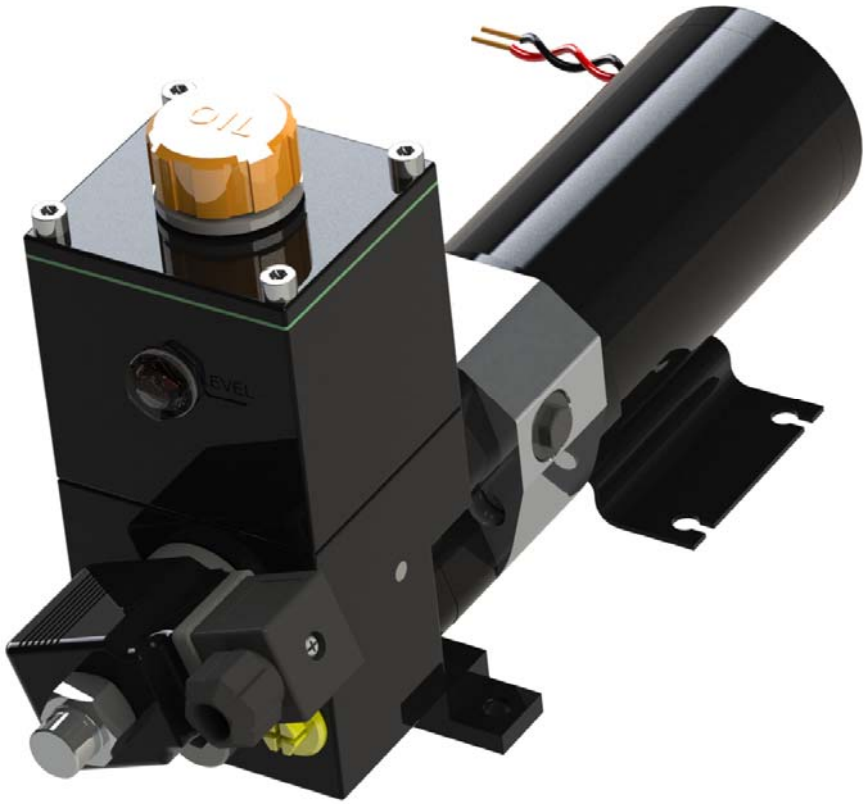
Hy-ProDrive

Marine Steering Technology
By Hydraulic Projects Ltd.



PR+RU

Reversing Marine Autopilot Hydraulic Pump With Reservoir and Unloader Installation and Service Instructions

Serial Number

Please record your pumps serial number here

R4508-m23 ISS.05

Hy-ProDrive™
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This precision engineered pump was designed and manufactured in the United Kingdom.

Please keep this manual in a safe place

The information in this manual was, to the best of our knowledge, correct when it went to press and Hydraulic Projects Ltd cannot be liable for any inaccuracies or omissions. There may also be differences between the specifications in the manual and the product as a result of ongoing development for which we accept no liability.

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IMPORTANT SAFETY INFORMATION

Failure to install and maintain this equipment in accordance with the instructions contained in this Manual could result in damage or injury.

This equipment must be installed and maintained by a person who is qualified to do so. This equipment is only for use with marine auto pilots within the limitations stated in the following pages.

Auto pilot steering systems are navigational aids and the user must still maintain a permanent watch.

This equipment meets the latest EMC (Electromagnetic Compatibility) standards required for use in the marine environment.
In order to ensure conformance and to prevent interference with electronic systems the unit must be properly bonded to earth and the supply cables screened.

Caution!

Do not  flash test.

Beware of hot motor and solenoid components and the risk of entrapment from moving parts.

DESCRIPTION

"PR+RU" reversing type gear pumps are driven by 12 or 24 volt DC permanent magnet motors. Incorporated in the design are pilot operated check valves that prevent the pump being back driven by the manual steering system or rudder load. The motors have an IP67 rating and can be removed from the pump without allowing air into the hydraulic system or fluid to escape. They can be used with both balanced and unbalanced cylinders. The pumps incorporate an unloading solenoid to allow the steering cylinder to ‘float’ when not in autopilot mode.

When used in conjunction with a cylinder of your choice it forms a linear actuator to enable secondary steering via an autopilot.

PUMP SIZE

The nominal flow output off load is indicated on the data label attached to the pump.

PR+RU 06	600 cc/m
PR+RU 08	800 cc/m
PR+RU 10	1250 cc/m
PR+RU 15	1800 cc/m
PR+RU 20	2000 cc/m
PR+RU 25	2500 cc/m

Check that the voltage shown on the label is correct for the output of your auto pilot computer.

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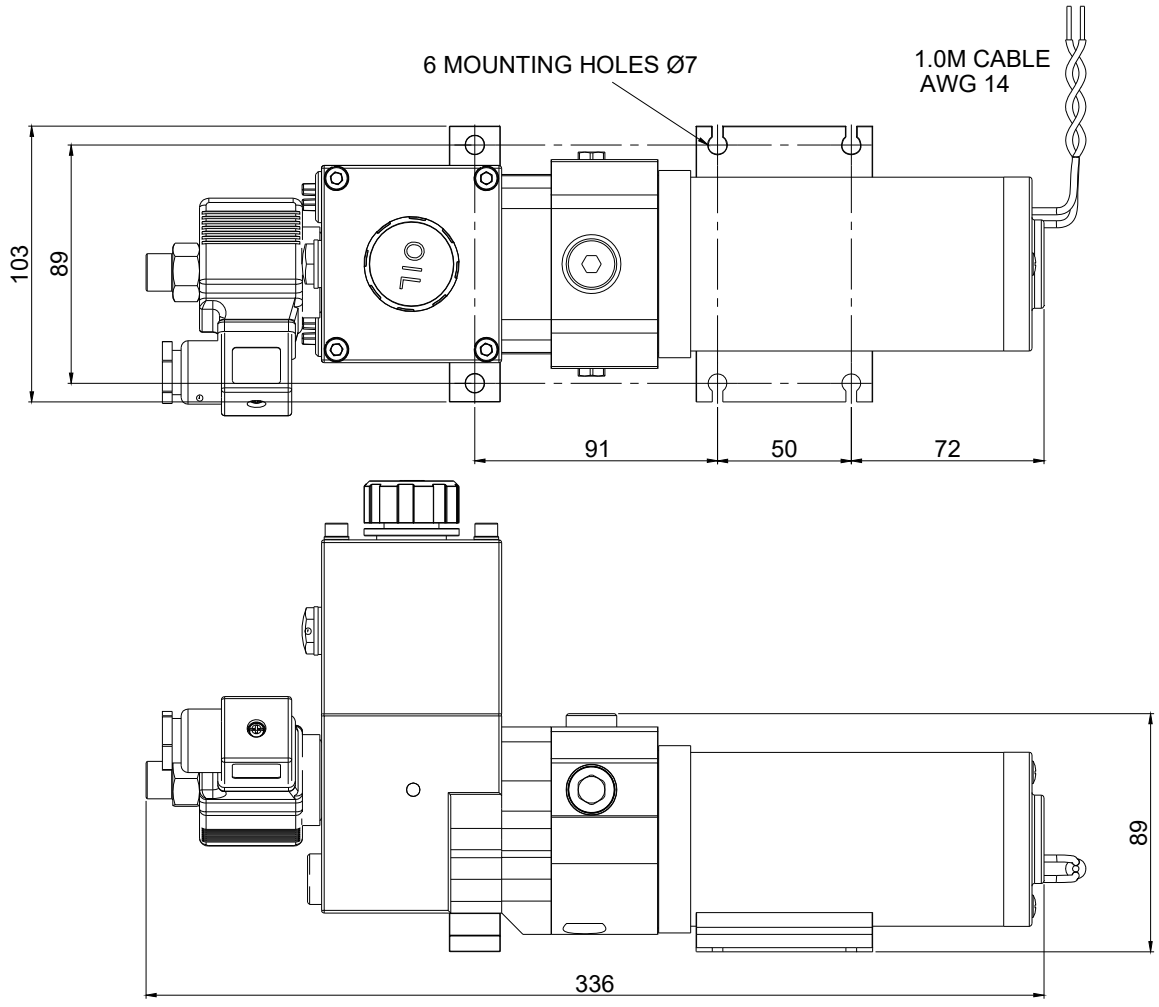
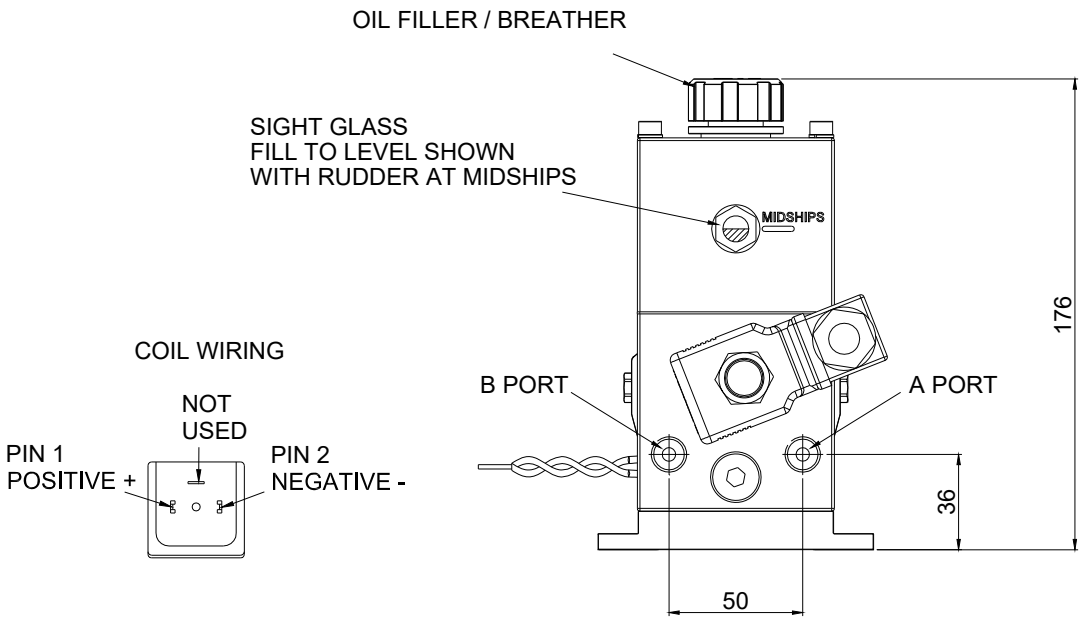
TECHNICAL DATA

Voltage	12 / 24 VDC			
Current	Typical amp-hour 5 bar at 25% duty		Typical current Intermittent 55 bar max	
	12v	24v	12v	24v
PR+RU 06	0.9	-	9.0	-
PR+RU 08	1.3	-	14.0	-
PR+RU 10	2.2	1.0	19.0	9.0
PR+RU 15	2.4	1.2	24.0	11.0
PR+RU 20	2.5	1.3	25.0	12.0
PR+RU 25	2.7	1.4	34.0	15.5

Ingress Protection	IP67
EMC Protection	BS EN 60945:2002 (DC)
Ignition protection	BS EN 8846:2017
Ambient operating Temperature	-15 to +55 deg C
Max Pressure	55 bar (intermittent operation)
Reservoir Capacity	107cc at midships
Max heel Angle	60°
Ports	A = Cylinder port G1/4 (BSP) Parallel B = Cylinder port G1/4 (BSP) Parallel Filler / Breather G1/2 (BSP) Parallel
Rotation	Red lead to positive - Pressure to A port
Hoses	Suitable for working pressure 55 bar. Minimum burst pressure 100 bar.
Fluid	ISO VG10 to VG40 Hydraulic mineral fluid meeting ISO 6743-4 HV The following commercial fluids are suitable. Fuchs Renolin B15 HV1 Seastar HA5430

DIMENSIONS


6 MOUNTING HOLES Ø7
1.0M CABLE
AWG 14
103
89
OIL
91
50
72
89
336


OIL FILLER / BREATHER
SIGHT GLASS
FILL TO LEVEL SHOWN
WITH RUDDER AT MIDSHIPS
MIDSHIPS
176
B PORT
A PORT
36
50

COIL WIRING
NOT
USED
PIN 1
POSITIVE +
PIN 2
NEGATIVE -

PUMP SELECTION

It is important to select the correct size PR+RU pump as it directly influences the steering performance and power consumption.

The type of vessel to be steered must be considered. The hard-over time may need to be faster on lightweight planing craft and modern yachts or slower on displacement power boats or long keel yachts.

If the pump is too large, the autopilot may become over active and use more power. If it is too small the autopilot may struggle to maintain a good course.

The table below shows the volume of cylinder that each of the PR+RU pumps is suited to. These selections give a nominal hard-over* time of 10-15 seconds.

In all cases refer to the information specified by your autopilot manufacturer.

Cylinder Volume (cc)	PR+
100 - 149	PR+RU 06
150 - 174	PR+RU 08
175 - 249	PR+RU 10
250 - 349	PR+RU 15
350 - 449	PR+RU 20
450 - 550	PR+RU 25

*The hard-over time is the number of seconds that the pump takes to drive the rudder from the port to starboard stops with no flow of water over the rudder.

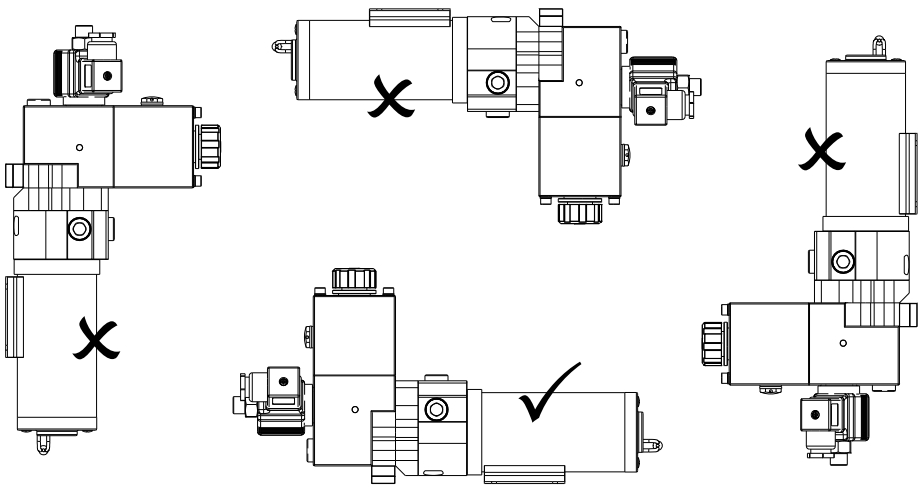
LOCATION

The PR+RU pump is designed for “Under Deck” installations only. When considering where to mount the pump the following points should be taken into account.

a) Keep hose and cable runs short.
b) Mount away from sources of heat.
c) Install the pump above areas liable to flooding.
d) Use a solid surface to prevent noise transmission and amplification.
e) Keep away from excessive vibration and fumes.
f) Do not mount in confined areas containing flammable materials.
G) Keep the area of installation free of other equipment or objects likely to cause obstruction or damage to the pump.

ORIENTATION

The PR+ pumps can only be mounted horizontally with the filler / breather port at the top.

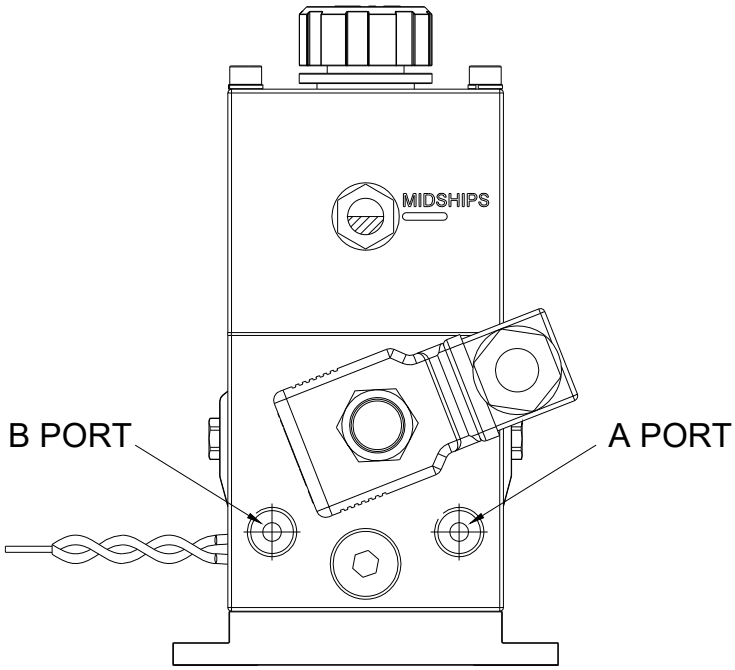


HYDRAULIC CONNECTIONS

The ports marked 'A' and 'B' are the service line connections to the cylinder. The hydraulic hoses and connections must be of a suitable pressure rating. Refer Technical data.

Use only bonded rubber/metal washers to seal the fittings.
Do not use tapered adapters, sealing compound or P.T.F.E tape.

Caution!
Ensure that no dirt enters the system during the installation, be certain that all hoses and fittings are cleaned before connecting up.



Adaptors are available to convert the ports to SAE, NPTF or Metric threads.

A)	G1/4 male to 5/8 SAE male	R2377-58
B)	G1/4 male to 1/4 NPTF female	R2377-N
C)	G1/4 male to M10 female	R2377-10

HYDRAULIC FLUID

Caution! ⚠
Do not use “brake fluid”
Use only mineral based good quality hydraulic fluid compatible with nitrile rubber hydraulic seals.

The PR+RU pump is designed to operate on a wide range of hydraulic fluids. Check the cylinder manufacturers recommendations for compatibility. Refer technical data on page 6.

COMMISSIONING

Caution! ⚠
The PR+RU pump must not be run without oil in the reservoir as damage to the internal components may occur.

Connect the hoses from the pump to the cylinder.
Fill the reservoir with oil to the indicated level.
Attach a short length of hose to each of the cylinder bleed nipples and have a suitable container available to catch the expelled oil.

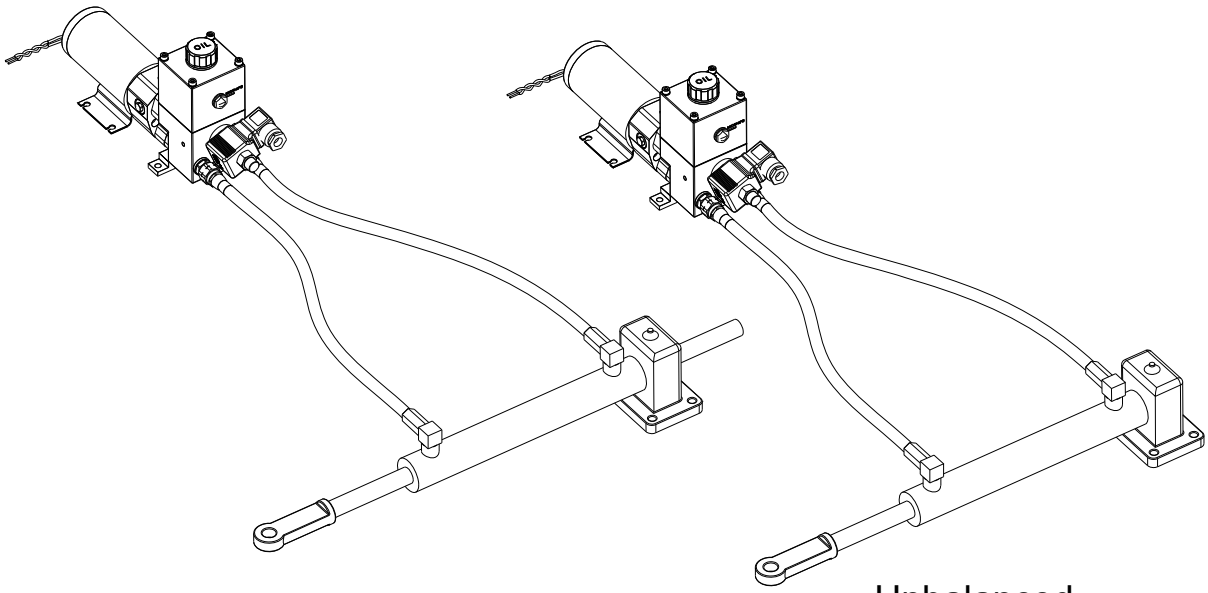
To fill the hoses and cylinder:
Open the bleed nipple at one end of the cylinder. Pull the cylinder rod towards the open bleed nipple (catching any oil expelled).
At full stroke close the nipple.
Open the bleed nipple at the other end of the cylinder and repeat the process. Do this several times until no more air bubbles appear.

It is very important to maintain the oil level in the reservoir at all times so that no air is drawn into the hoses. It may need to be topped up a number of times during the bleeding process.

When finished and with the cylinder at mid-stroke check that the oil level is correct.

TYPICAL ARRANGEMENTS

The PR+RU pump can be used with both balanced and unbalanced steering cylinders. In either case just 2 hoses plus the necessary fittings are all that is required to form a linear actuator to enable secondary steering in conjunction with an autopilot.



Balanced

Unbalanced

FAULT FINDING

1) Motor does not run

: check electrical connections.
: check auto pilot output.
: check fuse / trip rating. Refer Technical Data.

2) Motor runs, but erratic or no cylinder movement.

: check for air in system.
: check for incorrect hydraulic connections.
: check there is sufficient fluid in the system.
: check the drive coupling between pump and motor.
: check if the pump has been dismantled and incorrectly assembled.
: check for operation of the solenoid.

3) Unloader fails to disengage

: check for operation of the solenoid.
: check the condition of the oil

4) Excessive noise

: check for air in system.
: check the motor for damage.
: check the security of the mountings.

MAINTENANCE

1) Pump

With a minimum of moving parts and quality precision engineering the pump will give many years of trouble free service.

Should service replacement seals be required a kit is available.
Hy-ProDrive Part no. PR+RU sk.

2) Motor and coupling removal and replacement.

The long life motor is a non-serviceable item.

A new motor must be fitted in the event of motor failure, the brushes are not replaceable.

The motor can be removed (for replacement or coupling examination) from the pump head without fluid loss or air ingress into the hydraulic system.

Undo the two M6 (5mm AF Allen Key) socket head cap screws and remove the motor, coupling and water seal O ring.

If the coupling is worn or damaged please replace. Lubricate the slots with a small quantity of good quality grease.

If any hydraulic fluid is found in the coupling area the pump shaft seal must be replaced – see services kit for instructions.

Reassemble by replacing the O ring, engage the coupling between the motor and pump shafts, ensure the motor locates correctly in the pump spigot, using a low strength thread locking compound replace and tighten the two M6 socket head cap screws (13.5 Nm).

Caution!

Keep all ⚠ parts clean during dismantling and reassembly.

MOTOR KITS

Replacement motors are available under the following part numbers:

R4510-sk 12 100 = PR+RU 10 12 PR+RU15 12 PR+RU20 12
PR+RU 25 12

R4510-sk 24 100 = PR+RU10 24 PR+RU15 24 PR+RU20 24
PR+RU25 24

R4510-sk 12 50 = PR+RU08 12

R4510-sk 12 25 = PR+RU06 12

Each kit includes the motor, seals, coupling, bolts and fitting instructions.

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SOLENOID CARTRIDGE AND COIL

Should the solenoid cartridge or coil fail replacements are available under the following part numbers:

R4112-aO12 = Normally Open Solenoid Cartridge and 12V coil

R4112-aO24 = Normally Open Solenoid Cartridge and 24V coil

GENERAL INFORMATION

Keep this manual in a safe place. Quote the model and serial numbers in all correspondence.

Model Number: _____

Serial Number: _____

Date of Purchase: _____

Dealer: _____

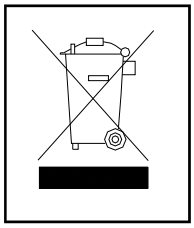
CONTACT DETAILS

Hydraulic Projects Limited
Dawlish Business Park
Dawlish
Devon
EX7 0NH UK

Tel: +44 (0)1626 863634
Email: sales@hypro.co.uk
Web: www.hypro.co.uk

DISPOSAL

Please dispose of End of Life items responsibly. In the event that you are unable to use your nearest local authority civic amenity sites to recycle, units can be returned to us.



Dec 2020

UK Declaration of Conformity for Design and Construction for Watercraft Components - Schedule II - when placed on the UK market separately under the requirements of the Recreational Craft Regulations 2017 as amended.

Name of component manufacturer: Hydraulic Projects Limited

Address: Dawlish Business Park

Town: Dawlish **Post Code:** EX7 0NH **Country:** UK

Name of authorised representative (if applicable):

Address:

Town: **Post Code:** **Country:**

Module used for design and construction assessment: ☒ B+C ☐ B+D ☐ B+E ☐ B+F ☐ G ☐ H

Name of Approved Body for design and construction assessment: HPI Verification Services Ltd

Address: The Manor House, Howbery Park

Town: Wallingford **Post Code:** OX10 8BA **Country:** UK **ID Number:** 1521

Approved Body certificate number: HPi/066-003-1-01 **Date:** 03 / 06 / 2013P

Other Regulations applied: **BS EN 60945:2002** (DC) (Electromagnetic Compatibility)

DESCRIPTION OF WATERCRAFT COMPONENT:

Brand/Model: PR+Hy-Pro Drive Hydraulic Reversing Pumps For Use With Autopilots in Hydraulic Steering Systems Sizes: 0.5 – 2.5 l/min

- ☐ Ignition-protected equipment for inboard and stern drive petrol engines
- ☒ Ignition-protected equipment for petrol tank spaces
- ☐ Start-in-gear protection devices for outboard engines
- ☐ Steering wheels
- ☒ Steering mechanisms and cable assemblies
- ☐ Fuel tanks intended for fixed installations
- ☐ Fuel hoses
- ☐ Prefabricated hatches
- ☐ Prefabricated port lights

This declaration of conformity is issued under the sole responsibility of the manufacturer. I declare on behalf of the manufacturer that the component mentioned above fulfils the requirements specified in Part 2 Regulation 6 and Schedule I of the Recreational Craft Regulations 2017 as amended.

Name and function: Elaine Slater (Managing Director) **Signature and title:** (or an equivalent marking)

(identification of the person empowered to sign on behalf of the manufacturer or his authorised representative)

Date and place of issue: **03/04/2022**

WATERCRAFT COMPONENTS	Designated standards Full Application	Designated standards Partial application, see technical file	Other reference documents [1] Full Application	Other reference documents Partial Application, see technical file	Other proof of conformity See technical file	Designated[2] standards or other reference documents used
	Tick only one box per line					*All lines right of ticked boxes must be filled in*
Ignition-protected equipment for inboard and stern drive petrol engines and petrol tank spaces	☒	☐	☐	☐	☐	BS EN ISO 8846:2017
Start-in-gear protection devices for outboard engines	☐	☐	☐	☐	☐	
Steering wheels, steering mechanisms and cable assemblies	☒	☐	☐	☐	☐	EN ISO 10592:2017 (Small Craft – Hydraulic Steering)
Fuel tanks intended for fixed installations and fuel hoses	☐	☐	☐	☐	☐	
Prefabricated hatches, and port lights	☐	☐	☐	☐	☐	
Installation and/or use manual	☐	☐	☐	☐	☐	

[1] Such as non-harmonised standards, rules, regulations, guidelines, etc.
[2] Standards published on gov.uk

EU Declaration of Conformity of Watercraft Components with the Design and Construction requirements of Directive 2013/53/EU (Recreational Craft)

Name of watercraft component manufacturer: Hydraulic Projects Limited

Address: Dawlish Business Park

Town: Dawlish **Post Code:** EX7 0NH **Country:** UK

Name of authorised representative (if applicable):

Address:

Town: **Post Code:** **Country:**

Module used for design and construction assessment: ☒ B+C ☐ B+D ☐ B+E ☐ B+F ☐ G ☐ H

Name of Notified Body for design and construction assessment (if applicable): HPI Verification Services Ltd

Address: The Manor House, Howbery Park

Town: Wallingford **Post Code:** OX10 8BA **Country:** UK **ID Number:** 1521

Notified Body certificate number: HPi/066-003-1-01 **Date:** 03 / 06 / 2013P

Other Community Directives applied: **2014/30/EU** (Electromagnetic Compatibility Directive)

DESCRIPTION OF WATERCRAFT COMPONENTS:

Brand/Model of the watercraft components: PR+ Hy-ProDrive Hydraulic Reversing Pumps For Use With Autopilots In Hydraulic Steering Systems Sizes: 0.5 l/min, 0.6 l/min, 0.8l/min, 1.0 l/min, 1.5l/min, 2.0 l/min and 2.5 l/min

Designation of Annex II component:	Applicable Essential Requirement	Harmonised standards applied
☒ Ignition-protected equipment for petrol engine/tank spaces	Fire protection (5.6.1)	EN ISO 8846:2017 - Electrical devices - Protection against ignition of surrounding flammable gases
☐ Start-in-gear protection devices for outboard engines	Outboard engine starting (5.1.4)	EN ISO 11547:1995 - Start-in-gear protection
☐ Steering wheels ☒ Steering mechanisms/cable assemblies	Steering system (5.4.1)	EN ISO 10592:2017- Small Craft – Hydraulic Steering Systems
☐ Fuel tanks intended for fixed installations	Fuel tanks (5.2.2)	EN ISO 21487:2012 - Permanently installed petrol and diesel fuel tanks
☐ Fuel hoses	Fuel system (5.2.1)	EN ISO 7840:2013 - Fire-resistant fuel hoses, *or* EN ISO 8469:2013 – Non-fire-resistant fuel hoses *(delete as appropriate)*
☐ Prefabricated hatches ☐ Prefabricated port lights	Openings in hull, deck and superstructure (3.4)	EN ISO 12216:2002 - Windows, portlights, hatches, deadlights and doors - Strength and watertightness requirements

This declaration of conformity is issued under the sole responsibility of the manufacturer. I declare on behalf of the manufacturer that the watercraft component(s) mentioned above fulfils the requirements specified in Article 4 (1) and Annex I of Directive 2013/53/EU.

Name and function: Elaine Slater (Managing Director) **Signature and title:** (or an equivalent marking)

(identification of the person empowered to sign on behalf of the manufacturer or his authorised representative)

Date and place of issue : 03 / 04 / 2022

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Hydraulic Projects Ltd supply the world's leading autopilot manufacturers with hydraulic pumps, cylinders and valves of the highest quality for steering yachts and commercial craft.

Our in-house design and technical teams offer the expertise and support
expected of an established world-class manufacturer.

Full technical details of our entire range are available to download from our website

www.hypro.co.uk