



STRAINSTALL UK LIMITED

DockAlert

Laser Vessel Docking System

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DockAlert – LASER VESSEL DOCKING SYSTEM
Technical Description

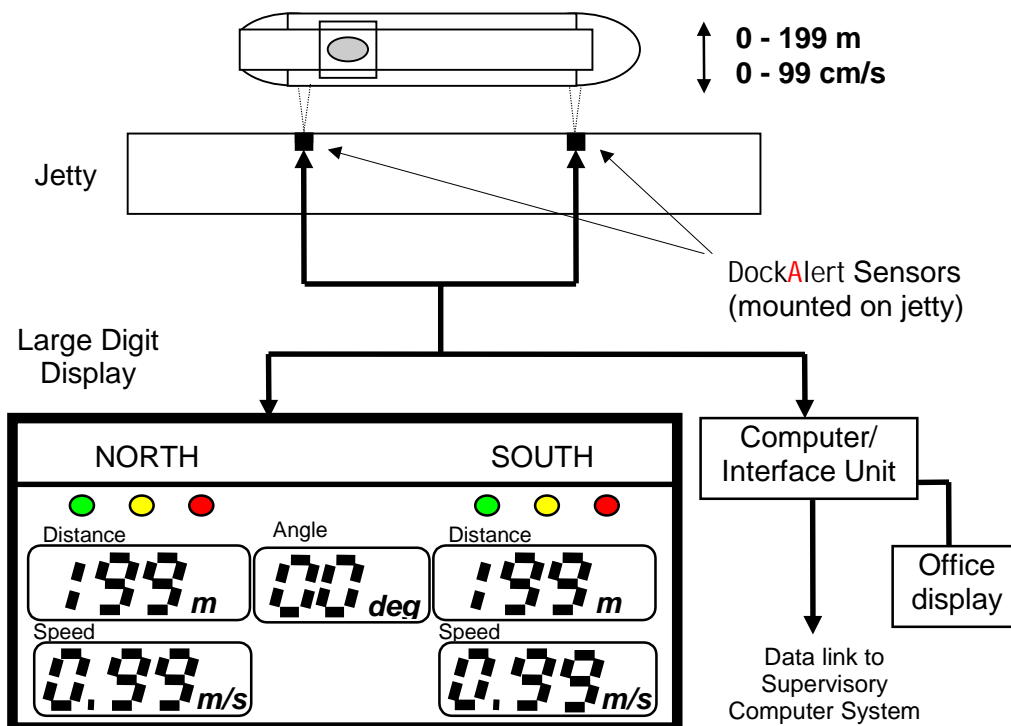
1. SYSTEM DESCRIPTION

The Strainstall DockAlert system is designed to give Harbour Authorities and Jetty Operators a clear and accurate reading of the speed and distance of a vessel as it approaches its berth, together with indication and alarm status of drift-off from the jetty once berthed.

DockAlert is a Dual Sensor system installed on the jetty, which transmits laser beams towards an incoming vessel, receiving reflections back from the Bow and Stern. The signals enable digital display of the vessel's approaching speed (Zero to ± 99 cm/s) and distance (-1 to 199m) from the berth.

A wide range of outputs is provided to maximise the system's flexibility - the DockAlert may be used in any configuration, from a simple high-visibility jetty display to a comprehensive data logging system integral with existing terminal control networks.

Optionally a small portable display (similar to a pager) can be provided. This is linked via radio to the main DockAlert system and provides a remote (e.g. on ship) display of the vessel's approach speed and distance. This unit may be supplied in an intrinsically safe version, enabling its use in a hazardous area.



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Key features of DockAlert include:

- ◆ Real-time display of approach speed and distance during berthing and drift-off when berthed.
- ◆ High accuracy, increasing during critical approach.
- ◆ Simple above-surface installation.
- ◆ Operation unaffected by weather conditions.
- ◆ Reliable low maintenance design.
- ◆ Explosion proof construction. EEx'd' II BT5, IP65.
- ◆ Small portable unit option for on ship display.

2. SYSTEM SPECIFICATION

System	Laser transmission, 1.5 n sec. width pulse
Peak Power	High peak power Sensor (100W), Pulsed 10 ⁵ times per sec
Safety	Eye safety, FDA Class 1 Laser.
Certification	Explosion proof construction to EEx'd' II BT5
Sealing	IP65
Distance Range	0 -199m
Accuracy	Better than 1cm
Minimum increment	1.0m (distances >10m) 0.1m (distances <10m)
Measuring Interval	1s to 9s
Speed Range	±99cm/s (Approach/leaving)
Resolution	1 cm/s
Angle range	±15°
Resolution	1°
Sensor size max. (mm)	W300×H450×D700 mm (one sensor each end of berth)
Operating temperature	-10 to 50°C
Data output	Analogue and digital selectable
Displays	a) VDU graphic display for Control Room b) Large Digit Display for jetty c) Optional 'carry-on' portable display

The precision of the system increases with decreasing target distance, providing the highest accuracy when it is most needed.

The system measures speed and distance simultaneously, with no delays or interpolation errors.

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Displays, outputs and peripherals can be configured to suit Customer requirements. Alarms can be 'zoned' so that a speed warning will be triggered by lower speeds at closer ranges.

Because the system is mounted above the waterline, it requires little maintenance and can be easily calibrated. The sensor unit is relatively small and can be mounted directly on a berth or fender dolphin..

DockAlert is unaffected by environmental conditions, including fog, rain and snow. It is packaged in a rugged weatherproof housing, and has no moving parts.

3. SUPPLY SCOPE

No.	Item	Q'ty	Remarks
1.	Laser Sensor	2	Explosion-proof (EEx'd' II BT5)
2.	Interface Unit	1 set	Non explosion-proof 800 x 800 x 2100mm panel
3.	Cable for Power Supply	1	3 core cable (10m length)
4.	Large Digit Display	1	Explosion-proof (Ex 'p')
5.	Accessories	1	
6.	Optional Portable Display (including base station transmitter antennae, software etc.)	1	Display may be EEx'ia' certified.

4. BRIEF DESCRIPTION OF EACH COMPONENT

4.1. LASER SENSOR

- Radiates ultra sharp laser pulse (1.5ns) with high peak power (100W), and receives reflection pulse easily from ship. Eye Safe, FDA Class 1 Laser.
- Self-supporting type and explosion proof construction. (EEx'd').
- Installed on the jetty for BOW and STERN, respectively.
- Easy maintenance as installed on dolphin platform. (above sea).

4.2. INTERFACE UNIT

- Enclosed in 800 x 800 x 2100mm panel and non-hazardous area use construction.
- Installed in the control room.
- Consist of Display Unit (VDU), Control Unit, Computer with keyboard and Power Unit.
- Process the input signals from LASER SENSOR and output the processed data.
- Measured data is saved in HD or FD. (3½")
- Optional Ethernet output for LAN connection.
- Optional serial and relay outputs for connection to site DCS etc.

4.3. LARGE DIGIT DISPLAY

- Installed on the jetty where captain can observe from ship's bridge.
- Self-supporting type, weather-proof and air pressurised hazardous protection.
- Display the distance BOW and STERN, ship approaching speed respectively.
- LED lamp digit display which can control light intensity.
- LED lamp alters the colour for three approaching speed levels.
RED in dangerous speed.
AMBER in cautionary speed.
GREEN in safety speed.

4.4. PORTABLE DISPLAY

- Small and lightweight (similar to a pager).
- Provides numerical display of approach speed and distance.
- Provides internal alarm to warn of danger levels.
- Multiple displays may be used with a single base station transmitter.
- Intrinsically Safe (EEx'ia') version available for use in hazardous areas.

4.5. CABLES

4.5.1. Purchaser Supply

- 3 pair twist cable individual screen 1.5mm², (use for Laser Sensor).
- 6 pair twist cable individual screen 1.5mm², (use for Large Digit Display).
- The recommended cable specification shall be provided at the detailed Contract planning stage.

4.5.2. Strainstall Supply

- 3 core cable, (used for power supply to Interface Unit).

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5. DETAILED SPECIFICATION

5.1. GENERAL

Measuring distance	-1 to 199m
Measuring speed	0 to ± 99 cm/s (+:Approaching, -: Leaving)
Tilt of ship to the berthing line	within $\pm 15^\circ$. Against berthing line
Increment of measurement (resolution of digit)	Distance : 1m at distance more than 10m 0.1m at distance less 9.9m
Speed:	1cm/s
Angle:	1°
Power consumption	AC 230V $\pm 10\%$ 50Hz 300VA (excluding LIGHT BOARD DISPLAY)

5.2. LASER SENSOR

5.2.1. Construction

Protection	EEx'd' II BT5 JIS : Explosion proof, IP65
Materials	Anti corrosive aluminium & SUS
Painting (Colour)	Epoxy (Manufacturer standard)
Dimension	W250 x H403 x D650mm
Weight	~ 30Kg

5.2.2. Laser Light

Wave length	~ 850nm
Peak power	100W peak
Pulse width	1.5ns
Pulse repeating	100,000 times/s
Eye safe class	FDA Class 1
Detective distance	More than 200m
Beam angle	$\pm 0.13^\circ$
Distance accuracy	Less 1cm

5.2.3. Operating Conditions

Ambient temperature	-10 to 50°C
Storage temperature	-10 to 70°C
Ambient humidity	10 to 95% RH (non condensation)

5.3. INTERFACE UNIT

An SVGA VDU (14" colour), computer, keyboard, power unit, control unit. Interface circuits are enclosed in a 800 x 800 x 2100mm panel and printer is on disk. I built diagnostics provide a maintenance function. Typical display screen layouts are provided in Appendix A.

5.3.1. Distance measurement

Measuring range	-1 to 199m
Number of digits	3 digits
Minimum increment	1m more than 10m distance (approach) 0.1m less than 9.9m distance (drift-off)
Measuring interval	1s to 9s selectable
Indicating method	SVGA Colour VDU 14"
Zero reference offset	0 to 9.99m

5.3.2. Speed measurement

Measuring range	0 to ±99cm/s
Number of digits	2 digits
Minimum increment	1cm/s
Measuring interval	1s to 9s selectable
Indicating method	SVGA Colour VDU 14"
Symbol indication	+: when approaching -: when leaving

5.3.3. Angle measurement

Measuring range	15°
Number of digits	2 digits
Minimum increment	1°
Measuring interval	1s
Indicating method	SVGA Colour VDU 14"

5.3.4. Alarms

Speed alarm range	0 to 99cm/s
Off berthing alarm range	0 to 9.99m
Angle alarm range	0 to 15°

5.3.5. Printer

An A4 colour InkJet printer is provided to provide an alarm/event log.

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5.3.6. Operating Conditions

Ambient temperature	0 to 45°C (main computer unit)
Storage temperature	-5 to 60°C
Ambient humidity	10 to 80% RH (non condensation)

5.4. LARGE DIGIT DISPLAY

5.4.1. Construction

Protection	Inner pressurised hazardous protection (Ex 'p')
Materials	Stainless Steel plate
Finish	Natural, unpainted
Dimension	W2800 x H1800 x D500mm
Weight	~1040kg

5.4.2. Indication

Range (Distance)	0 to 199m
Range (Speed)	0 to ±99cm/s
Number of digits (Distance)	3 digits
Number of digits (Speed)	2 digits
Min. increment distance	1m at distance more than 10m 0.1m at distance less than 9.9m
Min. increment speed	1cm/s
Lamp	LED lamp controlled light intensity

5.4.3. General

Power consumption	AC 110V ±10%, 50Hz
Design wind velocity	Within 50m/s
Air consumption	250l/m minimum
Name plate	[BOW] [STERN]
Turn swivel	±45° remote controlled from MCR
Visible Range	200m in clear weather
Visible Range	±45° (horizontal) ±45° (vertical)

5.4.4. Operating Conditions

Ambient temperature	-10 to 50°C
Storage temperature	-10 to 70°C
Ambient humidity	10 to 85% RH (non condensation)

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5.5. PORTABLE DISPLAY

5.5.1. Construction

Hazardous Area Certification	EEx 'ia' (option)
Dimensions	W57 x H82 x D17.5mm
Weight	~90g

5.5.2. Indication

Display Type	Supertwist LCD
Visible display screen	4 rows x 24 characters
Range (Distance)	0 to 199m
Range (Speed)	0 to ± 99 cm/s
Number of digits (Distance)	3 digits
Number of digits (Speed)	2 digits
Backlight	Electroluminescent backlight
Alarm	a) Internal vibrator motor, 80dB at 30cm b) Red LED indicator

5.5.3. Power Supply

Battery life	800 hours
Battery Type	Single AAA cell

5.5.4. Operating Conditions

Ambient temperature	-10 to 50°C
Storage temperature	-10 to 70°C
Ambient humidity	10 to 85% RH (non condensation)

Note. The portable Display requires a base station transmitter. This is incorporated into the Interface Unit.

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APPENDIX A
VDU Screen Displays

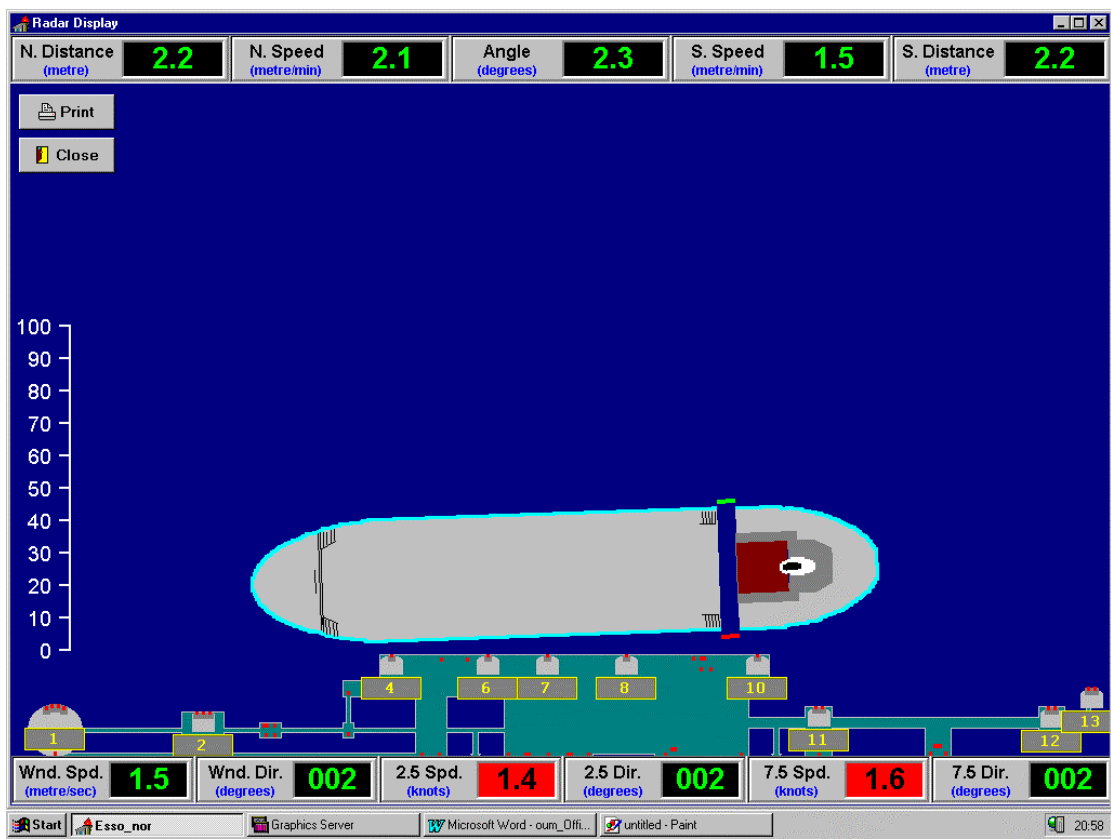


Figure 1 – Vessel Approach Screen Graphic

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Figure 2 – Alarm Setting VDU Screen

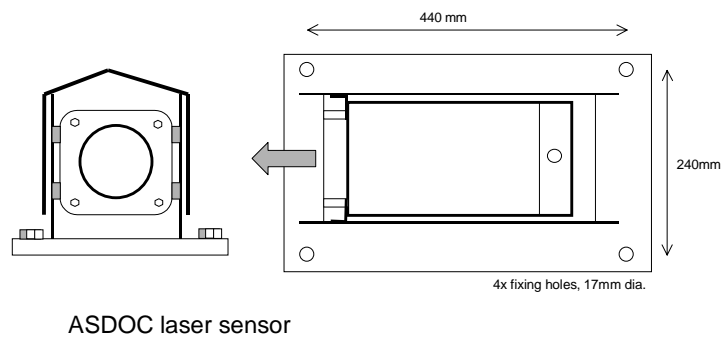


Figure 3 – Laser Sensor Details