#### VESSEL-MOUNTED CURRENT PROFILER

### Signature VM Ocean -100|75/55 kHz





# Delivers vessel-mounted ADCP capabilities with an optional scientific echosounder for biomass measurements.

Until now, epipelagic and mesopelagic VM ADCP surveys could not deliver the resolution, precision or range to examine the ocean boundary layer in detail. To study biomass in the upper-ocean boundary layer, you had to add a separate scientific echosounder.

Nortek's vessel-mounted Signature VM Ocean in the 100 kHz version opens up new opportunities to measure currents and to study biomass simultaneously. The 55 kHz version offers long-range current profiles with a proper precision.



### Highlights

- A coherent and modern system that is quick and convenient to operate
- Automated processing
- VM or stand-alone applications
- A novel transducer design allows focusing on measurement precision (75 kHz) and a 1000 m profiling range (55 kHz)
- Four beams for current profiling with a range over 300 m (100)
- Optional scientific echosounder with multiple modes for biomass (100)

### Applications

- ✓ Offshore operations
- Internal waves
- Upper-ocean boundary-layer studies (100)
- Detection of krill or plankton in the water column (100)
- Deep-water current profiles, ocean discharge (55)



### **Technical specifications**

$\longrightarrow$ Water Velocity Measurements - Signatur	e VM 100 kHz	
Profiling range**	300-400 m	
Doppler processing	Broadband & Narrowband	
Cell size	3-15 m	
Max no. cells	200	
Min. blanking	2	
Minimum accuracy	1.0% of the measured value $\pm$ 0.5 cm/s	
Velocity resolution	0.1 cm/s	
Maximum sampling rate	1 Hz (1/3 Hz with BT and echosounder)	
Velocity range (along beam)	5 m/s	
No. of beams	4 slanted at 20°	
**) Depending on acoustic scattering condition	n.	
→ Water Velocity Measurements - Signatur	e VM 75/55 kHz	
Profiling range**	685/1000 m	
Doppler processing	Broadband/Broadband & Narrowband	
Cell size	6-20 m	
Max no. cells	200	
Min. blanking	2	
Minimum accuracy	1.0% of the measured value $\pm$ 0.5 cm/s	
Velocity resolution	0.1 cm/s	
Maximum sampling rate	1 Hz (1/3 Hz at max power)	
Velocity range (along beam)	5 m/s	
No. of beams	3 slanted at 20°	
**) Depending on acoustic scattering condition.		
→ Bottom velocity measurements - Signature VM 100 kHz		
Single ping std @ 3 m/s	ТВА	
Long-term accuracy	ТВА	
Minimum altitude	5 m	
Maximum altitude	560 m	
Velocity resolution	0.01 mm/s	
Maximum sampling rate	1 Hz (1/3 Hz with VP and echosounder)	
→ Bottom velocity measurements - Signature VM 75/55 kHz		
Single ping std @ 3 m/s	ТВА	
Long-term accuracy	ТВА	



Minimum altitude50 mMaximum altitude1200 mVelocity resolution0.01 mm/sMaximum sampling rate1 Hz		ire VM 75/55 kHz	
Velocity resolution0.01 mm/sMaximum sampling rate1 Hz <b>A</b> Echo intensity (slanted beams) - Signature VM 100 HzSamplingSame as velocity for slanted beamsResolution/dynamic range0.5 dB/70 dBDynamic range70 dB slanted beamsTransducer acoustic frequency100 kHzNo. of beams4 slanted at 20°Beam width6.1°SamplingSame as velocitySamplingSame as velocityResolution/dynamic range0.5 dB/70 dBDynamic range70 dB slanted beamsY Echo intensity (slanted beams) - Signature VM 75/55 kHzSamplingSame as velocityResolution/dynamic range70 dB slanted beamsTransducer acoustic frequency75 and 55 kHzNo. of beams3 slanted at 20°Beam width4.5°-5.° <b>A - Echosounder Option - Signature VM UVETU</b> No. of beams1 verticalTransducer acoustic frequency70-120 kHzSampling1 Hz (1/3 Hz with VP and BT)Transducer acoustic frequency0.375 - 4 mResolution/ dynamic range0.01 dB/130 dBTransmit pulseMonochromatic 70 kHz, 90 kHz and 120 kHz or frequency chirp (90 kHz, 50% BW)Transmit pulseViale compression or binnel frequency response <b>D - Echosounder option - Signature VM USE</b> No. of beamsN/ATransmit pulseMonochromatic 70 kHz, 90 kHz and 120 kHz or frequency chirp (90 kHz, 50% BW)Transmit pulseViale compression or binnel frequency response <b>D - Echosounder </b>	Minimum altitude	50 m	
Maximum sampling rate   1 Hz     → Echo intensity (slanted beams) - Signatur   VM 100 kHz     Sampling   Same as velocity for slanted beams     Resolution/dynamic range   0.5 dB/70 dB     Dynamic range   70 dB slanted beams     Transducer acoustic frequency   100 kHz     No. of beams   4 slanted at 20°     Beam width   6.1°     → Echo intensity (slanted beams) - Signatur   VM 75/55 kHz     Sampling   Same as velocity     Resolution/dynamic range   0.5 dB/70 dB     Dynamic range   75 da 65 kHz     No. of beams   3 slanted at 20°     Beam width   4.5° - 5.5°     → Echosounder option - Signature VM 100 kHz   No. of beams     No. of beams   1 vertical     Transducer acoustic frequency   75 and 65 kHz     No. of beams   1 vertical     Transducer acoustic frequency   70 -120 kHz     Sampling   1 Vertical     Transducer beam width   15° @ 07 kHz, 8.7° @ 120 kHz     Resolution/ dynamic range   0.01 dB/130 dB     Transducer beam width   15° C120 W adjustable     Chirp signal processing   Pulse compression	Maximum altitude	1200 m	
→ Echo intensity (slanted beams) - Signature VM 100 kHz     Sampling   Same as velocity for slanted beams     Resolution/dynamic range   0.5 dB/70 dB     Dynamic range   70 dB slanted beams     Transducer acoustic frequency   100 kHz     No. of beams   4 slanted at 20°     Beam width   6.1°     → Echo intensity (slanted beams) - Signature VM 75/55 kHz     Sampling   Same as velocity     Resolution/dynamic range   0.5 dB/70 dB     Dynamic range   70 dB slanted beams     Transducer acoustic frequency   75 and 55 kHz     Sampling   Same as velocity     Resolution/dynamic range   0.5 dB/70 dB     Dynamic range   70 dB slanted beams     Transducer acoustic frequency   75 and 55 kHz     No. of beams   3 slanted at 20°     Beam width   4.5° - 5.5°     — Echosounder option - Signature VM 100 kHz     No. of beams   1 vertical     Transducer acoustic frequency   70-120 kHz     Sampling   1 Hz (1/3 Hz with VP and BT)     Transducer acoustic frequency   0.01 dB/130 dB     Transmit pulse   Monochoromatic 70 kHz, 90 kHz and 120 kHz or frequency chir	Velocity resolution	0.01 mm/s	
SamplingSame as velocity for slanted beamsResolution/dynamic range0.5 dB/70 dBDynamic range70 dB slanted beamsTransducer acoustic frequency100 kHzNo. of beams4 slanted at 20°Beam width6.1°Calco intensity (slanted beams) - Signature VM 75/55 kHzSamplingSame as velocityResolution/dynamic range0.5 dB/70 dBDynamic range70 dB slanted beamsTransducer acoustic frequency75 and 55 kHzNo. of beams3 slanted at 20°Beam width4.5° - 5.°Vectosurder option - Signature VM 100 kHzNo. of beams1 verticalTransducer acoustic frequency70-120 kHzSampling1 Hz (1/3 Hz with VP and BT)Transducer acoustic frequency70-120 kHzSampling1 Hz (1/3 Hz with VP and BT)Transducer beam width15° @ 70 kHz, 8.7° @ 120 kHzResolution/ dynamic range0.01 dB/130 dBTransmit pulse0.01 dB/130 dBTransmit pulsePulse compression or binned frequency responseChirp signal processingPulse compression or binned frequency responsePethosounder option - Signature VM 755 kHzNo. of beamsN/ATransducer acoustic frequencyN/ATransducer beam widthN/ATransducer beam widthN/ATransducer beam widthN/ATransducer beam widthN/ATransducer beam widthN/ATransducer beam widthN/ATransducer beam widthN/A <td>Maximum sampling rate</td> <td>1 Hz</td>	Maximum sampling rate	1 Hz	
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No. of beams1 verticalTransducer acoustic frequency70-120 kHzSampling1 Hz (1/3 Hz with VP and BT)Transducer beam width15° @ 70 kHz, 8.7° @ 120 kHzResolution0.375 - 4 mResolution/ dynamic range0.01 dB/130 dBTransmit pulseMonochromatic 70 kHz, 90 kHz and 120 kHz or frequency chirp (90 kHz, 50% BW)Transmit power7.5-120 W adjustableChirp signal processingPulse compression or binned frequency responseNo. of beamsN/ATransducer acoustic frequencyN/ASamplingN/ATransducer beam widthN/AResolutionN/A	Beam width	4.5°-5.5°	
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Sampling1 Hz (1/3 Hz with VP and BT)Transducer beam width15° @ 70 kHz, 8.7° @ 120 kHzResolution0.375 -4 mResolution/ dynamic range0.01 dB/130 dBTransmit pulseMonochromatic 70 kHz, 90 kHz and 120 kHz or frequency chirp (90 kHz, 50% BW)Transmit power7.5-120 W adjustableChirp signal processingPulse compression or binned frequency responseSechosounder option - Signature VM 75/5 VNo. of beamsN/ATransducer acoustic frequencyN/ASamplingN/AKesolutionN/ATransducer beam widthN/AN/AN/ATransducer beam widthN/A	No. of beams	1 vertical	
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Resolution0.375 - 4 mResolution/ dynamic range0.01 dB/130 dBTransmit pulseMonochromatic 70 kHz, 90 kHz and 120 kHz or frequency chirp (90 kHz, 50% BW)Transmit power7.5-120 W adjustableChirp signal processingPulse compression or binned frequency response-> Echosounder option - Signature VM 75/2 kHzN/ATransducer acoustic frequencyN/ASamplingN/ATransducer beam widthN/AN/AN/A	Sampling	1 Hz (1/3 Hz with VP and BT)	
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Echosounder option - Signature VM 75/55 kHzNo. of beamsN/ATransducer acoustic frequencyN/ASamplingN/ATransducer beam widthN/AResolutionN/A	Transmit power	7.5-120 W adjustable	
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Transducer acoustic frequencyN/ASamplingN/ATransducer beam widthN/AResolutionN/A	→ Echosounder option - Signature VM 75/55 kHz		
SamplingN/ATransducer beam widthN/AResolutionN/A	No. of beams	N/A	
Transducer beam width N/A   Resolution N/A	Transducer acoustic frequency	N/A	
Resolution N/A	Sampling	N/A	
	Transducer beam width	N/A	
Resolution/ dynamic range N/A	Resolution	N/A	
	Resolution/ dynamic range	N/A	



→ Echosounder option - Signature VM 75/5	55 kHz
Transmit pulse	N/A
Transmit power	N/A
Chirp signal processing	N/A
→ Other - Signature VM 100 kHz	
Temperature sensor range / accuracy	-4 °C to 40 °C / 0.1 °C
Pressure	Piezo resistive
Standard range	0-1500 m (inquire for options)
Accuracy/precision	0.1% FS / Better than 0.002% of full scale
Compass and tilt	Solid-state magnetometer and accelerometer
Data recording	16 GB (inquire for options)
Data cable	30 m Ethernet cable (inquire for options)
IO	Ethernet
DC input	15-48 V DC
$\longrightarrow$ Other - Signature VM 75/55 kHz	
Temperature sensor range / accuracy	-4 °C to 40 °C / 0.1 °C
Pressure	Piezo resistive
Standard range	0-1500 m (inquire for options)
Accuracy/precision	0.1% FS / Better than 0.002% of full scale
Compass and tilt	Solid-state magnetometer and accelerometer
Data recording	16 GB (inquire for options)
Data cable	30 m Ethernet cable (inquire for options)
IO	Ethernet
DC input	48 V DC
$\longrightarrow$ Dimensions - Signature VM 100 kHz	
Maximum diameter	460 mm
Maximum length without room for internal batteries	350 mm
$\longrightarrow$ Dimensions - Signature VM 75/55 kHz	
Maximum diameter	650 mm
Maximum length without room for internal batteries	314 mm
> Environmental	
Operating temperature	-4 °C to 40 °C
Storage temperature	-20 °C to 60 °C
Vibration	IEC 60068-1/IEC60068-2-64
EMC approval	IEC 61000

#### VESSEL-MOUNTED CURRENT PROFILER



> Environmental		
Depth rating	1500 m – Bottom track is limited to surface vessels	
Connectors	Straight fitted MCBH6F (Ethernet)	
Housing	Small instrument housing	
Material	POM with titanium fasteners	
$\longrightarrow$ Processing unit		
Processor/memory	Intel i5/8 GB	
Hard disk	SSD, 500 GB	
Operating system	Windows® 10	
Housing	Half 19" 2 HE case or 19" rack-mountable 1 HE	
Dimensions	265x110x340 mm or 480x45x325 mm	
Input	24 V DC, 20 W typical	
Total weight	5.75 or 3.80 kg	
Connections	Power, Signature ADCP, AN_GNSS, 2x HDMI, 2xLAN, 3x USB, 1x RS-232 (optional)	
→ Nortek Signature VM acquisition software		
Acquisition	Signature VM - binary, GNSS compass - binary	
Timing	< 0.6 s, IEEE1588/PTP for absolute time stamping (GNSS/Signature VM)	
Configuration	Signature VM (partly) GNSS Advanced navigation	
Display	Vessel track in map, Bottom-track velocity, Bottom-track depth, Velocity magnitude and direction, Echo amplitude (slanted beams), Echo correlation (slanted beams), corrected relative volume backscatter (100)	
Status	Signature VM + AN_GNSS compass	
Output	NMEA data strings online CSV, ASCII VMT, MATLAB VMT, MATLAB, KML	
$\longrightarrow$ GNSS compass option		
Brand and model	Advanced Navigation GNSS compass	
Position accuracy (with dGNSS)/post- processed	Horizontal : 0.6 m/0.01 m, vertical: 1.0 m/0.02 m	
Heading accuracy / post-processed	0.2 °/ 0.09°	
Supported navigation systems	GPS L1, GLONASS G1, GALILEO E1, BeiDou B1	
Optional high-accuracy RTK variant	GPS L1_L2, GLONASS G1_G2, GALILEO E1_E5b, BeiDou B1_B2	
Motion	9-axis IMU	
Communication	Ethernet 10/100	
Timing	PTP, NTP timeserver functionality	
Protocol	NMEA 0183, AN Packet protocol, TSS1, Simrad	



$\longrightarrow$ AHRS option	
Accelerometer dynamic	± 2 g
Gyro dynamic range	± 250°/sec
Magnetometer dynamic range	± 1.3 Gauss
Pitch and roll range/resolution	± 90° (pitch), ± 180° (roll)/0.01°
Pitch and roll accuracy	± 2° (dynamic)3), ± 0.5° (static, ± 30°)
Heading range / resolution	360°, all axes/0.01°
Heading accuracy	$\pm$ 3° (dynamic)3), $\pm$ 2° (static, tilt < 20°)
Sampling rate	Same as measurement rate