

# MRU Software History

This document includes the release notes for the 5<sup>th</sup> generation MRU software and only works on MRU units with serial number above 20000 (identified by titanium coloured housing and Ethernet communication). It is important that the user goes through the different releases to check whether any changes in the software affect the users own application.

Version 5.03.01 released 2015.12.04:

## Changed functionality

- *MGC R3 COMPASS type approved as IMO gyro compass.* The software is type approved according to the gyro compass standard.
- *Heading output from MGC R3.* The heading output variable (no. 68) is always the IMO approved heading calculated by the AHRS algorithm. This heading estimate is also the heading output if the NMEA output format is used (NMEA HDT, THS, etc.). When using the MGC in the inertial navigation mode, the inertial navigation orientation solution is available as the roll, pitch and yaw output variables, or by using one of the binary output formats (EM300, BIN23, BIN26, etc.).
- *Time synchronization functionality extended.* Both the MRU and MGC can now be time synchronized through input of ZDA message, NTP server or the TSC command.
- *Heave measurement with mean value dependent of vessel tilt.* Lever arm compensated heave relative to CG with nonzero mean (LA\_PosMp1\_D and LA\_PosMp2\_D) is modified to subtract the length of the configured vertical lever arm. The mean heave offset is then only dependent on the static mean roll and pitch angle. In previous versions the heave mean offset also included the (configured) vertical lever arm length.
- *Integrated heave output.* The following two output options can now be configured: 1) with zero mean value or 2) with heave offset depending on static roll/pitch angle.
- *Stable yaw output from MRU in calm position.* When in calm position the yaw rate drift is estimated in order to keep the yaw angle stable (variables 65 Yaw and 68 Heading). This applies to MRU 3, H, E, 5 and 5+.

## Corrected errors

- *Heading status on Seapath binary 23.* The heading status of the Seapath binary 23 format when output from an MGC R3 is corrected.

Version 5.02.01 released 2015.05.04:

## Changed functionality

- *Heave output on MRU 2 and D set to zero.* In operations with much dynamics, it has been experienced that the MRU 2 and D model can output values different from zero on the heave measurements. This has now been fixed and these models will always output zero value on the heave measurements.

### **Corrected errors**

- *Status indication on TSS1 output format.* The status indication in the TSS1 output format has been corrected and is now compatible with the status indication for the 4<sup>th</sup> Generation MRU software.
- *MRU heading input.* The MRU handle correctly heading input down to 1 Hz update rate (10 Hz update rate is recommended).
- *Speed input with rate less than 3 Hz.* The MRU handles correctly also external speed input with rate less than 3 Hz.
- *Coriolis force correction with only speed input.* The MRU compensate for the Coriolis force during turn with only speed input. External heading input is not required.
- *Roll and pitch measurements been exchanged in the RDI ASCP format.* This has been corrected in the PRDID format so the measurements comes in correct sequence (pitch, roll, heading).
- *LED light indication.* The LED light has been improved to show black color instead of dark red on some MRU units.
- *High acceleration level.* The MGC now also works at high vibrations.

Version 5.02.00 released 2014.11.20:

### **Changed functionality**

- *Gyrocompass and INS functionality.* The software include north seeking and integrated navigation algorithms for use in the MGC R3 product family.
- *New integrated heave filter mode.* A new heave filter with possibility to integrate the heave solution with external height information, like from GNSS receiver, is developed and included in this software. The heave output is only available on separate output variables. Variable 90 for heave position and 91 for heave velocity are to be used.
- *Extended status indication.* The status is extended with position aiding and the LED indication has also changed. See the installation manual for details.
- *Extended number of UDP ports.* Output data can now be configured on UDP port #1 to #5. When sending commands to the MRU over Ethernet the MRU will answer on the same port as the command was sent in.
- *Extended IP configuration.* Now gateway can be configured in addition to IP address, netmask and port number.
- *New output formats.* The RDI ADCP (PRID), Seapath binary 25 (raw IMU data) and Seapath binary 26 have been made available for as output formats. For the MGC also the format NMEA HDT, GGA, VTG, THS can be selected as output format.
- *New input formats.* The NMEA ZDA, GGA can be input to the MRU and MGC.
- *MRU ready signal.* The functionality of the MRU ready signal in the MRU junction box has been changed from going high when analog signal are available on the MRU connector to go high on analog data valid.

Version 5.01.06 released 2013.10.23:

### **Corrected error**

- *Even and Odd parity on serial lines.* Due to an error the MRU always used None on parity even though the unit was configured for Even or Odd parity. This was the case for all serial lines. This is now corrected and the MRU software will always use the parity configured and written in the configuration file.

Version 5.01.05 released 2013.06.27:

#### **Changed functionality**

- *New digital interface commands and compatibility with some earlier generation commands.* New commands to change digital output parameters and get digital output parameters are implemented. These commands support the 5<sup>th</sup> generation MRU's features with more serial lines and Ethernet. In addition this new MRU software will respond correctly to the following two previous generation commands; "Select Digital Output Format" and "Get Digital Output Format". If the MRU receives one of these old commands, the MRU will respond as if it was an older generation MRU with the previous source IDs. For more detailed information, see Appendix A "Digital Interface" in the latest MRU Installation Manual.

#### **Corrected error**

- *Heave output on analog channels.* Heave output variables on the analog channels only works if the same output variables are configured on the digital output lines (serial or Ethernet). Else the analog output variables are not activated and calculated within the MRU software. This has now been corrected and it is enough to configure the output variables on the analog channels to be activated.

Version 5.01.01 released 2012.10.04:

#### **New functionality:**

- *Support all MRU models of 5<sup>th</sup> generation.* This software support the MRU models 3, 2 and D in addition to 5+, 5, E, and H.
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- *Output of heave period.* The variable 129 has changed functionality and is now equal to the output in MRU version 3.5.1 and earlier. This variable outputs now the actual heave period used by the Automatic heave filter. The new variable 159 HeavePeriod outputs the estimated heave period.

Version 5.01.00 released 2012.06.27:

#### **New functionality:**

- Supports all 5<sup>th</sup> generation MRU models.
- The Seapath binary 23 format now outputs velocity in North, East and Down direction.
- The delay of the PFreeHeave output is changed to exactly 132 seconds.

#### **Corrected errors:**

- The scaling error on analog outputs from the MRU junction box (MRU-E-JB3) is corrected.

Version 5.00.02 released 2010.05.03:

This is the first version operation on the 5<sup>th</sup> generation MRU models. This generation include new functionality as:

- Ethernet communication (three output ports and one input port)
- Output of data on two independently configurable serial lines (COM1 and 2)
- The maximum output data rate is increased from 100 to 200 Hz.
- The time delay on output data is reduced.
- Delayed heave output with increased heave accuracy on long period swell is introduced and named PFreeHeave.
- The heave filter mode Automatic has been improved.
- Sensitivity to vibration as been changed from sequences of 50 Hz to 100 Hz.