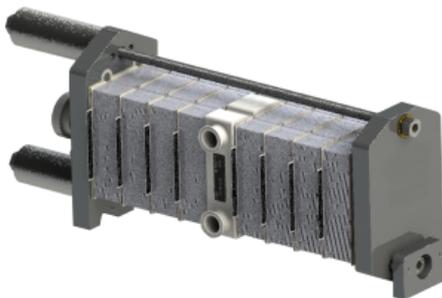


TangenX[®] SIUS[®] Auto-Torque Holders and System

User Guide



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Abbreviations

Bar	Metric unit of pressure
BM	Base mount
C	Celsius
DMF	Dimethylformamide
DMSO	Dimethyl Sulfoxide
EPDM	Ethylene Propylene Diene Monomer
F	Fahrenheit
FPI	Filter plate insert
lbs	Pounds
LPM	Liters per minute
M	Meter
m ²	Meters squared
N	Newton
NMWL	Nominal molecular weight limit
NPT	National pipe thread
psi	Pounds per square inch
sccm	Standard cubic centimeters per minute
UNC	Unified coarse threads

1. Introduction

TangenX® SIUS® Vertical Holders are intended for use with TangenX® SIUS® Single-use Cassettes and TangenX® SIUS® Filter Plate Inserts enabling a complete single-use system for tangential flow filtration ([Figure 1](#)). TangenX® SIUS® Vertical Cassette Holders are available in three sizes to accommodate different filter surface areas ([Table 1](#)). TangenX® SIUS® Vertical Cassette Holders are available as part of a complete Frame Assembly ([Figure 2](#)) that is operated with a KrosFlo® KTF/KPS System controller.

The Filter Plate Inserts (FPI) provide the same flow characteristics as traditional stainless steel holders. There are two different FPIs that are compatible with SIUS® cassettes and vertical SIUS® holders to accommodate filter surface areas from 1 m² - 30 m² ([Table 2](#)). Each FPI is delivered pre-sanitized with 0.2M NaOH.

Figure 1. TangenX® SIUS® Vertical Cassette Holder

TangenX® SIUS® Vertical Cassette Holder

1. TangenX® SIUS® Single-use Flat Sheet Cassettes
 - (8) 2.5 m² SIUS® Cassettes shown
2. TangenX® SIUS® Filter Plate Insert (bidirectional)
3. Vertical Cassette Holder

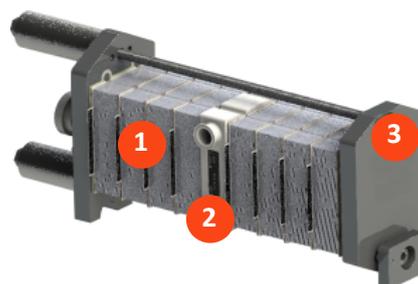


Table 1. TangenX® SIUS® Vertical Cassette Holder specifications

	V1AC	V2AC	V3AC
Holder capacity	1 m ² - 10 m ² (10.8 ft ² - 108 ft ²)	1 m ² - 20 m ² (10.8 ft ² - 215 ft ²)	1 m ² - 30 m ² (10.8 ft ² - 323 ft ²)
Materials of construction	End Plates, tie-rods, rails, hex nuts – 304 L Stainless steel Washers - Brass		
Hydraulic Pressure	1,100 – 1,300 psi		

Table 2. TangenX® Filter Plate Insert (FPI) specifications

	TFP75-SE16	TFP99-SP20 (Bi-directional)
Holder compatibility	V1AC, V2AC, V3AC	
Cassette compatibility	G05L, G05E, G05J, G15L, G15E, G15J, G25L, G25E, G25J	
Material of construction	Polypropylene (Class VI BSE Free)	
Connections	1" tri-clamp	1.5" tri-clamp
Maximum flow rate	49 LPM	140 LPM

Figure 2. TangenX® SIUS® Cassette Frame Assembly (Part # 3000431)

1. KrosFlo® KTF/KPS Backpressure valve
2. Flowmeter
3. TangenX® SIUS® Vertical Cassette Holder
4. Peristaltic pump
5. Hydraulic Pump



NOTE: Backpressure valve, Peristaltic pump and flowmeter can be operated when connected to KrosFlo® KTF/KPS System controller only.

Safety Conventions in this manual



NOTE: Relates important information about the current topic.



CAUTION: Identifies a situation that may cause product damage or compromise proper operation and may be a safety risk resulting in potential personal injury.



WARNING: Identifies a potentially dangerous situation that may cause catastrophic damage to equipment and may be a safety risk resulting in serious personal injury.

2. Before you begin

TangenX® SIUS® Vertical Cassette Holder

1. The holder may be cleaned with alcohol or any other detergent solution commonly used to clean tables and lab equipment.
2. TangenX® SIUS® Vertical Cassette Holders weigh approximately 100 - 150 lb (45 – 70 kg) depending on the size.



WARNING: System components are very heavy. Take proper precaution when lifting or moving the equipment or components to prevent personal injury. In some cases, hoists or other lifting equipment may be required.

TangenX® SIUS® Filter Plate Insert (TFP-SE16 and TFP99-SP20)

1. TangenX® SIUS® Filter Plate Insert, TFP75-SE16, provides uni-directional flow and is used with cassettes installed on one side of the filter plate insert. TangenX® SIUS® Filter Plate Insert, TFP99-SP20 provides bi-directional flow and is used with cassettes installed on both sides of the filter plate insert.
2. TangenX® SIUS® Filter Plate Inserts are shipped cleaned, dry and ready for use.
3. TangenX® SIUS® Filter Plate Inserts are designed for single-use and re-use is not recommended.
4. Included with TangenX® Filter Plate Inserts is an Isolation Plate (polypropylene) that is placed against the stainless steel end plate to prevent product contact with the end plate.

TangenX® SIUS® Cassettes

5. Cassettes may be stacked to increase filtration surface area; however, use only one type of membrane molecular weight cutoff at one time. **DO NOT** install a mixture of cassettes with different pore sizes in the hardware.
6. Cassettes must be equilibrated with an appropriate buffer (*i.e.* Phosphate Buffered Saline) to ensure the neutralization of the 0.2 M Sodium Hydroxide storage agent in the membrane filter. It is important to use pre-filtered buffer to avoid fouling the membrane or introducing contaminants into the system that could affect membrane performance and product recovery.



CAUTION: All cassettes are stored in 0.2 M Sodium Hydroxide as a preservative and storage agent. Follow standard safety procedures for handling 0.2 M Sodium Hydroxide, including the use of gloves, safety goggles, and lab coat.

Gasket for TangenX® SIUS® Cassettes

1. Gaskets are intended to be single use; Repligen recommends that you replace gaskets with each cassette changeover.
2. Repligen supplies two gaskets per cassette. Installation of the first cassette requires two gaskets – one on either side of the cassette; stacking additional cassettes requires only one gasket. Extra gaskets should be saved to replace worn or damaged gaskets.

Pump

1. When using TangenX® SIUS® Cassettes, select a pump with adequate capacity.
2. Consult the TangenX® SIUS® Cassette User Guide for the proper cross flow rate ranges for the type and size of cassette being used.

Figure 3. TangenX® SIUS® Vertical Cassette Holder components

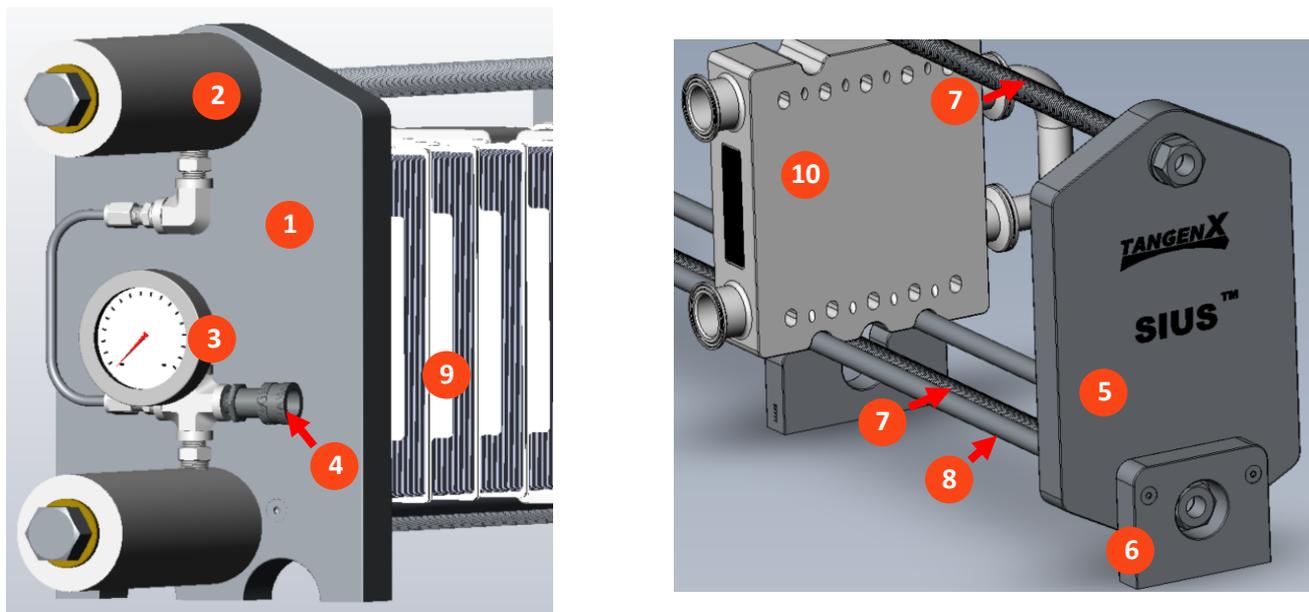


Table 3. TangenX® SIUS® Vertical Cassette Clamp components list

Description	Product #	Quantity
1. Stationary Hydraulic Clamp Plate	Holder	1
2. 12 ton hollow core hydraulic cylinder (QTY 2)	Auto-Torque	2
3. 2 ½ inch pressure gauge, 0 - 5000 psi, BM, Glycerin filled	Auto-Torque	1
4. Thread lock hydraulic coupling x 1/4 inch NPT male	Auto-Torque	1
5. Floating hydraulic clamp Plate	Holder	1
6. Floating Plate hydraulic foot plate	Holder	1
7. 3/4 - 10 UNC hex head threaded rod (QTY 2)	Holder	2
8. Filter support rail	Holder	2
9. SIUS® 2.5 m ² Cassette	SIUS Cassette	Up to 30 m ² *
10. Filter Plate Insert	TFP99-SP20	1

* See [Table 1](#) for total area

Auto-Torque = TangenX® SIUS® Auto-Torque components

Holder = TangenX® SIUS® Vertical 2-bolt Holder components (for V1AC, V2AC V3AC holders)

3. Holder Mounting and Installation

3.1 Tools required

- 5/32 inch Allen wrench (to secure foot plate [#6](#) and Stationary plate [#1](#))
- 1/4 inch Allen wrench (to secure hydraulic cylinders [#1 in Auto-Torque systems](#))

Clamp setup

1. Remove clamp from shipping box.
2. Mount the holder to a tabletop or another stable surface. The holder mounting hole locations are shown in [Figure 5](#). There are two 3/8 - 16 UNC tapped holes in the foot plate space 3.75 - inch apart and Stationary Plate 6.872 – inch apart as shown in [Figure 5](#).
3. Install the filter support rails [Figure 3. Item #8](#).
4. Install the Threaded Rods [Figure 3. Item #7](#).
5. Connect the hydraulic connection to ([Figure 3. Item #4](#)).
6. Connect the hydraulic pump to a compressed air connection with at least 75 psi air pressure. The pump maximum capacity is 100 psi to achieve full clamping capacity of the pump. Refer to TangenX® [Hydraulic System EH10236 section](#) for pump operation instructions.

Figure 4. Foot Plate

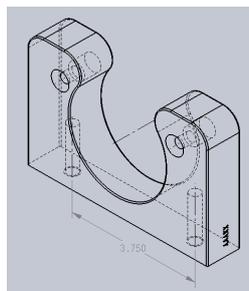
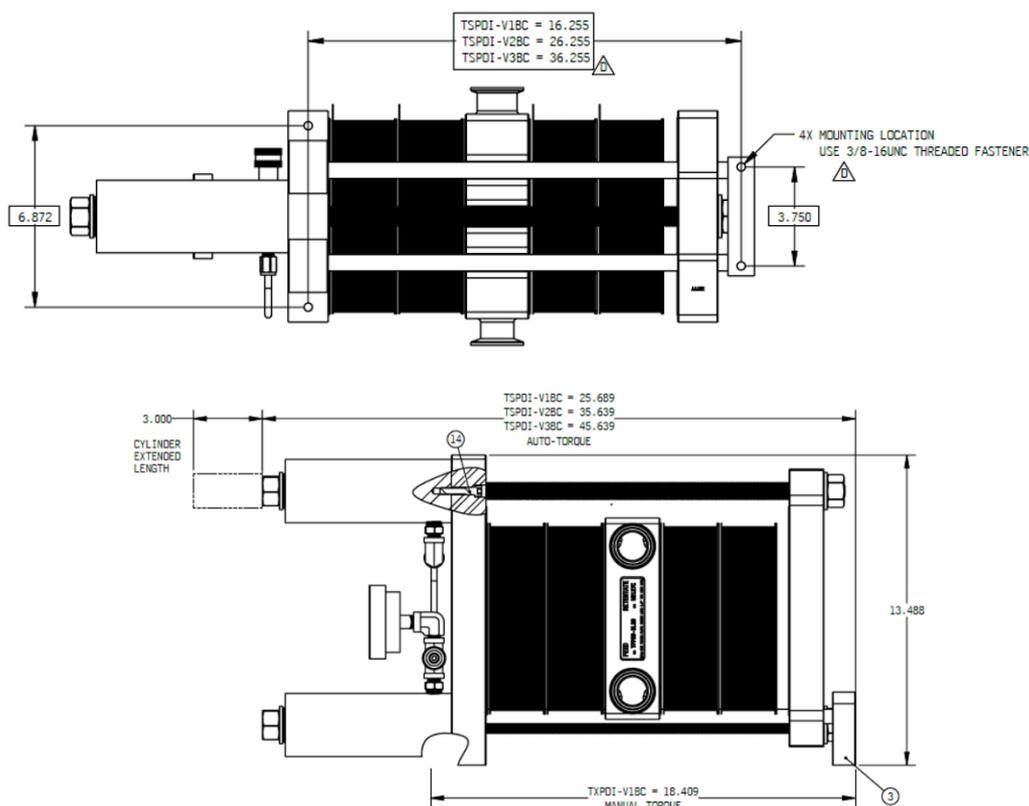
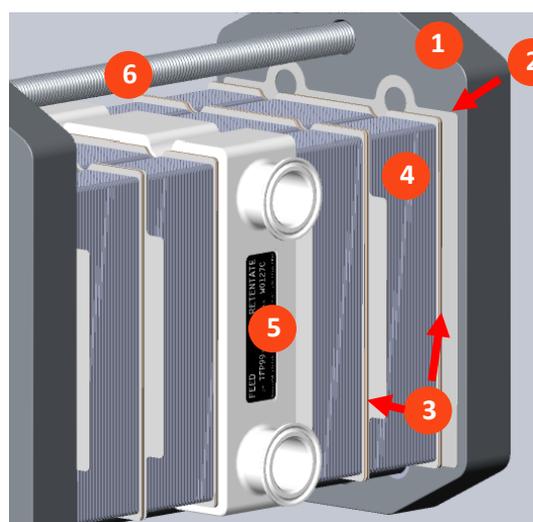


Figure 5: Mounting Hole Locations



3.2 TangenX® SIUS® Filter Plate installation

Figure 6. TangenX® SIUS® Filter Plate installation



1. Holder
2. Isolation Plate
3. Gasket
4. Cassette
5. Filter Plate Insert
TFP99-SP20
6. Threaded Rod

1. Remove the top Threaded Rod from the Holder Assy. [Figure 3. Item #7.](#)
2. Remove TangenX® SIUS® Filter Plate Insert (FPI) and isolation plate from the outer carton, if not already removed.



CAUTION: Wear gloves to avoid contamination.

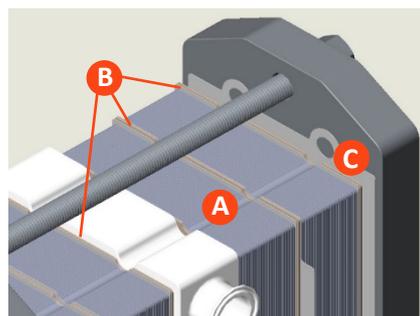
3. Using scissors, carefully open the FPI bag and remove the FPI.
4. Again using scissors, carefully open the isolation plate bag but do not remove the isolation plate from its bag. The isolation plate is the last item loaded before closing the clamp. To avoid contamination, leave it in its bag.
5. Place the TangenX® SIUS® Filter Plate Insert in the middle of the holder with the feed ports facing the direction most convenient to connect pump (Figure 3. TangenX® SIUS® Vertical Cassette Holder components). FPI TFP99-SP20 is shown in [Figure 6.](#)
6. Connect appropriate feed, retentate and permeate connections to FPI.



CAUTION: Hand-tighten any tri-clamp connectors to the TangenX® SIUS® Filter Plate. It is possible to crack the filter plate sanitary connection by squeezing it too tightly. In addition, any attached fitting/tubing packages should be supported under one of the components to reduce or eliminate any twisting effect on the filter plate fitting. Long fitting/tubing runs consisting of tees with valves and gauges may create sufficient force to cause the plastic filter plate connection to crack and/or break off.

3.3 TangenX® SIUS® Cassette installation

Figure 7. TangenX® SIUS® Cassette loading example



- A. TangenX® SIUS® Cassette
- B. Gaskets
- C. Isolation plate

1. TangenX® Filter Plate Insert is installed in clamp and ready for use.
2. Rinse the EPDM gaskets that are provided with the cassettes with deionized water or WFI. Place a rinsed gasket flat against the FPI; ensure that the holes in the gasket line up with the holes in the FPI.
3. Using scissors, carefully open the cassette bag to remove cassette.



WARNING: Each cassette is stored in 0.2M Sodium Hydroxide solution as a preservative. Follow standard safety procedures for handling 0.2 M Sodium Hydroxide, including the use of gloves, safety goggles, and lab coat.

4. Place the cassette against the gasket. Place another gasket next to the cassette on the opposite side of the first gasket. Ensure that the holes in the manifold, gaskets, and cassette are completely aligned. If you are using multiple cassettes, continue the same gasket/cassette/gasket pattern, ending with a gasket between the last cassette, followed by the isolation plate ([Figure 5](#)).
5. Follow the same procedure on the second side of the FPI as described above in Step #4. For TFP75-SE16, cassettes are only loaded on one side of the FPI.



NOTE: The [TFP99-SP20](#) must be loaded on both sides of the FPI. The cassette stack should be installed with half on side one and half on side two.

6. Replace the top threaded rod back into the assembly.
7. Push the two clamping plates towards the filter plate insert to close up the spacing. The amount of available space will be determined by the number of cassettes being used.
8. Pull the tie-rods from the opposite end of the hydraulic cylinders to take up the extra spacing.



WARNING: Be careful when loosening the holder clamping plates as they are heavy and create a possible pinch point. Never place your hands between the clamping plates when the hydraulic pump is running.

9. Load the washers and hex nuts (2 each).

10. Turn the hex nuts down the tie-rod to take up the extra thread.



NOTE: The hydraulic cylinders have a 3 inch stroke. Therefore, the hex nuts should be hand tightened up to the clamping plate to maximize the stroke to compress the stack. In cases where the initial compression exceeds 3 inch, the user will need to turn off the pump, and then repeat from [Step 7](#) above. Repeat this until the stack is compressed.

11. Repligen highly recommends running an integrity test after cassette installation. Refer to TangenX® Air Integrity Test App Note AN1002 for instructions and information on cassette integrity testing.

4. TangenX® SIUS® Cassette equilibration

TangenX® SIUS® Cassettes must be equilibrated with an appropriate buffer (i.e., Phosphate Buffered Saline) to ensure the neutralization of the 0.2 M Sodium Hydroxide storage agent in the membrane filter. Verify the pH of the effluent from the cassette is neutralized to minimize any possible interaction with your particular application. For most applications, further sanitization is not required.

5. TangenX® SIUS® Cassette and system cleaning

TangenX® SIUS® Cassettes are intended for single-use, therefore post-use cleaning and re-use is not recommended nor supported by Repligen. Similarly, the Filter Plate Insert is also designed for single-use and post-use cleaning is not supported by Repligen.

Cleaning:

1. Turn off hydraulic pump and separate clamping plates. Disconnect the hydraulic pump from the air supply. The hydraulic pump may remain connected to the cylinders when not in use, or it can be disconnected.
2. Remove the isolation plate, gaskets, cassettes, and FPI from the holder.
3. Wipe off any spillage on the holder components.

Cleaning the system hardware:

To clean the TFF system following use, recirculate 0.5 M Sodium Hydroxide through the system with all valves open. Cassettes are left in place during the system cleaning procedure to provide a flow path for the cleaning solution. Alternatively the cassettes may be removed and replaced with a CIP spacer gasket ([Table 4](#)). Upon completion of the cleaning cycle, flush the system with WFI, or DI water prior to draining and discarding the cassettes. Table 3 lists possible recommended cleaning solutions.



WARNING: Follow standard safety procedures for handling 0.5 M Sodium Hydroxide, including the use of gloves, safety goggles, and lab coat.

Table 4. Cleaning solutions

Cleaning agent	Cleaning conditions
0.5 N Sodium Hydroxide	Contact time = 30 - 60 minutes Temperature = 35 °C (95 °F)
1.5% Alconox® detergent	Contact Time = 30 - 60 minutes Temperature = 40 °C (104 °F)
TX047 Process Scale EPDM Clean-in-Place Gasket (5 pack) TX048 Process Scale Silicone Clean-in-Place Gasket (5 pack)	

6. Disposing of used TangenX® SIUS® Cassettes

TangenX® SIUS® Cassettes are removed from the holder by reversing the cassette installation procedure. If the cassettes are difficult to separate and remove from the stack, a thin plastic spatula can be used to break the seal by sliding into the edge between the cassettes. Cassettes can then be disposed of in a similar fashion to other disposable process equipment.

7. Storing unused cassettes

Membrane cassettes must remain sealed in their original packaging prior to use to maintain their performance, integrity, and prevent microbial growth. Below are critical factors to remember when storing unused TangenX® SIUS® Cassettes.

Recommended storage temperature:

- 4 ° C to 25 ° C - longer than 7 days (long term)
- 50 ° C - less than 7 days (short term)
- Do not freeze cassettes

8. Membrane operating characteristics

Take care to use the membrane at the lowest pressure possible while still producing consistent permeate flow. Although higher operating pressures initially improve flow rate, they also promote increased concentration polarization and membrane compaction, which ultimately limits flow. With very low NMWL membranes, lower operating pressure may also reduce the retention of salts and very low molecular weight species. Refer to the TangenX® SIUS® Cassette Product Use Guide for recommended cross flow rates and operating pressures.

9. Hydraulic system

9.1 Before you begin

Prior to using the TangenX® Hydraulic Pump system, please read and understand this document in its entirety, including the OEM Pump Safety Instructions ([Figure 16](#)). In addition to this document, the OEM pump manual is also provided and includes warnings, safety instructions, and a list of major pump components.

Table 5. Pump pressure

Maximum pump air inlet pressure	100 psi (6.9 bar)
Maximum pump hydraulic pressure	3,600 psi (248 bar)
Hydraulic relief valve set-point (by Repligen)	1,500 psi (103 bar)
Maximum cylinder capacity	10 cylinders

9.2 Installation

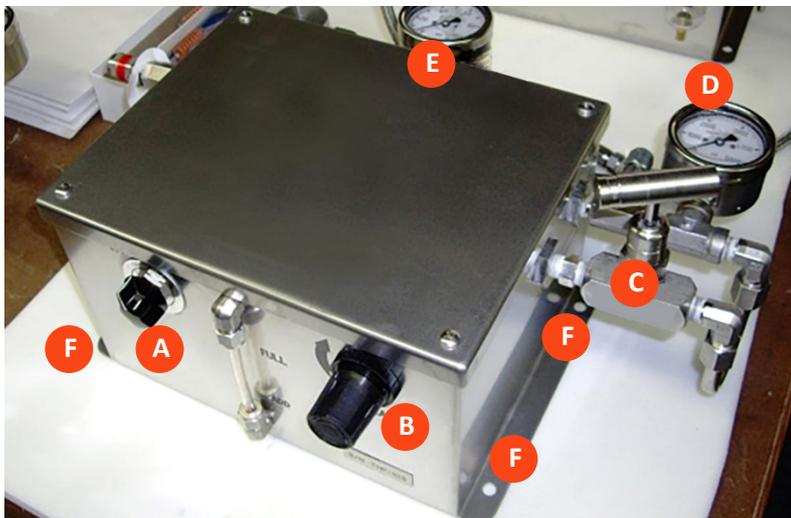
Pump filling - THE PUMP IS SHIPPED WITHOUT HYDRAULIC FLUID IN THE RESERVOIR.

1. Fill the unit with hydraulic fluid using Mobil DTE-FM-32 food grade oil.
2. Open the top cover by removing the four (4) screws located on the corners.
3. Pour approximately one gallon (3.8 liter) of hydraulic fluid into the unit. **DO NOT** pour oil directly on top of the pump because the breather port is located on the top.
4. Watch the fluid level through the level gauge mounted on the front of the unit. **DO NOT** fill the unit past the FULL level mark.

5. Make certain to clean the bottom of the cover before reinstalling.
6. Cycle the pump 10 - 20 times with the tank control valve open to bleed air from the pump prior to first use after filling with or replacing the hydraulic oil.
7. **Always use or fill the pump while positioned on a level surface.**

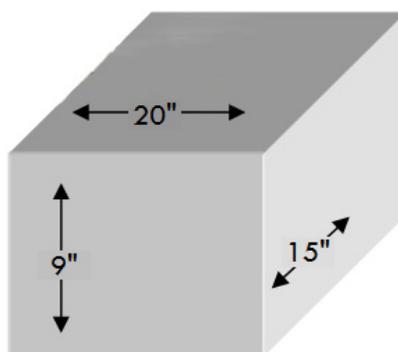
Figure 8. TangenX® Hydraulic Pump - Front view.

- A. On/Off (Control switch)
- B. Air pressure regulator
- C. Tank control valve
- D. Hydraulic pressure gauge
- E. Air pressure gauge
- F. Hole for screw mount



1. Permanent mounting: Mount the pump with 1/4 in diameter screws (or metric equivalents) using a 6 in x 10.75 in (15.2 cm x 27.3 cm) hole pattern (see "F" [Figure 8](#)). The pump must be mounted horizontally on a flat surface as shown in [Figure 8](#). The cover has a sealing gasket, but fluid is prone to leak from the unit if mounted on an unlevelled surface. **DO NOT** attempt to mount pump in a vertical position.
2. Pump envelope dimensions: The pump envelope dimensions are 20 in wide x 15 in deep x 9 in high (50.8 cm x 38.1 cm x 22.9 cm), as shown in [Figure 9](#). This envelope provides enough clearance for the user to operate the controls.

Figure 9. Pump envelope dimensions

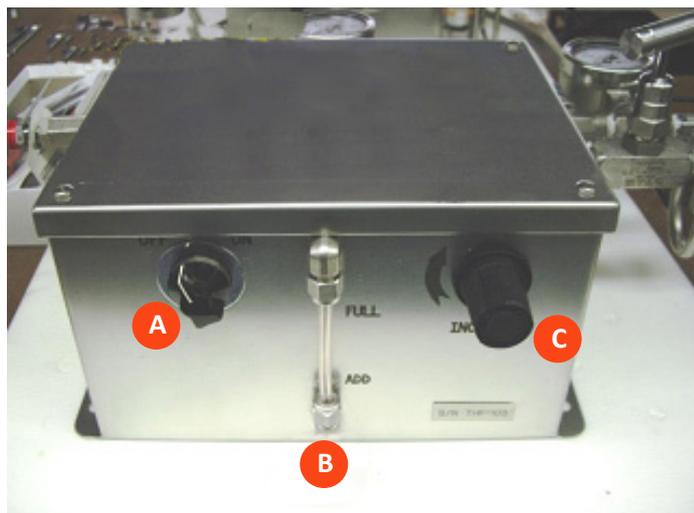


9.3 Operation

1. To operate the pump, close the tank control valve, and turn the air pressure regulator counterclockwise for minimum air pressure ([10](#)).
2. Turn the control switch to the "ON" position ([Figure 10](#)).

Figure 10. Control switch

- A. On/Off (Control switch)
- B. Hydraulic fluid sight glass
- C. Air pressure regulator



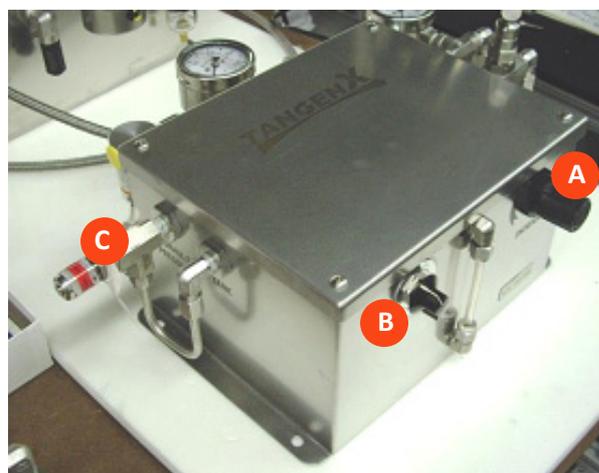
3. Slowly turn the air pressure regulator clockwise to increase the air pressure. The cylinders will advance, and hydraulic pressure will start to build once a load is encountered. Watch the pressure gauge for the hydraulic pressure reading (Figure 8).

Note: The pump has a maximum ratio of hydraulic pressure to input air pressure of 36:1.

4. As the hydraulic pressure approaches the target value, slowly stop turning the Air Pressure Regulator knob (Figure 10). When the set point ratio is reached, the pump will stall. Increasing the air pressure will result in the pump increasing the outlet hydraulic pressure. A decrease in air pressure will result in a corresponding decrease in outlet hydraulic pressure.

Figure 11. Air pressure regulator knob

- A. Air pressure regulator
- B. On/off (Control switch)
- C. Hydraulic relief valve



5. The hydraulic relief valve is set to 1,500 psi prior to shipment. This device prevents over-compression of the cassette stack, which may inadvertently occur by the operator or by an elevated temperature cycle during operation or cleaning.

Caution: Do not exceed 1500 psi when operating with TangenX® cassettes.

Note: To quickly decrease hydraulic pressure, the tank control valve Figure 8 must be opened to relieve any excess hydraulic pressure after the air regulator is adjusted.

6. The hydraulic pressure specifications for TangenX® SIUS® Single-use TFF Cassettes and TangenX® PRO Reusable TFF Cassettes are as follows and apply for filter holders listed below.

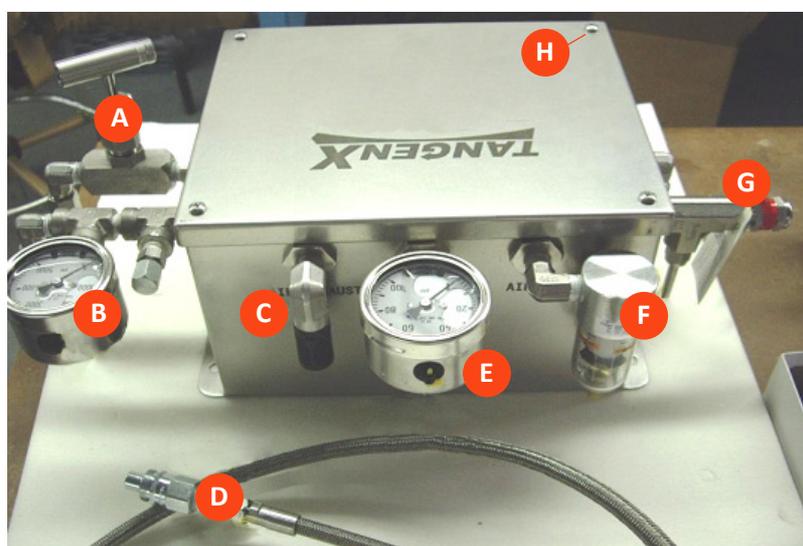
Table 6. Hydraulic pressure specifications for TangenX® TFF Cassettes

Target	1,200 psi
Normal range	1,100 to 1,300 psi
Hydraulic relief valve set-point	1,500 psi*
Maximum operating pressure	1,500 psi

Table 7. TangenX® TFF Holder product codes

Product code	Description
TSPDI-V1AC	TangenX® SIUS® Vertical 2-bolt 10 m ² auto clamp
TSPDI-V2AC	TangenX® SIUS® 2-bolt auto clamp (20 m ²)
TSPDI-V3AC	TangenX® SIUS® Vertical 2-bolt auto clamp (30 m ²)
TX005	TangenX® PRO - 75 Vertical holder with AutoTorque
TX006	TangenX® PRO - 150 Vertical bidirectional holder with AutoTorque
TX007	TangenX® PRO - 300 system with AutoTorque
TX008	TangenX® PRO -600 system with AutoTorque

Figure 12. TangenX® Hydraulic Pump - Back view



- A. Tank control valve
- B. Hydraulic pressure gauge
- C. Air exhaust
- D. Hydraulic hose to filter holder
- E. Air pressure gauge
- F. Air supply inlet
- G. Hydraulic relief valve
- H. Remove (4) screws and cover to change or add hydraulic fluid

9.4 Operation precautions

1. The fluid level gauge should be checked before each use. Add hydraulic fluid up to the “FULL” mark as required.
2. Check the air inlet filter bowl to make certain there is no water build-up. When the water level reaches the baffle plate, open the drain valve at the bottom of the filter.
3. Change the hydraulic fluid at least once each year.

9.4.1 Changing hydraulic fluid

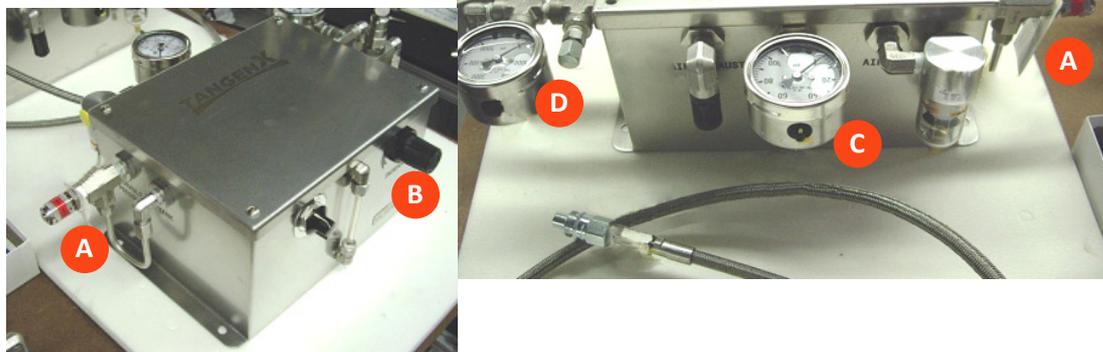
1. Disconnect all hydraulic and air hoses from the unit.
2. Remove the top cover and pour the used fluid into a suitable container for disposal.
3. Wipe off any excess fluid on the outside of the tank using a clean, lint free cloth.
4. Refill the reservoir referencing the instructions in [Section 9.2](#).

9.5 Operating with Non TangenX® Cassettes

1. Determine the clamping force required by the cassette manufacturer.
2. The Hydraulic relief Valve Figure 13 has a safety wire locking the max pressure to 1500psi for TangenX® cassettes.
3. Remove wire lock from Hydraulic relief valve and adjust knob setting to raise or lower the hydraulic relief set point pressure. The air pressure regulator may need to be adjusted to reach the corresponding Hydraulic pressure measured by the Hydraulic pressure gauge.

Figure 13: Adjustment for Non TangenX® Cassettes

- A. Hydraulic relief Valve
- B. Air pressure Regulator
- C. Air pressure gauge
- D. Hydraulic pressure gauge



9.6 Appendix

Figure 13. OEM Manufacturer Certificate of Compliance example

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Date 11/26/08

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Description of Material

Furnished to TangenX Technology Corporation
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For use on PO 8297
(Project Name and/or Contract Number)

In the amount of 1
(Quantity Represented)

Identified by our order # 1013540

Shipped on 12/01/08 Delivered on _____

Shipped VIA UPS

Meets the requirements of the pertinent project plans, special provisions and specifications in all respects. Processing, product testing and inspection control of raw materials are in conformance with all applicable specifications, drawings, and/or standards of all articles furnished.

For Toomey Associates Inc. 

Figure 14. OEM Manufacturer Inspection and Test Report example

TOOMEY ASSOCIATES, INC.
Instrumentation & Hydraulics

“OUR MISSION IS TO PROVIDE ALL OF OUR CUSTOMERS
WITH THE BEST PRODUCTS AND SERVICE AVAILABLE

1100 Russell Road P.O. Box 577 Westfield, MA 01086-0577

Tel (800) 762-5192 or (413) 562-5192 Fax (413) 568-0066 E-Mail admin@toomeyinc.com

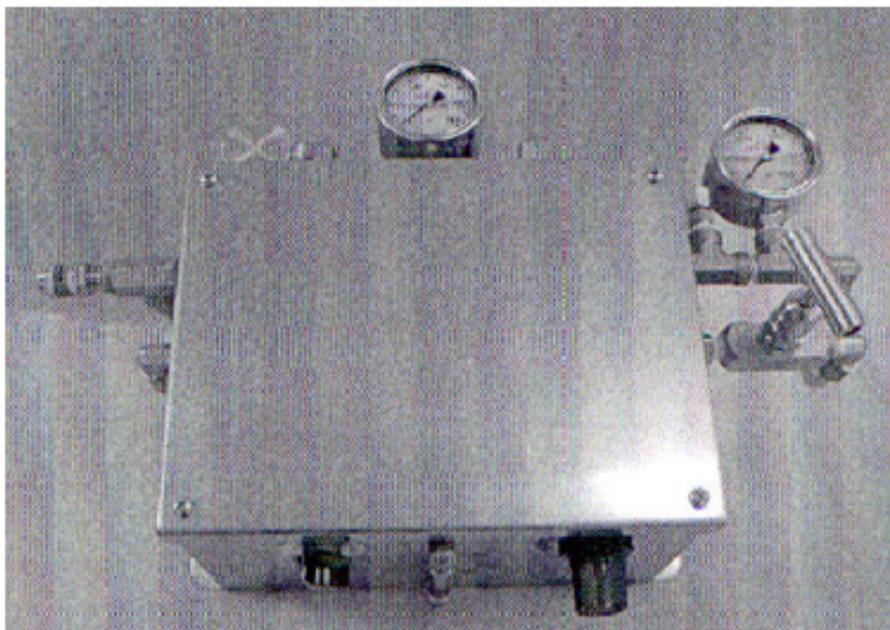
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Ref.: ISO 9001:2000 Sect: 8.2.4.2

Date: 11/21/08 QA APPROVAL: LWD

[TangenXI&T.doc

TANGENX STAINLESS STEEL PUMP ASSEMBLY
INSPECTION & TEST REPORT
P/N EH 10236



Pump S/N: THP- 103

*Assembled By: J. Tilly, J. Toomey
V. Reed & G. Strumer*

PO Ref.: 8297

Inspected By: L. Desi

Pg. 2 of 2

Date: 11-25-08

Pump S/N: THP- 103

Subassembly Inspection

	<i>Inspection Criteria</i>	<i>Tech</i>	<i>Q.A</i>
a.	<i>Verify that the SS enclosure is clean & free of scratches / defects.</i>	<i>VR</i>	<i>LD</i>
b.	<i>Verify that all external enclosure seams & weld joints are clean & defect free.</i>	<i>VR</i>	<i>LD</i>
c.	<i>Verify that the SS enclosure is clean & free of scratches / defects & that all etching is accurate & free of any cosmetic defects</i>	<i>VR</i>	<i>LD</i>
d.	<i>Verify that both gauges have been certified, are leak free, on zero and have a calibration sticker applied (B & G)</i>	<i>GS</i>	<i>LD</i>
e.	<i>Prior to assembly, place the Haskel pump into the test reservoir & verify proper operation</i>	<i>JT</i>	<i>LD</i>
f.	<i>Verify that all fittings are tight & have proper thread sealant applied.</i>	<i>JT</i>	<i>LD</i>
g.	<i>Verify that all flareless tube nuts are polished</i>	<i>JT</i>	<i>LD</i>
h.	<i>Verify the presence of a shipping checklist.</i>	<i>GS</i>	<i>LD</i>

Functional Verification

	<i>Test Criteria</i>	<i>Tech</i>	<i>Q.A</i>
a.	<i>Set the air pressure at 50-psi & cycle pump for 5 minutes with no-load</i>	<i>JT</i>	<i>LD</i>
b.	<i>Test system to stall at 3500-psi. With the air turned off pressure holds for 5 minutes.</i>	<i>JT</i>	<i>LD</i>
c.	<i>Test system to stall at 3000-psi. With the air turned off pressure holds for 5 minutes.</i>	<i>JT</i>	<i>LD</i>
d.	<i>Connect pump assembly to the counter test fixture. Set the outlet hydraulic pressure for 3000-psi with the air line connected. Keep the pump assembly under pressure for 1 hour. Note the number of cycles at the end of that time. Record all information in the space below.</i>	<i>JT</i>	<i>LD</i>

Start Time: 2:24

Total Run Time: 1:11

End Time: 3:35

Total Cycles: 0

CERTREAD **TOOMEY ASSOCIATES, INC.**
CERTIFICATION OF GAUGE ACCURACY

CERTIFICATION TYPE	C	READINGS IN:
INTERNAL CONTROL #	1013540B	PSIG <input checked="" type="checkbox"/>
CALIBRATION DATE	11/14/2008	DEG. F <input type="checkbox"/>
NEXT CALIBRATION DATE	11/14/2009	IN/H2O <input type="checkbox"/>
PRIMARY STANDARD TYPE USED	S/N 1306	IN/Hg <input type="checkbox"/>
		PSID <input type="checkbox"/>
		Lbs./Force <input type="checkbox"/>
		OTHER <input type="checkbox"/>

Base Unit ATE-100, S/N 1105, Certified 06/12/08, Due 06/12/09, Cert # 2392071

CUSTOMER	TANGENX TECHNOLOGY		
PO#	8297		
IUT MFG	WIKA	IUT ACCURACY %	1.50
IUT FULL SCALE	100	ALLOWED DEVIATION +/-	1.5
IUT SERIAL #	1013540B		

READING	STANDARD	IUT	DEVIATION
1	9.54	10	0.46
2	20.18	20	-0.18
3	30.58	30	-0.58
4	41.07	40	-1.07
5	50.90	50	-0.90
6	61.03	60	-1.03
7	70.92	70	-0.92
8	80.67	80	-0.67
9	90.55	90	-0.55
10	100.13	100	-0.13

READINGS ARE TAKEN AT AMBIENT ROOM TEMPERATURE

READINGS	XX	MEETS STANDARDS
MEET		
DO NOT MEET		
OEM SPECIFICATIONS		

STANDARD MODEL AQS-2, 0-150 PSI
STANDARD ACCURACY +/- .05% FULL SCALE
TRANSDUCER SERIAL # 1306
CERTIFIED 5/20/08 DUE 5/20/09
NIST TRACEABILITY THROUGH CERT # 2345294

*TOOMEY ASSOCIATES, INC. USES ISO 10012-1 AS THE BASIS OF ITS CALIBRATION SYSTEM
CALIBRATION PERFORMED USING NIST TRACEABLE STANDARDS*

TECHNICIAN GREG STURMER *Greg Sturmer*
QA LOUIS DEST *Louis Dest*

MEASUREMENT UNCERTAINTY DOES NOT EXCEED THE PERMISSIBLE ERROR FACTOR FOR THE CALIBRATION STANDARD IDENTIFIED ON THIS DOCUMENT
THIS REPORT MUST BE REPRODUCED IN FULL AND REQUIRES WRITTEN APPROVAL OF TOOMEY ASSOCIATES, INC

1100 RUSSELL ROAD, PO BOX 577
WESTFIELD, MA 01086-0577

ISO 9000 REF: CALWI.DOC

TEL: 800-762-5192
FAX: 413-568-0066

CERTREAD

TOOMEY ASSOCIATES, INC.
 CERTIFICATION OF GAUGE ACCURACY

CERTIFICATION TYPE **C**
 INTERNAL CONTROL # **1013540G**
 CALIBRATION DATE **11/14/2008**
 NEXT CALIBRATION DATE **11/14/2009**
 PRIMARY STANDARD TYPE USED **S/N 27861**

READINGS IN:
 PSIG **XX**
 DEG. F
 IN/H2O
 IN/Hg
 PSID
 Lbs./Force
 OTHER

Base Unit **ATE-100, S/N 1105, Certified 06/12/08, Due 06/12/09, Cert # 2392071**

CUSTOMER **TANGENX TECHNOLOGY**
 PO# **8297**
 IUT MFG **WIKA** IUT ACCURACY % **1.50**
 IUT FULL SCALE **5000** ALLOWED DEVIATION +/- **75**
 IUT SERIAL # **1013540G**

READING	STANDARD	IUT	DEVIATION
1	538.7	500	-38.7
2	1027.3	1000	-27.3
3	1510.1	1500	-10.1
4	2007.3	2000	-7.3
5	2499.3	2500	0.7
6	3011.2	3000	-11.2
7	3509.6	3500	-9.6
8	4033.7	4000	-33.7
9	4522.2	4500	-22.2
10	5033.0	5000	-33.0

READINGS ARE TAKEN AT AMBIENT ROOM TEMPERATURE

READINGS
 MEET **XX** **MEETS STANDARDS**
 DO NOT MEET
 OEM SPECIFICATIONS

STANDARD MODEL HQS-2, 0 - 5000 PSI
 STANDARD ACCURACY +/- .025% FULL SCALE
 STANDARD SERIAL #: 27861
 CERTIFIED 3/27/08 DUE 3/27/09
 NIST TEST #:7479/25781
 CERTIFICATION # QAID 1330

TOOMEY ASSOCIATES, INC. USES ISO 10012-1 AS THE BASIS OF ITS CALIBRATION SYSTEM
 CALIBRATION PERFORMED USING NIST TRACEABLE STANDARDS

TECHNICIAN **GREG STURMER**
 QA **LOUIS DESI**

MEASUREMENT UNCERTAINTY DOES NOT EXCEED THE PERMISSIBLE ERROR FACTOR FOR THE CALIBRATION
 STANDARD IDENTIFIED ON THIS DOCUMENT
 THIS REPORT MUST BE REPRODUCED IN FULL AND REQUIRES WRITTEN APPROVAL OF TOOMEY ASSOCIATES, INC

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 WESTFIELD, MA 01086-0577

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TEL: 800-762-5192
 FAX: 413-568-0066

Figure 15. OEM Manufacturer Pump Safety Instructions example

EH10236 PUMP SAFETY INSTRUCTIONS

▲ CAUTION

Do not use other fluids as they may damage the pump and void your warranty.

▲ WARNING

These cylinders are designed for a maximum pressure of 5,000 psi (360 Bar). Do not connect these cylinders to a pump with a higher pressure rating.

▲ CAUTION

AVOID DAMAGING HYDRAULIC HOSE.

Avoid sharp bends and kinks when routing hydraulic hose. Using a bent or kinked hose will cause severe back-pressure. Also, sharp bends and kinks will internally damage the hose leading to premature failure.

Do not drop heavy objects on hose. A sharp impact may cause internal damage to hose wire strands. Applying pressure to a damaged hose may cause it to rupture.

Do not use the hydraulic hose to carry a hydraulic components (i.e. pumps, cylinders and valves).

▲ CAUTION

KEEP HYDRAULIC EQUIPMENT AWAY FROM FLAMES AND HEAT!

Excessive heat will soften packings and seals, resulting in fluid leaks. Heat also weakens hose materials and packings. For optimum performance DO NOT expose equipment to temperatures of 150 deg F (65 deg. C) or higher.

▲ WARNING

DO NOT HANDLE PRESSURIZED HOSES

Escaping oil under pressure can penetrate the skin, causing serious injury. If oil is injected under the skin, see a doctor immediately.

SafetyInst.xls

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