ARKIV F 9 T

CEM
Cie Electro-Mécanique

TACHO-GENERATORS

NOVEMBER 1982

SERVOMOTEURS PARVEX

GENERAL DESCRIPTION

The several technologies used in C.E.M. Tacho-generators enable them to provide answers to all problems encountered in velocity servo-mechanisms.

DISC ROTOR GENERATORS F 9 T - FC 12 T - AXEM technology - EMF 3 and 6 Volts/1000 rpm - High signal-to-noise ratio and low inertia makes these generators ideally suitable for high performance servo-mechanisms..

WIRE-WOUND ROTOR GENERATORS TNB 400 - EMF 3 to 60 Volts/1000 rpm. Signal-to-noise ratio identical to F 9 T and FC 12 T. Fitted without separate coupling. The direct installation on shaft increases the resonant frequency, as with F 9 T and FC 12 T. These tachos are available with or without protective cover. The TBN 400 series is used as standard equipment on C.E.M. servo-motors : AXEM, TF, TC. They may also be fitted to conventional DC motors.

WIRE-WOUND ROTOR GENERATORS TBA 400 - Characteristics identical to TBN 400 except that this generator is fitted with a shaft and therefore requires a coupling between it and the motor. Protection is IP 55, with either output cable or terminal box fitted.

WIRE-WOUND ROTOR GENERATORS TBC 400 - The electrical characteristics and winding variants are identical with TBN and TBA 400. However, whereas the TBA series is fitted with an output shaft, the TBC series is fitted with a hollow shaft enabling its use in cases where it is impossible to locate the tacho on the motor rear flange. Under these conditions the generators are mounted with resilient block(s).

CUP ROTOR GENERATORS F 3 TC - EMF 3 Volts/1000 rpm. These are very low inertia generators (45 g/cm^2), thus making them ideal for use on very high performance servo-motors, (in particular high flux motors). Under these conditions it is possible to obtain very short acceleration and deceleration times.

FC 12 T

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F 9 T

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TBN 400

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TBN 400

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TBA 400

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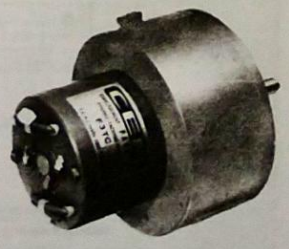
F 3 TC



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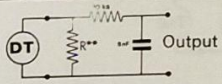
FC 12 T

This new discoidal design DC tacho-generator can be fitted to AXEM MC series servo-motors, and to certain series T torque motors, without the use of a separate coupling. This system is particularly suitable for velocity loop servo-systems in which precise measurement of speed is required. The various bore diameters available for the FC 12 T also enables it to be installed on a range of conventional DC motors.

SPECIFICATIONS

Designation	Symbol	Unit	TYPE FC 12 T
EMF/1000 rpm (open circuit)	K_E	V	$6^{+5\%}_{-0}$
Bidirectional tolerance		% K_E	± 1,5
Peak to peak ripple (*)	B	% U	3
Linearity with reference to 3600 rpm	L	% 3,6 K_E	0,05
Rotor terminal resistance at 25°C	R	Ω	1
Rotor moment of inertia	J	g.cm²	1500
Ambient operating range		°C	— 25 + 70
Temperature coefficient of output voltage		%/°C	0,02
Maximum operating speed		rpm	4000
Weight		g	1500

(*) As measured at 125 r.p.m. using the filter shown (fc 2 kHz) R** advised: 10 kΩ mini : 1 kΩ



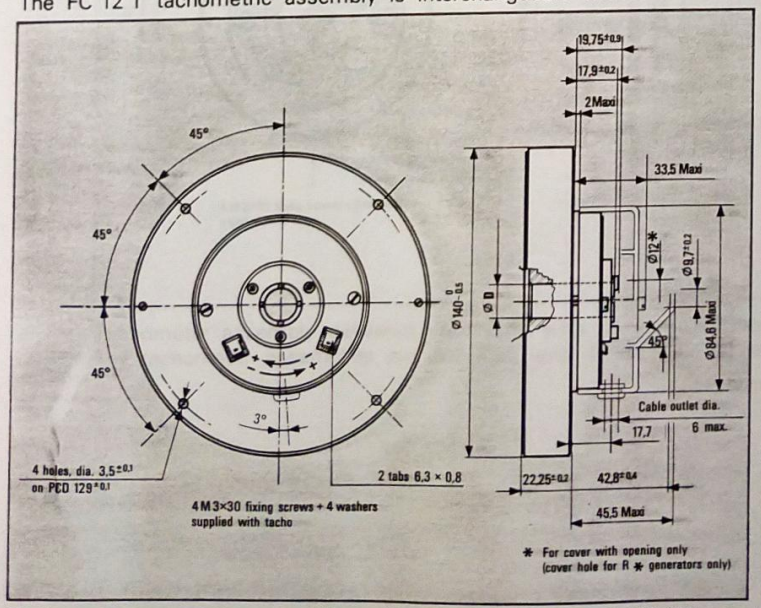
FC 12 T TACHOMETER ASSEMBLY CODIFICATION

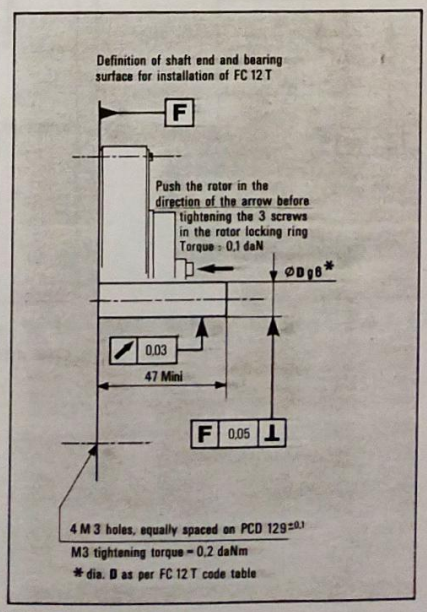
Bore dia. side D	Standard	Cover	Cover for output shaft end	Cover + 2nd shaft end
16	R 0001	R 0006	R 0011*	R 0016
14	R 0002	R 0007	R 0012*	R 0017
12,5	R 0003	R 0008	R 0013*	R 0018
10	R 0004	R 0009	R 0014*	R 0019

Painted tachometer assemblies delivered separately. Identification No. to be stated with all orders.

OVERALL DIMENSIONS (mm)

The FC 12 T tachometric assembly is interchangeable with the F 12 T.





Tachometer assemblies are delivered complete with 4 CBL M3/30 mm fixing screws.

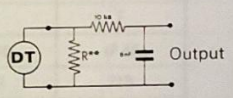
F9T

This generation of DC tacho-generators can be built onto any type of AXEM F series servomotor, and is particularly suitable for servosystems involving accurate speed measurement.

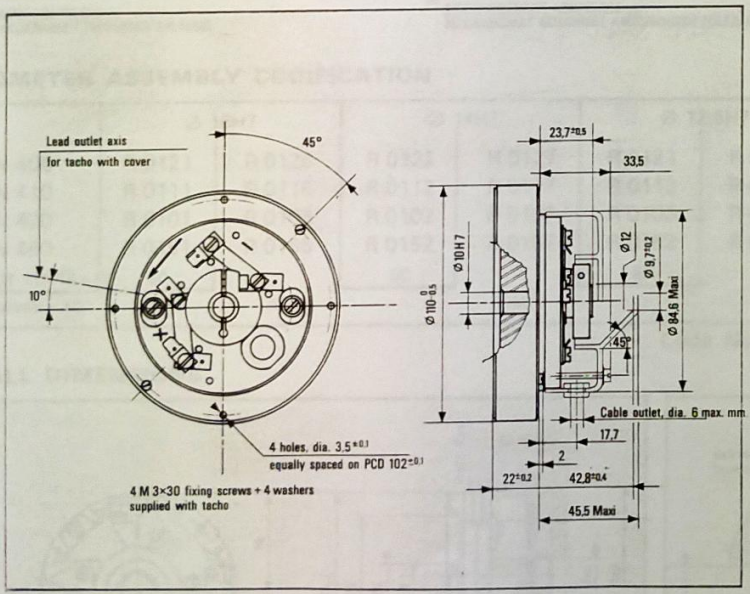
SPECIFICATIONS

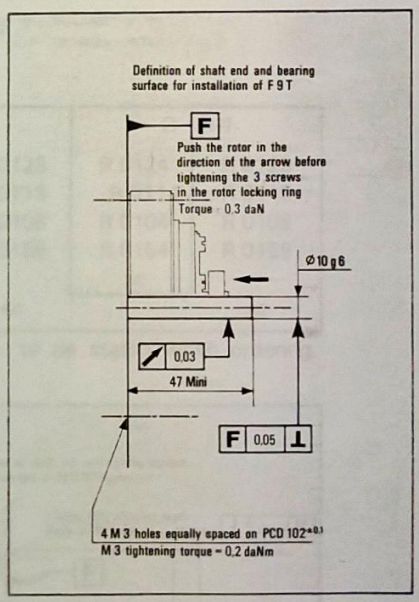
Designation	Symbol	Unit	TYPE FC 9 T
EMF/1000 rpm (open circuit)	K_E	V	$3^{+5\ \%}_{-0}$
Bidirectional tolerance		% K_E	± 1,5
Peak to peak ripple (*)	B	% U	4
Linearity with reference to 3600 rpm	L	% 3,6 K_E	0,05
Rotor terminal resistance at 25°C	R	Ω	1
Rotor moment of inertia	J	g.cm²	350
Ambient operating range		°C	— 25 + 70
Temperature coefficient of output voltage		%/°C	0,02
Maximum operating speed		rpm	4000
Weight		g	1000

(*) As measured at 125 rpm using the ripple filter shown (fc ≃ 2 kHz)



OVERALL DIMENSIONS (mm)





Tachometer assembly delivered separately with cover (code No. to be stated when ordering : F 9 T-57281)
The tachometer assemblies are delivered with 4 CBL M3 × 30 mm attaching screws.

TBN 400

The type TBN 400 wire-wound rotor tacho-generator range completes the present series of "AXEM" generators, by providing higher EMF's, of 10, 20 and 60 V/1000 rpm, as standard products. As for the FC 12 T's and F 9 T's, these generators are mounted directly on the motor shaft without insertion of a coupling. Therefore, these can be fitted to CEM servomotors, and also to conventional DC motors or any other system requiring a speed loop.

SPECIFICATIONS SPECIFICATIONS / KENNDATEN	SYMBOLE SYMBOL / SYMBOL	UNITÉ UNIT / EINHEIT	TBN 410	TBN 420	TBN 460
FEM A 1000 TR/MIN. EMF/1000 RPM (OPEN CIRCUIT) / EMK/1000 U MIN $^{-1}$ (LEERLAUF)	K_E	V	10	20	60
ÉCART DE BIDIRECTIONNALITÉ DE FEM BIDIRECTIONAL TOLERANCE / ABWEICHUNG RECHTS-LINKSLAUF		% K_E	< 1	< 1	< 1
ONDULATION RÉSIDUELLE CRÊTE-A CRÊTE PEAK-TO-PEAK RIPPLE / RESTWELLIGKEIT (SPITZE-SPITZE)	B	% U	< 0,5	< 0,5	< 0,5
LINEARITÉ RAPPORTÉE A 3600 TR/MIN LINEARITY WITH REFERENCE TO 3600 RPM / LINEARITÄT (BEZOGEN AUF 3600 U MIN^{-1})		%	< 0,15	< 0,15	< 0,15
COURANT MAXI * MAXIMUM PERMISSIBLE CURRENT / MAX. ZUL. STROM	I max.	mA	450	300	180
VITESSE MAXI ** MAXIMUM SPEED / HÖCHSTDREHZAHL		tr/min. r.p.m. / U.p.m.	10 000	10 000	10 000
MOMENT D'INERTIE ROTOR MOMENT OF INERTIA / LÄUFERTRAGHEITSMOMENT	J	g.cm^2	1400	1400	1400
DÉRIVE DE LA FEM AVEC LA TEMPERATURE TEMPERATURE COEFFICIENT OF OUTPUT VOLTAGE / TEMPERATURGANG DER EMK		%/°C	− 0,013	− 0,013	− 0,013
RÉSISTANCE D'INDUIT A 25°C ROTOR TERMINAL RESISTANCE AT 25°C / AUSGANGKLEMMENWIDERSTAND BEI 25°C		Ω	12	44	340
SELF INDUCTANCE INDUCTANCE / SELBSTINDUKTANZ		mH	9	33	300
CLASSE D'ISOLATION INSULATION CLASS / ISOLATIONS KLASSE			F	F	F
CLASSE DE PROTECTION DEGREE OF PROTECTION / SCHUTZART			IP 40	IP 40	IP 40
MASSE MASS / MASSE		g	710	710	710

* THERMIQUEMENT ADMISSIBLE
THERMALLY ALLOWABLE / THERMISCH ZULÄSSIG

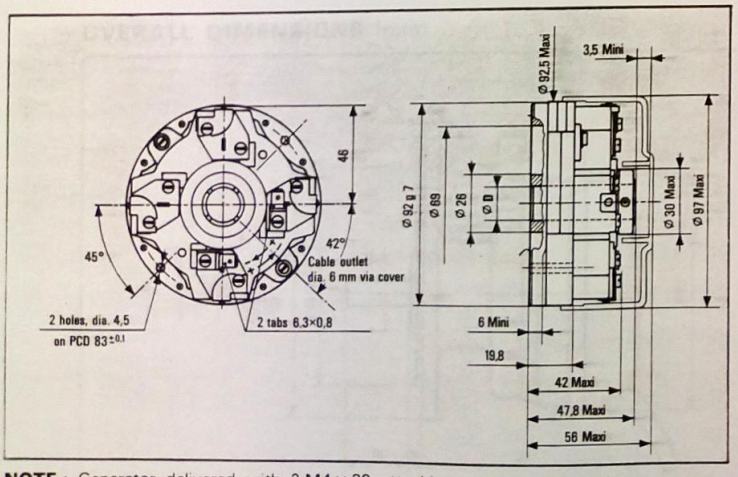
** MÉCANIQUEMENT ADMISSIBLE
MECHANICALLY ALLOWABLE / MECHANISCH ZULÄSSIG

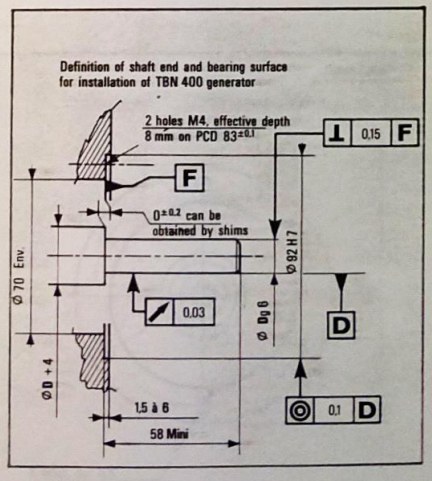
TACHOMETER ASSEMBLY CODIFICATION

	∅ 16H7		∅ 14H7		∅ 12,5H7		∅ 10H7	
TBN 406	R 0121	R 0126	R 0122	R 0127	R 0123	R 0128	R 0124	R 0129
TBN 410	R 0111	R 0116	R 0112	R 0117	R 0113	R 0118	R 0114V	R 0119
TBN 420	R 0101	R 0106	R 0102	R 0107	R 0103	R 0108	R 0104	R 0109
TBN 460	R 0151	R 0156	R 0152	R 0157	R 0153	R 0158	R 0154	R 0159
WITHOUT COVER = SC	SC		SC		SC		SC	
WITH COVER = AC		AC		AC		AC		AC

Code No. to be stated when ordering.

OVERALL DIMENSIONS





NOTE : Generator delivered with 2 M4 × 30 attaching screws and washers.

TBA 400

The TBA 400 generators differ from the TBN 400's in their mechanical design. As designed they are fitted with solid shafts and are driven via a flexible coupling, whereas the TBN 400 series fit directly over an existing motor shaft. The TBA 400 generators are IP 55 protected. Connection is made either by a cable or through a terminal box. The electrical characteristics and ease of adaptation of the EMF are identical to the TBN 400.

SPECIFICATIONS SPECIFICATIONS / KENNDATEN	SYMBOLE SYMBOL / SYMBOL	UNITÉ UNIT / EINHEIT	TBA 410	TBA 420	TBA 460
FEM A 1000 TR/MIN. EMF/1000 RPM (OPEN CIRCUIT) / EMK/1000 U MIN. (LEERLAUF)	K_E	V	10	20	60
ÉCART DE BIDIRECTIONNALITÉ DE FEM BIDIRECTIONAL TOLERANCE / ABWEICHUNG RECHTS-LINKSLAUF		% K_E	< 1	< 1	< 1
ONDULATION RÉSIDUELLE CRÊTE A CRÊTE PEAK-TO-PEAK RIPPLE / RESTWELLIGKEIT (SPITZE-SPITZE)	B	% U	< 0,5	< 0,5	< 0,5
LINÉARITÉ RAPPORTÉE A 3600 TR/MIN LINEARITY WITH REFERENCE TO 3600 RPM / LINEARITÄT (BEZOGEN AUF 3600 U MIN^{-1})		%	< 0,15	< 0,15	< 0,15
COURANT MAXI * MAXIMUM PERMISSIBLE CURRENT / MAX. ZUL. STROM	I max.	mA	450	300	180
VITESSE MAXI ** MAXIMUM SPEED / HÖCHSTDREHZAHL		tr/min. r.p.m. / U.p.m.	10 000	10 000	10 000
MOMENT D'INERTIE ROTOR MOMENT OF INERTIA / LÄUFERTRÄGHEITSMOMENT	J	g.cm^2	1500	1500	1500
DÉRIVE DE LA FEM AVEC LA TEMPÉRATURE TEMPERATURE COEFFICIENT OF OUTPUT VOLTAGE / TEMPERATURGANG DER EMK		%/°C	− 0,013	− 0,013	− 0,013
RÉSISTANCE D'INDUIT A 25°C ROTOR TERMINAL RESISTANCE AT 25°C / AUSGANGKLEMMENWIDERSTAND BEI 25°C		Ω	12	44	340
SELF INDUCTANCE INDUCTANCE / SELBSTINDUKTANZ		mH	9	33	300
CLASSE D'ISOLATION INSULATION CLASS / ISOLATIONS KLASSE			F	F	F
CLASSE DE PROTECTION DEGREE OF PROTECTION / SCHUTZART			IP 55	IP 55	IP 55
MASSE MASS / MASSE		g	1500	1500	1500

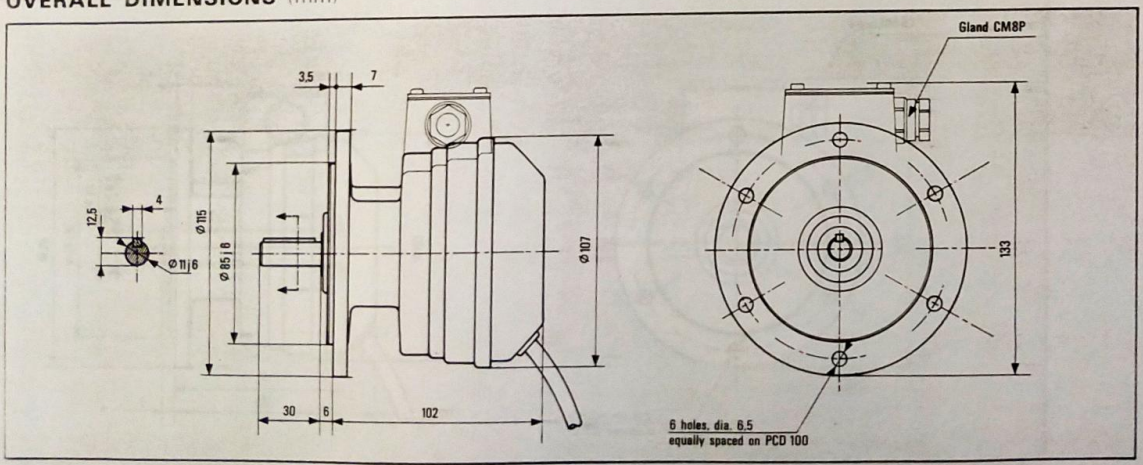
* THERMIQUEMENT ADMISSIBLE
THERMALLY ALLOWABLE / THERMISCH ZULÄSSIG

** MÉCANIQUEMENT ADMISSIBLE
MECHANICALLY ALLOWABLE / MECHANISCH ZULÄSSIG

TACHOMETER ASSEMBLY CODIFICATION

	Shaft ∅ 11j6 standard		Shaft ∅ 7j6 option	
	with cable output	with terminal box	with cable output	with terminal box
TBA 410	R 0031	R 0034	R 0032	R 0035
TBA 420	R 0016	R 0019	R 0017	R 0020
TBA 460	R 0001	R 0004	R 0002	R 0005

OVERALL DIMENSIONS (mm)



TBC 400

The hollow shaft TBC 400 series is designed for installation on the second shaft end of motors whose rear flanges or covers have not been designed for accurate positioning of the tachometric flange.
Axial and angular fixing can be resolved by the use of resilient block(s).

SPÉCIFICATIONS SPECIFICATIONS / KENNDATEN	SYMBOLE SYMBOL / SYMBOL	UNITÉ UNIT / EINHEIT	TBC 410	TBC 420	TBC 460
FEM A 1000 TR/MIN EMF/1000 RPM (OPEN CIRCUIT) / EMK/1000 U MIN $^{-1}$ (LEERLAUF)	K_E	V	10	20	80
ÉCART DE BIDIRECTIONNALITÉ DE FEM BIDIRECTIONAL TOLERANCE / ABWEICHUNG RECHTS-LINKSLAUF		% K_E	< 1	< 1	< 1
ONDULATION RÉSIDUELLE CRÊTE A CRÊTE PEAK TO PEAK RIPPLE / RESTWELLIGKEIT (SPITZE-SPITZE)	B	% U	< 0,5	< 0,5	< 0,5
LINÉARITÉ RAPPORTÉE A 3600 TR/MIN LINEARITY WITH REFERENCE TO 3600 RPM / LINEARITÄT BEZOGEN AUF 3600 U MIN $^{-1}$		%	< 0,15	< 0,15	< 0,15
COURANT MAXI * MAXIMUM PERMISSIBLE CURRENT / MAX. ZUL. STROM	I max.	mA	450	300	180
VITESSE MAXI ** MAXIMUM SPEED / HÖCHSTDREHZAHL		tr/min r.p.m. / U.p.m.	10 000	10 000	10 000
MOMENT D'INERTIE ROTOR MOMENT OF INERTIA / LAUFERTRAGHEITSMOMENT	J	g.cm^2	1450	1450	1450
DÉRIVE DE LA FEM AVEC LA TEMPÉRATURE TEMPERATURE COEFFICIENT OF OUTPUT VOLTAGE / TEMPERATURGANG DER EMK		%/°C	– 0,013	– 0,013	– 0,013
RÉSISTANCE D'INDUIT A 25°C ROTOR TERMINAL RESISTANCE AT 25°C / AUSGANGKLEMMENWIDERSTAND BEI 25°C		Ω	12	44	340
SELF INDUCTANCE INDUCTANCE / SELBSTINDUKTANZ		mH	9	33	300
CLASSE D'ISOLATION INSULATION CLASS / ISOLATIONS KLASSE			F	F	F
CLASSE DE PROTECTION DEGREE OF PROTECTION / SCHUTZART			IP 55	IP 55	IP 55
MASSE MASS / MASSE		g	1400	1400	1400

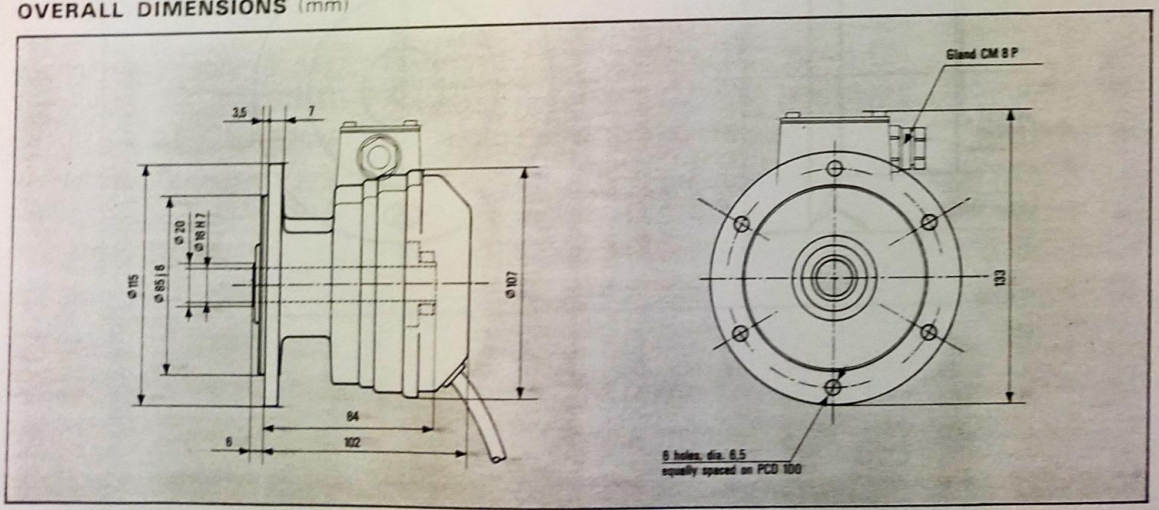
* THERMIQUEMENT ADMISSIBLE
THERMALLY ALLOWABLE / THERMISCH ZULÄSSIG

** MÉCANIQUEMENT ADMISSIBLE
MECHANICALLY ALLOWABLE / MECHANISCH ZULÄSSIG

TACHOMETER ASSEMBLY CODIFICATION

	Hollow shaft ∅ 16H7		Hollow shaft ∅	
	with cable output	with terminal box	with cable output	with terminal box
TBC 410	R 0031	R 0034		
TBC 420	R 0016	R 0019		
TBC 460	R 0001	R 0004		

OVERALL DIMENSIONS (mm)



F3TC

This tacho-generator featuring a cup rotor design, offers a very low moment of inertia compared with conventional tacho-generators, as well as F 9 T and FC 12 T discoidal rotor tachos.
Low peak-to-peak ripple and reduction of torsion resonance effects are the main advantages offered by this technique, which is ideally suited by reason of its low inertia to incremental closed loop servo-systems and to all variable speed systems.

SPECIFICATIONS

Designation	Symbol	Unit	TYPE FC 3 T
EMF/1000 rpm (open circuit)	K_E	V	$3\ ^{+0}_{-5}\ \%$
Bidirectional tolerance		% K_E	± 1,5
Peak-to-peak ripple*	B	% U	3
Linearity with reference to 3600 rpm	L	% 3,6 K_E	0,1
Rotor terminal resistance at 25°C	R	Ω	36
Maximum current	I max.	mA	15
Rotor moment of inertia	J	$g.cm^2$	5,3
Moment of inertia (rotor + flux returning)		$g.cm^2$	45
Ambient operating range		°C	0 - 70
Temperature coefficient of output voltage		%/°C	0,02
Inductance		mH	1,6
Maximum operating speed		rpm	6000
Weight		g	~700

*With RC - 500 Hz filter.