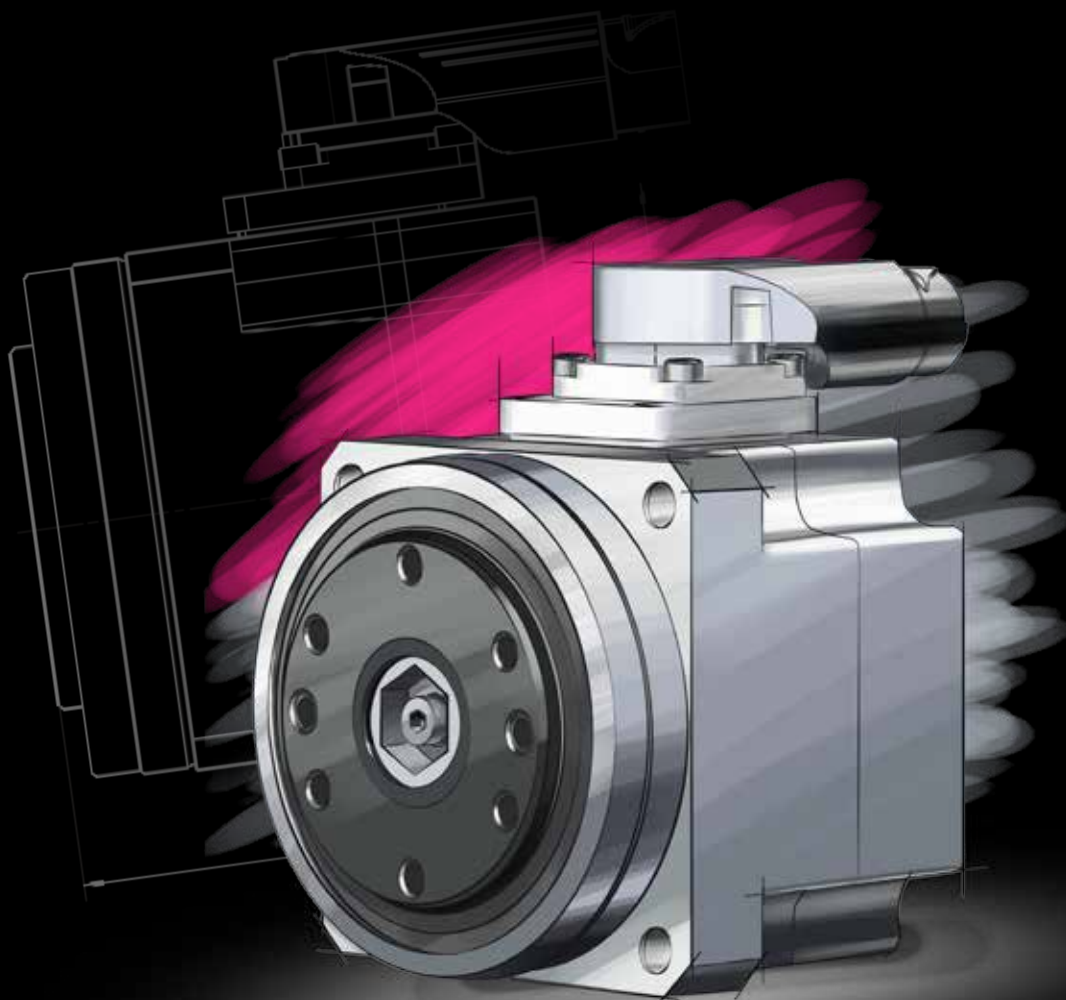
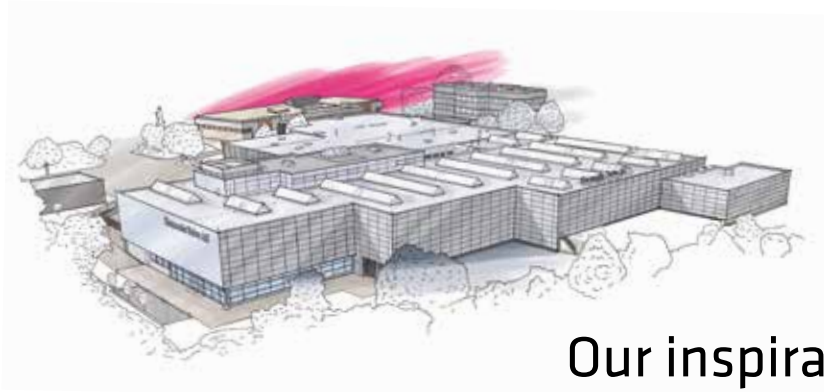


FHA-C Mini Servo Actuators with Multi-turn Absolute Encoder



Harmonic
Drive AG





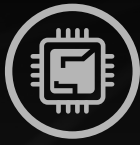
Our inspiration

Your business drives us. For every individual set of requirements, we have an equally diverse range of solutions: four out of every five products that leave our company are special versions, developed, designed, and produced to customer specifications – from space saving component sets to customised special drives. Harmonic Drive® Precision Drive Technology based on the strain wave gear principle can be found in machine tools, and of course also in robotics, the aerospace industry, and numerous other key industries.

Our headquarters are in Limburg an der Lahn, Germany, but our marketplace is the entire world. Since the company was founded in 1970, Harmonic Drive AG has grown from a small distribution company to a leading international solution provider with production capability for drive technology – with a parent company in Japan and a sister company in the USA, employees in more than 20 locations worldwide, and a product range of over 23,000 items.

Each product reflects our extensive expertise – and also the conviction that successful innovations are not made for the market, but are created by the market. We are your reliable partner when it comes to developing solutions together that ideally meet your needs – as a result Harmonic Drive AG has been creating pioneering products for nearly half a century.

Find out for yourself: share your next challenge with us and find out how your business can become a driving force for innovation.



Harmonic Drive AG

Compact mini servo actuator with multi-turn absolute encoder

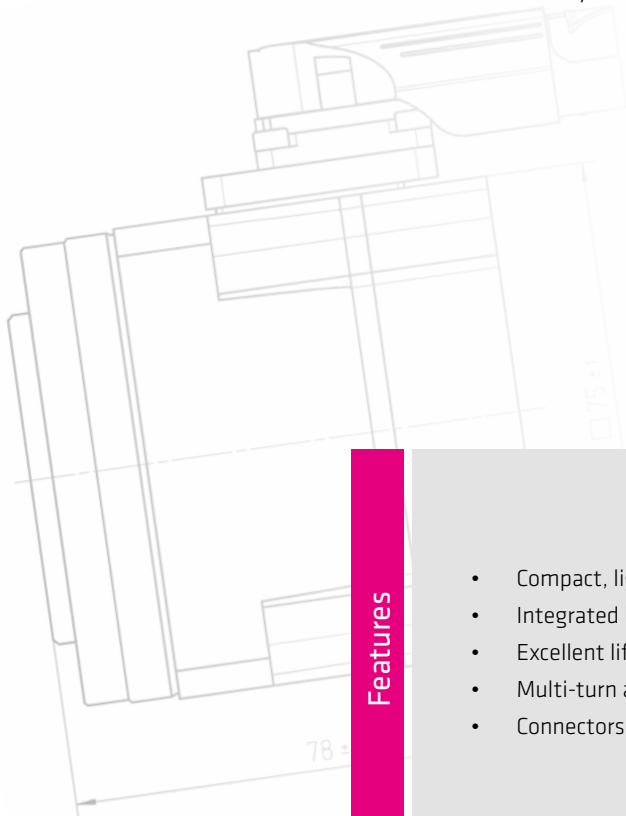
FHA-C Mini Servo Actuators with EnDat® multi-turn absolute encoder comprise a synchronous servo motor, an HFUC Series Component Set, feedback sensor and a specially developed output bearing.

Harmonic Drive® Servo Actuators are the perfect combination of highly dynamic compact servo motors, precision Harmonic Drive® Component Sets and integral high load capacity, tilt resistant output bearings.

Available in three sizes with gear ratios of 30, 50 and 100:1 the actuators can provide maximum torques from 1.8 to 28 Nm. The output bearing with high tilting capacity often allows direct attachment of heavy payloads without the need for further support, thereby providing simple and space saving design installations. The accurate positioning of the actuator guarantees stable machine characteristics and short cycle times, whilst the compact design ensures minimum installation space is required.

The multi-turn absolute motor feedback system detects the absolute position of the output with the highest accuracy over more than 600 revolutions. Productivity of the driven axis is therefore improved as unproductive referencing is not required. In addition, the new fully flexible connectors enable efficient and easy assembly.

By combining the FHA-C Mini Actuator with the specially adapted YukonDrive®, it is possible to provide a single source supply for a pre-configured drive system tailored to suit your application.



Features

- Compact, lightweight design
- Integrated high capacity output bearing
- Excellent lifetime precision
- Multi-turn absolute encoder
- Connectors

Optimised for your applications:

- Reduced material use
- Greater energy efficiency
- Lower production costs
- Small machine footprint
- Reduced set up time
- Increased operating reliability
- Shorter time to market
- Optimal design solution
- Easy load connection
- Low manufacturing and installation costs
- Higher product quality
- Less waste
- Consistent quality
- Reduced Total Cost of Ownership
- Reduced maintenance costs

Customer Benefits



FHA-C Mini
with Multi-turn Absolute Encoder

FHA-C Mini

Servo Actuators with Multi-turn Absolute Encoder

Ordering code

Table 6.1

Series	Size Version	Ratio			Motor feedback	Motor winding	Connector configuration	Special design		
FHA	8C	30	50	100	MZE	- E	Y	According to customer requirements		
	11C	30	50	100						
	14C	30	50	100						
Ordering code										
FHA	-	8C	-	100	-	MZE	-	Y	-	SP

Table 6.2

Motor feedback		
Ordering code	Type	Protocol
MZE	Multi-turn absolute	EnDat® 2.2/22

Table 6.3

Motor winding		
Size Version	Ordering code	Maximum DC bus voltage
8C	-	330 VDC
11C		
14C		
8C	E	48 VDC
11C		
14C		

Table 6.4

Connector configuration			
Ordering code	Motor feedback	Motor	Motor feedback system
Y	MZE	9 pol. (ytec®)	12 pol. (ytec®)

Combinations

Table 7.1

Size Version		8C	11C	14C
Ratio	30	●	●	●
	50	●	●	●
	100	●	●	●
Motor winding	-	●	●	●
	E	●	●	●
Connector configuration	Y	●	●	●
Motor feedback	MZE	●	●	●

● available ○ on request - not available



Technical data

Table 8.1

	Symbol [Unit]	FHA-8C			FHA-11C		
Motor feedback system		MZE			MZE		
Ratio	i []	30	50	100	30	50	100
Maximum output torque	T _{max} [Nm]	1.8	3.3	4.8	4.5	8.3	11
Maximum output speed	n _{max} [rpm]	200	120	60	200	120	60
Continuous stall torque	T ₀ [Nm]	0.8	1.5	2.0	1.8	2.9	4.2
Moment of inertia	J _{out} [kgm²]	0.0026	0.0074	0.0294	0.0062	0.0173	0.0690
Weight	m [kg]	0.5			0.75		
Hollow shaft diameter	d _H [mm]	-			-		
Transmission accuracy	[arcmin]	< 2.5	< 2.0		< 2.0	< 1.5	
Lost Motion	[arcmin]	< 1			< 1		
Torsional stiffness	K ₃ [x10³ Nm/rad]	0.54	0.84	1.2	1.6	3.2	4.4
Ambient operating temperature	[°C]	0 ... 40			0 ... 40		
Output bearing							
Dynamic radial load	F _{R dyn (max)} [N]	1163			2857		
Dynamic axial load	F _{A dyn (max)} [N]	200			300		
Dynamic tilting moment	M _{dyn (max)} [Nm]	15			40		

Table 8.2

	Symbol [Unit]	FHA-14C		
Motor feedback system		MZE		
Ratio	i []	30	50	100
Maximum output torque	T _{max} [Nm]	9	18	28
Maximum output speed	n _{max} [rpm]	200	120	60
Continuous stall torque	T ₀ [Nm]	3.5	4.7	6.8
Moment of inertia	J _{out} [kgm²]	0.0194	0.0538	0.2150
Weight	m [kg]	1.3		
Hollow shaft diameter	d _H [mm]	-		
Transmission accuracy	[arcmin]	< 2.0	< 1.5	
Lost Motion	[arcmin]	< 1		
Torsional stiffness	K ₃ [x10³ Nm/rad]	3.4	5.7	7.1
Ambient operating temperature	[°C]	0 ... 40		
Output bearing				
Dynamic radial load	F _{R dyn (max)} [N]	5357		
Dynamic axial load	F _{A dyn (max)} [N]	500		
Dynamic tilting moment	M _{dyn (max)} [Nm]	75		

Illustration 9.1

FHA-8C Mini-MZE [mm]

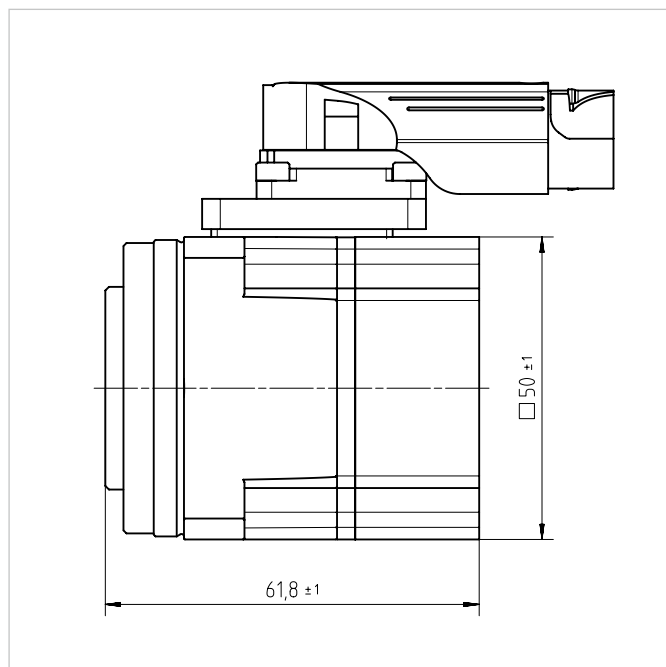


Illustration 9.2

FHA-11C Mini-MZE [mm]

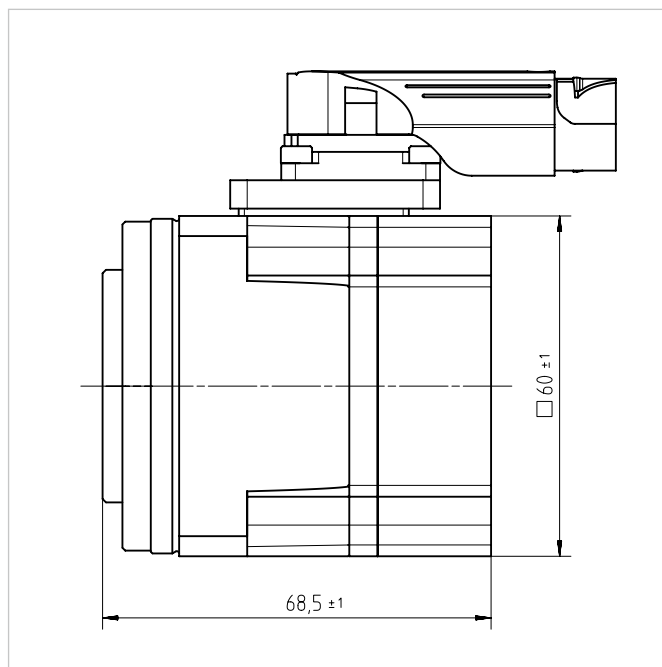
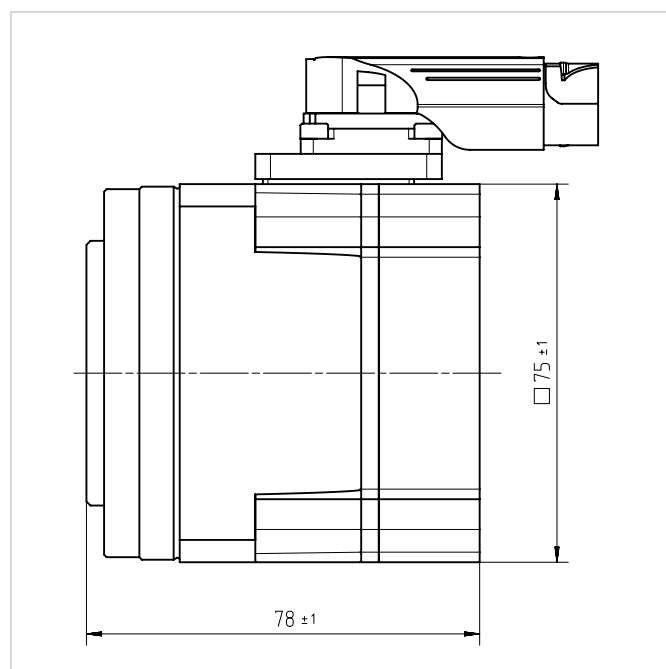


Illustration 9.3

FHA-14C Mini-MZE [mm]



FHA-C Mini

Servo Actuators with Multi-turn Absolute Encoder

Motor feedback

Encoder

Table 10.1

Type	Multi-turn Absolute
Ordering code	MZE
Manufacturers designation	EBI 1135
Protocol	EnDat® 2.2/22
Power supply	3.6 ... 14 VDC
Absolute position / revolution (motor side)	262144 (18 bit)
Number of revolutions	65536 (16 bit) Battery back up (external battery necessary)

Note:

The battery is not included.

For detailed information on the recommended battery, battery life and battery handling, please refer to the HEIDENHAIN product information.

For information on the evaluation and handling of the EnDat® 2.2/22 specific warning and faults, please see the documents of the servo controller.



Compatibility

Table 11.1

		Product	DC bus voltage		Motor feedback
Manufacturer	Type	FHA-C Mini	24 ... 48 VDC	320 VDC	EnDat® 2.2/22 MZE
Harmonic Drive AG	YukonDrive®	●	○	●	●

● in service ○ compatible according to datasheet
Compatibility with other manufacturers controllers are available on request.





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