

fluid-Check[®]
Hydraulics, Service and Maintenance
Mobile Measurement Kit
for Hydraulic Installations
Type FM-1 –B



for flow rate sensor QS-2 with
measuring connector serv-Clip[®] SC-2

Sensor connection:	24V DC / 4 -20 mA
	M 12 socket
Connection for hand-held measuring devices:	0 - 30 V DC or 4 - 20 mA with sensor detection;
(optional)	M 12 socket
Mains connection:	115/230 V AC, 50 Hz, 2 A, +/- 10
Power supply	24 VDC (17 – 30 V)

Note:

We also offer pressure and temperature sensors for measuring connector serv-Clip[®] SC-2.

You may also use the mobile measuring kit FM-1 -A in combination with these sensors.

fluid-Check[®]

Mobile Measurement Kit for Hydraulic Installations

Application Examples

**For service and maintenance as well as
continuous monitoring of hydraulic systems**

Fixed displacement pumps	Pumping capacity
Variable capacity pumps	Percentage of leak oil

Oil coolers	Flow characteristics
Water coolers	

Differential cylinders	Leak oil
Synchronous cylinders	Sealing damages
Plunger cylinders	Moving speed

Oil motors	Leak oil
	Speed

Pressure accumulators	Bladder control
	Charging behaviour
	Nitrogen charge

Operating Instructions

The flow rate sensor and the mobile measuring kit provide a combined solution that greatly simplifies monitoring of hydraulic systems.

1. Using the measuring connector serv-Clip® SC-2, you can immediately install a measuring point anywhere in the hydraulic system.
2. You can then use the flow rate sensor QS-2 to measure the flow rate in the hydraulic pipe. The sensor is simply screwed into the measuring connector installed on the pipe.
3. The measured flow rate is displayed on the mobile measurement kit FM-1 -B. The measured flow rate between 0.05 and 8 m/sec. is shown in form of a reading between 4 and 20 mA.
4. You can also connect pressure and temperature sensors to the mobile measurement kit.
5. The flow rate sensor stands out by its high repeatability of measurements. The variation of measurement results is less than $\pm 3\%$ of the flow rate measured. Note that changing the place of installation can affect the measuring results.
6. For precise measurements, you should always use the same measuring equipment with the preset flow rate sensor.

The flow rate sensor QS-2 comes preset (see sensor). The standard current output is 4 -20 mA.

The sensor is suitable for pipe diameters of 12 - 42 mm (or corresponding imperial dimensions) as well as larger pipe diameters (with a special welded connecting piece for QS-2).

- The mobile measuring kit FM-1 -B displays the electric current measured by the sensor, the values being between 4 and 20 mA.
The default settings of the sensor and the display unit are locked to prevent accidental misadjustment.
- The measured values can be used to check, for example, the displacement capacity of a hydraulic pump. By repeating measurements, it is possible to monitor the operating condition of such components and to determine aspects such as wear of pumps.
- By considering the pipe ID, the volumetric flow rate can be determined.
- Using the mobile measurement kit FM-1-B and the flow rate sensor QS-2, you can quickly and reliably capture flow rates to monitor the condition of hydraulic systems during service and maintenance tasks.
- **Measurements should be carried out at an oil temperature of 50 °C ± 10 °C.**

Brief instructions for the demonstration measuring unit FM-1-B with flow rate QS-2-B

The display has been preset to 4 - 20 mA and has been locked to prevent accidental misadjustment.

The flow rate sensor QS-2-B supplied together with the measurement kit is preset, too:

Current display 4 – 20 mA

Velocity / Flow Rate see label on sensor

Please do not modify the sensor in any way.

The preset measuring range is universally suitable for this device.

The minimum flow rate of 0.9 m/s and the maximum flow rate of 9.2 m/s is sufficient for almost all applications.

Changes of the flow velocity are represented by a change of the displayed current, thus indicating a changed flow rate.

If the displayed current changes by **1 mA**, this corresponds to a change of the flow rate of:

4.0 l/min for a pipe ID of 16 mm

8.1 l/min 20 mm

12.8 l/min 25 mm

To obtain a more accurate measurement result, allow the measuring device to measure for approx. 15 seconds (at a constant flow of oil).

Example:

The measurement of the pumping capacity of a hydraulic pump (volumetric displacement: 50 l/min) yielded a value of 15.3 mA.

Four months later the pump was re-checked, resulting in a value of 15.1 mA.

The flow rate sensor is installed on a pipe with an inner diameter of $(20 \times 2) = 16$ mm.

In case of this pipe, a current change of 1 mA corresponds to a change of the volumetric flow rate of 4 l/min

$$15.3 \text{ mA} - 15.1 \text{ mA} = 0.2 \text{ mA}$$

$$\frac{4 \text{ l/min}}{1 \text{ mA}} \times 0.2 \text{ mA} = 0.8 \text{ l/min}$$

Compared to its original condition, the pumping capacity of this pump (initial volumetric displacement: 50 l/min) has decreased by:

$$\frac{50 \text{ l/min}}{100} = 0.5 \text{ l/min} = 1\%$$

$$\frac{0,8 \text{ l/min}}{0,5 \text{ l/min}} = 1,6\%$$

This means that the pump has lost 1.6% of its pumping capacity.

Contents of the fluid-Check Service Suitcase:

- 1 Measuring device FM-1 -B
- 1 Flow rate sensor QS-2-B
- 1 Power cord 230V AC
- 1 Connecting cable with plug and M12 connector
- 1 Operating manual for display unit AX 345
- 1 Operating manual for measuring device FM-1 -B

Any questions?

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