

HARKEN®

Integral Hydraulic Cylinder

Installation and User Manual



Please read these instructions carefully before using or servicing the equipment.
This manual may be modified without notice. See: www.harken.com/manuals for updated versions.

PLEASE SAVE THESE INSTRUCTIONS

Introduction

This user manual contains important information for the correct use of the Integral Hydraulic Cylinder. Read all instructions carefully before use. If you do not understand these instructions, contact Harken. Do not use the Integral Hydraulic Cylinder unless you have a sufficient level of sailing training and experience.



CAUTION! Strictly follow all instructions to avoid an accident, damage to your vessel, personal injury or death. See harken.com/manuals for additional safety information.

Description

The Harken Integral Hydraulic Cylinder is designed for use on sailboats and is sized according to boat and rigging. When ordering, always have your choice confirmed by a Harken representative or other sailing professional. The limited warranty does not cover use of product outside of normal sailboat applications.

Parts ordered separately

Standard eye/jaw toggle

Tools Required

Hex driver, 3 mm

Loctite®, Blue 242



WARNING! Cylinders are capable of exerting very high loads and can break associated components. Inspect all standing backstay and forestay rigging components to ensure they are in good condition. Failure to inspect components may result in sudden breakage at high loads.

Installation

Installation

Review all instructions carefully prior to installation of your new Integral Hydraulic Cylinder.

1. Carefully unpack the cylinder and check for visible defects. If any signs of damage are present, contact your dealer at point of purchase or Harken.
2. Extend cylinder to prepare for installation.
Turn release knob counterclockwise completely. Attach the bottom (end) clevis to the deck, and attach the upper (rod) clevis to the main halyard. Pull rod clevis as necessary to fully extend the cylinder. When cylinder is extended, detach from deck and main halyard.
3. Check installation site for clearance.
Attach a standard eye/jaw toggle to the cylinder's bottom clevis before securing to the chainplate.
 - Install two pins in different orientation to accommodate stay movement so the aluminum won't fatigue during use.
 - Standard toggles fit all Harken cylinders.**NOTICE:** Be sure to include toggle length in cylinder length for deduction from stay.
4. Mount cylinder rod end up.
When mounting, orient pump handle to your preference.



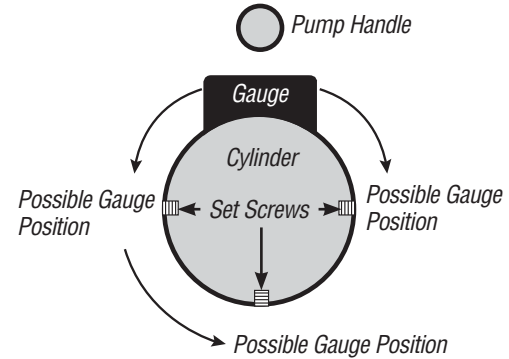
Installation

5. Check to see if gauge is aligned to your preference. If necessary, you may loosen set screws on bottom of cylinder tube (above release knob) completely. Rotate cylinder tube to adjust gauge to 1 of 4 positions as noted in diagram.
6. When gauge is in preferred position, re-tighten set screws. Make sure screws install into pump housing dimples.



CAUTION! Limit cylinder rotation to avoid problems or damage.

7. Attach cylinder to backstay.
 - Use 3 mm hex driver to remove screw from clevis pins.
 - Attach lower clevis to toggle/chainplate. Open the release valve and extend the cylinder.
 - Attach upper clevis to backstay.
8. Use Blue 242 Loctite® when installing screws to prevent loosening.



Gauge/Cylinder Rotation Direction	Limit of Rotation Relative to Pump Housing
Clockwise*	1/4-turn (90°)
Counter-Clockwise**	1/2-turn (180°)

*O-ring will expand and bulge.

**Overturning may lead to thread engagement issues.

Bleed Pump

All Harken Integral Hydraulic Cylinders are cycled and tested at factory prior to shipment. However, oil can become displaced inside cylinder during shipment or storage. Bleed pump prior to use.

1. With cylinder in vertical position, rod end up, fully extend the cylinder.
2. Open release valve and pump for one (1) minute. When complete, the pump and cylinder are bled.

Operation

The Harken Integral Hydraulic Cylinder is easy to use and offers unique, double-acting pump action to move oil twice as fast as a single-acting pump. Follow these simple steps for cylinder operation.

Increase tension

1. Turn pressure release knob clockwise to close.
The resting position for the pressure release knob is closed.
2. Move pump handle in and out until desired tension is achieved.

Notice: It is impossible to over-tighten the knob or damage the valve by hand.

Decrease tension

1. Turn release knob counterclockwise to open. Release speed depends on how far the knob is turned.



WARNING! Backstay cylinders can overload jib halyard and jib luff components including furlers. Be sure to check and/or ease jib halyard before tensioning backstay.



Operation

Relief Valve Settings

The Integral Hydraulic Cylinder relief valve is preset at our factory to limit the tension to the maximum load of the recommended cable of the rigging for which it is used. Each cylinder is set to provide a specific maximum pull force.

FACTORY-SET MAXIMUM PULL FORCE BY CYLINDER

Type	Cylinder Part No.	Maximum Pull Force	
		lb	kg
-6	HCI025110345	3500	1590
-10	HCI035130345	5000	2270
-12	HCI040160385	6500	2950
-17	HCI045160385	8700	3950

IMPORTANT: If release is set beyond max factory set pressure relief, warranty may be voided.

Reading Cylinder Gauge

The easy-to-read analog gauge displays oil pressure in thousands of pounds per square inch. Refer to the table below to convert oil pressure to pull force.



Notice: Gauge needle may go beyond specified relief setting during pump action then return to the maximum specified relief setting. This is normal and is part of the cylinder design.

Cylinder tension can be increased by adjusting the pressure relief setting. Contact your Harken Service Representative for assistance.

Part No.	- Size	Max wire Ø		Stroke in mm	Pin center length (closed)*		Weight**		Gap/pin Ø		@ 1000 psi 69 bar		@ 2000 psi 138 bar		Pull force***		@ 4000 psi 276 bar		@ 5000 psi 345 bar		Breaking load		
		in	mm		in	mm	lb	kg	in	mm	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	
HCI025110345BCC	-6	7/32	5.5	13.6	345	29.8	758	7.3	3.32	7/16	11.1	1236	561	2473	1122	3500	1587	—	—	—	—	7000	3175
HCI035130345BCC	-10	9/32	7	13.6	345	29.8	758	7.3	3.32	1/2	12.7	1236	561	2473	1122	3709	1682	4946	2243	6182	2804	12364	5608
HCI040160385BCC	-12	5/16	8	15.2	385	32.8	834	10.8	4.92	3/8	15.9	2098	952	4197	1904	6295	2855	8394	3807	10492	4759	20984	9518
HCI045160385BCC	-17	3/8	9.5	15.2	385	32.8	834	10.8	4.92	3/8	15.9	2098	952	4197	1904	6295	2855	8394	3807	10492	4759	20984	9518

*For pin center length open add stroke length to pin center length closed.

**Rod ends (forks) included in weights.

*** Max relief setting is 5,000 psi/345 bar.

Inspection

Perform a visual inspection of the Integral Hydraulic Cylinder prior to each use to ensure clean, unobstructed working conditions.

Care and Maintenance

Harken cylinders should give years of reliable service. If cylinder is properly bled, and clean environment is maintained, no regular maintenance is required. Seals should be changed every ten years (dependent on use) unless cylinder eases without pressure relief valve releasing the pressure first. If you experience any problems with your Harken Integral Hydraulic Cylinder, contact your Harken Service Representative.

Warranty

Harken warrants that each Harken product, when properly used and maintained, will be free from defects in material and workmanship from the date of receipt of the product by the final customer. Harken products are covered by two different kinds of warranties, on the basis of the purchaser and use made of them.

For complete warranty or for information relating to a specific warranty concern, please refer to the following:

Harken Catalog, Website: www.harken.com/manuals
Call or Email the Nearest Harken Distributor or
Harken Corporate Headquarters

HARKEN®

Corporate Headquarters

N15W24983 Bluemound Rd., Pewaukee, WI 53072-4974 USA, Tel: (262) 691-3320, Fax: (262) 701-5780,
Web: harken.com, **Online Catalog:** www.harkenstore.com, **Email:** harken@harken.com

Harken Adriatik d.o.o.: Obala 107, 6320, Portoroz, Slovenia, Tel/Fax: (386) 5-6774122
Web: www.harken.si, **Email:** info@harken.si

Harken Australia Pty, Ltd: 1B Green Street, Brookvale, N.S.W. 2100, Australia, Tel: (61) 2-8978-8666, Fax: (61) 2-8978-8667,
Web: www.harken.com.au, **Email:** info@harken.com.au

Harken France: ZA Port des Minimes, BP 3064, 17032, La Rochelle Cedex 1, France, Tel: (33) 05.46.44.51.20 • Fax: (33) 05.46.44.25.70,
Web: www.harken.fr, **Email:** info@harken.fr

Harken Italy S.p.A.: Via Marco Biagi, 14, 22070, Limido Comasco (CO) Italy, Tel: (39) 031.3523511, Fax: (39) 031.3520031
Web: www.harken.it, **Email:** info@harken.it

Harken New Zealand, Ltd: 30-36 Fanshawe Street, P.O. Box 1951, Auckland 1001, New Zealand, Tel: (64) 9-303-3744, Fax: (64) 9-307-7987,
Web: www.harken.co.nz, **Email:** harken@harken.co.nz

Harken Polska SP ZOO: ul. Rydygiera 8, budynek 3A, lokal 101, I piętro, 01-793, Warszawa, Poland, Tel: +48 22 561 93 93, Fax: +48 22 839 22 75,
Web: www.harken.pl, **Email:** polska@harken.com

Harken Sweden AB: Main Office and Harken Brandstore: Västmannagatan 81B, SE-113 26 Stockholm Sweden, Tel: +46 303 618 75, Fax: +46 303 618 76,
Mailing address: Harken Sweden AB, Box 64, SE -440 30 Marstrand, **Email:** harken@harken.se

Harken UK, Ltd: Bearing House, Ampress Lane, Lymington, Hampshire SO41 8LW, England, Tel: (44) 01590-689122, Fax: (44) 01590-610274,
Web: www.harken.co.uk., **Email:** enquiries@harken.co.uk

**Please visit: <http://www.harken.com/dealers/dealers.php>
for an up-to-date list of Harken dealers and distributors**