

Case Controller Installation Instructions and Test Procedures



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This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and—if not installed and used in accordance with this instruction manual—may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case correction of the interference will be at the user's expense.

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Introduction

A case controller is typically designed to control all refrigerated case functions including lights, fans, defrost, anti-sweat, and suction side or liquid side valve control.

A case controller is only one component of a standard CPC refrigeration control system. In general, a standard CPC system consists of the following components:

1. Refrigeration Monitor and Case Control (RMCC)
2. Various input and output boards (including case controllers)
3. 485 Alarm Panel
4. RS232 Bus Amplifier
5. Remote communication modem
6. Network wiring
7. Sensors and loads

Most of the components in this list are described and discussed in the *RMCC Installation and Operation Manual (P/N 026-1102)*. This manual provides a hardware overview and installation instructions for the Case Control Board, Power Module, and other components exclusive to a case-controlled refrigeration system. A test procedure for the Case Controller is also included in this manual.

Hardware Description

Case Controllers

CPC produces two different hardware versions of the case controller to interact with either a pulse valve or stepper valve.

The pulse valve case controller (*Figure 1*) may be configured with a second valve relay for simultaneous control of two pulse valves. Control of two valves simultaneously is intended for applications where two evaporators are being used to refrigerate a single space such as a walk-in box cooler. A single pulse case controller is not capable of controlling two separate cases. The stepper valve case controller (*Figure 2*) does not have the second valve relay, but

does have a jumper which is set based on whether the valve is bipolar or unipolar.

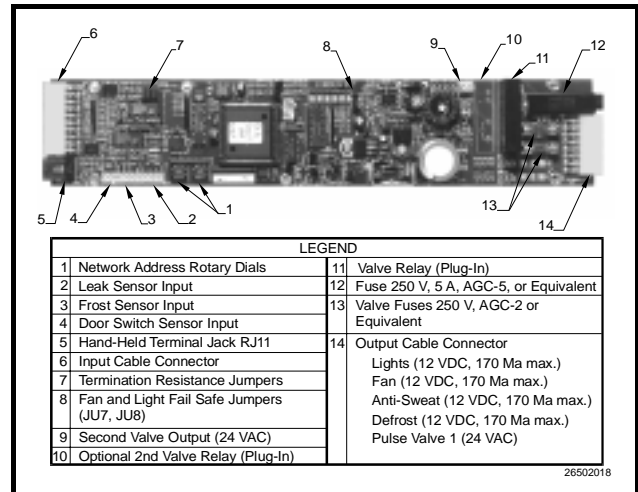


Figure 1 - Pulse EEV Case Controller

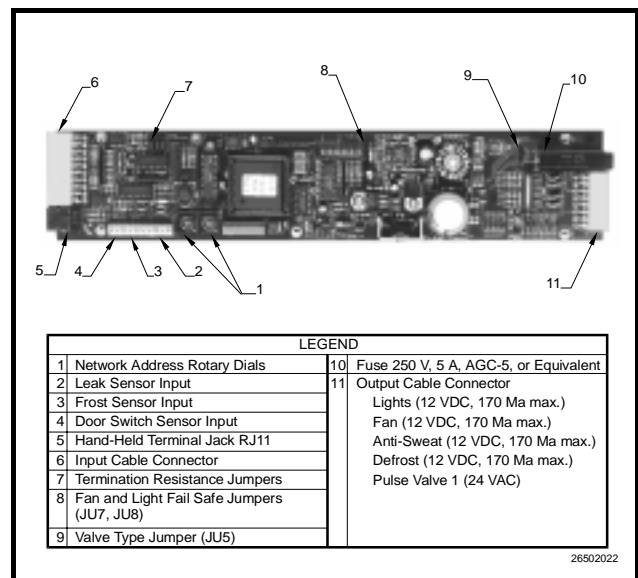


Figure 2 - Stepper EEV Case Controller

Full installation of the case control kit requires five standard components:

1. Case Controller
2. Applicable Temperature Sensors
3. Input Cable
4. Output Cable
5. Power Module

Items 1 and 2 are supplied as a single kit. The input and output cables must be ordered separately depending on the power modules being used.

Table 1 lists the different case controller types and their part numbers. **Table 2** lists the available input and output cable configurations and their part numbers.

Description	Part Number
Liquid Pulse EEV Case Controller Kit*	810-3140
Liquid Pulse EEV Case Controller (no sensors)	810-3141
Liquid Stepper EEV Case Controller Kit*	810-3150
Liquid Stepper EEV Case Controller (no sensors)	810-3151
Suction Stepper EEPR Case Controller Kit (Hussmann)**	810-3152
Suction Stepper EEPR Case Controller (Hussmann) (no sensors)	810-3153
Suction Stepper EEPR Case Controller Kit (CPC)**	810-3154
Suction Stepper EEPR Case Controller (CPC) (no sensors)	810-3155
Second Valve Kit (pulse only). Includes:	510-3130
Coil Inlet Temperature Sensor (Blue Leads)	501-1125
Coil Outlet Temperature Sensor (Red Leads)	501-1126
Solid State Relay	221-7000
75 VA Transformer	140-0050
Second Valve Kit, without 75 VA Transformer	510-3125
* Includes:	
Discharge Air Sensor (Green Leads)	501-1122
Coil Inlet Temperature Sensor (Blue Leads)	501-1125
Coil Outlet Temperature Sensor (Red Leads)	501-1126
** Includes:	
Discharge Air Sensor (Green Leads)	501-1122

Table 1 - Case Controller Part Numbers

Input and Output Cables

CPC produces a single input cable harness, and three different output cable harnesses depending on the power module or valve type being used.

The input cable harness (335-3151) is supplied with a connector for connection to the case controller, and connector ends which mate to the temperature sensors supplied with the case controllers.

The output cable harness may be any of three types. The full output cable harness is supplied without connectors (335-3156) for connection to non-CPC power modules, or with connectors (335-3158) for connection to CPC power modules, which are supplied with female connectors. A third output cable harness (335-3159) is provided if a Sporlan suction stepper unipolar valve is being used.

Table 2 lists the harness configurations and their part numbers.

Description	Part Number
Input Cable - Includes coil in and coil out for one valve, discharge air, defrost termination, suction valve, and network I/O communication.	335-3151
Output Cable - Includes lights, fans, anti-sweat, defrost. For use with non-CPC power modules (without connectors).	335-3156
Output Cable - For use with CPC power modules (with connectors).	335-3158
Output Cable - For Sporlan Suction Stepper Bipolar Valve (with connector).	335-3159

Table 2- Case Controller Cable Harness Part Numbers

Power Modules

In addition to the case controllers, CPC manufactures a power module for distribution of incoming power to the controller and electric defrost circuits. The power module is available with or without circuit protection. See **Figure 3** and **Figure 4**. The CPC power module configurations and part numbers are listed in **Table 3**.

The case controllers may also be installed within the case in conjunction with an OEM-designed power module.

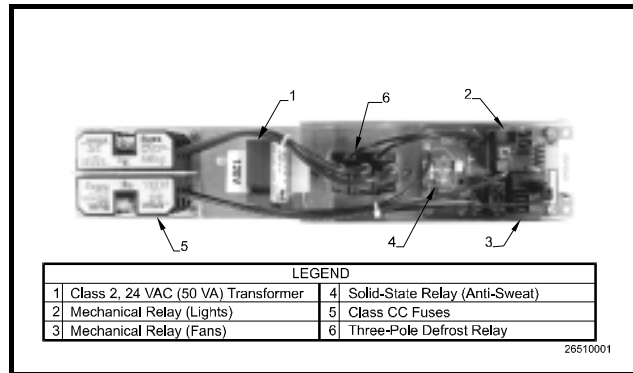


Figure 3 - Case Controller Power Module

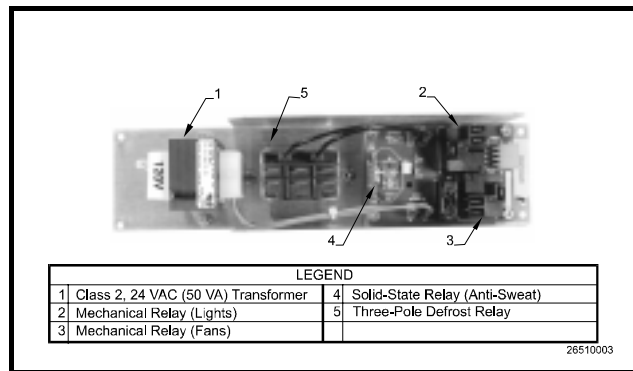


Figure 4 - Case Controller Power Module Without Fuse Protection

Description	Part Number	Lights	Fans	Anti-Sweat	Defrost
120 VAC 1 Phase/240 VAC 3 Phase Defrost, Full Configuration	816-3000	Yes	Yes		
	816-3005	Yes	Yes	Yes	
	816-3010	Yes	Yes	Yes	Yes
120 VAC 1 Phase/240 VAC 3 Phase Defrost, No Fuses, No Fuse Holder	816-3100	Yes	Yes		
	816-3105	Yes	Yes	Yes	
	816-3110	Yes	Yes	Yes	Yes
120 VAC 1 Phase/240 VAC 3 Phase Defrost, No Fuses, with Fuse Holder	816-3200	Yes	Yes		
	816-3205	Yes	Yes	Yes	
	816-3210	Yes	Yes	Yes	Yes
240 VAC 1 Phase, Full Configuration	816-3310	Yes	Yes	Yes	Yes

Table 3 - Power Module Part Numbers

Power Module Output Ratings				
Output	Volts	Normally Open	Normally Closed	Maximum Fuse
Lights	120 V	20 A	10 A	20 A
	240 V	6 A	3 A	
Fans	120 V	¾ hp	¼ hp	15 A
	240 V	1½ hp	½ hp	
Anti-Sweat	120 V	12 A		15 A
	240 V	12 A		
Defrost	120 V	30 A (1 or 2 pole) 25 A (3 pole)		30 A
	240 V	30 A (1 or 2 pole) 25 A (3 pole)		

Table 4 - Power Module Output Ratings

Installation

Case Controller

Generally, the case controller will be mounted within the raceway or on top of the case. If a controller must be replaced or installed in the field, it should be located based on the specific design of the case; however, the following guidelines are provided to help ensure proper installation.

Size

The case controller enclosure measures 14.375 inches long by 3 inches wide by 1.875 inches deep. The cover is secured to the base plate by two 6/32 lock nuts. The base has one 0.218 inch mounting hole located at each corner.

Power

Do not use the center tap of any transformer to power the CCB. Do not use a single transformer to power a CCB and another I/O board (16AI, 8RO, etc.).

The case controller should only be used with a Class 2, 24 VAC (50 VA) transformer with no center tap. Wiring of the case controller to the transformer is diagrammed in **Figure 5**.

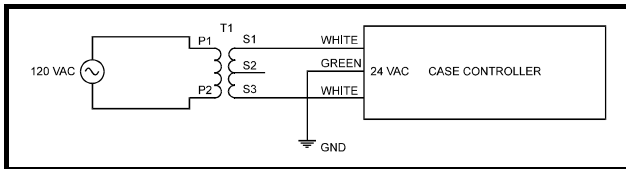


Figure 5 - Case Controller to Transformer Wiring

Jumper Settings

Valve Type Jumper (JU5) (Stepper EEV Only)

Set the valve type jumper (JU5) up for unipolar valves (Alco ESV Liquid Stepper) and down for bipolar valves (Alco ESR & Sporlan SEI Liquid Stepper).

Lights and Fans Output Jumpers (JU7 and JU8)

If the lights and fans are wired to the NC connection of the power module relays, then the light relays are derated to 10.

The relays on the power module that control case fans and lights may be used as either normally open or normally closed relays. Jumpers JU7 (lights) and JU8 (fans) define whether the relay will operate as normally open or normally closed. For a normally open relay, set the desired jumper

to the up position and wire the load to the N.O. connection on the power module relays, as shown in **Figure 13** and **Figure 14**. For a normally closed relay, set the desired jumpers in the down position and wire the load to the N.C. connection on the power module relays.

Baud Rate

The CCB baud rate is hard-coded at 19,200 and cannot be changed. For networks with case controllers attached, the baud rate setting for COM A and D on the RMCC should be set to 19,200. See **Section 5.10., Baud Rate Dip Switch Settings**, of the RMCC manual (P/N 026-1102 Rev 3).

Optional Inputs and Outputs

The case controller is configured with optional inputs for a leak detector, optical frost sensor, and clean/door switch (non-voltage contact change of state). One optional output for a second 24 VAC, pulse electronic expansion valve is provided. If a second valve is used, a valve relay must be installed. Wiring for these connections is shown in **Figure 6**.

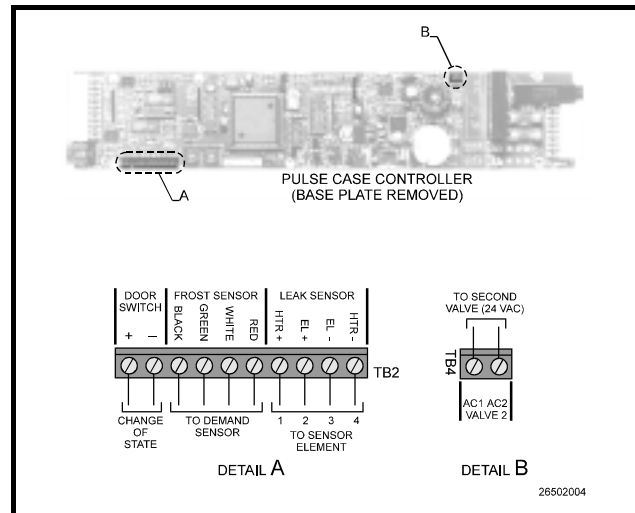


Figure 6 - Case Controller Optional Inputs and Outputs Wiring

Cable Harnesses

Input Cable

CPC's case controller input cable harness (335-3151) is designed for use with either a pulse or stepper valve case controller. The connector is constructed with 18 AWG color-coded wire with a male end, 20-pin connector for connection to the case controller. Female connectors are supplied for each of the sensors and wire leads are supplied

for an optional suction valve and the RS485 network. The schematic diagram for the cable is shown in **Figure 7**.

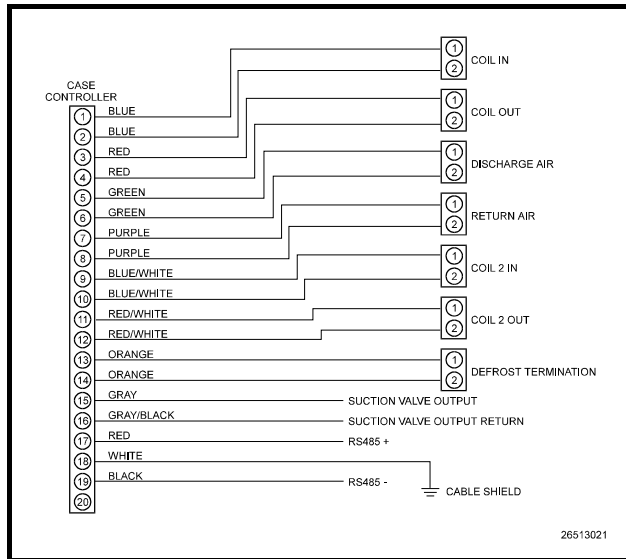


Figure 7 - Input Cable Harness (335-3151) Schematic Diagram

Output Cables

Full Output Cables

CPC's case controller full output cable harness without connectors (335-3156) and with connectors (335-3158) are designed for use with either a pulse or stepper valve case controller. The connector is constructed with 18 AWG color-coded wire with a 16-pin, male end connector for connection to the case controller. The 335-3156 output cable is supplied with wire leads for connection to non-CPC power modules, while the 335-3158 cable is supplied with an 8-pin, male end connector for connection to the CPC power module. The schematic diagrams for these cables are shown in **Figure 8** and **Figure 9**.

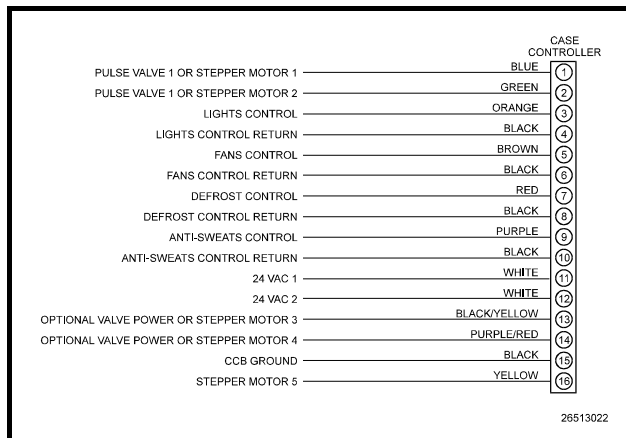


Figure 8 - Output Cable Harness Without Connectors (335-3156) Schematic Diagram

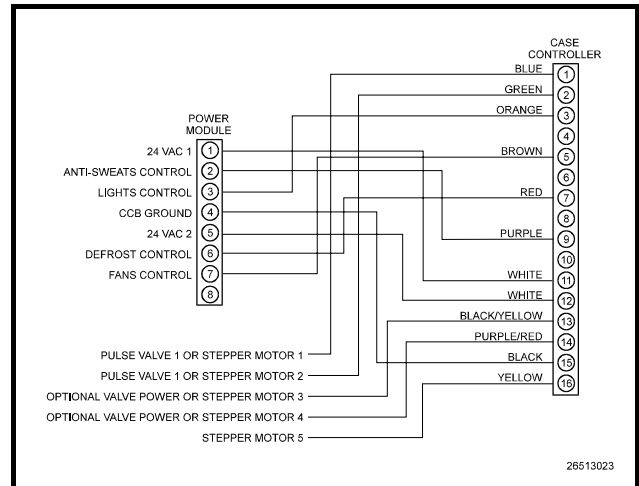


Figure 9 - Output Cable Harness With Connectors (335-3158) Schematic Diagram

Full Output Cable for Sporlan Suction Stepper Bipolar Valve

CPC's case controller full output cable harness (335-3159) is designed for use with a stepper valve case controller controlling a Sporlan suction stepper bipolar valve. The connector is constructed with 18 AWG color-coded wire with a 16-pin, male end connector for connection to the case controller, an 8-pin, male end connector for connection to a CPC power module, and a 4-pin female end connector for connection to the Sporlan valve.

The schematic diagram for this cable is shown in **Figure 10**.

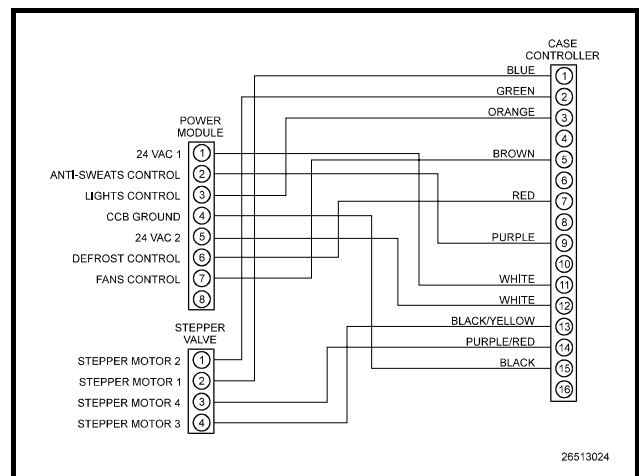


Figure 10 - Sporlan Stepper Valve Output Cable Harness (335-3159) Schematic Diagram

Full Output Cable for Alco ESR Valve

The CCB is designed to use the 24 V version of the Alco ESR Valve. The 24 V version of the valve has -24VDC appended to the part number. The ESR valve harness from Alco comes in two versions. With an in-line molex connector, the CPC harness (P/N 335-3159) can be used. If the valve is purchased with the in-line molex, the CPC Output Cable Harness with Quick Connects (335-3158) must be used. The connector must be cut off of the harness and the valve wired according to specifications in *Table 5*.

Table 5 shows the relationship between the CPC output cable colors and the associated valve cable colors.

CPC Wire Color	Pin #	ALCO ESV Liquid Stepper (S/EEV) Unipolar (24V)	AlcoESR (24 V Only)	Sporlan SEI Liquid Stepper (S/EEV), EEPR Bipolar (12V)
Blue	1	Blue	Red	Red
Green	2	Red	Blue	Green
Black/ Yellow	13	Black	Black	Black
Purple/ Red	14	White	White	White
Yellow	16	Yellow	Not Used	Not Used

Table 5 - Valve Cable Wire Colors

Power Modules

Case Controller Power Module

Size

The case controller power module measures 16.25 inches long by 3 inches wide by approximately 3¼ inches deep. The base plate has one 0.218 inch mounting hole located at each corner.

Power

The case controller power module should be connected to a 120 VAC single phase power source. Complete wiring of the case controller power module is diagrammed in *Figure 11*. Follow all local, NEC, and UL wiring practices.

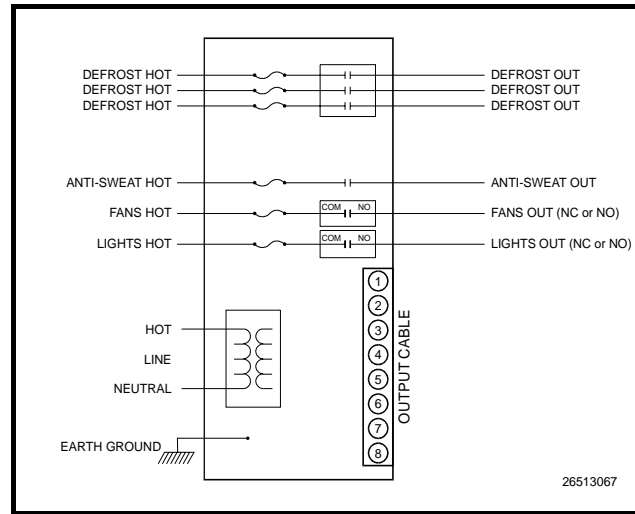


Figure 11 - Case Controller Power Module Wiring Schematic

Sensor Location

Discharge Air Sensor (Green Leads)

In general, the discharge air sensor should be located in the air stream leaving the evaporator coil, but just before the air stream enters the food compartment of the refrigerated display case.

Coil Inlet Sensor (Blue Leads)

Proper location of the coil inlet sensor is critical since valve control is dependent upon accurate measurement of changes to evaporator liquid temperature. The coil inlet sensor should be located on either the first or second pass through the evaporator. Preferably, the sensor should be placed six inches into the evaporator on the first pass.

Place the coil inlet sensor with the curved surface against the pipe and secure with the included Panduit low temperature cable tie number PLT2S-M120 or equivalent. The tie should be positioned in the groove on the top surface of the sensor. A second tie should be used to secure the lead to the pipe for additional support.

Sensors located on refrigerant tubing should be insulated to eliminate the influence of the surrounding air. A self-adhering insulation that will not absorb moisture is recommended to prevent ice accumulating at the sensor location. For orientation of the sensor on the coil, see *Figure 12*.

Coil Outlet Sensor (Red Leads)

Proper location of the coil outlet sensor is critical since valve control is dependent upon accurate measurement of changes to evaporator discharge gas temperature. The coil outlet sensor should be located on a horizontal section of

the suction line, near the evaporator outlet. Follow the mounting instructions listed for the coil inlet sensor. For orientation of the sensor on the coil, see *Figure 12*.

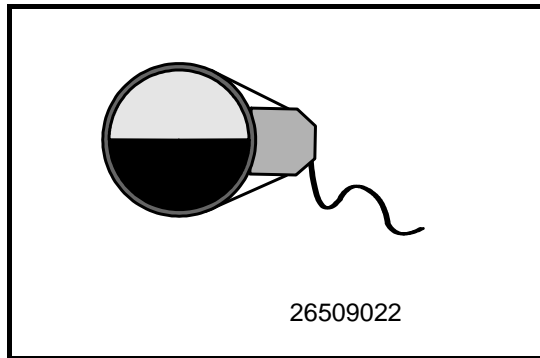
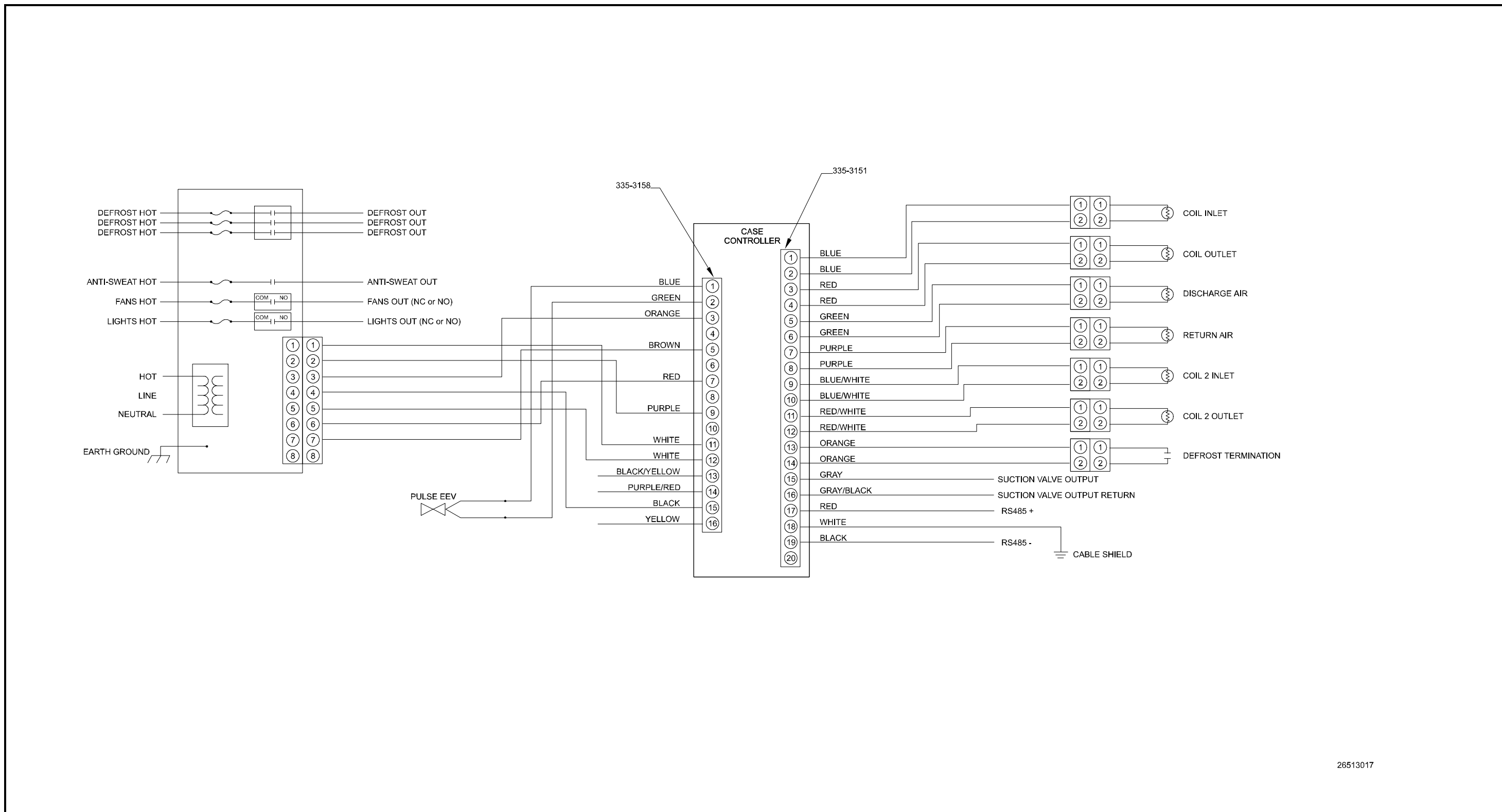


Figure 12- Sensor Orientation

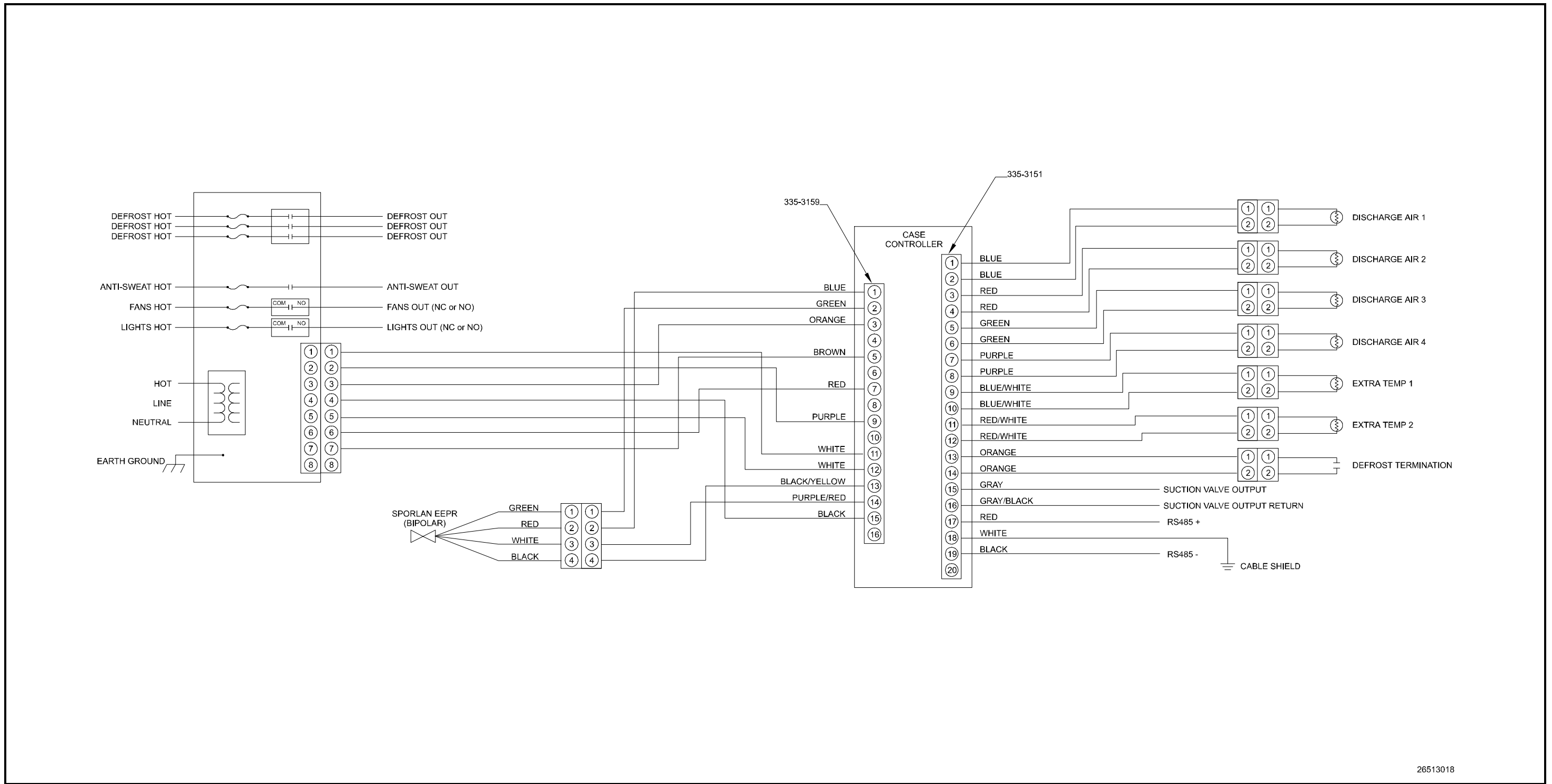
Wiring

Complete wiring of the Case Controller and Case Controller Power Module is shown in *Figure 13* and *Figure 14*.



26513017

Figure 13 - Wiring for Case Controller, Power Module, and Pulse EEV Valve



26513018

Figure 14 - Wiring for Case Controller, Power Module, and Sporlan EEPR Valve

Test Procedures

To confirm proper operation of the case controller once it has been installed in the case, the following test procedures should be performed using a hand-held terminal.

1. Plug the hand-held terminal into the case controller jack.
2. Press the **F1** key to ensure that the main screen is displayed (**Figure 15**).

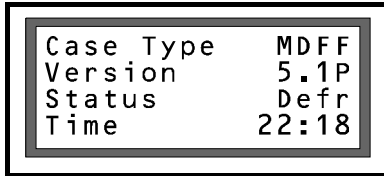


Figure 15- Main Screen

3. Press the **↑** key to switch to the configuration screen (**Figure 16**).

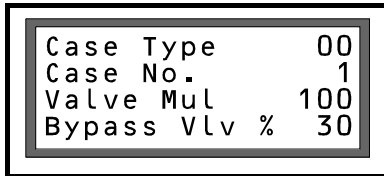


Figure 16- Configuration Screen

4. Press the **→** key.
5. Enter '987.'
6. Press the **↓** key.

The hand-held terminal is now in test mode and the test screen shown in Figure 17 is displayed.

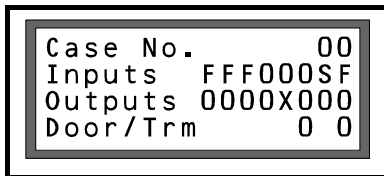


Figure 17- Test Screen

The test screen only displays valid readings for case controller outputs. To test CCB inputs, check the appropriate input status screens for valid input readings (see Table 7).

To test each case controller output, press the hand-held terminal keys as shown in Table 6. The corresponding case

load should be activated and the LED lit on the case controller. Press the key again to deactivate the load.

Key	Output	Comments
1	Lights	
2	Fans	
3	Defrost	
4	Anti-Sweat	
5	Unused	
6	Unused	
7	Valve 2 (24 VAC)	Pulse CCB only
8	Valve 1 (24 VAC)	Pulse CCB Only
9	All outputs ON and stepper EEV open	The stepper valve will step from closed to open based on the Bypass Valve% entered in hand-held terminal
0	All outputs OFF and stepper EEV closed	The stepper valve will step from open to closed based on the Bypass Valve% entered in hand-held terminal
-	Auto-test	Sequential toggle as follows: all outputs OFF odd outputs ON even outputs ON all outputs OFF

Table 6- Hand-Held Terminal Output Test Procedure Keypad Definitions

When output testing is complete, press the **↑** key to return the case controller to normal operation and disconnect the hand-held terminal from the case controller.

To test each case controller input:

1. Press the **F1** key to return to the main screen.
2. Press the **↓** key to display the first input status screen.
3. Press the **↓** key to scroll through the status screens to display the appropriate screens shown in Table 7.

A valid input sensor reading should be displayed for each sensor input.

Input	Status Screen #s (Number of times to press the DOWN key from the main screen)			Comments
	Pulse CCB	Liquid Stepper CCB	Suction Stepper CCB	
Coil 1 In	3	3	3	
Coil 1 Out	3	3	3	
Coil 2 In	5	not used	5	
Coil 2 Out	5	not used	5	
Discharge Air	12	10	12	
Return Air	12	10	12	
Door/Cleaning Switch	not displayed in a status screen.	12	not displayed in a status screen.	Look for CLSD status if connected. The status of the Door/Cleaning Switch is also displayed in the Test Screen in all three CCB versions (see Figure 17).
Frost	14	12	13	Look for OPEN status if connected.
Refrigeration Leak	14	12	13	

Table 7 - Input Test Procedure Status Screens

When input testing is complete, press the **F1** key to return to the main screen and disconnect the hand-held terminal from the case controller.

Defining Case Type

After testing is complete, the case type may be set as follows:

1. Plug hand-held terminal into the case controller jack.
2. Press the **F1** key to ensure that the main screen is displayed (*Figure 15*).
3. Press the **↑** key to switch to the configuration screen (*Figure 16*).
4. Press the **→** key.
5. Enter Case Type number from Table 8.
6. Press the **↑** key.

Type	Abbr.	Description	Type	Abbr.	Description
0	Spare	Spare for future use	33	PRBX	Produce cooler box
1	SDIC	Single deck ice cream	34	MILK	Milk case
2	MDIC	Multi-deck ice cream	35	PKDL	Packaged deli
3	SDFJ	Single deck frz. juice	36	DLDS	Deli display case
4	MDFJ	Multi-deck frz. juice	37	CHEZ	Cheese case
5	RIIC	Reach-in ice cream	38	POBX	Produce box
6	ICBX	Ice cream freezer box	39	BEER	Beer/Beverage
7	SDFF	Single deck frz. food	40	BVCS	Beverage case
8	RIFJ	Reach-in frz. juice	41	DLBX	Deli cooler box
9	FRBX	Frozen food box	42	FHBX	Fish cooler box
10	FFBX	Frozen fish box	43	SVDL	Service deli
11	FJBX	Frozen juice box	44	PRCS	Produce case
12	MDFP	Multi-deck frz. food	45	ISPR	Produce case (Island)
13	FZBK	Multi-deck frz. bakery	46	SALD	Salad table
14	RIFF	Reach-in frz. food	47	FLBX	Flower cooler box
15	SDMT	Single deck meat	48	FLWR	Flower cooler
16	SDPF	Single deck prepared	49	CTBX	Controlled temp box
17	PZZA	Single deck pizza	50	SDPO	Single deck poultry
18	KOSH	Single deck kosher	51	CAKE	Bakery cake case
19	SDFH	Single deck fish	52	BART	Bakery retarder
20	MDMT	Multi-deck meat	53	RTDR	Bakery retarder
21	MDPO	Multi-deck poultry	54	MTPK	Meat packaging room
22	MDFH	Multi-deck fish	55	MTCU	Meat cutting room
23	RIMC	Reach-in meat	56	MTPR	Meat prep room
24	SVMT	Service meat	57	MTWR	Meat wrapping room
25	SVFH	Service fish	58	FHPR	Fish prep room
26	MTBX	Meat cooler	59	SBCL	Subcooler
27	HDBX	Meat holding box	60	PRPR	Produce prep room
28	DYCS	Multi-deck dairy	61	SDFM	Single deck frz. meat
29	RFDY	Rear load dairy	62	RIFM	Reach-in frz. meat
30	RIDY	Reach-in dairy	63	MDFM	Multi-deck frz meat
31	DYBX	Dairy cooler	64	BKFZ	Bakery freezer box
32	BK BX	Bakery Cooler			

Table 8- Case Type Settings