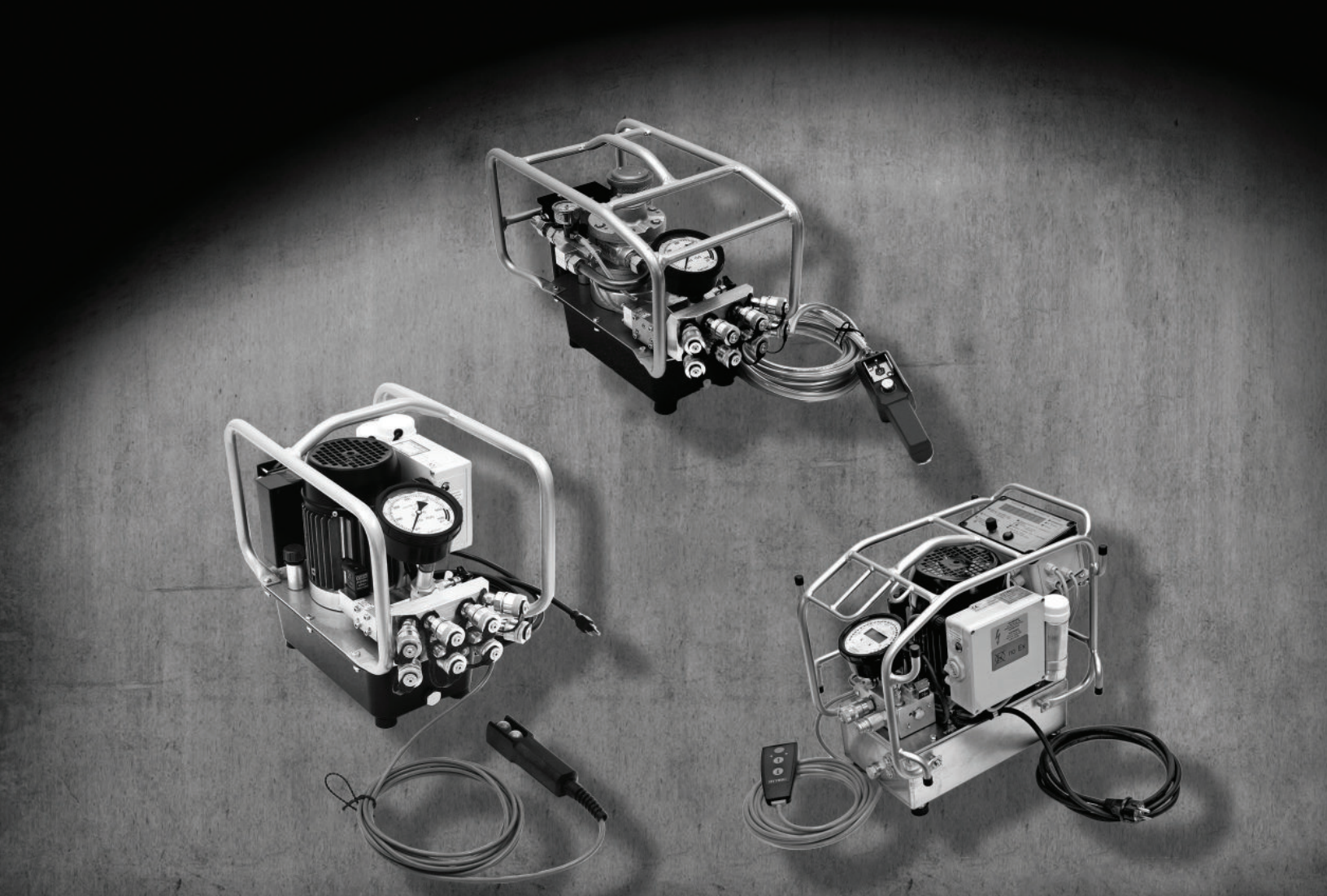
HYTORC®

Since 1968



HYDRAULIC PUMP

OPERATIONS MANUAL

3rd. Edition: Mar. 2015

This manual applies to all pumps in the Hydraulic Pump Product Families. It is recommended the manual is kept up-to-date by checking the edition and date code at the bottom of this page by utilizing the HYTORC website and downloading a copy of the most recent edition as needed.

HYDRAULIC PUMPS PRODUCT FAMILY:

JETPRO-S 115/230, HYSTREAM 115/230, HY-115/230, HY-115-FA1, HY-115-FA4, BigJet 18-400, HY-AIR

EN, EN-ISO, ISO Standards:

EN ISO 12100-1:2011	EN 982:2009
EN ISO 12100-2:2011	EN 61310-2:2008
EN ISO 14121-1:2007	EN 61310-3:2008
EN ISO 11148-6:2012	ISO 3744:2011

For a complete EC declaration of conformity or if you require any further assistance please contact your local HYTORC representative or 1-800-FOR-HYTORC (1-800-367-4986) or on the web at www.hytorc.com.

HYTORC Corporate Headquarters
333 Route 17 North
Mahwah, NJ 07430, USA

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Product Modifications: *Hytorc Corporation* ***DOES NOT ALLOW*** *any of the products listed in this manual to be modified by any end user without exception. Should an application require a modification to the tool, or any of the standard accessories please consult with your local HYTORC representative and they will be able to obtain the assistance for any modification that may be required.*

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3rd. Edition. Printed in USA. March 2015
Complies with standards publication BS EN 82079-1:2012

THANK YOU FOR PURCHASING THIS REVOLUTIONARY TORQUE/TENSION SYSTEM

PLEASE CALL YOUR HYTORC REPRESENTATIVE TO SCHEDULE A FREE TRAINING THAT WILL HELP YOU GET THE MOST OUT OF THIS ADVANCED BOLTING SYSTEM.

OPERATING CD: Please show the enclosed CD to your staff before each tool use to familiarize them with the tools.

FREE SAFETY TRAINING: To ensure safe operation, please request the FREE Safety Training before use by calling your local HYTORC Representative 1-800-367-4986 or www.hytorc.com. We recommend safety training every 6 months. These trainings are free of charge. Just call us. **PLEASE READ THE SAFETY INSTRUCTIONS HEREIN.**

SYSTEM INSPECTION: Before any use, please inspect the entire tool system, including hoses, gauge, sockets and backup wrenches. Do not use kinked hoses, oversized or heavily worn sockets, backup wrenches, damaged tools, pumps, connectors, or gauges. Connect system to operate from a safe distance. Ensure fasteners are in good shape. Check out tool functioning with drive or hex ratchet turning in one direction only and check out gauge from a safe distance that needle is on zero at no pressure and at 10,000 psi at high pressure. Keep high pressure on and check system visually for leaks. Please keep in mind that hydraulic tools are very strong and work at high pressure.

HANDS-FREE BOLTING: The tool you have purchased may be capable of hands-free operation when used with a HYTORC Washer™. We recommend the use of this washer to increase safety and accuracy and reduce job time. If your bolting system is not compatible with the HYTORC Washer™, the tool should be used with a limited movement reaction fixture and a safety handle to reduce the risk of finger pinching during operation. For more information, please contact us at 1-800-367-4986 or www.hytorc.com.

HANDS-FREE WASHER APPLICATION: Make sure the drive and the tool are locked on securely.

FREE ANNUAL TOOL INSPECTION: With the purchase of HYTORC, you have the right to a FREE annual tool inspection, which includes free seals, springs, connectors, and free lubrication. In case of damaged or worn parts, the first inspection within 12 months of purchase is free of charge. Thereafter, you will be informed of any cost prior to replacement. Any part replaced and charged by us will be sent to you for your inspection upon request when P.O. is issued.

FREE LOANER TOOLS: In case of tool failure during the warranty or rental period, please contact your local HYTORC Agent for a free loaner tool 24/7.

HOSE REPLACEMENT: Hose replacement is recommend every three years, however we recommend yearly hose inspections.

HYDRAULIC OIL REPLACEMENT: We recommend that the oil be changed every three months.

PLEASE WEAR REQUIRED SAFETY ATTIRE and use common sense during operation.

HELP: If you require any further assistance, please call your local HYTORC Representative or 1-800-FOR-HYTORC (1-800-367-4986), on the web at www.hytorc.com 24/7! **It's live!**

PLEASE REVIEW THESE SAFETY TIPS BEFORE EVERY TOOL USE

HYTORC® Since 1968

No. Safety 1-2-1009

STAY SAFE

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THANK YOU FOR BUYING HYTORC!

YOU ARE NOW HOLDING ONE OF THE WORLD'S LARGEST SELLING AND MOST ADVANCED INDUSTRIAL BOLTING SYSTEMS.

HYTORC is used more often, by more industries on more applications than all others combined.
If you maintain your new pump properly, it will last for years to come.

This manual is designed to provide you with the basic knowledge required to operate and maintain your HYTORC pump. Please read this manual carefully and follow the instructions provided. If you have any questions regarding your HYTORC tool, please call us directly at 201-512-9500 or fax 201-512-0530.

Finally, your purchase of this HYTORC tool entitles you to the following FREE services:

- **Free on-site training in the application and operation of your HYTORC equipment**
- **Free semi-annual training**
- **Free annual inspection**
- **Free loaner in case of pump failure**
- **Free engineering assistance by calling 1 800 FOR-HYTORC, or our continental office**

Your local HYTORC office was informed of the delivery of this equipment. Should you require immediate training, please feel free to call us directly to arrange an appointment with you at your convenience.

An instructional CD is also available for basic training and occasional brush up on operating procedures.

For additional information please visit our website at www.hytorc.com

Again, thank you and welcome to HYTORC!

Worldwide Warranty

HYTORC equipment is engineered to the latest technological standards and is backed by our exclusive 12-word, 12-month warranty.

"YOU BREAK IT UNDER NORMAL USE, WE FIX IT FREE OF CHARGE!"

If a HYTORC Pump cannot be repaired on-site, FREE loaner HYTORC equipment will be made available to you upon request.

UNEX CORPORATION OR ITS DEALERS SHALL NOT BE LIABLE FOR LOSS OF PRODUCT OR OTHER INCIDENTAL OR CONSEQUENTIAL COSTS INCURRED BY THE BUYER OR THE USER.

HYTORC Offices Worldwide

Europe	HYTORC Europe	Tel. 33-1-4288-6745
Japan	HYTORC Japan	Tel. 81-3-3314-3315
Australia	HYTORC Australia	Tel. 61-8-8293-8411
United Kingdom	HYTORC UK	Tel. 44-16-7036-3800
Brazil	HYTORC South America	Tel. 55-21-2223-2944
All Others	HYTORC USA	Tel. 201-512-9500 /800-FOR-HYTORC

SECTION I

GENERAL OPERATING INSTRUCTIONS

This manual is designed to provide you with the basic knowledge required to operate your hydraulic pump. Please read this manual carefully and follow the instructions provided.

All HYTORC Power Packs operate in a pressure range from 500 to 10,000 PSI, and are fully adjustable. They have been engineered and designed for portability and high flow for increased speed. Before using your HYTORC power pack, check the following points:

- **Is the reservoir filled with oil?**
- **Where is the closest electrical outlet at the job site?**
- **Is there enough air pressure (100 PSI) and flow at the job site? (Pnuematic only)**
- **Is the gauge mounted and rated for 10,000 PSI?**
- **Is the oil filler plug securely in place?**

IMPORTANT SAFETY INSTRUCTIONS

This pump is engineered to the latest technological and safety standards. In order to maintain these conditions, and to ensure proper operation, the user must follow the instructions for use and safety precautions. Please read this operating manual carefully and follow the instructions provided.The pumps are delivered without oil in the tank. Before starting the hydraulic pump, fill the pump with hydraulic oil.

Look at oil fill level on the oil sight gauge. The oil level is correct when the top gauge is half full. Please note that the oil level should not be above the red mark of the top oil sight The technical information in this manual has been collected with utmost care. However, there is always a possibility of minor errors or typos. Therefore, HYTORC cannot be held legally accountable for incorrect information provided. Please contact us if you have any questions or if you believe there may be an error in the manual.

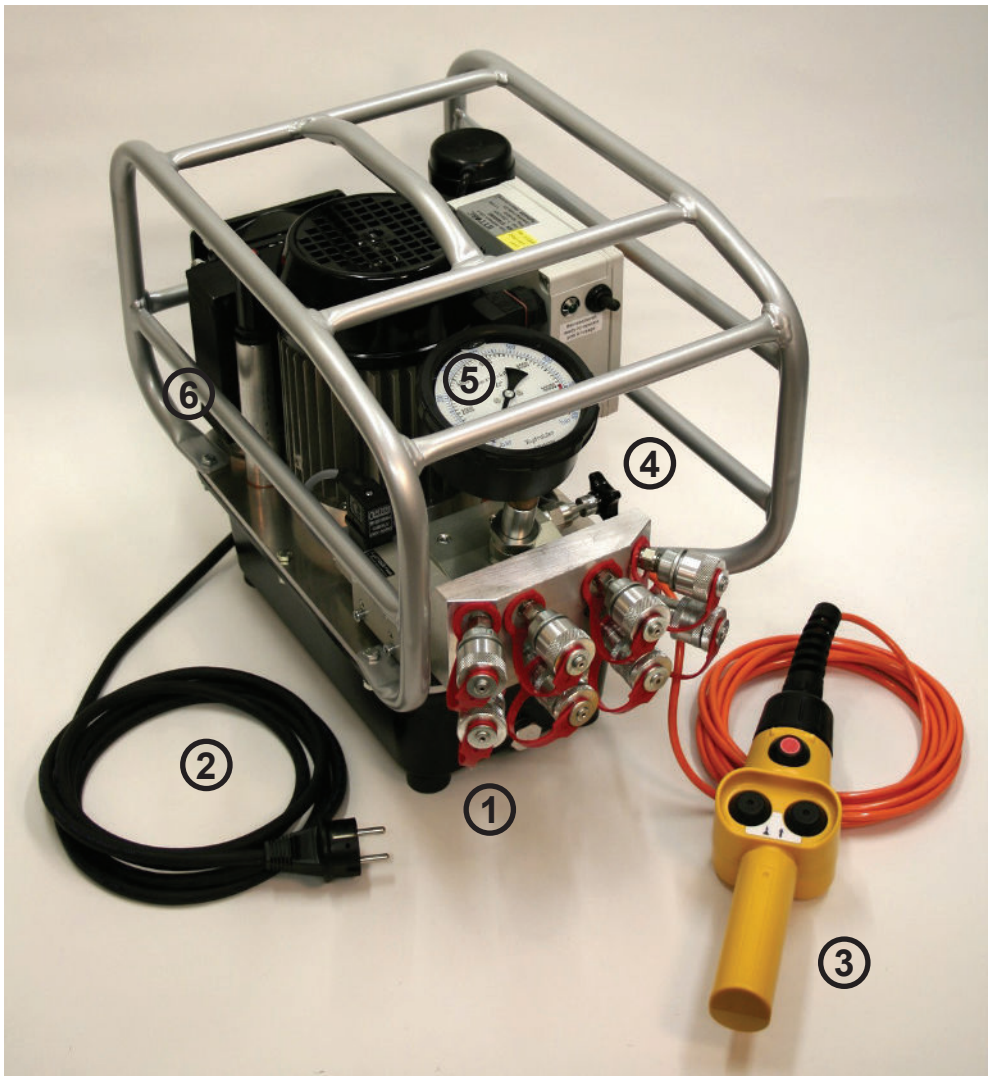
Technical improvements for our products are subject to change without prior notice.

SECTION II

PUMP AND OPERATIONAL CONTROLS

OPERATIONAL CONTROLS (DEPENDING ON PUMP MODEL):

1. **Hydraulic couplers (4-tool adapter on pump in picture)**
2. **Plug for main power cord**
3. **Remote control**
4. **Pressure regulator**
5. **Analog gauge**
6. **Plug for oil filler**

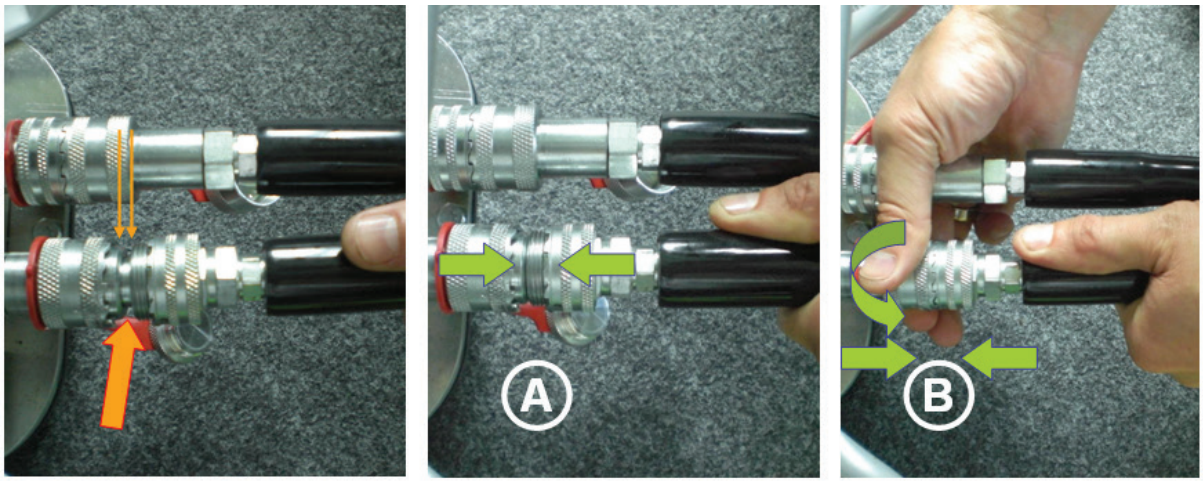


SECTION III

CONNECTING THE HYDRAULIC WRENCH

When using hydraulic hoses for a tool and pump, make sure the hoses are rated for pressure of 40,610 PSI/2800. The system is equipped with safety couplers which prevents the hoses from loosening accidentally.

Connect the twin-line hose as shown below. To connect the twin-line hose, make sure male couplers are connected to female couplers. Hold the hoses as shown in the picture below labeled (A). Ensure the connectors are fully engaged and tightened to the final thread (B). Loose or improperly threaded couplers will prevent the tool from operating and can be potentially dangerous if pressurized.



DO NOT USE PLIERS to tighten the couplers. Severe over-tightening can cause thread failure. Knurled sleeve on couplers need to be hand tight only. (Please also see "Releasing the pressure")

To loosen the couplers, turn it counter clock-wise. It is normal for a small amount of oil to drip from the couplers when disconnected.

RELEASING THE PRESSURE

Before loosening the couplers, release the pressure in the system (There might be residual pressure). Hold the STOP button and push the ON button on the remote control to release the pressure from the system.

SECTION IV

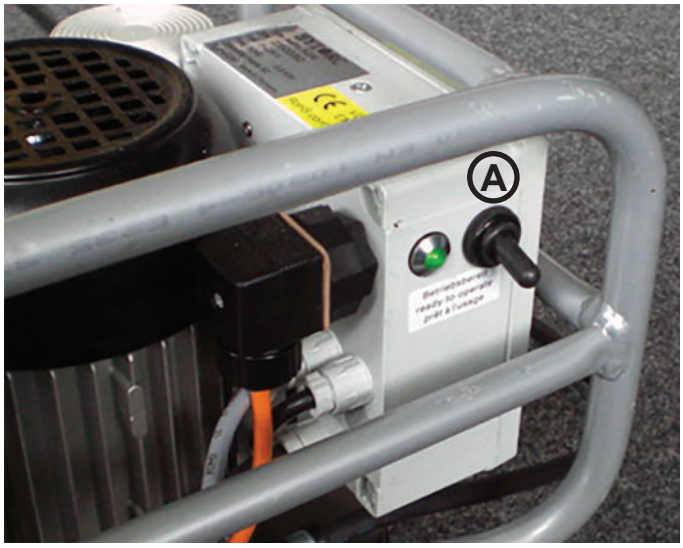
FUNCTIONAL CHECK

All HYTORC pumps are supplied completely assembled and are ready to use. A HYTORC Hydraulic Power Pack, for use with your HYTORC tools, is recommended to provide the safety, speed, pressure and portability that make the tools more efficient and accurate.

Before using the system, it has to be checked for its function and to make sure that no oil leaks occur. Set the pump to max. pressure of 700 bar (10,000psi) and advance and retract the tool a few times.

Do not hold the tool in your hands while performing the functional check!
Do not touch moving parts!

Before you start the pump, turn the lock nut of the pressure regulator counter- clockwise, plug the power cord into an outlet, and use the toggle switch *(A) to turn the pump on.



*Some models may not have a toggle switch. To start a pump without the toggle-switch, plug the power cord into an outlet and start the pump by pushing the manual button on the remote control.

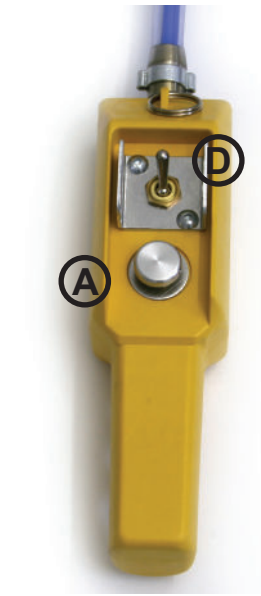
SECTION V

REMOTE CONTROL

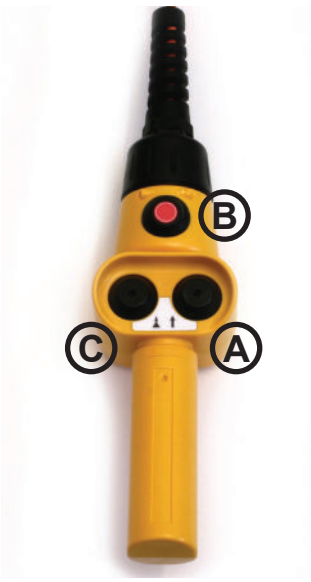
The pumps can be equipped with different remote control models. However, the mode of operation for any remote control is:

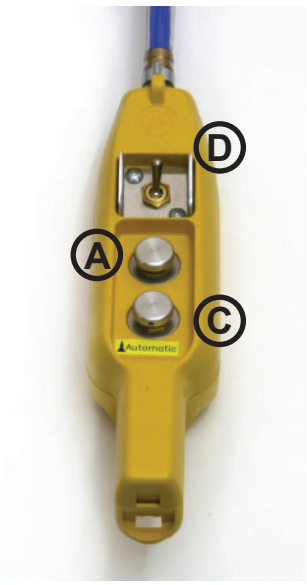
- **PUSH (A)-PUMP IS ON / TOOL ADVANCES**
- **RELEASE (A)-PUMP IS ON / TOOL RETRACTS**
- **PUSH (B)-PUMP IS OFF**
- **PUSH AND HOLD (C)-TOOL ADVANCES AND RETRACTS AUTOMATICALLY UNTIL (C) IS RELEASED**
- **TOGGLE SWITCH (D)-FORWARD (ON) DOWNWARD (OFF) (PNUEMATIC PUMPS)**

MANUAL PUMP



AUTOMATIC PUMP





SECTION VI

SETTING THE PRESSURE / TORQUE

On manual bolting applications, the torque value has to be set with the pump pressure. Therefore, every calibrated tool comes with a certificate. We recommend using tools that have been calibrated to increase safety and accuracy. It is also recommended to have all tools re-calibrated once a year. To make sure that the certificate matches with a certain tool, compare the tool model and serial number of the tool. Both, the tool model and the serial number are engraved in the housing of the tool.

TOOL MODEL AVANTI-1
DESCRIPTION AVANTI-1
SERIAL# E1939

Calibration Certificate with Serial Number (Draft) **Tool With Serial Number (Draft)**

Turn the lock nut on the pressure regulator counter-clockwise. To start the pump: push the green button (A) and hold it. To adjust the pressure, turn the pressure regulator (B) clockwise. The actual pressure is visible on the gauge at any time.
To determine the correct torque value, refer to the torque chart on the back of the calibration certificate. The detailed torque chart shows pressure values in steps of 20bar. After adjusting the pressure, hand tighten the lock nut on the pressure regulator by turning it clockwise.

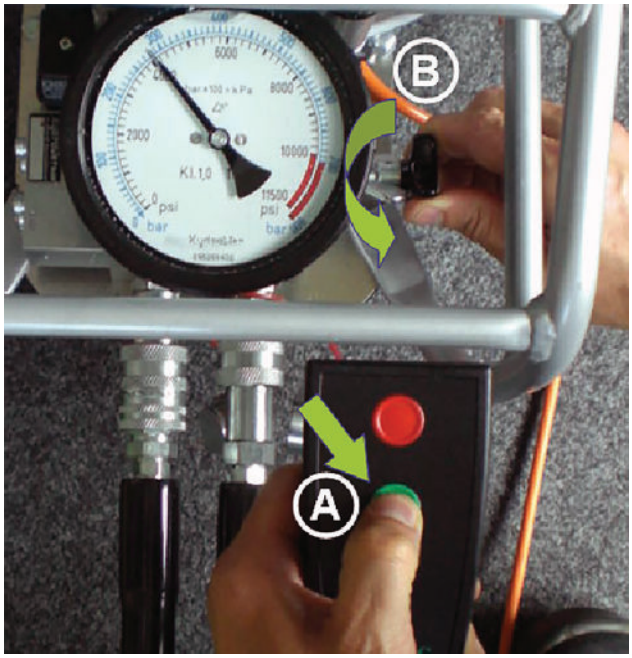
PRESSURE psi	HYTORC STANDARD Lb.ft.	AS LEFT Lb.ft.	AS FOUND Lb.ft.	MIN Lb.ft.	MAX Lb.ft.
1500	604	620	620	586	622
2000	806	802	802	782	830
3000	1201	1220	1220	1165	1237
4000	1602	1644	1644	1554	1650
5000	1993	2034	2034	1933	2053
6000	2404	2466	2466	2332	2476
7000	2809	2886	2886	2725	2893
8000	3198	3272	3272	3102	3294
9000	3608	*3716*	*3716*	3500	3716
10000	4020	4122	4122	3899	4141

Values in italics are close to spec. limits (for information only)

DRAFT

Pressure-Torque Chart (Draft) in a Calibration Certificate (100 bar steps)

Setting the Pressure/Torque Continued



Turn the lock nut on the pressure regulator counter-clockwise. To start the pump: push the green button (A) and hold it.

To adjust the pressure, turn the pressure regulator (B) clockwise. The actual pressure is visible on the gauge at any time.

To determine the correct torque value, refer to the torque chart on the back of the calibration certificate. The detailed torque chart shows pressure values in steps of 20bar.

After adjusting the pressure, hand tighten the lock nut on the pressure regulator by turning it clockwise.

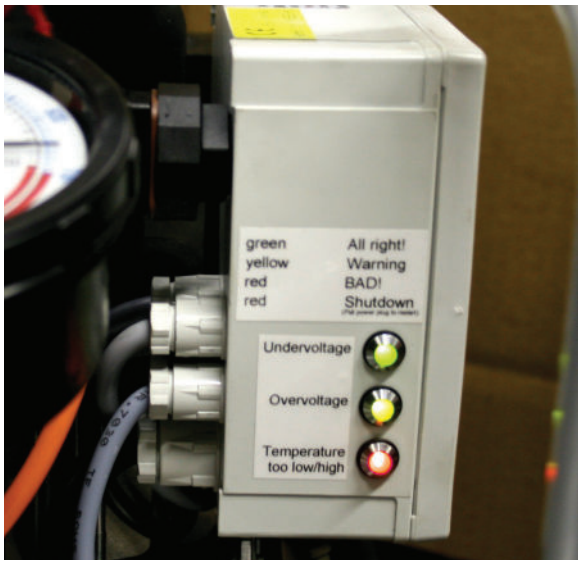
Applying the Torque Wrench - the Tightening Process

1. Having set your target pressure, cycle the tool three or four times to full pressure before putting it on the application. Cycling the tool ensures that the system is operating properly and removes trapped air, if any.
2. Place the proper size impact socket on the square drive and secure properly with a locking ring and pin.
3. Place the tool and the socket on the nut, making sure that the socket has fully engaged the nut. Further ensure that the drive retainer is engaged.
4. Make sure the reaction arm is firmly abutted against a stationary object (e.g. An adjacent nut, flange, equipment housing etc.)
5. When positioning the wrench, make sure that the hose connections are well clear of any obstructions, and that all body parts are safely out of harm's way.
6. THEN, AND ONLY THEN, apply momentary pressure to the system to ensure proper tool placement. If it doesn't look or act right, stop and re-adjust the reaction arm.

SECTION VII

LED LIGHTS FOR SYSTEM MONITORING

The HY-115 Pump is now equipped with (3) three-colored LEDs integrated into the electric control box for system monitoring.



Upper LED: Low voltage

- green when voltage above 95V = o.k.
- yellow when voltage between 95V and 80V
- red when voltage below 80V
- motor switches off when below 77V for more than 5 seconds

Middle LED: High voltage

While not running

- generally green when voltage below 138V
- when above 138V all LEDs will flash red

While running

- green when voltage below 128V
- all three LEDs blink red when voltage above or equal to 128V, motor switches off after 5 seconds

Lower LED: Temperature

Oil temperature

- green when temperature between +32°F (0°C) and +194°F (90°C) = o.k.
- yellow when temperature below +32°F (0°C) (solenoid valve locked) or above +194°F (90°C)
- red when oil temperature above +212°F (100°C) (motor switches off)

Motor temperature

- green when coil temperature below +356°F (180°C) = o.k.
- red when coil temperature above +356°F (180°C) (motor switches off)

SECTION VIII

IMPORTANT INSTRUCTIONS FOR ATEX CERTIFIED PNEUMATIC PUMPS FOR EXPLOSION PROTECTION

The device can be used in hazardous areas as follows:

Explosion-proof hydraulic torque controlled bolting system

HYTORC Division of UNEX Corp.
333 Route 17 North
Mahwah, New Jersey 07430 U.S.A.

EPS 13 ATEX 2 561 X
EX II 2 G EX c IIB T4
CE

Definition: HYTORC hydraulic bolting system, suitable for hazardous areas:

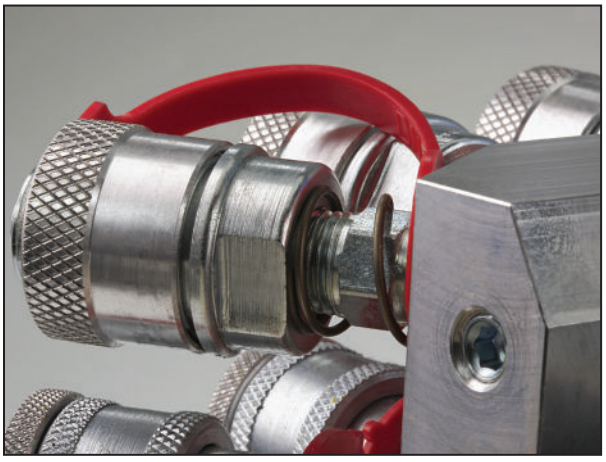
The bolting system, which can be used in hazardous areas, consists of at least three components:

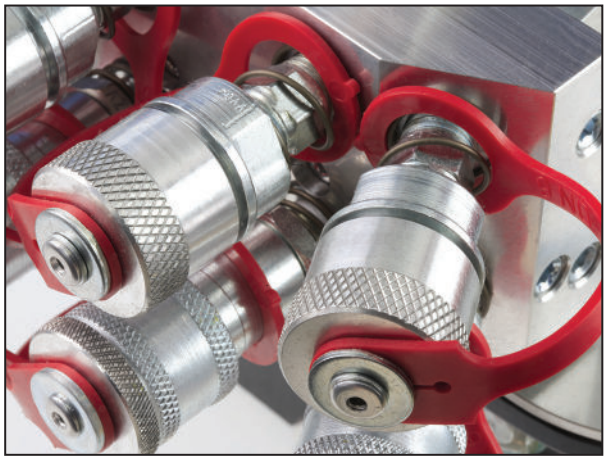
1. Modified pneumatic HYTORC Pump HY-AIR
2. Modified twin hose, nominal diameter 6 mm
3. Modified HYTORC Low Clearance Wrench STEALTH and / or HYTORC Square Drive Wrench AVANTI and / or ICE.

ATTENTION: Only modified HYTORC hydraulic torque wrenches STEALTH, AVANTI and ICE, modified twin hoses (only nominal diameter 6 mm) as well as the modified pneumatic HYTORC Pump JetAir-12 shall be used in hazardous areas!

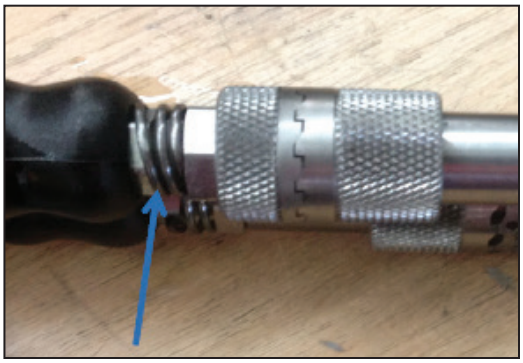
1. **Modified component:** HYTORC HY-AIR Pneumatic pump must be equipped as follows:

a) Solid metal spring on each male and female coupling (between coupler and fitting).





2. **Component:** The HYTORC hydraulic twin hose, with a nominal size of 6 mm (color mint-yellow).

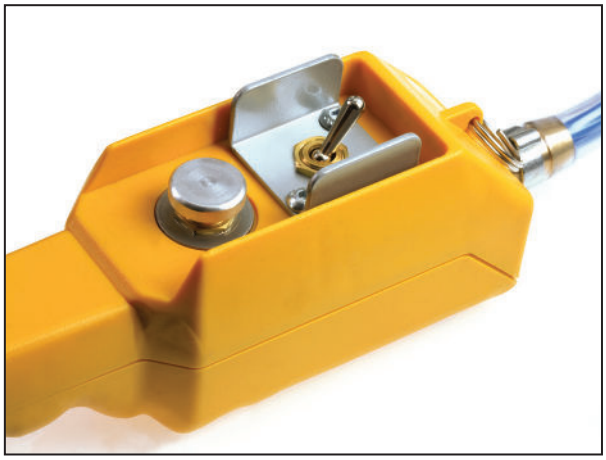


ATTENTION: HYTORC hydraulic twin hoses with a diameter smaller than 6mm are not suited for explosion protection.

The twin hose nominal size 6 mm must be equipped as follows:

a) Solid metal spring on each male and female coupling (between coupler and fitting). Each twin hose has two pairs of couplers, and therefore four couplers

b) Equipped with a plastic remote control FBP-A5 art.-No.: 31044774 or FBP-A10 art.-No.: 33150200. Only this plastic remote control has passed the electric charge and capacity test.



Qualified Personnel:
The bolting system may be operated only by trained and experienced personnel for explosion protection.

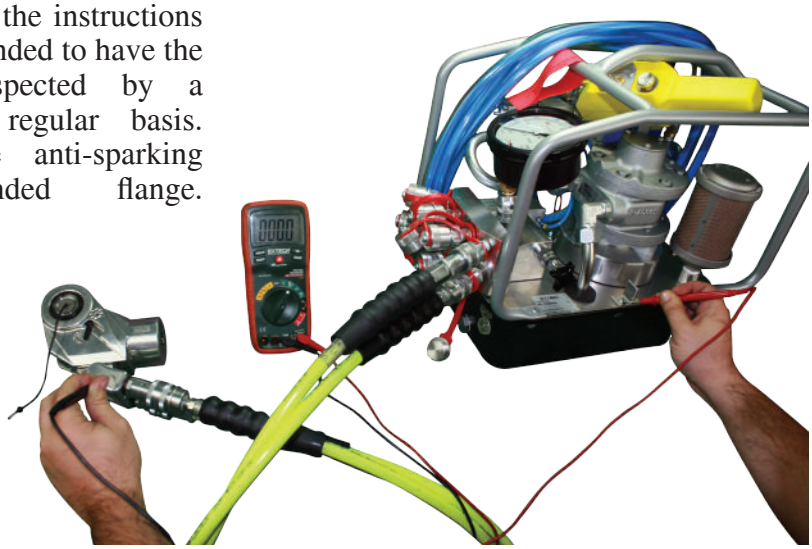
Conductivity:
Conductivity of the entire system is ensured by several solid metal springs,
- HYTORC Pneumatic Pump JetAIR 12.A connected securely to the hydraulic hose
- HYTORC Hydraulic Twin Hose (diameter 6 mm) connected securely to the tool

Explosion protection is guaranteed if:
The explosion protection is only guaranteed when all springs (pneumatic pump, twin hose and tool) are attached tightly. When in doubt about the conductivity of the connection, attach a standard multi-meter between the tool and the end of the ground wire and take a resistivity measurement.

Ground wire:
Avoid electric-potential differences between plant and tool. Before initial operation in explosive areas, a ground wire has to be attached between the HYTORC Pneumatic Pump (No Electric Pump to be used!) and the plant. The ground wire must be supplied by the operating company.

Final recommendation for explosion protection:

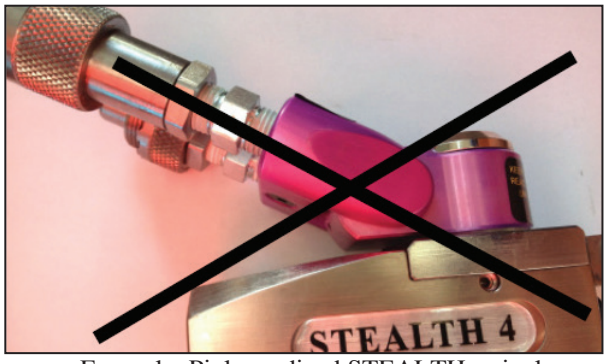
To ensure an effective explosion protection, it is imperative to comply with the instructions mentioned above. It is recommended to have the explosion proof system inspected by a HYTORC Specialist on a regular basis. This system should include anti-sparking sockets and a grounded flange.



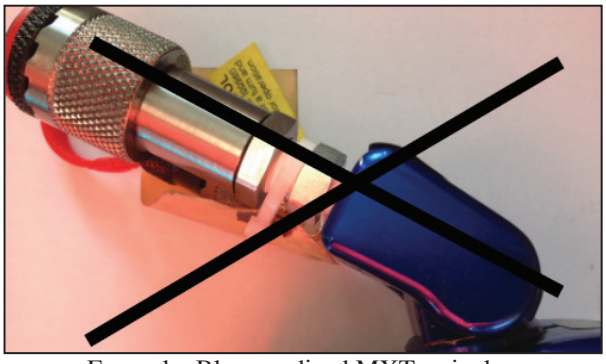
3. **Component:** The HYTORC hydraulic torque wrench. The torque wrench must be equipped as follows:
   a) Solid metal spring on each male and female coupling (between coupler and fitting).

   b) The joints of the swivel on the hydraulic wrench must not be ANODIZED!
   Only the polished swivel can be used!

Important note:
Other anodized HYTORC swivels, for example MXT swivels, are NOT suited for explosion protection!



Example: Pink anodized STEALTH swivel
Not suited for explosion protection!


Example: Blue anodized MXT swivel
Not suited for explosion protection!

The HYTORC HY-AIR hydraulic pump is equipped as follows:

SECTION IX

PREVENTIVE MAINTENANCE

Preventive Maintenance - Hydraulic Power Packs

HYTORC Hydraulic Power Packs are precision-built units and, as such, do require a certain amount of care and maintenance.

- **Hydraulic Oil**

Oil should be completely changed after every 40 hours of operation, or at least twice a year. Always make sure the reservoir is filled with fluid. If additional oil is required, use only high-grade hydraulic oil.

- **Quick-Disconnects**

Fittings should be checked periodically for leaks. Dirt or foreign materiais should be kept away from fittings. Clean before use.

- **Hydraulic Gauge**

Some gauges are liquid filled. Should this liquid level drop, it indicates external leakage, and replacement is necessary. Should the gauge fill with hydraulic oil, it indicates internal failure and it should be discarded.

- **Filter on Pump**

The filter should be replaced twice a year in normal use and more often if the pump is used daily or in a dirty, harsh environment.

- **Remote Control**

(Air Unit) The air line to the remote control unit should be checked for obstructions or kinks in the line periodically. If there is a bend or break in the line, it must be replaced. The spring-loaded buttons on the remote handle should be checked in the event of operating difficulties. (Electric Unit) The rocker switch should be checked periodically if any indication of problems exist.

- **Air Valve**

This valve should be checked twice a year.

- **Brushes and Brush Holders**

(Electric Unit) Check and replace, if worn.

- **Armature**

(Electric Unit) Check yearly.

SECTION X

TROUBLESHOOTING

SYMPTOM	PROBABLE CAUSE	REQUIRED ACTION
Gauge shows pressure build-up but the tool will not cycle	1. Couplings loose or inoperative	1. Tighten and/or replace couplings. Use Test #1 listed below to isolate problem.
	2. Solenoid inoperative	2. Check using test #2 below. If solenoid is bad, replace.
Cylinder will not retract.	1. See above	1. See Above
	2. Voltage to electric pump is too low to line drop or inadequate amperage is available.	2. Get shorter extension cord or upgrade to 12AWG, 25 amp rating or better. If shop power is adequate, draw power from welding machine or cal rod transformer.
	3. Linkage between piston rod and drive arms are broken.	3. Replace parts as necessary.
Cylinder pressure will not build.	1. Oil blow by in tool (Piston seal leak, blown O-ring, cracked piston)	1. Replace defective parts. SHOP JOB
	2. Pump Problem	2. Check to see if sub-plate is worn by; a) Remove screws from pump motor to reservoir, slide Pump motor to the side, turn pump on and while holding down on the button, put your finger on the dump tube (round tube under the directional control valve) - if you feel pressure, then replace the sub-plate and shear seals. 2A. Check to see if you have leaks from the external relief valve and the 2 oil line connections (bottom of relief valve and connection into pump body's other end) of oil line. If leaking, retighten with 9/16" open end wrench. SHOP JOB 2B. If pump sounds like a lot of pebbles in a tin can, the problem may be a worn motor coupling Remove motor from base plate - using a pair of needle nose pliers remove the motor coupling - if worn, replace. SHOP JOB 2C. AIR PUMPS - Faulty Air Valve due to excessive moisture and/or dirt in air supply. Disassemble air valve and wipe any residue from air valve piston - spray brake cleaner into air valve body, dry thoroughly. Disassemble all small air lines and blow out with compressed air. Lubricate both air valve piston and body with hydraulic oil (sparingly) and reassemble. SHOP JOB 2D. Air pumps - Faulty remote control valve cartridge. Replace.

SYMPTOM	PROBABLE CAUSE	REQUIRED ACTION
Cylinder/Tool leaks	1. Safety relief valve on swivel has lifted.	lA. Tighten all hose and couplers. If leak continues, adjust safety setting - Test #4 1B. Check to see if the system is properly plumbed by running test #5 (high pressure on retract side will lift the safety relief valve)
	2. Blown O-ring in cylinder	2. Replace O-Ring with proper high pressure O-Ring. SHOP JOB
	3. Defective gland seal.	3. Replace gland seal. SHOP JOB
Tool operates backwards	1. Couplings reversed	1. Run test #5. Replumb system as necessary.
	2. Multiple hoses in even numbers	2. As plumbed, HYTORC hoses may only be joined together in odd numbers ONLY. If it is necessary to use 2,4,6 hoses - make an adapter from spare high pressure couplings and nipples.
Ratchet returns with stroke	1. Broken or otherwise inoperable drive segment.	1. Replace drive segment and/or spring. SHOP JOB.
Ratchet will not take successive strokes	1. Broken or otherwise inoperative drive segment I or spring	1. Replace drive segment and/or spring. SHOP JOB
	2. Cylinder not retracting completely	2. Remove tool from nut and cycle freely for several strokes. If problem persists, check pawls. 2A. Operator not allowing adequate time for cylinder to retract fully.
	3. Linkage between piston rod and drive plates is broken	3. Replace parts as necessary - SHOP JOB.
Tool locks onto nut	1. Drive segment is loaded when the tool is max'd out in torque	1. Press advance button on remote and build pressure - continue to press down on remote while pulling back on one of the accuracy assurance levers - release remote while continuing to hold back on levers
	2. Tool is operating backwards	2. Push advance button down - tool should immediately fall free- Run test #5
	3. Tool is wedged under a fixed object	3. Remove shroud from around ratchet. Using any tool available, pry the drive segment out of the ratchet and at the same time pull back on the accuracy assurance levers. Tool should swing free or burn away the socket or obstruction.

SYMPTOM	PROBABLE CAUSE	REQUIRED ACTION
Gauge records no pressure	1. Gauge connection is loose	1. Tighten coupling.
	2. Bad gauge	2. Replace gauge
	3. Pump will not build pressure	3. See cylinder pressure will not build pressure-above
	4. Tool seals are blown	4. Replace defective seals. SHOP JOB
Pump will not build pressure	1. Air or electric supply is low	1. Check air pressure or voltage.
	2. Defective relief or regulator valve	2. Replace valve. SHOP JOB
	3. Low oil or clogged filter	3. Fill reservoir and clean filter.
	4. Internal leak in oil line from external relief valve to pump body.	4. Open reservoir, inspect oil line while trying to build pressure - if leaking tighten fittings or replace.
	5. Worn sub-plate	5. See cylinder pressure will not build pressure-above
Motor sluggish and inefficient "sounds sick" slow to build pressure	1. Air or electric supply is low	1. See #1 in preceding block
	2. Clogged filter	2. Clean or replace filter
Pump heats up	1. Improper use	1. Operator is continuing to hold down Pump heats up on the advance stroke after the cylinder has reached end of stroke - this causes a lot of oil to go through a very small hole in relief-valve - causing heat build-up. Have operator release advance stroke after accuracy assurance levers spring forward.
	2. Remote control is left in "on" position when pump is not actively in use.	2. Turn pump off whenever not actually being used. DO NOT leave pump running when tool is not in use.
Hose or tool fitting is damaged or leaks	1. Broken or melted plastic outer covering	1. If underlying Kevlar or steel is still intact continue operation. Inspect frequently.
	2. Frayed Kevlar or steel strands	2. Cut hose In half and discard. Replace Hose.
	3. Oil leaks through fibers	3. Cut hose in half and discard. Replace hose.
	4. Broken fittings	4. Remove old fitting and replace with STEEL high pressure fittings only. After changing fittings, always run test #5 to Ensure proper plumbing.
Electric pump will not run	1. Loose electric connections in control box.	1. Open control box and visually inspect for loose threaded or push-on connectors. Reconnect loose wires. If in doubt check wiring diagram. DANGER· BOX CONTAINS HIGH VOLTAGE· ALWAYS UNPLUG PRIOR TO TOUCHING ANYTHING IN CONTROL BOX.
	2. Bad brushes	2. Change brushes. SHOP JOB
	3. Motor burned up	3. Replace motor or components, whichever is necessary. SHOP JOB .

TEST #1

Attach hoses to pump and tool in the normal manner. Press the advance button and hold it down. If the pump pressure builds and the hoses "flex" but the tool still refuses to cycle, the problem is most likely a loose or defective coupling connection. To find out where the bad coupling is, remove the tool from the hoses and marry the loose ends together and cycle the pump. If the gauge pressure reads no more than 500 PSI, then the bad fitting is on the tool. A significantly greater pressure indicates that the problem is in either the pump or a hose fitting.

TEST #2

Place a welding rod or thin screwdriver in the opening of either side of the solenoid. Press and then release the advance button. Repeat this process on the opposite side of the solenoid. You should feel the solenoids moving back and forth. If either side is "dead" the solenoid is bad and needs to be replaced. Note: if in an urgent situation, the tool may be cycled manually by pushing the solenoids back and forth through these access holes.

TEST #3

Remove tool from hoses. Cycle pump. If pump fails to build pressure, the problem is with the pump. If it does build pressure, the problem is with hydraulic blow-by in the tool.

TEST #4

Connect tool, pump, and hoses together normally and turn pump "on". As oil leaks from the small port under the uniswivel, use a proper size Allen wrench and slowly tighten (clockwise) the set screw positioned between the couplings on the uni-swivel. Continue to tighten until the flow stops plus a quarter turn.

TEST #5

THIS TEST SHOULD BE RUN PRIOR TO EVERY USE OF A HYTORC TOOL

Connect the tool, pump, and hoses together as normal. Cycle the pump several times. Cycle the system once more and observe the sequence of operation. As you depress the advance button, the tool drive should turn about. 24 degrees and you should hear an audible "click". On square drive tools, you will also notice that the accuracy assurance levers will move to the rear of the tool and spring forward. At this point, release the advance button. You should see no further movement and after a moment you will hear another audible "click". This is how the tools are designed to operate. If you observe any other sequence of operation, the system is out of order and cannot deliver more than 10% of its designed capacity, Take immediate corrective action. For reference, tools and pumps are de signed from the factory plumbed as follows. This ensures that the tool, pump and ONE hose cannot possible be connected up incorrectly.

Tool Advance Side - Male
Retract Side - Female

Hose Advance Side - Female to Female
Retract Side - Male to Male

Pump Advance Side - Male
Retract Side - Female

Note that connecting two (or any EVEN number) of hoses together creates "one" hose which is plumbed backwards! Male to Female and Female to Male. This will cause the system to operate backwards per Test #5 above. If your hose isn't long enough, connect 3 hoses together, move your pump or call HYTORC for a longer hose assembly.

APPENDIX A

USER MANUAL FA1

Definition of Full Automatic FA1

Using the Full Automatic FA1 loose bolts can be tightened with a single tool. When the bolting is done an optical and acoustical signal comes up. The Full Automatic works with following tools: Stealth without valves, Avanti, MXT, XLT, XLCT and previous models.

Change of Tools or Torque Pressure

With the beginning of a new bolting job with a different torque or a different tool the pump has to be set-up every time on these. For doing a new setup the pump (resp. the electronic itself) has to be switched off and then on again. At the 400V-edition the switch built into the electronic box only switches off the electronic itself. It does not disconnect the pump from mains. The setup has to be done as described after every restart.

Operating Temperature

The pump resp. the oil needs to be above 20°C/68°F for secure and correct automatic operation. A safety check inhibits the automatic operation below this temperature. This safety check is indicated by a blinking of the lamp in the electronic box. When the pump does not react on pressing the automatic button ( ) the temperature is too low. Then the pump has to be warmed up using the manual mode. If the temperature is high enough the lamp shines constantly.

Important Notice

The Full Automatic ensures a specific tolerance of the torque set up. Due to physical and mechanical effects such as oil heating up it may happen that the pressure set up will no longer be reached. If the deviation reaches more than 3% the FA will not finish tightening. When this happens just switch off the pump and restart the setup (see next page).

Tool-Full-Automatic

For operating the pump following steps are to be accomplished:

1. **Adjusting the Torque-Pressure and Measuring the Tool:**
   After switching on the pump this setup is possible. Connect the tool to the pump. Do not apply it to the screws. Vent the system by driving back and forth several times. Press and hold 'Automatic'-button. The pump will build up pressure and the red lamp within the remote control begins to shine. Adjust the torque-pressure and fixate it. Make sure a minimum pressure of 110 bar / 1600 psi is set up. Keep the 'Automatic'-button pressed and press the 'Manual'-button about one second additionally to confirm the torque-pressure. Thereafter the pump will measure the tool and light up the green lamp when the setup is completed.
2. **Tightening Using the Automatic Mode:**
   Place the tool onto the next screw. Press and hold 'Automatic'-button. The loose bolt is being tightened up to torque pressure. When the bolting is done a horn sounds and the green lamp within the remote control comes up. The tool can be placed onto the next screw.
3. **Re-adjusting the Torque-Pressure and Measuring the Tool:**
   The pump automatically re-adjusts the changing of the initial adjustment while tightening a flange. In special cases this automatic re-adjustment is not possible. Ensuring a safe work the pumps signals a necessary re-adjustment by a short double horn signal and switching the red lamp on. In this case the operator has to place the tool onto the ground and adjust the torquepressure and measure the tool like shown above.
4. **Tightening of Pre-Torqued Screws**
   Pre-torqued screws can be tightened using the Full-Automatic.

APPENDIX B

USER MANUAL FA4

Definition of Full Automatic FA4

Using the Full Automatic FA4, loose bolts can be tightened with up to four tools. When the bolting is done an optical and acoustical signal comes up.

Changing Tools or Torque Pressure

At the beginning of a new bolting job with different torque or different tools the power pack has to be readjusted. To do this you have to switch off the power pack and switch it on again. After restarting the power pack you have to set it up as given below.

Working with the 4-Tool-Full-Automatic

1. **Adjusting the torque and measuring the tools:**
   Before starting a bolting job you have to setup the torque pressure and let the power pack measure the tools.
   - Connect the tools to the pump. Do not apply them to the screws; let them lay loosely on the floor. Vent the system by driving back and forth several times.
   - Press and hold 'Automatic'-button ( ). The power pack builds up pressure and the red LED within the remote control begins to shine.
   - Adjust the torque pressure and fixate it.
   - Keep the 'Automatic'-button pressed. For approx. one second press the 'Manual'-button () additionally. By doing so you save the torque pressure into the power pack. Still keep the Automatic-button pressed.
   - The power pack will now measure the tools. Therefor it will advance and retract them several times.

   Once the setup is done the green light in the remote control lights up.
2. **Tightening using the automatic mode:**
   - Place the tools onto the bolts.
   - Press and hold 'Automatic'-button ( ). The loose bolts are beeing pre-tightened first. Once the system detects that all bolts are pre-tightened, the system starts to tighten the bolts up to torque pressure.
   - When the bolting is done a horn sounds and the green LED within the remote
   - control lights up.
   - The tools can be placed onto the next bolts.
3. **Tightening of pre-torqued screws**
   Pre-torqued bolts can be tightened using the Full-Automatic. The built-in safety-check detects loose bolts and pre-tightens them first.

APPENDIX C

DECLARATION OF CONFORMITY

EC-DECLARATION OF CONFORMITY OF THE MACHINERY

In accordance with the EC machine directive 2006/42/EC of 17. May 2006, appendix II A

We hereby declare that the following described partly completed machines in their conceptions, constructions and forms put by us on the market, are in conformity with all the relevant essential health and safety requirements of the EC machinery directive 2006/42/EC as amended and the national laws and regulations adopting this directive. In case of alteration of the partly completed machine, not agreed upon by us, this declaration will lose its validity.

Name and address of the manufacturer:

HydroWer-Hydraulik GmbH
Am Leveloh 15b
DE – 45549 Sprockhövel (Germany)

Types: JetPro 5-230, JetPro 5.2, JetPro 5.3, JetPro 6.3, JetPro 10-230, JetPro 10.3, JetPro 12-230, JetPro 12.3, JetStream 115, JetStream 230, JetPro 18.3, JetPro 36.3, JetStream 460,JetPro 4.2, JetPro 115, JetPro 230, MiniJet 115, MiniJet 230, HYTORC G115,HYTORC G230, AE 6.3, MiniAir, JetAir 6.2, HYTORC G-Air, JetAir 12.3, JetAir 12, JetAir 24.3, AE 11.2, AE 7.2, Pressure intensifier HD25, MiniJet-So/200-230V, CP 10A-230V, CP 10A-115V, CP 12A-230V,HYSTREAM115, HYSTREAM230, HYSTREAM-Air,JetPro-S-115, JetPro-S-230 ; HYTORC 115; HYTORC 230; HYTORC Air; HY-115 ;HY-230 ; HY-Air

Furthermore we explain the agreement with further, likewise for the product valid directives/regulations:

Directive 2006/42/EC	EN ISO 4413:2010	safety requirements for fluid power systems
	EN ISO 60204: 2006	safety of machinery electrical equipment
	EN ISO 60335-1: 2012	safety of electrical
Directive 2004/108/EC	EN 55014-1 : 2006/A2:2011	electromagnetic compatibility (EMV)
	EN 55014-2 : 1997/A2:2008	electromagnetic compatibility (EMC)
	EN 61000-3-2 : 2006	electromagnetic compatibility (EMV)
	EN 61000-3-3 : 2008	electromagnetic compatibility (EMC)

UL AWM Style 21098 or 2587, UL AWM Style 4476 / 3529, UL 508/UL 50, E147323, E15012, E13393, E99479, E86615 for US-Market

Applicable Harmonized Standards 2006/42/EC

DIN EN ISO 12100:2010	safety of machinery
DIN EN 60204-1 2006	safety of machinery electrical equipment

Authorised to compile the relevant technical documentation

Sprockhövel / 20.02.2014
place / date

Rüdiger Lenz / Am Leveloh 15b / DE - 45549 Sprockhövel

Managing director

Sprockhövel / 20.02.2014
place / date

Karl Heinz Werner

APPENDIX D

ATEX EXPLOSION PROOF CERTIFICATE

BUREAU VERITAS

(1) EC-Certificate of Conformity

(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres – **Directive 94/9/EC**

(3) EC-Certificate of Conformity Number

EPS 13 ATEX 2 561 X

(4) Equipment: Ex-proof hydraulic torque controlled bolting system

(5) Manufacturer: Hytorc – a Division of UNEX Corp.

(6) Address: 33 Route, 17 North
Mahwah, New Jersey 07430
USA

(7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) Bureau Veritas Consumer Products Services Germany GmbH, Notified Body No. 2004 in accordance with Article 9 of the Council Directive 94/9/EC of March 23rd 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II of the Directive. The examination and test results are recorded in the confidential report 13TH0289.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 13463-1:2009 **EN 13463-5:2011**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-Certificate of Conformity relates only to the design and the construction of the specified equipment in accordance with Directive 94/9/EC. Further requirements of this Directive apply to the manufacture and supply of this equipment.

(12) The marking of the equipment shall include the following:

Ex II 2 G Ex c IIB T4

Certification department of explosion protection

Türkheim, 4th February 2014

D. Zitzmann

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Certificates without signature are void. This certificate is allowed to be distributed only if not modified.
Extracts or modifications must be authorized by Bureau Veritas Consumer Products Services Germany GmbH.
EPS 13 ATEX 2 561 X

APPENDIX D

ATEX EXPLOSION PROOF CERTIFICATE

BUREAU VERITAS

(13) **Annexe**

(14) **EC-Certificate of Conformity EPS 13 ATEX 2 561 X**

(15) Description of equipment:

The bolting-system is used for torque-controlled bolting of screwing couplings in hazardous locations of zone 1. The system consists of a pneumatic driven hydraulic-pump, which powers a torque-controlled tool via two hydraulic tubes. Operation of the device is achieved by a remote control which is part of the system.

(16) Test report: 13TH0289

(17) Special conditions for safe use:

Before operating the system has to be grounded with an earthing cable.

(18) Essential health and safety requirements:

Met by standards.

Certification department of explosion protection — Türkheim, 4th February 2014

D. Zitzmann

Certificates without signature are void. This certificate is allowed to be distributed only if not modified.
Extracts or modifications must be authorized by Bureau Veritas Consumer Products Services Germany GmbH.
EPS 13 ATEX 2 561 X

APPENDIX E

MATERIAL SAFETY DATA SHEET

MATERIAL SAFETY DATA SHEET

TOTAL Specialties USA, Inc.. 5 N. Stiles Street, Linden NJ 07036
Phone 1-908-862-9300

Product AZOLLA ZS
ORIGINAL ISSUE May 10-2010
REVISION DATE Nov 1-2013

IDENTIFICATION AND EMERGENCY INFORMATION

PRODUCT NAME:
AZOLLA ZS (ISO 32 to 150)

PRODUCT #:

CHEMICAL NAME:
N/A - Mixture

CAS #'S:
Mixture

PRODUCT APPEARANCE AND ODOR:
Amber liquid, petroleum odor

CHEMICAL FAMILY:
Petroleum hydrocarbon

SYNONYMS:
Petroleum-based AW hydraulic oil

EMERGENCY TELEPHONE:
1-800-442-5823 or 1-908-862-9300

COMPONENTS AND HAZARD INFORMATION

COMPONENTS:	W/W HAZARD DATA (TLV, LD50, LC50, ETC.):
Petroleum based lubricating oil CAS# 64742-54-7, 64742-65-0, 64741-89-5, 64741-88-4*	5 mg/m3 TWA (OSHA, ACGIH) (as an oil mist)

*** Paraffinic base oil used are not limited to but include these CAS numbers.**

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM (HMIS):

Health	Flammability	Reactivity
0	1	0

TRANSPORTATION INFORMATION

TRANSPORTATION/SHIPPING INFORMATION:

Department of Transportation (DOT): Not regulated

EMERGENCY FIRST AID

EYE CONTACT:
If splashed into the eyes, flush with clear water for 15 minutes or until irritation subsides. If irritation persists, call a physician.

SKIN CONTACT:
In case of skin contact, remove contaminated clothing and wash skin thoroughly with soap and water.

INHALATION:
Vapor pressure is very low. Vapor inhalation under ambient conditions is normally not a problem. If overcome by vapor from hot product, immediately remove from exposure and call a physician. If breathing is irregular or has stopped, start resuscitation; administer oxygen if available. If overexposure to oil mist, remove from further exposure until excessive oil mist condition subsides.

INGESTION:
If ingested, do not induce vomiting. Call a physician immediately.

APPENDIX E

MATERIAL SAFETY DATA SHEET

Azolla ZS (All grades) Revision Date 11-1-2013

FIRE AND EXPLOSION HAZARD INFORMATION

FLASH POINT (MINIMUM): AUTOIGNITION TEMPERATURE:
179°C (355°F) Test method: COC N/E

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) - HAZARD IDENTIFICATION:

Health	Flammability	Reactivity
0	1	0

FLAMMABLE OR EXPLOSIVE LIMITS (approximate percent by volume in air):
Estimated values: lower: N/E upper: N/E

EXTINGUISHING MEDIA AND FIRE FIGHTING PROCEDURES:
Foam, water spray (fog), dry chemical, carbon dioxide and vaporizing liquid type extinguishing agents may all be suitable for extinguishing fires involving this type product, depending on size or potential size of fire and circumstances related to the situation. Plan fire protection and response strategy through consultation with local fire protection authorities or appropriate specialists.

The following procedures for this type of product are based on the recommendations in the National Fire Protection Association's "Fire Protection Guide on Hazardous Materials", Eighth Edition (1984):

Use water spray, dry chemical, foam, or carbon dioxide. Water or foam my cause frothing. Use water to keep fire-exposed containers cool. Water froth may be used to flush spills away form exposure. Minimize breathing gases, vapor, fumes, or decomposition products. Use supplied-air breathing equipment for enclosed or confined spaces or as otherwise needed.

UNUSUAL FIRE AND EXPLOSION HAZARDS:
n/a

"EMPTY" CONTAINER WARNING:
Empty containers retain residue (liquid or vapor) and can be dangerous. DO NOT PRESSURIZE, WELD, CUT BRAZE, SOLDER, DRILL, GRIND OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, OR OTHER SOURCES OF IGNITION; THEY MAY EXPLODE AND CAUSE INJURY OR DEATH. Do not attempt to clean since residue is difficult to remove. "Empty" drums should be completely drained, properly bunged, and returned to a drum reconditioner. All other containers should be disposed of in an environmentally safe manner and in accordance with government regulations. For work on tanks refer to Occupational Safety and Health Administration regulations, ANSI Z49.1, and other governmental and industrial references pertaining to cleaning, repairing, welding, or other contemplated operations.

HEALTH AND HAZARD INFORMATION

EXPOSURE LIMIT FOR TOTAL PRODUCT: Monitor data listed in the Components and Hazard Information section.

VARIABILITY AMONG INDIVIDUALS:
Health studies have shown that many petroleum hydrocarbons and synthetic lubricants pose potential human health risks which vary from person to person. As a precaution, exposure to liquids, vapors, mists, or fumes should be minimized.

EFFECTS OF OVEREXPOSURE (Signs and symptoms of exposure):
Prolonged or repeated skin contact with this product tends to remove skin oils possibly leading to irritation and dermatitis.
Product contacting the eye may cause irritation.
Product has a low order of oral and dermal toxicity.
Possible aspiration hazard.
Induced vomiting may cause aspiration of product into the lungs.
(See Emergency First Aid Section).

APPENDIX E

MATERIAL SAFETY DATA SHEET

Azolla ZS (All grades) Revision Date 11-1-2013

PHYSICAL DATA

The following data are approximate or typical values and should not be used for precise design purposes.

BOILING RANGE:
Wide range

VAPOR PRESSURE:
< 0.1 @ 38°C/100°F

SPECIFIC GRAVITY (25°C/25°C):
(WATER = 1)
< 1.0

VAPOR DENSITY (AIR = 1):
> 8

MOLECULAR WEIGHT:
Wide range

PERCENT VOLATILE BY VOLUME:
Negligible

EVAPORATION RATE @ 1 ATM. AND 25°C (77°F) (n-BUTYL ACETATE = 1):
< 1.0

SOLUBILITY IN WATER @ 1 ATM. and 25°C (77°F):
Negligible

POUR, CONGEALING OR MELTING POINT:
n/e

FREEZING POINT:
n/e

REACTIVITY

This product is stable and will NOT react violently with water. Hazardous olymerization will not occur. Avoid contact with strong oxidants such as liquid chlorine, concentrated oxygen, sodium hypochlorite or calcium hypochlorite, etc., as this represents a serious explosion hazard.

DECOMPOSITION PRODUCTS UNDER FIRE CONDITIONS:
Fumes, smoke, carbon monoxide, oxides of sulfur, and other decomposition products, in case of incomplete combustion.

CONDITIONS TO AVOID:
Open flames

TOXICITY

ORAL (Acute)	N/E
DERMAL (Acute)	N/E
EYE	N/E
INHALATION (Acute)	N/E
CHRONIC, SUBCHRONIC, ETC.	N/E

Medical Conditions Aggravated by Exposure: Unknown
This product does NOT contain any ingredients identified as carcinogenic by IARC, NTP, or OSHA.
SARA Section 313 Status: This material is not known to contain any chemicals on the SARA Section 313 list at a concentration greater than 1.0 percent or carcinogenic chemical on that list at a concentration greater than 0.1 percent.

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:
Keep product out of sewers and watercourses by diking or impounding. Absorb with sand or inert material. Sweep or scoop up and remove. Prevent spread of spill. Advise authorities if product has entered or may enter sewers, watercourses or extensive land areas. Assure conformity with local regulations.

WASTE DISPOSAL METHOD: (Consult federal, state, or local authorities for proper disposal procedures.)
Assure conformity with applicable disposal regulations. Dispose of absorbed material at an approved waste site or facility.

APPENDIX E

MATERIAL SAFETY DATA SHEET

Azolla ZS (All grades) Revision Date 11-1-2013

PROTECTION AND PRECAUTIONS

VENTILATION: (Always maintain below permissible exposure limits.)
Use local exhaust to capture vapor, mist or fumes, if necessary. Provide ventilation sufficient to prevent exceeding recommended exposure limit or buildup of explosive concentrations of vapor in air.

RESPIRATORY PROTECTION: (Use only NIOSH approved equipment.)
Normally not needed at ambient temperatures. Use supplied air respiratory protection in confined or enclosed spaces, if needed. Use filter, dust, fume, or mist respirator type under misting conditions. Use can or cartridge; gas or vapor respirator type under conditions exceeding TWA standard.

PROTECTIVE GLOVES:
Use chemical-resistant gloves, if needed, to avoid prolonged or repeated skin contact.

EYE PROTECTION:
Use splash goggles or face shield when eye contact may occur.

OTHER PROTECTIVE EQUIPMENT:
Use chemical-resistant apron or other impervious clothing, if needed, to avoid contaminating regular clothing which could result in prolonged or repeated skin contact.

WORK PRACTICES/ENGINEERING CONTROLS:
Keep containers closed when not in use. Do not handle near heat, sparks, flame or strong oxidants.

PERSONAL HYGIENE:
Minimize breathing vapor, mist, or fumes. Avoid prolonged or repeated contact with skin. Remove contaminated clothing; launder or dry-clean before reuse. Remove contaminated shoes and thoroughly clean before reuse; discard if oil-soaked. Cleanse skin thoroughly after contact, before breaks and meals, and at end of work period. Product is readily removed from skin by waterless hand cleaners followed by washing thoroughly with soap and water.

REGULATORY INFORMATION

SARA SECTION 313 - TOXIC CHEMICALS:
This product does not contain toxic chemicals under SARA Section 313 and 40 CFR Part 372.

SARA SECTION 311 - HAZARD CATEGORIES:
This product may meet one or more of the criteria for the hazard categories defined in 40 CFR Part 370 as established be Sections 311 and 312 of SARA as indicated below:

NO	**IMMEDIATE (ACUTE) HEALTH HAZARD**	NO	**SUDDEN RELEASE OF PRESSURE HAZARD**
NO	**DELAYED (CHRONIC) HEALTH HAZARD**	NO	**REACTIVE HAZARD**
NO	**FIRE HAZARD**		

SARA SECTION 302 - EXTREMELY HAZARDOUS WASTE:
This product is not known to contain any components in concentrations greater than one percent that are listed as Extremely Hazardous Substances in 40 CFR Part 355 pursuant to the requirements of Section 302(a) of SARA.

CLEAN WATER ACT (CWA):
Under the CWA, discharges of crude oil and petroleum products to surface water without proper Federal and State permits must be reported immediately to the National Response Center at (800) 424-8802.

CERCLA HAZARDOUS SUBSTANCES:
As defined by CERCLA, the term "hazardous substance" does not include petroleum, including crude oil or any fraction thereof, which is not otherwise specifically listed or designated as a hazardous substance.

APPENDIX E

MATERIAL SAFETY DATA SHEET

U.S. TSCA INVENTORY
All components of this material are listed on the U.S. TSCA Inventory.

The Following Ingredients are Cited on the Lists Below:

Chemical Name	CAS Number	List Citations
Distillates, petroleum-dewaxed OR Hydrotreated heavy paraffinic OR Hydrotreated light paraffinic	64742-54-7, OR 64742-65-0, OR 64742-55-8	4, 13, 17, 18
PHOSPHORODITHOIC ACID, O,O-DI C1-14-ALKYL ESTERS, ZINC SALTS (2:1) (ZDDP)	68649-42-3	15
XYLENES	1330-20-7	5

--REGULATORY LISTS SEARCHED--

1 = ACGIH ALL	6 = TSCA 5a2	11 = CA P65 REPRO	16 = MN RTK
2 = ACGIH A1	7 = TSCA 5e	12 = CA RTK	17 = NJ RTK
3 = ACGIH A2	8 = TSCA 6	13 = IL RTK	18 = PA RTK
4 = OSHA Z	9 = TSCA 12b	14 = LA RTK	19 = RI RTK
5 = TSCA 4	10 = CA P65 CARC	15 = MI 293	

Code key: CARC=Carcinogen; REPRO=Reproductive

PREPARED BY: Alan Denniston Technical Services

THE ABOVE INFORMATION IS ACCURATE TO THE BEST OF OUR KNOWLEDGE. HOWEVER, SINCE DATA, SAFETY STANDARDS, AND GOVERNMENT REGULATIONS ARE SUBJECT TO CHANGE AND THE CONDITIONS OF HANDLING AND USE, OR MISUSE BEYOND OUR CONTROL, SELLER MAKES NO WARRANTY, EITHER EXPRESS OR IMPLIED, WITH RESPECT TO THE COMPLETENESS OR CONTINUING ACCURACY OF THE INFORMATION CONTAINED HEREIN AND DISCLAIMS ALL LIABILITY FOR RELIANCE THEREON. USER SHOULD SATISFY HIMSELF THAT HE HAS ALL CURRENT DATA RELEVANT TO HIS PARTICULAR USE.

APPENDIX F

MATERIAL SAFETY DATA SHEET-CAN

MSDS
(Material Safety Data Sheet)

SECTION #1 PRODUCT AND COMPANY IDENTIFICATION

TRADE NAME: **TOTAL AZOLLA ZS 10, 22, 32, 46, 68, 100 and 150**

CHEMICAL NAME AND SYNONYMS: MIXTURE

MANUFACTURER/SUPPLIER'S NAME: TOTAL LUBRICANTS CANADA INC.
220, LAFLEUR
LASALLE, QUEBEC
H8R 4C9
Tel.: (514) 595-7579 or 1-800-463-3955

24 HOURS EMERGENCY: Call CHEMTREC 1-800-424-9300 or 703-527-3887

PRODUCT USE: PREMIUM HYDRAULIC LUBRICANT

WHMIS CLASS AND DESCRIPTION -

These products are not regulated by the WHMIS.

SECTION #2 COMPOSITION/INFORMATION ON INGREDIENTS

NOM	%	No CAS
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ADDITIONAL REGULATORY INFORMATION

- No hazardous ingredients as defined by the Canadian Hazardous Products Act (BILL C70) or by OSHA 29 CFR 1910.1200.

- Canadian DSL status: All ingredients are listed.

* No components of this product have been found carcinogenic or potential carcinogen. Does not contain ingredients that are listed as carcinogenic or potential carcinogen by OSHA, IARC or the U.S. National Toxicology Program (NTP). This product or its components have no teratogenic or mutagenic effects known.

APPENDIX F

MATERIAL SAFETY DATA SHEET-CAN

SECTION #3 PHYSICAL DATA

PHYSICAL STATE AT 25°C	Liquid
BOILING POINT:	> 250°C
POUR POINT:	< -10°C
DENSITY (g/cm^3 at 15°C):	0,85 to 0,90
VAPOR PRESSURE (mm Hg at 20°C):	Negligible
VISCOSITY (cSt at 100°C):	2,5 to 16
pH:	No Object
EVAPORATION RATE:	Negligible
SOLUBILITY IN WATER:	Negligible
APPEARANCE ET ODOR:	Yellowish liquid with characteristic odor

SECTION #4 STABILITY AND REACTIVITY

STABILITY:	Stable
CONDITIONS TO AVOID:	Avoid excessive heat, open flames and formation of oil mist.
PRODUCTS TO AVOID:	Oxidizing agents, strong acids and bases.
HAZARDOUS DECOMPOSITION PRODUCTS:	N/A
POLYMERIZATION:	Will not occur

SECTION #5 FIRE FIGHTING MEASURES

FLASH POINT (COC):	> 170°C
FLAMMABILITY LIMITS IN AIR:	LEL: N/A
(% PER VOLUME)	UEL: N/A
AUTOIGNITION TEMPERATURE (°C):	N/A
EXTINGUISHING MEDIA*:*	Foam, Dry chemical and CO_2
HAZARDOUS COMBUSTION PRODUCTS:	Normal combustion products, CO and CO_2.
SPECIAL FIRE FIGHTING PROCEDURES:	Do not enter confined fire space without adequate protective clothing and an approved positive self-contained breathing apparatus. Use water to cool fire exposed containers.

APPENDIX F

MATERIAL SAFETY DATA SHEET-CAN

SECTION #6 TOXICOLOGICAL INFORMATION

SPECIES	LD_{50} ORAL	LD_{50} DERMAL	LC_{50} INHALATION	HRS
Rat	> 5000 mg/Kg	> 2000 mg/Kg	N/A	---

INHALATION: Prolonged exposure to high vapor concentration of this product can cause headache, dizziness and nausea. Short-term overexposure can cause an irritation to the respiratory passages.
Exposure limit to the mist = 5 mg/m^3 (TLV/TWA, ACGIH).

CONTACT WITH EYES: This product should not cause eye irritation. Repeated and prolonged contact may cause eye irritation.

SKIN CONTACT: This product should not cause skin irritation. Prolonged and repeated contact with this product can cause skin drying, which may result in skin irritation and dermatitis.

INGESTION: May cause nausea.

SECTION #7 ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK PROCEDURES: Eliminate all ignition sources. Stop leak only if safe to do so. Absorb residue or small spills with absorbent material and remove to non-leaking containers for disposal.

SECTION #8 HANDLING AND STORAGE

STORAGE AND HANDLING: Store in cool, dry, ventilated area, away from heat and ignition sources. Use good personal hygiene. Always keep the container close.

SECTION #9 EXPOSURE CONTROLS / PERSONAL PROTECTION

VENTILATION: Mechanical ventilation is recommended.

RESPIRATORY PROTECTION: If mist present, chemical cartridge respirator is recommended.

GLOVES: Resistant gloves (Viton, Nitrile, Neoprene) are recommended when handling this material.

EYE PROTECTION: Chemical safety goggles are recommended.

OTHER PROTECTION: In confined spaces or where the risk of skin exposure is higher, resistant clothing or apron should be worn.

APPENDIX F

MATERIAL SAFETY DATA SHEET-CAN

SECTION #10 DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHODS: Consult relevant local authorities. Reclaim or dispose of at a licensed waste disposal company. Incinerate with approval of appropriate local authority.

SECTION #11 FIRST AID

INHALATION: Remove person to fresh air. See a physician if irritation persists.

CONTACT WITH EYES: Flush immediately with water for at least 15 minutes.

CONTACT WITH SKIN: Wash contaminated skin with mild soap and water. See a physician if irritation persists.

INGESTION: This product has a low toxicity. May cause nausea and have a laxative effect. Do not induce vomiting. Contact an Anti-Poison Center (1-800-463-5060).

SECTION #12 HAZARDS IDENTIFICATION

INHALATION: Prolonged exposure to high vapor concentration of this product can cause headache, dizziness and nausea. Short-term overexposure can cause an irritation to the respiratory passages.
Exposure limit to the mist = 5 mg/m^3 (TLV/TWA, ACGIH).

CONTACT WITH EYES: This product should not cause eye irritation. Repeated and prolonged contact may cause eye irritation.

SKIN CONTACT: This product should not cause skin irritation. Prolonged and repeated contact with this product can cause skin drying, which may result in skin irritation and dermatitis.

INGESTION: May cause nausea.

SECTION #13 ECOLOGICAL INFORMATION

ENVIRONMENTAL EFFECTS:

Do not allow product or runoff from fire control to enter storm or sanitary sewers, lakes, rivers, streams, or public waterways. Block off drains and ditches. Provincial regulations require and federal regulations may require that environmental and/or other agencies be notified of a spill incident. Spill area must be cleaned and restored to original condition or to the satisfaction of authorities.

BIODEGRADABILITY: NOT READILY BIODEGRADABLE.

APPENDIX F

MATERIAL SAFETY DATA SHEET-CAN

SECTION #14 TRANSPORTATION INFORMATION

TRANSPORTATION (TDG)

SHIPPING NAME:	None
UN NUMBER:	None
CLASS DESCRIPTION:	None

SECTION #15 REGULATORY INFORMATION

This product has been classified in accordance with the hazard criteria of the Controlled Products. Regulations (CPR) and the MSDS contains all the information required by the CPR.
THIS PRODUCT IS NOT A WHMIS CONTROLLED SUBSTANCE.
DSL/NDSL Status: This product, or all components, are listed on the Domestic Substances List, as required under the Canadian Environmental Protection Act. This product and/or all components are listed on the U.S. EPA TSCA Inventory.
Other Regulatory Status: No Canadian federal standard; however, for general discharge guidance, federal installations limited to 15 mg/L for total oil and grease. Provincial criteria are likely and should be requested when notifying provincial authorities.

SECTION #16 ADDITIONAL INFORMATION

Prepared by: Francis Bossé, Chemist
Revised on: 21 JUNE 2011
We believe that technical information and recommendations contained herein to be reliable and accurate. However, we provide these data without warranty or guarantee of any kind, expressed or implied. We assume no responsibility for any loss, damage, or expense, direct or consequential, arising from the use of products described herein.

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