Balancing EVCB14NIT_ Controllers

Airflow Balancing on EVCB14NIT_ Controllers is performed to stabilize the airflow, and to enable the user to achieve a desired minimum and/or maximum airflow. We recommend you to perform airflow balancing every time the KFactor or Airflow Scale is modified.

Neptronic® EVCB14NIT_ Controllers can be balanced using the following three methods:

- Airflow Balance through Thermostat
- Airflow Balance through BACnet Configuration
- Airflow Balance through Modbus Configuration

Note: The result of balancing airflow using any of the above methods is the same. However, the procedure for performing airflow balancing is different with each method.

References

For information on the following, refer to the manuals as listed below:

- *Specification and Installation Instructions* to access the Airflow Balance Mode on the thermostat.
- *BACnet Communication Module User Guide* for a list of BACnet objects.
- *Modbus Communication Module User Guide* for an indexed list of Modbus registers.

Pre-requisites

The EVCB14NIT_ Airflow Balance Instruction Manual assumes the following:

- *The parameters such as KFactor and Airflow Scale have been configured according to the specific installation.*
- *A known value airflow reading such as a Balometer or a Manometer should be used in conjunction with the EVC to balance its airflow readings properly.*

Airflow Balance through Thermostat

Access Airflow Balance Mode

The Airflow Balance Mode is available when the mode selection jumper JP1 is set to RUN. To access Airflow Balance Mode, perform the following steps:

1. Press both the ⊛ and ↵ buttons simultaneously for 5 seconds.

    The display shows the *ENTER PASSWORD* message, and *000* is displayed.

2. Enter the password, **757** within one minute.

- Use the Up △ and Down ▽ arrow buttons to increase or decrease the value.
- Use ⊛ to advance and ↵ to return to the digits respectively.

3. After you enter the correct password, press ⊛. The Airflow Balance Mode is activated, the 🔧 symbol is displayed to indicate that the Airflow Balance Mode is active.

    If you enter an incorrect password, the screen displays *EROR* and the thermostat returns to Operation Mode.

4. In the Airflow Balance Mode, press ⊛ to advance to the next program function, ↵ to return to the previous step, and △ and ▽ to change values.

The thermostat will return to normal mode if you navigate through the entire menu and do not make any selection, or if you do not press any button for 5 minutes. The changed values will be saved automatically.

Balance Airflow

To balance the airflow, calibrate the minimum and maximum airflow values using the following options:

- *Closed Balancing*
- *Minimum Flow Balancing*
- *Maximum Flow Balancing*
- *Open Balancing*

Note: When performing airflow balance, use only up to three of the four available options. Select the option, which gives the most precise airflow control, according to the specific installation.

Closed Balancing

Apply an offset to the airflow reading.

1. Set the value of Airflow Balance Mode to **Close**.
2. Wait for the actuator to reach the fully closed position.
   When the value on the thermostat is stable, measure the actual airflow with a Balometer or a Manometer.
3. Calculate the offset value by comparing the difference between the measured value and the actual airflow (Balometer/Manometer reading minus thermostat reading).
4. Enter the value using the △ and ▽ buttons.
5. Press the ⊛ button to confirm the value. Press the ↵ button to cancel.

Minimum Flow Balancing

Apply a factor to the airflow readings around the minimum airflow for current mode.

  AirflowSetpoint value = lower value of Cooling or Heating Minimum Airflow values

 when MotorRamp = Changeover Ramp, Airflow Setpoint, or Cooling Heating Ramp 1

1. Set the value of Airflow Balance Mode to **MinFlow**.
2. Wait for the actuator to reach the minimum airflow position.
   The airflow reaches to the minimum value of either the heating or cooling airflow setpoints. When the value on the thermostat is stable, measure the actual airflow with a Balometer or a Manometer.
3. Enter the measured value using the △ and ▽ buttons to match the value displayed on the thermostat. Consider the following points while adjusting the value:

- If the difference between the known airflow reading and the initial value displayed on the thermostat is greater than half the value of setpoint, it indicates an improper configuration, a non-calibrated instrument, or faulty components. In other words, the airflow value should be within the minimum and maximum range. If it is less than the minimum value or greater than the maximum value, it falls outside the adjustable range. For example, 300<airflow reading value<100 for a setpoint of 200CFM.
- If the adjusted airflow reading is more than the airflow hysteresis start %, the actuator repositions during balancing to account for this change. For example, 220<airflow reading value<180 for a setpoint of 200 CFM and a 10% hysteresis.
- Do not press arrow keys until the actuator has stabilized once more.

4. Press the ⊛ button to confirm the value. Press the ↵ button to cancel.

Maximum Flow Balancing

Apply a factor to the airflow readings around the maximum airflow for the current mode.

AirflowSetPoint value = higher value of Cooling or Heating Maximum Airflow values

when MotorRamp = Changeover Ramp, Airflow Setpoint, or Cooling Heating Ramp 1

> *Note: Use either the Maximum Flow Balancing or Open Balancing method as the affected factor is the same.*

1. Set the value of Airflow Balance Mode to **MaxFlow**.
2. Wait for the actuator to reach the maximum airflow position.
   The airflow reaches to the maximum value of either the heating or cooling airflow setpoints. When the value on the thermostat is stable, measure the actual airflow with a Balometer or a Manometer.
3. Enter the measured value using the $\triangle$ and $\triangledown$ buttons to match the value displayed on the thermostat. Consider the following points while adjusting the value:

- If the difference between the known airflow reading and the actual airflow is greater than half the value of setpoint, it indicates an improper configuration, a non-calibrated instrument, or faulty components. In other words, the airflow value should be within the minimum and maximum range. If it is less than the minimum value or greater than the maximum value, it falls outside the adjustable range. For example, 900<airflow reading value<300 for a setpoint of 600CFM.
- If the adjusted airflow reading is more than the airflow hysteresis start %, the actuator repositions during balancing to account for this change. For example, 660<airflow reading value<540 for a setpoint of 600 CFM and a 10% hysteresis.

4. Press the ⊛ button to confirm the value. Press the ⏎ button to cancel.

Open Balancing

Apply a factor to the airflow readings around the full open airflow.

> *Note: Use either the Maximum Flow Balancing or Open Balancing method as the affected factor is the same.*

1. Set the value of Airflow Balance Mode to **Open**.
2. Wait for the actuator to reach the fully open position.
   When the value on the thermostat is stable, measure the actual airflow with a Balometer or a Manometer.
3. Enter the measured value using the $\triangle$ and $\triangledown$ buttons to match the value displayed on the thermostat. Consider the following point while adjusting the value:

- If the difference between the known airflow reading and the actual Airflow is greater than half the value of setpoint, it indicates an improper configuration, a non-calibrated instrument, or faulty components. In other words, the airflow value should be within the minimum and maximum range. If it is less than the minimum value or greater than the maximum value, it falls outside the adjustable range. For example, 1500<airflow reading value<500 for a setpoint of 1000CFM.

4. Press the ⊛ button to confirm the value. Press the ⏎ button to cancel.

Airflow Balance through BACnet Configuration

Enable Airflow Balance

To enable airflow balancing function, set the value of **BV.45 AirFlowBalancing** BACnet object to **1 = Enable**.

Balance Airflow

To balance the airflow, calibrate the minimum and maximum airflow values using the following options:

- *Closed Balancing*
- *Minimum Flow Balancing*
- *Maximum Flow Balancing*
- *Open Balancing*

> Note: When performing airflow balance, use only up to three of the four available options. Select the option, which gives the most precise airflow control, according to the specific installation.

Closed Balancing

Apply an offset to the airflow reading.

1. Set the value of **MSV.42 AirFlowBal_Mode** BACnet object to **Closed (1)**.
2. Wait for the actuator to reach the fully closed position.
   When the value of **AV.110 ActualAirFlow** is stable, measure the actual airflow with a Balometer or a Manometer.
3. Calculate the offset value by comparing the difference between the measured value and the actual airflow (Balometer/Manometer reading minus AV.110 ActualAirflow).
4. Write the offset value to the **AV.114 Cfg_AirFlowOffset** BACnet object.

Minimum Flow Balancing

Apply a factor to the airflow readings around the minimum airflow for the current mode.

AV.111 AirflowSetpoint value = lower value of AV.102 Cfg_AirflowCoolMin or AV.104 Cfg_AirFlowHeatMin

when MSV.35 Cfg_MotorRamp = Change Over Ramp (6), Air Flow Set Point (5), or Cooling Heating Ramp 1 (7)

1. Set the value of **MSV.42 AirFlowBal_Mode** BACnet object to **Min Flow (2)**.
2. Wait for the actuator to reach the minimum airflow position.
   When the value of **AV.110 ActualAirFlow** is stable, measure the actual airflow with a Balometer or a Manometer.
3. Write the known value reading to the **AV.113 Cfg_AdjustAirFlowMin** BACnet object. Consider the following points while adjusting the value:

- If the difference between the known airflow reading and the AV.110 ActualAirFlow is greater than half the value of setpoint, it indicates an improper configuration, a non-calibrated instrument, or faulty components. In other words, the airflow value should be within the minimum and maximum range. If it is less than the minimum value or greater than the maximum value, it falls outside the adjustable range. For example, 300<airflow reading value<100 for a setpoint of 200CFM.
- If the adjusted airflow reading is more than AV.117 Cfg_AirFlowHysteresisStart, the actuator repositions during balancing to account for this change. For example, 220<airflow reading value<180 for a setpoint of 200 CFM and a 10% hysteresis. Once the actuator stabilizes, the known value reading will be equal to AV.110 ActualAirFlow.
- To rebalance, reset the factor by writing a value of zero (0) to **AV.113 Cfg_AdjustAirFlowMin** BACnet object.

Maximum Flow Balancing

Apply a factor to the airflow readings around the maximum airflow for the current mode.

AV.111 AirflowSetPoint value = higher value of AV.103 Cfg_AirFlowCoolMax or AV.105 Cfg_AirFlowHeatMax

when MSV.35 Cfg_MotorRamp = Change Over Ramp (6), Air Flow Set Point (5), or Cooling Heating Ramp 1 (7)

Note: Use either the Maximum Flow Balancing or Open Balancing method as the affected factor is the same.

1. Set the value of **MSV.42 AirFlowBal_Mode** BACnet object to **Max Flow (3)**.
2. Wait for the actuator to reach the maximum airflow position.
   When the value of **AV.110 ActualAirFlow** is stable, measure the actual airflow with a Balometer or a Manometer.
3. Write the known value reading to the **AV.112 Cfg_AdjustAirFlowMax** BACnet object. Consider the following points while adjusting the value:

- If the difference between the known airflow reading and the AV.110 ActualAirFlow is greater than half the value of setpoint, it indicates an improper configuration, a non-calibrated instrument, or faulty components. In other words, the airflow value should be within the minimum and maximum range. If it is less than the minimum value or greater than the maximum value, it falls outside the adjustable range. For example, 900<airflow reading value<300 for a setpoint of 600CFM.
- If the adjusted airflow reading is more than AV.117 Cfg_AirFlowHysteresisStart, the actuator repositions during balancing to account for this change. For example, 660<airflow reading value<540 for a setpoint of 600 CFM and a 10% hysteresis. Once the actuator stabilizes, the known value reading will be equal to AV.110 ActualAirFlow.
- To rebalance, reset the factor by writing a value of zero (0) to **AV.112 Cfg_AdjustAirFlowMax** BACnet object.

Open Balancing

Apply a factor to the airflow readings around the full open airflow.

Note: Use either the Maximum Flow Balancing or Open Balancing method as the affected factor is the same.

1. Set MSV.42 AirFlowBal_Mode BACnet object to **Full Open (4)**.
2. Wait for the actuator to reach the fully open position.
   When the value of **AV.110 ActualAirFlow** is stable, measure the actual airflow with a Balometer or a Manometer.
3. Write the known value reading to **AV.112 Cfg_AdjustAirFlowMax** BACnet object. Consider the following points while adjusting the value:

- If the difference between the known airflow reading and the AV.110 ActualAirFlow is greater than half the value of setpoint, it indicates an improper configuration, a non-calibrated instrument, or faulty components. In other words, the airflow value should be within the minimum and maximum range. If it is less than the minimum value or greater than the maximum value, it falls outside the adjustable range. For example, 1500<airflow reading value<500 for a setpoint of 1000CFM.
- To rebalance, reset the factor by writing a value of zero (0) to **AV.112 Cfg_AdjustAirFlowMax** BACnet object.

Airflow Balance through Modbus Configuration

Enable Airflow Balance

To enable airflow balancing function, set the value of Register Index 40**103** to **Airflow 1 Balancing (1)**.

Balance Airflow

To balance the airflow, calibrate the minimum and maximum airflow values using the following options:

- *Closed Balancing*
- *Minimum Flow Balancing*
- *Maximum Flow Balancing*
- *Open Balancing*

Note: When performing airflow balance, use only up to three of the four available options. Select the option, which gives the most precise airflow control, according to the specific installation.

Closed Balancing

Apply an offset to the airflow reading.

1. Set the value of Register Index 40**131** to **Close (1)**.
2. Wait for the actuator to reach the fully closed position.

   When the value of the actual airflow (Register Index 400**60**) is stable, measure the actual airflow with a Balometer or a Manometer.
3. Calculate the offset value by comparing the difference between the measured value and the actual airflow (Balometer/Manometer reading minus Register Index 400**60**).
4. Write the offset value to airflow offset (Register Index 400**81**).

Minimum Flow Balancing

Apply a factor to the airflow readings around the minimum airflow for the current mode.

   AirflowSetpoint value (Register Index 400**61**) = lower value of airflow cool min (Register Index 400**55**) or airflow heat min (Register Index 400**57**)

   when motor ramp (Register Index 40**125**) = COR (8), STFL (7), or CH1 (9)

1. Set the value of Airflow Balance Mode (Register index 40**131**) to **Minimum Flow (2)**.
2. Wait for the actuator to reach the minimum airflow position.

   When the value of the actual airflow (Register Index 400**60**) is stable, measure the actual airflow with a Balometer or a Manometer.
3. Write the known value reading to balancing airflow min (Register Index 400**84**). Consider the following points while adjusting the value:

- If the difference between the known airflow reading and the actual airflow (Register Index 400**60**) is greater than half the value of setpoint, it indicates an improper configuration, a non-calibrated instrument, or faulty components. In other words, the airflow value should be within the minimum and maximum range. If it is less than the minimum value or greater than the maximum value, it falls outside the adjustable range. For example, 300<airflow reading value<100 for a setpoint of 200CFM.
- If the adjusted airflow reading is more than the airflow hysteresis start % (Register Index 40**139**), the actuator repositions during balancing to account for this change. For example, 220<airflow reading value<180 for a setpoint of 200 CFM and 10% hysteresis. Once the actuator stabilizes, the known value reading will be equal to the actual airflow (Register Index 400**60**).
- To rebalance, reset the factor by writing a value of zero (0) to balancing airflow min (Register Index 400**84)**.

Maximum Flow Balancing

Apply a factor to the airflow readings around the maximum airflow for the current mode.

AirflowSetpoint value (Register Index 400**61**) = higher value of airflow cool max (Register Index 400**55**) or airflow heat max (Register Index 400**57**)

when motor ramp (Register Index 40**125**) = COR (8), STFL (7), or CH1 (9)

> *Note: Use either the Maximum Flow Balancing or Open Balancing method as the affected factor is the same.*

1. Set the value of Airflow Balance Mode (Register index 40**131**) to **Maximum Flow (3)**.
2. Wait for the actuator to reach the maximum airflow position.
   When the value of the actual airflow (Register Index 400**60**) is stable, measure the actual airflow with a Balometer or a Manometer.
3. Write the known value reading to balancing airflow max (Register index 400**62**). Consider the following points while adjusting the value:

- If the difference between the known airflow reading and the actual airflow (Register Index 400**60**) is greater than half the value of setpoint, it indicates an improper configuration, a non-calibrated instrument, or faulty components. In other words, the airflow value should be within the minimum and maximum range. If it is less than the minimum value or greater than the maximum value, it falls outside the adjustable range. For example, 900<airflow reading value<300 for a setpoint of 600CFM.
- If the adjusted airflow reading is more than the airflow hysteresis start % (Register Index 40**139**), the actuator repositions during balancing to account for this change. For example, 660<airflow reading value<540 for a setpoint of 600 CFM and a 10% hysteresis. Once the actuator stabilizes, the known value reading will be equal to the actual airflow (Register Index 400**60**).
- To rebalance, reset the factor by writing a value of zero (0) to balancing airflow min (Register Index 400**62**).

Open Balancing

Apply a factor to the airflow readings around the full open airflow.

> *Note: Use either the Maximum Flow Balancing or Open Balancing method as the affected factor is the same.*

1. Set Airflow Balance Mode (Register Index 40**131**) to **Full Open (4)**.
2. Wait for the actuator to reach the fully open position.
   When the value of the actual airflow (Register Index 400**60**) is stable, measure the actual airflow with a Balometer or a Manometer.
3. Write the known value reading to balancing airflow max (Register index 400**62**). Consider the following points while adjusting the value:

- If the difference between the known airflow reading and the actual airflow (Register Index 400**60**) is greater than half the value of setpoint, it indicates an improper configuration, a non-calibrated instrument, or faulty components. In other words, the airflow value should be within the minimum and maximum range. If it is less than the minimum value or greater than the maximum value, it falls outside the adjustable range. For example, 1500<airflow reading value<500 for a setpoint of 1000CFM.
- To rebalance, reset the factor by writing a value of zero (0) to balancing airflow min (Register Index 400**62**).

Notes