

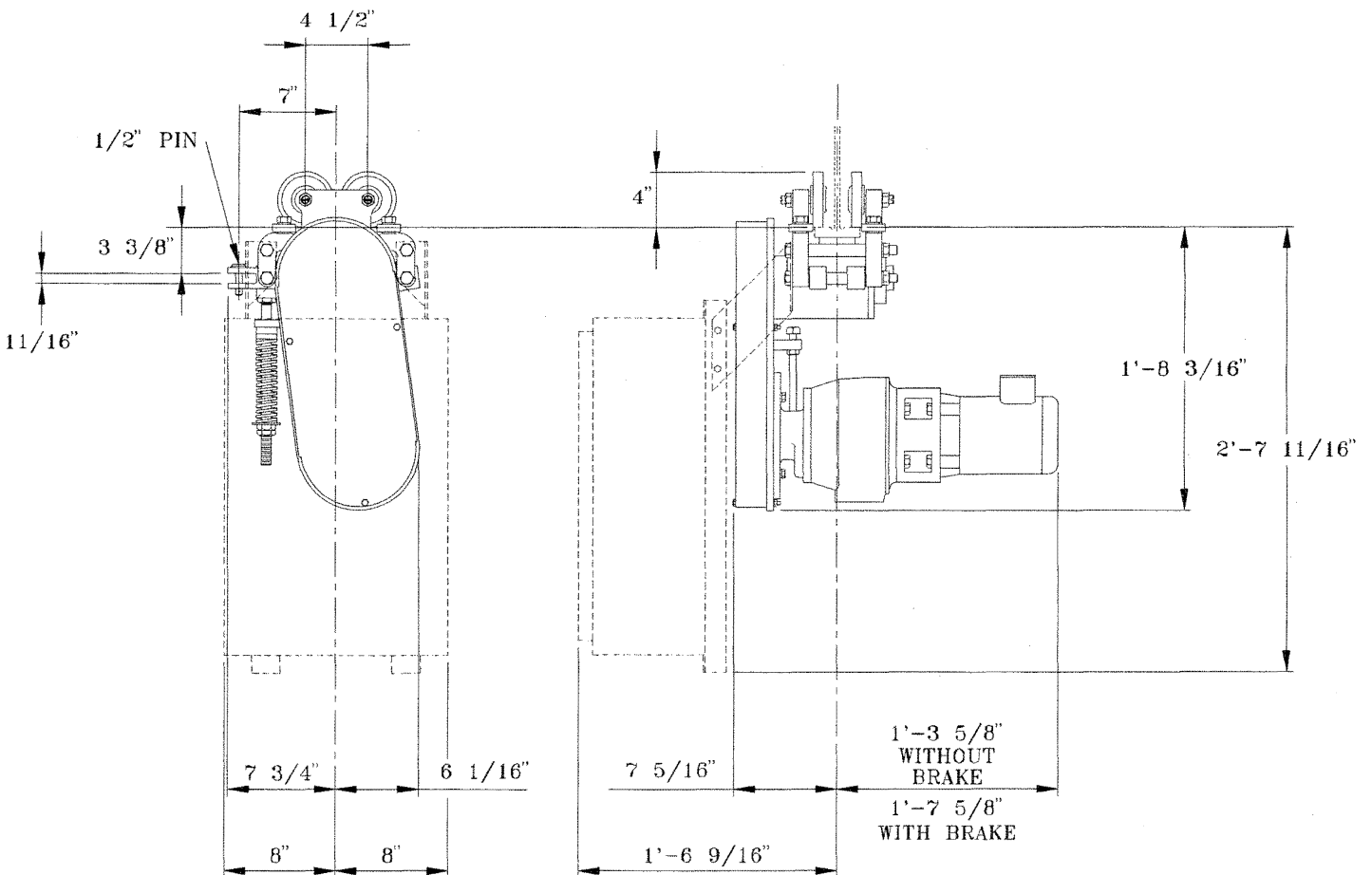
**NO. 2409 TRACTOR DRIVE**

No. 2409 tractor drives are powered by NEMA C face mounted motors driving through double reduction helical gear reducers and a roller chain final reduction to 6 in. diameter polyurethane drive wheels. Traction is obtained by the drive wheel bearing against the bottom of the track. Pressure is applied by a compression spring and is adjustable.

These drives are available with 1/2, 3/4, 1 and 1-1/2 horsepower motors. Nominal speeds are 100, 125, 150 and 200 FPM; slower speeds can be furnished. Drives with 1-1/2

HP motors are available for 150 and 200 FPM only. They are available with squirrel cage motors and single speed solid state or variable frequency control and multi-speed squirrel cage motors and 2-speed solid state control.

The drawing provides maximum clearance dimensions. The dotted lines indicate the single speed control panel location for single girder carriers. Consult factory for dimensions of variable frequency and 2-speed control panels.



**HORSEPOWER REQUIREMENTS - SINGLE MOTOR DRIVES**

The table lists the maximum total load that a single motor drive at a particular horsepower and speed is capable of moving. Nos. 24010, 2409 and 2408 drives are used for propelling single girder carriers; the No. 24011 drive is used for propelling double girder carriers. The efficiency of the drives has been considered in determining the horsepower.

The total load consists of the rated load and the weights of

the hoist, carrier and accessory equipment (when used). The impact allowance is not considered in determining the total load. After determining the total load and knowing the carrier speed and the type of drive to be used, the motor horsepower of the drive is selected from the table. When the total load falls between those shown in the table, select the greater horsepower.

Horsepower Required						
	1/2 HP	3/4 HP	1 HP	1-1/2 HP	2 HP	3 HP
Speed (FPM)	Maximum Load					
	No. 24010 Drive					
55	11,200	16,800	N. A.	N. A.	N. A.	N. A.
90	8,000	12,000	16,000	N. A.	N. A.	N. A.
No. 2409 Drive						
100	9,400	14,100	18,800	N. A.	N. A.	N. A.
125	7,500	11,300	15,000	N. A.	N. A.	N. A.
150	6,200	9,400	12,500	18,800	N. A.	N. A.
200	N. A.	7,000	9,400	14,100	N. A.	N. A.
No. 2408 Drive						
100	9,400	14,100	18,800	28,200	37,700	N. A.
150	6,200	9,400	12,500	18,800	25,100	37,700
200	N. A.	7,000	9,000	14,100	18,800	28,200
250	N. A.	N. A.	7,500	11,300	15,000	22,600
300	N. A.	N. A.	6,200	9,400	12,500	18,800
No. 24011 Drive						
100	9,400	14,100	18,800	28,200	N. A.	N. A.
125	7,500	11,300	15,000	22,600	N. A.	N. A.
150	6,200	9,400	12,500	18,800	N. A.	N. A.
200	N. A.	7,000	9,400	14,100	N. A.	N. A.

**HORSEPOWER REQUIREMENTS - DUAL MOTOR DRIVES**

The table lists the maximum total load that a dual motor drive at a particular horsepower and speed is capable of moving. Nos. 24010, 2409 and 2408 drives are used for propelling single and double girder cranes; Nos. 24016 and 24017 drives are used for propelling double girder carriers. The efficiency of the drives has been considered in determining the horsepower.

The total load consists of the rated load and the weights of the hoist, carrier, crane and accessory equipment (when used). The impact allowance is not considered in determining the total load. After determining the total load and knowing the crane speed and the type of drive to be used, the motor horsepower of the drive is selected from the table. When the total load falls between those shown in the table, select the greater horsepower.

Horsepower Required						
	2 @ 1/2 HP	2 @ 3/4 HP	2 @ 1 HP	2 @ 1-1/2 HP	2 @ 2 HP	2 @ 3 HP
Speed (FPM)	Maximum Load					
	No. 24010 Drives					
55	22,400	33,600	N. A.	N. A.	N. A.	N. A.
90	16,000	24,000	32,000	N. A.	N. A.	N. A.
Nos. 2409, 24016 and 24017 Drives						
100	18,800	28,200	37,700	N. A.	N. A.	N. A.
125	15,000	22,600	30,100	N. A.	N. A.	N. A.
150	12,500	18,800	25,100	37,700	N. A.	N. A.
200	N. A.	14,100	18,800	28,200	N. A.	N. A.
No. 2408 Drives						
100	18,800	28,200	37,700	56,500	75,400	N. A.
150	12,500	18,800	25,100	37,700	50,200	75,400
200	N. A.	14,100	18,800	28,200	37,700	56,500
250	N. A.	N. A.	15,000	22,600	30,100	45,200
300	N. A.	N. A.	12,500	18,800	25,100	37,700

## CONTROL EQUIPMENT

Control equipment for motor driven Trambeam carriers and cranes consists of an operating station and a control system for the drive motors. The operating station may be a push button station for floor or remote controlled equipment, a transmitter for radio or infrared controlled equipment or master switches for cab controlled equipment. Many types of motor control systems are available with selection depending on type of service, weight and size of load, speeds and precision required in handling.

Three control systems have been designed specifically for Trambeam carriers and cranes - single speed solid state, 2-speed solid state and adjustable frequency. These systems are satisfactory for most applications. Other control systems for special applications are also available.

### SINGLE SPEED SOLID STATE MOTOR CONTROL

Single speed motor controls use solid state components for electronic control of squirrel cage motors. It is the most frequently used control for Trambeam carriers and cranes and is recommended for speeds to 200 FPM.

The control supplies a balanced 3 phase, reduced voltage (initial torque) to the motor. The voltage is increased over a preset acceleration time thus gradually applying torque to the motor. The gradual increase of torque provides smooth acceleration which is repeatable under varying load conditions.

Adjustments are provided for setting the initial torque and the time it takes the control to pass full line voltage to the motor. Adjustments are simple to make requiring only a screwdriver.

### 2-SPEED SOLID STATE MOTOR CONTROL

2-Speed motor controls use solid state components for electronic control of multi-speed squirrel cage motors. It is used where precision spotting of heavier loads is required and

is recommended for speeds to 250 FPM. The control is available with 2 to 1 and 3 to 1 ratios of the high to the low speeds.

The control supplies a balanced 3 phase, reduced voltage (initial torque) to either the low or high speed motor winding depending on which speed is selected by the operator. The voltage is increased over a preset acceleration time thus gradually applying torque to the motor. The gradual increase of torque provides smooth acceleration which is repeatable under varying load conditions.

The control switches to a deceleration mode when the motor is switched from high to low speed. In the deceleration mode, reduced voltage is applied to the low speed winding for approximately 2 seconds thereby reducing the motor countertorque. The voltage then increases to full voltage at the rate determined by the time adjustment setting. The deceleration mode provides smooth transition from high to low speed.

Adjustments are provided for setting the initial torque and the time it takes for the control to pass full line voltage. Time adjustments are provided for the acceleration and deceleration modes. Adjustments are simple to make requiring only a screwdriver.

### ADJUSTABLE FREQUENCY MOTOR CONTROL

Adjustable frequency motor controls use solid state components for electronic control of squirrel cage motors. It is used to position delicate loads at precise creep speeds. The control provides a 12 to 1 ratio between the high and low speeds. It can be arranged for 1, 2 or 3 speeds; speeds can be changed at any time with a built-in potentiometer which allows any speed to be dialed in between 5 and 60 hertz. The control provides smooth acceleration and deceleration, electronic reversing and speed selection and electronic dynamic braking. Consult factory for additional information on specific applications.

**CONTROL EQUIPMENT****OSHA AND NEC ELECTRICAL STANDARDS**

The electrical diagrams on Pages TD-12 and TD-13 illustrate the requirements of the Occupational Safety and Health Act (OSHA) and National Electric Code (NEC) standards. Control panels for Trambeam carriers and cranes comply with these standards.

**CONTROL EQUIPMENT**

Crane control panels include the following mandatory devices as standard equipment:

- Fused motor switch arranged to be locked in the OFF position.
- Mainline contactor operated from the crane operating station to open the power circuit to all motors.
- Branch circuit overcurrent protection for the crane motors.
- Thermal overloads in 3 phases for motor running over current protection.

Carrier control panels have branch circuit overcurrent protection for the carrier motor and thermal overloads in 3 phases for motor running overcurrent protection as standard. Most monorail carriers also require a motor circuit switch and a mainline contactor.

The National Electric Code requires that monorail carriers and hand propelled cranes with electric hoists be provided with a motor circuit switch. A mainline contactor is also required when the motor circuit switch is not readily accessible from the operating station. An exception to this requirement is allowed where the installation meets all of the following:

1. The unit is floor controlled.
2. The unit is within view of the power supply disconnecting means.
3. No fixed platform has been provided for servicing the unit.

Motor circuit switches can be provided on hand propelled carriers and cranes and on motor driven carriers where the installation does not meet the conditions stated above. A mainline contactor, when required, can be provided on motor driven carriers; but it is usually provided on the hoist.

**CONTROL PANELS AND WIRING**

NEMA 12 dust-tight enclosures are furnished as standard for carrier and crane control panels. Special enclosures are available for outdoor applications or where corrosive or explosive vapors or dust are present.

Internal wiring of crane control panels terminates at a terminal block to facilitate field maintenance.

All crane wiring is installed in rigid conduit except at the connections to the control panel and drive motors. At these connections, wiring is installed in flexible liquid-tight metal conduit. Junction boxes, conduit and flexible conduit are compatible with the NEMA 12 control panel.

**CURRENT CHARACTERISTICS**

Motor driven equipment is furnished for operation on 3 phase, 60 hertz, 230 or 460 volts alternating current with 115 volts in the control circuit. Equipment can be furnished to operate on alternating current with other characteristics or on direct current.