



REGAL Series RH40

Handheld Ultrasonic Flow & BTU Meter

Applications

The RH40 handheld unit is the most compact yet powerful flow / BTU meter on the market. The utilization of our proprietary technologies, such as ultrasonic signal processing, signal quality tracking, and self-adaptation as well as high-density electronic design, allows the device to measure liquid flow, temperature and thermal energy from outside of a pipe reliably and accurately.

Examples of the applications include:

- Energy consumption supervision and water conservation management
- Cooling system and air conditioning/glycol solutions
- Water, including hot water, chilled water, city water, sea water, and more
- Sewage and drainage water with small particle quantity
- Oil, including crude oil, lubricating oil, diesel oil, fuel oil, and more
- Chemicals, including alcohol, acids, and more
- Solvents
- Beverage and food processors
- Water and waste treatment
- Power plants (nuclear, thermal & hydropower) heat energy boiler feed water



- Metallurgy and mining applications (e.g., acid recovery)
- Marine operation and maintenance
- Pulp and paper
- Pipeline leak detection, inspection, tracking and collection
- Water distribution network monitoring

Features and Benefits

- Accurately measures energy and flow using non-intrusive technology.
- Capability of measuring bi-directional flow/energy
- Ease of use and fast installation
- Able to measure on a very wide pipe size range, from 3/4" up to 120"
- Ergonomic design, allowing the main unit to be held and operated with one hand
- Signal quality tracking and self-adaptation for robust performance
- Suitable for pure liquids and liquids with some particles. No dependency on conductivity
- Suitable for all commonly used pipes
- Rechargeable battery for 10 hours of operation
- Self-explanatory user interface. Step-by-step Quick Start guidance
- Built-in large data logger
- PC software for data download and real-time data acquisition
- Bluetooth and serial interfaces for PC link



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Our innovation never stops! This Handheld Ultrasonic flow and BTU meter, RH40, is a revolutionary portable meter with numerous features and powerful functions. It is the most compact and mobile flow/BTU meter on the market. The meter is completely portable and utilizes clamp-on sensors to effectively perform non-invasive flow and thermal energy measurements. This yields major advantages. For example, there are no pipeline disturbance, no pressure loss, and most importantly no process interruption.

Using the patented signal processing technology that has demonstrated its robustness and data measurement repeatability, the portable meter offers a highly accurate and reliable measurements. The meter user interface is

self-explanatory and simple to follow. The unique strap-on fixtures for both the ultrasonic transducers and the temperature sensors make the installation hassle free. No special skills or tools are required.

The RH40 handheld unit has a rechargeable battery allowing the user to measure flow and energy for more than 8 hours. A built-in data logger memory of up to 2GB gives the user the flexibility of using the meter for data-logging and data-analysis. The RH40 also offers a bluetooth interface to connect to a computer or a PDA wirelessly.

RH40 is the best choice for flow survey, meter verification, pump checking, HVAC and energy balancing, energy auditing, facility management and other demanding flow and energy monitoring applications.





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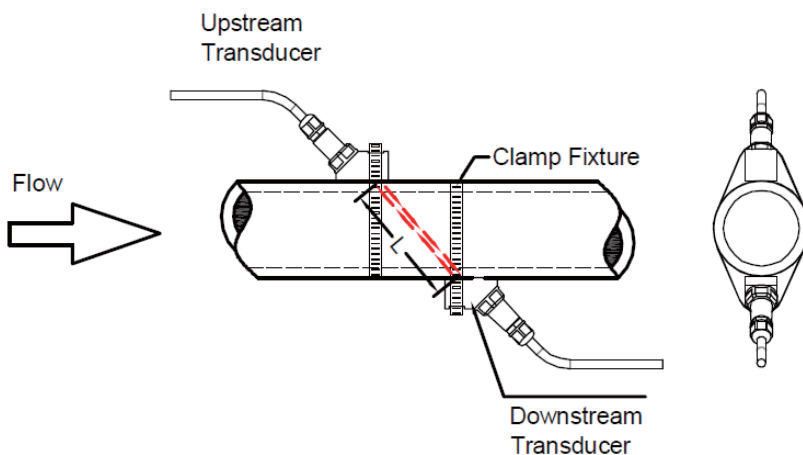
Handheld Ultrasonic Flow & BTU Meter

Measurement Principle

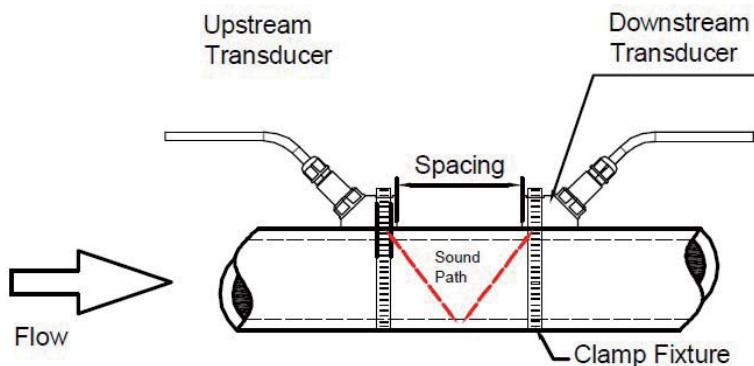
The Regal Series flow and energy meters are based on the transit-time measurement principle, where the system utilizes a pair of sensors (A and B in figure below) that function as both ultrasonic transmitter and receiver. The sensors are installed on the pipe wall, either clamped on the outside of the pipe or inserted into the pipe at a specific distance from each other. The flow meter operates by alternately transmitting and receiving a coded burst of sound energy between the two sensors and measuring the transit time it takes for sound to travel between the two sensors. The difference in the transit time is directly related to the velocity of the liquid in the pipe. The flowrate is then calculated based on the transit-time difference,

the geometry of the pipe and the fluid dynamics formula.

The sensors are commonly mounted with the Z-method or the V-method. With the Z-method, the two sensors are installed on opposite sides of a pipe. This method offers a shorter sound path, thus, better signal strength. It is often used for large size pipes where signal strength is more important. With the V-method, the two sensors are installed on the same side of a pipe. The sound path is doubled, thus, the measurement accuracy is better. This method is often used for small and medium size pipes.



(a) Z-method



(b) V-method



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Typical Transducer Installation



(a)

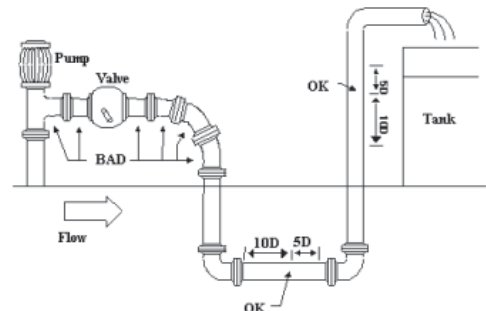
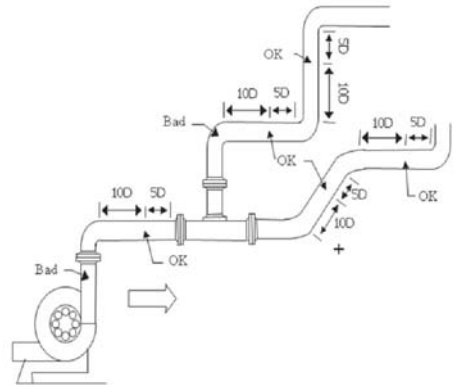


(b)

There are several types of transducers you may choose for your application. RS, RM and RL transducers have mounting rail, thus, are easy to install (figure(a)). You may need to use clamping strap to tie the mounting rail to the pipe if the magnet on the rail does not work with the pipe. All the other types of transducers do not feature mounting rails. Again, the supplied clamping strap can be used to mount the transducers (b).

The site of the transducer installation is very important. Here are some recommendations for selecting the right site:

- In order to achieve good accuracy, it is recommended to have 15D straight-pipe run: upstream 10D and downstream 5D, where D is pipe diameter
- If there is a valve upstream and the valve is not fully open, it could generate flow disturbance. A longer upstream straight pipe run is recommended
- If there is a pump upstream, we recommend to have 25D straight pipe run
- If pipe is vertical, make sure the flow is going upward, not downward. Downward flow could have air gaps if the flow is free fall
- If pipe is horizontal, make sure the pipe is FULL and ensure the transducer is installed on the side of the pipe, not on the top or bottom of the pipe





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Specifications: flow/energy transmitter (main unit)

Design	Portable	
Energy Measurement	Measure Energy rate and energy total. Optional dual RTD is required.	
Flow Velocity Range	± 32 ft/s, bi-directional.	
Flow Accuracy	For pipe $\geq 6"$: $\pm 1\%$ of reading ± 0.03 ft/s in velocity* For pipe $< 6"$: $\pm 2\%$ of reading ± 0.03 ft/s in velocity*	
Temperature Accuracy	Temp: $\pm 1.8^\circ\text{F}$ Delta Temp: $\pm 0.18^\circ\text{F}$ with matched RTD sensors	
Repeatability	0.5%	
Response Time	0.5s. Configurable between 0.5s and 99s.	
Display/Keypad	LCD with backlight. 4 x 16 letters. 5 x 4 tactile-feedback membrane keypad plus utility 4 keys. Displays instantaneous Energy rate/total, flow rate/total (positive, negative and net), velocity.	
Units	English (U.S.)	
Physical Quantity	Volumetric flow rate, total flow, velocity, temperature, BTU	
Totalizers	Positive totalizer, negative totalizer, net totalizer, manual totalizer.	
Output	4-20mA Optically isolated Open Collector Transistor output (OCT) for frequency and pulse.	
Recording	Automatically records the daily total of the last 64 days, the monthly total of the last 64 months and the yearly total of the last 5 years.	
Data Logger	> 150,000 measured values.	
Communication Interface	Bluetooth and RS232. Supports the MODBUS protocol.	
Software	PC software for data logger download and real-time data acquisition.	
Pipe Size Range	3/4" - 120" , depending on transducer.	
Pipe Material	All metals, most plastics, some lined pipes.	
Liquid Type	Virtually all liquids (full pipe).	
battery	Ion-Li up type to 10 hours	
Liquid Temperature	32°F - 176°F or 32°F - 312°F , depending on transducer type	
Enclosure	Handset: Plastic with anti-shock protection 1.2 lbs with batteries	Carrying case: Aluminum alloy protective case. Suitable for normal and harsh environment
Protection	IP54	
Dimensions	For handset: 8"x4"x1.5" For carrying case: 21"x17"x6.5"	
Weight	Weight Handset: 1.2 lbs with batteries	Carrying case: 15 lbs approximate
Power source	3 AAA Ni-H built-in batteries. When fully recharged, it will last over 10 hours of operation.	

*Note: Under reference condition and velocity should be above 1ft/s. Flowrate is calculated by multiplying velocity with the inner cross-section area of the pipe.



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How to Order:

R H 4 0

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BTU Measurement:

N) – No

Y) – Yes

Flow Transducer:

0) – No flow transducer (You must order flow transducer separately to make a complete system)

1) – For pipe size $\frac{3}{4}$ " - 3" standard temperature (THC-RS2 transducer)

2) – For pipe size 3" – 28" standard temperature (THC-RM transducer)

3) – For pipe size $\frac{3}{4}$ " – 28" standard temperature (THC-RS2 and THC-RM transducers)
(Value package)

4) – For pipe size $\frac{3}{4}$ " – 120" standard temperature (THC-RS2, THC-RM and THC-RL transducers)

5) – For pipe size $\frac{3}{4}$ " - 3" high temperature (THC-RS2HT transducer)

6) – For pipe size 3" – 28" high temperature (THC-RMHT transducer)

7) – Other, please specify

Example: RH40-Y-3.

Standard handheld ultrasonic BTU meter package for pipe sizes from $\frac{3}{4}$ " (DN20) to 28"

Features include:

- Main unit (handset)
- THC-RS2 2MHz clamp-on transducer with mounting rack (magnetic)
- THC-RM 1MHZ clamp-on transducer with mounting rail (magnetic)
- Transducer cable – 15ft (5m)
- Clamping stretcher

- RTD temperature sensors in pair – surface mount type
- Acoustic couplant
- Battery charger
- Terminal cable
- Carrying case
- PC software
- 3-point calibration certificate
- User's manual



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Optional and Replacement Parts

Model	Picture	Description
PN#: THC-RS2		Small size transducer (mounting rack with magnetic) For pipe size: $\frac{3}{4}$ " - 3" Temperature: 32°F - 176°F
PN#: THC-RM		Medium size transducer (mounting rack with magnetic) Pipe size: 3" - 28" Temperature: 32°F - 176°F
PN#: THC-RS2HT		Small size, high temperature transducer Pipe size: $\frac{3}{4}$ " - 3" Temperature: 32°F - 312°F
PN#: THC-RMHT		Medium size, high temperature transducer Pipe size: 3" - 28" Temperature: 32°F - 312°F
PN#: THC-RL		Large size transducer Pipe size: 12" - 120" Temperature: 32°F - 176°F
PN#: TH-CBL		Transducer cable Standard 15' cable for flow transducer
PN#: TH-CBLEX		Transducer cable – extension Extension cable, 15' , for handheld flow transducer
PN#: PT100CL		Clamp-on Temperature Sensor RTD pair PT100
PN#: UT850		Thickness gauge Ultrasonic thickness gauge for measuring pipe wall thickness on plastic and metal pipes, ranging from pipe size 1" – 120"
PN#: HA-BP		Battery pack For replacement only
PN#: HA-BC		Battery charger For replacement only
PN#: HA-CC		Carrying case Aluminum carrying case
PN#: TH-CPLT-G		Acoustic couplant Lithium grease acoustic couplant for transducer installatio
PN#: TH-CLP2		Clamp Clamping Stretcher for transducer mounting



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Pc Software:

StufManager™ is a Windows-based PC software aimed to facilitate the use of and to explore the full potential of the RH40 handheld flowmeter.

StufManager™ software makes it very easy to connect a RH40 device to a PC through Bluetooth or RS232 connection. The software automatically detects the virtual COM port used by the Bluetooth port and talks to the flowmeter with minimum human interaction. For those users with limited technical expertise, this software is essential as its ease of use saves both time and money.

With StufManager™ software, you can download data from the data logger inside the flowmeter directly to your computer. You can format the downloaded raw data into standard formats with a simple click of the mouse. You may then save the data to your computer hard drive and use Excel or other spreadsheet software to manipulate the data at a later point.

StufManager™ software allows you to acquire the flowmeter data in real-time and display the data on a graphical interface. You can save the real-time data to your computer easily.



Link the RH40 Btu and flowmeter to the computer using Stufmanager.

About Spire Metering Technology

Spire Metering is a global leader in flow and energy management solutions. Through continuous innovation, we transform cutting-edge technologies into affordable, reliable solutions for accurate flow and energy measurement. Spire Metering offers water, heat, electricity and gas meters as well as AMR/AMI solutions. To find out how we can help today, please tell us about your application.