

pulsometer
PM20

Operating instructions

Manufacturer:

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PURPOSE

The pulsometer type **PM20** is intended for:

- measurements of dynamic characteristics of milking machine electronic and pneumatic pulsators; all calculations are based on 5 successive pulsation cycles;
- vacuum and static pressure measurement up to $-10 \div 85$ kPa.

All measurements are performed in two channels at the same time.

PM20 PULSOMETER SPECIFICATIONS

- operating temperature: $0 \div 40^{\circ}\text{C}$
- humidity: 90%
- power supply: - 5 AAA (R3) 900 mA accumulators charged with an external charger, plus inside, charging time 10 hours.
- dimensions: 215x100x45 mm
- outer/inner stub pipe diam: 9 mm / 5,5mm
- stub pipe span: 19 mm
- weight: 400 g
- display: LCD, 2x16 characters, back lighted

ACCESSORIES:

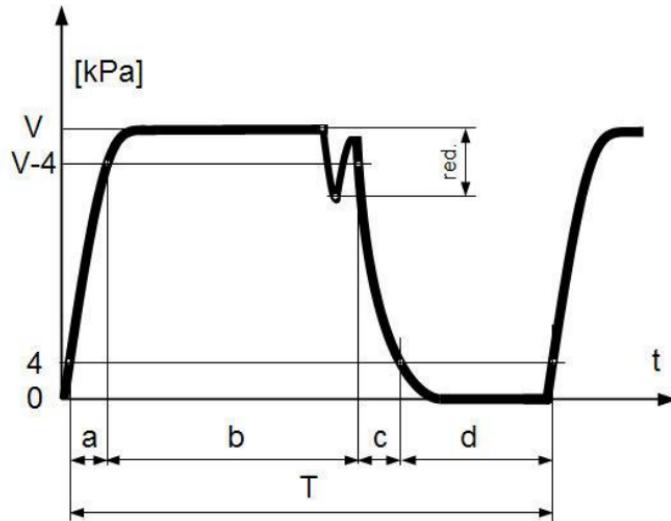
- Tube 180 mm 2pcs
- T-piece, Ø10 2pcs
- charger 12V DC
- etui

MEASURING RANGE AND ACCURACY:

Pulsator characteristics (*ref. Milking cycle characteristic description – page 6*)

R	- pulsation rate	15 ÷ 240 (± 0.1) min ⁻¹
A+B	- relative milking time	1 ÷ 99 (± 0.2) %
T	- pulsation cycle period	0.25 ÷ 4 (± 0.001) s
L	- relative milking time difference for both channels M2-M1 (balance)	1 ÷ 99 (± 0.2) %
A	- relative open time	1 ÷ 99 (± 0.2) %
C	- relative closed time	1 ÷ 99 (± 0.2) %
D	- relative minimum vacuum time	1 ÷ 99 (± 0.2) %
V	- maximum vacuum	10 ÷ 60 (± 0.6) kPa

MILKING CYCLE CHARACTERISTIC DESCRIPTION



$$R = 60/T \text{ [min.}^{-1}\text{]}$$

$$A = a \cdot 100/T \text{ [%]}$$

$$B = b \cdot 100/T \text{ [%]}$$

$$C = c \cdot 100/T \text{ [%]}$$

$$D = d \cdot 100/T \text{ [%]}$$

$$A+B = (a+b) \cdot 100/T \text{ [%]}$$

$$C+D = (c+d) \cdot 100/T \text{ [%]}$$

OPERATING

The pulsometer is provided with five keys. The key **ON** switches the pulsometer on and back lighting the display. The key **OFF** switches the pulsometer off. The keys **START**, **+** and **-** control the pulsometer functions. If no key is depressed for 5 minutes, the pulsometer switches off automatically.

The pulsometer type **PM20** serves several functions:

1. **Basic function:** measurement of dynamic pulsator characteristics.
2. **Additional functions:** static pressure (vacuum meter) measurement.

The basic function is available after the pulsometer is switched on with the key **ON**.

The pulsometer acknowledgement message should be displayed:

PULSOMETR
ver. 2.8

The pulsometer is ready for operation:

- using the **START** key, you can initiate the pulsator characteristic measuring process.

DYNAMIC PULSATOR CHARACTERISTIC MEASUREMENT

- 1) Connect drains of pulsator channels under measurement to the pulsometer stub pipes.
- 2) Switch the pulsometer **ON**. The message shown above should be displayed.
- 3) Press the **START** key to take a measurement. The message

...MEASUREMENT...
0123456789012345

will be displayed and the blinking cursor will indicate successive measurement phases. The pulsometer waits for pulsation for 5 seconds. If no pulsation occurs, the following message will be displayed:

NO PULSATION

If pulsation occurs, a complete measurement of all pulsator characteristics is taken and the values of parameters are displayed. The key + enables access to the next result page, while the key - , to the previous one. When it is impossible to take a characteristics measurement in a given channel, which is signaled by messages just after the measurement is completed, the characters ---- are displayed instead of a numerical value.

DYNAMIC PULSATOR CHARACTERISTIC MEASUREMENT ERROR MESSAGES:**The pulsometer detects and indicates:**

- Pulsation phase coincidence in the measuring channels,
- No pulsation in one or both channels,
- Too low pulsation amplitude (< 10 kPa),
- Too high reduction (> 4kPa).

The error messages are of the following form and may be preceded by indication of the channel number, they refer to (Ch1 or Ch2), or not, if they refer to both channels:

COINCIDENT PHASES!

NO PULSATION

Vmax < 10 kPa

RED. > 4kPa

ADDITIONAL FUNCTIONS

If you want to use the additional functions of the **PM20** pulsometer:

1) Switch it on with the **START** key depressed (press and hold the **START** key, and then depress **ON**).

PM20 works as a **vacuum meter**.

Drains should be disconnected from the pulsometer since the reference level (zero value) is settled during switching on. In these options START key calibrate pulsometer.

2) Switch it on with the - key depressed (press and hold the - key, and then depress **ON**).

PM20 works as a **frequency meter**. The message shown above should be displayed.

R ---- puls/min

ACCUMULATOR CHARGING

The pulsometer detects too low voltage of the accumulators and indicates on the display **LOW BATTERY**.

That means, in next future, necessity of charging. Use 12V DC charger

Time of charging is about 10 hours.



RECOMMENDATIONS AND NOTES FOR THE USER

- Do not connect the pulsometer to pressures exceeding 100 kPa. This generates instrument damage hazard.
- Protect the pulsometer against severe sunlight and moisture.
- Protect display glass against damage.
- No liquid or solid matter is allowed in drains feeding the pressure signal to be measured.

It is recommended to switch on the vacuum pump a few minutes before the pulsometer is connected.

PERIODIC CHECKING AND CALIBRATION OF VACUUM

Every few months or when there is suspicion of false readings, it is recommended to compare PM20 meter with a vacuum gauge class 0,6. Before testing, make sure that the **batteries are charged**.

If the readings exceed + / - 0.5 kPa at 50 kPa forcing calibration is required.

Operations.

Remove the two screws on the battery compartment cover.

Remove the four screws in the corners of the housing and disconnect the upper part of the bottom.

Run the PM20 as a vacuum meter.

Using the T-pieces connect the vacuum gauge class 0.6 and PM20 to a source of vacuum 50 kPa.

By adjusting potentiometers equalize the vacuum gauge and PM20 indications. Turn off the vacuum.

Turn on the vacuum, set the zero vacuum level by pressing key START and repeat the measurement.

ANY NOTES CONCERNING OPERATION OF THE **PM20** SHOULD BE PASSED TO THE MANUFACTURER. WE DO HOPE THAT THE PULSOMETER IN OPERATION WILL MEET YOUR EXPECTATIONS.

NOTE! Cold pulsometer switched on in a warm room may operate incorrectly. Wait ca. 30 minutes for temperature equalization (recondition the pulsometer).

WARRANTY AND REPAIRS

The Manufacturer provides full repair service, both during the 12-month guarantee period and afterwards. Mechanical damages and those implied by instrument operation not compliant with the operating instructions are not covered by the warranty.

For any claims, the guarantee card should be prepared.



GUARANTEE CARD		
..... Serial number	 Quality Control
..... Date of manufacture Date of sale Salesman stamp
ANNOTATIONS OF REPAIRS		
No.	Date	Type of repair
		Signature

ATTENTION: serial number is available when pulsometer is switched on with + key depressed