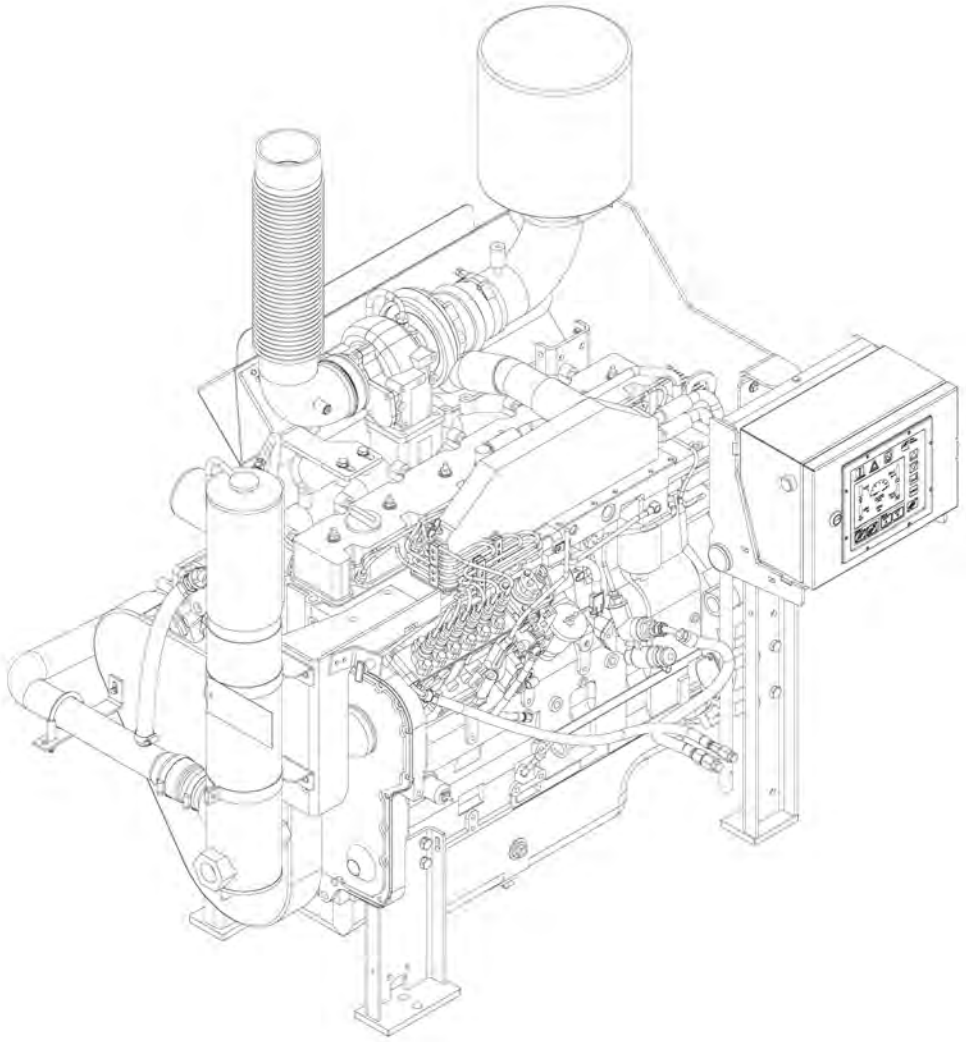
CFP59/CFP83 SERIES

Fire Power

Operation & Maintenance Manual

Fire Pump Drive Engines



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English Version

Fire Power

This manual contains proprietary information to equipment produced by Cummins Fire Power or Cummins Inc. and is being supplied solely for the purpose of operating, maintaining, and servicing the fire pump engine purchased from Cummins Fire Power.

Cummins Fire Power
Limited Warranty

Fire Pump Package

This limited warranty applies to all Cummins Fire Power (hereinafter referred to as “Cummins Fire Power” branded fire pump driver and associated accessories (hereinafter referred to as "Product"). This warranty covers any failures of the Product, under normal use and service, which result from a defect in material or factory workmanship.

Warranty Period:

The warranty start date for stationary Product is the date of initial start up, demonstration or 18 months after factory ship date, whichever is sooner.

Base Warranty Duration (whichever occurs first): 2 years/2000 hours.

Cummins Fire Power Responsibilities:

In the event of a failure of the Product during the warranty period due to defects in material or workmanship, Cummins Fire Power will only be responsible for the following costs:

- All parts and labor required to repair the Product.
- Reasonable travel expenses to and from the Product site location.
- Maintenance items that are contaminated or damaged by a warrantable failure.

Owner Responsibilities:

The owner will be responsible for the following:

- Notifying Cummins Fire Power distributor or dealer within 30 days of the discovery of failure.
- Installing, operating, commissioning and maintaining the Product in accordance with Cummins Fire Power’s published policies and guidelines.
- Providing evidence for date of commissioning.
- Providing sufficient access to and reasonable ability to remove the Product from the installation in the event of a warrantable failure.

In addition, the owner will be responsible for:

- Incremental costs and expenses associated with Product removal and reinstallation resulting from difficult or non-standard installations.
- Costs associated with Fire Watch Protection during Product being repaired.
- Costs associated with labor overtime and premium shipping requested by the owner.
- All downtime expenses, fines, all applicable taxes, and other losses resulting from a warrantable failure.

Limitations:

This limited warranty does not cover Product failures resulting from:

- Inappropriate use relative to designated power rating or application guidelines.
- Normal wear and tear, negligence, accidents or misuse.
- Improper and/or unauthorized installation.
- Lack of maintenance or unauthorized repair.
- Noncompliance with any Cummins Fire Power published guideline or policy.
- Use of improper or contaminated fuels, coolants or lubricants.
- Improper storage before and after commissioning.
- Owner’s delay in making Product available after notification of potential Product problem.
- Replacement parts and accessories not authorized by Cummins Fire Power.
- Owner or operator abuse or neglect such as: operation without adequate coolant or lubricants; over-fueling; over-speeding; lack of maintenance to lubricating, cooling or air intake systems; late servicing and maintenance; improper storage, starting, warm-up, run-in or shutdown practices, or for progressive damage resulting from a defective warning device.
- Damage to parts, fixtures, housings, attachments and accessory items that are not part of the fire pump package.

Limitations (cont.):

This limited warranty does not apply to:

- Costs of maintenance, adjustments, installation, commissioning or start-up.
- Starting batteries and enclosures.
- Components added to the Product after shipment from Cummins Fire Power.
- Block heaters are warranted for 1 year from date in service

Please contact your local Cummins NPower Distributor for clarification concerning these limitations.

Extended Warranty

Cummins Inc offers several levels of Extended Warranty Coverage (**Base Engine Only**). Please contact your local Cummins Distributor for details.

Cummins Fire Power Right to Failed Components:

Failed components claimed under warranty remain the property of Cummins Fire Power. Cummins Fire Power has the right to reclaim any failed component that has been replaced under warranty.

THE WARRANTIES SET FORTH HEREIN ARE THE SOLE WARRANTIES MADE BY CUMMINS FIRE POWER IN REGARD TO THE PRODUCT. CUMMINS FIRE POWER MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, OR OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT IS CUMMINS FIRE POWER LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

This limited warranty shall be enforced to the maximum extent permitted by applicable law. This limited warranty gives the owner specific rights that may vary from state to state or from jurisdiction to jurisdiction.

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Section 1 - Safety

1.1 Introduction

Cummin's Fire Power and Engine Manuals should be considered part of the equipment. Keep the manuals with the equipment. If the equipment is traded or sold, give the manuals to the new owner.

All personnel responsible for operation and maintenance of the equipment should read and thoroughly understand this manual.

1.2 Advisory and Cautionary Statements

Advisory and Cautionary Statements are used throughout this manual to call attention to special information, correct operating procedures and to safety precautions.

NOTE: *A general advisory statement relating to equipment operation and maintenance procedures*

IMPORTANT: *A specific advisory statement intended to prevent damage to the equipment or associated components.*

Cautionary Statements consist of two levels:

WARNING

Indicates the presence of a hazard which CAN cause severe personal injury.

CAUTION

Indicates the presence of a hazard which CAN cause personal injury, or cause equipment damage.

1.3 Safety Precautions

Warning: Read and understand all of the safety precautions and warnings before performing any repair. This manual contains the general safety precautions that must be followed to provide personal safety. When they apply, special safety precautions are included with operating procedures.

Warning: Perform a walk around inspection and alert all area personnel that the equipment will be starting before manual operation.

Warning: Do not operate faulty or damaged equipment. Ensure that all hoses, pipe connections, clamps and guards are in place and securely fastened. Electrical components should be kept in good working condition and repaired immediately by qualified personnel.

Warning: After performing maintenance, remove all tools and foreign materials, reinstall and securely fasten ALL guards, covers and protective devices.

Warning: Exposed in-running belt nips can cause severe personal injury or dismemberment. Ensure that guards are in place and securely fastened before operation.

Warning: Rotating drive shafts can lacerate, dismember or cause strangulation. Keep hands, body parts, long hair, or loose-fitting clothing clear at all times.

Warning: Never attempt to manually clean a machine while it is operating or in standby mode.

Warning: Never open ports on tanks or piping while the engine is operating. Contact with pressurized agents can cause severe personal injury.

Warning: Relieve all pressure in the air, oil, and the cooling systems before any lines, fittings, or related items are removed or disconnected.

Caution: Engine fuel is flammable when in contact with electrical spark or flame sources. Remove all sources of spark or flame from the work area.

Caution: Always use the same fastener part number (or equivalent) when replacing fasteners.

Caution: Some state and federal agencies in the USA have determined that used engine oil can be carcinogenic and can cause reproductive toxicity. Dispose of waste oil in accordance with applicable requirements.

Section 2 - Description

2.1 Introduction

This manual contains information for the correct operation and maintenance of a Cummins Fire Pump Engine. Read and follow all safety instructions. Refer to the General Safety Instructions in Section 1 - Safety.

This manual covers installation, operation and maintenance of specific engine models. Most illustrations are representations that are common between each models. Where differences occur, refer to Section 8 - Component Parts and Assemblies for specific information.

Keep this manual with the equipment. If the equipment is traded or sold, give the manual to the new owner.

Cummins Fire Power, Cummins NPower and Cummins, Inc. reserve the right to make changes at any time without obligation.

The latest technology and the highest quality components were used to produce this engine. When replacement parts are needed, we recommend using only genuine Cummins or ReCon® exchange parts.

2.2 Fire Pump Engines

Cummins complete line of fire pump engines have been approved as packaged units (engine and all accessories) by Factory Mutual Approvals and listed by Underwriter's Laboratories, Inc. and Underwriter's Laboratories of Canada.

Refer to Model Specific Engine Data sheet in Section 8 for Emissions Rating.

No deviations are permitted without prior written approval. These engines are to be used only for fire protection applications. Refer to Figure 2-1, Figure 2-3.

2.3 Engine Digital Control Panel

The engine digital control panel is mounted on the left side of the engine on the flywheel end. refer to Section 4 - Controls for additional information.

The engine digital control panel contains controls for starting, monitoring engine performance and controlling fire pump engine operation.

2.3.1 Overspeed Function Feature

Each engine is equipped with an electronic overspeed control which activates the fuel pump solenoid valve or ECM ignition to shut off the engine when the RPM exceeds a preset limit. The overspeed control senses engine speed during the start cycle and stops the starting motor cranking cycle.

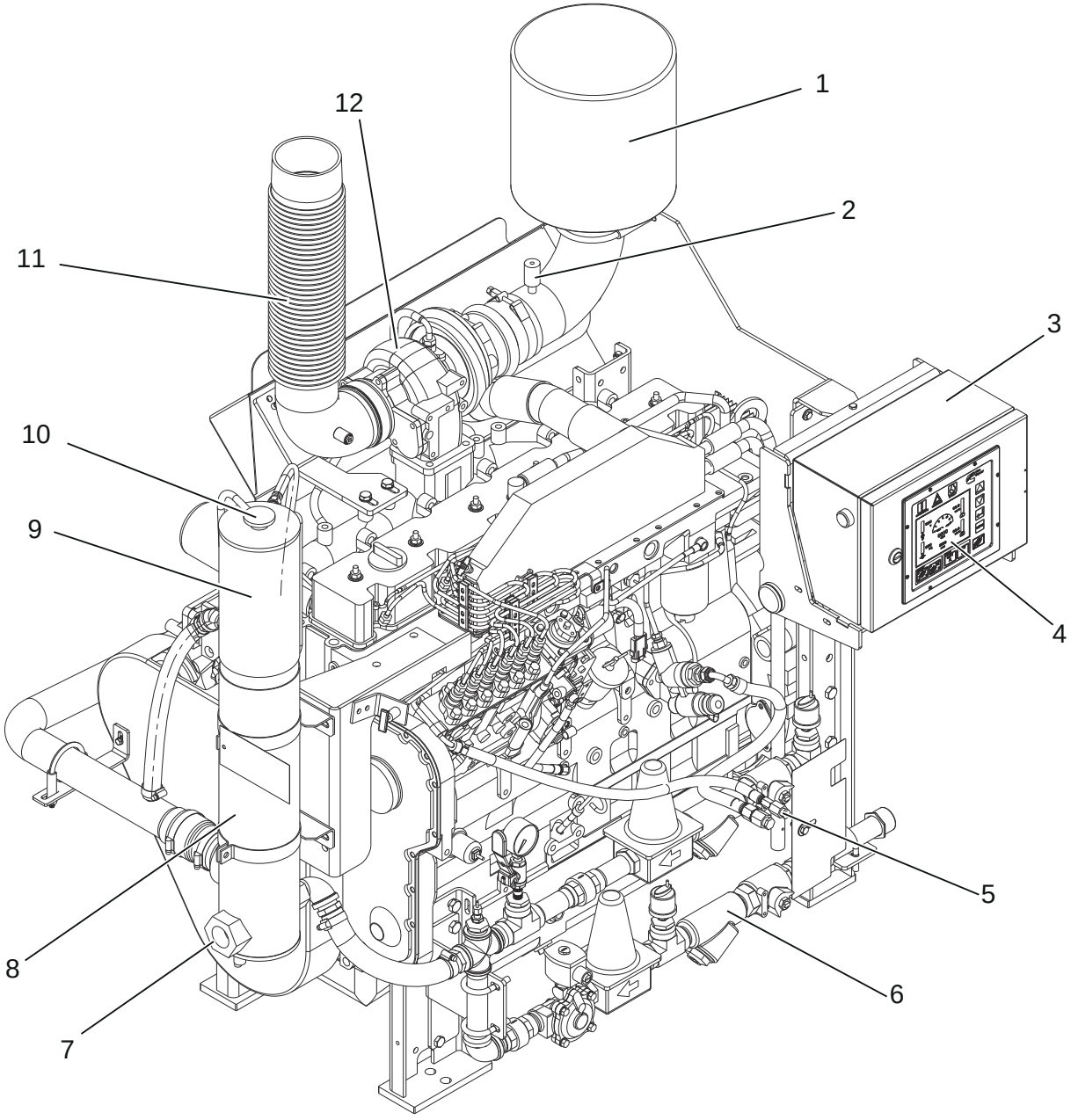
2.3.2 Operating Speed

All Cummins fire pump engines are shipped from the factory adjusted to the requested operating speed (RPM). Final operating speed adjustment must be made during the in-service inspection to obtain the required operating speed specified by the pump manufacturer.

2.4 Fire Pump Controller

The Fire pump Controller is not supplied by Cummins Fire Power, or Cummins, Inc. The fire pump controller starts the engine automatically when a remote fire demand signal is initiated and automatically shuts down the engine when the fire demand signal is discontinued.

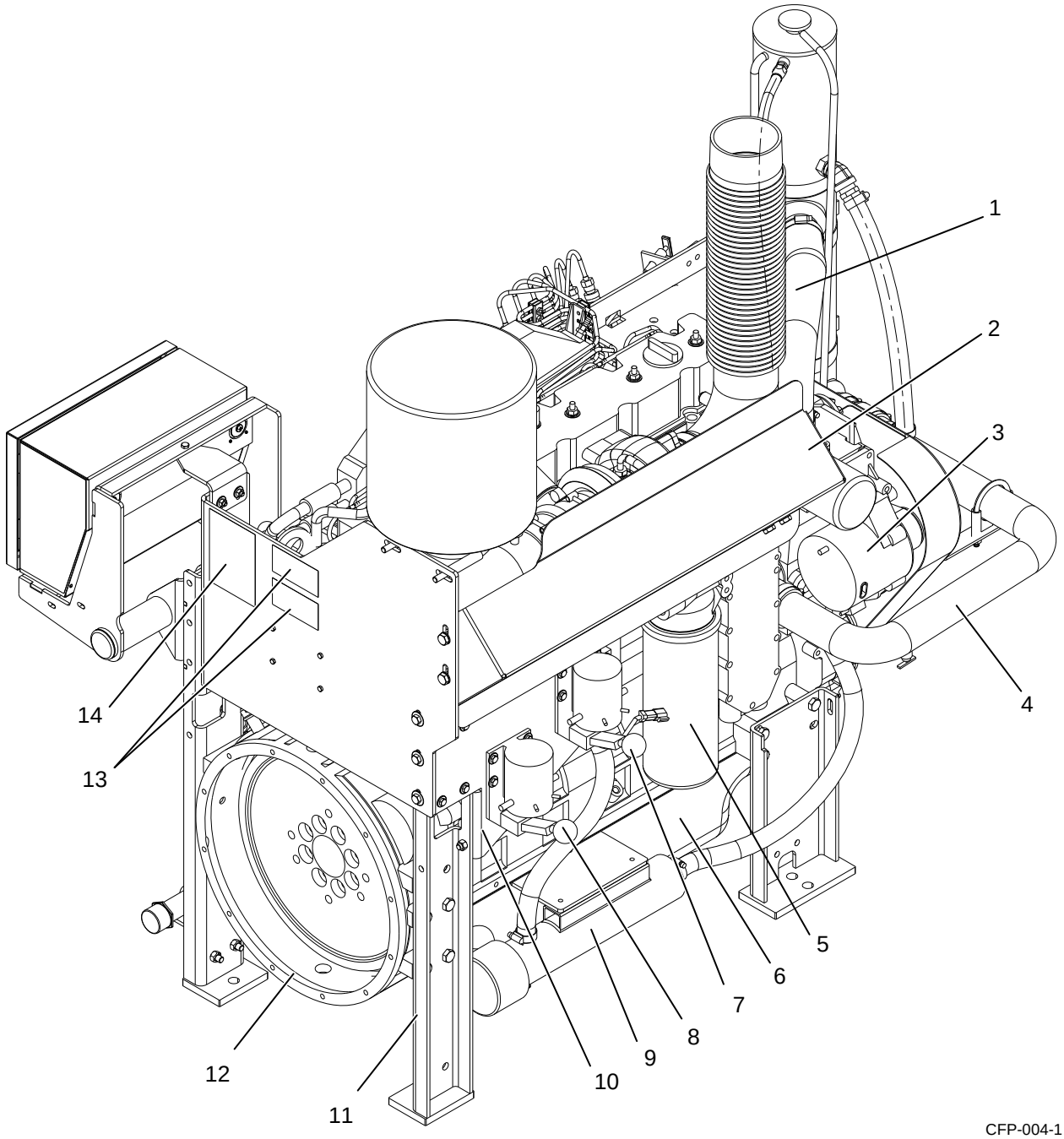
The engine may be started locally in the Manual Mode and shut down using the Engine Digital Control Panel Stop Button.



CFP-003-1

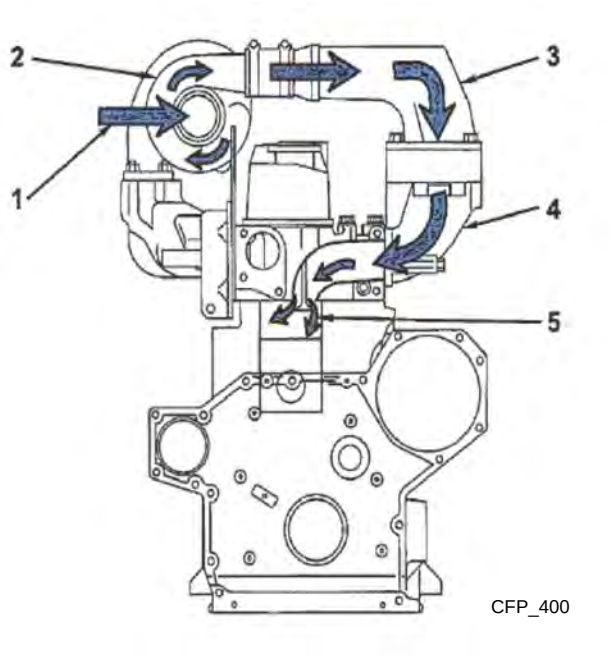
1. Air Cleaner Assembly
2. Air Cleaner Service Indicator
3. Terminal Box
4. Engine Digital Control Panel
5. Fuel Inlet and Outlet (air mount)
6. Cooling Loop Manifold
7. Heat Exchanger Cooling Water Discharge
8. Coolant Heat Exchanger
9. Coolant Expansion Tank
10. Coolant Pressure/Fill Cap
11. Exhaust Flex Connection
12. Turbocharger

Figure 2-1 Engine Components - Engine Digital Control Panel (EDCP) Side (CFP83 shown)



1. Upper Coolant Hose/Tube
2. Manifold Heat Shield
3. Alternator
4. Lower Coolant Hose/Tube
5. Engine Oil Filter
6. Oil Pan and Drain
7. Battery Starter Contactor B
8. Battery Starter Contactor A
9. Engine Coolant Heater
10. Starter Motor
11. Engine Supports
12. Flywheel Housing
13. Engine Speed Setting Plates
14. Manual Start Instruction Decal

Figure 2-2 Engine Components - Turbocharger Side (CFP83 shown)



1. Filtered Air
2. Turbocharger Compressor
3. Air Crossover Tube
4. Intake Manifold
5. Intake Valve Port

Figure 2-3 Air Intake Flow Diagram (typical)

The Air Intake System supplies combustion air to the fire pump engine cylinders. The air filter prevents particulate matter from entering the air intake. Combustion air drawn into the system by the turbocharger is directed through the intake manifold before entering the intake valves. A low charge air temperature (requirement of 60° C (140° F) with 25° C (77° F) ambient) meets emission levels, while improving engine performance and efficiency. Refer to Figure 2-3.

2.5 Cooling Water System

The fire pump cooling water supply provides cooling water for the engine heat exchanger system.

Water entering the cooling system through the cooling water inlet, first circulates through the heat exchanger, cooling the compressed air from the turbocharger outlet ducting. Refer to Figure 2-3 for Engine Air Intake and the Engine Cooling system Flow Diagram, Figure 2-3. Note the charge air cooler and fuel heat exchanger are not included in these model engines.

NOTE: *The cooling water supply must be immediately available when the engine is started.*

Engine coolant is circulated around the outside of the heat exchanger tube bundle and is cooled by cooling water which enters and circulates through the bundle tubes of the engine coolant Heat Exchanger. The cooling water exits the Coolant Heat Exchanger through a discharge connection.

IMPORTANT: *If the piping will be supplied by the customer, provide cooling water supply piping and components equivalent to components supplied by Cummins Fire Power and as shown in Assembly Diagram, Cooling Water Piping. Refer to National Fire Protection Association NFPA 20 for installation requirements. When choosing components for the cooling water supply and bypass, ensure that the internal cross sectional area of the component is at least as large as the recommended pipe size.*

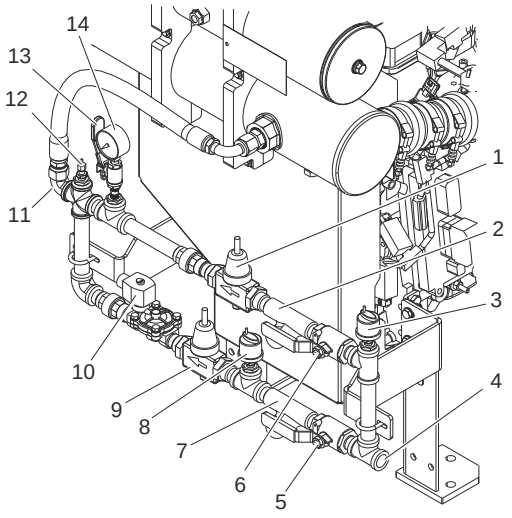
When the cooling water piping is installed, adjust both pressure regulator set points before operating the pump.

1. When the cooling water piping is installed, adjust both pressure regulator set points before operating the pump.
2. The upper line is the bypass line. The bypass line outlet valve should be closed.
3. The lower line with the solenoid valve is the normal inlet line. The pressure gauge isolation valve must be open. The normal water inlet line valve should be open.

IMPORTANT: *Monitor the oil pressure and coolant temperature displays frequently. Refer to Lubricating Oil System Specifications or Cooling System Specifications in the Engine Data Sheets for recommended operating pressures and temperatures. Shut off the engine if any pressure or temperature does not meet the specifications.*

Maximum engine coolant temperature should not exceed temperature listed on the Engine Data Sheet found in Section 8. The coolant expansion pressure/fill cap must meet the minimum pressure of 10 kPa (15 psi).

The engine coolant system contains a mixture of at least 50 percent antifreeze and 50 percent water. The coolant level should be maintained just below the fill neck of the coolant supply tank.



1. Bypass Water Pressure Regulator
2. Bypass Water Strainer
3. Pre Strainer Pressure Sensor
4. Cooling Water Inlet
5. Normal Water Inlet Valve
6. Bypass Water Inlet Valve
7. Normal Water Strainer
8. Post Strainer Pressure Sensor
9. Normal Water Pressure Regulator
10. Normal Water Solenoid Valve
11. Outlet to Heat Exchanger
12. Temperature Sensor
13. Pressure Gauge Isolation Valve
14. Water Supply Pressure Gauge

Figure 2-4 Cooling Water Manifold (typical)

CAUTION

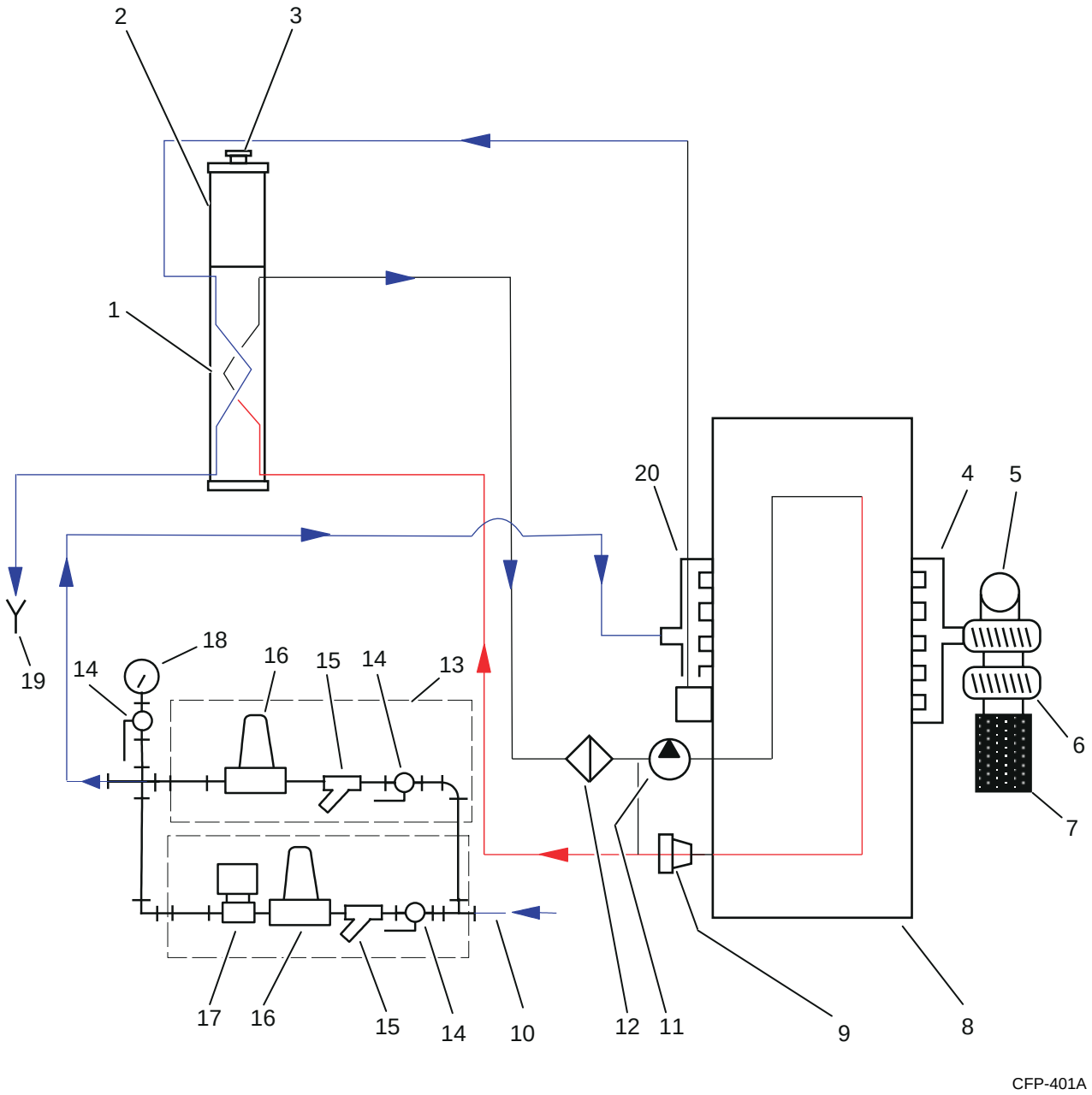
Continuous operation with low coolant temperature (below 70° C (158° F)) or high coolant temperature (above 107° C (225° F)) can damage the engine. Verify cooling water pressure and flow.

2.6 Fuel Supply and Drain Location

The fuel supply and return connections are certrally located on the engine digital control panel side. Refer to Figure 2-1. Refer to the Model specific Engine Data Sheet in Section 8 for the maximum allowable fuel tank supply locations above the fuel pump.

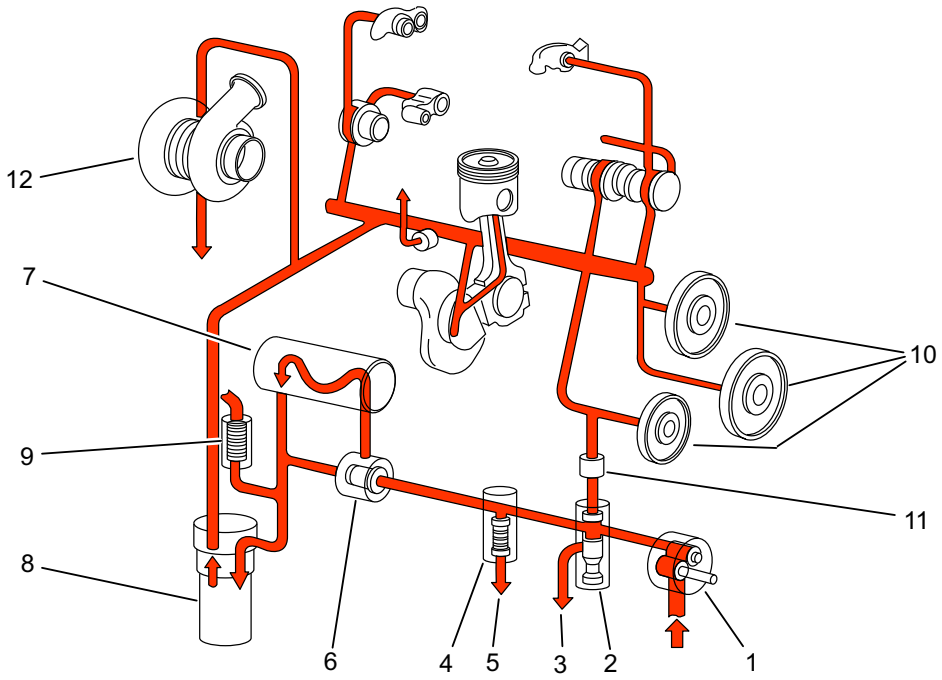
2.7 Fuel System

The fire pump engine is equipped with fuel system to provide fuel metering and timing based on temperature, altitude, pressure and throttle position. Refer to Figure 2-1.



1. Coolant Heat Exchanger
2. Coolant Expansion Tank
3. Coolant Pressure/fill Cap
4. Exhaust Manifold
5. Exhaust Flex Connection
6. Turbocharger
7. Air Filter
8. Engine Block
9. Thermostat
10. Cooling Water Inlet Pipe
11. Coolant Pump
12. Coolant Filter
13. Bypass Piping
14. Manual Shut-off Valve
15. Cooling Water Strainer
16. Cooling Water Pressure Regulator
17. Cooling Water Solenoid Valve
18. Cooling Water Pressure Gauge
19. Cooling Water Drain Line
20. Combustion Air Intake Manifold

Figure 2-5 Engine Cooling System Flow Diagram (typical)



CFP-010

1. Oil Pump
2. Pressure Regulator Valve
3. Oil Return To Pan
4. High Pressure Relief Valve
5. Oil Return To Pan
6. Oil Thermostat
7. Oil Cooler
8. Combination Oil Filter
9. Filter Bypass Gears
10. Idler Gears
11. Viscosity Sensor
12. Turbocharger

Figure 2-6 Flow Diagram - Engine Lubricating Oil System (typical)

2.8 Engine Oil System

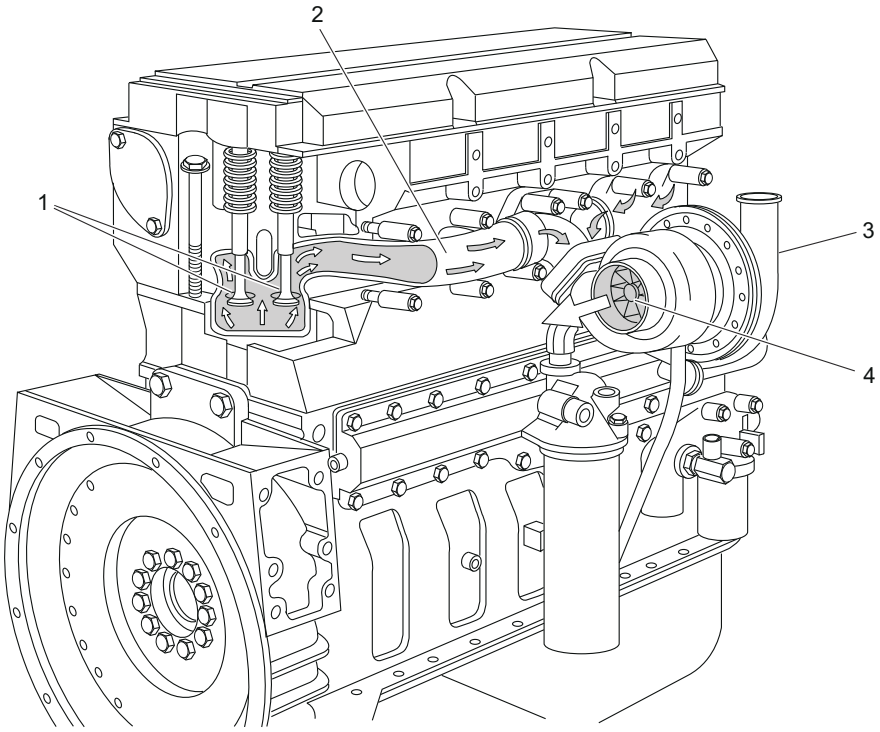
The Engine Oil System lubricates moving internal engine parts (pistons, piston arms, valves, cam shafts, drive shafts and bearings). The oil pump circulates oil from the oil pan, through the oil filter and into engine areas where friction may develop. Refer to section D of the Cummins Engine Operation and Maintenance Manual for additional information.

Typically engine oil has been added during manufacture and testing procedures, however, shipping restrictions can affect whether the oil is maintained in the engine or drained for shipment.

Check the oil level at the dipstick. Add oil as necessary to bring the oil level to the H (high) mark on the dipstick.

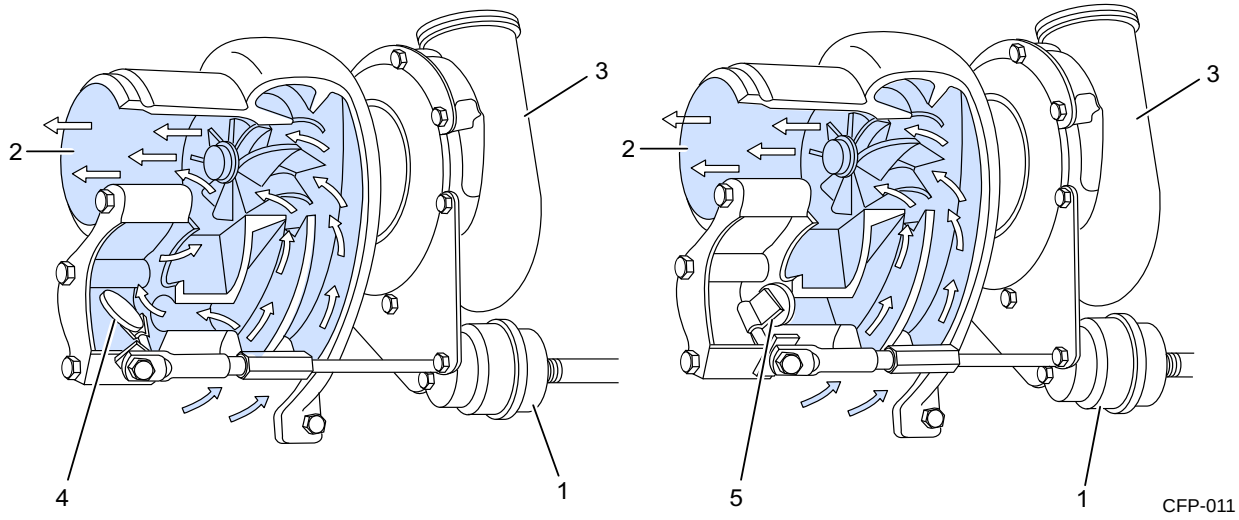
2.9 Exhaust System

The exhaust system removes engine exhaust from the cylinders after the combustion process. The exhaust discharges from the exhaust manifold, passes through (drives) the turbocharger, and exits through the exhaust flex-pipe. Refer to Figure 2-7, and Figure 2-8.



1. Exhaust Valve Ports
2. Engine Exhaust Manifold
3. Combustion Air To Charge Air Cooler
4. Turbocharger Turbine

Figure 2-7 Flow Diagram - Exhaust System (typical)



1. Wastegate Actuator Cylinder
2. Exhaust Flow to Flex Pipe
3. Combustion Air To Charge Air Cooler
4. Wastegate OPEN
5. Wastegate CLOSED

Figure 2-8 Turbocharger Exhaust Flow Diagram (typical)

Section 3 - Installation

3.1 Receiving and Handling Information

Cummins Fire Power Pump Engines are pre-assembled and tested before shipment. Parts not shipped attached to the engine are sometimes shipped individually. The equipment was thoroughly inspected and prepared for shipping before it was turned over to the carrier.

1. Carefully remove the components from the shipping container. Remove crating, shipping tape, braces, and tie-downs.

2. Inspect the equipment for damage that may have occurred in shipping.

3. Check each item carefully against the shipping manifest or bill of lading.

3.2 Site Preparation

This section provides instructions for the initial installation, adjustment, and testing of the Cummins Fire Pump Engine. Appropriate portions of this section should be used when returning the engine to operation after overhaul or major maintenance.

The site should be clean and relatively level. Clear the proposed equipment area of overhanging obstructions and obstacles protruding from the floor.

Cooling water piping should be installed by trained technicians familiar with local, state, and federal codes and regulations, per the equipment layouts supplied by Cummins Fire Power or Cummins Inc.

Refer to the general fire pump and engine layout drawings for installation dimensions supplied with this manual.

Refer to National Fire Protection Association NFPA 20 for US installation and applicable local code requirements and NFPA 25 for inspection, testing, and maintenance requirements.

1. Lay out a designated center line on the site floor. Find the center line of the engine drive shaft. Lay out a center line on the cross frame members.

2. If the engine is assembled with the drive line, pump, and mounting base, use the lifting points provided on the mounting base or lift the entire skid using an approved fork lift.

CAUTION

Ensure that the lifting device is capable of safely lifting the weight of the engine or the combined weight of the assembled pump base, drive line, and pump. Refer to the bill of lading for combined shipping weights.

3. Position the engine as required for the interface with the fire pump, water piping, fuel piping, exhaust, and air system connections.

3.2.1 Drive Shaft Installation

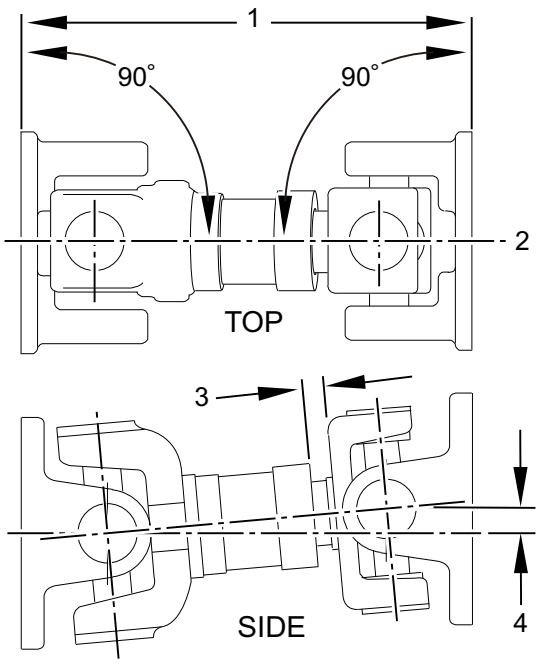
1. Position the engine center line to align the engine drive shaft with the fire pump drive. Ensure that the engine and pump are correctly aligned.

   a. Ensure engine position is centered on frame side to side within ± .76 mm (.03 in) by measuring outside of frame side to engine support leg mounting pad. (Compare the two front engine supports and two back engine supports).

   b. Align engine center line to pump center line within ± .76 mm (.03 in). Refer to Figure 3-1.

   c. The pump center line to the engine crankshaft center line (in vertical plane) is to be 2° +/- 1°.

   d. Drive shaft mounting flanges must be parallel.



1. Planes Must Be Parallel
2. Align Both Mounting Center lines to ± .76 mm (.03 in)
3. Distance to Equal Half of Total Travel
4. 2° +/- 1°

Figure 3-1 Drive Shaft Alignment

2. Lubricate the grease fittings on the drive shaft universal joint. Refer to Figure 3-2.

   a. Wipe the grease fittings and grease gun nozzle with a clean cloth.

   b. Add grease to the drive shaft universal joint grease fittings.

   c. Wipe excess grease from the grease fittings.

NOTE: *Cummins Fire Power or Cummins Inc. recommends using a good quality semi-synthetic, molybdenum-fortified NLGI #2 lithium complex grease.*

NOTE: *Some lubrication loss may occur during transport and storage. It is recommended that the drive shaft be re-lubricated upon installation.*

3. Check that the fire pump is properly installed per the pump manufacturer's specifications.

4. Connect the exhaust piping to a safe location, away from building air intake sources (air conditioners, windows, fresh air intake pipes, etc.).

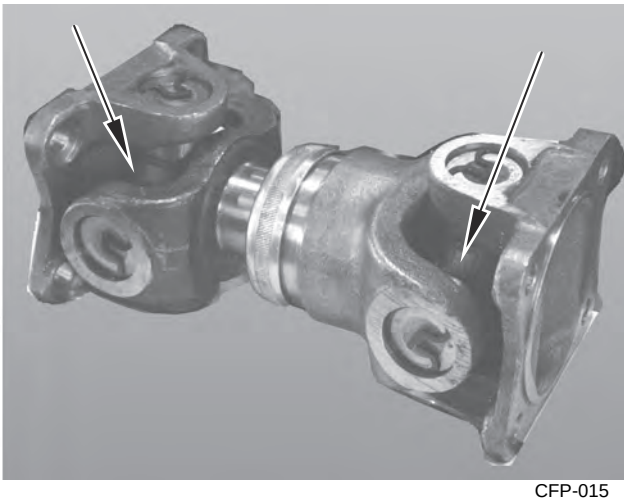


Figure 3-2 Drive Shaft Universal Joint Grease Fittings

5. Check that the alternator/coolant pump drive belt is properly installed.

6. Check that all hoses and tubes are properly installed and all clamps secure.

3.3 Fuel Supply Installation

1. Install a properly rated fuel tank per NFPA 20 guidelines.

2. Install a proper sized fuel line per the Engine Data Sheet in Section 8 - Component Parts and Assemblies.

NOTE: *DO NOT use copper or galvanized pipe for the fuel return or supply lines.*

CAUTION

Due to the precise tolerances of diesel injection systems, it is extremely important that the fuel be kept clean and free of dirt or water. Dirt or water in the system can cause severe damage to both the fuel pump and the fuel injectors.

3.3.1 Fuel Recommendations

WARNING

Do not mix gasoline, alcohol, gasohol, ethanol, or methanol with diesel fuel. This mixture will cause severe engine damage or explosion.

CAUTION

Use ONLY no. 2 diesel (ASTM no. 2D) fuel. Any adjustment to compensate for reduced performance with a fuel system using alternate fuel is not warrantable.

3.4 Cooling Water Supply Installation

IMPORTANT: *The cooling water supply must be immediately available when the engine is started. Ensure that the supply line valves are in the OPEN position.*

NOTE: *The velocity of the cooling water should be as great as possible without exceeding the maximum allowable pressure shown in the appropriate Engine Data Sheet in Section 8 - Component Parts and Assemblies*

1. Provide a cooling water discharge line at the outlet of the engine coolant heat exchanger and provide a cooling water supply line to the cooling water inlet per the model specific Engine Data Sheet in Section 8 - Component Parts and Assemblies. Refer to Figure 2-4.

NOTE: *Cooling water outlet piping from the heat exchanger should be one pipe size larger than the supply piping.*

2. Check the pressure regulator setting with water flowing through the heat exchanger. If supplied as an option from CFP, both water pressure regulators have been set at 207 kPa (30 psi) or slightly less water pressure during manufacture and testing.

IMPORTANT: *The manual water valves for the automatic loop should remain OPEN at ALL times. The manual valves for the bypass loop should be CLOSED during automatic (pump controller) operation. When running, the engine should stabilize between temperatures identified on the model specific Engine Data Sheet. The flow rate may need to be adjusted to maintain desired engine temperature.*

NOTE: *Excessively cold (4° C to 23° C [40° F to 75° F]) cooling water flow can cause condensation inside the charge air cooler.*

IMPORTANT: *Continuous operation with low coolant temperature (below 70° C [158° F]) or high coolant temperature (above 107° C [225° F]) can damage the engine.*

3. The cooling water should be adjusted based on water flow rather than water pressure. The flow is dependent on the cooling water temperature. Refer to the Engine Data Sheet in Section 8 - Component Parts and Assemblies for details.

4. Use an appropriate sized container to measure and time the flow from the discharge pipe.

   Flow rate = time to fill container/container size.

Example: Time to fill 19 liter (5 gal) container = 15 seconds.

Divide 15 by 5 = 3 (seconds per liter [gal]).

Divide 60 seconds by 3 = 76 liters (20 gal) per minute.

5) Adjust both pressure regulators to a pressure that will provide a flow rate at or above the specifications.

CAUTION

When the cooling water piping is installed, adjust both pressure regulator set points before operating the pump. Damage to the heat exchanger may occur from improperly regulated cooling water supply pressure.

3.5 Battery Requirements

One set of lead /acid batteries must be supplied for the standard 12VDC operating voltage. Two redundant sets of batteries must be supplied for the optional 24 VDC operating voltage. Refer to National Fire Protection Association Standard NFPA 20 and Section 1 - Safety of this manual for additional battery installation information.

The minimum recommended reserve capacity (SAE RC) and cold cranking ampere (SAE CCA) values for a particular engine can be found on the Engine Data Sheet in Section 8 - Component Parts and Assemblies. RC and CCA definitions can be found in SAE Standard J537.

3.6 Battery Installation

1. Provide adequate room for servicing or replacing the batteries. Provide protection from extremes of temperature and weather.

2. Refer to National Fire Protection Association NFPA 20 for proper location of batteries and

applicable local codes requirements. Ensure that the batteries are configured properly for standard 12 VDC operations or optional 24 VDC operations. Refer to Figure 3-3 and Figure 3-4.

NOTE: *Coat the terminals with petroleum jelly to prevent corrosion. Tighten the battery connections.*

3. Install the Battery Cable Kit or equivalent customer supplied wiring.

4. Follow battery connection schematic Figure 3-3 and Figure 3-4 to ensure adequate starting requirements for the system.

CAUTION

Do not connect battery charging cables to any electronic control system component. This can damage the electronic control system.

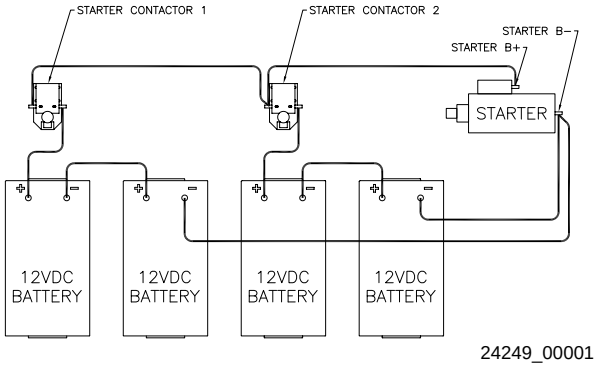


Figure 3-3 Series Battery Connection - 24 VDC

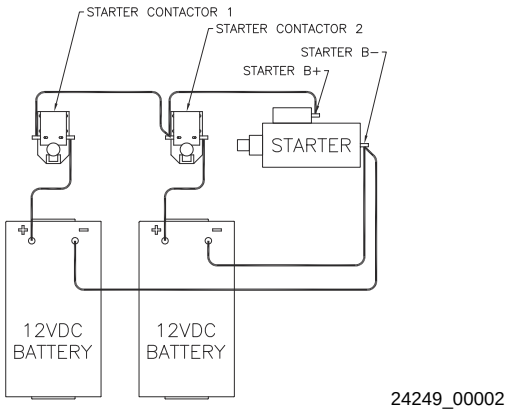


Figure 3-4 Series Battery Connection - 12 VDC

WARNING

Batteries can emit explosive gases during charging. Always ventilate the compartment before servicing the batteries. Remove sources of spark or open flame. To avoid arcing, remove the negative (-) battery cable first and attach the negative (-) battery cable last.

IMPORTANT: *Batteries must meet the requirement listed in the electrical system specifications. Batteries may be supplied by Cummins Fire Power or Cummins Inc. as an option, or may be supplied by the customer.*

WARNING

Battery electrolyte (sulfuric acid) is highly caustic and can burn clothing and skin. Wear impervious neoprene gloves and safety goggles, or full face shield, when working with the batteries.

3.7 Signal and Control Installation

This section explains how to connect the controller wires to the terminal block.

1. Ensure that the fire control system is properly installed and configured per the manufacturer's instructions. Refer to the Wiring Schematic Drawings provided with the pump manual.

2. Complete the fire pump controller wiring (customer supplied) per the manufacturer's instructions.

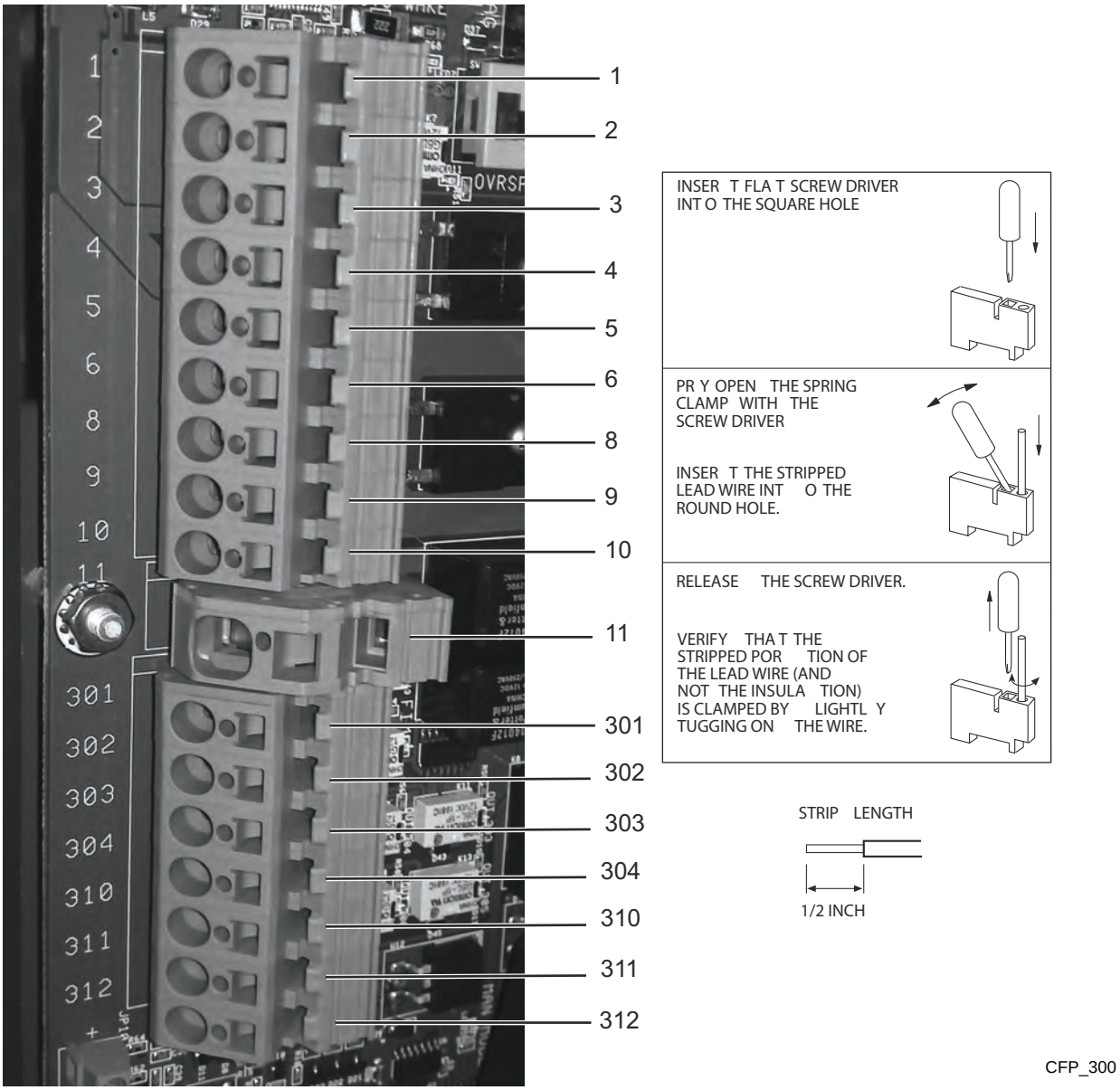


Figure 3-5 Termination Blocks and Wiring Decal

3. Connect the following wires to the Fire Pump Engine Digital Control Panel per the engine electrical diagrams. Refer to Figure 3-5.

   a. TB-1: Connect the control power from the fire pump controller. This power source is necessary for fire pump operations while in the AUTO mode.

   b. TB-2: Connect the crank termination input signal for the fire pump controller. This signal is present when the engine is running. This signal indicates that the engine has started and that the crank command from the fire pump controller should stop immediately.

   c. TB-3: Connect the remote overspeed alarm input to the fire pump controller. This signal is present when the overspeed control module has operated. If this event occurs, the fire pump engine will stop.

   d. TB-4: Connect the low oil pressure alarm input from the fire pump controller. This 0 VDC grounded signal is present when the oil pressure has dropped below the 83 ± 13 kPa (12 ± 2 psi) set point.

e. TB-5: Connect the high coolant temperature alarm input from the fire pump controller. This 0 VDC grounded signal is activated when the engine is running and the coolant temperature is at or above 93° C (200° F). The alarm will deactivate when the engine is running and the coolant temperature drops below 88° C (190° F).

f. TB-6: Connect battery set A lead from the controller. The controller senses battery A charge state and charges A battery through this heavy gauge wire.

g. TB-8: Connect battery set B lead from the controller. The controller senses battery B charge state and charges B battery through this heavy gauge wire.

h. TB-9: Battery positive signal driven from the Pump Controller to contactor A when desiring to crank from Battery A. Current in this circuit shall not exceed 10A continuous.

i. TB-10: Battery positive signal driven from the Pump Controller to contactor B when desiring to crank from Battery B. Current in this circuit shall not exceed 10A continuous.

j. TB-11: Common ground and battery negative for both Battery A and Battery B from between the pump controller and engine. This is not intended to create a fully isolated battery negative or ground system. Current in this circuit shall not exceed 20A continuous.

k. TB-301: Battery negative signal driven from the Fire Pump Digital Controller when the engine is operating on ECM B.

l. TB-302: Battery negative signal driven from the Fire Pump Digital Controller when either ECM triggers a fault code which can affect performance of the Fuel Injection system.

NOTE: *Fault codes are disabled for mechanical engine units.*

m. TB-303: Battery negative signal driven from the Fire Pump Digital Controller when a single ECM has failed.

n. TB-304: Battery negative signal driven from the Fire Pump Digital Controller when both ECMs have failed.

o. TB-310: Battery negative signal driven from the Fire Pump Digital Controller when high cooling water temperature is sensed.

p. TB-311: Battery negative signal driven from the Fire Pump Digital Controller when the cooling water supply restriction is sensed.

q. TB-312: Battery negative signal driven from an engine temperature switch when engine coolant reaches or falls below 43.3 ± 2.78° C (110 ± 5° F). The signal will be removed when the coolant temperature reaches or exceeds 60 ± 2.78° C (140 ± 5° F).

4. Ensure electrical continuity and adequate insulation resistance for the installed wiring.

5. Provide the initial charge on the redundant batteries per the battery charger's instructions.

6. Check that both voltmeters on the Engine Digital Control Panel indicate the approximate battery voltage.

3.8 Coolant System Preparation

CAUTION

Ensure that coolant and lubrication systems have been filled to the proper level before operation.

1. Inspect the engine coolant hoses and hose clamps. Ensure that all coolant hoses and clamps are properly installed and water tight. Refer to Figure 2-1 and Figure 2-2.

2. Ensure that the engine coolant level is visible at the center of the expansion tank sight gauge. Add coolant as required. DO NOT OVERFILL!

WARNING

Do not remove the pressure/fill cap from a hot engine. Wait until the coolant temperature is below 50° C (122° F) before removing the pressure/fill cap. Heated coolant spray or steam can cause personal injury.

3. The engine coolant heater must maintain an engine coolant temperature of 49° C (120° F) or above.

4. Ensure that water is present in the engine heater before plugging in the heater element into a dedicated electrical circuit.

3.9 Engine Oil System Preparation

CAUTION

Some regulatory and shipping restrictions may require that all lubricants, fuels and coolants be drained for transport. Ensure that all cooling and lubrication systems have been filled to the proper level before operation.

1. Check the oil level using the crankcase dip stick before operating. Refer to Figure 2-7.
2. Fill the crankcase at the oil fill port, to the “H” mark on the dipstick with engine oil.

NOTE: *Cummins Inc. recommends Valvoline Premium Blue® 15W-40 oil.*

3.10 Pre-Start Inspections

Perform a visual inspection as follows:

1. Check that there is no apparent damage and that all components are installed.
2. Check that the drive belt is properly installed.
3. Check that all hoses and tubes are properly installed.
4. Check that all electrical connections are properly installed.
5. Check that the fire pump is properly installed per the pump manufacturer’s instructions, is correctly aligned, and is free to rotate.
6. After completing preliminary set-up procedures, perform the engine start tests and speed adjustment procedures as outlined in detail in Section 5 - Operation.

WARNING

Before operating the equipment, complete all safety checks, remove all tools and foreign objects from the equipment, ensure that all guards are in place and securely fastened. Alert area personnel that the equipment will be starting. Unintentional equipment start-up or contact with exposed or moving components can cause personal injury or equipment damage.

3.11 Engine Monitoring

When the engine starts it is important to monitor the oil pressure and cooling water temperature gauges to ensure safe operation.

CAUTION

If the oil pressure is not displayed on the gauge or if the low oil pressure message is displayed within 5 seconds, STOP THE ENGINE immediately! Continued operation without proper lubrication will cause engine damage.

1. If oil pressure is not within the rated range, troubleshoot per Engine Oil Pressure High or Engine Oil Pressure Low in Section 7 - Troubleshooting.
2. Immediately check that cooling water flow is established through the coolant heat exchanger. Cooling water flow should be established immediately but some delay may occur before the flow exits the heat exchanger drain connection.
   a. Ensure that cooling water is flowing through the heat exchanger and water pressure shown on the local pressure gauge is no more than 414 kPa (60 psig). The minimum cooling water flow rate is provided on the Engine Data Sheets found in Section 8 - Component Parts and Assemblies.

CAUTION

If the water temperature display is not reading properly or if the Water Temperature Lamp is illuminated for 15 seconds, STOP THE ENGINE immediately! Continued operation without proper cooling water will cause engine damage.

3. Ensure that engine operating temperature stabilizes within the applicable range as identified in the Model Specific Engine Data Sheet in Section 8 - Component Parts and Assemblies.

NOTE: *If temperature does not stabilize, stop the engine and refer to Coolant Temperature Above Normal or Coolant Temperature Below Normal (Engine Running) in Section 7 - Troubleshooting.*

4. Operate the engine for 8 to 10 minutes.
5. Inspect for leaks, unusual noises, or other indications of incorrect operation.
6. Shut off the engine by pressing and holding the Overspeed RESET/STOP Button.

7. Check that cooling water flow stops automatically shortly after the engine stops.

8. Correct any problems found during the inspection before proceeding. Check the engine lubricating oil level at the crankcase dip stick. Top off if necessary.

9. Check the coolant expansion tank level. Top off if necessary.

10. Check the cooling water strainers. Clean the strainers as required per the instructions in Section 6 - Maintenance.

11. Perform engine speed control and safety system tests per the instructions in Section 5 - Operation.

Section 4 - Controls

4.1 Engine Digital Control Panel

The Engine Digital Control Panel (EDCP) contains controls for starting, monitoring engine performance and controlling fire pump engine operation. Refer to Figure 4-1. In manual mode, the panel remains active as long as battery power is available. In auto mode, the panel is active when battery power is present on TB1, otherwise it goes into standby mode after 30 minutes of no battery voltage on TB1.

4.1.1 Warning Lamp

Illuminates (yellow) in the event that overspeed condition has occurred.

4.1.2 Fault Indicator Lamp

(Disabled on Mechanical Engine models)

4.1.3 Scroll Buttons

Used to scroll up or down when in the menus.

4.1.4 Enter Button

Used when making changes in the Menu Screen.

4.1.5 Menu Button

Opens the menu option on the display.

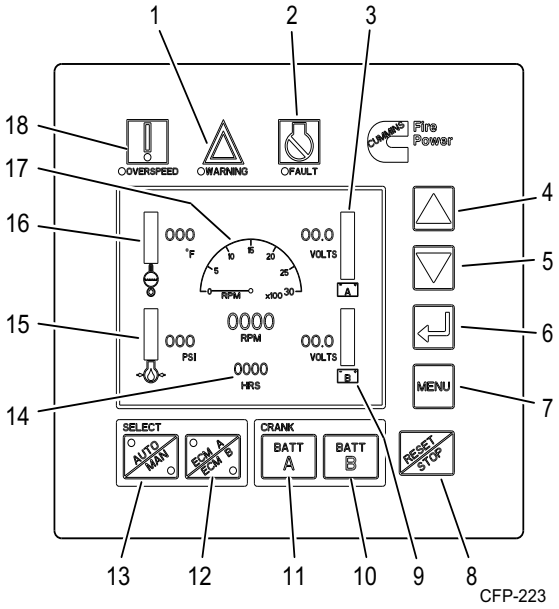
4.1.6 Overspeed RESET/STOP Button

Used to shut off engine at the Engine Digital Control Panel. Momentarily pressing the switch removes key switch for 30 seconds.

Pressing the Overspeed RESET Button after correcting an engine overspeed shutdown, resets the Overspeed Control Module, allowing subsequent restarts of the fire pump engine.

4.1.7 Battery A and B Voltmeters

The Battery Voltmeters display the charge status (VDC) of the relative battery connections.



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1. Warning Lamp
2. Fault Lamp
3. Battery “A” Voltmeter
4. Scroll UP Button
5. Scroll DOWN Button
6. ENTER Button
7. MENU Button
8. Overspeed RESET/STOP Button
9. Battery “B” Voltmeter
10. Crank Battery B Momentary Start Button
11. Crank Battery A Momentary Start Button
12. ECM A/B Selector Button & Indicator Lamp
13. AUTO/MAN Mode Button & Indicator Lamps
14. Hour Meter
15. Engine Oil Pressure
16. Coolant Temperature
17. Tachometer
18. Overspeed Warning Lamp

Figure 4-1 Engine Digital Control Panel (EDCP)

4.1.8 Tachometer and Hour Meter

The Tachometer displays the engine speed in revolutions per minute (RPM) whenever the engine is operating. The Hour Meter maintains a running total of the hours of operation (run time).

4.1.9 ECM A/B Indicator LED

(Disabled on Mechanical Engine models)

The ECM Indicator LED's (yellow) will illuminate indicating the ECM being used to control the engine. If the ECM Switch is in the ECM A (normal) position, ECM A is controlling the engine. Refer to Figure 4-1.

If the ECM Switch is in the ECM B (alternate) position, ECM B is controlling the engine. When the alternate (B) ECM is selected the EDCP will send a ground signal to terminal buss #301 which will send a signal to set off an alarm on the Fire pump system controller to indicate that the engine is operating on the alternate ECM.

4.1.10 CRANK BATT A or BATT B Buttons

The CRANK BATT A or CRANK BATT B Buttons initiate an immediate engine start (momentary start) using the selected A or B Crank Battery.

Crank A or B will energize Battery contactor A or B depending on which one is selected.

Both A and B buttons can be energized at the same time in the event both batteries are weak.

4.1.11 AUTO/MANUAL Mode

The AUTO/MANUAL Mode determines whether the engine starts and is controlled by the operator (MANUAL) or by an automatic signal from the fire pump system controller (AUTO). The LED lamp (yellow) is illuminated on which mode is selected.

The Manual Mode is typically used for engine setup, testing, emergency and maintenance procedures.

The AUTO Mode is used to start the engine under the control of the fire pump control system. In the AUTO mode, the fire pump engine stops upon loss of signal power from the fire pump controller.

4.1.12 Coolant Temperature Gauge

The Coolant Temperature Gauge displays the engine coolant temperature.

4.1.13 Engine Oil Pressure Gauge

The Engine Oil Pressure Gauge displays the engine oil pressure. The gauge is independent of the low oil pressure alarm.

4.1.14 Engine Overspeed Warning LED

The Overspeed Control Module monitors engine speed. If the engine RPM's exceed 115% rated speed, the engine Overspeed Warning Lamp is illuminated (yellow).

The EDCP will send a power signal to terminal buss #3 that will send a signal to set off an alarm on the Fire pump system controller indicating that an overspeed condition has occurred.

The EDCP will automatically switch to Manual mode and will shut the engine down. After the overspeed has been reset by using the RESET/STOP button on the EDCP, the engine operation will revert to the original AUTO mode position.

NOTE: *The engine will not be allowed to restart automatically from the Fire pump system controller until the EDCP is reset.*

4.1.15 ECM Fault Code Lamps

(Disabled on Mechanical Engine models)

4.1.16 Engine Stop Button

The Engine stop button is located on the left side of the EDCP enclosure and is used to stop the operation of the engine in either Manual or Auto Mode. The button must be pressed and held until the engine has stopped.

4.1.17 Engine Communications Port

This plug-in is located on the left side of the EDCP enclosure and is used for the communications connection port for Cummins Insite for electronic engine models.

NOTE: *Insite is a Cummins, Inc. computer software tool used to monitor or report electronic engine performance criteria.*

4.1.18 Contractor Access Port

The contractor access knock-out is located on the lower side of the EDCP enclosure. This is the only 1 inch (25.4cm) knock-out provided for the installing contractor to connect the Fire Pump system controller to the EDCP.

IMPORTANT: *If this port is not used for the installation, all warranty on the fire pump engine will be void.*

4.1.19 Engine ECM Power Supply

This plug-in is located on the lower side of the EDCP enclosure. The power supply port supplies unswitched battery power to both ECM A and ECM B for electronic engine models.

4.1.20 Engine Harness Connection

This plug-in is located on the lower side of the EDCP enclosure. The Engine harness connection connects the panel to the power source, start contactors, magnetic pick-up, alternator and other engine related functions controlled by the EDCP.

4.2 Cooling Water Flow Control Valves

1. The fire pump system controller opens the cooling water Normal Loop Solenoid Valve in either Manual or Automatic Mode. In the OPEN position, water can flow through the heat exchangers. Refer to Figure 2-4. Manual cooling water valves for the Automatic Loop should remain OPEN at ALL times.

2. Manual cooling water valves for the Bypass Loop should be CLOSED during Automatic (fire pump system controller) operation.

Section 5 - Operation

WARNING

Before preparing the machine for normal production, complete all safety checks, remove all tools and foreign objects from the machine, ensure that all guards are in place and securely fastened and alert area personnel that the equipment will be starting.

5.1 Remote Starting Procedure

To start the engine from the Fire Pump Controller Panel:

1. Press the AUTO/MANUAL Mode Button on the engine digital control panel to place the engine in the AUTO Mode position. Refer to Figure 4-1.
2. Start the engine by initiating an engine CRANK Signal from the Fire Pump Controller.

CAUTION

If the Crank Terminate Signal is absent, the engine starter motor will continue to operate. Shut the engine off immediately at the Fire pump controller panel to avoid damage to the starter.

3. The engine continues to operate as long as the RUN signal is present. When the RUN signal is terminated by the fire pump control panel, the engine stops.
4. The engine may be stopped locally by pressing the Engine Stop button on the side of the Engine Digital Control Panel.

5.2 Manual Starting Procedure

To start the engine manually from the Engine Digital Control Panel:

1. Press the AUTO/MANUAL Mode Button on the engine digital control panel to MANUAL Mode position to place engine in manual mode.
2. Press either the CRANK BATT A or CRANK BATT B Button to start the engine.

5.3 Emergency Starting Procedure

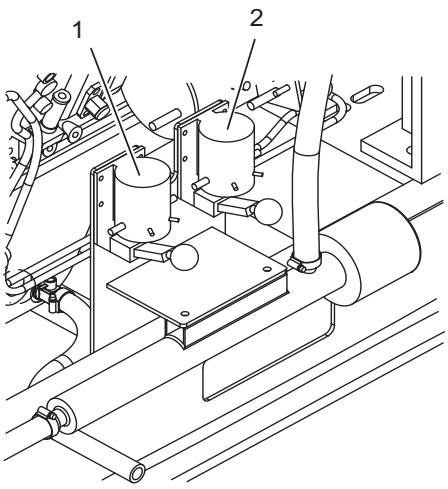
The engine starts automatically in the event of a fire emergency. However if it fails to start automatically, the engine can be started manually from the engine digital control panel:

1. If necessary, open both manual bypass valves in the cooling water supply manifold (if equipped).
2. Press the AUTO/MANUAL Mode Button on the engine digital control panel to MANUAL Mode position to place engine in manual mode. Refer to Figure 4-1.
3. Press downward on the desired Battery contactor lever for up to 15 seconds or until the engine starts. Repeat up to three times if necessary. Refer to Figure 5-1.
4. Release the Contactor Lever immediately after the engine starts.

CAUTION

To prevent damage to the starter, do not engage the starting motor more than 15 seconds. Wait 15 seconds between each attempt to start up to six attempts.

5. The engine may be stopped manually by pressing and holding the stop button on the left hand side of the control panel. Refer to Figure 4-1.



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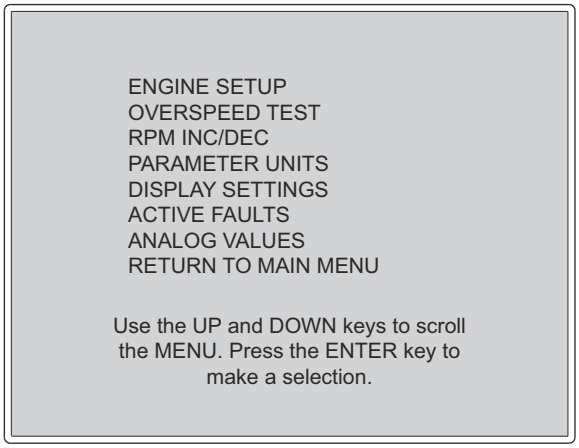
1. Battery A Starter Contactor
2. Battery B Starter Contactor

Figure 5-1 Manual Battery Contactors

5.4 Engine Digital Panel Control Screens and Adjustments

The following menu screens are available for operator input and monitoring of engine parameters on the Engine Digital Control Panel Menu Screens.

5.4.1 Main Menu



CFP-224

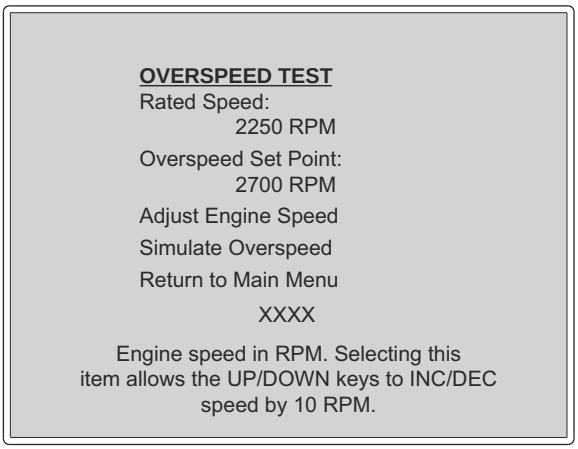
Figure 5-2 Main Menu Screen (typical)

5.4.2 Engine Set-up Screen

This screen is for Cummins Fire Power internal use.

5.4.3 Overspeed Test Screen

The Engine Overspeed Set Point was set during manufacturing and test procedures. It may, however, be necessary to adjust the overspeed set point based on the actual fire pump application.



CFP-225

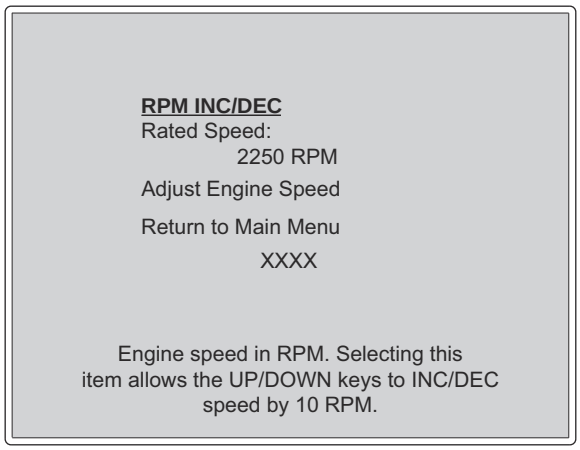
Figure 5-3 Overspeed Test Screen (example)

The overspeed test screen will allow for two options to demonstrate overspeed:

1. Increment the engine speed up to reach overspeed set point for engine models. Example above identifies 2250 RPM.
2. Used to simulate overspeed for engine speed models above 2250 RPM or for instances when overpressurizing of sprinkler systems can cause damage.

NOTE: *If Option 1 is selected above, the engine speed will have to be manually reset back to pump rated speed after overspeed test is completed.*

5.4.4 RPM INC/DEC Screen



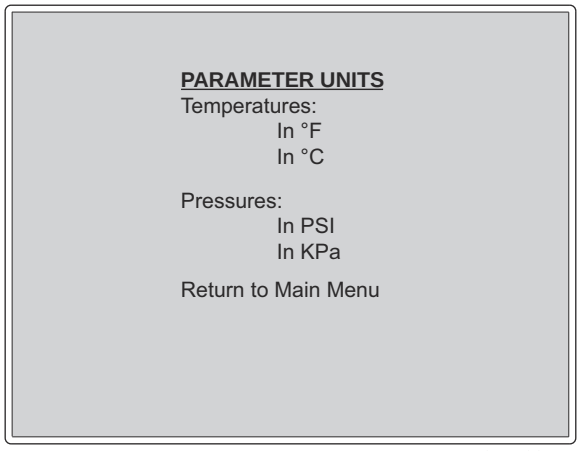
CFP-226

Figure 5-4 RPM INC/DEC Screen (typical)

This screen allows adjustments to the Engine operating speed. The Engine Operating Speed was factory set during manufacturing and test procedures.

If the speed does not match the Engine RPM shown on the Factory Setting Plate, scribe the actual RPM on the Field Setting plate.

5.4.5 Parameter Units Screen



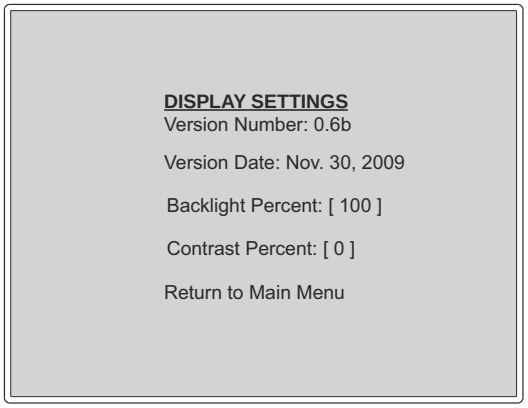
CFP-227

Figure 5-5 Parameter Units Screen (typical)

This screen will allow for English and Metric units.

NOTE: *Metric or Imperial values can be changed using the Parametric Units screen.*

5.4.6 Display Settings Screen

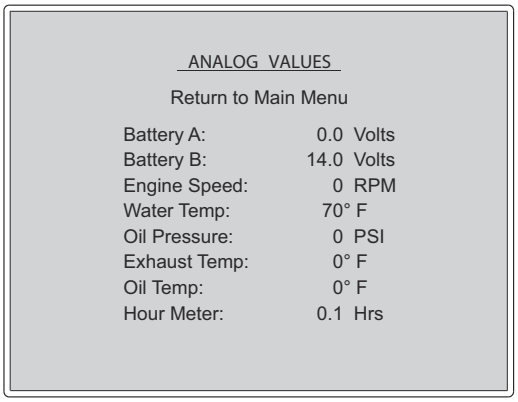


CFP-228

Figure 5-6 Display Settings Screen (typical)

This screen will enable adjustments to the backlight and contrast for optimal viewing in varying lighting environments.

5.4.7 Analog Values Screen



CFP_312

Figure 5-7 Analog Values Screen (typical)

This screen will provide analog output values for battery voltages, engine speed, water temperature, oil pressure and temperature, exhaust temperature, differential oil pressure, and hours of operation.

NOTE: *For exhaust temperature values less than 93° C (200° F), or not monitored, the value will be displayed as 0°. For oil temperature values less than 24° C (75° F), or not monitored, the value will be displayed as 0°.*

5.5 Field Acceptance Testing

The required tests are outlined in the NFPA 20 and NFPA 25 standards and shall be performed to validate Automatic and Manual operational requirements for Field Acceptance Testing.

Section 6 - Maintenance

6.1 Introduction

Before performing maintenance procedures, read and understand the Safety Section of this manual and the model specific Engine Operation and Maintenance Manual. Improper performance or lack of critical information could result in personal injury or equipment damage.

Cummins encourages our customers to perform maintenance and repairs whenever necessary. However, servicing complex components within the normal warranty period may void the Cummins warranty and any specified warranty extended by the manufacturer of OEM products.

Cummins recommends that the engine be maintained according to the Maintenance Schedule in this Section.

Maintenance procedures should be performed by skilled technicians, who are familiar with the equipment, local regulations and service procedures for fire pump engine and pump systems. Improper maintenance can damage the engine, the fire pump or can cause severe personal injury.

IMPORTANT: *If your engine is equipped with a component or accessory not manufactured by Cummins Inc, refer to the component manufacturer's Vendor supplied literature for specific maintenance recommendations.*

6.2 Engine Operation Report

The engine must be maintained in top mechanical condition. The maintenance department needs daily running reports from the operator to make necessary adjustments.

The weekly running report helps to make provisions for scheduling more extensive maintenance or repairs as required.

Report to the maintenance department any of the following conditions:

1. Low engine oil pressure.
2. Engine surge.
3. Erratic operation or frequent shutdowns.
4. Any warning lamps flashing or staying illuminated.
5. Abnormal water or oil temperature.
6. Unusual engine noise or vibration.
7. Excessive smoke.
8. Excessive use of coolant, fuel or engine oil.
9. Any fluid leaks.
10. Loose, worn or damaged parts.

Maintenance Chart

NOTE: *All maintenance and inspections intervals are accumulative. When performing annual maintenance, also perform maintenance listed under daily, weekly, monthly, and 3 month intervals.*

Maintenance Record Form

Engine Serial Number:			Engine Model:		
Owner's Name:			Equipment Name/Number:		
Date	**Hours or Time Interval**	**Actual Hours**	**Check Performance**	**Performed By:**	**Comments**

6.3 Weekly Maintenance

When the engine is running, to be alert for mechanical problems that could create unsafe or hazardous conditions.

6.3.1 General Walk Around Inspection

The following areas should be inspected weekly to maintain safe and reliable operation.

1. Check fluid levels, oil pressure and coolant temperatures frequently. Most engine problems give an early warning.

    a. Look and listen for changes in engine performance, sound, or appearance that will indicate that service or repair is needed. Be alert for misfires, vibration, excessive exhaust smoke, loss of power, or increases in oil or fuel consumption.

    b. Check the engine appearance for excessive heat, wiring short circuits, excessive endplay, vibrations, excessive wear, excessive abrasion, damaged electrical wiring or loose electrical wiring.

    c. Check the engine for odors of diesel fuel, burning rubber, electrical system failure, exhaust fumes or smoke.

6.3.2 Air Filter and Piping

The frequency of cleaning or replacing the air cleaner filter element is determined by the conditions in which the engine operates.

1. Visually inspect the air intake filter and piping daily for blockage, damage to piping, loose clamps, or punctures that can allow debris to enter the engine. If there is a blockage, the service indicator will be activated. Refer to Figure 2-1.

NOTE: *Turbocharged engines must be operated at rated RPM and full load to check maximum intake air restriction.*

NOTE: *Cummins recommends using Air Cleaner Element as listed on the Specific Engine Data sheet in Section 8 - Component Parts and Assemblies.*

CAUTION

Never operate the engine without an air cleaner. Intake air must be filtered to prevent dirt and debris from entering the engine and causing premature wear. Dirt or foreign objects could cause engine damage.

2. The air cleaner service indicator is actuated when excessive air restriction has occurred at the air cleaner. Refer to Figure 2-1.

    a. If the red indicator flag is at the raised position in the window, clean or replace the air filter per the manufacturer's recommendation as required. Do not remove the felt washer from the indicator. The felt washer absorbs moisture.

    b. After the air cleaner has been serviced, push the flag IN, to reset the service indicator.

IMPORTANT: Maximum intake air restriction is 762 mm H_2O (25.0 in H_2O) for turbocharged engines

    c. Check for corrosion under the clamps and hoses of the intake system piping. Corrosion can allow corrosive products and dirt to enter the intake system. Disassemble and clean as required.

3. Replace damaged air filter or hoses, and tighten loose clamps, as necessary, to prevent the air system from leaking. Torque hose clamps to 8 N-m (72 in-lb).

6.3.3 Cooling System

CAUTION

Do not remove a coolant pressure/fill cap from a hot engine. Shut down the engine and wait until the coolant temperature is below 50° C (120° F) before removing the pressure cap. Heated coolant spray or steam can cause severe personal injury.

1. Inspect the cooling water piping, coolant heat exchanger tanks, engine coolant hoses and hose clamps for loose fittings, leaks, damage and corrosion.

    a. Tighten the hose clamps as necessary

b. Check for cracks, holes or other damage. Repair or replace as necessary.

CAUTION

Never use a sealing additive to stop leaks in the cooling system. This can result in cooling system plugging and inadequate coolant flow, causing the engine to overheat.

2. Ensure that the coolant level is visible by checking the coolant level sight gauge. Refer to Figure 2-1.

3. Add coolant as required. DO NOT OVERFILL!

NOTE: *Supplemental engine coolant should be a mixture of 50% ethylene glycol antifreeze and 50% water to avoid engine damage. Refer to Antifreeze information in Section 6.5.2.*

4. Check the antifreeze concentration at least 6 times a year or whenever coolant is added to the cooling system by using a refractometer (such as Fleetguard® Part No. CC2806.

5. Drain a small amount of coolant from the return line petcock and inspect the coolant for excessive rust or particulate matter. Change the coolant more frequently if particles are present.

CAUTION

Do not mix coolant brands or chemical solutions, as this could damage the cooling system. Keep a record of the coolant concentration and manufacturer with the engine maintenance records.

6. Check for soft, overly pliant hoses, oxidation, and loose hose clamps. Torque hose clamps to 8 N-m (72 in-lb). Replace damaged hoses and clamps as required.

7. Check the heat exchanger for leaks, damage, and dirt buildup. Clean and repair as required.

6.3.4 Engine Oil System

WARNING

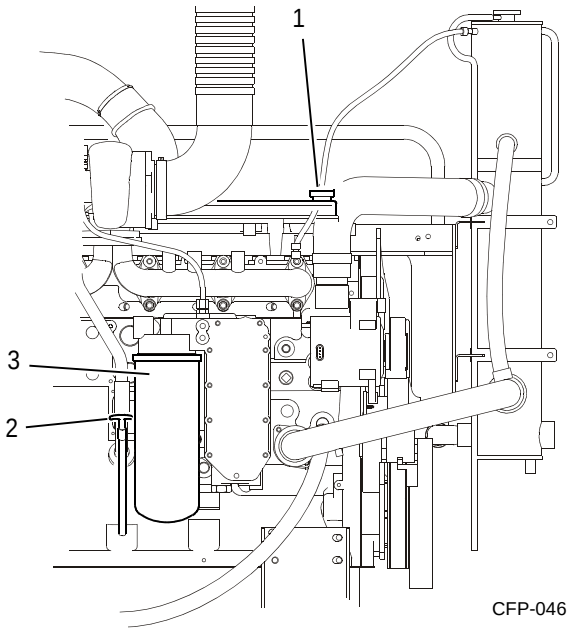
Perform the specific checks in this section only after the engine is fully stopped. Unless tests require engine operation, disconnect the battery leads from the batteries (negative terminal first). Contact with exposed or moving components can cause severe personal injury.

1. For accurate dipstick readings, shut off the engine and wait approximately 10 minutes to allow the oil in the upper portions of the engine to drain back into the crankcase.

2. Check the oil level at the engine dipstick. Refer to Figure 6-1.

   a. If the oil level is greater than the high mark (H), drain excess oil and recheck the level.

   b. If the oil level is below the low mark (L), add the equivalent type oil.



1. Oil Fill Port (on valve cover)
2. Oil Level Dipstick
3. Engine Oil Filter

Figure 6-1 Oil Level Dipstick (typical)

NOTE: *Cummins recommends using Cummins Premium Blue S.A.E. 15W-40 Multi-viscosity Engine Oil or equivalent. Refer to the oil change interval and the procedures in Section 6.4.5 Engine Oil and Oil Filter Change.*

6.3.5 Fuel System Inspections

WARNING

Engine fuel is highly flammable and represents an extreme hazard for fire or explosion when exposed to electrical sparks or open flame. Clean up spilled fuel immediately. Keep sources of electrical spark or open flame away from a fuel source.

1. Shut off the engine.

2. Inspect the fuel supply line, return line, filter and fittings for cracks or abrasions.

   a. Ensure the lines are not rubbing against anything that could damage the fuel system hoses. Repair any leaks or alter line routing to eliminate wear immediately.

   b. Relieve fuel line pressure by carefully loosening the fuel inlet line.

NOTE: *See Model Specific Engine Data Sheet in Section 8.*

6.3.6 Engine Exhaust System

With the engine operating, inspect the entire exhaust system including the exhaust manifold, exhaust flex pipe, muffler and piping.

Check for leaks at all connections, welds, gaskets and joints, and make sure that the exhaust pipes are not heating surrounding areas excessively. Repair any leaks immediately.

6.3.7 Electrical Supply and Controls

Check the terminals on the starting batteries for clean and tight connections. Inspect EDCP harness connections to be sure they are secure.

6.3.8 Crankcase Breather

1. Inspect the crankcase breather for a worn or damaged hose, sludge, blockage, or dirt buildup. Refer to Figure 2-1.

2. Clean the breather if obstructed or blocked. Replace worn or damaged breather as required.

6.3.9 Clean Cooling Water Strainers

The (2) cooling water strainers should be cleaned weekly, to remove sediment. Refer to Figure 6-2.

To clean the normal line strainer, ensure that the normal line valves are closed and the bypass line valves are open.

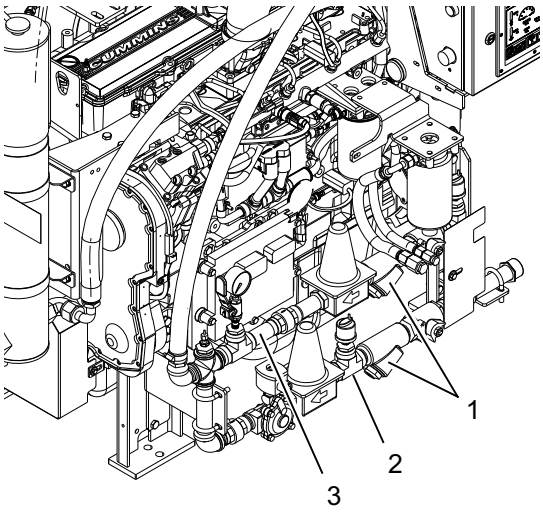
To clean the bypass line strainer, ensure that the bypass line valves are closed and the normal line valves are open.

1. For each cooling water strainer, remove the plug.

2. Inspect and remove any debris.

3. Install the strainer plugs.

4. When finished, open the normal line valves and close the bypass line valves for normal operation.



CFP-029

1. Cooling Water Strainers
2. Normal Water Line
3. Bypass Water Line

Figure 6-2 Cooling Water Strainers (typical)

6.3.10 Check Battery Condition

CAUTION

Batteries can emit explosive gases during charging. To reduce the possibility of personal injury, always ventilate the battery compartment before servicing the batteries.

CAUTION

To reduce the possibility of arcing, remove the negative (-) battery cable first and attach the negative (-) battery cable last.

1. Keep the batteries clean by wiping them with a damp cloth whenever dirt appears excessive.

2. Use a battery hydrometer to check the specific gravity of the electrolyte in each battery cell. A fully charged battery will have a specific gravity of 1.260. Charge the battery if the specific gravity reading is below 1.215.

3. Check battery wiring and cable connections for loose, corroded, worn or damaged cables. Check both connectors at the alternator, battery connections and engine grounding lug (near starter motor).

   a. If the battery cables are corroded, remove the battery cable clamps, starting with the (-) negative battery cable.

   b. Use fine emery cloth or a wire brush to clean the cable clamps and battery cables. The metal should be shiny.

   c. Wash the battery terminals with a solution of baking soda and water (1/4 lb. baking soda to one quart of water).

   d. Be careful to prevent the solution from entering the battery cells, and flush the batteries with clean water when done.

   e. After cleaning the connections, coat the terminals with a light application of petroleum jelly.

   f. Reinstall and tighten the cable clamps.

WARNING

Battery electrolyte (sulfuric acid) is highly caustic and can burn clothing, the skin or cause blindness. Wear protective clothing, impervious neoprene gloves, safety goggles or full-face shield, when working with the batteries.

4. Check the electrolyte level in the batteries monthly. If low, fill the battery cells to the bottom of the filler neck with distilled water.

5. Check for continuity between terminals using a digital multimeter or other test equipment. Check also the insulation resistance to ground. Correct any electrical faults.

6.3.11 Engine Run Testing

1. Start at least once a week for a minimum of 30 minutes with as much load as possible. Periods of no-load operation should be held to a minimum, because unburned fuel tends to accumulate in the exhaust system.
2. Refer to the instructions in Section 5 - Operation.
3. Check that the engine starts and operates at the recommended fire pump speed specification.
4. Engine oil pressure must be indicated on the gauge within 15 seconds after starting.
5. Run the engine no less than 30 minutes to attain normal running temperature. Observe that the engine is operating at proper operating speed.
6. Check unusual engine noise. Listen for any unusual engine noise which can indicate that service is required.
7. Ensure oil pressure is greater than 10 PSI.
8. Check coolant temperature between 70° C (158° F) and 107° C (225° F).
9. Check that both battery voltmeters indicate 12 VDC for standard or 24 VDC for optional operating systems.
10. Check that the Air Filter service indicator has not popped-up; indicating an air filter blockage. Replace the air filter as required.
11. End test run by pressing and holding the Overspeed RESET/STOP Switch until the engine stops.

6.3.12 Engine Heater

NOTE: *Perform this inspection procedure 24 hours after shutting off the engine.*

The engine coolant heater must maintain an engine coolant temperature of 49° C (120° F) or above. The engine block must be warm to the touch in the water jacket areas. Refer to Figure 2-2.

If the heater does not appear to be working correctly, see Section 7 - Troubleshooting.

6.4 Annual Maintenance

All checks or inspections listed under previous maintenance intervals must also be performed at this time in addition to those listed under this maintenance interval.

6.4.1 Electrical Components

CAUTION

AVOID SERVICING complex components such as: ECM controllers, printed circuit boards and programmable controllers. Contact the local Cummins Authorized Repair Location before performing any extensive maintenance.

CAUTION

To reduce the possibility of arcing, remove the negative (-) battery cable first and attach the negative (-) battery cable last.

1. Remove the battery terminal cables, starting with the (-) negative cable first.
2. Inspect the electrical wiring harness, electrical terminal connections and electrical plug-ins, for secure, clean electrical contacts, worn or damaged insulation, burnt wires, broken wires and loose connections. Refer to Figure 2-1
   a. Clean and tighten any loose electrical connections.
   b. Replace worn, damaged, burnt or poorly insulated wiring immediately.

IMPORTANT: Refer to the OEM Vendor supplied literature for recommended maintenance procedures.

   c. Repair or replace damaged components. Refer to Section 8 - Component Parts and Assemblies.
3. Inspect the function of all gauges, voltmeters, switches and warning lamps on the Engine Digital Control Panel. Replace EDCP if any are not functioning properly.

6.4.2 Turbocharger Mounting Nuts

1. Check the turbocharger mounting nuts. Refer to 2-1.
2. Torque the mounting nuts to 65 N-m (50 ft-lb).

6.4.3 Engine Supports and Mounting Bolts

CAUTION

Loose engine mount bolts or damaged brackets can cause engine misalignment or excessive vibration. These conditions can cause engine or pump damage.

1. Inspect all engine supports for cracks or loose bolts. Refer to Figure 2-1 for location of engine supports.
2. Check the torque on the engine support mounting bolts. Torque the support bracket to engine mounting cap screws to 47 N-m (35 ft-lb).

6.4.4 Inspect Fuel Pumps and Filters

1. Inspect the fuel injection pump mounting nuts, including the support bracket for loose or damaged hardware. Refer to Figure 2-1 and Figure 2-2.
2. Inspect the fuel line hoses and fuel filters for wear damage, loose fittings and leaks. Repair or replace damaged hoses and filters as required.

6.4.5 Engine Oil and Oil Filter Change

Engine oil becomes contaminated and essential oil additives are depleted with use. The amount of contamination is related to the total amount of fuel and oil consumed. Change the oil at least once annually.

NOTE: *For composite oil pans, always use a new sealing washer on the oil drain plug. Hold the external locking nut in place while tightening the oil drain plug.*

1. Change the oil and the oil filter to remove the contaminants suspended in the oil.

IMPORTANT: *If the engine oil is drained from the oil pan to make an engine repair, new oil must be used.*

NOTE: *Cummins does not recommend exceeding 600 hours on oil change intervals.*

WARNING

To reduce the possibility of personal injury, avoid direct contact of hot oil with your skin. Prolonged, repeated contact can cause skin disorders or other bodily injury. Avoid inhalation of vapors, and ingestion of used engine oil. Dispose of the oil in accordance with local regulations.

2. Operate the engine until the water temperature reaches 70° C (158° F). Shut the engine off.

3. Place an appropriate container under the oil pan drain plug. Refer to the Specific Model Engine Data Sheet in Section 8 for Oil pan capacity.

4. Remove the oil drain plug and drain the oil immediately to make sure all the oil and suspended contaminants are removed from the engine. Refer to Figure 6-1.

5. Remove the oil filter.

   a. Clean the area around the engine oil filter canister.

   b. Use a filter wrench to remove the filter.

   c. Remove and discard the O-ring seal if it has remained attached to the mounting flange. Clean the filter, mounting flange with a clean lint-free cloth.

   d. Apply a light film of 15W-40 engine oil to the replacement filter gasket before installing the filter.

6. Fill the oil filter with a high-quality 15W-40 multi-viscosity engine oil, such as Cummins Premium Blue®, or its equivalent.

7. Center the filter ring on the threaded mounting nipple. Screw the filter canister onto the mounting flange until the gasket is snug against he mounting flange. Then tighten an additional 1/4 turn.

CAUTION

Mechanical over tightening can distort the threads or damage the filter element seal.

8. Check and clean the oil pan drain plug threads and sealing surface. Install the oil pan drain plug. Torque the plug to 50 N-m (37 ft-lb).

9. Add a high-quality 15W-40 multi-viscosity engine oil, such as Cummins Premium Blue® or its equivalent.

10. Fill the engine to the proper level with clean oil at the fill port. Refer to Figure 6-1.

CAUTION

If no oil pressure is noted within 15 seconds after the engine is started, shut down the engine to reduce the possibility of internal damage.

11. Stop the engine.

12. Wait approximately 15 minutes to let the oil drain from the upper parts of the engine.

13. Check the oil level again. Add oil as necessary to bring the oil level to the H (high) mark on the dipstick.

6.4.6 Change Fuel Filters

Perform maintenance at the proper maintenance intervals.

1. Shut off the engine.

2. Close any OEM fuel valves (if equipped) to prevent fuel from draining or siphoning.

WARNING

Engine fuel is highly flammable and represents an extreme hazard for fire or explosion when exposed to electrical sparks or open flame. Clean up spilled fuel immediately. Keep sources of electrical spark or open flame away from a fuel source.

3. Clean the area around the fuel filter or fuel/water separator heads.

NOTE: *Refer to the Specific Model Engine Data Sheet in Section 8 for Filter replacement recommendations.*

4. Remove the spent filter canisters using a filter wrench.

5. Do not open the fuel filter/water separator drain valve or dismantle the fuel lines on the high-pressure fuel system with the engine running. High pressure fuel spray from and operating engine can cause serious personal injury, fire hazard or fatality.

6. Clean the filter mounting head surfaces of sludge buildup and foreign particles. Ensure mating gasket surfaces are clean.

7. Lubricate the gasket seals with clean S.A.E. 15W-40 engine oil.

NOTE: *Refer to the Specific Model Engine Data Sheet in Section 8 for Filter replacement recommendations.*

8. Center the filter ring on the threaded mounting nipple. Screw the filter canisters onto the mounting flange until the gasket is snug against the mounting flange. Then tighten an additional 1/4 turn.

9. Open the fuel supply valves (optional).

CAUTION

Mechanical over tightening can distort the threads or damage the filter element seal.

10. Press either the CRANK BATT A or CRANK BATT B Switch to start the engine to allow the fuel to flow through the system.

11. Depress the selector switch for up to 15 seconds or until the engine starts. Repeat up to three times, if necessary.

CAUTION

To prevent damage to the starter, do not engage the starting motor more than 15 seconds. Wait 15 seconds between each start attempt.

IMPORTANT: *If the engine does not start after three attempts, check the fuel supply system. Absence of blue or white exhaust smoke during cranking indicates no fuel is being delivered.*

NOTE: *Engines used in fire pumps or standby service, are expected to immediately accelerate from crank to full load.*

6.4.7 Output Shaft Lubrication

It is recommended that proper lubrication to drive shafts and output shafts is to be completed on a regular schedule.

1. Remove the output shaft guards.

2. Wipe the grease fittings and grease gun nozzle with a clean cloth to avoid contamination.

3. Add grease to the universal joint grease fittings. Refer to Figure 3-3. Wipe excess grease from the grease fittings

NOTE: *Cummins, Inc recommends using a good quality semi-synthetic, molybdenum-fortified NLGI #2 lithium complex grease which protects from -54° to 400° F.*

6.4.8 Engine Operation Checks

The following service procedures ensure that the engine starts and operates properly under normal conditions.

WARNING

Before equipment operation, ALL guards, covers and protective devices MUST BE in place and securely fastened. Serious personal injury could result from contact with exposed or moving components.

6.4.8.1 Crank Termination Set Point

The Speed Switch Crank Termination Set Point is factory set at 600 rpm and should not be changed from this value.

6.4.8.2 Engine Speed Calibration

If the speed does not match the Engine RPM shown on the Factory Settings Plate, Refer to section 5.5.3 RPM Increment/Decrement screen on the Engine Digital Control Panel.

1. Start the engine using the local start method.

2. Observe that the engine starts and accelerates to the speed set point listed on the Factory Settings Plate.

3. Monitor engine speed on the tachometer. Record the observed engine speed.

   If the speed does not ramp up to the setting shown on the Factory Settings Plate, the engine operating speed set point must be calibrated.

4. Depress the Up (increase) and Down (decrease) arrows on the EDCP display to set the desired speed. Refer to Figure 4-1.

NOTE: *Each time the Speed INCREASE/ DECREASE arrow is depressed, the idle speed is increased or decreased by 10 RPM. Holding the arrows in either the INC or DEC position ramps the engine speed in the selected direction.*

5. Stop the engine.

6. Start the engine. Observe that the engine starts and accelerates to the rated speed set point.

IMPORTANT: *The final pump speed is typically set while the pump is flowing 150%.*

6.4.9 Coolant Pump/Alternator Belt Inspection

On some engine models, the pump and alternator belt drives both the pump and alternator.

CAUTION

Belt damage can be caused by, incorrect tension, incorrect size or length, pulley misalignment, incorrect installation, severe operating environment, and oil or grease on the belt or pulley.

1. Place the AUTO/MANUAL Mode Switch in the MANUAL position.
2. Disconnect both batteries at their terminals Remove (-) negative cable first. Install the (-) negative cable last.
3. Remove the belt guard bolts and the belt guard. Set aside for re-installation. Refer to Figure 6-4.
4. Visually inspect the belt for frayed, worn, missing pieces or cracked belt surfaces. Check the belt for intersecting cracks.
5. If the belt condition is acceptable, check the belt tension.

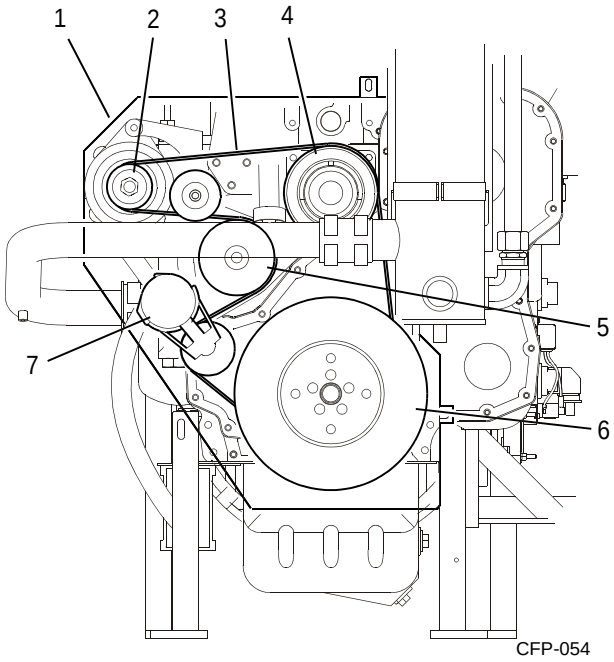
6.4.10 Coolant Pump/Alternator Belt Tension

CAUTION

Disconnect batteries (negative cable first) before performing service on the Fire Pump Engine or on any of its controls.

1. Check the coolant pump belt tension.
2. Use the Cummins belt tension gauge, Part No. 3822524, to measure the drive belt tension.
   a. Measure the belt tension in the center span of the belt between the fan and alternator pulleys.
   b. Belt tension should be between 81 to 149 N-m (60 to 110 ft-lb).

NOTE: *Transverse cracks (across the belt width) are acceptable. Longitudinal cracks (direction of belt length) that intersect with transverse cracks are not acceptable. Replace the belt if it is cracked, frayed or damaged.*



1. Belt Guard
2. Alternator Pulley
3. Drive Belt
4. Idler Pulley
5. Coolant Pump Pulley
6. Balancer Pulley
7. Belt Tensioner

Figure 6-3 Coolant Pump/Alternator Belt (typical)

3. The deflection method can also be used to measure drive belt tension.

    a. Measure the belt tension in the center span of the belt between the alternator and idler pulleys.

    b. Apply 110 N-m (25 ft-lb) of force on the belt.

    c. If belt deflection is more than one belt thickness per foot of pulley center-to-center distance, adjust the belt tension.

NOTE: *Belts with glazed or shiny surfaces indicates belt slippage. Correctly installed and tensioned belts will show even pulley and belt wear.*

6.4.11 Heat Exchanger Pressure Test

This test is required if internal leakage in the heat exchanger is suspected. It may be performed prior to the removal from the engine.

NOTE: *Use Teflon tape or other pipe sealant when installing the test setup in order to prevent leaks.*

NOTE: *Size of fittings required on the water outlets and inlets are listed on the Model Specific Engine Data Sheet in Section 8.*

1. Install an adapter at the cooling water outlet of the heat exchanger.

2. Install a pressure test setup with 700 kPa (100 psi) pressure gauge at the cooling water inlet to the heat exchanger.

3. Apply air pressure at 414 kPa (60 psig).

    a. Isolate the pressure source and monitor the pressure gauge for 5 minutes.

    b. There should be no change in pressure for the duration of the test.

4. After testing, release the pressure. Remove the tubing adapters, plug and the test equipment.

5. If leakage is detected, the heat exchanger must be replaced.

6.4.12 Turbocharger Inspection

1. Visually inspect the air intake filter and piping for dirt buildup, blockage, wear points, soft hoses, loose clamps, or punctures. Refer to Figure 6-4.

2. Replace damaged air filter or hoses, and tighten loose clamps, as necessary, to prevent the air system from leaking.

3. Check that the filter service indicator has not indicated a filter blockage. Clean or replace blocked filters.

4. Check for corrosion under the clamps and hoses of the intake system piping. Corrosion can allow foreign particles and dirt to enter the intake system

5. Disassemble and clean, as required.

6. Remove the air intake and the exhaust piping from the turbocharger.

7. Inspect the turbocharger turbine wheel for cracks in the housing or turbine blades, missing blades, mechanical binding, eccentric motion or excessive end-play.

8. Replace the turbocharger if damage excessive end-play, binding, wear or eccentric motion is found. Contact a Cummins Authorized Repair Location for replacement

IMPORTANT: *The turbocharger must be removed for replacement or rebuild if the clearance is beyond the limits, the housing is cracked or the turbine wheel is damaged.*

9. Reinstall the air intake filter and the exhaust piping. Tighten the clamps. Torque loosened clamps to 8 N-m (72 in-lb).

6.5 Every 2 Years or 2000 Hours

All checks or inspections listed under daily or previous maintenance intervals must also be performed at this time, in addition to those listed under this maintenance interval.

6.5.1 Water Pump Inspection

1. Inspect the water pump for eccentric motion, mechanical binding, excessive end play, seal damage and grease or water leakage around the water pump shaft.

2. Replace with a new or rebuilt, pre-lubricated unit as necessary. Contact a Cummins Authorized Repair Location for replacement.

6.5.2 Drain and Flush Cooling System

The cooling system must be clean to work properly. If the system shows excessive mineral buildup, particulate matter, scale, oxidation or oil contamination, drain and flush the cooling system. If the coolant is excessively dirty or is mixed with oil, contact a Cummins Authorized Repair Facility.

WARNING

Do not remove the pressure/fill cap from a hot engine. Shut down the engine and wait until the coolant temperature is below 50° C (120° F) before removing the pressure cap. Heated coolant spray or steam can cause severe personal injury.

1. Press down, unscrew and remove the coolant expansion tank pressure/fill cap. The cap must be removed to allow air to vent the cooling system during the draining process.

2. Unplug the engine heater power supply before draining the cooling system. Refer to Figure 6-4.

3. Place a container that will hold at least 15 gallons of liquid, under the coolant drain valve. Refer to Figure 6-4.

4. Ensure that the coolant filter shut off valves are OPEN.

5. Open the drain petcock on the lower coolant tube, allowing the coolant to drain into the waste container.

6. When the system is empty, move the container under the engine heater.

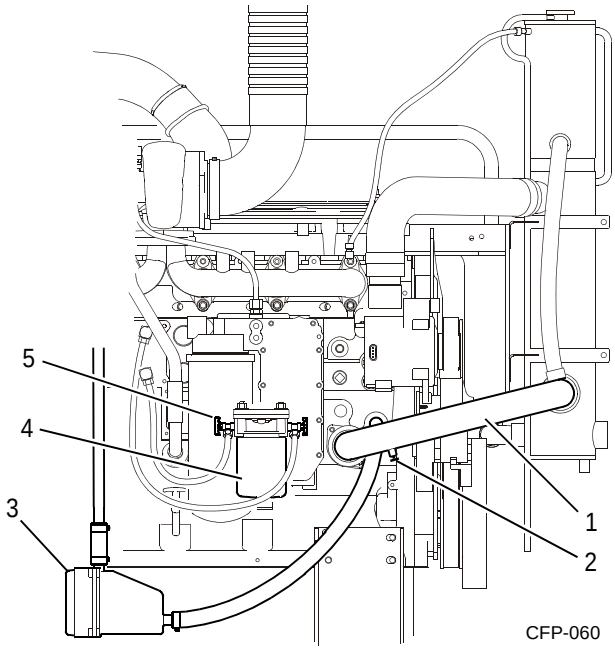
7. Disconnect either end of the engine heater coolant hose and drain the engine heater.

CAUTION

Coolant is toxic. Avoid prolonged and repeated skin contact with used antifreeze - wash thoroughly after contact. Prolonged, repeated contact can cause skin disorders. Dispose of waste antifreeze in accordance wit local environmental regulations.

8. Flush with clean fresh water or heavy-duty heat exchanger cleaner. Follow the manufacturer's directions on the product container.

NOTE: *Some cooling system cleaners or commercial solvents require a soapy water rinse after use. Follow the directions on the cleaning solution or solvent.*



1. Lower Coolant Hose
2. Coolant Drain Valve
3. Engine Heater
4. Coolant Filter
5. Coolant Filter Shut-off Valve

Figure 6-4 Engine Coolant Drains (typical)

CAUTION

Over concentration of antifreeze or use of high-silicate antifreeze can damage the engine. Do not use more than 50% antifreeze in the mixture unless additional freeze protection is required. Antifreeze at 68% concentration provides the maximum freeze protection, and must never be exceeded under any condition. Antifreeze protection decreases above 68%.

9. When the flushing water has fully drained, use a filter wrench to remove the water coolant filter from the filter housing.

a. Clean the filter housing gasket mount of dirt buildup, oxidation or particulate matter with a clean cloth.

b. Coat the replacement filter gasket with a light coating of 15W-40 lubrication oil.

10. Center the filter ring on the threaded mounting nipple. Screw the filter canister onto the mounting flange until the gasket is snug against the mounting flange. If using a soapy water solution, flush again with clear water. Allow time for the water to fully drain.Then tighten an additional 1/4 turn.

NOTE: *Recommendations on Filter replacements and fill rates can be found on the Specific Model Engine Data sheets in Section 8.*

11. Reconnect the engine heater coolant hose and close the drain petcock and the lower coolant tube petcock.

CAUTION

Mechanical over tightening can distort the threads or damage the filter element seal.

NOTE: *During filling, air must be vented from the engine coolant passages. The air vents through the coolant filler port.*

12. Fill the coolant tanks with low-silicate antifreeze that meets ASTM 4985 test (GM 6038 M spec.) criteria. Use a mixture of 50% water and 50% ethylene-glycol base or propylene-glycol antifreeze (or pre-mixed solution) to protect the engine to -37° C (-34° F) year-around.

CAUTION

Use soft or distilled water in the coolant mixture. Contaminants in hard water neutralize the corrosion inhibitor components. Water must not exceed 300-ppm hardness or contain more than 100 ppm of either chloride or sulfate.

NOTE: *Cummins Inc. recommends using Fleetguard® ES COMPLEAT™ Ethylene-Glycol (EG) or Fleetguard® Propylene-Glycol (PG) Plus™ Antifreeze/Coolants. Both products are available in concentrated or pre-mixed formulations. Use a 50% concentration level (40% to 60% range) of ethylene-glycol or propylene-glycol and SCA (Supplemental Coolant Additive) required for wet sleeved engines in most climates. Contact your local Cummins Authorized Repair Location for additional information.*

Ethylene-Glycol	Propylene-Glycol
40% = -23° C (-10° F)	40% = -21° C (-6° F)
50% = -37° C (-34° F)	50% = -33° C (-27° F)
60% = -54° C (-65° F	60% = -54° C (-65° F
68% = -71° C (-90° F)	68% = -63° C (-82° F)

CAUTION

The system must be filled properly to prevent air locks. During filling, air must be vented from the engine coolant passages.

13. Check the condition of the pressure/fill cap.

a. If the pressure/fill cap seal is worn, damaged, missing or the pressure spring is damaged or shows signs of sticking, replace the filler cap.

b. Install the expansion tank fill cap.

14. Operate the engine until it reaches a temperature of 82° C (180° F), and check for coolant leaks.

15. Ensure that the coolant level is just below the fill neck.

6.6 Every 4 Years or 5000 Hours

All maintenance checks and inspections listed in previous maintenance intervals must also be performed at this time.

Cummins recommends performing maintenance on valve lash settings.

CAUTION

Valve lash maintenance should be performed by a skilled technician. Improper maintenance can damage the engine or cause severe personal injury. Contact your local Cummins Authorized Repair Location before performing any extensive maintenance.

6.6.1 Coolant Thermostat Removal/Installation

The thermostat regulates the temperature of the engine coolant circulating through the engine cooling system.

CAUTION

Always use the correct thermostat and never operate the engine without a thermostat installed. The engine can overheat if operated without a thermostat because the path of least resistance for the coolant is through the bypass to the pump inlet.

1. Remove the upper coolant hose clamps and the upper coolant hose.

2. Remove the (2) thermostat housing flange cap screws and the thermostat flange. Refer to Figure 6-5.

3. Remove the thermostat and gasket from the housing.

4. Clean the housing flange faces of dirt buildup, oxidation and sludge. Install the thermostat in the housing.

NOTE: *Recommendations on thermostat replacement components can be found on the Model Specific Engine Data sheets in Section 8 - Component Parts and Assemblies.*

5. Install a new thermostat seal on the thermostat housing flange surface.

6. Replace the thermostat flange and cap screws.

6.6.2 Coolant Pump/Alternator Belt Replacement

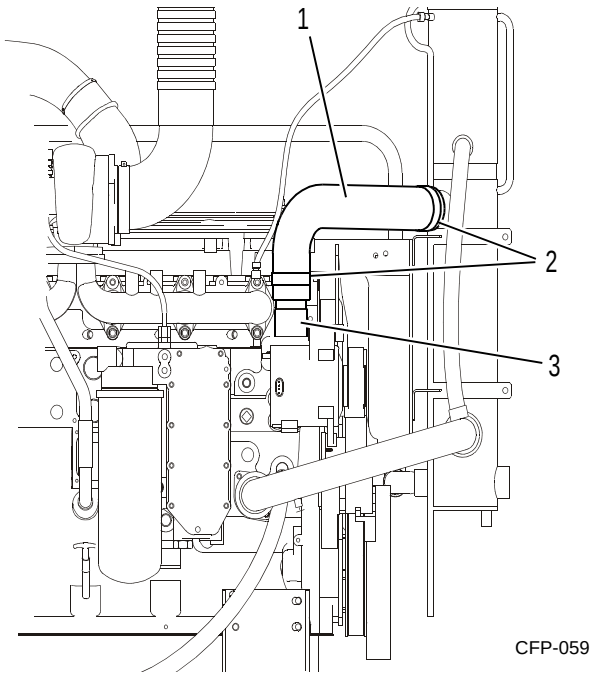
Replace the Coolant Pump/Alternator Belt if it is cracked, frayed or has pieces of material missing

1. Remove the belt guard.

2. Use a 3/8” drive ratchet or breaker bar to rotate the tensioner arm away from the belt and remove the belt.

3. Check the belt tensioner cap screw torque. The screw should be torqued to 43 N-m (32 ft-lb).

4. Check the tensioner arm, pulley and stops for cracks. If any cracks are noticed, the tensioner must be replaced.



1. Upper Coolant Hose
2. Hose Clamp
3. Thermostat Housing

Figure 6-5 Thermostat Housing (typical)

CAUTION

Disconnect both batteries (negative cable first) before performing service on the Fire Pump Engine or on any of its controls. Wear safety glasses when disconnecting batteries!

5. Verify that the tensioner arm stop is not in contact with the spring casing stop. If either stop is touching, the tensioner must be replaced.

6. Inspect the tensioner for evidence of the tensioner arm contacting the tensioner cap.

   If there is evidence of the two areas making contact, the pivot tube bushing has failed and the tensioner must be replaced.

7. Check the tensioner bearing.

   a. Rotate the tension pulley. The pulley should spin freely with no mechanical binding, eccentric motion or excessive end-play.

b. If the arm rotates with mechanical binding, eccentric movement or excessive end play, replace the tensioner.

8. Inspect the clearance between the tensioner spring case and the tensioner arm for uneven bearing wear.

   If the clearance exceeds 3 mm (0.12 in) at any point, the tensioner must be replaced as a complete assembly. Contact a Cummins Authorized Repair Location for replacement.

NOTE: *Experience has shown that tensioners generally will show a larger clearance gap near the lower portion of the spring case, resulting in the upper portion rubbing against the tensioner arm. Always replace the belt when a tensioner is replaced.*

9. After checking the torque, use a 3/8” drive ratchet or breaker bar to rotate the tensioner slowly away from the area of belt contact.
10. Install the replacement drive belt.

CAUTION

To prevent pulley or belt damage, do not roll a belt over the pulley or pry it on with a tool. Move the tensioner arm away from the belt area before installing the drive belt.

11. Check the location of the drive belt on the belt tensioner pulley. The belt should be centered on, or centered close to the middle of, the pulley.
12. Reinstall the belt guard.

CAUTION

Unaligned belts, either too far forward or backward, can cause belt wear, belt roll-off failures or increase uneven tensioner bushing wear.

6.6.3 Coolant Thermostat Removal/Installation

1. Provide support for the coolant heat exchanger in order to avoid dropping it.
2. Position the heat exchanger and clamps on the engine’s mounting bracket and hand tighten the mounting bolts. Refer to Figure 2-1 and Figure 2-2.
3. Align the heat exchanger with the required hose connections and tighten the hose clamp fasteners.
4. Reinstall all water supply and drain fittings. Use Teflon™ pipe tape to prevent leaks. Torque the hose clamp screws to 8 N-m (71 in-lb).
5. When the charge air heat exchanger hose clamps and cooling water lines are secure, tighten the mounting bracket bolts.
6. Open the cooling loop cooling water supply manual valves and check for leaks.
7. After completing all service work, start the engine and check for air leaks, loose clamps and blowby.

Section 7 - Troubleshooting

7.1 Troubleshooting

The following information is intended as a guide to troubleshooting some common nontechnical equipment problems. Many problems can be resolved using corrective maintenance, adjustment or minor repair. Refer to the Vendor supplied literature, electrical schematics and mechanical prints for additional information.

For engine related issues, refer to Operation and Maintenance Manual Bulletin or contact the Cummins Customer Assistance Center at 1-800-DIESELS (1-800-343-7357).

WARNING

The status checks should be performed ONLY by a qualified technician. Contact with exposed electrical components could cause extreme personal injury or death.

WARNING

Before equipment operation, ALL guards, covers and protective devices MUST BE in place and securely fastened. Serious personal injury could result from contact with exposed or moving components.

CAUTION

AVOID SERVICING complex components such as: printed circuit boards or ECM's. Contact a Cummins Fire Power Customer Service Department before performing any extensive maintenance.

CAUTION

Never climb or stand on the equipment frame, guards, or enclosures. Contact with exposed or moving components can cause personal injury or equipment damage.

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Problem **Page**

Troubleshooting Chart

PROBLEM	POSSIBLE CAUSE	SOLUTION
7.1.1 Neither Battery is Charging with the Engine Running **NOTE:** *If one or both batteries do not charge with the engine stopped, troubleshoot the customer supplied battery charging system.*	Battery cables or connections are loose, broken, or corroded (excessive resistance).	Check the battery cables and connections. Ensure that all connections are free of corrosion and that no cables are broken.
	Alternator not functioning.	Replace the alternator. Contact an Authorized Cummins Repair Facility.
	Battery isolator input has faulted.	Test continuity from the alternator to the battery isolator input. Repair any open circuit. Test continuity through the battery isolator. If an internal open circuit exists, replace battery isolator.
	Alternator internal voltage regulator is malfunctioning.	Test the alternator electrically. If required, replace the alternator. Contact an Authorized Cummins Repair Facility.
7.1.2 Only One Battery is Charging with the Engine Running **NOTE:** *If one or both batteries do not charge with the engine stopped, troubleshoot the customer supplied battery charging system.*	Battery has failed.	Check battery charge.
	Battery cables or connections are loose, broken, or corroded (excessive resistance).	Check the battery cables and connections. Ensure connections clean and that no cables are broken.
	Battery isolator has failed.	Remove the battery isolator.
7.1.3 Voltage Indications Differ **NOTE:** *Normal differences in battery condition may also cause differences in indication. These are normal differences and require no action.*	One battery is discharge or failing.	Check battery condition. Replace failing battery elements. Check wiring for corrosion. Ensure good electrical contact. Charge discharged batteries by running the engine or with an external battery charger. If the battery does not charge with the engine running, go to Only One Battery is Charging with the Engine Running. Check for apparent wire damage or shorts to grounds. Replace the failed fuse.

Troubleshooting Chart (Continued)

PROBLEM	POSSIBLE CAUSE	SOLUTION
7.1.4 Coolant Contamination	Coolant is rusty and has debris.	Drain and flush the cooling system per the instructions in Section 6 - Maintenance. Replace the coolant water filter per the instructions. Refill with correct mixture of antifreeze and water per the instructions.
	Engine oil cooler is leaking oil into the coolant. Coolant begins to have the texture and color of chocolate pudding.(CFP11E only)	Check the engine oil cooler for coolant leaks and cracks. Replace the oil cooler gasket or other parts as necessary. Refill with correct mixture of antifreeze and water. If the problem persists, the cylinder block may be cracked or porous. Contact the Cummins Authorized Repair Facility.
	Coolant Heat Exchanger is leaking cooling water into the coolant. Coolant volume increases and pressure is relieved when the unit is operating. Antifreeze concentration decreases.	Drain and flush the cooling system per the instructions in Section 6 - Maintenance. Perform a pressure test of the cooling water side of the heat exchanger. If the heat exchanger leaks, it should be replaced. Check and adjust cooling water pressure regulator set points. Refill with correct mixture of antifreeze and water per the instructions in Section 6 - Maintenance.
	Coolant is inadvertently contaminated with unknown liquids.	Drain and flush the cooling system. Refill with correct mixture of antifreeze and water per the instructions in Section 6 - Maintenance. Contact an Authorized Cummins Repair Facility.

Troubleshooting Chart (Continued)

PROBLEM	POSSIBLE CAUSE	SOLUTION
7.1.5 Excessive Coolant Loss	Adequate coolant was not added following previous maintenance activities.	Check the coolant level. Add coolant as required and check engine operation. If coolant loss persists, check for other problems.
	Inadvertent coolant leak is present.	Inspect the engine for coolant leaking from drain cocks or vents. Close the leaking drain or vent. Add coolant as required and check engine operation.
	Cooling system hose is leaking.	Check the condition of the hoses. Replace and/or tighten loose hose clamps. Replace any damaged hoses as necessary. Add coolant as required and check engine operation.
	Pressure cap is malfunctioning or has low-pressure rating.	Check that the pressure cap does not relieve coolant under normal operating conditions. Replace a leaking pressure cap, (Cummins Fire Power Part No. 11407). Add coolant as required and check engine operation.
	Mechanical coolant leak.	Inspect the engine for coolant leaking from manifold, expansion and pipe plugs, fittings, engine oil cooler, water pump seal, cylinder block, and other components that have coolant flow. Repair leaking components. Add coolant as required and check engine operation.

Troubleshooting Chart (Continued)

PROBLEM	POSSIBLE CAUSE	SOLUTION
7.1.6 Coolant Temperature Above Normal **NOTE:** *The thermostat's normal operating temperature range is 82-95° C (180-203° F)*	Incorrect cooling water flow.	Measure cooling water flow and adjust per Data sheet values in Section 8.
	Cooling water pressure regulator is improperly adjusted. **NOTE:** *Pressure should not exceed 414 kPa [60 psig].*	Check the cooling water pressure indication. If pressure is inadequate, adjust the regulator.
	Cooling water solenoid has failed. (Applicable to Horizontal Pump installations only)	Replace the solenoid.
		Check the cooling water piping for blockage. Clean the piping if necessary.
	Coolant level is low.	Refill to proper level.
	Cooling system hose is collapsed, restricted or leaking.	Inspect and replace the hoses and pressure/fill cap as necessary.
	Coolant thermostat is malfunctioning.	Remove and replace the defective thermostat.
	Coolant pump is malfunctioning.	Contact an Authorized Cummins Repair Facility.
	Contaminated coolant.	Contact an Authorized Cummins Repair Facility.
	Coolant mixture of antifreeze and water is not correct.	Verify the concentration of antifreeze in the coolant. Add antifreeze or water to correct the concentration.
7.1.7 Coolant Temperature Below Normal when engine not running.	Coolant temperature switch is malfunctioning.	Repair or replace the switch.
	The heater's overload thermostat has operated.	Ensure that there is coolant in the heater. Allow time for the automatic overload reset to occur.
	Coolant temperature switch is malfunctioning.	Repair or replace the switch.
	Coolant is not free to circulate through the heater.	Ensure that the coolant hoses are clear. Repair or replace hoses as necessary.
	The coolant heater has failed.	Replace the coolant heater.

Troubleshooting Chart (Continued)

PROBLEM	POSSIBLE CAUSE	SOLUTION
7.1.8 Cooling Water Drain Steaming **NOTE:** *The cooling water drain from the Coolant Heat Exchanger may steam if cooling water flow is inadequate when the engine is running. It may also steam shortly after the engine is stopped. If coolant is leaking into the cooling water drain piping, the steaming may last for some time while the engine cools. Antifreeze may also be observed in the cooling water drain.*	Cooling water flow did not start when the engine started. Engine coolant is leaking into the cooling water piping in the coolant heat exchanger. Cooling water flow not adequate.	Check engine coolant temperature. Refer to, Coolant Temperature Above Normal in this section. Remove the coolant heat exchanger and perform the pressure test. Refer to Section 6 - Maintenance. If pressure is not maintained, replace the heat exchanger. Compare actual flow rate against required flow rate - adjust regulators to required flow.
7.1.9 Cooling Water Solenoid Valve fails to Operate (applicable to Horizontal Pump installations.)	Solenoid valve remains open when the engine stops. Solenoid valve fails to open. **NOTE:** *Apply 12 VDC to standard operating systems or 24 VDC to optional operating systems.*	Replace the solenoid valve. Check control voltage is equal or above system voltage. Repair any open or short circuits in the wiring.
7.1.10 Auto Start failure - Does not Crank on BATT A or B	The electrical connection from the fire protection system to terminal board has failed. The electrical connection from terminal board to relay has failed.	Test continuity and insulation from ground between the fire protection system and the engine digital control panel. Locate and repair any electrical fault in the field wiring or in the fire protection system controller. Test continuity and insulation from ground between the terminal board and the relay. Locate and repair any electrical fault.

Troubleshooting Chart (Continued)

PROBLEM	POSSIBLE CAUSE	SOLUTION
7.1.11 Auto Start failure - Cranks but does not Start	The overspeed switch has activated. The overspeed lamp is illuminated on the engine digital control panel.	Press the RESET switch on the engine digital control panel or repair any other electrical faults as necessary.
	Control power from the Fire Protection System Controller is not available at local control panel.	Locate and correct the fault in the Fire Protection System Controller or the field wiring to the engine digital control panel.
	The AUTO/MANUAL Mode Switch fails to select AUTO mode.	Replace the Engine Digital Control Panel.
	The overspeed switch has failed. **NOTE:** *Check system basics* *- Battery voltage level* *- Fuel supply* *- Crank speed*	Check power and grounding to the overspeed switch. Replace the switch as necessary.
7.1.12 Auto Start failure - Engine Starts but Crank Terminate Does Not Occur	The overspeed control switch not correctly adjusted or has failed.	With the engine running, verify speed sensor input to the overspeed switch. Replace the overspeed switch as necessary.
	The speed sensor has failed. The tachometer indicates zero RPM.	Locate and repair any electrical fault in the speed sensor circuitry. Replace the speed sensor as necessary.
	An electrical fault is present in the Fire Protection System.	Test continuity and insulation from ground between the fire protection system controller and the engine digital control panel. Locate and repair any electrical fault in the field wiring.

Troubleshooting Chart (Continued)

PROBLEM	POSSIBLE CAUSE	SOLUTION
7.1.13 Manual Start Failure from Contactor Lever - Does not Crank on A or B **NOTE:** *The fire pump engine will not crank locally when either contactor lever is actuated.*	Crank Battery A or B contactor fails to make contact.	Replace the faulty contactor as necessary.
	Both batteries dead or not connected.	Charge, check wiring connections or replace batteries.
	Starter motor has failed.	Replace the starter motor.
	Engine is seized.	Contact an Authorized Cummins Repair Facility.
7.1.14 Manual Start Failure from Control Panel - Does not Crank on A or B **NOTE:** *The fire pump engine will not crank locally from the control panel when either CRANK BATT A or CRANK BATT B is selected, however, it does start when a contactor lever is actuated.*	The AUTO/MANUAL Mode Switch contact fails to close.	Test the electrical operation of the AUTO/MANUAL Mode Switch. Replace the faulty switch as necessary.
	An electrical fault exists in the wiring.	Test continuity and insulation from ground between the AUTO/MANUAL Switch and the Relays. Locate and repair any electrical fault.
	Overspeed switch crank circuit fails to reset with engine shutdown.	Test and adjust the crank setting as necessary. Replace the overspeed switch as necessary.
7.1.15 Engine Cranks Normally But Will Not Start (No Exhaust Smoke)	Air is in the fuel system.	Check for air in the fuel system. Tighten or replace the fuel connections, fuel lines, fuel tank stand pipe and fuel filters as necessary. Vent air from the system.
	Fuel drain line is restricted.	Check the fuel drain lines for restriction. Clear or replace the fuel lines, check valves, or tank vents as necessary.
	Fuel filter is clogged.	Replace the fuel filter. Refer to Change Fuel Filter in Section 6 - Maintenance.
	Fuel grade is not correct for the application or the fuel quality is poor.	Operate the engine from a tank of high-quality no. 2 diesel fuel.
	Fuel pump overflow valve is malfunctioning.	Check the overflow valve. Replace if necessary.
	Fuel suction line is restricted.	Check the fuel suction line for restriction.

Troubleshooting Chart (Continued)

PROBLEM	POSSIBLE CAUSE	SOLUTION
	Fuel connections on the suction side of the fuel lift pump are loose.	Tighten all the fuel fittings and connections between the fuel tanks and fuel lift pump.
	Fuel suction stand pipe in the fuel tank is broken.	Check and repair the stand pipe, if necessary.
	Fuel supply is not adequate.	Locate and correct the restriction in the customer supplied fuel lines to the engine.
	Fuel tank air breather is blocked.	Clean the fuel tank breather.
	Fuel lift pump or injection pump is malfunctioning.	Check the fuel lift pump and injection pump for correct operation. Check the pump output pressure. Replace the fuel lift pump if necessary.
	Injection pump drive shaft or drive shaft key is damaged.	Repair or replace the injection pump or Contact an Authorized Cummins Repair Facility.
	Fuel injectors are plugged.	Replace the fuel injectors.
	Moisture is in the wiring harness connectors.	Dry the connectors with Cummins electronic cleaner, Part Number 3824510.
	Starter motor failed	Replace the starter motor as necessary. Contact an Authorized Cummins Repair Facility.
7.1.16 Engine Cranks Slowly But Does Not Start **NOTE:** *Typical engine cranking speed is 120 RPM. Engine cranking speed can be checked with a hand-held tachometer, stroboscope or electronic service tool*	The battery cable connections are loose, broken, or corroded creating excessive resistance.	Check the battery cables and connections. Ensure that connections are clean and tight.
	The battery is not properly charged or has failed.	Recharge the battery. If the battery does not take the charge, replace it.
	Engine oil level is too high.	Check the oil level per instructions in Section 6 - Maintenance. Drain any excess oil.
	Starter motor is malfunctioning.	Replace the starter motor. Contact an Authorized Cummins Repair Facility.

Troubleshooting Chart (Continued)

PROBLEM	POSSIBLE CAUSE	SOLUTION
7.1.17 Engine Stops During Operation	Normal automatic mode shut-down occurs when the fire protection systems controller removes the signal power feed to the engine digital control panel.	No action required. This is a desirable outcome.
	An overspeed trip has occurred. The overspeed trip lamp illuminated on the local control panel.	Remote indications may also be present. Overspeed switch failure has occurred. The trip indications may not be present.
	In the automatic mode, the signal power feed is lost from the fire protection system controller to the engine digital control panel.	Locate and correct the electrical fault in the fire protection system controller or the field wiring to the engine digital control panel.
	Fuel tank level is low.	Fill the fuel tank. Fill and bleed the fuel lines to the engine.
	Clogged fuel tank air breather hose.	Clean the fuel tank breather.
	Fuel piping to engine is clogged.	Clean and repair engine fuel piping.
	The fuel filter is clogged.	Replace the fuel filter. Refer to Change Fuel Filter in Section 6 - Maintenance.
	Air is trapped in the low pressure fuel lines at the engine.	Bleed the fuel lines. Refer to Air in Fuel in Section 6 - Maintenance.
	Fuel lift pump or injection pump has failed	Check the fuel lift pump for correct operation. Check the pump output pressure. Replace either pump if necessary. Contact an Authorized Cummins Repair Facility.

Troubleshooting Chart (Continued)

PROBLEM	POSSIBLE CAUSE	SOLUTION
7.1.18 Engine Will Not Reach Rated Speed (RPM)	Tachometer is not reading correctly or is erratic. Compare the tachometer reading with a hand held tachometer or an electronic service tool reading.	Replace the Engine Digital Control Panel. Contact an Authorized Cummins Repair Facility for assistance.
	Fuel filter requires replacement.	Refer to Change Fuel Filter per the instructions in Section 6 - Maintenance.
	Fuel grade not correct for the application or fuel quality is poor.	Operate the engine with a good quality no. 2 diesel fuel.
	Fuel suction line is restricted.	Check the fuel suction line for restriction.
	Air-fuel tube leaking, waste gate diaphragm ruptured or waste gate plumbing damaged.	Tighten the fittings, repair plumbing. Contact an Authorized Cummins Repair Facility.
	Charge air cooler restricted.	Inspect the air cooler for internal and external restrictions. Replace the restricted cooler if necessary.
	Fuel supply is not adequate.	Locate and correct the restriction in the fuel lines to the engine.
	Stop circuit malfunction in the fire pump controller or field wiring.	In the AUTO mode, the fire pump engine stops upon loss of signal power from the fire pump controller. Check stop circuit in Fire Pump Controller.
7.1.19 Engine Will Not Shut Off Remotely	Stop circuit malfunction in the fire pump controller or field wiring.	Check for short to voltage on the signal wiring from the fire pump controller to the engine control panel. Correct any faults. Check operation of the switch contacts of the AUTO/MANUAL switch at the engine control panel. Replace the switch if the switch contacts fail to operate properly.
	Engine running on fumes drawn into the air intake.	Identify and isolate the source of the combustible fumes. Contact an Authorized Cummins Repair Facility.

Troubleshooting Chart (Continued)

PROBLEM	POSSIBLE CAUSE	SOLUTION
7.1.20 Engine Will Not Shut Off Locally	Power source has not been removed by the fire pump controller.	Depress and hold Stop button on left side of Engine Digital Control Panel until engine is stopped.
	Engine running on fumes drawn into the air intake.	Identify and isolate the source of the combustible fumes. Contact an Authorized Cummins Repair Facility.
7.1.21 Fuel Consumption is Excessive	Fuel is leaking.	Check the fuel lines, fuel connections, and fuel filters for leaks. Check the fuel lines to the supply tanks. Repair any leaks.
	Poor-quality fuel is being used.	Assure good-quality no. 2 diesel fuel is being used.
	Defective or clogged injection nozzle.	Replace the defective or clogged injection nozzle.
	Injection pump is adjusted incorrectly causing excessive injection.	Adjust or replace the injection pump.
	Air intake or exhaust leaks.	Check for loose or damaged piping connections and missing pipe plugs. Check the turbocharger and exhaust manifold mounting. Repair any leaks.
	Air intake system restriction is above specification.	Check the air intake system for restriction. Refer to Check Air Cleaner Service Indicator in Section 6 - Maintenance. Replace the air filter as necessary.
7.1.22 Fuel or Engine Oil Leaking From Exhaust Manifold	Intake air restriction is high.	Check the air intake system for restriction. Refer to Check Air Cleaner Service Indicator in Section 6 - Maintenance. Replace the air filter if required.
	Turbocharger drain line is restricted.	Remove the turbocharger drain line and check for restriction. If required, clean or replace the drain line.
	Turbocharger oil seal is leaking.	Check the turbocharger for oil seals and for leaks. Refer to the Turbocharger Leaks Engine Oil or Fuel symptom tree in this section.

Troubleshooting Chart (Continued)

PROBLEM	POSSIBLE CAUSE	SOLUTION
7.1.23 Engine Oil is Contaminated	Bulk oil supply is contaminated.	Check the oil supply. Replace it is necessary. Drain the oil and replace with non-contaminated oil. Also, replace the oil filter. Refer to Change Engine Oil and Filters in Section 6 - Maintenance.
	Fuel is present in the engine oil.	Refer to the Fuel in Engine Oil in this section.
	Coolant is present in the engine oil.	Refer to the Coolant in Engine Oil symptom tree in this section.
	Metal is present in the engine oil.	Contact an Authorized Cummins Repair Facility.
7.1.24 Engine Oil Consumption is Excessive	Verify the oil consumption rate.	Check the amount of oil added versus the operating hours.
	Engine crankcase overfilled.	Remove excess oil and recalibrate dipstick.
	External engine leak is present.	Inspect the engine and its components for seal, gasket, tappet cover, oil cooler, or drain cocks leaks. Repair or correct any leaks.
	Crankcase ventilation system is plugged.	Check and clean the crank case breather and vent tube per the instructions in Section 6 - Maintenance.
	Turbocharger oil seal is leaking.	Check the turbocharger compressor and turbine seals. Contact an Authorized Cummins Repair Facility.
	Engine oil cooler is leaking.	Check for engine oil in the coolant. Refer to the Engine Oil in the Coolant in this section. Contact an Authorized Cummins Repair Facility.
	Engine oil does not meet specifications for operating conditions.	Change the oil and filters per the instructions in Section 6 - Maintenance.

Troubleshooting Chart (Continued)

PROBLEM	POSSIBLE CAUSE	SOLUTION
7.1.24 Engine Oil Consumption is Excessive (continued)	Engine oil drain interval is excessive.	Verify the correct engine oil drain interval. Refer to Change Engine Oil and Filters in Section 6 - Maintenance.
	Piston, cylinder liner, or piston rings are worn or damaged.	Check for air intake system leaks. Contact an Authorized Cummins Repair Facility.
	Piston rings are not seated correctly (after an engine rebuild or piston installation).	Check blowby. If blowby is excessive, check the piston rings for correct seating. Contact an Authorized Cummins Repair Facility.
7.1.25 Engine Oil in the Coolant	Bulk coolant supply is contaminated.	Check the coolant expansion tank. Drain the coolant and replace with non-contaminated coolant. Refer to Drain and Flush Cooling System in Section 6. Replace the coolant filter.
	Engine oil cooler is malfunctioning.	Check the oil cooler. Contact an Authorized Cummins Repair Facility.
	Cylinder head gasket damaged or leaking.	Contact an Authorized Cummins Repair Facility.
	Cylinder block or head is cracked or porous.	Contact an Authorized Cummins Repair Facility.
7.1.26 Tachometer Does not Indicate Engine Speed	An electrical fault exists in the wiring and grounding circuits.	Check continuity and insulation from ground for the power wiring and ground wiring to the tachometer. Replace defective components and repair electrical faults. Contact an Authorized Cummins Repair Facility.
	The tachometer is not reading correctly or is operating erratically.	Check the operation of the tachometer with a pulse generator. Replace the Engine Digital Control Panel. Contact an Authorized Cummins Repair Facility.

Section 8 - Component Parts and Assemblies

8.1 Part Ordering Information

Replacement parts for the Cummins Inc. equipment are manufactured to the same quality standards and specifications as the original equipment. Unapproved substitution may result in poor performance, reduced service life, lost production or unsafe operation.

Cummins Inc. relies on the best and most cost effective shipping methods, unless specific instructions or requirements are requested by the customer. When ordering parts please be prepared to provide the following information.

PARTS REQUESTS REQUIRE:

1. Model and serial number.
2. Part description by name or number
3. Quantity required.
4. Purchase order number.

NOTE: *A purchase order number is desirable, even if the part(s) are supplied on a Returned Goods Authorization (RGA) issue number. A purchase order number helps Cummins NPower Inc. and its customer track the parts and necessary credits.*

8.2 Routine Service and Parts

Personnel at Cummins Authorized Repair Locations can assist you with the correct operation and service of your engine. Cummins has a worldwide service network of more than 5,000 Distributors and Dealers who have been trained to provide sound advice, expert service, and complete parts support.

Check the telephone directory yellow pages or refer to the directory in this section for the nearest Cummins Authorized Repair Location.

8.3 Emergency Repairs and Technical Service

The Cummins Customer Assistance Center provides a 24-hour, toll free telephone number to aid in technical and emergency service when a Cummins Authorized Repair Location can not be reached or is unable to resolve an issue with a Cummins product.

If assistance is required, call Toll-Free: 1-800-DIESELS (1-800-343-7357) Includes all 50 states, Bermuda, Puerto Rico, Virgin Islands, and the Bahamas.

Outside of North America contact your Regional Office. Telephone numbers and addresses are listed in the International Directory.

Refer also to the Cummins Inc. web site at www.cummins.com

8.4 Recommended Spares Inventory

To minimize downtime and increase productivity, Cummins Inc. recommends maintaining a stock of spare parts critical to uninterrupted engine operation. Shipping costs can be lower using ground transportation rather than overnight or next day air freight. For this reason Cummins Inc. can provide a list of recommended spare parts. Contact the Cummins Authorized Repair Location for additional information.

8.5 Parts and Drawing Sections

Fire Power Pump Engine Model CFP59

Fire Power Pump Engine Model CFP83

CFP59 Engine Data Sheet

Cummins Fire Power	**Engine Data Sheet** **Cummins Fire Power** De Pere, WI 54115 http://www.cumminsfirepower.com	Basic Engine Model **CFP59-F15, F25**
		Curve Number: **FR - 90026** CPL Code: **1948**
Configuration Number: **D402056CX02** Installation Drawing: **26107**		Engine Family: **D40** Revision Date: **October 2011**

General Engine Data

Type	4 Cycle; In-Line; 6 Cylinder	
Aspiration	Turbocharged and Aftercooled	
Bore & Stroke - in. (mm)	4.02 x 4.72	(102 x 120)
Displacement - in.^{3} (litre)	359	(5.9)
Compression Ratio	17.4:1	
Valves per Cylinder - Intake	1	
- Exhaust	1	
Maximum Allowable Bending Moment @ Rear Face of Block - lb.-ft. (N-m)	1000	(1356)

Air Induction System

Max. Temperature Rise Between Ambient Air and Engine Air Inlet - °F (°C)	30	(16.7)
Maximum Inlet Restriction with Dirty Filter - in. H_2O (mm H_2O)	25	(635)
Recommended Air Cleaner Element - (Standard)	FLG Industrial	AH1140

Lubrication System

Oil Pressure Range at Rated - PSI (kPa)	10-50	(69-345)
Oil Capacity of Pan (High - Low) - U.S. quarts (litre)	15-13	(14.2-12.3)
Total System Capacity - U.S. Gal. (litre)	4.3	(16.3)
Recommended Lube Oil Filter	Fleetguard (Cummins)	LF3959 (3937743)

Cooling System

Raw Water Working Pressure Range at Heat Exchanger - PSI (kPa)	60	(413) MAX
Recommended Min. Water Supply Pipe Size to Heat Exchanger - in. (mm)	0.75	(19.05)
Recommended Min. Water Disch. Pipe Size From Heat Exchanger - in. (mm)	1.00	(25.40)
Coolant Water Capacity (Engine Side) - U.S. gal. (litre)	4	(15.1)
Standard Thermostat - Type	Modulating	
- Range - deg F (deg C)	180-200	(82-93)
Minimum Raw Water Flow with Water Temperatures to 90 °F (32 °C) - U.S. GPM (litre/s)	20	(1.26)
Recommended Cooling Water Filter	Fleetguard (Cummins)	None

A jacket water heater is mandatory on this engine. The recommended heater wattage is 1500 down to 40 °F (4 °C).

Exhaust System

Max. Back Pressure Imposed by Complete Exhaust System in in. H_2O (kPa)	40.8	(10.2)
Exhaust Pipe Size Normally Acceptable - in. (mm)	4.0	(102)

Noise Emissions

Top	96.3 dBa
Right Side	96.3 dBa
Left Side	99.0 dBa
Front	98.9 dBa
Exhaust	114 dBa

The noise emission values are estimated sound pressure levels at 3.3 ft. (1 m.).

CFP59 Engine Data Sheet (Continued)

Fuel Supply / Drain System	**2100**	**2350**	**2600**
CFP59-F25 Nominal Fuel Consumption - Gal./hr. (L/hr)	7.7 (29.3)	8.3 (31.5)	8.7 (32.7)
CFP59-F15 Nominal Fuel Consumption - Gal./hr. (L/hr)	6.5 (24.8)	7.1 (26.8)	7.4 (27.9)
Fuel Type		Number 2 Diesel Only	
Minimum Supply Line Size - in. (mm)		0.25	(6.35)
Minimum Drain Line Size - in. (mm)		0.125	(3.18)
Maximum Fuel Height above C/L Crankshaft - in. (mm)		80	(2032)
Recommended Fuel Filter - Primary	Fleetguard (Cummins)	FS5052	(3903640)
- Secondary		None	
Maximum Restriction @ Lift Pump-Inlet - With Clean Filter - in. Hg (mm Hg)		4.0	(102)
Maximum Restriction @ Lift Pump-Inlet - With Dirty Filter - in. Hg (mm Hg)		8.0	(203)
Maximum Return Line Restriction - Without Check Valves - in. Hg (mm Hg)		20	(508)
Minimum Fuel Tank Vent Capability - ft^3/hr (m^3/hr)		12	(0.36)
Maximum Fuel Temperature @ Lift Pump Inlet - °F (°C)		160	(71)

Starting and Electrical System	**12V**	**24V**
Min. Recommended Batt. Capacity - Cold Soak at 0°F (-18°C) or Above		
Engine Only - Cold Cranking Amperes - (CCA)	900	900
Engine Only - Reserve Capacity - Minutes	430	430
Battery Cable Size (Maximum Cable Length Not to Exceed 5 ft. [1.5 m] AWG)	00	00
Maximum Resistance of Starting Circuit - Ohms	0.002	0.002
Typical Cranking Speed - RPM	120	120
Alternator (Standard), Internally Regulated - Ampere	95	45
Wiring for Automatic Starting (Negative Ground)	Standard	
Reference Wiring Diagram	16122	

Performance Data

All data is based on the engine operating with fuel system, water pump, lubricating oil pump, air cleaner, and alternator; not included are compressor, fan, optional equipment, and driven components. Data is based on operation at SAE standard J1394 conditions of 300 ft. (91.4 m) altitude, 29.61 in. (752 mm) Hg dry barometer, and 77 °F (25 °C) intake air temperature, using No.2 diesel or a fuel corresponding to ASTM-D2.

Altitude Above Which Output Should be Limited - ft. (m)	300	(91.4)
Correction Factor per 1000 ft. (305 m) above Altitude Limit	3%	
Temperature Above Which Output Should be Limited - °F (°C)	77	(25)
Correction Factor per 10 °F (11 °C) Above Temperature Limit	1%	(2%)

Exhaust Emissions (EPA Tier T1) [Reference Emissions Data Doc. 9809]	**g/kW-hr**	**g/BHP-hr**
Hydrocarbons (HC/OMHCE)	0.50	0.37
Oxides of Nitrogen (NOx)	5.70	4.25
Non-Methane Hydrocarbons + NOx (NMHC+NOx)	6.20	4.62
Carbon Monoxide (CO)	1.00	0.75
Particulate	0.37	0.28

CFP59 Engine Data Sheet (Continued)

FM Approved and UL Listed Ratings for CFP59-F15, F25

Engine Speed - RPM	**2100**	**2350**	**2600**
CFP59-F25 Output - BHP (kW)	**144 (107)**	**148 (110)**	**148 (110)**
Ventilation Air Required for Combustion - CFM (litre/sec)	346 (163)	398 (188)	430 (203)
Exhaust Gas Flow - CFM (litre/sec)	868 (410)	968 (457)	1035 (489)
Exhaust Gas Temperature - °F (°C)	893 (478)	878 (470)	880 (471)
Engine Heat Rejection to Coolant- BTU/min. (kW)	3021 (53)	3656 (64)	3810 (67)
Engine Heat Rejection to Ambient - BTU/min. (kW)	811 (14)	864 (15)	910 (16)
CFP59-F15 Output - BHP (kW)	**122 (91)**	**126 (94)**	**126 (94)**
Ventilation Air Required for Combustion - CFM (litre/sec)	329 (155)	383 (181)	415 (196)
Exhaust Gas Flow - CFM (litre/sec)	762 (360)	865 (408)	975 (460)
Exhaust Gas Temperature - °F (°C)	785 (418)	776 (413)	780 (416)
Engine Heat Rejection to Coolant- BTU/min. (kW)	2636 (46)	3262 (57)	3520 (62)
Engine Heat Rejection to Ambient - BTU/min. (kW)	683 (12)	739 (13)	810 (14)

All Data is Subject to Change Without Notice.

Director of Engineering: Jim Vanden Boogard
Cummins Fire Power, De Pere, WI 54115 U.S.A.

CFP59 Engine Data Sheet

Cummins Fire Power	**Engine Data Sheet** **Cummins Fire Power** De Pere, WI 54115 http://www.cumminsfirepower.com	Basic Engine Model **CFP59-F10, F20, F40, F50**
		Curve Number: **FR - 91231, 91232** CPL Code: **8387**
Configuration Number: **D403050DX02** Installation Drawing: **26106**		Engine Family: **G Drive** Revision Date: **January 2014**

General Engine Data

Type	4 Cycle; In-Line; 6 Cylinder	
Aspiration	Turbocharged, Aftercooled	
Bore & Stroke - in. (mm)	4.02 x 4.72	(102 x 120)
Displacement - $in.^3$ (litre)	359	(5.9)
Compression Ratio	16.5:1	
Valves per Cylinder - Intake	1	
- Exhaust	1	
Maximum Allowable Bending Moment @ Rear Face of Block - lb.-ft. (N-m)	1000	(1356)

Air Induction System

Max. Temperature Rise Between Ambient Air and Engine Air Inlet - °F (°C)	30	(16.7)
Maximum Inlet Restriction with Dirty Filter - in. H_2O (mm H_2O)	25	(635)
Recommended Air Cleaner Element - (Standard)	FLG Industrial	AH1140

Lubrication System

Oil Pressure Range at Rated - PSI (kPa)	40-60	(276-414)
Oil Capacity of Pan (High - Low) - U.S. quarts (litre)	15-13	(14.2-12.3)
Total System Capacity - U.S. Gal. (litre)	4.3	(16.3)
Recommended Lube Oil Filter	Fleetguard (Cummins) LF3959	(3937743)

Cooling System

Raw Water Working Pressure Range at Heat Exchanger - PSI (kPa)	60	(413) MAX
Recommended Min. Water Supply Pipe Size to Heat Exchanger - in. (mm)	0.75	(19.05)
Recommended Min. Water Disch. Pipe Size From Heat Exchanger - in. (mm)	1.00	(25.40)
Coolant Water Capacity (Engine Side) - U.S. gal. (litre)	4	(15.1)
Standard Thermostat - Type	Modulating	
- Range - deg F (deg C)	180-203	(82-95)
Minimum Raw Water Flow		
with Water Temperatures to 90 °F (32 °C) - U.S. GPM (litre/s)	20	(1.26)
Recommended Cooling Water Filter	Fleetguard (Cummins)	None

A jacket water heater is mandatory on this engine. The recommended heater wattage is 1500 down to 40 °F (4 °C).

Exhaust System

Max. Back Pressure Imposed by Complete Exhaust System in in. H_2O (kPa)	40.8	(10.2)
Exhaust Pipe Size Normally Acceptable - in. (mm)	4.0	(102)

Noise Emissions

Top	99.0 dBa
Right Side	96.3 dBa
Left Side	98.9 dBa
Front	96.3 dBa
Exhaust	116.0 dBa

The noise emission values are estimated sound pressure levels at 3.3 ft. (1 m.).

CFP59 Engine Data Sheet (Continued)

Fuel Supply / Drain System	**1470**	**1760**
CFP59-F50 Nominal Fuel Consumption - Gal./hr. (L/hr)	7.9 (30.0)	9.2 (34.9)
CFP59-F40 Nominal Fuel Consumption - Gal./hr. (L/hr)	7.2 (27.4)	8.4 (31.7)
CFP59-F20 Nominal Fuel Consumption - Gal./hr. (L/hr)	6.3 (23.8)	7.3 (27.6)
CFP59-F10 Nominal Fuel Consumption - Gal./hr. (L/hr)	4.8 (18.3)	5.6 (21.3)
Fuel Type	Number 2 Diesel Only	
Minimum Supply Line Size - in. (mm)	0.25	(6.35)
Minimum Drain Line Size - in. (mm)	0.125	(3.18)
Maximum Fuel Height above C/L Crankshaft - in. (mm)	80	(2032)
Recommended Fuel Filter - Primary ..... Fleetguard (Cummins).....	FS1251	(3286503)
- Secondary	None	
Maximum Restriction @ Lift Pump-Inlet - With Clean Filter - in. Hg (mm Hg)	4.0	(102)
Maximum Restriction @ Lift Pump-Inlet - With Dirty Filter - in. Hg (mm Hg)	8.0	(203)
Maximum Return Line Restriction - Without Check Valves - in. Hg (mm Hg)	20	(508)
Minimum Fuel Tank Vent Capability - ft^3/hr (m^3/hr)	12	(0.36)
Maximum Fuel Temperature @ Lift Pump Inlet - °F (°C)	160	(71)

Starting and Electrical System	**12V**	**24V**
Min. Recommended Batt. Capacity - Cold Soak at 0°F (-18°C) or Above		
Engine Only - Cold Cranking Amperes - (CCA)	900	900
Engine Only - Reserve Capacity - Minutes	430	430
Battery Cable Size (Maximum Cable Length Not to Exceed 5 ft. [1.5 m] AWG)	00	00
Maximum Resistance of Starting Circuit - Ohms	0.002	0.002
Typical Cranking Speed - RPM	120	120
Alternator (Standard), Internally Regulated - Ampere	95	45
Wiring for Automatic Starting (Negative Ground)	Standard	
Reference Wiring Diagram	16122	

Performance Data

All data is based on the engine operating with fuel system, water pump, lubricating oil pump, air cleaner, and alternator; not included are compressor, fan, optional equipment, and driven components. Data is based on operation at SAE standard J1394 conditions of 300 ft. (91.4 m) altitude, 29.61 in. (752 mm) Hg dry barometer, and 77 °F (25 °C) intake air temperature, using No.2 diesel or a fuel corresponding to ASTM-D2.

Altitude Above Which Output Should be Limited - ft. (m)	300	(91.4)
Correction Factor per 1000 ft. (305 m) above Altitude Limit	3%	
Temperature Above Which Output Should be Limited - °F (°C)	77	(25)
Correction Factor per 10 °F (11 °C) Above Temperature Limit	1%	(2%)

Exhaust Emissions (EPA Tier T1) [Reference Emissions Data Doc. 9807]	**g/kW-hr**	**g/BHP-hr**
Hydrocarbons (HC/OMHCE)	0.50	0.37
Oxides of Nitrogen (NOx)	7.80	5.82
Non-Methane Hydrocarbons + NOx (NMHC+NOx)	8.30	6.19
Carbon Monoxide (CO)	1.80	1.34
Particulate	0.46	0.34

CFP59 Engine Data Sheet (Continued)

FM Approved and UL Listed Ratings for CFP59-F10, F20, F40, F50

Engine Speed - RPM	**1470**	**1760**
CFP59-F50 Output - BHP (kW)	**164 (122)**	**188 (140)**
Ventilation Air Required for Combustion - CFM (litre/sec)	284 (134)	391 (185)
Exhaust Gas Flow - CFM (litre/sec)	757 (357)	972 (459)
Exhaust Gas Temperature - °F (°C)	1041 (561)	947 (508)
Engine Heat Rejection to Coolant- BTU/min. (kW)	3587 (63)	4205 (74)
Engine Heat Rejection to Ambient - BTU/min. (kW)	1401 (25)	1442 (25)
CFP59-F40 Output - BHP (kW)	**150 (112)**	**171 (128)**
Ventilation Air Required for Combustion - CFM (litre/sec)	252 (119)	347 (164)
Exhaust Gas Flow - CFM (litre/sec)	706 (333)	882 (416)
Exhaust Gas Temperature - °F (°C)	1054 (568)	951 (511)
Engine Heat Rejection to Coolant- BTU/min. (kW)	3809 (67)	4209 (74)
Engine Heat Rejection to Ambient - BTU/min. (kW)	1345 (24)	1384 (24)
CFP59-F20 Output - BHP (kW)	**130 (97)**	**149 (111)**
Ventilation Air Required for Combustion - CFM (litre/sec)	226 (107)	309 (146)
Exhaust Gas Flow - CFM (litre/sec)	617 (291)	773 (365)
Exhaust Gas Temperature - °F (°C)	1016 (547)	918 (492)
Engine Heat Rejection to Coolant- BTU/min. (kW)	3334 (59)	3771 (66)
Engine Heat Rejection to Ambient - BTU/min. (kW)	1291 (23)	1329 (23)
CFP59-F10 Output - BHP (kW)	**100 (75)**	**115 (86)**
Ventilation Air Required for Combustion - CFM (litre/sec)	189 (89)	260 (123)
Exhaust Gas Flow - CFM (litre/sec)	489 (231)	626 (295)
Exhaust Gas Temperature - °F (°C)	924 (496)	846 (452)
Engine Heat Rejection to Coolant- BTU/min. (kW)	2673 (47)	3078 (54)
Engine Heat Rejection to Ambient - BTU/min. (kW)	1240 (22)	1276 (22)

All Data is Subject to Change Without Notice.

Director of Engineering: Jim Vanden Boogard
Cummins Fire Power, De Pere, WI 54115 U.S.A.

CFP83 Engine Data Sheet

Cummins Fire Power	**Engine Data Sheet** **Cummins Fire Power** De Pere, WI 54115 http://www.cumminsfirepower.com	Basic Engine Model **CFP83-F10, F20, F30** Curve Number: **FR - 90242, 90243** CPL Code: **2218**
Configuration Number: **D413034GX02** Installation Drawing: **26110**		Engine Family: **G Drive** Revision Date: **January 2014**

General Engine Data

Type	4 Cycle; In-Line; 6 Cylinder	
Aspiration	Turbocharged, Aftercooled	
Bore & Stroke - in. (mm)	4.49 x 5.32	(114 x 135)
Displacement - $in.^3$ (litre)	505	(8.3)
Compression Ratio	16.8:1	
Valves per Cylinder - Intake	1	
- Exhaust	1	
Dry Weight - lb (kg)	1985	(893)
Wet Weight - lb (kg)	2057	(926)
Maximum Allowable Bending Moment @ Rear Face of Block - lb.-ft. (N-m)	1000	(1356)

Air Induction System

Max. Temperature Rise Between Ambient Air and Engine Air Inlet - °F (°C)	30	(16.7)
Maximum Inlet Restriction with Dirty Filter - in. H_2O (mm H_2O)	25	(635)
Recommended Air Cleaner Element - (Standard)	FLG Industrial	AH1196

Lubrication System

Oil Pressure Range at Rated - PSI (kPa)	40-60	(276-414)
Oil Capacity of Pan (High - Low) - U.S. quarts (litre)	20-16	(18.9-15.1)
Total System Capacity - U.S. Gal. (litre)	6.3	(23.8)
Recommended Lube Oil Filter	Fleetguard (Cummins) LF9009	(3401544)

Cooling System

Raw Water Working Pressure Range at Heat Exchanger - PSI (kPa)	60	(413) MAX
Recommended Min. Water Supply Pipe Size to Heat Exchanger - in. (mm)	0.75	(19.05)
Recommended Min. Water Disch. Pipe Size From Heat Exchanger - in. (mm)	1.25	(31.75)
Coolant Water Capacity (Engine Side) - U.S. gal. (litre)	5.9	(22.3)
Standard Thermostat - Type	Modulating	
- Range - deg F (deg C)	180-203	(82-95)
Minimum Raw Water Flow with Water Temperatures to 90 °F (32 °C) - U.S. GPM (litre/s)	30	(1.89)
Recommended Cooling Water Filter	Fleetguard (Cummins) WF2072	(4058964)

A jacket water heater is mandatory on this engine. The recommended heater wattage is 2250 down to 40 °F (4 °C).

Exhaust System

Max. Back Pressure Imposed by Complete Exhaust System in in. H_2O (kPa)	40.8	(10.2)
Exhaust Pipe Size Normally Acceptable - in. (mm)	4.0	(102)

Noise Emissions

Top	97.7 dBa
Right Side	97.7 dBa
Left Side	97.7 dBa
Front	97.7 dBa
Exhaust	N/A dBa

The noise emission values are estimated sound pressure levels at 3.3 ft. (1 m.).

CFP83 Engine Data Sheet (Continued)

Fuel Supply / Drain System	**1470**	**1760**
CFP83-F30 Nominal Fuel Consumption - Gal./hr. (L/hr)	10.5 (39.7)	12.6 (47.7)
CFP83-F20 Nominal Fuel Consumption - Gal./hr. (L/hr)	9.6 (36.2)	11.4 (43.0)
CFP83-F10 Nominal Fuel Consumption - Gal./hr. (L/hr)	8.6 (32.4)	10.1 (38.2)
Fuel Type	Number 2 Diesel Only	
Minimum Supply Line Size - in. (mm)	0.375	(9.53)
Minimum Drain Line Size - in. (mm)	0.25	(6.35)
Maximum Fuel Height above C/L Crankshaft - in. (mm)	80	(2032)
Recommended Fuel Filter - Primary ..... Fleetguard (Cummins).....	FS1251	(3286503)
- Secondary	None	
Maximum Restriction @ Lift Pump-Inlet - With Clean Filter - in. Hg (mm Hg)	4.0	(102)
Maximum Restriction @ Lift Pump-Inlet - With Dirty Filter - in. Hg (mm Hg)	8.0	(203)
Maximum Return Line Restriction - Without Check Valves - in. Hg (mm Hg)	10	(254)
Minimum Fuel Tank Vent Capability - ft^3/hr (m^3/hr)	12	(0.36)
Maximum Fuel Temperature @ Lift Pump Inlet - °F (°C)	160	(71)

Starting and Electrical System	**12V**	**24V**
Min. Recommended Batt. Capacity - Cold Soak at 0°F (-18°C) or Above		
Engine Only - Cold Cranking Amperes - (CCA)	1250	900
Engine Only - Reserve Capacity - Minutes	430	430
Battery Cable Size (Maximum Cable Length Not to Exceed 5 ft. [1.5 m] AWG)	00	00
Maximum Resistance of Starting Circuit - Ohms	0.002	0.004
Typical Cranking Speed - RPM	120	120
Alternator (Standard), Internally Regulated - Ampere	95	45
Wiring for Automatic Starting (Negative Ground)	Standard	
Reference Wiring Diagram	16122	

Performance Data

All data is based on the engine operating with fuel system, water pump, lubricating oil pump, air cleaner, and alternator; not included are compressor, fan, optional equipment, and driven components. Data is based on operation at SAE standard J1394 conditions of 300 ft. (91.4 m) altitude, 29.61 in. (752 mm) Hg dry barometer, and 77 °F (25 °C) intake air temperature, using No.2 diesel or a fuel corresponding to ASTM-D2.

Altitude Above Which Output Should be Limited - ft. (m)	300	(91.4)
Correction Factor per 1000 ft. (305 m) above Altitude Limit	3%	
Temperature Above Which Output Should be Limited - °F (°C)	77	(25)
Correction Factor per 10 °F (11 °C) Above Temperature Limit	1%	(2%)

Exhaust Emissions (EPA Tier T1) [Reference Emissions Data Doc. 9811]	**g/kW-hr**	**g/BHP-hr**
Hydrocarbons (HC/OMHCE)	0.40	0.30
Oxides of Nitrogen (NOx)	8.40	6.26
Non-Methane Hydrocarbons + NOx (NMHC+NOx)	8.80	6.56
Carbon Monoxide (CO)	0.50	0.37
Particulate	0.18	0.13

CFP83 Engine Data Sheet (Continued)

FM Approved and UL Listed Ratings for CFP83-F10, F20, F30

Engine Speed - RPM	**1470**	**1760**
CFP83-F30 Output - BHP (kW)	**216 (161)**	**252 (188)**
Ventilation Air Required for Combustion - CFM (litre/sec)	407 (192)	540 (255)
Exhaust Gas Flow - CFM (litre/sec)	1100 (519)	1400 (661)
Exhaust Gas Temperature - °F (°C)	994 (534)	997 (536)
Engine Heat Rejection to Coolant- BTU/min. (kW)	4542 (80)	4828 (85)
Engine Heat Rejection to Ambient - BTU/min. (kW)	1370 (24)	1645 (29)
CFP83-F20 Output - BHP (kW)	**197 (147)**	**227 (169)**
Ventilation Air Required for Combustion - CFM (litre/sec)	404 (191)	539 (254)
Exhaust Gas Flow - CFM (litre/sec)	961 (454)	1234 (582)
Exhaust Gas Temperature - °F (°C)	968 (520)	977 (525)
Engine Heat Rejection to Coolant- BTU/min. (kW)	4241 (75)	4500 (79)
Engine Heat Rejection to Ambient - BTU/min. (kW)	1315 (23)	1579 (28)
CFP83-F10 Output - BHP (kW)	**176 (131)**	**202 (151)**
Ventilation Air Required for Combustion - CFM (litre/sec)	377 (178)	510 (241)
Exhaust Gas Flow - CFM (litre/sec)	877 (414)	1111 (524)
Exhaust Gas Temperature - °F (°C)	945 (507)	941 (505)
Engine Heat Rejection to Coolant- BTU/min. (kW)	3907 (69)	4590 (81)
Engine Heat Rejection to Ambient - BTU/min. (kW)	1263 (22)	1516 (27)

All Data is Subject to Change Without Notice.

Director of Engineering: Jim Vanden Boogard
Cummins Fire Power, De Pere, WI 54115 U.S.A.

Torque Table

Cap Screw Markings and Torque Values

CAUTION

Always use a cap screw of the same measurement and strength as the cap screw being replaced. Using the wrong cap screws can result in engine damage.

Always use the torque values listed in the following tables when specific torque values are not available.

When the ft-lb value is less than 10, convert the ft-lb value to in-lb to obtain a better torque with an in-lb torque wrench. Example: 6 ft-lb equals 72 in-lb.

Metric Cap Screw Identification

Sample:	**M8-1.25 x 25**		
Value:	**M8**	**1.25**	**X 25**
Meaning:	Major thread diameter in millimeters	Distance between threads in millimeters	Length in millimeters

Metric Cap Screw Head Markings

Metric cap screws and nuts are identified by the grade number stamped on the head of the cap screw or on the surface of the nuts.

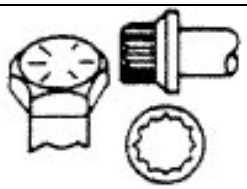
Commercial Steel Class	**8.8**	**10.9**	**12.9**
Caps Screw Head Markings			

US Customary Cap Screw Identification

Sample:	**5/16 x 18 x 1-1/2**		
Value:	**5/16**	**18**	**1-1/2**
Meaning:	Major thread diameter in inches	Number of threads per inch	Length in inches

U.S. Customary Cap Screw Head Markings

U.S. Customary cap screws are identified by radial lines stamped on the head of the cap screw.

SAE Grade 5 w/ three lines	**SAE Grade 8**
	

Torque Table (Continued)

Metric Cap Screw Torque Values (lubricated threads)

Class:	8.8				10.9				12.9			
Diameter	Cast Iron		Aluminum		Cast Iron		Aluminum		Cast Iron		Aluminum	
mm	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb
6	9	5	7	4	13	10	7	4	14	9	7	4
7	14	9	11	7	18	14	11	7	23	18	11	7
8	23	17	18	14	33	25	18	14	40	29	18	14
10	45	33	30	25	65	50	30	25	70	50	30	25
12	80	60	55	40	115	85	55	40	125	95	55	40
14	125	90	90	65	180	133	90	65	195	145	90	65
16	195	140	140	100	280	200	140	100	290	210	140	100
18	280	200	180	135	390	285	180	135	400	290	180	135
20	400	290	—	—	550	400	—	—	—	—	—	—

U.S. Customary Cap Screw Torque Values (lubricated threads)

Grade:	SAE Grade 5				SAE Grade 8			
Cap Screw Body Size	Cast Iron		Aluminum		Cast Iron		Aluminum	
	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb	N•m	ft-lb
1/4-20	9	7	8	6	15	11	8	6
1/4-28	12	9	9	7	18	13	9	7
5/16-18	20	15	16	12	30	22	16	12
5/16-24	23	17	19	14	33	24	19	14
3/8-16	40	30	25	20	55	40	25	20
3/8-24	40	30	35	25	60	45	35	25
7/16-14	60	45	45	35	90	65	45	35
7/16-20	65	50	55	40	95	70	55	40
1/2-13	95	70	75	55	130	95	75	55
1/2-20	100	75	80	60	150	110	80	60
9/16-12	135	100	110	80	190	140	110	80
9/16-18	150	110	115	85	210	155	115	85
5/8-11	180	135	150	110	255	190	150	110
5/8-18	210	155	160	120	290	215	160	120
3/4-10	325	240	255	190	460	340	255	190
3/4-16	365	270	285	210	515	380	285	210
7/8-9	490	360	380	280	745	550	380	280
7/8-14	530	390	420	310	825	610	420	310
1-8	720	530	570	420	1100	820	570	420
1-14	800	590	650	480	1200	890	650	480

Section 8.5 - Assembly Drawings (1)

Description	Drawing No.	Sheet No	Revision Level	Change date
Drawing, Installation, Fire Pump, CFP59-F10/20/40/50 (6BTA5.9-G3)	26106	1-2	A	2/14
Drawing, Installation, Fire Pump, CFP59-F15/25 (6BT5.9-C165)	26107	1-2	A	2/14
Engine, FP, CFP59-F10/20/40/50 (BTA5.9-G3)	8724		C	
Engine, FP, CFP59-F15, F25 (6BT5.9-C165)	8725		C	
Assembly, Guard, Pulley CFP59	8601		C	
Assembly, Engine Mounting FP CFP59	8579		E	
Assembly, Coolant Heater CFP59	24246		A	2/14
Assembly, ACC Rear mtg CFP59-CFP59-F10/F20/F40/F50	24245			
Assembly, ACC Rear mtg CFP59-F15-F25	24247			
Assembly, W-W Heat Exchanger Cooling Assembly CFP59	8650		K	
Misc Piping, Raw Water Cooling Loop	25983			
Assembly, Raw Water Cooling Loop, 3/4" Vertical	21511			
Assembly, Raw Water Cooling Loop, 3/4" Horizontal 12V	21509		A	4/14
Assembly, Raw Water Cooling Loop, 3/4" Horizontal 24V	21510		A	4/14
Assembly, Sea Water Cooling Loop, 3/4" Vertical	21512		A	
Assembly, Sea Water Cooling Loop, 3/4" Horizontal 12V	21438		B	4/14
Assembly, Sea Water Cooling Loop, 3/4" Horizontal 24V	21439		B	4/14
Misc Piping, Cooling Loop, Sea Water	Not Rel yet			
Assembly, Control Panel Mounting	21249		-	
Assembly Sensor Package, CFP59	A042A558		D	2/14
Assembly, Throttle Positioning, CFP59-F15, F25	8585		B	
Assembly, Solenoid Override, CFP59-CFP59-F10/F20/F40/F50	9699		A	
Assembly, Solenoid Override, CFP59-F25	9839		B	
Assy, All components Top level assy consisting of:	CFP59-AC-2014			
Assembly, Panel, Digital Mechanical	22793		-	
Assembly, Harness, CFP59	23926	1-2	B	4/14
Battery Contactors	8824-12			
Kit, Battery Cables Loose Wires, CFP59, CFP83	24234		-	
Kit, Fuel Lines CFP59-F10, F20, F40, F50	15204		B	
Kit, Fuel Lines CFP59-F15, F25, CFP83	15207		B	
Assembly, Stub-Shaft & Guard SAE#3, 1.50" QSB, QSC, 4B, 6B, 6C	8618		C	
Assembly, Stub-Shaft & Guard SAE#3, 2.25" QSB, QSC, 4B, 6B, 6C	8619		D	
General Arrangement Drawing CFP59	26722	1-4		
Schematic, Control Panel, Mechanical	16122		B	3/14

Also see Engine Identification and System Diagrams in Sec 2.
The most current revisions to these drawings and related documents accessible at: http://www.cumminsfirepower.com/products.html.

Section 8.5 - Assembly Drawings (1)

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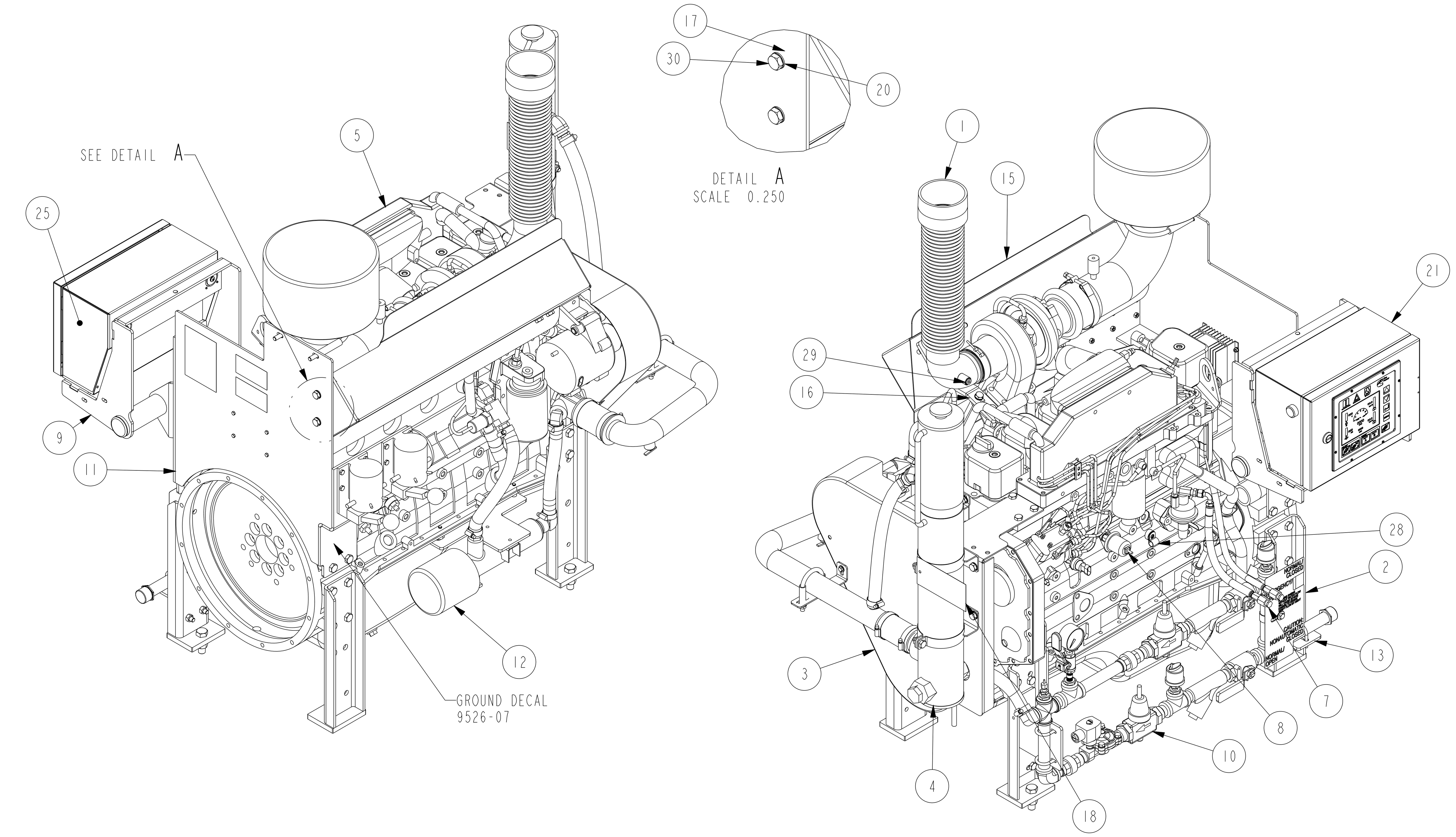

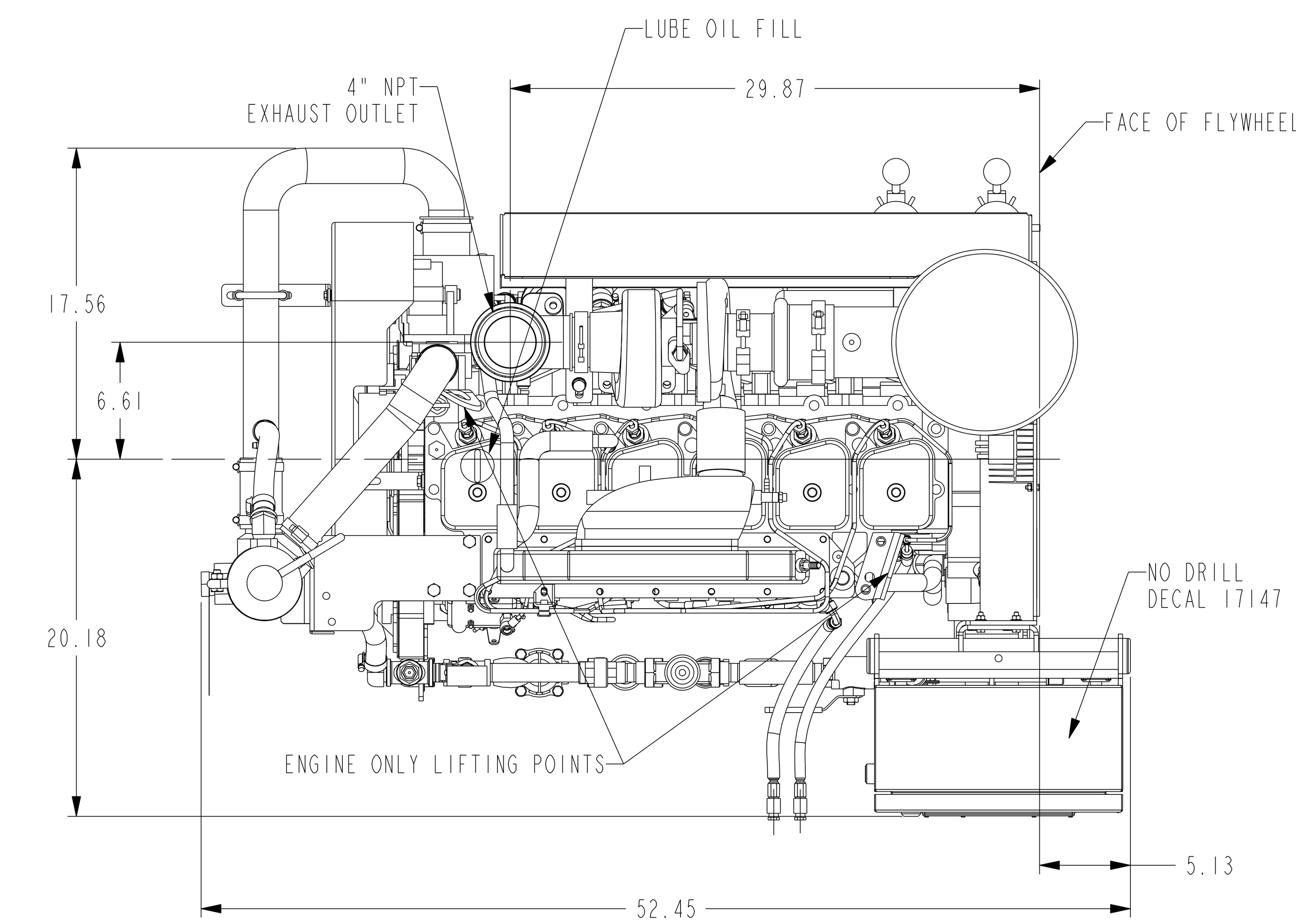

BILL OF MATERIAL

ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	EXHAUST, 90° HALF MARMON, 3" TURBO OUT, 4" MALE NPT	8550.10
2	1	ASSEMBLY, MOUNTING, ENGINE, FIREPUMP, 6B	8579
3	1	GUARD, PULLEY, FIREPUMP, 6B/4B	8601
4	1	ASSEMBLY, HEAT EXCHANGER W/O CAC, FIREPUMP, NFP-659	8650
5	1	ENGINE, 6BTA5.9G3	8724
6	1	KIT, FUEL SOLENOID OVERIDE, FIREPUMP	9699
7	1	KIT, FUEL LINES, CFP59, F10/20/30/40/50 - EXT ONLY	15204
8	1	KIT, SENSOR ADAPTER, CPF MECHANICAL	15388
9	1	ASSEMBLY, CONTROL PANEL MOUNTING, CFP POWER UNITS	21249
10	1	COOLING LOOP, 3/4" ,12V, RAW WATER	21509
11	1	ASSEMBLY, ACC, REAR MTG, CFP59, F10/F20/F40/F50	24245
12	1	ASSEMBLY, COOLANT HEATER, CF59	24246
13	1	MISC PIPING, RAW WATER, 6B	25983
14	1	STRAP, GROUNDING, 4 AWG, 12", WC90397-1	9757
15	1	HEAT SHIELD, CFP59	15383
16	1	BRACKET, HEAT SHIELD	15384
17	4	WASHER, RETAINING, M10	16662-13
18	1	TAG, ENGINE WEIGHT	16825
19	1	COVER, DOOR PANEL	16889
20	10	WASHER,FLAT, M10	20020-M10
21	1	CONTROL PANEL, MECHANICAL ENGINE	22793
22	1	HARNESS, WIRING, CFP5.9	23926
23	1	CABLES, BATTERY, CFP5E, 7E, 9E, 11E	24234
24	1	MANUAL, O&M CFP5.9/CFP8.3	24809
25	1	DECAL, MANUAL START/STOP, MECHANICAL (AUTOCAD CONTROLLED)	A042A317
26	1	PAINT, SPRAY BOMB, CUMMINS RED	A15730-A12
27	4	COOLANT, FC EG PM, 1 GALLON, -	CC2743
28	1	CLAMP, P-STYLE, 0.50" W/ 0.50 HOLE, LTL-CCV1317	LTL-CCV1317
29	1	PLUG, 1/4 NPT, STEEL	LTL-SCSP14
30	6	SCREW,HH, M10-1.50x25	20310-025

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE
A1	2014-056	ITEM A042A317 WAS 16960	GVD	29JAN2014

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°	MACHINED SURFACES	IMPERIAL UNITS	METRIC UNITS
THIRD ANGLE PROJECTION	125	MACHINE TOLERANCES .XX = ± 0.010 .XXX = ± 0.005; FORM TOLERANCES .XX = ± 0.030 .XXX = ± 0.015; FAB TOLERANCES .XX = ± 0.060 .XXX = ± 0.030	MACHINE TOLERANCES .X = ± 0.4 .XX = ± 0.2; FORM TOLERANCES .X = ± 0.8 .XX = ± 0.4; FAB TOLERANCES .X = ± 1.5 .XX = ± 0.8

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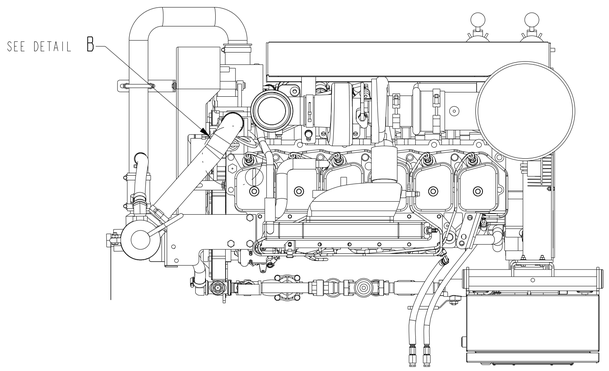
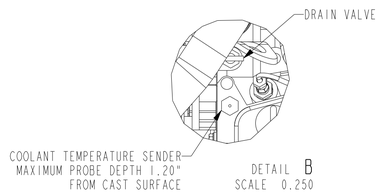
AND UPFIT CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

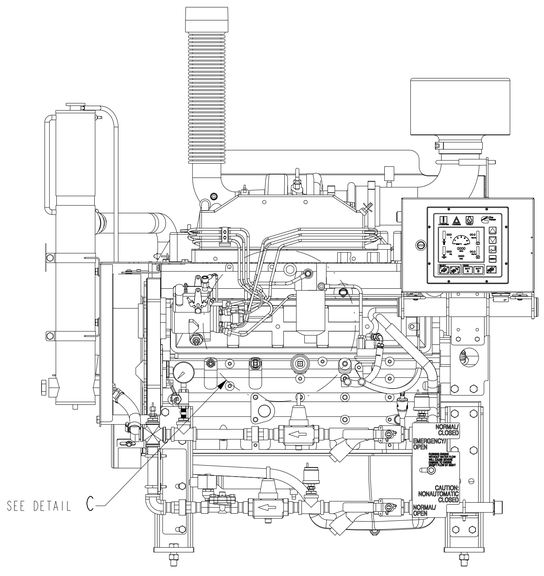
ASSEMBLY, FIREPUMP
CFP59-F10/20/40/50

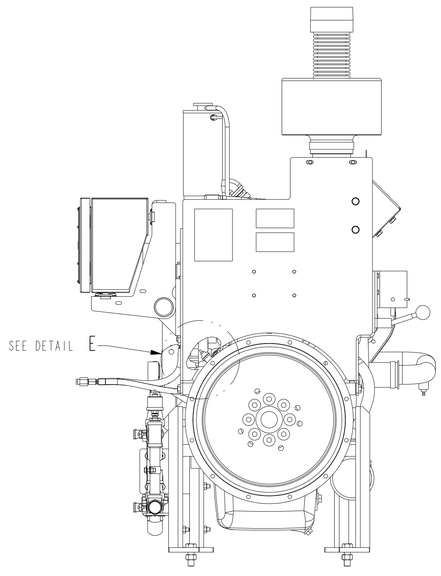
DWG UNITS: IN/LB/S	DRAWN BY: PBS PRO-ENGINEER	DATE: 07AUG2013 INIT ECO: 2013-454
SCALE: 0.125 EST WEIGHT: 42238.628	SHEET 1 OF 2	DRAWING NO: 26106

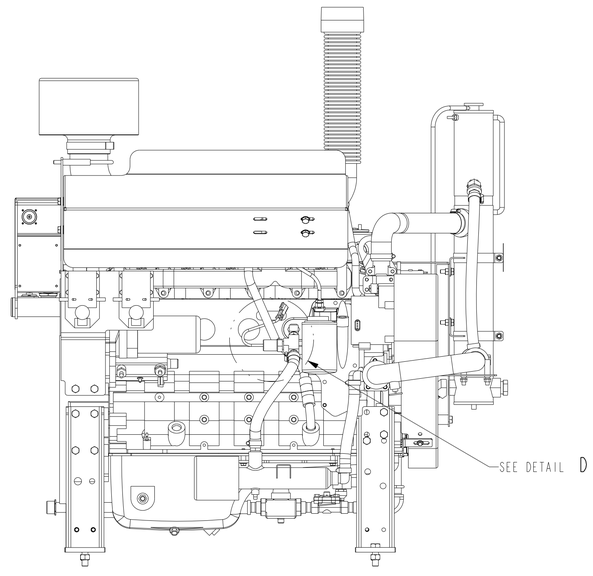


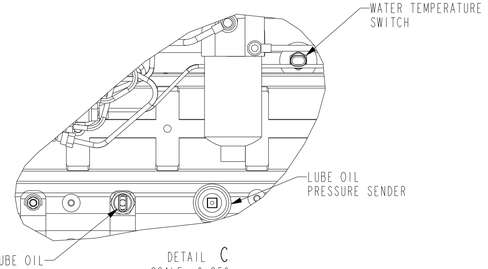


DETAIL B
SCALE 0.250

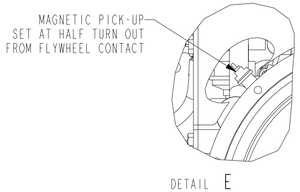




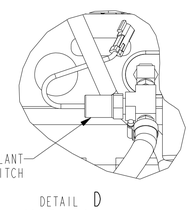




DETAIL C
SCALE 0.250



DETAIL E
SCALE 0.250



DETAIL D
SCALE 0.250

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE
ANGULAR DIMENSIONS ± 1°
THIRD ANGLE PROJECTION

MACHINED SURFACES	IMPERIAL UNITS	METRIC UNITS
MACHINE TOLERANCES	MACHINE TOLERANCES	
.XX ± 0.06	.XX ± 1.52	
.XXX ± 0.005	.XXX ± 0.127	
FOR TOLERANCES ON ROUGH SURFACES	FOR TOLERANCES ON ROUGH SURFACES	
.XX ± 0.06	.XX ± 1.52	
.XXX ± 0.010	.XXX ± 0.254	

125

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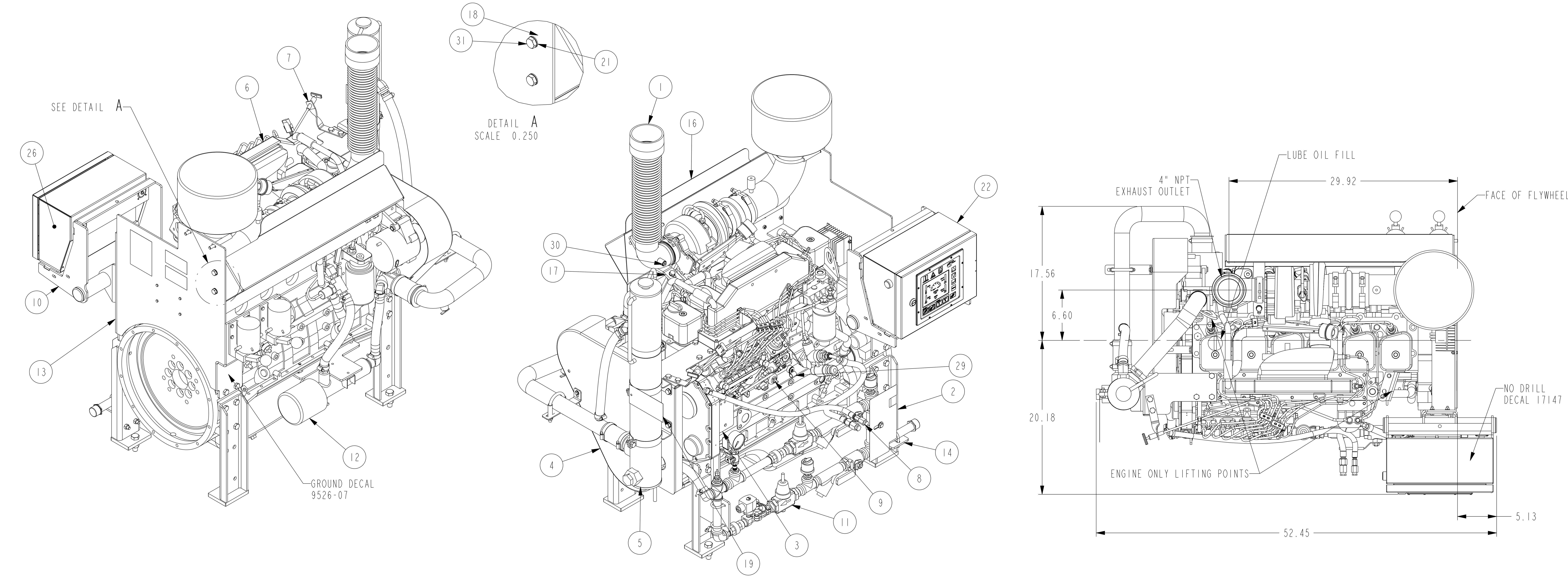
AND UPFIT CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

ASSEMBLY, FIREPUMP
CFP59-F10/20/40/50

DWG UNITS: IN/LB/S	DRAWN BY: PBS	DATE: 07AUG2013	
	PRO-ENGINEER	INIT. ECO: 2013-454	
SCALE: 0.125	SHEET 2 OF 2	DRAWING NO: 26106	
EST WEIGHT: 42238.628			



BILL OF MATERIAL

ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	EXHAUST, 90° HALF MARMON, 3" TURBO OUT, 4" MALE NPT	8550.10
2	1	ASSEMBLY, MOUNTING, ENGINE, FIREPUMP, 6B	8579
3	1	ASSEMBLY, THROTTLE POSITION, FIREPUMP	8585
4	1	GUARD, PULLEY, FIREPUMP, 6B/4B	8601
5	1	ASSEMBLY, HEAT EXCHANGER W/O CAC, FIREPUMP, NFP-659	8650
6	1	ENGINE, 6BTA-C165, FIREPUMP	8725
7	1	ASSEMBLY, SOLENOID OVERIDE, FIREPUMP	9839
8	1	KIT, FUEL LINES, CFP83, F10/20/30/40 - EXT ONLY	15207
9	1	KIT, SENSOR ADAPTER, CPF MECHANICAL	15388
10	1	ASSEMBLY, CONTROL PANEL MOUNTING, CFP POWER UNITS	21249
11	1	COOLING LOOP, 3/4" ,12V, RAW WATER	21509
12	1	ASSEMBLY, COOLANT HEATER, CF59	24246
13	1	ASSEMBLY, ACC, REAR MTG, CFP59, F15/F25	24247
14	1	MISC PIPING, RAW WATER, 6B	25983
15	1	STRAP, GROUNDING, 4 AWG, 12", WC90397-1	9757
16	1	HEAT SHIELD, CFP59	15383
17	1	BRACKET, HEAT SHIELD	15384
18	4	WASHER, RETAINING, M10	16662-13
19	1	TAG, ENGINE WEIGHT	16825
20	1	COVER, DOOR PANEL	16889
21	10	WASHER,FLAT, M10	20020-M10
22	1	CONTROL PANEL, MECHANICAL ENGINE	22793
23	1	HARNESS, WIRING, CFP5.9	23926
24	1	CABLES, BATTERY, CFP5E, 7E, 9E, 11E	24234
25	1	MANUAL, O&M CFP5.9/CFP8.3	24809
26	1	DECAL, MANUAL START/STOP, MECHANICAL (AUTOCAD CONTROLLED)	A042A317
27	1	PAINT, SPRAY BOMB, CUMMINS RED	A15730-A12
28	4	COOLANT, FC EG PM, 1 GALLON, -	CC2743
29	1	CLAMP, P-STYLE, 0.50" W/ 0.50 HOLE, LTL-CCV1317	LTL-CCV1317
30	1	PLUG, 1/4 NPT, STEEL	LTL-SCSP14
31	6	SCREW,HH, M10-1.50x25	20310-025

A1	2014-056	ITEM A042A317 WAS 16960	GVD	29JAN2014
REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1° | MACHINED SURFACES 125 | IMPERIAL UNITS: MACHINE TOLERANCES .XX = ± 0.010, .XXX = ± 0.005; FORM TOLERANCES .XX = ± 0.030, .XXX = ± 0.015; FAB TOLERANCES .XX = ± 0.060, .XXX = ± 0.030 | METRIC UNITS: MACHINE TOLERANCES .X = ± 0.4, .XX = ± 0.2; FORM TOLERANCES .X = ± 0.8, .XX = ± 0.4; FAB TOLERANCES .X = ± 1.5, .XX = ± 0.8

THIRD ANGLE PROJECTION

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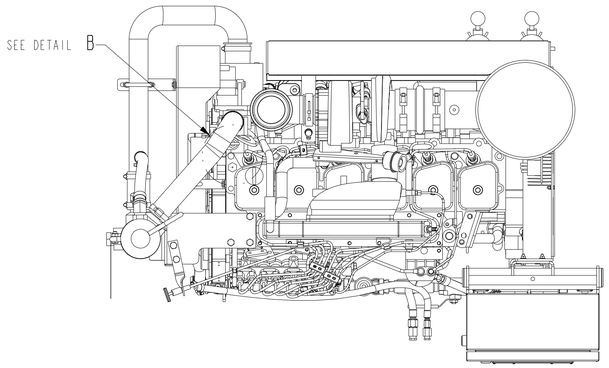
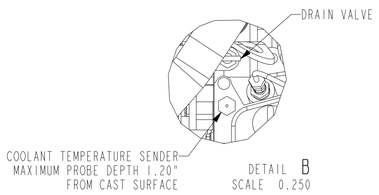
DEPERE, WISCONSIN

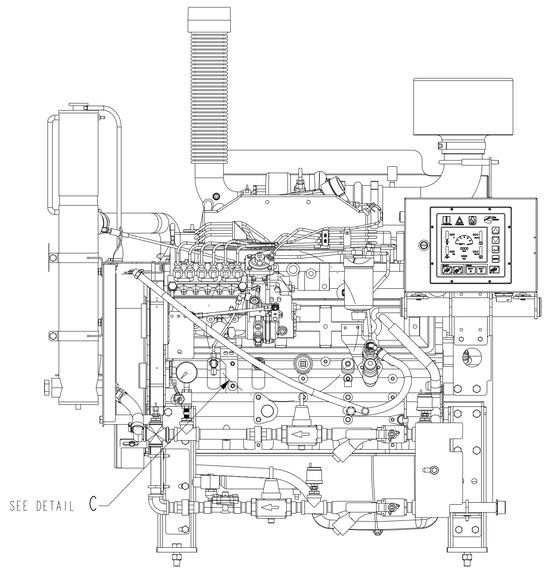
ASSEMBLY, FIREPUMP
CFP59-F15/25

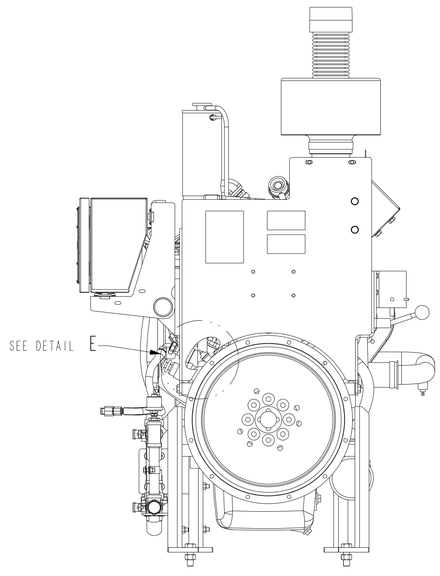
DWG UNITS: IN/LB/S	DRAWN BY: PBS	DATE: 08AUG2013
	PRO-ENGINEER	INIT ECO: 2013-454
SCALE: 0.125	SHEET 1 OF 2	DRAWING NO: 26107
EST WEIGHT: 42238.628		

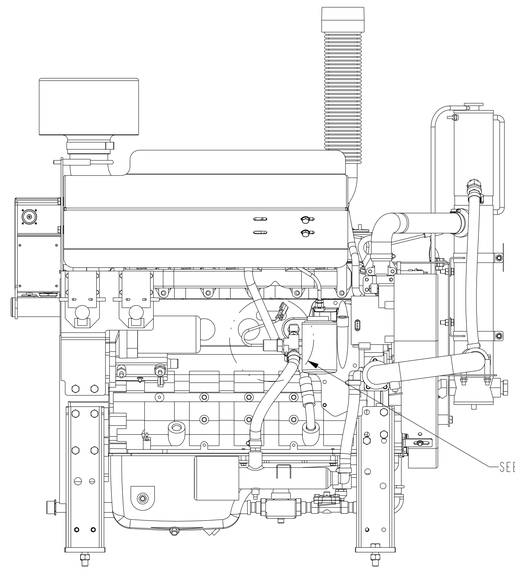


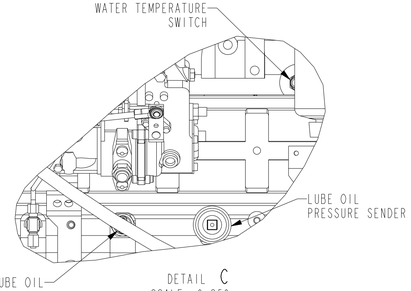


DETAIL B
SCALE 0.250

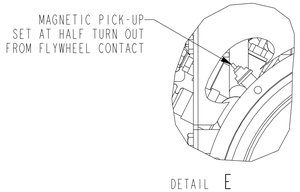




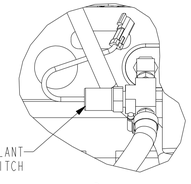




DETAIL C
SCALE 0.250



DETAIL E
SCALE 0.250



DETAIL D
SCALE 0.250

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE
ANGULAR DIMENSIONS ±
THIRD ANGLE PROJECTION
MACHINED SURFACES
IMPERIAL UNITS: MACHINE TOLERANCES .XX ± 0.005 .XXX ± 0.002 FOR TOLERANCES .XX ± 0.010 .XXX ± 0.005
METRIC UNITS: MACHINE TOLERANCES .X ± 0.13 .XX ± 0.05 FOR TOLERANCES .X ± 0.25 .XX ± 0.13

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DEPERE, WISCONSIN

ASSEMBLY, FIREPUMP
CFP59-F15/25

DWG UNITS: IN/LB/S
DRAWN BY: PBS
DATE: 08AUG2013
PRO-ENGINEER
INIT. ECO: 2013-454
SCALE: 0.125
SHEET 2 OF 2
EST WEIGHT: 42238.628
DRAWING NO: 26107

PN 8724
SO 35324
Model 6BTA5.9G3
Config D403050DX02

Option	Desc
FIRE 35	6BTA5.9G3
AF 9006	ADAPTER,FRONT DR
AH 9000	HEATER,AIR INTAK
AP 9229	APPROVAL,AGENCY
BP 9042	BASE PARTS
BP 9703	COVER,FRONT GEAR
BP 9710	LEVER,ROCKER
BP 9711	FOLLOWER,CAM
BP97149	BLOCK,ENGINE
CM 9016	COVER,CAM FOLLOW
CM 9701	COVER,CAM FOLLOW
DF 9051	DRIVE,FRT GR TR
DL 9001	LOCATION,FUEL DR
EC 9039	THERMOSTAT
EH 9001	LOCATION,ALTERNA
EH 9993	DRIVE,ALTERNATOR
EI 9000	DRIVE,MECH TACH
EI 9701	DRIVE,MECH TACH
FA 9000	DRIVE,FAN
FF 9003	FILTER,FUEL
FF 9740	PLUMBING,FUEL FI
FH 9002	HOUSING,FLYWHEEL
FP 9211	COUPLING,FUEL PU
FP90368	PUMP,FUEL
FR91231	RATING,FUEL
FS 9004	PUMP,LIFT
FT97121	PLUMBING,FUEL
FV 9001	VALVE,FUEL SHUTO
FW 9222	FLYWHEEL
LA 9007	BRACKET,LIFTING
LC 9020	COOLER,ENGINE OI
LG 9058	GAUGE,OIL LEVEL
LP 9714	PUMP,LUBRICATING
OB 9000	COVER,CYLINDER B
OB 9704	COVER,CYLINDER B
OP 9006	PAN,OIL
OP 9702	MOUNTING,OIL PAN
PP 8387	PERFORMANCE,PART
PP97222	HEAD,CYLINDER
PP97298	1 MOUNTING,CYLINDE
PP97611	1 TURBOCHARGER
SG 9000	1 PACKAGE,GUARD
SM 9701	1 MOUNTING,STARTER
SS 9005	1 PAINT
SS 9075	1 SKID
SS 9702	1 ENGINE,DRY
ST 9368	1 MOTOR,STARTING
TB 9766	1 MOUNTING,TURBOCH
TB 9792	1 MANIFOLD,EXHAUS
TTB90006	1 LOCATION,TURBOCH
TH 9001	1 HOUSING,THERMOST
TP 9703	1 PLUMBING,TURBOCH
VC 9005	COVER,VALVE
WA 9738	PLUMBING,AFTERCO
WI 9005	CONNECTION,WATER
WI 9701	CONNECTION,WATER
WP 9031	PUMP,WATER
XS 9009	CONNECTION,EXHAU

BUILT BEFORE JANUARY 1, 2007

PN 8724
SO 35324
Model 6BTA5.9G3
Config D403050DX02

Option	Desc
FIRE 35	6BTA5.9G3
AF 9006	ADAPTER,FRONT DR
AH 9000	HEATER,AIR INTAK
△6 AP 9716	APPROVAL,AGENCY
BP 9042	BASE PARTS
BP 9703	COVER,FRONT GEAR
BP 9710	LEVER,ROCKER
BP 9711	FOLLOWER,CAM
BP97149	BLOCK,ENGINE
CM 9016	COVER,CAM FOLLOW
CM 9701	COVER,CAM FOLLOW
DF 9051	DRIVE,FRT GR TR
DL 9001	LOCATION,FUEL DR
EC 9039	THERMOSTAT
△6 EE 9249	ALTERNATOR
EH 9001	LOCATION,ALTERNA
EH 9993	DRIVE,ALTERNATOR
EI 9000	DRIVE,MECH TACH
EI 9701	DRIVE,MECH TACH
FA 9000	DRIVE,FAN
FF 9003	FILTER,FUEL
FF 9740	PLUMBING,FUEL FI
FH 9002	HOUSING,FLYWHEEL
FP 9211	COUPLING,FUEL PU
FP90368	PUMP,FUEL
FR91231	RATING,FUEL
FS 9004	PUMP,LIFT
FT97121	PLUMBING,FUEL
FV 9001	VALVE,FUEL SHUTO
FW 9828	FLYWHEEL
LA 9007	BRACKET,LIFTING
LC 9020	COOLER,ENGINE OI
LG 9058	GAUGE,OIL LEVEL
△6 LP 9064	PUMP,LUBRICATING
△6 LT 9195	LITERATURE
OB 9000	COVER,CYLINDER B
OB 9704	COVER,CYLINDER B
OP 9006	PAN,OIL
OP 9702	MOUNTING,OIL PAN
PP 8387	PERFORMANCE,PART
PP97222	HEAD,CYLINDER
PP97298	MOUNTING,CYLINDE
PP97611	TURBOCHARGER
SG 9000	PACKAGE,GUARD
SM 9701	MOUNTING,STARTER
SS 9005	PAINT
SS 9024	OIL,LUBRICATING
SS 9075	ARRANGEMENT, SHIP
SS 9701	OIL, ENGINE
ST 9368	MOTOR,STARTING
TB 9766	MOUNTING,TURBOCH
TB 9792	MANIFOLD,EXHAUS
TTB90006	LOCATION,TURBOCH
TH 9001	HOUSING,THERMOST
TP 9703	PLUMBING,TURBOCH
VC 9005	COVER,VALVE
WA 9738	PLUMBING,AFTERCO
WI 9005	CONNECTION,WATER
WI 9701	CONNECTION,WATER
WP 9031	PUMP,WATER
XS 9009	CONNECTION,EXHAU

BUILT AFTER JANUARY 1, 2010

REV	DESCRIPTION OF REVISION	BY	DATE
C	UPDATE ENGINE SPEC	S DUBICK	08-04-10

UNLESS OTHERWISE NOTED
–
ALL DIMENSIONS ARE IN INCHES
–
APPLY MACHINE TOLERANCES
.X = ± 0.06
.XX = ± 0.010
.XXX = ± 0.001
–
APPLY WELDED TOLERANCES
.X = ± 0.25
.XX = ± 0.12
.XXX = ± 0.06

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DESIGN CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN
WWW.CUMMINSFIREPOWER.COM

DWG SCALE: NTS	DRAWN BY: DAVE N	DATE: 23SEP2004
PLOT SCALE:	APPD BY:	DATE:

DESCRIPTION
ASSEMBLY, ENGINE, 6BTA5.9G3

REFERENCE:
CFP59-F10/20/40/50

DRAWING NUMBER:
8724C

PN 8725
SO 35325
Model B5.9C
Config D402056DX02

Option	Desc
FIRE 29	B5.9-C
AH 9021	HEATER,AIR INTAK
AP 9001	APPROVAL,AGENCY
BP 9052	BASE PARTS
BP 9710	LEVER,ROCKER
BP 9711	FOLLOWER,CAM
BP97101	COVER,FRONT GEAR
BP97149	BLOCK,ENGINE
CM 9016	COVER,CAM FOLLOW
CM 9701	COVER,CAM FOLLOW
DA 9026	DAMPER,VIBRATION
DF 9051	DRIVE,FRT GR TR
DL 9028	LOCATION,FUEL DR
EC 9039	THERMOSTAT
EE9249	Alternator, 12v, 95A, Delco 11SI
EH 9001	LOCATION,ALTERNA
EH 9993	DRIVE,ALTERNATOR
EI 9000	DRIVE,MECH TACH
EI 9701	DRIVE,MECH TACH
FA 9000	DRIVE,FAN
FE 9000	PLUMBING,AIR FUE
FF 9104	FILTER,FUEL
FF 9790	PLUMBING,FUEL FI
FH 9002	HOUSING,FLYWHEEL
FP97760	PUMP,BASE FUEL
FP97774	COUPLING,FUEL PU
FR90026	RATING,FUEL
FS 9128	PUMP,LIFT
FT 9960	PLUMBING,FUEL
FV 9308	VALVE,FUEL SHUTO
FW 9222	FLYWHEEL
LA 9007	BRACKET,LIFTING
LC 9020	COOLER,ENGINE OI
LG 9058	GAUGE,OIL LEVEL
LP 9714	PUMP,LUBRICATING
OB 9000	COVER,CYLINDER B
OB 9704	COVER,CYLINDER B
OP 9006	PAN,OIL
OP 9702	MOUNTING,OIL PAN
PP 1948	PERFORMANCE,PART
PP97246	TURBOCHARGER
PP97298	MOUNTING,CYLINDE
PP97946	HEAD, CYLINDER
SM 9701	MOUNTING,STARTER
SS 9005	PAINT
SS 9075	SKID
SS 9702	ENGINE,DRY
ST 9368	MOTOR,STARTING
TB 9375	LOCATION,TURBOCH
TB 9767	MOUNTING,TURBOCH
TB 9792	MANIFOLD,EXHAUS
TTB90006	LOCATION,TURBOCH
TH 9001	HOUSING,THERMOST
TP 9703	PLUMBING,TURBOCH
VC 9005	COVER,VALVE
WI 9005	CONNECTION,WATER
WI 9701	CONNECTION,WATER
WP 9031	PUMP,WATER
XS 9009	CONNECTION,EXHAU

BUILT BEFORE JANUARY 1, 2007

PN 8725
SO 35325
Model B5.9C
Config D402056DX02

Option	Desc
FIRE 29	B5.9-C
AH 9021	HEATER,AIR INTAK
△6 AP 9536	APPROVAL,AGENCY
BP 9052	BASE PARTS
BP 9710	LEVER,ROCKER
BP 9711	FOLLOWER,CAM
BP97101	COVER,FRONT GEAR
BP97149	BLOCK,ENGINE
CM 9016	COVER,CAM FOLLOW
CM 9701	COVER,CAM FOLLOW
DA 9026	DAMPER,VIBRATION
DF 9051	DRIVE,FRT GR TR
DL 9028	LOCATION,FUEL DR
EC 9039	THERMOSTAT
EE9249	Alternator, 12v, 95A, Delco 11SI
EH 9001	LOCATION,ALTERNA
EH 9993	DRIVE,ALTERNATOR
EI 9000	DRIVE,MECH TACH
EI 9701	DRIVE,MECH TACH
FA 9000	DRIVE,FAN
FE 9809	PLUMBING,AIR FUE
FF 9104	FILTER,FUEL
FF 9790	PLUMBING,FUEL FI
FH 9002	HOUSING,FLYWHEEL
FP97760	PUMP,BASE FUEL
FP97774	COUPLING,FUEL PU
FR90026	RATING,FUEL
FS 9128	PUMP,LIFT
FT 9960	PLUMBING,FUEL
FV 9308	VALVE,FUEL SHUTO
FW 9828	FLYWHEEL
LA 9007	BRACKET,LIFTING
LC 9020	COOLER,ENGINE OI
LG 9058	GAUGE,OIL LEVEL
△6 LP 9064	PUMP,LUBRICATING
△6 LT 9195	LITERATURE
OB 9000	COVER,CYLINDER B
OB 9704	COVER,CYLINDER B
OP 9006	PAN,OIL
OP 9702	MOUNTING,OIL PAN
PP 1948	PERFORMANCE,PART
PP97246	TURBOCHARGER
PP97298	MOUNTING,CYLINDE
PP97946	HEAD, CYLINDER
SM 9701	MOUNTING,STARTER
SS 9005	PAINT
SS 9024	OIL, LUBRICATING
SS 9075	ARRANGEMENT,SHIP
SS 9701	OIL,ENGINE
ST 9368	MOTOR,STARTING
TB 9375	LOCATION,TURBOCH
TB 9767	MOUNTING,TURBOCH
TB 9792	MANIFOLD,EXHAUS
TTB90006	LOCATION,TURBOCH
TH 9001	HOUSING,THERMOST
TP 9703	PLUMBING,TURBOCH
VC 9005	COVER,VALVE
WI 9005	CONNECTION,WATER
WI 9701	CONNECTION,WATER
WP 9031	PUMP,WATER
XS 9009	CONNECTION,EXHAU

BUILT AFTER JANUARY 1, 2010

REV	DESCRIPTION OF REVISION	BY	DATE
C	UPDATE ENGINE SPEC	S DUBICK	08–04–10

UNLESS OTHERWISE NOTED
–
ALL DIMENSIONS ARE IN INCHES
–
APPLY MACHINE TOLERANCES
.X = ± 0.06
.XX = ± 0.010
.XXX = ± 0.001
–
APPLY WELDED TOLERANCES
.X = ± 0.25
.XX = ± 0.12
.XXX = ± 0.06

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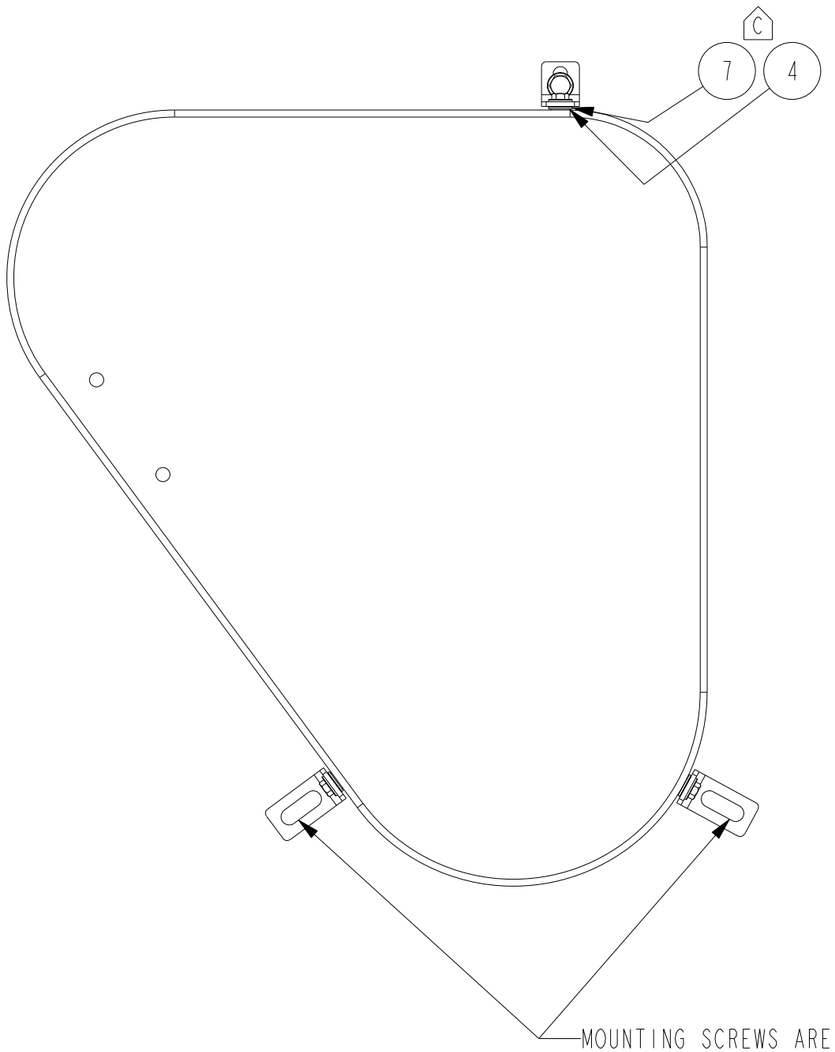
DWG SCALE: NTS	DRAWN BY: DAVE N	DATE: 23SEP2004
PLOT SCALE:	APPD BY:	DATE:

DESCRIPTION
ASSEMBLY, ENGINE, 6BTAC165

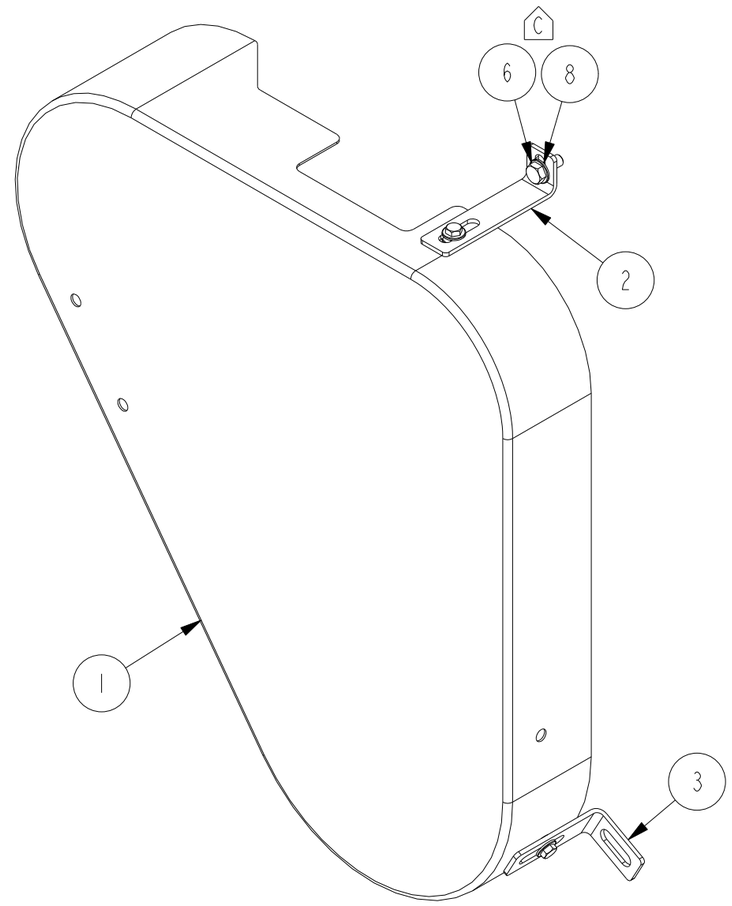
REFERENCE:
CFP59–F15/25

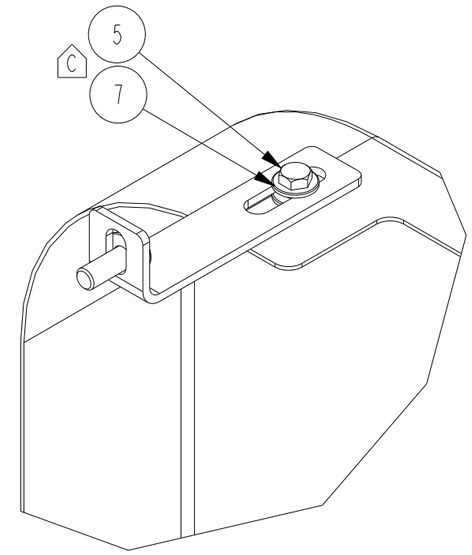
DRAWING NUMBER:
8725C

BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	GUARD, PULLEY, 6B/4B, FIRE PUMP	8591
2	1	BRACKET, MOUNTING, GUARD, FIREPUMP	8592
3	2	BRACKET, MOUNTING, GUARD, FIREPUMP	8593
4	3	WASHER, RETAINING, M6	16662-11
5	3	SCREW,HH, M6-1.00x16MM	20306-016
6	1	SCREW,HH, M8-1.25x20	20308-020
7	6	WASHER,FLAT,SMALL, 0.25	20010-025
8	1	WASHER,FLAT,SMALL, 0.31	20010-031



MOUNTING SCREWS ARE SUPPLIED ON ENGINE





TYPICAL GUARDING FASTENERS
SCALE 0.500

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE
C	2011-053	UPDATED FASTENERS PER SIX SIGMA REMOVED 8657	S DUBICK	16-MAY-11

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°

THIRD ANGLE PROJECTION

IMPERIAL UNITS	METRIC UNITS
MACHINE TOLERANCES .XX : ± 0.010 .XXX : ± 0.005	MACHINE TOLERANCES .X : ± 0.4 .XX : ± 0.2
FORM TOLERANCES .XX : ± 0.030 .XXX : ± 0.015	FORM TOLERANCES .X : ± 0.8 .XX : ± 0.4
FAB TOLERANCES .XX : ± 0.060 .XXX : ± 0.030	FAB TOLERANCES .X : ± 1.5 .XX : ± 0.8

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875 LAWRENCE DRIVE
DEPERE, WISCONSIN

GUARD, PULLEY
FIREPUMP, 6B/4B

DWG UNITS: IN/LB/S

DRAWN BY: DAVE N

DATE: 26APR2005

PRO-ENGINEER

INIT ECO:

SCALE: 0.250

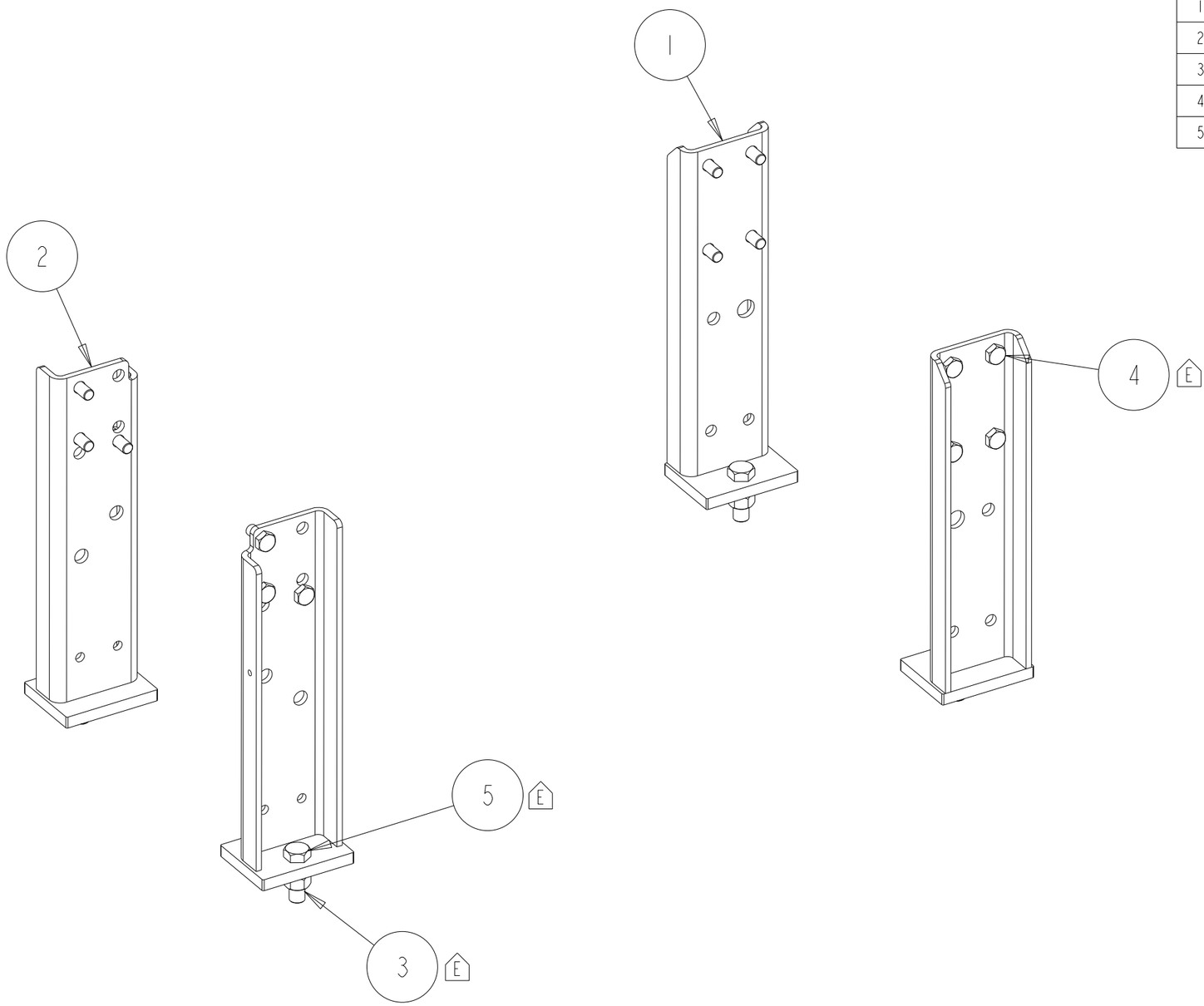
EST WEIGHT: 9.017

SHEET 1 OF 1

DRAWING NO: 8601

BILL OF MATERIAL

ITEM	QTY	DESCRIPTION	PART NUMBER
1	2	LEG, ENGINE SUPPORT, REAR, FIREPUMP, 6B/4B	8412
2	2	LEG, ENGINE SUPPORT, FRONT, FIREPUMP, 6B/6C	10576
3	4	NUT,HEX,PT, M16-2.00	20140-M16
4	14	SCREW,HH, M12-1.75x25	20312-025
5	4	SCREW,HH, M16-2.00x50	20316-050



REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE
E	2011-053	ADD FASTENERS PER SIX SIGMA	S DUBICK	13-MAY-11

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°

THIRD ANGLE PROJECTION

IMPERIAL UNITS	METRIC UNITS
MACHINE TOLERANCES .XX = ± 0.010 .XXX = ± 0.005	MACHINE TOLERANCES .X = ± 0.4 .XX = ± 0.2
FORM TOLERANCES .XX = ± 0.030 .XXX = ± 0.015	FORM TOLERANCES .X = ± 0.8 .XX = ± 0.4
FAB TOLERANCES .XX = ± 0.060 .XXX = ± 0.030	FAB TOLERANCES .X = ± 1.5 .XX = ± 0.8

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DEPERE, WISCONSIN

ASSEMBLY, MOUNTING, ENGINE FIREPUMP, 6B

DWG UNITS: IN/LB/S

DRAWN BY: S. DANFORTH

PRO-ENGINEER

DATE: 21MAR2004

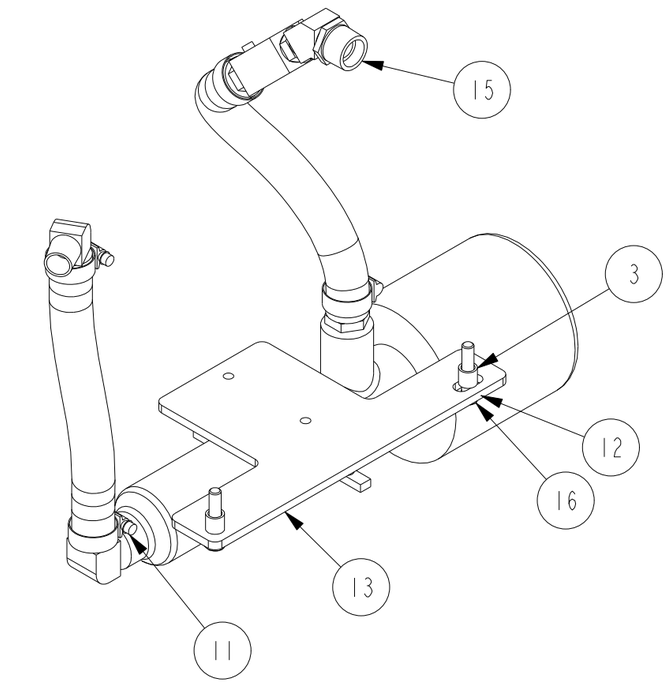
INIT ECO:

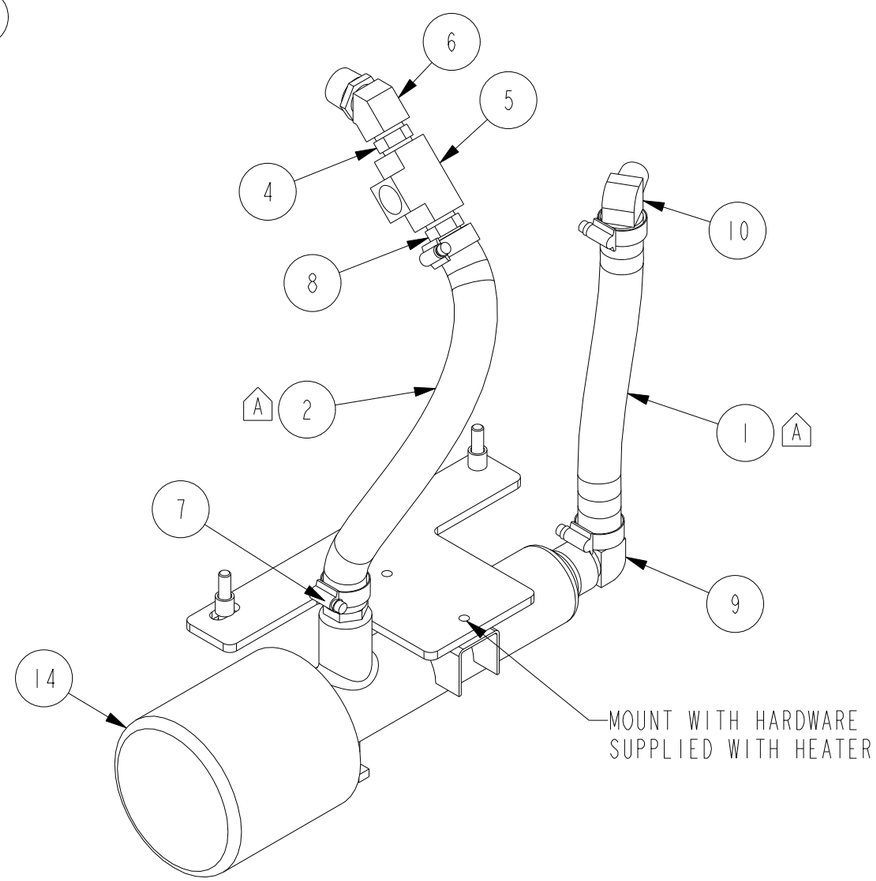
SCALE: 0.200

EST WEIGHT: 32.678

SHEET 1 OF 1

DRAWING NO: 8579





BILL OF MATERIAL

ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	HOSE, SILICONE HEATER, 3/4" ID x 10.00"	80242GL
2	1	HOSE, SILICONE HEATER, 3/4" ID x 12.00"	80242GL
3	2	SPACER, 0.5 OD X 0.38 ID X 0.50 LG	9618
4	1	NIPP, HEX, -8 NPT X -8 NPT	12164-8-8
5	1	TEE, UNION, -8 NPT	12531-8
6	1	ELB, 45 DEG, -8 NPT X -8 FMNPT	12532-8-8
7	1	FTG, STR, -12 BEAD X -12 NPT	12545-12-12
8	1	FTG, STR, -12 BEAD X -8 NPT	12545-12-8
9	1	ELB, 90 DEG, -12 BEAD X -12 NPT	12547-12-12
10	1	ELB, 90 DEG, -12 BEAD X -8 NPT	12547-12-8
11	4	CLAMP, WORM, .88 - 1.25	14990-12
12	2	WASHER,FLAT, M8	20020-M8
13	1	BRACKET, COOLANT HEATER MOUNTING, CFP5E	24233
14	1	HEATER, COOLANT, 1500W, 120/240VAC	24238
15	1	BUSHING, 1/2" x 3/4" NPT	LTL-SRB3412
16	2	SCREW,HH, M8-1.25x40	20308-040

NOTES:
1. ATTACH HOSE TO HEATER WITH OUT RADIAL TWIST
2. APPLY THREAD SEALANT ON ALL NPT THREADS

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE
A	2014-057	80242GL REPLACED 14194	S DUBICK	14-FEB-14

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°

THIRD ANGLE PROJECTION

MACHINED SURFACES: 125

	IMPERIAL UNITS	METRIC UNITS
MACHINE TOLERANCES	.XX = ± 0.010 .XXX = ± 0.005	.X = ± 0.4 .XX = ± 0.2
FORM TOLERANCES	.XX = ± 0.030 .XXX = ± 0.015	.X = ± 0.8 .XX = ± 0.4
FAB TOLERANCES	.XX = ± 0.060 .XXX = ± 0.030	.X = ± 1.5 .XX = ± 0.8

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HEATER, COOLANT, ASSEMBLY CFP5.9

DWG UNITS: IN/LB/S

DRAWN BY: PBS

PRO-ENGINEER

DATE: 16JAN2013

INIT ECO: 2013-013

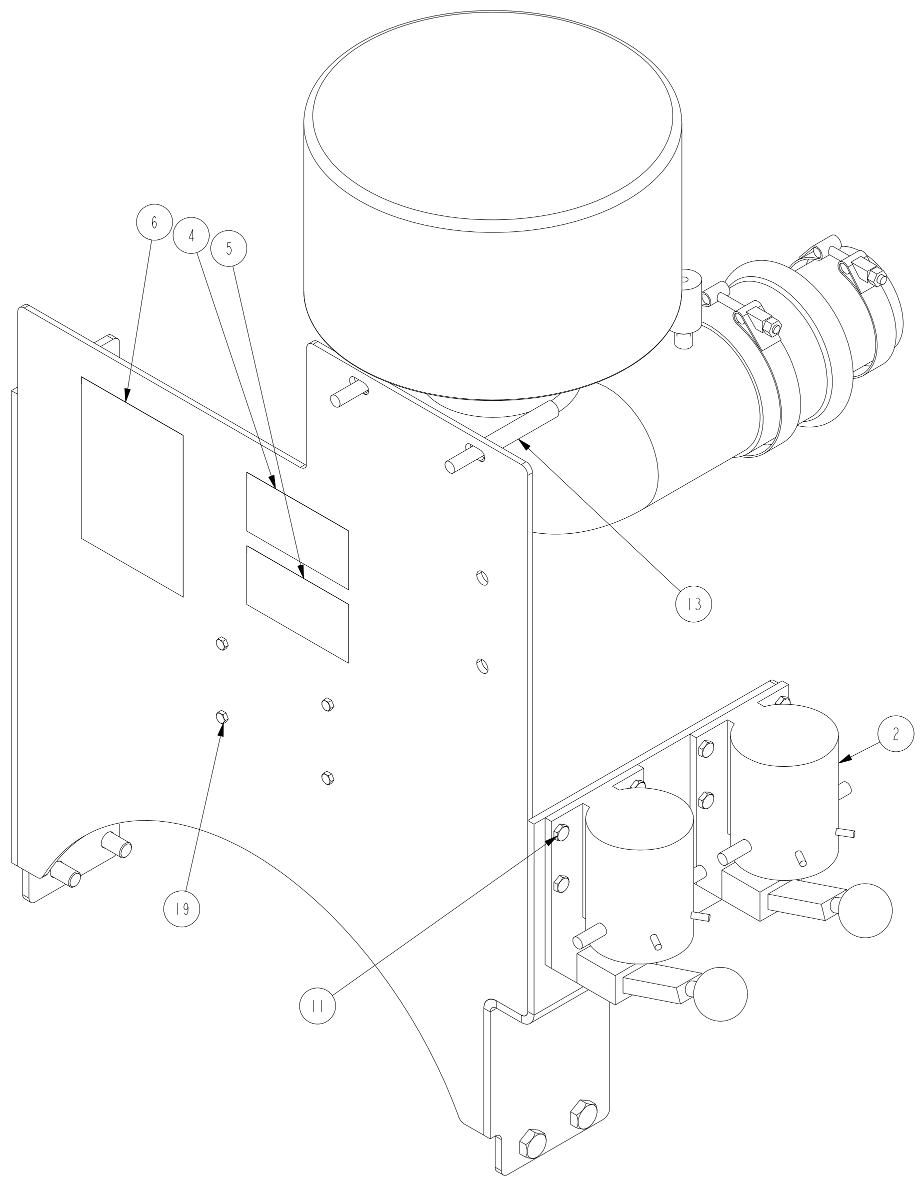
SCALE: 0.250

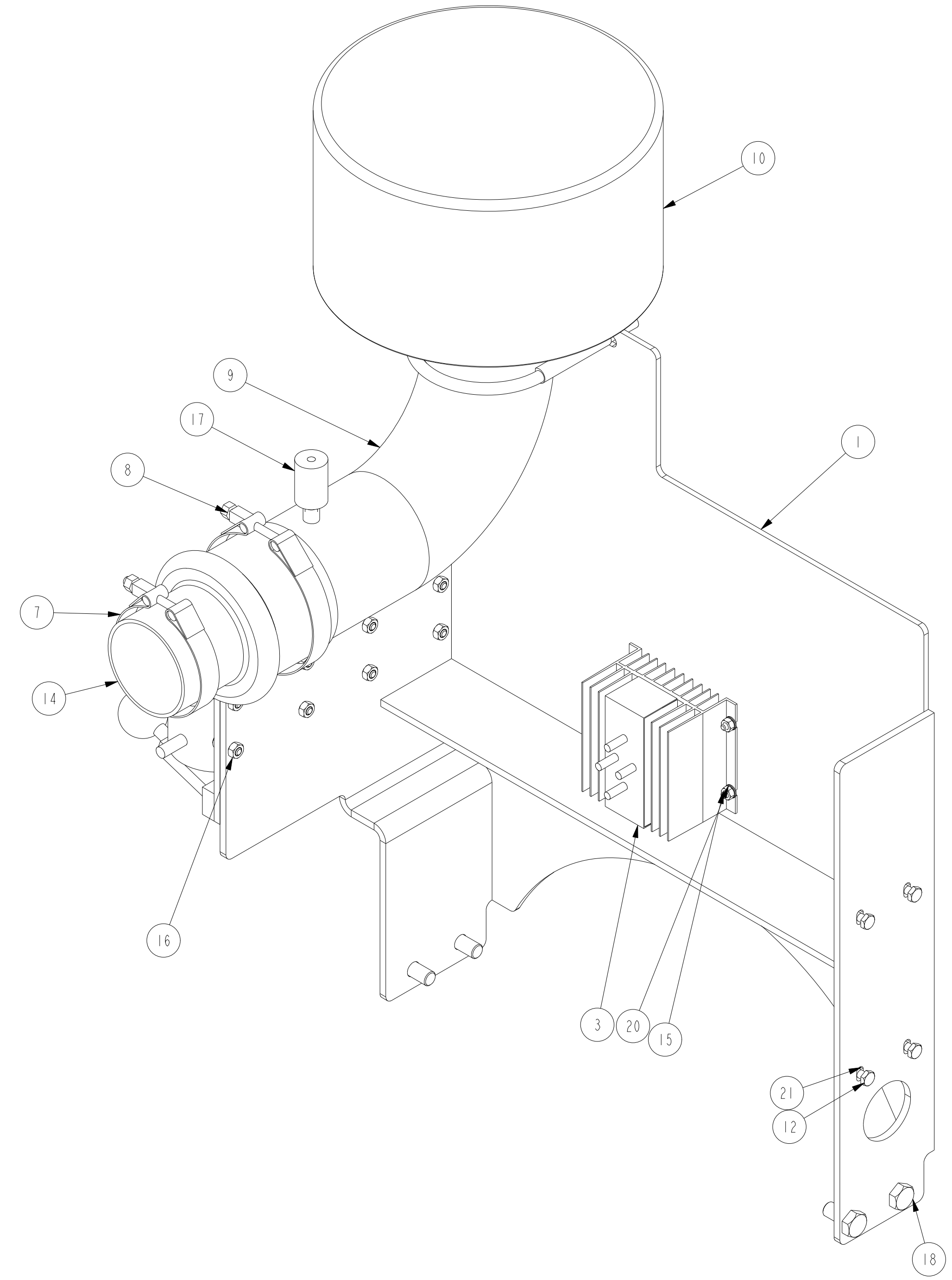
EST WEIGHT: 13.846

SHEET 1 OF 1

DRAWING NO: 24246

BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	BRACKET, ACCESSORY MOUNTING, CFP59	24240
2	2	CONTACTOR, MANUAL OVERIDE, CFP	8824
3	1	BATTERY ISOLATOR, FIRE PUMP	8838
4	1	FACTORY SETTINGS TAG, FIREPUMP	9526-02
5	1	FIELD SETTINGS TAG, FIREPUMP	9526-03
6	1	DATA TAG, FIREPUMP	9534
7	1	CLAMP, T-BOLT, 3.28-3.59	13164-0350
8	2	CLAMP, T-BOLT, 4.28-4.59	13164-0450
9	1	TUBE, AIR INTAKE	15367
10	1	AIR CLEANER, 4" CONNECTION, CF# AH1140 OR EQUAL	15608
11	8	SCREW,HH, 0.25-20x0.75	20225-075
12	4	SCREW,HH, 0.25-20x1.00	20225-100
13	1	CLAMP, U-BOLT, GUILLOTINE, 4.00", PLATED	89548K
14	1	HOSE, HUMP, REDUCER, 4" X 3", NELSON #89844K	89844K
15	4	NUT,HEX, M5-0.8	20120-M5
16	12	NUT,HEX, 0.25-20	20100-025
17	1	RESTRICTION INDICATOR, 1/8" NPT	RAX00-2352
18	4	SCREW,HH, M12-1.75x25	20312-025
19	4	SCREW,HH, M5-0.80x16	20305-016
20	4	WASHER,FLAT, M5	20020-M5
21	4	WASHER,FLAT,SMALL, 0.25	20010-025





UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°	MACHINED SURFACES	IMPERIAL UNITS	METRIC UNITS
THIRD ANGLE PROJECTION	125	MACHINE TOLERANCES .XX = ± 0.010 .XXX = ± 0.005	MACHINE TOLERANCES .X = ± 0.4 .XX = ± 0.2
		FORM TOLERANCES .XX = ± 0.030 .XXX = ± 0.015	FORM TOLERANCES .X = ± 0.8 .XX = ± 0.4
		FAB TOLERANCES .XX = ± 0.060 .XXX = ± 0.030	FAB TOLERANCES .X = ± 1.5 .XX = ± 0.8

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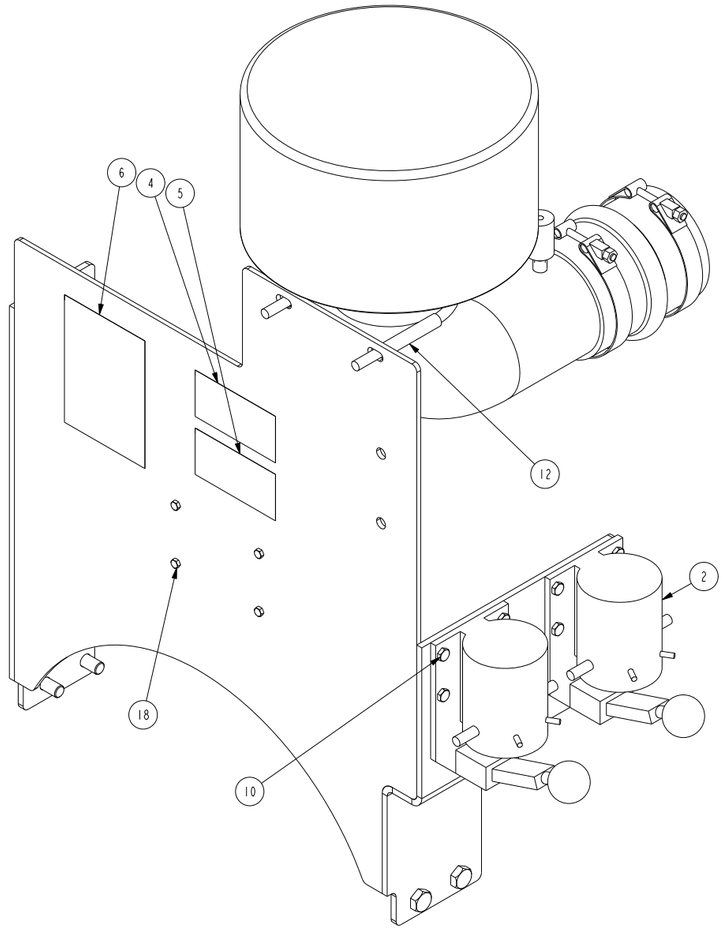
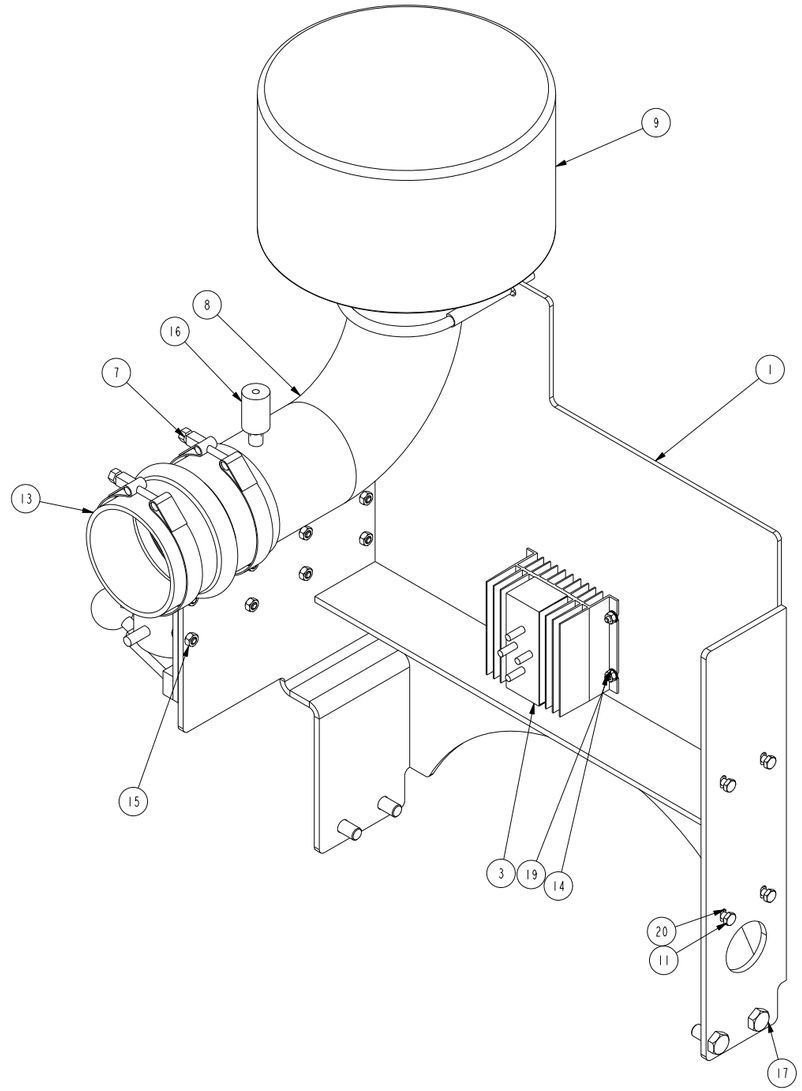
ASSEMBLY, ACC, REAR MTG
CFP59, F10/F20/F40/F50

DWG UNITS: IN/LB/S	DRAWN BY: PBS	DATE: 15JAN2013
	PRO-ENGINEER	INIT ECO: 2012-392
SCALE: 0.375	SHEET 1 OF 1	DRAWING NO: 24245
EST WEIGHT: 76.013		

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE

BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	BRACKET, ACCESSORY MOUNTING, CFP59	24240
2	2	CONTACTOR, MANUAL OVERIDE, CFP	8824
3	1	BATTERY ISOLATOR, FIRE PUMP	8838
4	1	FACTORY SETTINGS TAG, FIREPUMP	9526-02
5	1	FIELD SETTINGS TAG, FIREPUMP	9526-03
6	1	DATA TAG, FIREPUMP	9534
7	3	CLAMP, T-BOLT, 4.28-4.59	13164-0450
8	1	TUBE, AIR INTAKE	15367
9	1	AIR CLEANER, 4" CONNECTION, CF# AH1140 OR EQUAL	15608
10	8	SCREW,HH, 0.25-20x0.75	20225-075
11	4	SCREW,HH, 0.25-20x1.00	20225-100
12	1	CLAMP, U-BOLT, GUILLOTINE, 4.00", PLATED	89548K
13	1	COUPLING, RUBBER, 4", NELSON #89835K	89835K
14	4	NUT,HEX, M5-0.8	20120-M5
15	12	NUT,HEX, 0.25-20	20100-025
16	1	RESTRICTION INDICATOR, 1/8" NPT	RAX00-2352
17	4	SCREW,HH, M12-1.75x25	20312-025
18	4	SCREW,HH, M5-0.80x16	20305-016
19	4	WASHER,FLAT, M5	20020-M5
20	4	WASHER,FLAT,SMALL, 0.25	20010-025





UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± °	MACHINED SURFACES	IMPERIAL UNITS	METRIC UNITS
THIRD ANGLE PROJECTION	125	FROM THICKNESS 0.125 TO 0.249 ±0.010	FROM THICKNESS 3.18 TO 6.32 ±0.25
		FROM THICKNESS 0.250 TO 0.499 ±0.015	FROM THICKNESS 6.35 TO 12.67 ±0.38
		FROM THICKNESS 0.500 TO 1.000 ±0.020	FROM THICKNESS 12.70 TO 25.40 ±0.51

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE

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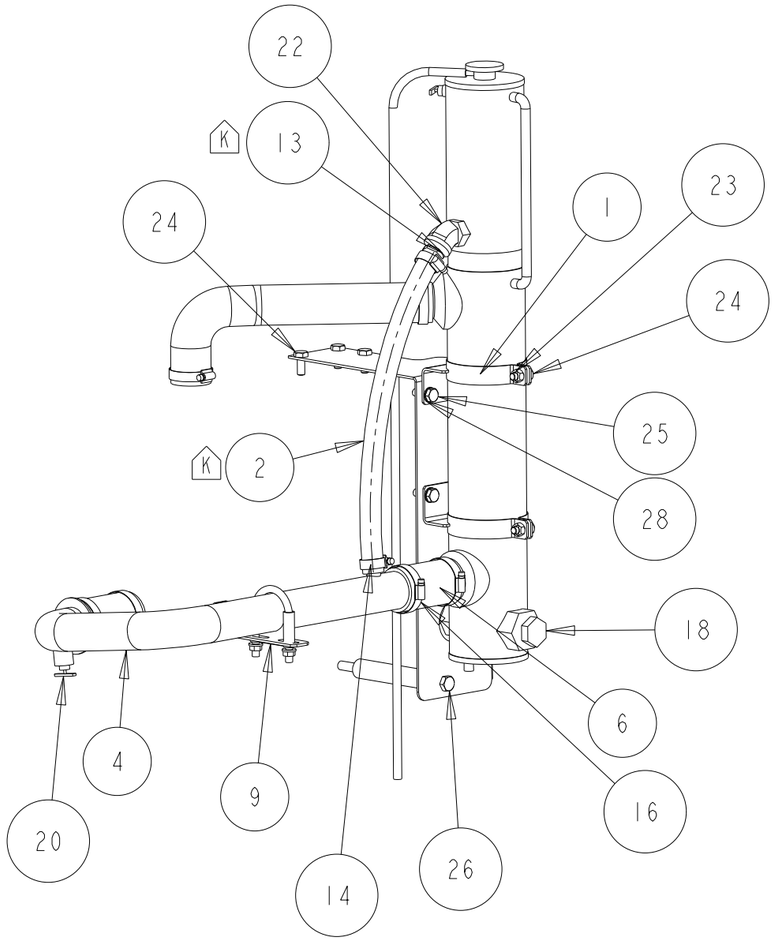
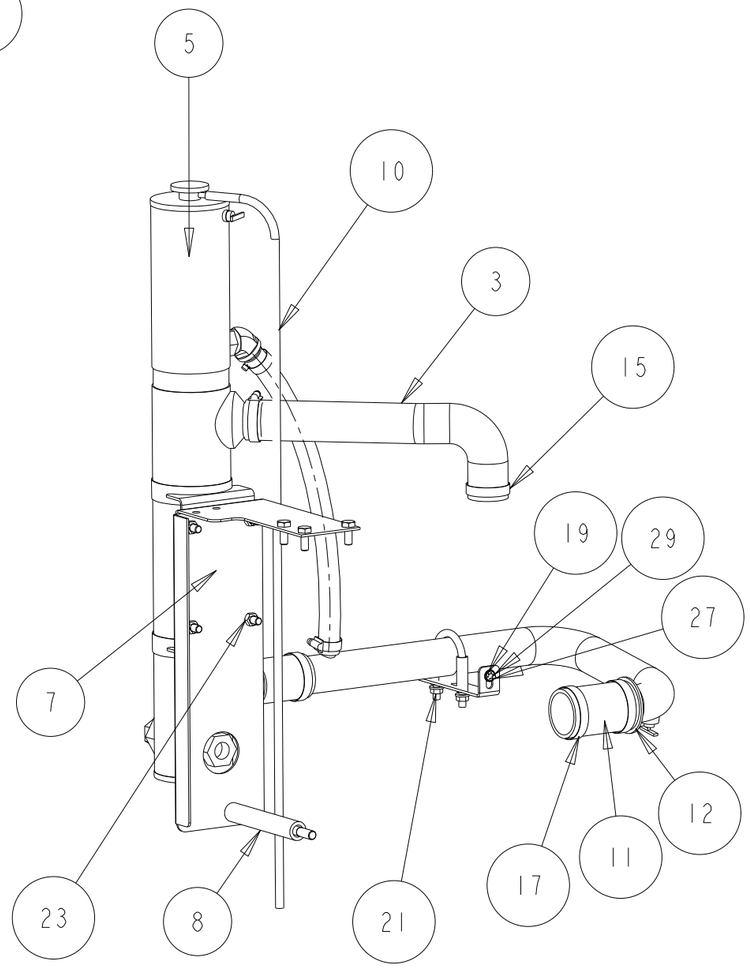
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

ASSEMBLY, ACC, REAR MTG
CFP59, F15/F25

DWG UNITS: IN/LB/S	DRAWN BY: PBS	DATE: 15JAN2013
PRO-ENGINEER		INIT ECO: 2012-392
SCALE: 0.375	SHEET 1 OF 1	DRAWING NO: 24247
EST WEIGHT: 76.013		





BILL OF MATERIAL

ITEM	QTY	DESCRIPTION	PART NUMBER
1	2	CLAMP, HEAT EXCHANGER, 4", CHAMP #300377, FIREPUMP	8659
2	1	HOSE, HEATER, 3/4" ID, 20" CUT LENGTH	80232GL
3	1	HOSE, COOLING, 1.75" I.D., FIREPUMP, 6B/4B	8566
4	1	TUBE, COOLING, 2" OD, FIREPUMP	8567
5	1	HEAT EXCHANGER, 4" DIAMETER, 2-PASS, W/ INTEGRAL TOP TANK	8652
6	1	COUPLING, HOSE, 2.0" I.D., FIREPUMP	8653
7	1	BRACKET, MOUNTING, HEAT EXCHANGER, FIREPUMP, 6B/4B	8655
8	1	SPACER, STAND-OFF, 5/8" BOLT x 6.33" LENGTH	8656
9	1	BRACKET, MOUNTING, TUBE SUPPORT, FIREPUMP	8657
10	1	TUBE, OVERFLOW, 5/16" ID x 36" LG, #27003	8662
11	1	COUPLING, HOSE, 2.25" I.D., #77225GL, FIREPUMP	8664
12	1	SLEEVE, 2.25" X 2" #903	8963
13	1	FTG, STR, -12 BARB X -12 NPT	12548-12-12
14	2	CLAMP, WORM, .88 - 1.25	14990-12
15	2	CLAMP, WORM, 1.31 - 2.25	14990-28
16	2	CLAMP, WORM, 1.56 - 2.50	14990-32
17	2	CLAMP, WORM, 1.81 - 2.75	14990-36
18	1	PLUG, NPT, PLASTIC, -16 (1") NPT	15255-16
19	1	WASHER, RETAINING, M6	16662-11
20	2	DRAIN VALVE, 1/4" NPT	80511
21	1	CLAMP, U-BOLT, 2" OD PIPE	89541K
22	1	STREET ELBOW, BLK, 3/4" NPT, 45 DEG.	E3445
23	6	NUT,HEX,PT, M10-1.50	20140-M10
24	5	SCREW,HH, M10-1.50x25	20310-025
25	4	SCREW,HH, M10-1.50x30	20310-030
26	1	SCREW,HH, M12-1.75x200	20312-200
27	1	SCREW,HH, M6-1.00x16MM	20306-016
28	4	WASHER,FLAT, M10	20020-M10
29	2	WASHER,FLAT,SMALL, 0.25	20010-025

NOTE: APPLY THREAD SEALANT ON ALL NPT THREADS.

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE
K	2012-392	REPLACE R-68HB-12-8 WITH 12548-12-12 CORRECT HOSE # TO 80232GL	S DUBICK	04-OCT-12

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°

THIRD ANGLE PROJECTION

MACHINED SURFACES: 125

	IMPERIAL UNITS	METRIC UNITS
MACHINE TOLERANCES	.XX = ± 0.010 .XXX = ± 0.005	.X = ± 0.4 .XX = ± 0.2
FORM TOLERANCES	.XX = ± 0.030 .XXX = ± 0.015	.X = ± 0.8 .XX = ± 0.4
FAB TOLERANCES	.XX = ± 0.060 .XXX = ± 0.030	.X = ± 1.5 .XX = ± 0.8

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875 LAWRENCE DRIVE
DEPERE, WISCONSIN

ASSEMBLY, HEAT EXCHANGER W/O CAC FIREPUMP, NFP-659

DWG UNITS: IN/LB/S

DRAWN BY: DAVE N

PRO-ENGINEER

DATE: 01JUN2004

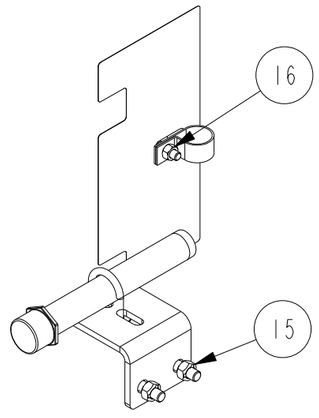
INIT ECO:

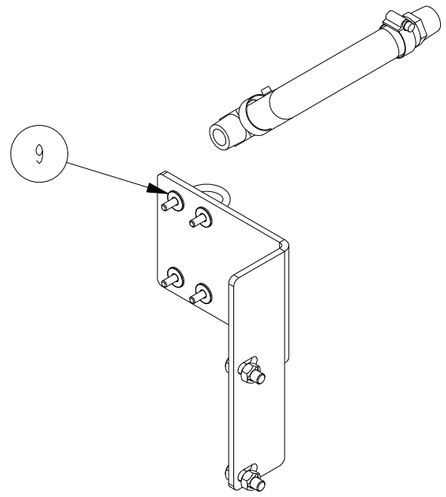
SCALE: 0.125

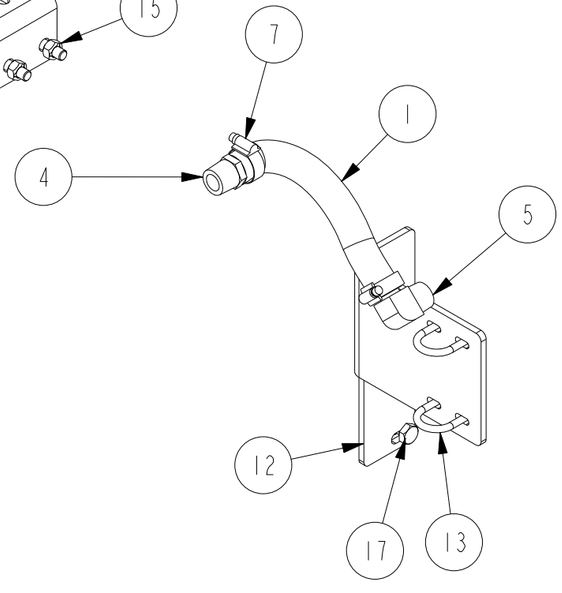
EST WEIGHT: 50.747

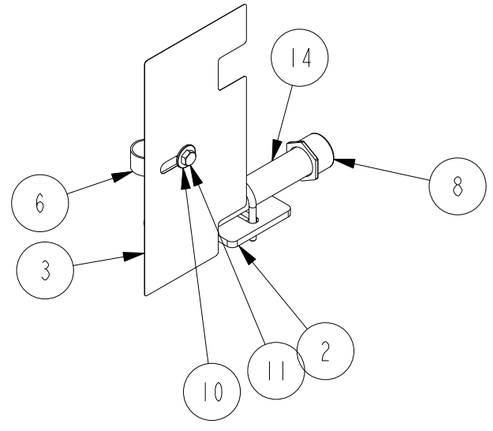
SHEET 1 OF 1

DRAWING NO: 8650









BILL OF MATERIAL

ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	HOSE, SILICONE, 3/4" ID x 9.00"	14194_029
2	1	BRKT, RAW WATER COOLING, 4" LG, 3/4" OR 1" PIPE	9633
3	1	DECAL, COOLING LOOP VALVES, VERTICAL MTG	10965
4	1	FTG, STR, -12 BEAD X -12 NPT	12545-12-12
5	1	ELB, 90 DEG, -12 BEAD X -12 NPT	12547-12-12
6	1	CLAMP, LOOM, 1", LTL-SCPV16627	13745
7	2	CLAMP, WORM, .88 - 1.25	14990-12
8	1	CAP, PVC, NPT FEMALE, 3/4" NPT	16663-12
9	6	WASHER,FLAT, 0.25	20000-025
10	1	WASHER,FLAT, 0.31	20000-031
11	1	SCREW,HH, 0.31-18x1.00	20231-100
12	1	BRACKET, COOLING MOUNTING, CFP59	26122
13	3	U-BOLT, FITS 1" PIPE	3201T13
14	1	NIPPLE, BLK, 3/4x9	BNFY
15	4	NUT,HEX,PT, M10-1.50	20140-M10
16	1	NUT,HEX, 0.31-18	20100-031
17	4	SCREW,HH, M10-1.50x30	20310-030

REFERENCE DRAWING 26106 FOR INSTALLATION ONTO THE POWER UNIT

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°

THIRD ANGLE PROJECTION

MACHINED SURFACES: 125

	IMPERIAL UNITS	METRIC UNITS
MACHINE TOLERANCES	.XX : ± 0.010 .XXX : ± 0.005	.X : ± 0.4 .XX : ± 0.2
FORM TOLERANCES	.XX : ± 0.030 .XXX : ± 0.015	.X : ± 0.8 .XX : ± 0.4
FAB TOLERANCES	.XX : ± 0.060 .XXX : ± 0.030	.X : ± 1.5 .XX : ± 0.8

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CUSTOM DESIGN
AND UPFIT CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

MISC PIPING, RAW WATER
6B

DWG UNITS: IN/LB/S

DRAWN BY: PBS

PRO-ENGINEER

DATE: 07AUG2013

INIT ECO: 2013-454

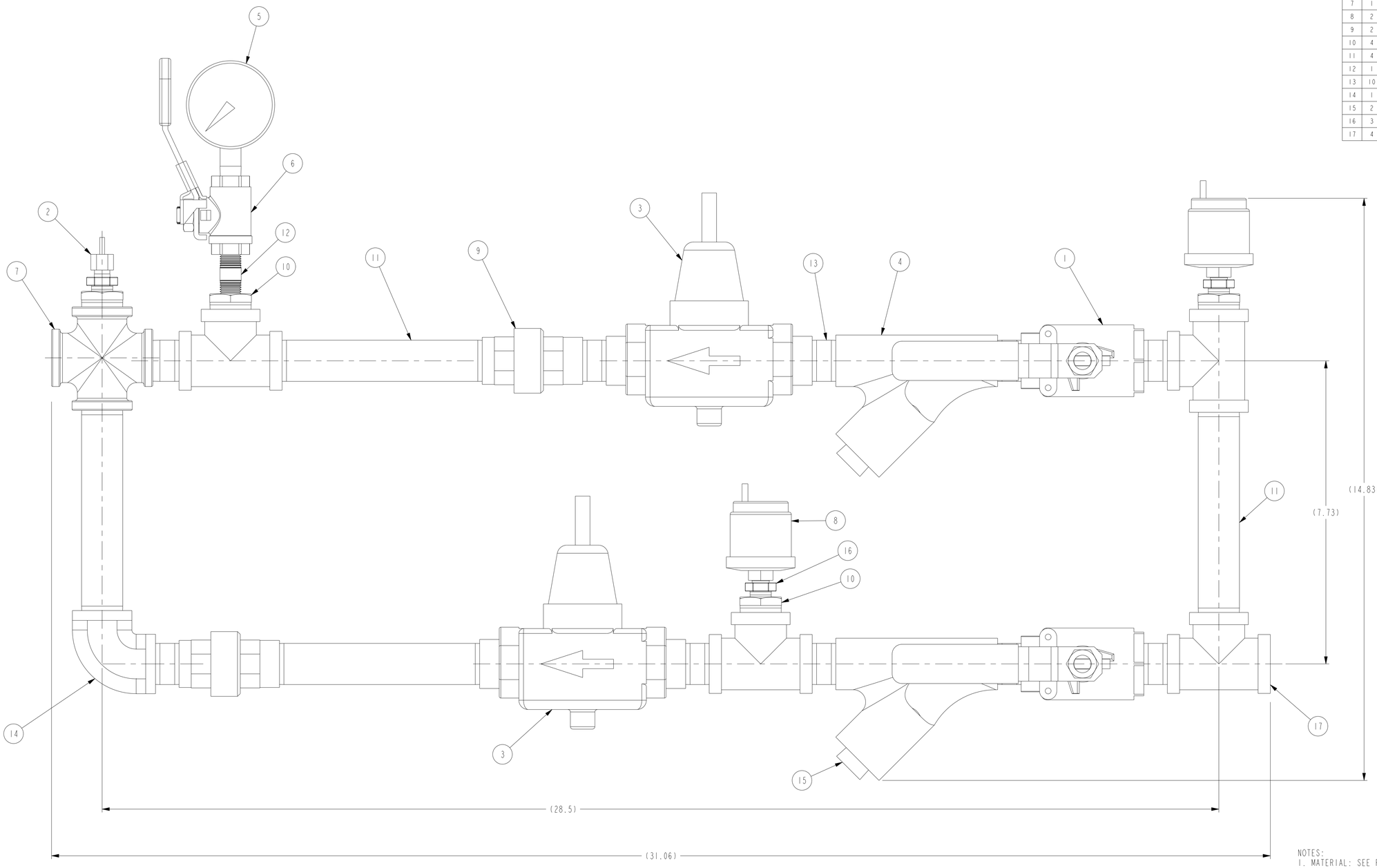
SCALE: 0.190

EST WEIGHT: 4.853

SHEET 1 OF 1

DRAWING NO: 25983

BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	2	VALVE,BALL,3/4NPT, BRASS, LOCKABLE	21504
2	1	SENDER, TEMPERATURE, DATCON #02022-00	8862
3	2	REGULATOR, 3/4" NPT, 400 PSI MAX, 25 TO 75 PSI OUT	8890
4	2	STRAINER, 3/4" NPT W/ PLUG	8891
5	1	GAUGE, PRESSURE, 1/4" NPT, DPGI-2 1/2, 0-100 PSI, (WATTS)	8892
6	1	VALVE, BALL, 1/4" NPT FEMALE	FA60204-1
7	1	CROSS,3/4NPT,STEEL, SCHEDULE 40 PIPE	21519
8	2	SENSOR,300PSI,1/8NPT, VEETHREE-977035	21574
9	2	VALVE, 3/4" NPT CHECK, VALUE ADDED: CV075	25502
10	4	BUSHING,3/4" NPT X 1/4" NPT, -	71494
11	4	NIPPLE, BLK, 3/4x6	71550
12	1	NIPPLE, 1/4" NPT x 1 1/2", BLK STEEL	LTL-CPN1411Z
13	10	NIPPLE, BLK, 3/4x1-1/2	LTL-CPN34
14	1	ELBOW, BLK, 3/4" NPT, 90 DEG.	LTL-E3490
15	2	PLUG, 1/2 NPT, -	LTL-SCSP12
16	3	REDUCER BUSHING, HEX, 1/4 x 1/8, BLK STEEL	LTL-SRB1418
17	4	TEE, BLACK PIPE, 3/4" NPT	LTL-ST34



NOTES:
1. MATERIAL: SEE PARTS LIST
2. REMOVE ALL SHARP EDGES PRIOR TO COATING
3. LEAK TEST TO 60PSI AND PRESET REGULATORS TO 60PSI
4. FINISH: COAT PER CUMMINS SPEC ES044 RAL 3001

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°	MACHINED SURFACES	IMPERIAL UNITS	METRIC UNITS
THIRD ANGLE PROJECTION		MACHINE TOLERANCES .XX ± 0.005	MACHINE TOLERANCES .X ± 0.1
	125	FORM TOLERANCES .XX ± 0.005	FORM TOLERANCES .X ± 0.1
		FAB TOLERANCES .XX ± 0.030	FAB TOLERANCES .X ± 0.1

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE

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CUSTOM DESIGN
AND UPFIT CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

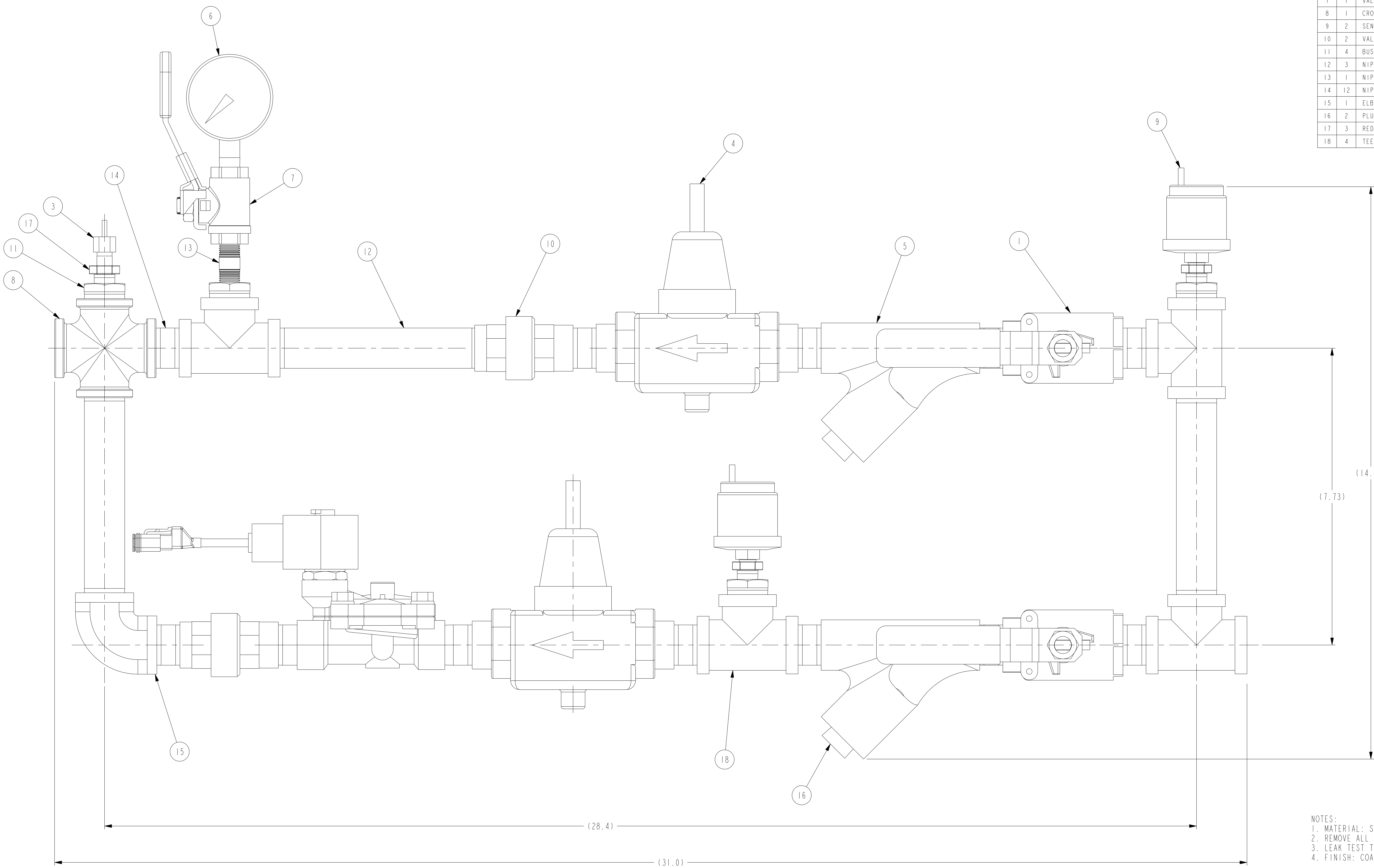
COOLING-LOOP, 3/4 " VERT
RAW WATER

DWG UNITS: IN/LB/S
DRAWN BY: BOB KROPP
PRO-ENGINEER
DATE: 07MAR2012
INIT ECO: 2013-303

SCALE: 0.750
EST WEIGHT: NA
SHEET 1 OF 1
DRAWING NO: 21511

BILL OF MATERIAL

ITEM	QTY	DESCRIPTION	PART NUMBER
1	2	VALVE,BALL,3/4NPT, BRASS, LOCKABLE	21504
2	1	VALVE, SOLENOID, 3/4" NPT, 12VDC	A042B123
3	1	SENDER, TEMPERATURE, DATCON #02022-00	8862
4	2	REGULATOR, 3/4" NPT, 400 PSI MAX, 25 TO 75 PSI OUT	8890
5	2	STRAINER, 3/4" NPT W/ PLUG	8891
6	1	GAUGE, PRESSURE, 1/4" NPT, DPG1-2 1/2, 0-100 PSI, (WATTS)	8892
7	1	VALVE, BALL, 1/4" NPT FEMALE	FA60204-1
8	1	CROSS,3/4NPT,STEEL, SCHEDULE 40 PIPE	21519
9	2	SENSOR,300PSI,1/8NPT, VEETHREE-977035	21574
10	2	VALVE, 3/4" NPT CHECK, VALUE ADDED: CV075	25502
11	4	BUSHING,3/4" NPT X 1/4" NPT, -	71494
12	3	NIPPLE, BLK, 3/4x6	71550
13	1	NIPPLE, 1/4" NPT x 1 1/2", BLK STEEL	LTL-CPN14112
14	12	NIPPLE, BLK, 3/4x1-1/2	LTL-CPN34
15	1	ELBOW, BLK, 3/4" NPT, 90 DEG.	LTL-E3490
16	2	PLUG, 1/2 NPT, -	LTL-SCSP12
17	3	REDUCER BUSHING, HEX, 1/4 x 1/8, BLK STEEL	LTL-SRB1418
18	4	TEE, BLACK PIPE, 3/4" NPT	LTL-ST34



NOTES:
1. MATERIAL: SEE PARTS LIST
2. REMOVE ALL SHARP EDGES PRIOR TO COATING
3. LEAK TEST TO 60PSI AND PRESET REGULATORS TO 60PSI
4. FINISH: COAT PER CUMMINS SPEC ES044 RAL 3001

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CUSTOM DESIGN
AND UPFIT CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

COOLING LOOP, 3/4" ,12V
RAW WATER

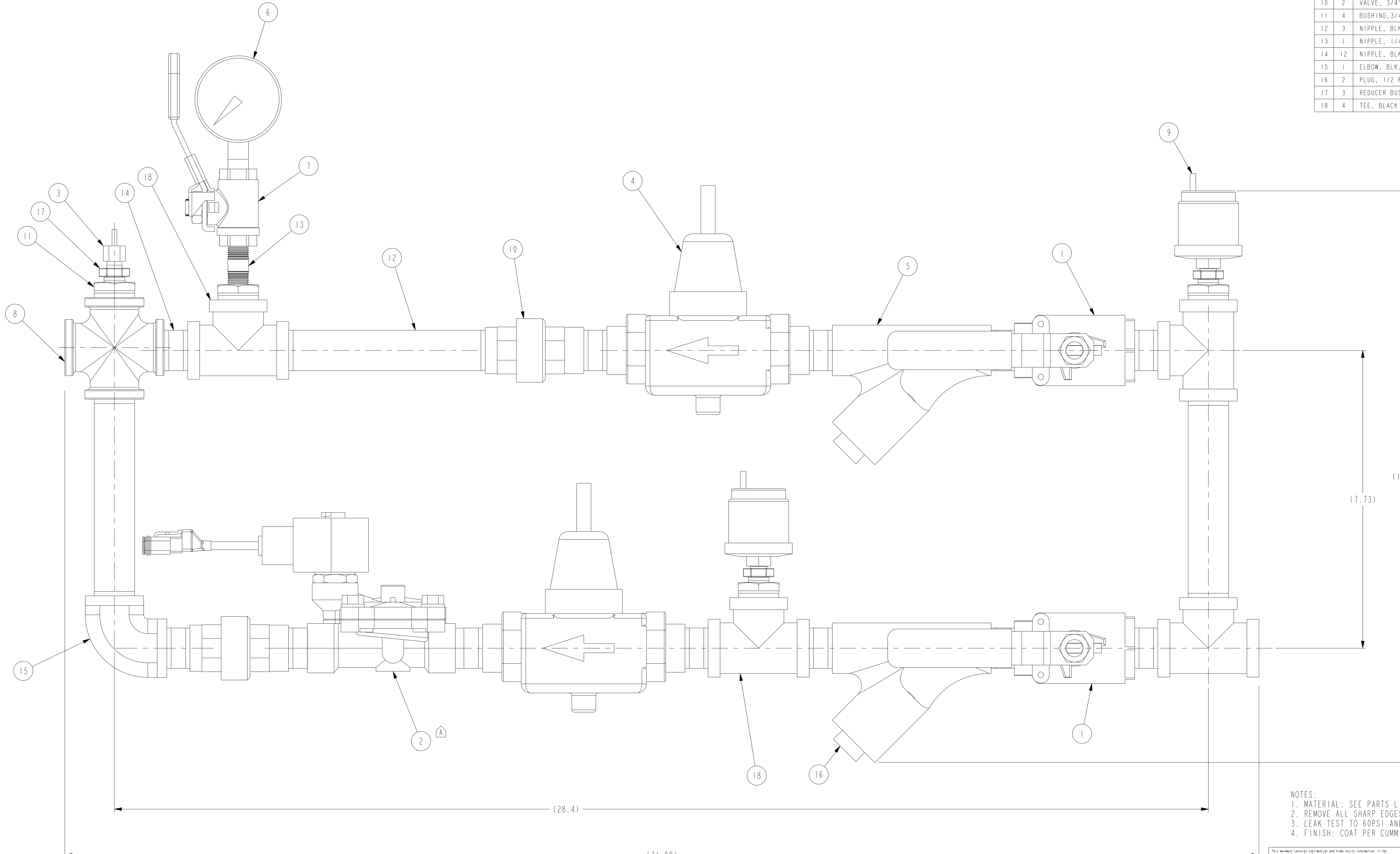
UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°	MACHINED SURFACES	IMPERIAL UNITS	METRIC UNITS
THIRD ANGLE PROJECTION	125	MACHINE TOLERANCES .XX = ± 0.010 .XXX = ± 0.005 FORM TOLERANCES .XX = ± 0.030 .XXX = ± 0.015 FAB TOLERANCES .XX = ± 0.060 .XXX = ± 0.030	MACHINE TOLERANCES .X = ± 0.4 .XX = ± 0.2 FORM TOLERANCES .X = ± 0.8 .XX = ± 0.4 FAB TOLERANCES .X = ± 1.5 .XX = ± 0.8

DWG UNITS: IN/LB/S	DRAWN BY: BOB KROPP		DATE: 06MAR2012
	PRO-ENGINEER		INIT ECO: 2013-303
SCALE: 0.750	SHEET 1 OF 1	DRAWING NO: 21509	
EST WEIGHT: NA			

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE
A	2014-241	A042B123 WAS 8210G003	PBS	17APR2014

BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	2	VALVE,BALL,3/4NPT, BRASS, LOCKABLE	21504
2	1	VALVE, SOLENOID, 3/4" NPT, 24VDC	A042B125
3	1	SENDER, TEMPERATURE, DATCON #02022-00	8862
4	2	REGULATOR, 3/4" NPT, 400 PSI MAX, 25 TO 75 PSI OUT	8890
5	2	STRAINER, 3/4" NPT W/ PLUG	8891
6	1	GAUGE, PRESSURE, 1/4" NPT, DPG1-2 1/2, 0-100 PSI, (WATTS)	8892
7	1	VALVE, BALL, 1/4" NPT FEMALE	FA60204-1
8	1	CROSS,3/4NPT,STEEL, SCHEDULE 40 PIPE	21519
9	2	SENSOR,300PSI,1/8NPT, VEETHREE-977035	21574
10	2	VALVE, 3/4" NPT CHECK, VALUE ADDED: CV075	25502
11	4	BUSHING,3/4" NPT X 1/4" NPT, -	71494
12	3	NIPPLE, BLK, 3/4x6	71550
13	1	NIPPLE, 1/4" NPT x 1 1/2", BLK STEEL	LTL-CPN14112
14	12	NIPPLE, BLK, 3/4x1-1/2	LTL-CPN34
15	1	ELBOW, BLK, 3/4" NPT, 90 DEG.	LTL-E3490
16	2	PLUG, 1/2 NPT, -	LTL-SCSP12
17	3	REDUCER BUSHING, HEX, 1/4 x 1/8, BLK STEEL	LTL-SRB1418
18	4	TEE, BLACK PIPE, 3/4" NPT	LTL-ST34



NOTES:
1. MATERIAL: SEE PARTS LIST
2. REMOVE ALL SHARP EDGES PRIOR TO COATING
3. LEAK TEST TO 60PSI AND PRESET REGULATORS TO 60PSI
4. FINISH: COAT PER CUMMINS SPEC ES044 RAL 3001

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COOLING LOOP, 3/4", 24V
RAW WATER

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

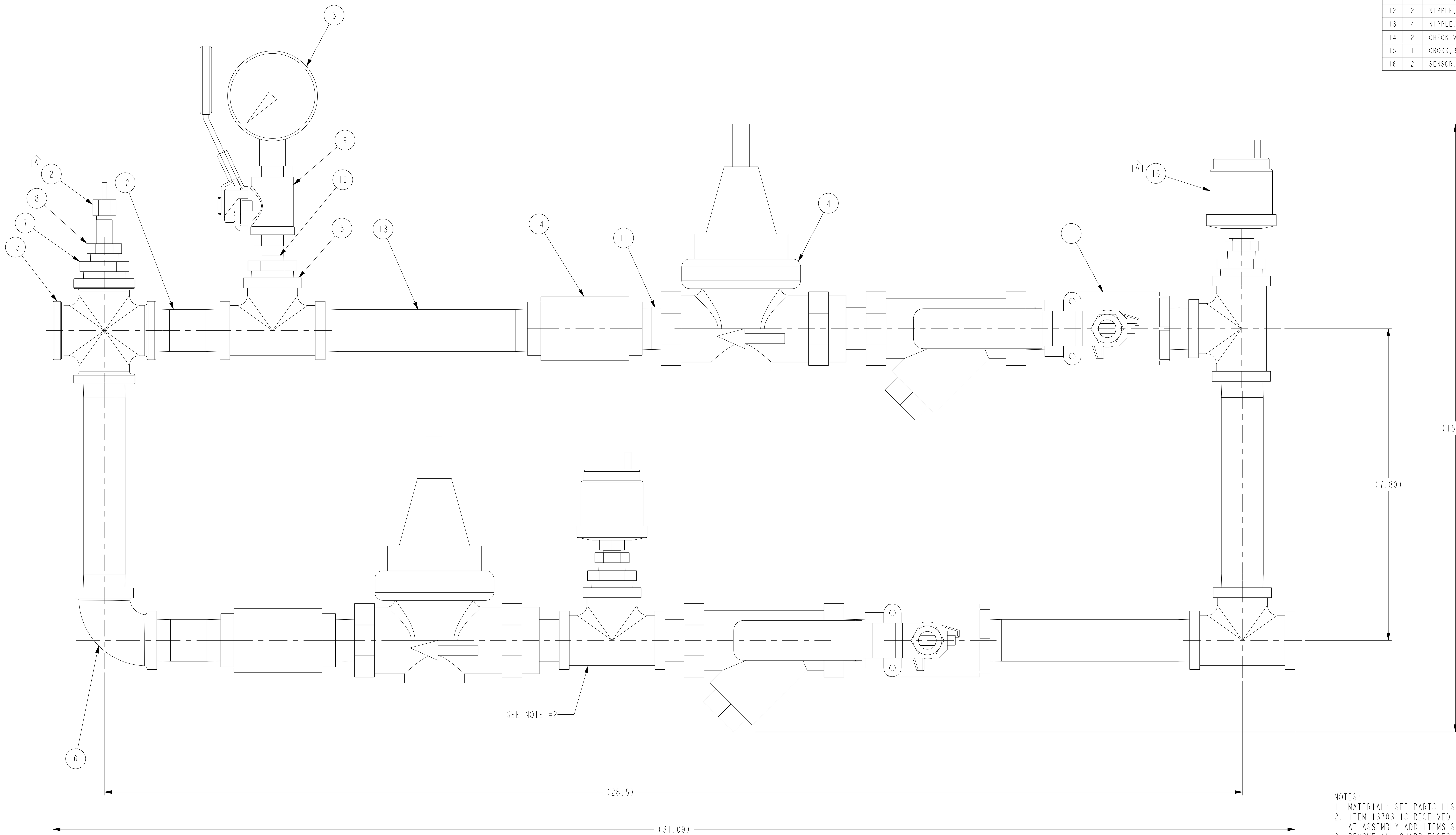
ANGULAR DIMENSIONS ± 1°	MACHINED SURFACES	IMPERIAL UNITS	METRIC UNITS
THIRD ANGLE PROJECTION	125	MACHINE TOLERANCES .XX = ± 0.010 .XXX = ± 0.005	MACHINE TOLERANCES .X = ± 0.4 .XX = ± 0.2
		FORM TOLERANCES .XX = ± 0.030 .XXX = ± 0.015	FORM TOLERANCES .X = ± 0.8 .XX = ± 0.4
		FAB TOLERANCES .XX = ± 0.060 .XXX = ± 0.030	FAB TOLERANCES .X = ± 1.5 .XX = ± 0.8

DWG UNITS: IN/LB/S	DRAWN BY: BOB KROPP	DATE: 06MAR2012	
	PRO-ENGINEER	INIT ECO: 2013-303	
SCALE: 0.750	SHEET 1 OF 1	DRAWING NO: 21510	
EST WEIGHT: NA			

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE
A	2014-241	A042B125 WAS 8210G003-24V	PBS	17APR2014

BILL OF MATERIAL

ITEM	QTY	DESCRIPTION	PART NUMBER
1	2	VALVE,BALL,3/4NPT, SEA WATER COMPATIBLE,LOCKABLE	21434
2	1	SENDER, TEMPERATURE, DATCON #02022-00	8862
3	1	GUAGE, 0-100 PSI, 1/4" NPT STN STL	13113
4	2	REGULATOR/STRAINER, 3/4" NPT, SEA WATER COMPATIBLE	13703
5	4	TEE, MARINE GRADE, 3/4" NPT	15755-12
6	1	ELBOW, MARINE GRADE, 3/4" NPT	15756-12
7	4	BUSHING, MARINE GRADE, 3/4" X 1/4"	15758-12-4
8	3	BUSHING, MARINE GRADE, 1/4" x 1/8"	15758-4-2
9	1	VALVE, BALL, 1/4" NPT,, APOLLO 77-100 (MARINE)	15759-04
10	1	NIPPLE, NAVAL BRONZE, 1/4" X CLOSE	15760
11	6	NIPPLE, MARINE GRADE, 3/4" X 1-3/8"	15761
12	2	NIPPLE, MARINE GRADE, 3/4" X 2-1/2"	15762
13	4	NIPPLE, MARINE GRADE, 3/4" X 6"	15764
14	2	CHECK VALVE, MARINE GRADE, 3/4" NPT	15768-12
15	1	CROSS,3/4,NVL-BRNZ, SCHEDULE 40 PIPE	21436
16	2	SENSOR,300PSI,1/8NPT, VEETHREE-977035	21574



NOTES:
1. MATERIAL: SEE PARTS LIST
2. ITEM 13703 IS RECEIVED AS AN UNASSEMBLED KIT.
   AT ASSEMBLY ADD ITEMS SHOWN
3. REMOVE ALL SHARP EDGES AND BURRS
4. LEAK TEST TO 60PSI AND PRESET REGULATORS TO 60PSI

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COOLING LOOP, 3/4", VERT
SEA WATER COMPATIBLE

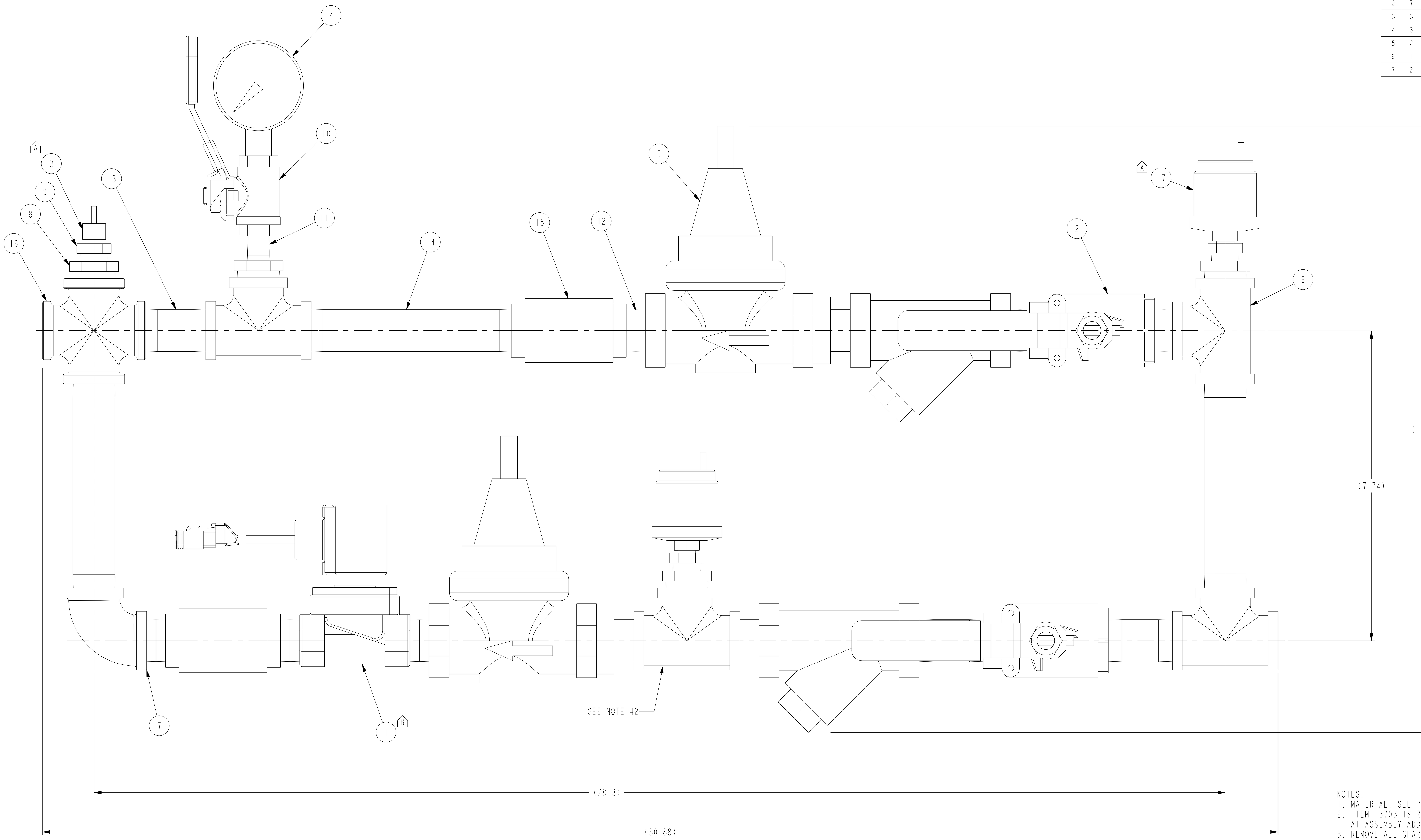
UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°	MACHINED SURFACES	IMPERIAL UNITS	METRIC UNITS
THIRD ANGLE PROJECTION	125	MACHINE TOLERANCES .XX = ± 0.010 .XXX = ± 0.005; FORM TOLERANCES .XX = ± 0.030 .XXX = ± 0.015; FAB TOLERANCES .XX = ± 0.060 .XXX = ± 0.030	MACHINE TOLERANCES .X = ± 0.4 .XX = ± 0.2; FORM TOLERANCES .X = ± 0.8 .XX = ± 0.4; FAB TOLERANCES .X = ± 1.5 .XX = ± 0.8

DWG UNITS: IN/LB/S	DRAWN BY: BOB KROPP	DATE: 07MAR2012
	PRO-ENGINEER	INIT ECO: 2013-303
SCALE: 0.750	SHEET 1 OF 1	DRAWING NO: 21512
EST WEIGHT: NA		

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE
A	2013-611	REPLACED 21008 & 21009 WITH 21574 & 8862	PBS	02OCT2013

BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	VALVE, SOLENOID, 3/4" NPT, 12VDC, SEA WATER COMPATIBLE	15738
2	2	VALVE,BALL,3/4NPT, SEA WATER COMPATIBLE,LOCKABLE	21434
3	1	SENDER, TEMPERATURE, DATCON #02022-00	8862
4	1	GUAGE, 0-100 PSI, 1/4" NPT STN STL	13113
5	2	REGULATOR/STRAINER, 3/4" NPT, SEA WATER COMPATIBLE	13703
6	4	TEE, MARINE GRADE, 3/4" NPT	15755-12
7	1	ELBOW, MARINE GRADE, 3/4" NPT	15756-12
8	4	BUSHING, MARINE GRADE, 3/4" X 1/4"	15758-12-4
9	3	BUSHING, MARINE GRADE, 1/4" x 1/8"	15758-4-2
10	1	VALVE, BALL, 1/4" NPT,, APOLLO 77-100 (MARINE)	15759-04
11	1	NIPPLE, NAVAL BRONZE, 1/4" X CLOSE	15760
12	7	NIPPLE, MARINE GRADE, 3/4" X 1-3/8"	15761
13	3	NIPPLE, MARINE GRADE, 3/4" X 2-1/2"	15762
14	3	NIPPLE, MARINE GRADE, 3/4" X 6"	15764
15	2	CHECK VALVE, MARINE GRADE, 3/4" NPT	15768-12
16	1	CROSS,3/4,NVL-BRNZ, SCHEDULE 40 PIPE	21436
17	2	SENSOR,300PSI,1/8NPT, VEETHREE-977035	21574



NOTES:
1. MATERIAL: SEE PARTS LIST
2. ITEM 13703 IS RECEIVED AS AN UNASSEMBLED KIT.
   AT ASSEMBLY ADD ITEMS SHOWN
3. REMOVE ALL SHARP EDGES AND BURRS
4. LEAK TEST TO 60PSI AND PRESET REGULATORS TO 60PSI

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UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1° | MACHINED SURFACES 125 | IMPERIAL UNITS: MACHINE TOLERANCES .XX : ± 0.010 .XXX : ± 0.005; FORM TOLERANCES .XX : ± 0.030 .XXX : ± 0.015; FAB TOLERANCES .XX : ± 0.060 .XXX : ± 0.030 | METRIC UNITS: MACHINE TOLERANCES .X : ± 0.4 .XX : ± 0.2; FORM TOLERANCES .X : ± 0.8 .XX : ± 0.4; FAB TOLERANCES .X : ± 1.5 .XX : ± 0.8

THIRD ANGLE PROJECTION

DWG UNITS: IN/LB/S	DRAWN BY: BOB KROPP		DATE: 02MAR2012	
	PRO-ENGINEER		INIT ECO: 2013-303	
SCALE: 0.750	SHEET 1 OF 1		DRAWING NO: 21438	
EST WEIGHT: NA				

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE
B	2014-241	UPDATED TO SHOW LEADS ON SOLENOID VALVE	PBS	17APR2014
A	2013-611	REPLACED 21008 & 21009 WITH 21574 & 8862	PBS	02OCT2013

BILL OF MATERIAL

ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	VALVE, SOLENOID, 3/4" NPT, 24VDC, SEA WATER COMPATIBLE	15739
2	2	VALVE,BALL,3/4NPT, SEA WATER COMPATIBLE,LOCKABLE	21434
3	1	SENDER, TEMPERATURE, DATCON #02022-00	8862
4	1	GUAGE, 0-100 PSI, 1/4" NPT STN STL	13113
5	2	REGULATOR/STRAINER, 3/4" NPT, SEA WATER COMPATIBLE	13703
6	4	TEE, MARINE GRADE, 3/4" NPT	15755-12
7	1	ELBOW, MARINE GRADE, 3/4" NPT	15756-12
8	4	BUSHING, MARINE GRADE, 3/4" X 1/4"	15758-12-4
9	3	BUSHING, MARINE GRADE, 1/4" x 1/8"	15758-4-2
10	1	VALVE, BALL, 1/4" NPT,, APOLLO 77-100 (MARINE)	15759-04
11	1	NIPPLE, NAVAL BRONZE, 1/4" X CLOSE	15760
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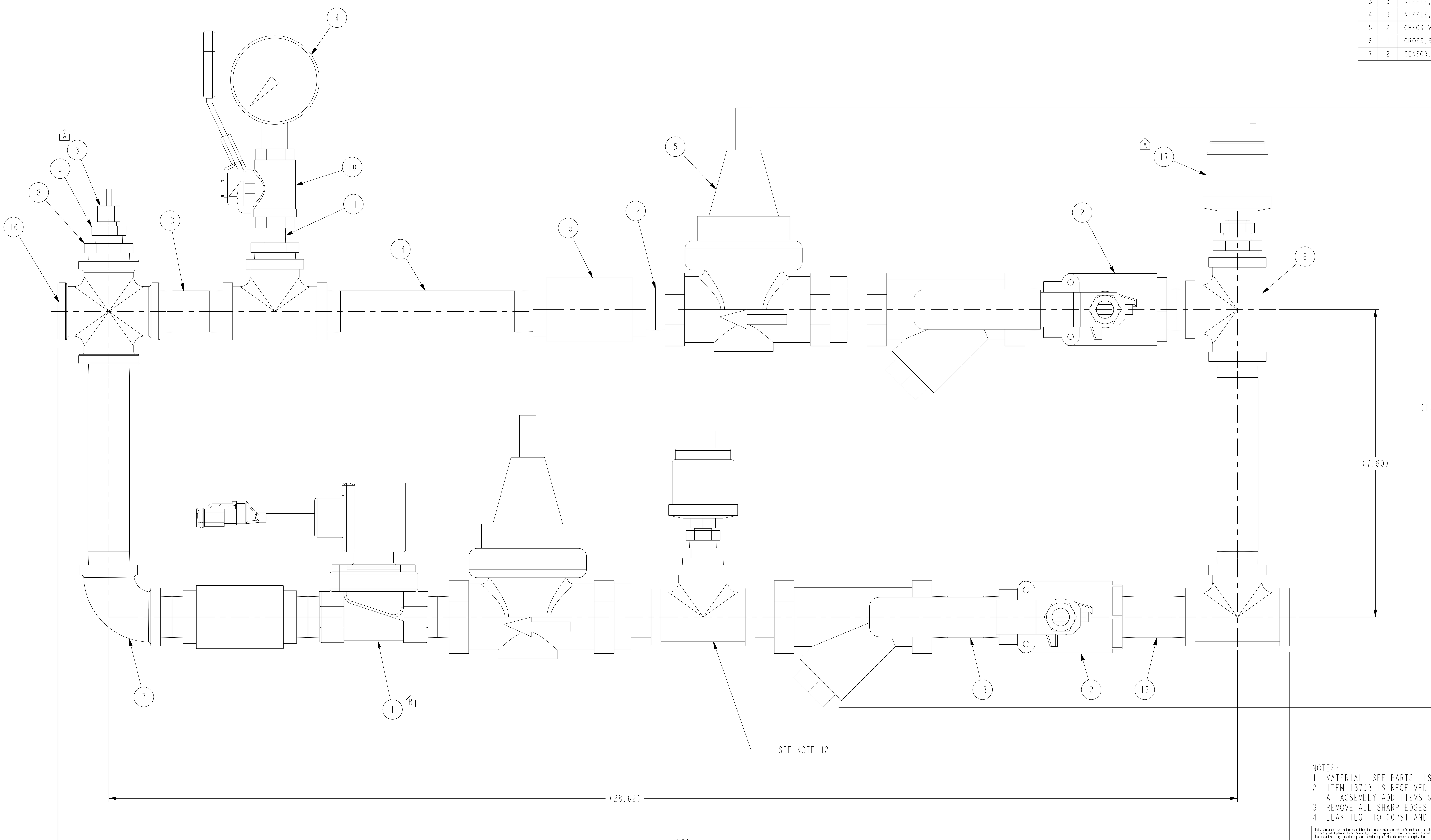
16	1	CROSS,3/4,NVL-BRNZ, SCHEDULE 40 PIPE	21436
17	2	SENSOR,300PSI,1/8NPT, VEETHREE-977035	21574



NOTES:
1. MATERIAL: SEE PARTS LIST
2. ITEM 13703 IS RECEIVED AS AN UNASSEMBLED KIT.
   AT ASSEMBLY ADD ITEMS SHOWN
3. REMOVE ALL SHARP EDGES AND BURRS
4. LEAK TEST TO 60PSI AND PRESET REGULATORS TO 60PSI

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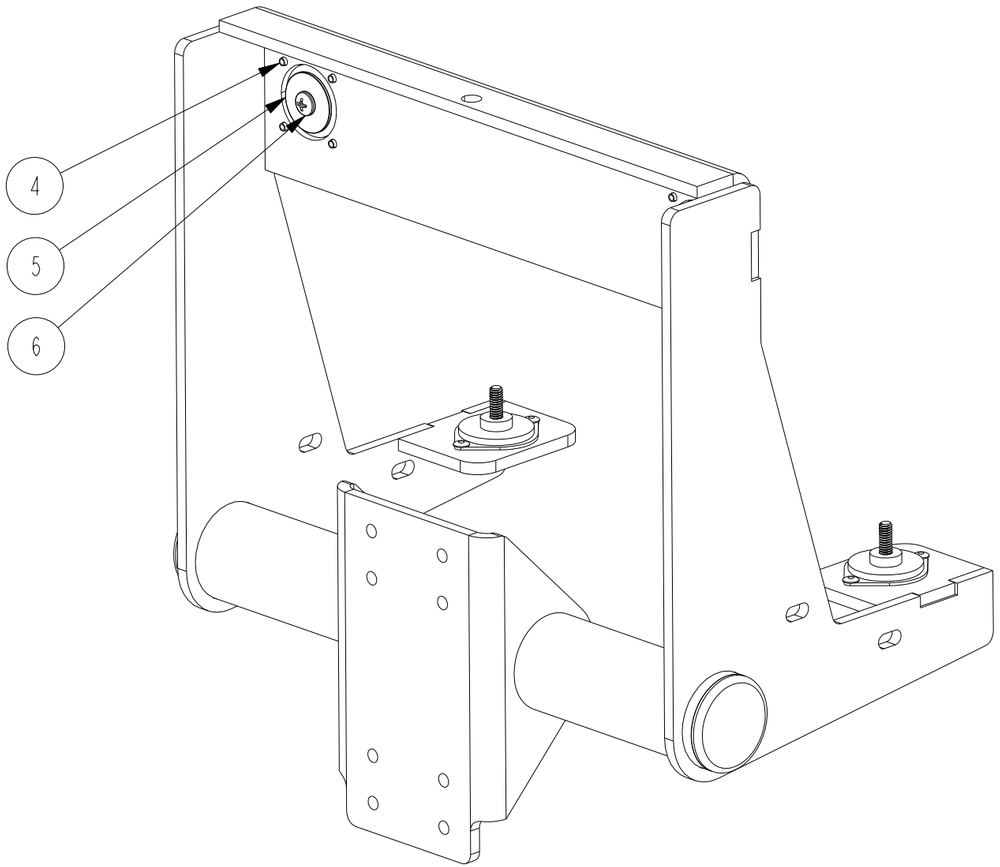
UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

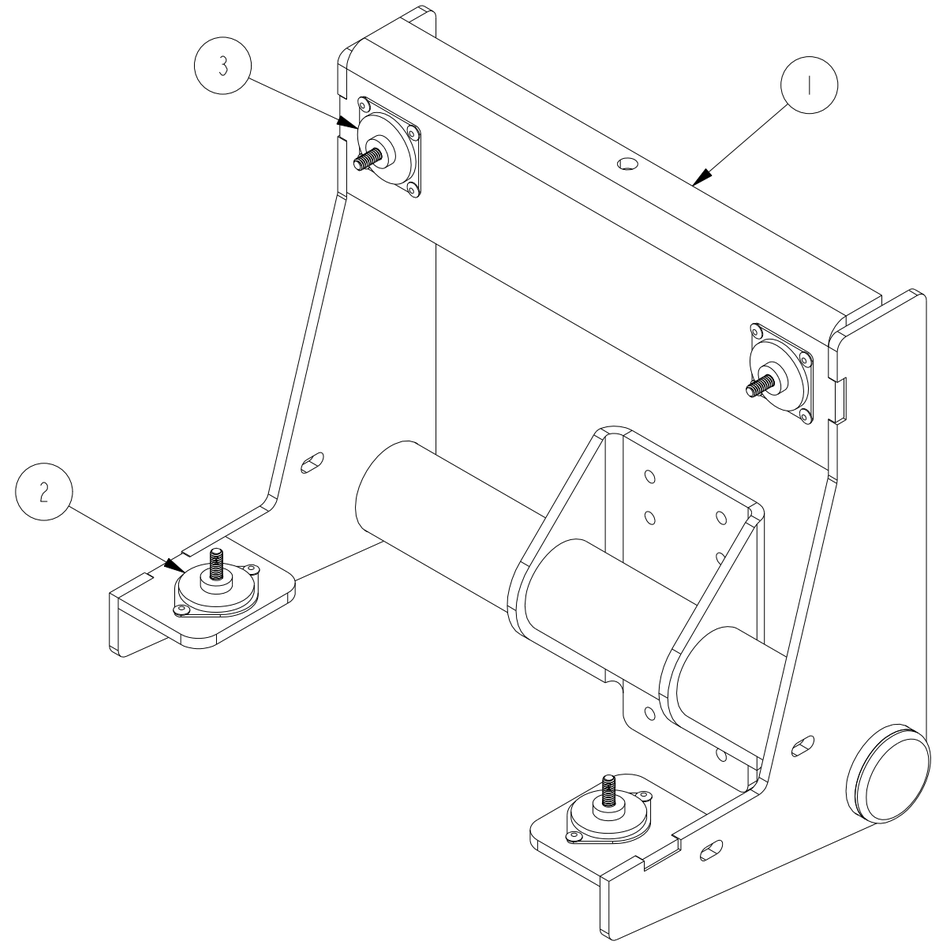
ANGULAR DIMENSIONS ± 1°	MACHINED SURFACES	IMPERIAL UNITS	METRIC UNITS
THIRD ANGLE PROJECTION	125	MACHINE TOLERANCES .XX = ± 0.010 .XXX = ± 0.005	MACHINE TOLERANCES .X = ± 0.4 .XX = ± 0.2
		FORM TOLERANCES .XX = ± 0.030 .XXX = ± 0.015	FORM TOLERANCES .X = ± 0.8 .XX = ± 0.4
		FAB TOLERANCES .XX = ± 0.060 .XXX = ± 0.030	FAB TOLERANCES .X = ± 1.5 .XX = ± 0.8

DWG UNITS: IN/LB/S
DRAWN BY: BOB KROPP
PRO-ENGINEER
DATE: 02MAR2012
INIT ECO: 2013-303
SCALE: 0.750
EST WEIGHT: NA
SHEET 1 OF 1
DRAWING NO: 21439

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE
B	2014-241	UPDATED TO SHOW LEADS ON SOLENOID VALVE	PBS	17APR2014
A	2013-611	REPLACED 21008 & 21009 WITH 21574 & 8862	PBS	02OCT2013

BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	MOUNT, OPERATOR STATION, CFP CONTROL PANEL	22318
2	2	ISOLATOR, PLATE MOUNT, 3 LB (YELLOW MARK)	15400
3	2	ISOLATOR, PLATE MOUNT, 6 LB (RED MARK)	15412
4	12	RIVET, ALUMINUM, STEEL SHANK, 0.156 DIA, 0.25-0.38 GRIP	15414
5	2	FENDER WASHER, 0.281 X 1.25	15421
6	4	SCREW, SELF LOCKING, 0.25-20 X 1.00, PH OR BH	15422





UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°

THIRD ANGLE PROJECTION

MACHINED SURFACES	IMPERIAL UNITS	METRIC UNITS
125	MACHINE TOLERANCES .XX = ± 0.010 .XXX = ± 0.005 FORM TOLERANCES .XX = ± 0.030 .XXX = ± 0.015 FAB TOLERANCES .XX = ± 0.060 .XXX = ± 0.030	MACHINE TOLERANCES .X = ± 0.4 .XX = ± 0.2 FORM TOLERANCES .X = ± 0.8 .XX = ± 0.4 FAB TOLERANCES .X = ± 1.5 .XX = ± 0.8

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE

Cummins Fire Power

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CORPORATE OFFICE
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WHITE BEAR LAKE, MN
WWW.CUMMINSFIREPOWER.COM

CUSTOM DESIGN
AND UPFIT CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

ASSEMBLY, CONTROL PANEL MOUNTING CFP POWER UNITS

DWG UNITS: IN/LB/S

DRAWN BY: S DUBICK

PRO-ENGINEER

DATE: 26-SEP-12

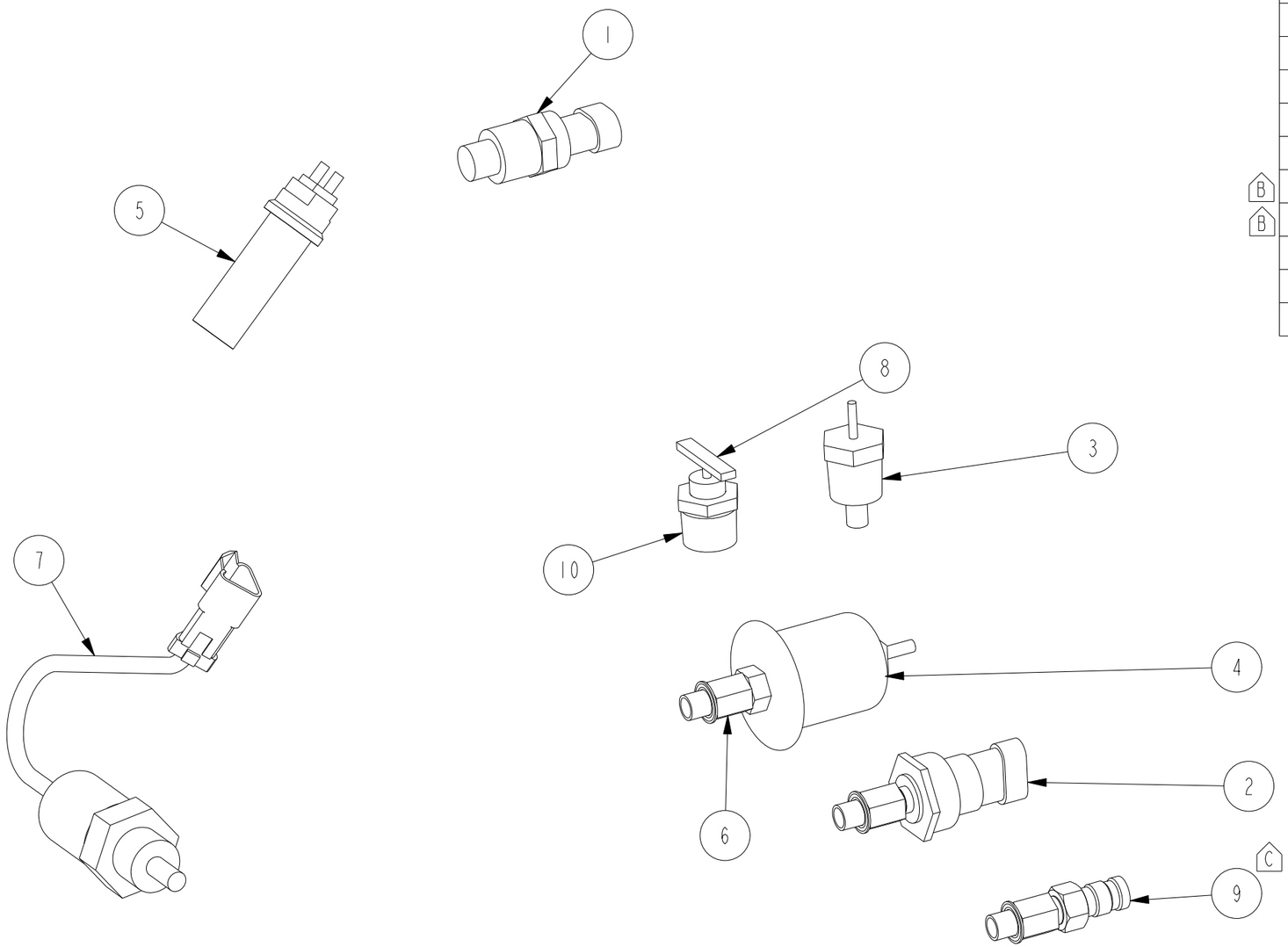
INIT ECO: 2012-392

SCALE: 0.333

EST WEIGHT: 16.439

SHEET 1 OF 1

DRAWING NO: 21249



BILL OF MATERIAL

ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	SWITCH, WATER TEMP, 200F SETTING, #3408632	8860
2	1	SWITCH, OIL PRESSURE, 16 PSI, #3408607	8861
3	1	SENDER, WATER TEMPERATURE, DATCON #02025-00	8862-01
4	1	SENDER, PRESURE, DATCON #02504-00	8863
5	1	SENSOR, MAG PICK UP, #5MT2005	9569
B 6	3	FTG, STR, M10 ORR X -2 FNPT	12181-M10-2
B 7	1	SWITCH, LOW COOLANT TEMP, 110° F SET POINT	18105
8	1	DRAIN VALVE, 1/4" NPT	80511
9	1	CONNECTOR, QUICK DISCONNECT	3377244
10	1	BUSHING, 1/4" NPT X 1/2" NPT	LTL-SRB-1214

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE
D	2013-736	RENAMED PER NEXT GEN, WAS 15388	PBS	27FEB2014
C	2014-073	ADDED 3377244	PBS	05FEB2014
B	2012-392	ADD (1) 12181-M10-2, 18105	S DUBICK	04-OCT-12

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°

THIRD ANGLE PROJECTION

MACHINED SURFACES 125

	IMPERIAL UNITS	METRIC UNITS
MACHINE TOLERANCES	.XX = ± 0.010 .XXX = ± 0.005	.X = ± 0.4 .XX = ± 0.2
FORM TOLERANCES	.XX = ± 0.030 .XXX = ± 0.015	.X = ± 0.8 .XX = ± 0.4
FAB TOLERANCES	.XX = ± 0.060 .XXX = ± 0.030	.X = ± 1.5 .XX = ± 0.8

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875 LAWRENCE DRIVE
DEPERE, WISCONSIN

KIT, SENSOR ADAPTER
CFP MECHANICAL

DWG UNITS: IN/LB/S

DRAWN BY: MAC

PRO-ENGINEER

DATE: 27AUG2009

INIT ECO:

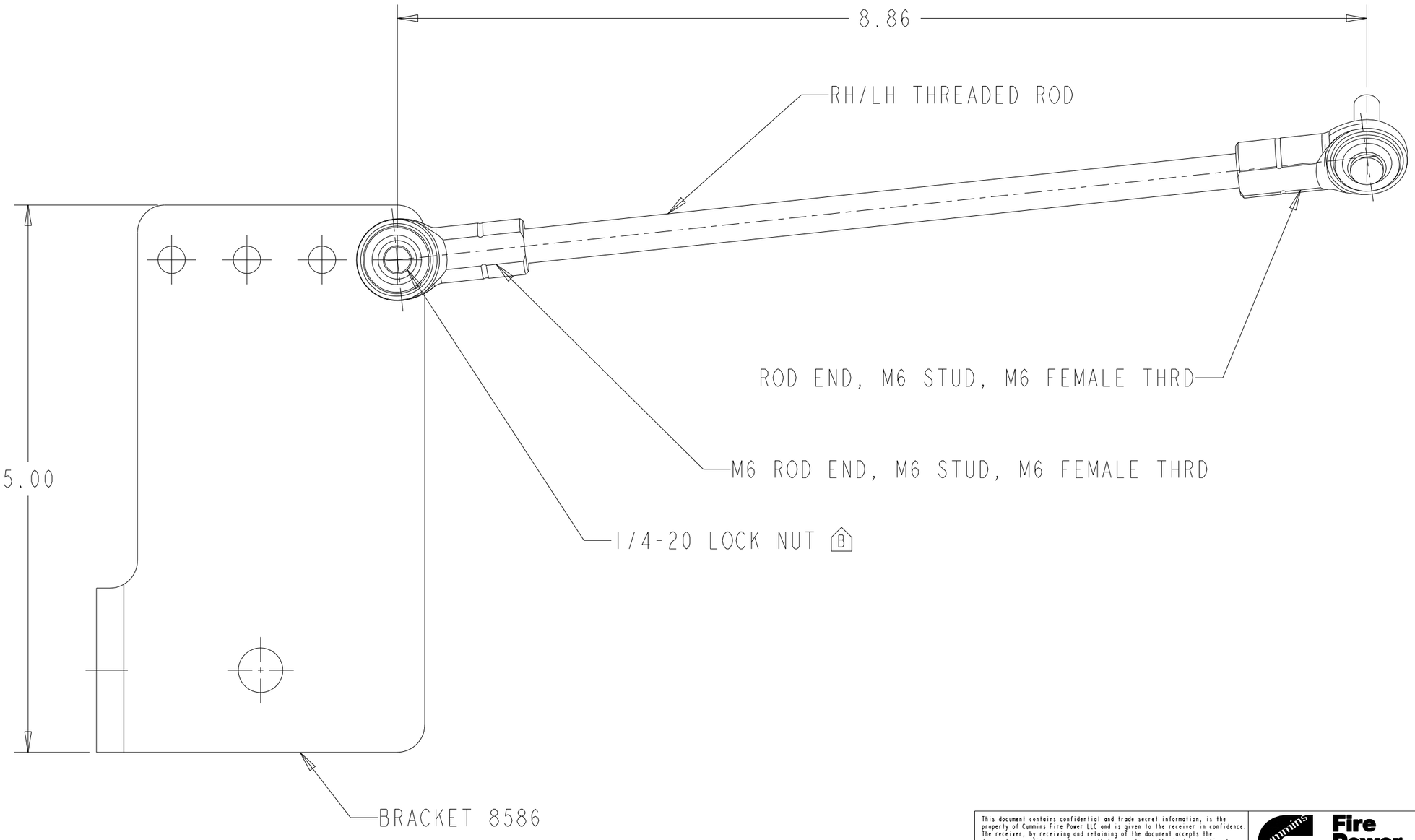
SCALE: 0.500

EST WEIGHT: 3.741

SHEET 1 OF 1

DRAWING NO: A042A558

LINKAGE PART NUMBER 8585-01-06



REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE
B	2011-053	ADDED NUT PER SIX SIGMA	S DUBICK	17-MAY-11

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°

THIRD ANGLE PROJECTION

IMPERIAL UNITS	METRIC UNITS
MACHINE TOLERANCES .XX : ± 0.010 .XXX : ± 0.005	MACHINE TOLERANCES .X : ± 0.4 .XX : ± 0.2
FORM TOLERANCES .XX : ± 0.030 .XXX : ± 0.015	FORM TOLERANCES .X : ± 0.8 .XX : ± 0.4
FAB TOLERANCES .XX : ± 0.060 .XXX : ± 0.030	FAB TOLERANCES .X : ± 1.5 .XX : ± 0.8

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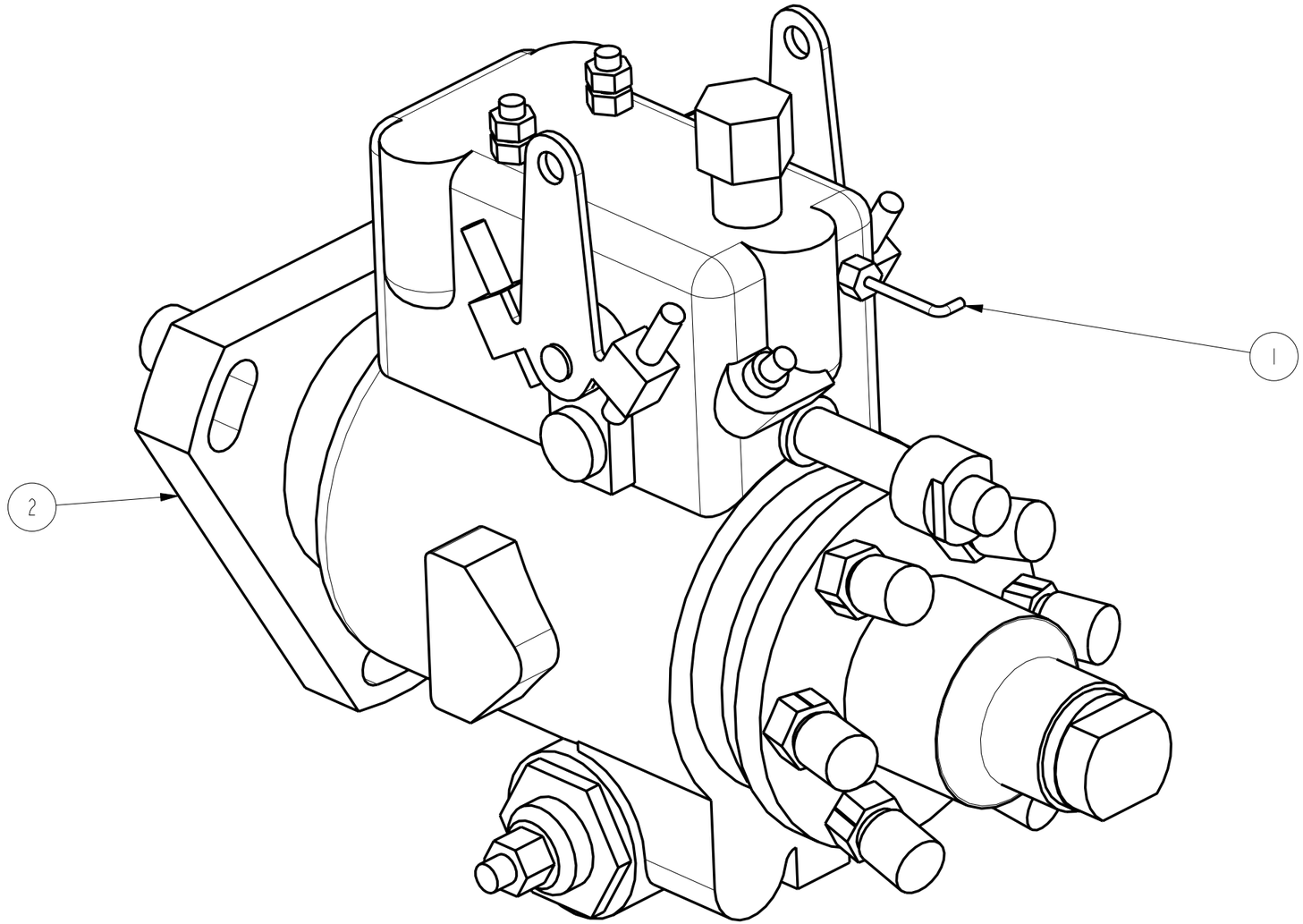
CUSTOM DESIGN
AND UPFIT CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

ASSEMBLY, THROTTLE POSITION
FIREPUMP

DWG UNITS: IN/LB/S	DRAWN BY: DAVE N	DATE: 05AUG2004
	PRO-ENGINEER	INIT ECO:
SCALE: 1.000	SHEET 1 OF 1	DRAWING NO: 8585
EST WEIGHT: 1.075		

BILL OF MATERIAL

ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	KIT, FUEL SOLENOID OVERIDE	9699
2	1	FUEL PUMP, REFERENCE ONLY	FP99437



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WHITE BEAR LAKE, MN
WWW.NPOWER.CUMMINS.COM

CUMMINS FIREPOWER
DESIGN CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN
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UNLESS OTHERWISE SPECIFIED
ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°

TITLE 1: KIT, FUEL SOLENOID OVERIDE
TITLE 2: FIREPUMP

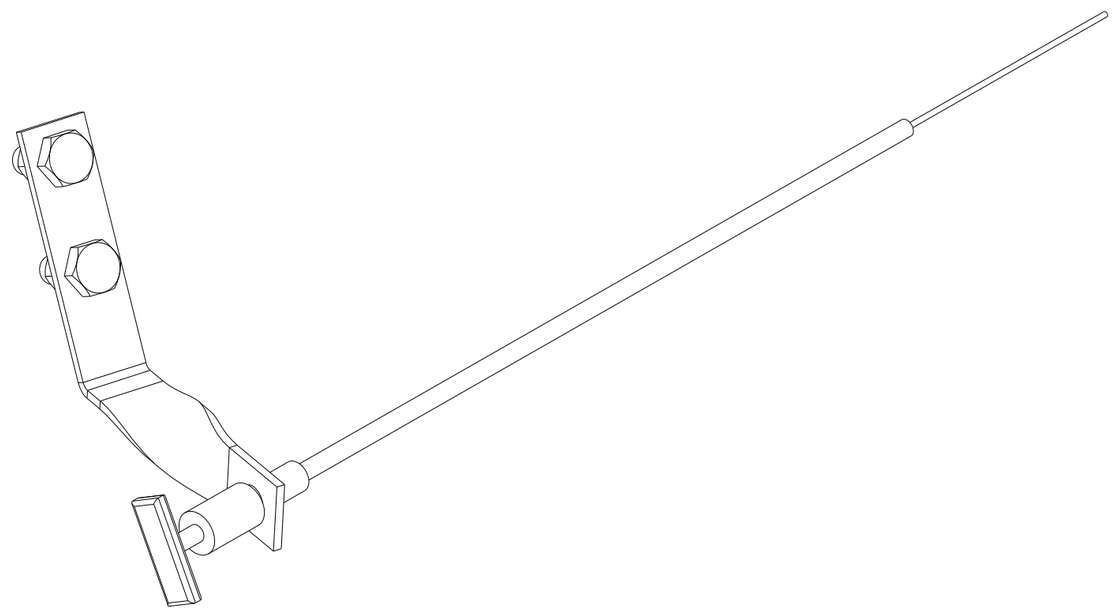
IMPERIAL UNITS	METRIC UNITS
MACHINE TOLERANCES .X = ± 0.06 .XX = ± 0.010 .XXX = ± 0.001 : WELD TOLERANCES .X = ± 0.25 .XX = ± 0.12 .XXX = ± 0.06	MACHINE TOLERANCES X = ± 1.5 X.X = ± 0.5 X.XX = ± 0.05 : WELDED TOLERANCES X = ± 5 X.X = ± 3 X.XX = ± 1.50

A	CREATED DRAWING	DAVE N	08JUL05
REV	DESCRIPTION OF REVISION	REV BY	DATE

DWG UNITS: IN/LB/S	DRAWN BY: DAVE N				DATE: MAR05
	APPD BY: -				DATE: -
EST WEIGHT: 42238.628	SCALE: 1.000	DO NOT SCALE	SHEET 1OF1	DRAWING NO: 9699	REV: A

BILL OF MATERIAL

ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	THROTTLE CABLE, TURN LOCKING	R09D3-5X06
2	1	DECAL, FUEL SOLENOID OVERIDE (NOT SHOWN), FIREPUMP	9526-12
3	1	BRACKET, HANDLE, SOLENOID OVERIDE, FIREPUMP	9835
4	1	CHAIN, CONNECTING (NOT SHOWN) P/N 1250, FIREPUMP	CHAIN-1250
B 5	1	NUT,HEX,PT, M5-0.80	20140-M5
B 6	2	NUT,HEX, M10-1.50	20120-M10
B 7	2	SCREW,HH, M10-1.50x25	20310-025
B 8	1	SCREW,HH, M5-0.80x16	20305-016
B 9	1	WASHER,FLAT, M5	20020-M5



REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE
B	2011-053	ADD FASTENERS PER SIX SIGMA	S DUBICK	17-MAY-11

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1° | IMPERIAL UNITS | METRIC UNITS

THIRD ANGLE PROJECTION

MACHINE TOLERANCES .XX : ± 0.010 .XXX : ± 0.005
FORM TOLERANCES .XX : ± 0.030 .XXX : ± 0.015
FAB TOLERANCES .XX : ± 0.060 .XXX : ± 0.030

MACHINE TOLERANCES .X : ± 0.4 .XX : ± 0.2
FORM TOLERANCES .X : ± 0.8 .XX : ± 0.4
FAB TOLERANCES .X : ± 1.5 .XX : ± 0.8

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CUSTOM DESIGN
AND UPFIT CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

ASSEMBLY, SOLENOID OVERIDE FIREPUMP

DWG UNITS: IN/LB/S

DRAWN BY: DAVE N

PRO-ENGINEER

DATE: 30APR05

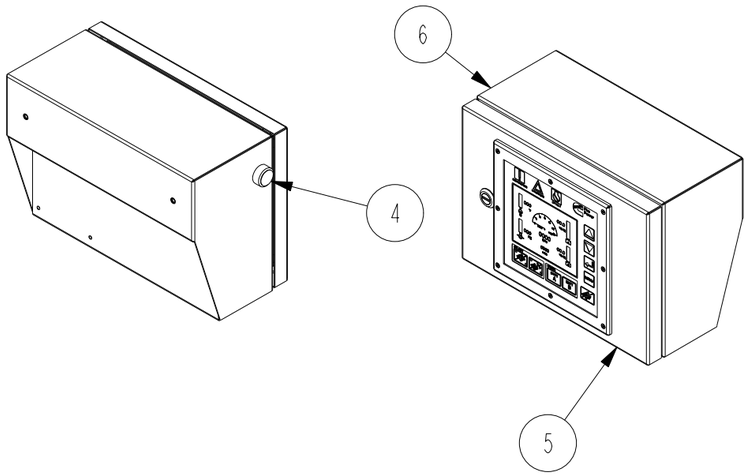
INIT ECO:

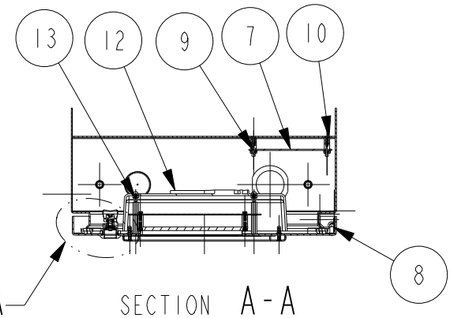
SCALE: 0.500

EST WEIGHT: 0.606

SHEET 1 OF 1

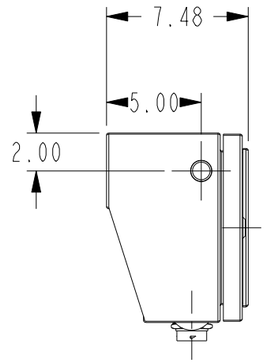
DRAWING NO: 9839

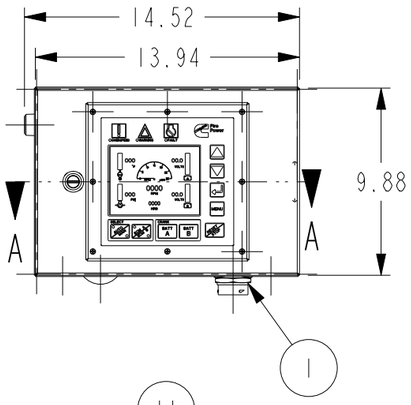


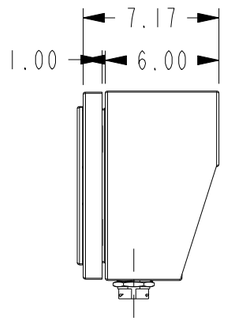


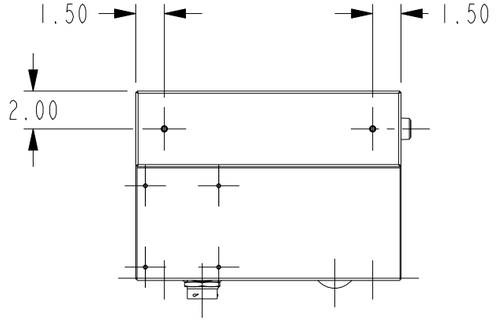
BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	ASSY,BULKHEAD WIRING, DIGITAL PANEL, BULKHEAD TO POWER PCB	15156
2	1	CABLE, DIGITAL PANEL, POWER PCB TO DISPLAY PCB	15157
3	1	CABLE, DIGITAL PANEL, POWER PCB TO ECM SWITCH PCB	15158
4	1	ASSY, WIRING, DIGITAL PANEL, ENGINE STOP SWITCH	15160
5	1	ASSEMBLY, DOOR, CONTROL PANEL	15575
6	1	WELDMT, DIGITAL PANEL, BOX, MECHANICAL	15654
7	1	POWER PCB, DIGITAL PANEL, ELECTRONIC	15153
8	2	HINGE, ASSEMBLY W/PIN, MILD STEEL, EMKA 1069-U2	15573_02
9	6	NUT, 8-32, W/TOOTH WASHER, ZNC -PLTD	15582
10	6	STANDOFF HEX M/F,8-32, .63"L, ALUM, DIGI-KEY 8428K-ND	15587
11	1	PLUG, LIQUID TIGHT, HEYCO, 3837	15645
12	1	COVER, DOOR PANEL	16889
13	4	NUT, ACORN,SELF-LOCKING, 8-32, 18-8 STNL STL	17149
14	1	LABEL, UL , MECHANICAL CONTROL PANEL	17791

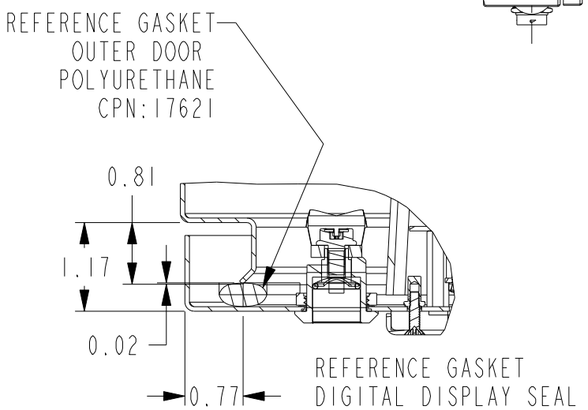
** BOM FOR REFERENCE ONLY **



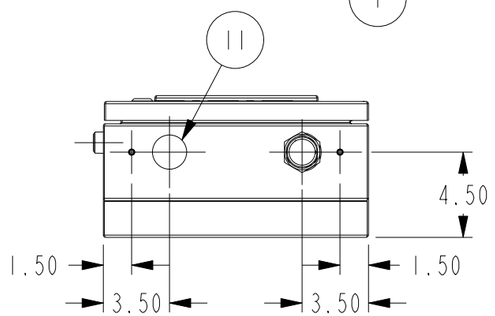








DETAIL A
SCALE 0.500



NOTES:
1. FINISH ON STEEL COMPONENTS:
   COAT PER CUMMINS SPEC ES044 CUMMINS RED
2. TYPE 4X INDOOR USE CONSTRUCTION
3. UPDATED SOFTWARE

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°	MACHINED SURFACES	IMPERIAL UNITS	METRIC UNITS
THIRD ANGLE PROJECTION	125	MACHINE TOLERANCES .XX : ± 0.010 .XXX : ± 0.005 FORM TOLERANCES .XX : ± 0.030 .XXX : ± 0.015 FAB TOLERANCES .XX : ± 0.060 .XXX : ± 0.030	MACHINE TOLERANCES .X : ± 0.4 .XX : ± 0.2 FORM TOLERANCES .X : ± 0.8 .XX : ± 0.4 FAB TOLERANCES .X : ± 1.5 .XX : ± 0.8

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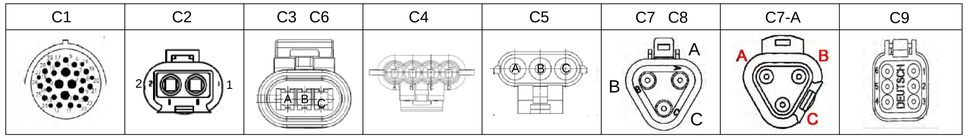
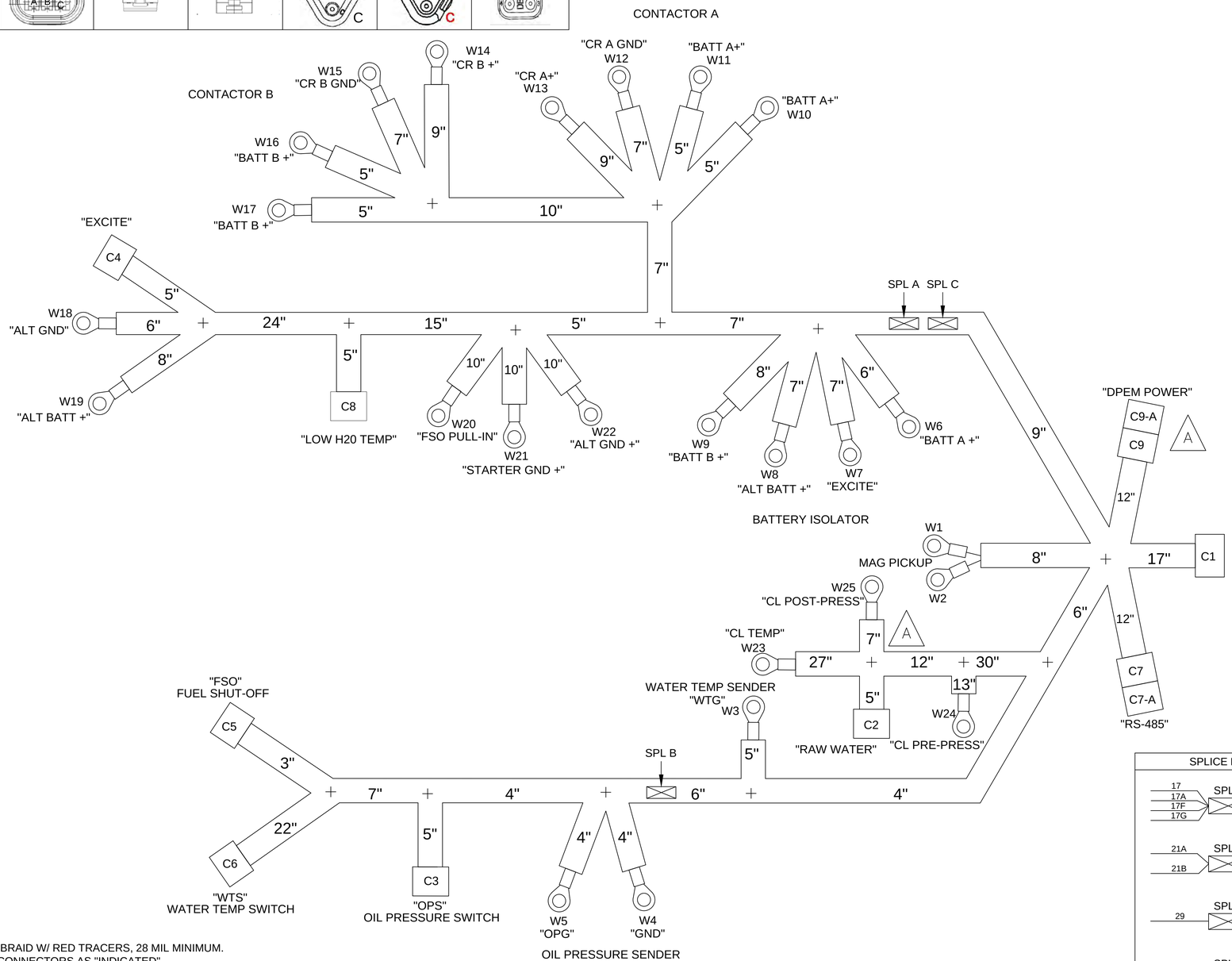
CUSTOM DESIGN
AND UPFIT CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

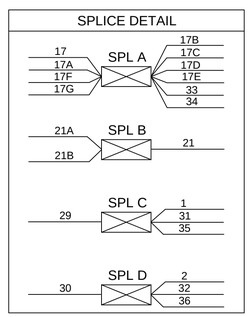
ASSEMBLY, DIGITAL PANEL
MECHANICAL FIRE PUMP DRIVER

DWG UNITS: IN/LB/S	DRAWN BY: S DUBICK	DATE: 21-SEP-12
	PRO-ENGINEER	INIT ECO: 2012-348
SCALE: 0.125	SHEET 1 OF 1	DRAWING NO: 22793
EST WEIGHT: 26.147		

CONNECTOR WIRE INSERTION VIEW







NOTES:

1) LOOM WITH BLACK NYLON BRAID W/ RED TRACERS, 28 MIL MINIMUM.
2) PROMINENTLY LABEL ALL CONNECTORS AS "INDICATED".
3) ALL SPLICES TO BE FITTED WITH GLUED HEATSHRINK.
4) ALL DIMENSIONS SHOWN ARE MEASURED FROM THE REAR OF THE CONNECTOR (WIRE ENTRY VIEW).
5) SEE SHEET 2 FOR THE WIRE TO/FROM LIST.
6) RUN BRAID OVER THE BOOT AT LEAST 1" ON ALL CONNECTORS WITH BOOST TO PREVENT THE BRAID FROM SLIPPING BACK.
7) USE A 3" LONG GLUED HEATSHRINK ON ALL RING TERMINALS AND RUN THE BRAID ½ WAY UP THE HEATSHRINK.
8) USE GLUED HEAT SHRINK ON CONNECTORS C4 & C5 TO ACT AS A BOOT. MAKE SURE HEAT SHRINK COVERS BACK OF CONNECTOR AND BRAID RUNS ½ WAY UP THE HEATSHRINK.
9) COMPONENTS MAY BE SUBSTITUTED AS LONG AS FIT, FORM, FUNCTION AND REGULATORY STANDARDS ARE MET OR EXCEEDED.

REV	ECO	DESCRIPTION OF REVISION	BY	DATE
A	2014–221	ADDED COOLING LOOP SENSORS; ADDED DPEM POWER BREAKOUT; ADDED SCHEMATIC, PAGE 3.	RMJ	24FEB2014

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°	IMPERIAL UNITS	METRIC UNITS
THIRD ANGLE PROJECTION	WORKING TOLERANCES .XX = ± 0.010 .XXX = ± 0.005 FORM TOLERANCES .XX = ± 0.010 .XXX = ± 0.010 FINE TOLERANCES .XX = ± 0.005 .XXX = ± 0.005	WORKING TOLERANCES .X = ± 0.2 .XX = ± 0.25 FORM TOLERANCES .X = ± 0.2 .XX = ± 0.2 FINE TOLERANCES .X = ± 0.2 .XX = ± 0.2

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CUSTOM DESIGN AND UPFIT CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

HARNESS, WIRE B5.9 FIRE PUMP DRIVER

DWG UNITS: INCH/LB/S	DRAWN BY: BG	DATE: 17–JAN–2013
	AUTO CAD	INIT ECO: 2013–030
SCALE:	SHEET 1OF3	DRAWING NO: 23926
EST WEIGHT:		

A

TAGS	QTY	CATALOG	MFG	DESC
C1	1	HDP26-24-29SN	DEUTSCH	CONNECTOR, PLUG, 29 POSITION, CIRCULAR
	4	1062-12-0222	DEUTSCH	TERMINAL, SOCKET, NICKEL, SIZE 12
	15	0462-209-16141	DEUTSCH	TERMINAL, SOCKET, NICKEL, SIZE 16
	3	0462-201-16141	DEUTSCH	TERMINAL, SOCKET, NICKEL, SIZE 16,16-20 AWG
	1	114017	DEUTSCH	PLUG, SEALING, SIZE 12-16
	6	0413-204-2005	DEUTSCH	PLUG, SEALING, SIZE 20
	1	HD30-24BT-BK	DEUTSCH	BOOT, 24 SHELL SIZE, BLACK
C2	1	DT04-2P	DEUTSCH	CONNECTOR, RECEPTACLE, 2 POSITION
	2	0460-202-16141	DEUTSCH	TERMINAL, PIN, NICKEL, SIZE 16
	1	W2P	DEUTSCH	WEDGELOCK
	1	DT2P-BT	DEUTSCH	BOOT, 2 WAY RECEPTACLE, GRAY
C3	1	12162280	DELPHI	CONNECTOR, ASSY, FEMALE, METRI-PACK 150.2, 3 WAY
	3	12124075	DELPHI	TERMINAL, FEMALE, METRI-PACK 150.2, TIN PLATED
	1	3656059	ELL-TRON	BOOT
C4	1	12186568	DELPHI	CONNECTOR, ASSY, FEMALE, METRI-PACK 150, 4 WAY
	1	12048074	DELPHI	TERMINAL, FEMALE, METRI-PACK 150, TIN PLATED
	1	12052387	DELPHI	SEAL, CABLE, GRAY
	3	12059168	DELPHI	PLUG, CABLE CAVITY, DARK RED
C5	1	12015793	DELPHI	CONNECTOR, ASSY, FEMALE, WEATHER PACK TOWER, 3 WAY
	3	12089188	DELPHI	TERMINAL, FEMALE, WEATHER PACK, TIN PLATED
	3	12010293	DELPHI	SEAL, CABLE, GRAY
C6	1	12162280	DELPHI	CONNECTOR, ASSY, FEMALE, METRI-PACK 150.2, 3 WAY
	2	12124075	DELPHI	TERMINAL, FEMALE, METRI-PACK 150.2, TIN PLATED
	1	12034413	DELPHI	PLUG, CABLE CAVITY, BLACK
	1	3656059	ELL-TRON	BOOT
C7, C8	2	DT06-3S	DEUTSCH	CONNECTOR, PLUG, 2-POSITION
	5	0462-201-16141	DEUTSCH	TERMINAL, SOCKET, SIZE 16, NICKEL
	2	W3S	DEUTSCH	WEDGELOCK
	2	DT3S-BT	DEUTSCH	BOOT
C7-A	1	DT04-3P	DEUTSCH	CONNECTOR, PLUG, 2-POSITION
	3	114017	DEUTSCH	PLUG, SEALING, SIZE 12-16
	1	W3P	DEUTSCH	WEDGELOCK
C9	1	DT06-6S	DEUTSCH	CONNECTOR, PLUG, 6-POSITION
	6	0462-201-16141	DEUTSCH	TERMINAL, SOCKET, NICKEL, SIZE 16
	1	W6S	DEUTSCH	WEDGELOCK
	1	DT6S-BTBK	DEUTSCH	BOOT, BLACK
C9-A	1	DT04-6P	DEUTSCH	CONNECTOR, RECEPTACLE, 6-POSITION
	6	114017	DEUTSCH	PLUG, SEALING, SIZE 12-16
	1	W6P	DEUTSCH	WEDGELOCK
W13,W14	2	31203	WAYTEK	TERMINAL, RING, #10, 16-14AWG, NON-INSULATED
	2	218N1V02	VTE	CAP, LUG AND RING TERMINAL, 200 SERIES
W1,W2,W3,W5,W12,W15, W23,W24,W25	9	31203	WAYTEK	TERMINAL, RING, #10, 16-14AWG, NON-INSULATED
W7	1	31204	WAYTEK	TERMINAL, RING, 1/4", 16-14AWG, NON-INSULATED
	1	218N1V02	VTE	CAP, LUG AND RING TERMINAL, 200 SERIES
W20	1	31207	WAYTEK	TERMINAL, RING, 1/2", 16-14AWG, NON-INSULATED
	1	218N1V02	VTE	CAP, LUG AND RING TERMINAL, 200 SERIES
W11,W16	2	32205	WAYTEK	TERMINAL, RING, 3/8", 10-12AWG, NON-INSULATED
W21	1	32206	WAYTEK	TERMINAL, RING, 1/2", 12-10AWG, NON-INSULATED
W19	1	34002	WAYTEK	TERMINAL, RING, 5/16", 6AWG, NON-INSULATED
	1	218N2V02	VTE	CAP, LUG AND RING TERMINAL, 200 SERIES
W22	1	34004	WAYTEK	TERMINAL, RING, 1/2", 6AWG, NON-INSULATED
W6,W8,W9	3	34001	WAYTEK	TERMINAL, RING, 1/4" 6AWG, NON-INSULATED
	1	218N2V02	VTE	CAP, LUG AND RING TERMINAL, 200 SERIES
W4,W10,W17	3	34003	WAYTEK	TERMINAL, RING, 3/8", 6AWG, NON-INSULATED
W18	1	34001	WAYTEK	TERMINAL, RING, 1/4" 6AWG, NON-INSULATED

A

CIRCUIT #	FROM	PIN1	TO	PIN2	WIRECOLOR	WIRESIZE	WIRE TYPE	TERM 1	TERM 2	STAMP
1	C1	1	SPL C	<	WHITE	10	GXL	1062-12-0222	-	BATT A
2	C1	2	SPL D	<	WHITE	10	GXL	1062-12-0222	-	BATT B
3	C1	4	W21	-	WHITE	10	GXL	1062-12-0222	32206	CHARGE GND
4	C1	5	W1	-	WHITE	16	GXL	0462-209-16141	31203	MPU +
5	C1	6	W2	-	WHITE	16	GXL	0462-209-16141	31203	MPU -
6	C1	7	C5	A	WHITE	16	GXL	0462-209-16141	12089188	FSO
7	C1	8	W5	-	WHITE	16	GXL	0462-209-16141	31203	OPG
8	C1	9	W3	-	WHITE	16	GXL	0462-209-16141	31203	WTG
9	C1	10	C3	C	WHITE	16	GXL	0462-209-16141	12124075	OPS
10	C1	11	C6	B	WHITE	16	GXL	0462-209-16141	12124075	WTS
11	C1	12	W13	-	WHITE	14	GXL	0462-209-16141	31203	CRANK A
12	C1	13	W14	-	WHITE	14	GXL	0462-209-16141	31203	CRANK B
13	C1	15	C2	1	WHITE	14	GXL	0462-209-16141	0460-202-16141	RW SOL +
14	C3	B	C6	A	WHITE	16	GXL	12124075	12124075	OPS TO WTS
15	W19	-	W8	-	WHITE	6	GXL	34002	34001	ALT B+
16	W18	-	W22	-	WHITE	6	GXL	34002	34004	ALT GND
17	W4	-	SPL A	>	WHITE	6	GXL	34003	-	GND
17A	C3	A	SPL A	>	WHITE	16	GXL	12124075	-	OPS GND
17B	C2	2	SPL A	<	WHITE	14	GXL	0460-202-16141	-	RW SOL GND
17C	C1	3	SPL A	<	WHITE	10	GXL	1062-12-0222	-	SYS GND
17D	W12	-	SPL A	<	WHITE	14	GXL	31203	-	CRANK A GND
17E	W15	-	SPL A	<	WHITE	14	GXL	31203	-	CRANK B GND
17F	C5	C	SPL A	>	WHITE	16	GXL	12089188	-	FSO GND
17G	C8	C	SPL A	>	WHITE	16	GXL	0462-201-16141	-	LCT GND
18	W6	-	W10		WHITE	6	GXL	34001	34003	BATT A +
19	W9	-	W17	-	WHITE	6	GXL	34001	34003	BATT B +
20	C5	B	W20	-	WHITE	16	GXL	12089188	31207	FSO PULL-IN
21	C1	14	SPL B	<	WHITE	16	GXL	0462-209-16141	-	EXCITE
21A	C4	C	SPL B	>	WHITE	16	GXL	12048074	-	EXCITE
21B	W7	-	SPL B	>	WHITE	16	GXL	31204	-	EXCITE
22	C1	21	C7	A	WHITE/BLUE	22	BELDEN 3105A	0462-201-16141	0462-201-16141	RS485 A
23	C1	22	C7	B	BLUE/WHITE	22		0462-201-16141	0462-201-16141	RS485 B
24	C1	16	C7	C	SHIELD	22		0462-201-16141	0462-201-16141	RS485 SHLD
25	C8	B	C1	19	WHITE	16	GXL	0462-201-16141	0462-209-16141	LCT SIG
26	C1	17	W23	-	WHITE	16	GXL	0462-209-16141	31203	LOOP TEMP
27	C1	25	W24	-	WHITE	16	GXL	0462-209-16141	31203	LOOP PRE PRESS
28	C1	26	W25	-	WHITE	16	GXL	0462-209-16141	31203	LOOP POST PRESS
29	SPL C	>	W11	-	WHITE	10	GXL	-	32205	BATT A
30	SPL D	>	W16	-	WHITE	10	GXL	-	32205	BATT B
31	SPL C	<	C9	1	WHITE	16	GXL	-	0462-201-16141	DPEM BA+
32	SPL D	<	C9	2	WHITE	16	GXL	-	0462-201-16141	DPEM BB+
33	SPL A	<	C9	3	WHITE	16	GXL	-	0462-201-16141	DPEM GROUND
34	SPL A	<	C9	4	WHITE	16	GXL	-	0462-201-16141	DPEM GROUND
35	SPL C	<	C9	5	WHITE	16	GXL	-	0462-201-16141	DPEM BA+
36	SPL D	<	C9	5	WHITE	16	GXL	-	0462-201-16141	DPEM BB+

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1° | IMPERIAL UNITS | METRIC UNITS

THIRD ANGLE PROJECTION

WHOLE TOLERANCES .XX ± 0.02 FOUR TOLERANCES .XXX ± 0.010 FIVE TOLERANCES .XXXX ± 0.0050

WHOLE TOLERANCES .X ± 0.5 FOUR TOLERANCES .XX ± 0.25 FIVE TOLERANCES .XXX ± 0.13

REV	ECO	DESCRIPTION OF REVISION	BY	DATE
A	2014-221	ADDED COOLING LOOP SENSORS; ADDED DPEM POWER BREAKOUT; ADDED SCHEMATIC, PAGE 3.	RMJ	24FEB2014

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CUMMINS FIRE POWER LLC
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1600 BUERKLE ROAD
WHITE BEAR LAKE, MN
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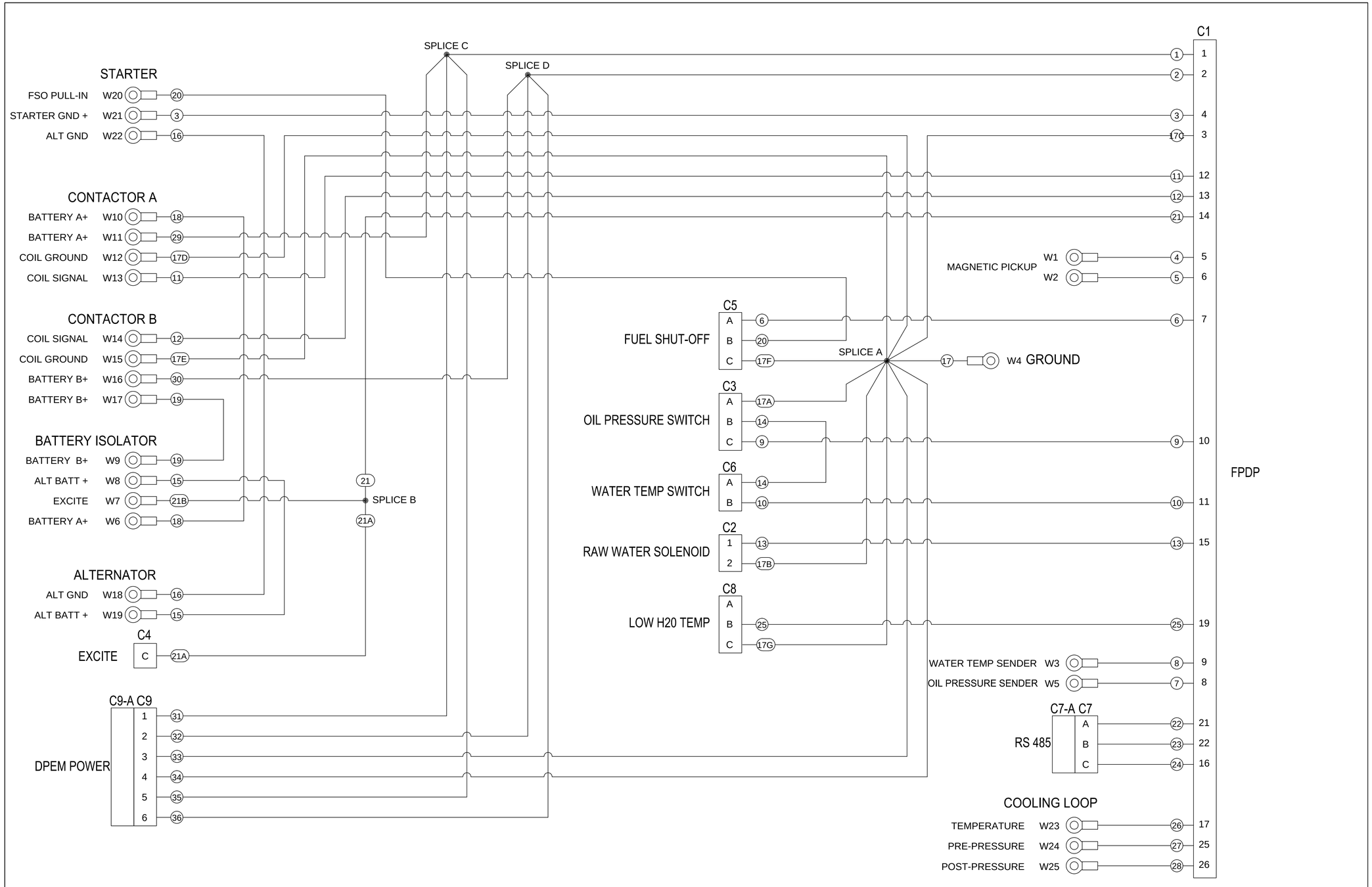
CUSTOM DESIGN AND
UPFIT CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

HARNESS, WIRE
B5.9 FIRE PUMP DRIVER

DWG UNITS: INCH/LB/S | DRAWN BY: BG | DATE: 17-JAN-2013
AUTO CAD | INIT ECO: 2013-030
SCALE: | SHEET 2OF3 | DRAWING NO: 23926
EST WEIGHT:



REV	ECO	DESCRIPTION OF REVISION	BY	DATE
A	2014-221	ADDED COOLING LOOP SENSORS; ADDED DPEM POWER BREAKOUT; ADDED SCHEMATIC, PAGE 3.	RMJ	24FEB2014

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°	IMPERIAL UNITS	METRIC UNITS
THIRD ANGLE PROJECTION	DECIMAL TOLERANCES .XX = ± 0.010 .XXX = ± 0.005 FRACTIONAL TOLERANCES .XX = ± 1/64 .XXX = ± 1/128 ANGULAR TOLERANCES .XX = ± 1/2	DECIMAL TOLERANCES .X = ± 0.2 .XX = ± 0.02 FRACTIONAL TOLERANCES .X = ± 1/2 .XX = ± 1/64 ANGULAR TOLERANCES .X = ± 1/2

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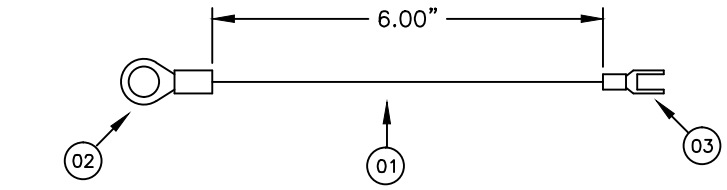
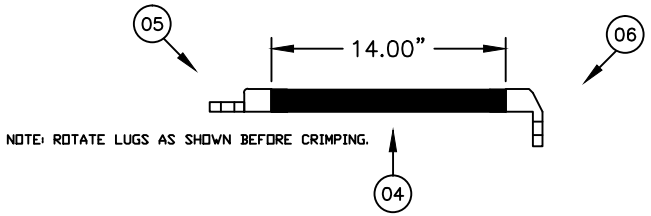
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

HARNESS, WIRE
B5.9 FIRE PUMP DRIVER

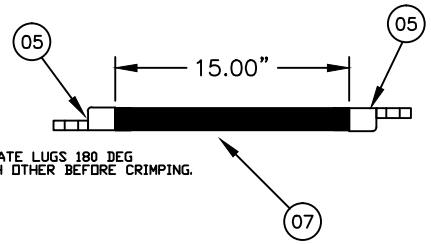
DWG UNITS: INCH/LB/S	DRAWN BY: BG	DATE: 17-JAN-2013
AUTO CAD		INIT ECO: 2013-030
SCALE:	SHEET 3OF3	DRAWING NO: 23926
EST WEIGHT:		

TAGS	QTY	SUB	CATALOG	MFG	DESC
1	1	6"	WL10-9	WAYTEK	WIRE, GXL, WHITE, 10 AWG
2	1	1	32706	WAYTEK	TERMINAL, RING, 1/2", 10 AWG, INSULATED
3	1	1	52717-2	AMP	TERMINAL, SPADE, #10
4	1	14"	WC00-0	WAYTEK	CABLE, WELDING, 2/0 AWG, BLACK
5	3	1	36534	WAYTEK	TERMINAL, EYELET, HEAVY DUTY, 3/8", 2/0 AWG, NON-INSULATED
6	1	1	YAV2CLTC12FX90	BURNDY	TERMINAL, EYELET, HEAVY DUTY, 90DEG, 1/2", 2/0 AWG, NON-INSULATED
7	1	15"	WC00-0	WAYTEK	CABLE, WELDING, 2/0 AWG, BLACK





NOTE: ROTATE LUGS AS SHOWN BEFORE CRIMPING.



NOTE: ROTATE LUGS 180 DEG
FROM EACH OTHER BEFORE CRIMPING.

NOTES: 1) USE RED HEAT SHRINK ON ALL BATTERY CABLE TERMINALS.
2) COMPONENTS MAY BE SUBSTITUTED AS LONG AS FIT, FORM, FUNCTION AND REGULATORY STANDARDS ARE MET OR EXCEEDED.

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°	IMPERIAL UNITS	METRIC UNITS
THIRD ANGLE PROJECTION		

REV	ECO	DESCRIPTION OF REVISION	BY	DATE

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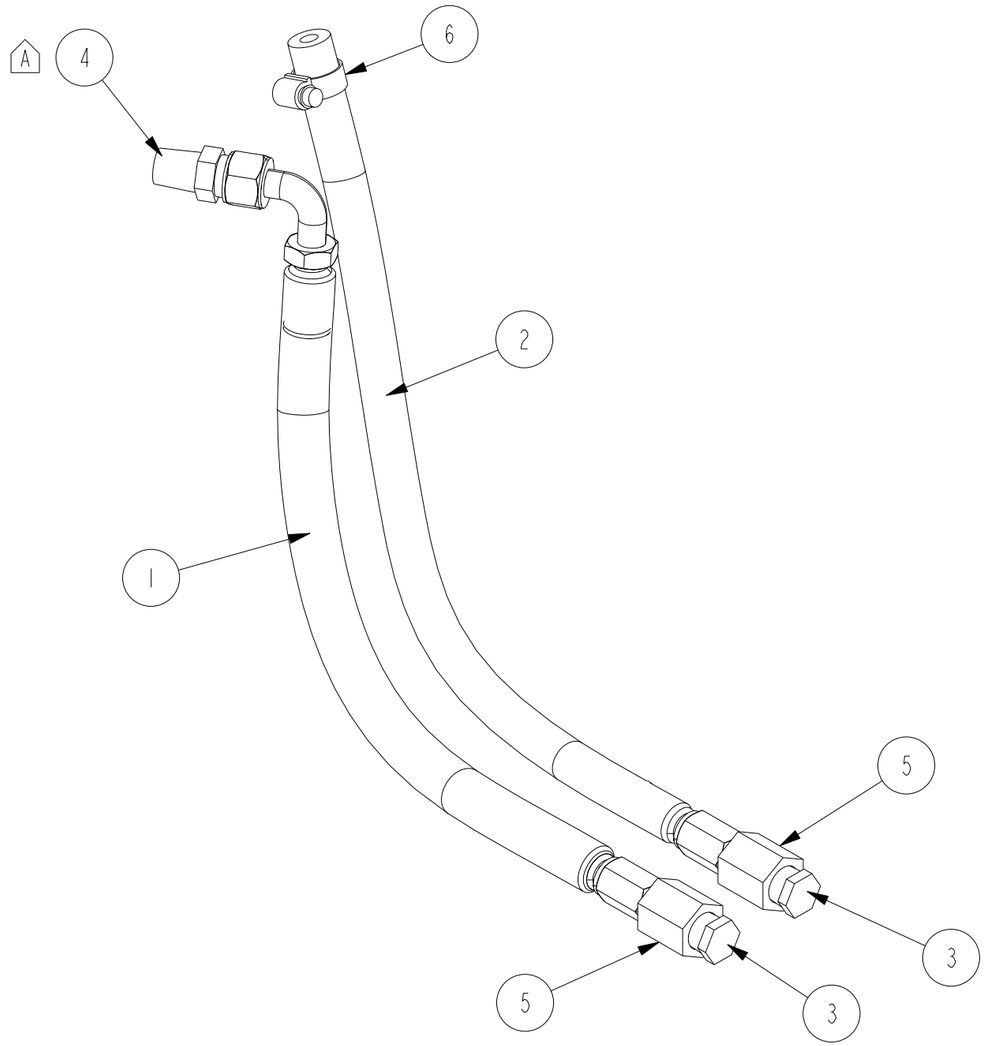
CUSTOM DESIGN AND
UPFIT CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

CABLES, BATTERY
CFP9E

DWG UNITS: INCH/LB/S	DRAWN BY: BG	DATE: 16 JAN 2013
	AUTO CAD	INIT ECO: 2012-026
SCALE:	SHEET 1OF1	DRAWING NO: 24234
EST WEIGHT:		



BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	ASSEMBLY, HOSE, FUEL LINE, CFP59 SUPPLY	15266
2	1	ASSEMBLY, HOSE, FUEL LINE, CFP59 RETURN	15267
3	2	PLUG. PIPE, -4 NPT	12210-4
4	1	FTG, STR, -6 JIC X -4 NPT	12238-6-4
5	2	FTG, STR, -4 JIC X -4 FMNPT	12240-4-4
6	1	CLAMP, WORM, .25 - .63	14992-04

B NOTE: APPLY THREAD SEALANT ON ALL NPT THREADS.

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE
B	2011-053	ADD NOTE	S DUBICK	17-MAY-11
A	2010-390	CHG FITTING SIZE, WAS -6-6	S DUBICK	24-AUG-10

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°	IMPERIAL UNITS	METRIC UNITS
THIRD ANGLE PROJECTION	MACHINE TOLERANCES .XX : ± 0.010 .XXX : ± 0.005 FORM TOLERANCES .XX : ± 0.030 .XXX : ± 0.015 FAB TOLERANCES .XX : ± 0.060 .XXX : ± 0.030	MACHINE TOLERANCES .X : ± 0.4 .XX : ± 0.2 FORM TOLERANCES .X : ± 0.8 .XX : ± 0.4 FAB TOLERANCES .X : ± 1.5 .XX : ± 0.8

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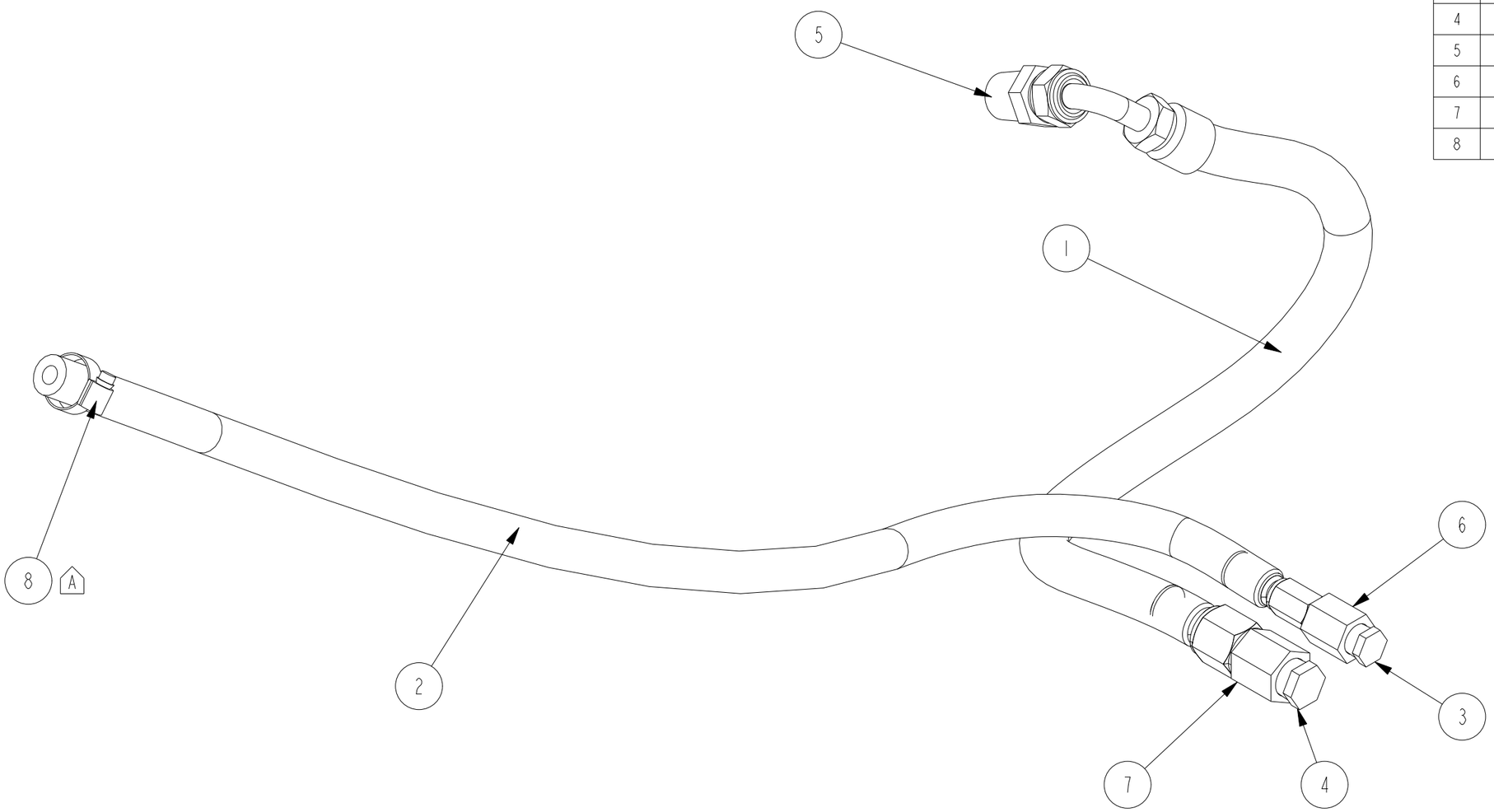
AND UPFIT CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

KIT, FUEL LINES, CFP59
F10/20/30/40/50 - EXT ONLY

DWG UNITS: IN/LB/S
DRAWN BY: DAN
DATE: 07-JUL-09
PRO-ENGINEER
REF DRWG: 8568
SCALE: 0.500
EST WEIGHT: 7.039
SHEET 1 OF 1
DRAWING NO: 15204



BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	ASSEMBLY, HOSE, FUEL LINE, CFP83 SUPPLY	15273
2	1	ASSEMBLY, HOSE, FUEL LINE, CFP83 RETURN	15274
3	1	PLUG. PIPE, -4 NPT	12210-4
4	1	PLUG. PIPE, -6 NPT	12210-6
5	1	FTG, STR, -8 JIC X -8 NPT	12238-8-8
6	1	FTG, STR, -4 JIC X -4 FMNPT	12240-4-4
7	1	FTG, STR, -8 JIC X -6 FMNPT	12240-8-6
8	1	CLAMP, WORM, .31 - .88	14992-06

B NOTE: APPLY THREAD SEALANT ON ALL NPT THREADS.

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE
B	2011-053	ADD NOTE	S DUBICK	17-MAY-11
A	2010-114	CLAMP 14992-06 WAS 14990-06	DAN	16-MAR-10

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1° | IMPERIAL UNITS | METRIC UNITS

THIRD ANGLE PROJECTION

MACHINE TOLERANCES .XX: ± 0.010 .XXX: ± 0.005
FORM TOLERANCES .XX: ± 0.030 .XXX: ± 0.015
FAB TOLERANCES .XX: ± 0.060 .XXX: ± 0.030

MACHINE TOLERANCES .X: ± 0.4 .XX: ± 0.2
FORM TOLERANCES .X: ± 0.8 .XX: ± 0.4
FAB TOLERANCES .X: ± 1.5 .XX: ± 0.8

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875 LAWRENCE DRIVE
DEPERE, WISCONSIN

KIT, FUEL LINES, CFP83
F10/20/30/40 - EXT ONLY

DWG UNITS: IN/LB/S | DRAWN BY: DAN | DATE: 07-JUL-09

PRO-ENGINEER | INIT ECO:

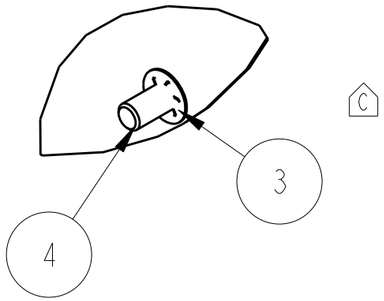
SCALE: 0.500 | SHEET 1 OF 1 | DRAWING NO: 15207

EST WEIGHT: 11.514

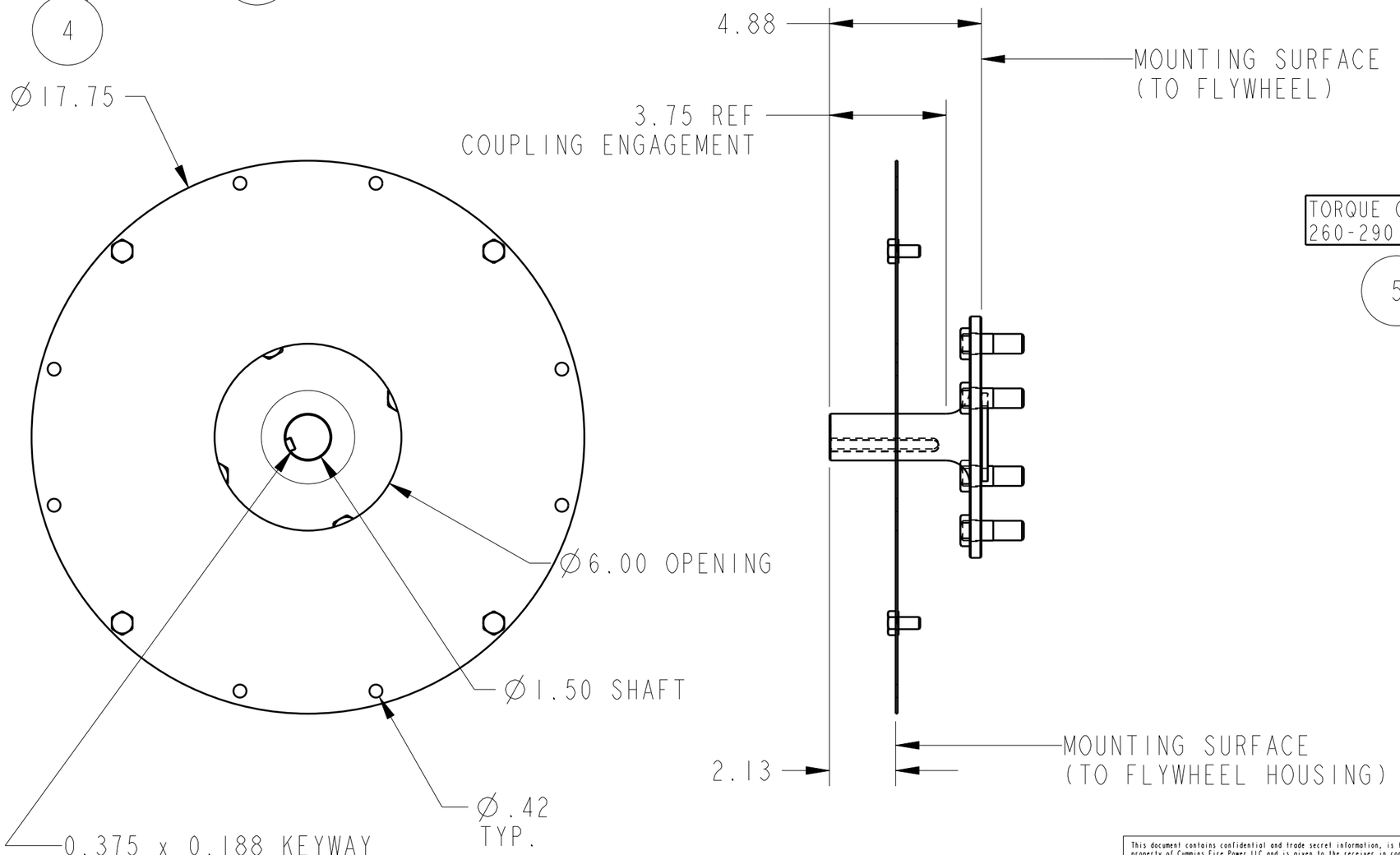
BILL OF MATERIAL

ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	GUARD, STUB SHAFT, SAE #3 FLYWHEEL, FIREPUMP	8611
2	1	STUB SHAFT, SAE #3 FLYWHEEL, HAYES #127396, FIREPUMP	9552
3	4	RETAINING WASHER, PUSHNUT, 3/8" BOLT	16662-06
4	4	SCREW, CAP, HEX HEAD, M10-1.5	HHCS_M10
5	4	SCREW, CAP, HEX HEAD, M16 x 50	HHCS_M16_50

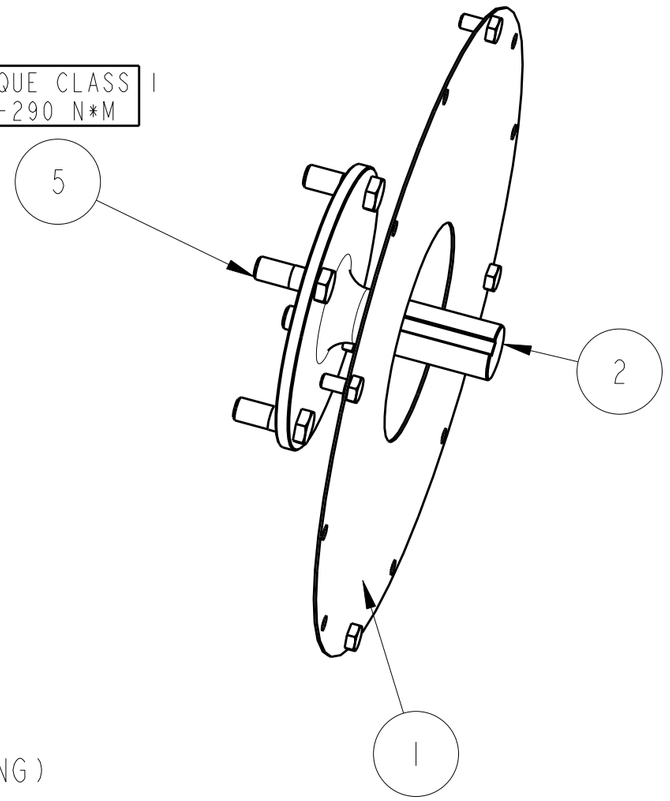
TYPICAL GUARDING FASTENERS
SCALE 0.500



C



TORQUE CLASS I
260-290 N*M



UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1° | IMPERIAL UNITS | METRIC UNITS

THIRD ANGLE PROJECTION

IMPERIAL UNITS: MACHINE TOLERANCES .XX = ± 0.010, .XXX = ± 0.005; FORM TOLERANCES .XX = ± 0.030, .XXX = ± 0.015; FAB TOLERANCES .XX = ± 0.060, .XXX = ± 0.030

METRIC UNITS: MACHINE TOLERANCES .X = ± 0.4, .XX = ± 0.2; FORM TOLERANCES .X = ± 0.8, .XX = ± 0.4; FAB TOLERANCES .X = ± 1.5, .XX = ± 0.8

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE
C	2010-098	ADDED RETAINING WASHERS	DAN	04-MAR-10

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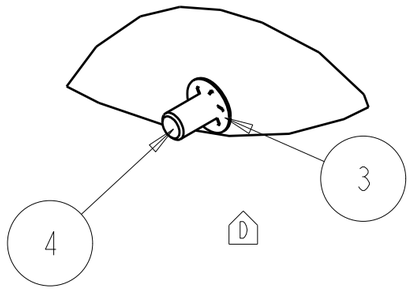
CUSTOM DESIGN
AND UPFIT CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

ASSEMBLY, STUB SHAFT, 1.50" DIA FIREPUMP

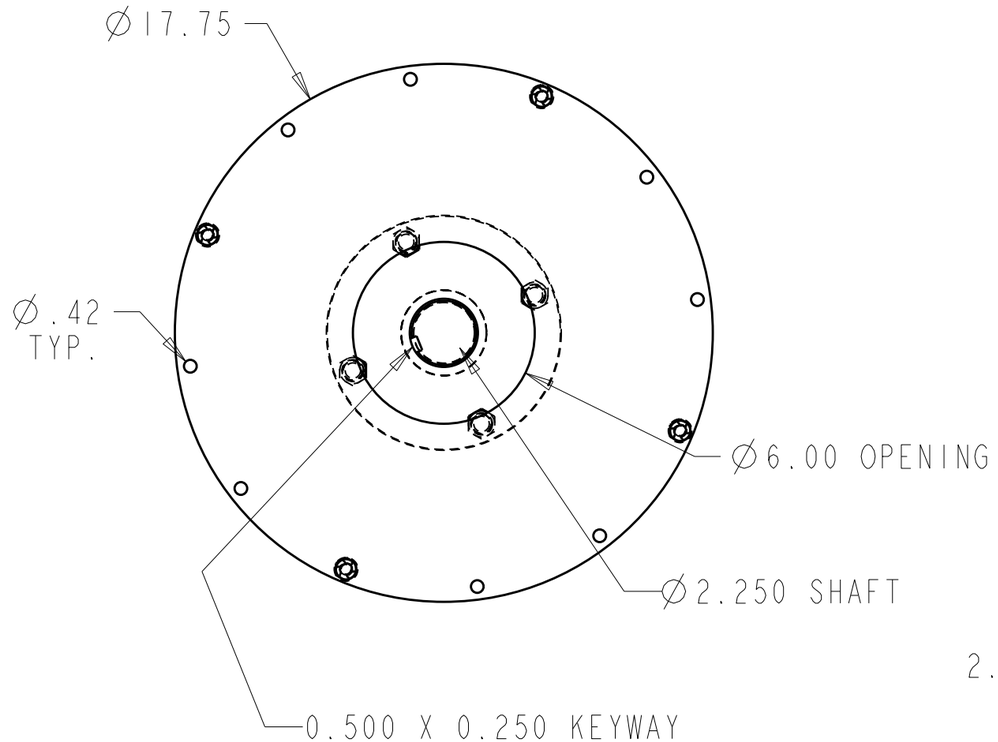
DWG UNITS: IN/LB/S
DRAWN BY: DAVE N
PRO-ENGINEER
DATE: 16SEP2004
INIT ECO:
SCALE: 0.250
EST WEIGHT: 14.724
SHEET 1 OF 1
DRAWING NO: 8618

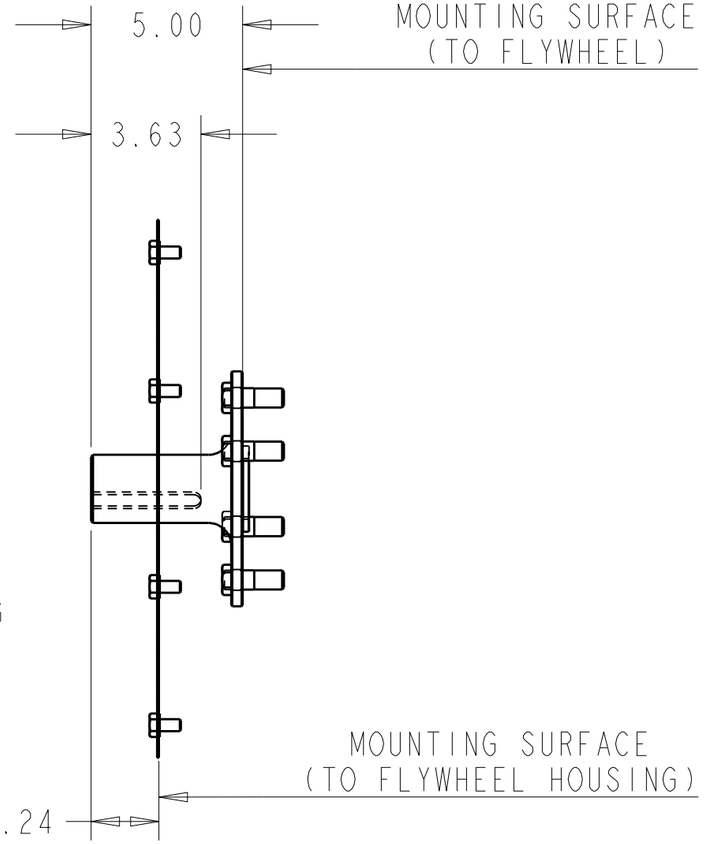
TYPICAL GUARDING FASTENERS
SCALE 0.500

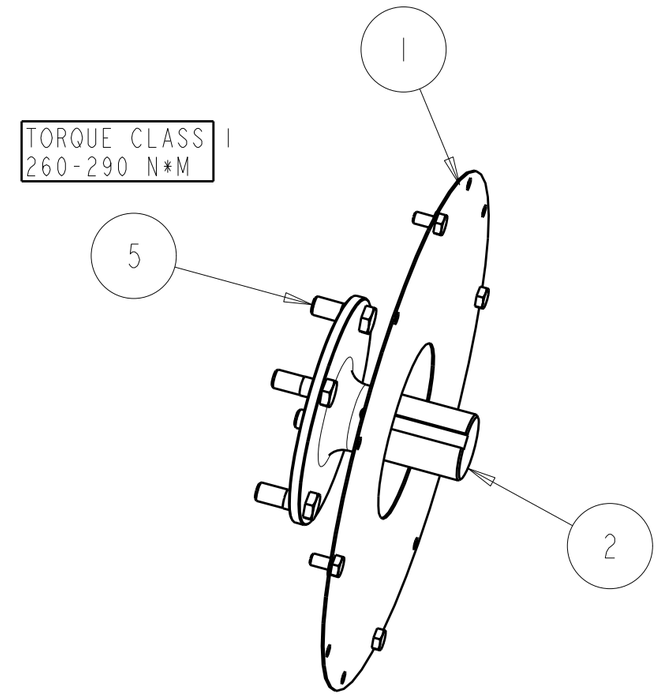


BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	GUARD, STUB SHAFT, SAE #3 FLYWHEEL, FIREPUMP	8611
2	1	STUB SHAFT, SAE #3 FLYWHEEL, HAYES #, FIREPUMP	9624
3	4	RETAINING WASHER, PUSHNUT, 3/8" BOLT	16662-06
4	4	SCREW, CAP, HEX HEAD, M10-1.5	HHCS_M10
5	4	SCREW, CAP, HEX HEAD, M16 x 50	HHCS_M16_50

D







C NOTES:
1. MASS: 13.9 LBS, INERTIA: 67.49 IB.IN^2

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE
D	2010-098	ADDED RETAINING FASTENERS	DAN	04-MAR-10
C	2009-620	ADDED MASS & INERTIA DATA	S DUBICK	12/23/09

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°	IMPERIAL UNITS	METRIC UNITS
THIRD ANGLE PROJECTION	MACHINE TOLERANCES .XX = ± 0.010 .XXX = ± 0.005 FORM TOLERANCES .XX = ± 0.030 .XXX = ± 0.015 FAB TOLERANCES .XX = ± 0.060 .XXX = ± 0.030	MACHINE TOLERANCES .X = ± 0.4 .XX = ± 0.2 FORM TOLERANCES .X = ± 0.8 .XX = ± 0.4 FAB TOLERANCES .X = ± 1.5 .XX = ± 0.8

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CUSTOM DESIGN
AND UPFIT CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

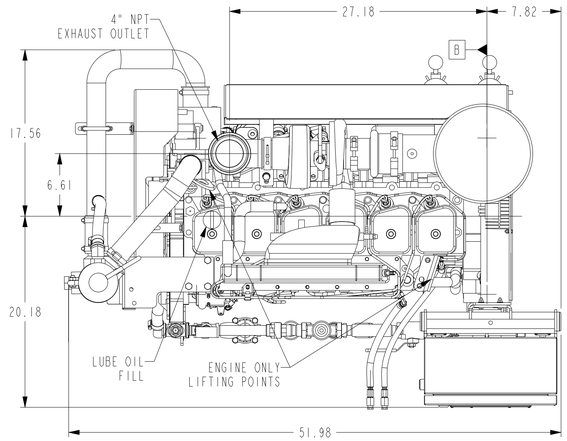
ASSEMBLY, STUB SHAFT, 2.25" DIA
FIREPUMP

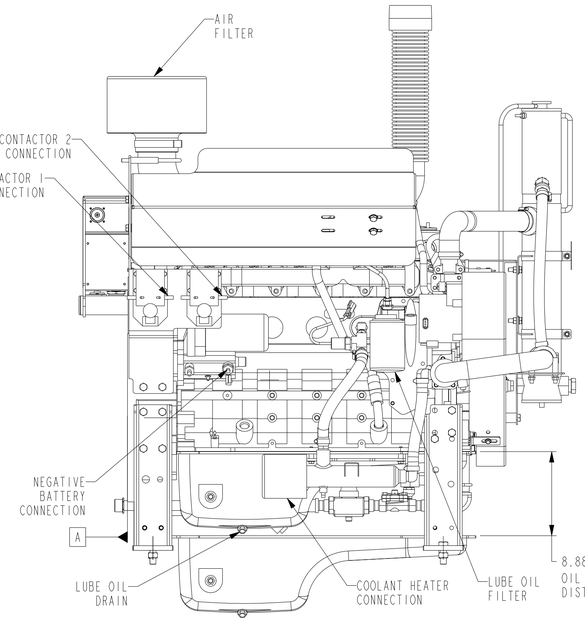
DWG UNITS: IN/LB/S	DRAWN BY: DAVE N	DATE: 15OCT2004
	PRO-ENGINEER	INIT ECO:
SCALE: 0.200	SHEET 1 OF 1	DRAWING NO: 8619
EST WEIGHT: 33.399		

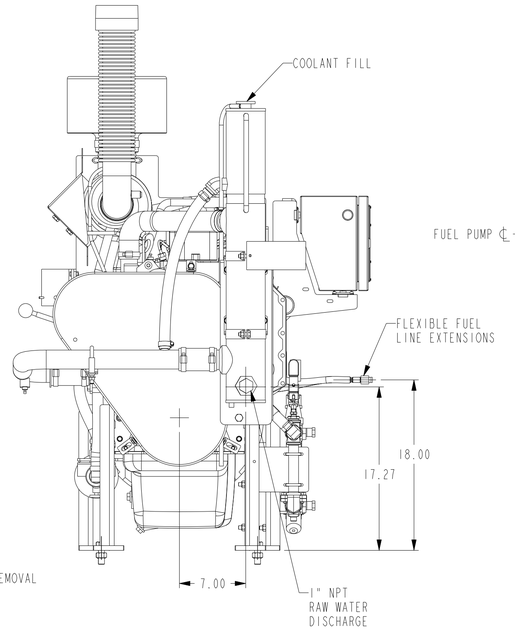
CFP5E CONNECTION INFORMATION	
SAE #3	FLYWHEEL HOUSING
1/4" NPT	FUEL INLET
1/4" NPT	FUEL OUTLET
3/4" NPT	RAW WATER INLET
1" NPT	RAW WATER DISCHARGE
120 / 240 VAC	COOLANT HEATER (1500WATTS)
3" DIA NPT, CUFF, OR FLANGE	EXHAUST CONNECTION

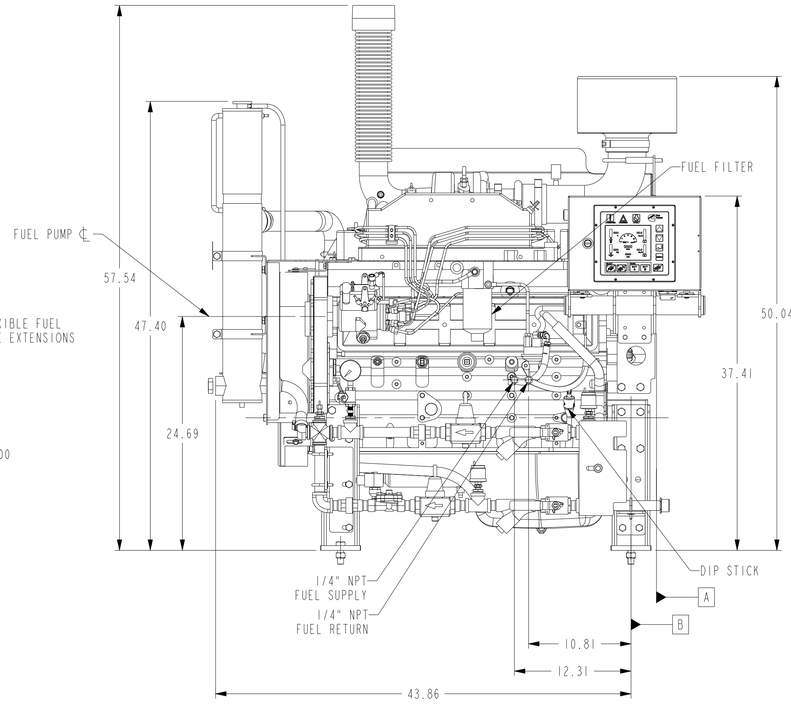
NOTES:
1. ALL PLUMBING MUST BE SUPPORTED AND/OR ISOLATED SO THAT NO WEIGHT OR STRESS IS APPLIED TO ANY ENGINE COMPONENT.
2. REFER TO ENGINE DATA SHEET FOR CUSTOMER CONNECTION RECOMMENDATIONS.
3. DRAWING SUBJECT TO CHANGE WITH OUT NOTICE.

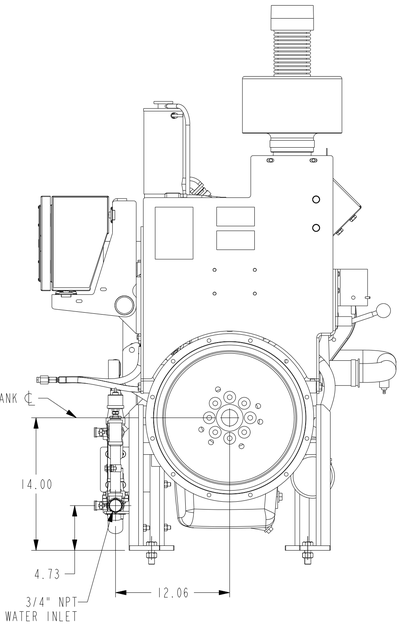
LEGEND AND DATUM IDENTIFIER	
SHEET 1	INSTALLATION DRAWING
SHEET 2	GENERAL ARRANGEMENT - HORIZONTAL SPLIT CASE PUMP BASE OPTION
SHEET 3	GENERAL ARRANGEMENT - VERTICAL TURBINE PUMP BASE OPTION
SHEET 4	DRIVE LINE OPTIONS
DATUM "A"	FACE OF FLYWHEEL HOUSING
DATUM "B"	REAR LEG BOLT LOCATION
DATUM "C"	FLYWHEEL MOUNTING SURFACE
DATUM "D"	UJOINT ADAPTER MOUNTING SURFACE
DATUM "EOS"	END OF PUMP SHAFT

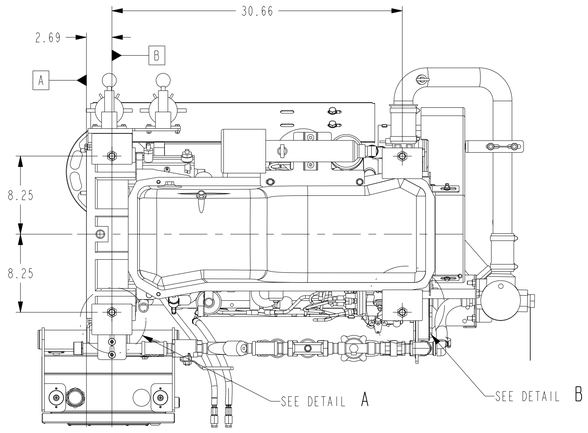


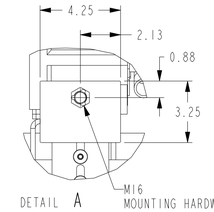




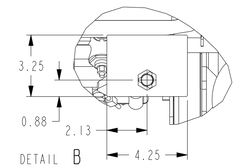








DETAIL A
SCALE 0.250



DETAIL B
SCALE 0.250

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°	MACHINED SURFACES	IMPERIAL UNITS	METRIC UNITS
THIRD ANGLE PROJECTION	125	WHOLE NUMBERS ± 0.02	WHOLE NUMBERS ± 0.5
		two numbers ± 0.01	two numbers ± 0.25
		three numbers ± 0.005	three numbers ± 0.125
		four numbers ± 0.002	four numbers ± 0.05

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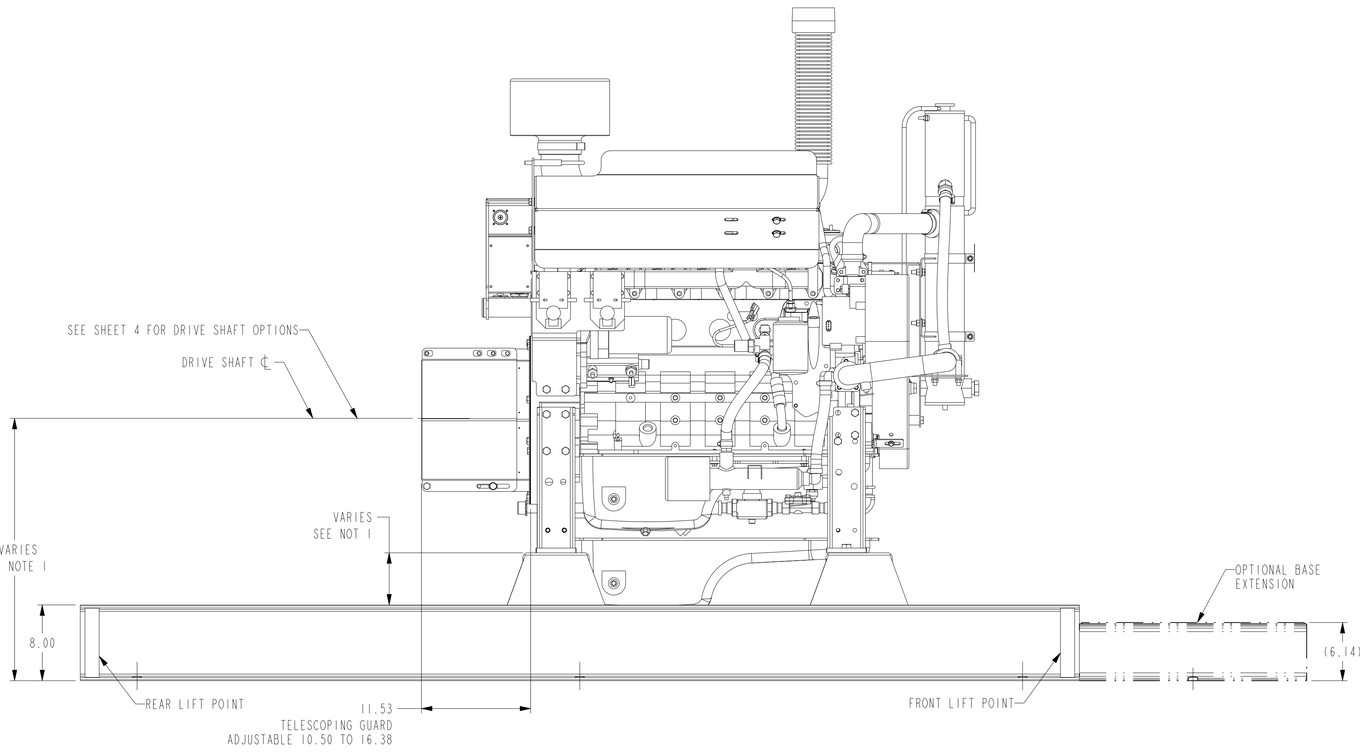
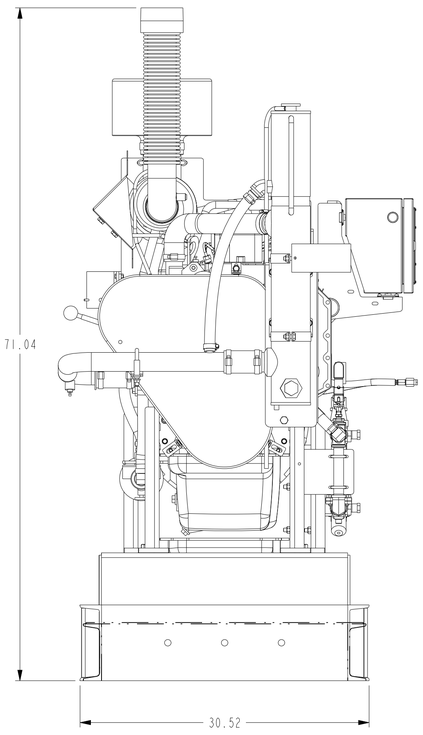
CUSTOM DESIGN
AND UPFIT CENTER
815 LAWRENCE DRIVE
DEPERE, WISCONSIN

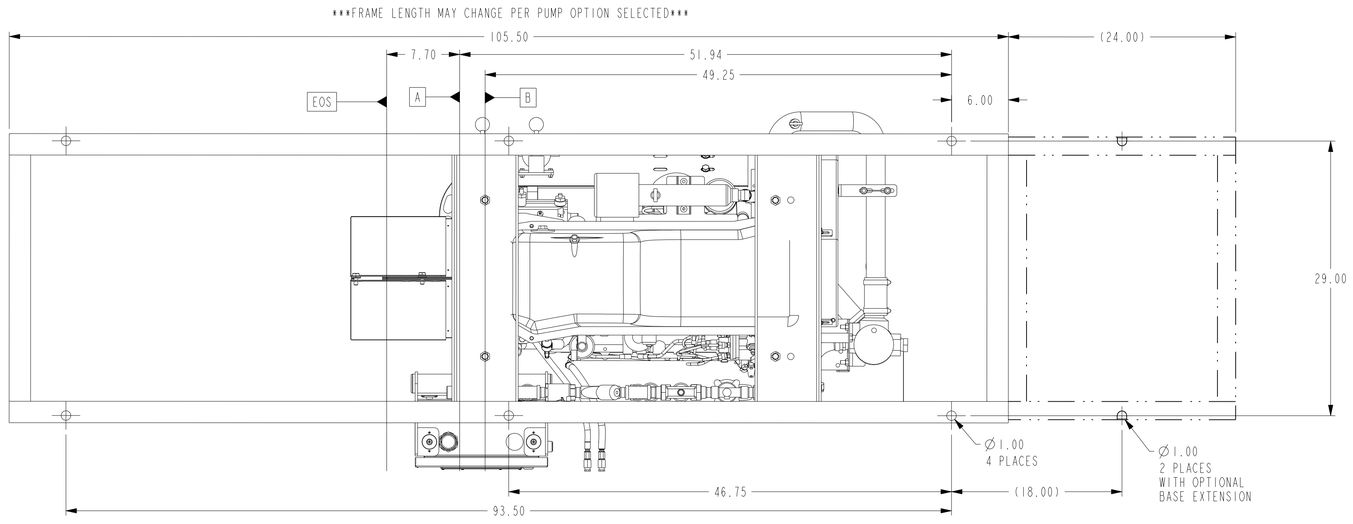
GENERAL ARRANGEMENT
CFP59-F10/15/20/25/40/45/50

DWG UNITS: IN/LB/S
DRAWN BY: PBS
DATE: 05NOV2013
PRO-ENGINEER
INIT ECO: 2013-662
SCALE: 0.125
SHEET 1 OF 4
EST WEIGHT: 42238.628
DRAWING NO: 26722

LEGEND AND DATUM IDENTIFIER	
SHEET 1	INSTALLATION DRAWING
SHEET 2	GENERAL ARRANGEMENT - HORIZONTAL SPLIT CASE PUMP BASE OPTION
SHEET 3	GENERAL ARRANGEMENT - VERTICAL TURBINE PUMP BASE OPTION
SHEET 4	DRIVE LINE OPTIONS
DATUM "A"	FACE OF FLYWHEEL HOUSING
DATUM "B"	REAR LEG BOLT LOCATION
DATUM "C"	FLYWHEEL MOUNTING SURFACE
DATUM "D"	UJOINT ADAPTER MOUNTING SURFACE
DATUM "EOS"	END OF PUMP SHAFT







NOTES:
1. RISER HIEGHT VARIES TO ACCOMODATE CUSTOMER SUPPIED PUMPS
2. REFERENCE OWNERS MANUAL FOR DRIVE SHAFT ALIGNMENT SPECS
3. DRAWING SUBJECT TO CHANGE WITH OUT NOTICE.
4. REFERENCE SHEET 1 FOR BASE FIREPUMP INTERFACE

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± .5° | MACHINED SURFACES | IMPERIAL UNITS | METRIC UNITS

THIRD ANGLE PROJECTION

MACHINE TOLERANCES IMPERIAL UNITS	MACHINE TOLERANCES METRIC UNITS
.XX ± 0.05	.X ± 0.2
FORM TOLERANCES IMPERIAL UNITS	FORM TOLERANCES METRIC UNITS
.XX ± 0.05	.X ± 0.2
FAB TOLERANCES IMPERIAL UNITS	FAB TOLERANCES METRIC UNITS
.XX ± 0.08	.X ± 0.2

125

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE

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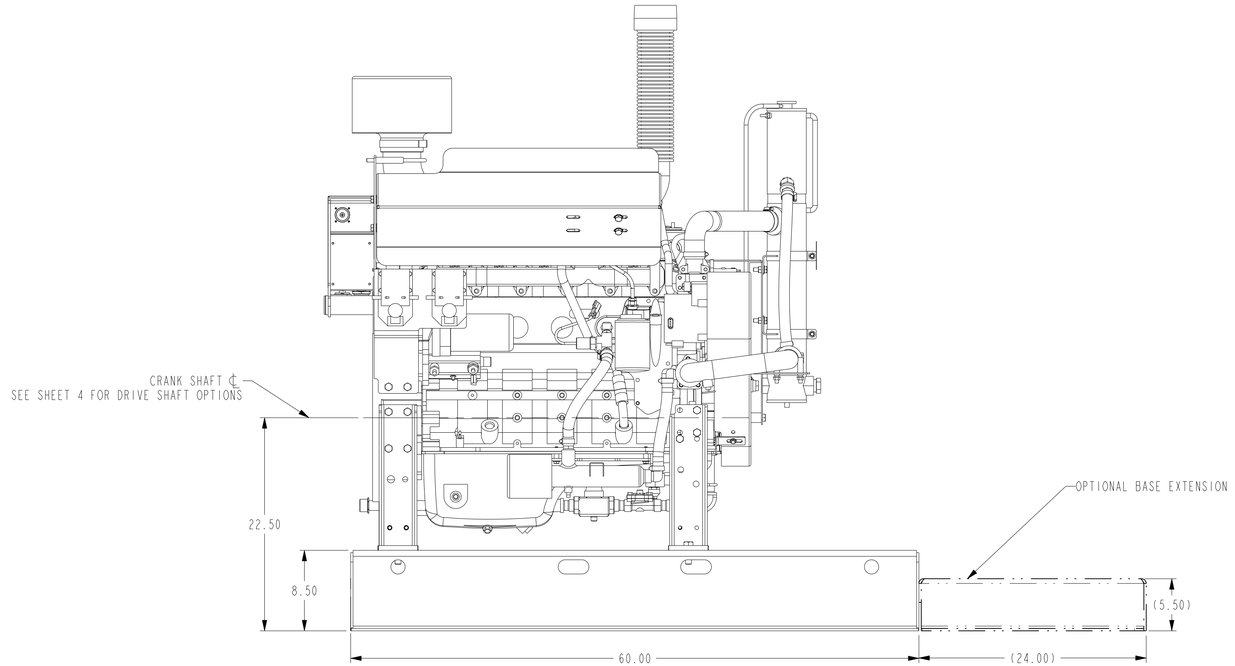
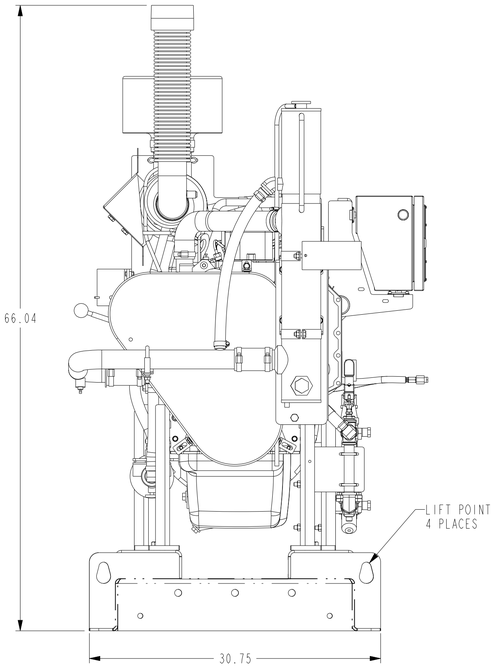
CUSTOM DESIGN
AND UPFIT CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

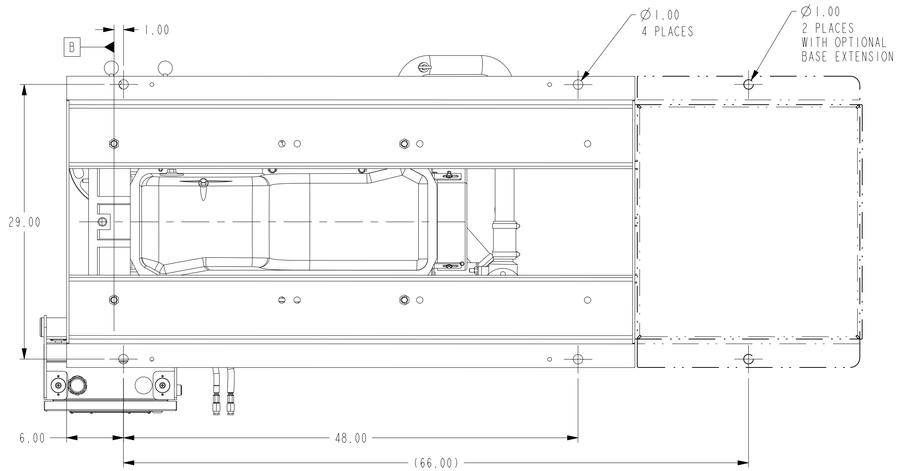
GENERAL ARRANGEMENT
CFP59-F10/15/20/25/40/45/50

DWG UNITS: IN/LB/S
DRAWN BY: PBS
PRO-ENGINEER
DATE: 05NOV2013
INIT ECO: 2013-662
SCALE: 0.125
EST WEIGHT: 42238.628
SHEET 2 OF 4
DRAWING NO: 26722

LEGEND AND DATUM IDENTIFIER	
SHEET 1	INSTALLATION DRAWING
SHEET 2	GENERAL ARRANGEMENT - HORIZONTAL SPLIT CASE PUMP BASE OPTION
SHEET 3	GENERAL ARRANGEMENT - VERTICAL TURBINE PUMP BASE OPTION
SHEET 4	DRIVE LINE OPTIONS
DATUM "A"	FACE OF FLYWHEEL HOUSING
DATUM "B"	REAR LEG BOLT LOCATION
DATUM "C"	FLYWHEEL MOUNTING SURFACE
DATUM "D"	UJOINT ADAPTER MOUNTING SURFACE
DATUM "EOS"	END OF PUMP SHAFT







NOTES:
1. TORSIONAL ANALYSIS IS REQUIRED FOR VERTICAL TURBINE INSTALLATION
2. REFERENCE OWNERS MANUAL FOR DRIVE SHAFT ALIGNMENT SPECS
3. DRAWING SUBJECT TO CHANGE WITH OUT NOTICE.
4. REFERENCE SHEET 1 FOR BASE FIREPUMP INTERFACE

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°

THIRD ANGLE PROJECTION

MACHINED SURFACES 125

	IMPERIAL UNITS	METRIC UNITS
MACHINE TOLERANCES	.XX ± 0.05	.X ± 0.2
FORM TOLERANCES	.XX ± 0.05	.X ± 0.2
FAB TOLERANCES	.XX ± 0.08	.X ± 0.2

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE

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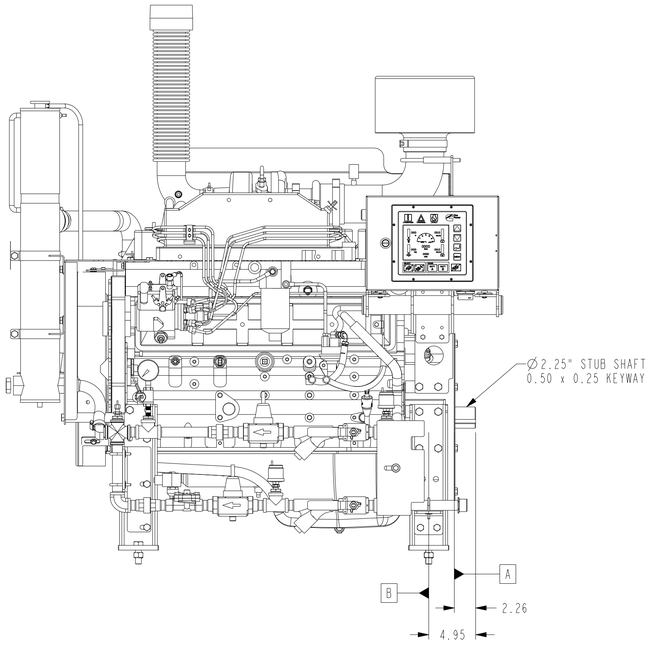
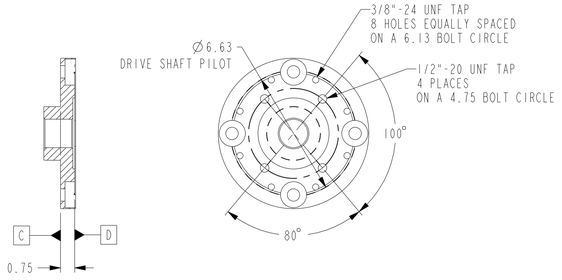
DEPERE, WISCONSIN

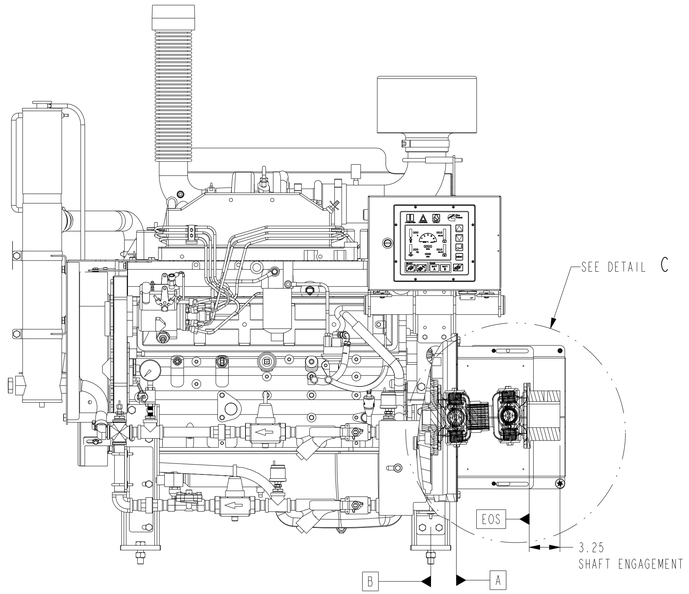
GENERAL ARRANGEMENT
CFP59-F10/15/20/25/40/45/50

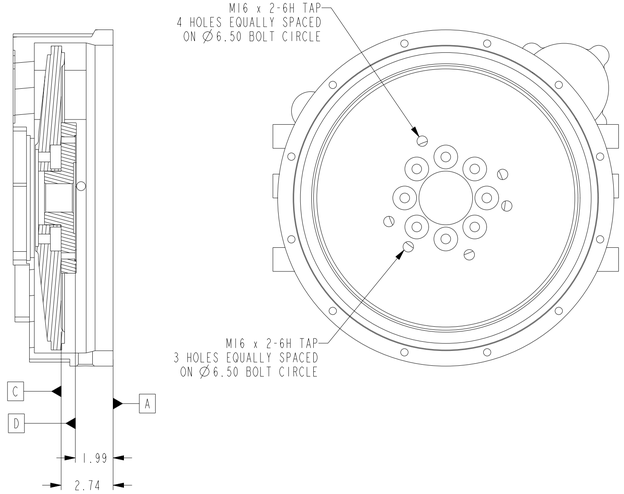
DWG UNITS: IN/LB/S
DRAWN BY: PBS
DATE: 05NOV2013
PRO-ENGINEER
INIT ECO: 2013-662
SCALE: 0.125
EST WEIGHT: 42238.628
SHEET 3 OF 4
DRAWING NO: 26722

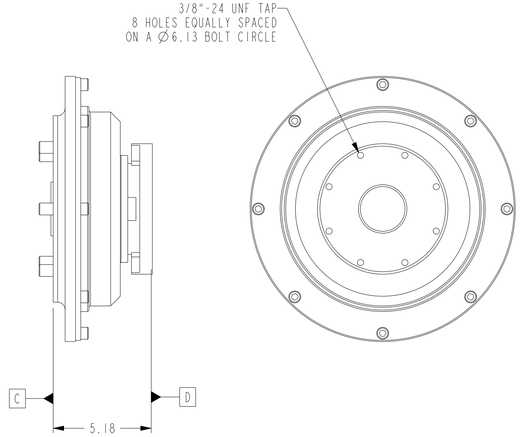




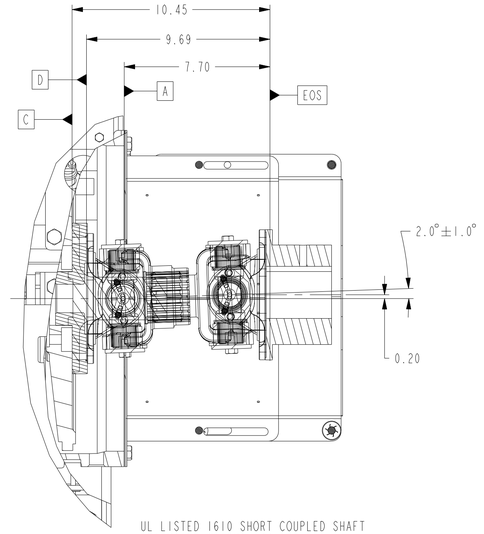
U-JOINT ADAPTER FOR 1610 DRIVE SHAFT







TORSIONAL COUPLING FOR 1610 DRIVE SHAFT



UL LISTED 1610 SHORT COUPLED SHAFT
ESTIMATED WEIGHT: 44 LBS

DETAIL C
SCALE 0.250

LEGEND AND DATUM IDENTIFIER	
SHEET 1	INSTALLATION DRAWING
SHEET 2	GENERAL ARRANGEMENT - HORIZONTAL SPLIT CASE PUMP BASE OPTION
SHEET 3	GENERAL ARRANGEMENT - VERTICAL TURBINE PUMP BASE OPTION
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DATUM "A"	FACE OF FLYWHEEL HOUSING
DATUM "B"	REAR LEG BOLT LOCATION
DATUM "C"	FLYWHEEL MOUNTING SURFACE
DATUM "D"	UJOINT ADAPTER MOUNTING SURFACE
DATUM "EOS"	END OF PUMP SHAFT

CFP DRIVE SHAFT MATRIX					
ENGINE MODELS	CFP F-RATING WITH MULTIPLE SHAFTS				
	RPM 1470	RPM 1760	RPM 2100	RPM 2350	RPM 2600
CPF59-F10	1610 SHAFT	1610 SHAFT	-	-	-
CPF59-F15	-	-	1610 SHAFT	1610 SHAFT	1610 SHAFT
CPF59-F20	1610 SHAFT	1610 SHAFT	-	-	-
CPF59-F25	-	-	1610 SHAFT	1610 SHAFT	1610 SHAFT
CPF59-F40	1610 SHAFT	1610 SHAFT	-	-	-
CPF59-F50	1610 SHAFT	1610 SHAFT	-	-	-

NOTES:
1. TORSIONAL ANALYSIS IS REQUIRED FOR VERTICAL TURBINE INSTALLATION
2. REFERENCE OWNERS MANUAL FOR DRIVE SHAFT ALIGNMENT SPECS
3. DRAWING SUBJECT TO CHANGE WITH OUT NOTICE.
4. REFERENCE SHEET 1 FOR BASE FIREPUMP INTERFACE

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE
ANGULAR DIMENSIONS ± 1°
THIRD ANGLE PROJECTION

MACHINED SURFACES	IMPERIAL UNITS	METRIC UNITS
	FROM THROUGH	FROM THROUGH
	0 6	0 150
	6 30	150 750
	30 120	750 3000

125

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DEPERE, WISCONSIN

GENERAL ARRANGEMENT
CFP59-F10/15/20/25/40/45/50

DWG UNITS: IN/LB/S
DRAWN BY: PBS
PRO-ENGINEER
DATE: 05NOV2013
INIT ECO: 2013-662
SCALE: 0.125
EST WEIGHT: 42238.628
SHEET 4 OF 4
DRAWING NO: 26722

CONTROL PANEL ENCLOSURE

CONNECTOR C1

RS485+ → 21
RS485- → 22
GROUND → 16

TO OPTIONAL DIGITAL PANEL EXPANSION MODULE

POWER BOARD
15153

PUMP CONTROLLER CONNECTIONS

1 2 3 4 5 6 8 9 10 11 301 302 303 304 310 311 312

AUTO CTS OSS LOP HCT BATT A BATT B MBC1 MBC2 GND RWHIT CRWCLS LCT

I2C I/O XPDR

OSS
CTS
RWHIT (B)
CRWCLS
MBC1
MBC2
MANUAL
KEYSWITCH
AUTO
LCT
LOP
HCT

Vr, B+

CHARGE GND → 4 → CHARGE GND
EXCITE → 14 → EXCITE
MCB1 → 12 → MCB1
MCB2 → 13 → MCB2
BATT B → 2 → BATT B
BATT A → 1 → BATT A
LCT → 19 → LCT
LOP → 10 → LOP
HCT → 11 → HCT
RWTS → 17 → RWTS
CLP PRE → 25 → CLP PRE
CLP POST → 26 → CLP POST
OPS → 8 → OPS
WTS → 9 → WTS
MPU+ → 5 → MPU+
MPU- → 6 → MPU-
RWS → 15 → RWS
FSO → 7 → FSO
SYS GND → 3 → SYS GND

B+ B+

NON-ISOLATED CPU
I2C
CTS
OSS
I2C

BATTERY ISOLATOR
B+
ALT
STARTER
S
CR A
CR B
POS NEG
BAT A
BAT B
LCT (B)
SHOWN IN "LOW OIL PRESS" STATE (OR ENGINE NOT RUNNING)
SHOWN IN "NORMAL TEMP" STATE (OR ENGINE NOT RUNNING)
RWTS (B)
CLP PRE
CLP POST
OPS
WTS
NC (ENERGIZE TO RUN)
NC (ENERGIZE TO RUN)

Control Panel

DISPLAY BOARD
15152

RS485
I2C
TACH

LEGEND:
OSS = OVER SPEED SWITCH
CTS = CRANK TERMINATION SWITCH
MBC1 = MAIN BATTERY CONTACTOR 1
MBC2 = MAIN BATTERY CONTACTOR 2
LCT = LOW COOLANT TEMPERATURE
HCT = HIGH COOLANT TEMPERATURE
LOP = LOW OIL PRESSURE
FSO = FUEL SHUT OFF
RWS = RAW WATER SOLENOID
VSP = VARIABLE SPEED PRESURE
DOP PRE = DIFFERENTIAL OIL PRESSURE PRE
DOP POST = DIFFERENTIAL OIL PRESSURE POST
OPS = OIL PRESSURE SENDER
WTS = WATER TEMPERATURE SENDER
MPU = MAGNETIC PICK-UP
RWHIT = RAW WATER HIGH INLET TEMP
CRWCLS= CLOGGED RAW WATER COOLING LOOP STRAINER
CLP PRE = COOLING LOOP PRESSURE PRE STRAINER
CLP POST = COOLING LOOP PRESSURE POST STRAINER
RWTS = RAW WATER TEMPERATURE SENDER

REV	ENF	DESCRIPTION OF REVISION	BY	DATE
B	2014-107	ADDED COOLING LOOP SENSORS	RMJ	21FEB2014
A	2011-189	ADDED RS485 WIRES.	PBS	15JUN2011

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE
ANGULAR DIMENSIONS ± 1° | IMPERIAL UNITS | METRIC UNITS
THIRD ANGLE PROJECTION

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SCHEMATIC, MECHANICAL FIRE PUMP DRIVERS CFP MODELS: 33, 39, 59, 83

DWG UNITS: INCH/LB/S
DRAWN BY: KAK
DATE: 14 DEC 2009
AUTO CAD
REF DRWG:
SCALE:
EST WEIGHT:
SHEET 10F1
DRAWING NO: 16122

Section 8.5 - Assembly Drawings (1)

Description	Drawing No.	Sheet No	Revision Level	Change Date
Drawing, Installation, Fire Pump, CFP83-F10/20/30 (6CTA8.3)	26110	1-2	B	1/14
Options, Engine, Fire Pump, G-Drive, CFP83-F10/20/30 (6CTA8.3)	8738		C	
Assembly, Engine Mounting	21841		A	
Assembly, Heat Exchanger CFP83	8919		G	
Assembly, Coolant Heater CFP83	A042A161		B	3/14
Assembly, ACC Rear Mounting, CFP83	26567		-	
Assembly, Contactors, CFP8.3	21246		-	
Assembly, Control Panel Mounting	21249		-	
Assembly Sensor Package, CFP83	9574		A	
Assembly, Pulley Guard CFP83	9625		B	
Assembly, Solenoid Override, CFP83	9830		A	
Assembly, All components Top level assy consisting of:	CFP83-AC-2014			
Assembly, Panel, Digital Mechanical	22793		-	
Assembly, Harness, CFP83	23930	1-2	A	3/14
Battery Contactors	8824-12			
Kit, Loose Wires, 4B, 6B, 6C, QSB	24234		-	
Kit, Fuel Lines CFP83	15207		B	
Misc Piping, Cooling Loop, Raw Water CFP83	26288-xx			
Assembly, Raw Water Cooling Loop, 3/4" Vertical	21511			
Assembly, Raw Water Cooling Loop, 3/4" Horizontal 12V	21509		A	4/14
Assembly, Raw Water Cooling Loop, 3/4" Horizontal 24V	21510		A	4/14
Assembly, Sea Water Cooling Loop, 3/4" Vertical	21512		A	
Assembly, Sea Water Cooling Loop, 3/4" Horizontal 12V	21438		B	4/14
Assembly, Sea Water Cooling Loop, 3/4" Horizontal 24V	21439		B	4/14
Misc Piping, Cooling Loop, Sea Water CFP83	Not Rel yet			
Assembly, Stub-Shaft, SAE#3, 2.25" QSB, QSC, 4B, 6B, 6C	8619		D	
General Layout, Fire Pump, CFP83	26726	1-4	-	3/14
Schematic, Control Panel, Mechanical	16122		B	3/14

Also see Engine Identification and Systems Diagrams in Sec 2.
The most current revisions to these drawings and related documents accessible at: http://www.cumminsfirepower.com/products.html.

Section 8.5 - Assembly Drawings (1)

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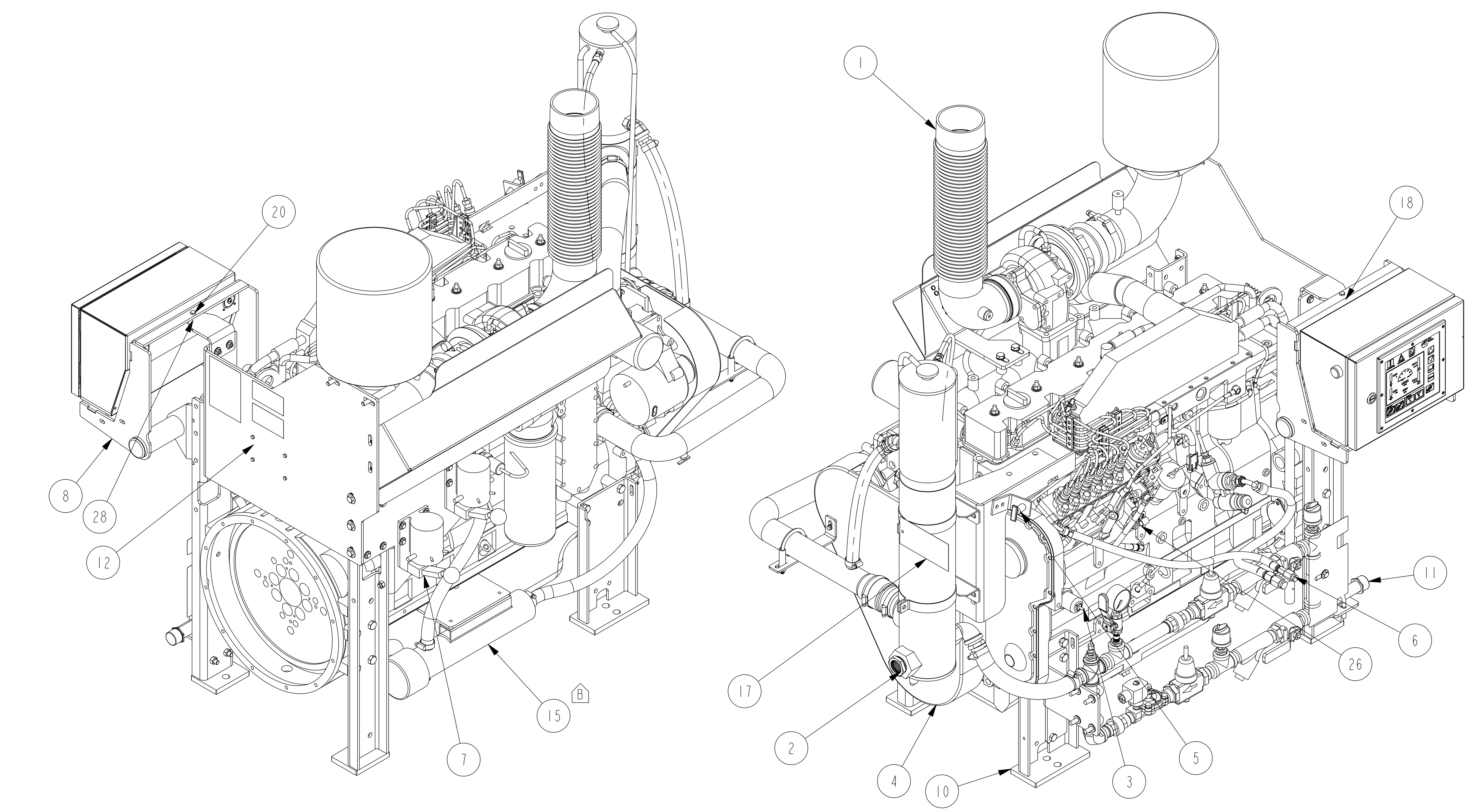

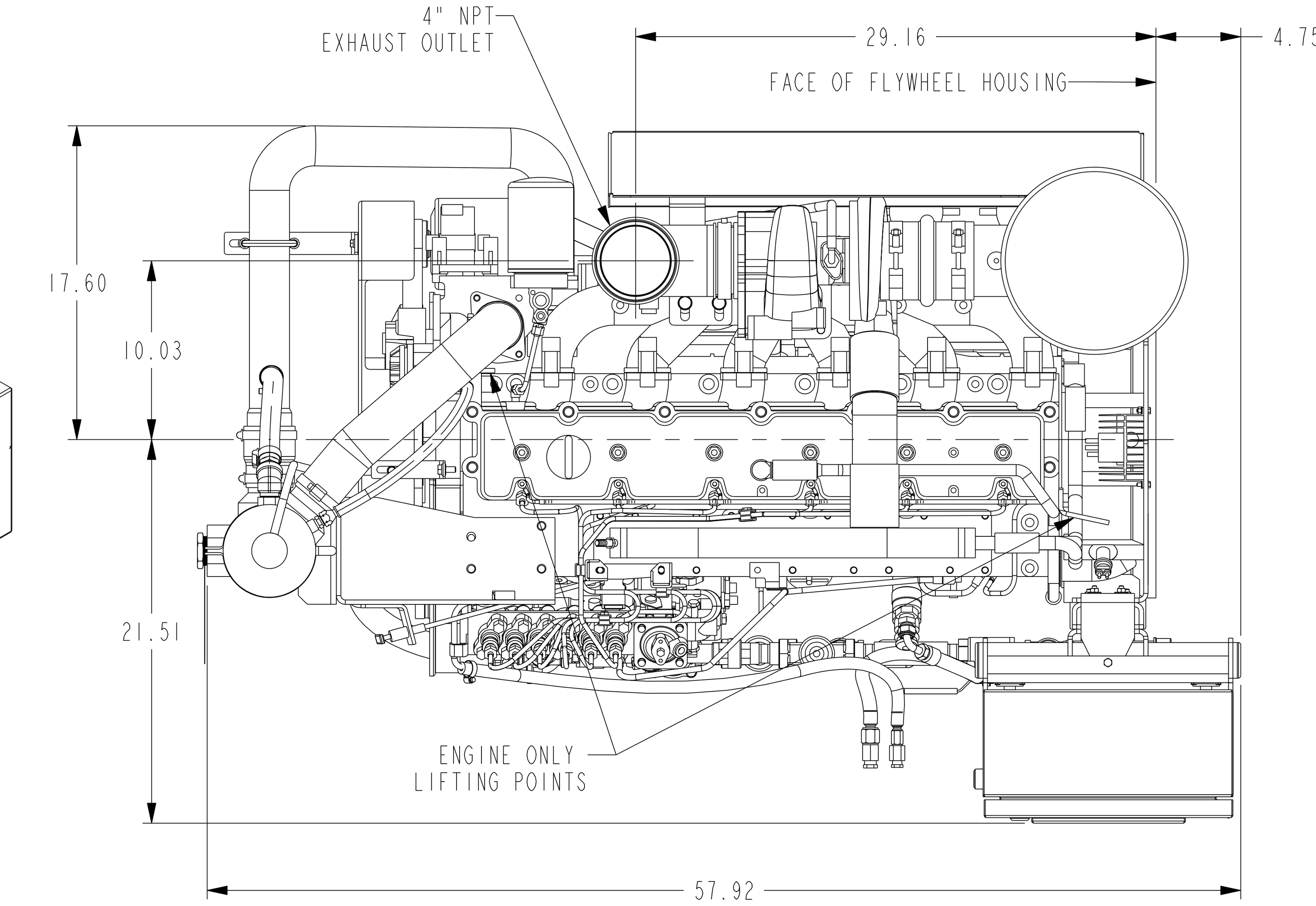

BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	EXHAUST, 90 HALF MARMON, 4" TURBO OUT, 4" MALE NPT	8780.01
2	1	ASSEMBLY, HEAT EXCHANGER, FIREPUMP 6C8.3	8919
3	1	ASSEMBLY, SENSOR PACKAGE, CFP8.3/9E	9574
4	1	GUARD, PULLEY, 6C, FIREPUMP	9625
5	1	ASSEMBLY, SOLENOID OVERIDE, FIREPUMP	9830
6	1	KIT, FUEL LINES, CFP83, F10/20/30/40 - EXT ONLY	15207
7	1	ASSEMBLY, CONTACTORS, CFP8.3	21246
8	1	ASSEMBLY, CONTROL PANEL MOUNTING, CFP POWER UNITS	21249
9	1	COOLING LOOP, 3/4" ,12V, RAW WATER	21509
10	1	ASSEMBLY, MOUNTING LEGS, CFP8.3	21841
11	1	MISC PIPING, RAW WATER, 6C	26288
12	1	ASSEMBLY, ACC, REAR MTG, CFP8.3	26567
13	1	CONTROL ASSEMBLY, FPDP MECHANICAL CARBON STEEL	26762
14	1	ASSEMBLY, ENGINE, CFP83-F10/20/30	26773
15	1	ASSEMBLY, COOLANT HEATER, CFP83	A042A161
16	1	STRAP, GROUNDING, 4 AWG, 12", WC90397-1	9757
17	1	TAG, ENGINE WEIGHT	16825
18	1	WASHER,FLAT,SMALL, 0.25	20010-025
19	4	SCREW,HH, 0.25-20x0.75	20225-075
20	1	SCREW,HH, 0.25-20x1.00	20225-100
21	1	HARNESS, WIRING, CFP8.3	23930
22	1	CABLES, BATTERY, CFP5E, 7E, 9E, 11E	24234
23	1	MANUAL, O&M CFP5.9/CFP8.3	24809
24	1	PAINT, SPRAY BOMB, CUMMINS RED	A15730-A12
25	5	COOLANT, FC EG PM, 1 GALLON, -	CC2743
26	1	CLAMP, P-STYLE, 0.50" W/ 0.50 HOLE, LTL-CCV1317	LTL-CCV1317
27	1	PLUG, 1/2 NPT, -	LTL-SCSP12
28	1	NUT,HEX, 0.25-20	20100-025

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875 LAWRENCE DRIVE
DEPERE, WISCONSIN

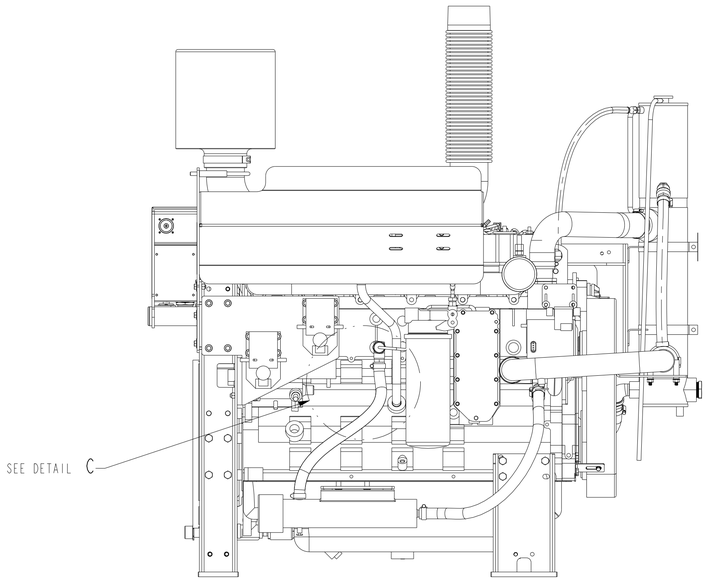
ASSEMBLY, FIREPUMP
CFP83-F10/20/30

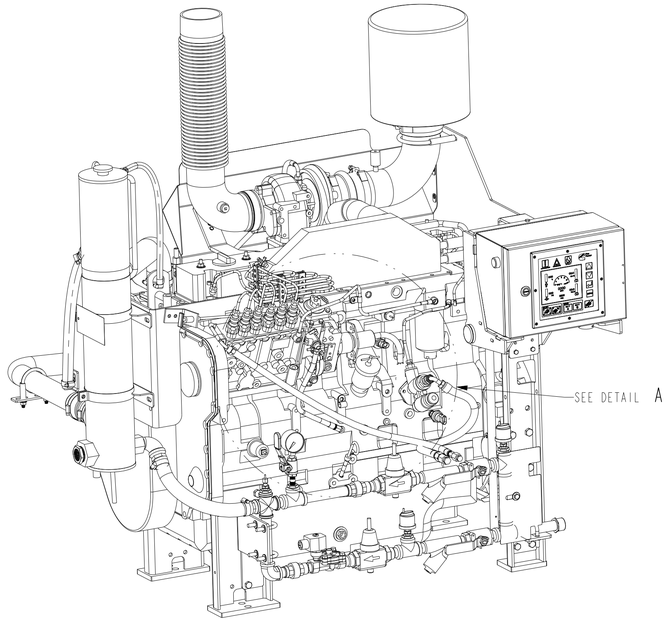
UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

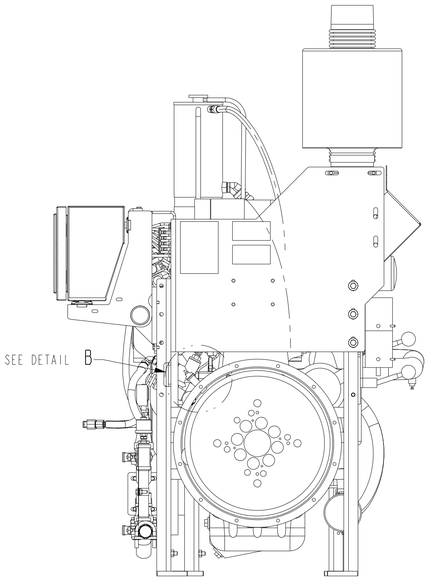
ANGULAR DIMENSIONS ± 1°	MACHINED SURFACES	IMPERIAL UNITS	METRIC UNITS
THIRD ANGLE PROJECTION	125	MACHINE TOLERANCES .XX : ± 0.010 .XXX : ± 0.005	MACHINE TOLERANCES .X : ± 0.4 .XX : ± 0.2
		FORM TOLERANCES .XX : ± 0.030 .XXX : ± 0.015	FORM TOLERANCES .X : ± 0.8 .XX : ± 0.4
		FAB TOLERANCES .XX : ± 0.060 .XXX : ± 0.030	FAB TOLERANCES .X : ± 1.5 .XX : ± 0.8

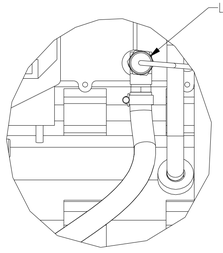
DWG UNITS: IN/LB/S	DRAWN BY: PBS PRO-ENGINEER	DATE: 16AUG2013 INIT ECO: 2013-480
SCALE: 0.125	SHEET 1 OF 2	DRAWING NO: 26110
EST WEIGHT: 42238.628		

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE
B	2014-024	DELETED 23526, ADDED A042A161	PBS	13JAN2014
A	2013-756	DELETED: LTL-SCSP14, 22793, 16889, 16960 16825, 21513, 15383, 15431, 8738, 24809 ADDED: LTL-SCSP12, 26762, 21509, 26773	PBS	26DEC2013

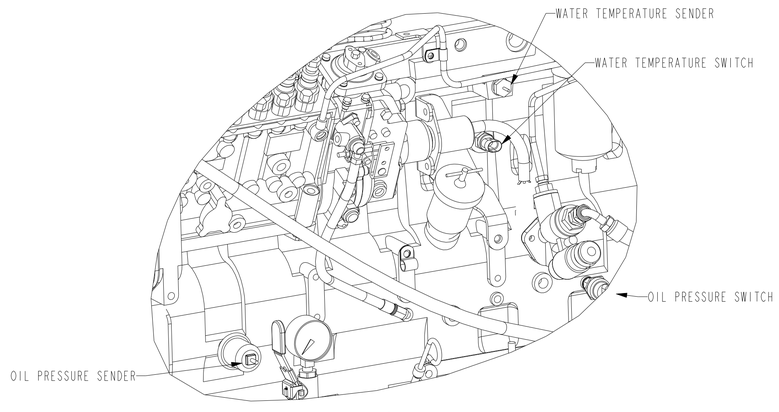




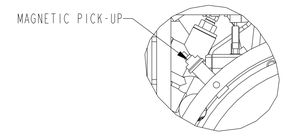




DETAIL C
SCALE 0.250



DETAIL A
SCALE 0.250



DETAIL B
SCALE 0.250

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE
A	2013-756	SEE SHEET 1 FOR LATEST REVISION DETAILS	PBS	26DEC2013

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE
ANGULAR DIMENSIONS ± 1°
THIRD ANGLE PROJECTION
MACHINED SURFACES 125

	IMPERIAL UNITS	METRIC UNITS
Whole numbers	.xx ± 0.02	.x ± 0.5
two decimals	.xx ± 0.02	.xx ± 0.25
three decimals	.xxx ± 0.005	.xxx ± 0.127
four decimals	.xxxx ± 0.0005	.xxxx ± 0.0127

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AND UPFIT CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

ASSEMBLY, FIREPUMP
CFP83-F10/20/30

DWG UNITS: IN/LB/S
DRAWN BY: PBS
DATE: 16AUG2013
PRO-ENGINEER
INIT ECO: 2013-480
SCALE: 0.125
SHEET 2 OF 2
EST WEIGHT: 42238.628
DRAWING NO: 26110

PN 8738
SO 35330
Model 6CTA8.3G2
Config D413034GX02

Option	Desc
FIRE 32	6CTA8.3G2
AP 9229	APPROVAL,AGENCY
BP 9026	BASE PARTS
BP 9717	FOLLOWER,CAM
BP 9795	LEVER,ROCKER
BP 9827	COVER,FRONT GEAR
BP 9896	BLOCK,ENGINE
BR 9002	BREATHER,CRANKCA
DA 9087	DAMPER,VIBRATION
DF 9063	DRIVE,FRT GR TR
DL 9009	LOCATION,FUEL DR
EC 9002	THERMOSTAT
EE9242	Alternator, 12V, 95A, Delco 11SI
EH 9020	LOCATION,ALTERNA
EH97011	DRIVE,ALTERNATOR
EI 9000	DRIVE,MECH TACH
EI 9701	DRIVE,MECH TACH
FA 9000	DRIVE,FAN
FF 9011	FILTER,FUEL
FF 9766	PLUMBING,FUEL FI
FH 9030	HOUSING,FLYWHEEL
FP97838	COUPLING,FUEL PU
FP98036	PUMP,BASE FUE
LFR90242	RATING,FUEL
FS 9089	PUMP,LIFT
FT 9982	PLUMBING,FUEL
FV 9206	VALVE,FUEL SHUTO
FW 9024	FLYWHEEL
FW 9335	Flywheel, 8/10
FX 9004	SUPPLY,LATCHOUT
LA 9006	BRACKET,LIFTING
LC 9028	COOLER,ENGINE OI
LG 9028	GAUGE,OIL LEVEL
LP 9710	PUMP,LUBRICATING
OB 9006	COVER,CYLINDER B
OP 9013	PAN,OIL
PP 2218	PERFORMANCE PART
PP 9830	HEAD,CYLINDER
PP97945	TURBOCHARGER
SG 9000	PACKAGE,GUARD
SM 9706	MOUNTING,STARTER
SS 9005	PAINTSS 9075SKID
SS 9702	ENGINE,DRY
ST 9238	MOTOR,STARTING
TB 9757	AFTERCOOLER,JACK
TB 9789	GASKET,EXHAUST M
TB 9809	MANIFOLD,EXHAUST
TB90076	LOCATION,TURBOCH
TH 9007	HOUSING,THERMOST
TP 9709	PLUMBING,TURBOCH
VC 9014	COVER,VALVE
WA 9703	PLUMBING,AFTERCO
WF 9003	RESISTOR,CORROSI
WH 9005	PLUMBING,BLOCK V
WI 9007	CONNECTION,WATER
WO 9004	CONNECTION,WATER
WP 9028	PUMP,WATER
XS 9024	CONNECTION,EXHAU

BUILT BEFORE JANUARY 1, 2007

PN 8738
SO 35330
Model 6CTA8.3G2
Config D413034GX02

Option	Desc
FIRE 32	6CTA8.3G2
△6 AP 9716	APPROVAL,AGENCY
BP 9026	BASE PARTS
BP 9717	FOLLOWER,CAM
BP 9795	LEVER,ROCKER
BP 9827	COVER,FRONT GEAR
BP 9896	BLOCK,ENGINE
BR 9002	BREATHER,CRANKCA
DA 9087	DAMPER,VIBRATION
DF 9063	DRIVE,FRT GR TR
DL 9009	LOCATION,FUEL DR
EC 9002	THERMOSTAT
△6 EE 9249	ALTERNATOR
EH 9020	LOCATION,ALTERNA
EH97011	DRIVE,ALTERNATOR
EI 9000	DRIVE,MECH TACH
EI 9701	DRIVE,MECH TACH
FA 9000	DRIVE,FAN
FF 9011	FILTER,FUEL
FF 9766	PLUMBING,FUEL FI
FH 9030	HOUSING,FLYWHEEL
FP97838	COUPLING,FUEL PU
FP98036	PUMP,BASE FUEL
FR90242	RATING,FUEL
FS 9089	PUMP,LIFT
FT 9982	PLUMBING,FUEL
FV 9206	VALVE,FUEL SHUTO
FW 9828	FLYWHEEL
FX 9004	SUPPLY,LATCHOUT
LA 9006	BRACKET,LIFTING
LC 9028	COOLER,ENGINE OI
LG 9028	GAUGE,OIL LEVEL
LP 9710	PUMP,LUBRICATING
△6 LT 9225	LITERATURE
OB 9006	COVER,CYLINDER B
OP 9013	PAN,OIL
PP 2218	PERFORMANCE PART
PP 9830	HEAD,CYLINDER
PP97945	TURBOCHARGER
SG 9000	PACKAGE,GUARD
SM 9706	MOUNTING,STARTER
SS 9005	PAINT
SS 9025	OIL,ENGINE
SS 9075	ARRANGEMENT,SHIP
SS 9701	OIL,ENGINE
ST 9238	MOTOR,STARTING
TB 9757	AFTERCOOLER,JACK
TB 9789	GASKET,EXHAUST M
TB 9809	MANIFOLD,EXHAUST
TB90076	LOCATION,TURBOCH
TH 9007	HOUSING,THERMOST
TP 9709	PLUMBING,TURBOCH
VC 9014	COVER,VALVE
WA 9703	PLUMBING,AFTERCO
WF 9003	RESISTOR,CORROSI
WH 9005	PLUMBING,BLOCK V
WI 9007	CONNECTION,WATER
WO 9010	CONNECTION,WATER
WP 9028	PUMP,WATER
XS 9024	CONNECTION,EXHAU

BUILT AFTER JANUARY 1, 2010

REV	DESCRIPTION OF REVISION	BY	DATE
C	UPDATE ENGINE SPEC	S DUBICK	08-04-10

UNLESS OTHERWISE NOTED
–
ALL DIMENSIONS ARE IN INCHES
–
APPLY MACHINE TOLERANCES
.X = ± 0.06
.XX = ± 0.010
.XXX = ± 0.001
–
APPLY WELDED TOLERANCES
.X = ± 0.25
.XX = ± 0.12
.XXX = ± 0.06

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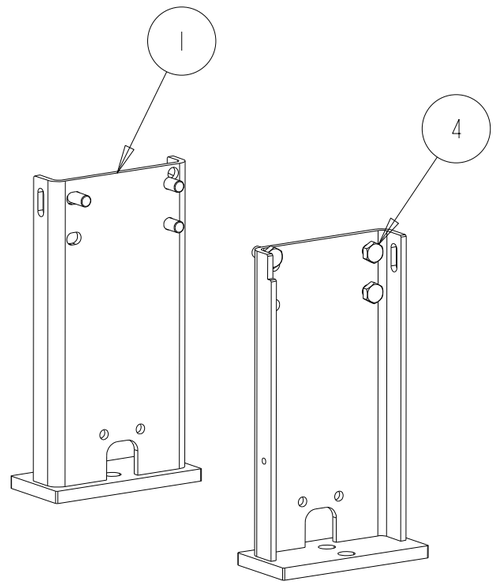
DWG SCALE: NTS	DRAWN BY: DAVE N	DATE: 23SEP2004
PLOT SCALE:	APPD BY:	DATE:

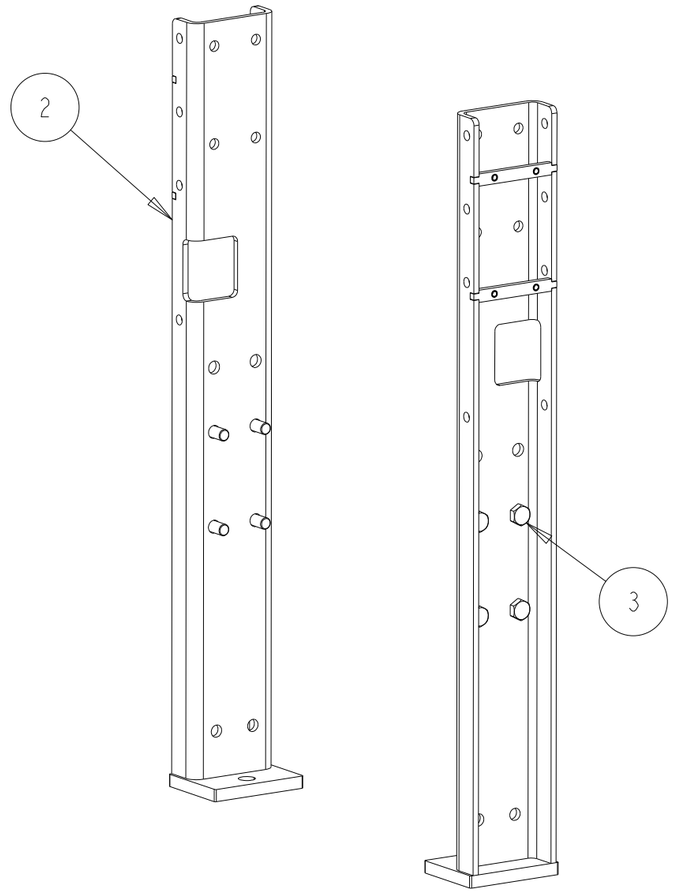
DESCRIPTION
ASSEMBLY, ENGINE, 6CTA8.3G3

REFERENCE:
CFP83-F10/20/30

DRAWING NUMBER:
8738C

BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	2	SUPPORT, ENGINE, FRONT, FIREPUMP, C8.3	8908
2	2	LEG, ENGINE SUPPORT, REAR, FIREPUMP, 6B/4B	15428
3	12	SCREW,HH, M12-1.75x25	20312-025
4	2	SCREW,HH, M12-1.75x40	20312-040





UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°	MACHINED SURFACES	IMPERIAL UNITS	METRIC UNITS
THIRD ANGLE PROJECTION	125	MACHINE TOLERANCES .XX ± 0.010 .XXX ± 0.005 FORM TOLERANCES .XX ± 0.030 .XXX ± 0.015 FAB TOLERANCES .XX ± 0.060 .XXX ± 0.030	MACHINE TOLERANCES .X ± 0.4 .XX ± 0.2 FORM TOLERANCES .X ± 0.8 .XX ± 0.4 FAB TOLERANCES .X ± 1.5 .XX ± 0.8

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE
A	2013-129	PER UPDATE TO 15428	S DUBICK	06-MAR-13

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DEPERE, WISCONSIN

ASSEMBLY, MOUNTING LEGS CFP8.3

DWG UNITS: IN/LB/S

DRAWN BY: S DUBICK

PRO-ENGINEER

DATE: 08-NOV-12

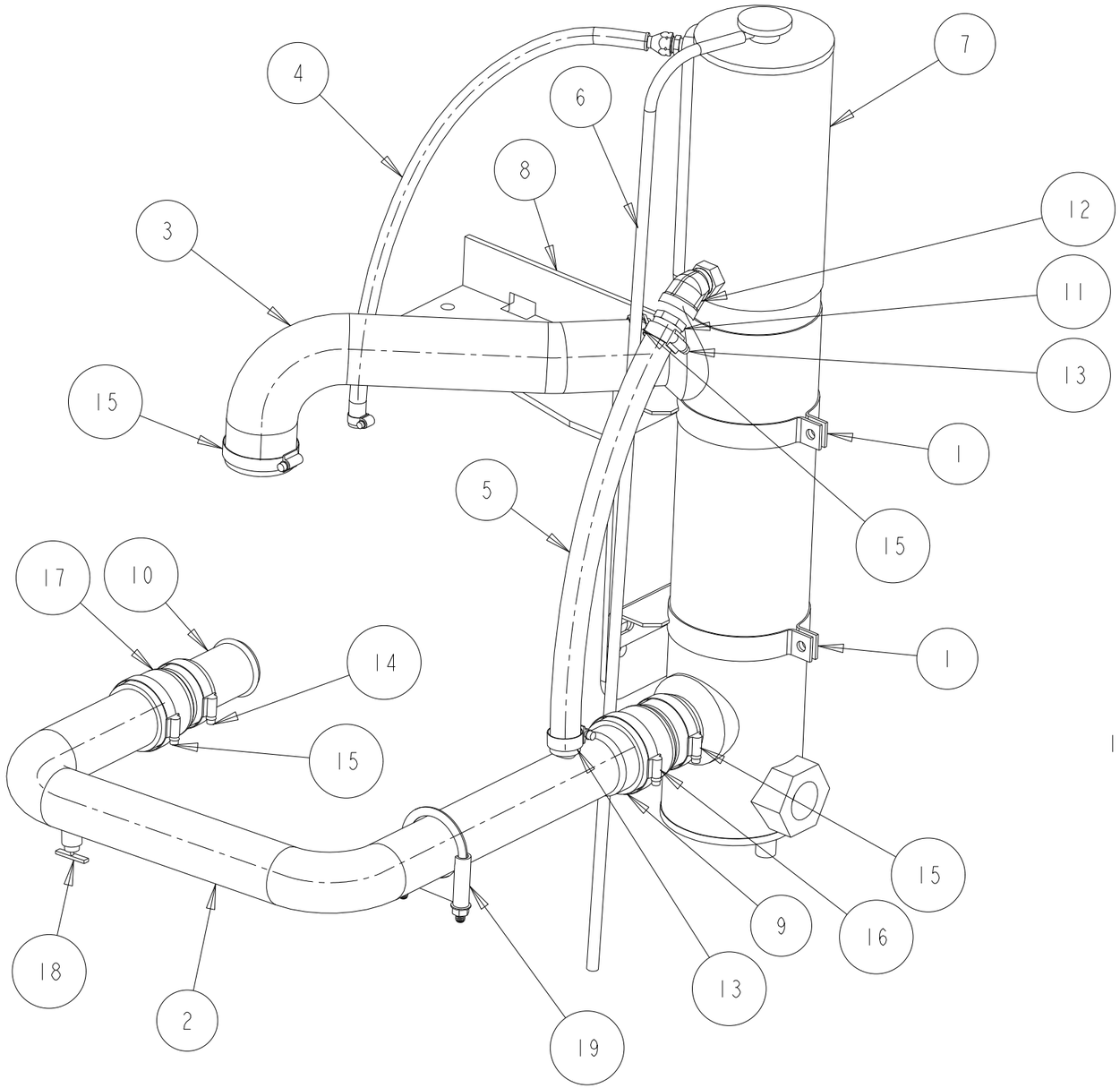
INIT ECO: 2012-392

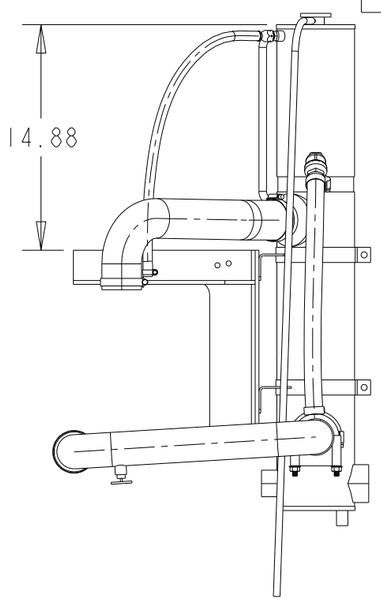
SCALE: 0.166

EST WEIGHT: 37.382

SHEET 1 OF 1

DRAWING NO: 21841





BILL OF MATERIAL

ITEM	QTY	DESCRIPTION	PART NUMBER
1	2	CLAMP, SUPPORT, HEAT EXCHANGER, CHAMP #300385	8819
2	1	TUBE, WATER INLET, CFP8.3	8920
3	1	HOSE, WATER OUTLET, FIREPUMP, C8.3	8921
4	1	ASSEMBLY, VENT LINE, 3/8 x 28", CFP9E	9658
G 5	1	HOSE, 3/4" ID, 18" LENGTH	80242GL
6	1	TUBE, OVERFLOW, 5/16" ID x 36" LG, #27003	8662
7	1	HEAT EXCHANGER, 5" DIA., 2-PASS, INTEGRAL TOP TANK	8687
8	1	BRACKET, SUPPORT, HEAT EXCHANGER, FIREPUMP, C8.3	8922
9	1	HOSE, REDUCER, 2.50 x 2.25, GATES, 20369	12140
10	1	TUBE, 2" OD x 4" L, P206331	12141
11	1	FTG, STR, -12 BEAD X -12 NPT	12545-12-12
12	1	ELBOW, 45°, 3/4"NOM, MNPTxFNPT, 150LB BLACK IRON	14204-12
G 13	2	CLAMP, WORM, .88 - 1.25	14990-12
G 14	1	CLAMP, WORM, 1.56 - 2.50	14990-32
G 15	4	CLAMP, WORM, 1.81 - 2.75	14990-36
G 16	1	CLAMP, WORM, 2.06 - 3.00	14990-40
17	1	HOSE, REDUCER, 2.25 x 2.00	20532
18	1	DRAIN VALVE, 1/4" NPT	80511
19	1	CLAMP,U-BOLT,GUILLOTINE, 2.25"	89542K

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE
G	2012-392	UPDATE CLAMPS AND HOSE	S DUBICK	08-NOV-12

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°

THIRD ANGLE PROJECTION

MACHINED SURFACES 125

	IMPERIAL UNITS	METRIC UNITS
MACHINE TOLERANCES	.XX = ± 0.010 .XXX = ± 0.005	.X = ± 0.4 .XX = ± 0.2
FORM TOLERANCES	.XX = ± 0.030 .XXX = ± 0.015	.X = ± 0.8 .XX = ± 0.4
FAB TOLERANCES	.XX = ± 0.060 .XXX = ± 0.030	.X = ± 1.5 .XX = ± 0.8

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DEPERE, WISCONSIN

ASSEMBLY, HEAT EXCHANGER FIREPUMP 6C8.3

DWG UNITS: IN/LB/S

DRAWN BY: DAVE N

PRO-ENGINEER

DATE: 28APR2004

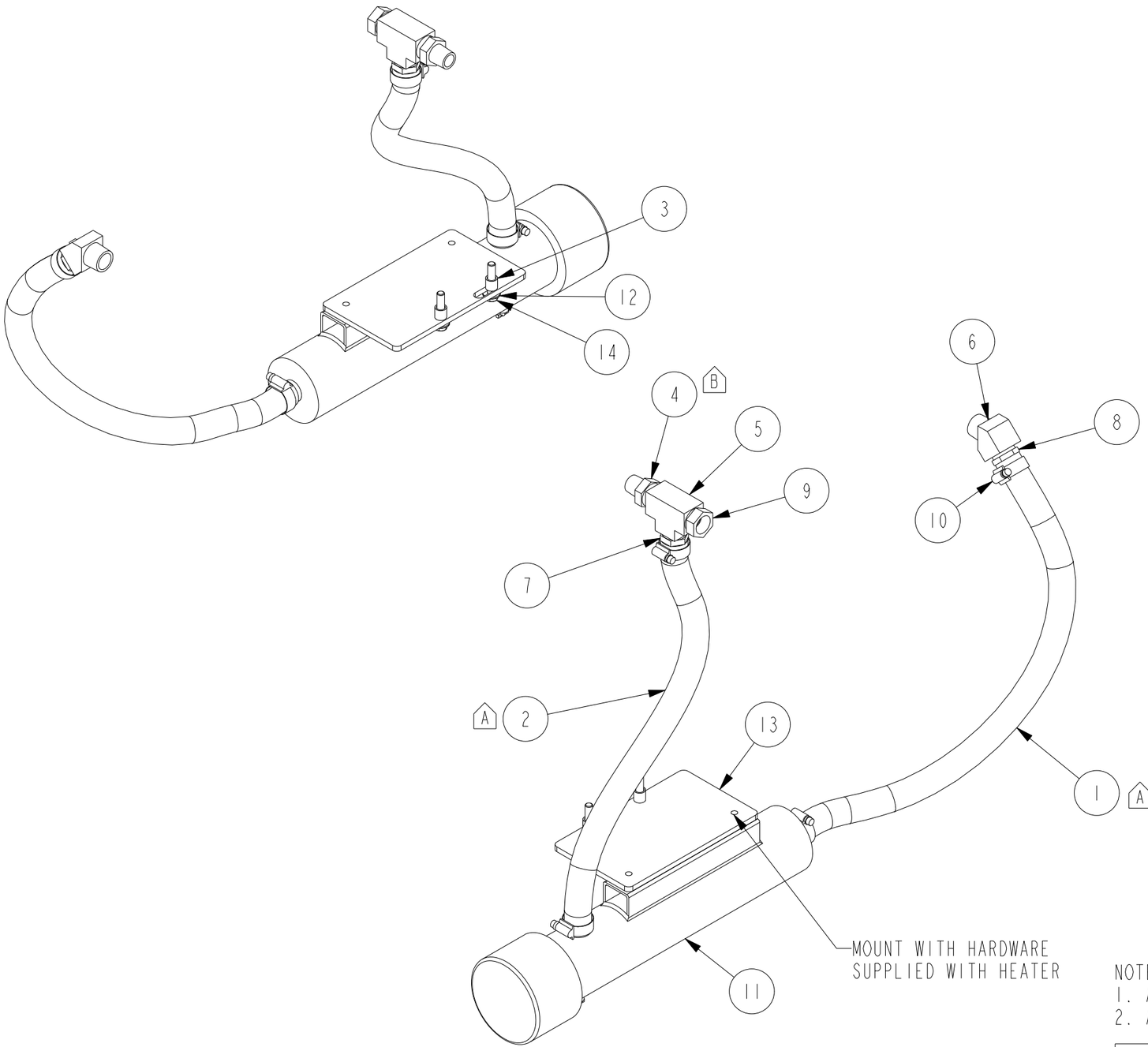
INIT ECO:

SCALE: 0.200

EST WEIGHT: 75.665

SHEET 1 OF 1

DRAWING NO: 8919



BILL OF MATERIAL

ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	HOSE, SILICONE HEATER, 3/4" ID x 23.00"	80242GL
2	1	HOSE, SILICONE HEATER, 3/4" ID x 19.00"	80242GL
3	2	SPACER, 0.5 OD X 0.38 ID X 0.50 LG	9618
B 4	1	NIPP, HEX, -12 NPT X -8 NPT	12164-12-8
5	1	TEE, UNION, -12 NPT	12531-12
6	1	ELB, 45 DEG, -12 NPT X -12 FMNPT	12532-12-12
7	1	FTG, STR, -12 BEAD X -12 NPT	12545-12-12
8	1	FTG, STR, -12 BARB X -12 NPT	12548-12-12
9	1	BUSH, RED, -12 NPT X -8 FNPT	14783-12-8
10	4	CLAMP, WORM, .88 - 1.25	14990-12
11	1	HEATER, COOLANT, 2250W, 120/240 VOLT, 150 DEGREE THERMOSTAT	15167
12	2	WASHER,FLAT, M8	20020-M8
13	1	BRACKET, COOLANT HEATER MOUNTING, CFP9E	23527
14	2	SCREW,HH, M8-1.25x40	20308-040

NOTES:
1. ATTACH HOSE TO HEATER WITH OUT RADIAL TWIST
2. APPLY THREAD SEALANT ON ALL NPT THREADS

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE
B	2014-165	OMIT 15761,ADDED 12164-12-8	MRH	10MAR2014
A	2014-057	80242GL REPLACED 14194	S DUBICK	14-FEB-14

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°

THIRD ANGLE PROJECTION

MACHINED SURFACES 125

	IMPERIAL UNITS	METRIC UNITS
MACHINE TOLERANCES	.XX : ± 0.010 .XXX : ± 0.005	.X : ± 0.4 .XX : ± 0.2
FORM TOLERANCES	.XX : ± 0.030 .XXX : ± 0.015	.X : ± 0.8 .XX : ± 0.4
FAB TOLERANCES	.XX : ± 0.060 .XXX : ± 0.030	.X : ± 1.5 .XX : ± 0.8

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DEPERE, WISCONSIN

HEATER, COOLANT, ASSEMBLY
CFP8.3

DWG UNITS: IN/LB/S

DRAWN BY: PBS

PRO-ENGINEER

DATE: 13JAN2014

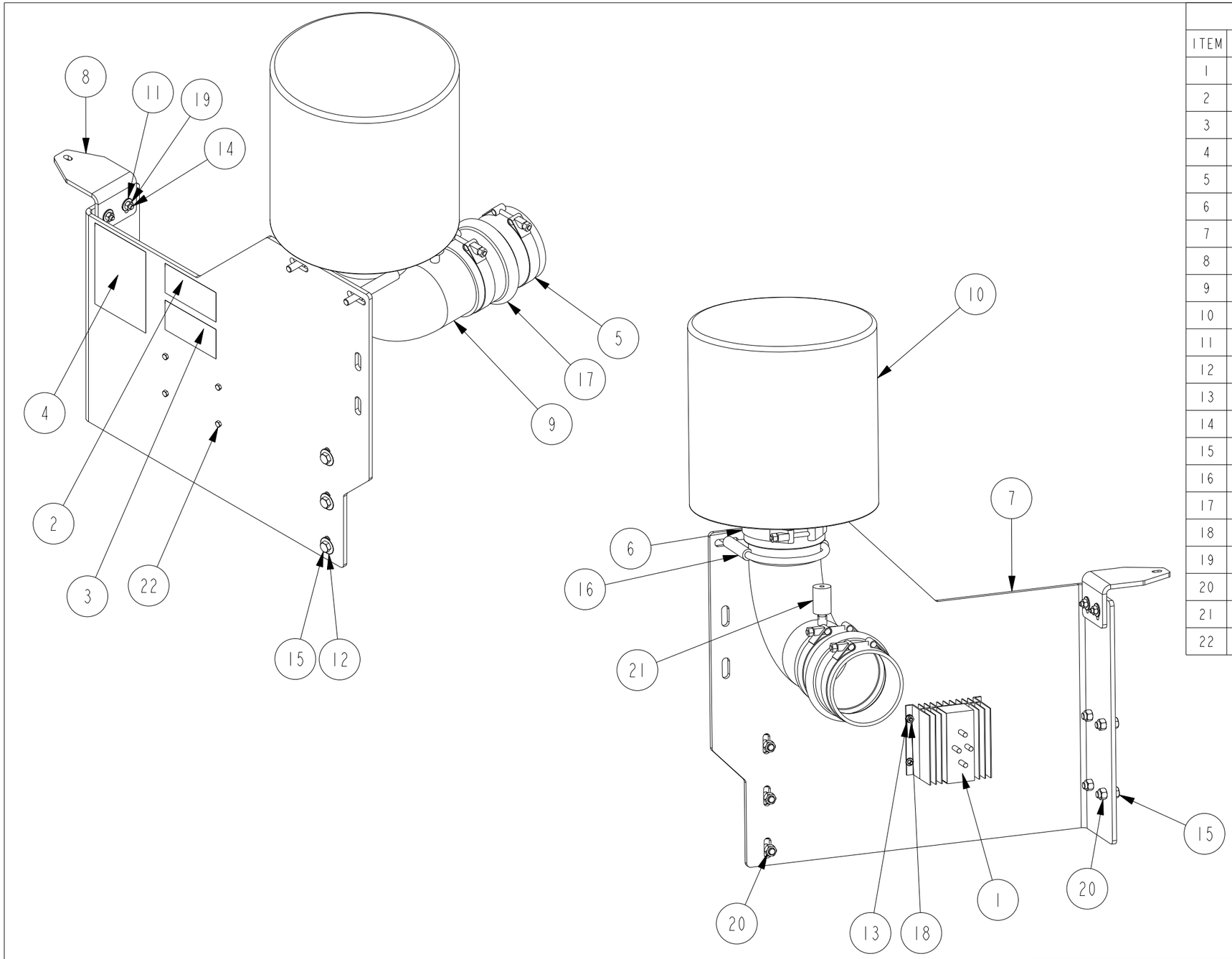
INIT ECO: 2014-024

SCALE: 0.200

EST WEIGHT: 13.466

SHEET 1 OF 1

DRAWING NO: A042A161



BILL OF MATERIAL

ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	BATTERY ISOLATOR, FIRE PUMP	8838
2	1	FACTORY SETTINGS TAG, FIREPUMP	9526-02
3	1	FIELD SETTINGS TAG, FIREPUMP	9526-03
4	1	DATA TAG, FIREPUMP	9534
5	2	CLAMP, T-BOLT, 4.03-4.34	13164-0425
6	1	CLAMP, T-BOLT, 4.28-4.59	13164-0450
7	1	PLATE, CONTACTOR MOUNTING, CFP8.3	15430
8	1	BRACE, CONTROL PANEL, CFP8.3	15526
9	1	TUBE, AIR INTAKE	15529
10	1	AIR CLEANER, 4" CONNECTION, CF# AH1196 OR EQUAL	15609
11	4	WASHER,FLAT, 0.25	20000-025
12	3	WASHER,FLAT, 0.38	20000-038
13	4	WASHER,FLAT, M5	20020-M5
14	2	SCREW,HH, 0.25-20x1.00	20225-100
15	7	SCREW,HH, 0.38-16x1.00	20238-100
16	1	CLAMP, U-BOLT, GUILLOTINE, 4.00", PLATED	89548K
17	1	COUPLING, RUBBER, 4", NELSON #89835K	89835K
18	4	NUT,HEX, M5-0.8	20120-M5
19	2	NUT,HEX, 0.25-20	20100-025
20	7	NUT,HEX, 0.38-16	20100-038
21	1	RESTRICTION INDICATOR, 1/8" NPT	RAX00-2352
22	4	SCREW,HH, M5-0.80x16	20305-016

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°

THIRD ANGLE PROJECTION

MACHINED SURFACES: 125

IMPERIAL UNITS	METRIC UNITS
MACHINE TOLERANCES .XX = ± 0.010 .XXX = ± 0.005	MACHINE TOLERANCES .X = ± 0.4 .XX = ± 0.2
FORM TOLERANCES .XX = ± 0.030 .XXX = ± 0.015	FORM TOLERANCES .X = ± 0.8 .XX = ± 0.4
FAB TOLERANCES .XX = ± 0.060 .XXX = ± 0.030	FAB TOLERANCES .X = ± 1.5 .XX = ± 0.8

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875 LAWRENCE DRIVE
DEPERE, WISCONSIN

ASSEMBLY, ACC, REAR MTG
CFP8.3

DWG UNITS: IN/LB/S

DRAWN BY: PBS

PRO-ENGINEER

DATE: 23SEP2013

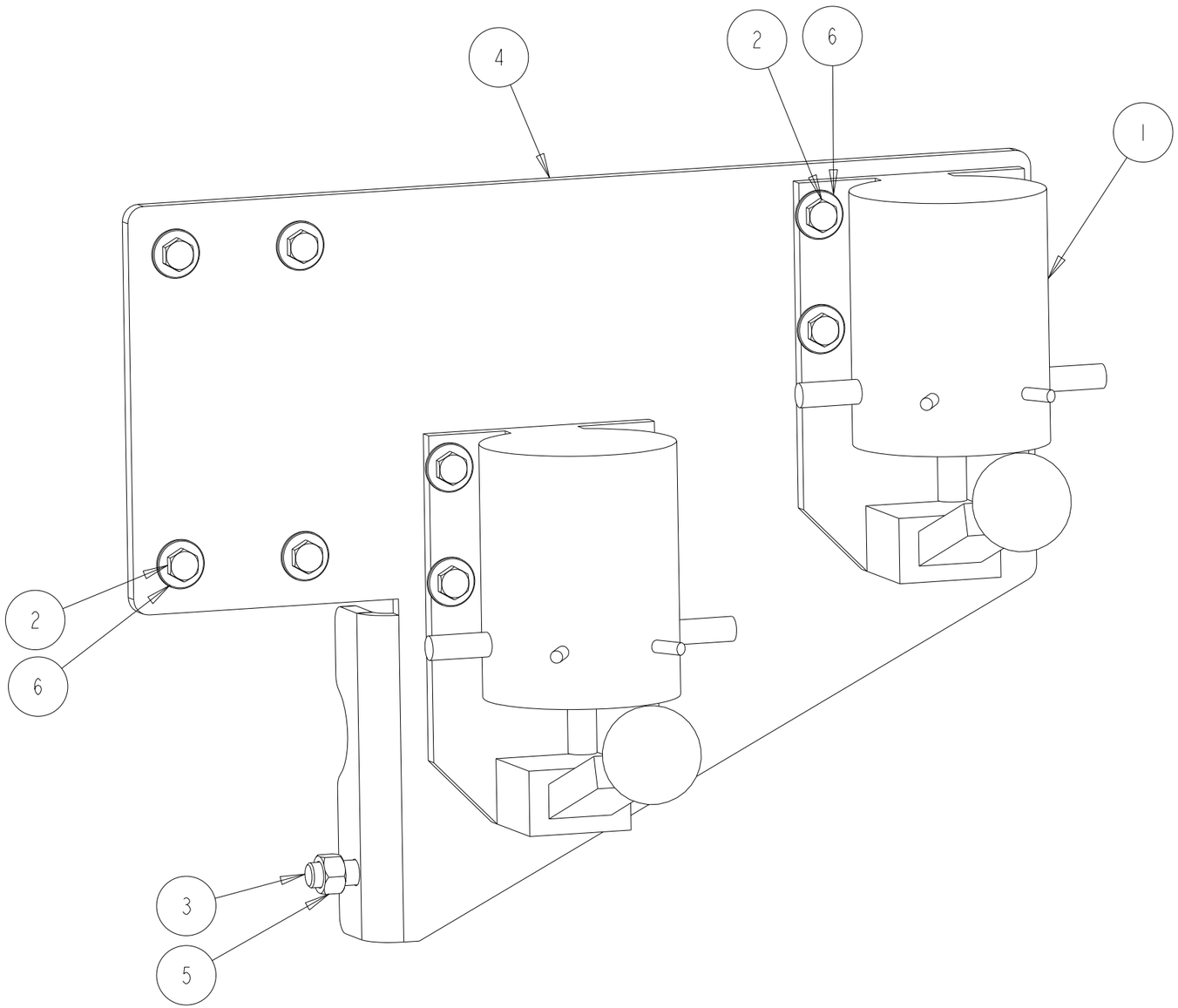
INIT ECO: 2013-480

SCALE: 0.166

EST WEIGHT: 123.250

SHEET 1 OF 1

DRAWING NO: 26567



BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	2	CONTACTOR, MANUAL OVERIDE, CFP	8824
2	12	SCREW,HH, 0.25-20x0.75	20225-075
3	1	SCREW,HH, 0.38-16x1.00	20238-100
4	1	BRACKET, CONTACTOR, CFP8.3	21239
5	1	NUT,HEX, 0.38-16	20100-038
6	12	WASHER,FLAT, 0.25	20000-025

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°	MACHINED SURFACES	IMPERIAL UNITS	METRIC UNITS
THIRD ANGLE PROJECTION	125	MACHINE TOLERANCES .XX = ± 0.010 .XXX = ± 0.005 FORM TOLERANCES .XX = ± 0.030 .XXX = ± 0.015 FAB TOLERANCES .XX = ± 0.060 .XXX = ± 0.030	MACHINE TOLERANCES .X = ± 0.4 .XX = ± 0.2 FORM TOLERANCES .X = ± 0.8 .XX = ± 0.4 FAB TOLERANCES .X = ± 1.5 .XX = ± 0.8

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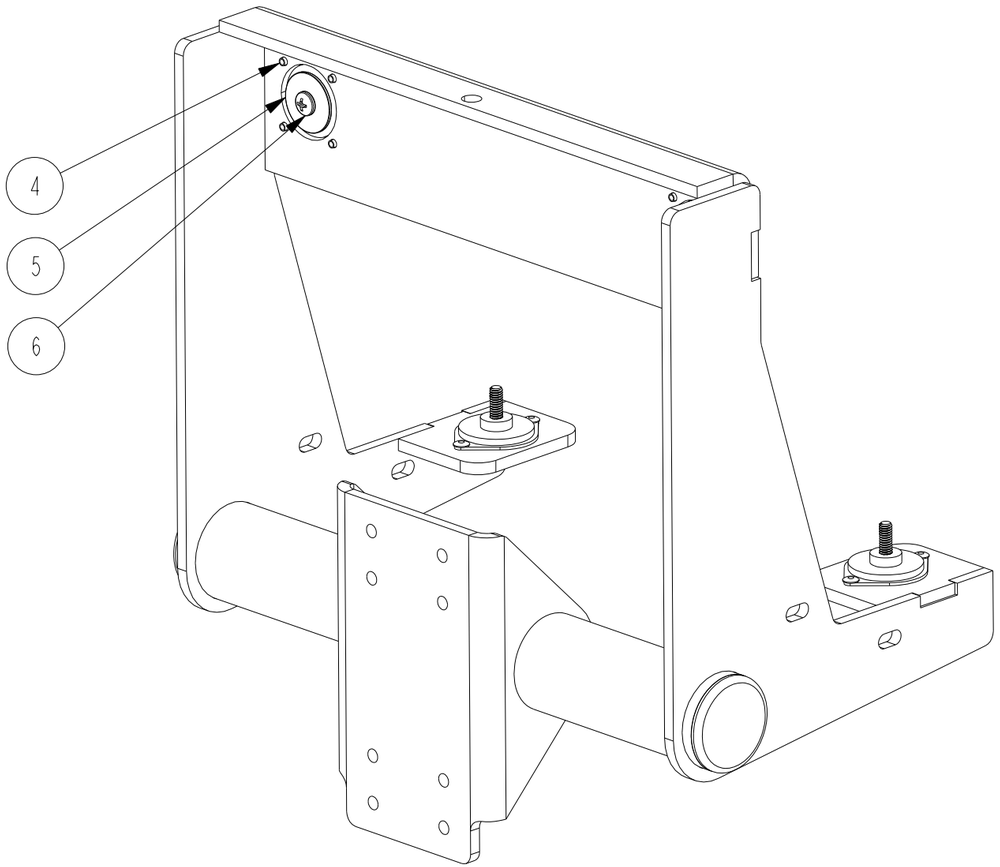
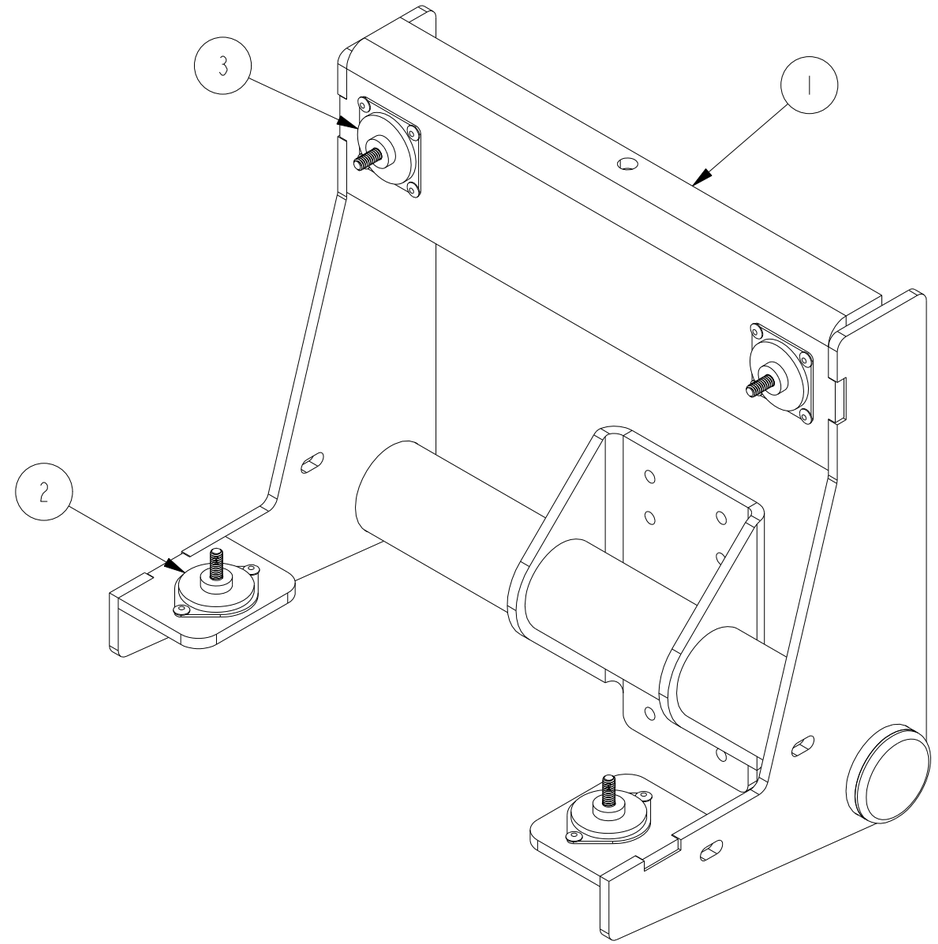
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

ASSEMBLY, CONTACTORS CFP8.3

DWG UNITS: IN/LB/S	DRAWN BY: S DUBICK	DATE: 09-NOV-12
	PRO-ENGINEER	INIT ECO: 2012-392
SCALE: 0.500	SHEET 1 OF 1	DRAWING NO: 21246
EST WEIGHT: 9.976		

BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	MOUNT, OPERATOR STATION, CFP CONTROL PANEL	22318
2	2	ISOLATOR, PLATE MOUNT, 3 LB (YELLOW MARK)	15400
3	2	ISOLATOR, PLATE MOUNT, 6 LB (RED MARK)	15412
4	12	RIVET, ALUMINUM, STEEL SHANK, 0.156 DIA, 0.25-0.38 GRIP	15414
5	2	FENDER WASHER, 0.281 X 1.25	15421
6	4	SCREW, SELF LOCKING, 0.25-20 X 1.00, PH OR BH	15422





UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°

THIRD ANGLE PROJECTION

MACHINED SURFACES	IMPERIAL UNITS	METRIC UNITS
125	MACHINE TOLERANCES .XX = ± 0.010 .XXX = ± 0.005 FORM TOLERANCES .XX = ± 0.030 .XXX = ± 0.015 FAB TOLERANCES .XX = ± 0.060 .XXX = ± 0.030	MACHINE TOLERANCES .X = ± 0.4 .XX = ± 0.2 FORM TOLERANCES .X = ± 0.8 .XX = ± 0.4 FAB TOLERANCES .X = ± 1.5 .XX = ± 0.8

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE

Cummins Fire Power

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CUSTOM DESIGN
AND UPFIT CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

ASSEMBLY, CONTROL PANEL MOUNTING CFP POWER UNITS

DWG UNITS: IN/LB/S

DRAWN BY: S DUBICK

PRO-ENGINEER

DATE: 26-SEP-12

INIT ECO: 2012-392

SCALE: 0.333

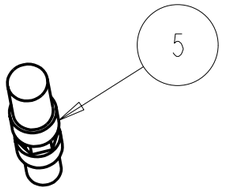
EST WEIGHT: 16.439

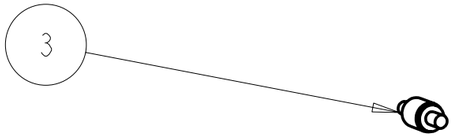
SHEET 1 OF 1

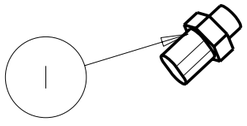
DRAWING NO: 21249

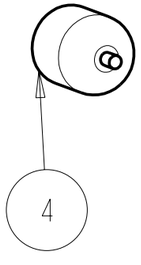
BILL OF MATERIAL

ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	SWITCH, WATER TEMP, 200F SETTING, RS#85879-A3	8860
2	1	SWITCH, OIL PRESSURE, 16 PSI, RS#85858-A3	8861
3	1	SENDER, WATER TEMPERATURE, DATCON #02022-00	8862
4	1	SENDER, OIL TEMPERATURE, DATCON #02504-00	8863
5	1	SENSOR, MAG PICK UP	9569









REV	DESCRIPTION OF REVISION	REV BY	DATE
A	UPDATED PER ASSEMBLY	DAVE N	26AUG04

UNLESS OTHERWISE SPECIFIED
ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°

IMPERIAL UNITS	METRIC UNITS
MACHINE TOLERANCES .X : ± 0.06 .XX : ± 0.010 .XXX : ± 0.001 WELD TOLERANCES X : ± 0.25 .XX : ± 0.12 .XXX : ± 0.06	MACHINE TOLERANCES X : ± 1.5 X.X : ± 0.5 X.XX : ± 0.05 WELDED TOLERANCES X : ± 5 X.X : ± 3 X.XX : ± 1.50

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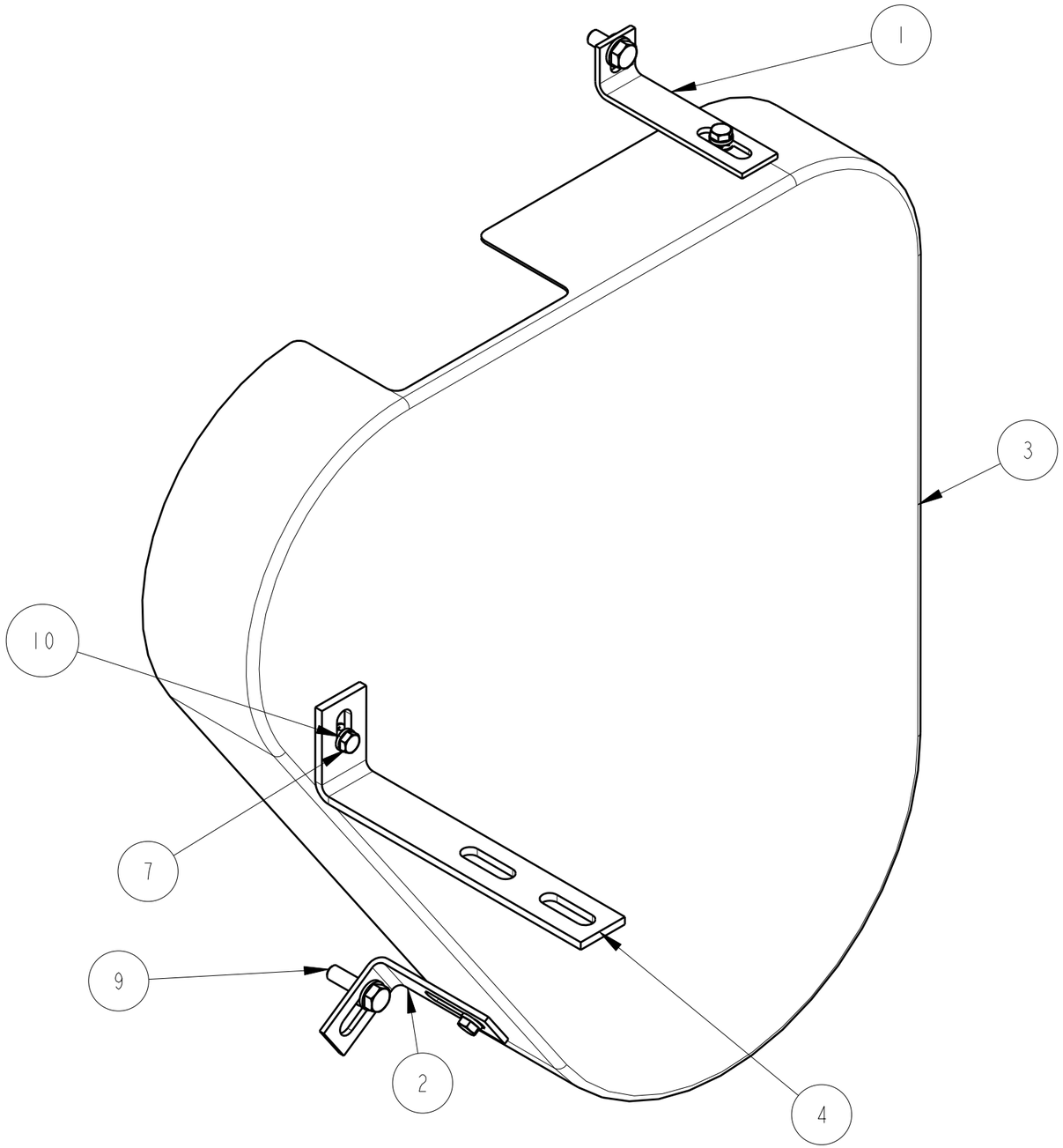
NPOWER SYSTEMS
DESIGN CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

TITLE 1: ASSEMBLY, SENSOR PACKAGE, C8.3
TITLE 2: FIREPUMP

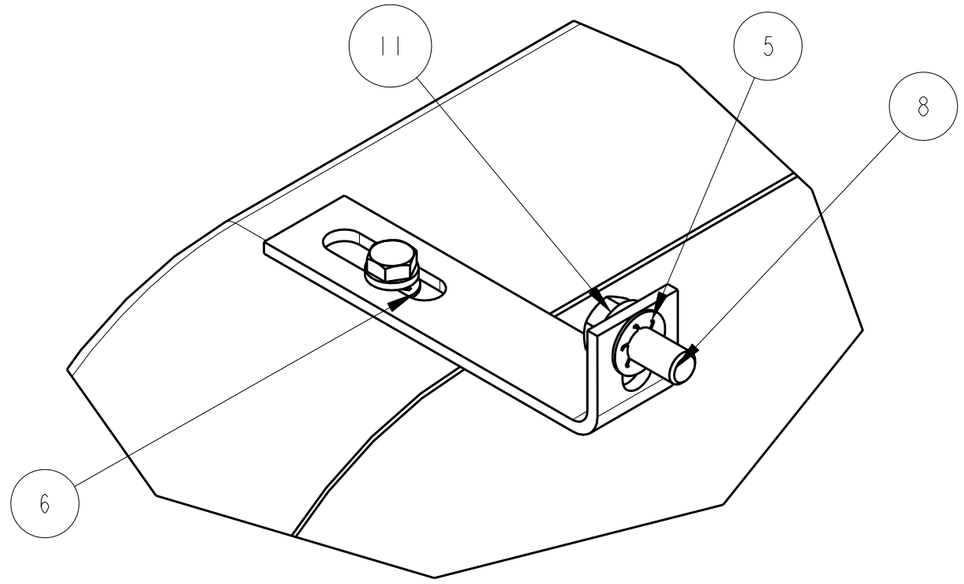
DWG UNITS: IN/LB/S	DRAWN BY: DAVE N	DATE: 21AUG2004
	APPD BY: -	DATE: -

EST WEIGHT: 42238.628	SCALE: 0.375	DO NOT SCALE	SHEET 1OF1	DRAWING NO: 9574	REV: A



BILL OF MATERIAL

	ITEM	QTY	DESCRIPTION	PART NUMBER
	1	1	BRACKET, MOUNTING, GUARD, FIREPUMP	8592
	2	1	BRACKET, MOUNTING, GUARD, FIREPUMP	8593
	3	1	GUARD, PULLEY, 6C, FIRE PUMP	8633
	4	1	BRACKET, MOUNTING, TUBE SUPPORT, FIREPUMP	9834
B	5	2	RETAINING WASHER, PUSHNUT, 5/16" BOLT	16662-05
	6	3	RETAINING WASHER, PUSHNUT, M6 BOLT	16662-11
	7	3	SCREW, CAP, HEX HEAD, M6	HHCS_M6
B	8	1	SCREW, CAP, HEX HEAD, M8-1.25 x 20	HHCS_M8-20
	9	1	SCREW, CAP, HEX HEAD, M8-1.25 x 30	HHCS_M8-30
B	10	3	WASHER, M6	WASHER_M6
	11	2	WASHER, M8	WASHER_M8



TYPICAL FASTENERS
SCALE 0.750 B

REV				
B	2010-075	ADDED RETAINING NUTS AND FASTENERS	DAN	18-FEB-10
REV	ENF	DESCRIPTION OF REVISION	REV BY	DATE

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°

THIRD ANGLE PROJECTION

IMPERIAL UNITS	METRIC UNITS
MACHINE TOLERANCES .XX : ± 0.010 .XXX : ± 0.005	MACHINE TOLERANCES .X : ± 0.4 .XX : ± 0.2
FORM TOLERANCES .XX : ± 0.030 .XXX : ± 0.015	FORM TOLERANCES .X : ± 0.8 .XX : ± 0.4
FAB TOLERANCES .XX : ± 0.060 .XXX : ± 0.030	FAB TOLERANCES .X : ± 1.5 .XX : ± 0.8

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CUSTOM DESIGN
AND UPFIT CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

GUARD, PULLEY, 6C
FIREPUMP

DWG UNITS: IN/LB/S

DRAWN BY: DAVE N

PRO-ENGINEER

DATE: 26APR2005

REF DRWG:

SCALE: 0.375

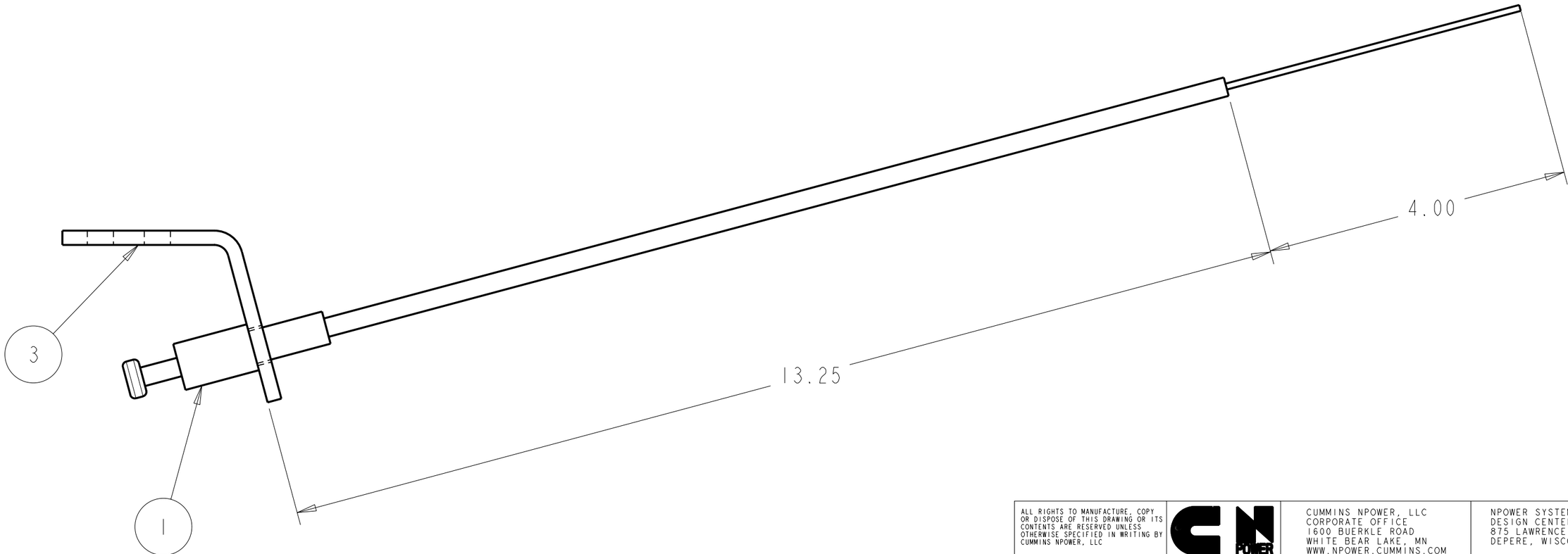
EST WEIGHT: 8.720

SHEET 1 OF 1

DRAWING NO: 9625

BILL OF MATERIAL

ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	THROTTLE CABLE, TURN LOCKING	R09D3-5X06
2	1	DECAL, FUEL SOLENOID OVERIDE (NOT SHOWN), FIREPUMP	9526-12
3	1	BRACKET, MTG, FUEL SOLENOID OVERIDE, FIRPUMP	9831
4	1	CHAIN, CONNECTING (NOT SHOWN) P/N 1250, FIREPUMP	CHAIN-1250



REV	DESCRIPTION OF REVISION	REV BY	DATE
A	AS BUILT	DAVE N	03MAY05

UNLESS OTHERWISE SPECIFIED
ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°

IMPERIAL UNITS	METRIC UNITS
MACHINE TOLERANCES .X : ± 0.06 .XX : ± 0.010 .XXX : ± 0.001 : WELD TOLERANCES .X : ± 0.25 .XX : ± 0.12 .XXX : ± 0.06	MACHINE TOLERANCES X : ± 1.5 X.X : ± 0.5 X.XX : ± 0.05 : WELDED TOLERANCES X : ± 5 X.X : ± 3 X.XX : ± 1.50

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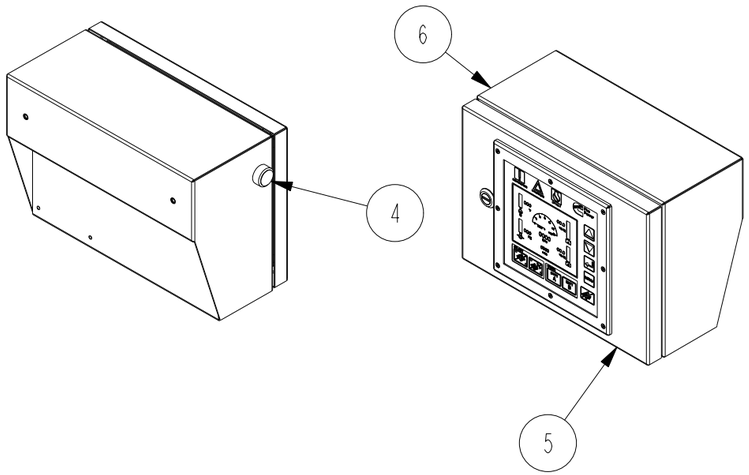
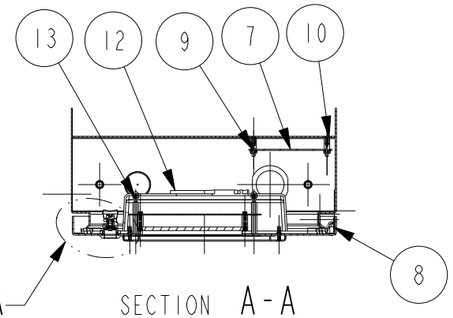
NPOWER SYSTEMS
DESIGN CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

TITLE 1: ASSEMBLY, SOLENOID OVERIDE
TITLE 2: FIREPUMP

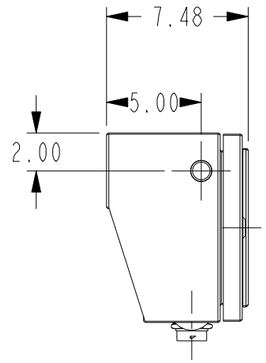
DWG UNITS: IN/LB/S	DRAWN BY: DAVE N		DATE: 02FEB2005
	APPD BY: -		DATE: -
EST WEIGHT: 42238.628	SCALE: 0.750	DO NOT SCALE	SHEET 1OF1
DRAWING NO: 9830	REV: A		

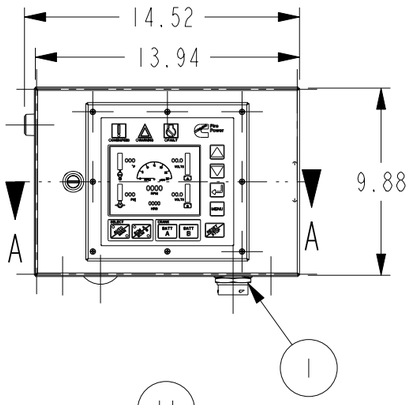


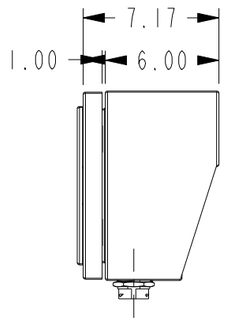


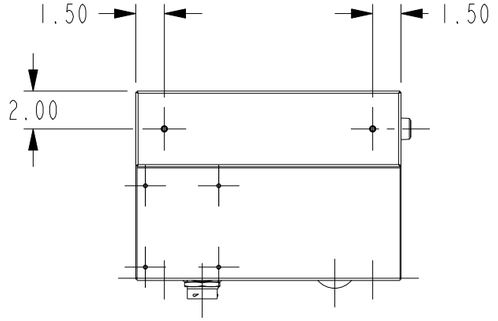
BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	ASSY,BULKHEAD WIRING, DIGITAL PANEL, BULKHEAD TO POWER PCB	15156
2	1	CABLE, DIGITAL PANEL, POWER PCB TO DISPLAY PCB	15157
3	1	CABLE, DIGITAL PANEL, POWER PCB TO ECM SWITCH PCB	15158
4	1	ASSY, WIRING, DIGITAL PANEL, ENGINE STOP SWITCH	15160
5	1	ASSEMBLY, DOOR, CONTROL PANEL	15575
6	1	WELDMT, DIGITAL PANEL, BOX, MECHANICAL	15654
7	1	POWER PCB, DIGITAL PANEL, ELECTRONIC	15153
8	2	HINGE, ASSEMBLY W/PIN, MILD STEEL, EMKA 1069-U2	15573_02
9	6	NUT, 8-32, W/TOOTH WASHER, ZNC -PLTD	15582
10	6	STANDOFF HEX M/F,8-32, .63"L, ALUM, DIGI-KEY 8428K-ND	15587
11	1	PLUG, LIQUID TIGHT, HEYCO, 3837	15645
12	1	COVER, DOOR PANEL	16889
13	4	NUT, ACORN,SELF-LOCKING, 8-32, 18-8 STNL STL	17149
14	1	LABEL, UL , MECHANICAL CONTROL PANEL	17791

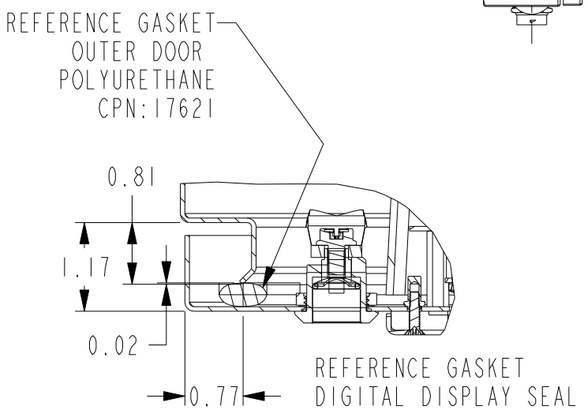
** BOM FOR REFERENCE ONLY **



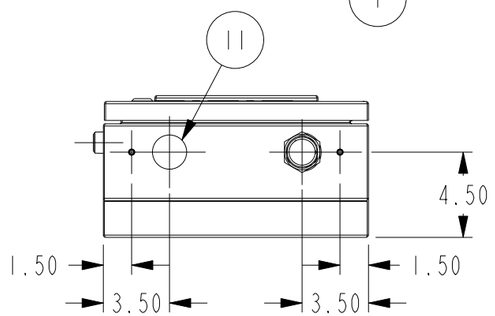








DETAIL A
SCALE 0.500



NOTES:
1. FINISH ON STEEL COMPONENTS:
   COAT PER CUMMINS SPEC ES044 CUMMINS RED
2. TYPE 4X INDOOR USE CONSTRUCTION
3. UPDATED SOFTWARE

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°
THIRD ANGLE PROJECTION

MACHINED SURFACES: 125

	IMPERIAL UNITS	METRIC UNITS
MACHINE TOLERANCES	.XX : ± 0.010 .XXX : ± 0.005	.X : ± 0.4 .XX : ± 0.2
FORM TOLERANCES	.XX : ± 0.030 .XXX : ± 0.015	.X : ± 0.8 .XX : ± 0.4
FAB TOLERANCES	.XX : ± 0.060 .XXX : ± 0.030	.X : ± 1.5 .XX : ± 0.8

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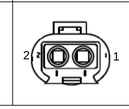
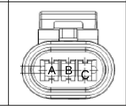
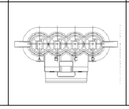
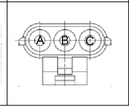
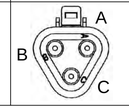
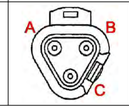
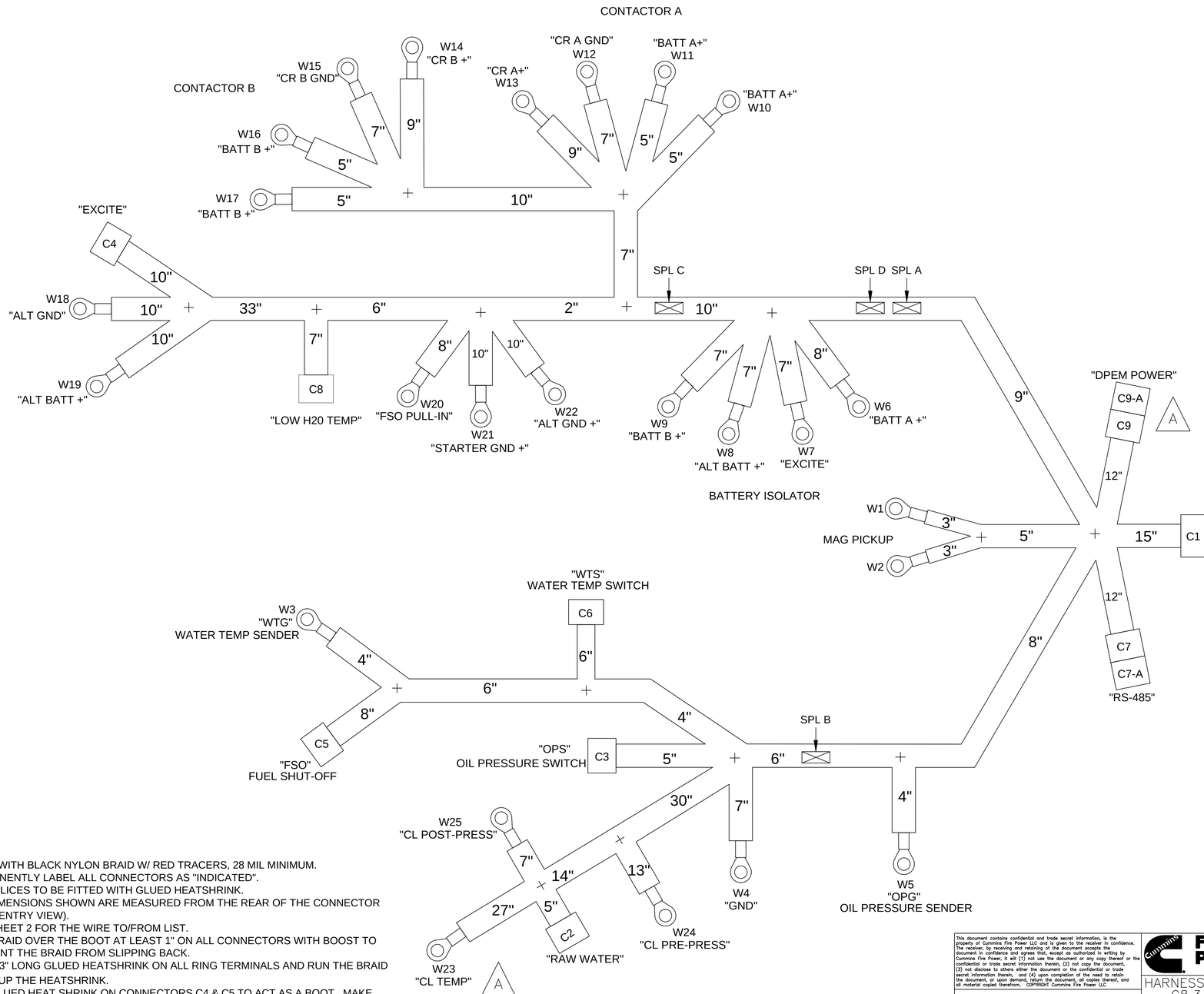
CUSTOM DESIGN
AND UPFIT CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

ASSEMBLY, DIGITAL PANEL MECHANICAL FIRE PUMP DRIVER

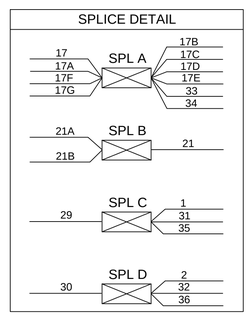
DWG UNITS: IN/LB/S	DRAWN BY: S DUBICK	DATE: 21-SEP-12
	PRO-ENGINEER	INIT ECO: 2012-348
SCALE: 0.125	SHEET 1 OF 1	DRAWING NO: 22793
EST WEIGHT: 26.147		

CONNECTOR WIRE INSERTION VIEW

C1	C2	C3 C6	C4	C5	C7 C8	C7-A	C9
							



SPLICE DETAIL



NOTES:

1) LOOM WITH BLACK NYLON BRAID W/ RED TRACERS, 28 MIL MINIMUM.
2) PROMINENTLY LABEL ALL CONNECTORS AS "INDICATED".
3) ALL SPLICES TO BE FITTED WITH GLUED HEATSHRINK.
4) ALL DIMENSIONS SHOWN ARE MEASURED FROM THE REAR OF THE CONNECTOR (WIRE ENTRY VIEW).
5) SEE SHEET 2 FOR THE WIRE TO/FROM LIST.
6) RUN BRAID OVER THE BOOT AT LEAST 1" ON ALL CONNECTORS WITH BOOST TO PREVENT THE BRAID FROM SLIPPING BACK.
7) USE A 3" LONG GLUED HEATSHRINK ON ALL RING TERMINALS AND RUN THE BRAID $\frac{1}{2}$ WAY UP THE HEATSHRINK.
8) USE GLUED HEAT SHRINK ON CONNECTORS C4 & C5 TO ACT AS A BOOT. MAKE SURE HEAT SHRINK COVERS BACK OF CONNECTOR AND BRAID RUNS $\frac{1}{2}$ WAY UP THE HEATSHRINK.
9) COMPONENTS MAY BE SUBSTITUTED AS LONG AS FIT, FORM, FUNCTION AND REGULATORY STANDARDS ARE MET OR EXCEEDED.

REV	ECO	DESCRIPTION OF REVISION	BY	DATE
A	2014-221	ADDED COOLING LOOP SENSORS; ADDED DPEM POWER BREAKOUT; ADDED SCHEMATIC, PAGE 3.	RMJ	24FEB2014

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°	IMPERIAL UNITS	METRIC UNITS
THIRD ANGLE PROJECTION	WHOLE TOLERANCES .XX = ± 0.030 .XXX = ± 0.005 FORM TOLERANCES .X = ± 0.06 .XX = ± 0.015 RM TOLERANCES .XX = ± 0.030 .XXX = ± 0.005	WHOLE TOLERANCES .X = ± 0.8 .XX = ± 0.1 FORM TOLERANCES .X = ± 0.8 .XX = ± 0.4 RM TOLERANCES .X = ± 0.8 .XX = ± 0.8

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CUSTOM DESIGN AND UPFIT CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

HARNESS, WIRE C8.3 FIRE PUMP DRIVER

DWG UNITS: INCH/LB/S	DRAWN BY: BG	DATE: 17-JAN-2013
	AUTO CAD	INIT ECO: 2013-030
SCALE:	SHEET 1OF3	DRAWING NO: 23930
EST WEIGHT:		

A

TAGS	QTY	CATALOG	MFG	DESC
C1	1	HDP26-24-29SN	DEUTSCH	CONNECTOR, PLUG, 29 POSITION, CIRCULAR
	4	1062-12-0222	DEUTSCH	TERMINAL, SOCKET, NICKEL, SIZE 12
	15	0462-209-16141	DEUTSCH	TERMINAL, SOCKET, NICKEL, SIZE 16
	3	0462-201-16141	DEUTSCH	TERMINAL, SOCKET, NICKEL, SIZE 16,16-20 AWG
	1	114017	DEUTSCH	PLUG, SEALING, SIZE 12-16
	6	0413-204-2005	DEUTSCH	PLUG, SEALING, SIZE 20
	1	HD30-24BT-BK	DEUTSCH	BOOT, 24 SHELL SIZE, BLACK
C2	1	DT04-2P	DEUTSCH	CONNECTOR, RECEPTACLE, 2 POSITION
	2	0460-202-16141	DEUTSCH	TERMINAL, PIN, NICKEL, SIZE 16
	1	W2P	DEUTSCH	WEDGELOCK
	1	DT2P-BT	DEUTSCH	BOOT, 2 WAY RECEPTACLE, GRAY
C3	1	12162280	DELPHI	CONNECTOR, ASSY, FEMALE, METRI-PACK 150.2, 3 WAY
	3	12124075	DELPHI	TERMINAL, FEMALE, METRI-PACK 150.2, TIN PLATED
	1	3656059	ELL-TRON	BOOT
C4	1	12186568	DELPHI	CONNECTOR, ASSY, FEMALE, METRI-PACK 150, 4 WAY
	1	12048074	DELPHI	TERMINAL, FEMALE, METRI-PACK 150, TIN PLATED
	1	12052387	DELPHI	SEAL, CABLE, GRAY
	3	12059168	DELPHI	PLUG, CABLE CAVITY, DARK RED
C5	1	12015793	DELPHI	CONNECTOR, ASSY, FEMALE, WEATHER PACK TOWER, 3 WAY
	3	12089188	DELPHI	TERMINAL, FEMALE, WEATHER PACK, TIN PLATED
	3	12010293	DELPHI	SEAL, CABLE, GRAY
C6	1	12162280	DELPHI	CONNECTOR, ASSY, FEMALE, METRI-PACK 150.2, 3 WAY
	2	12124075	DELPHI	TERMINAL, FEMALE, METRI-PACK 150.2, TIN PLATED
	1	12034413	DELPHI	PLUG, CABLE CAVITY, BLACK
	1	3656059	ELL-TRON	BOOT
C7, C8	2	DT06-3S	DEUTSCH	CONNECTOR, PLUG, 2-POSITION
	5	0462-201-16141	DEUTSCH	TERMINAL, SOCKET, SIZE 16, NICKEL
	2	W3S	DEUTSCH	WEDGELOCK
	2	DT3S-BT	DEUTSCH	BOOT
C7-A	1	DT04-3P	DEUTSCH	CONNECTOR, PLUG, 2-POSITION
	3	114017	DEUTSCH	PLUG, SEALING, SIZE 12-16
	1	W3P	DEUTSCH	WEDGELOCK
C9	1	DT06-6S	DEUTSCH	CONNECTOR, PLUG, 6-POSITION
	6	0462-201-16141	DEUTSCH	TERMINAL, SOCKET, NICKEL, SIZE 16
	1	W6S	DEUTSCH	WEDGELOCK
	1	DT6S-BTBK	DEUTSCH	BOOT, BLACK
C9-A	1	DT04-6P	DEUTSCH	CONNECTOR, RECEPTACLE, 6-POSITION
	6	114017	DEUTSCH	PLUG, SEALING, SIZE 12-16
	1	W6P	DEUTSCH	WEDGELOCK
W13,W14	2	31203	WAYTEK	TERMINAL, RING, #10, 16-14AWG, NON-INSULATED
	2	218N1V02	VTE	CAP, LUG AND RING TERMINAL, 200 SERIES
W1,W2,W3,W5,W12,W15, W23,W24,W25	9	31203	WAYTEK	TERMINAL, RING, #10, 16-14AWG, NON-INSULATED
W7	1	31204	WAYTEK	TERMINAL, RING, 1/4", 16-14AWG, NON-INSULATED
	1	218N1V02	VTE	CAP, LUG AND RING TERMINAL, 200 SERIES
W20	1	31207	WAYTEK	TERMINAL, RING, 1/2", 16-14AWG, NON-INSULATED
	1	218N1V02	VTE	CAP, LUG AND RING TERMINAL, 200 SERIES
W11,W16	2	32205	WAYTEK	TERMINAL, RING, 3/8", 10-12AWG, NON-INSULATED
W21	1	32206	WAYTEK	TERMINAL, RING, 1/2", 12-10AWG, NON-INSULATED
W19	1	34002	WAYTEK	TERMINAL, RING, 5/16", 6AWG, NON-INSULATED
	1	218N2V02	VTE	CAP, LUG AND RING TERMINAL, 200 SERIES
W22	1	34004	WAYTEK	TERMINAL, RING, 1/2", 6AWG, NON-INSULATED
W6,W8,W9	3	34001	WAYTEK	TERMINAL, RING, 1/4" 6AWG, NON-INSULATED
	1	218N2V02	VTE	CAP, LUG AND RING TERMINAL, 200 SERIES
W4,W10,W17	3	34003	WAYTEK	TERMINAL, RING, 3/8", 6AWG, NON-INSULATED
W18	1	34001	WAYTEK	TERMINAL, RING, 1/4" 6AWG, NON-INSULATED

A

CIRCUIT #	FROM	PIN1	TO	PIN2	WIRECOLOR	WIRESIZE	WIRE TYPE	TERM 1	TERM 2	STAMP
1	C1	1	SPL C	<	WHITE	10	GXL	1062-12-0222	-	BATT A
2	C1	2	SPL D	<	WHITE	10	GXL	1062-12-0222	-	BATT B
3	C1	4	W21	-	WHITE	10	GXL	1062-12-0222	32206	CHARGE GND
4	C1	5	W1	-	WHITE	16	GXL	0462-209-16141	31203	MPU +
5	C1	6	W2	-	WHITE	16	GXL	0462-209-16141	31203	MPU -
6	C1	7	C5	A	WHITE	16	GXL	0462-209-16141	12089188	FSO
7	C1	8	W5	-	WHITE	16	GXL	0462-209-16141	31203	OPG
8	C1	9	W3	-	WHITE	16	GXL	0462-209-16141	31203	WTG
9	C1	10	C3	C	WHITE	16	GXL	0462-209-16141	12124075	OPS
10	C1	11	C6	B	WHITE	16	GXL	0462-209-16141	12124075	WTS
11	C1	12	W13	-	WHITE	14	GXL	0462-209-16141	31203	CRANK A
12	C1	13	W14	-	WHITE	14	GXL	0462-209-16141	31203	CRANK B
13	C1	15	C2	1	WHITE	14	GXL	0462-209-16141	0460-202-16141	RW SOL +
14	C3	B	C6	A	WHITE	16	GXL	12124075	12124075	OPS TO WTS
15	W19	-	W8	-	WHITE	6	GXL	34002	34001	ALT B+
16	W18	-	W22	-	WHITE	6	GXL	34002	34004	ALT GND
17	W4	-	SPL A	>	WHITE	6	GXL	34003	-	GND
17A	C3	A	SPL A	>	WHITE	16	GXL	12124075	-	OPS GND
17B	C2	2	SPL A	<	WHITE	14	GXL	0460-202-16141	-	RW SOL GND
17C	C1	3	SPL A	<	WHITE	10	GXL	1062-12-0222	-	SYS GND
17D	W12	-	SPL A	<	WHITE	14	GXL	31203	-	CRANK A GND
17E	W15	-	SPL A	<	WHITE	14	GXL	31203	-	CRANK B GND
17F	C5	C	SPL A	>	WHITE	16	GXL	12089188	-	FSO GND
17G	C8	C	SPL A	>	WHITE	16	GXL	0462-201-16141	-	LCT GND
18	W6	-	W10		WHITE	6	GXL	34001	34003	BATT A +
19	W9	-	W17	-	WHITE	6	GXL	34001	34003	BATT B +
20	C5	B	W20	-	WHITE	16	GXL	12089188	31207	FSO PULL-IN
21	C1	14	SPL B	<	WHITE	16	GXL	0462-209-16141	-	EXCITE
21A	C4	C	SPL B	>	WHITE	16	GXL	12048074	-	EXCITE
21B	W7	-	SPL B	>	WHITE	16	GXL	31204	-	EXCITE
22	C1	21	C7	A	WHITE/BLUE	22	BELDEN 3105A	0462-201-16141	0462-201-16141	RS485 A
23	C1	22	C7	B	BLUE/WHITE	22		0462-201-16141	0462-201-16141	RS485 B
24	C1	16	C7	C	SHIELD	22		0462-201-16141	0462-201-16141	RS485 SHLD
25	C8	B	C1	19	WHITE	16	GXL	0462-201-16141	0462-209-16141	LCT SIG
26	C1	17	W23	-	WHITE	16	GXL	0462-209-16141	31203	LOOP TEMP
27	C1	25	W24	-	WHITE	16	GXL	0462-209-16141	31203	LOOP PRE PRESS
28	C1	26	W25	-	WHITE	16	GXL	0462-209-16141	31203	LOOP POST PRESS
29	SPL C	>	W11	-	WHITE	10	GXL	-	32205	BATT A
30	SPL D	>	W16	-	WHITE	10	GXL	-	32205	BATT B
31	SPL C	<	C9	1	WHITE	16	GXL	-	0462-201-16141	DPEM BA+
32	SPL D	<	C9	2	WHITE	16	GXL	-	0462-201-16141	DPEM BB+
33	SPL A	<	C9	3	WHITE	16	GXL	-	0462-201-16141	DPEM GROUND
34	SPL A	<	C9	4	WHITE	16	GXL	-	0462-201-16141	DPEM GROUND
35	SPL C	<	C9	5	WHITE	16	GXL	-	0462-201-16141	DPEM BA+
36	SPL D	<	C9	5	WHITE	16	GXL	-	0462-201-16141	DPEM BB+

REV	ECO	DESCRIPTION OF REVISION	BY	DATE
A	2014-221	ADDED COOLING LOOP SENSORS; ADDED DPEM POWER BREAKOUT; ADDED SCHEMATIC, PAGE 3.	RMJ	24FEB2014

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1° | IMPERIAL UNITS | METRIC UNITS

THIRD ANGLE PROJECTION

IMPERIAL TOLERANCES
.XX = ± .030
.XXX = ± .010
FDM TOLERANCES
.XX = ± .030
.XXX = ± .010
FDR TOLERANCES
.X = ± .06
.XX = ± .030

METRIC TOLERANCES
.X = ± .8
.XX = ± .25
FDM TOLERANCES
.X = ± .8
.XX = ± .25
FDR TOLERANCES
.X = ± 1.5
.XX = ± .08

Cummins Fire Power
CUMMINS FIRE POWER LLC
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1600 BUERKLE ROAD
WHITE BEAR LAKE, MN
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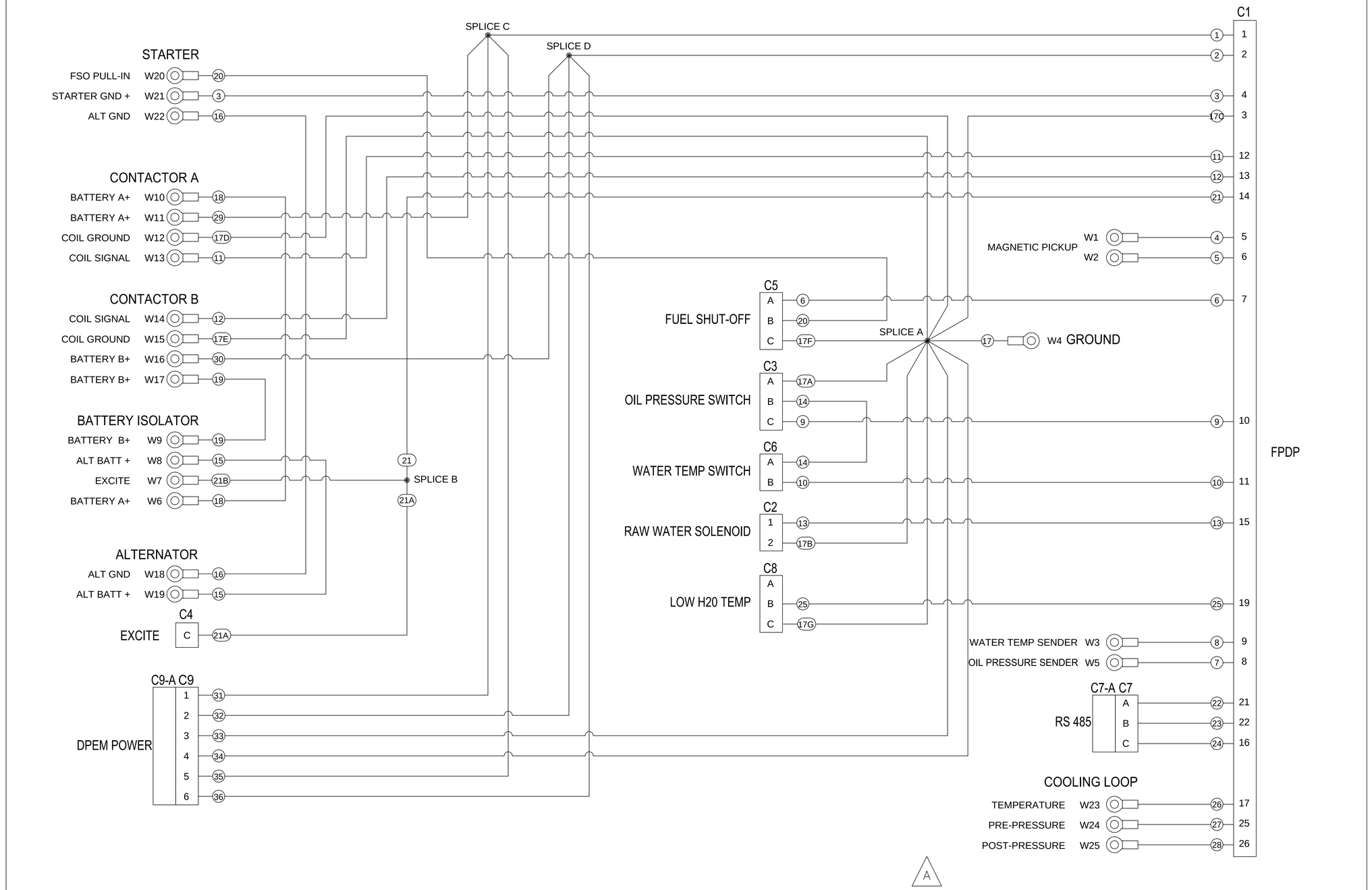
CUSTOM DESIGN AND
UPFIT CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

HARNESS, WIRE
C8.3 FIRE PUMP DRIVER

DWG UNITS: INCH/LB/S
DRAWN BY: BG
AUTO CAD
DATE: 17-JAN-2013
INIT ECO: 2013-030
SCALE:
EST WEIGHT:
SHEET 20F3
DRAWING NO: 23930



A

REV	ECO	DESCRIPTION OF REVISION	BY	DATE
A	2014–221	ADDED COOLING LOOP SENSORS; ADDED DPEM POWER BREAKOUT; ADDED SCHEMATIC, PAGE 3.	RMJ	24FEB2014

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1° | IMPERIAL UNITS | METRIC UNITS

THIRD ANGLE PROJECTION

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CUSTOM DESIGN AND
UPFIT CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

HARNESS, WIRE
C8.3 FIRE PUMP DRIVER

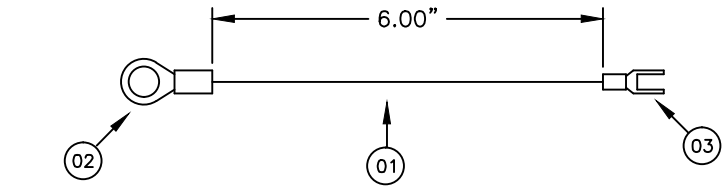
DWG UNITS: INCH/LB/S | DRAWN BY: BG | DATE: 17–JAN–2013

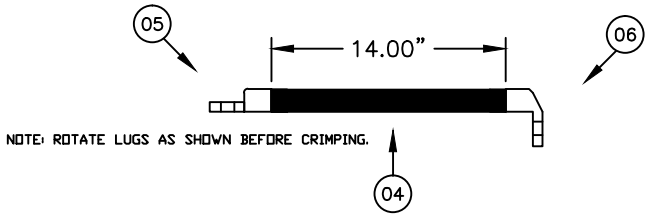
AUTO CAD | INIT ECO: 2013–030

SCALE:

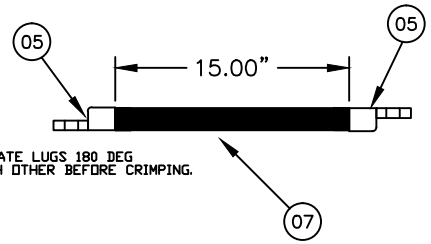
EST WEIGHT: | SHEET 3OF3 | DRAWING NO: 23930

TAGS	QTY	SUB	CATALOG	MFG	DESC
1	1	6"	WL10-9	WAYTEK	WIRE, GXL, WHITE, 10 AWG
2	1	1	32706	WAYTEK	TERMINAL, RING, 1/2", 10 AWG, INSULATED
3	1	1	52717-2	AMP	TERMINAL, SPADE, #10
4	1	14"	WC00-0	WAYTEK	CABLE, WELDING, 2/0 AWG, BLACK
5	3	1	36534	WAYTEK	TERMINAL, EYELET, HEAVY DUTY, 3/8", 2/0 AWG, NON-INSULATED
6	1	1	YAV2CLTC12FX90	BURNDY	TERMINAL, EYELET, HEAVY DUTY, 90DEG, 1/2", 2/0 AWG, NON-INSULATED
7	1	15"	WC00-0	WAYTEK	CABLE, WELDING, 2/0 AWG, BLACK





NOTE: ROTATE LUGS AS SHOWN BEFORE CRIMPING.



NOTE: ROTATE LUGS 180 DEG
FROM EACH OTHER BEFORE CRIMPING.

NOTES: 1) USE RED HEAT SHRINK ON ALL BATTERY CABLE TERMINALS.
2) COMPONENTS MAY BE SUBSTITUTED AS LONG AS FIT, FORM, FUNCTION AND REGULATORY STANDARDS ARE MET OR EXCEEDED.

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°	IMPERIAL UNITS	METRIC UNITS
THIRD ANGLE PROJECTION		

REV	ECO	DESCRIPTION OF REVISION	BY	DATE

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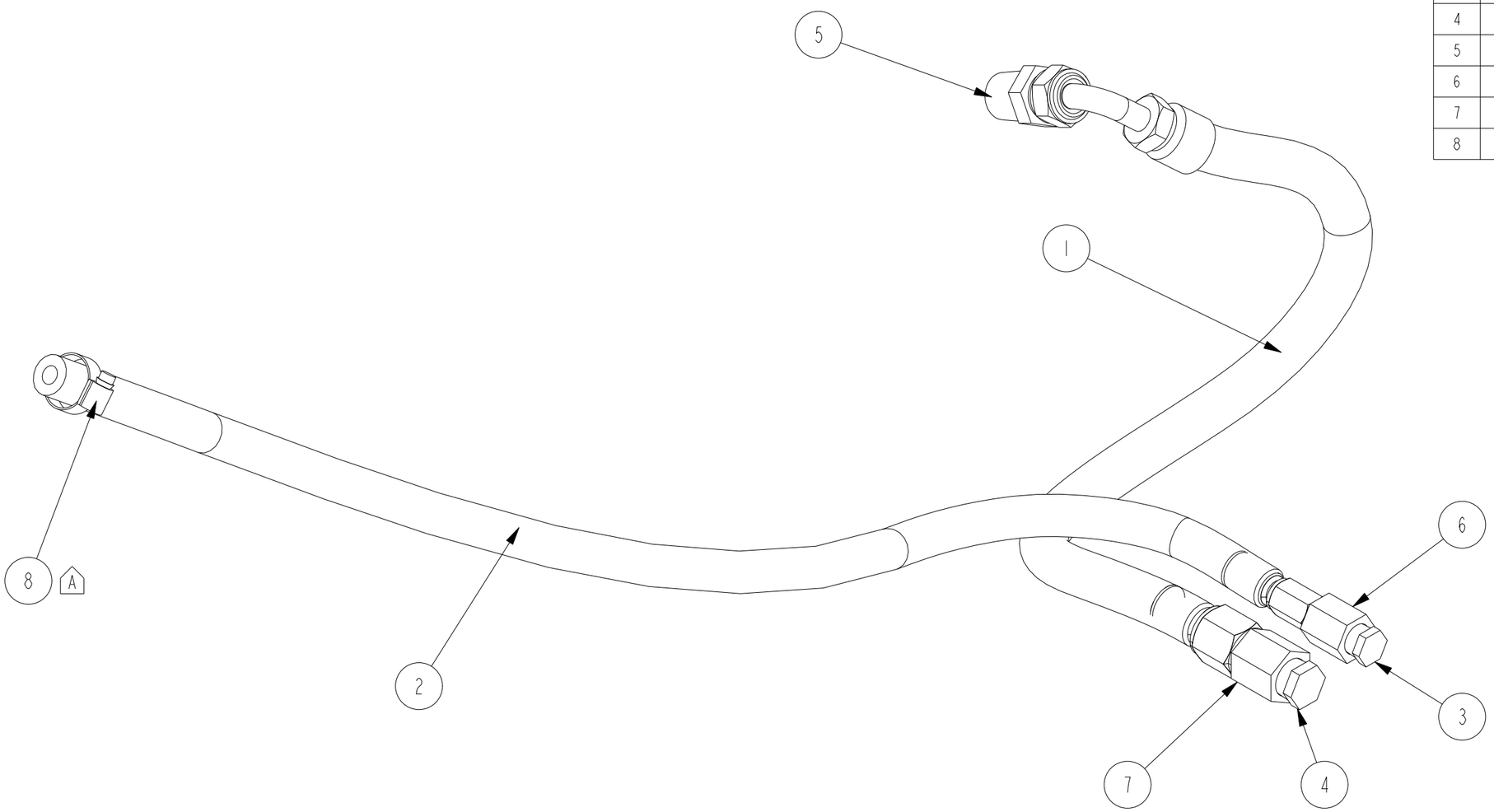
CUSTOM DESIGN AND
UPFIT CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

CABLES, BATTERY
CFP9E

DWG UNITS: INCH/LB/S	DRAWN BY: BG	DATE: 16 JAN 2013
	AUTO CAD	INIT ECO: 2012-026
SCALE:	SHEET 1OF1	DRAWING NO: 24234
EST WEIGHT:		



BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	ASSEMBLY, HOSE, FUEL LINE, CFP83 SUPPLY	15273
2	1	ASSEMBLY, HOSE, FUEL LINE, CFP83 RETURN	15274
3	1	PLUG. PIPE, -4 NPT	12210-4
4	1	PLUG. PIPE, -6 NPT	12210-6
5	1	FTG, STR, -8 JIC X -8 NPT	12238-8-8
6	1	FTG, STR, -4 JIC X -4 FMNPT	12240-4-4
7	1	FTG, STR, -8 JIC X -6 FMNPT	12240-8-6
8	1	CLAMP, WORM, .31 - .88	14992-06

B NOTE: APPLY THREAD SEALANT ON ALL NPT THREADS.

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE
B	2011-053	ADD NOTE	S DUBICK	17-MAY-11
A	2010-114	CLAMP 14992-06 WAS 14990-06	DAN	16-MAR-10

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1° | IMPERIAL UNITS | METRIC UNITS

THIRD ANGLE PROJECTION

MACHINE TOLERANCES .XX: ± 0.010 .XXX: ± 0.005
FORM TOLERANCES .XX: ± 0.030 .XXX: ± 0.015
FAB TOLERANCES .XX: ± 0.060 .XXX: ± 0.030

MACHINE TOLERANCES .X: ± 0.4 .XX: ± 0.2
FORM TOLERANCES .X: ± 0.8 .XX: ± 0.4
FAB TOLERANCES .X: ± 1.5 .XX: ± 0.8

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CUSTOM DESIGN
AND UPFIT CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

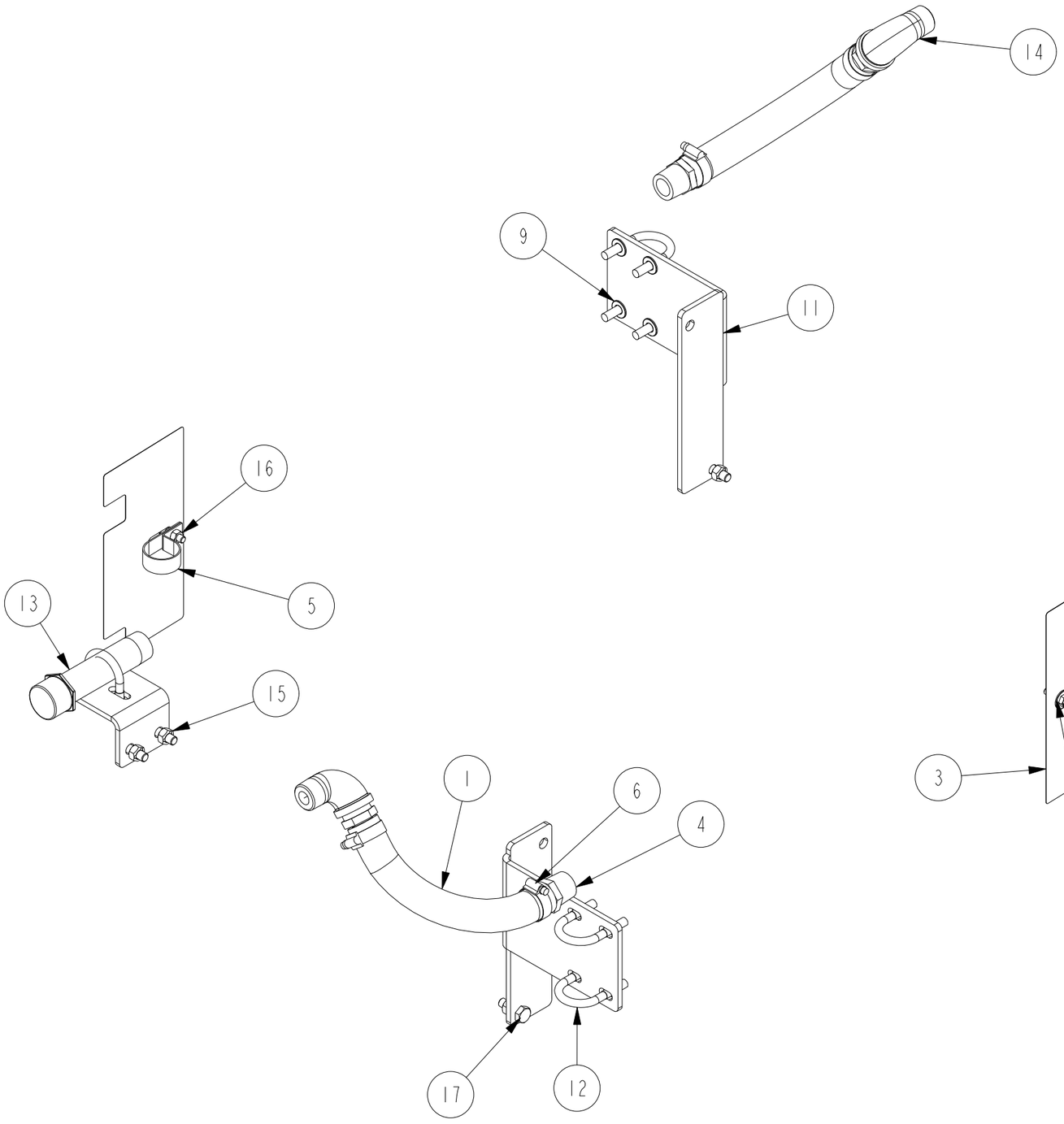
KIT, FUEL LINES, CFP83
F10/20/30/40 - EXT ONLY

DWG UNITS: IN/LB/S | DRAWN BY: DAN | DATE: 07-JUL-09

PRO-ENGINEER | INIT ECO:

SCALE: 0.500 | SHEET 1 OF 1 | DRAWING NO: 15207

EST WEIGHT: 11.514



BILL OF MATERIAL

ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	HOSE, SILICONE, 1" ID x 11.00"	14195_016
2	1	BRKT, RAW WATER COOLING, 4" LG, 3/4" OR 1" PIPE	9633
3	1	DECAL, COOLING LOOP VALVES, VERTICAL MTG	10965
4	2	FTG, STR, -16 BEAD X -16 NPT	12545-16-16
5	1	CLAMP, P-STYLE, 1-1/2", 13747	LTL-SCPV24627
6	2	CLAMP, WORM, 1.00 - 1.50	14990-16
7	1	CAP, PVC, NPT FEMALE, 1" NPT	16663-16
8	1	WASHER,FLAT, 0.31	20000-031
9	6	WASHER,FLAT,SMALL, 0.38	20010-038
10	1	SCREW,HH, 0.31-18x1.00	20231-100
11	1	BRACKET, COOLING MOUNTING, CFP59	26289
12	3	U-BOLT, 1" NPT, 3/8" x 1-1/2" x 2-1/2"	3043T37
13	1	NIPPLE, BLK, 1 x 6	BNGU
14	1	STREET ELBOW, BLK, 1" NPT	LTL-SE190
15	3	NUT,HEX,PT, M10-1.50	20140-M10
16	1	NUT,HEX, 0.31-18	20100-031
17	3	SCREW,HH, M10-1.50x30	20310-030

REFERENCE DRAWING 26106 FOR INSTALLATION ONTO THE POWER UNIT

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°	MACHINED SURFACES	IMPERIAL UNITS	METRIC UNITS
THIRD ANGLE PROJECTION	125	MACHINE TOLERANCES .XX ± 0.010 .XXX ± 0.005 FORM TOLERANCES .XX ± 0.030 .XXX ± 0.015 FAB TOLERANCES .XX ± 0.060 .XXX ± 0.030	MACHINE TOLERANCES .X ± 0.4 .XX ± 0.2 FORM TOLERANCES .X ± 0.8 .XX ± 0.4 FAB TOLERANCES .X ± 1.5 .XX ± 0.8

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CUSTOM DESIGN
AND UPFIT CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

MISC PIPING, RAW WATER
6C

DWG UNITS: IN/LB/S

DRAWN BY: PBS

PRO-ENGINEER

DATE: 07AUG2013

INIT ECO: 2013-480

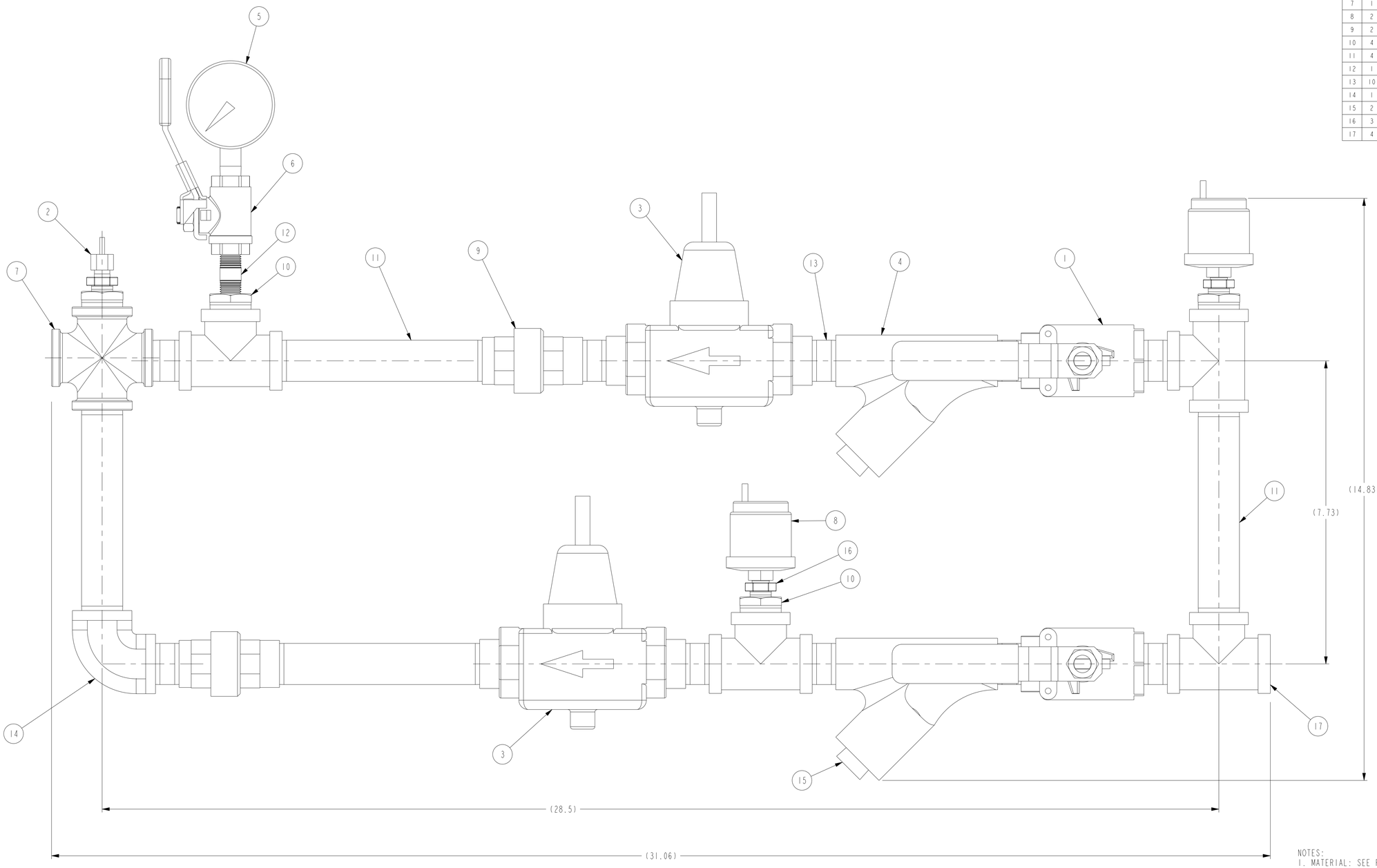
SCALE: 0.190

EST WEIGHT: 4.853

SHEET 1 OF 1

DRAWING NO: 26288

BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	2	VALVE,BALL,3/4NPT, BRASS, LOCKABLE	21504
2	1	SENDER, TEMPERATURE, DATCON #02022-00	8862
3	2	REGULATOR, 3/4" NPT, 400 PSI MAX, 25 TO 75 PSI OUT	8890
4	2	STRAINER, 3/4" NPT W/ PLUG	8891
5	1	GAUGE, PRESSURE, 1/4" NPT, DPGI-2 1/2, 0-100 PSI, (WATTS)	8892
6	1	VALVE, BALL, 1/4" NPT FEMALE	FA60204-1
7	1	CROSS,3/4NPT,STEEL, SCHEDULE 40 PIPE	21519
8	2	SENSOR,300PSI,1/8NPT, VEETHREE-977035	21574
9	2	VALVE, 3/4" NPT CHECK, VALUE ADDED: CV075	25502
10	4	BUSHING,3/4" NPT X 1/4" NPT, -	71494
11	4	NIPPLE, BLK, 3/4x6	71550
12	1	NIPPLE, 1/4" NPT x 1 1/2", BLK STEEL	LTL-CPN1411Z
13	10	NIPPLE, BLK, 3/4x1-1/2	LTL-CPN34
14	1	ELBOW, BLK, 3/4" NPT, 90 DEG.	LTL-E3490
15	2	PLUG, 1/2 NPT, -	LTL-SCSP12
16	3	REDUCER BUSHING, HEX, 1/4 x 1/8, BLK STEEL	LTL-SRB1418
17	4	TEE, BLACK PIPE, 3/4" NPT	LTL-ST34



NOTES:
1. MATERIAL: SEE PARTS LIST
2. REMOVE ALL SHARP EDGES PRIOR TO COATING
3. LEAK TEST TO 60PSI AND PRESET REGULATORS TO 60PSI
4. FINISH: COAT PER CUMMINS SPEC ES044 RAL 3001

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°	MACHINED SURFACES	IMPERIAL UNITS	METRIC UNITS
THIRD ANGLE PROJECTION		MACHINE TOLERANCES .XX ± 0.005	MACHINE TOLERANCES .X ± 0.1
	125	FORM TOLERANCES .XX ± 0.005	FORM TOLERANCES .X ± 0.1
		FAB TOLERANCES .XX ± 0.030	FAB TOLERANCES .X ± 0.1

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE

CUMMINS FIRE POWER LLC
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1600 BUERKLE ROAD
WHITE BEAR LAKE, MN
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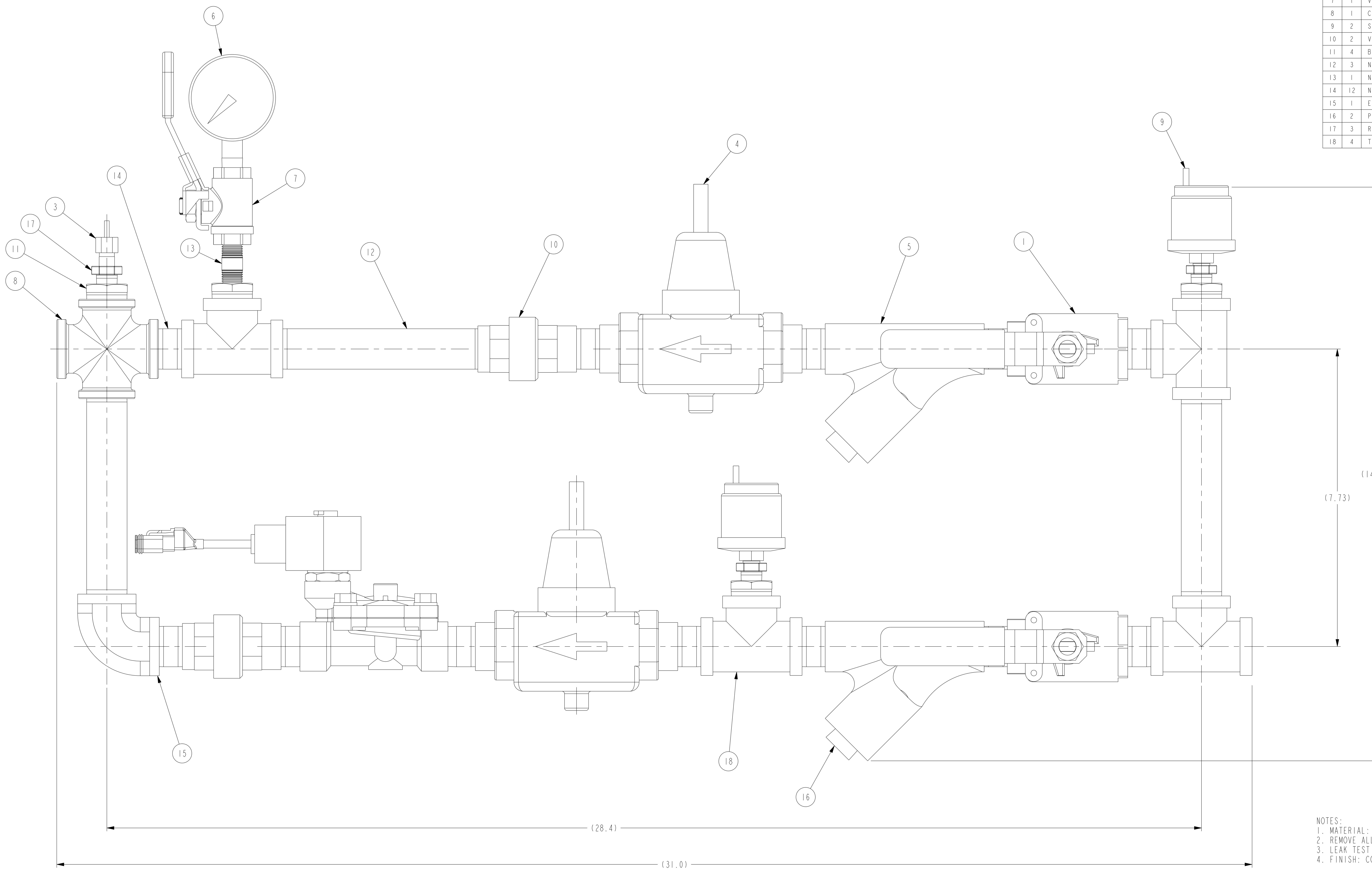
CUSTOM DESIGN
AND UPFIT CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

COOLING-LOOP, 3/4 " VERT
RAW WATER

DWG UNITS: IN/LB/S
DRAWN BY: BOB KROPP
PRO-ENGINEER
DATE: 07MAR2012
INIT ECO: 2013-303

SCALE: 0.750
EST WEIGHT: NA
SHEET 1 OF 1
DRAWING NO: 21511

BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	2	VALVE,BALL,3/4NPT, BRASS, LOCKABLE	21504
2	1	VALVE, SOLENOID, 3/4" NPT, 12VDC	A042B123
3	1	SENDER, TEMPERATURE, DATCON #02022-00	8862
4	2	REGULATOR, 3/4" NPT, 400 PSI MAX, 25 TO 75 PSI OUT	8890
5	2	STRAINER, 3/4" NPT W/ PLUG	8891
6	1	GAUGE, PRESSURE, 1/4" NPT, DPG1-2 1/2, 0-100 PSI, (WATTS)	8892
7	1	VALVE, BALL, 1/4" NPT FEMALE	FA60204-1
8	1	CROSS,3/4NPT,STEEL, SCHEDULE 40 PIPE	21519
9	2	SENSOR,300PSI,1/8NPT, VEETHREE-977035	21574
10	2	VALVE, 3/4" NPT CHECK, VALUE ADDED: CV075	25502
11	4	BUSHING,3/4" NPT X 1/4" NPT, -	71494
12	3	NIPPLE, BLK, 3/4x6	71550
13	1	NIPPLE, 1/4" NPT x 1 1/2", BLK STEEL	LTL-CPN14112
14	12	NIPPLE, BLK, 3/4x1-1/2	LTL-CPN34
15	1	ELBOW, BLK, 3/4" NPT, 90 DEG.	LTL-E3490
16	2	PLUG, 1/2 NPT, -	LTL-SCSP12
17	3	REDUCER BUSHING, HEX, 1/4 x 1/8, BLK STEEL	LTL-SRB1418
18	4	TEE, BLACK PIPE, 3/4" NPT	LTL-ST34



NOTES:
1. MATERIAL: SEE PARTS LIST
2. REMOVE ALL SHARP EDGES PRIOR TO COATING
3. LEAK TEST TO 60PSI AND PRESET REGULATORS TO 60PSI
4. FINISH: COAT PER CUMMINS SPEC ES044 RAL 3001

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CUSTOM DESIGN
AND UPFIT CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

COOLING LOOP, 3/4" ,12V
RAW WATER

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

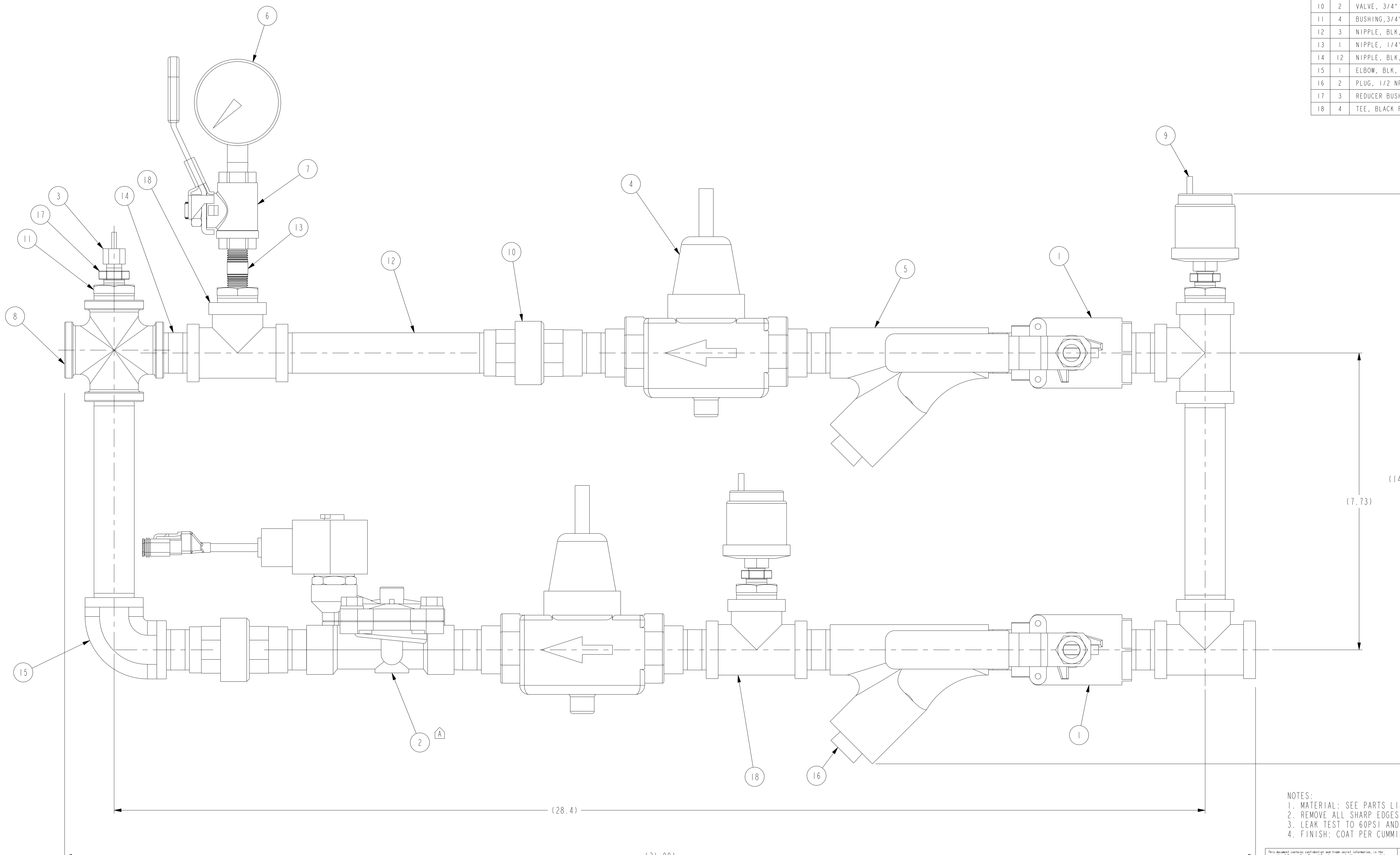
ANGULAR DIMENSIONS ± 1°	MACHINED SURFACES	IMPERIAL UNITS	METRIC UNITS
THIRD ANGLE PROJECTION	125	MACHINE TOLERANCES .XX = ± 0.010 .XXX = ± 0.005	MACHINE TOLERANCES .X = ± 0.4 .XX = ± 0.2
		FORM TOLERANCES .XX = ± 0.030 .XXX = ± 0.015	FORM TOLERANCES .X = ± 0.8 .XX = ± 0.4
		FAB TOLERANCES .XX = ± 0.060 .XXX = ± 0.030	FAB TOLERANCES .X = ± 1.5 .XX = ± 0.8

DWG UNITS: IN/LB/S	DRAWN BY: BOB KROPP	DATE: 06MAR2012	
	PRO-ENGINEER	INIT ECO: 2013-303	
SCALE: 0.750	SHEET 1 OF 1	DRAWING NO: 21509	
EST WEIGHT: NA			

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE
A	2014-241	A042B123 WAS 8210G003	PBS	17APR2014

BILL OF MATERIAL

ITEM	QTY	DESCRIPTION	PART NUMBER
1	2	VALVE,BALL,3/4NPT, BRASS, LOCKABLE	21504
2	1	VALVE, SOLENOID, 3/4" NPT, 24VDC	A042B125
3	1	SENDER, TEMPERATURE, DATCON #02022-00	8862
4	2	REGULATOR, 3/4" NPT, 400 PSI MAX, 25 TO 75 PSI OUT	8890
5	2	STRAINER, 3/4" NPT W/ PLUG	8891
6	1	GAUGE, PRESSURE, 1/4" NPT, DPG1-2 1/2, 0-100 PSI, (WATTS)	8892
7	1	VALVE, BALL, 1/4" NPT FEMALE	FA60204-1
8	1	CROSS,3/4NPT,STEEL, SCHEDULE 40 PIPE	21519
9	2	SENSOR,300PSI,1/8NPT, VEETHREE-977035	21574
10	2	VALVE, 3/4" NPT CHECK, VALUE ADDED: CV075	25502
11	4	BUSHING,3/4" NPT X 1/4" NPT, -	71494
12	3	NIPPLE, BLK, 3/4x6	71550
13	1	NIPPLE, 1/4" NPT x 1 1/2", BLK STEEL	LTL-CPN14112
14	12	NIPPLE, BLK, 3/4x1-1/2	LTL-CPN34
15	1	ELBOW, BLK, 3/4" NPT, 90 DEG.	LTL-E3490
16	2	PLUG, 1/2 NPT, -	LTL-SCSP12
17	3	REDUCER BUSHING, HEX, 1/4 x 1/8, BLK STEEL	LTL-SRB1418
18	4	TEE, BLACK PIPE, 3/4" NPT	LTL-ST34



NOTES:
1. MATERIAL: SEE PARTS LIST
2. REMOVE ALL SHARP EDGES PRIOR TO COATING
3. LEAK TEST TO 60PSI AND PRESET REGULATORS TO 60PSI
4. FINISH: COAT PER CUMMINS SPEC ES044 RAL 3001

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DEPERE, WISCONSIN

COOLING LOOP, 3/4", 24V
RAW WATER

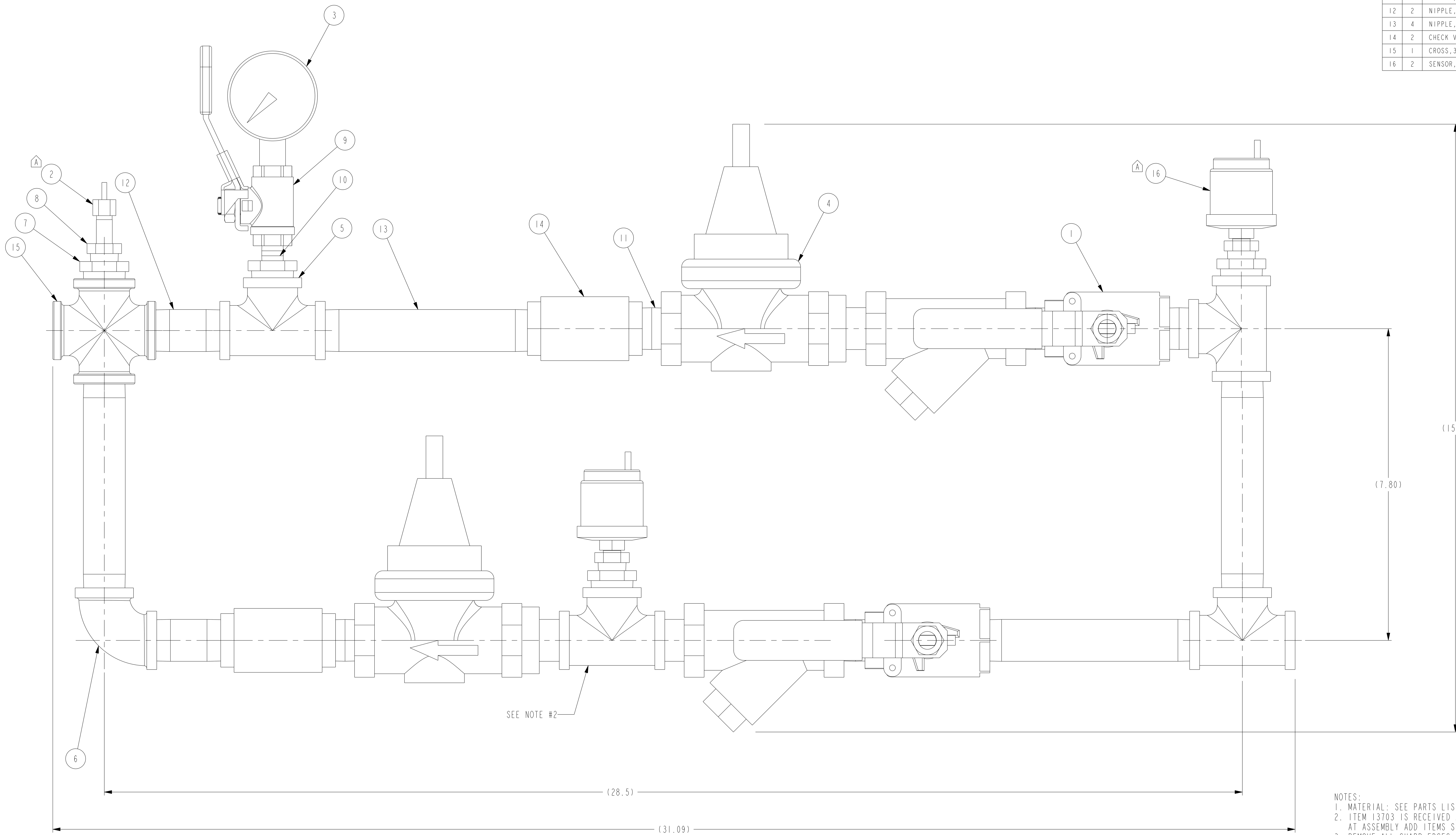
UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°	MACHINED SURFACES	IMPERIAL UNITS	METRIC UNITS
THIRD ANGLE PROJECTION	125	MACHINE TOLERANCES .XX = ± 0.010 .XXX = ± 0.005	MACHINE TOLERANCES .X = ± 0.4 .XX = ± 0.2
		FORM TOLERANCES .XX = ± 0.030 .XXX = ± 0.015	FORM TOLERANCES .X = ± 0.8 .XX = ± 0.4
		FAB TOLERANCES .XX = ± 0.060 .XXX = ± 0.030	FAB TOLERANCES .X = ± 1.5 .XX = ± 0.8

DWG UNITS: IN/LB/S	DRAWN BY: BOB KROPP	DATE: 06MAR2012
	PRO-ENGINEER	INIT ECO: 2013-303
SCALE: 0.750	SHEET 1 OF 1	DRAWING NO: 21510
EST WEIGHT: NA		

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE
A	2014-241	A042B125 WAS 8210G003-24V	PBS	17APR2014

BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	2	VALVE,BALL,3/4NPT, SEA WATER COMPATIBLE,LOCKABLE	21434
2	1	SENDER, TEMPERATURE, DATCON #02022-00	8862
3	1	GUAGE, 0-100 PSI, 1/4" NPT STN STL	13113
4	2	REGULATOR/STRAINER, 3/4" NPT, SEA WATER COMPATIBLE	13703
5	4	TEE, MARINE GRADE, 3/4" NPT	15755-12
6	1	ELBOW, MARINE GRADE, 3/4" NPT	15756-12
7	4	BUSHING, MARINE GRADE, 3/4" X 1/4"	15758-12-4
8	3	BUSHING, MARINE GRADE, 1/4" x 1/8"	15758-4-2
9	1	VALVE, BALL, 1/4" NPT,, APOLLO 77-100 (MARINE)	15759-04
10	1	NIPPLE, NAVAL BRONZE, 1/4" X CLOSE	15760
11	6	NIPPLE, MARINE GRADE, 3/4" X 1-3/8"	15761
12	2	NIPPLE, MARINE GRADE, 3/4" X 2-1/2"	15762
13	4	NIPPLE, MARINE GRADE, 3/4" X 6"	15764
14	2	CHECK VALVE, MARINE GRADE, 3/4" NPT	15768-12
15	1	CROSS,3/4,NVL-BRNZ, SCHEDULE 40 PIPE	21436
16	2	SENSOR,300PSI,1/8NPT, VEETHREE-977035	21574



NOTES:
1. MATERIAL: SEE PARTS LIST
2. ITEM 13703 IS RECEIVED AS AN UNASSEMBLED KIT.
   AT ASSEMBLY ADD ITEMS SHOWN
3. REMOVE ALL SHARP EDGES AND BURRS
4. LEAK TEST TO 60PSI AND PRESET REGULATORS TO 60PSI

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°	MACHINED SURFACES	IMPERIAL UNITS	METRIC UNITS
THIRD ANGLE PROJECTION	125	MACHINE TOLERANCES .XX = ± 0.010 .XXX = ± 0.005 FORM TOLERANCES .XX = ± 0.030 .XXX = ± 0.015 FAB TOLERANCES .XX = ± 0.060 .XXX = ± 0.030	MACHINE TOLERANCES .X = ± 0.4 .XX = ± 0.2 FORM TOLERANCES .X = ± 0.8 .XX = ± 0.4 FAB TOLERANCES .X = ± 1.5 .XX = ± 0.8

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AND UPFIT CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

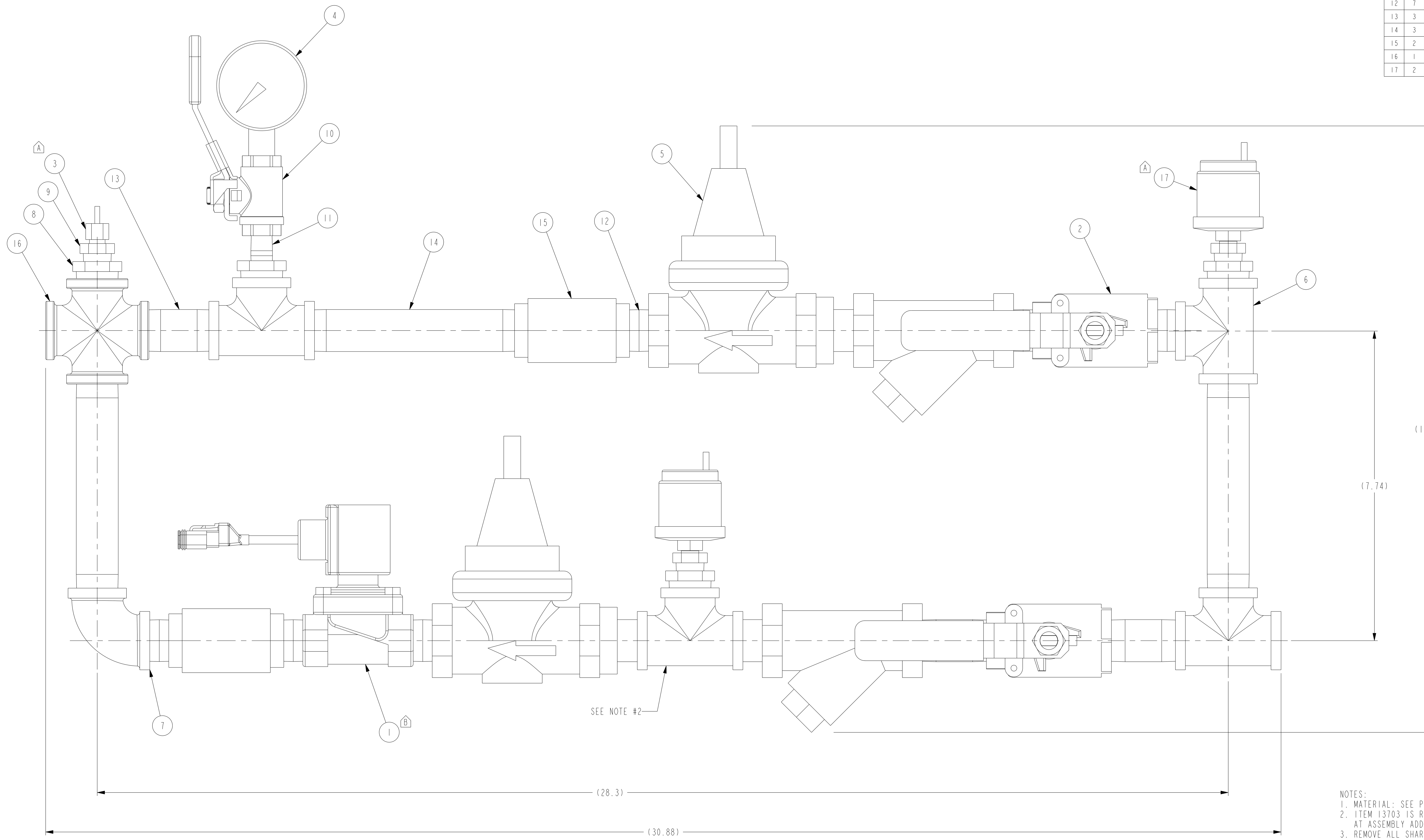
COOLING LOOP, 3/4", VERT
SEA WATER COMPATIBLE

DWG UNITS: IN/LB/S	DRAWN BY: BOB KROPP PRO-ENGINEER	DATE: 07MAR2012 INIT ECO: 2013-303
SCALE: 0.750 EST WEIGHT: NA	SHEET 1 OF 1	DRAWING NO: 21512

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE
A	2013-611	REPLACED 21008 & 21009 WITH 21574 & 8862	PBS	02OCT2013

BILL OF MATERIAL

ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	VALVE, SOLENOID, 3/4" NPT, 12VDC, SEA WATER COMPATIBLE	15738
2	2	VALVE,BALL,3/4NPT, SEA WATER COMPATIBLE,LOCKABLE	21434
3	1	SENDER, TEMPERATURE, DATCON #02022-00	8862
4	1	GUAGE, 0-100 PSI, 1/4" NPT STN STL	13113
5	2	REGULATOR/STRAINER, 3/4" NPT, SEA WATER COMPATIBLE	13703
6	4	TEE, MARINE GRADE, 3/4" NPT	15755-12
7	1	ELBOW, MARINE GRADE, 3/4" NPT	15756-12
8	4	BUSHING, MARINE GRADE, 3/4" X 1/4"	15758-12-4
9	3	BUSHING, MARINE GRADE, 1/4" x 1/8"	15758-4-2
10	1	VALVE, BALL, 1/4" NPT,, APOLLO 77-100 (MARINE)	15759-04
11	1	NIPPLE, NAVAL BRONZE, 1/4" X CLOSE	15760
12	7	NIPPLE, MARINE GRADE, 3/4" X 1-3/8"	15761
13	3	NIPPLE, MARINE GRADE, 3/4" X 2-1/2"	15762
14	3	NIPPLE, MARINE GRADE, 3/4" X 6"	15764
15	2	CHECK VALVE, MARINE GRADE, 3/4" NPT	15768-12
16	1	CROSS,3/4,NVL-BRNZ, SCHEDULE 40 PIPE	21436
17	2	SENSOR,300PSI,1/8NPT, VEETHREE-977035	21574



NOTES:
1. MATERIAL: SEE PARTS LIST
2. ITEM 13703 IS RECEIVED AS AN UNASSEMBLED KIT. AT ASSEMBLY ADD ITEMS SHOWN
3. REMOVE ALL SHARP EDGES AND BURRS
4. LEAK TEST TO 60PSI AND PRESET REGULATORS TO 60PSI

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COOLING LOOP, 3/4", 12V
SEA WATER COMPATIBLE

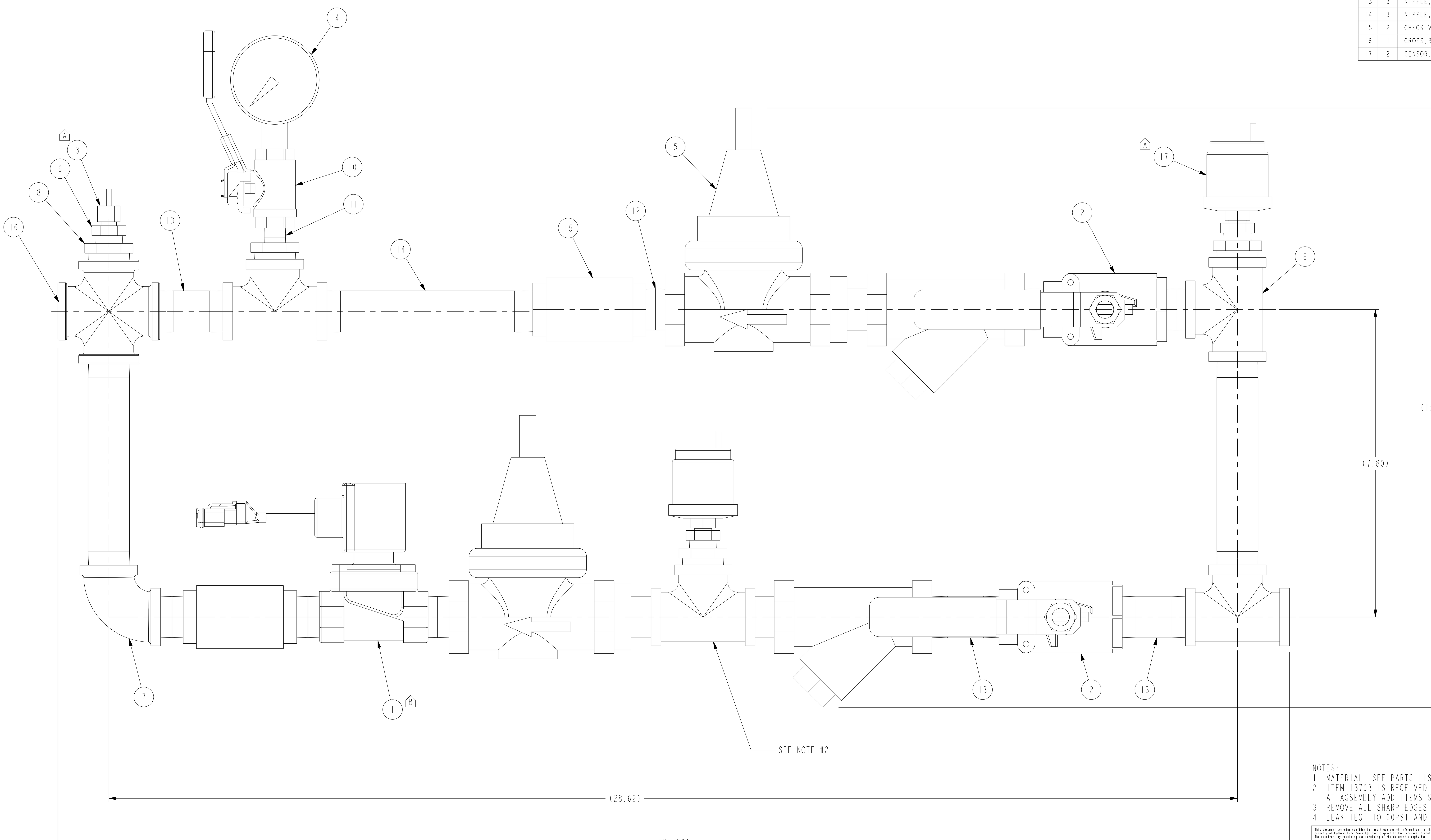
UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE
ANGULAR DIMENSIONS ± 1°
THIRD ANGLE PROJECTION

MACHINED SURFACES	IMPERIAL UNITS	METRIC UNITS
125	MACHINE TOLERANCES .XX : ± 0.010 .XXX : ± 0.005	MACHINE TOLERANCES .X : ± 0.4 .XX : ± 0.2
	FORM TOLERANCES .XX : ± 0.030 .XXX : ± 0.015	FORM TOLERANCES .X : ± 0.8 .XX : ± 0.4
	FAB TOLERANCES .XX : ± 0.060 .XXX : ± 0.030	FAB TOLERANCES .X : ± 1.5 .XX : ± 0.8

DWG UNITS: IN/LB/S	DRAWN BY: BOB KROPP	DATE: 02MAR2012
	PRO-ENGINEER	INIT ECO: 2013-303
SCALE: 0.750	SHEET 1 OF 1	DRAWING NO: 21438
EST WEIGHT: NA		

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE
B	2014-241	UPDATED TO SHOW LEADS ON SOLENOID VALVE	PBS	17APR2014
A	2013-611	REPLACED 21008 & 21009 WITH 21574 & 8862	PBS	02OCT2013

BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	VALVE, SOLENOID, 3/4" NPT, 24VDC, SEA WATER COMPATIBLE	15739
2	2	VALVE,BALL,3/4NPT, SEA WATER COMPATIBLE,LOCKABLE	21434
3	1	SENDER, TEMPERATURE, DATCON #02022-00	8862
4	1	GUAGE, 0-100 PSI, 1/4" NPT STN STL	13113
5	2	REGULATOR/STRAINER, 3/4" NPT, SEA WATER COMPATIBLE	13703
6	4	TEE, MARINE GRADE, 3/4" NPT	15755-12
7	1	ELBOW, MARINE GRADE, 3/4" NPT	15756-12
8	4	BUSHING, MARINE GRADE, 3/4" X 1/4"	15758-12-4
9	3	BUSHING, MARINE GRADE, 1/4" x 1/8"	15758-4-2
10	1	VALVE, BALL, 1/4" NPT,, APOLLO 77-100 (MARINE)	15759-04
11	1	NIPPLE, NAVAL BRONZE, 1/4" X CLOSE	15760
12	6	NIPPLE, MARINE GRADE, 3/4" X 1-3/8"	15761
13	3	NIPPLE, MARINE GRADE, 3/4" X 2-1/2"	15762
14	3	NIPPLE, MARINE GRADE, 3/4" X 6"	15764
15	2	CHECK VALVE, MARINE GRADE, 3/4" NPT	15768-12
16	1	CROSS,3/4,NVL-BRNZ, SCHEDULE 40 PIPE	21436
17	2	SENSOR,300PSI,1/8NPT, VEETHREE-977035	21574



NOTES:
1. MATERIAL: SEE PARTS LIST
2. ITEM 13703 IS RECEIVED AS AN UNASSEMBLED KIT.
AT ASSEMBLY ADD ITEMS SHOWN
3. REMOVE ALL SHARP EDGES AND BURRS
4. LEAK TEST TO 60PSI AND PRESET REGULATORS TO 60PSI

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SEA WATER COMPATIBLE

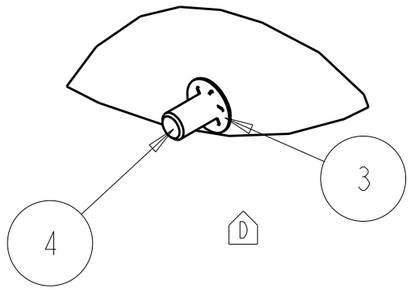
UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°	MACHINED SURFACES	IMPERIAL UNITS	METRIC UNITS
THIRD ANGLE PROJECTION	125	MACHINE TOLERANCES .XX = ± 0.010 .XXX = ± 0.005 FORM TOLERANCES .XX = ± 0.030 .XXX = ± 0.015 FAB TOLERANCES .XX = ± 0.060 .XXX = ± 0.030	MACHINE TOLERANCES .X = ± 0.4 .XX = ± 0.2 FORM TOLERANCES .X = ± 0.8 .XX = ± 0.4 FAB TOLERANCES .X = ± 1.5 .XX = ± 0.8

DWG UNITS: IN/LB/S	DRAWN BY: BOB KROPP		DATE: 02MAR2012
	PRO-ENGINEER		INIT ECO: 2013-303
SCALE: 0.750		SHEET 1 OF 1	DRAWING NO: 21439
EST WEIGHT: NA			

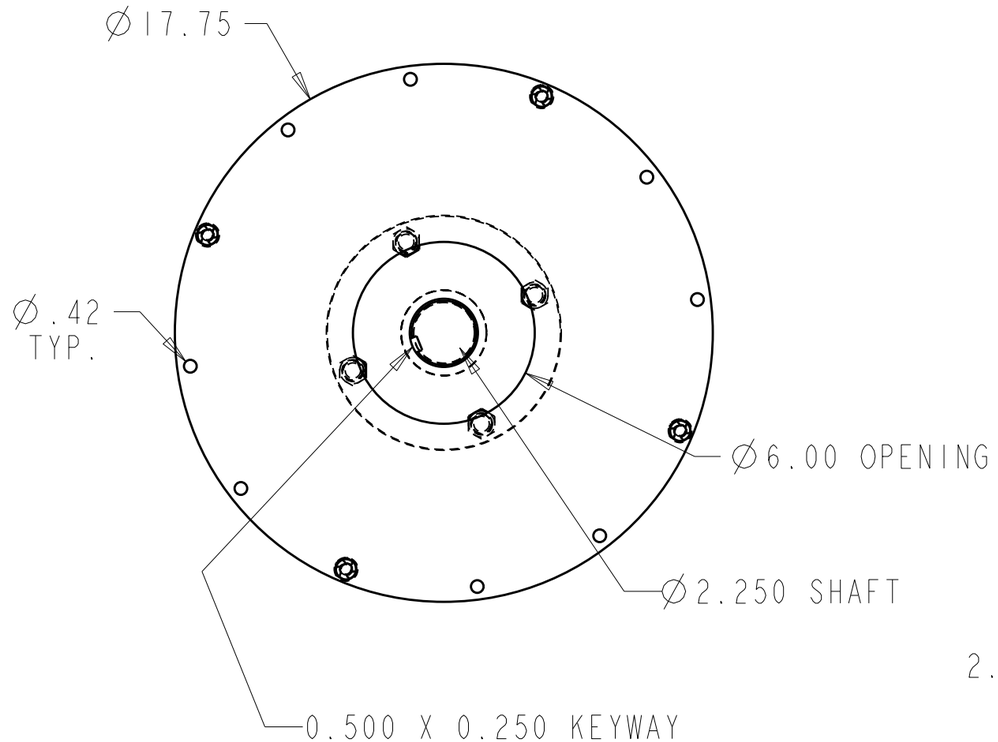
REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE
B	2014-241	UPDATED TO SHOW LEADS ON SOLENOID VALVE	PBS	17APR2014
A	2013-611	REPLACED 21008 & 21009 WITH 21574 & 8862	PBS	02OCT2013

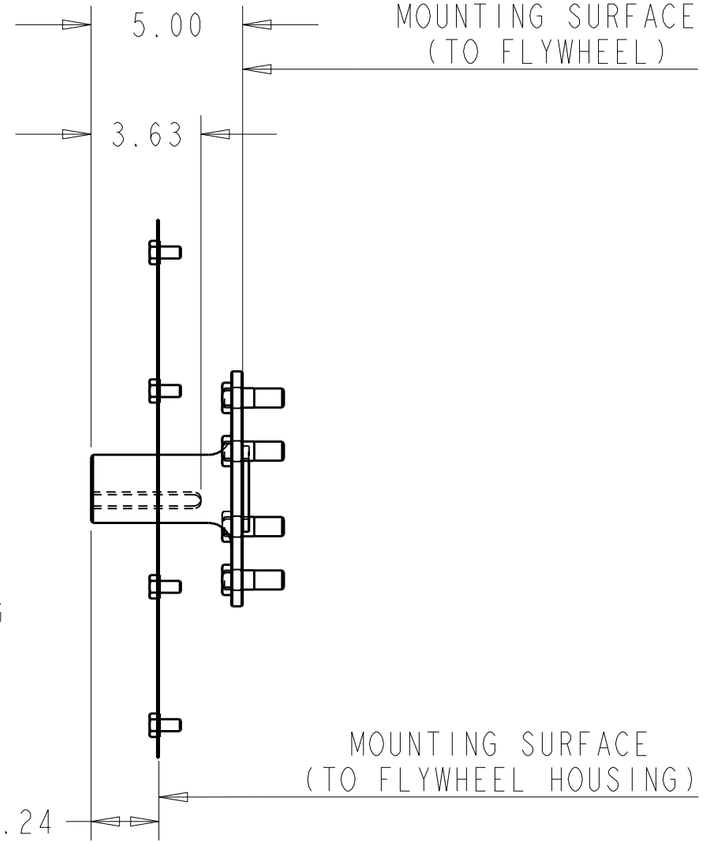
TYPICAL GUARDING FASTENERS
SCALE 0.500

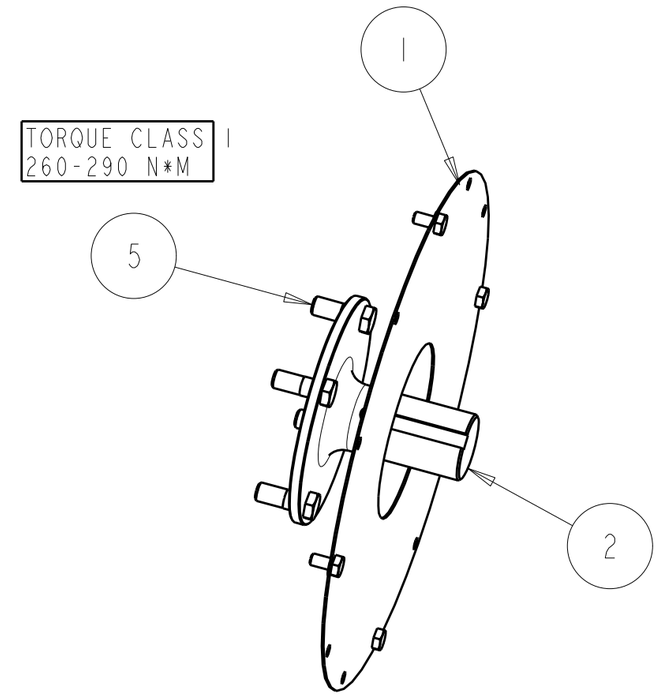


BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	PART NUMBER
1	1	GUARD, STUB SHAFT, SAE #3 FLYWHEEL, FIREPUMP	8611
2	1	STUB SHAFT, SAE #3 FLYWHEEL, HAYES #, FIREPUMP	9624
3	4	RETAINING WASHER, PUSHNUT, 3/8" BOLT	16662-06
4	4	SCREW, CAP, HEX HEAD, M10-1.5	HHCS_M10
5	4	SCREW, CAP, HEX HEAD, M16 x 50	HHCS_M16_50

D







C NOTES:
1. MASS: 13.9 LBS, INERTIA: 67.49 IB.IN^2

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE
D	2010-098	ADDED RETAINING FASTENERS	DAN	04-MAR-10
C	2009-620	ADDED MASS & INERTIA DATA	S DUBICK	12/23/09

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°	IMPERIAL UNITS	METRIC UNITS
THIRD ANGLE PROJECTION	MACHINE TOLERANCES .XX = ± 0.010 .XXX = ± 0.005 FORM TOLERANCES .XX = ± 0.030 .XXX = ± 0.015 FAB TOLERANCES .XX = ± 0.060 .XXX = ± 0.030	MACHINE TOLERANCES .X = ± 0.4 .XX = ± 0.2 FORM TOLERANCES .X = ± 0.8 .XX = ± 0.4 FAB TOLERANCES .X = ± 1.5 .XX = ± 0.8

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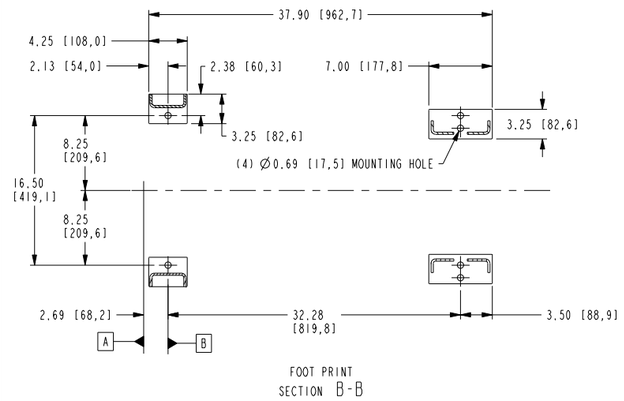
ASSEMBLY, STUB SHAFT, 2.25" DIA
FIREPUMP

DWG UNITS: IN/LB/S	DRAWN BY: DAVE N	DATE: 15OCT2004
	PRO-ENGINEER	INIT ECO:
SCALE: 0.200	SHEET 1 OF 1	DRAWING NO: 8619
EST WEIGHT: 33.399		

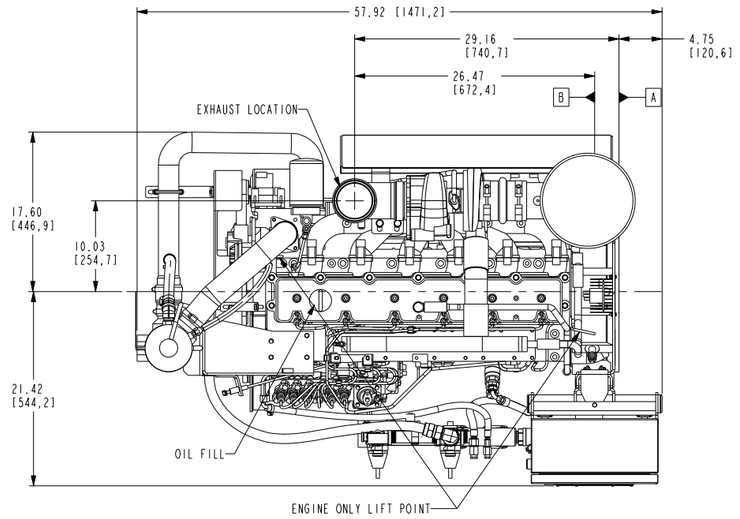
CFP83 CONNECTION INFORMATION	
SAE #3	FLYWHEEL HOUSING
3/8" NPT	FUEL SUPPLY
1/4" NPT	FUEL RETURN
1" NPT	RAW WATER INLET
1-1/4" NPT	RAW WATER DISCHARGE
120 / 240 VAC	COOLANT HEATER (2250WATTS)
4" DIA NPT, CUFF, OR FLANGE	EXHAUST CONNECTION

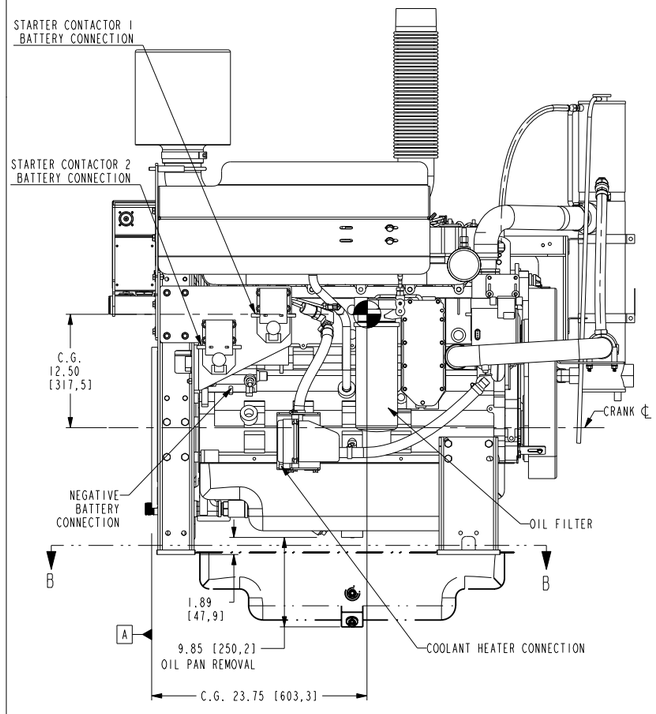
NOTES:
1. ALL PLUMBING MUST BE SUPPORTED AND/OR ISOLATED SO THAT NO WEIGHT OR STRESS IS APPLIED TO ANY ENGINE COMPONENT.
2. REFER TO ENGINE DATA SHEET FOR CUSTOMER CONNECTION RECOMMENDATIONS.
3. DO NOT SCALE DRAWING.
4. DRAWING SUBJECT TO CHANGE WITHOUT NOTICE.

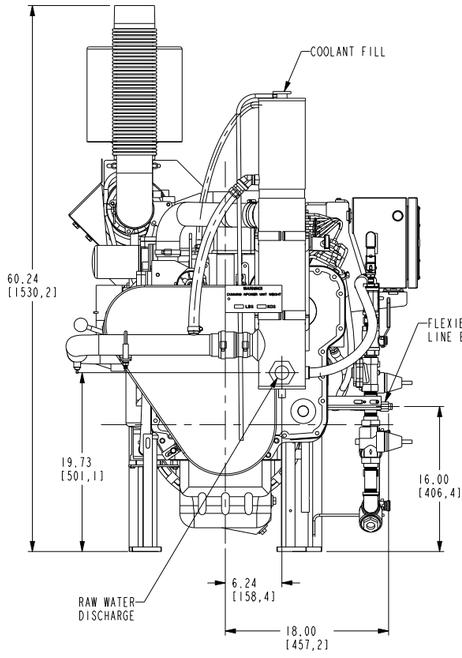
LEGEND AND DATUM IDENTIFIER	
SHEET #1	INSTALLATION DRAWING
SHEET #2	GENERAL ARRANGEMENT - HORIZONTAL SPLIT CASE PUMP BASE OPTION
SHEET #3	GENERAL ARRANGEMENT - VERTICAL TURBINE PUMP BASE OPTION
SHEET #4	DRIVE LINE OPTIONS
DATUM "A"	FACE OF FLYWHEEL HOUSING
DATUM "B"	REAR LEG BOLT LOCATION
DATUM "C"	FLYWHEEL MOUNTING SURFACE
DATUM "D"	UJOINT ADAPTER MOUNTING SURFACE
DATUM "EOS"	END OF PUMP SHAFT

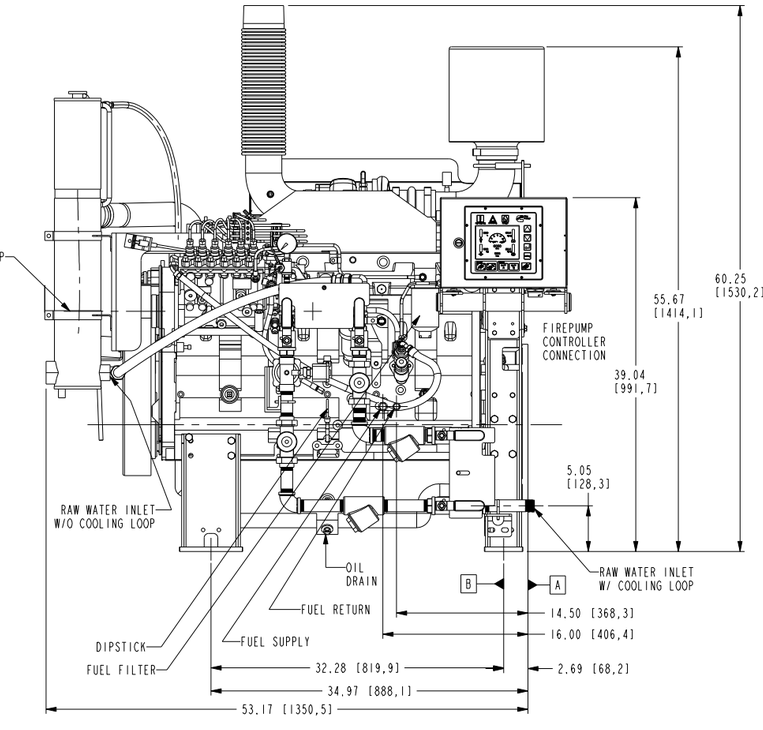


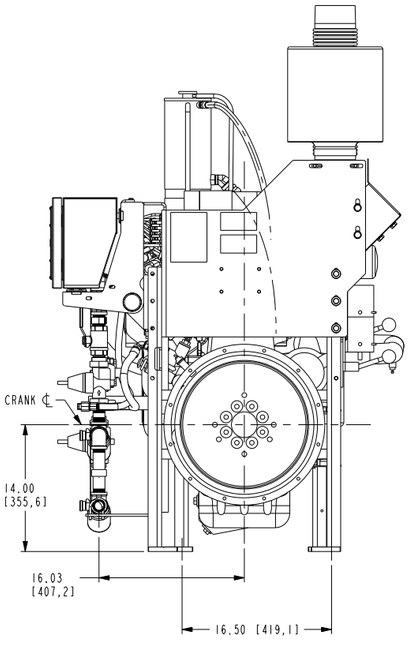
FOOT PRINT
SECTION B-B











**OPTIONAL COOLING LOOP SHOWN

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE
ANGULAR DIMENSIONS ± 1°
THIRD ANGLE PROJECTION

MACHINED SURFACES	IMPERIAL UNITS	METRIC UNITS
125	.XX ± 0.030 .XXX ± 0.010 FOR TAPERED OR ANGULAR SURFACES ± 0.030	.X ± 0.8 .XX ± 0.25 FOR TAPERED OR ANGULAR SURFACES ± 0.8

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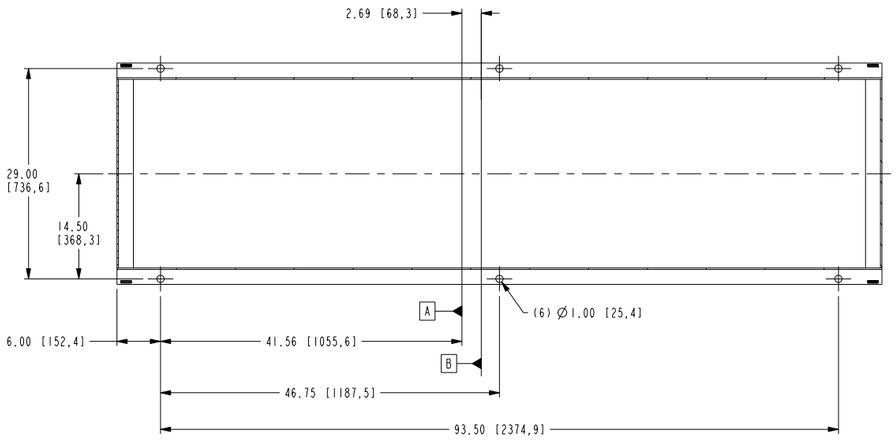
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

GENERAL ARRANGEMENT
CFP8.3 F10/F20/F30

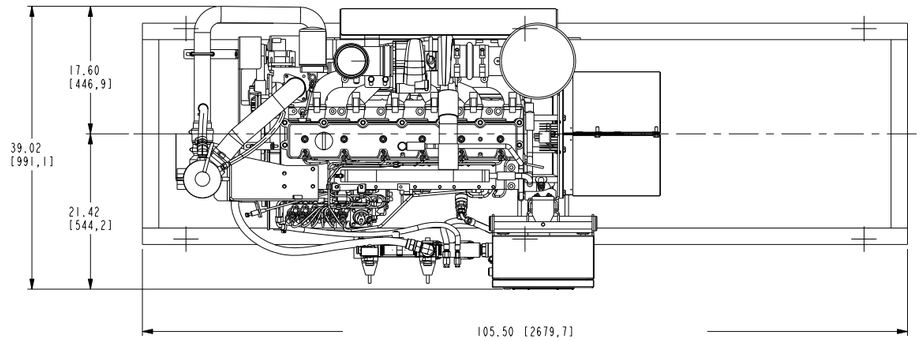
DWG UNITS: IN/LBS
DRAWN BY: S DUBICK
DATE: 04-FEB-13
PRO-ENGINEER
INIT ECO: 2012-598
SCALE: 0.125
SHEET 1 OF 4
EST WEIGHT: 0.000
DRAWING NO: 23034

LEGEND AND DATUM IDENTIFIER	
SHEET #1	INSTALLATION DRAWING
SHEET #2	GENERAL ARRANGEMENT - HORIZONTAL SPLIT CASE PUMP BASE OPTION
SHEET #3	GENERAL ARRANGEMENT - VERTICAL TURBINE PUMP BASE OPTION
SHEET #4	DRIVE LINE OPTIONS
DATUM "A"	FACE OF FLYWHEEL HOUSING
DATUM "B"	REAR LEG BOLT LOCATION
DATUM "C"	FLYWHEEL MOUNTING SURFACE
DATUM "D"	UJOINT ADAPTER MOUNTING SURFACE
DATUM "EOS"	END OF PUMP SHAFT

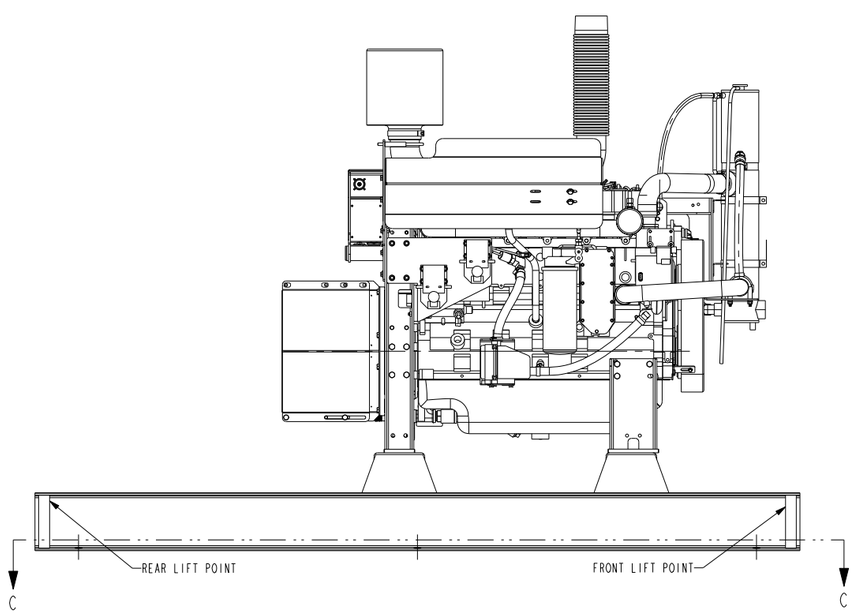


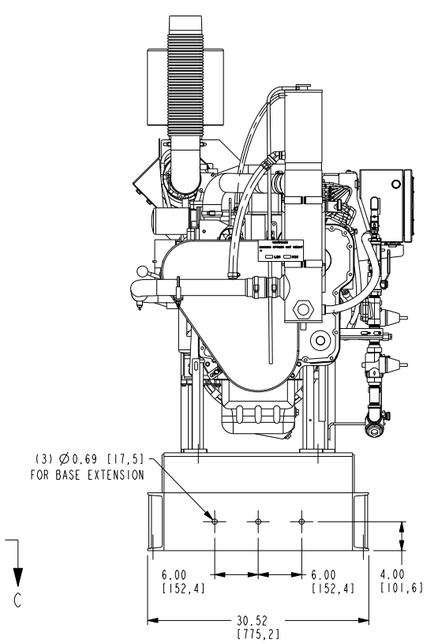
SECTION C-C

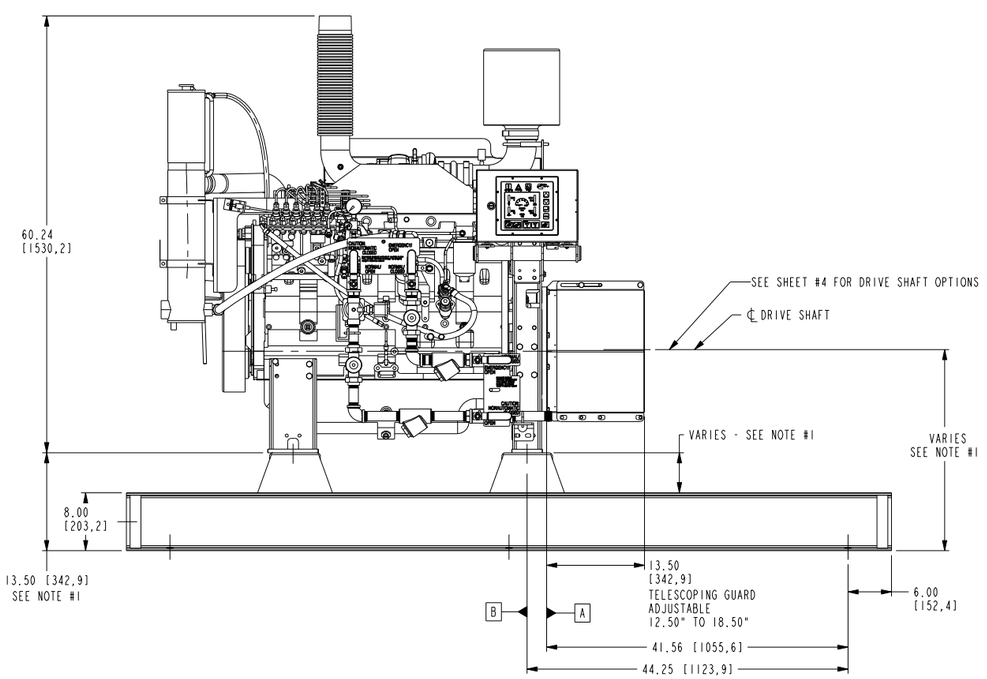
*** FRAME DIMENSIONS MAY CHANGE PER PUMP OPTION SELECTED ***



*** FRAME LENGTH MAY CHANGE PER PUMP OPTION SELECTED ***







NOTES:
1. RISER HEIGHT VARIES TO ACCOMODATE CUSTOMER SUPPIED PUMPS
2. REFERENCE OWNERS MANUAL FOR DRIVE SHAFT ALIGNMENT SPECS
3. DO NOT SCALE DRAWING.
4. DRAWING SUBJECT TO CHANGE WITH OUT NOTICE.
5. REFERENCE SHEET #1 FOR BASE FIREPUMP INTERFACE

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°	MACHINED SURFACES	IMPERIAL UNITS	METRIC UNITS
THIRD ANGLE PROJECTION	125	.XX ± 0.03	.X ± 0.8
		.XXX ± 0.010	.XX ± 0.25
		.XXXX ± 0.005	.XXX ± 0.127

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CUSTOM DESIGN AND UPFIT CENTER
875 LAWRENCE DRIVE
DEPERE, WISCONSIN

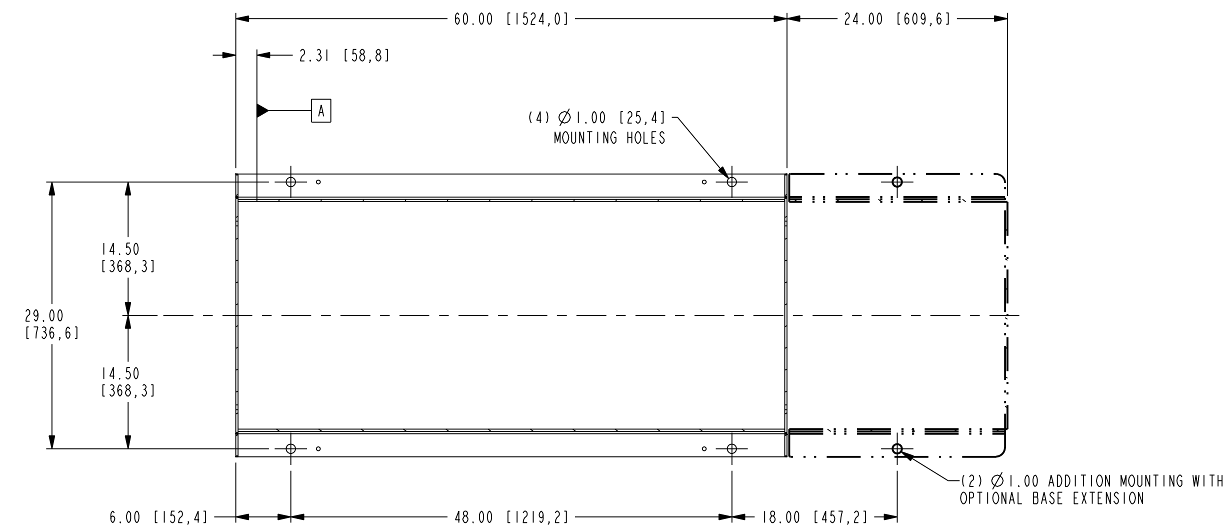
GENERAL ARRANGEMENT
CFP8.3 F10/F20/F30

DWG UNITS: IN/LB/S
DRAWN BY: S DUBICK
PRO-ENGINEER
DATE: 04-FEB-13
INIT ECO: 2012-598

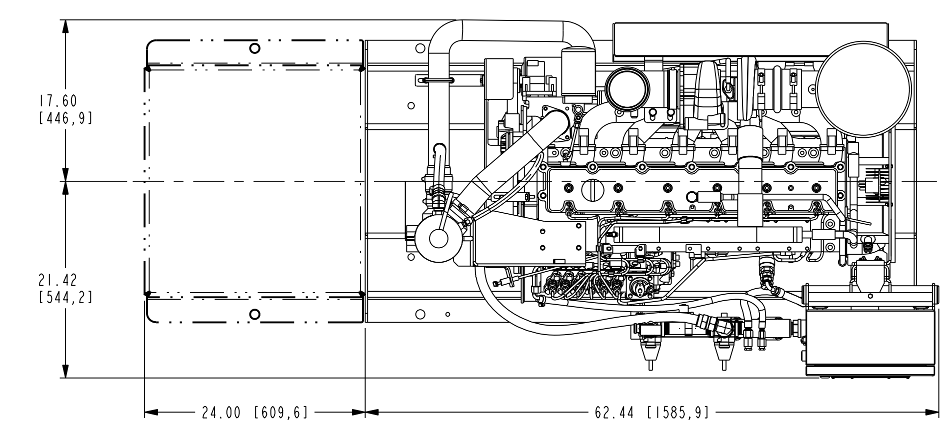
SCALE: 0.125
EST WEIGHT: 0.000
SHEET 2 OF 4
DRAWING NO: 23034

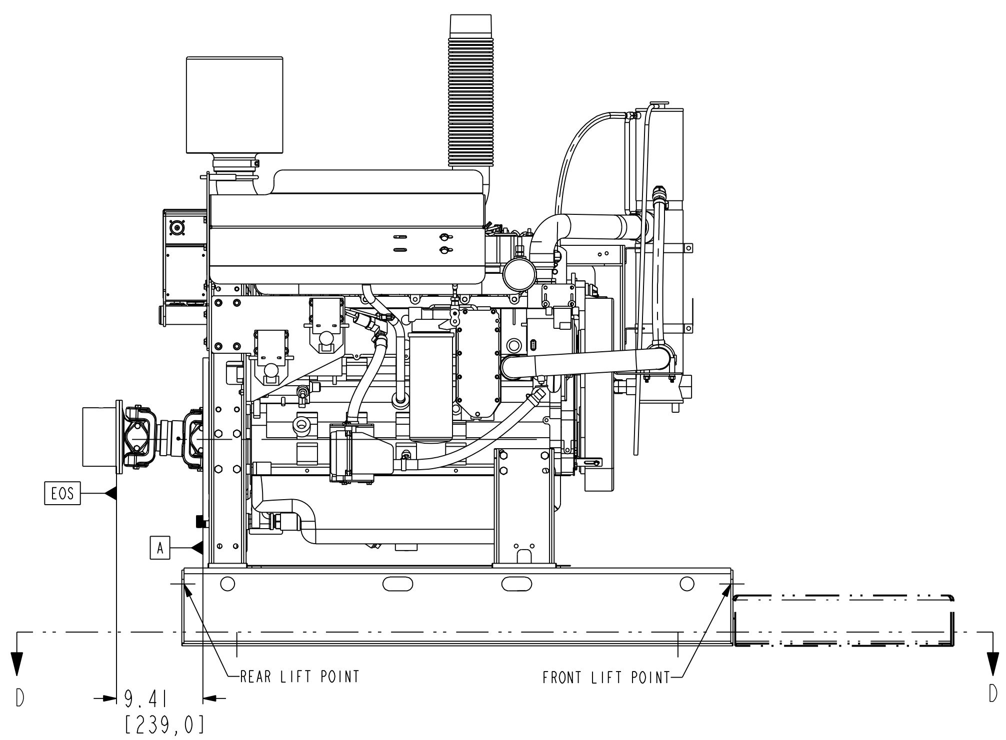
LEGEND AND DATUM IDENTIFIER

SHEET #1	INSTALLATION DRAWING
SHEET #2	GENERAL ARRANGEMENT - HORIZONTAL SPLIT CASE PUMP BASE OPTION
SHEET #3	GENERAL ARRANGEMENT - VERTICAL TURBINE PUMP BASE OPTION
SHEET #4	DRIVE LINE OPTIONS
DATUM "A"	FACE OF FLYWHEEL HOUSING
DATUM "B"	REAR LEG BOLT LOCATION
DATUM "C"	FLYWHEEL MOUNTING SURFACE
DATUM "D"	UJOINT ADAPTER MOUNTING SURFACE
DATUM "EOS"	END OF PUMP SHAFT

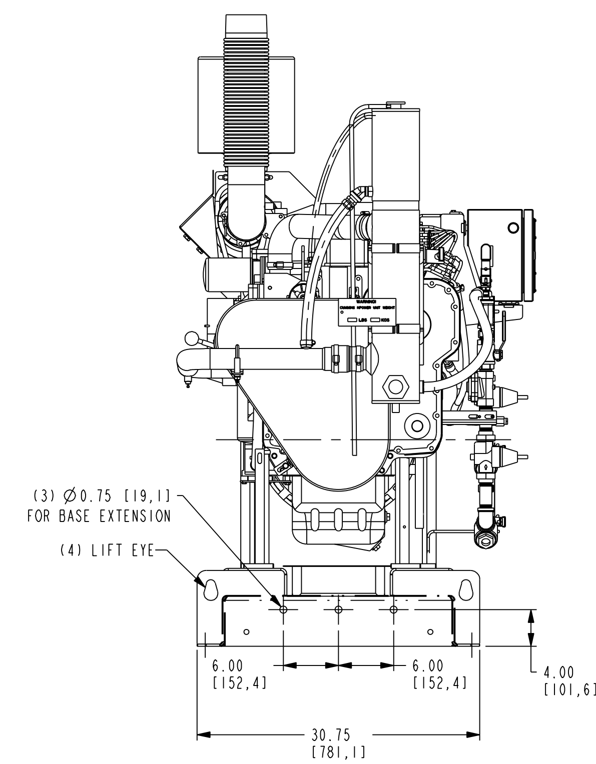


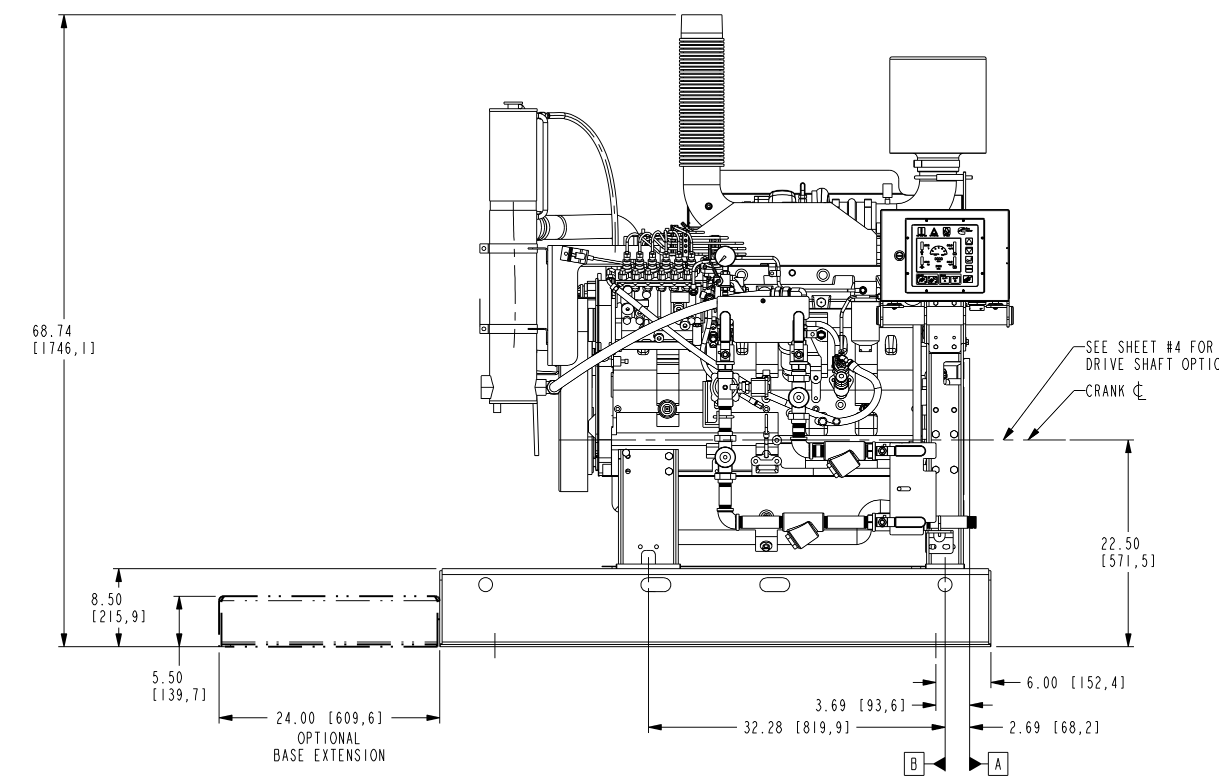
SECTION D-D





VERICAL TURBINE PUMP SHAFT OFFSET





NOTES:
1. TORSIONAL ANALYSIS REQUIRED FOR VERTICAL TURBINE INSTALLATION
2. REFERENCE OWNERS MANUAL FOR DRIVE SHAFT ALIGNMENT SPECS
3. DO NOT SCALE DRAWING.
4. DRAWING SUBJECT TO CHANGE WITH OUT NOTICE.
5. REFERENCE SHEET #1 FOR BASE FIREPUMP INTERFACE

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1°	MACHINED SURFACES	IMPERIAL UNITS	METRIC UNITS
THIRD ANGLE PROJECTION	125	MACHINE TOLERANCES .XX : ± 0.010 .XXX : ± 0.005 FORM TOLERANCES .XX : ± 0.030 .XXX : ± 0.015 FAB TOLERANCES .XX : ± 0.060 .XXX : ± 0.030	MACHINE TOLERANCES .X : ± 0.4 .XX : ± 0.2 FORM TOLERANCES .X : ± 0.8 .XX : ± 0.4 FAB TOLERANCES .X : ± 1.5 .XX : ± 0.8

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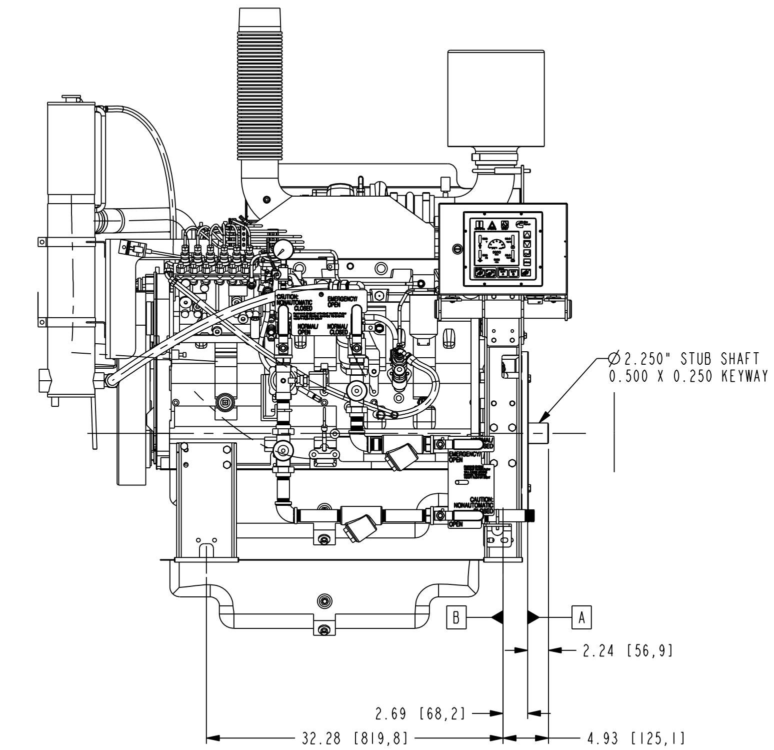
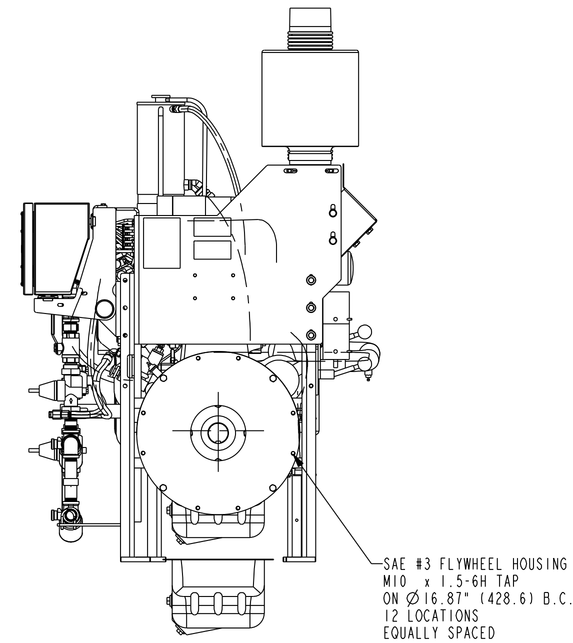
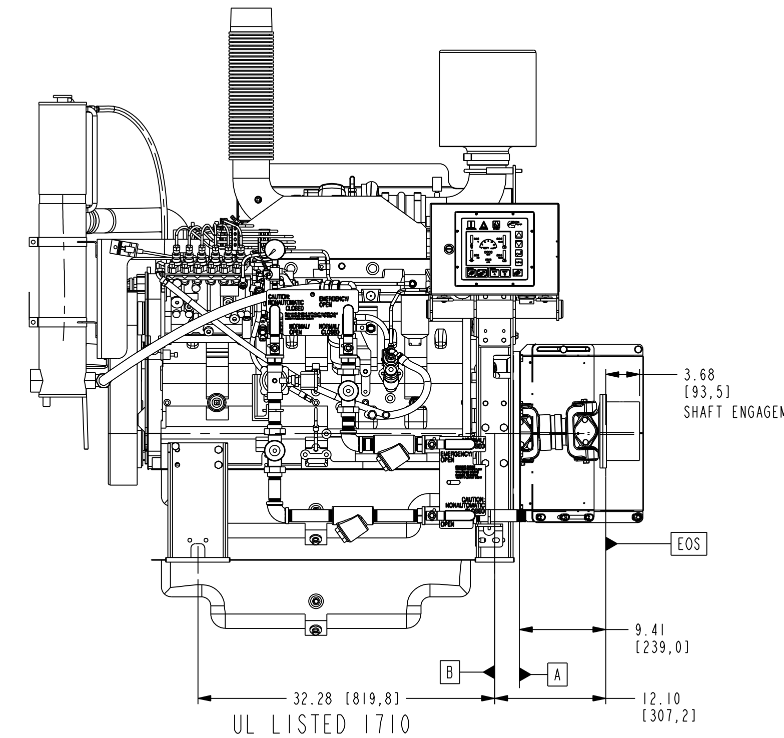
GENERAL ARRANGEMENT
CFP8.3 F10/F20/F30

DWG UNITS: IN/LB/S	DRAWN BY: S DUBICK	DATE: 04-FEB-13
	PRO-ENGINEER	INIT ECO: 2012-598
SCALE: 0.125	SHEET 3 OF 4	DRAWING NO: 23034
EST WEIGHT: 0.000		

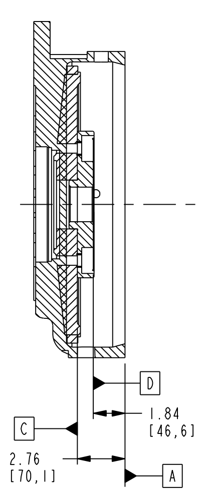




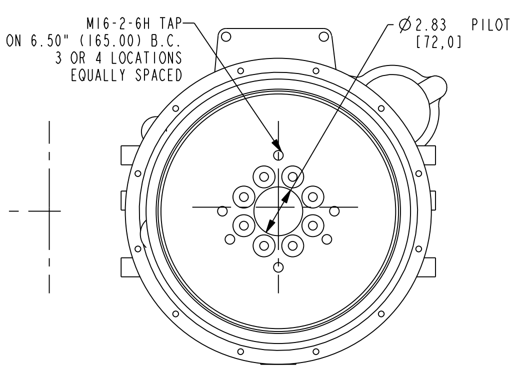
STUB SHAFT OPTION
***SEE NOTE #1



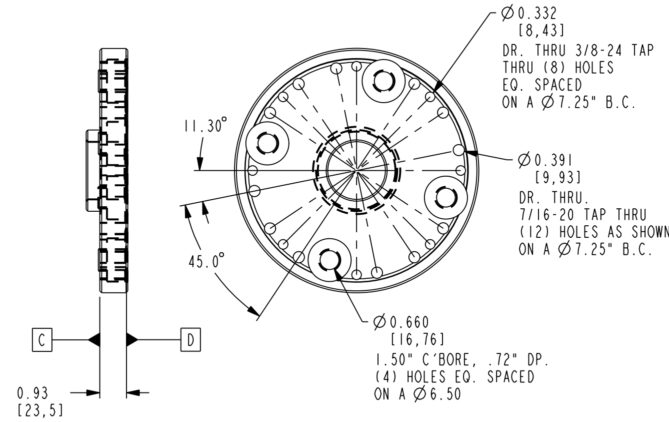
UL LISTED 1710
SHORT COUPLED SHAFT



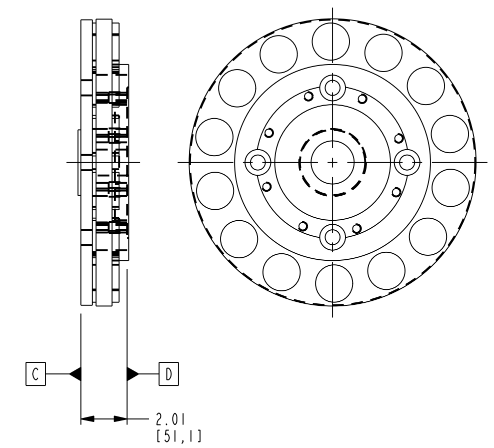
FLYWHEEL DETAIL
SCALE: 0.19" = 1"



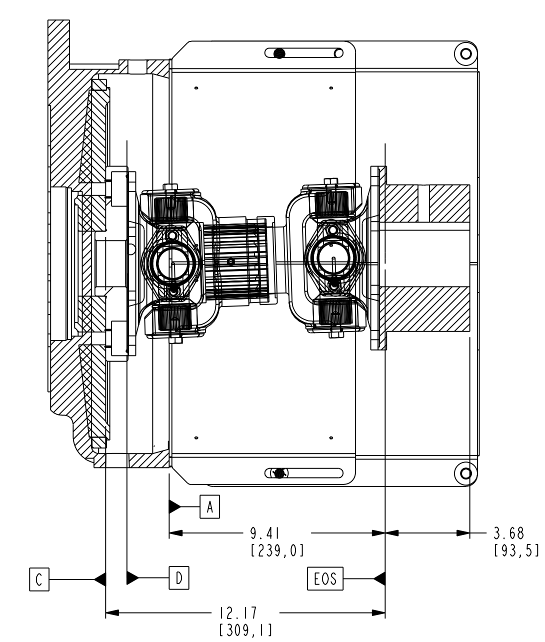
FLYWHEEL REAR VIEW
SHOWN WITHOUT
U-BOLT ADAPTER
SCALE: 0.25" = 1"



UJOINT ADAPTER DETAIL
SCALE: 0.31" = 1"



TORSIONAL COUPLING DETAIL
SCALE: 0.25" = 1"



UL LISTED 1710
SHORT COUPLED SHAFT
SCALE: 0.25" = 1"
EST WEIGHT = 54 LBS (24 KG)

LEGEND AND DATUM IDENTIFIER	
SHEET #1	INSTALLATION DRAWING
SHEET #2	GENERAL ARRANGEMENT - HORIZONTAL SPLIT CASE PUMP BASE OPTION
SHEET #3	GENERAL ARRANGEMENT - VERTICAL TURBINE PUMP BASE OPTION
SHEET #4	DRIVE LINE OPTIONS
DATUM "A"	FACE OF FLYWHEEL HOUSING
DATUM "B"	REAR LEG BOLT LOCATION
DATUM "C"	FLYWHEEL MOUNTING SURFACE
DATUM "D"	UJOINT ADAPTER MOUNTING SURFACE
DATUM "EOS"	END OF PUMP SHAFT

CFP DRIVE SHAFT MATRIX

ENGINE MODEL	CFP F-RATINGS - W/MULTIPLE SHAFTS	
	RPM 1470	RPM 1760
CFP83E-F10	1710 SHAFT	1710 SHAFT
CFP83E-F20	1710 SHAFT	1710 SHAFT
CFP83E-F30	1710 SHAFT	1710 SHAFT

NOTES:
1. TORSIONAL ANALYSIS REQUIRED FOR VERTICAL TURBINE INSTALLATION
***ADD 1.26" FOR TORSIONAL COUPLING
2. REFERENCE OWNERS MANUAL FOR DRIVE SHAFT ALIGNMENT SPECS
3. DO NOT SCALE DRAWING.
4. DRAWING SUBJECT TO CHANGE WITH OUT NOTICE.
5. REFERENCE SHEET #1 FOR BASE FIREPUMP INTERFACE

REV	ECO	DESCRIPTION OF REVISION	REV BY	DATE

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GENERAL ARRANGEMENT
CFP8.3 F10/F20/F30

DWG UNITS: IN/LB/S	DRAWN BY: S DUBICK	DATE: 04-FEB-13
	PRO-ENGINEER	INIT ECO: 2012-598
SCALE: 0.125	SHEET 4 OF 4	DRAWING NO: 23034
EST WEIGHT: 0.000		

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE
THIRD ANGLE PROJECTION

CONTROL PANEL ENCLOSURE

CONNECTOR C1

RS485+ → 21

RS485- → 22

GROUND → 16

TO OPTIONAL DIGITAL PANEL EXPANSION MODULE

POWER BOARD
15153

PUMP CONTROLLER CONNECTIONS

1	2	3	4	5	6	8	9	10	11	301	302	303	304	310	311	312
AUTO	CTS	OSS	LOP	HCT	BATT A	BATT B	MBC1	MBC2	GND					RWHIT	CRWCLS	LCT

I2C I/O XPDR

OSS

CTS

RWHIT (B)

CRWCLS

MBC1

MBC2

MANUAL

KEYSWITCH

AUTO

LCT

LOP

HCT

Vr, B+

CHARGE GND → 4 → CHARGE GND

EXCITE → 14 → EXCITE

MCB1 → 12 → MCB1

MCB2 → 13 → MCB2

BATT B → 2 → BATT B

BATT A → 1 → BATT A

LCT → 19 → LCT

LOP → 10 → LOP

HCT → 11 → HCT

RWTS → 17 → RWTS

CLP PRE → 25 → CLP PRE

CLP POST → 26 → CLP POST

OPS → 8 → OPS

WTS → 9 → WTS

MPU+ → 5 → MPU+

MPU- → 6 → MPU-

RWS → 15 → RWS

FSO → 7 → FSO

SYS GND → 3 → SYS GND

NON-ISOLATED CPU

I2C

CTS

OSS

I2C

TACH

RS485

DISPLAY BOARD
15152

Control Panel

B+ B+

BATTERY ISOLATOR

B+ ALT D+

STARTER S B+

CR A

CR B

POS NEG BAT A

POS NEG BAT B

LCT (B)

SHOWN IN "LOW OIL PRESS" STATE (OR ENGINE NOT RUNNING)

SHOWN IN "NORMAL TEMP" STATE (OR ENGINE NOT RUNNING)

RWTS (B)

CLP PRE

CLP POST

OPS

WTS

NC (ENERGIZE TO RUN)

NC (ENERGIZE TO RUN)

LEGEND:

(B) = B

OSS = OVER SPEED SWITCH
CTS = CRANK TERMINATION SWITCH
MBC1 = MAIN BATTERY CONTACTOR 1
MBC2 = MAIN BATTERY CONTACTOR 2
LCT = LOW COOLANT TEMPERATURE
HCT = HIGH COOLANT TEMPERATURE
LOP = LOW OIL PRESSURE
FSO = FUEL SHUT OFF
RWS = RAW WATER SOLENOID
VSP = VARIABLE SPEED PRESURE
DOP PRE = DIFFERENTIAL OIL PRESSURE PRE
DOP POST = DIFFERENTIAL OIL PRESSURE POST
OPS = OIL PRESSURE SENDER
WTS = WATER TEMPERATURE SENDER
MPU = MAGNETIC PICK-UP
RWHIT = RAW WATER HIGH INLET TEMP
CRWCLS= CLOGGED RAW WATER COOLING LOOP STRAINER
CLP PRE = COOLING LOOP PRESSURE PRE STRAINER
CLP POST = COOLING LOOP PRESSURE POST STRAINER
RWTS = RAW WATER TEMPERATURE SENDER

UNLESS OTHERWISE SPECIFIED ALL DIMENSION TOLERANCES ARE

ANGULAR DIMENSIONS ± 1° | IMPERIAL UNITS | METRIC UNITS

THIRD ANGLE PROJECTION

REV	ENF	DESCRIPTION OF REVISION	BY	DATE
B	2014-107	ADDED COOLING LOOP SENSORS	RMJ	21FEB2014
A	2011-189	ADDED RS485 WIRES.	PBS	15JUN2011

Cummins Fire Power

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SCHEMATIC, MECHANICAL FIRE PUMP DRIVERS CFP MODELS: 33, 39, 59, 83

DWG UNITS: INCH/LB/S | DRAWN BY: KAK | DATE: 14 DEC 2009

AUTO CAD | REF DRWG:

SCALE: | SHEET 1OF1 | DRAWING NO: 16122

EST WEIGHT: