# NORTRON by BRGAN

MISSISSAUGA, ONTARIO L5T 1H9

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# **D SERIES ELECTRIC FURNACE**

# 🗥 WARNING

- Never tamper with the unit or its controls. User MUST contact a specialized contractor when a failure occurs. DO NOT ATTEMPT to repair.
- When using a humidifier make sure not to damage the heating element bank.
- We recommend that your unit be inspected by a specialized technician once a year.
- Poor maintenance of air filters OR an unbalanced static pressure may result in a performance decrease.
- Always use genuine parts for maintenance or service call. The use of unbranded parts will void the warranty.
- The use of this unit without an air distribution duct will void the warranty.
- It is strictly forbidden to use jumpers to simulate heat demand.
- Risk of electrical shock. Disconnect power before installation, servicing, maintenance or field wiring. Replace all panels before operating. Failure to do so can result in electrical shock causing severe injuries or death.
- When performing installation, servicing or cleaning the unit, it is recommended to wear safety glasses and gloves.
- To assure a proper performance of your furnace, we recommend that you use high quality name brand thermostats.
- When applicable local regulation comprises more restrictive installation and/or certification requirements, the aforementioned requirements prevail on those of this document and the installer agrees to conform to these at his own expenses.
- For your safety, do not store or use gasoline or other flammable liquids and vapors in the vicinity of this unit or any other appliance.
- These instructions are intended to be use by qualified personnel who have been trained in installing this type of furnace. Installation of this furnace by an unqualified person may lead to equipment damage and/or hazardous condition which may lead to bodily harm.

- This furnace is not watertight and is not designed for outdoor installation. This furnace shall be installed in such a manner as to protect its electrical components from water. Outdoor installation leads to a hazardous electrical condition and to premature furnace failure, thus voiding the warranty.
- Do not block the combustion air openings in the furnace. Any blockage will result in improper overheat situation and may result in a fire hazard and/or cause bodily harm.
- The unit must have an uninterrupted or unbroken electrical ground to minimize personal injury if an electrical fault should occur. When performing electrical connection, the ground conductor must be firmly attached to the ground lug in the furnace.
- Do not use this furnace as a construction heater. Use of this furnace as a construction heater exposes the furnace to abnormal conditions, contaminated combustion air and the lack of air filters. Failure to follow this warning can lead to premature furnace failure and/or vent failure which could result in a fire hazard and/or bodily harm.
- The owner and/or the user is responsible of the following: Always maintain the immediate surrounding of the furnace free from combustible and highly flammables materials. The furnace ambient air should not have an excessive dust concentration and humidity. Never operate this central heating appliance without an air filter.
- Before performing any service functions, unless operations specifically require the power to be on, make sure all utilities are turned "OFF" upstream of the appliance. Failure to comply with this warning will cause a fire hazard and/or bodily harm.
- All questions regarding the operation, maintenance or warranty of this unit should be addressed to the company where this product has been sold from.

#### CAUTION Never burn garbage or paper in the heating system and never leave rags or paper around the unit. Return air grilles and warm air registers must not be obstructed. IMPORTANT: All local and national code requirements governing the electrical installation heating equipment, wiring and flue connections must be followed. Some of the codes that may be applicable are : ANSI/NFPA 70 NATIONAL ELECTRICAL CODE CSA C22.1 CANADIAN ELECTRICAL CODE Only the latest issues of the above codes should be used, and are available from either: The Canadian Standards Association The National Fire Protection Agency or Batterymarch Park 178 Rexdale Blvd. Rexdale, Ontario M9W 1R3 Quincy, MA 02269 **IMPORTANT: READ AND SAVE THESE INSTRUCTIONS.**

# INSTALLATION AND OPERATING INSTRUCTIONS

This furnace has been designed and manufactured to give the most reliable performance possible. Each unit has been given a running inspection before shipment to assure that every component is operating efficiently.

The safe and dependable operation of the furnace depends upon proper installation and compliance with all national and local codes and standards.



#### UNIT CERTIFICATION

This furnace is CSA certified.



## **GENERAL REQUIREMENTS AND SPECIFICATIONS**

### CAUTION

This unit must be installed in a dry place, in a non-corrosive, well-ventilated environment, without excessive dust. The ambient temperature must be over 10°C and under 27°C. If the ambient temperature is 10°C or less, the plenum must be insulated on 10 ft linear minimum length.

- 1. LOCATION The furnace should be centrally located to the heating area.
- 2. POSITIONS It can be installed for vertical, horizontal or downflow operation. When installed horizontally, the furnace should be positioned such as the door will not end up being on the top. The door should be on the side of the furnace, to ensure that the motor bearings are in their designed position. In vertical downflow installations, use only "L"- or "T"-shaped plenum with no openings or registers directly below furnace.
- INSTALLATION CLEARANCES As shipped from the factory, each unit is approved for "zero inch" clearance. If additional clearance is required, it will be indicated on the data label attached to the furnace.
- 4. TEMPERATURE RISE Furnaces are shipped to operate at 0.20" W.C. (50 Pa) external static pressure. They are certified for operation up to 0.50" W.C. (125 Pa). <u>Check the following page for temperature rise table on specification chart</u> and, if necessary, adjust the unit to match.
- SERVICE CLEARANCE Units are serviced from the FRONT. Leave at least 24" (610 mm) clearance in front of the door.

## **GENERAL REQUIREMENTS AND SPECIFICATIONS (CONT'D)**

240 VOLTS – SINGLE PHASE							TEMP. RISE @ 0.20 IN. W.C.			
MODEL NO.	KW	BTUH	AMPS INCL. MOTOR	HP	BLOWER	°C	°F	*SPEED	RPM	
21D10	10	34120	46	1/3		21	70	MED-LOW	814	
21D15	15	51180	67	1/3	10" x 8"	24	25	MED-LOW	814	
21D18	18	61420	77	1/3		27	81	MED-LOW	814	
21D20	20	68240	86	1/3	(254 mm x 203 mm)	33	91	MED-LOW	814	
21D23	22.5	76842	94	1/3		36	97	MED-LOW	814	
21D25	25	85003	107	1/3		37	99	MED-LOW	814	
21D27	27	92130	116	3/4	12" x 8" (304 mm x 203 mm)	36	97	MED-HI	707	

\*FACTORY SETTINGS. SUBJECT TO CHANGE WITHOUT NOTICE.

10" x 8" (254 mm x 203 mm) BLOWER							
SPEED	FLOW RATE	STATIC PRESSURE (INCHES OF WATER COLUMN)					
		0.2	0.3	0.4	0.5	0.6	
LOW**	CFM	756	749	740	729	713	
	L/s	357	353	349	344	337	
MED-LOW	CFM	1035	1018	997	971	935	
	L/s	488	480	470	458	441	
MED-HIGH	CFM	1177	1157	1132	1102	1063	
	L/s	556	546	534	520	502	
HIGH	CFM	1301	1276	1247	1207	1145	
	L/s	614	602	588	569	540	

12" x 8" (304 x 203 mm) BLOWER							
SPEED	FLOW BATE	STATIC PRESSURE (INCHES OF WATER COLUMN)					
		0.2	0.3	0.4	0.5	0.6	
LOW**	CFM	727	699	667	636	606	
	L/s	343	330	315	300	286	
MED-LOW**	CFM	912	897	878	853	823	
	L/s	431	423	414	402	388	
MED-HIGH	CFM	1216	1200	1181	1157	1129	
	L/s	574	566	557	546	533	
HIGH	CFM	1640	1601	1558	1513	1466	
	L/s	774	755	735	714	692	

#### WARNING:

\*\*These speeds can only be run with heater off, for cooling/ventilation purposes only.

#### **OPERATING OPTIONS**

The furnace is shipped from the factory in a "Standard Heating Mode" (all switches in the Down position). When the thermostat calls for heat, the automatic controls will be activated and the furnace turns "ON".

The blower will run at low speed or higher speed (as selected by **SPEED SELECTOR** switch).



#### SPEED SELECTOR

The **SPEED SELECTOR** switch is used to control the fan speed (ventilation). Even if there is no call for heat, the ventilation can be controlled by the thermostat; the fan speed is determined by this switch.

Low – The blower motor will operate at low speed.

HIGH - The blower motor will operate at a higher speed.

As the furnace heats up, it automatically switches to a medium speed when additional elements are activated by the electronic control, if it was initially set to run at low speed. The timing of this blower speed change will depend on whether **COLD** or **MILD** is selected on the **SEASON SELECT** switch.

You may, however, change from the Standard Heating Mode by using the controls built into your furnace.



#### SEASON SELECT

During spring or fall, you may require less rapid response when the thermostat calls for heat.

When **MILD** is selected, it takes more time to bring all the elements online. When **ColD** is selected, the heating elements come online faster.

MILD SEASON (First Stage) Slow Response Sequence	Cold Season (Second Stage) Rapid Response Sequence
Element 1 - Heat on instantly	Element 1 - Heat on instantly
Blower on after 3 seconds delay	Blower on after a 3 seconds delay
Elements 3 and 5 after 1 minute delay	Elements 3 and 5 after 10 seconds delay
Element 2 after 2 minutes delay	Element 2 after 20 seconds delay
Elements 4 and 6 after 3-minute delay	Elements 4 and 6 after 30 seconds delay

NOTE: Elements 4, 5 and 6 only where applicable.

## **INSTALLATION NOTES**

#### 1. COLD AIR RETURN

The duct can be attached to either side, rear or the bottom of the furnace.

For side return there are four  $1\frac{1}{2}$ " (38 mm) knockouts which can be removed and used as an outline for cutting a 18" x 18" (457 mm x 457 mm) return air opening in the furnace left or right side. Mount the filter frame to the furnace over the opening with the open side of the frame facing front. Then attach the 19" x 19" (483 mm x 483 mm) air duct to the flanges on the filter frame. For bottom mounting, remove the screws holding the bottom plate to the furnace, discard the bottom plate and attach the filter frame to the bottom flanges with the open side of the frame facing front.

#### 2. ELECTRICAL WIRING - POWER SUPPLY

The furnaces are completely factory wired. From a separate breaker, a two-wire plus ground supply wire is required. The ground conductor must be firmly attached to the ground lug in the furnace and the supply wires to the terminal block in the furnace.

**NOTE:** If a FK120 kit will be used to supply an air cleaner and/or humidifier, a third (neutral) conductor must be brought into the furnace.

### A WARNING

For all installations, we only recommend appropriate gauge good quality copper wire(s). However, it is the electrician's responsibility to ensure that the wiring and connections are compliant to the latest editions of the Canadian Electrical Code and local codes.

#### 3. CONNECTING AND ADJUSTING

THE LOW VOLTAGE THERMOSTAT

(Use only class 1 wires inside furnace compartments.) Attach thermostat wires to the low voltage terminal connections located on the printed circuit board inside the furnace. Follow the diagrams supplied with the thermostat. As a general guide, remember that the R & W terminals control single stage heating; the R & Y terminals control cooling. Single stage cooling uses "Y/Y2" as first and only stage.

Two-stage cooling uses "Y1" as first stage and "Y/Y2" as second stage. Make sure the thermostat is levelled on the wall and in appropriate location as per instructions supplied with the thermostat.

#### CAUTION

Before turning the furnace on, the heat anticipator in the thermostat must be properly set to prevent its failure and to assure comfortable, economical heating.

Because each installation is different an accurate reading of the current draw should be made with an AC meter. Set the meter at a 2 A range.

- A. Set the anticipator at its highest setting.
- B. Disconnect the "W1" thermostat wire from the furnace low voltage terminal connections.
- C. Connect the AC meter between the "W1" terminal on the board and the loose "W1" wire.
- D. Turn the thermostat up to start the furnace and allow it to run, with all elements on, for three or four minutes.
- E. Read the current draw on the meter and reset the anticipator to match the meter reading.

# FOR USE IN MOBILE HOMES

D Series furnaces models 21D10, 21D15, 21D18 and 21D20 are certified for "L" -shape and "T"-shape shallow duct installation with model FSB-1 sub-base in downflow applications when the supply air ducts pass through the floor of the structure. Recommended size of a floor opening: 14¼" x 14¼" (362 mm x 362 mm). The duct system must be designed so that the external static pressure of the system does not exceed the maximum external static pressure of 0.50" W.C. (125 Pa).

#### SHALLOW DUCT AREA REQUIREMENTS

Duct Depth	Duct Width
4" (102 mm)	16" (406 mm)
5" (127 mm)	13" (330 mm)
6" (152 mm)	10" (254 mm)

## USING OPTIONAL EQUIPMENT

#### 1. TWO-STAGE OR OUTDOOR THERMOSTAT

(The **SEASON SELECT** switch must be in the **MILD** position). Follow the directions supplied with the two-stage or outdoor thermostat in conjunction with the furnace wiring diagram.

#### 2. AIR CONDITIONING

Your furnace is equipped with all the controls required for the addition of air conditioning (except the heat-cool thermostat).

The evaporator coil may be installed by a local contractor in sheet metal plenum of his own manufacture. The coil should be located: Centered over the "chimney" of the furnace 4" (102 mm) to 6" (152 mm) above the top of the furnace.

Make sure no air is allowed to bypass the cooling coil during cooling operation. If the discharge opening is a great deal larger than the coil, and the ductwork is correspondingly larger than the coil, you may want to use a bypass damper for heating. The damper would be closed in summer, directing all air flow through the coil. In winter the damper would be open to allow air to bypass the coil.

Typical air-conditioning field wiring connections are shown in the following diagram:



3. ELECTRONIC AIR CLEANERS AND/OR POWERED FURNACE HUMIDIFIERS

These units operate at 120 V. Your 240 V furnace is designed so that Model FK120 adaptor kit can be mounted inside the furnace to supply the required 120 V. Instructions for mounting and wiring are included with the kit.

#### 4. INTERLOCK CONNECTION

When the electric furnace is used in combination with another device (as for example, a wood burning furnace), it is recommended to perform the connection by referring to the wiring diagram below. The burning furnace thermostat will then turn automatically on the blower in the electric furnace.



#### MAINTENANCE

MOTOR: The motor is lubricated for life and needs no oiling.

- FILTERS: Size is 20" x 20" x 1" (508 mm x 508 mm x 25 mm). Should be inspected and replaced when dirty. Ordinarily replacement is required twice per heating season and, perhaps, a third time if continuous blower operation is used.
- **NOTE:** Each element has an automatic reset thermal cut-out which is set to open at 160°F (71°C). If it opens, the element will be de-energized until the cut-out resets itself. In addition to that, there are 2 manual reset thermal cut-outs that open at 200°F (93°C). If any of them open, a front panel needs to be removed so the cut-out can be manually reset.

#### **WARNING**

Cut 240 V supply before removing the front panel!

The reason for the failure should be investigated before re-starting the furnace. The limit usually opens when airflow is reduced because of blocked ductwork or very dirty filters.

# SERVICE PARTS



REPLACEMENT PARTS					
KEY NO.	PART NO.	DESCRIPTION			
1	30270032	Automatic Limit			
2	30030006	Season Select Switch			
3	30030025	Speed Selector Switch			
4	30280021	Thermostat Indicator Light			
5	10941203	Motor 1/3 HP (21D10/15/18/23/25)			
5	10941288	Motor 3/4 HP (21D27)			
6	30390553	Blower Wheel 12" x 8" (305 mm x 203 mm)			
7	30270038	Motor Capacitor (21D10/15/18/20/25)			
,	30271114	Motor Capacitor (21D27)			
8	10940080	Element Assembly 5000 W, 240 V			
9	10940081	Element Assembly 4500 W, 240 V			
10	30274131	20 A Relay			
11	30274132	30 A Relay			
12	30280020	Manual Reset Limit			
13	624663	Electronic Control (PC Board)			
14	30300022	Transformer 240 V			
15	30010010	Fiberglass Filter 20" x 20" x 1" (508 mm x 508 mm x 25 mm)			
16	10941149	Service Blower Assembly for 21D10/15/18/20/23			
10	10941221	Service Blower Assembly for 21D27			
17*	624664	Daughterboard (21D23/25/27 only)			
18*	FK120	120 Volt Kit (optional, purchase separately)			

\* Item not shown.

## WIRING DIAGRAMS

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Risk of electrical shock. Disconnect power before installation, servicing, maintenance or field wiring. Replace all panels before operating. Failure to do so can result in electrical shock causing severe injuries or death.



## WIRING DIAGRAMS (CONT'D)

# A WARNING

Risk of electrical shock. Disconnect power before installation, servicing, maintenance or field wiring. Replace all panels before operating. Failure to do so can result in electrical shock causing severe injuries or death.



# WIRING DIAGRAMS (CONT'D)

## 

Risk of electrical shock. Disconnect power before installation, servicing, maintenance or field wiring. Replace all panels before operating. Failure to do so can result in electrical shock causing severe injuries or death.





- If any of the original wire, as supplied, must be replaced, use the same equivalent wire. Wiring must comply with applicable codes, ordinances and regulations.
- 2. Field wiring must comply with applicable codes, ordinances and regulations. Use only Class 1 wiring inside furnace compartments.

Line voltage wiring:

UL AWM 1015/1230, 600V, 105°C, VW-1,12AWG; CSA TEW 600V, 105°C, FT1, 12AWG.

Low voltage wiring: same ratings as high voltage except 18AWG.

For the use of a two-stage heat thermostat or an outdoor thermostat, connect between W1 and W2. Make sure that the Season Select switch is set to the Mild Position.

WIRING COLOR CODE				
BLK	BLACK			
BLU	BLUE			
BRN	BROWN			
GRN	GREEN			
GRY	GREY			
ORG	ORANGE			
PNK	PINK			
PPL	PURPLE			
RED	RED			
WHT	WHITE			
YEL	YELLOW			

FAN MOTOR SPEED	COLOR
н	BLACK
MED-HIGH	BLUE
MED-LOW	YELLOW
LOW	RED

LEGEND				
с	Capacitor			
F1	Fuse			
E	Heating Element			
KC	Heating Element Relay			
К	Fan Relay			
HTL	Auto-Reset Thermal Protector			
MRHTL	Manual Reset Thermal Protector			
М	Fan Motor			
TB	Terminal Block			
Т	Transformer Class 2			
HEAT	Heat			
L1, L2	240V Line Supply			
N	Neutral			

# TROUBLESHOOTING

The first step in identifying an operational problem is to determine whether the fault is in the furnace or in the thermostat and/or its connecting wiring.

To help make this determination, the furnace is equipped with a "Thermostat ON" diagnostic light. If the light is "ON", it indicates the thermostat has closed and is calling for heat; the blower should be running. If the light is "OFF", the furnace should not be operating. 1. If the furnace will not start:

Turn the thermostat to its highest setting. If the light goes on, the thermostat has closed, so the fault is in the furnace. If the light does not go on, the thermostat or its connecting wiring is the problem.

2. If the furnace will not turn off:

Turn the thermostat to its lowest setting. If the light goes off and the furnace continues to run, the thermostat has opened properly and the fault is in the furnace. If the light stays on, the fault is in the thermostat or its connecting wiring.

After the fault area is isolated by use of the diagnostic light, a check of the following components can be made more efficiently.

PROBLEM	POSSIBLE DEFECTIVE PARTS OR COMPONENTS
1. The furnace will not turn on	<ul> <li>Thermostat</li> <li>Circuit breaker or fuse is open</li> <li>Motor or capacitor</li> <li>SPEED SELECTOR switch (open contact)</li> <li>Electronic control</li> <li>Transformer</li> </ul>
2. Motor runs continuously	Thermostat wires incorrectly attached to furnace
3. Elements on, but motor does not run	Motor or capacitor     SPEED SELECTOR switch (open contact)     Electronic control
<ol> <li>Motor going on and off in short cycles (or in too long cycles)</li> </ol>	<ul> <li>Heat anticipator in thermostat incorrectly set or may be defective</li> </ul>
5. Must set thermostat much higher (or lower) than the desired house temperature	Thermostat is not leveled or out of calibration
6. Not enough heat	<ul> <li>One or more defective elements or relays</li> <li>SEASON SELECT switch in MILD position</li> <li>Safety limits opening because duct obstruction or dirty filters are restricting air flow</li> <li>Defective or incorrectly wired two-stage or outdoor thermostat</li> <li>Lack of enough cold air returns in house</li> </ul>
7. Two-stage or outdoor thermostat not operating properly	• SEASON SELECT switch not in MILD position

#### SIXTY-MONTH LIMITED WARRANTY FOR NORTRON PRODUCTS

Broan-NuTone Canada (Broan-NuTone) warrants to the original consumer purchaser of Notron products that such products will be free from defects in materials or workmanship for a period of sixty (60) months from the date of original purchase. THERE ARE NO OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, IMPLIED WARRANTIES OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. During this sixty-month period, Broan-NuTone will, at its option, repair or replace without charge, any product or part which is found to be defective under normal use and service. This product or part should be shipped prepaid by the customer to the company factory or the nearest authorized service center. THIS WARRANTY DOES NOT EXTEND TO FILTERS, FURNACE KITS SOLD SEPARATELY, DUCTS, AND ACCESSORIES FOR DUCTING. This warranty does not cover (a) normal maintenance and service or (b) any products or parts which have been subject to misuse, negligence, accident, improper maintenance or repair (other than by Broan-NuTone), faulty installation or installation contrary to recommended installation instructions. Broan-NuTone does not accept any responsibility for transportation of repaired part or replaced product mentioned above and for reinstallation costs.

The duration of any implied warranty is limited to the sixty-month period as specified for the express warranty. Some jurisdictions do not allow limitation on how long an implied warranty lasts, so the above limitation may not apply to you.

BROAN-NUTONE'S OBLIGATION TO REPAIR OR REPLACE, AT BROAN-NUTONE'S OPTION, SHALL BE THE PURCHASER'S SOLE AND EXCLUSIVE REMEDY UNDER THIS WARRANTY. BROAN-NUTONE SHALL NOT BE LIABLE FOR INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES ARISING OUT OF OR IN CONNECTION WITH PRODUCT USE OR PERFORMANCE. Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights, which vary from province to another. This warranty supersedes all prior warranties, and applies only in Canada territorial limits.

To qualify for warranty service, you must (a) notify Broan-NuTone at the address or telephone number stated below, (b) give the model number and part identification and (c) describe the nature of any defect in the product or part. At the time of requesting warranty service, you must present evidence of the original purchase date.

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