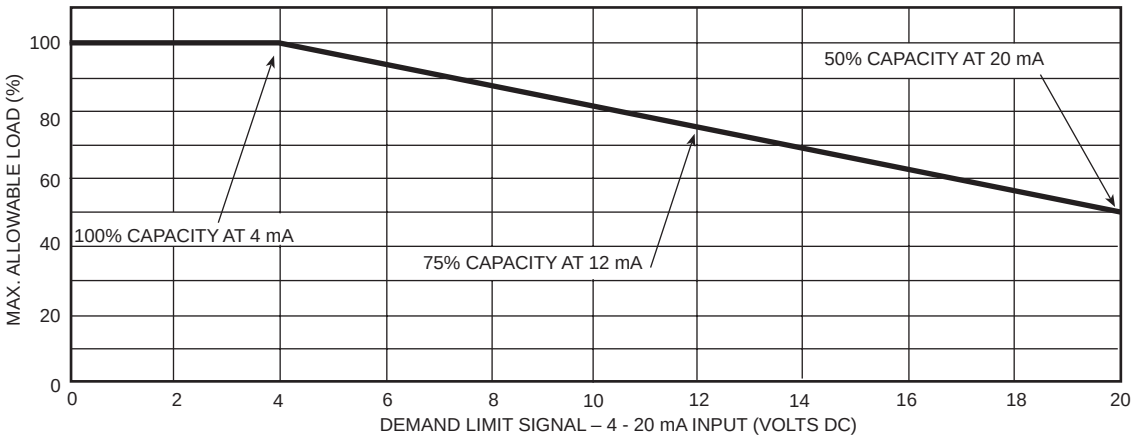

Fig. 21 — 4 to 20 mA Demand Limiting

TROUBLESHOOTING

Compressor Protection Control System (CPCS) Board — The compressor protection board controls the compressor and compressor crankcase heater.

The ground current protection is provided by the compressor board.

The large relay located on the board is used to provide a feedback signal to the Main Base Board.

The operation of the compressor board can be checked using the Service Test procedure. When the Service Test step is turned on, the compressor board is energized. All safeties are continuously monitored. The crankcase heater will be turned off and the compressor contactor will be turned on. The feedback contacts will close and the Main Base Board (MBB) will read the feedback status.

If the board does not perform properly, use standard wiring troubleshooting procedures to check the wiring for open circuits. Refer to Alarms and Alerts section on page 45 for alarm or alert codes for possible causes for failure.

If a compressor short-to-ground exists, the compressor board may detect the short before the circuit breaker trips. If this is suspected, check the compressor for short-to-ground failures with an ohmmeter. The ground current is sensed with a current toroid (coil) around all 3 or 6 wires between the main terminal block and the compressor circuit breaker(s).

Compressor Ground Current (CGC) Board (30GTN,R130-210, 230A-315A, and 330A/B-420A/B) — One board is used for each circuit of these units. Each board receives input from up to 4 toroids wired in series, one toroid per compressor. With 24 v supplied at terminals A and B, a current imbalance (compressor ground current) sensed by any toroid causes the NC (normally closed) contacts to open, shutting down the lead compressor in the affected circuit. All other compressors in that circuit shut down as a result. The NC contacts remain open until the circuit is reset by momentarily deenergizing the board using the push-button switch.

If the NC contacts open, it is necessary to remove toroids from the T1-T2 circuit to determine which toroid is causing the trip. The chiller circuit can then be put back on line after the circuit breaker of the faulty compressor is opened. The compressor problem can then be diagnosed by normal troubleshooting procedures.

EXV Troubleshooting — If it appears that the EXV is not properly controlling operating suction pressure or superheat, there are a number of checks that can be made using the quick test and initialization features built into the ComfortLink™ control.

Follow the procedure below to diagnose and correct EXV problems.

STEP 1 — CHECK PROCESSOR EXV OUTPUTS — Check EXV output signals at the J6 and J7 terminals of the EXV board.

Turn unit power off. Connect the positive lead of the meter to terminal 3 on connector J6 on the EXV board. Set meter for approximately 20 vdc. Turn unit power on. Enter and enable the Service Test mode. Locate the appropriate valve under 'OUTS.' Select the desired percentage and press Enter to move the valve. The valve will overdrive in both directions when either 0% or 100% are entered. During this time, connect the negative test lead to terminals 1, 2, 4, and 5 in succession. The voltage should fluctuate at each pin. If it remains constant at a voltage or at 0 v, replace the EXV board. If the outputs are correct, then check the EXV.

To test Circuit B outputs, follow the same procedure above, except connect the positive lead of the meter to terminal 3 on connector J7 on the EXV board and the negative lead to terminals 1, 2, 4, and 5 in succession.

STEP 2 — CHECK EXV WIRING — Check wiring to EXVs from J6 and J7 terminal strips on EXV board.

1. Check color coding and wire connections. Make sure that wires are connected to correct terminals at J6 and J7 terminal strips and EXV plug connections. Check for correct wiring at driver board input and output terminals. See Fig. 2-4.
2. Check for continuity and tight connection at all pin terminals.
3. Check plug connections at J6 and J7 terminal strips and at EXVs. Be sure EXV connections are not crossed.

STEP 3 — CHECK RESISTANCE OF EXV MOTOR WINDINGS — Remove plug at J6 and/or J7 terminal strip and check resistance between common lead (red wire, terminal D) and remaining leads A, B, C, and E. Resistance should be 25 ohms ± 2 ohms.

STEP 4 — CHECK THERMISTORS THAT CONTROL EXV — Check thermistors that control processor output voltage pulses to the EXVs. Circuit A thermistor is T7, and circuit B thermistor is T8. Refer to Fig. 9 and 10 for location.

1. Use service test to determine if thermistors are shorted or open.
2. Refer to Thermistors section on page 57 for details on checking thermistor calibration.

3. Make sure that thermistor leads are connected to the proper pin terminals at the J5 terminal strip on EXV board and that thermistor probes are located in proper position in the refrigerant circuit.

When these checks have been completed, the actual operation of the EXV can be checked by using the procedures outlined in Step 5 — Check Operation of the EXV section below.

STEP 5 — CHECK OPERATION OF THE EXV — Use the following procedure to check the actual operation of the EXVs. The ENABLE/OFF/REMOTE contact switch must be in the OFF position.

1. Close the liquid line service valve for the circuit to be checked and run through the appropriate service test to pump down the low side of the system. Run lead compressor for at least 30 seconds to ensure all refrigerant has been pumped from the low side and that the EXV has been driven fully open (1500 steps).

   NOTE: Do not use the Emergency ON-OFF switch to recycle the control during this step.
2. Turn off the compressor circuit breaker(s) and the control circuit power and then turn the Emergency ON/OFF switch to the OFF position. Close compressor service valves and remove any remaining refrigerant from the low side of the system.
3. Remove screws holding top cover of EXV. Carefully remove top cover, using caution to avoid damage to the O-ring seal and motor leads. If EXV plug was disconnected during this process, reconnect it after the cover is removed.
4. Note position of lead screw (see Fig. 14). If valve has responded properly to processor signals in Step 5.1 above, the valve should be fully open and the lead screw should protrude approximately ¼ in. to ¾ in. above the top of the motor.
5. Recycle the control by turning the control circuit power on and switching the Emergency ON-OFF switch to the ON position. This puts the control in initialization mode. During the first 60 seconds of the initialization mode, each valve is driven to the fully closed position (1500 steps) by the processor. With the cover lifted off the EXV valve body, observe the operation of the valve motor and lead screw. The motor should turn in the counterclockwise (CCW) direction and the lead screw should move down into the motor hub until the valve is fully closed. Lead screw movement should be smooth and uniform from the fully open to the fully closed position.
6. When test has been completed, carefully reassemble expansion valve. Be careful not to damage motor or O-ring when reassembling valve. Open compressor service valves and close compressor circuit breakers. Open liquid line service valve. Turn the ENABLE/OFF/REMOTE contact switch and allow unit to operate. Verify proper operation of unit.

This process of opening and closing the EXV (EXV.A/EXV.B under OUTS) can be repeated by using these Service Test steps and recycling the control as described in the preceding steps. If the valve does not operate as described when properly connected to the processor and receiving the correct signals, it should be replaced.

If operating problems persist after reassembly, they may be due to out-of-calibration thermistor(s) or intermittent connections between the EXV board terminals and the EXV plug. Recheck all wiring connections and voltage signals.

Other possible causes of improper refrigerant flow control could be restrictions in the liquid line. Check for plugged filter drier(s), restricted metering slots in the EXV, or partially closed liquid line service valves. Formation of ice or frost on the lower body of the EXV is one symptom of restricted metering slots. Clean or replace the valve if necessary. Wrap a wet cloth around the valve if it is to be replaced to prevent the heat from damaging the internal components of the valve.

NOTE: Frosting of the valve is normal during service test and at initial start-up. The frost should dissipate after 5 to 10 minutes operation of a system that is operating properly.

NOTE: The EXV orifice is a screw-in type and may be removed for inspection and cleaning. Once the top cover has been removed, the EXV motor may be taken out by removing the 2 cap screws securing motor to valve body. Pull motor, lead screw, and the slide assembly up off the orifice assembly. See Fig. 14. A slot has been cut in top of orifice assembly to facilitate removal using a large screwdriver. Turn orifice assembly counterclockwise to remove.

When cleaning or reinstalling orifice assembly, be careful not to damage orifice assembly seals. The bottom seal acts as a liquid shut-off, replacing a liquid line solenoid valve.

Reassembly of valve is made easier by screwing the slide and lead screw assembly out of the motor. Align hole in top of slide with the guide pin in orifice assembly and gently push slide and lead screw onto orifice assembly about halfway. Screw motor onto lead screw and secure EXV motor with cap screws. Be careful not to twist or pull on wires from EXV motor to valve cover pin connections. Check EXV operation in quick step steps.

Alarms and Alerts — These are warnings of abnormal or fault conditions, and may cause either one circuit or the whole unit to shut down. They are assigned code numbers as described in Table 27.