

003-428

Pressure measurement in the intake and exhaust systems

Low-pressure sensors DigitalSmart (DS series)

Type 4011A

0…5/10/20/50/100/ 250/500
-20 ...120 (L),15 ...180 (H)
M6 / M8x0.75 M12x1/M14x1.25

- Universal pressure sensor
- Highest accuracy
- Media-separated
- Versatile, adaptable, with M6 or M8 media connection; or compatible with Types 4073/4075, 4043/4045
- ATEX certified for usage in hazardous areas

- Intake/exhaust pressure
- General pressure

003-267

Type 4049B

0...5/10
0 ... 80
M14x1.25

- Compact pressure sensor with integrated water cooling for exhaust gas pressure measurements
- Media-separated

- Exhaust pressure

003-145

Type 7533B

For sensor Types 4011A, 4045, 4075
M14x1.25

- Cooling adapter with pneumatic switching function allows zero point correction for gas exchange sensors while combustion engine is running
- For highest accuracy measurements

- Intake/exhaust pressure

002-614

High-pressure sensors DigitalSmart (DS series)

Type 4065B

0...200/500/1000
25 ... 120
M7x0.75

- Compact high-pressure sensor
- Robust steel diaphragm for harsh and highly dynamic applications

- Injection pressure

003-165

Type 4067E

0 ... 2 000/3 000
25 ... 180
M10x1

- High-pressure sensor, front sealing
- Robust steel diaphragm for harsh and highly dynamic applications

- Injection pressure

003-166

Pressure measurement

Press./temp. transmitter

Type 4080B/4080BT

0 ... 5/10/20/130/250
25 ... 150
M6x1

- Robust, media-separated miniature pressure transmitter
- With integrated signal conditioning
- Ideal for onboard applications and applications with limited space
- 4080BT includes media temperature sensor with signal conditioning; <20bar

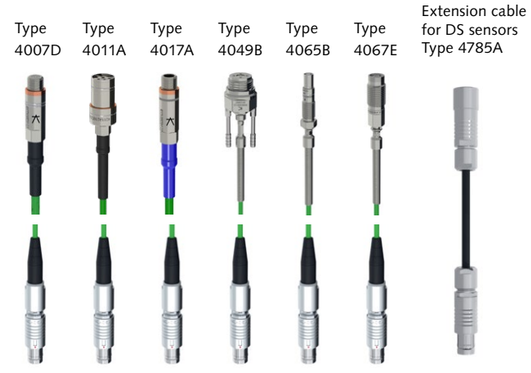
- Motorsport
- General pressure

003-391

Automatic sensor identification with PiezoSmart

For piezoresistive/absolute pressure sensors

Digitally compensated sensors (DS sensors) contain sensor parameters and pressure-temperature compensation data stored in TEDS. When connected to a compatible amplifier (Types 4624/4665/4667), no parametrization is needed.



Connectable to amplifier Types 4624A/4665B/4667A directly, or with Type 4785A extension cable

PR amplifier Type 4624A

SCP Slim Type 2852B PR amplifier Type 4665B1 with SCP Slim

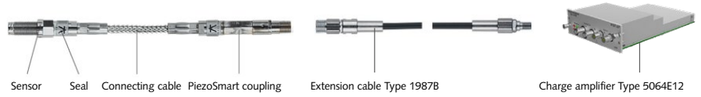
KiBox2 Type 2895A PR amplifier Type 4667A with KiBox2

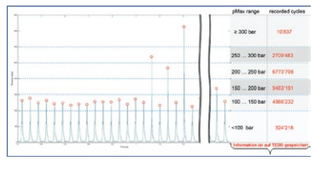
For piezoelectric/cylinder pressure sensors

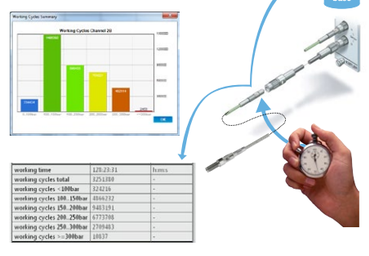
PiezoSmart is an active system for identifying individual piezoelectric pressure sensors. Its main element is an electronic data sheet called TEDS (Transducer Electronic Data Sheet). The TEDS contains all the essential data of an individual pressure sensor, which it can exchange with ancillary equipment.

The amplifiers automatically set the correct parameters by exchanging data with the TEDS of the pressure sensor.

- Correct assignment of the sensor data is always guaranteed, so you benefit from enhanced process reliability.
- Measurement can take place independently without any database.
- Operating time and cycles of PiezoSmart pressure sensors are recorded automatically, with classification of pMax values.







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