



KONGSBERG

DARPS 232

High performance position reference system for offshore loading

DARPS is a DP position reference system tailor made for offshore loading operations. The DARPS system combines high-performance sensors for reliable and accurate absolute and relative positioning of two vessels such as a shuttle tanker and an FPSO/FSU.

High precision absolute and relative position

DARPS 232 is a GPS/GLONASS based system which uses simultaneously gathered GPS/GLONASS data from high performance sensors on remote and own vessel to compute distance to target (DT) and bearing to target (BT). Relative position will be available at short and long distances with a worldwide accuracy of 20 cm and is independent of differential correction data. For computation of absolute position, differential corrections are used. The absolute position is available with a worldwide accuracy of 20 cm in High Precision mode utilising commercial subscription services. In addition the DARPS system also makes use of free-to-air SBAS correction signals such as WAAS, EGNOS and MSAS. These correction signals can be received and used free of charge.

Combining GPS and GLONASS

Adding GLONASS to GPS improves all aspects of satellite navigation. With more observations available for position calculation, the accuracy, availability and integrity of the system is greatly enhanced when operating in challenging environments.

Trustworthy and reliable

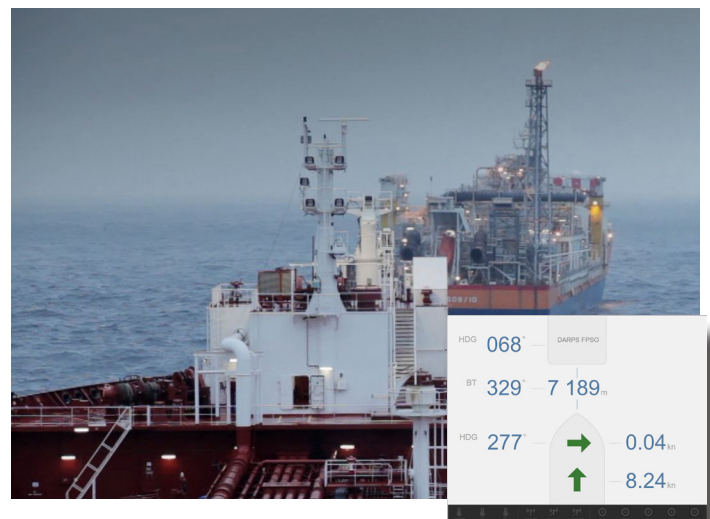
The DARPS product has been in the market for 20 years and is recognized as one of the most suitable positioning solutions for shuttle tanker offshore operations. The quality of a combined GPS/GLONASS system for DP operation has been improved through a long and incremental development cycle. DARPS is designed to ensure continuous and reliable operation. New hardware technology tailored for maritime use and advanced modular software design in a networked architecture ensure a robust and stable performance.

DP interface

Through the years, the DARPS system has been modified and improved to meet the demanding requirements for an accurate and reliable positioning sensor to the DP system. This includes features such as direct target selection by the DP, transfer of gyro information from the DP to the DARPS system and continuous updates of absolute and relative positions to the DP. All data interfaces, such as telegram formats, update rates and communication formats are duly in line with the prevailing DP specifications.

Radio communication

Data between the two DARPS systems are transferred by UHF transceivers operating in the 450 MHz band, 455 MHz band or 860 MHz band. The data are transmitted using a TDMA protocol, which enables two-way communication between the two systems. UHF frequency



configuration flexibility ensures reliable and safe operations in areas with high radio communication activity.

Lever arm compensation

Built-in lever arm compensation enables selection of several measurement points on the vessel. It is possible to establish and correct loading and offloading points both on-board the shuttle tanker and the FPSO/FSU. The selected monitoring points will be the basis for the distance calculations during relative position mode operation. Heading input is necessary to utilise the built-in lever arm compensation.

Real-time situational awareness

A new operator software has been developed in close co-operation with DP operators for the new generation DARPS system. Operators need to assess the quality of their absolute and relative position quickly and efficiently. The primary goal of the HMI is to enable the operator to instantly identify and to react safely to critical situations. Several views tailored for different vessel operation modes are available.

System diagnostics made easy

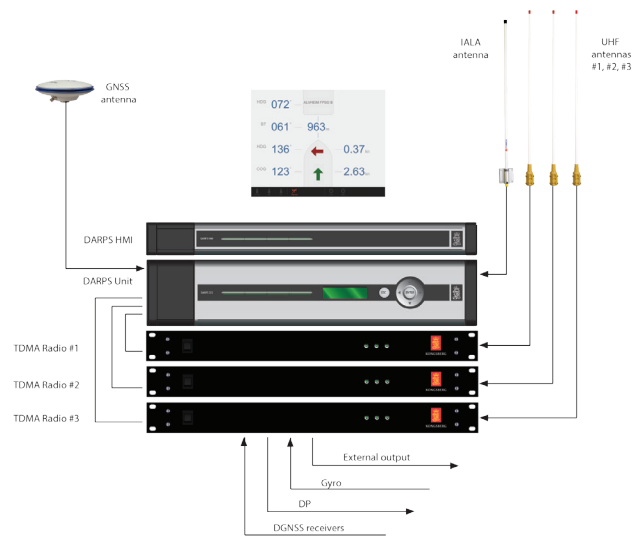
DARPS offers a set of graphical views for easy and effective on-board system diagnostics. In addition, sensor data and telegram outputs are automatically logged by the system. A data export tool provides an easy way of exporting data from the system to a USB disk media, either for documentation, post-processing or diagnostics.

System verification

Reduce the risk of costly downtime by verifying your DARPS system before arriving at the location. A new tool has been developed for a quick verification of the DARPS UHF radios prior to an offshore loading operation. The test will run through all the radios sequentially and indicate if the radio units are operating as required. A redundant DARPS system is required to run the test.

Features DARPS 232

- Combined GPS L1/L2, GLONASS L1/L2 and SBAS receiver
- Multiple differential correction support including global decimetre-level network services and free-to-air services such as SBAS and IALA
- High-precision absolute and relative position
- Real-time compensation of errors introduced by high ionospheric activity
- Ease-of-use Human Machine Interface tailored to safety critical DP operations
- Available for both shuttle tanker and FPSO/FSU
- Lever arm compensation
- DARPS 232 can be controlled through a DP system during offshore loading
- Extended interfacing capabilities
- Multiple UHF links ensure reliable and safe operations
- Automatic data recording functionality
- GNSS heading for gyro monitoring (requires two DARPS systems on the same vessel)
- Optional bridge wing speed repeaters



Technical specifications

Performance

RTK horizontal accuracy	1 cm + 1.6 ppm RMS
RTK vertical accuracy	2 cm + 3.2 ppm RMS
XP/G2 horizontal accuracy	10 cm, 95 % CEP
XP/G2 vertical accuracy	15 cm, 95 % CEP
DGPS/DGLONASS position accuracy	< 1 m, 95 % CEP, 0.4 m, 1 σ
SBAS accuracy	< 1 m, 95 % CEP, 0.6 m, 1 σ
Velocity accuracy	0.05 m/s, 95 % CEP, 0.2 m/s, 1 σ
Relative position accuracy	0.2 m, 95 % CEP *)
Output rate	1 Hz

*) Requires 4th gen. DARPS system on both shuttle tanker and FPSO/FSU.

All accuracy specifications are based on real-life tests conducted in the North Sea under various conditions. Operation in other locations under different conditions may produce different results.

Interfaces

Serial ports	8 isolated ports, 6 configurable between RS-232 and RS-422
Ethernet/LAN	4
USB	3

Data outputs

Message formats	NMEA 0183 v 3.0, Proprietary
Message types	ABBDP, ARABB, DPGGA, DTM, GBS, GGA, GLL, GNS, GRS, GSA, GST, GSV, PKNOR, PSKPS, PSKRB, RMC, VBW, VTG, ZDA

Data inputs

DGPS/DGLONASS corrections	RTCM-SC104 v 2.2, 2.3, Seastar XP, Seastar G2
RTK corrections	RTCM-SC104 v 2.3, 3.0, 3.1 and CMR
Gyro compass	NMEA 0183 HDT, HRC, HDM, EM3000, PSXN10, PSXN 23 and Robertson LR22 BCD format

Power

DARPS 232 Processing Unit	100 to 240 V AC, 50/60 Hz, max. 60 W
DARPS 232 HMI Unit	100 to 240 V AC, 50/60 Hz, max. 40 W
Radio Units	100 to 240 V AC, 50/60 Hz, max. 15 W
GNSS antenna	5 V DC from Processing Unit
IALA beacon antenna	10.2 V DC from Processing Unit

Weights and dimensions

DARPS 232 Processing Unit	5.4 kg, 89 mm x 485 mm x 357 mm
DARPS HMI Unit	3.8 kg, 44 mm x 485 mm x 330 mm
Radio Units	3.0 kg, 44.5 mm x 482 mm x 370 mm
GNSS antenna	0.5 kg, 69 mm x 185 mm
IALA beacon antenna	0.9 kg, 1100 mm
UHF 450 antenna	1.3 kg, length 1400 mm, 6 cm max. diam.
UHF 860 antenna	1.4 kg, length 1510 mm

Environmental specifications

Operating temperature range

DARPS 232 Processing Unit	-15 to +55 °C (**)
DARPS 232 HMI Unit	-15 to +55 °C (**)
Radio Units	0 °C to +55 °C
GNSS antenna	-40 to +85 °C
IALA beacon antenna	-55 to +55 °C
UHF antennas	-30 to +70 °C

**) Recommended +5 to +40 °C

Humidity

DARPS 232 Processing Unit	Max. 95 % non-condensing
DARPS 232 HMI Unit	Max. 95 % non-condensing
Radio Units	Max. 95 % non-condensing
GNSS antenna	Hermetically sealed
IALA beacon antenna	Hermetically sealed
UHF antennas	Hermetically sealed

Mechanical

Vibration	IEC 60945/EN 60945
-----------	--------------------

Electromagnetic compatibility

Compliance to EMC/D, immunity/emission	IEC 60945/EN 60945
--	--------------------

Product safety

Compliance to LVD, standard used	IEC 60950/EN 60950
----------------------------------	--------------------

Product standards

IMO regulations	MSC.112(73), MSC.113(73), MSC.114(73), MSC.115(73)
-----------------	--

Maritime navigation & radio communication equipment & systems	IEC 61162-1, IEC 60945
Global navigation satellite systems	IEC 61108-1
UKOOA compliant	

Specification subject to change without further notice.