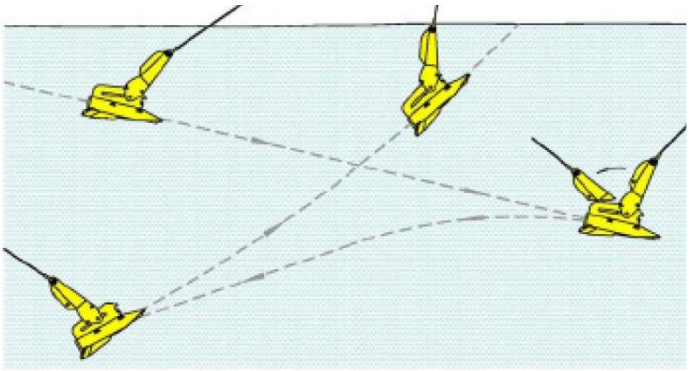
Intermoor
Moorings and Anchors

Bruce® Dennla

Advancing Dennla technology



The Omni-Directional Dennla

The Bruce Omni-directional Dennla is an enhanced version of the previous Dennla Mk4 which has an additional capability of accepting directional changes of loading from all headings. It has detail changes that enable it, after installation, to embed in the rearward direction as well as in the forward direction. It accommodates out of plane loading in the rearward direction, as well as in the forward direction as for the previous anchor, by veering into alignment with the direction of loading.

A removable shank stopper limits sliding movement of the shank to establish an optimum fluke centroid angle for deep embedment in the rearward direction. This, together with a bevel modification to the fluke, enables the installed anchor to embed further in the rearward direction in the same manner as it does in the forward direction in deeply penetrable seabeds. As a result, if the mooring line heading should become reversed 180o directly over the anchor (e.g. in hurricane conditions when other lines have parted), it embeds progressively deeper in a rearward direction to provide holding capacity in excess of the breaking load of the mooring line and so avoids the risk of the anchor being broken out and dragged into pipelines. No other anchor has this capability.

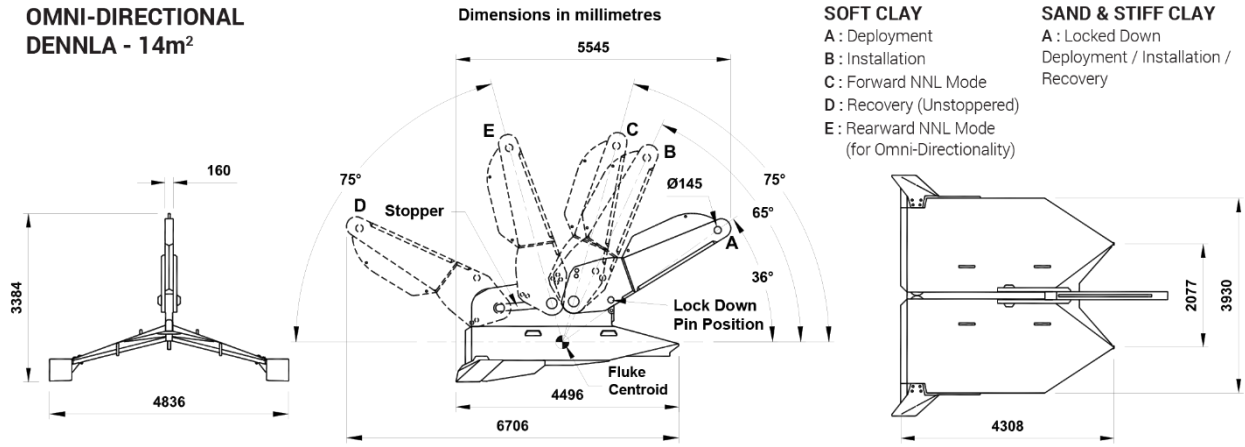
Outside the hurricane season, removal of the shank stopper enables the anchor to function as a Dennla Mk4 in proven near normal load mode (NNL mode), or in lock-down mode as a conventional MODU anchor for sand and stiff clay.

Near normal load mode

The Omni-directional Dennla has a final fluke centroid angle of 75° (near normal) for either forward embedment (forward NNL mode), or rearward embedment (rearward NNL mode).

The anchor is pulled in with a drogue tail fitted and with a mooring line scope chosen to give an uplift angle at the mud line of between 20° and 25° at a line tension typically between 150mT and 200mT. Scope is then reduced to give uplift between 40° and 45° and the same line tension is applied to ensure that leverage between shank and fluke parts a shear pin to allow the fluke centroid angle to increase from 65° to 75° as

shown for positions B and C. The anchor is now in the forward NNL mode (position C) with the capability of embedding deeper at uplifts up to 45° to provide line-breaking capability. If the mooring line heading is reversed over the anchor, the stoppered movement of the shank to position E provides a rearward NNL mode which again provides line-breaking capacity.



Conventional Drag Embedment Mode

The Omni-directional Dennla shank can be locked down to fix the fluke centroid angle at 36°. This enables the 12m2 and 14m2 Omni-directional Dennlas to act as conventional MODU anchors with, respectively, the performance of a 12,000kg and a 15,000kg Bruce FFTS Mk4 anchor in sand and stiff clay.

Anchor Recovery

The Omni-directional Dennla is recovered by the mooring line at uplift between 60° and 80° in a rearward direction. If the mooring line direction has become reversed, it is recovered in a forward direction at the same uplift (between 60° and 80°). Unstoppered, the anchor is recovered with the shank at position D as for the Dennla Mk4. Recovery in conventional drag embedment mode is similar to that of a conventional high holding power drag embedment anchor, e.g., Bruce FFTS Mk4.

Like the Bruce Dennla Mk4, the Omni-directional Dennla is designed to be racked on a MODU's bolster bars. It does not need a ROV for installation or recovery.

Anchor sizing

The Omni-directional Dennla is sized in terms of nominal fluke area. For deeply penetrable seabeds, the approximate anchor size needed is given by the relationship:

Anchor Size (m2) = UHC required / 81 for UHC values in the range 800 to 1,600 metric tonnes.

Contact us to see how we can apply this anchor to your next mooring project:

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