



DS-58 Rotary, Absolute, Electric Encoder™ with Sine/Cosine outputs

DS - Series

The DS-58 is a member of the DS series, which is based on Netzer Precision *Electric Encoder™ technology*. This, state-of-the-art, technology offers many features, some unparalleled:

- Lowest profile (≤ 10 mm)
- High precision, absolute position output
- High tolerance to temperature, shock, moisture, and contaminants
- Tolerance to EMI, RFI, and to magnetic fields.
- Very high reliability

The internally shielded, DC operated DS-58 includes an electric field generator and receiver, a sinusoidally-shaped dielectric rotor, and processing electronics. The coarse/fine, analog, output signals are proportional to the sine and cosine of the rotation angle.

The holistic ⁽¹⁾ construction of the *Electric Encoder™* guaranties high tolerance to eccentricity and axial mounting misalignments, thus obviating the need for internal ball bearings. The absence of bearings, flexible couplers, glass disc, light sources and detectors, and the low power consumption, all together make the DS encoders virtually failure free.

Demanding applications well suited to the DS-58 include: Aerospace, medical, instrumentation, and automation. It is available in a **standard** version, **premium** version and several **special** versions.



Standard DS-58

Parameter	Value	
Electrical Cycles/Revolution (EC/R) - Fine-mode / Coarse-mode ⁽²⁾	4 / 1	32 / 1
Angular resolution ⁽³⁾	15 bits	18 bits
Static error ⁽⁴⁾	$< \pm 0.2^\circ$	$< \pm 0.02^\circ$
Maximum usable speed ⁽⁵⁾	14,000 rpm	1,500 rpm
Output signal latency ⁽⁶⁾	800 μ s	
Fine-mode / Coarse-mode output ⁽⁷⁾	$\pm 0.5V / \pm 0.12V \pm 10\%$ (relative to Vr)	
Supply voltage and current ⁽⁸⁾	4.6V to 10V $I_{cc} < 8$ mA	
Maximum load current – I _{max} / Output resistance - R _o	I _{max} =10 mA / R _o <1 Ω	
EMC	IEC 6100-6-2, 6-4	
Operating temperature range	-40 °C to +110 °C	
Relative humidity	$< 98\%$ (non-condensing) ⁽⁹⁾	
Shock and vibration endurance	IEC 60068-2-27, 2-6	
Allowable mounting eccentricity and rotor axial motion ⁽¹⁰⁾	± 0.2 mm	
Rotor inertia	8 g cm ²	
Total weight	36 g	
Outer diameter / Inner diameter / Total height	58 mm / 12.7 mm / 17 mm	
Electrical interconnection	Hirose connector, type: DF13-6P with a 25 cm pigtail	

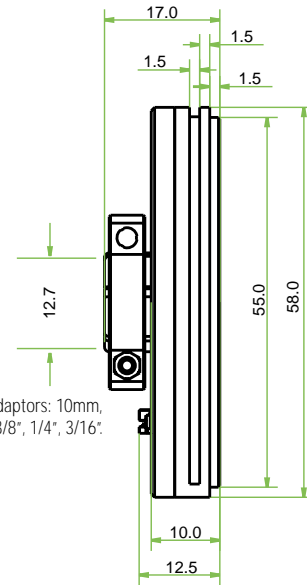
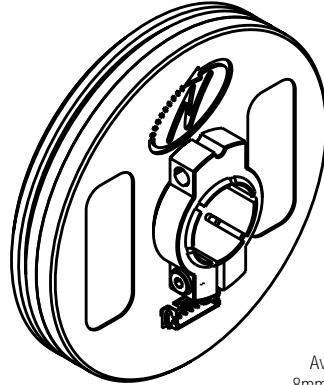
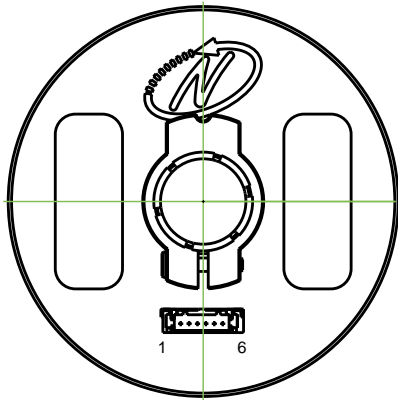
Premium DS-58

Parameter (All other parameters are as in the standard version)	Value
Electrical Cycles/Revolution (EC/R) - Fine-mode / Coarse-mode ⁽²⁾	32 / 1
Angular resolution ⁽³⁾	20 bits
Static error ⁽¹¹⁾	$< \pm 0.01^\circ$
Fine-mode / Coarse-mode output ⁽⁷⁾	$\pm 1V / \pm 0.25V \pm 10\%$ (relative to Vr)
Allowable mounting eccentricity and rotor axial motion	± 0.1 mm
Operating temperature range	-55 °C to +125 °C
Enhanced condensing durability	see note ⁽¹²⁾
Electrical interconnection	Strain-relieved 6 wire pigtail (25 cm)

Special Versions of DS-58

- Micro-Power ⁽¹³⁾ ($I_{cc} < 50 \mu A$ @ $V_{cc} = 3V$) - see AN 008
- Near-zero magnetic signature ⁽¹⁴⁾
- TTL incremental (AqB) output ⁽¹⁵⁾
- Dual-redundant outputs (32 EC/R) ⁽¹⁶⁾

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Available shaft adaptors: 10mm, 8mm, 6mm, 4mm, 3/8", 1/4", 3/16".

- Mounting by means of 3 supplied M2 servo screws (bolt circle Ø63mm) - see AN 004.
- All dimensions in mm, DXF drawings can be downloaded from website.

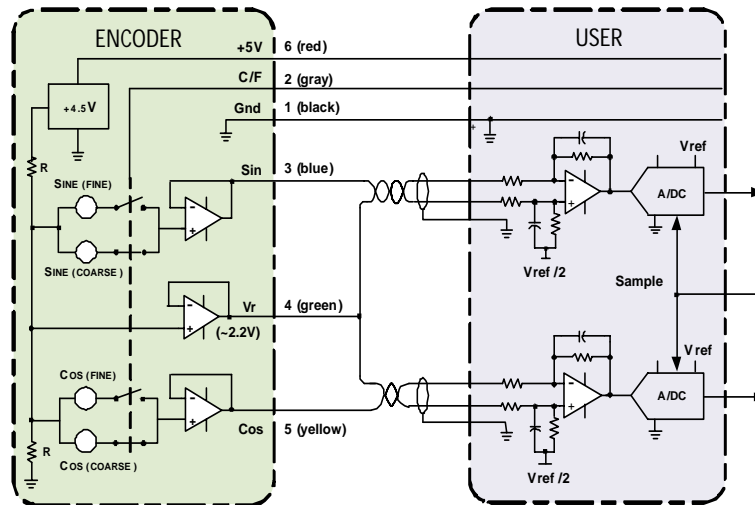
Electrical interface

The DS-58 has two operation modes selectable by a logic C/F command; logic "0" selects the **Coarse-mode**, which has one Electrical-Cycle/Revolution (EC/R) while logic "1" (+3V to +5V) selects the **Fine-mode** which has 4 EC/Rs or 32 EC/Rs.

Upon system initiation the **coarse-mode** should be momentarily selected for identifying the correct fine cycle. The encoder is then switched to the **Fine-mode**, which is responsible for accuracy and resolution (switching time is ~1.5ms).

Digitizing and processing Sin-Vr and Cos-Vr, provides the absolute position data - see AN 001 and AN 003 for factory-supplied codes.

All output signals are referenced to an internally generated voltage (Vr~2.2V).



Ordering options

DS-58 - **xx** -

A	10 mm	E	3/8"
B	8 mm	F	1/4"
C	6 mm	G	3/16"
D	4 mm	X	1/2" (Default)

Shaft adaptors

yy

04 (Standard)	16 (Non standard)
08 (Non standard)	32 (Standard)

Fine channel cycles/revolution

Z

A	Standard	E	AqB digital interface ⁽¹⁷⁾
B	Premium (32 EC/R only)	F	Dual redundancy ⁽¹⁷⁾
C	Micro Power	N	Non standard
D	Non-magnetic		

Features

Notes

- The **whole** area of the rotor if active at any time - see AN 007.
- The number of sine/cosine output cycles generated over one mechanical rotation. Other options can be customized.
- The inherent signal-to-noise ratio of the standard DS-58 inside its 1kHz bandpass supports an A/D conversion depth of N=12 bits; the premium encoder supports N=14 bits. The **angular** resolution equals N+M+1 bits, where M=5 for 32 EC/R. The stability of the LSB depends on the A/D converter - see AN 005.
- With offset compensation - see AN 004.
- Determined by the Fine-channel EC/Rs and the internal low pass filters.
- An inherent time delay, which is inversely proportional to the internal filter cut off frequency (1kHz, 3rd order Butterworth, standard) - see AN 006.
- With the rotor in the middle of its axial travel range. Sine/Cosine amplitudes change by 15%/0.1mm axial movement with 32 EC/R, by 10%/0.1mm in the premium version, and negligibly with 4 EC/R and coarse-mode. The Axial movement does not change amplitudes ratio, or encoder accuracy.
- The encoder includes a 4.5V LDO input regulator.
- The encoder may endure condensing conditions for short periods.
- Accuracy slightly degrades in proportion to mounting eccentricity.
- Offset and 4th-harmonic compensated (consult factory).
- Enduring condensing conditions for longer than the standard version.
- The accuracy and resolution are somewhat lower than in the standard DS-58.
- No Ferrous materials inside (except residuals in some electronic components).
- The fine channel Sine/Cosine signals are internally converted into AqB pulses. (up to 262,144 Increments/revolution) and 32 index pulses/revolution.
- Two independent outputs, dual electronics and connectors, a common rotor.
- Consult factory for customization specifics.

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