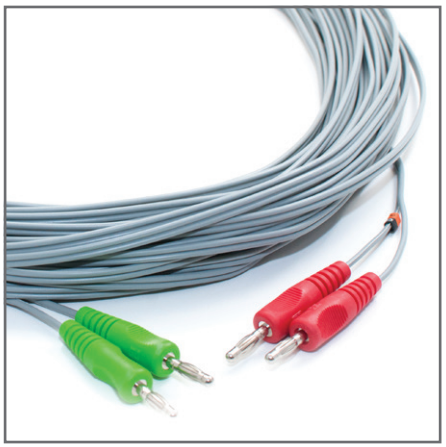
HR Wallingford
Working with water

Laboratory instrumentation and software

Wave gauge system (EtherNET)



Key features

- Extremely linear output
- No hysterisis
- Reliable, proven design
- Easily set up and calibrated
- Digital output connection
- Designed for use with HR DAQ data acquisition and analysis software

The wave gauge is a simple and reliable device for measuring rapidly changing water levels in physical models. When combined with our HR DAQ data acquisition and analysis software it provides a first rate method of measuring wave height and spectral wave energy in a flume or 3D basin.

Wave probe case

The wave probe case contains the signal conditioning circuitry for up to eight wave probes and a network connection to allow a computer to configure the probes. If more than eight probes are required to be used at the same time in the physical model then multiple cases can be linked together, so that only one computer is required for configuration.

The input connections for the wave probes are provided using 4mm sockets on one face of the case. The opposite face has connections to allow the device to be directly connected to a computer via an Ethernet cable and to an existing data acquisition system using analogue signal outputs. The unit is powered from an external 24Vdc laptop-style power supply.

The wave probe case is set up using a built-in web page which is accessed from the PC using the network connection. Whilst testing is underway the data acquired by the instrument is also transmitted over the network connection for collection by appropriate software.

Principle of operation

The wave probe operates by measuring the current that flows between two stainless steel wires that are immersed in water. This current is converted to an output voltage that is directly proportional to the immersed depth. Each wave probe case contains the energising and sensing circuits for the operation of eight wave probes and provides an output voltage (0-5V) for all eight channels on a 16-way output connector.

In order to avoid polarisation effects at the probe, a high frequency square wave is used to energise the probe. Adjacent probes are set to different frequencies to allow probes to be used close together without causing any interference.

Each wave probe channel contains circuitry designed to compensate for the resistance of the cable that connects the probe to the wave probe unit. Without this compensation, the output of the wave probe monitor would be non-linear. This circuit is factory set to work correctly with the wave probe cables supplied by HR Wallingford.

The probe output voltage is converted to a digital reading using an analogue to digital converter and the readings are batched and transmitted over the network in packets of data at a rate of 100 samples per second.

The configuration process allows the user to set the output level for a given initial probe immersion. This enables the user to scale the output, from zero (no water over probe) to maximum output for a desired full scale immersion.

Calibration

An overall calibration from wave height to output value can be performed by measuring the change in output when the probe is raised or lowered by a known distance in still water. This operation is facilitated by means of a calibrated stem, which is attached to the wave probe and has a series of accurately spaced holes drilled along its length.

Wave probes

The wave probes comprise two parallel stainless steel rods with a plastic head and foot. The head is fixed to the calibration stem and a mounting block is supplied that allows the calibration stem to be fixed to any vertical surface. The standard probe lengths are 300, 600 and 900mm. However longer probes up to 2m in length can be supplied, but the method to install and calibrate the probe over this length would need to be addressed on a case by case basis.

Wave probe cables and tripods

Each wave gauge channel will require a cable linking the wave probe to the wave probe case. The lengths of these cables are fixed at 30m and if damaged must be replaced rather than shortened.

We also have a selection of tripods available for deployment of the 300mm and 600mm wave probes in shallow water basins up to 1.0m in water depth.

Specifications

Wave probe case

Case configuration	8 channels (wave gauges)
Output signals	EtherNET digital output comms cable network to data acquisition PC
	0-5V via 16-way IDC connector
Excitation frequency	3kHz to 11kHz
Filter band width	-3dB at 20Hz
Supply voltage	220 or 110V ±10% 40-60Hz
Case dimensions	130 x 185 x 55mm
Trigger function	+5V input signal trigger

Wave probes

Active working range	300, 600, 900 mm
Probe diameter 300 mm	1.6 mm
Probe diameter 600, 900 mm	6.0 mm

Wave probe cables

Cable length supplied	30 m