# MST

## Full Height Turnstile

The MST is the most trusted, secure and reliable full height turnstile available. It is installed in thousands of locations around the world and offers key product features and benefits only provided by Alvarado. Electrically controlled MST models integrate with any access control system.



## COMMON APPLICATIONS

- Perimeter Control/Fence Line Security
- Time and Attendance Integration
- Loss Prevention
- Employee and Visitor Access Control
- Unmanned Point of Entry
- Single Direction Control and/or One-Way Exiting

## TYPICAL INSTALLATION SITES

- Military Installations
- Refineries and Power Distribution Centers
- Ports, Harbors and Airports
- Construction Sites
- Correctional Institutions
- Manufacturing and Distribution Centers
- City Parks and Recreation Sites
- Sports Parks, Arenas and Stadiums
- Zoos and Amusement Parks



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## FUNCTION

MST turnstiles are designed to control access into and out of facilities. Among its many attributes, the MST comes with self-adjusting, self-centering, speed control. This unique feature ensures a consistently even rotation, and smoothly self-centers the turnstile under all conditions. The MST is suitable for indoor or outdoor use. Contact Alvarado for recommendations on finishes and specific weatherization options for harsh environments.

## AVAILABLE CONFIGURATIONS

### MST-3 (MANUAL CONTROL)

Using included key locks on the underside of the turnstile top channel, the MST-3 can be configured to provide free passage in both directions; free passage in one direction and restricted passage (locked) in the opposite direction; or restricted passage (locked) in both directions.

### MST-6X (ELECTRIC LOCK CONTROL)

Provides separate electric lock controls for both directions. The key lock override controls described in the manual control unit above are included. The MST-6X interfaces with virtually any access control system.

## AVAILABLE FINISHES

### GALVANIZED

All exterior steel materials are hot-dip galvanized to ASTM Standards A123/A153. Galvanized units, like all Alvarado MSTs, have stainless steel top channel covers.

### POWDER COATED

All exterior steel materials are powder coated. Powder coating is available in a variety of colors.

### STAINLESS STEEL

All external materials are fabricated from #304 stainless steel polished to a #4 satin finish. Exterior welds are electro-polished.

### POWDER COATED OVER GALVANIZED OR STAINLESS STEEL

External galvanized or stainless steel materials are powder coated. Powder coating is available in a variety of colors.

## MATERIALS

### TOP CHANNEL

The exterior housing is fabricated from 16-gauge #304 stainless steel, regardless of finish. The interior top channel frame is a 7" wide U-frame fabricated from 4-gauge powder coated steel. The top channel houses the control mechanism and electrical components.

### YOKE GUARD PLATE (COVER)

A 16-gauge steel (or #304 stainless steel) sheet securely fastens to the top channel and yoke.

### YOKE (CURVED SECTION)

The yoke is a fully welded single assembly consisting of 10 vertical tubes notched and welded to two upper and lower horizontal tubes. Two 3/16" x 1" steel straps are welded to the vertical tubes for support. Vertical tubes and upper and lower horizontal tubes are 1.75" OD x 16-gauge steel (or #304 stainless steel) tubing. Electrically controlled models come with card reader plate receivers welded to the outside vertical yoke tube. Card reader attachment plates mount to the receivers to allow easy attachment of access control readers to the turnstile. No external fasteners are used in the construction of the yoke.

### ROTO (ROTATING SECTION)

The roto is a fully welded single assembly consisting of 13 arms per section (total of 39 arms per roto) notched and welded to a vertical tube. Arms are 1.75" OD x 14-gauge steel (or 16-gauge #304 stainless steel) tubing. Arms have either a welded metal cap (powder coated or stainless steel models) or a ribbed, force-fit plastic cap (galvanized models). The vertical tube is 3" OD x 6-gauge steel (or #304 stainless steel) tubing. No external fasteners are used in the construction of the roto.

### OV (BARRIER SECTION)

The OV is a fully welded single assembly consisting of 13 arms notched and welded to a vertical tube. Arms are 1.75" OD x 14-gauge steel (or 16-gauge #304 stainless steel) tubing. The vertical tube is 3" OD x 6-gauge steel (or #304 stainless steel) tubing. Arms have either a welded metal cap (powder coated or stainless steel models) or a ribbed, force fit plastic cap (galvanized models). No external fasteners are used in the construction of the OV.

## CONTROLS, OPERATIONAL MODES AND FUNCTIONALITY

### CONTROL MECHANISMS

**Turnstile Control Board (TCB)**

The turnstile control board (TCB) is a controller that controls activation and turnstile functions. Activation for either direction of operation is achieved by supplying a momentary dry contact to the TCB. Terminal strips on the board provide access to the available I/O. Communication between the turnstile and access control system is in the form of dry contact inputs and outputs. A primary power to low voltage, UL Listed transformer located in the turnstile top channel provides appropriate low voltage power to the TCB. The transformer may be bypassed by providing either 10VAC or 13.5VDC directly to the TCB.

| | |
|---|---|
| Locking Control | The locking and unlocking of the turnstile is controlled with hardened-steel lock arms that are moved into the appropriate locked or unlocked position by continuous duty rated solenoids and spring assemblies. There is independent control of each rotational direction. |
| Opto-Interruptor Detection Assembly | Rotation of the turnstile is detected by an internal opto-interruptor assembly. No mechanical microswitches are used. |
| Speed Control and Self-Centering Mechanism | Turnstiles have Alvarado's speed control system that self-adjusts to the pushing force of the user. This ensures a safe, controlled, turnstile rotation and safely and smoothly returns the rotating turnstile section to the home position. |
| Cam Shaft Assembly (Splined Connection) | The cam and shaft assembly consists of a stainless steel, investment cast lobed cam welded to a splined shaft. The splined shaft fits into a reciprocal splined coupling in the top of the roto, creating a solid non-slip connection that ensures very precise movement and reduces mechanism wear. The design makes it mechanically impossible to improperly install the roto. |
| Enclosed Bearing Assemblies | The cam and shaft assembly housed in the top channel rotates in a bearing assembly consisting of two outdoor-rated precision bearings. The upper visible bearing is protected by a sheet metal cover. The roto is installed on an outdoor-rated lower bearing assembly also protected by a sheet metal cover. |
| Card Reader Plate Recievers | All electric lock control models come with card reader plate receivers on both entry and exit sides of the yoke. Optional card reader attachment plates attach to the receivers to allow easy attachment of access control devices to the turnstile. Feeder wires are provided to simplify the process of running cable through the turnstile yoke up into the turnstile top channel. |

## PASSAGE MODES - ELECTRIC LOCK CONTROL MODELS

Electrically controlled turnstiles offer the following user configurable passage modes:

| | |
|---|---|
| Controlled Passage | The roto is locked in place in the home position. Upon receipt of an authorization signal from an access control system, the turnstile unlocks in the appropriate direction, allowing a single passage in the authorized direction. The roto returns to the closed position after the user has passed through the turnstile or the user-defined time frame allowed for an entry to occur expires. Controlled passage can be either single direction or bidirectional. |
| Free Passage | An authorization signal is not required for a user to pass through the turnstile. Either rotation direction can be set to free passage using the key locks located on the underside of the top channel. |
| No Passage | No passage is allowed. The roto is locked in place. Valid electronic credentials are ignored. |
| Remote Passage Mode Configuration | The above passage modes can be controlled remotely through inputs on the TCB. The access control system uses these inputs to set the desired mode, or Alvarado offers an optional 3-position key switch (Remote Turnstile Mode Key Switch Option) that is field wired into the TCB. Turning the key to one of three positions places the turnstile in Controlled Passage mode, Free Passage mode or No Passage mode. A seperate key switch is required for each rotation direction. |

### PASSAGE MODES - MANUAL CONTROL MODELS

Manual turnstiles offer the following user configurable passage modes:

| | |
|---|---|
| Free Passage / No Passage | Using the included key lock control, the MST-3 can be configured to provide free passage in both directions; free passage in one direction and restricted passage (locked) in the opposite direction; or restricted passage (locked) in both directions. |

### FUNCTIONALITY - OTHER FEATURES AND TOOLS

| | |
|---|---|
| Operational Configuration | The standard electric lock configuration is fail-lock (CCW)/fail-safe (CW). Other configurations are available including fail-lock in both directions or fail-safe in both directions. |
| Field Configuration Changes | Our turnstile design makes it very easy to change configurations in the field. Competitor turnstiles require removing and returning the entire top channel to the factory for configuration changes. |
| Automatic Turnstile Relock | This feature adjusts the time a user may pass through the turnstile after an activation (unlock) signal has been received. The default setting is 20 seconds before the turnstile automatically relocks. Additional settings are 5, 10 and 15 seconds. |
| Independent Turnstile Testing | The turnstile control board includes test activation buttons which allow the unlocking function to be tested independent of the access control system. This is an excellent tool for troubleshooting. |
| Junction Box | The transformer assembly in the turnstile top channel includes a fused junction box with UL Listed transformer. |

## CARD READERS / PHYSICAL ACCESS DEVICES

Electrically controlled models come with card reader plate receivers welded to the outside vertical yoke tube. Alvarado offers optional card reader attachment plates that attach to the receivers. The card reader/physical access devices attach directly to the card reader attachment plates. Feeder wires are provided to simplify the process of running cable through the turnstile yoke up into the turnstile top channel.

Alvarado can also custom fabricate large plates and enclosures that are welded to the turnstile yoke to accommodate large devices or custom applications.

## TURNSTILE INTERFACE TO ACCESS CONTROL SYSTEM

There are two types of interfaces to allow an access control system to operate with the turnstile:

| | |
|---|---|
| Dry Contact | Single passage activation is achieved by supplying an isolated, voltage-free, momentary dry contact of 1 second or less to the appropriate location on the turnstile control board. An output is provided when the turnstile is rotated. A description of available input and output signals is provided below. |
| Serial | Alvarado offers an optional turnstile controller that accepts an RS-232 or RS-485 serial communication activation signal. Contact Alvarado for information (see Options). |

A description of the available input and output signals (dry contacts) from the turnstile control board are provided below:

| Input Signal | Entry / Exit |
|---|---|
| Passage Direction Closed | √ |
| Passage Direction Open | √ |
| Good Card (Single Activation) | √ |
| Bad Card (Used with JS3 Light Option) | √ |

| Output Signal | Entry / Exit |
|---|---|
| Rotational Signal | √ |

## OPTIONS

### 220VAC

A 220VAC, 50 - 60 Hz transformer is substituted for the standard 110VAC transformer. 220VAC units bear CE marking, except for battery backup capability which is not available on CE marked units.

### BATTERY BACKUP

A trickle charge battery system is installed in the top channel to provide limited duration operation if primary power to the turnstile is lost. Not available on CE marked units.

### CARD READER ATTACHMENT PLATES

6" x 6" card reader attachment plates allow the attachment of the majority of card readers used. Custom designed plates and enclosures are available. Contact Alvarado for more information.

### CHANNEL COVER MONITOR

Provides an output when the top channel cover is removed.

### ELECTRIC LOCK CONTROL UPGRADE (MODEL MST-3 UNITS ONLY)

All model MST-3 units can be converted to electric lock control. MST-3 top channel frames include brackets and insertion holes to allow for easy field retrofit by a qualified technician.

### ENHANCED ENVIRONMENTAL PROTECTION

Additional protection measures are available for installation in harsh environments. These include additional sealing and heating inside the top channel. Contact Alvarado for more information.

### EXPEDITED MANUFACTURING TIMES

Expedited manufacturing times are available. Contact Alvarado for more information.

### FAIL-LOCK / FAIL-LOCK OPERATION

Both sides of the turnstile will remain locked upon loss of power. Key overrides (which are standard) can still be used to unlock the turnstile. The MST-6X unit is supplied in a fail-lock (entry)/fail-safe (exit) mode as default.

### FAIL-SAFE / FAIL-SAFE OPERATION

Both sides of the turnstile will unlock upon loss of power and provide free passage in both directions. The MST-6X unit is supplied in a fail-lock (entry)/fail-safe (exit) mode as default.

### LOCK ARM MONITOR

Provides an output when either lock arm is engaged. Monitors are required for each direction of operation.

### OPEN / CLOSED STATUS LIGHTS

Highly visible red/green lights are flush installed in the turnstile top channel in the controlled directions. An illuminated green light indicates the turnstile is open for controlled operation or free passage. An illuminated red light indicates that no passage will be allowed through the turnstile. This option is often used in conjunction with the Turnstile Mode Key Switch (option RKO-3). The lights can also be controlled through most access control systems.

### OUT OF SERVICE LOCK BRACKET

Enables the turnstile to be secured with a padlock when the turnstile is out of service.

### PADDED HEEL / ARM PROTECTIVE SLEEVES

Padded sleeves for arms at pushing level or for lower roto arms. Heel/Arm sleeves are packaged three to a set.

### PUSH BUTTON ASSEMBLY

Unlocks the turnstile for one passage. The stainless steel push button assembly can be supplied separately (uninstalled) or attached to the turnstile.

### READER PLATE RECEIVER COVER

A small aluminum plate used to cover an unused reader plate receiver.

### RKO-3 (REMOTE TURNSTILE MODE KEY SWITCH)

A 3-position key switch is provided that allows the turnstile to be placed in one of three operational modes. A key switch is required for each direction of operation.

**Controlled Passage** The roto is locked in place in the home position. Upon receipt of an authorization signal from an access control system, the turnstile unlocks in the appropriate direction, allowing a single passage in the authorized direction. The roto returns to the closed position after the user has passed through the turnstile or the user defined time frame allowed for an entry to occur expires. Controlled passage can be either single direction or bi-directional.

| | |
|---|---|
| **Free Passage** | An authorization signal is not required for a user to pass through the turnstile. |
| **No Passage (Direction Closed)** | No passage is allowed. The roto is locked in place. Valid electronic credentials are ignored and passage is not allowed. |

## SERIAL INTERFACE TURNSTILE CONTROL BOARD

The standard turnstile control board is substituted with a control board that accepts an RS-232 or RS-485 serial communication activation signal. Contact Alvarado for more information.

## TOP CHANNEL STABILIZER

A top channel stabilizer can be provided to increase rigidity between the OV and the top channel.

## USER NOTIFICATION ACTIVATION LIGHTS (JS-3 LIGHTS)

Available for use with MST-6X models, an LED array in a weatherized housing is located on the turnstile yoke slightly above and behind the card reader plate receiver area. The JS-3 option allows the user to select one of two signal arrays: red/green or yellow/green/red. The user selection is made via a jumper on the turnstile control board.

The light arrays function in one of the following manners:

### RED / GREEN SELECTION

| | |
|---|---|
| **Red Light** | Normal “ready” state; indicates the turnstile is locked and ready for card presentation. |
| **Green Light** | Illuminates when the access control system provides the turnstile controller an “authorized” input. When the green light illuminates, the turnstile will unlock and remain unlocked until the turnstile is rotated or the time for passage expires. |

### YELLOW / GREEN / RED SELECTION

| | |
|---|---|
| **Yellow Light** | Normal “ready” state; indicates the turnstile is locked and ready for card presentation. |
| **Green Light** | Illuminates when the access control system provides the turnstile controller an “authorized” input. When the green light illuminates, the turnstile will unlock and remain unlocked until the turnstile is rotated or the time for passage expires. |
| **Red Light** | Illuminates when the access control system provides an “unauthorized” input. The turnstile remains locked. |

## SHIPPING AND SITE PREPARATION

### SHIPPING

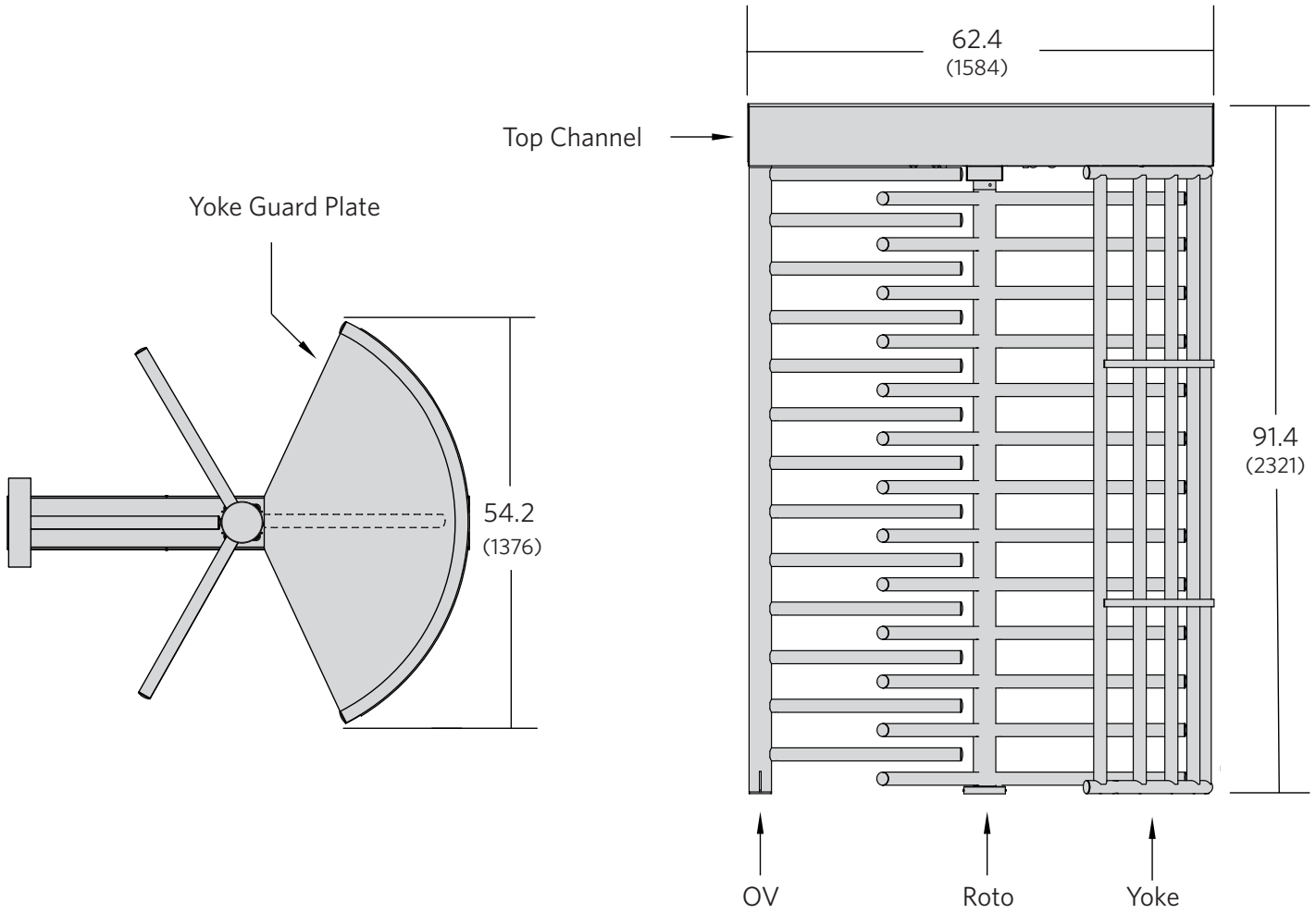
MST turnstiles are shipped in five main sections: the top channel, the yoke, the roto, the OV and the yoke guard plate.

### SITE PREPARATION

All turnstiles must be installed on a firm foundation in a manner that allows the required power and activation signal cabling to be pulled into the top channel. Optional conduit may be run through the OV base. The recommended slab platform is 72" square by 4" deep, level concrete. Concrete anchors, bolts and washers are included with each turnstile. Installation should be performed by a skilled installer following the manufacturer's directions and instructions. Detailed drawings and installation manuals are available online. For ease of installation and maintenance, a minimum 3" header clearance is recommended.

## TECHNICAL DIMENSIONS

Dimensions are shown in inches (mm). All measurements are approximate.



| Electrical | Description | |
|---|---|---|
| UL Rated Transformer | 110-120VAC, 60 Hz or 220-240VAC, 50 Hz (optional) | |
| Power Requirements | Maximum power consumption is 65W per turnstile with all available electrical options. | |
| Operational Voltage | Primary power is stepped down and rectified for low voltage 12VDC/5VDC operation. | |
| On/Off Switch | An on/off switch is located on each power junction box inside the MST-6X top channel. A visible green LED is illuminated on the TCB when the power is "on". | |
| Surge Protection | The TCB uses Transient Voltage Suppressor (TVS) devices to provide superior lightning and surge protection. The TCB is rated to 500A (6kV) for lightning and industrial surges (per IEC 61000-4-5). Protection against ESD is provided (per IEC 61000-4-4). Control signal lines are protected by bi-directional TVS devices up to 600W per input. | |
| Turnstile Control Board (TCB) Weatherization | The TCB is conformal coated to protect electronic circuitry from environmental damage. | |
| Bi-Directional Solenoid Drivers | Each TCB provides one solenoid driver per rotation direction. | |
| **Weights and Environmental** | | |
| Product Weight | 550 lbs. | 250 kg |
| Shipping Weight | 750 lbs. | 341 kg Includes weight of shipping crate(s) |
| Operating temperature | -20° to 150° F | -29 to 66° C |
| Storage Temperature | -30° to 160° F | -34 to 71° C |
| Relative Humidity | 0-90% (non-condensing) | -- |

## WARRANTY

For a period of one year from the date of shipping, Alvarado will replace or repair, at Alvarado's option, any products or parts which are defective in materials or workmanship, provided recommended installation and maintenance procedures are followed. This warranty is void if damage is due to improper installation, maintenance or use. This warranty is limited to parts only, and does not cover labor or shipping charges incurred in connection with the removal or replacement of warranted products or parts.

This warranty is expressly made in lieu of any and all other warranties, expressed or implied, including, but not limited to implied warranties of merchantability and fitness for a particular purpose. Alvarado shall not be liable for any loss or damage, directly or indirectly, arising from the use of purchased products. In no event shall Alvarado be liable to buyer for consequential damages, special damages, incidental damages, loss of use, business interruption, loss of profits, or damages of any kind arising out of the use or inability to use a purchased product. In NO event shall Alvarado be liable for damages which exceed the purchase price of a covered product.