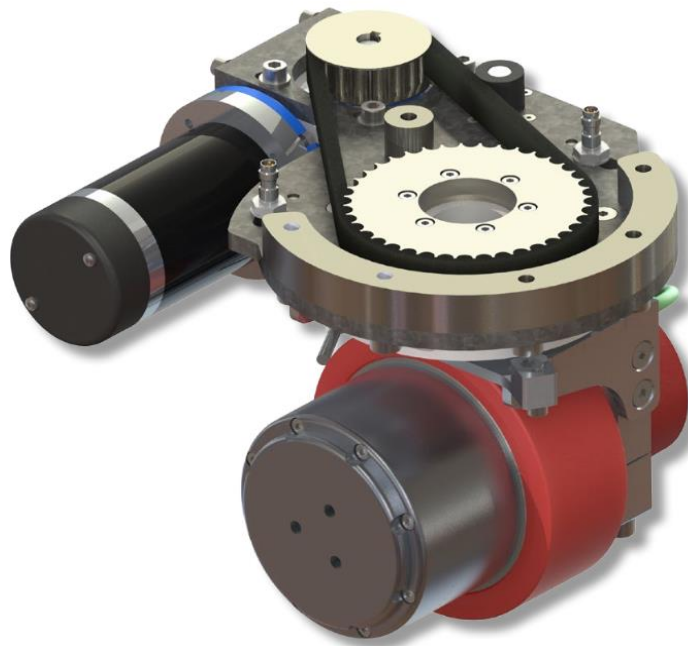


Wheel hub drive **ACHILLES**



The wheel hub drive with integrated steering unit is currently the most compact drive of its kind on the market for driverless transport systems.

In combination with the PROMETHEUS two-axis controller from MTA Systems, a coordinated optimised drive system for AGVs is available. The main component of the drive unit are 2 high-quality permanent magnet synchronous motors. The encoder system used is a magnetic angle encoder with 1024 increments, which corresponds to a resolution of 12 bits. Taking into account all the mechanics and all ratios, this provides a swivel angle of 3.22° per motor revolution.

3 directly mounted induction sensors are available for end positions and zero position detection. In addition, 2 optical absolute encoders are used as a redundant encoder system. This allows drive tasks to be implemented with regard to functional safety.

Technical data

Steering unit

Technical data			
Motor type steering drive		Pegasos60	
Worm gear steering drive		VMH025	
Nominal voltage steering drive	VDC	48	
Nominal speed steering drive	rum	100	
Swivel angle per motor revolution	°	3.22°	
Noise level	dB	< 60dB (depending on the application)	
Temperature sensor		PTC	
Absolute encoder 1		optical, CAN open	
Absolute encoder 2		optical, SSI preset	
Length of motor and encoder cable	mm		
Ambient temperature	°C	0 to 40	
Protection class		IP54	
Toothed belts		Performance profile	CTD
		Division	M8
		Tension supports	Carbon
		Width	15mm
		Length	544mm
Toothed belt disk 1		Performance profile	CTD
		Number of teeth	40
		Division	M8
		Width	15mm
		Material	C45
		Surface	burnished
Toothed belt disk 2		Performance profile	CTD
		Number of teeth	18
		Division	M8
		Width	15
		Material	C45
		Surface	burnished
		Version	with flanged disk
Design of housing and connecting parts		Material steel, galvanised surface	

Wheel hub drive

Technical data			
Motor type		Pegasos75	
Planetary gear		PM64	
Nominal voltage	VDC	48	
Nominal speed	rpm	250	
Travel distance per motor revolution	mm	25.53	
Noise level	dB	< 60dB (depending on the application)	
Temperature sensor		PTC	
Protection class		IP54	
Length of motor and encoder cable*	mm	1m	
Ambient temperature	°C	0 to 40	
Wheel	kg	Maximum load	500
	mm	Diameter	130
	mm	Width	50
		Material basic body	C30
		Material coating	Vulkollan 95° Shore A
Brake		Type	Spring loaded brake
	VDC	Voltage	24
	Nm	Holding torque	1.32
Design of housing and connecting parts		Material steel, galvanised surface	



Motor data

Steering unit

Technical data		Pegasos60
Nominal voltage	VDC	48
Nominal current	A	13.6
Nominal torque	Nm	0.75
Maximum torque	Nm	3.01
Nominal speed	rpm	5000
Permissible peak current	A	53
Continuous power output	W	392.70
Maximum power output	W	819.54
Torque constant	Nm/A	0.06
Phase resistance	Ω	0.08
Connection inductance L_q	mH	0.12
Connection inductance L_d	mH	0.09
Winding connection		Star
Number of pole pairs		3

Wheel hub drive

Technical data		Pegasos75
Nominal voltage	VDC	48
Nominal current	A	19.38
Nominal torque	Nm	1.75
Maximum torque	Nm	4.5
Nominal speed	rpm	4000
Permissible peak current	A	62.36
Continuous power output	W	733.04
Maximum power output	W	1225.22
Torque constant	Nm/A	0.09
Phase resistance	Ω	0.088
Connection inductance L_q	mH	0.24
Connection inductance L_d	mH	0.21
Winding connection		Star
Number of pole pairs		3



Transmission

Steering unit

Technical data		
Type		Worm gears VMH025
Gear ratios	i	50
Lubrication		OIL-SC220

Wheel hub drive

Technical data		
Type		Planetary gear PM64
Gear ratios	i	16
Lubrication		Gear grease

Encoder

Steering drive and wheel hub drive

Technical data		
Type		Magnetic encoder
Supply voltage	VDC	5
Signals		A, B, I, PWM performed inversely
Pulses per revolution	i	1024
Resolution		12 Bit

Sensor

Inductive sensors

In addition, three inductive sensors for zero-point detection and the detection of the end positions are attached to the steering unit.

Technical data		
Type		Inductive proximity sensor
Version		M8 short
Supply voltage	VDC	10 ...30
Output		PNP Closer / Opener
Diameter	mm	8
Length	mm	41

Encoder system

Toothed belts

In addition, a redundant encoder system is provided on the steering drive directly on the toothed belt.

Technical data		
Type		Absolute encoder multi-turn
Supply voltage	VDC	10 ...30
Interface		SSI Preset
Resolution single-turn	Bit	12
Resolution multi-turn	Bit	12
Diameter	mm	50
Length	mm	54.5
Connection		open ends

Gear shaft

In addition, an additional redundant encoder system is provided on the wheel hub drive directly on the gearbox.

Technical data		
Type		Absolute encoder multi-turn
Supply voltage	VDC	10 ...30
Interface		CAN open
Resolution single-turn	Bit	16
Resolution multi-turn	Bit	16
Diameter	mm	58
Length	mm	63
Hollow shaft	mm	Ø12 with clamping ring
Connection		M12, radial, 5-pin



Pin assignment and cable design



The delivery of the connecting cables is with open ends. On request, the delivery can be made with pre-assembled connectors. Cable lengths can be adapted according to the customer.

Motor cable steering drive / wheel hub drive

Signal	Pin	Description	Wire colour
U	1	Motor phase U	Red
V	2	Motor phase V	White
W	3	Motor phase W	Black
PE	4	Earth	Yellow/green

Motor cable wheel hub drive

Type	Cross section	Diameter	Bending radius	Temperature range
Radox 155 3 x single wire cables	4mm ²	4.2mm	12.6mm	-55°C to +155°C

Motor cable steering drive

Type	Cross section	Diameter	Bending radius	Temperature range
[4G0.75+(2x0.34)ST]ST	4 x 0.75 mm ² 2 x 0.34 mm ²	8 mm	48 mm	-50°C to +80°C

Encoder cable steering drive / wheel hub drive

Signal	Pin	Description	Wire colour
5 VDC	2	Supply +	Green / white
GND	1	Ground	Green / brown
A	8	Track A	Red
B	6	Track B	Grey
I	4	Track I	Yellow
/A	7	inv. Track A	Black
/B	5	inv. Track B	Pink
/I	3	inv. Track I	Purple
PWM	10	Track PWM	Brown
/PWM	9	inv. Track PWM	Green

Encoder cable wheel hub drive

Type	Cross section	Diameter	Bending radius	Temperature range
Kawaflex 444 TKO	4 x 2 x 0.14 mm ² 4 x 0.25 mm ²	6.1 mm	46 mm	-50°C to +80°C
MTA - 500126	3 x 2 x 0.14 mm ²	5.4 mm	33 mm	-50°C to +80°C

Encoder cable steering drive

Type	Cross section	Diameter	Bending radius	Temperature range
Kawaflex 444 TKO	4 x 2 x 0.14 mm ² 4 x 0.25 mm ²	6.1 mm	46 mm	-50°C to +80°C

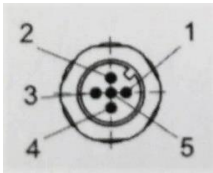
Redundant encoder system on the toothed belt

Signal	Pin	Description	Wire colour
4.5 - 30 VDC	1	Supply +	Brown
GND	2	Ground	White
D+	3	Data +	Grey
D-	4	Data -	Pink
C+	5	Clock +	Green
C-	6	Clock -	Yellow
PS	7	Preset	Blue
DIR	8	DIR	Red
SH	9	Shielding	Protection

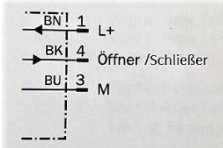
Redundant encoder system on the toothed belt

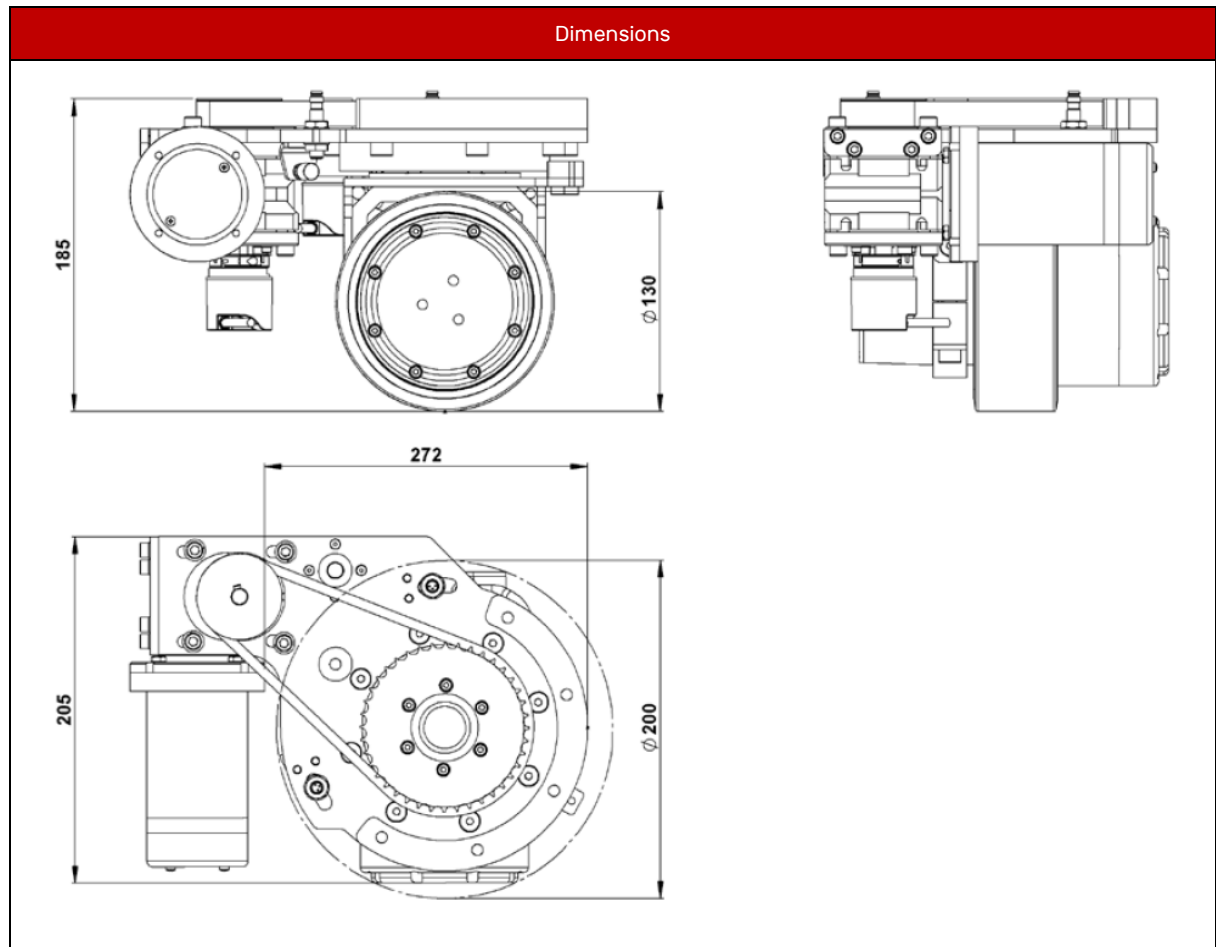
Type	Cross section	Diameter	Bending radius	Temperature range
Hohner	8 x 0.14 mm	6 mm	46 mm	

Redundant encoder system on the gear shaft

Signal	Pin	Description	Type	Image
CAN_GND	1	CAN_Ground	M12 plug radial, 5-pin	
10 - 30 VDC	2	Supply +		
GND	3	Ground		
CAN_H	4	CAN High		
CAN_L	5	CAN Low		

Inductive sensors

Signal	Pin	Description	Type	Image
BN	1	L+	M8 connector 3-pin	
BK	4	Opener / Closer		
BU	3	M		



Drive controller PROMETHEUS One controller for both drives

The PROMETHEUS two-axis controller is available as the optimum drive controller for the steering drive with integrated hub motor. With this drive controller, both motors can be controlled with one controller. Communication takes place via CAN. Optionally, communication can take place via ProfiNET or EtherCAT (Q3/2019). With the integrated STO function, the functional safety "safe torque off" is also available directly on the drive controller for both axes. Detailed information can be found in the documentation PROMETHEUS Two-axis controller.