
INSTRUCTION BOOK

**DIGITAL AIR™
LOAD RESISTORS**



**Electronic Corporation
Cleveland (Solon) Ohio USA**

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Safety Precautions

The following are general safety precautions that are not necessarily related to any specific part or procedure, and do not necessarily appear elsewhere in this publication. These precautions must be thoroughly understood and applied to all phases of operation and maintenance.

Keep Away From Live Circuits

Operating personnel must at all times observe normal safety regulations. Do not replace components or make adjustments to the equipment with the high voltage supply turned on. To avoid casualties, always remove power.

Do Not Service Or Adjust Alone

Under no circumstances should any person reach into an enclosure for the purpose of service or adjustment of equipment except in the presence of someone who is capable of rendering aid.

Safety Earth Ground

An uninterruptible earth safety ground must be supplied from the main power source to test instruments. Grounding one conductor of a two-conductor power cable is not sufficient protection. Serious injury or death can occur if this grounding is not properly supplied.

Shock Hazard

Do not attempt to remove the RF transmission line while RF power is present. Radiated RF power is a potential health hazard.

Safety Symbols

WARNING


Warning notes call attention to a procedure, which if not correctly performed could result in personal injury.

CAUTION

Caution notes call attention to a procedure, which if not correctly performed could result in damage to the instrument.



This symbol appears on the equipment indicating there is important information in the instruction manual regarding that particular area.

 **Note:** Calls attention to supplemental information.

Warning Statements

The following safety warnings appear in the text where there is danger to operating and maintenance personnel and are repeated here for emphasis.

WARNING

Turn off ac power and RF power before removing or replacing the access panel; the potential for electrical shock exists.

WARNING

Ensure the power is turned off when attaching power cable or wire.

WARNING

Never attempt to connect or disconnect an RF cable or line while power is on at the RF power source. Radiated RF energy is a potential health hazard.

WARNING

Exhausted air may exceed 95°C (203°F).

WARNING

Disconnect this unit from the RF power sources and the ac line before any disassembly. The potential for electrical shock exists.

WARNING

Improper wiring could result in electric shock and death.

WARNING

High heat present inside unit! Let cool for at least 10 minutes before servicing or severe burns could result.

WARNING

Maintenance by other than trained service personnel could result in electric shock.

Caution Statements

The following equipment cautions appear in the text whenever the equipment is in danger of damage and are repeated here for emphasis.

CAUTION

Do not block airflow. Air is forced into the housing via fans on all four sides and exhausts through a grille on the lower rear of the unit. Blocking air inputs or exhaust could cause unit failure.

CAUTION

Connect interlock before RF operation.

CAUTION

Check the local electrical code for proper ac hookup prior to operation of the unit. Make sure the neutral or return hookup is only used for that purpose.

CAUTION

Do not operate without ac power to the load.

CAUTION

Applying more than the rated average RF power to the load may damage the load resistor.

CAUTION

Do not disconnect ac line power before turning off RF power to the load. Application of full RF power to the load while the fans are unpowered will cause the load to overheat and destroy the resistor elements.

CAUTION

Improper wiring could disable load.

CAUTION

Do not disable fans. Application of full RF power to the load while the air circulation is off will cause the load to overheat and destroy the resistor elements.

CAUTION

All replacement wiring must be 18 AWG, with insulation rated to 400° F (205° C). Use of other wiring could result in unit damage.

CAUTION

This circuit diagram for use by trained service personnel only. Improper use could disable load.

Safety Statements



USAGE

ANY USE OF THIS INSTRUMENT IN A MANNER NOT SPECIFIED BY THE MANUFACTURER MAY IMPAIR THE INSTRUMENT'S SAFETY PROTECTION.

USO

EL USO DE ESTE INSTRUMENTO DE MANERA NO ESPECIFICADA POR EL FABRICANTE, PUEDE ANULAR LA PROTECCIÓN DE SEGURIDAD DEL INSTRUMENTO.

BENUTZUNG

WIRD DAS GERÄT AUF ANDERE WEISE VERWENDET ALS VOM HERSTELLER BESCHRIEBEN, KANN DIE GERÄTESICHERHEIT BEEINTRÄCHTIGT WERDEN.

UTILISATION

TOUTE UTILISATION DE CET INSTRUMENT QUI N'EST PAS EXPLICITEMENT PRÉVUE PAR LE FABRICANT PEUT ENDOMMAGER LE DISPOSITIF DE PROTECTION DE L'INSTRUMENT.

IMPIEGO

QUALORA QUESTO STRUMENTO VENISSE UTILIZZATO IN MODO DIVERSO DA COME SPECIFICATO DAL PRODUTTORE LA PROIZIONE DI SICUREZZA POTREBBE VENIRNE COMPROMESSA.



SERVICE

SERVICING INSTRUCTIONS ARE FOR USE BY SERVICE - TRAINED PERSONNEL ONLY. TO AVOID DANGEROUS ELECTRIC SHOCK, DO NOT PERFORM ANY SERVICING UNLESS QUALIFIED TO DO SO.

SERVICIO

LAS INSTRUCCIONES DE SERVICIO SON PARA USO EXCLUSIVO DEL PERSONAL DE SERVICIO CAPACITADO. PARA EVITAR EL PELIGRO DE DESCARGAS ELÉCTRICAS, NO REALICE NINGÚN SERVICIO A MENOS QUE ESTÉ CAPACITADO PARA HACERLO.

WARTUNG

ANWEISUNGEN FÜR DIE WARTUNG DES GERÄTES GELTEN NUR FÜR GESCHULTES FACHPERSONAL.

ZUR VERMEIDUNG GEFÄHRLICHE, ELEKTRISCHE SCHOCKS, SIND WARTUNGSARBEITEN AUSSCHLIEßLICH VON QUALIFIZIERTEM SERVICEPERSONAL DURCHZUFÜHREN.

ENTRETIEN

L'EMPLOI DES INSTRUCTIONS D'ENTRETIEN DOIT ÊTRE RÉSERVÉ AU PERSONNEL FORMÉ AUX OPÉRATIONS D'ENTRETIEN. POUR PRÉVENIR UN CHOC ÉLECTRIQUE DANGEREUX, NE PAS EFFECTUER D'ENTRETIEN SI L'ON N'A PAS ÉTÉ QUALIFIÉ POUR CE FAIRE.

ASSISTENZA TECNICA

LE ISTRUZIONI RELATIVE ALL'ASSISTENZA SONO PREVISTE ESCLUSIVAMENTE PER IL PERSONALE OPPORTUNAMENTE ADDESTRATO. PER EVITARE PERICOLOSE SCOSSE

ELETTRICHE NON EFFETTUARE ALCUNA RIPARAZIONE A MENO CHE QUALIFICATI A FARLA.



CONNECT INTERLOCK TO TRANSMITTER BEFORE OPERATING.

BRANCHER LE VERROUILLAGE À L'ÉMETTEUR AVANT EMPLOI.

CONECTE EL INTERBLOQUEO AL TRANSMISOR ANTES DE LA OPERACION.

VOR INBETRIEBNAHME VERRIEGELUNG AM SENDER ANSCHLIESSEN.

PRIMA DI METTERE IN FUNZIONE L'APPARECCHIO, COLLEGARE IL DISPOSITIVO DI BLOCCO AL TRASMETTITORE.

About This Manual

This instruction book covers Bird Digital Air Load Resistor Models:

DA5F15	DA5U15	DA5F30	DA5U30
DA10F15	DA10U15	DA10F30	DA10U30
DA15F15	DA15U15	DA15F30	DA15U30
DA25F15	DA25U15	DA25F30	DA25U30
	DA25-4U15		DA25-4U30
DA40F15		DA40F30	
	DA40-5U15		DA40-5U30
DA10V1F15	DA10V1U15	DA10V1F30	DA10V1U30
DA10V3F15	DA10V3U15	DA10V3F30	DA10V3U30
DA25V3F15	DA25V3U15	DA25V3F30	DA25V3U30
	DA25V4U15		DA25V4U30

This instruction book is arranged so that essential safety information appears in the front of the book. Reading the Safety Precautions Section before operating the equipment is strongly advised.

The remainder of this Instruction Book is divided into Chapters and Sections. At the beginning of each chapter, a general overview describes the contents of that chapter.

Operation

First time users should read Chapter 1 - Introduction, Chapter 2 - Installation, and Chapter 5 - Theory of Operation, to get an overview of equipment capabilities and installation. Specifications are provided in Chapter 6 - Specifications. An experienced operator can refer to Chapter 3 - Operating Instructions. All instructions necessary to operate the equipment appears in this chapter.

Maintenance

All personnel should be familiar with the preventive maintenance found in Chapter 4 - Maintenance. If a failure should occur, the troubleshooting section will aid in isolating and correcting the cause.

Changes to This Manual

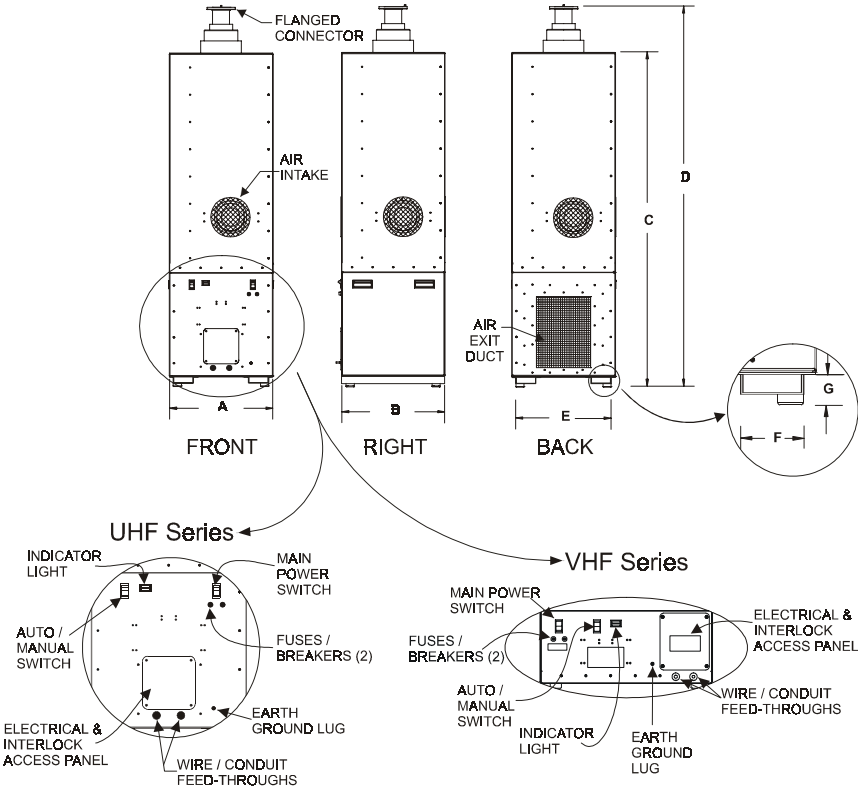
We have made every effort to ensure this manual is accurate. If you should discover any errors or if you have suggestions for improving this manual, please send your comment to our factory. This manual may be periodically updated. When inquiring about updates to this manual refer to the part number and revision level on the title page.

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Figure 1
Digital Air Outline Drawing



Series	Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Dim. F	Dim. G
DA10V	23.5" (597 mm)	23.5" (597 mm)	49.5" (1257 mm)	59" (1499 mm)	N/A ¹	N/A ¹	N/A ¹
DA25V	27.0" (686 mm)	27.0" (686 mm)	50.8" (1289 mm)	61.0" (1549 mm)	N/A ¹	N/A ¹	N/A ¹
DA5	17.0" (432 mm)	17.0" (432 mm)	55.5" (1410 mm)	64.0" (1626 mm)	N/A ¹	N/A ¹	N/A ¹
DA10	19.5" (495 mm)	19.5" (495 mm)	60.0" (1524 mm)	68.5" (1740 mm)	N/A ¹	N/A ¹	N/A ¹
DA15	25.0" (635 mm)	25.0" (635 mm)	68.0" (1727 mm)	76.5" (1943 mm)	24.5" (622 mm)	6.0" (152 mm)	2.0" (50.8 mm)
DA25	27.0" (686 mm)	27.0" (686 mm)	68.0" (1727 mm)	76.5" (1943 mm)	24.5" (622 mm)	6.0" (152 mm)	2.0" (50.8 mm)
DA40	27.5" (701 mm)	27.5" (701 mm)	78.8" (1999 mm)	84.0" (2134 mm)	24.5" (622 mm)	6.0" (152 mm)	2.0" (50.8 mm)

1. Forklift openings are not provided for these models.

Bird Digital Air Load Resistors are air cooled and capable of dissipating RF line power up to 40 kW (depending on the model). Virtually maintenance free and simple to operate, this unit should provide years of trouble free operation.

Description

The unit is supported by four bumper feet. The RF input connector is located on the top of the unit. Fans on all four sides allow for forced air cooling of the resistors. The transmitter interlock is located on the front panel. The model number is printed on a label on the lower left of the unit.

The unit is not intended for exposed outdoor use, or in areas of condensing humidity. Ensure adequate space is available for air circulation.

The Digital Air Load Resistors are offered in a variety of forms differing in their power ratings, ac input power requirements, frequency ranges, and connector types (see Figure 2 on page 2 for model numbers).

For example:

A Model DA10F15 is a UHF 10 kW load with a 3-1/8" flanged connector that requires a 115 V 50/60 Hz power source.

Figure 2
Digital Air Load Models

Power	Connector	Freq. Range	Model Number			
			Flanged, 115 Vac	Unflanged, 115 Vac	Flanged, 230 Vac	Unflanged, 230 Vac
5 kW	3-1/8" EIA	470 - 890 MHz	DA5F15	DA5U15	DA5F30	DA5U30
10 kW	3-1/8" EIA	470 - 890 MHz	DA10F15	DA10U15	DA10F30	DA10U30
15 kW	3-1/8" EIA	470 - 890 MHz	DA15F15	DA15U15	DA15F30	DA15U30
25 kW	4-1/16" Myat	470 - 890 MHz	DA25F15	DA25U15	DA25F30	DA25U30
25 kW	4-1/2" IEC	470 - 890 MHz		DA25-4U15		DA25-4U30
40 kW	4-7/8" IEC	470 - 890 MHz		DA40-5U15		DA40-5U30
40 kW	6-1/8" EIA	470 - 890 MHz	DA40F15		DA40F30	
10 kW	1-5/8" EIA	dc - 240 MHz	DA10V1F15	DA10V1U15	DA10V1F30	DA10V1U30
10 kW	3-1/8" EIA	dc - 240 MHz	DA10V3F15	DA10V3U15	DA10V3F30	DA10V3U30
25 kW	3-1/8" EIA	dc - 240 MHz	DA25V3F15	DA25V3U15	DA25V3F30	DA25V3U30
25 kW	4-1/2" IEC	dc - 240 MHz		DA25V4U15		DA25V4U30

This chapter provides information for on-site requirements, unpacking, inspection, and preparing the Digital Air load for use.

Unpacking and Inspection

1. Carefully inspect the shipping container for signs of damage. If damage is noticed, do not unpack the unit. Immediately notify the shipping carrier and Bird Electronic Corporation.
2. If the container is not damaged, unpack the unit. Save the packing materials in case the unit should need to be shipped again.
3. Inspect all of the components for visible signs of damage. Immediately notify the shipping carrier and Bird Electronic Corporation of equipment damage or missing parts.

Unit Placement

Refer to the guidelines in this section when placing the load. Handles are provided for all models. Forklift openings are provided for larger models (see Figure 1). Placement of these models without the use of a forklift is not recommended.

- Do not use in exposed outdoor locations or in areas of condensing humidity.
- Surrounding air must be free of contaminants or particles that could be drawn into the air intakes.
- Digital Air loads have no intermediate dielectric fluid or coolant. No water hookups are required.
- Digital Air loads are designed to be used upright. Consult the factory for other intended orientations.

Make sure the following open air requirements are met:

CAUTION

Do not block airflow. Air is forced into the housing via fans on all four sides and exhausts through a grille on the lower rear of the unit. Blocking air inputs or exhaust could cause unit failure.

- Do not place the unit in a small room or closet without proper ventilation. In restricted areas the heat given off by the unit may increase the ambient temperature to an unacceptable level.
- Fan intake openings should be at least 4 inches from walls and obstacles. Intake air should not exceed maximum ambient temperatures of 45°C.
- The air exit duct should be at least 24 inches from walls and obstacles.
- Do not place temperature sensitive equipment near the air exit, or equipment that will be affected by a rise in ambient air temperature. Exit air temperatures can reach in excess of 95°C depending on environmental conditions.

**Ducting
Placement**

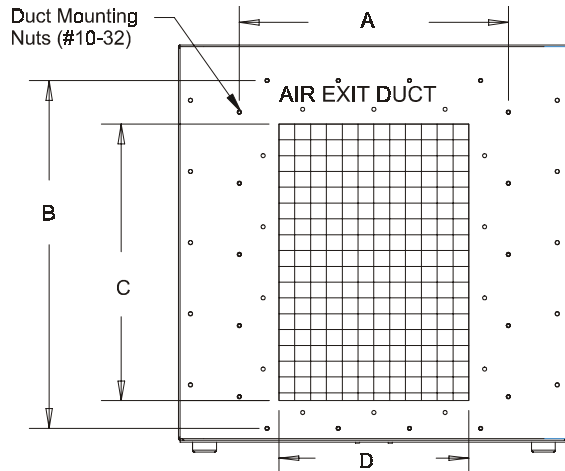
Ducting the unit exhaust is recommended for larger models. Mounting nuts are provided on the rear of the unit for ducting. Refer to Figure 3 for the location of the mounting nuts.

Should an external duct be desired, make sure the following requirements are met:

- Maximum 0.2" H₂O pressure rise at 45°C ambient.
- All ducts should be at least the area of the air exit duct on the unit. Refer to Figure 3.
- Ninety degree elbows going up to the ceiling may begin immediately at the load exit. However, they should have a minimum 4 inch radius, >15 inches preferred and should transition to a larger area.

- Ninety degree elbows into the floor or at right angles to the floor should start a minimum 5 inches from the load exit and should have a minimum 4 inch radius, >15 inches preferred and should transition to a larger area.

Figure 3
Duct Mounting
Location



Model	Dim. A	Dim. B	Dim. C	Dim. D
DA10V Series	21.375" (543 mm)	8.80" (224 mm)	7.325" (186 mm)	19.150" (486 mm)
DA25V Series	25.195" (640 mm)	10.55" (268 mm)	9.00" (229 mm)	22.125" (562 mm)
DA5 Series	11.00" (279 mm)	13.00" (330 mm)	10.0" (254 mm)	7.00" (178 mm)
DA10 Series	14.50" (368 mm)	16.00" (406 mm)	13.00" (330 mm)	10.00" (254 mm)
DA15 Series	17.00" (432 mm)	22.00" (559 mm)	17.50" (444 mm)	12.00" (305 mm)
DA25 Series	25.50" (648 mm)	23.00" (584 mm)	19.00" (483 mm)	21.00" (533 mm)
DA40 Series	25.50" (648 mm)	23.00" (584 mm)	19.00" (483 mm)	21.00" (533 mm)

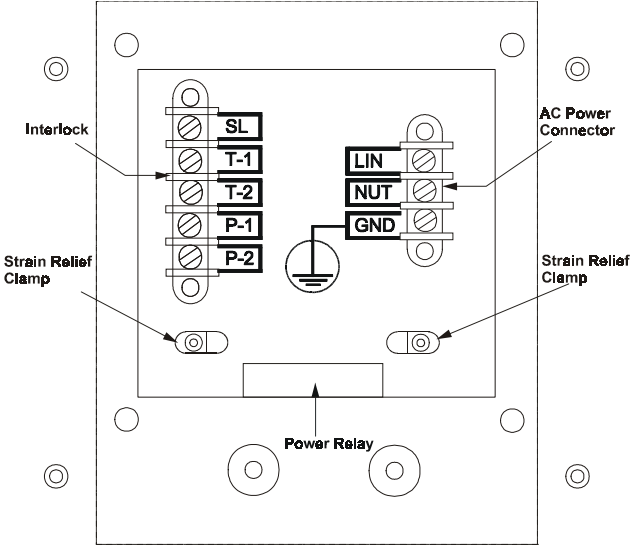
Access Panel

WARNING

Turn off ac power and RF power before removing or replacing the access panel; the potential for electrical shock exists.

Remove the access panel on the front of the load to connect interlocks, attach ac power cables, or hardwire the unit to ac power. For the location of the access panel see the outline drawing (Figure 1). See Figure 4 for the contents of the power entry box behind the access panel.

Figure 4
Power Entry
Box



Interlock Connection


<p>CAUTION</p>

<p>Connect interlock before RF operation.</p>

Units are equipped with one of three interlock systems. Refer to the instructions on the following pages appropriate for your interlock. When connecting terminals to an external interlock, refer to the transmitter instructions.

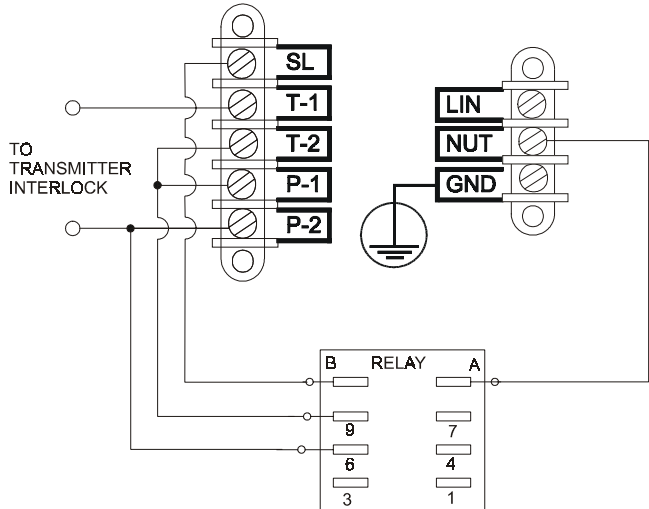
**Five
Terminal
Interlock
with Power
Relay**

This interlock has five terminals on the load's interlock connection as well as an external relay. T-1 and T-2 are the terminals for a thermal overload switch which trips if the load's operating temperature is exceeded. P-1 and P-2 are the terminals for a line power switch which trips if line power fails. Both switches are normally closed, SPST with a rating of 10 A @ 120 Vac and 5 A @ 250 Vac.


 **Note:** Line power interlock terminals will not function without the line power relay installed.

To connect both interlocks to a single interlock circuit, wire the interlock as follows (see Figure 5):

*Figure 5
Setup for
Single External
Interlock*



- Connect terminals T-2 and P-1.

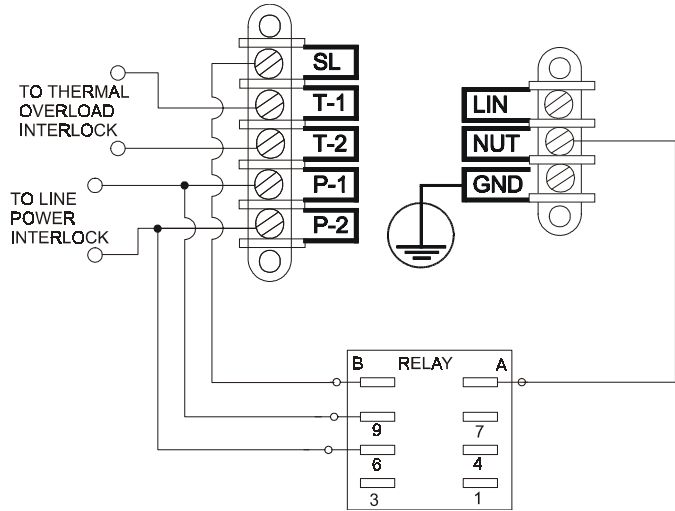
 **Note:** T-2 and P-1 are connected when shipped from the factory.

- Connect terminal SL to relay pin B. Connect relay pin A to the ac power NUT terminal.
- Connect terminal P-1 to relay pin 9. Connect terminal P-2 to relay pin 6.

- Connect terminals T-1 and P-2 to the transmitter interlock circuit.

For separate thermal and line power interlocks, set the interlock as follows (see Figure 6):

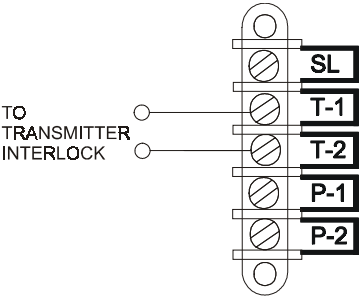
*Figure 6
Setup for
Separate
Thermal and
Line Power
Interlocks*



- Remove the connector between T-2 and P-1.
- Connect terminals T-1 and T-2 to the thermal overload circuit on the transmitter.
- Connect terminal SL to relay pin B. Connect relay pin A to the ac power NUT terminal.
- Connect terminal P-1 to relay pin 9. Connect terminal P-2 to relay pin 6.
- Connect terminals P-1 and P-2 the line power interlock circuit on the transmitter.

**Five
Terminal
Interlock
without
Power Relay**

Figure 7
Five Terminal Interlock without Power Relay

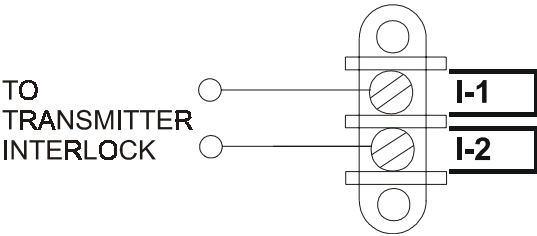


This interlock has five terminals on the load’s interlock connection, see Figure 7. T-1 and T-2 are the terminals for a thermal overload switch which trips if the load’s operating temperature is exceeded. The switch is normally closed, SPST with a rating of 10 A @ 120 Vac and 5 A @ 250 Vac. Terminals SL, P-1, and P-2 are not used.

🔊 **Note:** Line power interlock terminals will not function without the line power relay installed. See “Five Terminal Interlock with Power Relay” on page 8 for relay instructions.

**Two
Terminal
Interlock**

Figure 8
Interlock Two Terminal



This interlock has two terminals on the load’s interlock connection, see Figure 8. I-1 and I-2 are the terminals for a thermal overload switch which trips if the load’s operating temperature is exceeded. The switch is normally closed, SPST with a rating of 10 A @ 120 Vac and 5 A @ 250 Vac.

AC Power Hookup

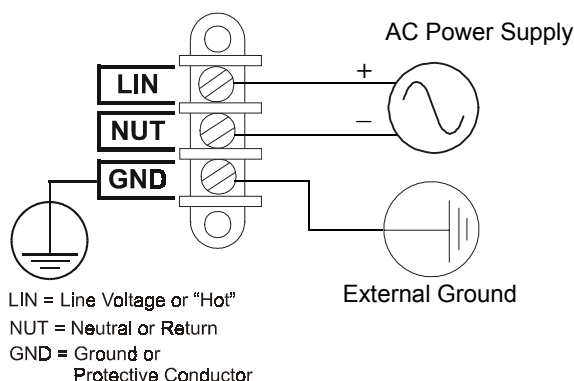
CAUTION

Check the local electrical code for proper ac hookup prior to operation of the unit. Make sure the neutral or return hookup is only used for that purpose.

The ac power supply required for this unit is 115/230 V @ 50/60 Hz, 1 ϕ depending on the model number. See “AC Power Required” on page 30 for current requirements. AC power is supplied through a 3-wire power cable or by hard wiring the unit with standard 1/2 inch conduit.

AC Power Cable

Figure 9
AC Power Connector



The ac power cable can be threaded through the holes in the access panel and connected to the terminals. Follow the instructions below to connect the cable:

WARNING

Ensure the power is turned off when attaching power cable or wire.

1. Thread the ac power cable through the grommet, lug end first.

2. Thread the ac power cable through the strain relief clamp. Secure the clamp and cable.
3. Connect the ac power cable to the terminals. See Figure 9.
4. Close and secure the access panel.
- 👉 Note: The third terminal, labeled “GND”, is the ground. For proper protection, if a 3-wire type plug and outlet are not used, connect the third terminal to a satisfactory ground at the supply end.
5. Plug the ac power cable into a suitable outlet.

**AC Hard
Wiring**

Follow the instructions below to hard wire the unit to ac power:

WARNING

Ensure the power is turned off when attaching power cable or wire.

1. Remove the grommet from the access panel.
2. Plumb the unit using standard 1/2" conduit.
3. Thread the wires through the conduit.
- 👉 Note: Make sure the ground line is copper.
4. Connect the ac power wires to the terminals. See Figure 9.
5. Close and secure the access panel.
6. Wire the unit to a suitable ac supply.
7. Provide a means for power disconnection at the ac source.

Connecting RF Power

WARNING

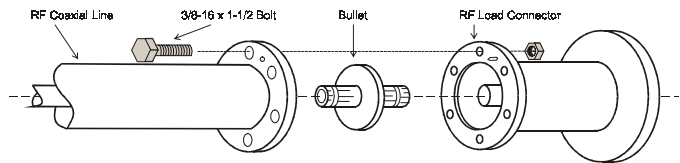
Never attempt to connect or disconnect an RF cable or line while power is on at the RF power source. Radiated RF energy is a potential health hazard.

After installation of the load, the coaxial RF transmission line may be attached using standard coaxial transmission line couplers.

Swivel Flanged Coupling

To couple the swivel flange with a flanged RF transmission line, use an appropriate coupling kit. Refer to Figure 10 while following the instructions below:

Figure 10
Swivel Flanged
Coupling

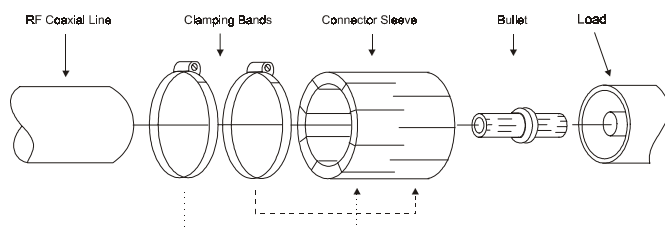


- Insert the center bullet and push it in until it is fully seated.
 - Connect the coaxial input in a straight line and push carefully on the center conductor to close.
- 👉 Note: The swivel flange on the load makes connection independent of the orientation of the fixed flange on the coaxial input outer conductor.
- Insert the bolt sets and tighten evenly all around to transmission line manufacturer's recommended torque. Use all of the bolts.

Unflanged Coupling

To couple the unflanged connector with an unflanged RF line, use an appropriate coupling kit. Refer to Figure 11 while following the instructions below:

Figure 11
Unflanged
Coupling



- Insert the center bullet and bottom it on the mid-point nibs.
- Position the outer sleeve, with clamping bands, over the input connector.
- Set the transmission line snugly against the coupling stops.
- Position the clamping bands evenly about 3/4" from the ends of the sleeve.
- Tighten the clamping bands.

4-1/16" Coupling

The RF connector on Bird 4-1/16 inch loads is built to the Myat Standard. To couple a 4-1/16 inch Myat Standard to a Dielectric Standard transmission line a special bullet (Myat P/N 401-081) must be used. The inner conductor interface is not compatible between Myat and Dielectric. The Myat inner conductor inside diameter is 1.631 inches and the inner conductor set-back from the outer conductor flange face is 1.375 inches. If you need help purchasing a Myat bullet, contact Myat or your Bird service representative.

Chapter 3

Operating Instructions

The Digital Air Series load has two controls, the ON/OFF switch and the Manual/Automatic switch. When properly installed, the only requirements to use the unit as a standby reject load are for the ON/OFF switch to be in the ON position, and the Manual/Automatic switch to be in the Automatic position.

Before operating the unit, make sure the fans are running or the “automatic” light is lit. Also, confirm that the inlet air flow is unrestricted and the exhaust is properly vented. The unit is now ready to accept RF power. Once the unit has been set up, there is no need for the presence of an operator.

WARNING

Exhausted air may exceed 95°C (203°F).

Automatic Mode

When the load is in automatic mode, the fans will turn on only when the load requires forced air to keep the temperature in the RF chamber below a safe limit. The fans may cycle on and off during warmup. This cycling is normal and is dependent upon the applied input power.

Manual Mode

When the load is in manual mode, the fans run continuously. This mode is recommended for power levels substantially below the unit’s power rating to prevent excessive fan cycling.

Load Operation

For operation of the load, follow these steps:

1. Turn on the ac power.

CAUTION

Do not operate without ac power to the load.

2. Verify all four fans are operating.

3. Select Automatic or Manual fan control.
4. Turn the interlock supply on at the transmitter.

CAUTION

Applying more than the rated average RF power to the load may damage the load resistors.

5. Apply RF power to the load.

Do not operate above the rated capacity. Refer to the specifications if you are unsure of the rating of your model load. The unit will handle a small percentage of overload for brief periods of time during transmitter tuning or adjustment. However, long periods of overload ($> 10\%$ of rated power for > 30 min) may damage the unit or cause the temperature interlock to open.

**Interlock
Operation**

The overtemperature interlock is set for proper operation at the maximum rated ambient temperature of 45°C (113°F). The normally closed switch opens at $86^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ($186.8^{\circ}\text{F} \pm 9^{\circ}\text{F}$) and closes at $65^{\circ}\text{C} \pm 3^{\circ}\text{C}$ ($149^{\circ}\text{F} \pm 5.4^{\circ}\text{F}$). This interlock is not dependent on ac line power.

The power interlock is set for proper operation when the load is connected to ac power, the power switch is on, and the circuit breakers are not tripped.

**Manual Shut
Down**

When operation of the load has been completed, follow these steps for shut down.

CAUTION

Do not disconnect ac line power before turning off RF power to the load. Application of full RF power to the load while the fans are unpowered will cause the load to overheat and destroy the resistor elements.

1. Turn the RF power to the load off.

2. Wait about 10 minutes to allow the air circulation to cool the resistive elements inside the load to ambient temperature. This cooling period will prevent unnecessary heat stress on the resistors.
3. Turn off the ac power.
4. Disconnect the RF line.

**Automatic
Shut Down**

When operations are completed, turn the RF power to the load off. The load fans will stay on until the load is cool, then they will shut off.

**Measure-
ment and
Monitoring
of RF Power**

The Digital Air Series load may be used in conjunction with any of the Bird rigid coaxial line power meters. When fitted with the appropriate line section and wattmeter, the combination is a useful tool for tuning and adjusting a transmitter as well as monitoring RF power directly in watts.

Broadcasters involved in the transmission of high definition television, digital audio broadcast, or other signals with complex modulation should use Bird Broadcast Power Monitors (BPM) for the measurement of true average power in these systems. BPMs are also required in applications where multiple carriers are present in the transmission system simultaneously, as in the case of post combiner power measurements. Conventional broadcast power meters will produce erroneous readings in the presence of complex modulation due to the high peak to average power ratio of these signals. Contact a Bird sales representative for more information.

Troubleshooting

WARNING

Disconnect this unit from the RF power sources and the ac line before any disassembly. The potential for electrical shock exists.

For corrections requiring repair or replacement of components see the appropriate section. Only those functions within the scope of normal maintenance are listed. This manual cannot list all malfunctions that may occur, or corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify a qualified service center.

Problem	Possible Cause	Possible Correction
Overtemperature interlock is active	Overheating	Make sure air input and output openings are not restricted
		Reduce RF power
	One or more fans failing	Make sure ac power is properly connected and turned on
AC power interlock is active, or no "ON" indicator lit (neither automatic nor manual light)		Contact the Bird Service Group for replacement
	No ac power	Make sure ac power is properly connected and turned on
	ON/OFF switch is off	Turn the switch on
	Blown fuse or fuses (If equipped)	Replace the two fuses (see "Fuse Replacement" on page 20).
	Open circuit breaker (If equipped)	Reset the circuit breaker

Problem	Possible Cause	Possible Correction
High VSWR	Poor flange connection	Make sure the flange connection is hooked up properly
	One or more resistors failing	Contact the Bird Service Group for replacement

Cleaning and Inspection

A main factor in effective preventive maintenance is cleanliness. For optimum performance and service life, the load must be kept in a clean, dust-free condition.

- The outside surface of the load should be wiped free of dust and dirt when necessary.
- Check the condition of the RF coaxial connection occasionally. If required, disconnect the unit from the transmission line and clean the RF connector parts, both metallic and insulator surfaces. When cleaning these parts and all other electrical parts, use a dry cleaning solvent that leaves no residue.

Fuse Replacement

The load will have either fuses or breakers, depending on the model. If your unit is equipped with fuses, they are located in fuse holders on the front panel of the load. The outline drawing (Figure 1) shows the location of the fuse holders, and the label on the unit gives the correct fuse rating. To replace the fuses follow the steps below:

WARNING

Disconnect this unit from the RF power sources and the ac line before any disassembly. The potential for electrical shock exists.

1. Turn off ac power to the unit.
2. Gently turn the top of the fuse holder counter-clockwise and pull the holder toward you.
3. Replace the fuses in the holders with two equally rated fuses. Refer to the label on your unit for the fuse rating.
4. Replace the cover on the holders by turning them clockwise while pushing them straight in.

Customer Service

Any maintenance or service procedure beyond the scope of those provided in this section should be referred to a qualified service center.

If you need to return the unit for any reason, contact the Bird Service Center for a return authorization. All instruments returned must be shipped prepaid and to the attention of Bird Service Center.

Service Group

Bird Service Center

30303 Aurora Road
Cleveland (Solon), Ohio 44139-2794
Phone: (440) 519-2298
Fax: (440) 519-2326

Sales Facilities

For the location of the Sales Office nearest you, give us a call or visit our Web site at:

<http://www.bird-electronic.com>

Preparation for Storage or Shipment

- Storage** If the unit is to be unused or stored for any length of time, cover it with a cloth or plastic sheet and store it in a moisture free, cool, dry place. There is no special preparation for the unit. Storage temperatures should remain between -40°C and +70°C (-40°F to +158° F) and the relative humidity should remain low.
- Shipment** To ship or return the unit to the factory, first secure all loose parts such as the swivel flange. Pack and seal the unit securely in a sturdy wooden box or equivalent, with sufficient padding to avoid shock damage. If possible, keep the original shipping carton for reshipment.

Circuit Diagram

The following circuit diagram identifies the function of the internal wiring of the load. This information is for use by trained service personnel only.

WARNING

Improper wiring could result in electric shock and death.

WARNING

Turn off ac power and RF power before removing or replacing the access panel, the potential for electrical shock exists.

WARNING

High heat present inside unit! Let cool for at least 10 minutes before servicing or severe burns could result.

WARNING

Maintenance by other than trained service personnel could result in electric shock.

CAUTION

Improper wiring could disable load.

CAUTION

Do not disable fans. Application of full RF power to the load while the air circulation is off will cause the load to overheat and destroy the resistor elements.

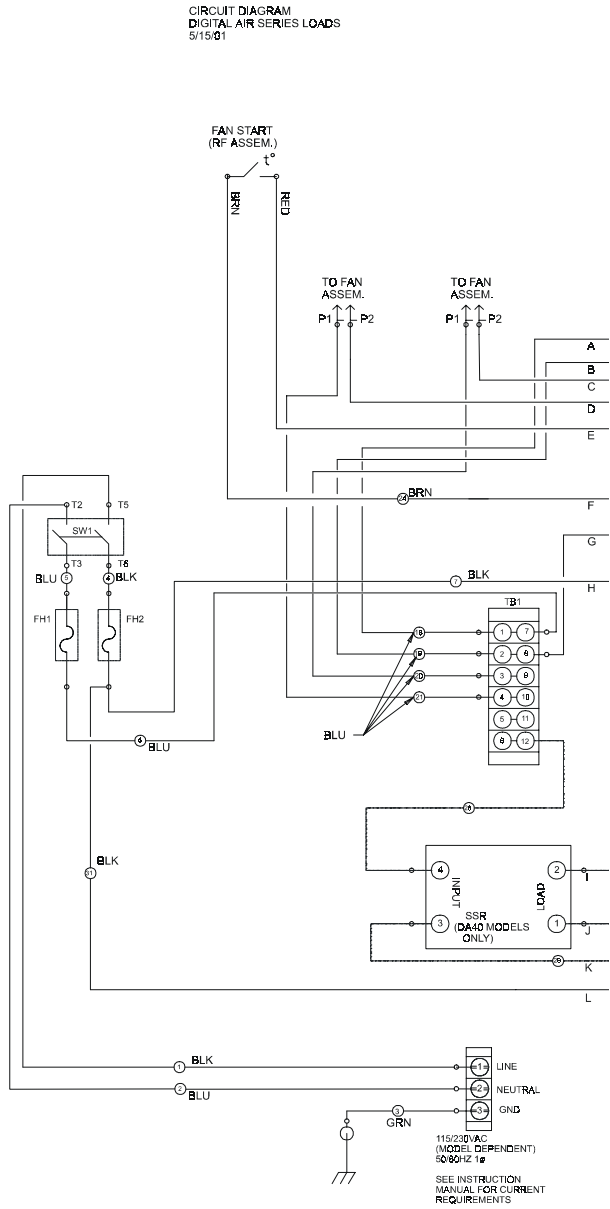
CAUTION

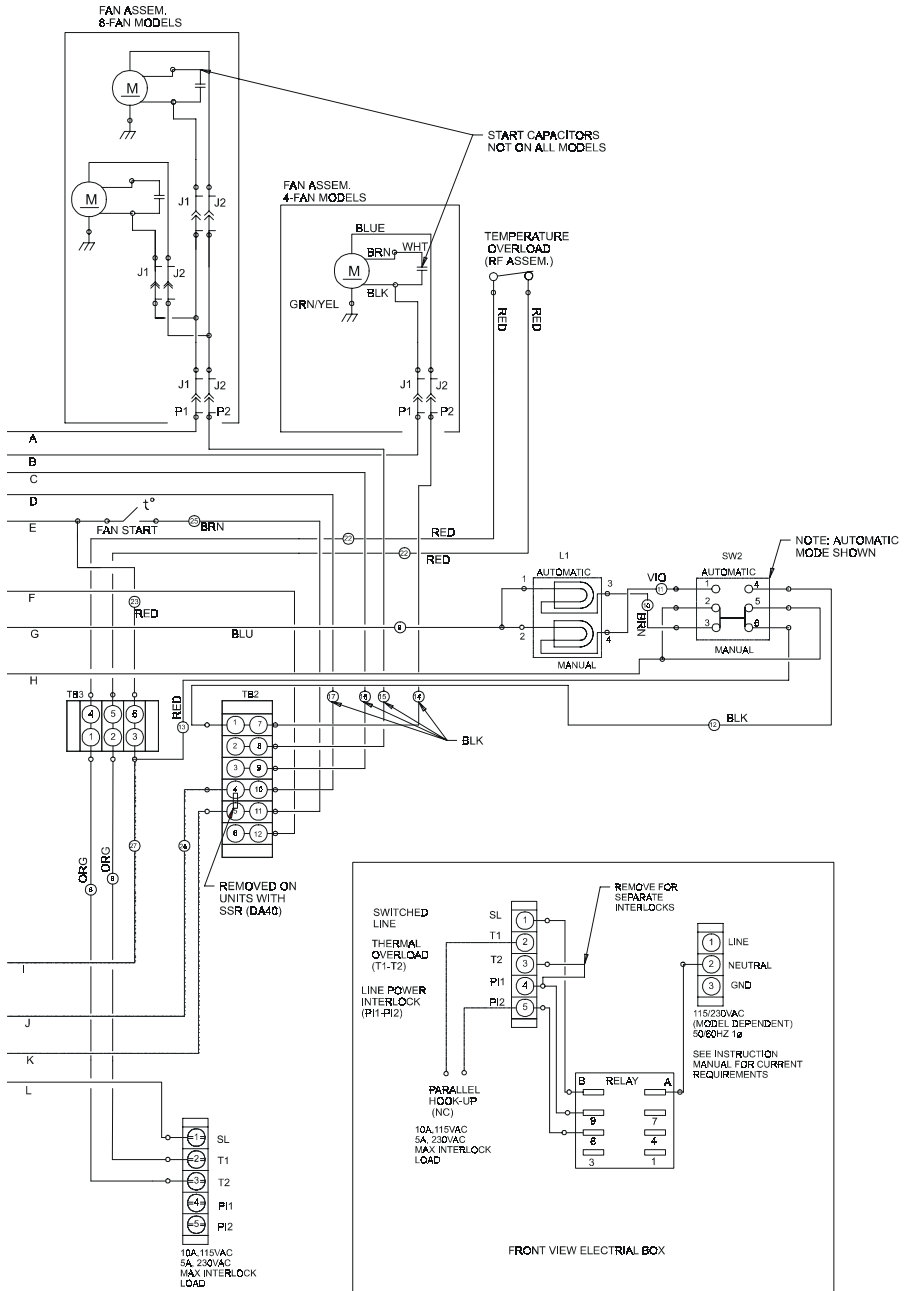
All replacement wiring must be 18 AWG, with insulation rated to 400° F (205° C). Use of other wiring could result in unit damage.

CAUTION

This circuit diagram for use by trained service personnel only. Improper use could disable load.

Figure 12
Digital Air Load
Circuit
Diagram





The Digital Air Series Loads are high powered, air-cooled, RF loads used for termination of coaxial transmission lines. The RF energy, when converted into heat, is transmitted to the surrounding area by a forced air system.

**RF Section
Description**

The RF section of a Digital Air load is a broadband tuned device composed of tubular ceramic resistors. These are carefully positioned to produce a very uniform and almost reflectionless line termination over the stated frequencies of the load resistor.

**Heat
Removal**

When in operation, air is forced into all four sides of the unit and directed over the RF resistor network. The heat, developed in the resistors from dissipation of RF energy, is carried off by the flow of air over the resistors surface. The hot air is then exhausted through the grille in the back of the unit.

**Fan
Activation**

The fans on the Digital Air loads are triggered with a pair of normally open snap disk thermostwitches. The top switch is located in the RF chamber, while the bottom switch is located in the air exit duct. In steady state operation, a fan cycle happens as follows:

- Rising air temperature in the RF chamber closes the top thermostwitch, turning the fans on.
- The hot air is forced into the exit duct by the fans, heating the bottom thermostwitch until it closes.
- As the cool air is blown into the RF chamber, the top switch reopens. Since the bottom switch is closed, the fans stay on.
- When RF power is removed, cool air reaches the exit duct, the bottom switch opens and the fans turn off.

For power levels substantially below the unit's power rating, the air in the exit duct may not heat up sufficiently to close the bottom switch. As a result, the fans cycle on and off more often. For these power levels, it is recommended that the unit be operated in manual mode.

**Thermal
Interlock**

All Digital Air loads are supplied with a passive, normally closed, snap disk overtemperature thermoswitch. Normally closed, the switch opens above the maximum safe load temperature, turning off the transmitter power. Because dissipation of the heat generated by the RF power depends upon forced air cooling, if airflow over the resistor array should stop or be restricted the temperature in the RF chamber can rise beyond a safe limit. The heat sensor will sense the change and actuate the interlock switch to turn off the transmitter. The interlock system will not permit reoperation of the transmitter until a lower, safe temperature in the RF housing is reached.

**Line Power
Interlock**

Digital Air loads are equipped with a line power failure interlock to provide protection against the loss of ac power. The switch is a normally closed relay. The switch opens if no line power is supplied to the load, the breakers or fuses on the load are tripped, or the power switch on the load has been turned off. When power is restored, the interlock will reset.

Impedance	50 ohm nominal
VSWR	1.10:1 maximum, 1.05:1 typical ¹
Connectors (Model Dependent)	
1-5/8" EIA Flanged	1-5/8" Unflanged
3-1/8" EIA Flanged	3-1/8" Unflanged
4-1/16" Myat Flanged	4-1/16" Myat Unflanged
4-1/2" IEC Unflanged	4-7/8" IEC Unflanged
6-1/8" EIA Flanged	
Power Rating	
DA5 Series	5 kW continuous duty
DA10 & DA10V Series	10 kW continuous duty
DA15 Series	15 kW continuous duty
DA25 & DA25V Series	25 kW continuous duty
DA40 Series	40 kW continuous duty
Peak to Average Power Ratio²	
Model DA40 series only:	>14dB
All other models	>10dB
Frequency Range	
DA10V & DA25V Series	dc-240 MHz
DA5, DA10, DA15, DA25, & DA40 Series	470-890 MHz

Dimensions			
DA10V Series	23.5"L x 23.5"W x 59"H (597 x 597 x 1499 mm)		
DA25V Series	27"L x 27"W x 61.0"H (686 x 686 x 1549 mm)		
DA5 Series	17"L x 17"W x 64.0"H (432 x 432 x 1626 mm)		
DA10 Series	19.5"L x 19.5"W x 68.5"H (495 x 495 x 1740 mm)		
DA15 Series	25"L x 25"W x 76.5"H (635 x 635 x 1943 mm)		
DA25 Series	27"L x 27"W x 76.5"H (686 x 686 x 1943 mm)		
DA40 Series	27.5"L x 27.5"W x 84.0"H (701 x 701 x 2134 mm)		
Ambient Temperature	-40°C to +45°C (-40°F to +113°F)		
Storage Temperature	-40°C to +70°C (-40°F to +158° F)		
Humidity	30% to 95% (non-condensing)		
Altitude	See Figure 13 and Figure 14		
Interlock contact rating	10 Amp @ 120 Vac 5 Amp @ 250 Vac		
AC Power Required³	115V	230V	@ 50/60 Hz, 1 ϕ
DA10V Series	3.2A	2.0A	
DA25V Series	9.0A	5.0A	
DA5 Series	3.2A	2.0A	
DA10 Series	3.2A	2.0A	
DA15 Series	9.0A	5.0A	
DA25 Series	10.0A	6.0A	
DA40 Series	20.0A	10.0A	
Fuse Rating	Refer to the fuse rating label on the unit.		
Safety	EN 60204-1:1998		

EMC	Emissions, EN 50081-1:1992 Emissions, EN 50081-1:1992 Harmonics, EN 61000-3-2:1995 Flicker, EN 61000-3-3:1995 ESD, EN 61000-4-2:1995 Radiated Immunity, EN 61000-4-3:1995 Electrical Fast Transient/Burst EN 61000-4-4:1995 Surge, EN 61000-4-5:1995 Conducted, EN 61000-4-6:1995 Voltage Dips and Interrupts, EN 61000-4-11:1995
Cooling Method	Forced air cooled
Weight, Nominal	
DA5 Series	100 lbs. (45.5 kg)
DA10, DA10V Series	130 lbs. (59.0 kg)
DA15 Series	192 lbs. (87.1 kg)
DA25 Series	245 lbs. (111.1 kg)
DA25V Series	150 lbs. (68.0 kg)
DA40 Series	310 lbs. (140.6 kg)
Finish	Blue Powder Coat

1. Typical value of the VSWR over the frequency range of the unit is 1.05:1. This is representative of the average VSWR for the unit in question.
2. The Duty Factor should be such that the Average Power Rating of the load is never exceeded.
3. AC voltage must be within +10%, -6% of listed value.

Figure 13
UHF Loads Derating

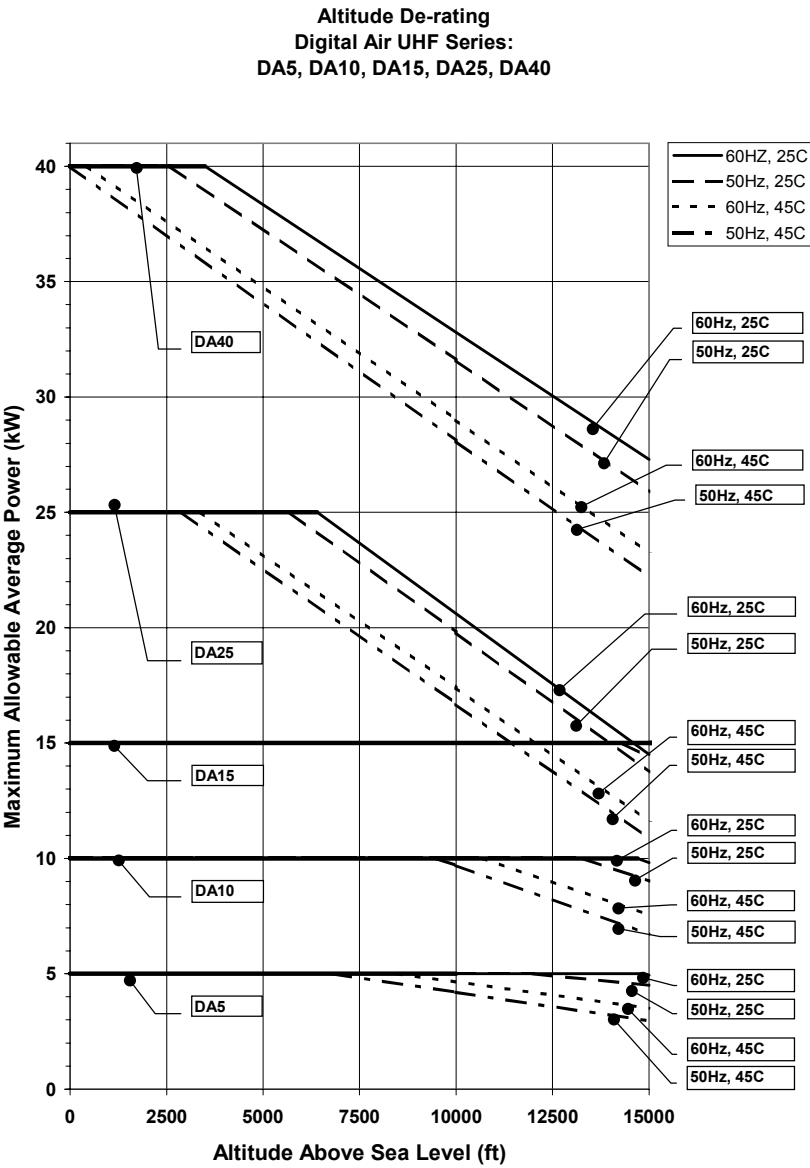
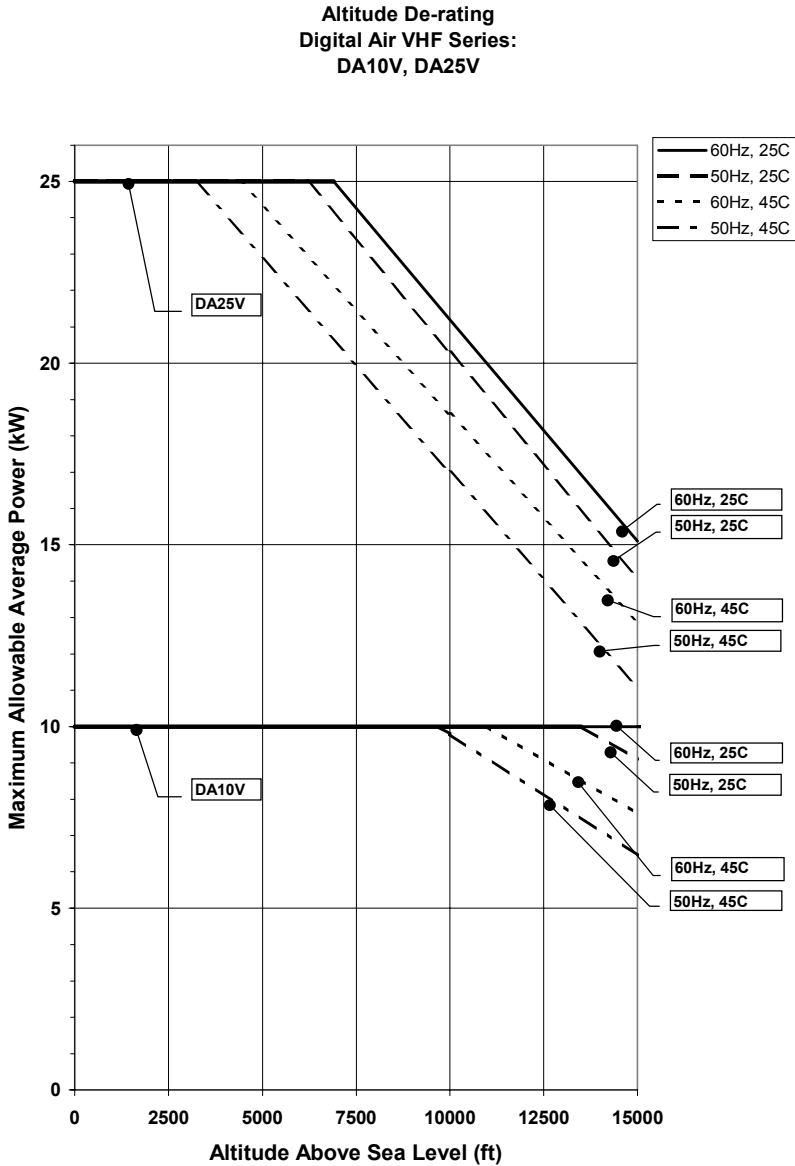


Figure 14
VHF Loads Derating



Limited Warranty

All products manufactured by Seller are warranted to be free from defects in material and workmanship for a period of one (1) year, unless otherwise specified, from date of shipment and to conform to applicable specifications, drawings, blueprints and/or samples. Seller's sole obligation under these warranties shall be to issue credit, repair or replace any item or part thereof which is proved to be other than as warranted; no allowance shall be made for any labor charges of Buyer for replacement of parts, adjustment or repairs, or any other work, unless such charges are authorized in advance by Seller.

If Seller's products are claimed to be defective in material or workmanship or not to conform to specifications, drawings, blueprints and/or samples, Seller shall, upon prompt notice thereof, either examine the products where they are located or issue shipping instructions for return to Seller (transportation-charges prepaid by Buyer). In the event any of our products are proved to be other than as warranted, transportation costs (cheapest way) to and from Seller's plant, will be borne by Seller and reimbursement or credit will be made for amounts so expended by Buyer. Every such claim for breach of these warranties shall be deemed to be waived by Buyer unless made in writing within ten (10) days from the date of discovery of the defect.

The above warranties shall not extend to any products or parts thereof which have been subjected to any misuse or neglect, damaged by accident, rendered defective by reason of improper installation or by the performance of repairs or alterations outside of our plant, and shall not apply to any goods or parts thereof furnished by Buyer or acquired from others at Buyer's request and/or to Buyer's specifications. In addition, Seller's warranties do not extend to the failure of tubes, transistors, fuses and batteries, or to other equipment and parts manufactured by others except to the extent of the original manufacturer's warranty to Seller.

The obligations under the foregoing warranties are limited to the precise terms thereof. These warranties provide exclusive remedies, expressly in lieu of all other remedies including claims for special or consequential damages. SELLER NEITHER MAKES NOR ASSUMES ANY OTHER WARRANTY WHATSOEVER, WHETHER EXPRESS, STATUTORY, OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS, AND NO PERSON IS AUTHORIZED TO ASSUME FOR SELLER ANY OBLIGATION OR LIABILITY NOT STRICTLY IN ACCORDANCE WITH THE FOREGOING.

DECLARATION OF CONFORMITY

Manufacturer: Bird Electronic Corporation
30303 Aurora Road
Cleveland, Ohio 44139-2794

Product: Digital Air Load Resistor

Models:	DA5 Series	DA10 Series
	DA15 Series	DA25 Series
	DA40 Series	DA10V Series
	DA25V Series	

The undersigned hereby declares, on behalf of Bird Electronic Corporation of Cleveland, Ohio, that the above-referenced product, to which this declaration relates, is in conformity with the provisions of the following standards:

Safety:	EN 60204-1:1998	Safety of Machinery - Electrical
		Equipment of Machines. Part 1 General Requirements.
		LVD - 73/23/EEC, 1973 including amendment 93/68/EEC, 1993.
EMC:	EN 50081-1:1992	Emissions. Part 1: Residential &
	Light Industrial	
	EN 50082-1:1997	Immunity. Part 1: Residential &
	Light Industrial	
	EN 61000-3-2:1995	Part 3: Harmonics
	EN 61000-3-3:1995	Part 3: Flicker
	EN 61000-4-2:1995	Section 2: ESD
	EN 61000-4-3:1995	Radiated Immunity
	EN 61000-4-3:1995	Electrical Fast Transient/Burst
	EN 61000-4-3:1995	Surge
	EN 61000-4-3:1995	Conducted
	EN 61000-4-3:1995	Voltage Dips and Interrupts

The technical documentation file required by this directive is maintained at the corporate headquarters of Bird Electronic Corporation, 30303 Aurora Road, Cleveland, Ohio.



Robert Gardiner
QA/Metrology Manager
Bird Electronic Corporation