

## Pneumatic Installation Guidelines

### Appendix B

#### Air System Requirements

The Ortlinghaus Series 0-420, 0-406, 0-400, 0-440, and 0-450 clutch/brakes, clutches, and brakes use compressed air to release the brake and actuate the clutch. To properly operate a sufficient supply of clean, dry compressed air at the proper pressure is required.

An advantage of the **Ortlinghaus** design is that the volume of air required for actuation is small related to the torque available. But, as the **Ortlinghaus** clutch/brakes, clutches, and brakes are designed for quick engagement/release, this volume of air must flow rapidly. This results in high instantaneous flow rates and requires that the air system components be properly sized for this flow. Also, a sufficient volume of compressed air must be available to support these instantaneous flow rates without an excessive pressure drop.

A properly designed and sized air system will allow the clutch/brake, clutch, or brake to perform to it's full capability, particularly if rapid single stroking of the equipment is required.

Figure B1 is the recommended schematic for the air system. Table B1 lists the recommended component sizes

The Normal Operating Pressure is 80 psi [5.5 bar]

The Maximum Operating Pressure is 87 psi [6.0 bar]

Lower operating pressures are permitted, but the available clutch torque will be reduced. The brake torque remains the same, as the brake is spring applied, but the unit must be vented to atmosphere with no back pressure to have full brake torque available.

Figure B1 shows an accumulator (or surge tank) and check valve in the air system. Orttech and **Ortlinghaus** strongly recommend the use of the accumulator as shown. An accumulator and check valve are required when the plant air system cannot deliver the required volume of air fast enough.

The best way to determine if an accumulator is required in an installation is to perform this simple test: With a pressure gauge installed on the outlet side of the regulator, record the air pressure when the operating valve is not energized (brake applied). Next, when the operating valve is energized (to release the brake/engage the clutch), observe the pressure gauge and note the lowest pressure reading. If the pressure drops 10% or more (say from 80 psi to 72 psi) the air system is not delivering the required volume of air fast enough. The installation requires an accumulator and check valve as shown on Figure B1. The accumulator will then act as a local air supply to provide the required volume of air. If the pressure drop is less than 10% the air system is able to deliver sufficient air for proper operation.

When selecting components for the air system, please keep these points in mind:

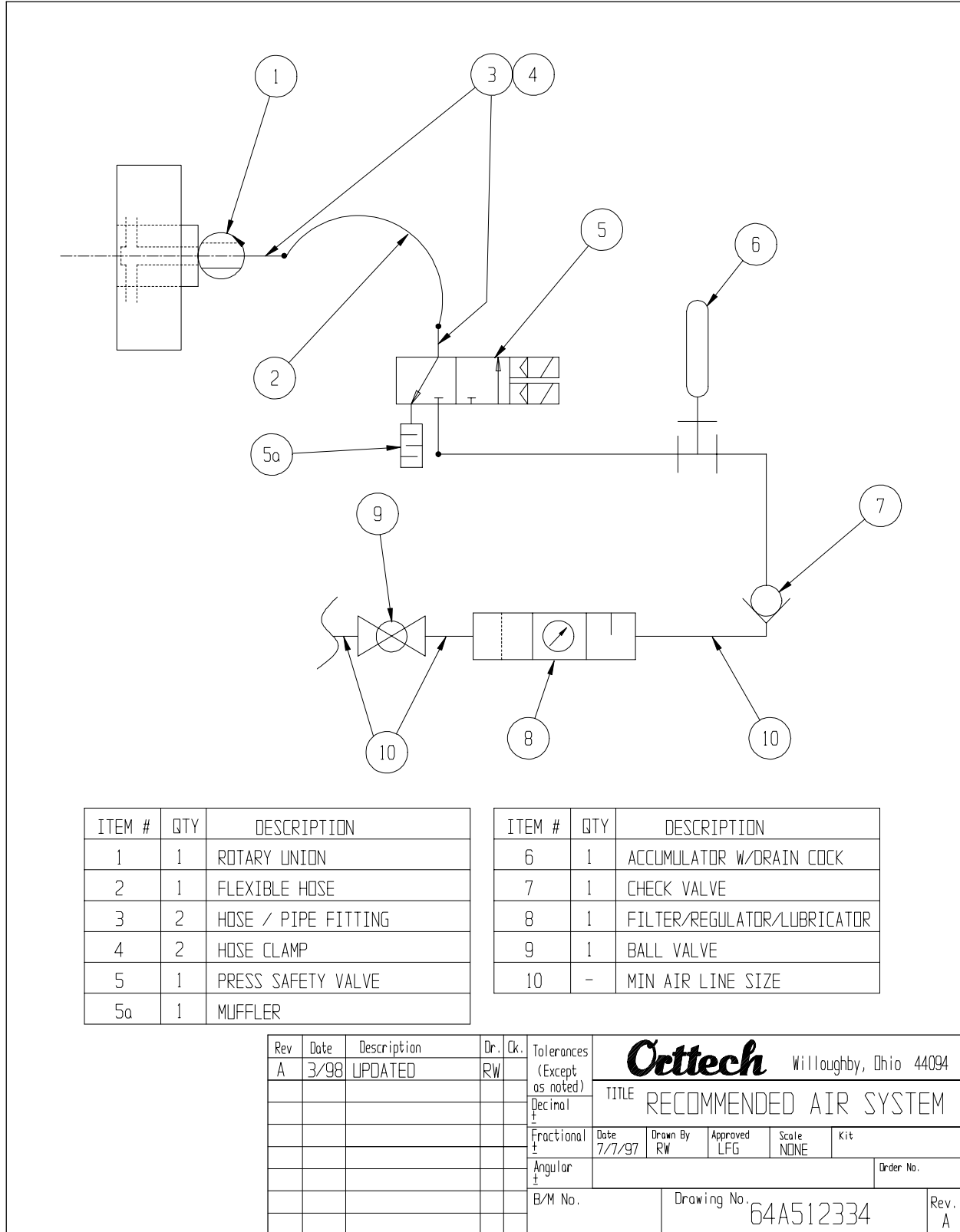
- **The operating valve** is to be properly sized for the clutch/brake, clutch, or brake being used. An undersized valve will give sluggish engagement and cause excessive slipping, leading to excessive heat buildup, and premature wear. The equipment builder/rebuilder/user must determine the type of valve used. Generally a Press Safety Valve (or Dual Valve) is required on press applications and similar equipment. Valve selection must take into account the applicable safety and regulatory guidelines and rules for the equipment it is to be used on.
- **The hose** used to connect the operating valve to the air inlet or rotary union is to be 2 to a maximum of 3 feet [0.6 to 1 meter] long, and of the proper inside diameter. Using a hose that is too long or too small in diameter will result in slower than normal engagement. Also, avoid the use of pipe and 90° elbows in this line.
- **Mufflers** used on the operating valve should be a low restriction design and properly sizes for the application. They should also be resistant to plugging. A restrictive, undersized, or plugged muffler can prevent full brake application, resulting in a hazardous situation.
- **Quick Exhaust Valves** are not generally recommended, as they will generally flow less air than a properly sized operating valve with the right diameter and length of hose. If a quick exhaust valve is to be used, it must have a flow coefficient equal to or greater than that of the proper size operating valve. The quick exhaust valve must be regularly inspected for leaks, as a leak when under pressure may cause a reduction in air pressure at the clutch/brake, clutch, or brake that may not be evident at the pressure gauge. A quick exhaust valve is not a substitute for a properly sized operating valve and hose.
- **The drilling in the shaft** must be of the correct size. Undersized passages in the shaft will cause sluggish operation. For mid-shaft installations where the length of the shaft drilling is greater than the length of the hose used from the operating valve to the rotary union, avoiding excessive air restriction is very important. Shaft air drilling must be generously sized, and the system from the operating valve to the rotary union must be properly sized and installed for optimum performance.

Undersize components, piping, or drilling and excessive line lengths can cause serious operational problems such as, but not limited to:

- Clutch slipping, overheating, and damage.
- Sluggish operation.
- Slow brake application.
- Short lining life.

***To summarize:***

**A properly designed and sized air system will allow the clutch/brake, clutch, or brake to perform as designed. In improper or insufficient air system will result in poor performance and shorter service life.**



ITEM #	QTY	DESCRIPTION
1	1	ROTARY UNION
2	1	FLEXIBLE HOSE
3	2	HOSE / PIPE FITTING
4	2	HOSE CLAMP
5	1	PRESS SAFETY VALVE
5a	1	MUFFLER

ITEM #	QTY	DESCRIPTION
6	1	ACCUMULATOR W/DRAIN COCK
7	1	CHECK VALVE
8	1	FILTER/REGULATOR/LUBRICATOR
9	1	BALL VALVE
10	-	MIN AIR LINE SIZE

Rev	Date	Description	Dr.	Ck.	Tolerances (Except as noted)	Orttech Willoughby, Ohio 44094					
A	3/98	UPDATED	RW			TITLE RECOMMENDED AIR SYSTEM					
					Decimal	Date	Drawn By	Approved	Scale	Kit	Order No.
					Fractional	7/7/97	RW	LFG	NONE		
					Angular	Drawing No. 64A512334					Rev. A
					B/M No.						

**Figure B1**  
**Typical Schematic for Air System**

It is important that the compressed air be free of dirt, dust, rust, scale, and excessive moisture that may condense during operation. If condensing moisture may be present in the compressed air it is mandatory that the air be lightly lubricated, as this will limit rust and corrosion and extend seal life. A good filter with 40 micron filtration, an accurate regulator, and a lubricator that can be adjusted for a very low oil rate are strongly recommended for most installations. See next page for air lubrication recommendations.

**Table B1**  
Air System Recommendations

0-420	C/B Size		Pipe & FRL Min Size	Nominal Valve Size	Dual Valve (PSV) Size		Rotary Union (NPT)	Accumulator (Min Gallons)
	0-406	0-400			Ross	Herion		
23	---	---	3/8"	3/8"	2 or 4	16	3/8"	3
29	---	---	3/8"	3/8"	2 or 4	16	3/8"	3
40	29	---	3/8"	3/8"	2 or 4	16	3/8"	3
50	40	---	1/2"	1/2"	8	20	1/2"	3
---	50	---	3/4"	3/4"	12 (3/4"Ports)	20 <sup>A</sup>	3/4"	3
61	---	---	3/4"	3/4"	12 (3/4"Ports)	20 <sup>A</sup>	3/4"	6
62	---	---	3/4"	3/4"	12 (3/4"Ports)	20 <sup>A</sup>	3/4"	6
67	---	---	3/4"	3/4"	12 (3/4"Ports)	32	3/4"	6
---	61	71	3/4"	3/4"	12 (3/4"Ports)	32	3/4"	12
72	---	74	1"	1"	12 (1"Ports)	32	1"	12
77	71	76	1"	1"	12 (1"Ports)	32	1"	15
80	76	79	1" <sup>B</sup>	1" <sup>B</sup>	12 (1-1/4"Ports)	32	1" <sup>B</sup>	17
83	79	82	1-1/2"	1-1/2"	30 (1-1/2"Ports)	50	1-1/2"	30
87	82	85	1-1/2" <sup>C</sup>	1-1/2" <sup>C</sup>	30 (1-1/2"Ports)	50	1-1/2" <sup>C</sup>	40
90	---	---	2"	2"	30 (1-1/2"Ports)	50	2"	40
91	90	---	2"	2"	30 (1-1/2"Ports)	50	2"	60
92	---	---	2"	2"	30 (1-1/2"Ports)	50	2"	60
93	---	---	2"	2"	30 (1-1/2"Ports)	50	2"	80

**Notes:**

- A. For single stroking applications use the "32" body size.
- B. For optimum performance in single stroking applications use the next larger size of air lines & components, valve, and rotary union (1-1/2").
- C. For optimum performance in single stroking applications use the next larger size of air lines & components, valve, and rotary union (2").

The data in this table is for normal conditions with proper installation. For severe conditions and rapid or very high cycle single stroking special care must be taken in the design of the air system. Please contact Orttech for further information on these types of applications.

## Additional Air System Information

If an accumulator is to be sized for a specific application, the following formula can be used:

$$V = (k * (C+B)) / 232 \quad \text{Where:}$$

V = Volume of accumulator in gallons

C = Cylinder volume of the clutch/brake, clutch, or brake used (in the worn condition).

B = The volume of air in the piping and shaft drilling between the clutch/brake, clutch, or brake and the operating valve.

k = The sizing factor, and is between 20 and 25.

The cylinder volume is listed in the catalog. Please note that C and B are to be in cubic inches for this formula, and that there are 232 cubic inches in a gallon.

If an air compressor is to be sized for an application, or if the air flow demand for an application is required, the following formula can be used:

$$Q = 1.5 * ((C + B) / 1728) * (P / 14.5) * Z \quad \text{Where}$$

Q = Volume of free air required in cubic feet per minute (CFM).

C = Cylinder volume of the clutch/brake, clutch, or brake used (in the worn condition).

B = The volume of air in the piping and shaft drilling between the clutch/brake, clutch, or brake and the operating valve.

P = The operating pressure of the clutch/brake, clutch, or brake in psi.

Z = The number of engagements per minute required.

The cylinder volume is listed in the catalog. Please note that C and B are to be in cubic inches for this formula. The factor 1.5 is an allowance for air leakage at connections and components. This may be increased or decreased based on the integrity of the particular air system.

When setting the oil flow rate of the air line lubricator, it is to be adjusted so that one drop of oil is delivered for about every 30 cubic feet (one cubic meter) of air used. An easy way to accomplish this is to disconnect the lubricator from the downstream equipment and install a plug with a 1/8" diameter drilled hole in it at the outlet of the lubricator. Then open the air supply, and at 70 to 80 psi adjust the lubricator so that it delivers about 1 to 1.5 drops of oil per minute. Close the air supply, remove the plug and reconnect the piping, then the system is ready for use. When doing this follow all safety precautions and procedures that are required. Do not aim the air stream at any person or equipment.