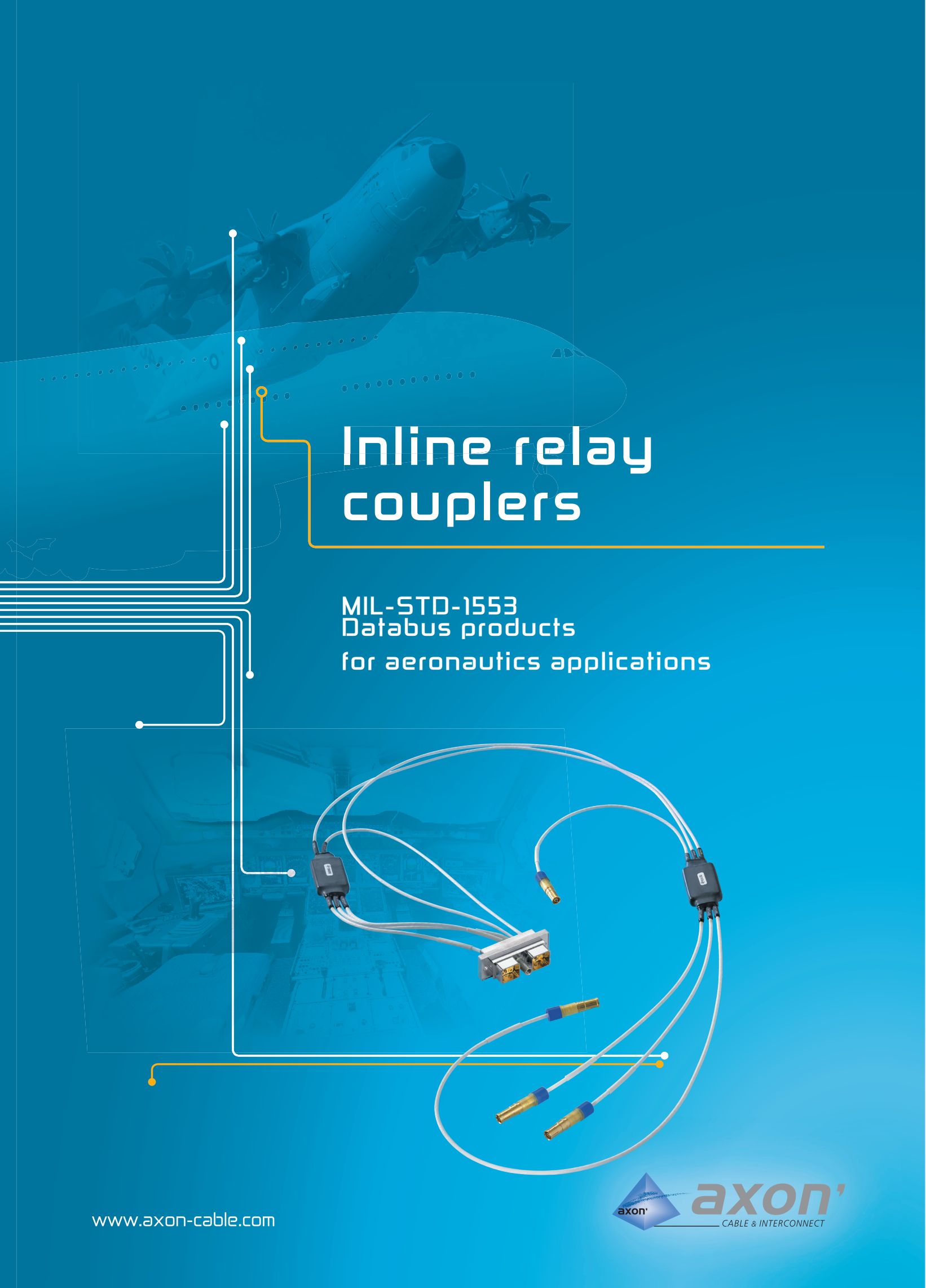
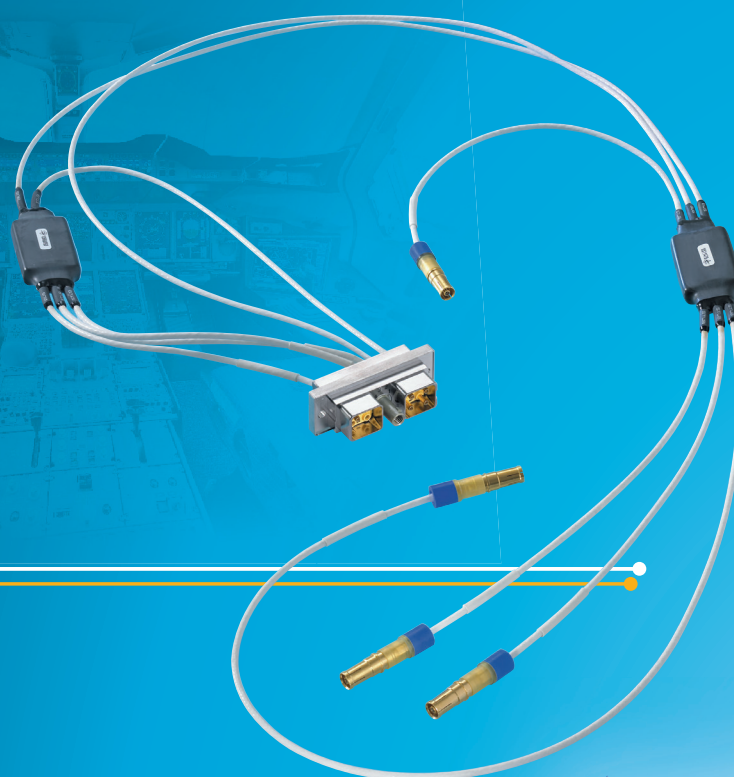




Inline relay couplers

MIL-STD-1553
Databus products
for aeronautics applications



Contents

Inline relay couplers

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THIS CATALOGUE IS INTENDED AS A GUIDE TO AID SELECTION OF AXON' PRODUCTS.
THE INFORMATION IN THIS CATALOGUE IS ACCURATE TO THE BEST OF OUR KNOWLEDGE AT TIME OF GOING TO PRINT,
HOWEVER, AXON' CANNOT BE HELD LIABLE FOR ANY ERRORS MADE AS A RESULT OF INFORMATION CONTAINED HEREIN.
CHANGES AND MODIFICATIONS CAN BE MADE TO THIS BROCHURE AT ANY TIME WITHOUT PRIOR NOTICE.

RELAY couplers

AXON' offers two kinds of relay couplers :

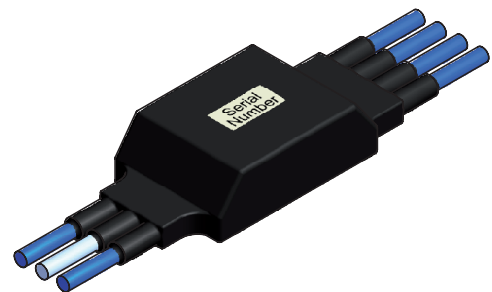
- Inline relay switch coupler (AMB/A-RE-A) :

its role is to commute simultaneously one or two bus lines to one or two different bus lines with a single command signal

- Inline relay couplers (AMB/A-RE-C, AMB/A-RE-D) : these have been developed for applications which need to allow for an automatic disconnection of a number of devices from the network without affecting the other remote terminals already connected. This is the case when a ground test bench is connected to an aircraft or in the case of applications which need to simultaneously disconnect a group of devices (a satellite or a rocket).

Advantages

- › Commuting to avoid mismatching : the bus line terminators are maintained a 77 ohms while the network is intentionally cut at a predefined point of the system (AMB/A-RE-C)
- › Improved EMI performance : high impedance resistive loads (3 Kohms) are connected to open stubs (AMB/A-RE-D).
- › Transmission of the signal without distortion.
- › Relay couplers are able to switch the signal to another line or to a particular device (AMB/A-RE-A).
- › Relay couplers can be connected to classic couplers with the help of splices or ACB1 connectors.



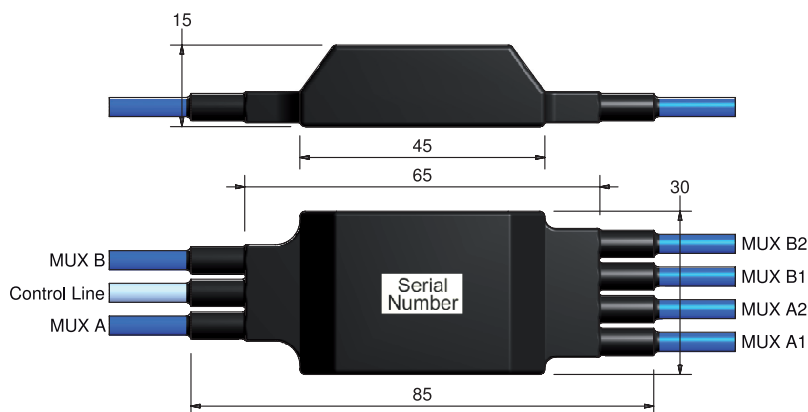
Inline switch relay coupler

SPECIFICATIONS

JN1161*
MIL-PRF-39016
MIL-R-39016/53
MIL-STD-810D

* JN1161
approval only concerns
AMB/A-RE-A-26.5
with cable 31.
DDP reference :
DDP-J-403-A-0301.

AMB / A - RE - A - 26.5 - XX

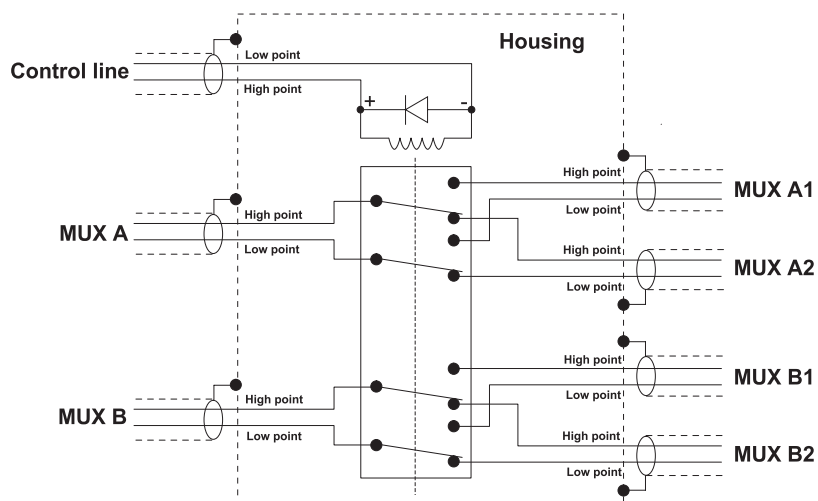


This specification defines an inline relay used to switch two MIL-STD-1553 lines to 2 other lines (for instance nominal and redundant line)



DIMENSIONS in mm

Electrical scheme



Identification code

AMB /

A

RE

A

26.5

XX

AXON'
INLINE
DATABUS
SERIES

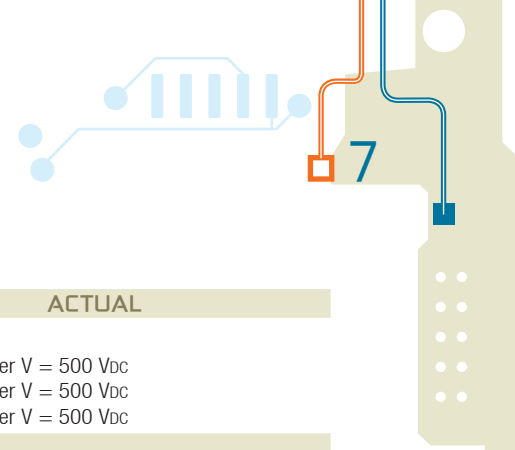
A : AERONAUTICS
VERSION
(for space
applications,
please contact us)

RELAY
VERSION

FOUR POLE,
DOUBLE THROW
RELAY ABLE TO
SWITCH 2 LINES TO 2
OTHER LINES

NOMINAL
COIL
VOLTAGE

CABLE REFERENCES (see cable specifications)
10 : TWINAX BUS AWG 24 SINGLE BRAID (SB)
according to MIL-C-17 /176-00002
20 : TWINAX BUS AWG 24 SINGLE BRAID (SB)
according to PR EN 3375-003
21 : TWINAX BUS AWG 24 DOUBLE BRAID (DB)
according to PR EN 3375-004
22 : TWINAX BUS AWG 24 DOUBLE BRAID with
high immunity tape (DB/HI) according to PR EN 3375-005
31 : TWINAX BUS AWG 24 DOUBLE BRAID (DB)
according to PAN 6421- JN 1161
70 : TWINAX BUS AWG 26 SINGLE BRAID (SB)
71 : TWINAX BUS AWG 26 DOUBLE BRAID (DB)
according to ECS 0700
72 : TWINAX BUS AWG 26 DOUBLE BRAID
with high immunity tape (DB/HI)
Other cables on request.



Electrical characteristics

PARAMETERS	REQUIRED	ACTUAL
Insulation resistance between (initial) : - outer jacket / shield - inner wires / shield - line / line		> 100 M Ω under V = 500 Vdc > 100 M Ω under V = 500 Vdc > 100 M Ω under V = 500 Vdc
Shield continuity	-	50 m Ω maximum.
Shield coverage	Cable 90 % / Connection 75 %	Cable 90 % / Connection 100 %
Dielectric strength : (sea level) - between outer jacket / shield - between shield and inner wires - between line and line	- - -	V = 500 V rms V = 500 V rms V = 500 V rms

Mechanical and environmental characteristics

PARAMETERS	PARAMETERS
Operating temperature : -65°C to +125°C	Excellent resistance to thermal stress
Weight (without cable) : 80 g nominal	Axial extraction force : > 50 N
Excellent vibration and shock resistance : - random vibration : - 27g rms, 2 hours in all directions (*) - 16.4 g rms, 1 hour in all directions	Fully waterproof allowing good resistance to onboard fluids and excellent resistance to salt spray (500 hours). (*) ACCORDING TO MIL-STD-810D METHOD 514-3, FIGURE 514.3-26 WITH A LEVEL OF 0.70 g ² / Hz FOR ENDURANCE AND 0.20 g ² / Hz FOR FUNCTIONAL TEST

Relay characteristics

PARAMETERS	PARAMETERS
Four pole, double throw relay Qualified to MIL-R-39016/53	Coil dropout voltage : . 1.5 Vdc maximum at 25°C . 0.9 Vdc maximum from -65°C to +125°C
Coil operating voltage : . 26.5 Vdc nominal . 35 Vdc maximum	Operating time at nominal voltage (26.5 Vdc): 4 ms maximum Release time at nominal voltage (26.5 Vdc): 6 ms maximum
Coil resistance : 720 $\pm$ 10% Ω at 25°C	Contact bounce : 2.0 ms maximum
Coil pickup voltage : . 13.5 Vdc maximum at 25°C . 18.0 Vdc maximum from -65°C to + 125°C	Contact stabilisation time : 2.5 ms maximum
Coil hold voltage : . 10.8 Vdc maximum at 25°C . 8.1 Vdc maximum from -65°C to + 125°C	Contact resistance (initial time state) : 50 m Ω maximum
	Mechanical life : 900 000 cycles minimum



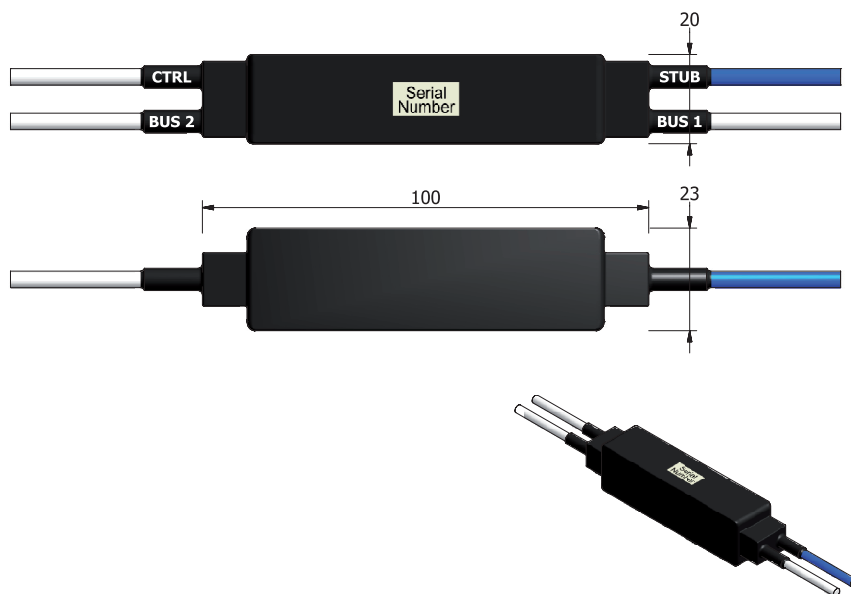
1 way inline relay coupler

with DPDT relay to switch the bus line to 77 ohms

SPECIFICATIONS

MIL-STD-1553B
MIL-R-39016/6
MIL-S-19500/429

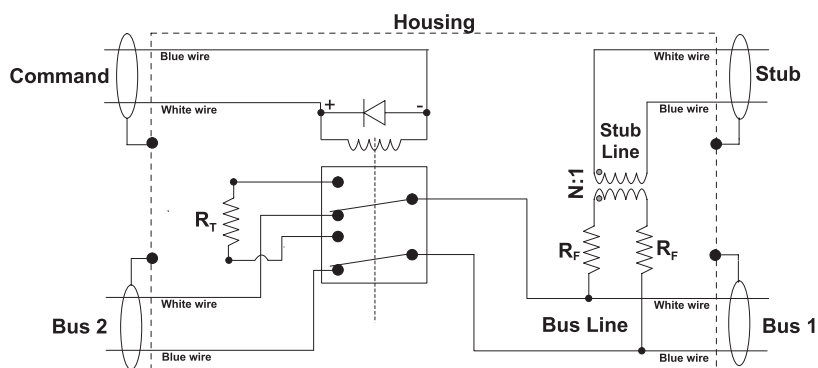
AMB / A - RE - C - 26.5 - XX



DIMENSIONS in mm

Electrical scheme

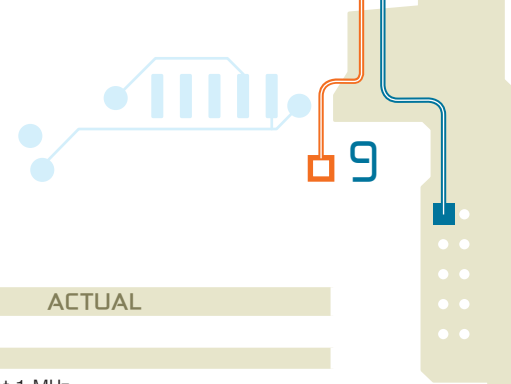
$N = 1.41 \pm 3\%$
 R_F = fault protection resistor
= $57.6 \Omega \pm 1\%$
 R_T = resistance terminator
= $76.8 \Omega \pm 1\%$



Identification code

AMB /	A	RE	C	26.5	XX
AXON' INLINE DATABUS COUPLER	A : AERONAUTICS VERSION (for space applications, please contact us)	RELAY VERSION	DOUBLE POLE DOUBLE THROW RELAY (DPDT) able to switch the «BUS» line to 77 Ω	NOMINAL COIL VOLTAGE	CABLE REFERENCES (see cable specifications) 10 : TWINAX BUS AWG 24 SINGLE BRAID (SB) according to MIL-C-17 /176-00002 20 : TWINAX BUS AWG 24 SINGLE BRAID (SB) according to PR EN 3375-003 21 : TWINAX BUS AWG 24 DOUBLE BRAID (DB) according to PR EN 3375-004 22 : TWINAX BUS AWG 24 DOUBLE BRAID with high immunity tape (DB/HI) according to PR EN 3375-005 31 : TWINAX BUS AWG 24 DOUBLE BRAID (DB) according to PAN 6421 Other cables on request.

NOTE : CABLE LENGTH AND CABLE COLOUR TO BE DEFINED WHEN ORDERING
(possibility to differentiate command and bus lines with a striped colour tape under transparent jacket or the extrusion of a colour jacket).
The same type of cable is used for bus lines and command lines.



Electrical characteristics

PARAMETERS	REQUIRED	ACTUAL
Terminator impedance	$77 \pm 2 \Omega$	$77 \pm 1 \Omega$
Turn ratio	$\sqrt{2} \pm 3 \%$	$\sqrt{2} \pm 3 \%$
CMR	< -45 dB mini at 1 MHz	< -45 dB mini at 1 MHz
Input impedance (control line un-energized)	> 3000 Ω in the frequency range (75 KHz to 1 MHz) and in the indicated temp. range (-65°C to 125°C)	> 3000 Ω
Insulation resistance between :		> 1 000 M Ω under V = 500 Vdc
- outer jacket / shield		> 1 000 M Ω under V = 500 Vdc
- inner wires / shield		> 1 000 M Ω under V = 250 Vdc
- bus / stub		> 1 000 M Ω under V = 500 Vdc
- command line / other lines		
Shield continuity	-	10 m Ω maximum.
Shield coverage	Cable 90 % / Connection 75 %	Cable 90 % / Connection 100 %
Dielectric strength : (sea level)		
between outer jacket / shield	-	V = 500 V rms
between shield and inner wires	-	V = 500 V rms

Mechanical and environmental characteristics

PARAMETERS	PARAMETERS
Operating temperature : -65°C to +125°C	High resistance to on-board fluids (sealed case)
Weight : < 100 g	High resistance to salt spray (sealed case)
Excellent vibration and shock resistance :	
- sine vibration : 30 G's, 10 to 3000 Hz	MTBF available following MIL-HDBK 217
- Shocks : 100 G's, 6 ms	(environment and operating temperature to be specified)
Excellent resistance to thermal stress	

Transformer characteristics

PARAMETERS	REQUIRED VALUES (MIL-STD-1553 or SAE AS 4115)	NOMINAL VALUES OR AXON' REQUIRED VALUES	
		NOMINAL VALUES	REQUIRED BY AXON' / QUALITY PLAN
Curie point	-	-	Over 195°C
Turn ratio	$\sqrt{2} \pm 3 \%$	$\sqrt{2} \pm 3 \%$	$\sqrt{2} \pm 3 \%$
Secondary DC resistance	$R_s < 5 \Omega$	$R_s = 2 \Omega$	$R_s < 2.5 \Omega$
Insulation resistance (winding to winding)	$R_i > 100 M\Omega$	-	$R_i > 1 000 M\Omega$ with a 250 Vdc test voltage
Primary open circuit impedance (from 75 kHz to 1 MHz)	$ Z > 3 k\Omega$ on full temperature operating range	$ Z > 10 k\Omega$ at 25°C $ Z > 4.8 k\Omega$ at -65°C $ Z > 4 k\Omega$ at -85°C	$ Z \geq 9.4 k\Omega$ at 25°C (**)
Primary parallel inductance	-	$L_p = 22 mH$	$L_p \geq 20 mH$
Primary parallel capacitance	-	$C_p = 10 pF$	$C_p \leq 11.4 pF$
Inter-winding capacitance	-	$C_i = 45 pF$	-
Primary leakage inductance	-	-	$L_f \leq 6 \mu H$
Droop (*)	$D < 20 \%$	$D = 4.5 \%$ (**)	$D < 20 \%$
Overshoot and ringing (*)	$0 < \pm 1 V$	$0 = 0.3 V$ (**)	$0 < \pm 1 V$

JN 1081 approved DDP-J-403-A-0222 -

(*) Tested with a 250 kHz square wave of 27 Vpp with 100ns rise and fall times through a $360 \pm 5 \%$ Ω resistor.

(**) Average values taken during the JN 1081N qualification. - (***) 9.4 k Ω at 25°C guarantees 3 k Ω minimum from -65°C to 150°C

Relay characteristics

PARAMETERS	PARAMETERS
Double pole, double throw relay (DPDT) Qualified to MIL-R-39016/6	Coil dropout voltage : . 1.5 Vdc at 25°C . 1.0 Vdc at -65°C
Coil operating voltage : . 26.5 Vdc nominal . 32 Vdc maximum	Operating time : 4 ms maximum Release time : 4 ms maximum
Coil resistance : 700 $\pm 10\%$ Ω at 25°C	Contact stabilisation time : 2.5 ms maximum
Coil nominal power : 1 W at 25°C	Contact resistance (initial time state) : 50 m Ω maximum
Coil pickup voltage : . 13.5 Vdc at 25°C . 18.0 Vdc at 125°C	Mechanical life expectancy : 50 million operations (*)
(*) refers to the MIL-PRF-39016 standard to have the relationship between the contact rating and the number of operations	Coil transient suppression means : MIL-S-19500 diode

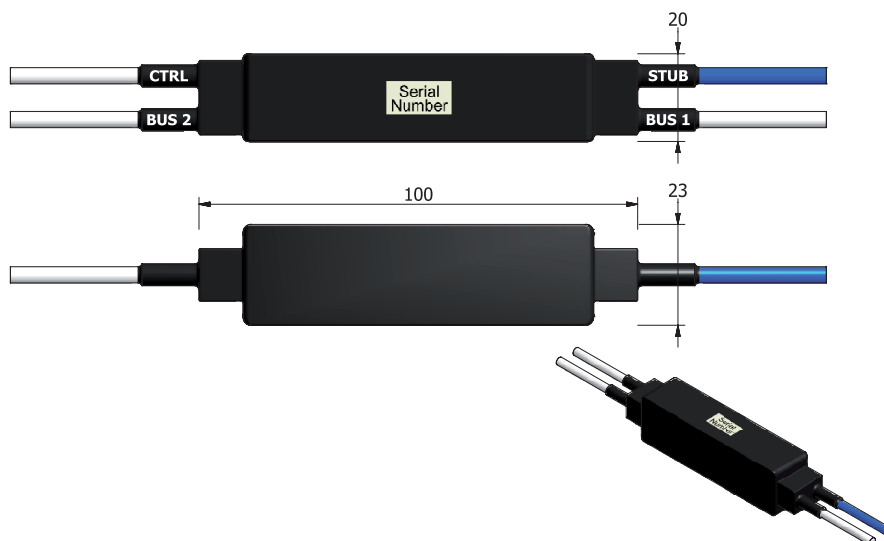
1 way inline relay coupler

with DPDT relay to switch the bus line to 3 K ohms

SPECIFICATIONS

MIL-STD-1553B
MIL-R-39016/6
MIL-S-19500/429

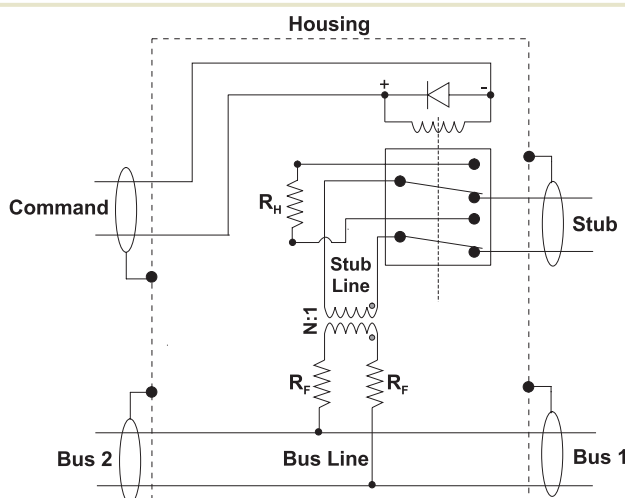
AMB / A - RE - D- 26.5 - XX



DIMENSIONS in mm

Electrical scheme

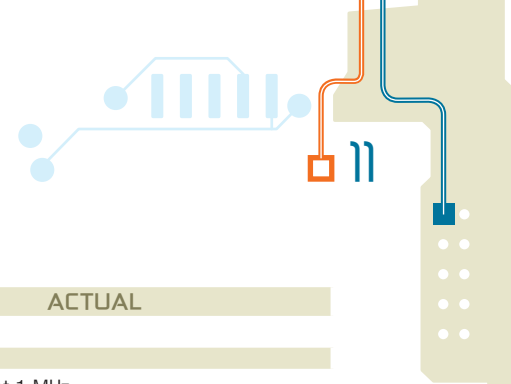
$N = 1.41 \pm 3\%$
 R_F = fault protection resistor
= $57.6 \Omega \pm 1\%$
 R_H = stub load resistance
= $3K \Omega \pm 2\%$



Identification code

AMB /	A	RE	D	26.5	XX
AXON' INLINE DATABUS COUPLER	A : AERONAUTICS VERSION (for space applications, please contact us)	RELAY VERSION	DOUBLE POLE DOUBLE THROW RELAY (DPDT) able to switch the «STUB» line to 3 K Ω	NOMINAL COIL VOLTAGE	CABLE REFERENCES (see cable specifications) 10 : TWINAX BUS AWG 24 SINGLE BRAID (SB) according to MIL-C-17 /176-00002 20 : TWINAX BUS AWG 24 SINGLE BRAID (SB) according to PR EN 3375-003 21 : TWINAX BUS AWG 24 DOUBLE BRAID (DB) according to PR EN 3375-004 22 : TWINAX BUS AWG 24 DOUBLE BRAID with high immunity tape (DB/HI) according to PR EN 3375-005 Other cables on request.

NOTE : CABLE LENGTH AND CABLE COLOUR TO BE DEFINED WHEN ORDERING
(possibility to differentiate bus and stub cable with a striped colour tape under the transparent jacket or the extrusion of a colour jacket).
The same type of cable is used for bus lines and command lines.



Electrical characteristics

PARAMETERS	REQUIRED	ACTUAL
Load impedance		3K Ω $\pm$ 2 %.
Turn ratio	$\sqrt{2} \pm 3$ %	$\sqrt{2} \pm 3$ %
CMR	< -45 dB mini at 1 MHz	< -45 dB mini at 1 MHz
Input impedance (control line un-energized)	> 3000 Ω in the frequency range (75 KHz to 1 MHz) and in the indicated temp. range (-65°C to 125°C)	> 3000 Ω
Insulation resistance between :		> 1 000 M Ω under V = 500 Vdc
- outer jacket / shield		> 1 000 M Ω under V = 500 Vdc
- inner wires / shield		> 1 000 M Ω under V = 250 Vdc
- bus / stub		> 1 000 M Ω under V = 500 Vdc
- command line / other lines		
Shield continuity	-	10 m Ω maximum.
Shield coverage	Cable 90 % / Connection 75 %	Cable 90 % / Connection 100 %
Dielectric strength : (sea level)		
between outer jacket / shield	-	V = 500 V rms
between shield and inner wires	-	V = 500 V rms

Mechanical and environmental characteristics

PARAMETERS	PARAMETERS
Operating temperature : -65°C to +125°C	High resistance to on-board fluids (sealed case)
Weight : < 100 g	High resistance to salt spray (sealed case)
Excellent vibration and shock resistance :	
- sine vibration : 30 G's, 10 to 3000 Hz	MTBF available following MIL-HDBK 217
- Shocks : 100 G's, 6 ms	(environment and operating temperature to be specified)
Excellent resistance to thermal stress	

Transformer characteristics

PARAMETERS	REQUIRED VALUES (MIL-STD-1553 or SAE AS 4115)	NOMINAL VALUES OR AXON' REQUIRED VALUES	
		NOMINAL VALUES	REQUIRED BY AXON' / QUALITY PLAN
Curie point	-	-	Over 195°C
Turn ratio	$\sqrt{2} \pm 3$ %	$\sqrt{2} \pm 3$ %	$\sqrt{2} \pm 3$ %
Secondary DC resistance	$R_s < 5 \Omega$	$R_s = 2 \Omega$	$R_s < 2.5 \Omega$
Insulation resistance (winding to winding)	$R_i > 100 M\Omega$	-	$R_i > 1 000 M\Omega$ with a 250 Vdc test voltage
Primary open circuit impedance (from 75 kHz to 1 MHz)	$ Z > 3 k\Omega$ on full temperature operating range	$ Z > 10 k\Omega$ at 25°C $ Z > 4.8 k\Omega$ at -65°C $ Z > 4 k\Omega$ at -85°C	$ Z \geq 9.4 k\Omega$ at 25°C (**)
Primary parallel inductance	-	$L_p = 22 mH$	$L_p \geq 20 mH$
Primary parallel capacitance	-	$C_p = 10 pF$	$C_p \leq 11.4 pF$
Inter-winding capacitance	-	$C_i = 45 pF$	-
Primary leakage inductance	-	-	$L_f \leq 6 \mu H$
Droop (*)	$D < 20$ %	$D = 4.5$ % (**)	$D < 20$ %
Overshoot and ringing (*)	$0 < \pm 1$ V	$0 = 0.3$ V (**)	$0 < \pm 1$ V

JN 1081 approved DDP-J-403-A-0222 -

(*) Tested with a 250 kHz square wave of 27 Vpp with 100ns rise and fall times through a 360 ± 5 % Ω resistor.

(**) Average values taken during the JN 1081N qualification. - (***) 9.4 k Ω at 25°C guarantees 3 k Ω minimum from -65°C to 150°C

Relay characteristics

PARAMETERS	PARAMETERS
Double pole, double throw relay (DPDT)	Coil dropout voltage :
Qualified to MIL-R-39016/6	. 1.5 Vdc at 25°C
	. 1.0 Vdc at -65°C
Coil operating voltage :	Operating time : 4 ms maximum
. 26.5 Vdc nominal	Release time : 4 ms maximum
. 32 Vdc maximum	
Coil resistance : 700 $\pm$ 10% Ω at 25°C	Contact stabilisation time : 2.5 ms maximum
Coil nominal power : 1 W at 25°C	Contact resistance (initial time state) : 50 m Ω maximum
Coil pickup voltage :	Mechanical life expectancy : 50 million operations (*)
. 13.5 Vdc at 25°C	
. 18.0 Vdc at 125°C	Coil transient suppression means : MIL-S-19500 diode

(*) refers to the MIL-PRF-39016 standard to have the relationship between the contact rating and the number of operations



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