DC high duty solenoids

1

Product Group

G TC A

Function

- increasing force characteristic (Fig.2)
- push and pull operation
- suitable for mounting in any attitude

Construction

- robust cylindrical construction with optional flange mounting
- seven sizes (40mm to 100mm diameter)
- connections with free leads, plug connector or terminal box
- coil insulation Class F, maximum 250V
- protection classfication - DIN VDE 0470/EN 60529

spade connectors	- IP 00
flying leads	- IP 00
plug base	- IP54 with plug ZKB
terminal box	- IP54

Fig.1 GTCA 090 X43 A02

Applications

- general purpose, high endurance for arduous service
- machine tools, office machines, automation, remote control, packaging, coin equipment and textile machines

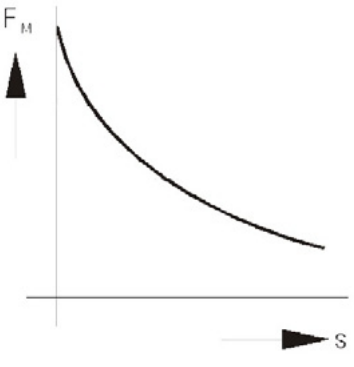

Fig. 2 Force vs. stroke characteristic

Options

- supplied with or without mounting flange
- armature return spring
- plug connectors - for DC supply (type ZKBX)
  - for AC supply, with built-in rectifier (type ZKBG)
- fork ends (type ZGA)
- double-acting version - type GTUW

Standards

- designed and tested to VDE 0580
- manufactured to ISO 9001

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Technical data

G TC A		040					050					060				
Operataing mode		S1 100%	S3 40%	S3 25%	S3 15%	S3 5%	S1 100%	S3 40%	S3 25%	S3 15%	S3 5%	S1 100%	S3 40%	S3 25%	S3 15%	S3 5%
Stroke s	(mm)	Magnetic Force F_M (N)					Magnetic Force F_M (N)					Magnetic Force F_M (N)				
	0	38	60	70	82	124	100	144	180	207	278	150	200	228	257	378
	2	12,6	21	27,5	34	58	28	46	63	77	121	54	89	107	126	200
	3	11,2	19,6	24,5	30	55	23	39	54	67	107	48	78	95	114	186
	4	10	18	22,5	28,5	53	21	36	50	63	102	43	71	87	105	178
	5	9	16,5	21	26,5	51	20	33	47	59	97	40	67	81	99	175
	6	7,7	15,5	19,5	25,5	48	18	31	44	56	94	38	62	76	93	172
	8	6	13	17,5	22	44	16	27	39	49	86	32	55	69	85	167
	10						14	24	36	46	82	29	51	64	79	156
	12											26	46	58	73	150
	15															
Rated work A_N	(Ncm)	4,8	10,4	14	17,6	35,2	14	24	36	46	82	31,2	55,2	69,6	87,6	180
Rated Power P_{20}	(W)	12,9	28	41	17,6	35,2	16,5	34	60	100	270	26	54	77	107	377
Operating frequncy S_h	(1/h)	19000	15000	10000	6500	2400	15000	12000	8000	5300	2000	12000	9700	6400	4200	1600
Closing time t_1	(ms)	102	94	90	82	73	128	117	112	101	90	163	148	140	126	112
Opening time t_2	(ms)	85	70	63	56	51	101	83	75	66	60	138	112	101	79	82
Time constant t (ms) • Armature in stroke start position • Armature in stroke end position Inductance L = τ x R (τ x 10^{-3})		7 18					15 18					23 33				
Armature weight m_A	(kg)	0,08					0,12					0,23				
Solenoid weight m_M	(kg)	0,38					0,74					1,26				

G TC A		070					080					090				
Operataing mode		S1 100%	S3 40%	S3 25%	S3 15%	S3 5%	S1 100%	S3 40%	S3 25%	S3 15%	S3 5%	S1 100%	S3 40%	S3 25%	S3 15%	S3 5%
Stroke s	(mm)	Magnetic Force F_M (N)					Magnetic Force F_M (N)					Magnetic Force F_M (N)				
	0	196	264	320	355	480	185	268	315	366	505	223	300	344	433	630
	2	85	130	164	183	264	-	-	-	-	-	-	-	-	-	-
	3	73	109	138	159	245	-	-	-	-	-	-	-	-	-	-
	4	68	102	132	154	236	-	-	-	-	-	-	-	-	-	-
	5	66	100	130	151	233	72	109	134	164	263	116	166	193	230	360
	6	59	94	125	147	229	-	-	-	-	-	-	-	-	-	-
	8	52	86	117	137	220	-	-	-	-	-	-	-	-	-	-
	10	45	75	105	126	214	59	96	120	147	236	102	160	182	215	335
	12	38	68	95	116	207	-	-	-	-	-	-	-	-	-	-
	15	28	54	81	101	193	42	78	104	134	224	87	148	175	212	324
	20						29	60	83	113	220	64	130	162	206	330
	25											46	102	134	188	330
Rated work A_N	(Ncm)	42	81	121	151	290	58	120	166	226	440	115	255	335	470	810
Rated Power P_{20}	(W)	33	66	118	142	447	31	71	119	185	588	51	131	202	318	823
Operating frequncy S_h	(1/h)	10000	7900	5200	3500	1400	9000	7100	4700	3200	1200	6800	4700	3200	2200	800
Actuation time t_1	(ms)	203	181	171	152	122	230	202	189	166	145	350	302	280	243	208
Fall time t_2	(ms)	148	119	107	95	87	166	132	118	105	95	182	142	127	113	101
Time constant t (ms) • Armature in stroke start position • Armature in stroke end position Inductance L = τ x R (τ x 10^{-3})		31 35					35 30					38 38				
Armature weight m_A	(kg)	0,34					0,46					0,8				
Solenoid weight m_M	(kg)	2					2,85					4,5				

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G TC A		100				
Operataing mode		S1 100%	S3 40%	S3 25%	S3 15%	S3 5%
Stroke s	(mm)	Magnetic Force F_M (N)				
	0 2	353 -	490 -	610 -	800 -	1060 -
	3 4	- -	- -	- -	- -	- -
	5 6	138 -	190 -	240 -	315 -	480 -
	8 10	- 129	- 180	- 230	- 295	- 440
	12 15	- 118	- 175	- 224	- 288	- 432
	20 25	107 93	163 156	215 212	288 288	440 460
	30	74	138	200	286	470
Rated work A_N	(Ncm)	222	414	600	858	1296
Rated Power P_{20}	(W)	69	125	198	403	855
Operating frequncy S_h	(1/h)	5700	4200	2900	2000	800
Actuation time t_1	(ms)	400	337	306	262	226
Fall time t_2	(ms)	230	175	156	139	121
Time constant t (ms) • Armature in stroke start position • Armature in stroke end position Inductance L = τ x R (τ x 10^{-3})		52 45				
Armature weight m_A	(kg)	1,15				
Solenoid weight m_M	(kg)	6,4				

Table notes
0 mm is completion of energised rotation

Table Basis

The terms used are defined in Technical Definitions GXX available on our website

Magnetic forces stated are based on:

- construction version GTCA...X43 A04 to A05
- 24V / 5-100% duty coil
- 35°C ambient temperature
- 90% of the rated voltage
- heat-insulated mounting
- working in the hot condition
- armature in horizontal attitude

For all other construction versions a heat conductive mounting is required to achieve the stated forces
For other rated volatages some minor variations in the magnetic forces noted may occur

Duty Rating ED, % of energised time/cycle: $\frac{t(on)}{t\,(on) + t\,(off)} \times 100$

Max. energised time/cycle: 100% continuous: 40% - 120 secs, 25% - 75 secs, 15% - 45 secs, 5% - 15 secs

Rated Power P_{20} stated with coil at 20°C

Values given may vary up to 10% owing to inherent and manufacturing tolerances

Supply voltage

Standard voltages available: 24V DC and 205V DC (for rectified 230V 50/60Hz)
Other voltages up to 250V DC, on request
For flying lead versions (GTCA...X20 A01 and GTCA...X20 A02), for voltages of ≥ 42V DC a protective earth connection to VDE0580 must be used

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AC SUPPLY - TYPE GTCA WITH RECTIFIER

The solenoids may be connected to AC supplies with:

a) plug connector with built-in rectifier (type Z KB G)

b) terminal box with built-in rectifier (type G TC A ... A14 - A15).

A rectifier increases opening time (t_2) by 200 - 300%. Magnetic force and closing time (t_1) are not affected when correct coil windings are used to allow for rectifed voltage drop (19.6V DC for 24V AC, 97V DC for 110V AC, and 205V DC for 230V AC)

The supply circuit should be arranged to avoid voltage peaks and if larger capacitance or inductance is in the circuit, the solenoid should be protected by chokes etc. AC switching is preferred. If DC switching is necessary then in the terminal box designs (GTCA ... A14 and A15) DC switching can be arranged replacing the bridge link and by installing a switch between terminals

- 2 and 3 (fig. 3) for sizes 040 to 060 and
- 3 and 4 (fig. 4) for sizes 070 to 100

Connection diagram of series G TC A ... A14 to G TC A ... A15

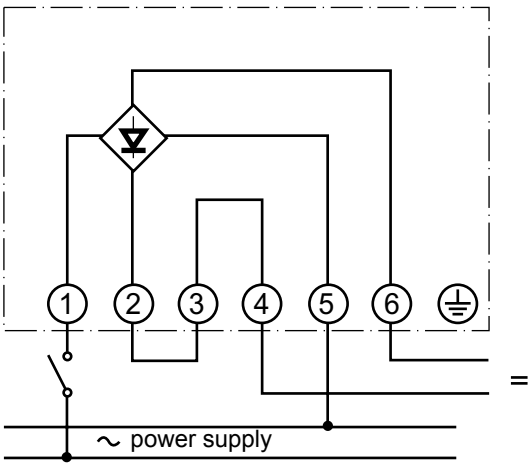

Fig. 3: Sizes 040 to 060

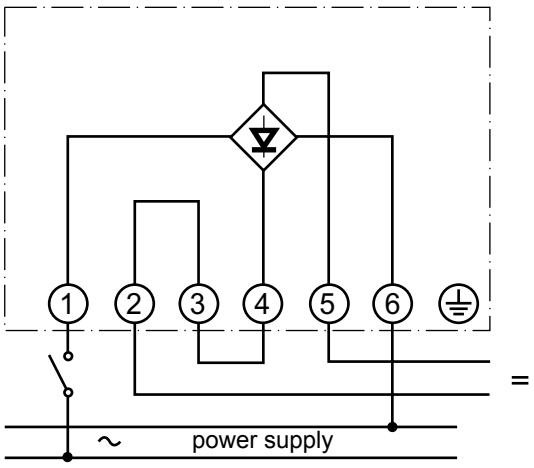

Fig. 4: Sizes 070 to 100

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Dimensions

G TC A							
size	**040**	**050**	**060**	**070**	**080**	**090**	**100**
Dimensions in mm							
a^1	50	60	70	80	90	100	110
a^2	7	11,5	12	14	14	16	20
b	40	40	40	56	56	56	56
d_1	40	50	60	70	80	90	100
d_2	22	25	32	38	42	52	58
d_3	24	27	34	40	44	54	60
d_4	M5	M5	M6	M8	M10	M12	M12
d_5	4,8	5,8	5,8	7	9,5	9,5	11,5
d_6	M3	M4	M5	M5	M6	M6	M8
d_7	20	23	28	32	35	42	48
d_8	24	28	34	38	45	52	56
d_9	25	28	35,5	40	44	54	58
e	38	46	54	62	72	80	88
f	3	3	2,5	5	5	5	5
h_1	51,5	61,5	71,5	$81,5^{\pm 1,5}$	$91,5^{\pm 1,5}$	$101,5^{\pm 1,5}$	$111,5^{\pm 1,5}$
h_2	83	92	94,5	118,5	124	134	144
h_3	44,5	48,5	46	59,5	60	65	70
k	30	34	45	52	62	68	76
l_1	45	55	65	74	79	93	110
l_2	50	64,5	74,5	85	90	105	125
l_3	55,5	70,5	82,5	93,5	104	123	144
l_4	60,5	80	92	104,5	115	135	159
l_5	29	30	33	39	50	60	61
l_6	37	40	45	54	70	85	91
l_7	32	30,5	35,5	43	59	73	76
l_9	15	16	16,5	23,5	32	37,5	37,5
l_{10}	15	15	18	20	30	40	40
l_{11}	111	125	143	167	199	238	262
l_{12}	7	10,5	12,5	15,5	21	26	31
l_{13}	4,5	10	10	12	13	15	19
l_{14}	4	4	4	5	5	5	6
l_{15}	150	150	200	200	200	200	250
l_{16}	0,5	0,5	0,5	1	2	3	4
l_{17}	121,5	140,5	160,5	186,5	224	268	296
s	8	10	12	15	20	25	30
sw	4,5	4,5	3	7	9	10	10
$^{1)}t_1$	4	5	6	6	8	8	11
$^{1)}t_2$	9	9	8	10	13	15	13
t_3	6	8	10	10	12	12	13
Pg	9	9	9	11	11	11	11
Fork end Z GA K*	50	50	60	80	100	120	120
Screw	M3	M4	M5	M5	M6	M6	M8
Tightening torque (Nm)	1,6	2,3	4,4	4,4	7,7	7,7	18,5

* see type **Z GA**

[1)] Please do not exceed the thread depth t_1 and t_2 as this may damage the coil.

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Free leads

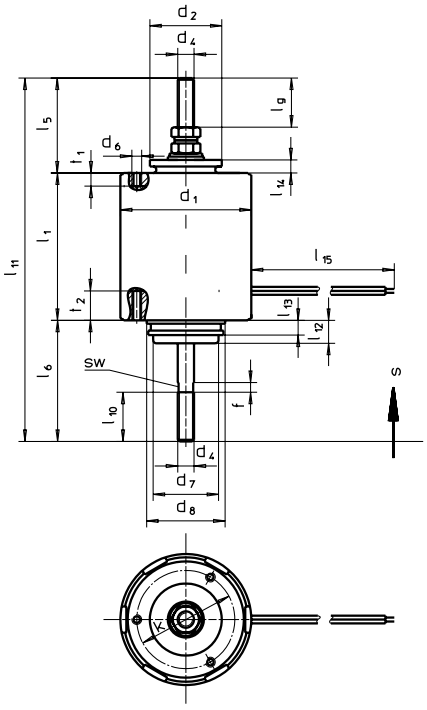

Fig. 5:
G TC A 040 **X20 A01** to G TC A 100 **X20 A01**

Plug connector

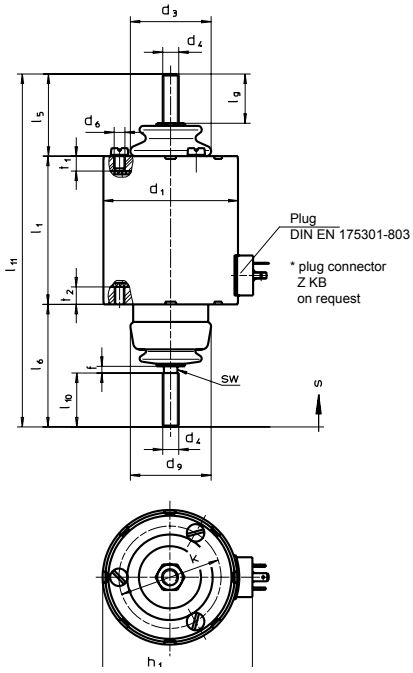

Fig. 7:
G TC A 040 **X43 A01** to G TC A 100 **X43 A01**
* see type Z KB

Terminal box

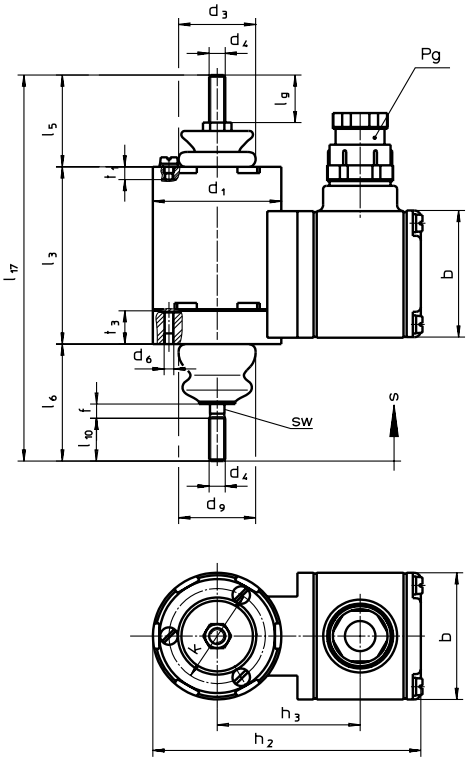

Fig. 9:
G TC A 040 **X43 A04** to G TC A 100 **X43 A04**
and with terminal box and integrated rectifier:
G TC A 040 **X43 A14** to G TC A 100 **X43 A14**

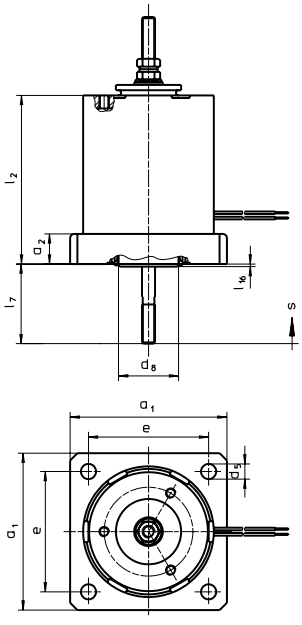

Fig. 6:
G TC A 040 **X20 A02** to G TC A 100 **X20 A02**
(other dimensions see fig. 5)

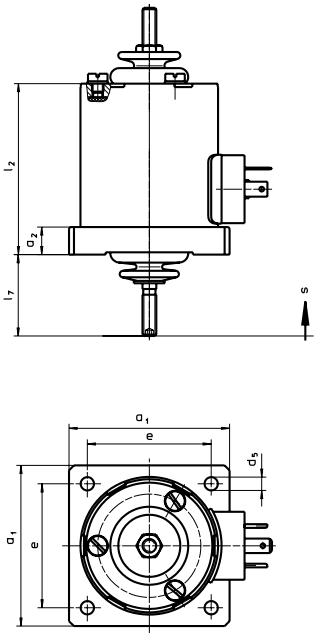

Fig. 8:
G TC A 040 **X43 A02** to G TC A 100 **X43 A02**
(other dimensions see fig. 7)

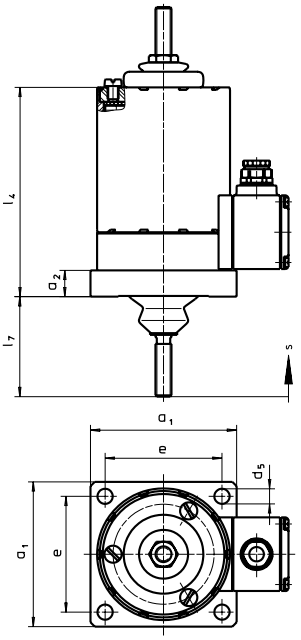

Fig. 10:
G TC A 040 **X43 A05** to G TC A 100 **X43 A05**
and with terminal box and integrated rectifier:
G TC A 040 **X43 A15** to G TC A 100 **X43 A15**
(other dimensions see fig. 9)

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Safety

It is important that the user selects equipment that is suitable for the application, especially if safety would otherwise be compromised. We supply Technical Definitions to help users understand our products and assistance is always available from our technical department.

Special

Special solenoids are available to meet the requirements of specific applications, such as short duty rating, high ambient temperature, special voltages, double acting etc., for which full operating, application and working conditions as well as environmental factors should be specified in accordance with Technical Definitions GXX.

Directives

A statement on compliance with European Directives is available on our website under “Our Technology”

Order example: GTCA 090 X43 A01 24V 100%

Order Codes Table:

Order Example	GTC	A	090	X43	A01	24V 100%
Group Basic Construction	**GTC**					
Modification code		**A**				
Size			040 050 060 070 080 090 100			
Arrangement & Basic protection				**X20** - free leads **X43** - plug connector - terminal box		
Design number					**Free leads or plug connector:** A01: Body mounting A02: Flange pulling end **Terminal box:** A04: Body mounting A05: Flange pulling end A14: as A04 with rectifier in terminal supply box for AC supply A15: as A05 with rectifier in terminal box for AC supply	
Voltage & Duty Rating						**24V**, 205V **100%**, 40%, 25%, 15%, 5%

This document is intended for technically qualified personnel. It is for information purposes only and should not be construed as a mandatory illustration of the products unless otherwise expressly confirmed.