

Section 9

BUOYANCY

Introduction

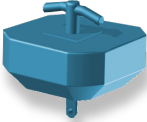
Anchor pendant and support buoy sizes are normally expressed in terms of the reserve buoyancy rather than the physical dimensions. The reserve buoyancy is equal to the weight of water displaced by the buoy when fully immersed less the buoys' weight in air. A buoy with 6 Tonnes reserve buoyancy would be fully immersed if required to support 6 Tonne. In practice, as the buoy would be fully submerged it would be very difficult to locate. Therefore standard practice is to use only about half the reserve buoyancy of the buoy so that approximately half the buoy is showing above the water.

The above does not apply to mooring buoys as they need to resist being pulled under the water when high loads are being applied to the mooring hawsers. Mooring analysis is generally required to ensure that buoys used in the mooring of vessels are of the correct size and that the structural steel within the buoy is of a sufficient strength.

Navigational buoys are selected on the basis of sea conditions and signal range requirements. Their buoyancy is required to support the moorings and give sufficient freeboard and height for the signals (light and day-marks etc) to be effective. Navigational buoys are also ballasted to aid stability.

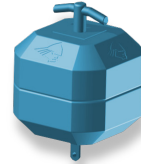
BUOYANCY

MODULAR SURFACE BUOYS



	Weight in air (kg)	Nominal buoyancy (kg)
Surface	886	3484

All numbers are approximate



	Weight in air (kg)	Nominal buoyancy (kg)
Surface	1773	6968

All numbers are approximate

9.2



	Weight in air (kg)	Nominal buoyancy (kg)
Surface	2396	10421

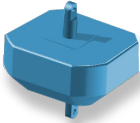
All numbers are approximate



	Weight in air (kg)	Nominal buoyancy (kg)
Surface	3020	13874

All numbers are approximate

MODULAR SUB SURFACE BUOYS



	Weight in air (kg)	Nominal buoyancy (kg)
250msw	1763	2607
500msw	2051	2319
1000msw	2328	2042
1500msw	2308	1974
2000msw	2402	1881

All numbers are approximate



	Weight in air (kg)	Nominal buoyancy (kg)
250msw	3526	5215
500msw	4103	4638
1000msw	4656	4084
1500msw	4617	3949
2000msw	4804	3762

All numbers are approximate



	Weight in air (kg)	Nominal buoyancy (kg)
250msw	3234	4758
500msw	3752	4241
1000msw	4248	3744
1500msw	4213	3594
2000msw	4381	3426

All numbers are approximate

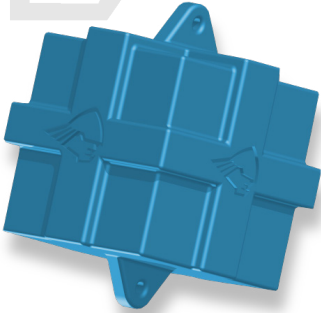


Depth	Weight in air (kg)	Nominal buoyancy (kg)
250msw	6427	10467
500msw	7547	9347
1000msw	8622	8272
1500msw	8547	8091
2000msw	8910	7728

All numbers are approximate

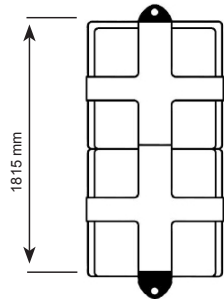
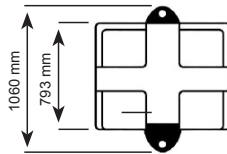
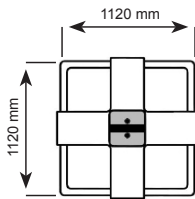
BUOYANCY

ROV SUPPORT BUOY



Depth	Buoyancy	Weight	Buoyancy	Weight
Surface	680	180	1390	330
205 m	530	330	1080	630
500 m	490	370	1010	710
800 m	470	390	960	750
1000 m	465	395	950	760
1500 m	420	440	860	860
2000 m	380	790	1190	1380

All dimensions are approximate



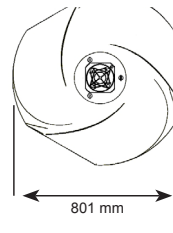
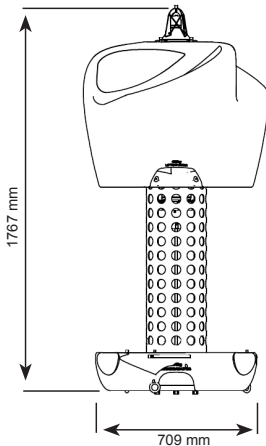
SPINBUOY



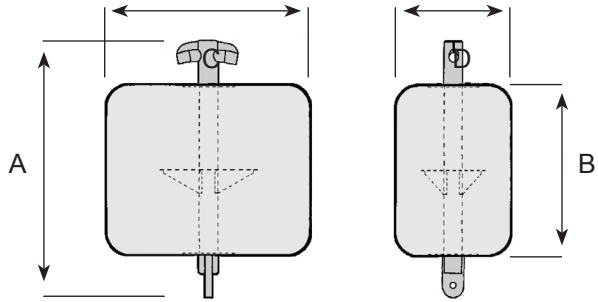
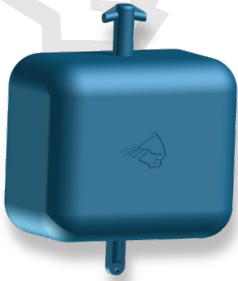
Parts	Dimensions (mm)	Wet Weight (kg)	Dry Weight (kg)
Upper buoy- ancy	OD846, h664	136	87
Bottom buoy- ancy	OD737, h175	21	19
Transponder	OD133, h	-12	23
Rope	OD700, h750	24	244
Tube	OD273	-26	30
Metal Plate	OD550, h25	-24	27
Total	ø846, h1768	-120 (buoyant)	430

All dimensions are approximate

A SPIN-assembly is a positively buoyant subsea buoy, comprising a defined length of pre-coiled high strength fibre-rope and an acoustically operated release transponder. Upon receiving a release command from the surface, the buoy will release itself, start ascending vertically to the surface, while rotating around its symmetrical axis and paying out the equivalent length of untwisted fibre rope. After recovery the buoy onboard, the fibre rope can be used to hoist the submerged object onboard.



ANCHOR PENDANT BUOYS



Viking Moorings elastomer anchor pendant buoys type EP

Buoy Type	Nominal weight kg	Nominal dimensions mm				Net reserve buoyancy kg	Nominal reserve buoyancy kg	Max length in metres of various dia of wire rope		
		A	B	C	D			56mm	64mm	70mm
EP1	310	1490	1100	1270	1100	1234	1000	90	70	60
EP2	560	2280	1770	1770	1270	3126	2000	185	130	120
EP4	1160	2880	1770	2600	1500	5499	4000	370	270	230
EP6	1330	3380	2200	2600	1500	7298	6000	550	400	350
EP8	1580	3605	2400	2600	1800	9702	8000	740	530	460
EP10	1770	3805	2600	2800	1800	11392	10000	920	660	580
EP12	2050	4210	2800	3200	1800	14150	12000	1100	800	690
EP14	2260	4210	2800	3300	2000	16303	14000	1290	930	810
EP16	2450	4210	3000	3400	2000	18042	16000	1480	1060	930
EP18	2660	4210	3000	3700	2000	19640	18000	1660	1200	1040
EP20	2860	4210	3000	3700	2200	21670	20000	1840	1330	1160
EP22	3070	4210	3000	3700	2400	23690	22000	2030	1460	1270
EP24	3270	4210	3000	3700	2600	25720	24000	2210	1600	1390
EP26	2480	4210	3000	3700	2800	27740	26000	2400	1730	1500

All dimensions are approximate

NWEA guidelines for Anchor Pendant Buoys:

- Must have 30% extra lift compared to buoy weight.
- The skin must be yellow.
- Must endure being run over by vessel.
- Buoy light must be yellow (amber).
- Must be marked /identification.

P 40 BUOYS

Viking Moorings P40 GRP buoys are constructed from Baltec foam filled glass reinforced plastic protected by a marine grade rubber fender. The bolt on pillar can be fitted with any IALA recommended topmarks.

The materials used by Viking Moorings in the construction make the buoys impact resistant, virtually unsinkable and ensure a long maintenance free life.

The standard P40 GRP buoy is equipped with the following fittings:

- 1 Single mooring eye
- 2 Rubber fender
- 3 Lifting eyes - 2 in no
- 4 Battery
- 5 Ladder
- 6 Radar reflector
- 7 Beacon
- 8 Topmarks
- WL Waterline

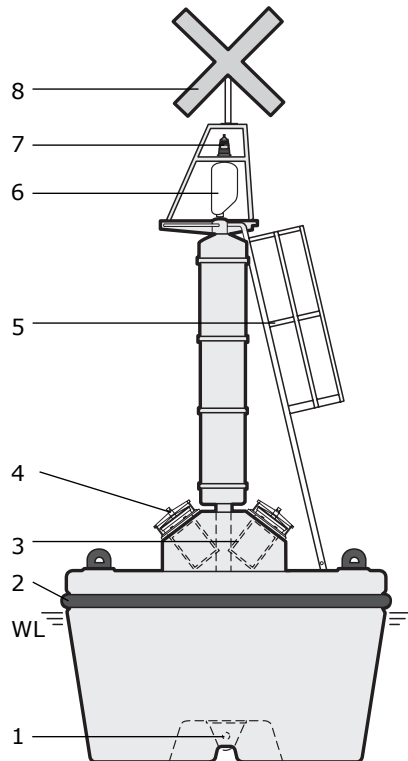
The buoy will be coloured to suit IALA recommendations.

A solar powered version is also available

General Particulars
 Diameter 4000 mm
 Focal Plane 6500 mm
 Draught 1650 mm
 Freeboard 1200 mm
 Weight 7500 kg
 Max mooring weight 3000 kg

Overall height 9050 mm
 (dependant on topmarks)

Viking Moorings' design and technical department can incorporate any special requirements as necessary.



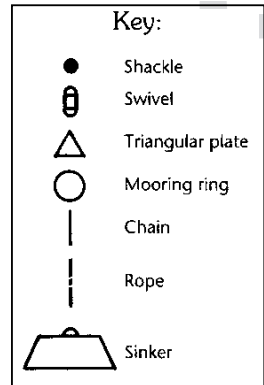
MOORING SYSTEMS

The choice of mooring system required is dependent on the size of buoy and the conditions in which it shall operate.

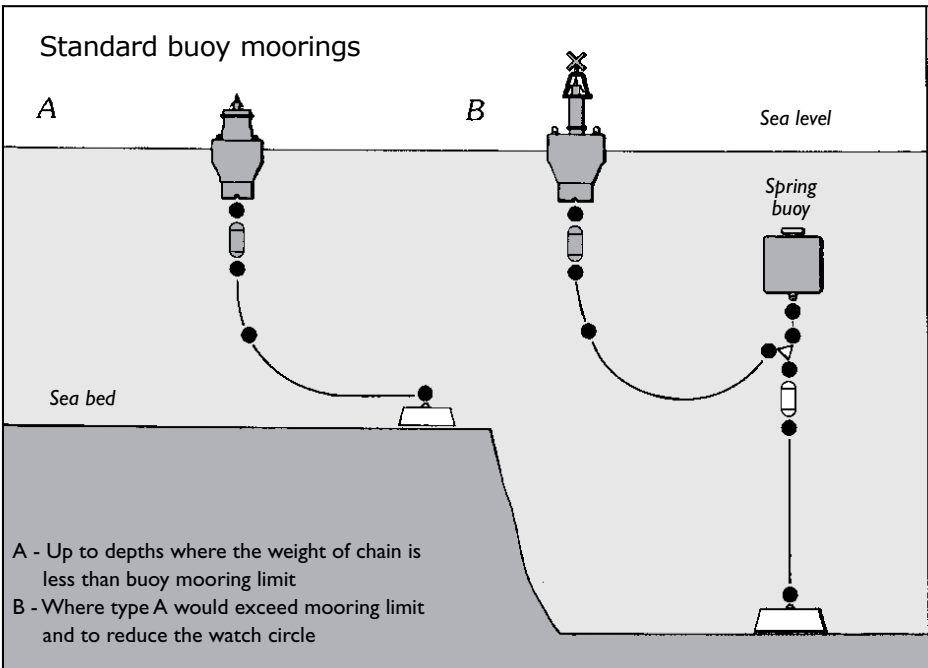
The diagrams depicted here are indicative of the type of mooring systems which can be used in various locations. Viking Moorings can design the optimum system for each application.

To achieve this the following information is required:

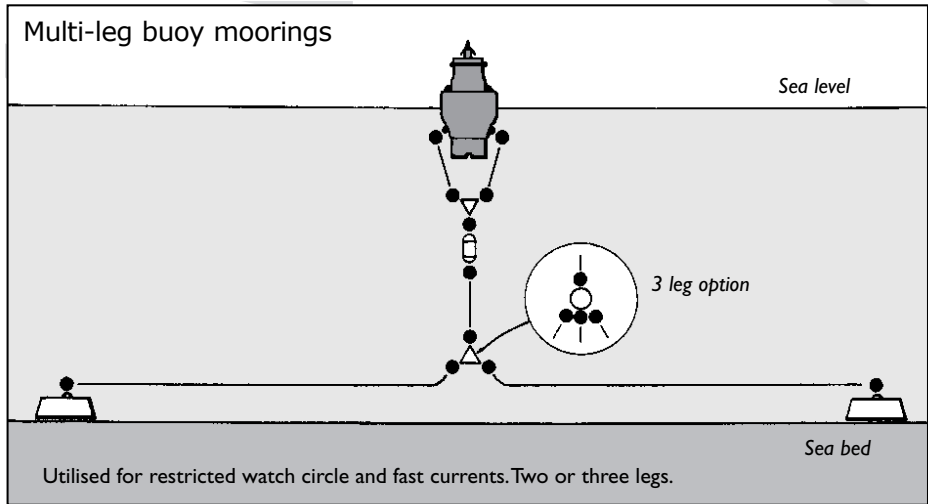
- 1 Location
- 2 Water depth
- 3 Tidal range
- 4 Current velocity
- 5 Wave heights and periods (if known)
- 6 Wind speeds
- 7 Maximum watch circle required (if applicable)
- 8 Sea bed conditions (if known)



Standard buoy moorings



MOORING SYSTEMS



SPAR BUOY MOORINGS

