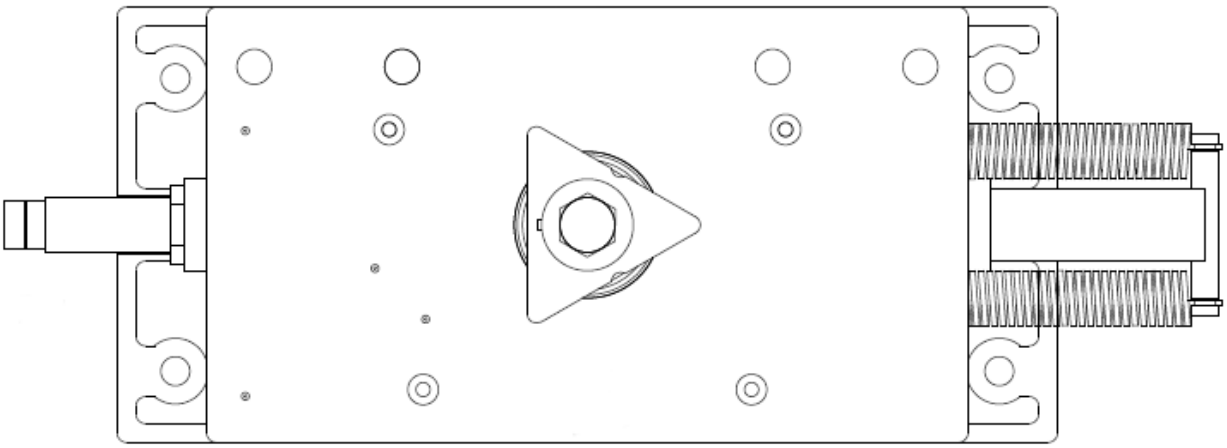
Controlled Access

The Leader in Pedestrian Control Systems
Waist & Full Height Turnstiles and Matching Gates

6500 Series Turnstile Control Head

Service & Installation Manual



Note: Successful turnstile installation depends on reading this manual.

Important Note: Please keep this service manual after installation. If an installation is done by a construction company or outside installer, please pass this book along to the end user. This book is required for maintenance, troubleshooting, and repairs.

RECOGNIZED COMPONENT
c ETL us
Intertek
4008027

The 6500 series control head is certified to conform to the following standards: UL Standard 326, UL Subject 2593 and CSA Standard C22.2 #247

Security Begins With Controlled Access
1636 W. 130th Street, Brunswick, OH 44212
Toll Free Phone: (800) 942-0829 | Fax: (800) 942-0828 / Phone: (330) 273-6185 | Fax: (330) 273-4468

Important Electrical Information

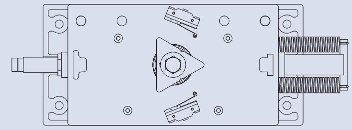
Installation of the control head mechanism into the turnstile requires a grounding-type outlet receptacle installed inside of the frame or cabinet through the provided conduit access points.

To reduce the risk of electric shock, this equipment has a grounding type plug that has a third (grounding) pin. This plug will only fit into a grounding type outlet. If the plug does not fit into the outlet, contact a qualified electrician to install the proper outlet. Do not change this plug in any way.

Additionally, the MS2-H50 power supply from this appliance must be grounded to the frame of the turnstile. Utilize the green colored grounding screw threaded into the grounding tab located near the power supply along with the provided grounding wire from the power supply to ensure the equipment is proper grounded.

The 6500 Series Control Head

The Solution to Your Security Needs



Controlled Access is proud to present the perfect solution to your security requirements. Certified as an ETL recognized component, the 6500 is our highly customizable modular control system. Whatever your security needs are, the 6500 Series Control Head is the solution.

Mechanical Overview

- Auto indexing to home position (self centering)
- Adjustable hydraulic shock suppression
- Permanently lubricated sealed bearings
- Oil impregnated bronze bushings
- Hardened steel locking bars, cams, and rollers
- Stainless steel pistons
- Cast aluminum housing
- Modular design, removable as an assembly for easy maintenance

Electronic Features

- Bidirectional access control inputs
- Integrated fire alarm input
- Fail lock or fail open configurations (direction independent)
- Adjustable relock timers for swipes with no passage
- Adjustable swipe queue for quicker traffic flow
- Integrated "one-shot" inputs for simplified access control integration
- Additional outputs for options integration
- Auto-selecting 100-240 VAC voltage input for easy international installation
- Built-in amp / voltage meter for troubleshooting and peace of mind
- Overvoltage / overcurrent protection adds resistance to electrical issues
- Expandable PLC allowing for solutions to customized applications

Standard Configurations

Every control head is built to order, with your choice of the following operations:

- Manual (free passage) in both directions
- Manual (free passage) in one direction, locked in the other direction
- Electronically controlled in one direction, manual (free passage) in the other direction
- Electronically controlled in one direction, locked in the other direction
- Electronically controlled in both directions

On power failure, each electronic direction will be configured in your choice of:

- Fail lock (also known as fail secure)
- Fail open (also known as fail safe)

Options & Add-ons

- Bidirectional key overrides
- Direction status indicator lights (daylight visible or LED graphic array)
- 8 digit key resetable digital counter with 7 year lithium battery
- Cold weather upgrade - insulated mainframe with thermostat controlled heater
- Contactless proximity sensor upgrade (replaces limit switches to relock unit)
- Home position switch for access control integration
- 12 Ah battery system (2x 12VDC batteries w/ 2 amp 24VDC charger)
- Additional options available upon request

Electrical Specifications:

Input Voltage: 100-240 VAC
Input Current: 1.3 - .55 A
Frequency: 50/60 Hz

Storage Temperature: -4 to 158 °F
Operating Temperature: 32 to 122 °F
(Cold weather package available)

Operating Voltage: 24VDC
Operating Current: 1.2 A (typical)

Directional Inputs:
Normally open contact closure
(Form C relay, 1 second pulse)

Fire Alarm Input:
Normally open contact closure
(Form C relay, closed for duration)

RECOGNIZED COMPONENT Intertek 4008027

The 6500 series control head is certified to conform to the following standards: UL Standard 326, UL Subject 2593 and CSA Standard C22.2 #247

Controlled Access, Inc. is a registered ISO 9001:2008 company

CONTROLLED ACCESS, INC. The Leader in Pedestrian Access Control

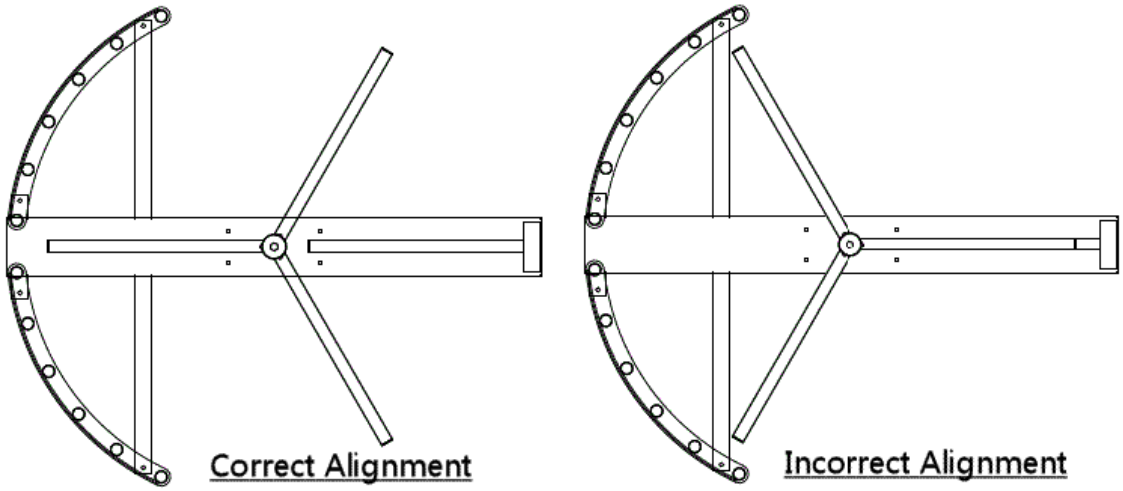
1636 West 130th Street | Brunswick, Ohio 44212 | Ph: 330.273.6185 | Fax: 330.273.4468 | Toll-Free Ph: 800.942.0829 | Toll-Free Fax: 800.942.0828

E-mail: sales@controlledaccess.com | www.controlledaccess.com

Full Height Turnstile Rotor Alignment

Mounting a new 6500 series control head is very simple. Unbolt the existing control head from whatever turnstile it is installed in and mount the new one in its place. The control head is backwards compatible with nearly every turnstile we have ever made on its own. In units that the hole pattern does not match, an adaptor plate is provided to make installation just as simple.

Full height turnstiles have one extra step involved when installing the control head. It is crucial that the rotor is aligned properly or the head will not function as intended. One set of arms on the rotor must rest in between the two half-moon shaped yoke assemblies on the turnstile. Refer to the diagram below as a visual guide to help install the control head into the rotor properly.



Note: Failure to align the rotor on a full height turnstile properly will cause inconsistent operation and may even physically trap someone inside of the turnstile.

See the next page for more detailed instructions for mounting the control head.

6500 Series Control Head Installation

To reduce the risk of electrical shock, do NOT hard wire the power supply directly into input voltage. Only power this turnstile from a grounding-type receptacle. Should the turnstile be installed without a grounding-type receptacle, contact a qualified electrician to install one for you.

Waist High Installation:

New waist high turnstiles already have the 6500 series control head mounted in place.

However, should the need to replace the control head ever arise, follow these steps:

- Remove the arm assembly from the turnstile by unbolting the 3x 5/16 button head cap screws
- Remove the lid from the cabinet. Some models have a lock and key system while some others are secured with 10/24 button head screws located on the sides.
- Unplug the control head from the grounded receptacle located inside of the cabinet.
- Unbolt the 4x 5/16 carriage bolts holding the control head assembly in place.
- Pull the control head out of the cabinet and disconnect any access control inputs from the control board.
- Place new control head on top of cabinet and connect access control inputs to the new control board (see wiring diagram).
- Insert control head into cabinet with the locking bars facing upwards toward you and bolt it into place with 5/16 carriage bolts.
- **Ground the power supply to the cabinet.**
- **Plug in the control head to the grounded outlet receptacle.**
- Install arm assembly onto arm adaptor with 5/16 button head cap screws.
- Reinstall the lid.

Full Height Installation:

- Remove the cover from the mainframe by removing the 10/24 button head cap screws.
- If replacing an existing control head follow these steps first:
    - Unplug the existing control head from the grounded outlet receptacle
    - Unbolt the 4 3/8 carriage bolts holding the control head in place
    - Disconnect access control inputs from existing control board
    - Pull the existing control head out
- Install the control head into the hex insert on the rotor so that the rotor aligns with one set of arms in between the two half-moon shaped yokes
- Bolt the control head into place
- Connect access control inputs (see wiring diagram)
- **Ground the power supply to the frame utilizing the provided grounding tab located near the control head.**
- **Plug the control head into a grounded outlet receptacle.**

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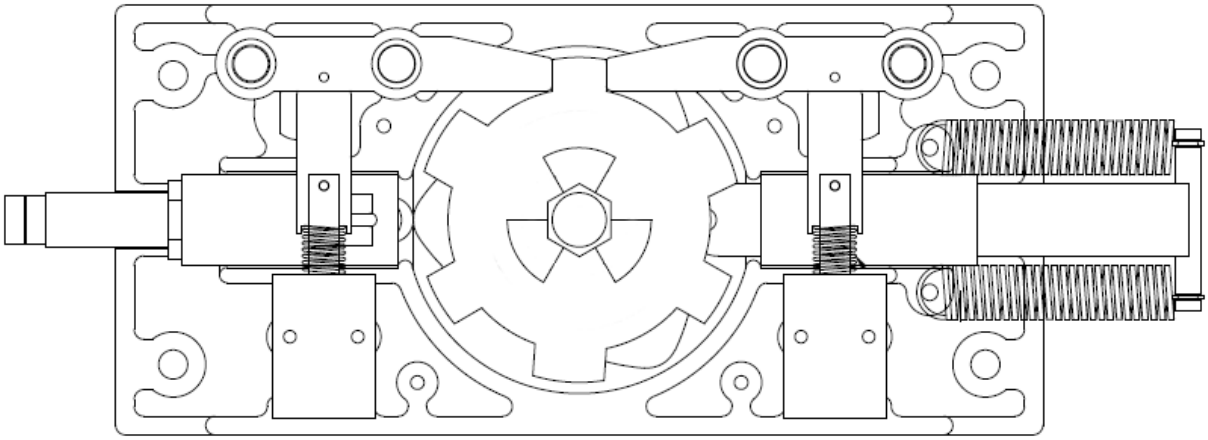
6500 Series Control Head Information

All of our turnstiles and ADA gates operate with a mechanism called the 6500 series control head. This sturdy and easy to maintain drive for the turnstile has replaced all previous model control heads. It is adaptable to any existing turnstile and comes with each new turnstile purchase. This control head can be configured in multiple ways to accommodate the security requirements of each individual job site.



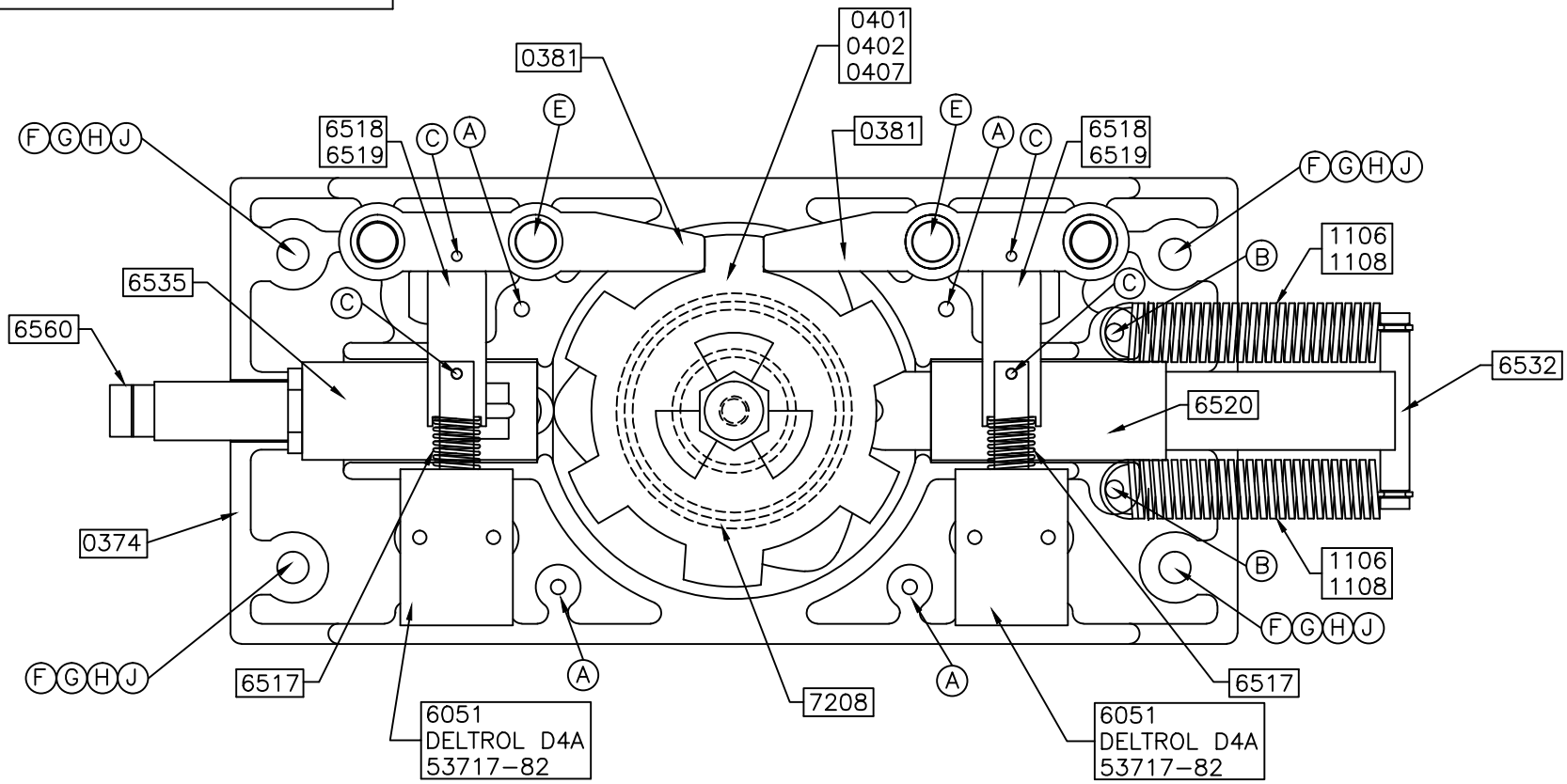
An internal view of an electronically controlled two-way 6500 series control head.

While the head can be configured for mechanical (no electronics) operation, the turnstile's security potential is reached in the case of an electronic two way control head. In this instance, each rotational direction is independently unlocked. Configured properly, this control head will allow for one rotation per valid entry request. Our anti-backup cams are designed so that it is impossible to become trapped within the turnstile when properly installed.

Each control head comes pre-configured to your specific needs based off of a directional sheet that is filled out before shipment. The heads are delivered pre-wired, tested, and adjusted to our factory recommendations. Installation is simple: connect inputs from access control devices into the logic controller and plug the unit's power supply into a 110-240VAC receptacle. The power supply will automatically set itself to function on your local voltage and convert it to 24VDC.

Note: Proper turnstile operation requires a dry, normally open momentary contact closure (of one second or less).

TOP CASTING REMOVED



ALL ELECTRICAL COMPONENTS UL CERTIFIED

NOTE:
ALL WIRE AWG 18 GAUGE 300 VAC
UL 1007/1569

CONTROLLED ACCESS, INC.
1636 West 130th Street
Brunswick, Ohio 44212

6500 SERIES CONTROL HEAD BOTTOM ASSEMBLY

SYM	QTY	DESCRIPTION
Ⓐ	4	1/4–20 x 1" SOCKET HEAD
Ⓑ	2	1/4"ø x 1 1/4" SPRING PIN
Ⓒ	4	1/8"ø x 5/8" SPRING PIN
Ⓔ	2	1/2"ø X 2 1/4" DOWEL PIN

WAIST HIGH UNITS		
Ⓕ	4	5/16 x 1–1/2" SS CARRIAGE BOLT
Ⓖ	4	5/16 SS FLAT WASHER
Ⓗ	4	5/16 SS LOCK WASHER
Ⓙ	4	5/16 SS HEX NUT

FULL HEIGHT UNITS		
Ⓕ	4	3/8" x 1–1/2" SS CARRIAGE BOLT
Ⓖ	4	3/8 SS FLAT WASHER
Ⓗ	4	3/8 SS LOCK WASHER
Ⓙ	4	3/8 SS HEX NUT

CONTROLLED ACCESS, INC.
Turnstiles and ADA Gates

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Phone: (800)942-0839
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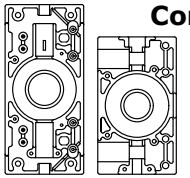
Email: sales@controlledaccess.com

Complete control heads are available upon request. Contact us for pricing details.

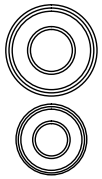
Control Head Castings



0373 - Bottom Casting
$184.47

0372 - Top Casting
$184.47

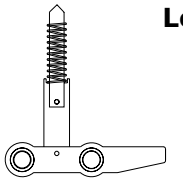
Control Head Bearings



7208 - Bottom Casting (6007RSNR)
$5.16

1641 - Top Casting (1641-2RSNR)
$6.21

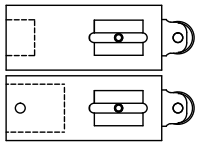
Locking Bar Assemblies



0382 - Fail Open
$76.36

0383 - Fail Lock
$76.36

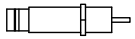
Shock Housing Assemblies



6535 - WH/427/430/T80/ADA
$158.88

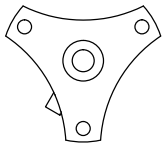
6541 - 439/448/P60
$166.86

Hydraulic Shock Absorbers



6560 - WH/427/430/T80/ADA
$160.20

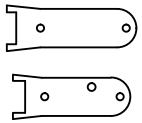
6561 - 439/448/P60
$232.33



2030 - Waist High Arm Adapter
$59.47

0381 - Locking Bar Casting
w/ Oil Impregnated Bushings
$36.75

Locking Bar Linkages



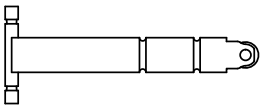
6519 - Fail Open
$10.30

6518 - Fail Lock
$10.30

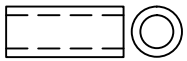
Solenoid Springs

6510 - Fail Open
$7.57

6016 - Fail Lock
$7.57



6532 - Index Pin
$111.44



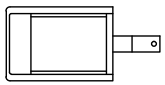
6520 - Index Pin Tubing
$27.70

Indexing Springs

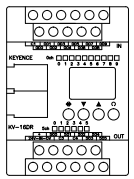
1106 - Waist High (Light) $5.47

1108 - Full Height (Heavy) $5.47

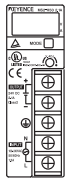
1107 - ADA (Extra Heavy) $5.47



6051 - Solenoid
Deltrol D4A53717-82
$55.89

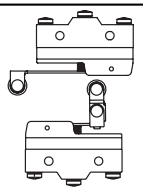


6789 - Logic Controller (KV-16DR)
$210.00



0781 - Power Supply (24VDC, 50 Watt)
w/ NEMA 5-15 power cable & bracket
(specify model type for bracket)
$167.37

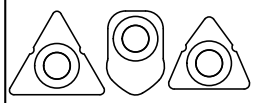
Limit Switches



2180 - Standard
(Z-15GW2-B7-K) $19.05

1700 - One Way
(BZ2RW825-Aw) $46.20

Limit Switch Cams

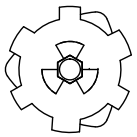


2267 - Standard $25.75

2268 - ADA $25.75

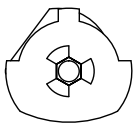
2269 - One-Way $25.75

Cam Assemblies



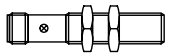
0401 - 427/430/T80/WH (7/8 Hex)
$222.24

0407 - 439/448/P60 (1 1/4" Hex)
$245.20

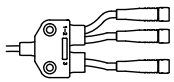


0402 - ADA (Must specify model)
$195.48

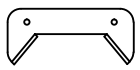
Proximity Sensor & Accessories



7211 - 24VDC PNP Prox. Sensor
w/ M12 Connector (Sick 1040763)
$76.50



0766 - 3 Branch M12 Splitter
$125.07



6589 - Turnstile Prox. Bracket
w/ 3x Mounts - LH, RH & Home
$10.00

Prices are subject to change without notice. Parts orders are shipped via UPS. Shipping costs are not included. All parts orders under a $500 require credit card payment. Date: 3/7/2017

6500 Series Control Head Configuration Information

The 6500 series can be configured in a number of different ways. All turnstiles operating with the 6500 series control head self center and hydraulically shock to the home position to prevent damage or injury.

Manual both ways: Turnstile rotates freely in both directions. This unsecure configuration is used as a means to direct traffic through one area. Full height turnstiles can be purchased with a lockout bar which would allow end user to lock the turnstile with a standard pad lock.

Manual one way: Turnstile rotates in one direction but not the other. This configuration is great for an exit way.

Electronic one way with free exit: Turnstile rotates freely in one direction and requires access credentials for the other. This configuration is suitable for secure entry and unsecure exit.

Electronic one way with no exit: Turnstile requires access credentials for one direction and allows no passage in the other. This configuration is suitable for a secured entryway with an alternate means of exit.

Electronic two way: Turnstile requires access credentials for both directions. This configuration is perfect for locations requiring secured entry and exit passage.

Fail lock: Upon power failure, turnstile will remain locked in one or both directions. This is convertible to fail open by ordering an alternate linkage. This can also be known as fail secure.

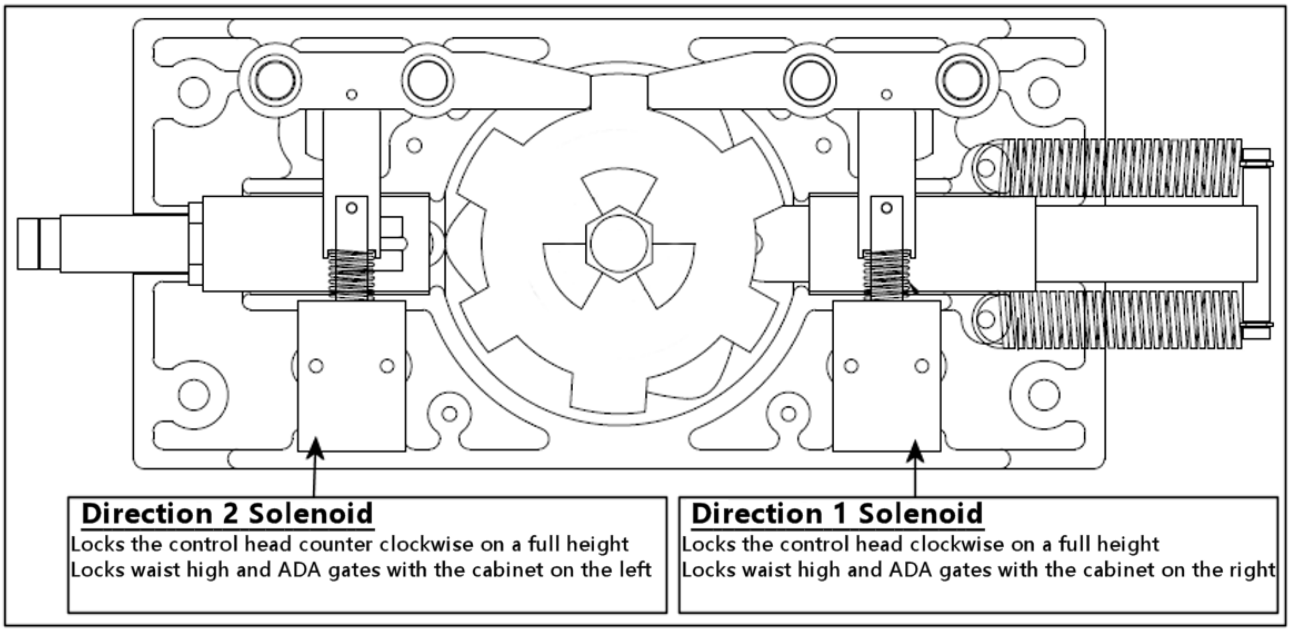
Fail open: Upon power failure, turnstile will remain unlocked in one or both directions. This is convertible to fail lock by ordering an alternate linkage. This can also be known as fail safe.

Key override: This option is for a location that the security requirements may change. The key override option is not intended for everyday use. Should you require an additional lockdown feature on your turnstile, a better option is a lockout bar (Figure L) with a standard pad lock.

Figure L: Optional lockout bar

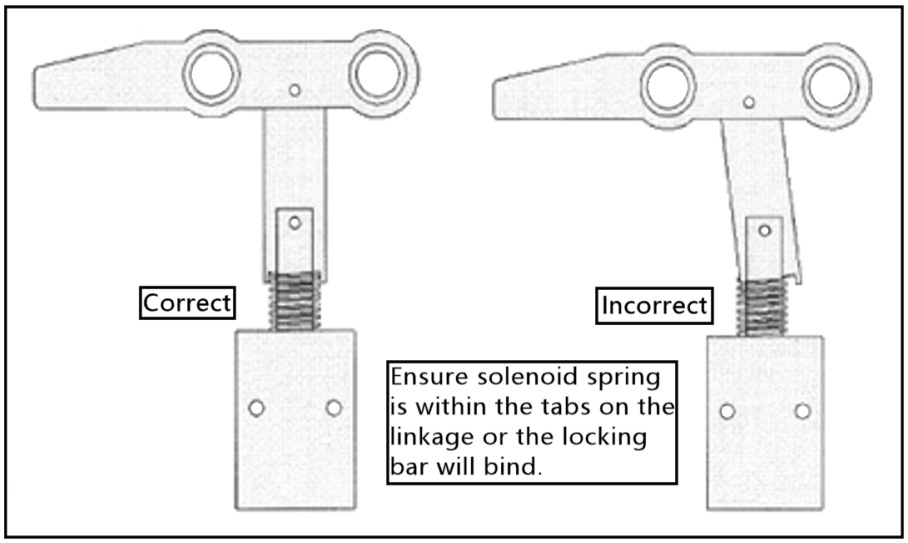
6500 Series Control Head Locking Bar Information

Any number of configurations is possible on the 6500 series control head. In the case of an electronic two way head, two independent locking mechanisms are in place. The following diagram indicates which direction unlocks from which locking mechanism. A logic controller or key override is needed to unlock the control head in each direction it is configured to lock in.



If removing the locking bar becomes necessary for any reason, two methods can be used. The easiest method is to punch the ½" dowel pin out from the bottom side of the control head. This releases the locking bar from the casting. An alternate approach would be to remove the (4) ¼-20 socket head cap screws from the casting and remove the lid.

When installing or replacing the locking bars into the control head, be sure to take special care to align the solenoid spring (shown below) or it will not pivot properly.



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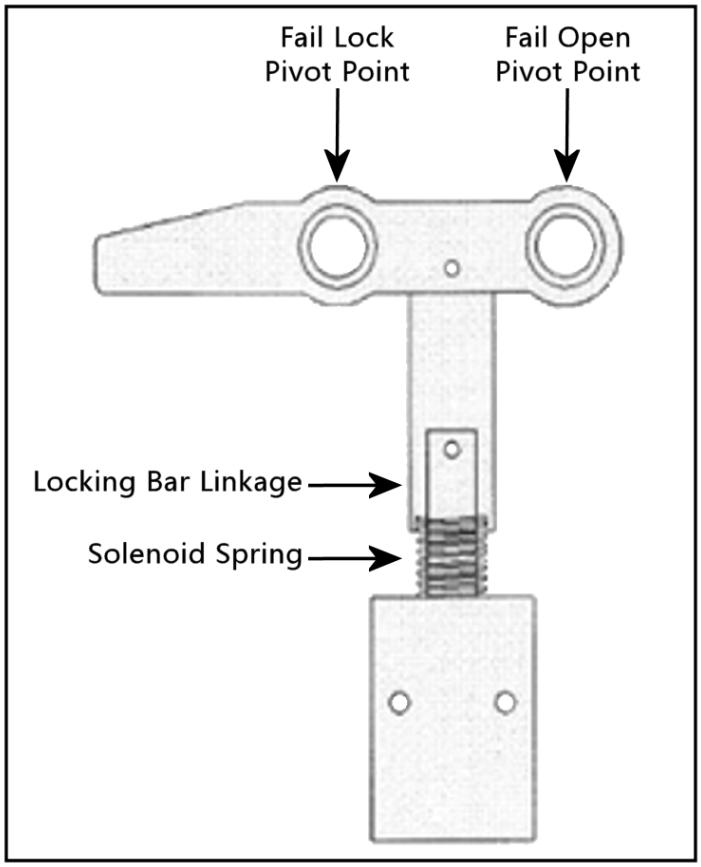
Power Failure State Configuration (Fail Lock / Fail Open)

Each direction on a control head can be independently configured to open or lock upon power failure. The fail status configuration is based on the pivot point used on the locking bar as well as the linkage and solenoid spring used. Control heads are preconfigured in our factory before shipment based on a direction sheet filled out by the end user. In the event a fail status field change is needed, a different linkage and spring will be required (the part numbers are noted in a table below). Control heads can also be returned to the factory for reconfiguration for a fee of parts plus approximately 1 hour of labor if desired.

Description	Part Number
Fail lock linkage	6518
Fail open linkage	6519
Fail open solenoid spring	6510
Fail lock solenoid spring	6016



Note: As a reference, it may be important to know that some vendors use different terms for fail status. Fail open is also known as fail safe, while fail lock is also known as fail secure.

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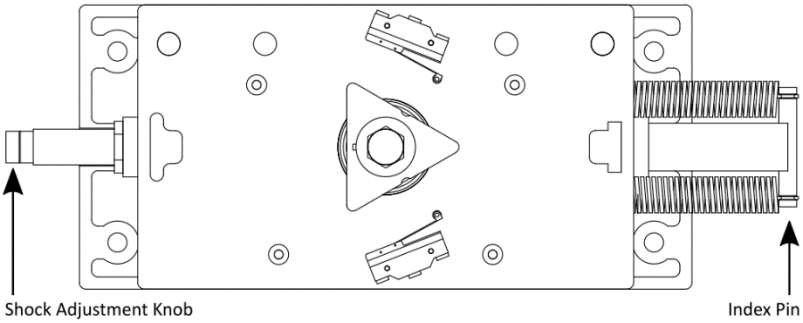
6500 Series Control Head Shock Adjustment and Replacement

The 6500 series control head utilizes a hydraulic shock for controlling the speed of the rotation. Set properly, the shock will allow a turnstile or gate to self-center while rotating smoothly without slamming.



Some turnstile models use a different shock than others. Waist highs and smaller full heights use a .75" diameter shock (Enidine brand) while the larger full heights use a 1" diameter shock (ACE Controls brand).

Enidine brand shocks

Replacement:

Thread the new shock into the shock housing until it bottoms out and then back it out approximately 1.5 - 2 turns until the numbers near the dial are facing up. Lock down the shock with the provided nut, and then make field adjustments to the shock strength. On some waist highs you may need to thread the shock out an additional turn if the unit will not self-center on the lowest setting.

Setting:

Loosen the set screw on the end of the dial and turn the knob. The dial can be set between 0 and 8. The higher the number, the stronger the shock will be. Tightening the set screw can change the strength of the shock so a good habit is to loosen, turn, tighten then test.

ACE Controls brand shocks

Replacement:

Thread the new shock into the shock housing until it bottoms out and then back it out approximately 1.5 - 2 turns until the small set screw located near the gray dial on the end of the shock is facing up. Lock down the shock by tightening (snugly, don't over tighten) the set screw in the shock housing, and then make field adjustments to the shock strength.

Setting:

Loosen the set screw at the end of the shock near the dial. The dial can be set between 0 and 8 while the set screw itself is the pointer. The lower the number, the stronger the shock will be. Simply turn the dial up or down to adjust the strength as desired and test.

Note: For either model, failing to back the shock out of the housing after bottoming it out can cause it to wear out very quickly.

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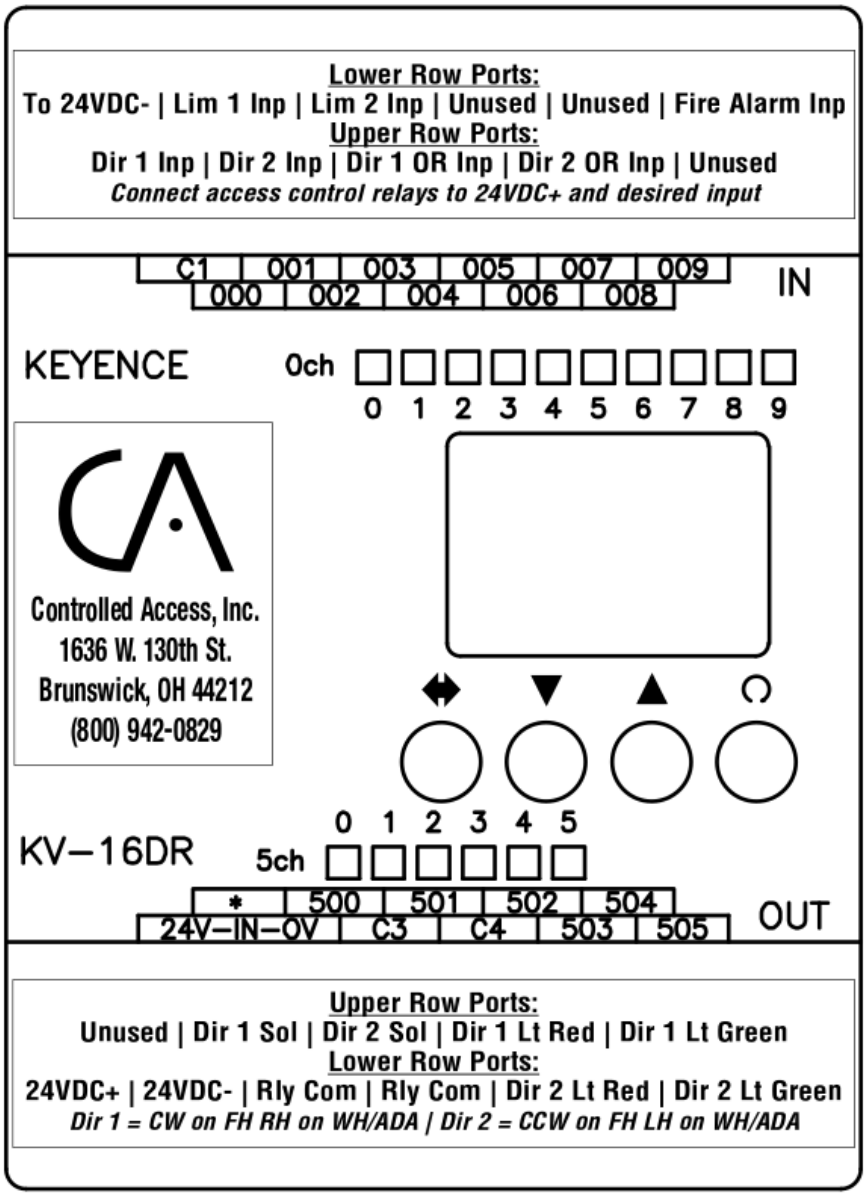
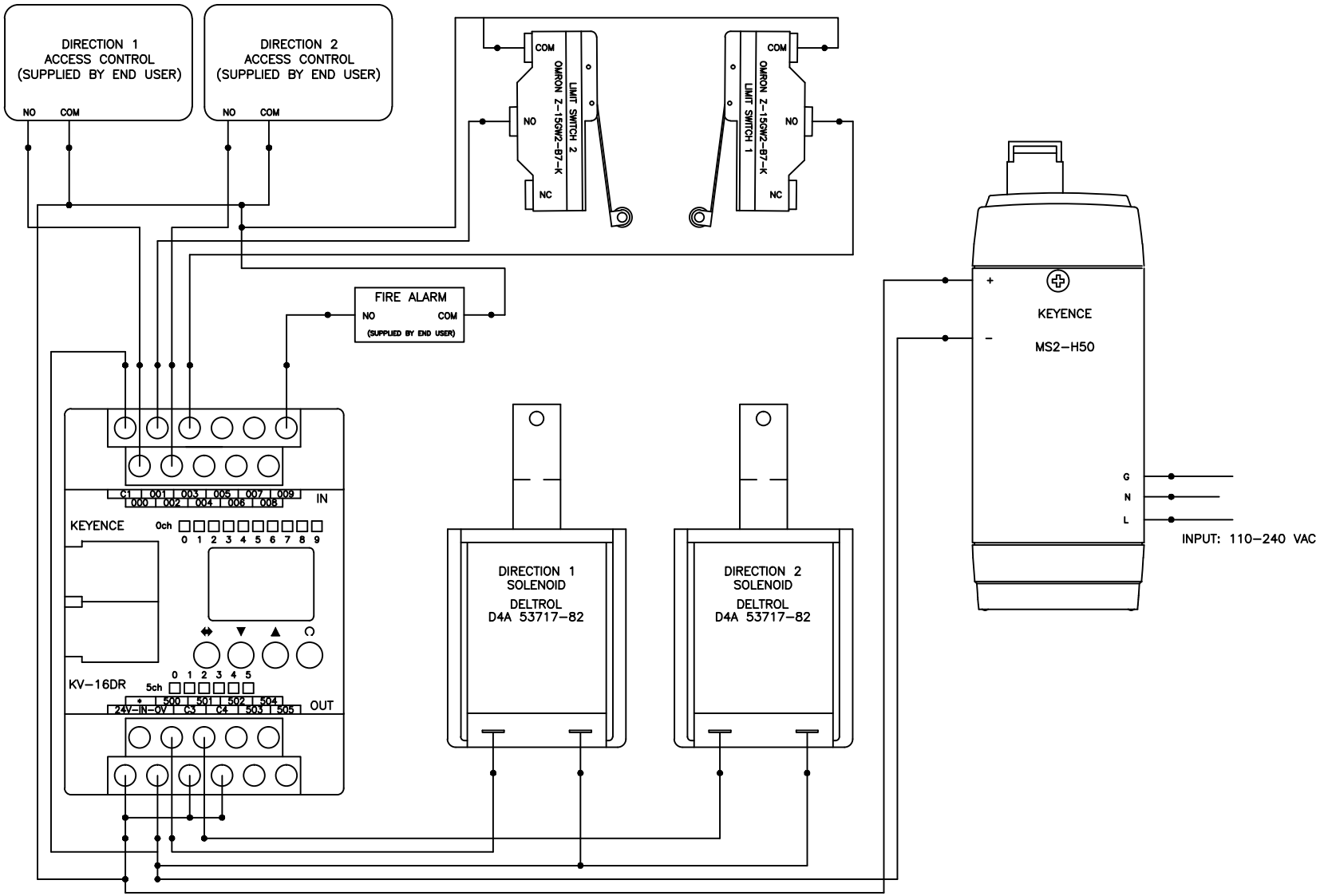
6500 Series Control Head Electrical Information

Each electronic control head comes with a power supply, a programmable logic controller (PLC), limit switches (or proximity sensors) and solenoids. For safety purposes, it is recommended that you read all literature on the electrical components before attempting to install the control head into a turnstile.



Note: Access control devices need to provide a momentary, normally open dry contact of one second or less. A longer signal can cause more than one person to be able to pass through the turnstile. If you are unable to provide a contact of one second or less, an onboard signal converter will automatically change the signal length to .1 seconds. However, the ability to hold the relay open is lost while that feature is active.



11/1/12

CONTROLLED
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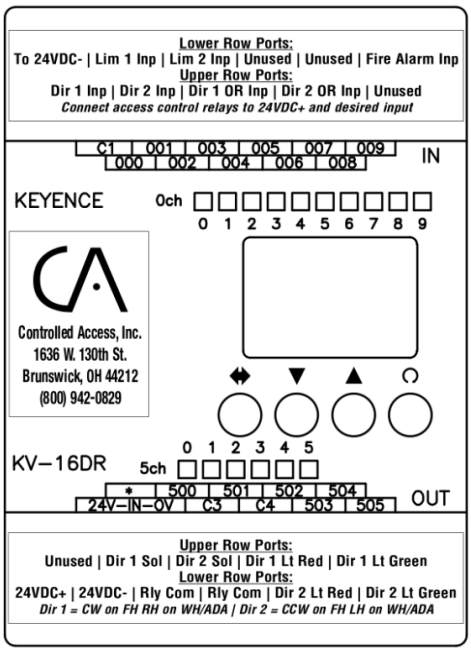
STANDARD WIRING DIAGRAM

6500 Series Control Head Wiring Legend

Since each control head comes pre-wired, only access control and fire alarm should need to be connected to the board. If you are unable to fit wires for access control on the 24VDC+ input on the board, the voltage can be picked up directly from the power supply or from the relay commons (C3 & C4) on the board (C4 may not have voltage depending on options purchased. There will be a red jumper to C4 if there is).



6789 Wiring Legend

Definitions:

- Direction 1: Clockwise for full height turnstiles, right hand cabinets for waist high turnstiles / ADA gates.
- Direction 2: Counter clockwise for full height turnstiles, left hand cabinets for waist high turnstiles / ADA gates.
- Dir 1 Inp: Activates direction 1 for one rotation or timeout. Various settings exist to modify functionality.
- Dir 2 Inp: Activates direction 2 for one rotation or timeout. Various settings exist to modify functionality.
- Dir 1 OR Inp: Activates (overrides) direction 1 for duration of contact closure. Direction 2 is not affected and can still be used.
- Dir 2 OR Inp: Activates (overrides) direction 2 for duration of contact closure. Direction 1 is not affected and can still be used.
- Fire Alarm Inp: Activates direction 1 and direction 2 for duration of contact closure.

Input Side:
C1: Jumper to 24VDC -
000: Direction 1 Input
001: Limit 1 Input
002: Direction 2 Input
003: Limit 2 Input
004: Direction 1 Override Input
005: Unused
006: Direction 2 Override Input
007: Unused
008: Unused
009: Fire Alarm Input

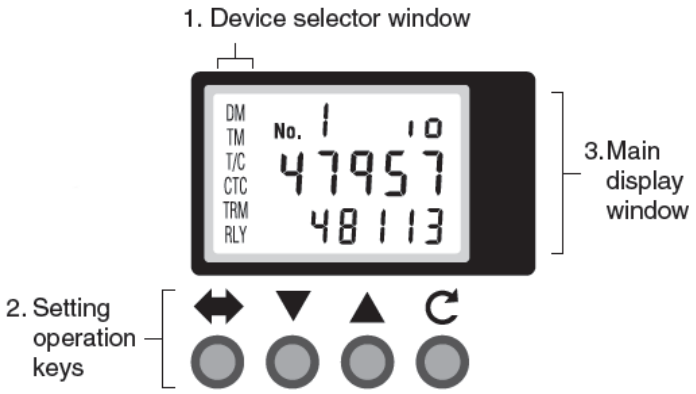
Output Side:
*: Unused
24V In: To 24VDC+ from Power Supply
0V: To 24VDC- from Power Supply
C3: Common for 500 & 501 Outputs (Jumper to 24VDC+)
C4: Common for 502-505 Outputs (Jumper to 24VDC+)
500: Direction 1 Solenoid Output
501: Direction 2 Solenoid Output
502: Direction 1 Indicator Light Output (Red)
503: Direction 2 Indicator Light Output (Red)
504: Direction 1 Indicator Light Output (Green)
505: Direction 2 Indicator Light Output (Green)

Note: Control heads are built to order based on customer specifications and may not have the necessary components to control both directions.

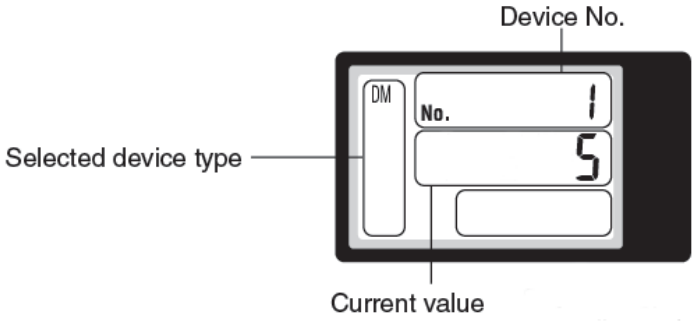
Note: Directional status outputs are unaffected by optional key overrides as the override occurs outside of the logic controller.

Overview of the Access Window

On the logic controller, an access window is available to change and adjust many different values. Each value is referred to as a "device". The window comprises of 3 primary areas: The device selector window, operation keys, and the main display window.



Although the logic controller is capable of many functions, all of the devices that the control head operates from are accessed in "Device Mode". When device mode is active, the display screen will show DM in the top left corner.



That being said, it is possible to stray from the device mode settings. In the selected device type section of the access window, DM, TM, T/C, CTC, TRM, and RLY are all possible selections to load. Again, we are only using DM (device mode) with the 6500 series control head.

Should you find that you accidently have loaded any other selected device type, simply press ⬌to scroll until you have once again loaded the DM type.

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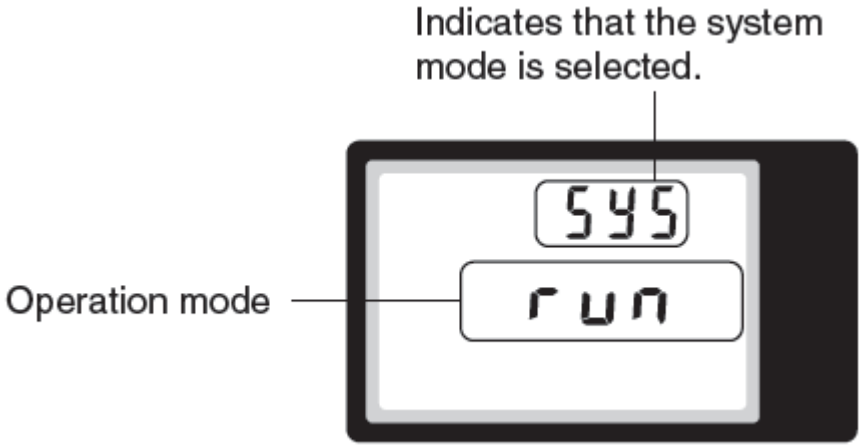
In addition to the device mode window, system mode can be accessed as well.



Although under normal circumstances you should never encounter this window, if by accident you should happen to come across it, simply press the up or down arrow until the window reads “run”. Press and hold the ↻ button for 3 seconds, and the display will return to device mode.

Additionally, should for any reason the display lettering become red instead of green, you will need to access system mode to run the program in this fashion. Holding the ⇔ key while pressing up and down allows you to change between system mode and device mode. A third mode, which will display TRM on the left side of the screen, can also be accessed. Cycle through until the appropriate mode is displayed.

Finally, it is possible to lock the keypad. Should you inadvertently do so, press and hold the ⇔ button and an arrow key together for 3 seconds to unlock the keypad again.

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Device Settings of the 6500 Series Control Head

While working within device mode, two primary values should be considered. On the top of the display, the selected device is shown. The 6500 series control head settings can be adjusted with devices 0 – 7.

Pressing the up or down arrows allow you to select which device you wish to modify. Pressing and holding the ↻ key for 3 seconds loads the modification window. While modifying, the digits on the window begin to flash. Pressing ⇔ will move the cursor in a digit. Select the correct digit to modify, then use the arrows to change the value. Once finished, hold the ↻ button for 3 seconds and your adjustment will save.

Should an entered value not fall within the specified range of the setting being modified, the value will automatically adjust to the highest possible value. A description of each device setting is:

- **DM0: Timer value for Direction 1 -** The range of this setting is 1 – 60 seconds. This is how long the direction will remain open for if a user does not pass through the direction. The default settingis 7 seconds.
- **DM1: Timer value for Direction 2** - The range of this setting is 1 – 60 seconds. This is how long the direction will remain open for if a user does not pass through the direction. The default settingis 7 seconds.
- **DM2: Direction 1 Power Failure Setting -** This determines when the solenoid receives power and is pre-configured based on each individual order. 0 means the direction is fail lock & 1 means the direction is fail open. This setting is not affected by factory reset.
- **DM3: Direction 2 Power Failure Setting -** This determines when the solenoid receives power and is pre-configured based on each individual order. 0 means the direction is fail lock & 1 means the direction is fail open. This setting is not affected by factory reset.
- **DM4: Direction 1 One Shot -** This setting determines whether or not the access control input length is ignored and converted to a .1 second pulse internally. Enabling this allows the turnstile to ignore access control from allowing too many users pass through the turnstile. Disabling it allows access control to hold the direction open. 0 means the one-shot timer is inactive & 1 means the one-shot timer is active.
- **DM5: Direction 2 One Shot -** This setting determines whether or not the access control input length is ignored and converted to a .1 second pulse internally. Enabling this allows the turnstile to ignore access control from allowing too many users pass through the turnstile. Disabling it allows access control to hold the direction open. 0 means the one-shot timer is inactive & 1 means the one-shot timer is active.
- **DM6: Direction 1 Multi-swipe -** This setting allows more than one access control request to be processed at a time to allow a faster flow of traffic. The range is 1-3. As each access controlrequest is processed, each rotation subtracts from the total, allowing a constant flow of traffic.Most installations would benefit from a value of 2, which is the default setting.
- **DM7: Direction 2 Multi-swipe -** This setting allows more than one access control request to be processed at a time to allow a faster flow of traffic. The range is 1-3. As each access controlrequest is processed, each rotation subtracts from the total, allowing a constant flow of traffic.Most installations would benefit from a value of 2, which is the default setting.

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- **DM9: Direction 1 Count -** Displays how many valid rotations were made in direction 1. This has a max value of 60,000 and will reset to 0 once that number is reached. This will not count fire alarm, hold open or key override rotations. This count is for maintenance and repair logging purposes.
- **DM10: Direction 2 Count -** Displays how many valid rotations were made in direction 2. This has a max value of 60,000 and will reset to 0 once that number is reached. This will not count firealarm, hold open or key override rotations. This count is for maintenance and repair logging purposes.

Scrolling downward past DM0 will allow you access to **DM1999**, which resets all settings to factory defaults (except for solenoid fail status settings). Choose any value greater than 0 to perform the factory reset.

To view the PLC logic software version, see **DM1998**. A value of 120 means software revision 1.20. Revision 1.20 introduced the revision number system as well as directional override inputs. If previous installations desire to add this feature, the logic controller can be shipped back to Controlled Access, Inc. for a software upgrade or a replacement controller can be purchased.

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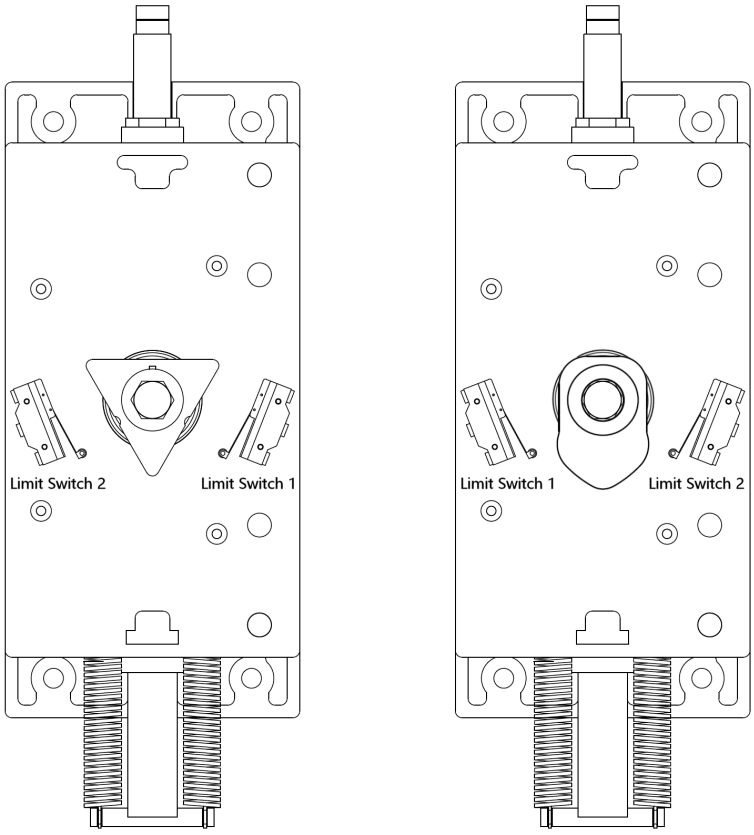
6500 Series Full Height Control Head Limit Switches

Limit Switch Placement



Standard Head
(Full Height & Waist High)

ADA Gate Head

Direction 1 is canceled by limit switch 1 and direction 2 is canceled by limit switch 2. As the unit rotates, both limit switches are triggered. However, only the limit switch designated for that direction is utilized to relock the unit. The switch is triggered towards the end of the rotation. Once it is triggered, the locking mechanism returns to the locked position, but users may still proceed until the home position is reached.

A minor exception to this is in the case of an ADA swing gate. The limit switch is triggered towards the beginning of the swing, which allows the locking bar to prevent the gate from over swinging. In this instance, the limit switches are designated backwards from those on a standard turnstile. Refer to the above diagram to illustrate which is which.

Note: The control head will not operate properly if the limit switches and top cam are not adjusted properly or altered from factory shipment.

Maintenance & Cleaning

To ensure long life on any turnstile, the following maintenance is recommended. Note: These figures are assuming a maximum of 75000 passages per year. Turnstiles with heavier traffic should be maintained more frequently.

- Annual Servicing
  - Secure all nuts & bolts throughout each model. This includes concrete anchors, carriage bolts holding together mainframes, and the bolts holding the control head assembly together.
  - Remove index pin assembly from control head by disconnecting the two extension springs & apply white lithium grease. Use 3-in-1 oil on the index pin roller.
  - If the unit is a full height, add grease to the rotor's roller bearing utilizing the grease fitting fastened into the bottom of the rotor.
- Bi-annual Servicing
  - Remove the lid from the control head assembly. Clean any debris and apply grease to the shock roller assembly. Use 3-in-1 oil on the shock piston roller.
  - Apply 3-in-1 oil to the bronze bushings for the locking bar assemblies.
  - Inspect internal components for wear and tear, replace as needed.
  - Reassemble control head. Use a removable strength (typically blue) thread sealer (such as Loctite 243) on the head bolts to ensure the assembly stays together.
- Cleaning
  - Galvanized surfaces can be cleaned with soap and water. The finish may dull over time but this is normal.
  - Powder coated surfaces should be cleaned with a non-abrasive cleaner such as Formula 409. Inspect finish for chips in the powder coating and touch them up or the exposed steel may rush.
  - Stainless steel surfaces should be polished with a stainless steel wax or polish. Contrary to common belief, stainless steel is not rust proof. Exposure to certain chemicals and harsh environments such as ocean air or chemical plants may cause surface corrosion. Minor discoloration can be removed with a rust penetrating product (such as PB Blaster) along with non-scratching scouring pads. Severe cases of contamination may require the use of specialty products. We have had great success with products such as Stellar Solutions' Citrisurf 2310 Rust Remover and Passivation Solution.
  - The decorative solid surface tops on our Executive models, Beacon models and some PassThru models should be polished with furniture polish (such as Scott's Liquid Gold Wood Cleaner). Allowing the product to soak in for a few minutes easily restores the finish to a consistent shine.
  - Polycarbonate plastic should only be cleaned by following the plastic manufacturer's recommendations. **DO NOT USE ANY PRODUCTS THAT INCLUDE AMMONIA OR OTHER HIGH PH PRODUCTS**. If the product purchased contains polycarbonate plastic, see the section of the manual dedicated to cleaning it (starting on the next page). Failure to use appropriate cleaning methods will cause aesthetic and structural damage to the plastic which will not be covered under the warranty.

Control heads can be removed from the turnstile and shipped to the factory at any time for repairs and maintenance. Please include contact information so we can call to discuss any issues your control head may have. Please note that any repairs that cost under $500.00 will require a credit card payment before being returned.

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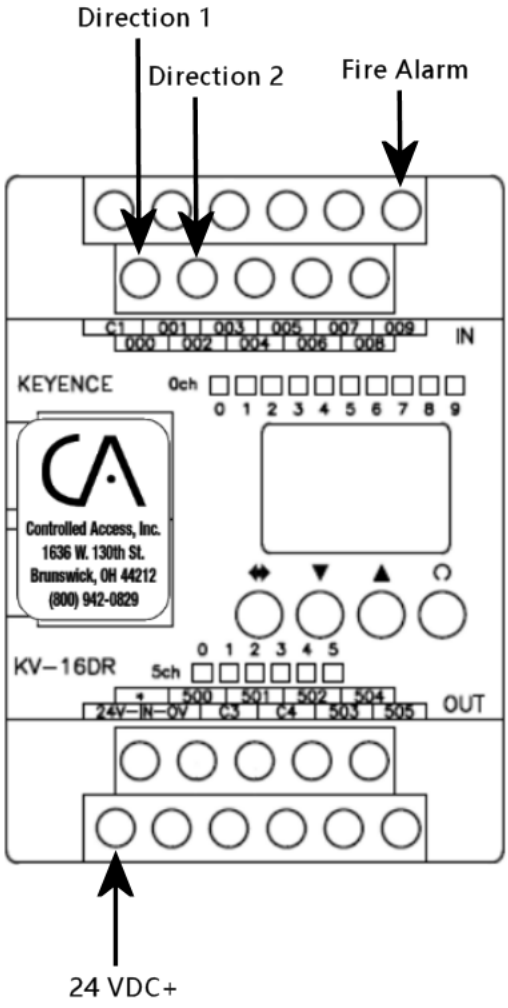
6500 Series Control Head Testing

6789 Control Board Testing Procedures



To test whether or not your control head is functioning properly...

- Unplug power supply from outlet.
- Disconnect access control and fire alarm system from inputs 000, 002, and 009.
- Plug power supply back in.
- Using a length of 18 gauge wire, momentarily touch the 24VDC+ screw terminal with one end and input 000 with the other. The solenoid should engage.
- Trigger limit switch 1 and the unit should relock. It will also relock when the timer expires.
- Repeat this step with 24VDC+ and input 002. The alternate solenoid should engage.
- Trigger limit switch 2 and the unit should relock.
- If desired, test the fire alarm input by jumping and holding input 009 to 24VDC+ and both directions should unlock.

** If the unit was ordered with "no passage" in a direction, it will not be activated by either the directional input or the fire alarm.*

6500 Series Control Head w/ Keyence KV-16DR Controller Troubleshooting

Symptoms	Causes	Solutions
Turnstile does not power up.	Power supply is not receiving input voltage.	Verify outlet receptacle installed in mainframe / cabinet is operating correctly and that the power supply is plugged in.
	Power supply is not producing 24VDC voltage, but is receiving AC.	Remove + lead from power supply output. If output voltage resumes, there is a short circuit in the wiring. If not, the power supply is faulty. Replace power supply.
	Short circuit in the wiring as determined in previous step.	Refer to pages 13-15 for wiring information.
	Loose wiring from power supply to logic controller.	
Logic controller's display cycles on and off.	Short circuit in the wiring.	
	Solenoid(s) burnt out (will occur if main AC voltage is connected directly to solenoid).	If wiring is correct, try to disconnect the solenoids from 500/501. If system stops cycling, replace faulty solenoid.
Turnstile powers up but does not respond.	Logic controller program is not running. This can be determined by the color of the lettering on the logic controller display screen. If it is red, it is not running.	Refer to the "Overview of the Access Window" section on pages 16-17 and "run" the program.
	Logic controller shows error code "224".	The internal battery on the logic controller has gotten low. Leave unit plugged in for approximately 15 minutes and then cycle power.
	Improper wiring from access control to turnstile.	Ensure one leg of access control output relay is connected to 24VDC + (not C1, which is -) and the other to the desired input.
	Access control device malfunction.	Disconnect access control from circuit board. Momentarily jump directional inputs. If the turnstile works properly, contact manufacturer of access control device.

6500 Series Control Head w/ Keyence KV-16DR Controller Troubleshooting

Symptoms	Causes	Solutions
More than one person can get through turnstile.	Access control device output connected to override inputs.	Wire access control to 000/002 with one-shot timer enabled.
	Access control device output set too long.	This can be avoided by enabling the one-shot timers built into the logic controller program. If this is undesirable, ensure the output from the access control system is 1 second or less. Refer to pages 18-19.
	Loose wiring to the logic controller from limit switches.	Refer to pages 13-15 for wiring information.
	Limit switches are broken.	Inspect limit switches for breakage, replace as needed.
	Control head requires maintenance.	Refer to page 21 for more information.
	Limit switches are missing the triangular top cam.	Adjust the top cam to the proper height and or tweak the triggers on the limit switch. Refer to page 20 for parts locations.
People are becoming trapped inside of the turnstile (Full Height).	Rotor was installed backwards.	Refer to page 4 installation for visual diagram on how to install rotor properly.
Turnstile only rotates 30 degrees.	Limit switches wired incorrectly.	Refer to pages 13-15 for wiring information and page 20 for limit switch placement.
	Limit switch cam is misaligned.	The top cam should have one point facing the control board. If this is not the case, readjust the top cam. Refer to page 20 for top cam information.
Unit remains unlocked until access control is presented.	Fail open / fail lock configuration is wrong on PLC	Change PLC settings as necessary per device settings on pages 18-19
Turnstile is slamming into the closed position.	Shock either needs adjusted or replaced.	Refer to page 12 for more information.
Turnstile is not centering properly.	Shock needs adjusted.	
	Binding in control head.	Ensure mainframe is level and the rotor is plumb. Shim the unit from the floor if necessary.
Turnstile seems to be binding mechanically.	Rotor is not plumb / turnstile body is not level.	

6500 Series Control Head w/ Keyence KV-16DR Controller Troubleshooting

Symptoms	Causes	Solutions
Unit remains locked after access control is presented until arm is pulled in.	Mechanical bind between locking bar and cam assembly (typically from unit being out of plumb/level).	Remove locking bar assembly from control head (easiest way on non-keylock models is to punch out dowel pin pivot point from bottom side of head casting) and file down tip of locking bar to give clearance.
Turnstile rotating the wrong direction.	Improperly filled out direction sheet.	In some cases, the control head can be reconfigured in the field to operate as needed. Refer to pages 9-11 for information about how the control head operates. If needed, control heads can be returned to the factory for reconfiguration for a fee of labor plus parts (if required). Please contact us before returning a control head in this instance.
	Directional inputs wired incorrectly.	Refer to wiring legend on page 15 for direction port explanations
Turnstile fails lock when needed to fail open or vice versa.	Improperly filled out direction sheet.	Refer to page 11 for more information. Additional parts will be required to convert operation. The control head can be returned for reconfiguration for a fee of labor plus parts (if required). Please contact us before returning a control head in this instance.
Unable to hold direction open to allow multiple people to pass through the turnstile.	Override wired to incorrect inputs.	Ensure the access control device dedicated to overriding passage is wired to the override input instead of the standard input for that direction.
	One-shot timers are enabled (on regular access control input).	Disable the one-shot timer settings on the logic controller. Be sure that your access control output is one second or less during regular secure operation or extra people may be able to pass through. Refer to pages 18-19.
Other problems.		Please contact us for any other issues.

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Proper Turnstile Usage

The 6500 series turnstile control head is easy to use. There are a few things that users should be trained on and informed of.

- In the case of an electronic turnstile, approach the unit and swipe the card. Do not push on the arms of the rotor until after access control device is engaged and a click sound from the mainframe is heard. This sound is the locking mechanism engaging.

  

  Note: Turnstile will not unlock if pressure is being applied to the rotor. The unit will unlock after pressure is released; however, it is a better practice to wait until the click sound is heard before pushing the rotor.
- After requesting access with access control devices, proceed through turnstile immediately. Waiting too long could cause the turnstile to time-out mid rotation, forcing the user to back out of the turnstile. Factory timer settings are at 7 seconds. While these timers are adjustable for up to 60 seconds, we recommend 7-10 seconds because if someone chooses to swipe and walk away from the turnstile, another person would not be able to pass through without credentials. The limit switches on the control head override the directional timers.
- Walk at a reasonable pace through the turnstile. Do not slam the rotor through the rotation. This can be unsafe and may cause unnecessary wear and tear to the control head.
- Try to be respectful of users wanting to pass through the other direction. Allow people who are waiting an opportunity to pass through the turnstile.
- Avoid rotating the rotor on a full height before walking through on a valid entry request. This will cause the rotor to lock before you have a chance to pass through the turnstile.
- Piggybacking: More than one user trying to squeeze through the turnstile on one rotation should be avoided. Large bags and carts should be brought through an alternate means of entrance.

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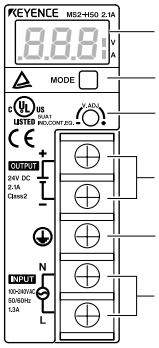
KEYENCE

96M1274

Compact Switching Power Supply
MS2 Series
Instruction Manual

Part Names and Functions



Digital display window
Displays the current values of output current/voltage and other items.

Display mode selection (MODE)
Switches the display mode.

Output voltage adjustment trimmer (V.ADJ)
Adjusts the output voltage within the range of ±5%.

DC output terminal (+, –) *
A load is connected here. (24 VDC)

Protective earthing terminal (⏚)
Connect to the protective earthing conductor in the building installation.

AC input terminal (N, L)
An input cable is connected here. (100 to 240 VAC)

*Only the MS-H300 has DC output of 4-terminal.

Safety Precautions

⚠ Danger

- Do not perform any electrical wiring while electric current is applied. Failure to follow this may result in an electric shock or fire.
- Be sure to connect the grounding cable. Failure to follow this may result in an electric shock or fire.
- Do not touch this unit within 1 minute after AC input is turned off. Failure to follow this may result in an electric shock.
- Do not modify or repair this unit. Failure to follow this may result in an electric shock, accident, or product failure.
- Do not touch any terminal of this unit while electric current is applied. Use the unit with the terminal cover installed to avoid an electric shock.

⚠ Warning

- When this unit is used in a system that may cause a serious accident or damage if the unit fails, be sure to install a safety device.
- Pay attention to prevent foreign matter such as metal particles, dust, paper or wood chips from entering the inside of this unit. Failure to follow this may result in a fire or product failure.
- Do not touch any metallic part while electric current is applied or immediately after input is shut off. Failure to follow this may result in a burn due to a high temperature.
- If a failure or abnormality occurs while this unit is in use, immediately such off AC input and stop operation of this unit . Failure to follow this may result in a fire or accident.

⚠ Caution

- Check that the AC input rated voltage of this unit is equal to the voltage of the AC power supply.
- Do not connect the AC power supply to the DC output terminals.
- Do not disturb the convection of air near the vent of the casing.

■ Precautions for CE Markings

KEYENCE has evaluated the conformity of the MS2 Series with the requirements of the EMC Directives and Low-voltage Directives under the following condition, and confirmed that the MS2 Series meets these requirements. For the Low-voltage Directives, the MS2 Series has obtained certification from TUV Rheinland for the following standards.

<Precautions>

● EMC Directives (89/336/EEC)

- Applicable standard (EMI) EN55011, Group 1, Class A
- Applicable standard (EMS) EN61000-6-2

● Low-voltage Directives (73/23/EEC)

- Applicable standard EN60950-1
  EN50178
- Overvoltage category II
- Pollution degree 2

- The MS2 Series is designed as a Class I Equipment. Be sure to connect the protective earthing terminal on the terminal block to the protective earthing conductor in the building installation.
- The MS2 Series is an open-type device. Be sure to install it in an appropriate enclosure rated as IP54 or better.
- Use the MS2 Series according to the derating conditions and the installation conditions described in this manual.
- The MS2 Series does not include a disconnecting device. Be sure to install a disconnecting device such as a circuit breaker in the building installation wiring.

■ Precautions for UL Standards

The MS2 Series meets the following UL standards and has obtained UL and C-UL certification.

- Applicable standard UL508 Industrial Control Equipment
  UL60950-1 Information Technology Equipment - Safety
  CAN/CSA C22.2 No. 14-M95
  Industrial Control Equipment
  CAN/CSA C22.2 No. 60950-1-03
  Information Technology Equipment - Safety
- UL File No. E195940, E242533
- UL category NMTR, NMTR7 / QQGQ2, QQGQ8

<Precautions>

- Use wires that meet the following conditions for the terminal block. (tightening torque : 1.2 N·m)
  Wire range AWG#14-22
  Wire Material Copper wire only
  Wire type Stranded wire only
  Temperature rating 60ºC/75ºC
- The MS2 Series is designed as a Class I Equipment. Be sure to connect the protective earthing terminal on the terminal block to the protective earthing conductor in the building installation.
- The MS2 Series is an open-type device. Be sure to install it in an appropriate enclosure rated as IP54 or better.
- Use the MS2 Series according to the derating conditions and the installation conditions described in this manual.
- The MS2 Series does not include a disconnecting device. Be sure to install a disconnecting device such as a circuit breaker in the building installation wiring.
- The output of the MS2-H50 is regarded as Class 2 output specified in NEPA70 (NEC: National Electrical Code) in the U.S.A. (UL Category: EPBU2/EPBU8)

Installation Conditions

■ Installation environment

- Installation this unit indoors.
- Do not install this unit in locations exposed to direct sunlight.
- Do not install this unit in locations in which there is corrosive gas or flammable gas.
- Do not install this unit in locations exposed to a lot of dust, soot, or stem.
- Do not install this unit in locations in which water, oil, or chemicals may splash onto the unit.
- When installing this unit in a location subject to vibration or impact, consider the vibration proof mounting.

■ When installing this unit in a control console

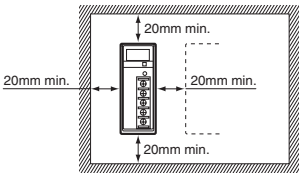
- The ambient temperature for this unit should not exceed the upper temperature limit (refer to the derating characteristic). When the upper temperature limit may be exceeded, install a cooling fan or cooler so that the ambient temperature is below the upper temperature limit.
- Leave a sufficient ventilation space around this unit for head dissipation.
- Do not install this unit just above a device with high head generation (transformer, inverter, servo amplifier, etc.).

Installation

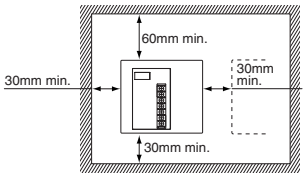
■ Space around the unit

The MS2 Series uses natural air-cooling. To ensure sufficient convection of air to dissipate heat, provide enough space between the MS2 Series and the control panel or other nearby devices as shown below.

MS2-H50/H75/H100/H150

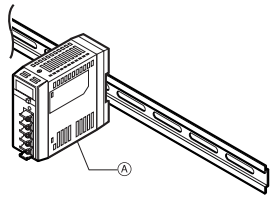


MS2-H300



■ Installation orientation

Install this unit with the base Ⓐ down as shown below. Do not install the unit in any other orientation.



■ Mounting bracket (optional)

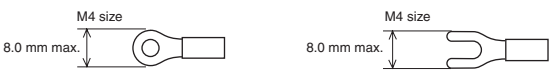
Make sure that the tightening torque for the mounting screw holes of this unit is 0.5 N•m or less.

Wiring

Terminals

Screw size	Tightening torque
M4	1.2 N•m

Crimp termianls



Cables

Select cables with a wire diameter suited to the output rated current.

Method of Operation

The display mode changes each time when the MODE switch is pressed.

- Output current display — Displays the output current down to 0.1 A.
- Load factor display — Displays the load factor down to 1%. When the load factor is over 100% , displays "FFP".
- Peak current display — Displays the maximum value of the output current down to 0.1 A. The current and "PH" are displayed alternately.
- Output voltage display — Displays the output voltage down to 0.1 V.

- The MS2 Series is set to the output current display mode before shipment. It retains the display mode that was used before the power was turned off.
- The maximum value for the peak current display mode is cleared when the power is turned off and the display mode is changed.
- When the switch is held down for 3 seconds or more, the current mode is locked and cannot be changed. To unlock the mode, hold down the switch again for 3 seconds or more.

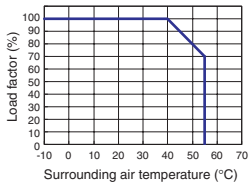
Dimensions

	Model	MS2-H50	MS2-H75	MS2-H100	MS2-H150	MS2-H300
Input conditions	Rated Input voltage *1	100 to 240 VAC (85 to 264 VAC, 110 to 370 VDC)				
	Rated Frequency *1	50/60 Hz (47 to 63 Hz, DC)				
	Input current (100/200 VAC)	1.3 A/0.7 A max.	1.9 A/0.9 A max.	2.1 A/1.3A max.	2.2 A/1.1 A max.	3.9 A/1.8 A max.
	Efficiency (100/200 VAC)	82%/85% typ. (with 100% load)				
	Leakage current (100/200 VAC)	0.4 mA/0.75 mA max. (with 100% load)				
	Rush current (100/200 VAC)	25 A/50 A max. (with 100% load, at 25°C cold start)				18 A/36 A max.
Output conditions	Rated output voltage	24 VDC				
	Adjustable voltage range	±5%(with V.ADJ)				
	Rated output current	2.1 A(Class2)	3.2 A	4.5 A	6.5 A	12.5 A
	Ripple/noise voltage	180mVp-p max.				
	Input fluctuation	0.4 % max.				
	Load fluctuation	1.5 % max.				
	Temperature fluctuation	0.02 %/°C max.				
	Starting time	500 ms max. (at Surrounding Air Temperature of 0 to 55°C under rated I/O conditions)				
	Output holding time	20 ms min. (at Surrounding Air Temperature of 25°C under rated I/O conditions)				
Protection	Overcurrent protection	Activates when the current reaches 125% or more of the rated output current. Constant current voltage limiting. Automatic reset				
		2.7 A min.	4.0 A min.	5.3 A min.	7.9 A min.	15.6 A min
	Overvoltage protection *2	Activates when the voltage reaches 26.4 V or more. Voltage turn-off. Operation resumes when the input power is turned on again.				
Display	Display method	3-digit, 7-segment LED (Character height: 10 mm)				
	Memory backup time	Approx. 10 years (at 20°C)				
	Display resolution	0.1 A/0.1 V/1%				
Environment	Surrounding Air Temperature (for operation)	–10 to 55ºC, No condensation (See "Output Derating Characteristics".)				
	Relative humidity	25 to 85%, No condensation				
	Surrounding Air Temperature (for storage)	–20 to 70°C, No condensation				
	Withstand voltage	3.0 kVAC 50/60 Hz 1 min (across input and output terminals), 2.0 kVAC 50/60 Hz 1min (across input terminals and PE terminal) 500 VAC 50/60 Hz 1 min (across output terminals and PE terminal)				
	Shock	Peak acceleration: 300 m/s², in X, Y, and Z directions, 2 times respectively				
	Vibration	In X, Y, and Z directions, 2 hours respectively under the following conditions 10 to 57 Hz, 0.3 mm double-amplitude, 57 to 500 Hz, 19.6 m/s2 (2G), 5.5-minute cycle				
	Insulation resistance	100 MΩ min. (with 500 VDC megohmmeter) (across input and output terminals) (across input terminals and PE terminal) (across output terminals and PE terminal)				
Applicable standard	Safety standard	UL : UL508, UL60950-1 C-UL : CSA C22.2 No.14-M95, CSA C22.2 No.60950-1-03 EN : EN60950-1, EN50178 IEC : IEC60950-1				
	EMC standard	FCC Part15B ClassA, EN55011 ClassA, EN61000-6-2				
	Limits for harmonic current emissions	EN61000-3-2 *3				
Other	Parallel operation	Possible (OP-42207 is required.) *4				
	Serial operation	Possible (External diode is required.) *4				
	Cooling method	Natural air-cooling				
	Weight	Approx. 270g	Approx. 470g	Approx. 490g	Approx. 700g	Approx. 1540g

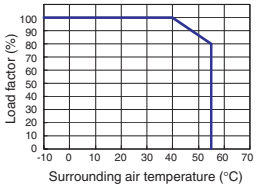
*1 For conforming to safety standards shown above, rated input voltage is 100 to 240 VAC 50/60 Hz.
*2 To reset the unit, turn off the input power once, wait for 1 minute or more, and then turn on the input power again.
*3 For MS2-H100, it is applied only when the load ratio is 70% or lower.
*4 The Applicable standards do not apply for parallel and serial operations.

Output Derating Characteristics

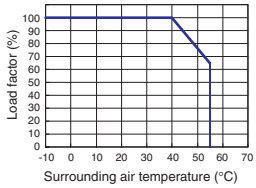
MS2-H50/H150



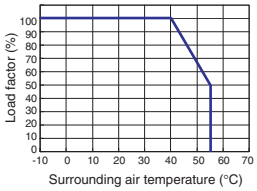
MS2-H75



MS2-H100



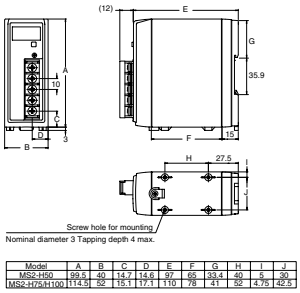
MS2-H300



* The characteristic data shown above are obtained when this unit is installed as described in this Manual.
* The surrounding air temperature is the temperature 50 mm below the bottom of the MS2 Series unit.

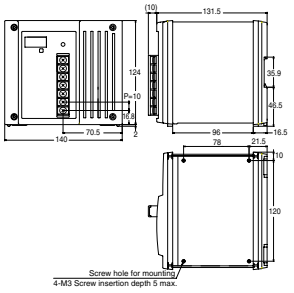
Dimensions

MS2-H50/H75/H100

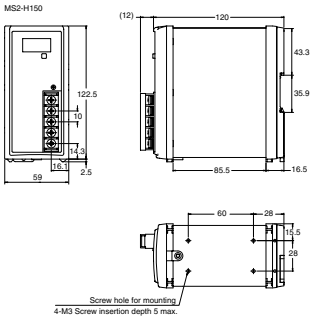


Model	A	B	C	D	E	F	G	H	I	J
MS2-H50	99.5	40	14.7	14.6	97	65	33.4	40	5	30
MS2-H75/H100	114.5	52	15.1	17.1	110	78	41	52	4.75	42.5

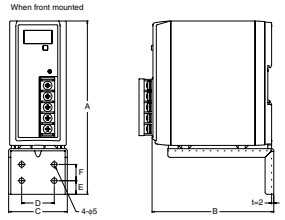
MS2-H300



MS2-H150



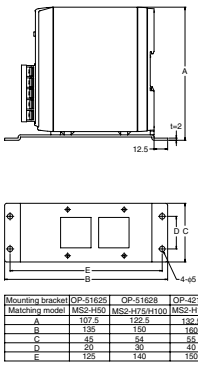
When front mounted



Mounting bracket	OP-51624	OP-51627	OP-42174
Matching model	MS2-H50	MS2-H75/H100	MS2-H150
A	123.5	159.5	170
B	99	112	122
C	45	54	59
D	20	30	40
E	8	12.5	12.5
F		15	15

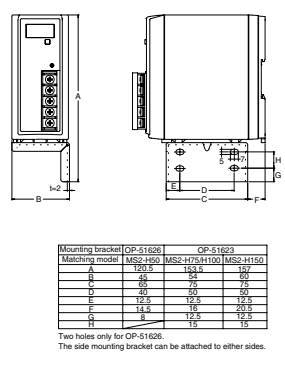
Two holes only for OP-51624.

When bottom mounted



Mounting bracket	OP-51625	OP-51628	OP-42175
Matching model	MS2-H50	MS2-H75/H100	MS2-H150
A	107.5	122.5	132.5
B	135	150	160
C	45	54	55
D	20	30	40
E	125	140	150

When side mounted



Mounting bracket	OP-51626	OP-51623	
Matching model	MS2-H50	MS2-H75/H100	MS2-H150
A	120.5	153.5	157
B	45	54	60
C	65	75	75
D	40	50	50
E	12.5	12.5	12.5
F	14.5	16	20.5
G	8	12.5	12.5
H		15	15

Two holes only for OP-51626.
The side mounting bracket can be attached to either sides.

KEYENCE

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Phone: 02-563-1270 Fax: 02-563-1271

Specifications are subject to change without notice. B0124

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PLC Specifications

General specifications

Model		AC type KV-10AT(P)/AR KV-16AT(P)/AR KV-24AT(P)/AR KV-40AT(P)/AR	DC type KV-10DT(P)/DR KV-16DT(P)/DR KV-24DT(P)/DR KV-40DT(P)/DR
Rated voltage		100 to 240 VAC (±10%)	24 VDC (+10%, -20%)
AC current consumption		KV-10AT(P)/AR: 0.4 A KV-16AT(P)/AR: 0.5 A KV-24AT(P)/AR: 0.6 A KV-40AT(P)/AR: 0.7 A	—
AC power factor		60%	—
Output voltage		24 VDC (±10%)	—
Output capacity (Including the internal current consumption and current consumption of expansion units.)		KV-10AT(P)/AR: 0.4 A KV-16AT(P)/AR: 0.6 A KV-24AT(P)/AR: 0.6 A KV-40AT(P)/AR: 0.7 A	—
Allowable instantaneous interruption time		40 ms max.	2 ms max.
Internal current consumption (converted into 24 VDC value)	Base unit	KV-10AR/DR: 100 mA max. KV-10AT(P)/DT(P): 80(85) mA max. KV-16AR/DR: 120 mA max. KV-16AT(P)/DT(P): 90(100) mA max. KV-24AR/DR: 140 mA max. KV-24AT(P)/DT(P): 100(105) mA max. KV-40AR/DR: 180 mA max. KV-40AT(P)/DT(P): 120(130) mA max.	
	Expansion units	KV-E8X: 25 mA max. KV-E16X: 35 mA max. KV-E8T(P): 40 mA max. KV-E16T(P): 60(70) mA max. KV-E8R: 70 mA max. KV-E16R: 110 mA max. KV-E4XR: 45 mA max. KV-E4XT(P): 30 mA max.	
	Others	KV-D30 Operator interface panel: 60 mA max. KV-P3E Handheld programmer: 65 mA max.	
Ambient temperature		0 to 50°C, 0 to 45°C (KV-P3E)	
Relative humidity		35 to 85%	
Ambient storage temperature		-20 to +70°C	
Withstand voltage		1,500 VAC for 1 minute (Between power terminal and I/O terminals, and between external terminals and housing)	
Noise immunity		1,500 Vp-p min., pulse width: 1 μs, 50 ns (by noise simulator) Conforming to EN standard (EN61000-4-2/-3/-4/-6)	
Shock		150 m/s² (15 G), working time: 11 ms, in X, Y and Z directions, 2 times respectively	
Vibration		10 to 55 Hz, 1.5 mm max. double amplitude in X, Y and Z directions, 2 hours respectively (1 G max. when attached to DIN rail)	
Insulation resistance		50 MΩ min. (Between power terminal and I/O terminals, and between external terminals and housing, measured with 500 VDC megohmmeter)	
Environmental restrictions		No excessive dust or corrosive gases	
Weight		KV-10AR: Approx. 250 g, KV-10AT(P): Approx. 240 g, KV-16AR: Approx. 300 g, KV-16AT(P): Approx. 280 g, KV-24AR: Approx. 350 g, KV-24AT(P): Approx. 330 g, KV-40AR: Approx. 450 g, KV-40AT(P): Approx. 410 g, KV-10DR: Approx. 150 g, KV-10DT(P): Approx. 140 g, KV-16DR: Approx. 190 g, KV-16DT(P): Approx. 180 g, KV-24DR: Approx. 240 g, KV-24DT(P): Approx. 210 g, KV-40DR: Approx. 330 g, KV-40DT(P): Approx. 280 g	

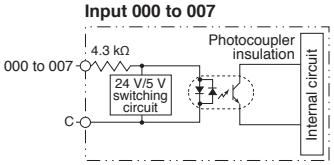
Performance specifications

Arithmetic operation control method		Stored program method
I/O control method		Refresh method
Programming language		Ladder diagram and expanded ladder diagram
Instruction types		Basic instruction: 28, Application instruction: 22, Arithmetic instruction: 26, Interrupt instruction: 4
Minimum scan time		140 μs min.
Instruction processing time		Basic instruction: 0.7 μs min., Application instruction: 6.4 μs. min.
Program capacity		2,000 steps (KV-10xx, KV-16xx)
		4,000 steps (KV-24xx, KV-40xx)
Maximum number of expansion units		8 (7 for KV-40xx)
Number of I/O points (including 10 to 40 I/O points of basic unit)		10 to 152 points (when expansion units are connected)
Internal utility relay		2,560 points: 1000 to 1915 and 3000 to 17915
Special utility relay		160 points: 2000 to 2915
Data memory (16 bits)		2,000 words: DM 0000 to DM1999
Temporary data memory (16 bits)		32 words: TM00 to TM31
Timer/counter		250 in all: 0.1-s timer: TMR (0 to 6553.5 s), 0.01-s timer: TMH (0 to 655.35 s), 0.001-s timer: TMS (0 to 65.535 s), UP counter: C, Up/down counter: UDC
Digital trimmer		2 trimmers (set in access window)
High-speed counter		2 counters of 30 kHz, 2-phase high-speed counter (0 to 65535 count) *1
High-speed counter comparator		4 comparators (2 for each high-speed counter) Direct output allowed
Positioning control function		Independent 1 axis, 50 kHz max.
Memory switch		16
Memory backup	**Program memory**	Flash ROM, rewritable 100,000 times or more
	Data memory, counter, internal utility relay (Retention devices are set by MEMSW instruction.)	Data retained for 2 months min. with electrical double-layer capacitor (at 25°C), Data can be backed up with Flash ROM in all models.
Self-diagnosis		CPU and RAM errors
Number of contact comments		1,000 max. contact comments can be saved.

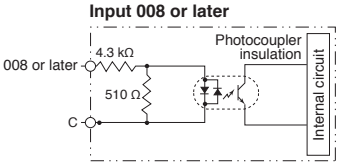
*1. 24-bit setting is available.

Input/output circuit of base unit

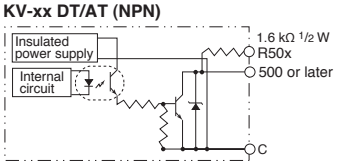
Input 000 to 007



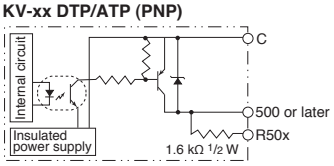
Input 008 or later



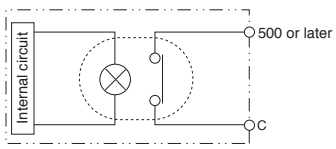
KV-xx DT/AT (NPN)



KV-xx DTP/ATP (PNP)



KV-xx DR/AR



Input specifications of base unit

Model	KV-10xx	KV-16xx	KV-24xx	KV-40xx
No. of inputs	6	10	16	24
Input common	COM is connected internally.			
Maximum input rating	26.4 VDC			
Input voltage *1	24 VDC, 5.3 mA/5 VDC, 1.0 mA			
Input time constant	10 ms (Typical) 10 µs when HSP instruction is used Variable in 7 steps from 10 µs to 10 ms while special utility relay 2813 is ON (Set by DM1940)			
Interrupt input response	10 µs (Typical)			
High-speed counter input response	30 kHz (24V±10%)			

*1. Inputs 000 to 007 can be changed to 5 V input.

Output specifications of basic unit

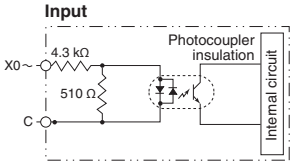
Model	KV-10xT(P)	KV-16xT(P)	KV-24xT(P)	KV-40xT(P)	KV-10xR	KV-16xR	KV-24xR	KV-40xR
No. of outputs	4	6	8	16	4	6	8	16
Output common	1 common				Each common terminal is independent.			
Output type	Transistor output (NPN or PNP)				Relay output			
Rated load	30 VDC 0.3 A (503 and other) 0.1 A (500 to 502)				250 VAC/30 VDC 2 A (Inductive load) 4 A (Resistive load)			
Peak load current	0.2 A (500 to 502) 1 A (Other)				5 A			
Relay service life	—				Electrical service life: 100,000 times or more (20 times/min) Mechanical service life: 20-million times or more			
Relay replacement	—				Not allowed			
Output frequency	50 kHz (500 to 502)				—			
Built-in serial resistance	1.6 kΩ 1/2W (R500 to R502)				—			

Input/output specifications of expansion unit

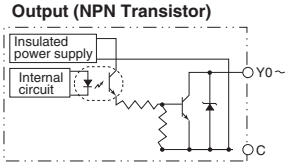
Input/output	Input		Output				Input/output
External connection method	Terminal block						
Model	KV-E8X	KV-E16X	KV-E8T(P)	KV-E16T(P)	KV-E8R	KV-E16R	KV-E4XT(P)/R
Number of inputs	8	16	—				4
Input common	4 points/common		—				4 points/common
Maximum input rating	26.4 VDC		—				26.4 VDC
Input voltage	24 VDC, 5.3 mA		—				24 VDC, 5.3 mA
Minimum ON voltage	19 V		—				19 V
Maximum OFF current	2 mA		—				2 mA
Input impedance	4.3 kΩ		—				4.3 kΩ
Input time constant (Changed in two steps by special utility relays 2609 to 2612)	For both rising (OFF → ON) and falling (ON → OFF) operations, 10 ms: 10 ms±20%, 10 µs: 10 µs±20%		—				For both rising (OFF → ON) and falling (ON → OFF) operations, 10 ms: 10 ms±20%, 10 µs: 10 µs±20%
Number of outputs	—		8	16	8	16	4
Output type	—		NPN (PNP) Transistor		Relay		NPN (PNP) Transistor/Relay
Output common	—		COM is connected internally.		4 points/common		4 points/common
Rated load voltage	—		30 VDC		250 VAC/30 VDC, 2 A (Inductive load), 4 A (Resistive load)		30 VDC/, 250 VAC/30 VDC, 2 A (Inductive load), 4 A (Resistive load)
Rated output current	—		0.5 (0.3) A/point		2 A/point (Inductive load), 4 A/point (Resistive load), 4 A/common		0.5 A/point/, 2 A/point (Inductive load), 4 A (Resistive load), 4 A/common
ON resistance	—		—		50 mΩ or less		— / 50 mΩ or less
Leakage current at OFF	—		100 µA max.		—		100 µA max./ —
Residual voltage at ON	—		0.8 V max.		—		0.8 V max./ —
Rising operation time (OFF → ON)	—		50 µs max.		10 ms max.		50 µs max./10 ms max.
Falling operation time (ON → OFF)	—		250 µs max.		10 ms max.		250 µs max./10 ms max.
Relay service life	—		—		Electrical: 100,000 times or more (20 times/min), Mechanical: 20-million times or more		Electrical: 100,000 times or more (20 times/min), Mechanical: 20-million times or more
Relay replacement	—		—		Not allowed		— /Not allowed
Weight	Approx. 100 g	Approx. 130 g	Approx. 100 g	Approx. 130 g	Approx. 130 g	Approx. 190 g	Approx. 100 g/Approx. 120 g

Input/output circuit of expansion unit

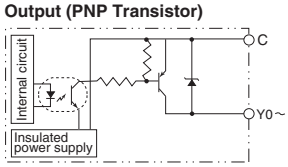
Input



Output (NPN Transistor)



Output (PNP Transistor)



Output (Relay)