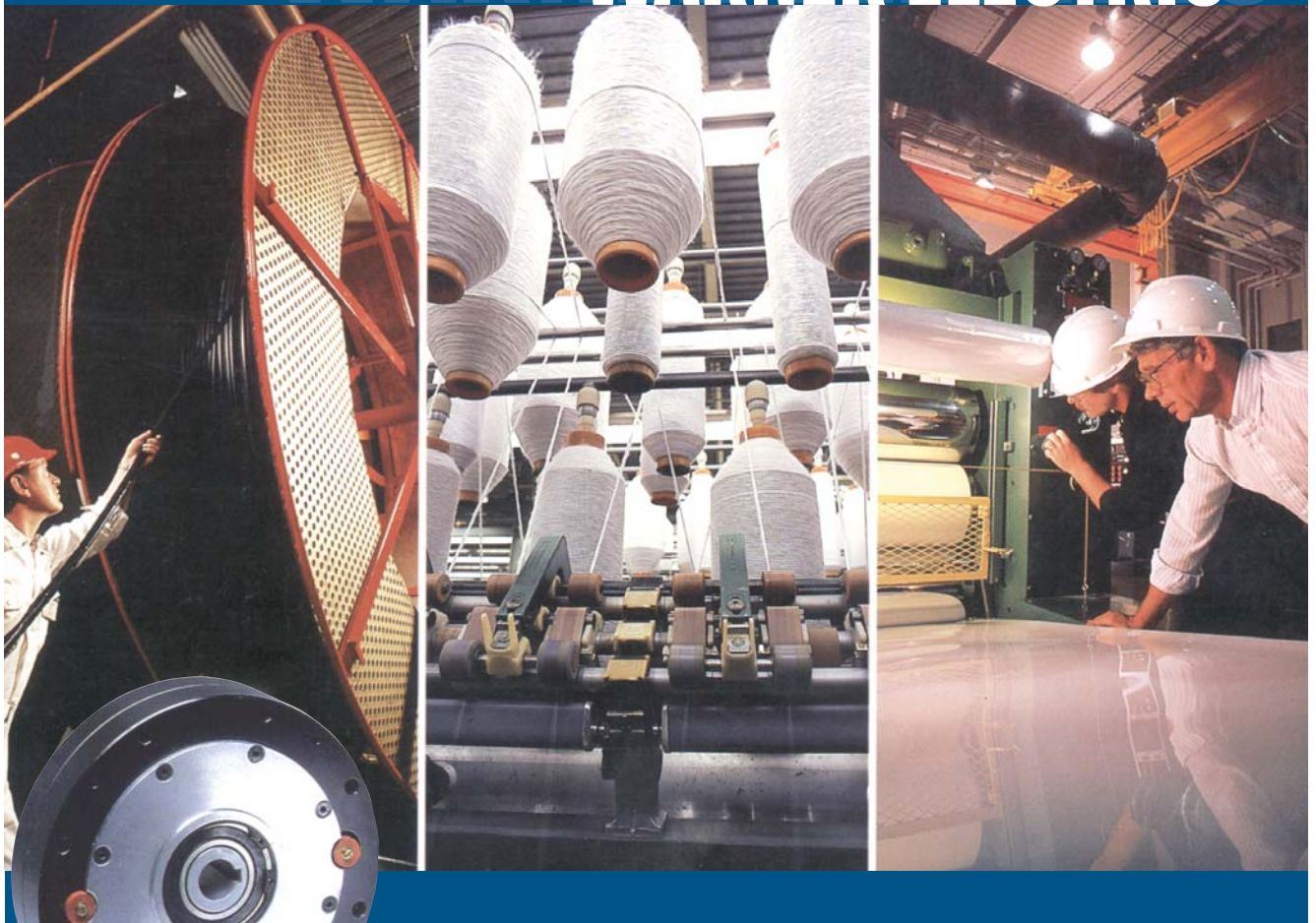


WARNER ELECTRIC



Magnetic Particle Clutches & Brakes

0,2 Nm to 500 Nm

Magnetic particle clutches and brakes

The electromagnetic Particle Coupling combines the resilience of a fluid coupling with the locked-in stability of a friction clutch. Torque is transmitted by a specially alloyed dry ferromagnetic powder, its apparent viscosity may be changed by modulation of the field coil current.

The couplings can sustain continuous slip (under maximum heat ratings) at a precise and stable torque value, which is determined by excitation level.

Slip between input and output members is not necessary in order to transmit torque, and provided load torque does not exceed the torque for which a unit is excited to transmit, locked-in synchronous operation will take place.

Conversely, if load torque exceeds the energised torque level, slip will occur in an absolutely smooth manner at the predetermined torque value. For all practical purposes, static and dynamic coefficients of friction are sensibly equal; also, output torque is independent of speed, or slip speed.

Powder performance is unaffected by temperature rise on the working sur-

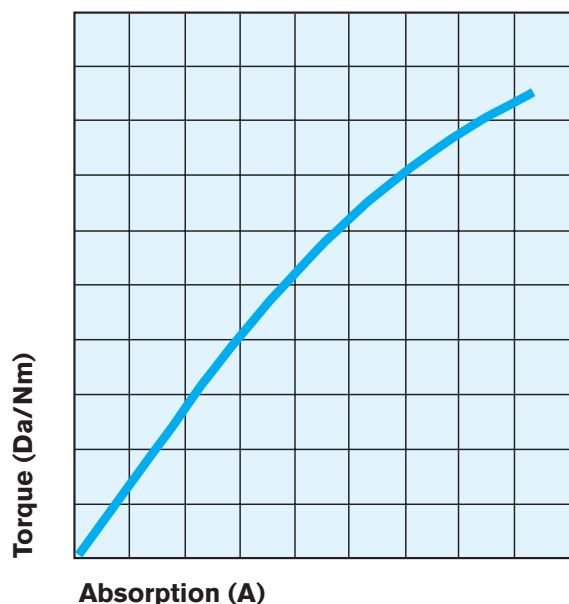
faces, and couplings will, have at all times, a torque directly proportional to current. It should be noted that use of a dry powder rather than a fluid-suspended powder medium promotes consistency and accuracy of torque control.

Briefly, the coupling comprises two concentric members, the body or input member containing the field coil, and within it, and separated by a small

annular gap, an inner rotor, or output member. The annular gap contains a ferromagnetic powder, which is activated when the coil is energised. The resultant flux which is generated, passed through the powder, causing it to align with the flux path, and thereby creates a driving bond between input and output members, the strength of which is only determined by the value of DC current applied to the coil.



Operating characteristics



The torque transmitted by powder couplings is proportional to field current, and is infinitely variable from maximum design rating down to practically zero in all models.

Torque/current characteristic curves can vary by 5% dependent on whether current is increasing or decreasing. This is due to magnetic hysteresis.

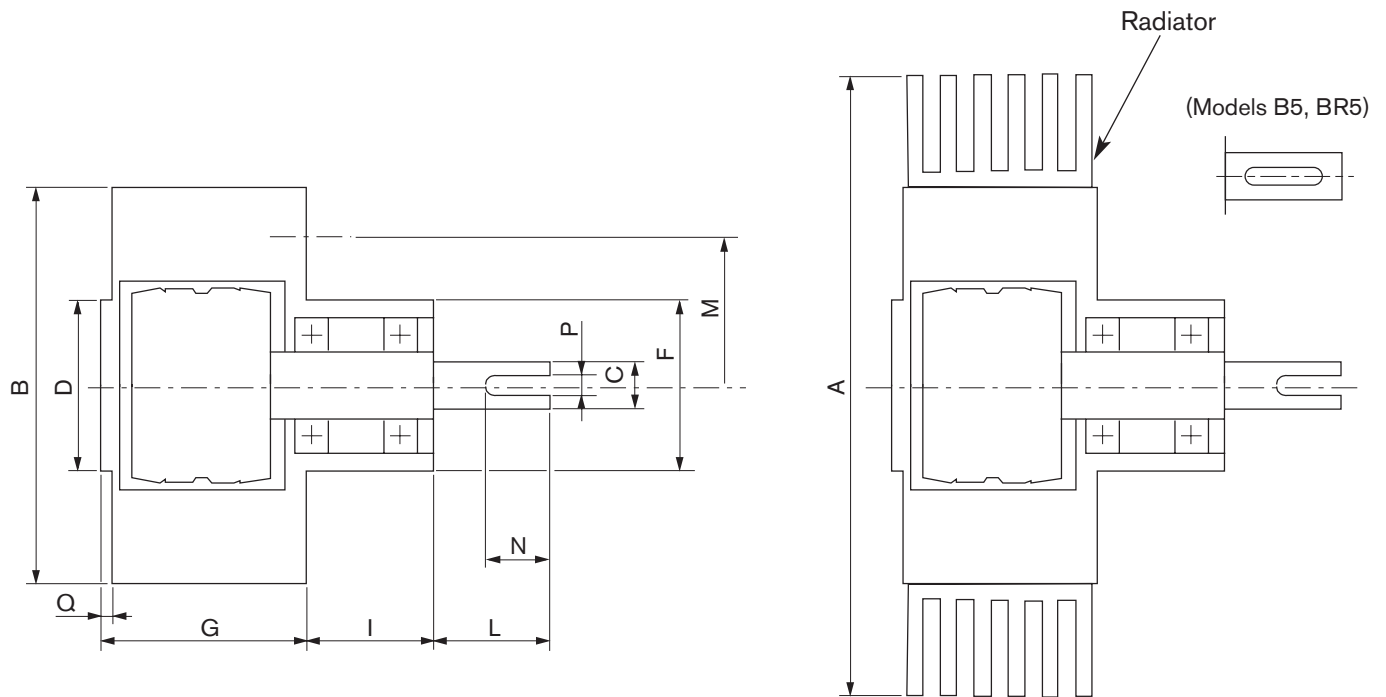
For all practical purposes torque is independent of speed, either with or without the presence of slip, and can be maintained within an accuracy of 5 % for speeds within the recommended operating range 50 to 3000 RPM.

De-energised drag torque due to residual iron circuit magnetism, bearing and seal friction, is less than 1% of design torque rating for any coupling.

Response time to torque is determined by field coil inductance to resistance ratio plus a magnetic delay due to eddy current loss.

Note: to ensure satisfactory operation, all couplings and brakes must be mounted in horizontal use.

Brakes Series B - Mini Range 0,2 Nm to 5 Nm

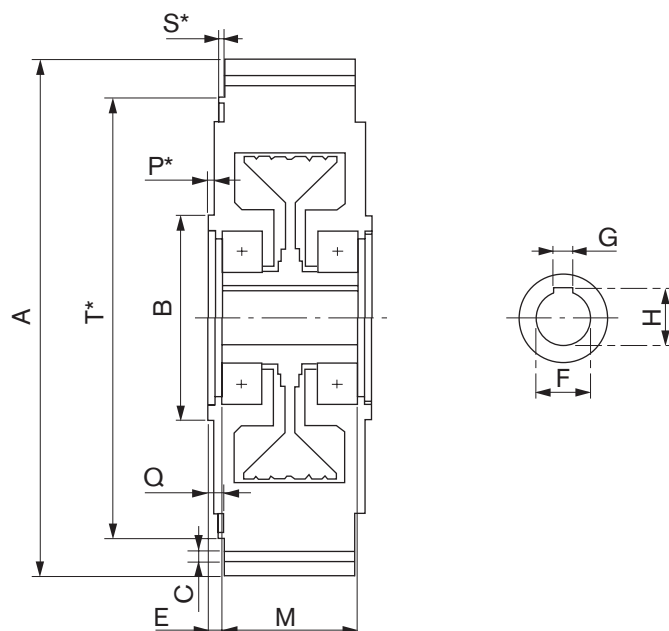


Dimensions and specifications

Models		B0,2	BR0,2	B2	BR2	B5	BR5
Maximum torque	Nm	0,2	0,2	2	2	5	5
Power dissipation	W	15	25	35	55	70	160
Voltage	V	24	24	24	24	24	24
Current	A	0,4	0,4	0,8	0,8	1,3	1,3
Resistance at 20° C	Ω	35	35	27	27	16,5	16,5
Weight	kg	0,25	0,4	0,8	1,2	1,8	2,2
A	mm	-	70	-	130	-	160
B	mm	45	-	70	-	91	-
C	mm	5	5	8	8	12	12
D	mm	-	-	30	30	-	-
F	mm	25	25	30	30	40	40
G	mm	22	22	36,5	36,5	45	45
I	mm	16,5	16,5	22,5	22,5	28	28
L	mm	17	17	20	20	31	31
M	mm	-	-	3 x M4 ø50	3 x M4 ø50	3 x M5 ø55	3 x M5 ø55
N	mm	-	-	11,5	11,5	20	20
P	mm	-	-	3	3	4	4
Q	mm	-	-	1,5	1,5	-	-

Attention : For a correct use of the brake, the operating temperature must not be more than 70° C

Brakes Series B - Range 12 Nm to 500 Nm



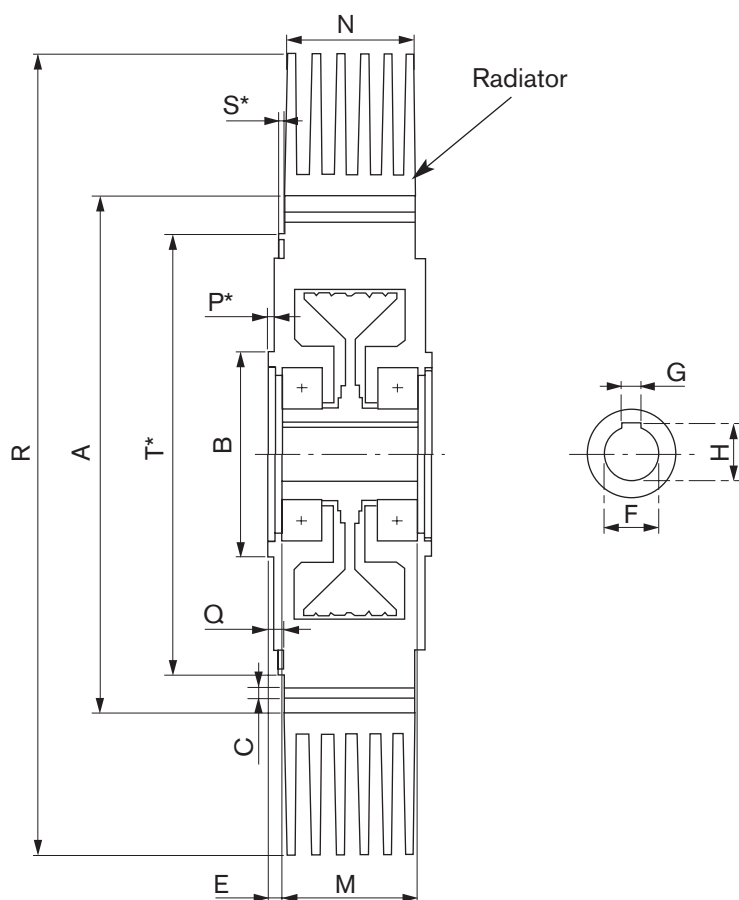
Dimensions and specifications

Models		B12	B35	B65	B120	B170	B250	B500
Maximum torque	Nm	12	35	65	120	170	250	500
Residual torque	Nm	0,3	0,4	0,4	0,6	0,7	1	1
Voltage	V	24	24	24	24	24	24	24
Current	A	0,9	0,9	0,95	1,8	1,8	1,1	0,9
Resistance at 20° C	Ω	25	20	24	11	11	22	27
Power dissipation	W	100	150	200	400	500	600	1600
Weight	kg	2,5	4,3	6,5	18	24	32	59
A	mm	115	135,5	157	254	254	286	360
B	mm	55 h7	55 h7	75 h7	99 h8	99 h8	150 h8	150 h8
C	mm	6 x M5 ø103	6 x M5 ø122	6 x M5 ø144	8 x ø7 ø233	8 x ø7 ø233	8 x M6 ø267	8 x ø8,5 ø342
E	mm	3	2,5	2,5	5	5	5	5
F	mm	15 H7	17 H7	20 H7	28 H7	28 H7	55 H7	55 H7
G	mm	4 D10	5 D10	6 D10	10 D10	10 D10	16 D10	16 D10
H	mm	16,3 +0,1/0	19,7 +0,1/0	22,8 +0,1/0	31,3 +0,1/0	31,3 +0,1/0	59,3 +0,2/0	59,3 +0,2/0
M	mm	47	56	64	64	80	90	110
*P	mm	-	-	-	2,8	2,8	-	-
Q	mm	6	6,5	6,7	8	8	10	5
*S	mm	-	-	-	3	3	-	-
*T	mm	-	-	-	214 g6	214 g6	-	-

*Only for sizes 120 and 170

Attention : For a correct use of the brake, the operating temperature must not be more than 70° C

Brakes Series BR - Range 12 N m to 500 Nm



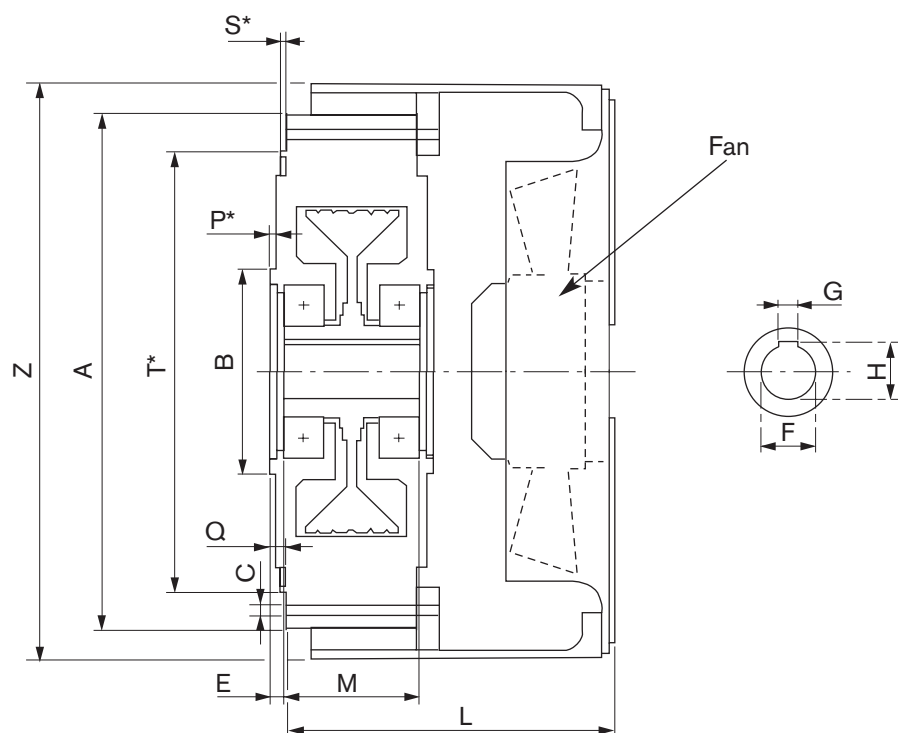
Dimensions and specifications

Models		BR12	BR35	BR65	BR120	BR170	BR250	BR500
Maximum torque	Nm	12	35	65	120	170	250	500
Residual torque	Nm	0,3	0,4	0,4	0,6	0,7	1	1
Voltage	V	24	24	24	24	24	24	24
Current	A	0,9	0,9	0,95	1,8	1,8	1,1	0,9
Resistance at 20° C	Ω	25	20	24	11	11	22	27
Power dissipation	W	200	280	400	800	1000	1200	3200
Weight	kg	4,3	7,3	9,8	23	30	38	62
A	mm	115	135,5	157	254	254	286	360
B	mm	55 h7	55 h7	75 h7	99 h8	99 h8	150 h8	150 h8
C	mm	6 x M5 ø103	6 x M5 ø122	6 x M5 ø144	8 x ø7 ø233	8 x ø7 ø233	8 x M6 ø267	8 x ø8,5 ø342
E	mm	3	2,5	2,5	5	5	5	5
F	mm	15 H7	17 H7	20 H7	28 H7	28 H7	55 H7	55 H7
G	mm	4 D10	5 D10	6 D10	10 D10	10 D10	16 D10	16 D10
H	mm	16,3 +0,1/0	19,7 +0,1/0	22,8 +0,1/0	31,3 +0,1/0	31,3 +0,1/0	59,3 +0,2/0	59,3 +0,2/0
M	mm	47	56	64	64	80	90	110
N	mm	48	60	66	58	72,5	82	91
*P	mm	-	-	-	2,8	2,8	-	-
Q	mm	6	6,5	6,7	8	8	10	5
R	mm	200	240	280	390	390	406	500
*S	mm	-	-	-	3	3	-	-
*T	mm	-	-	-	214 g6	214 g6	-	-

*Only for sizes 120 and 170

Attention : For a correct use of the brake, the operating temperature must not be more than 70° C

Brakes Series BV - Range 12 Nm to 500 Nm



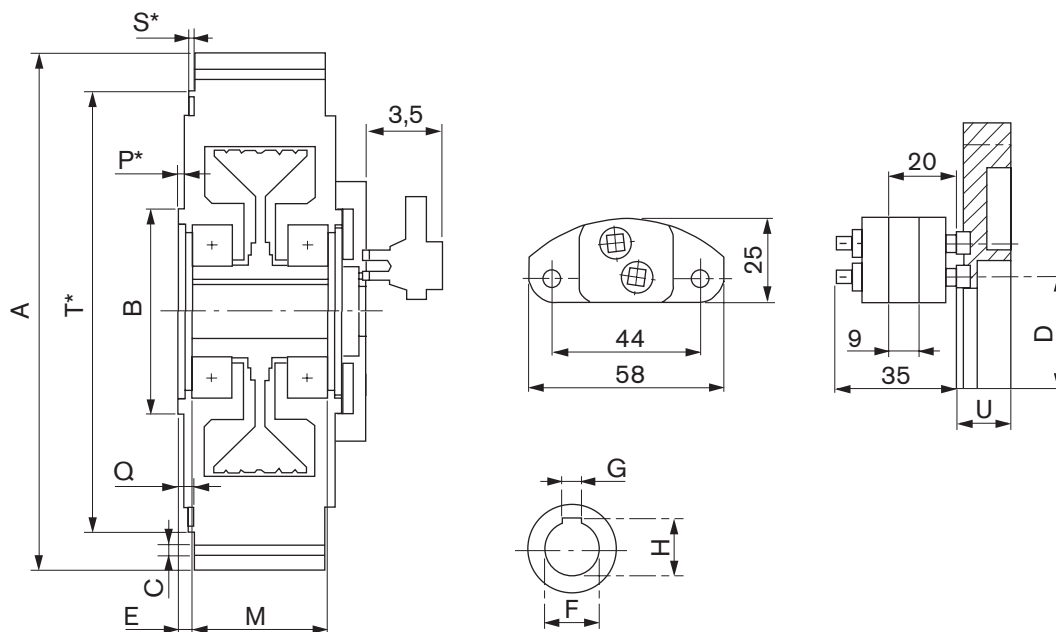
Dimensions and specifications

Models		BV12	BV35	BV65	BV120	BV170	BV250	BV500
Maximum torque	Nm	12	35	65	120	170	250	500
Residual torque	Nm	0,3	0,4	0,4	0,6	0,7	1	1
Voltage	V	24	24	24	24	24	24	24
Current	A	0,9	0,9	0,95	1,8	1,8	1,1	0,9
Resistance at 20° C	Ω	25	20	24	11	11	22	27
Power dissipation	W	400	600	800	1600	2000	2400	4800
Weight	kg	4,7	6,4	8,8	24	28	38	62
Fan tension	V	24 DC, 110/220 AC	24 DC, 110/220 AC	24 DC, 110/220 AC	24 DC, 110/220 AC	24 DC, 110/220 AC	24 DC, 110/220 AC	24 DC, 110/220 AC
A	mm	115	135,5	157	254	254	286	360
B	mm	55 h7	55 h7	75 h7	99 h8	99 h8	150 h8	150 h8
C	mm	6 x M5 ø103	6 x M5 ø122	6 x M5 ø144	8 x ø7 ø233	8 x ø7 ø233	8 x M6 ø267	8 x ø8,5 ø342
E	mm	3	2,5	2,5	5	5	5	5
F	mm	15 H7	17 H7	20 H7	28 H7	28 H7	55 H7	55 H7
G	mm	4 D10	5 D10	6 D10	10 D10	10 D10	16 D10	16 D10
H	mm	16,3 +0,1/0	19,7 +0,1/0	22,8 +0,1/0	31,3 +0,1/0	31,3 +0,1/0	59,3 +0,2/0	59,3 +0,2/0
L	mm	107	135	145	158	180	180	220
M	mm	47	56	64	64	80	90	110
*P	mm	-	-	-	2,8	2,8	-	-
Q	mm	6	6,5	6,7	8	8	10	5
*S	mm	-	-	-	3	3	-	-
*T	mm	-	-	-	214 g6	214 g6	-	-
Z	mm	135	182	185	284	284	315	390

*Only for sizes 120 and 170

Attention : For a correct use of the brake, the operating temperature must not be more than 70° C

Clutches Series C - Range 12 Nm to 500 Nm



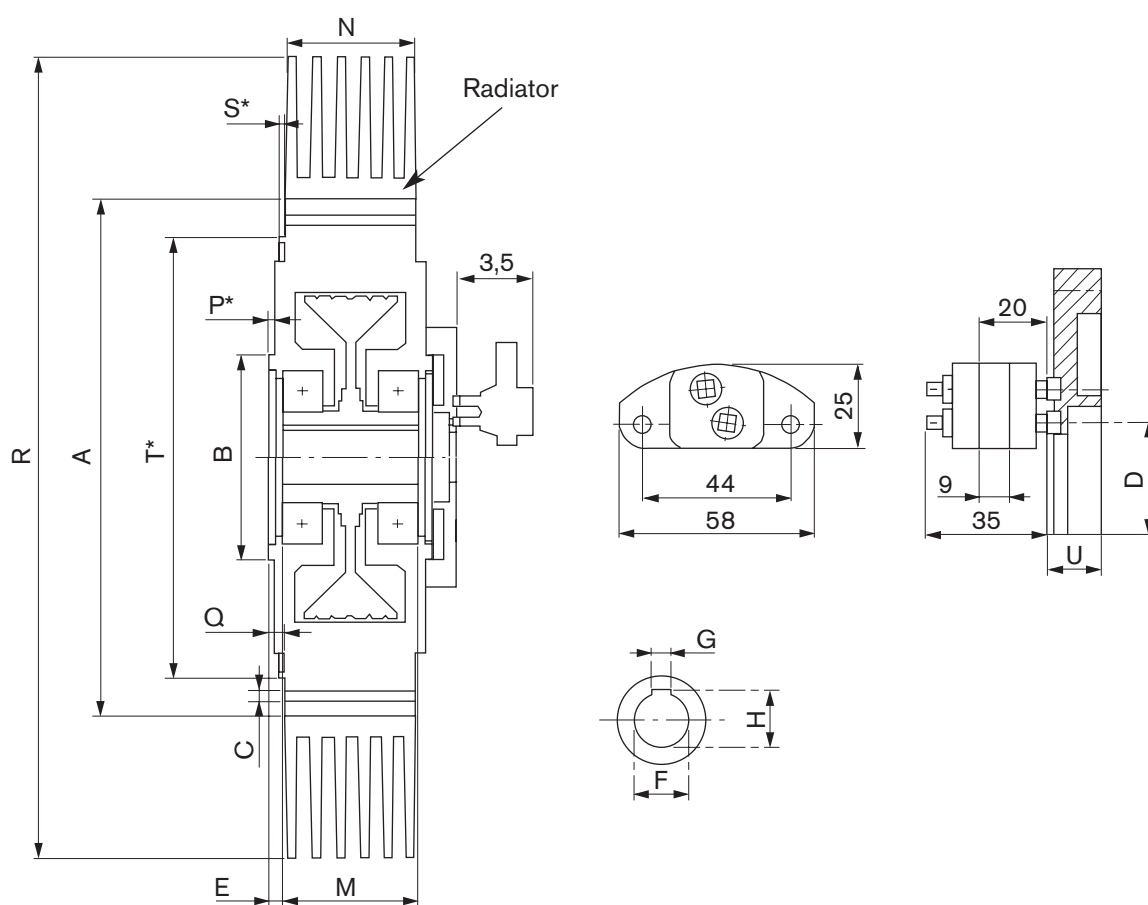
Dimensions and specifications

Models		C12	C35	C65	C120	C170	C250	C500
Maximum torque	Nm	12	35	65	120	170	250	500
Residual torque	Nm	0,3	0,4	0,4	0,6	0,7	1	1
Voltage	V	24	24	24	24	24	24	24
Current	A	0,9	0,9	0,95	1,8	1,8	1,1	0,9
Resistance at 20° C	Ω	25	20	24	11	11	22	27
Power dissipation at 500 rpm	W	120	200	280	800	1000	1440	2250
Power dissipation at 1000 rpm	W	150	250	350	1000	1250	1800	3500
Weight	kg	2,8	4,7	7,5	19	25	33	62
A	mm	115	135,5	157	254	254	286	360
B	mm	55 h7	55 h7	75 h7	99 h8	99 h8	150 h8	150 h8
C	mm	6 x M5 ø103	6 x M5 ø122	6 x M5 ø144	8 x ø7 ø233	8 x ø7 ø233	8 x M6 ø267	8 x ø8,5 ø342
D	mm	ø65	ø65	ø65	ø65	ø65	ø165	ø165
E	mm	3	2,5	2,5	5	5	5	5
F	mm	15 H7	17 H7	20 H7	28 H7	28 H7	55 H7	55 H7
G	mm	4 D10	5 D10	6 D10	10 D10	10 D10	16 D10	16 D10
H	mm	16,3 +0,1/0	19,7 +0,1/0	22,8 +0,1/0	31,3 +0,1/0	31,3 +0,1/0	59,3 +0,2/0	59,3 +0,2/0
M	mm	47	56	64	64	80	90	110
*P	mm	-	-	-	2,8	2,8	-	-
Q	mm	6	6,5	6,7	8	8	10	5
*S	mm	-	-	-	3	3	-	-
*T	mm	-	-	-	214 g6	214 g6	-	-
U	mm	13,5	13,5	14,5	14,5	14,5	14,5	14,5

*Only for sizes 120 and 170

Attention : For a correct use of the clutch, the operating temperature must not be more than 70° C

Clutches Series CR - Range 12 Nm to 500 Nm



Dimensions and specifications

Models		CR12	CR35	CR65	CR120	CR170	CR250	CR500
Maximum torque	Nm	12	35	65	120	170	250	500
Residual torque	Nm	0,3	0,4	0,4	0,6	0,7	1	1
Voltage	V	24	24	24	24	24	24	24
Current	A	0,9	0,9	0,95	1,8	1,8	1,1	0,9
Resistance at 20° C	Ω	25	20	24	11	11	22	27
Power dissipation at 500 rpm	W	440	640	960	1600	2200	2600	4480
Power dissipation at 1000 rpm	W	550	800	1200	2000	2750	3250	4800
Weight	kg	4,6	7,7	10,5	24	29	40	65
A	mm	115	135,5	157	254	254	286	360
B	mm	55 h7	55 h7	75 h7	99 h8	99 h8	150 h8	150 h8
C	mm	6 x M5 ø103	6 x M5 ø122	6 x M5 ø144	8 x ø7 ø233	8 x ø7 ø233	8 x M6 ø267	8 x ø8,5 ø342
D	mm	ø65	ø65	ø65	ø65	ø65	ø165	ø165
E	mm	3	2,5	2,5	5	5	5	5
F	mm	15 H7	17 H7	20 H7	28 H7	28 H7	55 H7	55 H7
G	mm	4 D10	5 D10	6 D10	10 D10	10 D10	16 D10	16 D10
H	mm	16,3 +0,1/0	19,7 +0,1/0	22,8 +0,1/0	31,3 +0,1/0	31,3 +0,1/0	59,3 +0,2/0	59,3 +0,2/0
M	mm	47	56	64	64	80	90	110
N	mm	48	60	66	58	72,5	82	91
*P	mm	-	-	-	2,8	2,8	-	-
Q	mm	6	6,5	6,7	8	8	10	5
R	mm	200	240	280	390	390	406	500
*S	mm	-	-	-	3	3	-	-
*T	mm	-	-	-	214 g6	214 g6	-	-
U	mm	13,5	13,5	14,5	14,5	14,5	14,5	14,5

*Only for sizes 120 and 170

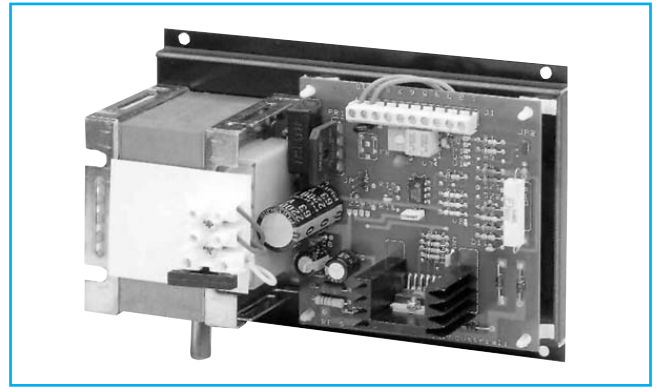
Attention : For a correct use of the clutch, the operating temperature must not be more than 70° C

TCS250 - Current regulator power supply for powder brakes

The TCS250 card was designed especially for controlling powder brakes and for increasing their yield. In fact, this permits complete elimination of residual magnetism in the powder and therefore it is possible to work in low torque ranges without limits.

The components used are professional type and this assures absolute reliability over time. Its limited size facilitates wall mounting.

Connection is easy and is done via 10-pole connector fastened to the terminals with screws.

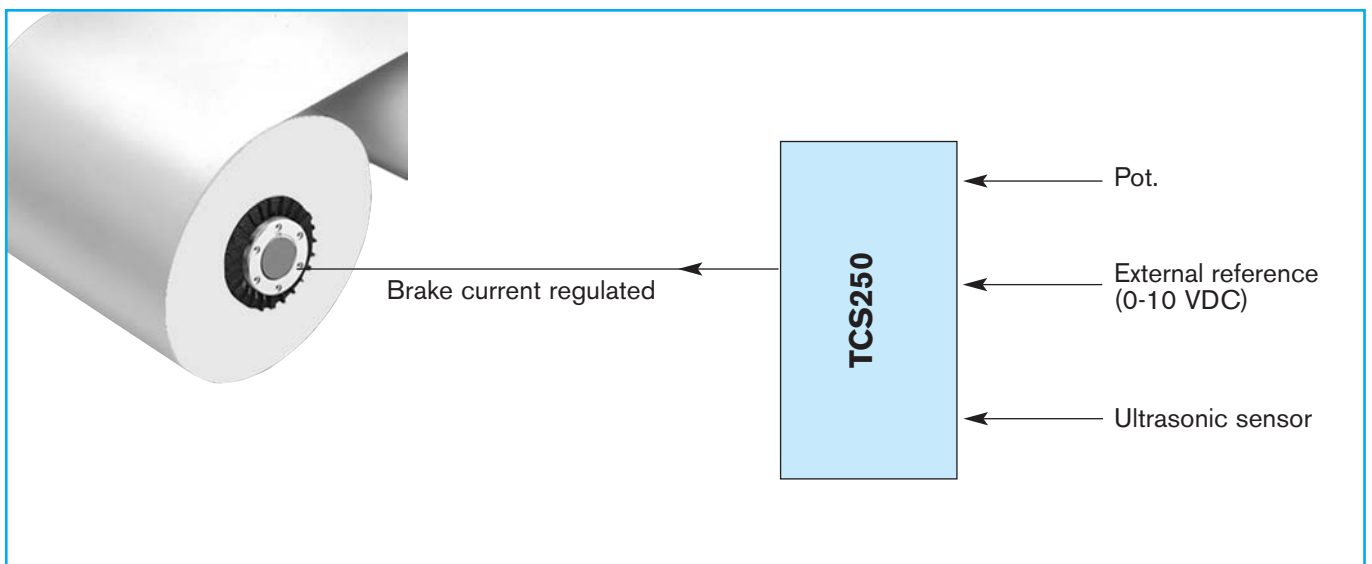
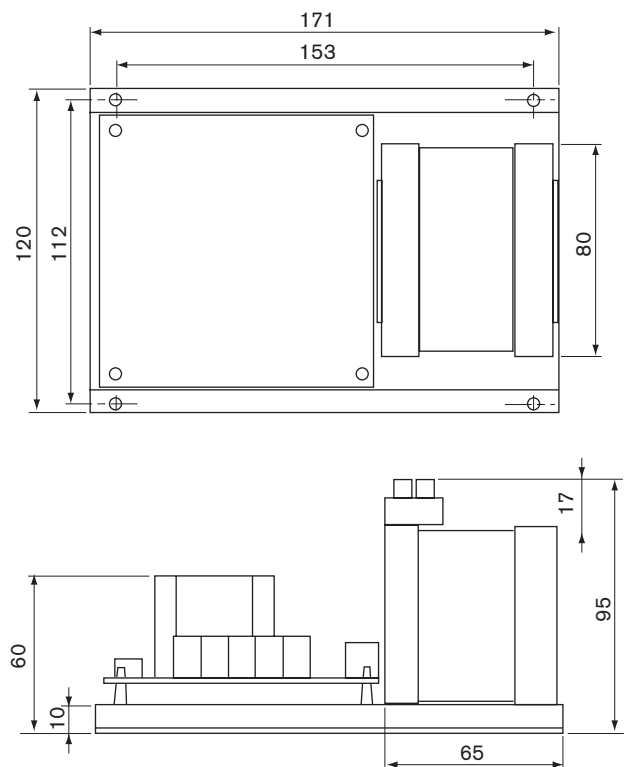


Specifications

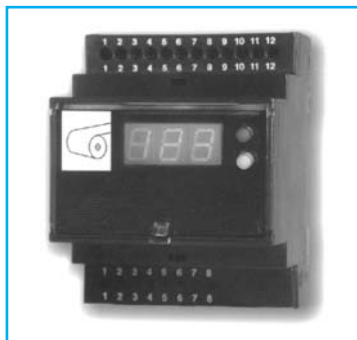
Power supply TCS250-C	28 VAC or 24 VDC
Power supply TCS250-T	110/230VAC 50/60 Hz
Input	0-10VDC from Pot. 10K
Output	0-2A modulated PWM
Absorbed power	30 W max.
Sensibility	10 mV
Repeatability	1%
Current limiter	from -50% to +50%
Polarization	from 0 to 100%
Operating temperature	+50° max
Size	171 x 120 x 95 mm
Weight	1,500 kg

TCS250-T	Card with transformer
TCS250-C	Only card
B90-26325C	Potentiometer
Service manual	MC544

Dimensions (mm)



TCS251 - Numeric control for closed loop applications



This device integrates a microprocessor control function and the power output to control the electromagnetic powder brakes. Equipped with only 3 push buttons for calibration and programming and one display with a 3 digit reading, it has been designed to be mounted on a DIN rail

inside customers electrical control panel.

The compact size, simple installation and easy to use make the instrument extremely flexible.

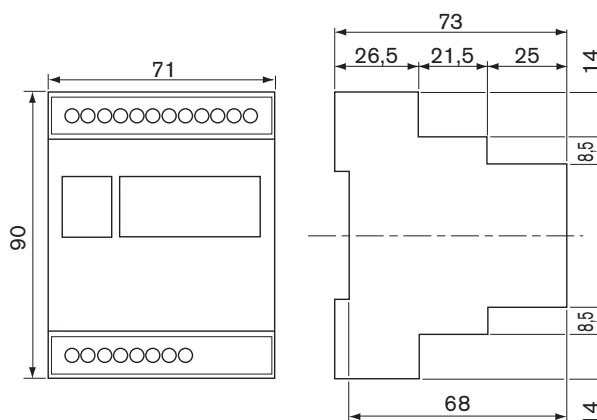
The 24 VDC digital inputs can be easily interfaced with the instrumentation running the machine logic (PLC). The type of input and output electrical signals can be chosen via a keyboard by the system designer and the P.I.D. control logic results in high performance precision control.

The unit has been designed specifically for machines utilising a dancer roll and magnetic powder brake however it can also be used with pneumatic brakes or motors, on unwind or rewind applications and with amplified load cells.

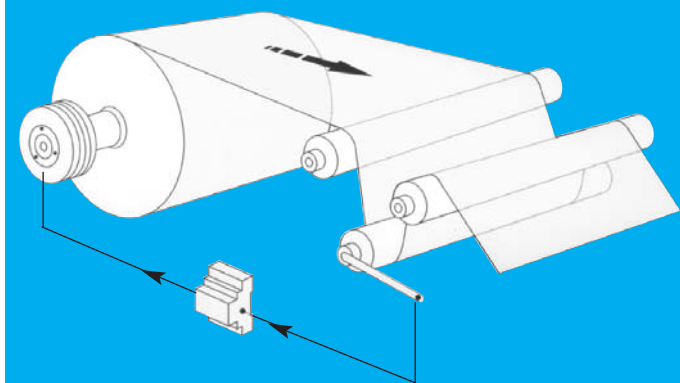
Specifications

Supply Power	18 VAC / 24 VDC with magnetic powder brake: 50 W max. with pneumatic brake or motor: 6 W max.
Regulated analog output	0-10V / -5-5V, 4-20 mA selectable via keyboard
Analog output	0-10V
PWM output	24V, 1,8 A max
Analog input	0-5V / 0-10V, 0-20 mA
keyboard selection	
Digital input	24 VDC
Working temp.	0-50 °C
Weight	180 g
Standard approval	CE/UL
Mounting	Rail DIN

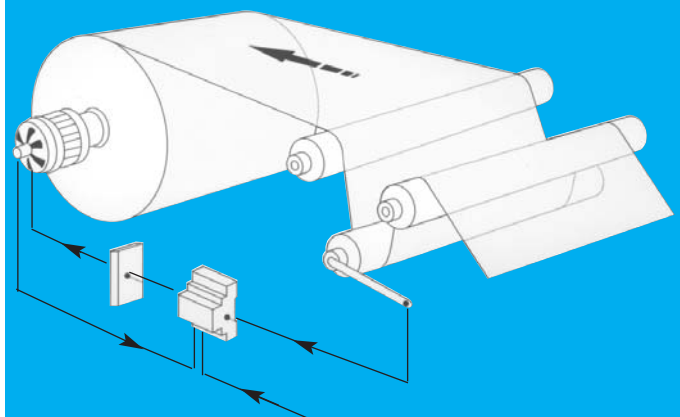
Dimensions (mm)



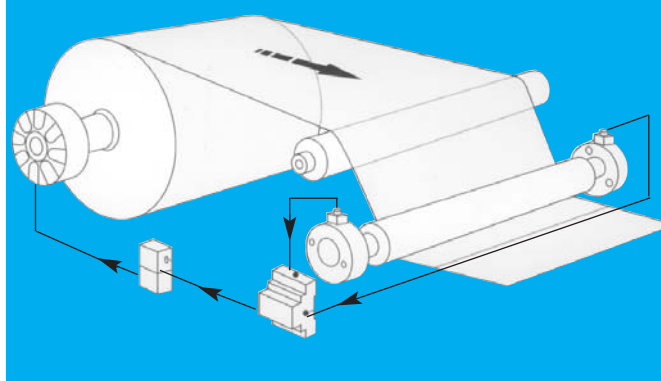
Torque control with DANCER ROLL - Mode 00



Speed control with DANCER ROLL - Mode 01



Torque control with LOAD CELLS - Mode 02



TCS252 - Single phase power supply / 24 VDC



The Warner Electric switching power supply units of the TCS252 series are designed and developed for industrial uses where safety, ease of use and reliability are essential. These units comply with the parameters set out by the Low Voltage Directive.

The low working temperature at full power with 45°C operating temperature combined with the use of first quality components ensure high reliability and duration.

Warner Electric switching power supply units comply with EMI standards. The TCS252 series with 90 – 264 VAC input has no ignition problems at full load even with low mains voltage and therefore suitable for critical supply mains. This series very com-

ed and has an IP 20 degree of protection against incidental contacts according to IEC 529. All the functions are located on the front panel and marked with IEC symbols, which makes its use very simple, even on site.

Specifications

INPUT TECHNICAL DATA

Rated voltage	90-264 VAC / 110 VDC $\pm 10\%$
Frequency	50 – 60 Hz
Current at lout max	1,1 A @ 120 VAC / 0,6 A @ 230 VAC $\pm 10\%$
Protection fuse	T 2 A

OUTPUT TECHNICAL DATA

Voltage	24 VDC $\pm 5\%$ (adjustable)
Continuous current	3 A
Load regulation	$< 1,5\%$
Overload	Short circuit protection motorised
Parallel connection	possible with external protection diode

GENERAL TECHNICAL DATA

Power dissipation	< 6 W
Operating temperature	10 – 60°C, -0,033 A/°C over 45°C
Protection degree	IP 30
Standard / Approvals	EN 60950, IEC950, UL 1950, UL508C
EMC standards	EN 50081-1, EN 50082-2, EN 61000-3-2,3
Surge immunity	EN61000-4-2, EN61000-4-4, EN 61000-4-5
Connection terminal blocks	terminal blocks 2,5 mm ² , pluggable
Housing material	polyamide UL94V-0
Approximative weight	0,3 kg ca.
Mounting information	vertical on rail, allow 20 mm spacing between adjacent components
Mounting rail according to IEC60715/TH35	Yes
Mounting rail according to IEC60715/G32	Yes
Dimensions	Width : 130 mm Depth : 55 mm Height : 115 mm

Block diagram

