Milroyal D - Datasheet

Liquid Ends:

DSD® Technology Hydraulically Actuated Diaphragm

HPD® Technology Hydraulically Actuated Diaphragm

Metallic Diaphragm High Pressure Hydraulically Actuated Diaphragm

COMPANY CONFIDENTIAL

MILTON ROY INDIA
Version 2022 Revision 02

MILROYAL D / DSD TECHNOLOGY:

General Technical Characteristics:

Accuracy	±1% over a range of 10 to 100% of nominal flow rate
Flow rate adjustment	While running or stopped: from 0 to 100% of nominal flow rate
Thrust	110 daN
Stroke length 100%	25.4 mm
Ambient operating temperatures	Standard: -10 °C to +50°C. Low temperature option: -40 °C to +50 °C
API 675	Conformity
ATEX	Conforms to ATEX CE EX II 2G/D c T3 with ATEX motorZone 1 and zone 2 possible
Discharge pressure	4 bar min. for plastic liquid ends (code VR) 2 bar min. for S.S. liquid ends (codes XR and XV)

Materials in contact with Pumped Fluid:

LIQUID END	VR		XR / XV	
	Single diaphragm	Double diaphragm	Single diaphragm	Double diaphragm
Liquid end body	PVDF		316L	
Check valve body	PVDF		316L	
Seats	plungers Ø3 to 8 mm : Hastelloy C		plungers Ø3 to 8 mm : 316L | plungers Ø10 to 16 mm : 17.4PH = AISI 630	
Balls	plungers Ø3 to 8 mm : Hastelloy C		plungers Ø3 to 8 mm : Hastelloy C | plungers Ø10 to 16 mm : 316L	
Diaphragm	PEEK	PTFE	PEEK	PTFE
Intermediate diaphragm	NA	POM	NA	POM standard (1)
Check valve o-ring	PTFE		NA	
Diaphragm o-ring	Ø3 to Ø8 : NA Ø10 to Ø16 : VITON standard (NITRILE as option)	VITON standard (NITRILE as option)	Ø3 to Ø8 : NA Ø10 to Ø16 : VITON standard (NITRILE as option)	VITON standard (NITRILE as option)
Temperature of the fluids	-5 °C to +50 °C For temperatures > 20 °C, the pressure has to be derated: 2 bar / 5 °C		-5 °C to +100 °C For temperatures > 20 °C, the pressure has to be derated: 1.5 bar / 5 °C	-5 °C to +80 °C
MASP (5 %) (2)	0.7 bar a.	0.8 bar a.	XR : 0.7 bar a. XV : 0.9 bar a.	XR : 0.8 bar a. XV : 1 bar a.

(1) For PEEK, please refer to Liquid end options: double diaphragm. Please check the corrosion resistance table

(2) Minimal Allowable Suction Pressure for a 5% decrease in flow

Available Valves:

Valves	Code	Description
Standard on XR and VR - except (1)	**ND**	Double valves / Double balls
(1) XR and VR liquid ends / plunger Ø3 mm at 23 spm only	**NT**	Triple valves / Triple balls
Standard on XV	**NS**	DSD 51/DSD 71 (Ø3 to 8 mm): Ø4 spring loaded ball - at suct. side: 0.2 bar / at disch. side: 1 bar DSD 91 (Ø10 to 16 mm): Ø6.35 spring loaded ball - at suct. side: 0.2 bar / at disch. side: 1 bar
Viscous products - For XV liquid end only	**VS1**	DSD 51/DSD 71 (Ø3 to 8 mm): Ø6.35 spring loaded ball - at suct. side: 0.2 bar / at disch. side: 1 bar DSD 91 (Ø10 to 16 mm): Ø9.52 spring loaded ball - at suct. side: 0.2 bar / at disch. side: 1 bar

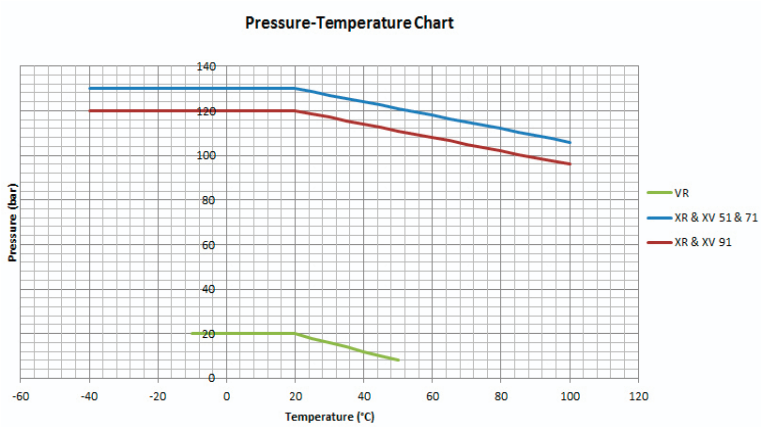
Connections:

Valves	XR or XV	VR	Description
Standard	**VV2**	**VV1**	Vertical on suction and discharge sides
Connection direction	**VV**	**VV**	Vertical on suction and discharge sides
Type of connection	**Ø3 to 8 mm: NPT f - Code 2** **Ø10 to 16 mm : NPT m - Code 2** **Flanged - Code 3**	**Ø3 to 8 mm : GAZ f - Code 1** **Ø10 to 16 mm : GAZ m - Code 1** **Flanged - Code 3**	

MILROYAL D / DSD TECHNOLOGY:

MOTORS:

Standard	0.25 kW 1,500 rpm - 50 Hz 230/400V 3-phase



Flow rate of 0.06 to 40 l/h Performances:

XR – Stainless Steel Liquid End:

Ø Plunger	Flow rate		Pressure	Frequency	P max. suction	Max. Viscosity at P max.	Connections	Stroke capacity
mm Diaphragm Ø mm	l/h 10 bar	P max	bar	spm	bar	mPA.s At NPSHa = 6 mWC Standard check valves	(Valves) seat balls	Motor
3	0.22	0.09	130	23	98	58	1/4" NPT f (Ø3.17 mm - ND) 316L Hastelloy C	Swept volume : 0.17 cm³
	0.44	0.17	130	46		40		
	0.88	0.35	130	93		22		
	1.11	0.44	130	117		10		
	1.33	0.53	130	140		10		
4 DSD 51	0.40	0.20	130	23		58		Swept volume : 0.31 cm³ Motor 0.25 kW
	0.79	0.41	130	46		40		
	1.60	0.83	130	93		22		
	2.02	1.05	130	117		10		
	2.41	1.25	130	140		10		
6	0.93	0.65	130	23		58		Swept volume : 0.71 cm³
	1.86	1.3	130	46		40		
	3.77	2.63	130	93		22		
	4.74	3.31	130	117		10		
	5.67	3.97	130	140		10		
8 DSD 71	1.66	1.16	130	23	59	58		Swept volume : 1.27 cm³ Motor 0.25 kW
	3.31	2.32	130	46		40		
	6.70	4.69	130	93		22		
	8.42	5.90	130	117		10		
	10.08	7.06	130	140		10		
10 DSD 91	2.58	1.87	120	23	37	58	1/2" NPT m (Ø6.35 mm - ND) 17.4PH 316L	Swept volume : 2 cm³ Motor 0.25 kW
	5.17	3.75	120	46		40		
	10.46	7.58	120	93		22		
	13.16	9.54	120	117		10		
	15.75	11.42	120	140		10		
12 DSD 91	3.72	3.2	80	23	25	58		Swept volume : 2.87 cm³ Motor 0.25 kW
	7.45	6.41	80	46		40		
	15.07	12.96	80	93		22		
	18.95	16.30	80	117		10		
	22.68	19.5	80	140		10		
14 DSD 91	5.07	4.61	55	23	19	58		Swept volume : 3.91 cm³ Motor 0.25 kW
	10.14	9.23	55	46		40		
	20.50	18.66	55	93		22		
	25.80	23.48	55	117		10		
	30.8	28	55	140		10		
16 DSD 91	6.62	6.23	40	23	14	58		Swept volume : 5.11 cm³ Motor 0.25 kW
	13.25	12.45	40	46		40		
	26.78	25.2	40	93		22		
	33.70	31.60	40	117		10		
	40.3	37.3	40	140		10		

MILROYAL D / DSD TECHNOLOGY:

XV – High Viscosity Stainless Steel Liquid End:

Ø Plunger	Flow rate		Pressure	Frequency	P max. suction	Max. Viscosity at P max.		Connections	Stroke capacity
mm Diaphragm Ø mm	l/h 10 bar	l/h P max	bar	spm	bar	mPA.s At NPSHa = 6 mWC Standard check valves	mPA.s At NPSHa = 6 mWC Option VS1	(valves) seat balls	Motor
3 DSD 51	0.22 (1)	0.06 (1)	130	23	98	1385	NA	Standard :1/4'' NPT f (Ø4 mm - VS) VS1 : 1/2'' NPT m (Ø6.35 mm - VS)316L Hastelloy C	Swept volume : 0.17 cm³ Motor 0.25 kW
4 DSD 51	0.4 (1)	0.2 (1)	130	23		750	NA		Swept volume : 0.31 cm³Motor 0.25 kW
	0.79 (1)	0.41 (1)	130	46		600	NA		
6 DSD 71	0.93 (1)	0.48 (1)	130	23		560	4900		Swept volume : 0.71 cm³Motor 0.25 kW
	1.86 (1)	0.97 (1)	130	46		280	2500		
8 DSD 71	1.66 (1)	0.86 (1)	130	23	59	300	2500		Swept volume : 1.27 cm³Motor 0.25 kW
	3.31 (1)	1.72 (1)	130	46		100	1400		
10 DSD 91	2.48 (1)	1.79 (1)	120	23	37	1200	6200	Standard : 1/4'' NPT m (Ø6.35 mm - VS) VS1 :1/2'' NPT m (Ø9.52 mm - VS) 17.4PH 316L	Swept volume : 2 cm³Motor 0.25 kW
	4.95 (1)	3.59 (1)	120	46		580	3100		
12 DSD 91	3.57 (1)	3.07 (1)	80	23	25	700	3600		Swept volume : 2.87 cm³Motor 0.25 kW
	7.13 (1)	6.13 (1)	80	46		340	1800		
14 DSD 91	4.85 (1	4.42 (1)	55	23	19	480	2500		Swept volume : 3.91 cm³Motor 0.25 kW
	9.71 (1)	8.84 (1)	55	46		240	1200		
16 DSD 91	6.34 (1)	5.96 (1)	40	23	14	340	1800		Swept volume : 5.11 cm³Motor 0.25 kW
	12.68 (1)	11.92 (1)	40	46		180	920		
	25.64 (1)	24.10 (1)	40	93		80	460		
	32.26 (1)	30.30 (1)	40	117		60	360		

At the maximum Viscosity,
Flow rate has to be derated by 10% and by 20% if option VS1 is selected.(the flow rate decreased according to the viscosity is linear)

VR –PVDF Liquid End :

Ø Plunger	Flow rate		Pressure	Frequency	P max. suction	Max. viscosity at max. P	Connections	Stroke capacity
mm Diaphragm Ø mm	l/h 10 bar	l/h P max	bar	spm	bar	mPA.s At NPSHa = 6 mWC Standard check valves	(Valves) seat balls	Motor
3 DSD 51	0.18	0.15	20	23	12	58	1/4'' Gaz f (Ø3.17 mm - ND) Hastelloy C Hastelloy C	Swept volume : 0.17 cm³ Motor 0.25 kW
	0.36	0.23	20	46		40		
	0.73	0.46	20	93		22		
	0.92	0.58	20	117		10		
	1.10	0.69	20	140		10		
4 DSD 51	0.33	0.30	20	23		58		Swept volume : 0.31 cm³ Motor 0.25 kW
	0.67	0.60	20	46		40		
	1.35	1.02	20	93		22		
	1.70	1.28	20	117		10		
	2.04	1.53	20	140		10		
6 DSD 71	0.93	0.79	20	23		58		Swept volume : 0.71 cm³ Motor 0.25 kW
	1.86	1.58	20	46		40		
	3.77	3.2	20	93		22		
	4.74	4.03	20	117		10		
	5.67	4.82	20	140		10		
8 DSD 71	1.66	1.41	20	23		58		Swept volume : 1.27 cm³ Motor 0.25 kW
	3.31	2.82	20	46		40		
	6.7	5.69	20	93		22		
	8.42	7.16	20	117		10		
	10.08	8.57	20	140		10		

The flow rates and stroke speeds are indicated for a frequency of 50 Hz. These values increase by 20% for 60 Hz motors.1 mPa.s = 1 cP

MILROYAL D / DSD TECHNOLOGY:

Model Code Selection:

Build the product code by selecting the model and options within each feature.

MILROYAL® D pump								
MD								
	Frequency (spm)					Please refer to the performance tables to select the stroke according the needed flow rate		
	23							CONSULT US
	46							CONSULT US
	93							CONSULT US
	117							CONSULT US
	140							CONSULT US
		Motor power						
			Standard pump motor power					CONSULT US
		F	0.25 kW					CONSULT US
		G	0.37 kW					CONSULT US
			Other motor powers			Reminder: motor de rating for multiplexing or frequency variation		CONSULT US
		H	0.55 kW			Duplex = motor power x 1.2 / Triplex = motor power x 1.35		CONSULT US
			Pump without motor					CONSULT US
		S	Pump supplied without motor (*) - specify power of motor to be used					
		Plunger Ø						
			3	3 mm				CONSULT US
			4	4 mm				CONSULT US
			6	6 mm				CONSULT US
			8	8 mm				CONSULT US
			10	10 mm				CONSULT US
			12	12 mm				CONSULT US
			14	14 mm				CONSULT US
			16	16 mm				CONSULT US
			Liquid End type - DSD® technology - Dynamic Stiffness Diaphragm					
			VR	Plastic liquid end: PVDF. Available only on DSD 51 and 71 (Ø3 to 8 mm)				CONSULT US
			XR	Metallic liquid end: 316L S.S.				CONSULT US
			XV	Metallic liquid end for viscous products: 316L S.S.				CONSULT US
				Operating Pressure				
					Indicate your operating pressure here. The internal safety valve will be set as a function of this pressure If operating pressure ≤ 20 bar => pressure setting = operating pressure + 8 bar. If operating pressure > 20 bar => pressure setting = operating pressure + 8 bar + 0.1 x operating pressure			
					Multiplexing			
					-	Simplex		CONSULT US
					DX	Duplex	Please consider the price of a simplex pump.	CONSULT US
					TX	Triplex	Multiply by the number of heads (options also).	CONSULT US
					-	Multiplex	Then add the multiplexing price addition.	CONSULT US
D	93	F	6	XR	70	-		See the following pages for options.

(*) If customer's motor is to be used: The pump will be tested with a Milton Roy's workshop motor. In the event that tests have to be donewith the customer's motor, any delay resulting from motor deliver or its dysfunction may not be attributed to Milton Roy.

Available paint systems (others - please consult us): please add this paint code at the end of the pump code

For ACC paint option, see Paint Section

				yellow RAL 1018	grey RAL 7035	grey RAL 7042	White RAL 9010
			Code Color	_S	_2	_3	_4
System Code	System	Description	Detail Description	Code system/color			
N_	C1, Standard	C1, Polyurethane FELOR 100 µ for very low corrosity Interior	Application of 1 coat: Feloxane HES, thickness 100 µ, colour RAL 1018 yellow	Standard Available	Standard Available	Standard Available	Standard Available
B_	CB, food grade	Food grade Epoxy 100 µ, No ACS certification, French Sanitary Conformity Certificate	Application of 1 coat : - sand blasting S.A. 2.5 - 1 coat of food grade processing epoxy, colour white RAL 9010	Consult us	Consult us	Consult us	Consult us
A_	C2	C2, 140 µ, For low corrosity, Interior/Exterior	Available in yellow RAL 1018. Application of 2 coats: - sand blasting S.A. 2.5 ; 1 coat 60µ: epoxy Hempadur SPEED-DRY ZP650 17650; - 1 top coat 80 µ: polyurethane Hempathane HS 55610	Consult us	Consult us	Consult us	Consult us
C_	C3	C3, 240 µ, for medium corrosity, Interior/Exterior	Application of 2 coats: - sand blasting S.A. 2.5; 1 coat 180 µ: epoxy Hempadur SPEED-DRY ZP650 17650; - 1 top coat 60 µ: polyurethane Hempathane HS 55610	Consult us	Consult us	Consult us	Consult us
E_	C4	C4, 70 µ, for high corrosity, Interior/Exterior	Available in yellow RAL 1018, grey RAL 7035 and 7042. Application of 2 coats: - sand blasting S.A. 2.5; 1 coat 200 µ: epoxy Hempadur SPEED-DRY ZP650 17650; - 1 top coat 80 µ: polyurethane Hempathane HS 55610	Consult us	Consult us	Consult us	Consult us
D_	C5	C5-M 245 µ, for very high corrosity Marine/Offshore, Interior/Exterior	Available in yellow RAL 1018, grey RAL 7035 and 7042. Application of 3 coats: - sand blasting Sa 3; 1 primer coat 60 µ: zinc epoxy Hempadur Avantguard 7501736G; - 1 coat 160 µ: epoxy Hempadur Mastic 4588W - 1 top coat 80 µ: polyurethane Hempathane HS 55610	Consult us	Consult us	Consult us	Consult us

Milton Roy is committed to minimizing the impact of its paints on the environment and therefore strongly recommends the use of its standard paints

MILROYAL D / DSD TECHNOLOGY:

Drive End Options:

Capacity Control Options		**Consult factory for application assistance for multiplex pumps with actuators**		
AW	Actuator Capacity Controller (ACC) **Waterproof** ; 24VDC ; 85V to 260V 1 phase 50/60Hz, -40°C/°F			CONSULT US
AE	Actuator Capacity Controller (ACC) **Ex-proof** ; 24VDC ; 85V to 260V 1 phase 50/60Hz IP68 Ex d II B T4, -40°C/°F			CONSULT US
P	Pneumatic actuator type "STI" OUTSIDE OF ATEX AREA			CONSULT US
PM	Pneumatic actuator type "STI" OUTSIDE OF ATEX AREA + manual course length adjustment option			CONSULT US
PA	Pneumatic actuator type "STI"			CONSULT US
PAM	Pneumatic actuator type "STI" for ATEX AREA + manual course length adjustment option			CONSULT US
PZ	For STI actuators: same as P + air failure lock up system: last position / air failure lock up system: return to 0% or 100%			CONSULT US
PMZ	For STI actuators: same as PM + air failure lock up system: last position / air failure lock up system: return to 0% or 100%			CONSULT US
PAZ	For STI actuators: same as PA + air failure lock up system: last position / air failure lock up system: return to 0% or 100%			CONSULT US
PAMZ	For STI actuators: same as PAM + air failure lock up system: last position / air failure lock up system: return to 0% or 100%			CONSULT US
	Special motors - Detailed descriptions are available in the MOTORS section			
	-	Standard: Standard motor with aluminum frame - 1,500 RPM		
		F	0.25 Kw	CONSULT US
	-	G	0.37 kW	CONSULT US
	-	H	0.55 kW	CONSULT US
	1	Ex-Proof: EEx D IIB T4 - 3 phase - 1,500 RPM - 4 poles - 50Hz		
		F	0.25 kW	CONSULT US
		G	0.37 kW	CONSULT US
		H	0.55 kW	CONSULT US
	4A	Frequency Variation - Ex Proof EEx D IIB T4 - 3 phase - 1,500 RPM - 4 poles - 50Hz for Frequency Variation with thermistor PTC (1 set of 3) coil protection		
		F	0.25 kW	CONSULT US
		G	0.37 kW	CONSULT US
		H	0.55 kW	CONSULT US
	4	VF 3 phase - Motor for frequency variation (forced ventilation) - 3 phase - 1,500 RPM - 4 poles - 50 Hz		
		G	0.37 kW	CONSULT US
		H	0.55 kW	CONSULT US
	4S	Frequency Variation - Motor for frequency variation - self cooled - 50 Hz		
		G	0.37 kW	CONSULT US
		H	0.55 kW	CONSULT US
B	**4**			**See next page for liquid end options.**

MILROYAL D / DSD TECHNOLOGY:

Liquid end version

Extra price on codes XR and XV (metallic liquid ends) ONLY

J	Heating or cooling jacketed liquid end					CONSULT US
Diaphragm						
Single diaphragm						CONSULT US
-	Standard for Single diaphragm: diaphragm in PEEK, seal o-rings in viton					CONSULT US
PKN	Option for Single diaphragm: diaphragm in PEEK, seal o-rings in nitril					CONSULT US
Double diaphragm						
-	Standard for Double diaphragm: intermediate diaphragm in POM, seal o-rings in viton					CONSULT US
PON	Option for Double diaphragm: intermediate diaphragm in POM, seal o-rings in nitril					CONSULT US
PK	Option for Double diaphragm: intermediate diaphragm in PEEK, seal o-rings in viton - Suitable for use up to 100 °C. Available on S.S. liquid ends (codes XR and XV) only					CONSULT US
Double diaphragm and rupture detector						
C5	Double diaphragm and rupture detection by pressure gauge - POM intermediate diaphragm					CONSULT US
C6	Double diaphragm and rupture detection by ASHRCROFT pressure switch - POM intermediate diaphragm					CONSULT US
C7	Double diaphragm and rupture detection by manometer with electric detection (power supply: 250 VAC/VDC max.) - POM intermediate diaphragm					CONSULT US
C8	Double diaphragm and rupture detection by ASHCROFT ex-proof pressure switch (ATEX certified as CE EX II 2G T6) - POM intermediate diaphragm					CONSULT US
CT	Double diaphragm with pressure transmitter and manifold Parker type HLS2V Transmitter should be mandatory defined according to the following criteria: process connections 1/2" NPT f and vertical mounting					CONSULT US
Special Valves						
-	Standard Valves					
VS1	Spring loaded ball - at suct. side: 0.2 bar / at disch. side: 1 bar - For XV liquid ends with plungers Ø 6 to 16 mm (DSD 71 and 91) ONLY					
Connections						
Gas or NPT connection					**If standard connections**	
	Type	**Suction**	**Vertical**		**1/4" VV2 f**	**1/2" VV1 m**
VV1	Gas	Vertical	Vertical		Available	Available
VV2	NPT	Vertical	Vertical		Available	Available
Flange connection - Price for a single connection only (price x2 for suction and discharge)						
ANSI flanges - On liquid ends DSD 51 and DSD 71						
Ø flanges						
H3 or V3	ANSI 1/2" flanges welded on 1/4" NPT threaded tubing				**150LB / 300LB/ 600LB/ 1500LB/ 2500LB – OPTIONS AVAILABLE**	
ANSI flanges - On liquid ends DSD 91						
Ø flanges						
H3	1/2" Metallic ANSI weld neck Welded flange 316L S.S. horizontal output					
V3	1/2" Metallic ANSI weld neck Welded flange 316L S.S. vertical output				**150LB / 300LB/ 600LB/ 1500LB/ 2500LB – OPTIONS AVAILABLE**	
Connections according to EN1092-1 or EN1759-1 - Price for one connection (Price x2 for suction and discharge). Smooth flash line						
Ø flanges						
H3	EN1092-1 or EN1759-1 / DN15 Welded flange 316L S.S.					
V3	EN1092-1 or EN1759-1 / DN15 Welded flange 316L S.S.				**EN1092-1 / EN1759-1,EN1092-1, EN1759-1 – OPTION AVAILABLE**	
Flanged connections on PLASTIC liquid ends ≤ 10 bar						
VV3	ISO/DIN DN15 - Bride PVC				**OPTION AVAILABLE**	
	ANSI 1/2" - RF flanges PVC					
	ISO/DIN DN15 - Bride PVDF					
	ANSI 1/2" - RF flanges PVDF					
Special option						
Z	Other options - on demand					Consult us

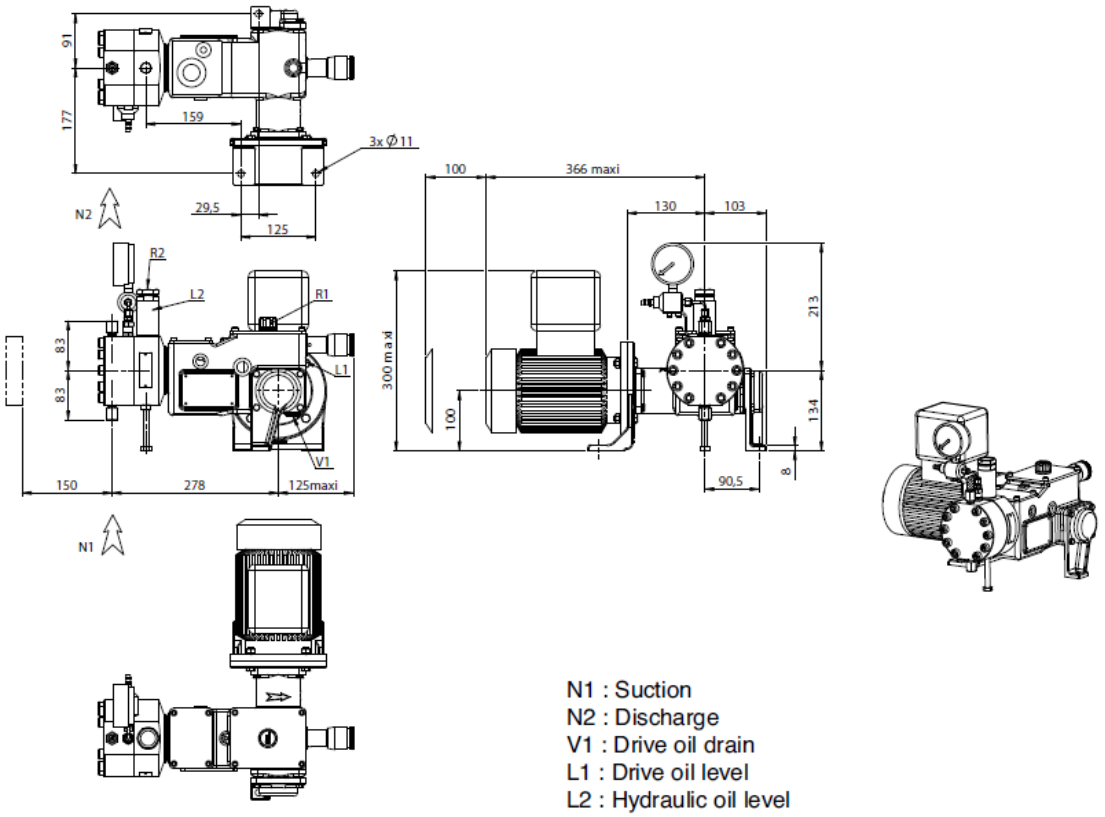
-	-	C5	-	VV3	Z

MILROYAL D / DSD TECHNOLOGY:

MILROYAL® D / DSD TECHNOLOGY®

Flow rate from 0.11 to 10.08 l/h Dimensions and Packing

Dimensions in mm



N1 : Suction
N2 : Discharge
V1 : Drive oil drain
L1 : Drive oil level
L2 : Hydraulic oil level
R1 : Drive oil fill
R2 : Hydraulic oil fill

The general dimensions are given as an indication only

Weight and Packing

Version	Standard packing	Net weight (1)	Gross weight (1)	Packing (L x l x h)
		kg	kg	mm
Simplex	Full wooden case	30	47	810 x 560 x 560
Duplex		50	74	800 x 800 x 590
Simplex + actuator		35	59	800 x 800 x 590
Triplex		70	115	1310 x 630 x 690

(1) Approximately

Standard packing
- Holes protected with Kapsto plastics caps
- Machined unpainted parts protected with waterproof varnish
- Material painted

Full case - SEI IV B
- Side panels and cover: full butt jointed wood doubled plastic film
- Floor: full butt jointed wood doubled plastic film, palletizable

Full case - SEI IV C
Same as SEI IV B plus:
- Waterproof thermowelded sheeting with dehydrating sachets
- Storage period to be specified: 6, 12 or 24 months

MILROYAL D / HPD Diaphragm Liquid Ends:

Metallic liquid end and Plastic liquid end:

General Technical Characteristics:

Accuracy	±1% over a range of 10 to 100% of nominal flow rate
Flow rate adjustment	While running or stopped: from 0 to 100% of nominal flow rate
Thrust	110 daN
Stroke length 100%	25.4 mm
Max. temperature of fluids	H liquid end: +10 to 95°C - PV option: -10 to 110 °CP liquid end: +10 to +50 °C
Ambient operating temperatures	Standard: -10 °C to +50 °C. Low temperature option: -40 °C to +50 °C
API 675	Conforms (exemptions available on request)
ATEX	Conforms to ATEX CE EX II 2G/D c T3 with ATEX motor For plastic liquid ends, in zone 1 Gas, except IIC, please add a stainless steel protectionof the liquid end for an ATEX certification - please consult.
Suction lift	Pump set to 2 mWater

Max Suction Pressure:

Plunger Ø (mm)	20	25	32	40	45
H liquid end - Maximum pressure at suction (bar)	10	6	4	2	2
P liquid end - Maximum pressure at suction (bar)	8	6	4	2	2

Materials in contact with Pumped Fluid:

LIQUID ENDS	H	P
Liquid end body	316L	PVC
Check valve cartridge	316L	PVDF
Seats	316L	PE
Balls	316L	-
Diaphragm	PTFE nitrile	PTFE nitrile
Seals	PTFE	VITON

Available Valves:

Valves	Code	Description	Comments
Standard	**ND**	Double valves / double ball	H liquid end: plungers Ø 20 and 25 P liquid end: plunger Ø 20 only if frequency = 23 spm
Standard	**NS**	Single valve / single ball	H liquid end: plungers Ø 32, 40 and 45 P liquid end: plunger Ø 20 only if frequency = 46, 93 or 140 spm and for plungers Ø 25, 32, 40 and 45
Option		Viscous, H_2SO_4, anti-siphoning, descaling passivation,	On H liquid end only - For possibilities for P liquid end, please consult usslurries

Connections:

Valves	Code	Description	Comments
Standard	**VV1**	Vertical suction, Horizontal discharge Gas	Refer to the standard code table for required size
Connection direction	**VV** **HH** **VH** **HV**	Vertical on suction and discharge sides Horizontal on suction and discharge sides Vertical on suction side / Horizontal on discharge side Horizontal on suction side / Vertical on discharge side	
Type of connection	**2f2m3**	NPT femaleNPT male Flanged	ANSI or EN1092-1 or EN1759-1: to be specified

Motors:

Standard	0.25 kW/ 0.37 kW 1,500 rpm - 50 Hz IP55 230/400V 3-phase

MILROYAL D / HPD LIQUID END:

HPD diaphragm liquid end: Metallic liquid end

Flow l/h		Pressure bar	Frequency	Connections
10bar	P max	0.25 kW	1,500 rpm	(valves) seats, balls
Plunger Ø 20 mm - Swept volume: 0.17 cm³ - Diaphragm: 106				
10	9.7	35	23	1/2" - VV1 m
20	19.3	35	46	(Ø 15.9 mm - NS)
41	39.5	35	93	
51	49.7	35	117	
62	59.8	35	140 (1)	
Plunger Ø 25 mm - Swept volume: 0.31 cm³ - Diaphragm: 106				
16	15.6	22	23	1/2" - VV1 m
32	31.8	22	46	(Ø 15.9 mm - NS)
65	62.9	22	93	
80	79.2	22	117	
98	94.7	22	140 (1)	
Plunger Ø 32 mm - Swept volume: 0.71 cm³ - Diaphragm: 106				
26	25.8	13	23	1/2" - VV1 m
52	52.8	13	46	(Ø 15.9 mm - NS)
108	104	13	93	
132	131	13	117	
	157	13	140 (1)	
Plunger Ø 40 mm - Swept volume: 1.27 cm³ - Diaphragm: 106				
	40.6	8	23	1/2" - VV1 m
	83	8	46	(Ø 15.9 mm - NS)
	164	8	93	
	207	8	117	
	247	8	140 (1)	
Plunger Ø 45 mm - Swept volume: 1.99 cm³ - Diaphragm: 106				
	56.5	7	23	1/2" - VV1 m
	115.5	7	46	(Ø 15.9 mm - NS)
	229	6	93	
	262	6	117	
	347	4	140 (1)	

MILROYAL D / HPD LIQUID END:

HPD diaphragm liquid end: Plastic liquid end

Flow l/h		Pressure bar	Frequency	Connections
10bar	P max	0.25 kW	1,500 rpm	(valves) seats, balls
Plunger Ø 20 mm - Swept volume: 0.17 cm³ - Diaphragm: 106				
10		10	23	1/2" - VV1 m
20		10	46	(Ø 15.9 mm - NS)
41		10	93	
51		10	117	
62		10	140 (1)	
Plunger Ø 25 mm - Swept volume: 0.31 cm³ - Diaphragm: 106				
				1/2" - VV1 m
32		10	46	(Ø 15.9 mm - NS)
65		10	93	
80		10	117	
98		10	140 (1)	
Plunger Ø 32 mm - Swept volume: 0.71 cm³ - Diaphragm: 106				
26.5		10	23	1/2" - VV1 m
54.1		10	46	(Ø 15.9 mm - NS)
107.1		10	93	
131.9		10	117	
161.3		10	140 (1)	
Plunger Ø 40 mm - Swept volume: 1.27 cm³ - Diaphragm: 106				
	41	8	23	1/2" - VV1 m
	83	8	46	(Ø 15.9 mm - NS)
	164	8	93	
	207	8	117	
	247	8	140 (1)	
Plunger Ø 45 mm - Swept volume: 1.99 cm³ - Diaphragm: 106				
	56.5	7	23	1/2" - VV1 m
	116	7	46	(Ø 15.9 mm - NS)
	229	6	93	
	262	6	117	
	347	4	140 (1)	

MILROYAL D / HPD LIQUID END:

Model Code Selection:

MILROYAL® D pump								
MD								CONSULT US
	Frequency (spm)		Please refer to the performance tables to select the stroke according the needed flow rate					
	23							CONSULT US
	46							CONSULT US
	93							CONSULT US
	117							CONSULT US
	140							CONSULT US
		Motor power						
			Standard pump motor power					
		F	0.25 kW					CONSULT US
		G	0.37 kW					CONSULT US
			Other motor powers	Reminder: motor derating for multiplexing or frequency variation				
		H	0.55 kW	Duplex = motor power x 1.2 / Triplex = motor power x 1.35				CONSULT US
			Pump without motor					
		S	Pump supplied without motor (*) - specify power of motor to be used					CONSULT US
			Plunger Ø					
			20					CONSULT US
			25					CONSULT US
			32					CONSULT US
			40					CONSULT US
			45					CONSULT US
				Liquid End type HPD Diaphragm				
				H	Metallic liquid end: 316L S.S. Standard - others refer to liquid end options			CONSULT US
				P	Plastic liquid end: PVC Standard - others refer to liquid end options			CONSULT US
					Operating Pressure			
					Indicate your operating pressure here. The internal safety valve will be set as a function of this pressure If operating pressure ≤ 25 bar => pressure setting = operating pressure + 4 bar. If operating pressure > 25 bar => pressure setting = operating pressure x 1.15			
					Multiplexing			
					-	Simplex		CONSULT US
					DX	Duplex		CONSULT US
					TX	Triplex		CONSULT US
					-	Multiplex		CONSULT US
MD	93	F	20	H	30	-		See the following pages for options.

(*) If customer's motor is to be used: The pump will be tested with a Milton Roy's workshop motor. In the event that tests have to be done with the customer's motor, any delay resulting from motor deliver or its dysfunction may not be attributed to Milton Roy.

Available paint systems (others - please consult us): please add this paint code at the end of the pump code

For ACC paint option, see Paint Section

				Code Color	yellow RAL 1018 _S	grey RAL 7035 _2	grey RAL 7042 _3	white RAL 9010 _4
System Code	System	Description	Detail Description		Code system/color PRICE			
N_	C1, Standard	C1, Polyurethane FELOR 100 µ for very low corrosityInterior	Application of 1 coat: Feloxane HES, thickness 100 µ, colour RAL 1018 yellow		Standard Available	Consult us		
B_	CB, food grade	Food grade Epoxy 100 µ, No ACS certification, French Sanitary Conformity Certificate	Application of 1 coat : - sand blasting S.A. 2.5 - 1 coat of food grade processing epoxy, colour white RAL 9010		Consult us			
A_	C2	C2, 140 µ, For low corrosity, Interior/Exterior	Available in yellow RAL 1018. Application of 2 coats: - sand blasting S.A. 2.5 ; 1 coat 60µ: epoxy Hempadur SPEED-DRY ZP650 17650; - 1 top coat 80 µ: polyurethane Hempathane HS 55610		Consult us			
C_	C3	C3, 240 µ, for medium corrosity, Interior/Exterior	Application of 2 coats: - sand blasting S.A. 2.5; 1 coat 180 µ: epoxy Hempadur SPEED-DRY ZP650 17650; - 1 top coat 60 µ: polyurethane Hempathane HS 55610		Consult us			
E_	C4	C4, 70 µ, for high corrosity, Interior/Exterior	Available in yellow RAL 1018, grey RAL 7035 and 7042. Application of 2 coats: - sand blasting S.A. 2.5; 1 coat 200 µ: epoxy Hempadur SPEED-DRY ZP650 17650; - 1 top coat 80 µ: polyurethane Hempathane HS 55610		Consult us			
D_	C5	C5-M 245 µ, for very high corrosity Marine/Offshore, Interior/Exterior	Available in yellow RAL 1018, grey RAL 7035 and 7042. Application of 3 coats: - sand blasting Sa 3; 1 primer coat 60 µ: zinc epoxy Hempadur Avantguard 750 1736G; - 1 coat 160 µ: epoxy Hempadur Mastic 4588W - 1 top coat 80 µ: polyurethane Hempathane HS 55610		Consult us			

Milton Roy is committed to minimizing the impact of its paints on the environment and therefore strongly recommends the use of its standard paints

MILROYAL D / HPD LIQUID END:

Drive End Options:

Capacity Control Options	Consult factory for application assistance for multiplex pumps with actuators	
AW	Actuator Capacity Controller (ACC) **Waterproof** ; 24VDC ; 85V to 260V 1 phase 50/60Hz, -40°C/°F	CONSULT US
AE	Actuator Capacity Controller (ACC) **Ex-proof** ; 24VDC ; 85V to 260V 1 phase 50/60Hz IP68 Ex d II B T4, -40°C/°F	CONSULT US
P	Pneumatic actuator type "STI" OUTSIDE OF ATEX AREA	CONSULT US
PM	Pneumatic actuator type "STI" OUTSIDE OF ATEX AREA + manual course length adjustment option	CONSULT US
PA	Pneumatic actuator type "STI"	CONSULT US
PAM	Pneumatic actuator type "STI" for ATEX AREA + manual course length adjustment option	CONSULT US
PZ	For STI actuators: same as P + air failure lock up system: last position / air failure lock up system: return to 0% or 100%	CONSULT US
PMZ	For STI actuators: same as PM + air failure lock up system: last position / air failure lock up system: return to 0% or 100%	CONSULT US
PAZ	For STI actuators: same as PA + air failure lock up system: last position / air failure lock up system: return to 0% or 100%	CONSULT US
PAMZ	For STI actuators: same as PAM + air failure lock up system: last position / air failure lock up system: return to 0% or 100%	CONSULT US
	Special motors - Detailed descriptions are available in the MOTORS section	
-	Standard: Standard motor with aluminum frame - 1,500 RPM	
	F 0.25 kW	CONSULT US
-	G 0.37 kW	CONSULT US
-	H 0.55 kW	CONSULT US
1	Ex-Proof: EEx D IIB T4 - 3 phase - 1,500 RPM - 4 poles - 50Hz	
	F 0.25 kW	CONSULT US
	G 0.37 kW	CONSULT US
	H 0.55 kW	CONSULT US
4A	Frequency Variation - Ex Proof EEx D IIB T4 - 3 phase - 1,500 RPM - 4 poles - 50Hz for Frequency Variation with thermistor PTC (1 set of 3) coil protection	
	F 0.25 kW	CONSULT US
	G 0.37 kW	CONSULT US
	H 0.55 kW	CONSULT US
4	VF 3 phase - Motor for frequency variation (forced ventilation) - 3 phase - 1,500 RPM - 4 poles - 50 Hz	
	G 0.37 kW	CONSULT US
	H 0.55 kW	CONSULT US
4S	Frequency Variation - Motor for frequency variation - self cooled - 50 Hz	
	G 0.37 kW	CONSULT US
	H 0.55 kW	CONSULT US
B	**4**	**See next page for liquid end options.**

Liquid End Connections:

Connection Code

CODE description: Suction/Discharge/Type — V= Vertical, H = Horizontal — 1 = Gas, 2 = NPT, 3 = Welded flanges

Threaded Connections

BASIC	VV1	HV1	VH1	HH1	VV2	HV2	VH2	HH2
1/4" - VV2 F	NA	NA	NA	NA	NA	NA	NA	NA
1/2" - VV2 M	CONSULT US	CONSULT US	CONSULT US	CONSULT US	STD AVAILABLE	CONSULT US	CONSULT US	CONSULT US
1/2" - VV2 M	CONSULT US	CONSULT US	CONSULT US	CONSULT US	CONSULT US	CONSULT US	CONSULT US	CONSULT US

Flanged Connections - ANSI Metallic 316L S.S.

Flanges 1/2" pipe Ø		
ANSI Metallic Weld neck flanges	Description	
	H3	CONSULT US
	V3	

Flanged Connections - DN Metallic - 316L S.S.

Flanges DIN 15 Ø		EN1092-1	EN1759-1	EN1092-1	EN1759-1	EN1092-1	EN1759-1
EN1092-1 or EN1759-1 standard	Description	PN-40	CLASS 150	PN-100	CLASS 600	PN-160	CLASS 1500
	H3	CONSULT US	CONSULT US	CONSULT US	CONSULT US	CONSULT US	CONSULT US
	V3	CONSULT US	CONSULT US	CONSULT US	CONSULT US	CONSULT US	CONSULT US

MILROYAL D / HPD LIQUID END:

Liquid end version						
	Extra price on code H (metallic liquid ends) ONLY					
A	Food grade version (no certificate) = descaling and passivation + internal machining + white paint + food grade hydraulic oil **ADD "AD" VALVES - REQUIRED**					CONSULT US
D	Descaling and passivation + Liquid end and 304 S.S. bolting **ADD "DS" VALVES - REQUIRED**					CONSULT US
J	Heating or cooling jacketed liquid end **ADD "ND" VALVES - REQUIRED**					CONSULT US
	Liquid end material					
	-	Standard				CONSULT US
	0	Other material to be specified				CONSULT US
		Diaphragm material				
		-	PTFE - nitrile standard Temperature from 10 to 95 °C for H liquid end / 10 to 50 °C for P liquid end			CONSULT US
		PV	PTFE diaphragm / Viton - on H liquid end only. - PV option does not include the special oil and seals for high temperature.			CONSULT US
		Z	Special oil for -10°C min. / 90°C max. To be specified: "special oil", working temperature			CONSULT US
			Double diaphragm and rupture detector			
			C5	Double diaphragm and rupture detection by pressure gauge - POM intermediate diaphragm		CONSULT US
			C6	Double diaphragm and rupture detection by ASHRCROFT pressure switch - POM intermediate diaphragm		CONSULT US
			C7	Double diaphragm and rupture detection by manometer with electric detection (power supply: 250 VAC/VDC max.) - POM intermediate diaphragm		CONSULT US
			C8	Double diaphragm and rupture detection by ASHCROFT ex-proof pressure switch (ATEX certified as CE EX II 2G T6) - POM intermediate diaphragm		CONSULT US
			CT	Double diaphragm with pressure transmitter and manifold Parker type HLS2V. Transmitter should be mandatory defined according to the following criteria: process connections 1/2" NPT f and vertical mounting		CONSULT US
				Special Valves		
				For standard Ø balls, refer to the connections in the Milroyal Technical Booklet		
				-	Standard valves	CONSULT US
				NS	Single ball	CONSULT US
				ND	Double ball	CONSULT US
				LS	Hardened valves single ball and seat	CONSULT US
				LD	Hardened valves double ball and seats	CONSULT US
				KS	Single ball and seat - Ball guide with increased play	CONSULT US
				KD	Double ball	CONSULT US
				HS	H^2SO^4 single ball and Seat	CONSULT US
				HD	H^2SO^4 double balls Alloy 2and Seats	CONSULT US
				VS	Viscous liquids: single ball spring loaded on suction side 0.1 bar / discharge side: 0.5 bar	CONSULT US
				TS	Polyelectrolyte: single ball spring loaded at discharge	CONSULT US
				SS	Anti-siphoning: suction: single ball /discharge: 2nd ball spring loaded	CONSULT US
				DS	Descaling / passivation - simple ball	CONSULT US
				DD	Descaling / passivation - double ball	CONSULT US
				AS	Single ball "food grade type" (no certificate)	CONSULT US
				AD	Double ball "food grade type" (no certificate)	CONSULT US
					ATEX option zone 1 for plastic liquid end	
					Z STAINLESS STEEL protection of plastic liquid end for ATEX area 1 compatibility	CONSULT US
A	**00**	**-**	**C5**	**KS**	**Connections - see next page**	

MILROYAL D / HPD LIQUID END:

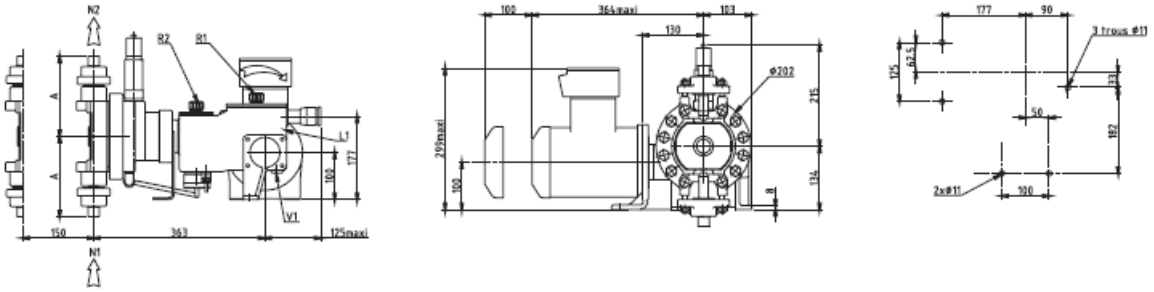
MILROYAL® D / HPD diaphragm liquid ends: metallic type H and plastic type P

Up to 345 l/h and 35 bar Dimensions and Packing

Dimensions in mm

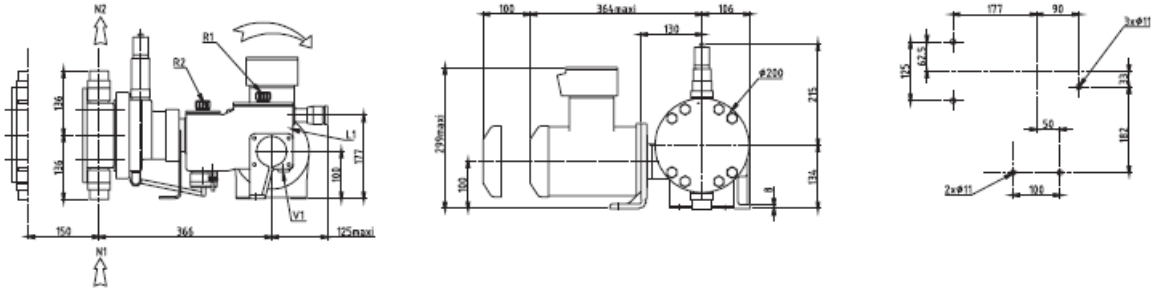
H liquid end Ø 20 and 45

Connections:
N1: Ø 1/2″
N2: Ø 1/2″
Plunger:
Ø 20 - 25 / A: 170
Ø 32 - 45 / A: 197
Motor weight: 13 kg
Weight without motor: 40 kg



H liquid end Ø 20 and 45

Connections:
N1: Ø 1/2″ F
N2: Ø 1/2″ F
Plunger:
Ø 20 - 25 / A: 170
Ø 32 - 45 / A: 197
Motor weight: 13 kg
Weight without motor: 40 kg



N1: Suction
N2: Discharge
V1: Drive oil drain
L1: Drive oil level
R1: Drive oil fill
R2: Hydraulic oil fill

Weight and Packing

Version	Standard packing	Net weight (1)	Gross weight (1)	Packing (L x l x h)
		kg	kg	mm
Simplex	Full wooden case	30	47	810 x 560 x 560
Duplex		50	74	800 x 800 x 590
Simplex + actuator		35	59	800 x 800 x 590
Triplex		70	115	1310 x 630 x 690

(1) Approximately

Standard packing
- Holes protected with Kapsto plastics caps
- Machined unpainted parts protected with waterproof varnish
- Material painted

Full case - SEI IV B
- Side panels and cover: full butt jointed wood doubled plastic film
- Floor: full butt jointed wood doubled plastic film, palletizable

Full case - SEI IV C
Same as SEI IV B plus:
- Waterproof thermowelded sheeting with dehydrating sachets
- Storage period to be specified: 6, 12 or 24 months

MILROYAL D / METALLIC DIAPHRAGM:

Up to 15.9 l/h and 500 bar / Technical characteristics

General technical characteristics:

Accuracy	±1% over a range of 10 to 100% of nominal flow rate
Flow rate adjustment	While running or stopped: from 0 to 100% of nominal flow rate
Thrust	110 daN
Stroke length 100%	25.4 mm
Temperature of the fluids	-20 °C to + 110 °C - standard oil provided for 10 to 95 °Cworking temperature to be supplied
Ambient operating temperatures	Standard: -10 °C to +50 °C. Low temperature option: -40 °C to +50 °C
Max. viscosity	see next page
API 675	Conforms (exemptions available on request)
ATEX	Conforms to ATEX CE EX II 2G/D c T3 with ATEX motor
Suction lift	Pump set to 2m Water

Max. Suction pressure

Plunger Ø (mm)	3	4	6	8	10
Maximum pressure at suction (bar)	420	236	105	59	38

Materials in contact with pumped liquid

LIQUID END		M
Liquid end body		316L
Check valve cartridge		316L
Seats	Ø 3.4 and 6 Ø 8 and 10	316L 17.4PH = AISI 630
Balls	Ø 3.4 and 6 Ø 8 and 10	Hastelloy C 316L
Diaphragm		Metallic diaphragm 316L S.S.
Seals		NA: leak proof seal metal - metal

Available valves:

Valves	Code	Description	Comments
Standard	**ND**	Double valves / double ball	Plungers Ø 3.4 and 6
Standard	**LD**	Hardener valves / Double ball	Plungers Ø 8 and 10

Connections:

Valves	Code	Description	Comments
Standard	**VV2**	Horizontal on suction and discharge sides NPT	Plungers Ø 3,4 and 6
Standard	**VV1**	Vertical suction, Horizontal dischargeGas	Plungers Ø 8 and 10
Connection direction	**VV** **HH**	Vertical on suction and discharge sides Horizontal on suction and discharge sides	
	VH **HV**	Vertical on suction side / Horizontal on discharge side Horizontal on suction side / vertical on discharge side	
Type of connection	**2f2m3**	NPT female NPT male Flanged	Standard on plungers Ø3.4 and 6 ANSI or EN1092-1 or EN1759-1: to be specified

MILROYAL D / METALLIC DIAPHRAGM:

Motors:

Standard	0.25 kW or 0.37 kW 1,500 rpm - 50 Hz IP 55 230/400V 3-phase

SINGLE metallic diaphragm liquid end type M

Flow l/h		Pressure bar	Frequency	Connections	Viscosity max.
10bar	P max	0.25 kW	1,500 rpm	(valves) seats, balls	cP
Plunger Ø 3 mm - Swept volume: 0.17 cm^3 - Diaphragm: 52					
0.23	0.12	500	23	1/4" - VV2 f	62
0.46	0.23	500	46	(Ø 3.17 mm - ND)	42
0.93	0.47	500	93	316L	23
1.17	0.59	500	117	Hastelloy C	17
1.4	0.71	500	140 (1)		12
Plunger Ø 4 mm - Swept volume: 0.31 cm^3 - Diaphragm: 52					
0.4	0.29	500	23	1/4" - VV2 f	62
0.81	0.57	500	46	(Ø 3.17 mm - ND)	42
1.64	1.16	500	93	316L	23
2.06	1.46	500	117	Hastelloy C	17
2.47	1.74	500	140 (1)		12
Plunger Ø 6 mm - Swept volume: 0.71 cm^3 - Diaphragm: 72					
0.91	0.7	390	23	1/4" - VV2 f	62
1.82	1.41	390	46	(Ø 3.17 mm - ND)	42
3.69	2.85	390	93	316L	23
4.64	3.58	390	117	Hastelloy C	17
5.55	4.28	390	140 (1)		12
Plunger Ø 8 mm - Swept volume: 1.27 cm^3 - Diaphragm: 92					
1.62	1.42	220	23	1/2" - VV1 m	62
3.24	2.83	220	46	(Ø 6.35 mm - LD)	42
6.55	5.73	220	93	17.4 PH*	23
8.25	7.21	220	117	316L	17
9.87	8.62	220	140 (1)		12
Plunger Ø 10 mm - Swept volume: 1.99 cm^3 - Diaphragm: 92					
2.53	2.34	140	23	1/2" - VV1 m	62
5.07	4.67	140	46	(Ø 6.35 mm - LD)	42
10.24	9.44	140	93	17.4 PH*	23
12.88	11.88	140	117	316L	17
15.42	14.21	140	140 (1)		12

DOUBLE metallic diaphragm liquid end type M

Flow l/h		Pressure bar
10bar	P max	0.25 kW
Plunger Ø 4 mm - Swept volume: 0.31 cm^3 - Diaphragm: 52		
0.4	0.21	500
0.81	0.41	500
1.64	0.84	500
2.06	1.05	500
2.47	1.26	500
Plunger Ø 6 mm - Swept volume: 0.71 cm^3 - Diaphragm: 72		
0.91	0.6	350
1.82	1.2	350
3.69	2.43	350
4.64	3.06	350
5.55	3.66	350
Plunger Ø 8 mm - Swept volume: 1.27 cm^3 - Diaphragm: 92		
1.62	1.25	220
3.24	2.5	220
6.55	5.18	220
8.25	6.51	220
9.87	7.79	220
Plunger Ø 10 mm - Swept volume: 1.99 cm^3 - Diaphragm: 92		
2.53	2.2	140
5.07	4.41	140
10.24	8.91	140
12.88	11.21	140
15.42	13.41	140

1. No 60 Hz. *17.4 PH = AISI 630

The Flow rates and stroke speeds are indicated for a frequency of 50 Hz. These Values can be increased by 20% for 60 Hz motors.

MILROYAL D / METALLIC DIAPHRAGM:

Model Code Selection:

MILROYAL® D pump								
MD								CONSULT US
	Frequency (spm)						Please refer to the performance tables to select the stroke according the needed flow rate	
	23							CONSULT US
	46							CONSULT US
	117							CONSULT US
	93							CONSULT US
	140							CONSULT US
		Motor power						
			Standard pump motor power					
		F	0.25 kW					See next page
			Other motor powers				Reminder: motor derating for multiplexing or frequency variation	
		H	0.55 kW				Duplex = motor power x 1.2 / Triplex = motor power x 1.35	See next page
			Pump without motor					
		S	Pump supplied without motor (*) - specify power of motor to be used					CONSULT US
			Plunger Ø					
			3	3 mm				CONSULT US
			4	4 mm				CONSULT US
			6	6 mm				CONSULT US
			8	8 mm				CONSULT US
			10	10 mm				CONSULT US
				Liquid End type - Metallic Diaphragm				
				M	Metallic diaphragm liquid end			CONSULT US
					Operating Pressure			
						Indicate your operating pressure here. The internal safety valve will be set as a function of this pressure If operating pressure ≤ 20 bar => pressure setting = operating pressure + 4 bar. If operating pressure > 20 bar => pressure setting = operating pressure x1.15		
						Multiplexing		
						-	Simplex	CONSULT US
						DX	Duplex	CONSULT US
						TX	Triplex	CONSULT US
						-	Multiplex	CONSULT US
MD	93	F	3	M	500	-		See the following pages for options.

(*) If customer's motor is to be used: The pump will be tested with a Milton Roy's workshop motor. In the event that tests have to be donewith the customer's motor, any delay resulting from motor deliver or its dysfunction may not be attributed to Milton Roy.

Available paint systems (others - please consult us): please add this paint code at the end of the pump code

For ACC paint option, see Paint Section

				Code Color	yellow RAL 1018 _S	grey RAL 7035 _2	grey RAL 7042 _3	white RAL 9010 _4
System	System	Description	Detail Description		Code system			
N_	C1, Standard	C1, Polyurethane FELOR 100 µ for very low corrosity Interior	Application of 1 coat: Feloxane HES, thickness 100 µ, colour RAL 1018 yellow		Standard Available	Standard Available	Standard Available	Standard Available
B_	CB, food grade	Food grade Epoxy 100 µ, No ACS certification, French Sanitary Conformity Certificate	Application of 1 coat : - sand blasting S.A. 2.5 - 1 coat of food grade processing epoxy, colour white RAL 9010		CONSULT US	CONSULT US	CONSULT US	CONSULT US
A_	C2	C2, 140 µ, For low corrosity, Interior/Exterior	Available in yellow RAL 1018. Application of 2 coats: - sand blasting S.A. 2.5 ; 1 coat 60µ: epoxy Hempadur SPEED-DRY ZP650 17650; - 1 top coat 80 µ: polyurethane Hempathane HS 55610		CONSULT US	CONSULT US	CONSULT US	CONSULT US
C_	C3	C3, 240 µ, for medium corrosity, Interior/Exterior	Application of 2 coats: - sand blasting S.A. 2.5; 1 coat 180 µ: epoxy Hempadur SPEED-DRY ZP650 17650; - 1 top coat 60 µ: polyurethane Hempathane HS 55610		CONSULT US	CONSULT US	CONSULT US	CONSULT US
E_	C4	C4, 70 µ, for high corrosity, Interior/Exterior	Available in yellow RAL 1018, grey RAL 7035 and 7042. Application of 2 coats: - sand blasting S.A. 2.5; 1 coat 200 µ: epoxy Hempadur SPEED-DRY ZP650 17650; - 1 top coat 80 µ: polyurethane Hempathane HS 55610		CONSULT US	CONSULT US	CONSULT US	CONSULT US
D_	C5	C5-M 245 µ, for very high corrosity Marine/Offshore, Interior/Exterior	Available in yellow RAL 1018, grey RAL 7035 and 7042. Application of 3 coats: - sand blasting Sa 3; 1 primer coat 60 µ: zinc epoxy Hempadur Avantguard 750 1736G; - 1 coat 160 µ: epoxy Hempadur Mastic 4588W - 1 top coat 80 µ: polyurethane Hempathane HS 55610		CONSULT US	CONSULT US	CONSULT US	CONSULT US

Milton Roy is committed to minimizing the impact of its paints on the environment and therefore strongly recommends the use of its standard paints

MILROYAL D / METALLIC DIAPHRAGM:

Drive End Option:

Capacity Control Options			**Consult factory for application assistance for multiplex pumps with actuators**	
AW	Actuator Capacity Controller (ACC) **Waterproof** ; 24VDC ; 85V to 260V 1 phase 50/60Hz, -40°C/°F			CONSULT US
AE	Actuator Capacity Controller (ACC) **Ex-proof** ; 24VDC ; 85V to 260V 1 phase 50/60Hz IP68 Ex d II B T4, -40°C/°F			CONSULT US
P	Pneumatic actuator type "STI" OUTSIDE OF ATEX AREA			CONSULT US
PM	Pneumatic actuator type "STI" OUTSIDE OF ATEX AREA + manual course length adjustment option			CONSULT US
PA	Pneumatic actuator type "STI"			CONSULT US
PAM	Pneumatic actuator type "STI" for ATEX AREA + manual course length adjustment option			CONSULT US
PZ	For STI actuators: same as P + air failure lock up system: last position / air failure lock up system: return to 0% or 100%			CONSULT US
PMZ	For STI actuators: same as PM + air failure lock up system: last position / air failure lock up system: return to 0% or 100%			CONSULT US
PAZ	For STI actuators: same as PA + air failure lock up system: last position / air failure lock up system: return to 0% or 100%			CONSULT US
PAMZ	For STI actuators: same as PAM + air failure lock up system: last position / air failure lock up system: return to 0% or 100%			CONSULT US
	Special motors - Detailed descriptions are available in the MOTORS section			
	-	Standard: Standard motor with aluminum frame - 1,500 RPM		
		F	0.25 kW	CONSULT US
	-	G	0.37 kW	CONSULT US
	-	H	0.55 kW	CONSULT US
	1	Ex-Proof: EEx D IIB T4 - 3 phase - 1,500 RPM - 4 poles - 50Hz		
		F	0.25 kW	CONSULT US
		G	0.37 kW	CONSULT US
		H	0.55 kW	CONSULT US
	4A	Frequency Variation - Ex Proof EEx D IIB T4 - 3 phase - 1,500 RPM - 4 poles - 50Hz for Frequency Variation with thermistor PTC (1 set of 3) coil protection		
		F	0.25 kW	CONSULT US
		G	0.37 kW	CONSULT US
		H	0.55 kW	CONSULT US
	4	VF 3 phase - Motor for frequency variation (forced ventilation) - 3 phase - 1,500 RPM - 4 poles - 50 Hz		
		G	0.37 kW	CONSULT US
		H	0.55 kW	CONSULT US
	4S	Frequency Variation - Motor for frequency variation - self cooled - 50 Hz		
		G	0.37 kW	CONSULT US
		H	0.55 kW	CONSULT US
B	**4**			**See next page for liquid end options.**

MILROYAL D / METALLIC DIAPHRAGM:

Liquid end version												
J	Heating or cooling jacketed liquid end											
	Plungers Ø3 and Ø4											CONSULT US
	Plunger Ø6											CONSULT US
	Plungers Ø8 and Ø10											CONSULT US
	Double diaphragm and rupture detector (caution: the flow rates are affected by the presence of a double diaphragm)											
	C5	Double diaphragm and rupture detection by pressure gauge										CONSULT US
	C6	Double diaphragm and rupture detection by ASHRCROFT pressure switch										CONSULT US
	C7	Double diaphragm and rupture detection by manometer with electric detection (power supply: 250 VAC/VDC max.)										CONSULT US
	C8	Double diaphragm and rupture detection by ASHCROFT ex-proof pressure switch (ATEX certified as CE EX II 2G T6)										CONSULT US
	CT	Double diaphragm with pressure transmitter and manifold Parker type HLS2V Transmitter should be mandatory defined according to the following criteria: process connections 1/2" NPT f and vertical mounting										CONSULT US
		Connections										
		Gas or NPT connection						**If standard connections**				
			Type	**Suctio**	**Vertical**			**1/4" VV2 f**		**1/2" VV1 m**		
		VV1	Gas	Vertical	Vertical	Ø 8, 10 in Standard		NA		AVAILABLE		
		VV2	NPT	Vertical	Vertical	Ø 3, 4, 6 in Standard		AVAILABLE		AVAILABLE		
		ANSI flanges - On liquid ends with plunger Ø 3, 4, 6										
		Ø flanges						150LBS	300LBS	600LBS	1500LBS	1500LBS	2500LBS
		H3 or **V3**	ANSI 1/2" flanges welded on 1/4" NPT threaded tubing					**OPTIONS AVAILABLE**				
		ANSI flanges - On liquid ends with plunger Ø 8, 10										
		Ø flanges						150LBS	300LBS	600LBS	1500LBS	1500LBS	2500LBS
		H3	1/2" Metallic ANSI weld neck Welded flange 316L S.S. horizontal output					**OPTIONS AVAILABLE**				
		V3	1/2" Metallic ANSI weld neck Welded flange 316L S.S. vertical output									
		Connections according to EN1092-1 or EN1759-1 - Price for one connection (Price x2 for suction and discharge). Smooth flash line										
		Ø flanges						EN 1092-1 PN 40	EN1759-1 CLASS 150	EN1092-1 PN 100	EN1759-1 CLASS 600	EN1092-1 PN 160	EN1759-1 CLASS 1500
		H3	EN1092-1 or EN1759-1 / DN15 Welded flange 316L S.S.					**OPTIONS AVAILABLE**				
		V3	EN1092-1 or EN1759-1 / DN15 Welded flange 316L S.S.					**OPTIONS AVAILABLE**				
J	C5	VV3										

MILROYAL D / METALLIC DIAPHRAGM:

MILROYAL® D / Metallic diaphragm liquid end type M

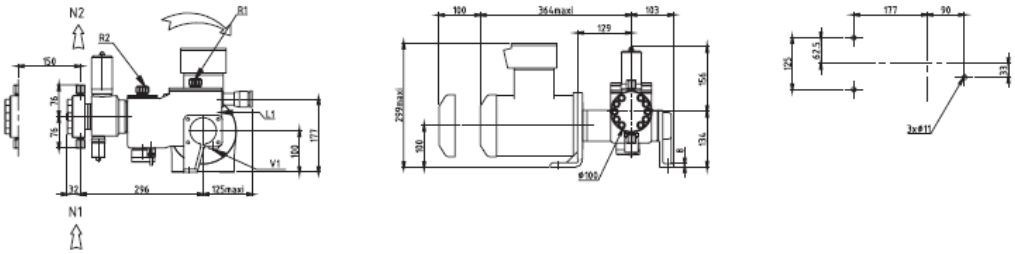
Up to 15.9 l/h and 500 bar Dimensions and Packing

Dimensions in mm

M liquid end Ø 3 and 4

Connections:
N1: Ø 1/4" NPT F
N2: Ø 1/4" NPT F

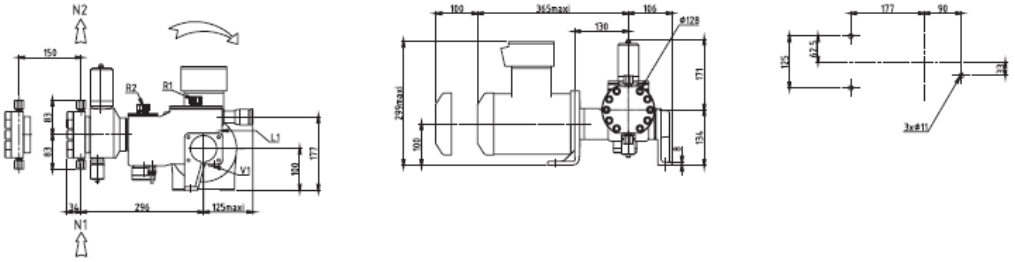
Motor weight: 13 kg
Weight without motor: 28 kg



M liquid end Ø 6

Connections:
N1: Ø 1/4" NPT F
N2: Ø 1/4" NPT F

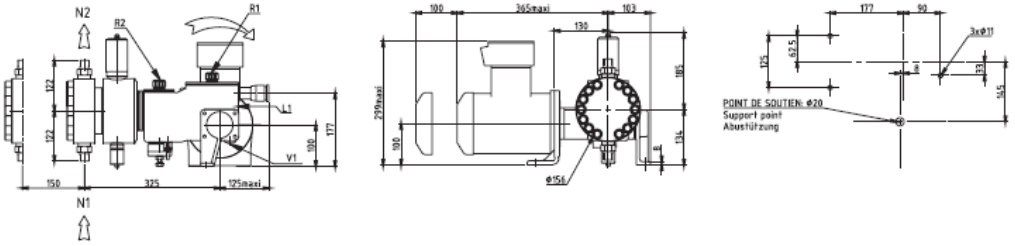
Motor weight: 13 kg
Weight without motor: 28 kg



M liquid end Ø 8 and 10

Connections:
N1: Ø 1/2"
N2: Ø 1/2"

Motor weight: 13 kg
Weight without motor: 28 kg



N1: Suction
N2: Discharge
V1: Drive oil drain
L1: Drive oil level
R1: Drive oil fill
R2: Hydraulic oil fill

Weight and Packing

Version	Standard packing	Net weight (1)	Gross weight (1)	Packing (L x l x h)
		kg	kg	mm
Simplex	Full wooden case	30	47	810 x 560 x 560
Duplex		50	74	800 x 800 x 590
Simplex + actuator		35	59	800 x 800 x 590
Triplex		70	115	1310 x 630 x 690

(1) Approximately

Standard packing
- Holes protected with Kapsto plastics caps
- Machined unpainted parts protected with waterproof varnish
- Material painted

Full case - SEI IV B
- Side panels and cover: full butt jointed wood doubled plastic film
- Floor: full butt jointed wood doubled plastic film, palletizable

Full case - SEI IV C
Same as SEI IV B plus:
- Waterproof thermowelded sheeting with dehydrating sachets
- Storage period to be specified: 6, 12 or 24 months

MILROYAL D / TESTS AND DOCUMENTATIONS:

1) Documents are supplied in French or English language. The manuals and CE certificates are available in European Union languages. The certificates related to the "Customs Union" are available in Russian language only

2) The material is delivered with: an instruction manual, a CE certificate, an A1 test report and an ATEX certificate if applicable . These documents are paper copies. For an electronic version, please select PACK 1
3) The documents included in the packs are provided in electronic format only (except option)
4) 3 customer's revisions are authorized, except in case of technical modifications and/or change orders
5) The comments on documentation are not authorized after material delivery (except in case of technical modifications)
6) Native files can't be provided
7) The original signed documents remain the property of Milton Roy Europe

PRICING PRINCIPLE: THE PRICE OF ONE PACK IS VALID FOR 1 TO 5 PRODUCTS. For 6 to 10 products: multiply the price of the unit pack by twice. For 11 to 15 products: to be multiplied by three, etc…

For any other document, please consult us for price and feasibility

DOCUMENTATION TO BE BOOKED WITH PO

PACK 1 / Basic

All products
Accessories according to applicability
Milton Roy standard documents
WITHOUT customer's approval of the documents
Availability: 1 week after delivery

Free
Price per 1 to 5 products

Instruction manual
CE certificate
ATEX certificate (if applicable)
T1 test report (Flow measurement at 100% and leak test at max. pressure)
Arrangement drawing (except LMI pumps)
Subject to availability:
Referenced motors: Outline drawing (supplier standard format)
Referenced motors: Atex certificate - for ATEX motors only (supplier standard format)
Referenced motors: EC declaration (supplier standard format)
Referenced motors: Instructions manual (supplier standard format)

DOCUMENTATION TO BE BOOKED WITH PO

PACK 2 / Middle

All products except Series LMI and G, Dosapack® and DOSASKID®
Accessories according to applicability
Milton Roy standard documents
WITHOUT customer's approval of the documents
Availability: 2 weeks after delivery

Price – On demand
Price per 1 to 5 products

ALL THE DOCUMENTS INCLUDED IN THE PACK 1 and also:

Technical product sheet MRE standard
Noise data sheet
Painting specification: MRE standard system (in the price list)
Painting conformity certificate
Declaration of compliance 2.1
Bill of materials MRE standard
Lubricant table & MSDS
MRE attestation of origin
Spare parts offer for start-up and 2 years
Subject to availability:
Referenced motors: Type test / data sheet (supplier standard format)
Referenced motors: Connection diagram (supplier standard format)

DOCUMENTATION PACK 3 TO BE BOOKED WITH PO

OPTION 1

PACK 3 / Premium basic

All products except Series LMI and G, Dosapack® and DOSASKID®
Accessories according to applicability
Milton Roy standard documents
NO APPROVAL SUBMITTAL OF DOCUMENTS
DOCUMENTATON SUPPLY FOR INFORMATION ONLY

Price – On demand

NEW OPTION 2

PACK 3A / Premium APPROVAL

All products except Series LMI and G, Dosapack® and DOSASKID®
Accessories according to applicability
Milton Roy standard documents
APPROVAL FOR FOLLOWING DOCUMENTTS ONLY:
GAD / DS/ ITP/ PAINT SPEC
Approval cycle according to MRE T&C,

non respect of approval cycle may put PO on hold and lead to shipment delay

Price – On demand

Price per 1 to 5 products

Availability: 1 month after delivery (subject to the approval of all the documents)

ALL THE DOCUMENTS INCLUDED IN THE PACKS 1 & 2 + below listed documents :

List of documents
Production schedule
Quality control plan (ITP)
Working instructions for the requested tests
Welding book (including PQR/WPS) (**)
Location drawing for welds (**)
Painting specification: specific system (not in the price list)
Nameplate diagram
Storage instructions
Pump Data Sheet API675

Subject to availability:
Special motors: Outline drawing (supplier standard format)
Special motors: Data sheet (supplier standard format)
Special motors: EC declaration (supplier standard format)
Connection diagram (supplier standard format)
Special motors: Instructions manual - Supplier standard format
Special motors: Atex certificate - for ATEX motors only (supplier standard format
Special motors: Type test certificate of similar motor (supplier standard format)
Special motors: Routine test report
Special motors: Torque speed curve (*)
Special motors: Agreement certificate (NEMA, IEC…) (*)

DOCUMENTATION PACK 4 TO BE BOOKED WITH PO

PACK 4 / Premium customized

All products except Series LMI and G, Dosapack® and DOSASKID®
Accessories according to applicability
According to customer requisition
Approval of the documents by the customer
Availability: 2 months after delivery (subject to the approval of all the documents)

Price – On demand

Price per 1 to 5 products

ALL THE DOCUMENTS INCLUDED IN THE PACKS 1 & 2 and 3.
ONLY THE FOLLOWING DOCUMENTS can be provided according to customer requisition:

List of documents
Technical product datasheet
Outline drawing: pump with study (code Z or without price)
Lubricant table
SPIR - Spare Parts Interchangeability Record (**)
Special motors: Data sheet (supplier standard format)

(*) Feasibility have to be checked for each quotation
(**) Non available on POWEROYAL®

For more documentation options, please see following pages "OPTIONS"

MILROYAL D / TESTS AND DOCUMENTATIONS:

ADMINISTRATION FEES		
Documentation request after reception of Acknowledgement Receipt and supply within year of shipment, if available	+ applicable doc pack costs	On demand
Documentation request and supply of archived documents, shipped within the last 4 years	+ applicable doc pack costs	On demand
DRAWINGS		
2D Outline drawing: pump with study (code Z or without price)		On demand
3D Outline drawing (step format) - issued at the same time that the 2D outline drawing		On demand
3D Outline drawing (step format) - issued after 2D outline drawing submission		On demand
Determination of center of gravity & anchor point (included on GA drawing) Weight and dimensional drawing of motor are necessary (to be requested to Customer in case of client supply)		On demand
NPSH Calculation Sheet		On demand
Load and torque calculations (N/A on plastic liquid end: data included on GA drawing) (**)		On demand
OPTIONS AVAILABLE FOR ALL THE PACKS Price		
Certificate of origin certified by the Chamber of Commerce		On demand
Legalization: certificate of origin and invoice (by consulate)		On demand
Legalization of other documentation (by consulate)		On demand
Technical Passeport, according to Milton Roy standard - Customs Union (Federations of Russia / Kazakhstan / Belarus) - Price per pump		On demand
GOST-EX certificate for explosive-proof equipment - Customs Union (Federations of Russia / Kazakhstan / Belarus) if applicable	Replaced by TRCU	On demand
Quality assurance manual (QAM)		Free of cost
ISO certificate		Free of cost
Attestation of order conformity type 2.1 according to EN10204		On demand
Attestation of interchangeability for spare parts only		On demand
OPTIONS for PACKS 3 and 4 only		
Translation of the full set of documentation (except FR and EN) - Documents will be translated only after validation of the French or English version Some documents cannot be translated despite request (as 3.1 material certificates for ex.)		On demand
Documents in North american format		On demand
Nameplate photos		On demand
MRE standard data book - one electronic copy (E-data book) - CD		On demand
MRE standard data book - one paper copy (P-data book) - binder		On demand
One copy of first E-data book - CD		On demand
One copy of first P-data book - binder		On demand
Documentation hard copies supplied with material (only available if documentation packs are booked)		On demand
Printing + shipping costs (TNT, UPS, Chronopost...)		On demand
Personalisation		On demand
Personalised data book - one electronic copy (E-data book) - CD		On demand
Personalised data book - one paper copy (P-data book) - binder		On demand
One copy of first E-data book - CD		On demand
One copy of first P-data book - binder		On demand

MILROYAL D / TESTS AND DOCUMENTATIONS:

For each test or control ordered as option, a certificate will be delivered. Test reports are only available in English languages.

Type of test	Reference	Comments	
Tests to be selected below			
Specifications			
☐ Pump : Flow measurement at 100% and leak test at max. pressure	T1	Supplied with the pump	Consult us
☐ Pump: T1 + steady state accuracy + leak test	T2	Per pump	Consult us
☐ Pump: 5-point linearity curve + accuracy + leak test	T3	Per pump	Consult us
☐ Pump: In accordance with API 675 - linearity, repeatability, steady state accuracy and hydrostatic test	T4	Per pump	Consult us
☐ Pump: Mechanical running test - 1 hour	-	Per pump	Consult us
☐ Pump: Mechanical running test - 2 hours	-	Per pump	Consult us
☐ Pump: Mechanical running test - 3 hours	-	Per pump	Consult us
☐ Pump: Mechanical running test - 4 hours	-	Per pump	Consult us
☐ Pump: Painting - Total thickness measurement	ITME001	Per pump	Consult us
☐ Pump: Painting - Thickness measurement of each layer	ITME001	Per pump	Consult us
☐ Pump: Painting - Adhesion test - X-cut tape test	ITME014	Delivery + 5 days / Per pump	Consult us
☐ Pump: Painting - Adhesion test - Pulls off test	ITOP342	Delivery + 10 days / Per pump	Consult us
☐ Pump: Painting according Norsok M501	-		Consult us
☐ Pump: Vibration test	ITSI041	Per pump	Consult us
☐ Pump: Noise test	ITSI040	Per pump	Consult us
☐ Pump: Temperature measurement		Per pump	Consult us
☐ Pump: MASP tests			Consult us
☐ Declaration of compliance with the order - 2.2 type acc. EN10204	-	For one line of order	Consult us
☐ Material certificate - 2.2 type acc. EN10204: PLASTIC LIQUID END	-	Per liquid end	Consult us
☐ Material certificate - 3.1 type acc. EN10204: STAINLESS STEEL LIQUID END (*)	-	Per liquid end	Consult us
☐ Material certificate - 3.1 type + Nace MR0175 acc. EN10204: STAINLESS STEEL LIQUID END (*)	-	Per liquid end	Consult us
☐ Material certificate - 3.2 type (Requalified 3.1) (*): NON AVAILABLE ON MX LIQUID ENDS	-	Per liquid end - If several liquid end, consult	Consult us
☐ PMI performed Milton Roy		Per liquid end - 1 to 5 liquid ends	Consult us
		Per liquid end - 6 or more liquid ends	Consult us
☐ PMI performed by third party	-	Per day - up to 8 liquid ends daily	Consult us
		Per day - up to 16 liquid ends daily	Consult us
☐ PMI + analysis and determination of the carbon (PMI + SPECTRO) - NON AVAILABLE ON MX LIQUID ENDS	-	Per day - up to 5 liquid ends daily	Consult us
		Per day - up to 10 liquid ends daily	Consult us
☐ Dye Penetrant test on connections (per liquid end)	-	VV3	Consult us
	-	HV3 - VH3	
	-	HH3	
☐ X-ray on connections (per liquid end) numerised image + test report, according to ASME 5	-	VV3	Consult us
The supply of the X-ray negatives are not included		HV3 - VH3	Consult us
(The negative remains the property of Milton Roy Europe for 5 years)		HH3	Consult us
☐ X-ray on connections (per liquid end) numerised image + test report, according to ASME 5	-	VV3	
Supply of X-ray negatives to customer	-	HV3 - VH3	Consult us
Must be ordered in addition to the X-ray test price (numerised image + test report, according to ASME 5, refer to the above test item) (The negative remains the property of Milton Roy for 5 years)	-	HH3	
Inspection			
☐ Test with 1/2 day inspection. Up to 2 pumps per 1/2 day. Clearly specify when only one pump per type is to be inspected. Pumps that are not inspected will be subject to an T2 or T3 factory test. This must be taken into account during quotation. The above price does not include payment of the inspector. NOTE: hydrostatic and performance tests cannot be realised the same day. Schedule several dates of inspection if both tests are inspected A minimum of 5 days should be stated between the two inspections. Date to be confirmed with our plant			

(*) 3.1 and 3.2: Seats, balls, ball guide: no marking of the casting number. Connection sleeve: marking available on demand