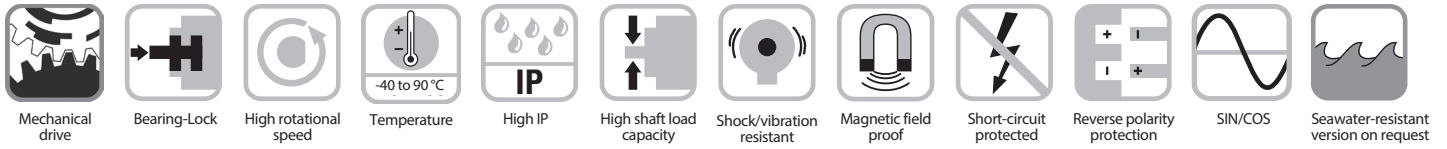


Absolute, Multiturn Type RM-28 (Shaft) / RM-35 (Hollow Shaft)

SSI/BiSS-C



Reliable

- **Increased ability to withstand vibration and installation errors.** Sturdy Bearing-Lock design structure eliminates machine downtime and repairs.
- **Fewer components and connection points increase the operational reliability:** Turck OptoASIC technology with highest integration density (Chip-on-Board).
- Die cast housing and protection up to IP67: **Remains sealed even when subjected to harsh everyday use.**
- Wide temperature range.
- **Easy diagnosis in case of fault condition.** Status indication by means of LED, sensor, voltage and temperature monitoring.



Absolute



Versatile

- **Connections for every application:** M12, M23 and cable connector.
- **Open interfaces ensure flexibility and independence:** SSI or BiSS-C with Sine-Cosine-Option incremental track RS422.
- Multiple mounting brackets for easy installation.
- Status LED and set key available.
- **Quick, simple on site start-up:** Set key or preset by means of a control input.

Fast

- **High accuracy:** Update rate of the whole position value above 100 kHz.
- **High productivity due to very short regulation cycles:** Clock rate with SSI up to 2 MHz, with BiSS-C up to 10 MHz.
- **High-resolution feedback system achievable in real-time:** SinCos incremental outputs.

Mechanical Characteristics:

Shaft version:	
Max. speed without shaft sealing (IP65) up to 158 °F (70 °C):	12,000 RPM, continuous 10,000 RPM
Max. speed without shaft sealing (IP65) up to Tmax:	8,000 RPM, continuous 5,000 RPM
Max. speed with shaft sealing (IP67) up to 158 °F (70 °C):	11,000 RPM, continuous 9,000 RPM
Max. speed with shaft sealing (IP67) up to Tmax:	8,000 RPM, continuous 5,000 RPM
Hollow shaft version:	
Max. speed without shaft sealing (IP65) up to 158 °F (70 °C):	9,000 RPM, continuous 6,000 RPM
Max. speed without shaft sealing (IP65) up to Tmax:	6,000 RPM, continuous 3,000 RPM
Max. speed with shaft sealing (IP67) up to 158 °F (70 °C):	8,000 RPM, continuous 4,000 RPM
Max. speed with shaft sealing (IP67) up to Tmax:	4,000 RPM, continuous 2,000 RPM
Starting torque without shaft seal (IP65):	Shaft version: < 1.4 oz-in (< 0.01 Nm) Hollow shaft version: < 4.25 oz-in (< 0.03 Nm)
Starting torque with shaft seal (IP67):	< 7 oz-in (< 0.05 Nm)
Moment of inertia:	Shaft version: 0.219 oz-in ² (4.0 x 10 ⁻⁶ kgm ²) Hollow shaft version: 0.383 oz-in ² (7.0 x 10 ⁻⁶ kgm ²)
Radial load capacity of shaft:	18 lbs (80 N)
Axial load capacity of shaft:	9 lbs (40 N)
Weight:	approx. 1 lb (0.45 kg)
Protection acc. to EN 60 529:	Housing: IP67, Shaft: IP65, opt. IP67
Working temperature:	-40 to +194 °F (-40 to +90 °C) ¹⁾
Materials:	Shaft: stainless steel, Flange: aluminum, Housing: die cast zinc, Cable: PVC
Shock resistance acc. to DIN-IEC 68-2-27:	> 250 g (> 2,500 m/s ²), 6 ms
Vibration resistance acc. to DIN-IEC 68-2-6:	> 10 g (> 100 m/s ²), 55-2,000 Hz

¹⁾ Cable versions: -22 to +167 °F (-30 to +75 °C)

Rotary Position Technology

Absolute Encoders, Multiturn

Absolute, Multiturn Type RM-28 (Shaft) / RM-35 (Hollow Shaft)

SSI/BiSS-C

General Electrical Characteristics:

Supply voltage:	5 VDC +5% or 10-30 VDC
Current consumption (without output load):	5 VDC: max. 80 mA, 10-30 VDC: max. 50 mA
Reverse polarity protection at power supply (+V):	Yes (only 10-30 VDC)
RoHS compliant according to EU guideline 2011/65/EU	
UL approval:	file E356899

General Interface Characteristics:

Output driver:	RS485 Transceiver type
Permissible load/channel:	max. 20 mA
Signal level high:	typ. 3.8 V
Signal level low at	typ. 1.3 V, $I_{load} = 20 \text{ mA}$:
Short-circuit protected:	Yes ¹⁾

Interface Characteristics SSI:

Singleturn resolution:	10-14 bits and 17 bits ²⁾
Number of revolutions:	4096 (12 bits)
Code:	Binary or Gray
SSI clock rate:	≤ 14 bits: 50 kHz-2 MHz ≥ 15 bits: 50 kHz -125kHz
Monoflop time:	≥ 15 μs

Note:

If clock starts cycling within monoflop time, a second data transfer starts with the same data. If clock starts cycling after monoflop time, the data transfer starts with updated values. The update rate is dependent on clock speed, data length and monoflop time.

Data refresh rate:	< 1 μs up to 14 bits, 4 μs for 15-17 bits
Status and Parity bit:	optional on request

Interface Characteristics BiSS-C:

Singleturn resolution:	10-14 bits and 17 bits, customer programmable ²⁾
Number of revolutions:	4096 (12 bits)
Code:	Binary
Clock rate:	up to 10 MHz
Max. update rate:	< 10 μs, depending on clock rate and data length
Data refresh rate:	≤ 1 μs

Note:

- Bidirectional, programmable parameters are: resolution, code, direction, alarms and warnings
- Multicycle data output (e.g., for temperature)
- CRC data verification

¹⁾ Short-circuit to 0 V or to output, one channel at a time, supply voltage correctly applied

²⁾ Other options upon request

SET (zero or defined value) and Direction (CW/CCW) Control Inputs

Input:	High active
Input type:	Comparator
Signal level high:	min. 60% of V+ (Supply voltage), max: V+
Signal level low:	max. 25% of V+ (Supply voltage)
Input current:	< 0.5 mA
Min. pulse duration (SET):	10 ms
Timeout after SET input:	14 ms
Reaction Time (DIR input):	1 ms

The encoder can be set to zero at any position by means of a HIGH signal on the SET input or by pressing the optional SET key. Other preset values may be factory programmed. The SET input has a signal delay time of approximately 1 ms. Once the SET function has been triggered, the encoder requires an internal processing time of approximately 15 ms before the new position data can be read. During this time the LED is ON and the status output is at LOW.

Status Output and LED

Output driver:	Open collector, internal pull up resistor 22 kOhm
Permissible load:	Max. 20 mA
Signal level high:	+V
Signal level low:	< 1 V
Active at:	Low

The optional LED (red) and the status output serve to display various alarm or error messages. In normal operation the LED is OFF and the status output is HIGH (open-collector with int. pull-up 22 k).

If the LED is ON (status output LOW) this indicates:

- Sensor error, singleturn or multiturn (soiling, glass breakage etc.)
- LED error, failure or aging
- Over- or under-temperature

In the SSI mode, the fault indication can only be reset by switching off the power-supply to the device.

DIR Input

A HIGH signal switches the direction of rotation from the default CW to CCW. This inverted function can also be factory-programmed. If direction is changed when the device is already switched on, then this will be interpreted as an error. The LED will come ON and the status output will switch to LOW.

Power-On Delay

After Power-ON the device requires a time of approx. 150 ms before valid data can be read.

Option Incremental Output (A/B), 2048 PPR:

	SinCos	RS422 TTL-compatible
-3dB frequency:	400 kHz	400 kHz
Signal level:	1 Vpp (+ 20%)	High: min. 2.5 V Low: max. 0.5 V
Short-circuit proof:	Yes	Yes

Absolute, Multiturn Type RM-28 (Shaft) / RM-35 (Hollow Shaft)

SSI/BiSS-C

Standard Wiring:

Output Circuit *C and *F (2 Control Inputs, 1 Status Output) (Connection C*1M or 12M23*)

Connection Type:	Common (0 V)	+V	+Clock	-Clock	+Data	-Data	ST	DIR	Status	NC	NC	NC	PE
M23 Multifast:	1	2	3	4	5	6	7	8	9	10	11	12	PH
Cable:	WH	BN	GN	YE	GY	PK	BU	RD	BK	-	-	-	Shield

Output Circuit *H (2 Control Inputs, 1 Status Output, Voltage Monitor Outputs) (Connection C*1M or 12M23*)

Connection Type:	Common (0 V)	+V	+Clock	-Clock	+Data	-Data	ST	DIR	Status	NC	0 V Sens	+V Sens	PE
M23 Multifast:	1	2	3	4	5	6	7	8	9	10	11	12	PH
Cable:	WH	BN	GN	YE	GY	PK	BU	RD	BK	-	GY/PK	RD/BU	Shield

Output Circuit *E, *G, *K or *L (2 Control Inputs, Incremental Track or Sine/Cosine) (Connection C*1M or 12M23*)

Connection Type:	Common (0 V)	+V	+Clock	-Clock	+Data	-Data	ST	DIR	Sin A	Sin inv A-	Cos B	Cos inv B-	PE
M23 Multifast:	1	2	3	4	5	6	7	8	9	10	11	12	PH
Cable:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY/PK	RD/BU	Shield

Output Circuit *J and *M (Sine/Cosine, Incremental Monitor or Voltage Outputs) (Connection C*1M or 12M23*)

Connection Type:	Common (0 V)	+V	+Clock	-Clock	+Data	-Data	Sin A	Sin inv A-	Cos B	Cos inv B-	0 V Sens	+V Sens	PE
M23 Multifast:	1	2	3	4	5	6	7	8	9	10	11	12	PH
Cable:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY/PK	RD/BU	Shield

Output Circuit *C and *F (2 Control Inputs) (Connection H1*81)

Connection Type:	Common (0 V)	+V	+Clock	-Clock	+Data	-Data	ST	DIR	PE
M12 Eurofast:	1	2	3	4	5	6	7	8	PH

Wiring Diagrams:

Male Encoder View	
<p>M12 Eurofast Pinout</p> <p>Mating Cordset: E-RKC 8T-264-*</p>	<p>M23 Multifast Pinout</p> <p>Mating Cordset: E-CKM 12-1687-*/A</p>

* Length in meters.



Encoder with tangential cable outlet



Safe operation in strong magnetic fields
Special gears with specific toothings

Rotary Position Technology

Absolute Encoders, Multiturn

Absolute, Multiturn Type RM-28 (Shaft) / RM-35 (Hollow Shaft)

SSI/BiSS-C

Part Number Key: RM-28 Shaft Version

A	B	C		D	E		F		G
RM-28S	6	C	-	5F	22B	-	H1181	/	N16

A	Type
RM-28S	Ø 58 mm, Shaft, IP67 Shaft Seal
RM-28T	Ø 58 mm, Shaft, IP65 Shaft Seal

B	Shaft (Ø x L)
6	Ø 6 mm x 10 mm
10	Ø 10 mm x 20 mm
A0	Ø 1/4" x 7/8"
A1	Ø 3/8" x 7/8"

C	Flange
C	Ø 58 mm Clamping Flange
S	Ø 58 mm Servo Flange
S0	Ø 2.5" Servo Flange
R	2.5" Square Flange

E	Resolution ¹⁾
22B	10 bits ST + 12 bits MT
23B	11 bits ST + 12 bits MT
24B	12 bits ST + 12 bits MT
25B	13 bits ST + 12 bits MT
26B	14 bits ST + 12 bits MT
29B	17 bits ST + 12 bits MT

¹⁾ Resolution, Preset Value and Counting Direction Factory-Programmable

F	Type of Connection
H1181	Radial 8-pin M12 Eurofast Connector ²⁾
H1481	Axial 8-pin Eurofast Connector ²⁾
12M23	Radial 12-pin M23 Multifast Connector
12M23A	Axial 12-pin M23 Multifast Connector
C1M	Radial Cable (1 m PVC)
CA1M	Axial Cable (1 m PVC)

²⁾ Only Available with Output Type *C and *F

G	Options
(BLANK)	SET Button and Status LED (Standard)
N16	No Option
N43	Status LED

D	Voltage Supply and Output Type			
	SSI (B)	SSI (G)	BiSS-C	Features
5 V	5F	3F	DF	2048 PPR SinCos Voltage Monitoring 2048 PPR SinCos Plus Voltage Monitoring 2048 PPR Incr., RS422 (TTL-Compatible) 2048 PPR Incr., RS422 (TTL-Compatible) Plus Voltage Monitoring
	5E	3E	DE	
	5H	3H	DH	
	5J	3J	DJ	
	5K	3K	DK	
	5M	3M	DM	
10-30 V	5C	3C	DC	2048 PPR SinCos 2048 PPR Incr., RS422
	5G	3G	DG	
	5L	3L	DL	

(B) = Binary, (G) = Gray

Accessories:

- See page H1, Connectivity, for cables and connectors
- See page G1, Accessories, for mounting attachments and couplings

Absolute, Multiturn Type RM-28 (Shaft) / RM-35 (Hollow Shaft)

SSI/BiSS-C

Part Number Key: RM-35 Hollow Shaft Version

A	B	C		D	E		F		G
RM-35H	10	T	-	5F	22B	-	H1181	/	N16

A	Type
RM-35H	Ø 58 mm, Hollow Shaft, IP67 Shaft Seal
RM-35I	Ø 58 mm, Hollow Shaft, IP65 Shaft Seal

B	Bore
10	Ø 10 mm
12	Ø 12 mm
14	Ø 14 mm
15	Ø 15 mm
A1	Ø 3/8"
A3	Ø 1/2"

C	Flange
T	Ø 50 mm Flange w/ Torque Stop
E	Ø 63 mm Flange w/ Slotted Flex Mount
E1	Ø 65 mm Flange w/ Flex Mount

E	Resolution ¹⁾
22B	10 bits ST + 12 bits MT
23B	11 bits ST + 12 bits MT
24B	12 bits ST + 12 bits MT
25B	13 bits ST + 12 bits MT
26B	14 bits ST + 12 bits MT
29B	17 bits ST + 12 bits MT

¹⁾ Resolution, Preset Value and Counting Direction Factory-Programmable

F	Type of Connection
H1181	Radial 8-pin M12 Eurofast Connector ²⁾
12M23	Radial 12-pin M23 Multifast Connector
C1M	Radial Cable (1 m PVC)
CT1M	Tangential Cable (1 m PVC)

²⁾ Only Available with Output Type *C and *F

G	Options
(BLANK)	SET Button and Status LED (Standard)
N16	No Option
N43	Status LED

D	Voltage Supply and Output Type			
	SSI (B)	SSI (G)	BiSS-C	Features
5 V	5F	3F	DF	2048 PPR SinCos Voltage Monitoring 2048 PPR SinCos Plus Voltage Monitoring 2048 PPR Incr., RS422 (TTL-Compatible) 2048 PPR Incr. RS422 (TTL-Compatible) Plus Voltage Monitoring
	5E	3E	DE	
	5H	3H	DH	
	5J	3J	DJ	
	5K	3K	DK	
	5M	3M	DM	
10-30 V	5C	3C	DC	2048 PPR SinCos 2048 PPR Incr., RS422
	5G	3G	DG	
	5L	3L	DL	

(B) = Binary, (G) = Gray

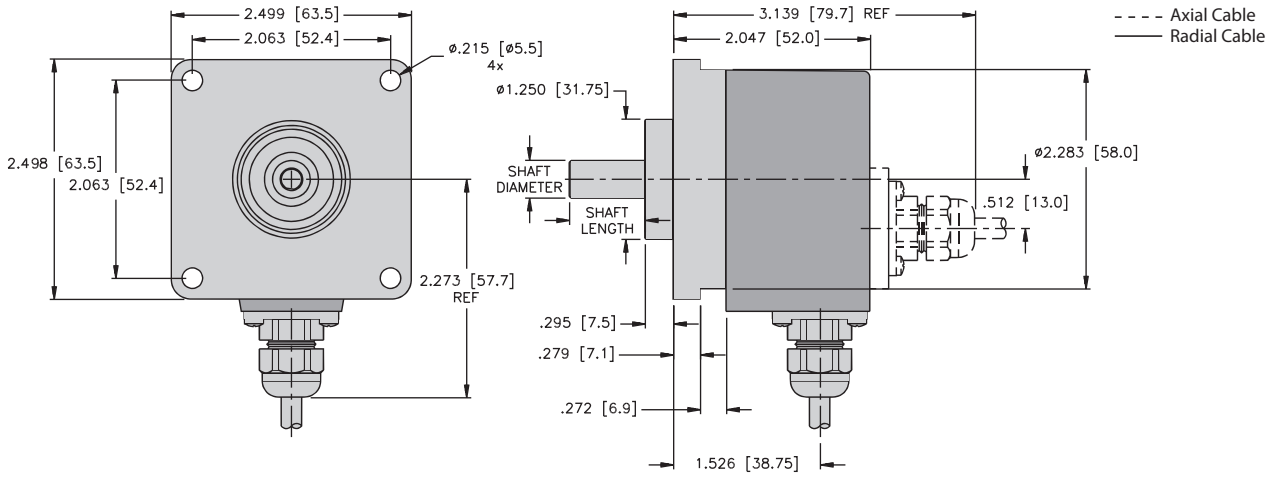
Accessories:

- See page H1, Connectivity, for cables and connectors
- See page G1, Accessories, for mounting attachments and couplings

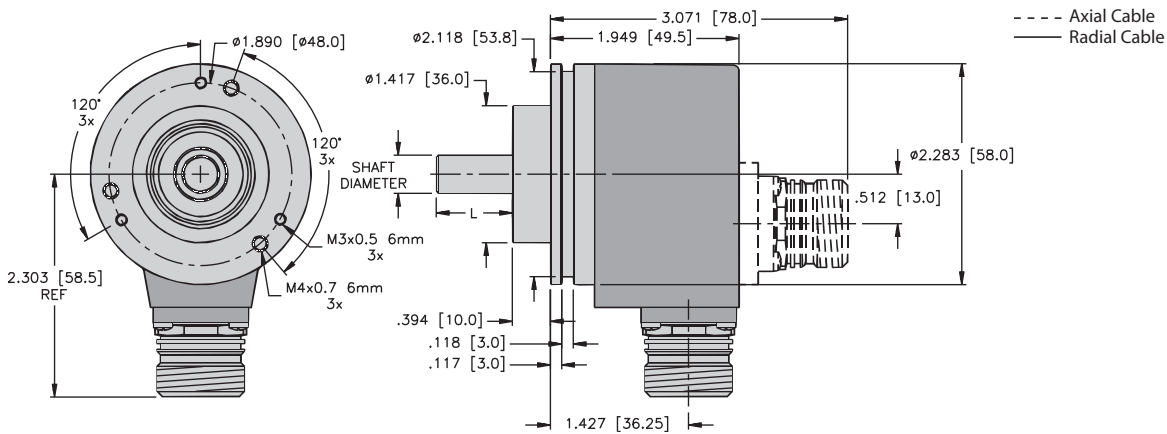
Absolute, Multiturn Type RM-28 (Shaft) / RM-35 (Hollow Shaft) SSI/BiSS-C

Dimensions: RM-28 Shaft Version

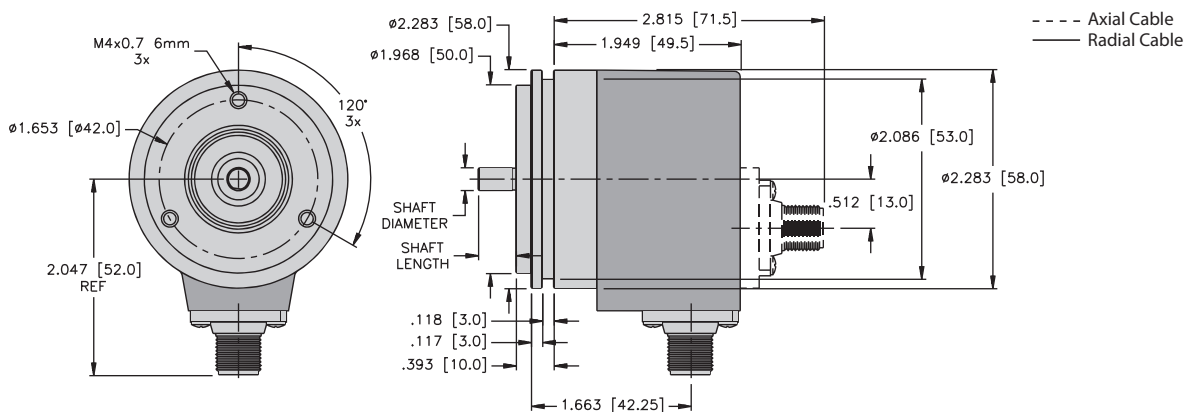
RM-28 Flange R Connection C*1M



RM-28 Flange C Connection 12M23*



RM-28 Flange S Connection H1*81

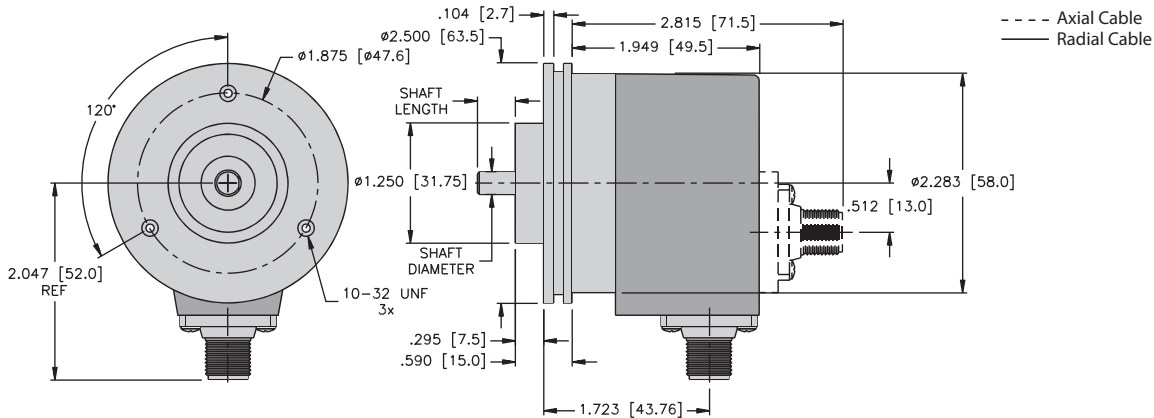


Absolute, Multiturn Type RM-28 (Shaft) / RM-35 (Hollow Shaft)

SSI/BiSS-C

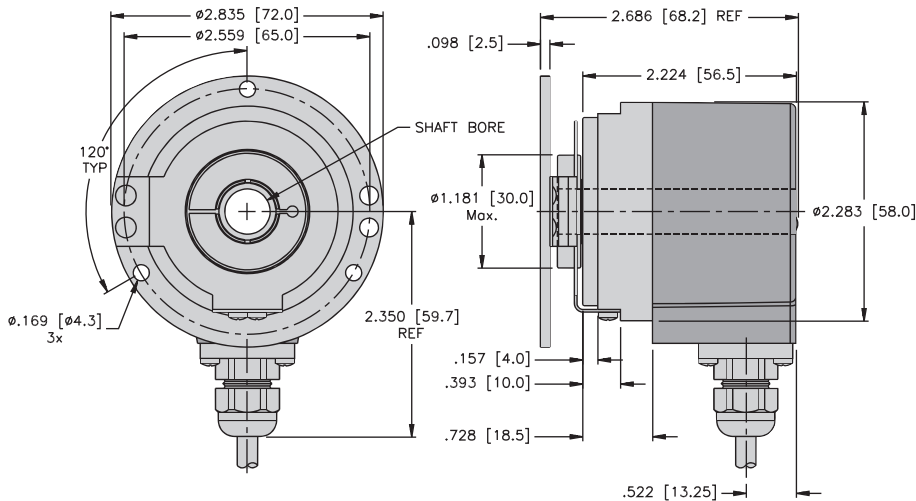
Dimensions: RM-28 Shaft Version

**RM-28 Flange S0
 Connection H1*81**

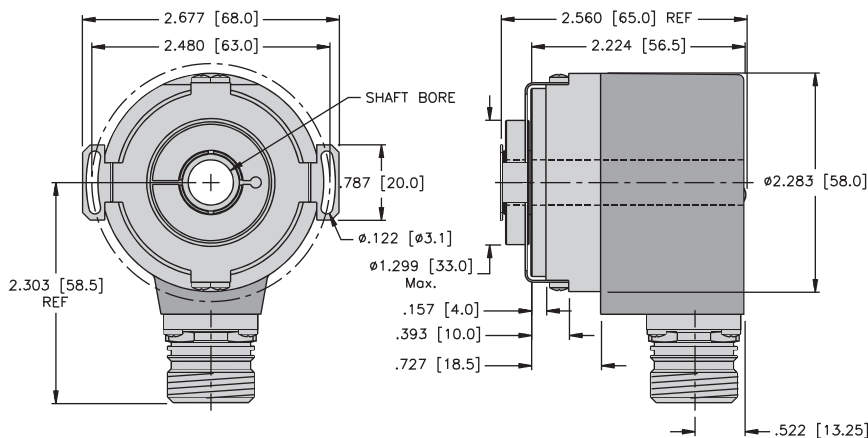


Dimensions: RM-35 Hollow Shaft Version

**RM-35 Flange E1
 Connection C1M**

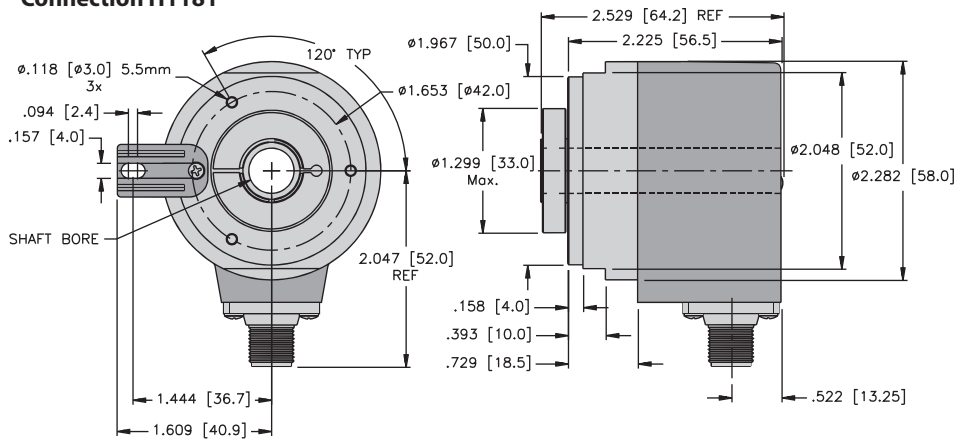


**RM-35 Flange E
 Connection 12M23**



Dimensions: RM-35 Hollow Shaft Version

RM-35 Flange T Connection H1181



RM-35 Flange T Connection CT1M

