



# **Diagnostic Test Equipment for Hydraulics**

*Catalogue 4054-1/UK*



All the instruments meet the guidelines of the European Community (EU).  
It is confirmed that these products are approved acc. to following standards.



DIN/ EN 61000-6-2  
DIN/ EN 61000-6-3

**Note!**

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Technical subject to change. September 2005.

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## SensoControl®

- Long-term stability
- Rugged design
- Easy operation
- Flexible use on site
- Documentation of measured values

**SensoControl®** handmeters and complete measuring systems are perfectly suitable measuring tools for every application. Whether they are used in the industrial area, in mobile hydraulics, for service or repair: measuring and processing of hydraulic values is the basis of safe trouble shooting. The systematic search for errors with modern aids is something the service engineer simply cannot do without.

High-speed processes, such as switching valves, cylinder strokes, pressure peaks, differential pressures and flow changes must be measured and evaluated simultaneously.



The **SensoControl®** handmeters have been specially developed for the following applications:

- Measurement and display of all hydraulic values, such as pressure, differential pressure, pressure peaks, temperature and flow, as well as speed.
- They are perfectly suitable for the mobile recording of measured values and feature high precision combined with easy operation.

All measuring devices as well as their accessories are manufactured and tested in our own plants. Our ever-increasing insistence on quality and flexibility make Parker a reliable partner.

## Choosing the Right Product

| Choice/features                                 | ServiceJunior                | Serviceman    | Service Master |
|---|------------------------------|---------------|----------------|
| <b>Measuring and read out</b>                   |                              |               |                |
| Read out  | ACT - MIN/MAX<br>(Peak-Hold) | ACT - MIN/MAX | ACT - MIN/MAX  |
| 2 inputs  | —                            | ●             | ●              |
| 3 inputs  | —                            | —             | ●              |
| 4 inputs  | —                            | —             | ○              |
| 6 inputs  | —                            | —             | ○              |
| Pressure peaks                                  | 10 ms                        | 2 ms          | 1 ms           |
| Pressure  | ●                            | ●             | ●              |
| Differential Pressure (P1-P2)                   | —                            | ●             | ●              |
| <b>Connection sensors</b>                       |                              |               |                |
| Socket 4 pin                                    | —                            | ●             | —              |
| Socket 5 pin                                    | —                            | ○             | ●              |
| Temperature/RPM/Flow                            | —                            | ●             | ●              |
| Electrical signals<br>48VDC/1,5ADC              | —                            | —             | ●              |
| External sensors<br>(0/4... 20 mA)/(0...10 VDC) | —                            | —             | ●              |
| <b>Functions</b>                                |                              |               |                |
| Rechargeable battery                            | battery                      | ●             | ●              |
| Interface                                       | —                            | ○             | ●              |
| OnLine-Function                                 | ○                            | ○             | ●              |
| Data recording                                  | —                            | —             | ●              |
| Print out graphs                                | —                            | —             | ●              |
| External power supply                           | —                            | ●             | ●              |

- not available
- optional
- standard

- Digital pressure measurement and display
- Accuracy  $\pm 0,5\%$  FS
- Display with bar graph (trailing indicator) with peak & hold function
- Pressure peaks captured – 10 ms scanning rate
- Easy operation
- Long-term stability
- Back-lit measured value display
- Pressure ports stainless steel 1/4 BSPP



### ServiceJunior Digital Pressure Gauge

The **ServiceJunior** makes possible the measurement and display of pressures with one instrument. Measured values are shown with high precision on a 4-digit display. Pressure peaks are securely captured at a scanning rate of 10 ms.

The **ServiceJunior** is distinctive through its very simple operation. With its convincing price to power ratio, the instrument offers all the advantages of digital pressure measurement.

With immediate effect, measurement data acquisition is entering **a new dimension!**

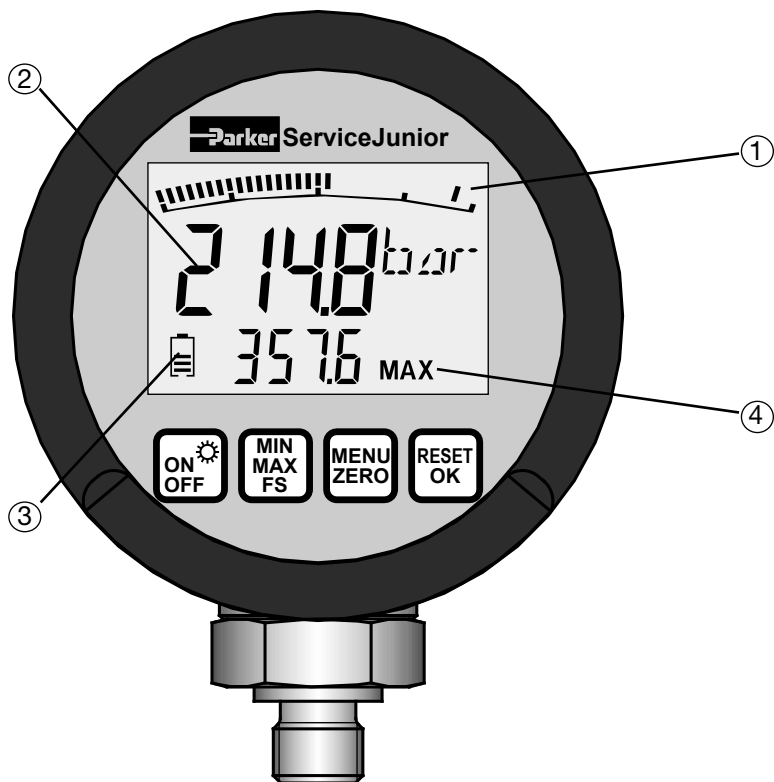
Utilising the **ServiceJunior wireless** from Parker's SensoControl family of products allows you to comfortably record the pressure values taken from one or several measurement points on your machine or installation. Stored measurement data is transmitted to a PC across distances of **up to 50 meters**.

The PC software '**JuniorWin**' allows you to set the limit value and the configuration to suit your needs.

Thus **ServiceJunior wireless** allows you to save time and costs for monitoring machines and installations – comfortably from your plant office.





At the same time you can evaluate and archive the data as well as perform other control functions from the same PC.

The device is ideal for monitoring, maintaining and servicing machines and installations in industrial and mobile hydraulic systems.



- ① Display with bar-graph due to peak & hold function
- ② Actual value back-lit display (15 mm)
- ③ Battery level display
- ④ Display of MIN/MAX or Full Scale Range display (FS)

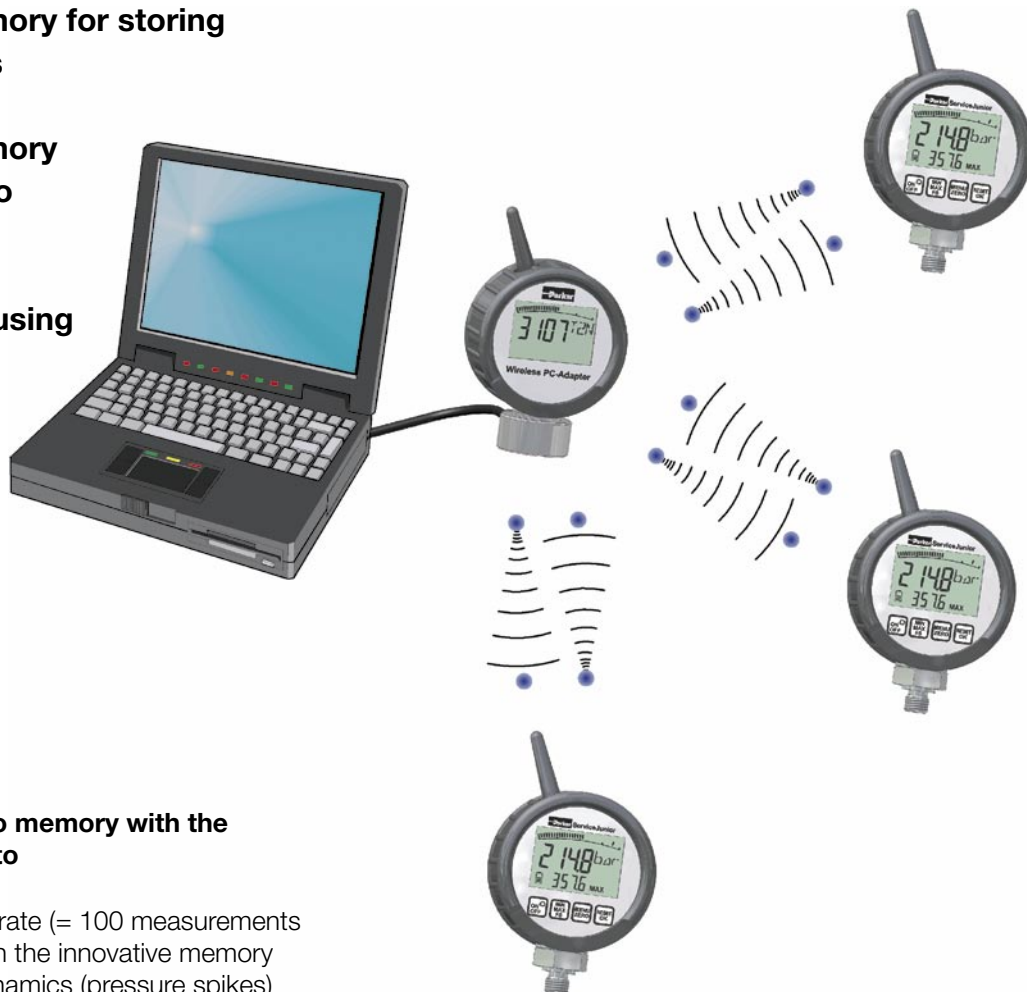
Menu functions

-  On/off switch  
Back-lit display
-  Minimum/maximum value  
FullScale
-  Menu: auto shut-off  
Choice of units  
Zero: Zero point equalisation
-  Delete MIN/MAX value  
Confirm menu function

| Digital Pressure Gauge                                    | ServiceJunior  | ServiceJunior wireless |
|---|--|------------------------|
| <b>Range</b><br>-1...016 bar<br>0 ...100/400/600/1000 bar | <b>SCJN-xxx-01</b>   | <b>SCJNP-xxx-01-RC</b> |
| Standard ServiceJunior delivery includes:                 | 1 ServiceJunior (acc. to pressure range)<br>2 batteries 1.5 VDC AA alkaline<br>1 adaptor SCA-1/4-EMA-3 |                        |
| ServiceJunior-Kit   | SCJN-KIT-xxx   | SCJNP-KIT-xxx-RC       |
| 1 Storage case  | SCC-120  |                        |
| 1 ServiceJunior   | SCJN-xxx-01  | SCJNP-xxx-01-RC        |
| 1 Adaptor a PC incl. Software                             | —  | SCSW-KIT-JN            |
| with adaptors:  |  |                        |
| 1 1/4 BSPP female - M16x2 female                          | SCA-1/4-EMA-3  |                        |
| 1 M16x2 male - M16x2 male                                 | SCA-EMA-3/3*   |                        |
| 1 Test hose assembly 1.500 mm (M16x2)                     | SMA3-1.500*  |                        |

\* not available for 1.000 bar

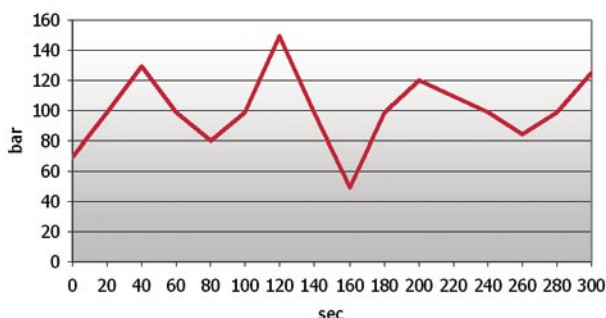
- Network operations:  
monitor several measurement points
- Measured data memory for storing  
pressure sequences
- Read-out data from  
measured data memory  
to the PC via a radio  
interface
- Set and evaluate  
measurement data using  
PC software  
"JuniorWin"



**Example of measurement to memory with the settings REC Time/REC Auto**

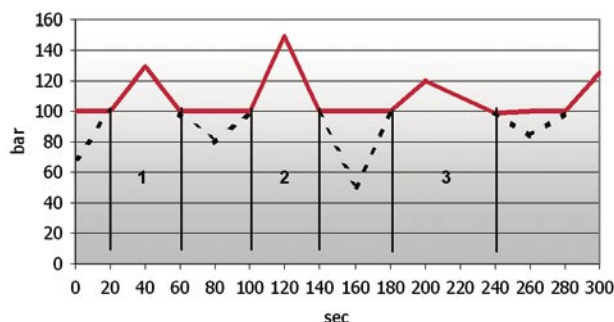
The constant 10 ms scanning rate (= 100 measurements per second) in conjunction with the innovative memory technology ensures that all dynamics (pressure spikes) are captured. There are two measurement functions available to the user:

**REC Time**



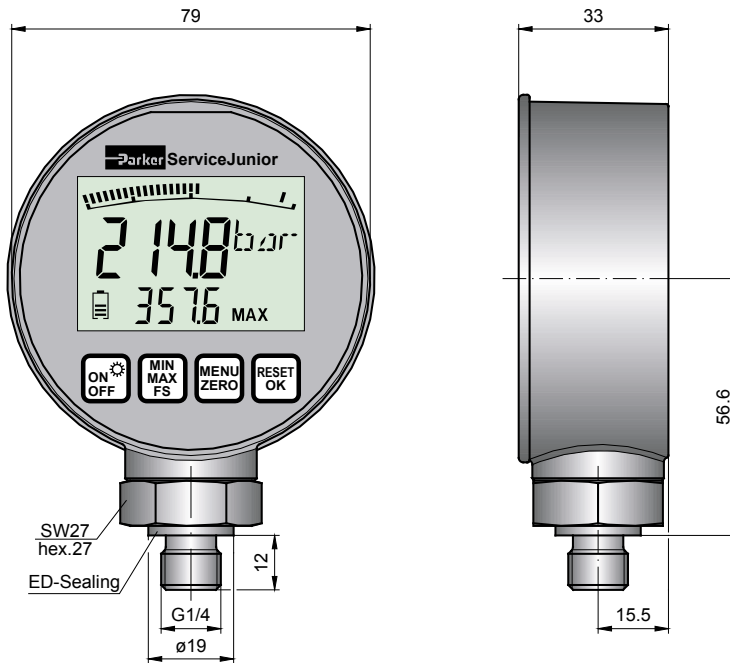
Measurement time (for example, 300 s);  
5.000 measurement values are written into the memory and diagrammed as a curve.  
Other measurement times can be set.

**REC Auto**



Pressure spike monitoring with limit value, for example 100 bar. All pressure values measured above 100 bar are stored to memory.





| Technical Data                     |  |         |         |         |           |
|------------------------------------|--|---------|---------|---------|-----------|
| Range (bar)                        | -1...16  | 0...100 | 0...400 | 0...600 | 0...1.000 |
| Overload Pressure P <sub>max</sub> | 40   | 200     | 800     | 1.200   | 1.500     |
| Burst Pressure (bar)               | 50   | 800     | 1.700   | 2.200   | 2.500     |
| Housing                            | Ø = 79 mm; T = 33 mm<br>Zinc die casting with rubber TPE protection cover  |         |         |         |           |
| Weight (g)                         | 540  |         |         |         |           |
| Port                               | Stainless Steel 1.4404<br>1/4" BSPP (ISO 228-1)  |         |         |         |           |
| Input                              | Sensor element ceramics (16 bar)<br>Strain gauge pressure measurement cell<br>10 ms scanning rate<br>Accuracy ± 0,25% FS typ.<br>± 0,5% FS max.<br>A/D converter 12 bit<br>4096 steps resolution |         |         |         |           |
| Display                            | LC text display<br>4 ½ digits 50x34 mm<br>Digit size: 15 mm<br>Units: mbar/bar/PSI/Mpa/kPa<br>Back lit illumination<br>Bar graph (trailing indicator) with peak & hold function                  |         |         |         |           |
| Sealing                            | NBR  |         |         |         |           |
| Parts in Contact with Media        | Stainless Steel 1.4404, NBR, ceramic   |         |         |         |           |

| Technical Data                        |  |
|---------------------------------------|--|
| Functions                             | Units: mbar/bar/PSI/Mpa/kPa<br>MIN/MAX - FullScale<br>Battery level display<br>Auto power Off/On<br>Zero (zero point equalization)<br>Reset (Delete MIN/MAX) |
| PC-Function*                          | PC Software "JuniorWin"<br>Read out data from memory to PC via radio interface (2,4 GHz)<br>Operation range 50 m<br>Setup of recording parameters            |
| Memory Function*                      | 5.000 Readings (MAX pressure peaks)<br>Setup of storage interval<br>REC TIME (Time based recording)<br>REC AUTO (Pressure spike monitoring)                  |
| Power Supply                          | 2 x 1,5 V alkaline batteries<br>Battery life typ. 1.500/800* hours   |
| Ambient Temperature (°C)              | -10...+50  |
| Storage Temperature (°C)              | -20...+60  |
| T <sub>max</sub> Fluid (°C)           | +80  |
| Rel. Humidity                         | < 85%  |
| Protection                            | EN 60529 (IP 67/IP 54*)  |
| Vibration                             | IEC 60068-2-6/10...500Hz; 5 g  |
| Shock Load                            | IEC 60068-2-29/25 g; 11 ms   |
| Reliability Cycles (10 <sup>6</sup> ) | 100  |

\* SC.JNP = ServiceJunior wireless

- Easy operation
- Prevention of measuring errors due to automatic sensor recognition
- Printer and PC connection
- Two-line display
- Rugged design



The **Serviceman** has 2 inputs for sensors. This enables a differential pressure measurement by pressing only one key. Fast comparisons of actual and set values are done very easily.

The **Serviceman** is extremely robust and insensitive to dirt, so that it can be used in even the toughest conditions. The digital display avoids reading errors.

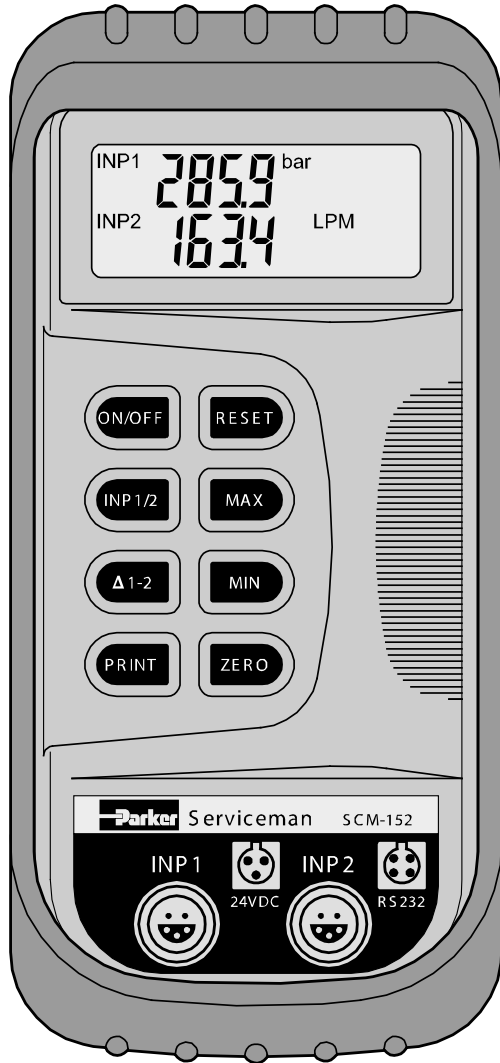
The **Serviceman** is small and light: perfect for mobile applications.

**Serviceman incl. external power supply  
2 Inputs (5 pin) incl. PC Interface**

The data output can be used to connect a PC. Data printout is valid under the documentation obligatory under ISO 9001.

The Min/Max memory permits the reading of peak values. Pressure peaks which could lead to damage are avoided.

Like all other **SensoControl**<sup>®</sup> measuring devices, the **Serviceman** is provided with sensor recognition. The measuring ranges are automatically scaled and units shown on the display. This avoids measuring errors and time-consuming adjustment work.



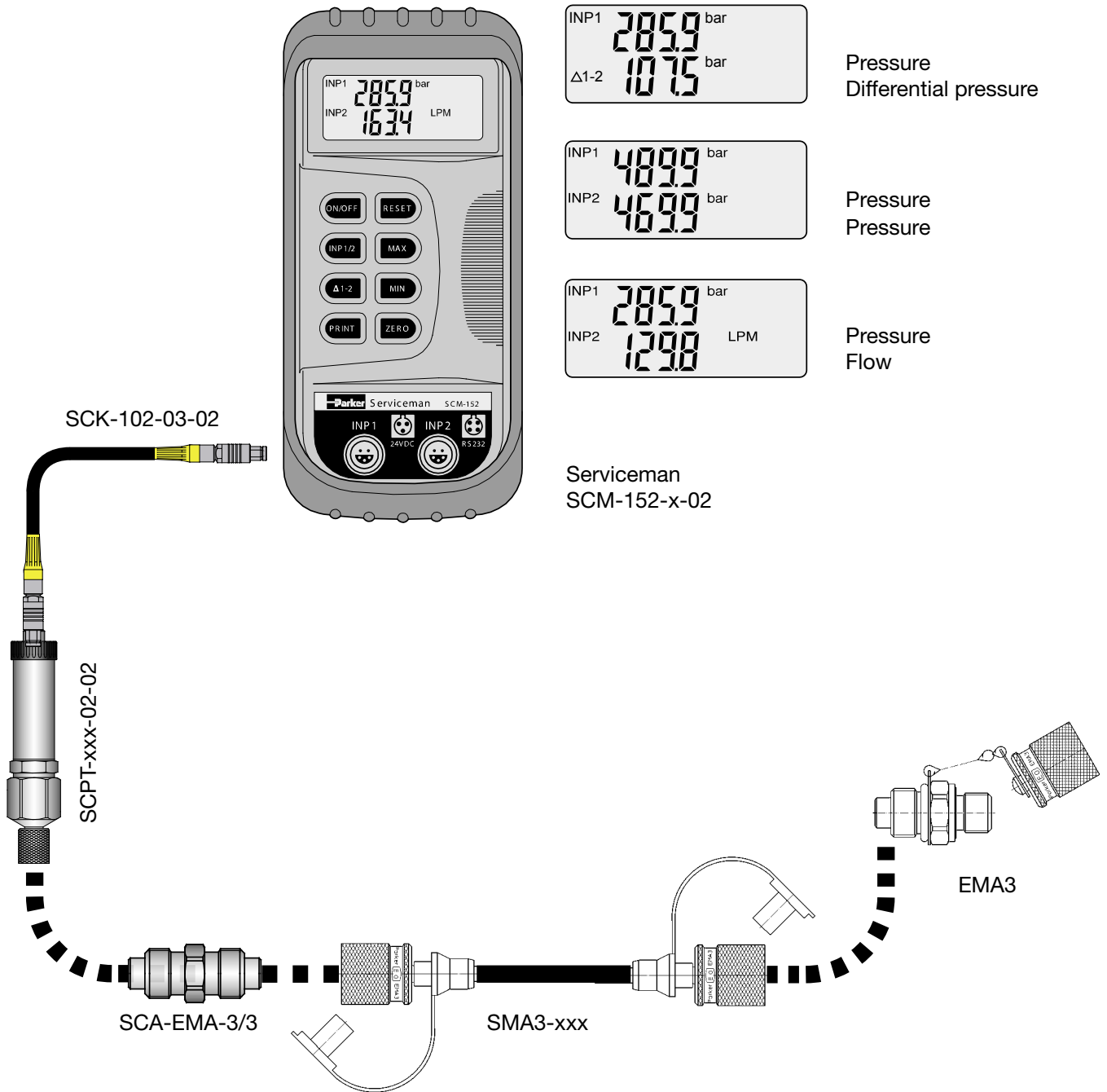
- Display      Display (two line)  
INP1 and INP2; ΔP display  
Battery level display  
MIN: Minimum value
- ON/OFF**      On/off switch
- INP 1/2**      Select button for input
- Δ 1-2**      Differential value display  
e.g. P1 - P2 = ΔP
- PRINT**      Data transfer to PC
- RESET**      Delete MIN/MAX-readings  
INP1 = INP2:  
Equalisation of ΔP-measuring
- MAX**      Maximum value (pressure peaks)
- MIN**      Minimum value
- ZERO**      Zero point equalisation
- INP1/INP2      Sensor inputs  
5-pin = push pull
- 24VDC      Power supply or  
automotive cable adaptor  
SCK-318-05-21
- RS232      PC interface  
SCM-152-2-02

| Type  | SCM-152-1-02 | SCM-152-2-02 |
|---|--------------|--------------|
| PC interface  | —            | ●            |
| Standard delivery includes SCSN-450<br>(power supply 110/220 VAC) | ●            | ●            |
| <b>Accessories</b>  |              |              |
| Automotive cable adaptor (24 VDC) SCK-318-05-21                   | ●            | ●            |
| PC-Software Kit SCSW-KIT-152                                      | —            | ●            |
| Spare battery SC-811  | ●            | ●            |
| Charging Unit (220 VAC) for SC-811                                | ●            | ●            |

— not available      ● serial

|                    | <b>Serviceman</b>  | <b>SCM-152-1-02</b> | <b>SCM-152-2-02</b> |
|--------------------|--|---------------------|---------------------|
| Input              | 2 sensor inputs (5-pin) push-pull  | ●                   | ●                   |
| Display            | LC text display (4 digit),<br>2 line, digit size 8 mm  | ●                   | ●                   |
| Interface          | RS232 (4-pin)<br>optional with a standard<br>RS232/USB PC adaptor  | —                   | ●                   |
| Functions          | MIN-/MAX display<br>Zero point equalisation<br>INP1-INP2 differential reading<br>Battery level display<br>Auto power off (15 min)                | ●                   | ●                   |
| Ambient conditions | Operating temperature: 0 ... +50 °C<br>Storage temperature: -20 ... +60 °C<br>Rel. humidity: < 85%<br>Protection according to (EN 60529) (IP 54) | ●                   | ●                   |
| Power supply       | External power supply SCSN-450 or<br>automotive cable adaptor SCK-313-05-21<br>(24 VDC)<br>Internal battery 9 V/110 mA/h<br>Battery life 5 h     | ●                   | ●                   |
| Housing            | ABS with rubber protection<br>Dimensions: 145 x 70 x 40 mm (L/W/H)<br>Weight: 330 g  | ●                   | ●                   |

— not available      ● serial

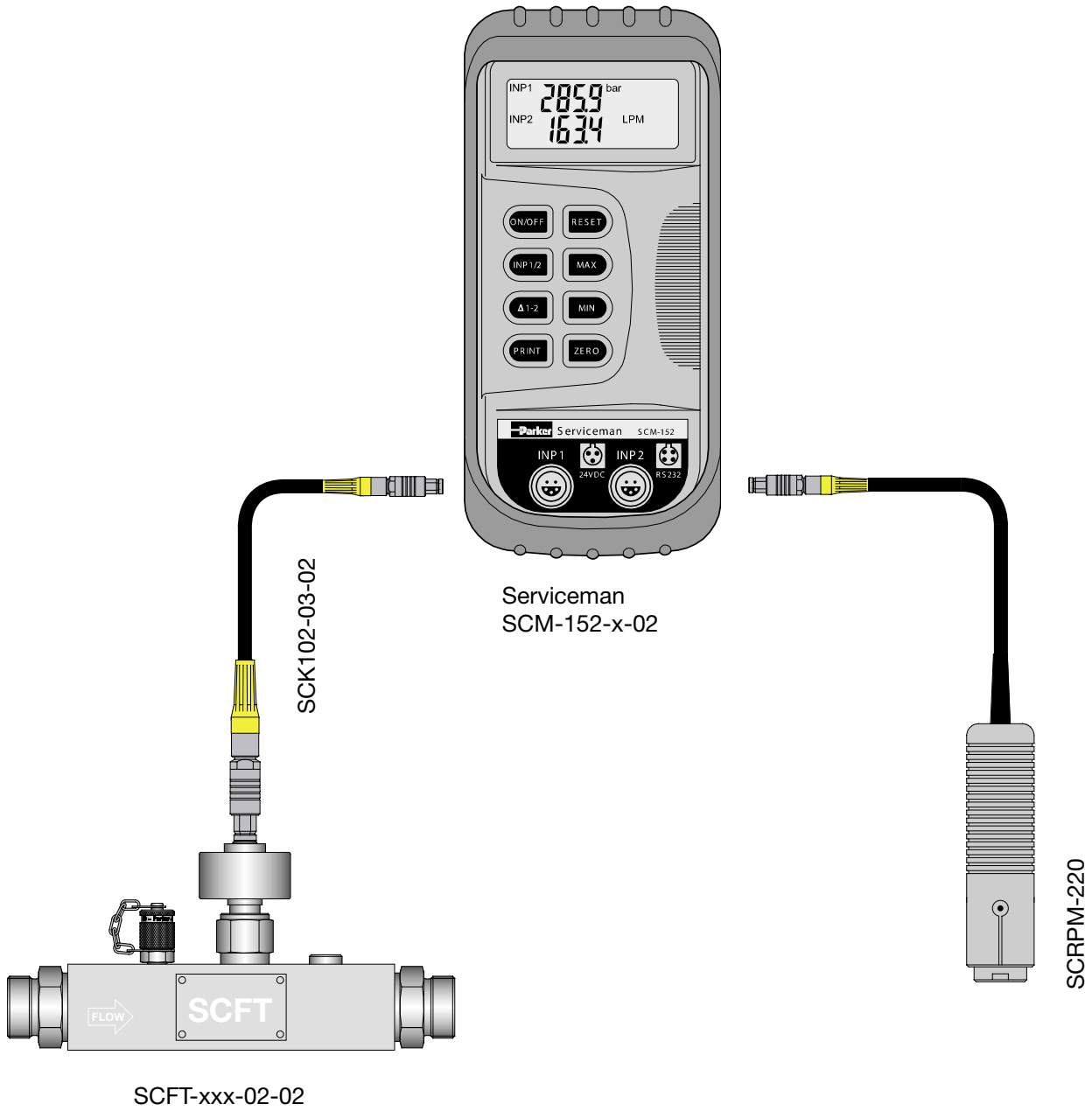


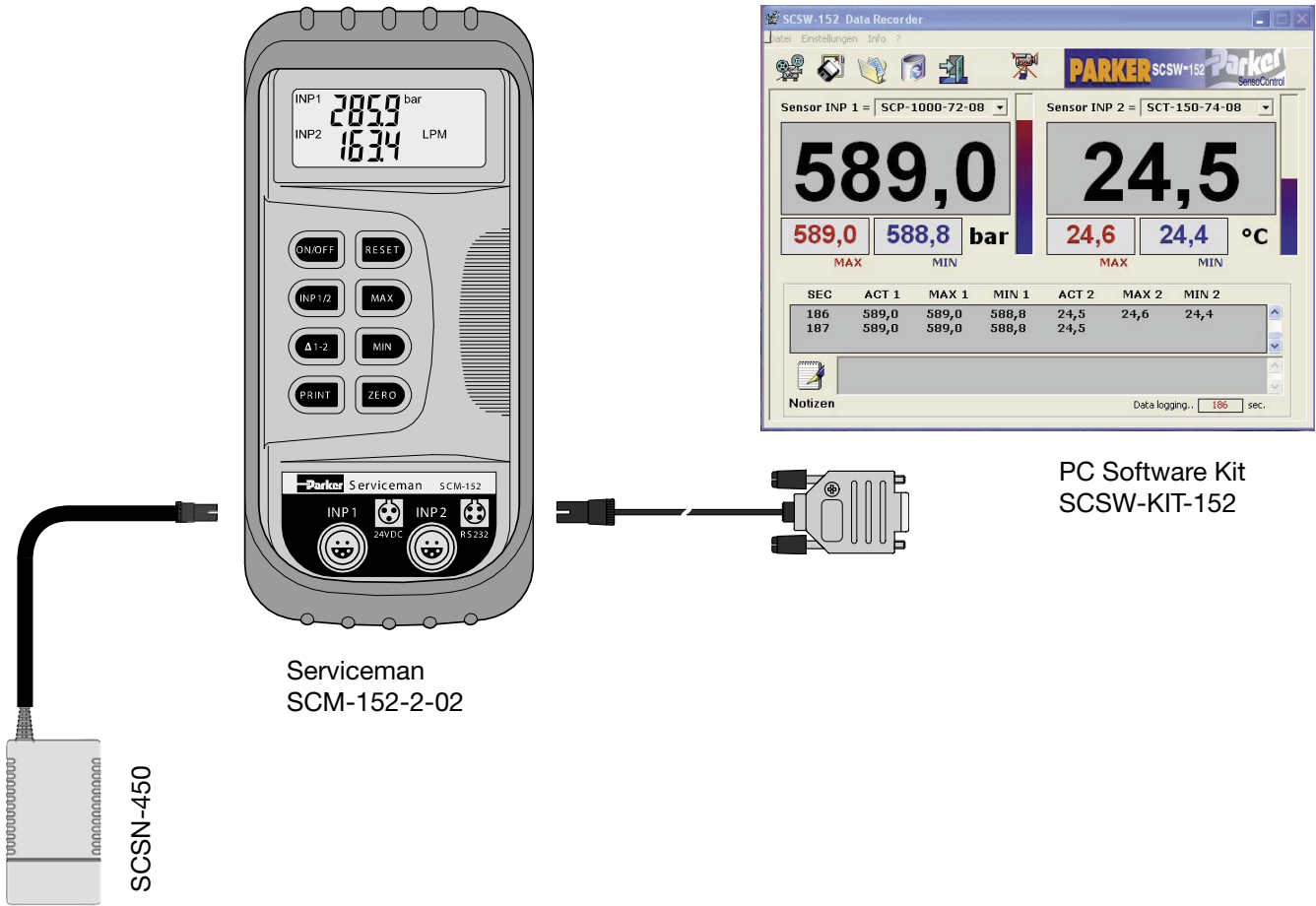
**Pressure Sensors**

There is a selection of various measuring ranges for pressure measurement. Sensors are available for pneumatic applications and also for measuring pressure peaks up to 1000 bar.

**Diagnostic adaptors**

All pressure sensors in a measurement case (kit) are provided with a factory-assembled SCA-1/2-EMA-3 diagnostic adaptor. The pressure sensors can be adapted to all standard measuring connections with the help of diagnostic couplings supplied. They are perfectly suitable for a quick and flexible diagnoses in hydraulic applications.





- Easy operation
- Self running installation
- On-line data recording
- Storage of readings in MS Excel format
- Analysis of data with standard software
- Print out readings on site

Data transfer from Serviceman to PC or laptop is possible with the PC Software Kit.

The software included is compatible with MS Windows 98/2000/XP.

Recorded data can be further processed and analysed with standard software (e.g. MS Excel).

- Instruments with 3-channel, 4-channel and 6-channel technology
- Easy operation due to automatic sensor recognition
- PC connection
- Powered by rechargeable battery
- Rugged design



The **Service Master** is a multi-channel hand meter for the simultaneous measuring of important hydraulic values:

All hydraulic parameters such as pressure, differential pressure, flow and hydraulic power can be measured, displayed, stored and processed.

To meet the requirements of both modern industrial hydraulics and complex mobile hydraulics, we offer a range of different models:



Service Master SCM-250 (3 inputs/channels)

Memory capacity = 60,000 MIN and MAX points  
 Max. 60 single graphs storable (1-channel operation)  
 Max. 20 different measurements storable (3-channel operation)

Service Master SCM-360 (4 inputs/channels)

Frequency measurement (I3)  
 Memory capacity = 125,000 MIN and MAX points  
 Max. 120 single graphs storable (1-channel operation)  
 Max. 30 different measurements storable (3-channel operation)

Service Master SCM-400 (6 inputs/channels)

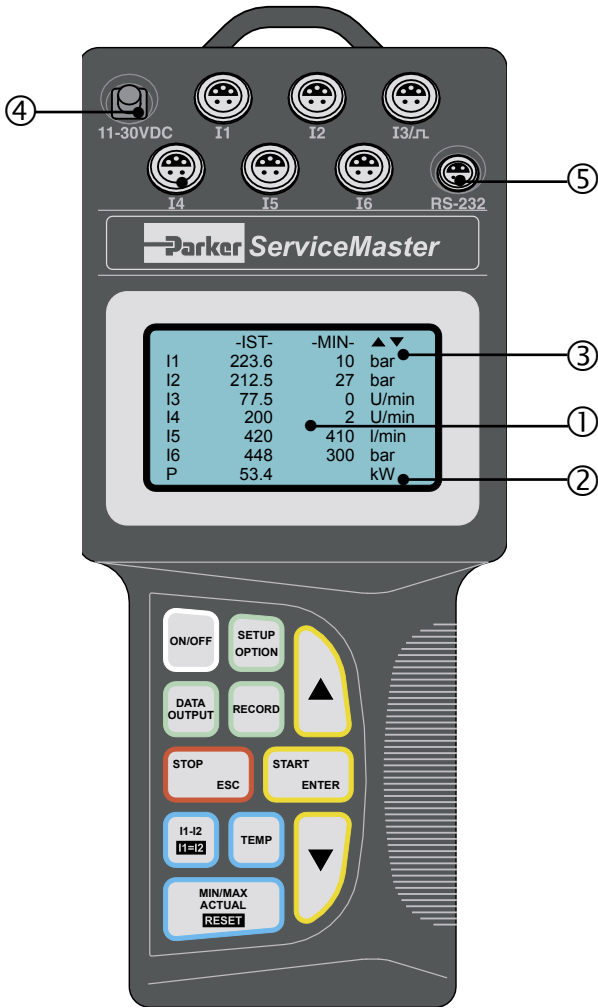
Frequency measurement (I3)  
 Memory capacity = 125,000 MIN and MAX points  
 Max. 120 single graphs storable (1-channel operation)  
 Max. 20 different measurements storable (6-channel operation)

Service Master SCM-450 (6 inputs/channels)

Frequency measurement (I3)  
 Memory capacity = 250,000 MIN and MAX points  
 Max. 240 single graphs storable (1-channel operation)  
 Max. 40 different measurements storable (6-channel operation)



|                       | SCM  | 250 | 360 | 400 | 450 |
|-----------------------|--|-----|-----|-----|-----|
| Input                 | Sensor inputs  | 3   | 4   | 6   | 6   |
|                       | With sensor recognition (p/T/Q/n)<br>Adaptor for external sensors with SCMA-VADC<br>Plug-in connection: 5-pin, push-pull<br>Sample rate: $\geq 1$ ms = 1,00 measurement values/sec.<br>Resolution: 12 bit + sign = 4,096 steps                     | ●   | ●   | ●   | ●   |
|                       | Frequency input via input socket I3<br>for flow turbine or tachometer<br>Frequency range: 0.5 Hz ... 30 kHz<br>Signal input: depends on frequency 5 V <sub>pp</sub> (max)  |     | ●   | ●   | ●   |
| Display               | Graphic LC<br>Resolution: 128 x 64 pixels<br>Visible area: 72 x 40 mm<br>Automatic adjustment of digit size<br>Digit size: 4.2 mm (for 8 line display)<br>Accuracy of display: < 0,25 % of Full Scale Range  | ●   | ●   | ●   | ●   |
|                       | Graphic curve representation   | ●   | ●   | ●   | ●   |
| Operation             | Via 11-key membrane keyboard<br>With mechanical tactile touch and embossed edges   | ●   | ●   | ●   | ●   |
| Interface             | RS232C (4-pin, push-pull)<br>optional with a standard RS232/USB PC adaptor<br>Baud rate: 1,200 ... 38,400.8 data bits, 1 stop bit<br>Online data transmission to the PC<br>Transferring recorded data to PC with SensoWin®                         | ●   | ●   | ●   | ●   |
| Functions             | I1-I2 indication of differential values<br>Indication of MIN/MAX/ACTUAL values<br>Indication of TEMP values (SCPT/SCT)<br>Auto power off/battery level control<br>Hydraulic power/outflow volume   | ●   | ●   | ●   | ●   |
| Measured value memory | Memory capacity (60,000 MIN and MAX points)  | ●   |     |     |     |
|                       | Memory capacity (125,000 MIN and MAX points)   |     | ●   | ●   |     |
|                       | Memory capacity (250,000 MIN and MAX points)   |     |     |     | ●   |
|                       | Variable storage interval (e.g. = 10 ms)<br>Number of points per channel (e. g. 4,000 Min-Max)<br>Variable recording time (2 s ... 100 h)<br>Trigger: slope/manual/external/time<br>Pre trigger<br>External trigger with additional device SCMA-TR | ●   | ●   | ●   | ●   |
| Ambient conditions    | Temperature range: 0 ... +50 °C<br>Storage temperature: -25 ... +60 °C<br>Temperature error: < 0.02 %/ °C<br>Rel. humidity: < 80 %<br>Protection according to DIN 40050:<br>IP 54 (water spray/ oil)   | ●   | ●   | ●   | ●   |
| Power supply          | Internal: NiCd-battery 7.2 V/700 mAh<br>Battery charging circuit<br>Battery service capacity: 5 h approx.<br>External: with SCSN-450 (220/100 VDC)<br>Automotive cable adaptor as equipment (12/24 VDC)  | ●   | ●   | ●   | ●   |
| Housing               | Material: glass ball-reinforced polyamide<br>Dimensions: 235 x 106 x 53 mm (L/W/H)<br>Weight: approx. 530 g  | ●   | ●   | ●   | ●   |



- I1 – I6 Sensor inputs with automatic sensor recognition (p/T/Q/n). External sensors with SCMA-VADC-250 V/A Measuring voltage/current with SCMA-VADC-400
- I3/∏ Frequency input
- ① Graphic LC Display: shows measured values, operation menus and graphs
- ② Additional line: Indication of hydraulic power or outflow volume
- ③ Status line: shows the actual, min and max values and menu settings
- ④ External power supply via power unit SCSN-450 or automotive cable adaptor
- ⑤ PC interface: RS232 External trigger module with SCMA-TR-250

- Switches the instrument on and off
- System settings, date/ time, storage operation
- Menu
- Start measurements
- Stop measurements
- Differential function I1-I2 Zero point equalisation (Tara-Function) I1=I2
- SCPT temperature measuring sensors
- Data output to PC or graphic display On-line test (200 ms)
- Recording and saving of measurements (program or start/Stop)
- ACT-, MIN- und MAX-display RESET deletes MIN/MAX-values

Order code

Service Master

(Delivery includes SCSN-450 power unit)

| Number of measuring channels | Frequency measuring | MIN and MAX value memory |
|------------------------------|---------------------|--------------------------|
| 3                            | —                   | 60.000 points            |
| 4                            | ●                   | 125.000 points           |
| 6                            | ●                   | 125.000 points           |
| 6                            | ●                   | 250.000 points           |

SCM-XXX-1-01

250

360

400

450

Automotive cable adaptor 12/24 VDC  
SensoWin® PC Software-Kit

SCK-318-05-21  
SCSW-KIT-400

The Service Master can be used as a measuring instrument in three different versions:

### 1. Measuring and readout

Through automatic sensor recognition all measured values are shown immediately on the display. Each input can be used as required. The display switches automatically to the appropriate line size.

- **Peak pressure measurement (MIN/ MAX display)**  
The scanning rate of 1,000 measurement values/s captures rapidly occurring pressure peaks within the space of a millisecond.

- **Differential pressure measurement**  
Exact  $\Delta p$  measurement is achieved by means of the  $\Delta p$  adjustment. Under operating pressure the deviation of the pressure sensors relative to each other is corrected. For load sensing control the exact  $\Delta p$  setting is a prerequisite for trouble-free functioning of the hydraulics. A combination of  $\Delta p$  (bar) and flow Q (l/ min) is displayed as hydraulic power P (kW).

- **External sensors**  
Analogue signals such as those from a force or stroke sensor (external sensor) can also be measured and evaluated with the Service Master. The measurement of electrical currents or voltages (for example proportional valves) up to 1.5 ADC or 48 VDC. External modules make the Service-Master a multifunctional measuring instrument.

|               |  |
|---------------|--|
| SCMA-VADC-250 | Signals<br>(0...20 mA or 0...10 VDC)   |
| SCMA-VADC-400 | V/A measurement<br>(1,5 ADC or 48 VDC) |
| SCMA-TR-250   | external trigger signal                |

### 3. Online Operation

In On-line operation all measurement values are transferred directly from the Service Master to a PC and subsequently stored. The current graphic display in SensoWin® allows the hydraulics to be set (valve position or pressure load) whilst the test is running.

With the SCMA-AO-400 the measurement values are documented as analogue signals (0...20 mA) on an external device (for example, graphic recorder or oscilloscope). The sensor signals can be processed directly by an external A/D converter or PLC control unit.

### 2. Data logging and recording

The recording (storage) of measurements provides documentation of settings and the actual condition of the hydraulics.

Measurements can be printed or further processed on a PC with SensoWin® software. This is ideal for customer care or service since the measurements can be called up at any time.

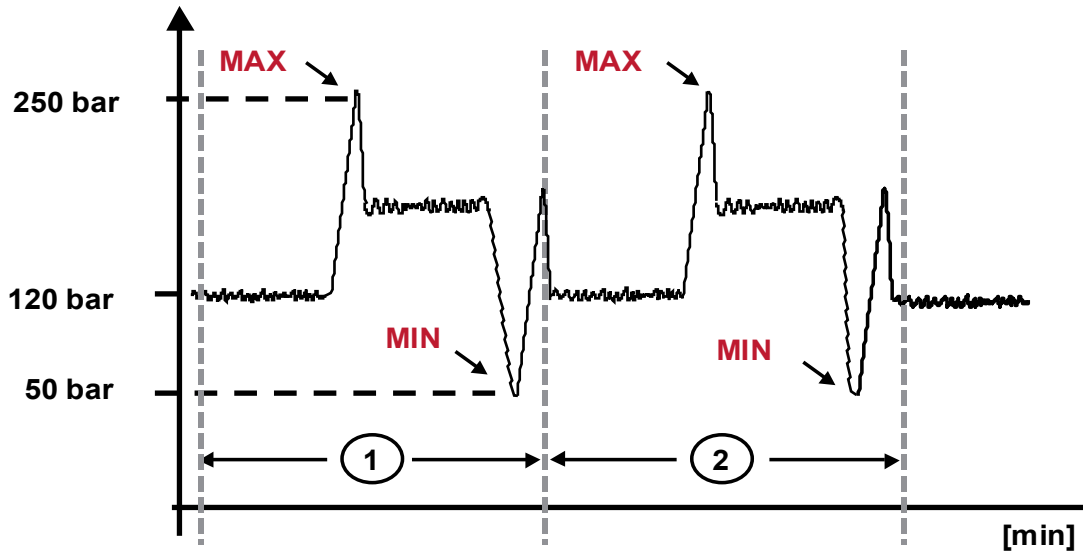
With the special storage technology of the Service-Master, all pressure peaks in the hydraulic system can be captured independently of the set measurement time (storage time). The storage interval (time interval between storage points) is automatically adapted within the base setting of the Service Master. Within each storage interval one min. and one max. value is stored. The user has only to pre-select the measuring time (storage time = 100 h. max.).

Individual setting of the storage interval is likewise available (for example, 10 ms).

- **Start-stop function**  
The start and finish of measurements are controlled by the start/stop key only

- **Program-controlled recording**  
Four programs may be selected:
  - Flank trigger  
Recording starts by pressure increase (60 bar, increasing slope)
  - Manual  
Start by pressing enter key
  - External trigger  
Starts recording by external signal (e.g. rely contact)
  - Clock time  
Start at e.g. 14.25 h

In each programme the recording time (2s...100 h) and the corresponding start function are selected. All the connected channels (sensors) are measured and stored. Program-controlled storage is particularly advantageous during the search for faults in hydraulic machinery. The point when the cause of damage occurs (for example, pressure peak or pressure drop) is not as a rule foreseeable. With the help of SensoWin® the recording can be subsequently analysed exactly.

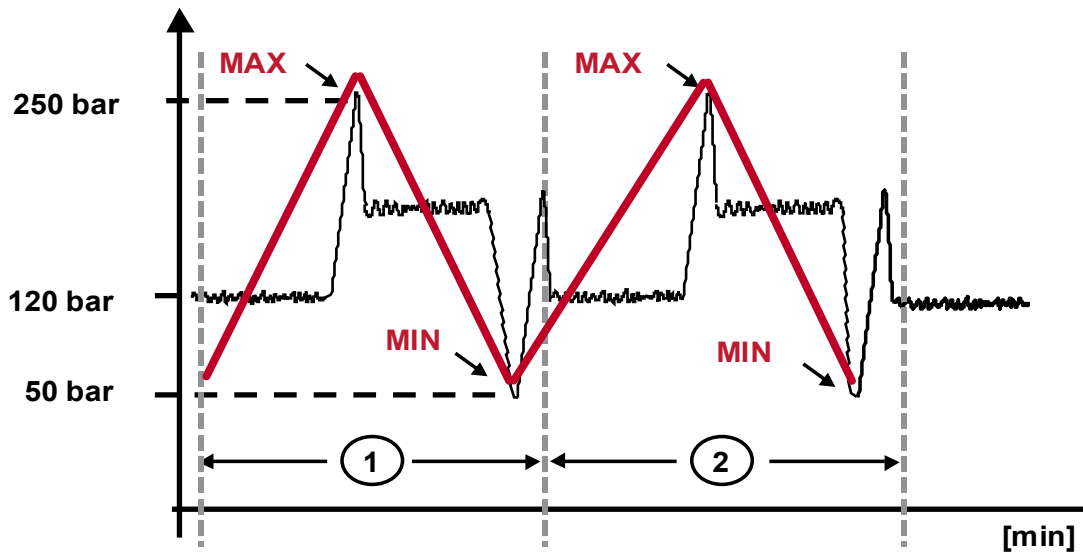


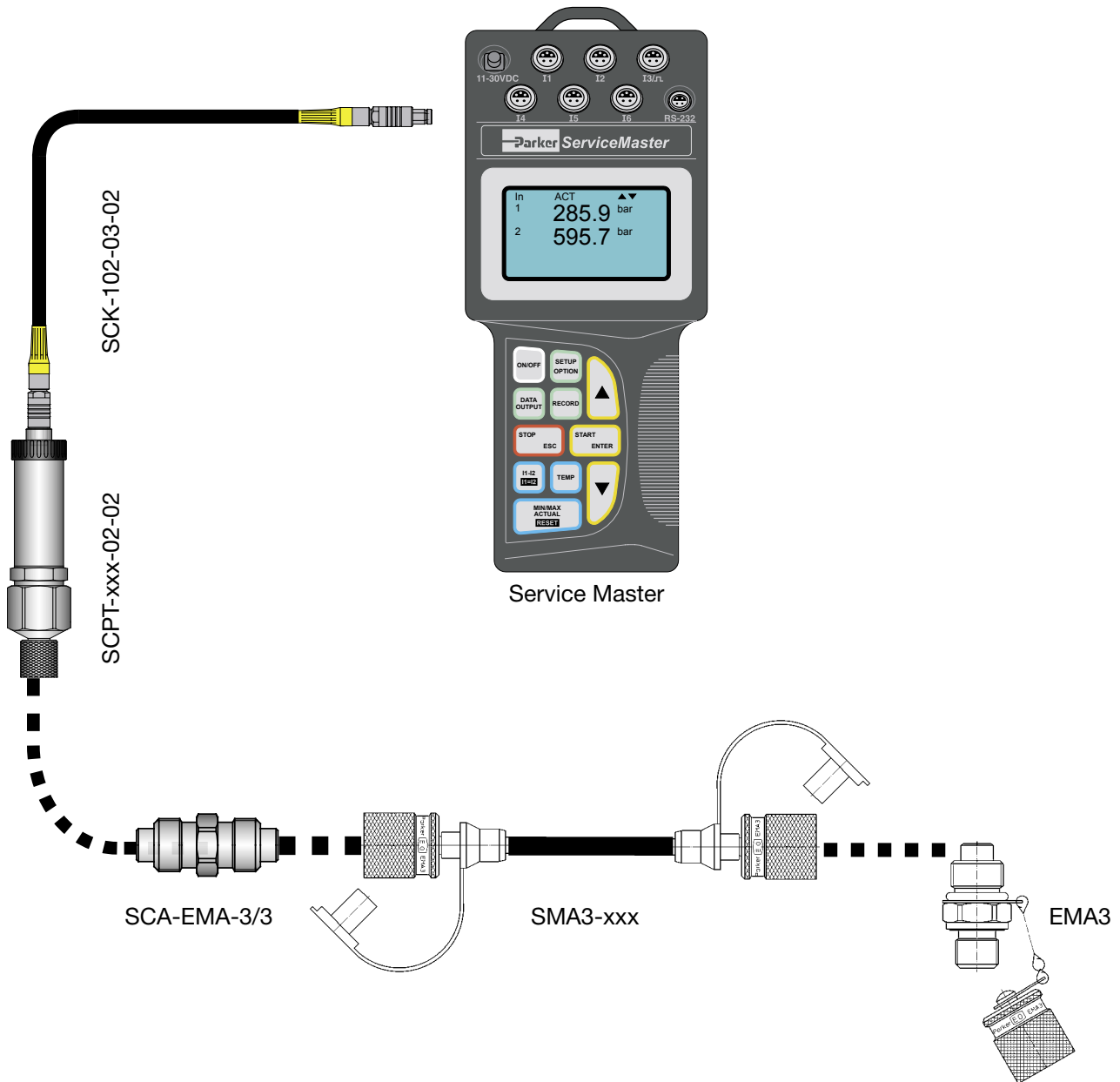
With the Service Master up to 6 sensors can be measured, displayed and recorded simultaneously. Each sensor (channel) enables up to 4,000 memory intervals to be created. Each memory interval will save a pair of data points. The pair consists of one MIN and one MAX reading.

Running a constant scanning rate of 1,000 readings/s this will correspond to 150 readings (interval).

The highest (max) and lowest (min) will be carried to the measurements memory. The connection of these data points creates a measured graph and guarantees the capture of pressure peaks.

In a recording session of 10 min and 4,000 intervals, the length of each storage interval is 150 ms.



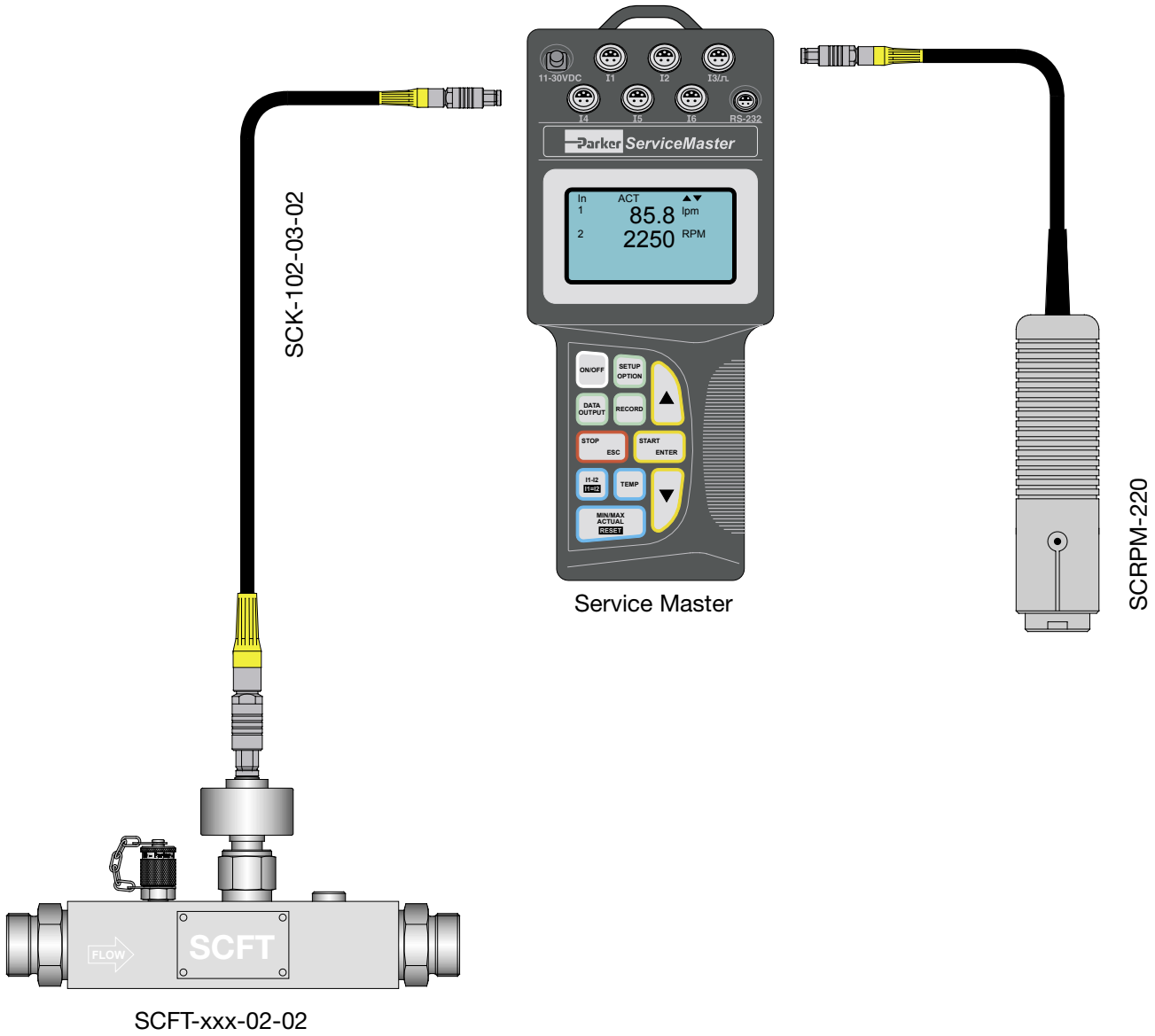


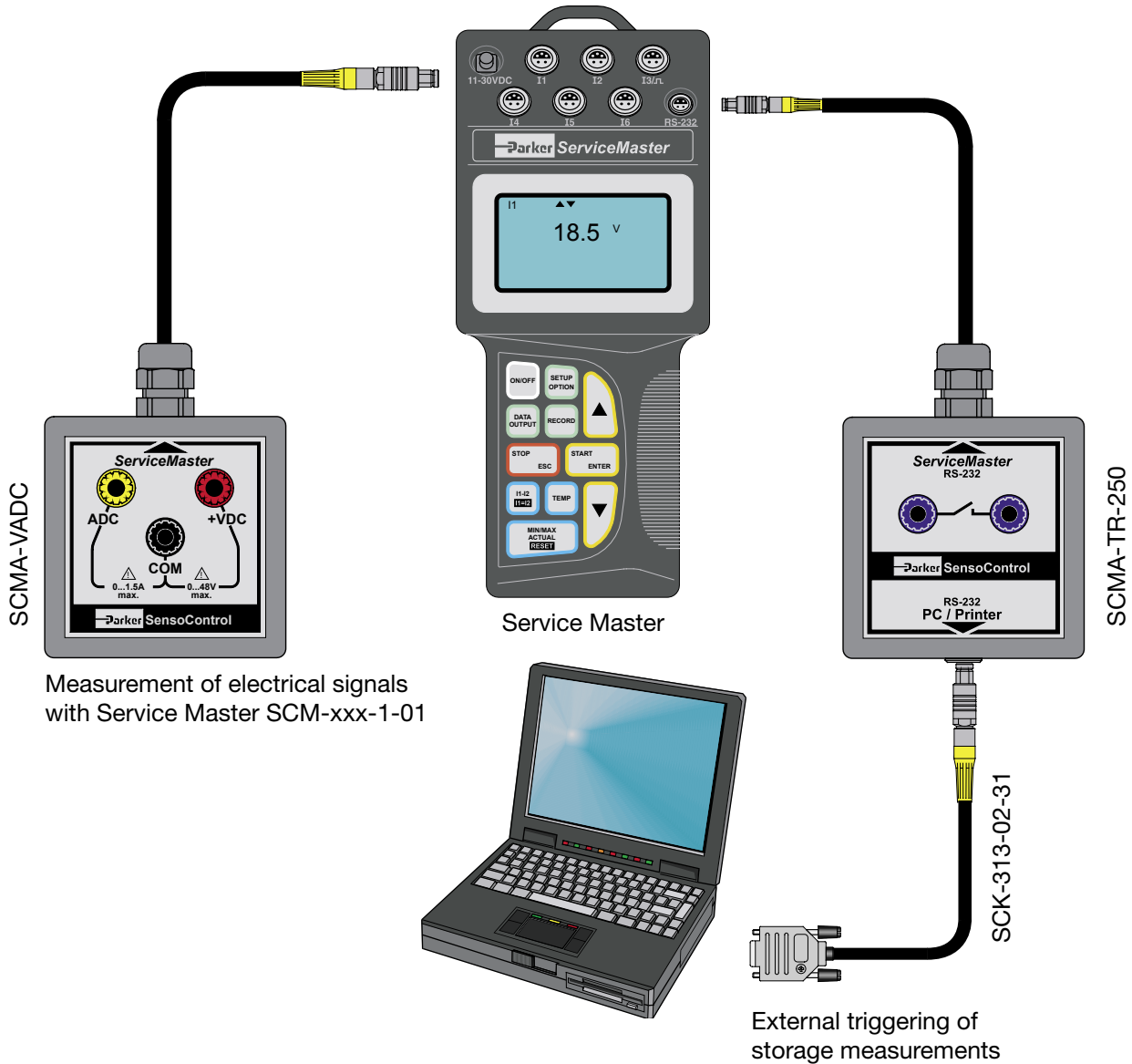
**Pressure/Temperature measurement SCPT**

There is a selection of various measuring ranges for the measuring of pressures. Sensors can be used for pneumatic applications and also for measuring pressure peaks up to 1000 bar. The pressure/temperature sensors of the SCPT series have a temperature channel which is retrieved via the TEMP key.

**Diagnostic adaptors**

All pressure sensors in a measurement case (kit) are provided with a factory-assembled SCA-1/2-EMA-3 diagnostic adaptor. The pressure sensors can be adapted to all standard measuring connections with the help of diagnostic couplings supplied. They are perfectly suitable for a quick and flexible diagnoses in hydraulic applications.





Measurement of electrical signals with Service Master SCM-xxx-1-01

External triggering of storage measurements

■ **Measurement of external signals**  
**SCMA-VADC-250**

Signals such as 0/4...20 mA or 0...10 V from external sensors, for example, for torque, power or stroke, are connected to the Service Master.

Typical applications:

- Power/stroke graphs
- Torque/flow volume nominal lines

■ **Current/voltage measurement**  
**SCMA-VADC-400**

Electric currents up to 1,5 ADC and voltages up to 48 VDC can be measured with this module.

Applications:

- Current consumption of a proportional valve
- Measurement of switch status in motors/pumps

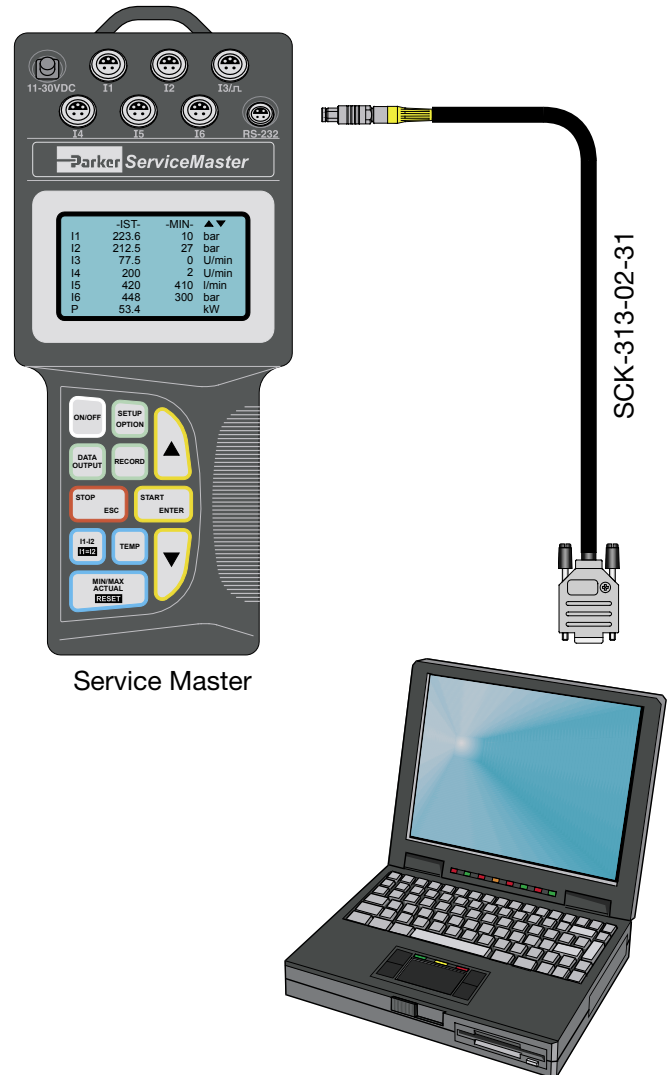
■ **SCMA-TR-250**

External signals such as relay contacts, for example, can be used as starting signals for measurement recording (storage). The measurement recording begins with the opening of a valve or the start-up of a pump. In order that during on-line measurement the external relay triggering is working, the SCMA-TR-250 is connected directly to the PC.

■ **Analogue Output 0...20mA**

With the SCMA-AO-400 (not shown) the measurement signals are emitted as analogue signals to external devices. The measurement value is graphically registered on a graphic recorder. The analogue signal can be processed in the hydraulic control as an actual value signal.

- Easy operation
- Windows® 95/98/2000/NT/XP
- Simultaneous representation of 16 curves
- Zoom functions
- Linking of measuring curves
- Tabular listing of measured values
- Calculation of extreme value
- Curve shifting function
- Free selection of units and measuring ranges
- Cursor functions
- Transmission of set-up parameters from the Service Master



Service Master

### General

The **SensoWin®** software is an easy to operate software package for reading and processing the measured curves recorded by the **Service Master**.

Documentation and certificates can be created easily and at low cost as **SensoWin®** can make use of all Windows facilities and advantages.

### Functions

Up to 16 different curves can be represented in a diagram. The curve shifting function allows exact hydraulics analysis. A power performance curve can be created to evaluate a pump.

Leaks and pressure losses can be detected with the help of the generation of a  $\Delta p$  function. With the cursor, an hydraulic procedure can be examined time-dependent.

For each curve, extensive information is provided, i.e. the **Service Master** measurements can be reproduced at any time. The change of the ranges and units allows later adjustment for presentation in a diagram.

Tabular presentation of MIN and MAX values, smoothing of the measurement curve and mathematical links are important functions in the analysis of the hydraulic system.

Date and time are documented with each measurement. This considerably facilitates later allocation of values.

Direct transmission of measured values from the **Service Master** to the PC is also possible.

Current events (pressure peaks, etc.) are visible while the process is running (on-line function).



- Robust stainless steel design
- Response times of 1 ms
- Capturing of pressure peaks
- Accuracy  $\pm 0,25$  % typ.
- Flexible operation
- SCPT sensors with 5 pin socket for Serviceman/Service Master



Fast response times guarantee the safe capture of pressure peaks in hydraulic systems. The robust stainless steel construction allows a variety of applications, for example cooling water or pneumatics.

All pressure sensors are delivered with a diagnosis adaptor (M16x2) installed. Connection to the hydraulic system takes place quickly and safely. Times for installation are reduced.

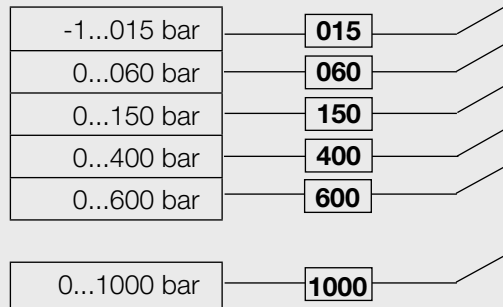
| Pressure Range    | Applications                  |
|-------------------|-------------------------------|
| -1...015 bar      | Pneumatics/ low pressure      |
| 0...060 bar       | Medium pressure               |
| 0...150 bar       | Medium pressure               |
| 0...400 bar       | Operating pressure hydraulics |
| 0...600 bar       | High pressure                 |
| 0 ... 1000 bar    | High pressure peaks           |
| Temperature Range |                               |
| -25...+105°C      | Oil temperature               |

**Service Master/Service Master**

**SCPT Pressure/Temperature Sensor**

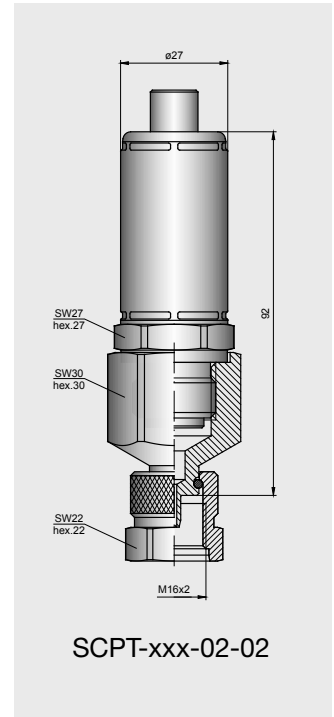
with push-pull connector (5 pin)  
+ SCA-1/2-EMA-3

+ SCA-1/2-EMA-3-HP



**SCPT-xxx-02-02**

| Connection cable                          | #             |
|---|---------------|
| Service Master (4 pin) 2 m                | SCK-102-02-08 |
| Service Master/Service Master (5 pin) 3 m | SCK-102-03-02 |
| Extension 5 m                             | SCK-102-05-12 |



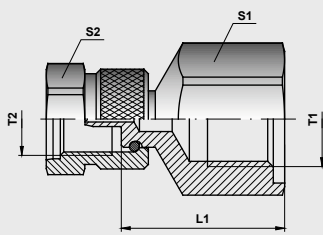
SCPT-xxx-02-02

| #   | SCPT-015   | SCPT-060   | SCPT-150   | SCPT-400   | SCPT-600   | SCPT-1000  |
|---|------------|------------|------------|------------|------------|------------|
| Pressure Measuring Range (bar)                            | -1...015   | 0...060    | 0...150    | 0...400    | 0...600    | 0...1.000  |
| Accuracy (± %) FS   | typ.       | 0,25       | 0,25       | 0,25       | 0,25       | 0,25       |
|   | max.       | 0,5        | 0,5        | 0,5        | 0,5        | 0,5        |
| Overload Pressure P <sub>max</sub> (bar)                  | 30         | 120        | 300        | 800        | 1.200      | 1.200      |
| Burst Pressure (bar)                                      | 150        | 500        | 900        | 1.200      | 1.800      | 2.500      |
| Temperature Measuring Range (°C)<br>Accuracy (± 1,5 %) FS | -25...+105 | -25...+105 | -25...+105 | -25...+105 | -25...+105 | -25...+105 |

FS = Full Scale Range

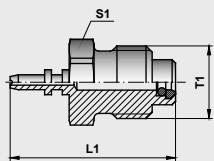
|                             |  |
|-----------------------------|--|
| Response Time (ms)          | 1                                      |
| Pressure Port               | 1/2" BSPP                              |
| Housing                     | Stainless Steel 1.4301                 |
| Weight (g)                  | 200                                    |
| Seal                        | Viton® (FKM)                           |
| Parts in Contact with Media | Stainless Steel 1.4301<br>Viton® (FKM) |

|                                       |                           |
|---------------------------------------|---------------------------|
| Ambient Temperature Range (°C)        | -25...+80                 |
| Storage Temperature Range (°C)        | -20...+80                 |
| T <sub>max</sub> Fluid (°C)           | +105                      |
| Reliability Cycles (10 <sup>6</sup> ) | 100                       |
| Shock Load                            | IEC 68-2-29               |
| Vibration Resistance                  | IEC 68-2-6<br>10...500 Hz |



**Diagnostic adaptor**

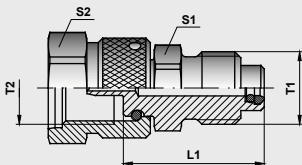
| #                | PN       | T1       | T2    | L1 | S1 | S2 |
|------------------|----------|----------|-------|----|----|----|
| SCA-1/4-EMA-3    | 1000 bar | 1/4 BSPP | M16x2 | 32 | 27 | 22 |
| SCA-1/2-EMA-3    | 630 bar  | 1/2 BSPP | M16x2 | 36 | 30 | 22 |
| SCA-1/2-EMA-3-HP | 1000 bar | 1/2 BSPP | M16x2 | 36 | 32 | 22 |



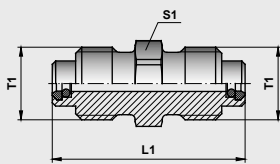
**SCA-EMA-3/1**

**Diagnostic couplings**

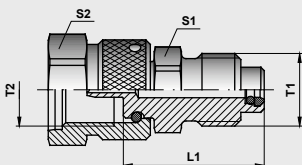
| #           | PN      | T1    | T2       | L1 | S1 | S2 |
|-------------|---------|-------|----------|----|----|----|
| SCA-EMA-3/1 | 630 bar | M16x2 | --       | 37 | 17 | -- |
| SCA-EMA-3/2 | 630 bar | M16x2 | S12x1.65 | 31 | 17 | 17 |
| SCA-EMA-3/3 | 630 bar | M16x2 | M16x2    | 43 | 17 | -- |
| SCA-EMA-3/4 | 630 bar | M16x2 | M16x1.5  | 31 | 17 | 17 |



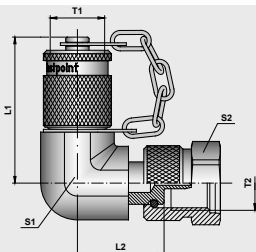
**SCA-EMA-3/2**



**SCA-EMA-3/3**



**SCA-EMA-3/4**

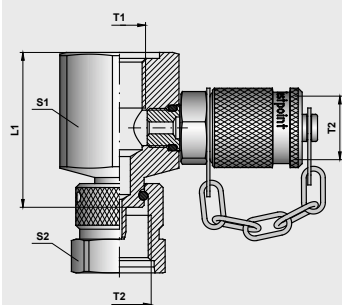


**90° Diagnostic adaptor with coupling**

| #            | PN      | T1    | T2    | L1 | L2 | S1 | S2 |
|--------------|---------|-------|-------|----|----|----|----|
| SCA-90-EMA-3 | 630 bar | M16x2 | M16x2 | 49 | 26 | 19 | 22 |



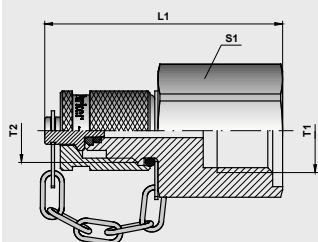
Please pay attention to pressure range



**90° Twin connector, ventable SMA3**

| #                | PN      | T1       | T2    | L1 | S1 | S2 |
|------------------|---------|----------|-------|----|----|----|
| SCA-1/4-EMA-3-EL | 630 bar | 1/4 BSPP | M16x2 | 39 | 30 | 22 |
| SCA-1/2-EMA-3-EL | 630 bar | 1/2 BSPP | M16x2 | 42 | 36 | 22 |

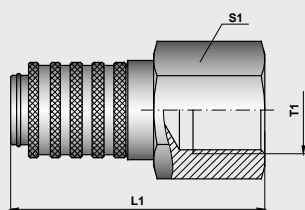
- 90° elbow connector with VSTI (see catalogue 4100)
- $\Delta p$ -adjustment for exact differential pressure measurement
- Venting of hydraulics with SMA3 (see catalogue 4100)



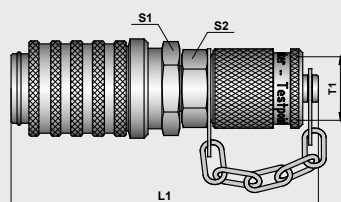
**Sensor connections for hose**

| #               | PN      | T1       | T2    | L1 | S1 | S2 |
|-----------------|---------|----------|-------|----|----|----|
| SCA-1/4-EMA-3-S | 630 bar | 1/4 BSPP | M16x2 | 54 | 24 | -- |
| SCA-1/2-EMA-3-S | 630 bar | 1/2 BSPP | M16x2 | 60 | 30 | -- |

- SMA-3 diagnostic hose (see catalogue 4100)



**SCA-1/2-PQC**



**SCA-EMA-3/PD**

**Parker Diagnostic quick couplings**

| #            | PN      | T1       | T2 | L1 | S1 | S2 |
|--------------|---------|----------|----|----|----|----|
| SCA-1/4-PQC  | 400 bar | 1/4 BSPP | -- | -- | -- | -- |
| SCA-1/2-PQC  | 400 bar | 1/2 BSPP | -- | 64 | 30 | -- |
| SCA-EMA-3/PD | 630 bar | M16x2    | -- | 78 | 21 | 17 |



**Please pay attention to pressure range**

|                        |       |
|------------------------|-------|
| PN (bar)               | 630   |
| P <sub>max</sub> (bar) | 800   |
| Burst pressure (bar)   | 1.200 |

|                        |       |
|------------------------|-------|
| PN (bar)               | 1.000 |
| P <sub>max</sub> (bar) | 1.200 |
| Burst pressure (bar)   | 2.000 |

## 5 Temperature Measurement

---

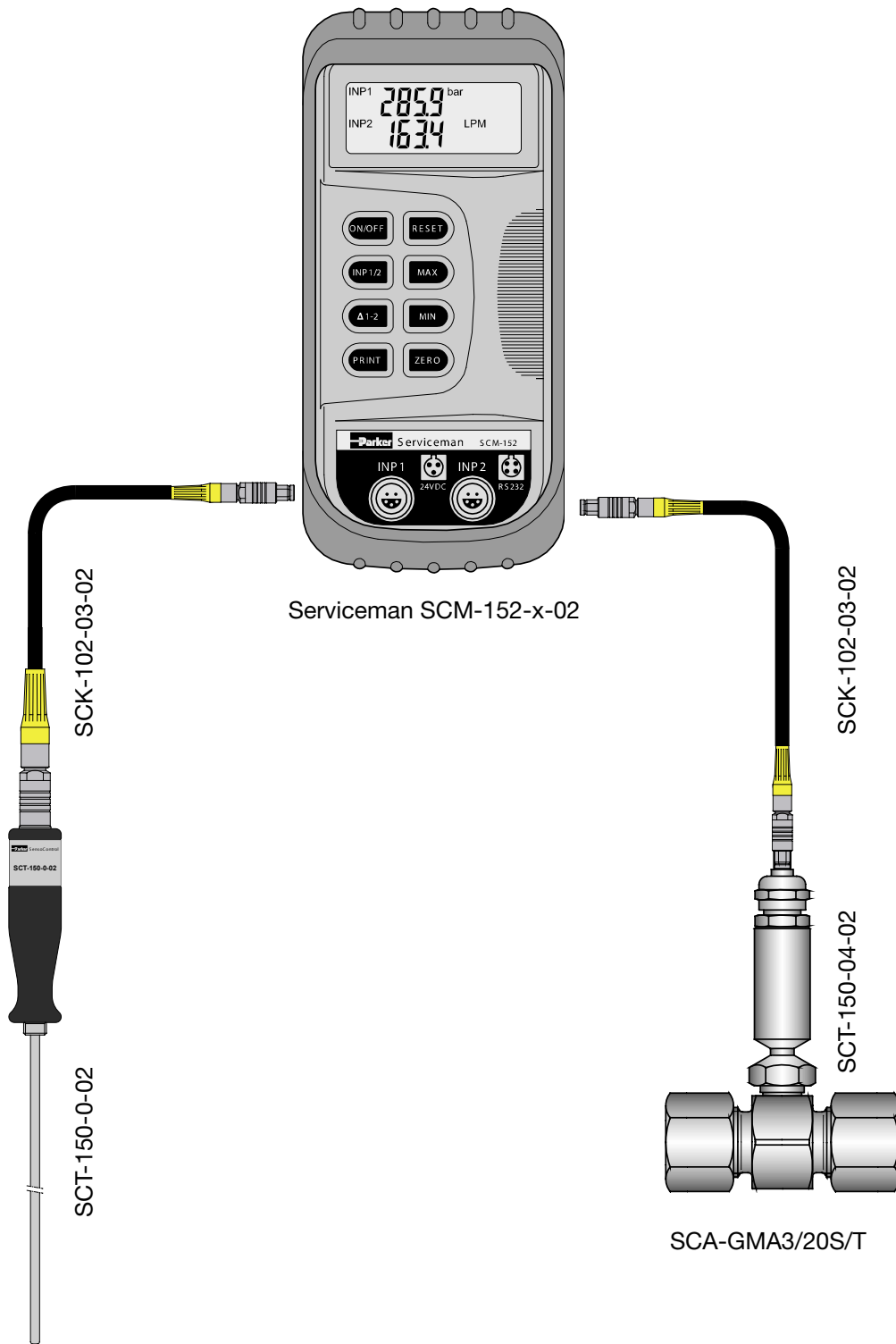
- High pressure-proof temperature sensor
- Measurement of oil temperatures up to 125 °C
- Flexible operation
- Screw-in or manual sensor
- Screw-in sensor with socket for Serviceman and Service Master

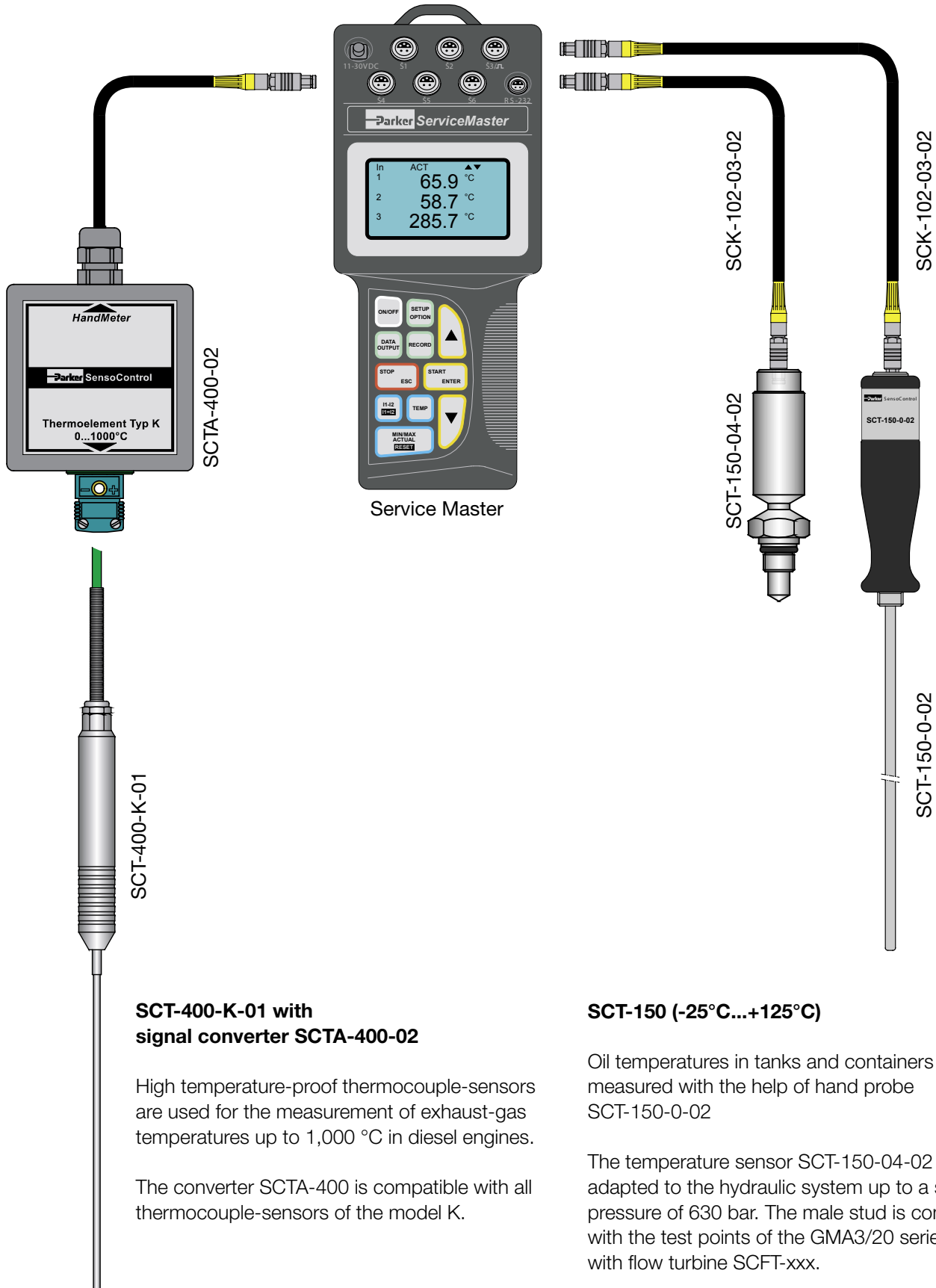


In hydraulics, temperature measurements serve to locate faults and avoid the kind of damage caused by excessive oil temperatures in critical parts such as pumps and proportional valves.

To get the exact temperature, the measurement is done directly in the tube or hose line.

The screw-in sensors SCT-150 are compatible with flow measurement turbines SCFT-xxx-02-02.





**SCT-400-K-01 with signal converter SCTA-400-02**

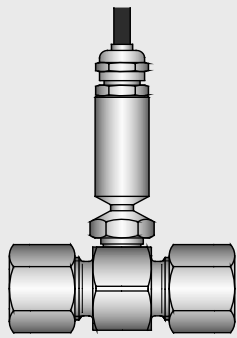
High temperature-proof thermocouple-sensors are used for the measurement of exhaust-gas temperatures up to 1,000 °C in diesel engines.

The converter SCTA-400 is compatible with all thermocouple-sensors of the model K.

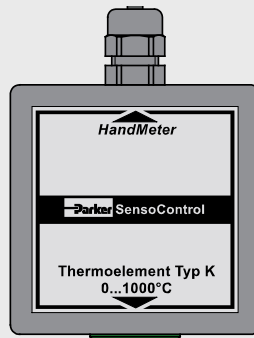
**SCT-150 (-25°C...+125°C)**

Oil temperatures in tanks and containers are measured with the help of hand probe SCT-150-0-02

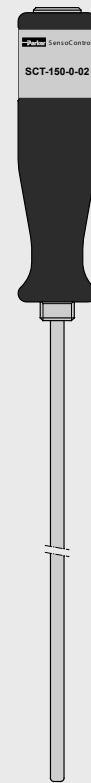
The temperature sensor SCT-150-04-02 can be adapted to the hydraulic system up to a system pressure of 630 bar. The male stud is compatible with the test points of the GMA3/20 series and with flow turbine SCFT-xxx.



IN-LINE Sensor  
SCT-150-04-02  
with IN-LINE adaptor



Signal converter  
SCTA-400-02



Handprobe  
SCT-150-0-02



SCT-400-K-01

| SCT IN-LINE Sensor M10x1              | #              |
|---------------------------------------|----------------|
| SCT-150 with female connector (5 pin) | SCT-150-04-02  |
| IN-LINE adaptor with M10 port         | SCA-GMA3/20S/T |

|  |              |
|--|--------------|
| <b>SCT-150 IN-LINE Adaptor Tube assembly (5 pin)</b> | SCT-150-0-02 |
|--|--------------|

| Connection cables SCT-150-04-02/SCT-150-0-02 | #             |
|--|---------------|
| Serviceman (4 pin) 2 m                       | SCK-102-02-08 |
| Serviceman/Service Master (5 pin) 3 m        | SCK-102-03-02 |
| Extension 5 m                                | SCK-102-05-12 |

|                                       | SCT-150-04-02                         | SCT-150-0-02                                  | SCT-400-K-01    | SCTA-400-02 |
|---------------------------------------|---------------------------------------|---|-----------------|-------------|
| Measuring Range (°C)                  | -25...+125                            | -25...+125                                    | 0...+1.000      | 0...+1.000  |
| Accuracy                              | ± 1,5°C                               | ± 1,5°C                                       | ± 1,5°C         | ± 1,0%FS    |
| Response Time T <sub>0,9</sub> (sec.) | 13,5                                  | 9,1   | ≤ 5             | -           |
| Ambient Temperature (°C)              | -25...+70                             | -25...+70                                     | -20...+150      | 0...+50     |
| Storage Temperature (°C)              | -25...+80                             | -25...+80                                     | -20...+80       | -25...+60   |
| T <sub>max</sub> (°C)                 | +125                                  | +125  | -               | -           |
| Operating Pressure (bar)              | 630                                   | -   | -               | -           |
| P <sub>max</sub> (bar)                | 630                                   | -   | -               | -           |
| Burst Pressure (bar)                  | 1.200                                 | -   | -               | -           |
| Housing                               | Steel C15K galvanized                 | Probe: Stainless Steel 1.4304<br>Grip: Delrin | Stainless Steel | ABS         |
| Seal                                  | Viton® (FKM)                          | -   | -               | -           |
| Weight (g)                            | 100                                   | 120   | 150             | -           |
| Parts in Contact with Media           | Steel C15K galvanized<br>Viton® (FKM) | Stainless Steel 1.4304                        | Stainless Steel | -           |

FS = FullScale



## 6 Determination of Flow Volume

Depending on the measurement job to be done, various measuring instruments are available to the hydraulic technician:

### 1 Flow meter type SCQ

- Flow measurement with direction indication
- Very fast reaction time < 2 ms
- Wide viscosity range
- Screw-in cartridge in connector block SCAQ

### 2 Turbine flow meter type SCFT

- Very low flow resistance
- Built-in measurement points for pressure and temperature
- Very simple installation into a hydraulic system
- 6 different measuring ranges up to 750 l/min.
- Recording of a p/Q characteristic curve with a load valve to determine hydraulic performance

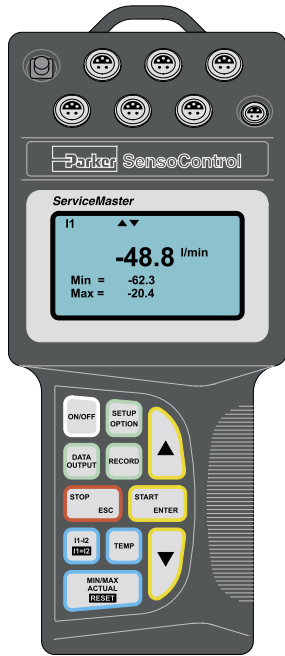
### 3 Gear flow meter type SCVF

- High precision flow measurement over a wide range of viscosity
- 4 measuring ranges up to 300 l/min.
- flexible use with various fluids

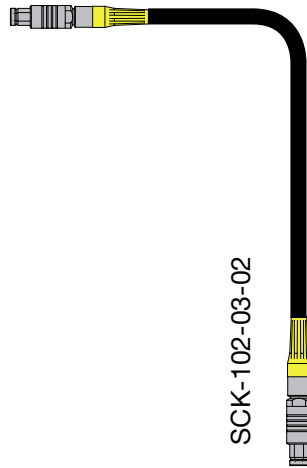


In addition to pressure measurement, the precise determination of flow volume in hydraulic equipment gives important evidence of the condition of the hydraulics. The efficiency of hydraulic drives such as hydrostatic units or variable pumps depends on the amount of flow. Hydraulic performance is determined by pressure and flow. The degree of wear in a hydraulic drive can be ascertained by comparing nominal and actual values. The resulting measurements can be used, for example, in preventive maintenance for systematic servicing and cost reductions. In mobile hydraulics, the efficiency of the machine is continually checked and documented. The diagnosis of pressure and flow thereby gives a total analysis.

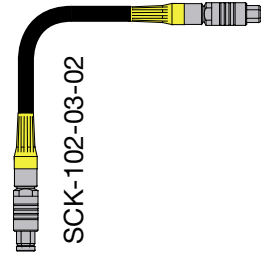




Service Master



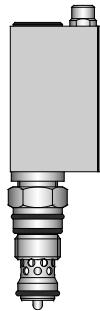
SCK-102-03-02



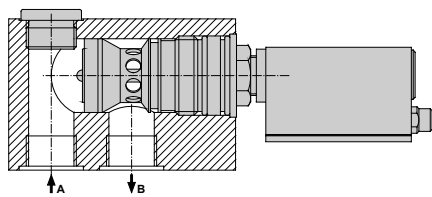
SCK-102-03-02



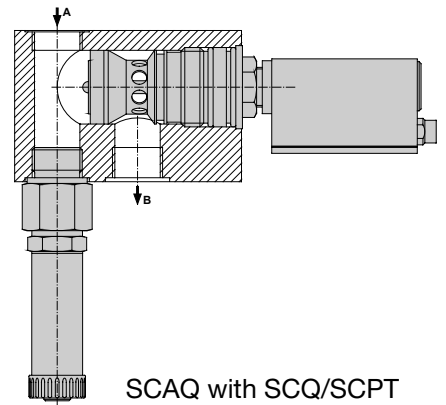
Serviceman  
SCM-152-x-02



SCQ-xxx-0-02



SCAQ with SCQ



SCAQ with SCQ/SCPT

| SCQ  | #            |
|--|--------------|
| 0...60 l/min   | SCQ-060-0-02 |
| 0...150 l/min  | SCQ-150-0-02 |
| (flow direction indication with Service Master only) |              |

| Connection Cables                     | #             |
|---------------------------------------|---------------|
| Serviceman (4 pin) 2 m                | SCK-102-02-08 |
| Serviceman/Service Master (5 pin) 3 m | SCK-102-03-02 |
| Extension 5 m                         | SCK-102-05-12 |

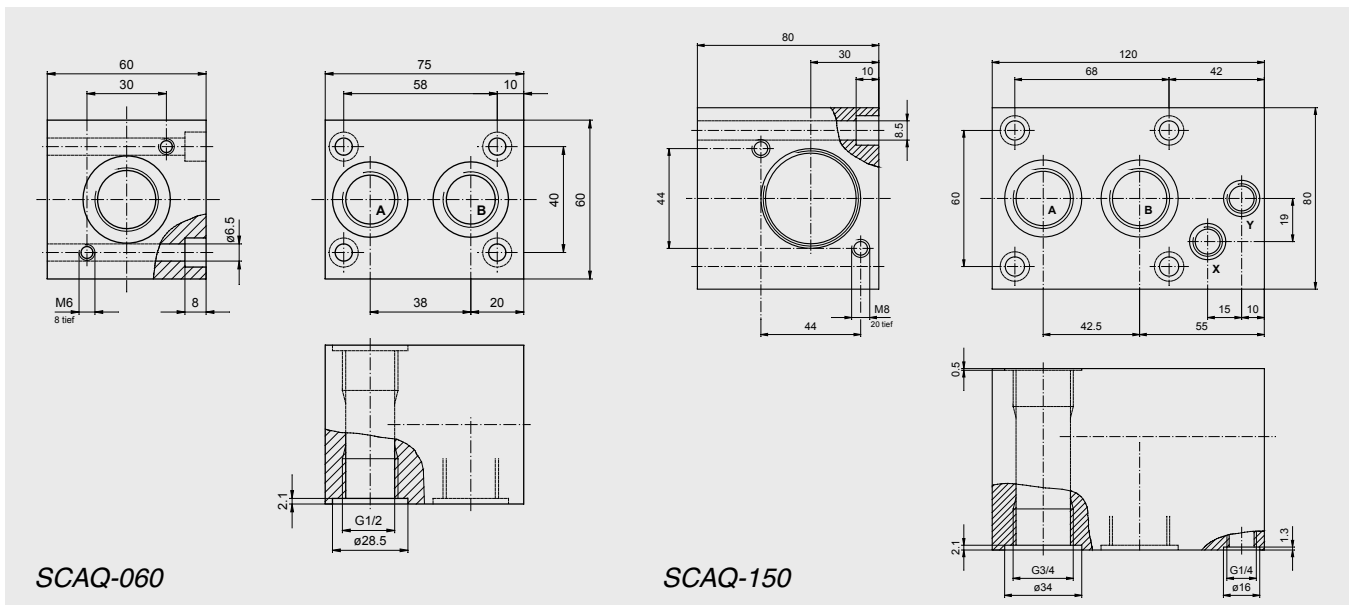
| #                                    | SCQ-060    | SCQ-150     |
|--------------------------------------|------------|-------------|
| Flow Range QN (l/min)                | -60...+60  | -150...+150 |
| Accuracy ( $\pm$ %) FS @ 46cSt.      | 2,0        | 2,0         |
| Operating Pressure PN (bar)          | 315        | 315         |
| Ports                                | M24 (NG10) | M42 (NG16)  |
| Pressure Drop $P_{max}$ (bar) @ (FS) | Graphs     |             |
| Weight (g)                           | 670        | 1050        |

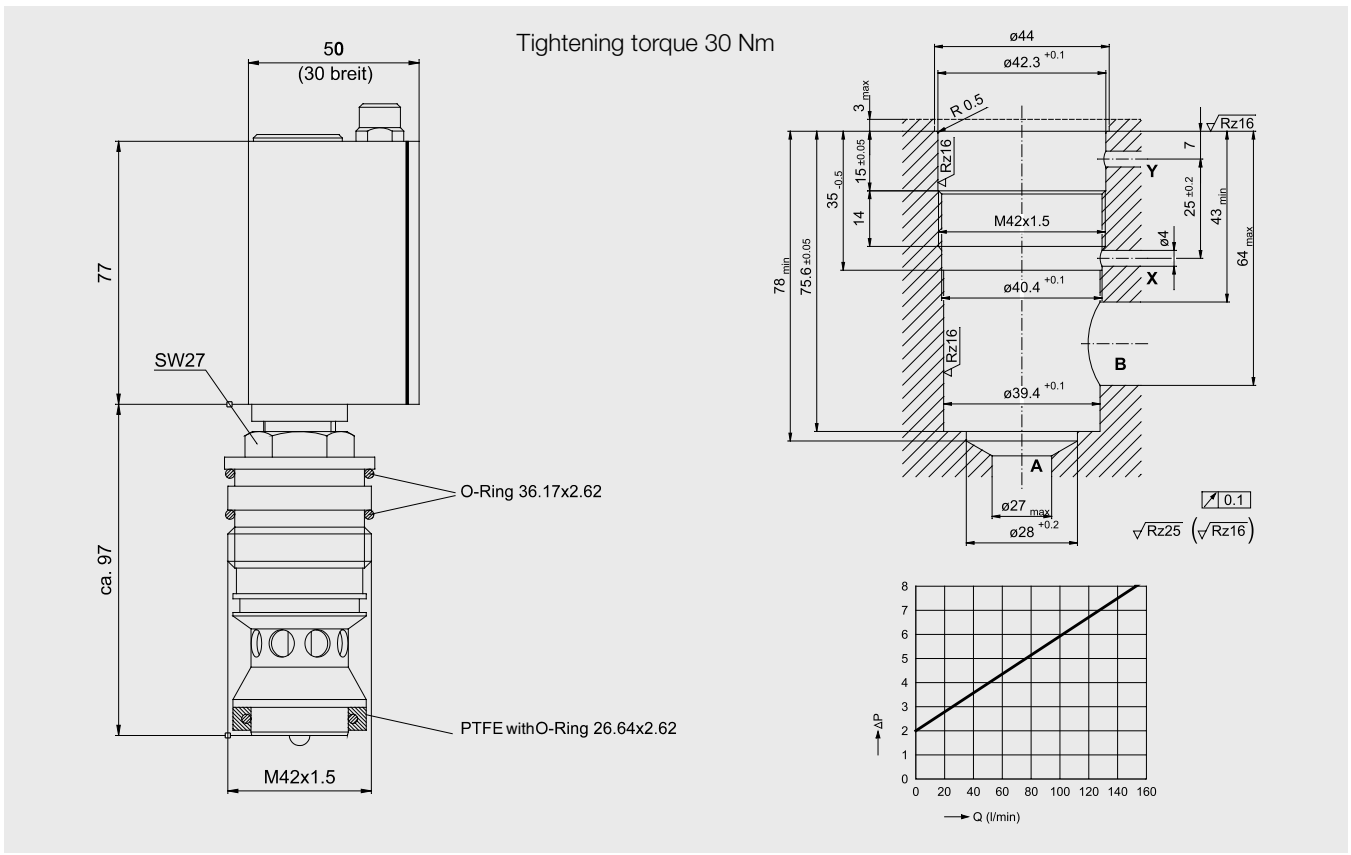
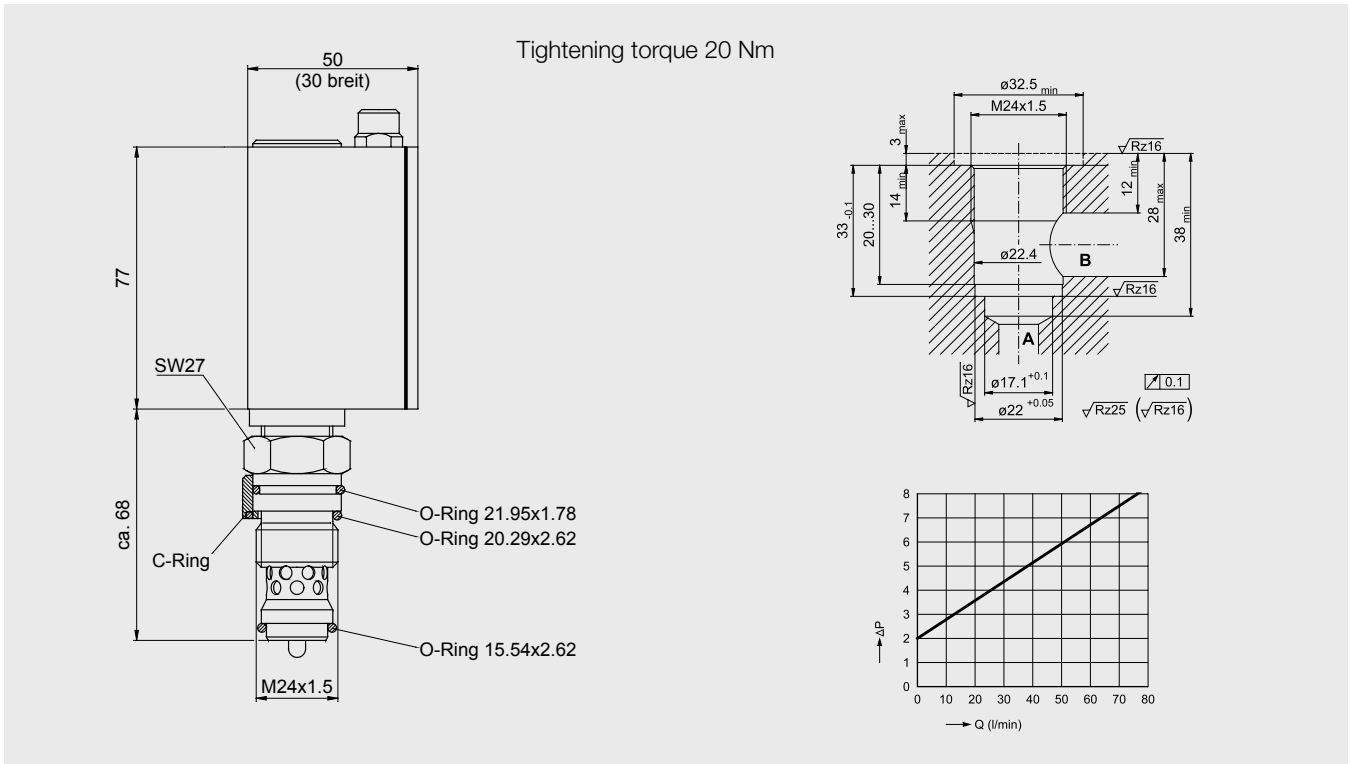
FS = FullScale

|                                   |            |
|-----------------------------------|------------|
| Response Time (ms)                | 2          |
| $Q_{max}$ (l/min)                 | QN x 1,1   |
| Overload Pressure $P_{max}$ (bar) | 420        |
| Housing                           | Steel      |
| Sealing                           | NBR        |
| Parts in Contact with Media       | Steel, NBR |

|                          |           |
|--------------------------|-----------|
| Ambient Temperature (°C) | +10...+60 |
| Storage Temperature (°C) | -20...+80 |
| $T_{max}$ Fluid (°C)     | +80       |
| Filtration ( $\mu$ m)    | 25        |
| Viscosity Range (cSt.)   | 15...100  |

| #             | SCAQ-GI-R-1/2 | SCAQ-060   | SCAQ-150   |
|---------------|---------------|------------|------------|
| Ports (SCQ)   | M24 (NG10)    | M24 (NG10) | M42 (NG16) |
| Ports (A - B) | 1/2" BSPP     | 1/2" BSPP  | 3/4" BSPP  |





- Measurement principle:  
flow turbine
- 6 flow ranges up to 750 l/min
- Simple installation
- Resistant to high pressure  
up to 480 bar
- Low flow resistance
- Built-in pressure and temperature  
measurement points
- Suitable for reverse operation



### Flow measurement with low flow resistance combined p/T/Q measurement

#### Function

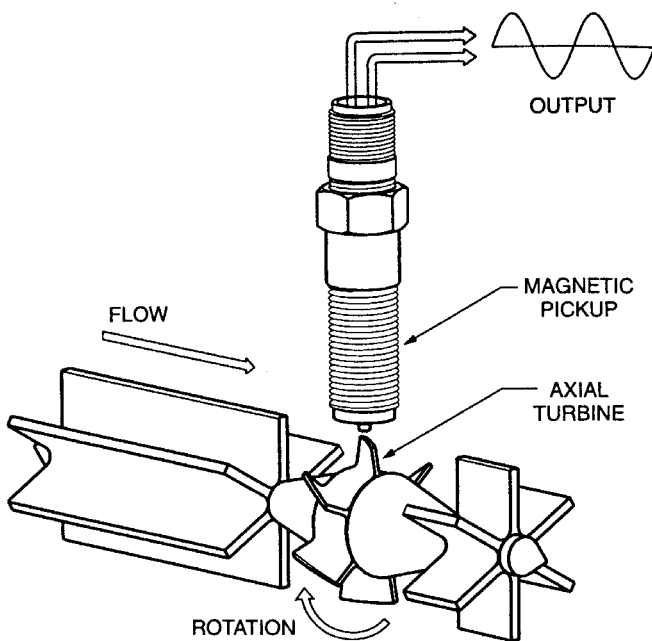
A turbine wheel is driven by the oil flow. The frequencies thus produced are processed by digital electronics. The influence of turbulent flow effects is compensated for.

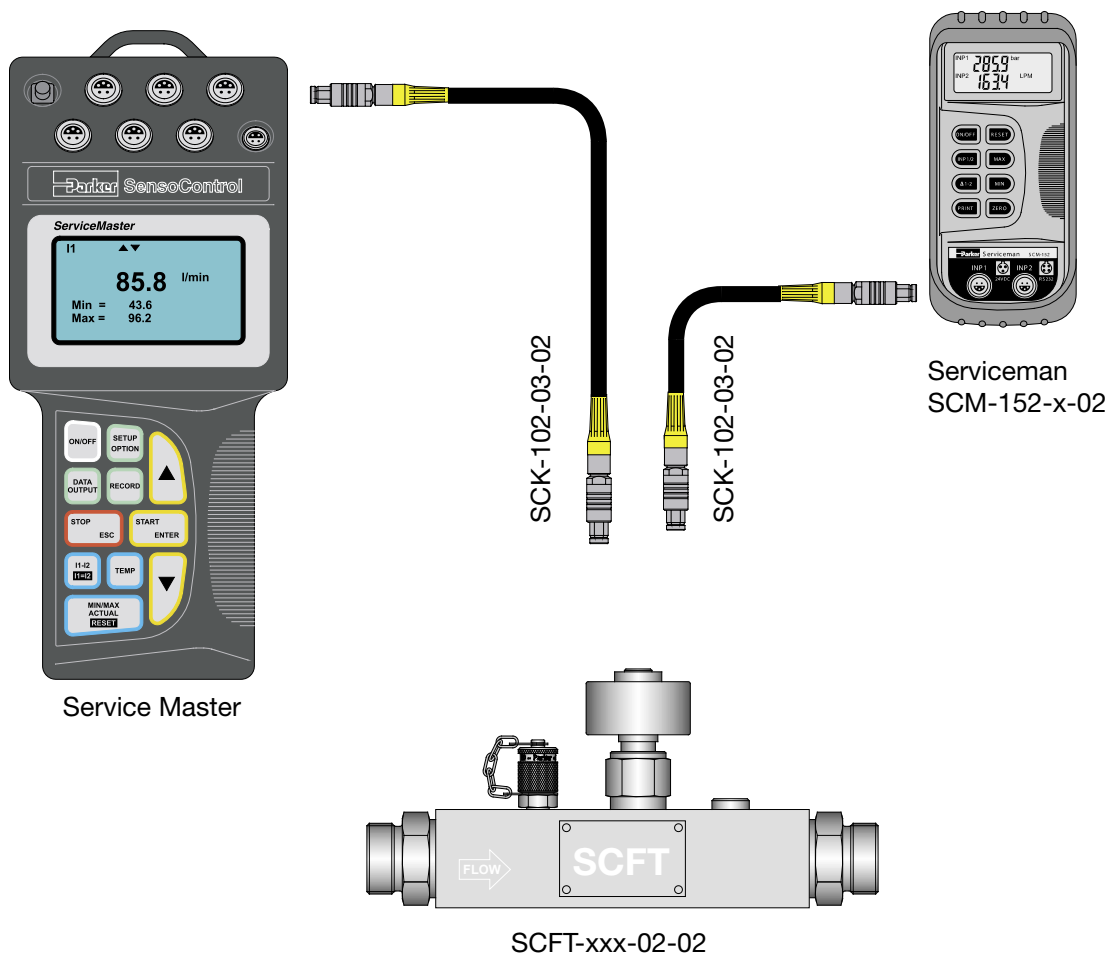
Because of the low flow resistance  $Q_R$  the hydraulic circuit operates with very low losses. For pressure measurement the turbine is equipped with an EMA-3 test point.

Oil temperatures are measured direct in the oil flow. Consequently all the important measurement parameters are available at one measuring location.

#### Applications

- mobile diagnosis (SCFT with SCM)
- p-Q measurement in construction and agricultural machines
- hydraulic tests with load valves
- automatic scaling





| SCFT Serviceman/Service Master | #              |
|--------------------------------|----------------|
| 1 ... 015 l/min                | SCFT-015-02-02 |
| 4 ... 060 l/min                | SCFT-060-02-02 |
| 6 ... 150 l/min                | SCFT-150-02-02 |
| 10 ... 300 l/min               | SCFT-300-02-02 |
| 20 ... 600 l/min               | SCFT-600-02-02 |
| 25 ... 750 l/min               | SCFT-750-02-02 |

| Connection Cables                     | #             |
|---------------------------------------|---------------|
| Serviceman (4 pin) 2 m                | SCK-102-02-08 |
| Serviceman/Service Master (5 pin) 3 m | SCK-102-03-02 |
| Extension 5 m                         | SCK-102-05-12 |

| #   | SCFT-015  | SCFT-060  | SCFT-150  | SCFT-300 | SCFT-600    | SCFT-750   |
|---|-----------|-----------|-----------|----------|-------------|------------|
| Flow Range QN (l/min)                       | 1...015   | 4...060   | 6...150   | 10...300 | 20...600    | 25...750   |
| Accuracy ( $\pm$ %) FS/IR @ 21cSt.          | 1,0 FS    | 1,0 IR    | 1,0 IR    | 1,0 IR   | 1,0 IR      | 1,0 IR     |
| Operating Pressure PN (bar)                 | 420       | 420       | 420       | 420      | 350         | 480        |
| Ports (A - B)                               | 1/2" BSPP | 3/4" BSPP | 3/4" BSPP | 1" BSPP  | 1-1/4" BSPP | 1-7/8" UNF |
| Pressure Drop $\Delta P_{max}$ (bar) @ (FS) | 1,5       | 1,5       | 1,5       | 4        | 4           | 5          |
| Weight (g)                                  | 650       | 750       | 750       | 1200     | 1800        | 2100       |

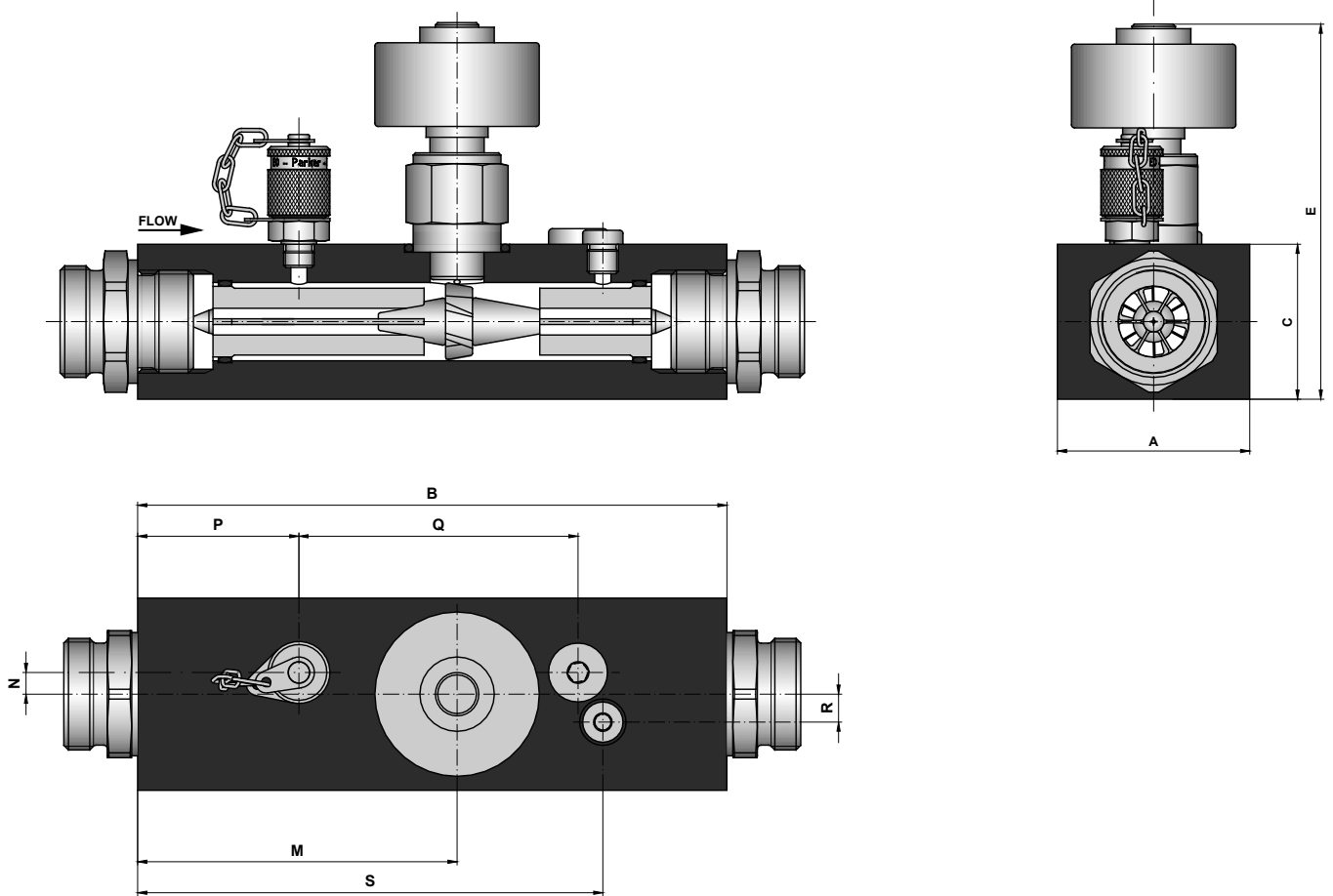
FS = FullScale

IR = Indicated Reading

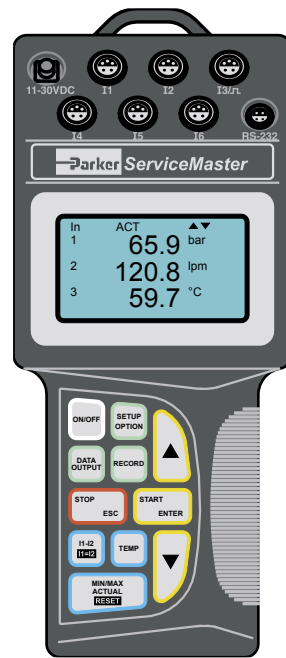
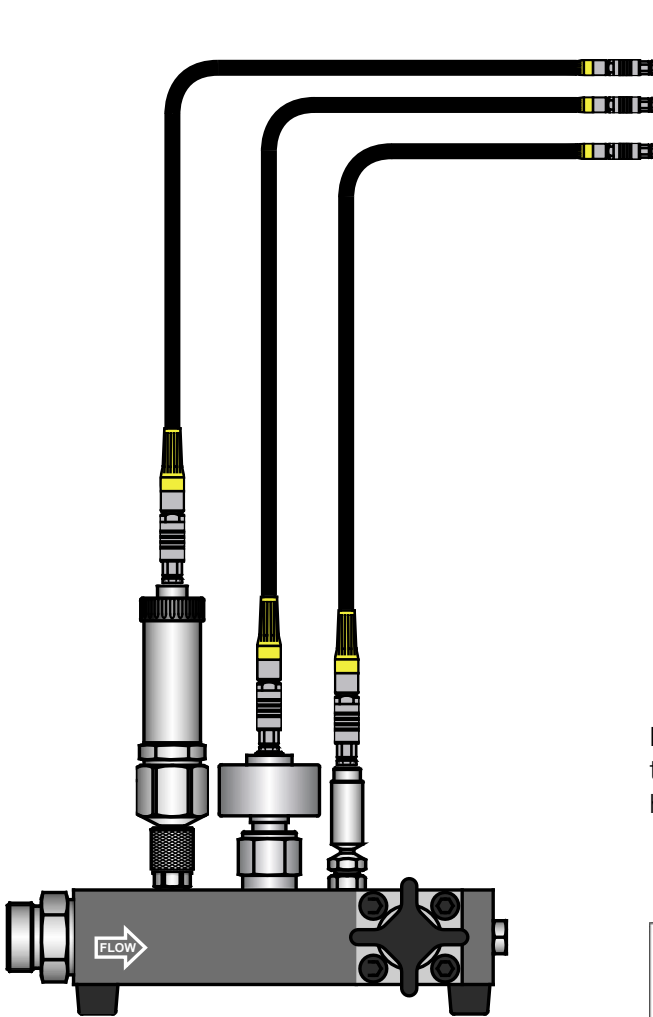
|  |                                   |
|--|-----------------------------------|
| Response Time (ms)   | 50                                |
| $Q_{max}$ (l/min)  | QN x 1,1                          |
| Overload Pressure $P_{max}$ (bar)  | PN x 1,2                          |
| Ports:<br>Temperature Port (SCT-150)<br>Pressure Port (EMA3 Fitting)<br>Pressure Port (VSTI) | M10x1 OR<br>M16x2<br>1/4" BSPP    |
| Housing  | Aluminium                         |
| Sealing  | Viton® (FKM)                      |
| Parts in Contact with Media  | Aluminium, Steel,<br>Viton® (FKM) |

|                          |           |
|--------------------------|-----------|
| Ambient Temperature (°C) | +10...+60 |
| Storage Temperature (°C) | -20...+80 |
| $T_{max}$ Fluid (°C)     | +80       |
| Filtration ( $\mu$ m)    | 25        |
| Viscosity Range (cSt.)   | 15...100  |



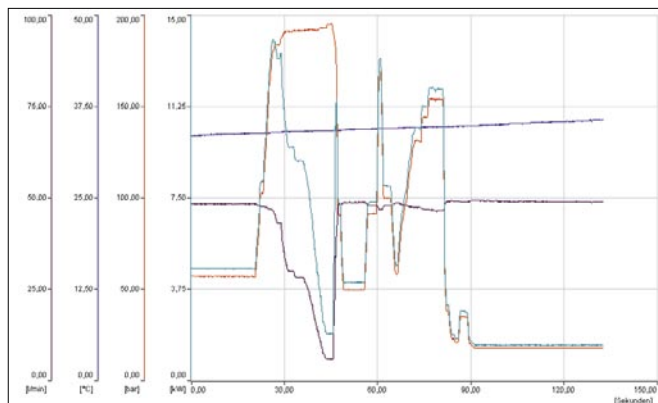
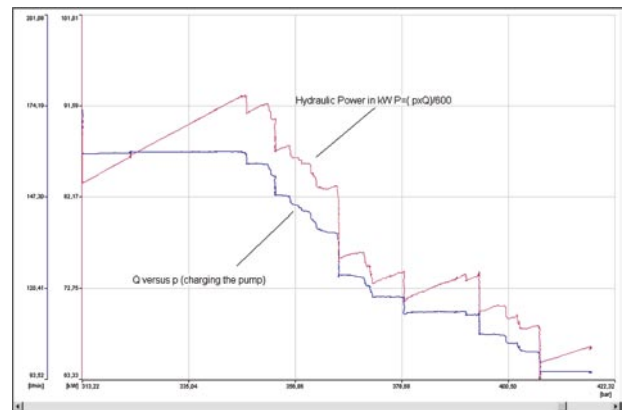


| # | SCFT-015 | SCFT-060 | SCFT-150 | SCFT-300 | SCFT-600 | SCFT-750 |
|---|----------|----------|----------|----------|----------|----------|
| A | 37       | 62       | 62       | 62       | 62       | 100      |
| B | 136      | 190      | 190      | 190      | 212      | 212      |
| C | 37       | 50       | 50       | 50       | 75       | 75       |
| E | 117      | 130      | 130      | 134      | 150      | 154      |
| M | 70       | 103      | 103      | 103      | 127      | 126      |
| N | 0        | 5        | 5        | 7        | 9        | 10       |
| P | 25       | 50       | 50       | 52       | 62       | 60       |
| Q | N/A      | 92       | 92       | 90       | 106      | 104      |
| R | 0        | 5        | 5        | 9        | 11       | 10       |
| S | 115      | 157      | 157      | 150      | 168      | 181      |



Measurement of pressure, flow and temperature using Service Master and hydraulic-tester SCLV-PTQ

The p-Q diagram (to the right) shows the power determined. Especially in hydraulic pump (load sensing) systems the speed-dependent load is important to analyze. The evaluation in **SensoWin**® will be done quickly and simply.



The hydraulic power of a system can be analyzed by a combined measurement of pressure and flow (to the left). The diagram shows an application with a hydraulic-tester SCLV-PTQ. Pressure in the system is generated by the integrated loading valve.

In the evaluation power will be calculated from the flow volume and pressure of the pump.

## 6.2 Determination of Flow Volume

## Hydraulic Tester

| #                                    | SCFT-150-DRV | SCLV-PTQ-300 | SCLV-PTQ-600 | SCLV-PTQ-750 |
|--------------------------------------|--------------|--------------|--------------|--------------|
| Flow Range QN (l/min)                | 6...150      | 10...300     | 20...600     | 25...750     |
| Accuracy (± %) IR @ 21cSt.           | 1,0          | 1,0          | 1,0          | 1,0          |
| Operating Pressure PN (bar)          | 420          | 420          | 420          | 480          |
| Ports (A - B)                        | 3/4" BSPP    | 1" BSPP      | 1-7/8" UNF   | 1-7/8" UNF   |
| Pressure Drop $P_{max}$ (bar) @ (FS) | 15           | 4            | 5            | 5            |
| Weight (kg)                          | 4,2          | 5,5          | 8,9          | 8,9          |

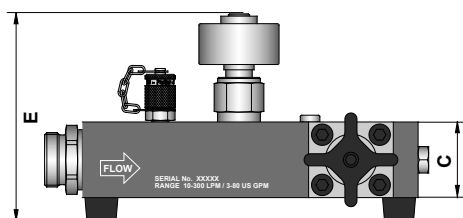
FS = FullScale

IR = Indicated Reading

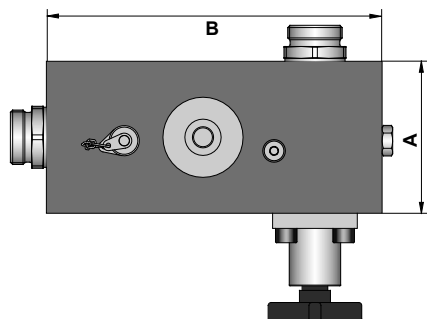
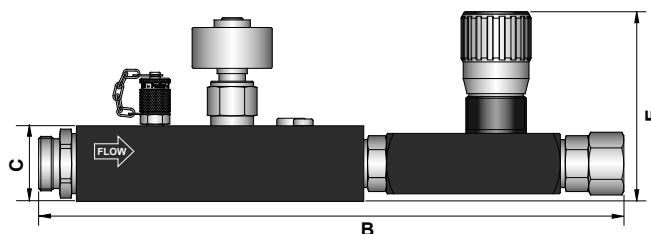
|  |                                   |
|--|-----------------------------------|
| Response Time (ms)   | 50                                |
| $Q_{max}$ (l/min)  | QN x 1,1                          |
| Overload Pressure $P_{max}$ (bar)  | PN x 1,2                          |
| Ports:<br>Temperature Port (SCT-150)<br>Pressure Port (EMA3 Fitting)<br>Pressure Port (VSTI) | M10x1 OR<br>M16x2<br>1/4" BSPP    |
| Housing  | Aluminium                         |
| Sealing  | Viton® (FKM)                      |
| Parts in Contact with Media  | Aluminium, Steel,<br>Viton® (FKM) |

|                          |           |
|--------------------------|-----------|
| Ambient Temperature (°C) | +10...+50 |
| Storage Temperature (°C) | -20...+80 |
| $T_{max}$ Fluid (°C)     | +110      |
| Filtration (µm)          | 25        |
| Viscosity Range (cSt.)   | 10...90   |

SCLV-PTQ-xxx



SCFT-150-DRV



| # | SCLV-PTQ-300 | SCLV-PTQ-600<br>SCLV-PTQ-750 | SCFT-150-DRV |
|---|--------------|------------------------------|--------------|
| A | 98           | 117                          | 62           |
| B | 222          | 235                          | 370          |
| C | 50           | 75                           | 50           |
| E | 135          | 150                          | 130          |

- **Measurement principle:**  
volume counter/positive displacement
- **4 flow ranges up to 300 l/min**
- **Measurement accuracy  $\pm 0.5\%$  FS**
- **Withstands pressures up to 400 bar**
- **High viscosity range**
- **Low noise emission**



### **Gear flow for the precision measurement of flow in hydraulic equipment**

#### **Function**

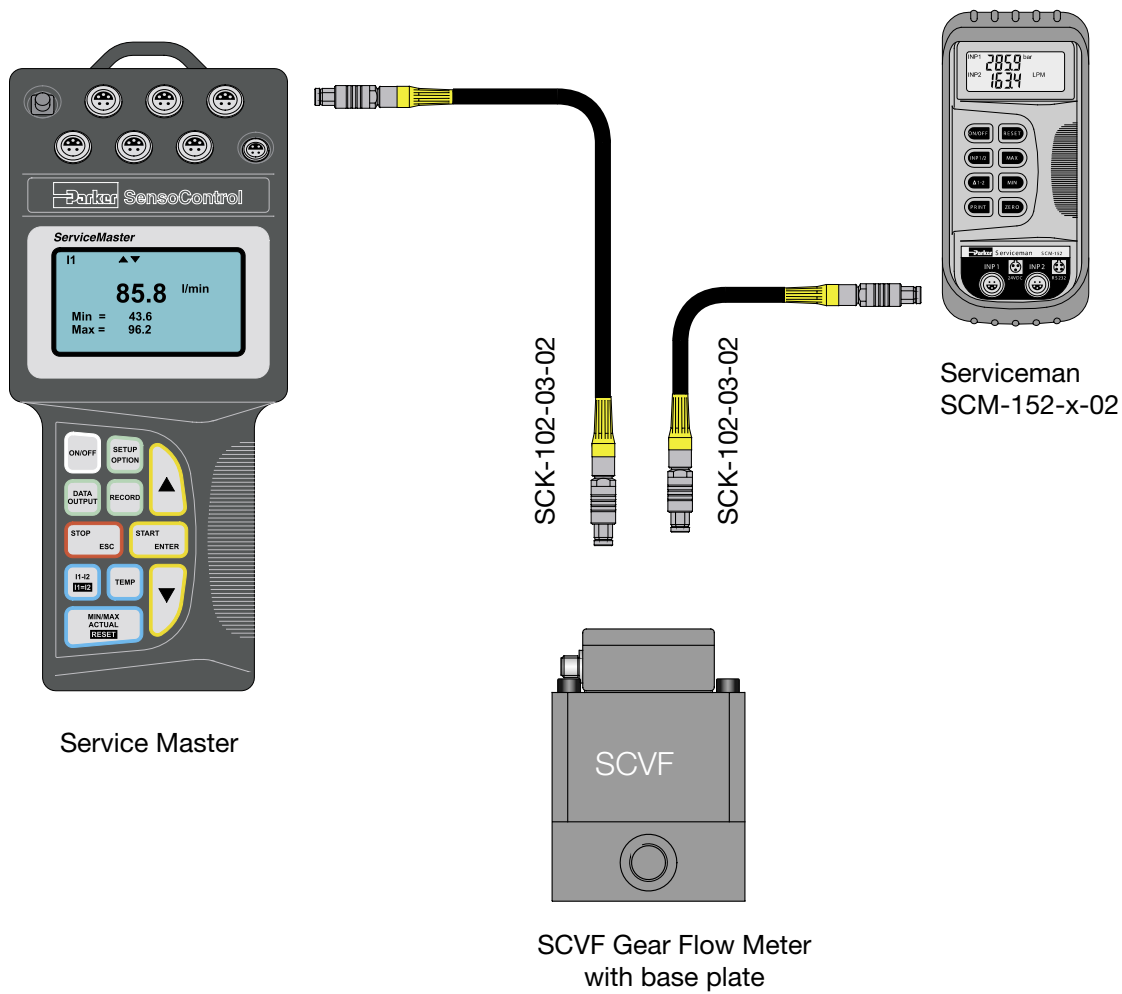
The **SCVF** gear flow meter operates as a flow volume counter. A very precisely machined pair of gears is driven by the fluid flow.

The **SCVF** accommodates a wide range of viscosity. Various seals\* permit a large number of applications.

#### **Applications**

Because of the wide viscosity range, all fluids which can be pumped and have a certain lubricating capability can be measured.

- brake fluids (EPDM Sealing)
- Skydrol
- mineral oils
- hydraulic oils
- fats
- mobile diagnosis (SCVF with SCM)  
exact Q measurement (oil leakage)  
automatic scaling (sensor recognition)



| SCVF Serviceman/Service Master | #              |
|--------------------------------|----------------|
| 0,1 ... 015 l/min              | SCVF-015-00-02 |
| 0,4 ... 060 l/min              | SCVF-060-00-02 |
| 0,4 ... 150 l/min              | SCVF-150-00-02 |
| 1,0 ... 300 l/min              | SCVF-300-00-02 |

| Connection Cables                     | #             |
|---------------------------------------|---------------|
| Serviceman (4 pin) 2 m                | SCK-102-02-08 |
| Serviceman/Service Master (5 pin) 3 m | SCK-102-03-02 |
| Extension 5 m                         | SCK-102-05-12 |

### 6.3 Determination of Flow Volume

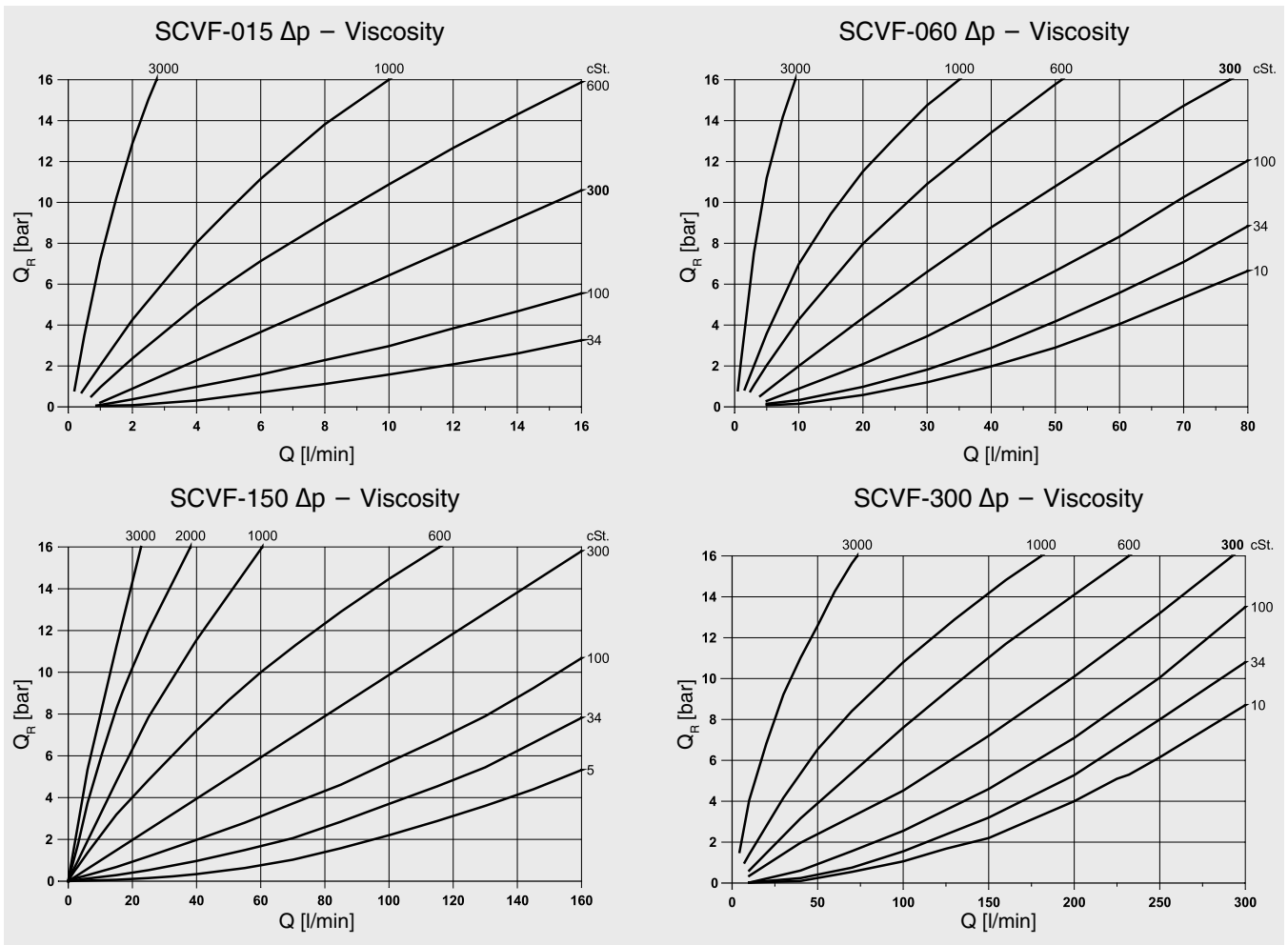
### Gear Flow Meter

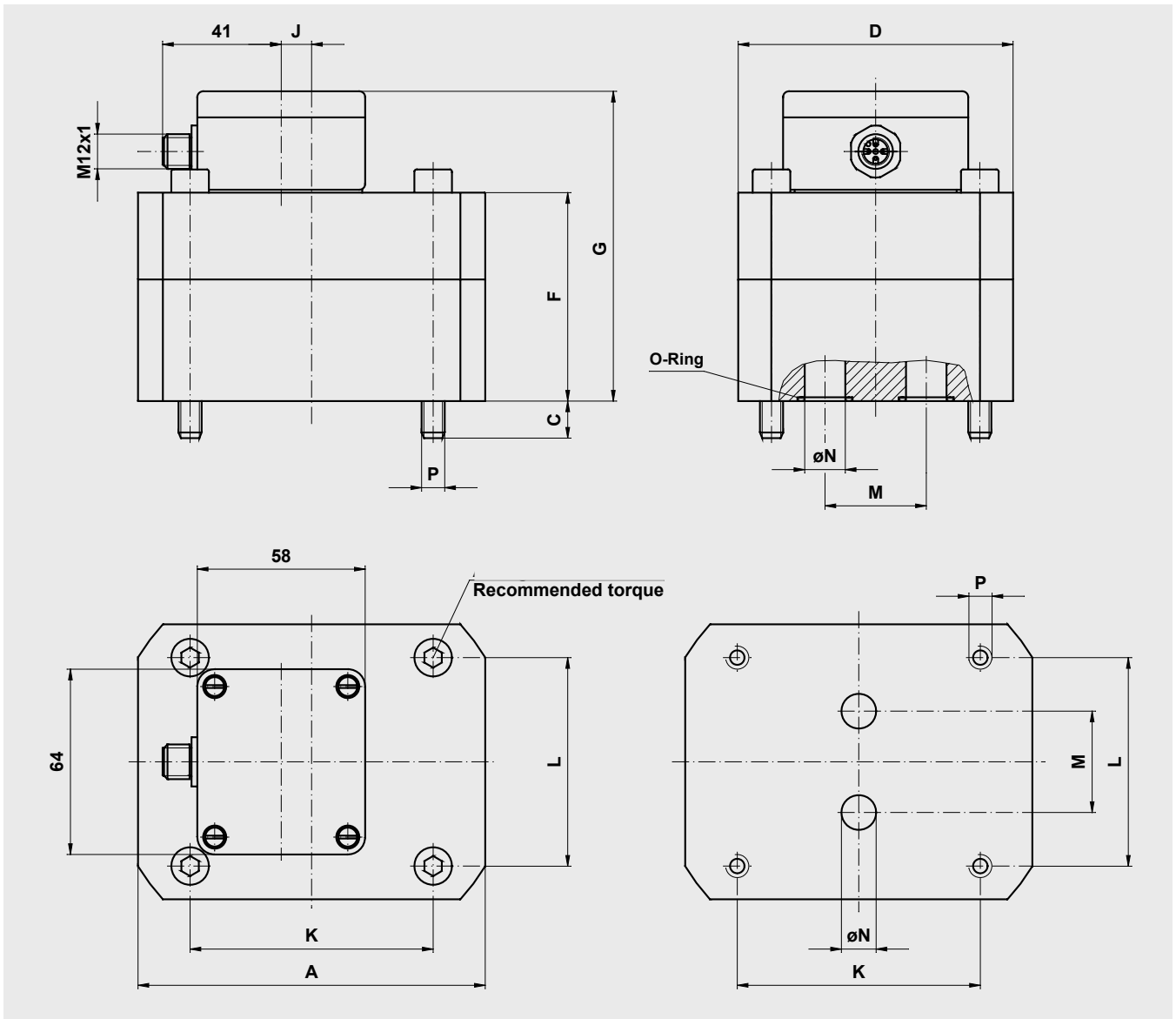
| Typ   | SCVF-015  | SCVF-060  | SCVF-150  | SCVF-300 |
|---|-----------|-----------|-----------|----------|
| Flow Range QN (l/min)                       | 1...015   | 0,4...060 | 0,6...150 | 1...300  |
| Accuracy ( $\pm$ %) FS @ 21cSt.             | 0,5       | 0,5       | 0,5       | 0,5      |
| Operating Pressure PN (bar)                 | 400       | 400       | 315       | 315      |
| Ports (A - B)                               | 3/8" BSPP | 1/2" BSPP | 1" BSPP   | 1" BSPP  |
| Pressure Drop $\Delta P_{max}$ (bar) @ (FS) | Graph     |           |           |          |
| Weight (kg)                                 | 3,8       | 8,1       | 23        | 27       |

FS = FullScale) IR = Indicated Reading

|                                   |                             |
|-----------------------------------|-----------------------------|
| Response Time (ms)                | 400                         |
| $Q_{max}$ (l/min)                 | QN x 1,1                    |
| Overload Pressure $P_{max}$ (bar) | PN x 1,2                    |
| Housing                           | GGG 40                      |
| Sealing                           | Viton® (FKM)                |
| Parts in contact with media       | Viton® (FKM), Steel, GGG 40 |

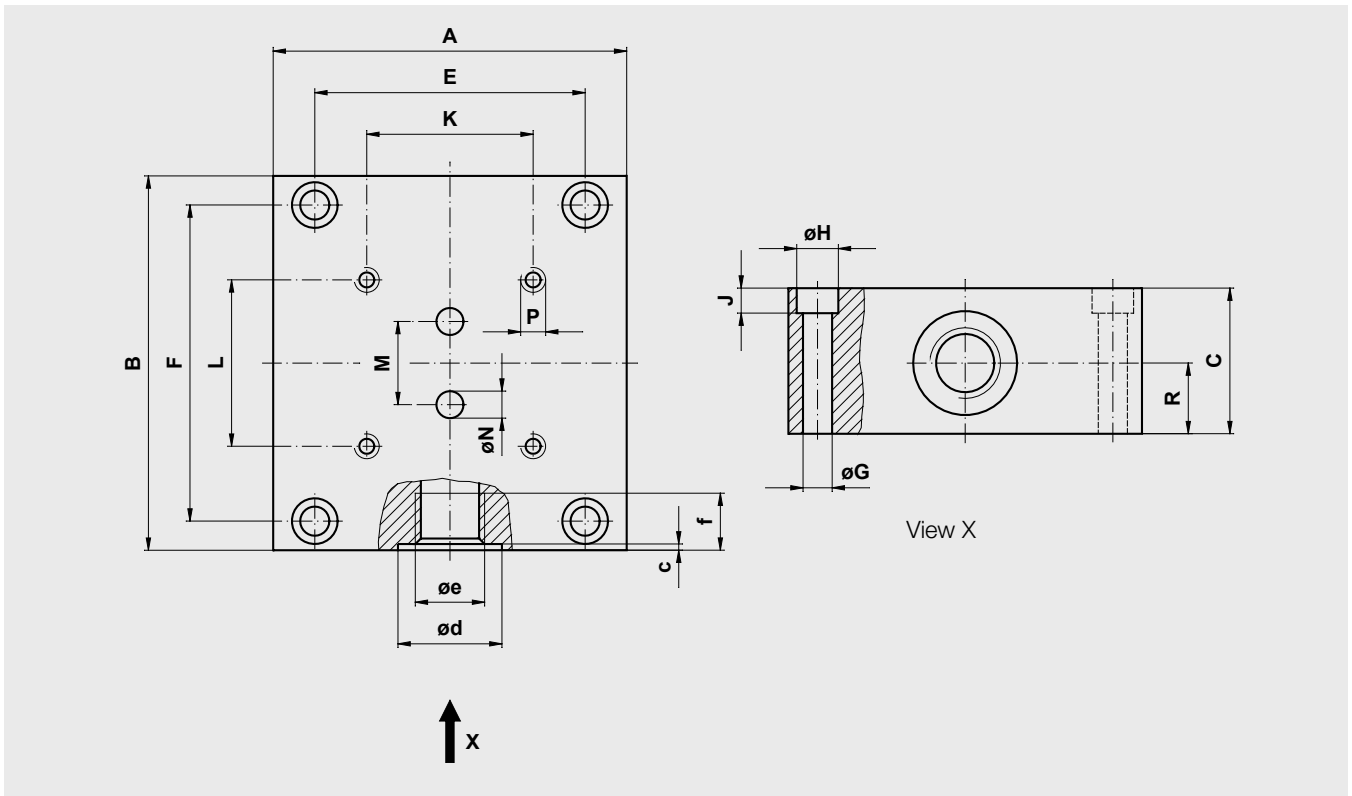
|                          |           |
|--------------------------|-----------|
| Ambient Temperature (°C) | +10...+50 |
| Storage Temperature (°C) | -20...+80 |
| $T_{max}$ Fluid (°C)     | +110      |
| Filtration ( $\mu$ m)    | 25        |
| Viscosity Range (cSt.)   | Graph     |





| Type     | Weight (kg) | Torque (Nm) | A   | C  | D   | F   | G   | J    | K  | L  | M  | øN | P   |
|----------|-------------|-------------|-----|----|-----|-----|-----|------|----|----|----|----|-----|
| SCVF-015 | 2           | 14          | 85  | 13 | 60  | 57  | 94  | -    | 70 | 40 | 20 | 9  | M6  |
| SCVF-060 | 5,2         | 35          | 120 | 13 | 95  | 72  | 109 | 10,5 | 84 | 72 | 35 | 16 | M8  |
| SCVF-150 | 9           | 120         | 170 | 18 | 120 | 89  | 140 | 46,5 | 46 | 95 | 50 | 25 | M12 |
| SCVF-300 | 13          | 120         | 170 | 22 | 120 | 105 | 142 | 40   | 46 | 95 | 50 | 25 | M12 |

all measurements in mm



| Type                 | (kg) | A   | B   | C  | E   | F   | øG | øH | J | K  | L  | M  | øN  | P        | R    | c   | ød | øe<br>BSPP | f  |
|----------------------|------|-----|-----|----|-----|-----|----|----|---|----|----|----|-----|----------|------|-----|----|------------|----|
| SCVF-015             | 1,8  | 85  | 90  | 35 | 65  | 76  | 7  | 11 | 7 | 70 | 40 | 20 | 6,5 | M6/t=14  | 17   | 0,7 | 25 | 3/8"       | 13 |
| SCVF-060             | 2,9  | 100 | 120 | 37 | 80  | 106 | 7  | 11 | 7 | 84 | 72 | 35 | 12  | M8/t=18  | 17,5 | 0,7 | 29 | 1/2"       | 15 |
| SCVF-150<br>SCVF-300 | 14   | 160 | 165 | 80 | 140 | 145 | 9  | 15 | 9 | 46 | 95 | 50 | 25  | M12/t=24 | 28   | 1   | 42 | 1"         | 19 |

all measurements in mm



## 7 Speed Measurement

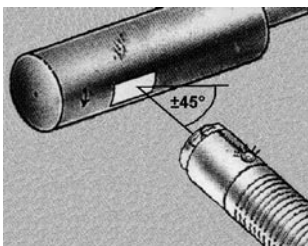
- Contact less measurement of rotational speed
- Measurement of rotational speed up to 10,000 rpm
- Tachometer with fixed cable (2 m) for Serviceman or Service Master



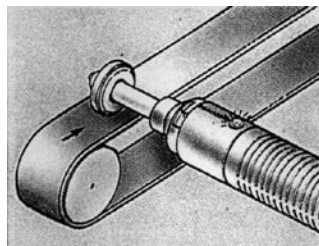
Rotational speed-dependent data, such as delivery from a variable pump, are determined ideally in combination with the pressure and flow-test of a hydraulic drive.

Contact-less measurement (opto-electronic principle) can be done quickly and easily.

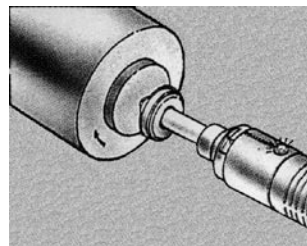
Rotational speed is detected, for example, at a main drive shaft (e. g. power take-off shaft of a tractor), and displayed on the hand-held device. Installation or adjustment is not necessary.



Rotating shaft - non-contact measurement of rotational speed.



Contact measurement of rotational speed with the contact adaptor



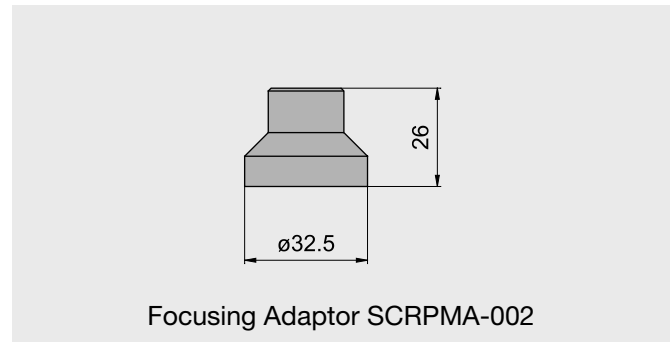
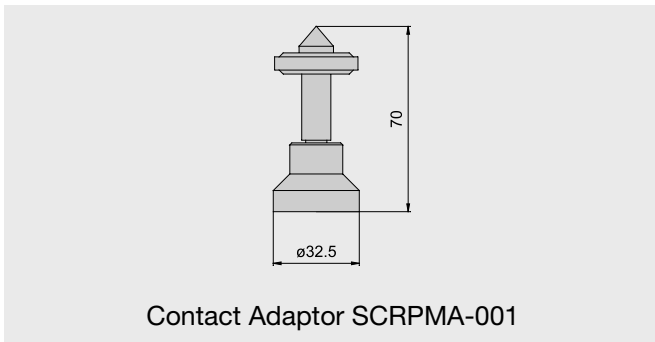
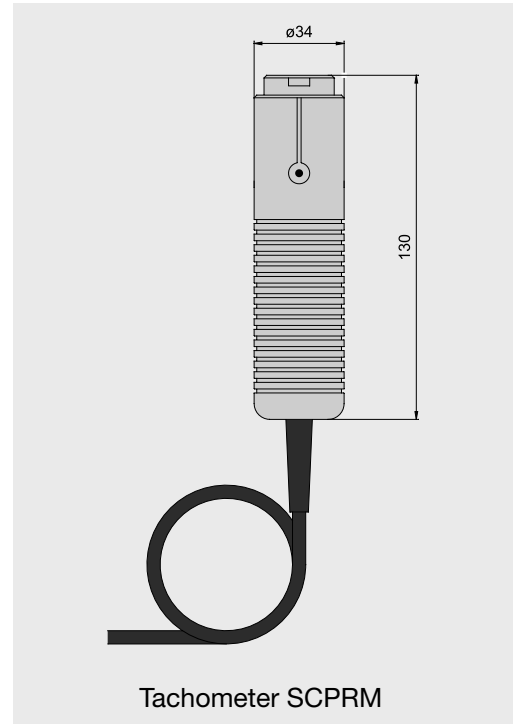
Front face measurement of rotational speed with contact adaptor.

For accurate acquisition of the opto-electronic signal, please use the supplied reflecting strips.

For a shaft or belt, the rotational speed is measured directly with the contact adaptor.

| Technical Data               |                       |
|------------------------------|-----------------------|
| <b>Input</b>                 |                       |
| Measuring distance           | 25...500 mm           |
| Measuring angle              | ± 45°                 |
| Type of measuring            | optical, red LED      |
| <b>Output</b>                |                       |
| Measuring range              | 20...10.000 RPM       |
| Accuracy                     | < 0,5% FS             |
| Resolution                   | ± 5 RPM               |
| <b>Electrical connection</b> |                       |
| Fixed cable 3 m              | 5-pin push-pull/4-pin |
| Ambient temperature          | 0...70 °C             |
| <b>General</b>               |                       |
| Material                     | ABS                   |
| Dimensions                   | ∅ 34 mm/L = 130 mm    |
| Weight                       | 230 g                 |

FS = Full Scale

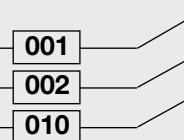


**Order references**

| Tachometer for connection to      | #             |
|-----------------------------------|---------------|
| Serviceman (4 pin)                | SCRPM-210     |
| Connection Cable 3 m              | SCK-108-03-18 |
| Serviceman/Service Master (5 pin) | SCRPM-220     |
| Connection Cable 5 m              | SCK-102-05-12 |

|                        |
|------------------------|
| Contact Adaptor        |
| Focusing Adaptor       |
| Reflecting strip 0,5 m |

**SCRPMMA-XXX**



- Easy operation
- Automatic sensor recognition
- PC connection
- Not dependent on main power supply



Serviceman-Kits



Service Master-Kit

**Serviceman/Service Master-Kits** meet the requirements of modern industrial hydraulic systems as well as those of complex mobile hydraulics.

All hydraulic parameters, such as differential pressure, flow and hydraulic power can be measured, displayed and processed.

This allows fitters in mobile hydraulics as well as in construction and agricultural machinery to make exact diagnoses. Furthermore, comparisons between set and actual values can be made and documented.

**Serviceman/Service Master-Kits** are an ideal tool for all fitters in maintenance departments who need simple hydraulic test equipment for mobile as well as industrial hydraulics. Fast diagnosis in the fields of hydraulic machinery can be done very easily.

With the **SensoWin**<sup>®</sup> software, the data can be processed on a PC.

**The models described on page 52  
are available ex stock**

### Serviceman-Kits

| #                     | SCKIT-152-600 | SCKIT-152-1-00   | SCKIT-152-2-00 |
|-----------------------|---------------|--|----------------|
| <b>SCC</b>            | SCC-150       | SCC-560  | SCC-560        |
| <b>Serviceman</b>     | SCM-152-1-02  | SCM-152-1-02   | SCM-152-2-02   |
| <b>SCSW-KIT-152</b>   | --            | --   | 1              |
| <b>SCPT-600-02-02</b> | 1             | Please order accessories (SCPT/SCT/SCFT/SCRPM) separate! |                |
| <b>SCK-102-03-02</b>  | 1             | 1  | 2              |
| <b>SCA-EMA-3/3</b>    | 1             | 1  | 2              |
| <b>SMA3-1500</b>      | 1             | 1  | 2              |

### Service Master-Kits

| #  | SCKIT-250-00 | SCKIT-360-00 | SCKIT-400-00 | SCKIT-450-00 |
|--|--------------|--------------|--------------|--------------|
| <b>SCC-750</b>   | 1            | 1            | 1            | 1            |
| <b>Service Master</b>                                    | SCM-250-1-01 | SCM-360-1-01 | SCM-400-1-01 | SCM-450-1-01 |
| <b>SCSW-KIT-400</b>                                      | 1            | 1            | 1            | 1            |
| <b>SCK-102-03-02</b>                                     | 2            | 2            | 2            | 2            |
| <b>SCA-EMA-3/3</b>                                       | 2            | 2            | 2            | 2            |
| <b>SMA3-1500</b>   | 2            | 2            | 2            | 2            |
| Please order accessories (SCPT/SCT/SCFT/SCRPM) separate! |              |              |              |              |

### Serviceman/Service Master-p-Q-Kits

| #                     | SCKIT-152-PQ | SCKIT-360-PTQ |
|-----------------------|--------------|---------------|
| <b>SCC-560</b>        | 1            | 1             |
| <b>Serviceman</b>     | SCM-152-2-02 | --            |
| <b>Service Master</b> | --           | SCM-360-1-01  |
| <b>SCSW-KIT-152</b>   | 1            | --            |
| <b>SCSW-KIT-400</b>   | --           | 1             |
| <b>SCPT-600-02-02</b> | 1            | 2             |
| <b>SCT-150-04-02</b>  | --           | 1             |
| <b>SCFT-150-DRV</b>   | 1            | 1             |
| <b>SCK-102-03-02</b>  | 2            | 4             |
| <b>SCA-EMA-3/3</b>    | 1            | 2             |
| <b>SMA3-1500</b>      | 1            | 2             |

## 9 Calibration Services

### Diagnostic Products with Calibration Certificate acc. to ISO 9001

New instruments can be supplied on request with a calibration certificate to ISO 9001.

| Typ                           | #  |
|-------------------------------|--|
| ServiceJunior                 | K-SCJN-xxx-01  |
| ServiceJunior <i>wireless</i> | K-SCJNP-xxx-01-RC                                      |
| Serviceman                    | K-SCM-152-x-02   |
| Service Master                | K-SCM-xxx-1-01   |
| Pressure Sensors              | K-SCPT-xxx-02-02                                       |
| Temperature Sensor            | K-SCT-150-04-02  |
| Flow Sensors                  | K-SCFT-xxx-02-02<br>K-SCQ-xxx-0-02<br>K-SCVF-xxx-00-02 |

| Kit                           | #   |
|-------------------------------|---|
| ServiceJunior                 | K-SCJN-KIT-xxx  |
| ServiceJunior <i>wireless</i> | K-SCJNP-KIT-xxx-RC                                    |
| Serviceman                    | K-SCKIT-152-x-00<br>K-SCKIT-152-600<br>K-SCKIT-152-PQ |
| Service Master                | K-SCKIT-xxx-00<br>K-SCKIT-360-PTQ                     |

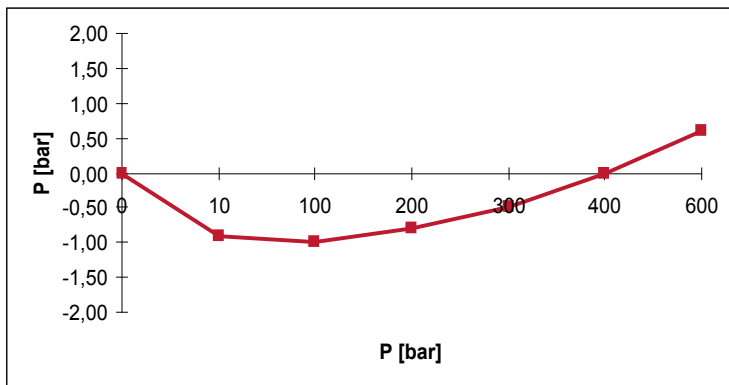
**Certificate No. 3143**

Description: Pressure Sensor  
Model: SCPT-600-02-02  
S/N: B1253S

Operating Range: 0...600 bar  
Accuracy:  $\pm 0,5\%$  FS

Reference1: Budenberg S/N 15404  
Reference2: HP 3497A Data Logger

Cal. No. NO94 DKD-KO5801  
Cal. No. 8370831402



| Nominal (bar) | Actual (bar) | Deviation (bar) |
|---------------|--------------|-----------------|
| 0             | 0            | 0,00            |
| 10            | 9,1          | -0,90           |
| 100           | 99           | -1,00           |
| 200           | 199,2        | -0,80           |
| 300           | 299,5        | -0,50           |
| 400           | 400          | 0,00            |
| 600           | 600,6        | 0,60            |
| 0             | 0,1          | 0,10            |

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## Parker Hannifin Corporation

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