1 YEAR
WARRANTY

User's Guide

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FTB600B Series
Ultra-Low Flow Sensors

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NOTES:

IMPORTANT: READ INSTRUCTIONS THOROUGHLY BEFORE INSTALLING FLOW METER

Section 1 - Introduction

A. General Description

The FTB600B Series is an axial paddle wheel turbine type flow meter based on the pelton wheel principle. This unique patented design makes the FTB600B Series a very accurate, repeatable, linear device. Not only is the FTB600B Series precise, but it is also a rugged, trouble-free flow meter, which can be used in a wide variety of industries including: medical, pharmaceutical, chemical processing, pulp & paper, semiconductor, biotech, agriculture etc.

B. Principle of Operation

Fluid flows through the meter, first passing through a helical nozzle, which causes flow to spiral, rotating in a helical pattern. The spiraling fluid then impacts on the flat blade rotor causing the rotor to spin. The rotor is designed to immediately develop a rotation-induced friction free fluid bearing, thus eliminating any potential bearing wear. An infrared electro-optical transmitter and receiver is molded into the body of the meter along with a pair of miniature circuit boards, providing voltage stabilizers.* This design inherently bleeds off entrained gas, improving the accuracy of the meter.

* Clear, transparent & translucent fluids; must transmit infrared light.

C. Material Characteristics of PVDF

(Polyvinylidene Fluoride)

1. Material of construction

Trade name - Kynar

All wetted parts of the FTB600B Series are PVDF, excluding the O-ring. Wetted parts include any part of the meter that will or could come in contact with the fluid.

List of wetted parts:

1. Barbed fittings
2. Flow meter body
3. Rotor
4. Helical nozzle (Viton O-ring seal)
5. End caps
6. Strainer
7. Bearings

2. Chemical Composition

Polyvinylidene Fluoride is a fluorpolymer consisting of three basic materials (carbon, hydrogen and fluorine)

3. Effects of Various Fluids

a . Weak acids - no effects

b. Strong acids - attacked by fuming sulfuric & nitric acids at high temperature.

c. Weak alkalis - no effects

d. Strong alkalis - no effects

e. Organic solvents - Resistant to most. Slight attack by some. Imbrittled by some amines, keystone and esters.

Section 2. - Operating Parameters

A. Temperature

Since the FTB600B Series has printed circuit boards molded into the body of the meter it is strongly recommended that 180°F not be exceeded. Exceeding 180°F can cause irreparable damage to the circuit boards.

B. Flow Ranges

The FTB600B Series is available in six different sizes, which cover a flow range from 0.1 to 120 lpm.

Specific flow ranges

FTB601B	0.1 to 2 lpm	(0.03 to 0.53 gpm)
FTB602B	0.3 to 9 lpm	(0.08 to 2.38 gpm)
FTB603B	0.5 to 15 lpm	(0.13 to 3.96 gpm)
FTB604B	1.0 to 30 lpm	(0.26 to 7.93 gpm)
FTB605B	2.5 to 75 lpm	(0.66 to 19.8 gpm)
FTB606B	4.0 to 120 lpm	(1.32 to 32 gpm)

WARNING

Over range may permanently damage the flow meter.

FTB600B Series
Operation Parameters

C. Recommended Viscosity

Range 1-5 cSt (w/o correction)

The effects of changing viscosity on the FTB600B Series are the same as any other turbine flow meter. It is important to remember that a turbine meter is a viscosity dependent device, where as the viscosity increases the linearity of the flow meter will decrease. (Water like viscosities are ideally suited for use with the FTB600B Series) The FTB600B Series is factory calibrated with water.

Correction procedure for higher viscosity

For viscosities greater than 5 cSt consult the factory. The FTB600B Series can be used on fluids greater than 5 cSt. however, the K-factor (linearity) will change. This requires a recalibration of the FTB600B Series at the known viscosity to determine the new KFactor.

D. Filter Recommendations

Meter	Micron	Mesh
FTB601B	35	400
FTB602B	50	300
FTB603B	100	80
FTB604B	100	80
FTB605B	100	80
FTB606B	100	80

Section 3 - Silicone Treatment

Silicone treatment is standard for all types of the FTB600B Series series electronics.

Section 4 - Infrared Sensor

A. Supply Voltage

24 Vdc. Do not exceed 24 Vdc. Doing so can cause overheating and eventual failure of all PC boards. Printed circuit boards are non-repairable.

B. Frequency Output

1. Square wave pulse, unscaled (See Figure 4-1)
2. Output impedance 75 ohms
3. Directly proportional to flow rate
4. Output - dc frequency
5. Offset 0.64 volts
6. Peak voltage = Supply voltage - 1.2 volts
7. Peak to peak voltage Supply voltage - 1.2 volts - 0.64 volts
8. Output signal cycle 66.7% (i.e. at 100 Hz there is a 6 millisecond “on” time and a 4 millisecond “off” time)
9. TTL/CMOS circuit compatibility. The FTB600B Series has an operational amplifier output, which has a high input impedance and a low output impedance.

C. Frequency Ranges for

(non-cartridge models) pulses/l

Model	Frequency (Hz)	K-Factor
FTB601B	60 to 1200	36,000
FTB602B	40 to 1200	8,000
FTB603B	27 to 800	3,200
FTB604B	20 to 600	1,200
FTB605B	18.75 to 562	450
FTB606B	15 to 450	225

D. Cable Requirements

1. 20 to 22 AWG (American Wire Gauge)
2. 4 conductor-shielded cable.

NOTE

Avoid influences of strong electromagnetic forces as they can damage components on the PC boards.

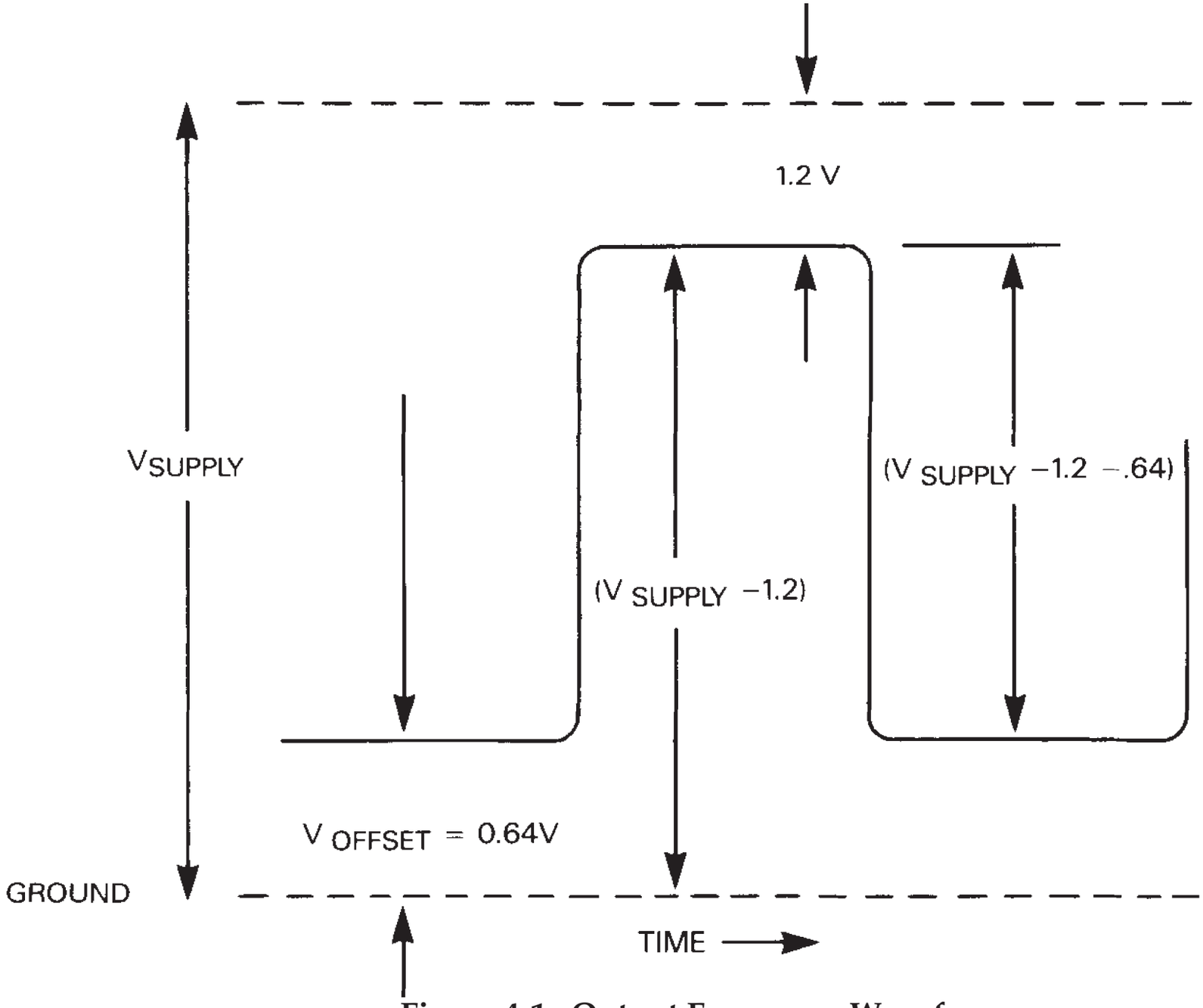


Figure 4-1. Output Frequency Waveforms

Section 5 - Installing the FTB600B Series in the fluid line.

A. Make sure the fluid is compatible with PVDF (polyvinylidene fluoride) and meets viscosity, pressure and temperature parameters of the FTB600B Series. The fluid must also meet filtration requirements as listed in 3D.

B. Install the FTB600B series in the fluid line with the arrow pointing in the direction of the flow.

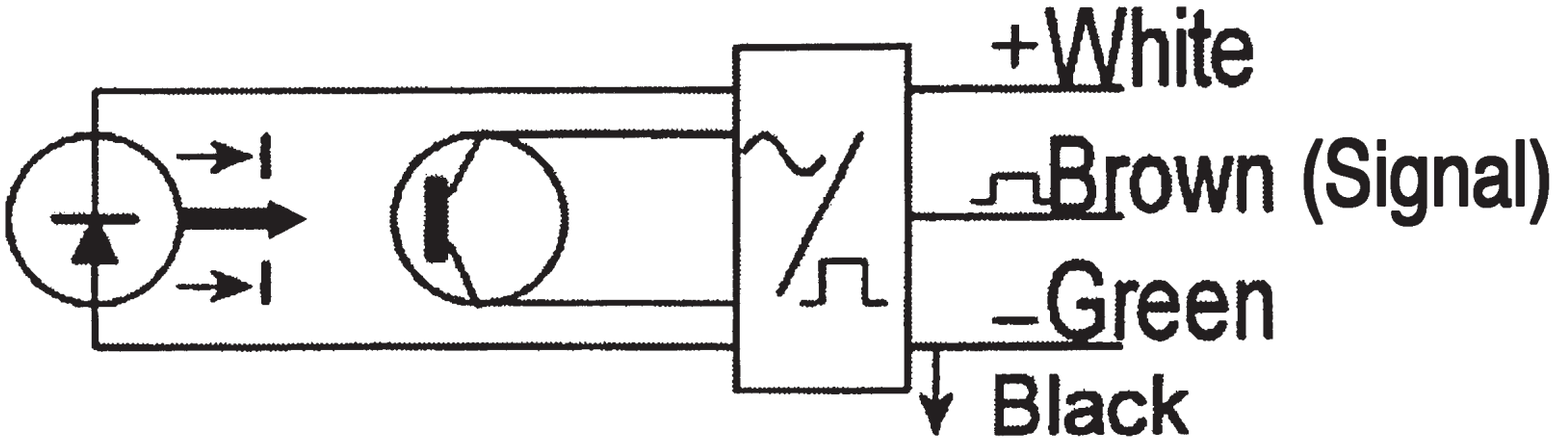
C. While installing the FTB600B Series in the fluid line be careful not to over-torque the end caps (on hose-barbed flowmeters) or other fittings on the flowmeter. Due to the relatively soft composition of PVDF the body or threads can be permanently distorted.

D. Attach wires to the readout display with the display and power off. Not only will this help to avoid a potential shock hazard, but it can also help prevent an error in hooking the flow meter to an incorrect 115 Vac supply.

E. Connect digital display to power supply and enter scaling factors for both the rate and total. Follow the manufacturers instructions for programming the digital display.

F. The FTB600B Series is now ready for use.

G. See Table 5-1 for straight pipe recommendations.



Black is used to pull down 'green' to zero if necessary by connecting to ground

Figure 5-1. Supply Voltage and Signal Output Connections

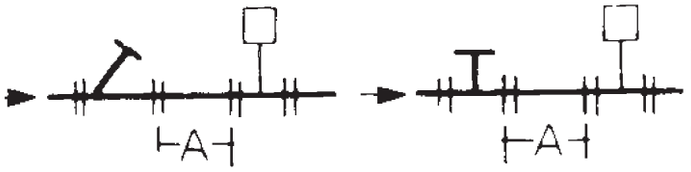
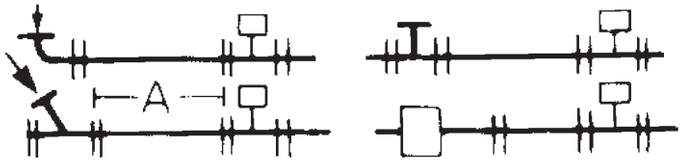
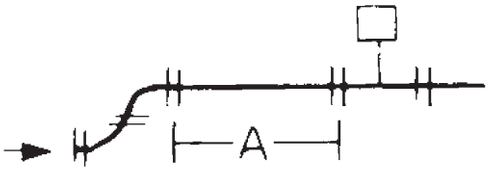
	Typical Piping	Recommended Straight Pipe Length "A"		Remarks
		Without Vanes	With Vanes	
All Fittings in Same Plane		15D	15D	Closed branch
		20D	15D	Elbow, Tee, Branch pipe
		25D	15D	Elbow, 2 planes
		25D	15D	Long-radius bends

Table 5-1. Piping Table

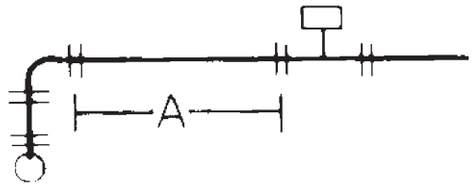
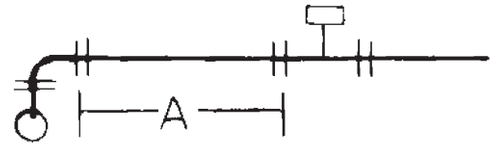
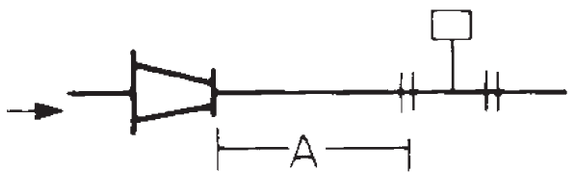
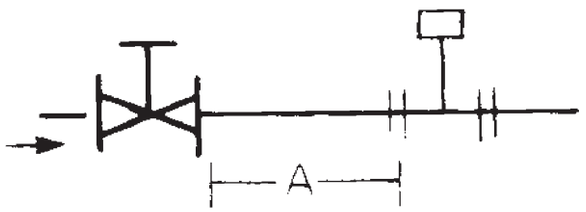
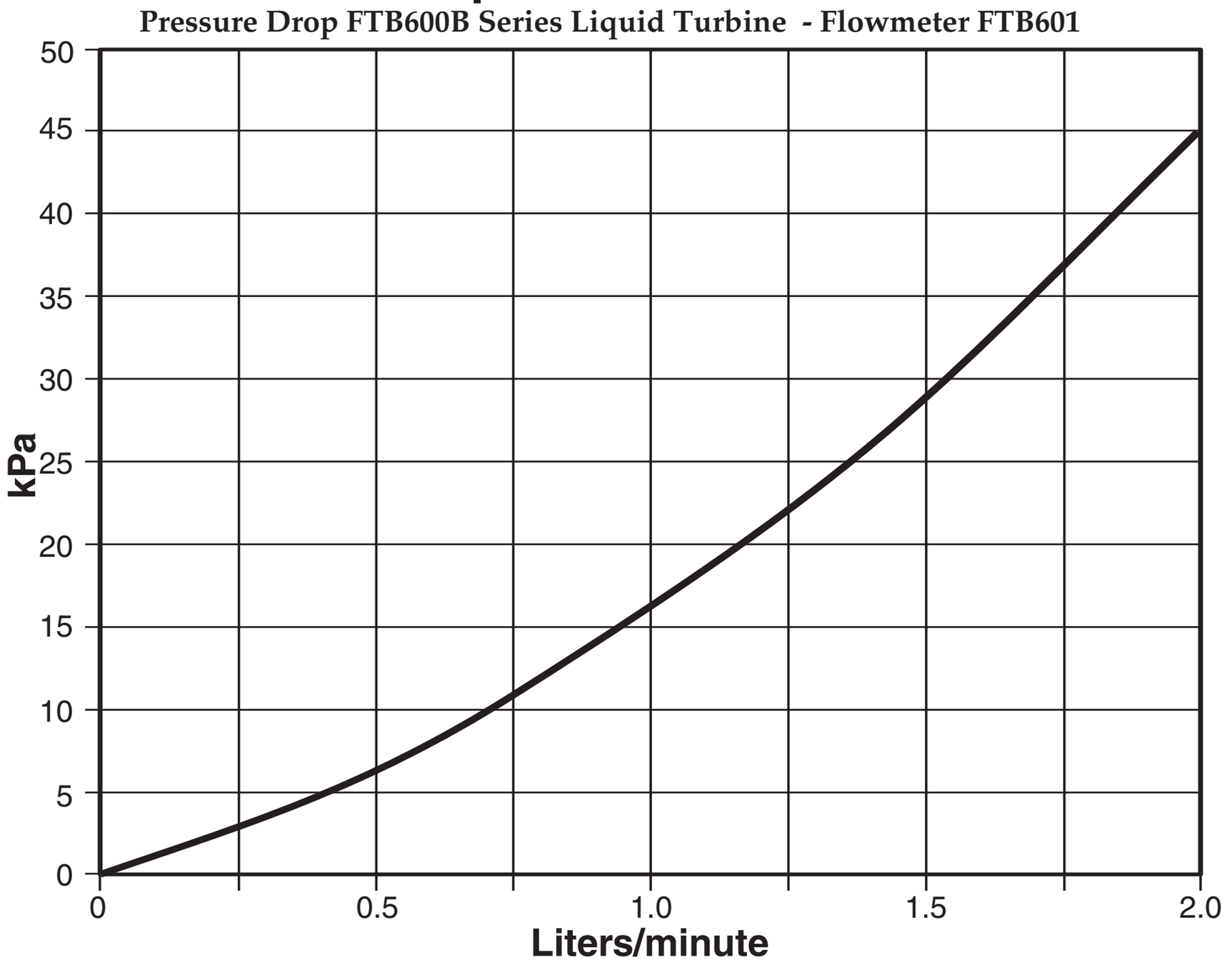
Fittings in Two Planes		30D 25D	15D 15D	Elbow Long-radius bends
		40D 35D	20D 20D	Elbow Long-radius bends
Varied Section		20D	15D	Contracting pipe
		40D	20D	Expanding pipe
Valves		Recommend Meter Be Installed Upstream		Regulating, reducing valves Ball, check valves Shut-off valve

Table 5-1. Piping Table Con't.

Section 6 - Specifications

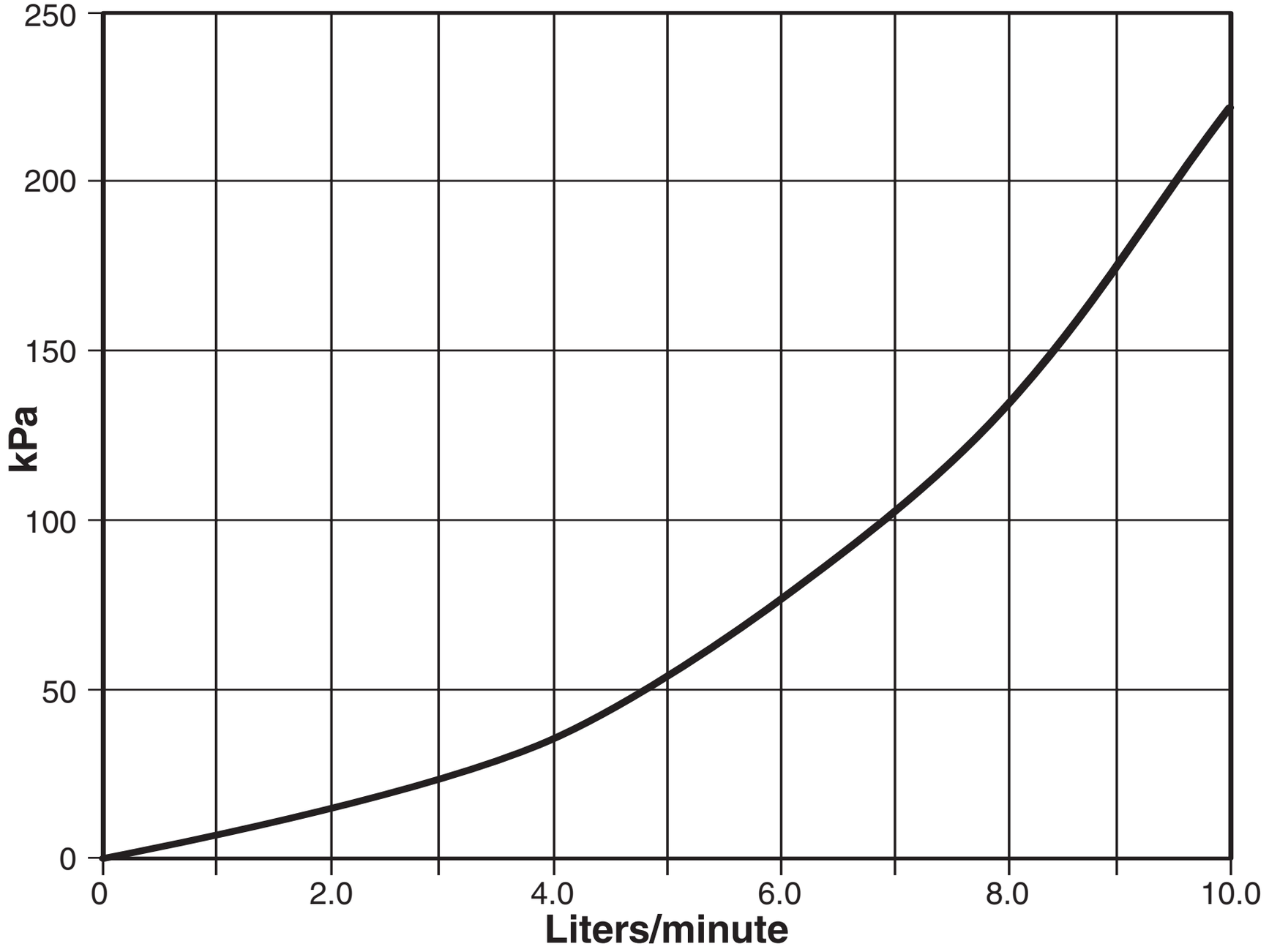
Accuracy:	±3% of reading
Repeatability:	±0.1% of reading
Linearity:	±1% of reading
Viscosity Range:	1 to 15 centistokes
Working Pressure:	150 PSIG at 175°F
Wetted Materials:	PVDF
Power Supply:	5 to 18 Vdc, 6 to 33 mA
Output Signal:	Unscaled square wave
Pressure Drop:	See Section 7

Section 7 - Pressure Drop Curves

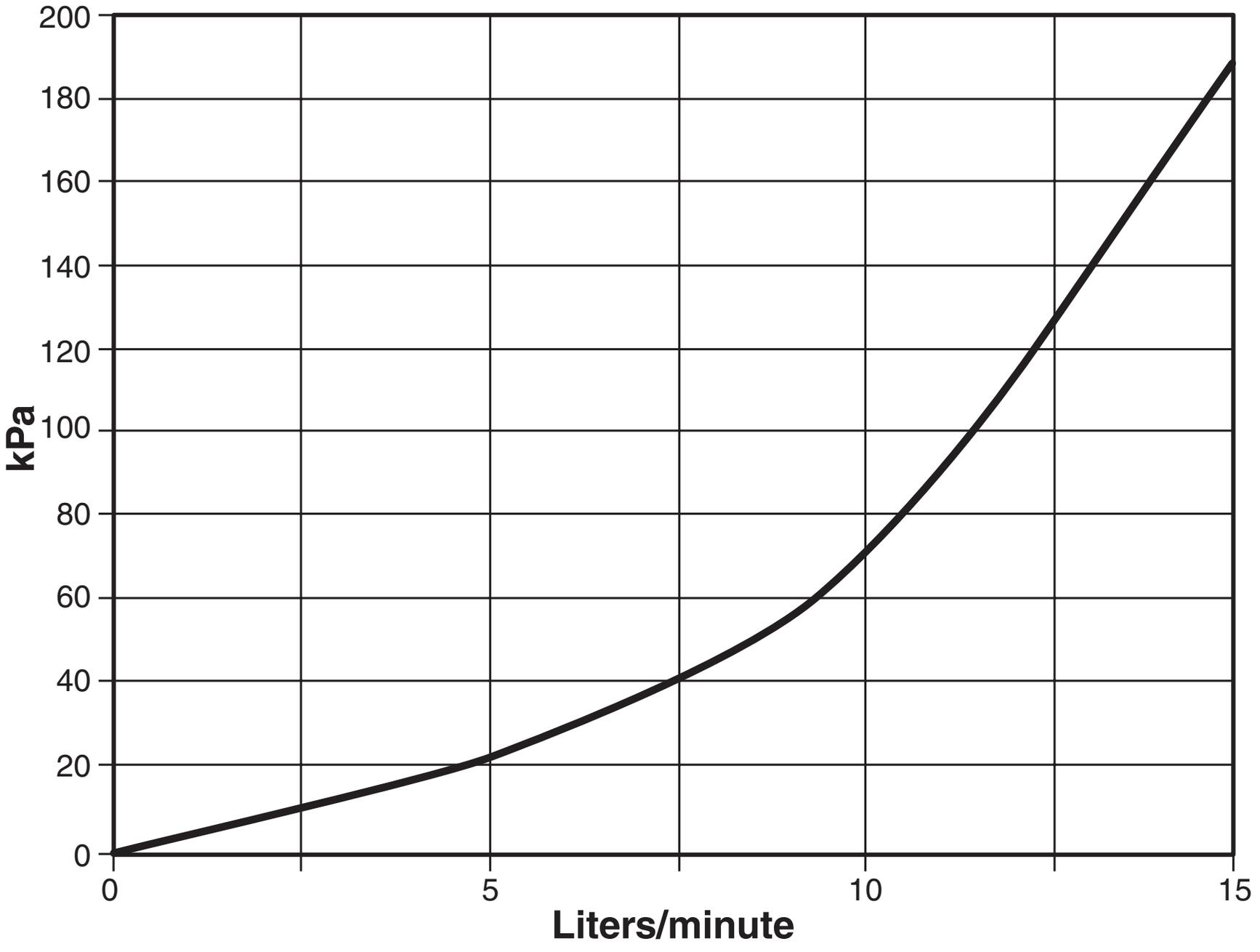


FTB600B Series
Pressure Drop Curves

Pressure Drop FTB600B Series Liquid Turbine - Flowmeter FTB602

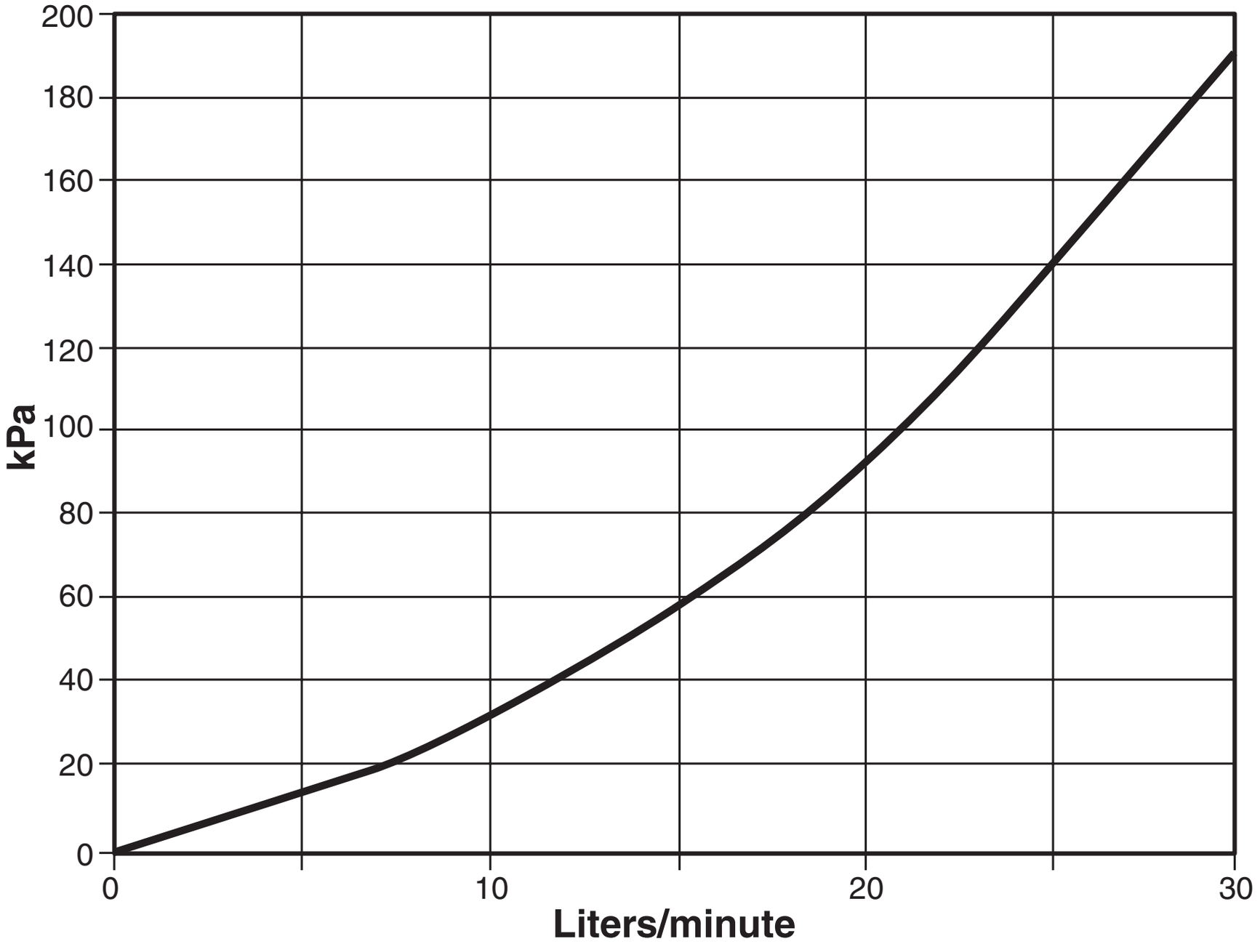


Pressure Drop FTB600B Series Liquid Turbine - Flowmeter FTB603

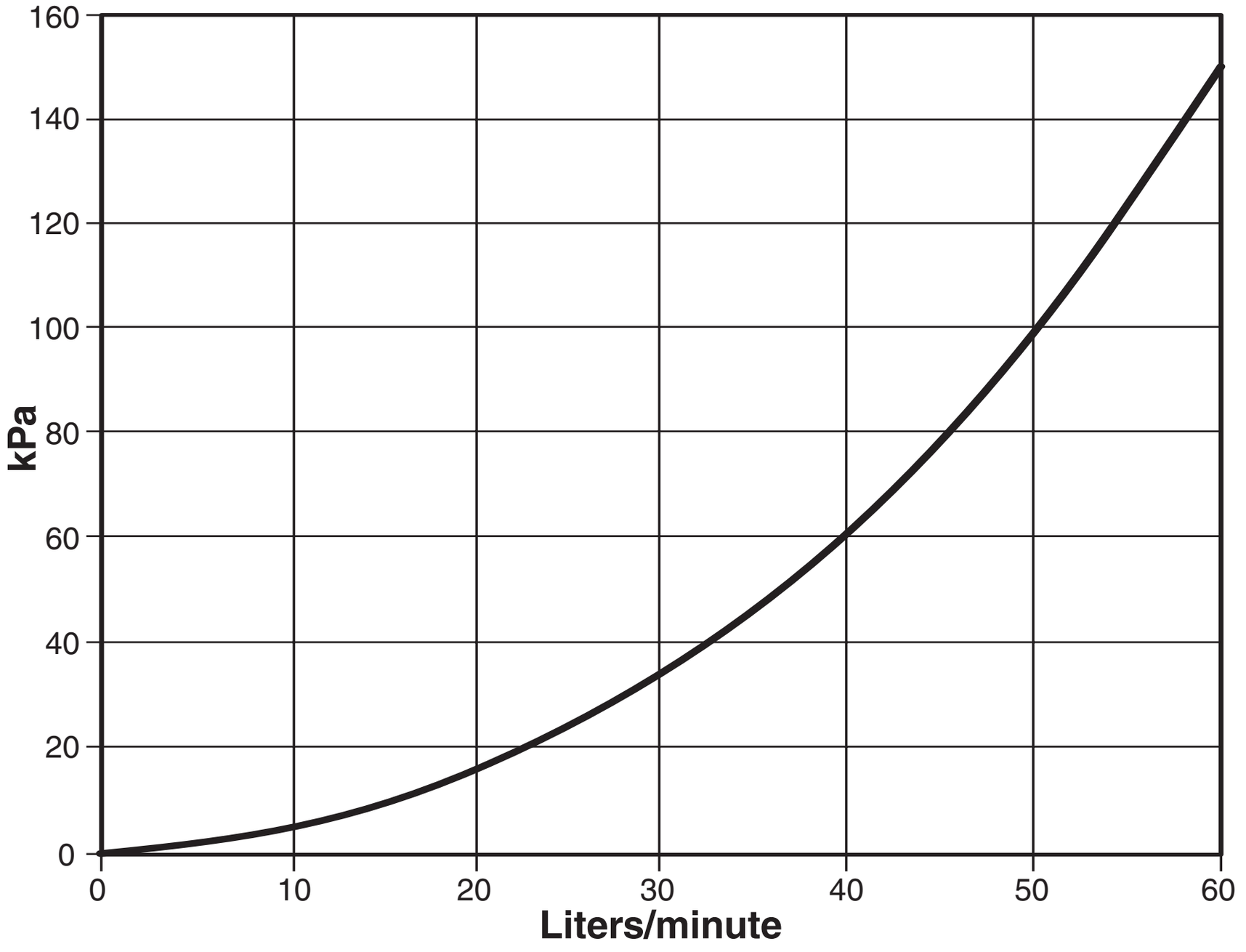


FTB600B Series
Pressure Drop Curves

Pressure Drop FTB600B Series Liquid Turbine - Flowmeter FTB604

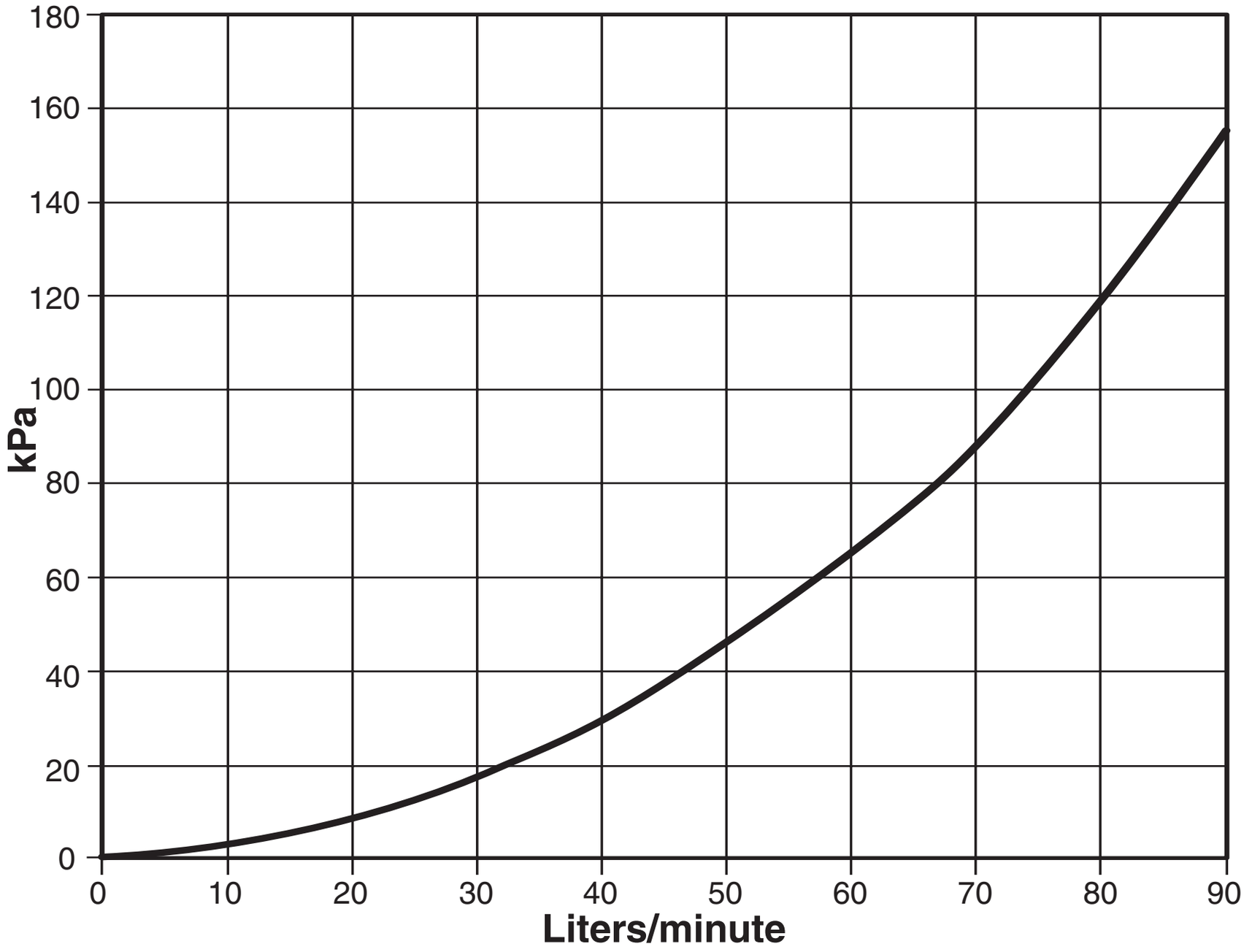


Pressure Drop FTB600B Series Liquid Turbine - Flowmeter FTB605A



FTB600B Series
Pressure Drop Curves

Pressure Drop FTB600B Series Liquid Turbine - Flowmeter FTB606A



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