

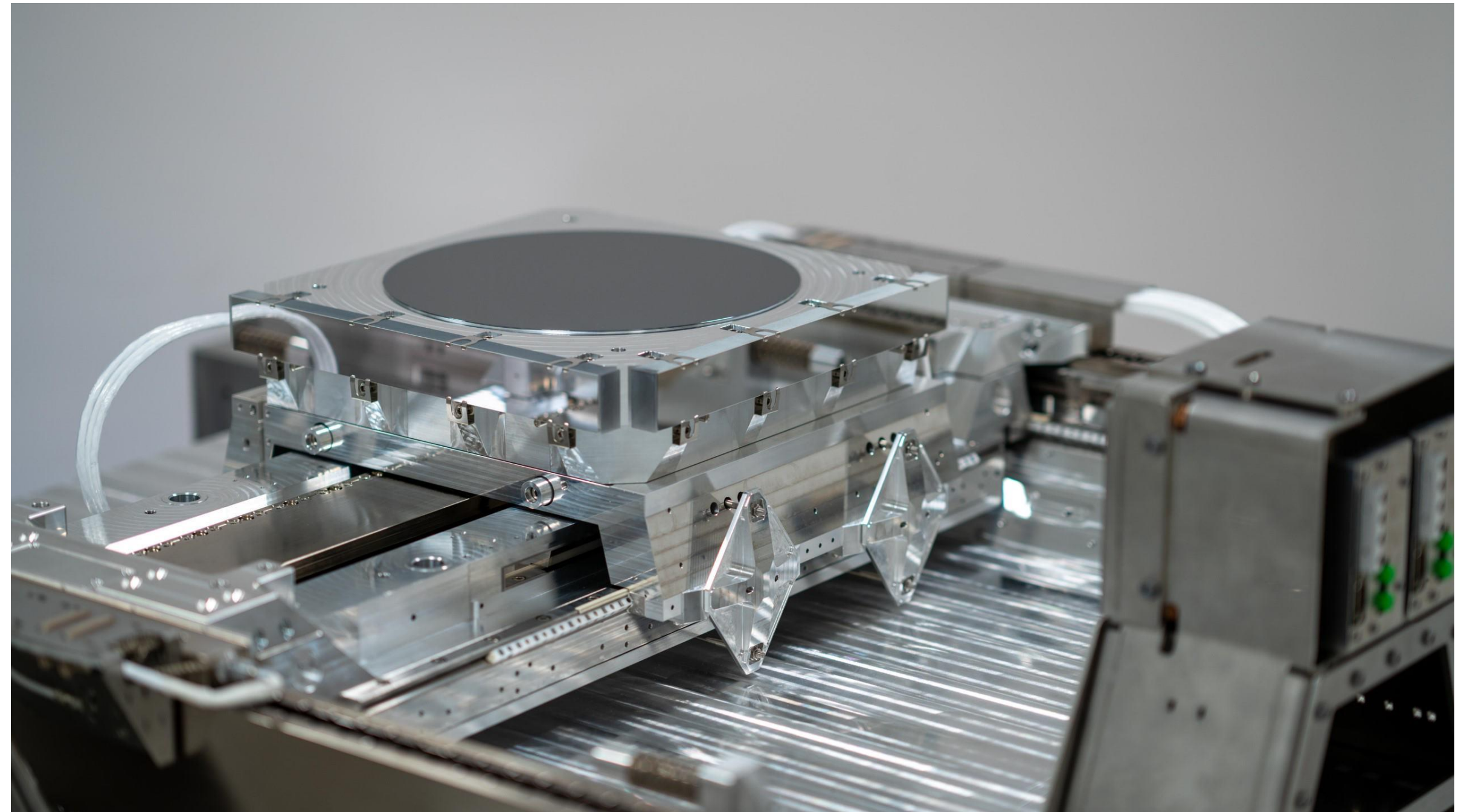
# SERVO DRIVES CATALOGUE





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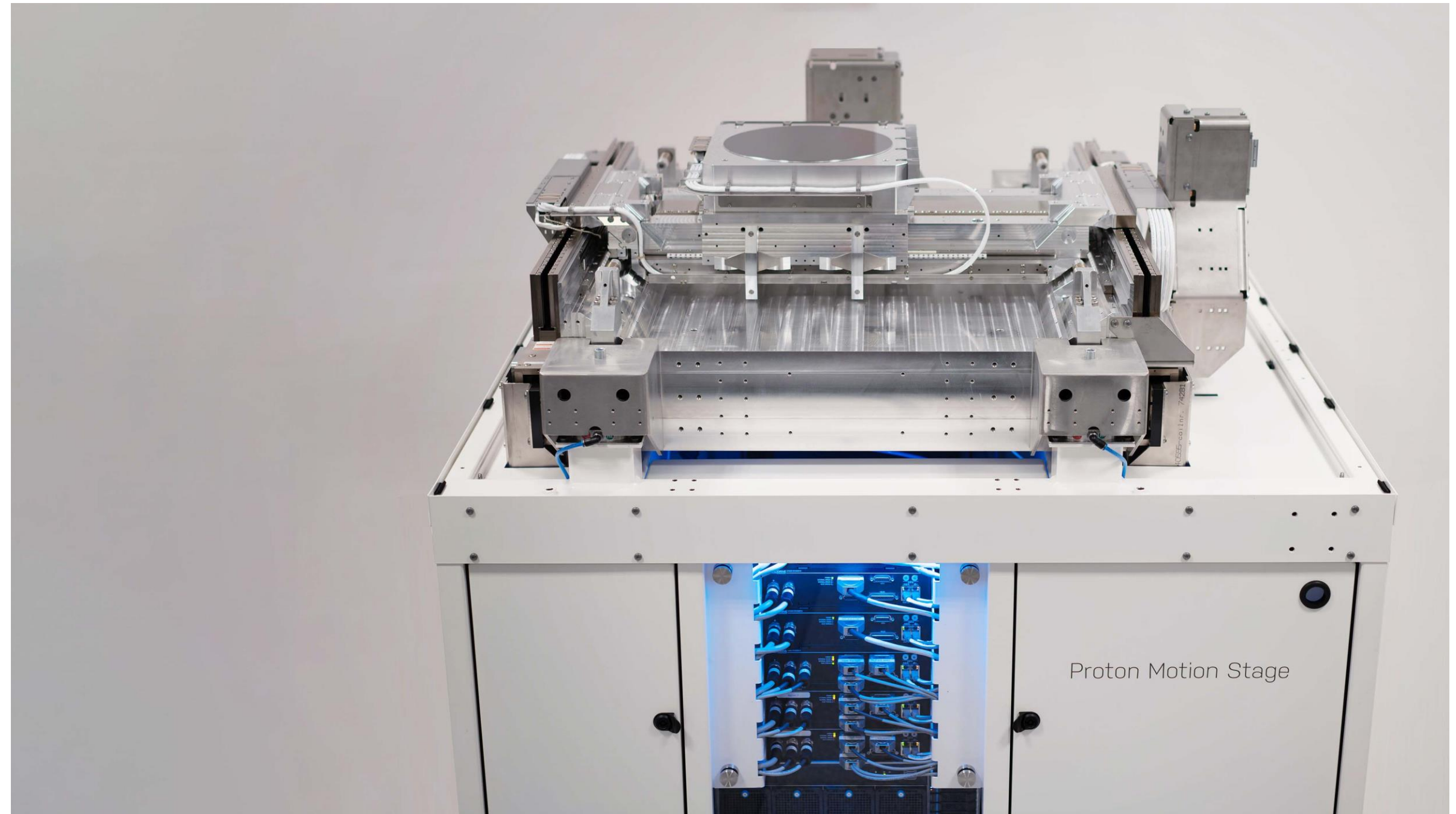
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Off the shelf motion stage for wafer inspection, powered by Apogee and Kepler drives

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Off the shelf motion stage for wafer inspection, powered by Apogee and Kepler drives



# A PASSION FOR TECHNOLOGY

## Knowledge

Engineering excellence is the driving force behind servo drive innovation in both design and manufacturing. Prodrive has a highly skilled group of electrical, mechanical and software engineers capable of customizing drive technology towards your needs.

## Quality

Quality is in the DNA of Prodrive Technologies. With a long history in electronics manufacturing, Prodrive continues in this area with the same philosophy and processes, setting a new standard within the servo drive market.

## Automation

Design for manufacturing is key to reduce cost and guarantee quality. Circuit board manufacturing, testing and assembly are highly automated processes which guarantee a constant quality at minimum cost.

## Time to market

Due to the agility of Prodrive Technologies' large development department, customization can be performed in a very short time, providing a short time to market for challenging mechatronic applications.



Prodrive Technologies HQ Campus, The Netherlands





## Cygnus

Highly integrated drive series, featuring up to 4 axes, safe torque off and safe brake control.

Typical applications

- Factory automation
- Machining
- XYZθ stages



## Kepler

Low noise, dual output drives for demanding applications requiring high linearity and a very low output current ripple.

Typical applications

- Active vibration isolation
- Gantry stages
- Precision robotics



## Apogee

Ultra low noise, high stability precision amplifier which rivals the best linear amplifiers.

Typical applications

- Metrology and lithography stages
- Nanometer positioning
- Replacement for linear amplifiers



## Quasar

Bi-directional power supply with integrated power factor correction circuitry.

Typical applications

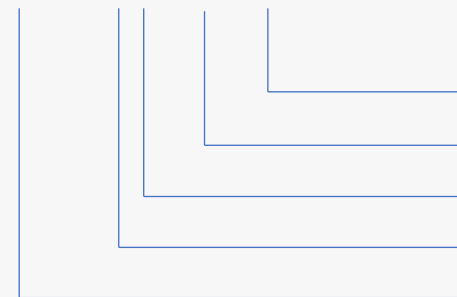
- Power supply for Cygnus drives
- Elimination of braking resistors



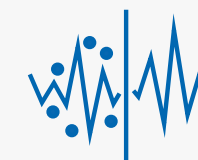
Cygnus motor drives come with a powerful integrated motion controller and a wide range of connectivity options. This makes the Cygnus the ideal choice for many applications. Due to its integrated input / output filtering, the Cygnus can operate with a minimal number of external components. The drive can be commanded via Ethernet or by using the CiA402 compatible EtherCAT interface.

The Cygnus drives make use of the programmable Prodrive Motion Platform (PMP). PMP is a highly flexible platform which is currently used across multiple industries. The motion controller can be integrated in the most demanding systems via the powerful Motion API (C++/C#). Custom real-time code can be deployed via Simulink code generation. The PMP tooling ensures fast and effortless commissioning by offering advanced signal tracing capabilities and a fully customizable HMI interface.

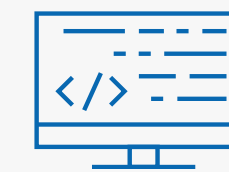
## Cygnus D3-400/4



- Rated phase current (continuous)
- Rated supply voltage
- Number of output phases
- Number of outputs (Single/Dual/Quad)
- Drive series



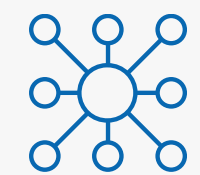
Integrated filtering



Programmable PMP motion controller via MATLAB Simulink integration




SBC/STO functions



Wide range of connectivity options



# CYGNUS LINE – FEATURES



External brake resistor interface for systems with high braking energy

CiA402-compliant EtherCAT slave

An integrated thermal solution with optional fan enables reliable operation at high ambient temperatures


Integrated RS485 and CAN interfaces enable direct communication with external systems

An embedded GbE diagnostic port allows real-time tracing of internal parameters and sensor values, even when connected to a 3<sup>rd</sup>-party EtherCAT master

Integrated Safe Torque Off (STO) and Safe Brake Control (SBC) functions reduce overall system complexity

Slew-rate limited outputs combined with internal filtering enables the use of unshielded connectors

Single, dual and quad output versions cover a range from 500W up to 7kW<sub>PK</sub> per axis

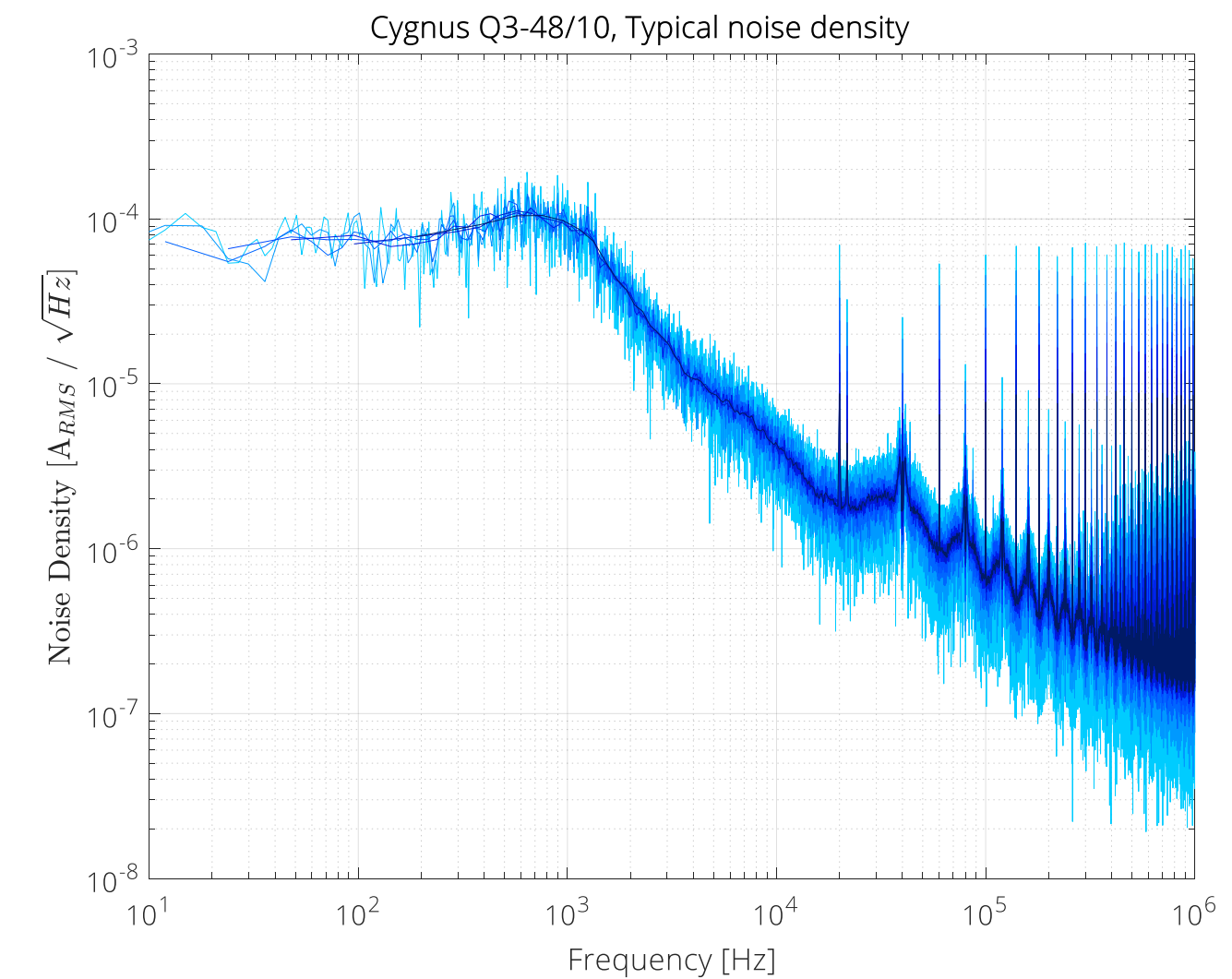


Cygnus S3-400/8      Cygnus D3-400/4      Cygnus Q3-48/10

Cygnus Q3-48/10, overview

# CYGNUS LINE – PERFORMANCE SPECIFICATIONS

	Parameter	Symbol	Unit	S3-400/8	D3-400/4	Q3-48/10	Remark
Input	Supply input voltage	V <sub>SUPPLY</sub>	V	390 - 410	390 - 410	17 - 54	
	Supply input voltage, abs. max	V <sub>SUPPLY_ABS_MAX</sub>	V <sub>DC</sub>	450	450	60	
	Peak input current	I <sub>SUPPLY_PEAK</sub>	A <sub>PK</sub>	max 20	max 20	max 50	
	Continuous input current	I <sub>SUPPLY_CONT</sub>	A <sub>RMS</sub>	max 10	max 10	max 30	
	Auxiliary input voltage	V <sub>SUPPLY_AUX</sub>	V	21 - 26			
	Auxiliary input current	I <sub>AUX_RMS</sub>	A <sub>RMS</sub>	max 3			
Output	Number of motor outputs	n <sub>MOT</sub>	-	1	2	4	
	Supported motor types		-	PMSM / BLDC / Stepper / Induction			
	Peak phase current	I <sub>PH_PK</sub>	A <sub>PK</sub>	22,6	11,3	28,2	
	Continuous phase current	I <sub>PH_CONT</sub>	A <sub>RMS</sub>	8,0	4,0	10,0	
	Peak phase-phase voltage range	V <sub>PHPH_PEAK</sub>	V <sub>PK</sub>	0 - 355	0 - 355	0 - 43	Input voltage 400V <sub>DC</sub> /48V <sub>DC</sub>
			V <sub>RMS</sub>	0 - 250	0 - 250	0 - 30	
	Current loop, small signal bandwidth	f <sub>-3dB</sub>	kHz	1			-3dB, typical value
	Rated switching frequency	f <sub>PWM</sub>	kHz	20			
	Output frequency	f <sub>MOT</sub>	Hz	0 - 595			dual use limited, see note
	Electrical braking function		-	No			
	External brake resistor		-	No			
	Internal brake resistor		-	Yes			
Accuracy	Offset	E <sub>MOT_OFFSET</sub>	% of I <sub>PH_PK</sub>	<1,0			
	Offset drift	E <sub>MOT_OFFSET_DRIFT</sub>	% of I <sub>PH_PK</sub>	<1,0			
	Gain error	E <sub>MOT_GAIN</sub>	% of I <sub>PH_PK</sub>	<4,0			
	Gain error drift	E <sub>MOT_GAIN_DRIFT</sub>	ppm of I <sub>PK</sub>	<8000			
Noise	Non-linearity	E <sub>MOT_NONL</sub>	ppm of I <sub>PK</sub>	<5000			
	Noise (spectral density @100Hz)	I <sub>NOISE_LF</sub>	μA/√Hz	50	20	100	typical value at 0A setpoint
	Noise (rms, 1Hz-10kHz)	I <sub>NOISE_100kHz</sub>	μA <sub>RMS</sub>	-			
Control	Ripple	I <sub>MOT_RIPPLE</sub>	μA <sub>RMS</sub>	-			
	Interface type		-	GbE			
				EtherCAT			
				RS485			50Mbps max
Update rate	f <sub>ECAT</sub>	-	100Hz - 20kHz				
Diagnostic interface		-	GbE				



	Parameter	Symbol	Unit	S3-400/8	D3-400/4	Q3-48/10	Remark
Safety	Applicable standard		-	IEC/UL61800-5-1			pending certification
	Pollution degree	PD	-	2			
	Overvoltage category	OVC	-	III		II	
	IP-protection class / enclosure type		-	IP20 / open type			
	Max operating altitude	h <sub>OP_max</sub>	m	2000			
	STO / SBC outputs		-	IEC61508, SIL3			pending certification
	EMC	Applicable standard					
Input filtering				Cat C2, 2nd env			use with listed supply
Output filtering				Clamped LC filter (dV/dt limiting)			

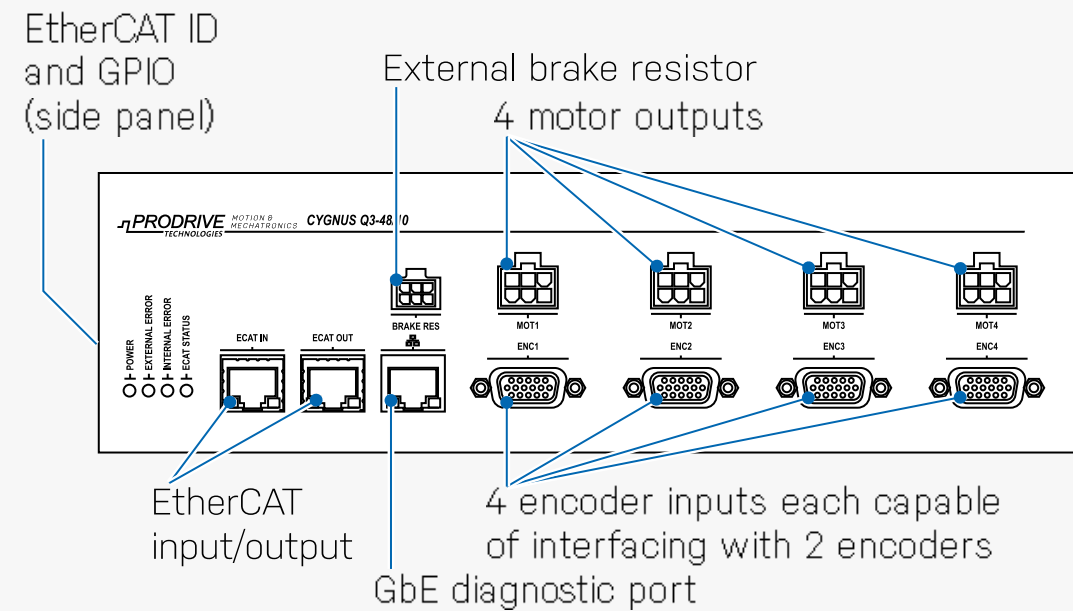
## Notes:

- All performance specifications are validated at an input voltage of 400VDC (Cygnus S3-400/8 & Cygnus D3-400/4) or 48VDC (Cygnus Q3-48/10)
- Dual use limited: output frequencies above 600Hz are subject to export control and require an export permit (EU 2021/821, 3A225)

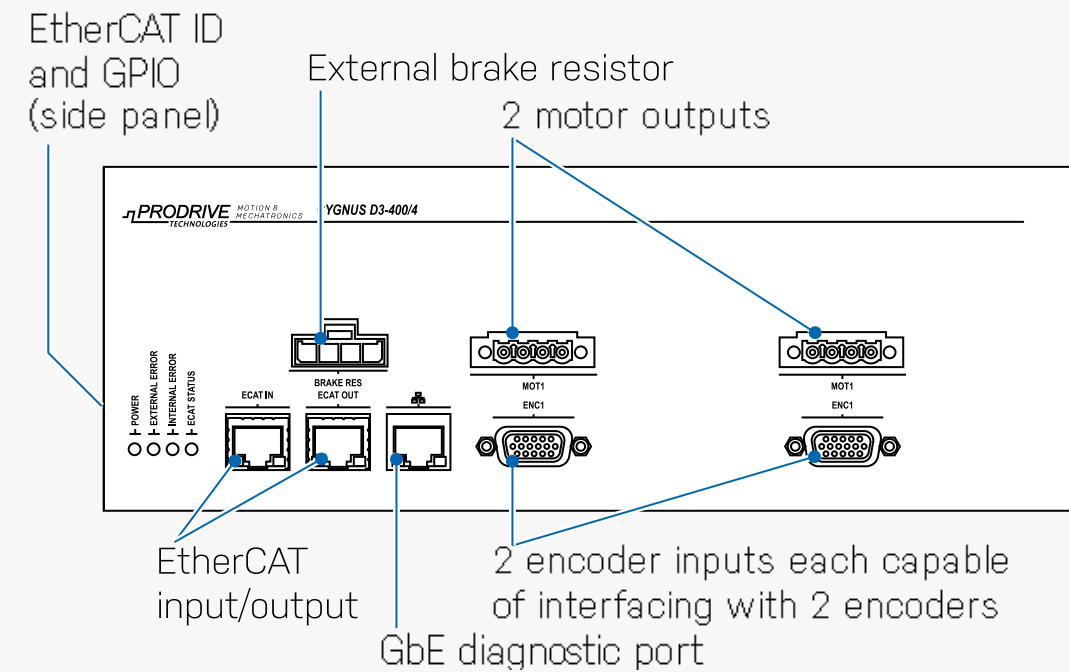


# CYGNUS LINE – INTERFACES & MECHANICAL SPECIFICATIONS

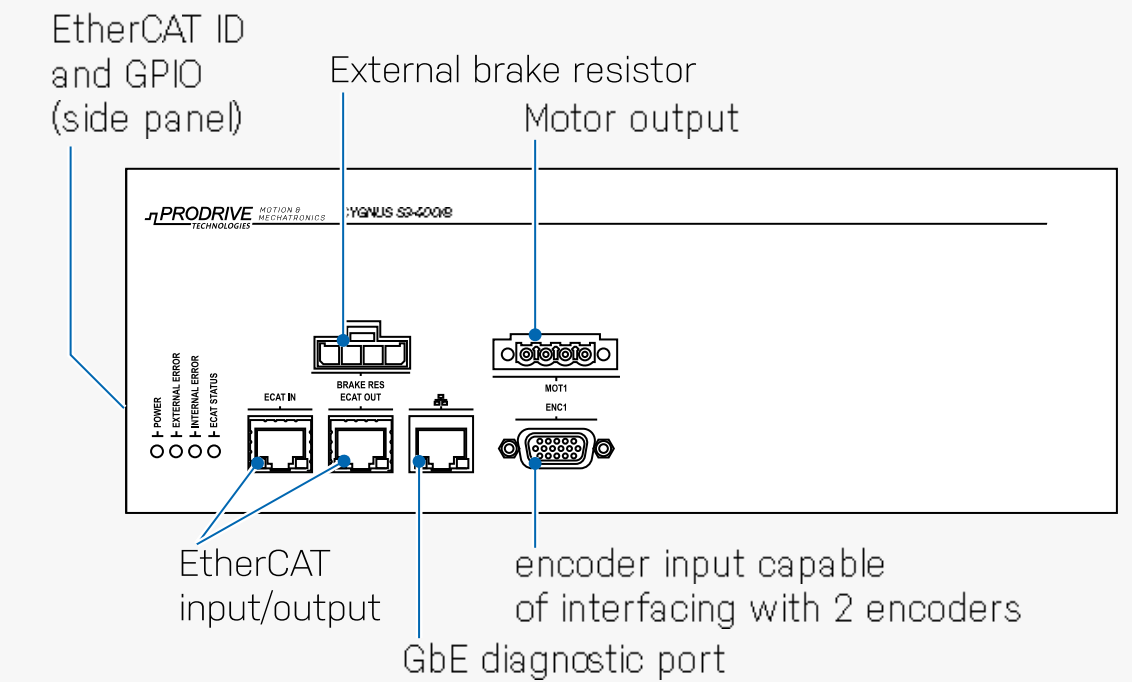
## Q3-48/10



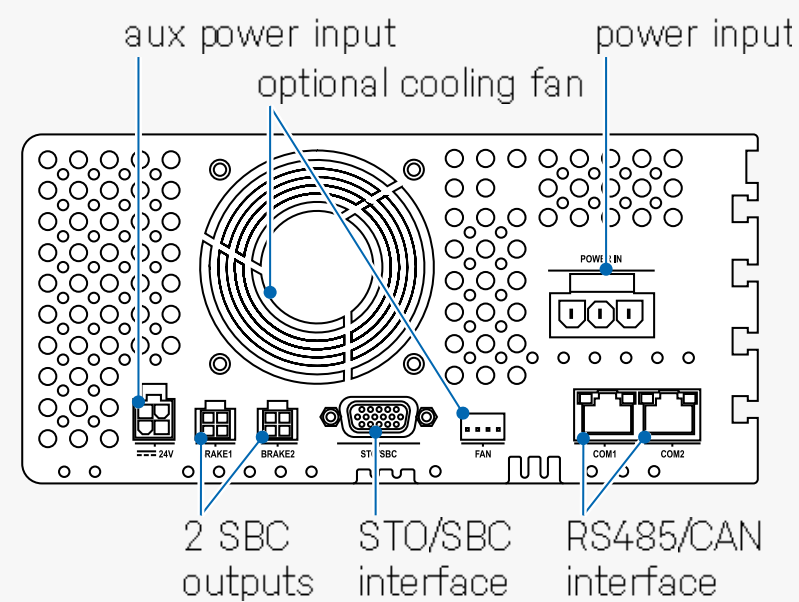
## D3-400/4



## S3-400/8



## Q3, D3, S3 side

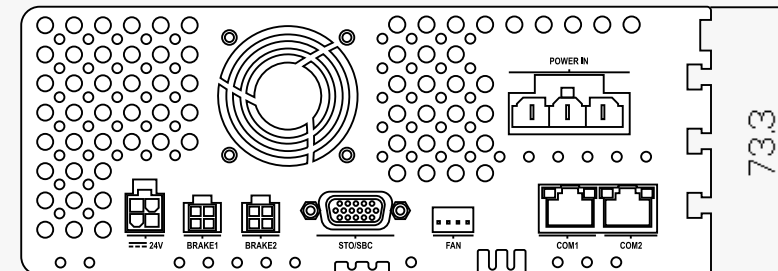
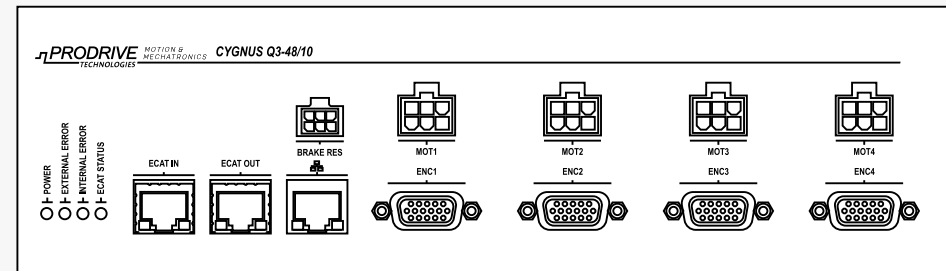


	Parameter	Symbol	Unit	S3-400/8	D3-400/4	Q3-48/10	Remark
Encoder inputs	Number of encoder inputs	$n_{ENC}$	-	1	2	4	
	Supported types		-	Quadrature Analog Sin/Cos Digital hall Endat 2.1/2.2 Hiperface DSL (2W/4W) SSI / BiSS C			
	Max signal frequency	$f_{sincos\_max}$	-	1MHz - 4M counts/s			No missing pulses
	Maximum baudrate (digital encoders)	$f_{rs422\_max}$	MHz	10			
	Encoder supply voltage	$V_{ENC SUP}$	V	5 / 10			software selectable
General purpose I/O	Encoder supply current	$I_{ENC SUP}$	mA	max 250			
	Isolated digital inputs		-	4 x 24V input			( $V_{IH} \geq 11V, V_{IL} \leq 5V, I_{IN} < 15mA$ )
	Isolated digital outputs		-				
	Non-isolated digital inputs		-	3 x TTL			
	Non-isolated digital outputs		-	4x 24V -2A			
	Analog inputs		-	4 x $\pm 10V$ (12-bit) + 1x 0-10V (10bit)			
	Analog output		-				
Brake outputs		-	2x 24V - 2A				

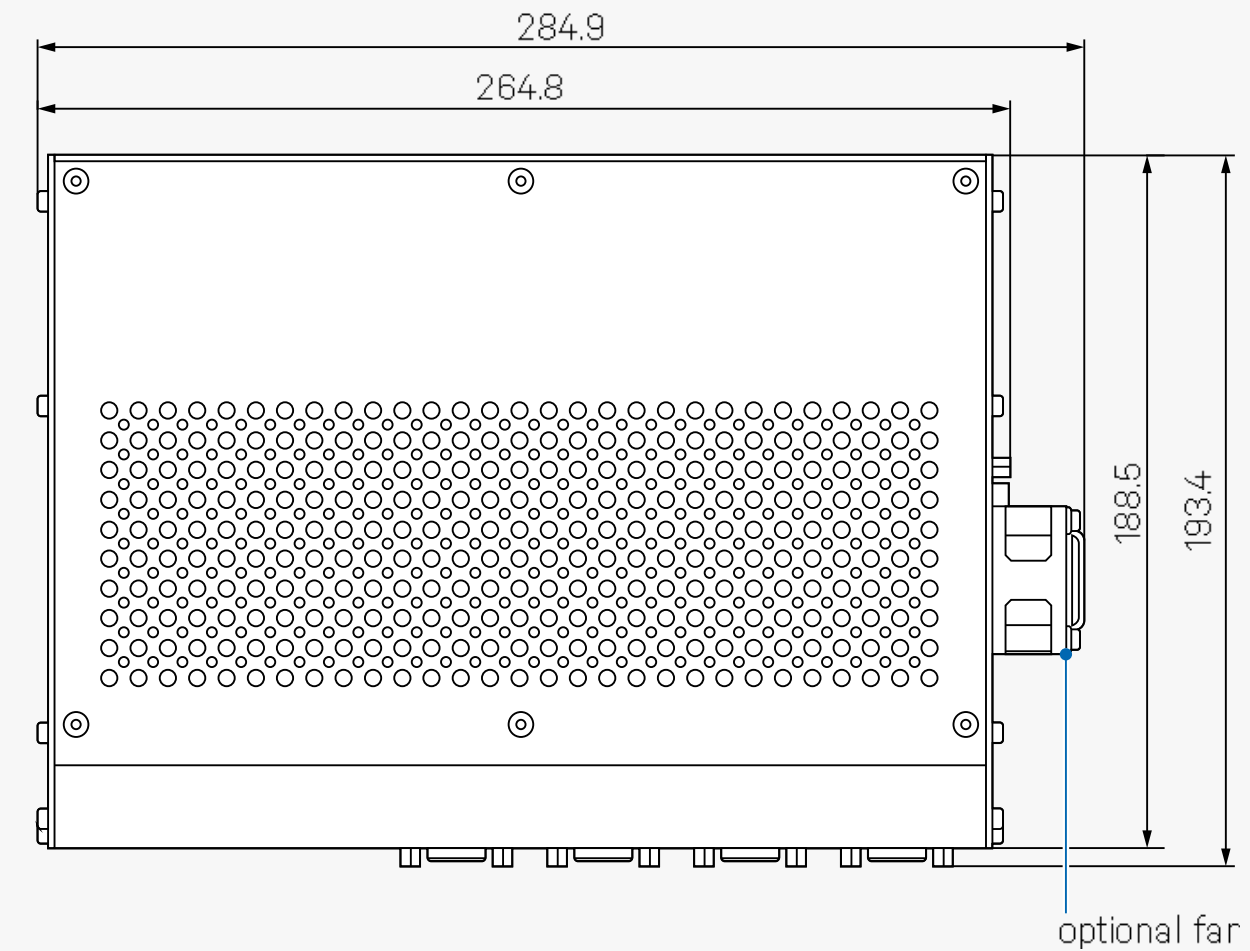


# CYGNUS LINE – INTERFACES & MECHANICAL SPECIFICATIONS

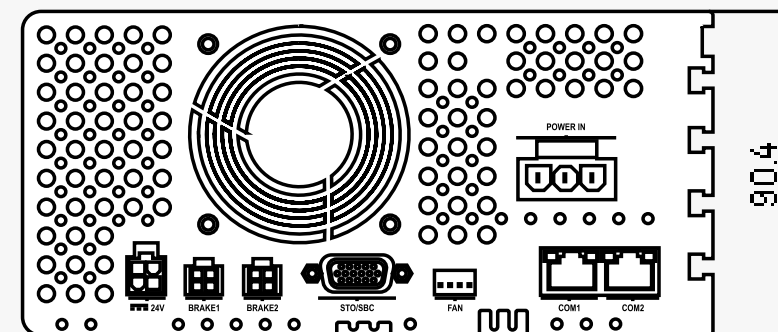
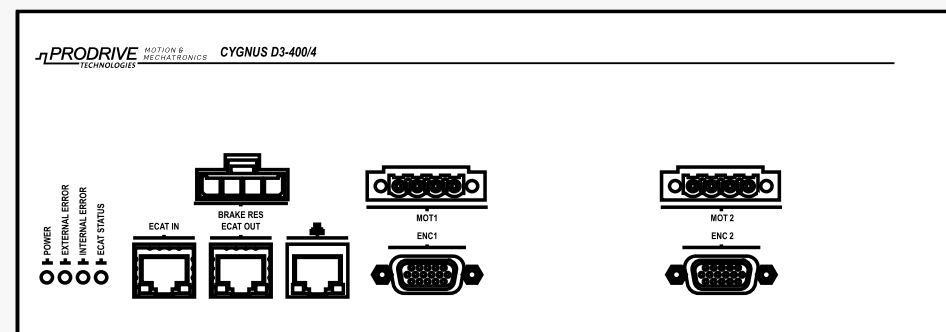
Q3



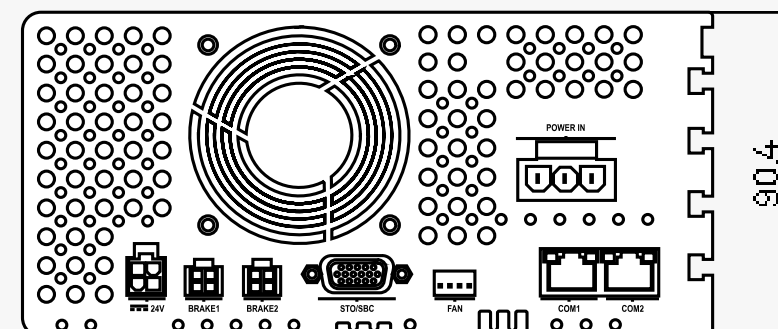
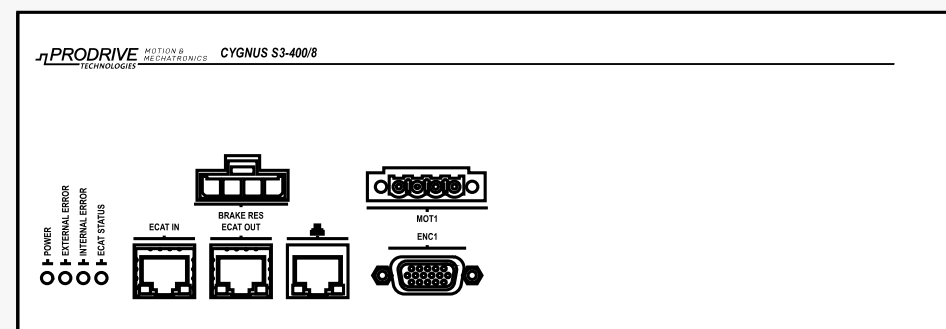
S3, D3, Q3



D3



S3



	Parameter	Symbol	Unit	S3-400/8	D3-400/4	Q3-48/10	Remark
Mechanical	Width	$d_w$	mm	90	90	73	
	Depth	$d_D$	mm	195	195	195	
	Height	$d_H$	mm	265	265	265	
	Operating temperature range	$T_{OP}$	°C	5 - 45			
	Operating humidity range	$h_{OP}$	%	0 - 90			non-condensing
	Shock & Vibration		-	IEC60068-2-6 (Fc)			
	Lifetime		-	>10 years			
	Mass	mass	kg	3,3	3,3	3,0	typical value





The Kepler series is designed for demanding applications requiring high linearity and a very low output current ripple. This used to be the exclusive domain of linear amplifiers, but Prodrive Technologies uses its extensive experience in amplifier technology to introduce a PWM drive with negligible switching noise that matches linear drive performance. The Kepler motor drives offer world-class linearity and switching noise. Due to internal output filtering and EMI protections, the drive can operate with a minimal number of external components.

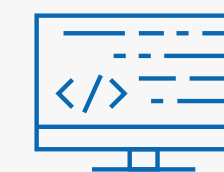
Kepler drives have an integrated Prodrive Motion Platform (PMP) motion controller. PMP is a highly flexible platform that is being used in many applications, ranging from personal transportation solutions to semiconductor industry. The PMP tooling ensures fast and effortless commissioning, while motion applications benefit from a powerful API and real-time control.

## Kepler D3-200/4-S

- Internal (S) / external (-) auxiliary power supply
- Rated phase current (continuous)
- Rated supply voltage
- Number of output phases
- Number of outputs (Single/Dual)
- Drive series



Integrated filtering



Programmable PMP motion controller via MATLAB Simulink integration



High precision Low Noise



Wide range of connectivity options



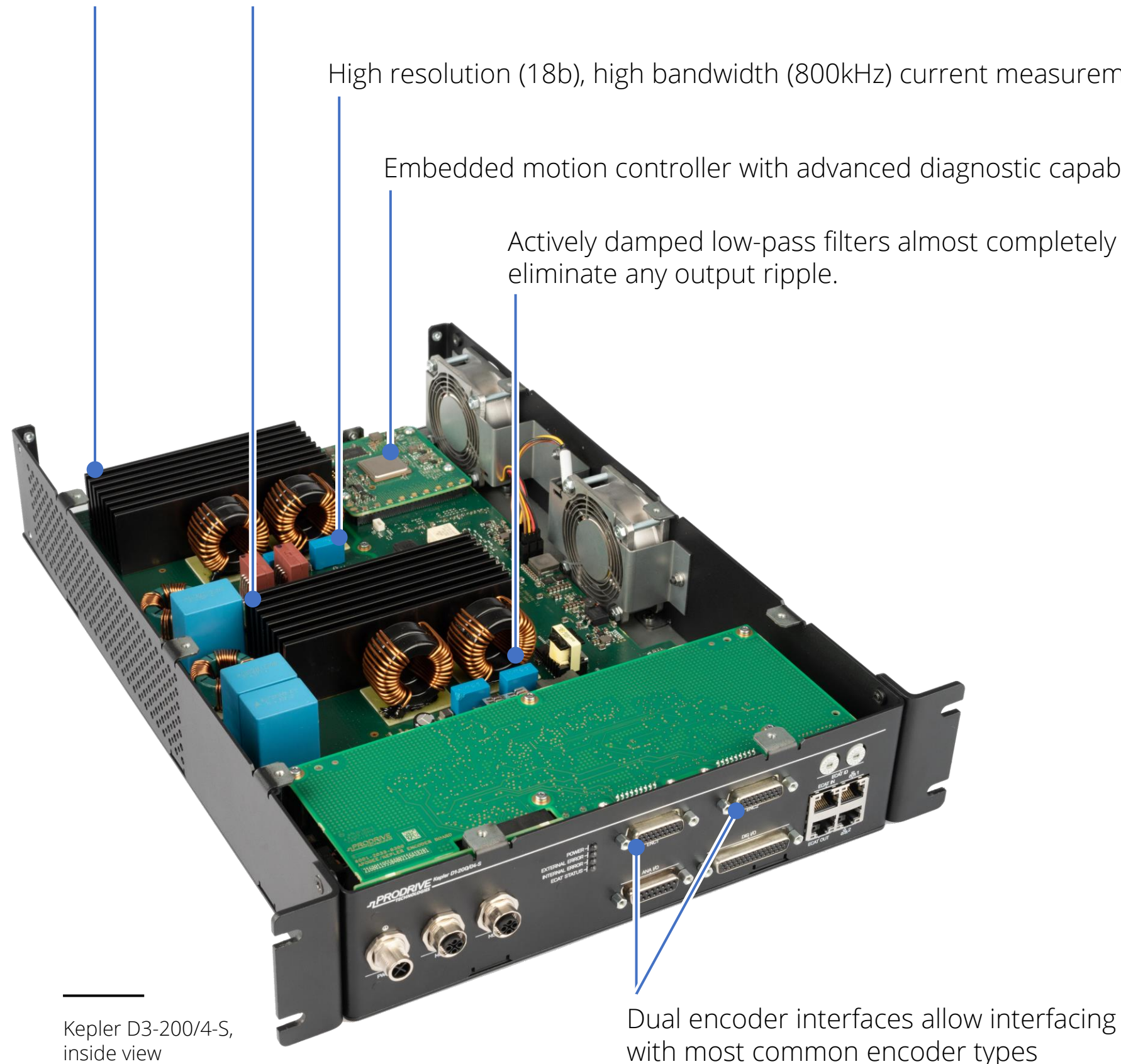
# KEPLER LINE – FEATURES

Dual, high-performance 200kHz power stages with Integrated thermal solution

High resolution (18b), high bandwidth (800kHz) current measurement circuit

Embedded motion controller with advanced diagnostic capabilities

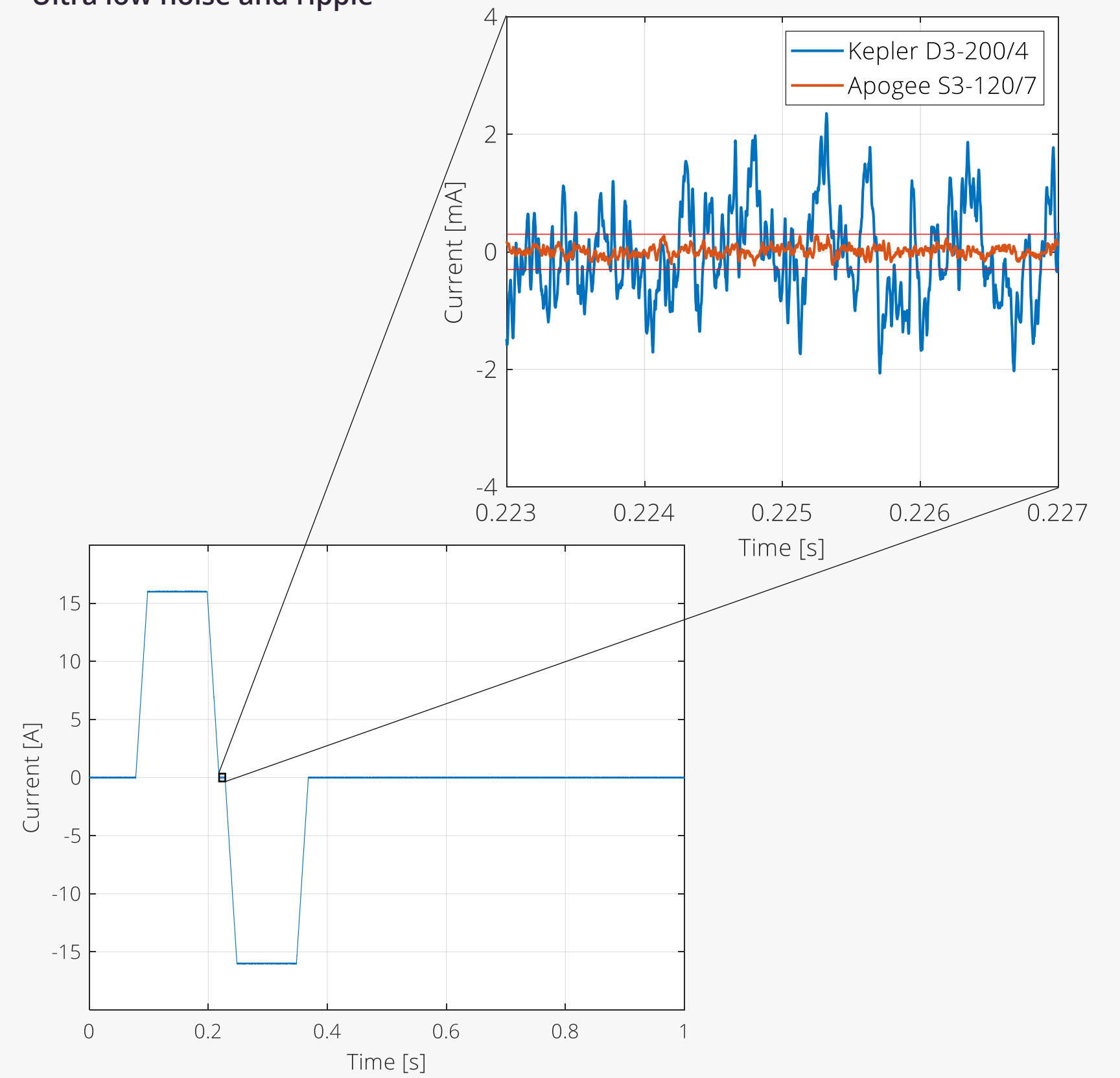
Actively damped low-pass filters almost completely eliminate any output ripple.



Kepler D3-200/4-S, inside view

Dual encoder interfaces allow interfacing with most common encoder types

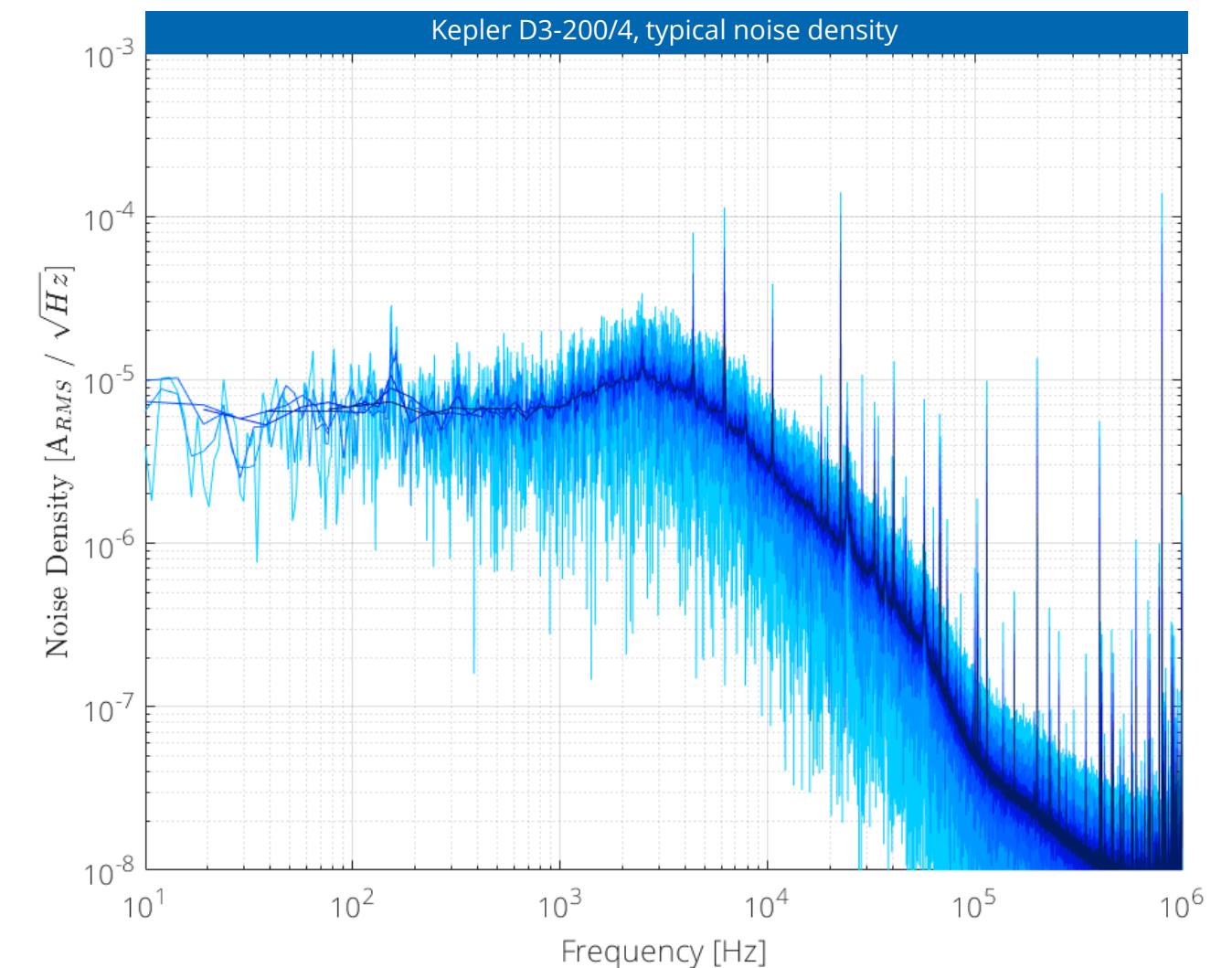
## Ultra low noise and ripple





# KEPLER LINE – PERFORMANCE SPECIFICATIONS

	Parameter	Symbol	Unit	D1-200/4	D3-200/4	Remark
Input	Supply input voltage	$V_{SUPPLY}$	V	2x30 to 2x100		Balanced supply
	Supply input voltage, abs. max	$V_{SUPPLY\_ABS\_MAX}$	$V_{DC}$	2x110		
	Peak input current	$I_{SUPPLY\_PEAK}$	$A_{PK}$	max 21		
	Continuous input current	$I_{SUPPLY\_CONT}$	$A_{RMS}$	max 9		
	Auxiliary input voltage	$V_{SUPPLY\_AUX}$	V	22 - 26		for version without -S suffix
	Auxiliary input current	$I_{AUX\_RMS}$	$A_{RMS}$	2		
Output	Number of motor outputs	$n_{MOT}$	-	2	2	
	Supported motor types		-	voice coil	3-phase PMSM/BLDC	
	Peak phase current	$I_{PH\_PK}$	$A_{PK}$	20		
	Continuous phase current	$I_{PH\_CONT}$	$A_{RMS}$	4,0		
	Peak phase-phase voltage range	$V_{PHPH\_PEAK}$	$V_{PK}$	0 - 180		$V_{SUPPLY} = 2x60VDC$
			$V_{RMS}$	0 - 120		
	Current loop, small signal bandwidth	$f_{-3dB}$	kHz	2 - 4		-3dB, typical value
	Rated switching frequency	$f_{PWM}$	kHz	200		
	Output frequency	$f_{MOT}$	Hz	0 - 595		dual use limited, see note
	Electrical braking function		-	Yes		shorts motor phases together
	External brake resistor		-	No		
	Internal brake resistor		-	No	Yes	
	Accuracy	Offset	$E_{MOT\_OFFSET}$	% of $I_{PH\_PK}$	<0,25	
Offset drift		$E_{MOT\_OFFSET\_DRIFT}$	% of $I_{PH\_PK}$	<0,07		
Gain error		$E_{MOT\_GAIN}$	% of $I_{PH\_PK}$	<0,82		
Gain error drift		$E_{MOT\_GAIN\_DRIFT}$	ppm of $I_{PK}$	<1500		
Non-linearity		$E_{MOT\_NONL}$	ppm of $I_{PK}$	<550		
Noise	Noise (spectral density @100Hz)	$I_{NOISE\_LF}$	$\mu A/Hz$	max 20		
	Noise (rms, 1Hz-10kHz)	$I_{NOISE\_100kHz}$	$\mu A_{RMS}$	max 600		
	Ripple	$I_{MOT\_RIPPLE}$	$\mu A_{RMS}$	350		2mH phase inductance, $\pm 48V$
Control	Interface type		-	GbE		
				EtherCAT		
				RS422		50Mbps max
	Update rate	$f_{ECAT}$	-	100Hz - 20kHz		
Diagnostic interface		-	GbE			



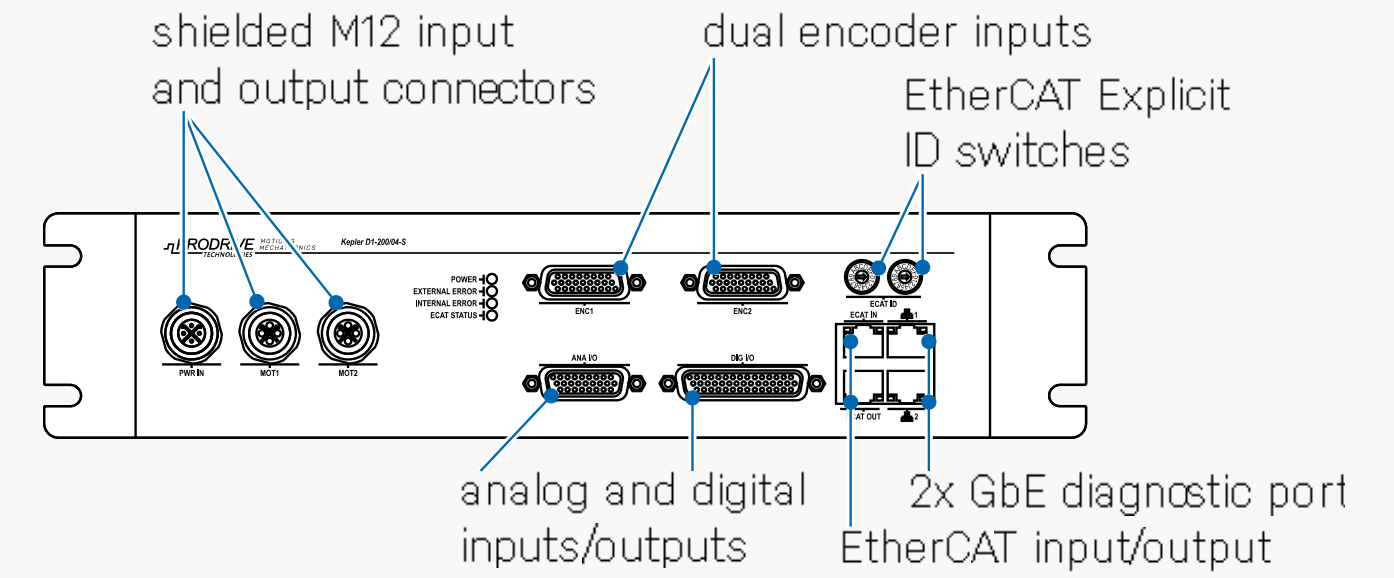
	Parameter	Symbol	Unit	D1-200/4	D3-200/4	Remark
Safety	Applicable standard		-	IEC/UL61800-5-1		TüV certified
	Pollution degree	PD	-	2		
	Overtoltage category	OVC	-	I		
	IP-protection class / enclosure type		-	IP20 / open type		
	Max operating altitude	$h_{OP\_max}$	m	2000		above mean sea level
	STO / SBC outputs		-			
EMC	Applicable standard		-	IEC61800-3		
	Input filtering		-	Cat C2, 2nd env		
	Output filtering		-	Actively damped LC		

## Notes:

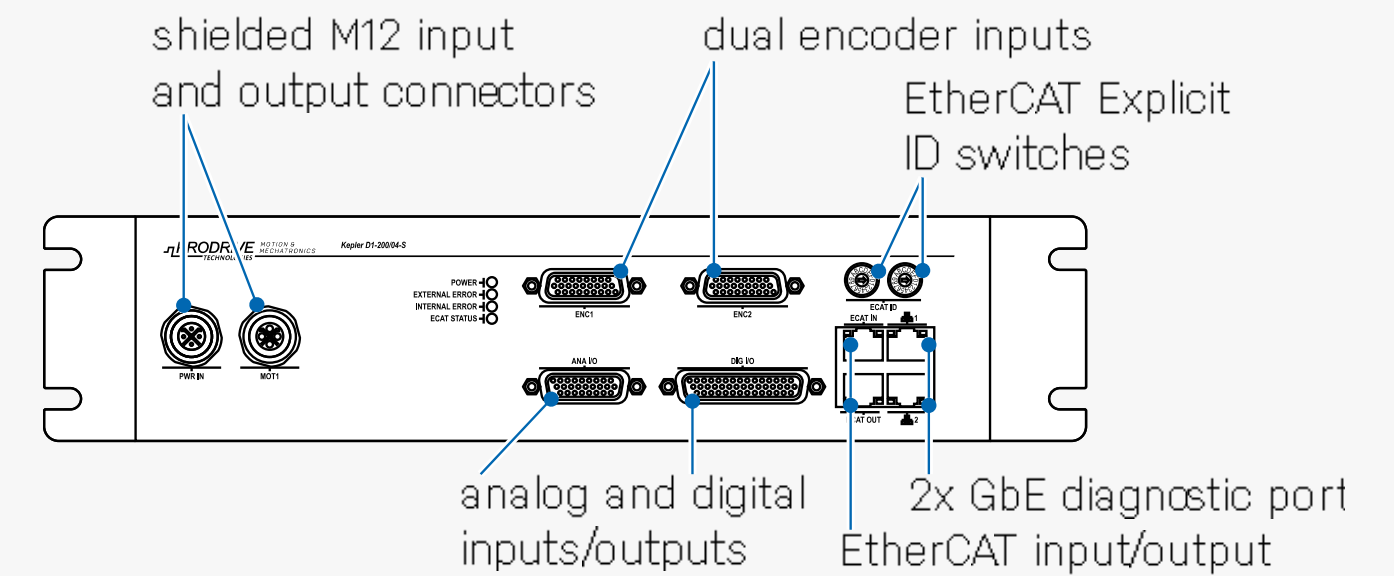
- All performance specifications are validated at an input voltage of 2 x 48V
- Dual use limited: output frequencies above 600Hz are subject to export control and require an export permit (EU 2021/821, 3A225)

	Parameter	Symbol	Unit	D1-200/4	D3-200/4	Remark
Encoder inputs	Number of encoder inputs	$n_{ENC}$	-	2		
	Supported types		-	Quadrature Analog Sin/Cos Digital hall Endat 2.1/2.2 Hiperface DSL (2W/4W) SSI / BiSS C		
	Max signal frequency	$f_{sincos\_max}$	MHz	1MHz - 4M counts/s		No missing pulses
	Maximum baudrate (digital encoders)	$f_{rs422\_max}$	MHz	32		
	Encoder supply voltage	$V_{ENC SUP}$	V	5 / 10		software selectable
	Encoder supply current	$I_{ENC SUP}$	mA	max 500		
General purpose I/O	Isolated digital inputs		-	4 x 24V		( $V_{IH} \geq 11V$ , $V_{IL} \leq 5V$ , $I_{IN} < 15mA$ )
	Isolated digital outputs		-	4 x 30V / 500mA		
	Non-isolated digital inputs		-	4 x TTL		
	Non-isolated digital outputs		-	2 x 24V - 1A 2x 24V - 200mA 4x TTL output		
	Analog inputs		-	2 x $\pm 10V$ diff		14bit resolution
	Analog output		-	2 x $\pm 10V$ diff		16bit resolution
	Brake outputs		-	-		

## S3-120/7

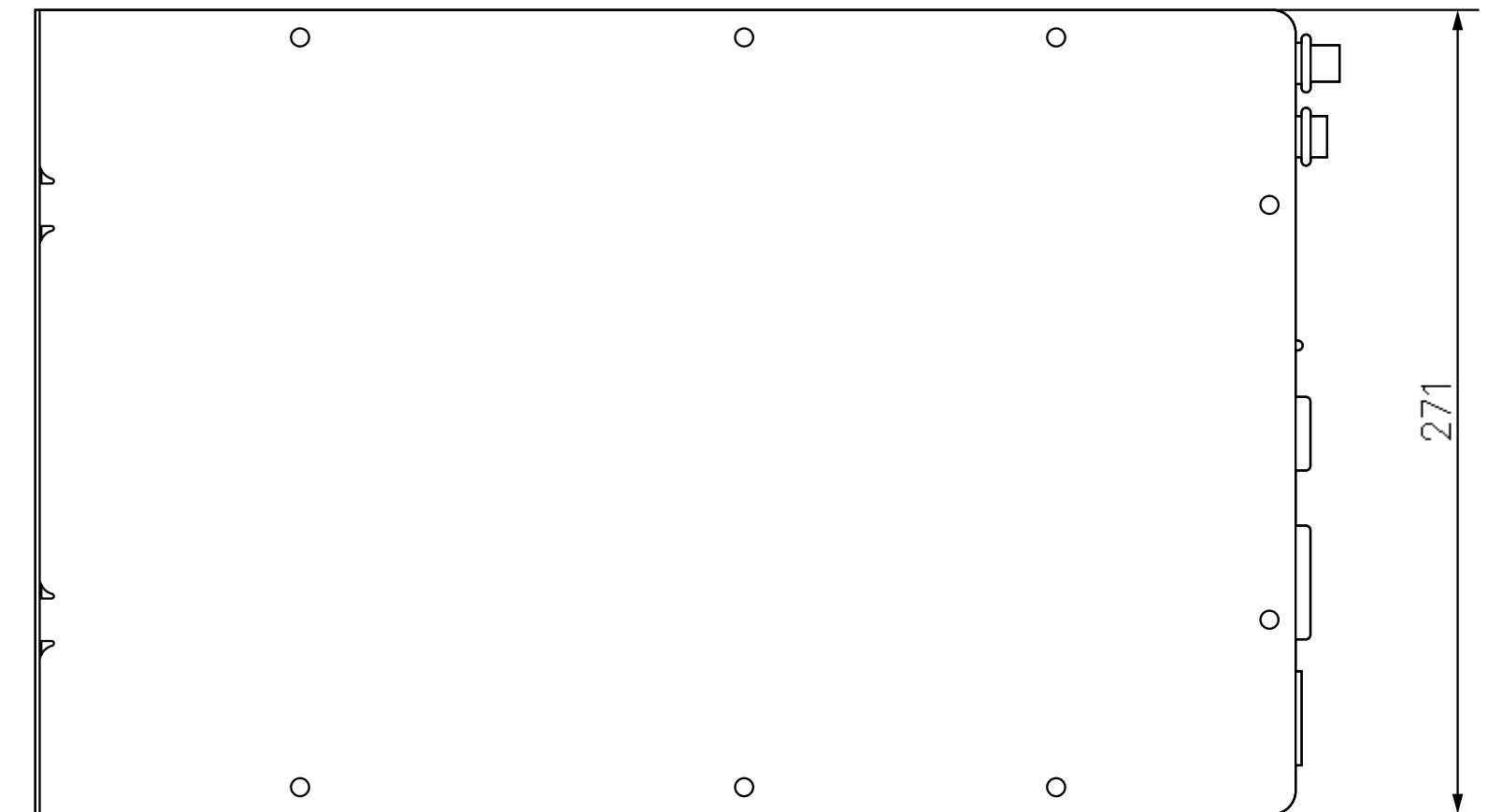
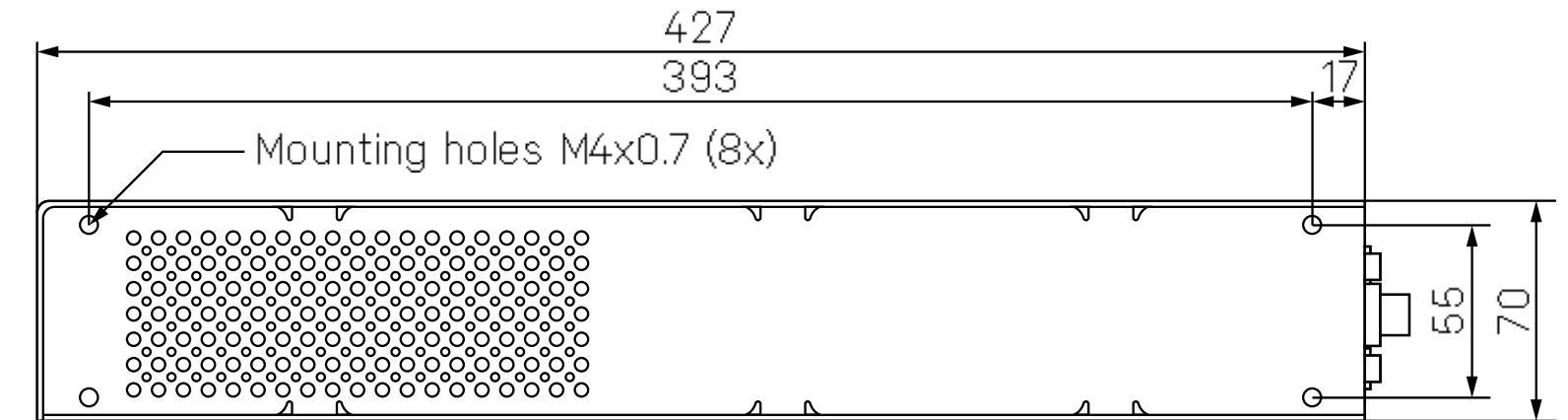
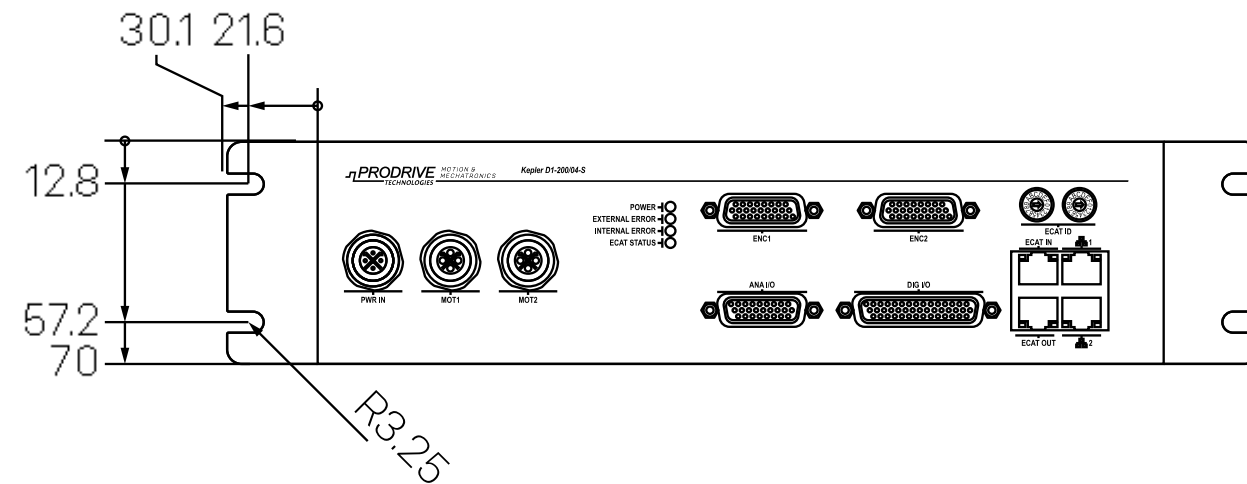


## D1-120/7





# KEPLER LINE – MECHANICAL SPECIFICATIONS



Mechanical	Parameter	Symbol	Unit	D1-200/4	D3-200/4	Remark
	Width	$d_W$	mm	271		
	Depth	$d_D$	mm	442		including connectors
	Height	$d_H$	mm	70		
	Operating temperature range	$T_{OP}$	°C	10 - 40		
	Operating humidity range	$h_{OP}$	%	20 - 80		non-condensing
	Shock & Vibration		-	IEC60068-2-6 (Fc)		
	Lifetime		-	>10 years		
	Mass	mass	kg	7,0		typical value



Apogee drives are especially designed for high-end applications that demand ultra-low output ripple and a highly linear response. This used to be the exclusive domain of linear amplifiers, but Prodrive Technologies uses its extensive experience in amplifier technology to introduce a PWM drive with negligible switching noise that matches linear drive performance.

Using proprietary end stage technology and a filtered output stage, the Apogee motor drives offer world-class linearity and switching noise. Due to internal output filtering and EMI protections, the drive can operate with a minimal number of external components.

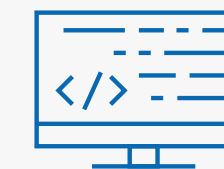
Compared with traditional analog drives, the Apogee line offers an increased system efficiency, significantly reducing the thermal load on the system.

## Apogee S3-120/7-S

- Internal (S) / external (-) auxiliary power supply
- Rated phase current (continuous)
- Rated supply voltage
- Number of output phases
- Number of outputs (Single/Dual)
- Drive series



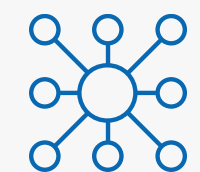
Integrated filtering



Programmable PMP  
motion controller via  
MATLAB Simulink  
integration



High precision  
Low Noise



Wide range of  
connectivity options



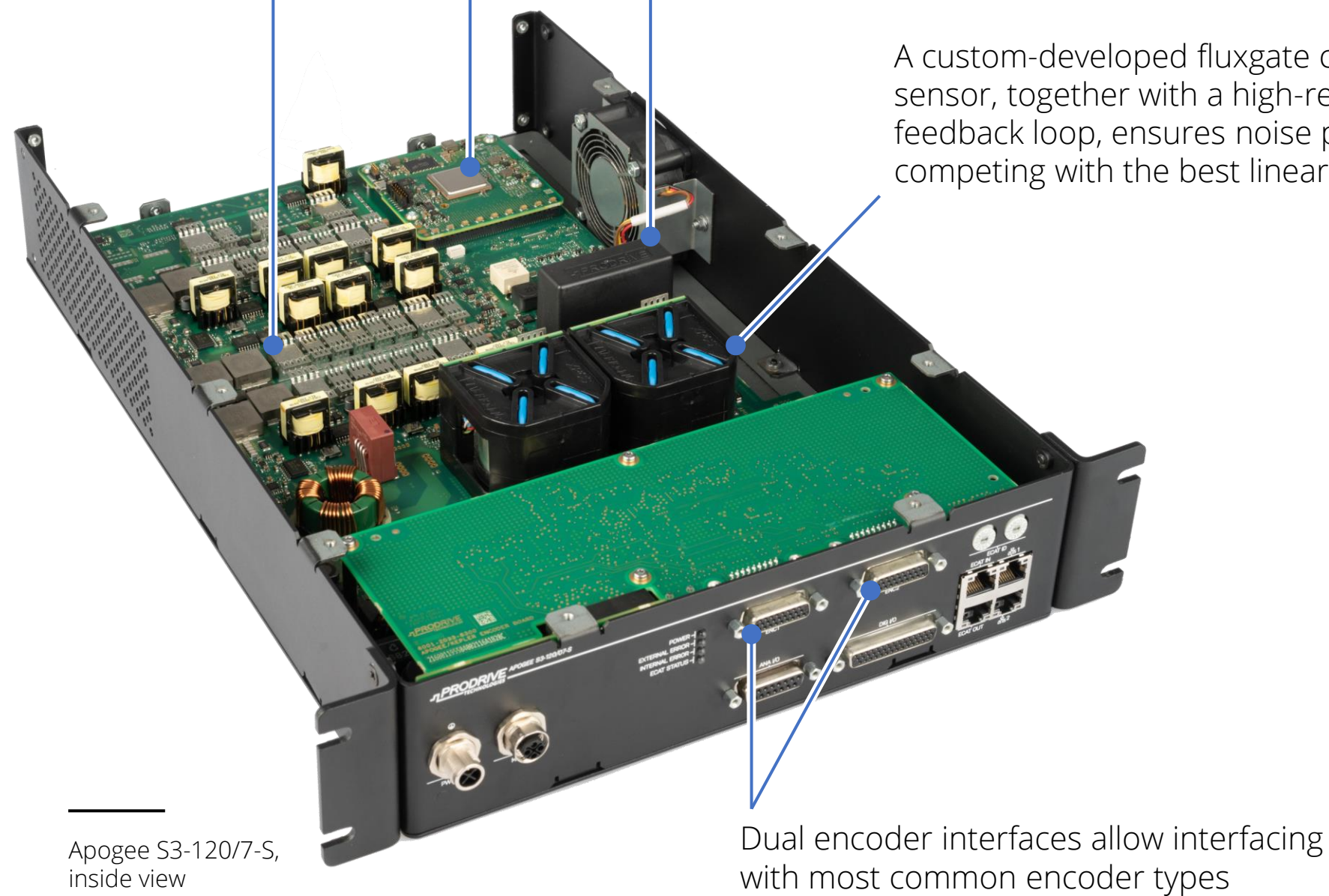
# APOGEE LINE – FEATURES

Internal low-pass filtering, combined with a multilevel output stage almost completely eliminates any output ripple.

Embedded motion controller with advanced diagnostic capabilities

The Apogee line uses high-stability metal foil resistors in combination with a temperature-controlled voltage reference to guarantee drift levels in the ppm range, significantly extending system level calibration intervals.

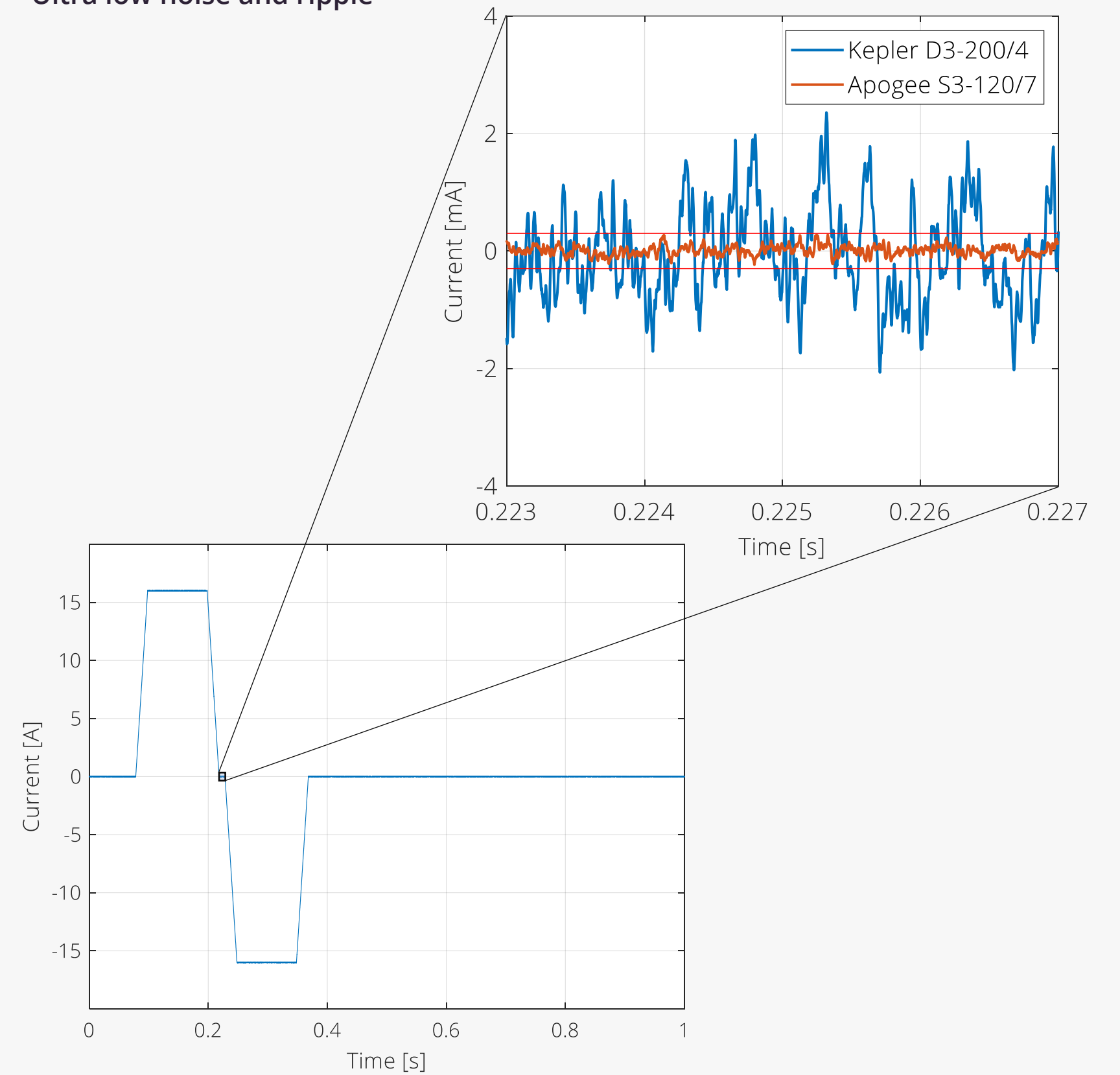
A custom-developed fluxgate current sensor, together with a high-resolution feedback loop, ensures noise performances competing with the best linear amplifiers.



Apogee S3-120/7-S, inside view

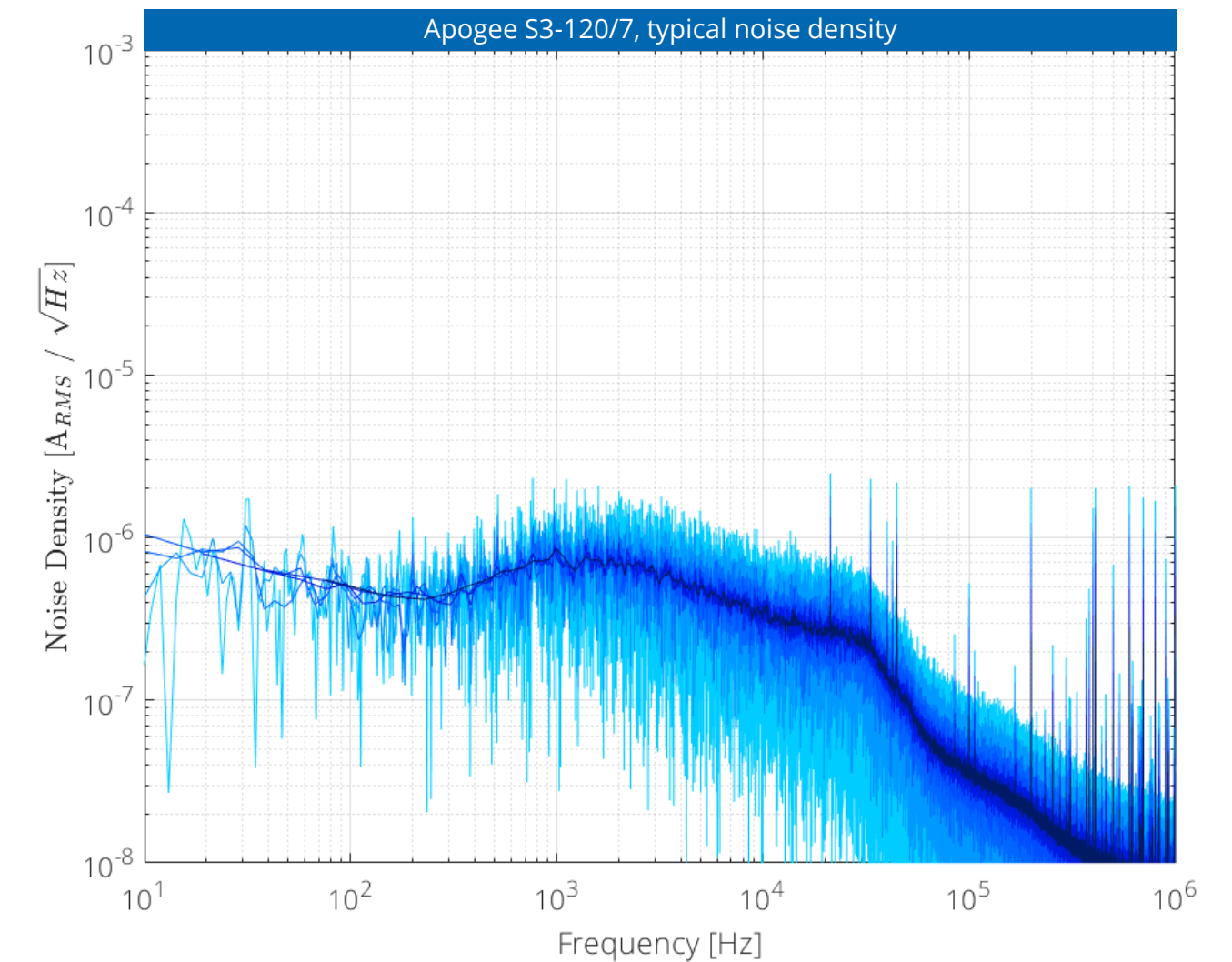
Dual encoder interfaces allow interfacing with most common encoder types

## Ultra low noise and ripple



# APOGEE LINE – PERFORMANCE SPECIFICATIONS

	Parameter	Symbol	Unit	S3-120/7	D1-120/7	Remark
Input	Supply input voltage	$V_{SUPPLY}$	V	2x30 to 2x60		Balanced supply
	Supply input voltage, abs. max	$V_{SUPPLY\_ABS\_MAX}$	$V_{DC}$	2x70		
	Peak input current	$I_{SUPPLY\_PEAK}$	$A_{PK}$	max 12		
	Continuous input current	$I_{SUPPLY\_CONT}$	$A_{RMS}$	max 7		
	Auxiliary input voltage	$V_{SUPPLY\_AUX}$	V	22 - 26		for version without -S suffix
	Auxiliary input current	$I_{AUX\_RMS}$	$A_{RMS}$	2		
Output	Number of motor outputs	$n_{MOT}$	-	1	2	
	Supported motor types		-	3-phase PMSM/BLDC	voice coil	
	Peak phase current	$I_{PH\_PK}$	$A_{PK}$	16,5		
	Continuous phase current	$I_{PH\_CONT}$	$A_{RMS}$	6,5		
	Peak phase-phase voltage range	$V_{PHPH\_PEAK}$	$V_{PK}$	0 - 100		$V_{SUPPLY} = 2x60VDC$
			$V_{RMS}$	0 - 70		
	Current loop, small signal bandwidth	$f_{-3dB}$	kHz	6 - 7		-3dB, typical value
	Rated switching frequency	$f_{PWM}$	kHz	200		
	Output frequency	$f_{MOT}$	Hz	0 - 595		dual use limited, see note
	Electrical braking function		-	Yes		shorts motor phases together
	External brake resistor		-	No		
	Internal brake resistor		-	Yes	No	
	Accuracy	Offset	$E_{MOT\_OFFSET}$	% of $I_{PH\_PK}$	<0,4	
Offset drift		$E_{MOT\_OFFSET\_DRIFT}$	% of $I_{PH\_PK}$	<0,1		
Gain error		$E_{MOT\_GAIN}$	% of $I_{PH\_PK}$	<0,7		
Gain error drift		$E_{MOT\_GAIN\_DRIFT}$	ppm of $I_{PK}$	<150		
Non-linearity		$E_{MOT\_NONL}$	ppm of $I_{PK}$	<50		
Noise	Noise (spectral density @100Hz)	$I_{NOISE\_LF}$	$\mu A/\sqrt{Hz}$	max 1		
	Noise (rms, 1Hz-10kHz)	$I_{NOISE\_10kHz}$	$\mu A_{RMS}$	max 110		
	Ripple	$I_{MOT\_RIPPLE}$	$\mu A_{RMS}$	100		2mH phase inductance, $\pm 48V$
Control	Interface type		-	GbE		
				EtherCAT		
				RS422		50Mbps max
	Update rate	$f_{ECAT}$	-	100Hz - 20kHz		
Diagnostic interface		-	GbE			



	Parameter	Symbol	Unit	S3-120/7	D1-120/7	Remark
Safety	Applicable standard		-	IEC/UL61800-5-1		TüV certified
	Pollution degree	PD	-	2		
	Overtoltage category	OVC	-	I		
	IP-protection class / enclosure type		-	IP20 / open type		
	Max operating altitude	$h_{OP\_max}$	m	2000		above mean sea level
	STO / SBC outputs		-			
EMC	Applicable standard		-	IEC61800-3		
	Input filtering		-	Cat C2, 2nd env		
	Output filtering		-	Actively damped LC		

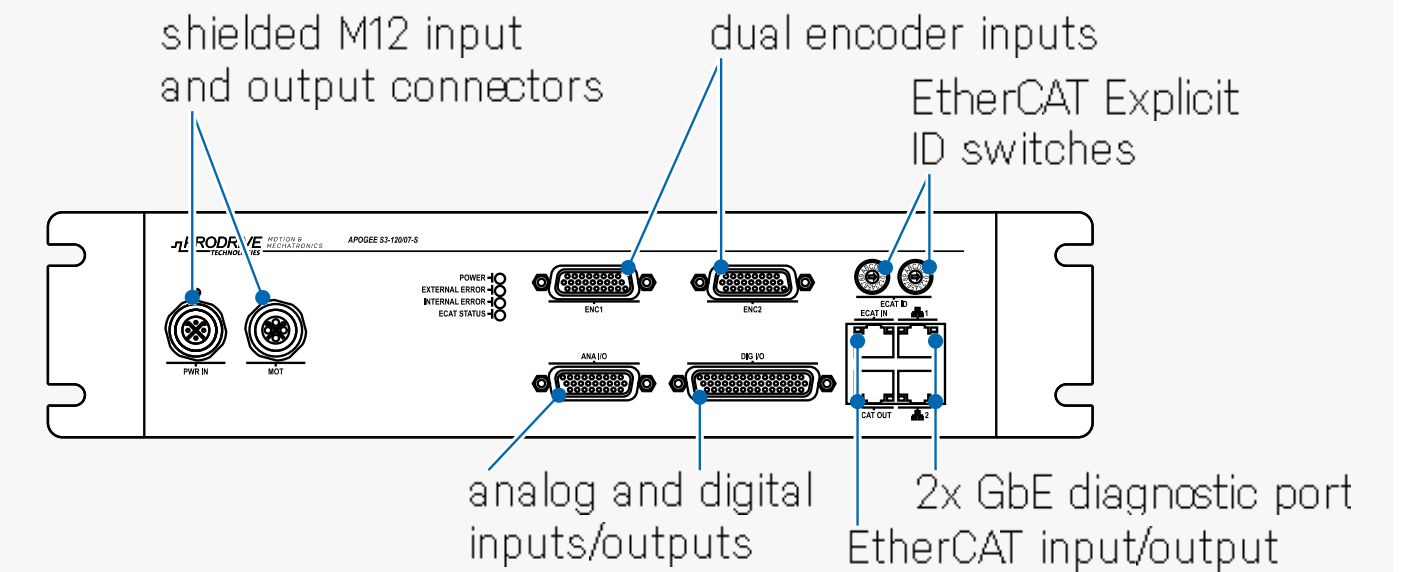
## Notes:

- All performance specifications are validated at an input voltage of 2 x 48V
- Dual use limited: output frequencies above 600Hz are subject to export control and require an export permit (EU 2021/821, 3A225)

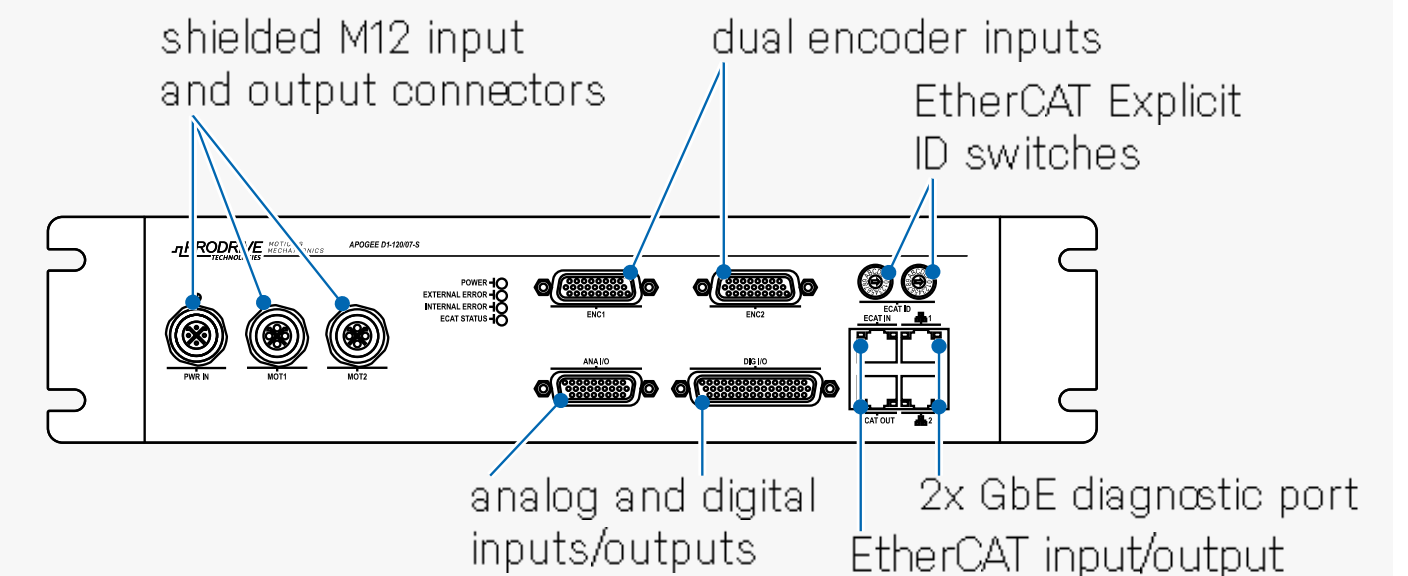


	Parameter	Symbol	Unit	S3-120/7	D1-120/7	Remark
Encoder inputs	Number of encoder inputs	$n_{ENC}$	-	2		
	Supported types			Quadrature Analog Sin/Cos Digital hall Endat 2.1/2.2 Hiperface DSL (2W/4W) SSI / BiSS C		
	Max signal frequency	$f_{sincos\_max}$	-	1MHz - 4M counts/s		No missing pulses
	Maximum baudrate (digital encoders)	$f_{rs422\_max}$	MHz	32		
	Encoder supply voltage	$V_{ENC SUP}$	V	5 / 10		software selectable
	Encoder supply current	$I_{ENC SUP}$	mA	max 500		
General purpose I/O	Isolated digital inputs		-	4 x 24V		( $V_{IH} \geq 11V, V_{IL} \leq 5V, I_{IN} < 15mA$ )
	Isolated digital outputs		-	4 x 30V / 500mA		
	Non-isolated digital inputs		-	4 x TTL		
	Non-isolated digital outputs		-	2 x 24V - 1A 2x 24V - 200mA 4x TTL output		
	Analog inputs		-	2 x $\pm 10V$ diff		14bit resolution
	Analog output		-	2 x $\pm 10V$ diff		16bit resolution
	Brake outputs		-	-		

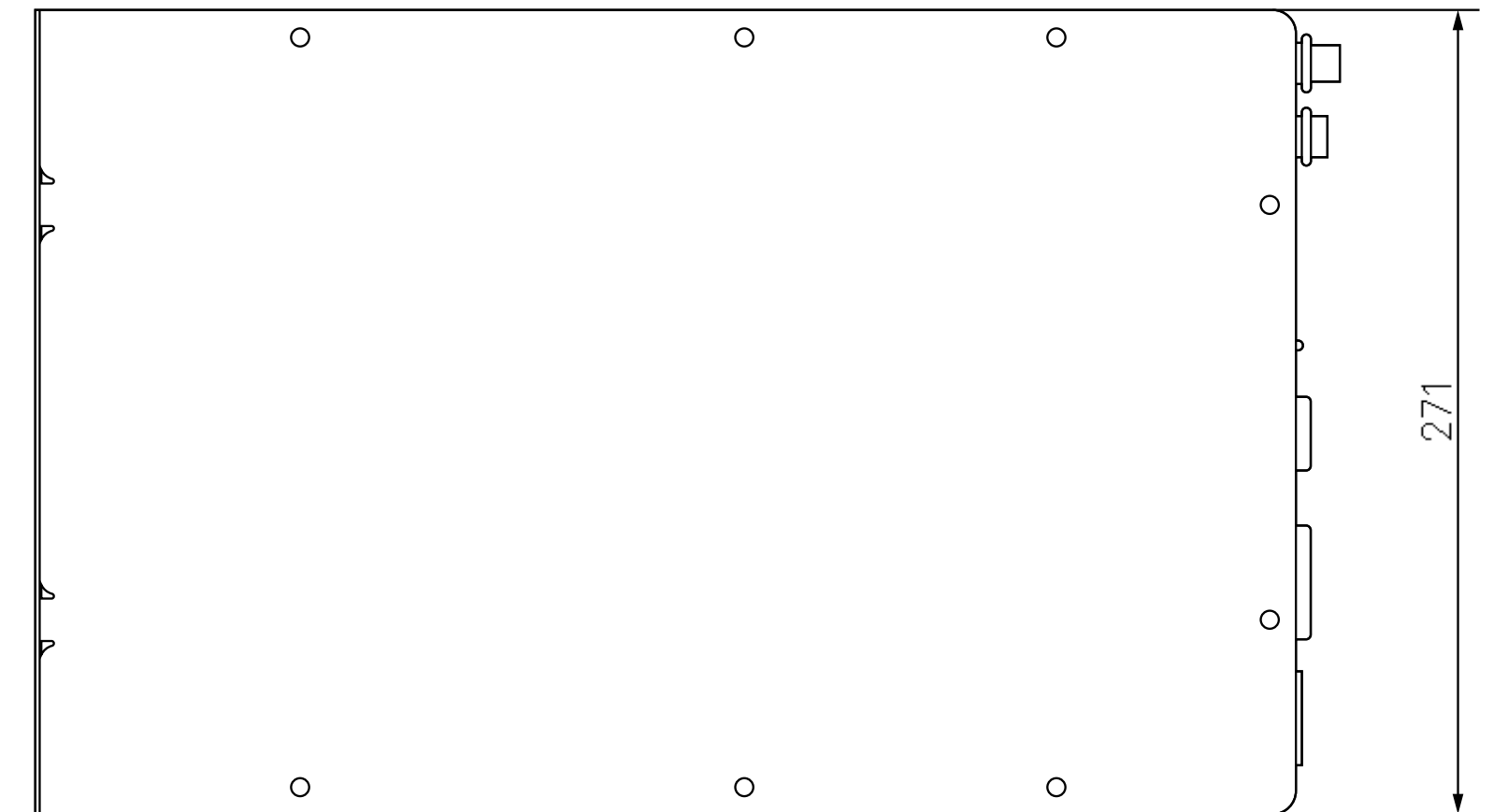
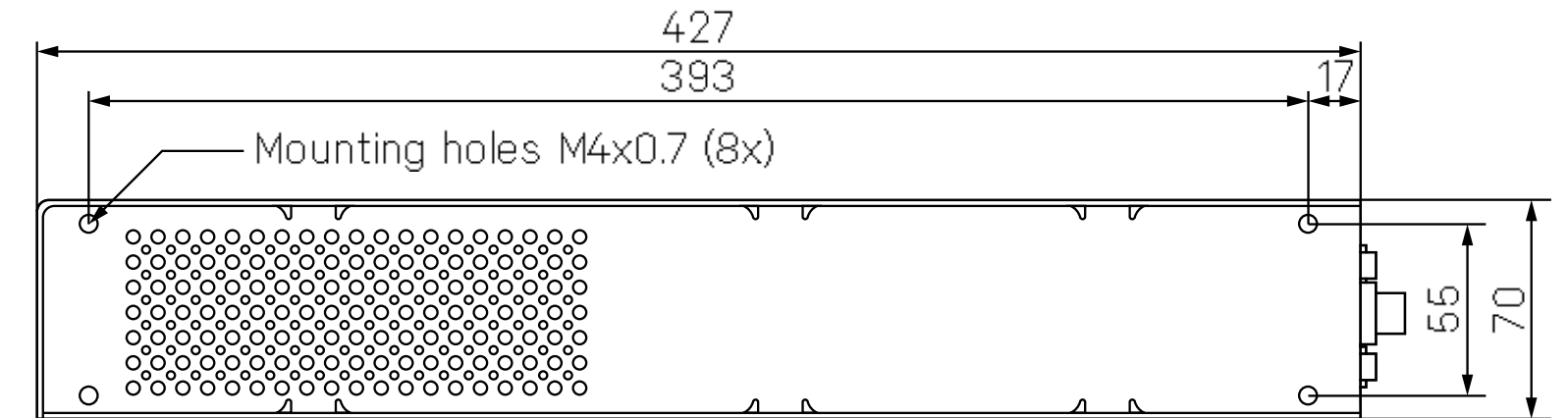
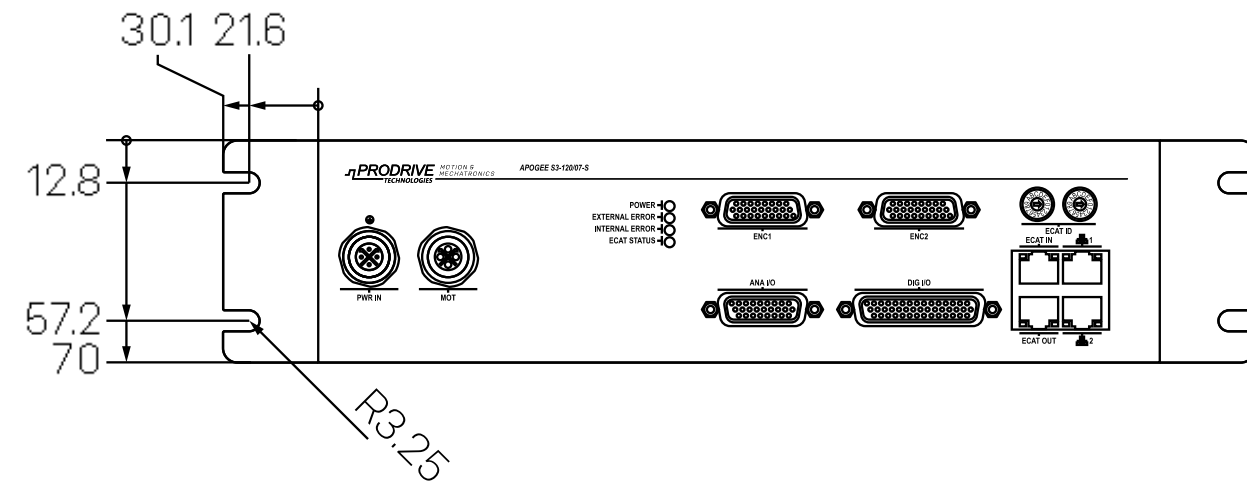
## S3-120/7



## D1-120/7

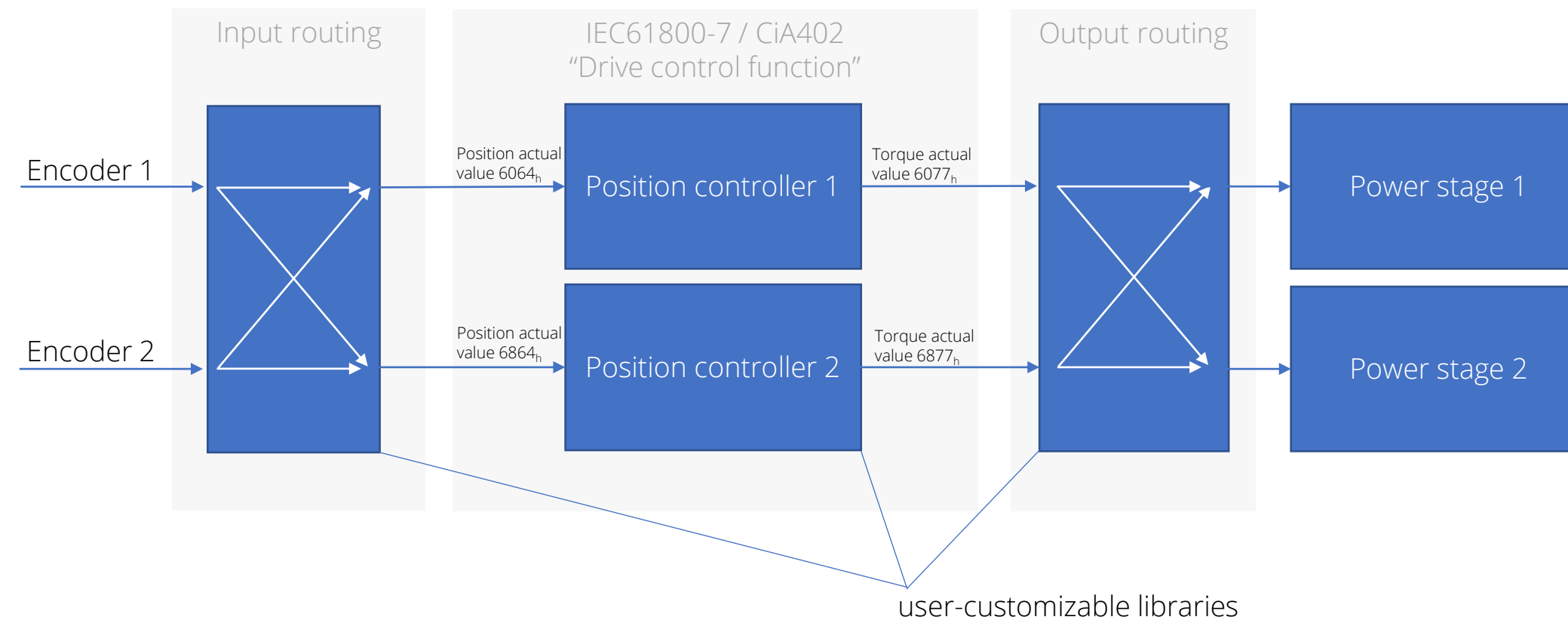


# APOGEE LINE –MECHANICAL SPECIFICATIONS



Mechanical	Parameter	Symbol	Unit	S3-120/7	D1-120/7	Remark
	Width	$d_W$	mm	271		
	Depth	$d_D$	mm	442		including connectors
	Height	$d_H$	mm	70		
	Operating temperature range	$T_{OP}$	°C	10 - 40		
	Operating humidity range	$h_{OP}$	%	20 - 80		non-condensing
	Shock & Vibration		-	IEC60068-2-6 (Fc)		
	Lifetime		-	>10 years		
Mass	mass	kg	6,0		typical value	





## Embedded motion controller

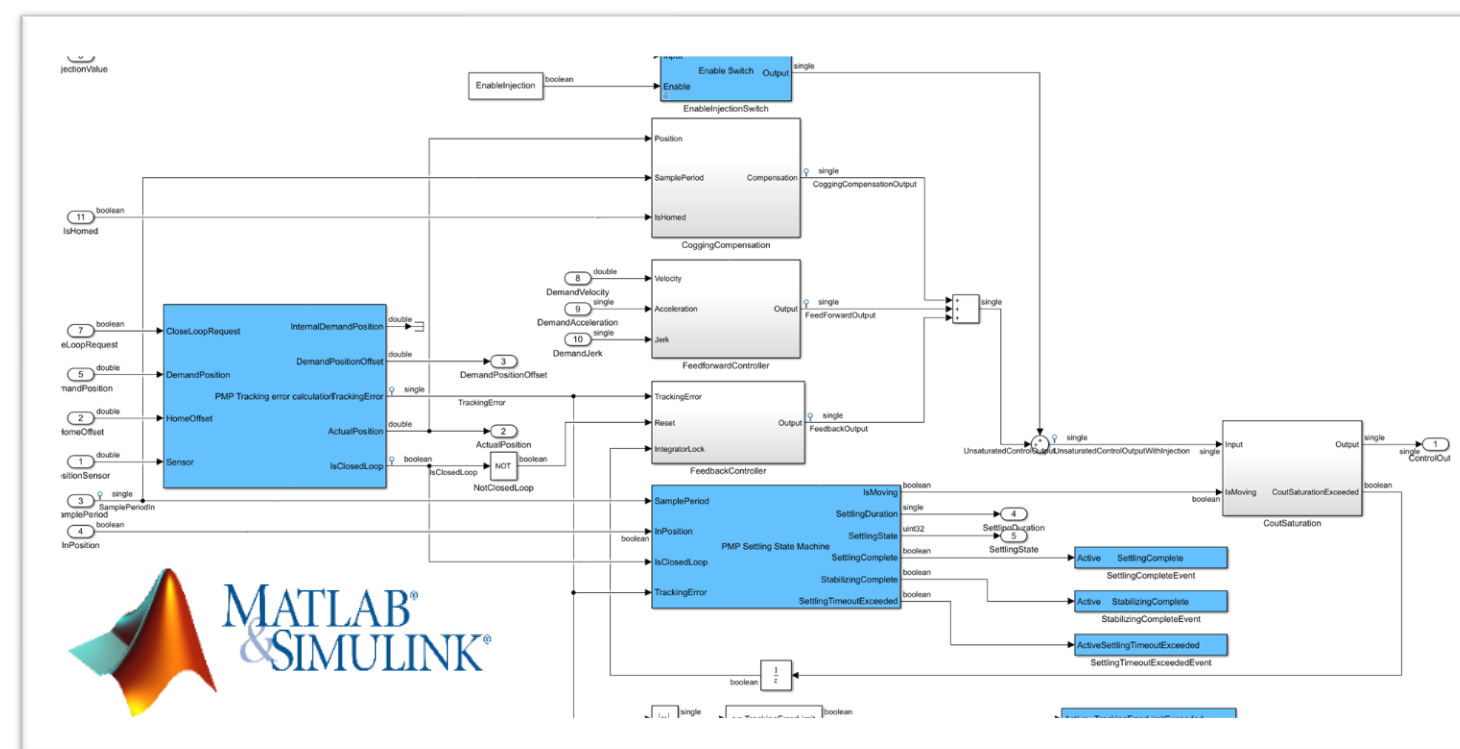
- ✓ Fast multi-core processing system
- ✓ Advanced trajectory generator
- ✓ Up to 20kHz position update rate
- ✓ Remotely updateable using EtherCAT or Ethernet

## Flexible architecture using custom libraries

- ✓ Real-time execution of custom libraries.
  - ✓ Compiled from C/C++ or
  - ✓ generated by MATLAB/Simulink
  - ✓ Tracing/monitoring of execution time
- ✓ User-customizable input routing and output routing
  - ✓ Support for gantry systems
  - ✓ Decoupling of system dynamics in complex systems
  - ✓ Apply custom filtering
- ✓ User customizable drive control function
  - ✓ Supports multiple sensor inputs per control loop (dual loop feedback)
  - ✓ Provided with various examples

## CiA402 compliant EtherCAT slave

- ✓ Remotely updateable using FoE
- ✓ Integrated alignment options for motor commutation (wake and shake, kick and swing, catch and move or fixed offset)
- ✓ Support all standard modes of operation (cst, cstca, csv, csp, pv, pp, homing)



Example for gantry control using a dual axis drive  
Drive architecture (top), Position control library example (bottom)



## Debug & integration tool suite

- ✓ Step-by-step configuration wizards
- ✓ Real-time tracing of measured values
- ✓ Remote firmware updating
- ✓ Triggered acquisition
- ✓ Queuing and executing movements
- ✓ User-configurable human machine interface view

## Service port

- ✓ Real-time tracing of measured values
- ✓ Triggered acquisition
- ✓ Remote diagnostics
- ✓ Independent/concurrent operation with EtherCAT

## Prodrive motion API

- ✓ Directly interface with the drive using GbE
- ✓ Easy upgrading/downgrading between different drive series
- ✓ C++ and C# interfaces available
- ✓ MATLAB / python scripting
- ✓ Compatible with all Prodrive EtherCAT masters
- ✓ Long-term support

PMP motion tooling, showing the signal acquisition and HMI-views





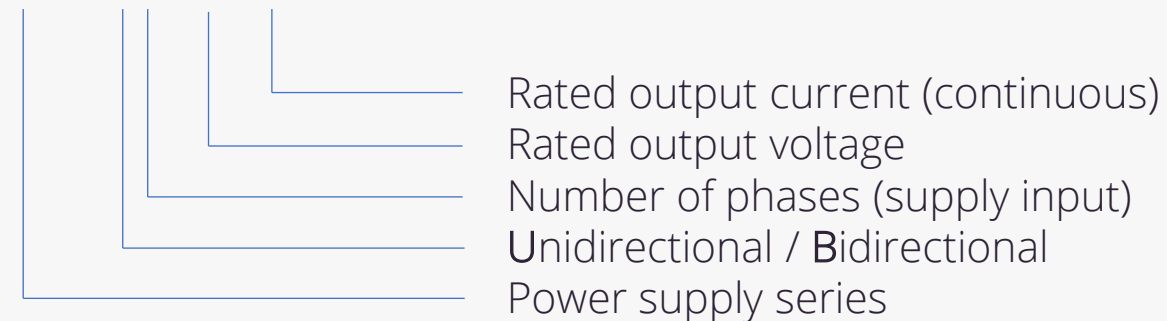
With the Quasar B1-400/6, Prodrive Technologies offers a matching supply for the Cygnus D3-400/4 and S3-400/8 series of servo drives.

Quasar power supplies are available with single phase or three-phase power inputs and feature an integrated power factor correction circuit. The integrated power factor correction circuit precisely regulates the output voltage, therefore isolating the potentially unstable mains voltage from the drives and guarantying maximum performance. Unlike conventional rectifier-based drive systems, peak forces can still be delivered at high velocities, even with long cables or low mains voltages.

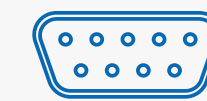
In addition to its integrated power factor correction circuit, select models in the Quasar series are capable of bidirectional power flow, increasing overall efficiency and saving cost on external brake resistors.

All Quasar power supplies are equipped with a CAN-interface which directly interfaces with our intelligent drives or motion controllers. Using this interface, critical parameters such is input/output voltages and currents can be monitored and alarms can be set to perform specific actions when the mains voltage reaches a predefined level.

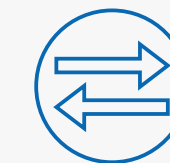
## Quasar B1-400/6



High peak power



CAN interface for remote diagnostics



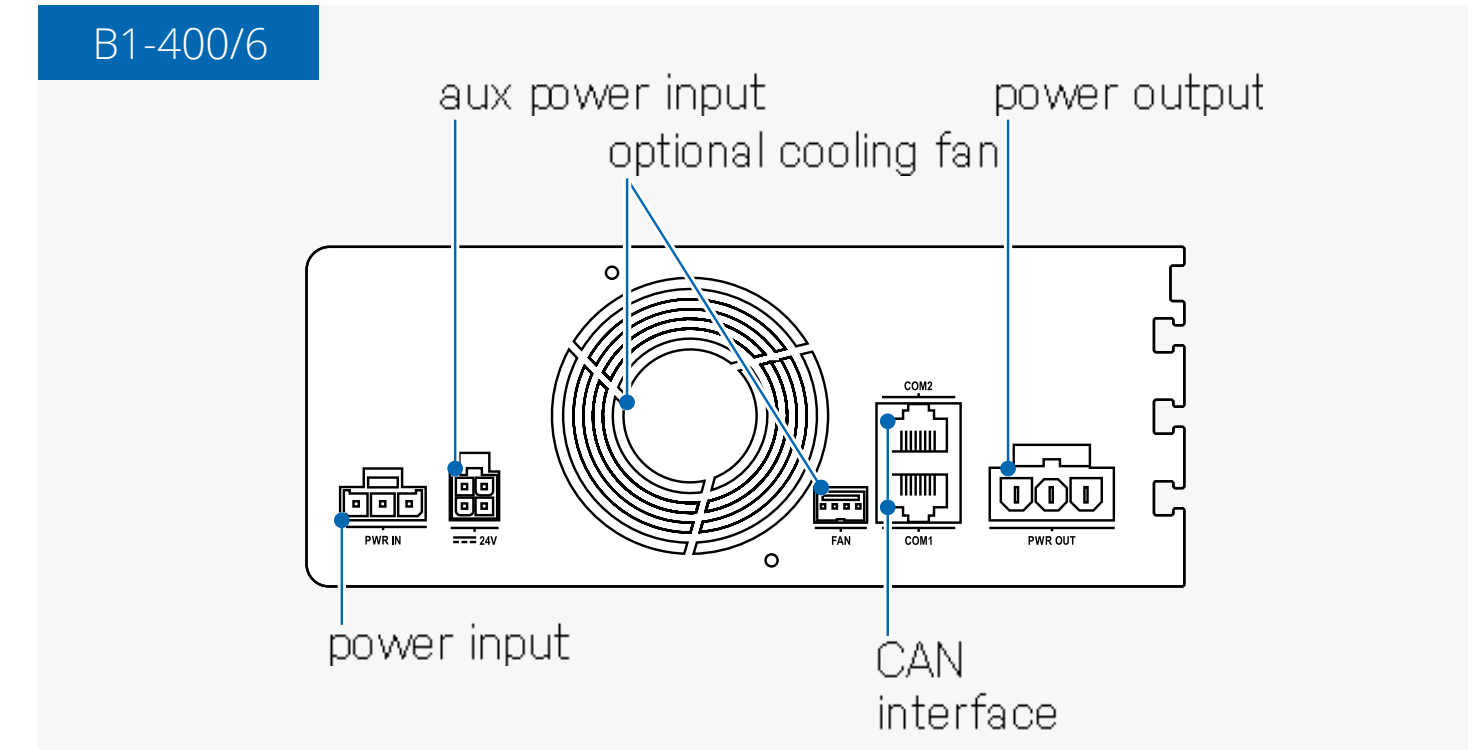
High efficiency & Bidirectional



Universal input voltage range

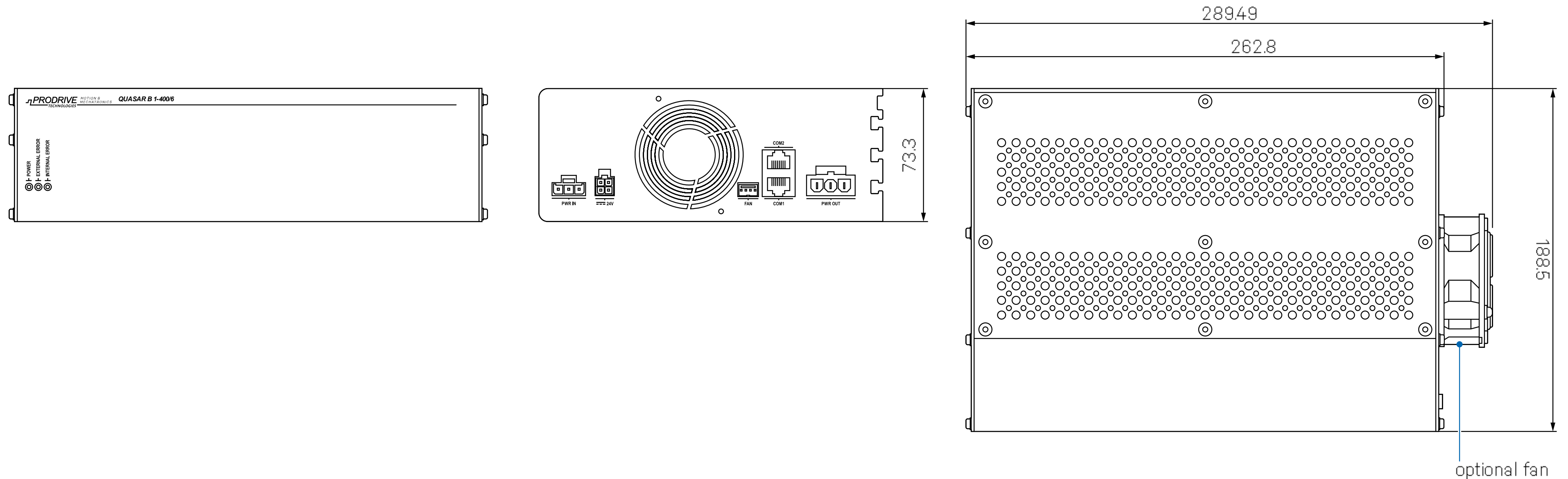
# QUASAR LINE – INTERFACES & MECHANICAL SPECIFICATIONS

	Parameter	Symbol	Unit	B1-400/6	Remark
Input	Supply input voltage	$V_{SUPPLY}$	V	85 - 265	
	Supply input voltage, abs. max	$V_{SUPPLY\_ABS\_MAX}$	$V_{AC}$	280	
	Peak input current	$I_{SUPPLY\_PEAK}$	$A_{PK}$	52	
	Continuous input current	$I_{SUPPLY\_CONT}$	$A_{RMS}$	15	
	Mains frequency	$f_{MAINS}$	Hz	50 / 60	
	Power factor	PF	Hz	min 0.9	$P_{OUT} > 10\%$ of $P_{OUT,MAX,CONT}$
	Auxiliary input voltage	$V_{SUPPLY\_AUX}$	$V_{DC}$	21-26	
	Auxiliary input current	$I_{AUX\_RMS}$	$A_{RMS}$	max 3	
Output	Number of outputs	$n_{OUT}$	-	1	
	Average output voltage	$V_{OUT}$	$V_{DC}$	390 - 410	
	Ripple & Noise	$V_{RIPPLE}$	$V_{PKPK}$	max 20 max 60	@ $P_{OUT}=2.4kW$ @ $P_{OUT}=7.2kW$
	Output current	$I_{OUT}$	A	6	
	Output current, peak	$I_{OUT\_PK}$	$A_{PK}$	18	
	Load regulation	$V_{OUT\_REG}$	-	max $\pm 10\%$	max 50W/ms
	Efficiency	$\eta_{MAX}$	-	$> 90\%$	at maximum load
Diagnostics	Interface	-	-	CAN V2.0A	
	Applicable standard	-	-		
	Device profile	-	-	CiA 453	
	Bit rate	-	Mbps	up to 1	





# QUASAR LINE – INTERFACES & MECHANICAL SPECIFICATIONS



	Parameter	Symbol	Unit	B1-400/6	Remark
Safety	Applicable standard		-	IEC61800-5-1	
	Pollution degree	PD	-	2	
	Overvoltage category	OVC	-	III	
	IP-protection class / enclosure type		-	20 / open type	
	Max operating altitude	$h_{OP\_max}$	m	2000	above mean sea level
EMC	Applicable standard			IEC61800-3	
	Classification		-	Cat C2, 2nd env	

	Parameter	Symbol	Unit	B1-400/6	Remark
Mechanical	Width	$d_W$	mm	73	
	Depth	$d_D$	mm	195	
	Height	$d_H$	mm	265	
	Operating temperature range	$T_{OP}$	°C	5-45	
	Storage temperature range	$T_{STOR}$	°C	-20-70	
	Operating humidity range	$h_{OP}$	%	0-95%	non-condensing
	Shock & Vibration		-	IEC60068-2-6	
	Lifetime		year	>10	
	Mass	mass	kg	3.6	typical value

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