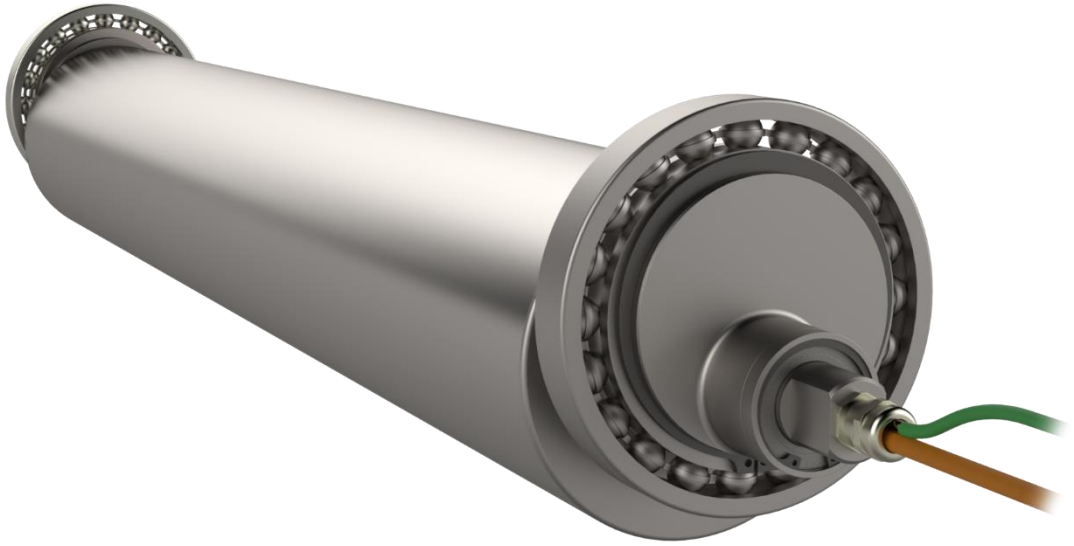
Drum motor
TITAN 168



The drum motors of the product range TITAN 168 come with very powerful, yet efficient, synchronous motors, which have been designed using the very latest calculation methods for the application in question.
The synchronous motors ensure a much higher efficiency than previously used asynchronous geared motors. The motors are combined with efficient and stable planetary gearboxes. The planetary wheels of each gearing stage are fitted with their own bearing. This guarantees the highest level of quiet operation and a long working life. The drive for this motor roller is the result of the consistent continuation of uncompromising development work in terms of motor and gear technology.
The drum motors of the type TITAN 168 can be adapted to the respective application with regard to their connection dimensions and mechanical/electrical interfaces

Characteristics

Applications

- Heavy pallet conveying technology
- Chain conveyors
- Lifting drives
- Drives for corner transfer nodes
- Eccentric drive, lifting and lowering of pallets
- Align pallets against stop

Features

- More storage space due to the elimination of interfering contours on the conveyor line, which are caused by externally mounted drives
- The lifting and lowering, as well as the alignment of pallets against stops is possible up to 1.5t pallet weight
- Integrated motor temperature protection (PTC)
- Voltage with 48VDC or 400VAC
- Variants with increased protection standards available on request

Technical data

Technical data		
Motor type		Synchronous motor
Insulation class of the motor winding		Class F
Voltage	V	48VDC or 400VAC
Protection type		IP54 (on request IP67)
Thermal protection		PTC
Noise level	dB	< 63dB (depending on the application)
Length of motor cable	mm	500 / 1500 / 3000*
Clamping length	mm	300 … 1200*
Ambient temperature	°C	0 to 40
Pipe diameter	mm	168
Pipe material		Galvanised steel / stainless steel
Pipe sleeve		PVC hose, PU hose, rubber coating
Pipe		straight or crowned
Maximum load		Depending on pipe length

*Dimensions and design can be adapted according to the customer.

Additional options for the drum motor TITAN 168

- Rubber coating the roll for bands
- Electromagnetic (spring) brakes
- Double rotor brake for increased standstill torque
- Variety of encoder systems for individual connection of drive controllers (sensorless, magnetic angle encoder, resolver, reverberation sensors, ...)

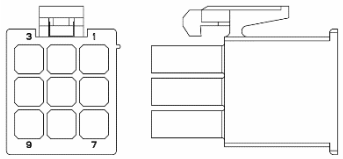
Electrical pin assignment of the drum motor HERKULES 168

The following encoder systems are available for operating the drum motors:

- Digital reverberation sensors
- Resolver
- Magnetic encoder

Pin assignment for variant with reverberation sensors and 48V (hybrid cable with combined motor and encoder cable):

Signal	Pin	Description	Wire colour
U	2	Motor phase U	Grey
V	1	Motor phase V	Brown
W	3	Motor phase W	Black
	4	n.c.	
GND	5	GND reverberation sensor	White
5V	6	5V supply reverberation sensor	Brown
H1	7	Reverberation sensor 1	Red
H2	8	Reverberation sensor 2	pink
H3	9	Reverberation sensor 3	Yellow

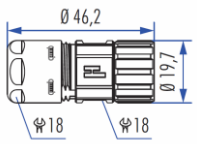


Cable specification:		Connector specification:	
Construction:	3 x AWG16 + 5 x AWG2 unshielded	Type:	Mini Mate-N-Lok
Material:	PUR, black	Gender:	Pin
Nominal voltage:	300V	Number of pins:	9 (3 rows)
Outer diameter:	7.4 +/-0.2mm	Manufacturer:	TE
Temperature:			
unmoved:	-40°C … +80°C		
moved:	-25°C … +80°C		
Certification:	CE, UL		
Halogen free	Yes		

Pin assignment of motor cable for resolver/magnetic angle encoder

When using a resolver/magnetic encoder, the motor and signal cables are separated. The following specification applies for the motor cable:

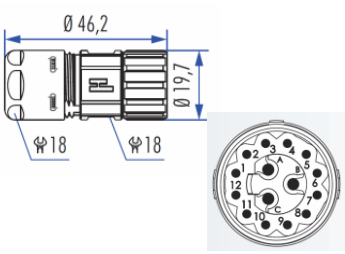
Signal	Pin	Description	Wire colour
U	A	Motor phase U	Grey
V	B	Motor phase V	Brown
W	C	Motor phase W	Black
PE	GND	Earth	Green / yellow
T1	1	Temperature sensor + PTC	White
T2	2	Temperature sensor – PTC	Black



Cable specification:		Connector specification:	
Construction:	(4G0.75 + (2 x 0.34)) mm² shielded	Type:	Circular connectors M16
Material:	PUR, orange (DESINA)	Gender:	Connector, pin
Nominal voltage:	1000V	Number of pins:	4 + 3 + PE
Outer diameter:	8.0 +/-0.2mm	Manufacturer:	Hummel
Temperature:			
unmoved:	-50°C … +80°C		
moved:	-		
Certification:	CE, UL		
Halogen free	Yes		

Pin assignment signal cable at resolver

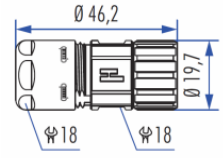
(Motor cable and signal cable run separately)

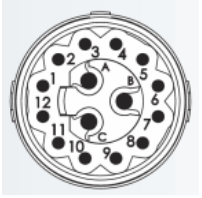
Signal	Pin	Description	Wire colour	
+sin	4		White / red	
-sin	6		Red	
+cos	3		White / blue	
-cos	5		Blue	
+ref	1		White / yellow	
-ref	2		Yellow	

Cable specification:		Connector specification:	
Construction:	(3 x 2 x 0.14mm²) shielded	Type:	Circular connectors M16
Material:	PUR, green (DESINA)	Gender:	Connector, pin
Nominal voltage:	300V	Number of pins:	12+3
Outer diameter:	5.4 +/-0.2mm	Manufacturer:	Hummel
Temperature:			
unmoved:	-50°C … +80°C		
moved:	-		
Certification:	CE, UL		
Halogen free	Yes		

Pin assignment signal cable with magnetic angle encoder

(Motor and encoder cable separated)

Signal	Pin	Description	Wire colour	
5V	2	5V IN	Green / white	
GND	1	GND Encoder	Green / brown	
A	8	Track A positive	Red	
B	6	Track B positive	Grey	
I	4	Track I positive	Yellow	
/A	7	Track A Negative	Black	
/B	5	Track B Negative	Pink	
/I	3	Track I Negative	Purple	
PWM	10	Track PWM positive	Brown	
/PWM	9	Track PWM Negative	Green	
BRK +	A	Brake +	Blue	
BRK -	B	Brake -	White	



Cable specification:		Connector specification:	
Construction:	(4 x 2 x 0.14 + 4 x 0.25mm²) shielded	Type:	Circular connectors M16
Material:	PUR, black	Gender:	Connector, pin
Nominal voltage:	300V	Number of pins:	12+3
Outer diameter:	6.1 +/-0.2mm	Manufacturer:	Hummel
Temperature:			
unmoved:	-50°C … +80°C		
moved:	-40°C … +80°C		
Certification:	CE, UL		
Halogen free	Yes		

On request, the connection cables can be supplied with open ends or with pre-assembled connection plugs.

Power and gear ratio variants of the TITAN 168 drum motor

The following tables show the motor variants with the corresponding power rating.

Characteristics of the installed synchronous motors in the low voltage range

Type		TITAN 168-B2D	TITAN 168-C2D	TITAN 168-D2E
Motor data				
Motor type		Pegasos 72E20	Pegasos 72E30	Pegasos 72E40
Nominal voltage	VDC	48VDC	48VDC	48VDC
Nominal current	A	7.2	19.4	18.5
Nominal torque	Nm	0.6	1.05	1.85
Maximum torque	Nm	2.8	4.5	8
Nominal speed	rpm	4000	4000	4000
Permissible peak current	A	41	62	103
Holding torque	Nm	0.63	1.05	1.75
Idling speed	rpm	5750	5500	5500
Continuous power output	W	210	440	770
Maximum power output	W	750	1300	2100
Torque constant	Nm/A	0.083	0.0902	0.0758
Phase resistance	Ω	0.117477	0.0876	0.0433
Connection inductance L_q	mH	0.3361	0.2401	0.1603
Connection inductance L_d	mH	0.2851	0.2136	0.1371
Winding connection		Star / Parallel	Star / Parallel	Star / Parallel
Number of pole pairs		3	3	3

Characteristics of the installed synchronous motors in the 400 VAC range

Type		TITAN 168-D3E	TITAN 168-E3E
Motor data			
Motor type		Pegasos 72E40	Pegasos 72E50
Nominal voltage	VDC	400	400
Nominal current	A	1.52	2.2
Nominal torque	Nm	1.75	2.4
Maximum torque	Nm	8	10
Nominal speed	rpm	4000	4000
Permissible peak current	A	8.6	10.6
Holding torque	Nm	8.4	10.5
Idling speed	rpm	5500	5500
Torque constant	Nm/A	1.21	1.1
Phase resistance at 120°C	Ω	8.80754	4.41
Phase resistance at 20°C	Ω	6.2911	3.15
Connection inductance L_q	mH	21.727	9.89531
Connection inductance L_d	mH	18.9119	8.46886
Winding connection		Star / Series	Star / Series
Number of pole pairs		3	3

Performance data of the complete TITAN 168 drum motors for various gear ratios.

Type	Performance [kW]	v [m/s]	i*	M_n [Nm]	M_{max} [Nm]	Mo [Nm]	F_n [N]	F_{max} [N]
TITAN 168-B2D with 48 VDC	0.21	0 ... 0.38	49	22.5	55.0	24.8	507	1236
		0 ... 0.53	35	16.1	55.0	17.7	362	1236
		0 ... 0.75	25	11.5	50.6	12.7	258	1137
		0 ... 0.93	20	9.2	40.5	10.1	207	910
		0 ... 1.17	16	7.4	32.4	8.1	165	728
		0 ... 1.55	12	5.5	24.3	6.1	124	546
		0 ... 2.66	7	3.3	14.5	3.6	74	325
		0 ... 4.66	4	1.9	8.3	2.1	42	186
TITAN 168-C2D with 48 VDC	0.44	0 ... 0.38	49	44.0	55.0	49.6	989	1236
		0 ... 0.53	35	33.8	55.0	35.4	760	1236
		0 ... 0.75	25	24.2	55.0	25.3	543	1236
		0 ... 0.93	20	19.3	55.0	20.2	434	1236
		0 ... 1.17	16	15.5	52.0	16.2	347	1169
		0 ... 1.55	12	11.6	44.2	12.1	260	992
		0 ... 2.66	7	6.9	26.3	7.2	155	591
		0 ... 4.66	4	3.9	15.0	4.1	89	338
TITAN 168-D2E with 48 VDC or Herkules 89-D3E with 400 VAC	0.77	0 ... 0.26	64	100.0	125.0	115.2	2247	2809
		0 ... 0.34	50	85.1	125.0	92.0	1912	2809
		0 ... 0.48	35	59.6	125.0	64.4	1339	2809
		0 ... 0.67	25	42.6	125.0	46.0	956	2809
		0 ... 0.84	20	34.0	119.6	36.8	765	2688
		0 ... 1.05	16	27.2	95.7	29.4	612	2150
		0 ... 1.4	12	20.4	71.8	22.1	459	1613
		0 ... 2.39	7	12.2	42.8	13.2	274	961
Herkules 89-E3E	1.1	0 ... 0.26	64	100.0	125.0	155.5	2247	2809
		0 ... 0.34	50	100.0	125.0	124.2	2247	2809
		0 ... 0.48	35	83.7	125.0	85.3	1881	2809
		0 ... 0.67	25	59.8	125.0	61.0	1344	2809
		0 ... 0.84	20	47.8	125.0	48.8	1075	2809
		0 ... 1.05	16	38.3	125.0	39.0	860	2809
		0 ... 1.4	12	28.7	99.4	29.3	645	2233
		0 ... 2.39	7	17.1	59.2	17.4	384	1331

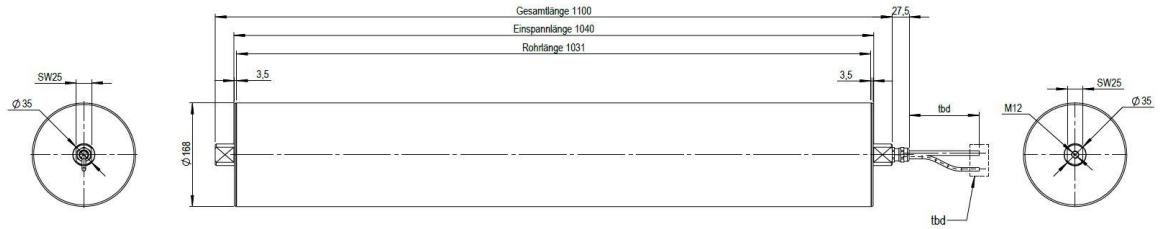
* other gear ratios on request

Performance data of the complete TITAN 168 drum motors (reinforced gearbox version) for various gear ratios.

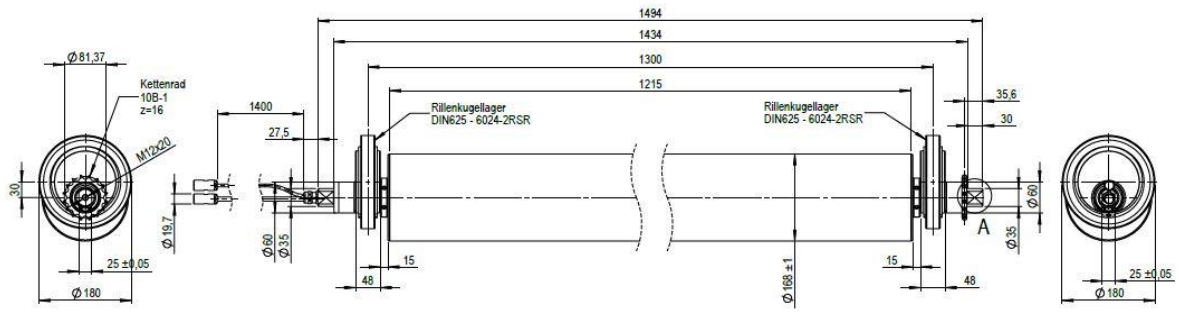
Type	Performance [kW]	v [m/s]	i*	M_n [Nm]	M_{max} [Nm]	Mo [Nm]	F_n [N]	F_{max} [N]
TITAN 168-B2E with 48 VDC	0.21	0 … 0.29	64	28.8	125.0	31.7	647	2809
		0 … 0.37	50	23.0	101.2	25.3	517	2274
		0 … 0.53	35	16.1	70.8	17.7	362	1592
		0 … 0.75	25	11.5	50.6	12.7	258	1137
		0 … 0.93	20	9.2	40.5	10.1	207	910
		0 … 1.17	16	7.4	32.4	8.1	165	728
		0 … 1.55	12	5.5	24.3	6.1	124	546
		0 … 2.66	7	3.3	14.5	3.6	74	325
TITAN 168-C2E with 48 VDC	0.44	0 … 0.29	64	60.5	125.0	63.4	1359	2809
		0 … 0.37	50	48.3	125.0	50.6	1085	2809
		0 … 0.53	35	33.8	125.0	35.4	760	2809
		0 … 0.75	25	24.2	92.0	25.3	543	2067
		0 … 0.93	20	19.3	73.6	20.2	434	1654
		0 … 1.17	16	15.5	58.9	16.2	347	1323
		0 … 1.55	12	11.6	44.2	12.1	260	992
		0 … 2.66	7	6.9	26.3	7.2	155	591

Dimensions

Smooth version



Eccentric drive version



Mechanical design can be adapted according to customer requests.