

# Mark 37/377

## Final Control Element

The Mark 37 is a motor-operated control valve that combines a state-of-the-art electronic linear actuator with the exceptional performance of Jordan's sliding gate valve seat design. The result is a superior degree of accuracy that makes the Mark 37 ideal for use as the final control element in distributed process control systems.

Precision control begins with an advanced bi-directional AC powered actuator that includes an integral servo amplifier (1/4" to 2" sizes only; amplifier optional above 2"). It utilizes a stepper motor and a soft seated output shaft that converts high torque, low speed motor shaft output to linear thrust to drive the valve stem and seats to the exact position required to meet the needs of the process.

Accuracy is further enhanced through the use of Jordan's unique sliding gate valve seat. Consisting of a modulating disc and stationary plate, the seat components are slotted with multiple orifices that align to provide the precise flow needed to meet the control system requirements. With multiple openings distributed over the mass of the seating surfaces, the valve fully strokes in a fraction of the travel required by conventional valves, for rapid correction of any deviation from the process setpoint.

### FEATURES

- Sliding Gate Seats — all of Jordan Valve's differential regulators feature advanced sliding gate seat technology.
  - Straight-through flow reduces turbulence for long life, quiet operation and excellent rangeability
  - Short stroke for fast response and accurate regulation.
  - Interchangeable seats for easy maintenance and Cv changes
  - Tight Shutoff (ANSI Class IV) due to overlap of seat closure area
- A stroke shorter than those found in globe or plug-style valves results in an operation much faster than other electric control valves.
- Long packing and stem life, with stem packing four times deeper than stem travel.
- Fewer spare parts, no gaskets or o-rings (on sizes 2" and below), and self cleaning seats mean long valve life and easy maintenance.

### ALTERNATIVE MODELS

For customers who require the specifications and performance of the Mark 37, but require equal percentage seats, Jordan Valve offers the MK377.



## SPECIFICATIONS

### Sizes

Note: 1/4" & 3/8" sizes uses 1/2" body with reducers

- 1/4" through 6" (DN8 through DN150)

### End Connections

- Threaded (NPT, BSPT, BSPP – through 2" sizes)
- ANSI Flanges (150#, 300#)
- DIN Flanges (PN10/16, PN25/40)

### Body Materials

- Bronze (1/2" - 2"/DN15-DN50)
- Ductile Iron
- Carbon Steel (WCB)
- Stainless Steel (CF8M)

### Trim Materials

- 303SS for DI, BZ or CS valves
- 316SS for SS body valves

### Seat Materials

- Jorcote on SST — Standard
- Jorcote/Jordanic on SST — For severe service
- Chrome Plated SST — Optional (1/2" - 2"/DN15 - 50 only)

**Yoke Material:** Cast Iron

### Stem Packing

- Spring-loaded Teflon (500°F max/260°C)
- Braided (above 500°F/260°C)

**Service:** steam, water, air, oil, gas and chemicals

**Shutoff:** ANSI Class IV

### Flow Characteristic

- linear
- equal percentage (*specify model MK377*)

### Action

- direct (control signal closes valve)
- reverse (control signal opens valve)

### Actuators

- MV1005 — fully functional, economical version
- MV1010 — upgrade over the MV1005
- MV1020 — for 2" and smaller, provides twice the thrust of MV1010
- SM1100 — for valves 2-1/2" – 6" in size

### Cv (Kv) Values and Maximum Allowable ΔP Ratings

Size (DN)	Cv (Kv)	Seat Material	Maximum ΔP psi (bar)	
			MK37	MK377
1/2" & 3/4" (DN15 & 20)	2.5 (2,15)	SST	125 (8,62)	N/A
	4.4 (3,78)	Jorcote	250 (17,24)	N/A
1/2" (DN15)	2.5 (2,15)	Jorcote	N/A	250 (17,24)
3/4" (DN20)	9.5 (8,17)	Jorcote	N/A	150 (10,34)
1" & 1-1/4" (DN25 & 32)	6.4 (5,50)	SST	100 (6,89)	N/A
	9.5 (8,17)	Jorcote	150 (10,34)	N/A
1" (DN25)	11.5 (9,89)	SST	N/A	100 (6,89)
		Jorcote	N/A	150 (10,34)
1-1/4" (DN32)	13 (11,2)	SST	N/A	100 (6,89)
		Jorcote	N/A	150 (10,34)
1-1/2" (DN40)	15 (12,9)	SST	75 (5,17)	100 (6,89)
		Jorcote	125 (8,62)	150 (10,34)
1-1/2" (DN40)	22 (18,9)	SST	N/A	100 (6,89)
		Jorcote	N/A	150 (10,34)
2" (DN50)	25 (21,5)	SST	75 (5,17)	N/A
		Jorcote	125 (8,62)	N/A
2" (DN50)	34 (29,2)	SST	N/A	100 (6,89)
		Jorcote	N/A	150 (10,34)
2-1/2" (DN65)	60 (51,6)	Jorcote	N/A	80 (5,52)
3" (DN80)	80 (68,8)	Jorcote	N/A	80 (5,52)
2-1/2" (DN65)	85 (73)	Jorcote	250 (17,24)	N/A
3" (DN80)	130 (112)	Jorcote	200 (13,79)	N/A
4" (DN100)	200 (172)	Jorcote	150 (10,34)	N/A
6" (DN150)	230 (197,8)	Jorcote	N/A	50 (3,45)
6" (DN150)	395 (340)	Jorcote	50 (3,45)	N/A

For smaller Cv (Kv) values, consult factory.

## MOTOR SPECIFICATIONS

Please see page 3 for specific information on MV1010 and MV1005 motors. *The MV1005 and MV1010 utilize the same explosion-proof housing, but the MV1010 has a few features that are not provided on the MV1005*

- Adjustable speed (both the MV1005 and MV1010 motors allow the same maximum thrust)
- Limit switches
- Selectable failure mode
- Standard with 4-20mA position feedback (available only as an option of the MV1005)
- Manual operation by hand knob

All other features and specifications are equal to those of the MV1005.

## MOTOR SPECIFICATIONS

### MV1005/MV1010 Motor: 1/4" - 2" Valves (DN8-50)



#### Electrical

Line Voltage: 120/240 VAC (switch selectable)

- Frequency: 50/60 Hz
- Current: 0.25/0.12A (12VA)

#### Control Signal

- Current: 4-20mA; 4-12mA; 12-20mA (280 ohm max. net loading effect)
- Voltage: 0-5 VDC; 0-10 VDC (200K ohm impedance)
- On/Off and other special ranges upon request

#### Motor Enclosures

- Temperature Limits: -40°F to 150°F (-40°C to 65°C)
- Enclosure: NEMA 4 (IP65), indoor and outdoor

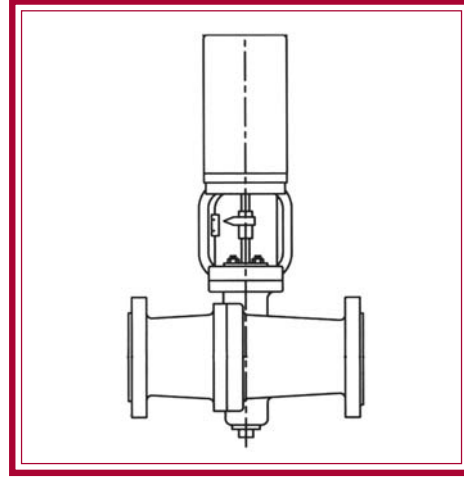
#### Performance

- Positioning Accuracy:  $\pm 1.5\%$  of rated full travel
- Thrust: 100 pounds
- Stroke: 0.093" - 1.375" (*potentiometer adjustable*)
- Speed: 0.02 to 0.20"/second (*potentiometer adjustable*)
- Action: direct or reverse (*switch selectable*)

#### Features

- 4-20mA position feedback (*requires customer-supplied external 12-36 VDC power supply and a load connected in series with one lead from power supply*)
- Failure mode is switch selectable — on loss of command, choose lock-in-place or return to minimum input signal
- Options: signal conversion module (for addition of limit switches); battery pack for "fail-safe" motor operation

### SM1100 Motor: 2-1/2" - 6" (DN65-150)



#### Electrical

**120VAC**, Single Phase Modulating Duty

- Running Current: 0.27 amps
- Frequency: 50/60 Hz
- Stall Current: 0.31 amps

**24VDC**, Permanent Magnet, Modulating Duty (*Note: internal amplifier uses 24VDC power supply; external amp requires 115VAC power supply*)

- Running Current: 1.2 amps
- Stall Current: 4.8 amps

#### Control Signal

- Standard Input Signal: on/off
- Optional Input Signals (requires amplifier)
  - Resistance Command: 0-1000 ohms
  - Current Command: 1-5mA DC; 4-20mA DC; 10-50mA DC; split ranges upon request
  - Voltage Command: 0-24VDC; 0-10VDC

#### Motor Enclosures

- Temperature Limits: -40°F to 150°F (-40°C to 65°C)
- Standard: NEMA 12 – inside industrial
- Optional: *Explosion-proof* for Class I, Div. I, Group C & D; *Dust-ignition-proof* for Class II, Div. I, Group E, F, G; Type 4 (IP65), indoor or outdoor (optional)

#### Amplifier Enclosures (Optional)

- NEMA 12: inside industrial; NEMA 4: water-tight; NEMA 7 & 9: explosion-proof. Note: internal amplifiers are available for AC motor in 4-20mA; for DC motors in 4-20mA or 0-10VDC; panel-mounted amplifier also available. Internal amplifiers require NEMA 4 or 7/9 motor enclosures.

#### Net Loading Effect on Electronic Controller

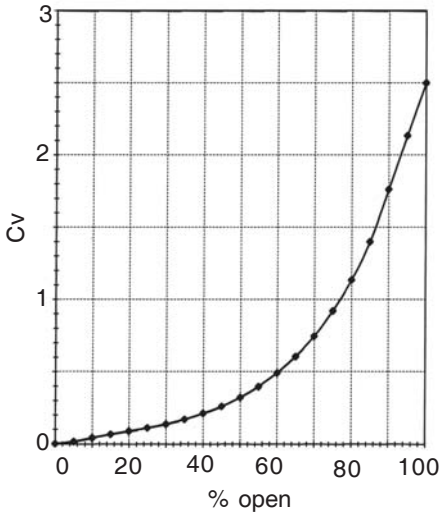
- 2700 ohms (1-5mA)
- 470 ohms (4-20mA)
- 270 ohms (10-50mA)

**FLOW CHART FOR MARK 37**

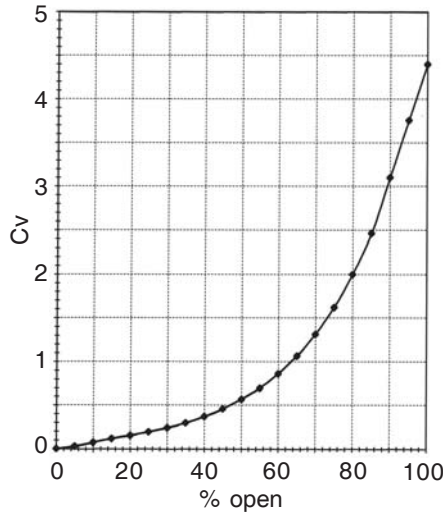
Valve Size	Cv at Travel										
	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%	F <sub>L</sub>
1/2" & 3/4" (DN15 & DN20)	0.290	0.520	0.740	0.960	1.200	1.450	1.820	2.160	2.340	2.50	0.80
	0.580	0.890	1.270	1.580	1.930	2.480	3.020	3.540	4.090	4.40	0.77
1" & 1-1/4" (DN25 & DN32)	0.970	1.460	1.920	2.500	3.170	3.870	5.180	5.700	6.310	6.40	0.75
	1.240	2.000	2.710	3.490	4.360	5.300	6.360	7.280	9.340	9.50	0.72
1-1/2" (DN40)	1.390	2.490	3.680	4.760	6.140	7.850	10.30	13.10	14.60	15.0	0.69
2" (DN50)	2.580	4.340	6.210	8.470	10.80	13.80	18.30	22.70	24.80	25.0	0.67
	1.950	3.900	6.300	8.460	11.10	14.20	18.20	25.90	29.10	30.0	0.66

**FLOW CHART FOR MARK 377**

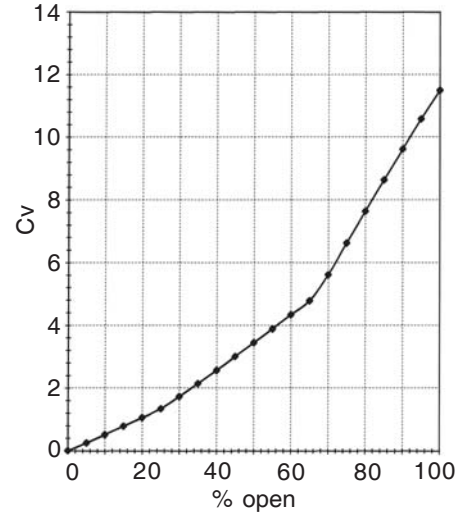
2.5 Cv - Equal Percentage



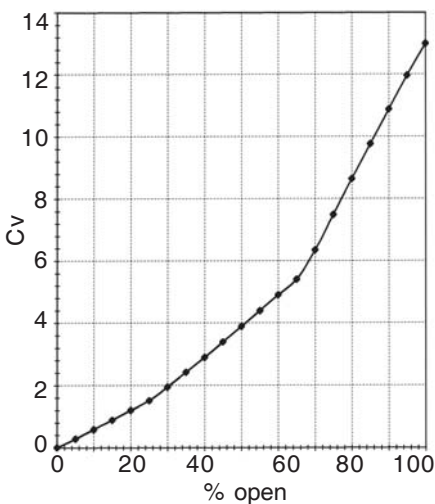
4.4 Cv - Equal Percentage



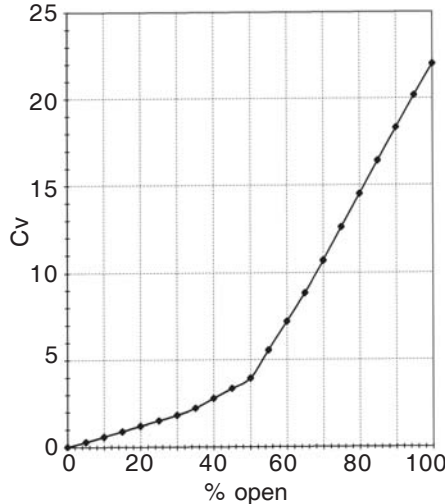
11.5 Cv - Equal Percentage



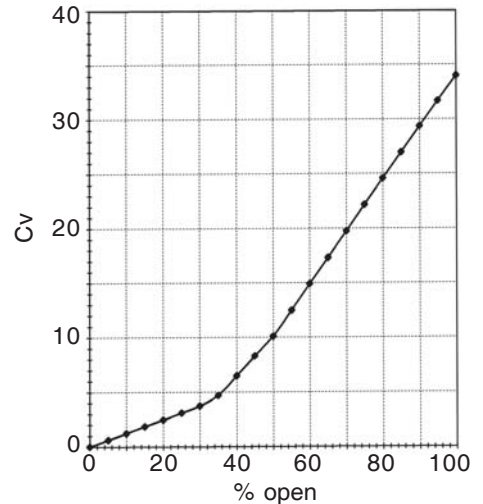
13 Cv - Equal Percentage



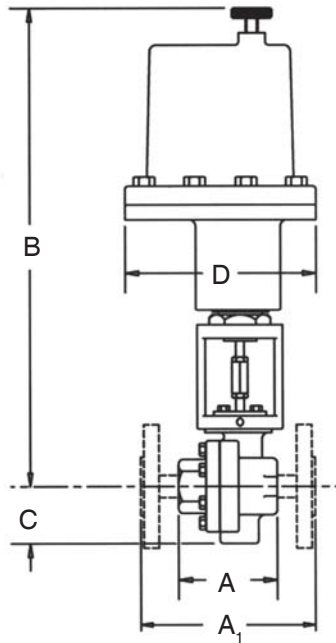
22 Cv - Equal Percentage



34 Cv - Equal Percentage



**DIMENSIONS**



■ Threaded & FSW Ends

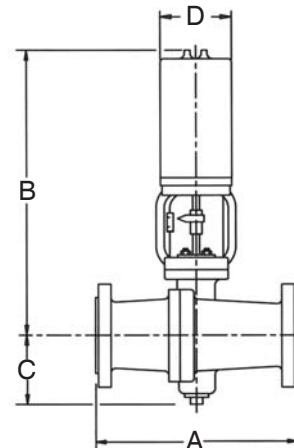
Size	Material	Dimensions (Inches)				Wt. (lbs.)
		A	B ①	C ②	D	
1/2" & 3/4"	DI/BRZ	3.62	17.78	2.12	7.13	22
	CS/SS	3.65	17.78	2.18	7.13	23
1"	DI/BRZ	4.12	18.06	2.62	7.13	24
	CS/SS	4.25	18.06	2.62	7.13	25
1-1/4"	DI/BRZ	4.12	18.06	2.62	7.13	24
1-1/2"	DI/BRZ	4.50	18.28	2.62	7.13	25
	CS/SS	4.65	18.28	2.75	7.13	26
2"	DI/BRZ	4.50	18.40	2.62	7.13	27
	CS/SS	5.50	18.40	3.00	7.13	30

■ Threaded & FSW Ends, Metric

Size (DN)	Material	Dimensions (mm)				Wt. (kg.)
		A	B ①	C ②	D	
15 & 20	DI/BRZ	91,9	451,6	55	181	10,0
	CS/SS	93,0	451,6	55	181	10,4
25	DI/BRZ	108,0	458,7	67	181	10,9
	CS/SS	108,0	458,7	67	181	11,3
32	DI/BRZ	108,0	458,7	67	181	10,9
40	DI/BRZ	114,3	464,3	67	181	11,3
	CS/SS	118,0	464,3	70	181	11,8
50	DI/BRZ	114,3	467,4	67	181	12,2
	CS/SS	139,7	467,4	76	181	13,6

■ Flanged Ends 1/2" - 2"

Size	Flange	Dimensions (Inches)				Wt. (lbs.)
		A <sub>1</sub>	B ①	C ②	D	
1/2"	150#	7.25	17.78	2.18	7.13	24
	300#	7.50	17.78	2.18	7.13	27
3/4"	150#	7.25	17.78	2.18	7.13	26
	300#	7.62	17.78	2.18	7.13	29
1"	150#	7.25	18.06	2.62	7.13	29
	300#	7.75	18.06	2.62	7.13	31
1-1/4"	150#	7.87	18.06	2.62	7.13	28
	300#	8.37	18.06	2.62	7.13	32
1-1/2"	150#	8.75	18.28	2.75	7.13	31
	300#	9.25	18.28	2.75	7.13	38
2"	150#	10.00	18.40	3.00	7.13	37
	300#	10.50	18.40	3.00	7.13	34



■ Flanged Ends DN15 - DN50, Metric

	Flange (PN)	Dimensions (mm)				Wt. (kg)
		A	B ①	C ②	D	
15	10/16	184,2	451,6	55	181	10,9
	25/40	190,5	451,6	55	181	12,2
20	10/16	184,2	451,6	55	181	11,8
	25/40	193,5	451,6	55	181	13,2
25	10/16	184,2	458,7	67	181	13,2
	25/40	196,9	458,7	67	181	14,1
32	10/16	199,9	458,7	67	181	12,7
	25/40	212,6	458,7	67	181	14,5
40	10/16	222,3	464,3	70	181	14,1
	25/40	235,0	464,3	70	181	17,2
50	10/16	254,0	467,4	76	181	16,8
	25/40	266,7	467,4	76	181	20,0

■ Flanged Ends 2-1/2" - 6"

Size	Flange	Dimensions (Inches)				Wt. (lbs.)
		A <sub>1</sub>	B ①	C ②	D	
2-1/2"	125-150#	10.88	26.22	5.84	4.50	175
	250-300#	11.50	26.22	5.84	4.50	175
3"	125-150#	11.75	26.22	5.84	4.50	190
	250-300#	12.50	26.22	5.84	4.50	190
4"	125-150#	13.88	28.54	6.91	4.50	300
	250-300#	14.50	28.54	6.91	4.50	300
6"	125-150#	17.75	30.10	7.72	4.50	375
	250-300#	18.62	30.10	7.72	4.50	375

■ Flanged Ends DN65 - DN150, Metric

Size (DN)	Flange (PN)	Dimensions (mm)				Wt. (kg)
		A	B ①	C ②	D	
65	10/16	276	666	148	114	79
	25/40	292	666	148	114	79
80	10/16	298	666	148	114	83
	25/40	318	666	148	114	83
100	10/16	353	725	176	114	136
	25/40	368	725	176	114	136
150	10/16	451	765	196	114	170
	25/40	473	765	196	114	170

- ① Add 6.28" (160mm) for removal of motor cover for electrical connections
- ② For explosion-proof motor, add 0.33" (8,38mm) to Dimension D

## ORDER SCHEMATIC

To specify a MK37/377 Final Control Element, build a model number by making a selection from each category in the Product Designator Coding System below.

1	—	2	—	3	/	4	5	6	7	8	9	10	11

1	Model	
37	Standard	
377	Equal Percentage Version	

2	Size					
		Inches	DN		Inches	DN
	025	1/4"	DN8	150	1-1/2"	DN40
	038	3/8"	DN10	200	2"	DN50
	050	1/2"	DN15	250	2-1/2"	DN65
	075	3/4"	DN20	300	3"	DN80
	100	1"	DN25	400	4"	DN100
	125	1-1/4"	DN32	600	6"	DN150

3	Material	
	DI	Ductile Iron
	BR	Bronze
	CS	Carbon Steel (WCB)
	S6	Stainless Steel (CF8M)
	CI	Cast Iron

4	End Connections			
	PT	NPT	F5	150# FE (except IFE)
	BT	BSPT	I2	250# IFE
	BP	BSPP	F2	250# FE (except IFE)
	SW	FSW	I3	300# IFE
	I1	125# IFE	F3	300# FE (except IFE)
	F1	125# FE (except IFE)	ZZ	Non-Standard
	I5	150# IFE		

5	Trim	
	T3	303SS/Teflon Packing, On-Off
	T6	316SS/Teflon Packing, On-Off
	V3	303SS/Teflon Packing, Ma/Volt
	V6	316SS/Teflon Packing, Ma/Volt
	ZZ	Non-Standard

6	Seat Materials	
	A	303SST
	B	316SST
	V	303SS/Jorcote
	W	316SS/Jorcote
	X	303SS/Jorcote/Jordanic
	Y	316SS/Jorcote/Jordanic

7	Seat CV (Kv)			
		MK37		MK377
	1	0.21 (0,18)	5	2.5 (2,16)
	2	0.42 (0,36)	6	4.4 (3,78)
	3	0.84 (0,72)	N	11.5 (9,91)
	4	1.6 (1,38)	P	13 (11,2)
	5	2.5 (2,16)	S	22 (18,9)
	6	4.4 (3,78)	U	34 (29,3)
	7	6.4 (5,51)	I	60 (51,7)
	8	9.5 (8,18)	2	80 (68,9)
	9	15 (12,9)	H	130 (112,1)
	A	25 (21,5)	3	230 (198,2)
	B	30 (25,8)	ZZ	Non-Standard
	F	85 (73)		
	H	130 (112)		
	I	200 (172)		
	J	395 (340)		

8	Range			
		1/4" - 2"		2-1/2" - 6"
	NF	On-Off	IA	Internal Amp
	42	4-20mA	NF	On-Off
	41	4-12mA	42	4-20mA Ext. Amp.
	12	12-20mA	A4	1-5mA Ext. Amp.
	V5	0-5V	A5	10-50mA Ext. Amp.
	V1	0-10V	A6	0-10/0-5V Ext. Amp.
	ZZ	Non-Standard		

9	Actuator			
		1/4" - 2"		2-1/2" - 6"
	NF	On-Off Nema 12	IA	Int. Amp. 4-20mA X-P/Nema 4
	XP	On-Off X-P/Nema 4	NF	On-Off or Ext. Amp. Nema 12
	MV	mA/Volt X-P/Nema 4	XP	On-Off Or Ext. Amp. X-P
	ZZ	Non-Standard		

10	Accessories			
	00	None		
	E1	Ext. Amp. Encl. AC Nema 12		
	E2	Ext. Amp. Encl. DC Nema 12		
	ZZ	Non-Standard		

11	Action			
	DD	Direct		
	RR	Reverse		