



ROBOTIC ACTUATORS

Specifications



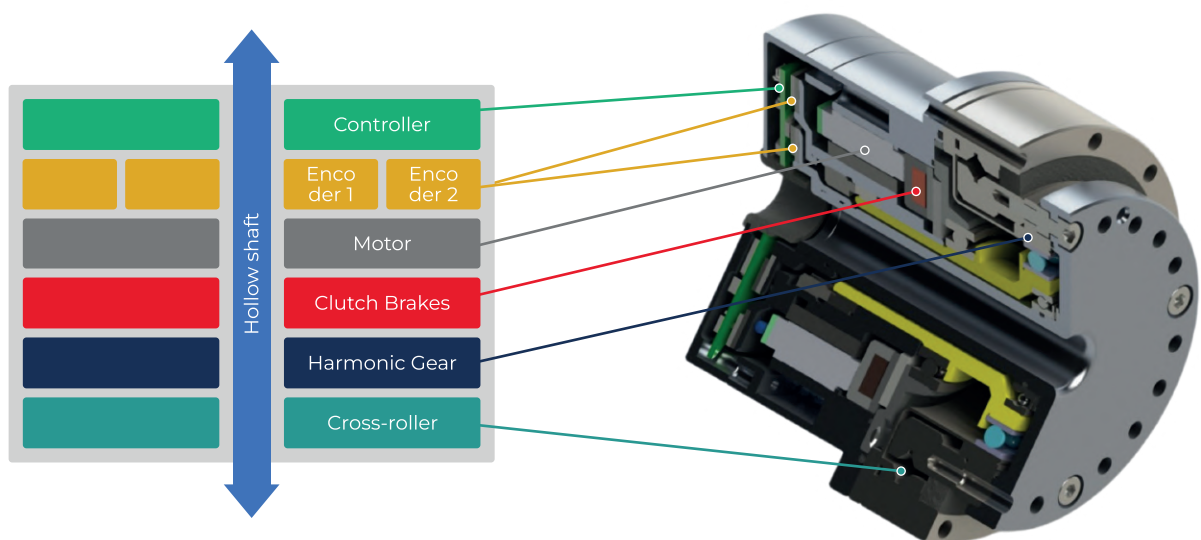
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ACTUATOR STRUCTURE ELEMENTS

- Motor** – high-torque brushless motor
- Gear** – strain wave harmonic reducer
- Brakes** – electromagnetic clutch tailored to motor torque
- EtherCAT Controller** - drive unit to run the servomotor
- Encoders** – 19-bit absolute multiturn magnetic encoders
- Cross-roller bearing** – handles high load moments
- Hollow shaft** – runs wires or media through servomotor



APPLICATIONS TO LEVERAGE ACTUATORS

- | | | | |
|---------------------|------------------------------|------------------------------|-------------------------------|
| Humanoid robots | Robotic arms | Surgery robotics | UAV Drones |
| Active exoskeletons | Harvesting robotic platforms | Inspection and rescue robots | Robotic engineering companies |

HOW IS IT DIFFERENT FROM OTHERS?

Considering the structure with clutch brakes, EtherCAT controller, and hollow shaft, there are no actuators with such a high torque density on the market. Moreover, actuator length and diameter have a ratio close to 1:1, which provides design, footprint, and weight advantages for your robotic product.

	D70 CM.1.1.12-G101	D80 CM.1.2.3-G101	D90 CM.1.3.6-G101	D110 CM.1.4.2-G101
PHYSICAL PROPERTIES				
Mass	0.8 kg	1.12 kg	1.68 kg	2.56 kg
Hollow shaft diameter	8.5 mm	9.5 mm	12 mm	12.4 mm
Rated torque	16 Nm	49 Nm	62 Nm	137 Nm
Peak torque	37 Nm	66 Nm	108 Nm	205 Nm
Permissible static tilting moment	144 Nm	328 Nm	515 Nm	1070 Nm
Permissible dynamic tilting moment	74 Nm	124 Nm	187 Nm	258 Nm
Gear ratio	101:1	101:1	101:1	101:1
Gear pitch diameter	1.4 inch (35 mm)	1.7 inch (43 mm)	2.0 inch (51 mm)	2.5 inch (64 mm)
Max speed	50 RPM	35 RPM	35 RPM	25 RPM
Brakes holding torque	40 Nm	70 Nm	100 Nm	200 Nm
Fast rotating parts Inertia, If	3.20E-05 kg*m²	5.70E-05 kg*m²	1.10E-04 kg*m²	2.30E-04 kg*m²
Slow rotating parts Inertia, Is	7.60E-05 kg*m²	1.50E-04 kg*m²	3.10E-04 kg*m²	7.50E-04 kg*m²

INTERFACE

Communication	EtherCAT, CoE, FoE
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POWER

Nominal voltage	48 V
Under-voltage limit	20 V
Over-voltage limit	60 V

OUTPUT POSITION SENSOR

Fast (motor) shaft position sensor	Absolute magnetic encoder
Output position sensor	Dual absolute multi-turn magnetic encoder with backup battery input (3.7V lithium)
Output position resolution	19 bit
Position accuracy	0.005 deg (Calibrated against external encoder)

OTHER

Brakes	Magnetic clutch
PWM frequency	20 kHz
Current/velocity loop frequency	20 kHz
Working modes	Synchronous cyclic torque/synchronous cyclic velocity with feed-forward/cyclic synchronous position
Protection	Comm. cycle time/over-current/over-voltage/under-voltage/motor over-temperature/switches over-temperature
Standard safety functions	STO and FSoE (In the process)
Lifetime (rated), h	10000 (At nominal torque)

SOFTWARE

Controller features	Cogging torque compensation, output position calibration map, dynamic current limits, current feed-forward, redundant output position feedback, output encoder eccentricity compensation, hardware torque-off during undervoltage
Control software	Tunning utility/GUI (Windows/Linux), C/C++/python examples using open-source SOEM EtherCAT master

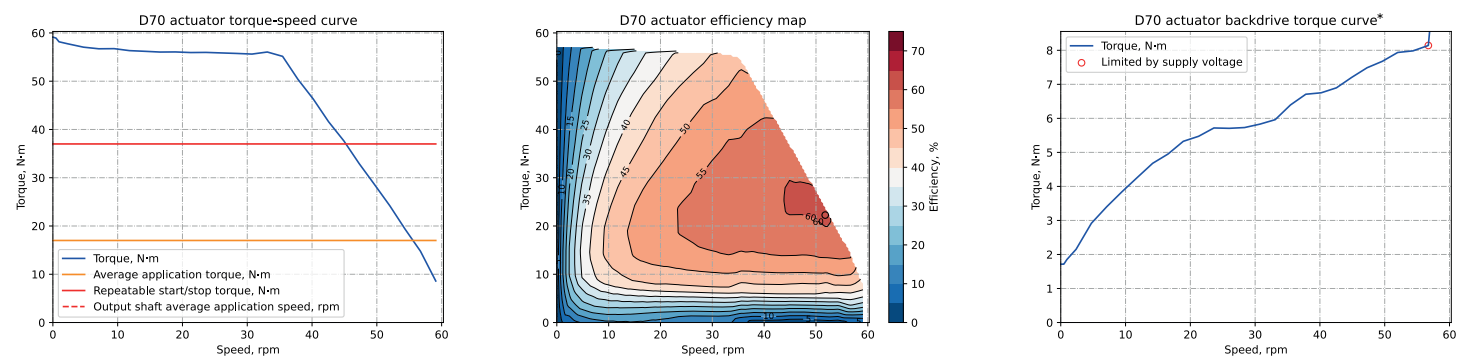
CONNECTORS

Power terminals	M3 standoffs (suitable for M3 O-type terminals)
EtherCAT connectors	JST GH 1.25mm pitch connector
Multiturn battery connector	JST GH 1.25mm pitch connector
Load mounting	Axial and Radial options, M3 bolts Axially oriented M3 bolts

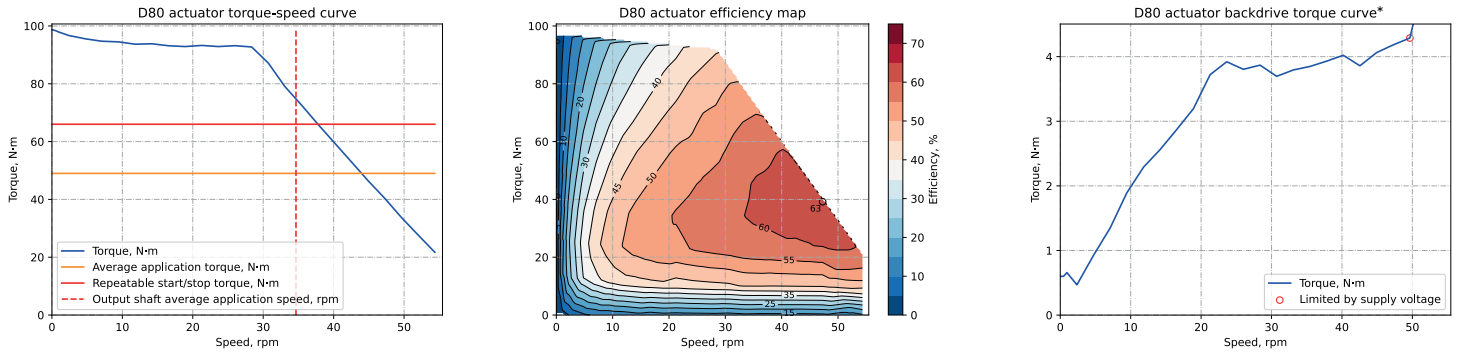
ENVIRONMENT

Operating temperature (environment)	0-50 deg C (When mounted on the heatsink > 400 cm²)
Operating temperature (case)	0-80 deg C
IP rating	IP30
Output shaft and bearings are sealed. IP could be improved up to IP65 by external housing	

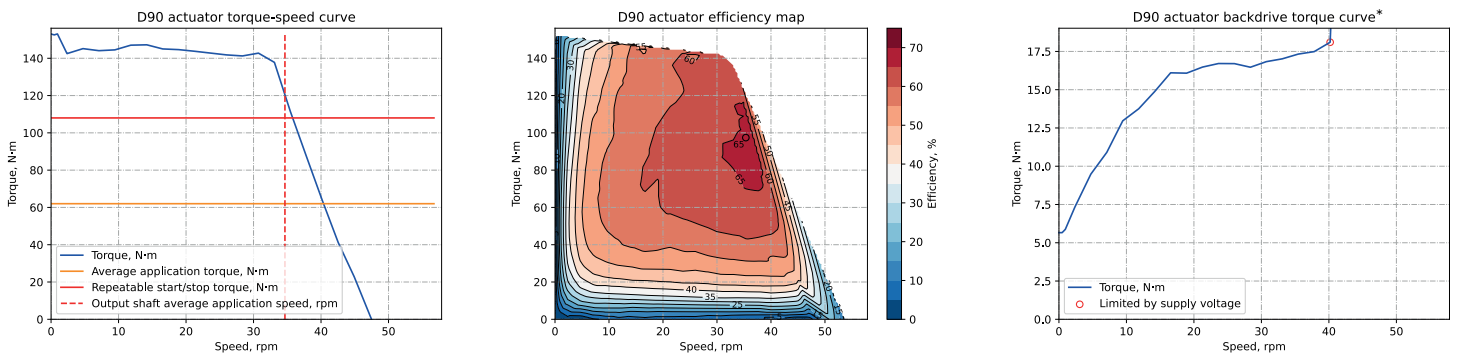
D70 (with 1:100 gear)



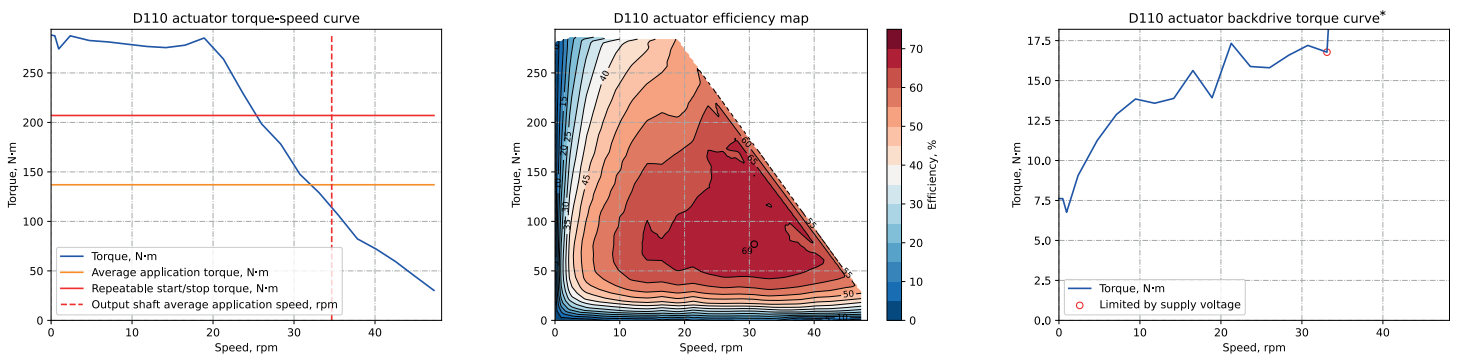
D80 (with 1:100 gear)



D90 (with 1:100 gear)



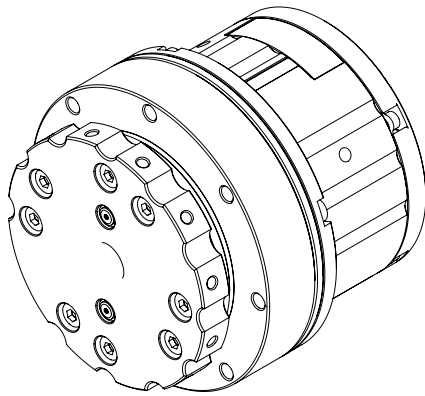
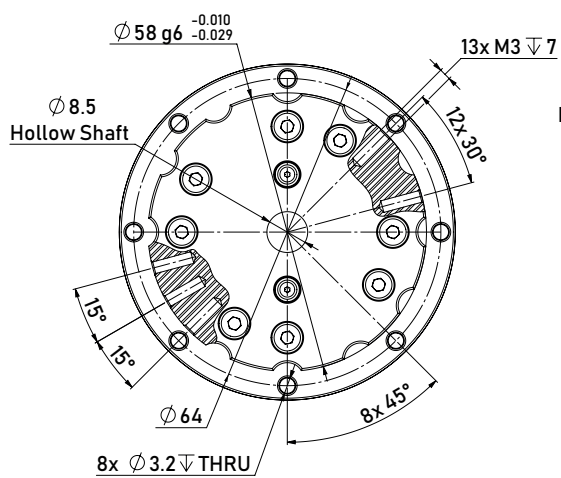
D110 (with 1:100 gear)



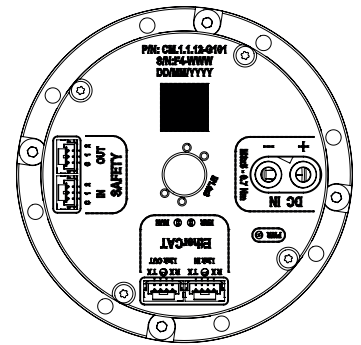
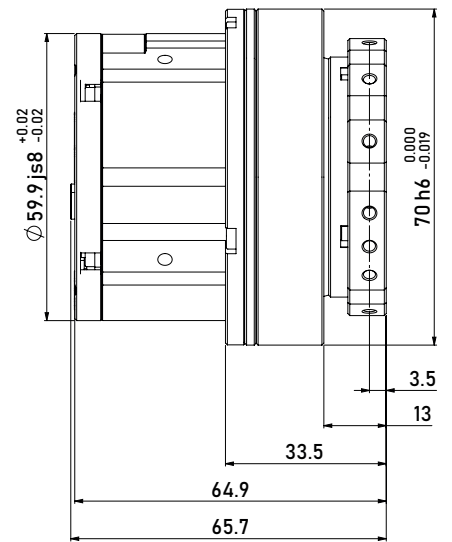
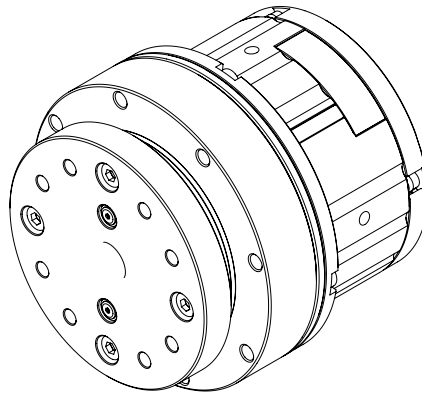
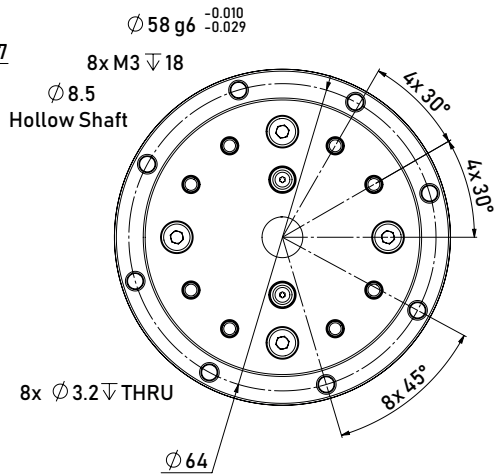
*values may slightly vary from actuator to actuator

D70

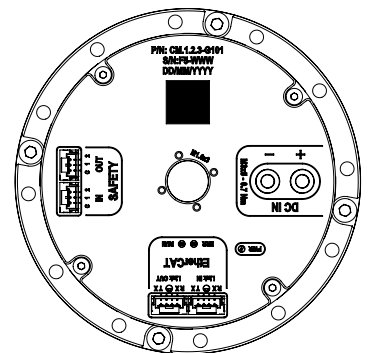
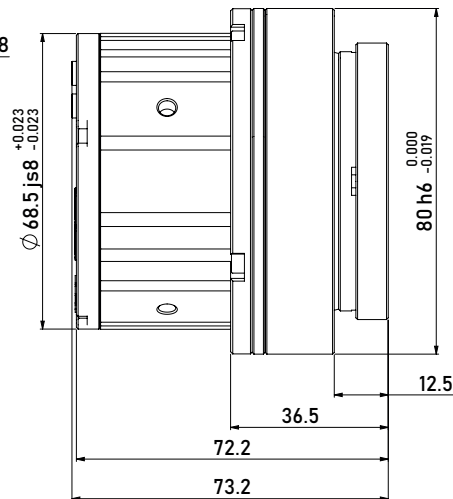
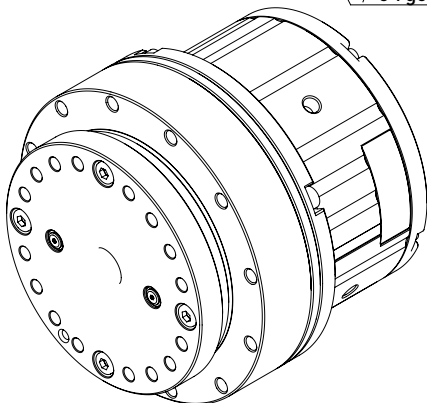
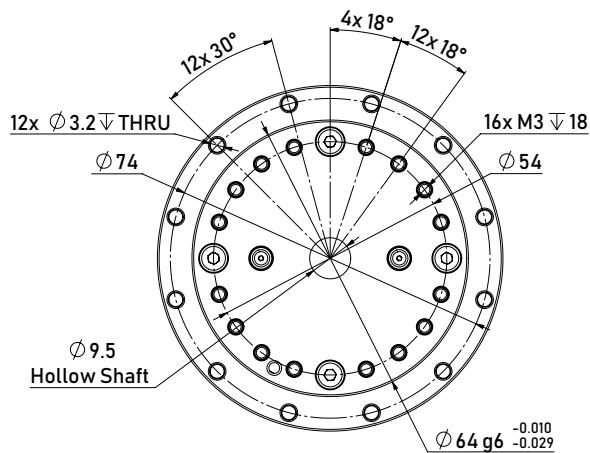
(CM.1.1.12-R-G101)



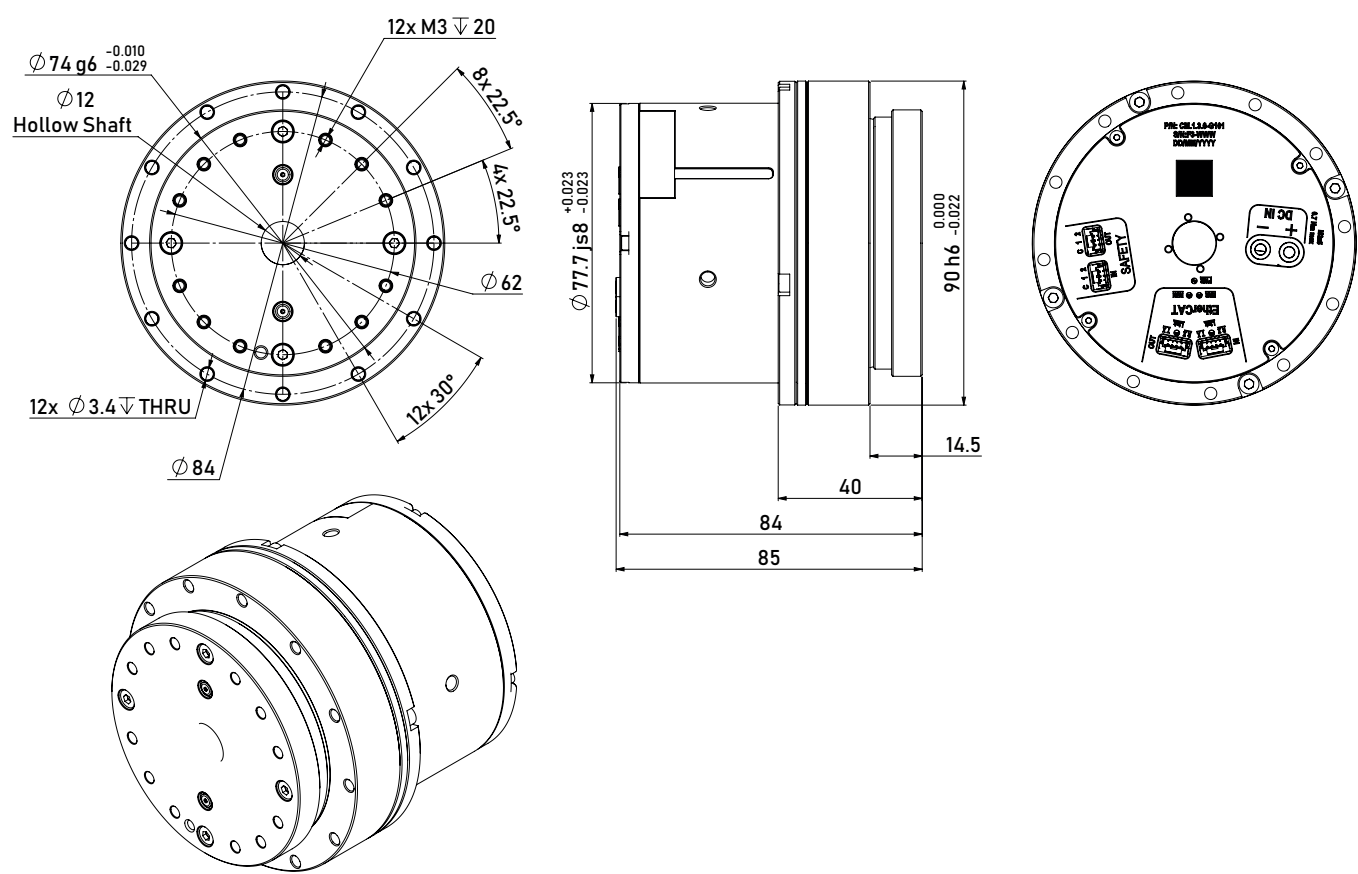
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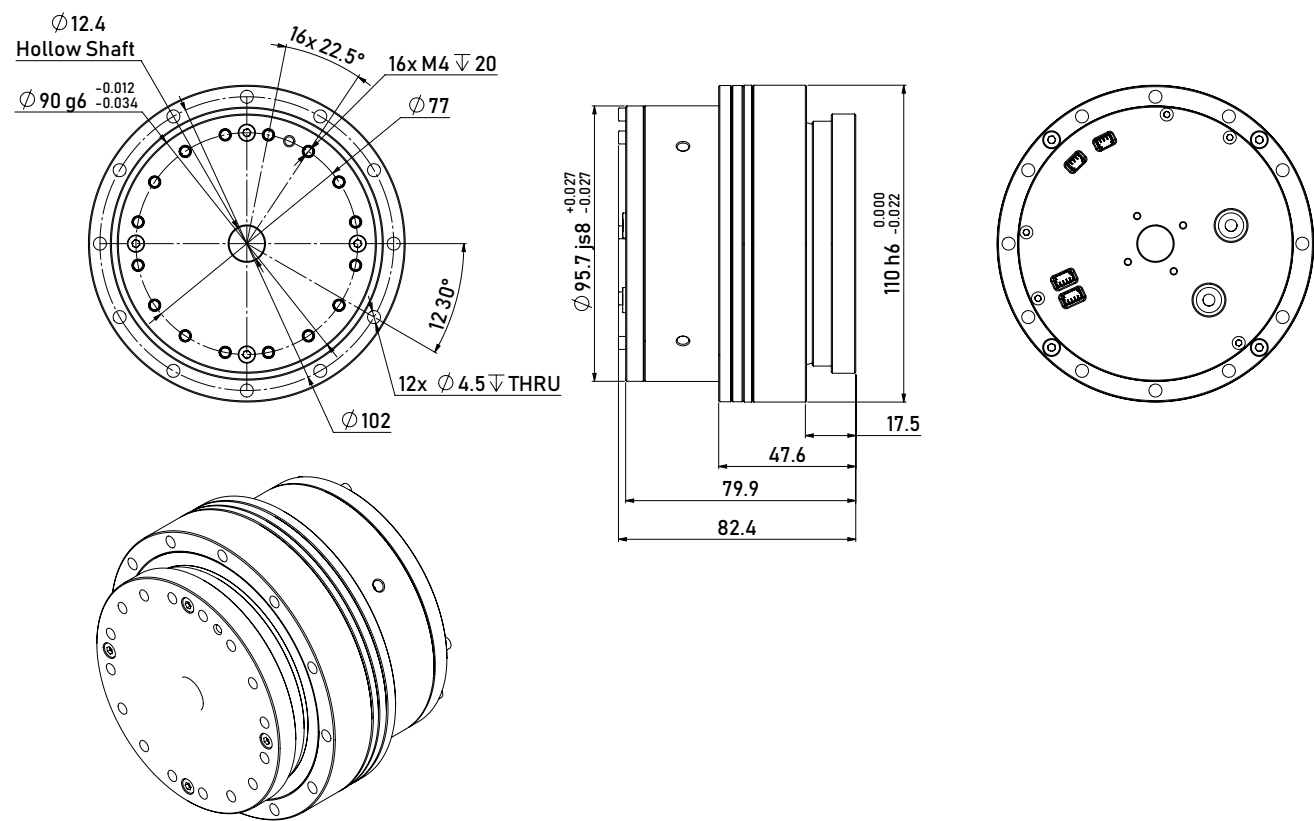
D80 (CM.1.2.3-G101)



D90 (CM.1.3.6-G101)



D110 (CM.1.4.2-G101)





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