



Conforms to UL STD 325  
Control No. 3011624



US Patent No.  
6,177,771,B1

## brookfield industries, inc. NB-1000 Swinging Door Operator

### Description:

The brookfield **NB-1000** Swinging Door Operator has been designed, tested and is manufactured by **brookfield industries, inc.** for use on linear accelerator swing doors weighing up to 12,000 lbs and 66" wide. The **NB-1000** can be expected to safely operate doors at the maximum weight for at least 500,000 cycles, providing none of the rated values are exceeded.

We are Authorized to Mark the **NB-1000** 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.

The NB-1000 is an electro-mechanical power open/power close operator, which utilizes a state of the art PLC and positioning control components that allow us to offer special features such as *Absolute position feedback* and *Auto backlash removal* to name a few.

The PLC (Programmable Logic Control) is programmed by the manufacturer to accept input signals from push paddles, 2 and 3 button stations and partial open commands. Additional I/O (Input/Output) have been added to the NB-1000 to accommodate any number of special customer requirements such as: E-stops, motion detectors, control mats, card readers, reversing edge sensors and battery backup to name a few.

Interface with the PLC is provided with a hand held, password protected operator panel to adjust door position presets (purchased separately).

### 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-1000 door operator, we have factored these variables into the Rated Operating Torque. This assures the customer they are getting the most dependable product at a reasonable cost.

Maximum Rated Operating Torque =	2,250 lb-in (254 N-m)
Maximum Rated Door Weight =	12,000 lb (5448 kg)
Maximum Rated Door Width =	66 in (1.68m)

*The NB-1000 can be expected to operate any linear accelerator swing door within the rated values for at least 500,000 cycles, provided the door is operating within the ANSI 156.10 speed criteria and the acceleration rate for a particular door weight has not been exceeded.*

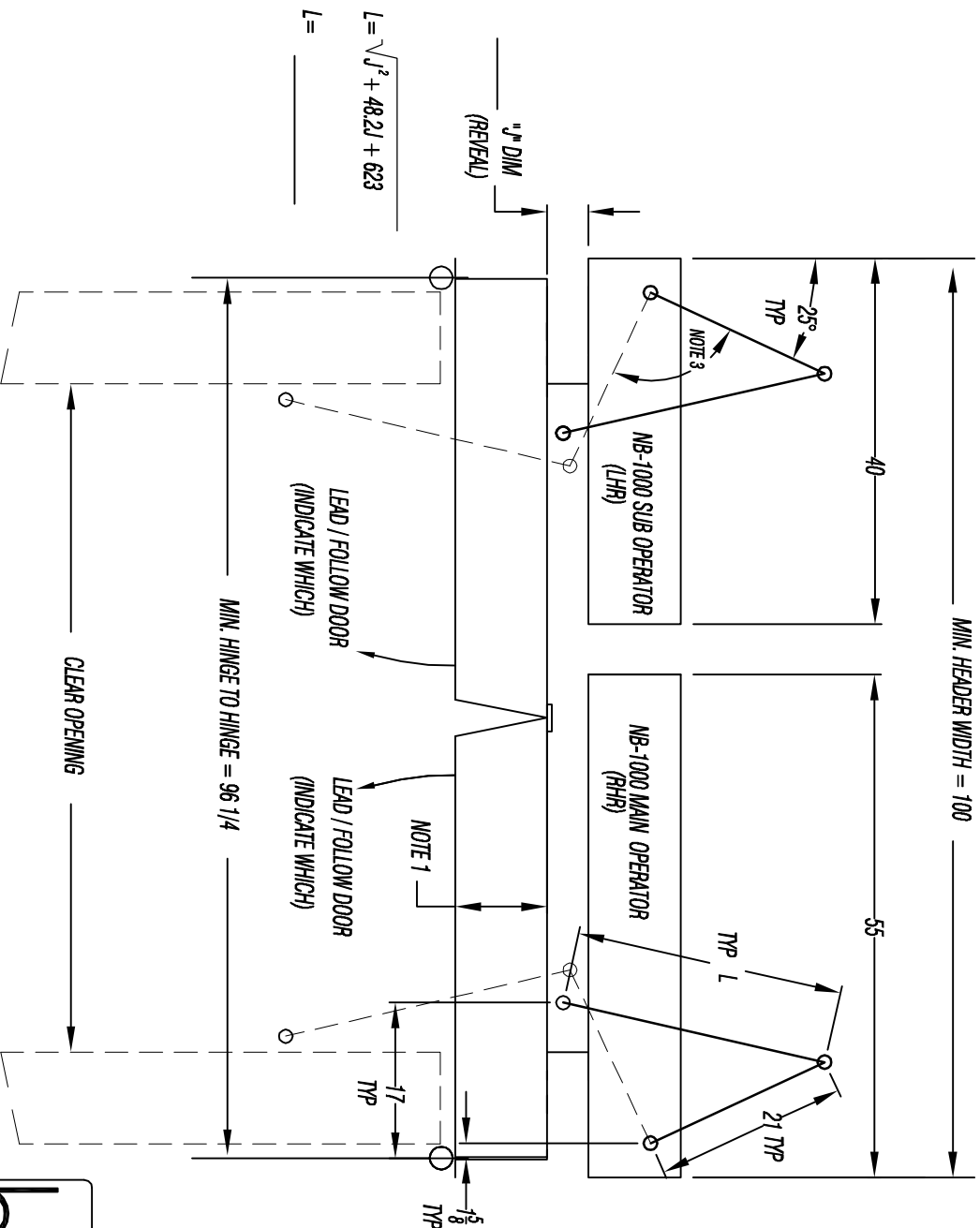
### Specification:

- 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) **Auto backlash removal:** automatically closes the door and removes all mechanical backlash in the system when in the latchcheck “creep close” mode. If a pressure differential exists or if the door wants to float open slightly, the motor will restart and “clamp” the door against the frame; thus, assuring the frame interlocks will not be disengaged and the response time to open will be optimized.
- 4) **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.
- 5) **Manual operation:** shall be in accordance with UL 325 during a power loss.
- 6) **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.
- 7) **Current Consumption:** maximum 5 amperes
- 8) **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.
- 9) **Motor:** 1/8 hp permanent magnet 90 volt DC motor 1750 RPM TENV
- 10) **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.
- 11) **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.
- 12) **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.
- 13) **Enclosure:** U- shaped 16 gage cover with 1/8” thick end plates reinforced with angle iron. Overall 54” x 9 1/8” x 10 1/8”. (2) 7/8” dia. penetrations for 1/2” conduit on each side or metric equivalent for European installations. For 230VAC service, the transformer shall be housed in a separate 16” x 20” x 6-5/8” NEMA 1 vented enclosure. Penetrations are provided for 1/2” conduit or the metric equivalent for European installations.
- 14) **Materials:** ASTM A569, A36, AISI 1018 cold rolled steel, grade 5 bolting or better.
- 15) **Mounting hardware:** the NB-1000 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.
- 16) **Finish:** all exposed metal surfaces shall be prime painted.
- 17) **Functionality test:** each NB-1000 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.
- 18) **Installation:** the NB-1000 shall be installed per drawings O4597K22-A for pull open linkages and O35298R10 and O30299K1 for push open applications.
- 19) **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 1/2” conduit or the metric equivalent for European installations. The first shall be used for a 110V AC line from the power source, the 2<sup>nd</sup> for a 110VAC hookup to the door operator and the 3<sup>rd</sup> for a 12VDC hookup to the door operator. An end of travel limit switch shall also be provided.

Rev	Revision note	Date	Sign	Check



# Notes:

- 1) MAX. DOOR THICKNESS=16 FOR DOORS OVER 10' CONTROL ENGINEERING DEPT.
- 2) FOR DOORS LESS THAN 48" WIDE, THE QUICK DISCONNECT LINKAGE OPTION MAY BE REQUIRED TO MEET THE 50 LB FORCE FOR MANUAL OPERATION WITH POWER REMOVED.

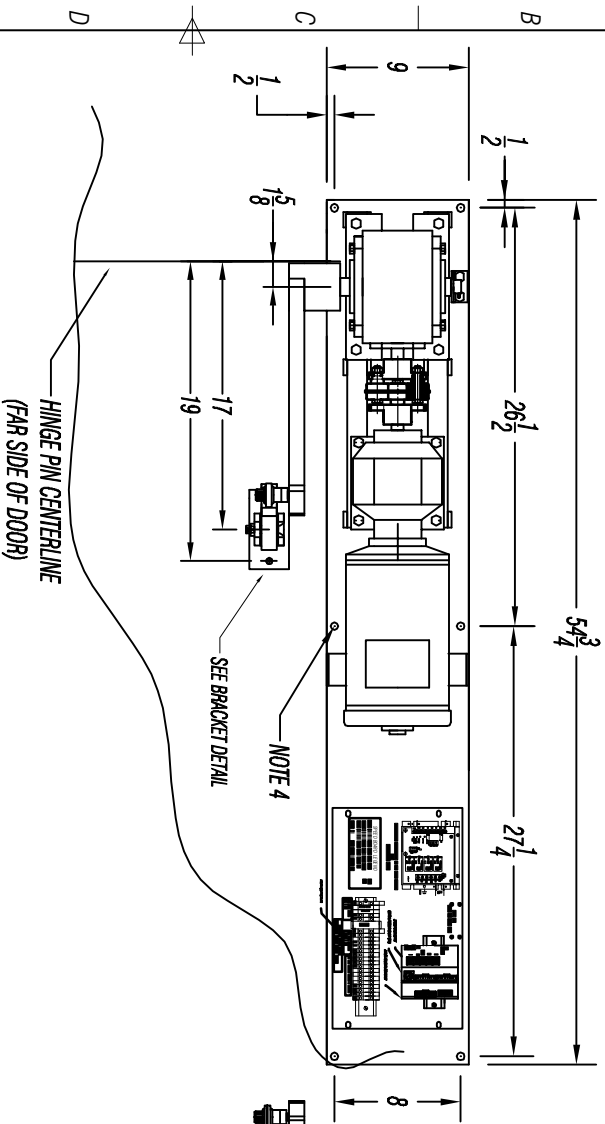
3) OUTPUT SHAFT ROTATION=9 DEG. FOR 90 DEG DOOR SWING

Tolerances
Decimal
Fractional
Angular

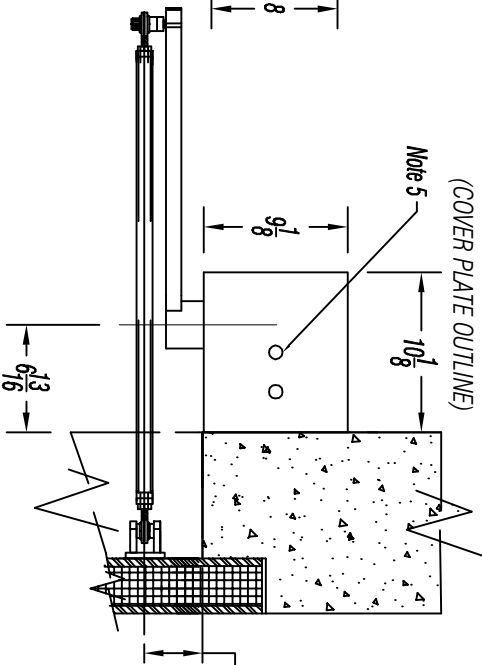
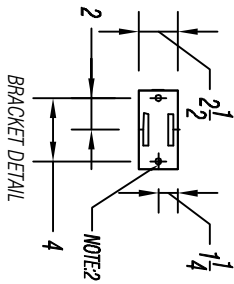
<b>NB-1000 MAIN-SUB INSTALLATION</b>		Drawn by <b>KPK</b>
Material	Date <b>10-18-13</b>	Checked by
PUSH OPEN LINKAGE FOR DOUBLE DOOR LEAD/FOLLOW SEQUENCING		Scale <b>1:1</b>
<b>brookfield industries inc.</b> 99 West Hillside Ave. : Thomaston, CT P: (860) 283-6211 F: (860) 283-6123 info1@brookfieldindustries.com		Drawing No./File Name <b>NB-1000-MainSub-2</b>

Rev	Revision note	Date	Sign	Check

# FRONT ELEVATION (BASE PLATE OUTLINE)



- NOTES:
- 1) LINKAGE ARM PROVIDED WITH SHIM PACK WITH +/- 1/4" ADJUSTMENT
  - 2) 13/32" DIA. HOLES PROVIDED FOR 3/8" DIA. BOLTS (TYP.2). (GRADE 5)
  - 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): ALWAYS RUN 110VAC THRU LEFT SIDE OF COVER AND CLASS 2 (24VDC OR LESS) THRU RIGHT SIDE OF COVER.
  - (2) 7/8" DIA. HOLES FOR 1/2" DIA. CONDUIT (TYP. BOTH SIDES OF COVER)



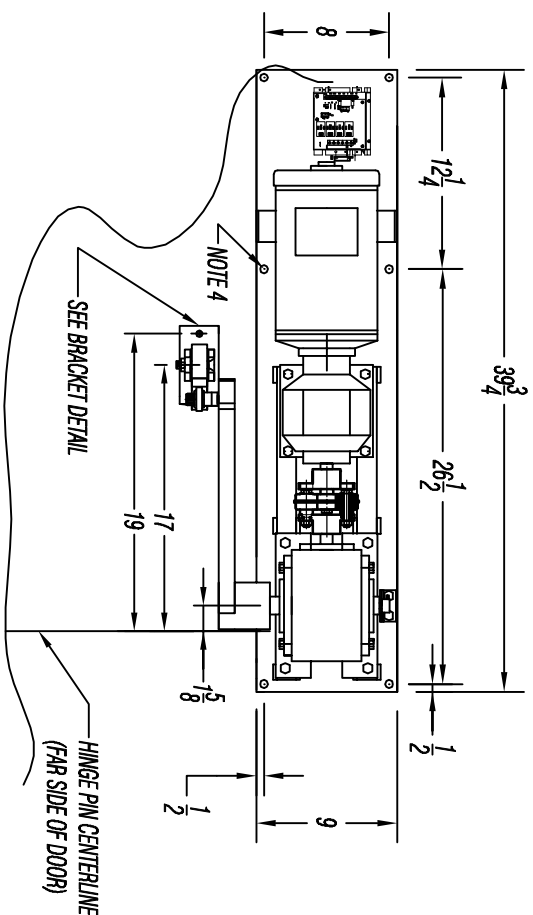
## SIDE ELEVATION

Tolerances			
Decimal	+/- .0015		
Fractional	+/- 1/16		
Angular	+/- .xxx		

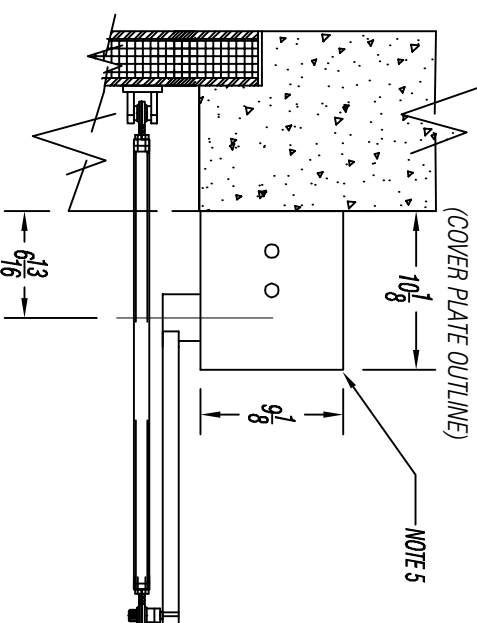
		<b>NB-1000 (MAIN) RHR OPERATOR</b>		Drawn by <b>KPK</b>
Material	Date <b>10-22-13</b>	Scale <b>1:1</b>	Checked by	
INSTALLATION DRAWING FOR PUSH OPEN			www.brookfieldindustries.com	
99 West Hillside Ave.: Thomaston, CT P: (860) 283-6211 F: (860) 283-6123 info1@brookfieldindustries.com			Drawing No./File Name <b>NB-1000 MainSub-3</b>	

Rev	Revision note	Date	Sign	Check

# FRONT ELEVATION (BASE PLATE OUTLINE)

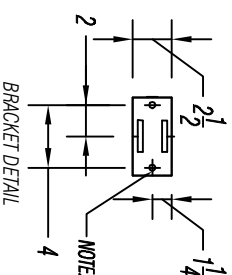


## SIDE ELEVATION



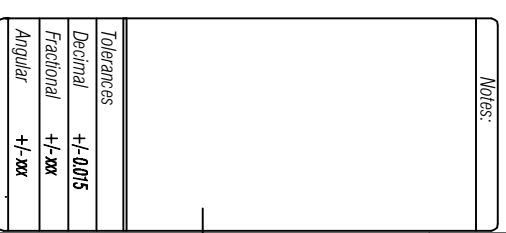
Notes:	
Tolerances	
Decimal	+/- .0015
Fractional	+/- 1/16
Angular	+/- .xxx

- NOTES:
- 1) LINKAGE ARM PROVIDED WITH SHIM PACK WITH +/- 1/4" ADJUSTMENT
  - 2) 13/32" DIA. HOLES PROVIDED FOR 3/8" DIA. BOLTS (TYP.2). (GRADE 5)
  - 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). ALWAYS RUN 110VAC THRU LEFT SIDE OF COVER AND CLASS 2 (24VDC OR LESS) THRU RIGHT SIDE OF COVER.
  - (2) 7/8" DIA. HOLES FOR 1/2" DIA. CONDUIT (TYP. BOTH SIDES OF COVER)



<b>NB-1000 (SUB) LHR OPERATOR</b>		Drawn by <b>KPK</b> Checked by
Material	Date <b>10-22-13</b>	Scale <b>1:1</b>
INSTALLATION DRAWING FOR PUSH OPEN		
<b>brookfield industries inc.</b> 99 West Hillside Ave. : Thomaston, CT P: (860) 283-6211 F: (860) 283-6123 info1@brookfieldindustries.com		
www.brookfieldindustries.com		Drawing No./File Name <b>NB-1000 MainSub-4</b>



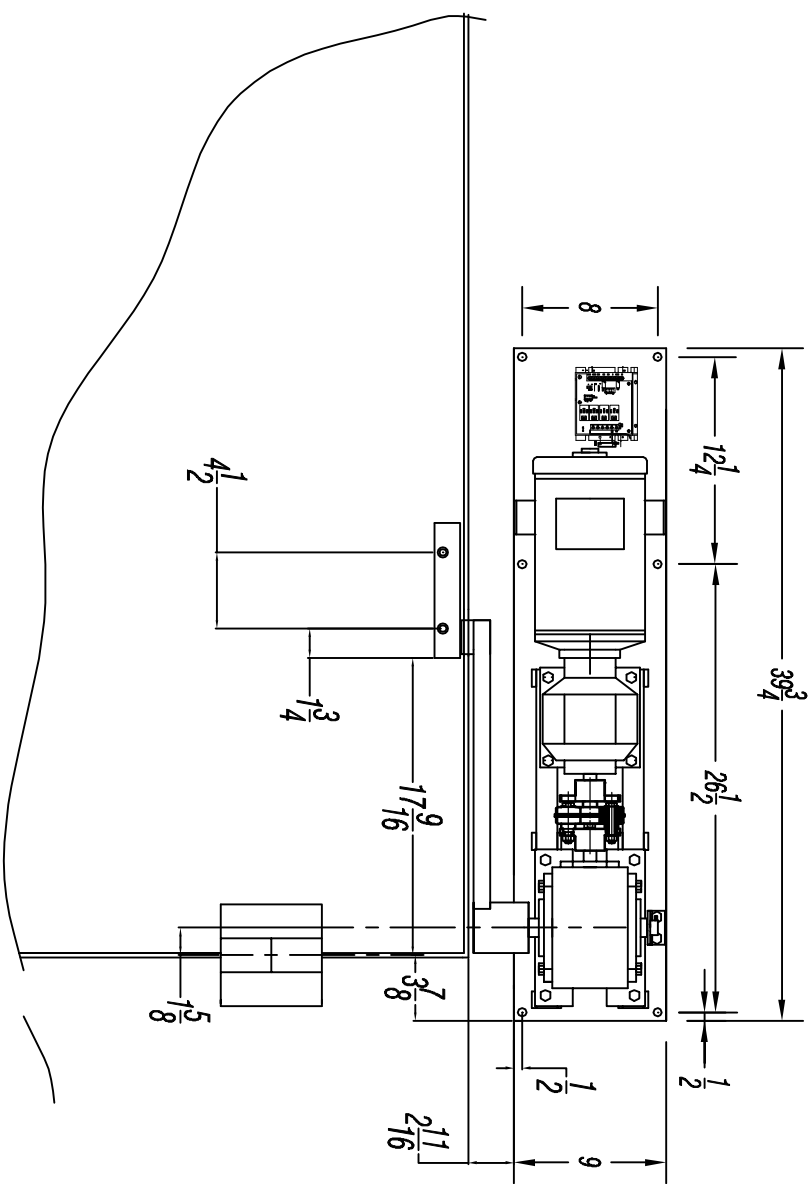


- |  |               |                              |
|--|---------------|------------------------------|
| IB-1000 (MAIN) RH OPERATOR   |               | Drawn by<br>kpk              |
| Material   | Date 10-23-13 | Checked by                   |
| INSTALLATION FOR PULL OPEN   |               | Scale 1:1                    |
| brookfield industries inc.<br>99 West Hillside Ave. : Thomaston, CT<br>P: (860) 283-6211 F: (860) 283-6123 |               | www.brookfieldindustries.com |
| Drawing No./Rev Name   |               | 1000-14-0-4-7                |

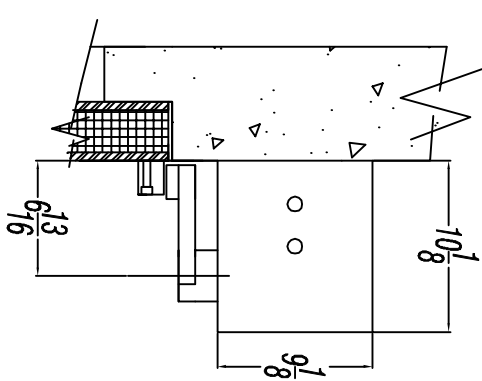
Rev	7	8	
6	Revision note	Date	Sign
7	<b>DIMENSIONS</b>	8/24/16	

Notes:	
<b>Tolerances</b>	
<b>Decimal</b>	<b>+/- .0015</b>
<b>Fractional</b>	<b>+/- .xxx</b>
<b>Angular</b>	<b>+/- .xxx</b>

FRONT ELEVATION  
(BASE PLATE OUTLINE)



(COVER PLATE OUTLINE)



SIDE ELEVATION

NOTES:

- 1) LINKAGE ARM PROVIDED WITH SHIM PACK FOR +/- 1/4" ADJUSTMENT. THIS ALLOWS FOR PROPER ENGAGEMENT OF CAM FOLLOWER INTO SLIDER BLOCK AND PREVENTS THE LINKAGE FROM INTERFERING WITH EITHER THE DOOR OR SLIDER BLOCK.
- 2) SLIDER BLOCK AND CAM FOLLOWER ASSEMBLY. 13/32" DIA. HOLES PROVIDED FOR 3/8" SOCKET HEAD BOLTS. (TYP. 2)
- 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). ALWAYS RUN 110 VAC THRU LEFT SIDE OF COVER AND CLASS 2 (24VDC OR LESS) THRU RIGHT SIDE OF COVER.
- (2) 7/8" DIA. HOLES FOR 1/2" CONDUIT. TYP. BOTH ENDS OF OPERATOR.

Rev	Revision note	Date	Sign	Check
1	DIMENSIONS	8/24/16		

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

**NB-1000 (SUB) LH OPERATOR**

Material	Date 10-23-13	Scale 1:1	Drawn by kpk	Checked by
INSTALLATION FOR 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-1000 MainSub-8