

Heavy Duty Types

HEAVY DUTY

ACURO[®] -XR_{Robust} HENGSTLER

NorthStar

Hengstler offers a new series of incremental and absolute encoders in compact size that provide the ruggedness of big magnetic ring kit encoders. Choose from a growing line of Heavy Duty encoders designed to provide reliable operation in harsh duty industrial applications that will not corrode and can withstand temperature extremes from -40°C to +100°C

Hengstler's Heavy Duty product line offers extreme shock and vibration resistance, special labyrinth sealing options on select models, hazardous environment ATEX certification as well as extreme corrosion and wash down resistant stainless and nickel plated models designed for the special application needs of the food and beverage industry among others.

Heavy
Duty

Examples of applications for Heavy Duty encoders:

- wind power plants
- commercial solar plants
- oil field exploration
 - draw works
 - rough necks
- construction machinery
- utility vehicles/ trucks
- steel mills
- paper mills
- saw mills
- gantry cranes
- marine equipment
- offshore applications
- food & beverage
- filling plants
- paper processing
- converting machinery
- material handling
- your individual application

Incremental



- Single or Dual output
- ATEX Certification available for Intrinsically Safe application
- High Resolution Unbreakable Disk
- Industrial Duty Connector
- NEMA 4X / IP67 Rated
- Nickel or Stainless Steel Housing available

HEAVY DUTY

NorthStar 

NUMBER OF PULSES

0001 / 0024 / 0025 / 0035 / 0040 / 0060 / 0100 / 0120 / 0192 / 0200 / 0240 / 0250 / 0256 / 0300 / 0360 / 0500 / 0512 / 0600 / 0625 / 0720 / 1000 / 1024 / 1200 / 1250 / 1440 / 2000 / 2048 / 2500 / 2540 / 3600

GENERAL INFORMATION

HARSH-DUTY OPTICAL ENCODER

The HD20 Harsh-Duty Optical Encoder is a compact heavy-duty encoder designed to exceed IP66/IP67 and NEMA 6 enclosure requirements. It is also available in stainless steel that exceeds NEMA 4X and NEMA 6P requirements and is ideal for stringent wash down environments, including those where high pressure steam or caustic chemicals are needed to meet regulatory requirements.

The HD20 features max. 440N Axial and Radial Bearings, -40° to +100°C temperature range and unique labyrinth double-sealed housing, and optional dual "redundant" outputs and is covered by a two-year warranty (one year for bearings). NorthStar's traditional quality, reliability and value are built-in to every HD20 encoder.

Also available in this series, is an Intrinsically Safe version certified to ATEX EEx ia IIB T4 when used with the appropriate IS Barrier. Accessory barriers can be supplied with the encoder.

APPLICATIONS

The HD20 Harsh-Duty Optical Encoder is ideal for machine applications with corrosive environments that demand heavy washdown protection. This compact, special-duty encoder is designed to exceed IP66/IP67 and NEMA 6 enclosure requirements with a PPR range through 3600. ATEX certification is also available for intrinsically safe applications.

- Converting Machinery
- Material Handling
- Packaging Equipment
- Pickling Equipment
- Processing Equipment

Industries

Chemical, Food & Beverage, Oil & Gas, Paper, Steel and any other where a precise encoder is needed to operate in harsh environments.

TECHNICAL DATA mechanical

Housing diameter	52.3 mm
Shaft diameter	9.52 mm / 10 mm (Solid shaft)
Flange (Mounting of housing)	Square flange
Protection class shaft input (EN 60529)	NEMA 4X or IP67
Protection class housing (EN 60529)	NEMA 4X or IP67

Incremental

TECHNICAL DATA mechanical (continued)

Shaft load axial / radial	max.: 440 N / 440 N
Max. speed	max. 6000 rpm
Bearing life	max. 5×10^{11} revs.
Torque	< 1.76 Ncm
Vibration resistance (DIN EN 60068-2-6)	200 m/s ² (5 ... 2000 Hz)
Shock resistance (DIN EN 60068-2-27)	500 m/s ² (11 ms)
Operating temperature	-40 °C ... +100 °C ATEX: -40 °C ... +80 °C
Material shaft	Stainless Steel
Material housing	Hard anodized Aluminum, Nickel
Weight	approx. 430 g
Connection	MS, radial M12-connector, radial Cable, radial

TECHNICAL DATA electrical

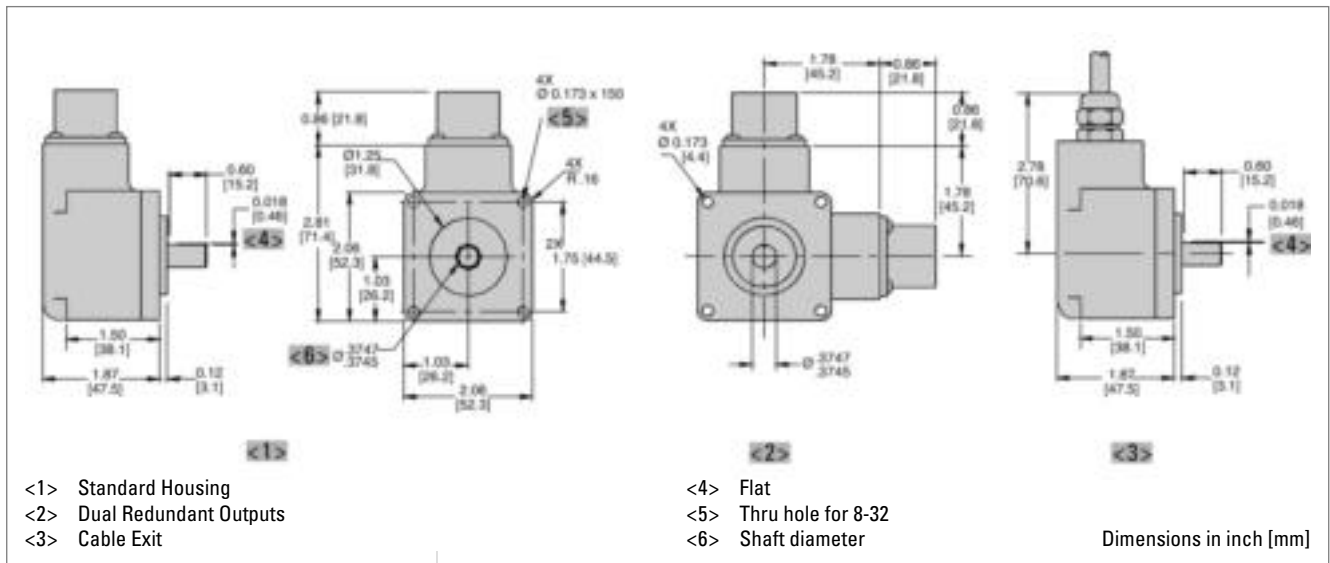
Supply voltage	DC 5 - 26 V ATEX: DC 5 V ATEX: DC 7 - 26 V
Max. current w/o load	50 mA
Code	Incremental, optical
Max. pulse frequency	125 kHz
Phasing	Incremental signals (A leads B): A leads B by 90° for ccw shaft rotation viewing the shaft clamp end of the encoder
Pulse shape	Square wave

ELECTRICAL CONNECTIONS 6, 7 & 10 Pin MS connector / Cable

Encoder Function	Cable 6 Pin Single Ended		Cable 7 Pin Single Ended		Cable 7 Pin Dif Line Drv w/o Idx		Cable 10 Pin Dif Line Drv w/ Idx		Cable Exit with Seal
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Wire Color
Sig. A	E	brown	A	brown	A	brown	A	brown	green
Sig. B	D	orange	B	orange	B	orange	B	orange	blue
Sig. Z	C	yellow	C	yellow	--	--	C	yellow	orange
Power +V	B	red	D	red	D	red	D	red	red
Com	A	black	F	black	F	black	F	black	black
Case	--	--	G	green	G	green	G	green	white
N/C	F	--	E	--	--	--	E	--	--
Sig. \bar{A}	--	--	--	--	C	brown/white	H	brown/white	violet
Sig. \bar{B}	--	--	--	--	E	orange/white	I	orange/white	brown
Sig. \bar{Z}	--	--	--	--	--	--	J	yellow/white	yellow

Incremental

DIMENSIONED DRAWINGS



Incremental

ORDERING INFORMATION

Type	Format	Number of pulses	Shaft Ø	Output	Connection ¹	Housing, Tether, Options ^{2,3,4,5}
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HD20	1 Uni-directional 2 Bi-directional 3 Bi-directional with Index	1 ... 3600	0 9.52 mm (3/8") 4 10 mm	0 5-26V in, 5-26V Open Collector out (7273) 2 5-26V in, 5-26V Push-Pull out 3 5-26V in, 5-26V Differential Line Driver out (7272) 4 5-26V in, 5V Differential Line Driver out (7272) F 5-26V in, 5-26V Open Collector out (2222) G 5-26V in, 5-26V Open Collector out with 2.2 kΩ Pul-lups (2222)	1 6 pin connector 3 7 pin connector 5 10 pin connector D Sealed cable, 0.45 m F Sealed cable, 0.15 m G Sealed cable, 0.25 m H Sealed cable, 0.38 m	0 No Options 1 Nickel Finish Housing 2 Stainless Steel Housing 3 Redundant Outputs (Dual Connector Housing) 4 Nickel Finish Housing with Redundant Outputs 5 Stainless Steel Housing with Redundant Outputs A Same as "0" with ATEX Typ 1 B Same as "1" with ATEX Typ 1 C Same as "2" with ATEX Typ 1 D Same as "3" with ATEX Typ 1 E Same as "4" with ATEX Typ 1 F Same as "5" with ATEX Typ 1 G Same as "0" with ATEX Typ 2 H Same as "1" with ATEX Typ 2 I Same as "2" with ATEX Typ 2 J Same as "3" with ATEX Typ 2 K Same as "4" with ATEX Typ 2 L Same as "5" with ATEX Typ 2 M Same as "0" with ATEX Typ 3 N Same as "1" with ATEX Typ 3 O Same as "2" with ATEX Typ 3 P Same as "3" with ATEX Typ 3 Q Same as "4" with ATEX Typ 3 R Same as "5" with ATEX Typ 3

¹ Output Code "3", "4" only available with Format Code "1", "2" and Connection Code "3" to "H" or with Format Code "3" and Connection Code "5" to "H"

² Available ATEX certified options:

ATEX Type 1: 5 V in, 5 V out

ATEX Type 2: 7-26V in, 7-26V out

ATEX Type 3: 7-26V in, 5V out

Note: When selecting ATEX models, ATEX voltages replace those shown in Output Code.

³ Housing/Tether/Options Code "G" to "L" only available with Output Code "0" to "3", "F" or "G"

⁴ Housing/Tether/Options Code "M" to "R" only available with Output Code "4"

⁵ Note for Housing with redundant outputs: Simultaneous use of redundant outputs may void ATEX certification. Consult us for details.

Incremental



- Single or Dual output
- Optional high current line driver
- ATEX Certification available for Intrinsically Safe application
- High Resolution Unbreakable Disk
- Industrial Duty Connector
- NEMA 4X / IP67 Rated
- Nickel or Stainless Steel Housing available

HEAVY DUTY

NorthStar CE

NUMBER OF PULSES

0001 / 0025 / 0035 / 0040 / 0050 / 0060 / 0100 / 0120 / 0192 / 0200 / 0240 / 0250 / 0256 / 0300 / 0360 / 0500 / 0512 / 0600 / 0625 / 0720 / 0900 / 1000 / 1024 / 1200 / 1250 / 1440 / 1524 / 1600 / 1800 / 2000 / 2048 / 2500 / 2540 / 3000 / 3048 / 3600 / 4096 / 5000

GENERAL INFORMATION

HARSH-DUTY OPTICAL ENCODER

The HD25 Harsh-Duty Optical Encoder is a compact heavy-duty encoder designed to exceed IP66/IP67 and NEMA 6 enclosure requirements. It is also available in stainless steel that exceeds NEMA 4X and NEMA 6P requirements and is ideal for stringent wash down environments, including those where high pressure steam or caustic chemicals are needed to meet regulatory requirements.

The HD25 features max. 440N Axial and Radial Bearings, -40° to +100°C temperature range and unique labyrinth double-sealed housing, and optional dual "redundant" outputs and is covered by a two-year warranty (one year for bearings). NorthStar's traditional quality, reliability and value are built-in to every HD25 encoder.

Also available in this series, is an Intrinsically Safe version certified to ATEX EEx ia IIB T4 when used with the appropriate IS Barrier. Accessory barriers can be supplied with the encoder.

APPLICATIONS

The HD25 Harsh-Duty Optical Encoder is ideal for machine applications with corrosive environments that demand heavy washdown protection. This compact, special-duty encoder is designed to exceed IP66/IP67 and NEMA 6 enclosure requirements with a PPR range through 5000. ATEX certification is also available for intrinsically safe applications.

- Converting Machinery
- Material Handling
- Packaging Equipment
- Pickling Equipment
- Processing Equipment

Industries

Chemical, Food & Beverage, Oil & Gas, Paper, Steel and any other where a precise encoder is needed to operate in harsh environments.

TECHNICAL DATA mechanical

Housing diameter	67.3 mm
Shaft diameter	3/8" / 10 mm (Solid shaft)
Flange (Mounting of housing)	Square flange
Protection class shaft input (EN 60529)	NEMA 4X or IP67

Incremental

TECHNICAL DATA mechanical (continued)

Protection class housing (EN 60529)	NEMA 4X or IP67
Shaft load axial / radial	max.: 440 N / 440 N
Max. speed	max. 6000 rpm
Bearing life	max. 5 x 10 ¹¹ revs.
Torque	< 1.76 Ncm
Vibration resistance (DIN EN 60068-2-6)	200 m/s ² (5 ... 2000 Hz)
Shock resistance (DIN EN 60068-2-27)	500 m/s ² (11 msec)
Operating temperature	-40 °C ... +100 °C ATEX: -40 °C ... +80 °C
Material shaft	Stainless Steel
Material housing	Hard anodized Aluminum, Nickel, Stainless Steel
Weight	approx. 430 g
Connection	MS, radial M12-connector, radial

TECHNICAL DATA electrical

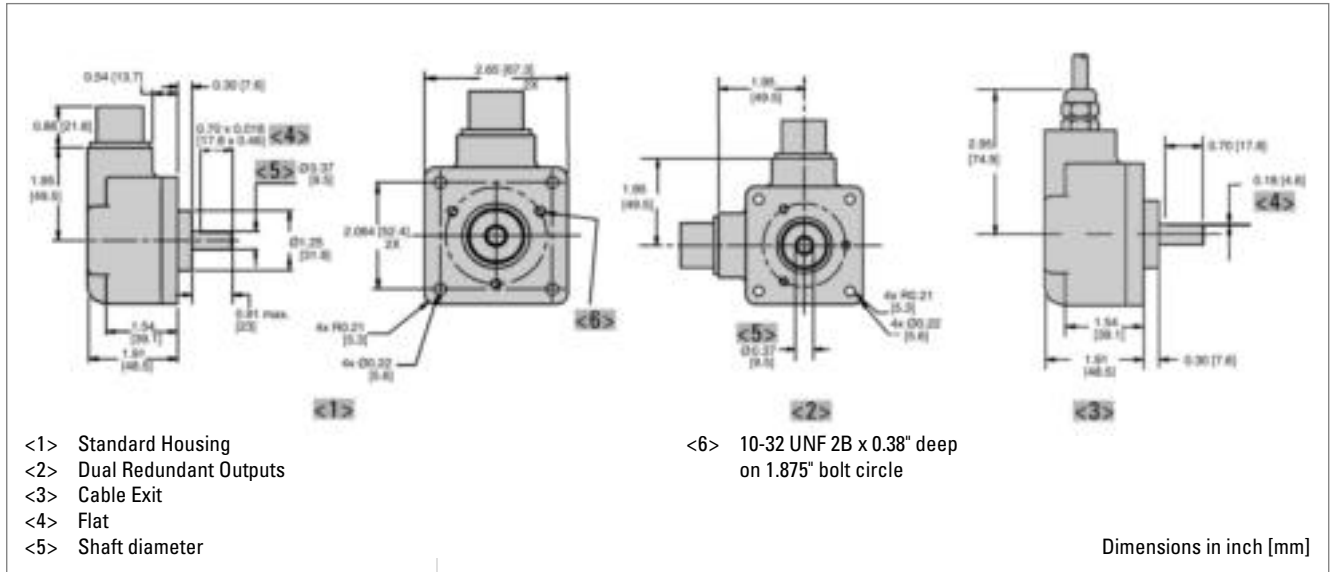
Supply voltage	DC 5 - 26 V ATEX: DC 5 V ATEX: DC 7 - 26 V
Max. current w/o load	50 mA
Code	Incremental, optical
Max. pulse frequency	125 kHz
Phasing	Incremental signals (A leads B): A leads B by 90° for ccw shaft rotation viewing the shaft clamp end of the encoder
Pulse shape	Square wave

ELECTRICAL CONNECTIONS 6, 7 & 10 Pin MS connector / Cable

Encoder Function	Cable 6 Pin Single Ended		Cable 7 Pin Single Ended		Cable 7 Pin Dif Line Drv w/o Idx		Cable 10 Pin Dif Line Drv w/ Idx		Cable Exit with Seal
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Wire Color
Sig. A	E	brown	A	brown	A	brown	A	brown	green
Sig. B	D	orange	B	orange	B	orange	B	orange	blue
Sig. Z	C	yellow	C	yellow	--	--	C	yellow	orange
Power +V	B	red	D	red	D	red	D	red	red
Com	A	black	F	black	F	black	F	black	black
Case	--	--	G	green	G	green	G	green	white
N/C	F	--	E	--	--	--	E	--	--
Sig. \bar{A}	--	--	--	--	C	brown/white	H	brown/white	violet
Sig. \bar{B}	--	--	--	--	E	orange/white	I	orange/white	brown
Sig. \bar{Z}	--	--	--	--	--	--	J	yellow/white	yellow

Incremental

DIMENSIONED DRAWINGS



Incremental

ORDERING INFORMATION

Type	Format	Number of pulses	Shaft Ø	Output	Connection ¹	Housing, Tether, Options ^{2,3,4,5}
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HD25	1 Uni-directional 2 Bi-directional 3 Bi-directional with Index	1 ... 5000	0 9.52 mm (3/8") 4 10 mm	0 5-26V in, 5-26V Open Collector out (7273) 2 5-26V in, 5-26V Push-Pull out 3 5-26V in, 5-26V Differential Line Driver out (7272) 4 5-26V in, 5V Differential Line Driver out (7272) 6 5-15V in, 5-15V Differential Line Driver out (4469) F 5-26V in, 5-26V Open Collector out (2222) G 5-26V in, 5-26V Open Collector out with 2.2 kΩ Pullups (2222)	1 6 pin connector 3 7 pin connector 5 10 pin connector D Sealed cable, 0.45 m F Sealed cable, 0.15 m G Sealed cable, 0.25 m H Sealed cable, 0.38 m	0 No Options 1 Nickel Finish Housing 2 Stainless Steel Housing 3 Redundant Outputs (Dual Connector Housing) 4 Nickel Finish Housing with Redundant Outputs 5 Stainless Steel Housing with Redundant Outputs A Same as "0" with ATEX Typ 1 B Same as "1" with ATEX Typ 1 C Same as "2" with ATEX Typ 1 D Same as "3" with ATEX Typ 1 E Same as "4" with ATEX Typ 1 F Same as "5" with ATEX Typ 1 G Same as "0" with ATEX Typ 2 H Same as "1" with ATEX Typ 2 I Same as "2" with ATEX Typ 2 J Same as "3" with ATEX Typ 2 K Same as "4" with ATEX Typ 2 L Same as "5" with ATEX Typ 2 M Same as "0" with ATEX Typ 3 N Same as "1" with ATEX Typ 3 O Same as "2" with ATEX Typ 3 P Same as "3" with ATEX Typ 3 Q Same as "4" with ATEX Typ 3 R Same as "5" with ATEX Typ 3

¹ Output Code "3", "4", "6" only available with Format Code "1", "2" and Connection Code "3" to "H" or with Format Code "3" and Connection Code "5" to "H"

² Available ATEX certified options:

ATEX Type 1: 5 V in, 5 V out

ATEX Type 2: 7-26V in, 7-26V out

ATEX Type 3: 7-26V in, 5V out

Note: When selecting ATEX models, ATEX voltages replace those shown in Output Code.

³ Housing/Tether/Options Code "G" to "L" only available with Output Code "0" to "3", "F" or "G"

⁴ Housing/Tether/Options Code "M" to "R" only available with Output Code "4"

⁵ Note for Housing with redundant outputs: Simultaneous use of redundant outputs may void ATEX certification. Consult us for details.

Incremental



- Single or Dual output
- ATEX Certification available for Intrinsically Safe application
- High Resolution Unbreakable Disk
- Industrial Duty Connector
- NEMA 4X, 6 / IP66, 67 Rated
- Nickel or Stainless Steel Housing available

HEAVY DUTY

NorthStar 

NUMBER OF PULSES

0001 / 0024 / 0035 / 0040 / 0050 / 0060 / 0100 / 0120 / 0192 / 0200 / 0240 / 0250 / 0256 / 0300 / 0360 / 0500 / 0512 / 0600 / 0625 / 0720 / 1000 / 1024 / 1200 / 1250 / 1440 / 2000 / 2048 / 2500 / 2540 / 3000 / 3600

GENERAL INFORMATION

HARSH-DUTY OPTICAL HUB SHAFT ENCODER

NorthStar's HSD25 Harsh-Duty Optical Hub Shaft Encoder accepts up to 0.75" diameter shafts and operates reliably from -40 to +100°C. The hard anodized finish encoder exceeds IP66/IP67 and NEMA 6 enclosure requirements.

This robust encoder is also available in Stainless Steel to meet NEMA 4x and 6P requirements and its sealed housing allows the Encoder to be operated when regulatory washdown and high pressure steam or caustic chemicals are required. Utilization of an advanced Opto ASIC with innovative packaging techniques enables the encoder to operate in high shock and vibration environments.

The HSD25 is also available in an Intrinsically Safe version certified to ATEX EEx ia IIB T4 when used with the appropriate IS barrier.

APPLICATIONS

The HSD25 Harsh-Duty Optical Encoder features simple installation on motor or machine hub shafts. It is often mounted on the back of motors where encoder feedback is needed in harsh environment applications. Available housing options make it ideal use in corrosive environments that demand heavy washdown protection. ATEX certification is also available for intrinsically safe applications.

- Converting Machinery
- Material Handling
- Packaging Equipment
- Oil Field Exploration
- Processing Equipment

INDUSTRIES

Chemical, Food & Beverage, Oil & Gas, Paper, Steel and any other where a precise encoder is needed to operate in harsh environments.

TECHNICAL DATA mechanical

Housing diameter	58.93 mm
Shaft diameter	3/8" / 10 mm / 12.7 mm / 5/8" / 3/4" (Hubshaft)
Flange (Mounting of housing)	Tether
Mounting of shaft	Front clamping ring
Protection class shaft input (EN 60529)	NEMA 4X or NEMA 6 IP66 or IP67

Incremental

TECHNICAL DATA mechanical (continued)

Protection class housing (EN 60529)	NEMA 4X or NEMA 6 IP66 or IP67
Bearing life	max. 5 x 10 ¹¹ revs.
Torque	< 1.76 Ncm
Vibration resistance (DIN EN 60068-2-6)	200 m/s ² (5 ... 2000 Hz)
Shock resistance (DIN EN 60068-2-27)	500 m/s ² (11 sec)
Operating temperature	-40 °C ... +100 °C ATEX: -40 °C ... +80 °C
Material shaft	Stainless Steel
Material housing	Hard anodized Aluminum, Nickel, Stainless Steel
Weight	approx. 600 g
Connection	MS, radial M12-connector, radial Cable, radial

TECHNICAL DATA electrical

Supply voltage	DC 5 - 26 V ATEX: DC 5 V ATEX: DC 7 - 26 V
Max. current w/o load	50 mA
Code	Incremental, optical
Max. pulse frequency	125 kHz
Phasing	Incremental signals (A leads B): A leads B by 90° for ccw shaft rotation viewing the shaft clamp end of the encoder
Pulse shape	Square wave

ELECTRICAL CONNECTIONS 6, 7 & 10 Pin MS connector / Cable

Encoder Function	Cable 6 Pin Single Ended		Cable 7 Pin Single Ended		Cable 7 Pin Dif Line Drv w/o Idx		Cable 10 Pin Dif Line Drv w/ Idx		Cable 12 Pin CCW		Cable Exit with Seal
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Wire Color
Sig. A	E	brown	A	brown	A	brown	A	brown	5	brown	green
Sig. B	D	orange	B	orange	B	orange	B	orange	8	orange	blue
Sig. Z	C	yellow	C	yellow	--	--	C	yellow	3	yellow	orange
Power +V	B	red	D	red	D	red	D	red	12	red	red
Com	A	black	F	black	F	black	F	black	10	black	black
Case	--	--	G	green	G	green	G	green	9	--	white
N/C	F	--	E	--	--	--	E	--	7	--	--
Sig. \bar{A}	--	--	--	--	C	brown/white	H	brown/white	6	brown/white	violet
Sig. \bar{B}	--	--	--	--	E	orange/white	I	orange/white	1	orange/white	brown
Sig. \bar{Z}	--	--	--	--	--	--	J	yellow/white	4	yellow/white	yellow
0 Volt Sense	--	--	--	--	--	--	--	--	2	green	--
5 Volt Sense	--	--	--	--	--	--	--	--	11	black/white	--

Incremental

ELECTRICAL CONNECTIONS 5 & 8 Pin M12 Accessory Cable

Encoder Function	Cable 5 Pin Single Ended		Cable 8 Pin Single Ended		Cable 8 Pin Differential	
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color
Sig. A	4	black	1	brown	1	brown
Sig. B	2	white	4	orange	4	orange
Sig. Z	5	grey	6	yellow	6	yellow
Power +V	1	brown	2	red	2	red
Com	3	blue	7	black	7	black
Sig. \bar{A}					3	brown/white
Sig. \bar{B}					5	orange/white
Sig. \bar{Z}					8	yellow/white

DIMENSIONED DRAWINGS

<1> Standard Housing
 <2> 8-32 UNC x .28 deep on 2.000 bolt circl 4 places 90° apart
 <3> Bore diameter
 <4> Hub shaft cavity maximum depth
 <5> Dual Redundant Outputs
 <6> Cable Exit
 <7> 4-40 x .25 deep 4 places - 90° apart
 <8> 4-40 x .25 deep 90° apart
 <9> Slotted Tether
 □ Single Point Tether
 □ 0.172 [43.7] ON Ø 2.00 [50.8] B.C.

Dimensions in inch [mm]

Incremental

ORDERING INFORMATION

Type	Number of pulses	Shaft Ø	Format ^{2 4}	Output	Connection	Safety ^{1 3}	Housing, Tether, Options
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HSD25	1 ... 3600	4 9.52 mm (3/8") 5 10 mm 7 12.7 mm (1/2") 8 5/8" C 3/4"	0 single ended, unidirectional (A) 1 single ended, bidirectional (AB) 2 single ended, bidirectional with index (ABZ) 3 differential, bidirectional (A→A B→B) 4 differential, bidirectional with index (A→A B→B Z→Z) 5 Dual isolated differential, bidirectional w/index (A→A B→B Z→Z)	0 5-26V in, 5-26V Open Collector out (7273) 2 5-26V in, 5-26V Push-Pull out 3 5-26V in, 5-26V Differential Line Driver out (7272) 4 5-26V in, 5V Differential Line Driver out (7272) F 5-26V in, 5-26V Open Collector out (2222) G 5-26V in, 5-26V Open Collector out with 2.2 kΩ Pullups (2222)	0 6 pin connector 1 7 pin connector 2 10 pin connector 3 12 pin connector 5 6 pin connector plus mating connector 6 7 pin connector plus mating connector 7 10 pin connector plus mating connector 8 12 pin connector plus mating connector A Cable 0,5 m B Cable 1 m C Cable 2 m D Cable 3m F 0.3 m cable with 10 pin connector plus mating connector G Cable, 0.3 m H M12 connector, 5 pole J M12 connector, 8 pole	0 No ATEX 1 ATEX Type 1 Option 2 ATEX Type 2 Option 3 ATEX Type 3 Option	0 Cast Aluminum Housing, Slotted Tether 1 Nickel Housing, slotted tether 2 Stainless Housing, slotted tether 3 Redundant Outputs (Dual Connector Housing), slotted tether 4 Nickel Housing, Redundant Outputs, slotted tether 5 Stainless Housing, Redundant Outputs, slotted-tether C Cast Aluminum Housing, Single-Point Tether Included (NEMA 4.5" C-face) D Nickel Housing, single-point tether E Stainless Housing, single-point tether F Redundant Outputs (Dual Connector Housing), single-point tether G Nickel Housing, Redundant Outputs, single-point tether H Stainless Housing, Redundant Outputs, single-point tether 6 Same as "0" but no tether 7 Same as "1" but no tether 8 Same as "2" but no tether 9 Same as "3" but no tether A Same as "4" but no tether B Same as "5" but no tether

¹ ATEX Type 1: 5 V in, 5 V out

ATEX Type 2: 7-26V in, 7-26V out

ATEX Type 3: 7-26V in, 5V out

² Format Code "3" only available with Output Code "3" or "4" resp. Housing/ Tether Code "0", "1", "2" or "6", "7", "8"

³ Safety Code "2" only available with Output Code "4"

⁴ Format Code "4" and Code "5" only available with Output Code "3" or "4" resp. Connection Code "A" to "G" and Housing/ Tether Code "0", "1", "2" or "6", "7", "8"

Incremental



- Hollow Shaft design eliminates mounting bracket, flexible shaft coupling, and installation labor
- Bore is electrically and thermally insulated
- Single or Dual output - Optional high current line driver
- Choice of Stamped Metal or Swivel Rod Tether
- High Resolution Unbreakable Disk
- Industrial Duty Latching Connector
- NEMA 4 / IP65 Rated

HEAVY DUTY

NorthStar CE

NUMBER OF PULSES

0001 / 0002 / 0003 / 0005 / 0006 / 0007 / 0010 / 0012 / 0025 / 0050 / 0060 / 0064 / 0100 / 0120 / 0128 / 0180 / 0200 / 0240 / 0250 / 0300 / 0360 / 0400 / 0500 / 0512 / 0600 / 0720 / 0800 / 0900 / 1000 / 1024 / 1200 / 1270 / 1500 / 1800 / 2000 / 2048 / 2400 / 2500

GENERAL INFORMATION

HEAVY DUTY SEALED HOLLOWSHAFT ENCODER

The NorthStar brand Series HSD35 Sealed Hollowshaft encoder is designed for easy installation on motor or machine shafts. Its hollowshaft design eliminates the need for a flexible shaft coupling, mounting bracket, flower pot, or flange adapter. This not only reduces the installation depth, but also lowers total cost.

The Series HSD35 Sealed Hollowshaft is equipped with an unbreakable disk that resists contamination and meets the demands of the most severe shock and vibration generating processes. Its floating shaft mount and spring tether eliminate bearing loads and flexible shaft couplings to eliminate wear and maintenance.

Series HSD35 has complete electrical protection from overvoltage, reverse voltage, and output short circuits. In addition, the Series HSD35 is not only electrically & thermally isolated, but also environmentally sealed with shaft seals at both ends.

APPLICATIONS

The HSD35 sealed hollow shaft encoder is ideal for motor and machine applications at resolutions to 2500 PPR. Choice of stamped metal or swivel rod tether provide flexible mounting for a wide variety of installations

- Vector Motor and Drive Feedback
- Converting Machinery
- Packaging Equipment
- Paper Processing

INDUSTRIES

Manufacturing, Assembly, Material Handling and any other where a precise, reliable feedback signal is required.

TECHNICAL DATA mechanical

Housing diameter	90.2 mm
Shaft diameter	6 mm / 8 mm / 10 mm / 12 mm / 15 mm / 25 mm / 28 mm / 31.75 mm (Through hollow shaft)
Flange (Mounting of housing)	Tether, Swivel rod
Mounting of shaft	Front clamping ring
Protection class shaft input (EN 60529)	IP65 or NEMA 4

Incremental

TECHNICAL DATA mechanical (continued)

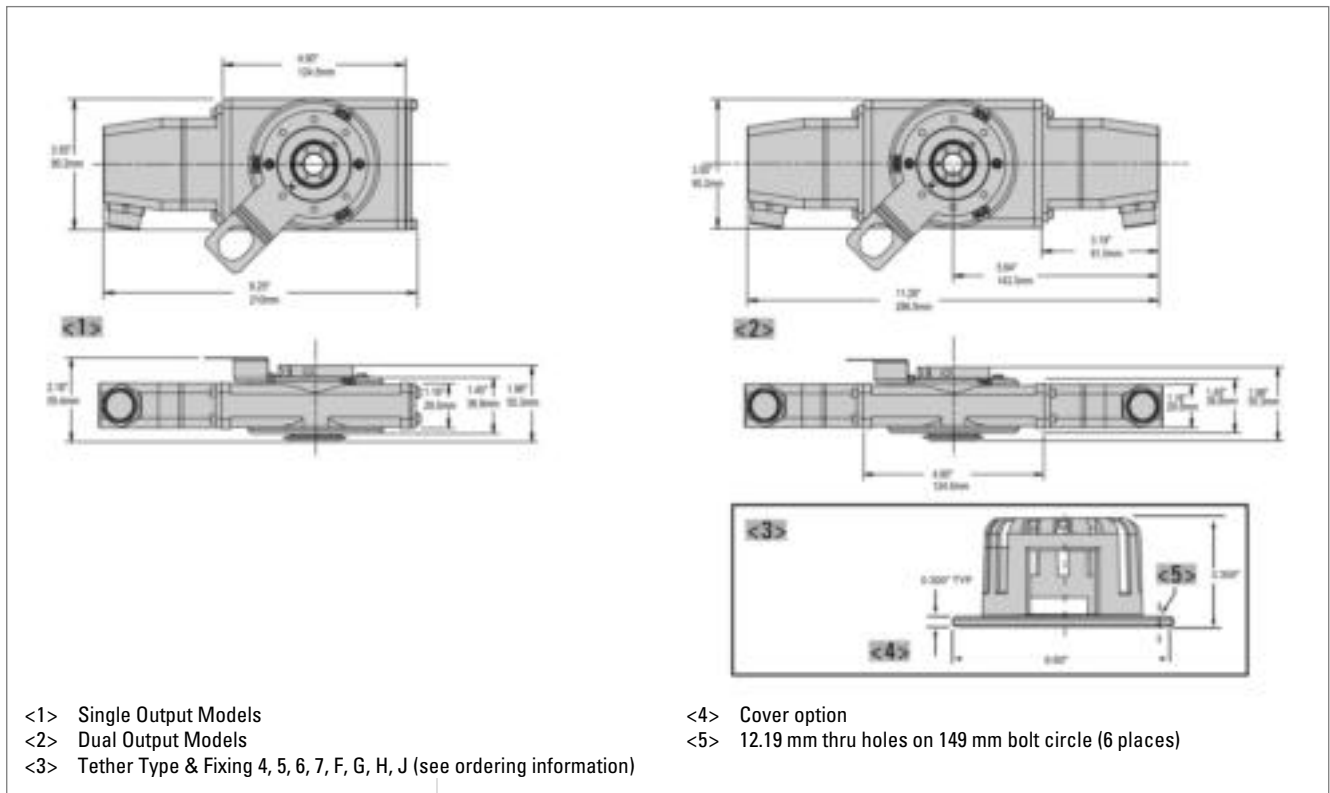
Protection class housing (EN 60529)	IP65 or NEMA 4
Axial endplay of mounting shaft (hubshaft)	± 1.27 mm
Radial runout of mating shaft (hubshaft)	± 0.63 mm
Max. speed	max. 3600 rpm
Bearing life	80 000 hours at 3600 rpm; 128 000 hours at 1800 rpm
Torque	3.53 Ncm (max.)
Vibration resistance (DIN EN 60068-2-6)	200 m/s ² (5 ... 2000 Hz)
Shock resistance (DIN EN 60068-2-27)	500 m/s ² (11 ms)
Operating temperature	-40 °C ... +70 °C Option: 0 °C ... +100 °C
Storage temperature	-40 °C ... +90 °C
Weight	max. 870 g
Connection	10 pin connector

TECHNICAL DATA electrical

Supply voltage	DC 4,5 - 26 V
Max. current w/o load	100 mA
Code	Incremental, optical
Max. pulse frequency	100 kHz
Phasing	Incremental signals (A leads B): A leads B by 90° for ccw shaft rotation viewing the shaft clamp end of the encoder
Pulse shape	Square wave

Incremental

DIMENSIONED DRAWINGS



Incremental

ORDERING INFORMATION

Type	Number of pulses	Shaft Ø	Tether Type & Fixing ^{1,2}	Format ³	Output	Seal	Housing, Tether, Options
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HSD35	1 ... 2500	0 6 mm 1 1/4" 2 5/16" 3 8 mm 4 9.52 mm (3/8") 5 10 mm 6 12 mm 7 12.7 mm (1/2") 8 5/8" 9 15 mm A 16 mm B 19 mm C 3/4" D 20 mm E 7/8" F 24 mm G 1" H 1-1/8" J 14 mm K 18 mm M 25 mm N 28 mm P 1-1/4"	A Standard Tether C 180C Tether E 180C Tether with protective guard B 56C Tether D 56C Tether with protective guard 0 None - customer supplied H Same as 'A' w/ dual cover kit F Same as 'A', w/ cover kit J Same as 'B' w/ dual cover kit G Same as 'B', w/ cover kit	0 single ended, unidirectional (A) 1 single ended, bidirectional (AB) 2 single ended, bidirectional with index (ABZ) 3 differential, bidirectional (A-A B-B) 4 differential, bidirectional with index (A-A B-B Z-Z) 5 Dual isolated differential, bidirectional w/index (A-A B-B Z-Z)	0 5 - 26 V in, 5 - 26 V Open Collector out 0 5-26V in, 5-26V Open Collector out (7273) 2 5 - 26 V in, 5 - 26 V Push pull out 1 5-26V in, 5-26V open collector out with 2.2kΩ pullups 2 5-26V in, 5-26V Push-Pull out 3 5 - 26 V in, 5 - 26 V Differential Line Driver out 4 5-26V in, 5V Differential Line Driver out A same as '3' but up to +100°C B same as '4' but up to +100°C	1 Rugged Shaft Seals 0 Standard Shaft Seals	Blank None D LED Output Indicator

¹ Tether Type & Fixing Code "F" or Code "G" only available with Format Code "0" to "4"

² Housing Tether & Fixing Code "H" or Code "J" only available with Format Code "5"

³ Format Code "3" to Code "5" only available with Output Code "3" to Code "6" and Code "A" resp. "B"

Incremental



- Single or Dual Output
- Double-Sealed Housing
- ATEX Certification for Intrinsically Safe Applications
- High Resolution Unbreakable Disk
- Electrically and Thermally Isolated
- Industrial Duty Connector
- NEMA 4X, 6 / IP66, 67 Rated
- Rugged Cast-Aluminum Housing
- Stainless Steel Housing Available

HEAVY DUTY

NorthStar 

NUMBER OF PULSES

0015 / 0032 / 0100 / 0200 / 0240 / 0250 / 0500 / 0512 / 0600 / 1000 / 1024 / 1200 / 2000 / 2048 / 2500 / 4000 / 5000

GENERAL INFORMATION

EXTREME HEAVY DUTY HOLLOWSHAFT ENCODER

NorthStar's HSD37 Extreme Duty Industrial Hollowshaft Encoder accepts up to 1" diameter shafts and operates reliably from -40 to +100°C. Its Hard Anodized finish enclosure exceeds IP66/IP67 and NEMA 6 enclosure requirements.

This robust encoder features a double-sealed housing that allows application where regulatory washdown or caustic chemicals are present. Utilization of an advanced Opto ASIC with innovative packaging techniques enables the encoder to operate in high shock and vibration environments.

It is also available in an Intrinsically Safe version, certified to ATEX EEx ia IIB T4, when used with the appropriate IS Barrier.

APPLICATIONS

The HSD37 extreme duty encoder features simple installation on motor or machine shafts. It is often mounted on the back of motors where encoder feedback is needed in harsh environment applications. It is ideal for use in environments that demand heavy washdown protection.

- Converting Machinery
- Material Handling
- Packaging Equipment
- Processing Equipment

Industries

Chemical, Food & Beverage, Oil & Gas, Paper, Steel and any other where a precise encoder is needed to operate in harsh environments.

TECHNICAL DATA mechanical

Housing diameter	95.25 mm
Shaft diameter	12 mm / 1/2" / 15 mm / 5/8" / 16 mm / 3/4" / 0.875" (Through hollow shaft)
Flange (Mounting of housing)	Tether
Mounting of shaft	Front clamping ring
Protection class shaft input (EN 60529)	NEMA 4X or NEMA 6 IP66 or IP67

Incremental

TECHNICAL DATA mechanical (continued)

Protection class housing (EN 60529)	NEMA 4X or NEMA 6 IP66 or IP67
Bearing life	31,75 mm max. 5 x 10 ¹¹ revs.
Torque	2.8 Ncm
Vibration resistance (DIN EN 60068-2-6)	200 m/s ² (5 ... 2000 Hz)
Shock resistance (DIN EN 60068-2-27)	500 m/s ² (11 msec)
Operating temperature	-40 °C ... +100 °C ATEX: -40 °C ... +80 °C
Material shaft	Aluminum
Material housing	Hard anodized Aluminum, Stainless Steel
Weight	approx. 1000 g
Connection	MS, radial Cable, radial with M12 connector

TECHNICAL DATA electrical

Supply voltage	DC 5 - 26 V
Max. current w/o load	50 mA
Code	Incremental, optical
Max. pulse frequency	125 kHz
Phasing	Incremental signals (A leads B): A leads B by 90° for ccw shaft rotation viewing the shaft clamp end of the encoder
Pulse shape	Square wave

ELECTRICAL CONNECTIONS 6, 7 & 10 Pin MS connector / Cable

Encoder Function	Cable 6 Pin Single Ended		Cable 7 Pin Single Ended		Cable 7 Pin Dif Line Drv w/o Idx		Cable 10 Pin Dif Line Drv w/ Idx		Cable Exit with Seal
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Wire Color
Sig. A	E	brown	A	brown	A	brown	A	brown	green
Sig. B	D	orange	B	orange	B	orange	B	orange	blue
Sig. Z	C	yellow	C	yellow	--	--	C	yellow	orange
Power +V	B	red	D	red	D	red	D	red	red
Com	A	black	F	black	F	black	F	black	black
Case	--	--	G	green	G	green	G	green	white
N/C	F	--	E	--	--	--	E	--	--
Sig. \bar{A}	--	--	--	--	C	brown/white	H	brown/white	violet
Sig. \bar{B}	--	--	--	--	E	orange/white	I	orange/white	brown
Sig. \bar{Z}	--	--	--	--	--	--	J	yellow/white	yellow

Incremental

ELECTRICAL CONNECTIONS 5 & 8 Pin M12 Accessory Cable

Encoder Function	Cable 5 Pin Single Ended		Cable 8 Pin Single Ended		Cable 8 Pin Differential	
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color
Sig. A	4	black	1	brown	1	brown
Sig. B	2	white	4	orange	4	orange
Sig. Z	5	grey	6	yellow	6	yellow
Power +V	1	brown	2	red	2	red
Com	3	blue	7	black	7	black
Sig. \bar{A}					3	brown/white
Sig. \bar{B}					5	orange/white
Sig. \bar{Z}					8	yellow/white

DIMENSIONED DRAWINGS

<1> 10-32 UNF x .38 deep on a \varnothing 3.000 bolt circle
 <2> 10-32 clamp screw
 <3> on 3.00 [76.20] bolt circle
 <4> 10-32 UNF x .38 deep on a \varnothing 3.000 bolt circle
 <5> Redundant Version

<6> Pigtail with MS Connector (K Option)
 <7> Single Point Tether
 <8> Slotted Tether

Dimensions in inch [mm]

Incremental

ORDERING INFORMATION

Type	Number of pulses	Shaft Ø	Format 4,5	Output	Connection 6	Safety 1,2,3	Housing, Tether, Options
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HSD37	15 ... 5000	6 12 mm 7 12.7 mm (1/2") 8 5/8" 9 15 mm A 16 mm C 3/4" E 7/8" G 1"	0 single ended, unidirectional (A) 1 single ended, bidirectional (AB) 2 single ended, bidirectional with index (ABZ) 3 differential, bidirectional (A→A B→B) 4 differential, bidirectional with index (A→A B→B Z→Z)	0 5-26V in, 5-26V Open Collector out (7273) 2 5-26V in, 5-26V Push-Pull out 3 5-26V in, 5-26V Differential Line Driver out (7272) 4 5-26V in, 5V Differential Line Driver out (7272)	0 6 pin connector 1 7 pin connector 2 10 pin connector 5 6 pin connector plus mating connector 6 7 pin connector plus mating connector 7 10 pin connector plus mating connector A Cable, 0.5 m H M12 connector, 5 pole J M12 connector, 8 pole K 0.5 m cable with 10 pin in-line connector L Cable, 0.91 m M Cable, 1.52 m N Cable, 3.05 m	0 No ATEX 1 ATEX Type 1 Option 2 ATEX Type 2 Option 3 ATEX Type 3 Option	0 Cast Aluminum Housing, Slotted Tether 2 Stainless Housing, slotted tether 3 Redundant Outputs (Dual Connector Housing), slotted tether 5 Stainless Housing, Redundant Outputs, slotted-tether C Cast Aluminum Housing, Single-Point Tether Included (NEMA 4.5" C-face) E Stainless Housing, single-point tether F Redundant Outputs (Dual Connector Housing), single-point tether H Stainless Housing, Redundant Outputs, single-point tether 6 Same as "0" but no tether 8 Same as "2" but no tether 9 Same as "3" but no tether B Same as "5" but no tether

¹ ATEX Type 1: 5 V in, 5 V out

ATEX Type 2: 7-26V in, 7-26V out

ATEX Type 3: 7-26V in, 5V out

² Safety Code "2" not available in combination with Output Code "4"

³ Safety Code "3" only available with Output Code "4"

⁴ Format Code "3" only available with Code "3" or "4"

⁵ Format Code "4" only available with Output Code "3" or "4" resp. Connection Code "2", "7", "J", "K", "L", "M", "N" or "A"

⁶ Connection Code "H" only available with Code "0" or "2"

Incremental



- Double-Sealed Housing
- High Resolution Unbreakable Disk
- Electrically and Thermally Isolated
- Industrial Duty Connector
- NEMA 4X, 6 / IP66 or IP67 Rated
- Rugged Cast-Aluminum Housing

HEAVY DUTY

NorthStar 

NUMBER OF PULSES

0015 / 0032 / 0100 / 0200 / 0240 / 0250 / 0500 / 0512 / 0600 / 1000 / 1024 / 1200 / 2000 / 2048 / 2500 / 4000 / 5000

GENERAL INFORMATION

EXTREME HEAVY DUTY HOLLOWSHAFT ENCODER

NorthStar's HSD38 Extreme Duty Industrial Hollowshaft Encoder accepts up to 1" (25,4 mm) diameter shafts and operates reliably from -40 to +100°C. Its Hard Anodized finish enclosure exceeds IP66/IP67 and NEMA 6 enclosure requirements.

This robust encoder features a double-sealed housing that allows application where regulatory washdown and high pressure steam or caustic chemicals are present. Utilization of an advanced Opto ASIC with innovative packaging techniques enables the encoder to operate in high shock and vibration environments.

APPLICATIONS

The HSD38 extreme duty encoder features simple installation on motor or machine shafts. It is often mounted on the back of motors where encoder feedback is needed in harsh environment applications. It is ideal for use in environments that demand heavy washdown protection.

- Converting Machinery
- Material Handling
- Packaging Equipment
- Processing Equipment

Industries

Chemical, Food & Beverage, Paper, Steel and any other where a precise encoder is needed to operate in harsh environments.

TECHNICAL DATA mechanical

Housing diameter	96.52 mm
Shaft diameter	12 mm / 15 mm / 1/2" / 5/8" / 16 mm / 3/4" / 0.875" (Hubshaft)
Flange (Mounting of housing)	Tether
Mounting of shaft	Front clamping ring
Protection class shaft input (EN 60529)	NEMA 4X or NEMA 6 IP66 or IP67
Protection class housing (EN 60529)	NEMA 4X or NEMA 6 IP66 or IP67
Bearing life	max. 5 x 10 ¹¹ revs.
Torque	< 2.8 Ncm

Incremental

TECHNICAL DATA mechanical (continued)

Vibration resistance (DIN EN 60068-2-6)	200 m/s ² (5 ... 2000 Hz)
Shock resistance (DIN EN 60068-2-27)	500 m/s ² (11 msec)
Operating temperature	-40 °C ... +100 °C
Storage temperature	-40 °C ... +100 °C
Material shaft	Aluminum
Material housing	Hard anodized Aluminum
Weight	approx. 800 g
Connection	MS, radial Cable, radial with M12 connector

TECHNICAL DATA electrical

Supply voltage	DC 5 - 26 V
Max. current w/o load	50 mA
Code	Incremental, optical
Max. pulse frequency	125 kHz
Phasing	Incremental signals (A leads B): A leads B by 90° for ccw shaft rotation viewing the shaft clamp end of the encoder
Pulse shape	Square wave

ELECTRICAL CONNECTIONS 6, 7 & 10 Pin MS connector / Cable

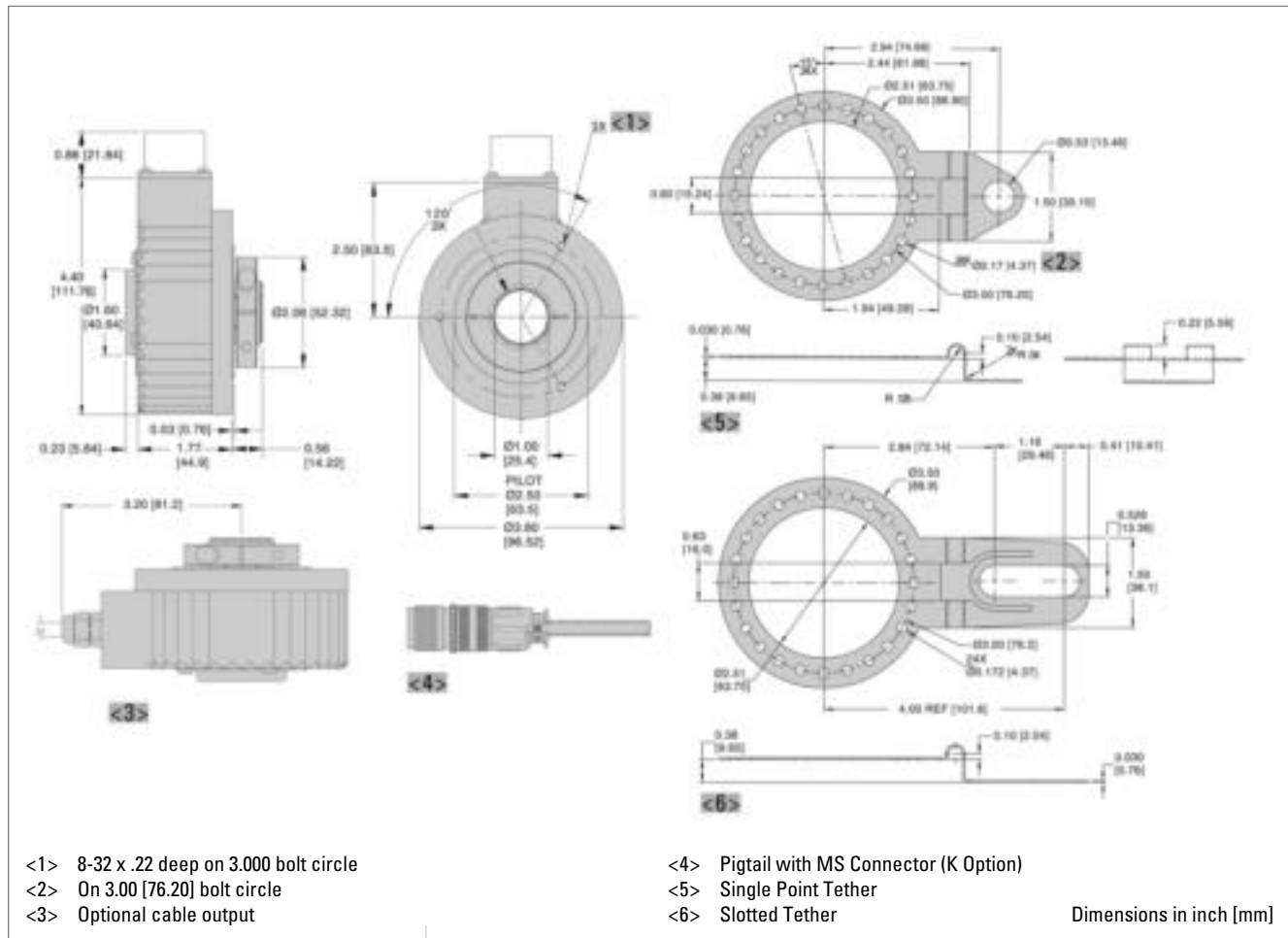
Encoder Function	Cable 6 Pin Single Ended		Cable 7 Pin Single Ended		Cable 7 Pin Dif Line Drv w/o Idx		Cable 10 Pin Dif Line Drv w/ Idx		Cable Exit with Seal
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Wire Color
Sig. A	E	brown	A	brown	A	brown	A	brown	green
Sig. B	D	orange	B	orange	B	orange	B	orange	blue
Sig. Z	C	yellow	C	yellow	--	--	C	yellow	orange
Power +V	B	red	D	red	D	red	D	red	red
Com	A	black	F	black	F	black	F	black	black
Case	--	--	G	green	G	green	G	green	white
N/C	F	--	E	--	--	--	E	--	--
Sig \bar{A}	--	--	--	--	C	brown/white	H	brown/white	violet
Sig \bar{B}	--	--	--	--	E	orange/white	I	orange/white	brown
Sig \bar{Z}	--	--	--	--	--	--	J	yellow/white	yellow

Incremental

ELECTRICAL CONNECTIONS 5 & 8 Pin M12 Accessory Cable

Encoder Function	Cable 5 Pin Single Ended		Cable 8 Pin Single Ended		Cable 8 Pin Differential	
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color
Sig. A	4	black	1	brown	1	brown
Sig. B	2	white	4	orange	4	orange
Sig. Z	5	grey	6	yellow	6	yellow
Power +V	1	brown	2	red	2	red
Com	3	blue	7	black	7	black
Sig. \bar{A}					3	brown/white
Sig. \bar{B}					5	orange/white
Sig. \bar{Z}					8	yellow/white

DIMENSIONED DRAWINGS



Incremental

ORDERING INFORMATION

Type	Number of pulses	Shaft Ø	Format	Output	Connection	Safety	Housing, Tether, Options
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
HSD38	15 ... 5000	6 12 mm 7 12.7 mm (1/2") 8 5/8" 9 15 mm A 16 mm C 3/4" E 7/8" G 1"	0 single ended, unidirectional (A) 1 single ended, bidirectional (AB) 2 single ended, bidirectional with index (ABZ) 3 differential, bidirectional (A↔A B↔B) 4 differential, bidirectional with index (A↔A B↔B Z↔Z)	0 5-26V in, 5-26V Open Collector out (7273) 2 5-26V in, 5-26V Push-Pull out 3 5-26V in, 5-26V Differential Line Driver out (7272) 4 5-26V in, 5V Differential Line Driver out (7272)	0 6 pin connector 1 7 pin connector 2 10 pin connector 5 6 pin connector plus mating connector 6 7 pin connector plus mating connector 7 10 pin connector plus mating connector A Cable 0,5 m G Cable, 0.3 m H M12 connector, 5 pole J M12 connector, 8 pole K 0.5 m cable with 10 pin in-line connector	0 Reserved for Future Options	0 Cast Aluminum Housing, Slotted Tether C Cast Aluminum Housing, Single-Point Tether Included (NEMA 4.5" C-face) 6 Cast Aluminum Housing, No Tether

Incremental



- Single or Dual output - NAMUR available
- Well suited for DrawWorks/ oil field application
- ATEX Certification available for Intrinsically Safe application
- High Resolution Unbreakable Disk
- Industrial Duty Connector
- NEMA 4X / IP67 Rated
- Nickel or Stainless Steel Housing available
- Option: removable shaft with thread
- Option: redundant output

HEAVY DUTY

NorthStar CE

NUMBER OF PULSES

0015 / 0032 / 0100 / 0200 / 0240 / 0250 / 0500 / 0512 / 0600 / 1000 / 1024 / 1200 / 2000 / 2048 / 4000 / 5000

GENERAL INFORMATION

HARSH- DUTY OPTICAL ENCODER - DRAWWORKS

The DWD38 Harsh-Duty Optical Encoder is an Industrial Hollow Shaft design that operates reliably from -40 to +100°C. Its Hard Anodized finish exceeds IP66/IP67 and NEMA 6 enclosure requirements.

The DWD38 is a preferred choice as a DrawWorks encoder by the Oil Field industry and is also commonly used in high shock and vibration environments such as Food Processing, Material Handling and Packaging Equipment applications.

Extremely robust, the DWD38 encoder is also available in Stainless Steel to meet NEMA 4x and 6P requirements. A unique labyrinth double-sealed housing allows operation when regulatory washdown and high pressure steam or caustic chemicals are required.

It is also available in an Intrinsically Safe version, certified to ATEX EEx ia IIB T4, when used with the appropriate IS Barrier.

APPLICATIONS

The DWD38 Harsh-Duty Optical Encoder is ideal for DrawWorks application and corrosive environments that demand heavy washdown protection. This compact, special-duty encoder is designed to exceed IP66/IP67 and NEMA 6 enclosure requirements with a PPR range through 5000. ATEX certification is also available for intrinsically safe applications.

- DrawWorks and other Oilfield
- Converting Machinery
- Material Handling
- Packaging Equipment
- Pickling Equipment
- Processing Equipment

INDUSTRIES

Chemical, Food & Beverage, Oil & Gas, Paper, Steel and any other where a precise encoder is needed to operate in very harsh environments.

TECHNICAL DATA mechanical

Housing diameter	3.75"
Flange (Mounting of housing)	Synchro flange

Incremental

TECHNICAL DATA mechanical (continued)

Protection class shaft input (EN 60529)	IP67 or NEMA 6
Protection class housing (EN 60529)	IP67 or NEMA 6
Shaft load axial / radial	Max.: 100 N / 100 N
Bearing life	max. 5 x 10 ¹¹ revs.
Vibration resistance (DIN EN 60068-2-6)	200 m/s ² (5 to 2000 Hz)
Shock resistance (DIN EN 60068-2-27)	500 m/s ² (11 msec)
Operating temperature	-40 °C ... +100 °C ATEX: -40 °C ... +80 °C
Storage temperature	-40 °C ... +100 °C
Material shaft	Stainless Steel
Material housing	Hard anodized Aluminum, Stainless Steel
Connection	MS, radial Cable, radial

TECHNICAL DATA electrical

Supply voltage	DC 5 - 26 V ATEX: DC 5 V ATEX: DC 5 - 26 V
Max. current w/o load	50 mA
Code	Incremental, optical
Max. pulse frequency	125 kHz
Standard output versions	RS422: A, B, N, \bar{A} , \bar{B} , \bar{N} NPN-O.C.: A, B, N Push-pull: A, B, N

ELECTRICAL CONNECTIONS 6, 7 & 10 Pin MS connector / Cable

Encoder Function	Cable 6 Pin Single Ended		Cable 7 Pin Single Ended		Cable 7 Pin Dif Line Drv w/o Idx		Cable 10 Pin Dif Line Drv w/ Idx		Cable Exit with Seal
	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Pin	Wire Color	Wire Color
Sig. A	E	brown	A	brown	A	brown	A	brown	green
Sig. B	D	orange	B	orange	B	orange	B	orange	blue
Sig. Z	C	yellow	C	yellow	--	--	C	yellow	orange
Power +V	B	red	D	red	D	red	D	red	red
Com	A	black	F	black	F	black	F	black	black
Case	--	--	G	green	G	green	G	green	white
N/C	F	--	E	--	--	--	E	--	--
Sig \bar{A}	--	--	--	--	C	brown/white	H	brown/white	violet
Sig \bar{B}	--	--	--	--	E	orange/white	I	orange/white	brown
Sig \bar{Z}	--	--	--	--	--	--	J	yellow/white	yellow

Incremental

DIMENSIONED DRAWINGS

<1> <2> <3>

<1> With Convertable Shaft
 <2> With Non-Convertible Shaft
 <3> Redundant Version
 <4> 10-32 UNF x .38 deep on Ø 3.000 bolt circle
 <5> 5/8-18 UNF male thread

<6> 1"-14 UNS female internal thread O-ring sealed
 <7> 1"-14 UNS male thread
 <8> Removable hollow shaft extension included with encoder

Dimensions in inch [mm]

Incremental

ORDERING INFORMATION

Type	Format	Number of pulses	Shaft Ø	Output ^{1,2}	Connection	Housing, Tether, Options ^{3,4,5,6}
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
DWD38	1 Uni-directional 2 Bi-directional 3 Bi-directional with Index	15 ... 5000	0 1"-14 UNS x 5/8" - 18 UNF Threaded Shaft 1 1"-14 UNS Threaded Shaft	0 5-26V in, 5-26V Open Collector out (7273) 2 5-26V in, 5-26V Push-Pull out 3 5-26V in, 5-26V Differential Line Driver out (7272) 4 5-26V in, 5V Differential Line Driver out (7272) F 5-26V in, 5-26V Open Collector out (2222) G 5-26V in, 5-26V Open Collector out with 2.2 kΩ Pullups (2222) N NAMUR 15 mA Maximum	1 6 pin connector 3 7 pin connector 5 10 pin connector D Sealed cable, 0.45 m F Sealed cable, 0.15 m G Sealed cable, 0.25 m H Sealed cable, 0.38 m	0 No Options 1 Nickel Finish Housing 2 Stainless Steel Housing 3 Redundant Outputs (Dual Connector Housing) 4 Nickel Finish Housing with Redundant Outputs 5 Stainless Steel Housing with Redundant Outputs A Same as "0" with ATEX Typ 1 B Same as "1" with ATEX Typ 1 C Same as "2" with ATEX Typ 1 D Same as "3" with ATEX Typ 1 E Same as "4" with ATEX Typ 1 F Same as "5" with ATEX Typ 1 G Same as "0" with ATEX Typ 2 H Same as "1" with ATEX Typ 2 I Same as "2" with ATEX Typ 2 J Same as "3" with ATEX Typ 2 K Same as "4" with ATEX Typ 2 L Same as "5" with ATEX Typ 2 M Same as "0" with ATEX Typ 3 N Same as "1" with ATEX Typ 3 O Same as "2" with ATEX Typ 3 P Same as "3" with ATEX Typ 3 Q Same as "4" with ATEX Typ 3 R Same as "5" with ATEX Typ 3

¹ Output Code "3", "4" only available with Format Code "1", "2" and Connection Code "3" to "H" or with Format Code "3" and Connection Code "5" to "H"

² Output Code "N" only available with "Number of pulses" Code "0015"

³ Available ATEX certified options:

ATEX Type 1: 5 V in, 5 V out

ATEX Type 2: 7-26V in, 7-26V out

ATEX Type 3: 7-26V in, 5V out

Note: When selecting ATEX models, ATEX voltages replace those shown in Output Code.

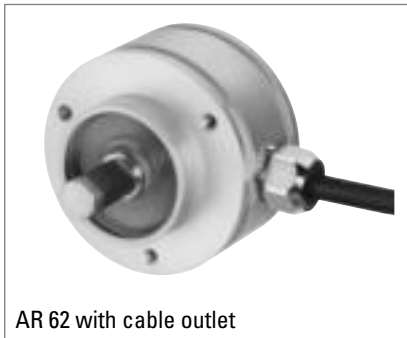
⁴ Housing/Tether/Options Code "G" to "L" only available with Output Code "0" to "3", "F" or "G"

⁵ Housing/Tether/Options Code "M" to "R" only available with Output Code "4"

⁶ Note for Housing with redundant outputs: Simultaneous use of redundant outputs may void ATEX certification. Consult us for details.

Absolute

BiSS / SSI



AR 62 with cable outlet



AR 62 with M12 connector

- Singleturn 12 Bit Resolution
- 300 N axial and radial load
- 200 g shock resistance
- 20 g vibrations resistance
- Submersible: Protection class up to IP69k
- High temperature range: -40 ... +100°C
- Compact design: 32 mm mounting depth
- Option: Stainless steel housing
- Option: Control inputs Preset and Direction

ACURO[®]-XR

HEAVY DUTY

BISS
INTERFACE

SSI

CE



GENERAL INFORMATION

ACURO-XR - THE ROBUST ENCODER FOR ALL ENVIRONMENTAL CONDITIONS!

The special features of the new ACURO-XR series not only comprise its particularly rugged enclosure, but also generously dimensioned, rigid ball-bearings. Capable of withstanding even high axial and radial loads on its shaft axis, this encoder type easily achieves a mechanical life of 10^9 rotations at a permanent radial load of 200 N and simultaneously, an axial load of 200N.

The newly designed ACURO-XR makes a difference. It easily withstands highest accelerations, extreme climatic fluctuations and even underwater operation. In this way, our rugged absolute encoder is ideally suitable for applications in wind farms, marine or utility vehicle applications, as well as for use in presses or wood and stone processing machinery: applications where high resistance to harsh environments and maximum reliability are required at the same time.

The AR62 is electrically compatible with standard encoders and operates with the magnetic technology. Available interfaces are SSI, BiSS, CANopen and Analogue (0 ... 10 V or 4 ... 20 mA).

With an installed depth of only 32 mm, this encoder is the most compact type in its class. Valuable space has been saved – to the benefit of the overall machinery design.

APPLICATIONS

Fields of application that clearly unfold the benefits of ACURO-XR:

- Construction machinery
- Utility vehicles / trucks
- Gantry cranes
- Marine equipment
- Offshore plants
- Wind power plants
- Commercial solar plants
- Food & Beverage Industry
- Filling plants
- Presses
- Your individual application

Absolute

BiSS / SSI

TECHNICAL DATA mechanical

Housing diameter	58 mm
Mounting depth	32 mm
Shaft diameter	10 mm / 12 mm (Solid shaft)
Flange (Mounting of housing)	Synchro clamping flange
Protection class shaft input (EN 60529)	IP67 or IP69k
Protection class housing (EN 60529)	IP67 or IP69k
Shaft load axial / radial	max.: 300 N / 300 N
Max. speed	max. 5000 rpm
Vibration resistance (DIN EN 60068-2-6)	200 m/s ²
Shock resistance (DIN EN 60068-2-27)	2000 m/s ² (6 ms)
Operating temperature	-40 °C ... +100 °C
Connection	Cable, radial M12-connector, radial

TECHNICAL DATA electrical

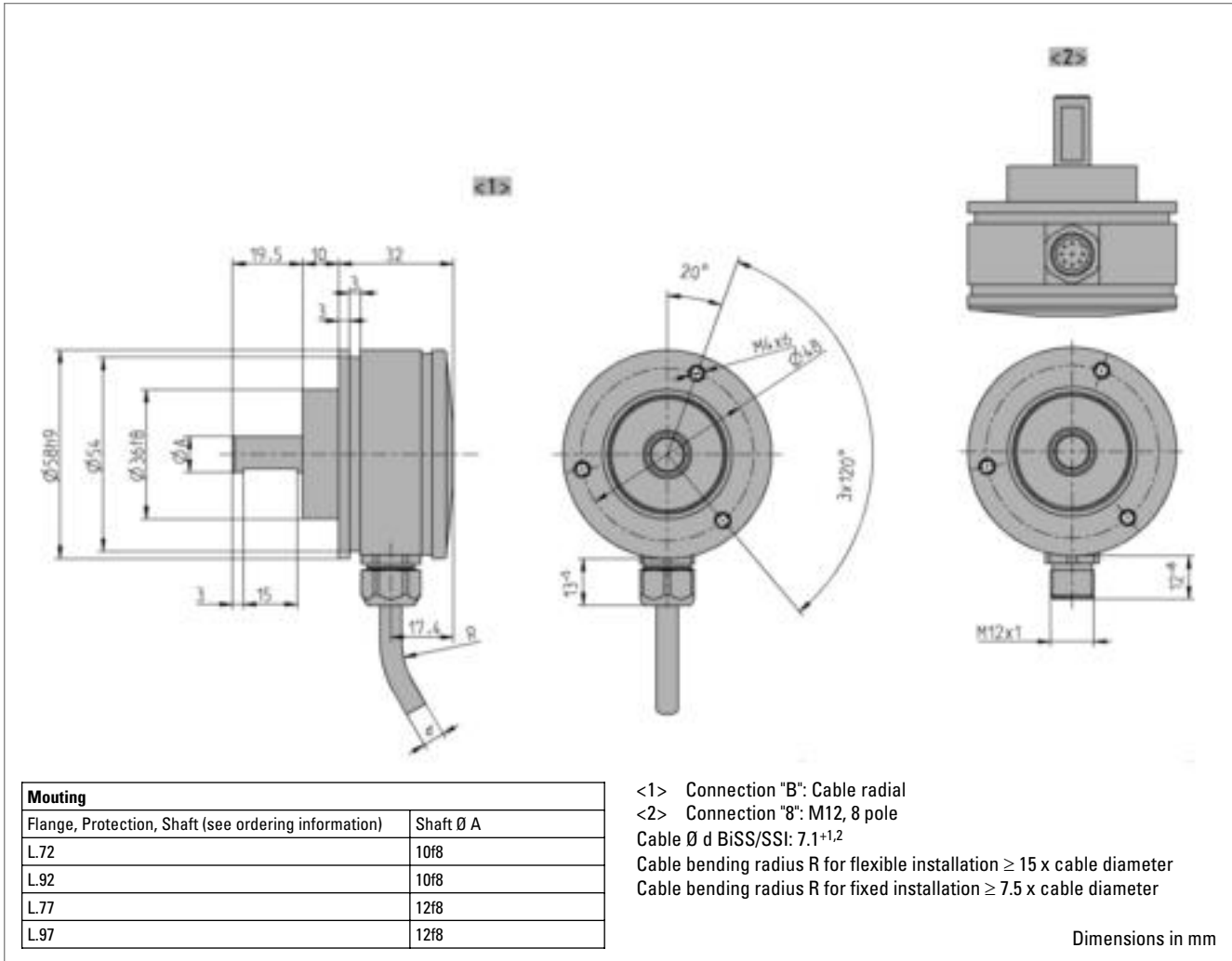
Supply voltage	DC 10-30 V
Max. current w/o load	50 mA (24 V)
EMC	EN 61326 Class A
Resolution singleturn	12 Bit
Output code	Gray
Repeatability	±0,2°
Control inputs ¹	Preset, Direction

¹ Preset, Direction optional available

ELECTRICAL CONNECTIONS Cable

Color cable	Signal
yellow	Clock
pink	Data
green	$\overline{\text{Clock}}$
grey	$\overline{\text{Data}}$
white	UB
brown	0 V
Screen	Screen

DIMENSIONED DRAWINGS



ORDERING INFORMATION

Type	Resolution	Supply voltage	Flange, Protection, Shaft	Interface	Connection ^{1,2}
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
AR62 Aluminum AR63 Stainless Steel	0012 12 Bit ST	E DC 10 - 30 V	L.72 Synchro clamping, IP67, 10 mm L.77 Synchro clamping, IP67, 12 mm L.92 Synchro clamping, IP69k, 10 mm L.97 Synchro clamping, IP69K, 12 mm	SG SSI Gray BG BiSS Gray	B Cable, radial 8 M12 connector, 8 pole, radial

¹ M12 connector not available with Stainless Steel housing

² M12 connector not available with IP69K

Absolute

BiSS / SSI

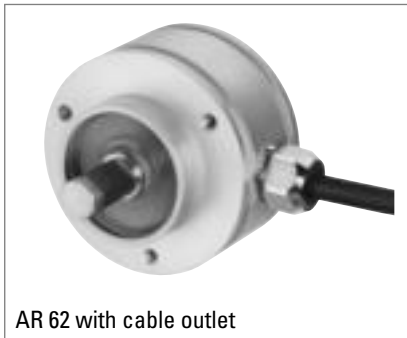
ORDERING INFORMATION Selection of cable length

Versions with cable outlet (connection A, B, E or F) are available with various lengths of cable. To order your desired cable length, please add the respective code to the end of your ordering code. Further cable lengths on request.

Code	Cable length
without code	1.5 m
-D0	3 m
-F0	5 m
-K0	10 m
-P0	15 m
-U0	20 m
-V0	25 m

Absolute

CANopen



AR 62 with cable outlet



AR 62 with M12 connector

GENERAL INFORMATION

- Singleturn 12 Bit Resolution
- 300 N axial and radial load
- 200 g shock resistance
- 20 g vibration resistance
- Submersible: Protection class up to IP69K
- High temperature range: -40 ... +100°C
- Compact design: 32 mm mounting depth
- Option: Stainless steel housing

ACURO[®]-XR

HEAVY DUTY

CANopen

CE



ACURO-XR - THE ROBUST ENCODER FOR ALL ENVIRONMENTAL CONDITIONS!

The special features of the new ACURO-XR series not only comprise its particularly rugged enclosure, but also generously dimensioned, rigid ball-bearings. Capable of withstanding even high axial and radial loads on its shaft axis, this encoder type easily achieves a mechanical life of 10^9 rotations at a permanent radial load of 200 N and simultaneously, an axial load of 200N.

The newly designed ACURO-XR makes a difference. It easily withstands highest accelerations, extreme climatic fluctuations and even underwater operation. In this way, our rugged absolute encoder is ideally suitable for applications in wind farms, marine or utility vehicle applications, as well as for use in presses or wood and stone processing machinery: applications where high resistance to harsh environments and maximum reliability are required at the same time.

The AR62 is electrically compatible with standard encoders and operates with the magnetic technology. Available interfaces are SSI, BiSS, CANopen and Analogue (0 ... 10 V or 4 ... 20 mA).

With an installed depth of only 32 mm, this encoder is the most compact type in its class. Valuable space has been saved – to the benefit of the overall machinery design.

APPLICATIONS

Fields of application that clearly unfold the benefits of ACURO-XR:

- Construction machinery
- Utility vehicles / trucks
- Gantry cranes
- Marine equipment
- Offshore plants
- Wind power plants
- Commercial solar plants
- Food & Beverage Industry
- Filling plants
- Presses
- Your individual application

Absolute

CANopen

TECHNICAL DATA mechanical

Housing diameter	58 mm
Mounting depth	32 mm
Shaft diameter	10 mm / 12 mm (Solid shaft)
Flange (Mounting of housing)	Synchro clamping flange
Protection class shaft input (EN 60529)	IP67 or IP69k
Protection class housing (EN 60529)	IP67 or IP69k
Shaft load axial / radial	max.: 300 N / 300 N
Max. speed	max. 5000 rpm
Vibration resistance (DIN EN 60068-2-6)	200 m/s ²
Shock resistance (DIN EN 60068-2-27)	2000 m/s ² (6 ms)
Operating temperature	-40 °C ... +100 °C
Connection	Cable, radial M12-connector, radial

TECHNICAL DATA electrical

Supply voltage	DC 10-30 V
Max. current w/o load	220 mA
EMC	EN 61326 Class A
Resolution singleturn	12 Bit
Output code	Binary
Interface	CAN High-Speed according to ISO/DIS 11898
Profile/ protocol	CANopen according to DS 301 with profile DSP 406, programmable encoder according class C2
Repeatability	±0,2°
Parametrization	Scaling, Preset, Offset, Direction
Integrated special functions	Speed, Acceleration, Limit values

ELECTRICAL CONNECTIONS Cable

Color cable	Cable pairs	Signal
yellow	Pair 1	CAN in+
green		CAN in-
pink	Pair 2	CAN out+
grey		CAN out-
blue		n.c.
red		n.c.
white	Pair 3	UB
brown		0 V
Screen	Screen	Screen

Absolute

CANopen

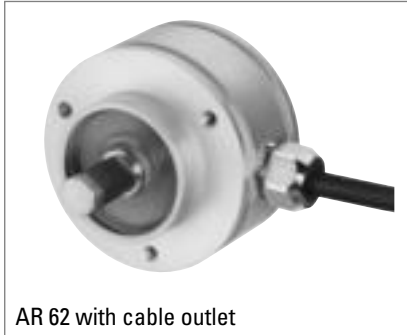
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-U0	20 m
-V0	25 m

Absolute

Analogue



AR 62 with cable outlet



AR 62 with M12 connector

GENERAL INFORMATION

- Singleturn 12 Bit Resolution
- 300 N axial and radial load
- 200 g shock resistance
- 20 g vibration resistance
- Submersible: Protection class up to IP69k
- High temperature range: -40 ... +100°C
- Compact design: 32 mm mounting depth
- Option: Stainless steel housing
- Option: Control inputs Preset and Direction

ACURO®-XR

HEAVY DUTY



CE



APPLICATIONS

ACURO-XR - THE ROBUST ENCODER FOR ALL ENVIRONMENTAL CONDITIONS!

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- Construction machinery
- Utility vehicles / trucks
- Gantry cranes
- Marine equipment
- Offshore plants
- Wind power plants
- Commercial solar plants
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- Presses
- Your individual application

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Analogue

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Protection class housing (EN 60529)	IP67 or IP69k
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Max. speed	max. 5000 rpm
Vibration resistance (DIN EN 60068-2-6)	200 m/s ²
Shock resistance (DIN EN 60068-2-27)	2000 m/s ² (6 ms)
Operating temperature	-40 °C ... +100 °C
Connection	Cable, radial M12-connector, radial

TECHNICAL DATA electrical

Supply voltage	DC 17 - 30 V
Max. current w/o load	50 mA (24 V)
EMC	EN 61326 Class A
Resolution singleturn	12 Bit
Interface	Analogue: 0 ... 10 V, Analogue: 4 ... 20 mA
Tolerance	Voltage output: 0 V: + 100 mV; 10 V: +/- 100 mV Current output: 4 mA ± 100 µA typ; 20 mA ± 100 µA typ
Load resistor	Voltage output: max. 2 kΩ Current output: max. 600 Ω (Output current max. 5 mA)
Repeatability	±0,2°
Control inputs ¹	Direction, Preset
Updating of values	updating every millisec (continuously)

¹ Preset, Direction optional available

ELECTRICAL CONNECTIONS Analogue

Color Cable	Cable pairs	Signal
pink	Pair 1	0 ... 10 V (Voltage output max. 5 mA)
blau		0 ... 20 mA or 4 ... 20 mA (current output)
grey		AGND
red		preset (set to 0)
white	Pair 2	UB
brown		0 V
yellow ¹	Pair 3	Diagnostic 1
green ¹		Diagnostic 2
Screen	Screen	Screen

¹ Diagnostic signals only for service purposes. The cable wires have to be isolated.

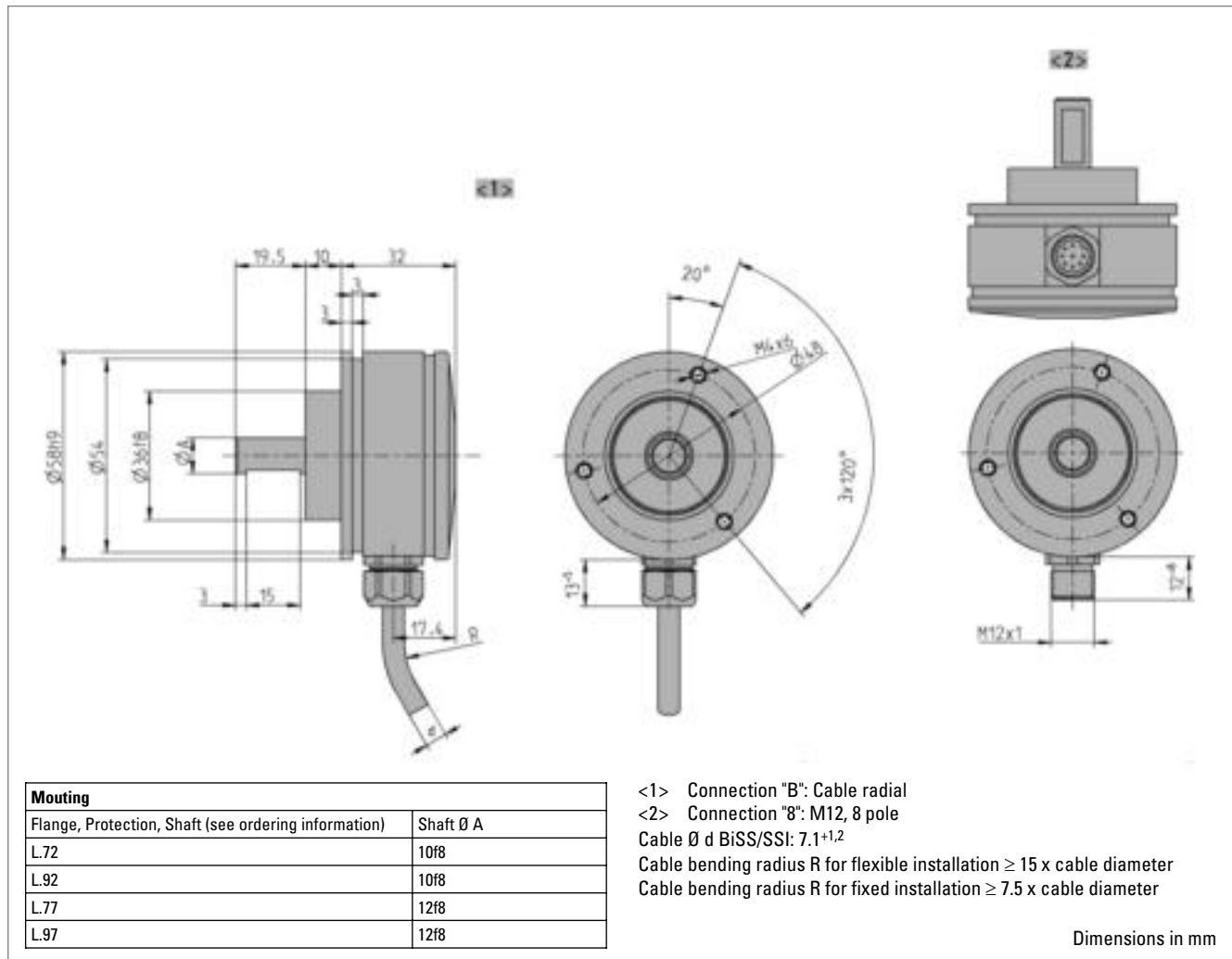
Heavy Duty Types

Absolute

AR 62/63

Analogue

DIMENSIONED DRAWINGS



ORDERING INFORMATION

Type	Resolution	Supply voltage	Flange, Protection, Shaft	Interface	Connection ^{1,2}
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
AR62 Aluminum AR63 Stainless Steel	0012 12 Bit ST	F DC 17 - 30 V	L.72 Synchro clamping, IP67, 10 mm L.77 Synchro clamping, IP67, 12 mm L.92 Synchro clamping, IP69k, 10 mm L.97 Synchro clamping, IP69K, 12 mm	AV Analogue 0 ... 10 V A0 Analogue 0 ... 20 mA A4 Analogue 4 ... 20 mA	B Cable, radial 8 M12 connector, 8 pole, radial

¹ M12 connector not available with Stainless Steel housing (AR63)

² M12 connector is not available with IP69K

Absolute

Analogue

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