INSTALLATION INSTRUCTIONS

Wall Mounted Gas/Electric

Models:

WG2SF WG3SF WG4SF WG5SF
WG2SFD WG3SFD WG4SFD WG5SFD

⚠ WARNING

READ ALL INSTRUCTIONS CAREFULLY BEFORE BEGINNING THE INSTALLATION.

THE INSTALLATION MUST COMPLY WITH THESE INSTRUCTIONS AND THE REQUIREMENTS OF ALL GOVERNING CODES AND ORDINANCES FOR THE INSTALLATION LOCATION.

IT IS THE RESPONSIBILITY OF INSTALLER TO KNOW AND UNDERSTAND ALL OF THESE REQUIREMENTS.

FAILURE TO DO SO COULD CREATE A HAZARD RESULTING IN PROPERTY DAMAGE, BODILY INJURY, OR DEATH.

C ETL CM LISTED US
Intertek

Bard® SINCE 1914
Climate Control Solutions

Bard Manufacturing Company, Inc.
Bryan, Ohio 43506
www.bardhvac.com

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SAFETY INSTRUCTIONS

READ ALL INSTRUCTIONS BEFORE USE

Your safety and the safety of others are very important.

We have provided many important safety messages in this manual and on your appliance. Always read and follow all safety messages.

ANSI Z535.5 Definitions:

DANGER: Indicate[s] a hazardous situation which, if not avoided, will result in death or serious injury. The signal word "DANGER" is to be limited to the most extreme situations. DANGER [signs] should not be used for property damage hazards unless personal injury risk appropriate to these levels is also involved.

WARNING: Indicate[s] a hazardous situation which, if not avoided, could result in death or serious injury. WARNING [signs] should not be used for property damage hazards unless personal injury risk appropriate to this level is also involved.

CAUTION: Indicate[s] a hazardous situation which, if not avoided, could result in minor or moderate injury. CAUTION [signs] without a safety alert symbol may be used to alert against unsafe practices that can result in property damage only.

NOTICE: [this header is] preferred to address practices not related to personal injury. The safety alert symbol shall not be used with this signal word. As an alternative to "NOTICE" the word "CAUTION" without the safety alert symbol may be used to indicate a message not related to personal injury.

DANGER

WARNING

CAUTION

NOTICE

NOTICE

APPLIANCE ACCESSIBLE TO THE GENERAL PUBLIC.

WARNING

Fire hazard.

Maintain minimum 1/4" clearance between the supply air duct and combustible materials in the first 3' feet of ducting.

Failure to do so could result in fire causing damage, injury or death.

WARNING

Electrical shock hazard.

Do not operate this equipment without an earth ground attached and always disconnect the remote electric power supplies before servicing.

Electrical shock can result in serious injury or death.

WARNING

Heavy item hazard.

Use more than one person to handle unit.

Failure to do so could result in unit damage or serious injury.

⚠ WARNING

Electrical shock hazard.

Have a properly trained individual perform these tasks.

Failure to do so could result in electric shock or death.

⚠ CAUTION

Sharp metallic edges.

Take care and wear appropriate protective devices to avoid accidental contact with sharp edges.

Failure to do so can result in personal injury.

⚠ WARNING

Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.

This appliance shall be stored in a room without continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater.)

⚠ WARNING

Do not pierce or burn through copper.

Be aware that the refrigerant used in system may not contain an odor.

Ducts connected to appliance shall not contain a POTENTIAL IGNITION SOURCE.

The following symbols are displayed on units.

This symbol indicates that the unit contains a mildly flammable refrigerant.

Refrigerant Safety Group A2L

This symbol indicates that the refrigerant used is classified as an A2L, or mildly flammable refrigerant.

This symbol indicates that the Operation Manual should be read carefully.

This symbol indicates that a service personnel should be handling this equipment with reference to the Installation Manual.

This symbol indicates that information is available such as the Operation Manual or Installation Manual.

IMPORTANT SAFETY INSTRUCTIONS

⚠ WARNING

To reduce the risk of explosion, fire, death, electric shock, scalding or injury to persons when using this product, follow basic precautions, including the following:

GENERAL

- The equipment covered in this manual is to be installed by trained, experienced service and installation technicians.
- This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
- The refrigerant system is completely assembled and charged. All internal wiring is complete.
- The unit is designed for use with or without duct work. Flanges are provided for attaching the supply and return ducts.
- These instructions explain the recommended method to install the air-cooled self-contained unit and the electrical wiring connections to the unit.
- These instructions and any instructions packaged with any separate equipment required to make up the entire air conditioning system should be carefully read before beginning the installation. Note particularly "Starting Procedure" and any tags and/or labels attached to the equipment.
- While these instructions are intended as a general recommended guide, they do not supersede any national and/or local codes in any way. Authorities having jurisdiction should be consulted before the installation is made. See Additional Publications for information on codes and standards.
- Size of unit for a proposed installation should be based on heat loss calculation made according to methods of Air Conditioning Contractors of America (ACCA). The air duct should be installed in accordance with the Standards of the National Fire Protection Association for the Installation of Air Conditioning and Ventilating Systems of Other Than Residence Type, NFPA No. 90A, and Residence Type Warm Air Heating and Air Conditioning Systems, NFPA No. 90B. Where local regulations are at a variance with instructions, installer should adhere to local codes.

INSTALLATION

- For appliances intended for use at altitudes exceeding 2,000 meters (6,562 feet), the maximum altitude of use shall be stated.
- Before use, the appliance must be properly installed as described in this manual.
- Contact the authorized service technician for repair or maintenance of this unit.
- Contact the installer for installation of this unit.
- The air conditioner is not intended for use by young children or invalids without supervision.
- Young children should be supervised to ensure that they do not play with the air conditioner.
- Installation work must be performed in accordance with the National Electric Code by qualified and authorized personnel only.
- Connect to a properly rated, protected, and sized power circuit to avoid electrical overload.
- Adhere to all industry recommended safety procedures including the use of long-sleeved gloves and safety glasses.
- Use care when unpacking and installing. The edges of the product may be sharp.
- Keep packaging materials out of the reach of children. These materials can pose a suffocation risk to children.
- Auxiliary devices which may be a POTENTIAL IGNITION SOURCE shall not be installed in the duct work. Examples of such POTENTIAL IGNITION SOURCES are hot surfaces with a temperature exceeding 700°C and electric switching devices.

WARNING

OPERATION

- This appliance is not intended for use by persons (including children) with reduced physical, sensory, or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
- Use this appliance only for its intended purpose.
- Never attempt to operate this appliance if it is damaged, malfunctioning, partially disassembled, or has missing or broken parts.
- Do not tamper with controls.
- Keep all required ventilation openings clear of obstructions.
- Ducts connected to an appliance shall not contain a POTENTIAL IGNITION SOURCE.

INSTRUCTIONS DE SÉCURITÉ

LIRE TOUTES LES INSTRUCTIONS AVANT UTILISATION

Votre sécurité et celle des autres sont très importantes.

Nous avons fourni de nombreux messages de sécurité importants dans ce manuel et sur votre appareil. Lisez et suivez toujours tous les messages de sécurité.

Définitions ANSI Z535.5 :

DANGER : Indique une situation dangereuse qui, si elle n'est pas évitée, entraînera certainement la mort ou des blessures graves. Le mot « DANGER » doit être limité aux situations extrêmes. Les indications « DANGER » ne doivent pas être utilisées pour les risques de dégâts matériels, à moins qu'il n'existe un risque concomitant de blessures corporelles.

AVERTISSEMENT : Indique une situation dangereuse qui, si elle n'est pas évitée, peut entraîner la mort ou des blessures graves. Les indications « AVERTISSEMENT » ne doivent pas être utilisées pour les risques de dégâts matériels, à moins qu'il n'existe un risque concomitant de blessures corporelles.

ATTENTION : Indique une situation dangereuse qui, si elle n'est pas évitée, peut entraîner des blessures mineures à modérées. Les indications « ATTENTION », sans symbole d'avertissement, peuvent être utilisées pour alerter sur des pratiques dangereuses pouvant entraîner des dégâts matériels uniquement.

REMARQUE : cet avis concerne les pratiques n'entraînant aucune blessure corporelle. Le symbole d'avertissement ne doit pas être utilisé avec ce mot. Comme alternative à « AVIS », le mot « ATTENTION » sans symbole d'avertissement peut être utilisé pour indiquer un message non lié à des blessures corporelles.

AVERTISSEMENT

Risque de choc électrique.

Ne pas faire fonctionner cet équipement sans qu'il soit relié à la terre et toujours débrancher les alimentations électriques avant de procéder aux opérations d'entretien.

Une électrisation peut entraîner des blessures graves ou la mort.

REMARQUE

APPAREIL ACCESSIBLE AU GRAND PUBLIC.

AVERTISSEMENT

Risque d'incendie.

Conserver un dégagement minimal de 6,35 mm/1/4 po entre le conduit d'air soufflé et les matériaux combustibles sur les 900 premiers millimètres (3 pi) du conduit.

Le non-respect de cette consigne entraîne des risques de dégâts matériels, de blessures corporelles ou de décès.

AVERTISSEMENT

Risque lié aux objets lourds.

Plusieurs personnes sont nécessaires à la manipulation de l'unité.

Le non-respect de cette consigne peut entraîner dégâts à l'unité ou des blessures graves.

⚠ AVERTISSEMENT

Risque de choc électrique.

Ces tâches doivent être réalisées par une personne parfaitement qualifiée et formée.

Le non-respect de cette consigne peut entraîner des chocs électriques ou la mort.

⚠ ATTENTION

Arêtes métalliques vives.

Faites attention et portez des dispositifs de protection appropriés pour éviter tout contact accidentel avec des arêtes vives.

Le non-respect de cette consigne peut entraîner des blessures corporelles.

⚠ AVERTISSEMENT

N'utilisez pas de moyens pour accélérer le processus de dégivrage ou pour nettoyer, autres que ceux recommandés par le fabricant.

Cet appareil doit être entreposé dans une pièce sans sources d'inflammation fonctionnant en continu (par exemple : flammes nues, un appareil à gaz en fonctionnement ou un appareil de chauffage électrique en fonctionnement).

⚠ AVERTISSEMENT

Ne percez pas ou ne brûlez pas à travers le cuivre.

Sachez que le réfrigérant utilisé dans le système peut ne pas contenir d'odeur.

Les conduits raccordés à l'appareillage ne doivent pas contenir de SOURCE D'INFLAMMATION POTENTIELLE.

Les symboles suivants sont affichés sur les unités.

Ce symbole indique que l'unité contient un réfrigérant légèrement inflammable.

Refrigerant Safety Group A2L

Ce symbole indique que le réfrigérant utilisé est classé comme réfrigérant A2L ou légèrement inflammable.

Ce symbole indique que le manuel d'utilisation doit être lu attentivement.

Ce symbole indique qu'un membre du personnel de service devrait manipuler cet équipement en se référant au manuel d'installation.

Ce symbole indique que des informations sont disponibles telles que le manuel d'utilisation ou le manuel d'installation.

INSTRUCTIONS DE SÉCURITÉ IMPORTANTES

AVERTISSEMENT

Pour réduire le risque d'explosion, d'incendie, de décès, de choc électrique, d'échaudure ou de blessures pour les personnes lors de l'utilisation de ce produit, suivez les précautions de base, notamment les suivantes :

GÉNÉRALITÉS

- L'équipement couvert dans ce manuel doit être installé par des techniciens de service et d'installation formés et expérimentés.
- Cet appareil n'est pas destiné à être utilisé par des personnes (y compris des enfants) ayant des capacités physiques, sensorielles ou mentales réduites, ou un manque d'expérience et de connaissances, à moins qu'elles n'aient reçu la supervision ou l'instruction concernant l'utilisation de l'appareil par une personne responsable de leur sécurité.
- Le système de réfrigérant est complètement assemblé et chargé. Tout le câblage interne est complet.
- L'unité est conçue pour être utilisée avec ou sans conduits. Des brides sont prévues pour fixer les conduits d'alimentation et de retour.
- Ces instructions expliquent la méthode recommandée pour installer l'unité autonome refroidie à l'air et les connexions de câblage électrique à l'unité.
- Ces instructions et toutes les instructions emballées avec tout équipement distinct requis pour constituer l'ensemble du système de climatisation doivent être lues attentivement avant de commencer l'installation. Notez en particulier « Procédure de démarrage » et les étiquettes et / ou étiquettes attachées à l'équipement.
- Bien que ces instructions soient conçues comme un guide général recommandé, elles ne remplacent en aucune façon les codes nationaux et/ou locaux. Les autorités compétentes devraient être consultées avant que l'installation ne soit effectuée. Voir d'autres publications pour obtenir des renseignements sur les codes et les normes.
- La taille de l'unité pour une installation proposée devrait être basée sur le calcul de la perte de chaleur effectué selon les méthodes de Air Conditioning Contractors of America (ACCA). Le conduit d'air devrait être installé conformément aux Normes de la National Fire Protection Association for the Installation of Air Conditioning and Ventilating Systems of Other Than Residence Type, NFPA No. 90A, et aux Systèmes de chauffage et de climatisation d'air chaud de type résidence, NFPA No. 90B. Lorsque les réglementations locales sont en contradiction avec les instructions, l'installateur doit respecter les codes locaux.

L'INSTALLATION

- Pour les appareils destinés à être utilisés à des altitudes supérieures à 2 000 mètres (6 562 pieds), l'altitude maximale d'utilisation doit être indiquée.
- Avant utilisation, l'appliance doit être correctement installée comme décrit dans ce manuel.
- Communiquez avec le technicien d'entretien autorisé pour la réparation ou l'entretien de cette unité.
- Contactez le programme d'installation pour l'installation de cet appareil.
- Le climatiseur n'est pas destiné à être utilisé par de jeunes enfants ou des invalides sans surveillance.
- Les jeunes enfants devraient être surveillés pour s'assurer qu'ils ne jouent pas avec le climatiseur.
- Les travaux d'installation doivent être effectués conformément au Code national de l'électricité par du personnel qualifié et autorisé uniquement.
- Connectez-vous à un circuit d'alimentation correctement évalué, protégé et dimensionné pour éviter les surcharges électriques.
- Respectez toutes les procédures de sécurité recommandées par l'industrie, y compris l'utilisation de gants à manches longues et de lunettes de sécurité.
- Faites attention lors du déballage et de l'installation. Les bords du produit peuvent être tranchants.
- Gardez les matériaux d'emballage hors de la portée des enfants. Ces matériaux peuvent poser un risque d'étouffement pour les enfants.
- Les dispositifs auxiliaires qui peuvent être une SOURCE D'INFLAMMATION POTENTIELLE ne doivent pas être installés dans les conduits. Des exemples de telles SOURCES D'INFLAMMATION POTENTIELLES sont les surfaces chaudes dont la température dépasse 700 °C et les dispositifs de commutation électrique.

INSTRUCTIONS DE SÉCURITÉ IMPORTANTES

AVERTISSEMENT

OPÉRATION

- Cet appareil n'est pas destiné à être utilisé par des personnes (y compris des enfants) ayant des capacités physiques, sensorielles ou mentales réduites, ou un manque d'expérience et de connaissances, à moins qu'elles n'aient reçu une supervision ou une instruction concernant l'utilisation de l'appareil par une personne responsable de leur sécurité.
- Utilisez cet appareil uniquement aux fins prévues.
- N'essayez jamais de faire fonctionner cet appareil s'il est endommagé, défectueux, partiellement démonté ou s'il a des pièces manquantes ou cassées.
- Ne pas altérer les contrôles.
- Gardez toutes les ouvertures de ventilation nécessaires à l'écart des obstacles.
- Les conduits raccordés à un appareil ne doivent pas contenir de SOURCE D'INFLAMMATION POTENTIELLE.

Getting Other Information and Publications

These publications can help when installing the furnace. They can usually be found at the local library or purchased directly from the publisher. Be sure to consult the current edition of each standard.

National Fuel Gas Code.....ANSI Z223.1/NFPA 54

National Electrical Code.....ANSI/NFPA 70

Standard for the Installation of Air Conditioning and Ventilating System.....ANSI/NFPA 90A

Standard for Warm Air Heating and Air Conditioning Systems..... ANSI/NFPA 90B

Standard for Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances .....NFPA 211

Load Calculation for Residential Winter and Summer Air Conditioning .....ACCA Manual J

Duct Design for Residential Winter and Winter Air Conditioning and Equipment Selection .....ACCA Manual D

Canadian Electrical Code.....CSA C22.1

Canadian Installation Code ..... CAN/CGA B149

For more information, contact these publishers:

ACCA **Air Conditioning Contractors of America**
1712 New Hampshire Avenue, NW
Washington, DC 20009
Telephone: (202) 483-9370

ANSI **American National Standards Institute**
11 West Street, 13th Floor
New York, NY 10036
Telephone: (212) 642-4900
Fax: (212) 302-1286

ASHRAE **American Society of Heating Refrigerating, and Air Conditioning Engineers, Inc.**
1791 Tullie Circle, NE.
Atlanta, GA 30329-2305
Telephone: (404) 636-8400
Fax: (404) 321-5478

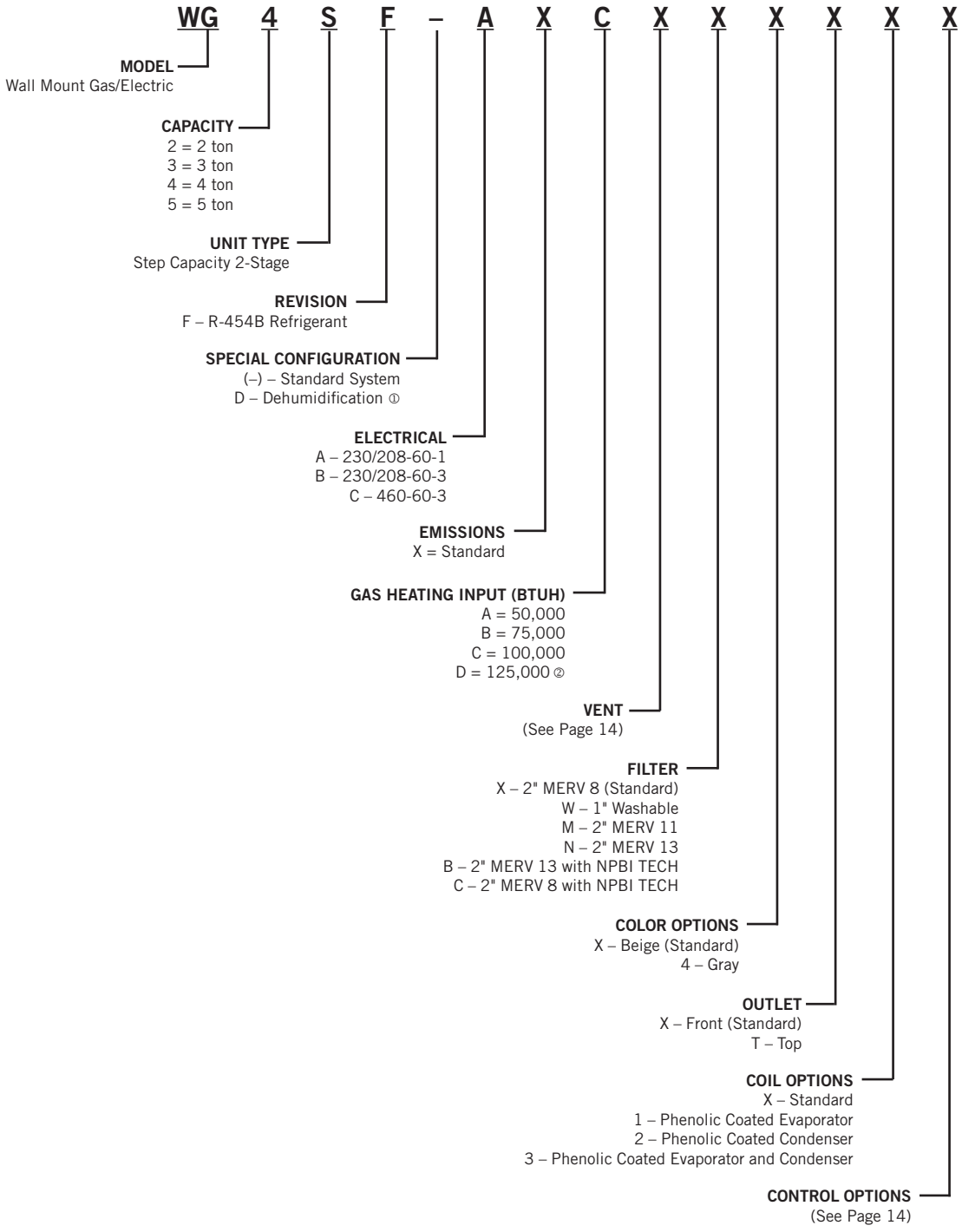
NFPA **National Fire Protection Association**
Batterymarch Park
P.O. Box 9101
Quincy, MA 02269-9901
Telephone: (800) 344-3555
Fax: (617) 984-7057

CSA **Canadian Standards Association**
178 Rexdale Boulevard
Rexdale, Ontario
Canada. M9W 1R3
Telephone: (416) 447-4044

NOTICE

APPLIANCE ACCESSIBLE TO THE GENERAL PUBLIC.

Model Nomenclature



① Reference Supplemental Instructions 7960-967 for dehumidification unit information.

Ventilation Options

		Models	
		WG2SF, WG3SF	WG4SF, WG5SF
Description	Factory Installed Code No.	Field Installed Part No.	Field Installed Part No.
Barometric Fresh Air Damper	X	WGBFAD-3	WGBFAD-5
Blank-Off Plate	B	WGBOP-3	WGBOP-5
Motorized Fresh Air Damper	M	WGMFAD-3A	WGMFAD-5A
Commercial Ventilator – Spring Return	V	WGCRVS-3A	WGCRVS-5A
Commercial Ventilator – Power Return	P	WGCRVP-3A	WGCRVP-5A
Economizer - JADE with Enthalpy Control ①	E	WGECON-S3	WGECON-S5
Energy Recovery Ventilator – 230 Volt	R	WGERV-A3B	WGERV-A5B
Energy Recovery Ventilator – 460 Volt	R	WGERV-C3C	WGERV-C5C

① Low ambient control is required with economizer for low temperature compressor operation.

Air Conditioning Module Options

CCM ①	HPC ②	LPC ③	LAC ④	SK ⑤	Factory Installed Code	Field Installed Part
STD	STD	STD	•		E	CMA-45 (WG*SFD Units) CMA-46 (WG*SF Units)
				•	Field Only	SK111 or CMC-15

STD – Standard equipment.

① CCM Compressor control module has adjustable 30 second to 5 minute delay-on-break timer. On initial power up, or any time the power is interrupted, the delay-on-make will be 2 minutes plus 10% of the delay-on-break setting. There is no delay-on-make during routine operation of the unit. The module also provides the lockout feature (with 1 retry) for high and/or low pressure controls, and a 2-minute timed bypass for low pressure control.

② HPC High pressure control is auto reset. Always used with compressor control module (CCM) which is included. See Note ①.

③ LPC Low pressure control is auto reset. Always used with compressor control module (CCM) which is included. See Note ①.

④ LAC Low ambient control permits cooling operation down to 0°F. (Includes fan cycling control + Freeze Stat)

⑤ SK CMC-15 is PTCR Start Kit can be used with all -A single phase models. Increases starting torque 2-3X. Not used for -B or -C 3-phase models. Do not use if SK111 is used.

⑤ SK SK111 Start Capacitor and Potential Relay Start Kit can be used with all -A single phase models. Increases starting torque 9x. Not used for -B or -C 3-phase models. Do not use if CMC-15 is used.

TABLE 1A
Electrical Specifications
Standard Models

Model	Rated Volts & Phase	No. Field Power Circuits	Single Circuit	
			① Minimum Circuit Ampacity	② Maximum External Fuse or Circuit Breaker
WG2SF-A	230/208-1	1	18	20
WG2SF-B	230/208-3	1	13	15
WG2SF-C	460-3	1	8	15
WG3SF-A	230/208-1	1	24	30
WG3SF-B	230/208-3	1	18	25
WG3SF-C	460-3	1	9	15
WG4SF-A	230/208-1	1	31	35
WG4SF-B	230/208-3	1	23	30
WG4SF-C	460-3	1	12	15
WG5SF-A	230/208-1	1	40	50
WG5SF-B	230/208-3	1	26	30
WG5SF-C	460-3	1	12	15

① These "Minimum Circuit Ampacity" values are to be used for sizing the field power conductors. Refer to the National Electrical code (latest version), Article 310 for power conductor sizing. ***CAUTION:*** *When more than one field power circuit is run through one conduit, the conductors must be derated. Pay special attention to note 8 of Table 310 regarding Ampacity Adjustment Factors when more than three (3) current carrying conductors are in a raceway.*

② Maximum size of the time delay fuse or circuit breaker for protection of field wiring conductors.

NOTE: *The Maximum Overcurrent Protection (MOCP) value listed is the maximum value as per UL 60335 calculations for MOCP (branch-circuit conductor sizes in this chart are based on this MOCP). The actual factory-installed overcurrent protective device (circuit breaker) in this model may be lower than the maximum UL 60335 allowable MOCP value, but still above the UL 60335 minimum calculated value or Minimum Circuit Ampacity (MCA) listed.*

IMPORTANT: *While this electrical data is presented as a guide, it is important to electrically connect properly sized fuses and conductor wires in accordance with the National Electrical Code and all local codes.*

TABLE 1B
Electrical Specifications
Dehumidification Models

Model	Rated Volts & Phase	No. Field Power Circuits	Single Circuit	
			① Minimum Circuit Ampacity	② Maximum External Fuse or Circuit Breaker
WG2SFDA	230/208-1	1	18	20
WG2SFDB	230/208-3	1	13	15
WG2SFDC	460-3	1	8	15
WG3SFDA	230/208-1	1	25	30
WG3SFDB	230/208-3	1	19	25
WG3SFDC	460-3	1	10	15
WG4SFDA	230/208-1	1	31	35
WG4SFDB	230/208-3	1	23	30
WG4SFDC	460-3	1	12	15
WG5SFDA	230/208-1	1	40	50
WG5SFDB	230/208-3	1	26	30
WG5SFDC	460-3	1	12	15

① These "Minimum Circuit Ampacity" values are to be used for sizing the field power conductors. Refer to the National Electrical code (latest version), Article 310 for power conductor sizing. ***CAUTION:*** *When more than one field power circuit is run through one conduit, the conductors must be derated. Pay special attention to note 8 of Table 310 regarding Ampacity Adjustment Factors when more than three (3) current carrying conductors are in a raceway.*

② Maximum size of the time delay fuse or circuit breaker for protection of field wiring conductors.

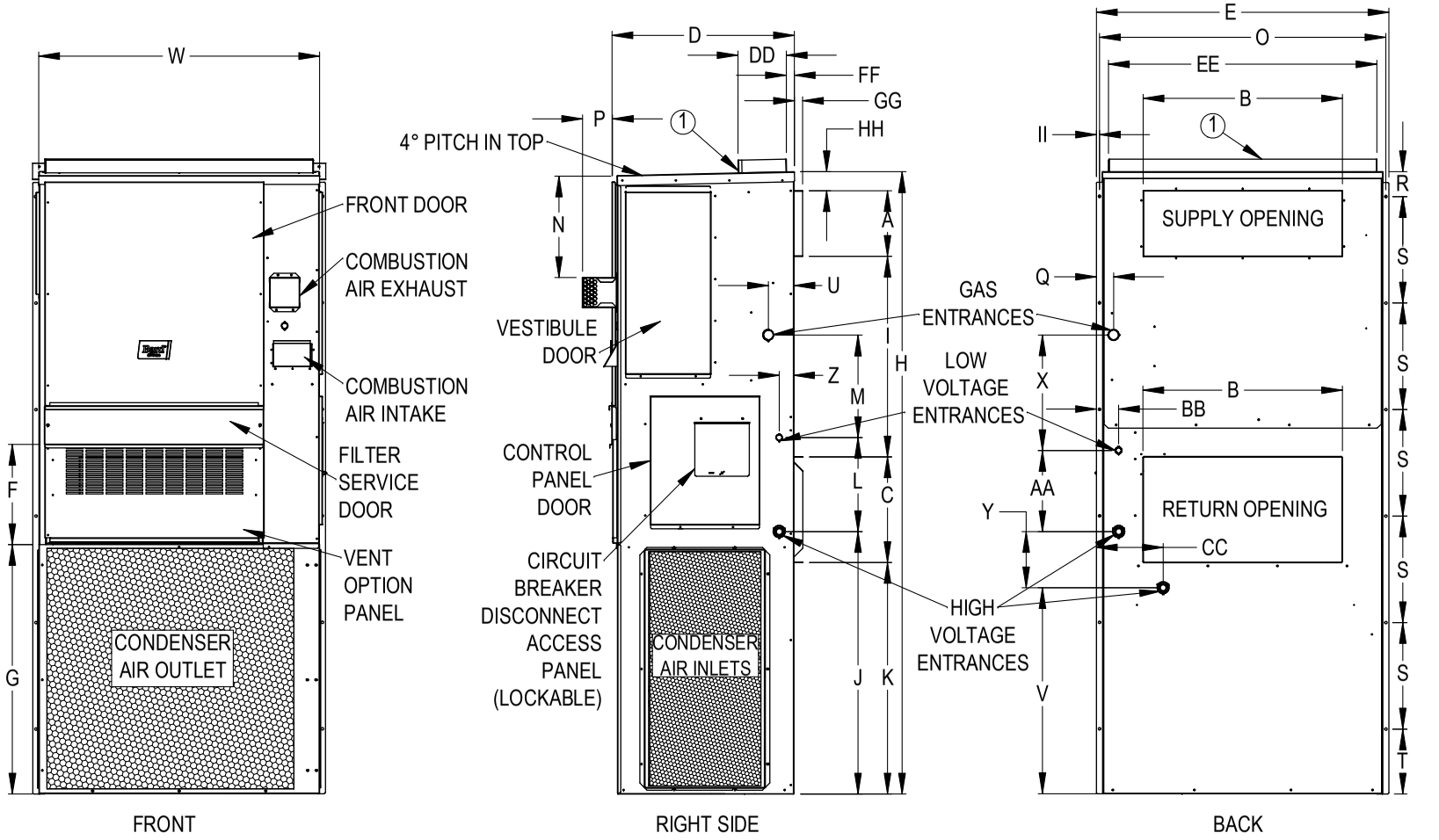
NOTE: *The Maximum Overcurrent Protection (MOCP) value listed is the maximum value as per UL 60335 calculations for MOCP (branch-circuit conductor sizes in this chart are based on this MOCP). The actual factory-installed overcurrent protective device (circuit breaker) in this model may be lower than the maximum UL 60335 allowable MOCP value, but still above the UL 60335 minimum calculated value or Minimum Circuit Ampacity (MCA) listed.*

IMPORTANT: *While this electrical data is presented as a guide, it is important to electrically connect properly sized fuses and conductor wires in accordance with the National Electrical Code and all local codes.*

FIGURE 1
Unit Dimensions

UNIT	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
WG2SF-WG3SF	7.88	27.88	13.88	24.25	40	14.88	25.63	81.63	30	27.38	27.5	14.12	15.44	15.31	39.25	4.5	2.5	5.88
WG4SF-WG5SF	9.88	29.88	15.88	27.25	43.81		31.63	93.25		33.38	28.75				42.88			3.75

UNIT	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH	II	
WG2SF-WG3SF	12 - 7 HOLES	3.75	2.88	22.9	38	17.84	4.44	2.25	11.44	3.25	9	7.25	36.25	1.13	1.25	2	0.38	
WG4SF-WG5SF	16 - 6 HOLES		3.88	24.9	42	17.34	8.44		12.19		10		40.25			2.75	0.44	



MIS-4549

① Top outlet models only

⚠ CAUTION

During the initial firing of the burners there will probably be some amount of smoke issued to the circulating air stream as the result of residual oil burning off of the heat exchanger tubes. This oil is required during the forming process of the stainless steel heat exchanger tubes to facilitate the bending. OSHA or the National Toxicology Program does not list the oil as a carcinogen. In vapor form this may be irritating to the eyes or could cause headaches. This is a one-time occurrence, and ventilation of the space may be required depending upon the space being conditioned.

1. Transportation Damage

All units are packed securely in shipping containers. All units should be carefully inspected upon arrival for damage. In the event of damage, the consignee should:

1. Note on delivery receipt of any damage to container.
2. Notify carrier promptly, and request an inspection.
3. In case of concealed damage, the carrier must be notified as soon as possible within 15 days after delivery.
4. Claims for any damage, apparent or concealed, should be filed with the carrier, using the following supporting documents:
   - A. Original Bill of Lading, certified copy or indemnity bond.
   - B. Original paid freight bill of indemnity in lieu thereof.
   - C. Original invoice or certified copy thereof showing trade and other discounts or deductions.
   - D. Copy of the inspection report issued by carrier's representative at the time damage is reported to carrier.

2. Important

The equipment covered in this manual is to be installed by trained, experienced service and installation technicians. All duct work or portions thereof not in the conditioned space should be properly insulated in order to both conserve energy and prevent condensation or moisture damage.

3. General Information

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

Children should be supervised to ensure that they do not play with the appliance.

These instructions explain the recommended method to install the air cooled self-contained electric air conditioning and gas heating unit and the electrical wiring connections and gas piping to the unit. The refrigerant system is completely assembled and charged. All internal wiring is complete.

These instructions and any instructions packaged with any separate equipment required to make up the entire heating/cooling system should be carefully read before beginning the installation.

While these instructions are intended as a general recommended guide, they do not supersede any national and/or local codes in any way. Authorities having jurisdiction should be consulted before the installation is made. See page 12 for information on codes and standards.

Size of unit for proposed installation should be based on heat loss/heat gain calculations made according to methods of Air Conditioning Contractors of America (ACCA). The air duct should be installed in accordance with the Standards of the National Fire Protection Association for the Installation of Air Conditioning and Ventilating Systems of Other Than Residence Type, NFPA No. 90A, and Residence Type Warm Air Heating and Air Conditioning Systems, NFPA No. 90B. Where local regulations are at a variance with instructions, installer should adhere to local codes.

4. Application

This is a fan-assisted forced air gas furnace with electric air conditioning for outdoor installation. A fan-assisted furnace is equipped with an integral mechanical means to draw products of combustion through the combustion chamber and heat exchanger. The furnace installation must conform with local building codes and ordinances or, in their absence, with the National Fuel Gas Code ANSI Z223.1 or CAN/CGA-B149.1, latest edition, and the National Electrical Code ANSI/NFPA-7 or CSA C22.1, latest edition. It is the personal responsibility and obligation of the purchaser to contact a qualified installer to assure that installation is adequate and is in conformance with governing codes and ordinances.

5. Duct Work

The unit is designed for use with or without duct work (see **WARNING**). Flanges are provided for attaching the supply and return ducts. All duct work, supply and return, must be properly sized for the design

airflow requirement of the equipment. Air Conditioning Contractors of America (ACCA) is an excellent guide to proper sizing.

⚠ WARNING

In all cases, there must be a metal duct connection made to the supply air flange, and a 1" clearance to combustibles must be maintained to this duct connection.

For free blow applications, a metal sleeve must be used in the wall opening itself, again maintaining a 1" clearance to combustibles.

Failure to use the sheet metal can cause fire resulting in property damage, injury, or death.

Refer to Tables 12, 13, 14 and 15 for maximum static pressure available for duct design.

See Figures 3A, 3B and 3C and clearance information in Section 9 and Table 2 for additional information.

Design the duct work according to methods given by the Air Conditioning Contractors of America (ACCA). When duct runs through unheated spaces, it should be insulated with a minimum of 1" of insulation. Use insulation with a vapor barrier on the outside of the insulation. Flexible joints should be used to connect the duct work to the equipment in order to keep the noise transmission to a minimum.

A 1" clearance to combustible material for the first 3' of duct attached to the outlet air frame is required. See wall mounting instructions and Figures 2A, 2B, 3A, 3B and3C for further details.

Ducts through the walls must be insulated and all joints taped or sealed to prevent air or moisture entering the wall cavity.

Some installations may not require any return air duct. A metallic return air grille is required with installations not requiring a return air duct. The spacing between louvers on the grille shall not be larger than 5/8".

Any grille that meets with the 5/8" louver criteria may be used. It is recommended that Bard Return Air Grille or Return Filter Grille be installed when no return duct is used. Contact distributor or factory for ordering information. If using a return air filter grille, filters must be of sufficient size to allow a maximum velocity of 400 fpm.

NOTE: *If no return air duct is used, applicable installation codes may limit this cabinet to installation only in a single story structure.*

6. High Altitude Applications

Ratings of gas utilization equipment are based on sea level operation and need not be changed for operation at elevations up to 6000'. For operation at elevations above 6000' and in the absence of specific recommendations from the local authority having jurisdiction, equipment ratings shall be reduced as specified in Section 21.

7. Wall Mounting Information

1. Two holes for the supply and return air openings must be cut through the wall as detailed in Figure 4.
2. On wood-frame walls, the wall construction must be strong and rigid enough to carry the weight of the unit without transmitting any unit vibration.
3. Concrete block walls must be thoroughly inspected to ensure that they are capable of carrying the weight of the installed unit.

8. Mounting the Unit

1. These units are secured by wall mounting brackets which secure the unit to the outside wall surface at both sides. A bottom mounting bracket is provided for ease of installation but is not required.

⚠ CAUTION

If the bottom bracket is used, be certain the bracket is secured to the outside wall surface in a way sufficient to support the entire weight of the unit during installation until side mounting brackets are secured.

2. The WG4SF and WG5SF models are suitable for 0 clearance on the installation mounting wall and to the top. For all models, the supply air duct flange and the first 3' of supply air duct require a minimum of 1" clearance to combustible material. The WG2SF and WG3SF models are suitable for 0 clearance on the installation mounting wall, but require 1" clearance to the top if combustible material overhang projects above the unit (see Figures 3A, 3B and 3C). If a combustible wall, use a minimum of Figure 1 “A” dimension plus 2" and “B” dimension plus 2". See Figures 4 and 5 for details.

⚠ WARNING

Failure to provide the 1" clearance between the supply duct and a combustible surface for the first 3' of duct can result in fire causing damage, injury or death.

3. Locate and mark lag bolt locations and bottom mounting bracket location.
4. Mount bottom mounting bracket.
5. Hook top rain flashing under back bend of top. Top rain flashing is shipped secured to the right side of the back.
6. Position unit in opening and secure with 5/16" lag bolts; use 7/8" diameter flat washers on the lag bolts. Use lag bolts long enough to support the unit's weight when mounted to the structure. This length may be dependent on the type of construction.
7. Secure rain flashing to wall and caulk across entire length of top (see Figures 2A and 2B).
8. On side-by-side installations, maintain a minimum of 20" clearance on right side to allow access to control panel and burner compartment, and to allow proper airflow to the outdoor coil. Additional clearance may be required to meet local or national codes.

FIGURE 2A
Mounting Instructions
for WG2SF and WG3SF

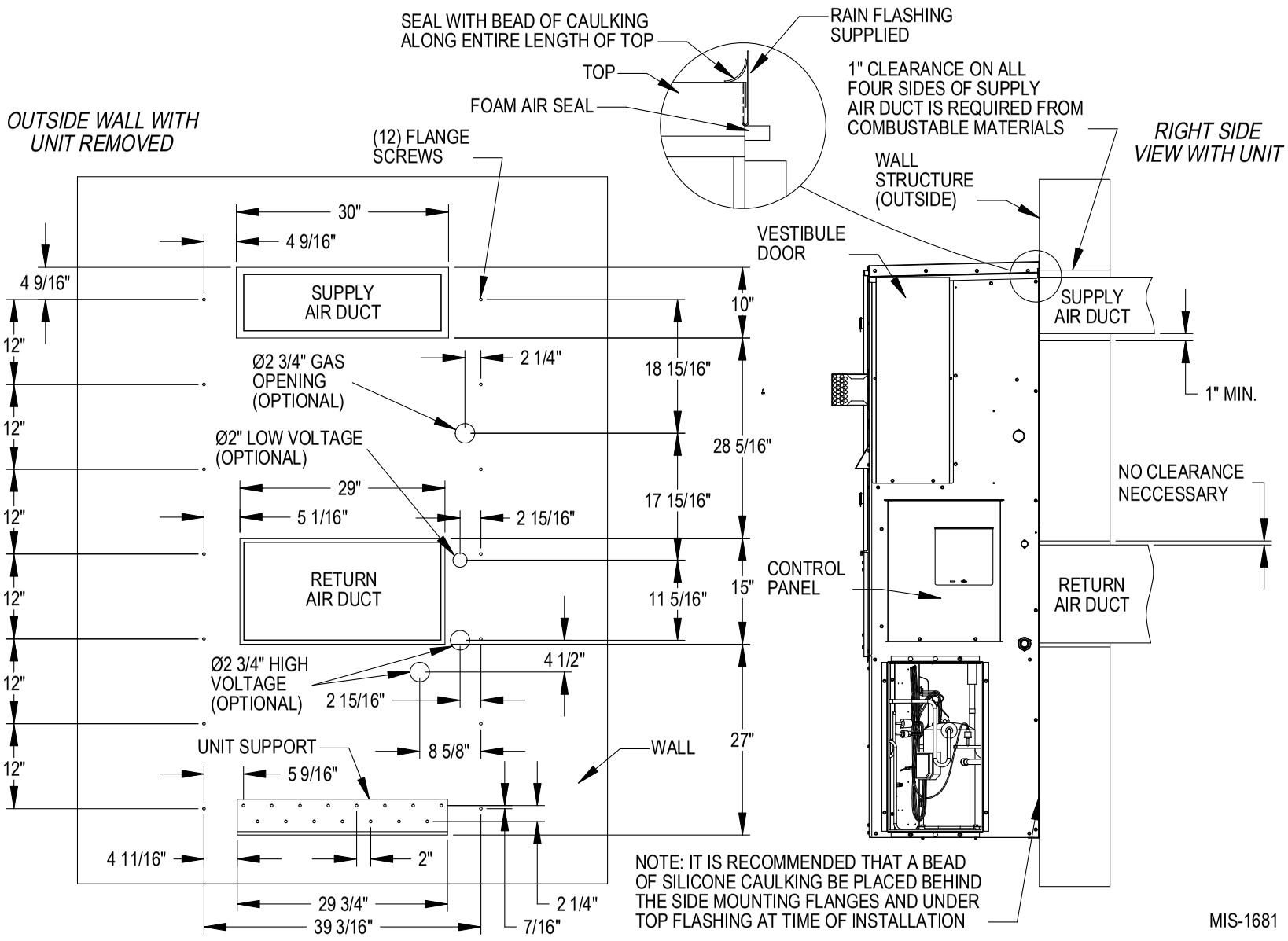


FIGURE 2B
Mounting Instructions
for WG4SF and WG5SF

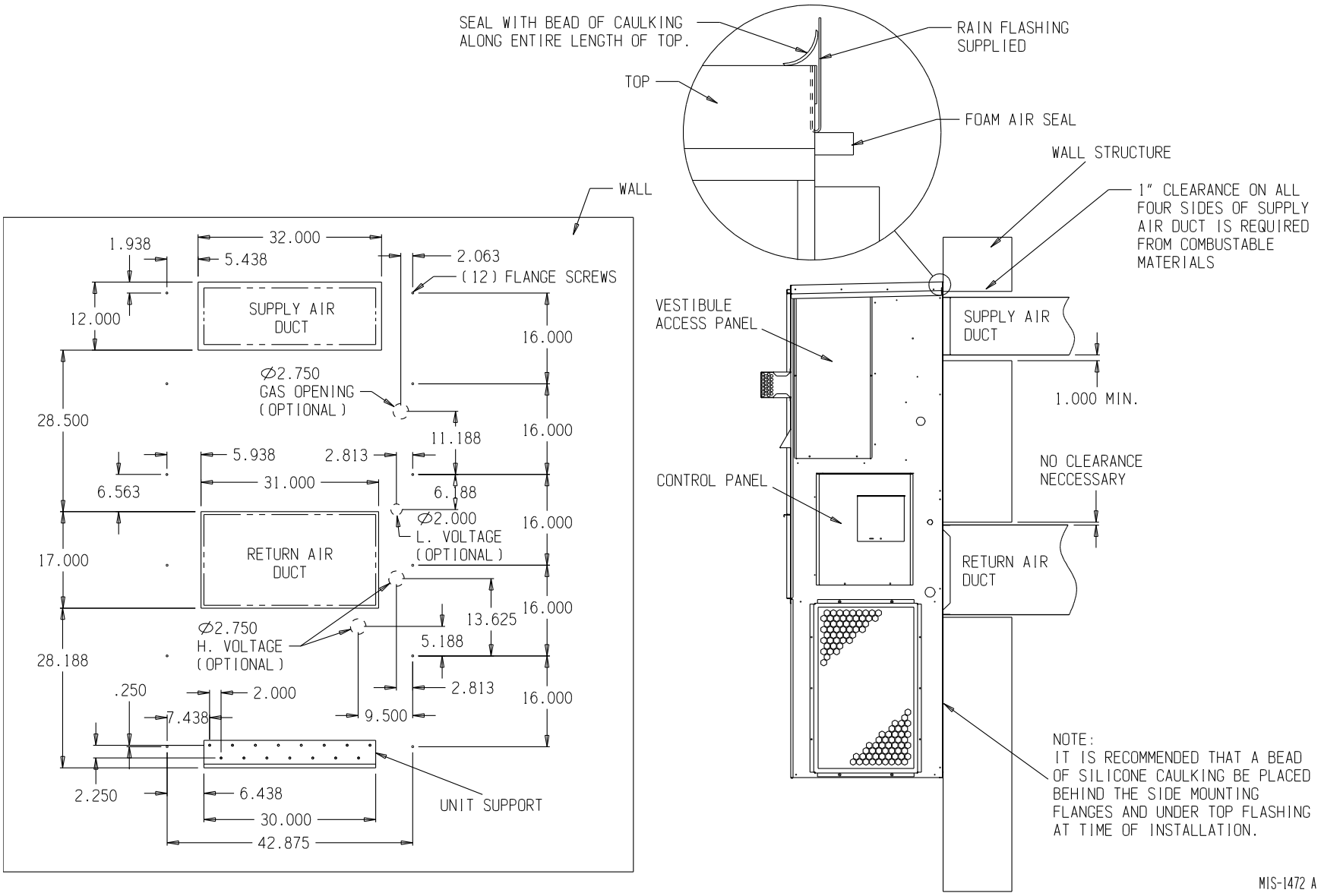
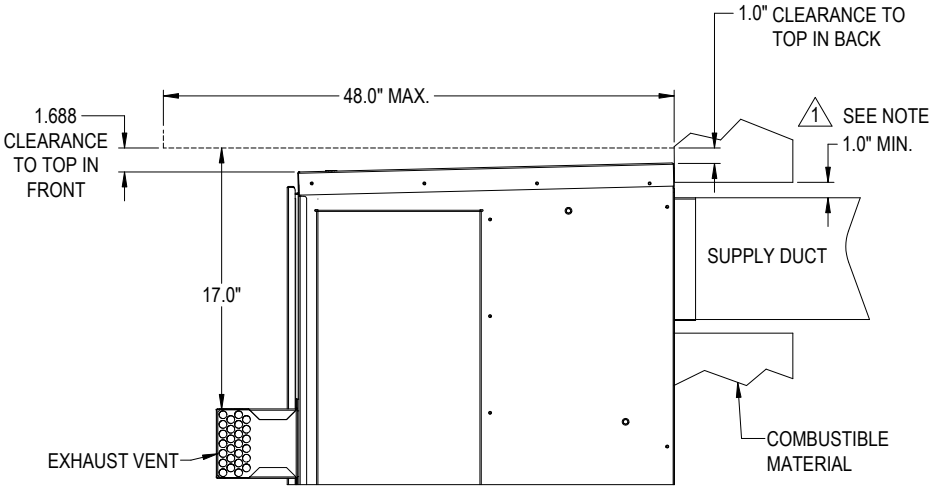


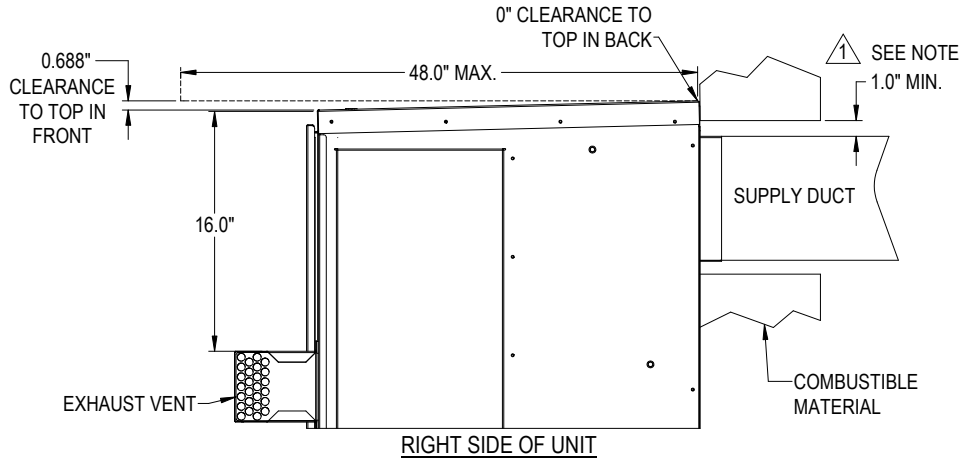
FIGURE 3A
Combustible Clearance
for WG2SF and WG3SF Models



1 SIDE SECTION VIEW OF SUPPLY AIR DUCT FOR WALL MOUNTED UNIT SHOWING 1.0" CLEARANCE TO ALL COMBUSTIBLE SURFACES.

MIS-1682

FIGURE 3B
Combustible Clearance
for WG4SF and WG5SF Models



1 SIDE SECTION VIEW OF SUPPLY AIR DUCT FOR WALL MOUNTED UNIT SHOWING 1.0" CLEARANCE TO ALL COMBUSTIBLE SURFACES.

MIS-1714

⚠ WARNING

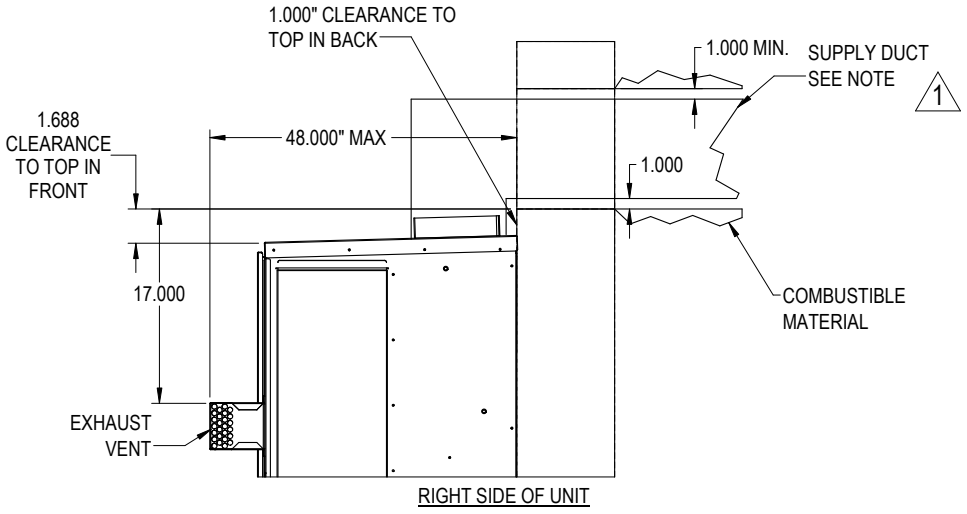
A minimum of 1" clearance must be maintained between the supply air duct and combustible materials. This is required for the first 3' of ducting.

It is important to ensure that the one 1" minimum spacing is maintained at all points.

Failure to do this could result in overheating the combustible material and may result in a fire causing damage, injury or death.

FIGURE 3C
Combustible Clearance
for Top Outlet WG2SF, WG3SF, WG4SF and WG5SF Models

TOP OUTLET
WG2/3SF

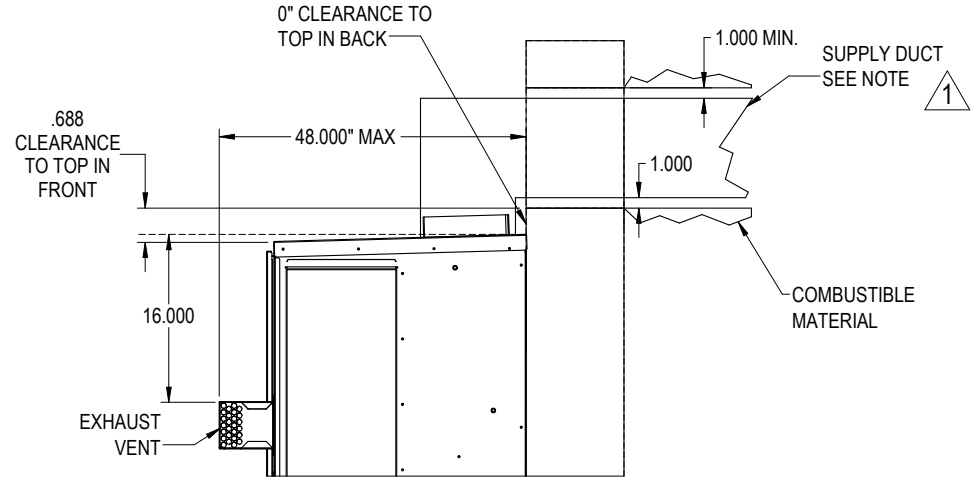


RIGHT SIDE OF UNIT

1 SIDE SECTION VIEW OF SUPPLY AIR DUCT FOR WALL MOUNTED UNIT SHOWING 1.0" CLEARANCE TO ALL COMBUSTIBLE SURFACES.

MIS-4597

TOP OUTLET
WG4/5SF



RIGHT SIDE OF UNIT

1 SIDE SECTION VIEW OF SUPPLY AIR DUCT FOR WALL MOUNTED UNIT SHOWING 1.0" CLEARANCE TO ALL COMBUSTIBLE SURFACES.

MIS-4597

⚠ WARNING

A minimum of 1" clearance must be maintained between the supply air duct and combustible materials. This is required for the first 3' of ducting.

It is important to ensure that the one 1" minimum spacing is maintained at all points.

Failure to do this could result in overheating the combustible material and may result in a fire causing damage, injury or death.

FIGURE 4
Wall Mounting Instructions

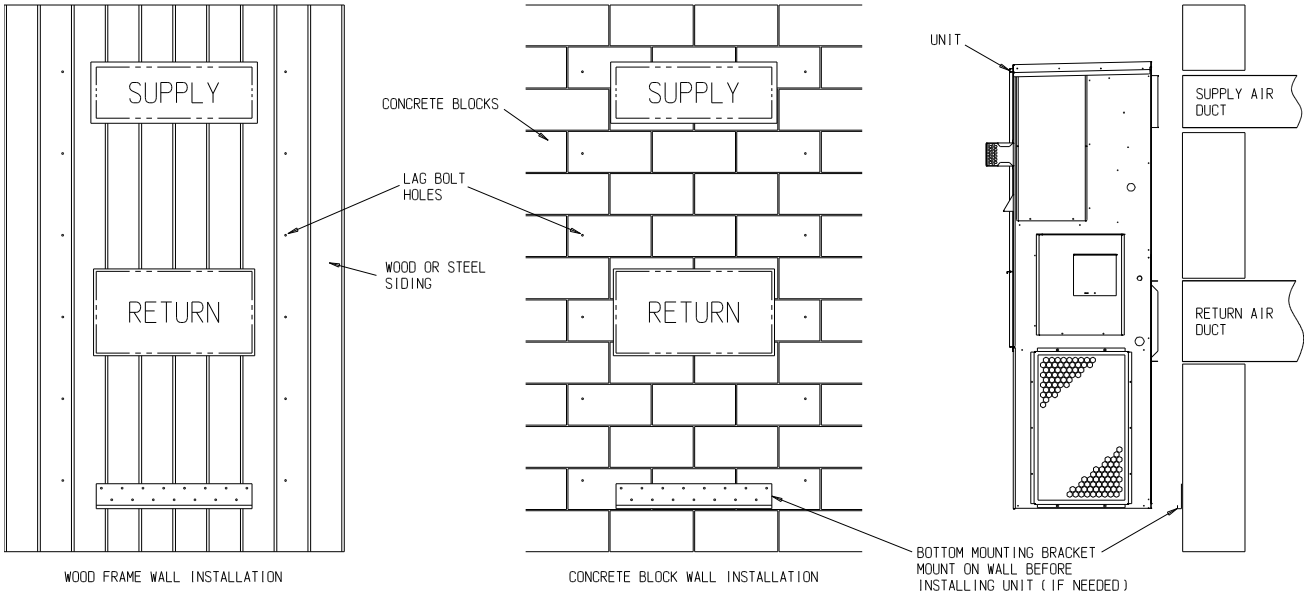


FIGURE 5
Wall Mounting Instructions

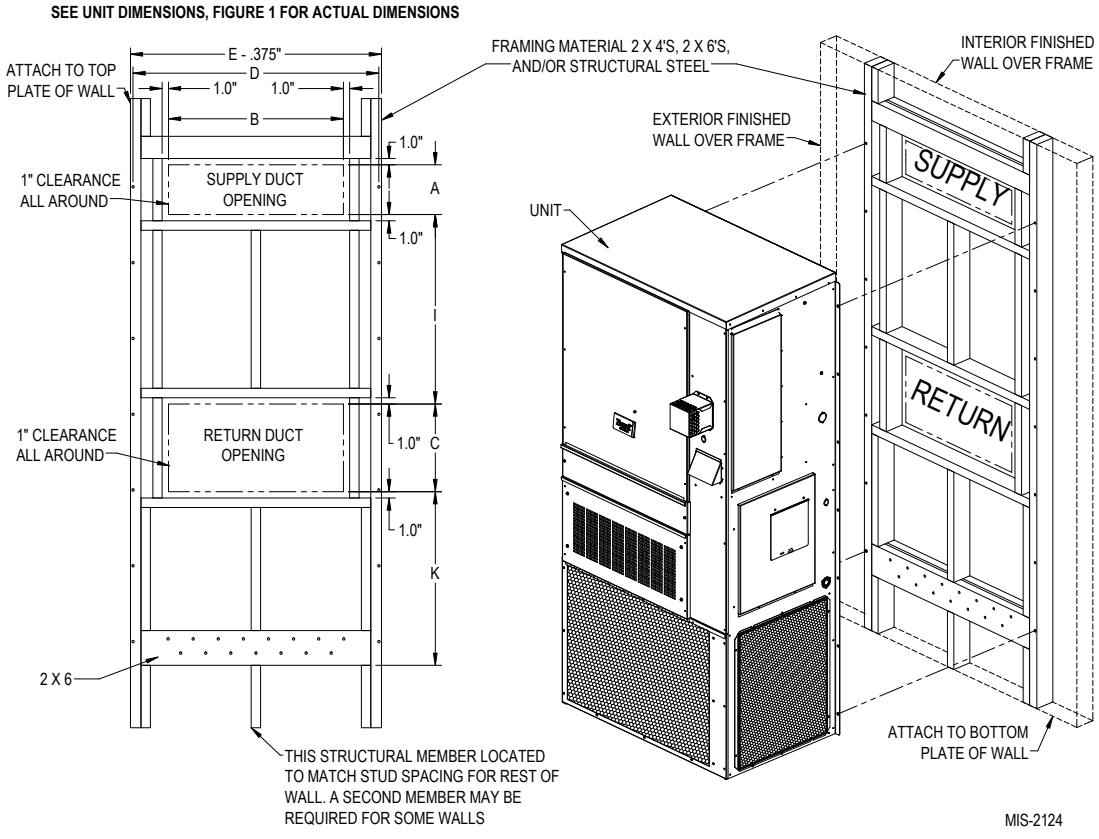


FIGURE 6
Common Wall Mounting Installations

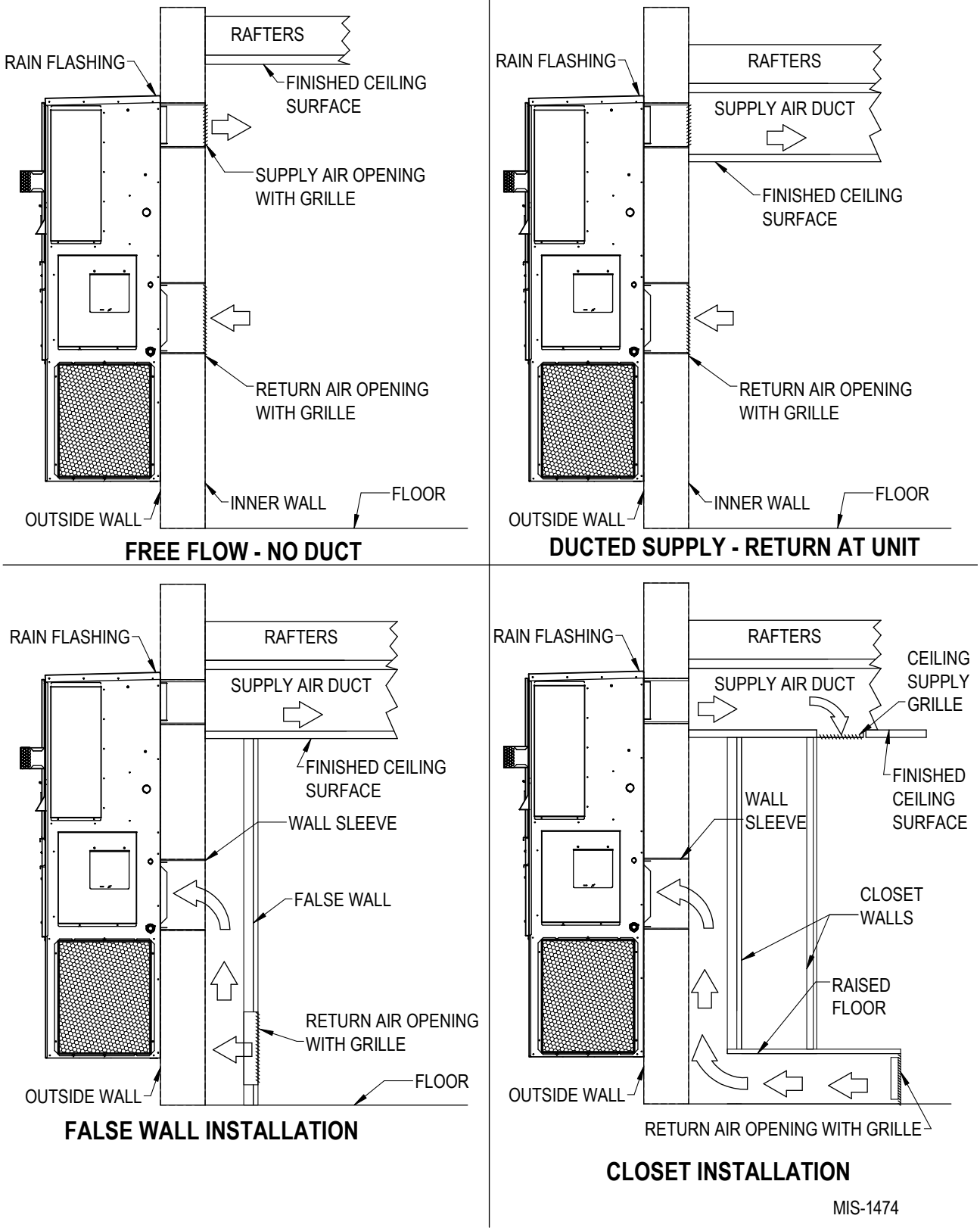
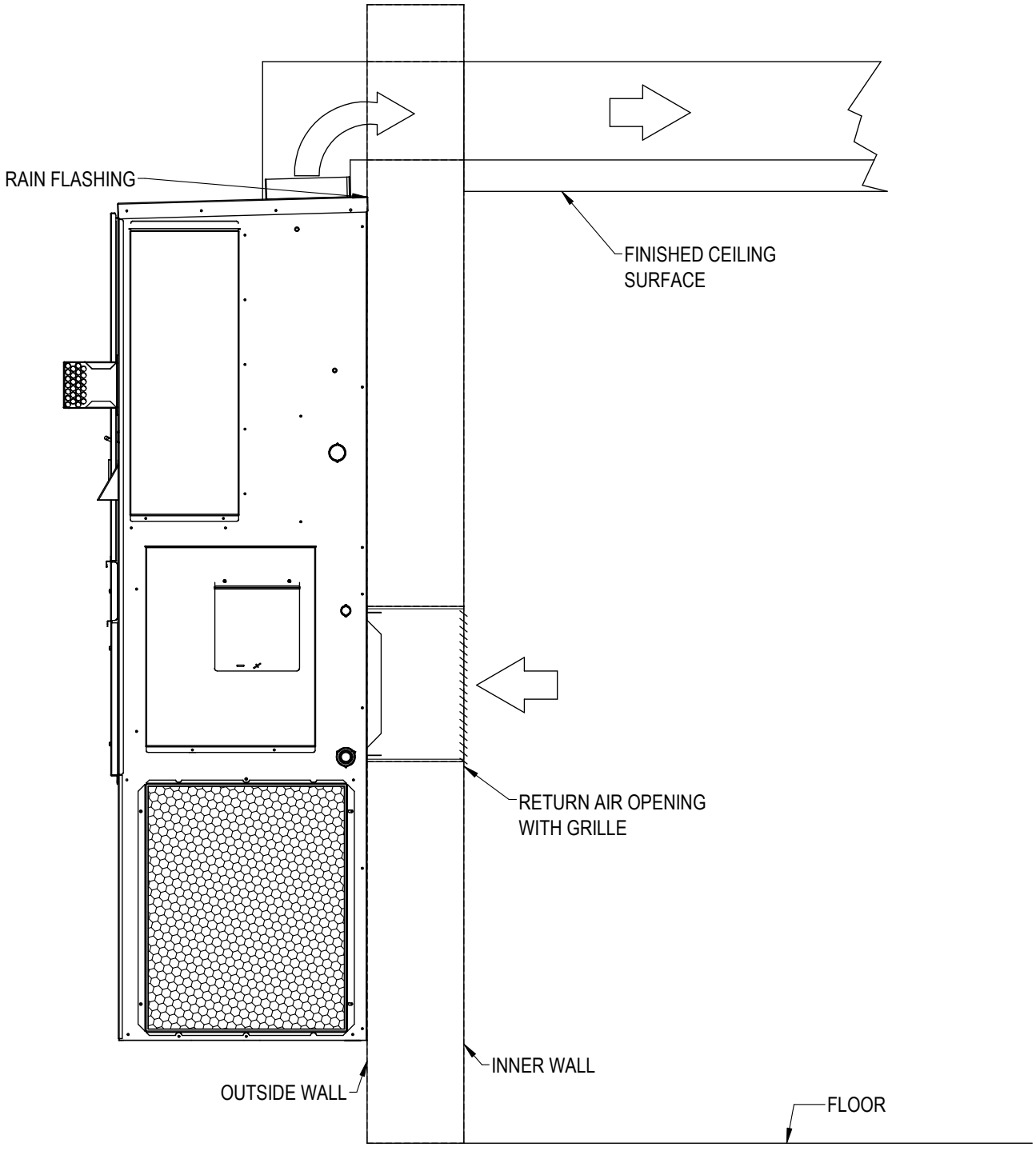


FIGURE 7
Top Outlet Installation



DUCTED SUPPLY TOP OUTLET- RETURN AT UNIT

MIS-4596

NOTE: *Inconsistent supply temperatures during furnace operation may be remedied with the installation of a mixing baffle into the supply flange or ductwork of the unit.*

9. Clearances

Minimum clearances, as specified in Table 2, must be maintained from adjacent structures to provide adequate fire protection, adequate combustion air and room for service personnel.

While minimum clearances are acceptable for safety reasons, they may not allow adequate air circulation around the unit for proper operation in the cooling mode. Whenever possible, it is desirable to allow additional clearance, especially around the condenser inlet and discharge openings. **Do not install the unit in a location that will permit discharged air from the condenser to recirculate to the condenser inlet.**

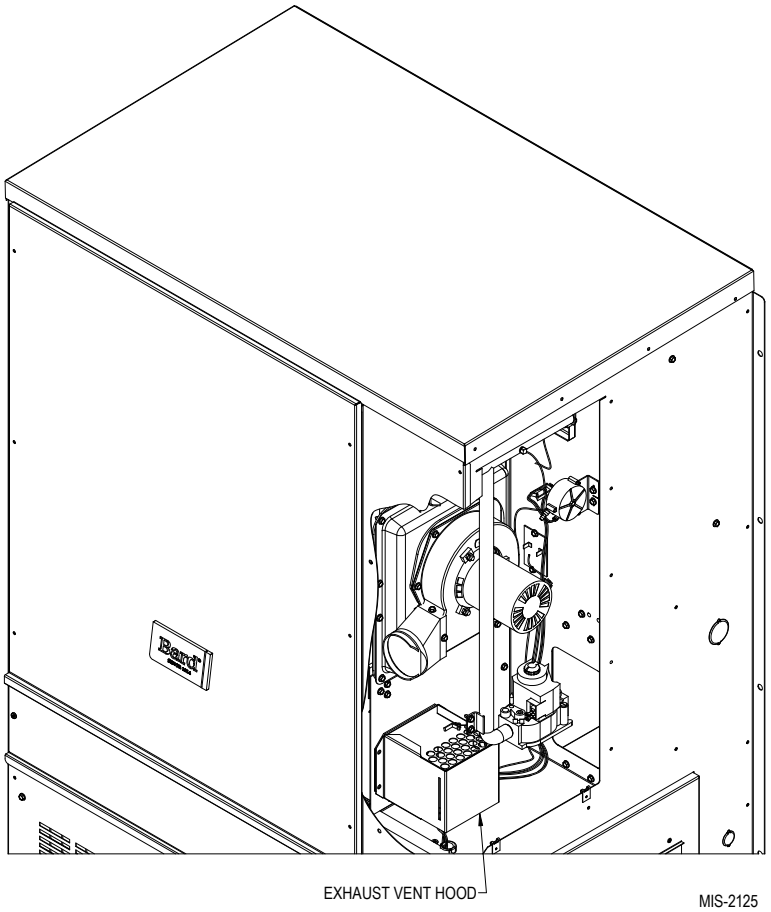
⚠ WARNING

Clearances from combustible materials must be maintained as specified. Failure to maintain clearances could cause fire resulting in property damage, injury or death.

TABLE 2
Minimum Installation Clearances

Outlet Duct (from combustible materials)	1" first 3'
Vent Hood (from combustible materials)	17"*
Condenser Inlet	20"
Top	See Figures 3A and 3B
Burner Service	20"
Combustible Base (Wood or Class A, B or C roof covering material)	0
* See Figures 3A and 3B	

FIGURE 8
Location of Vent Hood in Shipping



10. Vent Terminal and Combustion Air Inlet Hood

The vent terminal is shipped in the burner compartment (see Figure 8). Remove the two shipping screws and separate the two-piece assembly. Install the vent terminal by using the four screws provided. **Do not cut or trim gasket. Make sure gasket is in place.** See Figure 9. The combustion air intake vent hood is factory installed.

11. Optional Vertical Venting

With the optional vertical venting kit (VVK-5), this unit may be vented vertically through a roof or overhang. The kit includes a stainless steel transition drain tee, silicone sealant and drain tubing.

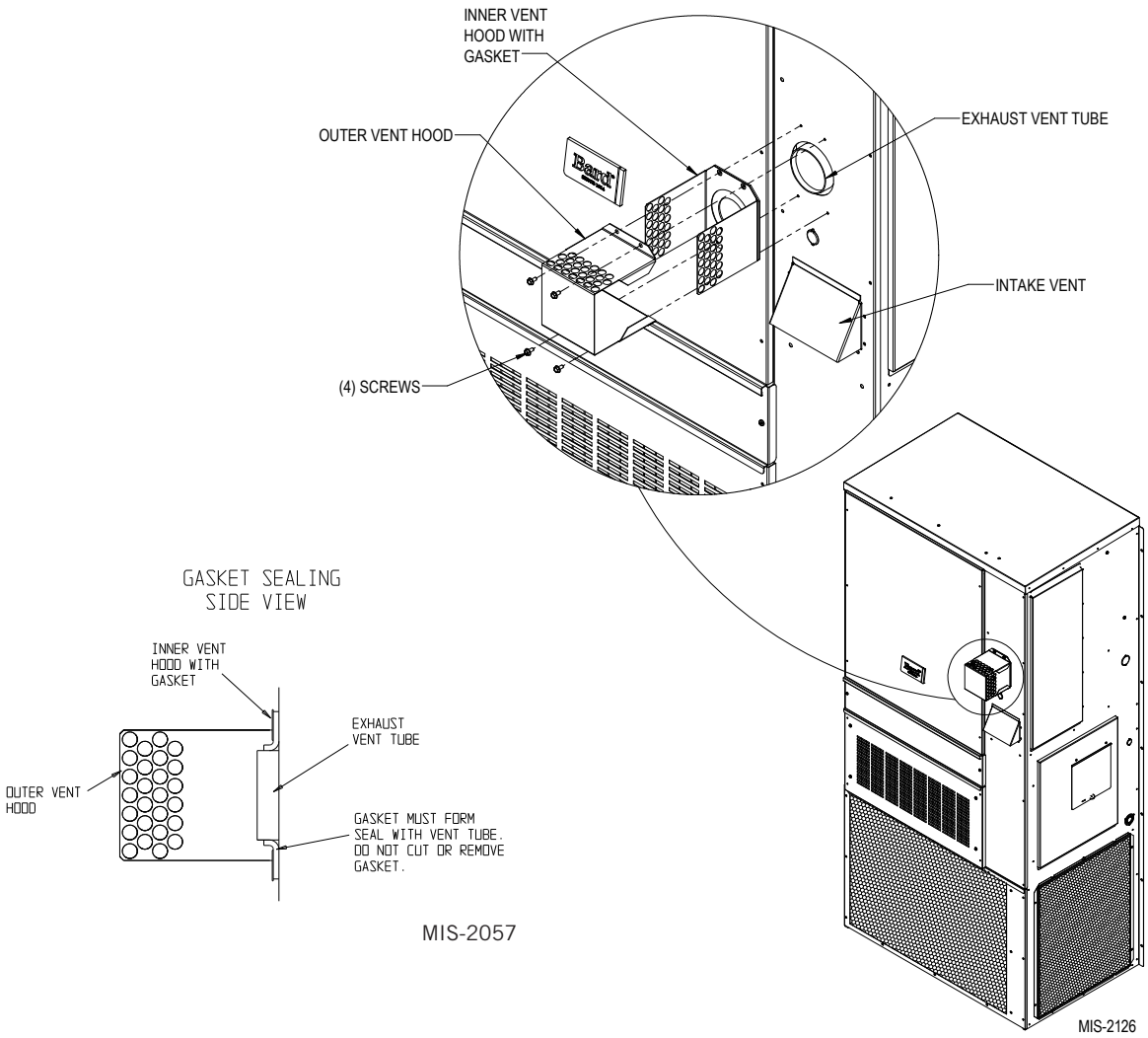
If unit is installed with vertical vent kit, annually inspect the vent system and drain. Replace any portion of the vent system that shows signs of deterioration. Make sure drain is open and free of obstruction.

⚠ CAUTION

Vent terminal must be installed as shown in Figure 9 for proper operation of the heating system.

NOTE: The inner vent hood gasket is designed to stretch over and seal around the combustion air blower outlet. This is a very critical seal to prevent water and flue products from entering the unit. Care must be taken to insure this gasket is in place and sealing properly.

FIGURE 9
Vent Terminal and Combustion Air Intake



12. Vent Resizing Instructions

When an existing furnace is removed from a venting system servicing other appliances, the venting system is likely to be too large to properly vent the remaining attached appliances.

The following steps shall be followed with each of the appliances remaining connected to the common venting system, placed in operation one at a time while the other appliances remaining connected to the common venting system are not in operation.

1. Seal any unused openings in the venting system.
2. Inspect the venting system for proper size and horizontal pitch, as required in the National Fuel Gas code, ANSI Z223.1 or the CAN/CGA B149 Installation Codes and these instructions. Determine that there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.

/3. In so far as is practical, close all building doors and windows and all doors between the space in which the appliance(s) connected to the venting system are located and other spaces of the building. Turn on clothes dryers and any appliances not connected to the venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.

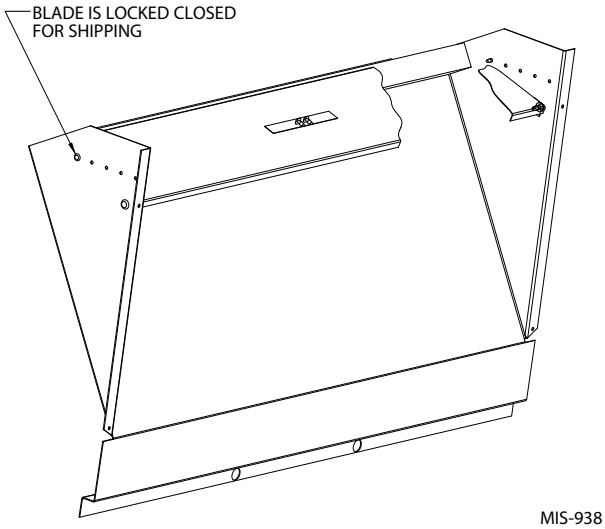
4. Follow the lighting instructions. Place the appliance being inspected in operation. Adjust thermostat so appliance shall operate continuously.
5. Test for draft hood equipped appliance spillage at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle.
6. After it has been determined that each appliance connected to the venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-burning appliances to their previous conditions of use.
7. If improper venting is observed during any of the above tests, the venting system must be corrected.

13. Fresh Air Intake

All units are built with fresh air inlet slots punched in the service panel.

If the unit is equipped with a fresh air damper assembly, the assembly is shipped already attached to the unit. The damper blade is locked in the closed position. To allow the damper to operate, the maximum and minimum blade position stops must be installed (see Figure 10).

FIGURE 10
Fresh Air Damper



All capacity, efficiency and cost of operation information as required for Department of Energy "Energyguide" Fact Sheets is based upon the fresh air blank-off plate in place and is recommended for maximum energy efficiency.

The blank-off plate is available upon request from the factory and is installed in place of the fresh air damper shipped with each unit.

One of several other ventilation options may be installed. Refer to model number and/or supplemental installation instructions.

14. Condensate Drain

A plastic drain hose extends from the drain pan at the top of the unit down to the unit base. There are openings in the unit base for the drain hose to pass through. In the event the drain hose is connected to a drain system of some type, it must be an open or vented type system to assure proper drainage.

15. Wiring – Main Power

⚠WARNING

For personal safety, turn off electric power at service entrance panel before making any electrical connections. Failure to do so could result in electric shock or fire.

Refer to unit rating plate maximum fuse or circuit breaker size. Each outdoor unit is marked with a "Minimum Circuit Ampacity". This means that the

field wiring used must be sized to carry that amount of current. All models are suitable only for connection with copper wire. Each unit and/or wiring diagram will be marked "*Use Copper Conductors Only*". These instructions ***must be*** adhered to. Refer to the National Electrical Code (NEC) for complete current carrying capacity data on the various insulation grades of wiring material. All wiring must conform to NEC and all local codes.

The electrical data lists fuse sizes for all models.

The unit rating plate lists a "Maximum Time Delay Relay Fuse" or circuit breaker that is to be used with the equipment. The correct size must be used for proper circuit protection and also to assure that there will be no nuisance tripping due to the momentary high starting current of the compressor motor.

The disconnect access door on this unit may be locked to prevent unauthorized access to the disconnect. To convert for the locking capability, bend the tab located in the bottom left-hand corner of the disconnect opening under the disconnect access panel straight out. This tab will now line up with the slot in the door. When shut, a padlock may be placed through the hole in the tab preventing entry.

⚠WARNING

Failure to provide an electrical power supply shut off means could result in electric shock or fire.

Electrical Grounding

When installed, the furnace must be electrically grounded in accordance with local codes, or in the absence of local codes, with the National Electrical Code, ANSI/NFPA 70 or Canadian Electrical Code, CSA22.1, latest edition. Use a copper wire from green ground wire on the furnace to a grounded connection in the service panel or a properly driven and electrically grounded ground rod.

⚠WARNING

Failure to provide a proper electrical ground could result in electric shock or fire.

Field-Installed Equipment

Wiring to be done in the field between the furnace and devices not attached to the furnace, or between separate devices which are field installed and located, shall conform with the temperature limitation for Type T wire {63° F rise (36° C)} when installed in accordance with the manufacturer's instructions.

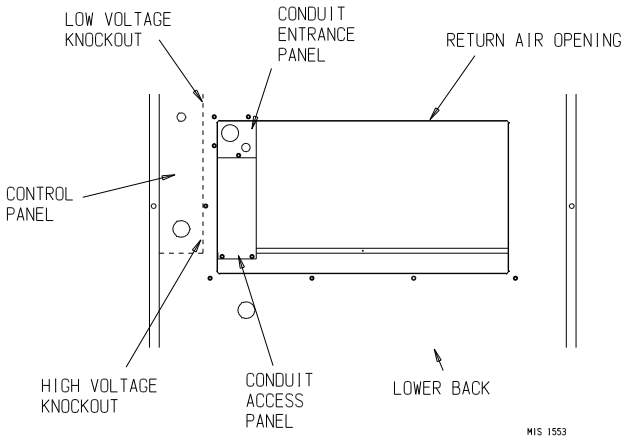
Installation of Flexible Conduit Through Return Air Opening

NOTE: *To allow proper clearance between the control panel and any vent options, 90° conduit fittings must be used on the back of the control panel.*

Installing Conduit (see Figure 11)

1. Remove conduit access panel if required to gain access to area behind control panel.
2. Remove low voltage and high voltage knockouts located in rear of control panel.
3. Run low voltage conduit through 7/8 bushing located in conduit entrance plate and secure to low voltage opening in rear of control panel.
4. Run high voltage conduit through 1-3/4 bushing located in conduit entrance plate and secure to high voltage opening in rear of control panel.
5. Replace conduit access panel if required to complete installation.
6. Seal around conduit in conduit entrance plate.

FIGURE 11
Installation of Flexible Conduit



16. Wiring – Low Voltage Wiring

230/208 Volt Units

All 230/208V 1 phase and 3 phase equipment have dual primary voltage transformers. All equipment leaves the factory wired on 240V tap. For 208V operation, reconnect from 240V to 208V tap. The acceptable operating voltage range for the 240 and 208V taps are:

Tap: 240 Range: 253 – 216
Tap: 208 Range: 215 – 197

NOTE: *The voltage should be measured at the field power connection point in the unit and while the unit is operating at full load (maximum amperage operating condition).*

For low voltage wiring, an 18 gauge copper, color-coded cable is recommended. See Table 5 for more information.

460 Volt Units

All models are equipped with transformer wired to 480V tap.

Direct Digital Controls (DDC)

For total and proper control using DDC, a total of six controlled outputs are required (five if no ventilation is installed).

TABLE 3
Low Voltage Connections for DDC Control

	Standard Units	Units w/ Economizers
Fan Only	Energize G	Energize G
1st Stage Cooling Mode	Energize Y1, G	Energize Y1, G
2nd Stage Cooling Mode	Energize Y1, Y2, G	Energize Y1, Y2, G
Gas Heating	Energize B/W1	Energize B/W1
Ventilation	Energize A	Energize A
Dehumidification (if employed)	Energize D	Energize D

Low Voltage (24VAC) Connections

These units use a 24-volt AC low voltage circuit.

C terminal is the *24VAC common and is grounded.*

G terminal is the *indoor blower input*.

Y1 terminal is the *1st Stage cooling input.* Economizer stage when used.

Y2 terminal is the *2nd Stage cooling input.* Compressor cooling stage when economizer is used.

B/W1 terminal is the *gas heat*.

A terminal is the *ventilation option input*. This terminal energizes any factory-installed ventilation option and indoor blower.

D terminal is the *dehumidification input*. If installed, this terminal energizes any factory-installed dehumidification option.

L terminal is *24 volt alarm active output*.

Unit Shutdown Feature (Standard on All Models)

The RT terminal is the 24VAC transformer output, and the R terminal is the 24VAC hot terminal for the operation of the equipment. RT and R are connected with a brass jumper bar which can be removed and RT and R connected to an external NC (normally closed) contact such as a fire/smoke detector that will cause shutdown of the equipment upon activation.

Dehumidification Feature (Optional)

The D terminal is the 24VAC input for dehumidification operation on dehumidification hot gas reheat equipped units. When 24VAC is applied to the D terminal, a 3-way valve solenoid is energized. The reheat coil located behind the evaporator coil is then active to reheat the supply air during cooling mode. This allows humidity to be removed from the air entering the unit without a large amount of sensible cooling capacity. During dehumidification, the indoor blower speed is reduced to help with the humidity removal. A humidity sensing thermostat or humidistat is required to control dehumidification operation. See Supplemental Instructions 7960-867 for additional information on dehumidification unit operation.

Ventilation Features (Optional)

See ventilation instructions provided with unit for low voltage wiring.

Low Ambient Control (LAC)

The low ambient control is a pressure switch that is attached to the liquid line of the system and monitors high side pressure. Operation of the LAC occurs as outdoor temperatures drop below 60°F. On/Off and modulating controls are used which operate based on pressure changes caused by outdoor temperature changes. On/Off LAC operation cycles the condenser fan on/off to maintain desired liquid pressure while modulating LAC operation is factory adjusted and slows the condenser fan speed (rpm).

If the unit is being installed with any ventilation package, a Bard LAC kit must be installed. Failure to utilize an LAC with any air conditioner can cause coil freeze up.

Refrigerant Leak Detection System (RDS)

The RDS continuously monitors air in the indoor section of the unit for leaked refrigerant. In the event of a refrigerant leak, the RDS will initiate mitigation actions to disperse the refrigerant and prevent potentially dangerous refrigerant concentration levels. The RDS will also provide a 24VAC alarm output signal on the "L" terminal of the unit low-voltage terminal strip.

Refer to page 63 for more information.

17. Thermostats

TABLE 4
CO_2 Controllers

Part Number	Predominate Features
8403-056	CO_2 ventilation control with digital display. Normally Open SPST (Default: Close at 800ppm)
8403-096	Normally Open SPST relay closes-on-rise 24V dual wave length sensor. Default setting 950ppm, adjustable to 0-2000ppm Default off setting 1000ppm, adjustable to 0-200 ppm can be calibrated

TABLE 5
Thermostat Wire Size

Transformer VA	FLA	Wire Gauge	Maximum Distance in Feet
55	2.3	18 gauge 16 gauge 14 gauge 12 gauge	60 100 160 250

TABLE 6
Humidity Controls

Part Number	Predominate Features
8403-100* (H6062A1000)	Electronic humidistat DPST; Humidity range 10-90% with adjustable stops
8403-047 (H200-10-21-10)	Electronic dehumidstat SPST closes-on-rise; Humidity range 10-90% with adjustable stops

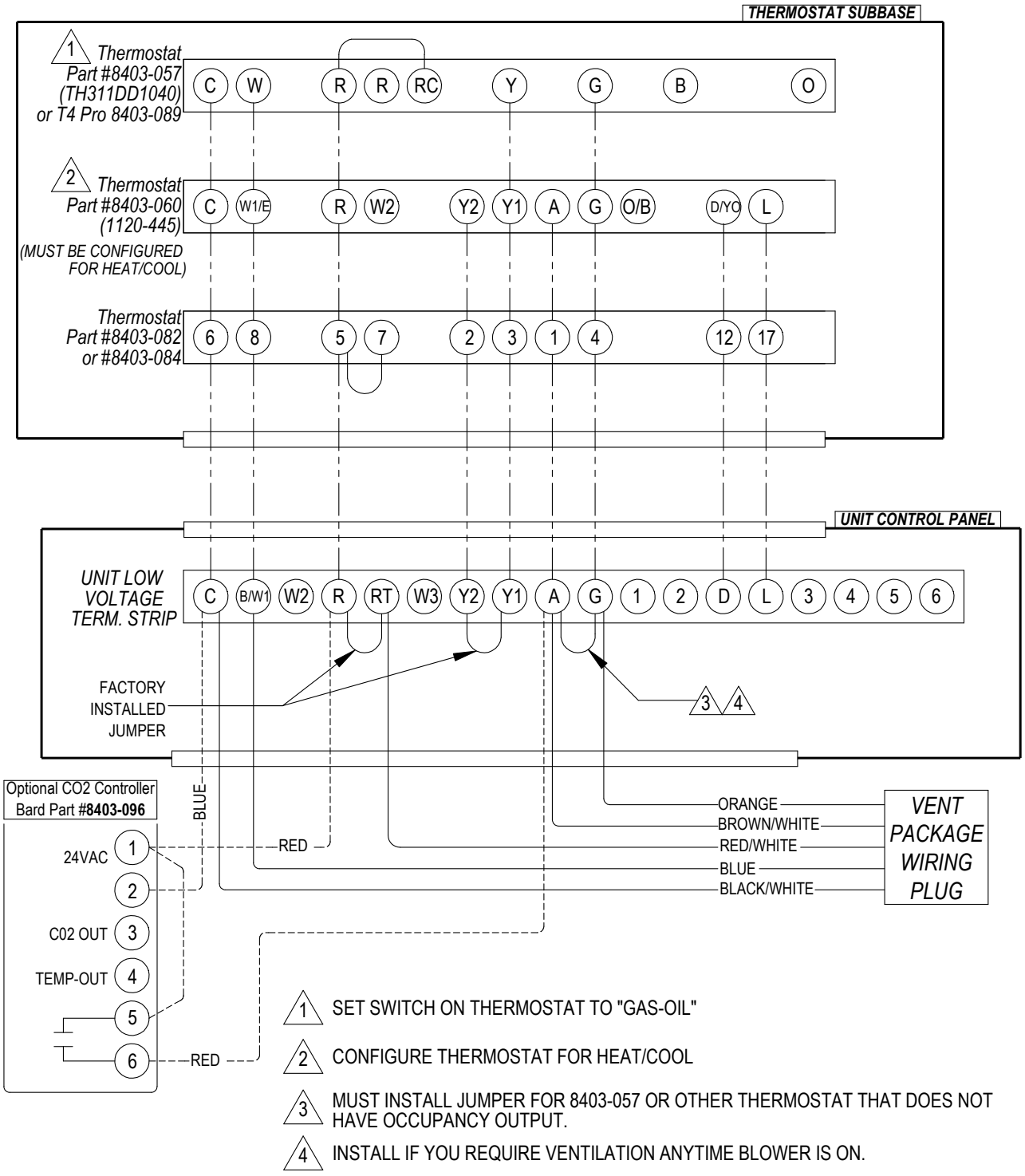
* If using Honeywell HumidiPRO (H6062A1000) 8403-100 humidistat, it must be configured for dehumidification in the menu.

TABLE 7
Wall Thermostats

Thermostat	Predominant Features
8403-060 1120-445	3 Stage Cool, 3 Stage Heat Programmable/Non-Programmable Electronic HP or Conventional Auto or Manual changeover
8403-081 (BrightStat)	2 Stage Cool, 2 Stage Heat Programmable/Non-Programmable Electronic HP or Conventional Auto or Manual Changeover with Humidity and Occupancy Sensor BACnet (Thermostat option only permissible for units up to 12 kW electric heat)
8403-082 (VT8600U5500B)	2 stage Cool, 2 stage Heat Programmable/Non-Programmable Electronic HP or Conventional, Auto or Manual changeover with Occupancy Sensor, BACnet
8403-083 (BrightStat)	2 Stage Cool, 2 Stage Heat Programmable/Non-Programmable Electronic HP or Conventional Auto or Manual Changeover with Humidity (only) BACnet (Thermostat option only permissible for units up to 12 kW electric heat)
8403-084 (VT8600U5000B)	2 stage Cool, 2 stage Heat Programmable/Non-Programmable Electronic HP or Conventional, Auto or Manual changeover with BACnet
8403-089 (T4 Pro)	1 stage Cool, 1 stage Heat – Heat Pump 1 stage Cool, 1 stage Heat – Conventional Programmable/Non-Programmable Electronic Auto or Manual changeover
8403-090 (T6 Pro)	2 stage Cool; 3 stage Heat – Heat Pump 2 stage Cool; 2 stage Heat – Conventional Programmable/Non-Programmable Electronic Auto or Manual changeover
8403-092 (T6 Pro Wi-Fi)	2 stage Cool, 3 stage Heat – Heat Pump 2 stage Cool, 2 stage Heat – Conventional Programmable/Non-Programmable Electronic Auto or Manual changeover Wi-Fi

NOTE:
Upon initial unit power-on, unit blower and inducer motor may operate for a short time before turning off.

FIGURE 12
Low Voltage Wiring
All Units Except Units with Economizers



1 SET SWITCH ON THERMOSTAT TO "GAS-OIL"

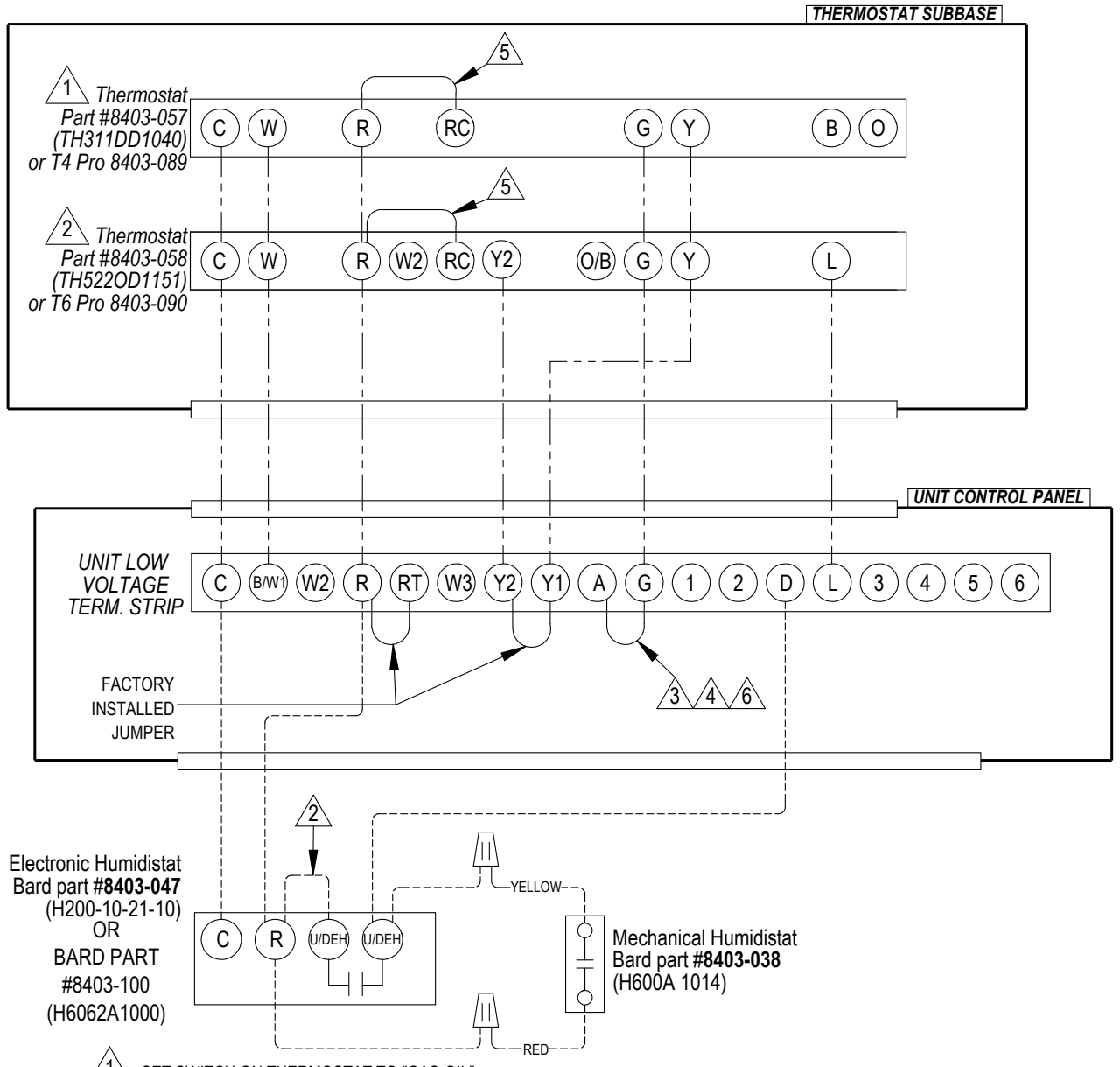
2 CONFIGURE THERMOSTAT FOR HEAT/COOL

3 MUST INSTALL JUMPER FOR 8403-057 OR OTHER THERMOSTAT THAT DOES NOT HAVE OCCUPANCY OUTPUT.

4 INSTALL IF YOU REQUIRE VENTILATION ANYTIME BLOWER IS ON.

MIS-4554

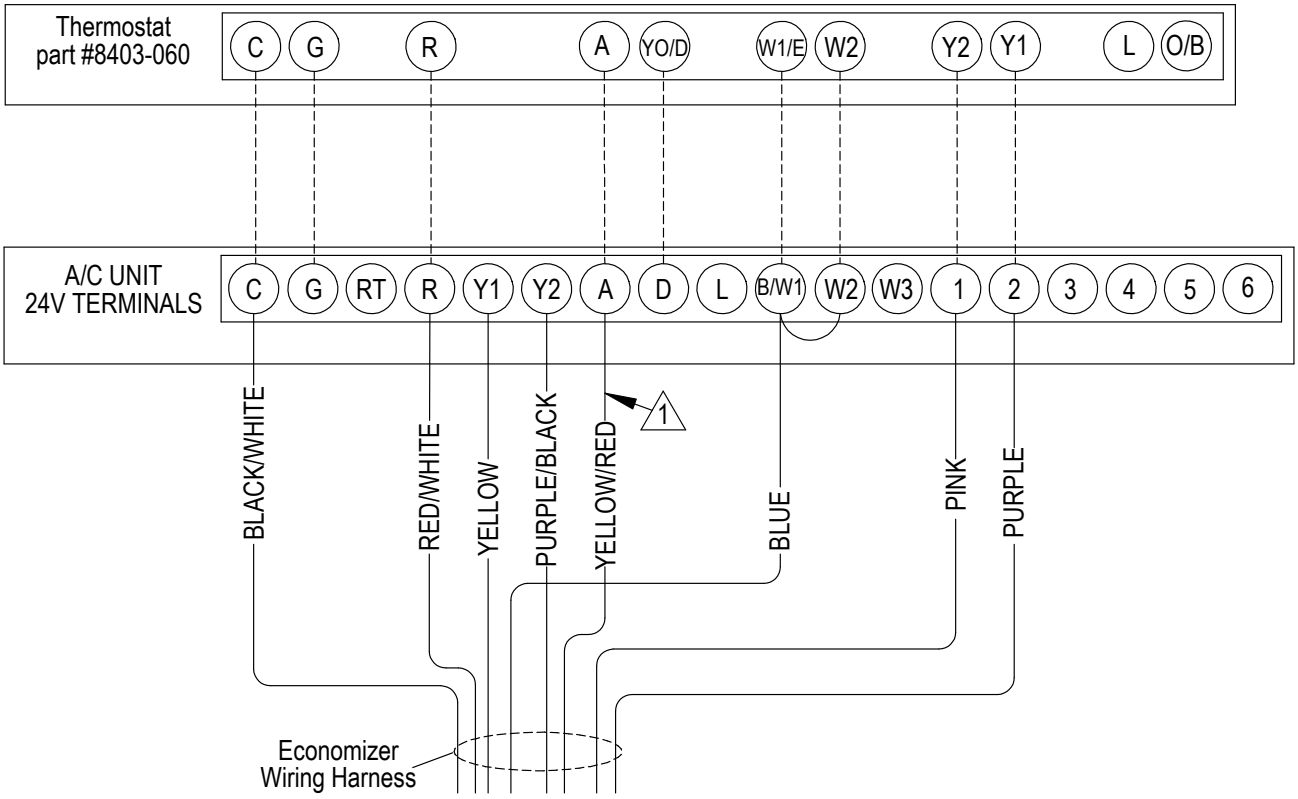
FIGURE 13
Low Voltage Wiring
Thermostat Using Separate Temperature and Humidity Controllers



1. SET SWITCH ON THERMOSTAT TO "GAS-OIL"
2. CHANGE "SYSTEM TYPE", SET UP FUNCTION 1, FROM 5 (2 HEAT/ 1 COOL HEAT PUMP) TO 6 (2 HEAT/ 2 COOL CONVENTIONAL).
3. MUST INSTALL JUMPER FOR 8407-057, 8403-058 OR OTHER THERMOSTAT THAT DOES NOT HAVE OCCUPANCY OUTPUT.
4. INSTALL IF YOU REQUIRE VENTILATION ANYTIME BLOWER IS ON.
5. FACTORY INSTALLED JUMPER.
6. IF THIS "A" TO "G" JUMPER IS INSTALLED, YOU MUST INSURE TO REMOVE VENTILATION PACKAGE ORANGE WIRE FROM TERMINAL "G".
7. HUMIDISTAT 8403-100 WILL NEED TO BE CONFIGURED FOR DEHUMIDIFICATION IN THE MENU. SEE USER'S MANUAL

MIS-4553

FIGURE 14
Schéma de câblage basse tension
Climatisation à 2 niveaux avec chauffage au gaz avec économiseur WGECON

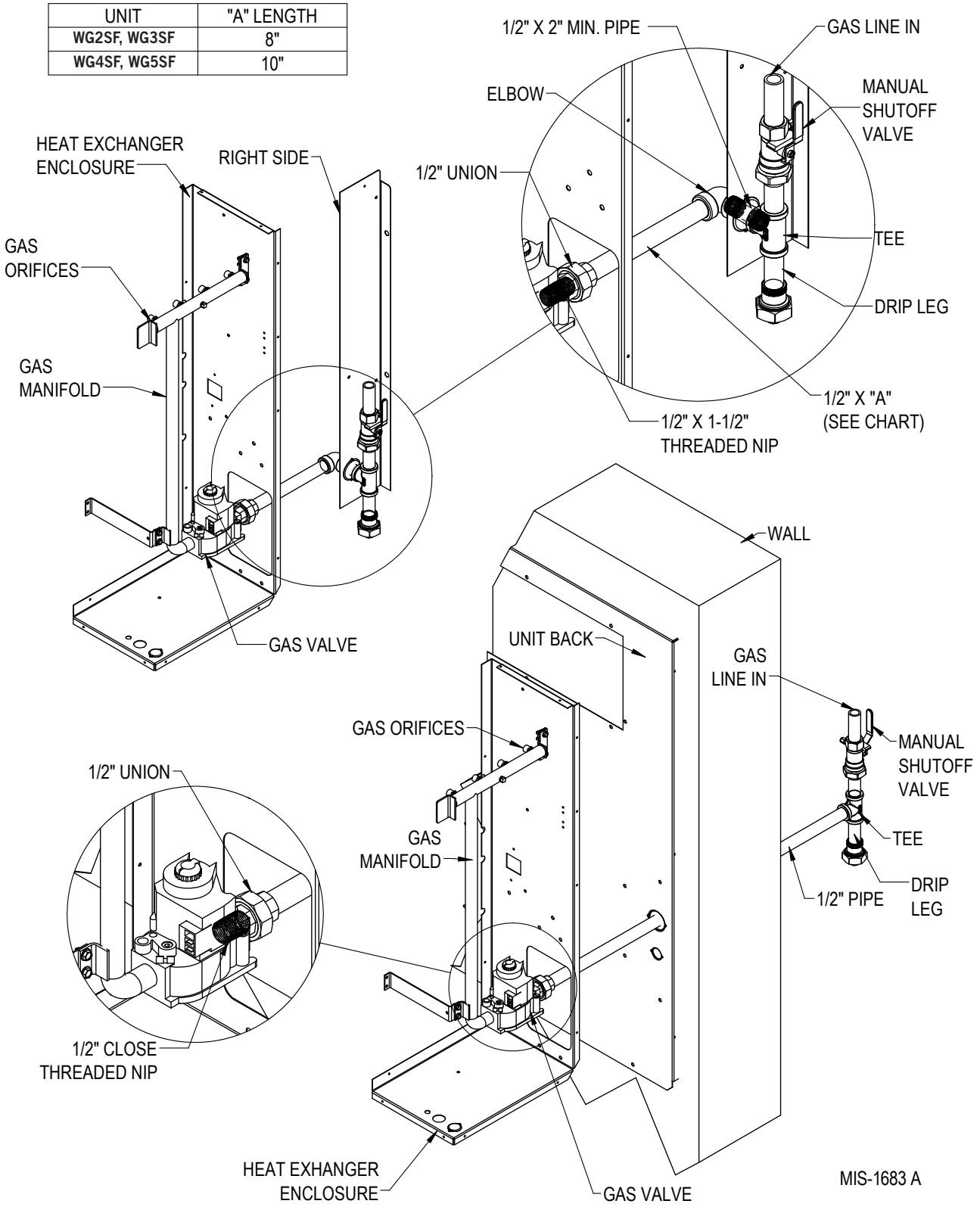


1 *Must be energized to enable minimum position. NOTE: Economizer Control Default Setting is 10V (100%). Depending upon application may require setting to lower value. If using this feature, move blue wire from "W1" to "A" terminal.*

MIS-4595

FIGURE 15
Gas Pipe Connection

UNIT	"A" LENGTH
WG2SF, WG3SF	8"
WG4SF, WG5SF	10"



18. Gas Supply and Piping

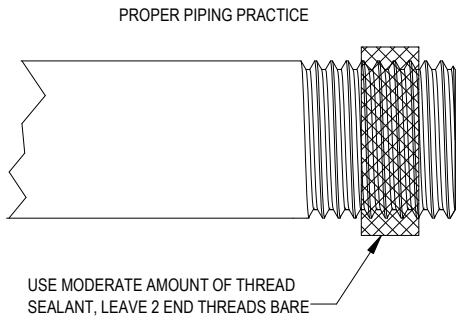
General Recommendations

1. Be sure the gas line complies with the local codes and ordinances, or in their absence with the National Fuel Gas Code, ANSI Z223.1, or Natural Gas Installation Code, CAN/CGA B149.1, or Propane Installation Code B149.2, latest edition.
2. A sediment trap or drip leg must be installed in the supply line to the furnace.
3. A ground joint union shall be installed in the gas line adjacent to and upstream from the gas valve and downstream from the manual shut-off valve.
4. An 1/8" NPT plugged tapping accessible for test gauge connection shall be installed immediately upstream of the gas supply connection to the furnace for the purpose of determining the supply gas pressure. This can be omitted if local codes permit use of plugged tapping in gas valve inlet.
5. Install listed manual shut-off valve in the supply gas line external to and immediately upstream of the furnace (see Figure 15).
6. Use steel or wrought iron pipe and fittings.
7. **Do not thread pipe too far.** Valve distortion or malfunction may result from excess pipe within the control. Use pipe joint compound resistant to the action of liquefied petroleum gases on male threads only. **Do not use Teflon tape.** See Table 8 and Figure 16.

TABLE 8
Length of Standard Pipe Threads (Inches)

Pipe Size	Effective Length of Thread	Overall Length of Thread
3/8	1/2	9/16
3/4	1/2 – 9/16	13/16
1	9/16	1

FIGURE 16
Proper Piping Practice



8. Refer to Table 9 for gas pipe sizes for natural gas. If more than one appliance is supplied from a single line size, capacity must equal or exceed the combined input to all appliances, and the branch lines feeding the individual appliances properly sized for each input.

This product must be gas piped by a licensed plumber or gas fitter in the Commonwealth of Massachusetts.

TABLE 9
Gas Pipe Sizes – Natural Gas

Length of Pipe - Feet	Pipe Capacity - BTU per Hour Input Pipe Size			
	1/2"	3/4"	1"	1-1/4"
10	132,000	278,000	520,000	1,050,000
20	92,000	190,000	350,000	730,000
30	73,000	152,000	285,000	590,000
40	63,000	130,000	245,000	500,000
50	56,000	115,000	215,000	440,000
60	50,000	105,000	195,000	400,000
70	46,000	96,000	180,000	370,000
80	43,000	90,000	170,000	350,000
100	38,000	79,000	150,000	305,000

Checking the Gas Piping

Before turning gas under pressure into piping, all openings from which gas can escape should be closed. Immediately after turning on gas, the system should be checked for leaks. This can be done by watching the 1/2 cubic foot test dial, allowing 4 minutes to show any movement, soaping each pipe connection and watching for bubbles. If a leak is found, make the necessary repairs immediately and repeat the above test. The furnace must be isolated from the gas supply piping system by closing the manual shut-off valve on the combination gas control valve during pressure testing of the gas supply piping system at pressures up to 1/2 PSIG. The furnace and its individual shut-off valve must be disconnected from supply piping and supply piping capped during any pressure testing of supply piping system at test pressures in excess of 1/2 PSIG.

Defective pipes or fittings should be replaced and not repaired. Never use a flame or fire in any form to locate gas leaks; use a soap solution.

After the piping and meter have been checked completely, purge the system of air. **Do not bleed air inside the furnace. Be sure to check and relight all the gas pilots on other appliances that may have been extinguished because of interrupted gas supply.**

PROPANE (LP) GAS CONVERSION

This unit may be converted in the field for use with propane (LP) gas. Propane gas conversion kit number WGCK-1 is designed for conversions of units installed from 0 – 6000' elevations. Propane gas conversion kit number WGCK-2 is designed for conversions of units installed from 6001' – 10,000' elevations. These kits may be purchased from the local distributor.

⚠ WARNING

When converting from propane (LP) gas to natural gas, the gas orifice spuds and gas valve spring must be replaced and the gas valve regulator pressure must be adjusted correctly. Failure to do so can result in fire, injury or death. Refer to Tables 11A and 11B for proper orifice sizing.

Natural gas spring kit, part number 5603-007, can be purchased through the local distributor.

19. Manifold Pressure Adjustment

A 0 to 15" water manometer with 0.1" resolution and a 1/8" NPT manual shut-off valve is needed to measure actual manifold pressure.

⚠ WARNING

Correct manifold pressure is necessary for proper ignition and burner operation. Failure to accurately adjust pressure could cause heat exchanger failure.

1. Turn off gas at equipment shut-off valve in gas supply line just ahead of furnace.
2. Remove plug from outlet pressure tap in gas control or gas manifold.
3. Install 1/8" NPT manual shut-off valve in hole vacated by plug. Make sure shut-off valve is in OFF position.
4. Attach manometer to 1/8" NPT manual shut-off valve just installed.
5. Slowly open equipment shut-off valve in gas supply line just ahead of furnace. Start furnace following "Operating Instructions" on front door.
6. Slowly open 1/8" NPT manual shut-off valve leading to manometer.
7. Read manifold pressure on manometer.
8. Adjust manifold pressure by turning gas control regulator adjusting screw clockwise to increase pressure or turning counterclockwise to decrease pressure. Manifold pressure must be within allowable range as follows:
   - Natural gas manifold pressure must be between 3.2" and 3.8" W.C. Rated pressure is 3.5" W.C.
   - Propane gas (LP) manifold pressure must be between 9.7" and 10.3" W.C. Rated pressure is 10" W.C.

NOTE: *For natural gas, if gas flow rate can't be properly set within these pressure ranges, the main burner orifices must be changed to obtain proper gas flow rate.*

9. Shut off furnace. Turn off gas at equipment shut-off valve in gas supply line just ahead of furnace. Install outlet pressure tap plug in gas control. Turn on gas.
10. Check regulator adjustment cover screw and gas control plug for gas leaks. Use a commercial soap solution made for leak detection.

20. Checking Gas Input Rate

It is the installer's responsibility to see that the BTU input rate of the furnace is properly adjusted. Under-firing could cause inadequate heat, excessive condensation or ignition problems. Overfiring could cause sooting, flame impingement or overheating of heat exchanger.

⚠ WARNING

Failure to adjust furnace to the proper firing rate could cause heat exchanger failure.

Depending on local gas heating value and elevation, the manifold pressure may need to be adjusted or the orifices changed to get proper gas input rate. Check with the local gas supplier to determine heating value (BTU/cu. ft.) of natural gas in the area.

NOTE: *If furnace is being installed at an altitude of more than 6000' above sea level, the furnace must be derated. See Section 21 "Standard Orifice Sizing and High Altitude Derate".*

Natural Gas Input Rate

Natural gas heating value (BTU/cu. ft.) can vary significantly. Before starting natural gas input check, obtain gas heating value at the location from local supplier. A stopwatch will be needed to measure actual gas input.

1. Gas supply pressure must be between 5" and 7" W.C. for natural gas.
2. Turn off all other gas appliances. The pilots may be left on.
3. Start furnace following "Operating Instructions" on front door.
4. Let furnace warm up for 6 minutes.
5. Locate gas meter. Determine which dial has the least cubic feet of gas and how many cubic feet per revolution it represents. This is usually one-half, one or two cubic feet per revolution.
6. With stopwatch, measure time it takes to consume two cubic feet of gas.
   - If dial is one-half cubic foot per revolution, measure time for four revolutions.
   - If dial is one cubic foot per revolution, measure time for two revolutions.
   - If dial is two cubic feet per revolution, measure time for one revolution.
7. Divide this time by two. This gives average time for one cubic foot of gas to flow through meter. Example: If it took 58 seconds for two cubic feet to flow, it would take 29 seconds for one cubic foot to flow.
8. Calculate gas input using this formula:

$$\text{Gas input} = \frac{\text{Gas Heating Value (BTU/cu. ft.)} \times 3600 \text{ sec/hr}}{\text{Time (Seconds for one cubic foot of gas)}} = \text{BTU/hour}$$

   Example:

   Assume it took 29 seconds for one cubic foot of gas to flow and heating value of 1,000 BTU/cu. ft.

$$\text{Gas input} = \frac{1{,}000 \times 3{,}600}{29} = 124{,}138 \text{ BTU}$$

   If no other pilots were left on, this is the furnace gas input.
9. If the water heater, dryer or range pilots were left on, allow for them in calculating correct furnace gas input. A quick way is to allow 1000 BTU per hour for a water heater, 500 BTU per hour for dryer and 500 BTU per hour for each range burner pilot.

   Example:

   If the gas water heater, dryer, two range burner pilots and one oven pilot were left on, allow:

Water heater pilot	1000 BTU per hour
Dryer pilot	500 BTU per hour
2 range burner pilots	1000 BTU per hour
1 range oven pilot	500 BTU per hour
	3000 BTU per hour

   Subtracting 3000 BTU per hour from 124,138 BTU per hour measured above equals 121,138 BTU per hour. This would be the correct furnace gas input after allowing for pilots left on.
10. Manifold pressure may be adjusted within the range of 3.2" W.C. to 3.8" W.C. to get rated input ± 2 percent. See Section 19, "Manifold Pressure Adjustment." If rated input with manifold pressure cannot be gotten within the allowable range, orifices must be changed.

Propane (LP) Gas Input Rate

⚠WARNING

Propane (LP) gas installations do not have gas meters to double check input rate. Measure manifold pressure adjustment with an accurate manometer. Failure to accurately adjust pressure could cause heat exchanger failure, asphyxiation, fire or explosion, resulting in damage, injury or death.

1. Make the main burner orifices are correct.
2. Gas supply pressure must be between 11" and 13" W.C. for propane (LP) gas.
3. Start furnace following "Operating Instructions" on front door.
4. Let furnace warm up for 6 minutes.
5. Adjust manifold pressure to 10.0" W.C. ± 0.3". See Section 19, "Manifold Pressure Adjustment".

⚠WARNING

Do not set propane (LP) manifold pressure at 11.0" W.C. It could cause heat exchanger failure.

21. Standard Orifice Sizing and High Altitude Derate

This furnace is shipped with fixed gas orifices for use with natural gas and sized for 1000 BTU/cubic foot gas. Make sure actual gas input does not exceed rating plate input. The orifices may need to changed to get the correct gas input. Whether they need changed or not depends on input and the gas heat value at standard conditions and elevation. Consult the local gas supplier for gas heat value and any special derating requirements. See Section 20 for more information.

At higher altitudes, the density of the air is reduced. Therefore, for proper combustion, the quantity of gas burned in the furnace must also be reduced. This is called derating. This unit must be derated when installed at altitudes greater than 6000' above sea level. A high altitude pressure switch must also be installed for operation above 6000'. High Altitude Pressure Switch Kit number 8620-189 is designed for this application.

It is the installer's responsibility to see that the furnace input rate is adjusted properly. Derating must be achieved by reducing the size of the main burner orifices. Derating the furnace by adjusting the manifold pressure lower than the range specified in the Section 19, "Manifold Pressure Adjustment" is considered to be an improper procedure.

Above 6000' elevation orifice changes are required, and capacity reductions are a function of altitude impact and orifice change. Pressure switch change is required above 6000' elevation. For natural gas, see Altitude Table 10 below and Orifice Tables 11A and 11B on following pages.

TABLE 10
Natural Gas Derate Capacities
for All Models

WG*SF Rated Input	Sea Level	1000	2000	3000	4000	5000	6000	7000	8000	9000	10,000
41,000	40,500	39,204	37,908	36,612	35,640	34,992	34,182	33,696	33,048	32,643	32,076
45,000	45,000	43,560	42,120	40,680	39,600	38,880	37,980	37,440	36,720	36,270	35,640
61,000	60,750	58,806	56,862	54,918	53,460	52,488	51,273	50,544	49,572	48,965	48,114
68,000	67,500	65,340	63,180	61,020	59,400	58,320	56,970	56,160	55,080	54,405	53,460
75,000	75,000	72,600	70,200	67,800	66,000	64,800	63,300	62,400	61,200	60,450	59,400
81,000	81,000	78,408	75,816	73,224	71,280	69,984	68,364	67,392	66,096	65,286	64,152
90,000	90,000	87,120	84,240	81,360	79,200	77,760	75,960	74,880	73,440	72,540	71,280
100,000	100,000	96,800	93,600	90,400	88,000	86,400	84,400	83,200	81,600	80,600	79,200
113,000	112,500	108,900	105,300	101,700	99,000	97,200	94,950	93,600	91,800	90,675	89,100
125,000	125,000	121,000	117,000	113,000	110,000	108,000	105,500	104,000	102,000	100,750	99,000

TABLE 11A
Natural Gas Orifice Tables for Models WG2SF and WG3SF

Factory Standard Input	Gas Heat* Value BTU/Cu. Ft.	Up to 6,000' No Changes Except for BTU Content	6,001' to 8,000' Requires Pressure Switch Change and Orifice Change Based on BTU Content	8,001' to 10,000' Requires Pressure Switch Change and Orifice Change Based on BTU Content
25000 BTU Per Burner	700-749	2.75	2.70	2.60
	750-799	2.70	2.60	2.50
	800-849	2.60	2.50	2.45
	850-899	2.50	2.45	2.35
	900-949	2.45	2.35	**(2.30)**
	950-999	2.35	**(2.30)**	2.25
	1000-1049**	**(2.30)**	2.25	**[2.20]**
	1050-1100	2.25	**[2.20]**	2.15
	Pressure Switch	Standard (.55)	Order 8620-189 High Altitude Pressure Switch Kit (.42)	
(2.30) is the standard factory-installed orifice size			**[2.20] orifices are shipped with the unit for field-installed optional 10% derate**	

Optional 10% Field-Converted Derate	Gas Heat* Value BTU/Cu. Ft.	Up to 6,000' No Changes Except for BTU Content	6,001' to 8,000' Requires Pressure Switch Change and Orifice Change Based on BTU Content	8,001' to 10,000' Requires Pressure Switch Change and Orifice Change Based on BTU Content
22250 BTU Per Burner	700-749	2.60	2.50	2.45
	750-799	2.50	2.45	2.40
	800-849	2.45	2.40	**(2.30)**
	850-899	2.40	**(2.30)**	2.25
	900-949	**(2.30)**	2.25	**[2.20]**
	950-999	2.25	**[2.20]**	2.15
	1000-1049**	**[2.20]**	2.15	2.10
	1050-1100	2.15	2.15	2.10
	Pressure Switch	Standard (.55)	Order 8620-189 High Altitude Pressure Switch Kit (.42)	
[2.20] orifices are shipped with the unit for field-installed optional 10% input rate			**(2.30) is the factory-installed orifice size for full rated input**	

* At standard conditions: 30.00 inches Mercury, 60F, saturated, .60 specific gravity.

** All Natural Gas factory orifice sizing and standard input ratings based on nominal 1025 BTU/cu. ft. gas and sea level conditions

All other orifice sizes shown are available as individual field-supplied items. See orifice tables below for specifications and number required.

Orifice Size (mm)	Orifice Diameter
2.10	0.0826
2.15	0.0846
2.20	0.0866
2.25	0.0885
2.30	0.0905
2.35	0.0925
2.40	0.0945

Orifice Size (mm)	Orifice Diameter
2.45	0.0964
2.50	0.0984
2.60	0.1024
2.70	0.1063
2.75	0.1082
2.80	0.1102
2.90	0.1142

No. of Orifices Required Based on Unit Input Rating
41,000 (2)
45,000 (2)
61,000 (3)
68,000 (3)
75,000 (3)
81,000 (4)
90,000 (4)
100,000 (4)
113,000 (5)
125,000 (5)

TABLE 11B
Natural Gas Orifice Tables for Models WG4SF and WG5SF

Factory Standard Input	Gas Heat* Value BTU/Cu. Ft.	Up to 6,000' No Changes Except for BTU Content	6,001' to 8,000' Requires Pressure Switch Change and Orifice Change Based on BTU Content	8,001' to 10,000' Requires Pressure Switch Change and Orifice Change Based on BTU Content
25000 BTU Per Burner	700-749	2.90	2.80	2.70
	750-799	2.80	2.70	2.60
	800-849	2.70	2.60	2.50
	850-899	2.60	2.50	2.45
	900-949	2.50	2.45	**(2.40)**
	950-999	2.45	**(2.40)**	2.35
	1000-1049**	**(2.40)**	2.35	**[2.30]**
	1050-1100	**[2.30]**	2.25	2.20
	Pressure Switch	Standard (.55)	Order 8620-189 High Altitude Pressure Switch Kit (.42)	
(2.40) is the standard factory-installed orifice size			**[2.30] orifices are shipped with the unit for field-installed optional 10% derate**	

Optional 10% Field Converted Derate	Gas Heat* Value BTU/Cu. Ft.	Up to 6,000' No Changes Except for BTU Content	6,001' to 8,000' Requires Pressure Switch Change and Orifice Change Based on BTU Content	8,001' to 10,000' Requires Pressure Switch Change and Orifice Change Based on BTU Content
22250 BTU Per Burner	700-749	2.75	2.70	2.60
	750-799	2.70	2.60	2.50
	800-849	2.60	2.50	
	850-899	2.50	2.45	**(2.40)**
	900-949	**(2.40)**	2.35	**[2.30]**
	950-999	2.35	**[2.30]**	2.25
	1000-1049**	**[2.30]**	2.25	2.20
	1050-1100	2.25	2.25	2.20
	Pressure Switch	Standard (.55)	Order 8620-189 High Altitude Pressure Switch Kit (.42)	
[2.30] orifices are shipped with the unit for field-installed optional 10% input rate			**(2.40) is the factory-installed orifice size for full rated input**	

* At standard conditions: 30.00 inches Mercury, 60F, saturated, .60 specific gravity.

** All Natural Gas factory orifice sizing and standard input ratings based on nominal 1025 BTU/cu. ft. gas and sea level conditions

All other orifice sizes shown are available as individual items. See orifice tables on page 32 for part numbers and number required.

22. Conversion of Gas Input BTUH from High to Low Rating

All the derated WG series units are produced with maximum BTUH input orifices installed. To field convert input, a change to main burner orifices is required.

NOTE: *No change to air orifices is necessary. A set of low input orifices is shipped with every unit. They will be found packaged in a bag behind the burner door. Refer to the unit rating plate to confirm the proper orifice size.*

Proper installation of the orifices is detailed as follows:

1. Shut off electrical supply to the unit.
2. Shut off gas supply to the unit.
3. Remove burner access panel.
4. Disconnect gas valve from gas supply piping.
5. Disconnect the two wires from the gas valve.
6. Remove the manifold assembly so that orifices are now accessible and remove orifices.
7. Apply a modest amount of pipe compound to the new orifices and screw them into the manifold.
8. To assemble burner, reverse Steps 1 through 7.

⚠WARNING

Failure to follow these instructions could create a hazard resulting in property damage, bodily injury or death.

23. Measuring Air Temperature Rise

Air temperature rise (supply air temperature minus return air temperature) must be within allowable air temperature rise range specified on furnace rating plate.

Two thermometers with 1° resolution capable of reading up to 200°F will be needed. Check thermometers to make sure they agree, or compensate accordingly.

Follow this procedure:

1. Open supply air registers and return air grilles. Make sure the registers and grilles are free of obstruction from rugs, carpets, drapes or furniture.
2. Set balancing dampers in supply duct system.
3. Check duct work for obstructions or leaks.
4. Make sure filters are clean and in place.
5. Place one thermometer in supply air plenum approximately 2' from furnace. Locate thermometer tip in center of plenum to ensure proper temperature measurement.
6. Place second thermometer in return air duct approximately 2' from furnace. Locate thermometer tip in center of duct to ensure proper temperature measurement.
7. Set room thermostat on highest temperature setting. Operate furnace 10 minutes. Record supply air and return air temperatures.
8. Calculate air temperature rise by subtracting return air temperature from supply air temperature.
   - If air temperature rise is above the temperature rise range on rating plate, furnace is overfired or has insufficient airflow. Check gas input following the instructions in Section 20, “Checking Gas Input Rate”. If air temperature rise is still above temperature rise range specified, more heating airflow is needed. Check duct work and grilles to make sure all are properly sized.
   - If air temperature rise is below the temperature rise range on rating plate, furnace is underfired or has too much airflow. Check gas input following the instructions in Section 20, “Checking Gas Input Rate”. If air temperature rise is still below temperature rise range specified, less heating airflow is needed. Adjust dampers or grilles as needed.
   - After making adjustments, check air temperature rise to verify that resulting air temperature rise is within allowable range. If air temperature rise is still outside the temperature rise range specified on rating plate, check duct system design with a qualified heating engineer. It may be necessary to re-size the duct work. Recheck air temperature rise after revising duct systems.
9. Set room thermostat to desired setting.
10. Remove thermometers and seal duct work holes.

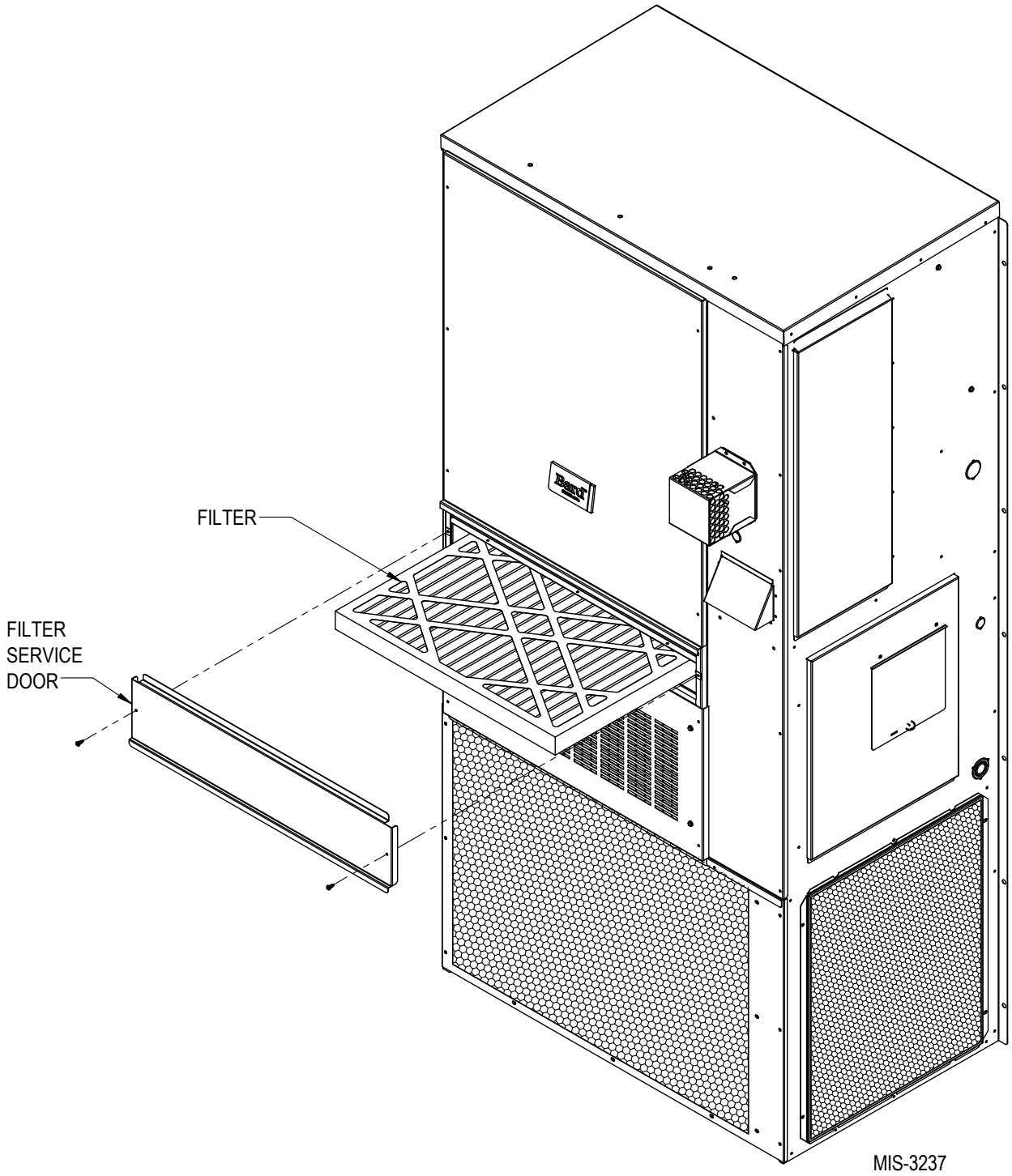
NOTE: *Failure to seal holes could result in reduced system performance.*

24. Filters

A 2" thick throwaway filter is supplied with each unit. This filter is installed by opening the filter service door (see Figure 17).

Replacement filters are available through the dealer.

FIGURE 17
Access Internal Filter Through Upper Service Door



25. Compressor Control Module

The compressor control module is standard on models covered by this manual (see Figure 18).

Features

Delay-on-Make Timer
Short Cycle Protection/Delay-on-Break
Low Pressure Detection
High Pressure Detection
LPC and HPC Status LED
Test Mode
Brownout Protection with Adjustment

Delay-on-Make Timer

A delay-on-make timer is included to be able to delay startup of the compressor. This is desired when more than one unit is on a structure so that all of the units do not start at the same time which could happen after a power loss or building shutdown. The delay-on-make time period is 2 minutes plus 10% of the delay-on-break time period. To ensure that all of the units do not start at the same time, adjust the delay-on-break timer on each unit to a slightly different delay time.

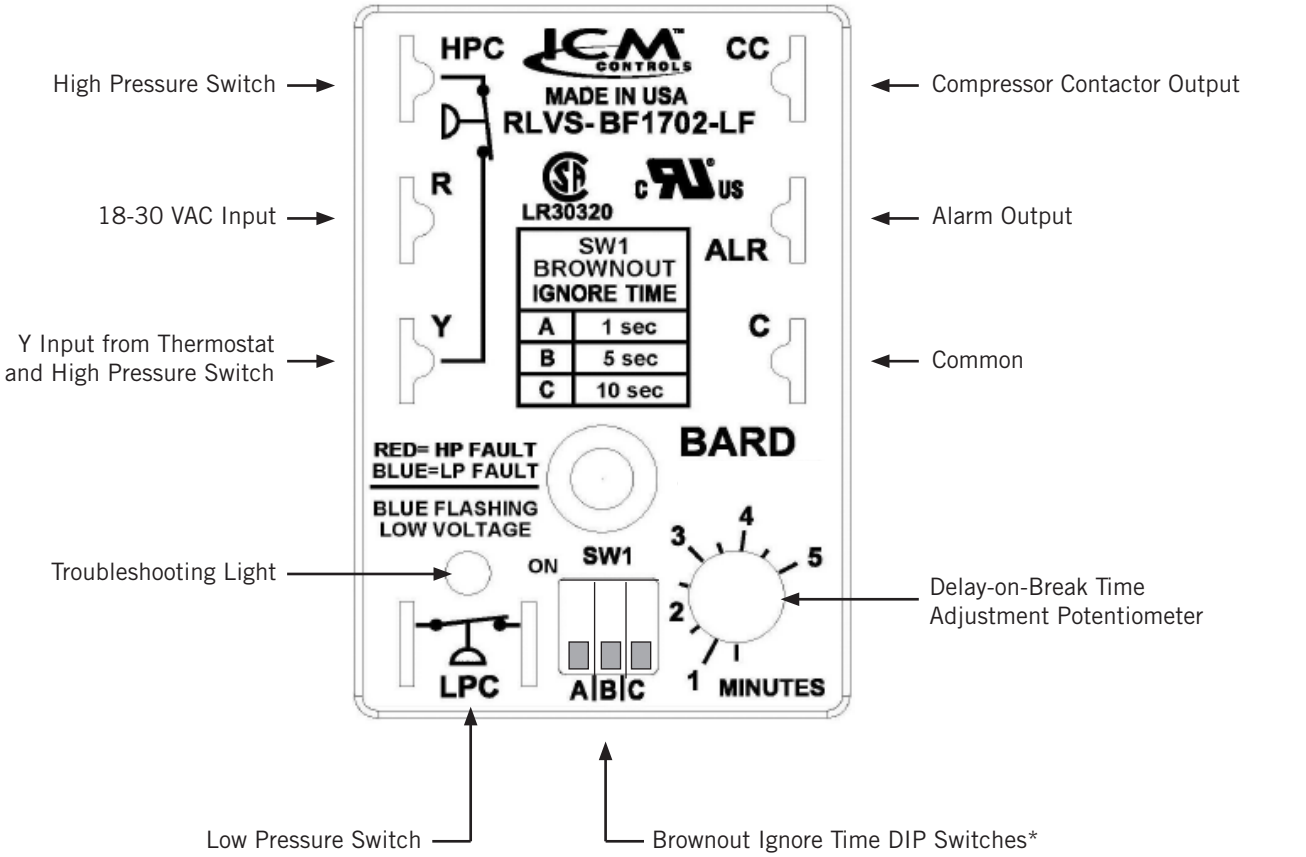
Short Cycle Protection/Delay-on-Break

An anti-short cycle timer is included to prevent short cycling the compressor. This is adjustable from 30 seconds to 5 minutes via the adjustment knob. Once a compressor call is lost, the time period must expire before a new call will be initiated.

Low Pressure Detection

Low pressure switch monitoring allows for a lockout condition in a situation where the switch is open. If the low pressure switch remains open for more than 2 minutes, the CCM will de-energize the compressor for the delay-on-break time. If the switch closes again, it will then restart the compressor. If the switch trips again during the same Y call, the compressor will be de-energized and the alarm terminal will be energized indicating an alarm. The blue LED will light and stay on until power is cycled to the control or a loss of voltage is present at Y terminal for more than ½ second.

FIGURE 18
Compressor Control Module



* Turn on only one switch for that specific "Ignore Time" setting. 10 seconds is the maximum brownout "Ignore Time". If all switches are “off”, the control is in “do not ignore”.

High Pressure Detection

High pressure switch monitoring allows for a lockout condition in a situation where the switch is open. If the high pressure switch opens, the CCM will de-energize the compressor. If the switch closes again, it will then restart the compressor after the delay-on-break setting has expired on the device. If the switch trips again during the same thermostat call, the compressor will be de-energized and the alarm terminal will be energized indicating an alarm. The red LED will light and stay on until power is cycled to the control or a loss of voltage is present at Y terminal for more than ½ second.

Test Mode

By rapidly rotating the potentiometer (POT) clockwise (see Figure 18), all timing functions will be removed for testing.

The conditions needed for the unit to enter test mode are as follows: POT must start at a time less than or equal to the 40 second mark. The POT must then be rapidly rotated to a position greater than or equal to the 280 second mark in less than ¼ second. Normal operation will resume after power is reset or after the unit has been in test mode for at least 5 minutes.

Brownout Protection with Adjustment

Brownout protection may be necessary if the utility power or generator power has inadequate power to prevent the voltage from dropping when the compressor starts. This is rare but can happen if the generator is undersized at the site or if the site is in a remote location far from the main power grid. Under normal circumstances, allowing the brownout to be ignored for a time period should not be needed. The CCM is shipped in "0" do not ignore position, with all the DIP switches off (see Figure 18).

If ignoring the brownout is needed because of the above conditions, three preset timers can be set by DIP switches in order to delay signaling a power brownout for a specific length of time after compressor contactor is energized. This allows the compressor a time period to start even if the voltage has dropped and allows the voltage to recover. This delay only happens when the CC terminal energizes. The delay can be set to 1 second ("A" DIP switch), 5 seconds ("B" DIP switch) or 10 seconds ("C" DIP switch); time is not cumulative—only the longest setting will apply. If the voltage recovers during the brownout delay period, the compressor will continue running.

If a brownout condition is detected by the CCM at any point while there is a cooling call or power is on at Y, the troubleshooting light will flash blue. The light will continue to flash until the cooling call is satisfied or power is removed from the Y terminal. This condition does not prevent operation, it only indicates that a brownout condition was present at some point during the call. If a brownout condition is detected while CC has an output, CC will be de-energized and will retry after the delay-on-break timer is satisfied, honoring any DIP switch timer chosen when the CC output is re-energized; this process will continue until call is satisfied.

If inadequate utility or generator power continues after the Delay-on-Make or Delay-on-Break timer is fulfilled, the CC output will not energize. This could lead to the compressor never starting. The control will see the brownout immediately and not start.

A common scenario and one that has been seen in the field is when a unit or units switches from utility power to generator power. With slower transfer switches, the time delay between the utility power and generator power didn't cause a problem. The units lost power, shut off and came back on line normally. With the introduction of almost instantaneous transfer switches, the power glitch may be enough that the compressor will start to run backwards.

26. Phase Monitor

All units with three phase scroll compressors are equipped with a three phase line monitor to prevent compressor damage due to phase reversal.

The phase monitor in this unit is equipped with two LEDs. If the "Y" signal is present at the phase monitor and phases are correct, the green LED will light.

If phases are reversed, the red fault LED will be lit and compressor operation is inhibited.

If a fault condition occurs, reverse two of the supply leads to the unit. Do not reverse any of the unit factory wires as damage may occur.

27. Lighting and Shutdown Instructions

FIGURE 19
Lighting and Shutdown Instruction Label

FOR YOUR SAFETY READ BEFORE OPERATING

WARNING: If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do NOT try to light the burner by hand.

B. BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU SMELL GAS

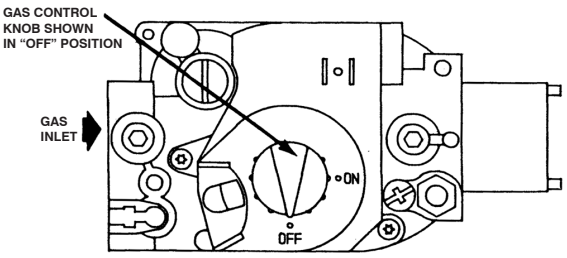
* Do not try to light any appliance.
* Do not touch any electric switch; do not use any phone in your building.
* Immediately call your supplier from a neighbor's phone. Follow the gas supplier's instructions.
* If you cannot reach your gas supplier; call the fire department.

C. Use only your hand to push in or move the gas control lever. Never use tools. If the lever will not push in or turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

OPERATING INSTRUCTIONS

1. STOP! Read the safety information above on this label.
2. Set the thermostat to lowest setting
3. Turn off all electric power to the appliance.
4. This appliance is equipped with an ignition device which automatically lights the burner. Do NOT try to light the burner by hand.



5. Remove control access panel.
6. Push in gas control knob slightly and turn clockwise to "OFF".

   NOTE: Knob cannot be turned to "OFF" unless knob is pushed in slightly. Do not force.
7. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information above on this label. If you don't smell gas, go to the next step.
8. Turn gas control knob counterclockwise to "ON".
9. Replace control access panel.
10. Turn on all electric power to the appliance.
11. Set thermostat to desired setting.
12. If the appliance will not operate, follow the instructions "To Turn Off Gas To Appliance" and call your service technician or gas supplier.

TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Remove control access panel.
4. Push in gas control lever slightly and move to "OFF". Do not force.
5. Replace control access panel.

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28. Service Agency Procedures

⚠CAUTION

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

⚠WARNING

Follow these procedures before inspecting furnace.

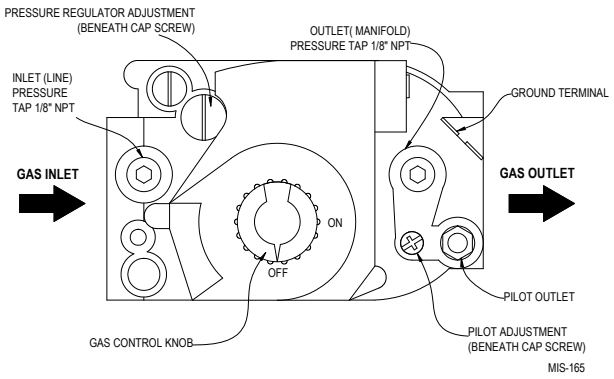
- Turn room thermostat to its lowest or off setting.
- Turn off manual gas shut-off valve.
- Wait at least 5 minutes for furnace to cool if it was recently operating.
- Turn off furnace electrical power; failure to do so could result in injury or death.

Main Burner

Observe the main burners in operation. The flame should be mostly "blue" with possibly a little orange (not yellow) at the tips of the flame. The flames should be in the center of the heat exchanger tubes and not impinging on the heat exchanger surfaces themselves.

Observe the fire until the blower starts (there is a normal delay period until the heat exchanger warms up). There should be no change in the size or shape of the flame. If there is any wavering or blowing of the flame on blower start-up, it is an indication of a possible leak in the heat exchanger.

FIGURE 20
Top View of Gas Control



Burners/Heat Exchanger/Flue Gas Passage Ways

The burners, heat exchanger and interior flue gas passages may be inspected using a light on small mirror or an extension handle. Remove the screws securing the inducer and collector box. Now inspect the upper tubes of the heat exchanger.

Check the exterior of the heat exchanger and the interior flue gas passages for any evidence of deterioration due to corrosion, cracking or other causes. If signs of sooting exist, remove the burners and clean the heat exchanger, as required.

29. Maintaining Unit in Good Working Order

The unit should be inspected annually by a qualified service agency.

⚠WARNING

Use replacement parts listed in the Replacement Parts list only. The use of incorrect parts could cause improper unit operation, resulting in damage, injury or death.

⚠WARNING

Disconnect electrical power before servicing unit. Failure to do so could result in electrical shock or death.

Annual Maintenance

Routine inspection and maintenance procedures are the responsibility of the user and are outlined below.

1. Before inspecting unit:
   A. Turn room thermostat to lowest or off setting.
   B. Turn off equipment gas shut-off valve.
   C. Wait for unit to cool if it was recently operating.
   D. Turn off electrical power to unit.
2. Inspect the following:
   A. Vent terminal and combustion air intake terminal. Make sure both are free from obstructions.
   B. Vertical vent applications: Inspect venting system. Make sure system has no holes, is physically sound and free from obstructions.
   C. Make sure the supply and return air flange sleeves or duct work are securely fastened to unit and physically sound.
   D. Supply and return grilles must be open and free from obstructions.
   E. Inspect to make sure the unit is securely fastened to the wall. Seal any possible leaks between unit and wall with appropriate exterior sealing material.
   F. Inspect burners, heat exchanger, induced draft blower and induced draft blower collector box. There must be no obvious signs of deterioration.
   G. Inspect all electrical connections and wiring.
   H. Check all gas piping for leaks with soap solution used to detect leaks.
   I. Inspect, clean and repair as needed the entire blower assembly, air filters, draft inducer, cooling coils and vent options (if installed).

Routine Maintenance

1. Air Filters: Check the condition at least monthly when the unit is in use, and replace as necessary.
2. Lubrication Requirements: The indoor circulating air blower motor and outdoor circulating air fan motor are permanently lubricated and require no re-oiling. The combustion air blower motor requires no re-oiling.

⚠WARNING

Turn off electrical power supply to prevent injury from moving parts or electric shock.

Routine Inspection

1. Inspect the physical support of the unit annually to make sure it is securely fastened to the building. Also look for any obvious signs of deterioration.
2. Inspect the main burners at the beginning of each heating season and clean as necessary.
3. Inspect the vent terminal and combustion air intake hood for any obvious deterioration, to make sure it is free and clear of any obstructions.

30. Troubleshooting NIDEC SelecTech Series ECM Motors

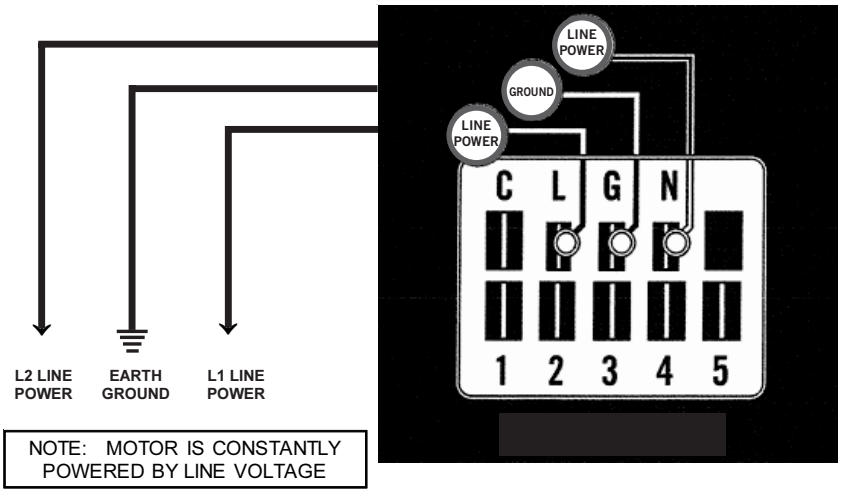
If the Motor Is Running

1. It is normal for the motor to rock back and forth on start up. Do not replace the motor if this is the only problem identified.
2. If the system is excessively noisy, does not appear to change speeds in response to a demand (Heat, Cool, Other) or is having symptoms during the cycle such as tripping limit or freezing coil, check the following:
   A. Wait for programmed delays to time out.
   B. Ensure that the motors control inputs are wired as shown in the factory-supplied wiring diagram to ensure motor is getting proper control signals and sequencing.
   C. Remove the filter and check that all dampers, registers and grilles are open and free flowing. If removing the filters corrects the problem, clean or replace with a less restrictive filter. Also check and clean the blower wheel or coil as necessary.
   D. Check the external static pressure (total of both supply and return) to ensure it is within the range as listed on the unit serial plate. If higher than allowed, additional duct work is needed.
   E. If the motor does not shut off at the end of the cycle, wait for any programmed delays to time out (no more than 90 seconds). Also make sure that there is no call for “Continuous Fan” on the “G” terminal.
   F. If the above diagnostics do not solve the problem, confirm the voltage checks in the next section below, then continue with the **Model SelecTech Communication Diagnostics**.

If the Motor Is Not Running

1. Check for proper high voltage and ground at the (L/L1) (G) (N/L2) connections at the motor (see Figure 21). Correct any voltage issues before proceeding to the next step. The SelecTech motor is voltage specific. Only the correct voltage should be applied to the proper motor. Input voltage within plus or minus 10% of the nominal line power VAC is acceptable.

FIGURE 21
Motor Connections



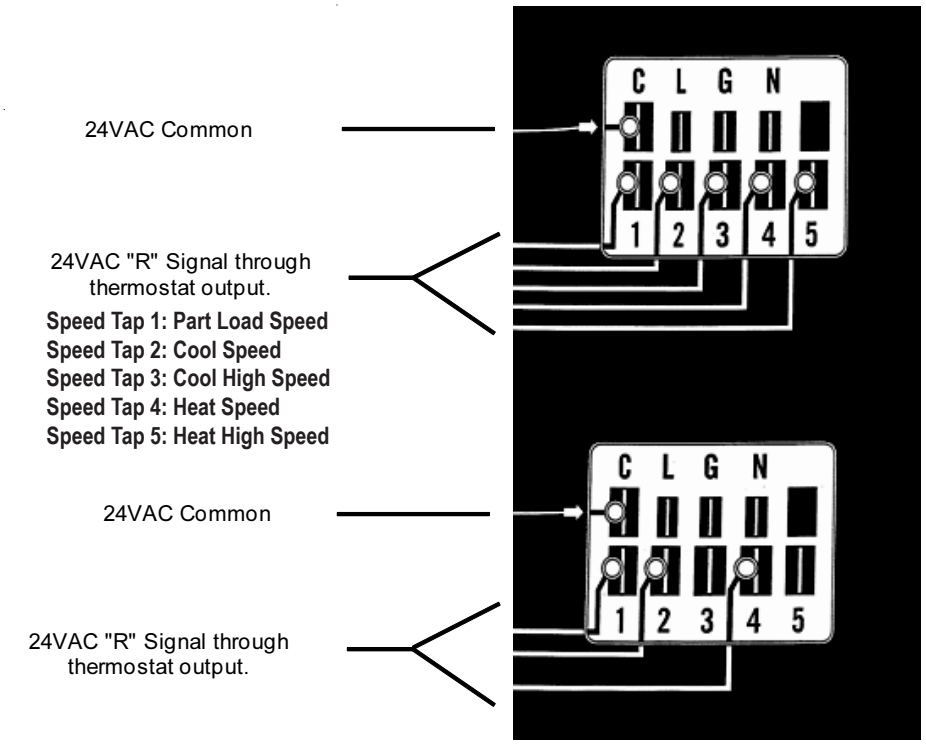
2. If the motor has proper high voltage and ground at the (L/L1) (G) (N/L2) connections, then continue to **Model SelecTech Communication Diagnostics**.

Model SelecTech Communication Diagnostics

The SelecTech motor is communicated through 24VAC low voltage (thermostat control circuit wiring).

1. Start with unit wiring diagram to confirm proper connections and voltage (see Figure 22).
2. Initiate a demand from the thermostat and check the voltage between the common and the appropriate motor terminal (1-5). ("G" input is typically on terminal #1, but always refer to wiring diagram.)
   A. If the low voltage communication is not present, check the demand from the thermostat. Also check the output terminal and wire(s) from the terminal strip or control relay(s) to the motor.

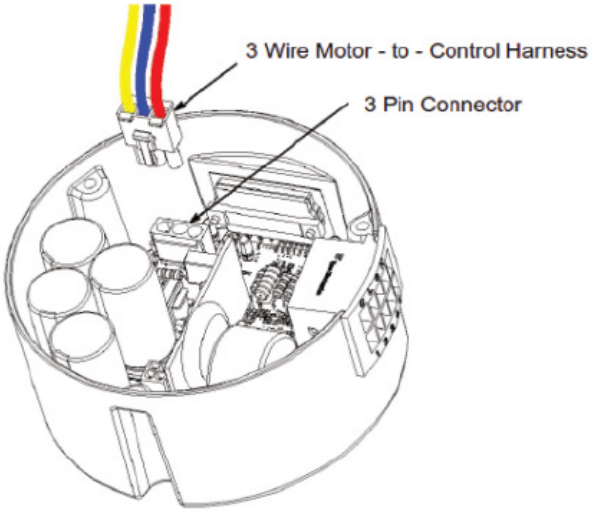
FIGURE 22
Motor Connections



B. If the motor has proper high voltage as identified above (**If the Motor Is Not Running** Step 1), proper low voltage to a programmed terminal and is not operating, next check resistances at the motor lead plug.

3. Disconnect power from the motor. Remove the motor control module from the blower assemblies mounting plate to access the back plate of the control module. Then remove the back plate and unplug the motors plug from the control module (see Figure 23).

FIGURE 23
Motor Control Module



4. The control module is now completely detached from the motor. Verify with a standard ohmmeter the motors winding resistance:

   A. Measure that there is resistance between pins 1 to 2, 1 to 3 and 2 to 3. The readings should not be 0 ohms and all three measurements should be within +-10% of each other. Move to step B if the windings resistance are within range. **If any motor lead fails this test, the motor is defective and must be replaced.**

   B. Test that each lead to the motor shell is >100K ohms (see Figure 22). (Take measurement to unpainted motor end plate.) **If any motor lead fails this test, the motor is defective and must be replaced.**

NOTE: *Installing the new control module will cause it to fail also.*

31. Replacement Parts

⚠ WARNING

Use replacement parts listed in Replacement Parts list. Failure to do so could cause improper furnace operation, resulting in property damage, personal injury or death.

Replacement parts for the gas/electric units are available through local distributors.

A replacement parts list manual is supplied with each unit. When ordering parts or making inquires pertaining to any of the units covered by these instructions, it is very important to always supply the ***complete*** model number and serial number of the unit. This is necessary to assure that the correct parts (or an approved alternate part) are issued to the service agency.

32. Sequence of Operation – Heating

On a call for heat from the thermostat, the induced draft blower is energized. Once sufficient draft is established, the pressure switch contacts close and the ignition system is energized. The direct spark igniter will be energized allowing gas to flow. At the same time the main valve is energized, a 30-second blower delay timer is activated.

After this delay, the heating speed blower relay energizes. The blower will begin operating and remain in operation until the set delay time after the call for heat has been satisfied. This timing sequence guarantees blower on, blower off operation.

This unit is equipped with a flame roll-out switch, which is wired in series with the control circuit. This is a manual reset switch and is used for the purpose of preventing possible fire hazard in the event of a system malfunction. If this switch has opened the control circuit, there could be a possible system malfunction. Some of the conditions that might cause a roll-out to occur are blockage or sooting of primary heat exchanger, overfiring of furnace due to improper main burner orifices or incorrect manifold pressure, insufficient combustion air or installation deficiencies with respect to return air duct design or sizing.

Once the problem has been resolved, reset the switch by pressing down on the reset button on top of the switch. See Figure 24 for additional information.

FIGURE 24
Sequence of Operation
Electronic Blower Control

Action	System Response
Thermostat calls for heat (W terminal is energized).	• Combustion air blower is energized. • Air proving switch makes. Airflow is established. • Ignition system is energized. • Gas valve opens and main burner lights. • Heat fan on delay timing begins. When timing is complete, the circulating fan is energized at heat speed.
Thermostat ends call for heat.	• Ignition system is de-energized and gas valve closes. • Combustion air blower is de-energized after postpurge timing. • Heat fan off delay timing begins. When timing is complete, the circulating fan is de-energized.
Thermostat begins call for cool (G and Y terminals energized).	• Cooling contactor is energized. • Circulating fan is energized on cool speed after cool fan on delay timing.
Thermostat begins call for fan (G terminal is energized).	• Circulating fan is energized.
Limit (flame rollout) opens.	• Thermostat and ignition system are de-energized and gas valve closes. • Combustion air blower and circulating fan heat speed are energized.
Limit (auto reset) or flame rollout (manual reset) circuit closed.	• Combustion air blower remains energized for postpurge timing. • The circulation fan remains energized for the selected delay off timing. • Normal operation resumes.

33. Sequence of Operation – Cooling

On a call for cooling from the room thermostat, the blower relay will be energized as well as the compressor contactor. Following termination of the cooling cycle, the blower motor will continue to run for one minute.

See Figure 24 for additional information.

The unit may be equipped with a low ambient control for lower outdoor temperature operation in the cooling mode. If equipped with this optional control, the condenser fan will not operate immediately upon compressor start-up, and will cycle on and off until the condensing pressure remains above 180 PSIG. Low ambient control energizes the fan motor at 280 PSIG, de-energizes at 180 PSIG.

34. Setting Unit Airflow

All models have multiple speed direct drive blower motors. If supply and return ducts are connected to the unit, the ducts must be of adequate size. Refer to the appropriate blower tables. See Tables 12, 13 and 14 for maximum static pressures acceptable. Note the minimum CFM for heating and cooling operation.

The unit is set from the factory at the default speed. W**G units have three (3) selectable speeds for cooling and two (2) selectable speeds for heating. First set the airflow for heating. For high static applications, the speed should be set to high. When in doubt, note the allowable air temperature rise listed on the name plate and using the procedure listed in Section 23, "Measuring Air Temperature Rise", measure the air temperature rise. If the temperature rise is above allowable range, the heating airflow must be increased.

To increase the heating airflow speed:

- First disconnect power to the unit.
- Open the control panel and find the furnace control board (see Figure 25).
- Remove the black wire from the unused terminal and then remove the red wire from the heat terminal.
- Install the red wire on the unused terminal and the black wire on the heat terminal.
- Close the control panel and repeat the air temperature rise test.
- To reduce the heating airflow speed from high to standard, move the black wire from the heat terminal to the unused terminal and the red wire from the unused terminal to the heat terminal.

The default speed for cooling is the rated cooling speed that is listed in Tables 12, 13 and 14. The higher cooling speed tap can be used for higher duct static applications or to increase the sensible cooling capacity. The higher speeds can also be used when higher sensible cooling is desired.

To increase the cooling airflow speed:

- First disconnect power to the unit.
- Open the control panel and find the terminal block above the blower relay (see Figure 26).

FIGURE 25
Increasing Heating Speed

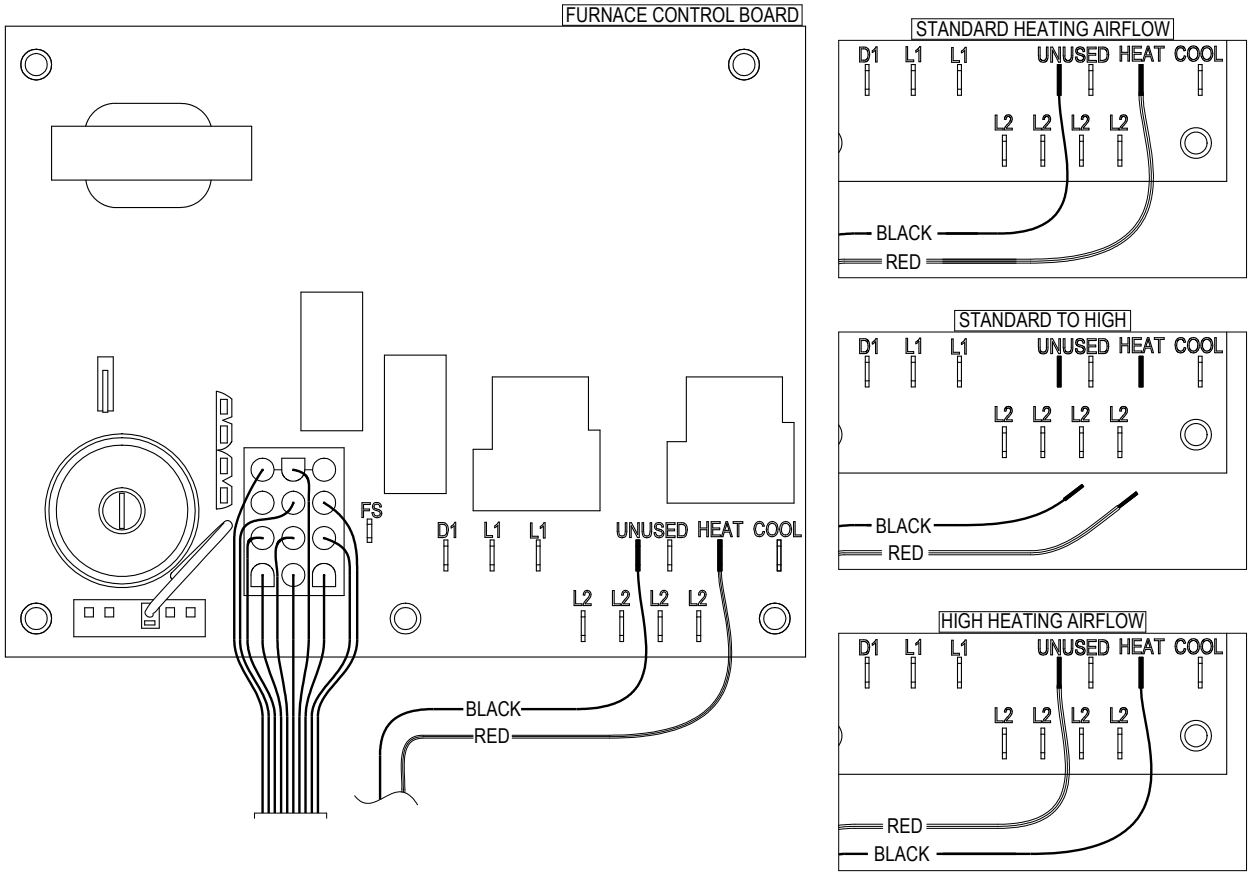


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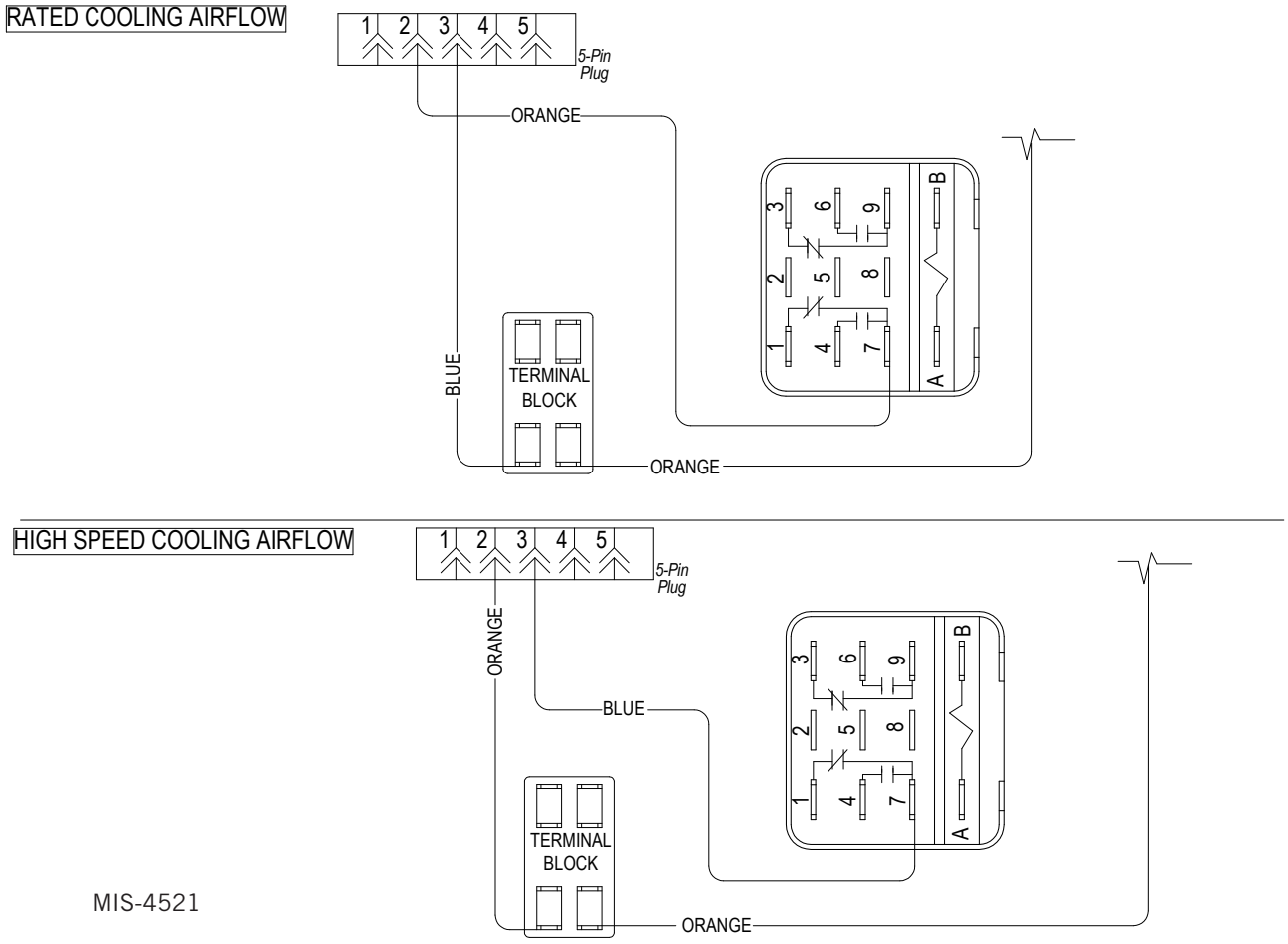
FIGURE 26
Increasing Cooling Speed



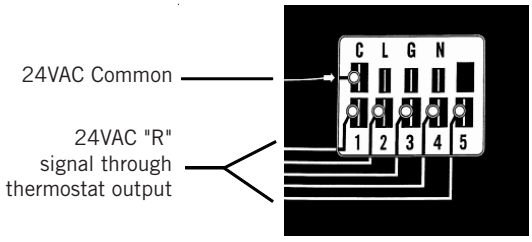
- Locate the orange and blue wires on the terminal block below the furnace control board.
- Switch the terminal landings on the terminal block.
- Close the control panel.
- To reduce the cooling airflow speed from high to rated, reverse the blue and orange wires on the terminal block below the furnace control board.

Blower Speeds

Five factory programmed speed taps (torque settings) are available for the motor, and are selected through different unit modes of operation. These modes are energized by 24VAC signals from the low voltage terminal block located inside the control panel by a thermostat or other controlling device. Each speed tap is programmed by Bard at the factory to different motor torque settings (see Figure 27).

Multiple motor speed taps may be energized simultaneously by 24VAC power during different modes of operation. The highest number speed tap energized takes priority with 5 being the highest and 1 being the lowest.

FIGURE 27
Speed Taps



Speed Tap 1: Part Load Speed
Speed Tap 2: Cool Speed
Speed Tap 3: Cool High Speed
Speed Tap 4: Heat Speed
Speed Tap 5: Heat High Speed

TABLE 12
WG2SF Indoor Blower Performance @ 230 and 460 VOLTS

Recommended WG2SF cooling airflow range at rated 800 CFM @ 0.20 ESP (WC) is 700 - 910 CFM
Factory set on Rated speed for cooling and Medium speed for heating.

ESP Inches H_2O	COOLING MODE			MANUAL FAN and HEATING MODE			
	Wet Coil			90,000 BTU Input		81,000 BTU Input	
	Part Load Speed Tap 1	**Rated Speed Tap 2 (Default)**	High Speed Tap 3 (MED)	**Medium**	High	**Medium**	High
	Wet Coil	Wet Coil	Wet Coil				
0.00	660	975	1135				
0.10	470	800	1050	1361			
0.20	315	655	965	1288	1373	1288	
0.30	200	530	880	1214	1324	1214	
0.40	120	435	795	1143	1278	1143	
0.50	75	360	705	1077	1237	1077	1237

ESP Inches H_2O	COOLING MODE			MANUAL FAN and HEATING MODE			
	Wet Coil			68,000 BTU Input		61,000 BTU Input	
	Part Load Speed Tap 1	**Rated Speed Tap 2 (Default)**	High Speed Tap 3 (MED)	**Medium**	High	**Medium**	High
	Wet Coil	Wet Coil	Wet Coil				
0.00	660	975	1135				
0.10	470	800	1050				
0.20	315	655	965	1288			
0.30	200	530	880	1214			
0.40	120	435	795	1143	1278	1143	
0.50	75	360	705	1077	1237	1077	

ESP Inches H_2O	COOLING MODE			MANUAL FAN and HEATING MODE			
	Wet Coil			45,000 BTU Input		41,000 BTU Input	
	Part Load Speed Tap 1	**Rated Speed Tap 2 (Default)**	High Speed Tap 3 (MED)	**Medium**	High	**Medium**	High
	Wet Coil	Wet Coil	Wet Coil				
0.00	660	975	1135				
0.10	470	800	1050	1361			
0.20	315	655	965	1288			
0.30	200	530	880	1214	1324		
0.40	120	435	795	1143	1278	1143	
0.50	75	360	705	1077	1237	1077	

SG-3, RG-3, non-ducted application adjustment – Reduce airflow by 100 CFM for SG-3 and RG-3 installations

TABLE 13
WG3SF Indoor Blower Performance @ 230 AND 460 VOLTS

Recommended WG3SF cooling airflow range at rated 1100 CFM @ 0.10 ESP (WC) is 940 - 1250 CFM
Factory set on Rated speed for cooling and Medium speed for heating.

ESP Inches H_2O	COOLING MODE			MANUAL FAN and HEATING MODE			
	Wet Coil			90,000 BTU Input		81,000 BTU Input	
	Part Load Speed Tap 1	**Rated Speed Tap 2 (Default)**	High Speed Tap 3 (MED)	**Medium**	High	**Medium**	High
	Wet Coil	Wet Coil	Wet Coil				
0.00	825	1223	1350	1281			
0.10	750	1143	1305	1237	1375	1237	
0.20	680	1069	1250	1188	1329	1188	
0.30	610	1005	1190	1134	1279	1134	
0.40	545	950	1125	1075	1225	1075	1225
0.50	480	901	1055	1011	1168	1011	1168

ESP Inches H_2O	COOLING MODE			MANUAL FAN and HEATING MODE			
	Wet Coil			68,000 BTU Input		61,000 BTU Input	
	Part Load Speed Tap 1	**Rated Speed Tap 2 (Default)**	High Speed Tap 3 (MED)	**Medium**	High	**Medium**	High
	Wet Coil	Wet Coil	Wet Coil				
0.00	825	1223	1350	1281			
0.10	750	1143	1305	1237			
0.20	680	1069	1250	1188			
0.30	610	1005	1190	1134	1279	1134	
0.40	545	950	1125	1075	1225	1075	
0.50	480	901	1055	1011	1168	1011	

ESP Inches H_2O	COOLING MODE			MANUAL FAN and HEATING MODE			
	Wet Coil			45,000 BTU Input		41,000 BTU Input	
	Part Load Speed Tap 1	**Rated Speed Tap 2 (Default)**	High Speed Tap 3 (MED)	**Medium**	High	**Medium**	High
	Wet Coil	Wet Coil	Wet Coil				
0.00	825	1223	1350	1281			
0.10	750	1143	1305	1237			
0.20	680	1069	1250	1188	1329	1188	
0.30	610	1005	1190	1134	1279	1134	
0.40	545	950	1125	1075	1225	1075	
0.50	480	901	1055	1011	1168	1011	1168

SG-3, RG-3, non-ducted application adjustment – Reduce airflow by 100 CFM for SG-3 and RG-3 installations

TABLE 14
WG4SF Indoor Blower Performance @ 230 AND 460 VOLTS

Recommended WG4SF cooling airflow range at rated 1400 CFM @ 0.20 ESP (WC) is 1150 - 1680 CFM
Factory set on Rated speed for cooling and Medium speed for heating.

ESP Inches H_2O	COOLING MODE			MANUAL FAN and HEATING MODE			
	Wet Coil			125,000 BTU Input		113,000 BTU Input	
	Part Load Speed Tap 1	**Rated Speed Tap 2 (Default)**	High Speed Tap 3 (MED)	**Medium**	High	**Medium**	High
	Wet Coil	Wet Coil	Wet Coil				
0.00	1140	1502	1660	1788			
0.10	1005	1458	1600	1734			
0.20	880	1404	1535	1678		1678	
0.30	765	1340	1470	1618		1618	
0.40	665	1266	1400	1557	1811	1557	
0.50	575	1187	1330	1492	1754	1492	

ESP Inches H_2O	COOLING MODE			MANUAL FAN and HEATING MODE			
	Wet Coil			100,000 BTU Input		90,000 BTU Input	
	Part Load Speed Tap 1	**Rated Speed Tap 2 (Default)**	High Speed Tap 3 (MED)	**Medium**	High	**Medium**	High
	Wet Coil	Wet Coil	Wet Coil				
0.00	1140	1502	1660	1788			
0.10	1005	1458	1600	1734		1734	
0.20	880	1404	1535	1678		1678	
0.30	765	1340	1470	1618	1870	1618	
0.40	665	1266	1400	1557	1811	1557	
0.50	575	1187	1330	1492	1754	1492	

ESP Inches H_2O	COOLING MODE			MANUAL FAN and HEATING MODE			
	Wet Coil			75,000 BTU Input		68,000 BTU Input	
	Part Load Speed Tap 1	**Rated Speed Tap 2 (Default)**	High Speed Tap 3 (MED)	**Medium**	High	**Medium**	High
	Wet Coil	Wet Coil	Wet Coil				
0.00	1140	1502	1660	1788			
0.10	1005	1458	1600	1734			
0.20	880	1404	1535	1678		1678	
0.30	765	1340	1470	1618	1870	1618	
0.40	665	1266	1400	1557	1811	1557	
0.50	575	1187	1330	1492	1754	1492	

SG-5, RG-5, non-ducted application adjustment – Reduce airflow by 170 CFM for SG-5 and RG-5 installations

TABLE 15
WG5SF Indoor Blower Performance @ 230 AND 460 VOLTS

Recommended WG5SF cooling airflow range at rated 1600 CFM @ 0.20 ESP (WC) is 1360 - 1850 CFM
Factory set on Rated speed for cooling and Medium speed for heating.

ESP Inches H_2O	COOLING MODE			MANUAL FAN and HEATING MODE			
	Wet Coil			125,000 BTU Input		113,000 BTU Input	
	Part Load Speed Tap 1	**Rated Speed Tap 2 (Default)**	High Speed Tap 3 (MED)	**Medium**	High	**Medium**	High
	Wet Coil	Wet Coil	Wet Coil				
0.00	1210	1716	1860	1743			
0.10	1120	1662	1795	1682			
0.20	1035	1607	1735	1619	1843	1619	
0.30	945	1547	1675	1554	1783	1554	
0.40	855	1492	1615	1486	1721	1486	
0.50	765	1433	1560	1417	1657	1417	1657

ESP Inches H_2O	COOLING MODE			MANUAL FAN and HEATING MODE			
	Wet Coil			100,000 BTU Input		90,000 BTU Input	
	Part Load Speed Tap 1	**Rated Speed Tap 2 (Default)**	High Speed Tap 3 (MED)	**Medium**	High	**Medium**	High
	Wet Coil	Wet Coil	Wet Coil				
0.00	1210	1716	1860	1743			
0.10	1120	1662	1795	1682		1682	
0.20	1035	1607	1735	1619	1843	1619	
0.30	945	1547	1675	1554	1783	1554	
0.40	855	1492	1615	1486	1721	1486	1721
0.50	765	1433	1560	1417	1657	1417	1657

ESP Inches H_2O	COOLING MODE			MANUAL FAN and HEATING MODE			
	Wet Coil			75,000 BTU Input		68,000 BTU Input	
	Part Load Speed Tap 1	**Rated Speed Tap 2 (Default)**	High Speed Tap 3 (MED)	**Medium**	High	**Medium**	High
	Wet Coil	Wet Coil	Wet Coil				
0.00	1210	1716	1860	1743			
0.10	1120	1662	1795	1682		1682	
0.20	1035	1607	1735	1619	1843	1619	
0.30	945	1547	1675	1554	1783	1554	
0.40	855	1492	1615	1486	1721	1486	1721
0.50	765	1433	1560	1417	1657	1417	1657

SG-5, RG-5, non-ducted application adjustment – Reduce airflow by 170 CFM for SG-5 and RG-5 installations

TABLE 16
Integrated Furnace and Blower Control Operation

IGNITION SEQUENCE CONTROL

Ignition Source	24 VAC DSI
Flame Sensing	Remote
Timings	
- Prepurge	15 seconds
- Postpurge	30 seconds (0 if cycle terminated before valve "on")
- Inter-trial purge	15 seconds
- Pressure switch proving period	60 seconds
- Trials for ignition	3 per ignition sequence
- Trial for ignition	7 seconds total time to prove flame
- Ignition sequence lockout	60 minutes (after 3 trials for ignition), auto reset – can be reset during the 60-minute lockout period by opening thermostat circuit for 3 seconds or more
- Heat blower on - delay	30 seconds (timing starts when ignitor cycles off)
- Heat blower off - delay	90, 120, 150 seconds selectable; factory set at 120
- Cool blower on - delay	7 seconds
- Cool blower off - delay	60 seconds
- Manual fan operations	Operates on selected heating speed and cycles off during ignition or burner start-up sequence.
- High limit control operation	Automatic reset, ignition sequence restart. See Note 1.
- Flame rollout switch operation	Manual reset, igniton sequence initiated after switch is manually reset. See Note 1.

NOTE 1: After the fourth limit trip on a given call for heat, there will be a 1-hour delay before the ignition sequence will restart. After either high limit switch or flame rollout switch actuation, the inducer will operate for the 30-second postpurge and the comfort air blower will operate for the selected off delay. If on Manual Fan operation, the comfort air blower will continue to operate.

SAFETY UNITS

High limit/Rollout	SPST in 24 Volt
Pressure switch	SPST, safe start check

COMFORT FAN CONTROL

Heating Speed Fan	
Normal operation	
- ON delay	30 seconds fixed. Timing starts when igniter de-energized.
- OFF delay	3 selectable timings – 120 seconds standard can be changed to 90 or 150 seconds.
Limit Operation	ON when limit OPEN OFF after OFF delay when limit CLOSES
Flame Sense	ON if flame is sensed *and* there is no call for heat.
Cooling Speed Fan	
- ON delay	7 seconds
- OFF delay	60 seconds
Manual Fan	ON continuously on HEATING speed. When call for cool, the fan switches to COOLING speed. Then when thermostat satisfied, the fan switches back to HEATING speed after COOLING OFF delay.

DIAGNOSTIC INDICATOR

A red LED is provided to indicate system faults as follows:

Steady ON - Control okay in standby, call for heat, cool or fan modes
Steady OFF - Internal control fault or no power. Also check 3A fuse on control.
1 flash - Lockout due to failed ignition or flame dropouts
2 flashes - Pressure switch open with inducer on
3 flashes - Pressure switch is closed with inducer off
4 flashes - Limit switch is open
5 flashes - Flame detected with gas valve closed
6 flashes - Compressor output delayed from short cycle/staging timer
The flash rate is 0.25 seconds on, 0.25 seconds off with 2.0 seconds pause between flash codes.

35. Pressure Service Ports

High and low pressure service ports are installed on all units so that the system operating pressures can be observed. Tables 17 and 18 outline expected pressures at various indoor and outdoor temperatures.

This unit employs high-flow Coremax valves instead of the typical Schrader-type valves.

WARNING! Do NOT use a Schrader valve core removal tool with these valves. Use of such a tool could result in eye injuries or refrigerant burns!

To change a Coremax valve without first removing the refrigerant, a special tool is required which can be obtained at www.fastestinc.com/en/SCCA07H. See the replacement parts manual for replacement core part numbers.

TABLE 17
Cooling Pressure Table – Rated Airflow

Model	Return Air Temperature	Pressure	75°	80°	85°	90°	95°	100°	105°	110°	115°	120°	125°
WG2SF	75° DB 62° WB	Low Side	117	118	119	120	121	122	123	124	126	127	129
		High Side	276	294	314	335	357	380	404	429	455	483	512
	80° DB 67° WB	Low Side	125	126	127	128	129	130	131	133	134	136	138
		High Side	283	302	322	343	366	389	414	440	467	496	525
	85° DB 72° WB	Low Side	130	130	131	132	133	135	136	137	139	141	143
		High Side	293	313	333	355	378	403	429	455	483	513	543
WG3SF	75° DB 62° WB	Low Side	120	121	122	123	124	125	126	128	129	131	133
		High Side	298	318	339	361	384	408	432	458	485	513	541
	80° DB 67° WB	Low Side	129	129	130	131	132	134	135	137	138	140	142
		High Side	306	326	348	370	394	418	443	470	497	526	555
	85° DB 72° WB	Low Side	133	134	135	136	137	138	140	141	143	145	147
		High Side	317	338	360	383	407	433	459	486	515	544	574
WG4SF	75° DB 62° WB	Low Side	124	123	124	124	124	125	126	127	128	130	--
		High Side	286	306	326	348	371	394	419	445	471	499	--
	80° DB 67° WB	Low Side	132	132	132	132	133	134	135	136	137	139	--
		High Side	293	314	335	357	380	404	430	456	483	512	--
	85° DB 72° WB	Low Side	137	137	137	137	138	138	139	140	142	144	--
		High Side	304	325	346	369	393	419	445	472	500	530	--
WG5SF	75° DB 62° WB	Low Side	119	120	120	121	122	123	124	125	126	128	--
		High Side	301	322	345	367	391	416	441	467	494	522	--
	80° DB 67° WB	Low Side	128	128	129	129	130	131	132	134	135	137	--
		High Side	309	331	353	377	401	426	452	479	507	535	--
	85° DB 72° WB	Low Side	132	133	133	134	135	136	137	138	140	141	--
		High Side	320	342	366	390	415	441	468	496	524	554	--

Low side pressure ± 4 PSIG High side pressure ±10 PSIG

Tables based upon rated CFM (airflow) across the evaporator coil.

If there is any doubt as to correct operating charge being in the system, the charge should be reclaimed, and the system evacuated and recharged to serial plate instructions.

TABLE 18
Cooling Pressure Table – Part Load Airflow

Model	Return Air Temperature	Pressure	75°	80°	85°	90°	95°	100°	105°	110°	115°	120°	125°
WG2SF	75° DB 62° WB	Low Side	122	122	122	122	123	124	126	128	130	132	135
		High Side	222	254	272	291	311	332	354	377	401	426	453
	80° DB 67° WB	Low Side	131	130	130	131	132	133	135	137	139	141	144
		High Side	228	261	279	298	319	340	363	386	411	437	464
	85° DB 72° WB	Low Side	135	135	135	136	136	138	139	141	144	146	149
		High Side	236	270	289	309	330	352	375	400	426	452	480
WG3SF	75° DB 62° WB	Low Side	114	122	124	127	130	132	133	135	135	136	136
		High Side	232	268	288	308	329	351	374	397	422	447	474
	80° DB 67° WB	Low Side	122	130	133	136	139	141	142	144	145	145	146
		High Side	238	275	295	316	337	360	383	408	433	459	486
	85° DB 72° WB	Low Side	127	134	138	141	143	146	147	149	150	150	151
		High Side	247	285	305	327	349	373	397	422	448	475	503
WG4SF	75° DB 62° WB	Low Side	132	129	128	128	128	128	129	130	132	134	--
		High Side	223	258	276	295	315	337	358	381	405	430	--
	80° DB 67° WB	Low Side	141	138	137	137	136	137	138	139	141	143	--
		High Side	229	264	283	303	324	345	368	391	415	441	--
	85° DB 72° WB	Low Side	146	143	142	141	141	142	142	144	146	148	--
		High Side	237	273	293	313	335	357	381	405	430	456	--
WG5SF	75° DB 62° WB	Low Side	122	123	123	124	125	126	126	127	128	130	--
		High Side	233	270	289	310	332	354	378	402	427	454	--
	80° DB 67° WB	Low Side	130	131	132	133	133	134	135	136	137	139	--
		High Side	239	276	297	318	340	363	388	413	438	465	--
	85° DB 72° WB	Low Side	134	136	136	137	138	139	140	141	142	143	--
		High Side	247	286	307	329	352	376	401	427	454	482	--

Low side pressure ± 4 PSIG High side pressure ±10 PSIG

Tables based upon rated CFM (airflow) across the evaporator coil.

If there is any doubt as to correct operating charge being in the system, the charge should be reclaimed, and the system evacuated and recharged to serial plate instructions.

36. Refrigerant Leak Detection System (RDS)

This unit is equipped with a refrigerant leak detection system (RDS). This system monitors the air in the indoor section of the unit for refrigerant leaks. In the event of a leak, the RDS will enter mitigation mode, which prohibits function of the compressor and electric heaters (if applicable) and turns on the indoor blower in order to prevent the refrigerant from concentrating within the unit. The RDS is made up of three major components: Refrigerant sensor, RDS harness and DPDT relay (see Figure 28).

See unit wiring diagram for RDS wiring.

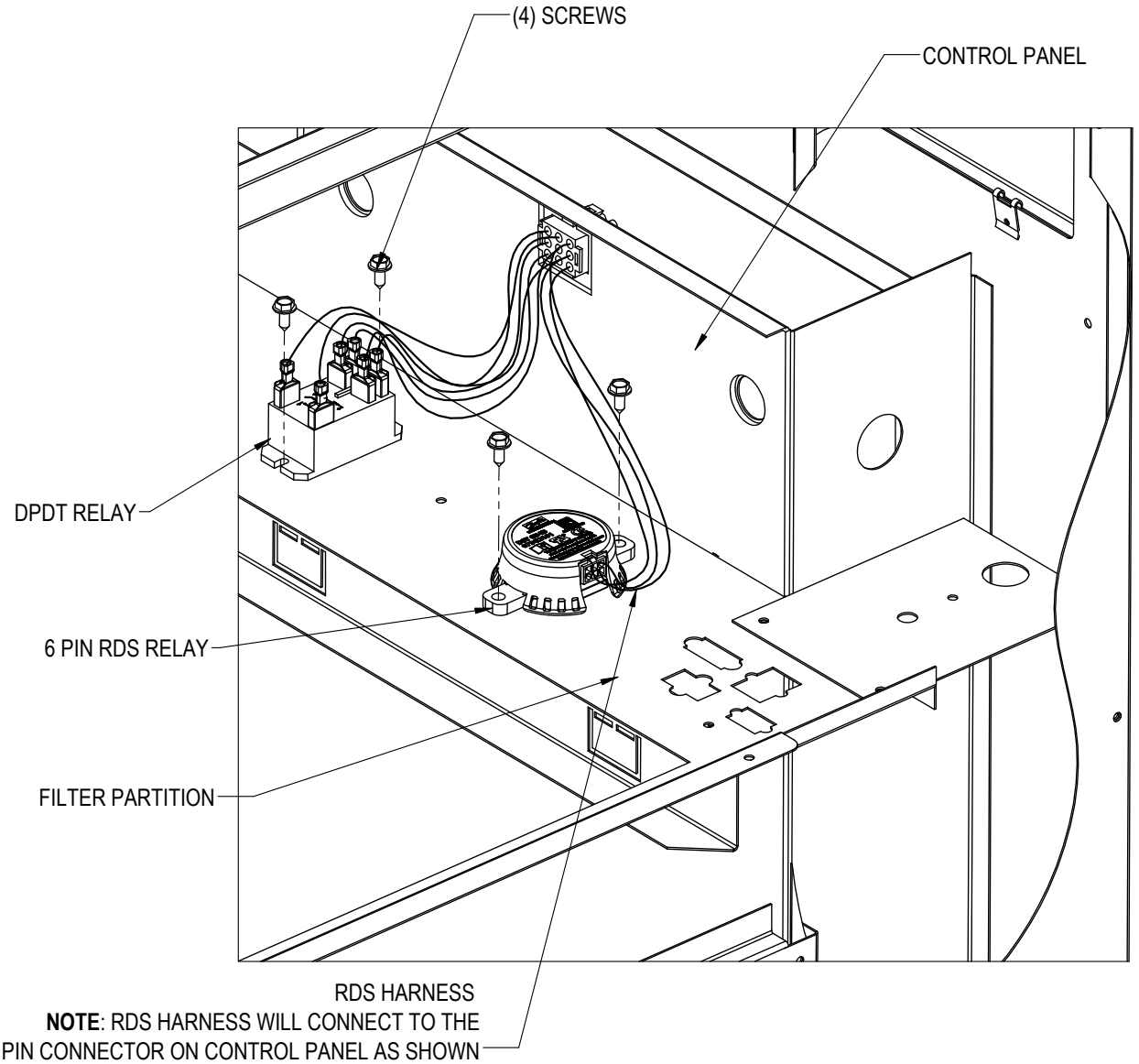
Why RDS?

R-454B refrigerant carries an "A2L" safety classification, meaning it is mildly flammable in certain concentrations. The purpose of the RDS is to prevent refrigerant from reaching potentially dangerous concentrations within the indoor section of the unit in the event of a refrigerant leak.

Sequence of Operations

The refrigerant sensor has four operating modes: Power up and self test, normal, alarm state and sensor fault. During all modes of operation the sensor will continue to perform runtime diagnostics.

FIGURE 28
Refrigerant Leak Detection System



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Power Up and Self Test

When the air conditioner receives power, the refrigerant sensor executes a series of self test diagnostics. This validates the integrity of the sensor's memory, embedded program, and power supply. This power up sequence only takes a few seconds.

Normal Operation

Once the refrigerant sensor's power up sequence is complete, the RDS begins normal operation. In this mode the refrigerant sensor is active and the air conditioner functions normally.

Alarm State

The refrigerant sensor has a factory-set alarm threshold limit value. When the sensor registers refrigerant at a concentration above this threshold, the sensor enters alarm state. In alarm state the internal relay within the refrigerant sensor is de-energized, which puts the RDS into mitigation mode.

Sensor Fault Mode

The refrigerant sensor performs continuous diagnostics on the sensor integrity (shorts, opens, out of range, communication errors) as well as the integrity of the on-board memory, programming, oscillator and voltage levels. If any of these diagnostics fail or the sensor becomes disconnected, the internal relay within the refrigerant sensor is de-energized, which puts the RDS into mitigation mode.

Mitigation Mode

When the RDS enters mitigation mode, it initiates the following:

- The "G" terminal is energized on the low voltage terminal strip. This activates the indoor blower.
- The signal from "CC" on the defrost board to the compressor contactor is interrupted. This stops compressor operation or prevents it from starting in the event of a call from the thermostat
- The 24V common connection to all electric heat contactors (if applicable) is broken. This stops electric heat operation or prevents it from starting in the event of a heating call
- The "L" terminal on the low voltage terminal strip is energized. This output may to used to trigger an external alarm or notify a building management system or group controller that a leak has occurred.

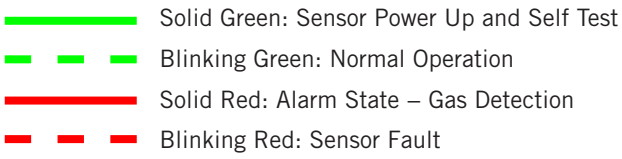
Alarm Reset

The refrigerant sensor will stay in alarm mode as long as the refrigerant concentration remains above the alarm threshold limit value. For the alarm to be reset, the sensor reading must be a minimum of 2.5% below the alarm threshold for a period of 5 minutes. The relay is then re-energized, and the unit returns to normal operation.

RDS Diagnosis

The refrigerant sensor of the RDS features a status LED. When the sensor is powered up, an LED will indicate sensor status. The sensor LED will back-light the sensor and create a visible reflection on the blower partition. Status LED blink codes shown in Figure 29.

FIGURE 29
Sensor Status LED Blink Code



⚠ WARNING

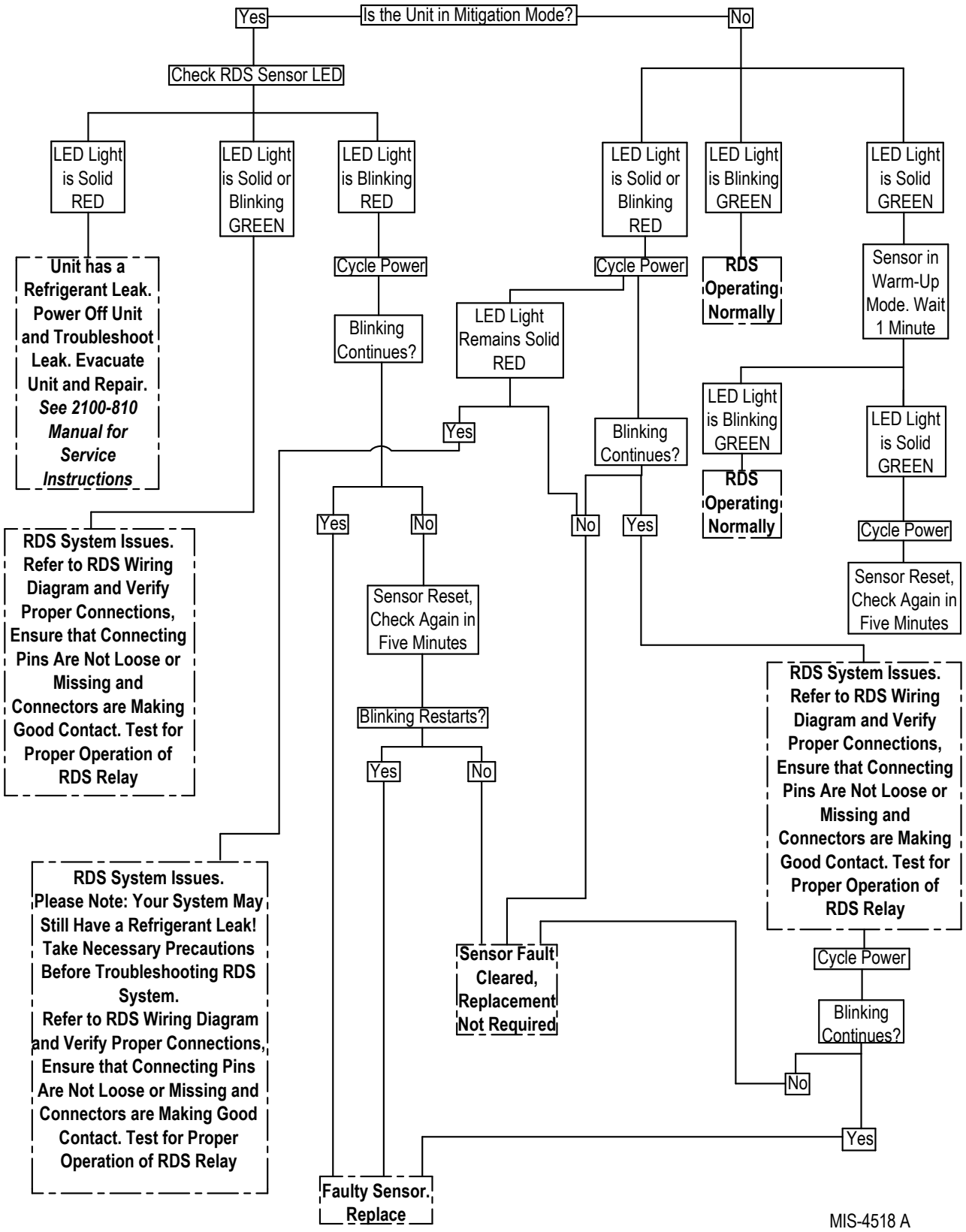
The Refrigerant Leak Detection System (RDS) is a safety device. Do not disable.

NOTE: *If the sensor status LED is not lit, the sensor is either not receiving power or may be faulty or damaged. Check harness connections and test internal relay. Refer to A2L Safety Manual 2100-810 for additional diagnostic information.*

Sensor End-of-Life

The refrigerant sensor has a rated life expectancy of 15+ years. This is not a set time length, but it is the expected time that the sensor should last without failing its internal checks. In the event that the sensor would reach its end-of-life, it will enter Sensor Failure Mode and the sensor will need to be replaced. **The sensor must be replaced with a Bard-approved refrigerant sensor.** See unit replacement parts manual for the correct replacement sensor information.

FIGURE 30
Refrigerant Leak Detection System (RDS) Troubleshooting



37. R-454B Refrigerant Charge

This unit was charged at the factory with the quantity of refrigerant listed on the serial plate. AHRI capacity and efficiency ratings were determined by testing with this refrigerant charge quantity.

Tables 17 and 18 show nominal pressures for the units. Since many installation specific situations can affect the pressure readings, this information should only be used by certified technicians as a guide for evaluating proper system performance. They shall not be used to adjust charge. If charge is in doubt, reclaim, evacuate and recharge the unit to the serial plate charge.

38. Fan Blade Setting Dimensions

The correct fan blade setting dimension for proper air delivery across the outdoor coil is shown in Figure 31.

FIGURE 31
Fan Blade

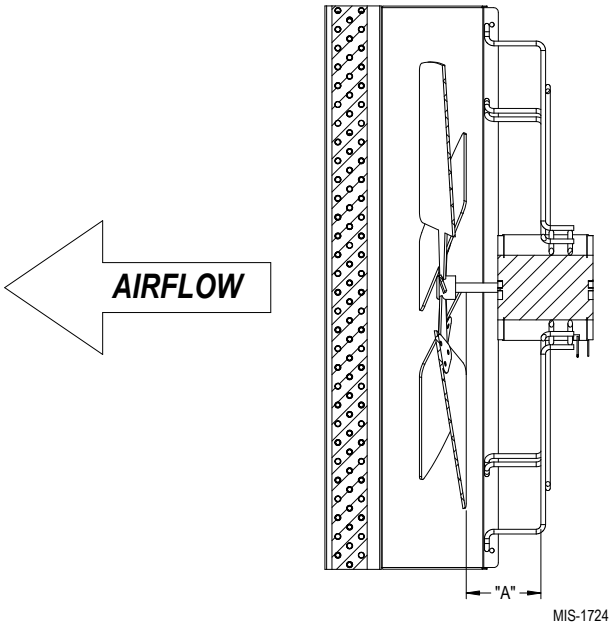


TABLE 19
Fan Blade Dimension

Model	Dimension A
WG2SF	1.25
WG3SF	1.25
WG4SF	1.5
WG5SF	1.5

39. Wiring Diagram Index

Unit Model No.	Basic Wiring Diagram
WG2SF-A	4218-101
WG2SF-B	4218-201
WG2SF-C	4218-301
WG3SF-A	4218-101
WG3SF-B	4218-201
WG3SF-C	4218-301
WG4SF-A	4218-101
WG4SF-B	4218-201
WG4SF-C	4218-301
WG5SF-A	4218-101
WG5SF-B	4218-201
WG5SF-C	4218-301