ems75vr

Dixie Narco 276 - Installation and User Guide
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For use with the following models:

DNCB276, DNCB-348, DNCB-414, DNCB-368, DNCB-414, DNCB-440, DNCB-501, DNCB-630, DN276E, DN501E, and DN600E
1.0 Installation requirements

1.1 Wiring harness

The ems75vr is provided with a wiring harness that is suitable for internal wiring only. The mounting, secureness, segregation requirements and acceptability of the wiring harness are to be investigated and considered under the requirements of the ultimate end-use application.

1.2 Ground continuity

The metal bracket used to mount the ems75vr is secured in position using two self-drilling screws. After securing the bracket into position, ground continuity tests must be performed to ensure that the installation meets local regulations for grounding of metal parts. If the ground continuity tests fail, a separate ground wire should be used between the metal bracket and vending machine, and the ground continuity tests repeated.

1.3 Installation kit

The ems75vr installation kit consists of the following:

- ems75vr controller mounted on a bracket complete with a remote display, wiring harness, appliance sensor, and motion sensor (not attached to cable).
- No. 4 self-tapping screws (x2) to secure the motion sensor.
- No. 8 self-drilling screws (x2) to secure the bracket.

Note: The motion sensor is supplied detached from the cable to facilitate installation.
1.4 Tools required

The following tools are required (not supplied):

- Drill driver
- 5/64" drill bit
- 1/2" deep well socket
- 1/4" nut setter
- 11/32" nut driver
- No. 2 Phillips head bit
- No. 2 Phillips head screwdriver
- Cable ties.

**Note:** Do not over tighten cable ties.

**Note:** Cable ties must not be used to secure the sensor head. This will invalidate the warranty.

1.5 Before installation

The vending machine should be checked to ensure that it is in good working order before the ems75vr kit is installed.
2.0 Install the ems75vr

2.1 ems75vr installation
Mount the bracket fitted with the ems75vr controller and remote display in the base of the vending machine. Then, connect the ems75vr wiring harness to the, mains supply, compressor and lights.

2.2 How to install the ems75vr
Install the ems75vr as follows:

1. Ensure that the mains supply is switched off and then open the vending machine door. 

   High voltages, surfaces with high temperatures, and sharp edges are present within the vending machine. 

   if you have any doubts, contact your supervisor before starting this procedure

2. Remove the plate to access the compressor compartment as shown below.

3. Place the ems75vr and bracket in the location shown below.
4. Secure the bracket in position using the two no. 8 self-drilling screws (supplied) as shown below.

2.3 How to connect to the mains supply

Connect the ems75vr to the mains supply as follows:

Mount the appliance sensor as follows:

1. Identify the mains cables as shown below.
2. Identify the access cover between the compressor and refrigeration compartment as shown below.

3. Unclip the access cover as shown below.
4. Route the sensor cable through the access as shown below.

5. Identify the mains cables as shown below.

6. Disconnect the live, smooth, cable as shown below.
7. Connect the black cable from the ems75vr to the live cable as shown below.

![Image of black cable connection](image1.png)

8. Connect the other mains wire from the ems75vr as shown below.

![Image of mains wire connection](image2.png)

2.4 How to connect to the compressor

Connect the ems75vr to the compressor as follows:

9. Identify the compressor cable as shown below.

![Image of compressor cable connection](image3.png)
10. Disconnect the compressor cable as shown below.

11. Connect the plug from the ems75vr as shown below.

12. Connect the plug from the compressor to the socket from the ems75vr as shown below.
2.5 How to connect to the lights

Connect the ems75vr to the lights as follows:

13. Remove the cover from the rear of the vending machine door as shown below.

14. Identify the lights connectors and disconnect the cable as shown below.
15. Connect the lights jumper from the ems75vr to the lights cable as shown below.

16. Do not replace the cover until you have fitted the motion sensor.
3.0 Mount the appliance sensor

3.1 Appliance sensor installation
The appliance sensor is placed in front of the evaporator and is secured into position using a holder, which is a small hook with a magnetic base.

3.2 How to mount the appliance sensor
Mount the appliance sensor as follows:

17. Identify the access cover between the compressor and refrigeration compartment. Then, route the sensor cable through the access as shown below.

18. Place the appliance sensor about 1 to 2 inches from the evaporator as shown below.
19. Refit the access cover as shown below and ensure that the cover is secure.
4.0  Mount the motion sensor

4.1  Motion sensor installation

The motion sensor is mounted in the hand chute facing forwards. The motion sensor must be fixed using the two no. 4 self-tapping screws (supplied).

Caution: Using rivets invalidates the warranty.

4.2  How to mount the motion sensor

Mount the motion sensor as follows:

20. Remove the cover (if necessary)

21. Route the motion sensor cable from the ems75vr along the cable loom between the vending machine and vending machine door.
22. Route the motion sensor up behind the vending tray as shown below.

23. Pass the motion sensor cable through the outlet casing in the hole on the left hand side as shown below.
24. Move round the front of the vending machine door to access the motion sensor cable as shown below.

25. Connect the motion sensor to the cable as shown below.

26. Place the motion sensor into position and drill two holes as shown below.
27. Secure into position using the two screws provided as shown below.

28. Replace the cover.
5.0 ems75vr wiring diagram

The wiring diagram for the ems75vr controller is shown below.
6.0 How to run the test routine

6.1 Test routine

The user interface for the ems75vr is as follows:

```
  USE
```

The LED indicators are as follows:

1. Saving temperature disable
2. Motion detection
3. Compressor.

Run the test routine as follows:

1. Enter the password as follows:
   
   A. Press Set and ensure that the display shows PAS.
   B. Press Set three times (x3)
   C. Press Up twice (x2)
   D. Press Down once (x1)
   E. Press Defrost four times (x4)
   F. Ensure that display shows PS.

2. Scroll to tst and press the Set button. The display changes to rEL for the relay tests.

3. Press the Down button to start the relay tests and then test the relays as described in the table.
4. Press the Defrost and Set buttons simultaneously to test the analogue inputs. The display changes to AnA.

5. Press the Up button to start the analogue input tests and then test the analogue inputs as described in the table below.

<table>
<thead>
<tr>
<th>Button</th>
<th>Display</th>
<th>Test</th>
<th>Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set</td>
<td>CP</td>
<td>Compressor relay</td>
<td>Compressor is running and compressor LED is on</td>
</tr>
<tr>
<td>Down</td>
<td>LITE</td>
<td>Light relay</td>
<td>Vending machine lights are on</td>
</tr>
</tbody>
</table>

Note: To switch off the relays that are on, press the defrost button

6. Press the Defrost and Set buttons simultaneously to test the motion detector. The display changes to Pir.

7. Press the Defrost button and then place your hand about 300mm in front of the motion sensor. Move your hand from left to right and ensure the following:
   - The display count increments for each detected movement.
   - The motion LED flashes for each detected movement.

8. Press the Defrost and Set buttons simultaneously to end the test routine.
7.0 Troubleshooting

This section describes how to identify and troubleshoot problems with the appliance sensor, motion sensor, and vendors not cooling.

7.1 Alarms

The table below shows the display for alarm conditions.

<table>
<thead>
<tr>
<th>problem</th>
<th>check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motion sensor LED flashing continuously.</td>
<td>See how to troubleshoot motion sensor alarms</td>
</tr>
<tr>
<td><img src="image" alt="PF1" /></td>
<td>See how to troubleshoot appliance sensor alarms.</td>
</tr>
<tr>
<td>Not cooling</td>
<td>See how to troubleshoot not cooling problems.</td>
</tr>
</tbody>
</table>
7.2 How to troubleshoot appliance sensor (PF1) alarms

The ems controller displays **PF1** to indicate a failure with the appliance sensor as show below.

![PF1 display](image)

Follow the chart below to troubleshoot problems with the appliance sensor.
7.3 How to troubleshoot motion sensor alarms

The motion detection LED flashes to indicate that the microRMD has detected movement. However, a motion sensor LED flashing continuously may indicate that the microRMD is faulty or, if a microRMD is not fitted, that the parameter settings are incorrect.

**Note:** The controller stays in the ready mode if the motion detection LED is flashing continuously.

Follow the chart below to troubleshoot problems with the microRMD.
7.4 How to troubleshoot not cooling problems

Follow the chart below to troubleshoot problems of the vending machine not cooling. That is, the vending machine or product is warm. If the ems controller is the saving mode, shows ---, then the product is at a higher temperature.

```
product warm

Is the controller on and display illuminated?
  Yes
  Is the compressor LED on?
    Yes
    Is compressor running?
      Yes
      Is power available at the controller mains connector?
        Yes
        Replace controller
        No
        Refrigeration system fault
      No
      Compressor fault
    No
    Is power available at controller compressor connector?
      Yes
      Replace controller
      No
      See alarm troubleshooting

Is the controller showing another fault?
  Yes
  Replace controller
  No
  Replace mechanical thermostat

Is power available at controller mains connector?
  Yes
  Replace controller
  No
  Check wiring and fuses
```

8.0 Annex – UL information

Note: this annex applies to 120VAC versions of the ems75vr only

**Inputs:**

<table>
<thead>
<tr>
<th>Control input item function</th>
<th>Input rating</th>
<th>Board ID terminals</th>
<th>Plug ID terminals</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main board</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input power supply</td>
<td>120VAC, 50/60Hz 1 A, 120 VA</td>
<td>J1 – J2 Live (L) – Neutral (N)</td>
<td>Mains socket – mains plug</td>
</tr>
<tr>
<td>Compressor line input</td>
<td>120VAC 10 FLA 60LRA</td>
<td>J3</td>
<td>Compressor in</td>
</tr>
<tr>
<td>Compressor neutral input</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Compressor ground</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Light line input</td>
<td>120VAC, 2.1 A 250VA</td>
<td>J4</td>
<td>Lights in</td>
</tr>
<tr>
<td>Lights in</td>
<td>Not used</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

**Control board**

<table>
<thead>
<tr>
<th>Type</th>
<th>Ratings</th>
<th>Board ID terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Door switch</td>
<td>Class 2 limited energy circuit less than 15 W</td>
<td>J21</td>
</tr>
<tr>
<td>Appliance sensor</td>
<td>less than 15 W</td>
<td>J22</td>
</tr>
<tr>
<td>Aux/condenser sensor</td>
<td></td>
<td>J20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>External 2-pin connector</td>
</tr>
</tbody>
</table>

**Communication:**

<table>
<thead>
<tr>
<th>Type</th>
<th>Ratings</th>
<th>Board ID terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control board</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication for external display</td>
<td>Class 2 limited energy circuit less than 15 W</td>
<td>J25</td>
</tr>
<tr>
<td>RJ45 LAN connection</td>
<td></td>
<td>J24</td>
</tr>
</tbody>
</table>

**Outputs:**

<table>
<thead>
<tr>
<th>Output designation</th>
<th>Type of load</th>
<th>Rating</th>
<th>Cycles of cycle</th>
<th>Board ID terminals</th>
<th>External ID terminals</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main board</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compressor relay</td>
<td>Compressor motor</td>
<td>120VAC 10 FLA 60LRA</td>
<td>100 K</td>
<td>J11</td>
<td>Compressor out</td>
</tr>
<tr>
<td>Compressor line / neutral</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Heater/aux relay</td>
<td>---</td>
<td>Not used</td>
<td>---</td>
<td>Not mounted</td>
<td>Not used</td>
</tr>
<tr>
<td>Light relay</td>
<td>Ballast</td>
<td>120VAC, 2.1 A 250VA</td>
<td>6 K</td>
<td>J5</td>
<td>Lights out</td>
</tr>
<tr>
<td>Lights out</td>
<td>---</td>
<td>Not used</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Fan relay</td>
<td>---</td>
<td>Not used</td>
<td>---</td>
<td>Not mounted</td>
<td>Not used</td>
</tr>
</tbody>
</table>
8.1 Additional information

The purpose of this control is classified as an: Operational Control.
The type on construction is: Integrated Control.

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum ambient operating temperature</td>
<td>0 °C up to 35 °C (32 °F up to 95 °F)</td>
</tr>
<tr>
<td>Overvoltage category</td>
<td>III – or better</td>
</tr>
<tr>
<td>Pollution degree</td>
<td>2 or better</td>
</tr>
<tr>
<td>Software class</td>
<td>A</td>
</tr>
<tr>
<td>Type 1 action</td>
<td></td>
</tr>
<tr>
<td>Rated impulse voltage</td>
<td>2500V</td>
</tr>
</tbody>
</table>

Elstat UL approvals:

- UL 60730-1     CSA E 60730-1
- UL 60730-2-9   CSA E 60730-2-9

UL reference : E325501 [www.ul.com](http://www.ul.com)
9.0 Parameter set

The following table details the parameter set for the ems75vr series of controllers including:

- Name
- Description
- Ranges
- Defaults

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Range</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SP</td>
<td>Set Point sets the lower ready mode temperature (cut out temperature).</td>
<td>-9.9 to 9.9°C (14 to 50°F)</td>
</tr>
<tr>
<td>2</td>
<td>DIF</td>
<td>Differential temperature added to SP temperature.</td>
<td>0.0 to 9.9°C (0 to 18°F)</td>
</tr>
<tr>
<td>3</td>
<td>CAL</td>
<td>Calibration 1 adds an offset to temperatures measured by the appliance sensor.</td>
<td>-9.9 to 9.9°C (-18 to 18°F)</td>
</tr>
<tr>
<td>4</td>
<td>RT</td>
<td>Compressor rest time is the minimum time between compressor cycles.</td>
<td>1 to 30 minutes</td>
</tr>
<tr>
<td>5</td>
<td>DS</td>
<td>Delay to standby is the delay in switching to saving mode from the operational mode.</td>
<td>0 to 120 minutes (in multiples of 30 minutes)</td>
</tr>
<tr>
<td>6</td>
<td>LD</td>
<td>Light delay is the delay to switch off the cooler lights after switching to the saving mode.</td>
<td>0 to 120 minutes</td>
</tr>
<tr>
<td>7</td>
<td>SR</td>
<td>Saving restart is the maximum time allocated to lower the product temperature to the set point temperature from the saving mode.</td>
<td>0 to 240 minutes (in multiples of 30 minutes)</td>
</tr>
<tr>
<td>8</td>
<td>CT</td>
<td>Refrigeration system failure is the maximum continuous runtime of the compressor without reaching the set point temperature (cut out temperature).</td>
<td>00 to 100 hours</td>
</tr>
<tr>
<td>9</td>
<td>CF</td>
<td>Celsius (°C) or Fahrenheit (°F) sets the temperature scale.</td>
<td>00 (°C) or 01 (°F)</td>
</tr>
<tr>
<td>10</td>
<td>SD</td>
<td>Saving differential is the temperature added to SSP that sets the upper saving mode temperature (cut in temperature).</td>
<td>0.0 to 9.9°C (0 to 18°F)</td>
</tr>
<tr>
<td>11</td>
<td>SSP</td>
<td>Saving mode set point sets the lower saving mode temperature (cut out temperature).</td>
<td>0.0 to 9.9°C (32 to 50°F)</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
<td>Range</td>
<td>Default</td>
</tr>
<tr>
<td>------</td>
<td>-------------</td>
<td>-------</td>
<td>---------</td>
</tr>
<tr>
<td>12</td>
<td><strong>IPd</strong></td>
<td>Uninterrupted pull down the compressor runs continually until the set point is reached</td>
<td>0.0 to 30ºC (32 to 86ºF)</td>
</tr>
<tr>
<td>13</td>
<td><strong>dtt</strong></td>
<td>Freeze-up protection is the temperature to disable the compressor and enable the evaporator fan to prevent freeze up due to low temperature.</td>
<td>-15 to 10ºC (5 to 50ºF)</td>
</tr>
<tr>
<td>14</td>
<td><strong>dE</strong></td>
<td>Defrost interval is the period between the end of a defrost cycle and beginning of the next defrost cycle.</td>
<td>0 to 199 hours</td>
</tr>
<tr>
<td>15</td>
<td><strong>dd</strong></td>
<td>Defrost duration is the maximum time of a defrost cycle.</td>
<td>1 to 199 minutes</td>
</tr>
<tr>
<td>16</td>
<td><strong>FCO</strong></td>
<td>Fan cycle on is the active period of the evaporator fan while the compressor is off.</td>
<td>1 to 30 minutes</td>
</tr>
<tr>
<td>17</td>
<td><strong>FCF</strong></td>
<td>Fan cycle off is the inactive period of the evaporator fan while the compressor is off.</td>
<td>1 to 30 minutes</td>
</tr>
<tr>
<td>18</td>
<td><strong>Ad</strong></td>
<td>Alarm delay is the maximum time a door can be open before sounding the alarm buzzer.</td>
<td>00 to 30 minutes</td>
</tr>
<tr>
<td>19</td>
<td><strong>bl</strong></td>
<td>Buzzer duration for open door alarm conditions. After the buzzer duration, the controller switches off the compressor.</td>
<td>1 to 254 seconds</td>
</tr>
<tr>
<td>20</td>
<td><strong>Sn</strong></td>
<td>Sensor enable enables the motion sensor input.</td>
<td>00 (disabled) or 01 (enabled)</td>
</tr>
<tr>
<td>21</td>
<td><strong>d2</strong></td>
<td>Display stability sets the rate of change of the displayed temperature.</td>
<td>1 to 254</td>
</tr>
<tr>
<td>22</td>
<td><strong>dtd</strong></td>
<td>Defrost termination temperature defines the temperature to end a defrost cycle.</td>
<td>1 to 30ºC (33 to 86ºF)</td>
</tr>
<tr>
<td>23</td>
<td><strong>HT</strong></td>
<td>Condenser high temperature is the maximum permitted temperature measured in the refrigeration system. On reaching HT, the controller disables the compressor and activates an alarm</td>
<td>0.0 to 125ºC (32 to 257ºF)</td>
</tr>
<tr>
<td>24</td>
<td><strong>AF</strong></td>
<td>Activity frequency is the minimum number of door openings or motion counts to indicate an active 30 minute period in the self-learning matrix.</td>
<td>00 – Low frequency 01 – Medium frequency 02 - High frequency 03 - Automatic</td>
</tr>
<tr>
<td>25</td>
<td><strong>FSP</strong></td>
<td>Fan set point is the temperature that if exceeded results in the evaporator fan running continuously even if the door is opened.</td>
<td>01 to 30ºC (33 to 86ºF)</td>
</tr>
<tr>
<td>Name</td>
<td>Description</td>
<td>Range</td>
<td>Default</td>
</tr>
<tr>
<td>------</td>
<td>--------------------------------------------------</td>
<td>------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>26</td>
<td>Buzzer enable</td>
<td>00 (disabled) or 01 (enabled)</td>
<td>01 (enabled)</td>
</tr>
<tr>
<td>27</td>
<td>Saving temperature disable</td>
<td>00 (off) or 01 (on)</td>
<td>00 (off)</td>
</tr>
<tr>
<td>28</td>
<td>Learning period</td>
<td>00 (1 day) or 01 (7 days)</td>
<td>00 (1 day)</td>
</tr>
<tr>
<td>29</td>
<td>Display</td>
<td>00 (US E) or 01 (temperature)</td>
<td>01 (temperature)</td>
</tr>
<tr>
<td>30</td>
<td>Marketing mode</td>
<td>00 (off) or 01 (on)</td>
<td>00 (off)</td>
</tr>
</tbody>
</table>

**Description**

- **Buzzer enable**: The option to disable a warning buzzer for alarm conditions. Does not affect door alarms.
- **Saving temperature disable**: The option to maintain the ready mode temperature at all times.
- **Learning period**: Defines 1-day or 7-day learning period.
- **Display**: The option to display the temperature or the word USE.
- **Marketing mode**: The option to keep the lights on at all times.