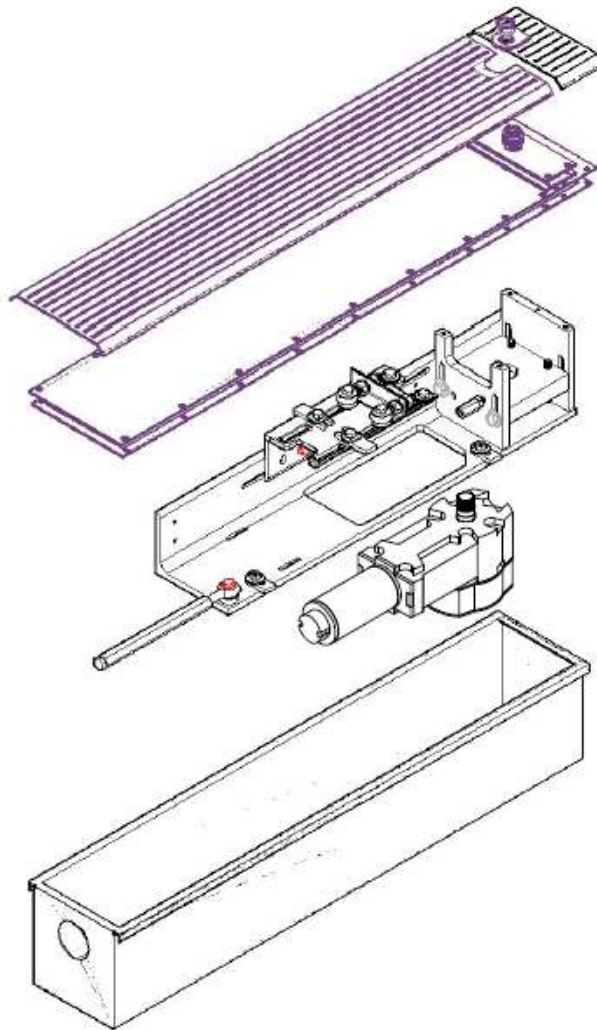




## ASSEMBLY & INSTALLATION MANUAL

### OPCON CONVERTER SYSTEM FOR DORMA ED-400 IG



Go to [www.opconusa.com](http://www.opconusa.com) for shop drawings, architectural details, technical details, hardware, product links and other related information.

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# OPERATOR CONVERSION THEORY & IMPORTANT CONSIDERATIONS

(REVIEW BEFORE STARTING ASSEMBLY AND INSTALLTION)

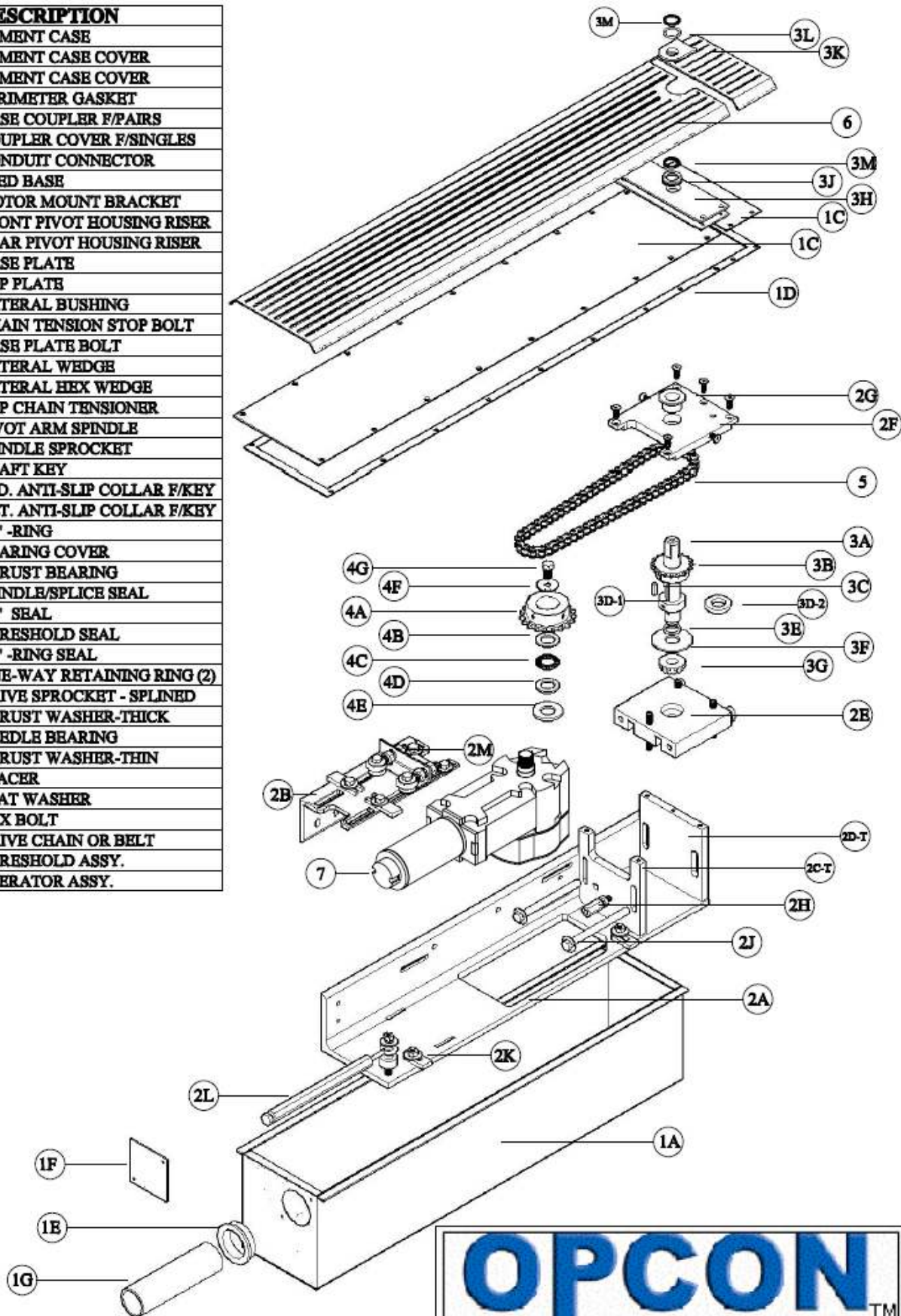
## THEORY OF OPERATION

The Opcon Operator Conversion System is designed to convert standard overhead mounted, swing door operators from overhead mounted to underground/underfloor use. A custom pivot assembly and operator-mounting sled is provided to attach the standard operator, creating a new drive assembly. The entire drive assembly is then placed into a waterproof cement case, sealed, and cemented into place under the door. The drive system Spindle attaches to the bottom arm of the door. The Spindle profile of the unit integrates with many available bottom arms for center hung and offset hung swing doors.

## CONSIDERATIONS

- 1) **HANDING:** It is important to note that handing the operator is opposite of standard since the operator is mounted upside down when converted. Specifically, a left hand operator swings a right hand door; and a right hand operator swings a left hand door. Microswitch placement, stop block placement, and programming functions will be affected depending upon the operator selected.
- 2) **DRIVE SPINDLE:** The Spindle of the converter is specific to the bottom arm selected for each door. Spindle profiles are available for most Dorma and Rixson bottom arm hardware for center hung, offset pivot hung, and offset butt hung (hinged) doors. The Dorma arm profile is often compatible with CR Laurence hardware. Bottom arms are NOT supplied with the converter. Be certain that the Spindle ordered matches the bottom arm selected. See Opcon website for details.
- 3) **CEMENT CASE SIZE:** All cement cases are supplied at the standard size of 35-1/2" long X 7" wide. On pairs of doors, a conduit connects the cement cases and the width is variable. Pairs of doors narrower than 72" are available as a custom order. Contact Opcon for custom size details.
- 4) **FLOOR EXCAVATION & PREPARATION:** The typical floor depth for the converter is 7" minimum; but this may be reduced somewhat by the height of the threshold or other flooring material if the converter can be raised under the floor covering. Center hung door excavation is the width between the jambs + 1/4" under the jambs; Offset hung door excavation is the width between the jambs + 2-1/4" under the pivot side jambs. Refer to Floor Blockout tab at Opcon website.
- 5) **THRESHOLD & FLOORING:** All units are shipped considering a 1/2" tall threshold or stone cover unless otherwise advised. Most thresholds must be 10" wide to cover the converter and excavation. Terrazzo/stone pans have a variable size between 8" and 10". Thresholds made to Opcon specifications are available directly from National Guard Products or Pemko. Terrazzo & Stone Pans are also available for stone flooring directly from Opcon. Refer to Thresholds at website.
- 6) **ELECTRICAL & LOW VOLTAGE:** The electrical supply and low voltage signal lines must enter the cement case at the non-pivot side of the converter on single doors, and at or near the center on pairs of doors. Liquid Tight conduit fittings must be installed. Wireless activation requires sealed antennae placement through the cement case. Refer to Wiring section of Install Manual.

PTN.	DESCRIPTION
1A	CEMENT CASE
1B	CEMENT CASE COVER
1C	CEMENT CASE COVER
1D	PERIMETER GASKET
1E	CASE COUPLER F/PAIRS
1F	COUPLER COVER F/SINGLES
1G	CONDUIT CONNECTOR
2A	SLED BASE
2B	MOTOR MOUNT BRACKET
2C-T	FRONT PIVOT HOUSING RISER
2D-T	REAR PIVOT HOUSING RISER
2E	BASE PLATE
2F	TOP PLATE
2G	LATERAL BUSHING
2H	CHAIN TENSION STOP BOLT
2J	BASE PLATE BOLT
2K	LATERAL WEDGE
2L	LATERAL HEX WEDGE
2M	TOP CHAIN TENSIONER
3A	PIVOT ARM SPINDLE
3B	SPINDLE SPROCKET
3C	SHAFT KEY
3D-1	STD. ANTI-SLIP COLLAR F/KEY
3D-2	ALT. ANTI-SLIP COLLAR F/KEY
3E	"O" -RING
3F	BEARING COVER
3G	THRUST BEARING
3H	SPINDLE/SPLICE SEAL
3J	"V" SEAL
3K	THRESHOLD SEAL
3L	"O" -RING SEAL
3M	ONE-WAY RETAINING RING (2)
4A	DRIVE SPROCKET - SPLINED
4B	THRUST WASHER-THICK
4C	NEEDLE BEARING
4D	THRUST WASHER-THIN
4E	SPACER
4F	FLAT WASHER
4G	HEX BOLT
5	DRIVE CHAIN OR BELT
6	THRESHOLD ASSY.
7	OPERATOR ASSY.



### DORMA ED400-IG ISOMETRIC

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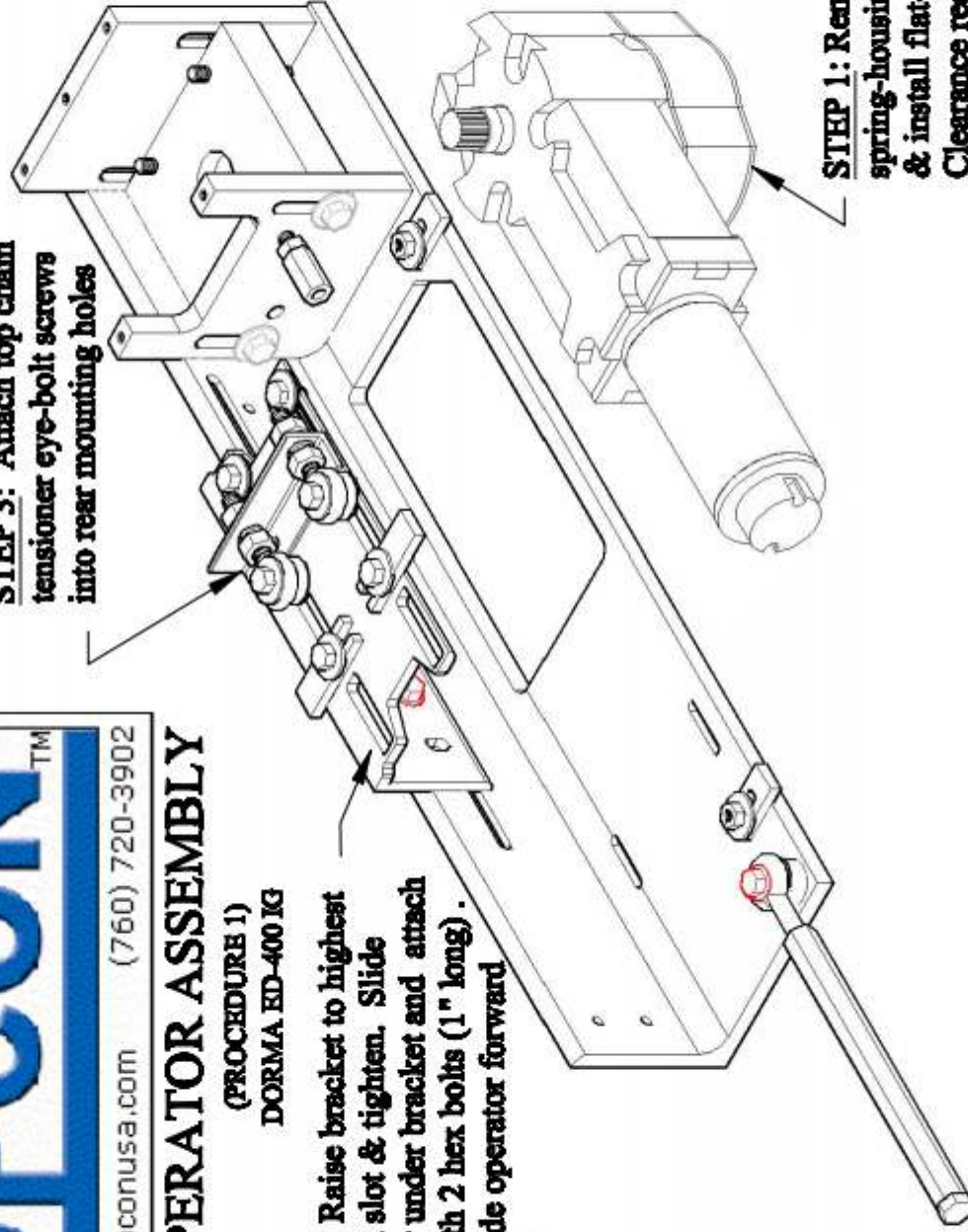


## OPERATOR ASSEMBLY

(PROCEDURE 1)  
DORMA ED-400 IG

**STEP 2:** Raise bracket to highest point on slot & tighten. Slide operator under bracket and attach front with 2 hex bolts (1" long). Then slide operator forward on sled

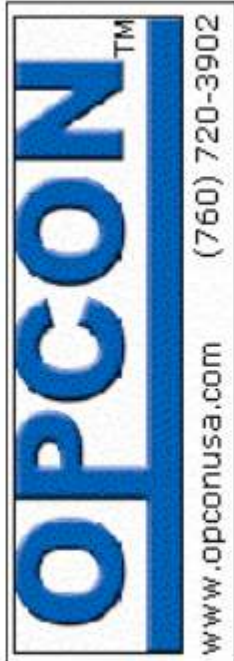
**STEP 3:** Attach top chain tensioner eye-bolt screws into rear mounting holes



**STEP 1:** Remove hex bolts at spring-housing. Countersink & install flat-head bolts. Clearance required for spindle seals.

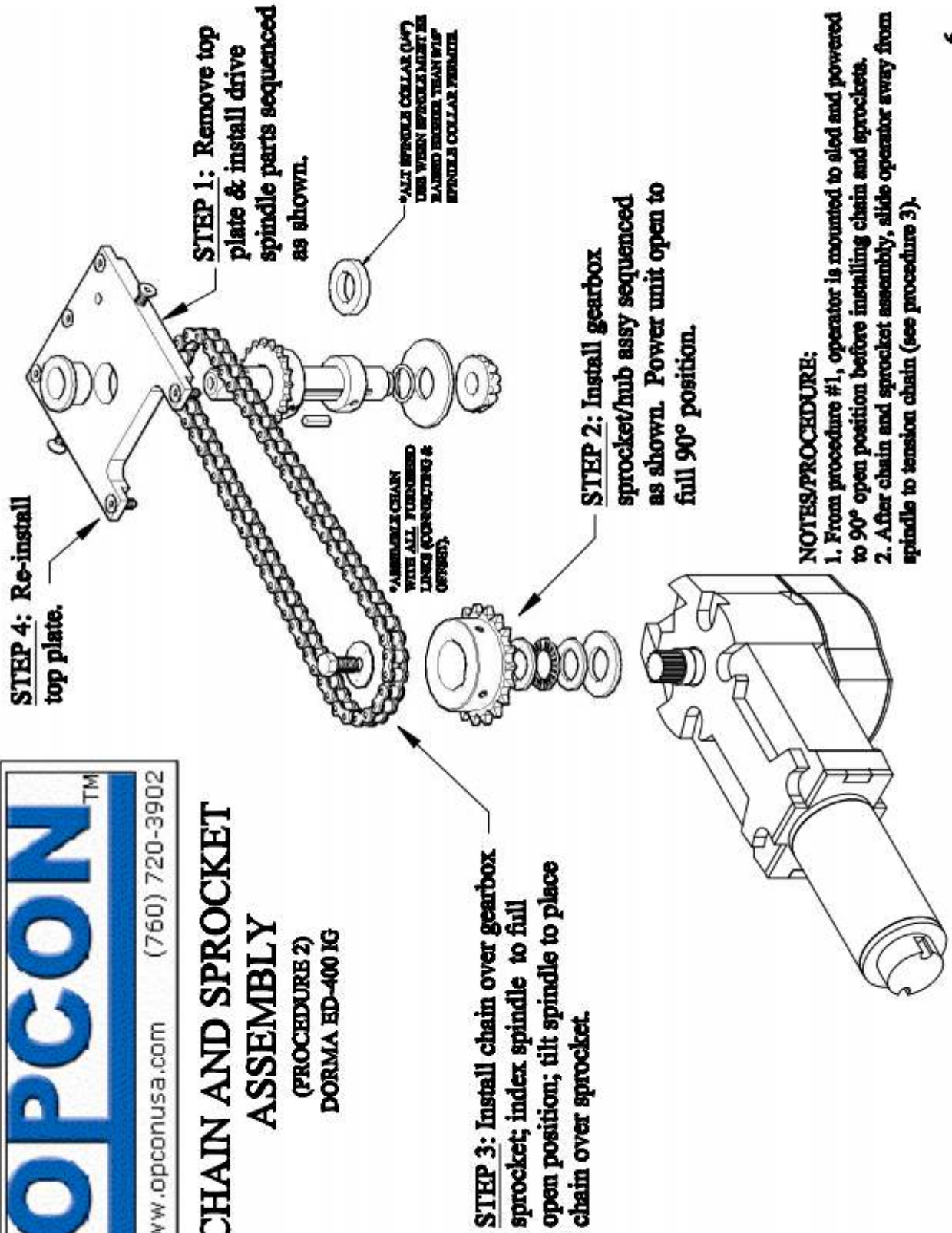
### NOTES/PROCEDURE:

1. Reference isometric drawing for more details.
2. Right hand outwiring shown; uses left hand outwiring operator due to upside-down mounting. Program for left-hand outwiring.
3. After mounting, power operator to 90° open position & set open stop block location.
4. See chain and sprocket assembly to continue.



## CHAIN AND SPROCKET ASSEMBLY

(PROCEDURE 2)  
DORMA HD-400 IG



**NOTES/PROCEDURE:**

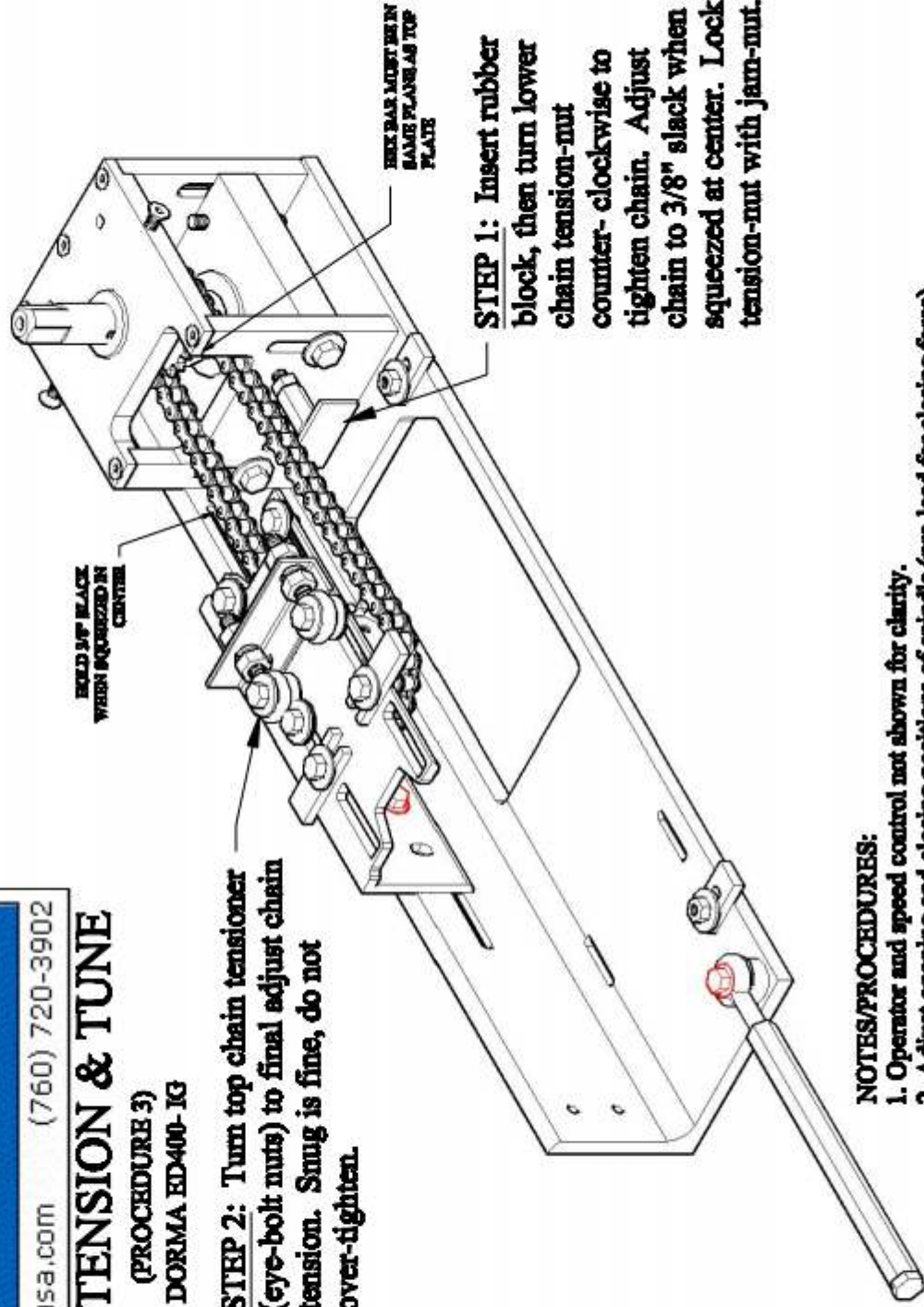
1. From procedure #1, operator is mounted to sled and powered to 90° open position before installing chain and sprockets.
2. After chain and sprocket assembly, slide operator away from spindles to tension chain (see procedure 3).



## CHAIN TENSION & TUNE

(PROCEDURE 3)  
DORMA ED400-IG

**STEP 2:** Turn top chain tensioner (eye-bolt nuts) to final adjust chain tension. Snug is fine, do not over-tighten.



### NOTES/PROCEDURES:

1. Operator and speed control not shown for clarity.
2. Adjust opening and closing positions of spindle (pre-load for closing force).
3. Attach control box and tune to Dorma specifications.
4. Install completed and tuned assembly into cement case.

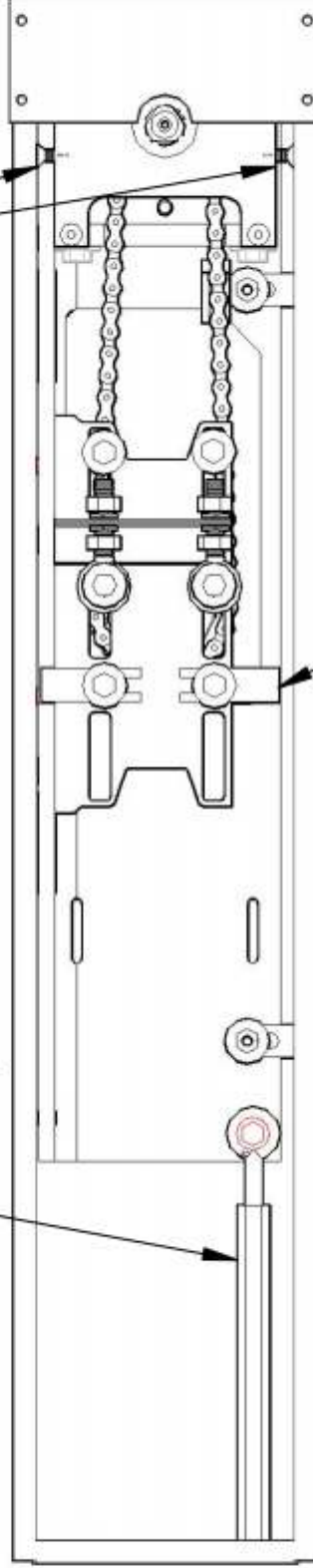


## SPINDLE CENTERING & WEDGING

(PROCEDURE 4)  
DORMA ED-400 IG

**STEP 1:** Center spindle using 2 bolts on top plate. Minimize pressure on cement case to avoid misalignment of cover screws.

**STEP 2:** Adjust hex bar for lateral movement. Insert shims behind spindle housing for alternate spindle locating.



**STEP 3:** Tighten sled wedges in 4 places. Wedge flat and tight against cement case.

### NOTES/PROCEDURES:

1. Operator and speed control not shown for clarity.
2. Insert tuned converter/operator assembly into cement case.
3. Adjust spindle to center of cement case using adjusting bolts and hex bar.
4. Wedge sled assembly firmly within cement case.



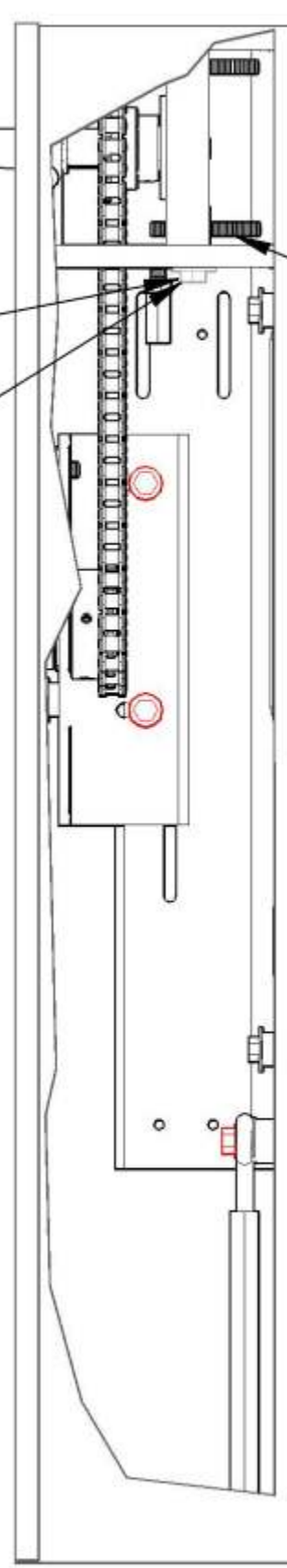


## SPINDLE HEIGHT ADJUSTMENT

(PROCEDURE 5)  
DORMA ED-400 IG

**STEP 1:** Loosen (2) 9/16" base plate bolts. Do not remove.

**STEP 3:** Re-tighten (2) 9/16" base plate bolts.



**STEP 2:** Adjust base-plate height using Allen wrench on 3 threaded posts. Turn clockwise to raise; turn counter-clockwise to lower. Turn each post equally.

### NOTES/PROCEDURES:

1. Operator and speed control not shown for clarity.
2. Spindle height adjustment formula:

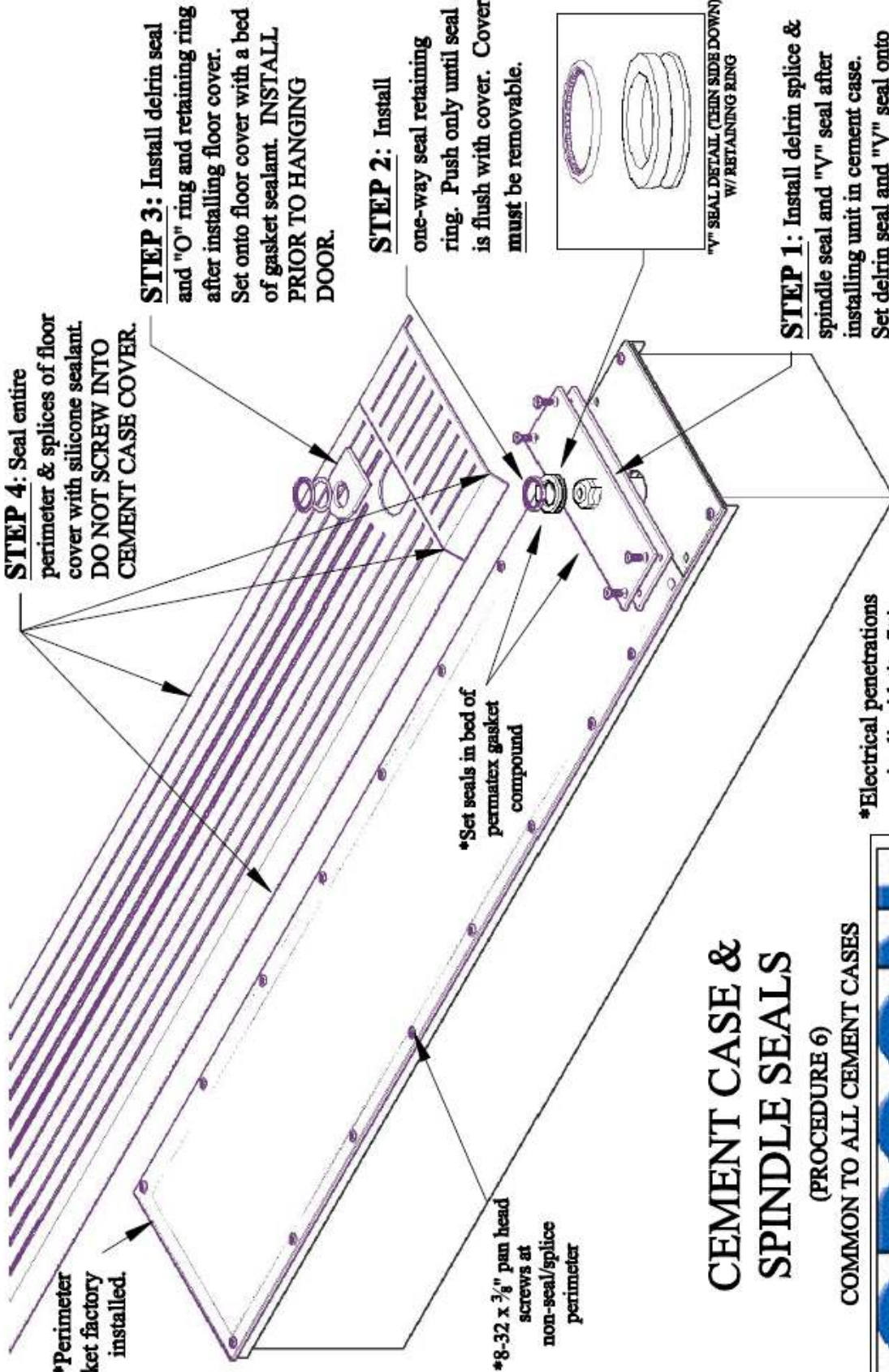
ASSUMES CEMENT CASE COVER IS 1/4" BELOW FINISHED FLOOR AT INSTALLATION.  
DIMENSIONS TAKEN FROM TOP OF CEMENT CASE COVER TO SPINDLE SHOULDER.  
1/4" BELOW FINISHED FLOOR + THRESHOLD HEIGHT + SPACE BENEATH DOOR +  
DEPTH OF BOTTOM ARM IF ARM IS RECESSED INSIDE BOTTOM OF DOOR (MAX RECESS 1/8").

**STEP 4:** Seal entire perimeter & splices of floor cover with silicone sealant. **DO NOT SCREW INTO CEMENT CASE COVER.**

\*Perimeter gasket factory installed.

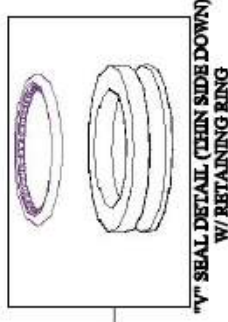
\*Set seals in bed of permatax gasket compound

\*8-32 x 3/8" pan head non-seal/splice screws at perimeter



**STEP 3:** Install delrin seal and "O" ring and retaining ring after installing floor cover. Set onto floor cover with a bed of gasket sealant. **INSTALL PRIOR TO HANGING DOOR.**

**STEP 2:** Install one-way seal retaining ring. Push only until seal is flush with cover. Cover **must** be removable.



**STEP 1:** Install delrin splice & spindle seal and "Y" seal after installing unit in cement case. Set delrin seal and "Y" seal onto cement case cover in a bed of gasket sealant and also as "beveled" topping on all 4 sides. Fasten with four 8-32 x 1/2" flat head screws. **INSTALL PRIOR TO HANGING DOOR.**

\*Electrical penetrations require liquid-tite fittings


\*See "Thresholds" tab at website for other floor covering options(terrazzo, stone, transition, etc.).

\*Leave sealant inside cement case for future access. Use re-seal after opening.

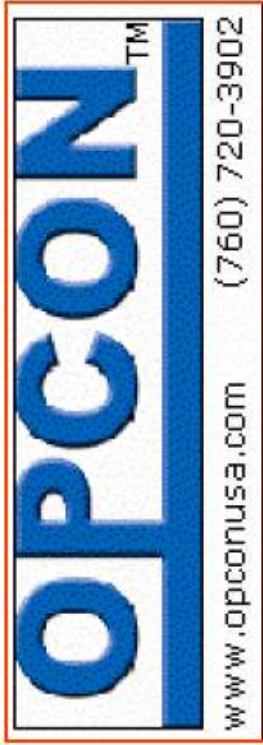
## CEMENT CASE & SPINDLE SEALS

(PROCEDURE 6)

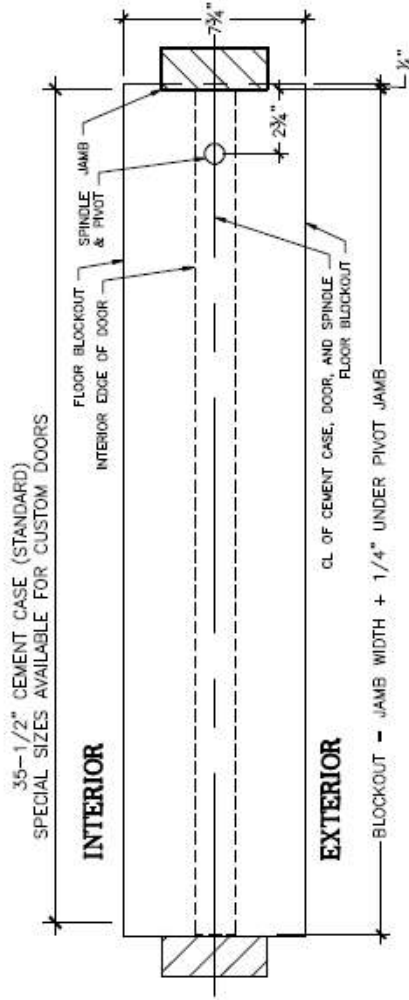
COMMON TO ALL CEMENT CASES



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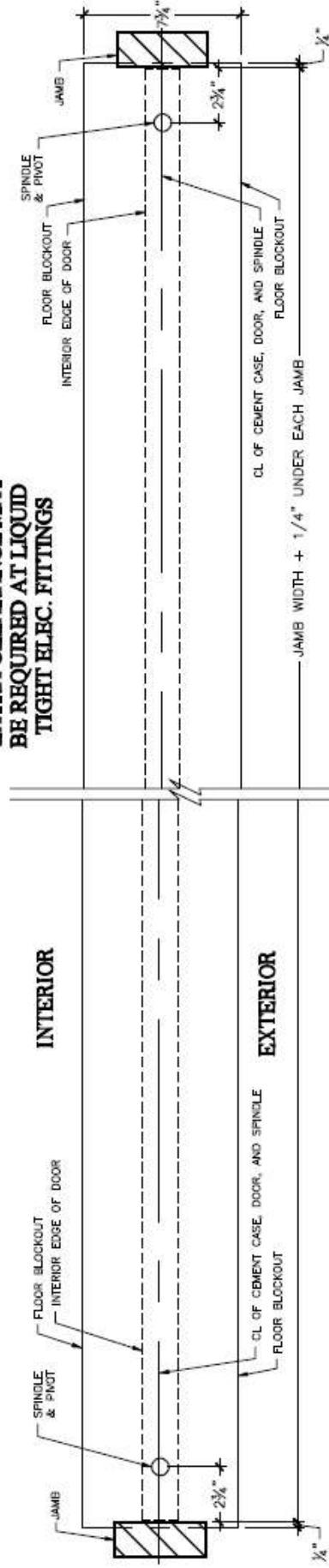


**FIELD LAYOUT TEMPLATE  
 FLOOR BLOCKOUT  
 CENTER HUNG DOORS**



**SINGLE DOOR : LEFT HAND OUTSWING (RHR) SHOWN  
 RIGHT HAND OUTSWING (LHR) OPPOSITE**

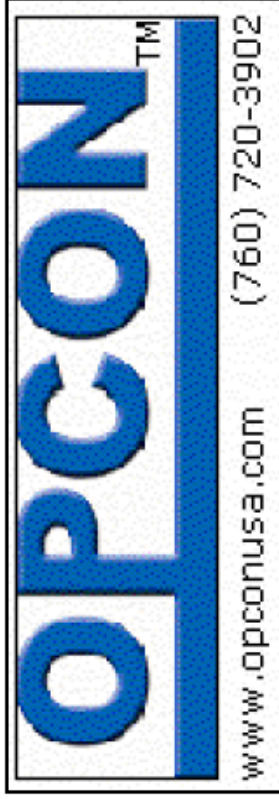
\*EXTRA CLEARANCE MAY  
 BE REQUIRED AT LIQUID  
 TIGHT ELEC. FITTINGS



**OUTSWING DOOR PAIR**

**NOTES**

1. CENTER HUNG DOORS ONLY. DIMENSIONS DIFFERENT ON OFFSET PIVOT AND BUTT HUNG DOORS
2. SEE MANUFACTURERS TEMPLATE FOR LATEST DOOR LEAF AND BOTTOM ARM PREP
3. DEPTH OF EXCAVATION IS 7.125 MINIMUM TO 7.75 MAXIMUM BELOW FINISHED FLOOR
4. SPINDLE CENTER MUST BE PLUMB WITH TOP PIVOT



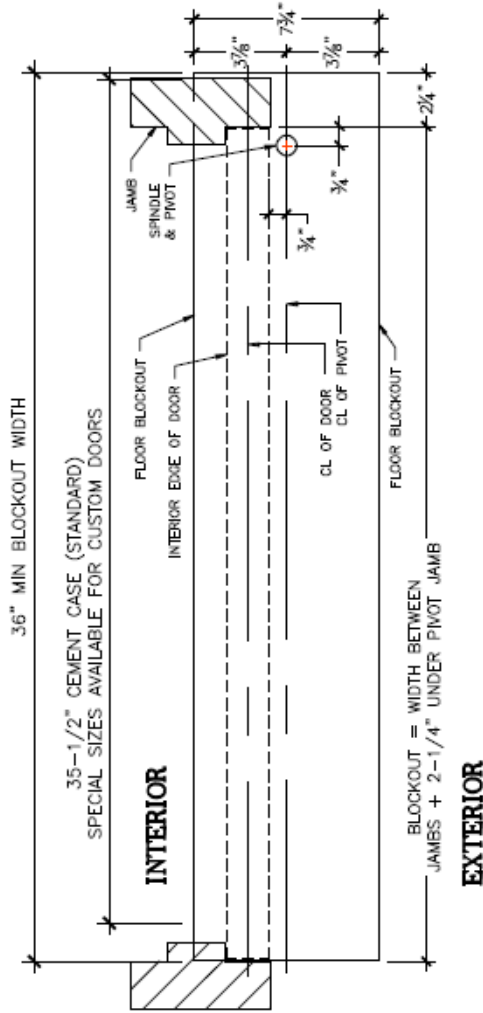
## FIELD LAYOUT TEMPLATE

FLOOR BLOCKOUT WITH STANDARD  
BOTTOM ARMS ONLY

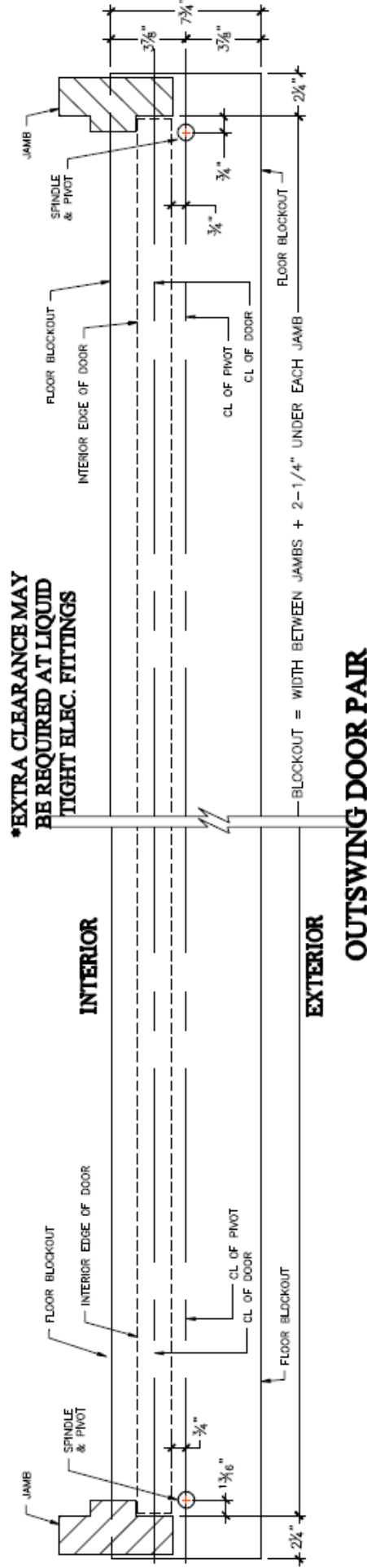
(RIXSON #27 OR DORMA BTS-80, ETC.)

3/4" OFFSET PIVOT HUNG DOORS ONLY

(SLIDE ARM SYSTEM IS RECOMMENDED FOR BUTT HUNG  
DOORS - REF. SLIDE ARM DRAWINGS)

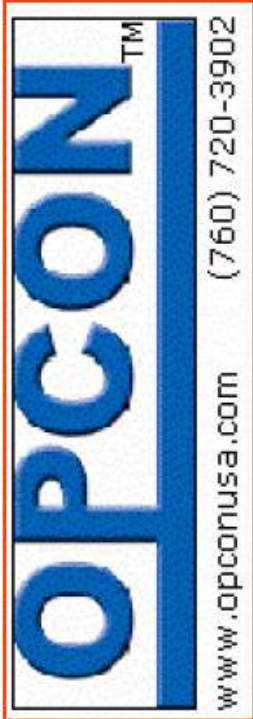


## SINGLE DOOR : LEFT HAND OUTSWING (RHR) SHOWN RIGHT HAND OUTSWING (LHR) OPPOSITE



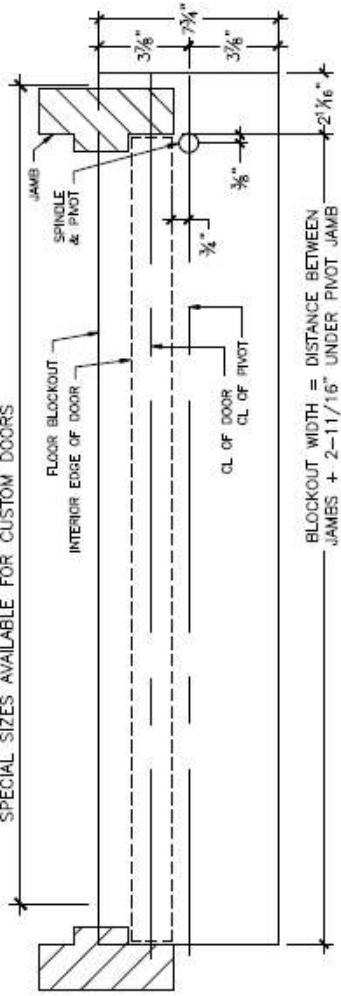
## NOTES

1. 3/4" OFFSET PIVOT DOORS USING STANDARD BOTTOM ARMS ONLY. DIMENSIONS DIFFERENT ON BUTT HUNG (HINGED), OFFSET SLIDE-ARM, AND CENTER-HUNG DOORS
2. SPINDLE MUST BE PLUMB WITH PIVOT CENTER. SEE MANUFACTURER'S CURRENT TEMPLATE FOR BOTTOM ARM PLACEMENT ON DOOR
3. DEPTH OF EXCAVATION IS 7.125 MINIMUM TO 7.75 MAXIMUM BELOW FINISHED FLOOR



INTERIOR

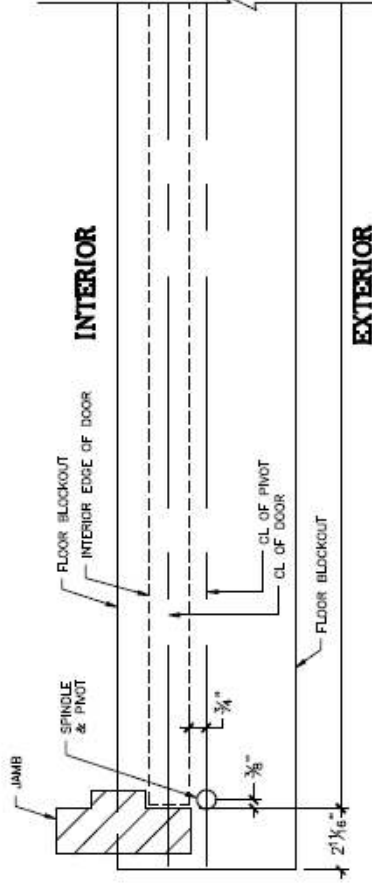
3/5-1/2" CEMENT CASE (STANDARD)  
SPECIAL SIZES AVAILABLE FOR CUSTOM DOORS



EXTERIOR

**SINGLE DOOR : LEFT HAND OUTSWING (RHR) SHOWN  
RIGHT HAND OUTSWING (LHR) OPPOSITE**

**\*EXTRA CLEARANCE MAY  
BE REQUIRED AT LIQUID  
TIGHT ELEC. FITTINGS**



**OUTSWING DOOR PAIR**

**NOTES:**

1. OFFSET BUTT-HUNG DOORS USING STANDARD BOTTOM ARMS ONLY. DIMENSIONS DIFFERENT ON OFFSET PIVOT, OFFSET SLIDE-ARM, AND CENTER-HUNG DOORS
2. SPINDLE MUST BE PLUMB WITH HINGE CENTER. BOTTOM ARM PLACEMENT ON DOOR WILL DIFFER FROM MANUFACTURER'S TEMPLATE.
3. DEPTH OF EXCAVATION IS 7.125 MINIMUM TO 7.75 MAXIMUM BELOW FINISHED FLOOR

**FIELD LAYOUT TEMPLATE**

**FLOOR BLOCKOUT WITH STANDARD BOTTOM  
ARMS ONLY**

(RIKSON #27 OR DORMA BTS-80, ETC.)

**BUTT HINGED - OFFSET HUNG DOORS ONLY  
(SLIDE-ARM SYSTEM IS RECOMMENDED FOR BUTT HUNG DOORS.  
REF. SLIDE ARM DRAWINGS)**



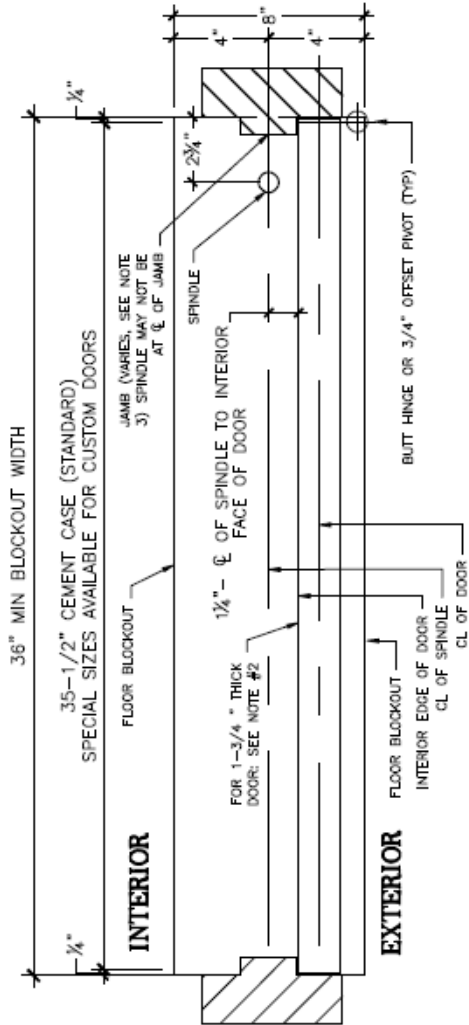
## FIELD LAYOUT TEMPLATE

### FLOOR BLOCKOUT FOR

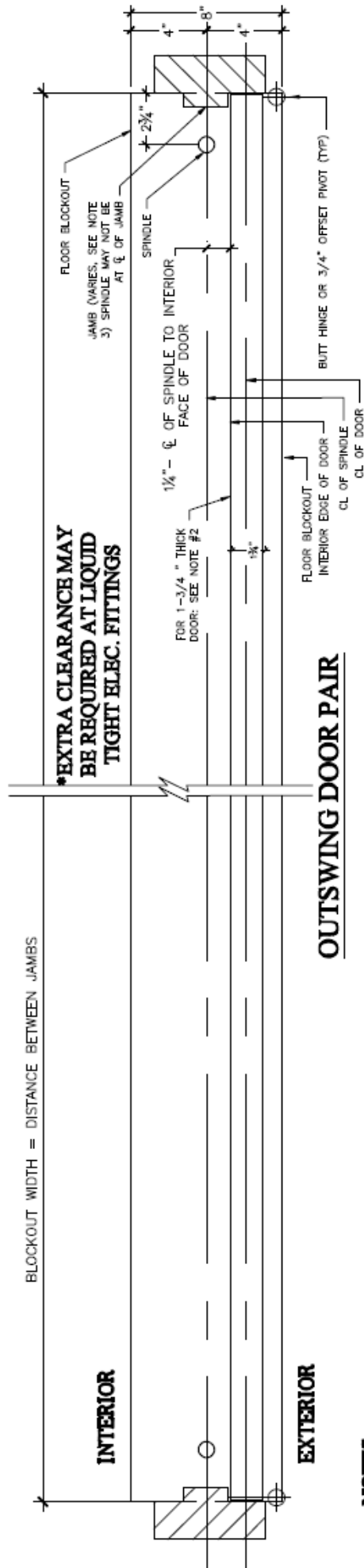
### BUTT HUNG (HINGED) & 3/4" OFFSET PIVOT DOORS

USING DORMA BTS-81 BOTTOM ARM & 7451N SLIDE TRACK  
OR

RIXSON #327 BOTTOM ARM W/SLIDE TRACK



### SINGLE DOOR : LEFT HAND OUTSWING (RHR) SHOWN RIGHT HAND OUTSWING (LHR) OPPOSITE



#### NOTES:

1. BUTT HUNG (HINGED) & 3/4" OFFSET PIVOT DOORS USING RIXSON OR DORMA BOTTOM ARM AND SLIDE TRACK DIMENSIONS ARE FOR 1-3/4" DOOR THICKNESS. HOLD 1-1/4" DIMENSION FROM INSIDE FACE OF ANY DOOR THICKNESS TO CENTERLINE OF SPINDLE. SPINDLE MAY NOT BE AT CENTERLINE OF JAMB.
2. DIMENSIONS ARE FOR 1-3/4" DOOR THICKNESS. HOLD 1-1/4" DIMENSION FROM INSIDE FACE OF ANY DOOR THICKNESS TO CENTERLINE OF SPINDLE. SPINDLE MAY NOT BE AT CENTERLINE OF JAMB.
3. JAMB WIDTHS VARY. PLACEMENT DIMENSIONS ARE FROM INTERIOR FACE OF JAMB TO CENTER OF SPINDLE.
4. SEE OPCON WEBSITE FOR LATEST DOOR LEAF PREP DRAWINGS
5. DEPTH OF EXCAVATION IS 7.125 MINIMUM TO 7.75 MAXIMUM BELOW FINISHED FLOOR

REF. WEB DWGS  
FL-P101-D81  
FL-B101-D81  
FL-P101-R327  
FL-B101-R327

# INSTALLATION PROCEDURE

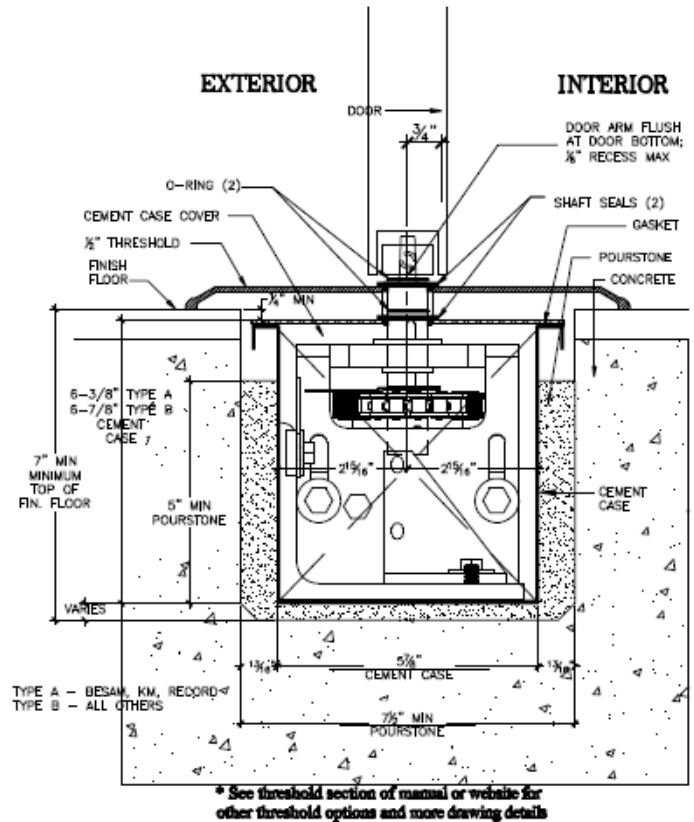
ALL MANUFACTURERS - ALL STANDARD OPERATORS

## CENTER HUNG DOORS

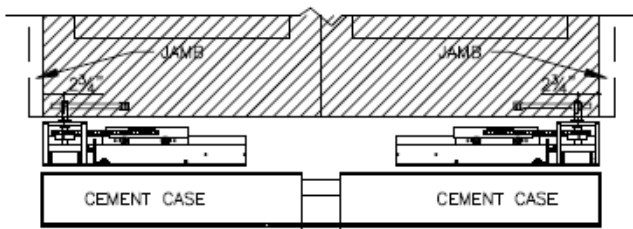
2 3/4" Pivot Setback (Rixson #28, Dorma BTS-80, etc.)



1. Cut concrete or floor to dimensions detailed on blockout/template drawing. Blockout must be entire door width between jambs + 1/4" under each pivot jamb.
2. Layout & drill cement case for electrical & signal lines
3. Install electric & low voltage conduit with OPCON supplied liquid-tight fittings.
4. Install top door pivot & locate center of OPCON converter spindle using a plumb-bob/laser.
5. Cement case must be parallel with door header. CEMENT CASE COVER IS SET 1/4" BELOW FINISHED FLOOR (min.).
6. For PAIRS of doors the cases will be set separately with a connecting conduit at center.
7. Cement case must be level & plumb in all directions.
8. Set cement case into excavation & secure in position.
9. Pourstone ONLY around bottom 1" of cement case. INSTALL SPINDLE/SHAFT SEALS NOW. Hang door and final adjust position.
10. BE SURE THAT CEMENT CASE COVER IS INSTALLED PRIOR TO POURSTONE. POURSTONE WILL COLLAPSE THE CEMENT CASE IF COVER IS NOT ATTACHED.
11. Final pourstone cement case with OPCON converter assembly & door leaf in place.

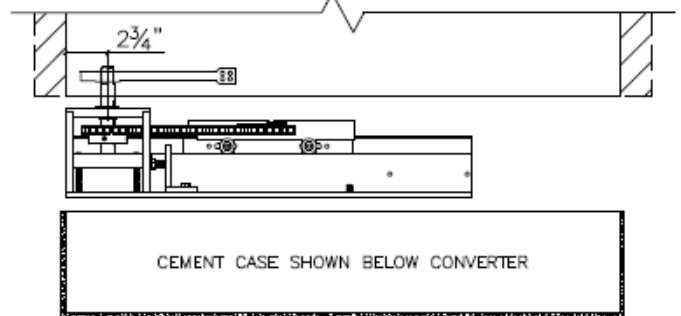
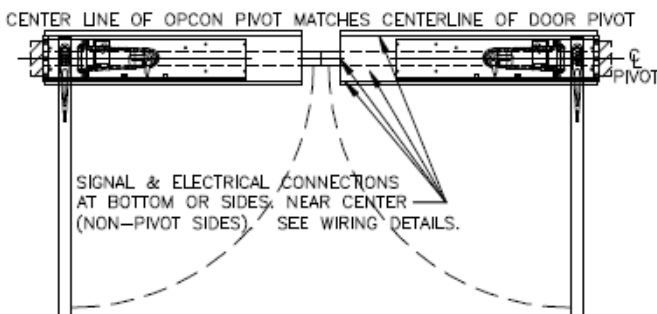


NOT TO SCALE

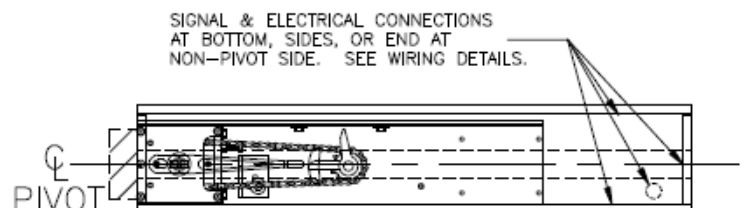


CONNECTING CONDUIT  
(CEMENT CASES SHOWN BELOW CONVERTER)

### CENTER HUNG DOORS - PAIR



### CENTER HUNG DOOR - SINGLE



# INSTALLATION PROCEDURE

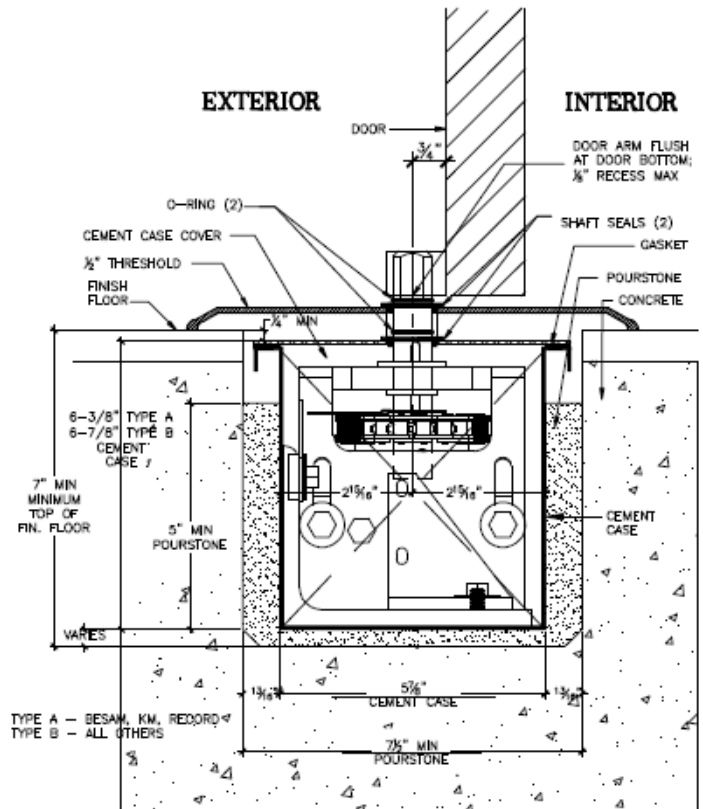
ALL MANUFACTURERS - ALL STANDARD OPERATORS

## OFFSET (PIVOT) HUNG DOORS

3/4" Pivot Setback (Rixson #27, Dorma BTS-80, etc.)

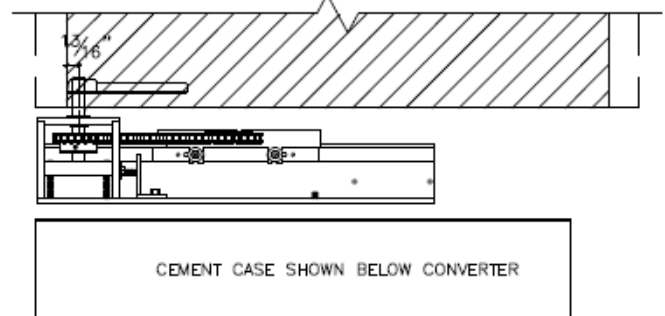


1. Cut concrete or floor to dimensions detailed on blockout/template drawing. Blockout must be entire door width between jambs + 2 1/4" under each pivot jamb.
2. Layout & drill cement case for electrical & signal lines
3. Install electric & low voltage conduit with OPCON supplied liquid-tight fittings.
4. Install top door pivot & locate center of OPCON converter spindle using a plumb-bob/laser.
5. Cement case must be parallel with door header. CEMENT CASE COVER IS SET 1/4" BELOW FINISHED FLOOR (min.).
6. For PAIRS of doors the cases will be set separately with a connecting conduit at center.
7. Cement case must be level & plumb in all directions.
8. Set cement case into excavation & secure in position.
9. Pourstone ONLY around bottom 1" of cement case. INSTALL SPINDLE/SHAFT SEALS NOW. Hang door and final adjust position.
10. BE SURE THAT CEMENT CASE COVER IS INSTALLED PRIOR TO POURSTONE. POURSTONE WILL COLLAPSE THE CEMENT CASE IF COVER IS NOT ATTACHED.
11. Final pourstone cement case with OPCON converter assembly & door leaf in place.

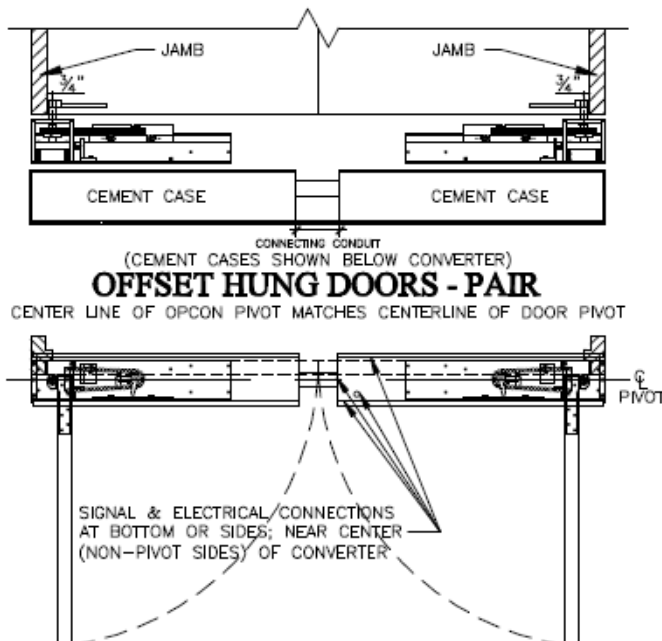


\*See threshold section of manual or website for other threshold options and more drawing details.

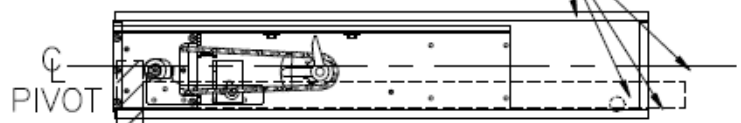
NOT TO SCALE



OFFSET HUNG DOOR - SINGLE



SIGNAL & ELECTRICAL CONNECTIONS AT BOTTOM, SIDES, OR END AT NON-PIVOT SIDE OF CONVERTER SEE WIRING DETAILS.





# INSTALLATION PROCEDURE

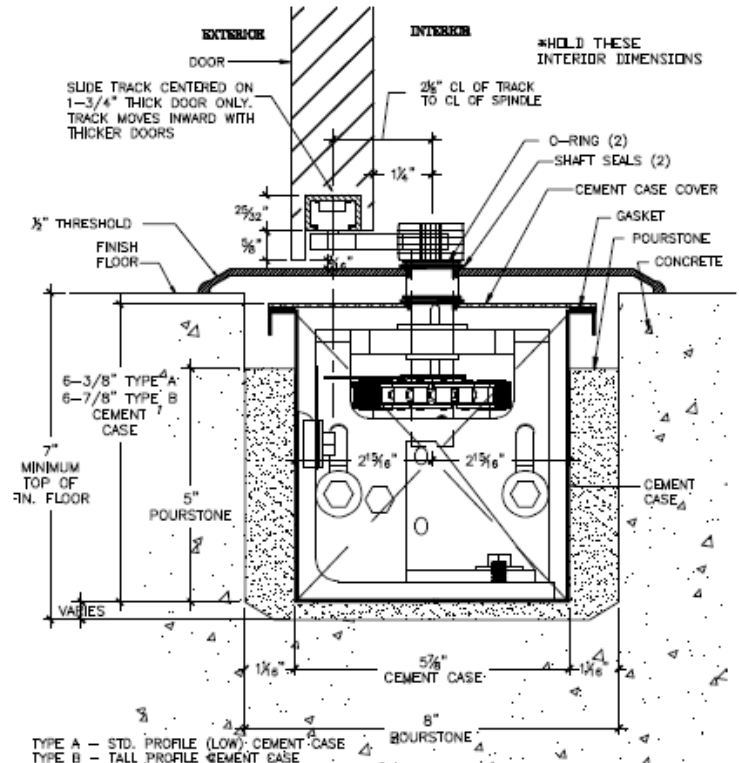
ALL MANUFACTURERS - ALL STANDARD OPERATORS

## BUTT-HUNG (HINGED) DOORS

Hinged Setback (Dorma #7451N Slide-arm or Rixson #327)

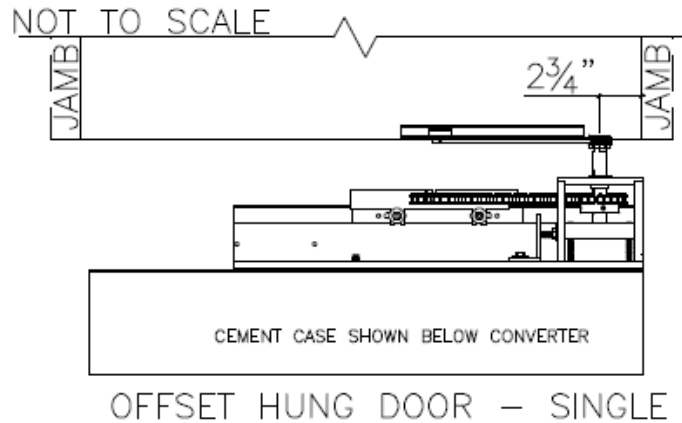
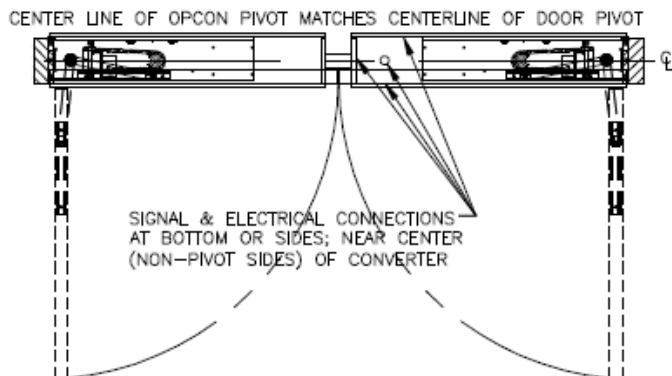
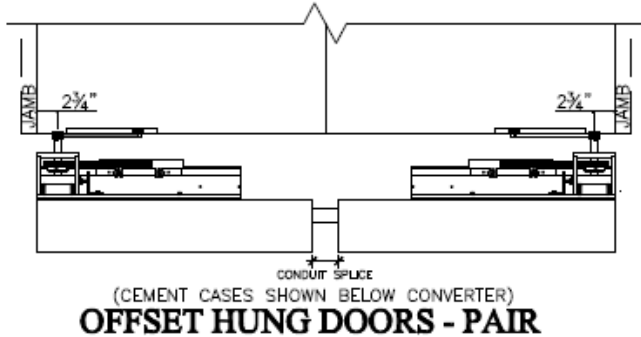


1. Cut concrete or floor to dimensions detailed on blockout/template drawing. Blockout must be entire door width between jambs.
2. Layout & drill cement case for electrical & signal lines
3. Install electric & low voltage conduit with OPCON supplied liquid-tight fittings.
4. Establish location of exterior door face & locate center of OPCON converter spindle. DRAWING ASSUMES 1-3/4" THICK DOOR, ADJUST DIMENSIONS FOR THICKER OR THINNER DOORS.
5. Cement case must be parallel with door header. CEMENT CASE COVER IS SET 1/4" BELOW FINISHED FLOOR (min.).
6. For PAIRS of doors the cases will be set separately with a connecting conduit at center.
7. Cement case must be level & plumb in all directions.
8. Set cement case into excavation & secure in position.
9. Pourstone ONLY around bottom 1" of cement case. INSTALL SPINDLE/SHAFT SEALS NOW. Hang door and final adjust position.
10. BE SURE THAT CEMENT CASE COVER IS INSTALLED PRIOR TO POURSTONE. POURSTONE WILL COLLAPSE THE CEMENT CASE IF COVER IS NOT ATTACHED.
11. Final pourstone cement case with OPCON converter assembly & door leaf in place.

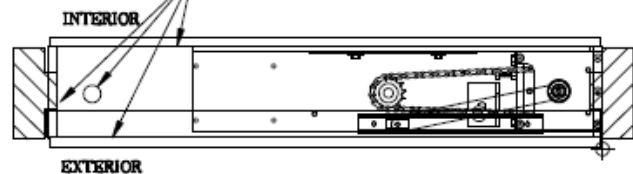


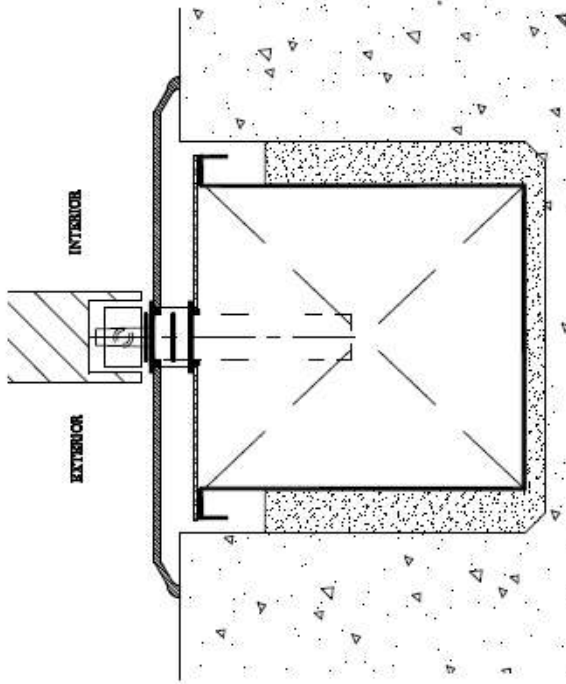
\*See threshold section of manual or website for other threshold options and more drawing details.

\*See door leaf prep template for bottom slide-arm details

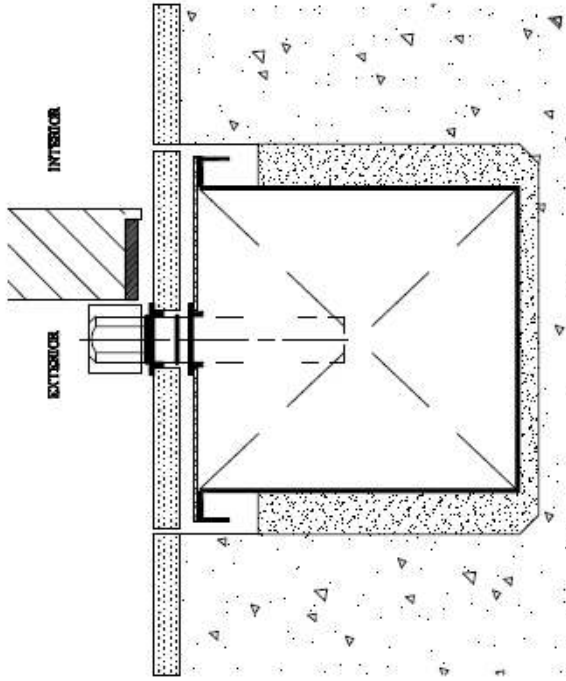


SIGNAL & ELECTRICAL CONNECTIONS AT BOTTOM, SIDES, OR END AT NON-PIVOT SIDE OF CONVERTER SEE WIRING DETAILS.

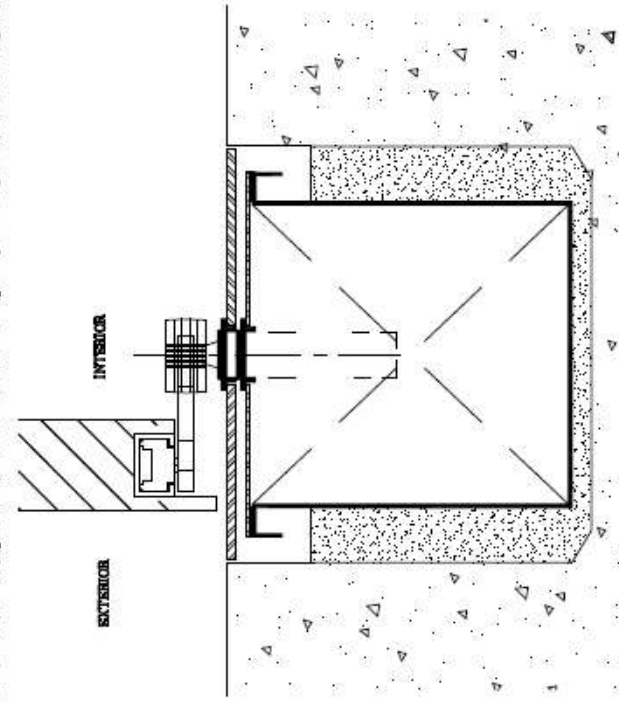




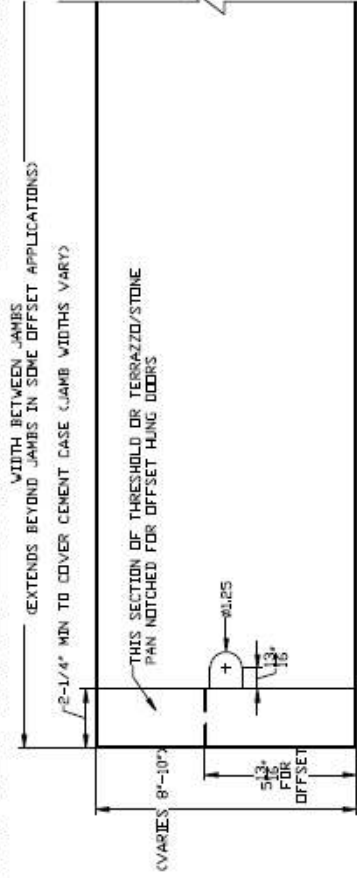
**END VIEW W/STANDARD THRESHOLD CENTER HUNG**



**END VIEW W/TERRAZZO OR STONE PAN - OFFSET PIVOT HUNG**



**END VIEW W/FLUSH (TRANSITION) THRESHOLD - BUTT HUNG (HINGED) WITH BOTTOM SLIDE-ARM**



**PLAN VIEW - TYPICAL FLOOR COVER PREP**  
**\*SEE WEBSITE FOR DETAILED DRAWINGS & OPTIONS**  
**FLOOR COVERING OPTIONS**

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# CONDUIT CONNECTIONS

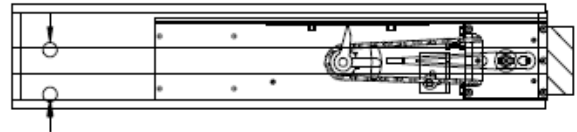
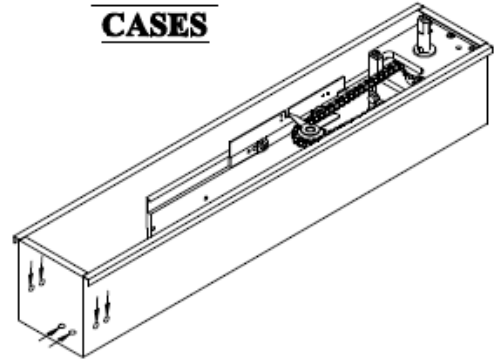
## ELECTRIC & LOW VOLTAGE LINES

TYPICAL FOR ALL INSTALLATIONS  
(Standard System for Single and Dual Cement Cases)

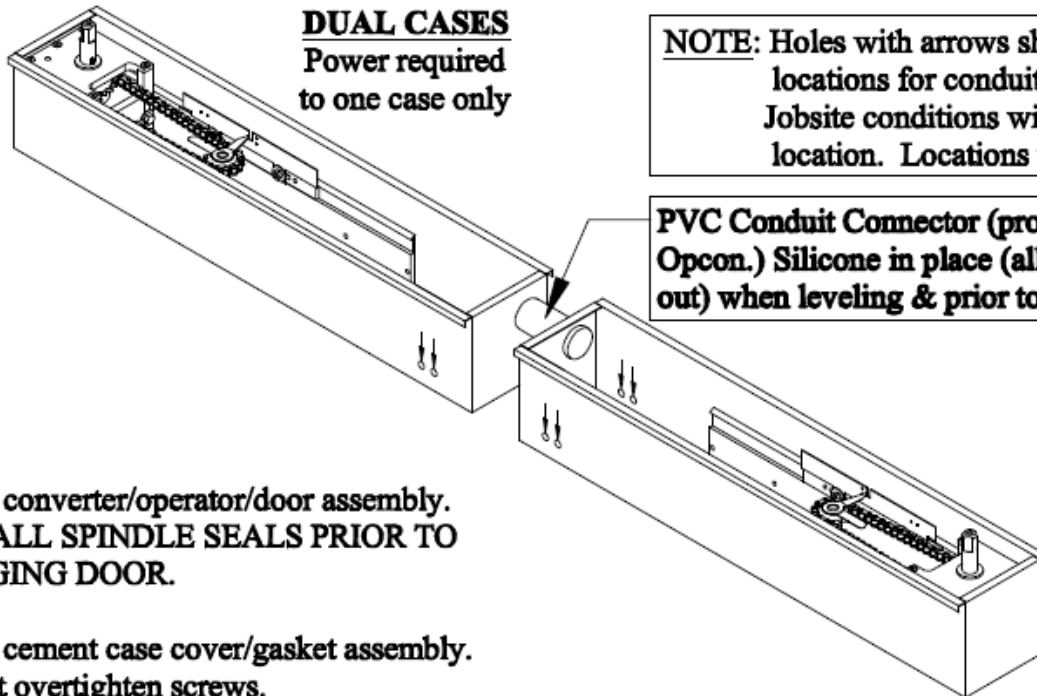


1. Verify power requirements with operator manufacturer & layout cement case for conduit.
2. Verify low voltage signal lines for accessories & layout cement case for conduit.
3. Conduit to cement case connection **MUST** be OPCON supplied "liquid-tight" water tight fittings specifying Arlington #LT7. Field drilled as required by supplied drawing detail. Conduit & liquid-tight fittings required for both 120VAC and low voltage signal runs.
4. Conduit connections to convertor must be at the strike side of single doors and near center of dual doors as shown. Holes may be located at sides, bottom, or end (on single doors) of cement case. **MUST** be liquid-tight fittings (Arlington #LT7). Use of other fittings may cause leaks & void warranty.

### SINGLE CASES



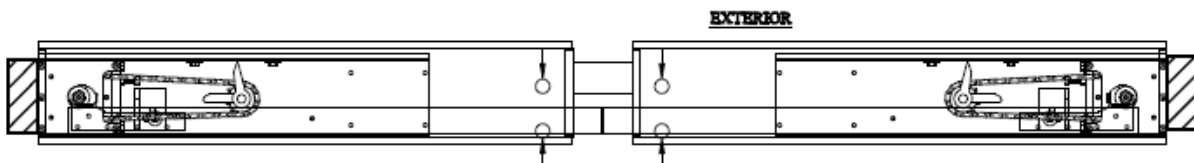
### DUAL CASES Power required to one case only



**NOTE:** Holes with arrows show the best locations for conduit penetrations. Jobsite conditions will dictate actual location. Locations vary by operator.

**PVC Conduit Connector (provided by Opcon.) Silicone in place (all sides-inside & out) when leveling & prior to pourstone.**

5. Install converter/operator/door assembly. **INSTALL SPINDLE SEALS PRIOR TO HANGING DOOR.**
6. Install cement case cover/gasket assembly. Do not overtighten screws.



**SIMPLY PUSH LIQUID-TIGHT CONDUIT OVER FERRULE END OF FITTING. WHILE PUSHING CONNECTOR, TURN CONDUIT SLIGHTLY CLOCKWISE TO SEAT IT.**

#LT-7 FITTING

PUSH ON

3/4" CONDUIT

**BORE CEMENT CASE 1-1/16" MIN. TO 1-1/8" MAX. TO ACCEPT LIQUID TIGHT FITTING. SEE OPCON PENETRATION DRAWING FOR ACCEPTABLE BORE LOCATIONS.**

**LEAVE ENOUGH SPACE AT FLOOR BLOCKOUT TO ACCEPT FITTINGS**

2" MIN.

**SPECIAL NOTE FOR FLEXIBLE CONDUIT: DO NOT USE BLUE "SMURF" FLEXIBLE CONDUIT. USE ONLY TYPE "B" SEAL TIGHT CONDUIT (GREY).**

GASKET

NUT

INT. CEMENT CASE

PLAN VIEW

**ARLINGTON #LT-7 LIQUID-TIGHT FITTING MUST BE USED FOR ELECTRICAL AND LOW VOLTAGE PENETRATIONS ON CEMENT CASE. OTHER FITTINGS HAVE NOT BEEN TESTED OR APPROVED; AND MAY CAUSE LEAKS THAT MAY VOID WARRANTY.**



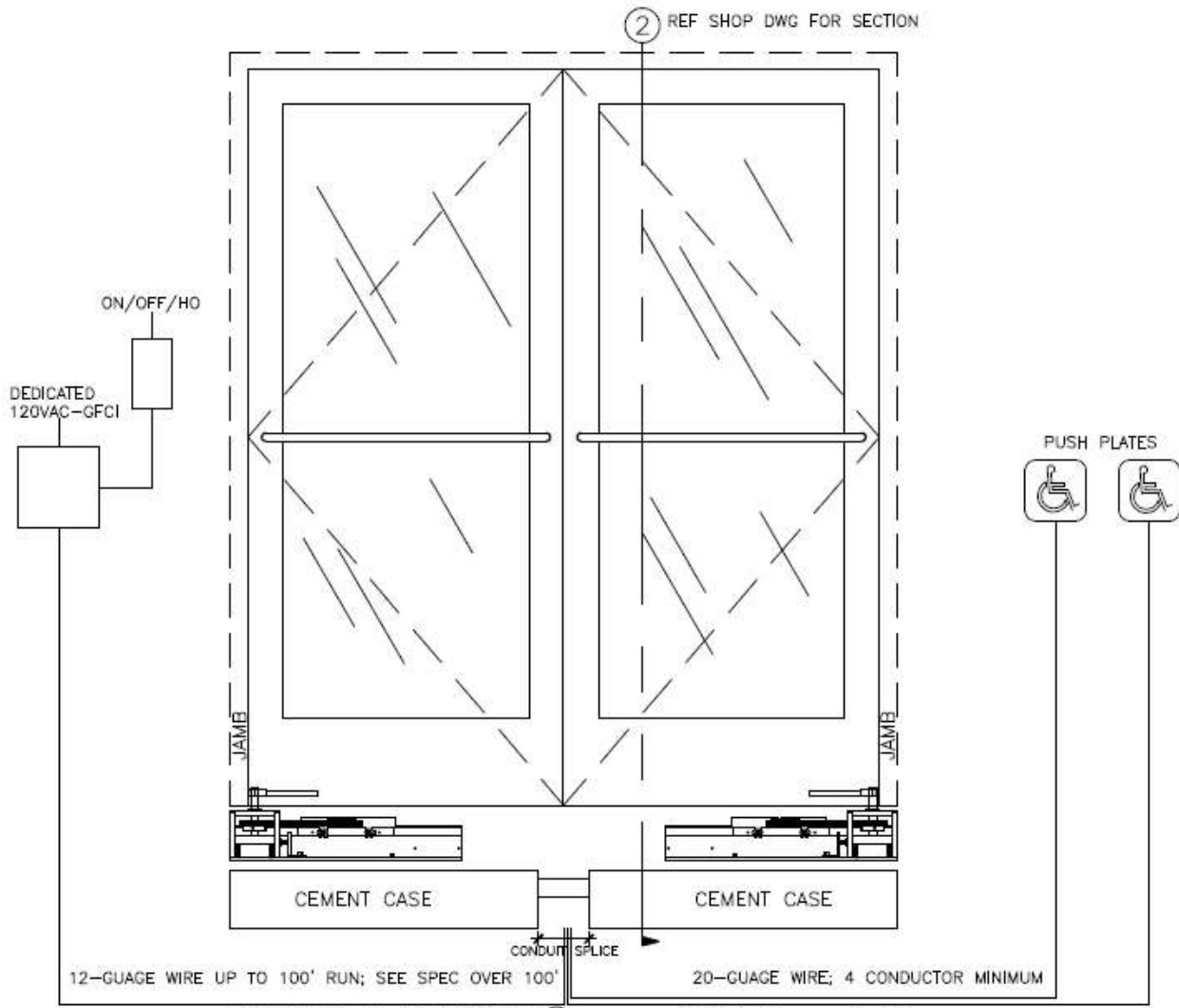
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**LIQUID TIGHT FITTING DETAILS  
ARLINGTON #LT-7 FOR 3/4" CONDUIT**

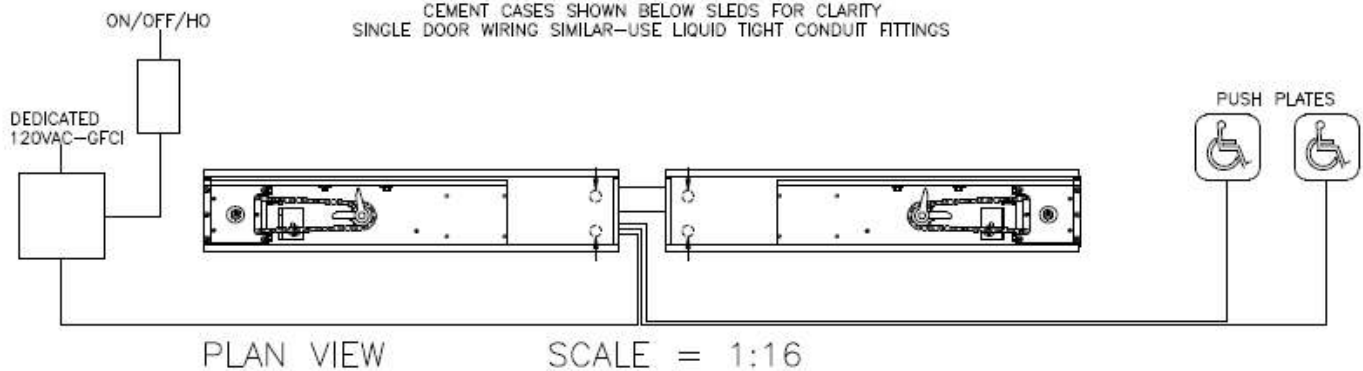
# WIRING REQUIREMENTS STANDARD INSTALL

ALL WIRING TO NON-PIVOT SIDE OF DOOR LEAF. WIRES TO CENTER ON PAIRS; WIRES TO STRIKE SIDE ON SINGLES. SEE ELECTRICAL PENETRATION DRAWING IN MANUAL FOR CONDUIT FITTING LOCATION ON CEMENT CASE. SEE OPERATOR MANUFACTURER'S MANUAL FOR SPECIFIC WIRING REQUIREMENTS



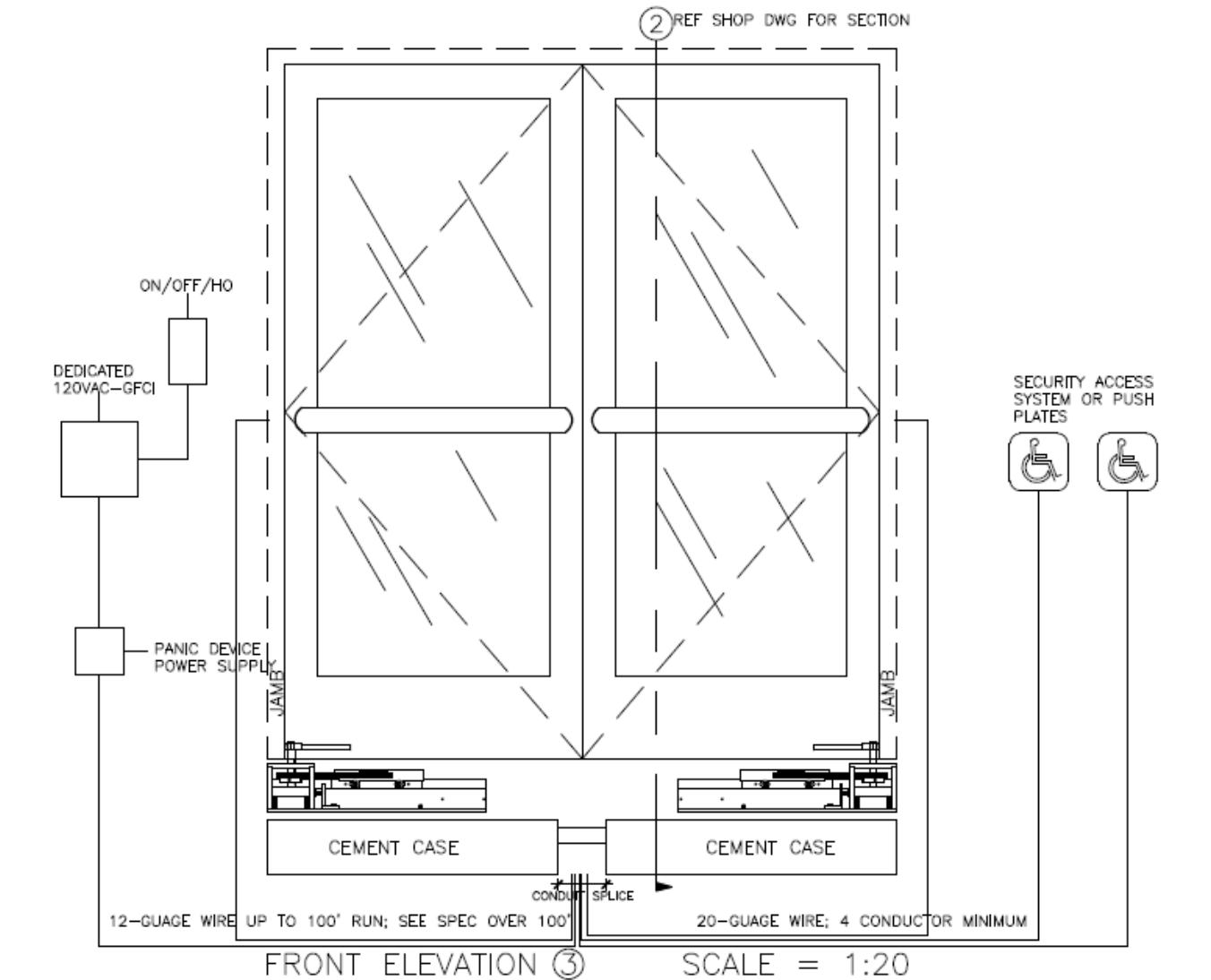
FRONT ELEVATION ③ SCALE = 1:20

CEMENT CASES SHOWN BELOW SLEDS FOR CLARITY  
SINGLE DOOR WIRING SIMILAR—USE LIQUID TIGHT CONDUIT FITTINGS

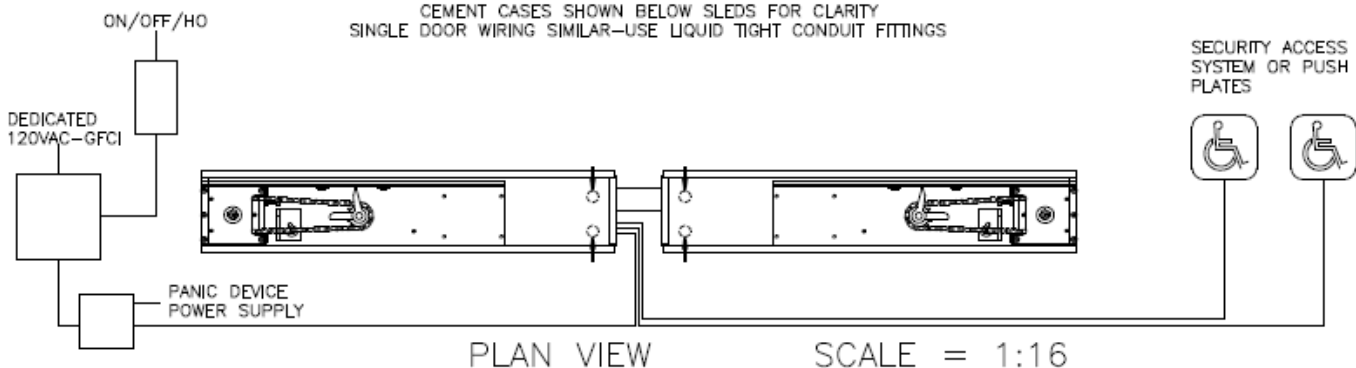


# WIRING REQUIREMENTS ELECTRIC PANIC DEVICE INSTALLATION

ALL WIRING TO NON-PIVOT SIDE OF DOOR LEAF. WIRES TO CENTER ON PAIRS; WIRES TO STRIKE SIDE ON SINGLES. SEE ELECTRICAL PENETRATION DRAWING IN MANUAL FOR CONDUIT FITTING LOCATION ON CEMENT CASE. SEE OPERATOR/DEVICE MANUFACTURER'S MANUAL FOR SPECIFIC WIRING

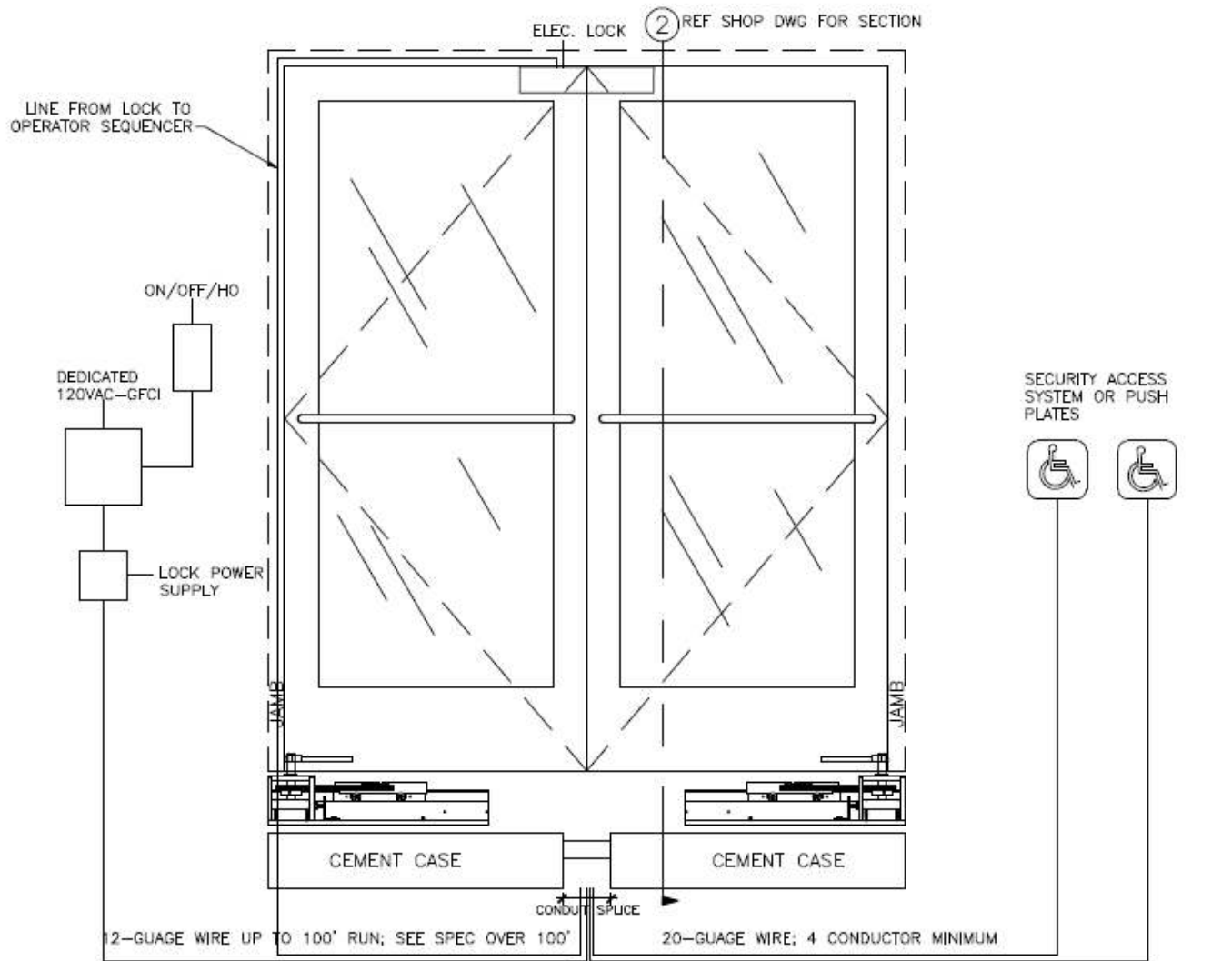


CEMENT CASES SHOWN BELOW SLEDS FOR CLARITY  
SINGLE DOOR WIRING SIMILAR—USE LIQUID TIGHT CONDUIT FITTINGS



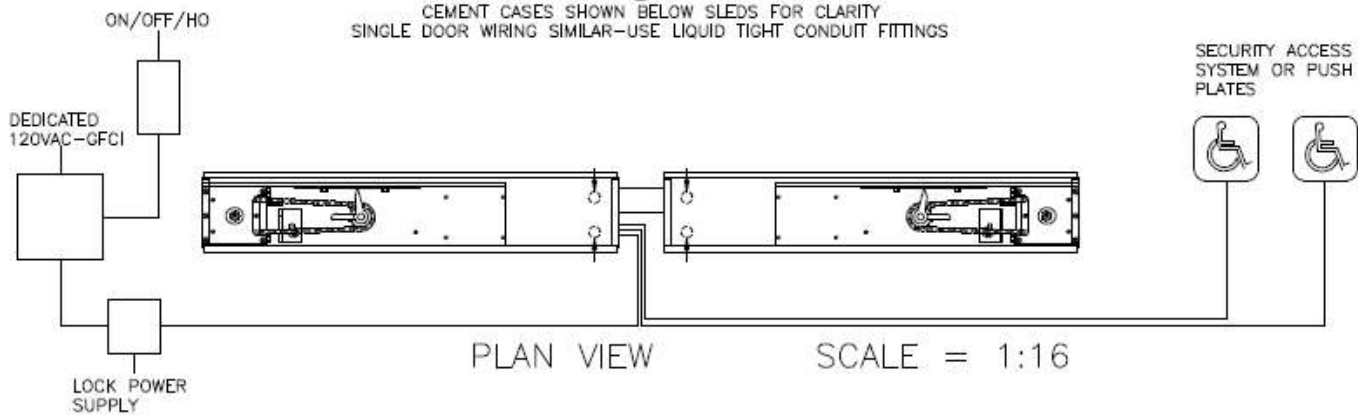
# WIRING REQUIREMENTS OVERHEAD LOCK INSTALL

ALL WIRING TO NON-PIVOT SIDE OF DOOR LEAF. WIRES TO CENTER ON PAIRS;  
WIRES TO STRIKE SIDE ON SINGLES. SEE ELECTRICAL PENETRATION DRAWING IN  
MANUAL FOR CONDUIT FITTING LOCATION ON CEMENT CASE. SEE LOCK &  
OPERATOR MANUFACTURER'S MANUALS FOR SPECIFIC WIRING REQUIREMENTS



FRONT ELEVATION ③ SCALE = 1:20

CEMENT CASES SHOWN BELOW SLEDS FOR CLARITY  
SINGLE DOOR WIRING SIMILAR-USE LIQUID TIGHT CONDUIT FITTINGS



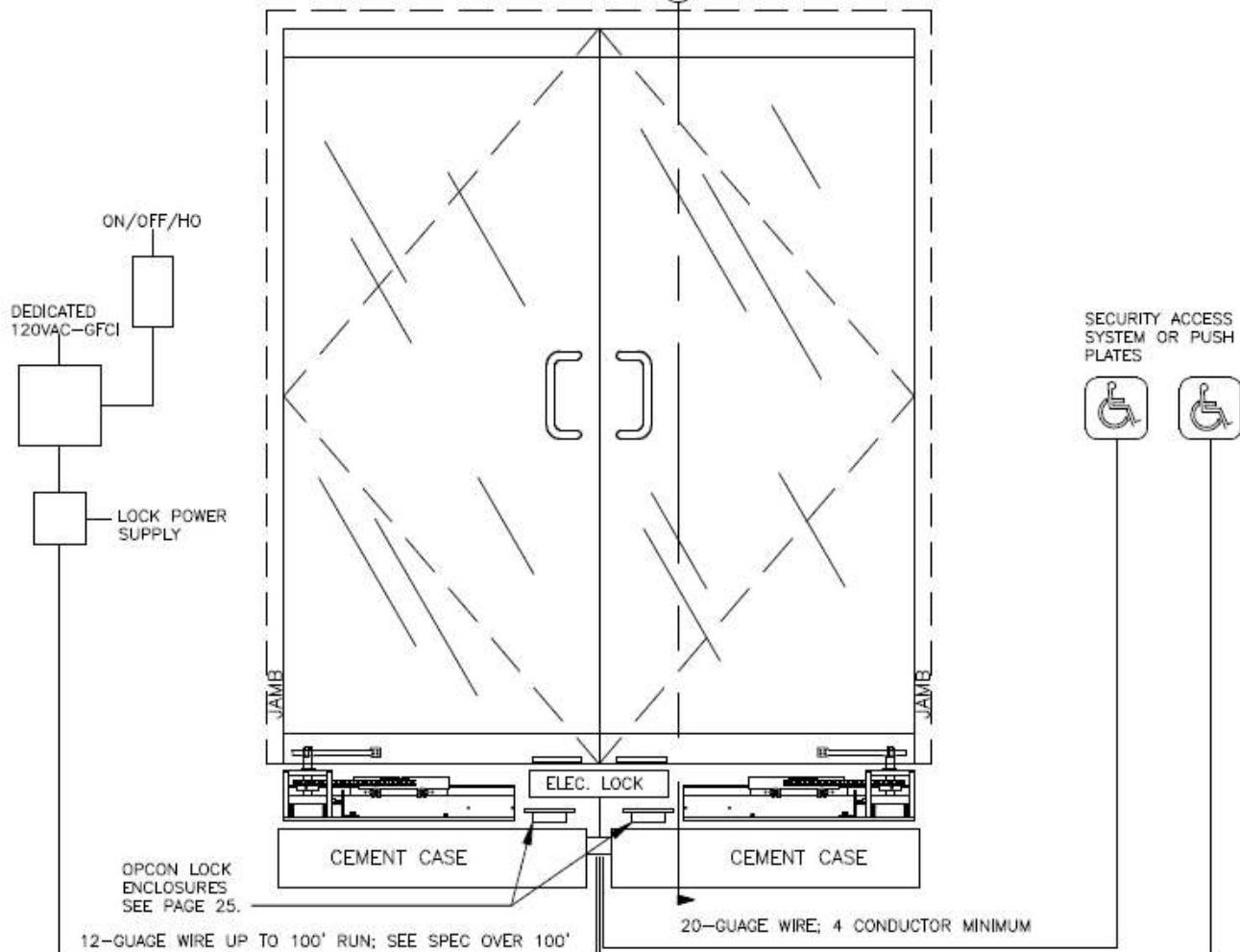
# WIRING REQUIREMENTS BOTTOM LOCK INSTALL



BOTTOM RAIL LOCK DESIGN IS BASED ON LOCKNETICS SHEAR LOCK MODEL #GF3000BRD. OPCON REQUIRES A WATERTIGHT LOCK HOUSING AVAILABLE AS AN OPTION WITH ALL BOTTOM RAIL LOCK INSTALLATIONS. ALL WIRING TO NON-PIVOT SIDE OF DOOR LEAF. WIRES TO CENTER ON PAIRS; WIRES TO STRIKE SIDE ON SINGLES. SEE ELECTRICAL PENETRATION DRAWING IN MANUAL FOR CONDUIT FITTING LOCATION ON CEMENT CASE. SEE LOCK & OPERATOR MANUFACTURER'S MANUALS FOR SPECIFIC WIRING REQUIREMENTS

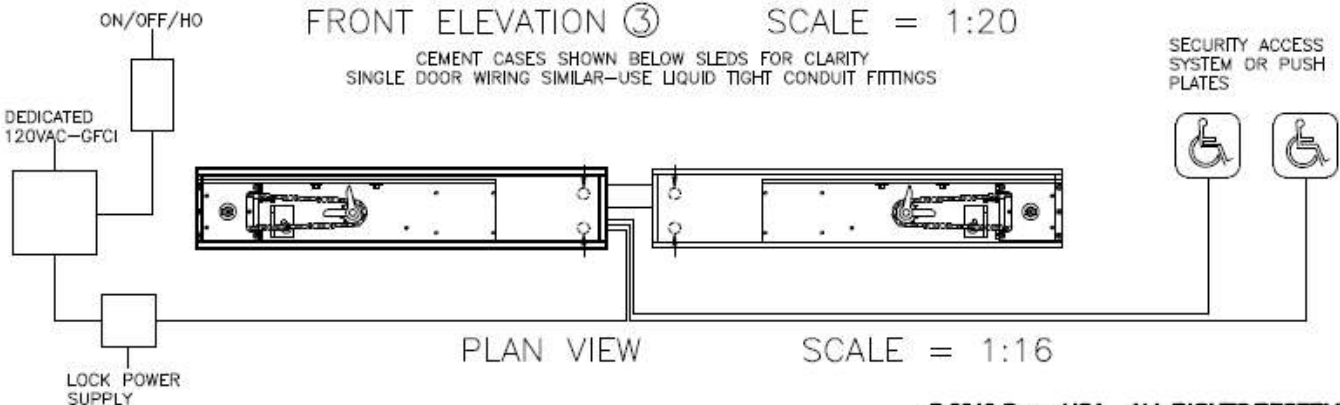
NOTE: REQUIRES IN-FIELD FABRICATION/MODIFICATION TO THRESHOLD & CEMENT CASE. INSTALL OPCON FURNISHED LOCK ENCLOSURE, ADEQUATE AND APPROPRIATE SEALANT IS REQUIRED AT LOCK PENETRATIONS. WATERPROOF SEAL IS THE RESPONSIBILITY OF THE INSTALLER

② REF SHOP DWG FOR SECTION



FRONT ELEVATION ③ SCALE = 1:20

CEMENT CASES SHOWN BELOW SLEDS FOR CLARITY  
SINGLE DOOR WIRING SIMILAR—USE LIQUID TIGHT CONDUIT FITTINGS



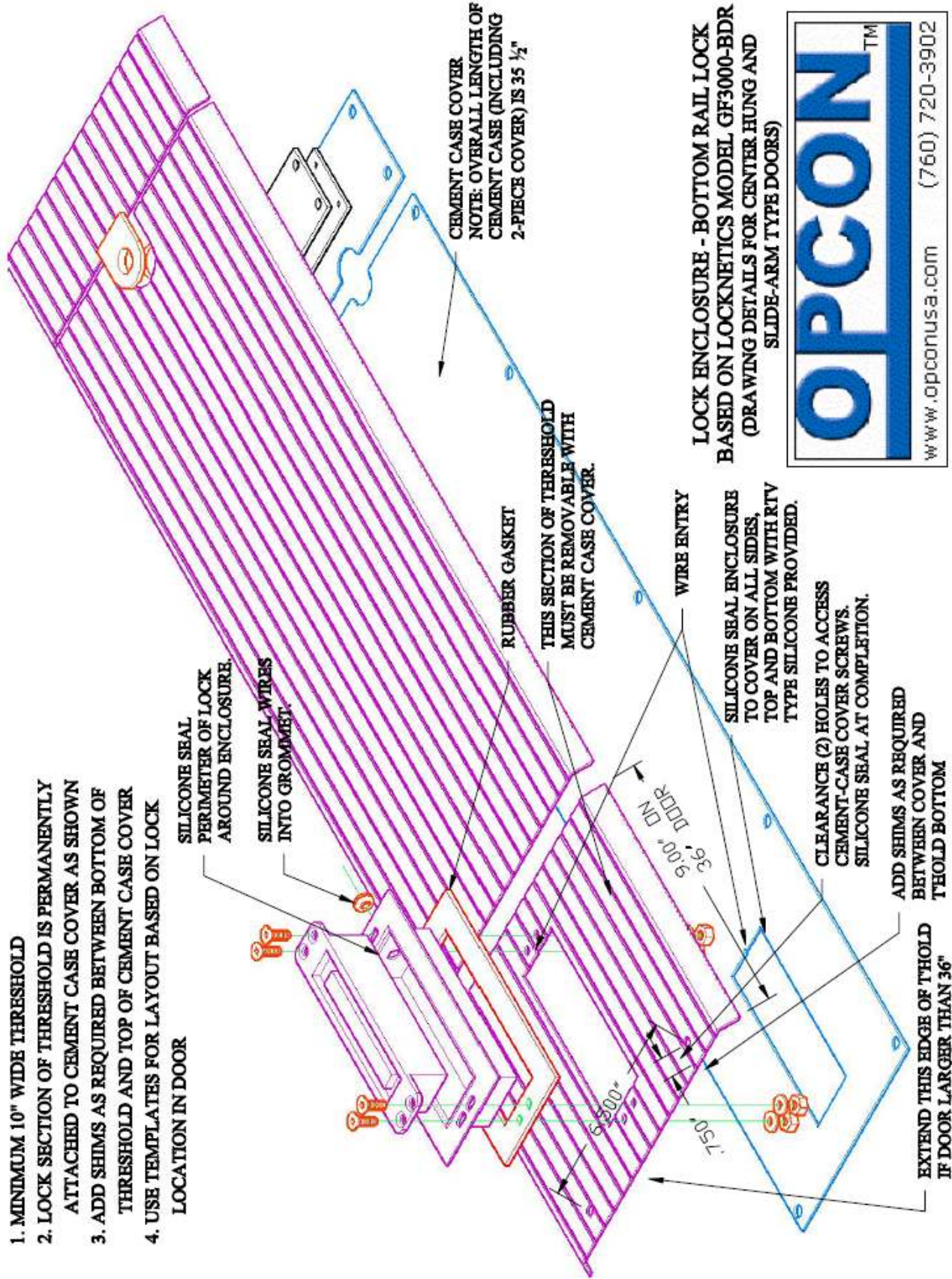
PLAN VIEW

SCALE = 1:16



**NOTES:**

1. MINIMUM 10" WIDE THRESHOLD
2. LOCK SECTION OF THRESHOLD IS PERMANENTLY ATTACHED TO CEMENT CASE COVER AS SHOWN
3. ADD SHIMS AS REQUIRED BETWEEN BOTTOM OF THRESHOLD AND TOP OF CEMENT CASE COVER
4. USE TEMPLATES FOR LAYOUT BASED ON LOCK LOCATION IN DOOR



**LOCK ENCLOSURE - BOTTOM RAIL LOCK**  
 BASED ON LOCKNETICS MODEL GF3000-BDR  
 (DRAWING DETAILS FOR CENTER HUNG AND SLIDE-ARM TYPE DOORS)

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**OPCON MANUFACTURING SYSTEMS, INC.**  
**WARRANTY POLICY ON OPCON PRODUCTS**

Opcon Manufacturing Systems, Inc. (Opcon) manufactures its products from high-grade materials with first class workmanship. Subject to the other conditions of the **Warranty**, if any parts of our own manufacture prove defective in material or workmanship within one (1) year after original installation, we shall repair or replace such parts free of cost. If any equipment or parts not of our own manufacture are utilized in connection with this automatic door operator conversion system, we shall assume responsibility and liability for defects only to the extent of such adjustment as the manufacturer thereof makes to us. The warranty shall not extend beyond one (1) year from the original date of installation regardless of any replacements that may be made. This is a parts replacement warranty. Field labor shall be the responsibility of the installing or servicing entity.

Our obligations under this **Warranty** are conditional upon (1) the owner's having filed the **Warranty** Registration Card with us at the time of the original installation, (2) giving us prompt written notice of alleged defects, and (3) upon our request, returning the allegedly defective items to us in Carlsbad, California, freight prepaid, for our inspection.

We shall have no obligation or liability, under this **Warranty** or otherwise, in the event of improper installation of this automatic door operator conversion system unless and until the installation is corrected. However, in no case shall we have any obligation or liability beyond one (1) year after the original installation for any replacement or repairs that may be made. We reserve the right, without obligation, to inspect all installations of Opcon door operator conversion systems and equipment for the protection of both the owner and ourselves. Only authorized automatic door installers may install or service the Opcon conversion system and/or the interfaced automatic door operator equipment.

In no event shall we have any obligation or liability, under this **Warranty** or otherwise, resulting in whole or in part from damage to defects in the door operator or equipment caused by abuse, misuse, malicious mischief, acts of God, casualty, improper handling or the negligence of the owner or others. Nor shall we have any obligation or liability for any loss, cost or expense incurred in the repair or replacement of the door operator or equipment except on express written authority from our office in Carlsbad, California.

The owner's sole remedy against us for any alleged defects in the Opcon Conversion System shall be as provided in this **Warranty**. We hereby disclaim all other obligations and liability for damages, including any incidental consequential damages. **THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.**

This **Warranty** may not be changed, expanded or modified in any way. Any warranty requiring field labor is the responsibility of the Opcon factory-authorized installer.

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US006176044B1

(12) **United States Patent**  
Nixon et al.

(10) Patent No.: **US 6,176,044 B1**  
(45) Date of Patent: **\*Jan. 23, 2001**

(54) **UNDERGROUND DOOR OPERATING APPARATUS AND METHOD**

(73) Inventors: **Angelo Nixon, Carlsted; Edward Preston Murphy, Monrovia, both of CA (US)**

(72) Assignee: **Opcon Manufacturing Systems, Inc. Carlsbad, CA (US)**

(\*) Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

Under 35 U.S.C. 154(b), the term of this patent shall be extended for 0 days.

(21) Appl. No.: **08/932,528**

(22) Filed: **Sep. 18, 1997**

(51) Int. Cl.7: **H06B 3/00; B05F 1/00**

(52) U.S. Cl.: **49/506; 49/534**

(56) Field of Search: **49/233, 234, 235, 49/236, 329, 343, 341, 506**

(54) **References Cited**

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\* cited by examiner

Primary Examiner—Daniel P. Stodola  
Assistant Examiner—Curtis A. Cohen  
(74) Attorney, Agent, or Firm—Myers, Dawe & Andros, LLP

(57) **ABSTRACT**

A door assembly includes a door operatively operable relative to a floor and further comprises an electro-mechanical power device disposed beneath the floor and providing a rotary output on a shaft. The support apparatus includes a spindle adapted to receive power from the rotary shaft beneath the floor and to extend above the floor into a coupled relationship with the door. A bearing included in the support apparatus supports the spindle and at least a portion of the weight of the door beneath the floor. The electro-mechanical device can be of the type commonly used in overhead systems, in which case the power device can be connected with the support apparatus for disposition beneath the floor. A coupling mechanism in the support apparatus can include pulleys, sprockets and gears, and power transfer devices such as belts and chains.

14 Claims, 2 Drawing Sheets

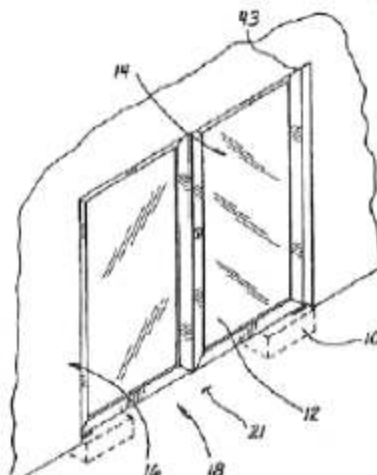
PATENT NUMBER:

US 6,176,044 B1 OF 2001

PATENTS PENDING:

PUB. NO. 2008/0256869 A1  
SEALING ARRANGEMENT  
FOR DOOR OPERATING  
APPARATUS

PUB. NO. 2008/0256870 A1  
ADJUSTABLE SPINDLE  
ARRANGEMENT FOR DOOR  
OPERATING APPARATUS



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