



MILLET SERIES — OPEN-TYPE OPTICAL GRATING DISPLACEMENT SENSOR

High-resolution, non-contact optical position sensing for precision motion applications.

The Millet Series is a reflective photoelectric linear encoder designed for applications requiring accurate, reliable position feedback without physical contact. Available in 80 µm and 20 µm grating pitch, it delivers resolutions as fine as 0.02 µm and supports both digital and analog output options to suit a wide range of motion control systems.

KEY FEATURES

- Non-contact reflective photoelectric system
- Compact mounting structure
- Grating pitch options: 80 µm or 20 µm
- ABZ digital output; 1Vpp analog and absolute value output available
- Resolution: 0.02 µm – 5 µm (model dependent)
- Optical zero reference: one zero mark every 50 mm
- High-corrosion-resistance stainless steel tape with matched thermal expansion coefficient (glass scale available as custom option)

SPECIFICATIONS AT A GLANCE

Parameter	Value
Supply Voltage	5V ±5%
No-load Current	<30 mA
Operating Current	<110 mA
Max Acceleration	400 m/s ²
Vibration Resistance	55–2000 Hz, max 100 m/s ²
Storage Temperature	-20°C to 80°C
Read Head Weight	8 g
Scale Weight	15 g/m

OUTPUT SIGNAL

Output Signal	A+, A-, B+, B-, Z+, Z- signals are RS-422 differential output; analog is 1Vpp Sin/Cos signal (0.6–1.2V)
Output Circuit	Push-pull
AB Signal Relationship	AB signal phase angle is 90° (used to determine direction during reading)
Maximum Signal Frequency	30 MHz (after ×4 interpolation)
Z Signal	Optical zero reference (Z signal width = 1/4 of A signal period); one zero reference every 50mm
LED Indicator	● Red = Alarm ● Green = Normal Operation

part number structure & ordering information

MILLET - O8 X - 3.0 - D09

Optical Grating Read Head Series

Grating Pitch — O8: 80 µm | O2: 20 µm

Resolution
 I: 20nm (Max speed: 0.6m/s)
 H: 50nm (Max speed: 1.5m/s)
 Y: 0.1µm (Max speed: 3m/s)
 W: 0.2µm (Max speed: 6m/s)
 Z: 0.5µm (Max speed: 15m/s)
 X: 1µm (Max speed: 18m/s)
 D: 5µm (Max speed: 18m/s)
 A: 1Vpp Analog output (Max output frequency: 350K)

Connector
 D00: Bare wire
 D09: 9-pin D-sub connector
 D15: 2-row 15-pin D-sub connector

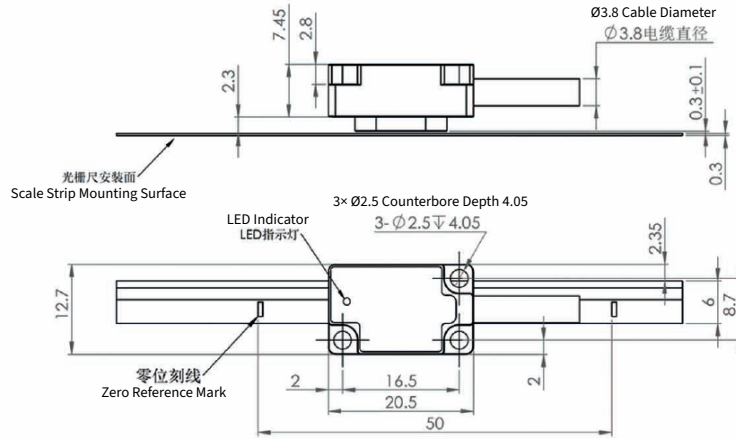
Cable Length
 03: 0.3m 30: 3.0m
 05: 0.5m 50: 5.0m
 10: 1.0m 100: 10m
 15: 1.5m *Other cable lengths available on request

MATCHING SCALE STRIP

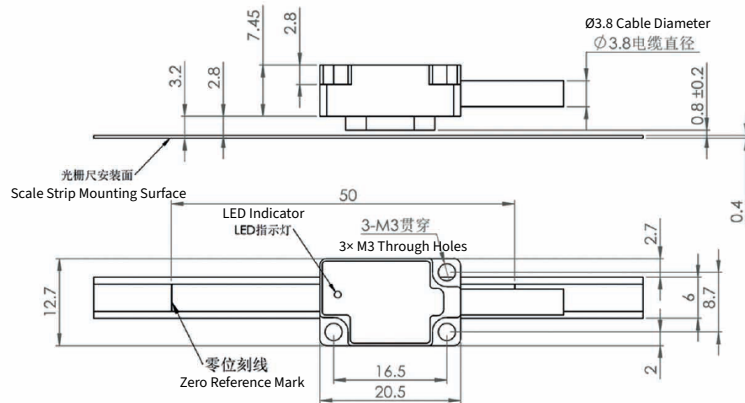
Scale Model	ORS80 / ORS20
Dimensions	0.3 x 6mm
Accuracy	±6 μm/m
Linearity	±3 μm/m
Max Length	50m
Thermal Expansion Coefficient	10.1 ±0.2 μm/m/°C
Scale Weight	15 g/m



MILLETO2 Installation Dimension



MILLETO8 Installation Dimension



MILLETO8 DIGITAL OUTPUT PIN ASSIGNMENT

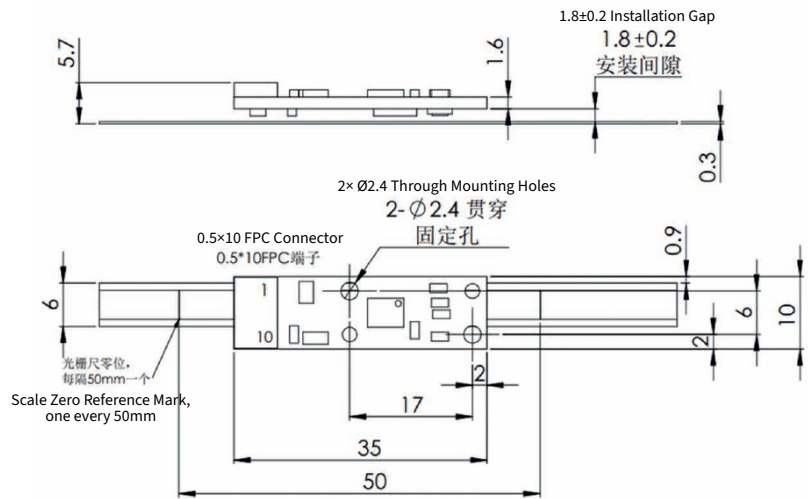
function	signal	colour	9-pin D (Male)	15-pin D (Male)
Power	5V	Red	5	7
	0V	Black	1	2
Incremental Signal	A+	White	2	14
	A-	Grey	6	6
	B+	Blue	4	13
	B-	Purple	8	5
Reference Zero Switch	Z+	Brown	3	12
	Z-	Orange	7	4

ANALOG OUTPUT PIN ASSIGNMENT

Function	Signal	Colour	9-pin D (Male)	15-pin D (Male)
Power	5V	Red	5	4
	0V	Black	1	12
Analog Signal	SIN+	White	2	9
	SIN-	Grey	6	1
	COS+	Blue	4	10
	COS-	Purple	8	2
Reference Zero Switch	Index+	Brown	3	3
	Index-	Orange	7	11
Shield	Inner	Silver	9	15
	Outer	Silver	Housing	Housing

PCB-MOUNT INCREMENTAL OPTICAL ENCODER

Pin No.	Definition
1	/
2	/
3	Z-
4	Z+
5	B-
6	B+
7	A-
8	A+
9	+5V
10	GND



TECHNICAL SPECIFICATIONS

PCB Read Head Model ORH80P-X (X: 1µm, Z: 0.5µm, W: 0.2µm, Y: 0.1µm, H: 40nm, l: 20nm)

Scale Model ORS80-1000L (1000L = 1000mm)

Grating Pitch 80 µm

Supply Voltage 5V ±5%

Operating Temperature -10°C to 70°C (wide-temp custom available)

Note PCB-mount scale standard pitch is 80 µm;
20 µm pitch also available on request

Circular Grating Incremental Encoder



GLASS DISC DIMENSION TABLE

Disc Size (mm)	Line Count	Pitch (μm)	Outer Dia. (mm)	Inner Dia. (mm)	Disc Thickness (mm)	Optical Dia. (mm)
11.5	362	80	11.5	5	1	9.218
17	512	80	16.9	7	1.1	13.04
30	1024	80	29.9	12.8	1.1	26.08
50	1800	80	49.9	25.5	2	45.84
	3600	40	49.9	25.5	2	45.84
56	2048	80	57.18	47.18	2.3	52.15
	4096	40	55.9	25.5	2.3	52.15
	8192	20	55.9	32	2.3	52.15
82.5	2935	80	82.5	50.9	2.3	74.739
	5870	40	82.5	50.9	2.3	74.739
	11740	20	82.5	50.9	2.3	74.739
86.3	12960	20	86.3	65	2.3	82.506
100	7226	40	99.7	70.6	2.3	92.004
108	8192	40	107.9	90	2.3	104.3
	16384	20	107.9	90	2.3	104.3
148	21600	20	148	120.1	2.3	137.51

TECHNICAL SPECIFICATIONS (GLASS DISC)

Material	Stainless steel
Reference Zero	Single reference zero
Thermal Expansion Coefficient	15.5 ±0.5 μm/m/°C
Contamination Resistance	Best performance at 40μm pitch
Signal Output	Digital (after ×4 interpolation: 128, 200, 256, 512, 800 selectable) or 1Vpp analog
Note	Other sizes available on request



RADIAL STEEL RING CIRCULAR GRATING DIMENSION TABLE

Model	Lines		Outer dia. (mm)	Inner dia. (mm)	Max RPM			
	(40μm)	(20μm)			— 40μm (0.1μm)	— 40μm (1Vpp)	— 20μm (0.1μm)	— 20μm (1Vpp)
IESR57	4500	9000	57.3	37	700	2550	350	1500
IESR75	5920	11840	75.35	55	534	1938	267	1140
IESR100	7872	15744	100.25	80	500	1360	250	800
IESR115	9000	18000	114.6	95	450	1190	225	700
IESR150	11800	23600	150.3	130	267	850	133	500
IESR206	16200	32400	206.3	186	195	680	97	400
IESR255	20000	40000	254.6	235	78	510	39	300
IESR300	23600	47200	300.3	280	66	476	33	280

MILLET 20A SERIES — ABSOLUTE OPTICAL GRATING ENCODER

True absolute position from power-on — no homing required.

The Millet20A absolute optical encoder provides immediate, reliable position data the moment the system powers up, eliminating the need for homing routines. With a resolution of 0.0125 μm and support for BiSS C and SSI output protocols, it integrates seamlessly into modern servo and motion control platforms requiring position certainty at all times.

part number structure & ordering information

Matching Scale Model:
20AS (e.g. Millet20AS-1000L — 1000L represents 1000mm length)

Scale Mounting Tool:
Millet20A-MT

MILLET20A 29 B - 3.0 - DB9

Absolute optical grating read head series

29Bit: Max diameter 6710mm

B: BiSS C output format | S: SSI output format

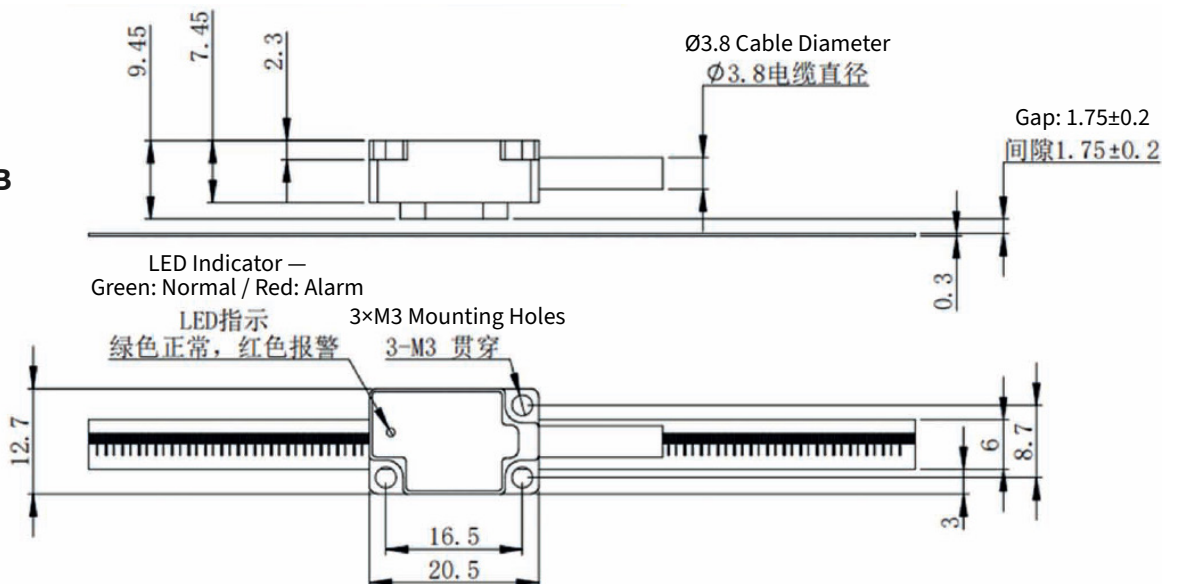
Connector
Blank: Bare wire (no connector)
DB9: 9-pin D-sub
DB15: 2-row 15-pin D-sub

Cable Length
1.0: 1.0m | 3.0: 3.0m | 5.0: 5.0m
*Other cable lengths available on request

TECHNICAL SPECIFICATIONS (ABSOLUTE ENCODER)

Scale Max Length	Currently up to 1m
Resolution	0.0125 μm
Max Speed	5 m/s
Supply Voltage	5V \pm 5%
Operating Temperature	-10°C to 70°C (wide-temp custom available)
Note	Absolute optical grating PCB-mount version also available

MILLET20A29B Installation Dimension



MILLET20A29B OUTPUT PIN ASSIGNMENT

Function	BiSS C Signal	SSI Signal	Colour	9-pin D (Male)
Power	5V	5V	Red	5
	0V	0V	Black	9
Signal	MA+ (clock)	CLK+ (clock)	White	4
	MA- (clock)	CLK- (clock)	Grey	8
	SL+ (data)	DAT+ (data)	Blue	3
	SL- (data)	DAT- (data)	Purple	7
Inner Shield	Shield	Shield	Silver	Not connected
Outer Shield	Shield	Shield	Silver	Housing

ABSOLUTE GLASS SCALE DIMENSION TABLE

Scale Size (mm)	Resolution (bit)	Outer Dia. (mm)	Inner Dia. (mm)	Scale Thickness (mm)	Max Speed (rpm)
9	17	9	3.4	1	2000
26	19	26	13	1.1	1000
70	20	70	50.95	2.3	800
138	21	138	80	2.3	500

TECHNICAL SPECIFICATIONS (ABSOLUTE GLASS SCALE)

Type	Single-turn absolute
Output Signal	BiSS C and SSI selectable
Glass Scale Material	Soda-lime glass
Installation Gap	1.75 ±0.2mm