Rotary Joint || BN 637424

Contactless Data Transmission + Slip Ring

The contactless data channels, realized by rotating capacitive couplers, offer improved lifetime without the need for maintenance. All rotating electronic devices are supplied through the slip ring.
The real-time ethernet contactless data types are protocol independent (only using OSI-Layer 1) and suitable for nearly all 100BASE-TX based industrial ethernet standards.

ETHERNET POWERLINK
PROFINET
EtherCAT
SERCOS III
EtherNet/IP
VARAN
IEEE-1588 v2 (PTP)

Available configurations

Contactless data (Type)	
Type	
1	1000BASE-T Ethernet
3	CAN-Channel (Repeater 500 kbps)
4	1 Channel ethernet for real-time applications 100BASE-TX, full duplex
5	1 Channel ethernet for real-time applications 100BASE-TX, half duplex
7	2 Channel ethernet (multiplexed) for real-time applications 100BASE-TX, full duplex
8	2 Channel ethernet (multiplexed) for real-time applications 100BASE-TX, half duplex

Slip ring (Type)	
Type	
I	Standard configuration

Transmission Type 1:

1000BASE-T Ethernet-Channel	One contactless coupler for one channel
Supported Ethernet Standards	10BASE-T (IEEE802.3 Clause 14) 100BASE-TX (IEEE802.3 Clause 25) 1000BASE-T (IEEE802.3 Clause 40) Auto negotiation provided to select Ethernet-Standard and full / half duplex mode automatically
OSI Layer operation	Layer 1 – 2
Supported Protocols	Not for real-time ethernet applications
Ethernet Frame Loss Ratio According to RFC2544	≤ 1 x 10^{-9} Measured for 800s with 64 byte frames at 99% channel utilization, corresponds to BER ≤ 1 x 10^{-12}
Data Interface Connection	Cat.6A S/FTP 4x2xAWG26/7 (PiMF) at Body and Hollow shaft side

Transmission Type 3:

CAN-Channel	One contactless coupler for one channel
Supported CAN Standards	ISO 11898-1:2003
CAN-functionality	Repeater (fast mode)
Data Rate, max.	500 kbps
Alarm Signal	Open Collector output $V_{CE} \leq 40V$, $I_C < 10mA$ Active if no failure detected Current has to be limited externally
Data and Alarm Signal Connection	Cat.6A S/FTP 4x2xAWG26/7 (PiMF) at Body and Hollow shaft side

Transmission Type 4 + Type 5:

100BASE-TX Ethernet Channel	One signal channel provided	
	Type 4	**Type 5**
Supported Ethernet Standards	100BASE-TX (IEEE802.3 Clause 25), autonegotiation (full duplex only)	100BASE-TX (IEEE802.3 Clause 25), autonegotiation (half duplex only)
Supported Protocols	Real-time ethernet protocols	
OSI Layer operation	Layer 1 (physical)	
Ethernet Frame Loss Ratio According to RFC2544	$\leq 1 \times 10^{-9}$ Measured for 8000s with 64 byte frames at 99% channel utilization, corresponds to BER $\leq 1 \times 10^{-12}$	
Data Interface Connection	Cat.6A S/FTP 4x2xAWG26/7 (PiMF) at Body and Hollow shaft side	

Transmission Type 7 + Type 8:

100BASE-TX Ethernet Channel	Two signal channels over one contactless transmission channel, signals are multiplexed, no redundancy	
	Type 7	**Type 8**
Supported Ethernet Standards	100BASE-TX (IEEE802.3 Clause 25), autonegotiation (full duplex only)	100BASE-TX (IEEE802.3 Clause 25), autonegotiation (half duplex only)
Supported Protocols	Real-time ethernet protocols	
OSI Layer operation	Layer 1 (physical)	
Multiplexer	Time Domain Multiplexing	
Ethernet Frame Loss Ratio According to RFC2544	$\leq 1 \times 10^{-9}$ Measured for 8000s with 64 byte frames at 99% channel utilization, corresponds to BER $\leq 1 \times 10^{-12}$	
Data Interface Connection	Cat.6A S/FTP 4x2xAWG26/7 (PiMF) at Body and Hollow shaft side	

Slip ring characteristics

Type I - standard configuration			
Group designation	A	B	Case ground
Number of channels	1	4	1
Number of paths per channel	2	1	1
Remark	Necessary for internal contactless data power supply on body and hollow shaft (see “Operating condition”; 0 VDC internally connected to case ground)	For arbitrary use	-
Type of circuit	SELV	SELV	SELV
Signal type	Only permanent DC-Power, Not for signals	---	---
Current nom. (DC)	4 A + internal current consumption	4 A	6 A
Voltage min.	21.6 VDC	-	-
Voltage max.	28.8 VDC	50 VDC	-
End-to-end resistance, max.	100 mΩ +30 mΩ per 1000 mm cable length	100 mΩ +30 mΩ per 1000 mm cable length	150 mΩ
Cable Type Body	2 x 0.75 mm^2 LiYCY cable, shielded, outer diameter ~6.7 mm	4 x 0.75 mm^2 LiYCY cable, shielded, outer diameter ~7.6 mm	-
Cable Type Hollow shaft	2 x 0.75 mm^2 LiYCY cable, shielded, outer diameter ~6.7 mm	4 x 0.75 mm^2 LiYCY cable, shielded, outer diameter ~7.6 mm	-

Operating condition

External Power Supply	Power Supply has to be a SELV type acc. to IEC60950-1 The current must be externally limited to 10 A
Input Voltage, nom.	24 VDC; 0 VDC internally connected to case ground
Input Voltage Range	21.6 VDC to 28.8 VDC
Current Consumption, typ. / max.	0.33 A / 0.5 A @ 24 VDC supply voltage
Inrush Current	3 A (duration 2 ms)
Power Consumption, typ. / max.	8 W/ 12 W
Supply Voltage Connection	Slip Ring – Group A 2 x 0.75 mm^2 LiYCY cable, shielded, outer diameter ~6.7 mm

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Standards and directives

Applicable EU Directive	EMC Directive 2014/30/EU	
Applied standards	DIN EN 55032 (Class B)	Radio disturbance characteristics
	DIN EN 55024	Immunity characteristics

Mechanical characteristics

Rotating speed, max.	200 rpm
Life, min.	20 x 10^6 revolutions
Torque (room / min. temperature), max.	0.5 Nm / 0,8 Nm @ start-up 0.5 Nm / 0.8 Nm @ rotation
Interface loads, max.	No loads allowed
Case material	Aluminum alloy
Case surface finish	Chromate conversion coat
Weight, approx.	1.5 kg
Marking	Adhesive label

Environmental conditions

Operation	
Operating altitude, max.	3000 m
Ambient temperature range	-30 °C to +71 °C
Relative humidity, max.	95% (non-condensing)
IP protection level	IP60 per EN 60529
Maintenance	Not required
Storage	
Ambient temperature range	-40 °C to +85 °C
Relative humidity, max.	95% (non-condensing)

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Applicable documents

Drawing	See table “Ordering information”
Circuit diagram	637424CXXXX-CD (CXXXX according to order number)

Ordering information

Order number	Drawing	Data	Contactless data interface				Slip ring	Slip ring interface			
			Body	L1* / mm	Hollow shaft	L2* / mm		Body	L3* / mm	Hollow shaft	L4* / mm
637424C0001	Standard outline	Type 1	Connector RJ45	1400	Connector RJ45	1400	Type I	Flying leads	1400	Flying leads	1400
637424C0003	Standard outline	Type 3	Flying leads	1400	Flying leads	1400		Flying leads	1400	Flying leads	1400
637424C0004	Standard outline	Type 4	Flying leads	1400	Flying leads	1400		Flying leads	1400	Flying leads	1400
637424C0005	Standard outline	Type 5	Flying leads	1400	Flying leads	1400		Flying leads	1400	Flying leads	1400
637424C0007	Standard outline	Type 7	Connector RJ45	1400	Connector RJ45	1400		Flying leads	1400	Flying leads	1400
637424C0008	Standard outline	Type 8	Connector RJ45	1400	Connector RJ45	1400		Flying leads	1400	Flying leads	1400
637424C0100	Standard outline	Type 5	Connector M12**	350	Flying leads	5000		Connector 2x M8**	350	Flying leads	5000

** Cable length tolerance ±5%*
*** For connector type and pin assignment see circuit diagram*

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Standard Outline (all dimensions in millimeter)