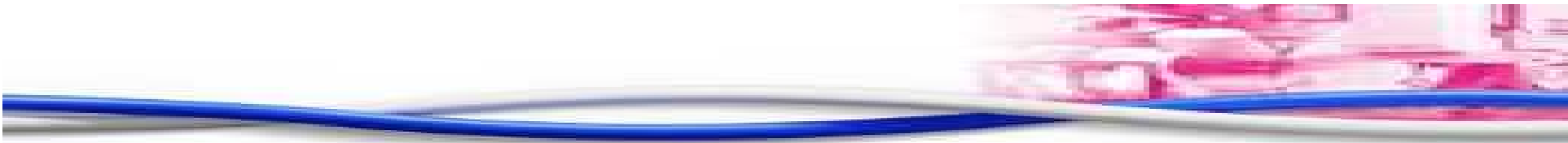


# Contribution to the MDI discussion

Matthias Fritsche



Related to MDI Connector Clauses 146.8.1 and 147.9.1 ballot comments

## Industrial connector IEC 63171-6 – Status of IEC 63171-6



### Connectors for electronic equipment - Product requirements

- Detail specification for 2-way, shielded, free and fixed connectors for data transmission up to 600 MHz with current carrying capacity

#### Status:

- CDV approved (similar like IEEE 3.x)
- Final FDIS has been submitted to IEC SC48B in July
- Publication via IEC-WEB store expected in autumn 2019

#### Content:

- 2-pole SPE connector (design by HARTING)
- 4-pole Hybrid connector with 2x data & 2x power (design by TE Connectivity)

**Absolutely final document without any IP protection**

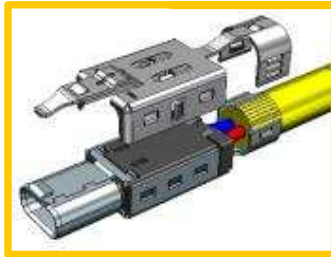
**(no patents and everyone can produce mating compatible products soon)**

More details see document 3N1218\_INF\_SC48B-connector-standards.pdf from IEC SC48B send to IEEE802.

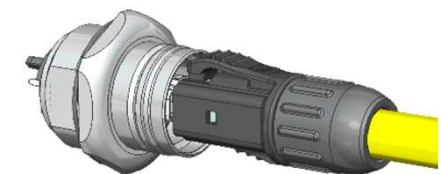
## Industrial connector IEC 63171-6 - made for industrial applications



- Unified „data container“ and modular product concept with from IP20 up to IP65/67 in M8 und M12 style with well known screw, Snap-In and PushPull locking mechanism



- → Approved design and cost effective use of existing and standardized housing variants and parts from the different vendors in the industrial market
- IP20 plugs can be mated and locked with all IP65/67 M8 und M12 jack variants  
→ useful for testing and configuration of devices



IP20 SPE plug  
mated and locked  
with a M12 jack

Quelle: HARTING Technologie Gruppe

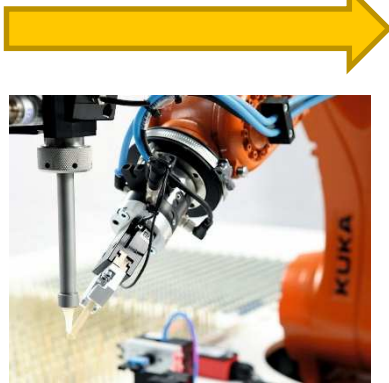
# Industrial connector IEC 63171-6 – especially made for:

## ■ SPE for:



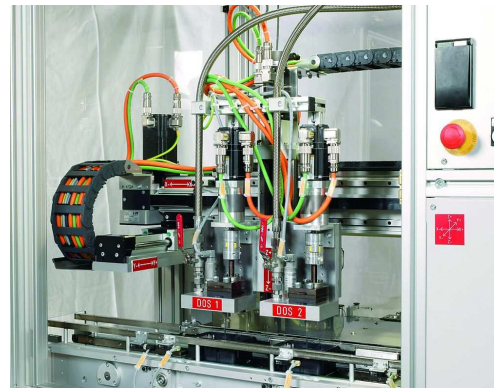
source: Siemens

## Machinery



source: Kuka

## Robotics



source: Scheugenpflug AG

## Railway



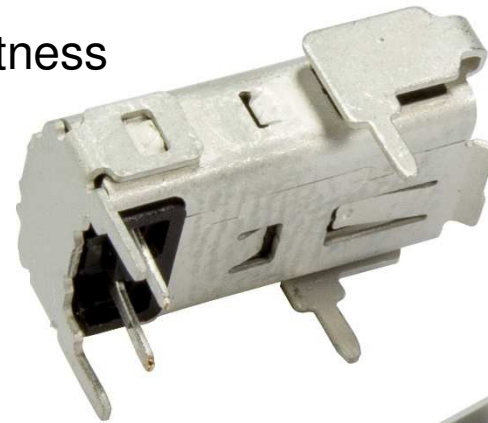
source: HARTING

## Automation

## Industrial connector IEC 63171-6 – sockets

### Industrial SPE jack design

- TRH contacts to provide maximal robustness between PCB and jack,  
→ strong market request for all interface connectors
- Ready for reflow soldering production
- Delivery always as tape and reel for automatic pic & place
- Pure SMD variant are possible because the IEC 63171-x standards not define the details at the PCB side. But pure SMD variants offer not the needed robustness.
- Ganged jack (Multiport 2x1 ... 2x8) are possible and planned at the product roadmap already.



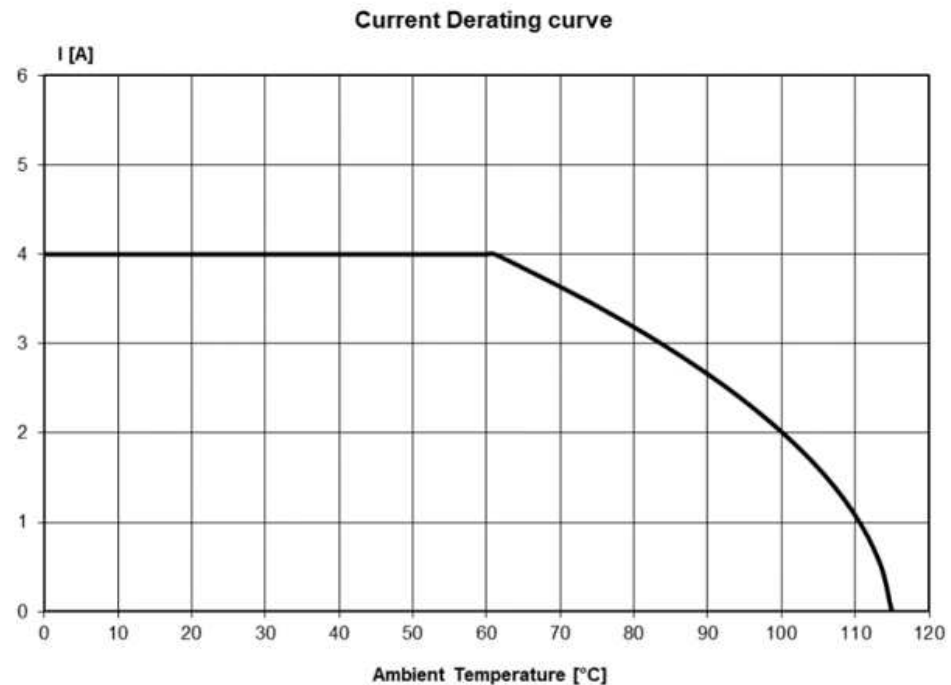
example SPE jack design



## Update Industrial connector IEC 63171-6 – 2-pole Variants



- **Current capacity 4A up to 60°C to have head room for future higher PoDL variants up to 4A / 24V (derating curve specified at IEC 63171-6)**

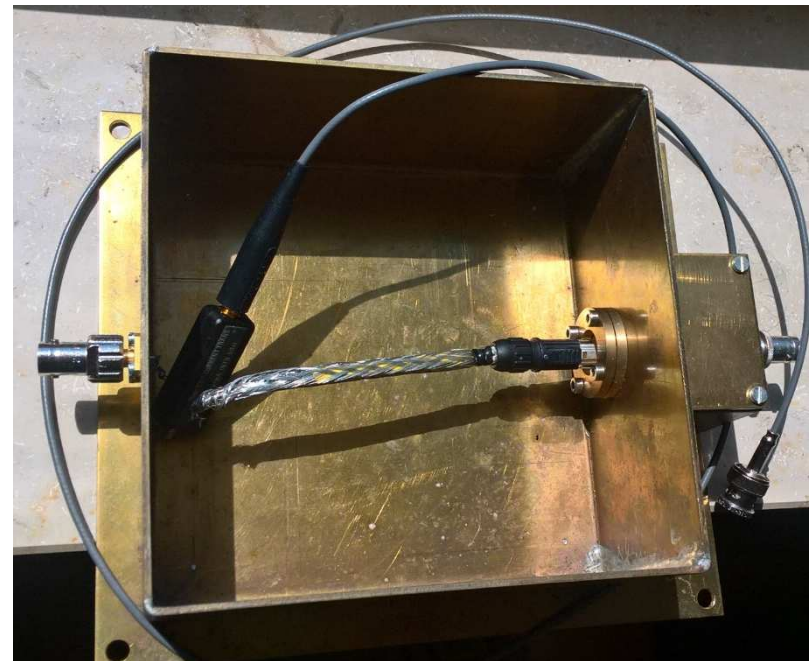


# Transfer Impedance measurement

Dieter Schicketanz  
Reutlingen University

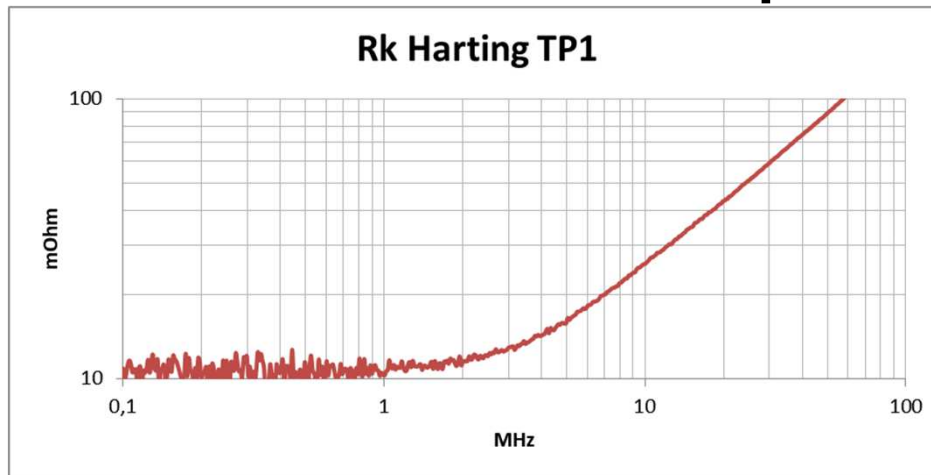
## Update Industrial connector IEC 63171-6

- Due to the used low frequencies below 100 MHz it is possible to open the tube usually used per IEC62153-4-3Ed2 for an easier to perform measurement.
- It was used to perform a measurement on the surface mounted IEC 63171-6 interface.
- See measurement test set up

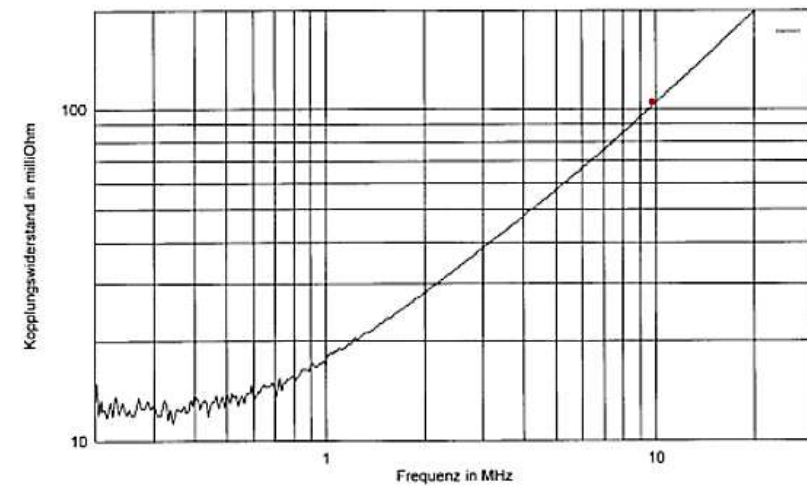




## Measurement and comparison SPE TP1 and RJ45



26,5 mOhm at 10 MHz, from there a screening attenuation of about 55 dB can be calculated and a coupling attenuation at 10 MHz greater than 80 dB

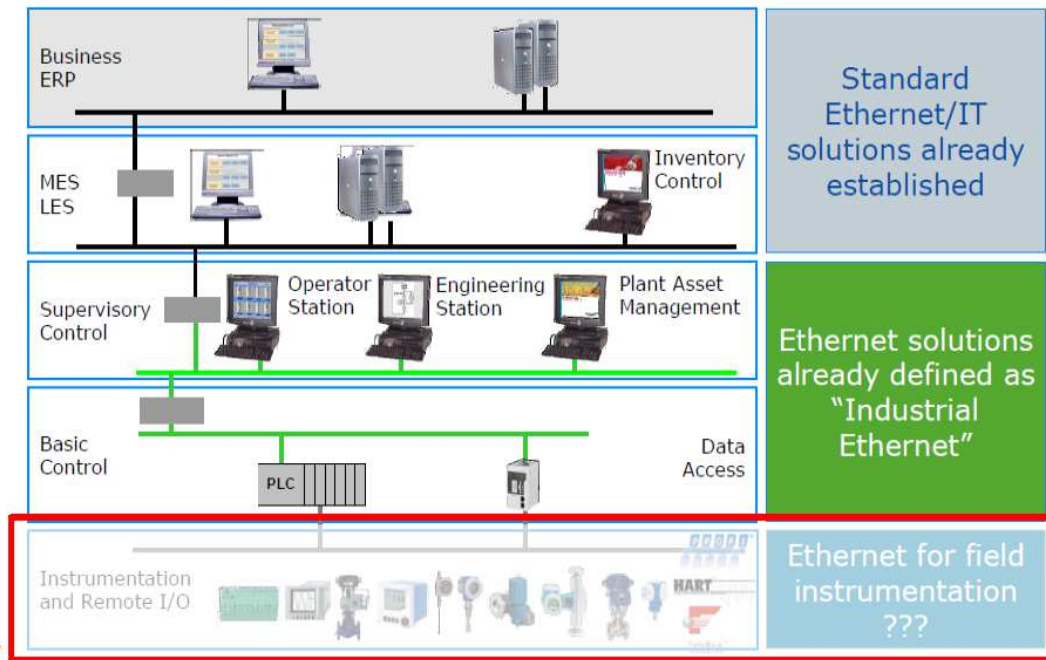


RJ45

# Remember our starting point and goals (see CFI pages)

## SPE can be used to replace the big amount of analog and serial bus sensors:

- Desire to converge on one network type
- Ethernet adoption is happening where technically possible
- Non-Ethernet *fieldbuses* still required to complete communications to the edge
  - Cable lengths > 1km
  - 1200 baud to hundreds of kb/sec
  - Challenges: Combined reach & rate, special environments, cost of operation



**Ethernet Gap at the 'Edge'** →

Credit: Dr. Raimund Sommer, Endress + Hauser, ODVA Industry Conference, Oct. 2014.

## Proposal to solve the MDI connector topic with consensus



Pushing Performance

- At this Ethernet-“gap” terminal blocks inside the switch cabinet and different styles of M8 and M12 coding versions are used today.

[Quelle: IEEE 802.3 10SPE CFI July 2016](#)

Ethernet Gap at the 'Edge'



Credit: Dr. Raimund Sommer, Endress + Hauser, ODVA Industry Conference, Oct. 2014.

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- If will successfully will address this potential market with SPE it is necessary to define at IEEE802.3cg also an Industrial style MDI connector
- If we not do so the market can not start immediately to implement SPE in new sensors and actuators and we will have a big delay of some years to build up the SPE ecosystem and market potential will be smaller as shown at the CFI.
- If we give up to define “may used” MDI connectors and hand over this topic to the different user groups it will take some more years to define the connectors and here is a high risk to have more different versions in the market.

People | Power | Partnership → higher cost / no compatibility

## Proposal to solve the MDI connector topic with consensus



### ■ **Consensus I see so far in our discussions:**

- Industry is fragmented and need different solutions
- Car industry will use depending on supplier and car platform different connector solutions
- Many sensors (APL / explosive atmosphere devices and other applications like lighting, thermostats and so on ) will still go on with terminal blocks and this must be possible too

### ■ **Proposal to fix the MDI topic with the maximum possible consensus:**

- Go back to version D 3.1 with the IEC 63171-1 and IEC 63171-6 connectors and add the additional text according to the presentation “diminico\_3cg\_01\_0819”.
- In addition we should add a useful note to describe why the MDI is defined as “may be used” for the “man on the street” how are not part of the IEEE802.3cg tasks force group.

## Why to connector solutions at IEEE802.3cg



- **View to the RJ45 world:**

- At the IEEE802.3 documents is only the RJ45 specified and this is from the volume point of view in the market the often used interface. But also today we have M8 and M12 based D- and X-coded products in the market for all industrial use cases in the field.

- **View to the future SPE ecosystem:**

- To address the whole future industrial Ethernet market ([sensor networks](#), [actuators](#), [machines](#), [drives](#) ...) we need special for this applications designed product range.

[IEC 63171-6](#)

- With both interfaces according to [IEC 63171-1](#) and [IEC 63171-6](#) version we set up a similar ecosystem as we have it today in the RJ45/M8/M12 world. If we do it now at IEEE802.3cg we save a lot of time to implement SPE to this markets. And keep in mind, all sensors we connect in the field with the industrial style connectors increase also the number of needed interface in the data center world with the LC style.

- Win win situation for the whole [SPE ecosystem](#).