

SCP for combustion engines

Signal conditioning system, with optional PiezoSmart

Types 2853B..., 4665B2,
5064E2..., 5225A1,
5271

The "Signal Conditioning Platform" SCP is a modular system for the conditioning of a wide range of different measuring signals, such as signals from piezoelectric and piezoresistive pressure sensors. They are specifically well suited for combustion pressure measurements on engine test beds.

Key features of SCP:

- Modular design for maximum flexibility (up to 32 channels)
- Ethernet interface
- Remote controlled via any PC
- Improved Graphical User Interface
 - Table overview with all amplifier and sensor relevant data
 - Parameters selectable (editing & copying) in table
 - Via Ethernet easy export function of amplifier settings and TEDS data
 - Histogram of peak cylinder pressure and number of working cycles
- Signal compatible with all combustion analyzers
- PiezoSmart sensor identification for increased process reliability and improved data quality
- Operating buttons on SCP front side for measure/reset and drift compensation on/off

Description

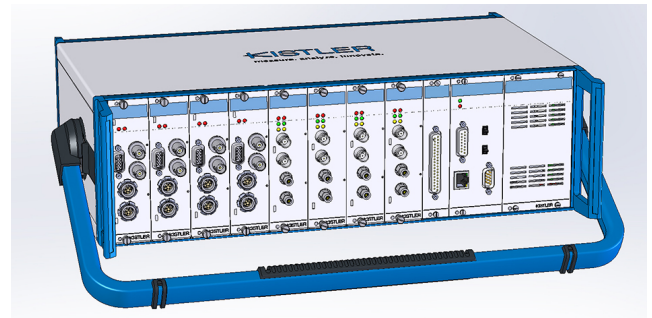
The SCP consists of a base unit and function-specific measuring modules. For combustion pressure measurements and combustion analysis on engines, a wide range of different and interchangeable measuring modules for front-end signal conditioning is available.

If the automatic sensor identification PiezoSmart is used, all relevant data of an individual sensor are stored on a TEDS (Transducer Electronic Data Sheet) and are available for automatic setting of parameters and adjustments.

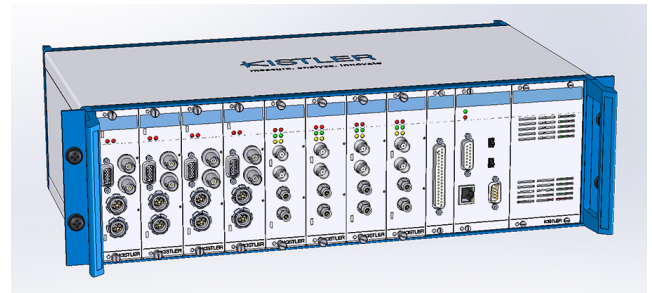
Process reliability of test procedures and quality of measurement data are significantly improved by simultaneously simplifying test bed setup and test preparations.

Application

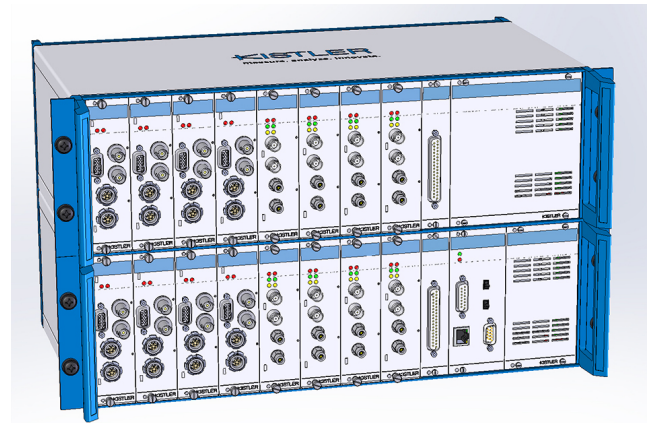
With the function-specific modules, measuring tasks within combustion pressure and gas exchange, as well as injection pressure and general pressure measurements are efficiently accomplished.



SCP Desktop version Type 2853BF21 for 8 measuring modules



SCP 19" Rack version Type 2853BF11 for 8 measuring modules



SCP 19" Rack version Type 2853BF11 and SCP extension chassis Type 2853BE11 for 16 measuring modules

Software interfaces for

- FEVIS
- OSIRIS
- A&D CAS
- ONO SOKKI DS-2000
- DEWETRON

Modules for signal conditioning system

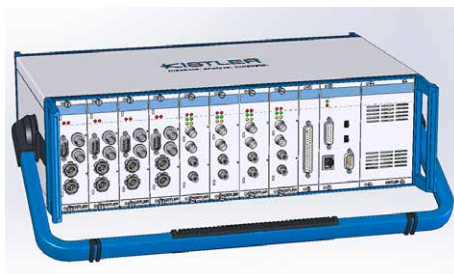
The following function specific measuring modules are available:

- Charge amplifier Type 5064E21
without sensor identification PiezoSmart
- Charge amplifier Type 5064E22
and Type 5064E23 with sensor identification PiezoSmart
- Piezoresistive amplifier Type 4665B2
with sensor identification PiezoSmart
- Bridge amplifier Type 5271

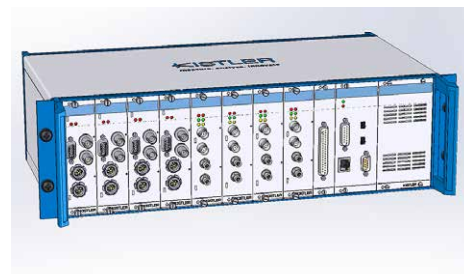
Available measuring modules



Variations of base units



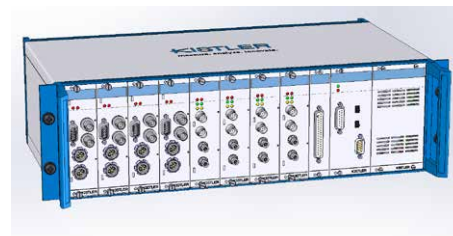
SCP Desktop version Type 2853BF21, 8 slots,
Ethernet interface on front side



SCP 19" Rack mounting Type 2853BF11, 8 slots,
Ethernet interface on front side



SCP Desktop version Type 2853BR21, 8 slots,
Ethernet interface on rear side



SCP 19" Rack mounting Type 2853BR11, 8 slots,
Ethernet interface on rear side

2853B_003-220e-08.23

Technical data, SCP Base Unit Type 2853B...

Chassis

| | | |
|------------------------------|---|------------|
| Module cards | max. | 8 |
| Channels per rack | max. | 16 |
| with rack combination | max. | 31 |
| Degree of protection | IP | 40 |
| Dimensions 19" rack mounting | | |
| Height | HE (mm) | 3 (132,5) |
| Width | TE (mm) | 84 (426,7) |
| Depth (incl. outgoing cable) | mm | min. 350 |
| Weight (without modules) | kg | ≈5,6 |
| Software | Graphical User Interface (GUI) COM components for Microsoft Windows, 10, 11 | |

AC Power supply Type 2853B...1

| | | |
|--|-----|----------------------|
| Power | VAC | 100 ... 240 ±10% |
| Power line frequency | Hz | 48 ... 62 |
| Power consumption max. | VA | 95 |
| Fuse | A | 1A (slow-blow) (SPT) |
| Operating temperature range ¹⁾ | °C | 0 ... 60 |
| Min./max. temperature range ¹⁾ | °C | –40/60 |
| Power connector (2P+E, Protection class I) | | IEC 320C14 |

DC Power supply Type 2853B...2

| | | |
|---|-----|----------------------|
| Power supply | VDC | 11 ... 36 |
| Max. power consumption | W | 80 |
| Inrush current | A | ≈15 |
| Fuse | | 8A (slow-blow) (SPT) |
| Operating temperature range ¹⁾ | °C | 0 ... 50 |
| Min./max. temperature range ¹⁾ | °C | –40/50 |

¹⁾ Non condensing

Technical data, interfaces

Analog interface card (Type 5225A1)

| | | |
|-------------------------------|------|-------------------|
| Analog outputs | | 32 |
| Voltage | V | 0 ... ±10 |
| Current (per channel) | mA | 0 ... ±2 |
| Error | % | <±0,1 |
| Trigger output (optocouplers) | | |
| High | V | >2,4 |
| Low | V | <0,8 |
| Pull-up on +5 V RS | kΩ | 10 |
| Connection | Type | D-Sub 37-pin neg. |

CPU Interface card Type 5615B... (Type 2853B...)

Digital I/O

| | | |
|-------------------------------------|------|--|
| Trigger/Operate input (Optokoppler) | – | Connected via optocouplers to Type 5225A1 (only trigger) |
| High | V | 3 ... 30 |
| Low | V | <2 |
| Current input High | mA | 2 ... 29 |
| Pull-up on +24 V (connectible) | kΩ | 10 |
| Pull-down on EGND (connectible) | kΩ | 1 |
| Connection | Type | D-Sub 9-pin neg. |
| Digital outputs | – | Isolated solid state relay |
| DOUTA1 ... B4 | | |
| Current load (continuous) | mA | <100 |
| Voltage (continuous) | V | <±42 |
| Voltage for external devices | V | 24 |
| Current draw max. | mA | 50 |
| Connection | Type | D-Sub 15-p neg. |

CAN-Bus interface

| | |
|------------------------|---------------|
| Number | 1 |
| Max. transmission rate | 1 Mbit/s max. |

Communication interface for Type 2853BF...

| | | |
|------------|------|----------|
| Interface | Type | Ethernet |
| Connection | Type | RJ-45 |

Operating buttons

Measure/Reset

Drift Compensation on/off

Connections on rear side of SCP

Communication interface for Type 2853BR...

| | | |
|------------|------|------------------|
| Interface | Type | RD-232C |
| Connection | Type | D-Sub 9 pin neg. |
| Interface | Type | Ethernet |
| Connection | Type | RJ-45 |

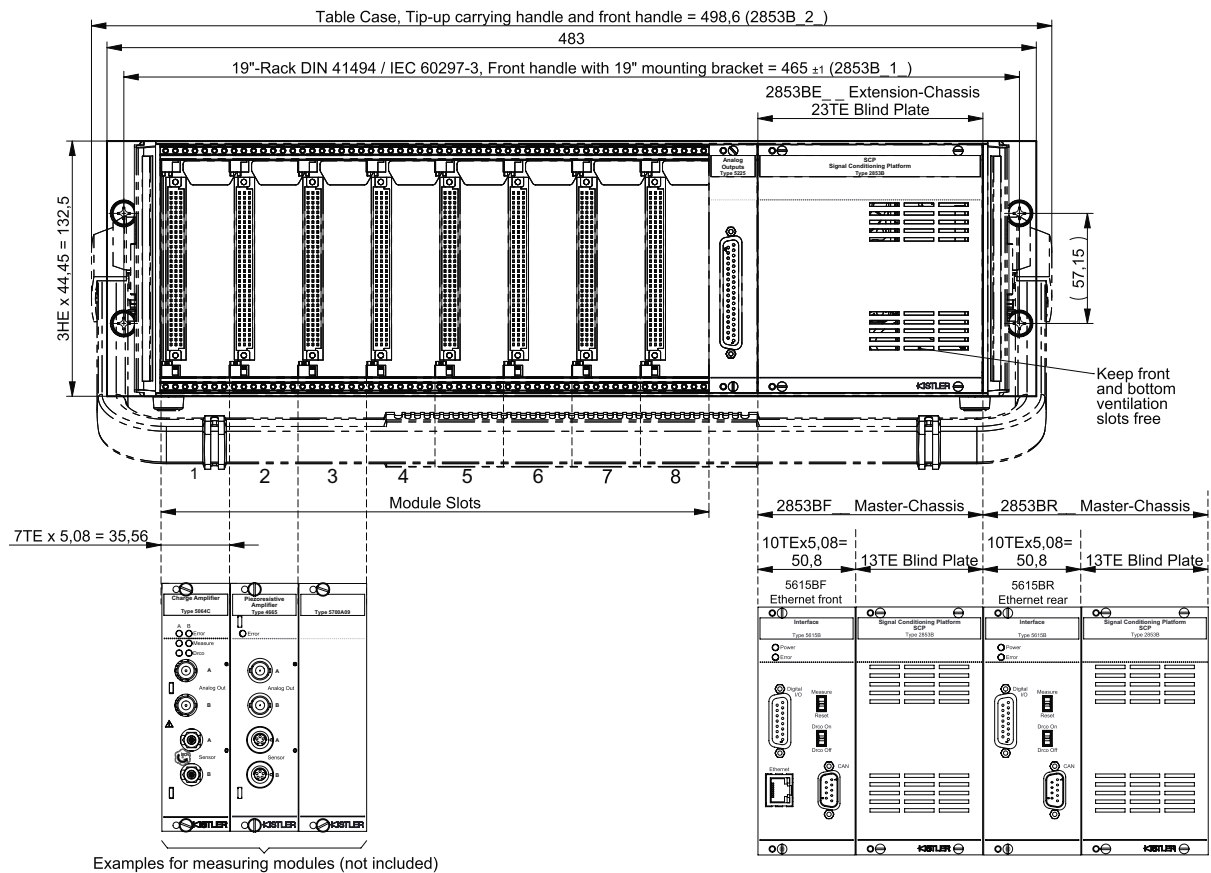
Communication interface for Type 2853BF...

| | | |
|------------|------|------------------|
| Interface | Type | RS-232C |
| Connection | Type | D-Sub 9 pin neg. |

CAN-Bus interface for Type 2853BR... and Type 2853BF

| | |
|------------------------|---------------|
| Number | 1 |
| Max. transmission rate | 1 Mbit/s max. |

Dimensions



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Technical data valid for all modules

All values for setting the parameters are stored in a nonvolatile data memory and are automatically loaded on initial startup. Operating the system and setting the parameters are performed exclusively with a PC via GUI or with a host computer.

| | | |
|--|-----|------------|
| Operating temperature range ¹⁾ | °C | 0 ... 60 |
| Min./max. temperature ¹⁾ | °C | –40/60 |
| Vibration resistance (20 ... 2 000 Hz, duration 16 min, cycle 2 min) | gp | 10 |
| Shock resistance (1 ms) | g | 200 |
| Sound resistance | dBA | 120 |
| Degree of protection (EN 60529) | IP | 40 |
| Front panel dimensions | mm | 128,7x35,0 |
| | HE | 3 |
| | TE | 7 |

¹⁾ Non condensing

Charge amplifier Types 5064E21, 5064E22, 5064E23

The amplifier modules Types 5064E21, 5064E22, 5064E23 are microprocessor controlled 2-channel charge amplifiers with analog signal conditioning. The Types 5064E22, 5064E23 include the function for automated sensor identification (PiezoSmart). These amplifiers enable the recording of sensor operating hours, pressure cycles and pMax when using PiezoSmart sensors. These amplifiers have the ability to determine when a cylinder pressure sensor is exposed to extreme operating conditions. Important information such as peak pressure and run time can be calculated and automatically saved to the TEDS chip (Transducer Electronic Data Sheet) located in the sensor connector. The recorded pMax-values are classified in 6 different pressure ranges, (<100 bar/<150 bar/<200 bar/<250 bar/<300 bar/≥300 bar) which give a clear indication of the sensor load profile during the application. A further feature is the cyclic detection of the pMax values, the output of which is a digital signal via the CAN bus interface (CAN2) of the SCP. In addition, the pMax values are output as an analog signal via the analog outputs (C and D). The pMax detection range corresponds to the double pressure range of ±2FS. The scaling of the detection range is adjustable between ±2FS and ±1FS. (Type 5064D has a fix scaling of ±1FS). Along with the input of the sensor-specific data, the parameterization allows the selection of different low-pass filters as well



Type 5064E22

as a –8 V offset with simultaneous amplification of the signal by a factor of 1,8 for a better utilization of analogue inputs with –8 ... 10 V.

LEDs on the module indicate the following operating conditions:

- Exceeding the overload threshold
- Drift compensation with cycle detection (Drco/Short, Drco/Long)
- Measure/reset

The amplifier has separated input grounds of channel A and channel B in order to prevent signal interference. A differential amplifier stage prevents ground loops between any input ground and the output ground.

Technical data

Charge amplifier Type 5064E2...

| | | |
|---|--------------------------------------|----------------------------|
| Number of channels | | 2 |
| Measuring range | pC | ±100 ... 100 000 |
| Error (0 ... 60 °C) | % | <±0,5 |
| typical (25 °C) | % | ±0,1 |
| Measuring modes | Short, Long, Drco*/Short, Drco*/Long | |
| Drift „Long“ | | |
| at 0 ... 60 °C | pC/s | <±0,2 |
| at 25 °C | pC/s | <±0,05 |
| typical | pC/s | <±0,03 |
| Reset-operate transition | pC | <±1,5 |
| Zero point deviation (range 100 pC) * | mV | <±5 |
| Zero point deviation (DrCo) | mV | <±30 |
| Time constant („Long“) | s | >100 000 |
| Drift compensation | 1/min | ≈100 ... 20 000 |
| Output voltage | V | 0 ... ±10 |
| Output current | mA | 0 ... ±2 |
| Output impedance | Ω | 10 |
| Output noise (0,1 Hz ... 1 MHz) | mV _{pp} | <8 |
| typical | mV _{pp} | <4 |
| Frequency range (20 V _{pp} , –3 dB) | kHz | ≈0 ... >200 |
| Group delay time | μs | <3 |
| Low-pass filter (Butterworth, 2 nd order, selectable, –3 dB) | kHz | 0,3/1/3/5/10/30/50/100/off |
| „Overload“ threshold | V | ≈±11 |
| Offset adjustable (gain 1,8) | V | –8,0 ±0,04 |
| Crosstalk attenuation chan. A, chan. B | dB | >60 |

pMax function

| | | |
|---|-----|------------------|
| pMax detection range (adjustable scaling) | FS | ±1/±2 |
| pMax output (digital) | - | CAN bus |
| Frequency range | kHz | 3/5/10/30/50/100 |
| Resolution | bit | 12 |

* Without measure jump and without drift

Technical data (continuation)

| | | |
|-----------------------|-----|------------------|
| pMax output (analog) | - | channel C & D |
| Frequency range | kHz | 3/5/10/30/50/100 |
| Recording on TEDS | | |
| Frequency range | kHz | 0 ... ≈100 |
| Errors absolute | %FS | ±2 |
| Power supply (module) | – | via SCP |
| Weight | kg | ≈0,42 |

Connections

Type

| | | |
|----------------------------|---------------------------------|---|
| Signal inputs | 5064E21 5064E22* 5064E23* | BNC neg TRIAx pos. Fischer TRIAX pos. |
| Signal outputs | | BNC neg. |
| Actuation, outputs, supply | | 64 pin DIN41612 |

* With automated sensor identification PiezoSmart

Piezoresistive amplifier Type 4665B2

The measuring module Type 4665B2 is a microprocessorcontrolled 2-channel amplifier for piezoresistive sensors with analog signal conditioning. The amplifier is particularly recommended for high-accuracy measurements with digitally compensated and analog compensated sensors.

- Automatic sensor identification PiezoSmart
- Compatible with all piezoresistive pressure sensors from Kistler
- Analog signal output for pressure and temperature
- Digital signal output for temperature via CAN bus
- Support of digital temperature compensation for maximum measuring accuracy
- Automatic zero-point adjustment
- Recording of working time synchron with charge amplifier Type 5064E... or via trigger signal

This measuring module is used for signal amplification of piezoresistive pressure sensors and is used typically for measuring injection pressure or hydraulic oil pressure as well as the pressures in the inlet/exhaust of combustion engines.



Type 4665B2

Technical data

Piezoresistive amplifier Type 4665B2

| | | |
|--|------------------|-------------------------------|
| Number of channels | | 2 |
| Gain | | 10 ... 270 |
| Additional gain | | 1 ... 10 (in 0,1) |
| Error (0 ... 60 °C) | % | <±0,3 |
| typical (25 °C) | % | ±0,1 |
| Group delay (input-output) | µs | <5 |
| Output voltage | V | 0 ... ±10 |
| Output current | mA | 0 ... ±2 |
| Output impedance | Ω | 10 |
| Zero point adjustment range referred to input | mV | –100 ... 500 |
| Output interference signal | | |
| (0,1 Hz ... 1 MHz) amp. ≤100 filter off | mV _{pp} | <20 |
| (0,1 Hz ... 1 MHz) amp. ≤100 filter 30 kHz | mV _{pp} | <10 |
| (0,1 Hz ... 1 MHz) amp. ≤270 filter off | mV _{pp} | <40 |
| (0,1 Hz ... 1 MHz) amp. ≤270 filter 30 kHz | mV _{pp} | <20 |
| Frequency range (20 V _{pp} , –3 dB) up to amp. 10 ... 270 | kHz | 0 ... >90 |
| Low-pass filter (Butterworth, 2 nd order selectable, –3 dB) | Hz kHz | 10,30,100,300 2, 3, 10, 30 |
| Linearity adjustment, second power | % | –3 ... 3 (in 0,1) |
| "Overload" threshold | V | ≈±11 |

| | | |
|-----------------------------|-------|-----------|
| Temperature output analog | | |
| Sensitivity | mV/°C | 10 |
| Frequency | Hz | 1 |
| Max. error | °C | ±2,5 |
| Temperature output digital | | |
| Temperature output | – | CAN-Bus |
| Frequency range | kHz | 0 ... ≈5 |
| Resolution | bit | 12 |
| Additional zero point shift | V | –8 or –10 |
| Power supply (module) | – | via SCP |
| Weight | kg | 0,32 |

Sensor

| | | |
|----------------------------|----|--------|
| Sensor supply (I ref) | mA | 1 or 4 |
| Maximum load (I ref: 4 mA) | kΩ | 5 |
| Minimum load (I ref: 1 mA) | kΩ | 20 |

Interface, sensor detection

| | | |
|---|----|------------|
| Connection according to IEEE 1451.4 | – | – |
| Max. length for extension cable | m | 10 |
| Temperature range for PiezoSmart coupling | °C | –20 ... 85 |

Connections

| | |
|---|--------------------------|
| Signal inputs | Type 03 (Fischer, 5 pin) |
| Signal outputs | Type BNC neg. |
| Actuation, outputs, supply | Type 64 pin DIN41612 |
| Signal input/output | Type D-Sub 9 neg. |
| Trigger for working time recording, temp. | |

Bridge amplifier Type 5271

This 2-channel bridge amplifier has two differential inputs and is designed for bridge sensors and especially for strain gauge sensors.

The amplifier provides an adjustable and stabilized voltage supply for piezoresistive sensors. High bandwidth electronics with selectable filters ensure that the Type 5271 can be utilized in a wide range of applications.

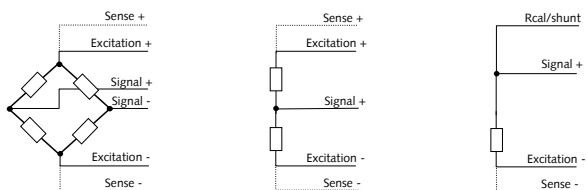


Product features

For universal applications for strain gage sensors and piezoresistive sensors with voltage excitation

- Variable bridge excitation 1 ... 12 Volt
- Voltage amplifier (with variable gain up to 5 000)
- Automatical zero adjustment (tare)
- Prepared for automatic sensor identification (PiezoSmart)

The bridge amplifier Type 5271 is suitable for the following connections:



4-wire/6-wire full bridge

Half bridge

Quarter bridge

Technical data

| | | |
|---|----|---------------|
| Number of channels | – | 2 |
| Input voltage range (differential) | V | 0 ... ±10 |
| Gain | – | 0,5 ... 5 000 |
| Input resistance | MΩ | >100 |
| Gain error (0 ... 60 °C) typical (25 °C) | % | <±0,1 |
| Zero point error | % | <10 mV |
| Linearity error | % | < ±0,01 |
| Zero adjustment (tare) | % | 0 ... ±100 |

This information corresponds to the current state of knowledge. Kistler reserves the right to make technical changes. Liability for consequential damage resulting from the use of Kistler products is excluded.

| | | |
|--|-----|---------------|
| Low-pass filter (2nd order, selectable/Butterworth, –3 dB) | Hz | 10/30/100/300 |
| | KHz | 1/3/10/30/100 |

Sensor excitation (bridge voltage)

| | | |
|---------------------------|----|--------------|
| Sensor excitation voltage | V | 1,0 ... 12,0 |
| Voltage error (>2,5 V) | % | <±0,1 |
| Output current | mA | <50 |

Bridge completion (amplifier internal)

| | | |
|-----------------------------|---|---------------|
| Half bridge (completion) | Ω | 10 000 |
| Quarter bridge (completion) | Ω | 120/350/1 000 |

Sensor bridge resistance

| | | | |
|-------------------|---------|---|----------------|
| Sensor excitation | = 1 V | Ω | 20 ... 10 000 |
| | = 2,5 V | Ω | 50 ... 10 000 |
| | = 5 V | Ω | 100 ... 10 000 |
| | = 10 V | Ω | 200 ... 10 000 |

Sensor sensitivity

| | | | |
|-------------------|---------|------|-------------|
| Sensor excitation | = 1 V | mV/V | 2 ... 2 000 |
| | = 2,5 V | mV/V | 0,8 ... 800 |
| | = 5 V | mV/V | 0,4 ... 400 |
| | = 10 V | mV/V | 0,2 ... 200 |

Output signals

| | | |
|--|------------------|------------|
| Output voltage (short circuit proof) | V | 0 ... ±10 |
| Output current | mA | 0 ... ±5 |
| Output impedance | Ω | 10 |
| Output noise signal (0,1 Hz ... 1 MHz) | | |
| Gain <100 | mV _{pp} | <15 |
| Gain <1 000 | mV _{pp} | <40 |
| Gain ≥1 000 | mV _{pp} | <180 |
| Frequency range (20 V _{pp} , –3 dB) | kHz | 0 ... >120 |
| Power supply (module) | – | via SCP |
| Weight | kg | ≈0,4 |

Connections

| | | |
|----------------------------|------|-----------------|
| Voltage output | Type | BNC-neg. |
| Sensor input | Type | DB9 female |
| Actuation, outputs, supply | Type | 64 pin DIN41612 |

Optional accessories

| | Type/Art. No. |
|---|---------------|
| • D-Sub connector 9 pin pos. with soldered connection | 7.640.048 |
| • Extension cable D-Sub 9 pin pos. with open ends, length = 5 m | 5.590.183 |
| • D-Sub connector 9 pin pos. with screw connection | 5.510.337 |



Order form with ordering code
Signal conditioning platform base unit
SCP Type 2853B...

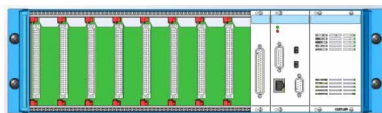
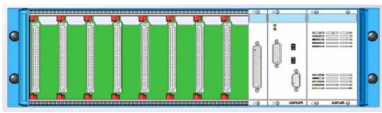
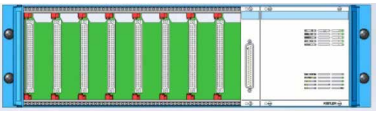
Please always place your order with this form

SCP without modules

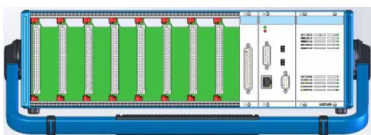
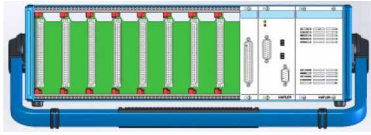
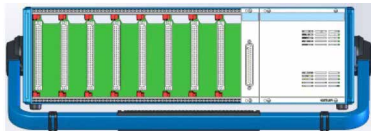
Ordering code

Type 2853B...

19" Rack mounting version

| | | | |
|---|---|---------------------------------|------------|
|  | Master chassis with Ethernet interface on front side. | AC power supply 100 ... 240 VAC | F11 |
| | | DC power supply 10 ... 36 VDC | F12 |
|  | Master chassis with Ethernet interface on rear side | AC power supply 100 ... 240 VAC | R11 |
| | | DC power supply 10 ... 36 VDC | R12 |
|  | Extension chassis (slave) | AC power supply 100 ... 240 VAC | E11 |
| | | DC power supply 10 ... 36 VDC | E12 |

19" Desktop version

| | | | |
|---|--|---------------------------------|------------|
|  | Master chassis with Ethernet interface on front side | AC power supply 100 ... 240 VAC | F21 |
| | | DC power supply 10 ... 36 VDC | F22 |
|  | Master chassis with Ethernet interface on rear side | AC power supply 100 ... 240 VAC | R21 |
| | | DC power supply 10 ... 36 VDC | R22 |
|  | Extension chassis (slave) | AC power supply 100 ... 240 VAC | E21 |
| | | DC power supply 10 ... 36 VDC | E22 |

Modules for SCP Type 2853B....

| Quantity | Type | |
|----------------------|---------|--|
| <input type="text"/> | 5064E21 | 2 channel charge amplifier without sensor identification, signal input: BNC |
| <input type="text"/> | 5064E22 | 2 channel charge amplifier with sensor identification, signal input: TRIAX |
| <input type="text"/> | 5064E23 | 2 channel charge amplifier with sensor identification, signal input: Fischer TRIAX |
| <input type="text"/> | 4665B2 | 2 channel piezoresistive amplifier with sensor identification |
| <input type="text"/> | 5271 | 2 channel bridge amplifier |
| <input type="text"/> | 5700A09 | Dummy front plate |

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| Included accessories | Type/Art. No. | Optional accessories | |
|---|---------------|---|-------------------------------|
| for SCP | | Input adapter for the connection of piezoelectric sensors without sensor identification to amplifiers with sensor identification. | |
| • Power cable | | | |
| • Ethernet cable to connect SCP and PC/host (not included with extension rack Type 2853BE...) | 65010017 | | |
| • CAN bus connecting cable of the extension unit, only for Type 2853BE... | 5.590.239 | for SCP | Type/Art. No. |
| • Connector for DC power supply, only for Type 2853BF12, 2853BR12, 2853BE12, 2853BF22, 2853BR22, 2853BE22 | 5.511.384 | • Adapter BNC neg. → TRIAX neg. | 1704A1 |
| | | • Adapter KIAG 10-32 neg. → TRIAX neg. | 1704A2 |
| | | • Adapter M4x0,35 neg. → TRIAX neg. | 1704A3 |
| | | • Adapter TRIAX pos. → BNC pos. | 1704A4 |
| | | • PiezoSmart extension cable for Type 5064E22 (TRIAX neg. – TRIAX pos.) | 1987B2, 1987B7, 1987B10 |
| | | • PiezoSmart connecting cable for Type 5064E23 (Fischer TRIAX neg. – TRIAX pos.) | 1987BFT3,5, |
| | | • CAN bus connecting cable of the extension unit, l = 0,5 m | 5.590.239 |
| | | • Power supply (ACadapter) 90 ... 260 VAC/50 ... 60 Hz only for Type 2853BF12, 2853BR12, 2853BE12, 2853BF22, 2853BR22, 2853BE22 | 5781A1 |
| | | • USB/RS-232C adapter | 2867 |
| | | • TEDS editor for PC | 2839A-01-003 |
| | | • D-Sub connector 37-pol. pos. | 7.640.062 |
| | | • Remote switch (measure/reset) connectable to digital I/O interface | Z20979 |
| | | • Remote switch, L = 2,0 m (measure/reset) connectable to digital I/O interface | Z20979-10 |
| | | • Null modem cable wire to connect SCP and PC/Host (not with extension rack) | 1200A27 |