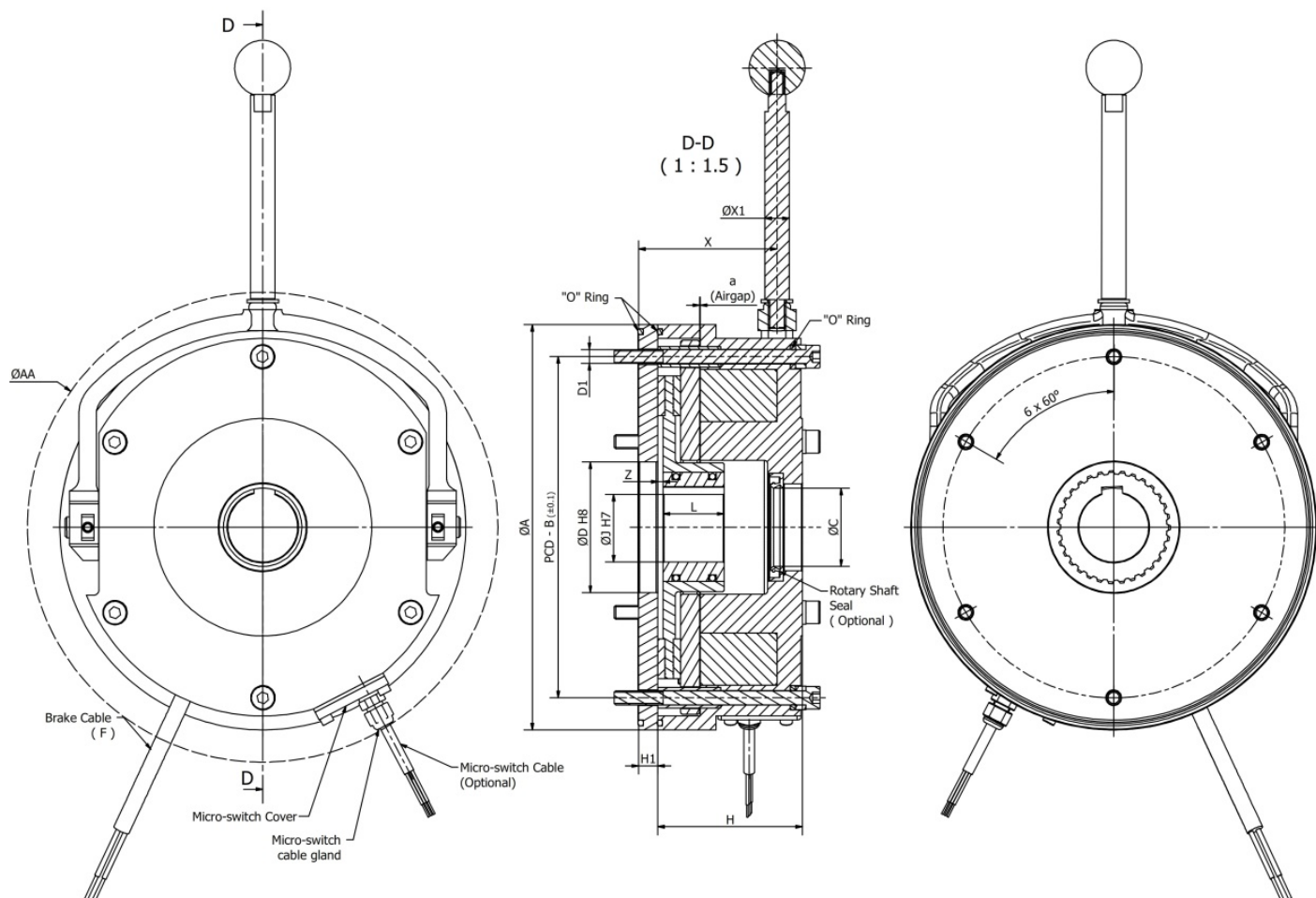


DC Spring Applied Fail Safe Brake

Model – 14.450.xx (06 to 31) (Brake with IP 55 Protection)



Brake Parameters

Brake Size	Input Power P20 (w)	Brake Torque M Rat. (Nm)	a (Airgap)	ØA (±0.5)	ØAA (±3)	AB (±3)	PCD - B (±0.1)	ØC	ØD H8	ØD H7	L (-0.2)	Z	D1	H (±2)	H1 (±0.5)	Brake Cable - F	X (±3)	ØX1 (+/- 0.5)
14.450.06	30	4	0.2	100	120	***	72	15 max.	31	11, 12, 14, 15	18	1	3 x M4	36	6	410 (±15)	40	9
14.450.08	40	8	0.2	120	140	***	90	20 max.	41	11, 12, 14, 15, 19, 20	20	1.5	3 x M5	41	7	410 (±15)	40.6	9
14.450.10	50	16	0.2	145	160	***	112	20 max.	40	11, 12, 14, 15, 19, 20	20	2	3 x M6	50	9	410 (±15)	49.7	10
14.450.12	60	32	0.3	166	185	***	132	25 max.	45	15, 19, 20, 22, 24, 25	25	2	3 x M6	55	9	410 (±15)	55	10
14.450.14	90	60	0.3	180	210	***	145	32 max.	55	20, 24, 25, 28, 30, 32	30	2	3 x M8	63.3	11	410 (±15)	58.5	12
14.450.16	100	100	0.3	204	243	121.5	170	35 max.	65	25, 28, 30, 32, 34, 35	30	2.25	3 x M8	72.5	11	610 (±15)	65.3	12
14.450.18	115	150	0.4	233	271	135.5	196	45 max.	75	30, 35, 38, 40, 42, 45	35	3	6 x M8	83	11	610 (±15)	79.5	14
14.450.20	140	260	0.4	271	307	153.5	230	48 max.	90	35, 40, 42, 45, 48	40	3.5	6 x M10	96	11	610 (±15)	81	14
14.450.23	150	315	0.4	271	307	153.5	230	48 max.	90	35, 40, 42, 45, 48	40	3.5	6 x M10	96	11	610 (±15)	81	14
14.450.25	190	400	0.5	325	363	181.5	278	65 max.	120	40, 45, 48, 50, 52, 55, 60, 65	50	4.5	6 x M10	108	12.5	610 (±15)	97.5	16
14.450.31	210	600	0.5	325	363	181.5	278	65 max.	120	40, 45, 48, 50, 52, 55, 60, 65	50	4.5	6 x M10	121	16	610 (±15)	****	****
14.450.31	240	800	0.5	325	363	181.5	278	65 max.	120	40, 45, 48, 50, 52, 55, 60, 65	50	4.5	6 x M10	121	16	610 (±15)	****	****

Emco-Simplatroll DC Spring Applied Fail Safe Brake Type 14.450. is a " Normally On " brake with IP 55 Protection. These brakes can be used for all applications where rotating machines must be stopped quickly when switched off or when power fails ensuring the SAFETY

Salient Features of Type 14.450.xx

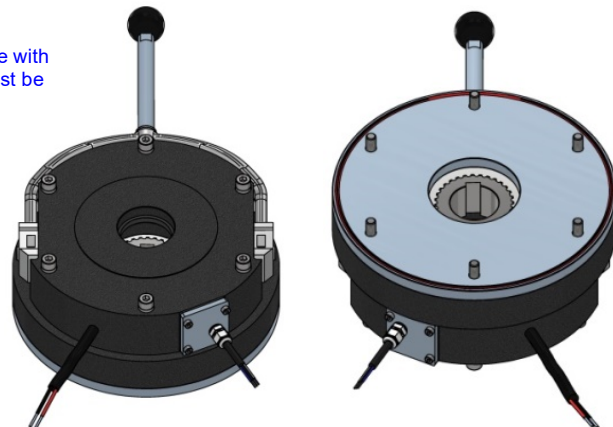
- 1 Brake outer diameter completely enclosed (Higher protection can be easily realised)
- 2 "Deadman Type" Manual releases
- 3 Easy Installations
- 4 Coil with "F" Class Insulation (** Higher coil insulation available on request.)
- 5 Non Asbestos friction liners
- 6 Low rotor inertia
- 7 Cold climate versions available on request
- 8 IP-66 Protection brake without manual hand release

Applications

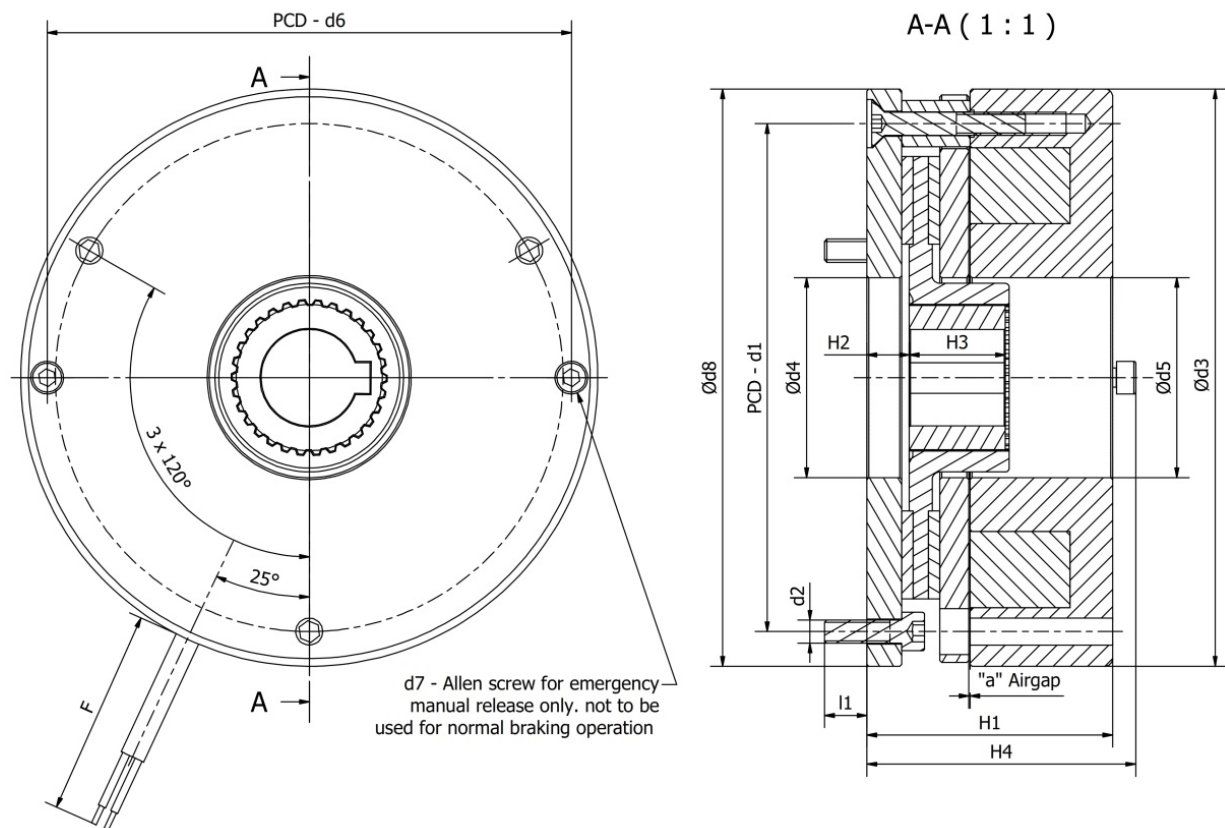
Cranes, Machines tools Industries, Packaging machines, Textile machines, Conveyors, Pallet truck drives, For outdoor application

Important :-

Brake size 31 will be supplied without manual hand release lever.



DC Spring Applied Fail Safe Brake Model – 14.457.xx (06 to 16)

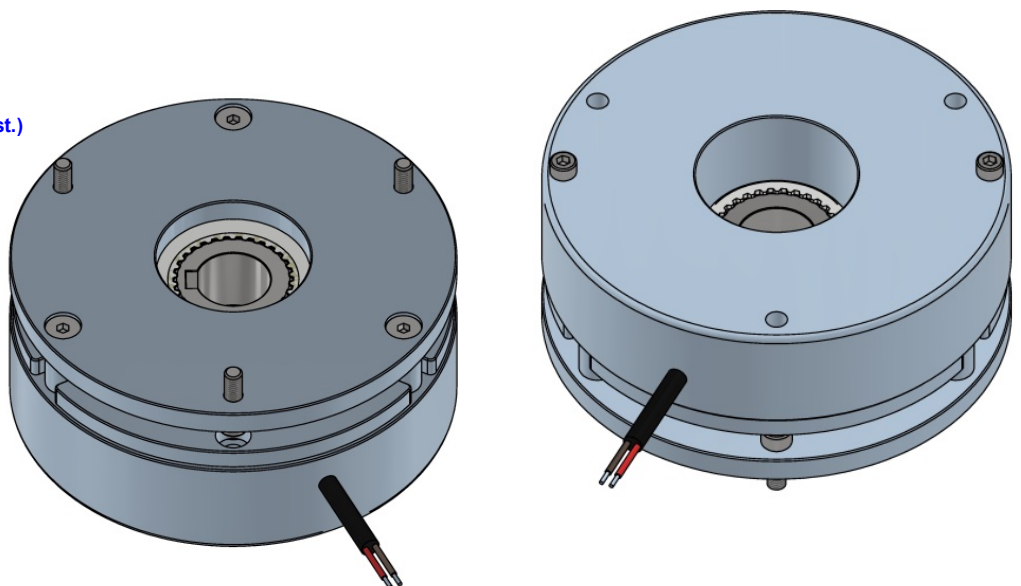


PARAMETERS																	
Brake Size	Input Power P20	Torque (Nm)	"a" Airgap	Ød3	PCD - d1	d2	Ød4	Ød5	PCD - d6	d7	Ød8	H1	H2	H3	H4	l1	F
14.457.06	20	4	0.2	84	72	3 x M4	31	31	77	M4 x 30	85	41.3	7.5	18	46.3	6	410
14.457.08	25	8	0.2	102	90	3 x M5	42	41.5	93.5	M5 x 35	104	49.8	8.5	20	55.8	9	410
14.457.10	30	16	0.2	130	112	3 x M6	44	44	117	M5 x 40	130	57.4	10	20	63.4	12	410
14.457.12	40	32	0.3	150	132	3 x M6	52	52	136.3	M5 x 45	150	63.9	10	25	69.9	12	410
14.457.14	50	60	0.3	165	145	3 x M8	60	60	150	M6 x 55	165	77.3	13	30	84.3	14	410
14.457.16	76	100	0.3	190	170	3 x M8	70	70	174.5	M6 x 60	190	83.5	13.3	30	91	14	610

Emco-Simplatroll DC Spring Applied Fail Safe Brake Type 14.457. is a "Normally On" These brakes can be used for all applications where rotating machines must be stopped quickly when switched off or when power fails ensuring the SAFETY

Salient Features of Type 14.457.xx

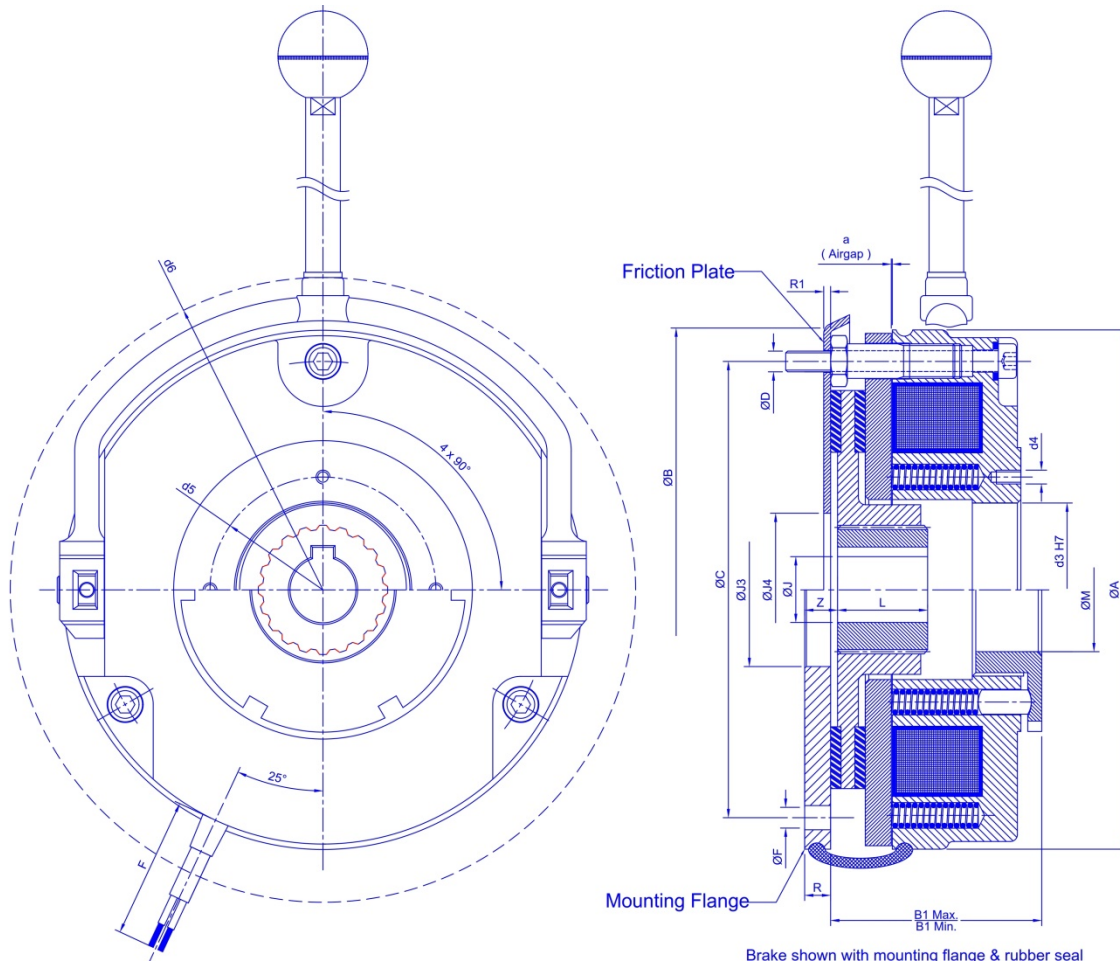
- 1 Quick and easy Installation.
- 2 Coil with "F" Class Insulation
- (** Higher coil insulation available on request.)
- 3 Non Asbestos friction liners
- 4 Low rotor inertia
- 5 Cold climate versions available on request
- 6 Integrated fixing screw.



Applications

Small motors, Vehicles for handicapped, wood working machinery, Automation mechanical engineering, Electric motors, Sports and recreation, Rotary indexing table, Industrial trucks, hoists, conveyor technology

DC Spring Applied Fail Safe Brake Model – 14.458.xx (06 to 31)



Brake shown with mounting flange & rubber seal

Emco-Simplatroll DC Spring Applied Fail Safe Brake Type 14.458. is a "Normally On" brake these brakes can be used for all applications where rotating machines must be stopped quickly when switched off or when power fails ensuring the SAFETY.

Salient Features of Type 14.458.xx

- 1 "Deadman type" Manual Release.
- 2 Dust Protecting Seal
- 3 Easy Installation
- 4 Simple Wear adjustment
- 5 Coil with "F" Class Insulation**
- ** Higher coil insulation available on request.
- 6 Non Asbestos friction liner
- 7 Low rotor inertia
- 8 Cold climate versions available on request

Applications

Cranes, Machines tools Industries, Packaging machines, Textile machines, Conveyors, Pallet truck drives

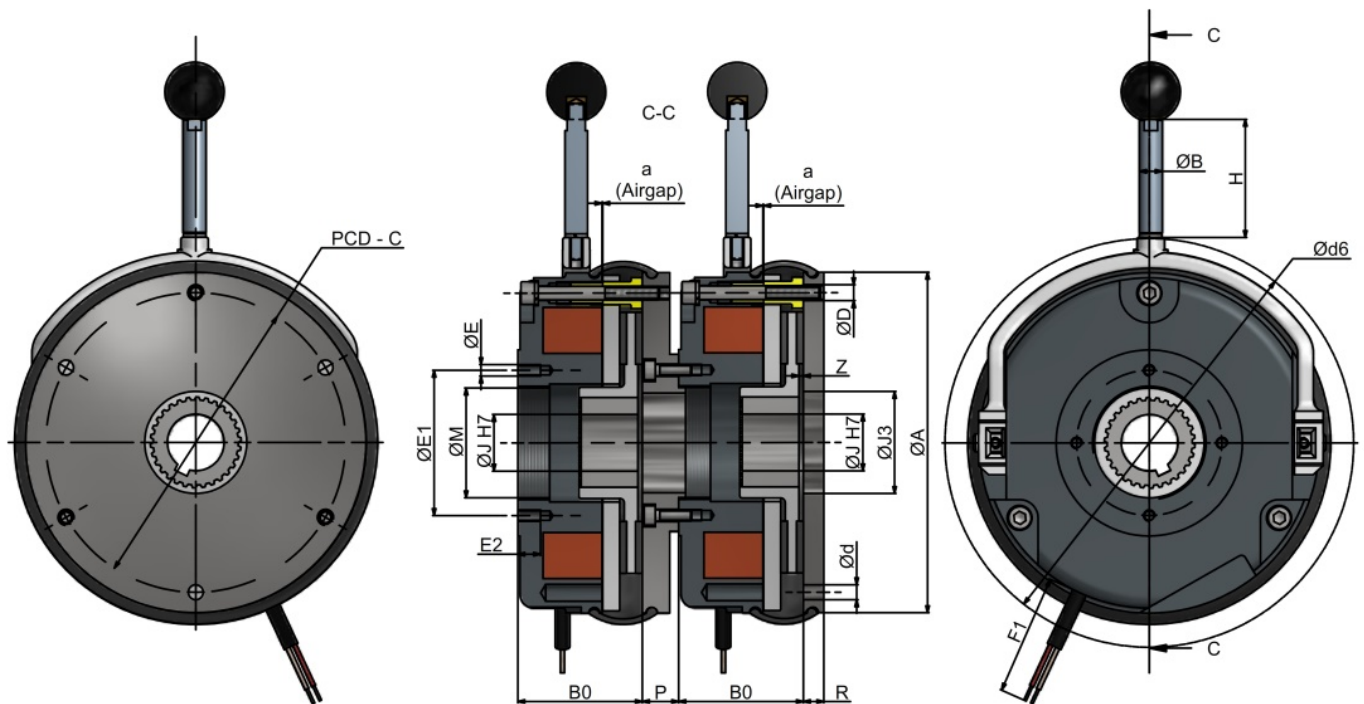
Important :-

Brake size 31 will be supplied without manual hand release lever.



Brake Size	06	08	10	12	14	16	18	20 / 23	25	31
Torque M RAT. (Nm)	4	8	16	32	60	100	150	260 / 315	400	600 / 800
Input Power P20 [w]	20	25	30	40	50	76	85	100 / 105	110	140 / 180
± 0.2 $\varnothing A$	87	105	130	150	165	190	217	254	302	302
± 0.2 $\varnothing B$	82	101.5	127	147	163.5	188.5	---	---	---	---
B1 Max.	41.5	48.5	56	64.5	77	82.5	98	114	124	144.7
B1 Min.	39.5	47	52.5	59	71.5	77.5	89	104.6	115.7	134.7
± 0.1 $\varnothing C$	72	90	112	132	145	170	196	230	278	278
$\varnothing D$	3 x M4	3 x M5	3 x M6	3 x M6	3 x M8	3 x M8	6 x M8	6 x M10	6 x M10	6 x M10
$\varnothing F$	3 x 4.5	3 x 5.5	3 x 6.6	3 x 6.6	3 x 9	3 x 9	4 x 9	6 x 11	6 x 11	6 x 11
± 0.2 $\varnothing J3$	31	40	40	45	55	65	75	90	120	120
± 0.2 $\varnothing J4$	42	45	60	68	78	98	---	---	---	---
-0.2 L	18	20	20	25	30	30	35	40	50	50
± 0.2 $\varnothing M$	22	26	33	40	48	56	60	73.1	95.1	95.1
± 0.2 R	6	7	9	9	11	11	11	11	12.5	16
R1	1.5	1.5	1.5	1.5	1.5	1.5	---	---	---	---
± 0.1 Z	7	8.5	11	11	13	13.25	13.75	14.5	17	20.5
± 0.1 -0.05 a (airgap)	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.5	0.5
± 0.1 U	1	1	1	1	1	1.5	1.5	1.5	2	2
d3 H7	25	32	42	50	60	68	75	85	115	115
d4	4 x M4	4 x M5	4 x M5	4 x M5	4 x M6	4 x M6	4 x M8	4 x M10	4 x M10	4 x M10
± 0.1 d5	37.7	49	54	64	75	85	95	110	140	140
± 3 d6	119	135	161	181	206	240	262	305	361	361
$\varnothing JH7$	10, 11, 12, 14, 15	11, 12, 14, 15, 19, 20, 24*	11, 12, 14, 15, 19, 20, 24*	20, 24, 25, 28*	20, 24, 25, 28, 30, 32, 34*	25, 28, 30, 32, 34, 35, 38*	30, 35, 38, 40, 42, 45	35, 40, 42, 45, 48, 50	45, 48, 50, 52, 55, 60, 65, 70*	45, 48, 50, 52, 55, 60, 65, 70*
+15 F	410					610				
Brake Weight kg	1.3 kg	2.2 kg	3.7 kg	5.7 kg	8.2 kg	11.7 kg	18.2 kg	27.6 kg	42.5 kg	53 kg

DC Spring Applied Fail Safe Double Brake Model – 14.458.xxDB (06 to 31)



Brake shown with mounting Flange & Rubber Seal

Brake Size	F1
14.458.06 to 14	410
14.458.16 to 31	610

PARAMETERS																					
Brake Size	Input Power	Torque	a (Airgap)	ØA	PCD-C	ØD	Ød	ØM	ØE1	ØE	E2	ØJ H7	ØJ3	B0	P	R	Z	L	ØB	H	Ød6
14.458.06	2x20	2x4	0.2	87	72	3xM4	3x4.5	25	37.7	4xM4	10	15	31	36.3	12	11	1	18	9	30	119
14.458.08	2x25	2x8	0.2	105	90	3xM5	3x5.5	32	49	4xM5	12	24*	41	42.8	12	12	1.5	20	9	50	135
14.458.10	2x30	2x16	0.2	130	112	3xM6	3x6.6	42	54	4xM5	15	24*	40	48.4	13	14.5	2	20	10	33.5	161
14.458.12	2x40	2x32	0.3	150	132	3xM6	3x6.6	50	64	4xM5	15	28*	45	54.9	16	15	2	25	10	52.5	181
14.458.14	2x50	2x60	0.3	165	145	3xM8	3x9	60	75	4xM6	15	34*	55	66.3	17	15	2	30	12	62.5	206
14.458.16	2x76	2x100	0.3	190	170	3xM8	3x9	68	85	4xM6	15	38*	65	72.5	20	18	2.25	30	12	95	240
14.458.18	2x85	2x150	0.4	217	196	6xM8	**4x9	75	95	4xM8	15	45	75	83.1	20	18	2.75	35	14	120	262
14.458.20	2x100	2x260	0.4	254	230	6xM10	6x11	85	110	4xM10	20	50	90	97.6	20	20	3.5	40	14	239	305
14.458.25	2x110	2x400	0.5	302	278	6xM10	6x11	115	140	4xM10	20	70*	120	106.7	25	25	4.5	50	16	239	361
14.458.31	2x140	2x600	0.5	302	278	6xM10	6x11	115	140	4xM10	20	70*	120	120.7	25	25	4.5	50	16	239	361
14.458.31	2x180	2x800	0.5	302	278	6xM10	6x11	115	140	4xM10	20	70*	120	120.7	25	25	4.5	50	16	239	361

Emco-Simplatroll DC Spring Applied Fail Safe Brake Type 14.458.xxDB is a "Normally On" brake these brakes can be used for all applications where rotating machines must be stopped quickly when switched off or when power fails ensuring the SAFETY.

Salient Features of Type 14.458.xxDB

- 1 "Deadman type" Manual Release
- 2 Braking Torque up to 1600 Nm
- 2 Dust Protecting Seal
- 3 Easy Installation
- 4 Simple Wear adjustment
- 5 Coil with "F" Class Insulation**
- (** Higher coil insulation available on request).
- 6 Non Asbestos friction liner
- 7 Low rotor inertia
- 8 Cold climate versions available on request

Applications

Cranes & Hoists, Construction machines, Textile machines, Windmills, Elevators, Machines tools industries

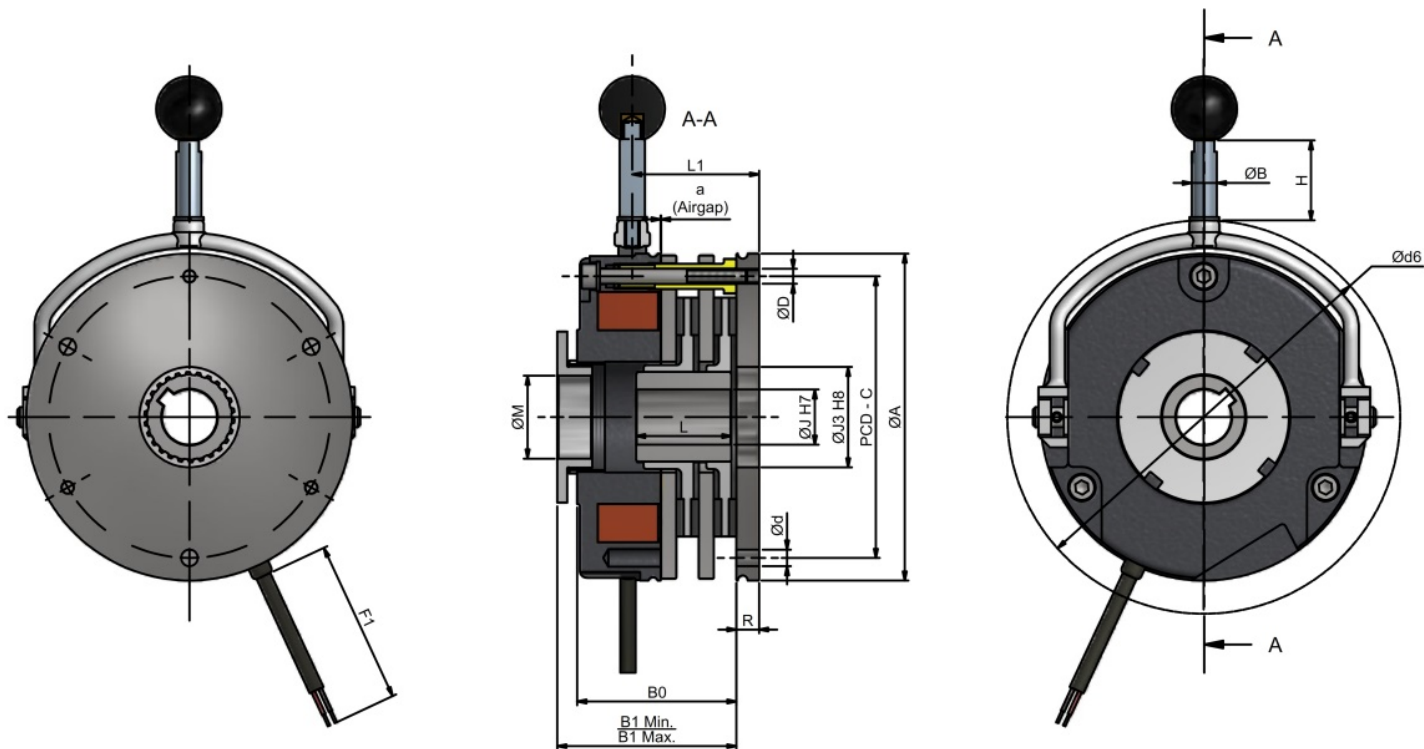
Important :-

Brake size 31 will be supplied without manual hand release lever.



DC Spring Applied Fail Safe Double Rotor Brake

Model – 14.458.xxDR (06 to 31)



Brake shown with mounting flange

PARAMETERS																					
Brake Size	Input Power	Torque	a (Airgap)	ØA	PCD-C	ØD	Ød	ØM	ØJ H7	ØJ3 H8	B0	B1 min.	B1 max.	R	Z	L	L1	ØB	H	Ød6	F1
14.458.06	20	2x4	0.2	87	72	3 x M4	3 x 4.5	24	10, 11, 12, 14, 15	31	47	51	53	6	1	32	32.3	9	30	119	410
14.458.08	25	2x8	0.2	105	90	3 x M5	3 x 5.5	26	11, 12, 14, 15, 19, 20, 24*	41	56	60.5	62	7	1.5	35	36.3	9	50	135	410
14.458.10	30	2x16	0.2	130	112	3 x M6	3 x 6.6	33	11, 12, 14, 15, 19, 20, 24	40	63.5	67.5	71	9	2	38	51.4	10	33.5	161	410
14.458.12	40	2x32	0.3	150	132	3 x M6	3 x 6.6	40	20, 24, 25, 28*	45	72.5	76.5	82	9	2	46	55.9	10	52.5	181	410
14.458.14	50	2x60	0.3	165	145	3 x M8	3 x 9	48	20, 24, 25, 28, 30, 32, 34*	55	85.5	90.5	96	11	2	52	63	12	62.5	206	410
14.458.16	76	2x100	0.3	190	170	3 x M8	3 x 9	56	25, 28, 30, 32, 34, 35, 38*	65	93	98	103	11	2.25	56	58	12	95	240	610
14.458.18	85	2x150	0.4	217	196	6 x M8	**4 x 9	64	30, 35, 40, 42, 45	75	107.5	113	122	11	2.75	64	76.1	14	120	262	610
14.458.20	100	2x260	0.4	254	230	6 x M10	6 x 11	73.1	35, 40, 42, 45, 48, 50	90	127	133.5	143	11	3.5	73	87.6	14	239	305	610
14.458.25	110	2x400	0.5	302	278	6 x M10	6 x 11	95.1	45, 48, 50, 52, 55, 60, 65, 70*	120	141	150	158	12.5	4.5	95	104.2	16	239	361	610
14.458.31	140	2x600	0.5	302	278	6 x M10	6 x 11	95.1	45, 48, 50, 52, 55, 60, 65, 70*	120	154.7	168.7	178.7	16	4.5	95	107.7	16	239	361	610
14.458.31	180	2x800	0.5	302	278	6 x M10	6 x 11	95.1	45, 48, 50, 52, 55, 60, 65, 70*	120	154.7	168.7	178.7	16	4.5	95	107.7	16	239	361	610

Emco-Simplatroll DC Spring Applied Fail Safe Brake
Type 14.458.xxDR is a " Normally On " brake these brakes can be used for all applications where rotating machines must be stopped quickly when switched off or when power fails ensuring the SAFETY.

Salient Features of Type 14.458.xxDR

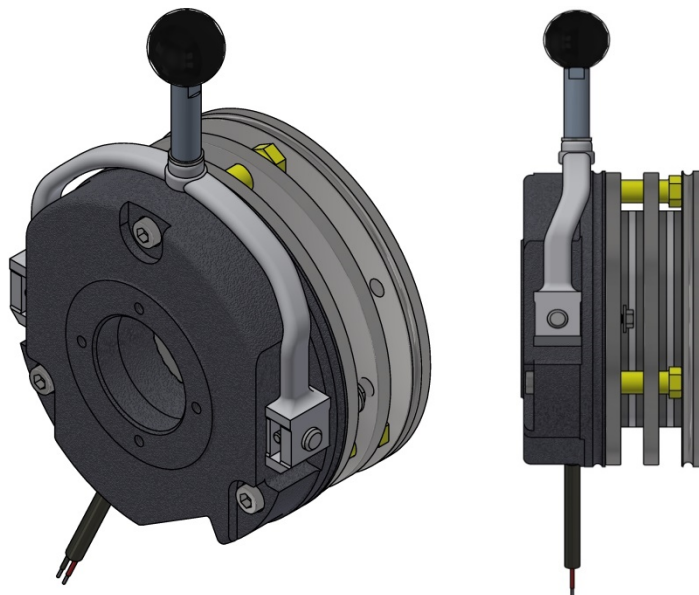
- 1 "Deadman type" Manual Release
- 2 Braking Torque up to 1600 Nm
- 2 Dust Protecting Seal
- 3 Easy Installation
- 4 Simple Wear adjustment
- 5 Coil with "F" Class Insulation**
- (** Higher coil insulation available on request).
- 6 Non Asbestos friction liner
- 7 Low rotor inertia
- 8 Cold climate versions available on request

Applications

Cranes & Hoists, Construction machines, Textile Machines, Windmills, Elevators, Machine Tools

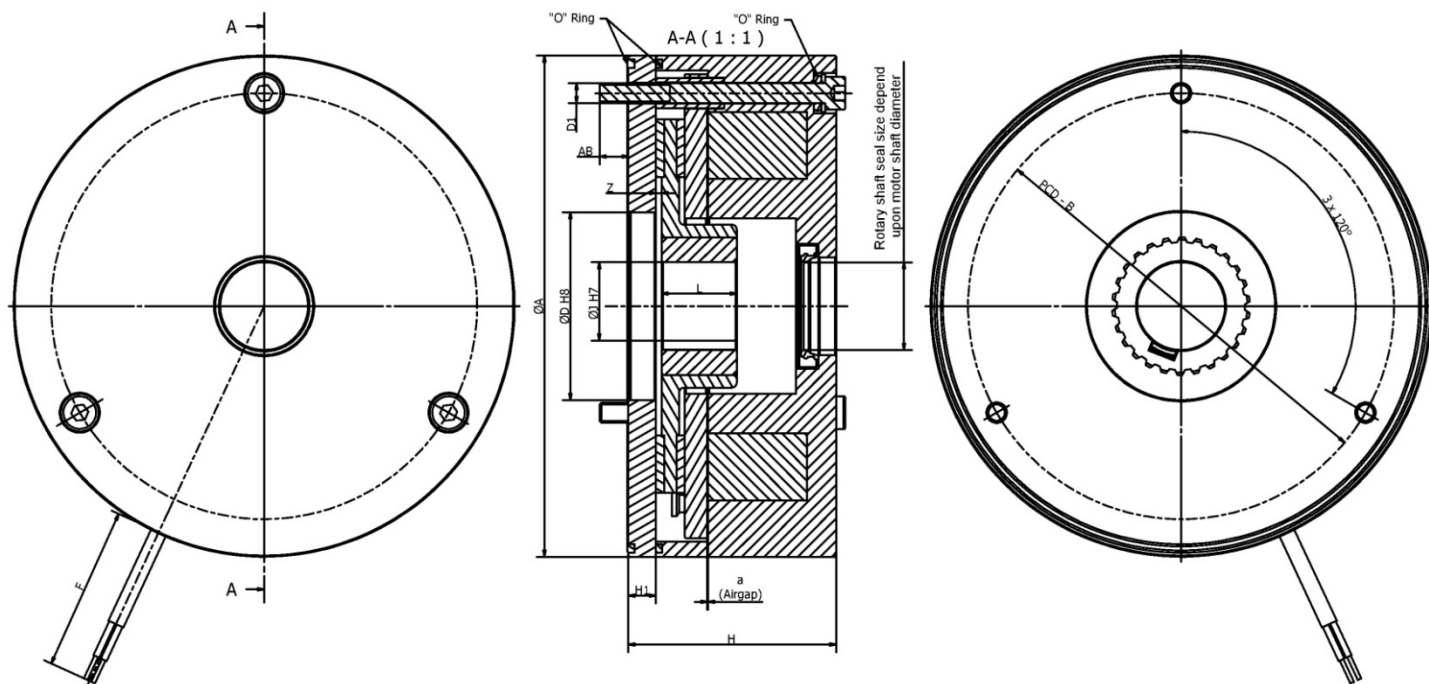
Important :-

Brake size 31 will be supplied without manual hand release lever.



DC Spring Applied Fail Safe Brake

Model – 14.461.xx (06 to 25) (Brake With IP 66 Protection)



Brake Parameters														
Brake Size	Input Power P20 (w)	Brake Torque M Rat. (Nm)	a (Airgap)	ØA (±0.5)	PCD - B (±0.1)	ØD H8	ØD H7	L (-0.2)	Z	D1	AB (±3)	H (±2)	H1 (±0.5)	Brake Cable - F
14.461.06	30	4	0.2	87	72	31	11, 12, 14, 15	18	1	3 x M4	7	42	6	410 (±15)
14.461.08	40	8	0.2	103	90	41	11, 12, 14, 15, 19, 20	20	1.5	3 x M5	9	50	7	410 (±15)
14.461.10	50	16	0.2	130	112	40	11, 12, 14, 15, 19, 20	20	2	3 x M6	12	58	9	410 (±15)
14.461.12	60	32	0.3	148	132	45	15, 19, 20, 22, 24, 25	25	2	3 x M6	12	63.5	9	410 (±15)
14.461.14	90	60	0.3	165	145	55	20, 24, 25, 28, 30, 32	30	2	3 x M8	12	76	11	410 (±15)
14.461.16	100	100	0.3	200	170	65	25, 28, 30, 32, 34, 35	30	2.25	3 x M8	15	83	11	610 (±15)
14.461.18	115	150	0.4	221	196	75	30, 35, 38, 40, 42, 45	35	3	6 x M8	15	94	11	610 (±15)
14.461.20	140	260	0.4	274	230	90	35, 40, 42, 45, 48	40	3.5	6 x M10	20	111	11	610 (±15)
14.461.23	150	315	0.4	274	230	90	35, 40, 42, 45, 48	40	3.5	6 x M10	20	111	11	610 (±15)
14.461.25	190	400	0.5	326	278	120	40, 45, 48, 50, 52, 55, 60, 65	50	4.5	6 x M10	20	122.5	12.5	610 (±15)

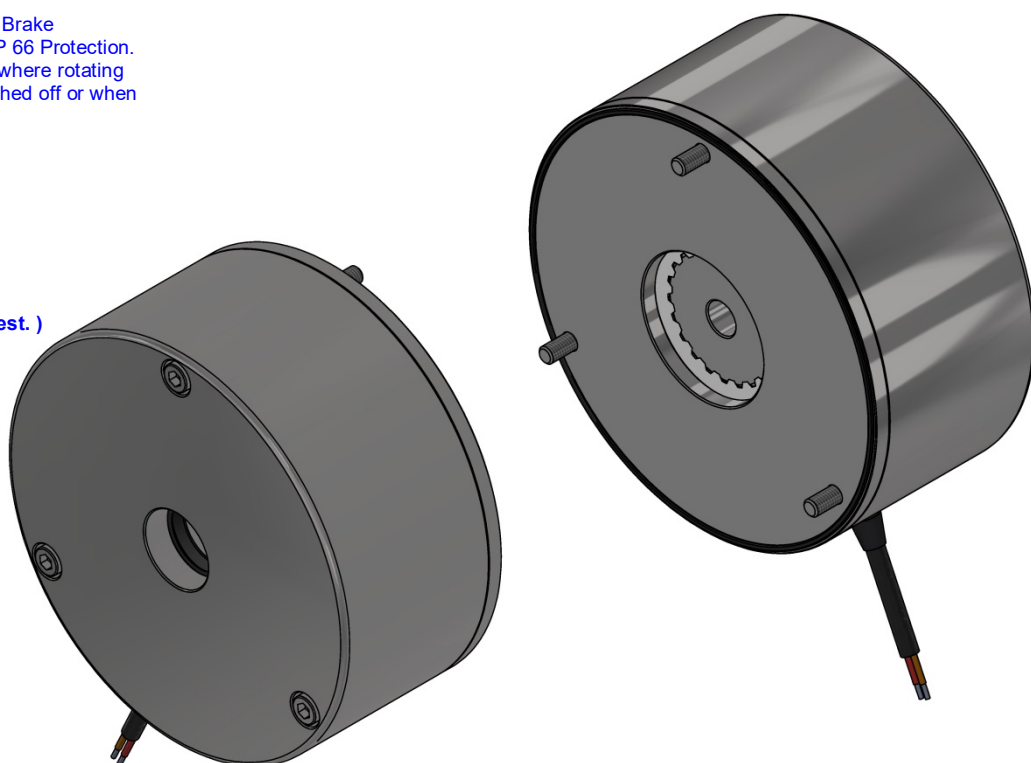
Emco-Simplatroll DC Spring Applied Fail Safe Brake Type 14.461. is a " Normally On " brake with IP 66 Protection. These brakes can be used for all applications where rotating machines must be stopped quickly when switched off or when power fails ensuring the SAFETY

Salient Features of Type 14.461.xx

- 1 Brake outer diameter completely enclosed
(Higher protection can be easily realised)
- 2 Easy Installation
- 3 Coil with "F" Class Insulation
(** Higher coil insulation available on request.)
- 4 Non Asbestos friction liner
- 5 Low rotor inertia
- 6 Cold climate versions available on request

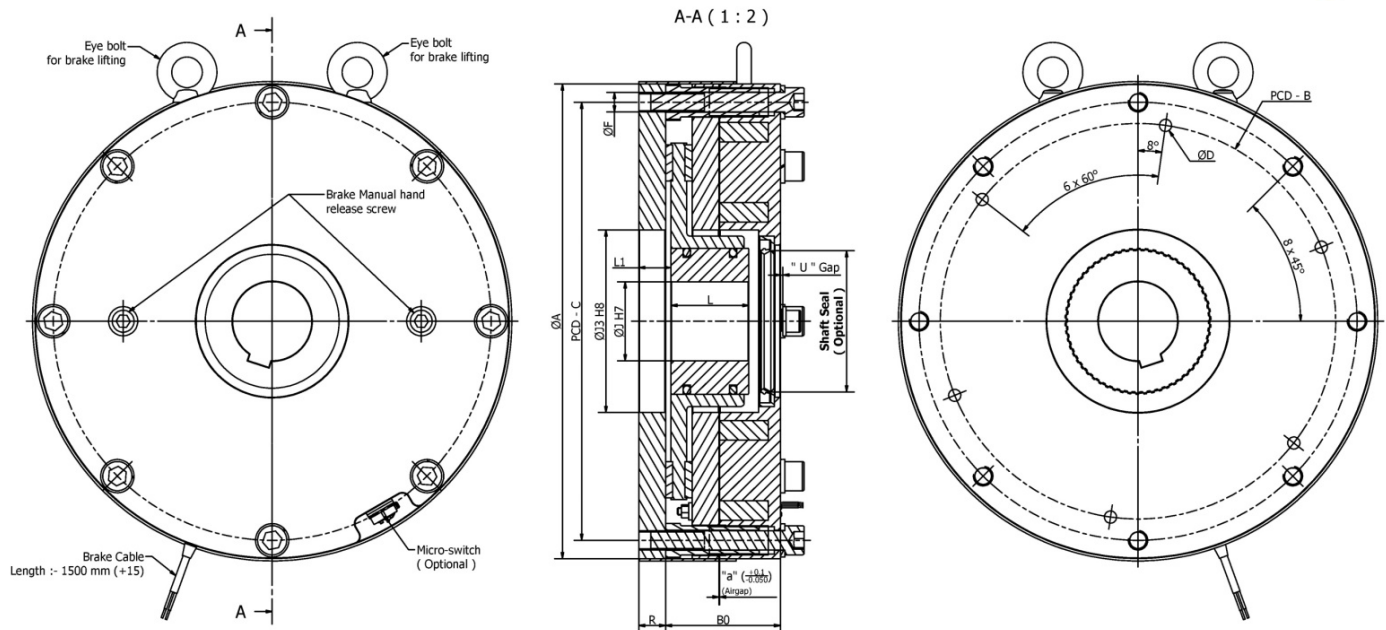
Applications

Cranes, Machines tools Industries ,
Packaging machines,
Textile machines,
Conveyors,
Pallet truck drives
For outdoor application



DC Spring Applied Fail Safe Multi-coil Higher Torque Brake Model – 14.468.xx (32 to 52)

NEW PRODUCT



Brake Size	Brake Torque (Nm)	Power P20 (W)	ØA (±0.5)	PCD-B (±0.1)	PCD-C (±0.1)	ØD	ØF	ØJ H7	ØJ3 H8	L (-0.2)	L1 (±0.2)	B0 (±0.5)	R (±0.5)	a (Airgap)	"U" Gap (±0.2)	Brake Weight (Kg)
14.468.32	1000	240	360	325	325	6 x Ø11	6 x M10	90 Max.	145	64	26.5	95	22	0.5	2	75
14.468.42	1100 to 1300	340	390	325	360	6 x Ø11	8 x M16	90 Max.	150	64	26.5	95	22	0.5	2	85
14.468.44	1700 to 1900	400	390	325	360	6 x Ø11	8 x M16	90 Max.	150	64	26.5	95	22	0.5	2	85
14.468.48	2100 to 2200	425	450	325	420	6 x Ø11	8 x M16	110 Max.	210	83	25	120.8	30	0.8	2	145
14.468.52	2500 to 2600	440	520	480	480	6 x Ø16.5	8 x M16	110 Max.	210	83	25	120.8	30	0.8	2	195

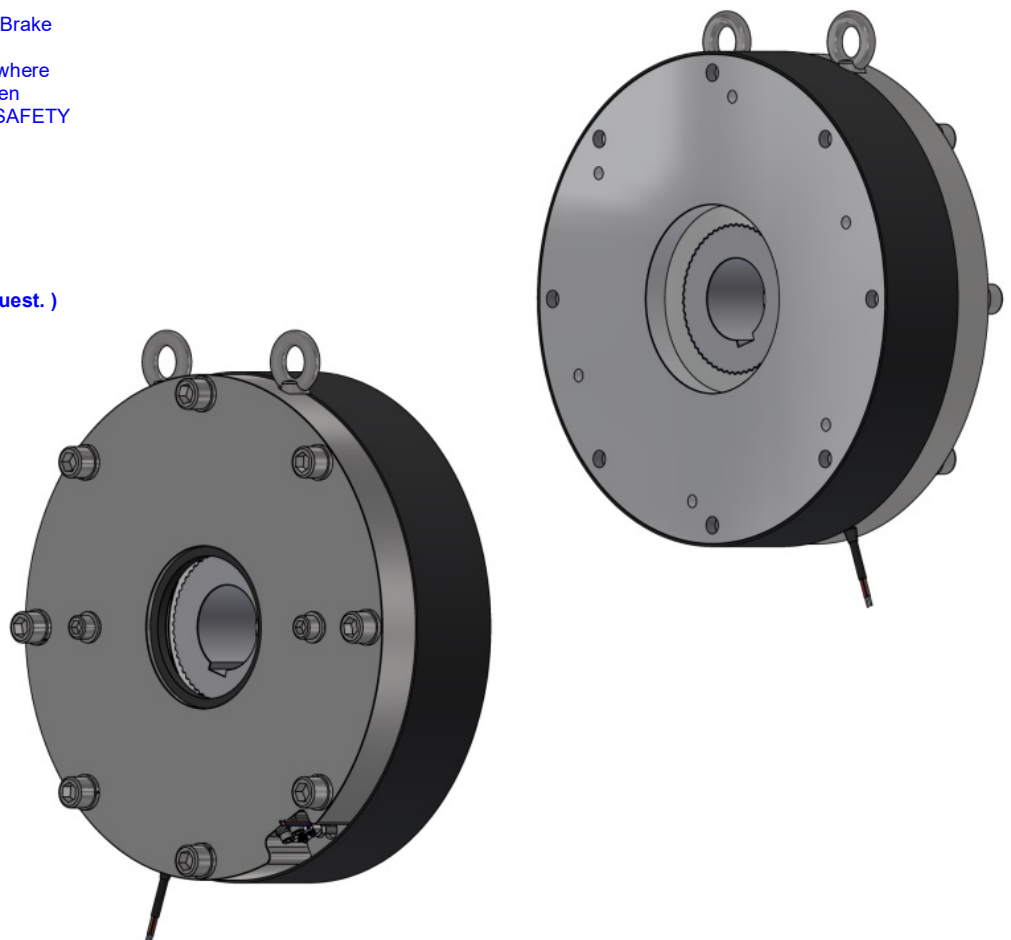
Emco-Simplatroll DC Spring Applied Fail Safe Brake Type 14.468.xx. is a " Normally On " brake .
These brakes can be used for all applications where rotating machines must be stopped quickly when switched off or when power fails ensuring the SAFETY

Salient Features of Type 14.468.xx

- 1 Screw Type Manual Release
- 2 Dust Protection Seal
- 3 Easy Installations
- 4 Coil with "F" Class Insulation
(** Higher coil insulation available on request.)
- 5 Non Asbestos friction liners
- 6 Low rotor inertia
- 7 Cold climate versions available on request

Applications

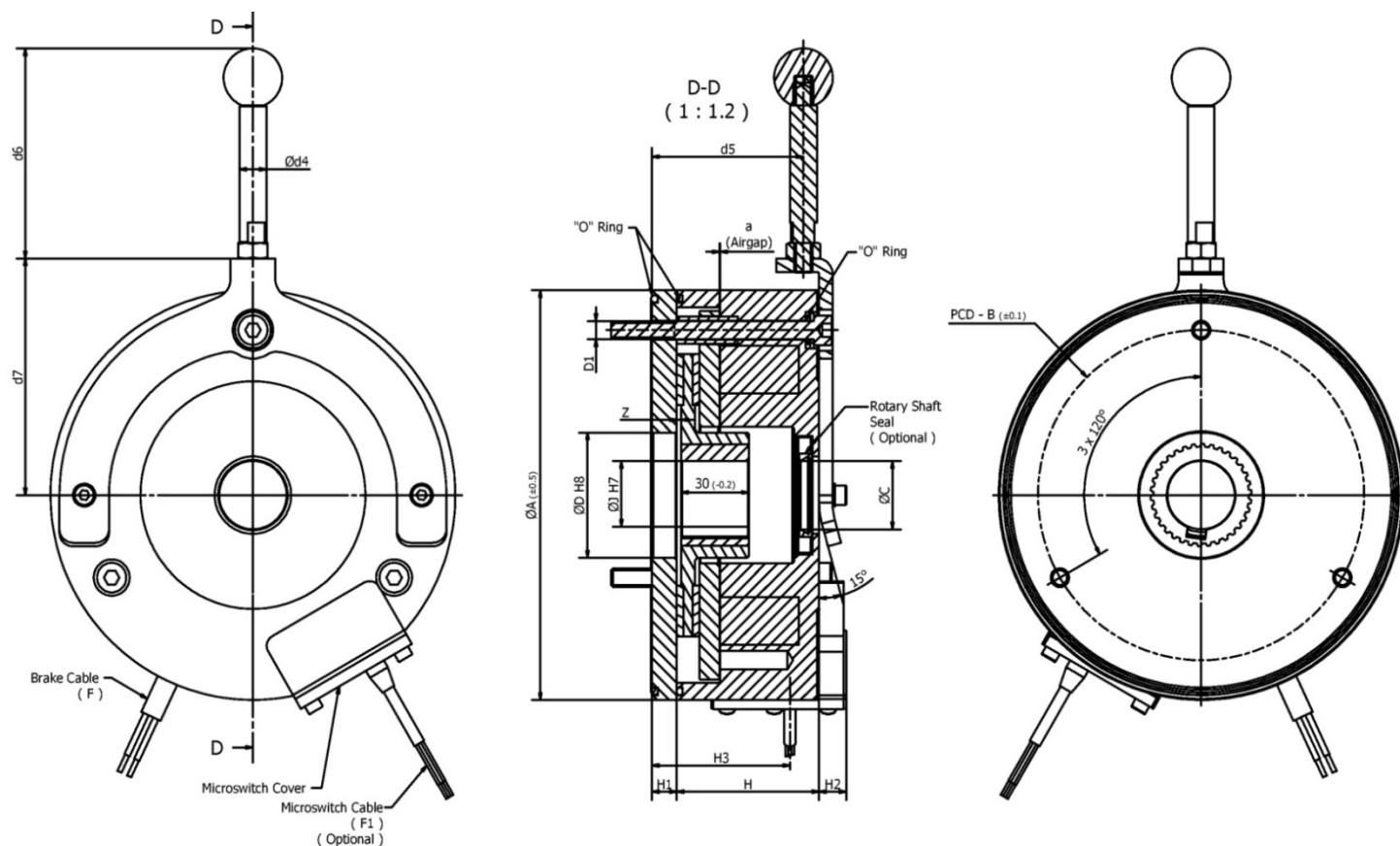
Cranes, Hoists,
Port Cranes,
Gantry Cranes,
Windmills,
Elevators,
Goods Lift,
Cargo Lift,
Wire Drawing Machines,
Paper Mills,
Mining Equipment,
Mooring Winches,
Tyres Press Machined,
Nuclear Plants tools,
Cement Plants



DC Spring Applied Fail Safe Brake

Model – 14.470.xx (10 to 14) (Brake with IP 55 Protection)

NEW PRODUCT



Brake Parameters																						
Brake Size	Input Power P20 (w)	Brake Torque M Rat. (Nm)	a (Airgap)	ØA (±0.5)	PCD - B (±0.1)	ØC	ØD H8	ØD H7	L (-0.2)	Z	D1	D2 (±3)	H (±2)	H1 (±0.5)	H2 (±2)	H3 (±1)	d5 (±3)	d6 (±5)	d7 (±3)	Ød4 (±0.5)	Brake Cable - F	Microswitch Cable - F1
14.470.10	50	16	0.2 (+0.1/-0.050)	145	112	20 max.	40	11, 12, 14, 15, 19, 20	20	2	3 x M6	15	50	9	14	58.5	50	59.5	85.5	10	410 (+15)	500 (+15)
14.470.12	60	32	0.3 (+0.1/-0.050)	166	132	25 max.	45	15, 19, 20, 24, 25	25	2	3 x M6	15	55	9	10	58.5	58	79.8	97	10	410 (+15)	500 (+15)
14.470.14	90	60	0.3 (+0.1/-0.050)	180	145	32 max.	55	19, 20, 24, 25, 28, 30, 32	30	2	3 x M8	18	63.3	11	12	61.3	67.3	92.3	104	12	410 (+15)	500 (+15)

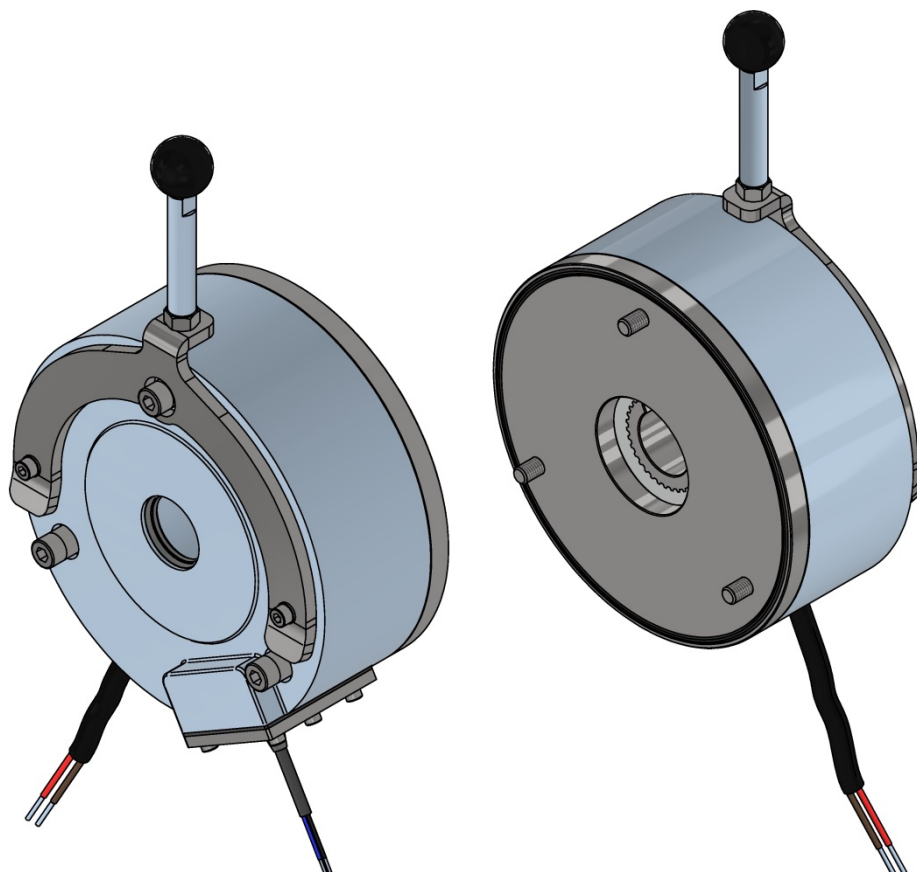
Emco-Simplatroll DC Spring Applied Fail Safe Brake Type 14.470. is a " Normally On " brake with IP 55 Protection. These brakes can be used for all applications where rotating machines must be stopped quickly when switched off or when power fails ensuring the SAFETY

Salient Features of Type 14.470.xx

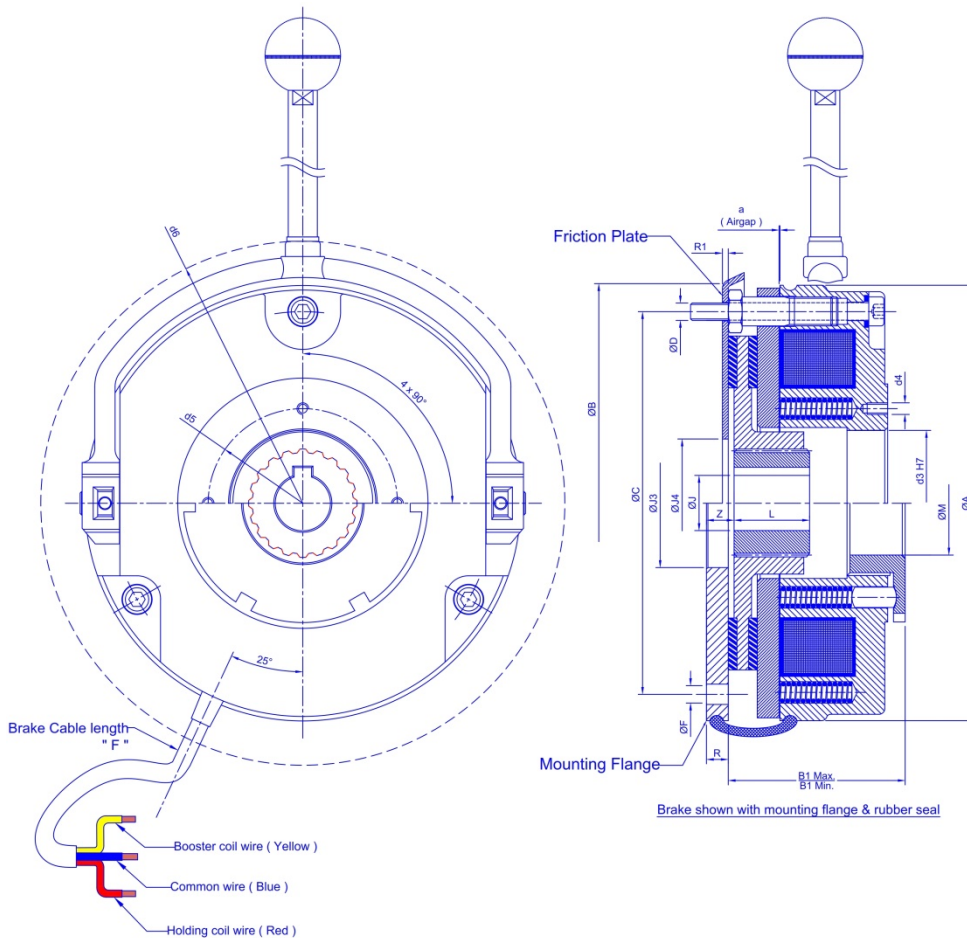
- 1 Brake outer diameter completely enclosed (Higher protection can be easily realised)
- 2 "Deadman Type" Manual releases
- 3 Easy Installations
- 4 Coil with "F" Class Insulation
- (** Higher coil insulation available on request.)
- 5 Non Asbestos friction liners
- 6 Low rotor inertia
- 7 Cold climate versions available on request

Applications

Cranes,
Machines tools Industries,
Packaging machines,
Textile machines,
Conveyors,
Pallet truck drives
For outdoor application



DC Spring Applied Fail Safe Power Saver Brake Model – 14.488.xx (06 to 31)



Emco-Simplatroll DC Spring Applied Fail Safe Brake Type 14.488. is a " Normally On " brake these brakes can be used for all applications where rotating machines must be stopped quickly when switched off or when power fails ensuring the SAFETY.

Salient Features of Type 14.488.xx

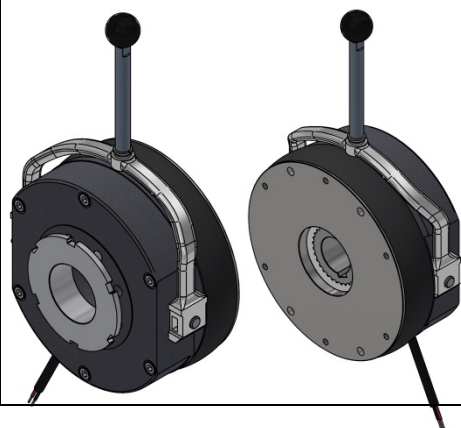
- 1 Power saver
- 2 Fast engagement and fast dis-engagement
- 3 Low heating of the brake
- 4 Enhanced liner life
- 5 Coil with "F" Class Insulation**
- ** Higher coil insulation available on request.
- 6 Non Asbestos friction liner
- 7 Low rotor inertia
- 8 Use rectifier UM-201 only for operating 14.488.brake
- 9 Cold climate versions available on request

Applications

Tower Cranes,
Windmills,
Packaging machines,
Textile machines,
Conveyors,
Pallet truck drives

Important :-

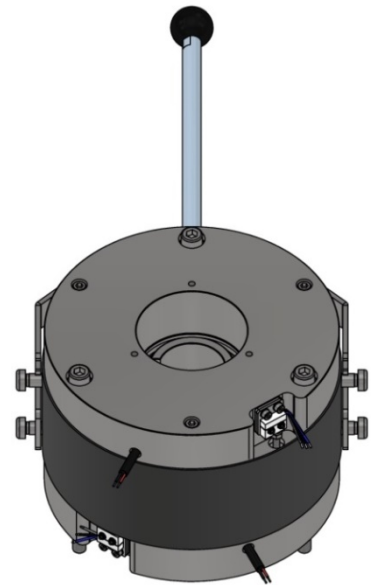
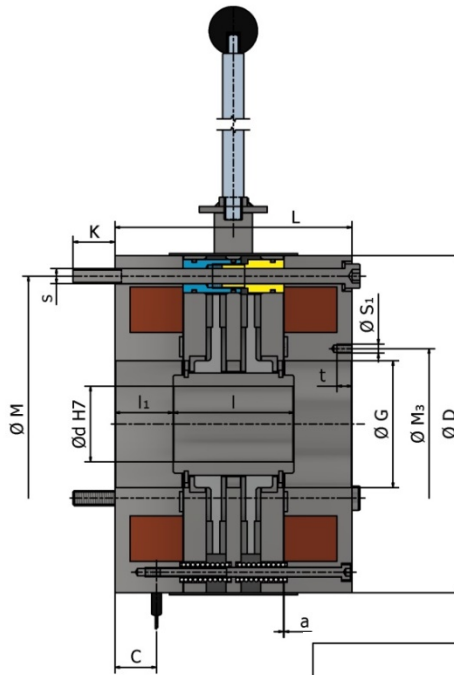
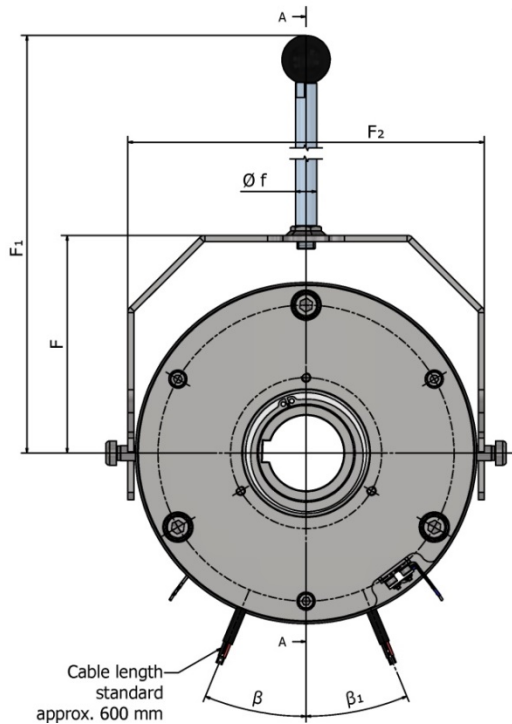
Brake size 31 will be supplied without manual hand release lever.



Brake Size	06	08	10	12	14	16	18	20 / 23	25	31
Torque M R AT. (Nm)	8	10	12	16	20	31	34	40	44	56 / 76
Input Power P20 [w]	20	25	30	40	50	76	85	100 / 105	110	140 / 180
±0.2 ØA	87	105	130	150	165	190	217	254	302	302
±0.2 ØB	82	101.5	127	147	163.5	188.5	---	---	---	---
B1 Max.	41.5	48.5	56	64.5	77	82.5	98	114	124	144.7
B1 Min.	39.5	47	52.5	59	71.5	77.5	89	104.6	115.7	134.7
±0.1 ØC	72	90	112	132	145	170	196	230	278	278
ØD	3 x M4	3 x M5	3 x M6	3 x M6	3 x M8	3 x M8	6 x M8	6 x M10	6 x M10	6 x M10
ØF	3 x 4.5	3 x 5.5	3 x 6.6	3 x 6.6	3 x 9	3 x 9	4 x 9	6 x 11	6 x 11	6 x 11
±0.2 ØJ3	31	40	40	45	55	65	75	90	120	120
±0.2 ØJ4	42	45	60	68	78	98	---	---	---	---
±0.2 L	18	20	20	25	30	30	35	40	50	50
±0.2 ØM	22	26	33	40	48	56	60	73.1	95.1	95.1
±0.2 R	6	7	9	9	11	11	11	11	12.5	16
R1	1.5	1.5	1.5	1.5	1.5	1.5	---	---	---	---
±0.1 Z	7	8.5	11	11	13	13.25	13.75	14.5	17	20.5
±0.1 a (airgap)	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.5	0.5
±0.1 U	1	1	1	1	1	1.5	1.5	1.5	2	2
d3 H7	25	32	42	50	60	68	75	85	115	115
d4	4 x M4	4 x M5	4 x M5	4 x M5	4 x M6	4 x M6	4 x M8	4 x M10	4 x M10	4 x M10
±0.1 d5	37.7	49	54	64	75	85	95	110	140	140
±3 d6	119	135	161	181	206	240	262	305	361	361
ØJH7	10, 11, 12, 14, 15	11, 12, 14, 15, 19, 20, 24*	11, 12, 14, 15, 19, 20, 24*	20, 24, 25, 28*	20, 24, 25, 28, 30, 32, 34*	25, 28, 30, 32, 34, 35, 38*	30, 35, 38, 40, 42, 45	35, 40, 42, 45, 48, 50	45, 48, 50, 52, 55, 60, 65, 70*	45, 48, 50, 52, 55, 60, 65, 70*
+15 F	410					610				
Brake Weight kg	1.3 kg	2.2 kg	3.7 kg	5.7 kg	8.2 kg	11.7 kg	18.2 kg	27.6 kg	42.5 kg	53 kg

EMCO – Stage Machinery
Dual Circuit Brake – Without double the torque
Model – 41.491.xx (10 to 18)

NEW PRODUCT



TECHNICAL DATA			
SIZE	BRAKE TORQUE	NOMINAL AIR GAP (a)	BRAKE VDC
10	20 Nm	0.5 (+0.050)	24, 103, 190 & 205
12	40 Nm	0.5 (+0.050)	24, 103, 190 & 205
14	80 Nm	0.5 (+0.050)	24, 103, 190 & 205
16	140 Nm	0.5 (+0.050)	24, 103, 190 & 205
17	230 Nm	0.5 (+0.050)	24, 103, 190 & 205
18	400 Nm	0.5 (+0.050)	24, 103, 190 & 205

BRAKE SIZE & DIMENSION																			
BRAKE SIZE	ØD	Ød H7	F	F1	F2	Øf	ØG	K	L	I	I1	ØM	ØM3	s	Øs1	t	β	β1	C
10	110	20 Max.	73	248	120	12	36	10	93.8	35	29.5	90	41	3 x M5	3 x M4	10	30	30	12.5
12	135	20 Max.	89	263	142	12	45	11	102.8	45	29	112	52	3 x M6	3 x M4	10	30	30	12
14	158	28 Max.	98	272	165	12	52	12	113.2	55	29	132	61	3 x M6	3 x M5	10	30	30	16
16	172	34 Max.	111	335	180	16	60	12	132.4	65	34	145	75	3 x M8	3 x M5	10	30	30	16
17	200	45 Max.	129	353	208	16	77	15.5	139.1	68	36	170	88	3 x M8	3 x M5	10	30	30	17
18	225	50 Max.	149	443	236	16	84	17	157	80	38.5	196	100	3 x M10	3 x M6	10	30	30	21

Stage brakes EMCO-STOP – Stage
100% Safety – 100% Brake Torque

Double safety, single load

1. Redundancy through two individual brake circuits.
2. Braking torque is not doubled.
3. Reduces loads on supporting structures.

Plug and play solution

1. Completely assembled and adjusted ready for use.
2. Simple and quick installation and application.
3. Adjustment errors are prevented, thus the highest possible safety is guaranteed.

Plug in hand release

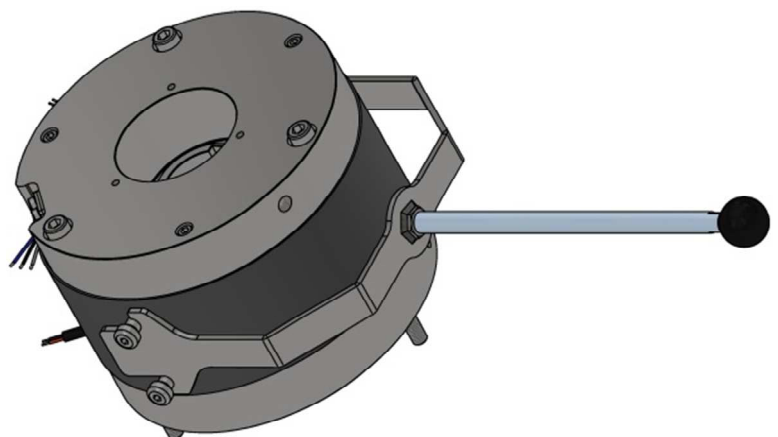
1. Easy and fast opening of both brake circuits in an Emergency.
2. Operation takes place without hand release.
This ensures safety and excludes operating errors.

Special features

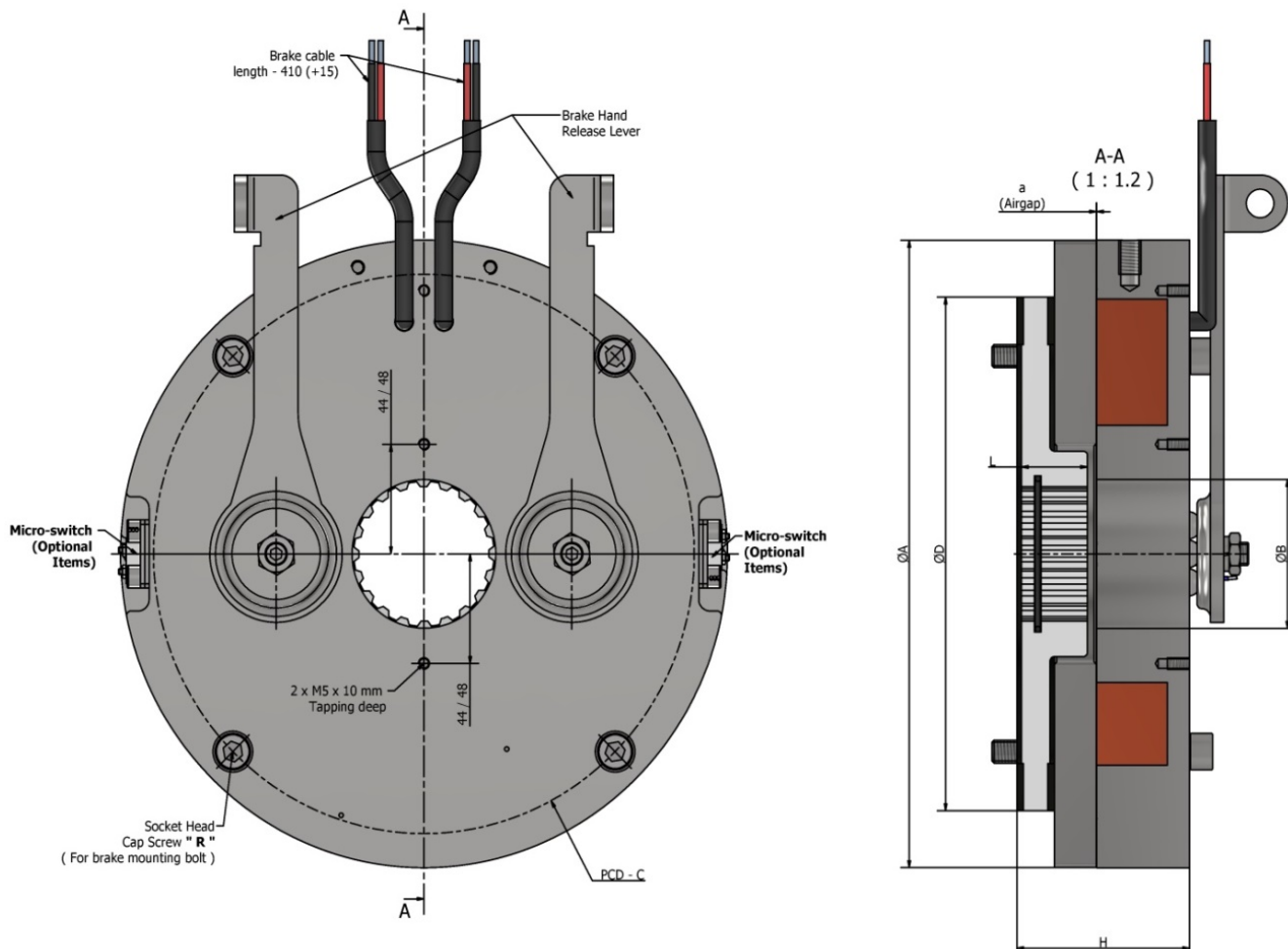
1. Low noise operation.
2. Compact dimensions.

Applications

Stage Machinery



Electro Magnetic Dual Circuit Spring Applied DC Brake Model – EDCB – 2 x XXX (90 to 1400)



Brake Size	Brake Power	Brake Torque (Nm)	ØA	ØB	PCD – C	ØD	"a" Airgap	H	R	L
EDCB – 90	90 W	2 x 90	190	65.1	170	149	0.2	68.7	6 x M8	30
EDCB – 225	100 W	2 x 225	245		215	194		78.2	4 x M10	30
EDCB – 350	130 W	2 x 350	275		245	225		78.2	4 x M10	30
EDCB – 450	252 W	2 x 450	290		262	241		78.2	4 x M10	30
EDCB – 600	240 W	2 x 600	300		275	255		86.2	6 x M10	35.6
EDCB – 750	240 W	2 x 750	300		275	255		86.2	6 x M10	35.6
EDCB – 800	240 W	2 x 800	300		275	255		86.2	6 x M10	35.6
EDCB – 1200	416 W	2 x 1200	358		318	292		97.2	4 x M12	40
EDCB – 1400	416 W	2 x 1400	358		318	292		97.2	4 x M12	40

*Rotor Spline as per DIN 5480

Braking system for lift & elevators applications

Emco Dynatorq is a leader in design & manufacturing of spring applied electrically released brake.

We offer ranges of brakes in customised solutions to meet the specific performance and installation requirements of the elevators, lifts & traction machine manufacturer.

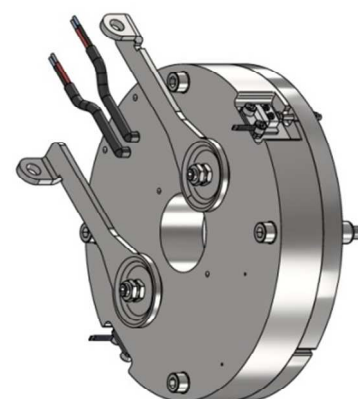
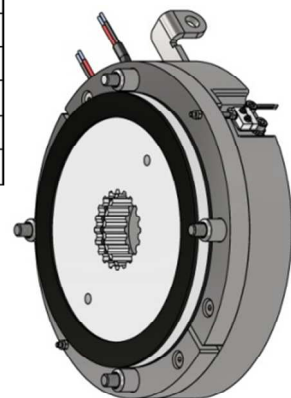
EDCB is an electrically released dual circuit safety brake.

Safety is the prime priority when using these brakes in elevators & lifts systems.

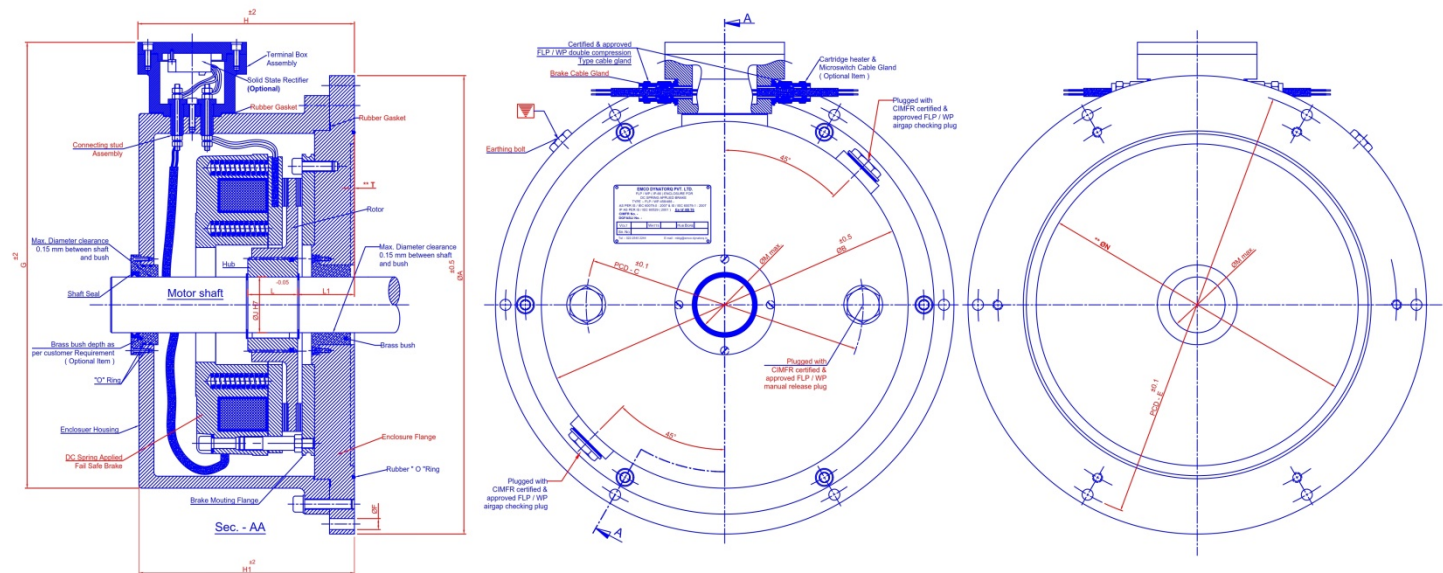
EDCB is a dual circuit split armature brake which is capable of generating high level of braking torque.

Features:-

- 1) Braking Torque Up to 2 x 1400 Nm.
- 2) Redundant braking system.
- 3) Ball Type manual brake release system for easy operation.
- 4) Low engagement & dis-engagement noise $\leq 55\text{dB}$.
- 5) Both armature plates can be individually operated.
- 6) Fixed air gap type.
- 7) Easy installations.
- 8) Micro-switch are used for monitoring brake circuit operation (Release & Wear).
- 9) Working ambient temp. -5° to $+45^{\circ}\text{C}$.
- 10) Class of Insulation " F " (Higher Insulation class circuit can be offered on request).
- 11) Zero maintenance (Only rotor need to be monitored & replace if required).
- 12) Non asbestos friction liner.
- 13) EDCB brake are also available in **UL Version**.
- 14) Brake to be operating with over-excitation voltage rectifier.



DC Spring Applied Fail Safe Brake with Flame Proof Enclosure
Model – FLP.458.xx (06 to 31)



Parameters

Brake Size	Torque M Rat. Nm	Input Power	VDC	±0.5 ØA	±0.5 ØB	±0.1 PCD - C	±0.1 PCD - E	ØF	ØJ H7 max.	-0.05 L	±0.2 L1	ØM max.	** ØN	** T	±2 G	±2 H	±2 H1	CIMFR No.	DGFASLI No.
FLP.458.06	4	20	Standard voltages :- 24, 96, 190 (Other voltages on request)	294	194	77	274	6 x Ø11	15	18	56	15.2	205 (max.)	6 (max.)	292	160	150	CIMFR / TC / P / H766	66 / 4(F) / 2014 - Tech
FLP.458.08	8	25				93.5			20	20		20.2							
FLP.458.10	16	30				112			20	20		20.2							
FLP.458.12	32	40		306	214	136	286	6 x Ø11	25	25	50	25.2	230 (max.)	6 (max.)	312	160	152.5	CIMFR / TC / P / H517	66 / 4(B) / 2014 - Tech
FLP.458.14	60	50		321	229	150	301	6 x Ø11	32	30	53	32.2	245 (max.)	6 (max.)	327	175	169	CIMFR / TC / P / H516	66 / 4(A) / 2014 - Tech
FLP.458.16	100	76		346	254	174.5	326	6 x Ø11	35	30	53	35.2	270 (max.)	6 (max.)	352	181	175	CIMFR / TC / P / H767	66 / 4(G) / 2014 - Tech
FLP.458.18	150	85		373	281	196	353	6 x Ø11	45	35	54	45.2	300 (max.)	6 (max.)	380	200	194	CIMFR / TC / P / H521	66 / 4(E) / 2014 - Tech
FLP.458.20	260	100		410	318	235	390	6 x Ø11	50	40	55	50.2	335 (max.)	6 (max.)	416	216	210	CIMFR / TC / P / H520	66 / 4(D) / 2014 - Tech
FLP.458.25	400	110		460	368	278	440	6 x Ø11	65	50	57	65.2	380 (max.)	6 (max.)	466	223	216.2	CIMFR / TC / P / H518	66 / 4(C) / 2014 - Tech
FLP.458.31	600 / 800	140 / 180		460	368	278	440	6 x Ø11	65	50	57	65.2	380 (max.)	6 (max.)	466	223	216.2		

Emco-Simplatrol flame proof brakes have been specially designed for high toxic & hazardous environment in industries where non flame proof equipment's are not recommended for safety reasons. Our products have approval & certification by **Central Institute of Mining & Fuel Research (C.I.M.F.R.) for Gas Group II-B for Zone 1&2 areas, suitable for T6 Temperature zone. Type FLP.458.xx** are DC Spring applied brake units designed to perform holding as well as emergency stopping functions (Normally On), making it particularly well-suited for brake motor applications. These brakes are electromagnetically actuated single disk with two friction surfaces. The braking power is applied by means of compression springs. The braking torque is generated in the no power or in event of power failure condition.

Brake are available in various version as per application need. Special version like brake with micro-switch, tacho mounting provision etc. can be also supplied. Brake also available for low temperature (-20°C) application.

Salient Features of Type FLP.458.xx

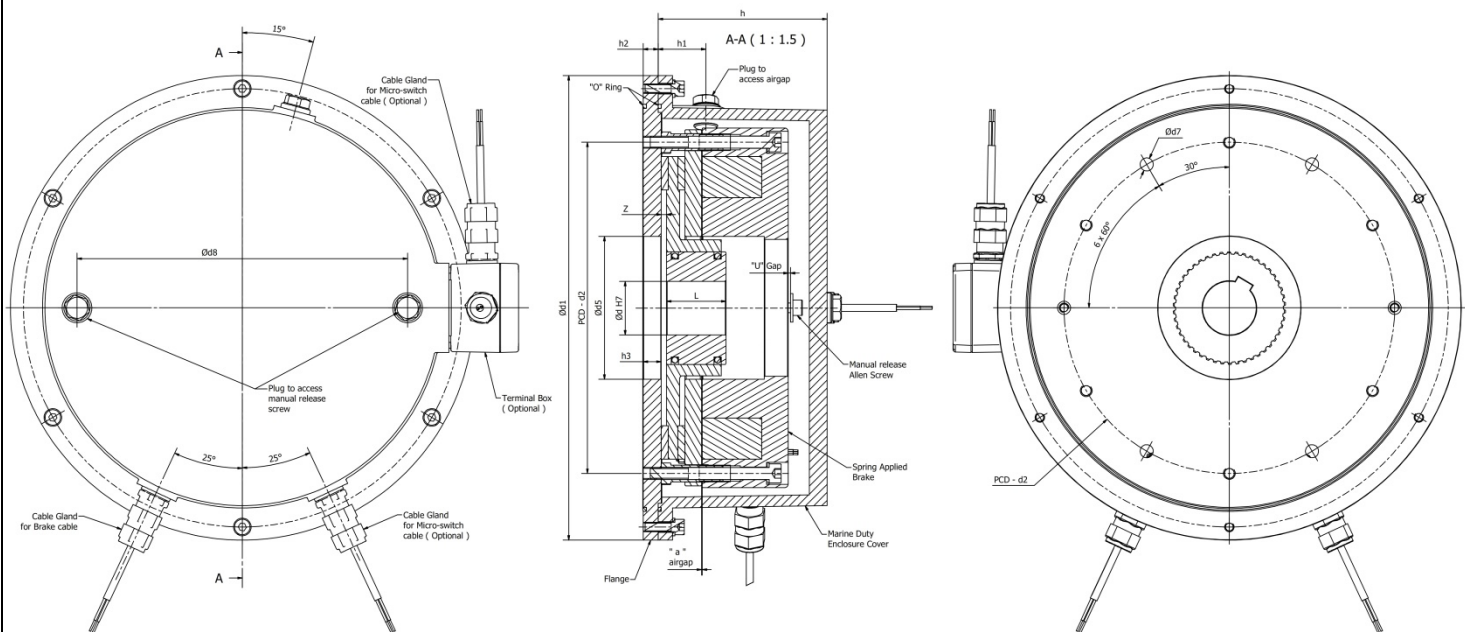
- 1 IP66 protection.
- 2 Compact robust unit.
- 3 Fail Safe brake.
- 4 Screw type manual release.
- 5 Coil with "F" Class Insulation
(**** Higher coil insulation available on request.**)
- 6 Non Asbestos friction liner
- 7 Low rotor inertia
- 8 Cold climate versions available on request

Applications

Oil Rings,
Petro-Chemical
Plants,
Mines,
Cranes & Hoists



DC Spring Applied Fail Safe Marine Duty Brake Model – WP.458.xx (06 to 31) (IP 66)



Brake Size	Input Power P 20	Torque	" a " Gap	Ød1	PCD - d2	Ød5	Ød7	Ød8	h	h1	h2	h3	Z	" U " Gap	F
WP.458.06	20	4	0.2	140	72	31	3 x 4.5	77	61	17	8	10	1	1	410
WP.458.08	25	8	0.2	160	90	41	3 x 5.5	93.5	68	18	9	11	1.5	1	410
WP.458.10	30	16	0.2	185	112	40	3 x 6.6	112	76	21	9	11.5	2	1	410
WP.458.12	40	32	0.3	205	132	45	3 x 6.6	132	86	23	9	11.5	2	1	410
WP.458.14	50	60	0.3	225	145	55	3 x 9	150	100	34	10	12.5	2	1	410
WP.458.16	76	100	0.3	250	170	65	3 x 9	170	105	25	10	12.5	2.25	1.5	610
WP.458.18	85	150	0.4	285	196	75	6 x 9	196	122	29	12.5	15	2.75	1.5	610
WP.458.20	100	260	0.4	330	230	90	6 x 11	230	131	35	12.5	15	3.5	1.5	610
WP.458.23	105	315	0.4	330	230	90	6 x 11	230	131	35	12.5	15	3.5	1.5	610
WP.458.25	110	400	0.5	390	278	120	6 x 11	278	142	40	12.5	15	4.5	2	610
WP.458.31	140	600	0.5	390	278	120	6 x 11	278	168	40	12.5	24	4.5	2	610
WP.458.31	180	800	0.5	390	278	120	6 x 11	278	168	40	12.5	24	4.5	2	610

Emco-Simplatroll marine duty brake stand approved for IP66 degree of protection by " The Electrical Research & Development Association " (ERDA).

These are specially designed and recommended for applications where protection is required against water and dust – especially in marine environment. These brakes are electromagnetically actuated single disk with two friction surfaces. .

The braking power is applied by means of compression springs.

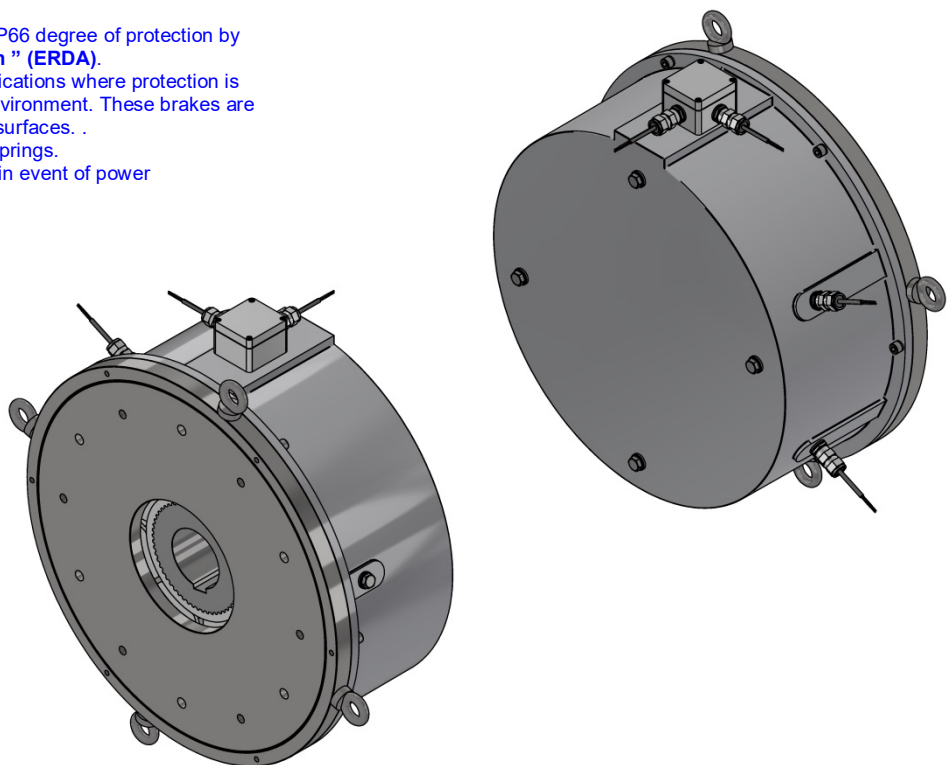
The braking torque is generated in the power off state or in event of power failure condition

Salient Features of Type WP.458.xx

- 1 IP65, IP66 and IP 56 protection.
- 2 IP 67 protection available on request.
- 3 Fail Safe brake.
- 4 Screw type manual release.
- 5 Coil with "F" Class Insulation
(** Higher coil insulation available on request.)
- 6 Non Asbestos friction liner
- 7 Low rotor inertia
- 8 Cold climate versions available on request

Applications

Tower Cranes,
Port Cranes,
Gantry Cranes,
Cement Plants,
Mining Equipment,
Marine Winches,

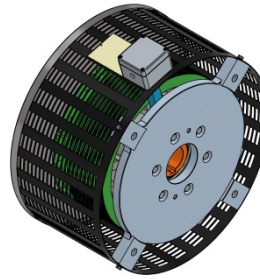
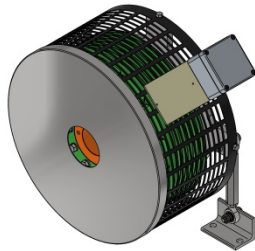


Eddy Current Brake Model – ECB – xx (19 to 50)

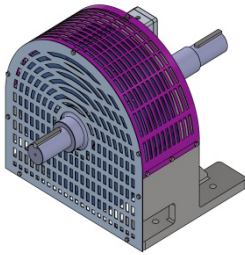
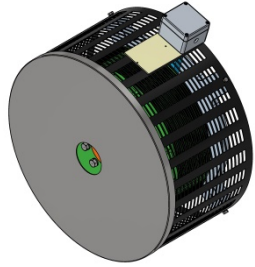
NEW PRODUCT



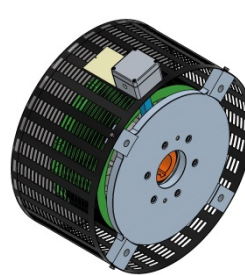
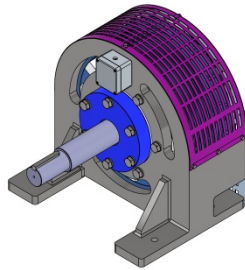
ECB - xx – TBTA (Tapered Bore with Torque Arm)



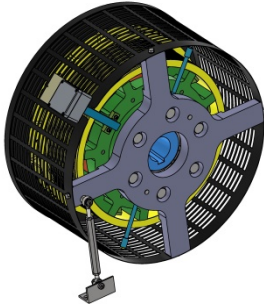
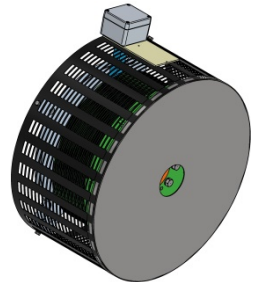
ECB – xx – SBDF (Straight bore with \"D\" Flange)



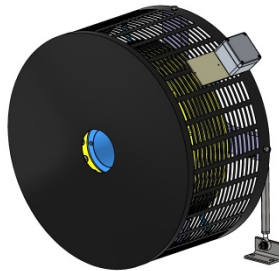
ECB - xx – SSFMB (Straight Shaft with Foot Mounted Bracket)



ECB – xx – TBDF (Tapered Bore with \"D\" Flange)



ECB – xx – SBTA (Straight bore with Torque Arm)



Working under extreme conditions, it is important that powertrain assemblies on drilling systems perform with ultimate reliability. This is especially true of the drawworks, which reels the drilling line in and out during operation.

A leading global manufacturer of drilling systems contacted EMCO to provide a bespoke ECB Eddy Current brake to meet its demanding drawworks specification.

A frictionless braking application

The drawworks on a drilling system consists of a large winch drum, brakes and a power source. It raises and lowers the drilling line as required, often to support the installation of piping as the borehole deepens. Brakes on the system stop the movement of the drilling line dynamically, while an additional friction brake holds it in the top position during the installation of a new pipe, before being released in a controlled manner to allow drilling to continue. Large braking forces are required from the system that stops the line. To present a further challenge, braking of the drawworks can take place frequently - every 180 seconds in some cases. Therefore, a system relying solely on friction to stop the line would quickly wear, greatly reducing service life. For these braking applications, a frictionless solution is the only option. Eddy current brakes use electromagnetism instead of friction to provide the titanic braking forces and the durability required for this application. Stationary electromagnetic coils surrounding the magnetic core within the brake produce magnetic flux. These induce eddy currents in a rotating outer rotor, which has additional teeth poles that amplify the braking effect. The electromagnetic eddy currents created cause drag to the outer rotor, providing braking and dissipating the energy as heat. This allows large braking forces to be achieved repeatedly with high reliability.

Salient Features of Type ECB – xx :-

- 1) High braking torque,
- 2) Continuous braking possible,
- 3) Air cooled only,
- 4) Short working cycles possible,
- 5) Nearly free from wear adjustable torque by regulating electrical current possible

Applications :-

Oil Industries,
Gas Industries,
Railway & Stackers etc.

Eddy Current brake drawing & other more detail contact as.

Ultra – Thin Servo Motor Brake Model – UTSB – xxx (300 to 500)

NEW PRODUCT

Fail-safe spring-applied brake in flat and space-saving design

Our brakes – perfect for your safe application

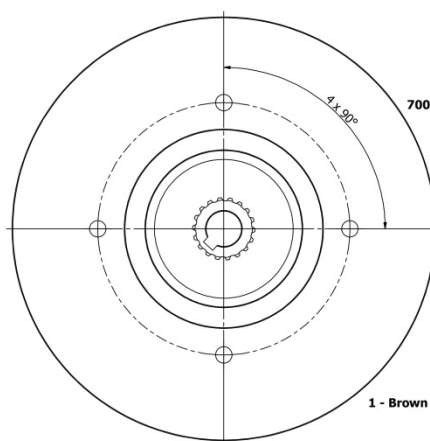
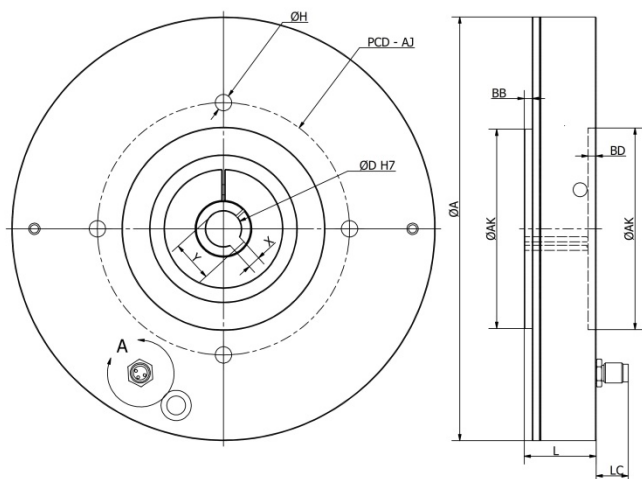
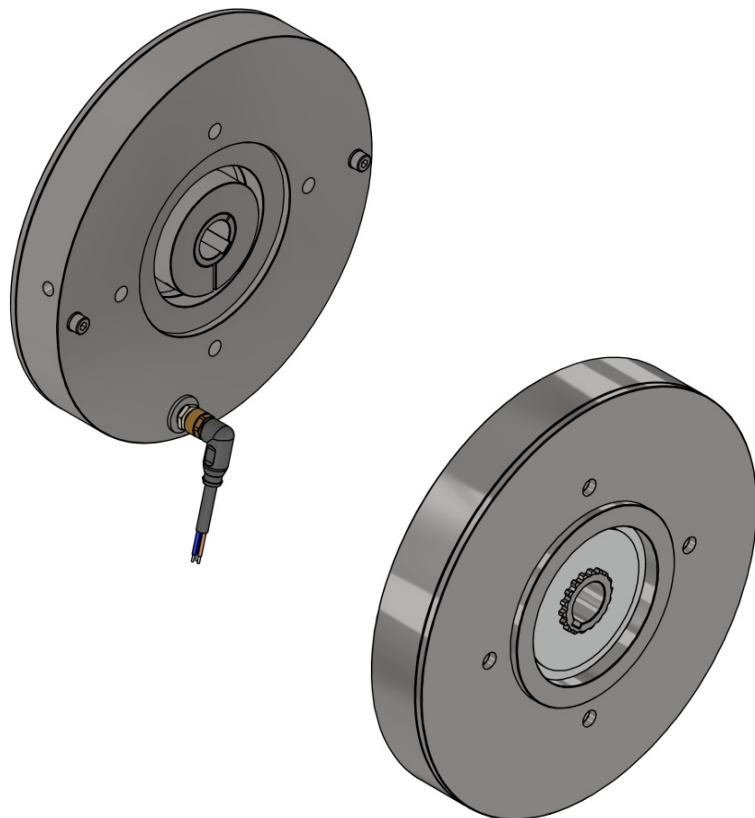
EMCO industrial brakes – this stands for excellent service and smart innovation, which we consistently use for the benefit of our customers.

The Ultra-Thin Servo motor brake

- # Fail-safe spring applied brake
- # Holding brake with emergency stop function
- # A total of 5 different sizes available
- # Torque range from 4 Nm to 28.3 Nm
- # Standard temperature range from -10°C to +100°C

Applications

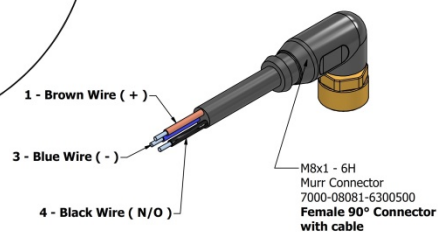
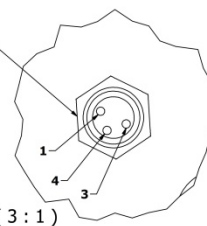
- # Robotics & Automation
- # Automated Guided Vehicles (AGVs)
- # Medical technology



M8x1 - 6g
Murr Connector
7000-08553-9700020
Male Connector

- 1 (+)
- 4 (N/O)
- 3 (-)

A (3 : 1)



Brake Parameters																
Model No.	Voltage	Wattage	Torque (Nm)	Bore ØD H7	Width - X	Depth - Y	ØA	ØH	PCD - A1	ØAK	BB	BD	L	LC	Bolt Size	Bolt Tightening Torque (Nm)
300	24	30	4	14, 16	5 (Js9)	17.6 (+0.1)	168	6.5	100 (±0.1)	80	3.2	3.2	28.5	16	4 x M6	9.0
400	24	30	10.2	19	6 (Js9)	21.8 (+0.1)	186	6.5	115 (±0.1)	95	3.2	3.2	28.5	16	4 x M6	9.0
450	24	30	10.2	24	8 (Js9)	27.3 (+0.1)	208	6.5	130 (±0.1)	110	3.2	3.2	28.5	16	4 x M6	9.0
500	24	76	28.3	24, 28	8 (Js9)	31.3 (+0.1)	200	10.6	165 (±0.1)	130	3.2	6.4	33.7	16	4 X M10	47

Ultra - Thin Servo Motor Brake
Model - UTSB - 34 (NEMA Motor Frame)
Fail-safe spring-applied brake in flat and space-saving design

NEW PRODUCT

Our brakes – perfect for your safe application

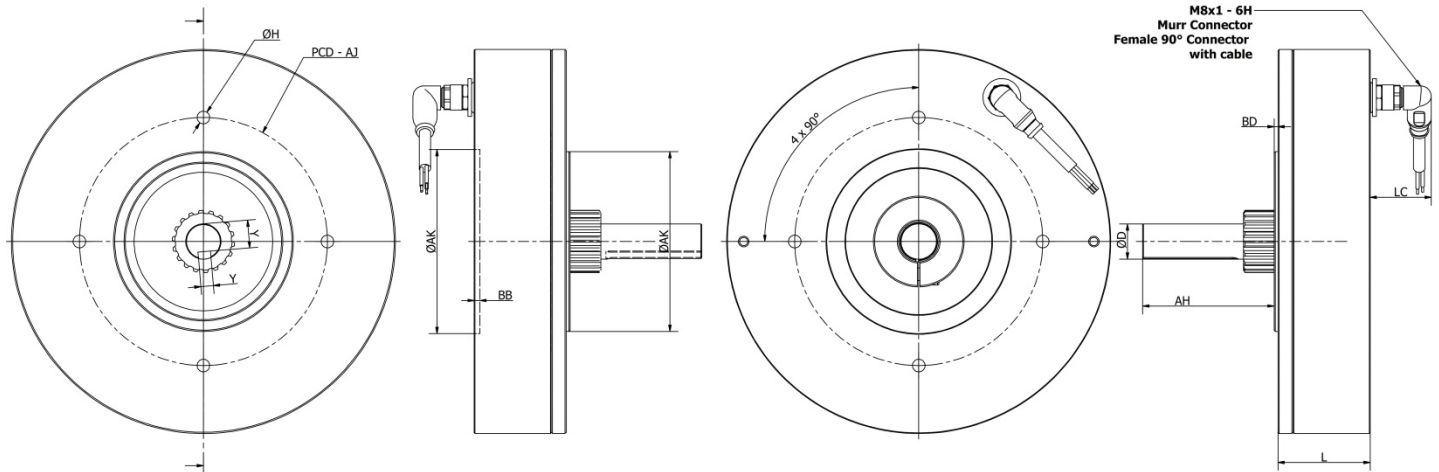
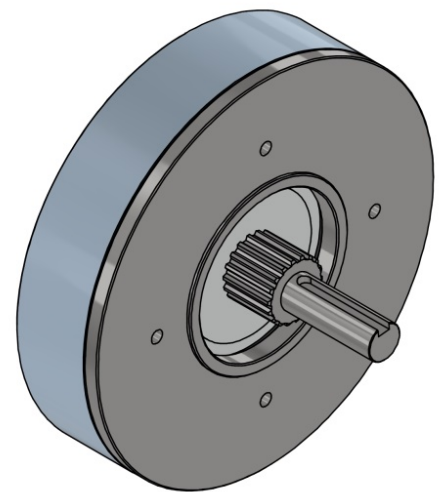
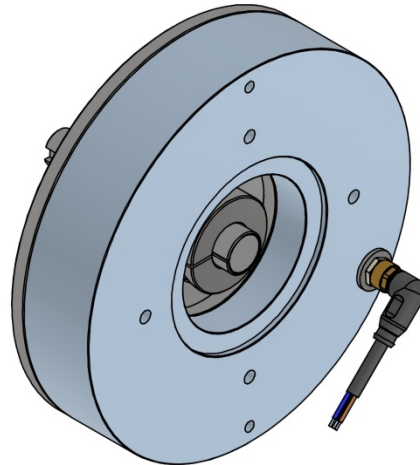
EMCO industrial brakes – this stands for excellent service and smart innovation, which we consistently use for the benefit of our customers.

The Ultra-Thin Servo motor brake

- # Fail-safe spring applied brake
- # Holding brake with emergency stop function
- # Standard temperature range from -10°C to +100°C

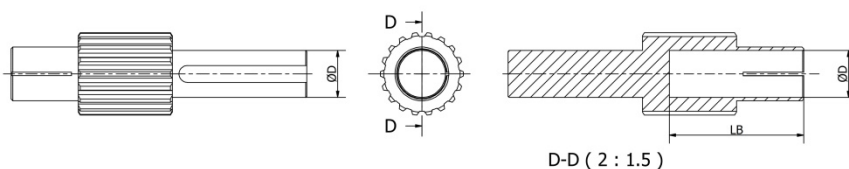
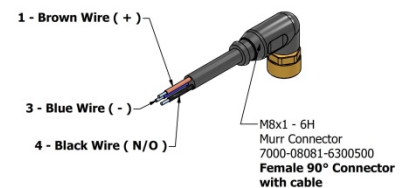
Applications

- # Robotics & Automation
- # Automated Guided Vehicles (AGVs)
- # Medical technology



Brake Parameter Dimension in inches (NEMA MODEL)																			
Model No.	NEMA Frame	Voltage	Wattage	Input Shaft ØD No key	Output Shaft ØD with Keyway	Width - X	Depth - Y	Torque (in-lb)	ØA	AH	LB	PCD - AJ	ØAK	BB	BD	SD	ØH	L	LC
UTSB 34	34	24	30	0.5	0.5	0.127 / 0.125	0.425 / 0.435	48	6	1.25	1.25	3.875 (±0.003)	2.875	0.1	0.145	0.591	4 x 0.28	1.44	1

Brake Parameter Dimension in mm																
Model No.	Voltage	Wattage	Input Shaft ØD No key	Output Shaft ØD with Keyway	Torque (Nm)	ØA	AH	LB	PCD - AJ	ØAK	BB	BD	SD	ØH	L	LC
300	24	30	14	14	5.5	152.4	40	40	100 (±0.1)	80	3.2	2.7	15	4 x 7	36.576	25



Brake Selection

1. Select Basic brake according to torque.

$$\text{Torque (Nm)} = \frac{9550 \times \text{Motor kW} \times \text{Safety Factor (K)}}{\text{RPM}}$$

<u>Load Condition</u>	<u>Safety Factor (K)</u>
1 – Load masses equal loading & non-intermittent operation	2.0
2 – Low masses, light shock load & intermittent operation	2.5
3 – Medium masses, light shock load & intermittent operation	3.0
4 – Large masses, light shock load & intermittent operation	3.0
5 – Diesel Engine drive	4-5
6 – Compressor drive	5-6
7 – Non overhauling loads	2-3
8 – Overhauling loads	3-4

2. Describe the brake with the ordering parameter. (Type, size, Operating voltage and hub bore).

3. Choose optional extras required (G-PCD, tacho mounting provision, friction plate & micro-switch).

4. Choose appropriate safety factor for the hoist, lift, inclined conveyors or equipment where holding against gravity is required.

5. Select proper rectifier considering rated voltage of the brake.

If coil operating voltage is 103, 190 & 205 VDC you can use our rectifier (Call for product details)

6. Choose correct input AC voltage for rectifier.

7. Space heater / Cartridge heater / PT sensor options available on request.

8. Inertia based size selection sheet available on request.

Important :-

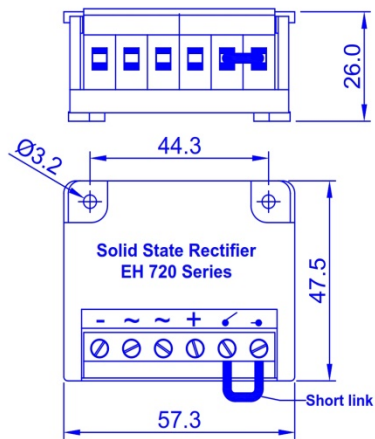
1 – For vertical mounting, High speed braking & for special environmental conditions contact us.

2 – For long motor running cycles & high switching frequency, kindly contact us.

3 – For motors operated on VFD, do not connect input to the rectifier from motor terminals.

4 – For brake size 18 and above use UM Rectifiers. UM series rectifiers are over excitation rectifiers.

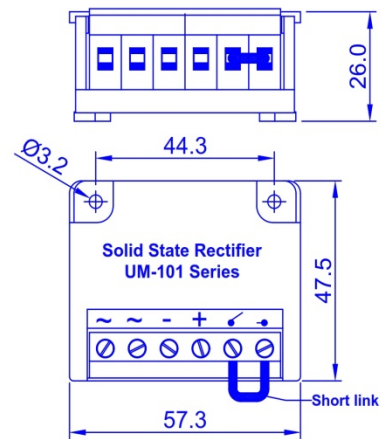
Solid State Rectifier Data sheet



Solid State Rectifier EH 720 Series

Full Wave and Half Wave Rectifiers for 50 / 60 Hz VAC Input

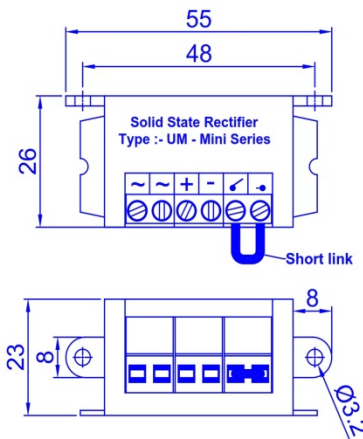
Rectifier Type	AC Input Voltage	Brake Coil Voltage	Current Rating
EH 720 AD	208 / 230 VAC	190 / 205 VDC	2 Amp.
EH 720 BD	115 VAC	103 VDC	
EH 720 CD	208 / 230 VAC	96 / 103 VDC	
EH 720 HHD	415 VAC	190 VDC	
EH 720 HHD - AV	415 / 460 VAC	190 / 205 VDC	
EH 720 HHD - AVH	480 / 500 VAC	215 / 225 VDC	
EH 720 HHD - AVH	525 / 550 VAC	235 / 245 VDC	



Solid State Rectifier UM-101 Series

With over-excitation for fast release of normally on brake or fast engagement of normally off brake or clutch, 50/60 Hz VAC input

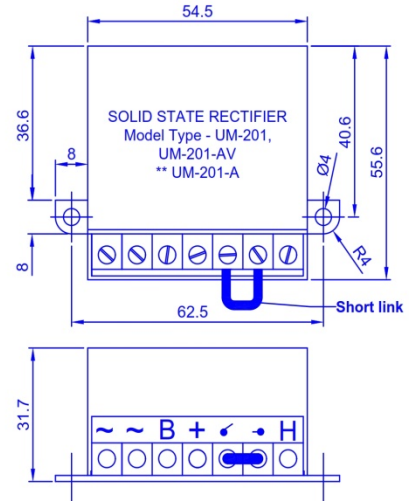
Rectifier Type	AC Input Voltage	Brake Coil Voltage	Current Rating
UM-101	415 VAC	190 VDC	2 Amp.
UM-101-AV	415 / 460 VAC	190 / 205 VDC	
UM-101-AVH	480 / 500 VAC	215 / 225 VDC	
UM-101-AVH	525 / 550 VAC	235 / 245 VDC	
UM-101-A	208 / 230 VAC	96 / 103 VDC	



Solid State Rectifier UM - Mini Series

Full Wave and Half Wave Rectifiers for 50 / 60 Hz VAC Input

Rectifier Type	AC Input Voltage	Brake Coil Voltage	Current Rating
UM-001 HHD	415 VAC	190 VDC	2 Amp.
UM-001 HHD-AV	415 / 460 VAC	190 / 205 VDC	
UM-001 HHD-AVH	480 / 500 VAC	215 / 225 VDC	
UM-001 HHD-AVH	525 / 550 VAC	235 / 245 VDC	
UM-001 CD	230 VAC	103 VDC	
UM-001 AD	230 VAC	205 VDC	
UM-001 BD	115 VAC	103 VDC	

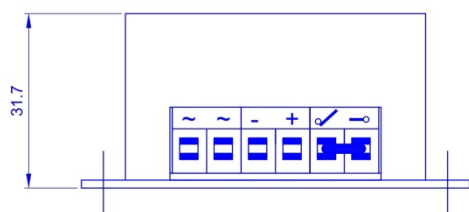
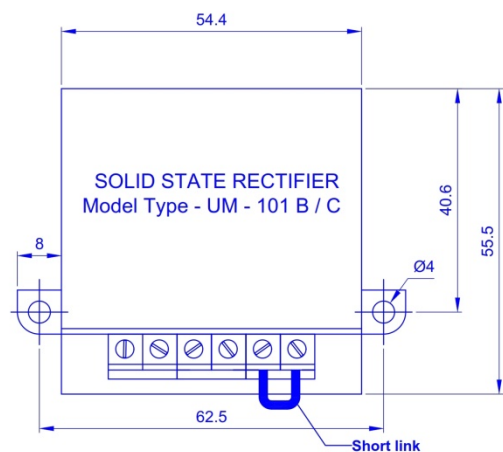


14.488. Brakes are to be operated with UM-201 Rectifier only

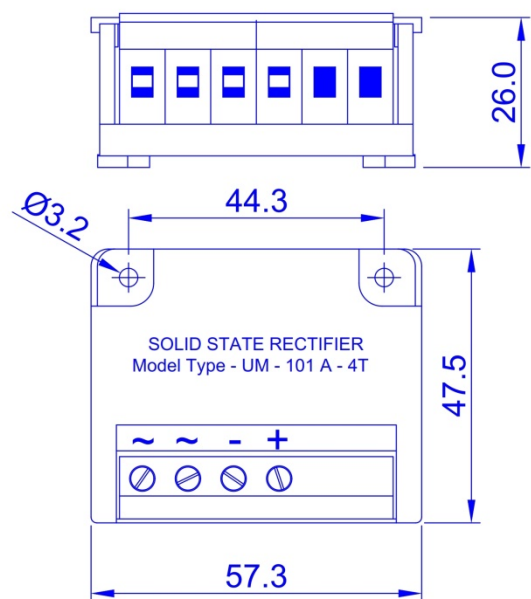
Special rectifier for double coil Brake / Clutch. Can provide quick release / quick set and power saving feature too.

Rectifier Type	AC Input Voltage	Brake Coil Voltage	Current Rating
UM-201	415 VAC	190 VDC	1 Amp.
UM-201-AV	415 / 460 VAC ±20%	190 / 205 VDC	
UM-201-A	230 VAC	103 VDC	

Solid State Rectifier Data sheet



Solid State Rectifier UM-101 B / C Series			
Rectifier Type	AC Input Voltage	Brake Coil Voltage	Current Rating
UM-101 B - 4	415 VAC	190 VDC	4 Amp.
UM-101 C - 5	230 VAC	103 VDC	5 Amp.



Full Wave / Half Wave Rectifiers UM-101 A - 4T			
Note: Output - first 400 - 1000 m. second Full Wave, subsequently Half Wave			
DC voltage output = 0.9 x Input AC Voltage** / 0.45 x Input AC Voltage			
** For initial over excitation period			
Model	Input VAC	Output	
		Full Wave VDC / Amp.	Half Wave VDC / Amp.
UM-101 A - 4T	220	200 / 4.2	96 / 2.1
	240	215 / 4.0	103 / 2.0

Manufactured by **USHA MEDISALES**, Waghodia Dist. Vadodara - 391760, Gujarat, INDIA