

Rotary Joint | BN 637421

Contactless Data Transmission



637421 – Standard outline

The contactless data channels, realized by rotating capacitive couplers, offer improved lifetime without the need for maintenance.

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.

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

Available Configurations

Type	Description	Standard product ordering number
1	1000BASE-T Ethernet	637421C0001
3	CAN-Channel (Repeater 500 kbps)	637421C0003
4	1 Channel ethernet for real-time applications 100BASE-TX, full duplex	637421C0004
5	1 Channel ethernet for real-time applications 100BASE-TX, half duplex	637421C0005
7	2 Channel ethernet (multiplexed) for real-time applications 100BASE-TX, full duplex	637421C0007
8	2 Channel ethernet (multiplexed) for real-time applications 100BASE-TX, half duplex	637421C0008
9	PROFIBUS DP according to IEC 61158, 500 kbps	637421C0009
10	PROFIBUS DP according to IEC 61158, 12 Mbps	637421C0010

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	$\leq 1 \times 10^{-9}$ Measured 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 (or special cable type according to specific circuit diagram)

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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 (or special cable type according to specific circuit diagram)

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	$\leq 1 \times 10^{-9}$ Measured 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 (or special cable type according to specific circuit diagram)	

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	$\leq 1 \times 10^{-9}$ 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 (or special cable type according to specific circuit diagram)	

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Transmission Type 9 + Type 10:

Supported PROFIBUS Standard	PROFIBUS DP according to IEC 61158	
Signal Channel Characteristics	PROFIBUS DP, RS-485, Half duplex	
	Type 9	Type 10
Data Rate	500 kbps	12 Mbps
Data Format	UART (11 Bit, NRZ)	
Termination	Internal, permanently terminated	
Bit Delay	< 2 Bit	
Bit Distortion, Input	500 kbps \pm 3.5%	12 Mbps \pm 3.5%
Bit Distortion, Output	< 1%; Bit-Retiming	
Data Interface Connection	PROFIBUS cable 7.8 mm outer diameter at stator and rotor side; Shielded twisted pair 1x2xAWG24/19; 150 Ω \pm 10% impedance; (or special cable type according to specific circuit diagram)	

Operating condition

External Power Supply	Power Supply has to be a ES1 type acc. to DIN EN 62368-1 The current must be externally limited to 4 A
Input Voltage Range	21.6 V to 28.8 V DC; 0 V is connected to Case Ground internally
Current Consumption, typ. / max.	0.33 A / 0.5 A @ 24 V Supply Voltage
Inrush Current	3 A (duration 2 ms)
Power Consumption, typ. / max.	8 W / 12 W
Supply Voltage Connection	2 x 0.25 mm ² LiYCY cable, shielded, outer diameter ~3.9 mm, at Body and Hollow shaft side (or special cable type according to specific circuit diagram)

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

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Mechanical data

Rotating speed, max.	1000 rpm
Acceleration, max.	1500 rad/s ² (239 rounds/s ²)
Life, min.	200 x 10 ⁶ revolutions
MTBF	300 000 h
Torque (room / min. temperature), max.	0.2 Nm / 0.5 Nm @ start-up 0.2 Nm / 0.5 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
Standard cable length	1400 mm ± 5 % (or special cable length according to specific data sheet)

Environmental conditions

Operation	
Ambient temperature range	-30 °C to +71 °C
Cooling	The temperature of at least one of the "cooling contact areas" as defined in the outline drawing must not exceed +71°C. Customer shall assure complete metallic contact to at least one of the "cooling contact areas".
Relative humidity, max.	95% (non-condensing)
Shock	30 g / 11 ms half sine, 3 shocks in each direction of 3 orthogonal axes
Vibration	20-50 Hz, PSD of 0,02 g ² /Hz falling to 0,001 g ² /Hz at 500 Hz in each of 3 orthogonal axes. Duration: 15 min/axis.
IP protection level	IP60 per EN 60529 (all interfaces connected with appropriate gaskets)
Maintenance	Not required
Storage	
Ambient temperature range	-40 °C to +85 °C
Relative humidity, max.	95% (non-condensing)

Applicable documents

Specific Circuit Diagram	637421CXXXX-CD (XXXX according to ordering number)
Specific Data Sheet	637421CXXXX-BE (XXXX according to ordering number)

Standard outline (all dimensions in millimeter)

