

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-4000
COMMERICAL/INDUSTRIAL
SLIDING
DOOR OPERATOR
MANUAL**

(11th Edition 06/22/2022)*

***20:1 reducer and 10 turn transducer replaces 133:1 reducer
and single turn transducer**



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. The installer is solely responsible for selecting and installing the correct safety devices to prevent severe injury or death. 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. Make any adjustments or repairs as necessary and retest. 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-4000 Commercial/Industrial Sliding Door Operator** has been designed, tested (over 500,000 cycles) and manufactured by **brookfield industries, inc.** for linear accelerator sliding doors weighing up to 30,000 lbs with a maximum travel of 60" and horizontal operating forces up to 700 lbs and linear speeds not to exceed 4.5 in/sec. *If any one of the following: horizontal operating force, weight, travel, speed or cycles exceeds the rated value, please contact the Engineering Department for further evaluation.*

The NB-4000 is designed to be mounted directly to the top or front of the same horizontal beam that supports a linear motion system. The NB-4000 can also be modified for wall mounted applications, such as those used in bottom roller supported doors.

This power open/power close electro-mechanical operator with state of the art components make it the strongest, most reliable, and easiest to install in the industry today. Refer to the **Terminal Strip Hookup** for all open, partial open, close, stop and **External Safety Device** inputs, which are all Class (2) 24VDC normally open momentary contact (*except the stop input, terminal #10, which is a normally closed input*). Power supply hookups for both Class (2) 24VDC, 110VAC and 230VAC (European installations) are also indicated. The PLC then processes all this information, in addition to many other features for proper control of these heavy lead doors. This door operator is patented under **US Patent No. 6,177,771 B1**.

The **NB4000 Commercial/Industrial Sliding Door** is compliant with **UL 325** under **External Entrapment Protection** featuring **Fail Safe Monitoring**, providing all External Safety Devices are wired and installed per this manual.

We are Authorized to Mark the **NB-4000** with the **ETL (US and Canada)**, and **CE** markings from Intertek Testing Services to assure compliance with UL 325(Control No. 3011624), FCC Part 15 (Emissions) and the following International Standards: EN 60335-1 and -2 (Safety), EN 61000-6-2 (Immunity), EN 61000-6-4 (Emissions), CAN/CSA-C22.2 and ICES-003. The "listing" reports specifically refer to the heavy commercial/industrial doors associated with linear accelerator rooms.

Logic Control:

This Operator offers the latest technology in PLC (Programmable Logic Control). The following (3) modules snap to a DIN rail base:

CPU (Central Processing Unit)- processes and stores data in its internal register such as door position presets, inputs from pushbutton stations and outputs to motor controls. This extremely compact unit houses (8) LED 24 VDC inputs and (6) LED outputs with (3) isolated commons.

Analog/Digital Converter- converts the analog signal of the Rotary Position Transducer to a digital value.

Class (2) 24 VDC Power Supply- converts 110 supply voltage to Class (2) 24VDC power to operate the CPU, A/D converter, Rotary Position Transducer and presence sensors.

These plug-in modules with LED make diagnostics and replacement of parts easy and quick to perform.

Interface with the PLC is necessary to adjust **Door Position Presets** in the field. This is accomplished by plugging in the **Programmable HMI (GT01)**, a hand-held, touch screen device that is purchased separately.

The CPU has been programmed to adjust on the fly, such door position presets as **Back Check, Full Open, Latch Check** and **Full Closed**. In addition, we've included a **Partial Open** preset as required on most Linac Doors in the marketplace today.

Input commands to be processed by the PLC, are done so by making the appropriate connections on the **Terminal Strip Hookup**. By connecting separate normally open (SPST) switches between terminals 1 and 14 to open, terminals 1 and 13 to partially open, terminals 1 and 12 to close and a normally closed (SPDT) switch to terminals 1 and 10 to stop the door, provides the customer discrete control of each input from a **momentary contact push button station** (not included). Reversing the direction of the door while it's moving (dynamic) can be accomplished by simply pressing the appropriate switch to change direction. *We do not include any activation devices or push button stations with our door operators.*

The NB-4000 features momentary contact **Input** commands for **External Safety Devices** that comply with **UL 325 Section: External Entrapment Protection** featuring **Fail Safe Monitoring**. These devices are normally door mounted, **4-wire reversing edge contact type sensors** that reverse the door while closing. However, they can be substituted with non-contact type presence sensors providing the external wiring is compatible with our internal wiring. **Note: The door will not be allowed to close unless these sensors are correctly wired per this manual.** When installing contact type sensors, assure they are properly secured to the leading edge of the door with sufficient spacing and length to assure safe activation (refer to the owner's manual).

Momentary contact **Input** commands and a **low voltage Class (2) power supply** are also provided for **additional (redundant) sensors**, such as **non-contact type presence sensors** that are frame mounted. brookfield industries does not manufacture nor do we include **External Safety Devices** with any of our door operators. *The installer is solely responsible for selecting the correct sensors to prevent injury.* To assure that external safety devices are properly installed and adjusted correctly, refer to the owner's manual for that device. For proper wiring, refer to **Terminal Strip Hookup** and the **Wiring Diagram** included in this manual.

The NB-4000 also features a maintained contact (constant pressure/dead man) Input (Terminals 1 & 20) to close the door that complies with UL 325, Entrapment. For proper wiring to this input, please refer the Terminal Strip Hookup.

The user now has the flexibility of choosing either one of the above methods: Entrapment by means of maintained contact or External Entrapment Protection through safety sensors. Both methods can be employed by simply connecting to both inputs. The maintained contact could then be utilized as an emergency override for closing the door in case the tape switches fail. This allows the door to stay in operation until the contact sensors can be repaired.

The **Stop** command (normally closed terminal #10) will stop the door in any position when activated but it will not prevent a motor drive from malfunctioning nor is it a true emergency stop. **Emergency Stop (E-Stop) can only be accomplished by disconnecting AC power to the operator (Terminal L1 and Terminal N).**

A 24 volt, 14Ah **Battery Backup System** with a float charger is included that will automatically open the door at design loads anytime power is interrupted.

The **NB-4000** features the same ***Absolute Position Feedback Control*** system and software as other **brookfield industries, inc.** door operators. There are no limit or proximity switches to adjust or install for any of the door positions under normal operation. Simply adjust the door's positioning presets as required by interfacing with the PLC via a hand held Human Machine Interface (purchased separately).

A **Rotary Position Transducer** attached to the worm gear output shaft provides the position of the door. As the door changes position, the output signal from the transducer varies in value. This signal, once converted to a digital value, is stored in the CPU for further processing. This device does not need to be "homed" or reset if there's a power loss, nor does it need to go through "learn speed" after power up or after any adjustments have been made.

Motor Control:

The **NB-4000** 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-4000** 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 (4) independent speeds. The **NB-4000** now 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**). 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 sets the amount of main speed trimpot rotation to initial output voltage and controls the amount of delay before regeneration starts. If not properly set, the motor may oscillate or continue to hum. 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** and **Forward Torque** trimpots, which controls the amount of DC current to the motor in both directions.

Drive Train:

The NB-4000 is an electro-mechanical, power open/power close sliding door operator, which converts rotary motion from a **56C, 3/4 HP 90VDC, 1750 RPM Motor** and **6.3:1 In Line Reducer** to linear motion via a **1" diameter x 1" lead Precision Ball**

Screw/Nut Assembly. The ball screw shaft is supported by a unique **Rigid End Block +Tensioning System**. These blocks support the ball screw shaft in the most rigid

configuration of end fixity or what is referred to in engineering terms as the fixed end-fixed end mode. The (2) precision bearings used in each support block are designed specifically for ball screws and are positioned in such a manner that places the ball screw shaft in tension only, no matter what direction the load is applied in. This design allows the ball screw to operate at the highest possible speeds and forces without exceeding what is known as the critical column strength or the critical rotational speed.

The ball nut assembly features a grease fitting for periodic maintenance and is equipped with end wipers to keep grease in and dirt out of the nut assembly.

Supply Voltage:

115 VAC, +/- 10%, 50/60 Hertz, single phase. Motor control and power supply are equipped with in-line circuit breakers. Surge protection and filtering of the supply voltage is featured to protect door operator components and to assure 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:

In case of loss of power, manual operation shall be less than 50 lbs to open per UL 325 ***Interruption of Power***. This is accomplished by engaging a flexible shaft into the rear shaft of the motor via a remote control cable. A lever arm, which activates the remote control cable, and a 7" diameter hand wheel, which is connected to the flexible shaft, are contained in a NEMA 1 box. Approximate opening time, while manually operating the hand wheel, is about 2.5 minutes.

Battery Backup (standard):

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 the NEMA 1 control panel. 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 Interruption of Power** for manual operation.*

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

Emergency Open Operation:

Emergency Open (Battery Backup Test): pulling out the mushroom head switch located on Emergency Hand Wheel enclosure will disconnect AC power to the motor and provide DC battery power to automatically open the door. The mushroom head LED light will come on indicating the operator is in emergency mode. Note: power entering this enclosure is class 2 low-voltage.

With the Emergency Hand Wheel enclosure easily accessible to the technician, activation will provide 2 benefits: (1) automatically opens the door in the event that any normal functioning component (motor control, PLC, safety sensors, activation switches) has malfunctioned; (2) provides a much easier method, then in the past, for performing periodic **Battery Backup Tests**. In both cases, the end of travel limit switch will disconnect DC power to stop the door in the open position. Pushing in the mushroom head switch will reset the operator.

Sequence of events: pulling out the mushroom head E-stop* (*see photo*), removes power to normally closed (N.C.) Relay 1** (providing DC power to the motor) and normally open (N.O.) Relay 2** (disconnecting AC power to the motor control) and provides for **Emergency Open Operation** or performs a **Battery Backup Test**.

Emergency Hand Wheel Manual Operation: opening the enclosure door will automatically disconnect AC and DC power to the motor. This provides for safe and easy method of testing the Emergency Hand Wheel Manual Operation without any danger of battery backup activation caused by a possible power interruption while performing the test (fail-safe). In addition, opening the door removes any resistance caused by the regenerative feature of the motor drive. *In the past, the 8 amp and 15 amp breakers inside the main panel needed to be shutoff prior to performing this test.*

Sequence of events: Opening the enclosure door (*see photo*), breaks the circuit to the normally open (N.O.) limit switch*, disconnecting DC power to the motor and providing for fail -safe operation of the Emergency Hand Wheel. At the same time, the circuit to the normally open (N.O.) magnetic proximity switch* is broken, disconnecting power to the (N.O.) Relay 2 and removing AC power to the motor control.

*Class 2 components added to Emergency Hand Wheel enclosure

**Relay 1 and Relay 2 have been added to the main control panel and replace the breaker switch formally used for Battery Backup tests



brookfield NB-4000 Door Operator Installation Instructions

Although each Door Operator has been fully inspected and tested prior to shipment, assure that no physical damage has occurred during shipping and handling. *Premature failure of the ball screw/nut assembly may occur if it's not installed properly.*

1. Drill and tap mounting holes for the beam and carriage per layout on drawing **NB-4000-AA**. Position **NB-4000 Door Operator** on top of beam per drawings **NB-4000-BB** or on side of beam per **NB-4000-CC**.
2. Install (8) 1/8" slotted and tabbed shims at each beam mounting bolt. This will allow for 1/8" minus adjustment, if necessary. Properly tighten the (8) 3/8" x 16 mounting bolts and lock washers.
3. Mount **Ball Nut Attachment Bar** (1" x 4" aluminum) to the carriage with (8) 3/8" x 16 socket head cap screws and assure they are properly tightened.
4. Measure the height from the **Rigid End Blocks** to the machined surface of the linear motion system. This dimension is shown as DIM. B on drawing **NB-4000-BB** or **NB-4000-CC** at each end of the ball screw. Now measure DIM. A, the distance from the **Ball Nut Mounting Block** to the machined surface. The difference between DIM A and DIM B, shall not exceed 1/8". If required, adjust the height of the **Rigid End Blocks** with the shim pack included.
5. Measure the height from of the **Ball Nut Attachment Bar** at (2) locations, DIM C and DIM D (see **NB-4000-BB** and **NB-4000-CC**). The difference between DIM C and DIM D shall not exceed 1/16" (shim as required).
6. Check lateral alignment of ball screw centerline with the centerline of the linear motion system. Over the 116.25" distance, the maximum deviation shall not exceed 1/8" off the linear motion centerline (see **NB-4000-AA**).
7. Check lateral alignment of ball nut attachment bar (1" x 4") to the centerline of the linear motion system by employing the same techniques as previously mentioned for the ball screw. The maximum deviation across the attachment bar length shall not exceed 1/16" for bars 28" long and less (see **NB-4000-AA**).
8. Install **Emergency Hand wheel** NEMA 1 enclosure and flex shaft as indicated on **NB-4000-21**.
9. Pull the (14ga.) (6) wire harness into the Emergency Hand Wheel enclosure.
10. Insert the (5) colored wires from the pigtail into the matching colors labeled on the connector splice using the insertion tool supplied (attached to wiring inside enclosure).
11. **Caution:** To prevent risk of serious injury, assure source voltage has been disconnected and all "Lock-Out" Safety Procedures have been strictly adhered to.
12. **Caution:** Hookup 115 VAC supply voltage (230VAC supply voltage for European installations) and grounding per **Terminal Strip Hookup** the applicable **Wiring Diagram** and/or local codes.
13. Connect DC motor leads to Class (2) 24VDC positive battery post.
14. Connect all Class (2) (24) VDC inputs per the **Terminal Strip Hookup** and the **Wiring diagram** including required **External Safety Devices** (not included with operator) that comply with the **External Entrapment Protection** of **UL 325** for **Fail Safe Monitoring**.
15. These devices can be door mounted, **4-wire reversing edge contact type sensors** that reverse the door while closing or compatible non-contact presence sensors. **Note: The door will not be allowed to close unless these sensors are correctly wired per this manual.** When installing contact type sensors, assure they are properly secured to the leading edge of the door with sufficient spacing and length to assure safe activation (refer to the owner's manual).
16. Attach the limit switch provided for battery backup end of travel mode. We recommend this be between 1-2" past the fully open position, when properly adjusted. Assure adequate clearance exists between the door carriage and the door operator mounting plates once the limit switch has been activated.
17. Connect the (2) unattached leads to the positive terminal of the battery.

18. Disconnect "Lock-Outs" and turn on power supply breakers.
19. All PLC and motor control settings have been preset prior to shipping; however, these values may require field adjustments that can vary for each installation (see **Parameter for NB-4000**).
20. Assure external speed "Pots" are set to the 10-20% range before activating the operator.
21. Assure all **Safety Instructions** and **Warnings** have been followed.
22. Activate Open, Partial Open and Close Commands.
23. Adjust **Open, Partial Open and Close** speed "Pots" clockwise to the 65%-70% maximum setting.
24. Adjust **PLC** door position factory presets as required. Refer to the **Door Position Setup** and **HMI Instructions** and the **NB-4000 Parameters** sheet if necessary.
25. Adjust **Latch Check** and **Back Check** trimpots until a smooth stop has been obtained (20-30% range).
26. ***WARNING! To avoid serious injury or death: While the door is closing, activate contact sensors and assure Latch Check trimpot speed is properly adjusted to prevent injury. Check for pinch points and adjust the Latch Check Door Position accordingly. Repeat for Back Check while the door is opening when required.***
27. Be prepared to hit stop button in case any obstacles are encountered.
28. For fine tuning of door position presets, it may be helpful to note that for every 1" of linear travel the change in digital values viewed from the Human Machine Interface is approximately 32; therefore, for 57" of travel the change in values 1938.
29. Check and adjust, if necessary, the trimpot settings (refer to the **Parameter** sheet) on the **Motor Control**.
30. Check operation of the battery backup system (see Emergency Open Operation).
31. Check operation of all other safety devices including redundant and non-contact type. Refer to the installation/owner's manual from the sensor manufacturer for proper settings and adjustments.
32. Operate the door several times assuring all inputs, such as open, close, partial open and stop features function properly. Make the necessary adjustments as required.

Instructions for Installation

Remote Actuator Cable to the Emergency Handwheel Flex Shaft

(Revised 6/8/2006)

1. If this is a new installation, skip down to step #7.
2. If upgrading to remote disconnect, go to step #3.
3. Mount Emergency Handwheel box to the wall, run cables to the back end of the motor.
4. Unbolt 5/16"-18 bolts from gear reducer, place aside.
5. Place the attachment plate for the remote actuator beneath the upper mounting plate of the gear reducer.
6. Bolt the remote actuator attachment plate and the gear reducer to the upper mounting plate using 5/16"-18 x 1 3/4" bolts. DO NOT TIGHTEN.
7. Remove detent screw from square hole bushing on shaft extension of motor.
8. Attach remote actuator cable block to attachment plate with 1/4"-20 x 1 3/4" Allen head cap screws. DO NOT TIGHTEN.
9. Using lever in the emergency handwheel control box, gently pull lever towards you and turn the handle until the 1/2" square end of the flex shaft is inserted into the square hole bushing on the back of the motor; and cable lever locks into place.
10. Tighten the 1/4"-20 screws on the remote actuator cable block.
11. Tighten upper mounting plate screws.
12. To release lever, push red button in on the emergency handwheel lever and push forward towards the back of the box until it locks in place.
13. Test 3 or 4 times by releasing and re-engaging and rotating the motor each time.

*****Caution*****

Before using door operator, assure that the flex shaft is fully disengaged by pushing lever arm forward until it is locked in place and closing the door on Nema 1 box.

Door Position Setup and HMI Instructions

GT-01/02 Touch Screen

1. Plug the eight prong Phoenix Connector into GT-01/02. For operator series before 'G,' use the black cable, plug the opposite ROUND end into the PLC unit on the operator. For 'G' series and above, use the gray cable and plug the opposite ROUND end into the receptacle on the end cover of the operator (right side).
2. A "Please Wait" logo message will flash for a few seconds and then a selection screen will show.

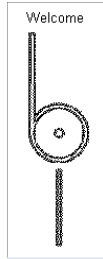


Fig. 2

3. For GT-01/02 software prior to Ver. 3, the screen in Fig. 3 will display. Choose either 'Standard' or 'Main/Sub' operator. For Ver. 3.7 of the GT-01/02 software, the screen in

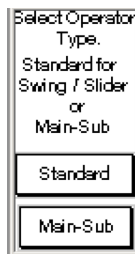


Fig. 3

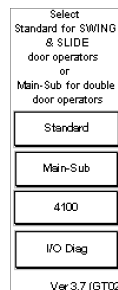


Fig. 4

Fig. 4 will display. For Main/Sub, select 'Lead Door' or 'Follow Door' on the next screen (Fig. 5), then skip to step 5. NOTE: Check PLC model number for appropriate 'Main-Sub' selection.

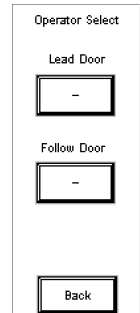
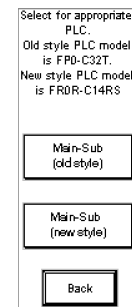


Fig. 5

4. Selecting Standard will give you the screen shown in Fig. 6. Choose the appropriate serial number series of the operator, to get to the first preset screen (Fig. 7)

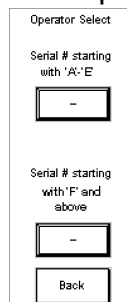


Fig. 6

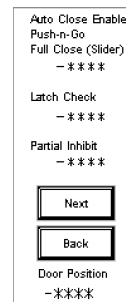


Fig. 7

5. You'll be given a display of the first three user presets (Fig. 7). To edit a preset, simply touch the preset number.
6. A keypad will then display for entering the new preset (Fig. 8). Enter the desired value and touch the ENTER (bent arrow) key to set the value. Press ESC to cancel and go back to the preset list.

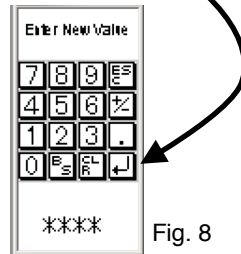


Fig. 8

7. Press 'Next' (Fig. 7) to display the remaining user presets or 'Back' to return to the previous screen.

Note: Real Time Door Position (RTDP) is always displayed on both preset screens

I/O Diagnostics for Series 'i' Operators and Above only

Selecting the 'I/O Diag' button from main screen (Fig. 4), will bring you to the screen in Fig. 9. 'Outputs' will display the screen in Fig. 11.

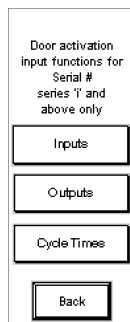


Fig. 9

Select 'Inputs' to display the Input Diagnostic Screen (Fig. 10).

The buttons down the left side, represent an actual input to the PLC. All standard Operator functions can be tested using these buttons.

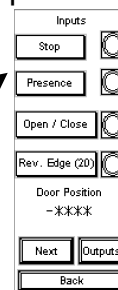
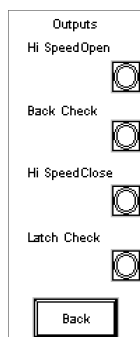


Fig. 10

The lamps down the right side of the screen indicate when an actual 'hard' input is being read by the PLC. E.g., if a Wall Switch or other device is sending an input, the applicable lamp will be lit.

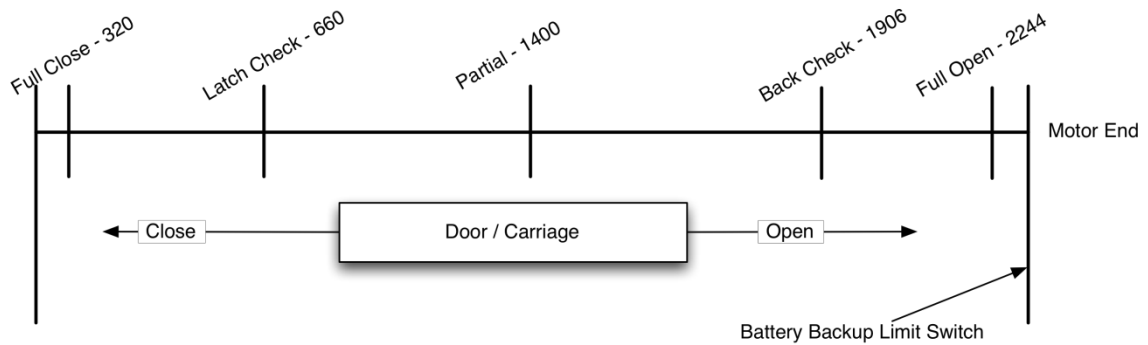


The lamps down the right side of the screen indicate when the PLC is sending the corresponding Output to the motor control.

The serial number series referred to in these instructions is the starting letter of the Operators Serial Number.

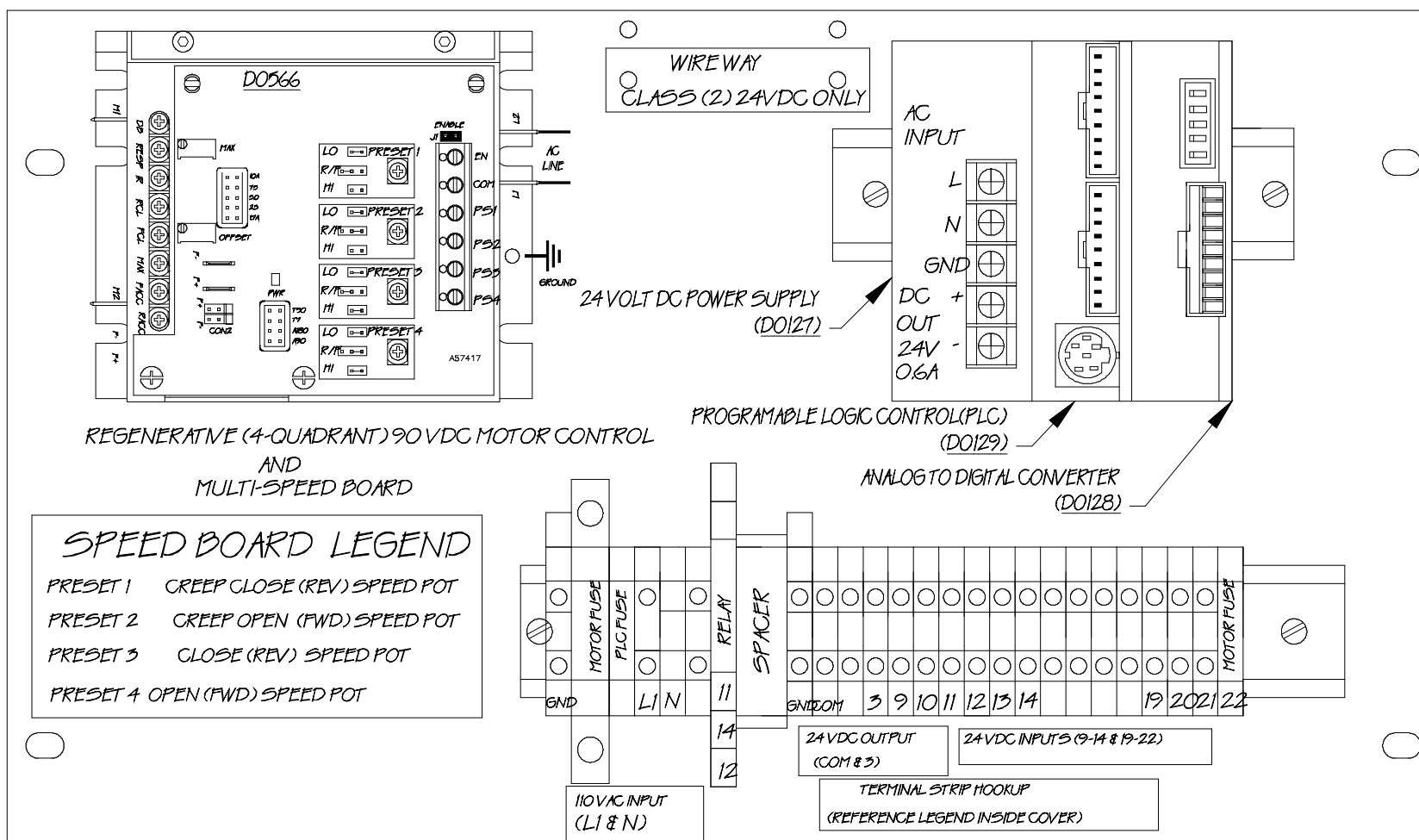
NOTE: When using the newer GT-01/02 Software with an older PLC, or vice-versa, the initial startup of the GT-01/02 may be longer than usual and/or may display an error on the screen, it will then clear and go to the initial screen shown in either Fig. 3 or Fig. 4

Door Position Setup Instructions



1. The factory settings represented in above diagram are a **starting point** and may need to be adjusted for each application depending on installation and environment variables.
2. Initiate a signal to have the operator close the door (Close button). Insure that the Creep speed pot is set so that the door doesn't "slam" into the frame. Operator will move closed at high speed then go into Creep and stop. Adjust the *Full Close* value lower or higher so that the door stops in the desired position.
3. Check position of door when fully open. Adjust *Back Check* and *Full Open* if necessary.
4. Adjust the *Partial Inhibit* value to the desired position to allow required access through doorway.

1	2	3	4	5	6	7	8
			Tolerances	Decimal	Fractional	Angular	Rev.
							Revision note
							DO Item numbers
							Date
							01/04
							Sign
							Check



SPEED BOARD LEGEND

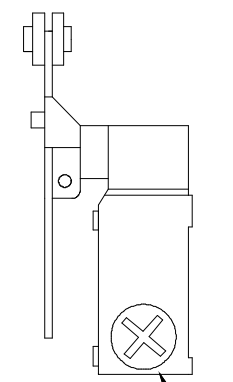
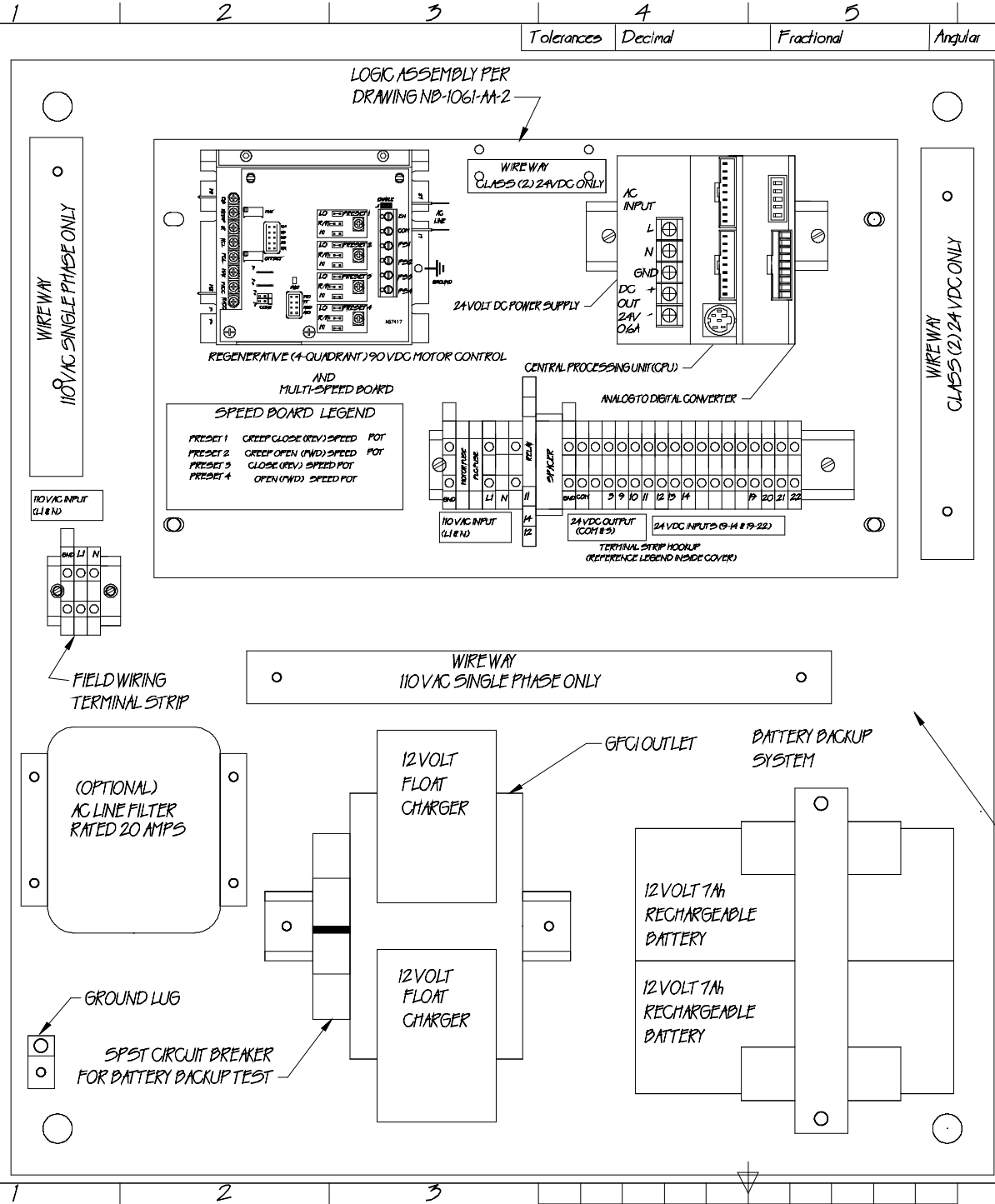
PRESET 1 CREEP CLOSE (REV) SPEED POT
 PRESET 2 CREEP OPEN (FWD) SPEED POT
 PRESET 3 CLOSE (REV) SPEED POT
 PRESET 4 OPEN (FWD) SPEED POT

NB-4000		Drawn by kpk
		Checked by
Material	Date 5/20/03	Scale 1:1
Logic Assembly		
brookfield industries inc.		www.bfimfg.com
99 West Hillside Ave.: Thomaston, CT		
P: (860) 283-6211 F: (860) 283-6123		
www.bfimfg.com		Drawing No./File Name NB-1061K-AA-2

Tolerances Decimal Fractional Angular

6	7	8
Rev.	Revision note	Date Sign Check

A
B
C
D
E
F



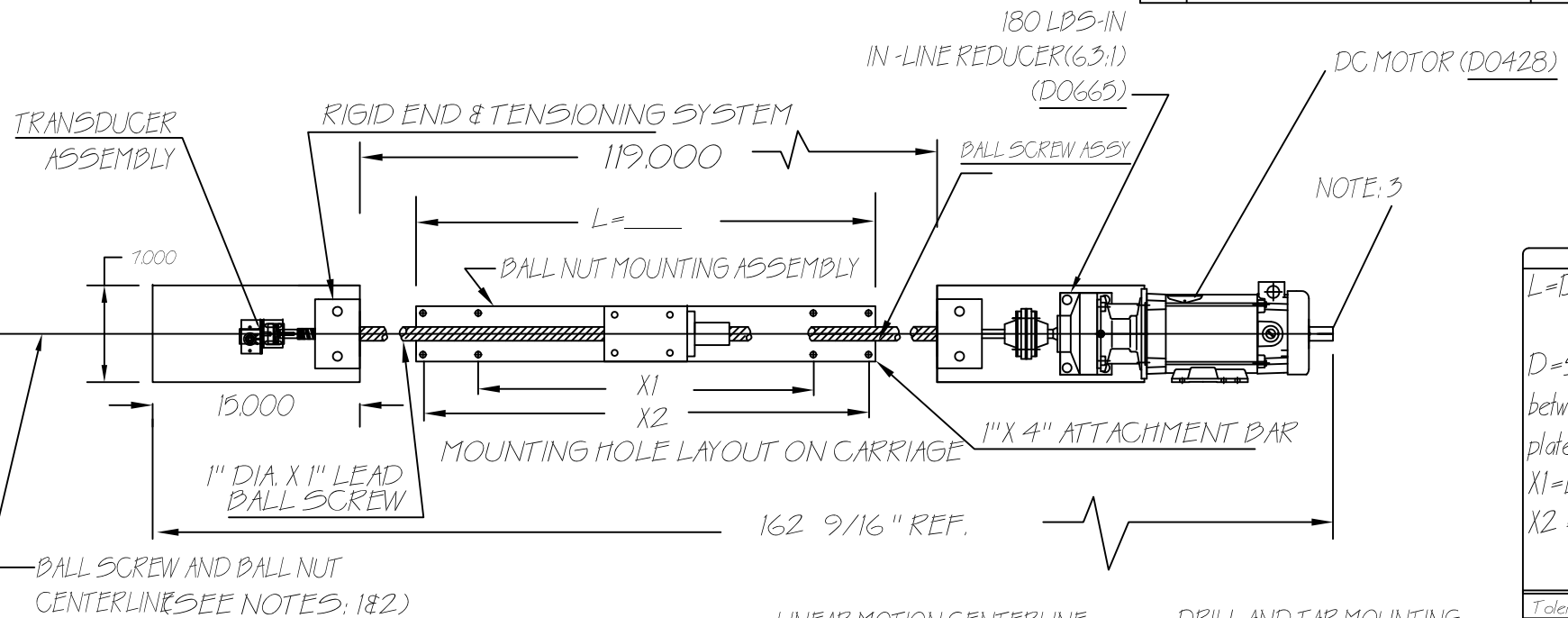
ADJUSTABLE LIMIT SWITCH FOR BATTERY BACKUP SYSTEM

BASE PLATE FOR NEMA 1 ENCLOSURE (24" X 20" X 6 5/8")

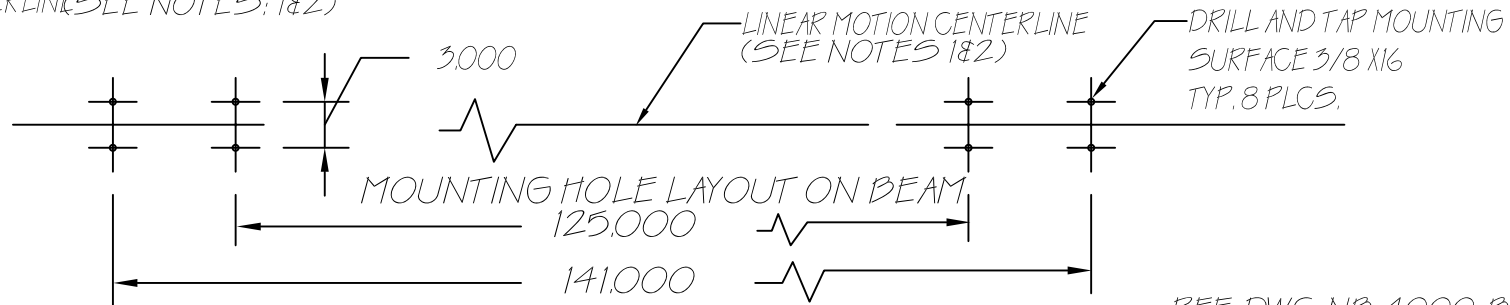
NB-4000 Door Operator		Drawn by kpk
Material		Checked by
Date 5/20/03		Scale 1:1
Logic Assembly & Battery Backup		
brookfield industries inc.		
99 West Hillside Ave.: Thomaston, CT		
P: (860) 283-6211 F: (860) 283-6123		
www.bfimfg.com		
Drawing No./File Name		www.bfimfg.com
NB-4000-A-2		

A
B
C
D
E
F

Rev.	Revision note	Date	Sign	Check
5	Title block revision	5/19/03	crnk	
6	Item numbers added	07/04	crnk	
7	REVISE TRANSDUCER END	6/22/22		




Notes:	
$L = D + 6.5 =$	
$D =$ Spacing between Carriage plates.	
$X1 = L - 5.5"$	
$X2 = L - 1.00"$	
Tolerances	
Decimal	$\pm .0015$
Fractional	$\pm .001$
Angular	$\pm .001$



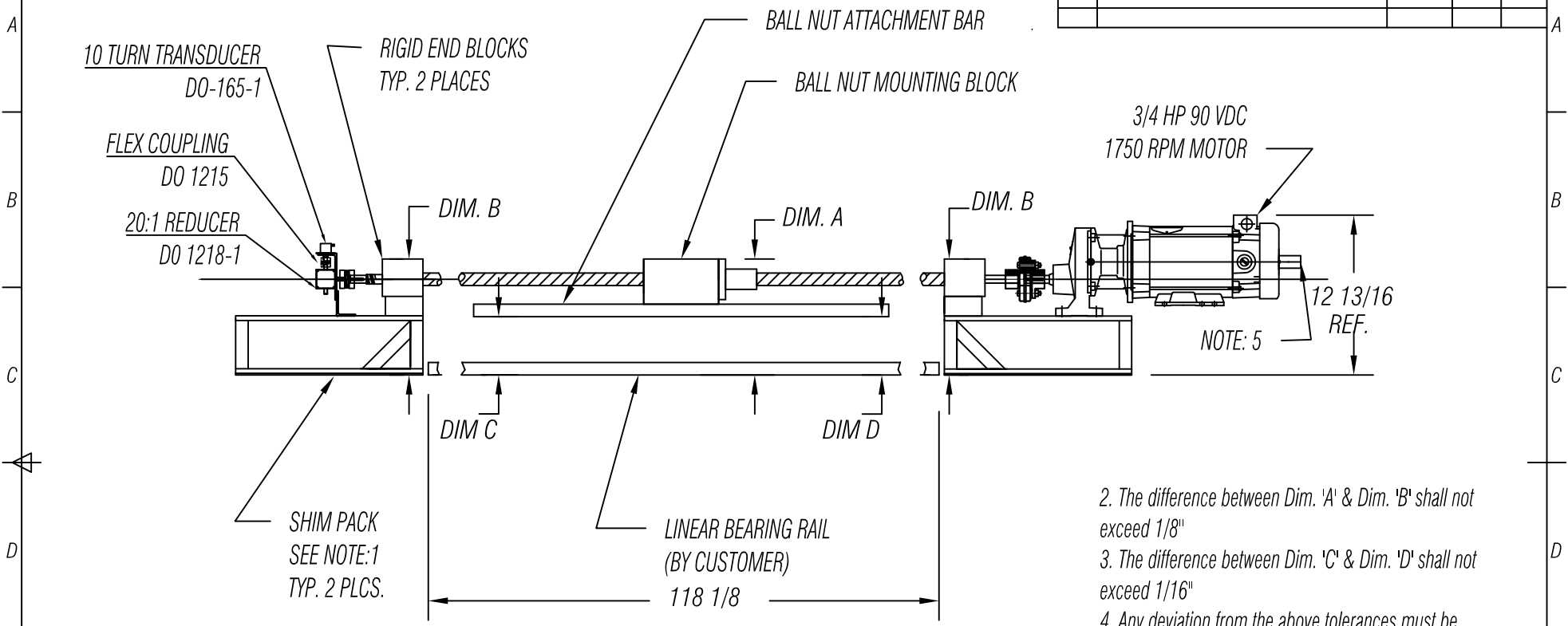
ADD TO NOTES:

- 1) BALL SCREW CENTERLINE SHALL BE WITHIN 1/8" OF LINEAR MOTION CENTERLINE OVER 116.625"
- 2) BALL NUT ATTACHMENT BAR TO BE WITHIN 1/16" OF LINEAR MOTION CENTERLINE FOR BARS 28" LONG OR LESS.
- 3) SEE NB-4000-21 FOR MANUAL OPERATION

REF. DWG. NB-4000-BB

	Sliding Door Operator NB-4000		Drawn by lk
			Checked by
	Material	Date 5/19/03	Scale 1:1
	Installation Drawing		
	brookfield industries inc. 99 West Hillside Ave.: Thomaston, CT P: (860) 283-6211 F: (860) 283-6123 info@brookfieldindustries.com		www.brookfieldindustries.com Drawing No./File Name NB-4000-AA

1	2	3	4	5	6	7	8
Tolerances			Decimal ± 0.015	Fractional	Angular	Rev.	Revision note
						5	Update TB
						6	REVISE TRANSDUCER END
							Date
							5/19/03
							6/22/22
							Sign
							cmk
							Check



2. The difference between Dim. 'A' & Dim. 'B' shall not exceed 1/8"
3. The difference between Dim. 'C' & Dim. 'D' shall not exceed 1/16"
4. Any deviation from the above tolerances must be shimmed to assure proper installation
5. See NB-4000-21 for manual operation

NOTE: 1
 PROVIDE (8) SHIM PACKS(SLOTTED & TABBED)
 (1)----- .125
 (2)----- .050
 (2)----- .010
 (1)----- .005
 TOTAL THICKNESS PER SHIM PACK = .250

REF. DWG. NB-4000-AA

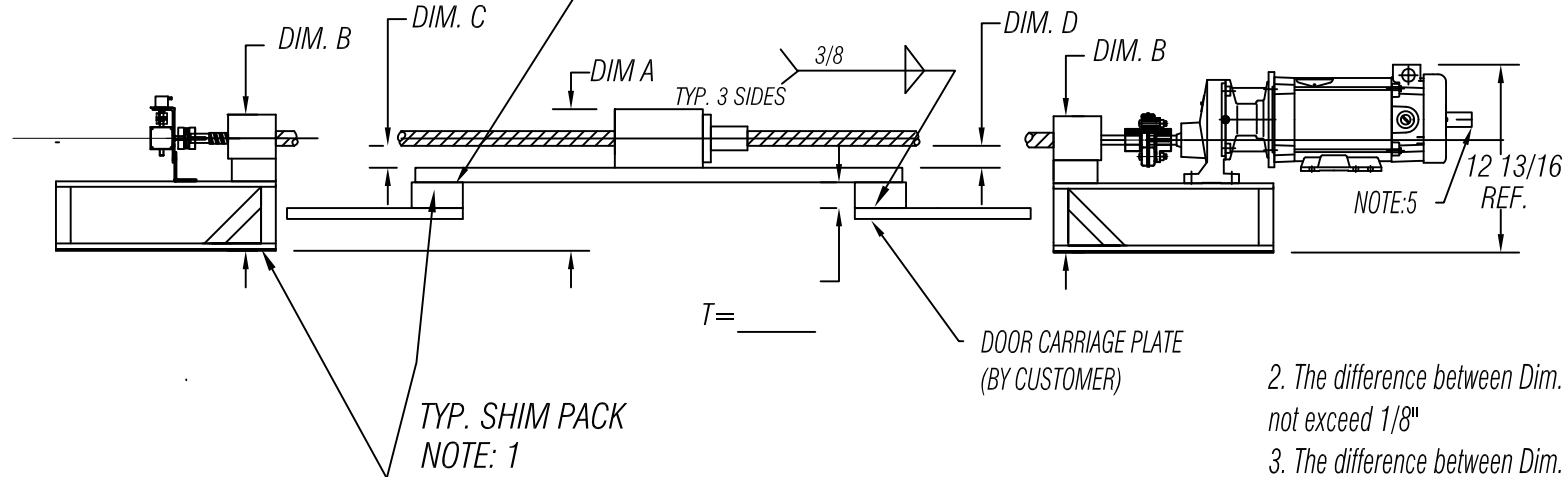
Sliding Door Operator NB-4000		Drawn by kpk	
Material		Date 5/20/03	Scale 1:1
Installation Information			
brookfield industries inc.		www.brookfieldindustries.com	
99 West Hillside Ave. : Thomaston, CT		Drawing No./File Name	
P: (860) 283-6211 F: (860) 283-6123		NB-4000-BB	
info1@brookfieldindustries.com			

Tolerances	Decimal	Fractional	Angular
	+/- 0.015		

Rev.	Revision note	Date	Sign	Check
6	New TB	5/19/03	cmk	
7	REVISE TRANSDUCER END	6/22/22		

INSTALLATION INFORMATION FOR SIDE MOUNTED OPERATOR.

ADD SPACER PLATES FOR SIDE MOUNTED OPERATOR
WELD TO CARRIAGE
(BY CUSTOMER)

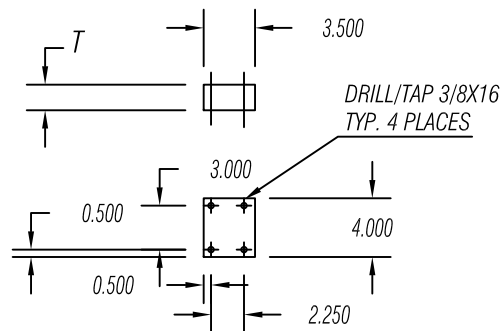


NOTE: 1

PROVIDE (16) SHIM PACKS (SLOTTED & TABBED)

- (1)----- .125
- (2)----- .050
- (2)----- .010
- (1)----- .005

TOTAL THICKNESS PER SHIM PACK = .250



SPACER BLOCK 2 REQ.
MAT. CRS 1018

- 2. The difference between Dim. 'A' & Dim. 'B' shall not exceed 1/8"
- 3. The difference between Dim. 'C' & Dim. 'D' shall not exceed 1/16"
- 4. Any deviation from the above tolerances must be shimmed to assure proper installation
- 5. See NB-4000-21 for manual operation

REF. DWG. NB-4000-AA

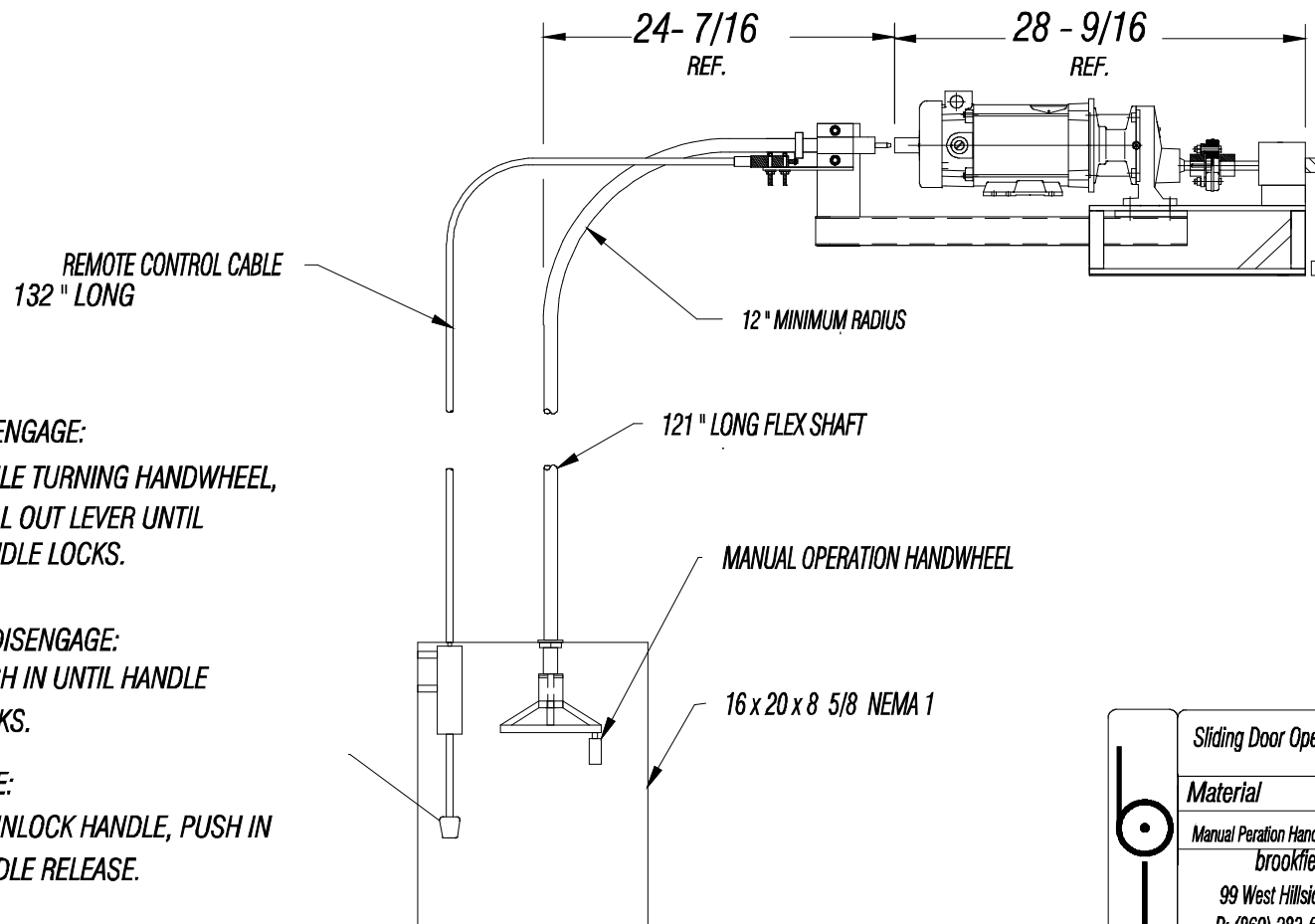
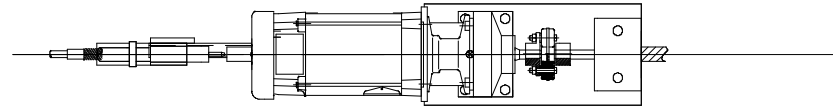
Sliding Door Operator NB-4000		Drawn by kpk	
Material		Date 5/20/03	Scale 1:1
Installation Information			
brookfield industries inc.		www.brookfieldindustries.com	
99 West Hillside Ave. : Thomaston, CT		Drawing No./File Name	
P: (860) 283-6211 F: (860) 283-6123		NB-4000-CC	
info1@brookfieldindustries.com			

WARNING!

ENGAGE ONLY DURING POWER INTERRUPTION
FOR EMERGENCY OPERATION.

DISENGAGE FOR ALL OTHER USE.

6		7		8	
Rev.	Revision note	Date	Sign	Check	



TO ENGAGE:
WHILE TURNING HANDWHEEL,
PULL OUT LEVER UNTIL
HANDLE LOCKS.

TO DISENGAGE:
PUSH IN UNTIL HANDLE
LOCKS.

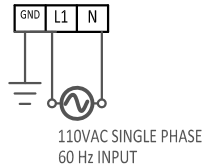
NOTE:
TO UNLOCK HANDLE, PUSH IN
HANDLE RELEASE.

Notes:

Tolerances	
Decimal	+/- 0.005
Fractional	+/- .xxx
Angular	+/- .xxx

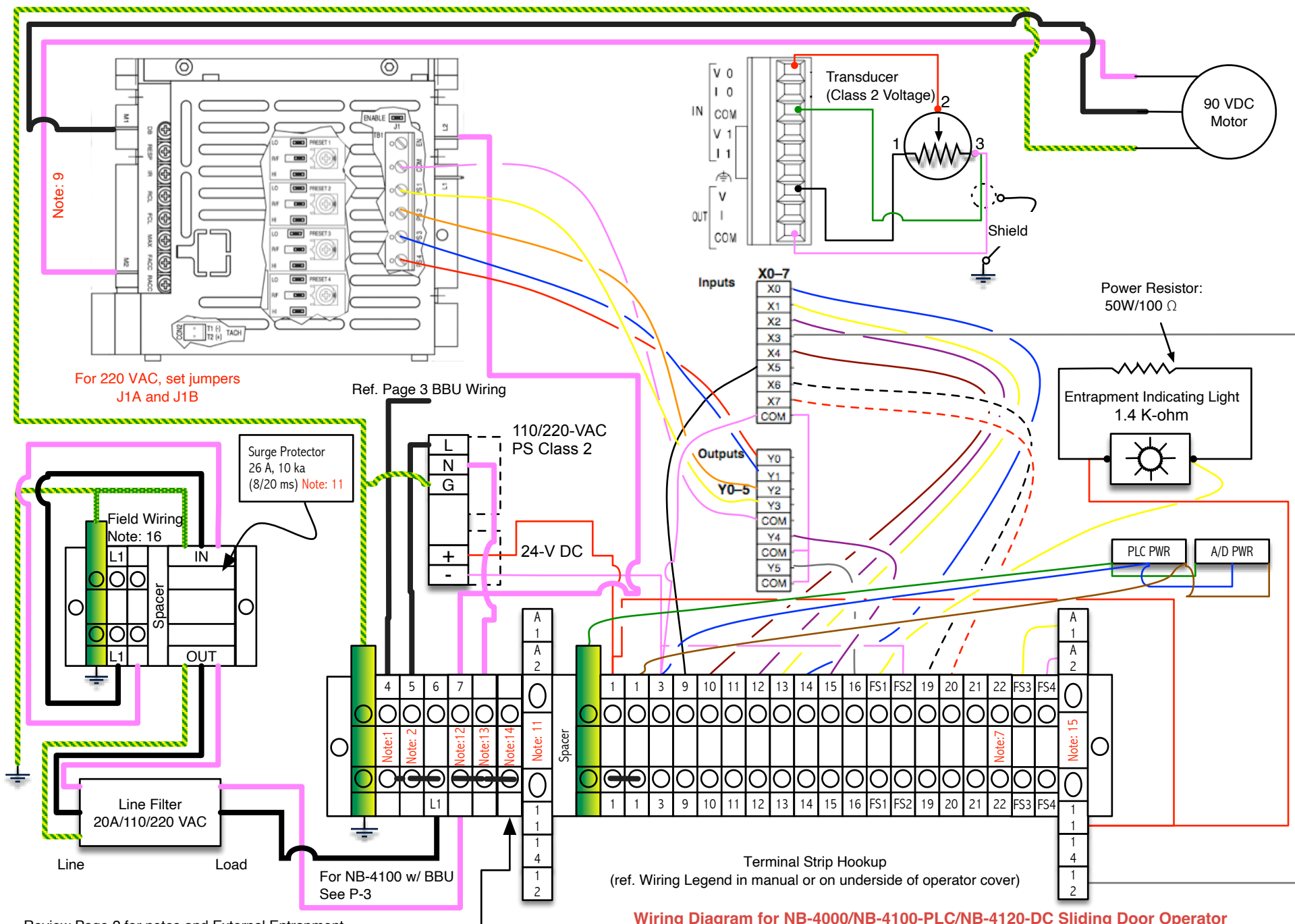
Sliding Door Operator NB-4000		Drawn by kpk
Material		Checked by
Date 5/20/03		Scale 1:1
Manual Peration Hand Wheel Mounting		
brookfield industries inc.		www.bfimfg.com
99 West Hillside Ave. : Thomaston, CT		Drawing No./File Name
P: (860) 283-6211 F: (860) 283-6123		NB-4000-21
www.bfimfg.com		

NB-4000, NB-4000-XXX, NB-4120-2-DC, NB-4100-PLC



1. *RESERVED*
2. *OPTIONAL: LAST MAN OUT*
3. PUSH TO **OPEN** (TYPE: PUSH BUTTON STATION)
4. PUSH TO **CLOSE**(TYPE: PUSH BUTTON STATION)
5. PUSH FOR **PARTIAL OPEN** (TYPE:PUSH BUTTON OR PRESS WALL SWITCH)
6. *RESERVED*
7. PUSH ONCE TO **STOP** (TYPE: PUSH BUTTON STATION, **NORMALLY CLOSED**)
8. MAINTAINED CONTACT TO CLOSE
9. BI-PARTING: MAINTAINED CONTACT THAT DISABLES THE CLOSE INPUT (NO REVERSE)
SINGLE SLIDE: SEE 10B
- 10A. **REVERSES A CLOSING DOOR:** 4-WIRE (FAIL SAFE) TAPE SWITCH(UL325 SECT. 30.2) OR
FAIL SAFE PRESENCE SENSOR**
- 10B. **REVERSES A CLOSING DOOR:** REDUNDANT NON-CONTACT PRESENCE SENSOR
11. BATTERY BACKUP: N.C. LIMIT SWITCH

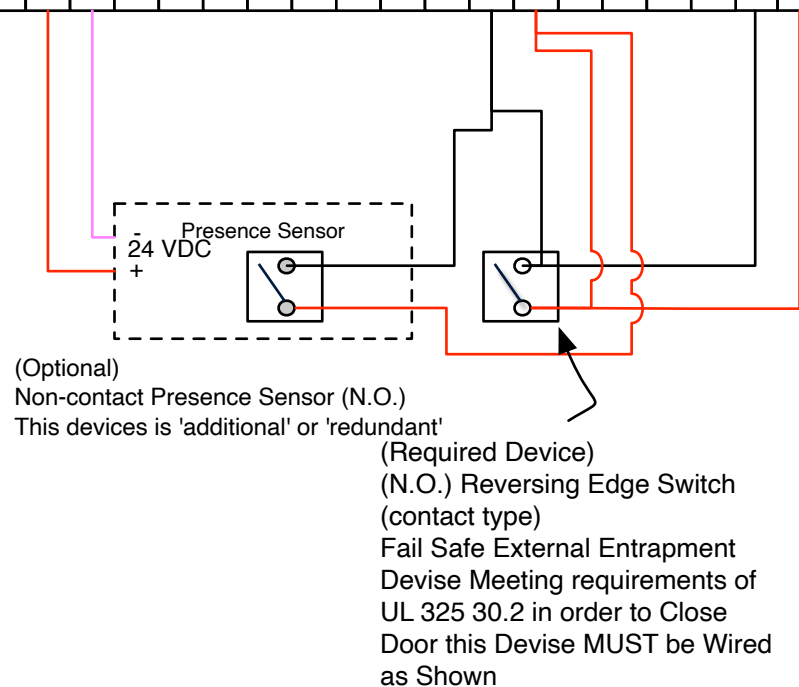
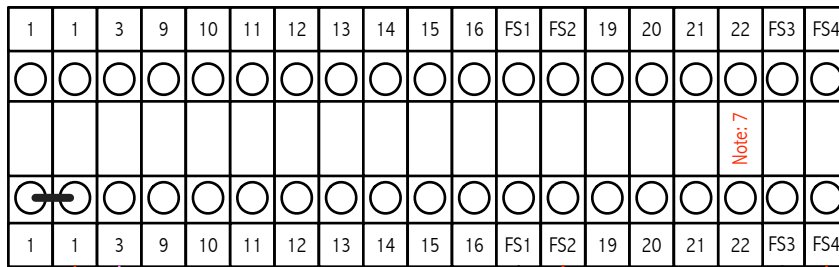
***CABLE SUPPLIED WITH OPERATORS FOR CLASS 2 CONNECTION TO AN EXTERNAL DEVICE, AND CABLE SUPPLIED WITH AN EXTERNAL DEVICE FOR CONNECTION TO A CLASS 2 CIRCUIT OF AN OPERATOR SHALL BE: TYPE CL2, CL2P, CL2R, CL2X COMPLYING WITH THE STANDARD FOR POWER-LIMITED CIRCUIT CABLES, REF. ANNEX A, REF. NO. 12, OR 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. IN 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 AN LPS(LIMITED POWER SOURCE) COMPLYING WITH THE STANDARD FOR INFORMATION TECHNOLOGY EQUIPMENT-SAFETY-PART 1: GENERAL REQUIREMENTS REF. IN ANNEX A, REF. NO. 14.



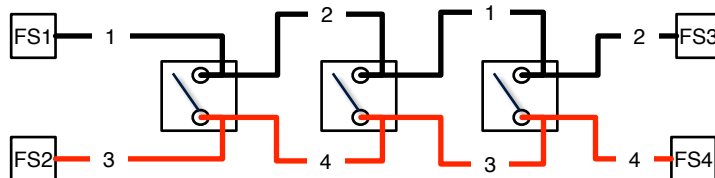
Review Page 2 for notes and External Entrapment Wiring.
Review Page 3 for Battery backup wiring detail.

110 VAC Input (L1&N)/220 VAC Input (L1&L2)

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and may not be duplicated in part or in whole without written consent



Daisy Chain Connection of 4-Wire Tape Switches



(Fail Safe)

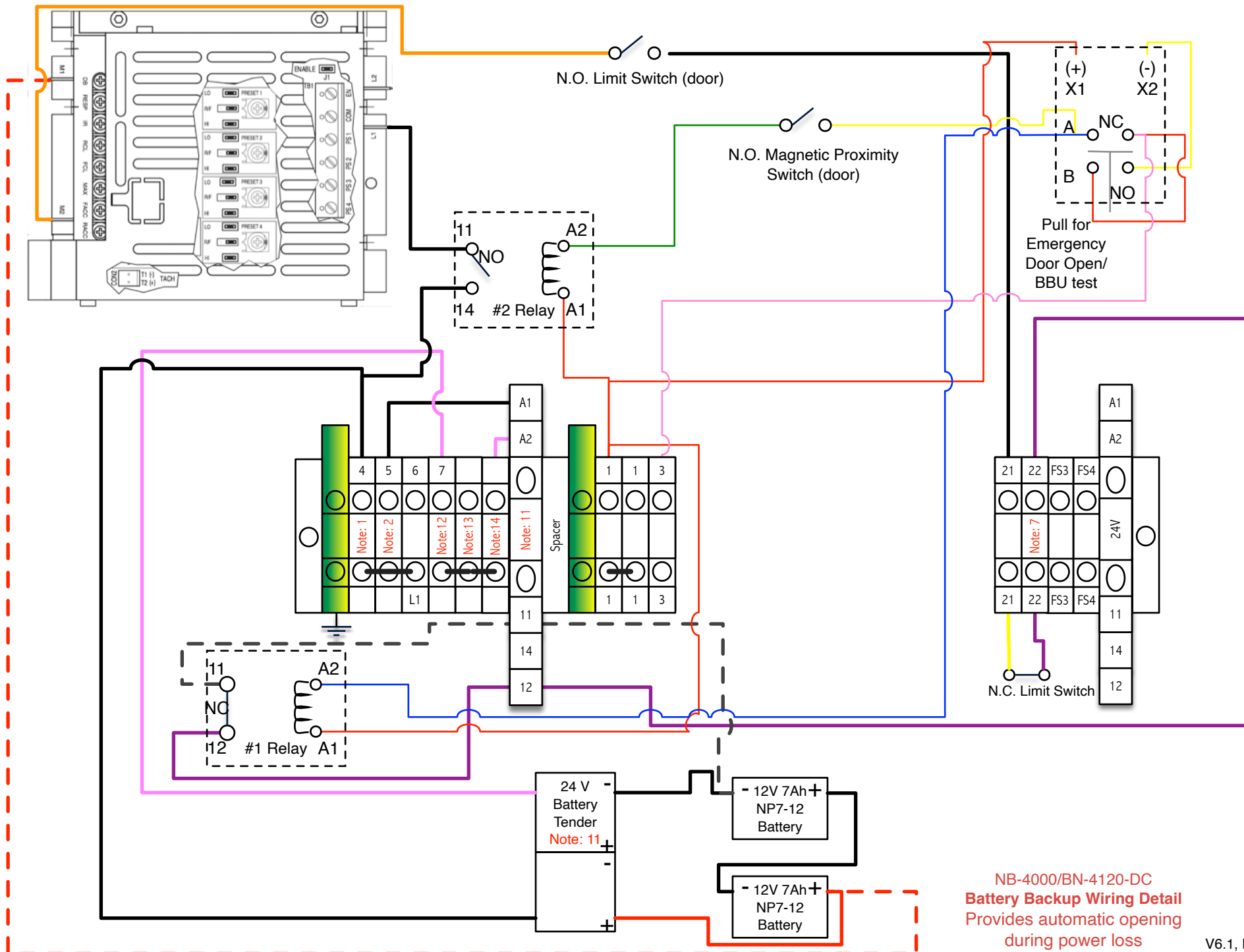
Notes:

1. Use 15 Amp/110/220 VAC; Circuit Breaker
2. Use 1 Amp/110/220 VAC slow-blow; Circuit Breaker
3. Class (2) 24 VDC Terminals: Power Supply: (Com & 3)
Inputs: 9-14 & 17-22
4. All 110/220 AC wires shall be minimum 14 AWG & (105° C, 300 V)
5. All 12-24 VDC (non-motor) wires shall be minimum 20 AWG & (105° C, 300 V)
6. All motor wires shall be minimum 12 AWG & (105° C, 300 V) and 25' max. length
7. Use 8 Amp/110/220 VAC slow-blow; Circuit Breaker
8. Wire as shown for normal direction, reverse 1&3 for opposite direction and reset transducer to 320 at new home position
9. For normal direction wire M1 & M2 as shown. To reverse direction, switch black wire to M2 & white wire to M1.
DO NOT ALTER BATTERY BACKUP WIRING
10. Install Ferrite Core Red Lion FCOR (2 turns=440 ohm @ 25 MHz) on all incoming AC and DC voltage lines
11. Part must be changed to utilize 220 VAC power
12. For 220 VAC Power see Note:1
13. For 220 VAC Power see Note: 2
14. Additional 'N' terminal block for battery backup only. For 220 VAC Power, See Note 2
15. 24V Safety Relay PSR-SCF24 UC/URM/2x21 (or equal impedance)
16. 110 VAC Input (L1&N)/220 VAC Input (L1&L2)

Transducer Wiring:

Wire as shown for : RH Operator (pull open), LH Operator (push open), LH Door Mounted
Reverse 1 & 3 for : RH Operator (push open), LH Operator (pull open), RH Door Mounted

Legend: _____
Pink solid line designates a WHITE wire.



**NB-4000/BN-4120-DC
Battery Backup Wiring Detail**
Provides automatic opening
during power loss

Parameters for NB-4000 Door Operator

PLC Settings of Door Position in Digital Value (DV):

Full Close	=	320	(digital value)
Full Open	=	1510	(digital value)
Partial Inhibit	=	1000	(digital value)
Back Check	=	1320	(digital value)
Latch Check	=	720	(digital value)
Resolution:			
(DV/in)	=	20	

Rotary Position Transducer Setting: 320 door closed position

Motor Control Jumper Setting:

Upper Board (Multi-Speed)

J1 Enable

PRESET 1 (Creep close Speed):

Lo
R / F
Hi

PRESET 2 (Creep open Speed):

Lo
R / F
Hi

PRESET 3 (Close Speed):

Lo
R / F
Hi

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

15V

 / 10V

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 50%*

PRESET 2: Creep Open (FWD) Speed POT 50%*

PRESET 3: Close (REV) Speed POT 80%*

PRESET 4: Open (FWD) Speed POT 80%*

*approximate time to open \approx 20 seconds, to partial \approx 8 seconds, to close \approx 20 seconds

Lower Board

DB	50%
RESP	50%
IR	50%
RCL	50%
FCL	50%
MAX	100%
FACC	20%
RACC	20%

Reversing Direction: Can be accomplished by (2) methods:

Method 1)

Physically rotate the operator 180 degrees by placing the motor end to the transducer end and the transducer end to the motor end.

Method 2)

1. With the door in the new home or closed position, reset the **Rotary Position Transducer** to 320.
2. On the **Rotary Position Transducer**: Move the green and white wire to terminal 1 and the black wire to terminal 3.
3. On the **Motor Control**: switch the black wire to M2 and the white wire to M1. Do not change the battery backup wiring.

Maintenance Intervals

1. Lubricate ball nut assembly every 25,000-50,000 cycles or any time balls in nut get excessively noisy under operation, taking care not to over lubricate.
2. Lubricate end blocks every 100,000 cycles. Do not over lubricate, since this can cause the seals to blow out.
3. Inspect and replace motor brushes every 300,000- 400,000 cycles if required.
4. Check all nuts, bolts and screws for tightness every 100,000 cycles.

Also, inspect the operator for wear or damage to any of its components, especially the ball screw and nut assembly. 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 and Battery Backup Test Intervals

External 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 monthly

Battery backup systems shall be tested in the same manner as above.

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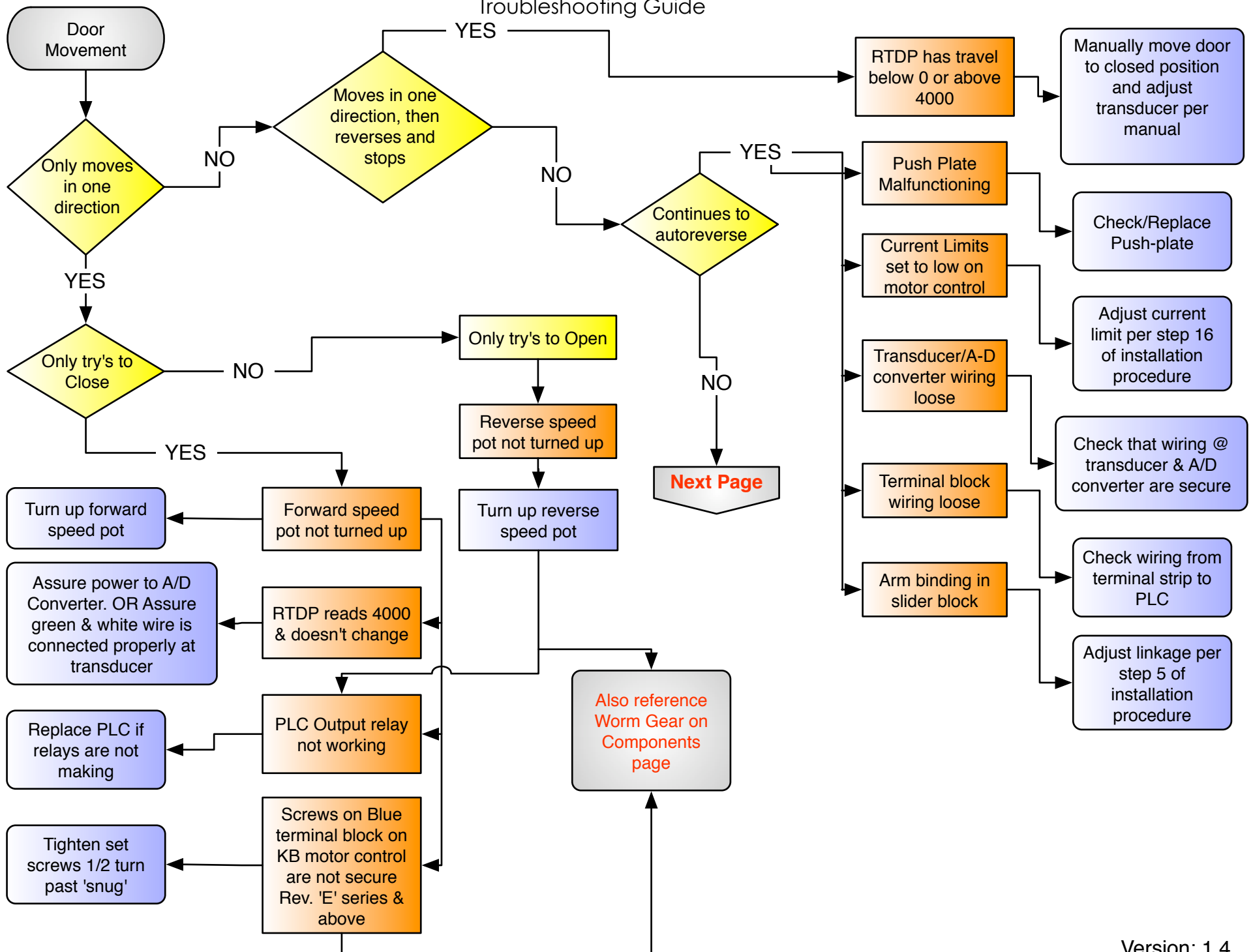
brookfield industries, inc.

Limited Warranty

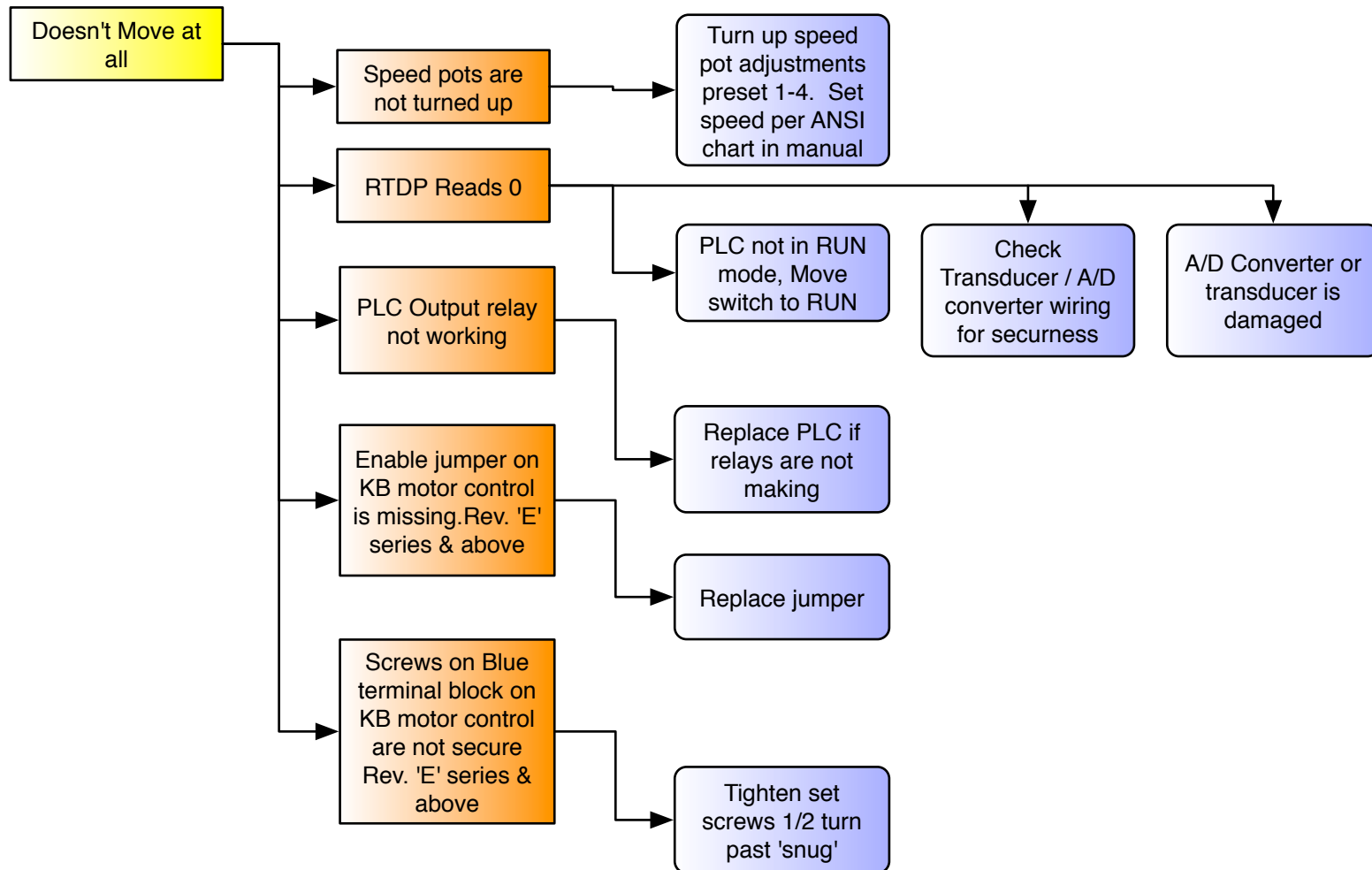
brookfield industries, inc. warrants that door operator models NB-500, NB-1000, NB-2000 and NB-4000 are free from defects in material and workmanship according to the following terms and conditions:

- 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.

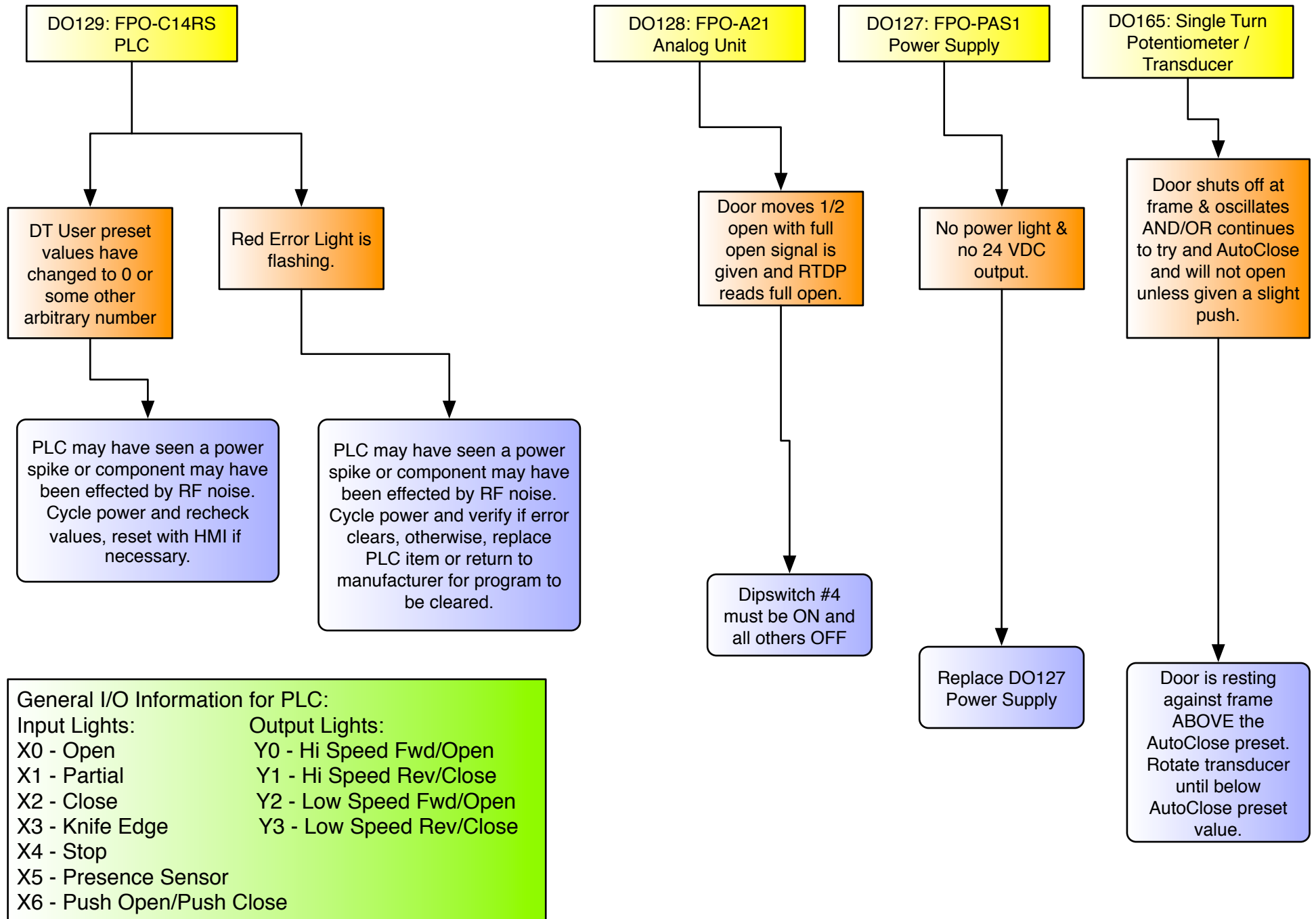
Troubleshooting Guide



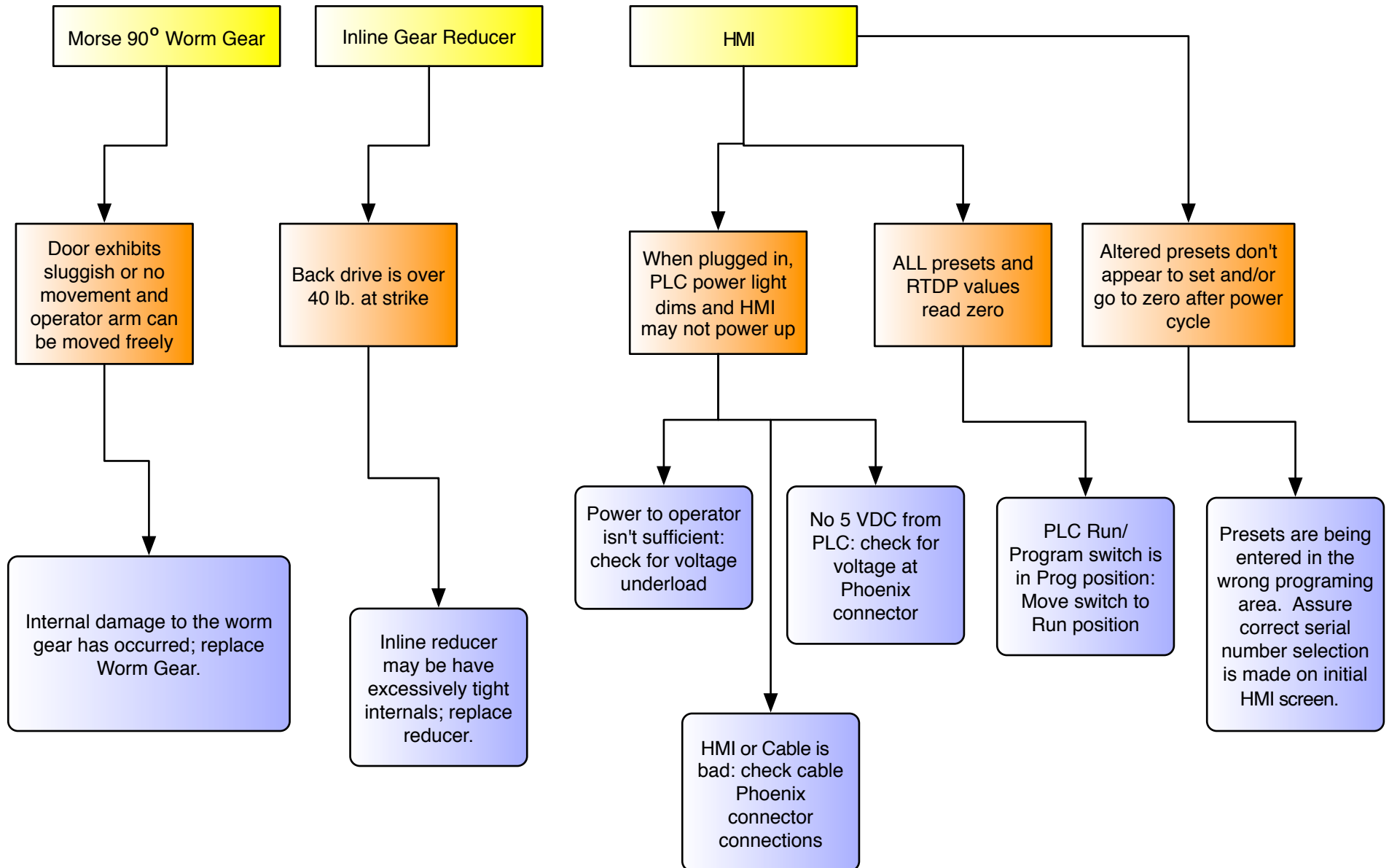
Troubleshooting Guide



Component Specific Problems



Component Specific Problems



Component Specific Problems

