

Appendix – A

Brezzamare SPI Boom Set – Technical Specifications

(Enclosure 1 to Invitation to Tender No EMSA/OP/13/2017)

Disclaimer

Any specifications and/or graphic material must not be understood as a commercial endorsement by the Agency of any given piece of equipment and/or manufacturer/supplier.

If there is a contradiction between this Appendix and the manufacturers' manuals, the manufacturers' manuals take precedence.

Markleen Containment Boom System – Uniboom X 1900

Manufacturer:

MARKLEEN TERRA, S.L.U.
Polígono Río Gállego, calle E, nº 22
50840 San Mateo de Gállego
Zaragoza
Tel. 976 683 000 – Fax 976 683 001
E-mail: markleen@markleen.com
Year of purchase: 2009

The system includes 2 self-inflatable containment booms of 250m each stored on 2 turntable reels with all necessary deployment equipment: hydraulic air compressor, hydraulic power pack, relevant hydraulic and air hoses, towing lines / cross bridles and spares.

The space required on board is at a minimum as the booms are deployed directly from the reels over the side of the ship. Reels are installed in the fore part of main deck and both booms are deployed from the Port Side of the vessel. The Starboard Side reel is installed higher than the Port Side one in order to facilitate the deployment. Between the two boom reels a wide grating assures easy and safe connecting operations between the two booms. Gratings are arranged also around boom reels as necessary to grant safe operation.



Figure 1 – Markleen Uniboom X 1900 – on board the vessel Brezzamare

The Markleen Uniboom X 1900 set includes the following components:

- 2 Containment boom sections (250m each);
- 2 Storage turntable reels (Unireel 12m3);
- Hydraulic power pack (Markleen DHPP 60);
- Air compressor (Uniair 5000/8);
- Towing set including cross-bridle;
- Spare parts and maintenance kit;
- Air and hydraulic hoses.

1. Containment boom sections (to be replaced) – 2 pcs (2 x 250m)

Table 1 - Technical Specifications of Markleen Uniboom X1900 containment barriers

Operational parameters	
Maximum wave height [m]	5
Wind force maximum [m/s]	20
Towing speed, recovery (relative to water) [kts]	1
Maximum towing force [kN]	60
Inflation system	Self-inflatable, single-point inflation
Required personnel during deployment (on oil recovery vessel)	1
Physical parameters	
Freeboard diameter [mm]	800
Skirt depth [mm]	1100
Freeboard, operational [mm]	740
Draft	1160
Primary inflation	Inflatable double spiral
Chamber length [mm]	5000
Weight [kg/m]	19
Breaking strength, bottom tension member [kN]	> 160
Breaking strength, top/centre tension member [kN]	> 60
Ballast, bottom tension line	Galvanised chain
Buoyancy/weight ratio	28:1
Material	
Boom fabric	PVC coated polyester 1400 g/m ²
Primary inflation, spiral system	Special woven spiral hose, double spiral
Secondary inflation, back-up system	PVC hose
Tension member, top and centre	Polyester
Bottom tension member	Galvanised steel
Requirements	
Air pressure, primary (spirals) [bar/psi]	min. 5 / 73
Air pressure, secondary (back-up) [bar/psi]	min. 5 / 73
Air volume, secondary (back-up) [m ³ /min.]	5 @ 5 bar

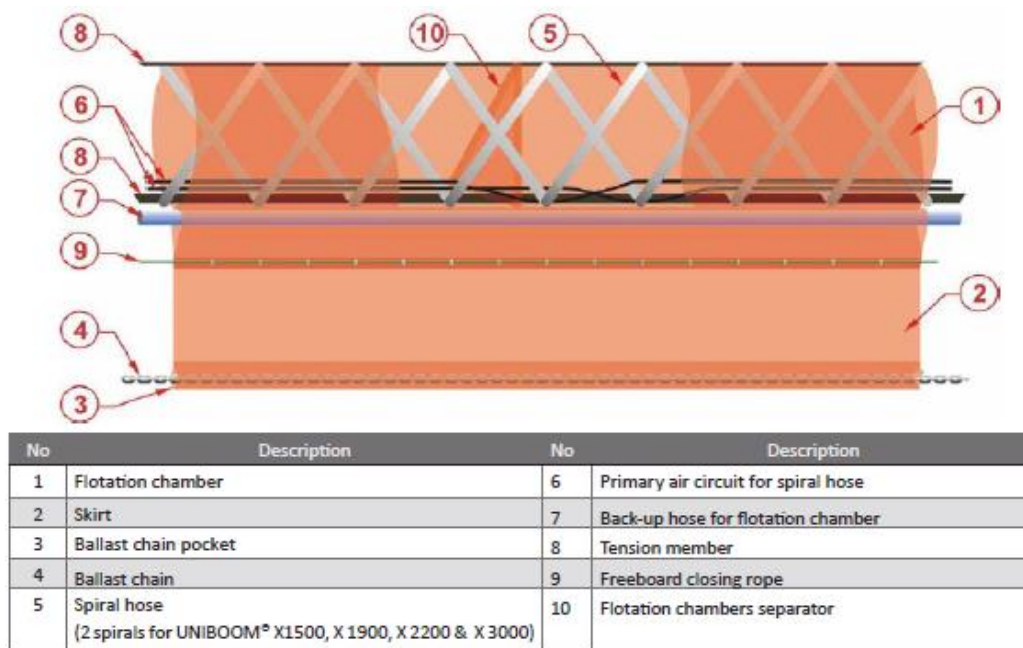


Fig. 2 Containment Boom - Uniboom X (Source: Markleen)

2 Towing set and connexion for open U formation (to be replaced)

The towing set and connexion for open U formation includes all necessary parts for effective and safe deployment of the booms.

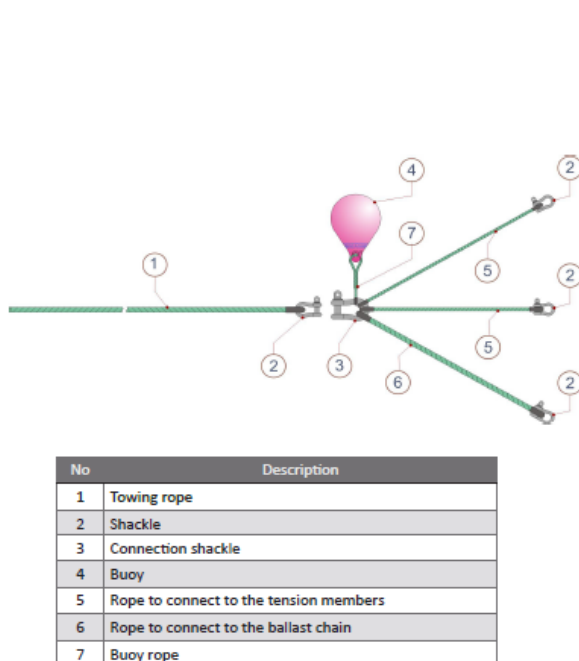


Fig. 3 Uniboom X outer towing line (Source: Markleen)

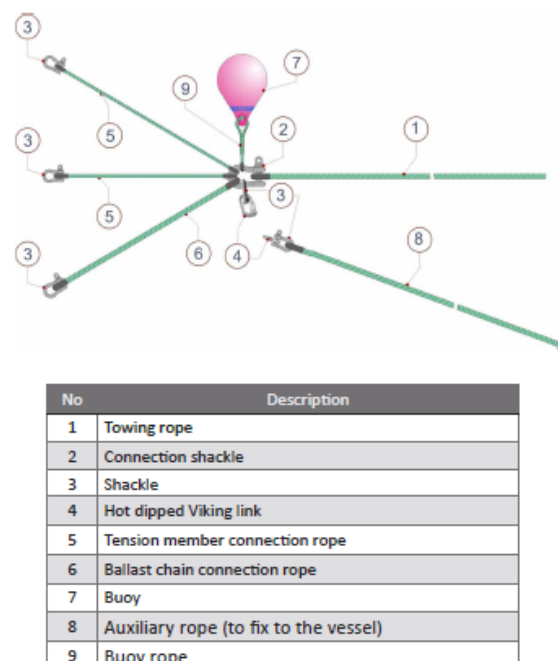
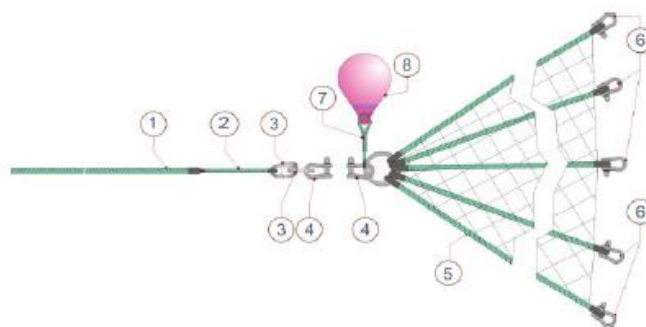


Fig. 4 Uniboom X inner towing line (Source: Markleen)



No	Description	No	Description
1	Towing rope	5	Cross bridle net with ring
2	Weak point	6	Shackle to connect to the UNIBOOM®
3	Viking link	7	Buoy rope
4	Shackle	8	Buoy

Fig. 5 Uniboom X Cross Bridle (Source: Markleen)

3 Spare parts & maintenance kit for the Markleen Uniboom X1900 boom (to be replaced)

Boom spare parts and maintenance kit includes all necessary items for field repair and maintenance.

4 Air supply/back-up air hoses (to be replaced)

Air supply/back-up air hoses from air compressor to the boom reels.

5 Boom storage reels

The UNIBOOM® X barriers are stowed on turntable reels with a hydraulic system for deployment and recovery. These UNIREEL® reels are characterised by including an automatic inflation system for the barriers and a rotating base that facilitates recovery and stowage.

The reels have variable speed operation and a compact design with the reduction gear installed inside the hub of the drum. The drum is provided with inspection holes to guarantee access for maintenance. The entire structure is painted with a high quality marine grade coating to protect against corrosion for increased product durability and minimum maintenance in marine environments.

Markleen UNIREEL® is fitted with ISO forklift tunnels, 4 hoisting points on the frame and 4 anchoring points for fixing the base of the reel to a dockside, ship deck or container bottom.

Safety of operation of Markleen UNIREEL® is maximised due to a control panel featuring a distributor valve which controls direction of rotation, rotational speed of base and drum (adjustable between 0 and 12 rpm) and the hydraulic brake.

Key features:

- Rotational base that makes easier the containment booms stowage and deployment;
- Integrated delivering air system for the MARKLEEN UNIBOOM® X Series containment booms;
- Automatic hydraulic brake counteracts excessive external pulling forces.



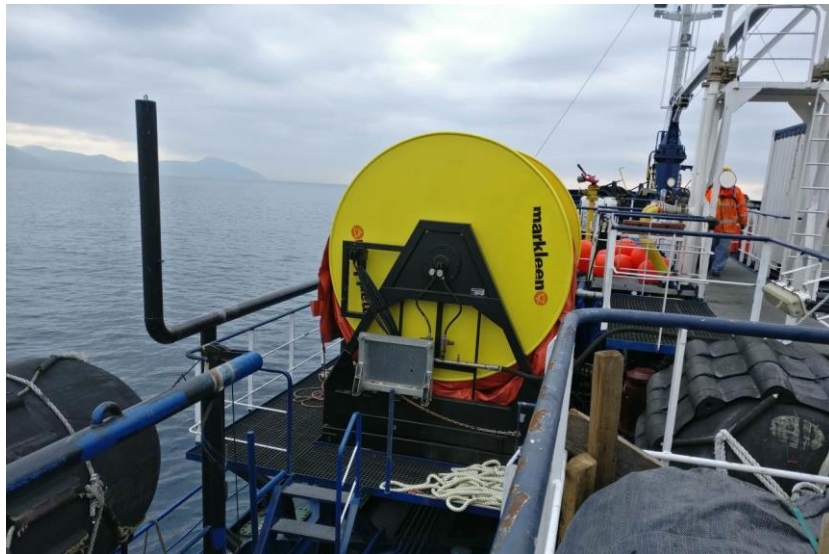
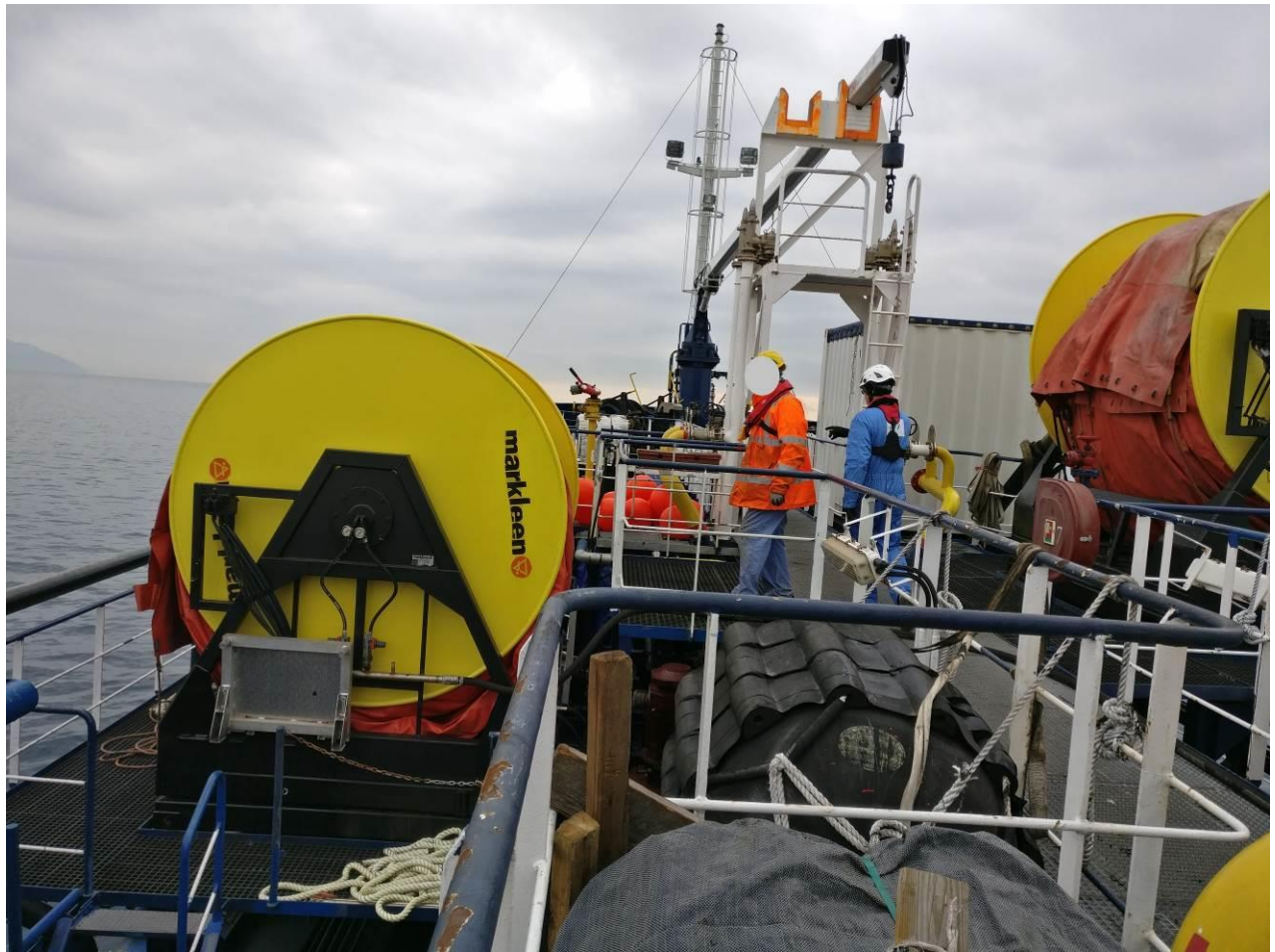
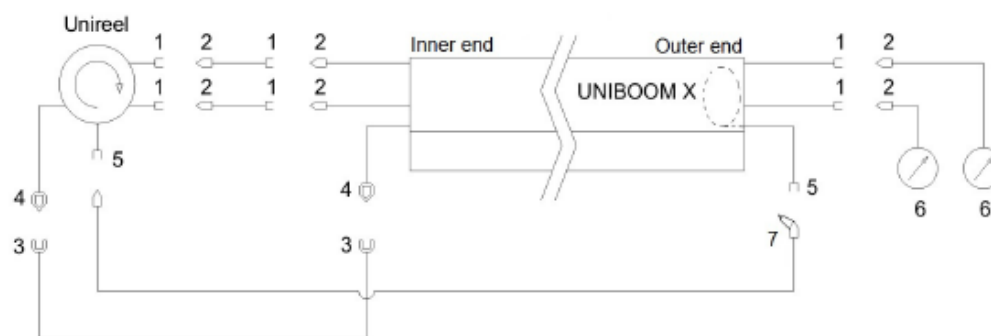


Fig. 6 Boom reels on board the Brezzamare



POS.	COMPONENT	DESCRIPTION
1	C000000596	Female STG type stainless steel quick connector
2	C000000595	Male STG type stainless steel quick connector
3	F000000377	Female Camlock 1½" / Hose connection MIL-C-27487 633C, Stainless steel
4	F000000399	Male Camlock 1½" / Hose connection MIL-C-27487 633C, Stainless steel
5	F000001056	1/4" ESTO female quick coupling
6	F000000396	Manometer 0-16 bar (Ref. MFI6304016V)
7	K000000553	Inflation gun set for buoy

Fig 7 – Inflation diagram: UNIREEL / Uniboom X Series connections

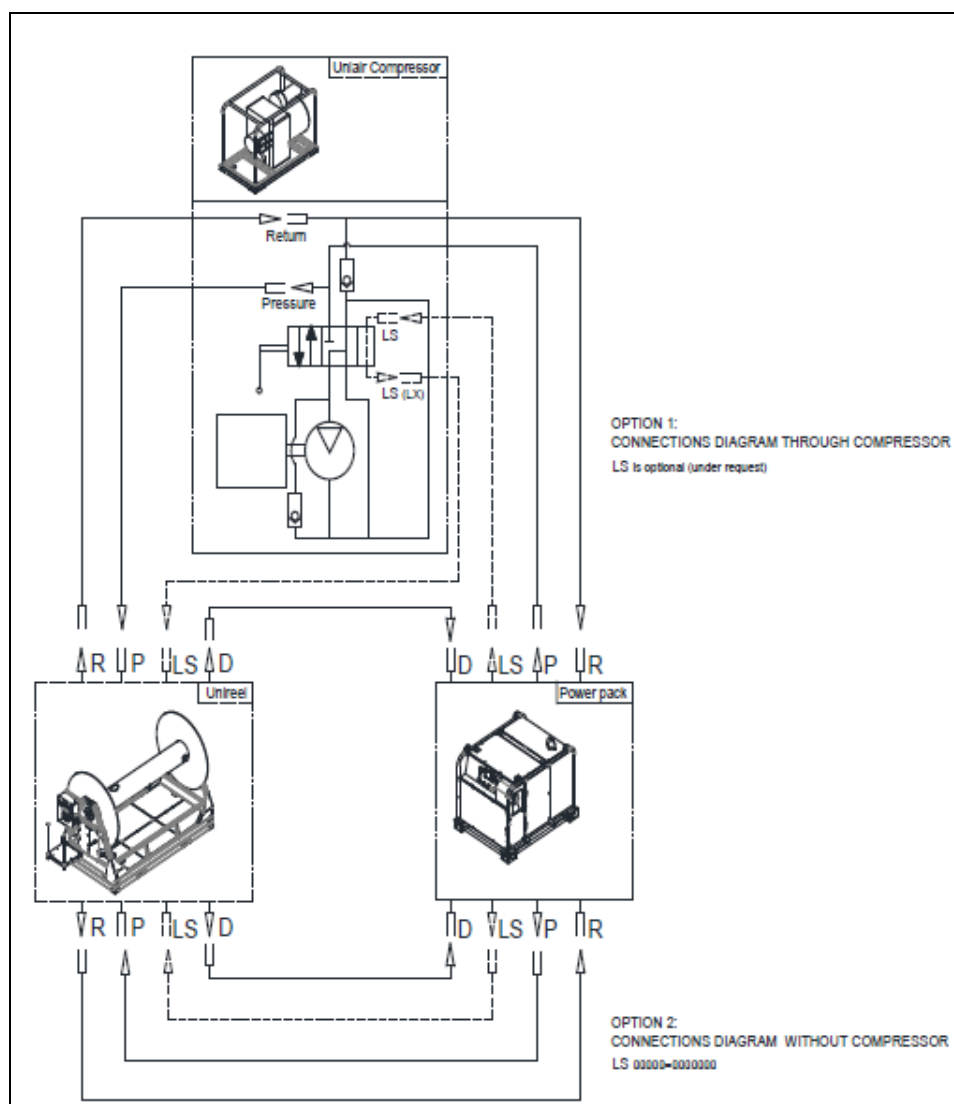


Fig 8 – Options of hydraulic connections with power pack and compressor

Table 2 - Technical Specifications – Boom reel – UNIREEL 12m3

UNIREEL 12	
Construction	Frame, discs and drum made of corrosion protected carbon steel
Drum diameter [mm]	610
Disc outside diameter [mm]	2350
Distance between discs [mm]	3025
Net volume [m ³]	12,2
Hydraulic motor	Brevini
Reducer	Brevini
Brake	Pressure loss hydraulic disc, negative hydraulic brake.
Max. hydraulic pressure [bar]	200
Max. hydraulic flow [l/min]	65
Bearing	Seat with rotating bearing
Max. pull [kgf]	3600
Braking capacity	Greater than max. pull
Operating speed	0 - 12 rpm depending on flow rate
Hydraulic connectors type (*)	Serie B ISO 7241-1
Pressure	Female 1"
Return	Male 1"
Drain	Male 3/8"
LS signal (optional)	Female 1/4"
Max. working air pressure (bar)	6
Recommended air flow (l/min)	5000 (**)
Air circuits connectors	1 1/2" male Camlock
Handling and transport	ISO corners (optional lifting arrangement)
Dimensions for transport (mm)	4000 x 2460 x 3275
Length (mm)	4660
Width (mm)	3490
Base length (mm)	3510
Base width (mm)	2440
Height (mm)	3275
Weight (kg)	5000

(*)As standard hydraulic quick couplings Series B ISO 7241-1 are supplied. Other quick couplings can be supplied under request.

(**) Lower flow rates decrease the boom inflation speed.

6. Hydraulic power pack – Markleen DHPP 6

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50840 San Mateo de Gállego

Zaragoza (Spain)

Tel. +34 976 683 000

Fax +34 976 683 001

E-mail: markleen@markleen.com

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Fig. 9 Hydraulic power pack Markleen DHPP 60

The Markleen Hydraulic Power Pack is a unit designed for marine applications. It is compact and robust, protected with marine grade paint to resist corrosion.

The Diesel engine of the DHPP60 Ex Zone 2 power pack operates below 200°C. This lower operating temperature, combined with additional shut down features, means that this equipment is designed to be used in areas where there is a strong potential explosion hazard. The flame protected engine is designed specifically to meet the European ATEX Directive Zone 2 requirements as well as the following key safety standards: ATEX (94/9/EEC); EEMUA No 107 (1992); OCMA-MEC 1.

This unit is driven by a diesel engine which moves a hydraulic gear pump. The pump will be coupled to the motor using an integral close coupled configuration, delivering variable flow. This hydraulic power unit consists of two vertical reservoirs (hydraulic oil and fuel).

The hydraulic tank incorporates sump drain, oil level gauge, filler/breather assembly and return connections. The fuel tank incorporates drain and fuel level indicator. It is provided with an ergonomic control panel that makes it possible for the operator to control the principal operational parameters from the engine.

Key features:

- Robust and compact design
- Fork lift tunnels and lifting points for easy transportation
- All components can be easily dismantled for transport or maintenance.
- Long working life: Rugged corrosion resistant build, with reservoirs made of stainless steel and frame protected with marine grade paints.
- Flame protected diesel engine designed to meet the European ATEX Directive Zone 2 requirements

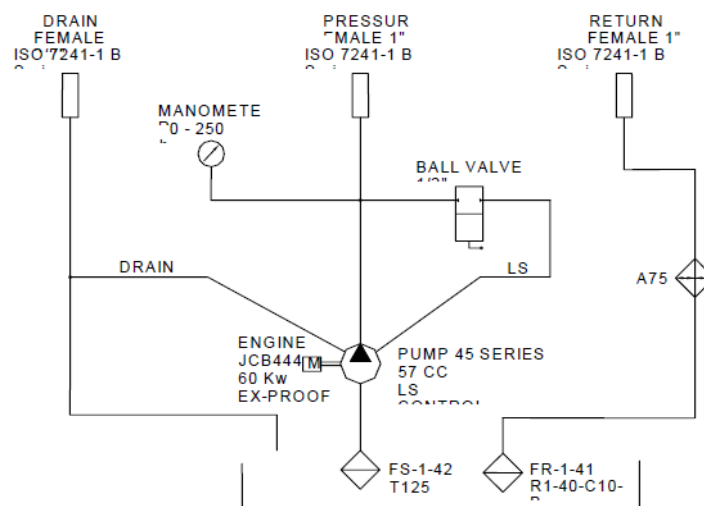


Fig. 10 Markleen DHPP 60 – Hydraulic Diagram

Table 3 - Technical Specifications - hydraulic power pack Markleen DHPP 60

MERKLEEN DHPP 60 EX ZONE II POWER PACK	
Construction	Frame: Steel protected with marine grade paints Tanks: Stainless Steel AISI 304 Bodywork: Stainless Steel AISI 304
Engine	JCB PP 854 Ex-Proof
Start	Manual
Max. rated power	63 kW to 2200 rpm
Hydraulic Pump	Variable displacement pump
Heat exchanger	Air/Oil
Max. hydraulic oil flow [l/min]	150
Max. hydraulic output [bar]	225
Number of hydraulic circuits	1
Fuel tank [litres]	95
Hydraulic oil tank [litres]	265
Hydraulic quick couplings (*)	Pressure: Male quick coupling 1" Return: Female quick coupling 1" Drain: Female quick coupling 3/8"
Controls	Start/ Emergency Stop lever Stop / Accelerator Hydraulic ball valve for start and decompression
Gauges	Engine control box: Oil pressure, water temperature, exhaust temperature and tachometer Manometer Hydraulic oil level and oil temperature / Fuel level
Handling and transport	4 hoisting points Forklift tunnels
Measurements (L x W x H) (mm)	2010 x 1160 x 1673
Weight (empty tanks / full tanks)	1500 / 1810

(*) As standard hydraulic quick couplings Series B ISO 7241-1 are supplied.

7 Hydraulic hoses

Sets of hydraulic hoses for the Power Pack Markleen DHPP 60: set for the power-pack to boom compressor and set for the power-pack to boom reels.

8 Hydraulic Air Compressor – UNIAIR 5000/8 (to be replaced)

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Fig. 11 Hydraulic compressor UNIAIR 5000/8

The Markleen Uniair 5000/8 air compressor supplies a high rate of compressed air flow to inflate Markleen Uniboom® X single-point inflatable boom. The high rate of compressed air flow supplied by the Uniair compressor allows the booms to be inflated extremely quickly, both via the primary inflation circuit at 8 bar pressure and the secondary (back-up) circuit at atmospheric pressure.

The hydraulic power should be supplied from a separate power source (power pack or hydraulic power take off on machine). Due to the fact that the Markleen Uniair 5000/8 air compressor is operated hydraulically and contains no electrical components, it is suitable for use in explosive or flammable environments.

The Markleen Uniair 5000/8 air compressor is compact and robust equipment, with frame in stainless steel and the components protected with marine grade paints to resist corrosion. It needs only pressure and return line connection to the hydraulic system, but it is also provided with drain. Assembly is configured with quick couplings.

The compressor needs more than 180 bar oil pressure to work properly. Max. oil pressure is 210 bar. If the power pack may supply more pressure, a separate pressure control valve has to be used. The return line must connect directly to the oil tank and there should not be more than 10 bar back pressure when the hydraulic oil is flowing normally.

Note: To avoid overheating of the hydraulic oil, it is important that the power pack has sufficient oil cooling capacity.

Key features:

- Hydraulically driven: contains no electrical components, it is suitable for use in explosive or flammable environments;

- Robust and compact design;
- Long working life: Rugged corrosion resistant build and components protected with marine grade paints;
- Connections: quick couplings;
- Pressure control valve included;
- Transportable: Easy to transport;
- Modular: All components can be easily dismantled for transport or maintenance.

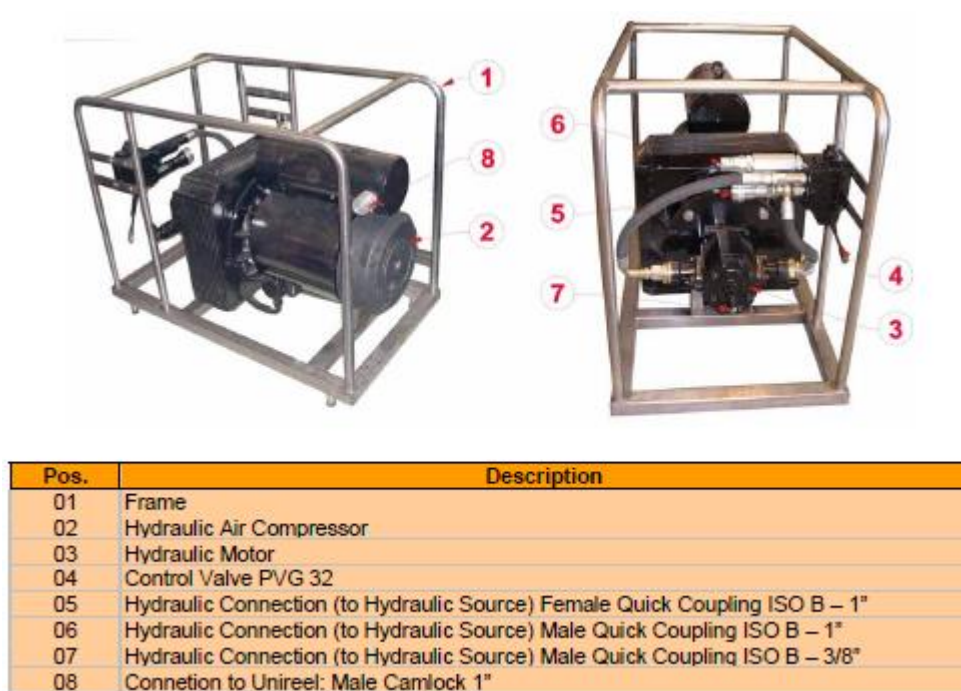


Fig. 12 Principal parts of the UNIAIR 5000/8 Air Compressor

Table 4 - Technical Specifications - hydraulic compressor UNIAIR 5000/8

MARKLEEN – UNIAIR 5000/8 – AIR COMPRESSOR	
Build	Stainless steel frame
Compressed air flow rate [l/min]	5000
Maximum air pressure [bar]	10
Continuous air pressure [bar]	8
Min-Max hydraulic flow rate required [l/min]	100-130
Hydraulic pressure required [bar]	200
Hydraulic quick couplings (to the power pack)	1" female ISO B type quick coupling 1" male ISO B type quick coupling
Hydraulic quick couplings (to the Unireel)	1" female ISO B type quick coupling 1" male ISO B type quick coupling
Air supply connection	1 ½" male Camlock Length [mm] 1200
Length [mm]	1200
Width [mm]	650
Height [mm]	950
Weight [kg]	210