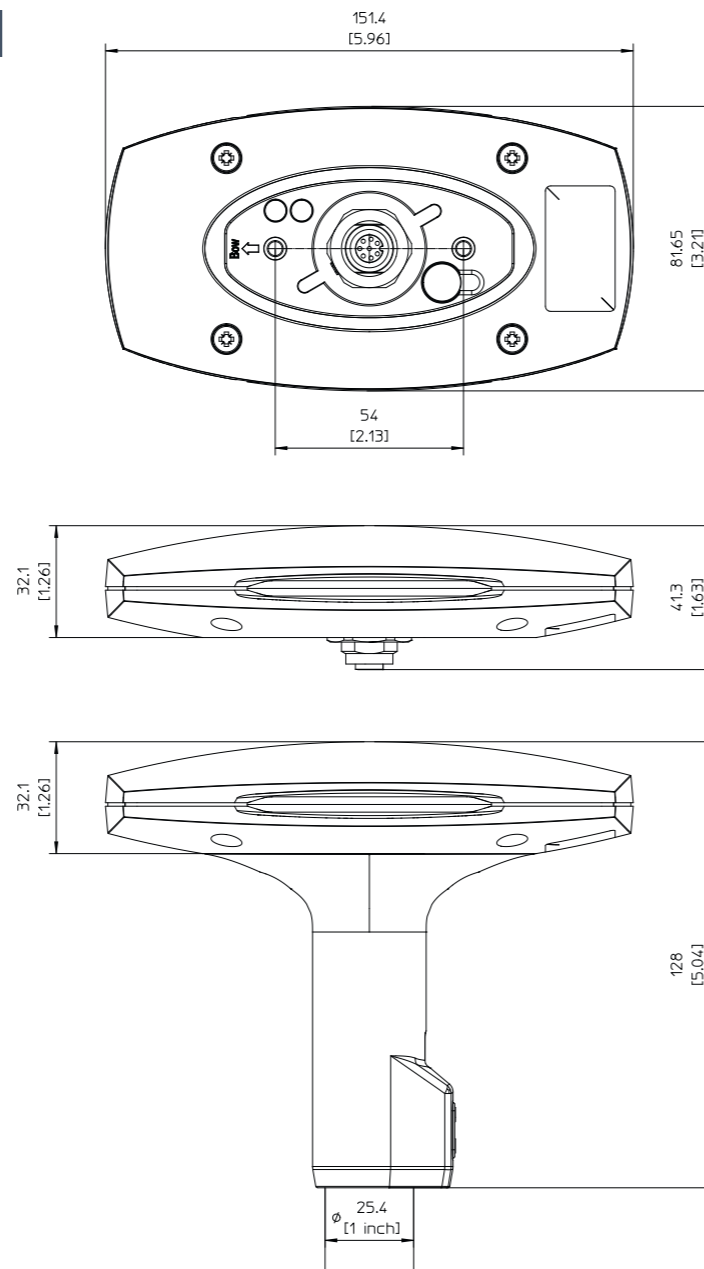


SPECIFICATIONS

LT-1000 NAVIGATION REFERENCE UNIT

Certification & standards	CE, IEC 60945, IEC 60950, EN 300 440 FCC, IC, RCM, RoHS NMEA 0183, NMEA 2000
Equipment class	Protected, according to IEC 60945
Weight, with pole mount	240 g (0.53 lbs)
Weight, with roof mount	281 g (0.62 lbs)
Dimensions, with pole mount	151.4 x 81.6 x 128.0 mm (5.96 x 3.21 x 5.04 in)
Dimensions, with roof mount	151.4 x 136.0 x 46.0 mm (5.96 x 5.35 x 1.81 in)
Temperature, operational	-40°C to +55°C (-40°F to +131°F)
Temperature, storage	-40°C to +85°C (-40°F to +185°F)
Vibration, operational	IEC 60945 (sine) & Proprietary Maritime Random profile (240 h)
Vibration, survival	Proprietary Maritime Random profile (100 h)
Vibration, shock	Proprietary Maritime profile (60 g pk, 11 ms)
Waterproof rating	IP46
Humidity	95% non-condensing @ 40°C
Wind, operational	80 knots (93 MPH)
Wind, survival	110 knots (127 MPH)
Ice, survival	25 mm (1 in)
Solar radiation	1120 W/m ²
Communication interface	8-pin female connector for NMEA 0183, NMEA 2000 and power
Input voltage	9-40 VDC
Power consumption	< 1 W
Load Equivalent Number (LEN)	2 (NMEA 2000)
Compass safe distance standard	0.3 m (1 ft)
Compass safe distance steering	0.3 m (1 ft)
Mounting, pole mount	25.4 mm (1 in)
Warranty	2 year
Maintenance	None



IN THE BOX

LT-1000 NRU (incl. pole mount)	P/N: 51-100142
10 m Cable Multi 8-pin Simple-Cut (M)	P/N: 91-100172
Screw-in Conn. NMEA 2000 Micro-C (M)	P/N: 91-100174
Quick Installation Guide	P/N: 97-100171
Safety Instruction Sheet	P/N: 97-100435
Unit Test Sheet	P/N: 46-100161

ACCESSORIES

LT-1000 NRU roof mount	P/N: 91-100214
LT-1000 NRU pole mount	P/N: 91-100223
10 m Cable Multi 8-pin Simple-Cut (M)	P/N: 91-100172
30 m Cable Multi 8-pin Simple-Cut (M)	P/N: 91-100173
Screw-in Conn. NMEA-2000 Micro-C (M)	P/N: 91-100174

LARS
Thrane communication systems

LT-1000 NRU

product sheet



LT-1000 NAVIGATION REFERENCE UNIT

designed and built for the demanding and rough environment at sea



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LT-1000 IN SHORT



- Navigation Reference Unit with 12 precision sensors
- True heading, magnetic heading, deviation, variation, roll, pitch, position, satellite information, ground speed, course over ground, time and date, air pressure, and temperature
- 72-ch. GNSS (GPS/GLONASS/BeiDou) satellite receiver with SBAS correction
- Simultaneous NMEA 0183 and NMEA 2000
- Configurable NMEA 0183 (enable/disable, talker ID, output rate)
- Easy configurable NMEA 2000 termination resistor (open or terminated)
- Easy configurable NMEA 0183 data rate (4800 or 38400 baud)
- Each unit is factory calibrated and functionally tested over temperature prior to shipment
- Worldwide maritime certification

INSTALLATION OPTIONS (MOUNTING KIT)



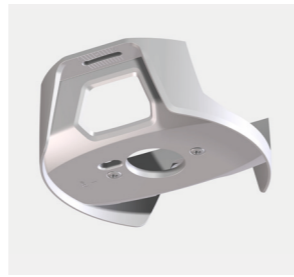
LT-1000 with pole mount



Pole mount



LT-1000 with roof mount



Roof mount

Introduction

The LT-1000 Navigation Reference Unit (NRU) is a maritime navigation product from Lars Thrane A/S. The LT-1000 NRU is designed for the leisure as well as the professional maritime markets. The LT-1000 unit meets all standards and certification requirements needed for worldwide maritime navigation equipment.

Performance

The LT-1000 NRU is a small, compact, and very advanced unit with 12 precision sensors (magnetometers, gyros, accelerometers, GNSS, barometer, and thermometer). With the use of sensor-fusion and Kalman filtering, the LT-1000 NRU outputs: true heading, magnetic heading, deviation, variation, roll, pitch, position, satellite information, ground speed, course over ground, time and date, air pressure, and temperature in real-time, with high precision and resolution. The LT-1000 NRU includes advanced technologies such as:

- Kalman filtering & sensor fusion
- Calculation of magnetic variation based on the World Magnetic Model (WMM)
- Compensation for soft and hard iron (deviation)
- Built-in magnetometer calibration algorithm
- Receive and track multiple satellite systems (GPS, SBAS, GLONASS, and BeiDou)
- Support for Satellite-Based Augmentation System (SBAS): EGNOS, WAAS and MSAS

The LT-1000 NRU makes use of the latest technology within GNSS receivers, with market leading acquisition and tracking performance.

The LT-1000 NRU is designed and built for the demanding and rough environment at sea and with an operational temperature range from -40°C and +55°C (-40°F to +131°F).

Installation & Navigation

The LT-1000 Navigation Reference Unit is easy to mount on a 1" pole (optional installation: roof mount) with a single cable supporting NMEA 0183, NMEA 2000, and power. Two deviation calibration options are available:

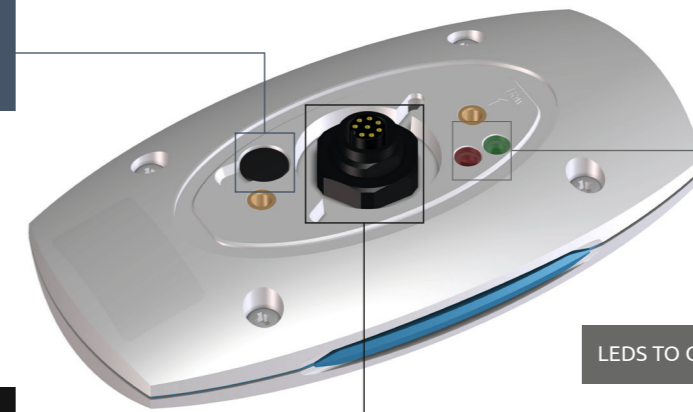
- Standard deviation calibration (figure 8-pattern). Default configuration
- Adaptive deviation calibration

The adaptive deviation calibration algorithm is an alternative to the standard deviation calibration algorithm (figure 8-pattern) and should be used by vessels that cannot perform the standard deviation calibration figure 8-pattern. The new adaptive deviation calibration algorithm will improve performance over time as the vessel navigates on different courses. The adaptive deviation calibration algorithm must be activated using the LT-Service Tool. Use the LT-Service Tool for optional configuration and offset adjustment of the LT-1000 NRU. The LT-Service Tool is a PC program, which may run on any Windows PC.

More than 40 years of experience have been put into the design and construction of the advanced LT-1000 NRU, with an exceptional performance and specification level.

INSTALLATION

MICROSWITCH CONFIGURATION:
NMEA 0183 (4800/38400 BAUD)
NMEA 2000 (OPEN/TERMINATED)



8-PIN OUTPUT CONNECTOR FOR
NMEA 0183, NMEA 2000 & POWER

LEDS TO OBSERVE STATUS OF SENSOR

PERFORMANCE

DATA	ACCURACY	RESOLUTION	RANGE/COMMENTS
Heading ¹	Static: < 0.5° (rms) Dynamic: < 1.5° (rms)	0.1°	Heading is calculated with input from Sensor-fusion technology and Kalman filtering
Position ²	GNSS: < 2.5 m SBAS: < 2 m	0.1 m	CEP, 50%, 24 hours static, -130 dBm, > 6 SVs. By default the GNSS receiver is configured for GPS/GLONASS & SBAS reception Time-To-First-Fix (cold acquisition): 27 s
Speed	0.1 knot	0.1 knot	0 to 195 knots
Roll/Pitch	Static: < 0.5°(rms)	0.1°	±90°
Rate of turn	< 1°/s	0.1°/s	0 to 45°/s
Air Pressure	1 hPa	0.1 hPa	800 to 1100 hPa
Air Temperature ³	1°C (1.8°F) 2°C (3.6°F)	0.1°C (0.1°F)	0°C to +55°C (32°F to +131°F) -40°C to 0°C (-40°F to +32°F)

1: The dynamic heading accuracy is specified with roll/pitch less than ±45° and ROT ≤ 45°/s. - 2: The LT-1000 NRU has an immunity filter against Iridium and Inmarsat transceivers. - 3: Solar radiation and environmental conditions will affect the measured air temperature (accuracy is specified as on-board sensor performance)

NMEA 0183			NMEA 2000		
SENTENCE	DESCRIPTION	RATE	PGN	DESCRIPTION	RATE
4800 BAUD			PERIODIC PGNS		
GNRMC	Recommended Minimum Specific GNSS Data	1 Hz	126992	System Time	1 Hz
HCHDG	Heading and Magnetic Heading Variation	1 Hz	126993	Heartbeat	< 0.1 Hz
HCHDM	Magnetic Heading	1 Hz	127250	Vessel Heading	10 Hz
HCHDT	True Heading	10 Hz	127251	Rate of Turn	10 Hz
HCROT	Rate of Turn	1 Hz	127257	Attitude	10 Hz
PFEC,GPatt	Attitude	1 Hz	127258	Magnetic Variation	1 Hz
WIMDA ¹	Meteorological Composite	0.5 Hz	129025	Position, Rapid Update	10 Hz
38400 BAUD			129026	COG & SOG, Rapid Update	4 Hz
GNDTM	Datum Reference	1 Hz	129029	GNSS Position Data	1 Hz
GNGGA	GPS Fix Data	1 Hz	129044	Datum	0.1 Hz
GNGLL	Position Latitude/Longitude WGS84	1 Hz	129539	GNSS DOPs	1 Hz
GNGSA	GNSS DOP and Active Satellite	1 Hz	129540	GNSS Sats in View	1 Hz
GNRMC	Recommended Minimum Specific GNSS Data	1 Hz	130311	Environmental Parameters	2 Hz
GNVTG	Course Over Ground and Ground Speed	1 Hz	130312	Temperature	0.5 Hz
GNZDA	Time and Date	1 Hz	130314	Actual Pressure	0.5 Hz
GPGSV ²	GNSS Satellites in View	1 Hz	130316	Temperature, Extended range	0.5 Hz
HCHDG	Heading and Magnetic Heading Variation	10 Hz	RESPONSE TO REQUESTED PGNS		
HCHDM	Magnetic Heading	10 Hz	126464	PGN List (Transmit and Receive)	-
HCHDT	True Heading	10 Hz	126996	Product Information	-
HCROT	Rate of Turn	10 Hz	129538	GNSS Control Status	-
HCHTS	True Heading and Status	10 Hz	OTHER PGNS		
PFEC,GPatt	Attitude	10 Hz	059392	ISO Acknowledgement	-
WIMDA ¹	Meteorological Composite	2 Hz	059904	ISO Request	-
WIXDR ³	Transducer Measurements	2 Hz	060928	ISO Address Claim	-
			126208	NMEA Request/Command/Acknowledge	-

NMEA 0183 sentences are configurable (enable/disable, talker ID, output rate). For all GNSS sentences, talker ID "GN" can be configured to "GP".

1: Pressure (inHg, Bar) and Air Temperature (°C) only - 2: Talker ID (GP, GL, GB) depends on satellite system (GPS/SBAS, GLONASS, BeiDou) - 3: Pressure (Pa) and Temperature (°C)