

CPC-DX (CPC Dual Transfer Skid)

Redundant current-to-pressure converter assembly

Applications

The CPC-DX (current-to-pressure converter–dual transfer) is a hydraulic pressure control skid designed for use in positioning single-acting steam turbine valve servos in critical applications. The packaged redundant CPC's superb accuracy and resolution make it ideal for steam turbine valve control, and this skid's integrated redundancy position it for applications requiring a high level of system reliability and availability.

This skid's integrated design allows for a cost-effective purchase and installation of one hydraulic assembly, which provides all the isolation, and support benefits of fully segmented current-to-pressure converters. Hand isolation valves are included within the package to give users the capability to easily repair or replace each individual current-to-pressure converter.

This skid utilizes two Woodward CPCs, includes all the capabilities of a CPC, and thus can replace a simplex converter to increase system reliability and availability. Refer to Woodward product specification 03352 for more information on using and applying the Woodward CPC.

Both automatic and manual transfer logic are available for use within this skid assembly, depending on the system's design. This skid's automatic transfer logic simplifies system design, as it requires no external relay/switching logic to operate, minimizing both converter-to-converter and control-to-converter interface wiring. The CPC's configurable alarm/shutdown logic allows users to easily configure which system conditions force an automatic transfer from the master CPC to the slave CPC.

Manual transfer functionality is also available for systems where users desire to switch between pressure converters via external logic or hand switches. Use of master selection discrete inputs allows users to easily and quickly select the desired control CPC.

Integrated oil pressure gauges allow users to visually understand which converter is in control and verify the skid's output oil header pressure level. Discrete output relay contacts can also be connected to system indication (lights, lamps, plant DCS) to assist with system health monitoring.

The CPC's robust design (strong actuator, corrosion-resistant material, single moving rotary valve, and self-cleaning port design) make it ideal for challenging applications where dirty or contaminated oil may be present.

Designed for use in new or retrofit turbine packages, the CPC skid's compact package size allows it to be located near the turbine valve, minimizing piping, and related system delays.



- Dirt resistant
 - No small passages to plug
 - 111 N (25 lb.) rotary chip shear force
 - Self-cleaning valve design
- Automatic & manual switching
- Fast switching times
 - Minimizes system disturbances
- Accurate pressure control
- Increased reliability
 - High pressure signal select design
 - On-line repairable
 - Master/Slave logic
- Included isolation valves
 - With tag-out lock protection
- Large pressure gauges
- Remote Master/Slave Indication
- Compact size
- 10 and 25 bar models available
- Certified for Division 2 and Zone 2 Hazardous locations

Description

The CPC-DX redundant CPC skid is a complete packaged and tested assembly which consists of two Woodward current-to-pressure converters (CPCs) connected together on a single manifold with all interconnect piping, gauges, and wiring included and tested.

The CPC is an electro-hydraulic pressure-regulating valve that utilizes a highly accurate internal pressure sensor and control algorithm to precisely control steam turbine valves. The CPC consists of a valve-actuator assembly, pressure sensor, and electronic driver module. The CPC supplies a hydraulic fluid control pressure that is proportional to a 4-20 mA demand current signal. Refer to Woodward product specification 03352 for more information on the Woodward CPC.

The CPC-DX redundant CPC skid uses a specially designed fast-switching hydraulic valve to ensure minimal switchover time and minimal system disturbance. This special valve allows the pressure converter with the highest output to control the steam turbine's control valve, while blocking the output pressure of the converter with the lower pressure output. Using a master/slave based logic, the skid's designated master CPC controls all aspects of the valve control oil pressure, while the slave CPC simply tracks the master CPC's pressure demand. This type of logic ensures smooth system operations in all stages of operation as it minimizes oil header pressure disturbances (bumps) during unit-to-unit transfers.

A Zone 2 rated electrical junction box located on the backside of the skid allows users to easily access the skid's interface wiring. For ease of installation, CPC uses gland plates with this junction box to allow installers to select the cable conduit interface method desired.

The total installed cost for this fully integrated hydraulic pressure skid is low because it has been completely assembled and tested at the factory. This greatly reduces OEM and end-user fabrication, installation, and testing times.

Features

Dirt Tolerance—The Woodward CPC and Redundant CPC Skid are specifically designed for steam turbine applications where turbine lube oil is also used to power the hydraulic turbine control valve actuator(s). Steam turbine applications can be extremely challenging for hydraulic trip block assemblies as dirt, metal shavings, water, and other contaminants (Babbitt, ammonia, etc.) are common in such oil systems. Also due to the high temperatures at which steam turbines operate, turbine oil breakdown is common, resulting in the creation of a sludge-type substance and the varnishing of internal system components. However, the Woodward CPC and this redundant skid are designed to operate reliably within such challenging applications. Corrosion-resistant materials, rotary valve design, 111 N (25 lb) of chip shear force, and self-cleaning ports allow these assemblies to operate in such applications without experiencing undesirable sticking or dragging.

Redundancy/Availability—Designed for use in critical steam turbine applications where turbine up time is important, the CPC-DX Skid uses the following methods to ensure long-term system operation:

- Two isolated current-to-pressure-converters
- High-signal-select voting between converters
- On-line CPC repair/replacement
- Automatic transfer logic
- Specially designed switchover valve to ensure at least one CPC is in control
- Accepts two redundant power supply inputs
- Accepts two redundant 4–20 mA demand inputs
- Allows external transfer commands based on external system failures

Lower System Cost and Complexity—The Redundant CPC Skid is a fully packaged assembly, which includes unit-to-unit tracking and automatic and manual switchover logic capability. The skid's automatic switchover logic greatly simplifies the overall turbine control design and lowers system cost as no external switching logic or related wiring is required (not true with competing products).

Pressure Gauges—Integrated pressure gauges are included with this skid to assist operators with verification of unit operation and control.

Remote Master/Slave Indication—Each CPC includes a discrete output relay contact which can be used to remotely indicate which unit is in control of the steam valve pressure header. A closed relay contact indicates which CPC is currently functioning as the master unit.

Available Models

1. CPC-DX Skid—Zone 2, 0–10 bar model
2. CPC-DX Skid—Zone 2, 0–25 bar model

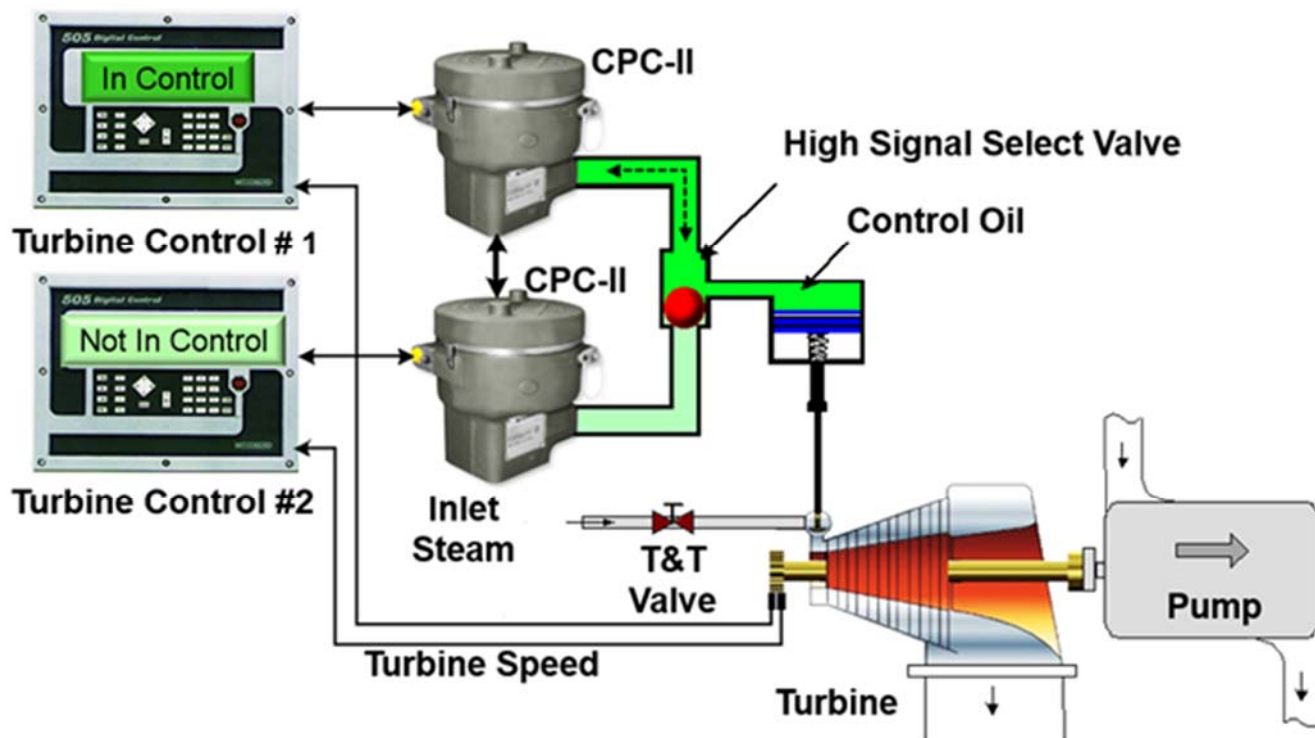


Figure 1. Basic Redundant CPC-II Skid Application

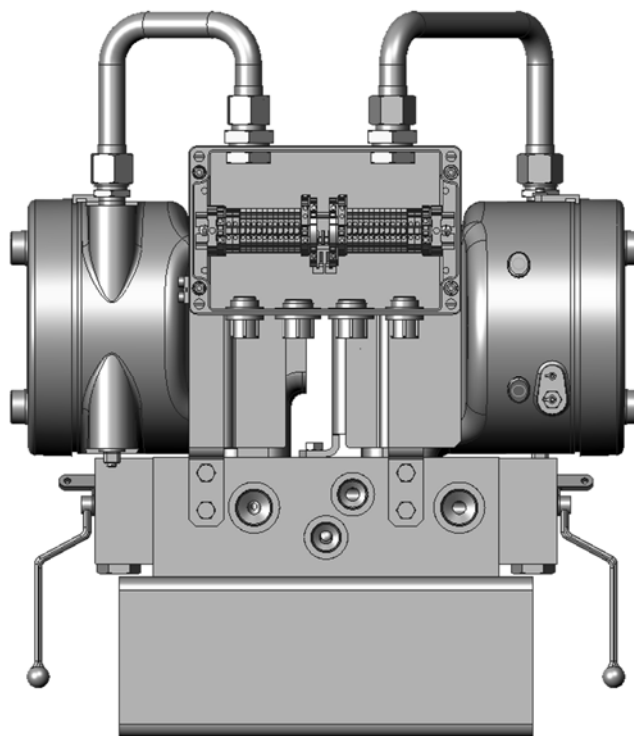
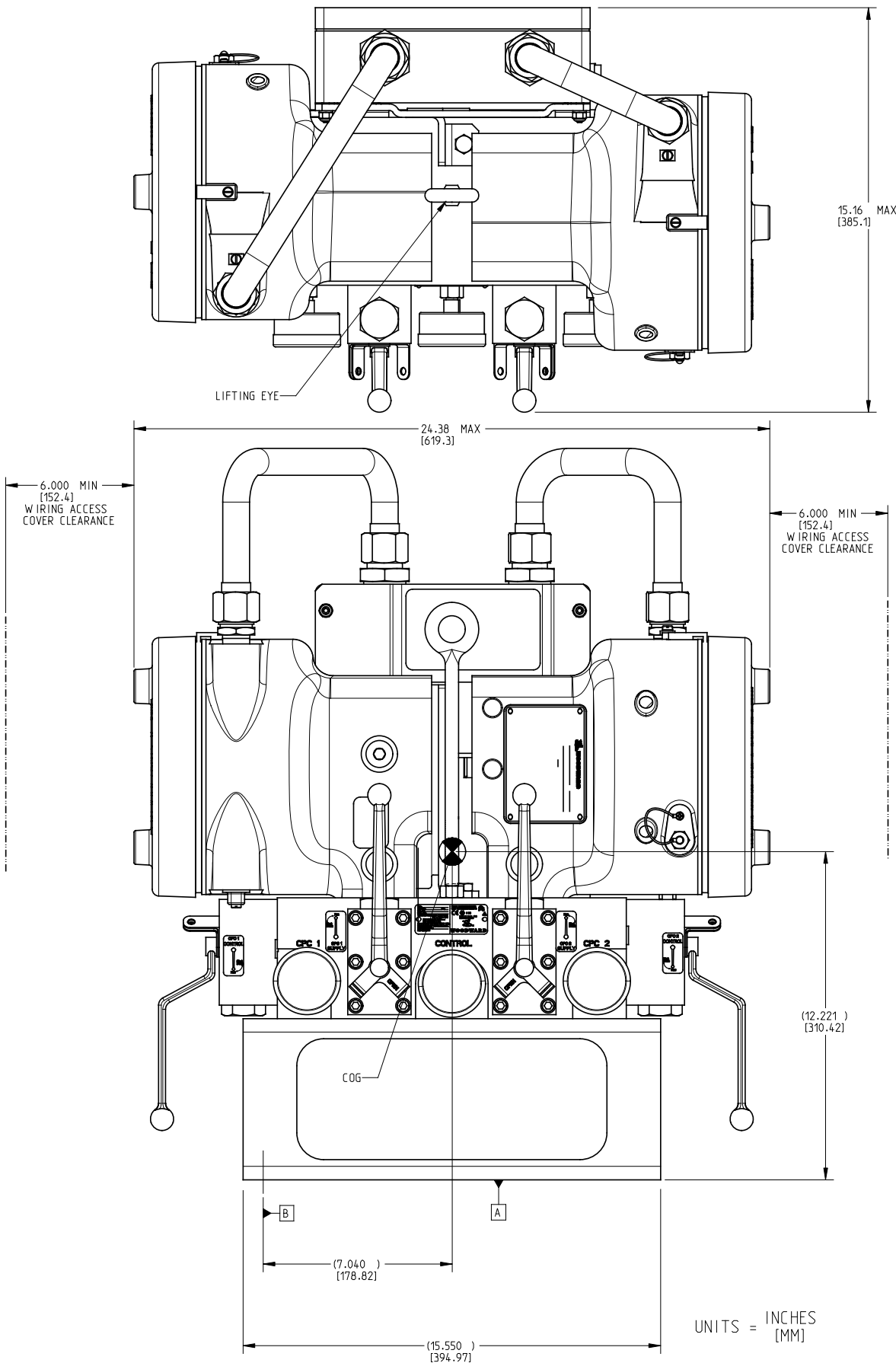
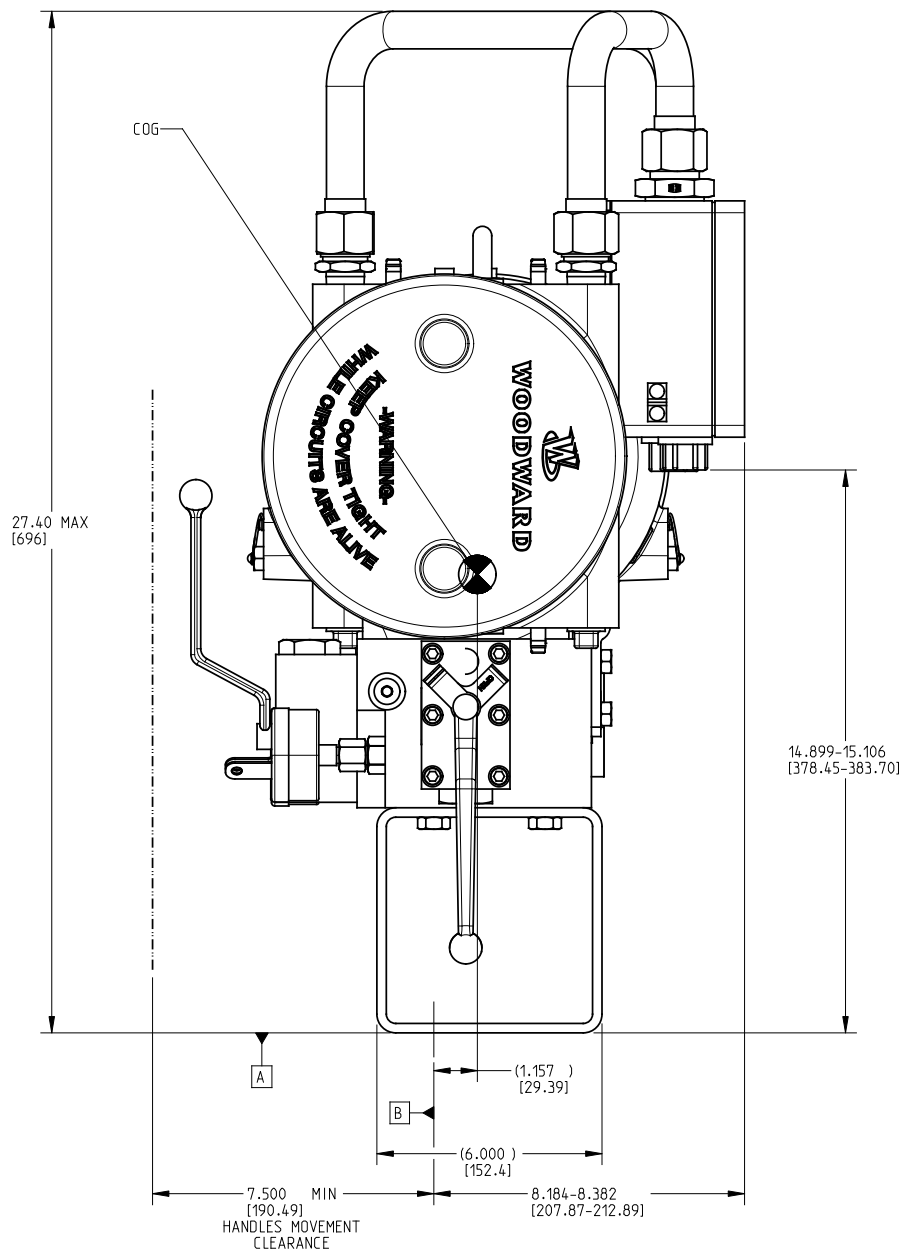


Figure 2. Electrical and Hydraulic Interface Connections





UNITS = INCHES
[MM]

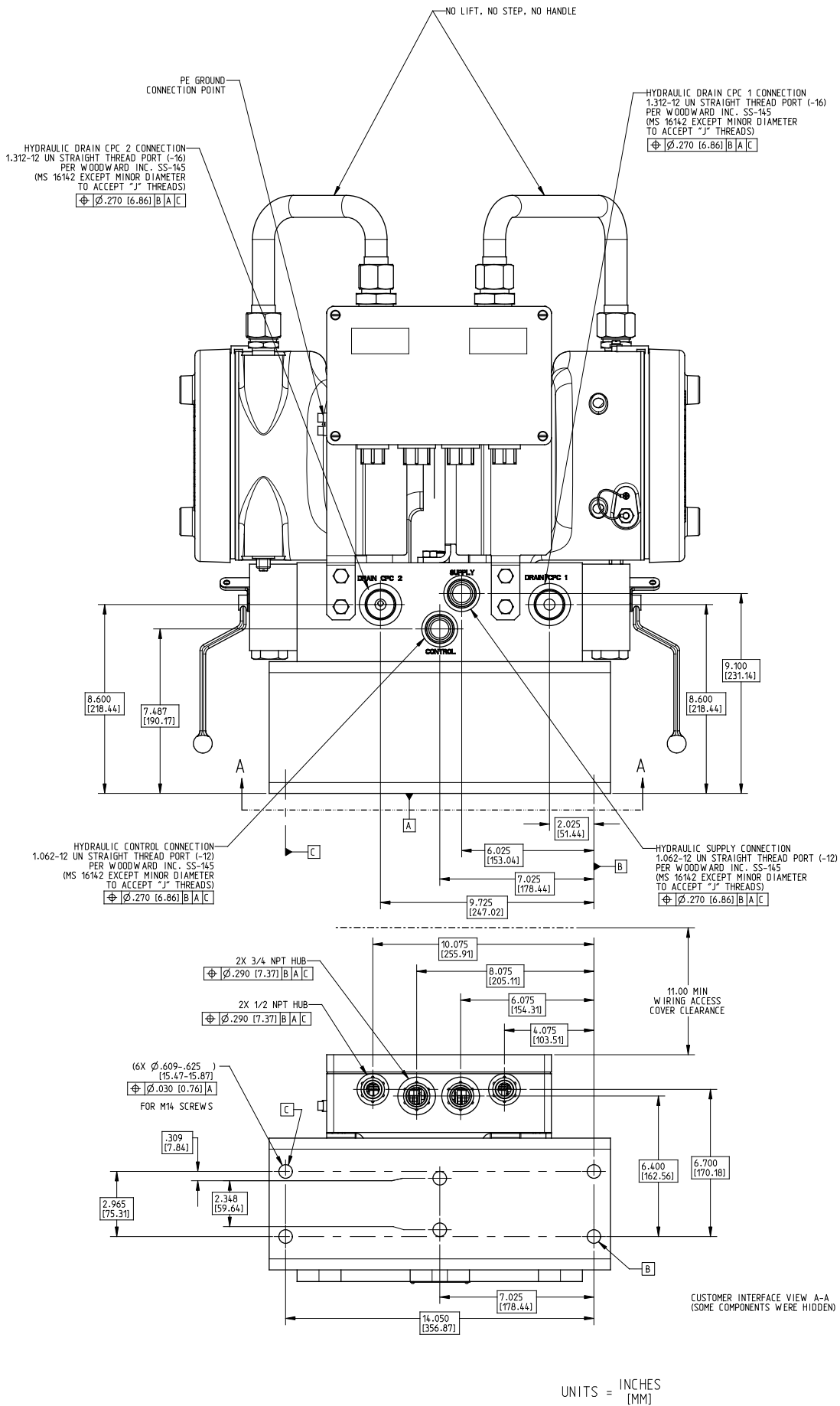


Figure 3. Skid Outline Dimensions

Specifications

Physical

Dimensions: See Figure 3, Skid Outline Dimensions
 Weight: 82 kg (180 lb)
 Mounting: Base side down

Environmental

Operating Temperature Range: -40 to +85 °C (-40 to +185 °F)
 Operating Oil Temperature Range: 15 to 70 °C (59 to 158 °F)
 Shock: MS1 (10 G Peak, 11 ms duration, saw tooth)
 Vibration: RV5 (0.04 G²/Hz, 10–500 Hz, 2 hours/axis, 1.04 Grms)
 Ingress Protection: IP66

Electrical

Refer to CPC product spec 03352 for CPC performance information.

Hydraulic

Fluid Ports:

SUPPLY (common) connection 1.062-12 UN straight thread port
CONTROL (common) connection 1.062-12 UN straight thread port
DRAIN CPC 1 connection 1.312-12 UN straight thread port
DRAIN CPC 2 connection 1.312-12 UN straight thread port

Other

Refer to CPC product spec 03352 for CPC performance information.

Regulatory Compliance

European Compliance for CE Marking:

EMC Directive: Declared to Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to electromagnetic compatibility (EMC)

ATEX – Potentially Explosive Atmospheres Directive: Directive 2014/34/EU on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres.
 Zone 2, Category 3, Group II G, Ex nA IIC T4 Gc IP66

Other European/International Compliance:

Machinery Directive: Compliant as partly completed machinery with Directive 2006/42/EC of the European Parliament and the Council of 17 May 2006 on machinery.

Pressure Equipment Directive: Compliant as “SEP” per Article 4.3 to Pressure Equipment Directive 2014/68/EU on the harmonisation of the laws of the Member States relating to the making available on the market of pressure equipment.

IECEX: Certified for use in hazardous locations: IECEx CSA 11.0017X (Ex nA) for Zone 2, Category 3, Group II G, Ex nA IIC T4 Gc IP66 or Zone 2, Category 3 G, Ex nA IIC T4 Gc IP66

North America Compliance:

CSA: CSA Certified for Class I, Division 2, Groups A, B, C, & D, T4 at 85 °C Ambient. For use in Canada and the United States.



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