

# VM Coastal - 1000|500|250 kHz



## **The Signature VM package delivers vessel-mounted ADCP capabilities based on present-day technology**

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The VM Coastal safeguards data quality, opens up new and unprecedented opportunities to the scientific community, and offers operational convenience and reduced complexity.

The VM Coastal package includes the Signature1000, 500 or 250, allowing for great versatility in both the vessel-mounted and bottom-mounted configurations. By using a state-of-the-art and user-friendly vessel-mounted package, measurement errors and initial installation time can be greatly reduced.

### Highlights

- ✓ A coherent system that is quick and convenient to operate
- ✓ Fifth echosounder beam for sediment measurements down to the bottom (1000/500)
- ✓ Ethernet ADCP and GNSS hardware, offering tight network timing
- ✓ Simultaneous current and depth information in one place (1000/500)
- ✓ Outstanding bottom-track performance, even under challenging conditions
- ✓ Straightforward data-acquisition and processing software

### Applications

- ✓ Coastal surveys, up to 200 m depth
- ✓ Port and harbor mapping
- ✓ Sediment transport studies
- ✓ Large-scale mixing studies

## Technical specifications

### → Water velocity measurements for Signature VM 1000 KHZ

|                       |   |
|-----------------------|---|
| Profiling range*      | 30 m                                      |
| Cell size             | 0.2-2 m                                   |
| Max no. cells         | 256                                       |
| Min. blanking         | 0.1 m                                     |
| Minimum accuracy      | 0.3% of the measured value $\pm$ 0.3 cm/s |
| Velocity resolution   | 0.1 cm/s                                  |
| Maximum sampling rate | 14 Hz                                     |
| No. of beams          | 4 slanted at 25 degrees                   |

\* Maximum range depends on acoustic scattering conditions and transmit power.

### → Water velocity measurements for Signature VM 500 KHZ

|                       |   |
|-----------------------|---|
| Profiling range*      | 70 m                                      |
| Cell size             | 0.5-4 m                                   |
| Max no. cells         | 256                                       |
| Min. blanking         | 0.5 m                                     |
| Minimum accuracy      | 0.3% of the measured value $\pm$ 0.3 cm/s |
| Velocity resolution   | 0.1 cm/s                                  |
| Maximum sampling rate | 6 Hz                                      |
| No. of beams          | 4 slanted at 25 degrees                   |

\* Maximum range depends on acoustic scattering conditions and transmit power.

### → Water velocity measurements for Signature VM 250 KHZ

|                       |   |
|-----------------------|---|
| Profiling range*      | 200 m                                   |
| Cell size             | 1-8 m                                   |
| Max no. cells         | 256                                     |
| Min. blanking         | 0.5 m                                   |
| Minimum accuracy      | 1% of the measured value $\pm$ 0.5 cm/s |
| Velocity resolution   | 0.1 cm/s                                |
| Maximum sampling rate | 2 Hz                                    |
| No. of beams          | 4 slanted at 20 degrees                 |

\* Maximum range depends on acoustic scattering conditions and transmit power.

### → Bottom velocity measurements for Signature VM 1000 KHZ

|                         |                             |
|-------------------------|-----------------------------|
| Single ping std @ 3 m/s | 0.5 cm/s                    |
| Long-term accuracy      | $\pm$ 0.1% / $\pm$ 0.1 cm/s |
| Minimum altitude        | 0.2 m                       |
| Maximum altitude        | 30 m                        |
| Velocity resolution     | 0.01 mm/s                   |
| Maximum sampling rate   | 4 Hz                        |

### → Bottom velocity measurements for Signature VM 500 KHZ

|                         |                              |
|-------------------------|------------------------------|
| Single ping std @ 3 m/s | 0.5 cm/s                     |
| Long-term accuracy      | $\pm 0.1\%$ / $\pm 0.1$ cm/s |
| Minimum altitude        | 0.3 m                        |
| Maximum altitude        | 70 m                         |
| Velocity resolution     | 0.01 mm/s                    |
| Maximum sampling rate   | 2 Hz                         |

### → Bottom velocity measurements for Signature VM 250 KHZ

|                         |           |
|-------------------------|-----------|
| Single ping std @ 3 m/s | TBA       |
| Long-term accuracy      | TBA       |
| Minimum altitude        | 5 m       |
| Maximum altitude        | 205 m     |
| Velocity resolution     | 0.01 mm/s |
| Maximum sampling rate   | 1 Hz      |

### → Depth measurements for Signature VM 1000 kHz

|                                |                                      |
|--------------------------------|--------------------------------------|
| No. of beams                   | 1 vertical                           |
| Maximum sampling rate          | 2 Hz                                 |
| Max. range                     | 30 m                                 |
| Vertical resolution / accuracy | 0.001 m / 1% of the measured value** |

\*\* Assuming a constant speed of sound

### → Depth measurements for Signature VM 500 kHz

|                                |                                      |
|--------------------------------|--------------------------------------|
| No. of beams                   | 1 vertical                           |
| Maximum sampling rate          | 2 Hz                                 |
| Max. range                     | 70 m                                 |
| Vertical resolution / accuracy | 0.001 m / 1% of the measured value** |

\*\* Assuming a constant speed of sound

### → Depth measurements for Signature VM 250 kHz

|                                |      |
|--------------------------------|------|
| No. of beams                   | N/A* |
| Maximum sampling rate          | N/A  |
| Max. range                     | N/A  |
| Vertical resolution / accuracy | N/A  |

\* Depth measurement via the 4 slanted beams.

### → Echo intensity Signature VM 1000 and 500 kHz

|               |                                    |
|---------------|------------------------------------|
| Sampling      | Same as velocity for slanted beams |
| Resolution    | 0.5 dB                             |
| Dynamic range | 70 dB slanted beams                |
| No. of beams  | 4 slanted at 25 degrees            |
| Beam width    | 2.9°                               |

### → Echo intensity Signature VM 250 kHz

|               |                                    |
|---------------|------------------------------------|
| Sampling      | Same as velocity for slanted beams |
| Resolution    | 0.5 dB                             |
| Dynamic range | 70 dB slanted beams                |
| No. of beams  | 4 slanted at 20 degrees            |
| Beam width    | 2.3°                               |

#### → Echosounder option for Signature VM 1000 kHz

|                            |  |
|----------------------------|--|
| No. of beams               | 1 vertical                                 |
| Maximum sampling rate      | 2 Hz                                       |
| Max. range                 | 30 m                                       |
| Resolution                 | 3 mm - 0.25 m                              |
| Number of bins             | 10,000                                     |
| Transmit pulse length      | 16 $\mu$ s - 0.5 ms                        |
| Transmit pulse             | Monochromatic or pulse compressed (25% BW) |
| Resolution / dynamic range | 0.01 dB / 70 dB                            |

#### → Echosounder option for Signature VM 500 kHz

|                            |  |
|----------------------------|--|
| No. of beams               | 1 vertical                                 |
| Maximum sampling rate      | 1 Hz                                       |
| Max. range                 | 70 m                                       |
| Resolution                 | 6 mm - 0.5 m                               |
| Number of bins             | 11,000                                     |
| Transmit pulse length      | 32 $\mu$ s - 1 ms                          |
| Transmit pulse             | Monochromatic or pulse compressed (25% BW) |
| Resolution / dynamic range | 0.01 dB / 70 dB                            |

#### → Echosounder option for Signature VM 250 kHz

|                            |     |
|----------------------------|-----|
| No. of beams               | N/A |
| Maximum sampling rate      | N/A |
| Max. range                 | N/A |
| Resolution                 | N/A |
| Number of bins             | N/A |
| Transmit pulse length      | N/A |
| Transmit pulse             | N/A |
| Resolution / dynamic range | N/A |

#### → Other, Signature VM ADCP

|                                    |  |
|------------------------------------|--|
| Temperature sensor range /accuracy | -4 °C to 40 °C / 0.1 °C                    |
| Pressure                           | Piezoresistive                             |
| Standard range                     | 0-300 m (inquire for options)              |
| Accuracy/precision                 | 0.1% FS / better than 0.002% of full scale |
| Compass and tilt                   | Solid-state magnetometer                   |
| Data recording                     | 16 GB (inquire for options)                |
| Data cable                         | 10 m Ethernet cable (inquire for options)  |

### → Other, Signature VM ADCP

|          |            |
|----------|------------|
| IO       | Ethernet   |
| DC Input | 15-48 V DC |

### → Environmental, Signature VM ADCP

|                       |   |
|-----------------------|---|
| 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   |
| Depth rating          | 300 m - Bottom track is limited to surface vessels                                |
| Connectors            | Straight fitted MCBH6F (Ethernet)   |
| Housing               | Small instrument housing  |
| Material              | POM with titanium fasteners and additional, reinforced transducer cups for VM 250 |

### → Processing unit

|                  |  |
|------------------|--|
| Processor/memory | Intel i5/8 GB  |
| Hard disk        | SSD, 500 GB  |
| Operating system | Windows® 10  |
| Housing          | Half 19" 2 HE case                                     |
| Dimensions       | 265x110x340 mm   |
| Input            | 24 V DC, 20 W typical. (230 120 V AC adaptor supplied) |
| Total weight     | 5.75 kg  |
| Connections      | Power, Signature ADCP, AN_GNSS, 2x HDMI, 2xLAN, 3x USB |

### → Nortek Signature VM acquisition software

|               |   |
|---------------|---|
| Acquisition   | Signature VM - binary, GNSS compass - binary  |
| Timing        | < 0.6 s, IEEE1588/PTP for absolute timestamping (GNSS compass/Signature VM)   |
| Configuration | Signature VM (partly)Advanced Navigation GNSS compass   |
| Display       | Vessel track in map, Bottom-track velocity, Bottom-track depth, Velocity magnitude and direction, Echo amplitude, Echo correlation, Vertical depth*, Vertical echogram; corrected relative volume backscatter (1000/500)* |
| Status        | Signature VM + AN_GNSS compass  |
| Output        | Online: NMEA data formats. Offline: CSV, ASCII VMT, MATLAB, MATLAB VMT, MATLAB QRev, KML  |

\* Signature1000 and 500

### → GNSS compass

|                              |  |
|------------------------------|--|
| Brand and model              | Advanced navigation GNSS compass v2                    |
| Position accuracy (with RTK) | Horizontal: 0.01 m, Vertical: 0.015 m                  |
| Heading accuracy             | 0.2°   |
| Supported navigation systems | GPS L1_L2, GLONASS G1_G2, GALILEO E1_E5b, BeiDou B1_B2 |
| Heave accuracy               | 0.05 m   |

## → GNSS compass

|               |  |
|---------------|--|
| Communication | Ethernet 10/100                                  |
| Timing        | PTP, NTP timeserver functionality                |
| Protocol      | NMEA 0183, AN Packet Protocol, TSS1 Simrad, RTCM |

## → AHRS option

|                                   |   |
|-----------------------------------|---|
| Accelerometer dynamic range       | $\pm 2$ g   |
| Gyro dynamic range                | $\pm 250^\circ/\text{sec}$  |
| Magnetometer dynamic range        | $\pm 1.3$ Gauss   |
| Pitch and roll range / resolution | $\pm 90^\circ$ (pitch), $\pm 180^\circ$ (roll)/ $0.01^\circ$        |
| Pitch and roll accuracy           | $\pm 2^\circ$ (dynamic), $\pm 0.5^\circ$ (static, $\pm 30^\circ$ )  |
| Heading range / resolution        | $360^\circ$ , all axes / $0.01^\circ$                               |
| Heading accuracy                  | $\pm 3^\circ$ (dynamic), $\pm 2^\circ$ (static, tilt $< 20^\circ$ ) |
| Sampling rate                     | Same as measurement rate  |