



**AL1-M12X • *induSwitch*™**

Industrial Gigabit Ethernet Switch

**Preliminary Edition**

## Technical Features

### *General*

- ▶ 1000BASE-T Ethernet Switch box, for DIN rail mount
- ▶ Self-managed operation
- ▶ Scalable 5 to 15 ports (stacked construction)
- ▶ Dimensions: ~30/60/90mm (W) x 130mm (H) x 60mm (D) w/o DIN rail brackets
- ▶ Metal case
- ▶ M12 X-coded Gigabit Ethernet connectors, 4 to 12 ports
- ▶ RJ45 Gigabit Ethernet connectors 1 to 3 ports
- ▶ M12 power connector
- ▶ Terminal block power connector (option)
- ▶ Nominal 12V/24V DC operation

### *Front Panel I/O*

- ▶ M12-X front panel GbE receptacles, rail approved connector system, Cat6A, IEC 61076-2-109
- ▶ 1000BASE-T, 100BASE-TX, 10BASE-T compliant data transfer rate front ports
- ▶ Future proof investment into cabling infrastructure - up to 10Gbps with M12 X Cat6A
- ▶ M12 X-coded to RJ45 connector Cat6A cable assemblies available from several suppliers
- ▶ Additional RJ45 connector(s), for general usage
- ▶ M12-A 5-position male connector for DC power input

### *Power Requirements*

- ▶ DC Input, 8 - 30V (12VDC, 24VDC)
- ▶ Power consumption 3W/6W/9W max. (5 - 10 - 15 ports)
- ▶ Fast acting chip fuse 2.5A (PCB soldered type - no replacement on-site)
- ▶ Protected against reverse polarity
- ▶ TVS ESD protection
- ▶ Common mode input filter 500 Ohm
- ▶ M12-A 5-position male connector for DC power input (+, GND, PE)
- ▶ Pigtail cable assemblies available M12-A 5-pos. female plug
- ▶ Option 4-position terminal block power connector, 3.50mm pitch, screw lock

## Technical Features

### *Gigabit Ethernet Switch(es)*

- ▶ Marvell® 88E6390 (Peridot) based Gigabit Ethernet switch(es)
- ▶ 1 to 3 switches for 5 - 10 - 15 front ports
- ▶ Switches connected via 2.5Gbps SERDES (stacking connectors)
- ▶ IMP - integrated management processor
- ▶ In use 5 (10 - 15) x front port GbE MAC/PHY 1000BASE-T
- ▶ 1 (2 - 3) x RJ45 connector(s) w. integrated magnetics
- ▶ 4 (8 - 12) x M12 X-coded connectors (isolated by magmods)
- ▶ High performance, non-blocking, Gigabit Ethernet
- ▶ Support for up to 16K MAC addresses, 10KByte Jumbo Frames
- ▶ Supports 802.1 Audio Video Bridging (AVB) Gen 2
- ▶ Time Sensitive Networking (TSN) Standards, IEEE 1588v2 one-step PTP
- ▶ Synchronous Ethernet
- ▶ Quality of Service (QoS) support with 8 traffic classes
- ▶ Supports 4096 802.1Q VLANs, three levels of 802.1Q security
- ▶ Unmanaged solution
- ▶ Up to two internal mezzanine stacking connectors for communication to adjacent internal switch (10 - 15 port solutions)
- ▶ Internal switch communication via SERDES 2.5Gbps ports
- ▶ Two and three internal switch versions (10 - 15 ports) are virtually combined into a single switch with aggregated performance

### *Applications*

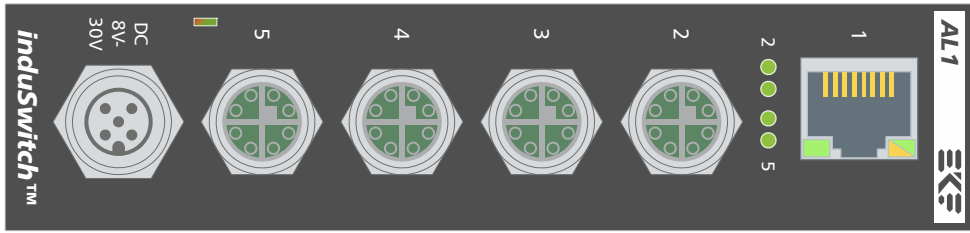
- ▶ Industrial networks - IoT - TSN
- ▶ Rugged environments
- ▶ Transportation vehicles
- ▶ Construction and harvesting machinery
- ▶ Railway

## Technical Features

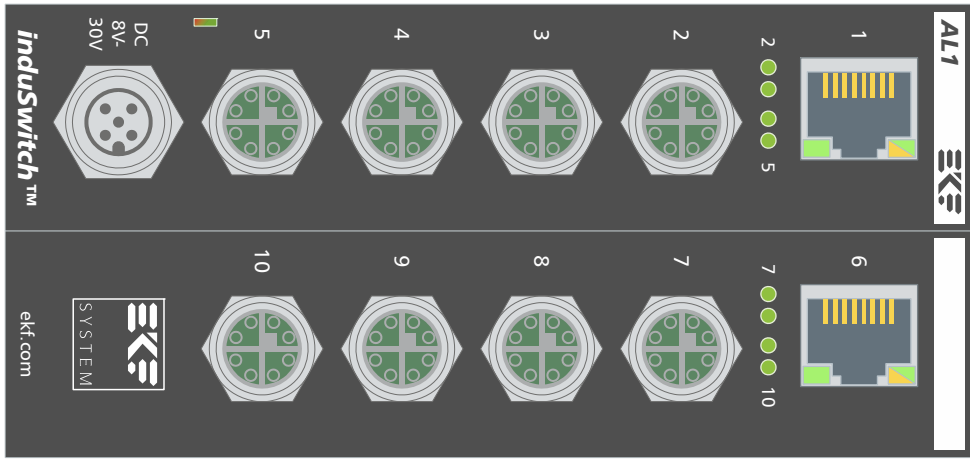
*Environmental, Regulatory*

- ▶ Designed & manufactured in Germany
- ▶ ISO 9001 certified quality management
- ▶ Long term availability
- ▶ Rugged solution
- ▶ RoHS compliant
- ▶ Operating temperature -40°C to +85°C (industrial temperature range)
- ▶ Storage temperature -40°C to +85°C, max. gradient 5°C/min
- ▶ Humidity 5% ... 95% RH non condensing
- ▶ Altitude -300m ... +3000m
- ▶ Shock 15g 0.33ms, 6g 6ms
- ▶ Vibration 1g 5-2000Hz
- ▶ EC Regulations EN55022, EN55024, EN60950-1 (UL60950-1/IEC60950-1)
- ▶ MTBF tbd years (5-port switch)

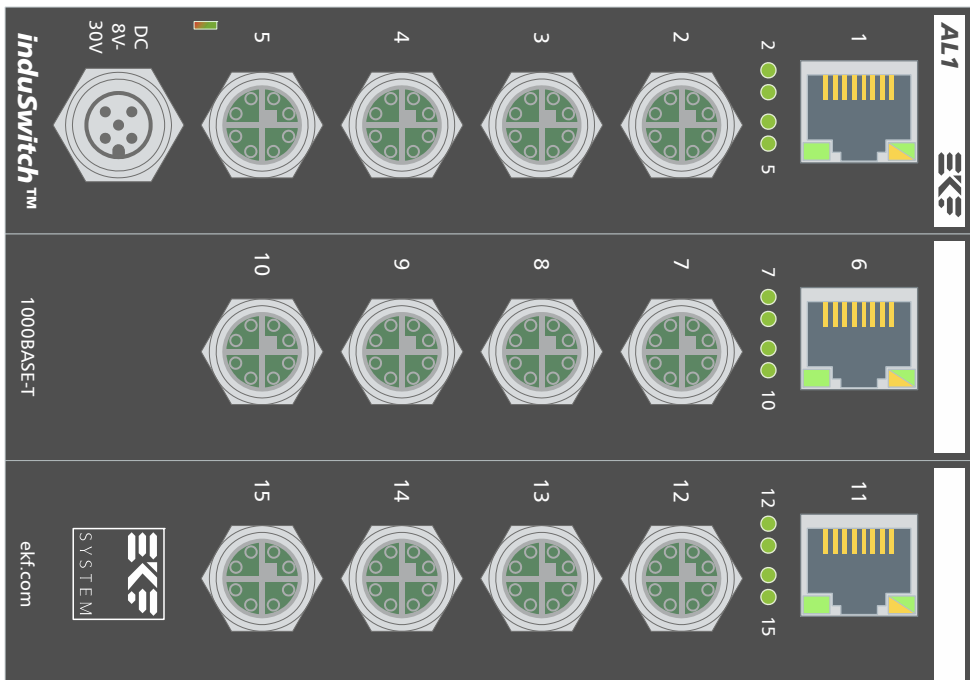
Front Panel



AL1-M12X

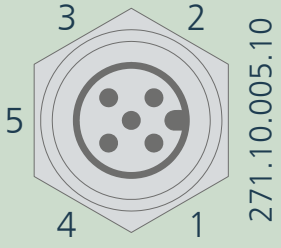


© EKF

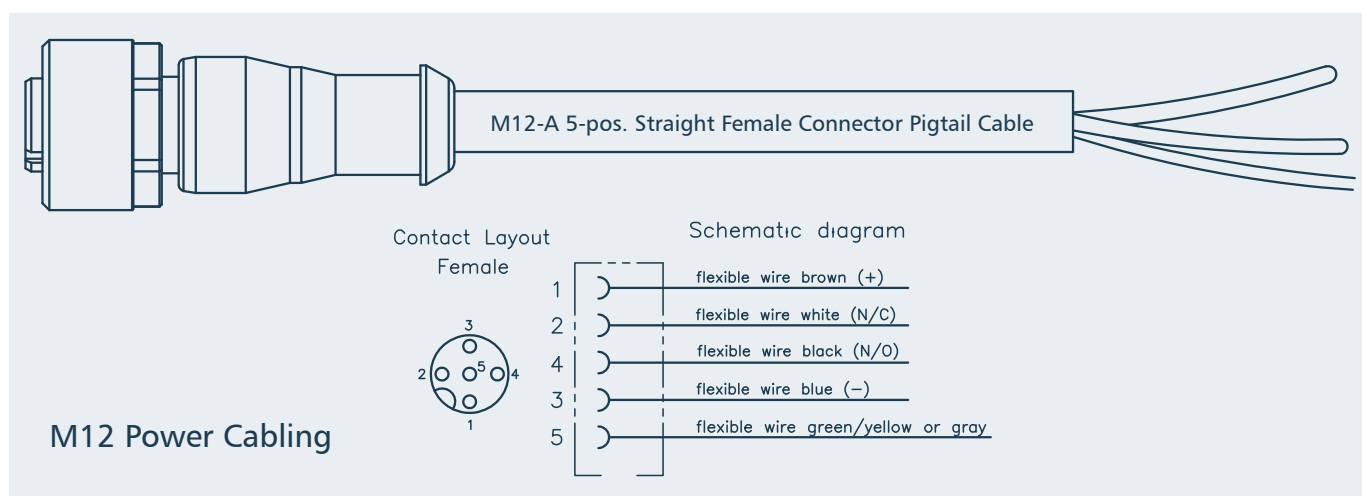


ekf.com

## M12 Power Connector Pin Assignment

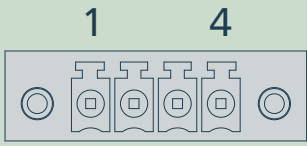
M12-A 5-Position Male			
	Power Input DC 8-30V	1	+12V/24V
		2	NC
		3	-(GND)
		4	NC
		5	PE (Shield)

Mating Pigtail Cable Assemblies 1.5m w. Female Straight Plug	
EKF	271.10.505.22.015
Phoenix Contact	1669822
Tyco	2273035-1

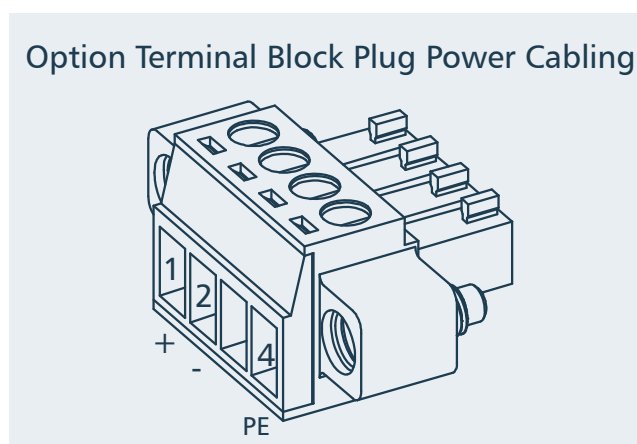


pre-assembled standard pigtail cables - wires #2 and #4 not in use with AL1  
may be left open, or connect to GND

### Option Terminal Block Power Connector Pin Assignment

3.50mm 4-Position Terminal Block			
 <p>245.35.04.20</p>	Power Input DC 8-30V	1	+12V/24V
		2	- (GND)
		3	NC
		4	PE (Shield)

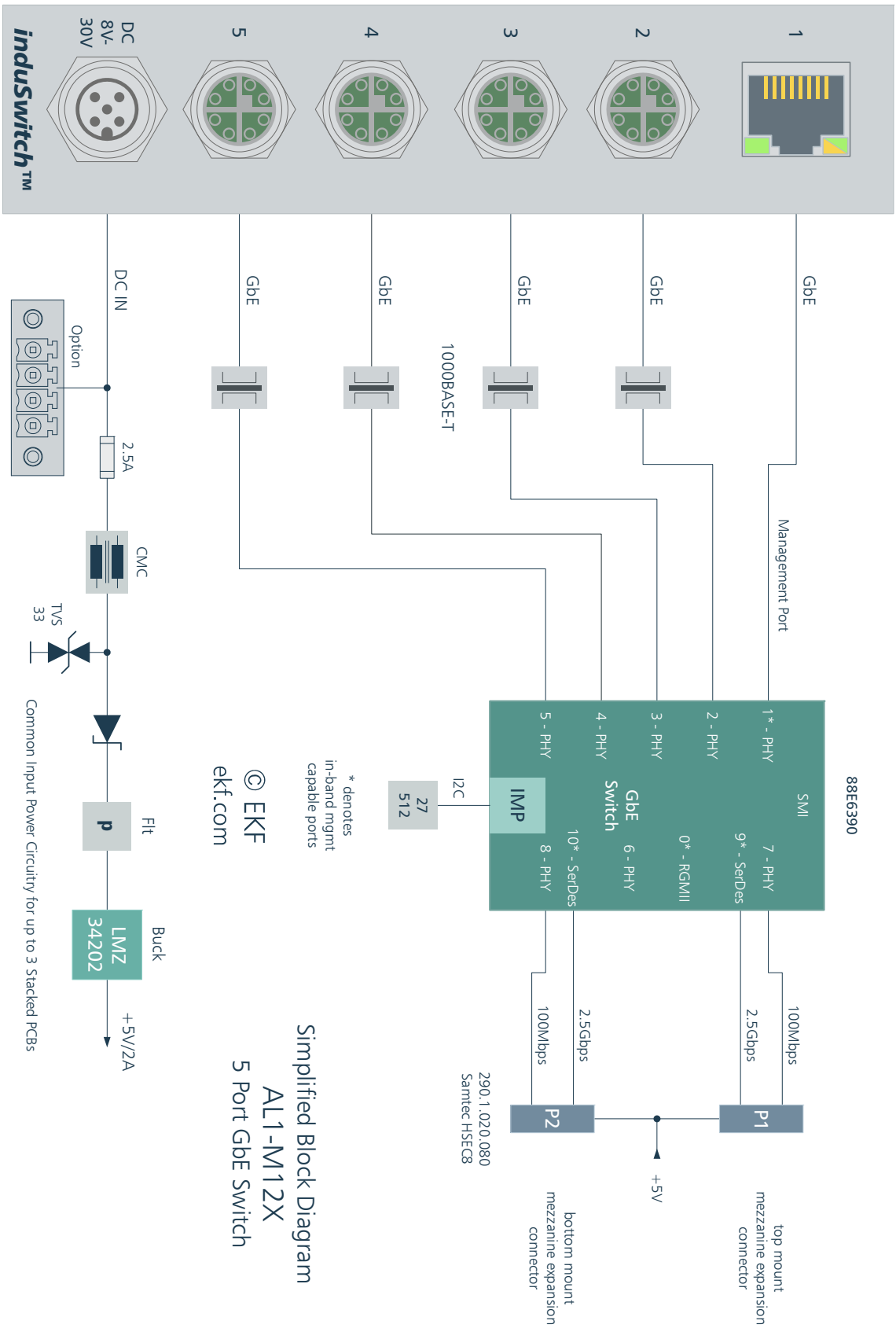
Mating Plugs w. Screw Lock	
EKF	245.35.04.20
FCI Amphenol	20020000-C041B01LF
Molex	39504-0004
Phoenix Contact	1847071
Tyco	284510-4



**Warning:**

Do not apply over-voltage e.g. 115/230V AC to any of the power connectors, since this will cause a PCB soldered chip fuse to break, which cannot be replaced on-site.

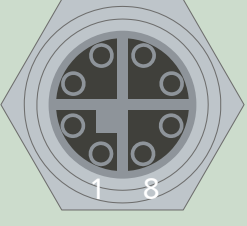
Block Diagram



single PCB layer - up to three boards stackable



## M12 X-Coded Receptacles

M12-X Receptacles • Gigabit Ethernet			
<p>271.12.008.00</p>  <p>F/P LEDs tbd</p> <p>© EKF • ekf.com Draft - Do Not Scale</p>	<p>Ports 2-5 7-10 12-15</p>	1	MDX0+
		2	MDX0-
		3	MDX1+
		4	MDX1-
		5	MDX3+
		6	MDX3-
		7	MDX2-
		8	MDX2+

The pin numbers of an M12 X-coded connector do not reflect the RJ45 Gigabit Ethernet signal assignment. For cross-over patch cables M12 to RJ45 please refer to the table below.

M12-X	Signal Colors T568B	RJ45
1	MDX0+ white/orange	1
2	MDX0- orange	2
3	MDX1+ white/green	3
4	MDX1- green	6
5	MDX3+ white/brown	7
6	MDX3- brown	8
7	MDX2- white/blue	5
8	MDX2+ blue	4

### Mating Cable Assemblies

Gigabit Ethernet cable M12 to M12: #271.14.008.xx (xx=length/meter)  
 Gigabit Ethernet cable M12 to RJ-45: #271.15.008.xx (xx=length/meter)



M12 to M12 Cable  
Phoenix Contact



M12 Cable Connector  
Phoenix Contact



M12 to RJ45 Cable  
Phoenix Contact



M12 Gigabit Ethernet Cable Assembly

## Ordering Information

For popular AL1 SKUs please contact [sales@ekf.de](mailto:sales@ekf.de)

Industrial Computers Made in Germany  
boards. systems. solutions.

***induSwitch***<sup>TM</sup>

Document No. 9091 • © EKF • 30 November 2018

EKF Elektronik GmbH  
Philipp-Reis-Str. 4 (Haus 1)  
Lilienthalstr. 2 (Haus 2)  
59065 HAMM  
Germany



Phone +49 (0)2381/6890-0  
Fax +49 (0)2381/6890-90  
Internet [www.ekf.com](http://www.ekf.com)  
E-Mail [sales@ekf.com](mailto:sales@ekf.com)