Carrier

30RC 010-060
30MPA, MPW 017-080
Hot Gas Bypass Accessory

Installation Instructions

Part No: 30MP70000301 and 30RC70006201

CONTENTS

SAFETY CONSIDERATIONS

Installation and servicing of air-conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair, or service air-conditioning equipment.

Untrained personnel can perform basic maintenance functions of cleaning coils and filters and replacing filters. All other operations should be performed by trained service personnel. When working on air-conditioning equipment, observe precautions in the literature, tags and labels attached to the unit, and other safety precautions that may apply.

Follow all local building codes and appropriate national electrical codes (in USA, ANSI/NFPA 70, National Electrical Code (NEC); in Canada, CSA C22.1) for special requirements. Wear safety glasses and work gloves. Use quenching cloth for unbrazing operations. Have fire extinguisher available for all brazing operations.

It is important to recognize safety information. This is the safety-alert symbol ⚠. When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury.

Understand the signal words DANGER, WARNING, CAUTION, and NOTE. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which **will** result in severe personal injury or death. WARNING signifies hazards which **could** result in personal injury or death. CAUTION is used to identify unsafe practices, which **may** result in minor personal injury or product and property damage. NOTE is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.

⚠ WARNING

DO NOT USE TORCH to remove any component. System contains oil and refrigerant under pressure.

To remove a component, wear protective gloves and goggles and proceed as follows:

a. Shut off electrical power to unit.
b. Recover refrigerant to relieve all pressure from system using both high-pressure and low pressure ports.
c. Traces of vapor should be displaced with nitrogen and the work area should be well ventilated. Refrigerant in contact with an open flame produces toxic gases.
d. Cut component connection tubing with tubing cutter and remove component from unit. Use a pan to catch any oil that may come out of the lines and as a gauge for how much oil to add to the system.
e. Carefully un-sweat remaining tubing stubs when necessary. Oil can ignite when exposed to torch flame.

Failure to follow these procedures may result in personal injury or death.

⚠ WARNING

Electrical shock can cause personal injury and death. Shut off all power to this equipment during installation and service. There may be more than one disconnect switch. Tag all disconnect locations to alert others not to restore power until work is completed.

⚠ WARNING

This product can expose you to chemicals including lead and lead components, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information, go to www.P65Warnings.ca.gov.

A2L Refrigerant Safety Measures

The chillers covered in these instructions are equipped with R-32, an A2L refrigerant with a low GWP (global warming potential). Additional measures are required for units installed with R-32 to ensure safe installation, start-up, and servicing of the air-cooled chiller. Refer to UL 60355-2-40 for comprehensive guidelines beyond the following sections.

QUALIFICATION OF WORKERS

Qualified installers and service technicians are required to have been trained on the following topics when installing and servicing air-conditioning equipment with A2L refrigerant such as R-32:

1. Explosive potential of A2L refrigerants.
2. Potential ignition sources.
3. Safety measures for unventilated and ventilated rooms or enclosures.
4. Refrigerant detectors.
5. Concept of sealed components and sealed enclosures according to IEC 60079-15:2010.
6. Correct work procedures for the following:
   a. Commissioning
   b. Maintenance
   c. Repair
   d. Decommissioning
   e. Disposal

Reference UL 60335-2-40 Annex HH for complete guidelines for qualifications.

SAFETY CHECKS

Prior to beginning work on air-conditioning equipment containing A2L refrigerants, safety checks are necessary to ensure that the risk of ignition is minimized. For repair to the air-conditioning equipment, the following must be completed prior to conducting work on the system:

1. Work shall be undertaken under a controlled procedure to minimize the risk of a flammable gas or vapor being present while the work is being performed.
2. All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out. Work in confined spaces shall be avoided.
3. The area shall be checked with an appropriate refrigerant detector prior to and during work to ensure the technician is aware of potentially toxic or flammable atmospheres. Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants.
4. If any hot work is to be conducted on the refrigerating equipment or any associated parts, then appropriate fire extinguishing equipment shall be available to hand. Have a dry powder or CO_2 fire extinguisher adjacent to the charging area.
5. No person carrying out work in relation to refrigerating equipment that involves exposing any pipe work shall use any sources of ignition in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repairing, removal, and disposal, during which refrigerant can possibly be released to the surrounding space. Prior to work taking place, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. “No Smoking” signs shall be displayed.
6. Where electrical components are being changed, they shall be fit for the purpose and to the correct specification. At all times, the manufacturer's maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer's technical department for assistance.
7. The following checks to the air-conditioning equipment shall also apply when using A2L refrigerants:
   a. The chilled water circuit shall be checked for the presence of A2L refrigerant via the vent, drain, or pipe plug ports at the inlet and outlet water piping connections.
   b. Markings to the equipment shall continue to be visible and legible. Markings and signs that are illegible shall be corrected.
   c. Refrigerating pipe or components are installed in a position where they are unlikely to be exposed to any substance that may corrode refrigerant-containing components, unless the components are constructed of materials that are inherently resistant to being corroded or are suitably protected against being corroded.
   d. Upon completing equipment work, check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges, or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

COMPONENT REPAIR

During repairs to sealed components, all electrical supplies shall be disconnected from the equipment being worked up prior to any removal of sealed covers, etc. If it is absolutely necessary to have an electrical supply to equipment during servicing, then a permanently operating form of leak detection shall be located at the most critical point to warn of a potentially hazardous situation.

Particular attention shall be paid to the following to ensure that, by working on electrical components, the casing is not altered in such a way that the level of protection is affected:

1. Ensure that the apparatus is mounted securely.
2. Ensure that seals or sealing materials have not degraded to the point that they no longer serve the purpose of preventing the ingress of flammable atmospheres. Replacement parts shall be in accordance with the manufacturer's specifications.

This shall include damage to cables, excessive number of connections, terminals not made to original specification, damage to seals, incorrect fitting of glands, etc.

Do not apply any permanent inductive or capacitance loads to the circuit without ensuring that this will not exceed the permissible voltage and current permitted for the equipment in use.

Intrinsically safe components are the only types that can be worked on while live in the presence of a flammable atmosphere. The test apparatus shall be at the correct rating.

Replace components only with parts specified by the manufacturer. Other parts may result in the ignition of refrigerant in the atmosphere from a leak.

NOTE: The use of silicon sealant can inhibit the effectiveness of some types of leak detection equipment. Intrinsically safe components do not have to be isolated prior to working on them.

Guidelines for A2L refrigerant detection, evacuation, charging procedures, and proper recovery equipment are presented in the Service section.

GENERAL

This control accessory reduces 30RC, 30MPA and 30MPW chiller capacities below the standard lowest capacity step. This capacity reduction provides more precise control of leaving fluid temperature during light load conditions.

Examine the components for the correct part numbers. If the components are damaged, file a claim with the shipping company and notify your Carrier representative.

IMPORTANT: The hot gas bypass (HGBP) accessory cannot be used on units with the digital scroll compressor option. The hot gas bypass accessory also cannot be used on 30MPA, 30MPW, or 30RC units with the medium temperature brine option.

The hot gas bypass (HGBP) valve accessory limits the amount of refrigerant which can be bypassed from the condenser without impacting oil return. See Fig. 1. See Table 1 for hot gas bypass accessory kit contents.

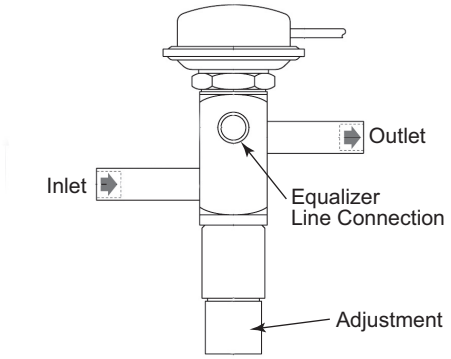

Fig. 1 — HGBP (Hot Gas Bypass) Valve Connections

Table 1 — Accessory Package Contents

ACCESSORY KIT NO.	PART NO.	QTY	DESCRIPTION
30MP70000301 (30MP)	EA52DS422	1	Hot Gas Bypass Valve
	EF23VS184	1	Solenoid Valve
	EF19XS016	1	Solenoid Coil
	2004837138	1	Bracket (31, 51-80)
	KA66AA155	1	Suction Pipe Clamp
	KA66TA155	2	1/2 in. Tube Clamp
	AL56ZA003	7	Screw
	30-4ASI	1	Instructions
30RC70006201 (30RC)	EA52DS422	1	Hot Gas Bypass Valve
	EF23VS184	1	Solenoid Valve
	2005209889	1	Hot Gas Bypass Line Bracket (10-30T)
	2004519966	1	Equalizer Line Bracket (25-30T)
	2006019202	1	Equalizer Line Bracket (20T)
	2005483725	1	Hot Gas Bypass Line Bracket (40-60T)
	2004553158	1	Equalizer Line Bracket (35T)
	EF19XS016	1	Solenoid Coil
	CEPL130567-02	1	Auxiliary Board
	30RCHSCSLX-A00	1	Auxiliary Hot Gas Bypass Wire Harness (10-30T)
	30RCHSCALXCA00	1	Auxiliary Power Standard Wire Harness (10-30T)
	30RCHSCALXCA10	1	Auxiliary Power Greenspeed® Wire Harness (10-30T)
	30RCHSCALXCA20	1	Auxiliary Power Standard Wire Harness (35-60T)
	30RCHSCALXCA30	1	Auxiliary Power Greenspeed® Wire Harness (35-60T)
	KA66AA024	1	1/4 in. Tube Clamp
	KA66AA155	2	Suction Pipe Clamp
	KA66AA138	2	Suction Pipe Clamp
	KA66FB050	1	1/2 in. Tube Clamp
	AL56ZA003	6	Screw
	30-4ASI	1	Instructions
	38APMSCLCA-A00	1	Auxiliary Board Mounting Bracket
	KA56MC085	4	Standoff HEX 6-32
	AU27AS081	4	No.6 Star-Tooth Lock Washer
	AC41AB100	6	8-32 x .380" L Screw

INSTALLATION

Install the HGBP Valve and Solenoid Valve

1. Remove refrigerant charge from the circuit using an approved refrigerant recovery device before proceeding with this installation.
2. Locate the factory-supplied stub between the expansion device and cooler and the discharge stub on the discharge line. Locate the stub for the equalizer line on the suction line. It is needed for controlling the HGBP (Hot Gas Bypass) valve. See Fig. 2 and 3 for 30RC units and Fig. 4-6 for 30MP units.
3. Cut the closed stubs on the discharge and cooler inlet. Prior to brazing both the hot gas bypass valve and solenoid valve, be sure to provide overheating protection to the devices by wrapping in a wet rag. Install a 1/2 in. copper line as shown in Fig. 2 and 3 for 30RC units and Fig. 4-6 for 30MP units. Connect the HGBP valve outlet to the stub between the expansion device and cooler with 1/2 in. copper tubing. Connect 4 to 6 in. of 1/2 in. OD copper tube to the HGBP valve inlet and then connect the solenoid valve to the end of that piping. In between the solenoid valve and the discharge stub, install the amount of 1/2 in. OD copper tube and 1/2 in. OD copper elbows necessary to connect the valve and stub together. The refrigerant flow will come from the discharge stub and into the stub between the expansion device and cooler. See Fig. 2 and 3 for 30RC units and Fig. 4 and 5 for 30MP units.

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IMPORTANT: For 30MP033 units, the minimum load valve piping must only be connected to refrigerant circuit A. The only discharge and liquid stubs available for connection are located on circuit A. Do not connect the minimum load valve piping at any other location.

IMPORTANT: The HGBP valve (hot gas bypass) and solenoid valve are direction specific and must have their arrows (printed on valves) pointing toward the cooler.

4. *30RC Units:* Connect the HGBP valve equalizer line to the stub on the suction line. Cut the line and install the 1/4 in. copper coupling to create a through connection. Use this open connection to connect the equalizer line using 1/4 in. OD copper tubing. See Fig. 2,3,7, and 8.

   Connect the sheet metal bracket to the suction and equalizer piping using the clamps and screws provided. See Fig. 2 and 3.

   30MP Units: Connect the HGBP valve equalizer line to the tube stub in the suction line. See Fig. 4 and 5.
5. When piping is completed, leak test the assembly. Then evacuate, dehydrate, and recharge the circuit using approved refrigeration practices. Be sure to use the correct type and amount of refrigerant listed in the nameplate data and base unit documentation. See Fig. 9.

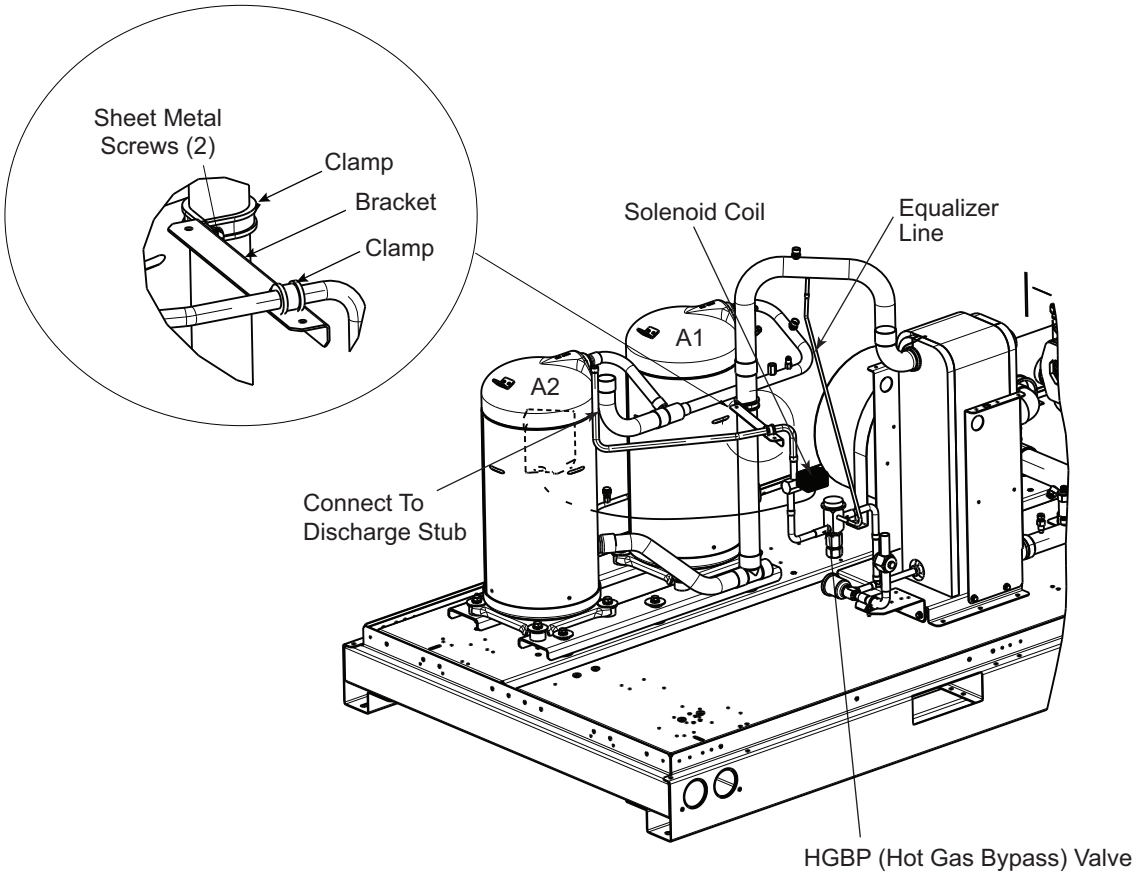


Fig. 2 — 30RC Base Unit Connection Locations (Sizes 011-030)

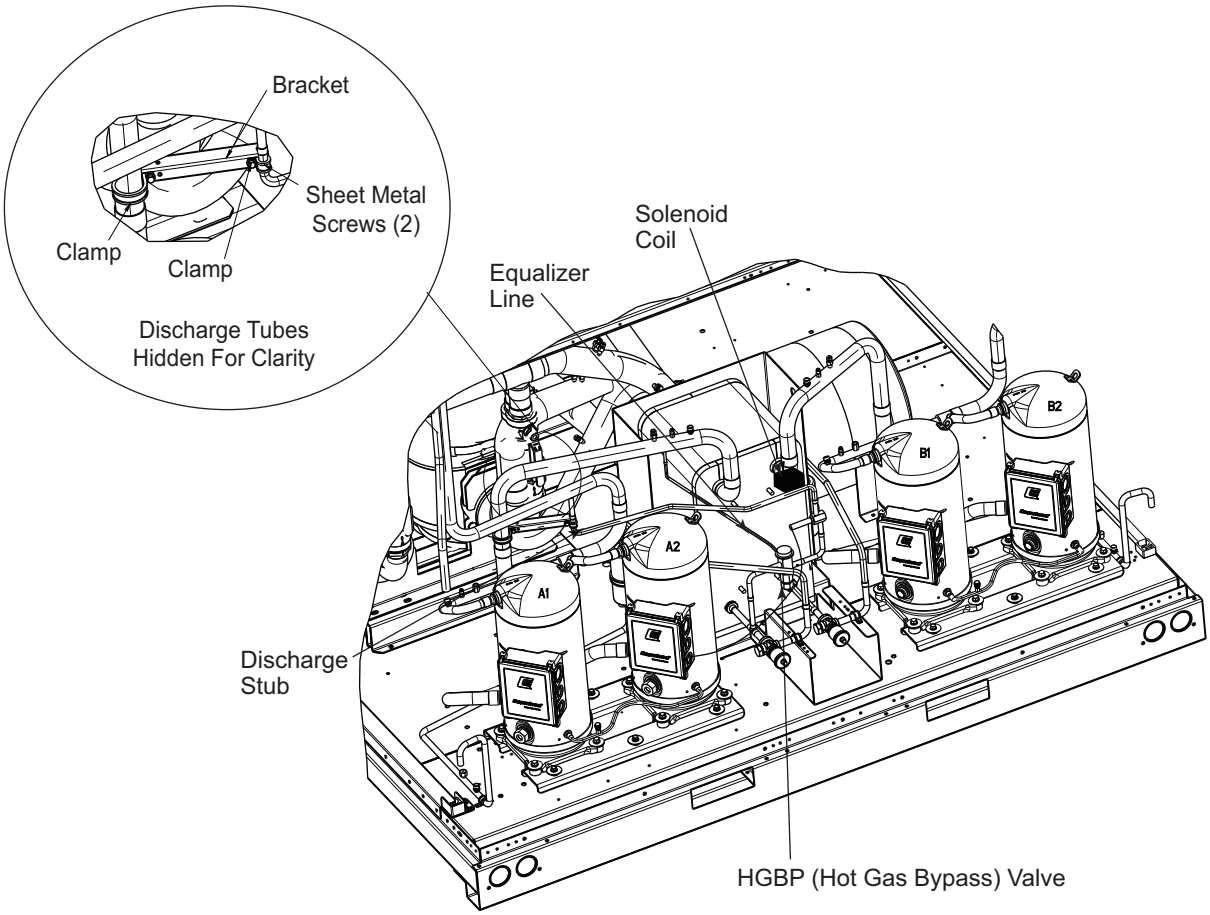


Fig. 3 — 30RC Base Unit Connection Locations (Sizes 035-060)

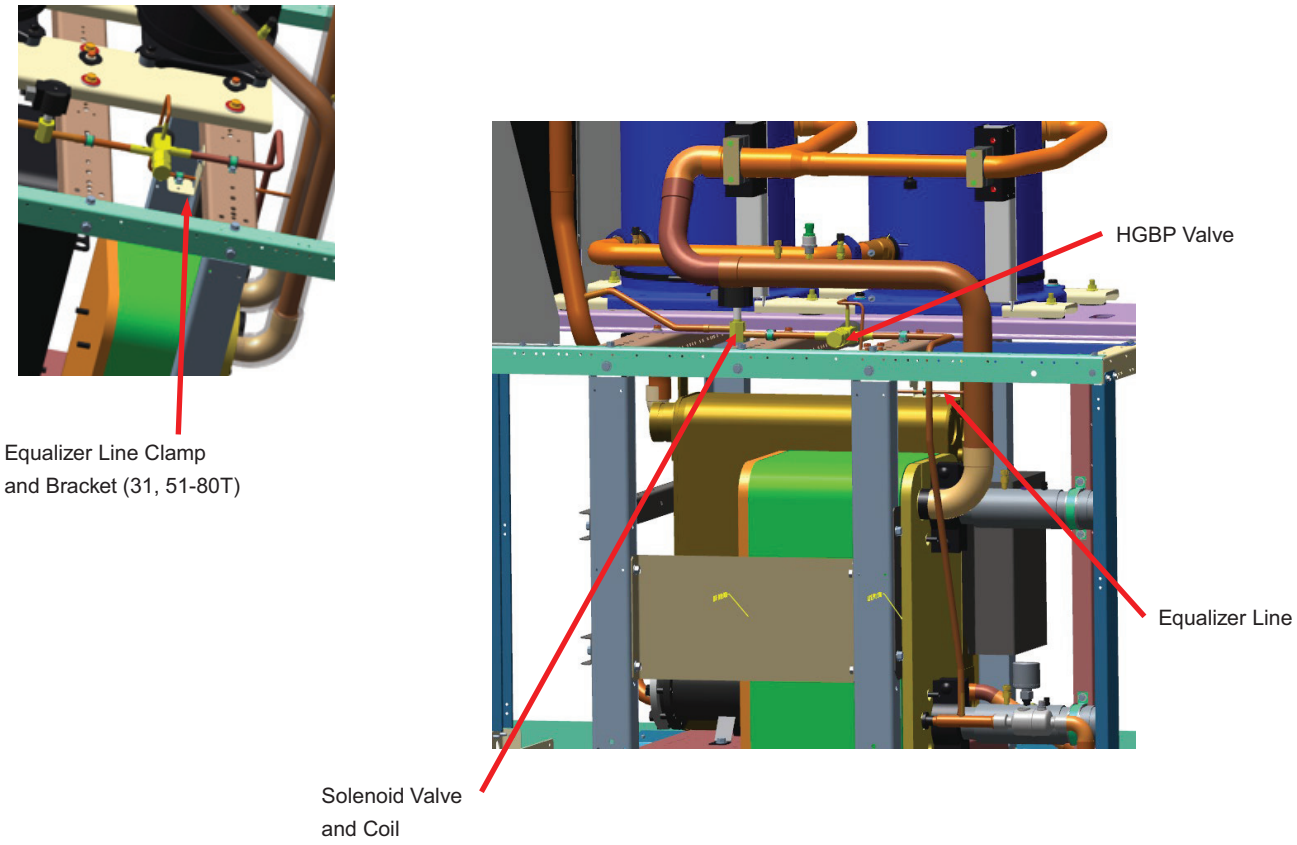


Fig. 4 — 30MP Base Unit Connection Locations

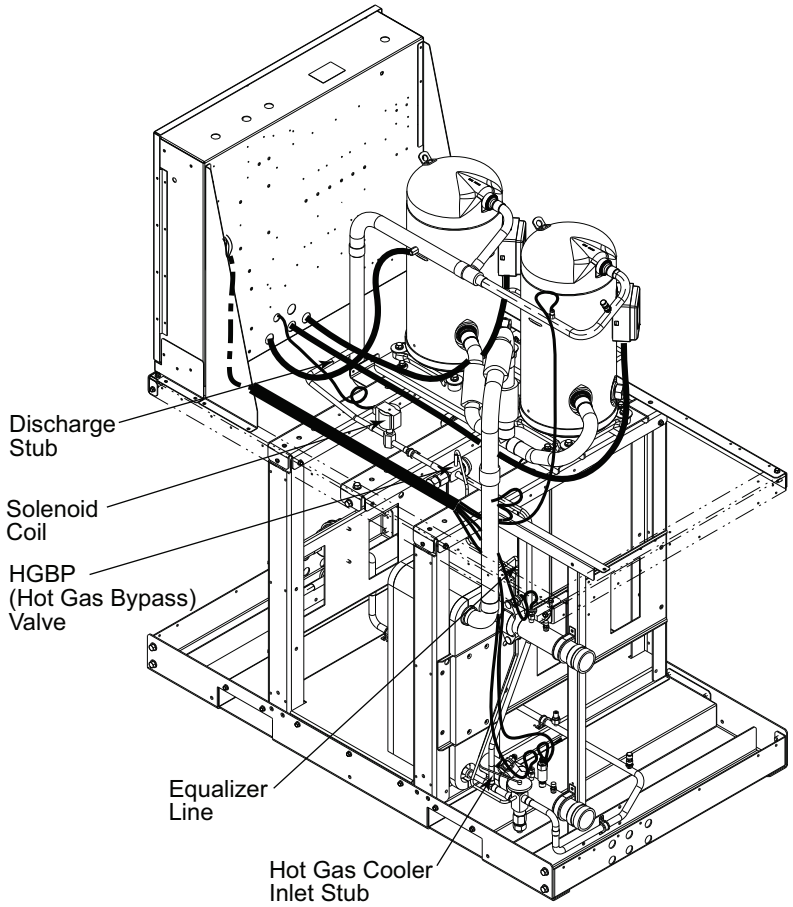


Fig. 5 — 30MPA and 30MPW Connection Location (Typical — Sizes 017-031, 041-080)

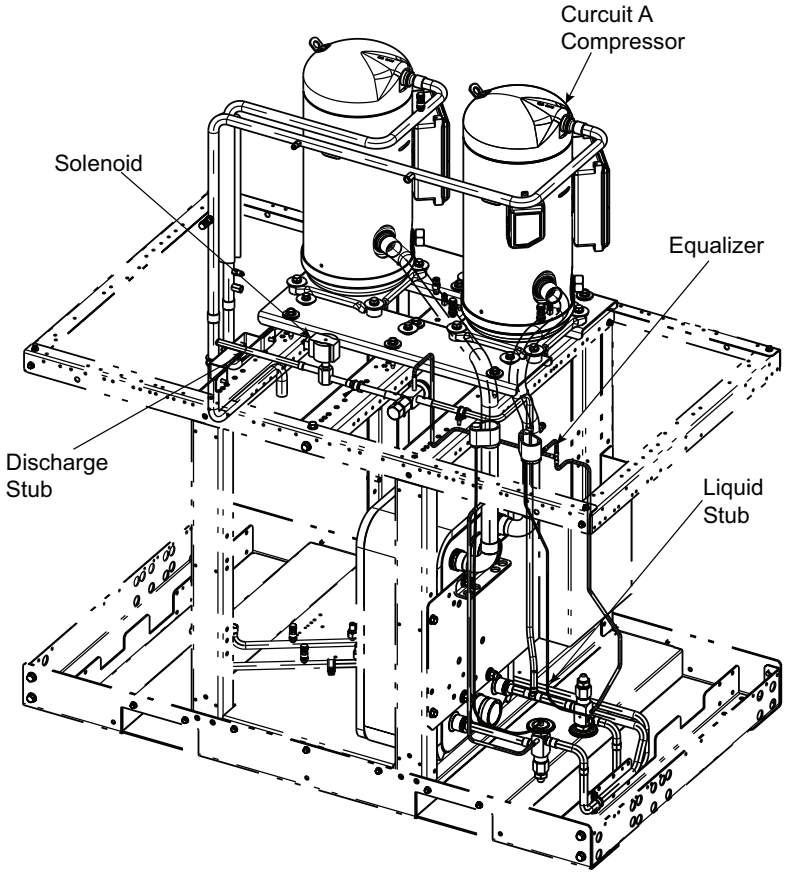


Fig. 6 — 30MPW033 Connection Location

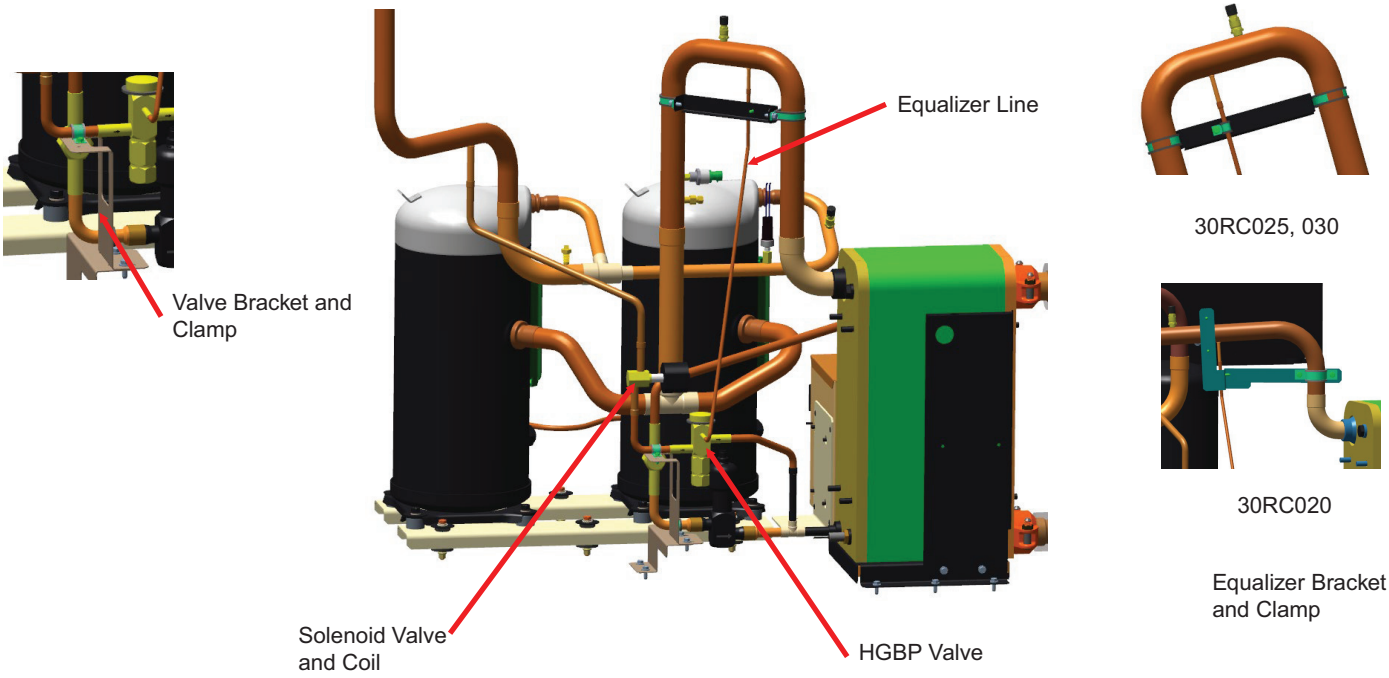


Fig. 7 — 30RC Base Unit Connection Locations (Sizes 020-030)

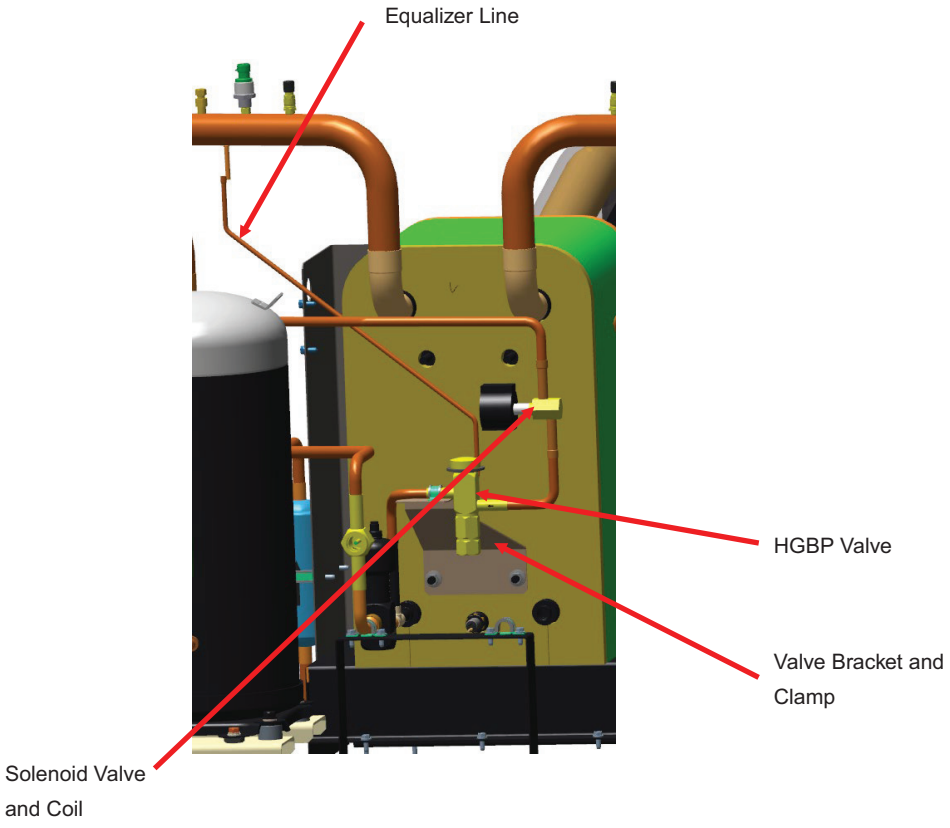
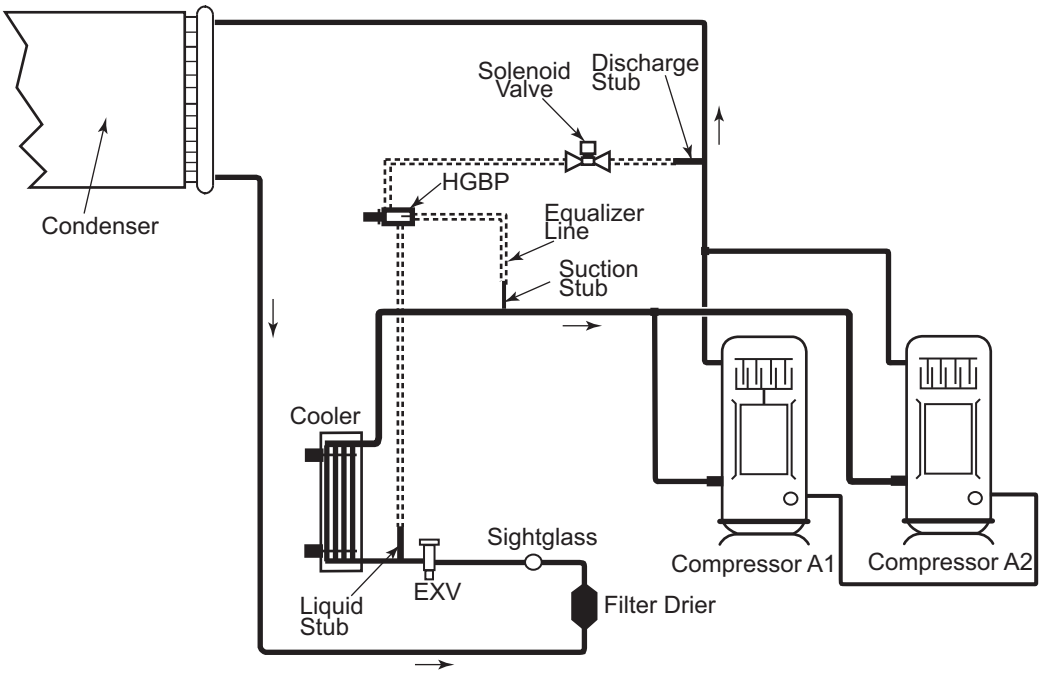


Fig. 8 — 30RC Base Unit Connection Locations (Sizes 035-060)



LEGEND

::::: Field-Supplied Piping

Fig. 9 — Hot Gas Bypass (HGBP) Valve Installation Piping

Install Control Wiring

30RC

1. Install solenoid coil in locations shown in Fig. 2-8.
2. Install the AUX (auxiliary) board using the standoffs and screws provided. The auxiliary board is located on left wall of the control panel on 30RC010-030 units. For 30RC035-060 units the AUX board is located on the left of the center section of the control panel. See Fig. 10 and 11.
3. Use supplied harness to connect board power and board communication cables. Select correct harness from parts list depending on if unit has Greenspeed® option. Route HGBP end of cable to HGBP solenoid. Refer to Fig. 9.
4. Address board per wiring in Fig. 12.

30MPA, 30MPW

1. Install solenoid coil in location shown in Fig. 5.
2. Locate the violet and brown wires labeled HGBP in the unit control panel. See Fig. 13.
3. Cut off the capped ends, strip the wires back 1/2 in., and wire the solenoid coil to the HGBP terminals. See Fig. 13.

Configure Unit for Minimum Load Control

The control must be configured for the minimum load control operation. Use the PIC6 controller display to configure the system.

1. Set the Enable/Off/Remote switch to **OFF** position.
2. Log into controller at Factory Level. See Installation and Troubleshooting manual for details.
3. From the Home menu, navigate to Factory Parameters menu.
4. Configure ***Hot Gas Bypass Selection → hgbp_sel→Yes***. Press the **Save** icon at the bottom left of the screen. Allow the controller to reboot.
5. After reboot, go back to the confirmation screen and verify the section has changed. The controller is not configured for HGBP operation.

Test Minimum Load Relay Output

Chiller must be in the local OFF mode to use Quick Test. From the Home menu navigate to the Quick Test menu. Enable the quick test function at the top of the screen. Scroll down to the HGBP feature and enable it. This will open the HGBP solenoid valve. Verify it is energized/open by the clicking sound or a sensor to detect energized solenoids. Once verification is complete, disable quick test.

Once the outputs have been tested, the installation is complete.

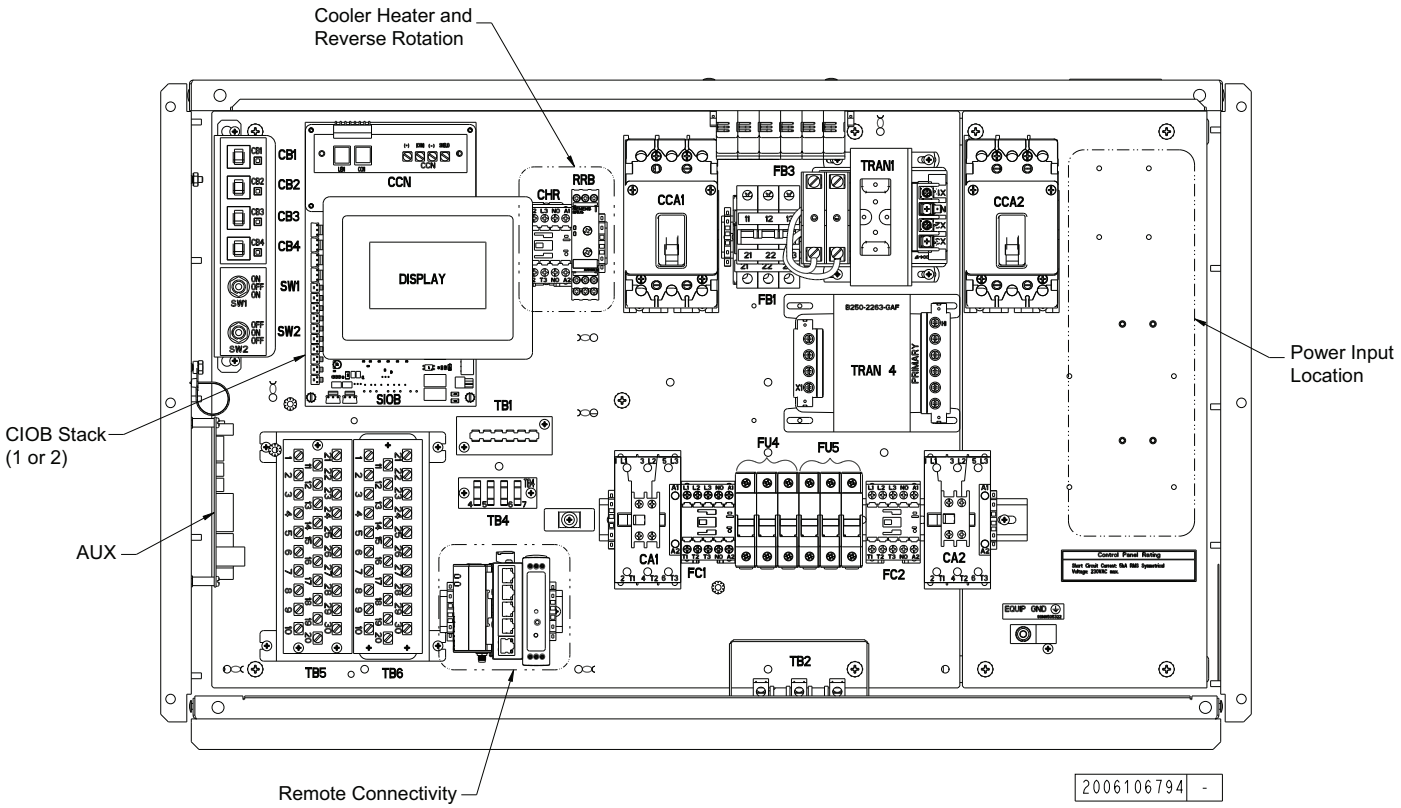
Hot Gas Bypass (HGBP) Valve Operation

The HGBP valve responds to changes in suction pressure. Refer to Fig. 1. When the evaporating pressure is above the valve setting, the valve remains closed. As the suction pressure drops below the valve setting, the valve responds and begins to open. The valve opens in proportion to the change in suction pressure. As the suction pressure continues to drop, the valve continues to open until the limit of the valve stroke is reached.

In typical applications, the pressure change is not sufficient to open the valve to the limit of the stroke. The amount of pressure change required to move the valve from the point at which it is closed to the point at which it is considered open varies widely depending on the evaporator temperature. For this reason, HGBP capacity reduction is a function of allowable evaporator temperature change from closed position to the opening setting, which for most applications is a 6°F (3.3°C) change in evaporator temperature.

Hot Gas Bypass (HGBP) Adjustment

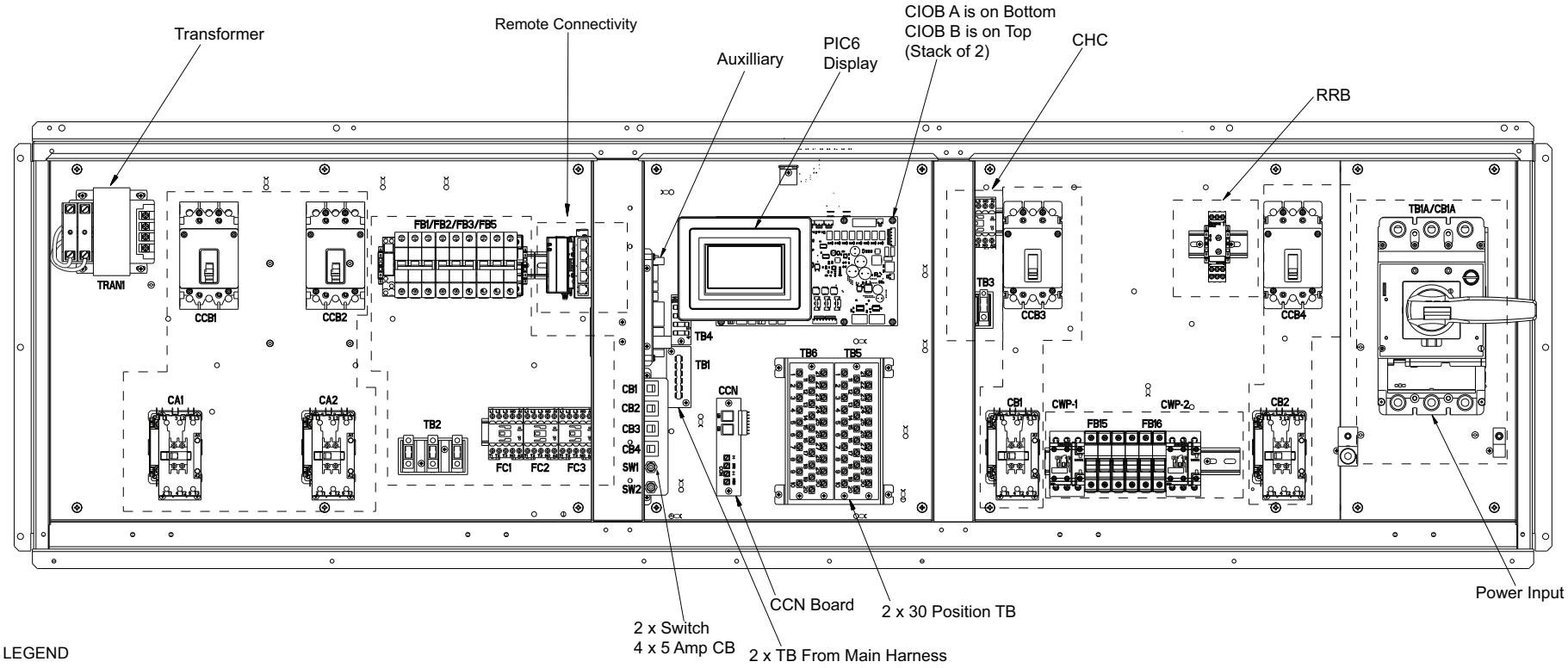
The HGBP valve utilizes a spring assembly which can be fixed at the desired pressure setting (opening pressure). This setting will not be affected by other factors such as ambient temperature or hot gas temperature. The HGBP valve has an adjustment range of 95 to 115 psig (655 to 793 kPa). The standard factory setting for this valve is 105 psig (724 kPa).



LEGEND

CIOB — Carrier Input/Output Board
AUX — Auxiliary Control Board

Fig. 10 — AUX Board Mounting Location (30RC 010-030 Units)



LEGEND

CB — Circuit Breaker
CCN — Carrier Comfort Network®
CHC — Evaporator Heater Circuit
CIOB — Carrier Input/Output Board
RRB — Reverse Rotation Board/Phase Monitor
TB — Terminal Block

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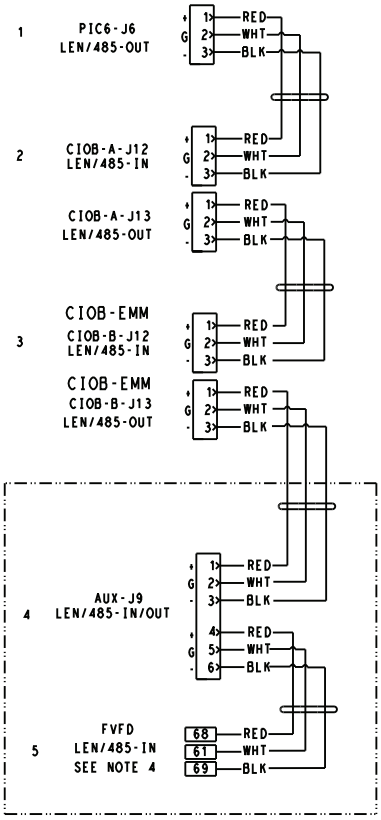
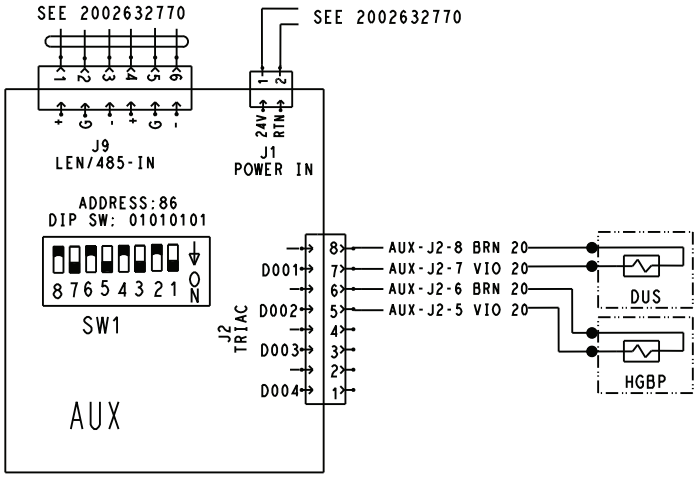
Fig. 11 — AUX Board Mounting Location (30RC 035-060 Units)

LEN BUS Wiring



HGBP (Hot Gas Bypass) Wiring



24-v Power Board

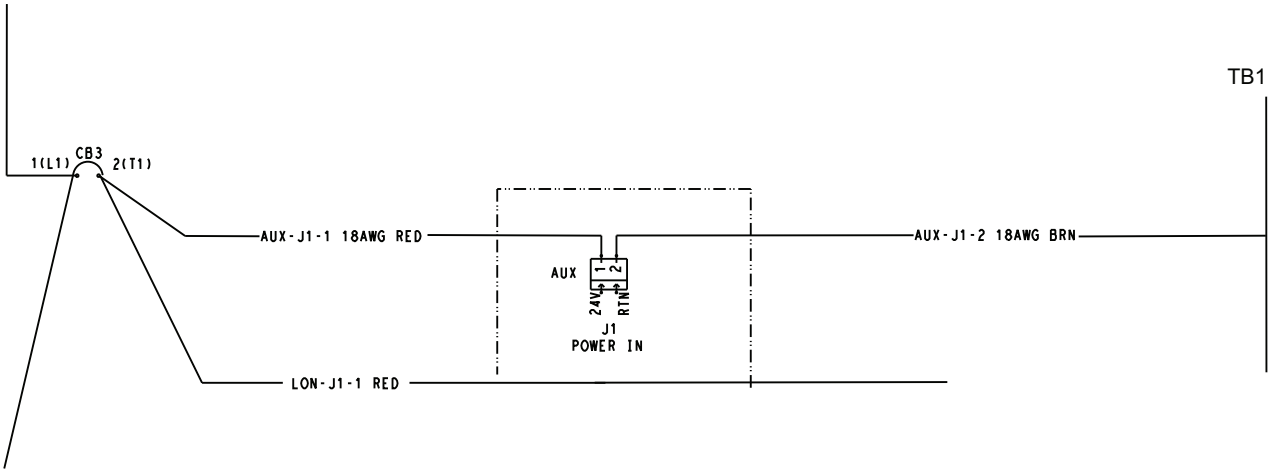


Fig. 12 — 30RC AUX Board Wiring

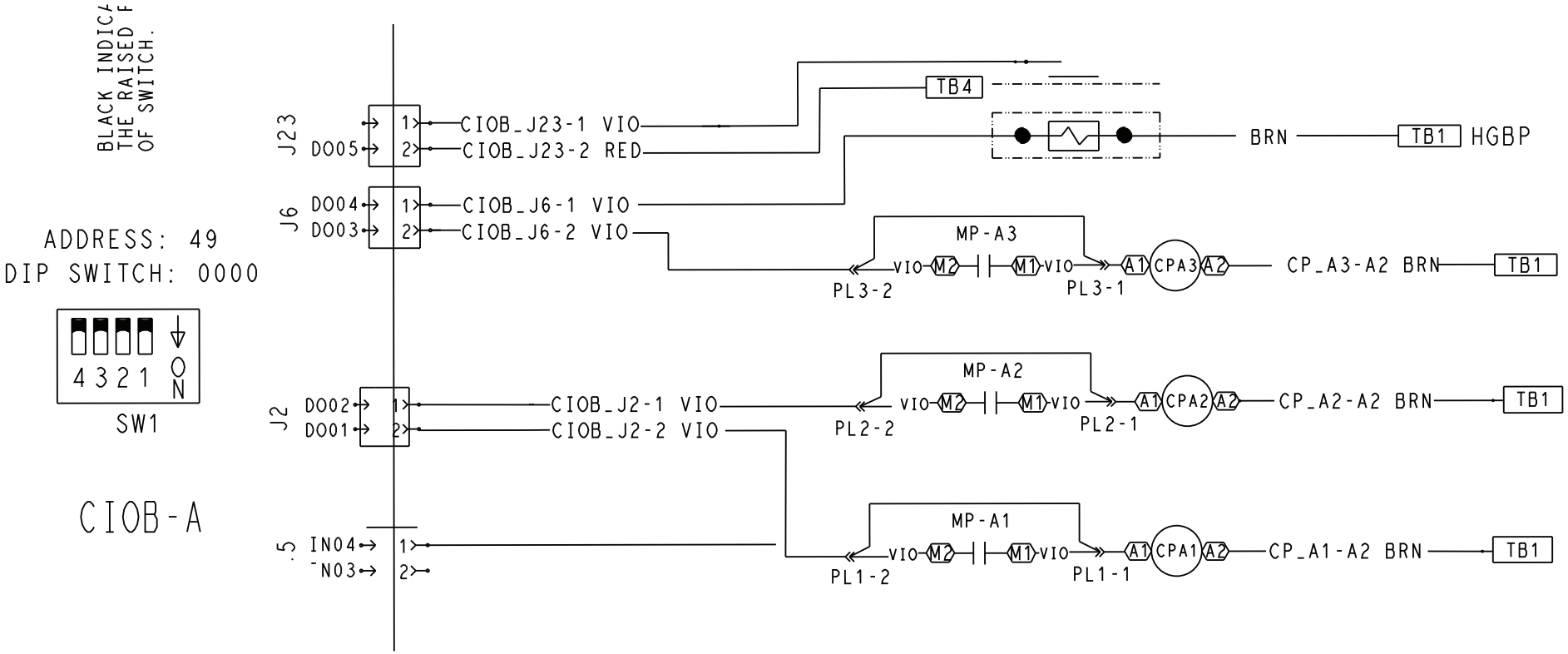


Fig. 13 — 30MP Control Wiring