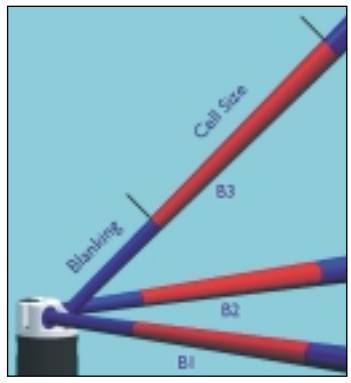
Head Configurations

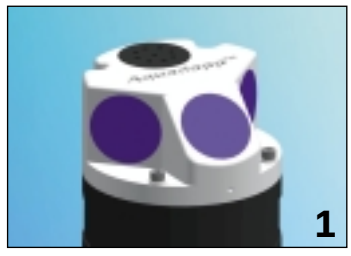
for Nortek Aquadopp ™



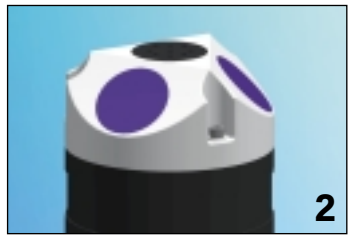
A variety of sensor heads are available for the Aquadopp. Each head is optimized for certain applications and the purpose of the variety is to ensure that you always can collect data that are undisturbed by flow interference.

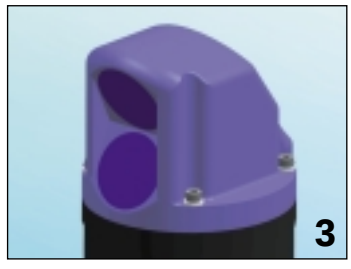
The Aquadopp measures the Doppler shift by transmitting and receiving sound along two or more narrow acoustic beams. The Doppler shift is proportional to the velocity component along the beam. The data are combined, using simple trigonometry, to generate 2D (minimum 2 beams) or 3D velocity (minimum 3 beams).

The sampling area is determined by the "blanking", "cell size", and beam geometry (see figure). The parameters "blanking" and "cell size" are user selectable in software whereas the geometry is determined by the orientation of the acoustic beams. The tilt and compass sensor in the Aquadopp works equally well if it points up or down. Any head can thus be used both in an "up-looking" and "down-looking" mode.



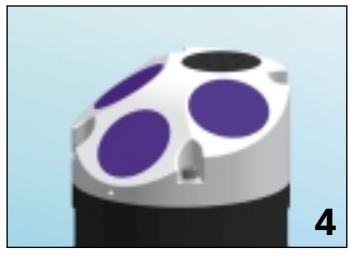
The standard Aquadopp is designed for mooring applications. All transducers are mounted on one side, assuring that the beams are pointing into the undisturbed flow if the mounting is balanced with a tail fin like the "Aquafin". If the tilt is zero (or in XYZ coordinates), only the two lower beams are used to calculate the horizontal velocity. All three beams are used to calculate the vertical velocity. The estimated uncertainty in the Aquadopp velocity data will vary with the different geometric configurations. The standard mooring head has the best short-term precision.



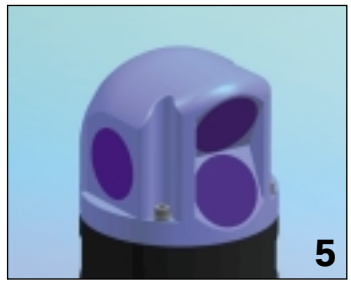


Symmetric sensor heads are used to measure above or below the Aquadopp. The geometry assures a precise definition of the vertical extent of sample area. The head is typically used for Aquadopps mounted in bottom frames.

The 2D side-looking Aquadopp head is used to measure 2D flow away from walls or boundaries. Typical applications are river or channel flow monitoring where the Aquadopp is mounted on the channel wall, protected from floating debris but where the actual measurements are made in the free flow.



The asymmetric Aquadopp head is used in situations where the sample area is best located above (or below) the instrument and over to the side. An example is buoy mounted Aquadopps, where the measurement area is best positioned both below the hull and away from the anchor chain.



The EasyQ head has four acoustic beams and combines velocity measurements with stage or distance measurements along the fourth, vertical beam. The two horizontal beams measure 2D velocity out in the free flow while the fourth vertical beam points toward the surface for high-resolution stage measurements. Stage is only available when used in combination with special "EasyQ firmware" and the complete Aquadopp in then referred to as an EasyQ.

Please specify an optional (or additional) sensor head(s) at the time of ordering. The sensors attached to the head (tilt, pressure, and temperature) are calibrated with reference to the specific electronics used in your Aquadopp.

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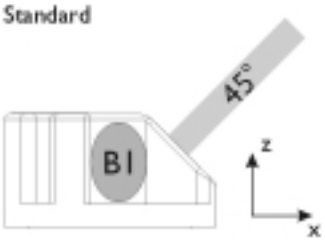
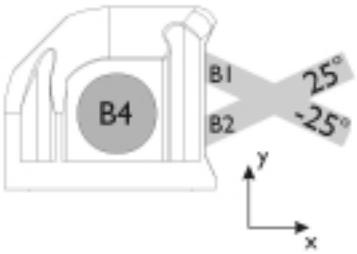
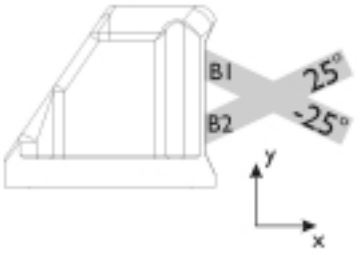
Standard



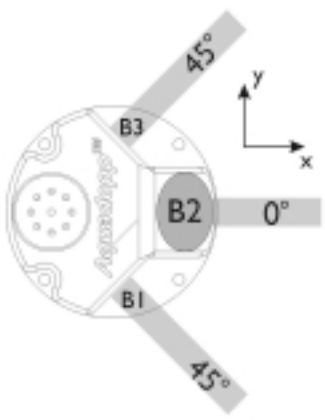
Easy-Q



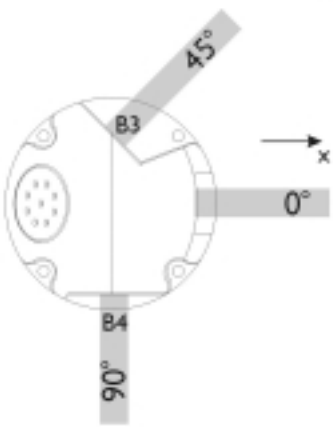
2D - H



B_1 = (0.906 -0.423)
B_2 = (0.906 0.423)



B_1 = (0.707 -0.707 0.000)
B_2 = (0.707 0.707 0.000)
B_3 = (0.707 0 0.707)

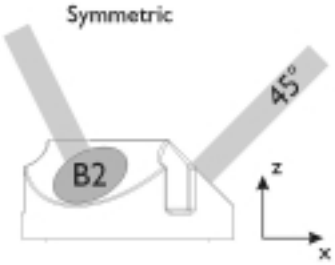


B_1 = (0.906 -0.423)
B_2 = (0.906 0.423)

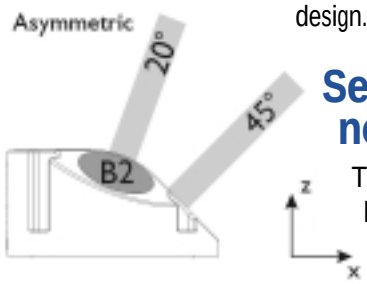
Custom sensor design

The Aquadopp sensor head is made from a tough polyurethane plastic material that is suitable for molding. This allows us to design and construct new sensor heads with a lead time of four week or less. Please contact Nortek or your local representative today if you have applications that might require a new sensor head design.

Symmetric

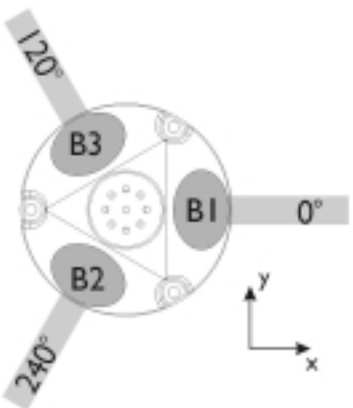


Asymmetric

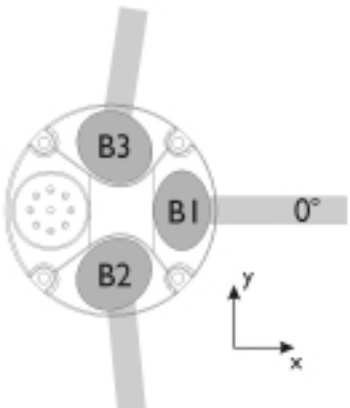


Sensor head nomenclature

The acoustic beams are defined by their unity vectors Bi in the reference coordinate system XYZ. The reference system remains constant, regardless of the orientation of the sensor. The conversion from beam velocity to XYZ velocity is given by the inverse matrix generated from the Bi vectors.



B_1 = (0.707 0.000 0.707)
B_2 = (-0.354 -0.612 0.707)
B_3 = (-0.354 0.612 0.707)



B_1 = (0.707 0.000 0.707)
B_2 = (0.342 -0.423 0.852)
B_3 = (0.342 0.423 0.852)

Other sensors

All heads have built-in tilt and temperature sensors. Pressure sensor is standard for all heads except for the 2D side-looking head.

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