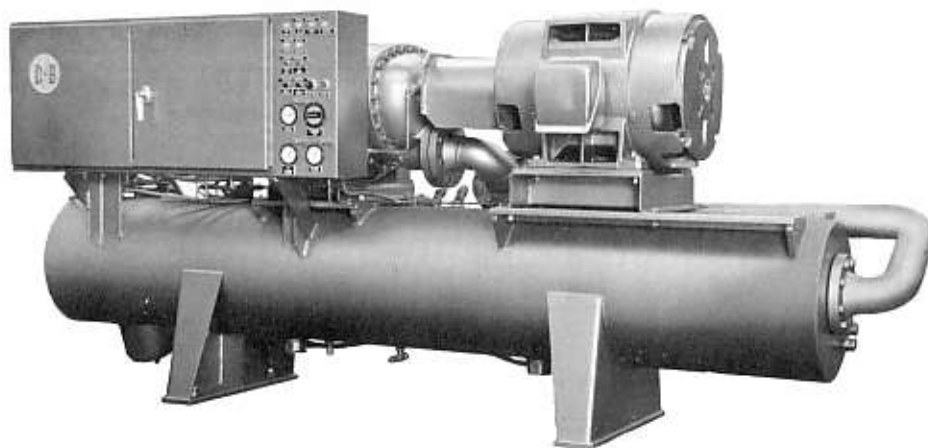


DUNHAM-BUSH

DBX

**OPEN TYPE CONDENSING UNITS
& COMPRESSOR UNITS**



**Installation, Operation, Maintenance,
and Trouble Shooting Manual**

DUNHAM-BUSH, INC. • WEST HARTFORD DIVISION

WEST HARTFORD, CONNECTICUT 06110, U.S.A.

one of The Signal Companies 

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I INSTALLATION

A. GENERAL

WARRANTY: We agree that the apparatus manufactured by the Seller will be free from defects in material and workmanship for a period of one year under normal use and service and when properly installed; and our obligation under this agreement is limited solely to repair or replacement at our option, at our factories, of any part or parts thereof, which shall, within one year from date of original installation or 18 months from date of shipment from factory to the original purchaser, whichever date may first occur, be returned to us with transportation charges prepaid, which our examination shall disclose to our satisfaction to have been defective. This agreement to repair or replace defective parts is expressly in lieu of and is hereby in disclaimer of all other express warranties, and is in lieu of and in disclaimer of any implied warranties of merchantability and fitness for a particular purpose, as well as all other implied warranties, in law or equity, and of all other obligations or liabilities on our part. There are no warranties which extend beyond the description hereof. We neither assume nor authorize any person to assume for us any liability or obligation in connection with the sale of our apparatus, except said repair or replacement of the defective parts as set forth above. Our liability does not include any labor charges for replacement of parts, adjustments, repairs, or any other work done outside our factories and our liability does not include any resulting damage to persons, property, equipment, goods, merchandise, profits, good will or reputation arising out of any defect in or failure of our apparatus. **OUR OBLIGATION TO REPAIR OR REPLACE SHALL NOT APPLY TO ANY APPARATUS WHICH SHALL HAVE BEEN REPAIRED OR ALTERED OUTSIDE OF OUR FACTORY IN ANY WAY, OR WHICH HAS BEEN SUBJECT TO NEGLIGENCE, TO MISUSE, OR TO PRESSURES IN EXCESS OF STATED LIMITS.** On parts not of our manufacture, such as motors, controls, etc., we extend only the same warranties given by the Seller. Our agreement hereunder runs only to the immediate purchasers and does not extend, expressly or by implication, to any other person.

These instructions and the drawings supplied with the DBX Unit must be followed carefully to insure proper installation, operation, and maintenance.

This manual is written and illustrated for a single DBX Unit installation. For instructions concerning a multiple unit installation, consult Dunham-Bush, Inc.

CAUTION

Valves or connections which can cause loss of the factory installed refrigerant holding charge and lubricating oil charges shall not be opened under any conditions. The system shall not be dismantled or opened except under the supervision of a Dunham-Bush, Inc. Service Representative.

The DBX Unit shall NOT be started following installation except under the direct supervision of a Dunham-Bush, Inc., authorized start-up representative.

CAUTION

CAUTION

Compliance with the above is mandatory in order that the warranty shall not be jeopardized. All contacts with Dunham-Bush, Inc., regarding requests for information, service, or parts should be made to the nearest sales office.


ORDER ALL		PARTS BY	
MODEL AND SERIAL NO.			
MOD NO	_____		
SER NO	_____		
CONTL	LINE	PH	
VOLTS	VOLTS	CY	
LOCK ROTOR	_____		
AMPS	_____		
FULL LOAD	_____		
LINE AMPS	_____		
FULL LOAD	_____		
PHASE AMPS	_____		
WIRING DGM	_____		
REFRIGERANT	_____		
CHARGE	_____	LBS	
COMPRESSOR MFGD UNDER PATENTS			
LICENSED FROM SVENSKA ROTOR			
MASKINER, AKTIEBOLAG SWEDEN.			
THIS UNIT IS COVERED UNDER ONE			
OR MORE OF THE FOLLOWING PATENTS			
3,408,876, 3,408,877, 3,408,878			
DUNHAM-BUSH, INC.			
WEST HARTFORD, CONN. 06110, U.S.A.			
one of The Signal Companies 			
PLT 669			

FIGURE 1 — UNIT NAMEPLATE

B. SHIPMENT

Shipping skids are attached to the unit when shipped and the oil system is fully charged. Refrigerant system contains a holding charge only. The condenser water connection flanges (condensing units only) have covers installed to prevent contamination of the vessel.

C. RECEIVING INSPECTION

Upon receipt of the unit and in the presence of the carrier's representative, immediately inspect the unit for evidence of shipping damage. Any damage noted should be entered on the carrier's delivery receipt before it is signed. A damage claim should then be filed against the delivering carrier as all shipments are made at the buyer's risk. The power requirements, installation wiring diagram number, type of refrigerant will be found on the unit nameplate which is mounted on a bracket on the oil sump.

D. RIGGING AND MOVING

Riggers and installers must use every precaution to prevent damage while moving the unit from the point of shipment to its permanent location. Pushing, pulling or climbing on any of the unit components or piping can easily create damage that will result in costly repairs of leaks and malfunctioning components. The only places it is safe to apply hoisting, jacking, pushing, or pulling forces are to the shipping skids.

Spreaders shall be used as necessary to prevent damage to the unit by the lifting cables.

Skidding may be done directly on the shipping skids or on properly spaced rollers under the skids. Pushing and pulling should only be directed against the skids.

E. INSTALLATION

1. Location

The location of the unit may be any foundation or deck that is generally level within 1/8 inch between mounting feet and structurally capable of supporting the weight of the unit. For ease of operation and maintenance, a cleared area around the unit should be provided. Provide access for removal of components.

2. Mounting

"Unisorb" vinyl coated pads are provided for installation under the mounting legs. The unit may be cemented or lagged to the foundation if so desired, but this is not mandatory. For critical installations, Dunham-Bush, Inc., will provide whatever type of vibration isolator the customer specifies, to be installed and adjusted in accordance with the isolator manufacturer's instructions.

3. Leveling

When the unit is at its final location, it should be jacked or hoisted, the shipping skids removed then let down on the isolator equipment supplied (felt pads or vibration isolators). It should then be checked for level longitudinally at the top center of the condenser shell (on condensing units, or oil sump/separator (on compressor units) and laterally across the compressor motor feet. Use steel shims under the isolator pads as necessary to level the unit.

F. EXTERNAL CONNECTIONS

All external water piping, external wiring and satellite equipment installations such as water pumps and cooling towers are to be provided by the customer.

1. Water Connections

After the unit has been leveled, the external water piping to the condenser and/or oil cooler may be made up. Air vent valves should be installed at all high points to facilitate access for air venting the system.

All external plumbing should have manual shut-off valves and strainers installed in close proximity to the unit to prevent contamination of the unit and its satellite equipment and to facilitate servicing and maintenance. The external plumbing must be carefully located and adequately supported by blocking and hangers so that it will not create twisting or bending stresses on the unit when the flanges are bolted. It is recommended that flanges be used at the connection to the condenser (condensing units only) so that the external piping will not interfere with pulling and cleaning of the condenser tubes. Following make up of the external plumbing, it should be thoroughly cleaned to remove all foreign material, connected to the unit, filled, all entrapped air bled off, and leak tested. A check should then be made for piping stresses at the unit piping flanges as follows: Remove condenser, and oil cooler connecting flange bolts. If any bolts are bound in the bolt holes so that the flanges spring out of line when the bolts are removed, adjust external piping blocking or hangers to properly align the flanges.

2. Refrigerant Connections

All refrigerant piping must follow recommended practices of the ASHRAE guide and the American Standard Code for Pressure Piping Section B31.5 Refrigeration Piping. Consideration must be given to the Refrigerant being used, capacity (tonnage), length of lines, refrigerant velocity, pressure drops to insure proper operation.

All piping after soldering or welding must be thoroughly cleaned. It is recommended that dry nitrogen be used when soldering copper tubing to prevent scaling. Silver solder is recommended on all copper connections.

All piping must be supported properly so that there is no strain on any of the equipment. Remove suction, discharge (or liquid line) flange bolts. If any bolts are bound in the bolt holes so that the flanges spring out of line, adjust the external piping to properly align the flanges. Stress on the suction line flange will disrupt compressor - motor alignment.

When all the connection of the refrigerant piping have been completed a leak check should be performed. If the refrigerant system is sound, the unit should be subjected to a vacuum of 1000 microns. Insulation should be installed on suction line to prevent sweating.

3. Electrical Connections

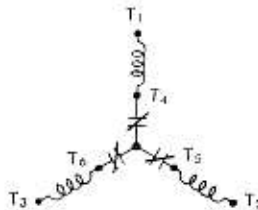
The unit is completely wired at the factory prior to delivery. The connections which must be made by the installer are to the main power source, starting equip-

ment and interlocking of the satellite equipment with the unit. Each of these circuits must have adequate circuit protection devices incorporated in it. The power voltage, frequency, and phase must be in accordance with that shown on the unit nameplate (Fig. 1) All wiring must be in accordance with the wiring diagram specified on the unit nameplate, the National Electrical Code, and any local codes that may apply. Any deviations from the above requirements must have the prior approval of Dunham-Bush, Inc. Customer supplied starters for the compressor motor must be in compliance with Dunham-Bush, Inc. Engineering Specification No. ELC-ES-9-3 (Appendix B) or as individually approved by Dunham-Bush, Inc.

COMPRESSOR MOTOR UNIT MOTOR WIRING

The following external wiring is to be provided by the installer.

- Power supply to compressor motor starter with circuit protection, and from starter to compressor motor.
- Power supply to oil pump motor contactor or starter with circuit protection.
- Condenser water pump starter control circuit to control panel (condensing units only).
- Compressor motor starter control circuitry to control panel.
- Control transformer (3KVA) or 115V/60Hz/PH power supply to control panel with circuit protection. Interlocked with control relay (if automatic pump down is not used).
- All customer supplied components must have the prior approval of Dunham-Bush, Inc.



DBX	CONNECTIONS		
LINE	L ₁	L ₂	L ₃
MOTOR	T ₁	T ₂	T ₃

T₄, T₅, and T₆ wired at factory.

OIL PUMP MOTOR

G. WATER TREATMENT

Most industrial water supplies contain dissolved or suspended materials which cause scale formation, corrosion, and propagate slime, algae, etc. If these are permitted to exist in the condenser and/or oil cooler water systems, maintenance costs can soar due to delays for scale removal, replacement of corroded parts, etc. It is strongly recommended that a water treatment specialist be consulted for additive systems to counteract or prevent the damages caused by these impurities.

If desired, an anti-corrosive agent known as "Corrode Stop" is available from Dunham-Bush, Inc. to be used as specified in Dunham-Bush, Inc., Engineering Specification No. MAT-ES-26 Anodic Corrosion Inhibiter (Appendix A).

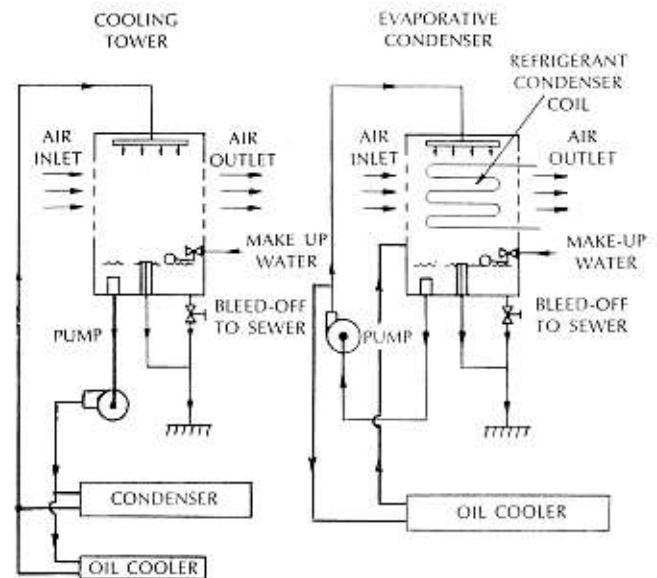


Figure 6 - TYPICAL BLEED-OFF SYSTEM

Dunham-Bush, Inc. will not be liable for any damage or failure resulting from the physical or chemical properties of any liquid or gas used in this equipment. Cooling towers and evaporative coolers experience a constant loss of water due to evaporation. Since evaporation is a distillation process, an increasing concentration of suspended and dissolved impurities occurs as they do not evaporate. This increasing concentration of impurities can be greatly reduced by a bleed-off system which allows a small amount of the contaminated water to be constantly bled-off and replaced with fresh water through the sump float valve.

Chemical water treatment in addition to the above bleed-off should be determined by a water treatment specialist and a daily check should be made to be sure the correct bleed-off rate is maintained.

H. INSTALLATION CHECK LIST

Following completion of the unit installation, plumbing and wiring, but prior to initial start-up, the installation check list will serve to assure the customer and Dunham-Bush, Inc., that the installation contractor has completed the installation of the unit and its satellite equipment to the satisfaction of the customer.

The following is an amplification of the check list:

A. Mounting and Leveling

- Erected on foundation . . . in accordance with construction and electrical drawings supplied to the customer and the requirements of this manual.
- Spring isolators or pads installed and adjusted to level unit . . . in accordance with isolator manufacturers instructions and the requirements of this manual.

B. Water Piping

- Condenser or oil cooler cooling water piping installed between condenser pumps and cooling tower or

well . . . as specified in this manual (condensing units only).

2. Make-up and fill lines installed to cooling tower water system . . . and chemical treatment and bleed-off systems as needed.
3. Thermometer wells installed in condenser water inlet and outlet lines, if required.
4. All piping checked for strain . . . as specified in this manual.
5. Water and refrigerant piping leak tested, flushed or cleaned and water strainers checked after flushing to be certain they are not clogged; water piping vented.
6. Condenser and oil cooler water supply available in sufficient quantity to meet unit design requirements . . . and with adequate water treatment.

C. Electrical Wiring

1. Power supply available . . . with circuit protection and in accordance with the requirements on the unit nameplate supplied, and this manual.
2. Wiring completed from power supply through circuit protection to compressor motor starter and compressor motor . . . in accordance with drawing supplied and the requirements of this manual.
3. Wiring completed from power supply through circuit protection to oil pump motor contactor or starter . . . in accordance with drawing supplied and the requirements of this manual.
4. Wiring completed from power supply through circuit protection to 115V control circuit in unit control panel (or through 115V transformer to control circuit) . . . in accordance with drawing supplied and requirements of this manual.
5. Wiring from power supply through circuit protection to satellite equipment and interlocks wired to control panel . . . in accordance with drawing supplied and requirements of this manual.
6. Phasing correct for direction of rotation of all motors except compressor and oil pump motors . . . phasing of compressor and oil pump motor will be checked by Dunham-Bush, Inc., start-up representative.

D. Refrigerant Piping

1. All refrigerant piping must be installed in accordance with accepted refrigeration design and practice. — Vents must be provided at high points to insure removal of non-condensibles. — All external refrigerant piping must be pressure tested and properly dehydrated.

E. Conditions

1. Load available for operation and testing . . . a refrigeration load adequate to cause normal operation of unit **MUST BE AVAILABLE**.
2. Operating personnel assigned on the job for start-up instructions . . . a list of the names of customer personnel to be instructed by the Dunham-Bush, Inc., authorized representative in the operation and maintenance of the unit.

I. REQUEST FOR AUTHORIZED START-UP REPRESENTATIVE

When the installation is completed, fill out Form 9193 (enclosed with unit). This form is a check list to make sure all work is completed and the unit is ready for start-up. Following receipt of this signed form by Dunham-Bush, Inc., a representative will be sent to the customer. He will inspect the installation to determine whether it meets Dunham-Bush, Inc. requirements, perform the initial start-up of the installation to determine whether it is in satisfactory operating condition and instruct the specified customer personnel in its operation and maintenance for the length of time specified in the purchase contract.

NOTE: The oil heater circuit breaker (CB2) must be turned on about 24 hours prior to arrival of the start-up representative. This will insure that the oil is warm enough to vaporize any refrigerant in the oil and that the oil is at the normal operating temperature. Indication of oil heater operation is the "Low Oil Sump Temperature" caution light on the instrument panel.

MAINTAINING RECEIVER PRESSURE FOR UNIT STARTING

This applies to receiver applications on all Screw Compressor Products. A liquid line check valve must be installed by the customer between the remote condenser and the liquid receiver. This check valve should have not over 3 psi pressure drop at maximum flow.

A 70°F minimum receiver temperature must be maintained during the off cycle to provide sufficient pressure to feed the expansion valves during startup.

CASE I:

UNIT WITH RECEIVER INSTALLED IN A ROOM WHICH IS ALWAYS 70°F OR ABOVE:

A check valve must be installed at the receiver, in the liquid line from the remote condenser to the receiver,

This will prevent:

1. Loss of receiver charge to the condenser, or
2. Thermosyphon cooling of the receiver by the condenser when condenser ambients below 70° are encountered. D/B does not supply this check valve as standard equipment.

well . . . as specified in this manual (condensing units only).

2. Make-up and fill lines installed to cooling tower water system . . . and chemical treatment and bleed-off systems as needed.
3. Thermometer wells installed in condenser water inlet and outlet lines, if required.
4. All piping checked for strain . . . as specified in this manual.
5. Water and refrigerant piping leak tested, flushed or cleaned and water strainers checked after flushing to be certain they are not clogged; water piping vented.
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