

# SHARKY 775

## ULTRASONIC COMPACT ENERGY METER

**DIEHL**  
Metering



### APPLICATION

SHARKY 775 is a ultrasonic compact energy meter designed for measuring the energy consumption in heating and bifunctional (heating/cooling) application, for billing purposes. The measurement principle is static and based on the measurement of the transit time. Ultrasonic technology offers many benefits: no moving parts (prevents wear and tear of the metering components), low pressure loss, large metering dynamics and low start flowrate, insensitiveness to suspended particles...

### FEATURES

- ▶ MID approval in class 2 with dynamic range (qi:qp) up to 1:250 (depending on DN), standard 1:100
- ▶ Heat-transfer fluid: water
- ▶ Complete range from DN 15 qp 0.6 m<sup>3</sup>/h up to DN 100 qp 100 m<sup>3</sup>/h
- ▶ Low power consumption enabling a long battery lifetime (up to 16 years)
- ▶ Integrated radio option
- ▶ Modular version, M-Bus, M-Bus RS232, M-Bus RS485, Modbus RTU RS485, Analog outputs 4-20mA, pulse outputs and inputs
- ▶ Programmable installation side (in option)

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### BASIC FEATURES

| SHARKY 775                    |                                                                                                                                                                    |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Application                   | Heating - bifunctional (heating/cooling)   Heat-transfer fluid: glycol-free water                                                                                  |
| Approval                      | MID (DE-10-MI004-PTB013)                                                                                                                                           |
| Environmental class (EN 1434) | Class C                                                                                                                                                            |
| Ambient class (MID)           | Class E2 + M2                                                                                                                                                      |
| Ambient operating temperature | °C +5 ... +55 (<35 °C have a positive lifetime effect)                                                                                                             |
| Ambient storage temperature   | °C -25 ... +60 (>35 °C max. 4 weeks)                                                                                                                               |
| Communication                 | 3 communication interfaces (e. g. M-Bus or integrated radio + 2 communication modules)                                                                             |
| Integrated Radio              | Optional                                                                                                                                                           |
| Frequency band                | 868 or 434 MHz                                                                                                                                                     |
| Type of radio telegram        | Open Metering Standard (OMS), optional individual encryption key                                                                                                   |
| Transmission data updating    | Online - no time delay between value measurement and data transmission                                                                                             |
| Data transmission             | Unidirectional                                                                                                                                                     |
| Sending interval              | With A-cell: 180 s (up to 10.5 years lifetime); with D-cell: ~12 s (up to 16 years lifetime); with mains unit: ~12 s; depending on length of telegram (duty cycle) |
| Test possibilities            | Via display, optical test pulses, test output or via NOWA software                                                                                                 |

\*Standard conditions of use and temperature. Theoretical life, with no guarantee.

### BASIC FEATURES - CALCULATOR

| SHARKY 775                            |                                                                                                                                                        |
|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| Protection class                      | IP 54                                                                                                                                                  |
| Battery supply                        | 3.6 VDC A-cell up to 10.5 years lifetime (depending on configuration); 3.6 VDC D-cell up to 16 years lifetime                                          |
| Mains supply                          | 24 VAC (50 - 60 Hz); 230 VAC (50 - 60 Hz)                                                                                                              |
| Temperature sensor type               | Pt 100 or Pt 500 with 2-wire leads; Ø 5.2 / 6 mm or direct sensor                                                                                      |
| Cable length of temperature sensor    | Pt 100: 1.9 m; Pt 500: 1.9 / 2.9 / 4.9 / 9.9 m                                                                                                         |
| Absolute temperature range calculator | Θ °C 1 ... 180                                                                                                                                         |
| Measuring cycle - flow                | With mains supply: 1/8 s; with A-cell battery: 1 s; with D-cell battery: 1 s                                                                           |
| Measuring cycle - temperature sensor  | T s With mains supply: 2 s; with A-cell battery: 16 s; with D-cell battery: 4 s                                                                        |
| Starting temperature difference       | ΔΘ K 0.125                                                                                                                                             |
| Min. temperature difference           | ΔΘ <sub>min</sub> K 3                                                                                                                                  |
| Max. temperature difference           | ΔΘ <sub>max</sub> K 120 / 175 (heating)   50 (cooling)                                                                                                 |
| Interfaces standard                   | Optical ZVEI interface                                                                                                                                 |
| Interfaces optional                   | 2 Slots for modules with M-Bus, L-Bus, LON works, LoRa, MOD Bus, RS232, RS485, pulse output, pulse input, combined pulse in-/output or analogue output |
| Extensive readable data memory        | Periodical log <sup>1</sup> ; 3 history logs; event memory                                                                                             |

<sup>1</sup> Programmable storage interval (daily, weekly, monthly, ...)

### BASIC FEATURES - FLOW SENSOR

| SHARKY 775                              |                                                                                                                |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------|
| Mounting position flow sensor           | Any position, calming sections not necessary, inlet installation / outlet installation / in field programmable |
| Protection class flow sensor            | Heating: IP 54; heating with cooling tariff: IP 65                                                             |
| Material of the flow sensor body        | Brass or spheroidal cast iron (only q <sub>p</sub> 15 up to q <sub>p</sub> 100 m <sup>3</sup> /h)              |
| Temperature range heating               | °C 5 ... 105 / 130 / 150 (depends on meter size and material)                                                  |
| Temperature range cooling               | °C 5 ... 50                                                                                                    |
| Temperature range heating/cooling meter | °C 5 ... 105                                                                                                   |

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### DISPLAY

| SHARKY 775         |                                                                                         |
|--------------------|-----------------------------------------------------------------------------------------|
| Display indication | LCD, 8-digit                                                                            |
| Units              | MWh - kWh - GJ - Gcal - MBtu - gal - GPM - °C - °F - m <sup>3</sup> - m <sup>3</sup> /h |
| Total values       | 99,999,999 - 9,999,999.9 - 999,999.99 - 99,999.999 (depending on the nominal diameter)  |
| Displayed values   | Energy - Volume - Flow rate - Power - Temperature                                       |

### INTERFACES

| SHARKY 775                |                                                                                                                                                                                                                                         |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Optical                   | ZVEI interface for communication and testing, M-Bus protocol                                                                                                                                                                            |
| M-Bus                     | Configurable telegram, according to EN13757-3, two wires with non polarity, auto baud detect (300 and 2400 baud), one M-Bus load                                                                                                        |
| Wireless M-Bus            | Open Metering Standard (OMS), Generation 3 Profile A or Generation 4 Profile B; frequency band 868 or 434 MHz                                                                                                                           |
| L-Bus                     | Adapter for external radio module, configurable telegram, according to EN13757-3, data reading and parametrization via 2 wires with polarity reversal protection                                                                        |
| Modbus RTU                | Polarity independent, Voltage 12 - 24 V AC/DC, <150 mW; protocol - Modbus RTU, Channel - EIA-485 (galvanic isolated), Baud rate 1,200 ... 115,200. The default communication: 9,600 bps Baud rate, 8N1 data format, Modbus Slave ID - 1 |
| LonWorks                  | Polarity independent; Voltage 12 - 24 V AC/DC, <150 mW; Channel - TP/FT-10, Baud rate - 78 kbits per second, Data format - Differential Manchester Coding                                                                               |
| LoRa                      | Five different telegrams can be selected via OTC App (AppStore Android). Up to 11 years lifetime with own battery and the modern ECO Mode. Transmission interval varies with the connection quality.                                    |
| RS232                     | Serial interface for communication with external devices, a special data cable is required, M-Bus protocol, 300 and 2,400 baud                                                                                                          |
| RS485                     | Serial interface for communication with external devices, power supply with 12 V ± 5 V, M-Bus protocol, 2,400 baud                                                                                                                      |
| Pulse output              | Module with 2 Open Collector pulse outputs (potential-free), output 1: 4 Hz (pulse width 125 ms), pulse or static conditions (e.g. errors), output 2: 200 Hz (pulse width ≥ 5 ms), configurable via IZAR@MOBILE 2 software              |
| Pulse input               | Module with 2 pulse inputs, max. 20 Hz, configurable via IZAR@MOBILE 2 software, data can be transferred remotely                                                                                                                       |
| Combined pulse in-/output | Module with 2 pulse inputs and 1 pulse output, configurable via IZAR@MOBILE 2 software, needed for leak detection                                                                                                                       |
| Analogue output           | Module for 4 ... 20 mA with 2 programmable passive outputs, programmable value in case of error                                                                                                                                         |

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## TECHNICAL DATA FLOW SENSOR

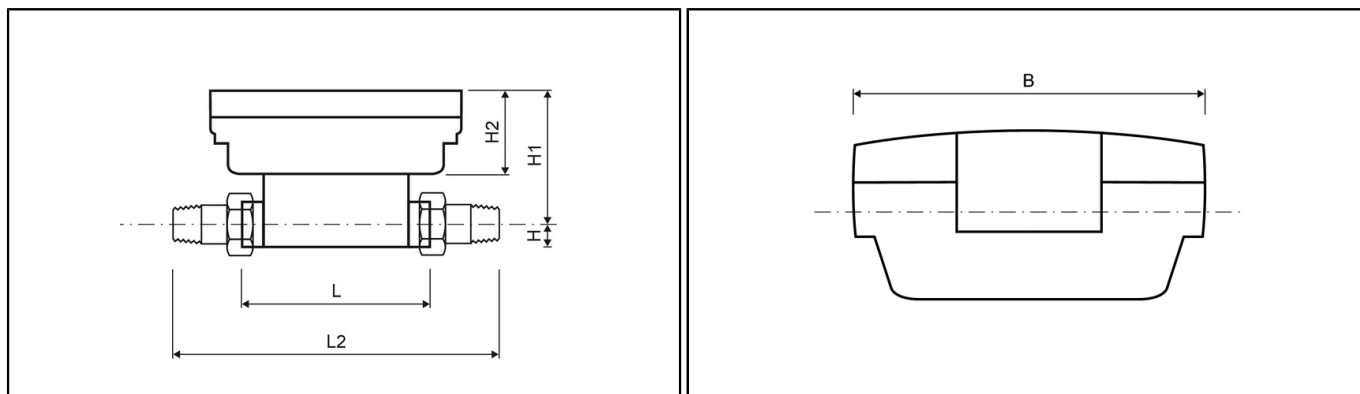
|                                                                        |            |                   |                 |                 |                  |           |                  |                  |
|------------------------------------------------------------------------|------------|-------------------|-----------------|-----------------|------------------|-----------|------------------|------------------|
| Nominal flow rate                                                      | $q_p$      | m <sup>3</sup> /h | 0.6             | 1.5             | 1.5              | 2.5       | 6                | 6                |
| Nominal diameter                                                       | DN         | mm                | 15              | 15              | 20               | 20        | 25               | 32               |
| Overall length                                                         | L          | mm                | 110             | 110             | 130              | 130       | 260              | 260              |
| Starting flow rate                                                     |            | l/h               | 1               | 2.5             | 2.5              | 4         | 10               | 10               |
| Minimum flow rate (DR 1:250)                                           | $q_i$      | l/h               | -               | 6               | 6                | 10        | 24               | 24               |
| Minimum flow rate (DR 1:100)                                           | $q_i$      | l/h               | 6               | 15              | 15               | 25        | 60               | 60               |
| Maximum flow rate                                                      | $q_s$      | m <sup>3</sup> /h | 1.2             | 3               | 3                | 5         | 12               | 12               |
| Overload flow rate                                                     |            | m <sup>3</sup> /h | 2.5             | 4.6             | 4.6              | 6.7       | 18.4             | 18.4             |
| Operating pressure                                                     | PN         | bar               | 16/25           | 16/25           | 16/25            | 16/25     | 16/25            | 16/25            |
| Pressure loss at $q_p$                                                 | $\Delta p$ | mbar              | 95              | 120             | 75               | 100       | 128              | 128              |
| Temp. range heating - brass body                                       |            | °C                | 5 ... 130       | 5 ... 130       | 5 ... 130        | 5 ... 130 | 5 ... 150        | 5 ... 150        |
| Temp. range heating - spheroidal cast iron body                        |            | °C                | -               | -               | -                | -         | -                | -                |
| kv value ( $q_p^2$ (m <sup>3</sup> /h) = $kv^2 \times \Delta p$ (bar)) |            |                   | 1.95            | 4.33            | 5.48             | 7.91      | 14.77            | 16.77            |
| Nominal flow rate                                                      | $q_p$      | m <sup>3</sup> /h | 10              | 15              | 25               | 40        | 60               | 100              |
| Nominal diameter                                                       | DN         | mm                | 40              | 50              | 65               | 80        | 100              | 100              |
| Overall length                                                         | L          | mm                | 300             | 270             | 300              | 300       | 360              | 360              |
| Starting flow rate                                                     |            | l/h               | 20              | 40              | 50               | 80        | 120              | 120              |
| Minimum flow rate (DR 1:250)                                           | $q_i$      | l/h               | 40 <sup>1</sup> | 60 <sup>1</sup> | 100 <sup>1</sup> | 160       | 240 <sup>1</sup> | 240 <sup>1</sup> |
| Minimum flow rate (DR 1:100)                                           | $q_i$      | l/h               | 100             | 150             | 250              | 400       | 600              | 1,000            |
| Maximum flow rate                                                      | $q_s$      | m <sup>3</sup> /h | 20              | 30              | 50               | 80        | 120              | 120              |
| Overload flow rate                                                     |            | m <sup>3</sup> /h | 24              | 36              | 60               | 90        | 132              | 132              |
| Operating pressure                                                     | PN         | bar               | 16/25           | 16/25           | 16/25            | 16/25     | 25               | 25               |
| Pressure loss at $q_p$                                                 | $\Delta p$ | mbar              | 140             | 134             | 120              | 140       | 130              | 210              |
| Temp. range heating - brass body                                       |            | °C                | 5 ... 150       | 5 ... 150       | 5 ... 150        | 5 ... 150 | 5 ... 150        | 5 ... 150        |
| Temp. range heating - spheroidal cast iron body                        |            | °C                | -               | 5 ... 105       | 5 ... 105        | 5 ... 105 | 5 ... 105        | 5 ... 105        |
| kv value ( $q_p^2$ (m <sup>3</sup> /h) = $kv^2 \times \Delta p$ (bar)) |            |                   | 26.73           | 40.09           | 91.29            | 141.42    | 219.09           | 218.22           |

<sup>1</sup> Only for horizontal installation

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## DIMENSIONS THREAD VERSION



|                               |                |                   |      |      |      |      |      |      |
|-------------------------------|----------------|-------------------|------|------|------|------|------|------|
| Nominal flow rate             | q <sub>p</sub> | m <sup>3</sup> /h | 0.6  | 1.5  | 1.5  | 2.5  | 6    | 6    |
| Nominal diameter              | DN             | mm                | 15   | 15   | 20   | 20   | 25   | 32   |
| Overall length                | L              | mm                | 110  | 110  | 130  | 130  | 260  | 260  |
| Overall length with coupling  | L2             | mm                | 190  | 190  | 230  | 230  | 380  | 380  |
| Length of calculator          | L1             | mm                | 150  | 150  | 150  | 150  | 150  | 150  |
| Height                        | H              | mm                | 14.5 | 14.5 | 18   | 18   | 23   | 23   |
| Height                        | H1             | mm                | 82   | 82   | 84   | 84   | 88.5 | 88.5 |
| Height of calculator          | H2             | mm                | 54   | 54   | 54   | 54   | 54   | 54   |
| Width of calculator           | B              | mm                | 100  | 100  | 100  | 100  | 100  | 100  |
| Connection thread on meter    | Inch           |                   | G¾B  | G¾B  | G1B  | G1B  | G1¼B | G1½B |
| Connection thread of coupling | Inch           |                   | R½   | R½   | R¾   | R¾   | R1   | R1¼  |
| Weight <sup>1</sup>           | kg             |                   | 0.76 | 0.76 | 0.85 | 0.85 | 1.5  | 1.5  |

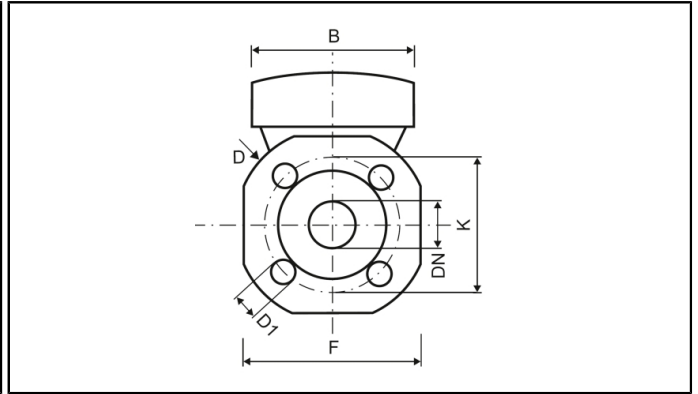
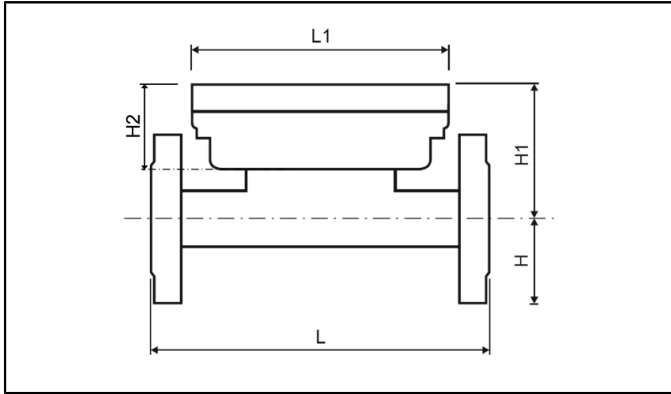
|                               |                |                   |     |     |     |     |     |     |
|-------------------------------|----------------|-------------------|-----|-----|-----|-----|-----|-----|
| Nominal flow rate             | q <sub>p</sub> | m <sup>3</sup> /h | 10  | 15  | 25  | 40  | 60  | 100 |
| Nominal diameter              | DN             | mm                | 40  | 50  | 65  | 80  | 100 | 100 |
| Overall length                | L              | mm                | 300 | 270 | 300 | 300 | 360 | 360 |
| Overall length with coupling  | L2             | mm                | 440 | -   | -   | -   | -   | -   |
| Length of calculator          | L1             | mm                | 150 | -   | -   | -   | -   | -   |
| Height                        | H              | mm                | 33  | -   | -   | -   | -   | -   |
| Height                        | H1             | mm                | 94  | -   | -   | -   | -   | -   |
| Height of calculator          | H2             | mm                | 54  | -   | -   | -   | -   | -   |
| Width of calculator           | B              | mm                | 100 | -   | -   | -   | -   | -   |
| Connection thread on meter    | Inch           |                   | G2B | -   | -   | -   | -   | -   |
| Connection thread of coupling | Inch           |                   | R1½ | -   | -   | -   | -   | -   |
| Weight <sup>1</sup>           | kg             |                   | 3.1 | -   | -   | -   | -   | -   |

<sup>1</sup> Meter with A-cell, without modules, 1.4 m cable length, 1.9 m cable length of temperature sensor Ø 5.2 mm

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## DIMENSIONS FLANGE VERSION

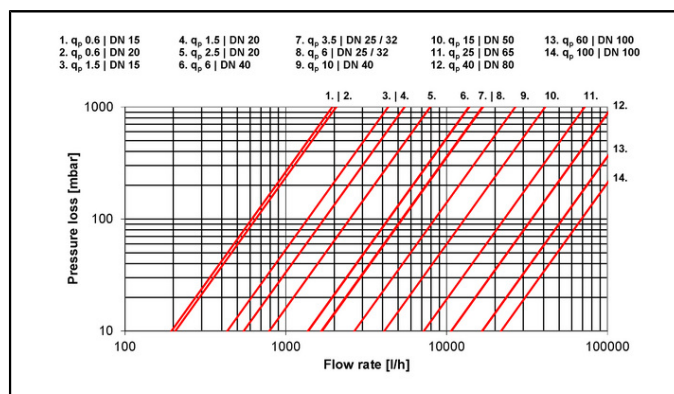


|                            |                |                   |     |      |       |      |      |      |
|----------------------------|----------------|-------------------|-----|------|-------|------|------|------|
| Nominal flow rate          | q <sub>p</sub> | m <sup>3</sup> /h | 0.6 | 1.5  | 1.5   | 2.5  | 6    | 6    |
| Nominal diameter           | DN             | mm                | 15  | 15   | 20    | 20   | 25   | 32   |
| Overall length             | L              | mm                | 110 | 110  | 130   | 130  | 260  | 260  |
| Length of calculator       | L1             | mm                | -   | -    | -     | -    | 150  | 150  |
| Height                     | H              | mm                | -   | -    | -     | -    | 50   | 62.5 |
| Height                     | H1             | mm                | -   | -    | -     | -    | 88.5 | 88.5 |
| Height of calculator       | H2             | mm                | -   | -    | -     | -    | 54   | 54   |
| Width of calculator        | B              | mm                | -   | -    | -     | -    | 100  | 100  |
| Flange dimension           | F              | mm                | -   | -    | -     | -    | 100  | 125  |
| Flange diameter            | D              | mm                | -   | -    | -     | -    | 114  | 139  |
| Hole circle diameter       | K              | mm                | -   | -    | -     | -    | 85   | 100  |
| Screw hole diameter        | D1             | mm                | -   | -    | -     | -    | 14   | 18   |
| Number of screw holes      |                | pcs               | -   | -    | -     | -    | 4    | 4    |
| Weight brass body          |                | kg                | -   | -    | -     | -    | 3.5  | 4.8  |
| Weight grey cast iron body |                | kg                | -   | -    | -     | -    | -    | -    |
| Nominal flow rate          | q <sub>p</sub> | m <sup>3</sup> /h | 10  | 15   | 25    | 40   | 60   | 100  |
| Nominal diameter           | DN             | mm                | 40  | 50   | 65    | 80   | 100  | 100  |
| Overall length             | L              | mm                | 300 | 270  | 300   | 300  | 360  | 360  |
| Length of calculator       | L1             | mm                | 150 | 150  | 150   | 150  | 150  | 150  |
| Height                     | H              | mm                | 69  | 73.5 | 85    | 92.5 | 108  | 108  |
| Height                     | H1             | mm                | 94  | 99   | 106.5 | 114  | 119  | 119  |
| Height of calculator       | H2             | mm                | 54  | 54   | 54    | 54   | 54   | 54   |
| Width of calculator        | B              | mm                | 100 | 100  | 100   | 100  | 100  | 100  |
| Flange dimension           | F              | mm                | 138 | 147  | 170   | 185  | 216  | 216  |
| Flange diameter            | D              | mm                | 148 | 163  | 184   | 200  | 235  | 235  |
| Hole circle diameter       | K              | mm                | 110 | 125  | 145   | 160  | 190  | 190  |
| Screw hole diameter        | D1             | mm                | 18  | 18   | 18    | 19   | 22   | 22   |
| Number of screw holes      |                | pcs               | 4   | 4    | 8     | 8    | 8    | 8    |
| Weight brass body          |                | kg                | 6.4 | 7.0  | 8.9   | 10.9 | 16.4 | 16.4 |
| Weight grey cast iron body |                | kg                | -   | 5.9  | 7.7   | 9.6  | 15.2 | 15.2 |

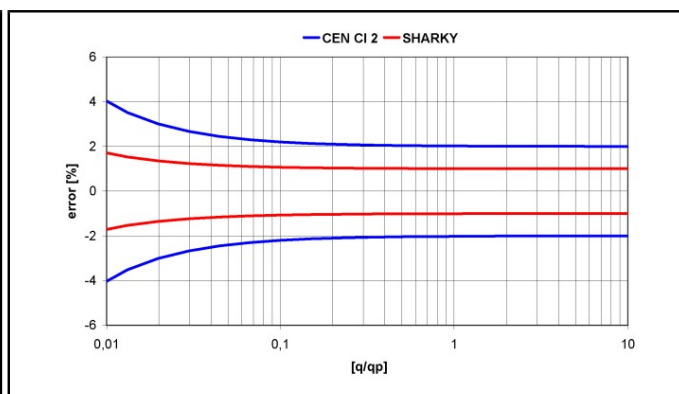
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## ULTRASONIC COMPACT ENERGY METER

### PRESSURE LOSS GRAPH / TYPICAL ERROR GRAPH



Pressure loss graph



Typical error graph