

Series 9120 Seated Angle Valves for ANSI 150-600 DIN/BS 4504 PN10-PN40

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Specification

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Series 9120 Features

General

The Series 9120 Angle-type control valves are indispensable to control fluid of high differential pressure, slurry, high viscosity or adhesive. They are provided with a number of features such as low resistance of passage, antiwear quality within the valve, and easy maintenance and inspection.

Performance:

- High Cv to body size ratio.
- Streamlined flow passages to optimize capacity.
- High Cv to valve weight ratio.
- Excellent flow control rangeability.

Design Flexibility:

- Modular construction design available with a range of different connections and styles.
- All trim components removable from the top for ease of maintenance.
- Wide range of supplementary noise control options.
- Inherently characterized trim offered in equal percentage, linear, quick opening and modified-parabolic (options).
- Multi trim sizes available.
- Full range of body and trim material options.
- Fully rationalized and interchangeable features.
- Full range of bonnet and packing designs to suit various temperatures and fluids.



Figure 1.
Series 9120 Valve incorporating Contoured Trim
and complete with Series 6100 Actuator

Angle Valve Specifications

Valve Type	Diaphragm Operated Angle Control Valve													
Valve Model	Series 9120													
Trim Type	S-P, C-B, Optional Special Valve													
Valve Size (inch)	1/2	3/4	1	1.1/2	2	2.1/2	3	4	5	6	8	10	12	14
(mm)	15	20	25	40	50	65	80	100	125	150	200	250	300	350
Pressure Rating	ANSI 150# ~ 600# (JIS 10K ~ 30K, PN 10~ 40)													
End Connection	RF, FF, SW, BW, RTJ													
Body Materials	A216WCB, A351CF8/CF8M, A351CF3/CF3M, H-C, H-B, and so on													
Bonnet Type	Plain(-17°C to 230°C), Extension(-45°C to -17°C, over 230°C), Cryogenic(-196°C to -45°C)													
Packing	Graphite foil, Carbon fiber, Teflon fiber													
Gasket	Spiral Wound Metal gasket													
Guiding	Top/Cage													
Seat Type	Metal/Soft													
Valve Plug Shapes	Contoured / Cage													
Plug Characteristic	Equal Percentage / Linear / Modified-Parabolic / Quick Opening													
Trim Materials	A351CF8/CF8M, A351CF3/CF3M, H-C, H-B, and so on													

Design Integrity :

- Heavy duty top guiding with no bottom guide to obstruct seat bore and potentially trap debris.
- Large diameter stems.
- Clamped bonnet and seat ring gaskets are fully retained for easy maintenance.

Quality manufacturing :

- Rigorously tested to ensure specified performance on site.
- Quality assurance system in accordance with ISO 9001.
- Optional full NACE MR-01-75 certification.

Scope of Design:

End Connection Sizes: 1/2" to 14" (15mm to 350mm)

End Connection Styles:

ANSI, DIN and BS flanged RF, FF, RTJ (and other grooved designs).
Welded profiles including butt weld, socket, etc., clamped designs. Other requirements available on request.

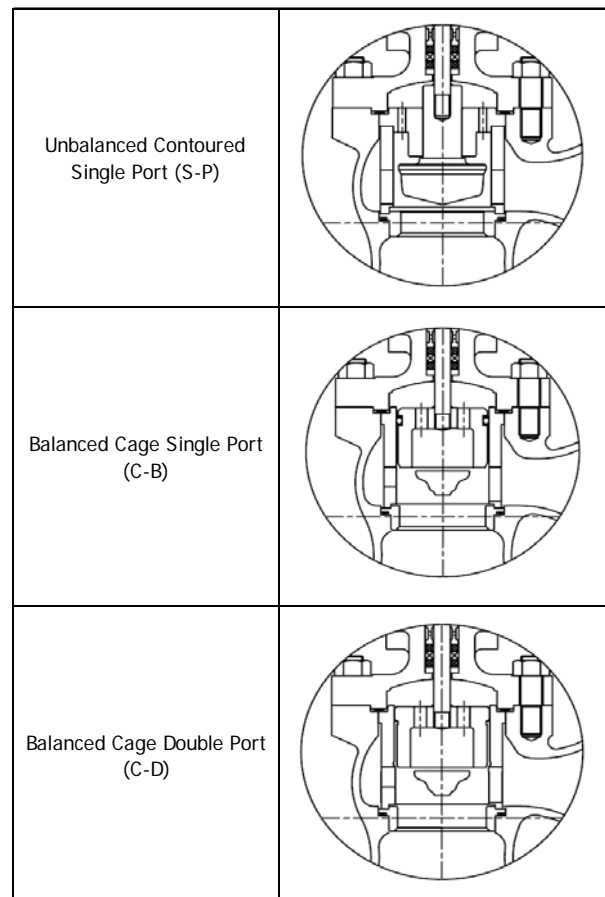


Figure 2. Trim Type

Valve Body Ratings:

JIS10K to JIS30K, ANSI 150 to ANSI 600, PN10 to PN40 as standard. Other requirements are available on request.

Design standards:

ANSI B16.34 and ASME section VIII (for body/bonnet bolting).

Trim Design Options:

Full and reduced trim, S-P and C-B are available as standard. Multi hole cages and silencers are available for specific applications.

Inherent Characteristics:

Equal percentage, Linear, modified parabolic or Quick open.

Material Combinations:

A wide range of body/bonnet and trim materials are available.

Plug Design Options:

Unbalanced with metal/metal or resilient seating plus balanced with metal/metal seating and metallic or resilient piston rings.

Bonnet Options

Standard, Extension and Cryogenic bonnet design options available.

Actuators:

Various types of actuators are available including;

6100 Series spring opposed pneumatic diaphragm.

Electric, electro-hydraulic, hydraulic operated versions are available.

Sizing/Noise prediction

The procedures for performing valve sizing, velocity and sound pressure level calculations are detailed in the sizing program user's manual.

Guide to Trim Options Available

Modular Design

Series 9120 has been designed around a modular manufacturing concept. Using this philosophy, a center body module selected to most suit the specified flow conditions and operating data, is combined with end connection size/rating, selected to support that module. This design feature allows not only the selection of full size ends, to offer oversize end connections to suit a particular requirement.

Unbalance Trim

Single Contoured Unbalance Port (S-P) are up to 4". Ports are guided by heavy guide.

Balance Trim

Pressure balanced cage port is used to reduced the thrust on the port.

Balanced Cage Port (C-B) is that over 4" is standard and under 4" are available for specific applications.

Soft seat is used in application requirement ANSI Class VI 'BUBBLE-TIGHT' shutoff and FIRE SAFE design. Its design consists of an elastomer sandwiched between two metal pieces, retainer (or cage) and metal seat. The installation can be done by inserting soft seat between retainer (or cage) and metal seat. Therefore it can be used for fire safe function.

Angle valve Bonnet type

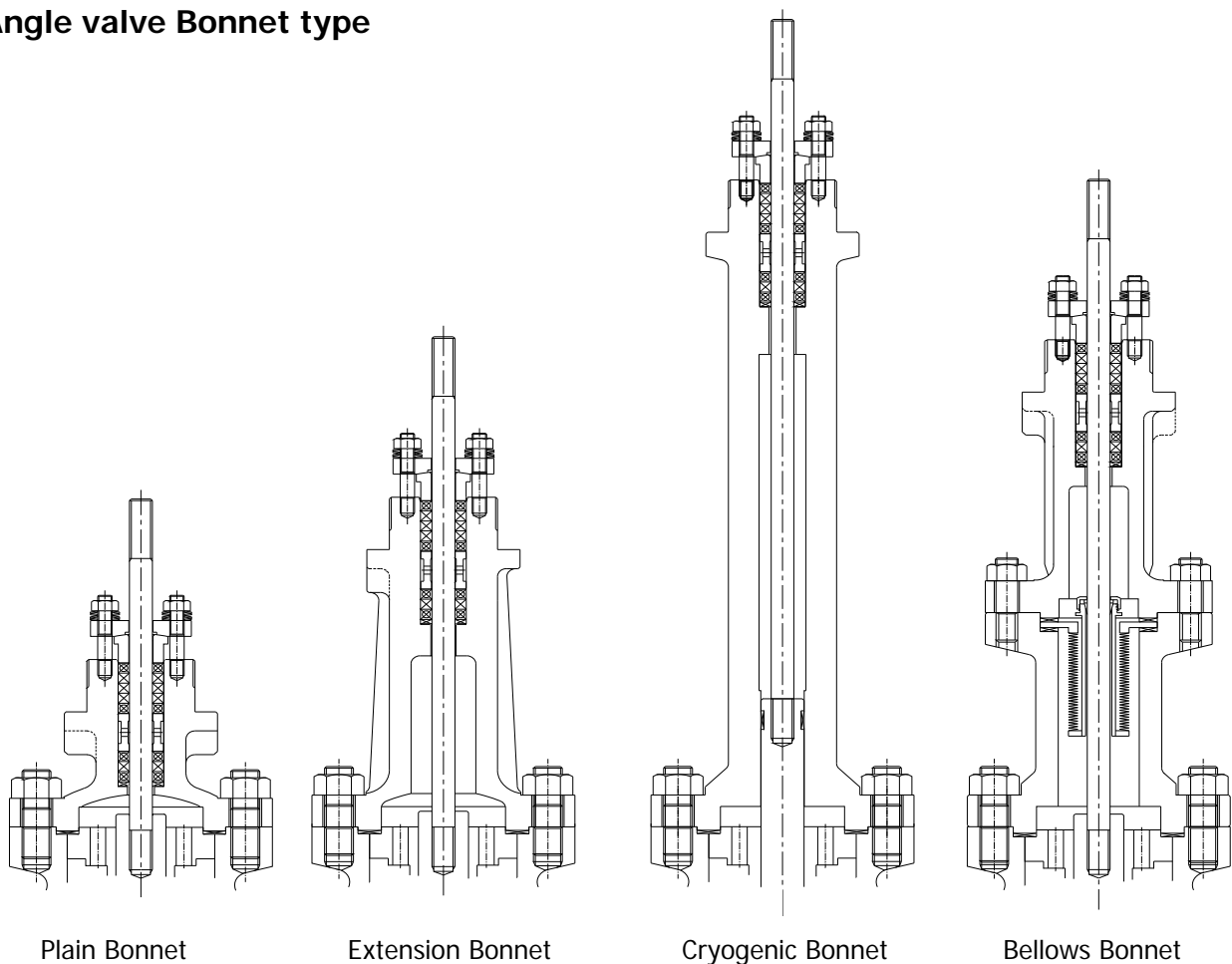


Figure 3. Bonnet Design Option

Series 9120 Design Cv Values

Table 1. Small Flow

Valve Size		Lift	Trim Size Number	Linear
in	mm			
1/2"	15	15	No.5	0.007
			No.4	0.014
			No.3	0.025
			No.2	0.037
			No.1	0.056

Note : Special Small Flow (Optional) is available.

Table 2. Single Contoured up to 1" valve size

Connection Size		Trim Size	Lift	EQ%	Linear
in	mm				
1/2"	15	3	15	0.09	0.09
		4		0.15	0.15
		6 (1/8)		0.4	0.4
		7 (3/16)		0.8	0.8
		8 (1/4)		1.5	1.5
		10 (3/8)		3.0	3.0
		15 (1/2)		5.2	5.2
3/4"	20	3	15	0.09	0.09
		4		0.15	0.15
		6 (1/8)		0.4	0.4
		7 (3/16)		0.8	0.8
		8 (1/4)		1.5	1.5
		10 (3/8)		3.0	3.0
		15 (1/2)		5.2	5.2
1"	25	4	15	0.15	0.15
		6 (1/8)		0.4	0.4
		7 (3/16)		0.8	0.8
		8 (1/4)		1.5	1.5
		10 (3/8)		3.0	3.0
		15 (1/2)		5.2	5.2
		20 (3/4)		9.0	9.0
		25 (1)		14	14

Note : The above Design Cv values apply to valves with body rating ANSI 150 to ANSI 600.

Table 3. Contoured Cv valve 1"~4" valve size (unbalanced)

Connection Size	Full ported			
	Trim Size	Lift	EQ%	Linear
1"	1"	15	14	14
1 1/2"	1 1/2"	20	32	36
2"	2"	25	52	58
2 1/2"	2 1/2"	25	78	88
3"	3"	38	116	130
4"	4"	38	195	220

Table 4. Cage guided Cv valve 1"~8" valve size (balanced)

Connection Size	Full ported			
	Trim Size	Lift	EQ%	Linear
1"	1"	15	18.5	19
1 1/2"	1 1/2"	20	34	34.2
2"	2"	25	56.2	60.5
2 1/2"	2 1/2"	25	83	84
3"	3"	38	125	135
4"	4"	38	210	211
5"	5"	50	276	294
6"	6"	50	424	438
8"	8"	100	675	690

Velocity Limitations

In selecting a valve for either a liquid or gas / vapor application one of the major considerations is the effect of fluid velocity. High velocity could lead to operational problems including erosion, excessive vibration and instability. The following tables indicate the maximum recommended velocity values for liquid and gas / vapor services.

Table 5. Recommended Maximum Velocities for Liquid Service

Valve Size				Maximum Velocity			
		Carbon Steel		Alloy Steel		Bronze, Cu / Ni Alloys	
in	mm	ft/s	m/s	ft/s	m/s	ft/s	m/s
0.5 - 2	15 – 50	41	12.5	46	14	25	7.6
3 - 6	80 – 150	34	10.4	34	10.4	20	6.2
8	200	29	8.9	29	8.9	17	5.2

Table 6. Recommended Maximum Velocities for Gas / Vapor Services

Valve Size		Maximum Inlet Velocity		Maximum Outlet Velocity		Max. Outlet Mach Number for Required Noise Level		
in	Mm	ft/s	m/s	ft/s	m/s	>95 dBA	<95 dBA	<85 dBA
0.5 - 2	15 – 50	340	104	830	253	0.65	0.5	0.3
3 - 6	80 – 150	294	90					
8	200	265	81					

Inherent Rangeability

The inherent rangeability of a control valve is the ratio between maximum and minimum flow with in the working characteristic at constant pressure drop.

Table 7. Rangeability Values

Trim Type	Rangeability	
3mm~ 4mm	10:1	
1/8" ~ 3/16"	15:1	
1/4" ~ 1/2"	30:1	* Over
3/4" ~ 8"	50:1	* Over

* Special option

Characteristic Curves

The inherent flow characteristic of a control valve is the relationship between the flow and the lift of the plug at constant pressure drop. The characteristics normally available are shown on Figure 4.

Definitions:

- **Linear**
Flow is directly proportional to valve lift.
- **Equal %**
Flow changes by a constant percentage of its instantaneous value for each unit of valve lift.
- **Quick Opening**
Flow increases rapidly with initial travel reaching near its maximum at a low lift.
- **Modified Parabolic**
Provides fine throttling action at low valve lift and approximately a linear characteristic for upper portions of travel.

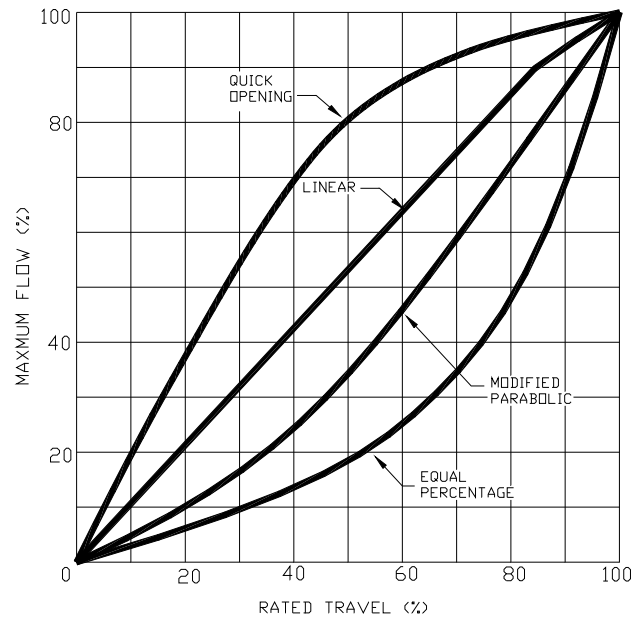


Figure 4. Characteristic Curves Table

Maximum Leakage Rates

Leakage rates are normally measured in accordance with the ANSI / FC170.2 specification using the class designation. The following Table defines the achievable leakage class for each available plug design.

Table 8. Maximum Leakage Rates

Plug Design	Seating Style	Achievable Leakage Class
Unbalanced (S-P)	Metal/Metal (standard)	IV
Unbalanced (S-P)	Metal/Metal (special)	V
Unbalanced (S-P)	Metal/PTFE (standard)	VI
Balanced (C-B)	Metal/Metal (standard)	IV
Balanced (C-B)	Metal/Metal (special)	V
Balanced (C-B)	Metal/PTFE (standard)	VI
Balanced (C-D)	Metal/Metal (standard)	II
Balanced (C-D)	Metal/Metal (special)	III

Note. (standard) or (special) refer to the amount seat/plug lapping carried out at final assemble.

Tables 9. Series 9120 Outline Dimensions up to ANSI 600 Rating

(Unit: mm)

Pressure Rating Body size (mm)	A, B		
	JIS 10K, 20K ANSI 150RF, 300RF	JIS 30K, 40K ANSI 300RF, 600RF	ANSI 400RJ, 600RJ
20	97	103	103
25	98	105	105
40	117	125	125
50	133	143	145
65	146	156	158
80	159	168	170
100	184	197	200
125	212	228	230
150	237	254	256

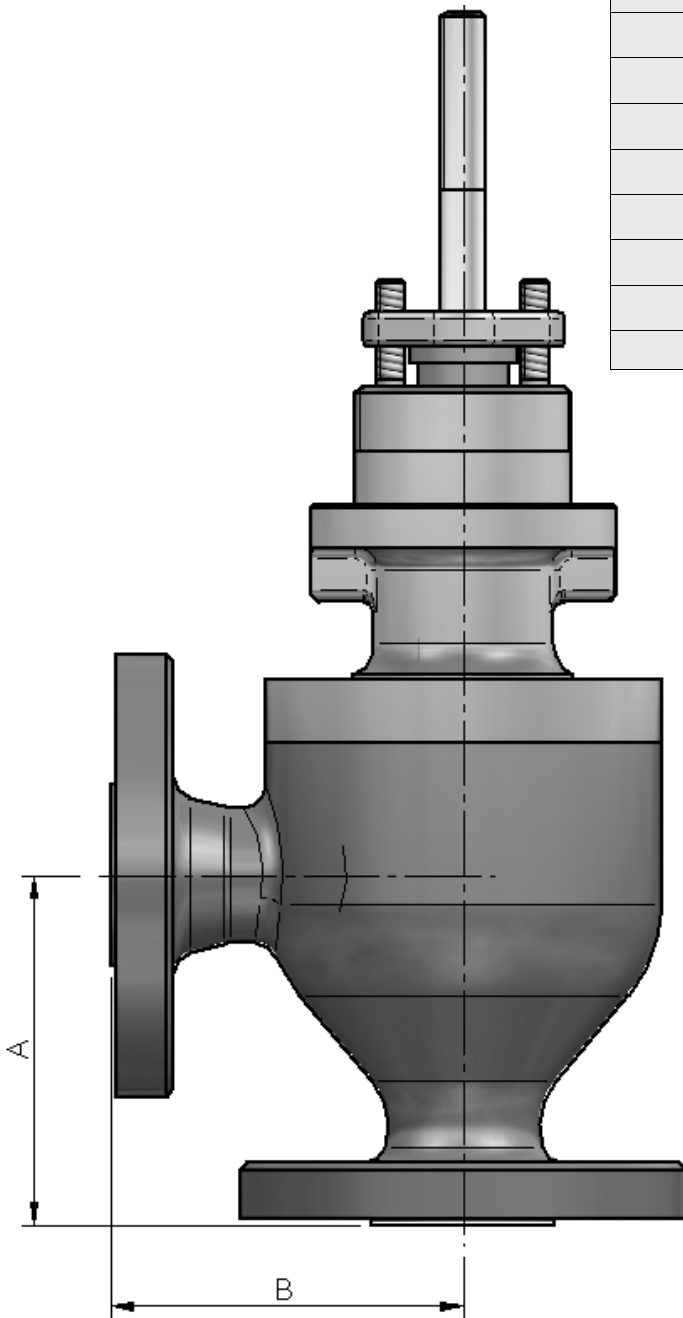
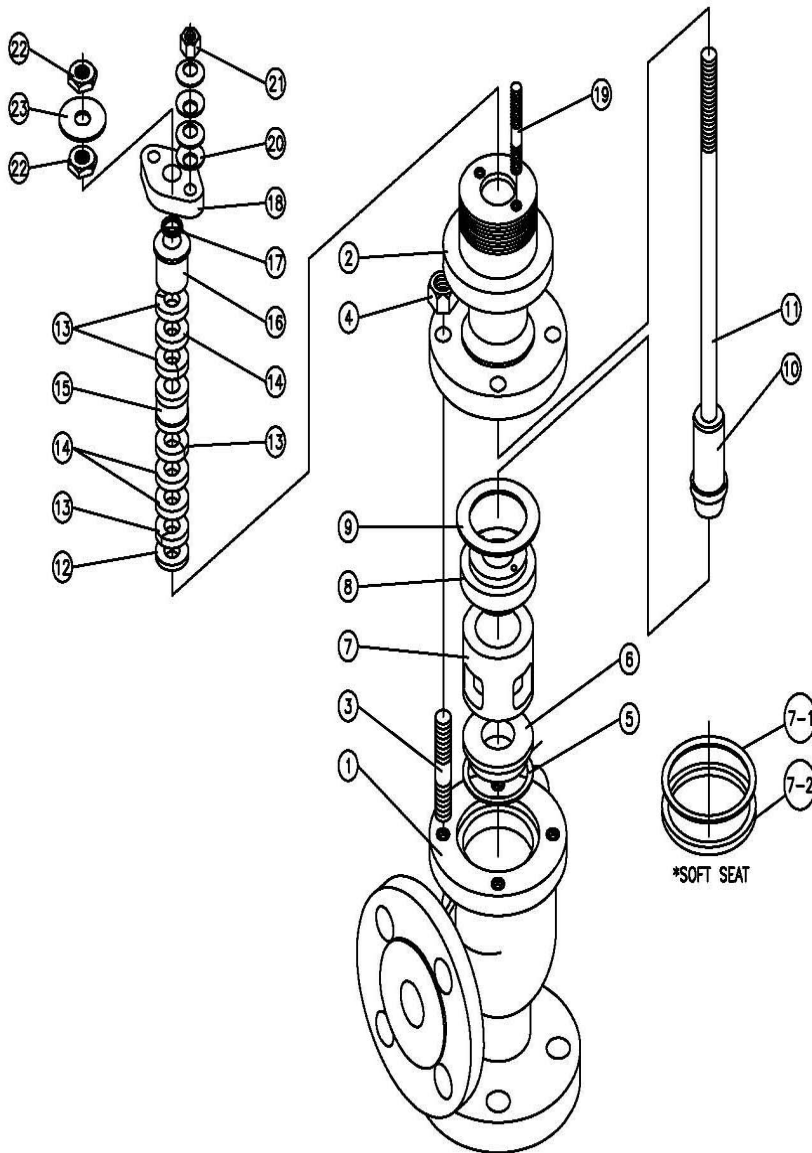


Figure 5. Series 9120 Dimensions



23	POINTER	CFB	1	
22	STEM LOCK NUT	CFB	2	
21	HEX. NUT	CFB	2	
20	CONED DISC SPRING	SK5M	8	
19	GLAND BOLT	CFB	2	
18	GLAND FLANGE	CFB	1	
17	DUST RING	TEFLON	1	
16	GLAND FOLLOWER	CFB	1	
15	LANTURN RING	CFB	1	
14	GLAND PACKING	GRAPHITE	3	
13	GLAND PACKING	CARBON FIBER	4	
12	PACKING RING	CFB	1	
11	STEM	CFBM	1	
10	INNER VALVE	CFBM	1	
9	BONNET GASKET	CFBM/GRAPHITE	1	
8	GUIDE	CFB	1	
7-2	TEFLON SEAT	TEFLON	1	
7-1	SEAT RETAINER (2)	CFB	1	
7	SEAT RETAINER (1)	CFB	1	
6	SEAT RING	CFBM	1	
5	SEAT GASKET	CFBM/GRAPHITE	1	
4	HEX. NUT	2H	4	
3	STUD BOLT	B7	4	
2	PLAIN BONNET	WCB	1	
1	BODY	WCB	1	
NO.	NAME OF PARTS	MATERIALS	Q'TY	REMARKS

Figure 6. Body Disassembly and Assembly Diagram

Warranty / Remedy

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