

**Section 7 – Controls**

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**Motor Data**

Table 1- Estimated Full Load Amps of Motors

Horsepower	110v Single $\phi$	220v Single $\phi$	208v Three $\phi$	230v Three $\phi$	460v Three $\phi$
1/3	5.8	2.9	1.4	1.3	0.65
1/2	8.8	4.4	2.0	1.8	0.9
1	10.8	5.4	3.0	2.8	1.4
1 1/2	17.2	8.6	5.2	5.0	2.5
2	20.0	10.0	6.5	6.2	3.1

**Industry Standard Enclosure Ratings:**

- NEMA1** Enclosures rated for indoor use primarily to provide a degree of protection against contact with the equipment in the enclosure.
- NEMA4** Enclosures rated for indoor use primarily to provide a degree of protection against wind blown dust and rain, splashing water and hose directed water.
- NEMA12** Enclosures rated for indoor use primarily to provide a degree of protection against dust, falling dirt, dripping non-corrosive liquids.
- NEMA13** Enclosures rated for indoor use primarily to provide a degree of protection against dust, spraying water, oil and non-corrosive coolant.

**Controls Glossary:**

- Control Panel – A control enclosure that could contain motor starters, relays, fuses, Control transformers, programmable logic controllers and terminal
- Control Station - A Control Enclosure containing pushbuttons.
- Control Transformer – A device used to convert high voltage to a lower level where it is used to power pushbuttons, photoeyes, motor starters and solenoids.
- Emergency Stop – A device that stops the equipment in the event of an emergency. Common types include pushbuttons and pull cord switches.
- Magnetic Starter – A electromechanical device which when activated applies power to motors.
- Motor Safety Switch – A lockout device that inhibits a motor from being run when maintenance personnel are working on the conveyor.
- Overload Relay – A device that detects if a motor is drawing too much current and stops the motor before damage occurs.
- PC – Personal Computer
- PLC – Programmable Logic Controller
- Solenoid Valve 3-way – An electrically operated pneumatic valve commonly used to operate brakes on line shaft conveyor.
- Solenoid Valve 4-way – An electrically operated pneumatic valve commonly used to operate transfers and pop-up stops with double acting cylinders.
- Variable Speed DC – (Direct Current)  
An operator can vary the speed of the conveyor with a DC motor and DC SCR speed controller. Power Source required 110vac or 220vac single phase.
- Variable Speed AC – (Alternating Current)  
An operator can vary the speed of the conveyor with a three phase AC motor and AC variable frequency drive speed controller.

**Controls Safety Guidelines:**

This section is provided to give you basic conveyor safety guidelines in addition to giving information on which controls accessories should be used in a particular application. For Safety considerations and applications not listed below consult the factory or a qualified source (OSHA, state or Local codes) to determine the safety requirements for your application.

**Lockout Safety Switches or Disconnect Switches:**

All control cabinets and motors should be provided with a safety switch. These completely remove the power from the conveyor. These switches have provisions for locking in the off position for any personnel working on the conveyor.

**Start-up Warning Horns:**

All conveyors should be within sight of the operator pushing the start pushbutton. If the operator cannot see the entire conveyor being started some type of audible device is required. The time delay would allow personnel to activate a emergency stop or become clear before motion begins.

**Emergency Stops:**

At each location where operators are working at or on the conveyor, an emergency stop should be located. An operator working directly at the conveyor should not be required to move to actuate an emergency stop. If several operators are working along the conveyor a cable operated switch is the most cost effective means for providing an emergency stop. Manual reset of the emergency stop that was activated is required before the system can be restarted.

For instances which the operators are not working at or on the conveyor, stop buttons should be provided so an operator can stop the system without having to cross any obstructions. In this instance the stop would be used to protect the equipment from damage rather than personal safety.

**Air Pressure Actuated Switches:**

Air pressure switches should be used on systems using air operated devices. The conveyor should stop rather than cause damage to personnel or product.

**Controls Logic and Start Circuits:**

Start-up circuits and emergency stop circuits should be configured using control relays and hard-wired devices.

**Foot Switches:**

Foot Switches can be dangerous operator controls when not applied correctly. A footswitch should be used in a application when accidental actuation will not cause harm to the operator.

**Safety Codes:**

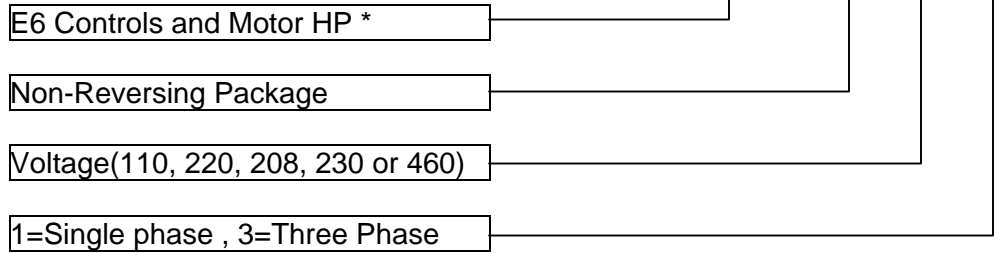
State and Local codes may require additional safety devices not covered in this section. Consult your local or state OSHA office for additional information.

**METZGAR CONVEYOR COMPANY ASSUMES NO LIABILITY TO THE INCLUSION OF ALL FEDERAL, STATE, LOCAL OR PLANT SAFETY DEPARTMENT REQUIREMENTS. IF METZGAR CONVEYOR IS MADE AWARE OF SUCH REQUIREMENTS AT THE TIME OF BID, WE WILL INCORPORATE THEM AS PART OF OUR PROPOSAL.**



**Controls Packages – Fixed Speed:**

**Non-UL Non-Reversing Package Model Number:** **E605** - **N** - **460** - **3**

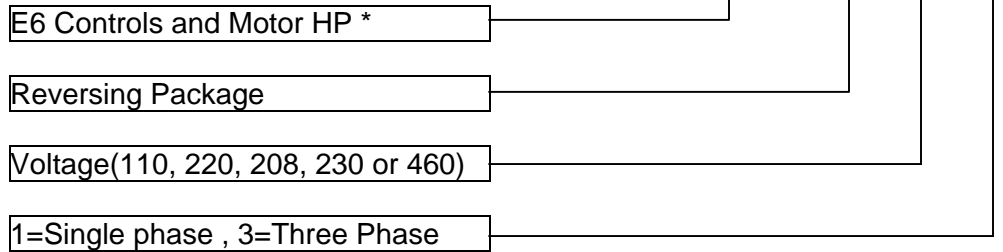


**Non-Reversing Equipment List:**

- (1)- Control Enclosure
- 1- Disconnect Switch
- 1- IEC Style Magnetic Motor Starter
- 1- IEC Style Overload Relay
- 1- Control Transformer ( 3 Phase Only)
- 1- “Start Conveyor” Pushbutton
- 1- “Stop Conveyor” Pushbutton

(1)- Standard Enclosure Mounting Bracket

**Non-UL Reversing Package Model Number:** **E605** - **R** - **460** - **3**



**Reversing Equipment List:**

- (1)- Control Enclosure
- 1- Disconnect Switch
- 1- IEC Style Reversing Magnetic Motor Starter
- 1- IEC Style Overload Relay
- 1- Control Transformer ( 3 Phase Only)

(1)- Standard Enclosure Mounting Bracket

(2)- “Forward/Reverse/Stop” Control Stations

\* Motor Sizes – ½ = 05, ¾ =75, 1=10, 1 ½ = 15 and 2=20

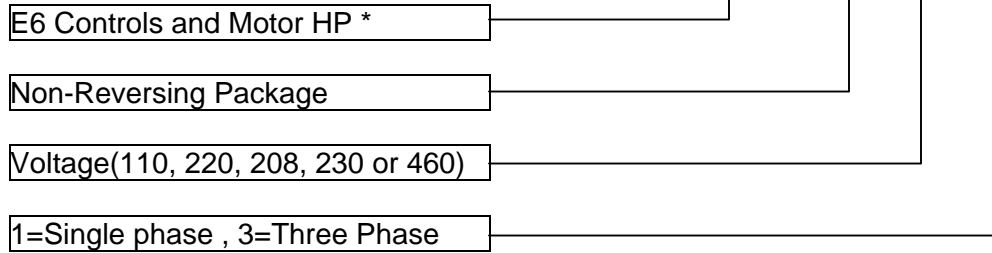
**Refer to Controls safety guidelines for your application to determine if any additional accessories are required.**

**All controls packages are shipped loose unless factory rewiring is purchased. Consult factory if specific brands or parts are required.**



**Controls Packages – AC Three Phase Variable Speed:**

**Non-UL Non-Reversing Package Model Number:** E605 - N - 460 - 3VS

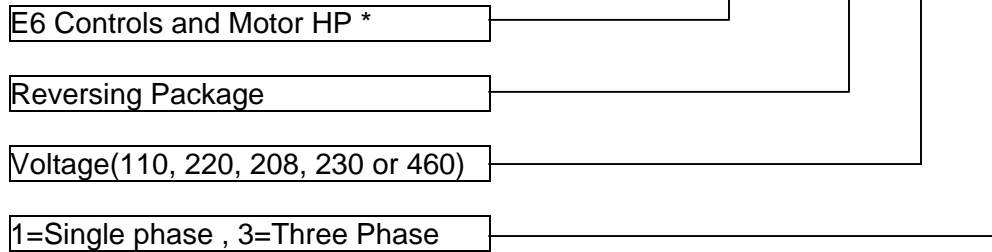


**Three Phase Variable Speed Non-Reversing Equipment List:**

- (1)- Control Enclosure
- 1- Disconnect Switch
- 1- AC Variable Frequency Drive
- 1- Control Transformer
- 1- Door mounted Speed control knob
- 1- “Start Conveyor” Pushbutton
- 1- “Stop Conveyor” Pushbutton

(1)- Standard Enclosure Mounting Bracket

**Non-UL Reversing Package Model Number:** E605 - R - 460 - 3VS



**Three Phase Variable Speed Reversing Equipment List:**

- (1)- Control Enclosure
- 1- Disconnect Switch
- 1- AC Variable Frequency Drive
- 1- Control Transformer
- 1- Door mounted Speed control knob

(1)- Standard Enclosure Mounting Bracket

(2)- “Forward/Reverse/Stop” Control Stations

\* Motor Sizes – ½ = 05, ¾ =75, 1=10, 1 ½ = 15 and 2=20

**Refer to Controls safety guidelines for your application to determine if any additional accessories are required.**

**All controls packages are shipped loose unless factory prewiring is purchased.**

**Consult factory if specific brands or parts are required.**

**Order Separately: Inverter Duty Motor**



**AC vs DC Variable Speed Application Information:**

**DC Variable Speed:**

Power Requirements: 110 or 220 volts Single Phase.

Motor: 90 volt DC Motor for 110v input, 180 volt DC Motor for 220v input.

Speed Controller: DC SCR Speed Controller

**Advantages:**

- Low Cost
- Constant Torque
- Allows for slow speeds
- Plug into wall power
- Easy to make portable

**Disadvantages:**

- Motor cost above 1 hp increases significantly.
- Motors have brushes that eventually will wear out.

**Table-1 DC Speed Chart**

Speed of Conveyor Drive FPM	Minimum Speed FPM	Maximum Speed FPM
20	2	20
30	3	30
40	4	40
50	5	50
60	6	60
70	7	70
80	8	80
90	9	90
100	10	100

**AC Variable Speed:**

Power Requirements: Three Phase (Special Drives can use Single phase for small motors).

Motor: AC three Phase Motor

Speed Controller: AC Drive also Referred to as an Inverter

**Advantages:**

- Uses Common Three Phase Motor
- Allows for Over Speeding of the Motor
- Is More Energy Efficient

**Disadvantages:**

- Three Phase Power Required
- Higher Initial Cost

**Table-1 AC Speed Chart**

Speed of Conveyor Drive FPM	Minimum Speed FPM	Maximum Speed FPM
20	7	30
30	10	45
40	14	60
50	17	75
60	20	90
70	24	105
80	27	120
90	30	135
100	33	150

\* Conveyor Speeds over 100FPM require Special Mechanical Components



**Controls Packages – DC Variable Speed:**

<b>DC Variable Speed (Requires 110 vac Power)</b>	
<b>E6DC-09005</b>	½ HP DC Adder – Includes 3 Phase to 90 VDC motor upgrade and SCR controller
<b>E6DC-09075</b>	¾ HP DC Adder – Includes 3 Phase to 90 VDC motor upgrade and SCR controller
<b>E6DC-09010</b>	1 HP DC Adder – Includes 3 Phase to 90 VDC motor upgrade and SCR controller

**Controls Accessories:**

<b>Pull Cord</b>	
<b>E6ES-000001</b>	Emergency Stop Pull Cord Switch and Mounting Bracket
<b>E6CK-000025</b>	25' Red Plastic Coated Cable and Mounting Hardware
<b>E6CK-000050</b>	50' Red Plastic Coated Cable and Mounting Hardware
<b>E6CK-000100</b>	100' Red Plastic Coated Cable and Mounting Hardware
<b>E6CK-000150</b>	150' Red Plastic Coated Cable and Mounting Hardware
<b>Control Stations</b>	
<b>E6CS-ES0001</b>	Emergency Stop Pushbutton Control station
<b>E6CS-SS0001</b>	Start-Stop Pushbutton Control Station
<b>E6CS-FRS001</b>	Forward-Reverse-Stop Pushbutton Control Station
<b>E6CS-UDS001</b>	Up-Down-Stop Pushbutton Control Station
<b>Safety Switch</b>	
<b>E6SW-NF0100</b>	Non-Fused Motor Safety Switch with Mounting Bracket

**Controls Prewiring:**

<b>E6PW-K003PH</b>	Wiring Three Phase Package to the Motor
<b>E6PW-K003PH</b>	Wiring Three Phase Package to the Motor
<b>E6PW-K001PH</b>	Wiring Single Phase Package to the Motor
<b>E6PW-K001PH</b>	Wiring Single Phase Package to the Motor
<b>E6PW-K001DC</b>	Wiring DC SCR Speed Controller to the Motor and 15' cord and Plug



**Notes:**