

brookfield industries, inc.

Commercial / Industrial Door Operator Manual

SWINGING AND SLIDING DOOR OPERATORS FOR LEAD
SHIELDED DOORS



*For All Door Operator Model Numbers
for Swinging and Sliding Doors*

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brookfield industries, inc.

**NB-4100
COMMERCIAL/INDUSTRIAL
SLIDING
DOOR OPERATOR
MANUAL**

(5th Edition 04/24/18)*

***Incorporates UL 325 7th Edition Issued 05/19/17**



**Conforms to UL STD 325
Control No. 3011624**



US Patent No. 6,177,771 B1

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WARNING!

IMPORTANT INSTALLATION INSTRUCTIONS

IMPROPER INSTALLATION CAN LEAD TO SEVERE INJURY OR DEATH

READ AND FOLLOW ALL INSTRUCTIONS

- **Commercial/Industrial Sliding Door Operator** that has exposed moving parts capable of causing injury to persons or employs a motor deemed indirectly accessible by UL 325,10.6 by virtue of its location above the floor shall include:
 - (a) Install the operator at least 8 ft (2.44 m) or more above the floor; or
 - (b) If the operator must be installed less than 8 ft (2.44 m) above the floor, exposed moving parts must be protected by covers or guarding, provided by the operator or door manufacturer; or
 - (c) Both (a) and (b)
- Install only on a properly operating and balanced door within the rated values for door weight, door width and operating forces as stated on the ratings label
- Do not connect door operator to source of power until instructed to do so
- This door operator shall be installed and serviced by a qualified technician, electrician or electrical maintenance person familiar with its operation and the potential hazards involved.
- Any person performing installation or service on this product shall read this manual first. Proper installation includes following all steps outlined in the **Installation Instructions** and the settings specified under the **Parameters** section.
- Assure all electrical wiring and grounding is installed as specified in this manual and as required by any local codes. Proper installation can also reduce the risk of electrical shock, fire or explosion.
- Locate activation switches or push button stations: (a) within sight of the door, (b) at a minimum height of 5 ft (1.53 m) above floors, landings, steps, or any other adjacent walking surface (c) away from moving parts of the door.
- As described in this manual, the Stop command controlled by the motor drive is not intended to be a fail safe or Emergency Stop (E-Stop) since it does not prevent the motor drive from malfunctioning. This can only be accomplished by disconnecting the AC power to the operator (terminals L1 and N).
- This door operator is to be a permanent or “hard” wired connection to the supply voltage. The electrical contractor shall install a dedicated breaker or line switch to disconnect each ungrounded pole of the door operator from the supply voltage. Each ungrounded pole shall have a minimum of 3mm contact separation.
- If this model is equipped with a manual release, disengage pin(s) between door and door operator before manually moving the door.

WARNING!

IMPORTANT SAFETY INSTRUCTIONS IMPROPER USAGE CAN LEAD TO SEVERE INJURY OR DEATH READ AND FOLLOW ALL INSTRUCTIONS

- **Commercial/Industrial Sliding Door Operator** for trained traffic* use only. The manufacturer of this product does not include external safety devices as a standard feature.
- **External safety devices** are required on this door operator. Refer to the Terminal Strip Hookup in this manual for proper wiring and to the owner's manual of the external safety device manufacturer for proper installation and use.
- No person shall perform any service or activate this door operator unless they have been properly trained in its safe usage and have read the owner's manual.
- Never let children operate or play with door controls.
- Before activating this door operator, check the following:
 1. Assure that all personnel are clear of the path of this operator and the door that it is attached to.
 2. Assure that all fingers, hands, feet, limbs and articles of clothing are clear of all moving parts and pinch points.
- Personnel should keep away from a door in motion and keep the moving door in sight until it is completely closed or open. **NO ONE SHOULD CROSS THE PATH OF A MOVING DOOR.**
- Test the door's safety features at least once a month. After adjusting either the force, speed or the limit of travel, retest the door operator's safety features. Failure to do so may cause severe injury or death.
- **KEEP DOORS PROPERLY OPERATING AND BALANCED.** Refer to door manufacturer's manual. Have repairs done by trained technicians.
- Prior to performing any service on this product (including the replacement of any fuses or circuit breakers), disconnect the operator from the supply voltage.
- For continued protection against fire, replacement fuses or circuit breakers shall be of the same type and ratings as those being replaced.

*Defined in ANSI 156.10 as a controlled group of people trained in the safe use and operation of a particular door installation.

SAVE THESE INSTRUCTIONS

Overview

The **NB-4100-1 Commercial/Industrial Sliding Door Operator** has been designed, tested (over 500,000 cycles) and is manufactured by **brookfield industries, inc.** in accordance with UL 325. The **NB-4100-1** will operate any industrial sliding door system that requires horizontal operating forces up to 300 lbs, variable speeds up to 13 inches/sec and move doors across practically any opening specified.

The **NB-4100-1** is compliant with **UL 325 Entrapment section** in which the operator requires constant pressure on a control to close the door. The operator stops the door when the constant pressure on the control is removed.

The NB-4100-1 mounts at the header of the door and disconnects for manual operation with a spring-loaded pull down pin. The operator features lightweight aluminum construction, which makes for easier installation and greater corrosion resistance. The steel reinforced, polyurethane timing belt and the *linear guide tracking system* are maintenance free and need no lubrication. The **NB-4100-1** can also be modified to operate a bi-parting door.

Door activation is via a maintained contact, **(3) position-keyed switch**, spring returned to stop from both the open and close directions, which is attached to the outside of the **NEMA 1** enclosure. Located on the inside the **NEMA 1** control panel is the following: **Terminal Strip** hookups for **110 VAC** Field Wiring and **Class (2) 24 VDC** components, **Motor Control, Line Filter, Surge Protection** and **Circuit Breakers**.

The NB-4100-1 door operator is patented under **US Patent No. 6,177,771 B1**.

We are Authorized to Mark the **NB-4100** with the **ETL, CE** and **CSA** 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.

Logic Control:

Safety features (**Entrapment**) include the following:

- A maintained contact, open and close, **(3) position keyed switch** that is spring return to stop in both directions.
- A **reversing edge non-contact type sensor**. (not supplied) N.O. input that when pressed against on the closing side of the door will rapid stop the door and override the **(3) position-keyed switch**. This is accomplished when the tape switch contact energizes a (N.C) 24 VDC relay and disables the **Motor Control**.

- Adjustable **end of travel limit switches** (supplied) that will override the **(3) position keyed switch** when activated.
- Adjustable **forward** and **reverse current limit trimpots** that allow the stall torque to be safely set slightly above the operating forces, which protects components as well as provide for additional safety.

Class (2) 24 VDC Power Supply- converts **110 VAC** supply voltage to **Class (2) 24 VDC** power to operate the 24 VDC relays and provide low voltage for the end of travel limit switches and the maintained contact activation switch. The power supply is DIN rail mounted and features an LED power on.

Motor Control:

The **NB-4100-1** uses a state of the art **Regenerative (4-Quadrant) 90 VDC Motor Control**. This provides the best assurance that the door's high inertia characteristics will not "overhaul" (or "freewheel") the motor; thus, resulting in controlled door motion. The **NB-4100-1** now features a **multi-speed board** that attaches to the top of the **motor control**. The logic panel is greatly simplified with the elimination of the external speed pots and the associated wiring. The new multi-speed board features control of up to (4) independent speeds. The **NB-4100-1** has the flexibility of controlling separate creep close speeds (**Preset 1**) and creep open speeds (**Preset 2**) as well as close speeds (**Preset 3**) and open speeds (**Preset 4**). ***Preset 1 and Preset 2 are disabled for most NB-4100-1 applications, but can be activated for heavier doors or high speed settings.*** The motor control also features additional trimpots, which greatly improve the performance of the drive and motion profile of such heavy doors. The **DB** (Dead Band) trimpot controls the amount of delay before regeneration starts (if set too low oscillation may occur). The **RESP** (Response) trimpot adjusts the dynamic response of the system; therefore, increasing this setting will increase response time (if set too high, unstable operation may result). The **IR Comp** trimpot determines the amount in which the motor speed is held constant as the motor load changes. For example, if set too low, the motor may not obtain the desired speed fast enough or not at all. If set too high, the motor may oscillate. The **RCL** (Reverse Current Limit) trimpot and **FCL** (Forward Current Limit) trimpot adjusts the armature current limit or motor torque in their respective directions. When properly set, the operator will have sufficient torque to operate in both directions, while at the same time limiting the current to the motor. This will prevent damage to any of the mechanical components of the door operator *(also eliminates the need for unreliable and hard to adjust manual slip or electromagnetic clutches).*

The **MAX** (maximum speed) trimpot adjusts the voltage or speed of the motor in the forward and reverse directions. The **FACC** (Forward Acceleration) trimpot adjusts the acceleration time in the forward direction as a function of the maximum rated motor speed. It also controls the Reverse Deceleration time. The **RACC** (Reverse Acceleration) trimpot adjusts the acceleration time in the reverse direction as a function of the maximum rated motor speed. It also controls the Forward Deceleration time.

Overload Protection for the DC motor is provided by using the appropriate line fuse to the 110VAC power supply of the motor control (see wiring diagram) and by the proper setting of the **Reverse Torque (RCL)** and **Forward Torque (FCL)** trimpots, which controls the amount of DC current to the motor in both directions.

Drive Train:

Power is supplied from a ¾ hp DC 1750 RPM 90 VDC motor coupled to a high torque 20:1 (1.75" center distance) cast aluminum wormgear. Rotary motion is transferred to linear motion through a steel reinforced, 1" wide x ½" pitch, polyurethane timing belt. The timing belt is supported by a *linear guide tracking system* and (2) 18 tooth-timing pulleys. One is attached to the wormgear output shaft, while the other is attached to the take-up end. The *linear guide tracking system* keeps the belt aligned and assures it is properly meshed into the pulleys at all times. The tracking system also allows the door operator to be disconnected from the door for manual operation. Once the adjustable take-up end of the belt is set with the proper pretension, the **NB-4100-1** becomes a reliable, maintenance free door operator that needs no lubrication and can operate at forces up to 300 lbs.

The *linear guide tracking system* consists of (4) self-aligning (open) linear plain bearings mounted to the same plate that the timing belt and the quick disconnect pin is attached to. The mounting plate assembly slides on (2) adjustable 5/8" diameter guides that are continuously supported along the length of the support channel.

Supply Voltage:

115 VAC, (+/- 10%), (230 VAC conversion available) 50/60 Hertz, single phase. In-line circuit breakers are supplied with Motor Control and Power Supply. Surge protection and line Filters are featured to protect door operator components and to assure their reliable performance (immunity) as well as minimizing RF noise (emissions).

For installations that require a 230 VAC, 50/60 Hz, single phase, power source, we offer a conversion that shall be specified on the purchase order.

Manual Operation:

A spring loaded disconnect pin that when pulled down, disengages the door operator from the door, so it can be pushed manually.

Battery Backup (optional):

When power is interrupted, and if the door is in any position other than fully open, the battery backup will be activated and provide low voltage DC power directly to the motor. The system is designed to open the door once for each power interruption at a constant speed. This system is not designed to open and close the door repeatedly. A float charger is included to provide a constant charge on the battery. These components are installed in a NEMA 1 box with a test switch

that will interrupt power and allow for testing the system. Also included is an end of travel limit switch, which must be installed so that it disconnects power to the motor when the door is fully open. (this limit switch is only for use in battery backup mode and not for normal operation).

*This is a redundant system and does not replace or substitute any requirements of **UL 325** section **Interruption of Power** for manual operation.*

Assure used batteries are disposed of at the appropriate drop off center

brookfield NB-4100-1 Door Operator Installation Instructions

Although each **NB-4100-1** has been fully inspected and tested prior to shipment, assure that no physical damage has occurred during shipping and handling. *Premature failure of the timing belt assembly may occur if it's not installed properly.*

Caution! *When performing welding operations, assure ground leads are in direct contact with work piece. Do not ground through the operator, since this will damage components.*

Refer to drawings DO2003R1 and DO2003R2 for Single Slide Doors. Refer to drawings DO28303R1 and DO28303R2 and Bi-Parting Doors:

1. For wall mounted units, position the (3) leg mounting brackets above the hanger track. Assure each bracket is the same vertical dimension from the track within (+/-) 1/8". Locate each bracket in the correct horizontal location from the door per DO20032. Mounting holes for the brackets are pre-drilled in the 8" aluminum channel.
2. After leveling the brackets on the wall, use the bracket as a template to mark the location on the wall of the (3) mounting holes. Repeat for both brackets.
3. Drill and install (3) expansion anchors at each bracket location.
4. Mount the brackets with the expansion anchors properly secured.
5. Mount the 8" aluminum channel and the fully assembled operator to the slotted mounting holes of the wall brackets with the hardware provided.
6. If the operator has a splice in the 8" channel, assemble as follows. If not go to step 7.:
 - Before lifting the operator into place, slide the (2) 8" channel sections together while assuring the (2) dowel pins (protruding from the 5/8" diameter guide bars of the 8" channel with the motor) are aligned into the holes of the 5/8" diameter guide bars of the 8" channel with the take-up frame.
 - Mount the 8" channels sections together with the (2) flange splice plates and the web splice plate with the hardware included. Tighten all hardware.
 - Slide guide plate over transition point to assure smooth operation. *Guide bars are adjusted at the factory with the Bellville washers installed at the mounting bolts, but may require final adjustment after shipping.*
 - Place the timing belt over both 18-tooth pulleys and pre-tension the belt to the marking on the take-up end frame made at the factory.

7. Mount the disconnect pin and angle bracket to the door by welding (3/8" fillet weld) or mount with (2) 3/8" grade 5 bolts (not included) making sure bracket is straight and pin has adequate engagement into receptacle on door operator mounting plate.
8. Measure the horizontal distance from the door track to the 5/8" diameter guide bars on the door operator at (3) locations (at each end and the in middle) adjusting the operator in the slotted holes to get the desired measurement within (+/- 1/16").
9. Properly tighten all mounting hardware.
10. Check disconnect pin to assure it operates and disconnects freely.

Refer to drawings DO30903R1 and DO3093R2 for multiple (stacked) doors:

1. For units with the (4) slotted 12" long mounting plates, clamp the plates in a nominal position that allows for both (+/-) adjustments. Before welding the plates in place (3/8 fillet welds), run a string line across the top of each plate along the length of the operator. Shim (shim pack included) the plates as required to get each plate height within (+/- 1/16").
2. Mount the disconnect pin and angle bracket to the door by welding (3/8" fillet weld) or mount with (2) 3/8" grade 5 bolts (not included) making sure bracket is straight and pin has adequate engagement into receptacle on door operator mounting plate.
3. Measure the horizontal distance from the door track to the 5/8" diameter guide bars on the door operator at (3) locations (at each end and the in middle) adjusting the operator in the slotted holes to get the desired measurement within (+/- 1/16").
4. Properly tighten all mounting hardware.
5. Check disconnect pin to assure it operates and disconnects freely

Electrical hookup:

1. **Caution:** *To prevent risk of serious injury, assure supply voltage has been disconnected from 110 VAC prior to wiring the **NB-4100-1**. Assure all "Lock-Out" procedures have been strictly adhered to. Assure all hookup leads are pulled through the proper solid metal conduit size and the proper penetration in the **NEMA 1** enclosure.*
2. Hookup **110 VAC (or conversion to 230 VAC when specified)**¹ supply voltage to the field wiring (L1, N & G) **Terminal Strip** in the **NEMA 1** enclosure per **Wiring Diagram** and/or local codes.

3. Connect the **90 VDC motor**¹ with the wires provided and as indicated on the labels and per the wiring diagram.
4. Connect all **Class (2) 24VDC**^{1,2} components to the **Terminal Strip** per the wiring diagram. This includes the **end of travel limit switches** wiring (included) and **tape switches** (not included).

¹Use Copper Conductors only(maximum cross-section of terminals (4mm²).

²Cable Supplied with operators for class 2 connection to an external devise, and cable supplied with an external devise for connection to a class 2 circuit of an operator shall be: type CL2, CL2P, CL2R, CL2X complying with the standard for power-limited circuit cables, ref. Annex A, ref. No. 12, or other cables with equivalent or better electrical, mechanical, and flammability ratings; or cable that is factory-connected integral part of a class 2 power supply complying with standard for class 2 power units, ref. Annex A, ref. No., 13, or a class 2 transformer complying with the standard for low voltage transformers-part 3: class 2 and class 3 transformers, ref. in Annex A, ref. No. 11, or a LPS(Limited Power Source) Complying with the standard for information technology equipment-safety-part 1: General Requirements ref. in Annex A, ref No. 14.

Final setup:

1. All **motor control** settings have been preset by brookfield industries, inc.; however, we recommend these values be double-checked with the **Parameter for NB-4100-1** sheet supplied.
2. Assure all **Safety Instructions** and **Warnings** have been followed.
3. Adjust location of both **open** and **close end of travel limit switches** as required to get the desired travel and stopping position.
4. The **NB-4100-1** should be operated at slower speeds at first and should only be increased in small increments at a time. Each time the speed (**Preset 3-close** and **Preset 4-open**) is increased, end of travel clearances should be checked. Fine tuning of the soft start and stop or **FACC** (Forward Acceleration) and **RACC** (Reverse Acceleration) may be necessary each time the speeds are changed. **Caution! Setting FACC ,RACC, Preset 3 and/or Preset 4 to high can damage or crash the operator.**
5. Operate the door several times to assure repeatability with the end of travel limits and to assure overall smooth operation. Adjust settings as required.
6. **FCL** and **RCL** have been pre-set to provide the maximum rated opening and closing forces and should not be increased without consulting the Engineering Department first. Doing so could damage the drivetrain and void the Limited Warranty.

Parameters for NB-4100-1 Door Operator

Motor Control Jumper Setting:

Upper Board (Multi-Speed)

J1 Disable (no jumper)

PRESET 1 (Creep close Speed): Lo
Disable (no jumpers) R/ F
Hi

PRESET 2 (Creep open Speed): Lo
Disable (no jumpers) R / F
Hi

PRESET 3 (Close Speed):

PRESET 4 (Open Speed): Lo R / F Hi

Lower Board

J1A- Line Voltage **115V** / 230V

J1B- Line Voltage **115V** / 230V

J2-Armature Current 1.7A / 2.5A / 5.0 / **7.5A** / 10A

J3-Armature Voltage A90 / A180 / T7 / T50

J4-Potentiometer Operation

J5-Speed Control **SPD** / TRQ

J6-Regenerate to Stop **RTS** / CTS

Motor Control Trimpot Settings (Approximate):

Upper Board (Multi Speed)

PRESET 1: Creep Close (REV) Speed POT 0%

PRESET 2: Creep Open (FWD) Speed POT 0%

PRESET 3: Close (REV) Speed POT 50%-60%*

PRESET 4: Open (FWD) Speed POT 50%-60%*

*Approximate linear travel speed of 5.0-7.5 inches/second

Lower Board

DB 50%

RESP 50%

IR 50%

RCL 35-40%

FCL 35-40%

MAX 100%

FACC 10-20%

RACC 10-20%

Timing belt pre-tension:

This value is calculated and preset at the factory for every belt length. The take-up end is marked with the pre-tension setting. This is necessary for replacement belts and for the assembly of any spliced units.

$$F = 360 / (c - c)$$

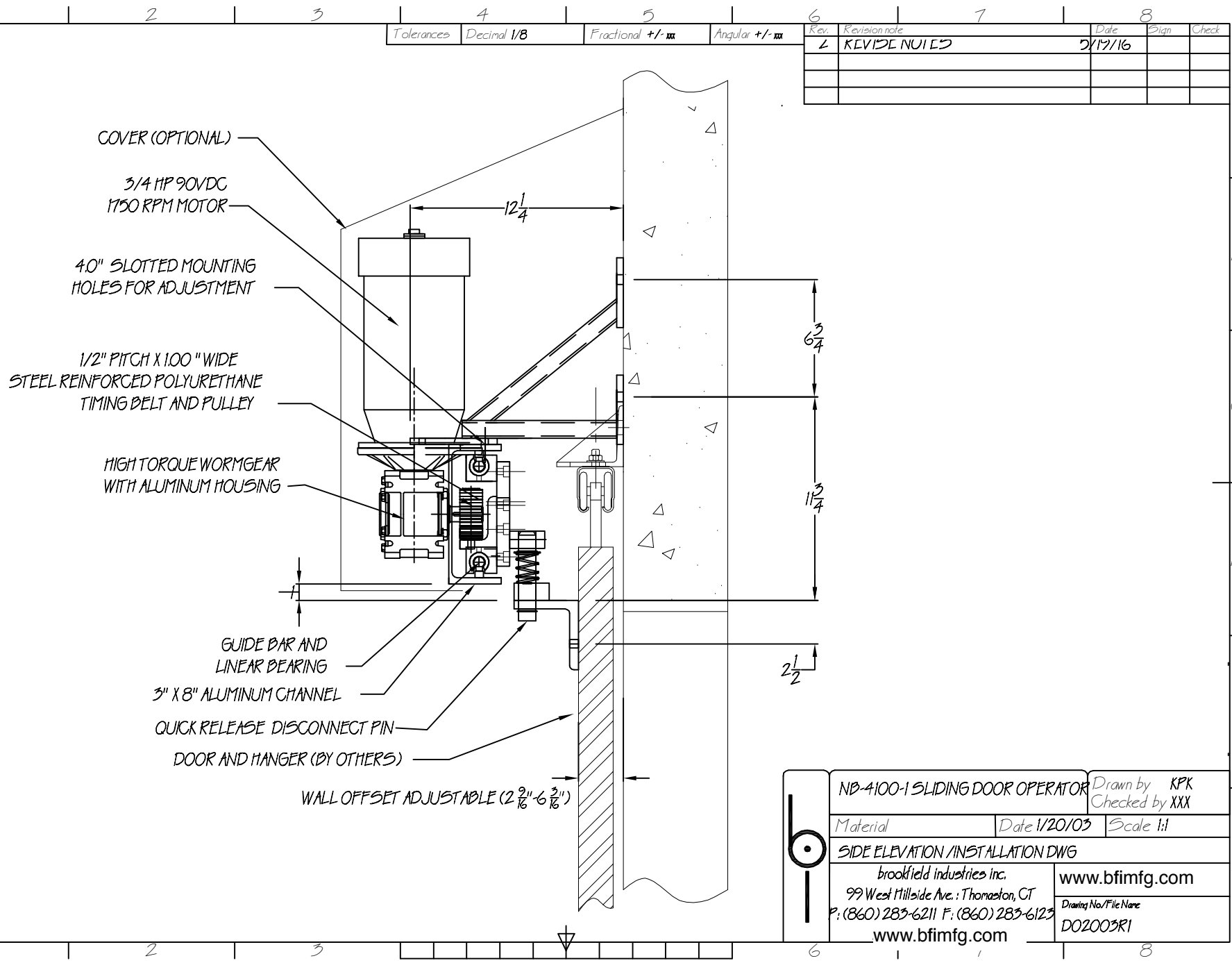
Where:

c-c = the center to center distance of the pulleys


F = the vertical force to deflect the belt 1" at midpoint position (c-c/2) in order to obtain the required belt pre-tension.

Idler Pulley pre-tension:

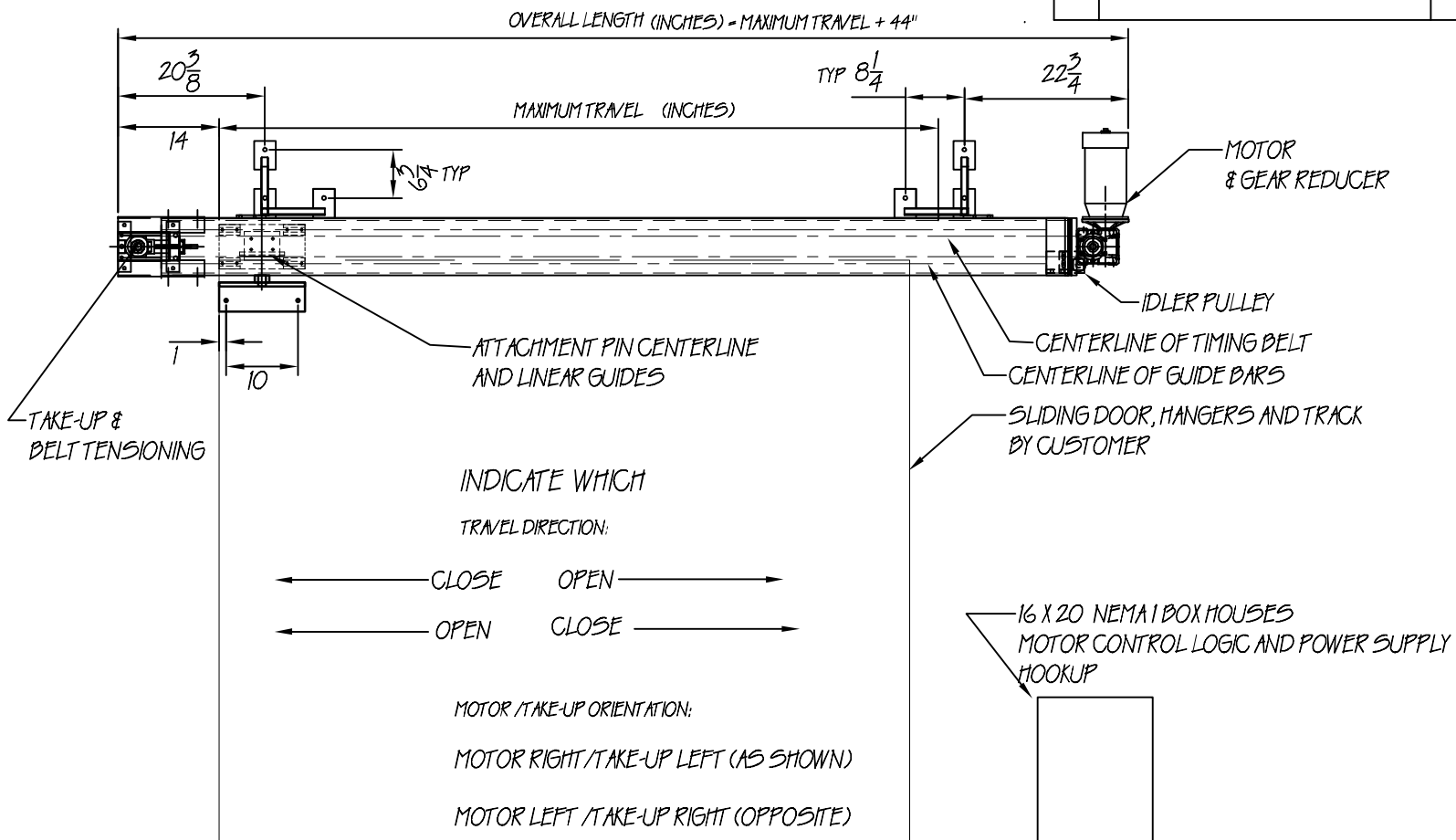
The idler pulley assures the belt does not slip off the drive pulley on the slack side. After properly adjusting the belt tension, bring the idler pulley into contact with the timing belt. Raise the idler 0.375"; secure mounting hardware.




Tolerances	Decimal 1/8	Fractional +/-	Angular +/-	Rev.	Revision note	Date	Sign	Check
				1	REVISED NOTES	2/17/16		

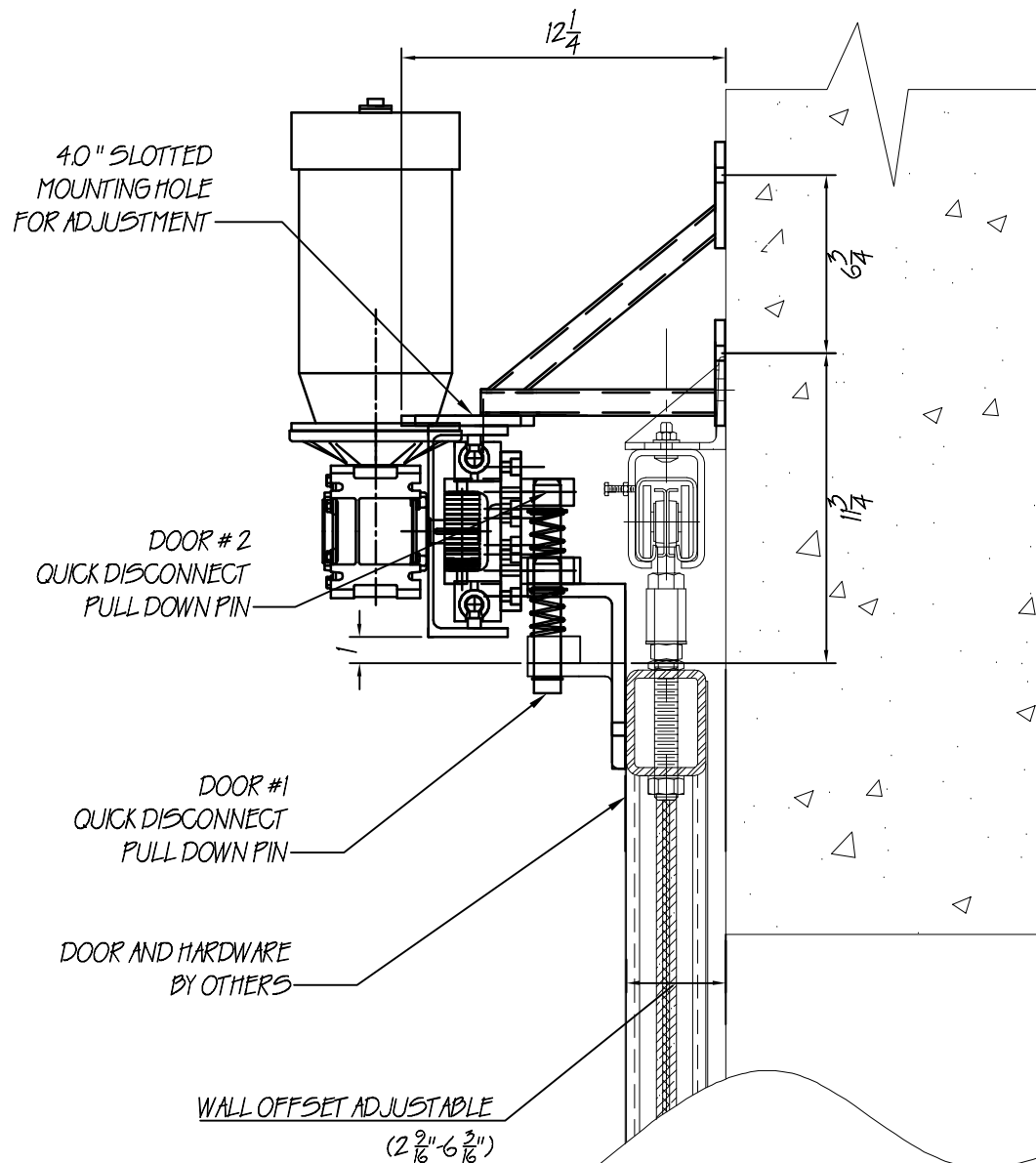
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	Material	Date 1/20/03	Scale 1:1
	SIDE ELEVATION / INSTALLATION DWG		
	brookfield industries inc. 99 West Hillside Ave. : Thomaston, CT P: (860) 283-6211 F: (860) 283-6123 www.bfimfg.com		www.bfimfg.com
			Drawing No/File Name D02003R1

Tolerances	Decimal ± 0.005	Fractional $\pm \frac{1}{32}$	Angular $\pm 1'$	Rev.	Revision note	Date	Sign	Check
				4	REVISE NOTES	5/19/16		



	NB-4100-1 SLIDING DOOR OPERATOR		Drawn by KPK
			Checked by XXX
	Material	Date 10-2-03	Scale 1:1
	ELEVATION/INSTALLATION DWG		
	brookfield industries inc. 99 West Hillside Ave.: Thomaston, CT P: (860) 283-6211 F: (860) 283-6123 www.bfimfg.com		www.bfimfg.com
			Drawing No./File Name DO2003R2

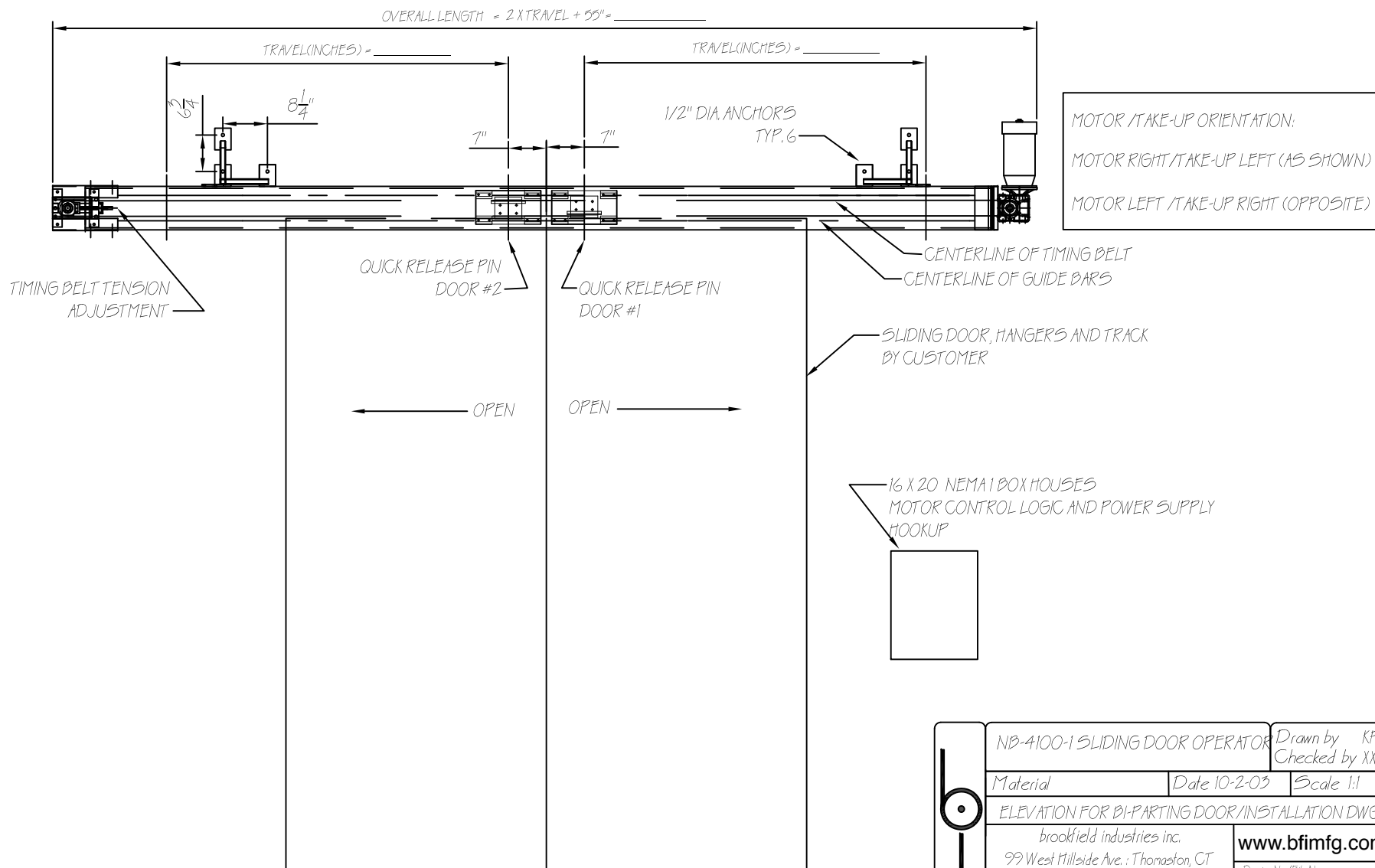
Tolerances	Decimal 1/8	Fractional +/-	Angular +/-	Rev.	Revision note	Date	Sign	Check
				2	REVISE NOTES	2/16		



NB-4100-1 SLIDING DOOR OPERATOR		Drawn by	KPK
		Checked by	XXX
Material	Date 10-02-03	Scale	1:1
SIDE ELEVATION BI-PARTING/INSTALLATION DWG			
brookfield industries inc.		www.bfimfg.com	
99 West Hillside Ave. : Thomaston, CT		Drawing No/File Name	
P: (860) 283-6211 F: (860) 283-6123		D028303R1	
www.bfimfg.com			

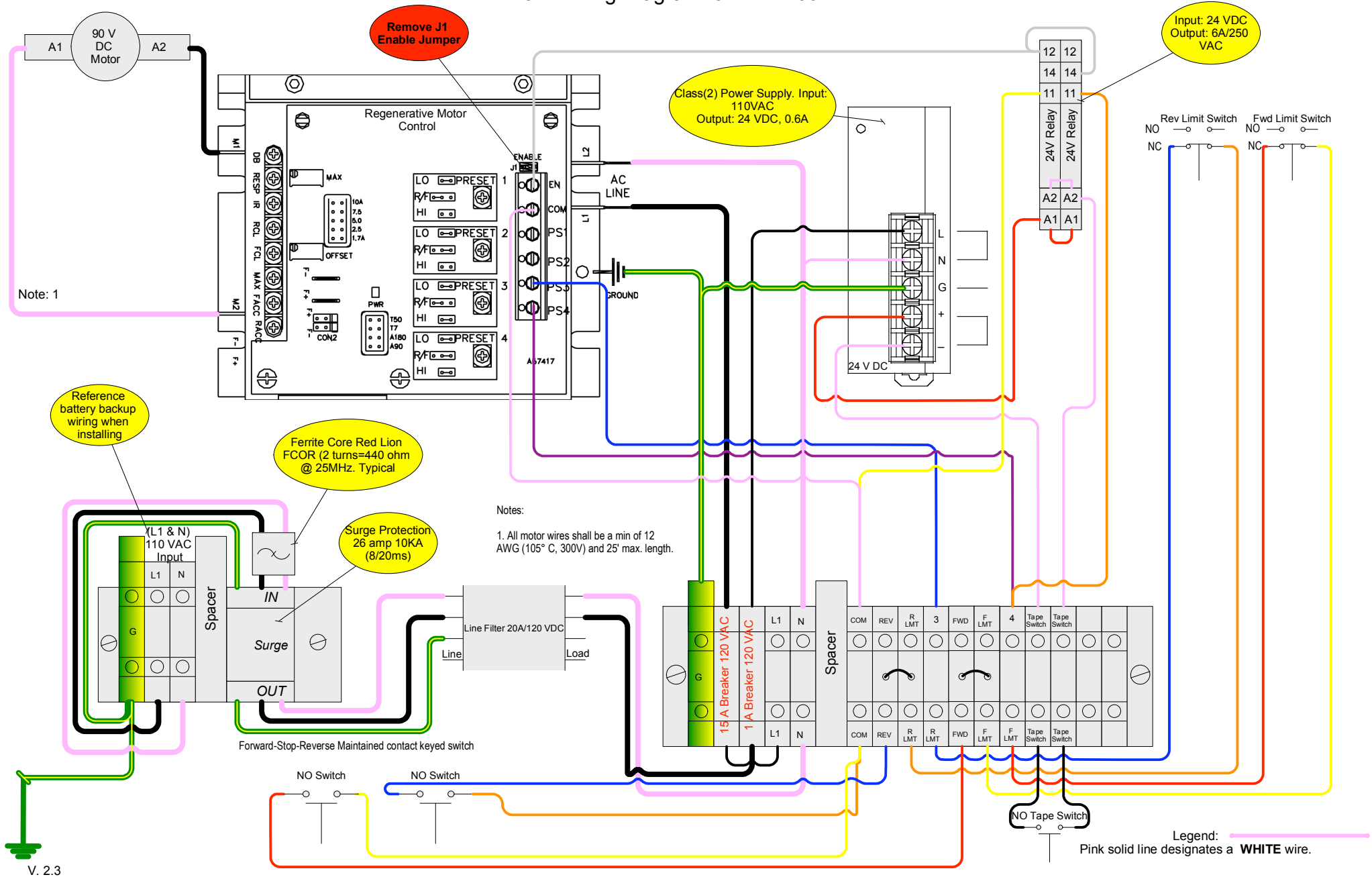
Tolerances	Decimal +/- 0.005	Fractional +/- 1/32	Angular +/- .03
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Rev.	Revision note	Date	Sign	Check
2	REVISE NOTES	5/2017		

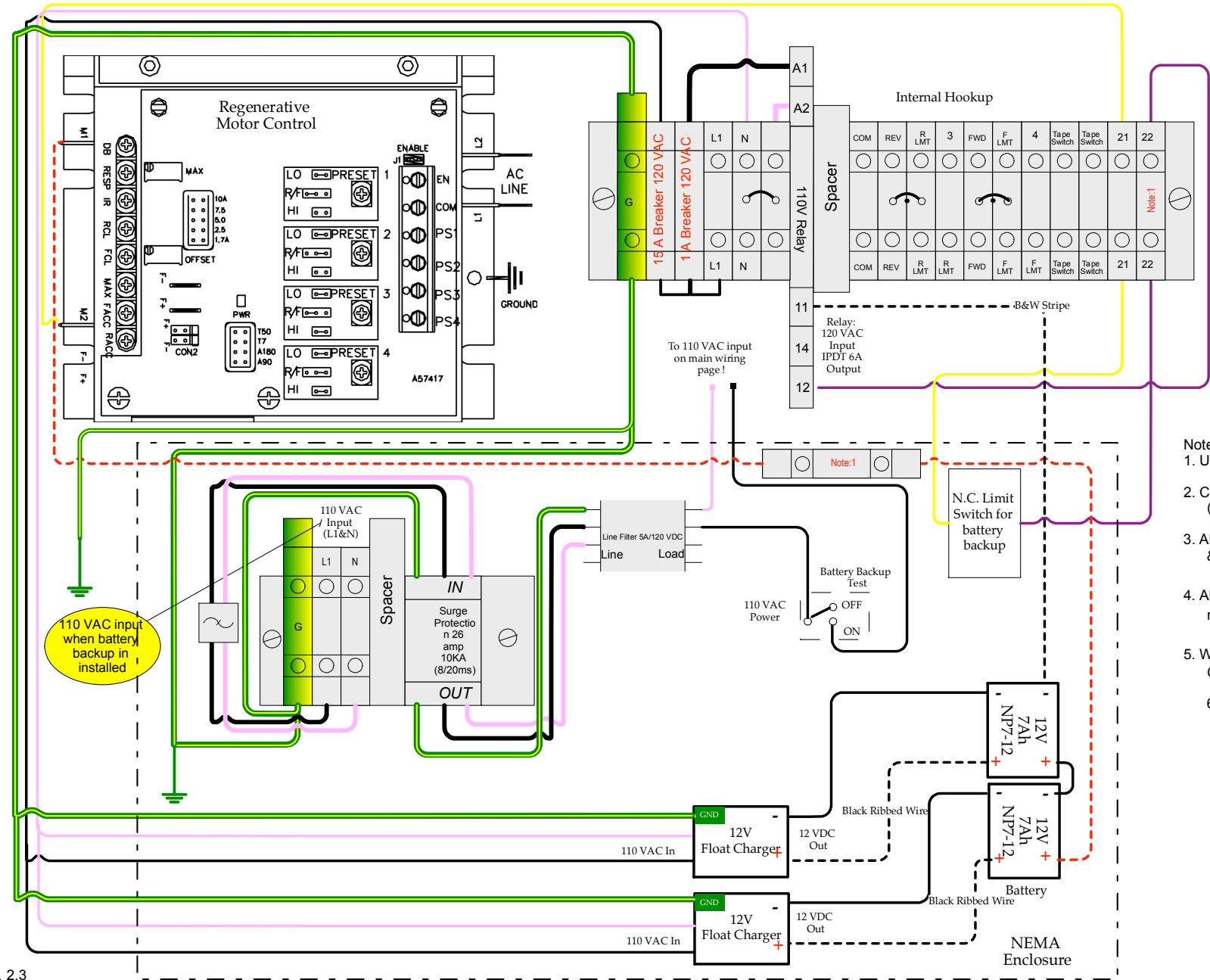


	NB-4100-1 SLIDING DOOR OPERATOR		Drawn by: KPK
			Checked by: XXX
	Material	Date 10-2-03	Scale 1:1
	ELEVATION FOR BI-PARTING DOOR / INSTALLATION DWG		
	brookfield industries inc. 99 West Hillside Ave. : Thomaston, CT P: (860) 283-6211 F: (860) 283-6123		
www.bfimfg.com		www.bfimfg.com	
		Drawing No./File Name D028303R2	

Main Wiring Diagram for NB-4100



Battery Backup Wiring⁶ Diagram for NB-4100



- Notes:
1. Use 10 Amp / 110 VAC Circuit Breaker
 2. Class(2) 24 VDC Terminals: Power Supply: (Com & 3). Inputs: 9-14 & 19-22
 3. All 110 AC wires shall be minimum 14 AWG & (105 deg. C, 300 V)
 4. All 12-24 VDC (non-motor) wires shall be minimum 20 AWG & (105 deg. C, 300 V)
 5. When using receptacle style chargers, use GFC-I type.
 6. Provides auto-open during power loss.

Maintenance Intervals

1. Lubricate the (2) bearings supporting the take-up end shaft every 250,000 cycles.
2. Check all nuts, bolts and screws for tightness every 250,000 cycles.
3. Inspect and replace the (4) linear bearings on the *Linear Guide Tracking System* every 250,000 cycles if required.
4. Inspect and replace the motor brushes every 300,000- 400,000 cycles if required.

Also, inspect the operator for wear or damage to any of its components, especially the timing belt and pulleys. Do not lubricate the timing pulley. The frequency of these inspections will vary upon installations and will be directly proportional to the usage of the operator. **Do not use the operator if any component is worn or damaged**

Safety Systems Test Intervals

External safety devices that are not normally supplied by the manufacturer of the door operator but added during installation, must be properly tested on a frequent enough basis so as not to compromise the safety and reliability of the complete door operating system on a continuing basis. These tests should be performed at least once a month

brookfield industries, inc.

Limited Warranty

brookfield industries, inc. warrants that door operator models NB-500, NB-1000, NB-2000 and **NB-4100-1** are free from defects in material and workmanship according to the following terms and conditions:

- 1) The limited warranty for all aforementioned products extends for (1) year beginning on the date of shipment from our facility.
- 2) During the limited warranty period, *brookfield industries, inc.* will repair or replace any defective component or any part that does not operate as originally specified or intended with a new or rebuilt part. No charge will be made to the consumer for any such parts. Credits or reimbursements, as well as associated shipping costs, will be issued only after any replacement parts have been returned by the consumer.
- 3) *brookfield industries, inc.* will also reimburse or credit the consumer for any reasonable labor charges associated with the repair or replacement of a particular part. *brookfield industries, inc.* and the consumer must agree upon the dollar amount as well as the scope of work, before any amount is allocated. This amount may vary depending on the geographical location of the labor market. Travel expenses are not applicable.
- 4) *brookfield industries, inc.* shall not cover, nor will the consumer have any benefits under this limited warranty if any of the following conditions apply to any returned parts as determined through an evaluation by *brookfield industries, inc.* or any of its vendors:
 - a) The product has been subjected to: improper installation, installation practices or any settings not in accordance with the operator manual, abnormal use, abnormal conditions, exposure to moisture, dampness or any other severe environmental conditions, unauthorized modifications, unauthorized connections, unauthorized repair, misuse, neglect, abuse, accident, altercation, door weights and/or door speeds and/or operating forces that exceed the rated values, or other acts which are out of the control of *brookfield industries, inc.*, such as damage caused by shipping.
 - b) Removing or altering of the serial number or any other action that prohibits *brookfield industries, inc.* from determining the original purchase date.