

In conjunction with the use of these instructions, obtain and refer to the construction, fan performance, and control wiring drawings submitted for the specific project.

The equipment covered in this document is designed for safe and reliable operation when installed and operated within its design specification limits. Observe the following cautionary statements.



Electrical Shock Hazards. All power must be disconnected prior to installation and servicing this equipment. More than one source of power may be present. Disconnect all power sources to avoid electrocution or shock injuries.



All assemblies must be adequately secured during lifting and rigging by temporary supports and restraints until equipment is permanently fastened and set in its final location.



All unit temporary and permanent supports must be capable of safely supporting the equipment's weight and any additional live or dead loads that may be encountered. All supports must be designed to meet applicable local codes and ordinances.



All fastening devices must be designed to mechanically lock the assembly in place without the capability of loosening or breaking away due to system operation and vibration.



Secure all dampers when servicing damper, actuator or linkages. Dampers may activate automatically; disconnect control circuits to avoid injury.

INSPECTION

1. Upon receipt of the equipment, carefully check all items against the bill of lading to ensure that all of the equipment has been received (including shipped loose items). Note any discrepancy on the bill of lading before signing for the shipment.
2. Inspect all equipment for any signs of damage caused during transit. Note any visual damage on the bill of lading before signing. Immediately report all visual and concealed damage to the carrier and file a claim with the carrier.
3. Locate the model number on the unit label and check that the correct units have been received. Verify that all options have been included. Also check that the unit voltage agrees with the building parameters. If a discrepancy is discovered between what was ordered and what was received, contact your local representative immediately.



Check assembly and component weights to be sure that the rigging equipment can handle them safely. In addition, check the centers of gravity and any specific rigging instructions.



Check for adequate ventilation so fumes do not migrate through ductwork to occupied spaces when welding or cutting around the unit.

STORAGE

If equipment is to be stored for more than two weeks prior to installation, observe the following storage precautions:

- Choose a dry storage site that is reasonably level and sturdy to prevent undue stress or permanent damage to the equipment. Set the equipment off of the ground if in a moisture prone area.
- Remove all loose parts from the job site to minimize theft. Tag and store the loose parts in a safe place until needed.
- Cover all of the equipment with a protective tarp or moisture proof cover. Extend the cover under the equipment if it is stored on the ground. Secure the cover with adequate tie downs and store indoors.

PRE-INSTALLATION INSPECTION

1. Check the coupling that connects the actuator to the damper shaft to ensure that the nuts are tight.
2. While viewing the damper from the discharge of the unit, rotate the shaft fully. The damper should close fully and there should be no gaps between the damper gasketing and the inside of the valve.

Sequence of Operation

The basic unit consists of an air valve, which is used to modulate the air being delivered into the occupied zone. These units are designed to modulate either cooling or heating air between 40°F (4°C) or 140°F (60°C). Air enters the air valve inlet and exits to the occupied zone through ductwork attached to the discharge of the unit.

Galvanized steel air valves come in diameters of 4, 5, 6, 8, 10, 12, 14, and 16 inches; an adapter must be used for metric ductwork.

Size 6 through 16 utilize the FlowStar™ airflow sensor, while sizes 4 and 5 feature a single axis averaging airflow sensor.

Stainless steel air valves come in diameters of 6, 8, 10, 12, 14 and 16 inches and utilize a stainless steel single axis averaging flow sensor.

See calibration charts on page 5.

INSTALLATION

Clearances

Observe the following clearance requirements.

- All equipment covered in this document are ETL listed for 0.0” clearance to combustibles. *Refer to National Fire Protection Association (NFPA) 70 in the National Electrical Code (NEC) requirements and/or local codes for minimum electrical clearances required for service.*
- Equipment should not make contact with any structure located above the equipment without appropriate isolation.

Hanging and Mounting Equipment

Observe the following hanging and mounting requirements:

- Although the basic equipment is generally light enough that it can be supported by the ductwork, it is strongly recommended that all equipment be suspended from the upper most ceiling or a structural element of the building, independent of the false ceiling grid. Suspension devices are field supplied, sized and designed by others. Johnson Controls, Inc. will not accept responsibility for unit support.

Equipment must be installed in a level horizontal plane. Provisions for proper support in seismically active regions is the responsibility of others.

- *See Table 1 for more information on unit weights.*
- Hanger straps may be utilized as a means of suspending the equipment. Do not secure hanger straps to control enclosures. Hanger straps can be mounted directly to the unit, such that they do not interfere with the damper assembly, using screws that are no longer than 1”.
- When hanging equipment, always use the support method as prescribed in the job specifications.

TABLE 1 - SINGLE DUCT ROUND AIR TERMINAL UNIT WEIGHTS

SIZE	WEIGHT (LBS)
04	15 [7]
05	15 [7]
06	15 [7]
08	17 [8]
10	19 [9]
12	20 [9]
14	21 [10]
16	24 [11]

Note : Weights in lbs. [kg.]

Duct Connections



When fastening ductwork to the unit, make sure that fasteners do not penetrate the unit in a location that interferes with damper assembly operation.

Observe the following duct connection guidelines:

- All duct connections should be configured and installed in accordance with Sheet Metal and Air Conditioning Contractors' National Association (SMACNA) guidelines and all local code requirements.
- Fasten and seal all ductwork connections in accordance with project specifications.
- Allow a minimum of 1½-duct diameters of straight duct prior to equipment inlet and equipment discharge.
- The diameter of the inlet duct for round valves must be equal to the listed size of the equipment. The round air valve inlet collar of the equipment is 1/8" smaller than the listed size in order to allow the round ductwork to slip over the air valve inlet collar. Do not insert ductwork into the air valve inlet collar.
- If the equipment is to be installed in a location with high humidity, external insulation around the unit should be installed.
- After all connections are made, check that the entire ductwork system is airtight. In some high pressure systems, duct sealer may be necessary.

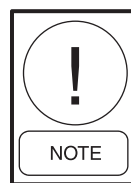
Electrical Connections

Observe the following electrical connection guidelines:

- All field wiring must comply with NEC and all local codes. Electrical and control wiring diagram is located on the control enclosure box.
- The installing electrician should rotate the incoming electric service by phase to help balance the building electrical load.
- Use copper conductors only.

OPERATION

Start-Up



IMPORTANT: *Thorough safety precautions should always be taken when performing startup and service. Only qualified individuals should perform these tasks.*

1. Check that all electrical work is finished and properly terminated.
2. Check that all electrical connections are tight and that the proper voltage is connected.

Damper Shaft

There is an indicator on the end of the damper shaft that can be used to determine the position on the damper blade. If the indicator is horizontal, the damper is completely open. The damper shaft is ½" diameter.

MAINTENANCE

Optional Damper Actuator

An optional factory mounted floating type actuator is available, which mounts directly to the damper operating shaft. The actuator is not provided with and does not require any limit switches but is electronically protected against overload. *See Actuator Installation Instructions, P/N 34-636-1433.*

Manual Override

A button on the side of the actuator cover disengages the gear train so the damper shaft can be moved manually. Releasing the button will re-engage the gear train.

External Terminal Strip

The external terminal strip is located on the top of the actuator. Connections are numbered. The terminals are designed for 26 to 16 gauge wires. For most installations, 18 or 16 gauge wire will work well with the actuator (*see table 2 for maximum wire lengths*).

TABLE 2 - MAXIMUM WIRE LENGTHS	
WIRE SIZE	MAX FEET
16 GA	1225 FT
18 GA	725 FT
20 GA	400 FT
22 GA	200 FT

Overload Protection

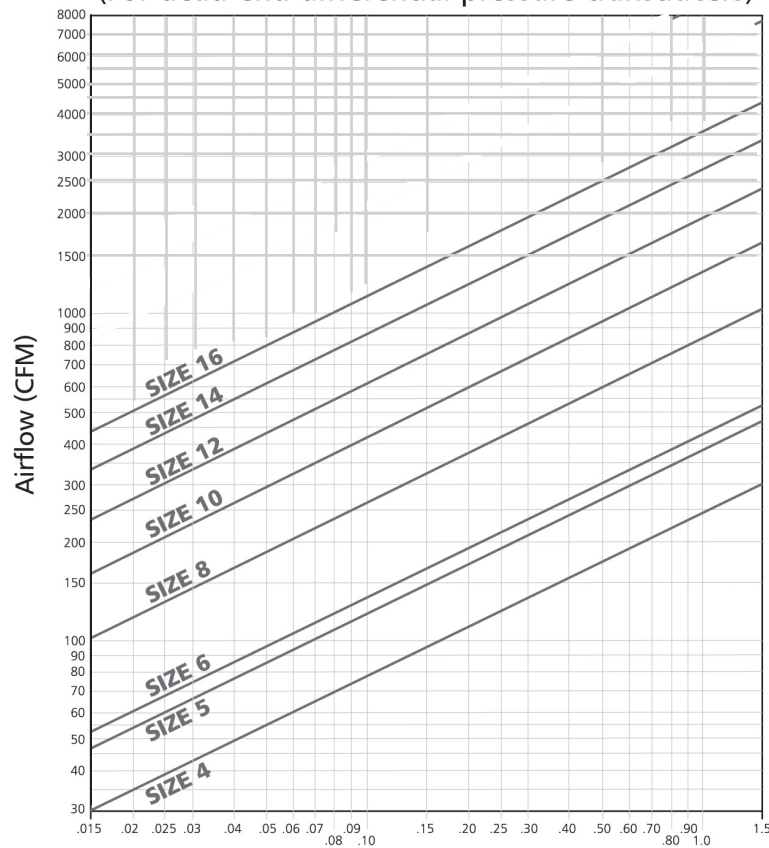
The actuators are electronically protected against mechanical overload. In the actuator, an electronic circuit maintains the current at a level that will not damage the motor while providing adequate holding torque.

Checkout Instructions

1. Disconnect actuator from the controller.
2. Apply 24 VAC to the COM and CW terminals on the actuator. Actuator should rotate in a clockwise direction.
3. Apply 24 VAC to the COM and CCW terminals on the actuator. Actuator should rotate in a counter clockwise direction.
4. If actuator moves in both directions, it is operational.
5. If the actuator does not rotate, it may be at an end stop or there is a problem with the damper.
6. Loosen the set screw to free the actuator from the damper shaft. Check to make sure that the damper shaft rotates freely.
7. Check to make sure that actuator is not against stop. Repeat steps 2 and 3.
8. If actuator does not rotate, replace.

CALIBRATION CHARTS

FlowStar™ Calibration Chart (For dead-end differential pressure transducers)



MODEL TSX

Probe Differential Pressure (inches w.g.)

NOTE: Maximum and minimum CFM limits are dependent on the type of controls that are utilized. Refer to the table below for specific values. When DDC controls are furnished by others, the CFM limits are dependent on the specific control vendor that is employed. After obtaining the differential pressure range from the control vendor, the maximum and minimum CFM limits can be obtained from the chart above (many controllers are capable of controlling minimum setpoint down to .015" w.g.).

UNIT SIZE	400 SERIES (PNEUMATIC) STANDARD CON- TROLLER		7000 SERIES ANALOG ELECTRONIC		DDC CONSIGNMENT CONTROLS (See Notes Below)				
	MIN.	MAX.	MIN.	MAX.	MIN.			MAX.	
					Min. transducer differential pressure (in. w.g.)			Max. transducer differential pressure (in. w.g.)	
					0.015	0.03	0.05	1.0	≥1.5
4	43	250	35	250	30	43	55	250	250
5	68	350	50	350	48	65	88	350	350
6	75	490	60	550	53	75	97	435	530
8	145	960	115	1000	105	145	190	840	1000
10	235	1545	185	1600	165	235	305	1355	1600
12	340	2250	285	2300	240	340	440	1975	2300
14	475	3100	390	3100	335	475	615	2750	3100
16	625	4100	520	4100	440	625	805	3595	4100
19	1180	6500	1025	6500	845	1180	1510	6375	6500
22	1730	8000	1450	8000	1260	1730	2200	8000	8000

Notes:

1. Minimum and maximum airflow limits are dependent on the specific DDC controller supplied. Contact the control vendor to obtain the minimum and maximum differential pressure limits (inches w.g.) of the transducer utilized with the DDC controller.
2. Maximum CFM is limited to value shown in General Selection Data.
3. FlowStar™ differential pressure tubing connections: High side indicated by red tubing; Low side indicated by black tubing.

