

USER MANUAL



AUTOPROP

Automatic Variable Pitch Propeller Since 1986

Autoprop serial No.

H2O Ball Bearing

FITTING, REMOVAL AND MAINTENANCE OF MODEL H2O APS 2 BLADE AUTOPROP

The Autoprop is supplied assembled, tested, and ready to fit to your yacht. Observing the following notes will ensure correct fitting and trouble free service. Additional information and video instructions are available on the Bruntons' You Tube page. Just type 'how to fit an Autoprop' into your web browser.

Tools required for maintenance and fitting/removal

- Selection of Allen keys
- Small punch
- Small flat blade screwdriver
- 10mm socket spanner
- Small hammer
- Peg Spanner (Brunton's special tool for bearing adjustment)
- Socket spanner for propeller shaft nut
- Propeller extractor tool. (Brunton's special tool for Autoprop removal)
- Thread locking compound

Parts available

- Anode nose cone kit
- Bearing adjustment kit
- Bearing service kit
- Replacement blades
- Individual components

Fitting

1. After removing the old propeller check that the shaft taper, key, and thread are undamaged. Try the new shaft nut on to the thread. The taper should be clean and dry.

Check that the key will slide through the keyway in the Autoprop without jamming at any point.

2. Fit the key in to its seat on the shaft. Push the Autoprop on to the shaft making sure it fits snugly on the taper. If it does not appear to fit well, there may be some foreign objects on the taper, or you may need to file the key down until the Autoprop fits snugly on to the taper.
3. Screw the new shaft nut up tight using a socket spanner, finishing with one of the flats of the nut coming under the shaft nut locking screw. If the shaft nut locking screw will bear on to the body of the shaft nut you will need to dimple the body of the shaft nut, with a drill bit.
4. Smear the thread of the shaft nut locking screw with thread locking compound and screw it down on to the shaft nut.
5. Hold the anode nose cone in place and screw in the nylon screws. Do not over tighten.
6. Your Autoprop is now ready for use. Do not attempt to grease it. The bearings are water lubricated.

Removal

1. We recommend that you use a special extractor available from your Autoprop supplier. This is simple to use and avoids having to remove the rope cutter, if fitted. Most three legged pullers will fit the Autoprop.
2. Remove the anode nose cone by removing the nylon screws.

- Unscrew the shaft nut locking screw until it is clear of the shaft nut.
- Unscrew the shaft nut remembering whether it has a right or left hand thread.
- You can now use your three legged puller to remove your Autoprop from the shaft. With the Brunton's extractor tool, slide the brass buffer in to the propeller boss. Screw the extractor plate on to the end of the propeller boss using the socket head screws provided. Screw in the jacking screw and tighten until the Autoprop loosens on the taper, and remove from the shaft.
- Tape the key on to the shaft, or remove and keep in a safe place.

LAYING-UP

When ever you haul-out for antifouling or laying-up for example, the Autoprop needs to be given a high pressure wash **before** it has a chance to dry out. This will remove the deposits which if left to dry will make the blades feel sticky when rotated. After this, rotate the blades by hand to ensure they are free moving, and 'rock' them to check that free movement is present in the bearing mechanism. At this stage the bearing clearance may be checked as outlined in BEARING ADJUSTMENT.

If the Autoprop is left out of the water for any length of time we suggest that a light lubricating oil is squirted in to the bearings to prevent them 'drying up'.

Before re-launching ensure that the blades are free to rotate and that the clearance as noted above is present.

BEARING ADJUSTMENT

Remove the retaining cap by first removing the plastic tamperproof cap. Bend back the tang of the tab washer and slacken the retaining cap locking nut sufficiently to enable the retaining cap to be slackened and removed. If the retaining cap remains tight, tap the hexagon head of locking nut lightly to disengage the cap expanding screw.

Remove the retaining cap locking nut and discard the old tab washer. A new tab washer must be used. It is advisable to slightly pre-bend the end of one tang of the new tab washer to aid re-assembly. Replace the retaining cap locking nut, complete with the new tab washer and tighten on to the cap expanding screw until this is lightly held in it's seat.

Replace the retaining cap on to the post, and tighten until it is lightly seated on the outer race assembly. Using the peg spanner and a torque wrench set to 14 lb./ft (18 Nm), further tighten the retaining cap. At this point the blade should still be able to be rotated through 360 degrees with some difficulty. Ensure that this is possible. If not, repeat the above procedure.

Make a mark on the edge of the retaining cap at a point no.1 as illustrated in figure 2. Slacken the retaining cap until the mark you have made is now in line with a point no.2 in figure 2. Tighten the retaining cap locking nut with a torque wrench set to 14 lb./ft. (18 Nm) whilst keeping the retaining cap in position with the peg spanner. Ensure that the blade is free to rotate through 360 degrees.

Ensure that a flat of the retaining cap locking nut is aligned with the pre bent tang of the tab washer. If necessary align using a tightening action only. Bend up the tang against the flat side of the locking nut. Insert a new tamper proof cap.



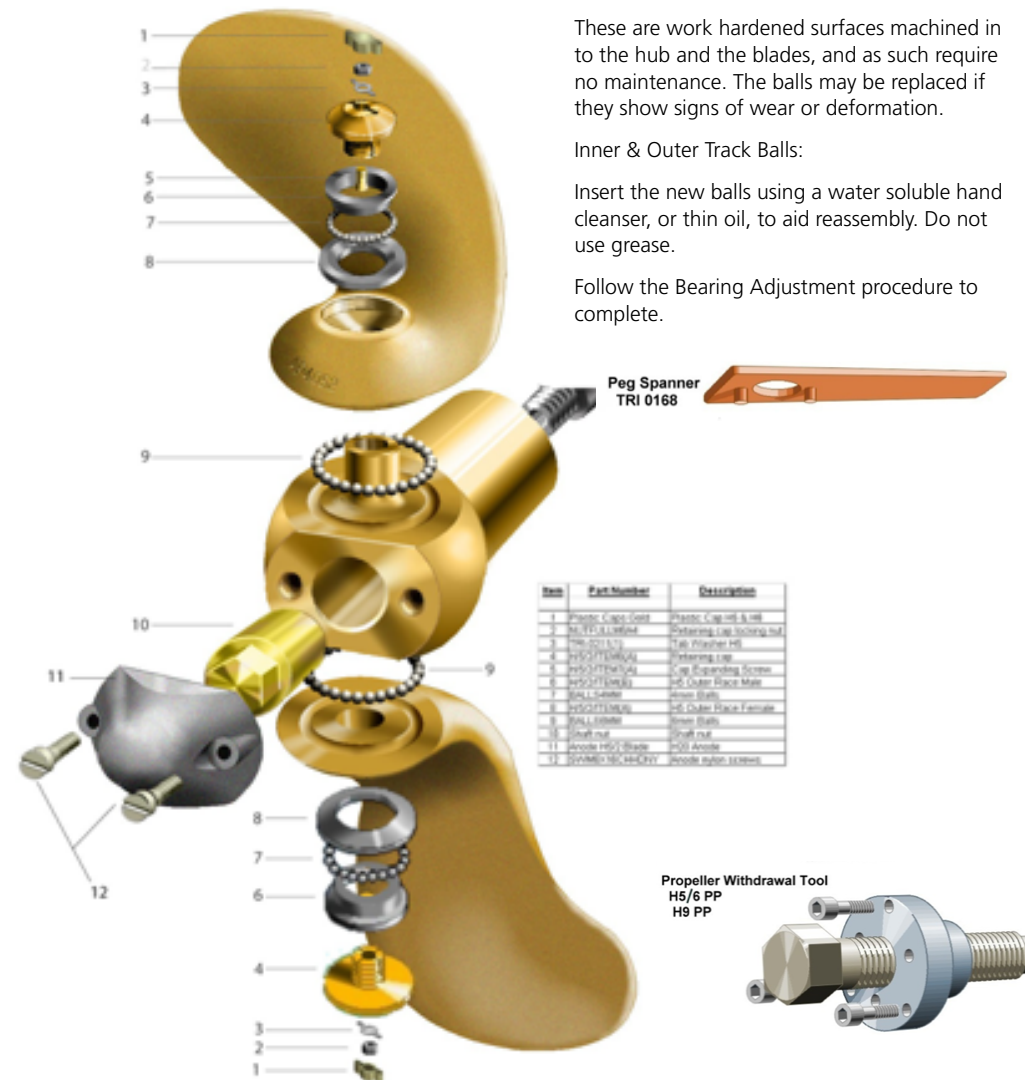
Repeat for the remaining blades.

OUTER & INNER BEARING REPLACEMENT

As wear takes place, the correct bearing clearance may be maintained by adjustment of the retaining cap. After a period of time, normally 700-1000 motoring hours, or when smooth operation cannot be ensured via adjustment, the bearing races will need to be replaced. Before doing so, ensure that rough operation is not due to foreign objects, which may have found their way in to the bearings.

Remove the retaining cap as in the previous section. The blade, and outer race assembly can now be removed by very carefully rocking the blade whilst pulling upwards. If it is difficult to remove, carefully levering under the blade with a screwdriver may help.

Remove the blade and outer race as a unit. This will expose the inner race. The stainless steel balls are not captive, and care should be taken not to loose any. If wear is evident in the outer races, or in the balls of the inner races these may be replaced as follows:



Upper Outer Track:

Once the blade is removed from the boss, this is easily accessible.

Upper Lower Track:

This may be removed by inserting a screwdriver in the gap formed between the underside of the track and its seat in the blade, and then prizing out. The new track can be pushed in place carefully by hand, having ensured that the seat is clean and undamaged.

Inner tracks:

These are work hardened surfaces machined in to the hub and the blades, and as such require no maintenance. The balls may be replaced if they show signs of wear or deformation.

Inner & Outer Track Balls:

Insert the new balls using a water soluble hand cleanser, or thin oil, to aid reassembly. Do not use grease.

Follow the Bearing Adjustment procedure to complete.

QUESTIONS YOU ASK

How does the Autoprop work?

The Autoprop's blades are custom designed by Brunton's Propellers for the particular power, shaft revolutions, and vessel speed. The components of hydrodynamic and centrifugal forces balance, to set the blades at the correct pitch angle. As the yacht speed or engine revolutions change, the blades will automatically readjust to keep the optimum angle of attack to the water flow at all times.

What kind of performance can I expect under power?

The Autoprop will give you improved speed at the same rpm throughout the rev range over all other propellers. The maximum speed attained at maximum rpm will be similar to that of a well designed and made three bladed fixed propeller.

The benefits of this are:

- 1) Achieve the same cruising speed at lower engine revolutions, typically 200-600 less, which means reduced engine noise and vibration, with greater fuel economy and potentially increased range.
- 2) Greater speed at the same engine revolutions over your previous propeller, which means shorter passage times.
- 3) When motor sailing, good drive from the engine is achieved at much lower engine revolutions, loading the engine more efficiently and reducing fuel consumption. The Autoprop senses the drive produced by the sails, and adjusts its pitch accordingly.
- 4) Greatly improved stopping power and astern performance due to the fact that the blades rotate through 180 degrees. They are therefore always operating in the correct attitude. Typically, with the Autoprop, most yachts will be able to stop from a speed of six knots within one boat's length.

Do I need to do anything to make the Autoprop 'feather' under sail?

All you need to do, is to stop the engine whilst motoring in ahead, and thereafter leave the engine engaged in ahead. With engines fitted

with some hydraulic gearboxes, engage your shaft lock. Your Autoprop distributor will be able to advise you if this is necessary.

What performance increase can I expect under sail?

Under sail the blades of the Autoprop will feather to the water flow, reducing drag by up to 85% compared with a fixed three bladed propeller. Typically, this means that a speed increase of between 1/2 and 1 knot may be achieved, this being particularly noticeable below the maximum speed of the yacht.

What manoeuvring characteristics can I expect with the Autoprop?

Due to the self pitching action of the Autoprop, manoeuvring is different to conventional propellers. Firstly, in most cases, there is noticeably less 'prop-walk' experienced. This is due to the finer pitch setting at low speeds giving a reduced 'paddle wheel' effect. Secondly, due to this finer pitch, at low speeds there is less 'bite' felt when engaging ahead or astern from a standstill. This means that more engine revolutions than normal should be used when moving off from a standstill, or at very low speeds. Once some speed has been attained, the engine revolutions may be reduced.

This unique feature of the Autoprop, enables the full power of the engine to be used in situations such as towing, or in emergencies. With conventional propellers because the pitch is too coarse at very low speeds, the engine cannot achieve its full revolutions, and therefore full thrust is not achievable.

Will the Autoprop 'seize up' due to fouling?

The Autoprop is prone to fouling like any other propeller. However, fouling within the bearing mechanism is not normally a problem. As long as your yacht is in an area which has some tidal or current movement, the blades of the Autoprop will be constantly moving back and forth. They will even do so if the yacht is subject to wave action. This movement is enough to dissuade any marine growth from developing on the bearing surfaces. If you are

in an area of exceptionally still water or very high marine growth, then we recommend that you periodically run your engine, and put it into ahead and astern a few times. This will cause any marine growth on the bearings to be crushed by the blade action, and this will then be flushed out.

Will my Autoprop still work correctly even with heavy fouling?

The performance of the Autoprop will be impaired by marine growth just as any conventional propeller. With heavy fouling, thrust diminishes, and there is a reduction in the maximum engine revolutions attainable. However, the Autoprop will still pitch correctly. In areas of high fouling, smoothly coating the Autoprop with a high quality marine antifouling may help to reduce the amount of growth, being careful of course not to allow any antifouling to enter the bearings.

My yacht is kept on a drying mooring. Does this cause any problems?

Drying out in mud poses no problem to the operation of the Autoprop. Brunton's Propellers initial development program included fitting an Autoprop to a yacht which was kept in a mud berth. Despite drying out on every tide for two years, no problem was experienced in the operation of the Autoprop. The water lubricated self-rinsing bearings quickly clear themselves of any debris which accumulates whilst in the mud.

How will the Autoprop stand up to damage?

The Autoprop is some 40% stronger than conventional propellers, as it is made from a special high grade bronze alloy called Superston. The high resistance to impact damage means that you are less likely to damage the Autoprop. In the unlikely event that a blade becomes damaged, you only need to replace that blade, and not the complete Autoprop.

What maintenance does the Autoprop need?

When ever you haul-out for antifouling or laying-up for example, the Autoprop needs to be given a high pressure wash before it has a chance to dry out. This will remove the deposits which if left to dry will make the blades stick when rotated. After this, rotate the blades by hand to ensure they are free moving, and 'rock' them to check that free movement is present in the bearing mechanism. If the Autoprop is left out of the water for any length of time we suggest that a light lubricating oil is squirted in to the bearings to prevent them 'drying up'. And that's it!

The bearings should not need any adjustment for upwards of 1000 engine hours, depending on how hard the engine is used. More movement than normal may then be felt in the blades, and the extra movement can be taken up by adjusting the retaining cap. Eventually, the bearings will need replacing. This is a straight forward procedure covered in the maintenance section. With new bearings in place, your Autoprop is ready once more to power you on for many more miles.

I plan to fit a rope cutter. Is this possible with the Autoprop?

You may fit a rope cutter with the Autoprop in the same way as any other propeller. Rope cutters can also be fitted to Autoprops which are for saildrive installations. Follow the manufacturers fitting instructions for three bladed propellers. With conventional propellers you need to dismantle the rope cutter in order to use a puller for propeller removal. Although you can use most conventional three legged pullers to remove the Autoprop, with Brunton's Propellers purpose made puller there is no need to disturb the rope cutter.

I may fit a different engine or gearbox at a later date. Will I need a new Autoprop?

Not necessarily. Unless the new engine or gearbox necessitate a large change in the diameter of Autoprop needed, Brunton's Propellers can supply replacement blades only, matched to the new engine or gearbox. This will reduce the cost of your new installation.

Autoprop Periodic Maintenance

Your Autoprop has been manufactured from the finest marine grade materials using the latest engineering techniques together with an advanced quality control process to ensure trouble free performance for your enjoyment. To keep your propeller in fine form and 100% reliable, it is highly recommended that your propeller is serviced and maintained as described in our fitting and maintenance instruction book.

You can carry out a basic service yourself, particularly for greasing the blades and zinc anode replacement. We do advise that you use original parts, as well as our recommended grease. These parts are available through our network or world-wide sales outlets.

For prescribed manufacturers recommended bearing and seal replacement. It is highly recommended to use a trained technician or a Brunton's Propellers Authorized Service Centre. Details of approved service centres are available on our website.

Thank you for choosing the World's only Automatic Variable Pitch propeller for your propulsion package. Happy Sailing.



Service 1	Service 2
Date	Date
Engine Hours	Engine Hours
Service Centre	Service Centre

Service 11	Service 12
Date	Date
Engine Hours	Engine Hours
Service Centre	Service Centre

Service 3	Service 4
Date	Date
Engine Hours	Engine Hours
Service Centre	Service Centre

Service 13	Service 14
Date	Date
Engine Hours	Engine Hours
Service Centre	Service Centre

Service 5	Service 6
Date	Date
Engine Hours	Engine Hours
Service Centre	Service Centre

Service 15	Service 16
Date	Date
Engine Hours	Engine Hours
Service Centre	Service Centre

Service 7	Service 8
Date	Date
Engine Hours	Engine Hours
Service Centre	Service Centre

Service 17	Service 18
Date	Date
Engine Hours	Engine Hours
Service Centre	Service Centre

Service 9	Service 10
Date	Date
Engine Hours	Engine Hours
Service Centre	Service Centre

Service 19	Service 20
Date	Date
Engine Hours	Engine Hours
Service Centre	Service Centre

TERMS & CONDITIONS OF WARRANTY AND PRODUCT LIABILITY

DEFINITIONS

These Conditions shall be incorporated in all Contracts entered into by Bruntons Propellers Ltd ("Company") to the exclusion of any other terms and conditions whether or not the same are endorsed upon, delivered with or referred to in any purchase order or other document delivered by the Purchaser to the Company.

REPAIR, SERVICING & OTHER WORKS

In the event of the Company undertaking the repair or servicing or any other work (whether of a similar nature or not) on goods made available for the purpose by a Purchaser:

Every care will be taken to carry out the work satisfactorily but no guarantee is given to return goods to their original state or as to their performance, nor is any liability accepted in connection with the time taken to carry out the work;

The Purchaser or his agents shall give the Company or its workmen or those of its agents access to any dock and ship or other premises where the goods are situated and to the goods to be worked on at all reasonable times with the use of normal dock or other services including air, water and electricity. If the Company consider it necessary to work outside normal hours the Purchaser will use his best endeavour to facilitate such work and to provide the necessary access and services.

DAMAGE IN TRANSIT

When the price quoted includes delivery the Company will repair or replace free of charge goods damaged in transit provided the carriers and the Company receive written notification of such damage within seven days of delivery. The Company shall not be responsible for any damage sustained after the goods have been unloaded at the agreed point of delivery of where the Purchaser has failed to notify the Company of the damage within the time period specified.

SPECIFICATION AND PERFORMANCE

Unless the Company has been engaged to produce technical drawings only, all specifications, drawings and other data submitted with a tender or quotation are approximate. Descriptions and illustrations contained in catalogues, prices lists and other advertising matter issued by the Company are intended only to present a general idea of the goods and none of these documents shall form part of any contract unless expressly stated.

1. Unless otherwise agreed by the parties, any drawings, specifications and other data issued by the Company for the purpose of any contract or prospective contract

remain the property of the Company and shall be treated as confidential by the Purchaser.

2. Performance figures given are based upon experience and are such as the Company expects to obtain on test. The Company accepts no liability if such performance is not attained in use unless it is expressly guaranteed in the contract. Where such guarantee is given it shall be without prejudice to the provisions of Clause 15 thereof.
3. It is the Purchaser's responsibility to satisfy themselves that the specification offered by the Company defines goods which are sufficient and suitable for the Purchaser's purpose. Defects in quality or dimensions in any delivery shall not be grounds for cancellation of the remainder of the order or contract (if any).

INTELLECTUAL PROPERTY RIGHTS

Unless expressly stated to the contrary and embodied in the contract, all intellectual property rights in respect of the goods and services remain vested in the Company.

1. Where goods are not of the Company's design the Purchaser shall indemnify the Company against all damages, penalties, costs, claims and liability in respect of the infringement of any letters patent registered design or other industrial rights resulting from the carrying out of work in accordance with his design particulars specifications work data or instructions, express or implied.

DELIVERY TAKING OVER AND PASSING OF PROPERTY

Without prejudice to any of the Company's other rights under these terms and conditions notwithstanding delivery of any goods and at the Company's sole discretion, title in the goods shall remain with the Company until they have been paid for in full.

1. If such payment is overdue in whole or in part the Company may (without prejudice to any of its other rights) recover or re-sell the goods or any of them and may enter upon your premises for that purpose, a licence for which purpose is hereby granted, if any of the goods are incorporated in other goods before such payment the Property in the goods delivery by the Company shall nevertheless be and remain with the Company until such payment has been made provided that where any goods delivered under this Contract have been sold by the Purchaser either in their original form or after further processing or incorporating in some products then the Purchaser shall be trustee for the Company of the proceeds of sale thereof or of any claim by the Purchaser in respect of such goods.
2. Notwithstanding the above, risk in the goods shall pass to the Purchaser upon delivery (and you should therefore insure).

PACKAGING

Unless otherwise stated packaging will be in accordance with the Company's standard packaging and is not returnable.

1. The Company accepts no liability whatsoever for damage in transit on the grounds of alleged unsuitability of packaging.

GUARANTEE

1. The Company undertakes during a period of twelve months from the date of delivery and provided the goods have been subject to proper use and storage to replace or at its option repair at a location of its choice goods which prove to be defective due to faulty materials or workmanship. The guarantee is given in lieu of any liability or guarantee implied by law in respect of the liability of the Company.
2. Defective items or parts thereof must be promptly returned to a location chosen by the Company. If the defect is found to have arisen under conditions covered by this guarantee then the Company will repair or replace the defective part and send the repaired or replacement part free of charge. If, however, the goods are found either to be serviceable or to be defective for reasons outside the guarantee then, the entire costs of the test repair or replacement and carriage shall be borne by the Purchaser. The Company decision as to whether or not a deflection is covered by this guarantee or not shall be final and binding on both parties.
3. In respect of parts of components with a finite life not manufactured by the Company the Purchaser shall receive only such guarantee as shall be given by the manufacturer or supplier thereof to the Company.
4. The benefits of sub-clause .1 and .2 shall apply to any goods repaired or replaced in accordance with the terms hereof.
5. The Company shall have no responsibility for goods or parts thereof altered by the Purchaser without the Company's express written agreement or exhibiting wear or suffering damage before the expiration of the Company's guarantee period due wholly or partially to improper or careless treatment or operation, excessive stressing, sandy or polluted water, deposit of or intrusion of extraneous bodies, or defective shipbuilding or machinery installation work, or for defects caused by or causing or contributing to vibration characteristics of a ship or engine.
6. In the event of the Company providing a member of its engineering staff to attend at the installation of a propeller manufactured or repaired by it, it is to be understood that except as otherwise agreed in writing with the Company any advice and/or assistance will be given in good faith but without any acceptance of responsibility.

7. Normal wear and tear will not be covered under warranty.
8. Parts not serviced correctly in the prescribed time frame with OEM parts, tools and grease, will be void of warranty.

TESTS

Goods if manufactured by the Company and requiring tests or inspection shall be tested at a place nominated by the Company. If the Purchaser or his representative does not attend, the Company will have the test or inspection carried out in accordance with the specification and the Purchaser shall be deemed to have accepted such test or inspection. If any additional or special tests by more than one Classification Society or Inspection Authority are required, the extra costs shall be borne by the Purchaser.

LIMITATION ON LIABILITY

The Company does not accept, and the Client indemnifies the Company against, any consequential loss and liability whatsoever, howsoever arising, directly or indirectly, from the provision of work, goods or services under the Contract.

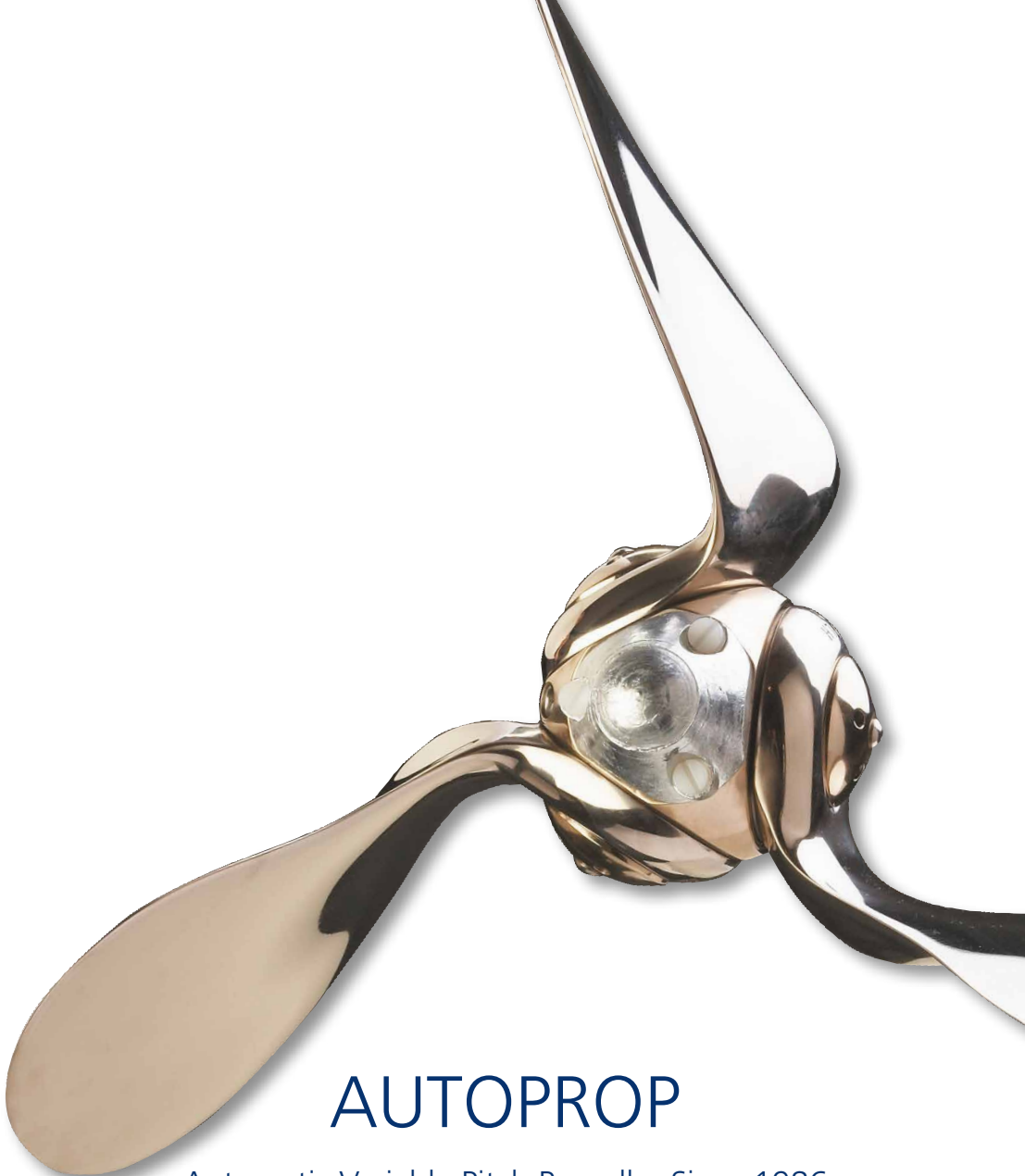
1. The Company shall be liable for general damages to the Customer's arising, directly or indirectly, from the provision of work, goods or services under the Contract. The Company's liability in respect of such damage shall in every respect, unless otherwise agreed in writing by the Company, be limited to 25% of the value of the work, goods or services provided under the terms of the Contract.

HEALTH AND SAFETY INDEMNITY

1. The Purchaser shall indemnify the Company in respect of any liability, monetary penalty or fine in respect of, or in connection with the Products incurred by the Company under the Health and Safety at Work Act 1974 or any statutory modification or re-enactment thereof or any regulations, orders or direction made thereunder.

JURISDICTION

1. All Contracts shall be construed in accordance with English Law and all disputes which may arise under or in connection with the Contract shall be submitted to arbitration in accordance with the Arbitration Act 1950 and any statutory modification or re-enactment thereof.



AUTOPROP

Automatic Variable Pitch Propeller Since 1986

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