Z Standard Rod Style

The Z style product line is one of the most versatile lines in the Micropulse® family. With a variety of electrical options, interfacing to your control system will never be a problem.

Built into the hydraulic cylinder, or mounted externally, the transducer provides continuous, absolute position feedback.

The Z housing offers a variety of outputs, replaceable electronics and the ability to adjust the analog signal in the field.

Applications:
Balluff transducers offer features which assure reliable operation in many areas of automation and process technology, even under extreme ambient conditions:

- Hydraulic cylinders
- Laminating presses
- Rolling mills
- Foundries
- Injection molding
- Liquid level monitoring
- Tunnel boring equipment
- Die casting machinery
- Woodworking machinery
- Flight simulators
- Cutting/slitting machinery
- Conveying
- Packaging machines
- Wire and cable machines
- Wind turbine pitch control
- Elevators
- Tire machinery
- Extruders

Features:

- Absolute, non-contact position feedback
- Highly accurate, super reliable, maintenance-free
- Heavy duty stainless steel pressure tube
- Rated to 8700 psi
- Optional Rapid Replacement Module
  - Plug and play field repair
  - Fluid circuit remains intact
  - Reduced downtime
- Wide variety of available outputs
  - Analog voltage or current
  - Digital START/STOP
  - Digital Pulse-Width-Modulated (PWM)
  - Synchronous Serial Interface (SSI)
  - CANopen
  - Profibus-DP
  - Quadrature

Wide selection of standard, legacy, and military style connectors available!

Drop-In Replacement of Competitor's Legacy Transducers

- Micropulse® transducers are available with a wide variety of special connector options, allowing drop-in replacement of competitors' products.
- Balluff patented autotuning electronics allows use of new and legacy Balluff magnets as well as many competitive magnets.
- Available Rapid Replacement Module allows quick repair without removing pressure tube from cylinder – so no oil spillage and no need to bleed air from hydraulic system after replacement.
- User-adjustable stroke on analog models for quick calibration.
- Easy DIP-switch setup for recirculations on PWM models – no programming hardware or software required.

RRM Rapid Replacement Module

(See page 22)

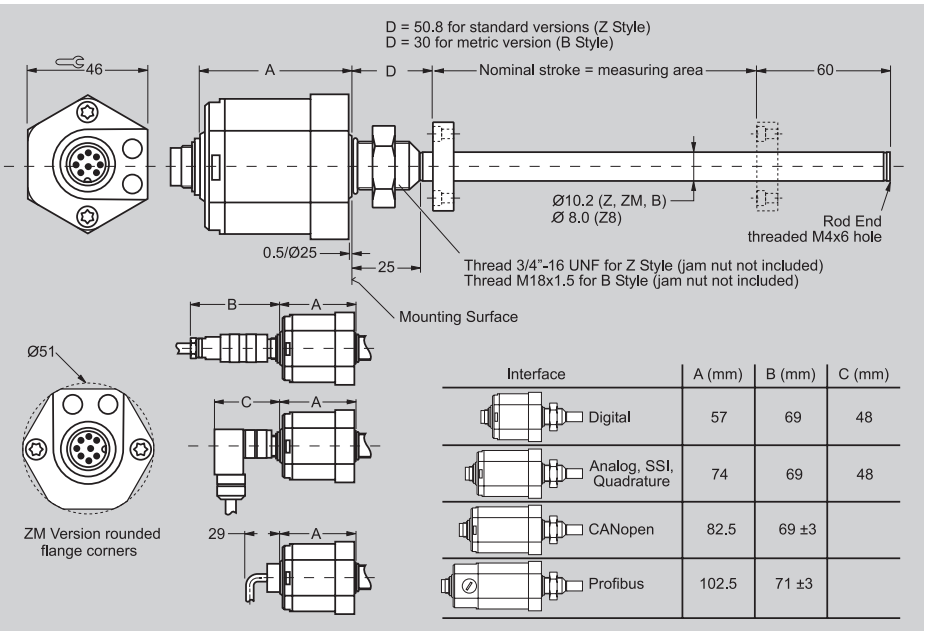
- 100% scalable output signal (analog versions)
- User-scalable using supplied programming tool
- Programming tool is removable to guard against tampering
- Three programming modes to suit any application requirement:

  Teach-In – Used to set the "zero" and "end" values anywhere within the nominal factory stroke range

  Adjust – Used to perform manual adjustment of output signal values

  Online Adjust – Used to perform real-time adjustment of output signal without disrupting the control-loop

Series	**Z Style**
Available Lengths	25 mm (1 in) to 5080 mm (200 in)
Output Signals	Analog, Digital Pulse, SSI, CANopen, Profibus, Quadrature



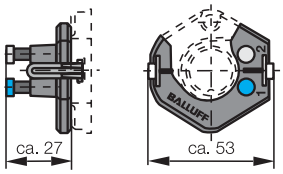
Ordering Code	**BTL5-_ _-M_ _ _-Z-_ _ _ _** (See ordering code on page 27)
Measurement Type	Linear displacement
Measurement Range	25 mm (1 in) to 5080 mm (200 in)
Shock Rating	100 g/6 ms (100 g/2 ms continuous) per IEC 68 2-27
Vibration Rating	12 g, 10 to 2000 Hz per IEC 68-2-6
Environmental Protection	IP 67- with connector attached
Housing Material	Anodized aluminum body, stainless investment cast flange (DIN 1.3952), 316 stainless steel tube
Pressure Rating (rod)	600 bar (8700 PSI) max (10.2 mm Ø rod) 250 bar (3600 PSI) max (8 mm Ø rod)
Operating Temperature	-40 to + 185° F
Storage Temperature	-40 to + 212° F
Humidity	< 90% non-condensing
Connection Type	connector or integral cable
Noise Immunity	ESD, RFI and BURST per IEC 1000-4-2/3/4/6, severity level 3
Approvals	CE

Warning:
These products are not rated for personnel safety applications.

Accessories:
Magnets and Floats ..... pg 23
Connectors ..... pg 24
Jam nuts ..... pg 24

For additional connectors, see pages 107-114

Calibration device BTL5 A-EH01



Supplied with analog versions

Autotuning Circuitry

Patented Autotuning circuitry in Balluff Micropulse® transducers automatically compensates for changes in the strength of the magnetostrictive return signal.

- Allows Micropulse rod-style transducers to be used in hydraulic cylinders that have both new and legacy Balluff magnets. Autotuning allows use of many legacy competitor's magnets as well.
- Automatically compensates for changes in temperature, providing a more stable signal over a wide temperature range.

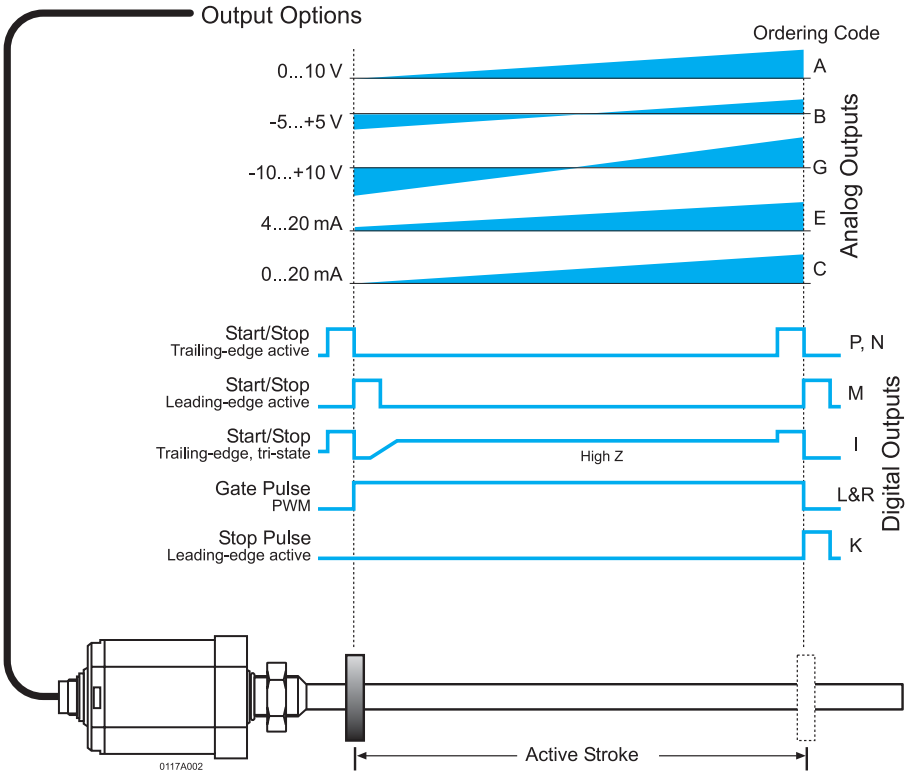
Analog Stroke Adjustment

- Removeable magnetic push button tool
- No delicate trim pots
- Housing remains sealed

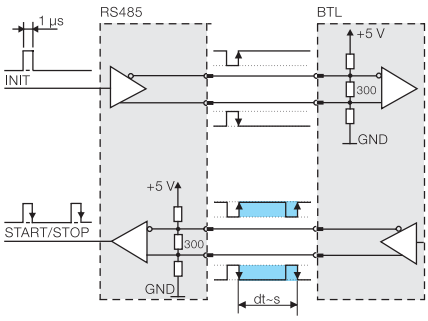
Electrical Interface	Analog	Analog	Digital
Electrical Type	Voltage	Current	Start/Stop PWM
Part No. Code (See pg. 27)	**A, B, G**	**E, C**	**P, M, N, I, L, R, K**
Output	0...+10 V, -5...+5 V, -10...+10 V	4...20 mA, 0...20 mA	Start/Stop or Pulse-width-modulated (RS422/RS485)
Output Load	> 2K Ω (5 mA max)	≤ 500 Ω	per spec
Resolution	≤ 0.33 mV	≤ 0.66 µA	Controller dependent
Non-linearity	±100 µm to 500 mm stroke, ±0.02 % over 500 mm stroke	±100 µm to 500 mm stroke, ±0.02 % over 500 mm stroke	±100 µm to 500 mm stroke, ±0.02 % over 500 mm stroke
Repeatability	Resolution/ min 2 µm	Resolution/ min 2 µm	Resolution/ min 2 µm
Hysteresis	≤ 5 µm	≤ 5 µm	≤ 5 µm
Sampling Rate	2 kHz	2 kHz	500 Hz stroke > 2000 mm 1 kHz stroke < 2000 mm
Temperature Coefficient*	[150 µV/° C + (5 ppm/°C*P*V/NL)] * ΔT	[0.6 µA/°C + (10 ppm/°C*P*V/NL)] * ΔT	(6 µm + 5 ppm*NL) / °C
Operating Voltage	24 Vdc ±20%, 10...30 Vdc or 15 Vdc ±2%	24 Vdc ±20%, 10...30 Vdc or 15 Vdc ±2%	24 Vdc ±20%, 10...30 Vdc or 15 Vdc ±2%
Operating Current	< 150 mA Nominal, @ 24 Vdc	< 150 mA Nominal, @ 24 Vdc	< 100 mA (at 1 kHz sampling rate)

Notes:
Analog voltage output versions incorporate both rising and falling outputs. Analog current version must be ordered as rising or falling ouputs.

***Temperature coefficient variables:**
V = output range in V
I = output range in [mA]
ΔT = temperature change
P = magnet position
NL = stroke length

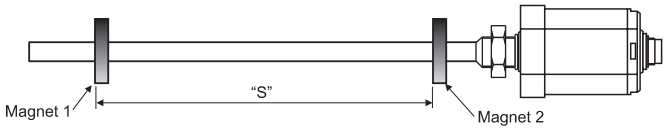


Analog and Digital Output Options for the Micropulse Z Style



RS-485 signal transmission with digital outputs

Two-Magnet Differential Mode
- Available on Analog and PWM
- Output proportional to distance "S"
- Add "-D" suffix to ordering code

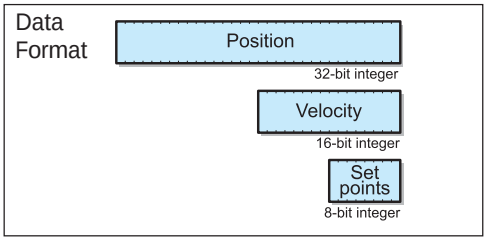


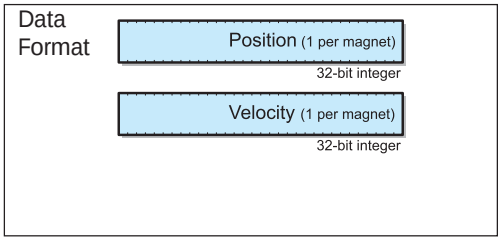
CANopen
This interface provides an efficient connection to machines using CANopen. Features include:
- Process data objects incorporating position, velocity and set-point information
- Emergency object for set-points
- Service data objects for configuring transducer modes
- Synchronization objects for network wide activities

Profibus
This interface provides an efficient connection to machines using Profibus. Features of this interface include:
- Single telegram message for fast updates even with 4 magnets
- Operates at 12 Mbps
- GSD file provided to configure telegram message
- Sync and Freeze functions available for coordination between other devices

Ordering Code	H	T
Resolution	Position 5 µm, Velocity 0.1 mm/s increments (selectable)	Position 5 µm (configurable) Velocity 0.1 mm/s increments (configurable)
Non-linearity	±30 µm at 5 µm resolution	±30 µm at 5 µm resolution
Repeatablity (resolution + hysteresis)	±1 digit	±1 digit
Hysteresis	≤ 1 digit	≤ 1 digit
Sampling Rate	1 kHz	1 kHz
Temperature Coefficient	(6 µm + 5 ppm x L)/°C	(6 µm + 5 ppm x L)/°C
Operating Voltage	24 Vdc ±20%	24 Vdc ±20%
Operating Current	≤ 100 mA	≤ 120 mA
Network Isolation	yes	yes
Network Speed	10, 20, 50, 100, 125, 250, 500, 800, 1000 kBaud	9.6, 19.2, 93.7, 187.5, 900, 1500, 12000 kBaud
Network Compatibility	CiA Standard DS301, DS406 (Encoder Profile)	EN 50170 (Encoder Profile)
Address Selection	Software/DIP switch	DIP switch
Communication Types	Producer/Consumer	Master/Slave
Configuration Software	none required	GSD file
Number of Magnets Supported	1, 2 or 4	1, 2 or 4

Notes:
For more technical information, see pages 123-128





BTL5-H1_ _-Mxxxx-Z-S94

Process Data
1 = 1 x position & 1 x velocity
2 = 2 x position & 2 x velocity
3 = 4 x position

Baud Rate
0 = 1 MBaud
1 = 800 kBaud
2 = 500 kBaud
3 = 250 kBaud
4 = 125 kBaud
5 = 100 kBaud
6 = 50 kBaud
7 = 20 kBaud
8 = 10 kBaud

Stroke Length
xxxx = length in mm (see chart on page 27)
Max = 156" (3962 mm)

Connection Type[1]
S92 = one 5-pin (optional)
S94 = two 5-pin M12 (standard)
Bus in: 5-pin male, M12
Mating connector: BKS-S92-00 (female)
Bus out: 5-pin female, M12
Mating connector: BKS-S94-00 (male)

BTL5-T1_0 -Mxxxx-Z-S103

No. of Magnets
1 = 1 magnet
2 = 2 magnets
3 = 4 magnets

Stroke Length
xxxx = length in mm
Max = 156" (3962 mm)
(see chart on page 27)

Connection Type[2]
S103 = 3 connectors (standard):
Power: 3-pin male, M8
Mating connector: BKS-S48-15-CP-xx (female)
Bus in: 5-pin male, M12
Mating connector: BKS-S103-00 (female)
Bus out: 5-pin female, M12
Mating connector: BKS-S105-00 (male)

[1]See pages 107-114 for mating cables/connectors.
[2]See pages 107-114 for mating cables/connectors.

BTL Z

SSI

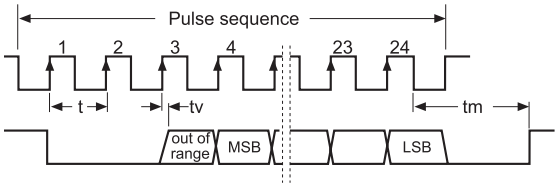
The SSI (synchronous serial interface) output interfaces with popular control systems from manufacturers such as Allen-Bradley, Delta Computer, Siemens, Parker, Bosch-Rexroth and many others. Cable spans can be up to 400 m with noise-free operation. Individual, EEPROM linearization of this interface makes it ideal for applications requiring the best accuracy available.

Ordering Code	S	S _ _ _ B*
Resolution	5, 10, 20 or 40 µm (see ordering code below)	5, 10, 20 or 40 µm (see ordering code below)
Non-linearity – Non-synchronized	±30 µm or ±2 LSBs, whichever is greater	±30 µm or ±2 LSBs, whichever is greater
Repeatablity (resolution + hysteresis)	±1 digit	±1 digit
Hysteresis	≤ 1 digit	≤ 1 digit
Sampling Rate	2 kHz	2 kHz
Temperature Coefficient	(6 µm + 5 ppm x L)/°C	(6 µm + 5 ppm xL)/°C
Communication Speeds	100, 200, 400, 500, 1000 kHz	100, 200, 400, 500, 1000 kHz
Output Modes	24 or 25 bits (binary or gray code)	24 or 25 bits (binary or gray code)
Operating Voltage	24 Vdc ±20% or 10...30 Vdc	24 Vdc ±20% or 10...30 Vdc
Operating Current	≤ 80 mA	≤ 80 mA
Output	Standard RS-485/422 levels	Standard RS-485/422 levels

Notes:

SSI Maximum cable lengths

Cable length	Clock Freq.
< 25 m	< 1000 kHz
< 50 m	< 500 kHz
< 100 m	< 400 kHz
< 200 m	< 200 kHz
< 400 m	< 100 kHz



***S_ _ _ _B Versions**

The internal interrogation of the S_ _ _ _B version is synchronized to the externally supplied clock pulses. This configuration results in a more uniform, predictable data update rate, and is better-suited for highly dynamic closed-loop servo applications. Like the standard version, the S_ _ _ _B version is EEPROM linearized at the factory.

BTL5-S_ _ _ _-Mxxxx-Z-_ _ _ _

Supply Voltage
1 = +24 V
5 = 10...30 V

Data Format
0 = Binary, increasing, 24 bit
1 = Gray code, increasing, 24 bit
2 = Binary, falling, 24 bit
3 = Gray code, falling, 24 bit
6 = Binary, increasing, 25 bit
7 = Gray code, increasing, 25 bit
8 = Binary, falling, 25 bit
9 = Gray code, falling, 25 bit

System Resolution
2 = 5 µm
3 = 10 µm
4 = 20 µm
5 = 40 µm
6 = 100 µm
8 = 50 µm

Synchronized Data
B = synchronized*
Blank = non-synchronized

Stroke Length
xxxx = length in mm
Max = 156" (3962 mm)
(see chart on page 27)

Connection Type
S 32 = 8-pin connector (standard)[1]
S140 = MS connector (optional)[2]
KA02 = 2 m PUR cable
KA05 = 5 m PUR cable
KA10 = 10 m PUR cable
KA15 = 15 m PUR cable

[1]See page 24 for mating cables/connectors.
[2]See pages 107-114 for mating cables/connectors.

Quadrature

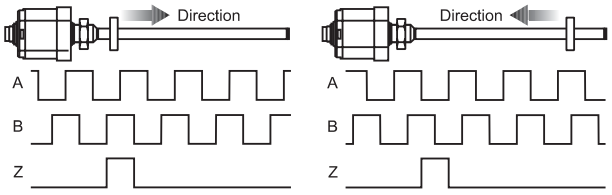
The quadrature output interfaces directly to standard encoder inputs (90° out of phase, A & B). This configuration gives you more interface options for connecting to motion based systems. In addition, the Micropulse quadrature output transducer has the ability to provide **absolute** position information through use of its innovative BURST function.

Ordering Code	Q
Resolution	1, 2, 5 10, 50 µm, 0.001", 0.0001", 0.0005" (switch selectable)
Non-linearity	±100 µm to 500 mm stroke, ±0.02% over 500 mm stroke
Repeatablity (resolution + hysteresis)	resolution + (±2 x resolution or 5 µm, whichever is greater)
Hysteresis	±2 x resolution or 5 µm, whichever is greater
Sampling Rate	Free-running: 1 ms, 2 ms, 4 ms; Synchronous: 500 µs to 10 ms
Temperature Coefficient	(6 µm + 5 ppm x L)/°C
Communication Speeds	10, 200, 400, 800 kHz
Output Modes	Free-running or Synchronous (switch selectable)
Operating Voltage	24 Vdc ±20%, ±15 Vdc ±2%, 10...30 Vdc
Operating Current	≤ 80 mA
Output	Standard A & B (RS-422 level)

Notes:

SSI Maximum cable lengths

Cable length	Clock Freq.
< 25 m	< 1000 kHz
< 50 m	< 500 kHz
< 100 m	< 400 kHz
< 200 m	< 200 kHz
< 400 m	< 100 kHz



BTL5-Q _ _ _ _-Mxxxx-Z-S140

Supply Voltage
1 = +24 V
2 = ±15 V
5 = 10...30 V

Quadrature Frequency
0 = 833 kHz
1 = 416 kHz
2 = 208 kHz
6 = 10 kHz

System Resolution
0 = 1 µm
1 = 2 µm
2 = 5 µm
3 = 10 µm
5 = 50 µm
6 = 0.0001"
7 = 0.001"
8 = 0.0005"

Mode/Update Rate
0 = Synchronous (initiated by controller— consult factory)
1 = free-running, 1 ms update — ≤ 1250 mm stroke only
2 = free-running, 2 ms update — 1251 mm to 2500 mm
4 = free-running, 4 ms update — ≥ 2501 mm

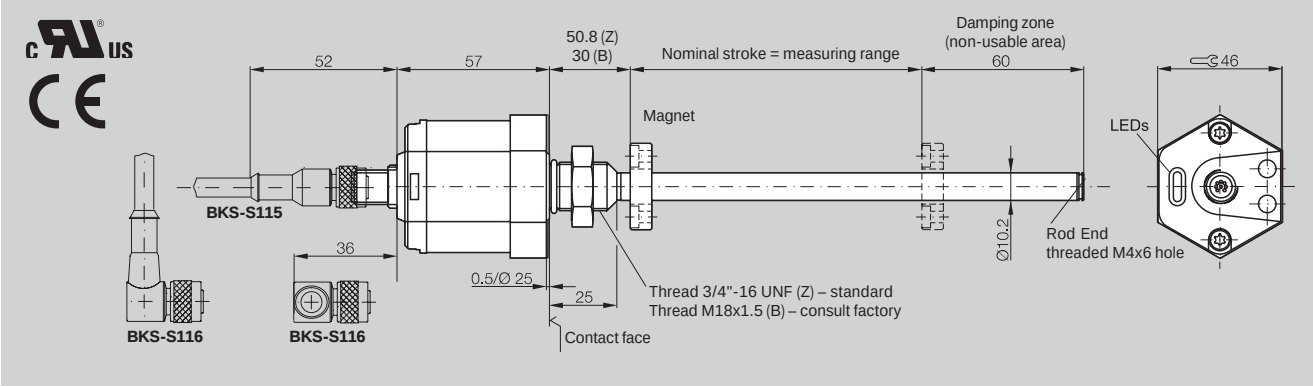
Stroke Length
xxxx = length in mm
(see chart on page 27)

Connection Type
S140 = MS connector[1]
KA_ _ = Integral PVC cable (specify length in meters - 05 standard)

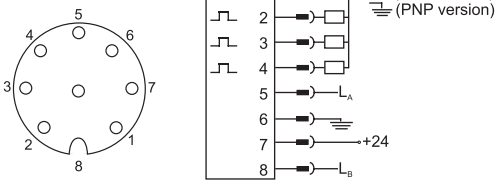
[1]See pages 107-114 for mating cables/connectors.

BTL Z

Series	**Z Style**
Transducer Interface Code	**F**
Input Interface	digital, programmable discrete setpoints



Ordering Code	**NPN**	**BTL5 F100-M_ _ _ _*-Z-S115**
	PNP	**BTL5 F110-M_ _ _ _*-Z-S115**
Output Signals		4 switching outputs
Max. Current Load Per Output		100 mA
Repeatability		±0.1 mm / ±0.004 inch
Internal Sampling Frequency		$f_{STANDARD}$ = 1 kHz = ≤ 1400 mm
Operating Voltage		24 Vdc ±20 %
No-load Current		≤ 100 mA
Operating Temperature		–40 to +185 °F
Storage Temperature		–40 to +212 °F
Pin Assignments	Pin 1	switching output (open collector)
	Pin 2	switching output (open collector)
	Pin 3	switching output (open collector)
	Pin 4	switching output (open collector)
	Pin 5	L_A; programming input (low-active)
	Pin 6	GND
	Pin 7	+24 Vdc (10...30 V not available)
	Pin 8	L_B; programming input (low-active)
Shock		100 g/6 ms per IEC 60068-2-27
Vibration		12 g, 10...2000 Hz per IEC 60068-2-6
Dielectric Strength		500 V (GND to housing)
Enclosure Rating per IEC 60529		IP 67 (with IP 67 BKS-S... connector attached)
Housing Material		Anodized Al/ 1.4571 (316) stainless steel rod, 1.3952 stainless investment cast flange
Mounting		Thread 3/4"-16 UNF (Z) or M18×1.5 (B)
Pressure Rating		600 bar (8700 psi) when installed in cylinder
Connection Type		S115 8-pole M12 DC Micro connector
Stroke Lengths		2" (51 mm)...200" (5080 mm)

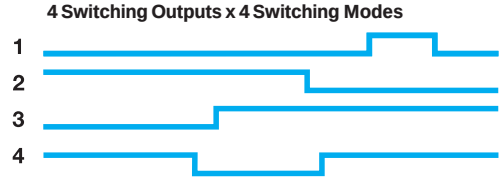


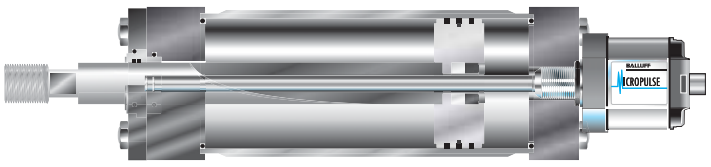
* See page 27 for standard lengths.

Advantages

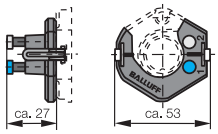
- Four setpoints detect cylinder end-of-stroke or anywhere in between
- Interfaces to discrete I/O instead of more costly analog inputs
- Upgrade from end-of-stroke sensors
- Eliminate multiple external proximity sensors, brackets, targets, cables, and connection blocks
- Eliminate motion controller: run speed/position ramping profiles with direct-input proportional valve
- Installs just like a traditional MDT in probe-ready steel-walled cylinders
- Auto-Tuning™ circuitry allows use of Balluff or competitors' magnets
- Two easy programming options: local, with handy programming tool; or remote, using teach-in connections

4 Switching Outputs x 4 Switching Modes





Programming Tool
BTL5-A-EH02
for teaching setpoints
(included)



RRM Rapid Replacement Module

Rapid Replacement Module Option

Balluff's new Rapid Replacement Module (RRM) option allows quick field replacement without removing the pressure tube from the cylinder, making change-outs easy and cutting equipment downtime.

Advantages of the RRM include:

- No hydraulic oil spillage and no need for environmental containment
- No danger from hot oil spilling onto repair personnel
- No need to bleed air from hydraulic system after replacement
- No danger of dirt entering open hydraulic port
- 100% exchange of sensor package eliminates guesswork
- Dimensionally identical to standard Balluff Z style for equivalent output type
- Backward-compatible with existing standard Balluff Z style pressure tubes*
- Available for all output types except Profibus, CANopen, and ProSet4

The RRM can be installed in your maintenance program in a variety of ways:

- For new installations, you can order optional ZM construction, which includes a Balluff pressure tube along with a RRM pre-installed. To change out this type, you simply remove two housing screws, replace the RRM, re-tighten the two housing screws – and you're done.
- For new installations, you can also order standard Z construction, which includes a complete standard transducer. You can still do field swaps on this type by removing the standard electronics head and internal waveguide element as two separate components, then replacing both with a single RRM unit.
- If you already have an installed base of standard Balluff Z transducers, you can also change them out quickly with the RRM as described above. The RRM easily retrofits into existing Balluff pressure tubes once the old electronics and waveguide element have been removed.*
- Keep spare RRM units on hand to maintain any Balluff ZM or Z construction transducer.

* Synchronized SSI RRM is not backward-compatible to standard pressure tubes used on non-synchronized SSI units. Synchronized SSI RRM only fits pressure tube supplied with complete synchronized SSI units.

Ordering Example – Complete Transducer Unit with RRM + Pressure Tube

BTL5-xxx-Mxxxx-ZM-xxx

Add "M" after "Z"

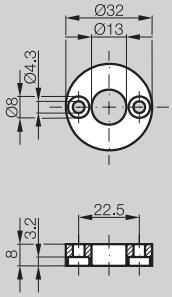
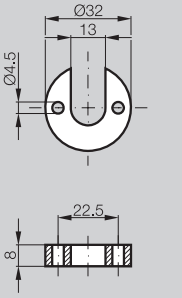
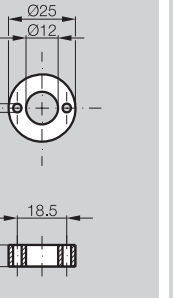
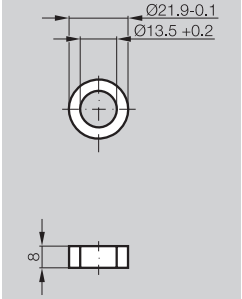
Ordering Example – Rapid Replacemnet Module Only

BTL5-xxx-Mxxxx-ZM-xxx/RU

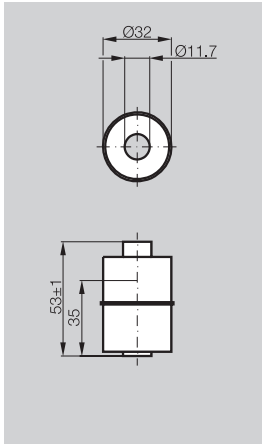
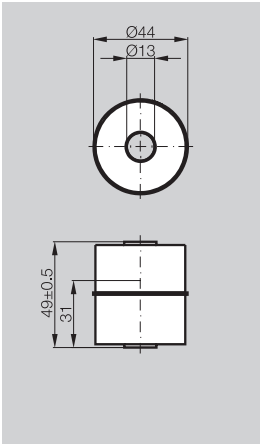
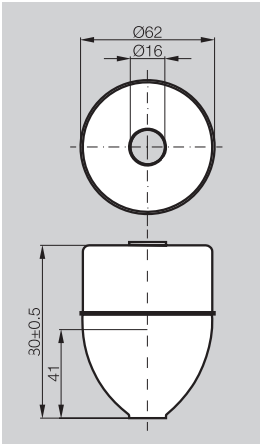
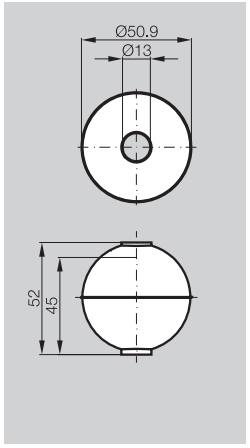
Add "M" after "Z"

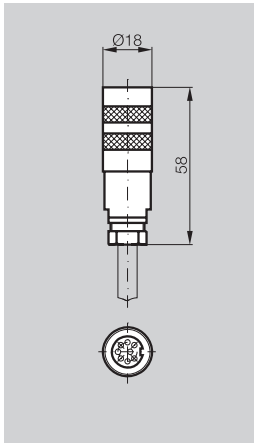
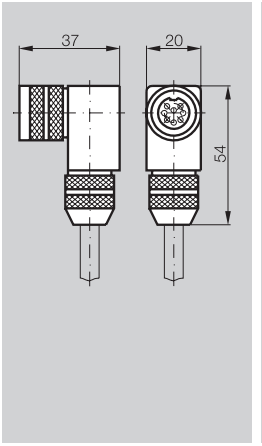
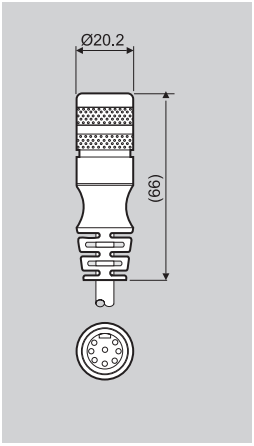
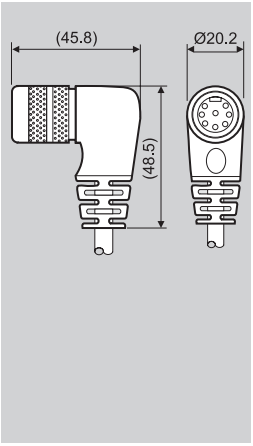
Add "/RU" at end of ordering code

See page 27 for complete ordering code.

Product	Magnet, Spacer	Magnet, Spacer	Magnet, Spacer	Magnet
Type	Ø32 ring	Ø32 open ring	Ø25 ring	Ø22 ring
					
Ordering Code - Magnet	**BTL-P-1013-4R***	**BTL-P-1013-4S***	**BTL-P-1012-4R***	**BTL-P-1014-2R**
Ordering Code - Spacer	**BTL Z-P-1013-4R-SPACER**	**SPACER BTL-P-1013-DS**	**BTL Z-2-1012-4R-SPACER**	**N/A**
Material	AL	AL	AL	AL
Weight	12 g	12 g	12 g	10 g
Magnet Speed	any	any	any	any
Operating/Storage Temperature	-40…+100°C	-40…+100°C	-40…+100°C	-40…+100°C

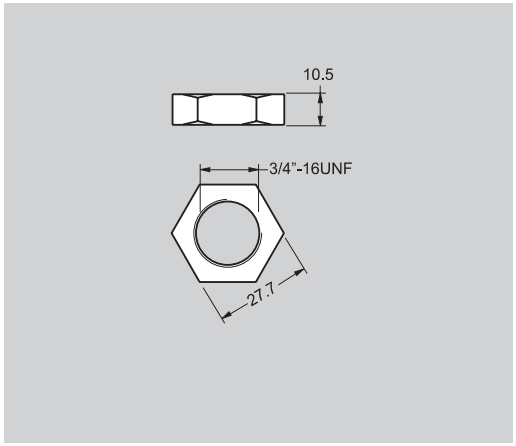
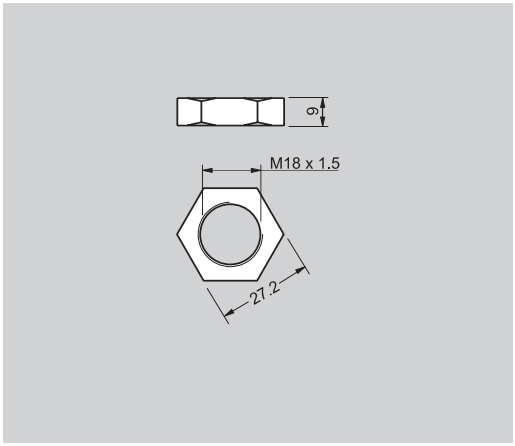
*Spacer is included with these magnets

Product	Magnet	Magnet	Magnet	Magnet
Type	Barrel float	Barrel float	Bullet float	Sphere float
					
Ordering Code	**BTL2-S-3212-4Z**	**BTL2-S-4414-4Z**	**BTL2-S-6216-8P**	**BTL2-S-5113-4K**
Material	Stainless 316	Stainless 316	Stainless 316	Stainless 316
Weight	20 g	35 g	66 g	34 g
Operating/Storage Temperature	-40…+120°C	-40…+120°C	-40…+120°C	-40…+120°C
Water Displacement	35 mm	30 mm	41 mm	26 mm
Pressure (static)	24 bar (348 psi)	20 bar (290 psi)	15 bar (217 psi)	40 bar (580 psi)

Product	Straight Connector	Right-angle Connector	Molded Straight Connector	Molded Right-angle Connector
Type	8-pin female	8-pin female	8-pin female	8-pin female
					
Ordering Code	**BKS-S 32M-_*_**	**BKS-S 33M-_*_**	**BKS-S 232-PU-_*_**	**BKS-S 233-PU-_*_**
Material	CuZn, nickel plated	CuZn, nickel plated	CuZn, nickel plated	CuZn, nickel plated
Contact Surface	0.8 µm Au	0.8 µm Au	0.8 µm Au	0.8 µm Au
Solder Connection	00 option only	00 option only	N/A	N/A
Cable	7 x 0.25 mm²/AWG 24	7 x 0.25 mm²/AWG 24	7 x 0.25 mm²/AWG 24	7 x 0.25 mm²/AWG 24
Cable Diameter	6.35 mm ± 0.35 mm	6.35 mm ± 0.35 mm	6.35 mm ± 0.35 mm	6.35 mm ± 0.35 mm
Allowable Cable Diameter	6…8 mm	6…8 mm	N/A	N/A
Cable Material	PUR	PUR	PUR	PUR
Environmental Rating	IP 67 (when installed)	IP 67 (when installed)	IP 67 (when installed)	IP 67 (when installed)

For additional connectors, see pages 107-114

* Indicate cable length in ordering code in meters
(consult factory for longer lengths)
00 = connector only (only available for BKS-S 32M and BKS-S 33M)
02 = 2 meter cable
05 = 5 meter cable

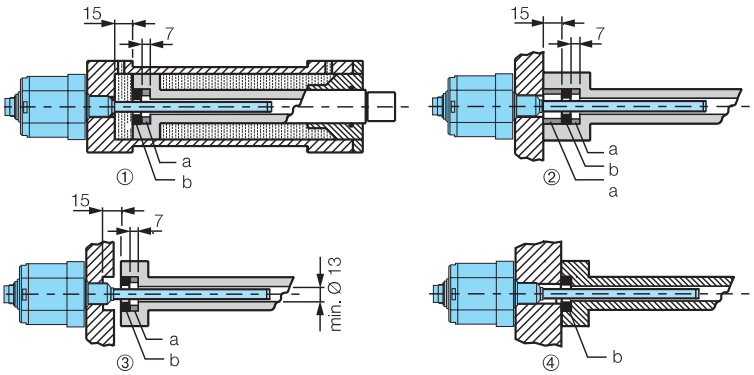
Product	Jam nut	Jam nut
Type	3/4"-16 UNF	M18 x 1.5
		
Ordering Code	**BTL-5-JAM-NUT**	**BTL-A-FK01-E-M18x1.5**
Application	Z housing	B/H housing
Material	Stainless steel	Stainless steel

Note:
Jam nut not needed for in-cylinder applications

BTL Z

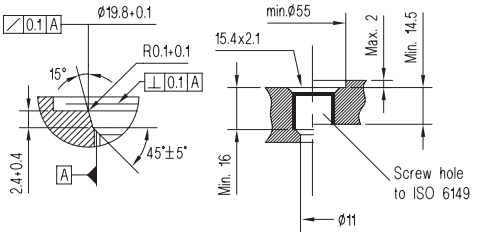
Installation

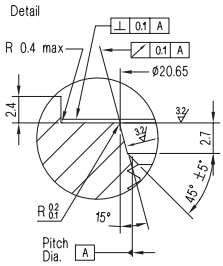
The BTL Micropulse transducer is provided with a ¾" x 16-UNF (optional M18 × 1.5) mounting thread. We recommend mounting into non-magnetizable materials. If magnetizable materials are used, the installation must be carried out as shown in the drawing below. Sealing is at the flange mounting surface, using the supplied O-ring.



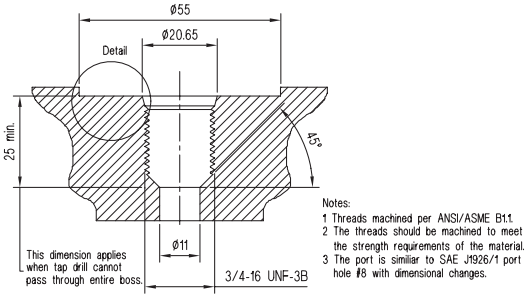
①②③ For magnetizable material
④ For non-magnetizable material
a Spacer made of non-magnetizable material
b Magnet

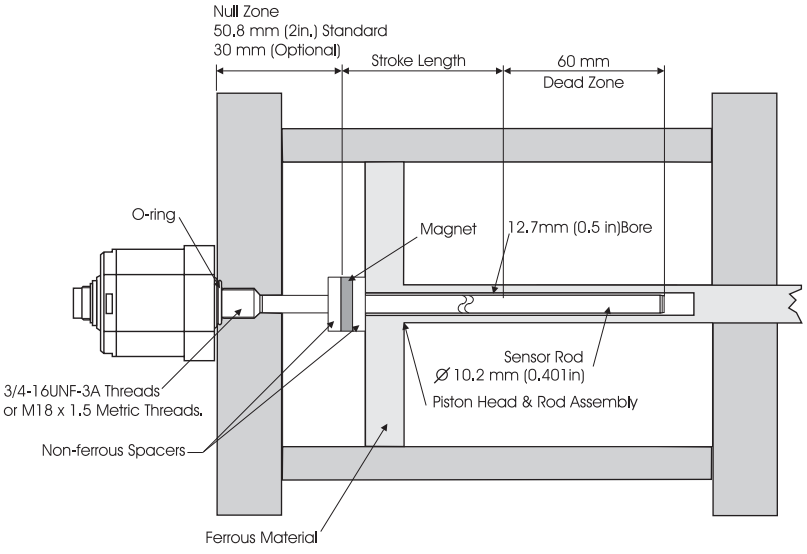
B Style Housing





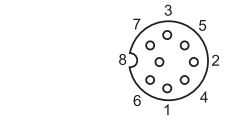
Z, Z8, ZM Style Housing



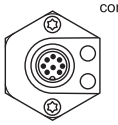


Typical Installation in Hydraulic Cylinder

Analog Wiring Diagrams



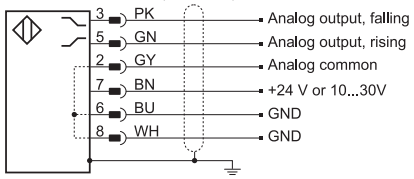
View of mating connector, wiring side



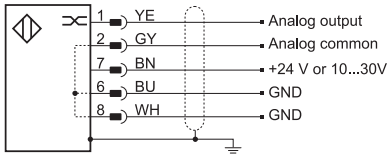
S32 Connector

Integral Cable

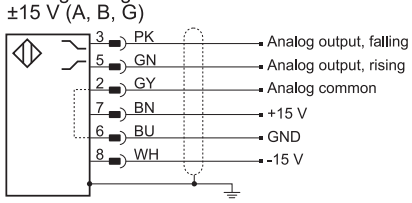
Analog Voltage
24 V or 10...30V (A, B, G)



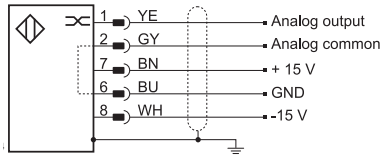
Analog Current
24 V or 10...30V (E, C)



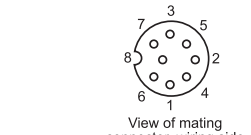
Analog Voltage
±15 V (A, B, G)



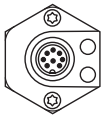
Analog Current
±15 V (E, C)



Digital Wiring Diagrams



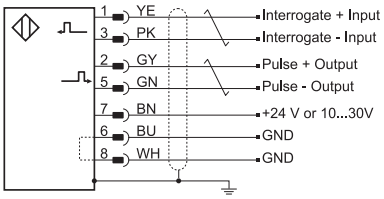
View of mating connector, wiring side



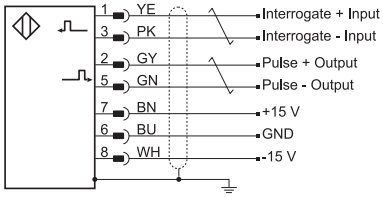
S32 Connector

Integral Cable

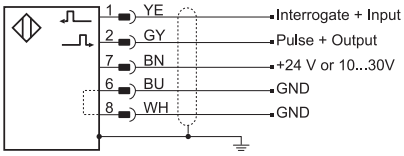
Digital, RS485 differential
24 V or 10...30V (P, M, I, K, L, R)



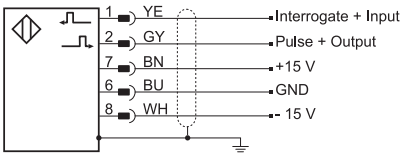
Digital, RS485 differential
±15 V (P, M, I, K, L, R)



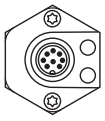
Digital, Single-ended
24 V or 10...30V (N)



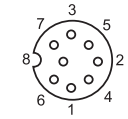
Digital, Single-ended
±15 V (N)



SSI Wiring Diagram

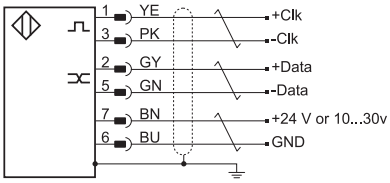


S32 Connector



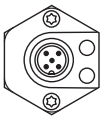
View of mating connector, wiring side

SSI (S)
24 V or 10...30V

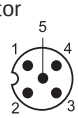


* Pin-8 (WH) must remain unconnected

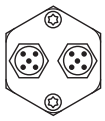
CANopen Wiring Diagram



S92 Connector

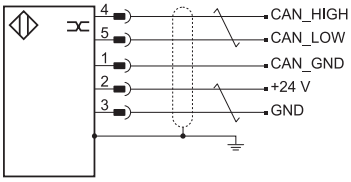


View of mating connector, wiring side



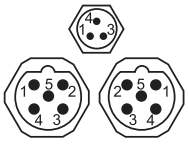
S94 Connector

CANopen (H)



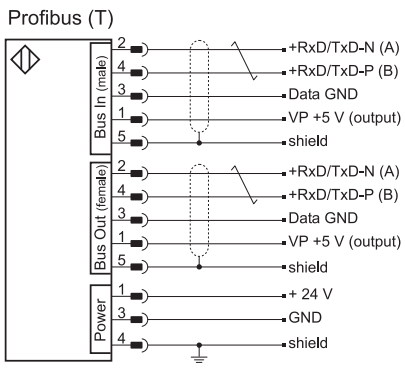
Profibus Wiring Diagram

S103 Connectors

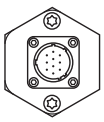


View of mating connector, wiring side

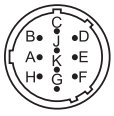
Profibus (T)



Quadrature Wiring Diagram

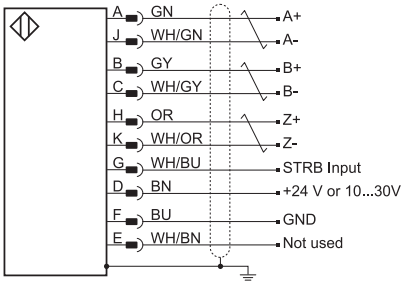


S140 Connector



View of mating connector, wiring side

Quadrature (Q)
24 V or 10...30V



Note: ⟍ = twisted-pair

B T L 5 - A 1 1 - M 0 3 0 5 - Z - S 3 2 - E 4 / U S
K A 0 5

Balluff Linear Transducer

Generation 5

Output Type

A = 0 to 10 Vdc	Q = Quadrature*
B = -5 to +5 Vdc	I = Differential start/stop with tri-state
C = 0 to 20 mA	K = Differential stop - leading edge active
E = 4 to 20 mA	L = Differential pulse - width modulated
F = Setpoint*	M = Differential start/stop - leading edge active
G = -10 to +10 Vdc	N = Single ended start/stop - leading edge (add/US)
S = SSI*	P = Differential start/stop - trailing edge active
T = Profibus*	R = Differential pulse-width - recirculated
H = CANopen*	

Supply Voltage
1 = 24 Vdc ±20%
2 = ±15 Vdc ±2% (Not available for S, T, H or F output types)
5 = 10...30 Vdc (Not available for T & H output types; not available for SSI "B")

Analog Output Operation (blank for digital)
Voltage output (Output type A, B & G)
1 = User selectable rising or falling
Current output (Output type C & E)
0 = Minimum output at connector end (rising towards opposite end)
7 = Maximum output at connector end (falling towards opposite end)

Stroke Length
0 3 0 5 = active stroke length (in mm)

Housing Type
Z = Standard Rod Style (3/4"x16-UNF mounting threads and 50.8 mm null zone) 10.2 mm dia. pressure tube
Z8 = Z Rod 8.0 mm dia. pressure tube (1016 mm max. length, 3600 psi max. pressure)
ZM = Rapid Replacement Module version of standard Z rod style. Rounded flange corners for clearance in hydraulic cylinder protective caps.
B = Metric Rod Style (M18x1.5 mounting threads and 30 mm null zone) 10.2 mm dia. pressure tube
B8 = Metric B Rod Style 8.0 mm dia. pressure tube (1016 mm max. length, 3600 psi max. pressure)
BM = Rapid Replacement Module version of B metric rod style. Includes rounded flange corners.

Connection Type
S 3 2 = 8-pin quick disconnect metal (standard) connector (see page 24 for mating cable)
K A 0 5 = Cable out (5 m standard; specify length in meters)
S 1 4 0 = MS connector (optional) (see pages 107-114 for mating cable)
(For additional connector options, refer to pages 107-114 in the connector options section)

Interrogation (only valid if output type = R, otherwise leave blank)
I = Internal interrogation, E = External interrogation

Recirculation (only valid if output type = R, otherwise leave blank)
1=1 circulation, 2 = 2 circulations, 3 = 3 circulations, 4 = 4 circulations, 6 = 6 circulations, 8 = 8 circulations, 10 = 10 circulations,16 = 16 circulations

N output only

/US = TTL - single ended Start/Stop - leading edge (US Standard)

Blank = TTL - single ended Start only - leading edge (European Standard)

*See additional ordering information on pages 18-21.

Standard Stroke Lengths, Inches (mm) (consult factory for additional lengths)

1	(0025)	9	(0230)	22	(0560)	48	(1220)	89	(2261)	156[A]	(3962)	192	(4877)
2	(0051)	10	(0254)	24	(0610)	50	(1270)	98	(2490)	160	(4064)	196	(4978)
3	(0076)	11	(0280)	26	(0661)	54	(1372)	108	(2743)	164	(4166)	200	(5080)
3.5	(0090)	12	(0305)	28	(0711)	60	(1524)	118	(2997)	168	(4267)		
4	(0102)	13	(0330)	30	(0762)	66	(1676)	126	(3200)	172	(4369)		
5	(0127)	15	(0381)	32	(0813)	69	(1753)	140	(3556)	176	(4470)		
6	(0152)	16	(0407)	36	(0914)	72	(1829)	144	(3658)	180[B]	(4572)		
7	(0178)	18	(0457)	40	(1016)	78	(1981)	148	(3759)	184	(4674)		
8	(0203)	20	(0508)	42	(1067)	84	(2134)	152	(3861)	188	(4775)		

[A] Maximum length for SSI, Profibus, CANopen = 156 inches.

[B] Maximum length for analog outputs = 180 inches.

cowan dynamics

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TOLL-FREE: **855-341-3415**

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Mississauga, Ontario L4Z 1P3
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TOLL-FREE: **855-341-3415**
E-MAIL: **info@cowandynamics.com**

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