AL706 • *Embedded Blue*®

Single Pair Ethernet

IEC 63171-6 SPE Connectors Adapter Module

4-Way Power + Data M8-Hybrid Connector

2-Way Latch Locking Data Connector

Overview

The international standard IEC 63171-6 describes connectors for Single Pair Ethernet (SPE), 2-way (data) as well as 4-way (data + power).

As of current, no breakout adapter cables are available for conversion between these two-wire and four-wire data connectors.

*The **AL706** Embedded Blue® is an adapter card equipped with a 2-way SPE latch locking receptacle and a 4-way M8-Hybrid Single Pair Ethernet connector, both according to IEC 63171-6.*

The SPE differential data line is simply passed through from one connector type to the other. In addition, DC power can be added to or drawn from the AL706 card, via a screw lock terminal block.

If the M8-Hybrid 4-way connector is used as upstream link for data + power, SPE downstream data will be available from the latch locking 2-way connector, and power is supplied for attachment of a device to the terminal block in addition.

Vice versa, with the 2-way receptacle used for upstream, external DC power can be applied to the terminal block, for downstream usage over the 4-way M8-Hybrid.
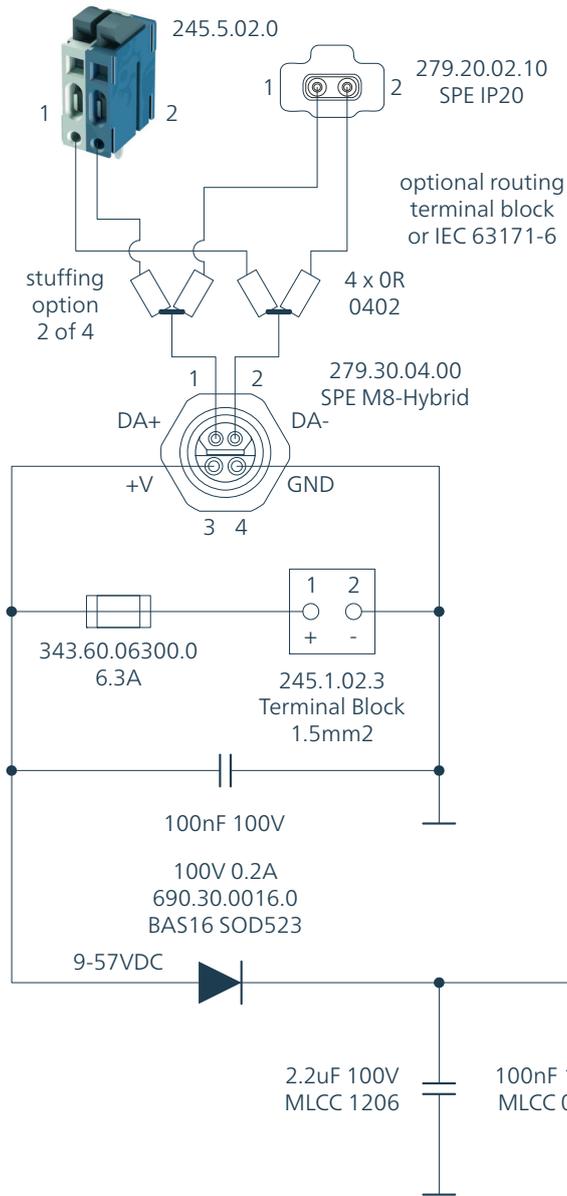
As a manufacturing option, the AL706 can be equipped with a 2-way SPE data terminal block, as replacement for the latch locking SPE connector.

The AL706 therefore is a simple solution for upgrading any 2-wire SPE equipment to 4-wire M8-Hybrid applications.
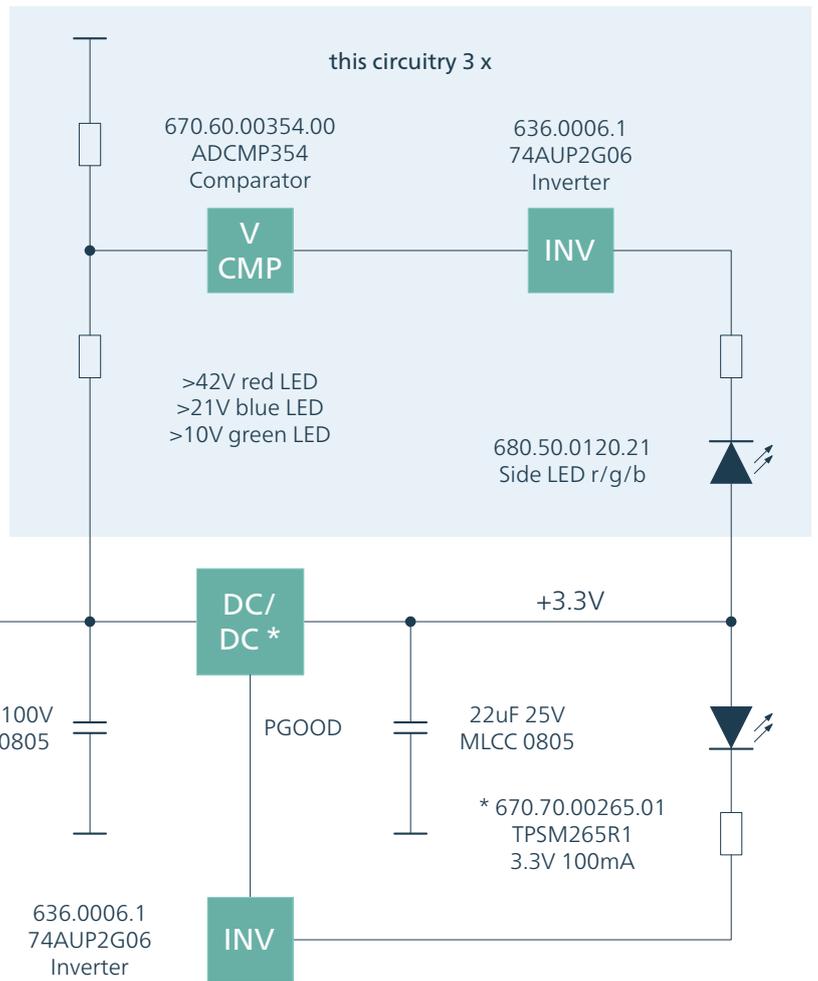
Technical Features

- ▸ Adapter PCB 58mm x 78mm
- ▸ Single Pair Ethernet IEC 63171-6 connectors adapter card
- ▸ 4-way vs. 2-way type connectors

- ▸ 1 x SPE 4-wire M8-Hybrid circular connector (data & power), IEC 63171-6 (style 6J-M8CI)
- ▸ 1 x SPE 2-wire latching receptacle according to IEC 63171-6 (2-way data)
- ▸ 1 x SPE 2-wire IDC terminal block (option, replacement for latching receptacle)
- ▸ 1 x Power terminal block 3.81mm pitch 2-pos, up to 1.5mm^2 screw lock, input or output use

- ▸ Typical input/output voltage (terminal block or M8-Hybrid) 12/24/48/54VDC
- ▸ Maximum input voltage 57VDC
- ▸ Applied voltage range displayed by four LEDs
- ▸ Chipfuse 6.3A between M8-Hybrid and terminal block power pins

- ▸ Breakout use - split SPE 4-way M8-Hybrid to SPE 2-way latch locking (data) and terminal block (power)
- ▸ Upgrade use - merge SPE 2-way latch locking (data) and terminal block (power) to SPE 4-way M8-Hybrid
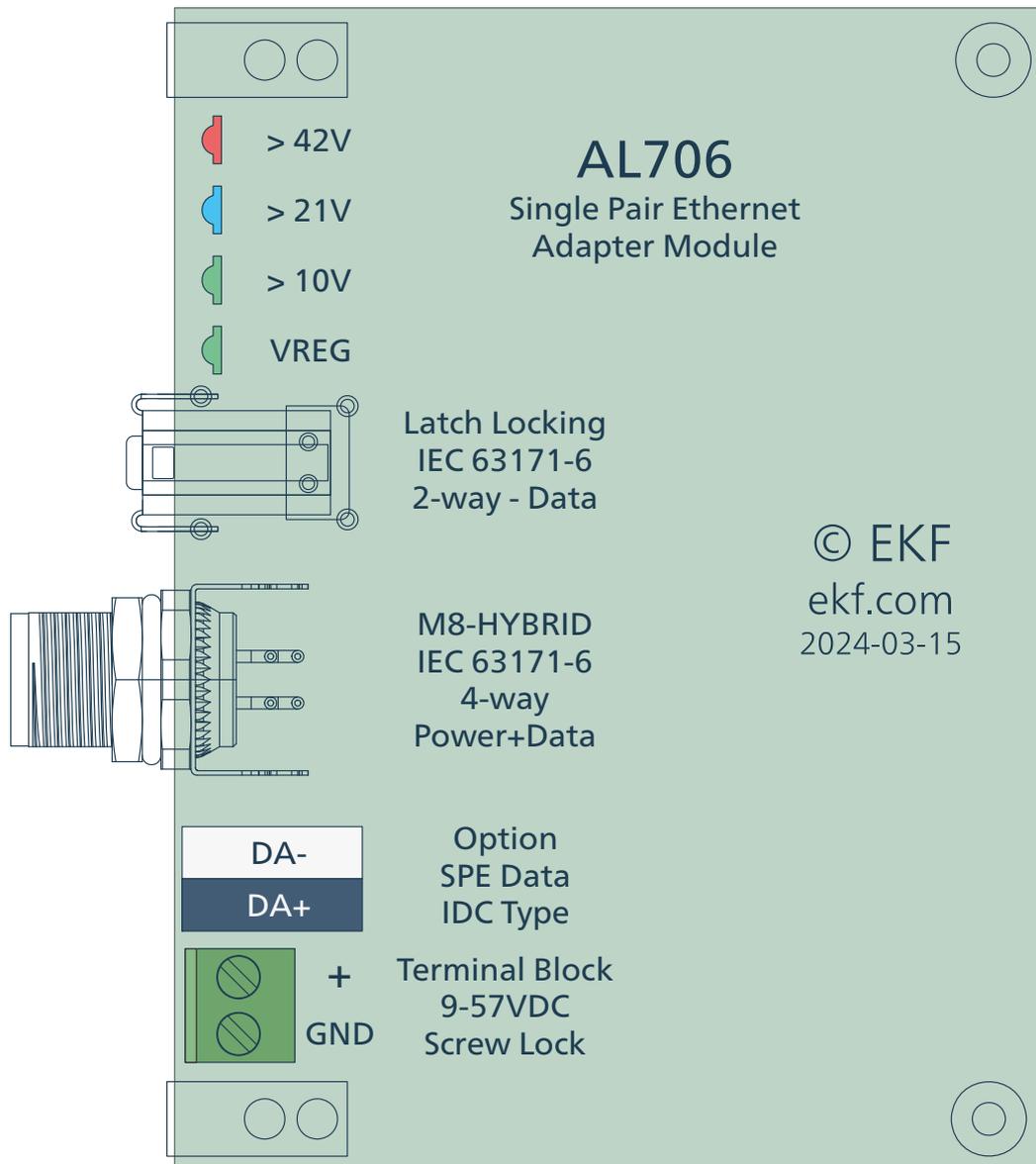- ▸ PCB can be mounted into 3U/4HP front panel

Block Diagram

245.5.02.0

1   2

279.20.02.10
SPE IP20

1   2

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2024-03-19

Simplified Block Diagram
AL706
SPE Adapter
M8-Hybrid to IP20

optional routing
terminal block
or IEC 63171-6

stuffing
option
2 of 4

4 x 0R
0402

279.30.04.00
SPE M8-Hybrid

1   2

DA+   DA-

+V   GND

3   4

this circuitry 3 x

670.60.00354.00
ADCMP354
Comparator

636.0006.1
74AUP2G06
Inverter

V
CMP

INV

343.60.06300.0
6.3A

245.1.02.3
Terminal Block
1.5mm2

1   2
+   -

>42V red LED
>21V blue LED
>10V green LED

680.50.0120.21
Side LED r/g/b

100nF 100V

100V 0.2A
690.30.0016.0
BAS16 SOD523

9-57VDC

DC/
DC *

+3.3V

2.2uF 100V
MLCC 1206

100nF 100V
MLCC 0805

PGOOD

22uF 25V
MLCC 0805

* 670.70.00265.01
TPSM265R1
3.3V 100mA

636.0006.1
74AUP2G06
Inverter

INV

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Connector Position

> 42V

> 21V

> 10V

VREG

AL706
Single Pair Ethernet
Adapter Module

Latch Locking
IEC 63171-6
2-way - Data

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M8-HYBRID
IEC 63171-6
4-way
Power+Data

DA-

DA+

Option
SPE Data
IDC Type

+

GND

Terminal Block
9-57VDC
Screw Lock

M=2:1

According to the manufacturers datasheets, the SPE connectors are capable for high speed Ethernet data rates. However, the AL706 was validated with 100BASE-T1 equipment as of current.

Warning: If external power has to be applied to the power terminal block, do not confuse the voltage polarity! Devices attached to the M8-HYBRID power pins may be damaged as a result to this mistake. Do not attach external power, if power is already present on the AL706 from the M8-HYBRID connector, in order to avoid backdriving current from either side.

M8-Hybrid Equipment

Latch Locking Equipment

M8-Hybrid SPE (Power & Data) Connector

M8-Hybrid IEC 63171-6 4-Position Female PCB Connector				
		Pin #	Wire Color	Signal
		1	blue	BI_DA+
	$+V_{SPE}$=9-57VDC	2	white	BI_DA-
		3	red	$+V_{SPE}$
		4	black	-V (GND)
		Shield		FE

(Connector diagram: 1 2 at top — DA+ DA-; +V GND; 3 4 at bottom)

M8-Hybrid

Mating shielded cordsets are available e.g. from Tyco Electronics. A maximum 40m shielded cable length is defined by the 100BASE-T1 Ethernet specification. Please note that both cable lengths in total, 2-wire and 4-wire, must not exceed the specified parameter for the T1 application in use.

Latching SPE (Data Only) Connector

IEC 63171-6 • Single Pair Ethernet Fully Shielded Latching PCB Connectors IP20			
279.20.02.10 DA- 2 1 DA+ IEC 63171-6	Pin #	Wire Color	Signal
	1	blue	BI_DA+
	2	white	BI_DA-
	Housing	-	FE (Shield)

Mating Cable Assemblies IEC 63171-6 Cable Connectors at Both Ends		
EKF Part No.	279.21.030.0	3m
Harting	33 28 020 2001 030 33 28 020 2001 XXX	030 = 3m XXX = Length

www.HARTING.com

As a manufacturing option, the latching connector can be functionally replaced by a terminal block for AWG24/AWG22 IDC free wire cabling (Harting 14030214301201 or Metz AIT0230299-000).

Voltage Control

If there is power applied to the AL706, either derived from the M8-Hybrid connector or the terminal block, its voltage range is displayed via a set of four LEDs.

Voltage Display LEDs	
Signal LED(s) Active	SPE Voltage (via M8-Hybrid or Terminal Block)
no LED on	no power, or voltage <5V, or wrong voltage polarity, or PCB chipfuse broken
lower green	>5V (voltage regulator power good)
upper green	>10V (+12V typical power supply)
blue	>21V (+24V typical power supply)
red	>43V (+48/+54V typical power supply)

Warning: The applied voltage must not exceed +57DC. Do not confuse voltage polarity, and do not apply power to the PCB simultaneously via both the power terminal block and the M8-Hybrid.

Ordering Information

For popular AL706 SKUs please contact sales@ekf.de

Related Products

AC370	ARM® V8 Industrial Microcontroller
AJ200	PoE+ Injector
AL100	M12-X 5 to 15 port unmanaged GbE switch
AL110	M12-X 5 port GbE switch w. ARM® V8 CPU
AL200	RJ45 8 port unmanaged GbE switch
AL210	RJ45 8 port GbE switch w. ARM® V8 CPU
AL220	RJ45 8 port unmanaged PoE+ GbE switch
AL230	RJ45 8 port PoE+ GbE switch w. ARM® V8 CPU
AL600	SPE IEC 63171-6 latch locking connectors 7 port switch
AL610	SPE IEC 63171-6 latch locking connectors 7 port switch w. ARM® V8 CPU
AL700	SPE IEC 63171-6 M8-Hybrid connectors 6 port switch
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