brookfield industries, inc. NB-2000-HD2-(Main-Sub) Swinging Door Operator

Description:
The **(Main-Sub)** meets all the basic requirements as the single swing **NB-2000-HD2** counterpart.

The **Main-Sub** operator is intended for use on double doors with an astragal and is designed to open the **Lead Door** first and close it last, while the **Follow Door** opens last and closes first. The **Lead Door** and **Follow Door** can be setup as either the left or right hand door. The **Main Operator** is designated as the right hand operator, while the **Sub** is always the left hand. The **Main Operator** houses a common: **CPU (Central Processing Unit), Analog/Digital Converter, Class (2) 24 VDC Power Supply,** and a **Terminal Strip Hookup.** The **Sub Operator** also receives basic commands from the Main Operator. All other components such as the **Motor Control**, **Drive Train** and **Rotary Position Transducer** are independent to both the Main and Sub operators.

The **CPU** has been uniquely programmed to assure the Lead and Follow doors remain in sequence during the closing cycle if one or both doors are in the **Entrapment** mode. The **CPU** program has been modified to automatically close the doors if required. The time the doors stay open can range from 0-300 seconds. This setting is titled **Hold Open Delay (HOD)** on the **Human Machine Interface (HMI).** If you do not want the automatic closing time feature, simply type in the value 301 or higher and the automatic closing time will be disabled.

We are Authorized to Mark the **NB-2000-HD2** with the **ETL** and **CE** markings from Intertek Testing Services to assure compliance with UL 325, FCC Part 15 (Emissions) and the following International Standards: EN 60335-1 and -2 (Safety), EN 61000-6-2 (Immunity) and EN 61000-6-4 (Emissions). The “listing” reports specifically refer to the heavy commercial/industrial doors associated with linear accelerator rooms.

Rating a Door Operator:
The rating of any door operator in a particular application cannot be based solely on the weight and width of the door. Other factors such as an “out-of plum” frame, “hinge bind”, hinge friction, acceleration and deceleration rates or pressure differential from one side of the door to the other, may have a substantial affect on the total operating torque it takes to move the door at ANSI speeds. For Example, a 4500 lb, 60” wide door would be well within the weight and width limitations; however, if any of the other factors are not properly controlled, the total operating torque could exceed the rated values. In the design and testing of the NB-2000-HD2 door operator, we have factored these variables into the Maximum Rated Operating Torque. This assures the customer they are getting the most dependable product at a reasonable cost.

Maximum Rated Operating Torque = 6,000 lb-in
Example of torque calculation:
$\mathbf{T_{max}}$ * = $T_{friction} + T_{accel/decel} + T_{stack\ pressure}$
* variables can be derived via mathematical formula or can be measured values. Torque caused by “hinge bind” or “out-of plumb” doors can drastically increase the actual torque reflected to the door operator.

Specification:
1) ***Forward and reverse torque adjustment:*** via current limit trimpot settings on the motor control to adjustment the operating torque in order to comply with the entrapment protection requirements of UL 325. This eliminates the need for unreliable and hard to adjust manual clutches or electromagnetic clutches that are not designed for slippage or stall applications.
2) ***Automatic egress:*** or door reversal whenever entrapment protection has been violated in either the opening or closing directions; however, door shall not reverse automatically when in the latchcheck or “creep close” mode. This feature can be adjustable for time delay and reversal force.

3) ***Absolute position feedback control:*** this assures the CPU always knows the door's position. During installation, a power interruption, or if electrical noise is encountered, the door is not required to be "homed", "reset" nor go through a "learn speed cycle" at any time.
4) ***Manual operation:*** shall be in accordance with UL 325 during a power loss.
5) ***Supply voltage:*** 115VAC +/- 10% (230VAC for European service) 50/60 Hertz single phase. In-Line circuit breakers supplied with motor control and PLC. Surge protection, line filters, and EMI ferrites shall be included.
6) ***Current Consumption:*** maximum 6 amperes
7) ***PLC/Logic Control:***
   a) Shall be a PLC with sufficient I/O and a CPU (Central Processing Unit) with adequate memory, response times and scanning rates in order to properly control the motion and positioning of Linear Accelerator Swing Doors.
   b) Outputs commands shall be the internal type, integral with the PLC. No external limit switches shall be allowed for control of door positioning.
   c) A means to interface with the PLC for adjusting preset values for the open, partial open, closed, latchcheck and backcheck positions.
   d) Diagnostics and troubleshooting of the PLC shall be provided with LED and modular plug-in components.
   e) The PLC shall be provided with an internal battery to store the door position presets in the CPU memory.
8) ***Motor:*** 1/4 hp permanent magnet 90 volt DC motor 1750 RPM TENV
9) ***Motor Control:*** shall be a full-wave, four quadrant, regenerative, 90 VDC variable speed control with the following functions:

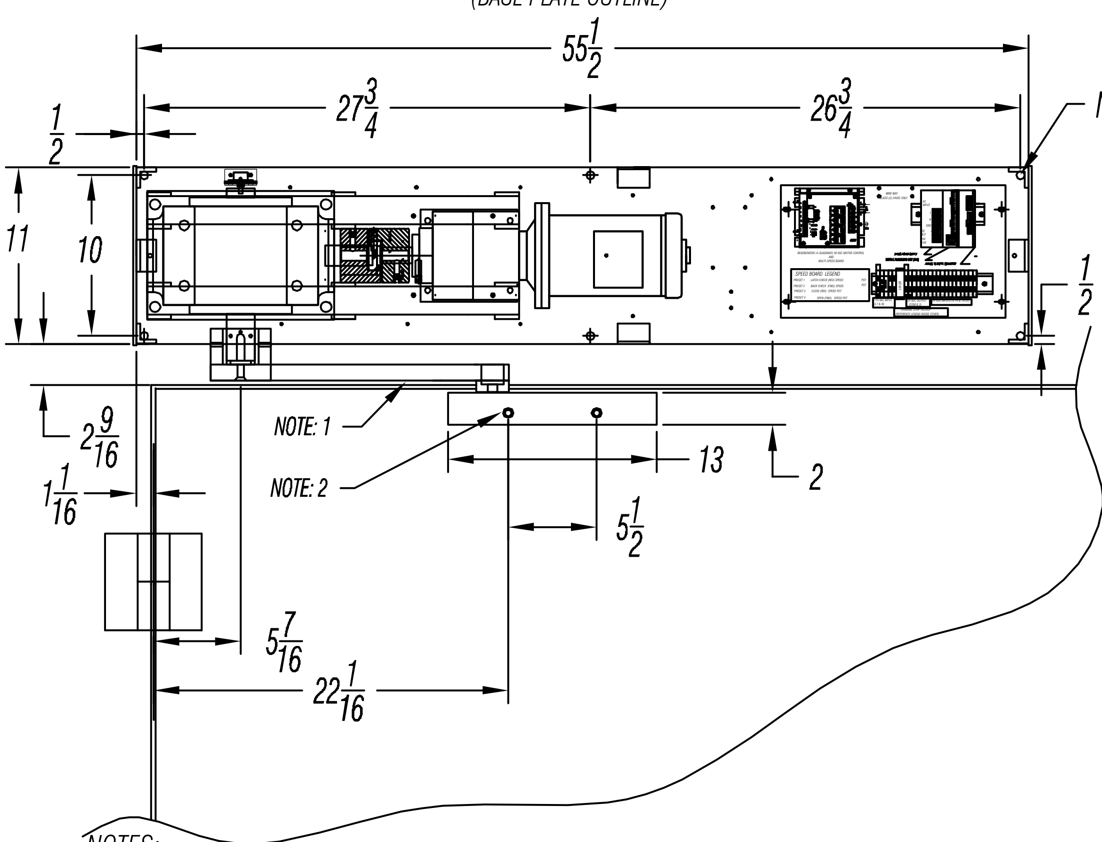
FWD/REV maximum speed	FWD/REV current limit	IR compensation
FWD/REV acceleration/deceleration	1% speed regulation	50:1 speed range.

10) ***Speed Control:*** a means of controlling independent forward and reverse speeds per ANSI 156.10 as well as controlling latchcheck and backcheck "creep" speeds. This can be accomplished externally with speed pots or internally with the PLC.
11) ***Drive train and linkage mechanism:*** shall be designed to allow manual operation of the door per UL 325 in addition to assuring each component from the motor to the door attachment point is properly "sized" in order to transfer all operating torques and forces as defined for Linear Accelerator Swing Doors. Standard linkage shall consist of a pull open design with crank arm, slider block and cam follower assembly.
12) ***Enclosures:*** U-shaped 16 gage cover with 3/16" thick end plates reinforced with angle iron. See attached drawings for Main and Sub overall dimensions. (2) 7/8" dia. penetrations for ½" conduit on each side or metric equivalent for European installations.
13) ***Materials:*** ASTM A569, A36, AISI 1018 cold rolled steel, grade 5 bolting or better.
14) ***Mounting hardware:*** the NB-2000-HD2 shall be mounted with (6) 3/8" grade 5 diameter bolts with compatible washers and lock washers. Hardware must also be properly tightened with adequate thread engagement.
15) ***Finish:*** all exposed metal surfaces shall be prime painted.
16) ***Functionality test:*** each NB-2000-HD2 is cycle tested in position for 24 hrs. prior to shipment. Each unit is checked for leaks and that all I/O are functioning properly.
17) ***Installation:*** see drawings attached.
18) ***Battery Backup (optional):*** Opens the door during power interruption only. A 12VDC, 1.2 Ah battery with float charger and test switch shall be assembled in a grounded and vented 6" x 12" x 14" NEMA 1 enclosure. (3) holes are provided at the top of the enclosure each for ½" conduit. The first shall be used for a 110V AC line from the power source, the 2nd for a 110VAC hookup to the door operator and the 3rd for a 12VDC hookup to the door operator. An end of travel limit switch shall also be provided.

Rev.	Revision note	Date	Sign	Check

FRONT ELEVATION

(BASE PLATE OUTLINE)



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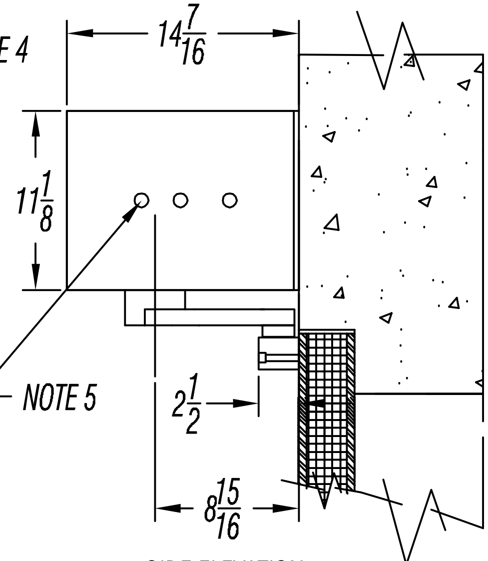


SIDE ELEVATION

Notes:

Tolerances	
Decimal	+/- 0.015
Fractional	+/-xxx
Angular	+/-xxx

NOTES:

1) LINKAGE ARM ADJUSTMENT +/- 1/4 " SHIM PACK
THIS ALLOWS FOR PROPER ENGAGEMENT OF CAM FOLLOWER INTO SLIDER BLOCK AND PREVENTS THE THE LINKAGE ARM FROM INTERFERING WITH THE DOOR OR THE SLIDER BLOCK.

2) SLIDER BLOCK AND CAM FOLLOWER ASSEMBLY. 13/32" DIA. HOLES PROVIDED FOR 3/8" SOCKET HEAD BOLTS. (TYP. 2 PLACES)

3) ALL DIMENSIONS IN INCHES.

4) 1/2" DIA. THRU HOLES FOR 3/8" DIA. GRADE 5 BOLTS.(TYP. 6 PLACES)

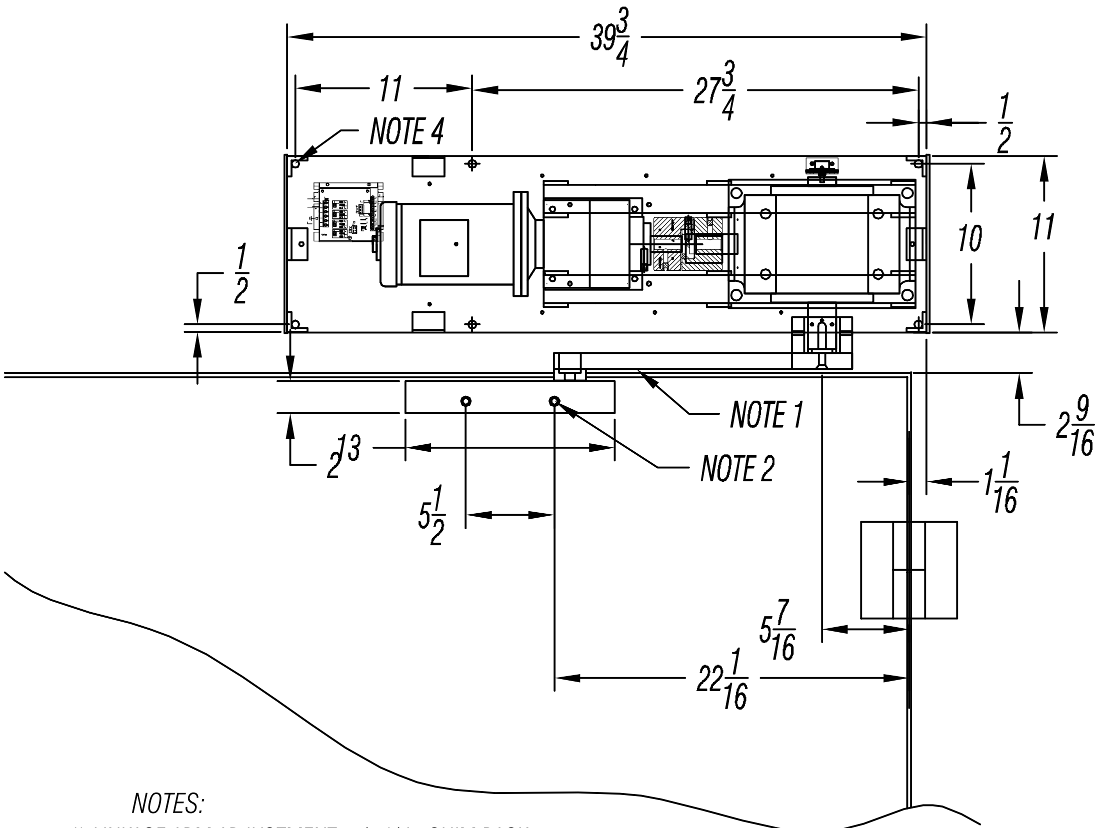
5) FIELD WIRING(LH OR RH): ALLWAYS RUN 110VAC THRU LEFT SIDE OF COVER AND CLASS 2 (24VDC OR LESS) THRU RIGHT SIDE OF COVER.
(3) 7/8" DIA. HOLES FOR 1/2" DIA. CONDUIT (TYP. BOTH SIDES OF COVER)

NB-2000-HD2 (MAIN RH OPERATOR)		Drawn by kpk Checked by
Material	Date 9/3/13	Scale 1:1
INSTALLATION DRAWING PULL OPEN		
brookfield industries inc. 99 West Hillside Ave. : Thomaston, CT P: (860) 283-6211 F: (860) 283-6123 info1@brookfieldindustries.com		www.brookfieldindustries.com Drawing No./File Name NB-2000-HD2-MS1

Rev.	Revision note	Date	Sign	Check

FRONT ELEVATION

(BASE PLATE OUTLINE)



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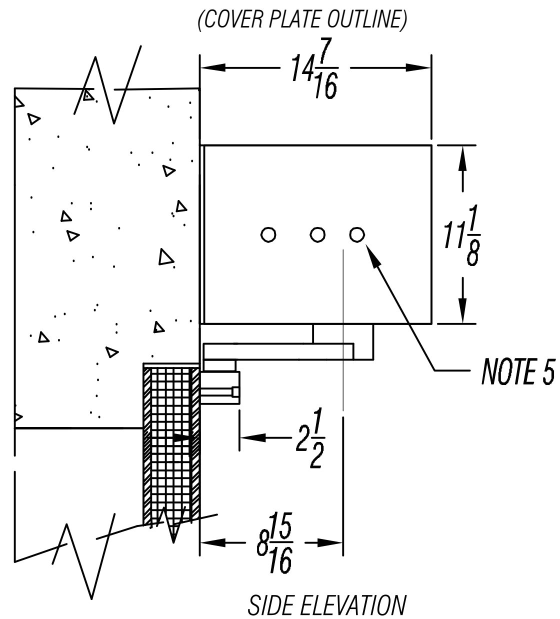

SIDE ELEVATION

Notes:

Tolerances	
Decimal	+/- 0.015
Fractional	+/-xxx
Angular	+/-xxx

NOTES:

1) LINKAGE ARM ADJUSTMENT +/- 1/4 " SHIM PACK
THIS ALLOWS FOR PROPER ENGAGEMENT OF CAM FOLLOWER INTO SLIDER BLOCK AND PREVENTS THE THE LINKAGE ARM FROM INTERFERING WITH THE DOOR OR THE SLIDER BLOCK.

2)SLIDER BLOCK AND CAM FOLLOWER ASSEMBLY. 13/32" DIA. HOLES PROVIDED FOR 3/8" SOCKET HEAD BOLTS. (TYP. 2 PLACES)

3) ALL DIMENSIONS IN INCHES.

4) 1/2" DIA. THRU HOLES FOR 3/8" DIA. GRADE 5 BOLTS.(TYP. 6 PLACES)

5)FIELD WIRING(LH OR RH): ALLWAYS RUN 110VAC THRU LEFT SIDE OF COVER AND CLASS 2 (24VDC OR LESS) THRU RIGHT SIDE OF COVER.
(3) 7/8" DIA. HOLES FOR 1/2" DIA.
CONDUIT (TYP. BOTH SIDES OF COVER)

NB-2000-HD2 (SUB LH OPERATOR)

Drawn by kpk
Checked by

Material | Date 9/3/13 | Scale 1:1

INSTALLATION DRAWING PULL OPEN

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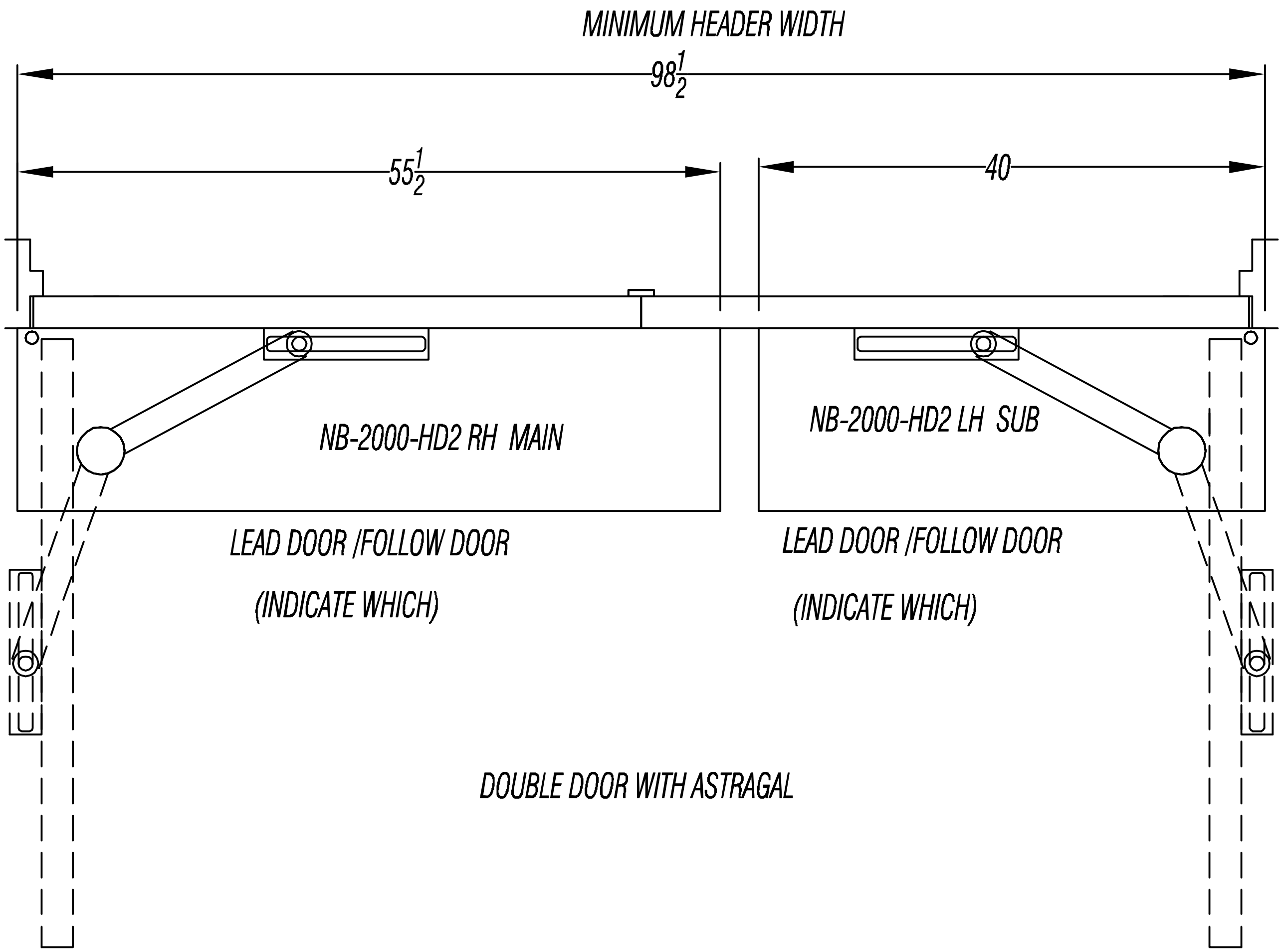
Drawing No./File Name
NB-2000-HD2-MS2

Rev.	Revision note	Date	Sign	Check

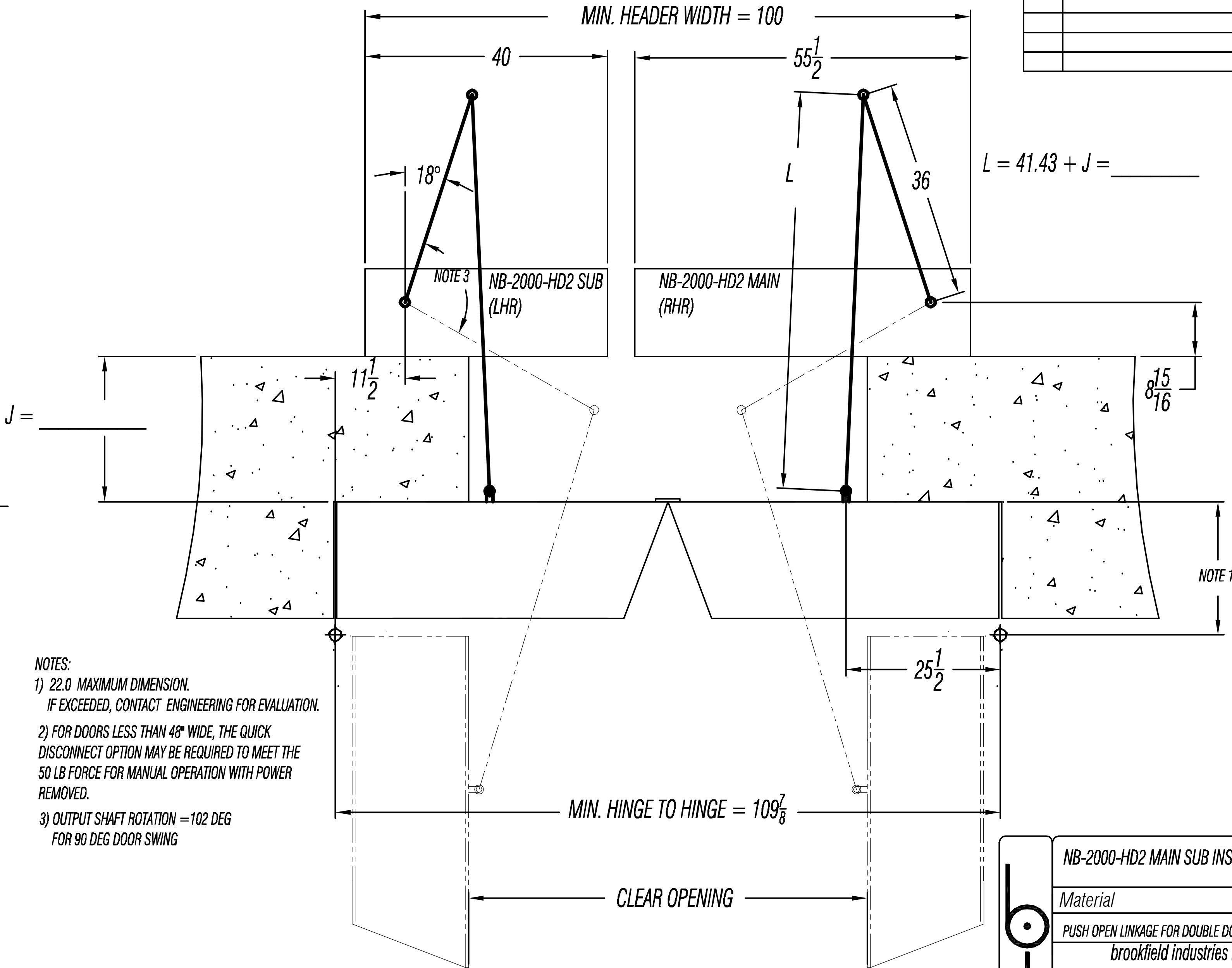


Notes:

Tolerances	
Decimal	
Fractional	+/-xxx
Angular	+/-xxx

NB-2000-HD2 MAIN/SUB INSTALLATION		Drawn by KPK Checked by
Material	Date 9-10-13	Scale 1:1
PULL OPEN LINKAGE FOR DOUBLE DOOR LEAD/FOLLOW SEQUENCING		
brookfield industries inc. 99 West Hillside Ave. : Thomaston, CT P: (860) 283-6211 F: (860) 283-6123 info1@brookfieldindustries.com	www.brookfieldindustries.com Drawing No./File Name NB-2000-HD2-MS3	

Rev.	Revision note	Date	Sign	Check



NOTES:

1) 22.0 MAXIMUM DIMENSION.
IF EXCEEDED, CONTACT ENGINEERING FOR EVALUATION.

2) FOR DOORS LESS THAN 48" WIDE, THE QUICK DISCONNECT OPTION MAY BE REQUIRED TO MEET THE 50 LB FORCE FOR MANUAL OPERATION WITH POWER REMOVED.

3) OUTPUT SHAFT ROTATION =102 DEG FOR 90 DEG DOOR SWING

Notes:

Tolerances	
Decimal	
Fractional	+/-xxx
Angular	+/-xxx

NB-2000-HD2 MAIN SUB INSTALLATION	Drawn by Checked by
Material	Date 01/23/14 — Scale 1:1
PUSH OPEN LINKAGE FOR DOUBLE DOOR (LEAD/FOLLOW) SEQUENCING	

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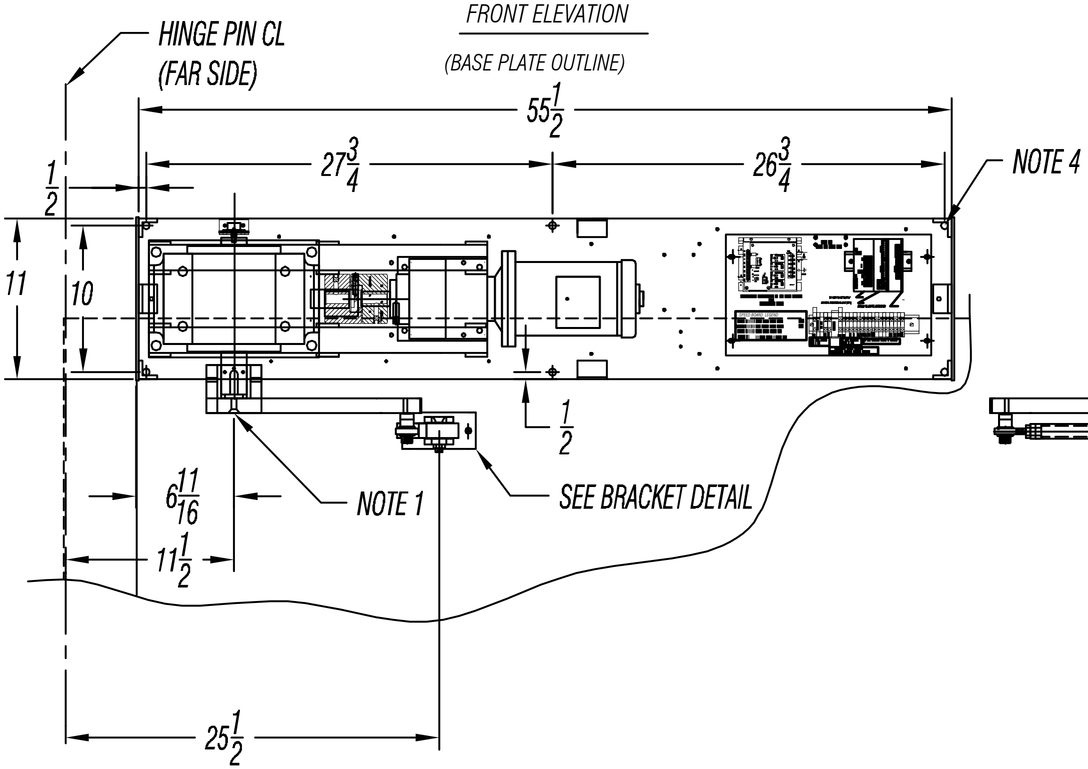
Drawing No./File Name
NB-2000HD2-MS5

Rev.	Revision note	Date	Sign	Check
1	REVISE LINKAGE	12-23-13		

FRONT ELEVATION

(BASE PLATE OUTLINE)



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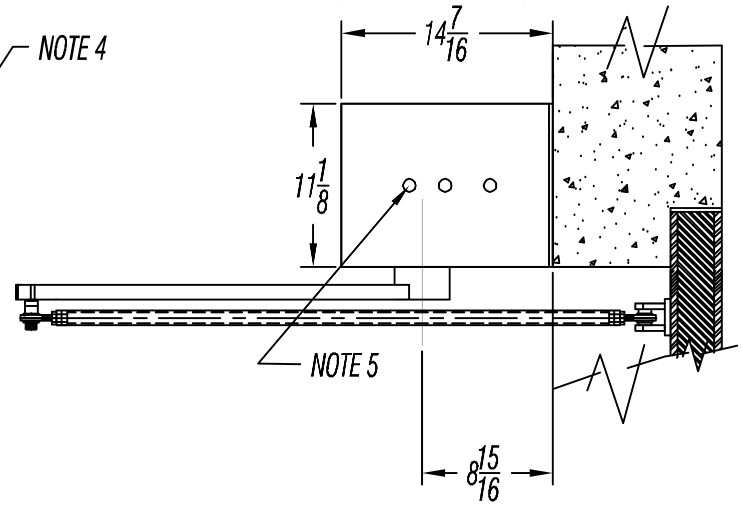


SIDE ELEVATION

NOTES:

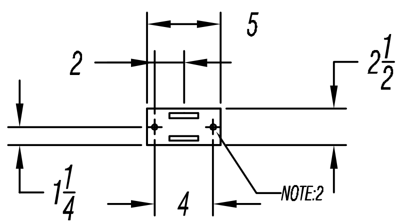
1) LINKAGE ARM PROVIDED WITH SHIM PACK (+/-) 1/4 ADJUSTMENT

2) 13/32 DIA. HOLES PROVIDED FOR 3/8 DIA. GR 5 BOLTS(TYP2)

3)ALL DIMENSIONS IN INCHES

4) 1/2 DIA, THRU HOLES FOR 3/8 DIA, GR. 5 BOLTS (TYP 6)

5) FIELD WIRING(LH OR RH): ALLWAYS RUN 110VAC THRU LEFT SIDE COVER AND CLASS 2 (24VDC OR LESS) THRU RIGHT SIDE COVER.(3) 7/8 DIA. HOLES FOR 1/2 " CONDUIT(TYP)



BRACKET DETAIL

Notes:

Tolerances	
Decimal	+/- 0.015
Fractional	+/- xxx
Angular	+/- xxx

NB-2000-HD2 (MAIN) RHR OPERATOR

Drawn by kpk
Checked by

Material | Date 1/23/14 | Scale 1:1

INSTALLATION DRAWING FOR PUSH OPEN LINKAGE

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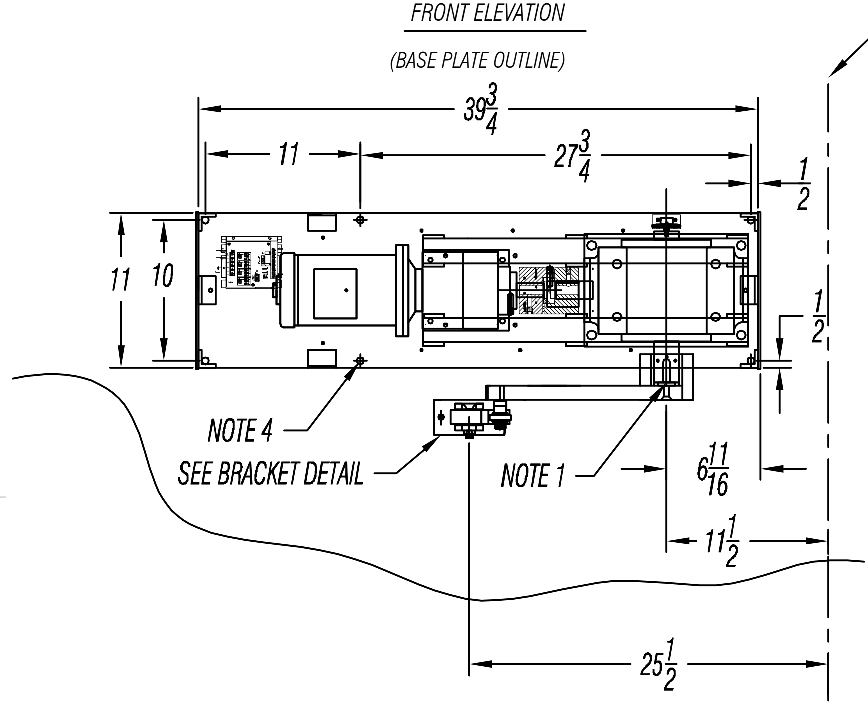
Drawing No./File Name
NB-2000-HD2-MS6

Rev.	Revision note	Date	Sign	Check

FRONT ELEVATION

(BASE PLATE OUTLINE)



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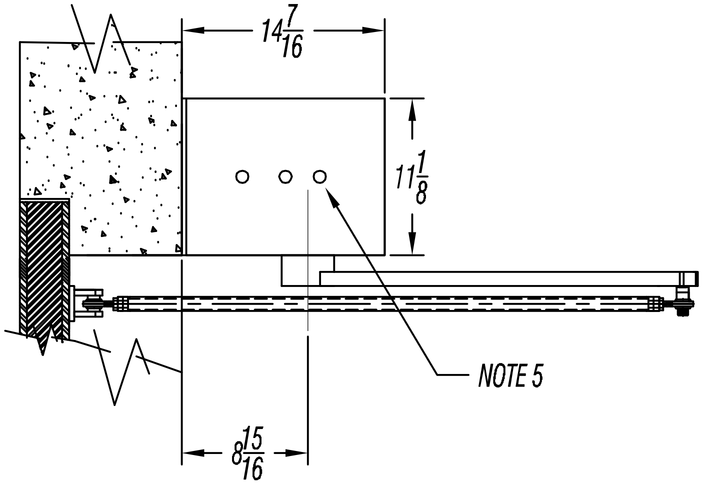


SIDE ELEVATION

Notes:	
Tolerances	
Decimal	+/- 0.015
Fractional	+/- xxx
Angular	+/- xxx

NOTES:

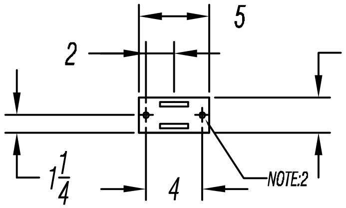
1) LINKAGE ARM ADJUSTMENT +/- 1/4 " SHIM PACK
THIS ALLOWS FOR PROPER ENGAGEMENT OF CAM FOLLOWER INTO SLIDER BLOCK AND PREVENTS THE THE LINKAGE ARM FROM INTERFERING WITH THE DOOR OR THE SLIDER BLOCK.

2) SLIDER BLOCK AND CAM FOLLOWER ASSEMBLY. 13/32" DIA. HOLES PROVIDED FOR 3/8" SOCKET HEAD BOLTS. (TYP. 2 PLACES)

3) ALL DIMENSIONS IN INCHES.

4) 1/2" DIA. THRU HOLES FOR 3/8" DIA. GRADE 5 BOLTS.(TYP. 6 PLACES)

5) FIELD WIRING(LH OR RH): ALLWAYS RUN 110VAC THRU LEFT SIDE OF COVER AND CLASS 2 (24VDC OR LESS) THRU RIGHT SIDE OF COVER.
(3) 7/8" DIA. HOLES FOR 1/2" DIA.
CONDUIT (TYP. BOTH SIDES OF COVER)



BRACKET DETAIL

NB-2000-HD2 (SUB) LHR OPERATOR		Drawn by kpk Checked by
Material	Date 01/23/14	Scale 1:1
INSTALLATION DRAWING PUSH OPEN LINKAGE		
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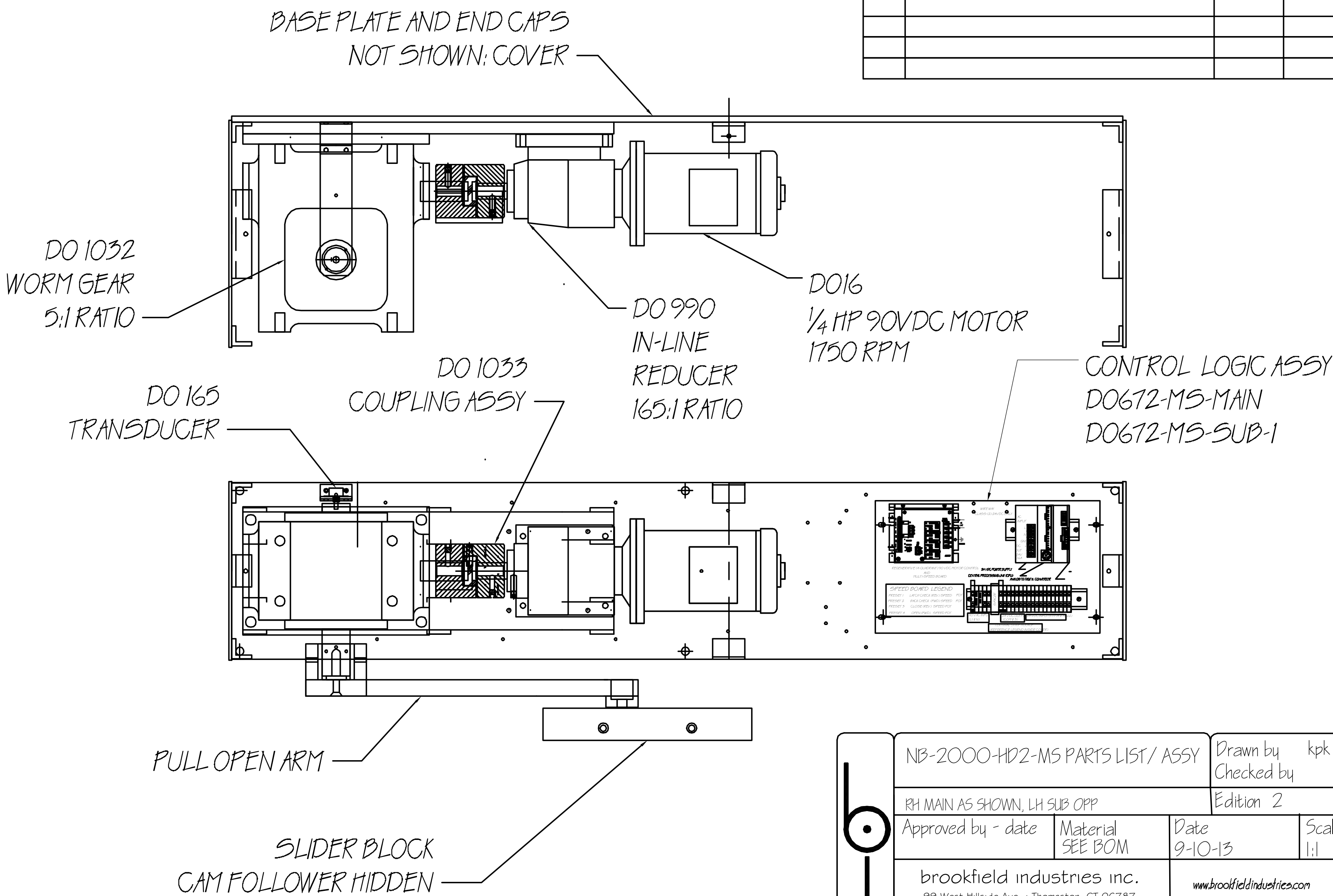
RevNo	Revision note	Date	Signature	Checked



NB-2000-HD2-MS PARTS LIST / ASSY

RH MAIN AS SHOWN, LH SUB OPP

Drawn by kpk
Checked by
Edition 2

Approved by - date
Material SEE BOM
Date 9-10-13
Scale 1:1

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Drawing Number/File Name
NB-2000HD2-MS4