

# ENGINEERING MANUAL

Medium & Heavy-Load  
Assembly Automation

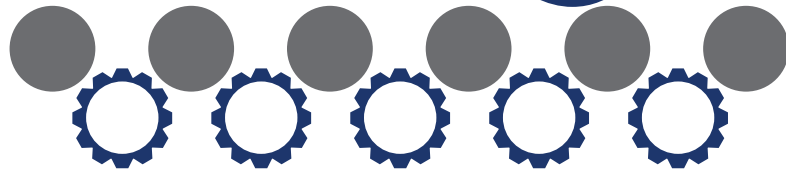
ISO Class 4 Approved  
for Cleanrooms

Efficient, Non-Contact  
Zoning

Clean, Open Roller  
Design



## ERT<sup>®</sup> 250



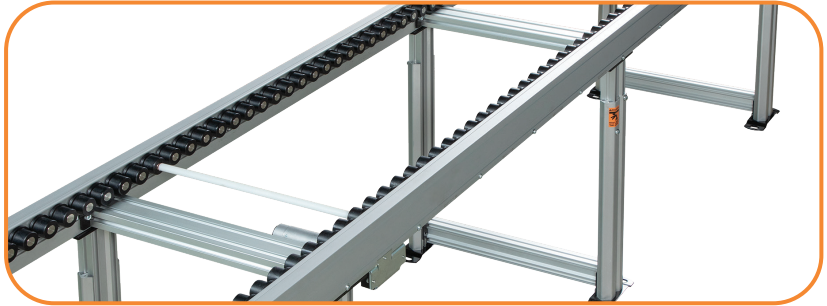
### Edge Roller Technology

Precision Edge Roller Pallet &  
Tray Handling Conveyors

**DORNER<sup>®</sup>** 

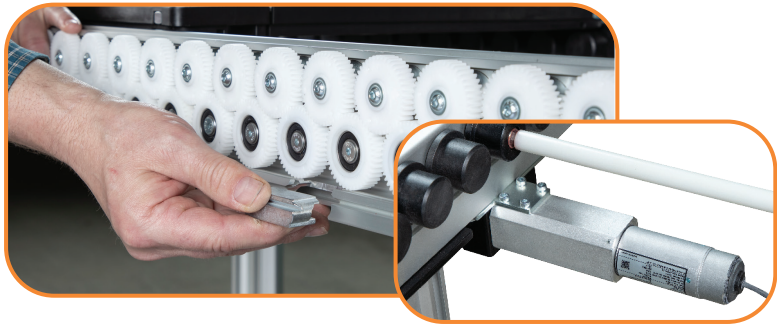
## Zone & Slip Roller Technology

- Non-contact zone control provides simplified traffic control, eliminating pallet stops and costly pneumatic valves
- Low back pressure slip rollers can be used for full length with conventional pneumatic pallet stops
- Individual rollers can be replaced if damaged without affecting the remaining portion of the conveyor
- No belts, reducing product contact and debris



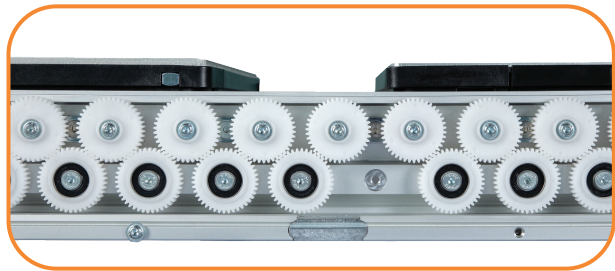
## Easily Reconfigurable

- Gears, drive shaft, and gearmotor can be repositioned in the field
- The gearmotor can be moved on 250 mm increments
- Lower gears can be removed and gearmotor added to create new zones
- The drive shaft can be moved to any roller zone
- The drive shaft can be relocated to the lower height for added product clearance



## Patent Pending Gearbox Drive Design

- Durable, patent pending linear gearbox design provides a robust and flexible method of driven rollers
- Brushless DC gearmotors and controllers
- Reversible motors for assembly automation
- 50 watt, 3.5 amp, low voltage brushless DC motors are used to save space and provide improved efficiency
- All motor controllers are Ethernet IP, Modbus TCP or PROFINET for ease of control logic, wiring and communication



## The Benefits of a Dornier ERT<sup>®</sup>250 Conveyor

### Industry Ready

- Reliable and adaptable edge roller platform for the conveyance of medical and cleanroom-based product assembly
- Versatile and durable low back pressure platform for the conveyance of appliance, electronics, automotive and consumer goods product assembly
- Open drive roller design with aluminum frames
- ISO Class 4 approved for cleanroom applications

### Simple & Effective Design

- Non-contact zoning and/or slip roller accumulation capability
- Patent pending linear gearbox technology
- Designed for configuration and modifications in the field
- Variety of automation modules for product traffic control

### Safe & Efficient

- Non-jamming; open drive rollers reduce pinch points
- Low-voltage motors are designed to reduce power consumption



**CONTROLLERS  
& WIRING**  
PAGES 29-31

**GEARMOTORS**  
PAGES 28

**90 & 180 DEGREE  
CORNER**  
PAGES 12-13

**PALLETS**  
PAGES 14-15

**LIFT &  
ROTATE**  
PAGES 22-23

**MULTI ZONE  
CONVEYOR**  
PAGES 10-11

**SINGLE ZONE  
CONVEYOR**  
PAGES 8-9

**PALLET  
STOPS**  
PAGES 24-27

**LIFT &  
LOCATE**  
PAGES 16-17

**SUPPORT  
STANDS**  
PAGE 32-33

**PALLET  
PUSHER**  
PAGES 20-21

**LIFT &  
TRANSFER**  
PAGES 18-19

**CONVEYOR  
FEATURES**  
PAGES 4-5

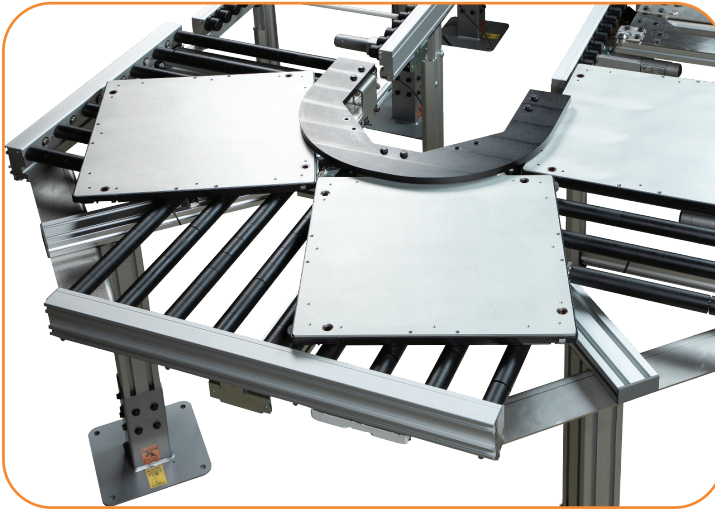
**EXAMPLE  
LAYOUTS**  
PAGES 6-7

**ENGINEERED  
SOLUTIONS**  
PAGES 37

**ACCESSORIES**  
PAGES 34-35

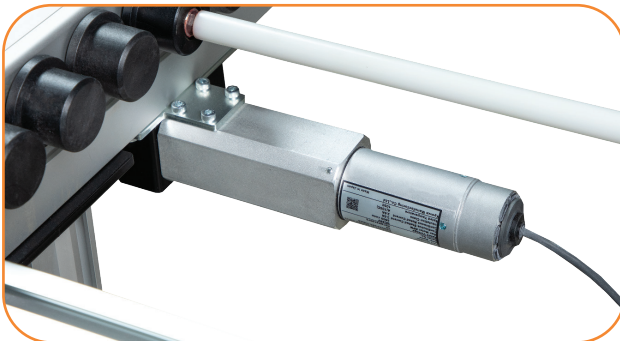


**TECHNICAL DATA  
& CALCULATIONS**  
PAGES 38-46



### INNOVATIVE CORNERS:

THE CORNER SYSTEMS IN CONJUNCTION WITH THE PALLET PIN TRACKING PROVIDE A SIMPLE, COST EFFECTIVE MEANS FOR PALLET TRAFFIC CONTROL



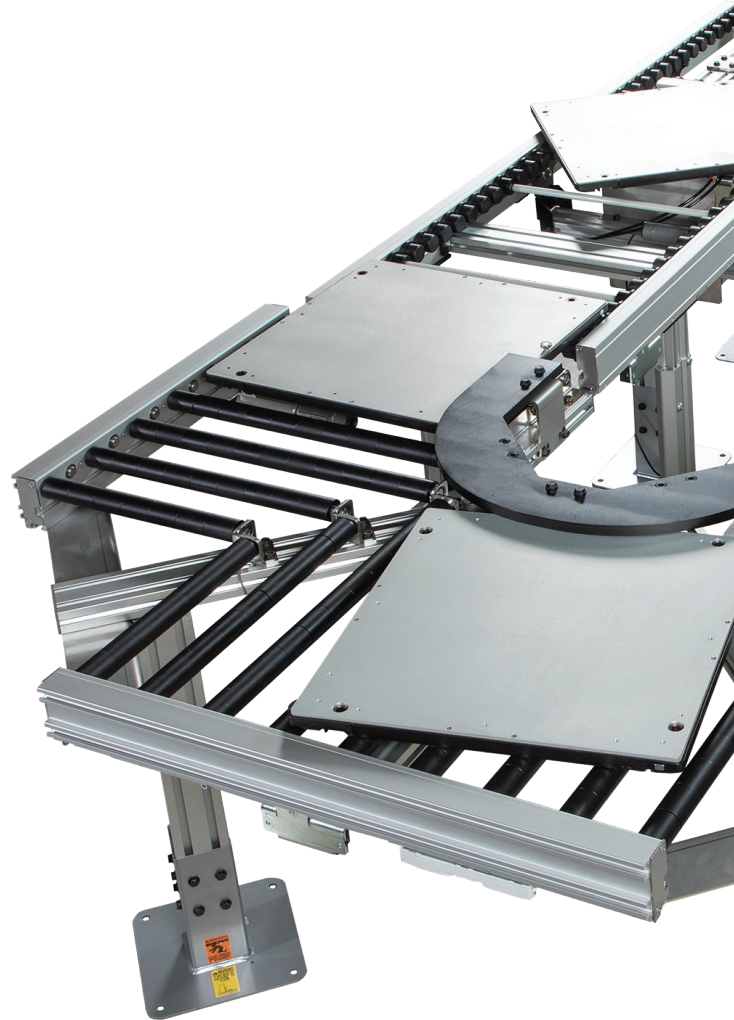
### LOW VOLTAGE GEARMOTORS:

COMPACT, COST EFFICIENT 24 VDC BRUSHLESS GEARMOTORS AND CONTROLS PROVIDE A MODULAR CONTROL SCHEME



### ONSITE RECONFIGURATION AND MAINTENANCE:

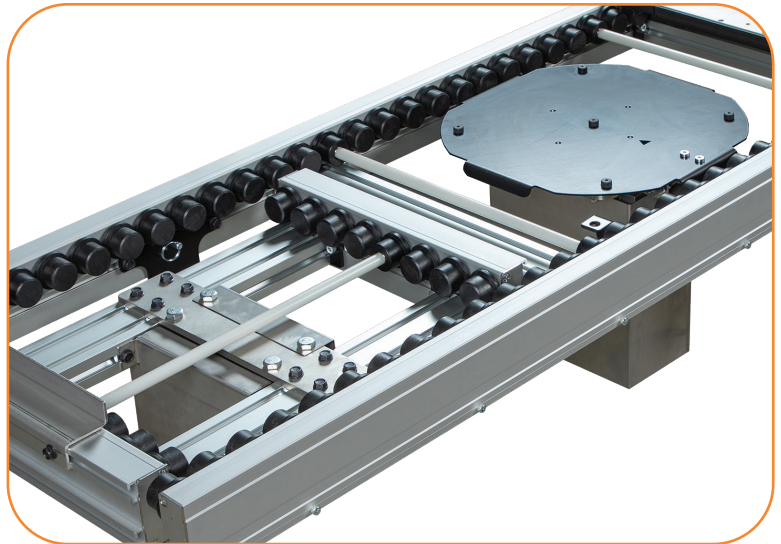
INDIVIDUAL ROLLERS, DRIVE SHAFTS, AND GEARMOTORS CAN BE REMOVED, REPAIRED, AND REPOSITIONED WITHOUT DIS-ASSEMBLY OF THE COMPLETE CONVEYOR



### UNIVERSAL T-SLOT:

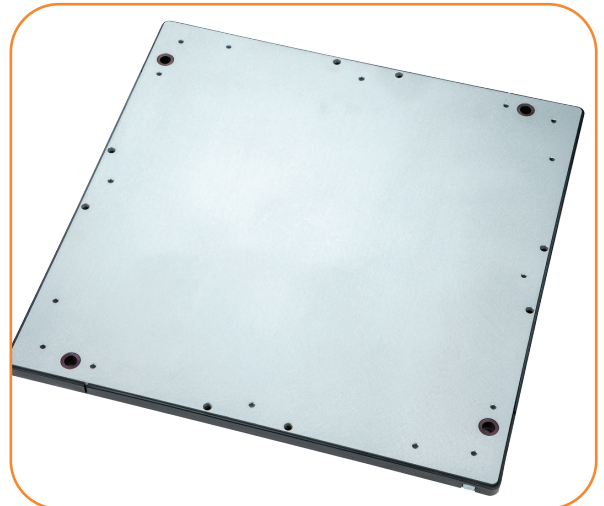
CONVEYOR T-SLOT IS COMPATIBLE WITH DORNER 2200 SERIES AND FLEXMOVE® T-SLOT HARDWARE ALONG WITH SELECT INDUSTRY STANDARD 10 MM SLOT HARDWARE





### **ZONING CONVEYOR:**

CONVEYOR CAPABLE OF HAVING MULTIPLE ZONES FOR PALLET OR TRAY CONTROL, ELIMINATING STOPS AND PNEUMATIC VALVES



### **INDUSTRY COMPATIBLE PALLETS:**

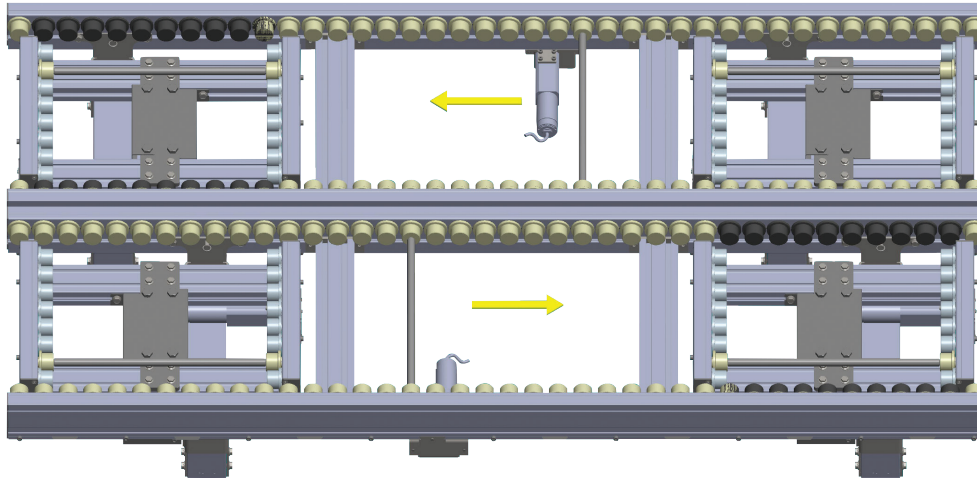
PALLETS AVAILABLE IN INDUSTRY STANDARD SIZES ALONG WITH LOCATION PINS THAT ARE COMPATIBLE WITH INDUSTRY STANDARD PALLETS AND LOCATE STATIONS



### **SLIP ROLLER CONVEYOR:**

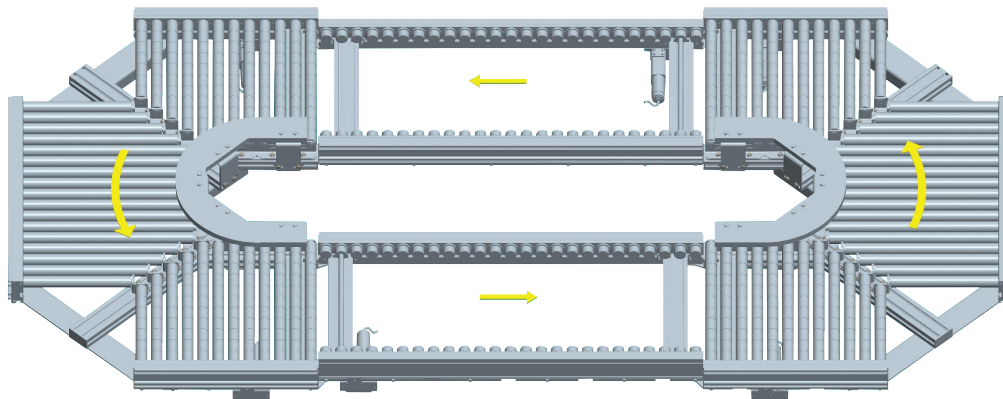
SLIP ROLLER DESIGN MINIMIZES BACK PRESSURE ON ACCUMULATED PALLET OR TRAYS, ALSO ELIMINATING DUST OFTEN SEEN WITH TRADITIONAL CONVEYORS





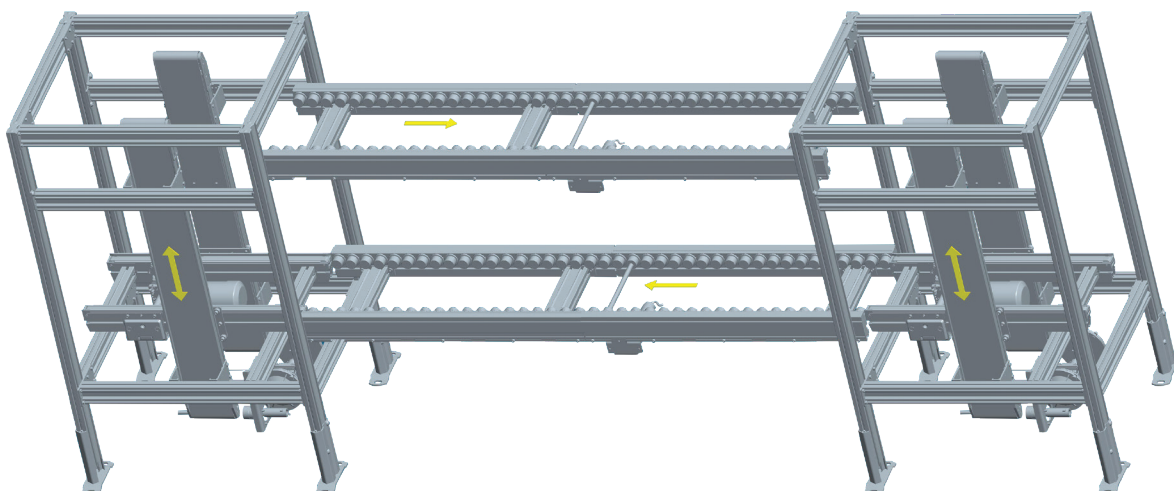
### Loop with Close Transfer

Main lines are spaced tightly together to remove transverse conveyors



### Loop (Racetrack)

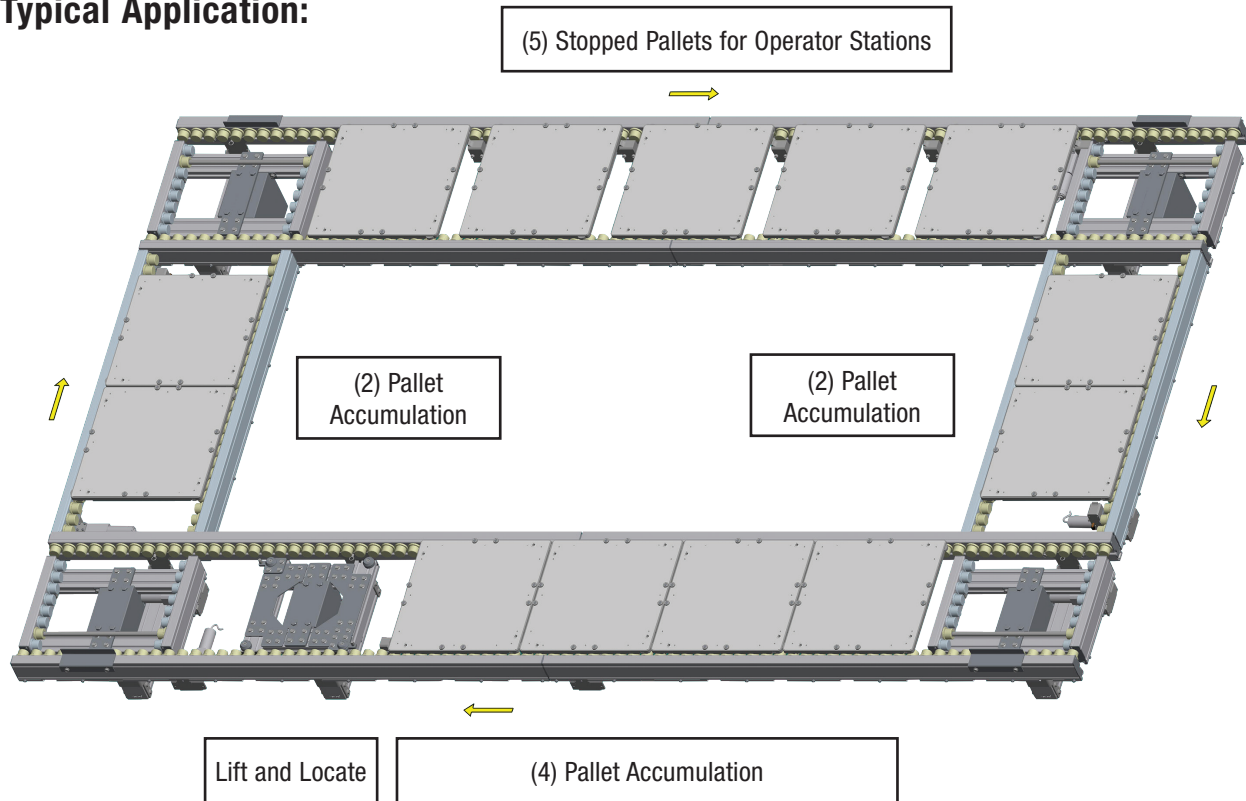
Leading edge orientation is maintained using 90 degree corners



### Over Under

The return line is located under the main line. Vertical Transfer Units (Elevators) raise and lower the pallets at each end

## Typical Application:



## Product Required for Slip Roller Conveyor Method:

- (2) Long conveyors – full slip rollers
- (2) Short conveyors – full slip rollers
- (4) Brushless DC gearmotors for conveyors
- (2) 24VDC gearmotor controllers
- (1) Lift and Locate Module
- (4) Lift and Transfer Modules
- (9) Pallet Stops
- (18) Pneumatic solenoid valves with air plumbing and electrical wiring

### Benefits:

- Low back pressure contact accumulation
- Continuous run gearmotors
- Low voltage gearmotor wiring

## Product Required for Zone Conveyor Method:

- (2) Long conveyors – with (5) zones each
- (2) Short conveyors – with (2) zones each
- (14) Brushless DC gearmotors
- (7) 24VDC gearmotor controllers
- (1) Lift and Locate
- (4) Lift and Transfer Modules
- (1) Pallet Stops (for Lift and Locate)
- (6) Pneumatic solenoid valves with air plumbing and electrical wiring

### Benefits:

- Non-contact pallet accumulation
- Flexibility of controlled gearmotors
- Low voltage gearmotor wiring
- Minimized pneumatics to reduce noise, wiring / plumbing costs, and solenoid hardware



## Specifications

- 38 mm (1.5 in) diameter rollers on 50 mm (1.97 in) centers
- 120 mm (4.72 in) to 960 mm (37.8 in) wide
  - Standard pallet widths from 320 mm to 800 mm wide
- Lengths from 250 mm to 3500 mm in 50 mm increments
  - Conveyors over 2000 mm contain 2 gearmotors
  - For longer conveyors simply bolt multiple conveyors together
- Load Capacity: Up to 114 kg (250 lbs) per pallet
  - Up to 7 kg (15 lbs) per roller in contact with pallet
- Up to 37 m/min (121 ft/min)
- Driven rollers for indexing / zoning and transport applications
- Slip rollers for low back pressure accumulation
- Brushless DC gearmotor and controller. See page 28-29 for specifications
  - Conveyors over 2000 mm in length contain (2) gearmotors with (1) controller
- Bi-directional and reversing
- Gearmotor can be located at multiple locations along length on 250 mm increments
- Outer frame cover: flush design or flexible dual T-slot options available
- Clear anodized aluminum framing
- Electrically conductive polyamide rollers
- ISO Class 4 Cleanroom Rated



**Driven Rollers**



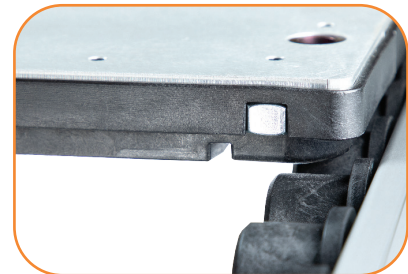
**Slip Rollers**



**STANDARD FEATURE:**  
Universal T-slot compatible with  
industry standard 10 mm hardware



**STANDARD OPTION:**  
Flush outer cover  
can be provided



**STANDARD FEATURE:**  
Conveyor roller provides  
pallet guiding



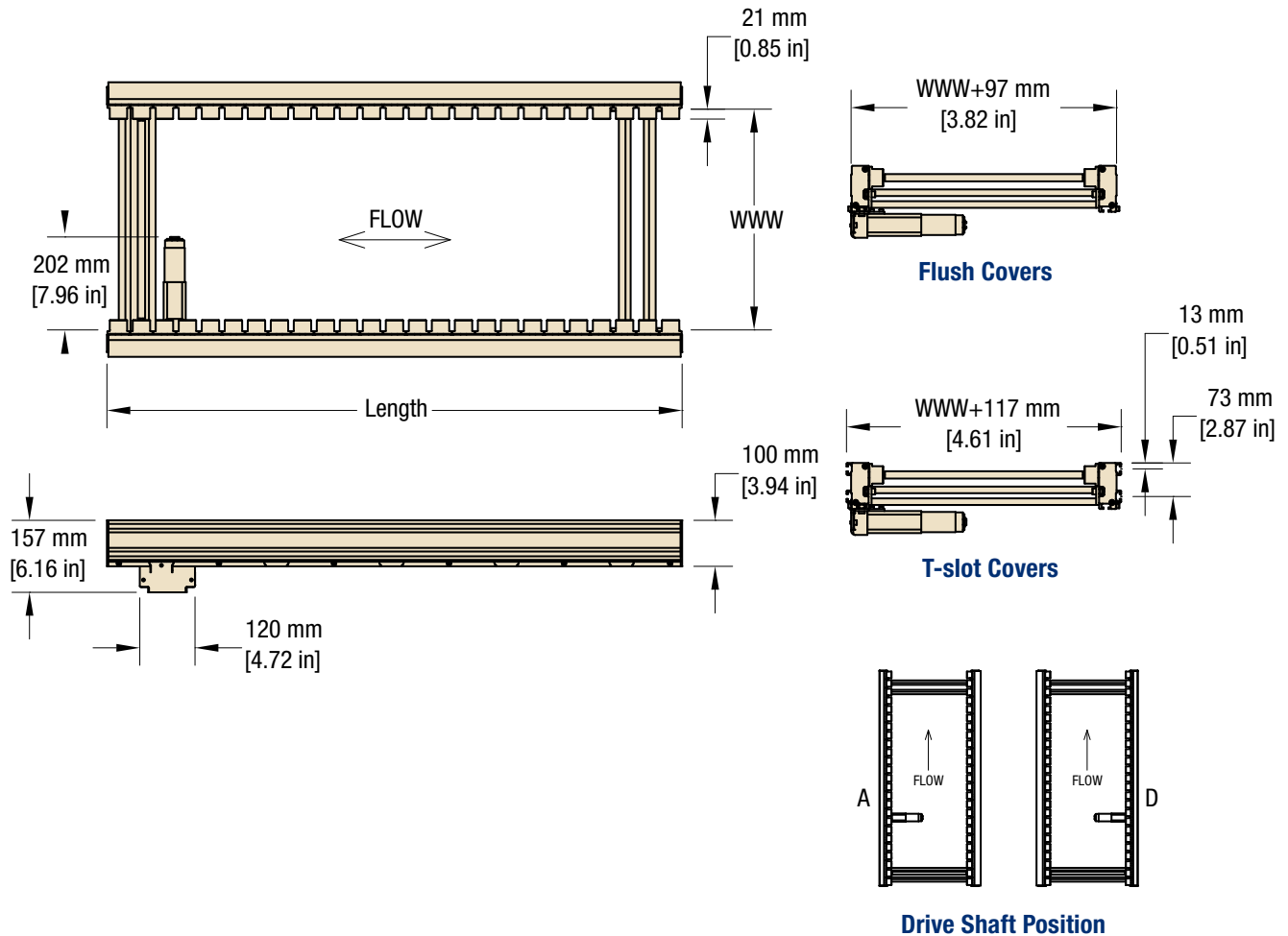
**STANDARD FEATURE:**  
Gearmotor location can be easily  
moved on 250 mm centers



**STANDARD OPTION:**  
Drive shaft can be located at lower  
height for added product clearance



# SINGLE ZONE CONVEYOR



## Standard Single Zone Sizes

| Conveyor Width Reference* | 120              | 160                              | 40 increments up to...             | 920              | 960                |
|---------------------------|------------------|----------------------------------|------------------------------------|------------------|--------------------|
| Conveyor Belt Width (W)*  | 120 mm (4.72 in) | 160 mm (6.3 in)                  | 40 mm (1.6 in) increments up to... | 920 mm (36.2 in) | 960 mm (37.8 in)   |
| Conveyor Length Reference | 0250             | 0050 increments up to...         |                                    |                  | 3500               |
| Conveyor Length (L)       | 250 mm (.82 ft)  | 50 mm (2 in) increments up to... |                                    |                  | 3500 mm (11.48 ft) |

\*Standard Pallet Widths: 320, 400, 480, 640 and 800 mm

## ERT250: Single Zone Conveyor

| E | R | 5 | M | WWW | - | L | L | L | L | M | T | R | S | S | R | S | S | - | H | D | S | C | T |
|---|---|---|---|-----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|   |   |   |   |     |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |



## Specifications

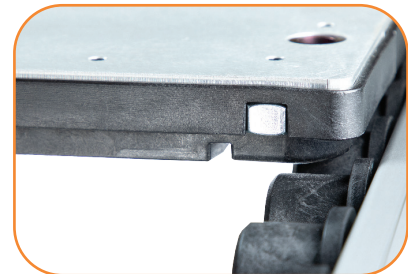
- Multiple Zone conveyor. Up to 4 zones per conveyor
- 38 mm (1.5 in) diameter rollers on 50 mm (1.97 in) centers
- 120 mm (4.72 in) to 960 mm (37.8 in) wide
  - Standard pallet widths from 320 mm to 800 mm wide
- Minimum Zone Length: 250 mm (9.8 in)
- Maximum Zone Length: 2000 mm (78.7 in)
- Length increments = 50 mm (1.97 in)
- Total maximum conveyor length: 3500 mm
- Load Capacity: Up to 114 kg (250 lbs) per pallet / per zone
  - Up to 7 kg (15 lbs) per roller in contact with pallet
- Up to 37 m/min (121 ft/min)
- Driven rollers for indexing / zoning and transport applications
- Slip rollers for low back pressure accumulation
- Brushless DC gearmotor provided for each zone. Controller can drive up to 2 gearmotors. See page 28-29 for specifications
- Bi-directional and reversing
- Gearmotor can be located at multiple locations along length on 250 mm increments
- Outer frame cover: flush design or flexible dual T-slot options available
- Clear anodized aluminum framing
- Electrically conductive polyamide rollers
- ISO Class 4 Cleanroom Rated



**STANDARD FEATURE:**  
Universal T-slot compatible with  
industry standard 10 mm hardware



**STANDARD OPTION:**  
Flush or T-slot outer cover  
can be provided



**STANDARD FEATURE:**  
Conveyor roller provides  
pallet guiding

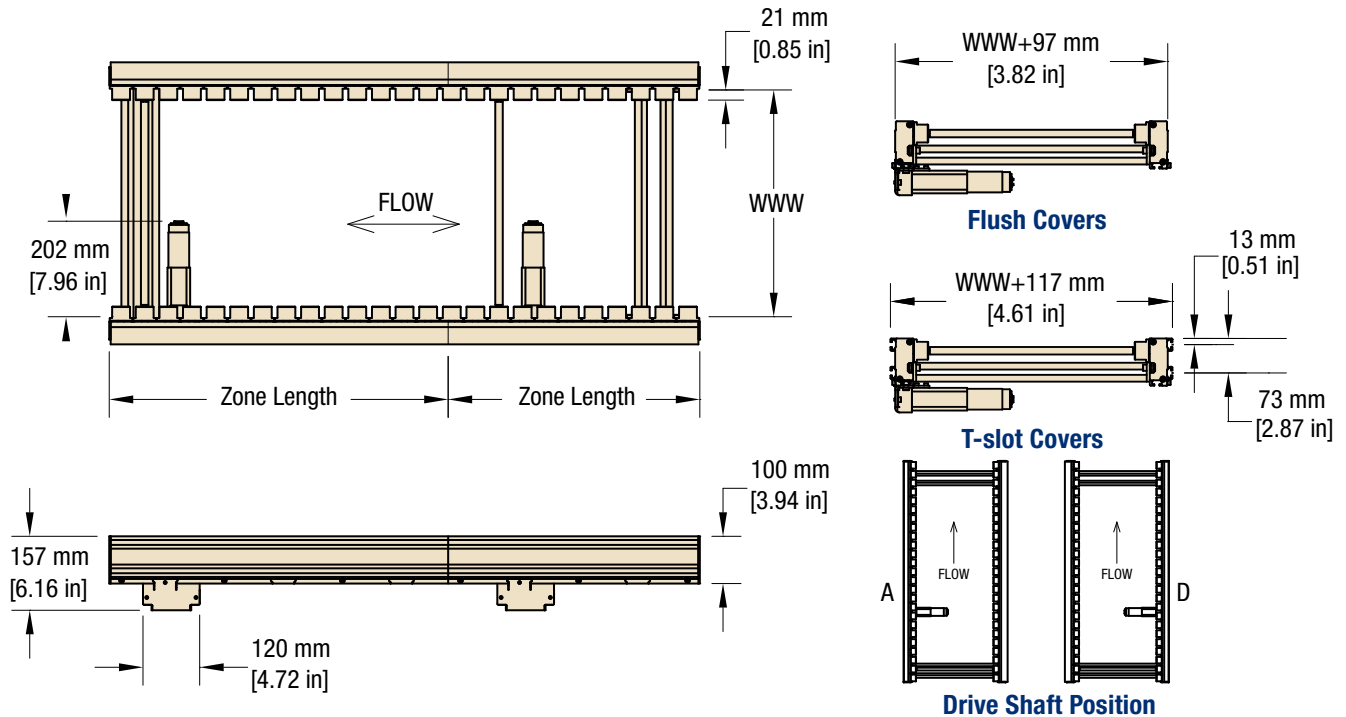


**STANDARD FEATURE:**  
Gearmotor location can be easily  
moved on 250 mm centers



**STANDARD OPTION:**  
Drive shaft can be located at lower  
height for added product clearance

# MULTIPLE ZONE CONVEYOR



## Standard Multiple Zone Sizes

| Conveyor Width Reference* | 120              | 160                              | 40 increments up to...             | 920              | 960               |
|---------------------------|------------------|----------------------------------|------------------------------------|------------------|-------------------|
| Conveyor Belt Width (W)*  | 120 mm (4.72 in) | 160 mm (6.3 in)                  | 40 mm (1.6 in) increments up to... | 920 mm (36.2 in) | 960 mm (37.8 in)  |
| Zone Length Reference     | 0250             | 0050 increments up to...         |                                    |                  | 2000              |
| Zone Length (L)           | 250 mm (.82 ft)  | 50 mm (2 in) increments up to... |                                    |                  | 2000 mm (6.56 ft) |

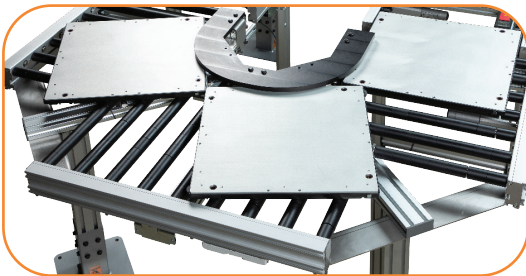
\*Standard Pallet Widths: 320, 400, 480, 640 and 800 mm

## ERT250: Multiple Zone Conveyor

| ER5 | M | WWW | - | LLLL | M | T | R | SS | - | LLLL | T | R | SS | - | LLLL | T | R | SS | - | LLLL | T | R | SS | - | H | D | S | C | T |
|-----|---|-----|---|------|---|---|---|----|---|------|---|---|----|---|------|---|---|----|---|------|---|---|----|---|---|---|---|---|---|
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |
|     |   |     |   |      |   |   |   |    |   |      |   |   |    |   |      |   |   |    |   |      |   |   |    |   |   |   |   |   |   |

**Note:** Due to the wide variety of drive setups and applications, point of installation guarding is the responsibility of the end user. **Note:** Dimensions = mm (in)

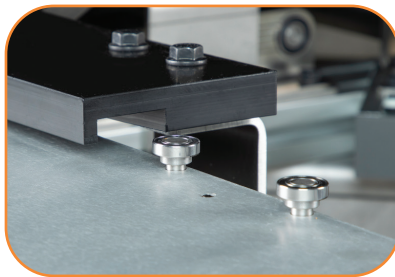




**Pallet Accumulation Around Corner**

### Specifications

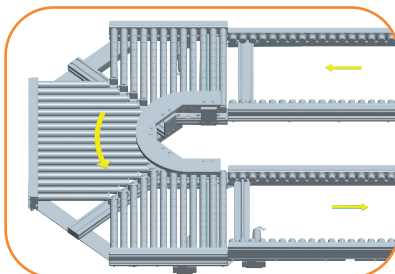
- 90 and 180 degree corners
- Standard pallet widths: 320 mm, 400 mm, 480 mm, 640 mm and 800 mm wide
- Load Capacity: Up to 114 kg (250 lbs) per pallet
- Up to 37 m/min (121 ft/min)
- Maintains pallet orientation around corner
- Requires pin tracking compatibility in pallet
- Pallet accumulation around corner is acceptable
- Brushless DC gearmotor and controller. See page 28-29 for specifications
  - 90 degree has 2 gearmotors, 1 controller
  - 180 degree has 3 gearmotors, 2 controllers
- Bi-directional
- Clear anodized aluminum framing
- Electrically conductive acetal rollers
- ISO Class 4 Cleanroom Rated
- Pallet length must be at or less than pallet width. For larger rectangular pallet sizes contact factory.



**STANDARD FEATURE:**  
Pin Tracking Bearing Cams  
smoothly guide the pallets  
around corner



**STANDARD FEATURE:**  
Universal T-slot compatible with  
industry standard 10 mm hardware

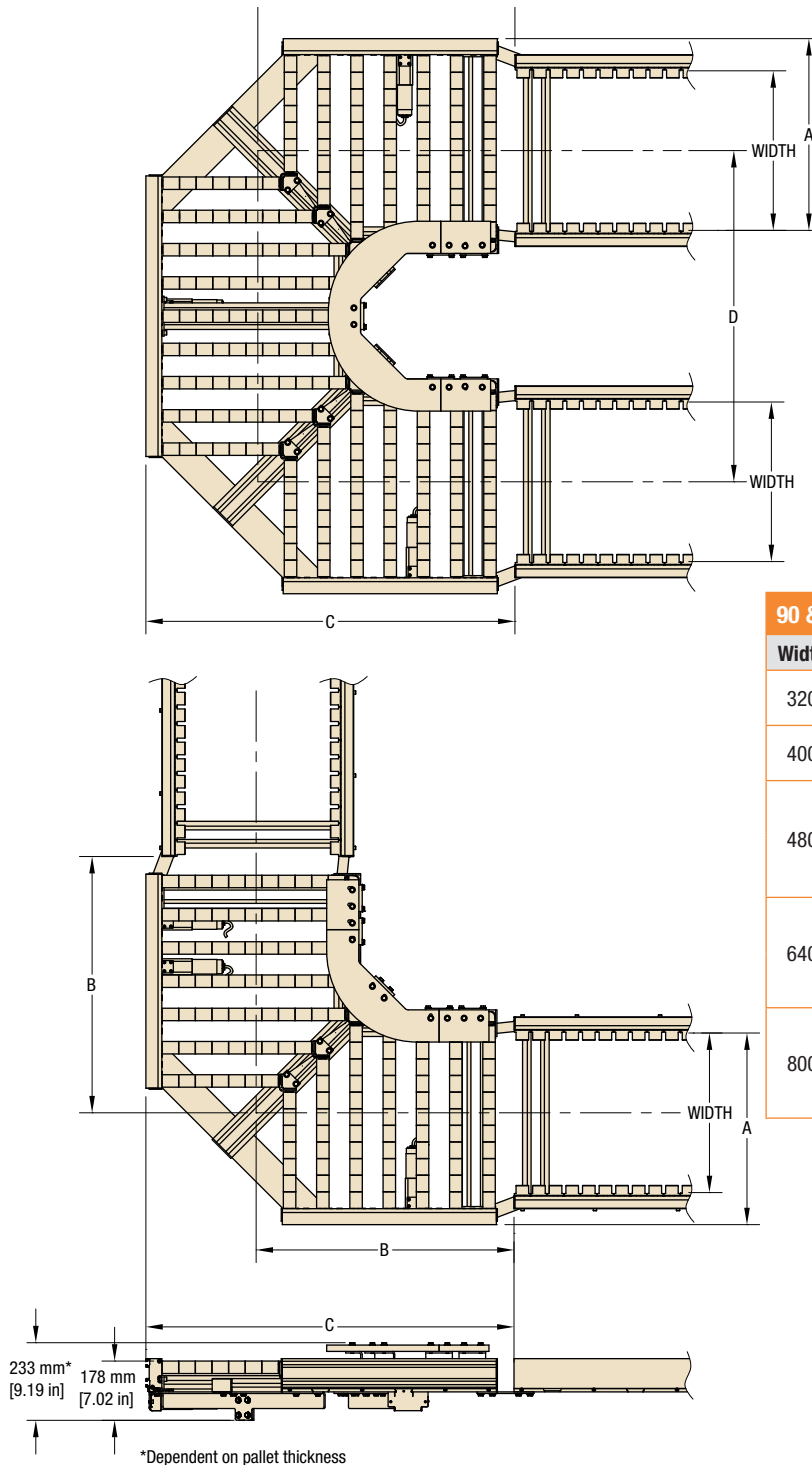


**STANDARD FEATURE:**  
Provides compact conveyor loops



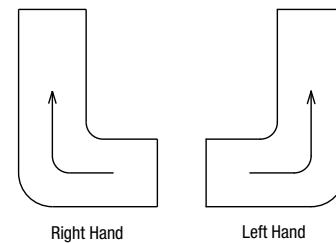
**OPTIONAL:**  
Support post, mounts directly to  
conveyor. See page 33 for details.

# 90 AND 180 DEGREE CORNER CONVEYOR



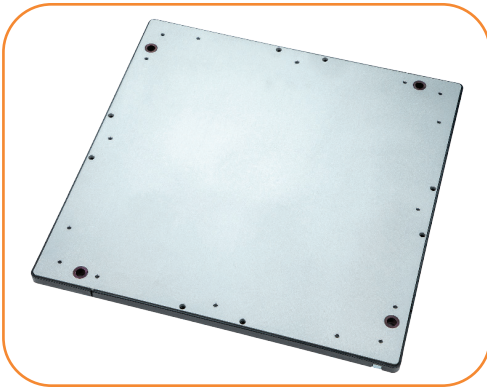
**90 & 180 Degree Corner Conveyor**

| Width | Length | A                   | B                    | C                    | D                      |
|-------|--------|---------------------|----------------------|----------------------|------------------------|
| 320   | 320    | 427 mm<br>(16.8 in) | 598 mm<br>(23.5 in)  | 860 mm<br>(33.9 in)  | 836 mm<br>(32.9 in)    |
| 400   | 400    | 427 mm<br>(16.8 in) | 737 mm<br>(29 in)    | 1060 mm<br>(37.8 in) | 915.67 mm<br>(36.0 in) |
| 480   | 320    | 527 mm<br>(20.8 in) | 678 mm<br>(26.7 in)  | 1010 mm<br>(39.8 in) | 996 mm<br>(39.2 in)    |
|       | 400    |                     | 778 mm<br>(30.6 in)  | 1110 mm<br>(41.7 in) |                        |
|       | 480    |                     | 858 mm<br>(34.6 in)  | 1260 mm<br>(49.6 in) |                        |
| 640   | 480    | 777 mm<br>(30.6 in) | 958 mm<br>(33.8 in)  | 1360 mm<br>(53.5 in) | 1156 mm<br>(45.5 in)   |
|       | 640    |                     | 1038 mm<br>(40.9 in) | 1560 mm<br>(61.4 in) |                        |
| 800   | 640    | 927 mm<br>(36.5 in) | 1138 mm<br>(44.8 in) | 1660 mm<br>(65.3 in) | 1316 mm<br>(51.8 in)   |
|       | 800    |                     |                      |                      |                        |



**ERT250: 90 Degree Corner Conveyor**

|   |   |   |     |   |     |   |   |   |
|---|---|---|-----|---|-----|---|---|---|
| ER 5  | C | M | WWW | - | AAA | D | S | C |
| Controller Type: A = No Controller B = Controller with mount bracket<br>Speed: 1 = 10 MPM 2 = 15 MPM 3 = 20 MPM 4 = 25 MPM 5 = 37 MPM<br>Direction: L = Left R = Right<br>Angle: 090 = 90 Degree 180 = 180 Degree<br>Conveyor Width Reference: (see offering tab)<br>Documentation Language: M = US-English U = Europe English D = German<br>Corner: C = Corner Turn<br>Conveyor Type: ERT250 |   |   |     |   |     |   |   |   |



## Specifications

- Pallet is dimensionally compatible with industry standards
- Pallet Base:
  - Anodized aluminum tool plate is standard (other materials available, contact factory)
  - Thicknesses of 1/4 in to 1/2 in (1/2 in recommended for 480 mm and larger pallets)
- Pallet Skirt Material: Electrostatic Dissipative HPDE
- Includes (4) hardened bushings for Lift and Locate
- Load Capacity to 114 kg (250 lbs)
- Optional ball bearing pin tracking used for pallet tracking at corners
- Plated steel proximity sensor pick-up on bottom and side of pallet
- Custom widths available
- Center of gravity of the combined payload should be located in the center third of the pallet

### Pallet Sizes

|            | Length (mm) |     |     |     |     |
|------------|-------------|-----|-----|-----|-----|
|            | 320         | 400 | 480 | 640 | 800 |
| Width (mm) |             |     |     |     |     |
| 320        | X           |     | X   |     |     |
| 400        |             | X   | X   |     |     |
| 480        | X           | X   | X   | X   |     |
| 640        |             |     | X   | X   | X   |
| 800        |             |     |     | X   | X   |

### Total Load Capacity including Pallet, Fixture and Product kg (lbs):

|            | Length (mm) |          |          |           |           |
|------------|-------------|----------|----------|-----------|-----------|
|            | 320         | 400      | 480      | 640       | 800       |
| Width (mm) |             |          |          |           |           |
| 320        | 41 (90)     |          | 55 (120) |           |           |
| 400        |             | 55 (120) | 68 (150) |           |           |
| 480        | 55 (120)    | 68 (150) | 82 (180) | 95 (210)  |           |
| 640        |             |          | 95 (210) | 114 (250) | 114 (250) |
| 800        |             |          |          | 114 (250) | 114 (250) |



**Bottom Sensing Location**



**Side Sensing Location**



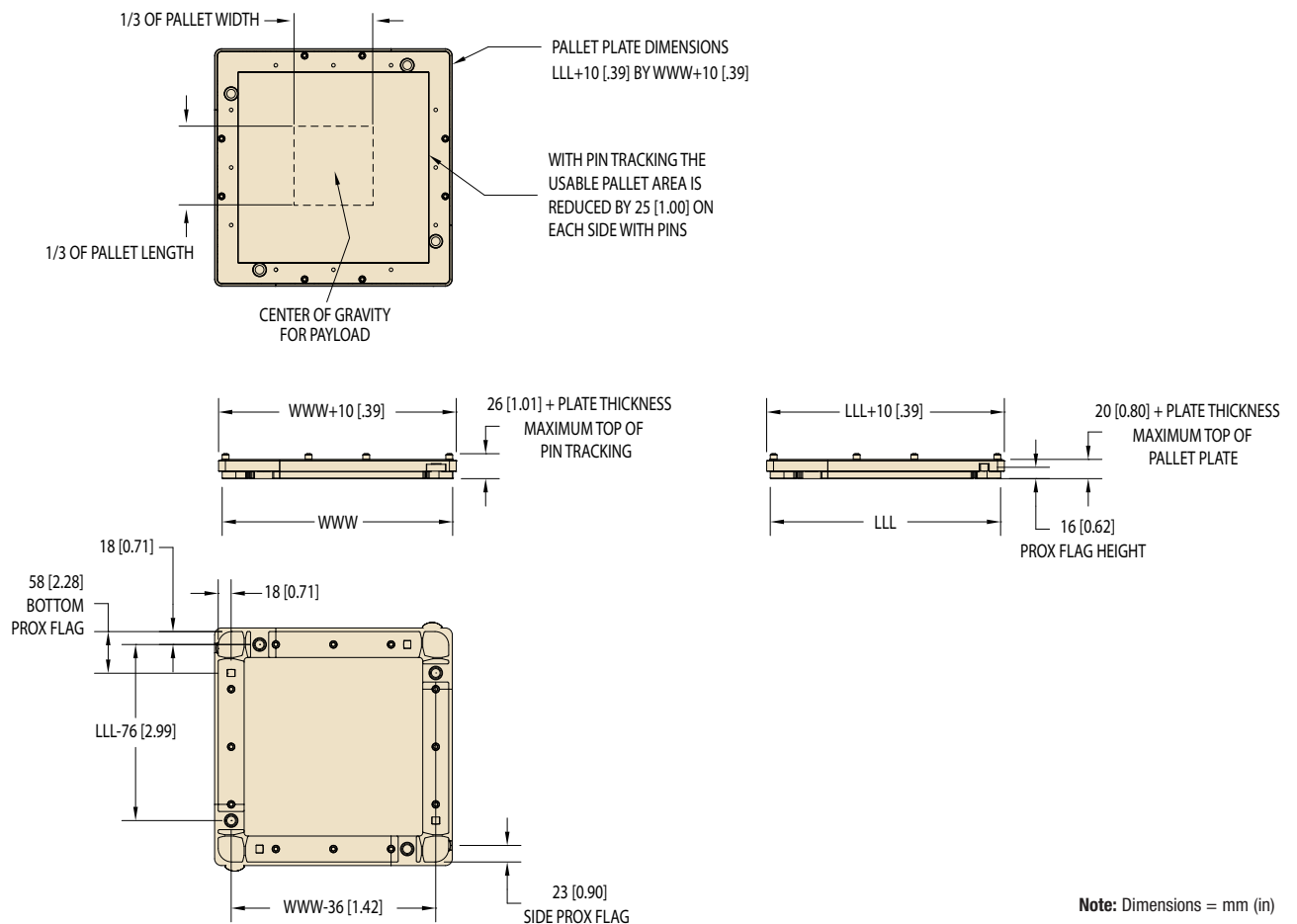
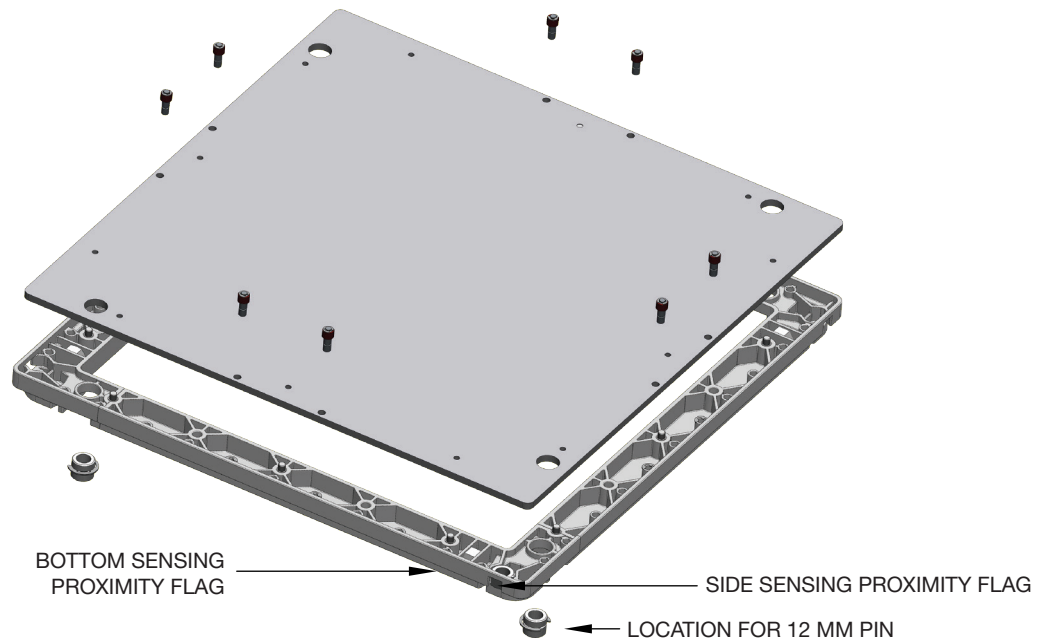
**OPTIONAL: Ball Bearing Pin Tracking**

### ERT250: Pallets

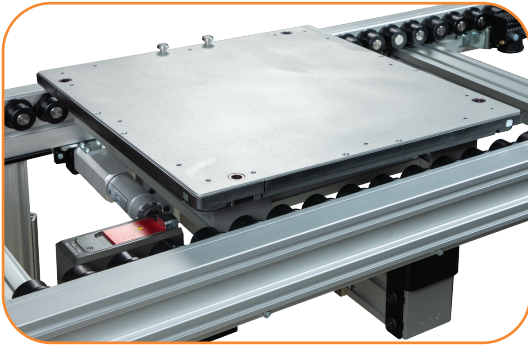
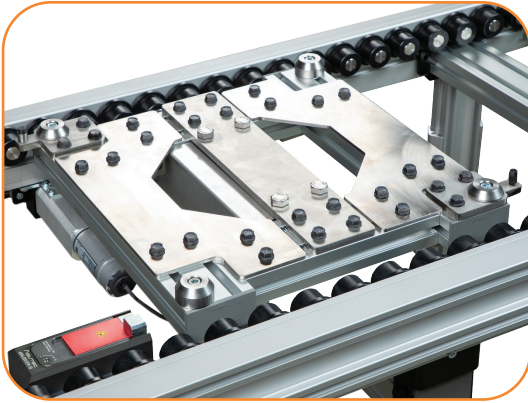
|      |    |   |     |   |     |   |   |   |  |
|------|----|---|-----|---|-----|---|---|---|--|
| ER 5 | SP | M | WWW | - | LLL | A | T | P |  |
|      |    |   |     |   |     |   |   |   | Pin Tracking System: 0 = Without Pin Tracking System 1 = Single Side Pin Tracking System                 |
|      |    |   |     |   |     |   |   |   | 2 = Dual Side Pin Tracking System 4 = 4 Side Pin Tracking System   |
|      |    |   |     |   |     |   |   |   | Plate Thickness: 4 = 1/4 in 6 = 3/8 in 8 = 1/2 in  |
|      |    |   |     |   |     |   |   |   | Pallet/Bumper Options: A = Assembled with std aluminum top plate C = Kit only without aluminum top plate |
|      |    |   |     |   |     |   |   |   | Pallet Length Reference: 320 - 800   |
|      |    |   |     |   |     |   |   |   | Pallet Width Reference: 320 - 800  |
|      |    |   |     |   |     |   |   |   | Documentation Language: M = US-English   |
|      |    |   |     |   |     |   |   |   | Conveyor Type: P = Pallet  |

**Note:** Pallet bumper cannot be used in applications where pallets slide against each other.





See page 42 & 45 for detailed pallet weights and detailed pallet plate drawings.

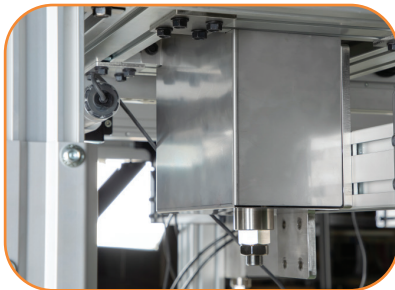


## Specifications

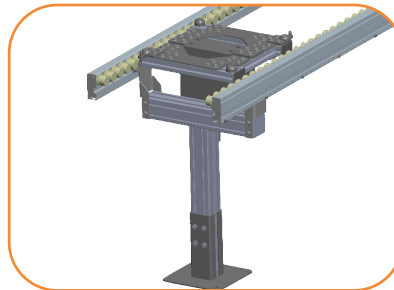
- Lifts from center of conveyor
- Pallet sizes: see chart
- Lift Capacity:
  - 114 kg (250 lbs) for pallet width 320 to 400 mm wide
  - 182 kg (400 lbs) for pallet width 480 to 800 mm wide
- Repeatability: +/- 0.13 mm (0.005 in)
- Lift height is adjustable. Maximum lift height is 20 mm (0.79 in) above top of roller
- Includes adjustable bumper lift stroke
- 63 mm diameter pneumatic lift cylinder provided for pallet widths up to 400 mm. 80 mm diameter pneumatic lift cylinder provided for pallet widths 480 to 800 mm. Includes air fittings with integrated flow controls for 1/4 inch push in air line. Solenoid valves and plumbing not provided
- Lift cylinder includes magnetic piston for position sensing. Sensors not provided
- Requires cushioned or non-cushioned pallet stop. See page 24-27
- Optional guarding package available

**Pallet Sizes**

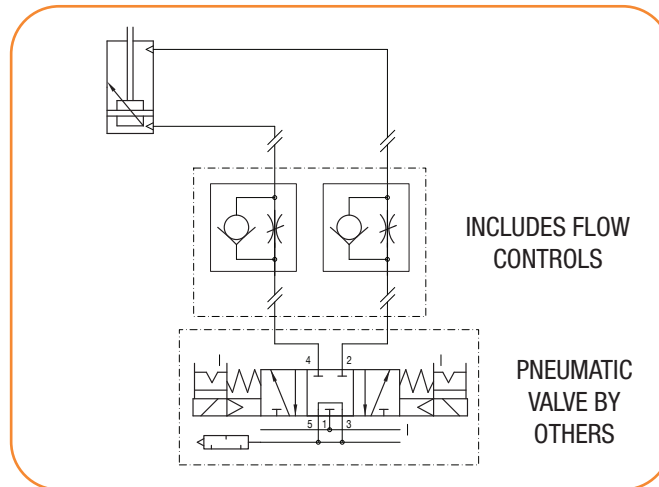
|            |     | Length (mm) |     |     |     |     |
|------------|-----|-------------|-----|-----|-----|-----|
| Width (mm) |     | 320         | 400 | 480 | 640 | 800 |
|            | 320 | X           |     | X   |     |     |
|            | 400 |             | X   | X   |     |     |
|            | 480 | X           | X   | X   | X   |     |
|            | 640 |             |     | X   | X   | X   |
|            | 800 |             |     |     | X   | X   |



**OPTIONAL:**  
**Guarding Package**



**OPTIONAL:**  
**Support post recommended for loads exceeding 113.4 kg (250 lbs). See page 33 for details.**



## ERT250: Lift and Locate

E R 5    L   M   WWW   -   L L L   C   N   G

— Guarding Included: **N** = No Guarding    **G** = Guarding Included

— Pallet Sensor Option: **N** = No Sensor Bracket Included    **B** = Bottom Sensor Bracket Included    **S** = Side Sensor Bracket

— Stop Type: **C** = Cushioned    **F** = Non-Cushioned    **N** = None

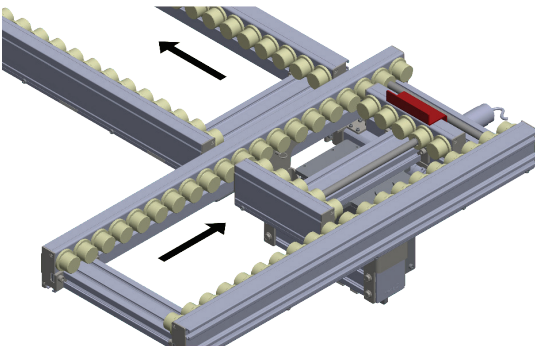
— Pallet Length Reference: **320 - 800**

— Pallet Width Reference: **320 - 800**

— Documentation Language: **M** = US-English

— Conveyor Type: **L** = Standard Lift and Locate

**Note:** Due to the wide variety of drive setups and applications, point of installation guarding is the responsibility of the end user.



See page 40 for detailed pallet stop configurations

## Specifications

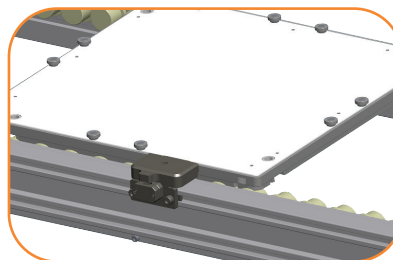
- 2 position lift and transfer
  - Up position transfers pallet on/off transverse conveyor
  - Down position lowers the transfer conveyor below feed conveyor
  - Indexing motor on feed conveyor is used to position incoming pallet for sending applications, eliminating pallet stops
- Pallet sizes: see chart
- Lift Capacity:
  - 114 kg (250 lbs) for pallet width 320 to 400 mm wide
  - 182 kg (400 lbs) for pallet width 480 to 800 mm wide
- Pallet transfers over conveyor side frame. 10 mm (0.40 in) height change required
- Includes ERT250 Series Transfer Conveyor
  - 38 mm (1.5 in) diameter rollers on 50 mm (1.97 in) centers
  - Load Capacity: Up to 114 kg (250 lbs) per pallet
  - Up to 37 m/min (121 ft/min)
  - Driven rollers
  - Brushless DC gearmotor and controller. See page 28-29 for specifications
  - Bi-directional and reversing
- 63 mm diameter pneumatic lift cylinder provided for pallet widths up to 400 mm. 80 mm diameter pneumatic lift cylinder provided for pallet widths 480 to 800 mm. Includes air fittings with integrated flow controls for 1/4 inch push in air line. Solenoid valves and plumbing not provided
- Lift cylinder includes magnetic piston for position sensing. Sensors not provided
- Optional guarding package available

**Pallet Sizes**

|            | Length (mm) |     |     |     |     |
|------------|-------------|-----|-----|-----|-----|
|            | 320         | 400 | 480 | 640 | 800 |
| Width (mm) | 320         | X   |     | X   |     |
|            | 400         |     | X   | X   |     |
|            | 480         | X   | X   | X   |     |
|            | 640         |     | X   | X   | X   |
|            | 800         |     |     | X   | X   |

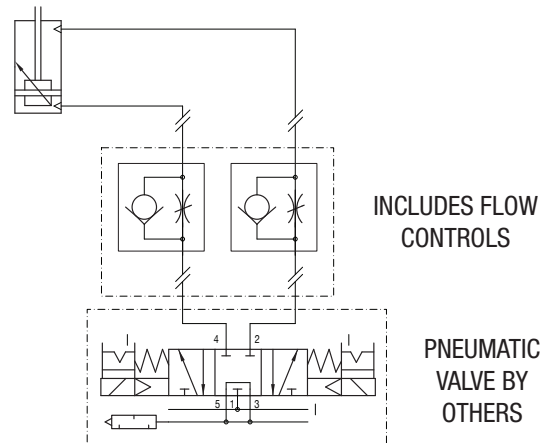
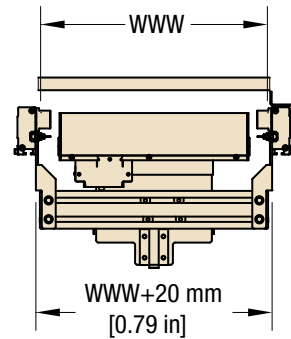


**OPTIONAL:**  
Guarding Package and Pallet Sensor



**OPTIONAL:**  
Rocker Sensor for receiving applications



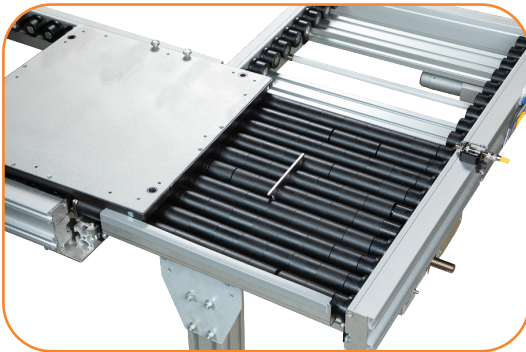


## ERT250: Lift and Transfer

**E R 5**    **T**    **M**    **WWW**    **-**    **LLL**    **F**    **D**    **C**    **N**    **G**    **S**    **C**

— **Controller Type:** **A** = No Controller    **B** = Controller included  
 — **Speed:** **1** = 10 MPM    **2** = 15 MPM    **3** = 20 MPM    **4** = 25 MPM    **5** = 37 MPM  
 — **Guarding Included:** **N** = No Guarding    **G** = Guarding Included  
 — **Pallet Sensor Option:** **N** = No Sensor Bracket    **S** = Side Sensor Bracket    **R** = Rocker Sensor Bracket  
 — **Cushion Option:** **N** = Non-Cushioned    **C** = Cushioned  
 — **Direction:** **S** = Sending    **R** = Receiving  
 — **Flow Option:** **E** = End Stop    **P** = Pass Thru  
 — **Pallet Length Reference:** 320 - 800  
 — **Pallet Width Reference:** 320 - 800  
 — **Documentation Language:** **M** = US-English  
 — **Conveyor Type:** **T** = Lift and Transfer

**Note:** Due to the wide variety of drive setups and applications, point of installation guarding is the responsibility of the end user.

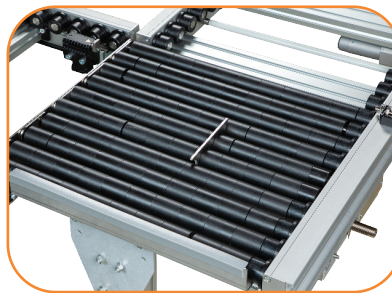


## Specifications

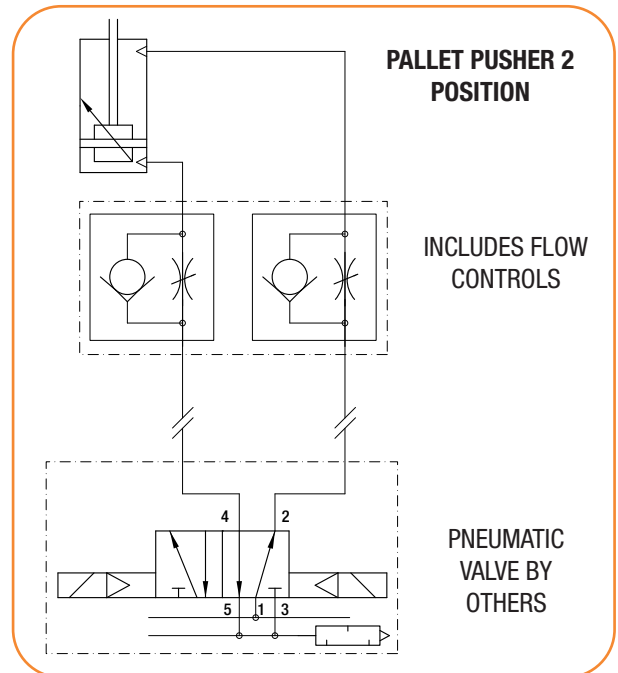
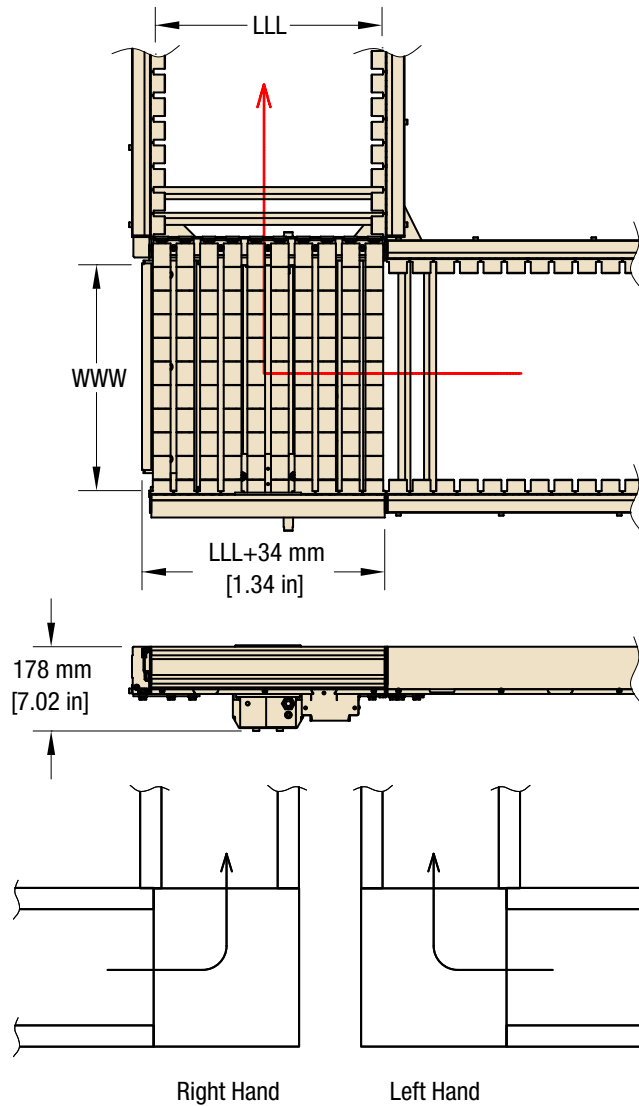
- Pneumatic pusher with integrated corner conveyor
- Pallet sizes: see chart
- Load Capacity: Up to 91 kg (200 lbs) per pallet
- Pallet pusher across transfer roller conveyor. No height change required.
- Includes ERT250 Series Transfer Conveyor
  - 38 mm (1.5 in) diameter rollers on 50 mm (1.97 in) centers
  - Load Capacity: Up to 91 kg (200 lbs) per pallet
  - Up to 37 m/min (121 ft/min)
  - Slip rollers
  - Brushless DC gearmotor and controller. See page 28-29 for specifications
- 32 mm diameter pneumatic pusher cylinder provided. Includes air fittings with integrated flow controls for ¼ inch push in air line. Solenoid valves and plumbing not provided
- Pusher cylinder includes magnetic piston for position sensing. Sensors not provided.

**Pallet Sizes**

|            |     | Length (mm) |     |     |     |     |
|------------|-----|-------------|-----|-----|-----|-----|
| Width (mm) |     | 320         | 400 | 480 | 640 | 800 |
|            | 320 | X           |     | X   |     |     |
|            | 400 |             | X   | X   |     |     |
|            | 480 | X           | X   | X   | X   |     |
|            | 640 |             |     | X   | X   | X   |
|            | 800 |             |     |     | X   | X   |



**STANDARD FEATURE:**  
**Break-Away Pusher Blade**  
for operator safety



PNEUMATIC SCHEMATICS

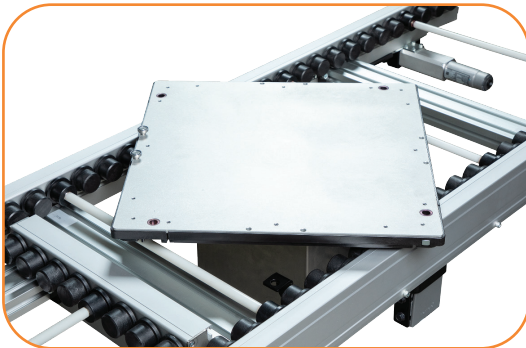
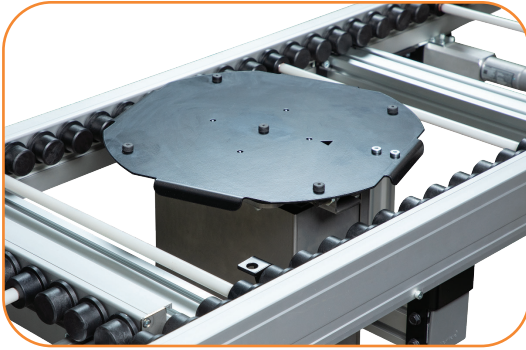
## ERT250: Pallet Pusher

ERT 5 D M WWW - LLL D S C N

- Pallet Sensor Option: N = No Sensor Bracket S = Side Sensor Bracket
- Controller Type: A = No Controller B = Controller with mount bracket
- Speed: 1 = 10 MPM 2 = 15 MPM 3 = 20 MPM 4 = 25 MPM 5 = 37 MPM
- Direction: L = Left R = Right
- Pallet Length Reference: 320 - 800
- Pallet Width Reference: 320 - 800
- Documentation Language: M = US-English
- Conveyor Type: D = Pallet Pusher

For detailed module spacing, see page 43. For pneumatic specifications, see page 42.

**Note:** Due to the wide variety of drive setups and applications, point of installation guarding is the responsibility of the end user.  
**Note:** Dimensions = mm (in)



## Specifications

- Pneumatic lifts from center of conveyor
- Pneumatic rotation with configurable 90 or 180 degree position
- Includes break-away magnetic coupled rotation plate for product safety
- Pallet sizes: see chart
- Rotation angle: 90 or 180 degrees
  - 90 degrees must be square pallets
  - Rectangular pallet sizes must be 180 degrees
- Lift Capacity:
  - 68 kg (150 lbs) for pallet width 320 to 400 mm wide
  - 114 kg (250 lbs) for pallet width 480 to 800 mm wide
- 63 mm diameter pneumatic lift cylinder provided for pallet widths up to 400 mm. 80 mm diameter pneumatic lift cylinder provided for pallet widths 480 to 800 mm. Includes air fittings with integrated flow controls for 1/4 inch push in air line. Solenoid valves and plumbing not provided
- 10 mm diameter pneumatic rotary actuator provided for pallets up to 400 mm. 20 mm diameter pneumatic rotary actuator provided for pallets width 480 to 800 mm
- Lift cylinder includes magnetic piston for position sensing. Sensors not provided. See page 34
- Slip Roller base conveyors requires cushioned or non-cushioned pallet stop. See page 24-27
- Optional guarding package available

**Pallet Sizes**

|            |     | Length (mm) |     |     |     |     |
|------------|-----|-------------|-----|-----|-----|-----|
| Width (mm) |     | 320         | 400 | 480 | 640 | 800 |
|            | 320 | X           |     | X   |     |     |
|            | 400 |             | X   | X   |     |     |
|            | 480 | X           | X   | X   | X   |     |
|            | 640 |             |     | X   | X   | X   |
|            | 800 |             |     |     | X   | X   |



**OPTIONAL:**  
Guarding Package

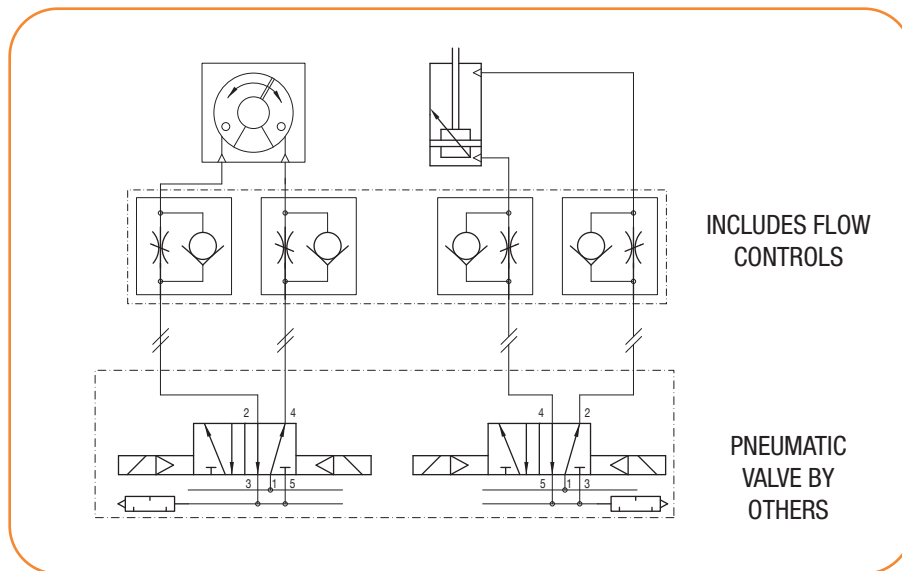


**STANDARD FEATURE:**  
Breakaway Top Plate  
for operator safety



**OPTIONAL:**  
Support Post, mounts directly to  
conveyor. See page 33 for details.





## ERT250: Lift and Rotate

ER5 R M WWW - L L L A A A C N G

Guarding Included: **N** = No Guarding **G** = Guarding Included

Pallet Sensor Option: **N** = No Sensor Bracket Included **B** = Bottom Sensor Bracket Included

Stop Type: **C** = Cushioned **F** = Non-Cushioned **N** = None

Angle: **090** = 90 Degree **180** = 180 Degree

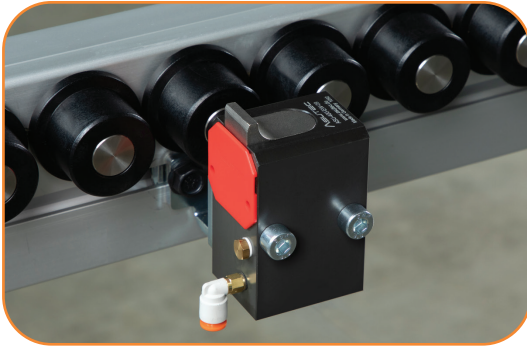
Pallet Length Reference: **320 - 800**

Pallet Width Reference: **320 - 800**

Documentation Language: **M** = US-English

Conveyor Type: **R** = Lift and Rotate

**Note:** Due to the wide variety of drive setups and applications, point of installation guarding is the responsibility of the end user.

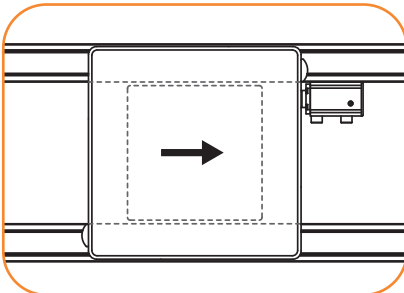


## Standard Load Pallet Stop – Non-cushioned

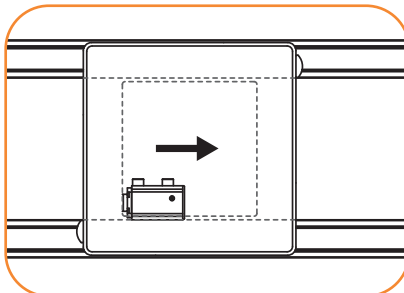
Non-cushioned pallet stop for traffic control. Stops one or more pallets at the specified location on the conveyor. Air pressure disengages the stop allowing pallets to pass until the pressure is released. A spring return re-engages the pallet stop.

### Specifications

- Maximum Load: 68 kg (150 lbs) accumulated
- Typically used for pallets 400 mm wide and narrower
- Pneumatically activated, spring return
- Mounts on the inside of the conveyor rail
- Airline can be mounted on the front or back of the stop
- Includes: stop, mounting hardware, and fittings for 6.3 mm (1/4 in) push in air line
- Optional vertical or side mounted sensor bracket. See page 34



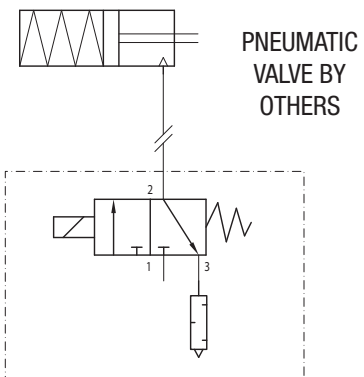
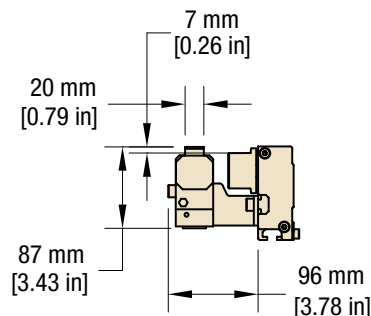
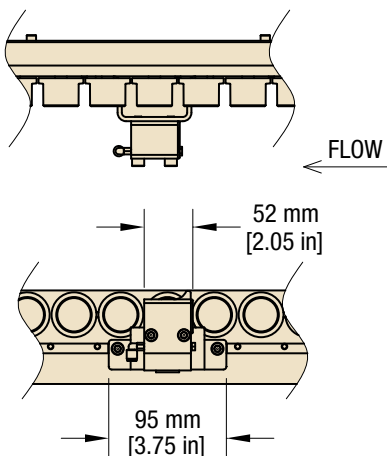
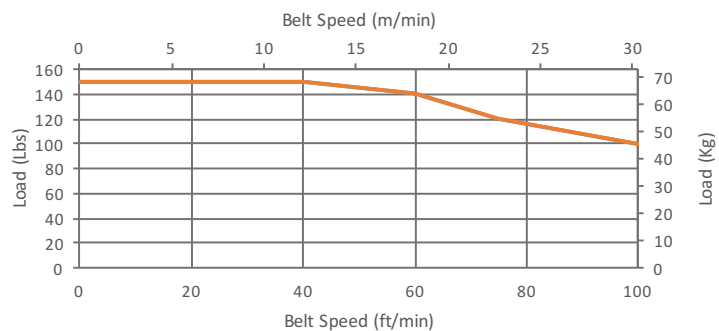
**Stop Located After Pallet**



**Stop Located Inside Pallet**

Part Number    ER5SM-LFX    where X = Sensor Bracket Option  
N = No Sensor Bracket    B = Bottom Sensor Bracket  
S = Side Sensor Bracket

### Maximum Accumulated Load - Non-cushioned Pallet Stop



**PNEUMATIC SCHEMATIC**

For pneumatic specifications, see page 42.

**Note:** Due to the wide variety of drive setups and applications, point of installation guarding is the responsibility of the end user.

**Note:** Dimensions = mm (in)

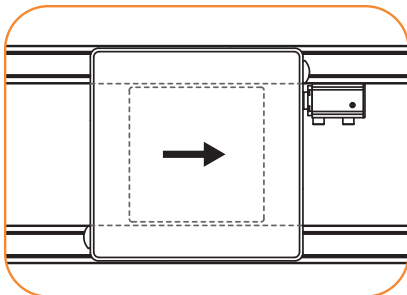


## Heavy Load Pallet Stop – Non-cushioned

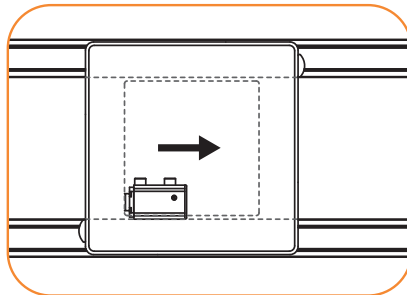
Non-cushioned pallet stop for traffic control. Stops one or more pallets at the specified location on the conveyor. Air pressure disengages the stop allowing pallets to pass until the pressure is released. A spring return re-engages the pallet stop.

### Specifications

- Maximum Load: 250 kg (550 lbs) accumulated
- Recommended for pallets wider than 400 mm
- Pneumatically activated, spring return
- Mounts on the inside of the conveyor rail
- Airline can be mounted on the front or back of the stop
- Includes: stop, mounting hardware, and fittings for 6.3 mm (1/4 in) push in air line
- Optional vertical or side mounted sensor bracket. See page 34



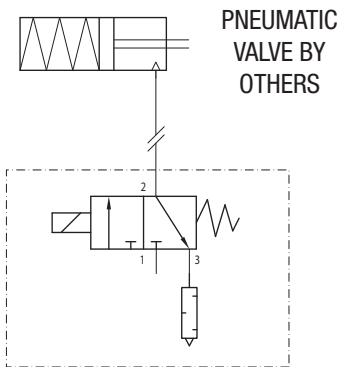
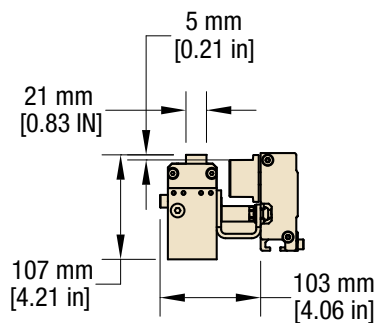
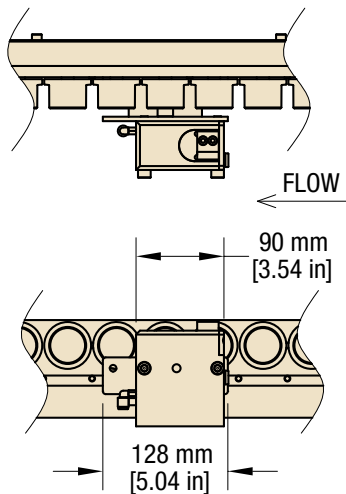
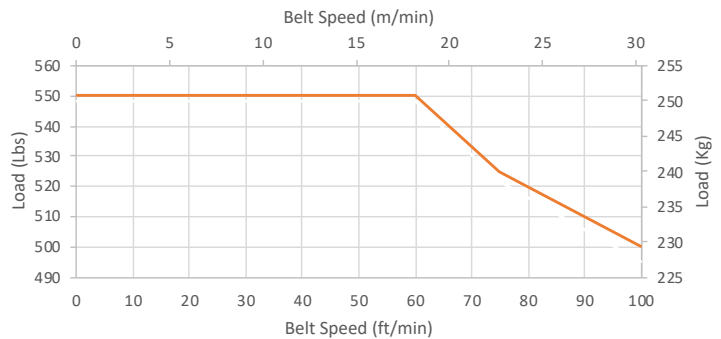
**Stop Located After Pallet**



**Stop Located Inside Pallet**

Part Number    ER5SM-HFX    where X = Sensor Bracket Option  
                          N = No Sensor Bracket    B = Bottom Sensor Bracket  
                          S = Side Sensor Bracket

### Maximum Accumulated Load - Non-cushioned Pallet Stop

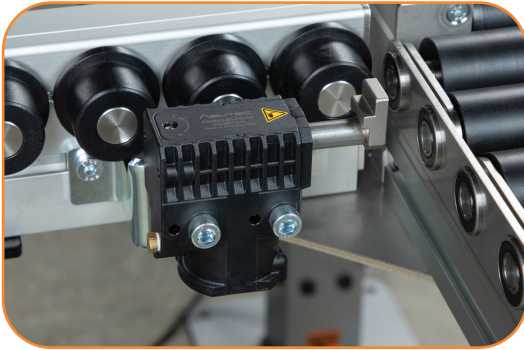


**PNEUMATIC SCHEMATIC**

For pneumatic specifications, see page 42.

**Note:** Due to the wide variety of drive setups and applications, point of installation guarding is the responsibility of the end user.

**Note:** Dimensions = mm (in)

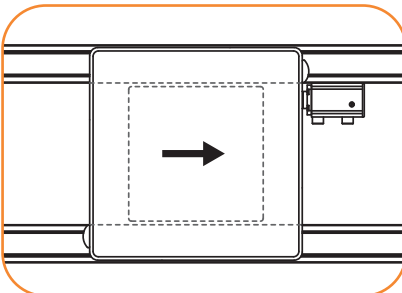


## Standard Load Pallet Stop – Cushioned

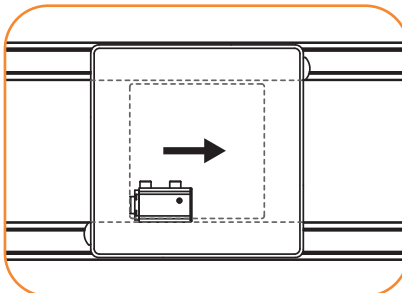
Cushioned pallet stop for traffic control. Stops one or more pallets at the specified location on the conveyor. Cushioned deceleration of the first pallet into the stopped location, guarding against vibration of sensitive payloads. Accumulated pallets are not cushioned. Air pressure disengages the stop allowing pallets to pass until the pressure is released. A spring return re-engages the pallet stop and resets the cushion.

## Specifications

- Maximum Load: 55 kg (120 lbs) accumulated
- Typically used for pallet 400 mm wide and narrower
- Pneumatically activated, spring return
- Stops the pallet on the leading or trailing edge
- Mounts on the inside of the conveyor rail
- Airline can be mounted on the front or back of the stop
- Includes: stop, mounting hardware, and fittings for 6.3 mm (1/4 in) push in air line
- Optional vertical or side mounted sensor bracket. See page 34



**Stop Located After Pallet**

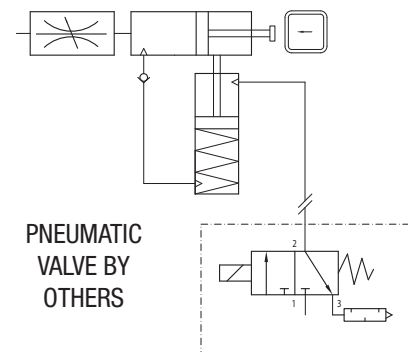
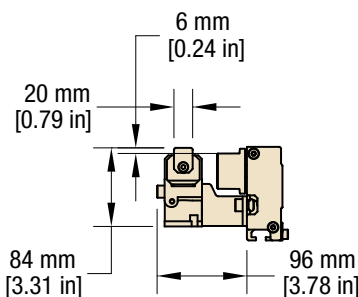
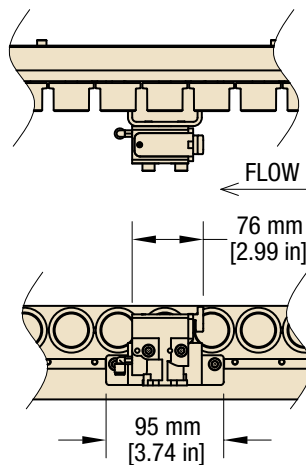
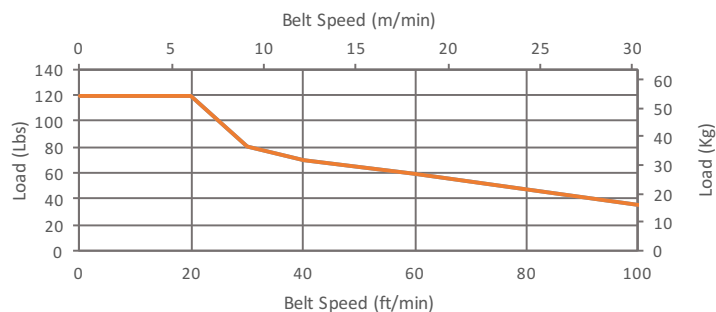


**Stop Located Inside Pallet**

Part Number

ER5SM-LCX where X = Sensor Bracket Option  
**N** = No Sensor Bracket **B** = Bottom Sensor Bracket  
**S** = Side Sensor Bracket

### Maximum Accumulated Load - Cushioned Pallet Stop



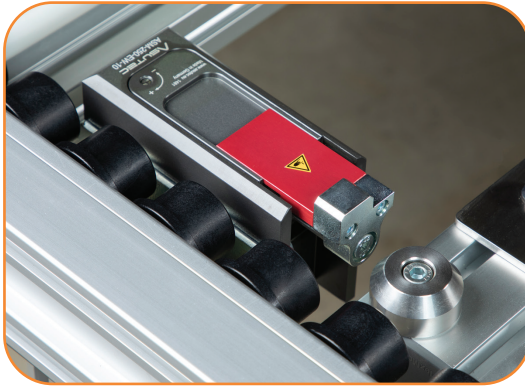
**PNEUMATIC SCHEMATIC**

For pneumatic specifications, see page 42.

**Note:** Due to the wide variety of drive setups and applications, point of installation guarding is the responsibility of the end user.

**Note:** Dimensions = mm (in)



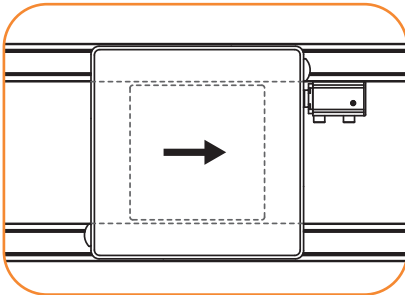


## Heavy Load Pallet Stop – Cushioned

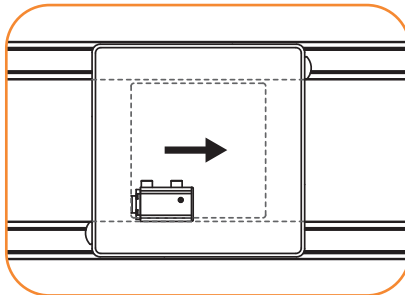
Cushioned pallet stop for traffic control. Stops one or more pallets at the specified location on the conveyor. Cushioned deceleration of the first pallet into the stopped location, guarding against vibration of sensitive payloads. Accumulated pallets are not cushioned. Air pressure disengages the stop allowing pallets to pass until the pressure is released. A spring return re-engages the pallet stop and resets the cushion

## Specifications

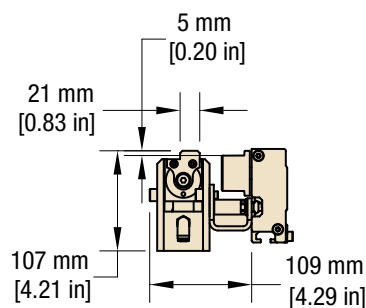
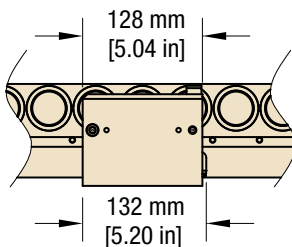
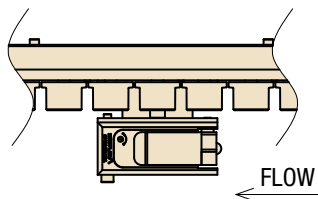
- Maximum Load: 114 kg (250 lbs) accumulated
- Recommended for pallets wider than 400 mm
- Pneumatically activated, spring return
- Stops the pallet on the leading or trailing edge
- Mounts on the inside of the conveyor rail
- Airline can be mounted on the front or back of the stop
- Includes: stop, mounting hardware, and fittings for 6.3 mm (1/4 in) push in air line
- Optional vertical or side mounted sensor bracket. See page 34



**Stop Located After Pallet**

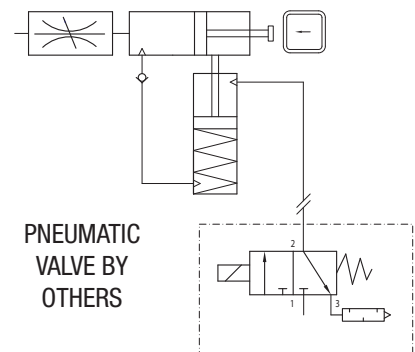
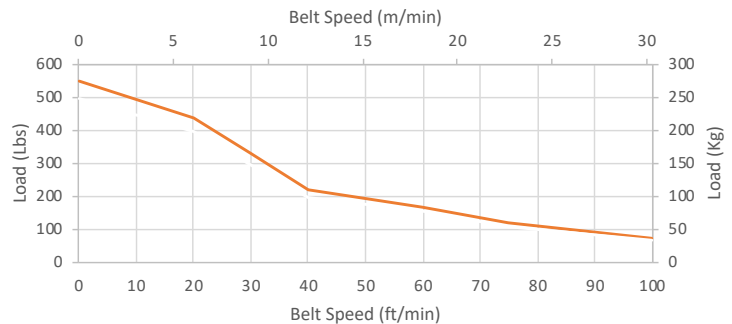


**Stop Located Inside Pallet**



Part Number ER5SM-HCX where X = Sensor Bracket Option  
N = No Sensor Bracket B = Bottom Sensor Bracket  
S = Side Sensor Bracket

## Maximum Accumulated Load - Cushioned Pallet Stop

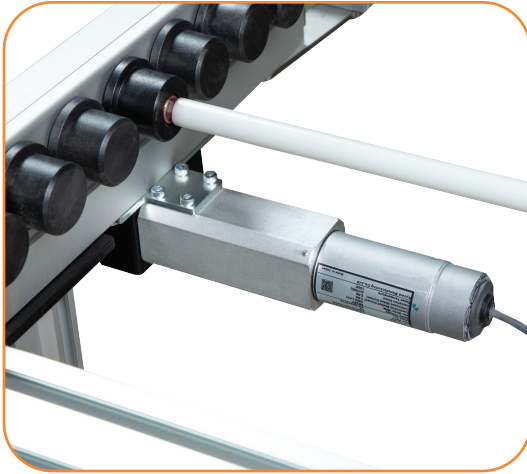


**PNEUMATIC SCHEMATIC**

For pneumatic specifications, see page 42.

**Note:** Due to the wide variety of drive setups and applications, point of installation guarding is the responsibility of the end user.

**Note:** Dimensions = mm (in)

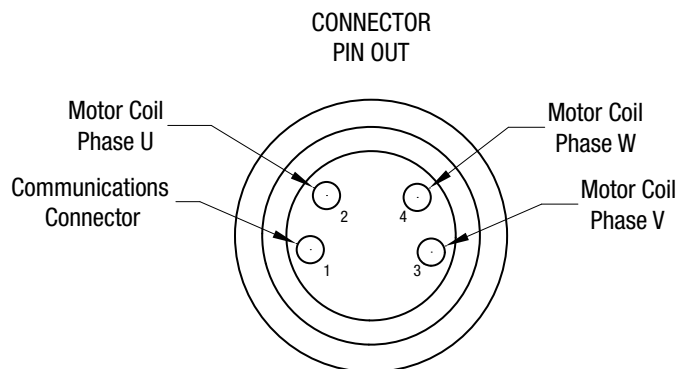
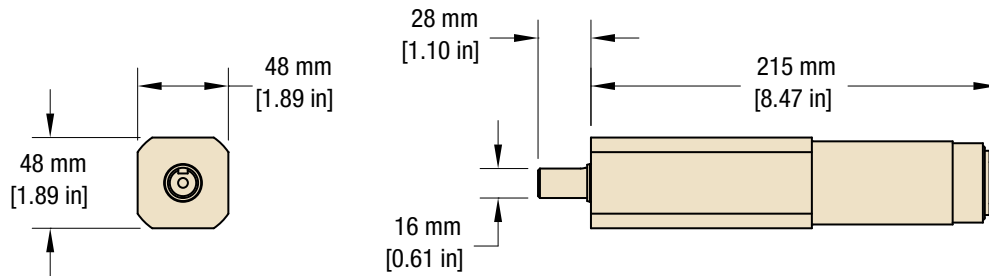


## Specifications

- Brushless DC Gearmotor
- 50 watt
- 24 VDC
- IP 54 ingress rating
- Aluminum body, steel shaft
- Certifications
  - ETL/UL certified
  - CE certified
  - RoHS and REACH compliant
- Temperature rating: -10° to 40° C (14° to 104° F)
- M8-4 Pin connector with 1 m long cable

| Part Number* | Maximum Speed m/min (ft/min) | Gear Ratio | Shaft Speed Rev/min | Rated Torque Nm (in-lb) | Starting Torque Nm (in-lb) | Rated Current amps | Starting current amps |
|--------------|------------------------------|------------|---------------------|-------------------------|----------------------------|--------------------|-----------------------|
| 826-984      | 10.3 (33.7)                  | 67.22      | 8.6 to 86.7         | 4.4 (39.1)              | 24 (215)                   | 2.5                | 3.0                   |
| 826-985      | 15.2 (50)                    | 45         | 12.8 to 129         | 2.9 (26.2)              | 16 (145)                   | 2.5                | 3.0                   |
| 826-986      | 20.8 (68.2)                  | 33         | 17.5 to 176         | 2.2 (19.2)              | 12 (106)                   | 2.5                | 3.0                   |
| 826-987      | 25.4 (83.3)                  | 27         | 21.3 to 215         | 1.8 (15.7)              | 9.8 (87)                   | 2.5                | 3.0                   |
| 826-988      | 37.4 (122.8)                 | 18.33      | 31.5 to 317         | 1.2 (10.6)              | 6.7 (59)                   | 2.5                | 3.0                   |

\*Note: Gearmotor is provided with conveyor part number and not required to be ordered separately.



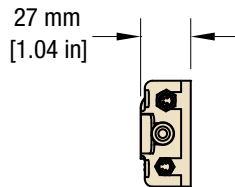
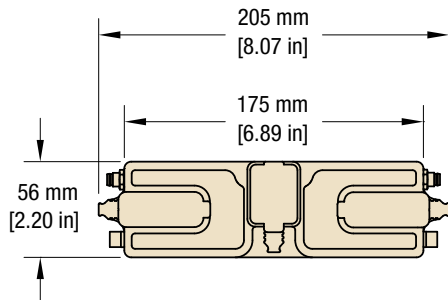
Note: Dimensions = mm (in)



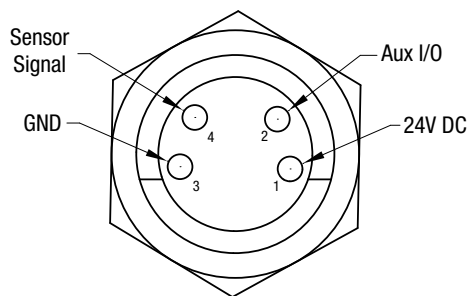
## Electrical Specifications

|                               |                            |
|-------------------------------|----------------------------|
| Voltage Range                 | 18-28 VDC                  |
| Rated Current                 | 5.2 amps, for 2 gearmotors |
| Starting Current              | 6.0 amps, for 2 gearmotors |
| Operating ambient temperature | -10 to 40 C (14 to 104F)   |

Part Number 400396



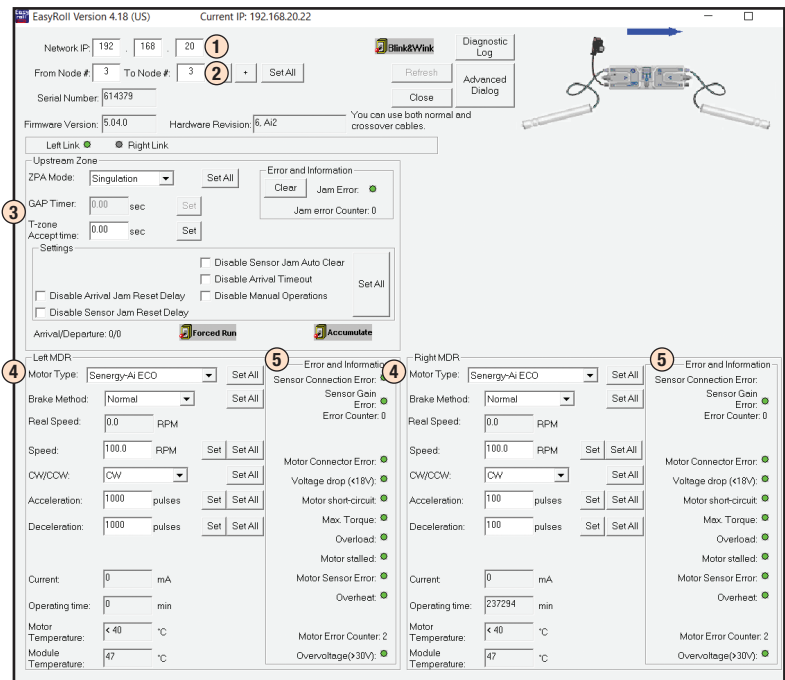
## INTERFACE CONNECTOR PIN OUT



## Specifications

- Brushless DC Ethernet motor control
- Control can be used as motor drive and/or remote I/O
- Controls up to 2 gearmotors
- Controls up to 4 inputs
- Built in zero pressure accumulation logic for zoning applications
- ConveyLINX software is used to set up controller and adjust control parameters\*
- IP 54 ingress rating
- Certifications
  - UL recognized to UL/eUL standard 61800-5-1
  - CAN.CSA to standards: C22.2 NO.61010-1
  - CE certified
  - RoHS and REACH compliant
- Connectivity
  - Ethernet IP
  - Modbus TCP
  - PROFINET

## ConveyLINX Software\*



1. Configure Network IP
2. Configure Nodes on Network
3. Upstream / Downstream Gearmotor, select mode
4. Upstream / Downstream gearmotor, select motor speed, acceleration/ deceleration, etc.
5. Error Indicators for connection and performance

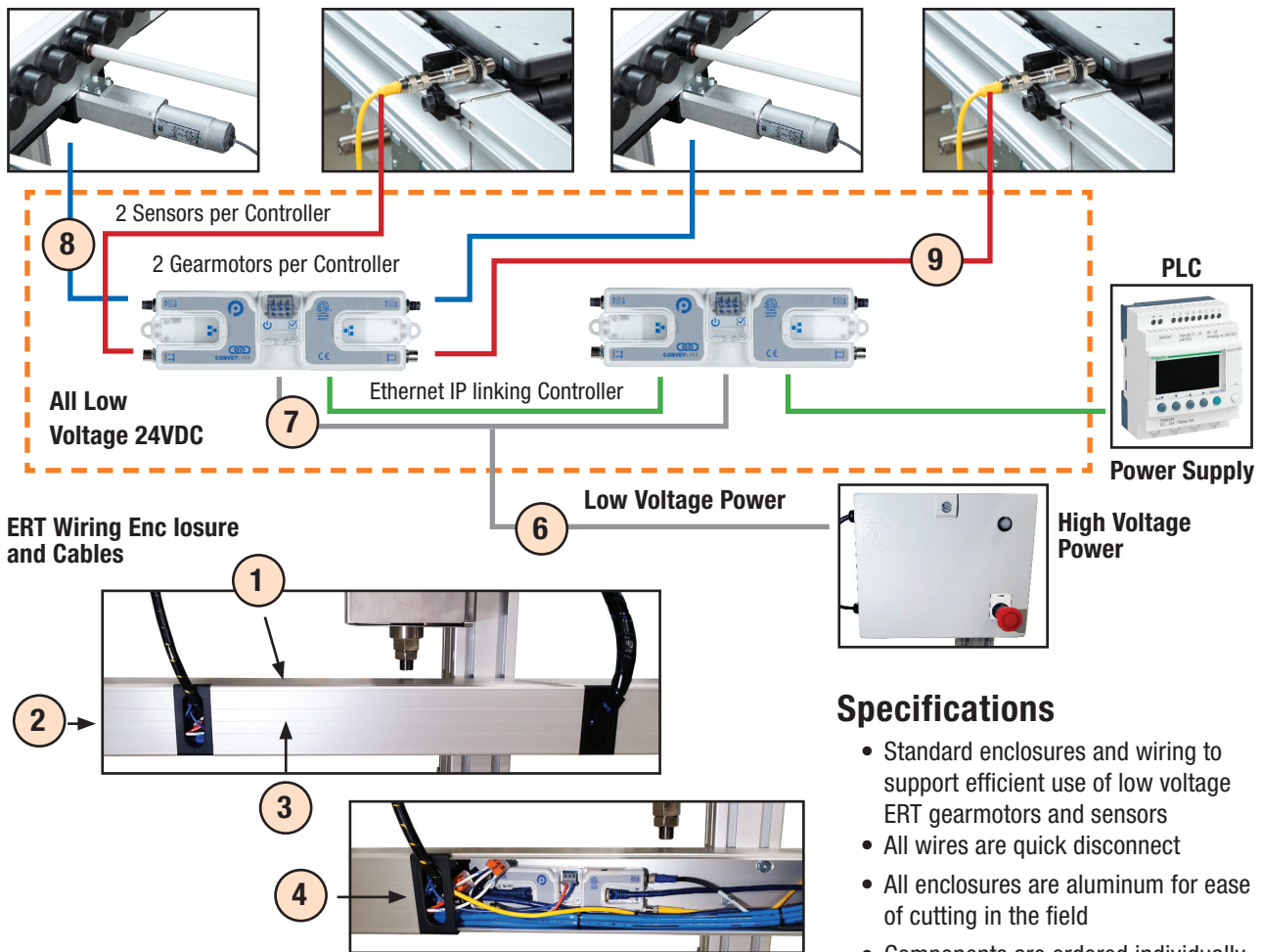
\*ConveyLINX Software provided by Pulse Roller, see [www.pulseroller.com](http://www.pulseroller.com) for details.

**Note:** Due to the wide variety of drive setups and applications, point of installation guarding is the responsibility of the end user.

**Note:** Dimensions = mm (in)



## Wiring Diagram:



## Specifications

- Standard enclosures and wiring to support efficient use of low voltage ERT gearmotors and sensors
- All wires are quick disconnect
- All enclosures are aluminum for ease of cutting in the field
- Components are ordered individually

| Item | Part Number   | Description   | Specification   |
|------|---------------|---|---|
| 1    | ERTW1-CE3000  | ERT Motor Controller Enclosure, 80 mm x 80 mm x 3000 mm long, Aluminum  | Aluminum Extruded Enclosure, requires customer to cut to length and add mounting holes  |
| 2    | ERTW1-ECX     | ERT Motor Controller Enclosure End Cap. Where X = 1 for closed, X = 2 for with hole for wiring pass through                 | Plastic end cap for closing motor controller closure. Includes mounting screws  |
| 3    | ERTW1-CV3000  | ERT Motor Controller Enclosure Cover 3000 mm long, Aluminum   | Aluminum Extruded Cover, requires customer to cut to length. Snaps into main enclosure for tight fit  |
| 4    | ERTW1-CBE1    | ERT Motor Controller Enclosure Cable Entry Single Hole  | Plastic 2-piece cover providing cable entry to enclosure  |
| 5    | ERTW1-MBXXXX  | ERT Motor Controller Enclosure Mounting Bracket Where XXXX = length of support arm. 0100, 0200, 0300, 0400 mm long          | Mounting bracket including hardware. Mounts to conveyor cross members and automation module support arms Maximum distance between supports = 2000 mm. |
| 6    | ERTCB1-PCXXXX | ERT DC Power Supply to Enclosure Cable XXXX mm long. Where XXXX = length in mm. 1000, 2000, 3000, 4000 mm length available. | 12 Ga. 3 wire cable. Includes re-usable clamp style wire connectors to splice up to 4 controllers   |
| 7    | ERTCB1-LCXXXX | ERT Controller Linking Cable XXXX mm long. Where XXXX = length in mm. 1000, 2000, 3000 mm length available.                 | 8 Ga. 3 wire cable  |
| 8    | ERTCB1-MCXXXX | ERT Controller to Motor Extension Cable XXXX mm long. Where XXXX = length in mm. 2000, 3000 mm length available.            | 24 Ga. 4 wire cable. Includes M-8 male/female quick disconnect connector on both ends of cable  |
| 9    | ERTCB1-SCXXXX | ERT Controller to Sensor Cable XXXX mm long. Where XXXX = length in mm. 2000, 3000, 4000 mm length available.               | 24 Ga. 4 wire cable. Includes M-8 male/female disconnect connector on both ends of cable  |

## Multiple Conveyor Power Supply



Outside

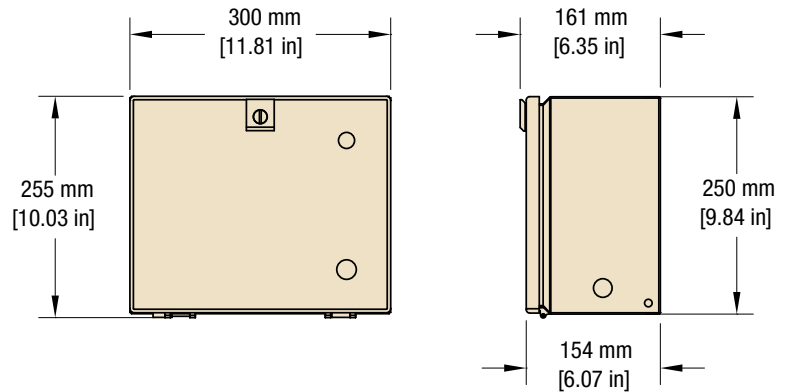


Inside

### Specifications

- Provides 24 VDC power to gearmotor controllers
- 20 AMP output can power up to 4 controllers
- Recommended to be placed near controller on conveyor line
- IP66 painted steel enclosure
- Panel mounted pull-to-release on/off button with indicator light
- See page 30 for low voltage cable to controllers
- High voltage wiring by customer

| Part Number     | Input Volts | Input Phase | Input H <sub>3</sub> | Input Amps | Output Volts | Output Amps |
|-----------------|-------------|-------------|----------------------|------------|--------------|-------------|
| ERTPS1-112D-20A | 110         | 1           | 60                   | 4.5        | 24 VDC       | 20          |
| ERTPS1-122D-20A | 220         | 1           | 60                   | 2.3        | 24 VDC       | 20          |
| ERTPS1-232D-20A | 230         | 3           | 60                   | 2.2        | 24 VDC       | 20          |
| ERTPS1-432D-20A | 460         | 3           | 60                   | 1.1        | 24 VDC       | 20          |



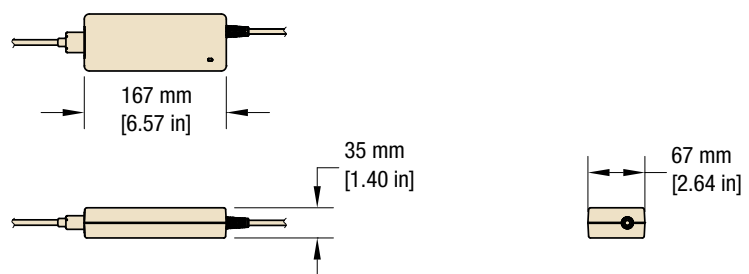
## Single Conveyor Power Supply



### Specifications

- Provides 24 VDC power to gearmotor controller
- 5 AMP output can power one controller
- 115V, 1 Phase, 60 hz input
- RoHS, REACH certified
- UL, CUL and CE approved
- Black plastic enclosure

Part Number 400386





## Fixed Height Support Stands

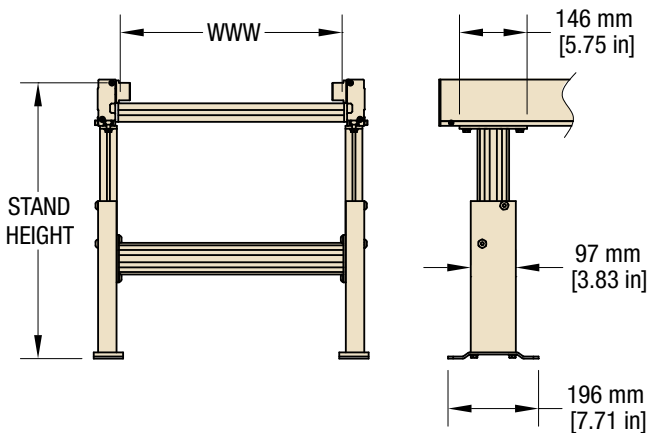
- 210 mm (8.27 in) minimum TOB height
- 1970 mm (77.6 in) maximum TOB height
- Aluminum construction with T-slot mounting for bolt on accessories and structure
- Adjustment range is dependent on stand height. All stands 345 mm (13.6 in) and taller have a minimum of  $\pm 50$  mm (2 in) of adjustment
- Optional diagonal brace, see page 33

**Stand Width Chart**

| Stand Width           | 120 mm | 160 mm | 40 mm increments up to... | 920 mm | 960 mm |
|-----------------------|--------|--------|---------------------------|--------|--------|
| Part Number Reference | 120    | 160    | 040 increments up to...   | 920    | 960    |

**Stand Height Chart**

| Stand Height          | 210-225 mm (8.27 - 8.86 in) | 10 mm (0.4 in) increments up to... | 1470-1970 mm (57.9 - 77.6 in) |
|-----------------------|-----------------------------|------------------------------------|-------------------------------|
| Part Number Reference | 02100225                    | 00100010 increments up to...       | 14701970                      |



**ERT250: Fixed Height Support Stands**

ERT250: Fixed Height Support Stands

ERS M WWW - L L L L U U U U F

Footings: F = Fixed Foot

Upper Height to TOB (in mm)

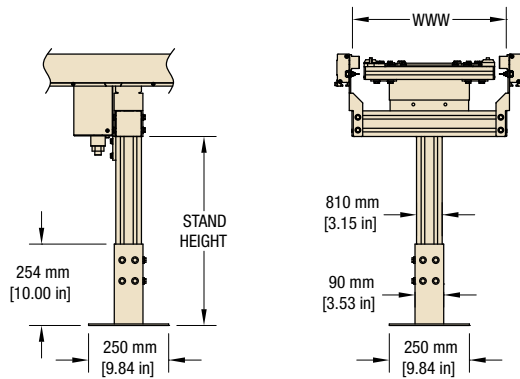
Lowest Height to TOB (in mm)

Conveyor Width Reference: 120 - 960

Documentation Language: M = US-English

**Note:** Due to the wide variety of conveyor and stand options along with possible configurations, stability of the final setup is the responsibility of the end user.  
**Note:** Due to the wide variety of drive setups and applications, point of installation guarding is the responsibility of the end user. **Note:** Dimensions = mm (in)

## Support Post

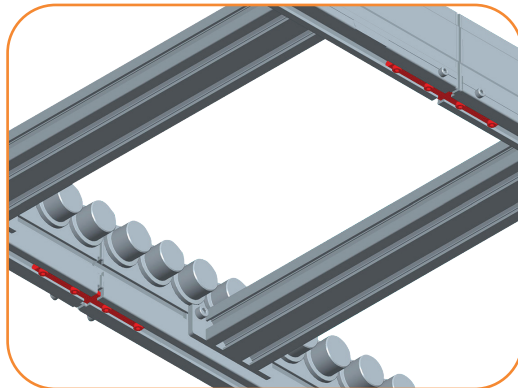


### Specifications

- Single support post to provide extra support or stability to conveyors and automation modules
- Aluminum extruded construction with T-slot mounting
- $\pm 50$  mm (2 in) adjustment range
- Minimum top of roller height depends on the device mounting to
- From top of roller height subtract the following to determine support post height
  - ERT250 Conveyor = 93 mm
  - Curve Conveyor = 93 mm
  - All Automation Modules = 310 mm

|             |   |
|-------------|---|
| Part Number | 400247-LLLLL-M<br>Where LLLLL-X = Stand Height in mm XXXX.X |
|-------------|---|

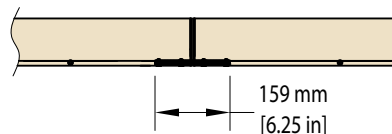
## Conveyor Tie Bracket



### Specifications

- Tie bracket for connecting conveyors inline
- Can be used in bottom or inside T-slot. Do not use with T-slot cover
- Includes a pair of tie plate assemblies
- Includes all mounting hardware

|             |        |
|-------------|--------|
| Part Number | 206519 |
|-------------|--------|



## Diagonal Bracing



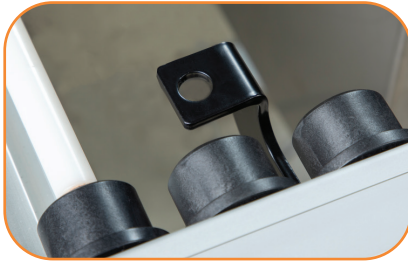
### Specifications

- For use on ERT250 aluminum support stands
- Provides additional stability for large and heavy pallet applications
- Metric fastener mounting hardware included
- Minimum conveyor top of roller = 510 mm (20 in)
- One brace per stand for conveyors up to 480 mm
- Two braces per stand for conveyors over 480 mm

| Part Number | Description                     |
|-------------|---------------------------------|
| 400264-LH   | Support brace for ERT stand, LH |
| 400264-RH   | Support brace for ERT stand, RH |



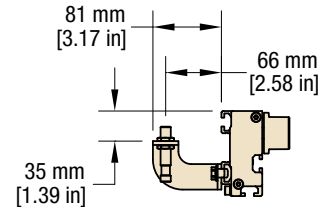
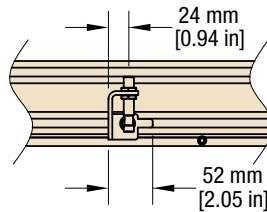
## Pallet Sensor Bracket, Sensing



### Specifications

- Standard mounting for 12 mm barrel proximity sensors
- Sensor faces upward, sensing pallet pick-up on the bottom of pallet
- Requires a minimum of 25 mm (1 in) long threaded portion on sensor
- Includes all mounting hardware
- Proximity sensor with 4 mm minimum sensory range recommended

Part Number 400268



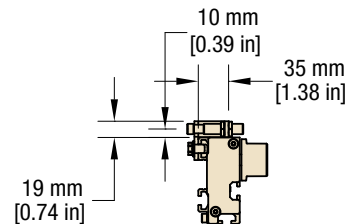
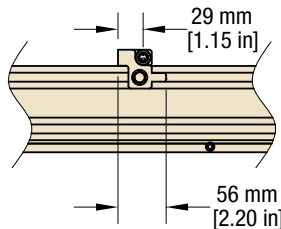
## Pallet Sensor Bracket, Side Sensing



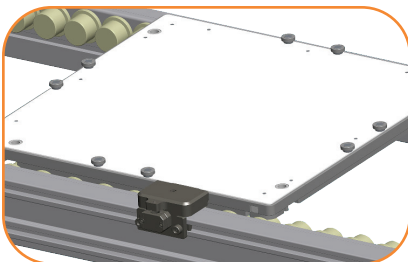
### Specifications

- Standard mounting for 12 mm barrel proximity sensors
- Sensor faces inward, sensing pallet pick-up on outside of pallet
- Requires a minimum of 25 mm (1 in) long threaded portion on sensor
- Includes all mounting hardware
- Proximity sensor with 4 mm minimum sensory range recommended

Part Number 400269



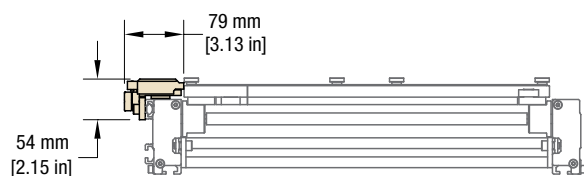
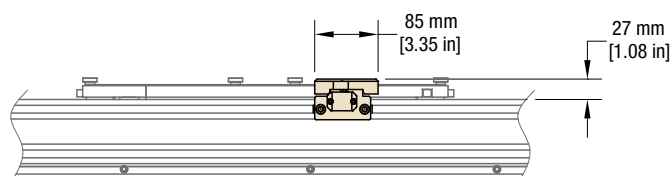
## Pallet Sensor Bracket, Rocker



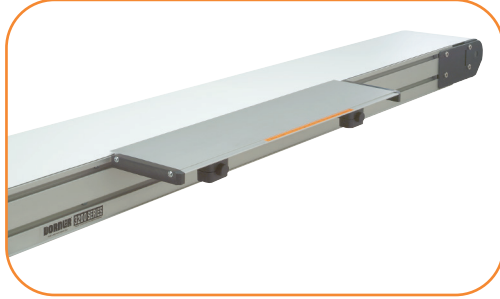
### Specifications

- Guide block contacts pallet to engage proximity switch
- Used with Lift and Transfer
- Requires a minimum of 25 mm (1 in) long threaded portion on sensor
- Standard mount for 12 mm barrel proximity sensor
- Proximity sensor with 4 mm minimum sensory range recommended

Part Number 400350



## Side Tables



### Specifications

- Provides a 152 mm (6 in) or 305 mm (12 in) wide working surface
- Adjusts in/out and up/down
- Can be positioned anywhere along the conveyor
- Anodized aluminum work surface
- Max load: 6 kg/m (5 lbs/ft), use Adjustable Tie Brackets for added capacity
- Available in 305 mm (1 ft) increments from 305 to 30,175 mm (1 to 99 ft)

#### Side Tables

27MSF T - 06 LLLL

##### Table Length

ex. 0200 = 610 mm (2 ft)

Table Width: 06 = 152 mm (6 in)

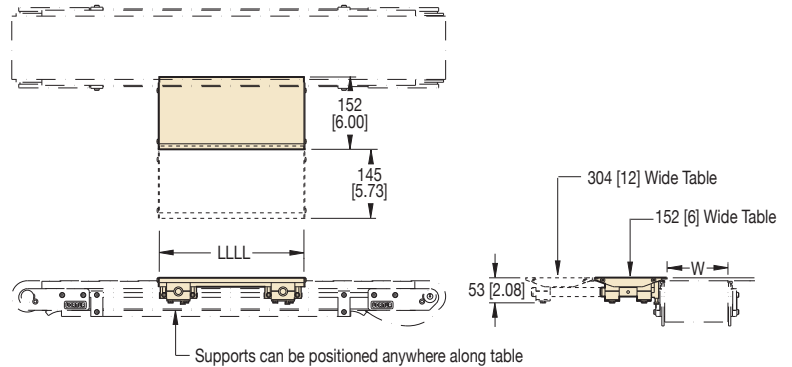
12 = 305 (12 in)

##### Conveyor / Table Type:

1 = One Side

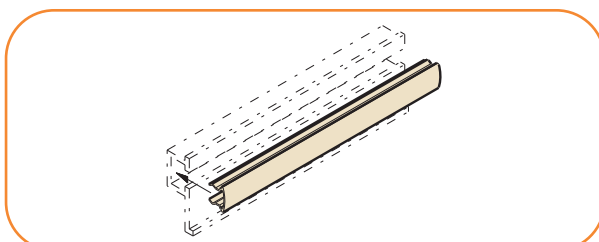
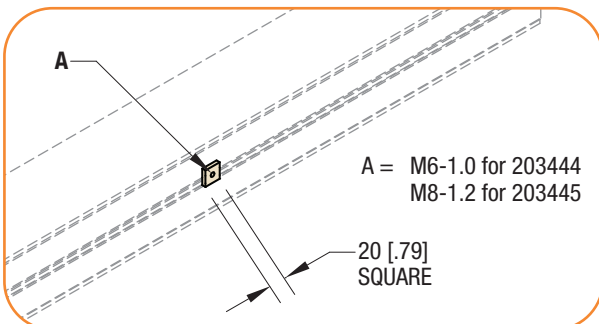
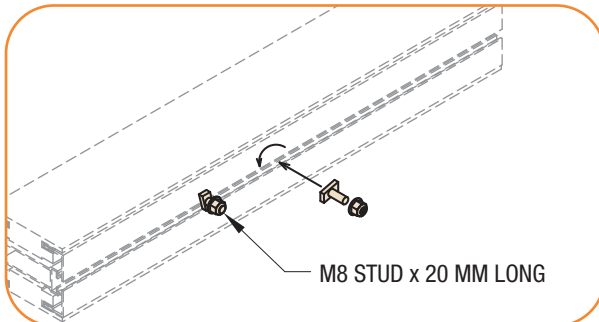
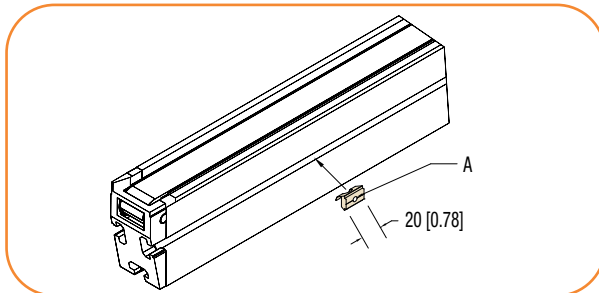
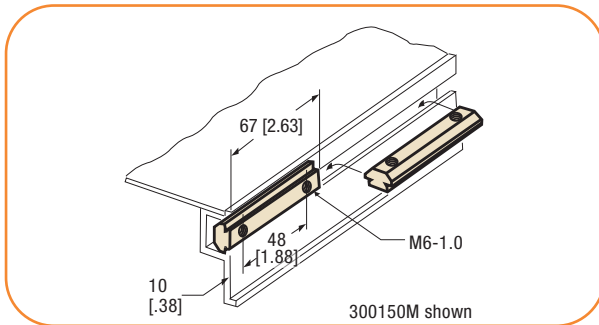
2 = Two Sides

**Example:** 27MSF1-060200



LLLL = 305 to 30,175 mm (1 to 99 ft), Maximum 2438 mm (8 ft) length single piece

## T-slot Accessories



### T-Bars

- Mounts in T-slot to attach heavy accessories
- Fits conveyor and stands

|             |  |
|-------------|--|
| Part Number | 639971M (1 hole T-bar, M6-1.0, .75 in long)                    |
|             | 202390M (1 hole T-bar, M8-1.25, .63 in long)                   |
|             | 643874M (0.75 in centers, 2 hole T-bar, M6-1.0, 1.5 in long)   |
|             | 200626M (0.875 in centers, 2 hole T-bar, M6-1.0, 1.62 in long) |
|             | 200830M (1.0 in centers, 2 hole T-bar, M6-1.0, 1.75" long)     |
|             | 639717M (1.25 in centers, 2 hole T-bar, M6-1.0, 2.0" long)     |
|             | 300150M (1.875 in centers, 2 hole T-bar, M6-1.0, 2.62 in long) |
|             | 300536M (2.125 in centers, 2 hole T-bar, M6-1.0, 2.88 in long) |

### Spring Nuts

- For mounting accessories to conveyor
- Spring retains position in T-slot
- 20 mm (0.78 in) long

|             |                  |
|-------------|------------------|
| Part Number | 205504 M4 x 0.7  |
|             | 205505 M5 x 0.8  |
|             | 205506 M6 x 1.0  |
|             | 205508 M8 x 1.25 |

### T-Bolt Hardware

- For mounting accessories to conveyor
- Twist in T-Bolt for mounting accessories
- M8-1.25 male threaded post
- (2) lengths available; 20 mm long and 35 mm long
- 20 mm long used to mount up to 0.25 in plate thickness
- 35 mm long used to mount up to 0.85 in plate thickness
- Provided in a package of 5 T-Bolts and flanged locknuts

|             |                     |
|-------------|---------------------|
| Part Number | 203446 (20 mm long) |
|             | 203447 (35 mm long) |

### Slide In Square Nuts

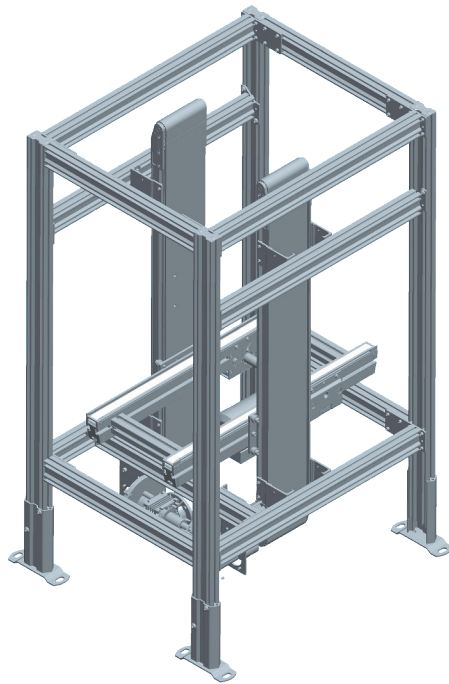
- For mounting accessories to conveyor
- Must be slid in at section break
- (2) thread sizes available: M6-1.0 or M8-1.25
- Provided in a package of 5 nuts

|             |                  |
|-------------|------------------|
| Part Number | 203444 (M6-1.0)  |
|             | 203445 (M8-1.25) |

### T-Slot Cover

- Snaps into conveyor and aluminum stand T-slots
- Black plastic extrusion
- Can be trimmed to fit

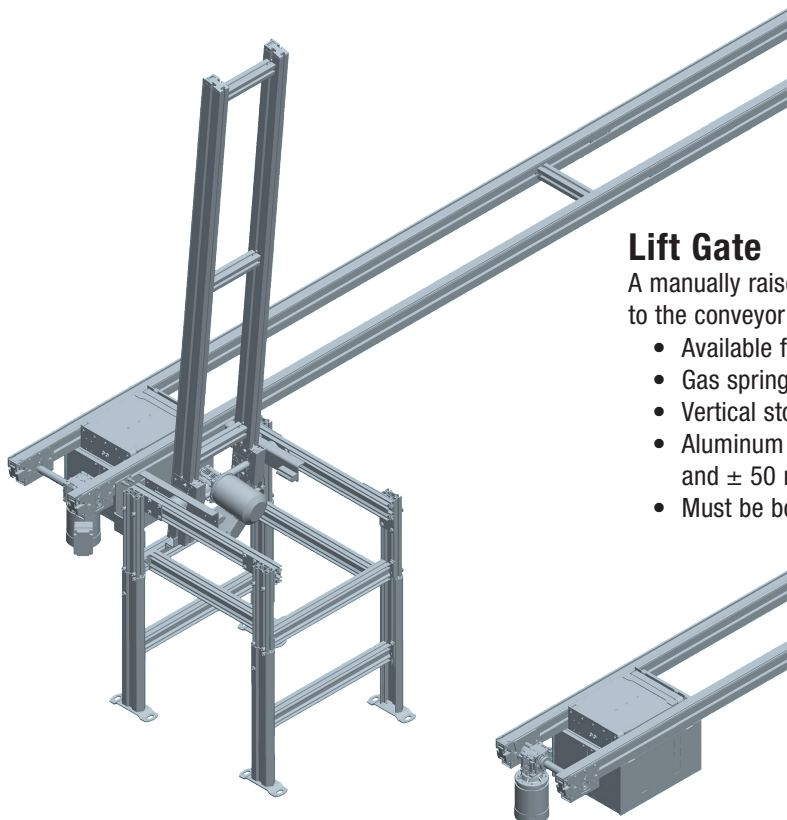
|             |                                       |
|-------------|---------------------------------------|
| Part Number | 645656P (Per 305 mm (1 ft) of length) |
|-------------|---------------------------------------|



## Vertical Transfer Unit (Elevator)

Vertical Transfer Units raise or lower a pallet between two different levels allowing for over/under layouts or transferring pallets over aisles

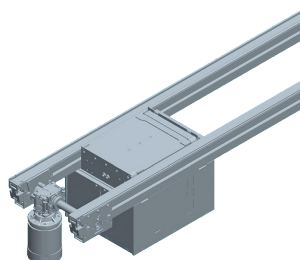
- Includes Precision Move conveyor to shuttle pallets in and out of the Vertical Transfer Unit
- Transfers standard and custom pallet sizes
- Up to 91 kg (200 lbs) lift capacity
- Minimum Height TOB: 305 mm (12 in)
- Maximum height TOB 3050 mm (120 in)
- Transfer one or more pallet(s) per cycle
- AC VFD rated gearmotor driven lift and shuttle
- Includes Lexan guarding
- Includes proximity sensor brackets for pallet and lift position detection
- Available as a complete package including automation controls



## Lift Gate

A manually raised and lowered conveyor section to allow access to the conveyor line

- Available for standard and custom pallet sizes
- Gas spring-controlled pivot mechanism
- Vertical stop position
- Aluminum support structure with T-slot construction and  $\pm 50$  mm (2 in) adjustability
- Must be bolted to the floor





## Regulatory Approvals:







### Conveyors:

All Dorner ERT250 standard conveyors are CE approved. CE approval follows the provisions of the following directives; Machine Directive 2006/42/EC, EU Low Voltage Directive 2006/95/EC, and EMC Directive 2004/108/EC. All conveyors are marked with the CE symbol on the Dorner serial number tag located on the conveyor frame. Contact the factory for the CE Declaration of Conformity.

All Dorner ERT250 standard conveyors (not including gearmotors and controllers) are designed and manufactured in accordance with the restrictions defined in the "Restriction of Hazardous Substances" directive, citation 2015/863/EU, commonly known as RoHS. All conveyors are marked with the RoHS symbols on the Dorner serial number tag located on the conveyor frame.

### Gearmotors and Controllers:

All Dorner ERT250 gearmotors and controllers carry one or more of the following approvals. Products are not covered by each approval. Please see the appropriate part number on the gearmotor and controller charts located in this manual. In addition, regulatory symbols are located on the product information tags located on the product.

|   |  |
|---|--|
|    | CE marking on a product is a manufacturer's declaration that the product complies with the essential requirements of the relevant European health, safety and environmental protection legislation, in practice by the Product Directives. CE Marking on a product ensures the free movement of the product within the European Union (EU).  |
|  | This directive restricts (with exceptions) the use of six hazardous materials in the manufacture of various types of electronic and electrical equipment. It is closely linked with the Waste Electrical and Electronic Equipment Directive (WEEE) 2002/96/EC which sets collection, recycling and recovery targets for electrical goods and is part of a legislative initiative to solve the problem of huge amounts of toxic e-waste.  |
|  | The UL Recognized Component mark is for products intended to be installed in another device, system or end product. This Recognized Component Mark is for the United States only. When a complete product or system containing UL Recognized Components is evaluated, the end-product evaluation process can be streamlined.   |
|  | The UL Recognized Component mark is for products intended to be installed in another device, system or end product. This Recognized Component Mark is for the United States and Canada. When a complete product or system containing UL Recognized Components is evaluated, the end-product evaluation process can be streamlined.   |
|  | CSA International (Canadian Standards Association), is a provider of product testing and certification services for electrical, mechanical, plumbing, gas and a variety of other products. Recognized in the U.S., Canada and around the world, CSA certification marks indicate that a product, process or service has been tested to a Canadian or U.S. standard and it meets the requirements of an applicable CSA standard or another recognized document used as a basis for certification. |
|  | The UL Listing Mark means UL found that representative product samples met UL's safety requirements. These requirements are primarily based on UL's own published standards for safety. The C-UL-US Mark indicates compliance with both Canadian and U.S. requirements. The products with this type of Mark have been evaluated to Canadian safety requirements and U.S. safety requirements.  |

## Cleanroom Certifications:

ERT250 Conveyors are often used in Cleanroom applications where the generation of particulates from the conveyor are a concern. In these applications the correct installation and application of the conveyor is critical to the proper running of the conveyor and minimizing the dust generated by the conveyor.

ERT250 Conveyors are designed and constructed to be used in Cleanroom environments. The following ERT250 Series products has gone through third party testing and certification and is certified for use in ISO Standard 14644-1:2015 Class 4 and Federal Standard 209 Class 10 Cleanroom applications.

Contact the factory for a copy of the certification.



TUV Tested and Approved  
for Cleanroom Class 4  
Certification.

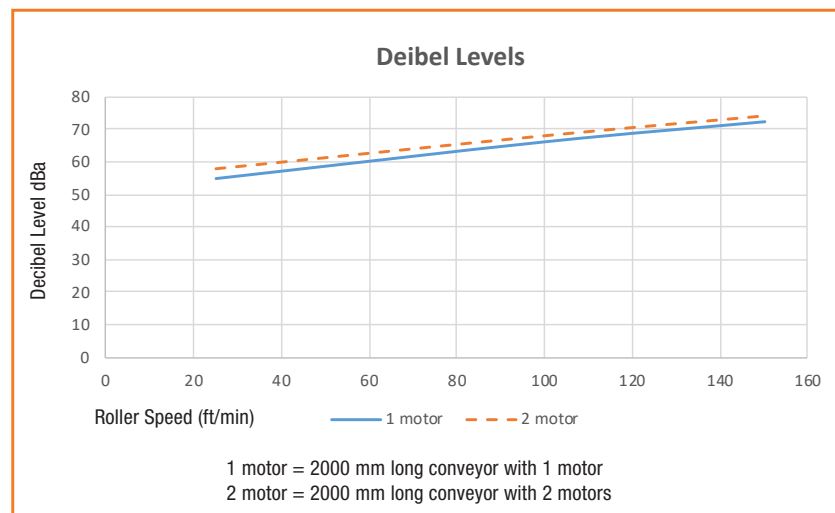
| Test Report No. : 721653387<br>Report Date: 27 April 2020   |   |
|---|---|
| <b>SUBJECT</b>  | Airborne particle concentration Test for ERT250 Conveyor  |
| <b>TEST LOCATION</b>  | TÜV SÜD China<br>TÜV SÜD Products Testing (Shanghai) Co., Ltd.<br>B-3/4, No. 1999 Du Hu Road, Minhang District<br>Shanghai 201108, P.R. China |
| <b>CLIENT NAME</b>  | Dorner Manufacturing Corp.  |
| <b>CLIENT ADDRESS</b>   | 975 Cottonwood Avenue Hartland, Wisconsin, USA  |
| <b>TEST PERIOD</b>  | 13-Apr-2020-21-Apr-2020   |
| <b>TEST REQUEST</b>   | ISO 14644-1:2015 Cleanrooms and associated controlled environments<br>- Part1:Classification of air cleanliness by particle concentration     |
| <b>Prepared By</b><br><i>Nance Gao</i><br>(Nance Gao)<br>Report Drafter   | <b>Authorized By</b><br><i>(Signature)</i><br>(Saver Zhang)<br>Authorized Signatory   |
| <b>TEST CONCLUSION</b><br>The airborne particle concentration testing result complies with ISO Class 4 specified in ISO 14644-1:2015 when the conveyor was put in above mentioned laboratory testing condition.   |   |
| <small>Note: (1) General Terms &amp; Conditions as mentioned overleaf. (2) The results relate only to the items tested.(3) The test report shall not be reproduced except in full without the written approval of the laboratory.(4) Without the agreement of the laboratory, the client is not authorized to use the test results for unapproved propaganda.</small> |   |
| <small>Chemical/Wearability Laboratory<br/>TÜV SÜD Products Testing (Shanghai) Co., Ltd.<br/>B-3/4, No. 1999 Du Hu Road, Minhang District<br/>Shanghai 201108<br/>P.R. China</small>  |   |
| <small>Phone : +86 (21) 6037 6375<br/>Fax : +86 (21) 6037 6345<br/>Email: food.shen@tuv-sud.cn<br/>Website: www.tuv-sud.cn</small>  |   |
| <small>Regional Head Office:<br/>TÜV SÜD Certification and Testing<br/>(China) Co., Ltd.<br/>No.151 Hong Tong Road Shanghai<br/>200 070 P.R.China</small>   |   |

## Conveyor Noise Level (Decibel Ratings)

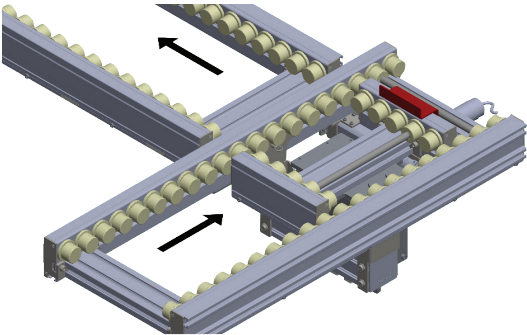
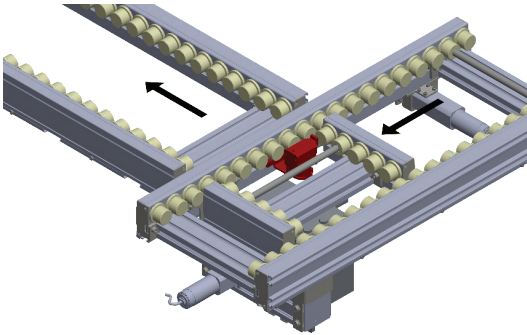
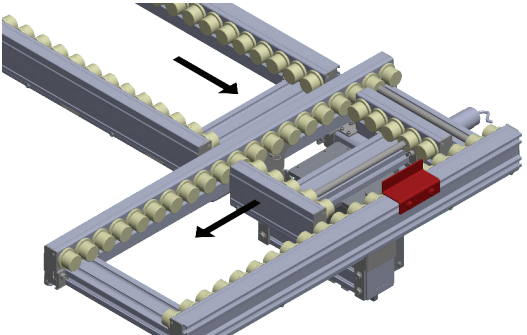
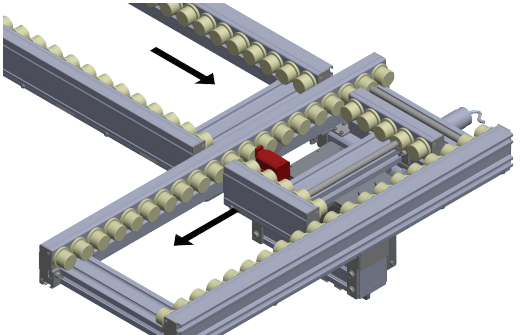
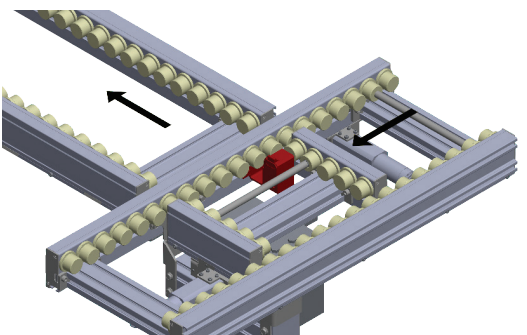
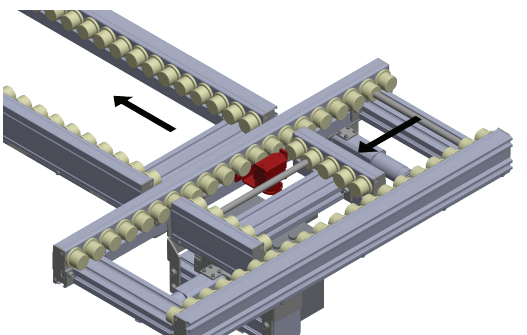
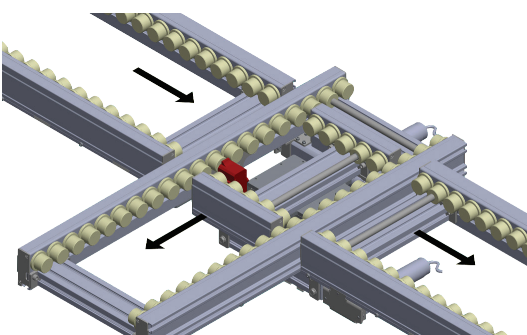
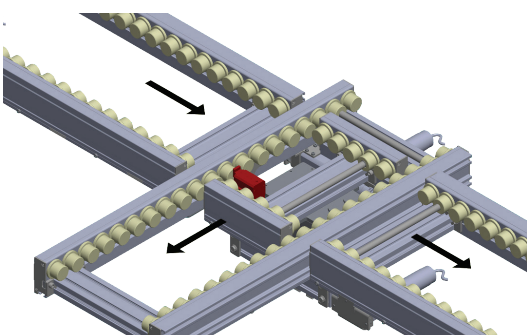
The actual noise level generated by the conveyor depends on several factors: the installation configuration, the product running on the conveyor, the surrounding equipment, the conveyor options and belt speed. The noise level generated by the conveyor is typically less than the general noise level of factory equipment.

The following charts provide basic decibel ratings for a typical conveyor arrangements.

### ERT250 Conveyors:



## Lift & Transfer Pallet Stop Configurations

|           |           | Non-Cushioned   | Cushioned  |
|-----------|-----------|---|--|
| End Stop  | Sending   |    |    |
|           | Receiving |   |   |
| Pass Thru | Sending   |  |  |
|           | Receiving |  |  |

## Calculating Conveyor Belt Speed

### ERT250 Conveyors:

To calculate the conveyor belt speed you need to know the following factors:

- Roller diameter: 38 mm (1.5 in)
- RPM of gearmotor

Note: All gearing in the ERT250 conveyor is 1:1 ratio

Belt Speed:

$$(\text{ft/min}) = (\text{Drive roller diameter}/12) * (3.14) * (\text{RPM of gearmotor})$$

$$(\text{m/min}) = (\text{Drive roller diameter, mm}/1000) * (3.14) * (\text{RPM of gearmotor})$$

Example: ERT250 Conveyor and gearmotor. The gearmotor is a 33:1 ratio with 176 rpm output.

$$\text{Belt Speed (ft/min)} = (1.5/12) * (3.14) * (176)$$

$$\text{Belt speed (ft/min)} = 69 \text{ ft/min}$$

## Calculating Conveyor Load Capacity

There are several factor(s) that effect the overall conveyor load of the ERT250 conveyor.

These include:

- Conveyor size and configuration
- Conveyor speed
- Application temperature
- Product accumulation
- Number of starts and stops per hour

Located online at [www.dornerconveyors.com](http://www.dornerconveyors.com) is the Dorner conveyor configuration tool, DTools. This tool allows you to configure your conveyor layout and determine the maximum load capacity for the conveyor. It is suggested that this program be used to calculate the conveyor load as the calculation is quite complicated. This configuration program however does not take into account temperature, dirty conditions, and conveyor starts and stops. If these conditions are part of your application please use the load reducing factors as shown below.

Maximum Load = (Load from DTools)(Temperature Factor)(Start/Stop Factor)

| Temperature Factor  |               |                    |
|---|---------------|--------------------|
| Ambient temperature can negatively affect the capacity of the conveyor. |               |                    |
| Temperature F   | Temperature C | Temperature Factor |
| -4  | -20           | 1.0                |
| 32  | 0             | 1.0                |
| 68  | 20            | 1.0                |
| 104   | 40            | 0.9                |
| 140   | 60            | 0.8                |

| Start / Stop Factor   |                     |
|---|---------------------|
| Frequent Start / Stops of the conveyor can negatively affect the capacity of the conveyor. All start / stop applications must use a soft start mechanism such as a Frequency Inverter with a 1 second acceleration cycle. |                     |
| Application Condition   | Start / Stop Factor |
| Continuous Run or 1 start/stop per hour   | 1.0                 |
| Maximum 10 starts/stop per hour   | 0.83                |
| Maximum 30 starts/stop per hour   | 0.70                |
| Greater than 30 starts/stop per hour  | 0.62                |



## ERT Pallet Weights Kg (lbs)

| ERT250 Pallet Weights Kg (lbs) |                    |                   |                   |                   |
|--------------------------------|--------------------|-------------------|-------------------|-------------------|
| Pallet Width (mm)              | Pallet Length (mm) | 1/4 in Alum Plate | 3/8 in Alum Plate | 1/2 in Alum Plate |
| 320                            | 320                | 2.6 (5.8)         | 3.6 (8)           | 4.6 (10.1)        |
| 320                            | 480                | 3.8 (8.3)         | 5.3 (11.7)        | 6.7 (14.8)        |
| 400                            | 400                | 3.9 (8.6)         | 5.5 (12.1)        | 7 (15.4)          |
| 400                            | 480                | 4.6 (10.1)        | 6.5 (14.3)        | 8.3 (18.3)        |
| 480                            | 480                | 5.4 (11.9)        | 7.7 (17)          | 9.9 (21.7)        |
| 480                            | 640                | 7 (15.5)          | 10.1 (22.3)       | 13 (28.6)         |
| 640                            | 640                | 9.2 (20.2)        | 13.3 (29.3)       | 17.1 (37.7)       |
| 640                            | 800                | 11.3 (24.9)       | 16.5 (36.3)       | 21.3 (46.8)       |
| 800                            | 800                | 14 (30.7)         | 20.4 (44.9)       | 26.4 (58)         |

## Automation Modules – Pneumatic Specifications

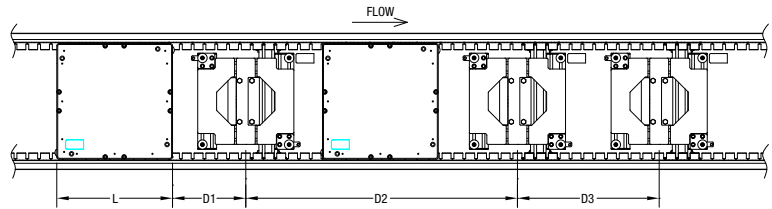
| ERT250 Pneumatic Specifications |                                     |                 |                 |             |               |                   |                  |                   |
|---------------------------------|-------------------------------------|-----------------|-----------------|-------------|---------------|-------------------|------------------|-------------------|
| Devise                          | Action                              | Bore Diameter   | Stroke          | Return Type | Force per Psi | Sensor Compatible | Fitting Tap Size | Fitting Tube Size |
| Lift & Locate                   | Lift cylinder, 320 to 400 mm wide   | 63 mm (2.5 in)  | 50 mm (2 in)    | Pneumatic   | 4.9 lb        | Yes               | 1/4 NPT          | 1/4 in            |
|                                 | Lift cylinder, 480 to 800 mm wide   | 80 mm (3.1 in)  | 50 mm (2 in)    | Pneumatic   | 7.7 lb        | Yes               | 3/8 NPT          | 1/4 in            |
| Lift & Transfer                 | Lift cylinder, 320 to 400 mm wide   | 63mm (2.5 in)   | 50 mm (2 in)    | Pneumatic   | 4.9 lb        | Yes               | 1/4 NPT          | 1/4 in            |
|                                 | Lift cylinder, 480 to 800 mm wide   | 80 mm (3.1 in)  | 50 mm (2 in)    | Pneumatic   | 7.7 lb        | Yes               | 3/8 NPT          | 1/4 in            |
| Lift & Rotate                   | Lift cylinder, 320 to 400 mm wide   | 63 mm (2.5 in)  | 50 mm (2 in)    | Pneumatic   | 4.9 lb        | Yes               | 1/4 NPT          | 1/4 in            |
|                                 | Lift cylinder, 480 to 800 mm wide   | 80 mm (3.1 in)  | 50 mm (2 in)    | Pneumatic   | 7.7 lb        | Yes               | 3/8 NPT          | 1/4 in            |
|                                 | Rotary Actuator, 320 to 400 mm wide | 10 mm (0.4 in)  | n/a             | Pneumatic   | n/a           | Yes               | 1/8 NPT          | 1/4 in            |
|                                 | Rotary Actuator, 480 to 800 mm wide | 20 mm (0.8 in)  | n/a             | Pneumatic   | n/a           | Yes               | 1/8 NPT          | 1/4 in            |
| Pallet Pusher                   | Pusher cylinder                     | 32 mm (1.34 in) | 52 mm (2.04 in) | Pneumatic   | 1.2           | Yes               | 1/8 NPT          | 1/4 in            |
| Pallet Stop, Cushioned          | Light Load, Retract                 | 35 mm (1.4 in)  | 9 mm (0.35 in)  | Spring      | n/a           | No                | GM5              | 1/4 in            |
|                                 | Heavy Load, Retract                 |                 |                 | Spring      | n/a           | No                | G 1/8            | 1/4 in            |
| Pallet Stop, Non-Cushioned      | Light Load, Retract                 | 35 mm (1.4 in)  | 9 mm (0.35 in)  | Spring      | n/a           | No                | GM5              | 1/4 in            |
|                                 | Heavy Load, Retract                 |                 |                 | Spring      | n/a           | No                | G 1/8            | 1/4 in            |

Dimensions = mm (in)

## ERT250 Module Spacing Guidelines

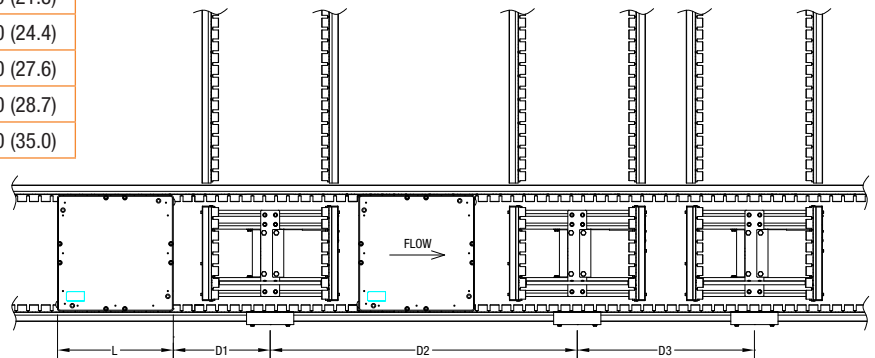
**Pallet/Stop to Lift & Locate and Lift & Locate Spacing\***

| Pallet Length | Minimum Distance D1 | Minimum Distance D2 | Minimum Distance D3 |
|---------------|---------------------|---------------------|---------------------|
| 320 (12.6)    | 162 (6.4)           | 820 (32.3)          | 410 (16.1)          |
| 400 (15.75)   | 202 (7.9)           | 980 (38.6)          | 490 (19.3)          |
| 480 (18.9)    | 242 (9.5)           | 1140 (44.9)         | 570 (22.4)          |
| 640 (25.2)    | 402 (15.8)          | 1460 (57.5)         | 730 (28.7)          |
| 800 (31.5)    | 562 (22.1)          | 1780 (70.1)         | 890 (35.0)          |



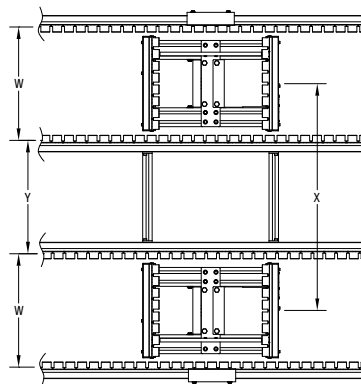
**Pallet/Stop to Lift & Transfer and Lift & Transfer Spacing\***

| Pallet Length | Minimum Distance D1 | Minimum Distance D2 | Minimum Distance D3 |
|---------------|---------------------|---------------------|---------------------|
| 320 (12.6)    | 250 (9.8)           | 880 (34.6)          | 540 (21.3)          |
| 400 (15.75)   | 280 (11.0)          | 1040 (40.9)         | 620 (24.4)          |
| 480 (18.9)    | 330 (13.0)          | 1200 (47.2)         | 700 (27.6)          |
| 640 (25.2)    | 410 (16.1)          | 1520 (59.8)         | 730 (28.7)          |
| 800 (31.5)    | 490 (19.3)          | 1840 (72.4)         | 890 (35.0)          |

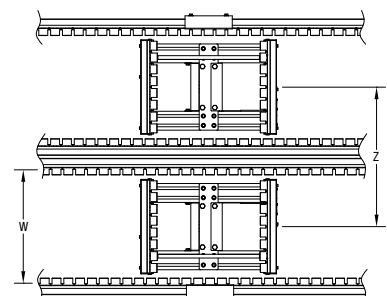


**Parallel Conveyors with Lift & Transfer**

| Pallet Width | Minimum Distance X | Minimum Distance Y | Minimum Distance Z |
|--------------|--------------------|--------------------|--------------------|
| 320 (12.6)   | 680 (27.8)         | 250 (9.8)          | 435 (17.1)         |
| 400 (15.75)  | 760 (29.9)         | 250 (9.8)          | 515 (20.3)         |
| 480 (18.9)   | 840 (33.0)         | 250 (9.8)          | 595 (23.4)         |
| 640 (25.2)   | 1000 (39.4)        | 250 (9.8)          | 755 (29.7)         |
| 800 (31.5)   | 1160 (45.7)        | 250 (9.8)          | 915 (36.0)         |

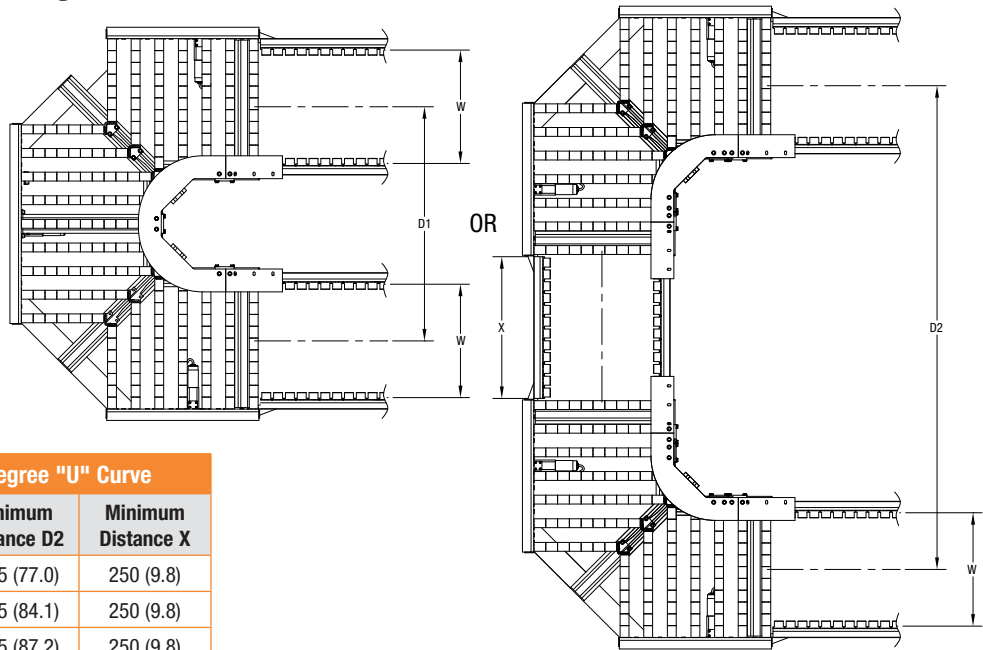


OR



Dimensions = mm (in)

## ERT250 Module Spacing Guidelines *Continued*

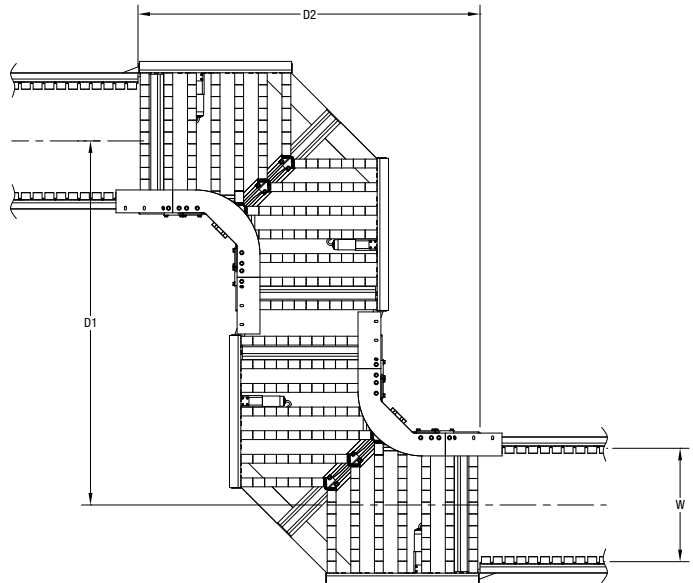


**Parallel Conveyors with 180 Degree "U" Curve**

| Pallet Length | Minimum Distance D1 | Minimum Distance D2 | Minimum Distance X |
|---------------|---------------------|---------------------|--------------------|
| 320 (12.6)    | 840 (33.1)          | 1955 (77.0)         | 250 (9.8)          |
| 400 (15.75)   | 920 (36.2)          | 2135 (84.1)         | 250 (9.8)          |
| 480 (18.9)    | 1000 (39.4)         | 2215 (87.2)         | 250 (9.8)          |
| 640 (25.2)    | 1160 (45.7)         | 2475 (97.4)         | 250 (9.8)          |
| 800 (31.5)    | 1160 (45.7)         | 2735 (107.7)        | 250 (9.8)          |

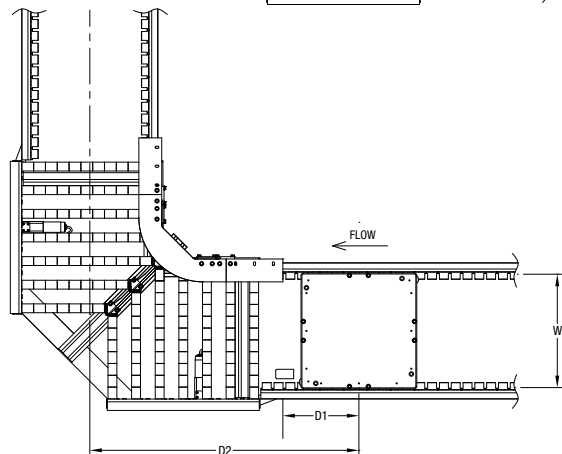
**Parallel Conveyors with 180 Degree "S" Curve**

| Pallet Length | Minimum Distance D1 | Minimum Distance D2 |
|---------------|---------------------|---------------------|
| 320 (12.6)    | 1705 (67.1)         | 1705 (67.1)         |
| 400 (15.75)   | 1885 (74.2)         | 1885 (74.2)         |
| 480 (18.9)    | 1965 (77.4)         | 1965 (77.4)         |
| 640 (25.2)    | 2225 (87.6)         | 2225 (87.6)         |
| 800 (31.5)    | 2485 (97.8)         | 2485 (97.8)         |



**Lift & Locate Before 90 Degree Corner**

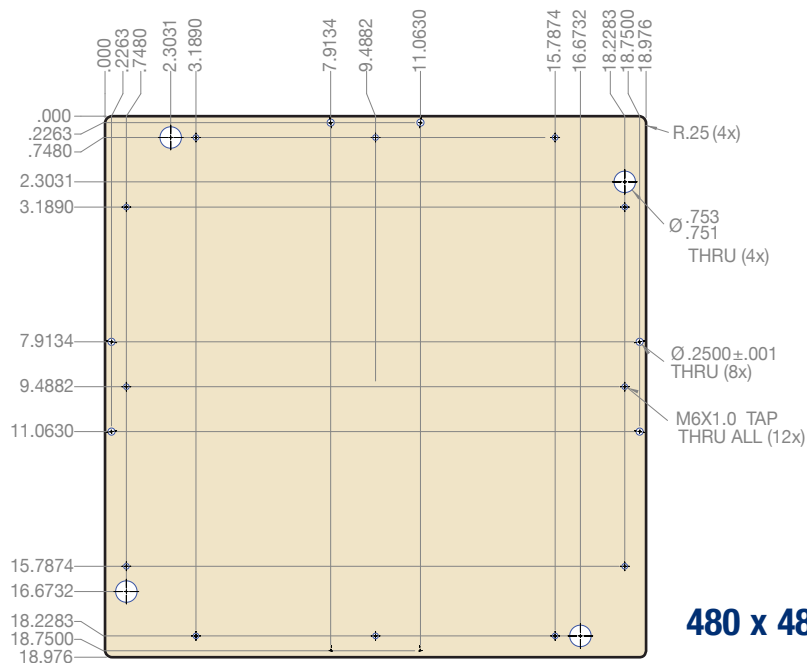
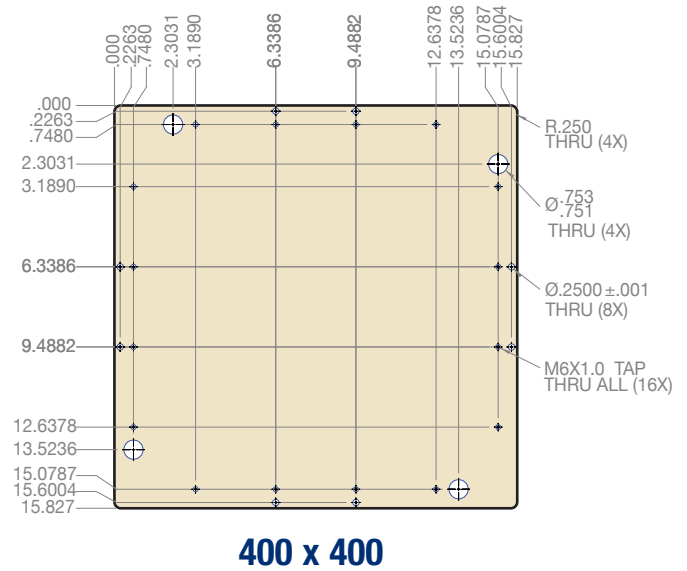
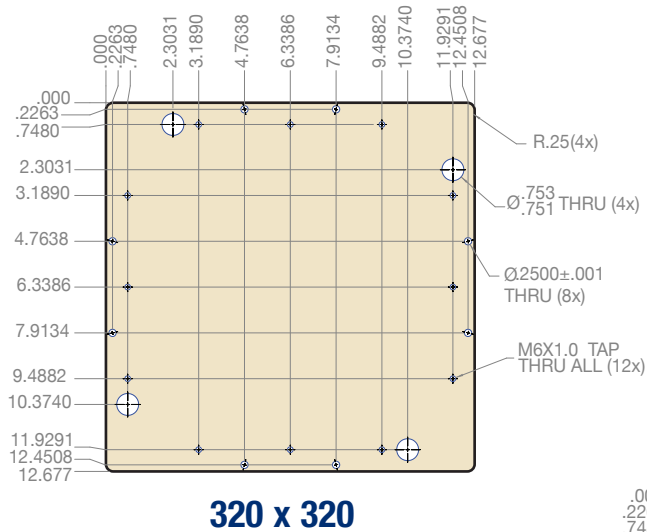
| Pallet Length | Minimum Distance D1 | Minimum Distance D2 |
|---------------|---------------------|---------------------|
| 320 (12.6)    | 250 (9.8)           | 1100 (43.3)         |
| 400 (15.75)   | 290 (11.4)          | 1230 (48.4)         |
| 480 (18.9)    | 370 (14.6)          | 1350 (53.1)         |
| 640 (25.2)    | 530 (20.9)          | 1640 (64.6)         |
| 800 (31.5)    | 690 (27.2)          | 1930 (76.0)         |



Dimensions = mm (in)  
Note: All dimensions assume square pallets

## ERT250 Pallet Plate Details Dimensions

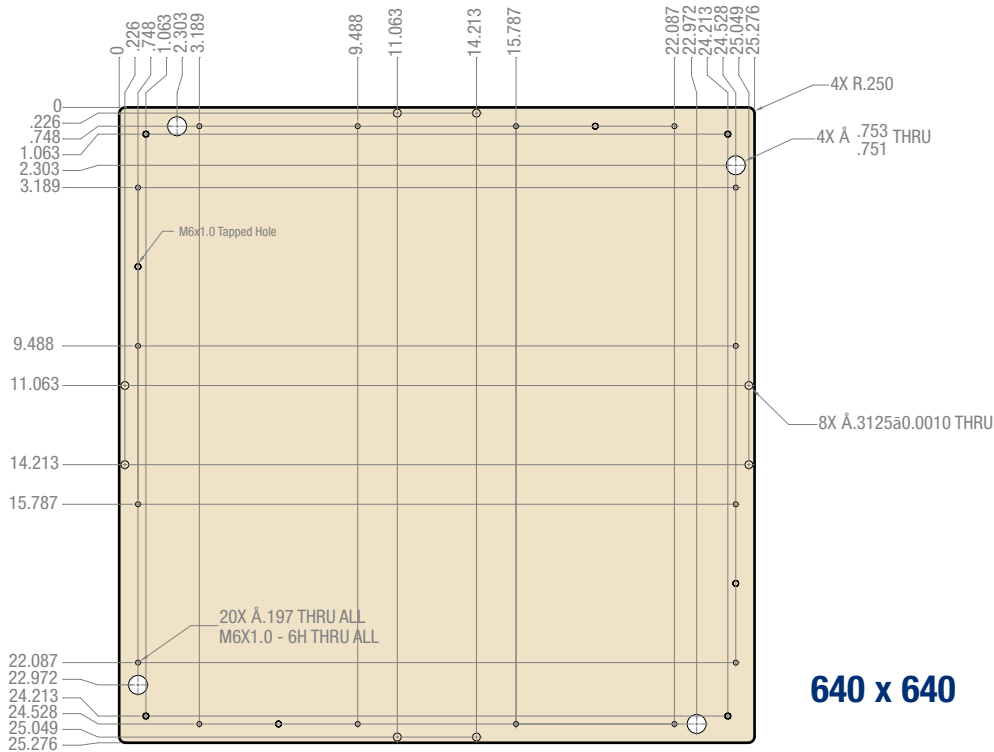
The following details are for standard square pallets only. For other size pallets contact Dorner.



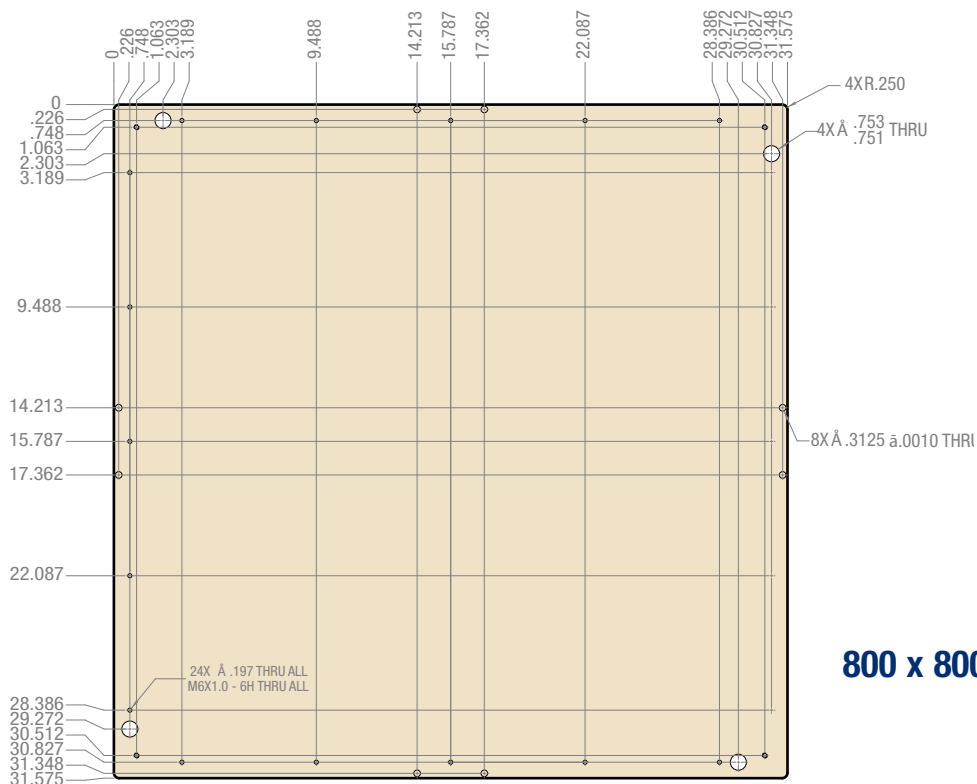


## ERT250 Pallet Plate Details Dimensions *Continued*

The following details are for standard square pallets only. For other size pallets contact Dorner.



**640 x 640**



**800 x 800**

## ERT250 Conveyors are best for:

- Pallet & Tray Handling
- No & Low Back Pressure Accumulation
- Cleanroom Applications
- Large & Medium Assembly Automation
- Medical Product Manufacturing
- Packaging
- Medical Device Manufacturing
- Automotive Assembly
- Electronic & Consumer Goods Assembly
- Appliance Manufacturing

## Sizes & Measurements

- 120 mm to 960 mm wide
- 150 mm long tray minimum
- 38 mm diameter rollers on 50 mm centers

## Slip & Driven Rollers



Driven Roller  
(over molded on shaft)



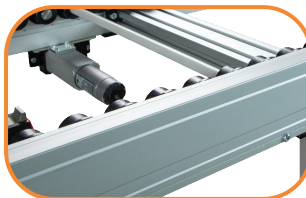
Slip Roller

## Slide Rail Options

Aluminum frame with two T-slot options



T-slot Rail



Flush Side Rail (Cleanroom)

## Loads & Speeds

- Loads: up to 114 kg (250 lbs) per pallet or tray
- Up to 6.8 kg (15 lbs) per roller
- Speeds: up to 37 m/min (121 ft/min)

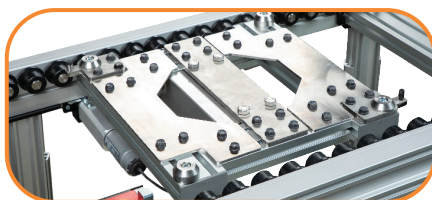


## Pallets

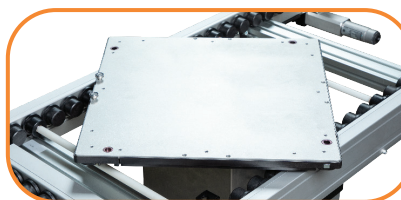
- 320 to 800 mm pallets
- Static conductive HPDE skirt
- Proximity sensor pick-up on side and bottom
- Optional pin tracking ball bearings for corner conveyors



## Modules



Lift & Locate



Lift & Rotate



Lift & Transfer



90 & 180 Degree Corners

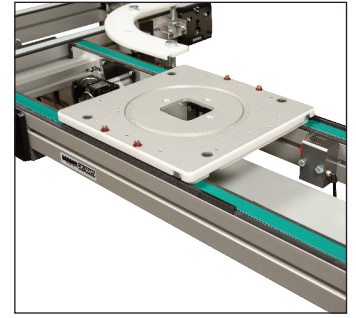
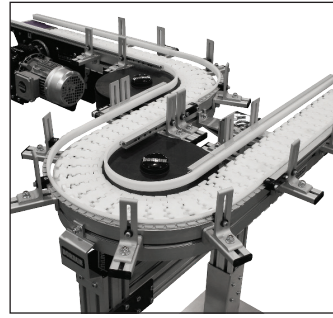
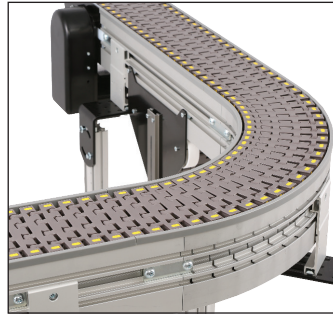


Pallet Pusher

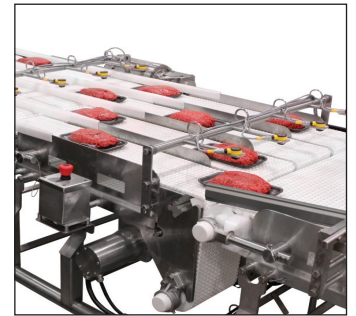
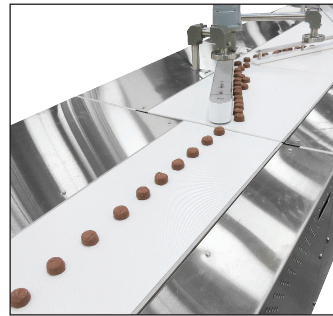
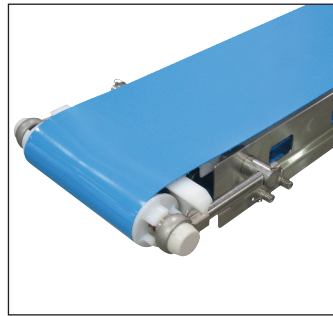
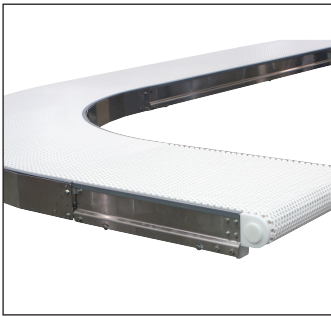


Pallet Stops

# Industrial & Automation Conveyors



## Sanitary Conveyors



## Engineered Solutions



Parts



Service



Online Configurator



Warranty

# Transforming Conveyor Automation

## Dorner – North & South America

### Dorner – U.S.A. Headquarters

975 Cottonwood Ave  
Hartland, WI 53029, USA  
(800) 397-8664  
(262) 367-7600  
info@dorner.com

### Dorner – Canada

100-5515 North Service Road  
Burlington, Ontario L7L 6G6  
Canada  
(289) 208-7306  
info@dorner.com

### Dorner – Latin America

Carretera a Nogales #5297,  
Nave 11. Parque Industrial Nogales  
Zapopan, Jalisco C.P. 45222  
Mexico  
+52.33.30037400  
info.latinamerica@dorner.com



## Dorner – Europe

### Dorner – Germany

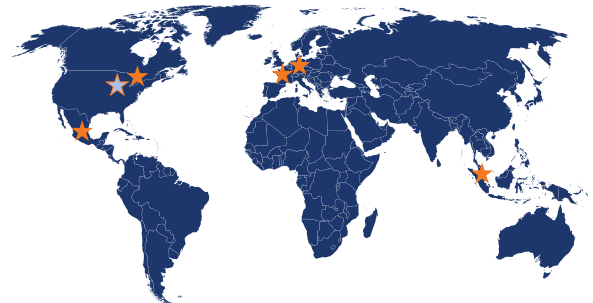
Karl-Heinz-Beckurts-Straße 7  
52428 Jülich,  
Germany  
+49 (0) 2461/93767-0  
info.europe@dorner.com

### Dorner – France

8 rue des Frères Caudron  
78140 Velizy-Villacoublay  
France  
+33 (0)1 84 73 24 27  
info.france@dorner.com

## Dorner – Asia

128 Jalan Permatang Damar Laut, Bayan Lepas 11960  
Penang, Malaysia  
+604-626-2948 | info.asia@dorner.com



[www.dornerconveyors.com](http://www.dornerconveyors.com)