Reference Sheet ASA56

Version: 1.0.2

Contents

1 Document, audience, intended use

Nanotec's *ASA56* and this document address to technically trained experts alone, such as developers, application / plant engineers, fitters, and service staff. Only experts may install, commission and run the product. Always required is the qualification for the product's assembly, commissioning and maintenance as part of an *overall* machine / system, as well as:

- Training and experience in working with motors, their control and electrostatically threatened components
- Reading and understanding of this and all applicable documents
- Observing all valid regulations

Place this PDF in valid version always to hand and accessible. Use *ASA56* as intended only, within licit technical limits and ambients. For product combinations, please contact Nanotec Sales.

Disclaimer

Product modification / alteration is illicit. Nanotec is not liable for damage / malfunction from installation error, failure to observe this document, or undue repair; nor for product integration in the end system or interaction (= third-party ware). The audience alone is liable for selecting / running / using our products. Our risk analysis for partly completed machinery (if applicable) only rated the hazards of duly installed and networked *single* products. Risks in the *overall* system are exempt and to be rated by the *audience.* The general terms & conditions at *www.nanotec.com* apply (*us.nanotec.com* for clients of Nanotec USA).

2 Your product

ASA56 is a stepper motor in IP65 protection (save shaft outlet) with integrated incremental or multi-turn encoder for drive systems in a wide range of industrial scenarios.

2.1 Highlights

Typical ASA56 features are: size variance, holding force, and precision.

- UL certificate
- 2 motor sizes
- Protection class IP65 (shaft outlet: IP54)
- Optional brake integrated (on request)
- High encoder resolution

2.2 ASA56 variants

Find your product variant by its article number.

ASA5618**x**42-xxX	Motor length **M**edium | **L**arge
ASA5618x42-**xx**X	Encoder **E3:** Incremental | **W1:** SSI

2.3 Product layout

Internalize the ASA56 product layout and technical data before installation so as to avert added hazards (say, abrupt motor run on defect / inhibition from your **overall** construct).

- ASA56 size sheet
- Flange *NEMA23*
- Torque tool to bolt the motor
- 4 *M5* screws *8.8* (ISO 4762 / 10642)

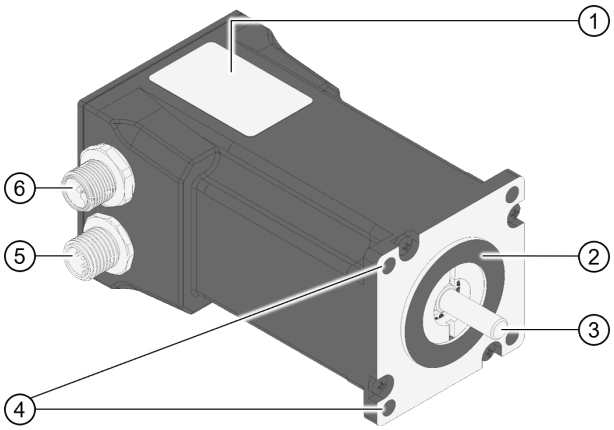

Fig. 1: ASA56 (here: size L).

1. Type label
2. IP54 ball bearing
3. Motor shaft
4. Four fixing bores *M5*
5. Encoder connector
6. Motor connector

3 Technical data

Uae the product within its technical limits. The size sheet on our website applies. Select the exact ASA56 type there and download the needed CAD-/ PDF file.

3.1 Ambient conditions

Save for the shaft / leadscrew outlet (= IP54), *ASA56* is IP65-protected. For *overall* IP65, you must seal the outlet installation-ward, say, by O-ring or surface seal.

Protection class	IP65 (shaft outlet: IP54)
Air humidity (non-condensing)	0 to 85 %
Ambient °C (°F)	-10 to +50 °C (+14 to +122 °F)
Axial force *Fa* $N^{max.}$	10
Radial force *Fr* (@ 10 mm) $N^{max.}$	28

3.2 Motor

There are two ASA56 lengths, each with a different holding torque.

ASA56 stepper	**M size**	**L size**
$Current^{per\ winding}$ A	4.2	4.2
$Resistance^{per\ phase}$ (@ 25 °C / 77 °F) $\Omega^{\pm 15\%}$	0.45	0.55
$Inductance^{per\ phase}$ (@ 1kHz) $mH^{\pm 20\%}$	1.6	2.1
Rotor inertia $kg \cdot m^2$ ($x10^{-6}$)	30	48
Holding torque Nm	1.4	2.3
Step angle $^{\circ \pm 5\%}$	1.8	1.8
Axial play (*Fa* = 4.0 N) mm	0.08	0.08
Radial play (*Fr* = 4.0 N) mm	0.02	0.02

3.3 Encoder

ASA56 encoders work incremental or, in the SSI version, *multi-turn*.

	SSI	**Incremental**
Protective circuits	Reverse polarity, short circuit	Overvoltage
Energy harvesting	Wiegand effect	-/-
Operating voltage	4.75 to 15 VDC	$5\ VDC^{\pm 10\%}$
Consumption (typical)	≤ 0.3 W	≤ 30 mA (no-load @ 5 V)

	SSI	Incremental
Start-up time	100 ms	-/-
Clock input	RS 422	-/-
Sensor type	Magnetic	Magnetic
Incremental cpr / ppr[squared]	-/-	4096 / 16384
SSI (*single-*/*multi-turn*) bit	17 / 16	-/-
Accuracy	±0.0878° (@ room temperature)	±0.2° (@ standstill / constant speed)
Axis rotation count[seen from front]	Clockwise	Clockwise
Maximum rpm	12,000	14,000

3.4 Pin assignment

NOTICE

Electronic damage: from lack of reverse polarity guard!

►Assign pins correctly.

►Use correct connector types.

Motor and encoder

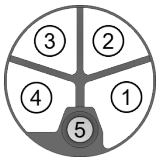

Fig. 2: Motor. L-coded M12 (m).

1: A\
2: A
3: B
4: B\
5: n/a

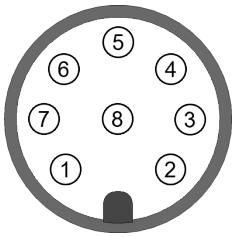

Fig. 3: Encoder. A-coded M12 (m).

SSI:	**1:** Clk+	**3:** Data+	**5:** Gnd	**7:** n/c
	2: Clk-	**4:** Data-	**6:** n/c	**8:** +Ub
Incremental:	**1:** A	**3:** B	**5:** Gnd	**7:** I
	2: A\	**4:** B\	**6:** I\	**8:** +Ub

4 Sensor data format

Depending on type, the ASA56's encoder sends the motor position incrementally via two channels **A, B** plus index **I** or via **s**ynchron-**s**eriell-**i**nterface (SSI) as a 33-bit packet (after 16 start bits).

Incremental output

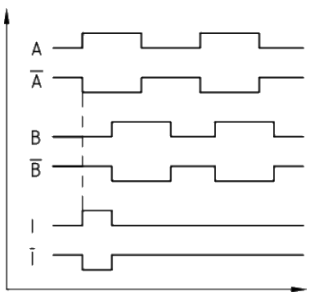

*Fig. 4: The index signal **I** runs in sync with channel **A**'s rising edge.*

If the motor shaft rotates clockwise (seen from front), channel A's signal leads channel B by 90 degrees (electrical).

Ub = 5 V	**Load**	**High level**	**Low level**
A, A\, B, B\, I, I\	35 mA	≥ 4.5 V	≤ 0.3 V

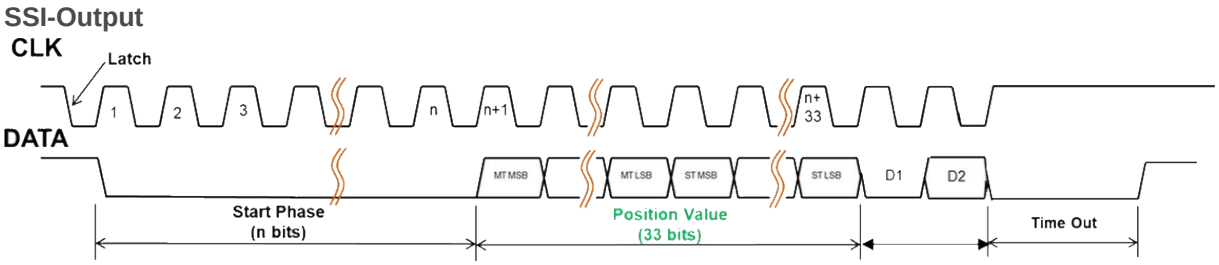

*Fig. 5: By **s**ynchronous **s**erial **i**nterface (SSI), the ASA56's encoder transfers the position values as 33-bit packets.*

- **S303B**
- Cycle: ≥ 50 µs
- Time-out: 7 µs$^{typ.}$
- 16 Start bits (= *0*) + *multi-turn* (16 bits) + *single-turn* (17 bits) + D1 + D2
- D1: Constant value = *0*
- D2: Error-bit for displaying the sensor-internal status (*1* = no error; *0* = error)

Prepare the SSI for *Nanotec* controllers

63	62	61	60	59	58	57	56	55	54	53	52	51	50	49	48
													0	0	0
47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
0	0	0	0	0	0	0	0	0	0	0	0	0	POS	POS	POS
31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
POS	POS	POS	POS	POS	POS	POS	POS	POS	POS	POS	POS	POS	POS	POS	POS
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
POS	POS	POS	POS	POS	POS	POS	POS	POS	POS	POS	POS	POS	POS	S	E

*Fig. 6: ASA56 uses 51 status, start and position bits: 1 **S** for status (D1), 1 **E** for error (D2), 33 **POS** for position and 16 start bits (= 0).*

- **Bit 0** (= error): value *1* if no error
- **Bit 1**: always value *0*

Edit the 33B0$_h$ **sub-inidices** below so that *Nanotec* controllers in *Autosetup* (see controller manual) duly process the encoder and its data:

1. Set **33B0$_h$:06$_h$** to *2000000* (baud rate in Hz).
2. Set **33B0$_h$:05$_h$** to *51* (number of bits plus start bits).
3. Set **33B0$_h$:07$_h$** to *FFFFFFFC$_h$* (Position data: *POS* bits 2 to 31).
4. Set **33B0$_h$:08$_h$** to *7* (Position data: *POS* bits 32 to 34).
5. Set **33B0$_h$:09$_h$** to *3* (status and error bits 0 and 1).
6. Set **33B0$_h$:0B$_h$** to *1* (error bit = *1*, status bit = *0*).
7. To store the object: Insert *65766173$_h$* to **1010$_h$:06$_h$**.
8. Restart the controller.

5 Imprint, marking, versions

Document	**+ Added │ > Changed │ # Fixed**
1.0.2 [2025.07]	# Correction of typo in :Technical data incremental encoder typical accuracy is ±0.2°.
1.0.1 [2024.11]	**+** Revision.
1.0.0 [2023.11]	Release.