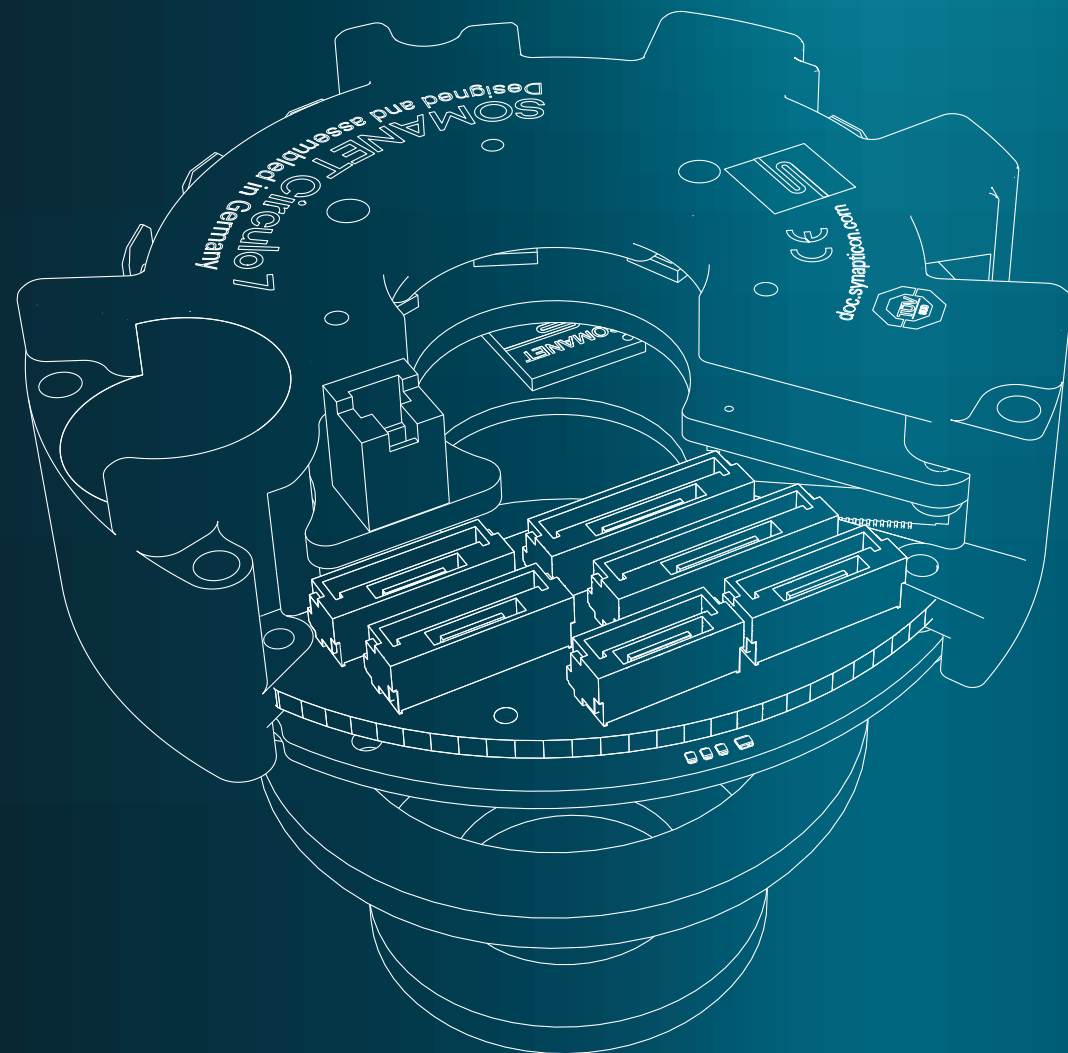




CIRCULO SERIES

SOPHISTICATED ROBOT MOTION CONTROL

WORLD'S FIRST INTEGRATED MOTION DEVICE



CIRCULO VIRTUOSO ALL-IN-ONE SERVO DRIVE FOR ROBOTS AND COBOTS

■ Highest motion control performance

■ High speed EtherCAT Interface (DS402, up to 4kHz)

■ >10 Certified Safety Functions (SIL3, PL-e)

■ 2x Integrated High Resolution Absolute Encoder (optional)

■ Integrated Motor Brake System (optional) and Safe Brake Control

■ Various sensor interfaces

■ Optimal mechanical integration for most compact actuator designs

■ 100% ready to go, no customization necessary

■ All necessary certifications (EMI, EMC and safety)

■ Easy to use commissioning and tuning tools



Robot motion control for the future. SOMANET Circulo is the world's first Integrated Motion Device: a complete servo solution for robots and smart actuators. ■

A FULL FEATURED SERVO DRIVE TO REALIZE BETTER PRODUCTS IN LESS TIME

- Works with any type of PMSM/BLDC motor up to 60 V and 60 Arms

- Model-predictive Field-oriented Control for high efficiency, maximum bandwidth

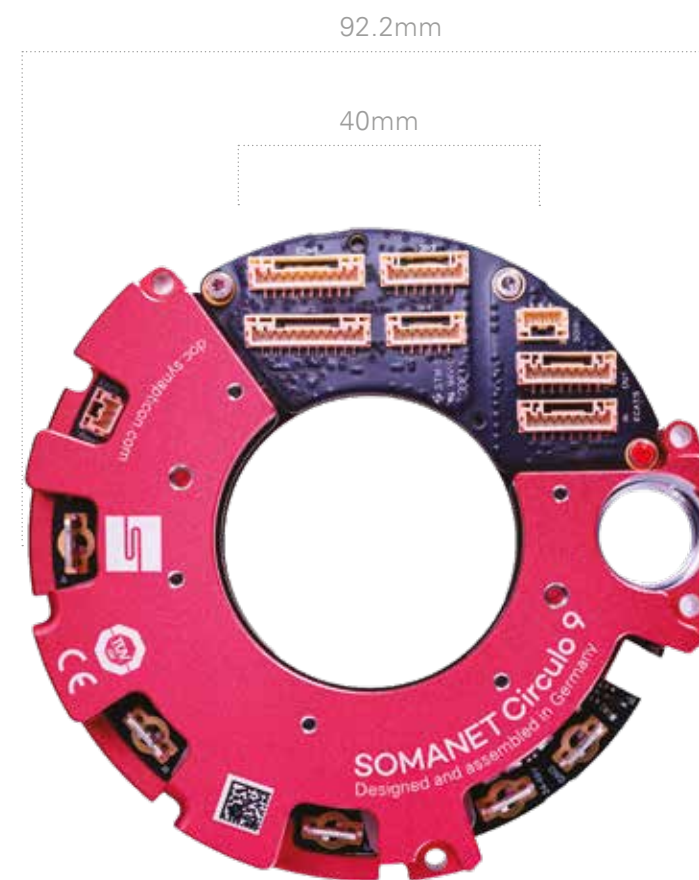
- Dual-loop control, gain-scheduling, high frequency control loops

- EtherCAT interface with high frequency (up to 4kHz), low latency, negligible jitter

- Support for 2 position feedbacks of any type, torque sensors, KTY / PT1000

- Motor brake control with power saving mode and special latching brake algorithm

- Most comprehensive set of certified safe motion features



Best in class solution for any kind of robotic application.

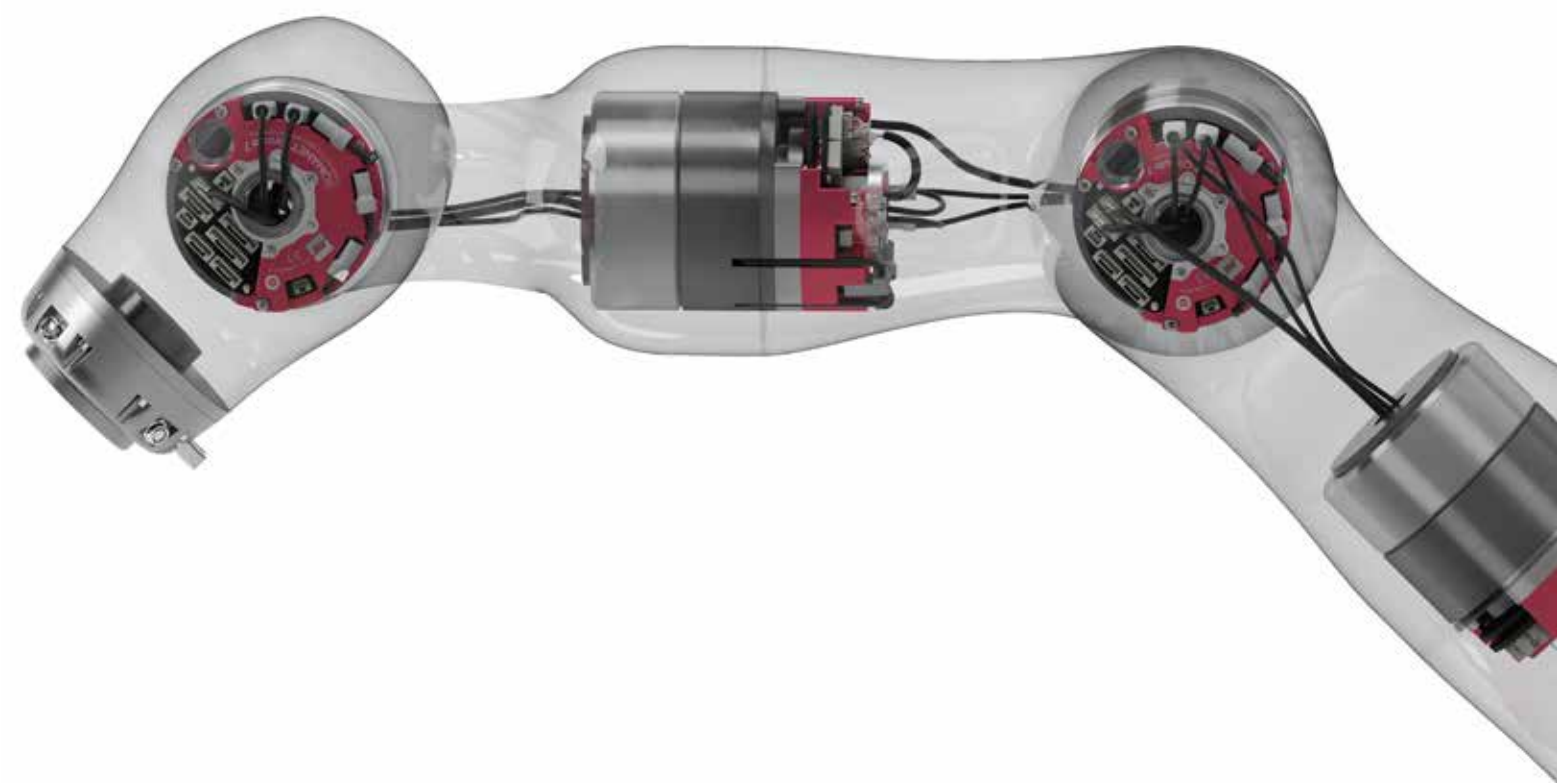
Whether you are planning a collaborative robotic arm, a service robot or an automated logistics solution: With our compact and efficient, high-performance, decentral servo drives, OEMs such as robot manufacturers and machine builders can utilize Synapticon's advanced motion control technology to realize better products in less time. ■

A PERFECT FIT

A perfect fit for your robot actuator with zero mess cabling. With their circular shape and hollow shaft they are ideal for fully integrated hollow-shaft actuators that are mainly used in robot arms.



ZERO MESS CABLING



- Designed for direct motor mounting
- Optimized thermal management for cool robot/machine body
- Smart cable guiding for high reliability
- Precisely machined body for flexible integration

A COOL BODY

A DUAL HIGH RESOLUTION ABSOLUTE ENCODER AND A SERVO DRIVE WORK AS ONE.

For the first time in a standard servo drive: Servo drive and position encoders work as one! Circulo features up to two integrated absolute encoders with no extra cables and no inconvenient encoder calibration tools.

- 2 x Magnetic Absolute Encoders (up to 20bit resolution)

- Dual-loop configuration for motor and gear output feedback

- Optional battery based multi-turn functionality

- Very low profile <5mm for both encoders

- Calibration and diagnostics GUI within servo commissioning software



Encoder rings

The **BRAKE SYSTEM** prevents rotary motors from unwanted motion. The brake is designed as a spring-applied brake, in case of a power loss, the PIN BRAKE locks the motor. Thanks to the drives' SBC function the Pin Brake

additionally ensures safety while operating. The integrated quick stop function is smart and therefore prevents the motor from being damaged. The motor speed is being lowered before the brake finally latches. ■

The optional **Safe Motion Module** for Circulo allows for SIL3 PL-e level safe motion functions over FSoE (FailSafe over EtherCAT). Implement your application according to ISO/TS 15066.

Safety over
EtherCAT

SAFETY FUNCTIONS:

- STO + SBC (Safe Torque Off + Safe Brake Control)
- SS1 (Safe Stop 1) - ramp stop and STO + SBC
- SS2 (Safe Stop 2) - ramp stop and SOS
- SOS (Safe Operating Stop) - hold current position
- SMS (Safe Maximum Speed)
- 4 x SLS (Safe Limited Speed, 4 instances)

SAFE PROCESS DATA VIA FSOE (4 ms cycle time)

- Safe velocity
- Safe position
- Safe torque
- SDI, SDO, SAI

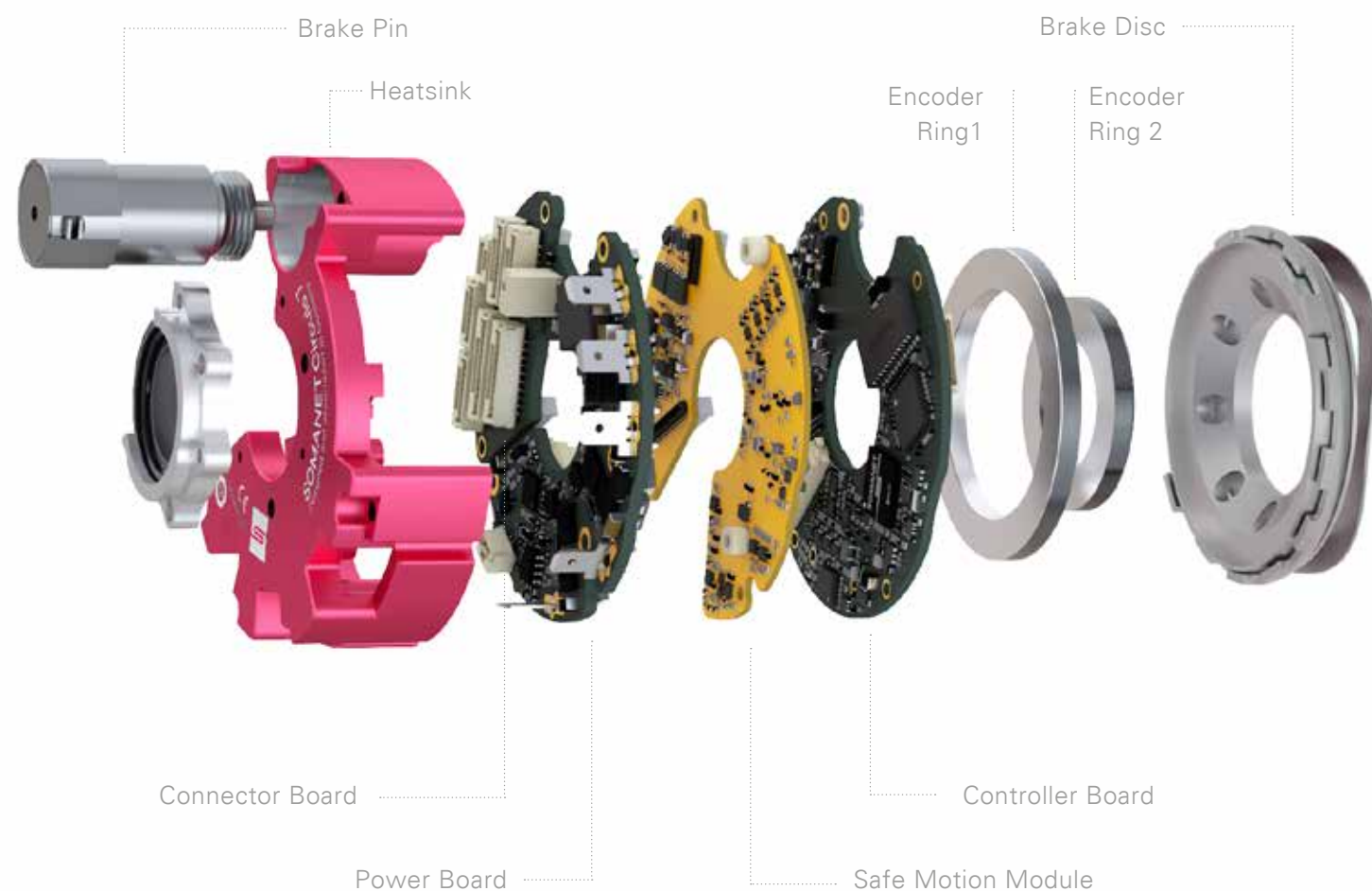
SAFE INPUTS / OUTPUTS

- 2 x Safe Digital Input
- 1 x Safe Digital Output (OSSD)
- 1 x Safe Analog Input (differential)
- Safe Power Delivery (5V)

Up to SIL3, PLe, Cat.3

Für Circulo SMM samples Q2/2022, Certification Q4/2022

SOMANET Circulo components



Your actuator components



SAFE! FOR TRUE HUMAN-ROBOT COLLABORATION

UP AND RUNNING IN NO TIME

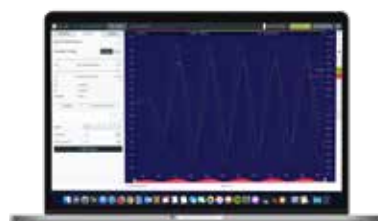


Tuning and control on the same cable. Any number of SOMANET nodes can be connected to the PC running OBLAC Drive Tools using a single fieldbus cable. The firmware of each node can be installed or updated individually or simultaneously.



Smart wizard guides.

The wizard guides the user through the setup and offers advanced troubleshooting. It recognizes configuration errors during configuration by systematic user interaction and logical analysis and indicates possible solutions. Fine-tuning electric motors becomes a breeze with a highly sophisticated and intuitive user interface offering a multitude of tuning functions and graphical evaluation options.



Auto-tuning safe and easy.

Automatic motion controller tuning based system identification and dominant pole placement, ensures robust control at a press of a button. Operating in a very limited motion range it prevents any damage on your equipment and provides a safe set of parameters to



Playground shortcut

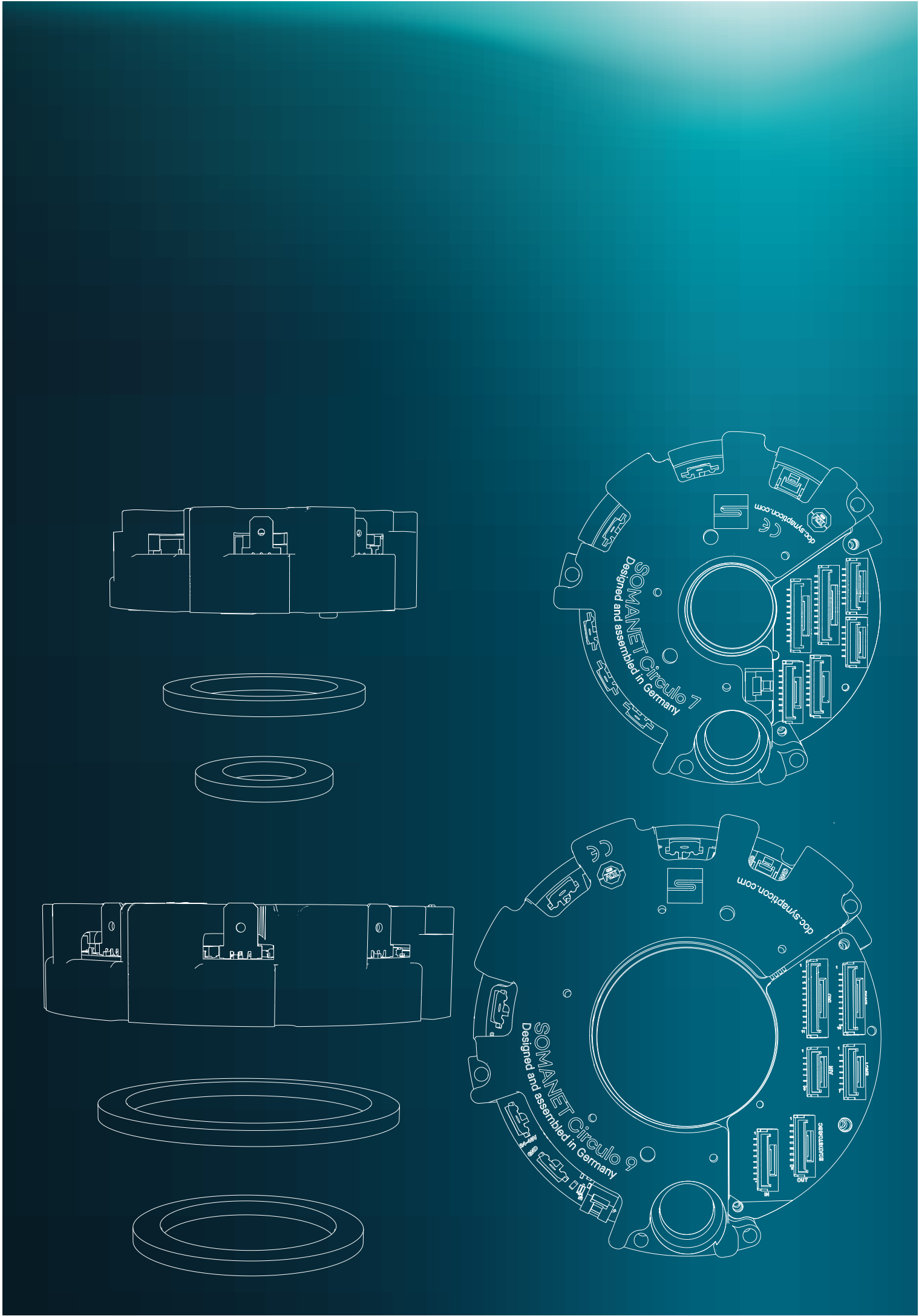
to motion experience. Test and evaluate your system without setting up and running a motion application. Operate the drive in Torque, Speed and Position mode and evaluate the performance using advanced scope features like math, triggers, recording and more.

Best practice: Use the OBLAC DRIVES BOX
It's a physical machine that comes preinstalled with Linux OS and runs OBLAC Drives and the related services. It supports access over WiFi or local area network.

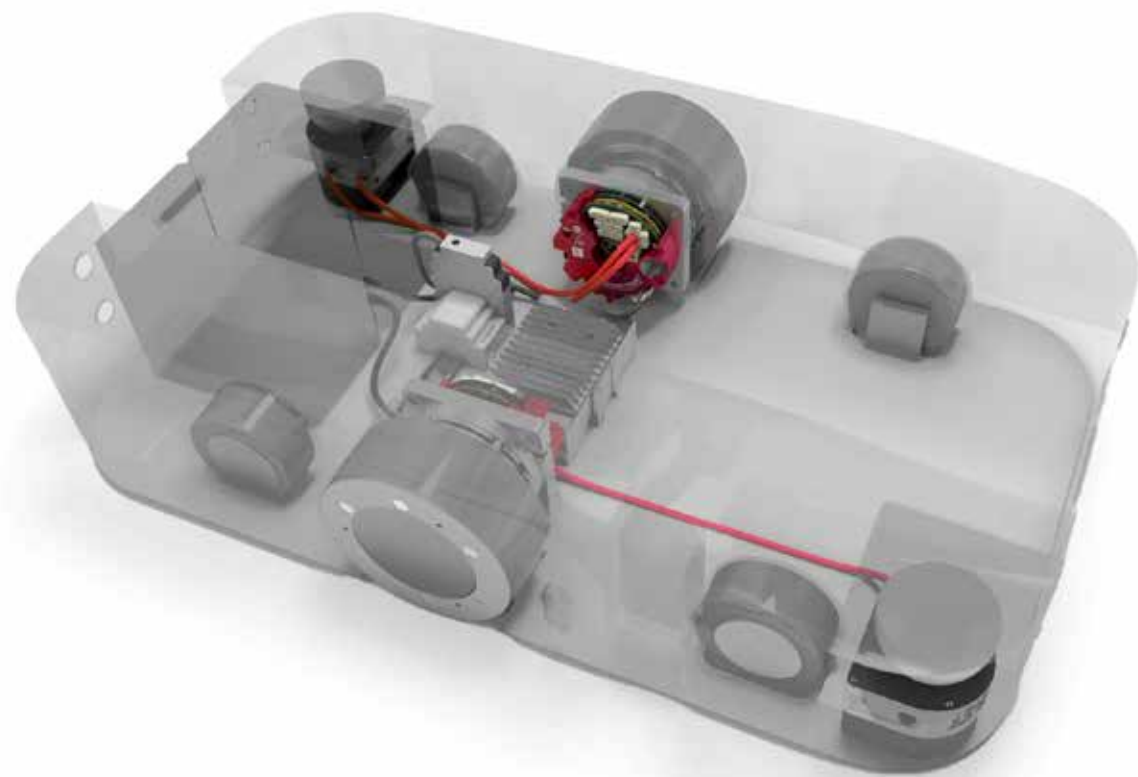


OBLAC Drives Box

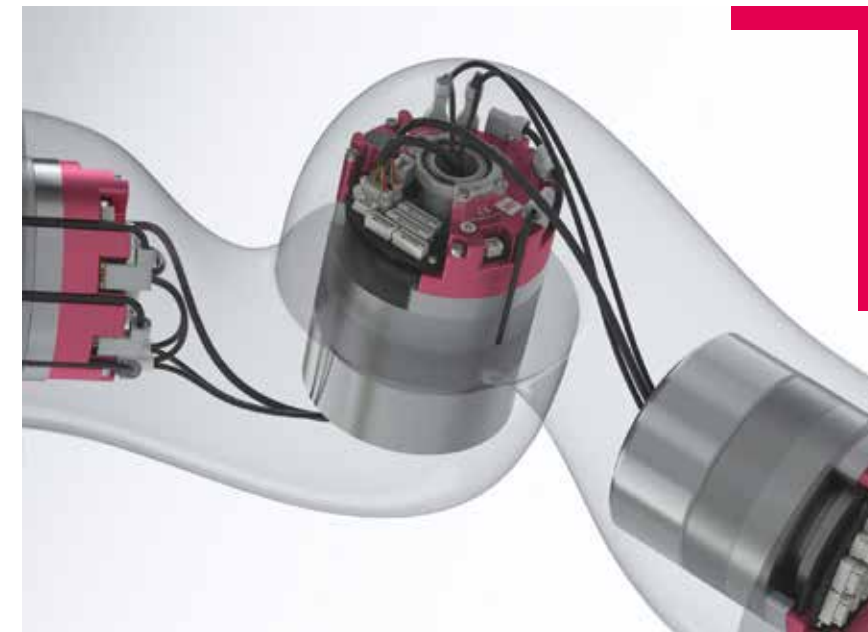
	SPECS	Circulo 7	Circulo 9
Communication interface	EtherCAT, DS402, CoE, FoE, FSoE		
Rated supply voltage DC	24-48 V		
Maximum voltage DC	60 V		
Continuous phase current RMS	8 A _{RMS}	20 A _{RMS}	
Maximum phase current RMS	24 A _{RMS}	60 A _{RMS}	
Maximum efficiency	99%		
Integrated absolute encoder (option)	2 x 19 bit (1 x multi-turn)	2 x 20 bit (1 x multi-turn)	
Supported motors	BLDC, PMSM		
Hardware protections	Overcurrent, overvoltage,undervoltage, overtemperature, PWM deadtime, PWM shoot through		
Sensors on-board	3 x I _{phase} , U _{DC} , t _{MOSFET} , t _{core}		
Encoder interface (ext.)	Port 1: SSI / BiSS-C Port 2: ABZ / SSI / BiSS-C / Nikon		
Brake output	Nominal 1 A @ 48 V, peak 4 A, pwm controlled		
GPIO	5x DIO(3.3/5 V), 1x DO(3.3/5 V), 1x DI(24 V)		
	1x Analog In Single Ended (0-10 V)		
	1x Analog In Differential (+-5 V)		
Heatsink	Aluminum, anodized, precision machined		
Standard safety functions	STO / SBC according to SIL 3 PL-e		
Safe Motion Module (optional)	FSoE, STO, SBC, SS1/2, SOS, SMS, 4x SLS, Safe Process Data (position, velocity), 1 x safe analog input, 2 x safe digital inputs, 1 x safe digital output (OSSD)		
Integrated brake	Solenoid actuator for latching motor brake (optional)		
Compliance with standards	CISPR 11 Class B (EN 55011:2016)		
	IEC 61000-4-6:2013		
	IEC 61000-4-3:2020		
	IEC 61000-4-2:2008		
	IEC 61000-4-8:2009		
	IEC 61800-5-1:2007		
	IEC 60204-1:2016		
	IEC 61800-5-2:2017		
	ISO 13849-1:2015		
	IEC 61508:2010 parts 1-7		
	Compliance with European directives: CE (EMC Directive 2014/30/EU) CE (Machinery Directive 2006/42/EC)		
	Certificates: TÜV Süd Mark (Functional Safety)		



SYNAPTICON'S INTEGRATED MOTION AT WORK



SOMANET Circulo inside an AGV application solves the problems related to space, safety and complexity.



SOMANET Circulo working inside a cobot and ensuring a safe human-robot collaboration



Meet the Synapticon team, we will show you how our customers integrate efficient and safe motion control in their applications. ■



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