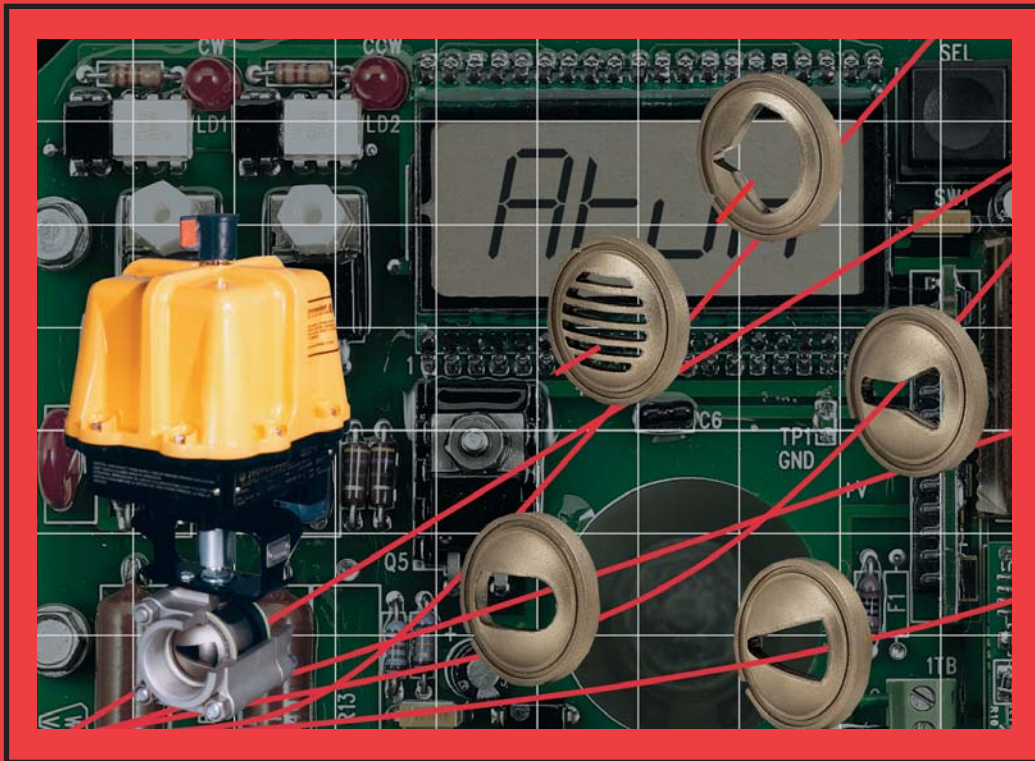




Worcester Controls

PB 935-5

The DataFlo logo features a stylized, three-dimensional "D" icon on the left, composed of three vertical bars of increasing height. To the right of the icon, the word "DataFlo" is written in a large, black, serif font. Below "DataFlo" is the phrase "SMART PRODUCTS" in a smaller, black, sans-serif font. The entire logo is set against a background of three horizontal, wavy lines that sweep from left to right.

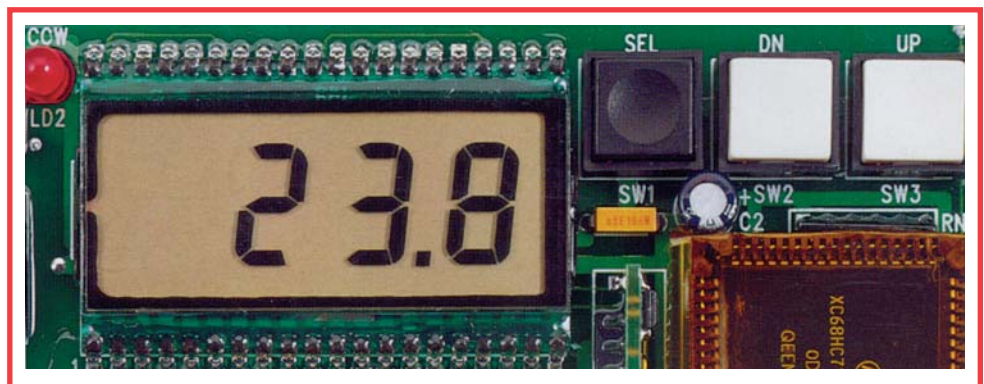
DataFlo

P[®] SMART POSITIONER

An Electronic Positioner with a Built-in Microcontroller For precise process control

The **DataFlo P** Positioner, controlled by a 4-20 mA analog signal from a PLC or digitally from a computer, gives you calibration, monitoring and diagnostics both onsite or from a control room computer. This dramatically increases system dependability and lowers valve calibration, monitoring and maintenance costs. **DataFlo P** controls your process better and turns your final control element into an efficient digital communications platform. **DataFlo P's** cutting edge technology offers you many benefits:

- Digital communication
- Diagnostics
- Selectable input signals
- Onboard setup
- Onboard LCD
- Remote setup
- Fail position on loss of signal
- Opening and closing speed control
- AC or DC power
- Power-on delay
- Power-on position
- Select position of power-up
- DOS-compatible setup software
- Adjustable deadband
- Four 21-point user selectable/programmable curves
- Adjustable split range



Three-button keypad for onsite calibration and functional setup.



DataFlo P Positioner Specifications

Features and Options

- Controlled by Motorola® microcontroller
- Push-button set-point signal calibration
- Selectable fail position upon loss of control signal plus time to respond upon restoration of signal
- Selectable fail position upon loss of and subsequent restoration of power plus time lag.
- Speed control 0-200 seconds
- Separate speed control for open and close
- Security code
- Unit address selection
- Push-button or remote programming of direct or reverse-acting
- Split range
- Adjustable deadband or auto-adjust
- Electronic travel stops
- Programmable response curves; standard linear and 1:25 or 1:50 equal percentage or up to four user defined 21-point curves
- Tight valve shutoff with yA set to other than 0% open
- Full open valve with yE set to other than 100% open
- Push-button restoration of factory defaults
- Selectable baud rate 1200 bps to 38K bps.

I/O Options

- Seven analog inputs available
 - 4-20 mA
 - 1-5 mA
 - 10-50 mA
 - 135 ohm potentiometer
 - 1000 ohm potentiometer
 - 0-5 VDC
 - 0-10 VDC
- One digital RS485 input
- One alarm output (open collector 50 volt max; 100 mA max.)

Diagnostics

- High Alarm
- Low Alarm
- Position Deviation Alarm
- Cycle Count (accumulated cycles)

Technical Data

Supply Voltage	
120 VAC (±10%)	
240 VAC (±10%)	
24 VDC (±10%)	
Power Consumption	
(Circuit Board Only)	2.5 Watts
Maximum Noise Level	Approx. 3.5 mV
at Maximum Sensitivity	
(16 microamps)	
Maximum Normal Starting or	
In-rush Current	10 Amps for 1 Second
Maximum Stall Current	8 Amps for 1 Minute
Maximum Running Current	
Resistive Load - 90% Duty Cycle	5 Amps
Maximum Running Current	
Inductive Load - 90% Duty Cycle	3 Amps
Maximum Peak Voltage at Load Circuit	
(All 120 VAC and 240 VAC models) . .	800 VAC
Maximum Driver Circuit Current	
(All 24 VDC Models)	3 Amps Continuous
Optional 4-20 mA output will drive 20 mA into a	
600 ohm maximum load.	
Alarm output - 100 mA maximum at 50 volts	
DC maximum.	
Input Circuit Load Resistances	
1 to 5 milliamper models	Approx. 1000 ohms
4 to 20 milliamper models	Approx. 220 ohms
10 to 50 milliamper models	Approx. 100 ohms
0 to 5 VDC models	Approx. 800 ohms
0 to 10 VDC models	Approx. 1100 ohms
Linearity - 0.1% to deadband	
Resolution 0.2%	
Deadband 0.1% to 10% or auto	



DataFlo
C[®]
SMART CONTROLLER

PID Controller with Auto-Tune Inside

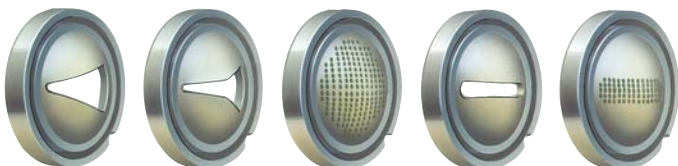
The final control element

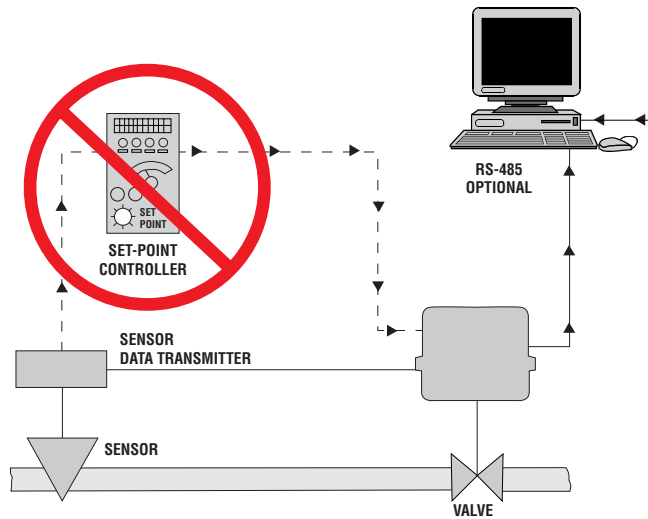


The **DataFlo C** is a fresh approach to PID control. This combination microcontroller based PID single-loop controller and final control element brings control to the point of use. The rugged compact package simplifies wiring requirements by directly accepting RTD, analog or thermocouple inputs. The signal does not have to be conditioned, improving reliability. All the parameters are easily programmed through the local keypad or via a simple RS-485 computer interface. The control valve/PID controller is easily tuned to the loop with the built-in Auto-Tune program (excluding level control).

- Rugged valve and actuator package with integral PID control
- Auto-tuning of PID algorithm
- Total control of process parameters either locally or via RS485 computer network.
- Closed loop control
- Easy push-button calibration of the controller
- Embedded microcontroller
- Adjustable filter
- Programmable direct/reverse-acting
- Programmable deadband and operating parameters
- Electronic Travel Limits
- Single and two-channel process signal inputs (RTD only)
- Single source, valve, actuator, controller
- High resolution
- Performance monitoring
 - Cycle count
 - Hi/low process alarm
 - Hi/low position alarm
 - Invalid signal position
 - Highest/lowest process recording
 - Thermal warning for DC motors and thermal shutdown on DC

DataFlo C, the 75 actuator and characterized seat control valve make an ideal final control element for process control loops such as: Pressure, Level, Temperature, Ph, Flow, Vacuum.





PLC Interface/Manual Valve Control

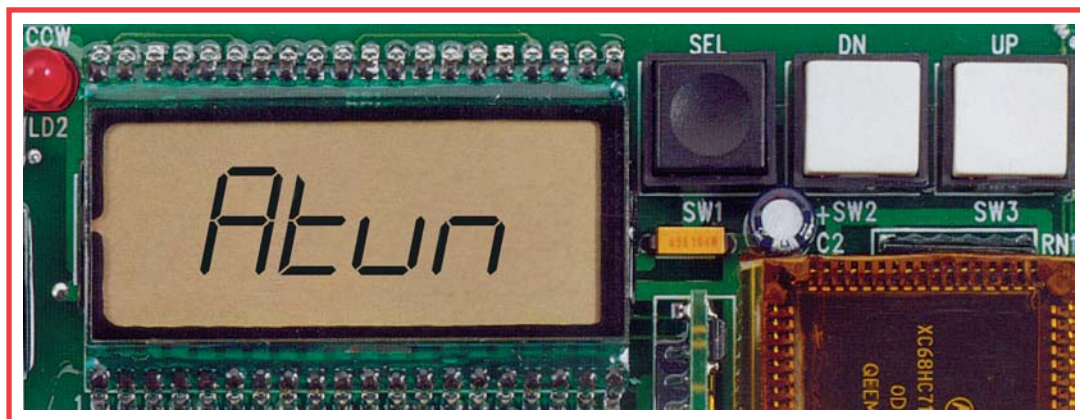
Enables the user to take the controller offline and operate in a manual positioning mode. The user can switch between PID control and a linear positioning mode by a discrete 24 VDC output from the PLC. An operator can also change set-point input via an analog input to the controller.

Why install the PID Controller in the Final Control Element?

- Reduces lag time between the measuring element, controller and control valve.
- Increases process efficiency through faster valve response.
- Quicker process startup.
- Microcontroller function allows for greater resolution and more variables to customize the valve to the process.
- Set-point control either locally at the valve or from a PLC.
- Inexpensive to install, less wiring.
- Cost approximately the same as the traditional valve, actuator and positioner.

Auto-Tune Made Simple

- Worcester has incorporated a simple to use, highly effective auto-tune algorithm within the microcontroller of the *DataFlo C*. Using the time proven method of tuning commonly referred to as the Ziegler/Nichols Curve, Worcester has been able to make the tuning of a loop as simple as pushing a button.
- The operator can control valve position during the tuning function so as not to create major process upsets.
- The controller will output “real time” tuning information, via the RS485 interface, that will allow the operator to monitor the process and the controller output during tuning.
- The program is designed to allow the operator to quickly get the controller online with minimum difficulty and limited loop tuning experience.



DataFlo C Controller Specifications

Features and Options:

- Controlled by Motorola microcontroller
- Push-button set point signal calibration (zero and span)
- Push-button process signal calibration (zero and span)
- Selectable action on set-point or process signal failure
 - Hold
 - None
 - Go to position
- Invalid feedback potentiometer signal
 - Go full clockwise
 - Go full counter clockwise
 - Hold or none
- PID controller, fully programmable
- Contained within the actuator
- High resolution
- Maintains cycle count (accumulated cycles)
- Monitors highest/lowest process values
- Programmable direct or reverse-acting
- Programmable deadband
- Programmable operating parameters
- Electronic travel limits
- PID auto-tune
- Security code
- Unit address selection
- Push-button restoration of factory defaults
- Selectable baud rates 1200 bps to 38K bps

I/O Options:

- Set-point inputs (standard)
 - 4-20 mA
 - 1000 ohm potentiometer
 - Local
 - 1 digital RS485 input
- Set-point inputs (optional)*
 - 1-5 mA
 - 10-50 mA
 - 135 ohm potentiometer
 - 0-5 VDC
 - 0-10 VDC
- Process inputs available
 - 4-20 mA analog
 - 1 or 2 100 ohm platinum RTD
 - Thermocouple Type J, K, T, E

Performance Monitoring:

- Process high limit alarm
- Process low limit alarm
- Upper travel limit alarm
- Lower travel limit alarm
- Invalid shaft position alarm
- Invalid process value alarm
- Invalid set-point value alarm
- Thermal warning alarm, DC only
- Cycle count, accumulated cycle time

Technical Data:

Input Voltage

- 120 VAC (±10%)
- 240 VAC (±10%)
- 24 VDC (±10%)

Power Consumption

(Circuit Board Only)2.5 Watts

Maximum Noise Level at

Maximum Sensitivity.....Approx. 3.5 mV
(16 microamps)

Maximum Normal Starting or

In-rush Current10 Amps for 1 Second

Maximum Stall Current8 Amps for 1 Minute

Maximum Running Current -

Resistive Load - 90% Duty Cycle.....5 Amps

Maximum Running Current -

Inductive Load - 90% Duty Cycle.....3 Amps

Maximum Peak Voltage at Load Circuit

(All 120 VAC and 240 VAC models)

Maximum Driver Circuit Current800 VAC

(All 24 VDC Models)3 Amps Continuous

Optional 4-20 mA output will drive 20 mA into a 600 ohm maximum load.

Alarm Output -100 mA maximum at 50 volts DC maximum.

Input Circuit Load Resistances

4 to 20 Milliampere ModelsApprox. 220 ohms

Temperature Ranging

Allows the user to specify the actual process temperature conditions within the stipulated range of the measuring element, i.e., RTD or thermocouple. The control range can be as little as 50°C or 100°C respectively or to the full range of the measuring device. For temperatures above 600°C, consult factory.

* For optional set-point inputs, consult factory.

Series 75 Actuator Specifications

Actuator Series: 75

Sizes:

Small: 10, 12, 15, 20, 22, 23
Large: 25, 30

Torque: 150-3000 in.-lbs.

Enclosures:

TYPE 4 Watertight
TYPE 7, Class I, Division 1, 2, Group C, D
TYPE 9, Class II, Division 1, 2, Group E, F, G
Hazardous Locations
TYPE 4, 4X, 7, and 9 Combined Locations

Enclosure Coatings:

Corrosion resistant baked epoxy finish standard. Consult Flowserve for special applications.

Voltages:

120 V and 240 VAC, 24 VDC

Connection:

Male output shaft (female shaft available on request)

Gearing:

Small: Sealed, permanently lubricated spur gear module driving a final dual torque bull gear

Large: Two stage planetary gear, permanently lubricated self-locking gear train

Manual Override:

All sizes, TYPE 4, 7 and 9 only
Lift position indicator and turn shaft:
Sizes 10, 12, 15, 20, 22, 23
Turn side mounted handwheel: Sizes 25 and 30

Options:

All sizes, all enclosures. Dual-Feedback Potentiometer, 4-20 mA Position Indicator, Heater/Thermostat, Condensation Drain plug (V-53), Mechanical Brake

***Temperature Limits**

(Circuit board in actuator):

-40°F (with heater and thermostat) to 115°F (max.)

***Temperature Limits**

(Circuit board remote):

-40°F (with heater and thermostat) to 150°F (max.)

Lubrication:

Permanently lubricated gear train. Self-lubricated bearings.

Conduit Connection:

One 1/2" NPT - Second 1/2" Optional
(Size 23 has 3/4" NPT)

Operation:

Reversing (bidirectional) for use with quarter-turn valves or rotating equipment to full rotation

Overcurrent Protection:

Refer to brochure PB 730

** At elevated temperatures, duty cycle has to be derated. Consult Flowserve.*

Actuator Model	Startup Torque in.-lbs.	Voltages		Duty Cycles	90° Time Seconds	Current at rated stall torque - AMPS			Approx. Weight lbs. (kg.)
		VAC	VDC			120 VAC	240 VAC	24 VDC	
1075	120	120, 240	24	75%	17, 15	.30	.15	.25	8.20
		120	—	100%	17	.25	—	—	(3.70)
1275	180	120, 240	24	75%	27, 25	.30	.15	.25	8.20
		120	—	100%	27	.25	—	—	(3.70)
2075	480	120, 240	24	75%	17, 15	.70	.30	.80	9.50
		120	—	100%	27	.50	—	—	(4.31)
2275*	720	120	24	75%	27, 25	.70	.30	.75	9.50 (4.31)
2375	950	120	24	75%	25	.70	.30	1.0	17.70 (8.04)
2575	1440	120, 240	—	75%	15	2.20	1.20	—	48 (21.8)
3075	2400	120, 240	—	75%	23	2.20	1.20	—	48 (21.8)

**Note: A 2" CPT valve should not be sized with an electric actuator smaller than 2275, and a mechanical brake must be ordered.*

How to Order

Series DFP17 Digital Positers

10	DFP17	4		120A	
Positoner Size	Product Series	Range	Options	Voltage	Optional Kits††
10 - 10-2375 Actuator 25 - 25-3075 Actuator	DFP17 - Positoner	1 - 1-5 mA input 4 - 4-20 mA input 10 - 10-50 mA input 13 - 135 ohm input 1K - 1000 ohm input 5V - 0-5 VDC input XV - 0-10 VDC input	Blank - No options 4 - 4-20 mA position feedback (Factory Mounted)	120A - 120 V 50/60 Hz 240A - 240 V 50/60 Mz† 24 VDC** †If using 240 VAC for DFP17, order code for actuator size must use suffix A. (Example: 20 A) ** 24 VDC not available in sizes 2575 and 3075. Must have suffix B after actuator size code.	DS17 - Digital Communications software package 4DK75 - 4-20 mA position feedback (for field mounting) †† Optional kits must be ordered as separate line items.

Series DFC17 Digital Controllers

10	DFC17	4	4		120A	
Controller Size	Product Series	Setpoint* Input	Process* Input	Options	Voltage	Optional Kits††
10 - 10-2375 Actuator 25 - 25-3075 Actuator	DFC17 - Controller	4 - 4-20 mA K - 1000 ohm	4 - 4-20 mA R - RTD J - Thermocouple J K - Thermocouple K T - Thermocouple T E - Thermocouple E	Blank- std. controller Blank- full temp. range 1 - 200 °C to +100 °C 2 - 100 °C to +200 °C 3 - 0 °C to +200 °C 4 - 0 °C to +400 °C Blank- full temp. range 1 - 0 °C to +100 °C 2 - 0 °C to +250 °C Note: For factory mounted 4-20 mA position feedback option, use "4" prefix in actuator code.	120A - 120V 50/60 Hz 240A - 240V 50/60 Mz† 24 VDC** †If using 240 VAC for DFP17, order code for actuator size must use suffix A. (Example: 20 A) ** 24 VDC not available in sizes 2575 and 3075. Must have suffix B after actuator size code.	10 or 30 D4K75 - 4-20 mA position feedback w/dual feedback pot for field mounting. †† Optional kits must be ordered as separate line items.

*For other setpoints and/or process inputs, consult factory.

Series 75 Electric Actuators

20	H	75	5	ZM1		120A	
Actuator Size	Variations	Product Series	Duty Cycle*	Standard Options	Voltage	V-Number Variations	
10 12 20 22 23 25 30	A - DFP17/DFC 240 VAC only B - DFP17/DFC17 (DC only) H - Heater/Thermostat M - Mechanical Brake D - Dual Feedback Potentiometer D4 - 4-20 mA Position Feedback* with dual feedback pot (Factory Mounted) Use this prefix for DFC 17 only. * Used only with 120 VAC DFC17.	75	5 - 100% Duty Cycle Available in sizes 10, 12, 20 AC only †4 - 75% Duty Cycle Available in all sizes AC; sizes 10, 12, 20, 22, 23 DC	W - Enclosure TYPE 4 watertight; sizes 10, 12, 20, 200 X - Enclosure TYPE 7, 9 Explosion proof; sizes 10, 12, 20, 22 Z - Enclosure TYPE 4, 4X, 7, 9 Combined Locations; All sizes Additional options available through custom products dept. M1 - One extra auxiliary limit switch (SPDT) with cam M2 - Two extra auxiliary limit switch (SPDT) with cam	120A - 120 V 50/60 Hz 240A - 240 V 50/60 Hz 24 VDC** **24 VDC not available in sizes 2575 and 3075. If using 24 VDC for DFP17 or DFC17, order code for actuator size must use suffix B. Example: 10B.	Blank - None V49 - Anodized base & cover V53 - Drain/breather V65 - CE marking declaration of Conformity for European orders	

Flowserve Corporation has established industry leadership in the design and manufacture of its products. When properly selected, this Flowserve product is designed to perform its intended function safely during its useful life. However, the purchaser or user of Flowserve products should be aware that Flowserve products might be used in numerous applications under a wide variety of industrial service conditions. Although Flowserve can (and often does) provide general guidelines, it cannot provide specific data and warnings for all possible applications. The purchaser/user must therefore assume the ultimate responsibility for the proper sizing and selection, installation, operation, and maintenance of Flowserve products. The purchaser/user should read and understand the Installation Operation Maintenance (IOM) instructions included with the product, and train its employees and contractors in the safe use of Flowserve products in connection with the specific application.

While the information and specifications contained in this literature are believed to be accurate, they are supplied for informative purposes only and should not be considered certified or as a guarantee of satisfactory results by reliance thereon. Nothing contained herein is to be construed as a warranty or guarantee, express or implied, regarding any matter with respect to this product. Because Flowserve is continually improving and upgrading its product design, the specifications, dimensions and information contained herein are subject to change without notice. Should any question arise concerning these provisions, the purchaser/user should contact Flowserve Corporation at any one of its worldwide operations or offices.

For more information about Flowserve Corporation, contact www.flowserve.com or call USA 1 800 225 6989.

FLOWSERVE CORPORATION
FLOW CONTROL DIVISION
 1978 Foreman Drive
 Cookeville, Tennessee 38501 USA
 Phone: 931 432 4021
 Facsimile: 931 432 5518

Worcester® is a registered trademark of Flowserve Corporation.
 DataFlo C® is a registered trademark of Flowserve Corporation.
 DataFlo P® is a registered trademark of Flowserve Corporation.
 Motorola® is a registered trademark of Motorola Corporation.