

The 4M2 series of residential controllers is changing the way the residential elevator market purchases controllers. Currently controllers are purchased as a job specific item after the homeowner has defined any optional features. The 4M2 allows the controller to become a **STOCKED ITEM** because all optional features are incorporated into every unit. The OEM or contractor simply takes a unit from inventory and makes it job specific within minutes. It also allows customer changes and future upgrades to become seamless and cost effective. This purchasing method allows a mid-sized company the benefit of volume pricing.

System Description:

The 4M2 is a line of programmable microprocessor based controllers designed for the North American residential elevator market. This reliable controller fulfills all A17.1 requirements and is ETL listed for residential elevators. The 4M2 can operate in either single automatic or constant pressure modes and accommodates 2-4 stops, short floors, two speeds in both directions, two way re-leveling, retiring cam, fixed cam or four electric locks, two automatic gate operators, four swing door operators, emergency lowering and an emergency light output. It can be used with hatch switches or a magnetic landing system such as our SEL2. All relays that operate external devices are socket mounted to allow easy field replacement.

The 4M2 incorporates a twenty event log to track system events. The system also tracks the number of runs and re-levels. Both the log and counters require a password before they can be cleared.

The entire line of controllers is housed in a 20 x 20 x 6 ¾ inch cabinet.

The price point for this line is less than a basic relay logic unit.

There are four basic models to choose from depending on your drive system

| <u>Drive System</u> | <u>Part Number</u> |
|-------------------------------|--------------------|
| Hydraulic (1 contactor) | 4M2H2 |
| Hydraulic (2 contactors) | 4M2H2A |
| Single Speed Drum or Traction | 4M2SS |
| V.V.V.F. Drum or Traction | 4M2VF |

This product line conforms to UL508A, ASME A17.1A, ASME A17.5 and CSA-B44-94.

Complete technical information available upon request.

Mfg. By:



Electro-Mech. Industries

250 Hamilton Road, Arlington Heights, IL 60005
Phone (847) 593-4900 Fax (847)593-1394



Hardware Features:

- Microprocessor based
- 3hp 230V contactor(s)
- 2 to 4 stops
- Red LED's on all inputs
- Yellow LED's on all outputs
- Emergency light output -> 24vdc
- Supports two Power Gate Operators
- Supports four Swing Door Operators
- Supports the following H. Door interlocks
 - Retiring Cam
 - Fixed Cam
 - Electric Door Locks (24vdc)
- Supports the following drive systems
 - Single Speed Drum
 - VVVF Drum
 - Hydraulic (110vac coils)
 - Single coil
 - Three coil (common H.S.)
 - Four coil
- Selector Type -> 24vdc Active Low
- Battery Lowering (Hydro only)
- RS232 Port for PC interface

Software Features:

- Two Modes of Operation
 - Single Automatic Pushbutton
 - Constant Pressure
- Password Protected
- Two way Leveling (re-level Hydro only)
- Supports Short Floors
- Selectable Call Button Fault Indication
- Adjustable Gate Open timer
- Adjustable Swing Door Close timer
- Adjustable Run timer
- Adjustable Non Interference timer
- Adjustable Car Light timer
- Adjustable Call Cancel timer
- 20 Event LIFO Log
- On Board Counters
 - Total Trip
 - Run
 - Re-level
- Delay Up Stop
- Selectable Homing Floor
- Adjustable Homing Timer
- Auto Shutdown Counter
- Relevel Shutdown Counter

Optional Equipment:

1. Portable or Controller Mounted Programming tool
2. Five horsepower contactor(s)
3. Magnetic Landing System (Model:SELECTOR2)

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RESIDENTIAL CONTROLLERS

INPUTS

The following are 24vdc Active High

| | |
|-----|---------------------|
| MSC | Main Safety Chain |
| GC | Gate Switch |
| HDC | Hatch Doors Closed |
| HDL | Hatch Doors Locked |
| LPS | Low Pressure Switch |
| UT | Up Terminal Limit |
| LT | Down Terminal Limit |
| OL | Motor Overload |

The following are 24vdc Active Low

| | |
|-----|------------------|
| UL | Up Leveling |
| DL | Down Leveling |
| DZ | Door Zone |
| P1 | Position 1 |
| P2 | Position 2 |
| P3 | Position 3 |
| P4 | Position 4 |
| DOB | Door Open Button |

OUTPUTS

| | | |
|-----|-----------------------|-------------|
| RP | Run Contactor | 110vac 1A |
| UP | Up Contactor | 110vac 1A |
| UP | Up Coil | 110vac 1A |
| DN | Down Coil / Contactor | 110vac 1A |
| HSU | H.S. Up Coil | 110vac 1A |
| HDS | H.S. Down Coil | 110vac 1A |
| HSC | H.S. Common Coil | 110vac 1A |
| AL | Automatic Light | 110vac 3A |
| RC | Retiring Cam | 24vdc .2A |
| 1EL | Door Lock FL 1 | 24vdc .5A |
| 2EL | Door Lock FL 2 | 24vdc .5A |
| 3EL | Door Lock FL 3 | 24vdc .5A |
| 4EL | Door Lock FL 4 | 24vdc .5A |
| OK | System Checking | 24vdc |
| OPF | Gate Op. Front | 24vdc .2A |
| OPR | Gate Op. Rear | 24vdc .2A |
| BZ | Buzzer | 24vdc .2A |
| EL | Emergency Light | 24vdc .5A |
| PD1 | Swing Door Op 1 | Dry Contact |
| PD2 | Swing Door Op 2 | Dry Contact |
| PD3 | Swing Door Op 3 | Dry Contact |
| PD4 | Swing Door Op 4 | Dry Contact |

INPUT / OUTPUT

| | |
|----|-------------------|
| C1 | Call & Light FL 1 |
| C2 | Call & Light FL 2 |
| C3 | Call & Light FL 3 |
| C4 | Call & Light FL 4 |

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Intertek

RESIDENTIAL CONTROLLERS

SELECTOR REQUIREMENTS

The 4M2 series Controllers require seven selector inputs for proper operation:

| | | |
|-----------------|------------------------------|------------------------------|
| LU = Level Up | P1 = Verifies Car is at FL 1 | P4 = Verifies Car is at FL 4 |
| LD = Level Down | P2 = Verifies Car is at FL 2 | |
| DZ = Door Zone | P3 = Verifies Car is at FL 3 | |

The inputs are 24VDC active low; meaning that 24VDC Reference must be present at the appropriate controller terminal to turn on the input.

Up Travel Logic Sequence:

- When an up call is registered, the “UP”, “RP” and “HS” computer outputs will be activated.
- Each time UL is activated along with DZ the selector will increment one level
- When the selector increments to the landing where the call is registered, the “HS” computer output will deactivate and the car will continue up the hoistway at leveling speed.
- To stop the car after it is running in leveling speed UL turns off while DZ remains on. The “UP” computer output is deactivated then after 3 seconds “RP” computer output is deactivated.

Down Travel Logic Sequence:

- When a down call is registered, the “DN”, “RP” and “HS” computer outputs will be activated.
- Each time DL is activated along with DZ the selector will decrement one level
- When the selector decrements to the landing where the call is registered, the “HS” computer output will deactivate and the car will continue down the hoistway at leveling speed.
- To stop the car after it is running in leveling speed DL turns off while DZ remains on. The “DN” computer output is deactivated then after 3 seconds “RP” computer output is deactivated.

Releveling (Hydro Only)

After the car has stopped at floor level in response to a call, the car will re-level up when UL and DZ are on together, and will stop when LU is off. The car will re-level down if DL and DZ are on together, and will stop when DL is off. Releveling is deactivated for single speed and VVVF winding drums.

Positive Encoding:

The MHTAL Controller board achieves positive encoding via four independent positioning magnets. Door Lock outputs will be activated only when proper position magnet is present.

Short Floors: The minimum travel distances are as follows:

Automatic PB: 12 inches.

Constant Pressure: 24 inches.

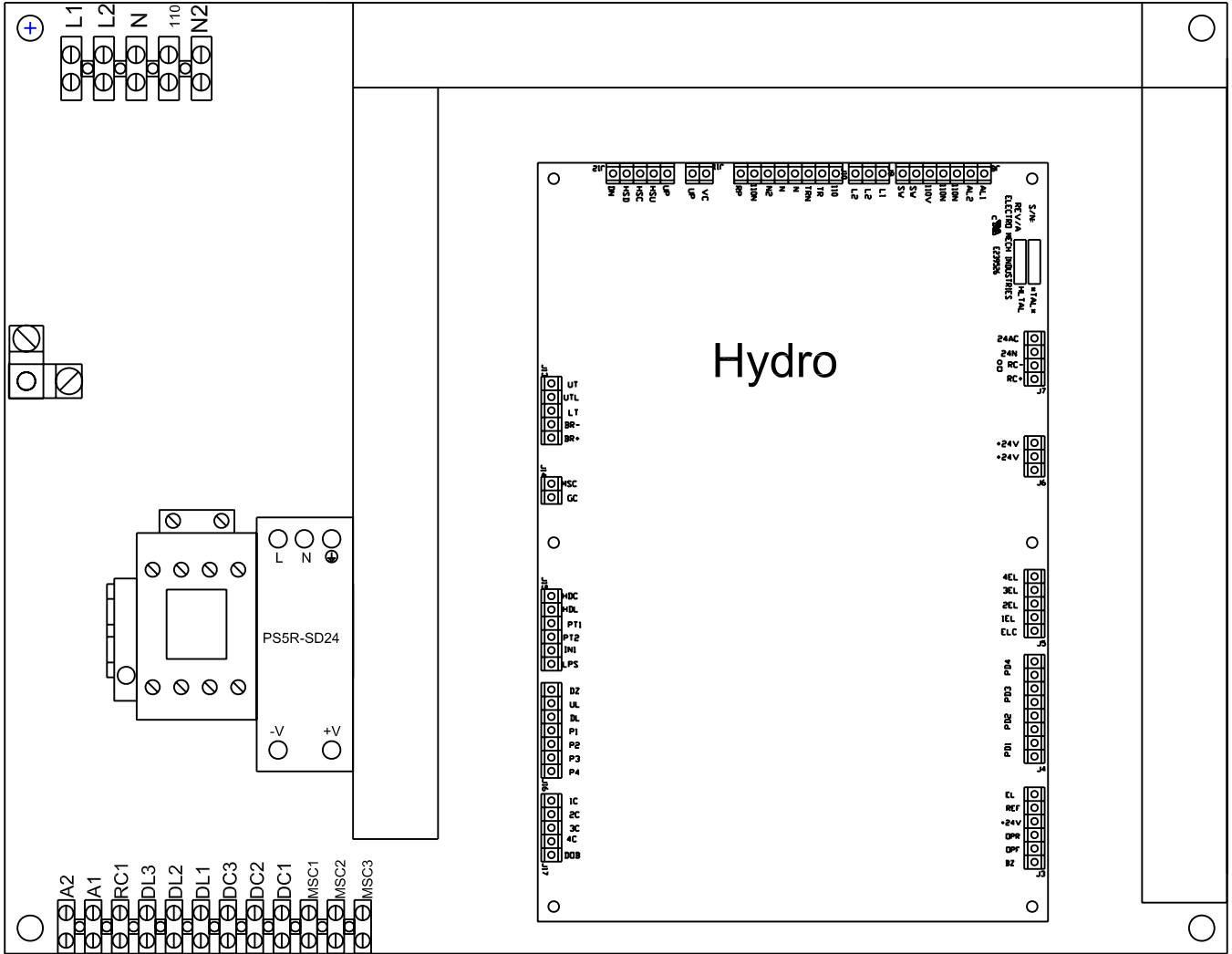
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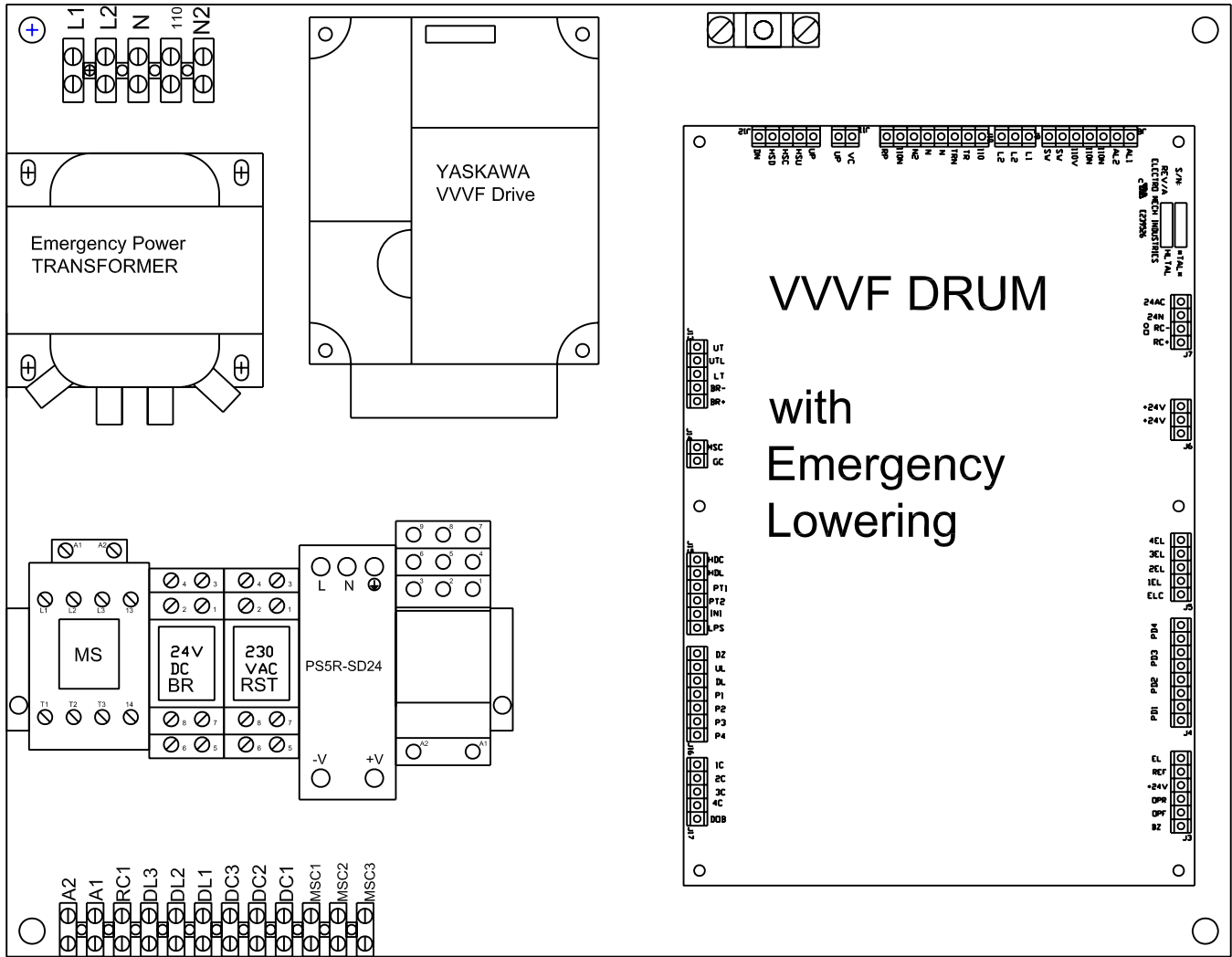


UPS 425VA

Size = 20" x 20" x 6 3/4"

Model#: 4M2H2
Controller Layout

| | |
|---|---|
| DWG DATE: 08-01-13 | PAGE 1 OF 1 |
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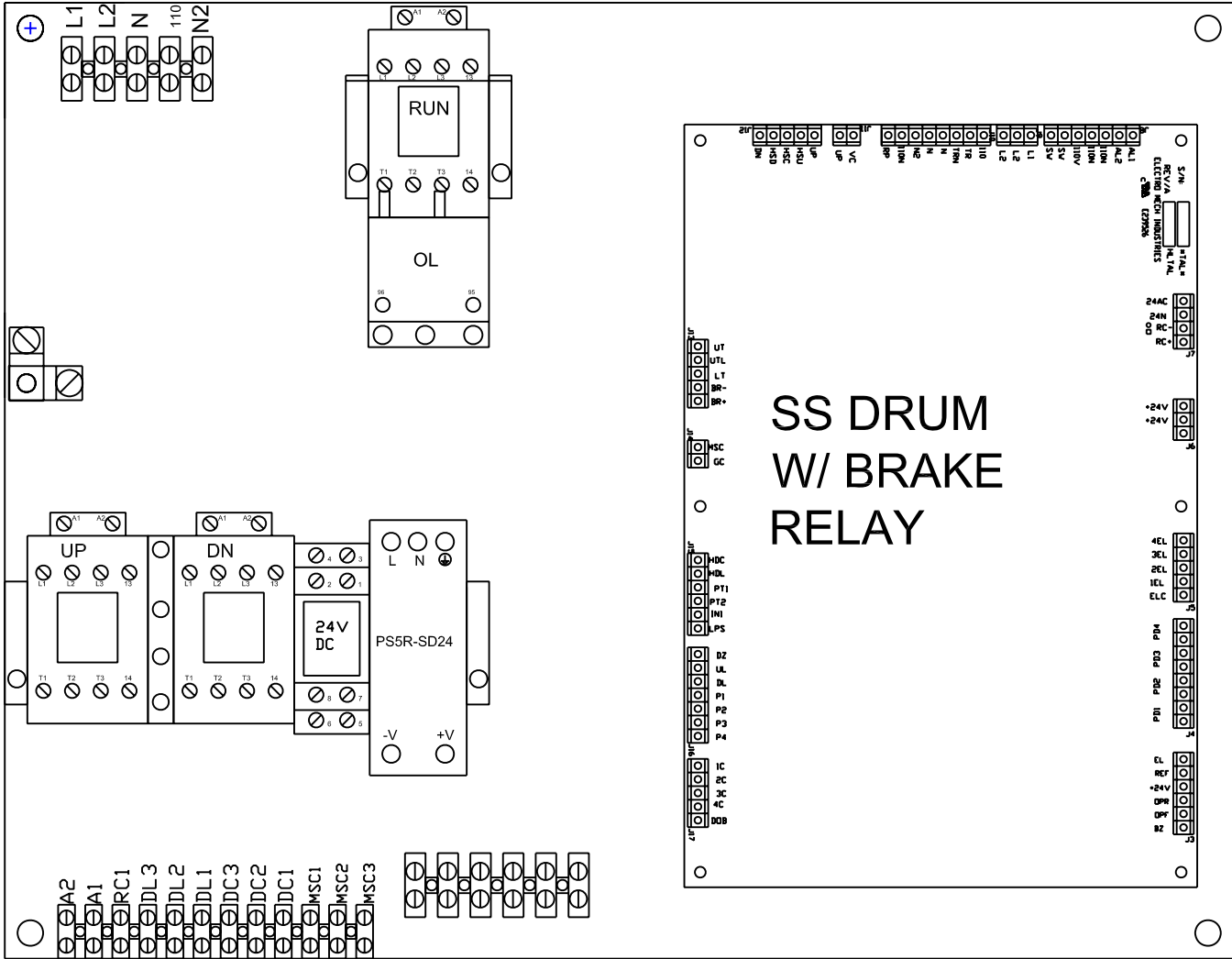
UPS 800VA (Min)

Size = 20" x 20" x 6 3/4"

Model#: 4M2VF
Controller Layout

DWG DATE: 08-01-13 PAGE 1 OF 1

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Arlington Hts., IL 60005 Fax: (847)593-1394



Size = 20" x 20" x 6 3/4"

Model#: 4M2SS
Controller Layout

| | |
|---|---|
| DWG DATE: 08-01-13 | PAGE 1 OF 1 |
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LEV RETROFIT CONTROLLERS

Since TKA announced that they would terminate their North American Residential Elevator operations, we have moved forward with providing a LEV retrofit control system to the industry. We will offer control systems for both chain drive and hydraulic LEV's. The controllers will be available for both hoistway and remote installations.

Product Goals:

- Offer a cost effective solution to changing out a LEV controller without sacrificing any functionality.
- To reuse as much of the existing wiring and ancillary components as possible.
- To complete the retrofit within 4 hours

Features & Benefits:

- Reuse of the following ancillary components
 - Hall Stations
 - COP
 - Selector
 - Automatic Gate Operator
 - TKA Temp Run Pendant (to run car only)
- Reuse of all CAT-5 cables
- Reuse all wire harnesses with pluggable Terminal strips as is

Retrofit Limitations:

- Larger Controller cabinet (non-hoistway mounted H=20.5" x W=24.5" x D=6.8")
- 4 Stops Maximum
- No fault codes to hall stations

Installation Overview (non Hoistway installation):

1. Un-plug all connectors to original controller & remove controller
2. Mount Retrofit controller
 - Re-pipe incoming power from disconnect
 - Plug in all original connectors to Retrofit Controller
3. Un-plug all connectors to original COP Interface PCB & remove
4. Install Retrofit COP Interface PCB (Same mounting points)
5. Plug in all original connectors to Retrofit COP Interface PCB
6. Reposition Selector magnets
7. Program Job specific parameter to controller
8. Return car to service

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Required Selector Signals 4M2 Controller Series

| CAR LOCATION | RUNNING UP | | | | | | | P3 | P4 |
|--------------|------------|----|----|----|----|----|----|----|----|
| | DZ | UL | DL | P1 | P2 | P3 | P4 | | |
| @ FL 1 | X | | | X | | | | | |
| | X | | X | X | | | | | |
| | X | | X | O | | | | | |
| | O | | X | | | | | | |
| ALL OFF | | | O | | | | | | |
| | | X | | | | | | | |
| | X | X | | | | | | | |
| | X | X | | | X | | | | |
| @ FL 2 | X | O | | | X | | | | |
| | X | | X | | X | | | | |
| | X | | X | | O | | | | |
| | O | | X | | | | | | |
| ALL OFF | | | O | | | | | | |
| | | X | | | | | | | |
| | X | X | | | | | | | |
| | X | X | | | | X | | | |
| @ FL 3 | X | O | | | | | | | |
| | X | | X | | | X | | | |
| | X | | X | | | O | | | |
| | O | | X | | | | | | |
| ALL OFF | | | O | | | | | | |
| | | X | | | | | | | |
| | X | X | | | | | | | |
| | X | X | | | | | | | |
| ALL OFF | | | O | | | | | | |
| | | X | | | | | | | |
| | X | X | | | | | | | |
| | X | X | | | | | | X | |
| @ FL 4 | X | O | | | | | | X | |

X= LED ON
O= LED HAS TURNED OFF

| CAR LOCATION | RUNNING DOWN | | | | | | | P3 | P4 |
|--------------|--------------|----|----|----|----|----|----|----|----|
| | DZ | UL | DL | P1 | P2 | P3 | P4 | | |
| @ FL 4 | X | | | | | | | X | |
| | X | X | | | | | | X | |
| | X | X | | | | | | O | |
| | O | X | | | | | | | |
| ALL OFF | | O | | | | | | | |
| | | | X | | | | | | |
| | X | | X | | | | | | |
| | X | | X | | | X | | | |
| @ FL 3 | X | | O | | | | | X | |
| | X | X | | | | | | X | |
| | X | X | | | | | | O | |
| | O | X | | | | | | | |
| ALL OFF | | O | | | | | | | |
| | | | X | | | | | | |
| | X | | X | | | | | | |
| | X | | X | | X | | | | |
| @ FL 2 | X | | O | | | | | | |
| | X | X | | | | | | | |
| | X | X | | | | | | | |
| ALL OFF | | O | | | | | | | |
| | | | X | | | | | | |
| | X | | X | | | | | | |
| | X | | X | | | | | | |
| @ FL 1 | X | | O | | | | | | |

X= LED ON
O= LED HAS TURNED OFF

Selector Logic Requirements Rev 1

The MHTAL Controller board requires seven selector inputs for proper operation:

| | | |
|-----------------|------------------------------------|------------------------------------|
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Up Travel Logic Sequence:

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- Each time **UL** is activated along with **DZ** the selector will increment one level
- When the selector increments to the landing where the call is registered, the “HS” computer output will deactivate and the car will continue up the hoistway at leveling speed.
- To stop the car after it is running in leveling speed **UL** turns off while **DZ** remains on. The “UP” computer output is deactivated then after 3 seconds “RP” computer output is deactivated.

Down Travel Logic Sequence:

- When a down call is registered, the “DN”, “RP” and “HS” computer outputs will be activated.
- Each time **DL** is activated along with **DZ** the selector will decrement one level
- When the selector decrements to the landing where the call is registered, the “HS” computer output will deactivate and the car will continue down the hoistway at leveling speed.
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Releveling (Hydro Only)

After the car has stopped at floor level in response to a call, the car will re-level up when **UL** and **DZ** are on together, and will stop when **LU** is off. The car will re-level down if **DL** and **DZ** are on together, and will stop when **DL** is off. Releveling is deactivated for single speed and VVVF winding drums.

Positive Encoding:

The MHTAL Controller board achieves positive encoding via four independent positioning magnets. Door Lock outputs will be activated only when a positioning magnet is present.

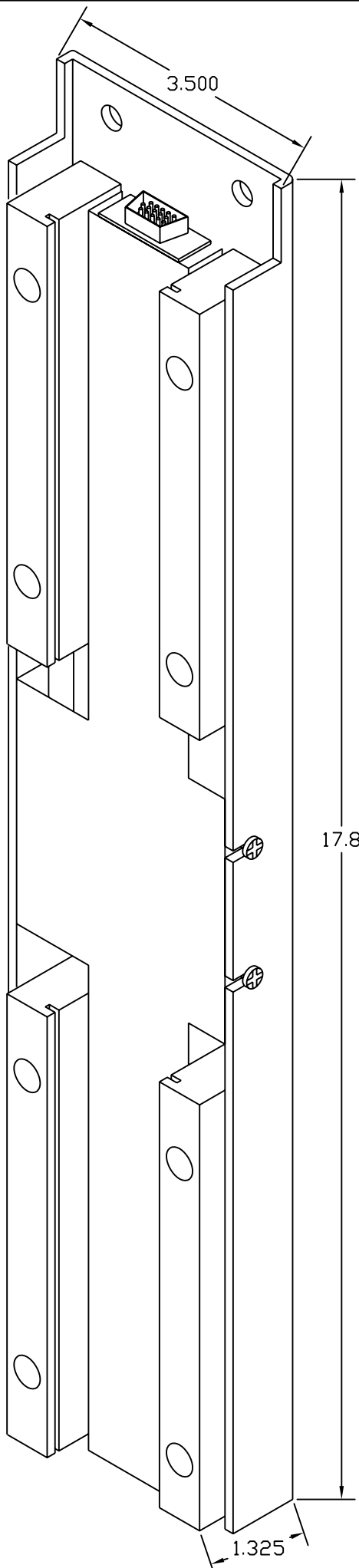
Short Floors: The minimum travel distance is 12 inches.

Short Floor Up Logic Sequence from floor A to floor B:

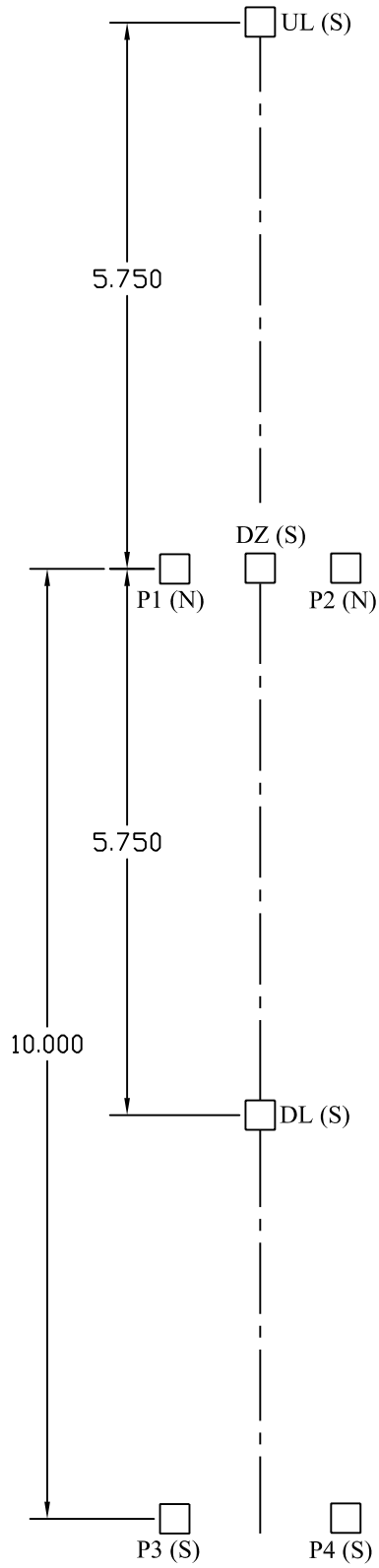
- When an up call is registered, the “UP” and “RP” computer outputs will be activated.
- Before the car moves the computer will have the following signals from the selector: **DZ** on, **PA** on.
- Once the car moves away from floor A, the computer will see the following selector signals:
 - **DL** on, **UL** on, **PA** off, **DZ** off, **DZ** on, **PB** on, **DL** off then **UL** off.
- Stop the car when **UL** turns off. The “UP” computer output is deactivated then after 3 seconds “RP” computer output is deactivated.

Short Floor Down Logic Sequence from floor B to floor A:

- When a down call is registered, the “DN” and “RP” computer outputs will be activated.
- Before the car moves the computer will have the following signals from the selector: **DZ** on, **PB** on.
- Once the car moves away from floor B, the computer will see the following selector signals:
 - **UL** on, **DL** on, **PB** off, **DZ** off, **DZ** on, **PA** on, **UL** off then **DL** off.
- Stop the car when **DL** turns off. The “DN” computer output is deactivated then after 3 seconds “RP” computer output is deactivated.



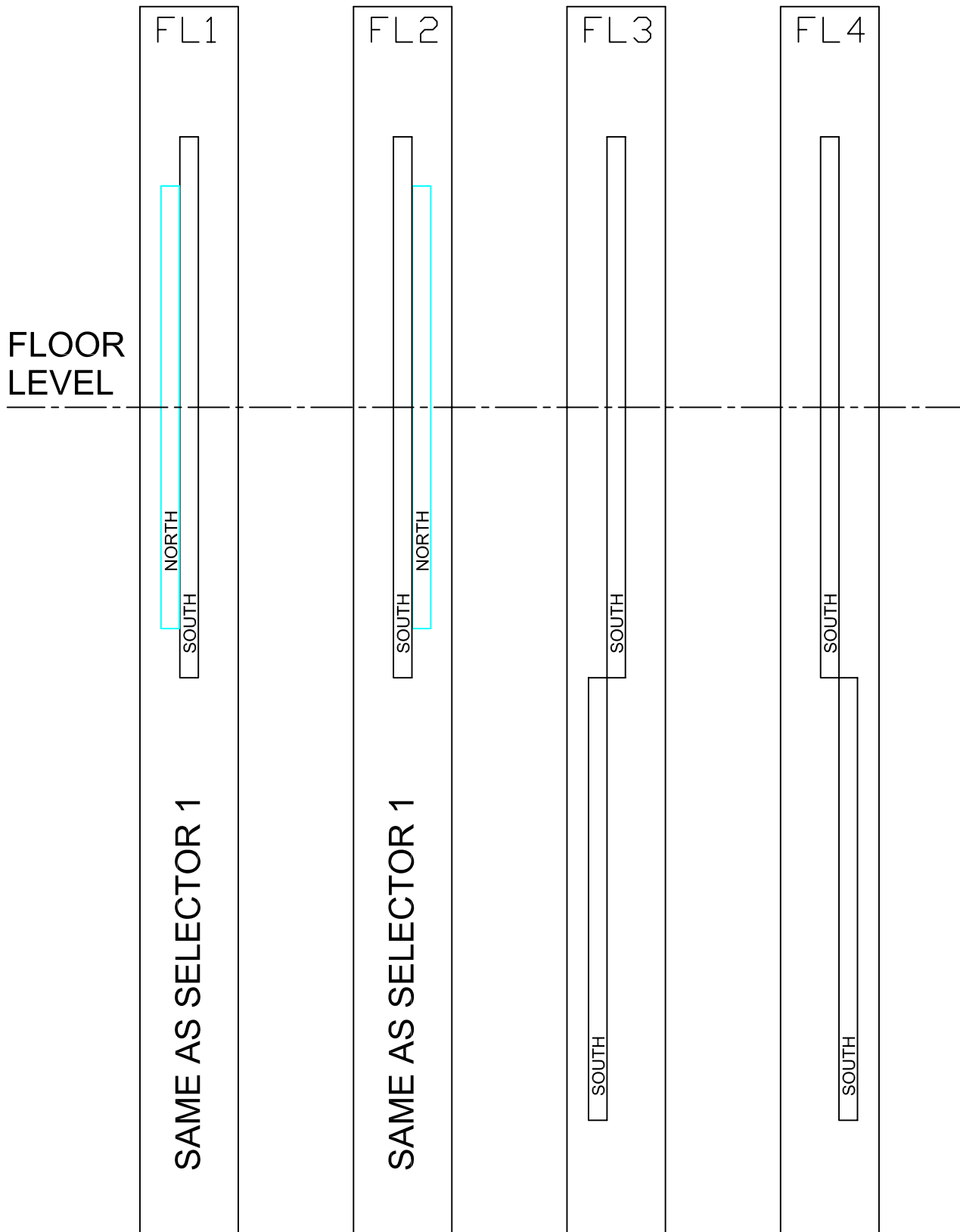
SENSOR SPACING



Electro Mech Industries, Inc.

| | | | |
|-------------|----------|-----------------|-----|
| SIZE A | FSCM NO. | DWG NO. SEL2 | REV |
| SCALE: None | | SHEET | |

SELECTOR 2 MAGNET CONFIGURATIONS



After magnets are positioned, trim as necessary to avoid a "yo-yo" effect during arrival to a floor.