



brookfield industries, inc.
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NB-4120-2-DC Sliding Door Operator

Description:

The NB-4120-2-DC, Single and Bi-Parting Sliding Door Operator, is designed and tested for lead shielding doors weighing up to **35,000 lbs** (single door)/**17,500 lbs** (each bi-parting door), operating at linear speeds of **6.0 in/sec** maximum (single door)/**12.0 in/sec** maximum (bi-parting doors), or a maximum horizontal operating force of **700 lbs** (single door) or **350 lbs** (each bi-parting door). The drive train features a 2" wide (H) pitch, polyurethane, steel reinforced timing belt, coupled to a ¾ hp, 90VDC, helical-bevel (high torque) gear motor. Since the drivetrain features a ¾ hp DC motor, this operator also includes a **Battery Backup System** and **Manual Operation** as a redundant backup for power interruption. *Applications involving heavier doors at slower speeds/acceleration rates should be referred to the Engineering Department.*

The NB-4120-2-DC is designed to be used in conjunction with an existing linear bearing/rail system capable of supporting heavy doors with a low coefficient of friction or standard beam trolley supports for hanging the door. The open ended style timing belt normally clamps to the side of the door carriage/attachment structure. Once the timing belt has been properly aligned and pre-loaded, in addition to the motor control parameters being correctly set, the **NB-4120-2-DC** will provide many years of maintenance free service.

The PLC (Programmable Logic Control) is programmed by the manufacturer to accept input signals from an external (4) button station (including open, partial open, close and stop commands). Additional I/O (input/output) are featured with the **NB-4120-2-DC** to accommodate inputs from infrared presence sensors and pressure sensitive tape switches that will either stop or reverse the door to the open position, when activated in the closing cycle. All input commands to the PLC are class 2, low voltage. There are no limit or proximity switches to adjust or install. Simply adjust the door's positioning presets as required by interfacing with the PLC via a hand held Data Access Unit (purchased separately).

Rating a Sliding Door Operator:

The rating of a sliding door operator in any particular installation cannot be based solely on the weight of the door. Other factors such as linear bearing alignment, coefficient of friction, and acceleration/deceleration rates may have a substantial affect on the total axial force acting on the door operator components. We have factored these variables into the **Rated Maximum Operating Forces**. This assures the customer they are getting the most dependable product at a reasonable cost over the life expectancy of the operator.

Maximum Operating Force* =	700 lbs (3115 kg) (total)
Maximum Rated Linear Speed =	6.0 in/sec (15.24 cm/sec)
Maximum Door Weight =	35,000 lbs(15,890 kg) (total)
Minimum Rated Cycles =	500,000 openings and closings
Maximum Travel =	Unlimited

**The maximum horizontal force acting on the timing belt assembly in order to accelerate the mass of the door to the maximum operating speed and to overcome friction and any misalignment.*

Specification:

- 1) **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.
- 2) **Battery Backup (standard):** Opens the door during power interruption only. (2) 12VDC, 7.0 Ah battery with float chargers and test switch shall be included along with an end of travel limit switch to disconnect the motor.
- 3) **Current Consumption:** maximum 12 amperes.



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- 4) **Entrapment Protection:** The **NB-4120-DC Commercial/Industrial Sliding Door** is compliant with **UL 325 Section 30.2 External Entrapment Protection (Fail Safe/Self-Monitoring)** providing all External Safety Devices are wired and installed per this manual.
- 5) **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. Also, limit or proximity switches are not required for controlling the door's position.
- 6) **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 Sliding Doors.
 - b) Outputs commands shall be the internal type, integral with the PLC. No external limit or proximity 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, creep closed and creep open 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.
- 7) **Motor:** 3/4 hp permanent magnet 90 volt DC motor 1750 RPM TEFC with rear shaft extension.
- 8) **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.
- 9) **Speed Control:** a means of controlling independent forward and reverse speeds as well as controlling end of travel (latch check/back check speeds). This can be accomplished externally with speed pots or internally with the PLC.
- 10) **Drive train:** shall be designed to assure each component (including gear reducers, timing belt and structural parts) 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 Sliding Doors.
- 11) **Enclosure:** NEMA 1 vented enclosure of sufficient size (24" x 20 x 6-5/8") to house the PLC, motor control, speed pots, battery backup system and terminal strip hookups. Enclosure shall have separate penetrations for supply voltage, safety sensors, push buttons, motor and positioning transducer hookups. All penetrations shall be drilled for 3/4" conduits or the equivalent metric size for European installations.
- 12) **Raw Materials:** ASTM A36, AISI 1018 cold rolled steel, Aluminum 6061-T6511, Structural tubing ASTM A-500, grade 5 bolting or better.
- 13) **Mounting hardware:** the NB-4120-DC shall be mounted with (8) 3/8" grade 5 diameter bolts with compatible washers and lock washers. Hardware must also be properly tightened with adequate thread engagement.
- 14) **Finish:** all exposed metal surfaces shall be prime painted.
- 15) **Functionality test:** each NB-4120-DC 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.
- 16) **Manual Operation:**

A flexible shaft engages and disengages into the rear shaft of the motor via a remote control cable. A lever arm activates the remote control cable and a 7" diameter hand wheel is connected to the flexible shaft for smooth operation. The hand wheel and lever arm are contained in a NEMA 1 enclosure. Approximate opening time, is 2.5 minutes. Opening force at the hand wheel is not more than 50 lbs with power removed (ref. UL 325 29.3) Important: **the flexible shaft shall not be engaged to the motor unless power to the operator has been interrupted.**
- 17) **Installation:** Please refer to the **NB-4120-2-DC Door Operator Manual, Installation instructions** and Drawings: NB-4120-2C4, NB-4120-2DC4, NB-4120-2DC8, NB-4120-2DC9, NB-4120-2P2, NB-4120-2-DC-Travel and NB-4120-2-DC-SingleSlide-1

RevNo	Revision note	Date	Signature	Checked
1	ADD BELT LENGTH	12-1-14		
2	ADD SHOP NOTES	01/16/17		

A

B

C

D

E

F

A

B

C

D

E

F

(OVERALL = 2 X TRAVEL + 123 1/16)

178 3/16

(CENTER TO CENTER = 2 X TRAVEL + 100)

155 11/16

NB-4120-2C4

(TRAVEL)

27 7/8

4 1/16

(TRAVEL)

27 7/8

NB-4120-2DC9

NB-4120-2P2

83 9/16

(DISTANCE = TRAVEL + 55 11/16)

51 7/16

(DISTANCE = TRAVEL + 23 9/16)

EMERGENCY
HAND WHEEL
CONNECTION
NB-4120-2DC8

OPEN

OPEN

BELT LENGTH (INCHES) = 4 X TRAVEL + 200

Drawing Notes:

FOR SHOP ONLY:
TRAVEL < 96" USE 10 TURN POT AND
NB-4120 PLC PROGRAM.

Tolerances

Decimal +/- 1/16 UNO

Fractional +/- .xxx

Angular +/- .xxx

NB-4120-2 (DC) BI-PART SINGLE BELT

Drawn by KPK
Checked by XXX

FRONT ELEVATION INSTALLATION

Edition 0

Approved by - date
XXX - 00/00/00

Filename

Date
4/2/13

Scale
1:1

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Material
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NB-4120-2DC4

WARNING!

ENGAGE ONLY DURING POWER INTERRUPTION
FOR EMERGENCY OPERATION ONLY
DISENGAGE FOR ALL OTHER USE

$23\frac{1}{8}$
REF

$24\frac{7}{16}$
REF

12" MIN. RADIUS

132" LONG REMOTE
CONTROL CABLE

121" LONG FLEX SHAFT

REMOTE CONTROL
HANDLE

HAND WHEEL
MANUAL OPERATION

16 X 20 X $8\frac{5}{8}$
NEMA 1 ENCLOSURE

RevNo	Revision note	Date	Signature	Checked

Drawing Notes:

TO ENGAGE:
WHILE TURNING HAND WHEEL,
PULL LEVER OUT UNTIL IT
LOCKS.

TO DISENGAGE:
PUSH HANDLE IN UNTIL IT
LOCKS.

NOTE: TO UNLOCK HANDLE,
PUSH IN HANDLE RELEASE

Tolerances

Decimal $\pm 1/16$ UNO

Fractional $\pm .xxx$

Angular $\pm .xxx$

NB-4120-2 (DC) INSTALLATION

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EMERGENCY HAND WHEEL

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4/2/13

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NB-4120-2DCB

RevNo	Revision note	Date	Signature	Checked
1	ADD TOLERANCES	2/11/20		

Drawing Notes:

Tolerances

Decimal $\pm 1/32$ UNO

Fractional $\pm .xxx$

Angular $\pm .xxx$

NB-4120-2 (DC) SINGLE BELT

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Checked by XXX

GEAR MOTOR BRACKET INSTALLATION

Edition 0

Approved by - date
XXX - 00/00/00 XXX

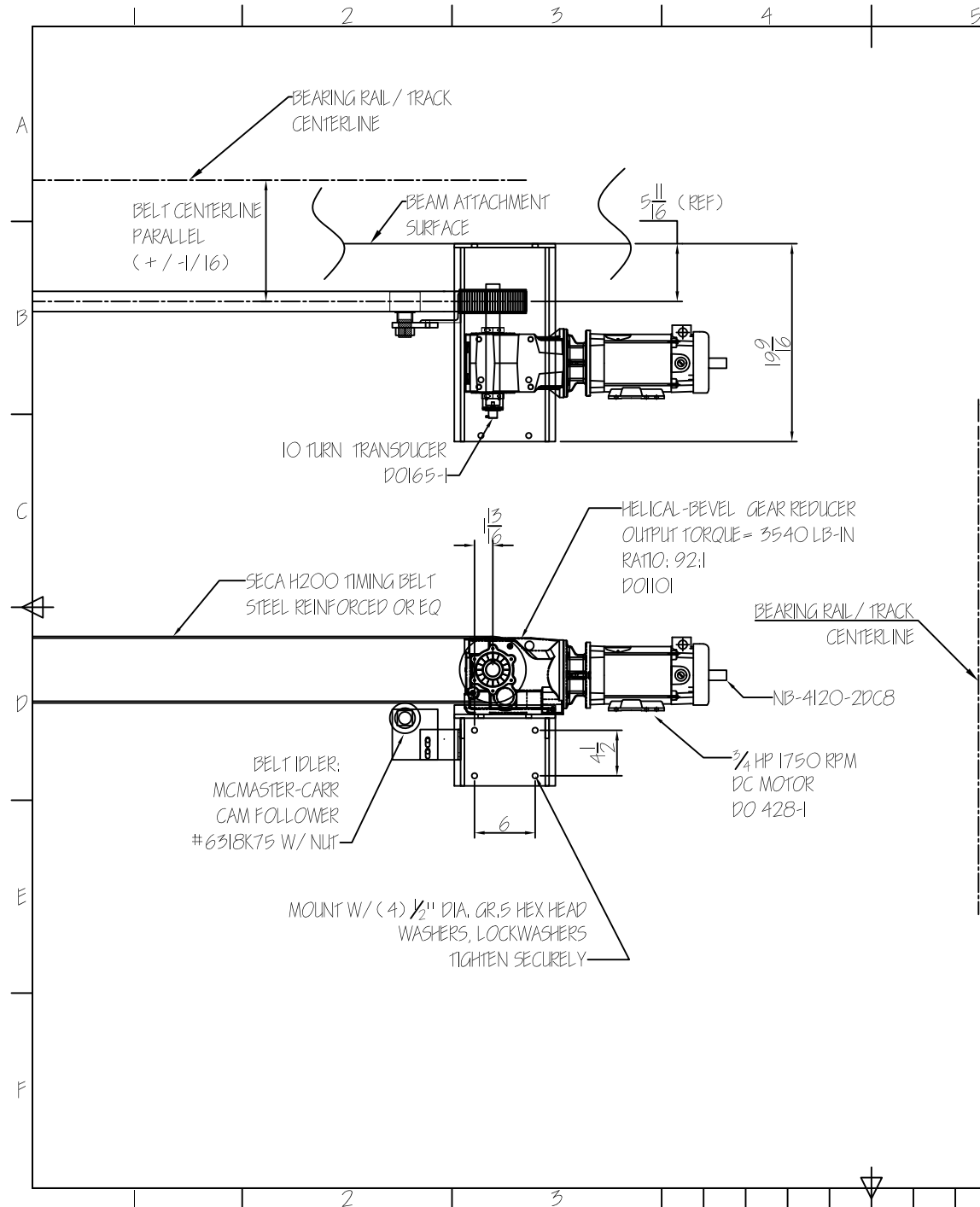
Date
4/9/13

Scale
1:1

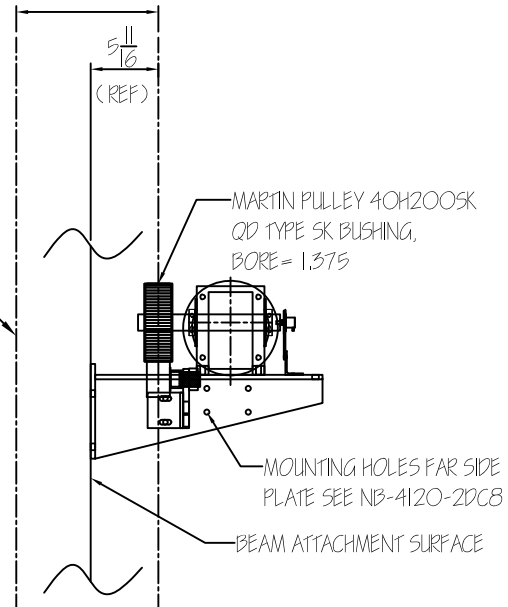
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Material
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NB-4120-2DC9



PULLEY
CENTERLINE
PARALLEL
($\pm 1/32$)



BEAM BY OTHERS

DOOR CARRIAGE
BY OTHERS

MOUNT CLAMPING PLATES TO DOOR ATTACHMENT
WITH (4) $\frac{3}{8}$ DIA. GR. 5 HEX HEAD, WASHERS
AND LOCK WASHERS. TIGHTEN PROPERLY
TYP 3

MOUNT DOOR ATTACHMENT TO CARRIAGE
WITH (4) $\frac{3}{8}$ DIA. GR 5 HEX HEAD, WASHERS
AND LOCK WASHERS. TIGHTEN PROPERLY
TYP 3

OPEN

OPEN

RevNo	Revision note	Date	Signature	Checked

Drawing Notes:

Tolerances

Decimal + / - 1/16 UNO

Fractional + / - xxx

Angular + / - xxx

NB-4120-2 (BMD) INSTALLATION

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SINGLE BELT DOOR ATTACHMENTS

Edition 0

Approved by - date
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Filename

Date
12/12/12

Scale
1:1

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Material
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NB-4120-2P2

RevNo	Revision note	Date	Signature	Checked
1	ADD BELT LENGTH	12-1-14		
2	REVISE BELT LENGTH/ ADD NOTE	5/30/18		

INCHES
(CENTER TO CENTER + 33.5)

INCHES
(CENTER TO CENTER)*

NB-4120-2C4

IN
(TRAVEL)

IN
(TRAVEL)

NB-4120-2DC9
NB-4120-2P2

*NOTE: 1

*NOTE: 1

EMERGENCY
HAND WHEEL
CONNECTION
NB-4120-2DC8

OPEN

OPEN

INDICATE WHICH
MOTOR/ TAKEUP ORIENTATION:

BELT LENGTH (INCHES) = 2 X C-C + 25

INCHES

MOTOR RIGHT/ TAKE-UP LEFT (AS SHOWN)

MOTOR LEFT/ TAKE-UP RIGHT (OPPOSITE)

Drawing Notes:

FOR SHOP ONLY:
TRAVEL > 96" < 180" USE 10 TURN POT
AND NB-4000 PLC PROGRAM
TRAVEL > 180" < 276" USE 15 TURN POT
AND NB-4000 PLC PROGRAM

NOTES:

1) MINIMUM SHALL BE TRAVEL + 18

Tolerances

Decimal + / - 1/16 UNO

Fractional + / - .xxx

Angular + / - .xxx

NB-4120-2(DC) BI-PART SINGLE BELT

Drawn by KPK
Checked by XXX

ELEVATION-INSTALLATION

Edition 0

Approved by - date
XXX - 00/00/00

Filename

Date
4/2/13

Scale
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NB-4120-2DC-Travel

RevNo	Revision note	Date	Signature	Checked
1	REVISE BELT LENGTH	05/30/18		
2	REVISE FORMULA	9/03/24		

Drawing Notes:

Tolerances	
Decimal	+ / - 1/16 UNO
Fractional	+ / - xxx
Angular	+ / - xxx

NB-4120-2-DC SINGLE SLIDE

Drawn by KPK
Checked by XXX

FRONT ELEVATION INSTALLATION

Edition 0

Approved by - date
XXX - 00/00/00

Filename

Date
7/11/16

Scale
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Material
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NB-4120-2DC-SingleSlide-1

