Supplement to Operations Manual B-PCOM

Calibration Procedure for TITUS II Controller

A. Direct Acting Cooling or Reverse Acting Heating.

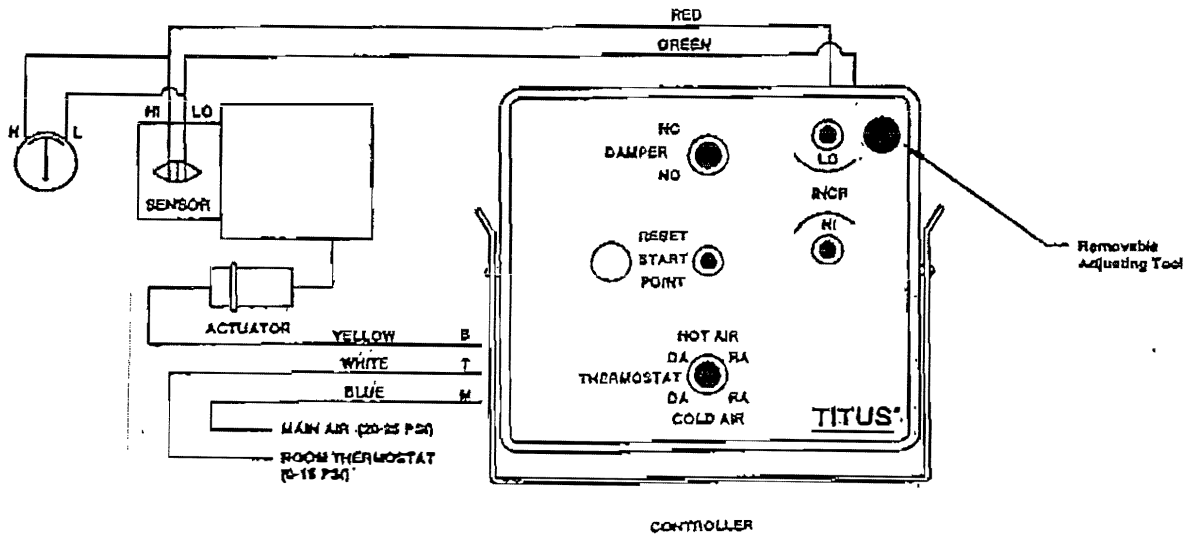
1. Adjusting minimum air flow:
   a. Apply zero PSI signal to port T on the controller.
   b. If the minimum CFM equals zero, the damper should drive to a closed position with compressed air (observe the indicator on the end of the damper shaft). If not, adjust the LO knob on the controller until the damper is closed.
   c. If a non-zero minimum CFM is required, read the differential pressure for the desired CFM from the calibration curve corresponding to the inlet size of the terminal being calibrated (B-PCOM figure 5). Adjust the LO knob until the desired differential pressure is read on the manometer gauge. Allow several seconds for the controls to react to the system pressure and stabilize. Note: Air flow must be going across the inlet probe.
2. Adjusting maximum air flow:
   a. Apply 15-25 PSI signal to port T on the controller.
   b. Refer again to the calibration curve (B-PCOM figure 5) to determine the differential pressure necessary for the required CFM.
   c. Adjust the HI knob on the controller until the manometer gauge reads the required differential pressure from the curve.

NOTE: If actuator fails to respond, see Guide to Service Procedures B-PCOM.

B. Reverse Acting Cooling and Direct Acting Heating.

1. Adjusting minimum air flow:
   a. Apply 15-25 PSI signal to port T on the controller.
   b. If the minimum CFM equals zero, the damper should assume a closed position (observe the indicator on the end of the damper shaft). If not, adjust LO knob on the controller until the damper closes.
   c. If a non-zero minimum CFM is required, read the differential pressure for the desired CFM from the calibration curve corresponding to the inlet size of the terminal being calibrated (B-PCOM figure 5). Adjust the LO knob until the desired differential pressure is read on the manometer gauge. Allow several seconds for the controls to react to the system and stabilize.
2. Adjusting maximum air flow:
   a. Apply zero signal to port T on the controller.
   b. Refer again to the calibration curve (B-PCOM figure 5) to determine the differential pressure necessary for the required maximum CFM.
   c. Adjust the HI knob on the controller until the manometer gauge reads the required differential pressure from the curve.

NOTE: If actuator fails to respond, see Guide to Service Procedures B-PCOM.



(Continued on back).

Reset Start Point Instructions for the TITUS II Controller

Setup Procedure (Figure 1)

1. Confirm the setting on the Thermostat adjustment Switch for TITUS II controls.
2. Confirm the setting on the Damper Switch.
3. Disconnect the red HI and green LO lines from the controller.
4. Detach the white thermostat line from Port T on the controller. Attach a squeeze bulb with 0 to 25 PSI gauge to Port T.
5. Remove the yellow motor line from Port B on the controller. Attach a 0 to 25 PSI gauge to Port B.

To Adjust the Start Point

Direct-Acting Thermostats:

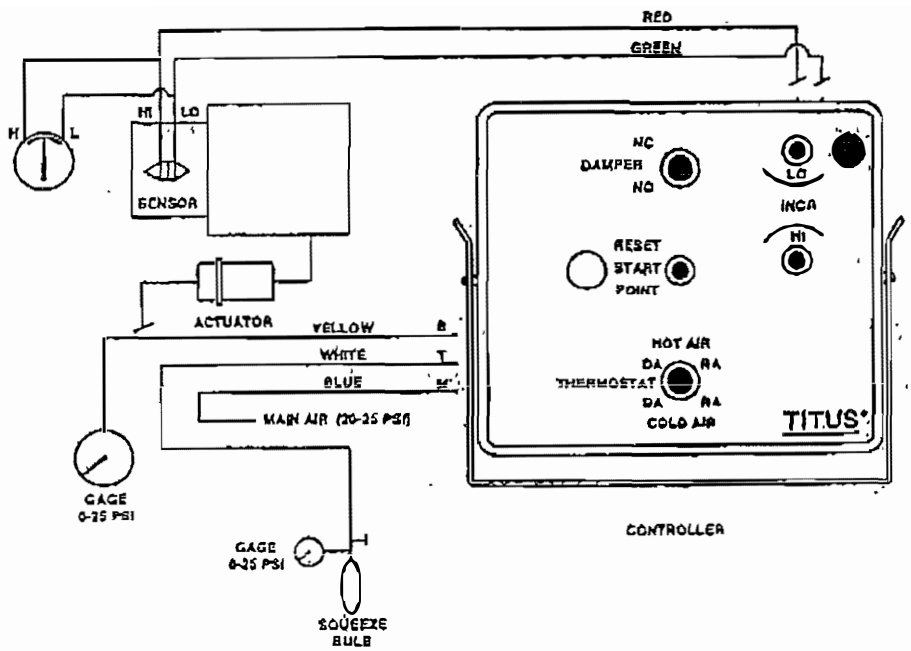
1. Apply zero PSI to thermostat Port T.
2. Adjust the LO knob on the face of the controller until the gauge on Port B reads:
   2 PSI for normally closed terminals [or]
   15 PSI for normally open terminals.
3. Use the Squeeze-Bulb to set the thermostat pressure to 8 PSI or (whatever PSI the desired setpoint should be).
4. Adjust the Reset-Start-Point knob until the gauge on Port B reads: (note 1)
   4-5 PSI for normally open terminals [or]
   10-11 PSI for normally closed terminals.
5. SEE NOTE 2.

Reverse-Acting Thermostats:

1. Apply 15 PSI to thermostat Port T.
2. Adjust the LO knob on the face of the controller until the gauge on Port B reads:
   2 PSI for normally closed terminals [or]
   15 PSI for normally open terminals.
3. Use the Squeeze-Bulb to set thermostat to desired start-point PSI.
4. Adjust the Reset-Start-Point knob until the gauge on Port B reads: (note 1)
   4-5 PSI for normally open terminals [or]
   10-11 PSI for normally closed terminals.
5. SEE NOTE 2.

NOTE 1: Pressures shown are for 5-10 PSI actuators. For other spring ranges adjust readings accordingly.

NOTE 2: Reconnect Red-Green-Yellow-White tubes to their proper control terminals. Recalibrate Min./Max. CFM settings in accordance with procedures shown in the proper Installation Manual.



TITUS®

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Qwik-Chek Procedure for TITUS I, II, and IIA Controllers

Preparing for Calibration

Disconnect the actuator tube (yellow stripe) from controller Port B.
2. Connect squeeze bulb with 0 to 25 PSI gauge to the actuator.
3. Connect 0 to 25 PSI gauge to controller Port B (figure 4).

A. Direct Acting Cooling or Reverse Acting Heating

1. Apply zero PSI to thermostat Port T.
2. Read the differential pressure for the desired Minimum CFM from the calibration curve corresponding to the inlet size of the terminal being calibrated (figure 5 or 6).
3. Pump the squeeze bulb until the desired differential pressure is read on the manometer gauge.
4. Adjust the LO knob on the face of the controller until the gauge on Port B reads 7.5 PSI ± 1.0 PSI.
5. Read the differential pressure for the desired Maximum CFM from the calibration curve corresponding to the inlet size of the terminal being calibrated (figure 5 or 6).
6. Pump the squeeze bulb until the desired differential pressure is read on the manometer gauge.
7. Adjust the HI knob on the face of the controller until the gauge on Port B reads 7.5 PSI ± 1.0 PSI.
8. Remove gauges and reconnect actuator to controller Port B.

NOTE: If the actuator fails to respond, see Guide to Service Procedures, page 4.

B. Reverse Acting Cooling or Direct Acting Heating

For TITUS I Controllers

1. Apply zero PSI to thermostat Port T.
2. Read the differential pressure for the desired Maximum CFM from the calibration curve corresponding to the inlet size of the terminal being calibrated (figure 5 or 6).
3. Pump the squeeze bulb until the desired differential pressure is read on the manometer gauge.
4. Adjust the HI knob on the face of the controller until the gauge on Port B reads 7.5 PSI ± 1.0 PSI.
5. Read the differential pressure for the desired Minimum CFM from the calibration curve corresponding to the inlet size of the terminal being calibrated (figure 5 or 6).
6. Pump the squeeze bulb until the desired differential pressure is read on the manometer gauge.
7. Adjust the LO knob on the face of the controller until the gauge on Port B reads 7.5 PSI ± 1.0 PSI.
8. Remove gauges and reconnect actuator to controller Port B.

NOTE: If the actuator fails to respond, see Guide to Service Procedures page 4.

For TITUS IIA Controllers

1. Apply zero PSI to thermostat Port T.
2. Read the differential pressure for the desired Maximum CFM from the calibration curve corresponding to the inlet size of the terminal being calibrated (figure 5 or 6).
3. Pump the squeeze bulb until the desired differential pressure is read on the manometer gauge.
4. Adjust the LO knob on the face of the controller until the gauge on Port B 7.5 PSI ± 1.0 PSI.
5. Read the differential pressure for the desired Minimum CFM from the calibration curve corresponding to the inlet size of the terminal being calibrated (figure 5 or 6).
6. Pump the squeeze bulb until the desired differential pressure is read on the manometer gauge.
7. Adjust the HI knob on the face of the controller until the gauge on Port B reads 7.5 PSI ± 1.0 PSI.
8. Remove gauges and reconnect actuator to controller Port B.

NOTE: If the actuator fails to respond, see Guide to Service Procedures page 4.

For TITUS II Controllers

1. Apply 15 to 25 PSI to thermostat Port T.
2. Read the differential pressure for the desired Minimum CFM from the calibration curve corresponding to the inlet size of the terminal being calibrated (figure 5 or 6).
3. Pump the squeeze bulb until the desired differential pressure is read on the manometer gauge.
4. Adjust the LO knob on the face of the controller until the gauge on Port B reads 7.5 PSI ± 1.0 PSI.
5. Read the differential pressure for the desired Maximum CFM from the calibration curve corresponding to the inlet size of the terminal being calibrated (figure 5 or 6).
6. Pump the squeeze bulb until the desired differential pressure is read on the manometer gauge.
7. Adjust the HI knob on the face of the controller until the gauge on Port B reads 7.5 PSI ± 1.0 PSI.
8. Remove gauges and reconnect actuator to controller Port B.

NOTE: If the actuator fails to respond, see Guide to Service Procedures page 4.

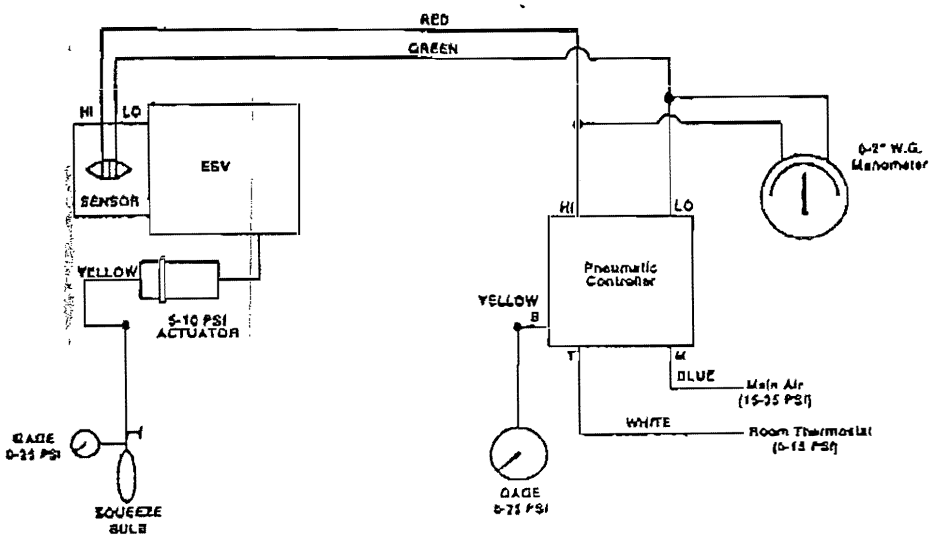


FIGURE 4

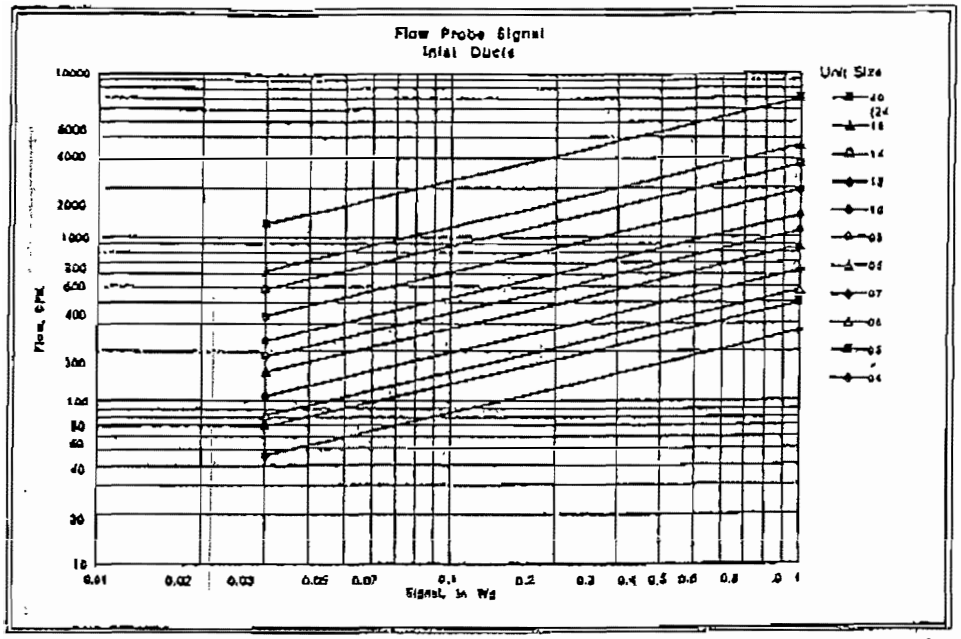
Replacement Parts

	Description	Part Number
1.	Actuators	
	Kruetar MCP-8031	10058501
	Johnson D-3062	10058601
2.	Actuator Crank Arms	
	Kruetar	30192002
	Johnson	30192006
3.	Act. Mtg. Plate-RH/LH	70560301
4.	Controllers	
	TITUS I DA (Beige)	10015001
	TITUS I RA (Gray)	10015101
	TITUS II	70500001
	TITUS IIA	10065001
	TITUS III	70743201
5.	Room Thermostats	
	Std. DA one pipe	10182203
	Std. RA one pipe	10182204
	Std. DA two pipe	10182201
	Std. RA two pipe	10182202
	Restrictor Tee (.005)	41410174
	Pneumatic Ctl. Mtg. Brkt.	
	TITUS I	70267002
	TITUS II, IIA, III	70382901
	Controller Box Enclosure	
	TITUS II, IIA, III	70073401
	Cover	
	TITUS II, IIA, III	70073501
	Enclosure TITUS I	70267201
	Cover TITUS I	70267101

Guide To Service Procedures

Symptom	Probable Cause	Correction
Actuator will not stroke. (Generally any setting of the damper compatibility selector on the face of the controller).	1. Leak in the control line between the controller and the actuator.	1. Repair the leak.
	2. Leak in the actuator.	2. Apply 15-25 psi air from the main air supply to the acuator. The actuator should stroke. Pinch the air supply line. If the actuator retracts, it is leaking. Replace the actuator and contact your TITUS distributor.
	3. Insufficient main air supply pressure.	3. The controller must receive compressed air from the main supply at 15-25 psi. Be sure all connections are as shown in Figure 4.
	4. Faulty controller.	4. If the controller appears to be faulty, contact your TITUS distributor.
	5. Pneumatic thermostat and main air line connections are reversed at the controller.	5. See Figure 4. The thermostat must be connected to Port T and the main air to Port M.
	6. Control lines from the sensor to the controller are reversed.	6. See Figure 4. Make the connections as shown.
Actuator will not stroke. (Normally open setting of the damper compatibility selector on the face of the controller).	1-6. As above.	1-6. As above.
	7. Rubber caps on HI or both balancing tees are missing.	7. Replace the caps on the balancing tees.
	8. HI control line or the HI passage of the sensor is plugged.	8. Clean out the passage or control line.
	9. Damper compatibility selector on the face of the controller is set wrong.	9. Set the damper compatibility selector to match the action of the damper.
	10. Low differential pressure at the sensor.	10. Increase the air flow rate to the terminal inlet if necessary.
Actuator will not stroke. (Normally closed setting of the damper compatibility selector on the face of the controller).	1-6. As above.	1-6. As above.
	7. Rubber cap on the LO balancing tee is missing.	7. Replace the cap.
	8. LO control line or the LO passage in the sensor is plugged.	8. Clean out the passage or control line.
Actuator remains fully stroked at all times. (Normally open setting of the damper compatibility selector on the face of the controller).	1. Faulty controller.	1. If the controller appears to be faulty, contact your TITUS Products distributor.
	2. Rubber cap on the LO balancing tee is missing.	2. Replace the cap.
	3. LO control line or the LO passage of the sensor is plugged.	3. Clean out the passage or control line.
Actuator remains fully stroked at all times. (Normally open setting of the damper compatibility selector on the face of the controller).	1. Faulty controller.	1. If the controller appears to be faulty, contact your TITUS Products distributor.
	2. Control lines from the sensor to the controller are reversed.	2. See Figure 8. Make the connections as shown.
	3. Rubber caps on HI or both balancing tees are missing.	3. Replace the caps on the balancing tees.
	4. HI control line or the HI passage of the sensor is plugged.	4. Clean out the passage or control line.
	5. Damper compatibility selector on the face of the controller is set wrong.	5. Set the damper compatibility selector to match the action of the damper.
	6. Low differential pressure at the sensor.	6. Increase the air flow rate to the terminal inlet if necessary.
Inaccurate or erratic air flow control.	1. Poor inlet duct connection.	1. Check inlet duct for blockage or kinks.
	2. Leakage in the duct work.	2. Repair the leakage.
	3. Assembly mounted in a non-level position or upside down.	3. Control must be horizontal ± 10 degrees.
	4. Controller adjustment dials are not set correctly.	4. See "Adjusting the Minimum and Maximum Air Flow".
	5. Low velocity pressure in the inlet duct.	5. Increase the air flow rate to the terminal inlet if necessary.
	6. Thermostat compatibility selector on the face of the controller is set wrong.	6. Set the thermostat compatibility selector to match the action of the thermostat.
	7. Thermostat is out of calibration.	7. Turn the thermostat adjusting dial through its full travel. The air pressure signal delivered by the thermostat to Port T on the back of the controller must vary from 0 to main air supply pressure (15-25 psi). If this pressure range is not correct, recalibrate the thermostat or consult your TITUS Products distributor.

MULTI-POINT INLET SENSOR



Inlet Duct Applications:

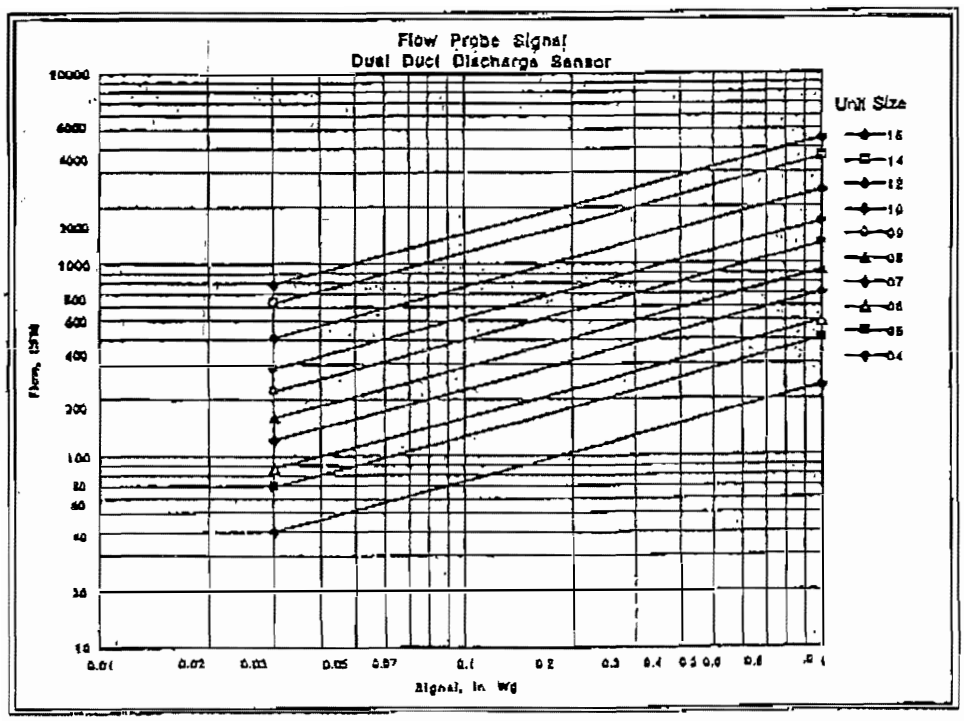
Inlet Size Code	K-Factor (CFM)
04	269
05	404
06	474
07	625
08	881
09	1094
10	1371
12	1931
14	2795
16	3677
40 (24x16)	7784

FIGURE 5

$$CFM = \sqrt{DP} \times K$$

$$DP = \left(\frac{CFM}{K}\right)^2$$

MULTI-POINT DISCHARGE SENSOR



Dual Duct Discharge/EDV & MDV

Terminal Unit Size	Sensor Size	K-Factor (CFM)
04	04	236
05	06	406
06	07	504
07	08	714
08	09	935
09	12	1281
10	12	1675
12	14	2428
14	16	3647
16	16	4607

FIGURE 6