



Universal Hydraulic Oil Cooler

Owner's Manual
(Originating w/Serial Number 50-950)

Model Number: _____
Serial Number: _____
Date of Purchase: _____



LOFTNESS SPECIALIZED EQUIPMENT, INC.

LIMITED WARRANTY POLICY

The limited warranty policy begins upon delivery of the unit to the original customers.

All Loftness products have a one (1) year limited warranty. The XLB10 Grain Bag Loader has a two (2) year limited warranty.

If any Loftness product is used as rental or leased equipment the limited warranty period is for only 30 days from the delivery date to the original customers.

Loftness Specialized Equipment, hereinafter referred to as LOFTNESS, a manufacturer of quality machinery since 1956, warrants new LOFTNESS machinery and/or attachments at the time of delivery to the original purchaser, to be free from defects in material and workmanship when properly set up and operated in accordance with the recommendations set forth in the LOFTNESS Operator's Manual.

LOFTNESS' liability for any defect with respect to accepted goods shall be limited to repairing the goods at an authorized dealer or other LOFTNESS designated location, or replacing them as LOFTNESS shall elect. The above shall be in accordance with LOFTNESS warranty adjustment policies.

WARRANTY REQUIREMENTS

Warranty registration form must be filled out and returned to Loftness Specialized Equipment to validate all warranty claims.

To receive a warranty claim, a return authorization from LOFTNESS must be obtained. The failed part may then be returned in an untampered status. This warranty does not include freight or delivery charges incurred when returning machinery for servicing. Dealer mileage, service calls and pick-up/delivery charges are the customer's responsibility.

LIMITATIONS OF WARRANTY

LOFTNESS products are designed to provide years of dependable service when proper use and maintenance is adhered to. The potential for misuse in many applications exists; therefore, a limited warranty is provided as follows.

This warranty shall not apply to any machine or attachment which shall have been repaired or altered outside the LOFTNESS factory or authorized LOFTNESS dealership or in any way so as in LOFTNESS' judgment, to affect its stability or reliability, nor which has been subject to misuse, negligence or accident, nor to any machine or attachment which shall not have been operated in accordance with LOFTNESS' printed instructions or beyond the company recommended machine rated capacity. LOFTNESS may elect to have an area representative evaluate the condition of the machine before warranty is considered.

In addition, this limited warranty provides no coverage for general wear or maintenance items, misuse, environmental conditions and/or contamination for which they were not designed or not intended, including but not limited to the following items:

- Use of machine beyond its rated capacity;
- Improper knife replacement;
- Missing knives;
- Striking foreign objects
- Lack of lubrication
- Failures caused by running in an "out-of-balance" condition;
- Tires;
- Conveyors;
- Auger wear;
- Saw blades;
- Brakes and brake pads; and
- Hydraulic hoses damaged by being caught in "pinch points" or by moving parts.

EXCLUSIONS OF WARRANTY

Except as otherwise expressly stated herein, LOFTNESS makes no representation or warranty of any kind, expressed or implied. **The implied warranty of merchantability and fitness for a particular purpose are excluded from this limited warranty.** The remedies set forth in this warranty are the only remedies available to any person under this warranty. LOFTNESS shall have no liability to any person for incidental, consequential or special damages of any description, whether arising out of express or implied warranty or any other contract, negligence, or other tort or otherwise. This exclusion of consequential, incidental and special damages is independent from and shall survive any finding that the exclusive remedy failed of its essential purpose. Upon purchase, the buyer assumes all liability, all personal injury and property damage resulting from the handling, possession or use of the goods by the buyer.

No agent, employee or representative of LOFTNESS has any authority to bind LOFTNESS to any affirmation, representation or warranty concerning its machinery and/or attachments except as specifically set forth herein. (October 2020)



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Warranty

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Owner Information

Thank you for your decision to purchase a Universal Hydraulic Oil Cooler 140,000 BTU kit, attached to a skid-steer, from Loftness. It has been designed to provide years of profitable and dependable service. To ensure maximum performance of your Oil Cooler, it is mandatory that you thoroughly study the owner's manual and follow its recommendations. Proper operation and maintenance are essential to maintain and maximize the life of the machine and to prevent damage or injury.

The Loftness Universal Hydraulic Oil Cooler and protective box were designed to be used where more hydraulic cooling is needed in mobile equipment. With a little ingenuity, the universal cooler can be adapted to a variety of applications.

There are three basic steps to installing the Loftness Universal Oil Cooler:

- A. Physically mounting the cooler and protective box to the machine.
- B. Connecting the cooler inlet and outlet ports to the proper location in the hydraulic system.
- C. Wiring the fan to the electrical system.

This guide is designed to help you connect the Loftness Universal Oil Cooler to your machine.

You will need to know a little information about your machine's hydraulic and electrical systems. Most of the information can be obtained with observation. The operator's manual is another source of information along with the help of your local dealer.

Operate and maintain this unit in a safe manner and in accordance with all applicable local, state, and federal codes, regulations and/or laws, and in compliance with on-product labeling and these instructions.

Make sure that all personnel have read this owner's manual and thoroughly understand safe and correct operating, installation and maintenance procedures.

Continuous improvement and advancement of Loftness products may result in changes to your equipment that may not be reflected in this publication. Loftness reserves the right to make product improvements to the machine at any time. Although great care has been taken to ensure the accuracy of this publication, Loftness does not assume any liability for errors or omissions.

It is the owner's responsibility to fulfill all warranty obligations so as not to void the warranties. The warranty section at the beginning of this manual outlines the warranty policy of Loftness.

Warranty Policy

Be sure to read and understand the Warranty Policy at the beginning of this manual. It is also important that you fill out the Warranty Registration form(s) completely and return to Loftness so as not to void the warranty.

Serial Number Location



The serial number tag (1) is located just below the outlet port on the rear of the oil cooler. It is also stamped (2) on the cooler box to the left of the serial number tag.

Always use your model and serial number when requesting information or when ordering parts.



Safety First

Accidents can be prevented by recognizing the causes or hazards before an accident occurs and doing something about them. Regardless of the care used in the design and construction of this machine, there are some areas that cannot be safeguarded without interfering with accessibility and efficient operation.



Safety Alert Symbol

This message alert symbol identifies important safety messages on the machine and in the owner's manual. When you see this symbol, be alert to the possibility of personal injury and carefully read the message that follows.

In the owner's manual and on decals used on the machine the words **DANGER, WARNING, CAUTION, IMPORTANT, and NOTE** are used to indicate the following:

DANGER: This word warns of immediate hazards which, if not avoided, will result in severe personal injury or death. The color associated with Danger is RED.

WARNING: This word refers to a potentially hazardous situation which, if not avoided, could result in severe personal injury or death. The color associated with Warning is ORANGE.

CAUTION: This word refers to a potentially hazardous or unsafe situation that, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices. The color associated with Caution is YELLOW.

IMPORTANT: Highlights information that must be heeded.

NOTE: A reminder of other related information that needs to be considered.

If Safety Decals on this machine are ISO two panel pictorial, decals are defined as follows:

- The first panel indicates the nature of the hazard.
- The second panel indicates the appropriate avoidance of the hazard.
- Background color is YELLOW.
- Prohibition symbols such as  and  if used, are RED.

Be certain all machine operators are aware of the dangers indicated by safety decals applied to the machine, and be certain they follow all safety decal instructions. Contact Loftness for safety decal replacement.

Loftness cannot anticipate every possible circumstance that may involve a potential hazard. The warnings in this owner's manual are not all inclusive.

Owner's Responsibility

Because of the potential safety hazard to eyes from hydraulic leaks and/or flying debris, **"USE OF PROTECTIVE EYEWEAR IS ABSOLUTELY MANDATORY"** for operator and others in the work area.

Due to the possible danger of flying debris, it is **ABSOLUTELY MANDATORY** that **IMPACT RESISTANT SHIELDING** be provided on the power unit to protect the operator. The owner is responsible for providing the operator protection devices on the power unit.

Flying debris can gather on the skid-steer and needs to be cleaned off, especially around the radiator and oil cooler screens, engine compartment and exhaust areas. Periodic cleaning will help prevent the possibility of fire.

Make sure that all personnel have read this owner's manual, and thoroughly understand safe and correct installation, operation, and maintenance procedures.

Operate, install, and maintain this unit in a safe manner and in accordance with all applicable local, state, and federal codes, regulations and/or laws; and in compliance with on-product labeling and this owner's manual instructions.

Make sure that all personnel know how to stop the machine.

Safety Instructions

Owner's Responsibility (Cont'd)

Make sure the oil cooler is set up and installed on the machine correctly before being placed in service. At regular intervals thereafter, the oil cooler should be serviced in accordance with procedures outlined in this owner's manual.



WARNING: *The hydraulic system is under high pressure. Make sure all lines and fittings are tight and in good condition. These fluids escaping under high pressure can have sufficient force to penetrate skin and cause serious injury.*



CAUTION: *The oil cooler will become hot during operation. Avoid touching or performing any maintenance on the oil cooler until it has had ample time to cool.*

Safety Rules

These are general safety considerations. Additional precautions may be necessary to operate your machine in a safe manner. Be certain you are operating your machine in accordance with all safety codes, OSHA rules and regulations, insurance requirements and local, state, and federal laws.

- Read and observe all warnings decals on the oil cooler before putting into service. Do not attempt to use the oil cooler unless all factory devices and decals are in place. Keep safety decals clean of dirt and grime. Keep all guards, shields and decals in place.
- Do not allow anyone to install the oil cooler until he or she has read the owner's manual and is completely familiar with all safety precautions. Keep the work area clear of all unauthorized personnel.
- Do not allow persons under the influence of alcohol, medications, or other drugs that can impair judgment or cause drowsiness to install or maintain the oil cooler or operate the machine.
- Never attempt to make any adjustments to the oil cooler while the machine is running or the key is in the "ON" position in the machine. Before leaving the operator's position, shut off engine and remove ignition key.
- Become familiar with and know how to operate all safety devices and controls on the machine and oil cooler before attempting to operate. Know how to stop the machine before starting it.
- Do not put the oil cooler into service, or work on the oil cooler until you have carefully read and thoroughly understand the contents of this manual, and the operator's manual for your machine.
- Before inspecting, cleaning, adjusting or servicing any part of the oil cooler, always shut down the machine following the procedure in the operator's manual for your machine. After service has been performed, be sure to restore all guards, shields and covers to their original position.
- Periodically check all guards, shields and structural members. Replace or repair anything that could cause a potential hazard.
- Do not replace components or parts with other than factory-recommended service parts. To do so may decrease the effectiveness of the oil cooler.
- It is the operator's responsibility to be aware of machine and oil cooler operation and work area hazards at all times.
- Operators are responsible to make certain that all guards are in place when operating the machine and the oil cooler.
- Operators are responsible to be aware of safety hazard areas and follow instructions on warning, caution, or danger decals applied to the oil cooler.
- Do not service the oil cooler while the machine is running.
- Do not smoke while installing or servicing the oil cooler, or operating the machine.

Safety Rules (Cont'd)

Hydraulic Safety

- The hydraulic system is under high pressure. Make sure all lines and fittings are tight and in good condition. These fluids escaping under high pressure can have sufficient force to penetrate skin and cause serious injury.
- Never check for leaks by using any part of your body to feel for escaping fluid.

	WARNING: <i>Contact with high pressure fluids may cause fluid penetration and burn hazards. Fluid that is under pressure can penetrate body tissue. Fluid penetration can cause serious injury and possible death. If fluid is injected into the skin, seek medical attention immediately!</i>
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California Proposition 65 Warning

	WARNING: <i>This product can expose you to Mineral Oil, which is known to the State of California to cause cancer. For more information, go to www.p65warnings.ca.gov.</i>
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A decal with this warning statement is adhered to the oil cooler. If the decal should become worn or missing, replace immediately.

Machine Decals And Signs

Check and replace any worn, torn, hard to read or missing decals on your machine.

Part No. 203264

	WARNING: This product can expose you to Mineral Oil, which is known to the State of California to cause cancer. For more information, go to www.p65warnings.ca.gov . 203264
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Part No. N13721

Model Number	
Serial Number	

Part No. 4138



Part No. N13517



Part No. N26974



Part No. N49007



Part No. N33106





Installation Introduction

The Loftness Universal Oil Cooler consists of:

- Oil Cooler/Protective Box
- Oil Cooler Core
- Dual 14 in. (35.6 cm) Electric Fan
- Fan Controller
- Internal 60 PSI Cold Oil By-Pass Check Valve
- Temp Sensor
- Wire Harness
- Inlet And Outlet Ports
- Slide Out Screen
- Removable Top

Refer to pages 24 through 30 for a complete parts listing.

Mounting the Oil Cooler

Choosing a Location for the Oil Cooler



The first step is to determine the best location to physically mount the oil cooler. The cleanest, coolest air available will deliver the best oil cooling results. The oil cooler draws air in from the bottom and blows it out the top.

The oil cooler is approximately 46-1/2 in. long x 25-5/8 in. wide x 12-3/8 in. tall (118.1 cm x 65.1 cm x 31.4 cm) and weighs approximately 253 lbs. (115 kg). See “Dimensional Drawings” on page 33 for dimensions and specifications.

The skid steer roof is a prime location for the oil cooler. Cool, clean air is available and the cooler is not blocking the operator’s line of sight. It will add approximately 13 in. (33.0 cm), plus the height of the mount, to the height of the machine. This could be an issue if low clearance is needed.

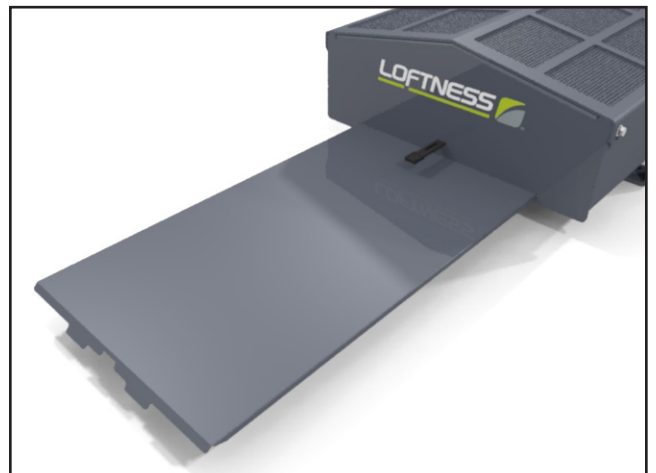


Behind the operator’s cab or on top of a forestry package are also places to consider.



IMPORTANT - DO NOT:

- *block any operator emergency escape routes.*
- *block access to any machine service areas.*
- *interfere with operation of the boom arms.*
- *severely limit the operator’s vision when choosing a location for the oil cooler.*



When positioning the oil cooler, keep in mind that the bottom screen slides forward. Allow clearance when choosing a location for the oil cooler.

Set-up Instructions

Mounting the Oil Cooler (Cont'd)

Designing a Mounting Bracket

Because there are many skid steer brands and designs, you will need to use some ingenuity to design brackets or some form of secure hold-down device.



IMPORTANT: *When designing your brackets avoid drilling holes into or welding onto the roof or cab structure. This could weaken the cab rollover and falling object protection. Drilling holes could also cause water leaks into the cab. Welding directly onto the cab may make the mount removal difficult.*

Look for holes, tabs and lugs already on the structure which could be used as mounting points.

If drilling holes can not be avoided, look for tabs, lugs and overhangs which can be modified without affecting the main cab structure.

Checking Loader Arm Clearance



Raise loader arms slowly and check clearances for cab, cooler and mount.

Lower arms and adjust mounting if necessary. Recheck clearances after making adjustments.

NOTE: *If the cab tilts for service, make sure this is still possible with the cooler attached.*

With arms lowered, tighten all mounting hardware to the proper specifications.

Connecting the Hydraulics

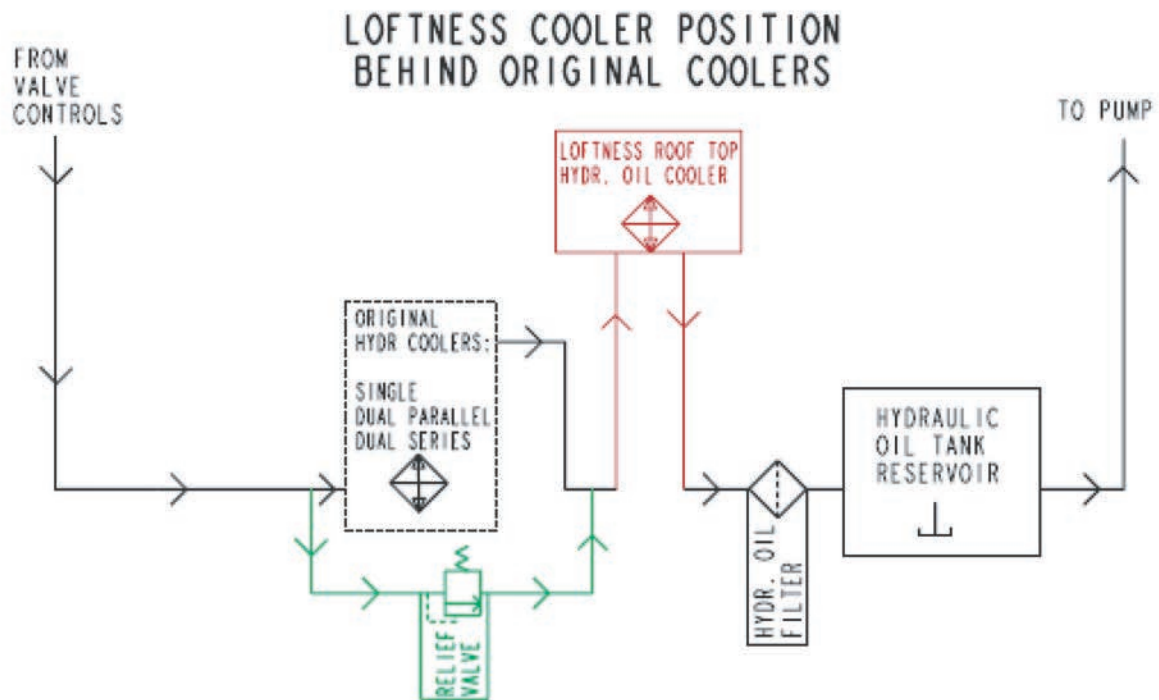
Connect the Loftness Universal Oil Cooler behind the original oil cooler so the hot oil will enter the original oil cooler first and the Loftness Universal Oil Cooler second. This will give the best cooling results for the entire hydraulic system.

Use the schematic on page 15 as a guide when installing your Loftness Universal Oil Cooler.

Pressure Relief Check Valve

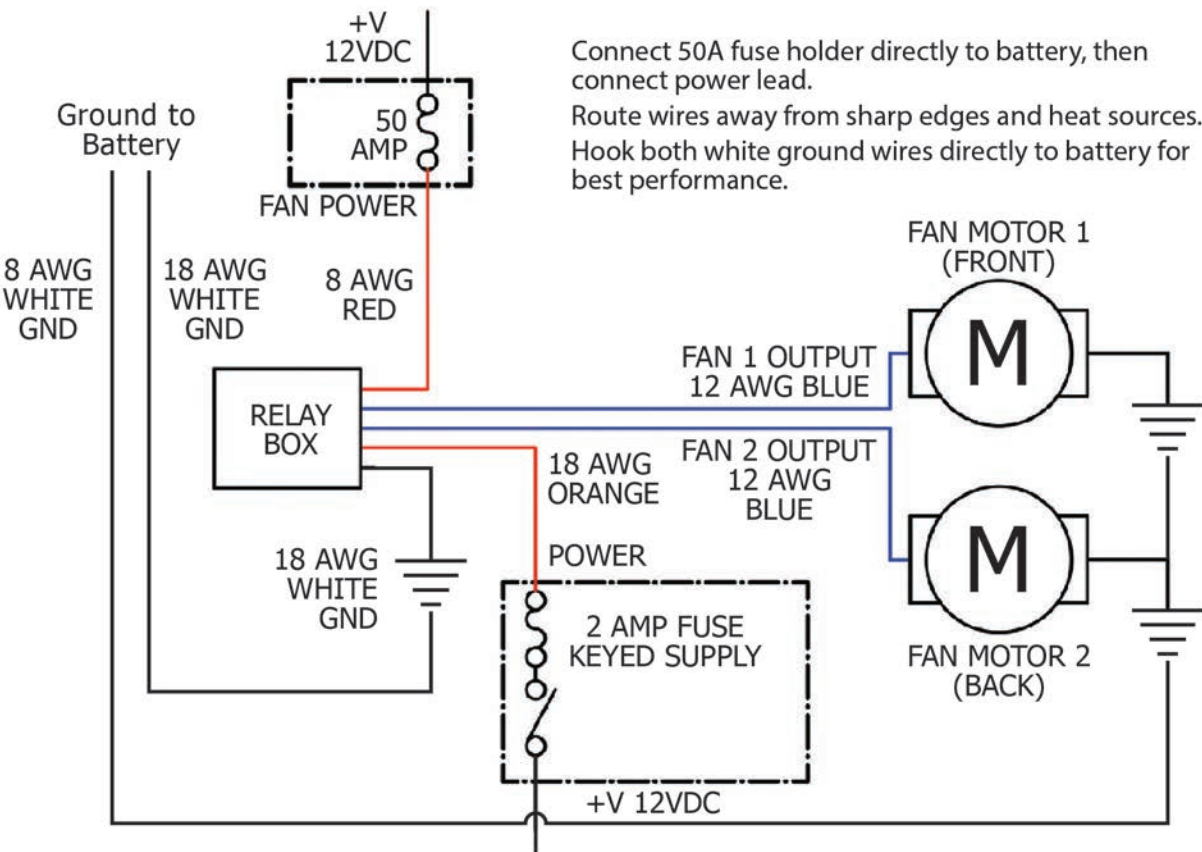
The Loftness Universal Oil Cooler has a pressure relief check valve built in to allow the oil to bypass the cooler if the pressure builds beyond 65 psi.

Loftness Cooler Position Schematic

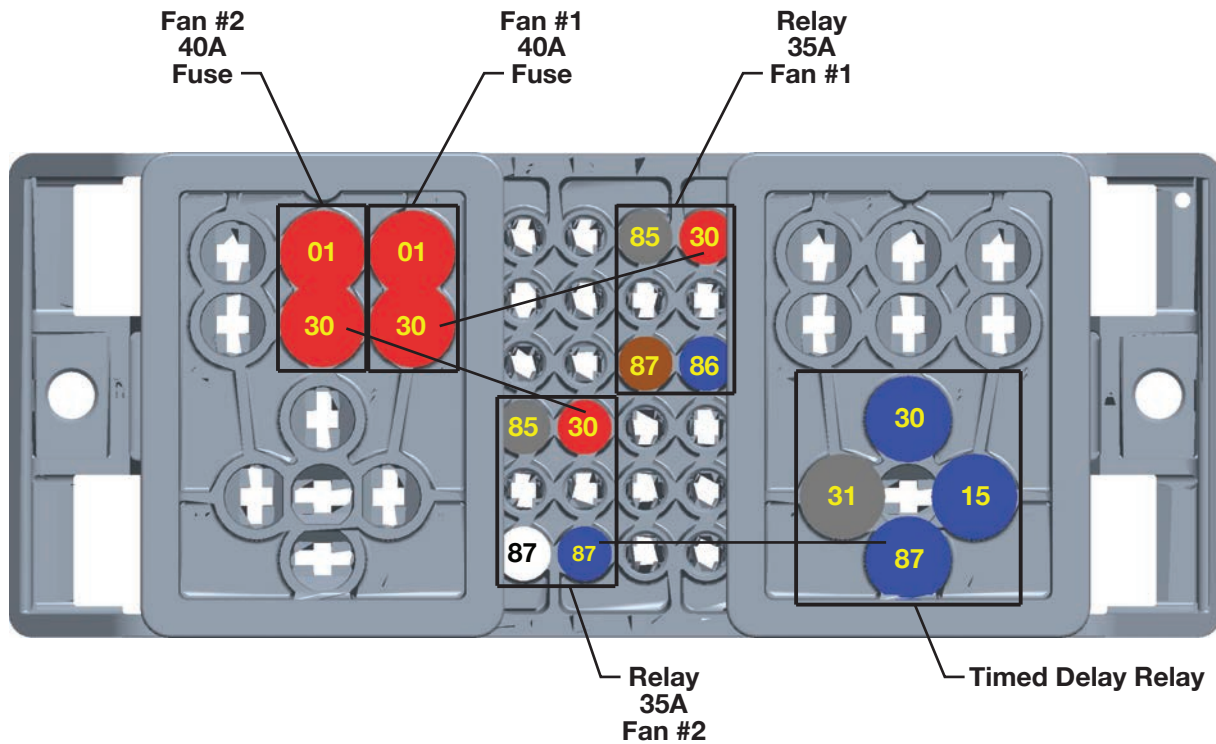


Set-up Instructions

Loftness Cooler Position Schematic (Wire Harness N68127)



Fan Control Box Configuration



(Viewed from bottom)

01	12V Battery
15	12V Key Power
30	RED 12V Power
30	BLUE 12V Power
31	Battery Ground
85	Battery Ground
86	12V Signal from Temp Switch
87	BROWN 12V to Fan #1
87	WHITE 12V to Fan #2
87	12V Signal from Time Delay Relay

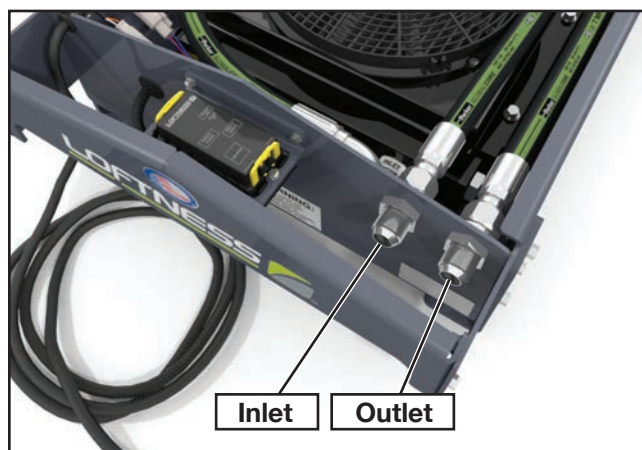
Set-up Instructions

Hydraulic Hose Specifications

NOTE: Any external hydraulic hoses are not included with the Loftness Universal Oil Cooler and must be acquired separately. Follow the specifications below when purchasing hoses for the oil cooler.

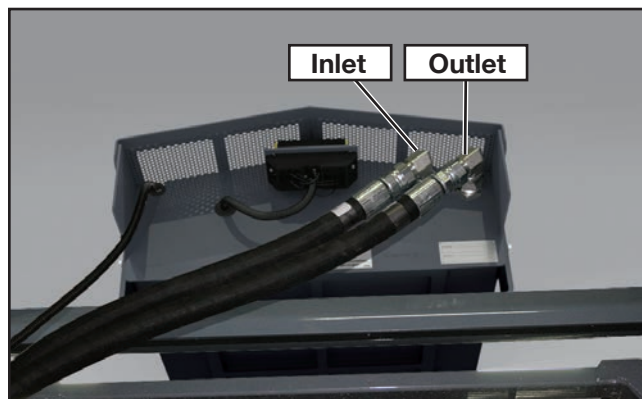
- Hose Inside Diameter: 1.0 inch
- Working Pressure: 800 psi or greater
- Minimum Bend Radius: 6 inches
- Temperature Range: -40°F to +250°F
- Cover: Fiber Braid

Hydraulic Fitting Specifications



Loftness Inlet Port: JIC Size 16 (1-5/16" Dia.) Male
Loftness Outlet Port: JIC Size 16 (1-5/16" Dia.) Male

Connecting the Hydraulic Hoses



Hydraulically connect the roof cooler to the skid steer at the connection point determined earlier.



Route the hoses along one side. Make sure the hoses will not be pinched or kinked. Also make sure the hoses will not rub on sharp edges, hit moving parts (fan, belts), or rest against hot surfaces (exhaust, muffler, etc).

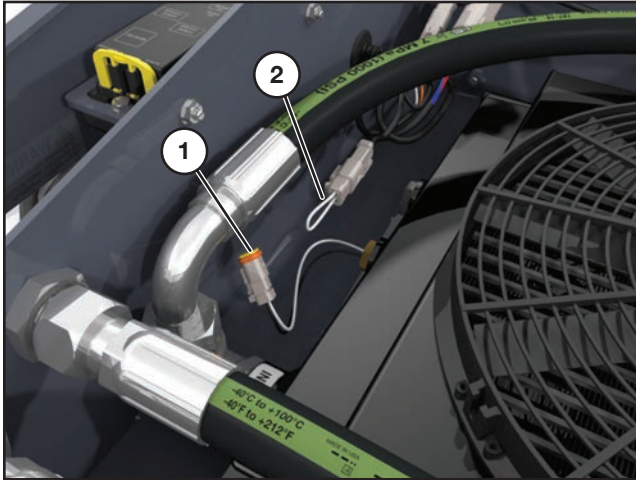


You may need to cut holes in the engine hood or sheet metal as the hoses pass from under the hood up towards the Loftness Universal Oil Cooler. Line the newly cut sheet metal edge with rubber edging.

Set-up Instructions

Check and Verify Fan Operation

To Check Fan



Remove the temperature sensor plug (1) on the main harness.

Use a jumper wire or Deutsch plug jumper (2) (dealer-made) to activate fan #1. Fan #2 will activate 25-30 seconds later.

Preset 120° F temperature setting is non-adjustable.

Check Clearances, Hardware & Hydraulic Connections



Raise cab and check that the hoses from the roof cooler do not pinch against the cab or hood structure.

Double check that all hardware is tightened to the proper specifications. Refer to "Torque Specifications" on pages 34 and 35.

Recheck all the hydraulic connections before operation.

Start engine and function loader arms slowly.

Carefully observe for any hydraulic leaks using proper hydraulic techniques.



WARNING: Do not use exposed skin to test for hydraulic leaks. High pressure oil can be injected into the skin. If oil is injected into the skin, seek immediate medical attention as serious side affects and death can occur.

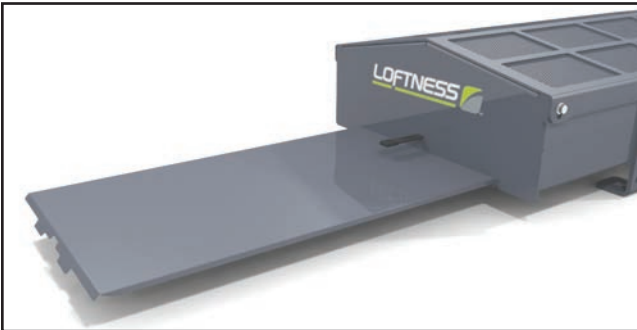


IMPORTANT: Flying debris can gather on the skid-steer and needs to be cleaned off, especially around the radiator and oil cooler screens, engine compartment and exhaust areas. Periodic cleaning will help prevent the possibility of fire. See "Cleaning The Cooler" on page 21 for cleaning instructions.

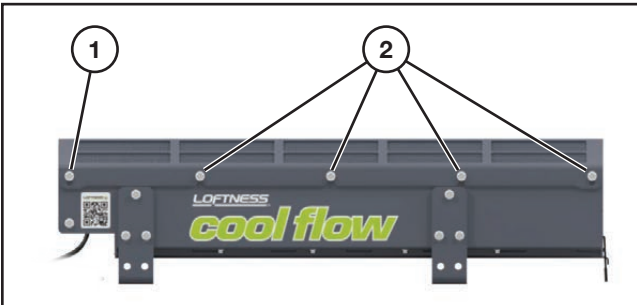


Cleaning the Cooler

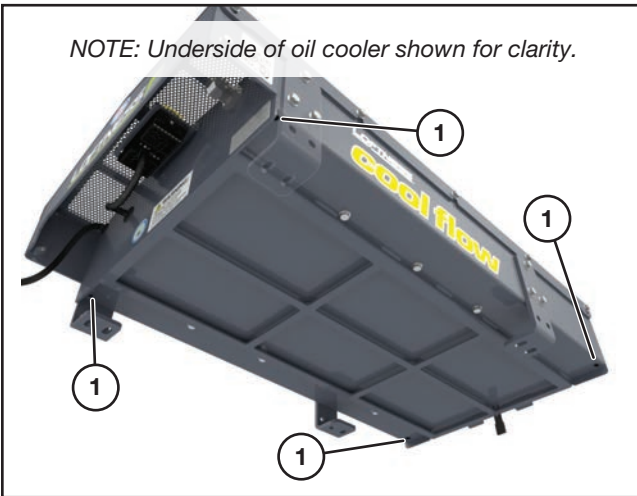
Use compressed air or a shop vacuum to remove dust and debris from the oil cooler.



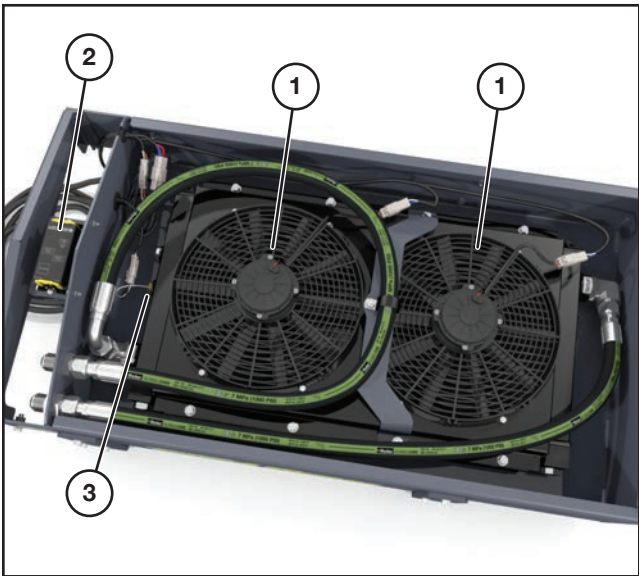
Clean the bottom screen daily. The bottom screen pulls out for easy cleaning.



Remove two bolts on one end of the cover (1) (one on each side) and loosen the remaining eight bolts (2) (four on each side). Pivot the screen up.



Ensure weep holes (1) located at each corner are clear and free of debris.



Clean the fans (1), fan controller (2), and the temperature sensor (3).

Maintenance Schedule

H O U R S	SERVICE POINTS	SERVICE REQUIRED				
		C H E C K	C L E A N	C H A N G E	G R E A S E	A D J U S T
Every 8	Bottom and Top Screen		X			
	Hydraulic Fluid Leaks	X				
	Loose Nuts and Bolts	X				
Every 50	Cooler Fins and Core		X			

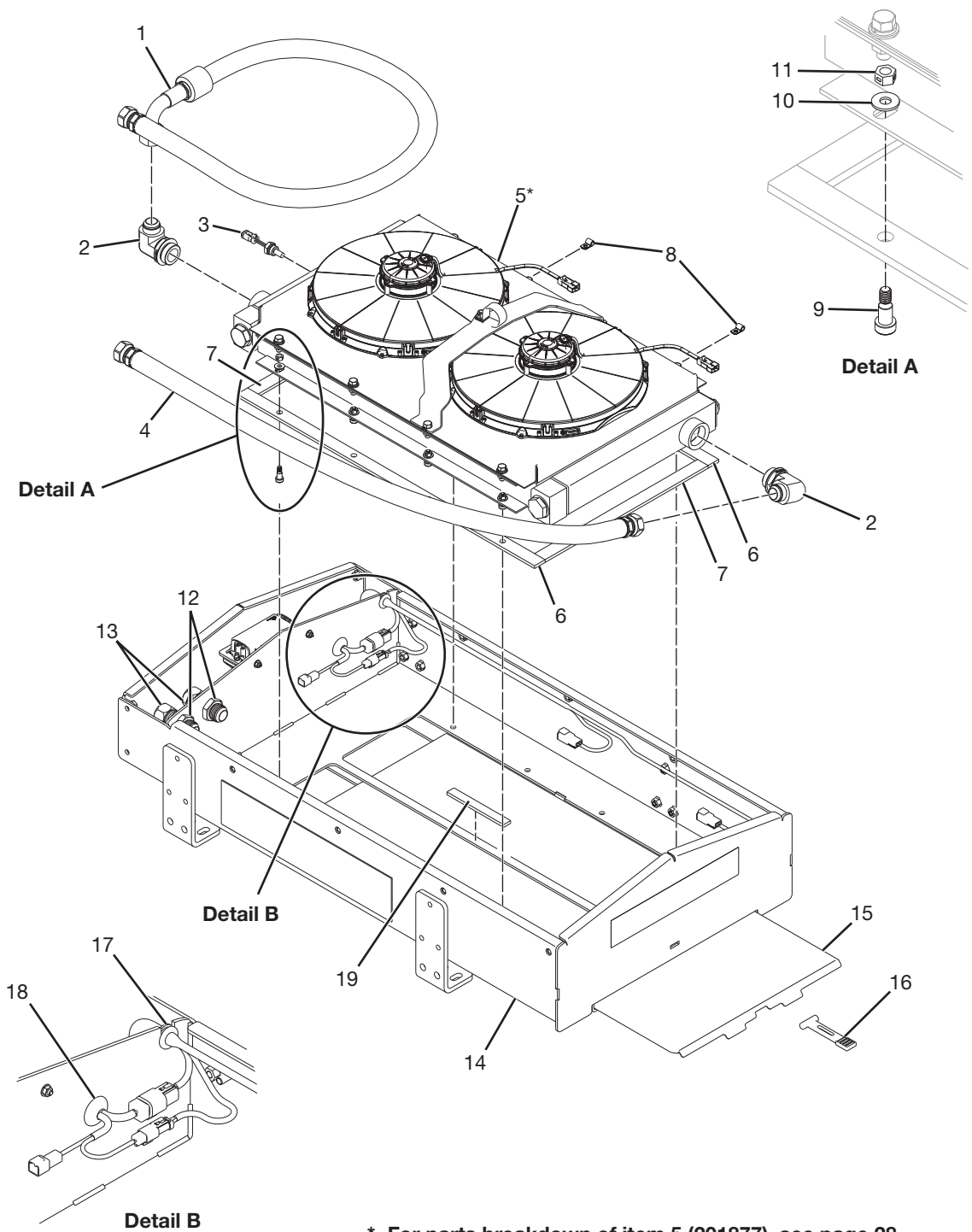




PARTS IDENTIFICATION

Parts Identification

Oil Cooler

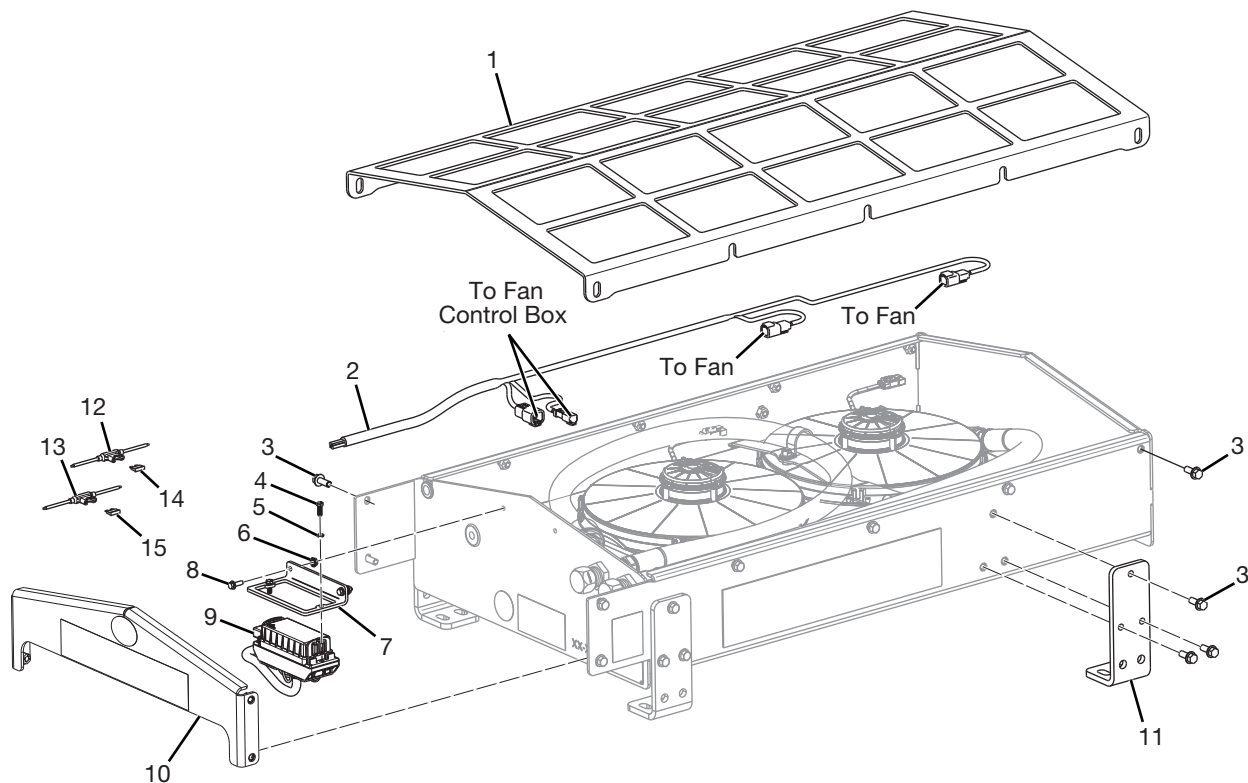


Oil Cooler

#	QTY.	PART #	DESCRIPTION
1	1	201778	HOSE, 1" X 62.5" -16FJIC-16FJIC
2	2	N28911	ELBOW, 90DEG 16MJIC -20MOR
3	1	201875	SWITCH, 120 DEG NO TEMP W/CONN
4	1	201776	HOSE, 1" X 49" -16FJIC-16FJIC
5	1	201877	COOLER, MAR-232 W/DUETSCH CONN
6	2	209481	STRIP, OIL COOLER DAMPENING A
7	2	209483	GASKET, OIL COOLER A
8	2	209319	CLAMP, 3/8 VIBRATION-DAMP LOOP
9	8	209486	BOLT, SHOULDER 3/8IN X 1/2IN
10	8	3183	WASHER, FLAT 1/4"
11	8	4051	NUT, LOCK 5/16"
12	2	N19817	ADAPTER, BLK HD 16MJIC-16MJIC
13	2	N19329	CAP, 16 FJIC
14	1	201761	WELDMENT, OIL COOLER FRAME
15	1	201766	SCREEN, OIL COOLER
16	1	N41122	HOOD STRAP
17	1	N19297	GROMMET-RUBBER
18	1	205013	GROMMET, 1/2 ID X 1-1/4 OD
19	1	206363	STRIP, OIL COOLER NEOPRENE CTR

Parts Identification

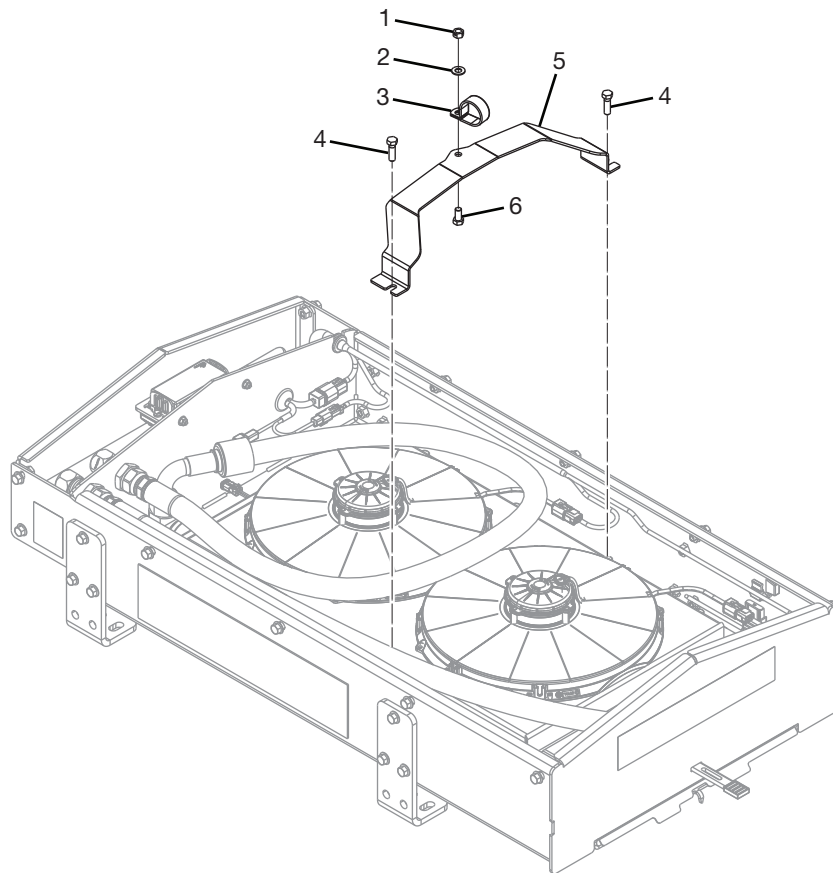
Oil Cooler (Cont'd)



* For parts breakdown of item 9 (206027), see page 30.

#	QTY.	PART #	DESCRIPTION
1	1	201767	COVER, OIL COOLER TOP
2	1	N68127	HARNESS, OIL COOLER
3	24	N26743	BOLT, 3/8" X 1" SER FLG
4	2	201876	BOLT, M6 X 18 MM GR. 8.8
5	2	N16468	WASHER, 1/4 NORDLOCK
6	2	N105230	NUT, LOCK 1/4" SER FLANGE
7	1	201870	PLATE, OIL COOLER ELECT BOX
8	2	4573	BOLT, 1/4" X 3/4" SER FLANGE
9	1	206027	RELAY FAN CONTROL BOX
10	1	209048	ENDPLATE, OIL COOLER W/DECALS
11	4	202597	LEG, OIL COOLER FORMED
12	1	N157076	HOLDER, IN-LINE 8 GA FUSE
13	1	N49321	HOLDER, IN-LINE 10A 18GA
14	1	N157078	FUSE, MAXI 50A
15	1	N49322	FUSE, 2A, 32V, ATO/ATC, GREY

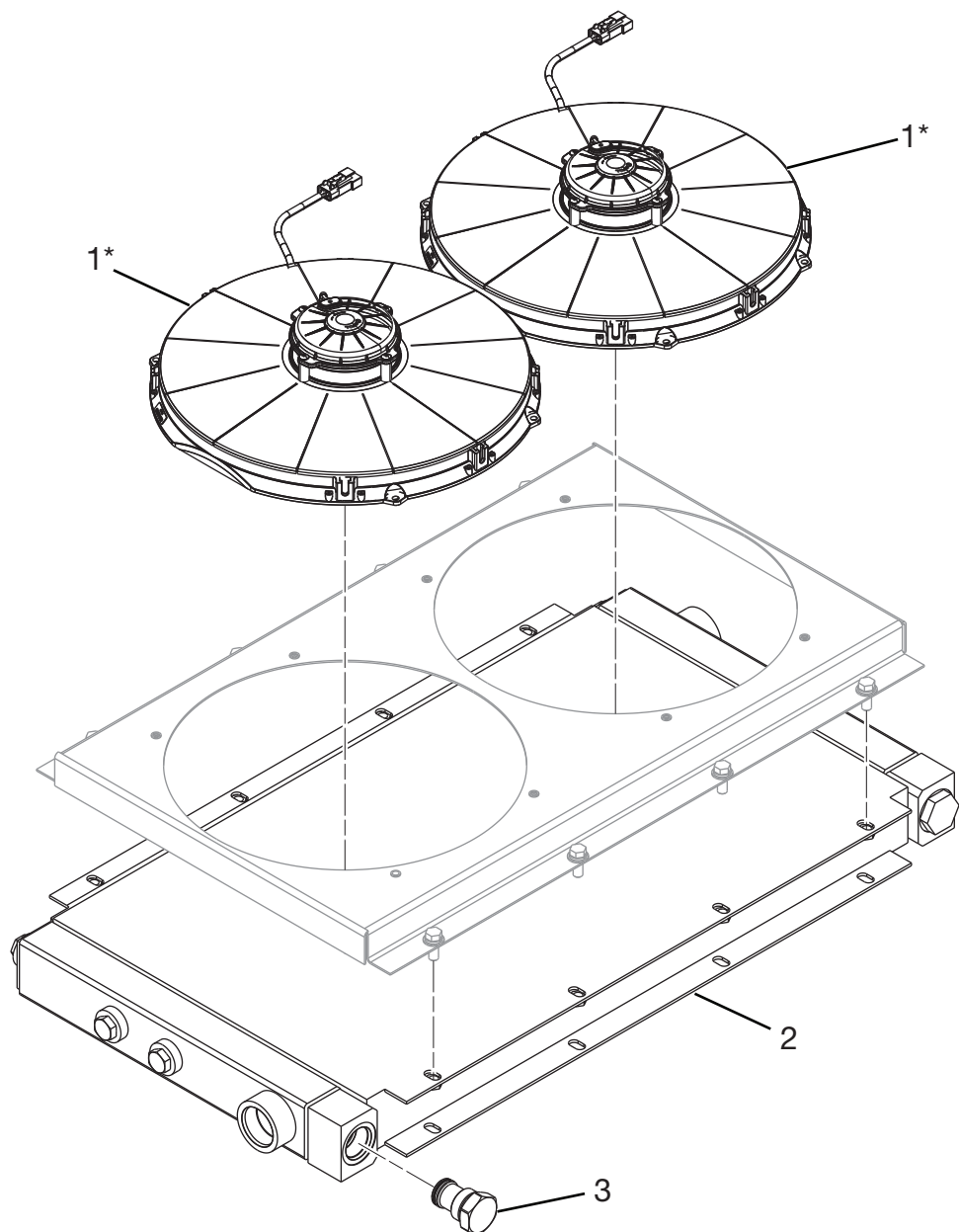
Hose Platform



#	QTY.	PART #	DESCRIPTION
1	1	4052	NUT, LOCK 3/8"
2	1	N31741	WASHER, FLAT 3/8" SAE
3	1	206352	CLAMP, LOOP 1.50
4	2	4005	BOLT, 3/8" X 1-1/4" GRADE 5
5	1	206353	PLATE, HOSE PLATFORM
6	1	4193	BOLT, 3/8" X 3/4" GRADE 5

Parts Identification

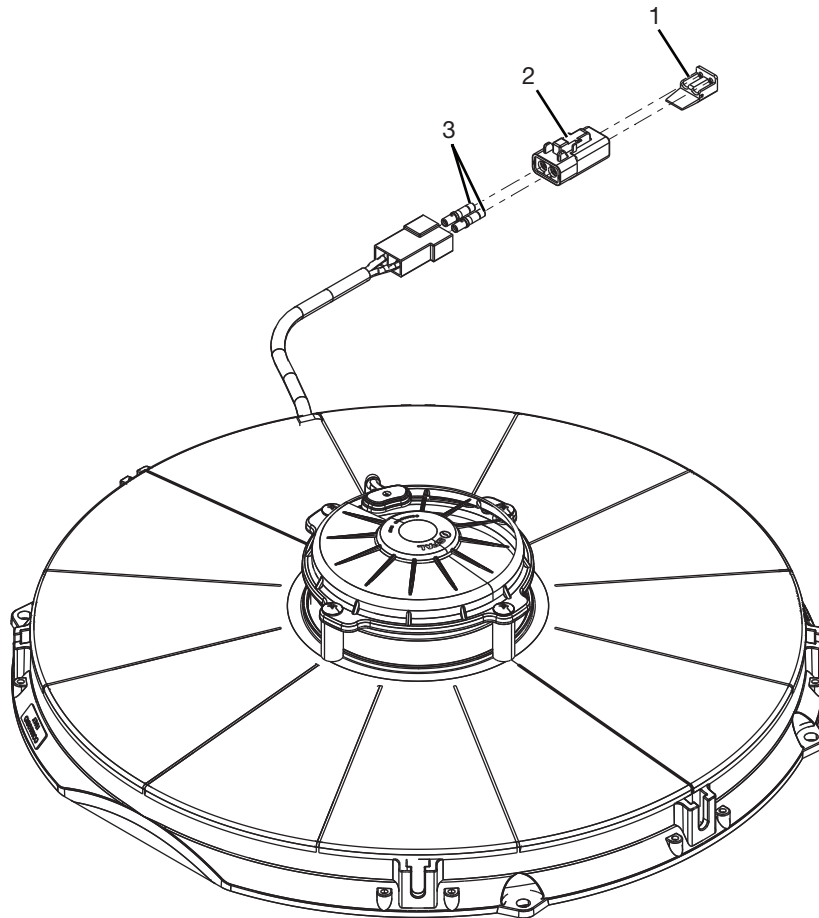
Cooler, MAR-232 with Duetsch Connector (201877)



* For parts breakdown of item 1 (201878), see page 29.

#	QTY.	PART #	DESCRIPTION
1	2	201878	FAN, MAR-232 COOLER W/DUETSCH
2	1	202991	CORE, COOLER MAR-232
3	1	205061	VALVE, 60 PSI COLD BYPASS CHECK

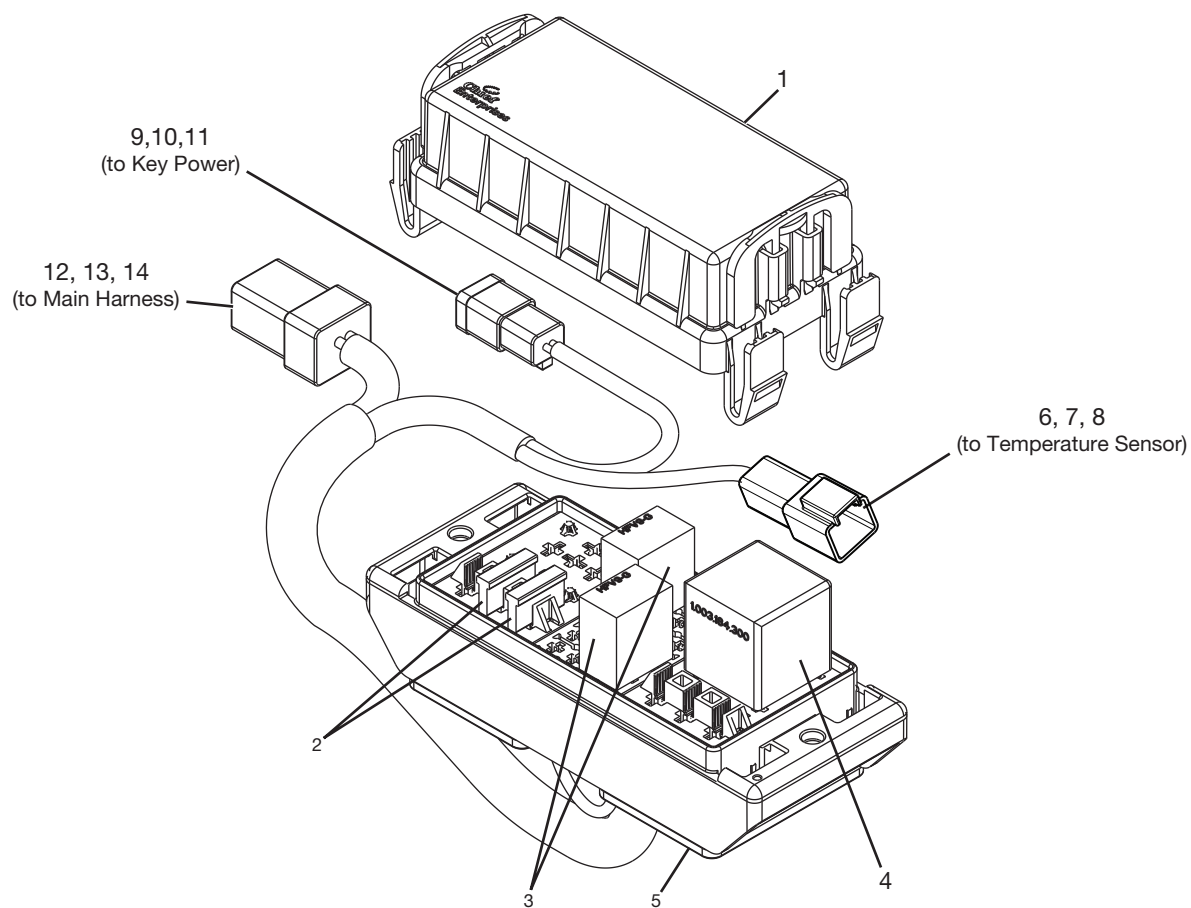
Fan, MAR-232 Cooler with Duetsch Connector (201878)



#	QTY.	PART #	DESCRIPTION
1	1	N68188	LOCK, DEUTSCH WP-2S
2	1	N68172	CONNECTOR, DEUTSCH DTP06-2S
3	2	N68176	CONTACT, 12 SOCKET, 12-14 AWG

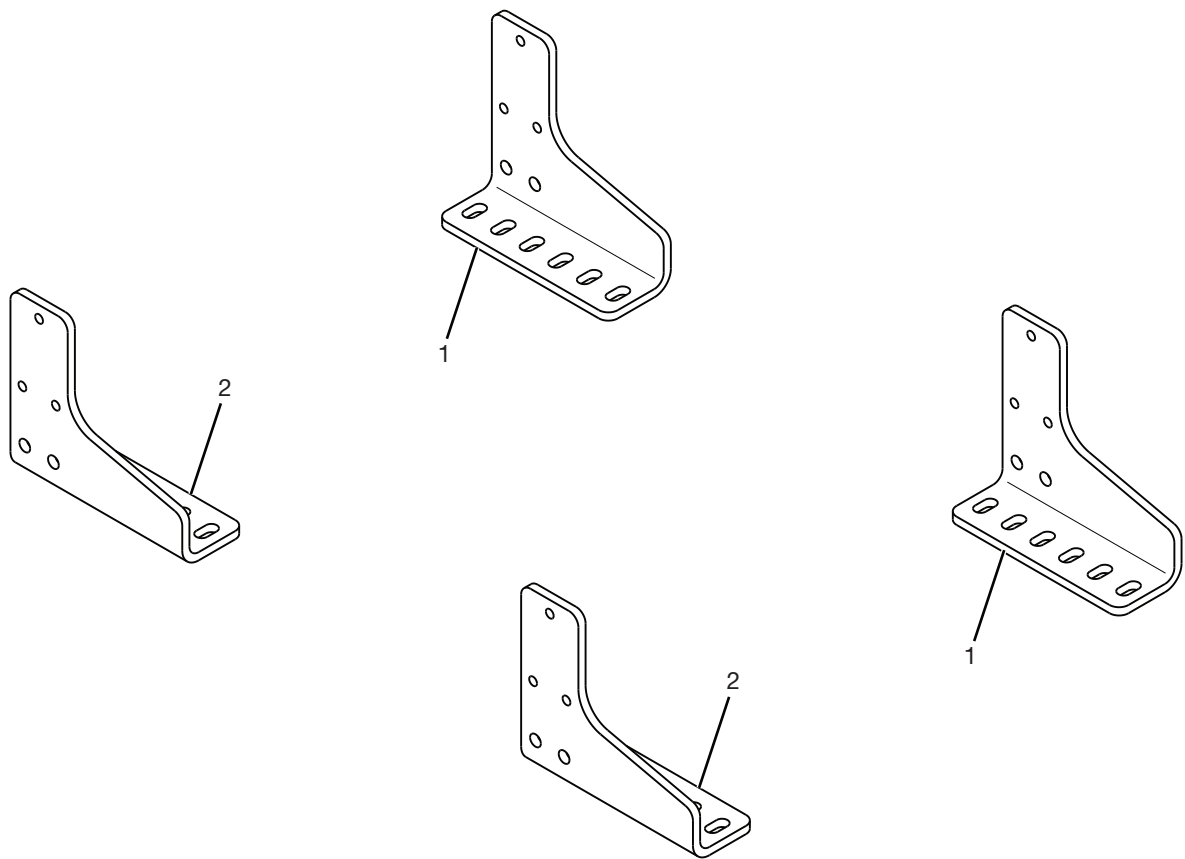
Parts Identification

Relay Fan Control Box (206027)



15#	QTY.	PART #	DESCRIPTION
1	1	201872	COVER, W/SEAL CPAS & VENT LG
2	2	N68290	FUSE, ATC 40A
3	2	201873	RELAY, 12-ZS-R AUTOMOTIVE
4	1	201874	RELAY, SWITCH ON DELAY TIME
5	1	201871	BASE, FUSION REL X 280 X REL
6	1	N154819	CONNECTOR
7	1	N154815	LOCK
8	2	N108467	CONTACT 2X
9	1	N68180	CONNECTOR
10	1	N68184	LOCK
11	2	N68178	CONTACT 2X
12	1	N68169	CONNECTOR
13	1	N68182	LOCK
14	3	N68176	CONTACT 3X

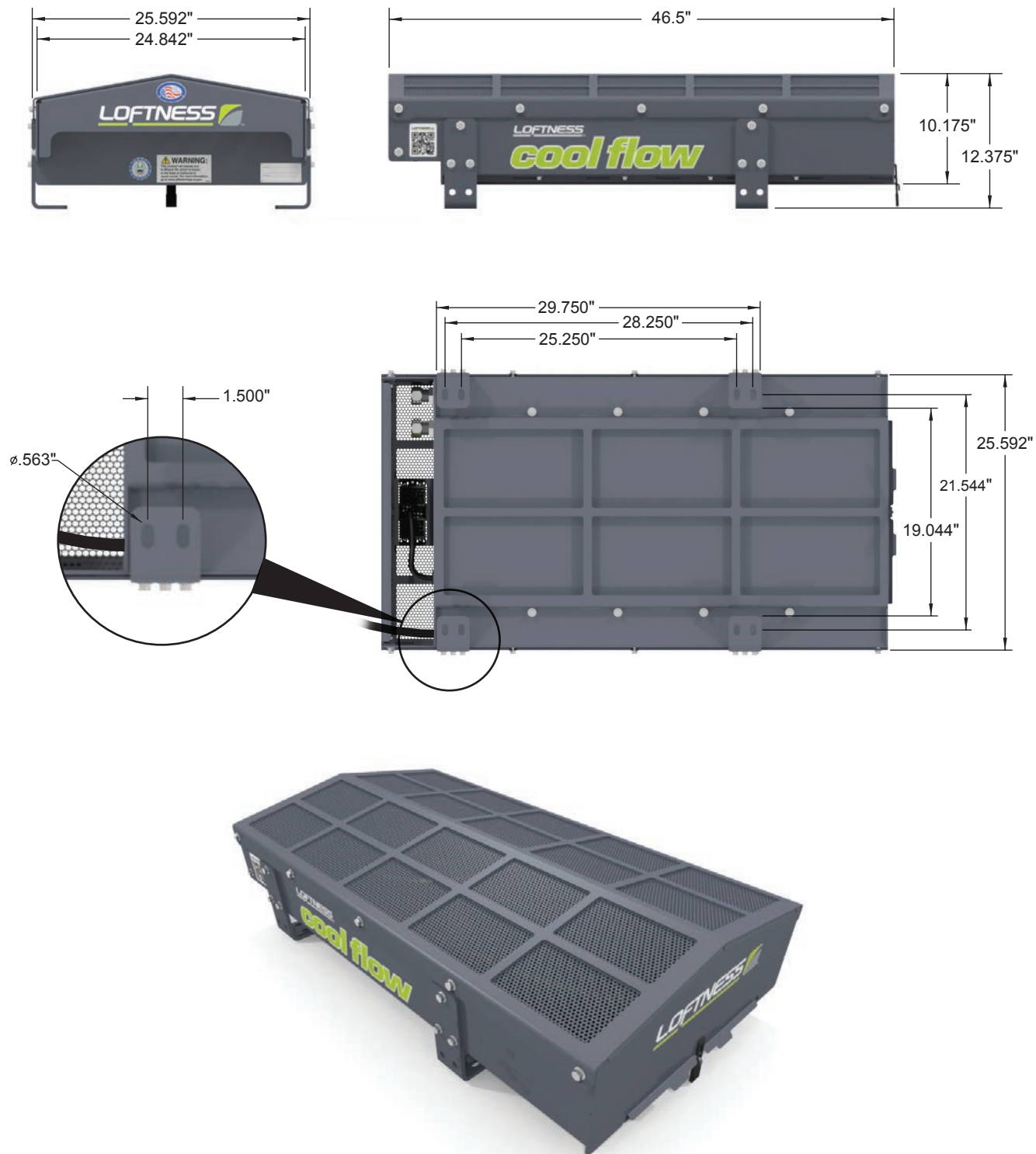
Adjustable Leg Kit (206362) - Optional



#	QTY.	PART #	DESCRIPTION
1	2	206360	LEG, OIL COOLER ADJUSTABLE A
2	2	206361	LEG, OIL COOLER ADJUSTABLE B



Dimensional Drawings



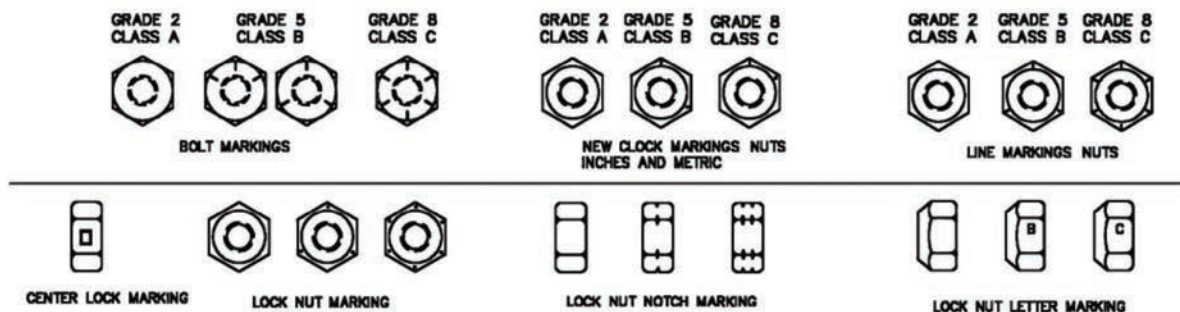
Appendix

Torque Specifications

Inches Hardware and Lock Nuts

TORQUE CHARTS
Minimum Hardware Tightening Torques
Normal Assembly Applications
(Standard Hardware and Lock Nuts)

SAE Gr. 2	SAE Grade 5		SAE Grade 8		LOCK NUTS			
Nominal Size	Unplated or Plated Silver	Plated W / ZnCr Gold	Unplated or Plated Silver	Plated W / ZnCr Gold	Unplated or Plated Silver	Plated W / ZnCr Gold	Grade W / Gr. 5 Bolt	Grade W / Gr. 8 Bolt
1/4	55 in.-lb. (6.2 N•m)	72 in.-lb. (8.1 N•m)	86 in.-lb. (9.7 N•m)	112 in.-lb. (12.6 N•m)	121 in.-lb. (13.6 N•m)	157 in.-lb. (17.7 N•m)	61 in.-lb. (6.9 N•m)	86 in.-lb. (9.8 N•m)
5/16	115 in.-lb. (13 N•m)	149 in.-lb. (17 N•m)	178 in.-lb. (20 N•m)	229 in.-lb. (26 N•m)	250 in.-lb. (28 N•m)	324 in.-lb. (37 N•m)	125 in.-lb. (14 N•m)	176 in.-lb. (20 N•m)
3/8	17 ft.-lb. (23 N•m)	22 ft.-lb. (30 N•m)	26 ft.-lb. (35 N•m)	34 ft.-lb. (46 N•m)	37 ft.-lb. (50 N•m)	48 ft.-lb. (65 N•m)	19 ft.-lb. (26 N•m)	26 ft.-lb. (35 N•m)
7/16	27 ft.-lb. (37 N•m)	35 ft.-lb. (47 N•m)	42 ft.-lb. (57 N•m)	54 ft.-lb. (73 N•m)	59 ft.-lb. (80 N•m)	77 ft.-lb. (104 N•m)	30 ft.-lb. (41 N•m)	42 ft.-lb. (57 N•m)
1/2	42 ft.-lb. (57 N•m)	54 ft.-lb. (73 N•m)	64 ft.-lb. (87 N•m)	83 ft.-lb. (113 N•m)	91 ft.-lb. (123 N•m)	117 ft.-lb. (159 N•m)	45 ft.-lb. (61 N•m)	64 ft.-lb. (88 N•m)
9/16	60 ft.-lb. (81 N•m)	77 ft.-lb. (104 N•m)	92 ft.-lb. (125 N•m)	120 ft.-lb. (163 N•m)	130 ft.-lb. (176 N•m)	169 ft.-lb. (229 N•m)	65 ft.-lb. (88 N•m)	92 ft.-lb. (125 N•m)
5/8	83 ft.-lb. (112 N•m)	107 ft.-lb. (145 N•m)	128 ft.-lb. (174 N•m)	165 ft.-lb. (224 N•m)	180 ft.-lb. (244 N•m)	233 ft.-lb. (316 N•m)	90 ft.-lb. (122 N•m)	127 ft.-lb. (172 N•m)
3/4	146 ft.-lb. (198 N•m)	189 ft.-lb. (256 N•m)	226 ft.-lb. (306 N•m)	293 ft.-lb. (397 N•m)	319 ft.-lb. (432 N•m)	413 ft.-lb. (560 N•m)	160 ft.-lb. (217 N•m)	226 ft.-lb. (306 N•m)
7/8	142 ft.-lb. (193 N•m)	183 ft.-lb. (248 N•m)	365 ft.-lb. (495 N•m)	473 ft.-lb. (641 N•m)	515 ft.-lb. (698 N•m)	667 ft.-lb. (904 N•m)	258 ft.-lb. (350 N•m)	364 ft.-lb. (494 N•m)
1	213 ft.-lb. (289 N•m)	275 ft.-lb. (373 N•m)	547 ft.-lb. (742 N•m)	708 ft.-lb. (960 N•m)	773 ft.-lb. (1048 N•m)	1000 ft.-lb. (1356 N•m)	386 ft.-lb. (523 N•m)	545 ft.-lb. (739 N•m)



Torque Specifications (Cont'd)

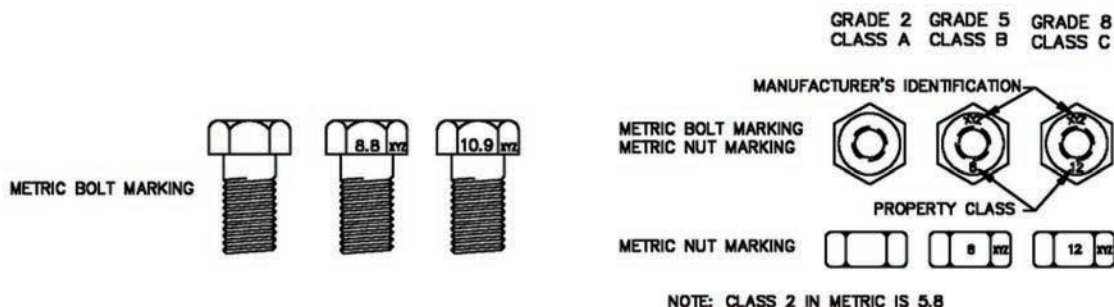
Metric Hardware and Lock Nuts

TORQUE CHARTS

Minimum Hardware Tightening Torques

Normal Assembly Applications
(Metric Hardware and Lock Nuts)

Nominal Size	Class 5,8		Class 8,8		Class 10,9		Lock nuts
	Unplated or Plated Silver	Plated W / ZnCr Gold	Unplated or Plated Silver	Plated W / ZnCr Gold	Unplated or Plated Silver	Plated W / ZnCr Gold	Class 8 W / CL. 8,8 Bolt
M4	1.7 N•m (15 in.-lb.)	2.2 N•m (19 in.-lb.)	2.6 N•m (23 in.-lb.)	3.4 N•m (30 in.-lb.)	3.7 N•m (33 in.-lb.)	4.8 N•m (42 in.-lb.)	1.8 N•m (16 in.-lb.)
M6	5.8 N•m (51 in.-lb.)	7.6 N•m (67 in.-lb.)	8.9 N•m (79 in.-lb.)	12 N•m (102 in.-lb.)	13 N•m (115 in.-lb.)	17 N•m (150 in.-lb.)	6.3 N•m (56 in.-lb.)
M8	14 N•m (124 in.-lb.)	18 N•m (159 in.-lb.)	22 N•m (195 in.-lb.)	28 N•m (248 in.-lb.)	31 N•m (274 in.-lb.)	40 N•m (354 in.-lb.)	15 N•m (133 in.-lb.)
M10	28 N•m (21 ft.-lb.)	36 N•m (27 ft.-lb.)	43 N•m (32 ft.-lb.)	56 N•m (41 ft.-lb.)	61 N•m (45 ft.-lb.)	79 N•m (58 ft.-lb.)	30 N•m (22 ft.-lb.)
M12	49 N•m (36 ft.-lb.)	63 N•m (46 ft.-lb.)	75 N•m (55 ft.-lb.)	97 N•m (72 ft.-lb.)	107 N•m (79 ft.-lb.)	138 N•m (102 ft.-lb.)	53 N•m (39 ft.-lb.)
M16	121 N•m (89 ft.-lb.)	158 N•m (117 ft.-lb.)	186 N•m (137 ft.-lb.)	240 N•m (177 ft.-lb.)	266 N•m (196 ft.-lb.)	344 N•m (254 ft.-lb.)	131 N•m (97 ft.-lb.)
M20	237 N•m (175 ft.-lb.)	307 N•m (226 ft.-lb.)	375 N•m (277 ft.-lb.)	485 N•m (358 ft.-lb.)	519 N•m (383 ft.-lb.)	671 N•m (495 ft.-lb.)	265 N•m (195 ft.-lb.)
M24	411 N•m (303 ft.-lb.)	531 N•m (392 ft.-lb.)	648 N•m (478 ft.-lb.)	839 N•m (619 ft.-lb.)	897 N•m (662 ft.-lb.)	1160 N•m (855 ft.-lb.)	458 N•m (338 ft.-lb.)





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