

- 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 (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 48VDC/1,5ADC	—	—	●
External sensors (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!**

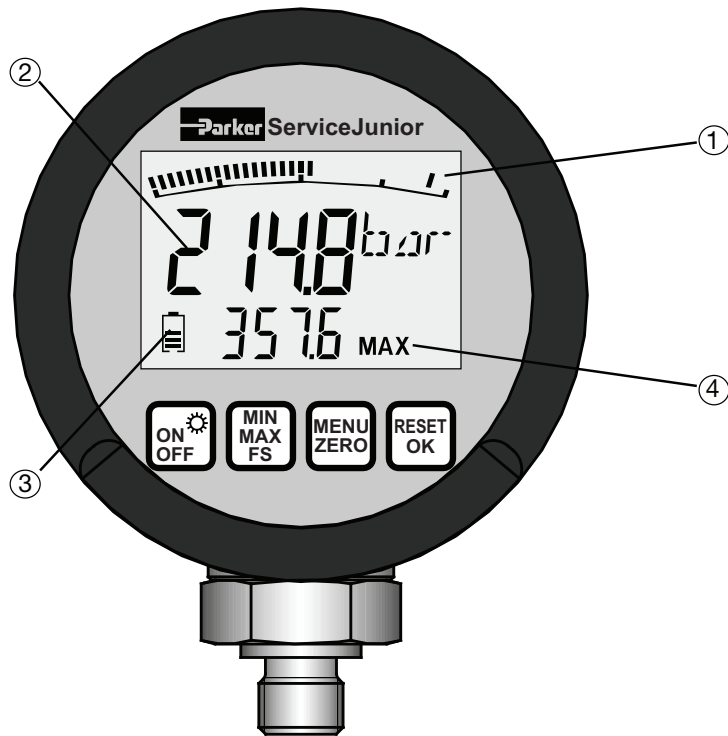
Utilising the **ServiceJunior wireless** from Parker's SensoControl family of products allows you to comfortably record the pressure values taken from one or several measurement points on your machine or installation. Stored measurement data is transmitted to a PC across distances of **up to 50 meters**.

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)

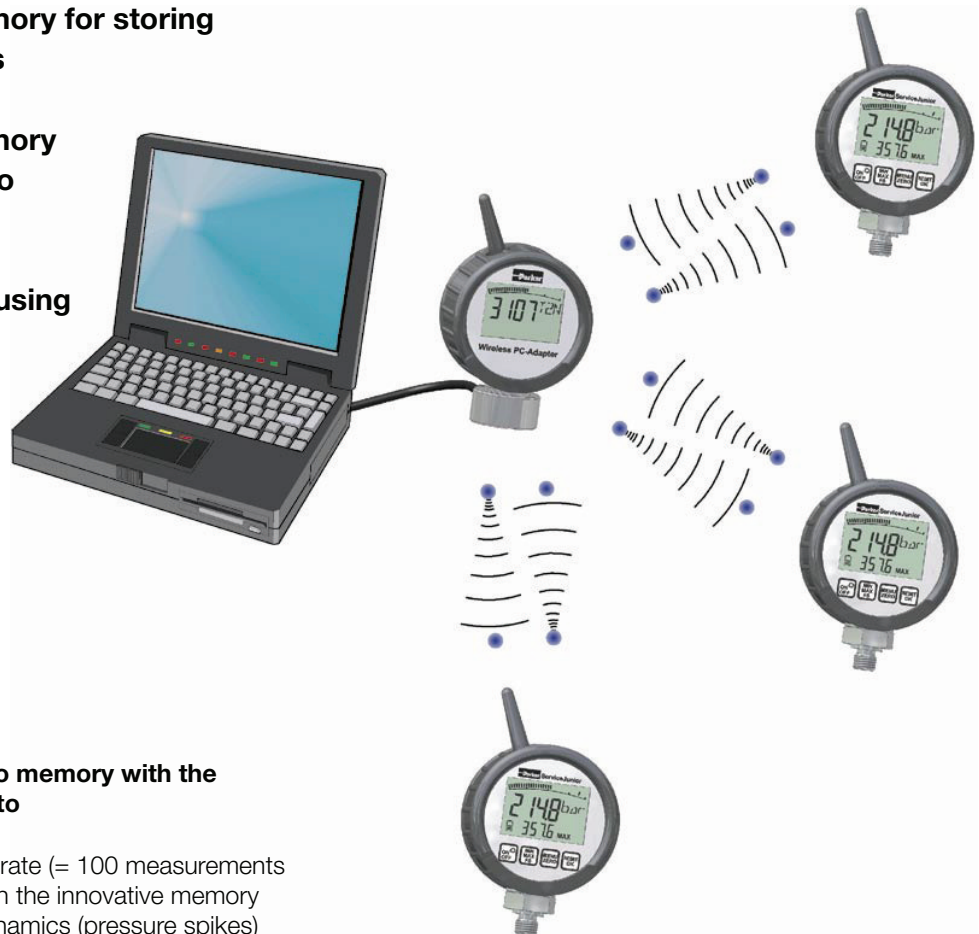
## Menu functions

-  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 <i>wireless</i>
<b>Range</b> -1...016 bar 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) 2 batteries 1.5 VDC AA alkaline 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

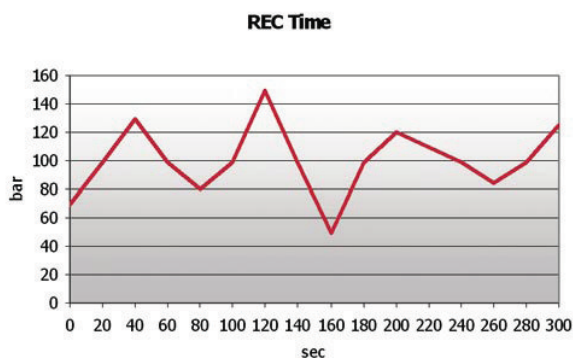
- **Network operations:**  
monitor several measurement points
- **Measured data memory for storing**  
pressure sequences
- **Read-out data from**  
measured data memory  
to the PC via a radio  
interface
- **Set and evaluate**  
measurement data using  
PC software  
"JuniorWin"



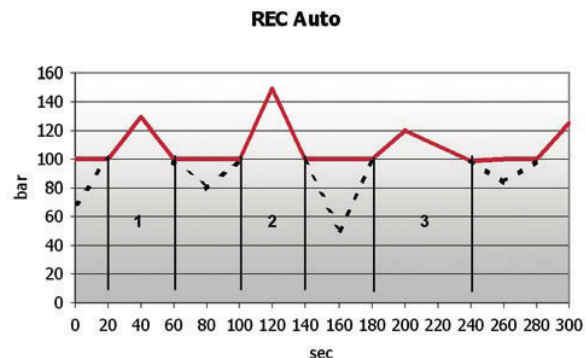
#### Example of measurement to memory with the settings REC Time/REC Auto

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.

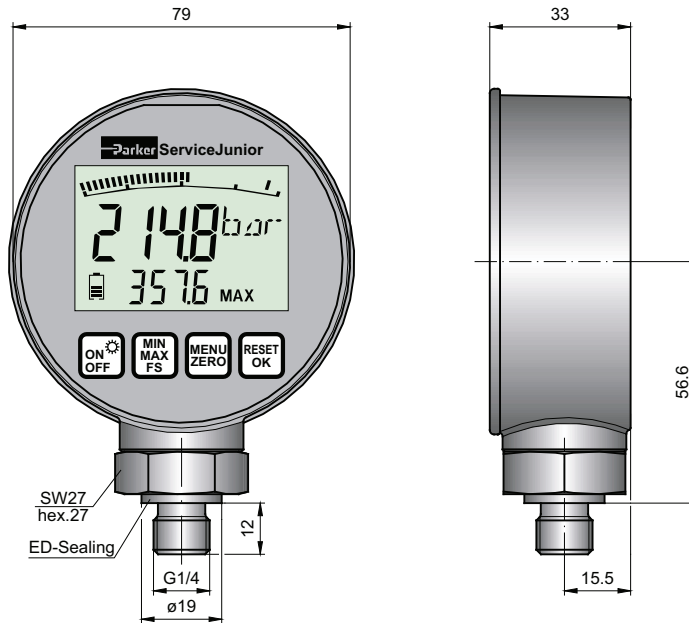
There are two measurement functions available to the user:



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.



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 $P_{max}$	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 Zinc die casting with rubber TPE protection cover				
Weight (g)	540				
Port	Stainless Steel 1.4404 1/4" BSPP (ISO 228-1)				
Input	Sensor element ceramics (16 bar) Strain gauge pressure measurement cell 10 ms scanning rate Accuracy $\pm 0,25\%$ FS typ. $\pm 0,5\%$ FS max. A/D converter 12 bit 4096 steps resolution				
Display	LC text display 4 ½ digits 50x34 mm Digit size: 15 mm Units: mbar/bar/PSI/Mpa/kPa Back lit illumination 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 MIN/MAX - FullScale Battery level display Auto power Off/On Zero (zero point equalization) Reset (Delete MIN/MAX)
PC-Function*	PC Software "JuniorWin" Read out data from memory to PC via radio interface (2,4 GHz) Operation range 50 m Setup of recording parameters
Memory Function*	5.000 Readings (MAX pressure peaks) Setup of storage interval REC TIME (Time based recording) REC AUTO (Pressure spike monitoring)
Power Supply	2 x 1,5 V alkaline batteries 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

\* SCJNP = 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.

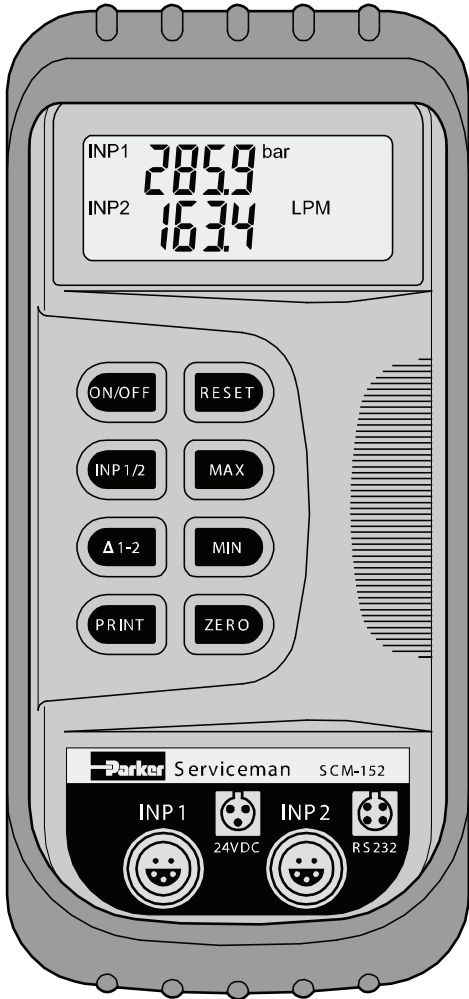
**Serviceman incl. external power supply  
2 Inputs (5 pin) incl. PC Interface**

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®** 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 (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	●	●

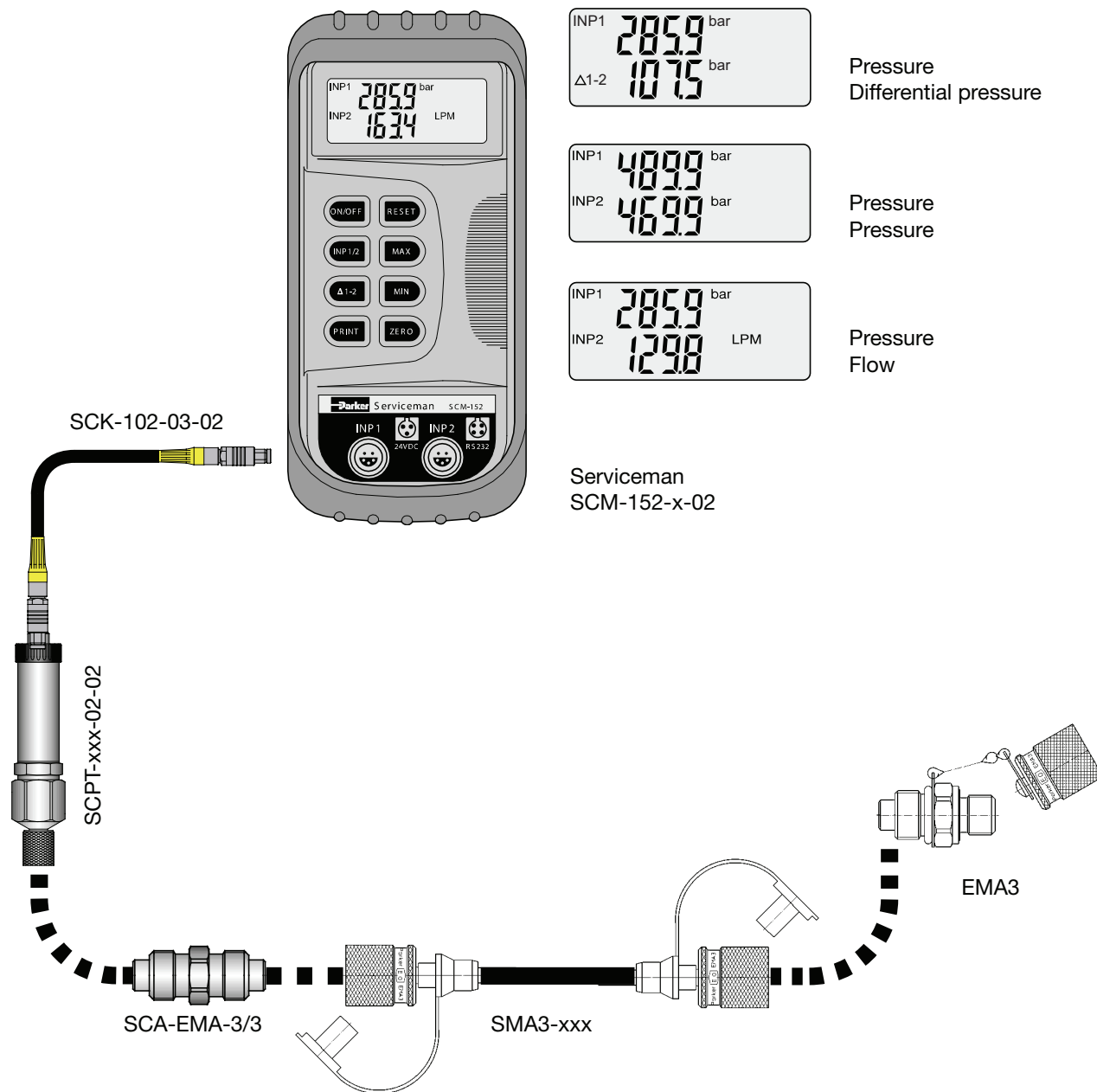
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● serial



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

— not available      ● serial

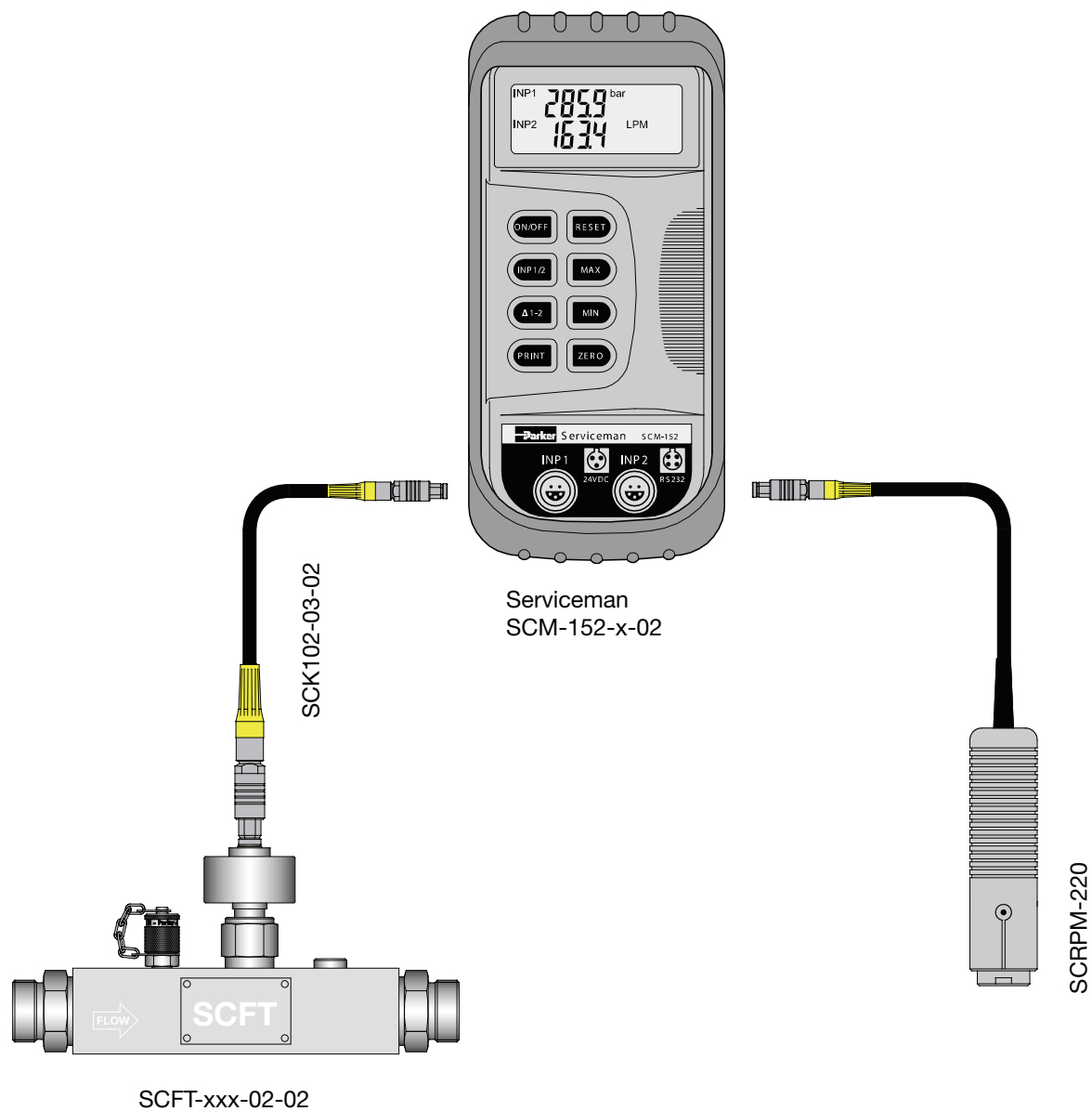


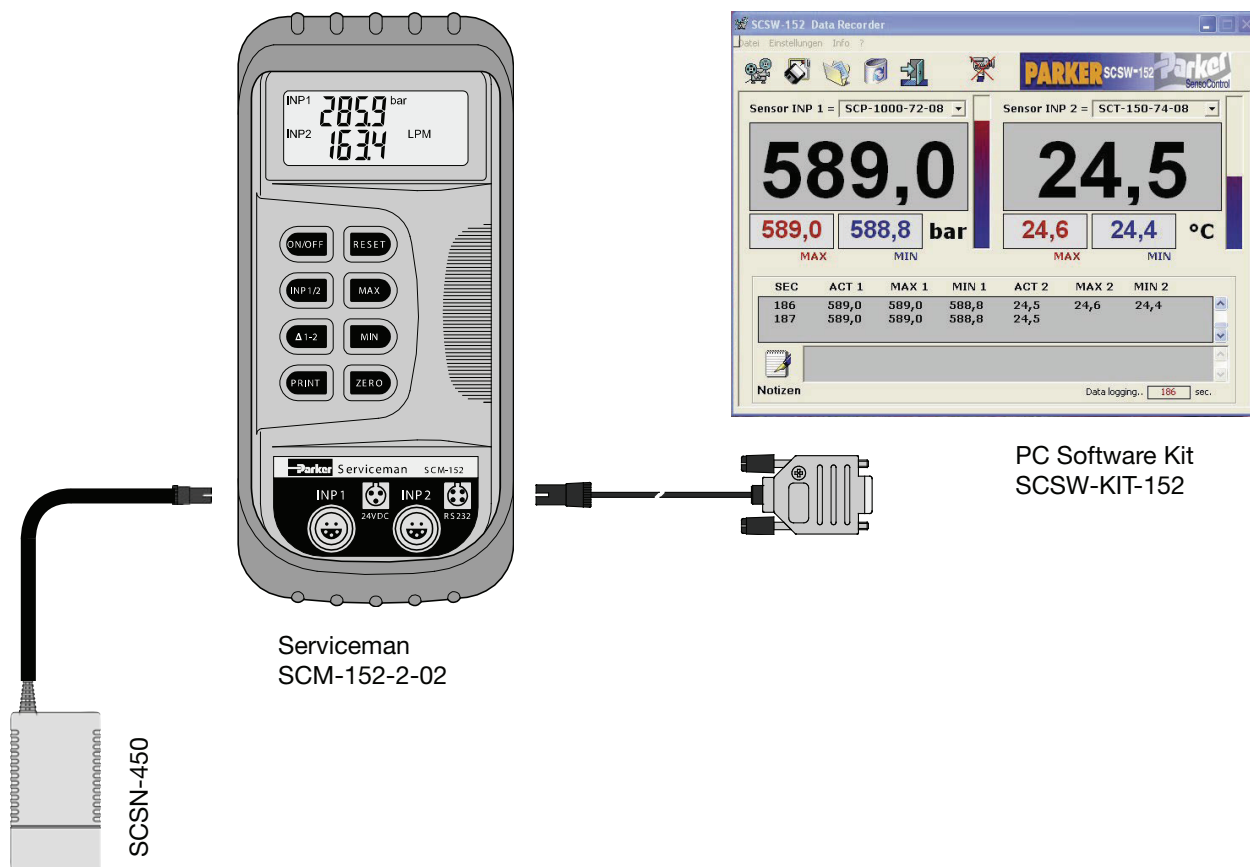
### Pressure Sensors

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)

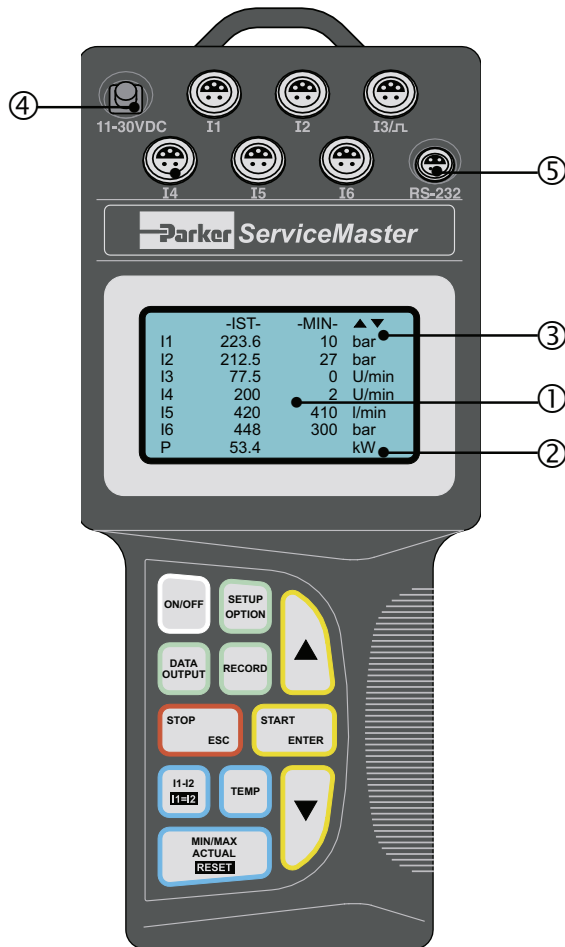
#### Service Master SCM-400 (6 inputs/channels)

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) Adaptor for external sensors with SCMA-VADC Plug-in connection: 5-pin, push-pull Sample rate: $\geq 1$ ms = 1,00 measurement values/sec. Resolution: 12 bit + sign = 4,096 steps	●	●	●	●
	Frequency input via input socket I3 for flow turbine or tachometer Frequency range: 0.5 Hz ... 30 kHz Signal input: depends on frequency 5 V <sub>pp</sub> (max)		●	●	●
Display	Graphic LC Resolution: 128 x 64 pixels Visible area: 72 x 40 mm Automatic adjustment of digit size Digit size: 4.2 mm (for 8 line display) Accuracy of display: < 0,25 % of Full Scale Range	●	●	●	●
	Graphic curve representation	●	●	●	●
Operation	Via 11-key membrane keyboard With mechanical tactile touch and embossed edges	●	●	●	●
Interface	RS232C (4-pin, push-pull) optional with a standard RS232/USB PC adaptor Baud rate: 1,200 ... 38,400.8 data bits, 1 stop bit Online data transmission to the PC Transferring recorded data to PC with SensoWin®	●	●	●	●
Functions	I1-I2 indication of differential values Indication of MIN/MAX/ACTUAL values Indication of TEMP values (SCPT/SCT) Auto power off/battery level control 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) Number of points per channel (e. g. 4,000 Min-Max) Variable recording time (2 s ... 100 h) Trigger: slope/manual/external/time Pre trigger External trigger with additional device SCMA-TR	●	●	●	●
Ambient conditions	Temperature range: 0 ... +50 °C Storage temperature: -25 ... +60 °C Temperature error: < 0.02 %/ °C Rel. humidity: < 80 % Protection according to DIN 40050: IP 54 (water spray/ oil)	●	●	●	●
Power supply	Internal: NiCd-battery 7.2 V/700 mAh Battery charging circuit Battery service capacity: 5 h approx. External: with SCSN-450 (220/100 VDC) Automotive cable adaptor as equipment (12/24 VDC)	●	●	●	●
Housing	Material: glass ball-reinforced polyamide Dimensions: 235 x 106 x 53 mm (L/W/H) 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/I4 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

SCK-318-05-21

SensoWin® PC Software-Kit

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 (0...20 mA or 0...10 VDC)
SCMA-VADC-400	V/A measurement (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.

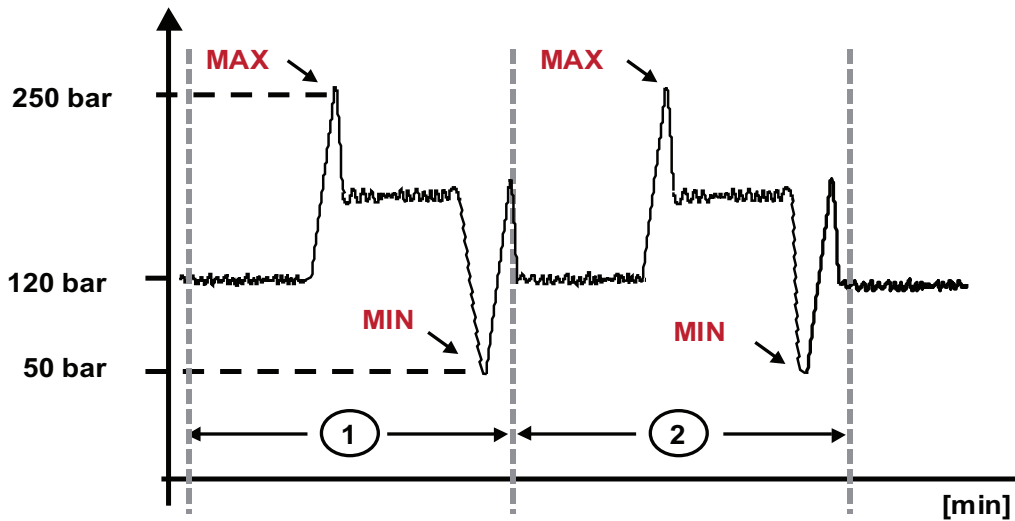
With the special storage technology of the Service-Master, all pressure peaks in the hydraulic system can be captured independently of the set measurement time (storage time). The storage interval (time interval between storage points) is automatically adapted within the base setting of the Service Master. 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. relay 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.

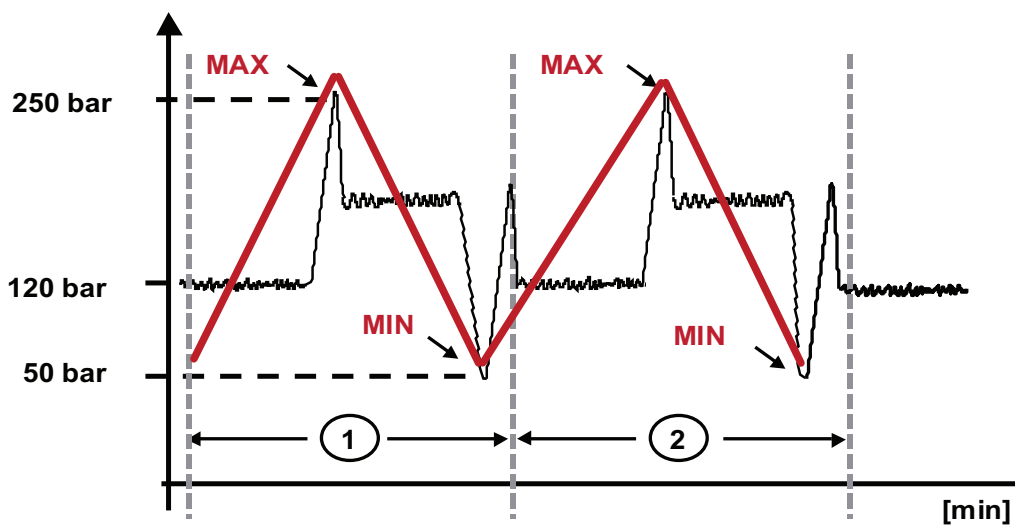


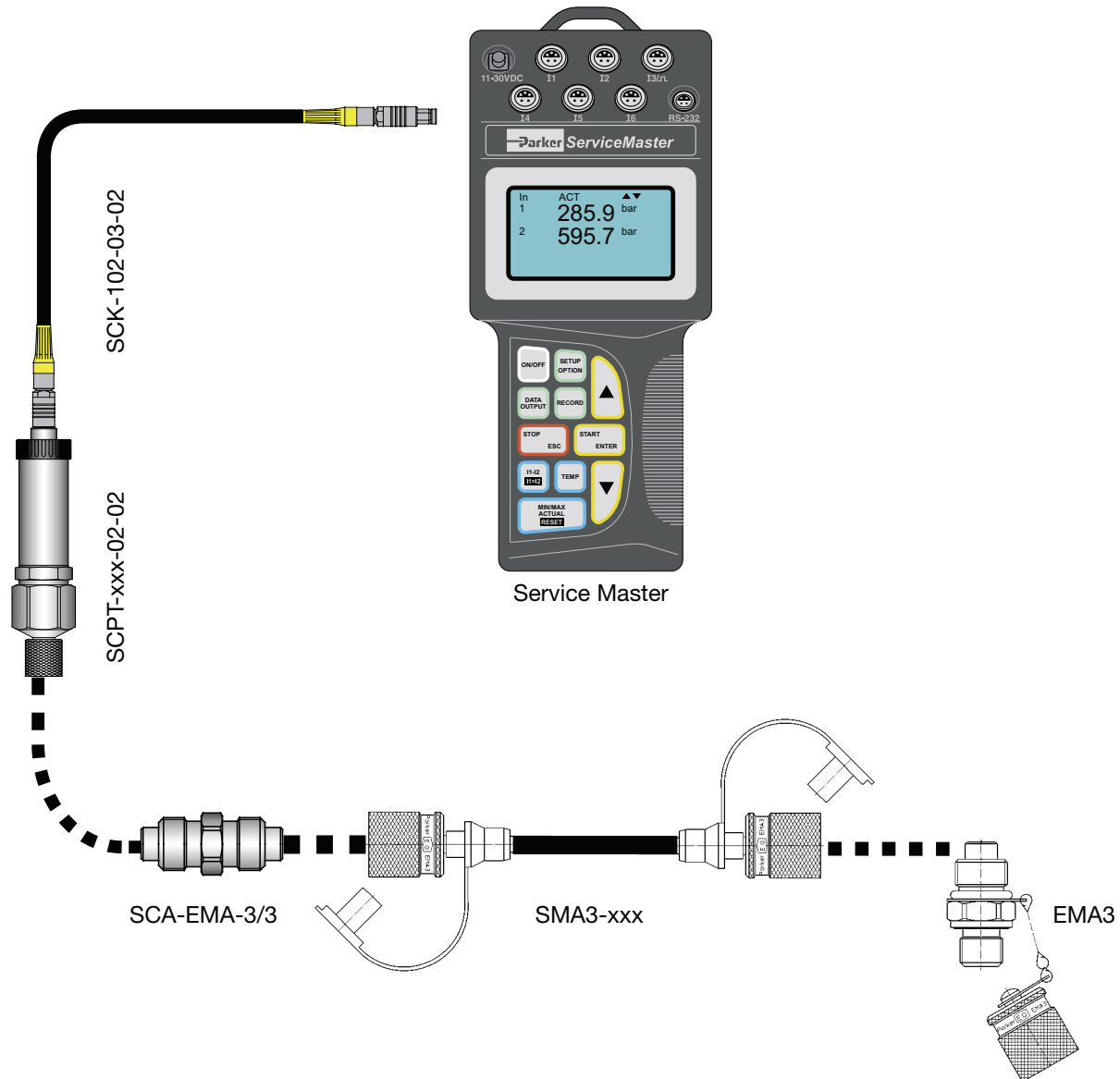
With the Service Master up to 6 sensors can be measured, displayed and recorded simultaneously. Each sensor (channel) enables up to 4,000 memory intervals to be created. Each memory interval will save a pair of data points. The pair consists of one MIN and one MAX reading.

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

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.



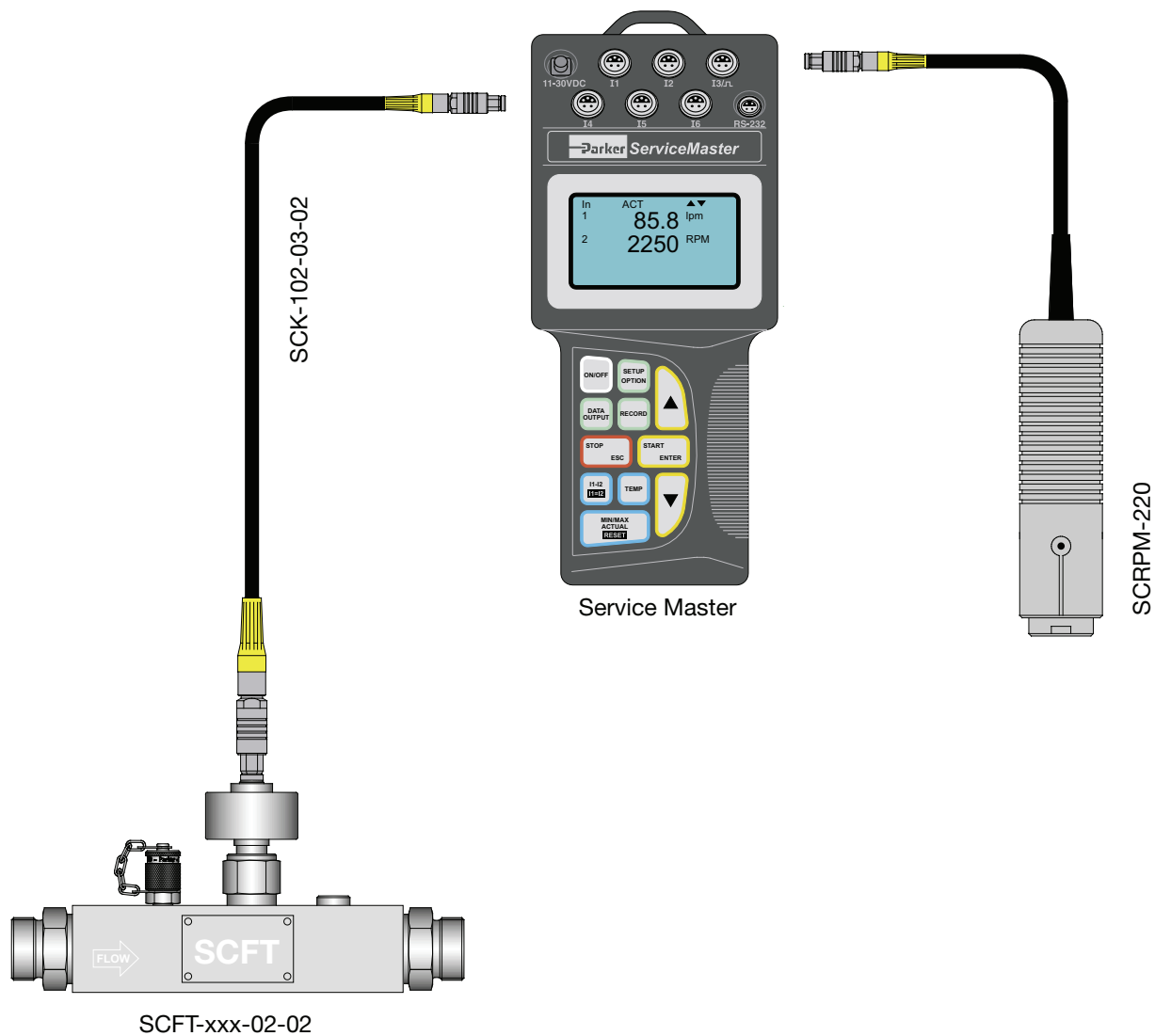


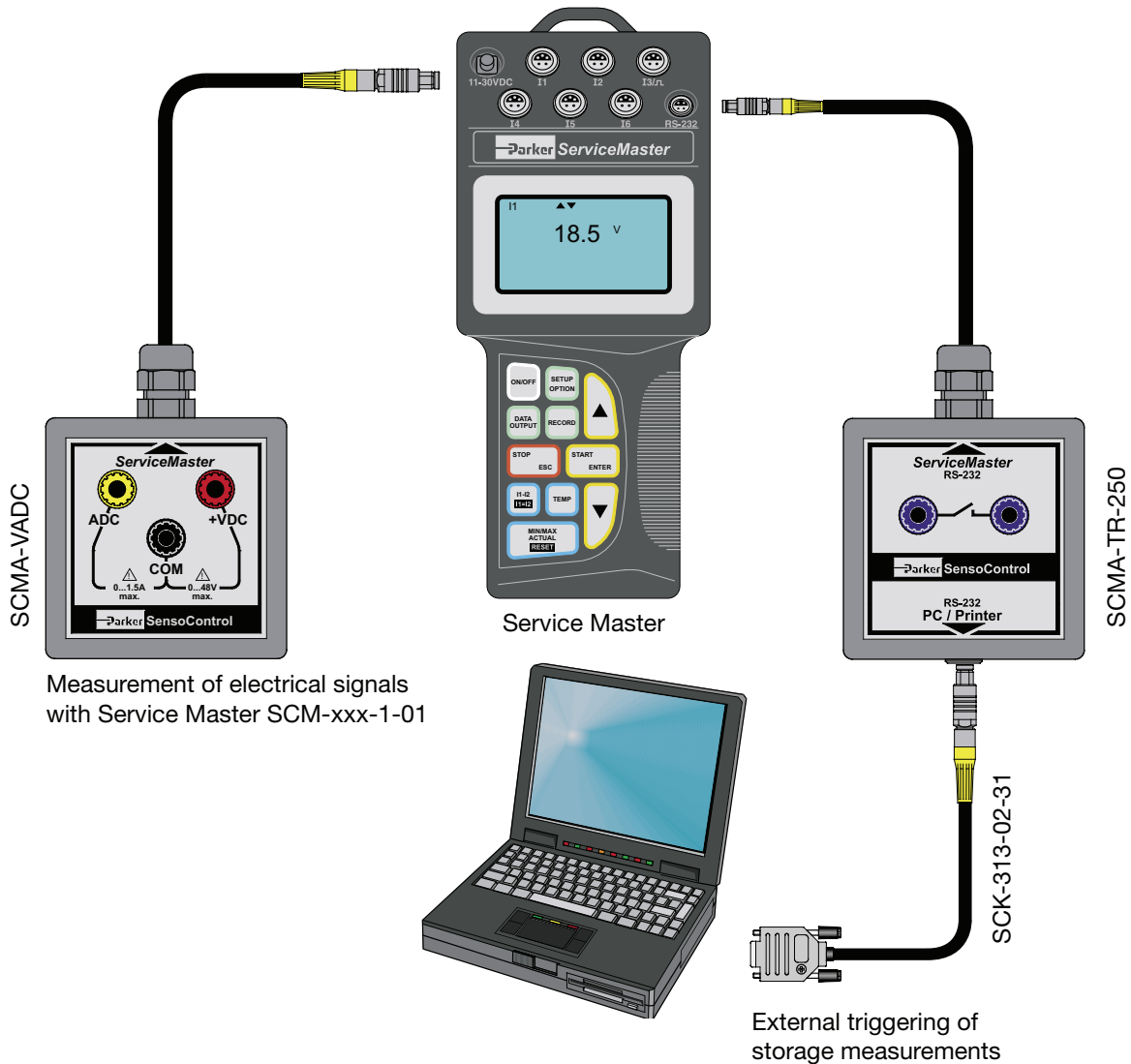
#### Pressure/Temperature measurement SCPT

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 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

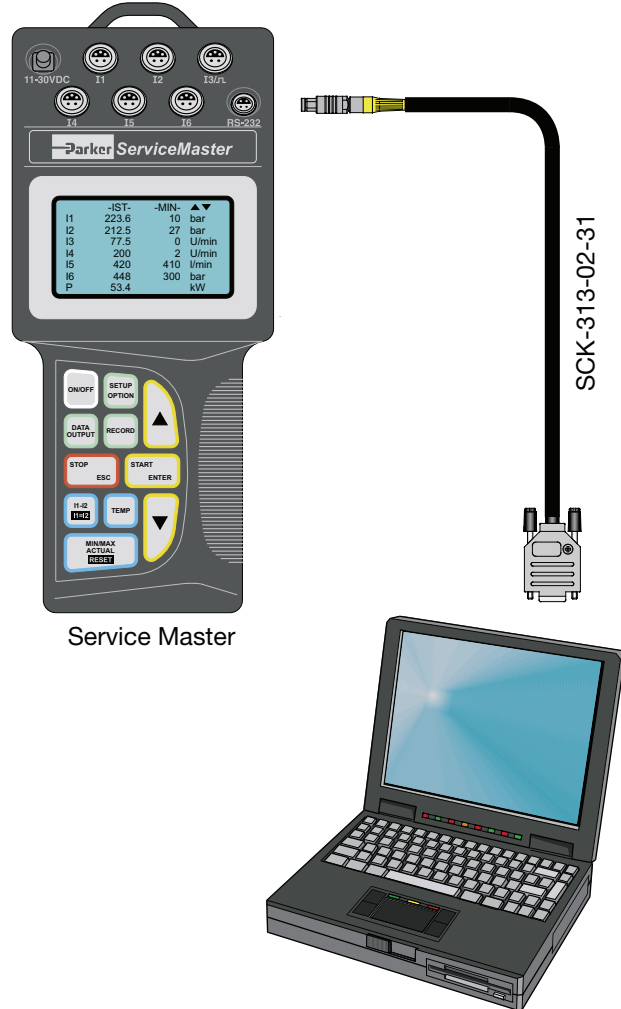
#### ■ SCMA-TR-250

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).