Absolute, Singleturn Type RS-44 (Shaft) / RS-48 (Blind / Hollow Shaft) SSI/BiSS-C

Bearing-Lock | High rotational speed | Temperature | High IP | High shaft load capacity | Shock/vibration resistant | Magnetic field proof | Short-circuit protected | Reverse polarity protection | SIN/COS | Optical sensor | Seawater-resistant version on request

Reliable

- **Increased ability to withstand vibration and installation errors.** Sturdy Bearing-Lock Design bearing 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 of -40 to +194 °F (-40 to +90 °C).
- **Easy diagnosis in case of fault condition.** Status indication by means of LED, sensor, voltage and temperature monitoring.

Absolute

Fast

- **High accuracy:** Update rate of the whole position value above 100 kHz for a max. jitter of 1 µs (real-time).
- **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.

Versatile

- **Connections for every application:** Tangential cable or M12 connector.
- **Open interfaces ensure flexibility and independence:** SSI or BiSS-C with Sine-Cosine-Option incremental track RS422.
- Multiple mounting brackets for easy installation.
- **Compact design.**
- **Fast and easy start-up on site:** Preset and reversal of rotation direction by control inputs.
- **Direct mounting on standard diameter shafts up to 10 mm** through hollow shaft up to 8 mm.

Mechanical Characteristics:

Max. speed: IP65 shaft or blind hollow shaft version: IP67 shaft version or IP65 hollow shaft version:	 12,000 RPM, continuous operation 10,000 RPM 10,000 RPM, continuous operation 8,000 RPM
Starting torque without shaft sealing:	< 1 oz-in (< 0.007 Nm)
Starting torque with shaft sealing:	< 1.4 oz-in (< 0.01 Nm)
Radial load capacity of shaft:	9 lbs (40 N)
Axial load capacity of shaft:	4.5 lbs (20 N)
Weight:	approx. 0.44 lbs (0.2 kg)
Protection acc. to EN 60 529:	Housing: IP67, Shaft: IP65, opt. IP67
Working temperature:	-40 to +194 °F (-40 to +90 °C)
Materials:	Shaft/Hollow shaft: stainless steel, Flange: aluminum, Housing: die cast zinc, Cable: PUR
Shock resistance acc. to DIN-IEC 68-2-27:	> 250 g (> 2,500 m/s²), 6 ms
Vibration resistance acc. to DIN-IEC 68-2-6:	> 10 g (>100 m/s²), 55-2,000 Hz

Absolute, Singleturn Type RS-44 (Shaft) / RS-48 (Blind / 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. 60 mA, 10-30 VDC: max. 30 mA
Reverse polarity protection at power supply (+V):	yes
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. ±30 mA
Signal level high:	typ. 3.8 V
Signal level low at I_{load} = 20 mA:	typ. 1.3 V
Short-circuit protected outputs:	yes [1]

Interface Characteristics SSi:

Singleturn resolution:	10-17 bit
Code:	Binary or Gray
SSI clock rate:	≤ 14 bit: 50 kHz-2 MHz ≥ 15 bit: 50 kHz-125 kHz
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. Max. update rate is dependent on clock speed, data length and monoflop time.

Time jitter (data request to position latch):	≤ 1 µs up to 14 bits, 4 µs up to 15-17 bits
Status and Parity bit:	optional on request

Interface Characteristics BiSS-C:

Singleturn resolution:	10-17 bit
Code:	Binary
Clock rate:	up to 10 MHz
Max. update rate:	< 10 µs, depending on clock speed and data length
Time jitter (data request to position latch):	≤ 1 µs

Note:
- Bidirectional, programmable parameters are: resolution, code, direction, alarms and warnings
- CRC data verification

Incremental Output (A/B) 2048 ppr:

	Sin/Cos	RS 422 (TTL compatible)
Max. -3dB frequency:	400 kHz	400kHz
Signal level:	1 Vpp (±20%)	high: min. 2.5 V low: max. 0.5 V
Short-circuit proof:	yes [1]	yes [1]

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

SET Input:

Input characteristics:	active HIGH
Input type:	comparator
Signal level high:	min. 60% of V+ (supply voltage), max: V+
Signal level low:	max. 30% of V+ (supply voltage)
Input current:	< 0.5 mA
Min. pulse duration (SET):	10 ms
Input delay:	1 ms
New position data readable after:	1 ms
Internal processing time:	200 ms

The encoder can be set to zero at any position by means of a HIGH signal on the SET input. Other preset values can 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 200 ms before the new position data can be read. During this time the supply voltage must not be switched off. The set function should only be carried out when the encoder is at rest.

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 DIR 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.

Status Output:

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 status output serves to display various alarm or error messages. In normal operation the status output is HIGH (open-collector with int. pull-up 22k).

An active status output (LOW) indicates:
- LED error (failure or aging)
- Over temperature
- Undervoltage

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

Power-On Delay:

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

Absolute, Singleturn Type RS-44 (Shaft) / RS-48 (Blind / Hollow Shaft) SSI/BiSS-C

Standard Wiring:

Output *C & *F (SSI or BiSS-C, SET, DIR, Status) (Connection CT*M)

Connection Type:	Common (0 V)	+V	+Clock	-Clock	+Data	-Data	SET	DIR	Status	PE
Cable:	WH	BN	GN	YE	GY	PK	BU	RD	VT	Shield

Output *C & *F (SSI or BiSS-C, SET, DIR) (Connection H1481)

Connection Type:	GND	+V	+Clock	-Clock	+Data	-Data	SET	DIR	Sheild/PE
M12 Eurofast	1	2	3	4	5	6	7	8	PH

Output *E & *G (SSI or BiSS-C, SET, DIR, 2048 Sin/Cos) (Connection CT*M)

Connection Type:	GND	+V	+Clock	-Clock	+Data	-Data	SET	DIR	A	A inv	B	B inv	PE
Cable:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY/PK	RD/BU	Shield

Output *H (SSI or BiSS-C, SET, DIR, Voltage Sense Outputs) (Connection CT*M)

Connection Type:	GND	+V	+Clock	-Clock	+Data	-Data	SET	DIR	0 V sens	+V sens	PE
Cable:	WH	BN	GN	YE	GY	PK	BU	RD	VT	RD/BU	Shield

Output *J (SSI or BiSS-C, SET, DIR, 2048 Sin/Cos, Voltage Sense Outputs) (Connection CT*M)

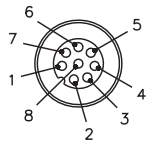
Connection Type:	GND	+V	+Clock	-Clock	+Data	-Data	0 V sens	+V sens	A	A inv	B	B inv	PE
Cable:	WH	BN	GN	YE	GY	PK	BU	RD	BK	VT	GY/PK	RD/BU	Shield

Output *K & *L (SSI or BiSS-C, SET, DIR, 2048 inc. RS422) (Connection CT*M)

Connection Type:	GND	+V	+Clock	-Clock	+Data	-Data	A	A inv	B	B inv	PE
Cable:	WH	BN	GN	YE	GY	PK	BK	VT	GY/PK	RD/BU	Shield

Wiring Diagrams:

Male Encoder View



M12 Eurofast Pinout

Mating Cordset:
E-RKC 8T-264-*

* Length in meters.

Absolute, Singleturn Type RS-44 (Shaft) / RS-48 (Blind / Hollow Shaft) SSI/BiSS-C

Part Number Key: RS-44 Shaft Version

A	B	C		D	E		F
RS-44S	6	C	-	5F	10B	-	H1481

A	Type
RS-44S	Ø 39 mm, Shaft, IP67 Shaft Seal
RS-44T	Ø 39 mm, Shaft, IP65 Shaft Seal

B	Shaft (Ø x L)
6	Ø 6 mm x 12.5 mm
8	Ø 8 mm x 15 mm
10	Ø 10 mm x 20 mm
A0	Ø 1/4'' x 12.5 mm
A1	Ø 3/8'' x 5/8''

C	Flange
C	Ø 36 mm Clamping Flange
S	Ø 36 mm Servo Flange

E	Resolution
10B	10 bit ST
12B	12 bit ST
13B	13 bit ST
14B	14 bit ST
17B	17 bit ST

F	Type of Connection
H1481	Axial 8-pin M12 Eurofast Connector*
CT1M	Tangential Cable (1 m PUR)
CT5M	Tangential Cable (5 m PUR)

* Only Available with Output '*F' and '*C'

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

(B) = Binary, (G) = Gray

Accessories:

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

Absolute, Singleturn Type RS-44 (Shaft) / RS-48 (Blind / Hollow Shaft) SSI/BiSS-C

Part Number Key: RS-48 Blind / Hollow Shaft Version

A	B	C		D	E		F
RS-48B	6	E	-	5F	10B	-	H1481

A	Type
RS-48B	Ø 39 mm, Blind Hollow Shaft, IP65 Shaft Seal
RS-48H	Ø 39 mm, Hollow Shaft, IP65 Shaft Seal

B	Bore
6	Ø 6 mm
8	Ø 8 mm
10	Ø 10 mm* (14.5 mm Insertion Depth)
A0	Ø 1/4"

* Only available with RS-48B

C	Flange
E	Ø 36 mm Flange w/ Slotted Flex Mount
T	Ø 36 mm Flange w/ Long Torque Stop
T1	Ø 36 mm Flange w/ Short Torque Stop

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

(B) = Binary, (G) = Gray

E	Resolution
10B	10 bit ST
12B	12 bit ST
13B	13 bit ST
14B	14 bit ST
17B	17 bit ST

F	Type of Connection
H1481	Axial 8-pin M12 Eurofast Connector*
CT1M	Tangential Cable (1 m PUR)
CT5M	Tangential Cable (5 m PUR)

* Only available with output '*F' and '*C'

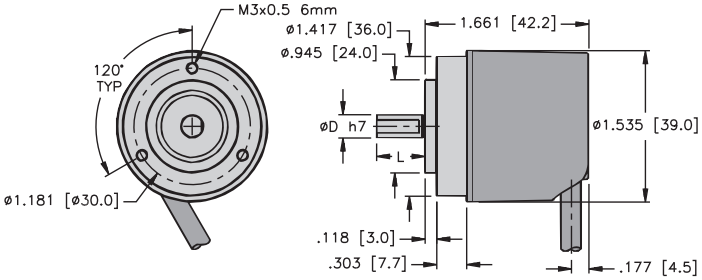
Accessories:

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

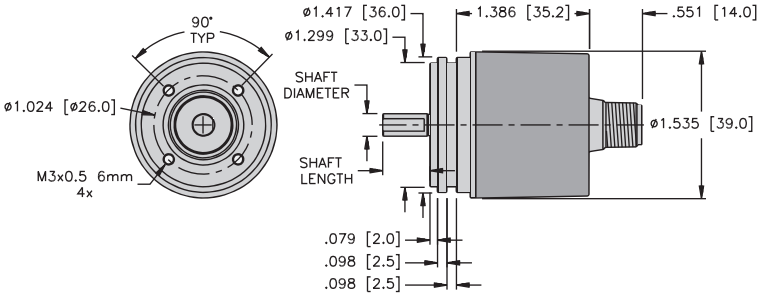
Absolute, Singleturn Type RS-44 (Shaft) / RS-48 (Blind / Hollow Shaft) SSI/BiSS-C

Dimensions: RS-44 Shaft Version

RS-44 Flange C
Connection CT*M



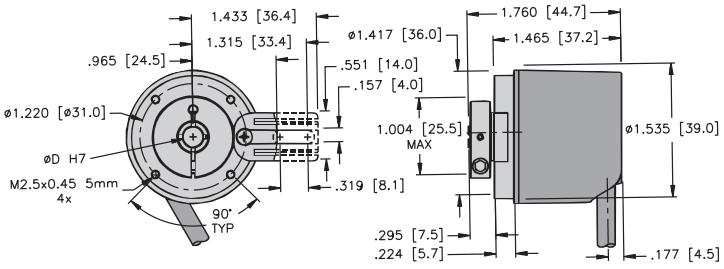
RS-44 Flange S
Connection H1481



Mounting Advice:
The flanges and shafts of the encoder and drive should not be rigidly coupled together at the same time. We recommend the use of suitable couplings (see page G1, Accessories).

Dimensions: RS-48 Hollow Shaft Version

RS-48 Flange T1 & T (dotted)
Connection CT*M



RS-48 Flange E (Blind Hollow Shaft)
Connection H1481