

MULTI-PHASE* PNEUMATIC CONVEYOR

Installation, Operation and Maintenance Manual

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*TM/The Young Industries

FOREWORD

This manual contains instructions for installation, operation and maintenance of Young Industries' Multi-Phase Dense-Phase Pneumatic Conveyor. The care taken during receiving, storage, installation and continued maintenance will add to the reliable operation and long service life of this equipment.

This manual should be read and understood in its entirety by the operator and the director of plant safety prior to performing any work on or operating a Dense-Phase Pneumatic Conveyor. Contact Young Industries for additional copies which may be required to ensure the conveyor is being operated safely and according to the recommended procedures included in this manual.

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SAFETY

READ AND FULLY UNDERSTAND THIS MANUAL PRIOR TO OPERATING OR PERFORMING ANY WORK ON A DENSE-PHASE PNEUMATIC CONVEYOR.

If you have previously received delivery of a Dense-Phase Pneumatic Conveyor and are just now receiving this manual, insist that both the conveyor operator and the director of plant safety read and fully understand this manual prior to continued use of and/or performing any maintenance on the conveyor.

Notify Young Industries if your conveyor does not include safety warning labels or devices recommended within this manual, which you believe may be important to improve the safe operation or maintenance of your conveyor installation. Contact the Chief Engineer for assistance at 570/546-3165 prior to continued use or maintenance.

Notify Young Industries if you have sold, leased, rented or given any Young conveyor to another user. Your assistance will allow Young Industries to contact the new user with updated safety and/or operational recommendations.

Safety is a fundamental factor that must be considered at all times in the operation and maintenance of mechanical equipment. Use of proper tools and methods can prevent serious accidents that may result in injury to you and your fellow workers.

A number of safety precautions are listed throughout this manual. Study them carefully and follow them; insist that those working with you do the same. Remember: an accident can easily be caused by someone's carelessness or negligence.

The various precautions and recommendations detailed within this manual are not necessarily all-inclusive. Young Industries has attempted to provide SAFETY AND OPERATIONAL GUIDANCE relating to typical installation with which we are familiar. We urge you to review your particular conveyor installation to determine whether there are potential hazards beyond the warnings of this manual.

If you have any safety or operational questions pertaining to the design or application of a Young filter collector as it relates to your particular installation, please contact the Chief Engineer at 570\546-3165.

Failure to observe and follow the safety precautions may result in serious personal injury or property damage.

Young Industries looks to our customers to achieve a cooperative effort for the purpose of making each conveyor installation as safe for the operator as is reasonably possible and to ensure proper maintenance and operating procedures are followed. Many times we do not have access to the installation; therefore, your participation in the safe installation, operation and maintenance of each conveyor is critical.

WARNING ELECTRICAL GROUNDING AND BONDING ARE REQUIRED

Ungrounded machinery presents a potential hazard of fatal electrical shock from electrical power sources. Static electricity may also accumulate on ungrounded/unbonded equipment. Static electricity discharge from ungrounded equipment or between unbonded pieces of equipment may cause explosion or fire if flammable vapor or dust is present.

Electrical equipment must be installed by a certified professional electrician.

Before operating the equipment described by this manual or any other equipment in the same processing system, grounding and bonding must be completed in accordance with the National Electrical Code (NFPA 70) published by the National Fire Protection Association, 1 Batterymarch Park, Quincy, Mass. 02269-9101, and any other applicable National, State or Municipal codes. Codes for safe control of static electricity must also be observed, including the National Fire Code Recommended Practice on Static Electricity (NFPA 77) and any other applicable National, State or Municipal codes.

To avoid hazardous static discharge, mobile, movable or portable equipment which may attach to or come near to other equipment and which is not prohibited by codes from being connected to ground must be safely grounded and bonded before close approach or contact is made. This warning also applies to movable containers such as drums, totes, boxes and bags.

Sections of pipe, duct and gravity spout must be bonded to adjacent sections and must have a conductive path to electrical ground.

Regular periodic safety inspections of electrical systems and grounding/bonding systems are required.

RECEIVING AND INSPECTION

A. RECEIVING AND INSPECTION

1. Upon receipt of equipment and material from Young Industries the following basic steps should be taken:
 - a. Use the packing list to determine that all the items shipped have been received. Your equipment order was carefully crated or packaged for safe shipment then given to the carrier. Check for damage.
 1. Damage in transit is the responsibility of the carrier. Be sure to have the driver sign a copy of the freight bill with a notation about any damage.
 2. If a shipment was sent to you by parcel post, have the postmaster complete a damage claim report.
 3. Concealed damage: If equipment or goods are discovered to be damaged by shipment at a later date, contact the carrier and Young Industries immediately.
 4. IN ALL CASES OF DAMAGE IN TRANSIT, CONTACT THE YOUNG INDUSTRIES CHIEF ENGINEER AT 570/546-3165 FOR ASSISTANCE IN DETERMINING WHETHER OR NOT THIS DAMAGE MAY IN ANY WAY AFFECT SAFETY OR PROPER OPERATION OF YOUNG INDUSTRIES EQUIPMENT.
 5. If shipped UPS, DO NOT THROW ORIGINAL CARTON AWAY. Keep all evidence for the inspector.

NOTE:

YOUNG INDUSTRIES CANNOT ASSUME ANY LIABILITY FOR SHORTAGES OR DAMAGED GOODS. CLAIMS MUST BE NEGOTIATED WITH THE CARRIER. CONTACT THE YOUNG INDUSTRIES CHIEF ENGINEER AT 570/546-3165 FOR ASSISTANCE IN RECTIFYING ANY SHORTAGE OR DAMAGE AS IT RELATES TO SAFE AND PROPER OPERATION OF YOUNG INDUSTRIES EQUIPMENT.

2. Moving the Pneumatic Conveyor

- a. Moving and installation should always be performed by trained, experienced personnel, using safe and accepted rigging practices.

CAUTION:

WHEN MOVING A CONVEYOR OR COMPONENT PARTS, BE SURE THAT MOVING PRACTICES USED ARE SAFE FOR BOTH PERSONNEL AND EQUIPMENT. CONTACT THE YOUNG INDUSTRIES CHIEF ENGINEER IF THERE ARE ANY QUESTIONS RELATING TO WHAT CONSTITUTES SAFE AND ACCEPTED RIGGING PRACTICES FOR MOVEMENT AND/OR INSTALLATION OF DENSE PHASE SYSTEM COMPONENTS.

- b. Care and caution should be exercised to prevent damaging the conveyor components.
3. Storing the Conveyor
 - a. If moved to storage, the equipment should be located in a dry area, preferably inside. Outside storage will require adequate protection from the weather.
 - b. The conveyor equipment has been shipped with temporary guards or covers. Do not remove these covers while the equipment is in storage.
 - c. After prolonged storage and prior to start-up, the equipment shall be inspected by a qualified person. Contact Young Industries Chief Engineer at 570/546-3165 for assistance.

CAUTION:

USE CAUTION TO PROTECT AGAINST OBJECTS OR DEBRIS FROM ENTERING OR DAMAGING THE EQUIPMENT.

INSTALLATION

A. SUPPORTS

1. The Dense-Phase Pneumatic Conveyor is designed to be supported and/or anchored to a rigid support base or foundation.
 - a. The transport vessel is supplied with four support legs with anchor bolt holes.
 - b. Securely anchor the transport vessel by bolting.
 - c. The support for transport vessel and conveying must be structurally adequate to support an operating vessel with the components full of product.
2. Locate the unit with sufficient clearance to allow inspection and replacement of all components.
3. Support the conveyor at the support points shown on the assembly drawing furnished as a separate document for your conveyor.
4. Level the conveyor by grouting and/or shimming. Use care to eliminate twisting or blending when supporting the conveyor.

B. ASSEMBLY

1. The unit is completely assembled and is ready for electrical, air (gas) and conveying line attachment.

C. GROUNDING

1. It is recommended that all conveyors be grounded. Certain materials may cause the build up of static electricity in the conveyor. Proper grounding is necessary. If there are any questions about proper grounding methods, contact Young Industries Chief Engineer.

D. COMPRESSED AIR INSTALLATION (OR GAS INSTALLATION)

1. Connect the plant compressed air or gas supply to the transporter.
 - a. The compressed air or gas supply must be clean and dry with a minimum pressure of 80 psi at the unit.

CAUTION

COMPRESSED GAS - SHUT OFF AND BLEED SYSTEM BEFORE SERVICING.

E. PRESSURE RELIEF VALVE

1. Install the pressure relief valve on the Dense Phase conveyor. Inspect the pressure relief valve to determine that it is not damaged and that it will operate properly.

CAUTION

THE PRESSURE RELIEF VALVE IS FACTORY SET. DO NOT CHANGE THE RELIEF VALVE SETTING.

F. ELECTRICAL INSTALLATION

1. Refer to the wiring diagram furnished as a separate document for your Multi-Phase* Dense Phase Conveyor.
2. For a prewired unit connect your power source and make any other required connection as shown on the wiring diagram.
3. Check all safety interlocks to assure they are wired and working properly.

CAUTION

DISCONNECT POWER AND BLEED COMPRESSED AIR SYSTEM BEFORE SERVICING.

4. In addition to following the manufacture's installation instructions, care must be taken to ensure compliance with Federal, State and Local Government requirements.

G. PRECOMMISSIONING

1. Prior to operating or test running the pneumatic conveyor and with the power and compressed air or gas shut off, check internally for cleanliness, using caution to avoid physical harm to personnel and equipment.
2. Inspect the installation to assure the conveyor is installed properly and mounted securely.
3. Determine that electrical power and compressed air or gas supplies are properly installed and operative.
4. Inspect the conveyor to assure that all guards, covers and safety equipment are in place and working properly.

CAUTION

BEFORE DISCONNECTING OR WORKING INTERNALLY ON A DENSE PHASE CONVEYOR, DISCONNECT THE POWER, SHUT OFF AND BLEED THE COMPRESSED AIR SYSTEM. USE SPECIAL CARE TO AVOID THE PINCHING ACTION THAT MAY OCCUR FROM THE PRODUCT INLET AND AIR VENT VALVES.

5. Inspect the assembly of the conveying line to the discharge point. Use caution when assembling the pipe, couplings, and flanges of the system to assure the bolts are tightened to safely handle the system design pressure.
6. We urge the installation crew to notify the plant safety committee and/or the plant engineer when installation is complete and prior to initial operation. Those in your plant responsible for plant safety should review your dense phase conveyor installation prior to operation for safety in light of the extensive operating recommendations made within this manual. Contact the Chief Engineer at Young Industries, telephone 570/546-3165, if this review results in additional questions or uncertainty.

OPERATION

A. START-UP

1. Before operating the Multi-Phase*/Dense Phase Conveyor, the following items should be checked and/or adjusted.
 - a. An air (gas) supply pressure of 80 to 100 PSI is required to operate the pneumatic transport system.
 - b. The gas flow rate for the transport line is controlled with the manually adjusted flow valve for the transport pipe. When conveying material, the valve will need a pressure of 20 to 50 PSI, measured at the product entrance point of the transport pipe. The required pressure depends on transport system length and material flow characteristics.
 - c. The flow rate of material out of the pressure vessel depends on the amount of positive pressure applied to the top of the material in the vessel. A positive differential pressure of two or four PSI is required between the top of the pressure vessel and the transport inlet.
 - d. If applicable, the flow valve that controls the air flow to the aerator pads should be adjusted to allow material to flow out of the vessel.
 - e. The nozzle in the discharge elbow should be adjusted to obtain the desirable material flow rate.
2. The object of the various adjustments of the Multi-Phase/Dense Phase conveyor is to control the density of the product as it is being conveyed. In order to achieve this requirement there are four adjustments on the unit. These adjustments are as follows:
 - a. Install the largest of the three orifices nozzles supplied with the unit. This orifice provides the maximum CFM (gas) to the system. This acts as a coarse setting for the system.

- b. The nozzle in the discharge elbow is adjusted in and out by loosening the lock nut and rotating the unit clockwise or counterclockwise as required. The initial setting of the nozzle is with the end of the nozzle on the centerline of the transporter discharge.
- c. The convey line gas rate control valve is completely open which will provide the maximum air to the convey line.
- d. The flow control valve that controls the air to the top of the transporter is open only enough to provide an equalizing air pressure.

With the above settings, the material can be conveyed. However, the material will be conveyed very dilute. As the material is being conveyed, the air flow to the conveying line can be reduced, which will densify the material in the convey line. The air flow to the top of the transporter should be adjusted to either equalize the convey line pressure or provide a 2 to 4 PSI pressure differential.

The above adjustments are made until the system conveys in a dense phase mode. The flow valve that controls the air flow to the conveying system should be closed until the product conveys in a pulse phase condition. When this condition occurs, the flow valve that controls the air to the conveying line should be opened slightly, which will provide more air to the system. At this point, the system is running at the proper settings.

- e. If the air settings do not cause the system to convey in a pulse phase mode, the next smaller size orifice nozzle should be installed in the discharge elbow and the above replaced.
3. Prior to actual operation, the operator must familiarize himself with the method of starting and stopping the Dense Phase Pneumatic Conveyor and the status of supporting utilities.
 4. The general appearance of the conveyor and the surrounding area should be visually inspected to determine that the conveyor system can be operated safely and without damage.
 5. Guards, doors, covers and all safety interlocks must be in place and working whenever the conveyor is in service.

CAUTION

DISCONNECT POWER AND BLEED COMPRESSED AIR SYSTEM BEFORE SERVICING.

6. If your particular installation has an unsafe condition unforeseen by Young Industries and beyond typical operating conditions, **CEASE FURTHER OPERATION** of the conveyor and immediately notify both your safety committee and the Chief Engineer at Young Industries, telephone 570/546-3165. The Young Industries Chief Engineer can assist you in speeding the return of your pneumatic conveyor to a recommended operating condition.

B. OPERATION DESCRIPTION

1. Dense-Phase with Level Probe Control

- a. Fill Cycle — The Dense-Phase transport operation sequence starts with the main on/off switch turned to the on position. When the start/stop switch is turned to the start position, the upper inlet valve opens. When the upper gate is confirmed open through the upper valve limit switch, the lower inlet valve opens. When the level probe senses a full level condition the upper gate then closes. After a predetermined time delay is completed, the lower gate closes. This time delay allows for any material below the upper inlet gate to clear the lower valve prior to closing. This assures that the lower valve never closes on material preventing the lower valve from sealing properly.
- b. Transport and Purge Cycle — Once the lower valve is confirmed closed, through the lower valve limit switch, the air valve is opened and the conveying cycle is started. As the cycle starts, pressure builds in both the vessel and the conveying line. When no more material is remaining in the vessel the conveying line starts to clear. The vessel and conveying line pressure decrease until the conveying line is cleared. A pressure switch senses the change in pressure. When the pressure reaches the low set point (typically slightly above empty line loss pressure) and the level probe senses a low level condition, the air valve is closed. A second pressure switch with the set point at 0 PSIG senses when there is no pressure remaining in the system and allows the start of another cycle.

If the start/stop switch is turned to the stop position anytime during the cycle the transport will finish the present cycle, and not allow the vessel to refill.

2. Dense-Phase with Load Cell Control

- a. Fill Cycle — The Dense-Phase transport operation sequence starts with the main on/off switch turned to the on position. When the start/stop switch is turned to the start position, the upper inlet valve opens. When the upper gate is confirmed open through the upper valve limit switch, the lower inlet valve opens. When the load cells sense a full level condition, the upper gate then closes. After a predetermined time delay is completed, the lower gate closes. This time delay allows for any material below the upper gate to clear the lower valve prior to closing. This assurance that the lower valve never closes on material preventing the lower valve from sealing properly.
- b. Transport and Purge Cycle — Once the lower valve is confirmed closed, through the lower valve limit switch, the air valve is opened and the conveying cycle is started. As the cycle starts, pressure builds in both the vessel and the conveying line. When no more material is remaining in the vessel, the conveying line starts to clear. The vessel and conveying line pressure decrease until the conveying line is cleared. A pressure switch senses the change in pressure. When the pressure reaches the low set point (typically slightly above empty line loss pressure) and the load cells sense a low level condition, the air valve is closed. A second pressure switch with the set point at 0 PSIG senses when there is no pressure remaining in the system and allows the start of another cycle.

If the start/stop switch is turned to the stop position anytime during the cycle, the transport will finish the present cycle, and not allow the vessel to refill.

3. Anti-Plug Injector System

- a. If the material becomes plugged in the convey line, the pressure will exceed a preset maximum line pressure and will activate the anti-plug device.
- b. A solenoid controlled valve will open, allowing air to be injected into the convey line.
- c. The pressure regulator allows the gas to flow freely into the vessel top and starts to restrict flow when approximately 80 to 90% of the set pressure is obtained. When overfeeding occurs the transport gas pressure automatically increases to force the product through the transport pipe. The pressure regulator isolates the vessel top and maintains the regulator set pressure. By isolating the vessel top, the pressure differential is eliminated or reversed and product feeding from the vessel stops.

C. LOADING

1. Ingredients shall be loaded to the Dense-Phase Pneumatic Conveyor through an enclosed spout or hopper that is protected by an approved safety guard, such as a fixed grate.
 - a. Safety guard or grate shall be sized and arranged to prevent the operator from making contact with the fill valve and vent valve gates.

D. CONTINUOUS OPERATION

1. During conveyor operation, the operator should recognize and report any unusual noise or vibration. Notify you maintenance personnel or call Young Industries for assistance or additional guidance in defining these conditions. Refer also to the maintenance section of this manual.
2. Guards, covers and safety equipment shall be in place whenever the conveyor is in service.

E. SHUT-DOWN

1. When shutting down a dense phase conveyor, shut off supporting utilities in accordance with plant operating procedures.
2. When cleaning or servicing is required on the dense phase conveyor; proper lock-out of electrical, compressed air or gas and mechanical equipment must be completed before the work is started.

CAUTION

DISCONNECT POWER, SHUT OFF COMPRESSED AIR OR GAS AND BLEED SYSTEM BEFORE CLEANING OR SERVICING.

MAINTENANCE

A. GENERAL INSPECTION

1. Observe the air cleaning valves and piping for any unusual noise or vibration.
2. Check pipe connections for tightness.
3. Check flexible hoses for cracking and hose fittings for tightness.
4. Inspect all safety equipment , guards, covers, and labels to assure the conveyor and auxiliary equipment can be operated safely. If an unsafe condition is observed, cease further operation of the conveyor and immediately notify both your safety committee and the Chief Engineer at Young Industries, telephone 570/546-3165.
5. Cleanliness of the dense phase conveyor is important in its operation. Make sure there is no foreign matter, debris etc. on or in the conveying system.
6. Check all joints for loose bolts and/or cracking.
7. Cycle valves to see if they turn.
8. Inspect the transport vessel.
9. Refer to the proper IOM Manual for lubrication instructions of auxiliary equipment used with the dense-phase conveyor.

DANGER

DISCONNECT POWER, SHUT OFF AND BLEED AIR OR GAS SUPPLY BEFORE SERVICING.

B. TROUBLESHOOTING

1. When properly installed, operated and maintained, your Young Industries Dense-Phase Conveyor will give years of service. Table One “Troubleshooting Dense Phase Conveyors” gives symptoms, causes and remedies for most problems that may be encountered.

C. SPARE PARTS INFORMATION

1. A nameplate is furnished with each Dense-Phase conveyor. The necessary information for ordering spare parts is found on this nameplate. When ordering, please provide shop number and serial number. Contact Spare Parts Department Manager at Young Industries, telephone 570/546-3165 for assistance.

TABLE ONE - TROUBLESHOOTING DENSE-PHASE PNEUMATIC CONVEYORS

<u>SYMPTOM</u>	<u>CAUSE</u>	<u>REMEDY</u>
Product not flowing	Foreign objects in tubes conveyor components	Empty conveyor, remove object
	Lumpy product	Take precaution to ensure product in conveyor is not lumpy
	Air line is plugged	Bleed system, check for blocked line
	Air supply cut-off	Check line for leaks; Check compressed air source
Product leaks from tube joints	Loose tubing flange	Clean and tighten tubing couplings
	Damaged flange gasket	Replace gasket
Low system capacity	Low air pressure or improper setting of valves	Adjust system
	Low feed rate into transporter	Check feeding device and auxiliary equipment for proper operation
	Worn relief valve	Check relief valve for pressure setting
	Filter unit is not functioning correctly	Clean or replace filter unit (reference filter IOM Manual)
	Sticking diverter valve	Adjust valve (reference diverter valve IOM Manual)
	Material is not free flowing	Check for material build-up in all horizontal conveying lines and elbows
Dusting from product inlet valve	Improper setting of controls	Adjust controls
	Product inlet valve not seating properly or a worn valve seat	Check actuator alignment and operation; replace worn valve seat (reference valve and actuator IOM Manual)

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THE Young®
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MADE BY	KFH	DATE	7/24/93	ORDER NO.		ISSUE	
CHKD	PFEIFFER		7/26/93				
APPR	PFEIFFER		7/26/93	SHEET	1	OF	1
CUST.	-						
TITLE	GROUNDING/BONDING WARNING						

WARNING – ELECTRICAL GROUNDING AND BONDING ARE REQUIRED

Ungrounded machinery presents a potential hazard of fatal electrical shock from electrical power sources. Static electricity may also accumulate on ungrounded/unbonded equipment. Static electricity discharge from ungrounded equipment or between unbonded pieces of equipment may cause explosion or fire if flammable vapor or dust is present.

Electrical equipment must be installed by a certified professional electrician.

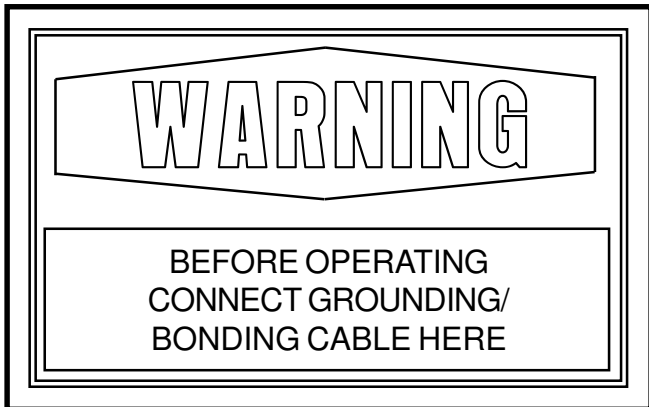
Before operating the equipment described by this manual or any other equipment in the same processing system, grounding and bonding must be completed in accordance with the National Electrical Code (NFPA 70) published by the National Fire Protection Association, 1 Batterymarch Park, Quincy, Mass. 02269-9101, and any other applicable National, State or Municipal codes. Codes for safe control of static electricity must also be observed, including the National Fire Code "Recommended Practice on Static Electricity" (NFPA 77) and any other applicable National, State or Municipal codes.

To avoid hazardous static discharge, mobile, movable or portable equipment which may attach to or come near to other equipment and which is not prohibited by codes from being connected to ground must be safely grounded and bonded before close approach or contact is made. This warning also applies to movable containers such as drums, totes, boxes and bags.

Sections of pipe, duct and gravity spout must be bonded to adjacent sections and must have a conductive path to electrical ground.

Regular periodic safety inspections of electrical systems and grounding/bonding systems are required.

LOOK FOR THESE TAGS AND TERMINAL CONNECTING POINTS



CABLES AND TERMINATIONS MUST BE SUPPLIED BY INSTALLER

