

# PROTORQ™ 4960 SERIES HUBBELL INDUSTRIAL DRIVES FOR CRANE CONTROL

## Dedicated AC Drives for Crane Applications

Hubbell Protorq's crane control program brings a series of functions to the hoist, trolley and long-travel movements of cranes.

Rated:

208-240 VAC, 4.4 to 260A (0.75 to 150 HP)

380-500 VAC, 1.7 to 1274A (0.75 to 1000 HP)

525-690 VAC, 6.1 to 2421A (5 to 2500 HP)

Eliminating the need for an external PLC, the program incorporates all the functions commonly required in crane applications and enables stepless speed and torque control in:

- Industrial cranes
- Harbor cranes
- Tower cranes
- Marine and deck cranes

A key feature of the Hubbell Protorq™ industrial drive is its motor control platform, direct torque control (DTC). DTC enables the drive to achieve full torque at zero speed with or without the need for an encoder feedback. In addition, the torque response of the drive is fast which means the crane can react quickly to changes in movement commands. High torque levels can be reached, making the drive ideal for lifting operations. DTC delivers enhanced operational safety and accurate slow speed control.

Hubbell Protorq™ industrial drives' built-in brake choppers connect the DC bus voltage to an external dynamic braking resistor, where the braking energy is converted to heat.

Low harmonic drives help to maintain power supply quality and meet the strictest harmonic standards without any need for filtering equipment.

The drive can work in either standalone mode or as a master follower.



## Optional Regenerative Drive Solutions

Regenerative drives can recover energy from a process and feed it back into the network, thus saving energy. This single drive is a compact and complete regenerative drive solutions, with everything needed for a regenerative operation.

With regenerative functionality, the braking energy of the motor is returned back to the drive and distributed forward to the supply network. No need for external dynamic braking resistor.

## Removable Memory Unit

The removable memory unit stores the software that includes user settings, parameter settings and motor data. Situated on the control unit, the memory unit can easily be removed for maintenance, firmware updates or replacement purposes. This common type of memory unit is used throughout the 4960 Series.



System parameters and motor data can also be uploaded to the HMI. The HMI can be removed and reinstalled in a new drive with the same system parameters.



[www.hubbell-icd.com](http://www.hubbell-icd.com)

## Flexible Control Platform

The Hubbell Protorq™ firmware offers flexible interfaces for different types of analog, digital or fieldbus systems, enabling a wide range of connectivity for start, stop and reference change signals.

Analog Signal: 0-10 VDC, 4-20mA,  $\pm 10$  VDC

Network communication modules available: Profibus, Profinet, CANopen, DeviceNet, Ethernet/IP, Modbus RTU, Powerlink and ControlNet.

## Mechanical Brake Control & Torque Memory

The crane control program features an integrated brake control logic that utilizes torque memory and pre-magnetizing to open and close the mechanical brake safely and reliably. The drive can generate full torque on the motor shaft before the brake is released. In addition, brake status feedback signals improve the safety when a start or stop command is given.

## Adaptive Programming

Function block programming - included as standard - is like having a small PLC inside the drive. Adaptive programming, as it is also called, enables the user to integrate external control logic or create new functions, so the program can be customized quickly and easily.

## Load Speed Control

Load speed control maximizes the hoist speed for the given load and ensures that there is sufficient motor torque in the field weakening area. This minimizes operating time and optimizes crane capacity.

## Safety Control

The 'slow down' safety control function limits the speed to a preset level in critical zones. High and low limit sensors stop the drive at the end positions. The 'fast stop' safety control function is used in emergency situations.

## Speed Monitor and Speed Matching

The speed monitor function ensures that the crane motor speed remains within safe limits to prevent over speed. The speed matching function continuously compares the speed reference and the actual motor shaft speed to detect any possible difference. One of these functions will stop the motor immediately if a fault should occur in the operation of the motor.

## Retrofit Older Wound Rotor Motors

Hubbell 4960 Drive circuit incorporates a special dv/dt filter that allows the older existing motors to be used with the new drives. No need for costly motor replacement.



## Crane System Check

The crane system check function includes both electrical and mechanical checks. Torque proving ensures that the drive and motor are able to produce torque and that the mechanical brake does not slip before the drive releases the brake and starts operating the crane.

## Built-in Anti-sway Control

Load sway can occur in trolley and bridge travel motions. The Hubbell Protorq™ 4960 drive's anti-sway control program automatically compensates for it when it happens. The control program creates a mathematical model of the crane's pendulum. It estimates the pendulum's time constant by continually measuring the hoist position and load properties, and factors in the swing velocity and angle. When the operator changes the speed of the crane's travel, the drive quickly recalculates the required speed reference to compensate for the crane's speed change, preventing the load from swaying.

There is no additional hardware required for this option. Just a simple data communication cable is required between the drives or fieldbus communication modules.



## Built-in STO (Safe Torque Off)

Safe Torque Off is a function that prevents the drive from generating torque in the motor. It ensures that no torque generating energy continues to act on the motor and that the motor cannot be re-started until the STO is removed. What this means is that once the Safe Torque Off is activated the motor will not turn after it has come to a stop.

One of the major advantages compared to normal safety practices, both in terms of reduced cost and simplicity is the elimination of the need for input contactors or separate safety relays. Fewer components mean less effort in wiring and servicing. In addition electronic switching times are significantly quicker than electromechanical devices such as contactors or relays.

Certified SIL 3 / PL e safety rating and complies with EN/ IEC 61800-5-2 which is the standard that defines the Safe Torque Off feature.

Finally, it is important to remember that Safe Torque Off DOES NOT provide electrical isolation. The motor must be electrically isolated by cutting the supply to the drive and by local isolation to the motor before any access to the motor power connections.

## Flange Mounted Drive Kit

Flange mounted drive kits allow the heat sink to be external of the drive cabinet reducing the possible need for air conditioning in higher ambient applications. Instead of producing heat internal of the cabinet, it is moved to the exterior of the crane drive cabinet. Crane drives can be rated to 55°C. Higher ambients and higher duty cycles will require flange kit and or air conditioning (Consult factory).

## Single Cabinet Design - Single Source Responsibility

Unitized construction with radio interface reduces downtime. With all the crane drives (ie: hoist, trolley and bridge) mounted and wired in a single cabinet provides the following features:

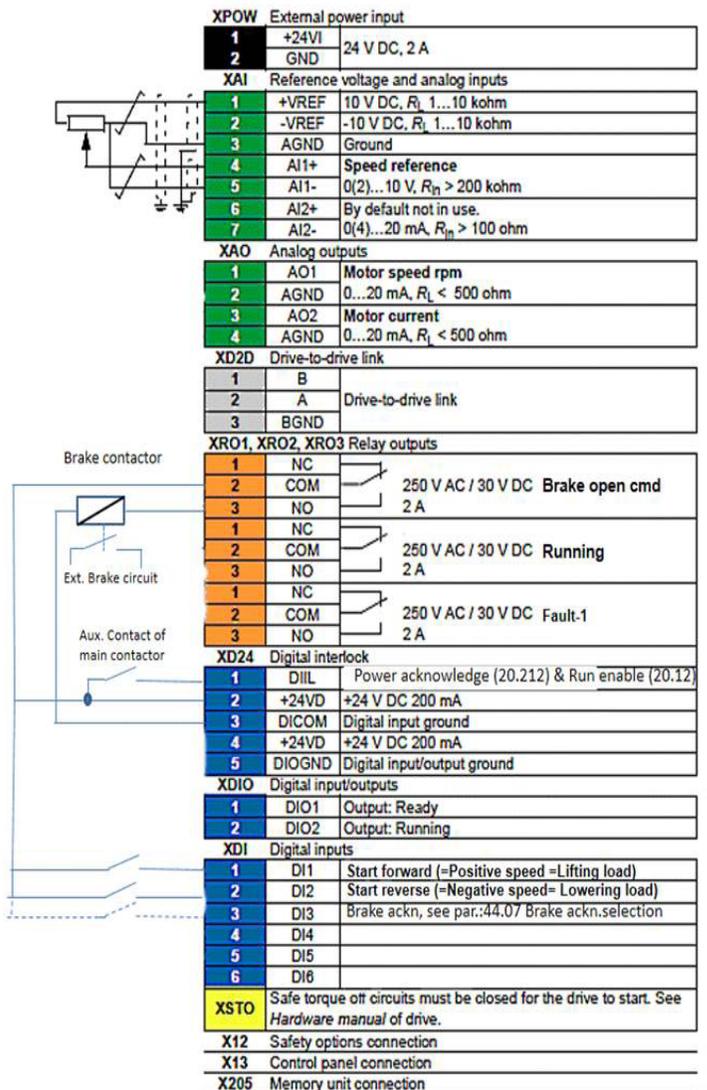
- Built-in Main Line Contactor (Main Crane Drive Disconnect) with flange mounted disconnect handle (lockable). Eliminates a separate Manual Magnetic Disconnect.
- With a radio control option, it allows the Hubbell Radio Control 'Plug and Play' Receiver to be factory wired to all the drives and tested before it leaves the factory.
- Dual receiver option eliminates a need for back up pendant and pendant festoon system.
- DB Resistors are wired and mounted to all the individual drives.

## Color Coded Terminal Blocks

Color coded terminal blocks allow for easy connection without incorrectly hooking up to the wrong input/outputs terminal points. Also, there is a barrier between the power connections (T1, T2, T3) on the bottom of the drive and the color coded control terminal blocks.



I/O Hookup Diagram:



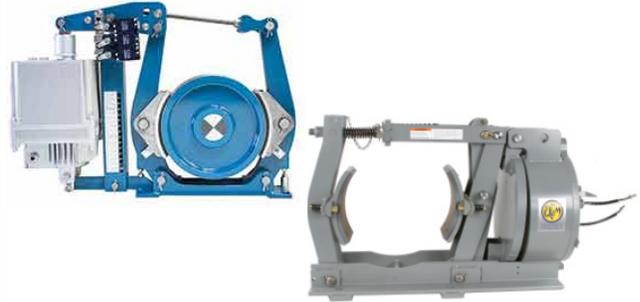
Customized and related integrated solutions for all your crane product needs.  
Since 1897 Hubbell has been providing AC/DC crane control solutions.



### Radio Controls



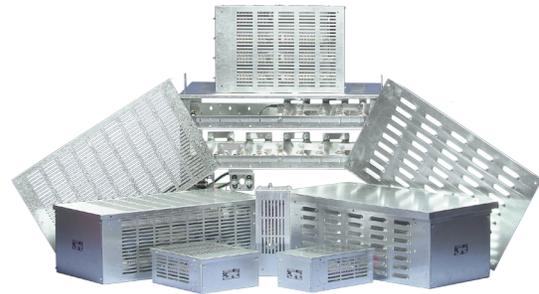
### Industrial Brakes



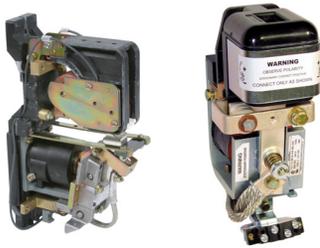
### Cable Management Systems



### Dynamic Braking Resistors



### Contactors



### Pendants



### Magnet Controllers



### Electrification



**Hubbell Industrial Controls, Inc.**  
4301 Cheyenne Drive, Archdale, NC 27263  
Phone (336) 434-2800 • Fax (336) 434-2803  
[www.hubbell-icd.com](http://www.hubbell-icd.com)  
[sales@hubbell-icd.com](mailto:sales@hubbell-icd.com)