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WARRANTY

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FTB600B Series
Ultra-Low Flow Sensors

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FTB600B Series
Ultra-Low Flow Sensors

IMPORTANT: READ INSTRUCTIONS THOROUGHLY BEFORE INSTALLING FLOW METER

Section 1 - Description

A. General Description

The FTB600B is an axial paddle wheel turbine type flow meter based on the Pelton wheel principle. This unique patented design makes the FTB600B a very accurate, repeatable, linear device. Not only is the FTB600B 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, semi-conductor, 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 are molded into the body of the meter along with a pair of miniature circuit boards, providing voltage stabilizers. The wave length of the infrared light is approx. 85 nm.*

This design inherently bleeds off entrained gas, improving the accuracy

of the meter. It also eliminates the need for flow straighteners or special lengths of inlet piping to stabilize turbulent flow.

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

Section 2 - Material Characteristics

A. Material of Construction

Chemical name: Polyvinylidene Fluoride

Trade name – Solef

All wetted parts of the FTB600B 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. End caps
3. Flow meter body
4. Strainer
5. Rotor
6. Bearings
7. Helical nozzle (FMK O-ring seal)

B. Chemical Compatibility

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

C. Chemical Compatibility

Always verify chemical compatibility of wetted materials against your application

D. Effects of Various Fluids

- Weak acids – no effects
- Strong acids – attacked by fuming sulfuric & nitric acids at high temperature
- Weak alkalis – no effects
- Strong alkalis – no effects
- Organic solvents – Resistant to most. Slight attack by some. Imbrittled by some amines, keystone and esters. (Ref: Compass Corrosion Guide II)

Section 3 - Operation Parameters

A. Temperature

Since the FTB600B 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 is available in six different sizes, which cover a flow range from 0.1 – 120 lpm (0.3 – 32 gpm)

Specific flow ranges

Size: 0.1 – 2 lpm (.03 – 0.53 gpm)

Size: 0.3 – 9 lpm (.08 – 2.38 gpm)

Size: 0.5 – 15 lpm (.13 – 3.96 gpm)

Size: 1.0 – 30 lpm (.26 – 7.93 gpm)

Size: 2.5 – 75 lpm (.66 – 19.8 gpm)

Size: 4.0 – 120 lpm (1.06 – 32 gpm)

Consult factory for specific applications requiring an extended flow range. Warning: Over range may permanently damage the flow meter.

C. Recommended Viscosity

Range 1-5 cSt (w/o correction) The effects of changing viscosity on the FTB600B 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) The FTB600B is factory calibrated with water.

Correction procedure for higher viscosity

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

D. Filter Recommendations

Meter	Micron	Mesh
Size 1:	35	400
Size 2:	50	300
Size 3:	100	80
Size 4:	100	80
Size 5:	100	80
Size 6:	100	80

FTB600B sizes 2 – 6 are fitted with strainers* to help protect against dirt, fiber and other contaminants. Due to space restrictions it is not possible to fit size 1 with a strainer. Removal of the strainer will reduce pressure drop through the flow meter and may also change the linearity of the meter to solid contaminant, which could damage the meter. * The strainer is a 30 mesh filter / 550 micrometer. Cartridge models have no strainer.

E. Cleaning

1. Steam cleaning

Steam sterilization is not possible with FTB600B due to the high temperature of the steam. Steam sterilization will permanently damage the flow meter bearings and printed circuit boards.

2. Chemical cleaning Chemical cleaning the FTB600B is permissible, provided the chemicals are compatible with PVDF (polyvinylidene fluoride).

3. Bi-directional flow

The FTB600B is designed to only provide fluid readings in the forward flow direction. Reverse flow will not unduly restrict fluid flow.

Section 4 - Silicone Treatment

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

Section 5 - Infrared Sensor

A. Supply Voltage

5 – 12 Vdc (6 – 33 mA) or 8 – 24 Vdc (18 – 30 mA). Do not exceed 12 / 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
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 100Hz there is a 6 millisecond “on” time and a 4 millisecond “off” time)
9. TTL/CMOS circuit compatibility. The FTB600B has an operational amplifier output, which has high input impedance and low output impedance.

C. Frequency Ranges:

Model	Freq.(Hz)	K-Factor (1/l)
Size 1:	60 – 1200	36000
Size 2:	40 – 1200	8000
Size 3:	26.66 – 800	3200
Size 4:	20 – 600	1200
Size 5:	18.75 – 562	450
Size 6:	15 – 450	225 Non-cartridge models only

D. Cable Requirements

1. 20 – 22 AWG (American Wire Gauge)

2. 4 conductor-shielded cable.

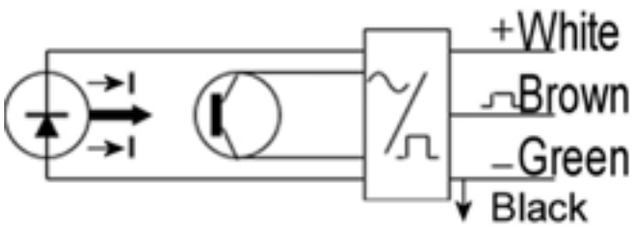
NOTE

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

Section 6 - Installing the FTB600B

- Make sure the fluid is compatible with PVDF (polyvinylidene fluoride) and meets viscosity, pressure and temperature parameters of the FTB600B. The fluid must also meet filtration requirements as listed in 3D.
- Install the FTB600B in the fluid line with the arrow pointing in the direction of the flow.
- While installing the FTB600B 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.
- 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.
- Connect digital display to power supply and enter scaling factors for both the rate and total. Follow the manufacturer's instructions for programming the digital display.
- The FTB600B is now ready for use.

Supply Voltage and Signal Output Connections



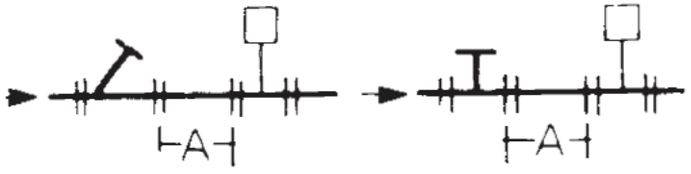
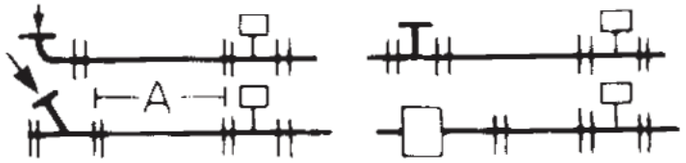
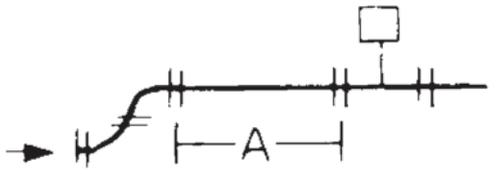
	Typical Piping	Recommended Straight Pipe Length "A"		Remarks
		Without Vanes	With Vanes	
All Fittings In Same Plane		15D	15D	Closed Branch
		20D	15D	Elbow, Tee, Branch Pipe
		25D	15D	Elbow, 2 Planes
		25D	15D	Long-radius Bends

Table 6-1. Piping Table

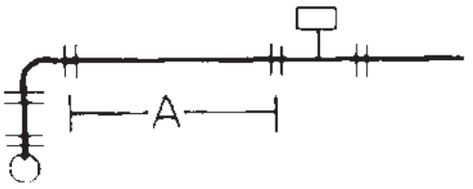
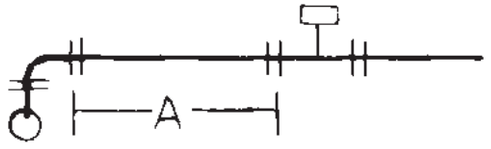
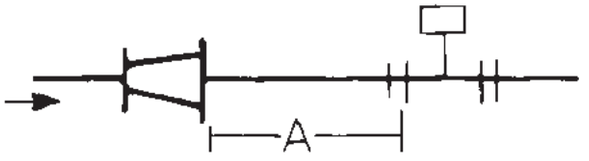
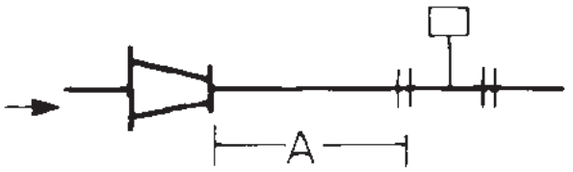
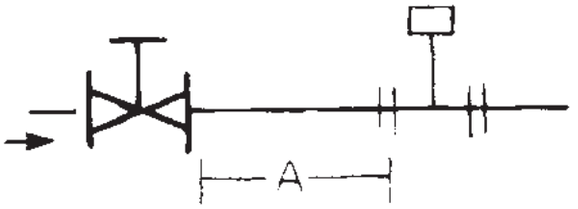
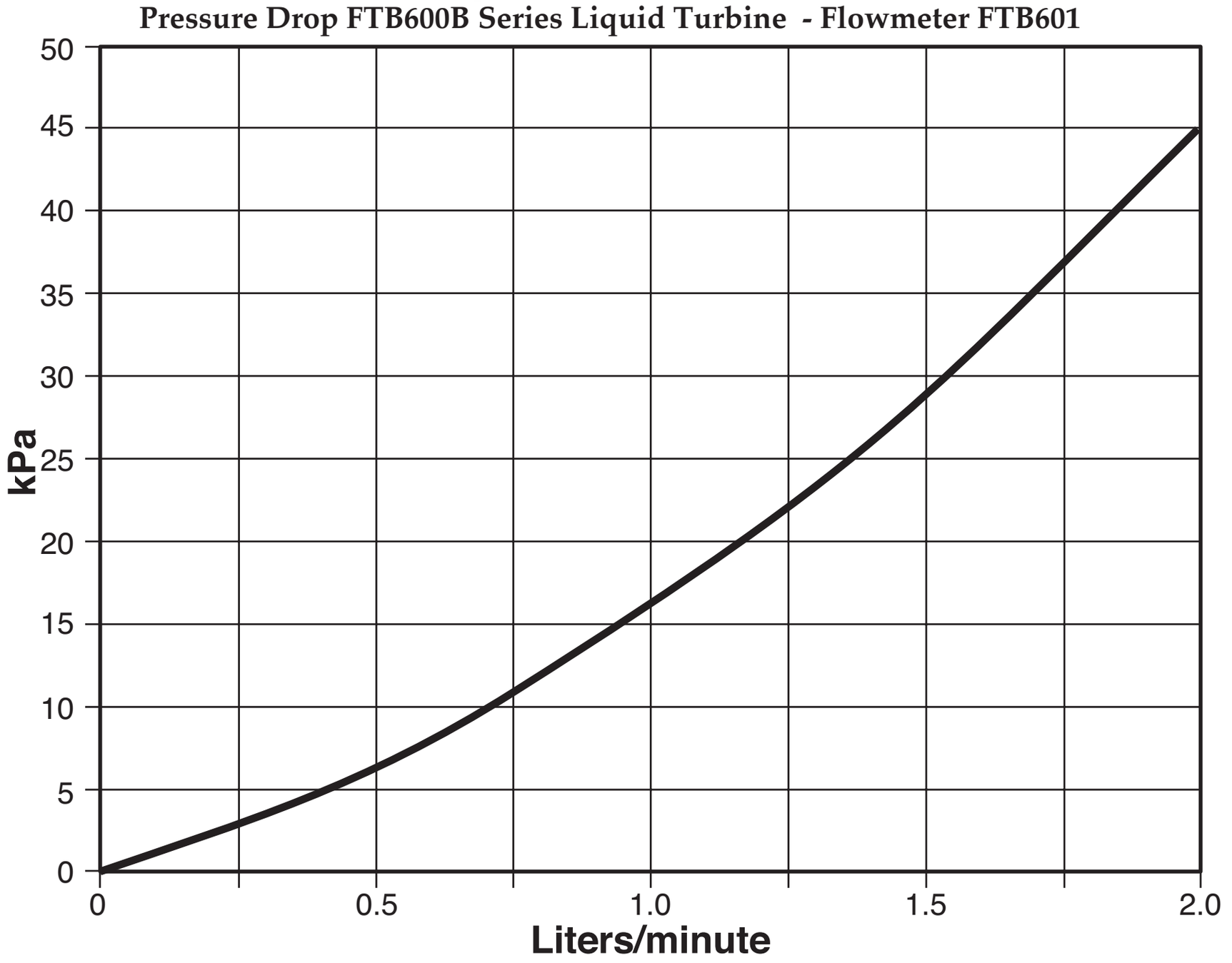
Fittings in Two Planes		30D 25D	15D 15D	Elbow Long-radius bends
		40D 35D	20D 20D	Elbow Long-radius bends
Varied Section		20D	15D	Contracting pipe
		40D	20D	Expanding pipe
Valves		Recommend Meter Be Installed Upstream		Regulating, reducing valves Ball, check valves Shut-off valve

Table 6-1. Piping Table Con't.

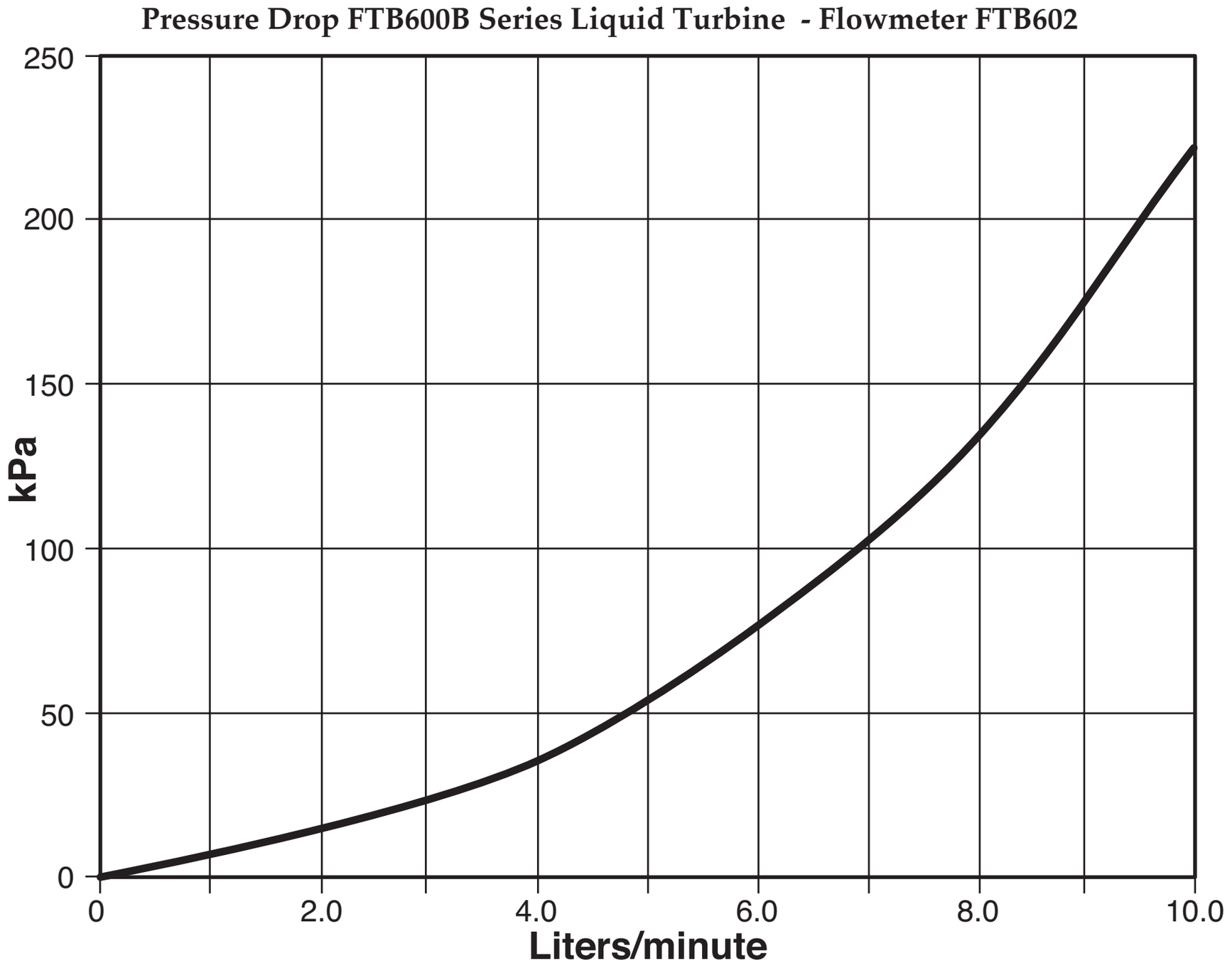
Section 7 - Specifications

Accuracy:	±1% 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 8

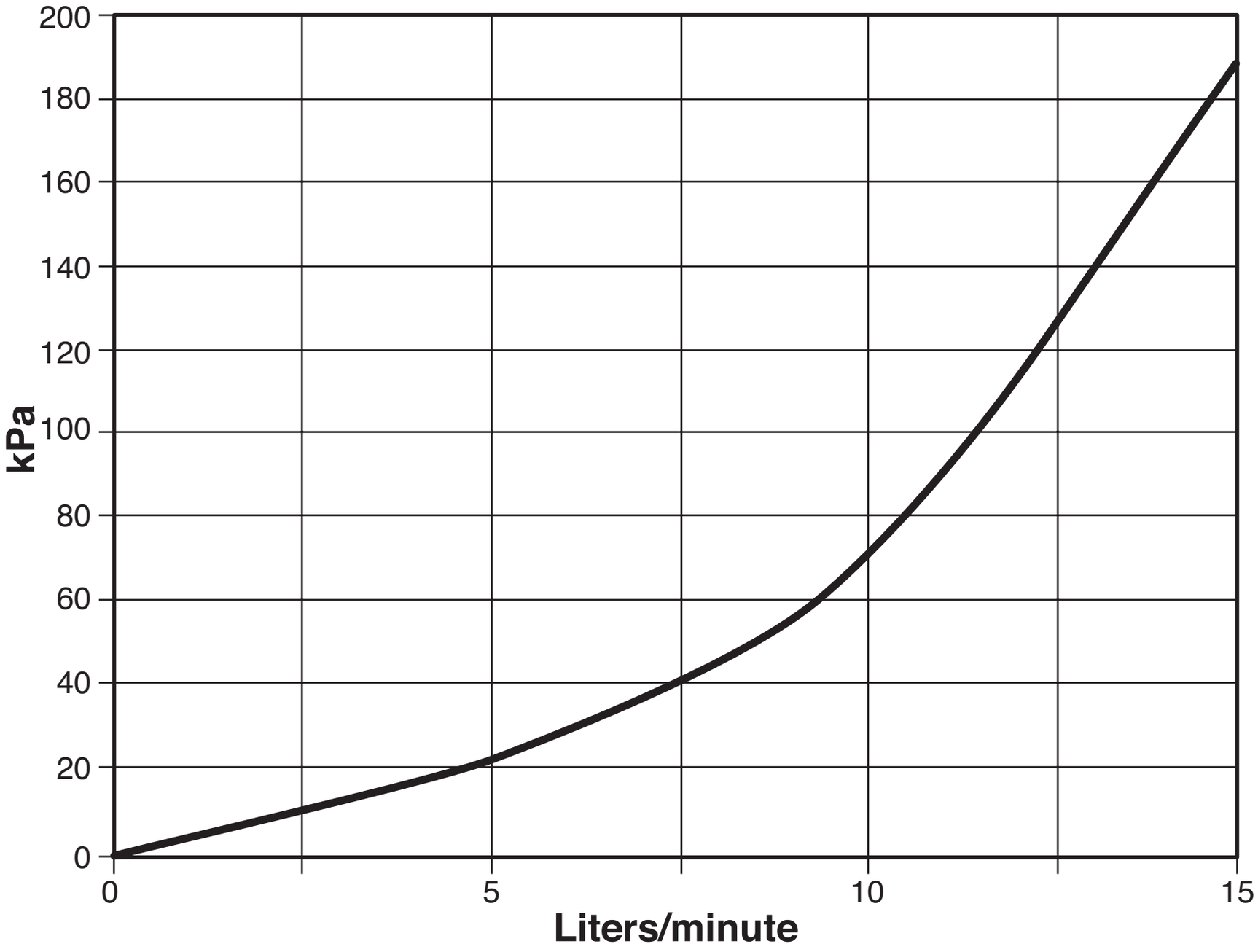
Section 8 - Pressure Drop Curves



FTB600B Series
Pressure Drop Curves

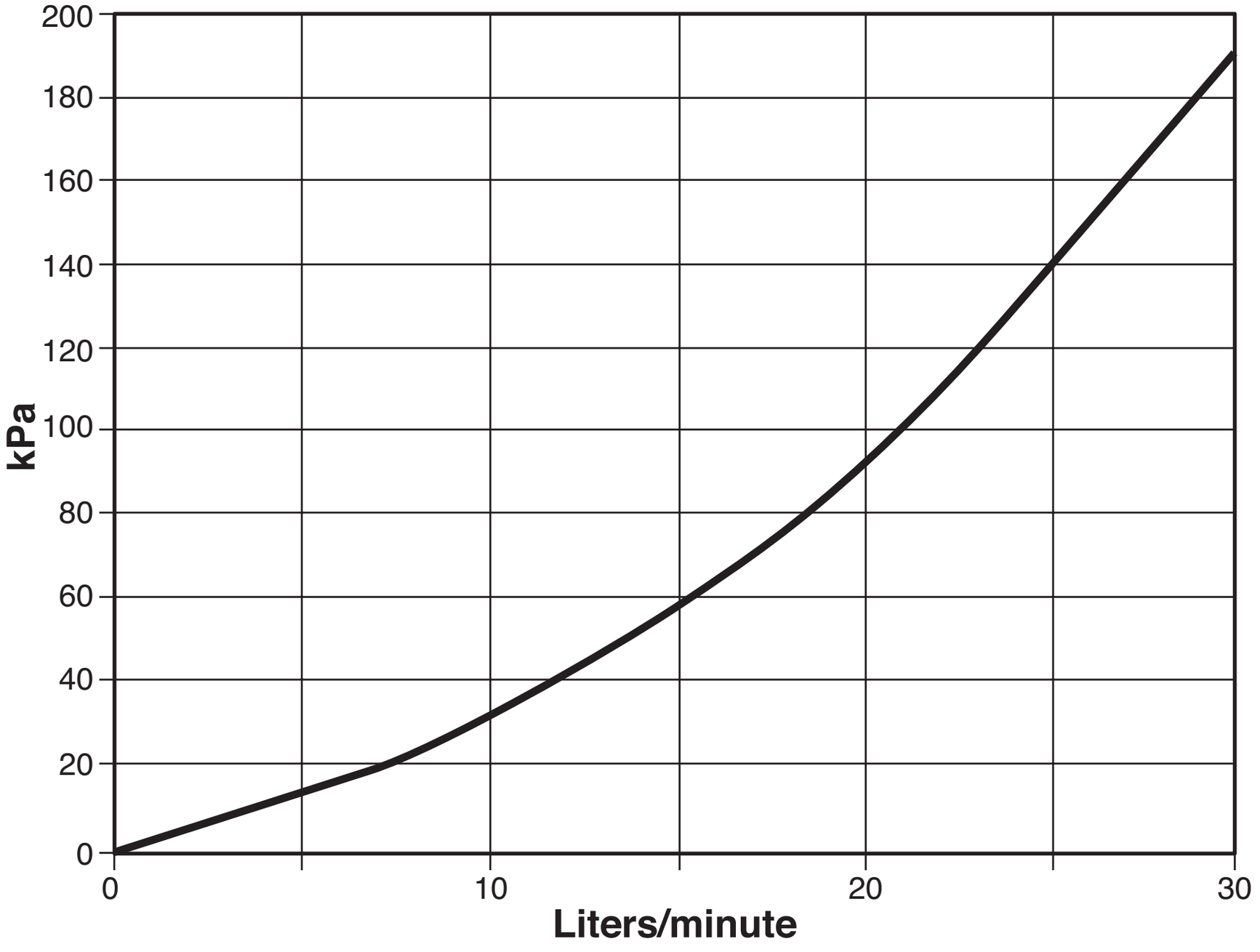


Pressure Drop FTB600B Series Liquid Turbine - Flowmeter FTB603

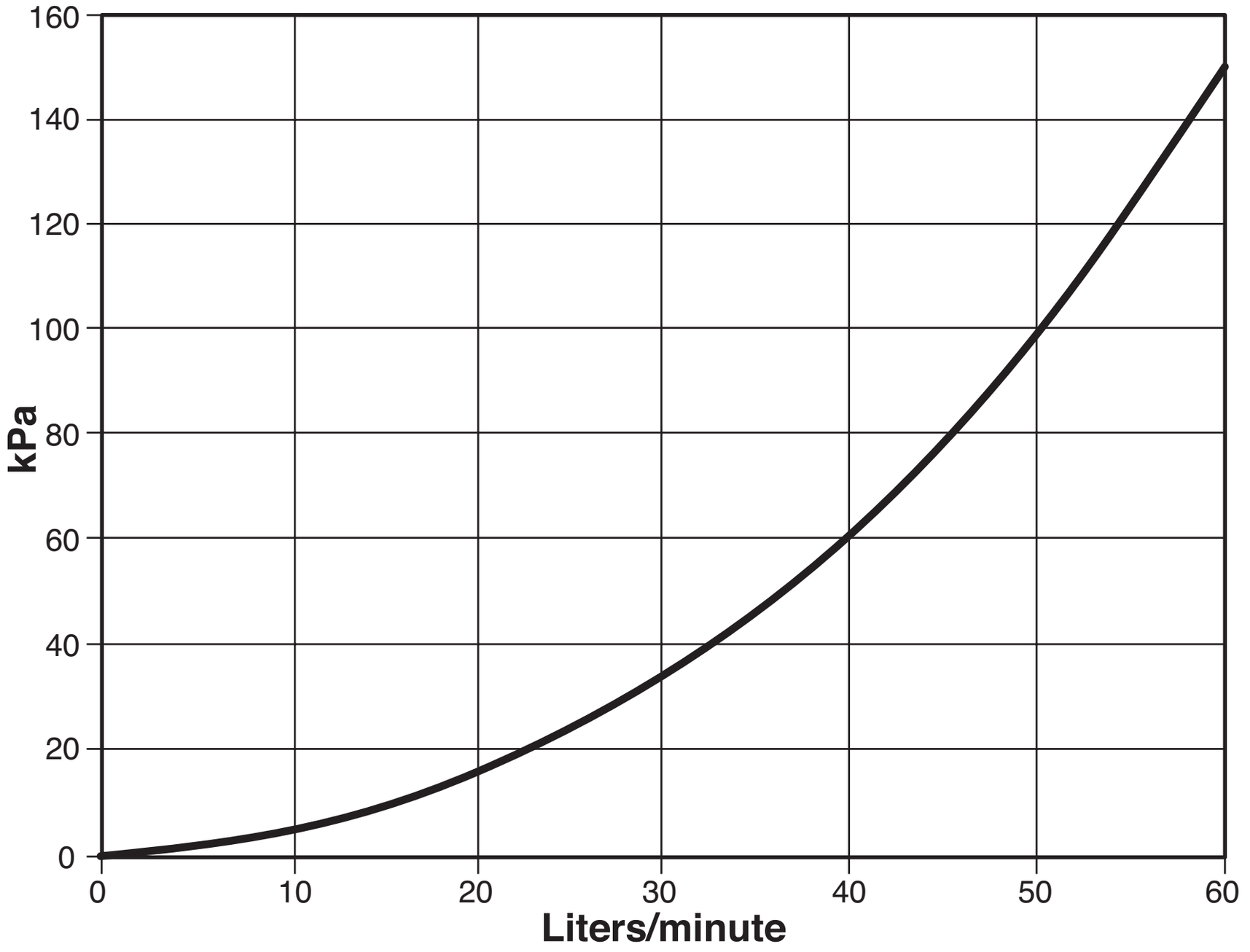


FTB600B Series
Pressure Drop Curves

Pressure Drop FTB600B Series Liquid Turbine - Flowmeter FTB604

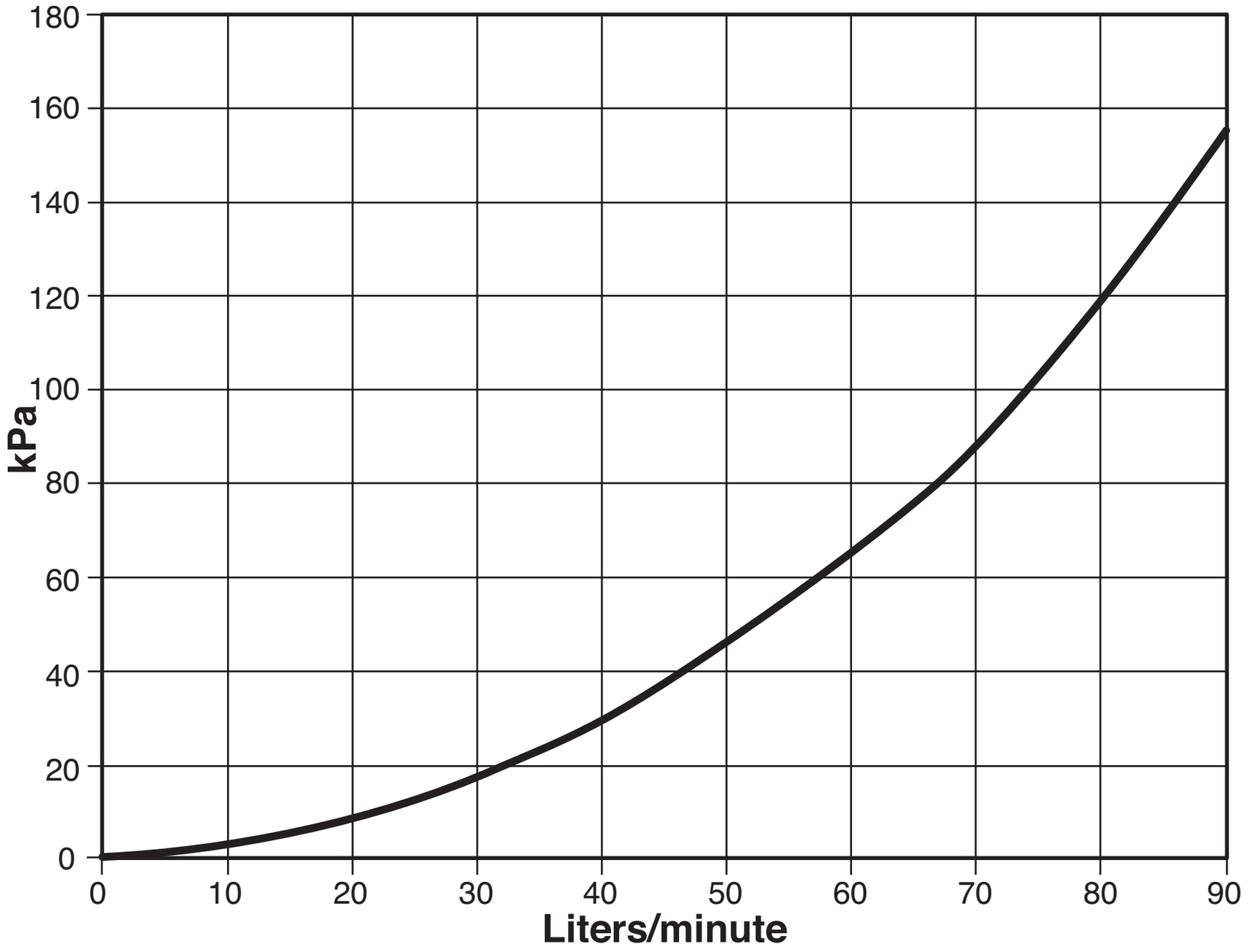


Pressure Drop FTB600B Series Liquid Turbine - Flowmeter FTB605A



FTB600B Series
Pressure Drop Curves

Pressure Drop FTB600B Series Liquid Turbine - Flowmeter FTB606A



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