



Valve

Solutions

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Type 683B

DIGITAL EXHAUST THROTTLE VALVE FOR DEVICENET™ NETWORKS

The MKS Type 683 Intelligent Exhaust Throttle Valve is specifically designed for computer integrated applications where a simple pressure control system is desired. The 683 integrates all control, communication, and driver circuits via a compact “add-on” electronics module onto an MKS Type 253 Throttle Valve assembly, thereby eliminating the need for mounting a separate pressure control electronics module. The second generation PID control algorithm can be tuned to drive the system to set point fast and with minimum overshoot, and ensures repeatable process recipes without operator involvement. The loop tuning parameters are completely adjustable to accommodate variations in system parameters.

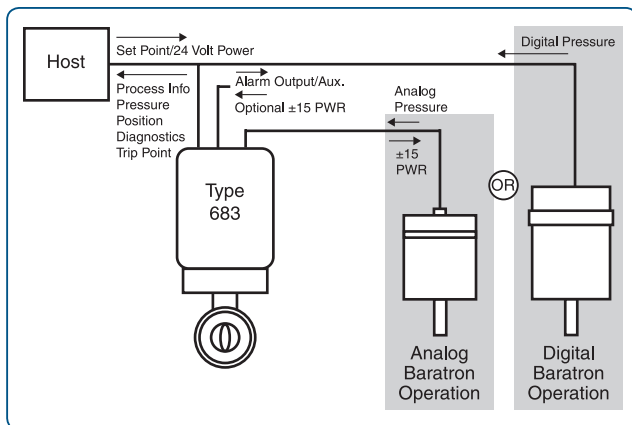
Features & Benefits

- Designed to meet ODVA specifications assures seamless integration
- Compact pressure control system integrating control, communication, and valve driver circuits within the throttle valve assembly
- Two built-in alarm trip points with status indicators provide hard-wired safety interlocks
 - Programmable for pressure, position, or set point limits
- Configurable operating modes for pressure control (PID) and flapper position control
- Digital data transmission provides immunity to system noise
- Smart attributes provide monitoring and control of key setup and run time parameters
- Unique linear valve transfer characteristics provides smooth linear pressure control
- Available in popular ISO flange styles
- Sealing sizes available up to 2” bores



The Type 683 Throttle Valve operates in two modes: flapper positioning or pressure control, either of which can be user-activated through the network communications interface. All of the adjustable setup parameters, run time operation, and diagnostics information is available through the network communications interface. The Type 683 also includes adjustable soft-start functions for set point changes to minimize turbulence and thus particle distribution in the chamber. Two alarm relay outputs are fully adjustable to trip at specified pressure, valve position or set point deviation settings. The Type 683 is designed to be compatible with MKS Digital Baratron® Capacitance Manometers to offer all of the components required to perform closed-loop pressure control over the network. Alternately, the Type 683 will accept a 0-10 VDC signal from a traditional analog Baratron Capacitance Manometer for closed-loop control.

This downstream pressure control technique provides wide dynamic range, works with all types of pumps, provides fast response, and is tolerant to most effluent gases.



DeviceNet Pressure Control System

The MKS Type 683 communicates using DeviceNet™, a high performance communication link based on a broadcast-oriented protocol called Controller Area Network (CAN). The DeviceNet protocol, managed by the Open DeviceNet Vendor Association (ODVA), is easy to install and provides a simple and economical way for instruments and controllers to be interoperable on a network.

The “intelligent instrument” concept results in valuable system space savings, improved noise immunity, and easy access to time-critical process and calibration information as well as on-board diagnostic functions. System design, installation, maintenance, and labor costs are reduced as compared to the traditional analog I/O.

Minimize software/integration costs by choosing other digital measurement and control devices found on most process systems. In addition to the Type 683 Exhaust Throttle Valve, MKS also provides the following digital instruments:

Baratron Capacitance Manometers

DMB



Mass Flow Controllers

DeviceNet™ Type 1179
 DeviceNet™ Type 1479
 DeviceNet™ Type 2179
 DeviceNet™ Type 179



Software Functions

- Pressure control or position control mode
- Set control tuning parameters - gain, lead
- Set points for pressure and position control
- Soft start mode with user-definable ramp rate
- Adjust trip points for pressure, position, or set point deviation
- Adjustable trip point direction, hysteresis
- Manual override to open or close valve
- Learn valve steps and drive limits
- Report pressure from external transducer
- Report HW/SW revision, serial and model numbers
- Report valve cycles and run hours

The Valve

The Type 683 is based on the field-proven Type 253 valve, a direct-drive design with no belts to wear or slip, thereby improving performance. The valve driver includes a unique cosine generator placed between the flapper shaft and the motor drive shaft which generates a more linear valve transfer characteristic and provides high resolution pressure control. The robust, high torque motor provides extended uptime and reduces preventative maintenance cycles — a great advantage in demanding processes where just one hour of downtime can cost thousands of dollars.

The valve is constructed of corrosion-resistant 316 stainless steel for the toughest process gases and is available in standard ISO-KF and MF flange styles with bore sizes from 3/4" to 4" (20-100 mm). Consult factory for availability of additional flange styles. Standard seals offered are Viton®, alternate materials can be specified for compatibility with various process chemistries.



ISO Flanges

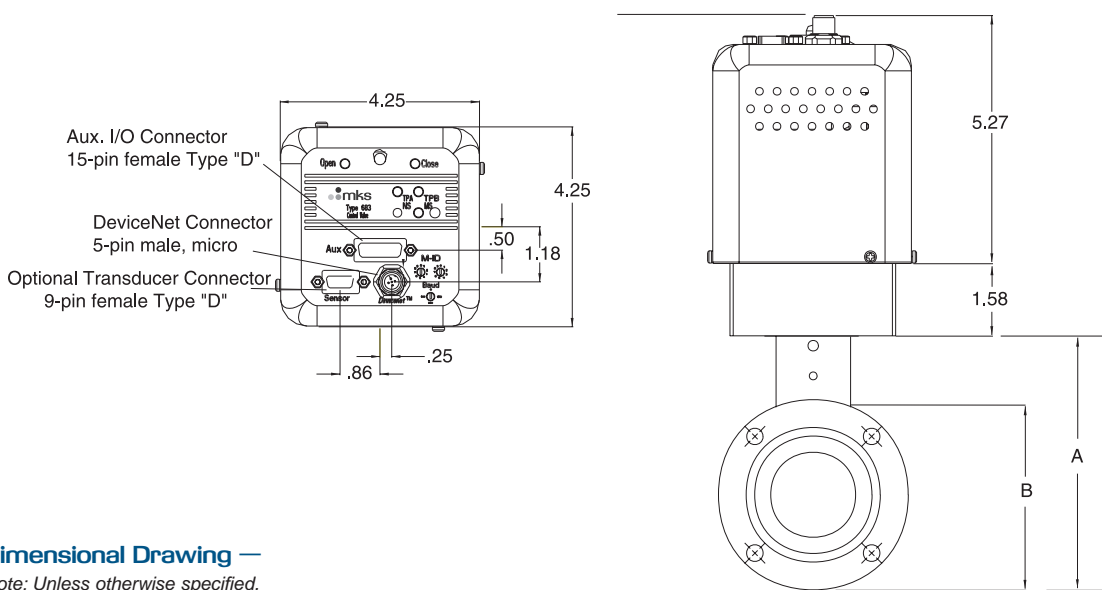
Valve Model Number (XXX=option code numbers - see Ordering Information on page 4 for choices)	683B20K1XXX	683B20K2XXX	683B01K1XXX	683B01K2XXX	683B02K1XXX	683B02K2XXX	683B60N2XXX	683B03N2XXX	683B04N2XXX
Bore in (mm)	0.779 (20)	0.779 (20)	1.270 (32)	1.270 (32)	1.888 (48)	2.000 (51)	2.362 (60)	3.000 (76)	3.875 (98)
Mounting Flange	KF-40	KF-40	KF-40	KF-40	KF-50	KF-50	NW-63	NW-80	NW-100
Flange Diameter in (mm) (see B on dimensional drawing below)	2.75 (70)	2.75 (70)	2.75 (70)	2.75 (70)	3.25 (83)	3.25 (83)	5.95 (151)	5.95 (151)	7.40 (188)
Controllable Conductance (l/sec) min. max.	0.07 24	0.25 31	0.20 50	0.40 55	0.35 300	0.7 300	0.80 375	1.00 500	1.50 900
Closed Leakage (Torr l/sec)	<10 ⁻⁷	N/A	<10 ⁻⁷	N/A	<10 ⁻⁷	N/A	N/A	N/A	N/A
Flapper Seal (Note 1)	Viton	None	Viton	None	Viton	None	None	None	None
Body Thickness in (mm)	2.25 (57)	2.25 (57)	2.25 (57)	2.25 (57)	2.00 (51)	2.00 (51)	0.81 (21)	0.81 (21)	0.94 (24)
Dimension A (see dimensional drawing below)	4.19 (106)	4.19 (106)	4.19 (106)	4.19 (106)	4.69 (119)	4.69 (119)	6.34 (161)	6.34 (161)	
Bolt Hole Diameter	N/A	N/A	N/A	N/A	N/A	N/A	0.35 (9)	0.35 (9)	0.35 (9)
No. of Bolt Holes	N/A	N/A	N/A	N/A	N/A	N/A	4	8	8
Bolt Circle Diameter	N/A	N/A	N/A	N/A	N/A	N/A	4.330 (110)	4.920 (125)	5.710 (145)
Flange O-ring Groove ID	Note 2	Note 2	Note 2	Note 2	Note 2	Note 2	Note 3	Note 3	Note 3

Chart 1: Available Bore, Flange, Seal Combinations —

Note 1: Where Viton is used, other materials are available; consult Applications Engineering at 800.227.8766 or 978.975.2350.

Note 2: For mating flanges/fittings, see Series 31 Brochure.

Note 3: For mating flanges/fittings, see Series 76 Brochure.



Dimensional Drawing —

Note: Unless otherwise specified, dimensions are nominal values in inches.



Specifications and Ordering Information

Valve Speed (open to close)	
Standard	7.5 seconds
Optional	<2 seconds
Resolution	
Standard	1/10,000
Fast Motor	1/2800
Operating Temperature	
Motor and Electronics	0° to 50°C
Valve Body	0° to 90°C
Storage Temperature	-20° to 80°C
Differential Pressure Across Valve	1 Atm (15 psig) max
External Leak at Shaft Seal	<1 x 10 ⁻⁷ scc/sec He
Flange Sizes/Styles	ISO KF-40, ISO MF-100
Materials Exposed to Process	316 S.S., Viton®
Optional Seal Material	Kalrez®, Chemraz®
Analog I/O	
Pressure input	0-10 VDC can be calibrated to any voltage between 1-10 VDC
Discrete I/O	
Alarm trip point outputs	(2) relays @ 2.0A @ 30 VDC with status LEDs
Physical Switches	Valve Open Valve Close
Power Input	
DeviceNet	13-30 VDC @ <15 Watts (through network connector)
Optional Baratron	±15 VDC ±5% (required if analog transducer is used)
Auxiliary I/O Connector	
DeviceNet	15-pin female Type "D" for trip points and optional power input
Pressure Transducer Connector (Analog)	9-pin female Type "D"
Digital Communications	
Network Interface	DeviceNet™
Communications Connector	5-pin, male Micro
Data Rate (Selectable)	125, 250, or 500 kbaud

Ordering Code Example: 683B20K2900VV

Type 683B Smart Exhaust Throttle Valve	Code	Configuration
Type Number	683B	683B
Valve Bore/Flange Size		
20mm/KF-40	20K	20K
1"/KF-40	01K	
2"/KF-50	02K	
60mm/NW-63	60N	
3"/NW-80	03N	
4"/NW-100	04N	
Valve Type		
Sealing*	1	2
Non-sealing	2	
Communications		
DeviceNet	9	9
Motor Speed		
Standard Speed	0	0
High Speed	1	
Options		
None	0	0
Firmware		
Unless otherwise specified, MKS will ship the current firmware revision	VV	VV

Other Intelligent Digital Instruments

Digital Series Mass Flow Controllers, Types 1179, 1479, 2179, and 179
Digital Capacitance Manometer, Type DMB

*Sealing type available with standard speed motor up to 2". Sealing type not available with fast motor option.



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