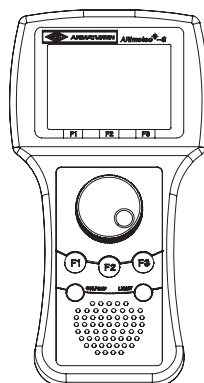


## Multifunction tester ARImetec®-S

### Multifunction tester ARImetec®-S

#### Ultrasonic gauge

- Temperature measurement range to max 800°C
- Internal memory for 1000 test values
- Software package for data transfer to PC, incl. USB cable



ARImetec®-S

#### Features

- Simultaneous ultrasonic and temperature measurement
- Built-in loudspeaker for ultrasound
- Integrated temperature measurement
- Digital display for ultrasound level and temperature
- Illuminated graphic display/Display
- Shock-proof plastic with wipe clean membrane keyboard
- Auto Power-off
- Accessories: e.g.
  - Headphones (with excellent sound insulation)
  - Extension for temperature sensor



- On-line evaluation of steam leakage through steam traps and valves by monitoring ultrasonic sound
- Minimises steam (and hence money) loss through early identification of leakage
- Minimises plant downtime by only taking plant off-line if repairs are required
- With the multifunction **tes'er** ARImetec-S the correct working of the steam traps can be controlled and a valuation of possible steam loss is enabled
- Ultrasonic characteristic and surface temperatures produced at the traps are detected and digitally displayed.
- The ARImetec-S allows a characteristic test to be recorded, stored and transferred to a PC.
- The test period and measurement interval for the characteristic test is user definable. The basic setting for steam trap monitoring is 1 min test period with 1 measurement per sec.
- A precise operational check is possible with the combination of ultrasonic and surface temperature measurement.
- Because steam traps operate on a number of principles, readings are allocated to a decision chart, the limit value curve, and the application of which is described in greater detail in the Brief Guide and Operating Instructions.
- Instrument for use in explosive/hazard areas specified to comply with Directive 94/9/EC on request

| Type                                 |       | ARImetec®-S                                                                                                                                                                                                                      |
|--------------------------------------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ultrasonic measurement frequency     | (kHz) | 40 kHz +/- 1 kHz (20 to 60 Hz in 2 kHz steps)                                                                                                                                                                                    |
| Temperature measurement range        | (°C)  | to max. 800°C                                                                                                                                                                                                                    |
| Max. permissible ambient temperature | (°C)  | 0°C to +50°C                                                                                                                                                                                                                     |
| Reading display                      |       | Backlit graphic display, menu control                                                                                                                                                                                            |
| Battery                              |       | 5 x LR6 with 1.5 V mains voltage                                                                                                                                                                                                 |
| Body                                 |       | Shock-proof plastic with wipe clean membrane keyboard                                                                                                                                                                            |
| Dimensions                           | (mm)  | 190 x 110 x 85 mm                                                                                                                                                                                                                |
| Weight                               | (kg)  | ARImetec®-S: 0,65 kg , incl. case approx 3,5 kg                                                                                                                                                                                  |
| Connections                          |       | <ul style="list-style-type: none"> <li>• Body sound probe</li> <li>• Surface temperature sensor</li> <li>• Headphone</li> <li>• USB interface (USB 2.0)</li> </ul>                                                               |
| Extra functions                      |       | <ul style="list-style-type: none"> <li>• Built-in loudspeaker</li> <li>• Auto Power-off</li> <li>• Maximum hold mode</li> </ul>                                                                                                  |
| Scope of supply                      |       | <ul style="list-style-type: none"> <li>• Software and USB cable</li> <li>• Body sound probe</li> <li>• Surface temperature sensor to max. 800°C</li> <li>• Carrying case</li> <li>• Shoulder strap with sensor holder</li> </ul> |
| Options                              |       | <ul style="list-style-type: none"> <li>• Headphones (with excellent sound insulation)</li> <li>• Extension for temperature sensor</li> </ul>                                                                                     |

## Functional testing of steam traps

### Note:

#### General:

- The Multifunction tester can only be used on valves and steam traps which are operational and at operating temperature.

#### Ultrasound

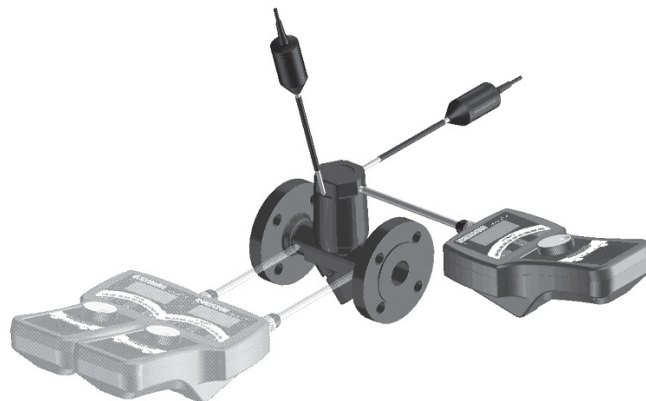
- Any sound-emitting components within the system under test must be switched off prior to testing.
- It is important that in steam traps of the same operating type the Body sound probe should always be positioned at the same place on the body so that traps can be compared and changes ascertained during repeat testing! See Operating Instructions for more detailed information. Steam traps operate on a number of different principles, each with unique characteristics
- Evaluation of the steam trap is carried out using a limit curve. To do this the operating pressure of the system must be known. If the system pressure is not known, system pressure may also be determined on hand of the steam table illustrated, using the boiling temperature.

#### Temperature

- As the ARImetec-S measures temperatures on the outside of the pipeline or steam trap, the temperature loss during heat transfer through the pipe or steam trap must be taken into account As a rough guide:  $T(\text{internal}) = T(\text{external}) \times 1,1$
- The saturation temperature can be read off from the steam tables if the system operating pressure is known.
- If the operating pressure of the system is not known, the saturation temperature can be determined by measuring the surface temperature of the pipeline well upstream of the steam trap. The measurement point must be upstream of any section where condensate may accumulate and sub-cool.

Temperature and ultrasonic measurements may be taken in parallel. The temperature probe is rigidly mounted onto the gauge body so that the gauge can be held in one hand and the body sound probe in the other. In places where access is difficult, temperature measurement may be carried out separately.

As shown in the illustration, if possible place the temperature probe on a flat surface at the steam trap inlet and set the connected body sound probe vertically with light pressure on the body or hood, cap or cover



#### - Stable ultrasonic value below the limit curve:

If a stable ultrasonic value is achieved, and can be plotted beneath the limit curve (refer to page 4), the steam trap is steam-tight. Taking the temperature measurement (please read note on temperature measurement) allows the user to determine if the steam trap is at operating temperature:

When thermal (bimetal, diaphragm capsule and thermodynamic) steam traps are working correctly the operating temperature  $T(\text{internal})$  should be between 5 and 30 K below the saturation temperature, depending on type, or at saturation temperature in the case of float steam traps. If the temperature is much more than 30 K below boiling temperature, then the steam trap has been set to too high a degree of overcooling, is blocked or defective (provided the system is in operation).

#### - Periodically fluctuating ultrasonic reading:

Periodic fluctuation of the ultrasonic reading between a maximum and minimum value indicates intermittent working of the steam trap. The steam trap is opening and closing and is thus working properly. Here again, in thermal (bimetal, diaphragm capsule and thermodynamic) traps the operating temperature  $T(\text{internal})$  the steam trap should be between 5 and 30 K below the boiling temperature, depending on type, or at saturation temperature in the case of float-type traps..

#### - Stable ultrasonic value above the limit curve

If the value lies above the limit curve, the steam trap must be isolated from other sound sources to confirm the ultrasonic signal is only from the steam trap under test. This may be verified by taking an ultrasonic reading upstream and downstream of the steam trap.

If the ultrasonic readings at the steam trap are higher than at the pipe, ultrasound is being produced in the steam trap by a flow. If the ultrasonic readings at the steam trap are lower than at least at one pipeline, an external sound source is influencing ultrasonic measurement. In both instances only temperature measurement can provide a sure and unequivocal evaluation, as it remains to be determined whether the flow is of steam or condensate and if the trap is working correctly.

#### a) Thermal steam trap

For further evaluation of thermal steam traps the surface temperature, as seen in the figure, is measured and compared with the boiling temperature:

- I If  $T(\text{internal})$  is more than 5... 10K below the boiling temperature this indicates a condensate flow.
- II If  $T(\text{internal})$  is roughly consistent with the boiling temperature, this indicates a steam flow – the steam trap is defective.
- III If the reading is greater than the boiling temperature (superheated steam), the steam trap is also defective.

#### b) Float-type steam trap

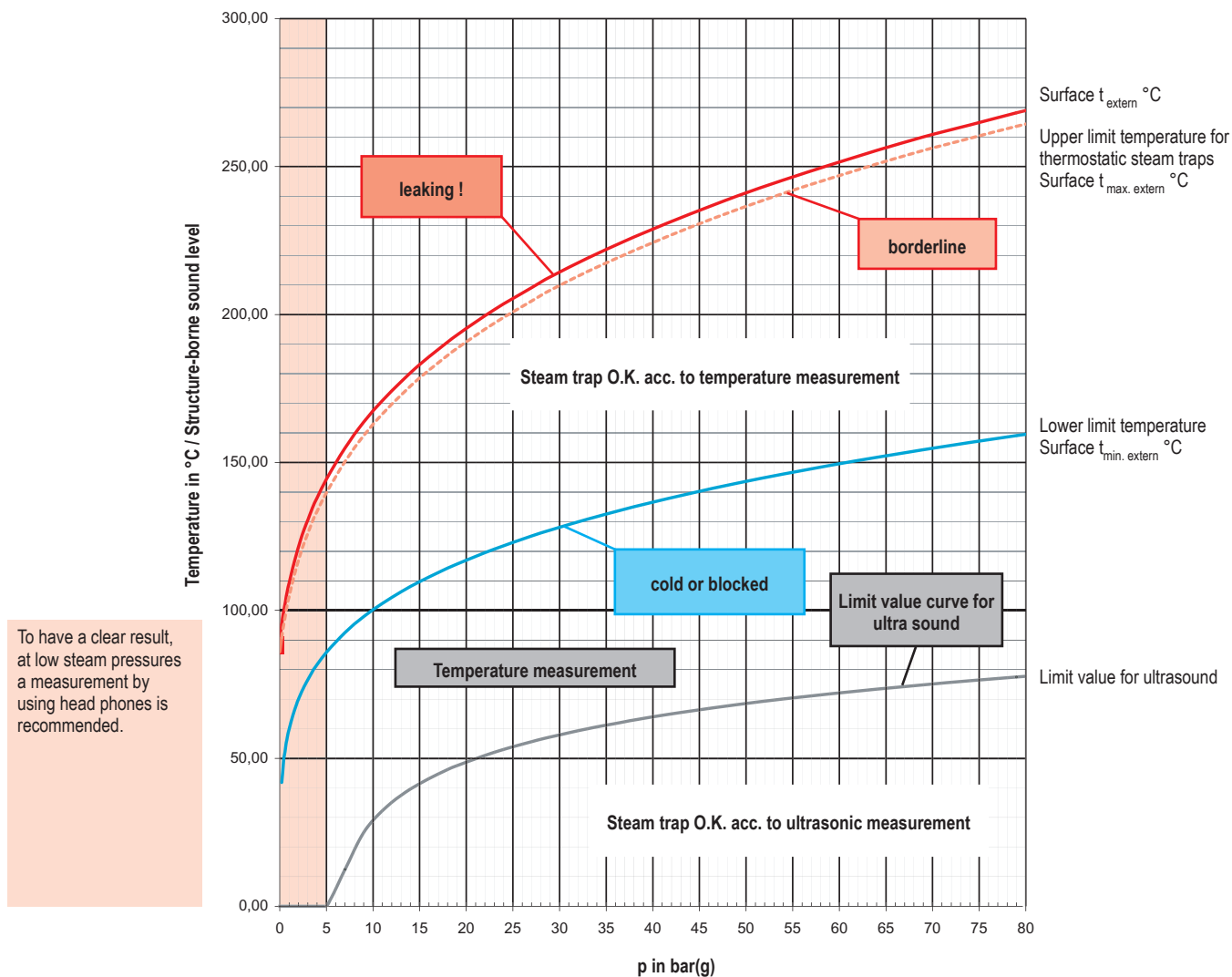
To evaluate float-type traps the temperature difference between inlet and outlet is measured.

- I In a correctly working steam trap it must be possible to measure a definite temperature drop from inlet to outlet.
- II If the temperature measured at the outlet is just as high as at the inlet, then there is steam flow. The float-type steam trap is defective.

**Operating pressure – boiling temperature correspondence**

|                        |        |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|------------------------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Pressure               | (barg) | 0   | 1   | 2   | 3   | 4   | 5   | 6   | 8   | 10  | 13  | 16  | 20  | 24  | 28  | 32  | 40  | 50  | 60  | 80  | 100 | 120 | 150 |
| Saturation temperature | (°C)   | 100 | 120 | 133 | 144 | 151 | 159 | 165 | 175 | 184 | 194 | 204 | 214 | 223 | 231 | 238 | 250 | 264 | 275 | 294 | 310 | 323 | 341 |

See enclosed CD-ROM for further correspondence values

**Limit value curve**


The graph relates saturation temperature and pressure and may be used to interpret the results obtained by ultrasonic measurement

Owing to the broad type spectrum of steam traps and specific system conditions, the allocation of readings is made by recommended decision criteria. Individual experience may produce differing limit curves: this is entirely justified and should be applied.



**Technology for the Future.**  
GERMAN QUALITY VALVES

ARI-Armaturen Albert Richter GmbH & Co. KG, D-33756 Schloß Holte-Stukenbrock,

Tel. +49 52 07 / 994-0, Telefax +49 52 07 / 994-158 or 159 Internet: <http://www.ari-armaturen.com> E-mail: [info.vertrieb@ari-armaturen.com](mailto:info.vertrieb@ari-armaturen.com)