

SINGLE AXIS DRIVE

DS2020



Rev. A, April 2024

ULTRA-COMPACT SERVO DRIVE

WHEN PERFORMANCE REALLY MATTERS

MOOG

If you need the best performance and design flexibility, look no further than Moog and its expertise. With collaboration, creativity and cutting-edge technological solutions, we can help you tackle the toughest problems and improve the performance of your machines.

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This catalogue is written for experts. To make sure all information necessary for operation and safety has been provided, the user must check the suitability of the products described. The products described are subject to change without notice. If you have any doubts, please contact Moog.

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MAKING THE IMPOSSIBLE POSSIBLE IN MOTION CONTROL

Moog Industrial is your partner of choice when performance really matters. We combine world class technologies with expert advisory support to solve our customers' most difficult challenges in motion control.

Our Experience

Moog Industrial excels in a wide range of applications, including industrial automation, machine building, robotics and medical motion control - just to name a few.

Get exceptional customer support from our well-trained experts, backed by Moog's longstanding track record of high performance and trusted experience. All related technology is owned by Moog.

Will Make You Triumph

Moog's typical hands-on mentality and our ambition to make the impossible possible in motion control can provide you with a competitive advantage, which will most likely last for years.

Our formula:

- Superior and reliable machine design, based on technology-neutral approach
- Customize to your very specific requirements, including the utmost compactness and quietness
- Improved profitability through economically effective project design
- A trustful partnership, driven by empathy and passion



SYSTEM OVERVIEW

Highly compact, modular design for top productivity

- The DS2020 is a digital “stand-alone” servodrive, purposely designed with ultra compact dimensions. The current sizes of the five versions (50, 75, 85, 125 165 and 355 mm) range from 2 Arms to 192 Arms continuous, and from 4 Arms to 384 Arms peak.

Designed to work with different motor types and feedback devices

- The DS2020 servodrive is designed to control synchronous brushless or asynchronous motors (it is compatible with various feedback systems (Resolver standard, encoder single and multi-turn, incremental) as well as motors with sensorless algorithms.

User-friendly Graphic User Interface (GUI)

- The graphic user interface offers easy access to all the drive functions, simplifying the settings, initial start-up and system monitoring. Communication with the PC is via a USB or RS422 interface.

Integrated Safe Torque Off (STO) function

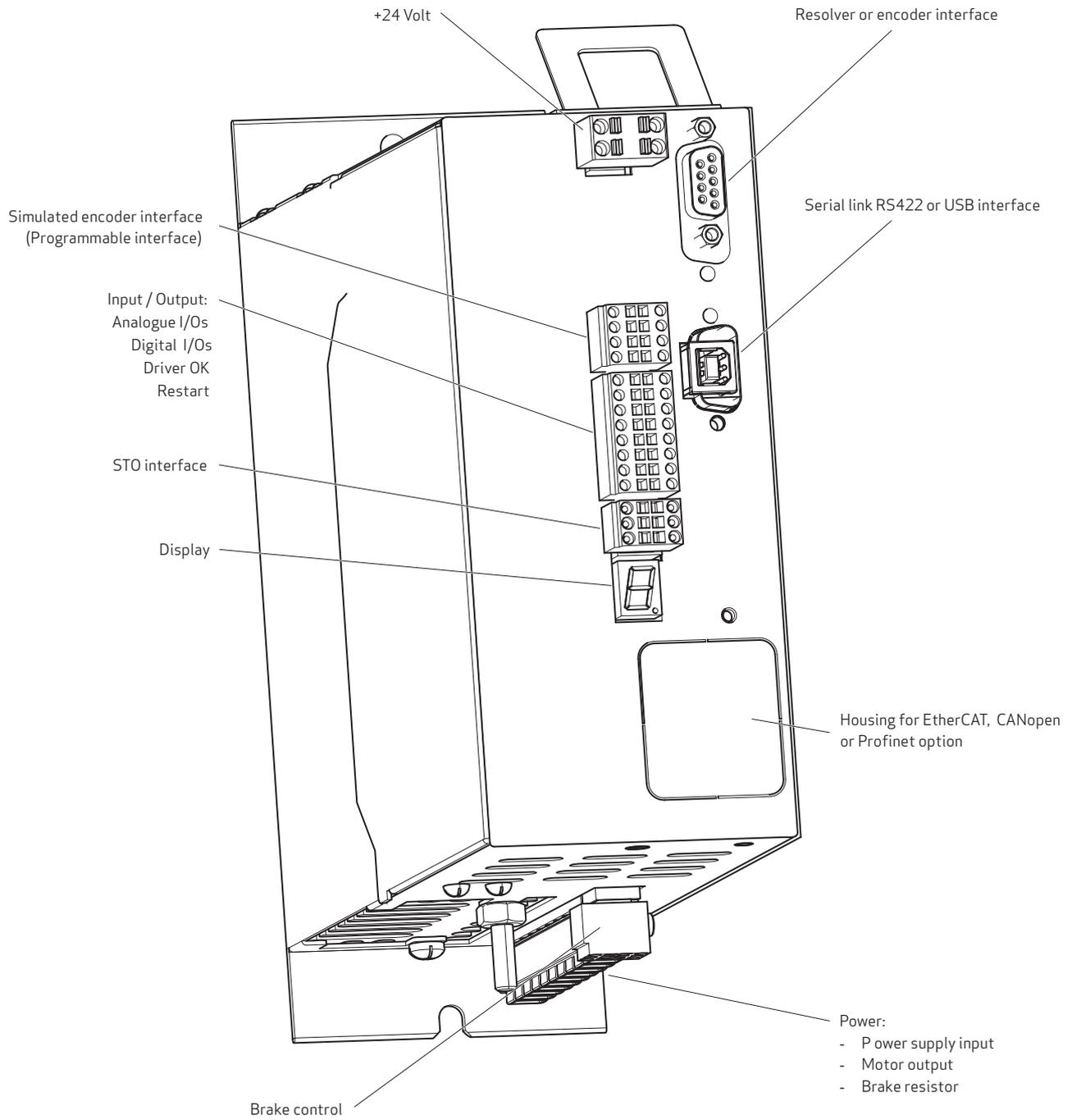
- The Safe Torque Off safety function is integrated as standard in every drive.

Applications

- Single-axis applications in industrial automation
- Applications with high precision and top dynamics
- Applications requiring significant space saving during installation
- Applications with personalised functions and flexible configurations
- Applications requiring quick, precise movements

AXIS MODULE

Interface



TECHNICAL CHARACTERISTICS AND ENVIRONMENTAL DATA

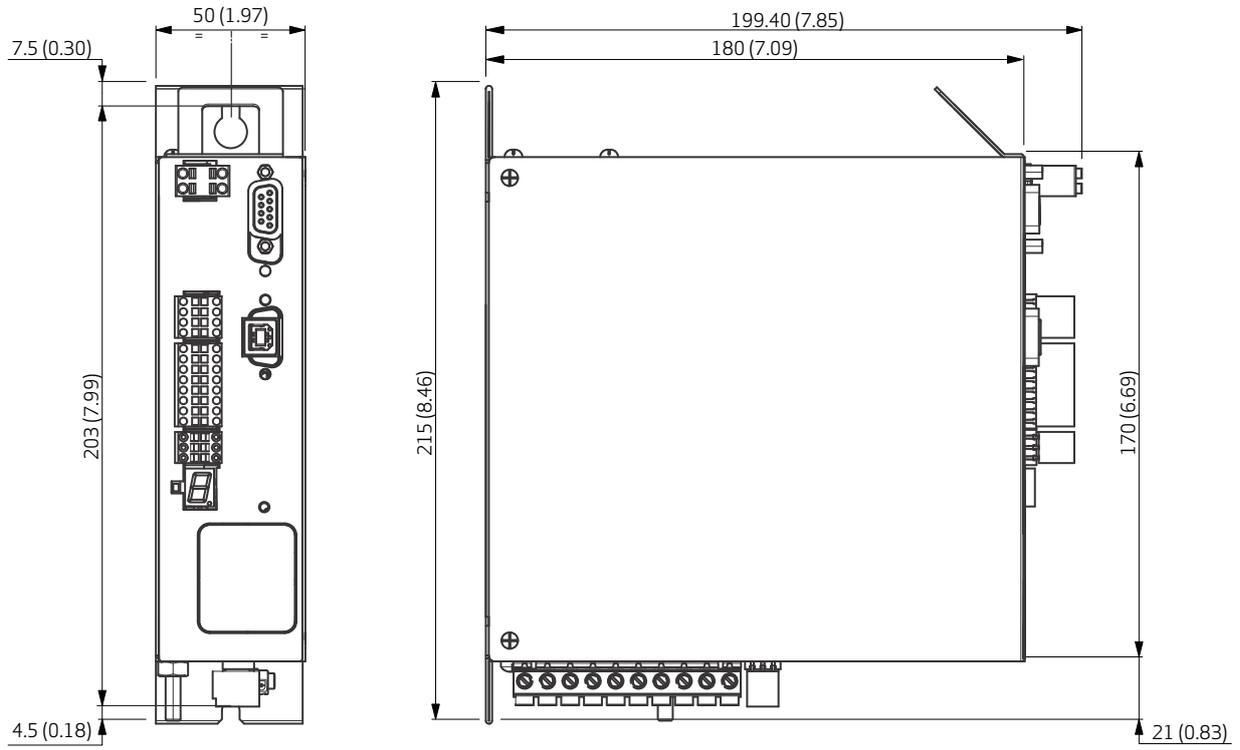
Control functions	Implementation of Torque, Speed and Position loops
Command protocols	EtherCAT, CANopen, Profinet and Analogue
Machine safety	STO (Safe Torque Off) SIL CL3 PL "e"
AC/DC conversion	Three-phase input section with soft start
Power supply range	Up to 480 V AC \pm 10 %
PWM frequency	8 kHz (from 2 to 16 kHz conf. via SW)
Encoder simulation	Simulated encoder output with programmable number of pulses
Auxiliary power supply voltage	+ 24 V DC \pm 10%
Analogue inputs	2 inputs \pm 10 volt, differential
Analogue outputs	2 outputs \pm 10 volt, single-ended
Digital inputs	2 opto-insulated digital inputs / 1 restart input
Digital outputs	1 opto-insulated digital output / 1 drive OK output
Communication interface for set-up	USB or RS422
Ambient operating temperature	From 0 to 40 °C; up to 55 °C with reduction of output current
Storage temperature	From -25 to +55 °C
Transport temperature	From -25 to +55 °C (for short periods of no more than 24 hours, it is possible to reach up to +70 °C)
Humidity permitted during operation	From 5 to 85% (condensate not permitted)
Humidity permitted for storage	From 5 to 95%
Humidity permitted for transport	95% at +40 °C
Operating elevation	Up to 3000 m (installing above 3000 m will cause current output reductions)
Mechanical resistance in compliance with EN 60721-3-3	Vibration: 3 mm for frequencies between 2 and 9 Hz Vibration: 9.8 m/s ² (1 g) for frequencies between 9 and 200 Hz Shock: 98 m/s ² (10 g) for 11 ms
Motor overtemperature protection	PTC, NTC or PT1000
Motor brake command	Integrated (max. 2 amp current) up to size L355 excluded
Brake resistor	Integrated up to size L75 included
Certification	CE, UL ⁽¹⁾ , EAC
IP protection rating	IP 20

Size	L50	L75	L85	L125	L165 (MP) ⁽¹⁾	L355 (VHP) ⁽¹⁾
Rated currents	2 to 4 arms	6 to 12 arms	16 to 24 arms	32 to 48 arms	64 arms	192 arms
Peak currents	4 to 8 arms	12 to 22 arms	32 to 48 arms	64 to 96 arms	128 arms	384 arms

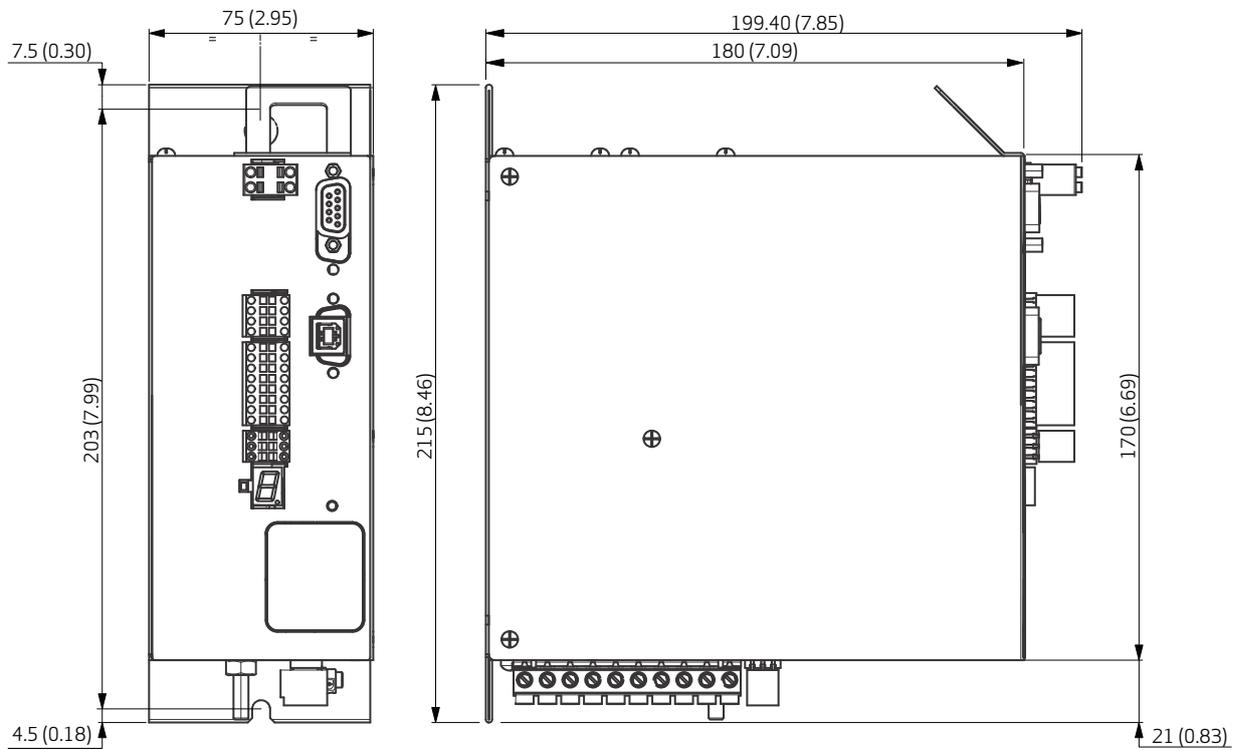
⁽¹⁾ UL pending for this size.

DIMENSIONS AND WEIGHT

Axis module 50 mm (1.97 in) - Weight 1.2 kg (2.64 lbs)

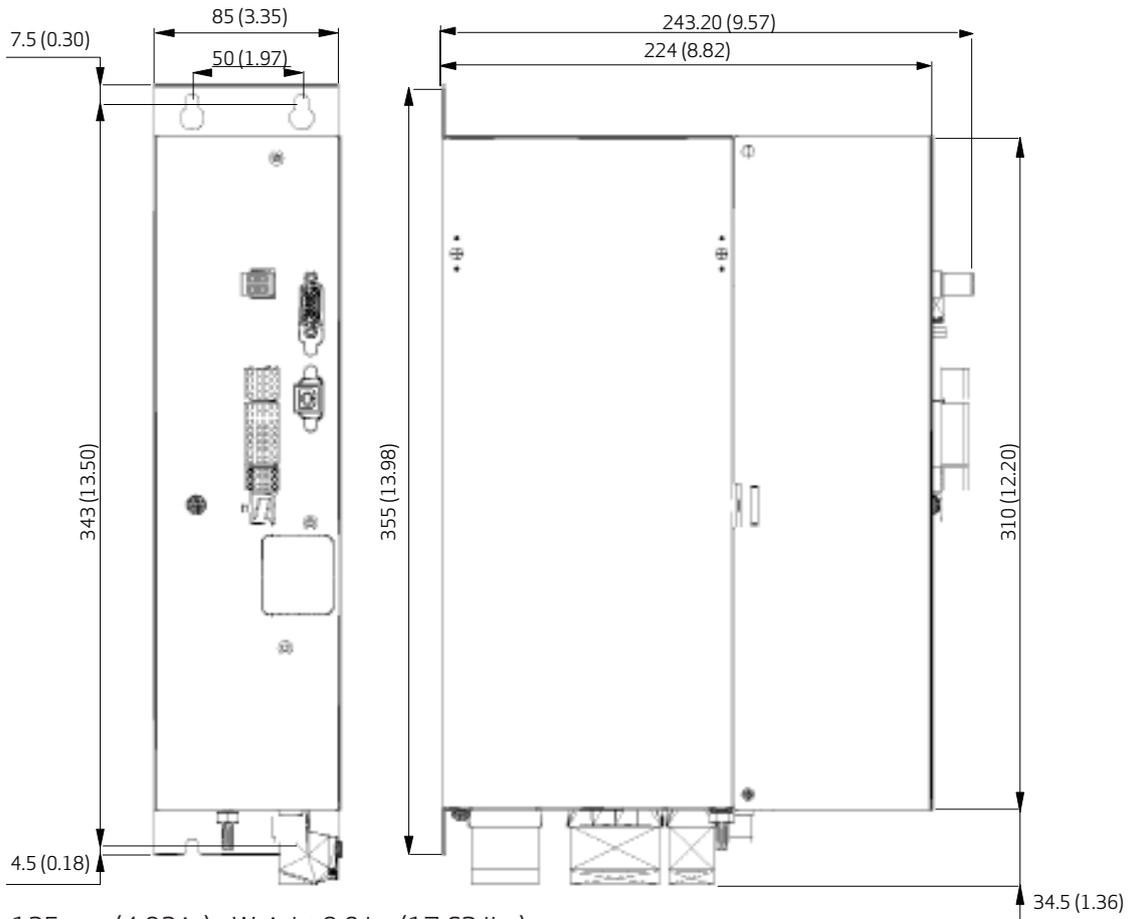


Axis module 75 mm (2.95 in) - Weight 2.3 kg (5.07 lbs)

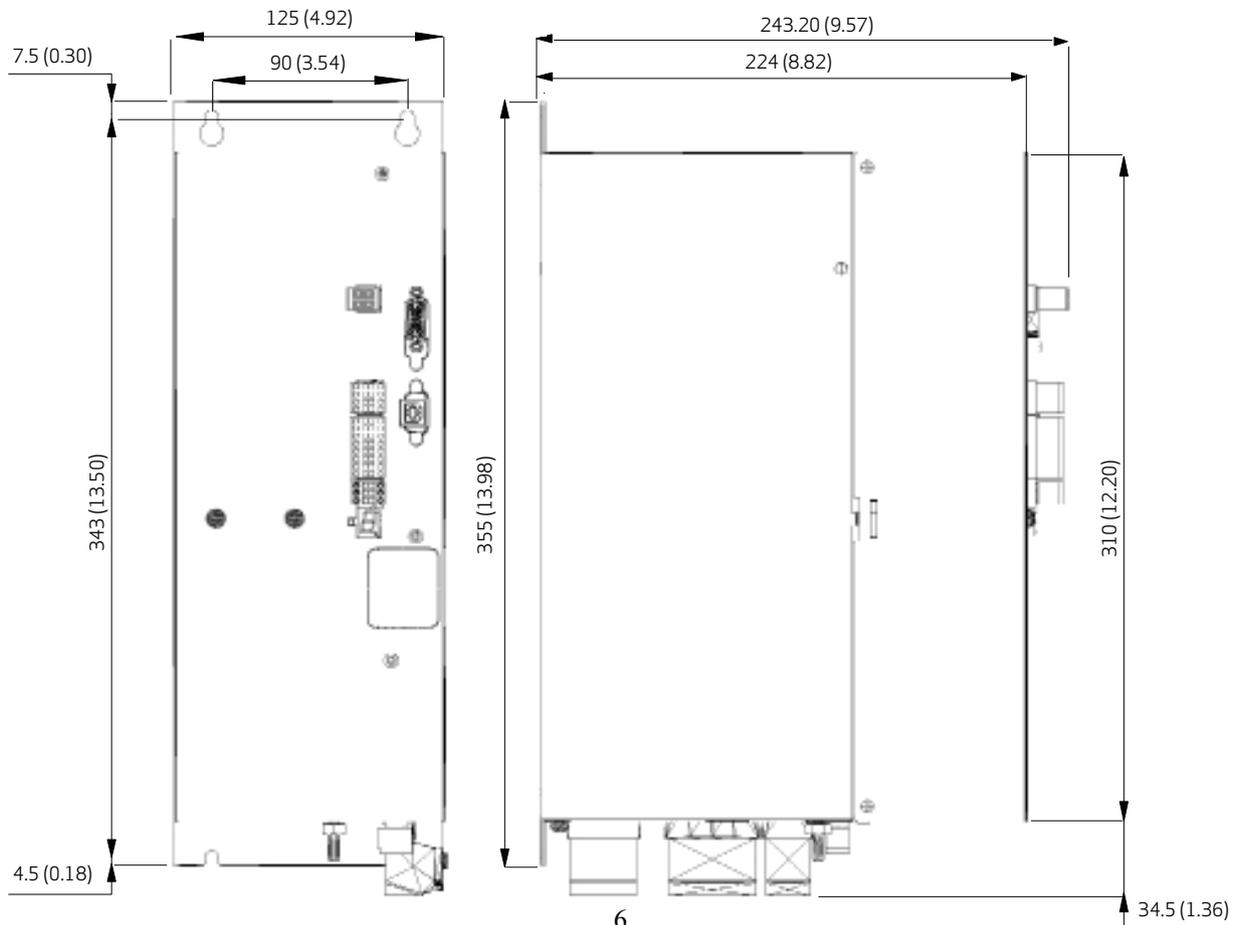


DIMENSIONS AND WEIGHT

Axis module 85 mm (3.35 in) - Weight 5.5 kg (12.12 lbs)

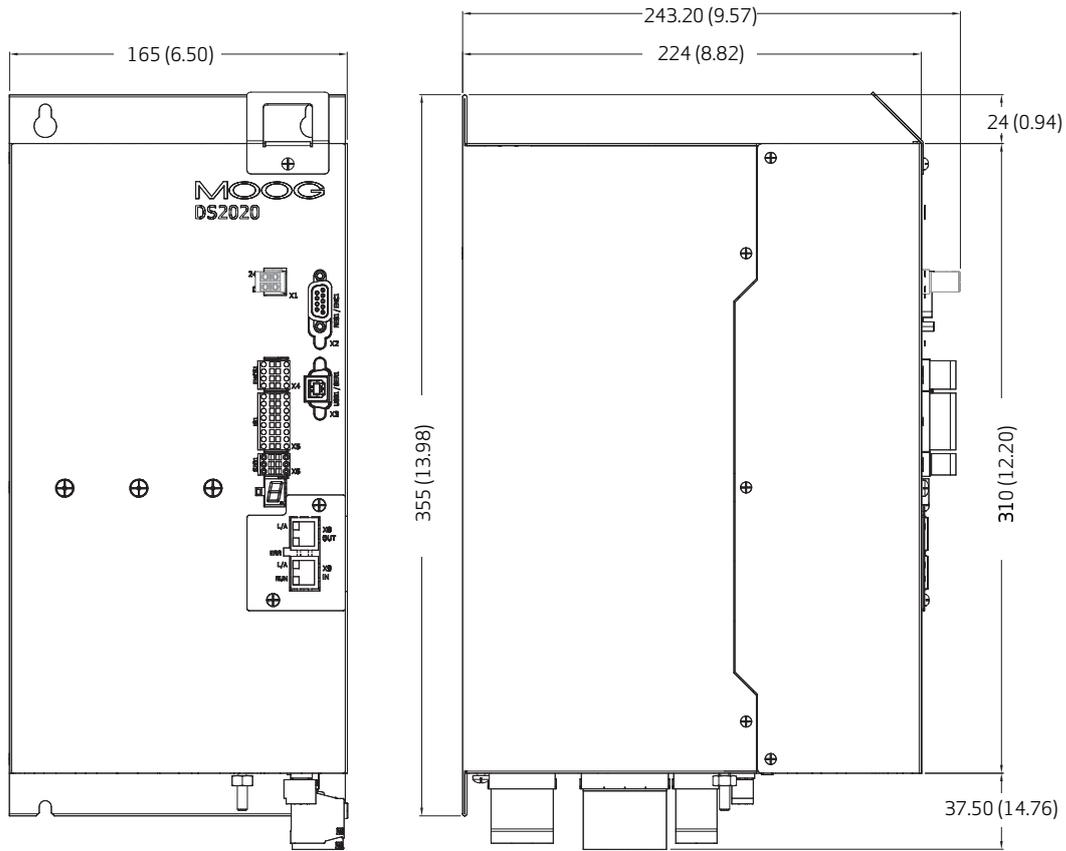


Axis module 125 mm (4.92 in) - Weight 8.0 kg (17.63 lbs)

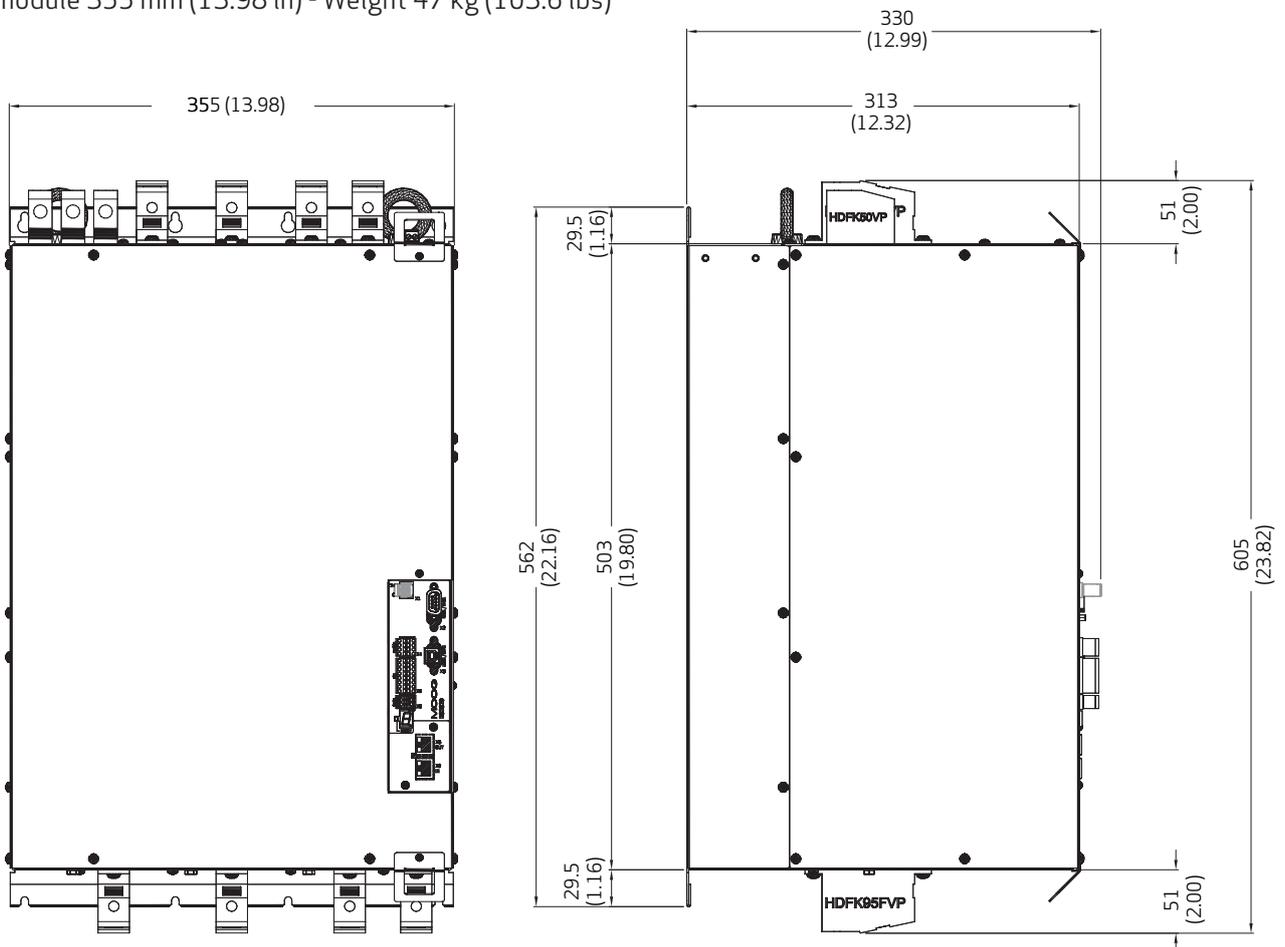


DIMENSIONS AND WEIGHT

MP module 165 mm (6.50 in) - Weight 9.5 kg (20.9 lbs)



VHP module 355 mm (13.98 in) - Weight 47 kg (103.6 lbs)



SOFTWARE

FIELD BUS

EtherCAT

- Synchronous and real-time high-performance RT-Ethernet fieldbus
- CANopen over EtherCAT communication profile (CoE)
- CiA 402 device profile

CAN Bus

- CAN (ISO 11898, IEC/EN 61800-7) fieldbus
- 10 kb/s to 1 Mb/s baud rate
- CANopen (CiA 301) communication profile
- CiA 402 device profile

Profinet

- Profinet real time industrial fieldbus

GRAPHIC INTERFACE (GUI)

The DX2020GUI graphic interface is used for:

- Basic configuration with access to the system parameters (transducers, digital and analogue i/os, motor parameters, etc.)
- Calibration of the speed and position loops to personalise and optimise the drive response
- Direct control of the drive (jog mode, speed profile with internal generator, etc.)
- Commissioning and diagnostics
- Drive and i/o monitoring
- Registration of the centre distance sizes via internal memory support and signal visualisation on 4-track digital oscilloscope
- Firmware updating, drive parameter management (saving, backup, etc.)

Note: The DS2020 drives are not included in the list of “dual use” products, as defined in the framework regulation EC 428/2009, and are therefore not subject to its restrictions regarding sale and transportation.

OPTIONS AND ACCESSORIES

- Optional external braking resistors for heavy-duty applications (L50 and L75)
- Fieldbus option (EtherCAT, CANopen or Profinet)
- Motor feedback interface option (resolver as standard and digital, fully digital and TTL encoders)
- Communication interface for commissioning USB

Connectors Kit Option

All the connectors can be ordered with a separate code. These kits are necessary for the wiring of the power supply and for the spare part or repair of the wiring.

For the correct coupling between the connector kit and the module, refer to the ordering page.

Each connector kit contains:

- 3 I/O section connectors
- 1 24 v connector
- 1 power connector (3 for L85, L125 and L165)
- 1 brake connector
- 1 transducer connector (9 poles per Resolver, 15 poles per encoder)

Note: To define the accessories needed for your application, please contact our Application Engineers.

FILTERS

Rated voltage	From 400 V, + 10% to 600V max, 50/60 Hz
Nominal current	From 7 to 200 arms
Operating ambient temperature	From -25 to +100 °C
Assembly height	1000 m, with current reduction of up to 4000 m (6%/1000 m)
Relative air humidity	From 15 to 85% (condensate not permitted)
Storage temperature	From -25 to +70 °C
IP protection rating	IP 20
Acceptance test	Complies with CE
Industrial environment - EN61800-3 complies with radio shielding	Permitted drive cable length - up to 100 m

	Model	Drive
EMC Filters	AT6050, AT6055, AT6065, AT6074	2/4 4/8 6/12 8/16
	AT6051, AT6056, AT6066, AT6075	12/22 16/32
	AT6052, AT6057, AT6067, AT6076	24/48
	AT6047, AT6058, AT6068	32/64
	AT6049, AT6059, AT6069, AT6077	48/96
	AT6060, AT6070, AT6078	64/128
	AT6045, AT6073, AT6081	192/384

Note: to select the correct filter for your needs, please consult our Application Engineers.

Resistances

The DS2020 uses the braking resistance as a soft start resistance. This resistance is built-in for sizes 50 and 75 mm and external for sizes 85, 125 and 165 mm, and it is supplied together with the drive package.

The DS2020 VHP is equipped with a built-in, dedicated, soft start resistance. The braking resistance is supplied as an option (AR5984, 3 ohm, 1500 watt).

ORDERING



Version	
1	Standard model
E	Special model

Mechanical hardware configuration			
Value	Type / width	Rated current	Peak current
02	Single / 50 mm L50	2 arms	4 arms
04	Single / 50 mm L50	4 arms	8 arms
06	Single / 75 mm L75	6 arms	12 arms
08	Single / 75 mm L75	8 arms	16 arms
12	Single / 75 mm L75	12 arms	22 arms
16	Single / 85 mm L85	16 arms	32 arms
24	Single / 85 mm L85	24 arms	48 arms
32	Single / 125 mm L125	32 arms	64 arms
48	Single / 125 mm L125	48 arms	96 arms
70 ⁽³⁾	Single / 165 mm L165 - MP	64 arms	128 arms
88 ⁽³⁾	Single / 355 mm L355 - VHP	192 arms	384 arms

Special version
Value - Internal coding ⁽²⁾

Special configurations
Value - Internal coding ⁽²⁾
00 Standard

Hardware revision
Value - Internal coding ⁽²⁾

Fieldbus configuration	
Value	Type
0 ⁽¹⁾	Analogue references
1	CanBus configuration (option)
2	EtherCAT configuration (option)
3	Analog ref. P/q control (option)
5 ⁽³⁾	Profinet Anybus (option)

X2 / X3 - Type of transducer and type of Serial link RS422		
Value	Type	
R ⁽¹⁾	RESOLVER	SERIAL
T	RESOLVER	USB
E	ENCODER SINCOS	SERIAL
U	ENCODER SINCOS	USB
G	TTL SINGLE ENDED	SERIAL
H	TTL FULL DIFFERENTIAL	SERIAL
L	TTL SINGLE ENDED	USB
M	TTL FULL DIFFERENTIAL	USB
B	ENCODER BISS	SERIAL
D	ENCODER BISS	USB
C	RES/ENC Conf. board with 2 Voltage An. Ref.	
F	RES/ENC Conf. board with 2 Current An. Ref.	

⁽¹⁾ Standard version.

⁽²⁾ Values assigned by Moog.

⁽³⁾ Only as special model available. Please consult Moog.

To order the connectors

Drive size	Connector kit code	Type of transducer
L50/L75	BC8901-R	RESOLVER
	BC8902-R	ENCODER SINCOS
		TTL SINGLE ENDED
L85/L125	BC8921-R	RESOLVER
	BC8922-R	ENCODER SINCOS
		TTL SINGLE ENDED
L165 - MP	BC8913-R	RESOLVER
	BC8914-R	ENCODER SINCOS
		TTL SINGLE ENDED
L355 - VHP	BC8911-R	RESOLVER
	BC8912-R	ENCODER SINCOS
		TTL SINGLE ENDED

OTHER MOOG PRODUCT OFFERING

We are committed to offering a range of servo motor products with matched servo drives that are easy to integrate into industrial applications.

Moog servo motors are electronically commutated synchronous AC motors with magnet field excitation. Our portfolio includes three motor families, with different characteristics to answer to any applicative need.

CD (Compact Dynamic) Brushless Servo Motors

Combining compactness with performance, the CD servo motor series offers one of the industry's widest power ranges with continuous nominal torques from 0.15 to 77 Nm (1.3 to 681 lb-in). The modular design is supported by a variety of options with Moog's application engineers capable of supplying fully customized solutions.



HD (High Dynamic) Brushless Servo Motors

The HD servo motor series stands out for its extremely high level of dynamic and high acceleration speeds. With nominal torques from 2 Nm to 909 Nm (20 to 8047 lb-in) and a fully customizable modular structure, these motors are perfect for high dynamic applications where reliable performance is fundamental.



ExD (Explosion-Proof) Brushless Servo Motors

Designed and tested for operation in conditions where vapors or gases form flammable or explosive environments. Flameproof housing withstands internal explosions without bursting.



CP (Compact Power) Brushless Servo Motors

The CP servo motor series is a range of compact motors with high power density. These motors are designed for dynamic servo applications where small dimensions (especially shorter length) and high torque are needed.



OTHER DRIVE PRODUCTS

Moog servo drives and electronic products can deliver the highest level of control accuracy, dynamic performance and reliability in both centralized and decentralized configurations. Machine designers are allowed complete freedom to achieve their goals, with space savings and optimized layouts perfectly fitting both traditional cabinets and distributed control architectures.

CENTRALIZED SOLUTIONS

Moog drive portfolio for cabinet installation include both single-axis and multi-axis configurations.

Multi-Axis Drives DM2020 Series - Digital Multi-Axis Servo Drive

Modular design drive platform, single and double axis modules, with shared power supply. About 50% more compact than a comparable standalone configuration.



DECENTRALIZED SOLUTIONS

Out-of-cabinet products for flexible machine architecture.

DR2020 - Machine-Mounted Servo Drive

On-board servo control, for installation on machine surfaces and easy daisy-chain and out of the cabinet connections.



DI2020 Motor Integrated Servo Drive

Servo control integrated with a high efficiency brushless motor. It allows great machine design freedom and a significant reduction in wiring and cabinet space.



SmartMotor™

Highly programmable, integrated servo motor systems with an encoder, an amplifier, a controller, RS-232/RS-485 communication, and IOs. Ideal for fast, high precision applications.



MORE PRODUCTS. MORE SUPPORT.

Moog covers an extensive range of motion control solutions and also provides service and support. Moog has offices around the world. For more information or the office nearest you, visit www.moog.com/contact-us/moog-facilities



For product information, visit www.moog.com
or email us em-motioncontrol@moog.com

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