

VOITH TURBO



**I/H converters designed
for precise steam and
fuel valve control**

TURCON Model E360 I/H (Current-to-Pressure) Converters

Turcon stands for turbine control—and the Voith Turcon series of I/H (“current-to-pressure”) converters offer unsurpassed control of steam and fuel valve actuators. Although designed for turbine applications, the Voith converters can also be extremely effective in other process control situations.

The Turcon converter quickly and precisely changes a current input signal into a proportional fluid output pressure to regulate steam or fuel flow.

Voith I/H converters deliver extraordinary performance in a solid, compact design. All of the control electronics are safely housed within the unit for reliable functioning—even in harsh and XP environments. With just three moving parts, the Turcon I/H converter is an extremely reliable and durable “low-wear” assembly.



A typical installation in a cogeneration plant.



Minimum and maximum output pressures can be easily set externally.

Operating Principles

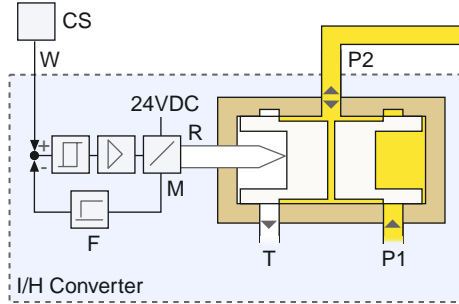
How the Turcon reliably converts a 4-20mA input signal into a proportional output hydraulic pressure...and “double-checks” for supremely accurate valve positions and turbine speeds:

At the core of the I/H converter is an electromagnet. A 24-volt DC current energizes the magnet, which in turn creates a force on the actuating rod. A 4-20mA input signal works with the unit's controller and amplifier to regulate this force. Any variation in the 4-20mA input signal affects the pressure being exerted by the magnet onto the actuating rod. The force applied to the actuating rod is used to precisely control a hydraulic piston, which opens and closes the consumer and drain ports.

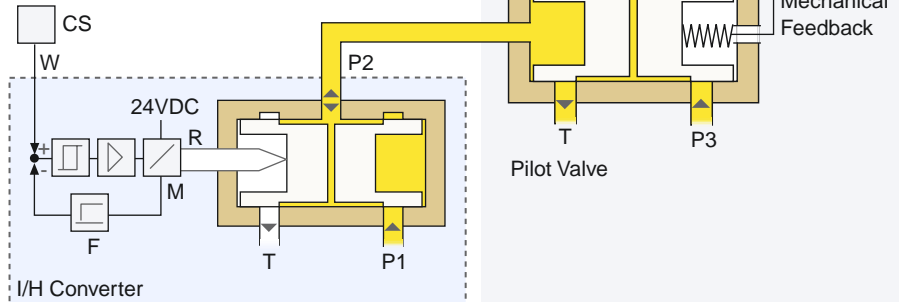
Here's how Voith's technology performs this operation with unsurpassed accuracy:

- 1 When the 4-20mA signal reaches the converter, its controller and amplifier adjust the magnetic force to a pressure directly proportional to the input signal.
- 2 This force is measured by a semiconductor which serves as the unit's magnetic force sensor/flux detector. Magnetic force lines penetrating this element produce a proportional output voltage (the “Hall effect”).
- 3 The output voltage is looped back to the converter's controller and compared to the set value, W. If the unit senses a difference between the input signal and the feedback signal, the controller and amplifier correct the magnetic force so that the difference is zero.
- 4 The magnetic force adjusts the actuating rod to the appropriate position with up to 90 lbs (400 N) of pressure.
- 5 As a result of this precise control technology, the I/H Converter's output line always contains the exact pressure needed to position the steam or fuel valve.

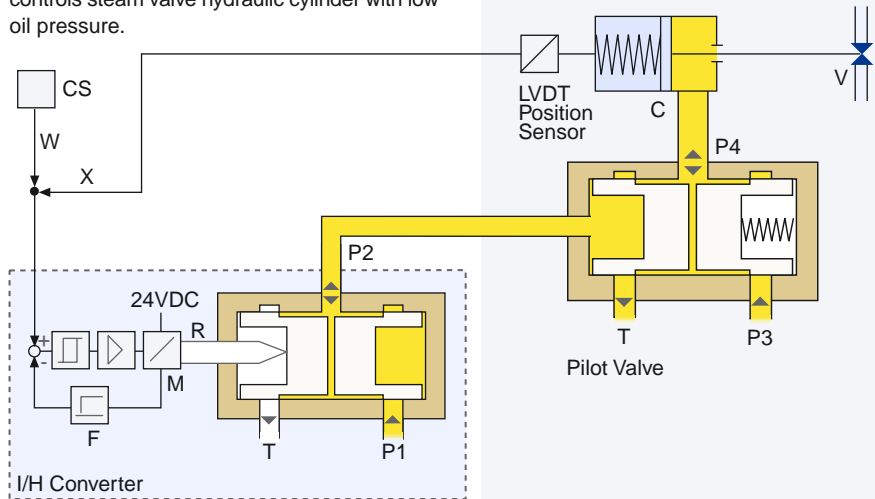
Application 1: Direct control of a hydraulic cylinder with low oil pressure.



Application 2: Operating pilot valve with mechanical feedback; no LVDT position sensor; controls steam valve hydraulic cylinder with low oil pressure.



Application 3: Operating pilot valve with electronic feedback; with LVDT position sensor; controls steam valve hydraulic cylinder with low oil pressure.



- [---] = I/H converter (Voith scope of supply)
- CS = Control station
- F = Magnetic force feedback
- M = Magnet
- P1, P3 = Hydraulic oil supply pressure
- P2 = Modulated oil pressure, pilot valve
- P4 = Modulated oil pressure, high volume
- R = Actuating rod
- C = Hydraulic cylinder
- T = Drain line
- V = Steam throttle valve
- W = Set value/input signal, 4-20 mA
- X = Actual value, 4-20 mA

Features

Unit is shown in typical mounting position, which is vertical, with hydraulic connections up.

1 Control Piston

2 Dual drain lines for higher maximum output drain rates (aids quicker shutdown)

3 Actuating rod

4 Connecting cable socket

5 All electronics are contained within the housing for protection against damage, radio interference, etc.

6 Flux detector

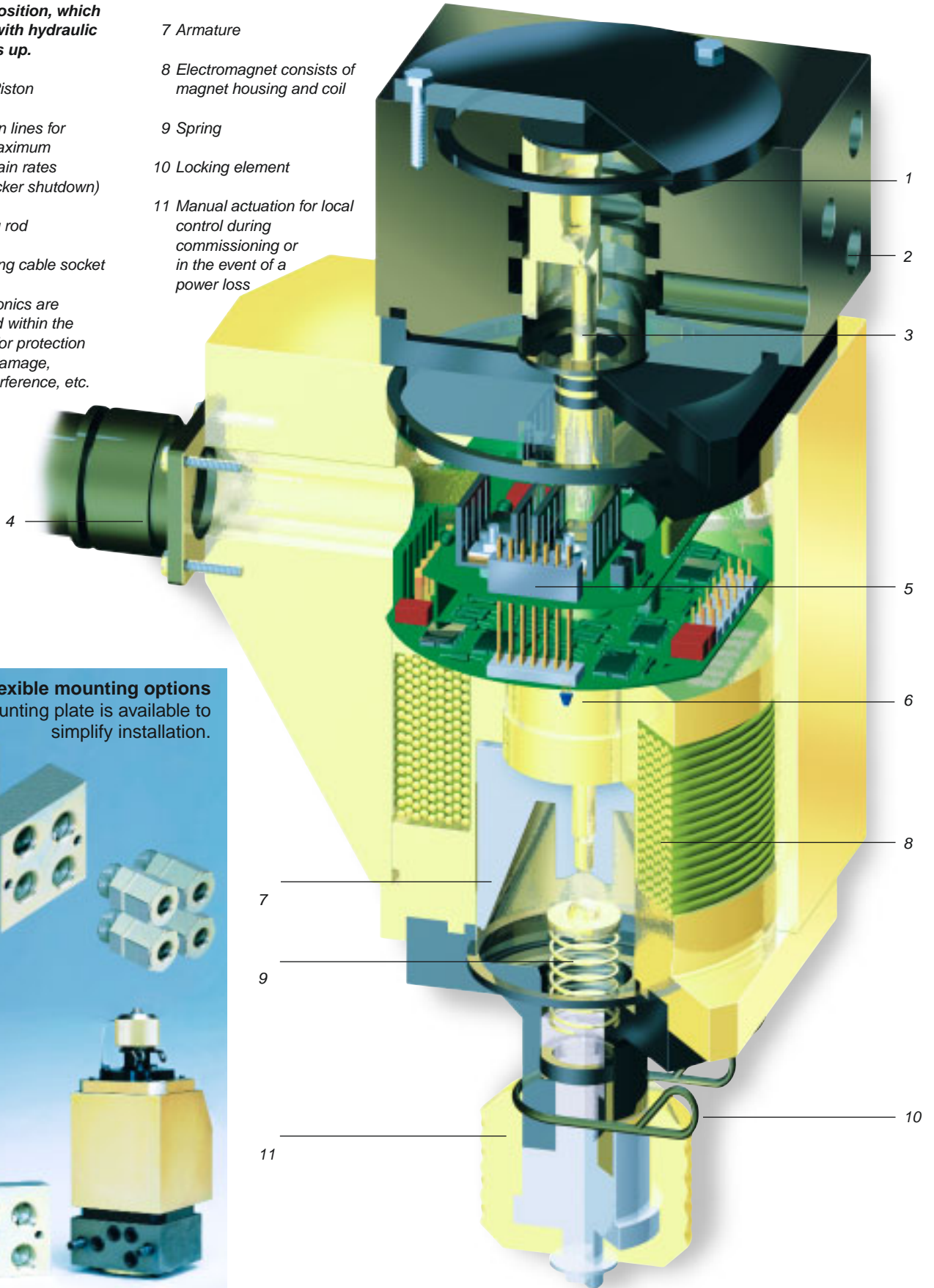
7 Armature

8 Electromagnet consists of magnet housing and coil

9 Spring

10 Locking element

11 Manual actuation for local control during commissioning or in the event of a power loss



Flexible mounting options

A mounting plate is available to simplify installation.

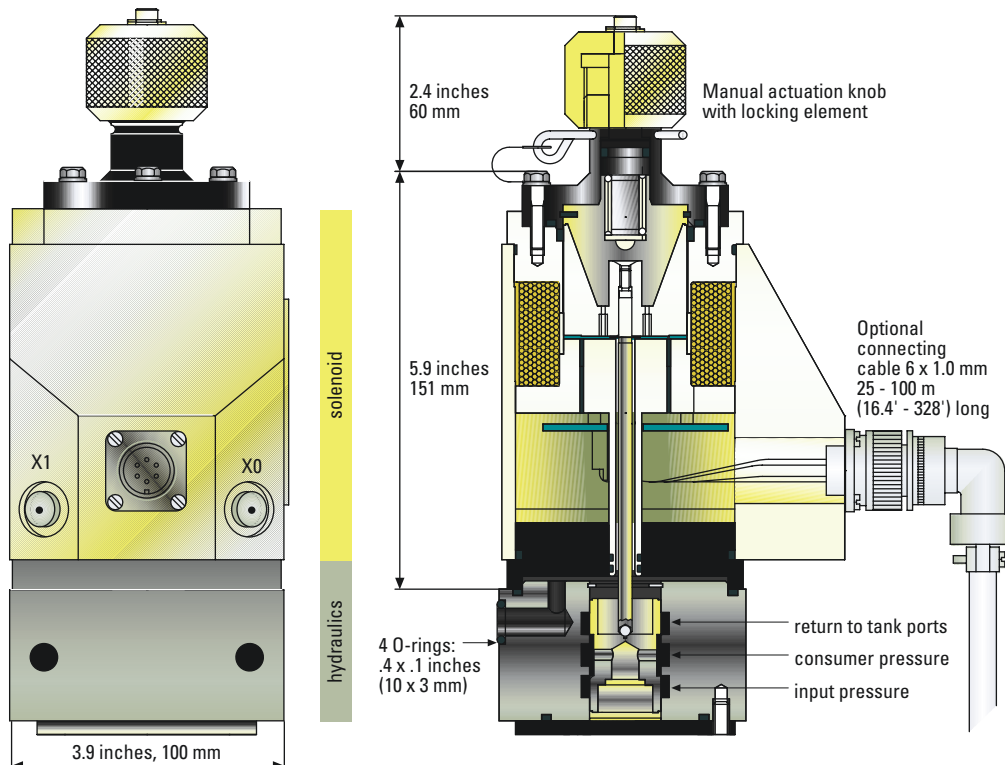


Advantages

- The unit's magnetic drive and the hydraulic section's pressure-reducing valve work together to function as a pressure-regulating valve.
- Dynamic and hysteresis-free
 - Resolution is better than 0.1%
 - Accuracy is not affected by air-gap, magnetic hysteresis, temperature, or fluctuations in supply voltage.
- Recommended oil cleanliness: to NAS1638 Class 7, or ISO 4406 Class 16/13.
- Short conversion time from mA input signal to proportional, stationary pressure ($t < 35$ msec.).
- Few electronic and mechanical parts ensure full functionality in harsh environments.
- All electronics for the I/H converter are integrated in the housing.
- Design withstands higher input pressure (pressure ranges available from 0 to 3000 psi).
- Standard and explosion-proof designs are available.
- In the version incorporating a PID controller, you can compensate for pipeline pressure losses. This optional design also allows for control of valve positions and turbine RPM.
- Hydraulic damping is available for vibration-critical applications

Dimensions

Standard I/H Converter with Manual Actuation



Voith Value

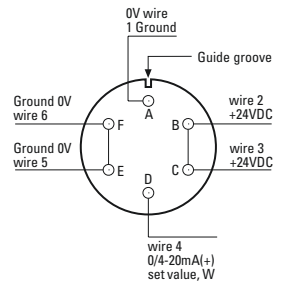
In addition to being the most rugged I/H converter on the market, the Voith Turcon series is also the most economical.

Here are a few of the ways Voith adds value:

- Competitive pricing
- Simple installation: just connect and start (No costs associated with on-site commissioning.)
- Uses turbine oil as hydraulic fluid with no additional filter required.
- Serves as an extremely cost-effective alternative for retrofitting and modernizing older mechanical/hydraulic control and regulatory systems.

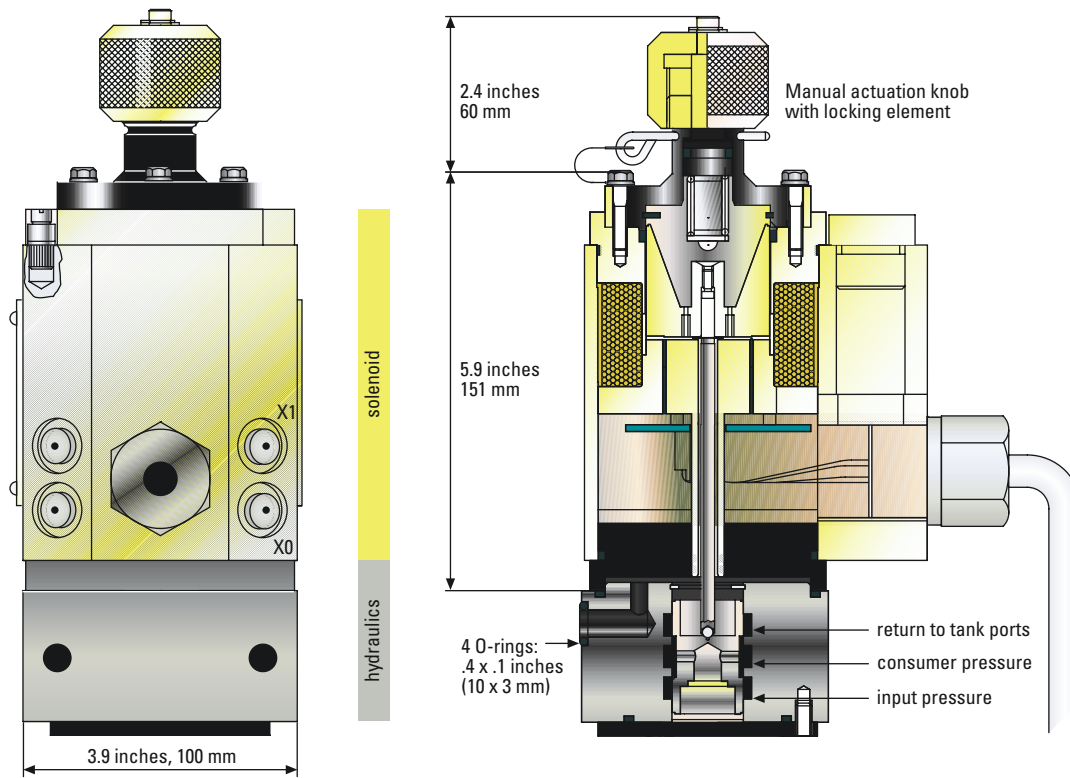


Unit employs simple, industry-standard connections.



Dimensions

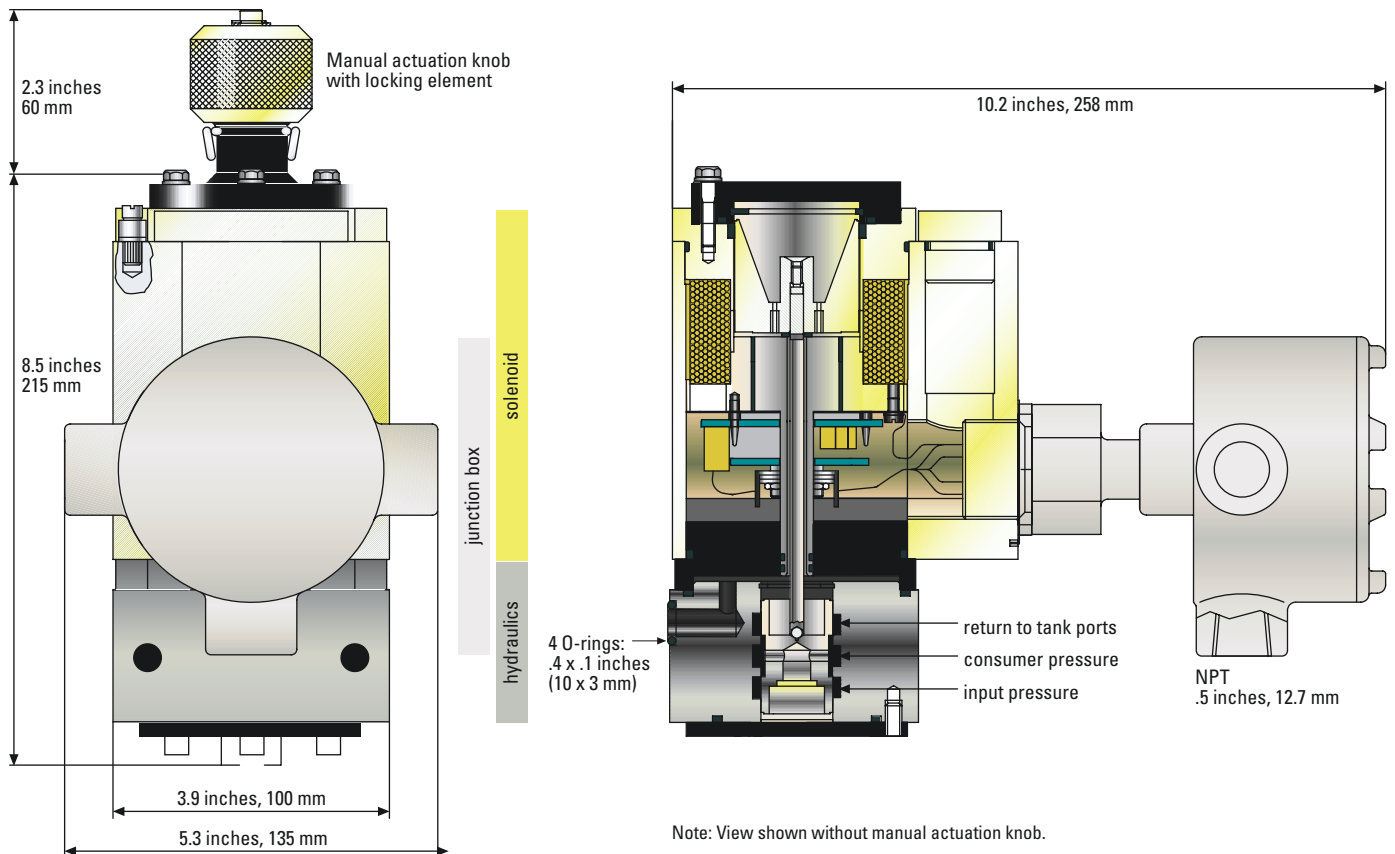
Explosion-proof design for EEx D IIC T4 service (PTB No. Ex-90.C.1065)



Typical XP version compared to a standard Voith I/H converter.

Standard cable length: 16.4 feet (5 meters)

Explosion-proof design for Class I, Divisions 1 & 2, Groups B, C, and D service (FM/CSA)



Speed and Accuracy

Here's proof of the extraordinary speed and accuracy of the Turcon I/H converters:

- Reproducibility < 0.1%
- Accuracy < 1%
- No drift
- Resolution is better than 0.1%
- Hysteresis-free
- Does not generate static friction during operation.
- Minimum pressure differential (AP) = 22 psi (1.5bar).
- Accuracy is not affected by air-gap, magnetic hysteresis, temperature, or fluctuations in supply voltage.
- Faster response time
 - Short conversion time for proportional stationary pressure (t < 35 msec.)
 - Rapid closedown, which includes internal oil circulation (≤ 0.1 second)

Selection Table

Regulating range	Manual Actuation		Piston Damping		I/H Converter type		Maximum Input Pressure*	Flow rate to consumer Δ p=1 bar	Flow rate to drain Δ p=1 bar
	with	without	with	without	standard	explosionproof			
	0 – 72.5 psi		■		■	DSG-B05102			
0 – 5 bar	■			■	DSG-B05112	DSG-B05212	40 bar	18.6 l/min	20.5 l/min
		■	■		DSG-B05103	DSG-B05203			
	■		■		DSG-B05113	DSG-B05213			
14.5 – 101.5 psi		■		■	DSG-B07102	DSG-B07202	580 psi	4.9 GPM	5.4 GPM
1 – 7 bar	■			■	DSG-B07112	DSG-B07212	40 bar	18.6 l/min	20.5 l/min
		■	■		DSG-B07103	DSG-B07203			
	■		■		DSG-B07113	DSG-B07213			
0 – 145 psi		■		■	DSG-B10102	DSG-B10202	580 psi	4.4 GPM	4.9 GPM
0 – 10 bar	■			■	DSG-B10112	DSG-B10212	40 bar	16.8 l/min	18.8 l/min
		■	■		DSG-B10103	DSG-B10203			
	■		■		DSG-B10113	DSG-B10213			
14.5 – 203 psi		■		■	DSG-B14102	DSG-B14202	580 psi	4.4 GPM	4.9 GPM
1 – 14 bar	■			■	DSG-B14112	DSG-B14212	40 bar	16.8 l/min	18.8 l/min
		■	■		DSG-B14103	DSG-B14203			
	■		■		DSG-B14113	DSG-B14213			
0 – 290 psi		■		■	DSG-B20102	DSG-B20202	870 psi	2.5 GPM	2.1 GPM
0 – 20 bar	■			■	DSG-B20112	DSG-B20212	60 bar	9.8 l/min	12.0 l/min
		■	■		DSG-B20103	DSG-B20203			
	■		■		DSG-B20113	DSG-B20213			
0 – 430 psi		■		■	DSG-B30102	DSG-B30202	580 psi	5.4 GPM	5.8 GPM
0 – 30 bar	■			■	DSG-B30112	DSG-B30212	40 bar	20.5 l/min	22.3 l/min
		■	■		DSG-B30103	DSG-B30203			
	■		■		DSG-B30113	DSG-B30213			

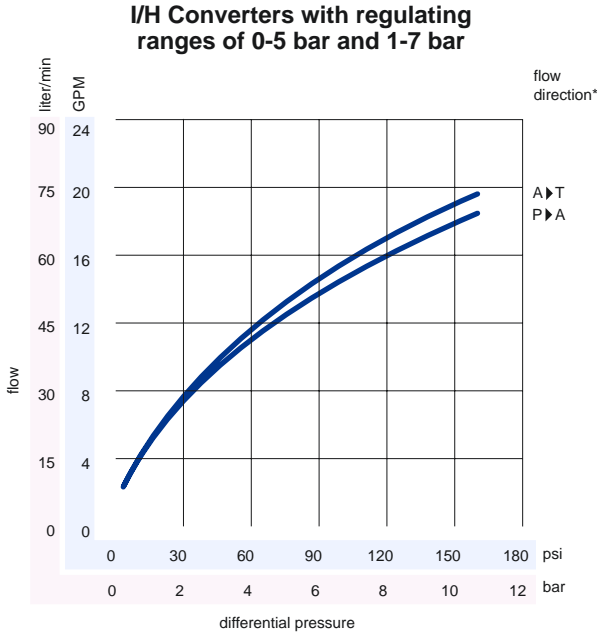
Notes:

1. Further pressure ranges available upon request
2. I/H Converter weight: approximately 22 lbs. (10 kg) for all models.
- *3. Maximum input pressure for FM/CSA - approved converters is 19 bar (275.5 psi).

Performance & Frequency Response

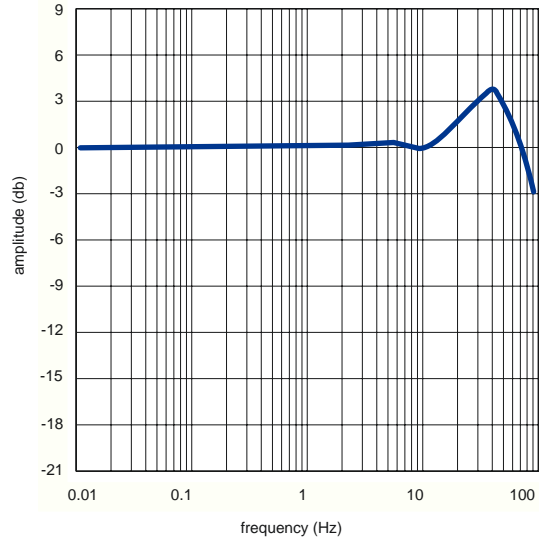
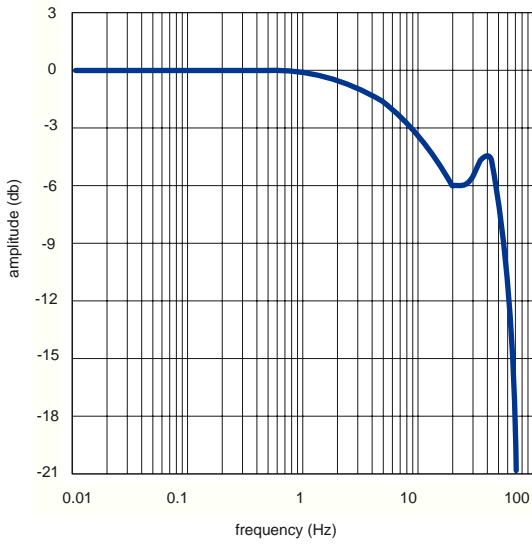
(See corresponding selection table on page 6.)

Flow Vs. Differential Pressure

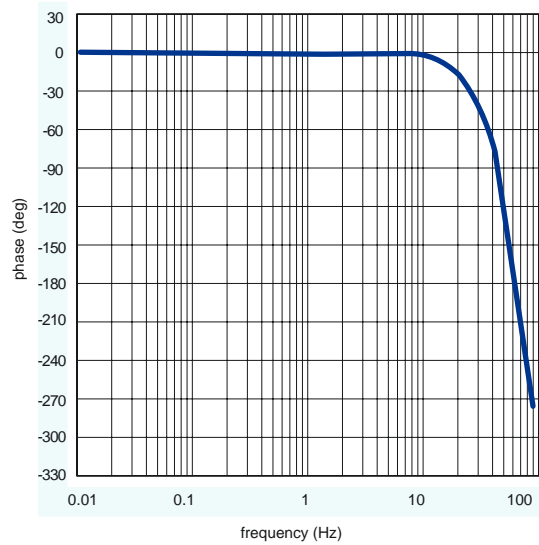
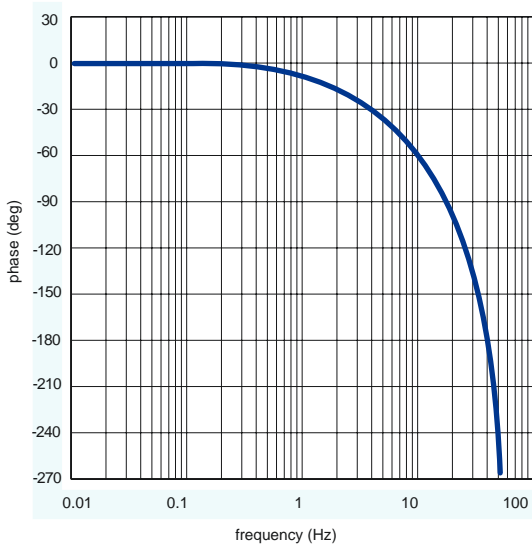


*A to T = Flow direction from output to drain; P to A = Flow direction from oil supply to output / consumer; hydraulic oil: Teresso 46 (at 40°C)

Amplitude

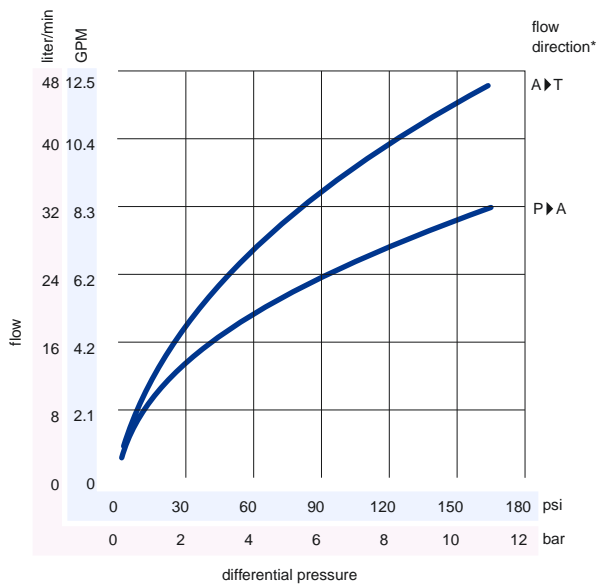


Phase

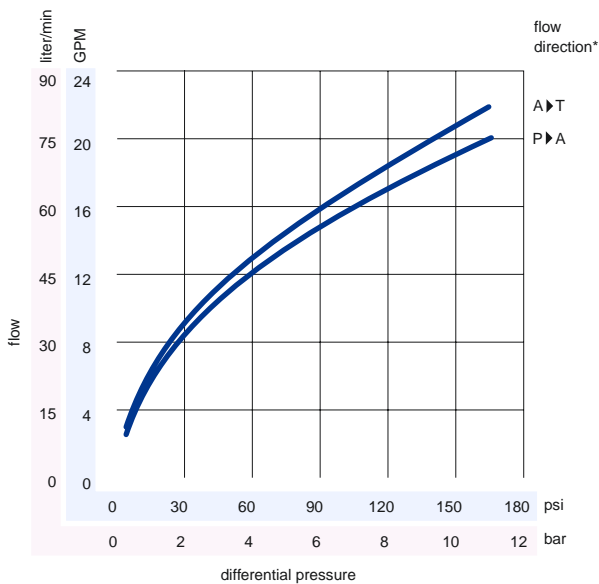


Flow Vs. Differential Pressure

I/H Converters with regulating range of 0-20 bar

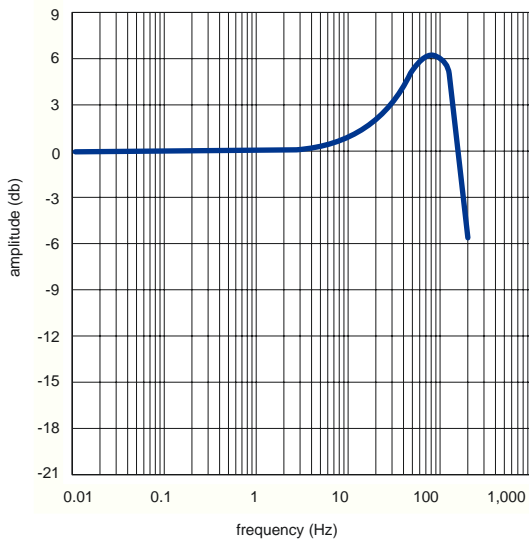
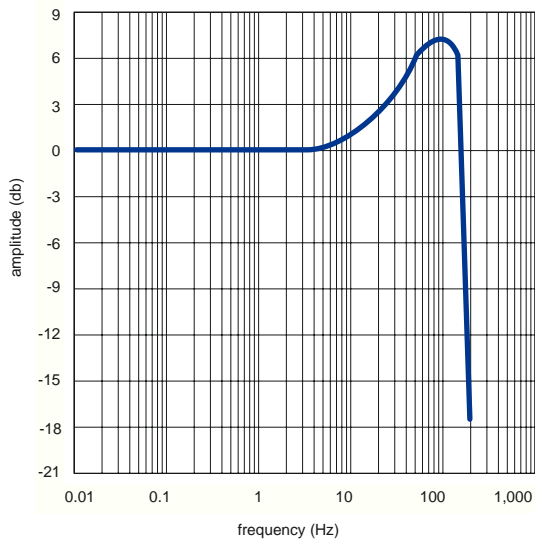


I/H Converters with regulating range of 0-30 bar

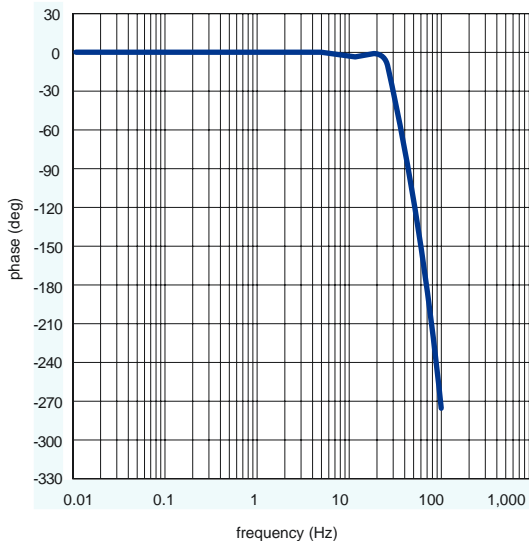
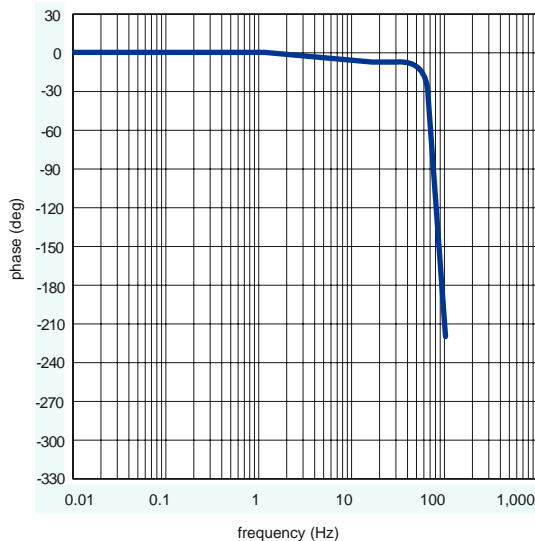


*A to T = Flow direction from output to drain; P to A = Flow direction from oil supply to output / consumer; hydraulic oil: Teresso 46 (at 40°C)

Amplitude



Phase



A history of bringing technological advancement to industries worldwide



Voith Turbo, Crailsheim, Germany



Voith Transmissions, Inc., York, Pennsylvania

Voith Turbo GmbH is the world leader for turbo couplings, hydrodynamic variable-speed drives, and industrial torque converters. Established in 1956, the company now has 1,000 employees producing world-class drive systems in a 484,000 square-foot facility.

The North American operations of Voith Transmissions, Inc. (VTI), established in 1976, now encompass a facility in York, Pennsylvania, and a West Coast plant in Sacramento.

Turcon I/H converters are just a small part of the range of products handled by VTI. Other current product lines include linear and electrohydraulic actuators for turbo-machinery fuel control, torque converters, gas turbine starting systems, universal joints, hydrostatic pumps, constant and variable-speed fluid couplings, and bus and light rail transmissions.

All these products receive exceptional support through our service program. Voith customers can rely on prompt responses from knowledgeable factory service technicians. Our newly expanded service area performs expert repair and upgrading. And with more than 40,000 square feet of inventory, Voith can quickly ship spare parts from three distribution centers in the U.S. and Canada.

VTI is part of the Voith Group of Companies, a world leader in power transmission, paper technology, and fluid machinery for more than half a century. The Voith organization has grown to employ more than 13,000 employees in more than 30 locations worldwide. And for consistently high performance throughout the organization, all Voith manufacturing facilities are ISO certified.

Voith: setting world standards of quality, precision, and innovation.

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VOITH
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