



## **LT-1000 NAVIGATION REFERENCE UNIT**

designed and built for the demanding and rough environment at sea





- Navigation Reference Unit with 12 precision sensors
- True heading, roll, pitch, position, ground speed, course over ground, air pressure and temperature
- 72-ch. GNSS (GPS/GLONASS/BeiDou) satellite receiver with SBAS correction
- Simultaneous NMEA 0183 and NMEA 2000
- 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, barometer, thermometer, and GNSS). With the use of sensor-fusion and Kalman filtering, the LT-1000 NRU outputs: true-heading, roll, pitch, position, ground speed, course over ground, air pressure and temperature in real-time, with high precision and resolution. The LT-1000 NRU includes advanced technologies such as:

- Kalman filtering
- Calculation of magnetic variation based on the World Magnetic Model (WMM)
- Compensation of soft and hard iron (deviation)
- Built-in magnetometer calibration algorithm
- Receive and track multiple satellite systems (GPS, GPS & GLONASS, or GPS & 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. The built-in magnetometer calibration algorithm will quickly compensate for heading deviation, and the LT-1000 NRU will output reliable navigation data. An external PC Installation and Service Software is available for optional configuration and maintenance of the LT-1000 NRU.

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)



LEDS TO OBSERVE STATUS OF SENSOR

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

# PERFORMANCE

DATA	ACCURACY	RESOLUTION	RANGE/COMMENTS
Heading <sup>1</sup>	Static: < 0.5° (rms) Dynamic: < 1.5° (rms)	0.1°	Heading is calculated with input from Sensor-fusion technology and Kalman filtering
Position <sup>2</sup>	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): 26 s
Speed	0.1 knot	0.1 knot	0 to 970 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 <sup>3</sup>	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		
SENTENCE	DESCRIPTION	RATE
<b>4800 BAUD</b>		
GNGGA	GPS Fix Date	1 Hz
GNVTG	Course Over Ground and Ground Speed	1 Hz
GNZDA	Time and Date	1 Hz
HCHDG	Heading and Magnetic Heading Variation	1 Hz
HCHDM	Magnetic Heading	1 Hz
HCHDT	True Heading	10 Hz
HCROT	Rate of Turn	1 Hz
PFEC,GPatt	Attitude	1 Hz
WIMDA <sup>1</sup>	Meteorological Composite	0.5 Hz
<b>38400 BAUD</b>		
GNDTM	Datum Reference	1 Hz
GNGGA	GPS Fix Data	1 Hz
GNGLL	Position Latitude/Longitude WGS84	1 Hz
GNGSA	GNSS DOP and Active Satellite	1 Hz
GNRMC	Mini Specific GNSS Data	1 Hz
GNVTG	Course Over Ground and Ground Speed	1 Hz
GNZDA	Time and Date	1 Hz
GPGSV <sup>2</sup>	GNSS Satellites in View	1 Hz
HCHDG	Heading and Magnetic Heading Variation	10 Hz
HCHDM	Magnetic Heading	10 Hz
HCHDT	True Heading	10 Hz
HCROT	Rate of Turn	10 Hz
HCTHS	True Heading and Status	10 Hz
PFEC,GPatt	Attitude	10 Hz
WIMDA <sup>1</sup>	Meteorological Composite	2 Hz
WIXDR <sup>3</sup>	Transducer Measurements	2 Hz

NMEA 2000		
PGN	DESCRIPTION	RATE
<b>PERIODIC PGNS</b>		
126992	System Time	1 Hz
126993	Heartbeat	< 0.1 Hz
127250	Vessel Heading	10 Hz
127251	Rate of Turn	10 Hz
127257	Attitude	10 Hz
127258	Magnetic Variation	1 Hz
129025	Position, Rapid Update	10 Hz
129026	COG & SOG, Rapid Update	4 Hz
129029	GNSS Position Data	1 Hz
129044	Datum	0.1 Hz
129539	GNSS DOPs	1 Hz
129540	GNSS Sats in View	1 Hz
130311	Environmental Parameters	2 Hz
130312	Temperature	0.5 Hz
130314	Actual Pressure	0.5 Hz
130316	Temperature, Extended range	0.5 Hz
<b>RESPONSE TO REQUESTED PGNS</b>		
126464	PGN List (Transmit and Recieve)	-
126996	Product Information	-
126998	Configuration Information	-
129538	GNSS Control Status	-
<b>OTHER PGNS</b>		
059392	ISO Acknowledgement	-
059904	ISO Request	-
060928	ISO Address Claim	-
065240	ISO Commanded Address	-
126208	NMEA Request/Command/Acknowledge	-

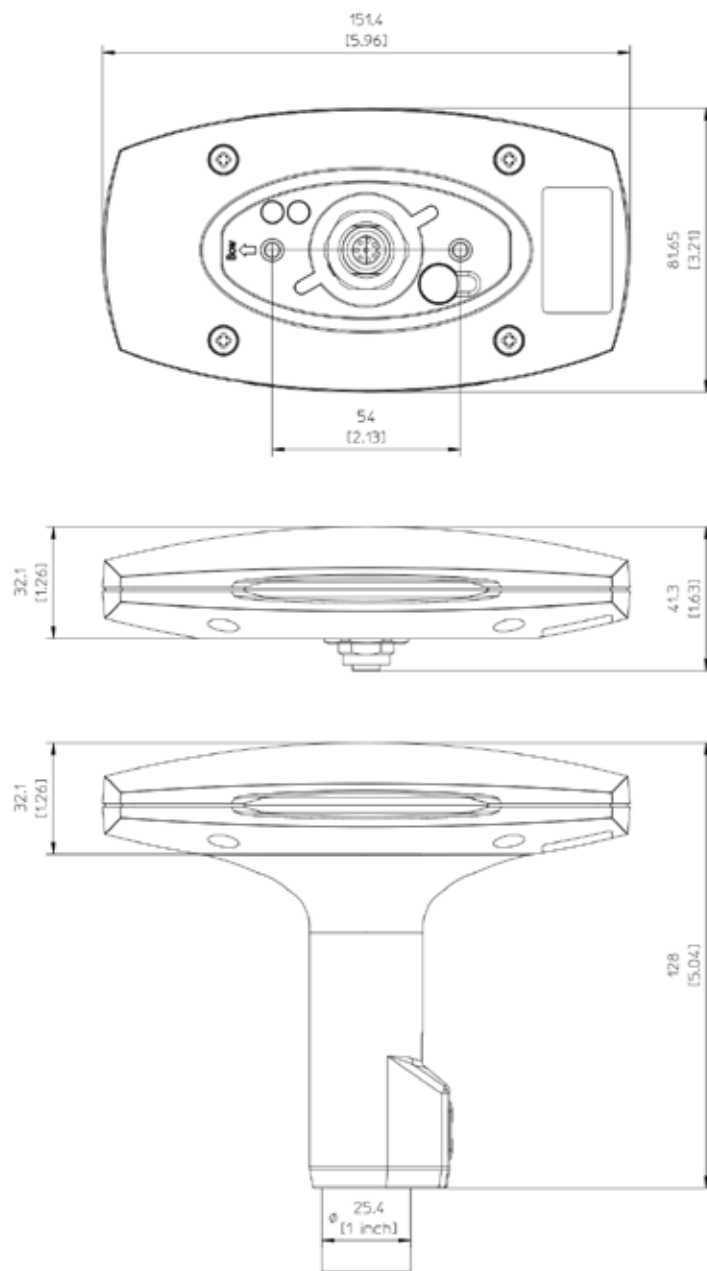
For all GNSS sentences, talker ID "GN" can be configured to be "GP"

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)

# SPECIFICATIONS

## LT-1000 NAVIGATION REFERENCE UNIT

Certification & standards	CE, IEC 60945, IEC 60950, EN 300 440 FCC, IC, 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	IPX6
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 <sup>2</sup>
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	0.3 m (1 ft)
Magnetic field safe distance to unit	1 m (3.28 ft) to prevent heading interference
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
USB Memory key (optional inst. software)	P/N: 25-100170
User & Installation Manual	P/N: 95-100178
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



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