

13. Radial Piston Motors

Fixed Displacement Page 13 - 2

Series	Maximum Pressure Cont. / Interm. (psi)	Displacement Range (in ³ /rev)	Remarks	Pages
MR	3600 / 4400	2.0 - 426.8	5 pistons design - Brake Option	13 - 4
MRE	3000 / 3600	20.3 - 500.2		
MRT	3600 / 4400	433.3 - 1190.4	433.3-659.2 in³/rev. :2x5 pistons 854.9-1405.5 in³/rev. :2x7 pistons	13 - 6
MRTE-MRTF	3000 / 3600	476.5 - 1405.5		

Dual & Variable Displacement Page 13 - 8

Series	Maximum Pressure Cont. / Interm. (PSI)	Displacement Range (high / low) ¹ (in ³ /rev.)	Remarks	Pages
MRD	3600 / 4400	18.6 / 9.3 - 274.7 / 137.4	- Dual displacement - Brake Option	13 - 10
MRDE	3000 / 3600	20.3 / 10.1 - 329.6 / 164.8		
MRV	3600 / 4400	27.6 / 8.1 - 274.7 / 137.4	- Variable displacement - Brake Option.	13 - 10
MRVE	3000 / 3600	30.4 / 9.0 - 329.6 / 164.8		

Accessories Page 13 - 12

Brakes	13 - 12
Incremental Encoder and Tachometer drives	13 - 13
Flanges	13 - 14

¹ Other ratios available : consult Denison Hydraulics.

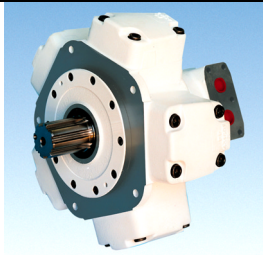
Series	Displacement (in³/rev.)						
	0	100	200	300	400	500	600
MR 33	2.0						
MR 57	3.4						
MR 73	4.4						
MR 93	5.7						
MR 110	6.7						
MR 125	7.6						
MR 160	9.7						
MR 190	11.7						
MR 200	12.2						
MR 250	15.3						
MR 300	18.6						
MRE 340	20.3						
MR 350	21.3						
MR 450	27.6						
MRE 500	30.4						
MR 600	37.1						
MR 700	43.1						
MRE 800	49.1						
MR 1100	68.7						
MRE 1400	83.6						
MR 1600	97.5						
MR 1800	110.4						
MRE 2100	127.6						
MR 2400	146.0						
MR 2800	170.4						
MRE 3100	189.4						
MR 3600	221.9						
MR 4500	274.8						
MRE 5400	329.6						
MR 6500	396.9						
MR 7000	426.8						
MRE 8200	500.2						

Series	0	250	500	750	1000	1250	1500
MRT 0710			433.3				
MRTF 0780			476.5				
MRTE 0850			519.7				
MRT 0900			549.5				
MRTF 0990			604.3				
MRTE 1080			659.2				
MRT 14000				854.9			
MRTF 15500				932.2			
MRTE 16500					1009.4		
MRT 17000					1022.7		
MRTF 18000						1099.9	
MRTF 18500						1130.2	
MRT 19500							1190.4
MRTE 20000							1207.5
MRTF 21500							1298.0
MRTE 23000							1405.5

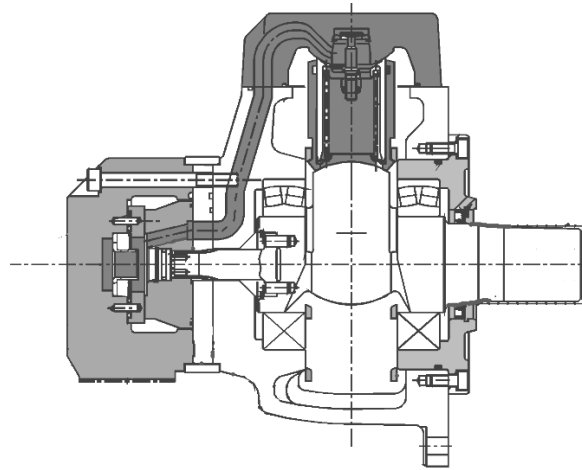
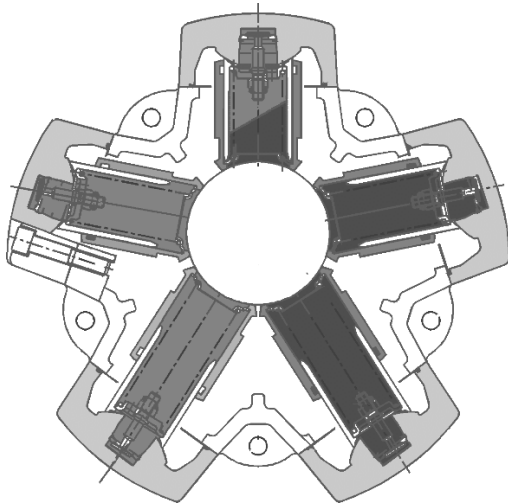
Series	Torque in-lbs. / 100 PSI	Maximum Pressure (PSI)					Speed (rpm)		Max. Power (HP)		Weight (lbs.)
		Cont.	Int.	Peak	A+B	Case	Flushing		Flushing		
							With	Without	With	Without	
MR 33	32	3600	5100	6100	5800	75	1...1400	-	13.4	9.4	82
MR 57	56	3600	5100	6100	5800	75	1-1300	-	21.5	14.8	82
MR 73	71	3600	5100	6100	5800	75	1-1200	-	24.1	17.4	97
MR 93	90	3600	5100	6100	5800	75	1-1100	-	29.5	20.1	97
MR 110	107	3600	5100	6100	5800	75	1-1000	-	34.9	22.8	97
MR 125	121	3600	4400	6100	5800	75	1-1000	-	34.9	22.8	101
MR 160	155	3600	4400	6100	5800	75	1...800		40.2	26.8	101
MR 190	186	3600	4400	6100	5800	75	1...800		48.3	32.2	101
MR 200	195	3600	4400	6100	5800	75	1...800		51.0	33.5	110
MR 250	244	3600	4400	6100	5800	75	1...750		64.4	42.9	110
MR 300	295	3600	4400	6100	5800	75	1...750		71.1	46.9	110
MRE 340	322	3000	3600	5100	5800	75	1...700		71.1	46.9	110
MR 350	340	3600	4400	6100	5800	75	1...600		72.4	48.3	170
MR 450	439	3600	4400	6100	5800	75	1...600		100.6	61.7	170
MRE 500	484	3000	3600	5100	5800	75	1...600		93.9	61.7	170
MR 600	591	3600	4400	6100	5800	75	1...500		112.6	75.1	214
MR 700	687	3600	4400	6100	5800	75	1...500		130.1	87.2	214
MRE 800	782	3000	3600	5100	5800	75	1...450		124.7	87.2	214
MR 1100	1094	3600	4400	6100	5800	75	0.5...330		159.6	103.3	309
MRE 1400	1331	3000	3600	5100	5800	75	0.5...280		136.8	103.3	309
MR 1600	1550	3600	4400	6100	5800	75	0.5...260		193.1	128.7	461
MR 1800	1759	3600	4400	6100	5800	75	0.5...250		210.5	138.1	461
MRE 2100	2033	3000	3600	5100	5800	75	0.5...250		198.5	134.1	461
MR 2400	2326	3600	4400	6100	5800	75	0.5...220		245.4	160.9	717
MR 2800	2714	3600	4400	6100	5800	75	0.5...200		260.2	170.3	717
MRE 3100	3017	3000	3600	5100	5800	75	0.5...200		254.8	167.6	717
MR 3600	3535	3600	4400	6100	5800	75	0.5...180	0.5...150	265.5	174.3	1120
MR 4500	4377	3600	4400	6100	5800	75	0.5...170	0.5...130	281.6	187.7	1120
MRE 5400	5250	3000	3600	5100	5800	75	0.5...160	0.5...120	281.6	187.7	1120
MR 6500	6322	3600	4400	6100	5800	75	0.5...130	0.5...110	335.3	221.3	1654
MR 7000	6800	3600	4400	6100	5800	75	0.5...130	0.5...100	348.7	228.0	1654
MRE 8200	7960	3000	3600	5100	5800	75	0.5...120	0.5...90	348.7	228.0	1654

Series ¹	Torque	Cont.	Int.	Peak	A+B	Case	Speed		Power		Weight
MRT 0710	6904	3600	4400	6100	5800	75	0.5...150	0.5...75	442.5	-	1980...2030
MRTF 0780	7588	3000	3600	5100	5800	75	0.5...130	0.5...70	375.5	-	1980...2030
MRTE 0850	8277	3000	3600	5100	5800	75	0.5...120	0.5...60	388.9	-	1980...2030
MRT 0900	8754	3600	4400	6100	5800	75	0.5...130	0.5...70	496.2	-	1980...2030
MRTF 0990	9626	3000	3600	5100	5800	75	0.5...120	0.5...60	402.3	-	1980...2030
MRTE 1080	10499	3000	3600	5100	5800	75	0.5...110	0.5...65	415.7	-	1980...2030
MRT 14000	13613	3600	4400	6100	5800	75	0.5...85	-	505.6	346.0	6500
MRTF 15500	14839	3000	3600	5100	5800	75	0.5...80	-	410.3	273.6	6500
MRTE 16500	16073	3000	3600	5100	5800	75	0.5...80	-	443.9	296.4	6500
MRT 17000	16280	3600	4400	6100	5800	75	0.5...80	-	569.9	388.9	6500
MRTF 18000	17513	3000	3600	5100	5800	75	0.5...80	-	484.1	321.8	6500
MRTF 18500	17995	3000	3600	5100	5800	75	0.5...75	-	465.3	311.1	6500
MRT 19500	18954	3600	4400	6100	5800	75	0.5...80	-	662.5	453.3	6500
MRTE 20000	19222	3000	3600	5100	5800	75	0.5...75	-	497.5	331.2	6500
MRTF 21500	20663	3000	3600	5100	5800	75	0.5...75	-	535.1	356.7	6500
MRTE 23000	22378	3000	3600	5100	5800	75	0.5...75	-	579.3	386.2	6500

¹ MRT 14000...23000 : Speed & Power are valid when used with largest distribution system. Consult Denison Hydraulics.



MR & MRE Series
Fixed Displacement
LSHT Motors
2.0 - 500.2 in³/rev. - 6100 PSI



Key Sheet.....Example : MR-160C-N1M1F1N1N-**

1. MR-160C-N1M1F1N1N- Series**

Standard3600 PSI max. cont.	MR
Expanded.....3000 PSI max. cont.	MRE

2. MR-160C-N1M1F1N1N- Size & Displacement**

Size	In ³ /rev			
	Code			
A	2.0	3.4		
	MR 33 A	MR 57 A		
B	4.4	5.7	6.7	
	MR 73 B	MR 93 B	MR 110 B	
C	7.6	9.7	11.7	
	MR 125 C	MR 160 C	MR 190 C	
D		15.3	18.6	20.3
	MR 200 D	MR 250 D	MR 300 D	MRE 340 D
E	21.3	27.6	30.4	
	MR 350 E	MR 450 E	MRE 500 E	
F	37.1	43.1	49.1	
	MR 600 F	MR 700 F	MRE 800 F	
G	68.7	83.6		
	MR 1100 G	MRE 1400 G		
H	110.4	127.6		
	MR 1800 H	MRE 2100 H		
I	146.0	170.4	189.4	
	MR 2400 I	MR 2800 I	MRE 3100 I	
L	221.9	274.8	329.6	
	MR 3600 L	MR 4500 L	MRE 5400 L	
M	396.9	426.8	500.2	
	MR 6500 M	MR 7000 M	MRE 8200 M	

3. MR-160C-N1M1F1N1N- Shaft**

Standard	Spline, Standard	N1
	Spline, DIN 5480	D1
	Female Spline DIN5480	F1
Others		P1/B1/C1

4. MR-160C-N1M1F1N1N-Speed sensor option**

None		N1
Incremental Elcis Encoder (500 pulse/rev.)	Uni-directional	M1
	Bi-directional	B1
Other (drives only)		C1/T1/Q1

5. MR-160C-N1M1F1N1N- Seals**

NBR : mineral oil	N1
FPM seals	V1
NBR, 220 PSI shaft seal	F1
No shaft seal (for brake)	U1

6. MR-160C-N1M1F1N1N- Connection Flange**

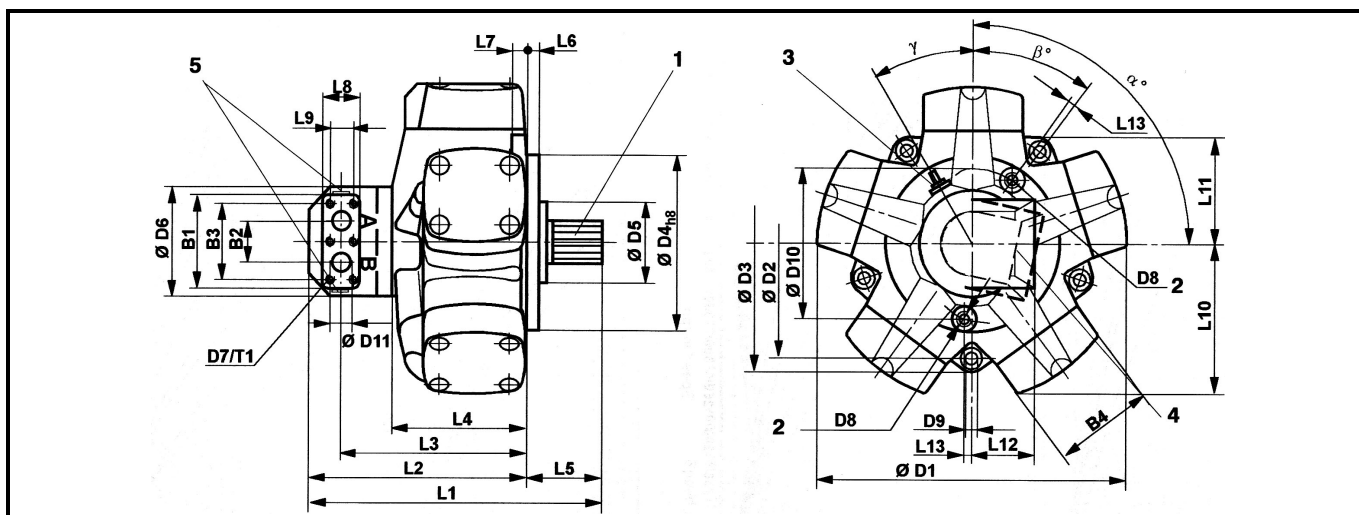
None	N1
Standard Denison Calzoni	C1
Standard SAEmetric / UNC	S1 / T1
SAE 6000 PSImetric / UNC	G1 / L1

7. MR-160C-N1M1F1N1N- Rotation**

Standard (CW : inlet in A, CCW : inlet in B)	N
Reversed (CW : inlet in B, CCW : inlet in A)	S

8. MR-160C-N1M1F1N1N- Special**

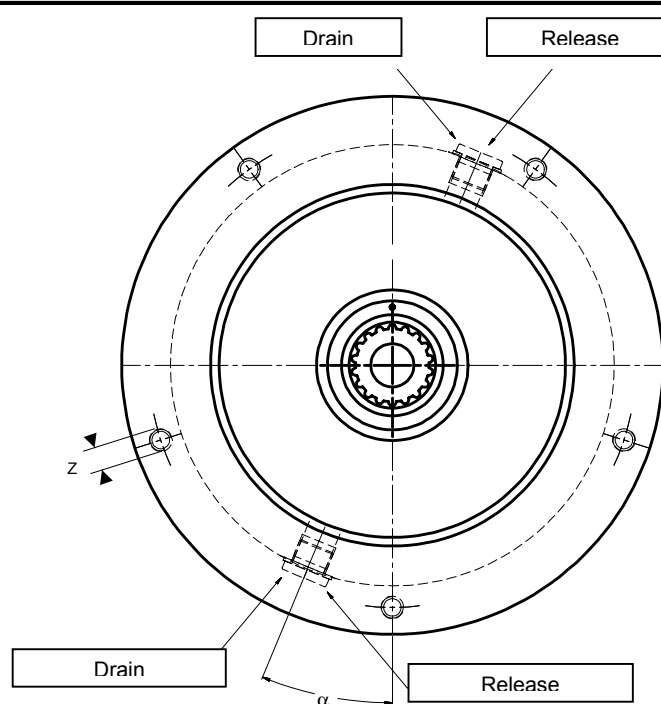
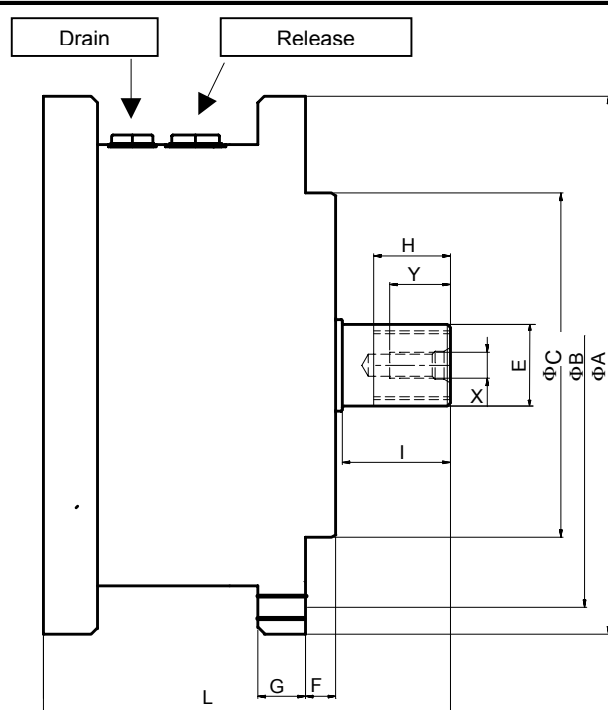
Drawing number, Version, Revision,...	Denison
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MR	33 57	73 93 110	125 160 190	200 250 300	350 450	600 700	1100	1600 1800	2400 2800	3600 4500	6500 7000	MR	33 57	73 93 110	125 160 190	200 250 300	350 450	600 700	1100	1600 1800	2400 2800	3600 4500	6500 7000
MRE				340	500	800	1400	2100	3100	5400	8200	MRE				340	500	800	1400	2100	3100	5400	8200
L1	11.18	11.69	12.17	12.72	14.80	15.75	17.91	19.80	24.37	27.52	29.37	ØD1	9.06	9.84	12.36	12.91	14.49	15.94	18.50	21.97	25.28	30.16	33.70
L2	7.87	8.98	9.53	9.53	10.98	11.77	13.31	14.61	18.35	19.25	20.31	ØD2	6.30	8.03	8.86	9.13	10.47	11.42	12.99	14.96	17.32	21.26	23.62
L3	5.83	7.48	8.03	8.03	9.25	10.04	11.42	12.72	15.43	16.46	17.76	ØD3	7.28	8.90	9.80	10.08	11.65	12.60	14.45	16.65	19.45	23.50	25.91
L4	4.45	5.35	5.71	5.71	6.57	7.56	7.99	9.29	11.22	12.09	13.39	ØD4 _{h8}	4.92	5.71	6.30	6.89	7.48	8.66	9.84	11.42	13.19	15.75	17.72
L5	2.24	2.68	2.64	3.19	3.82	3.98	4.61	5.20	6.02	8.27	9.06	ØD5	2.32			3.54	3.78	4.02	4.72	5.83	5.51		7.48
L6	0.47	0.67	0.55	0.59	0.59	0.59	0.79	0.83	0.94	1.26	1.26	ØD6	4.96	5.08	5.08	5.08	6.14	6.14	6.77	6.77	8.46	8.46	9.45
L7	0.63	0.79	0.63	0.63	0.71	0.79	0.87	0.94	1.02	1.10	1.18	D7	M10	M8	M8	M8	M10	M10	M12	M12	M14	M16	M16
L8	2.76	2.13	2.13	2.13	2.76	2.76	3.23	3.23	3.86	3.86	3.86	T1	0.98	0.59	0.59	0.59	0.71	0.71	0.87	0.87	1.10	1.26	1.18
L9		1.34	1.34	1.34	1.57	1.57	1.97	1.97	2.44	2.68	2.68	D8	G ¾	G ¾	G ¾	G ¾	G ¾	G ¾	G ¾	G ½	G ½	G ½	G ½
L10	4.25	4.72	5.79	6.02	6.85	7.56	8.78	10.31	11.81	14.17	15.91	D9	0.35	0.43	0.43	0.43	0.51	0.51	0.59	0.67	0.75	0.91	0.98
L11	3.54	3.78	4.41	4.69	5.12	5.51	6.50	7.76	8.70	9.72	10.71	ØD10			6.30	6.38	7.64	8.15	8.98	10.47	12.36	14.96	16.93
L12	2.76	2.83	2.83	2.83	3.31	3.31	4.13	4.13	4.72	5.51	5.51	ØD11	0.98	0.79	0.79	0.79	0.98	0.98	1.22	1.22	1.45	1.50	1.50
L13			0.26	0.30	0.37	0.32	0.35	0.43	0.59	0.75	0.83	α	108°	90°	90°	90°	90°	90°	104°	90°	90°	108°	108°
B1	4.88	4.72	4.72	4.72	5.59	5.59	6.38	6.38	8.19	9.06	9.06	β	36°	36°	36°	36°	36°	36°	36°	36°	36°	36°	36°
B2	2.56	1.97	1.97	1.97	2.36	2.36	2.80	2.80	3.39	4.57	4.57												
B3		3.94	3.94	3.94	4.72	4.72	5.35	5.35	7.09	7.87	7.87												
B4	2.72	3.54	3.94	3.94	4.69	5.24	5.83	6.61	7.40	9.45	10.55												

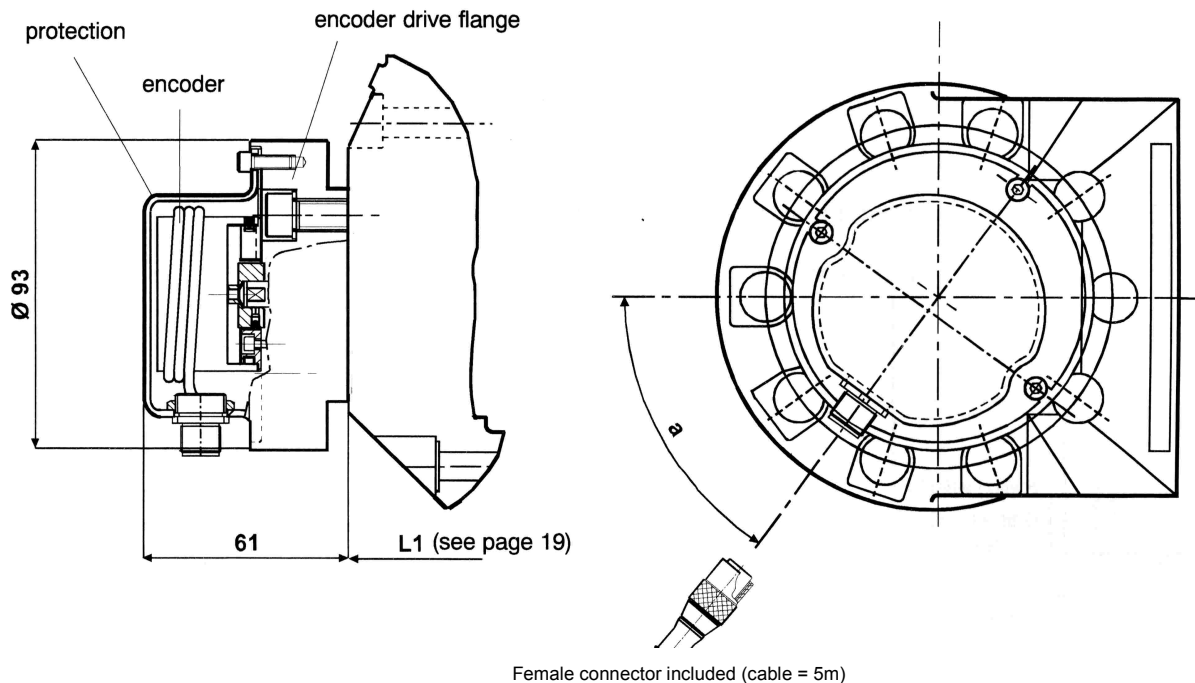
Shafts	MR	33 57	73 93 110	125 160 190	200 250 300	350 450	600 700	1100	1600 1800	2400 2800	3600 4500	6500 7000
	MRE				340	500	800	1400	2100	3100	5400	8200
	L5	2.24	2.70	2.64	3.19	3.82	3.98	4.61	5.20	6.02	8.27	9.06
	L21	1.57	2.03	1.97	2.36	2.91	3.07	3.46	3.94	4.72	6.81	7.40
	L22(N1)	1.10	1.24	1.40	1.81	2.22	2.44	2.72	3.11	3.90	5.67	5.91
	L22(D1)	1.10	1.40	1.40	1.81	2.36	2.44	2.83	3.15	3.94	5.67	6.02
	D12		M12	M12	M12	M12	M12	M12	M12	M12	M12	M12
	T10		0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
	ØD13 (N1)	B6 x 26 x 32	B6 x 28 x 34	B8 x 32 x 38	B8 x 42 x 48	B8 x 46 x 54	B8 x 52 x 60	B8 x 62 x 72	B10 x 72 x 82	B10 x 82 x 92	B10x102 x112	B10x112 x125
	ØD13 (D1)	W32 x 1.5 x 20-8e	W35 x 2 x 16-8e	W38 x 2 x 18-8e	W48 x 2 x 22-8e	W55 x 3 x 17-8e	W60 x 3 x 18-8e	W70 x 3 x 22-8e	W80 x 3 x 25-8e	W90 x 4 x 21-8e	W110 x 4 x 26-8e	W120 x 4 x 28-8e
	L5	0.67	0.67	0.55	1.06	1.10	1.10	1.50	1.85	1.89	1.97	1.97
	L21	0.20	0.20	0.20	0.20	0.20	0.20	0.32	0.32	0.32	0.55	0.55
	L22	0.83	1.02	1.10	1.42	1.50	1.73	1.97	2.24	2.44	2.68	2.99
	ØD13	N28 x 1.25 x 21-9H	N32 x 2 x 14-9H	N35 x 2 x 16-9H	N40 x 2 x 18-9H	N47 x 2 x 22-9H	N55 x 3 x 17-9H	N65 x 3 x 20-9H	N75 x 3 x 24-9H	N85 x 3 x 27-9H	N100 x 3 x 32-9H	N110 x 3 x 35-9H

Multidiscs Brakes



Type		B 190	B 300	B 450	B 700	B 1100	B 1800	B 2800
MR		125/160/190	200/250/300	350 / 450	600 / 700	1100	1600 / 1800	2400 / 2800
MRE			340	500	800	1400	2100	3100
MRD / MRV			300	450	700	1100	1800	2800
MRDE / MRVE			340	500	800	1400	2100	3100
Braking torque (in-lbs.)	Static	11060	15930	23460	35400	54880	100900	151360
	Dynamic	7700	10620	12830	19470	37180	55320	106210
Release pressure (PSI)		406	406	392	392	392	435	435
ØA		9.84	10.08	11.65	12.60	14.17	16.65	19.45
ØB		8.86	9.13	10.47	11.42	12.99	14.96	17.32
ØC _{h8}		6.30	6.89	7.48	8.66	9.84	11.42	13.19
ØE (Ei / Ee)		1.26 / 1.50	1.65 / 1.89	1.81 / 2.13	2.05 / 2.36	2.44 / 2.83	2.83 / 3.23	3.23 / 3.62
F		0.55	0.59	0.59	0.59	0.79	0.83	0.94
G		0.87	0.98	1.06	1.10	1.02	1.10	1.18
H		1.40	1.81	2.22	2.44	2.83	3.11	3.90
I		1.97	2.36	2.91	3.07	3.46	3.94	4.72
L		7.40	8.54	9.61	10.75	12.01	13.70	16.38
ØX		M12	M12	M12	M12	M12	M12	M12
Y		1.10	1.10	1.10	1.10	1.10	1.10	1.10
Z		0.41	0.41	0.53	0.53	0.59	0.69	0.75
Screws (x5)		M10 x 1.38	M10 x 1.38	M12 x 1.57	M12 x 1.77	M14 x 1.97	M16 x 2.17	M18 x 2.35
α		22°30'	22°30'	22°30'	22°30'	0°	22°30'	0°
Weight (kg)								
Case Drain (x 2)		G 3/8"				M16 x 1.5	G 1/2"	
Release ports (x 2)		G 1/4"						
Shaft		Same as motors N1 shafts						

Incremental Encoder

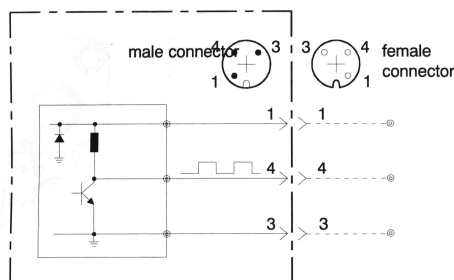


Technical Data :

- Encoder Type..... ELCIS mod. 478
- Supply Voltage..... 8 – 24 VDC
- Current Consumption..... 120 mA max.
- Current Output..... 10 mA max.
- Response Frequency..... 100 kHz max.
- Pulse per tour..... 500
- Operating Temp..... 0 → +70° C
- Protection..... IP67

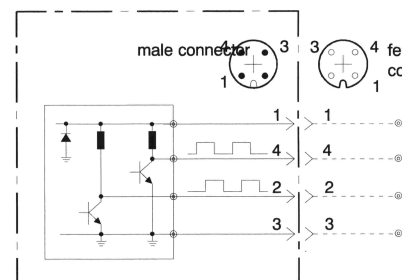
Wiring Identification :

- Brown Power Supply (8 - 24 VDC)
- White Output phase B (max. 10 mA - 24 VDC)
- Blue Power Supply (0 VDC)
- Black Output phase A (max. 10 mA - 24 VDC)



Connectors (Lumberg) : **Uni-directional**

- Male..... : RSF3/0.5 M
- Female .. : RKT3-06/5m

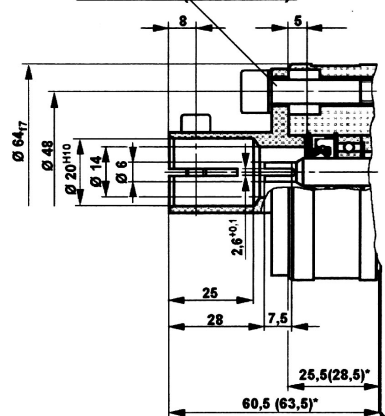


Connectors (Lumberg) : **Bi-directional**

- Male..... : RSF4/0.5 M
- Female... : RKT4-07/5m

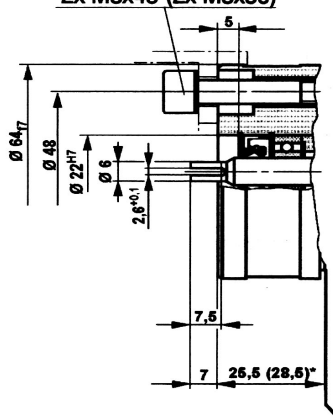
Mechanical Tachometer drive : C

2x M8x45 (2x M8x50)*



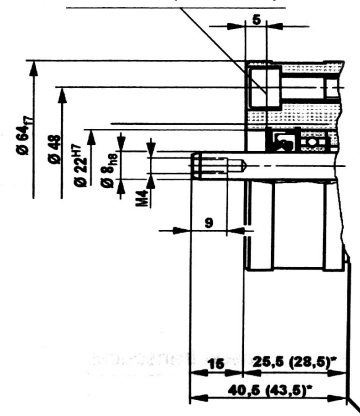
Tachometer drive : T

2x M8x45 (2x M8x50)*



Encoder drive : Q

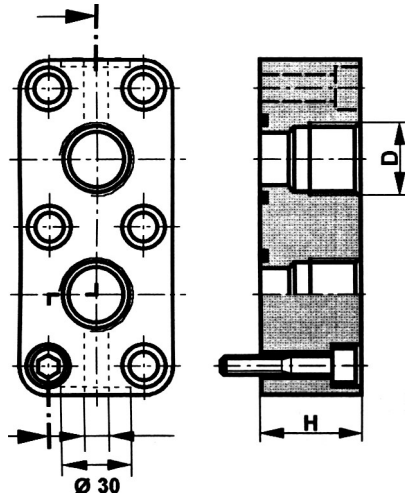
2x M8x30 (2x M8x35)*

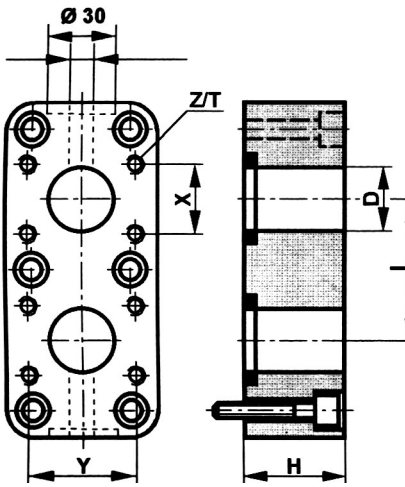


* : MR 160 / 190, MR 250 / 300, MRE 340, MRD 300, MRDE 340

Note : all dimensions are metric (mm).

Flanges (seals and bolts included)	MR MRE Series	MR 160 MR 190 MR 200 MR 250 MR 300 MRE 340	MR 350 MR 450 MRE 500 MR 600 MR 700 MRE 800	MR 1100 MRE 1400 MR 1600 MR 1800 MRE 2100	MR 2400 MR 2800 MRE 3100	MR 3600 MR 4500 MRE 5400 MR 6500 MR 7000 MRE 8200
	MRD MRDE Series	MRD 300 MRDE 340	MRD 450 MRDE 500 MRD 700 MRDE 800	MRD 1100 MRDE 1400 MRD 1800 MRDE 2100	MRD 2800 MRDE 3100	MRD 4500 MRDE 5400

		Threaded connection flange					
		D	G ¾"	G 1 ¼"	G 1 ½"	G 1 ½"	G 2"
		H	1.42	1.57	1.77	2.36	2.36
Part #	NBR	262098	262089	262093	264572	272724	
	Viton	229394	229395	229396	229397	229398	

		SAE connection flange								
		Size	5000 psi	5000 psi	4000 psi	6000 psi	3000 psi	6000 psi	3000 psi	6000 psi
		H	1.42	1.57	1.77	1.77	2.36	2.36	2.36	2.36
I	2.17	2.36	2.95	2.80	3.39	3.84	4.41	4.57		
X	0.87	1.03	1.19	1.09	1.41	1.44	1.69	1.75		
Y	1.87	2.06	2.31	2.25	2.75	3.13	3.06	3.81		
Metric	D	¾"	1"	1 ¼"	1"	1 ½"	1 ½"	2"	2"	
	Z / T	M10x0.98	M10x0.98	M10x0.98	M12x0.87	M12x1.18	M16x1.18	M12x1.18	M20x1.38	
	Part #	277295	277297	277299	230166	277301	230168	277303	230170	
UNC	D	¾"	1"	1 ¼"	1"	1 ½"	-	2"	2"	
	Z / T	¾"-16	¾"-16	7/16"-14	7/16"-14	½"-13	-	½"-13	¾"-10	
	Part #	223335	223336	223337	342092	223338	-	223339	342547	