Airflex®

EATON

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Water Cooled Clutches I

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Airflex® WCB Description

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WCB elements are disc type, externally cooled units. They are designed to absorb and dissipate the thermal loads associated with the most severe clutch and brake applications. The WCB friction couple was developed specifically for continuous slip service and has a dynamic coefficient of friction which is larger than its static coefficient of friction. Special high coefficient linings are also available which provide 50% higher torque than standard friction linings and provide a 1:1 dynamic to static torque ratio.

Element construction and operation is illustrated in the figure. Pressurizing the cylinder causes the piston to clamp the friction disc between the water jackets. Heat generated at the friction interfaces is quickly transferred to the circulating coolant.

Element sizes are indicated by the number of friction discs and the disc diameter in inches. For instance, size 224WCB has two friction discs 24 inches in diameter.

Features:

Unique friction couple.
A specially formulated friction material, interfacing with a copper alloy surface, eliminates the stick-slip characteristic associated with ordinary frictional devices.

Rapid heat dissipation.
The copper interface conducts heat rapidly to the circulating coolant.

Open or closed loop coolant systems.
The element works equally well with open or closed loop circulating systems. On mobile equipment, the engine's cooling system can be tapped to provide coolant to the element.

Optional corrosion protection
For marine environment applications, protective coatings are available to minimize corrosion.

Where used:

- Dynamometers
- Logging equipment
- Marine Mooring Systems
- Slip Clutches
- Tension Brakes
- Unwind Stands

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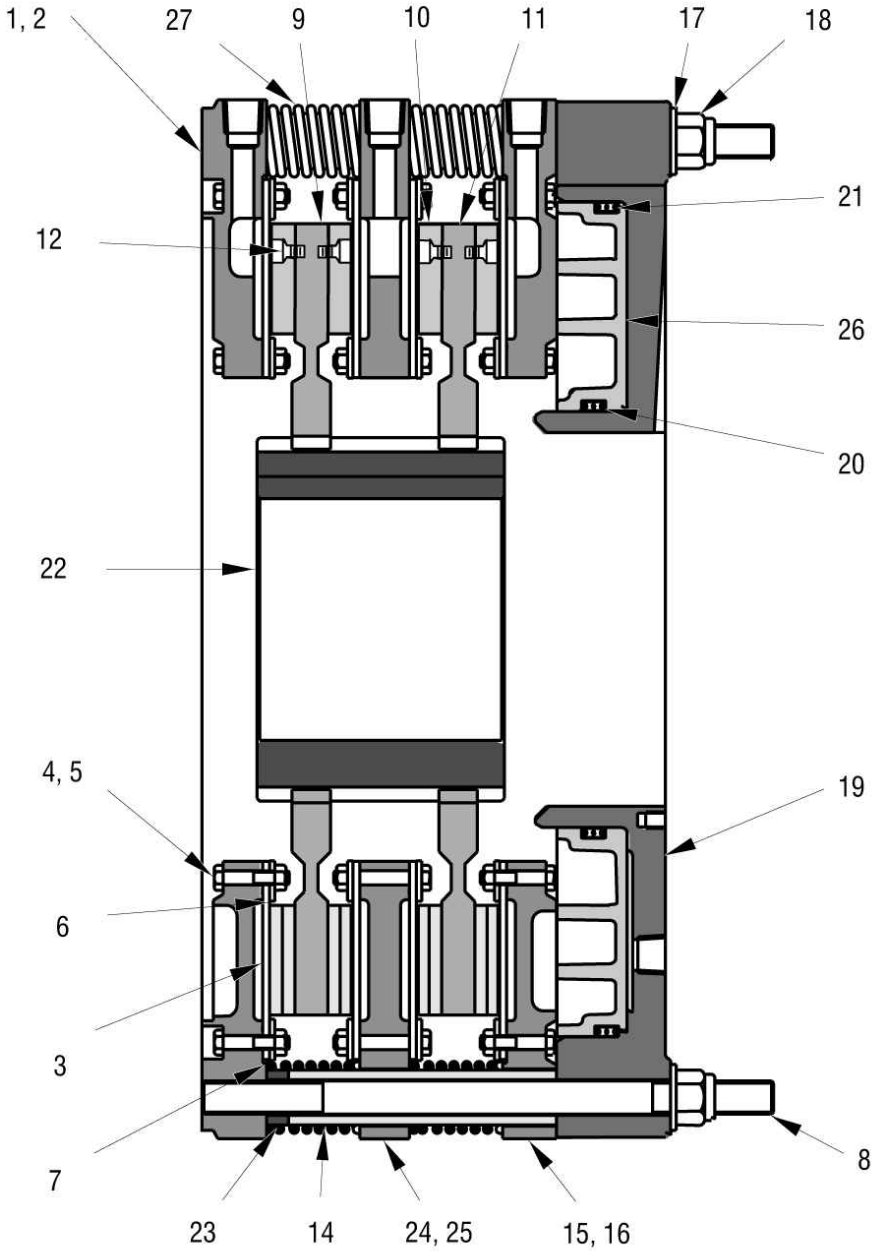
Airflex® WCB Component Parts



Item	Description
1	Mounting Flange Sub-Assembly
2	Mounting Flange
3	Wear Plate
4	Hex Head Screw
5	Locknut
6	Inner Support Ring
7	Outer Support Ring
8	Stud
9	Friction Disc Sub-Assembly
10	Friction Disc
11	Friction Disc Core
12	Flat Head Screw
14	Clamp Tube

Item		Description
15		Pressure Plate Sub-Assembly
16		Pressure Plate
17		Flat Washer
18		Locknut
19		Cylinder
20		Inner Seal
21		Outer Seal
22		Gear
23	❶	Wear Spacer
24	❶	Reaction Plate Sub-Assembly
25		Reaction Plate
26		Piston
27		Release Spring

Note:

❶ Dual disc unit shown. Other multi-disc units are similar. Items 23 and 24 are not required for single disc units.

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Airflex® WCB Elements

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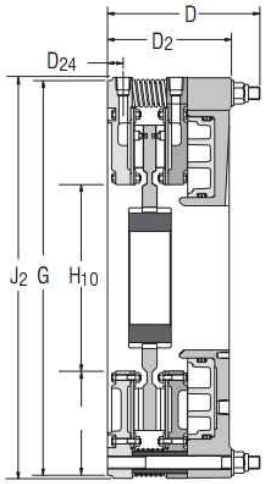
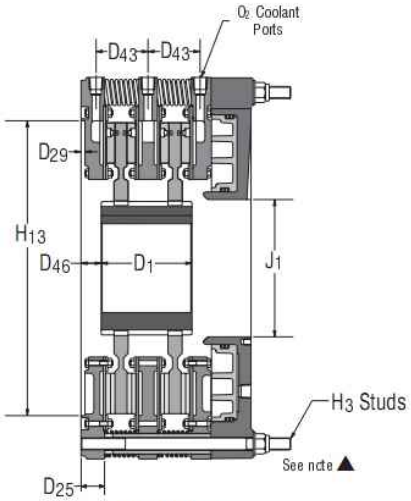
Form WC 1103 Dimensional Data



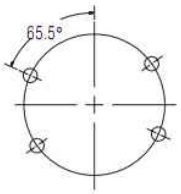
Single Disc



Dual Disc

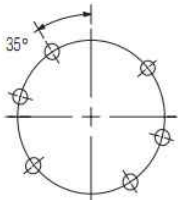
* Size 18, 24 & 36
Customer's mounting plate must provide rigid support and contact for this length

Mounting Bolt Circles ❷



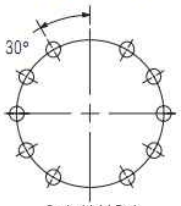
Coolant Inlet Port
8WCB

(4) 0.531 (13,5)Ø Mounting Holes Based on 6 equally spaced as shown on 11.125 (282,5) bolt circle



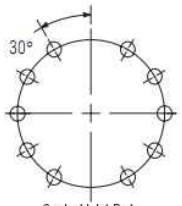
Coolant Inlet Port
14WCB

(6) 0.656 (16,7)Ø Mounting Holes Based on 8 equally spaced as shown on 17.500 (444,5) bolt



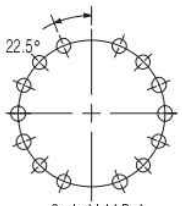
Coolant Inlet Port
18WCB

(10) 0.656 (16,7)Ø Mounting Holes Based on 12 equally spaced as shown on 22.000 (558,8) bolt circle



Coolant Inlet Port
24WCB

(10) 0.656 (16,7)Ø Mounting Holes Based on 12 equally spaced as shown on 28.750 (730,3) bolt circle



Coolant Inlet Port
36WCB

(14) 1.062 (27,0)Ø Mounting Holes Based on 16 equally spaced as shown on 42.000 (1066,8) bolt circle

English	Dimensions in inches																
8WCB	0.81	1.25	0.250	❼	2.62	12.125	6	1/2-13	10.875	4.12	8.375	3.12	12.24	3	1/4-20NC2	3.500	3/8-18	6.63
14WCB	0.91	1.41	0.250	❽	2.90	18.750	6	3/4-10	17.000	7.12	14.375	6.00	18.94	3	3/8-16NC2	6.500	1/2-14	11.50
18WCB	0.93	1.47	0.250	1.25	3.14	23.25	12	3/4-10	21.750	11.00	18.250	8.50	23.86	3	3/8-16NC2	9.125	1/2-14	15.25
24WCB	1.06	1.75	0.250	1.38	4.13	29.998	12	1 1/8-7	27.875	12.75	24.375	11.50	30.62	6	3/8-16NC2	12.250	1/2-14	18.50
36WCB	1.52	2.58	0.280	2.38	4.97	44.498	16	1 3/8-6	41.500	16.50	18.375	16.50	44.86	6	1/2-13NC2	17.500	3/4-14	28.00

Size	D_{24}	D_{25}	D_{29}	D_{46}	D_{43}	G ❸	H_3 No.	H_3 Size ❹	H_3 Bolt Circle	H_{10}	H_{13} ❺	J_1	J_2 ⓾	H_4 No.	H_4 Size	H_4 Bolt Circle	O_2 ❻ Size	O_2 ❻ Bolt Circle
8WCB	21	32	6,4	❼	67	308,0	6	1/2-13	276,2	105	212,7	79	311	3	1/4-20NC2	88,9	3/8-18	168
14WCB	23	36	6,4	❽	74	476,3	6	3/4-10	431,8	181	365,1	152	481	3	3/8-16NC2	165,1	1/2-14	292
18WCB	24	37	6,4	32	80	590,6	12	3/4-10	552,4	279	463,5	216	606	3	3/8-16NC2	231,8	1/2-14	387
24WCB	27	44	6,4	35	105	761,9	12	1 1/8-7	708,0	324	619,1	292	778	6	3/8-16NC2	311,2	1/2-14	470
36WCB	39	65	7,1	60	126	1130,2	16	1 3/8-6	1054,1	419	466,7	419	1139	6	1/2-13NC2	444,5	3/4-14	711
SI	Dimensions in millimeters																	

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Airflex® WCB Elements

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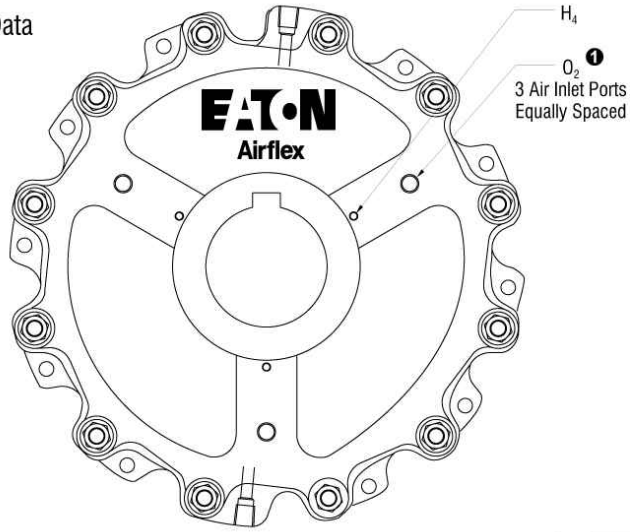
Form WC 1103 Dimensional Data



English	Dimensions in inches						
108WCB	1.38	2.38	7.00	1.75	5.69	4	3/8-18
208WCB	1.75	2.38	9.75	4.00	8.31	6	3/8-18
308WCB	2.00	2.31	12.88	7.75	10.95	8	3/8-18
114WCB	2.25	4.63	8.00	2.88	6.59	4	1/2-14
214WCB	2.00	4.25	11.50	4.38	9.50	6	1/2-14
314WCB	3.25	4.25	16.25	8.25	12.39	8	1/2-14
118WCB	2.88	5.63	9.00	2.50	7.32	4	1/2-14
218WCB	3.63	5.75	13.00	5.63	10.66	6	1/2-14
318WCB	4.13	5.81	17.25	9.63	14.00	8	1/2 -14
418WCB	4.63	5.81	21.50	12.50	17.34	10	1/2-14
124WCB	3.88	7.38	11.00	3.50	9.26	4	3/4-14
224WCB	4.75	7.50	15.50	8.63	13.31	6	3/4-14
324WCB	5.50	7.38	24.00	13.19	17.38	8	3/4-14
424WCB	6.00	7.38	28.50	16.94	21.43	10	3/4-14
136WCB	5.63	10.63	17.00	5.00	12.07	4	1 1/4-11 1/2
236WCB	7.62	10.75	20.75	9.00	17.04	6	1 1/4-11 1/2
336WCB	7.25	10.88	27.48	13.00	22.00	8	1 1/4-11 1/2
436WCB	8.00	10.88	35.00	18.00	26.99	10	1 1/4-11 1/2

Size	Min. Bore Range ❾	Max. Bore Range ❾	D	D_1	D_2	No. O Coolant Ports ❻	Size O Coolant Ports ❻
	Min.	Max.				No.	Size
108WCB	35	60	178	44	145	4	3/8-18
208WCB	44	60	248	102	211	6	3/8-18
308WCB	50	59	327	196	278	8	3/8-18
114WCB	57	117	203	73	167	4	1/2-14
214WCB	51	108	292	111	241	6	1/2-14
314WCB	82	108	413	210	315	8	1/2-14
118WCB	73	143	229	64	186	4	1/2-14
218WCB	92	146	330	143	271	6	1/2-14
318WCB	105	148	438	245	356	8	1/2-14
418WCB	118	148	546	318	440	10	1/2-14
124WCB	98	187	279	89	235	4	3/4-14
224WCB	121	191	394	219	338	6	3/4-14
324WCB	140	187	610	335	441	8	3/4-14
424WCB	152	187	724	430	544	10	3/4-14
136WCB	143	270	432	127	307	4	1 1/4-11 1/2
236WCB	194	273	527	229	433	6	1 1/4-11 1/2
336WCB	184	276	698	330	559	8	1 1/4-11 1/2
436WCB	203	276	889	457	686	10	1 1/4-11 1/2
SI	Dimensions in millimeters						

Notes:

❶ Only two ports, 180° apart, furnished on sizes 8 and 14WCB.

❷ To insure proper cooling, inlet port must be located at the six o'clock position.

❸ Tolerance Sizes 8WCB thru 24WCB +0.000/-0.003 (+0,00/-0,08) 36WCB +0.000/-0.005 (+0,00/-0,13)

❹ American National Standard for Unified Screw Threads.

❺ Tolerance +0.003/-0.000 in (0,08/-0,00 mm)

❻ American National Pipe Thread

❼ 1.00 in (25 mm) for 108WCB.
1.38 in (35 mm) for 208WCB.
0.19 in (4,8 mm) for 308WCB.

❽ 1.06 in (27 mm) for 114WCB & 314WCB.
1.69 in (43 mm) for 214WCB.

❾ Maximum bore sizes are based on flat keys, allowable gear hub stresses and torque ratings at 80 psi (5,5 bar).

❿ Maximum diameter of "as cast" surfaces.

▲ Some high torque applications of three and four disc elements require additional torsional support on the cylinder end of the unit. Contact your local Airflex representative for more details.

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Airflex® WCB Technical Data

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English			lb in @ 80 psi	HP	GPM		lb ft²	
108WCB	146246	415313	5700	30	3	6.7 E-02	9	0.8
208WCB	146247	415314	11400	60	6	1.7 E-02	12	1.5
308WCB	146377	416457	17100	90	9	7.4 E-03	15	2.33
114WCB	146231	415454	21500	60	6	2.4 E-02	64	6.4
214WCB	146232	415302	43000	120	12	6.0 E-03	83	12.6
314WCB	146365	416303	64500	180	18	2.6 E-03	102	19.5
118WCB	146308	302813	48800	120	12	1.3 E-02	170	20
218WCB	146310	302907	97600	240	24	3.2 E-03	220	40
318WCB	146363	413208	146400	360	36	1.4 E-03	270	60
418WCB	146305	414111	195200	480	48	8.0 E-04	320	80
124WCB	146313	411672	100000	270	27	8.1 E-03	622	78
224WCB	146339	410970	200000	540	54	2.0 E-03	822	158
324WCB	146361	412433	300000	810	81	8.9 E-04	1022	238
424WCB	146362	413195	400000	1080	108	5.0 E-04	1222	318
136WCB	146287	416538	295000	650	65	2.9 E-03	4922	324
236WCB	146338	416536	590000	1300	130	7.2 E-04	6323	667
336WCB	146289	416535	885000	1950	195	3.2 E-04	7724	1010
436WCB	146298	416537	1180000	2600	260	1.8 E-04	9125	1353

Size	Part Number ❶	Gear Part Number	Mr ❷ Torque Rating	❸ Thermal Rating	❹ Water Flow	Pressure Drop Coefficient	Wk² Housing	Wk² Disc & Gear
							J	
108WCB	146246	415313	644	22,4	11,4	3,2 E-04	0,38	0,03
208WCB	146247	415314	1287	44,7	22,7	8,2 E-05	0,51	0,06
308WCB	146377	416457	1932	67,2	34,2	7,4 E-03	0,64	0,04
114WCB	146231	415454	2427	44,7	22,7	1,2 E-04	2,70	0,27
214WCB	146232	415302	4855	89,5	45,4	2,9 E-05	3,50	0,53
314WCB	146365	416303	7288	134,4	68,4	2,6 E-03	4,30	0,82
118WCB	146308	302813	5510	89,5	45,4	6,3 E-05	7,16	0,84
218WCB	146310	302907	11019	179,0	90,9	1,5 E-05	9,27	1,69
318WCB	146363	413208	16529	268	136	6,7 E-06	11,38	2,53
418WCB	146305	414111	22038	358	182	3,9 E-06	13,48	3,37
124WCB	146313	411672	11290	201,3	102,2	3,9 E-05	26,21	3,29
224WCB	146339	410970	22580	402,7	204,4	9,6 E-06	34,64	6,66
324WCB	146361	412433	33870	604	307	4,3 E-06	43,07	10,03
424WCB	146362	413195	45160	805	409	2,4 E-06	51,50	13,40
136WCB	146287	416538	33306	484,7	246,1	1,4 E-05	207,41	13,65
236WCB	146338	416536	66611	969,4	492,1	3,5 E-06	266,45	28,11
336WCB	146289	416535	99917	1454	738	1,5 E-06	325,49	42,56
436WCB	146298	416537	133222	1939	984	8,7 E-07	384,53	57,02
SI			Nm@ 5,5 bar	kW	dm³/min		kg m²	

Notes:

❶ Basic part number only. Gear must be ordered separately.

❷ Exact torque rating is dependent upon applied pressure. Maximum allowable pressure is 150 psi (10,3 bar).

❸ Based upon a 70ºF (21ºC) fresh water inlet temperature and a 50ºF (28ºC) temperature rise between inlet and outlet. See cooling requirements.

❹ To insure proper cooling, inlet port must be located at the six o'clock position. Maximum allowable inlet pressure is 45 psi (3,1 bar), 40 psi (2,7 bar) for 36 WCB only.

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Airflex® WCB Technical Data

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English	rpm		lb		in		in³			
108WCB	2150	3400	96	15	3.17	2.05	4	23	12	10
208WCB	2150	3400	128	30	4.44	3.38	7	27	24	20
308WCB	2150	3400	160	45	5.55	4.55			36	30
114WCB	1260	2100	230	48	3.69	2.42	9	58	40	29
214WCB	1260	2100	300	86	5.26	3.83	19	68	75	58
314WCB	1260	2100	373	141	6.95	5.23			120	87
118WCB	955	1600	254	87	4.0	2.6	25	90	65	54
218WCB	955	1600	318	180	5.5	4.2	50	180	125	108
318WCB	955	1600	382	552	7.4	6.2	75	270	185	162
418WCB	955	1600	446	895	10	7.6	100	360	245	216
124WCB	715	1200	345	577	5.2	3.3	36	157	160	126
224WCB	715	1200	600	700	7.6	5.7	95	337	320	252
324WCB	715	1200	855	820	10	8	154	517	480	378
424WCB	715	1200	1110	941	12.4	10.1	213	697	640	504
136WCB	475	700	1746	363	6.9	4.3	135	355	600	337
236WCB	475	700	2970	3750	9.5	6.8	265	710	1135	673
336WCB	475	700	4194	1247	12.11	9.2	395	1065	1670	1009
436WCB	475	700	5418	1689	14.67	11.8	525	1420	2205	1345

Size	❺ Maximum Slip Speed	Maximum ❻ Freewheeling Speed	Weight		Center of Gravity ❼		New	Worn	Water Volume	Lining Wear Volume
			Housing	Disc & Gear	Housing	Disc & Gear	Engaging Volume ❽			
			Mass		Center of Gravity		New	Worn		
108WCB	2150	3400	44	7	81	52	0,1	0,4	0,2	0,2
208WCB	2150	3400	58	14	113	86	0,1	0,4	0,4	0,3
308WCB	2150	3400	73	20	141	116			0,6	0,4
114WCB	1260	2100	104	22	94	61	0,1	1,0	0,7	0,5
214WCB	1260	2100	136	39	134	97	0,3	1,1	1,2	1,0
314WCB	1260	2100	169	64	177	133			2,0	1,5
118WCB	955	1600	115	39	102	66	0,4	1,5	1,1	0,9
218WCB	955	1600	144	82	140	107	0,8	3,0	2,1	1,8
318WCB	955	1600	173	124	188	157	1,2	4,4	3,0	2,7
418WCB	955	1600	202	166	254	193	1,6	5,9	4,0	3,5
124WCB	715	1200	156	82	132	84	0,6	2,6	2,6	2,1
224WCB	715	1200	272	179	193	145	1,6	5,5	5,3	4,1
324WCB	715	1200	388	277	254	203	2,5	8,5	7,9	6,2
424WCB	715	1200	503	374	315	257	3,5	11,5	10,5	8,3
136WCB	475	700	792	165	175	109	2,2	5,8	9,9	5,5
236WCB	475	700	1347	365	241	173	4,4	11,7	18,6	11,1
336WCB	475	700	1902	566	308	234	6,5	17,5	27,4	16,6
436WCB	475	700	2457	766	373	300	8,6	23,3	36,2	22,1
SI	rpm		kg		mm		dm³			

Notes:

❺ Based upon a continuous slip velocity of 4500 fpm (22,9 mps).

❻ Maximum freewheeling velocity is 7500 fpm (38,1 mps)

❼ Located from mounting flange surface.

❽ Absolute volume of cylinder at contact with new and worn friction discs.

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Airflex® WCS Description

EATON

WCS elements are disc type, externally cooled, spring applied units. They are designed to absorb and dissipate the thermal loads associated with the most severe braking and tensioning applications. The WCS friction couple was developed specifically for continuous slip service and has a dynamic coefficient of friction which is larger than its static coefficient of friction. Special high coefficient linings are also available which provide 50% higher torque than standard friction linings and provide a 1:1 dynamic to static torque ratio.

Element construction and operation is illustrated in the figure. Pressurizing the unit compresses the brake springs and withdraws the water jackets from the brake discs. Heat generated at the friction interfaces is quickly transferred to the circulating coolant.

Element sizes are indicated by the number of friction discs and the disc diameter in inches. For instance, size 224WCS has two friction discs 24 inches in diameter.

Features:

Unique friction couple.
A specially formulated friction material, interfacing with a copper alloy surface, eliminates the stick-slip characteristic associated with ordinary frictional devices.

Rapid heat dissipation.
The copper interface conducts heat rapidly to the circulating coolant.

Open or closed loop coolant systems.
The element works equally well with open or closed loop circulating systems. On mobile equipment, the engine's cooling system can be tapped to provide coolant to the element.

Optional corrosion protection
For marine environment applications, protective coatings are available to minimize corrosion.

Where used:

- Logging equipment
- Marine Mooring Systems
- Drilling Rigs

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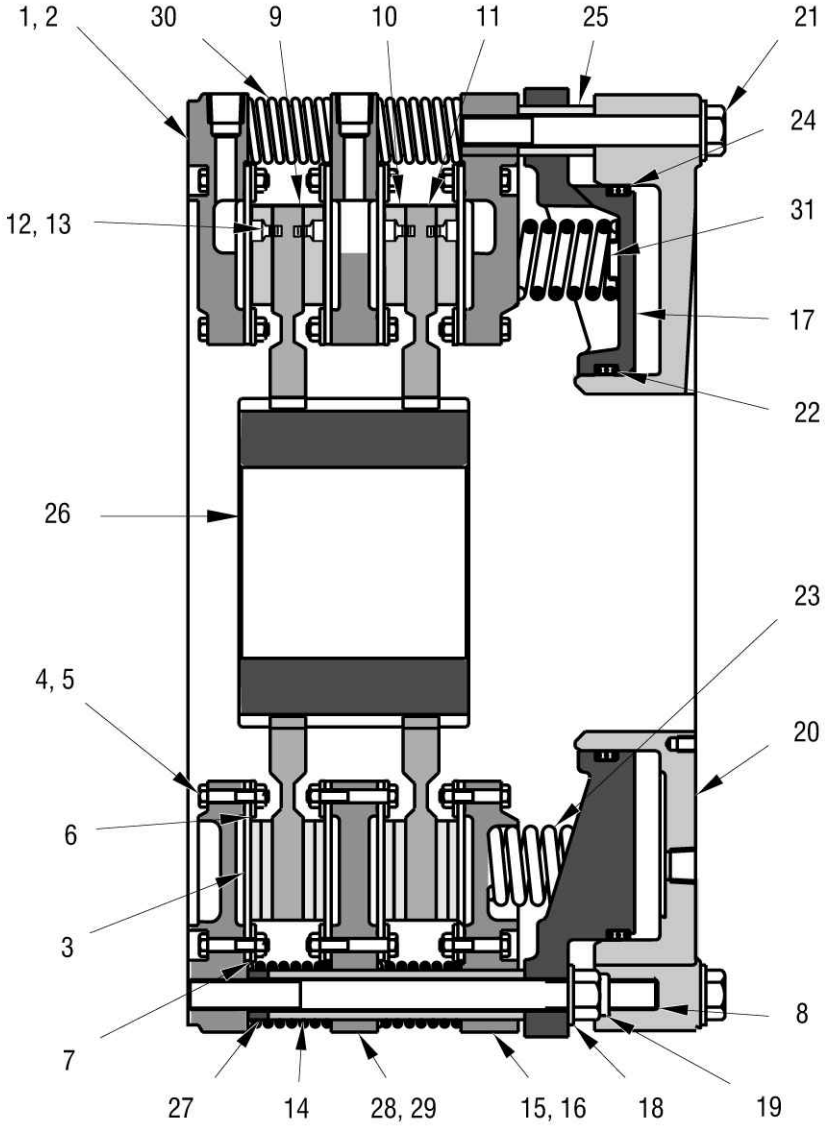
Airflex® WCS Component Parts



Item	Desciption
1	Mounting Flange Sub-Assembly
2	Mounting Flange
3	Wear Plate
4	Hex Head Screw
5	Locknut
6	Inner Support Ring
7	Outer Support Ring
8	Stud
9	Friction Disc Sub-Assembly
10	Friction Disc
11	Friction Disc Core
12	Flat Head Screw
14	Clamp Tube
15	Pressure Plate Sub-Assembly
16	Pressure Plate

Item	Desciption
17	Spring Housing
18	Flat Washer
19	Locknut
20	Cylinder
21	Hex Head Screw
22	Inner Seal
23	Spring
24	Outer Seal
25	Spacer Tube
26	Gear
27	Wear Spacer
28	Reaction Plate Sub-Assembly
29	Reaction Plate
30	Release Spring
31	Spring Retainer

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Airflex® WCS Elements

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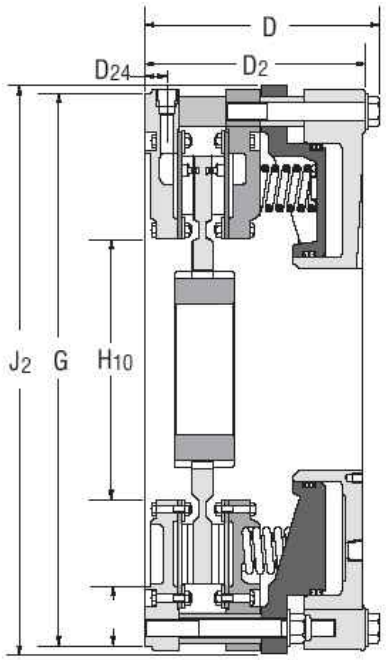
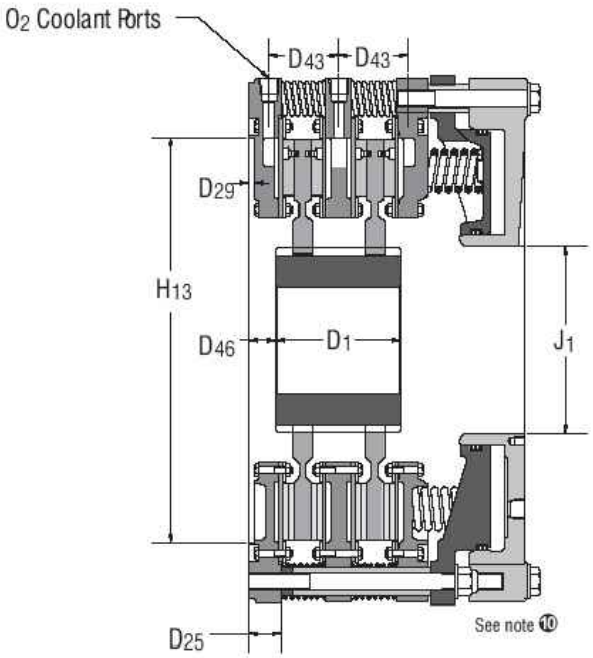
Form WC 1104 Dimensional Data



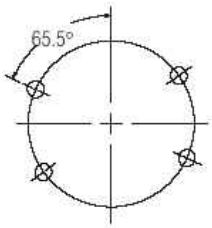
Single Disc



Dual Disc

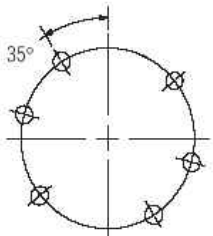
* Size 18, 24 & 36
Customer's mounting plate must provide rigid support and contact for this length

Mounting Bolt Circles ❷



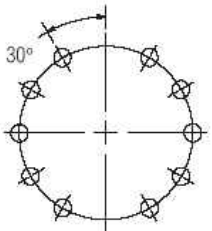
Coolant Inlet Port
8WCS

(4) 0.531 (13,5)∅ Mounting Holes Based on 6 equally spaced as shown on 11.125



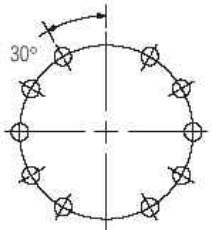
Coolant Inlet Port
14WCS

(6) 0.656 (16,7)∅ Mounting Holes Based on 8 equally spaced as shown on 17.500



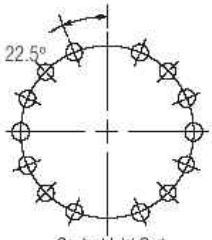
Coolant Inlet Port
18WCS

(10) 0.656 (16,75)∅ Mounting Holes Based on 12 equally spaced as shown on 22.000



Coolant Inlet Port
24WCS

(10) 0.656 (16,75)∅ Mounting Holes Based on 12 equally spaced as shown on 22.000



Coolant Inlet Port
36WCS

(14) 1.062 (27,0)∅ Mounting Holes Based on 16 equally spaced as shown on 42.000

English	Dimensions in inches														
8WCS	0.81	1.25	0.250		2.56	12.125	4.12	8.375	3.12	12.24	3	1/4-20NC-2	3.500	3/8-18	6.63
14WCS	0.91	1.41	0.250	❼	2.81	18.750	7.12	14.375	6.00	18.94	3	3/8-16NC-2	6.500	1/2-14	11.50
18WCS	0.93	1.47	0.250	1.25	3.14	23.250	11.00	18.250	8.50	23.69	3	3/8-16NC-2	9.125	1/2-14	15.25
24WCS	1.06	1.75	0.250	1.38	4.13	29.998	12.75	24.375	11.50	30.89	4	3/8-16NC-2	12.250	1/2-14	18.50
36WCS	1.52	2.58	0.280	2.38	4.88	44.498	16.50	18.375	16.50	45.01	4	1/2-13NC-2	17.500	3/4-14	28.00

Size	D_{24}	D_{25}	D_{29}	D_{46}	D_{43}	❸ G	H_{10}	❾ H_{13}	J_1	❹ J_2	H_4 No.	H_4 Size	H_4 Bolt Circle	O_2 ❺ Size	O_2 ❺ Bolt Circle
8WCS	21	32	6,4		65	308,0	105	212,7	79	311	3	1/4-20NC-2	88,9	3/8-18	168
14WCS	23	36	6,4	❼	71	476,3	181	365,1	152	481	3	3/8-16NC-2	165,1	1/2-14	292
18WCS	24	37	6,4	32	80	590,6	279	463,5	216	602	3	3/8-16NC-2	231,8	1/2-14	387
24WCS	27	44	6,4	35	105	761,9	324	619,1	292	785	4	3/8-16NC-2	311,2	1/2-14	470
36WCS	39	65	7,1	60	124	1130,2	419	466,7	419	1143	4	1/2-13NC-2	444,5	3/4-14	711
SI	Dimensions in millimeters														

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Airflex® WCS Elements

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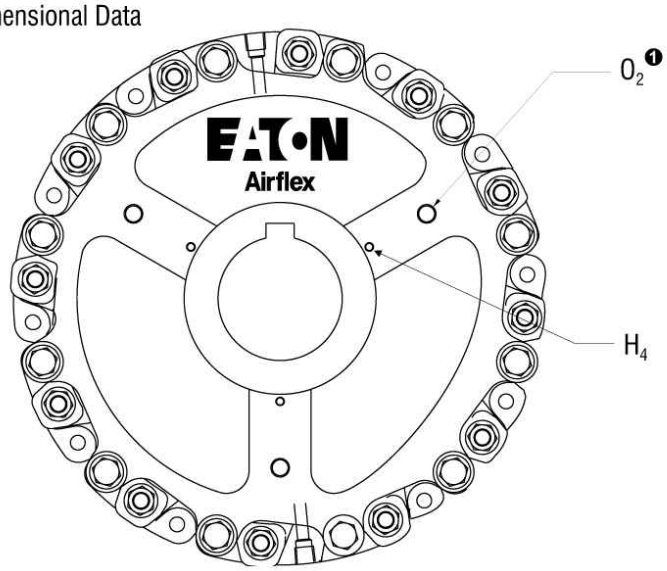
Form WC 1104

Dimensional Data



English	Dimensions in inches						
108WCS	1.38	2.50	7.18	1.75	6.68	4	3/8-18
208WCS	1.63	2.50	9.78	4.00	9.25	6	3/8-18
308WCS	1.88	2.31	12.34	7.75	11.81	8	3/8-18
114WCS	2.13	4.38	8.51	2.88	7.72	4	1/2-14
214WCS	2.63	4.49	11.41	4.38	10.70	6	1/2-14
118WCS	2.75	5.75	9.98	2.50	9.29	4	1/2-14
218WCS	3.38	5.88	13.33	5.63	12.55	6	1/2-14
318WCS	4.13	5.81	16.57	9.62	15.82	8	1/2-14
418WCS	4.63	5.81	19.89	12.50	19.02	10	1/2-14
124WCS	3.50	7.50	12.02	3.50	11.04	4	3/4-14
224WCS	4.75	7.50	16.07	8.63	15.05	6	3/4-14
324WCS	5.50	7.38	20.12	13.19	19.00	8	3/4-14
424WCS	6.00	7.38	24.08	16.44	23.80	10	3/4-14
136WCS	5.63	10.63	15.38	5.00	14.28	4	1 1/4-11 1/2
236WCS	7.62	10.75	20.39	9.00	19.14	6	1 1/4-11 1/2
336WCS	7.25	10.88	25.33	13.00	24.02	8	1 1/4-11 1/2
436WCS	8.00	10.88	30.30	18.00	28.89	10	1 1/4-11 1/2
Size	Min. / Max. Bore Range ❽		D	D_1	D_2	No. / Size O Coolant Ports ❺	
	Min.	Max.				No.	Size
108WCS	35	64	182	44	170	4	3/8-18
208WCS	41	64	248	102	235	6	3/8-18
308WCS	48	59	313	197	300	8	3/8-18
114WCS	54	111	216	73	272	4	1/2-14
214WCS	67	114	290	111	267	6	1/2-14
118WCS	70	146	253	64	236	4	1/2-14
218WCS	86	149	339	143	319	6	1/2-14
318WCS	105	148	421	222	402	8	1/2-14
418WCS	118	148	505	244	483	10	1/2-14
124WCS	89	191	305	310	282	4	3/4-14
224WCS	121	191	408	219	382	6	3/4-14
324WCS	140	187	511	335	483	8	3/4-14
424WCS	152	187	518	430	605	10	3/4-14
136WCS	143	270	391	127	363	4	1 1/4-11 1/2
236WCS	194	273	518	229	486	6	1 1/4-11 1/2
336WCS	184	276	643	330	610	8	1 1/4-11 1/2
436WCS	203	276	770	457	734	10	1 1/4-11 1/2
SI	Dimensions in millimeters						

Notes

❶ Only two ports, 180° apart, furnished on sizes 8 and 14WCS.

❷ To insure proper cooling, inlet port must be located at the six o'clock position.

❸ Tolerance Sizes 8WCS thru 24 WCS +0.000/0.003 (+0,00/-0.08) 36WCS +0.000/-0.005 (+0,00/-0,13)

❹ Tolerance +0.003/-0.000 in (+0,00/-0,00 mm)

❺ American National Pipe Thread.

❻ 1.00 in (25mm) for 108WCS. 1.38 in (35mm) for 208WCS. 0.19 in (4,8mm) for 308WCS.

❼ 1.06 in (27mm) for 114WCS and 314WCS. 1.69 in (43mm) for 214WCS.

❽ Maximum bore sizes are based on flat keys, allowable gear hub stresses and torque ratings with a full complement of springs.

❾ Maximum diameter of "as cast" surfaces.

❿ Some high torque applications of three and four disc elements require additional torsional support on the cylinder end of the unit. Contact your local Airflex representative for more details.

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Airflex® WCS Technical Data

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English			lb in	psi	HP	GPM		lb ft²	
108WCS	146244	415313	5600	80	30	3	6.7E-02	9	0.8
208WCS	146245	415314	10000	80	60	6	1.7E-02	12	1.5
308WCS	146376	416457	13950	80	90	9	7.4 E-03	15	2.33
114WCS	146229	415454	20000	80	60	6	2.4E-02	64	6.4
214WCS	146230	415302	37500	80	120	12	6.0E-03	83	12.6
118WCS	146309	302813	40000	80	120	12	1.3E-02	170	20
218WCS	146318	302907	76000	80	240	24	3.2E-03	220	40
318WCS	146311	413208	112000	80	360	36	1.4 E-03	270	60
418WCS	146312	414111	148000	80	480	48	8.0 E-04	320	80
124WCS	146314	411673	82000	80	270	27	8.1E-03	622	78
224WCS	146340	410970	157000	80	540	54	2.0E-03	822	158
324WCS	146371	412433	232000	80	810	81	8.9 E-04	1022	238
424WCS	146372	413195	307000	80	1080	108	5.0 E-04	1222	318
136WCS	146347	415871	283000	80	650	65	2.9E-03	4922	324
236WCS	146341	416069	532000	80	1300	130	7.2E-04	6323	667
336WCS	146272	416539	781000	80	1950	195	3.2 E-04	7724	1010
436WCS	146369	416537	1030000	80	2600	260	1.8 E-04	9125	1353

Size	❶ Part Number	Gear Part Number	❷ M, torque Rating	Release Pressure	❸ Thermal Rating	❹ Water Flow Rate	C Pressure Drop Coefficient	Wk² Housing	Wk² Disc & Gear
								J	
108WCS	146244	415313	632	5,5	22,4	11,4	3,2 E-04	0,38	0,03
208WCS	146245	415314	1129	5,5	44,7	22,7	8,2 E-05	0,51	0,06
308WCS	146376	416457	1576	5,5	67	34,1	3,5 E-03	0,64	
114WCS	146229	415454	2258	5,5	44,7	22,7	1,2 E-04	2,70	0,27
214WCS	146230	415302	4234	5,5	89,5	45,4	2,9 E-05	3,50	0,53
118WCS	146309	302813	4516	5,5	89,5	45,4	6,3 E-05	7,16	0,84
218WCS	146318	302907	8580	5,5	179,0	90,9	1,5 E-05	9,27	1,69
318WCS	146311	413208	12645	5,5	268,5	136,3	6,7 E-06	11,38	2,53
418WCS	146312	414111	16709	5,5	357,9	181,7	3,9 E-06	13,48	3,37
124WCS	146314	411673	9258	5,5	201,3	102,2	3,9 E-05	26,21	3,29
224WCS	146340	410970	17725	5,5	402,7	204,4	9,6 E-06	34,64	6,66
324WCS	146371	412433	26193	5,5	604,0	306,6	4,3 E-06	43,07	10,03
424WCS	146372	413195	34660	5,5	805,4	408,9	2,4 E-06	51,50	13,40
136WCS	146347	415871	31951	5,5	484,7	246,1	1,4 E-05	207,41	13,65
236WCS	146341	416069	60063	5,5	969,4	492,1	3,5 E-06	266,45	28,11
336WCS	146272	416539	88175	5,5	1454,1	738,2	1,5 E-06	325,49	42,56
436WCS	146369	416537	116287	5,5	1938,8	984,3	8,7 E-07	384,53	57,02
SI			N m	bar	kW	dm³/min		kg m²	

Notes:

❶ Basic part number only. Gear must be ordered separately.

❷ Torque ratings are for new linings. Torque decreases with lining wear. At the worn out condition, torque is approximate 0.66 of values shown. Minimum releasing pressure 80 psi (5,5 bar).

❸ Based upon a 70°F (21°C) fresh water inlet temperature and a 50°F (28°C) temperature rise between inlet and outlet. See cooling requirements.

❹ To insure proper cooling, inlet port must be located at the six o'clock position. Maximum allowable inlet pressure is 45 psi (3,1 bar).

❺ Based upon a continuous slip velocity of 4500 fpm (22,9 mps).

❻ Maximum freewheeling velocity is 7500 fpm (38,1 mps)

❼ Located from mounting flange surface.

❽ Absolute volume of releasing cylinder.

❾ Contact factory for dimensions.

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Airflex® WCS Technical Data

EATON

English	rpm		lb		in		in³		
108WCS	2150	3400	90	15	3.4	2.0	30	12	10
208WCS	2150	3400	116	30	4.7	3.4	30	24	20
308WCS	2150	3400	121	59	❾	❾	30	36	30
114WCS	1260	2100	222	48	4.1	2.4	75	40	29
214WCS	1260	2100	287	86	5.6	3.7	75	75	58
118WCS	955	1600	418	87	4.0	2.6	133	65	54
218WCS	955	1600	548	180	5.5	4.2	133	125	108
318WCS	955	1600	413	273	7.4	6.2	133	185	162
418WCS	955	1600	458	366	10	7.6	133	245	216
124WCS	715	1200	458	180	5.2	3.3	259	160	126
224WCS	715	1200	665	395	7.6	5.7	259	320	252
324WCS	715	1200	872	610	10	8	259	480	378
424WCS	715	1200	1079	625	12.4	10.1	259	640	504
136WCS	475	700	2302	363	6.9	4.3	612	600	337
236WCS	475	700	3300	805	9.5	6.8	612	1135	673
336WCS	475	700	4298	1247	12.11	9.2	612	1670	1009
436WCS	475	700	5296	1689	14.67	11.8	612	2205	1345

Size	❺ Maximum Slip Speed	Maximum ❻ Freewheeling Speed	Weight		Center of Gravity ❼		❽ Releasing Volume New	Water Volume	Linear Wear Volume
			Housing	Disc & Gear	Housing	Disc & Gear			
			Mass		Center of Gravity				
108WCS	2150	3400	41	7	86	51	0,5	0,20	0,16
208WCS	2150	3400	53	14	119	86	0,5	0,39	0,33
308WCS	2150	3400	55	27	❾	❾	0,5	0,60	0,48
114WCS	1260	2100	101	22	104	61	1,2	0,66	0,48
214WCS	1260	2100	130	39	142	94	1,2	1,23	0,95
118WCS	955	1600	146	39	102	66	2,2	1,07	0,89
218WCS	955	1600	167	82	140	107	2,2	2,05	1,77
318WCS	955	1600	187	124	188	157	2,2	3,04	2,66
418WCS	955	1600	208	166	254	193	2,2	4,02	3,55
124WCS	715	1200	208	82	132	84	4,3	2,63	2,07
224WCS	715	1190	302	179	193	145	4,3	5,26	4,14
324WCS	715	1190	395	277	254	203	4,3	7,89	6,21
424WCS	715	1190	489	374	315	257	4,3	10,51	8,28
136WCS	475	700	1044	165	175	109	10,1	9,86	5,54
236WCS	475	700	1497	365	241	173	10,1	18,65	11,06
336WCS	475	700	1949	566	308	234	10,1	27,44	16,58
436WCS	475	700	2402	766	373	300	10,1	36,22	22,10
SI	rpm		kg		mm		dm³		

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Airflex® WCSB Elements (Single Piston)

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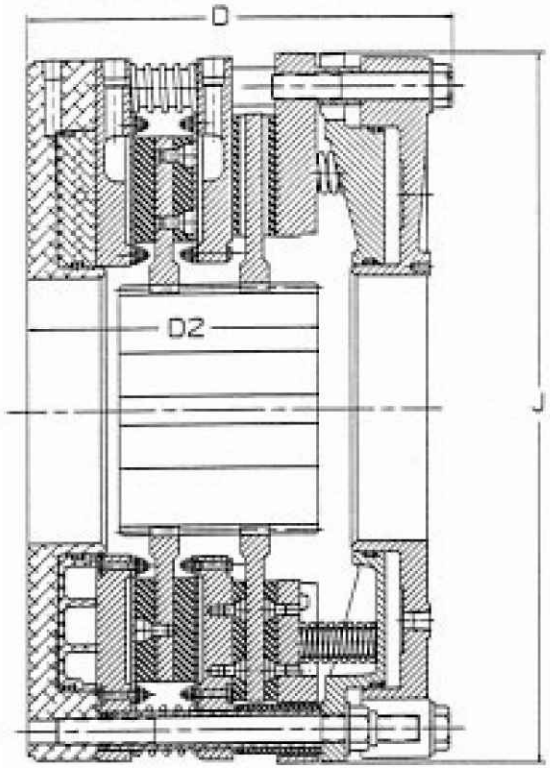
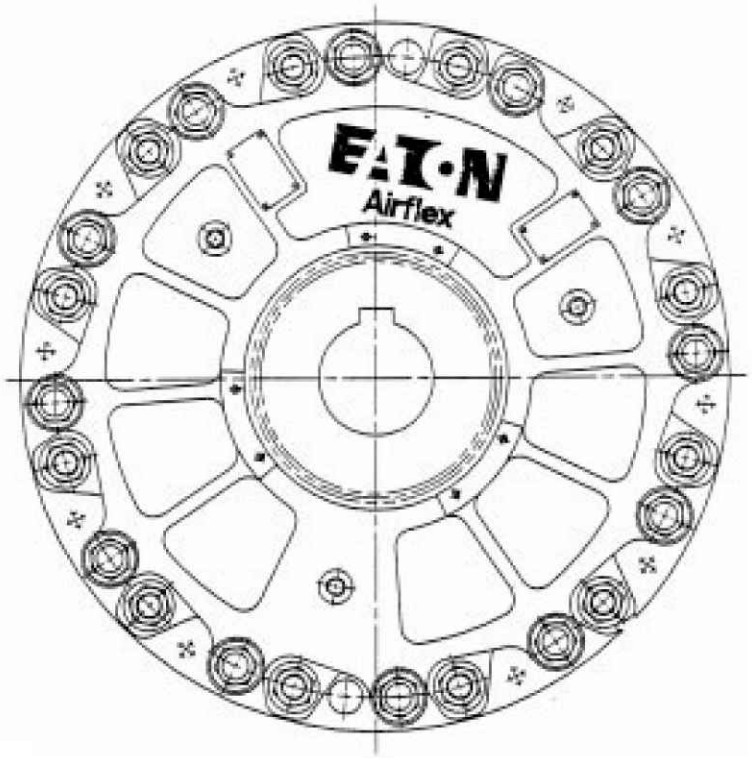
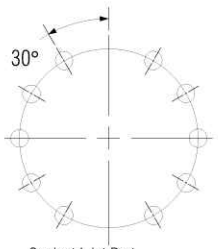
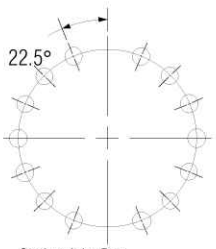






Coolant Inlet Port
24WCSB

(10) 0.656 (16,7)∅
Mounting Holes Based on 12
equally spaced as shown
on 28.750 (730,3) bolt circle



Coolant Inlet Port
36WCSB

(14) 1.062 (27,0)∅
Mounting Holes Based on 16
equally spaced as shown on
42.000 (1066,8) bolt circle

Patent Pending

Size	Number of Water Cooled Disc	Number of Air Cooled Disc	Pressure Applied Torque @ 80 psi (lb in)	Spring Applied Dynamic Torque (lb in)	Spring Applied Static Torque (lb in)	Thermal Rating (HP)	D (inch)	D_2 (inch)	J (inch)
224WCSB	1	1	100,000	256,000	252,000	270	18.70	12.88	31.00
324WCSB	2	1	200,000	337,000	304,000	540	22.74	16.82	31.00
324WCSB	1	2	100,000	396,000	413,000	270	21.68	16.82	31.00
424WCSB	4	0	400,000	307,000	214,900	1,080	27.84	20.47	31.00
424WCSB	3	1	300,000	422,000	361,000	810	26.78	20.47	31.00
424WCSB	2	2	200,000	476,000	465,000	540	25.72	20.47	31.00
424WCSB	1	3	100,000	530,000	569,000	270	24.66	20.47	31.00
236WCSB	1	1	295,000	1,112,000	1,116,000	650	26.50	15.50	45.00
336WCSB	2	1	590,000	1,430,000	1,325,000	1,300	31.50	20.00	45.00
336WCSB	1	2	295,000	1,796,000	1,906,000	650	30.10	20.00	45.00
436WCSB	4	0	1,180,000	1,404,000	983,000	2,600	38.00	24.88	45.00
436WCSB	3	1	885,000	1,740,000	1,528,000	1,950	36.56	24.88	45.00
436WCSB	2	2	590,000	2,077,000	2,072,000	1,300	35.00	24.88	45.00
436WCSB	1	3	295,000	2,413,000	2,617,000	650	33.63	24.88	45.00

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Airflex® Selection Procedure

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General

Technical Section Y of the catalog contains useful information pertaining to the selection, mounting, alignment and control of clutches and brakes in general. Formulas, symbols and units are also identified. It is recommended that Section Y be reviewed before attempting to size a specific product for an application.

WCB elements are used primarily in applications which must slip for long periods of time. Selection criteria are the dynamic slipping torque and the resulting thermal power, neither of which necessitates the use of service factors.

Like all friction material, the torque developed by water-cooled elements is not perfectly constant at a given air pressure. Once per revolution torque variation and drift over time may occur.

Element Torque Adjustment

WCB dynamic torque ratings $\mathbf{M_r}$ are based upon an effective pressure $\mathbf{p_r}$ of 80 psi (5,5 bar). Maximum allowable operating pressure is 150 psi (10,3 bar). Torque ratings must be adjusted for operating pressure $\mathbf{p_o}$ and parasitic loss $\mathbf{p_p}$.

The elements have an inherent parasitic pressure $\mathbf{p_p}$ required to cause friction disc engagement which represents the pressure to overcome internal sliding friction and to compress disc releasing springs.

No. of Friction Discs	Pressure p_p	
	psi	bar
1	3	0,21
2	4	0,28
3	5	0,34
4	6	0,41

Element torque $\mathbf{M_e}$ is calculated from:

$$M_e = \frac{p_o - p_p}{p_r} \cdot Mr$$

WCS elements are spring-applied, pressure released. Minimum releasing pressure is 80 psi (5,5 bar). Maximum allowable cylinder pressure is 150 psi (10,3 bar). The torque ratings are for new linings. Torque will decrease as lining wears. At the worn out condition, the torque is approximately 0.66 of the new lining condition. Element torque can be regulated by biasing the spring force through control of the minimum releasing pressure and monitoring lining wear.

Thermal Capacity

Thermal capacities are for continuous operation at the coolant flow rate and temperatures indicated. For intermittent duty such as short duration loads or infrequent high inertia stops, the thermal capacities can be increased 50% for periods up to 20 minutes. The coolant flow must be increased accordingly.

Example

What is the dynamic torque capacity of a 224WCB element when used with an operating pressure of 50 psi (3,4 bar)?

$$M_e = \frac{p_o - p_p}{p_r} \cdot Mr$$

$$= \frac{50 - 4}{80} \cdot 20000$$

$$= 115000 \text{ lb·in}$$

Example

What pressure should be applied to a 118WCB element to develop a torque of 60,000 lb·in (6780 N · m)?

$$M_e = \frac{p_o - p_p}{p_r} \cdot Mr$$

$$p_o = \frac{M_e}{M_r} \cdot p_r + p_p$$

$$= \frac{60000}{48000} \cdot 80 + 3$$

$$= 103 \text{ psi}$$

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Airflex® Cooling Requirements

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For efficient cooling, an adequate supply of filtered fresh water is required. Excessive water hardness promotes the formation of scale deposits, which in time will affect the service life of the WCB unit. Water of high acidity may cause electrolytic corrosion between the dissimilar metals used in the WCB construction. Water treatment should be considered if the calcium carbonate exceeds 100 ppm. The water pH value should fall between 7.0 and 9.0.

The WCB cooling capacity of 10 HP per gallon per minute (1.97 kW per cubic decimeter per minute) is based on a 50°F (28°C) maximum temperature rise of a fresh water coolant. Maximum outlet water temperature should not exceed 150°F (66°C).

Maximum ambient temperature limit for the WCB is 110°F (43°C). For open loop systems using water, the minimum is 45°F (7°C). Minimum ambient temperature limit for closed loop systems using an ethylene glycol coolant is 0°F (-18°C).

Maximum allowable inlet coolant pressure is 45 psi (3,1 bar). A relief valve should be incorporated in the inlet manifold to prevent pressure surges.

Ethylene glycol is usually added to cooling water (especially in exposed applications) to prevent freezing. An ethylene glycol coolant conforming to SAE Standard J1034 should be used. For preparation of a water/ethylene glycol mix, water which is low in corrosive ions such as chlorides and sulphates should be used. The mixture's pH value should fall between 7.5 and 10.5. The thermal capacity of a mixture is not as great as that of water alone, so coolant flow must be determined from the values given in the table. Because the boiling point of the mixture is higher, a higher outlet coolant temperature is permissible. Ethylene glycol content of the mixture should not exceed 50% by volume. Larger amounts will reduce cooling capacity and can cause coolant leakage, due to overheating.

English Units		
30	8.5	165
40	7.7	165
50	6.7	170
Ethylene Glycol Mixture % by Volume	**HP/GPM**	**° F**
	Flow	**Maximum Outlet Temperature**
	kW/dm³pM	**° C**
30	1,67	74
40	1,52	74
50	1,32	77
SI Units		

Sea water can be used as a coolant; however, its thermal capacity is 8 HP per gallon per minute (1.58 kW per cubic decimeter per minute). If sea water is used as a coolant, a 500 micron filter is recommended. After use, coolant cavities must be flushed with fresh (uncontaminated) water.

The coolant values are based on balanced parallel coolant flow through each section of the brake. Series flow is not recommended. Inlet and outlet coolant manifolds must be provided with connecting flexible hoses to each brake section. To insure coolant cavities are filled, inlet ports must be at the six o'clock position.

For intermittent duty under certain conditions, such as short duration loads or infrequent high inertia stops, thermal ratings can be exceeded for limited periods.

Pressure drops for parallel balanced flow across the brake can be determined from:

$$p = C\,F^2$$

where:

p = pressure drop (psi or bar)

C = pressure drop coefficient*

F = flow (gallons/min or dm^3/min)

* see WCS technical data section

Example

It is planned to use a 136WCB to handle a thermal load of 300 HP (224 kW). What flow of fresh water is required and what is the pressure drop across the element?

$$GPM = \frac{P_t}{10^{HP/GPM}}$$

$$= \frac{300}{10}$$

$$= 30$$

$$p = C\ F^2$$

$$= 2.9\ E\text{-}03\ \ 30^2$$

$$= 3\ \text{psi}$$

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Airflex® Coolant System

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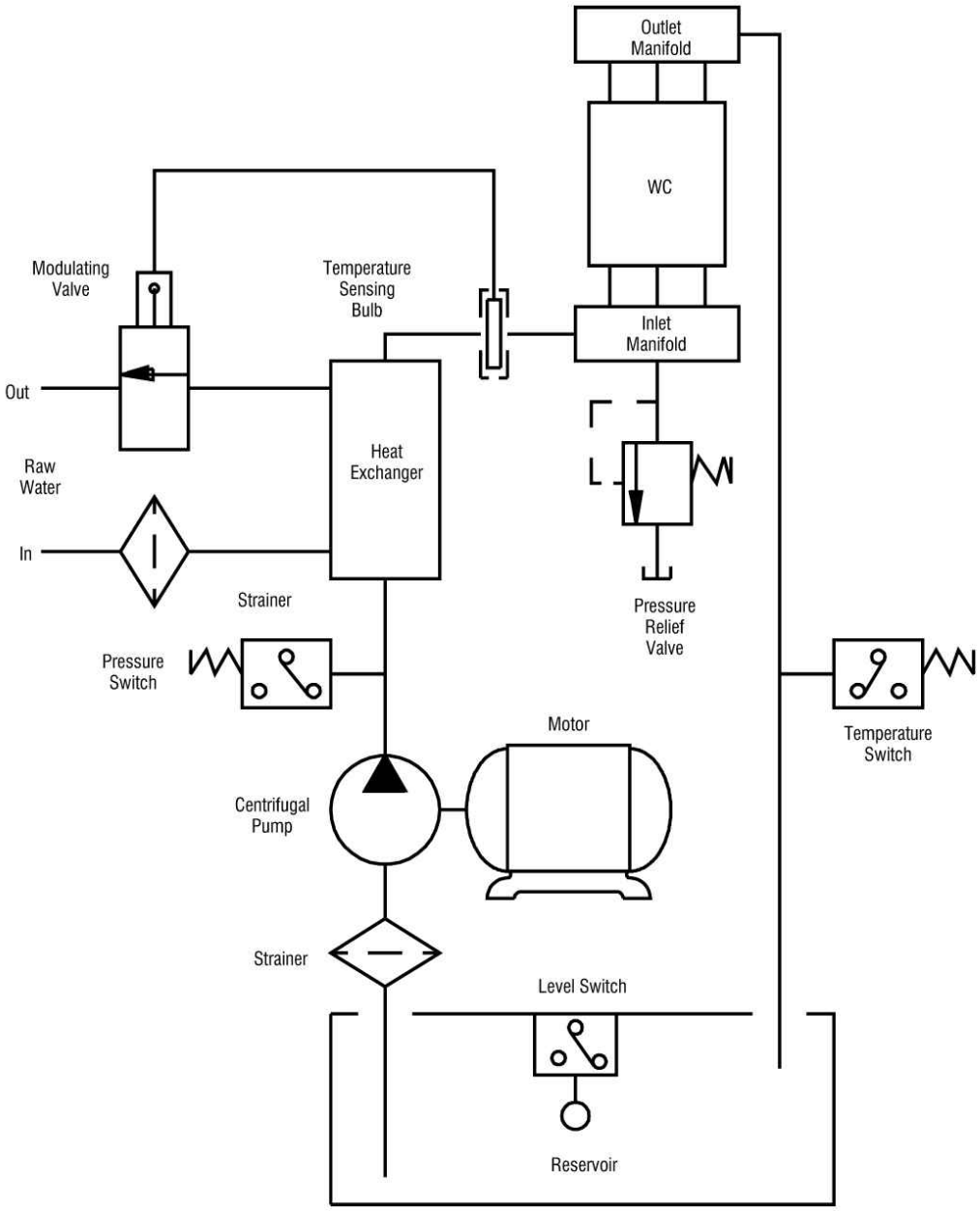
Liquid to Liquid Coolant System

A typical closed loop liquid to liquid system is shown here. The heat exchanger and its temperature control are replaced by a radiator, fan and motor in a liquid to air system.



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