

PROMESH P10

PROFINET/ Ethernet SWITCH

- ✓ **ONLINE CABLE DIAGNOSTICS**
- ✓ **INTEGRATED CABLE TEST**
- ✓ **EMC ANALYSIS**



PROmesh P10



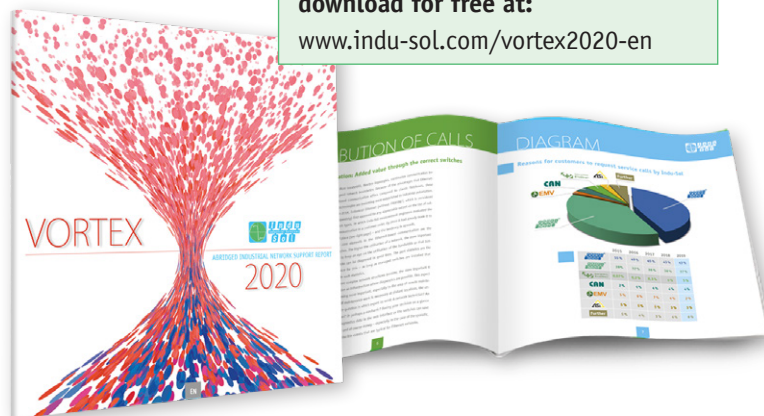
Contents

The intelligent "network monitor"	2
Online cable diagnostics	4
Integrated cable test	5
Performance monitoring	6
EMC monitoring	7
Heterogeneous & convergent networks need bandwidth	8
24V monitoring	9
PROFINET specification V2.4	9
Technical specifications	10
Ordering specifications	11

The intelligent "network monitor"

When installing PROFINET networks in machines and systems, the proper functioning of the connection cables is usually tested beforehand, or even subjected to elaborate cable certification in accordance with CAT. Up until now, these measurements were considered absolutely necessary, as there was no adequate way to test or monitor physical network connections. The **VORTEX Report 2020** (findings from around 1,000 Indu-Sol service calls) shows that 40% of all anomalies during commissioning and in later permanent operation are caused by cables, connectors, and connection points.

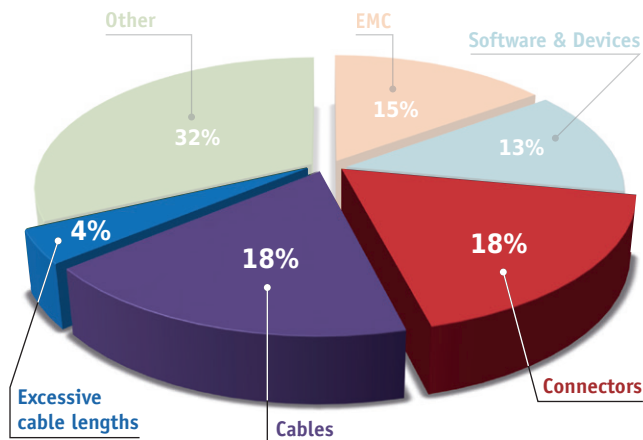
**VORTEX Report 2020 –
download for free at:**
www.indu-sol.com/vortex2020-en





The **PROmesh P10** switch from the latest gigabit switch generation has integrated cable diagnostics, which satisfies both the requirements of cable measurement, as well as permanent and qualitative cable monitoring.

When the production phase starts, permanent monitoring is ensured automatically. This shows physical transmission quality and makes possible a statement on the "wear reserve" of the network up-to-the-minute. This knowledge makes it easier to plan maintenance tasks in advance.



Source: VORTEX Report 2020 – Failure statistics

PROmesh P10 HIGHLIGHTS

- Online cable diagnostics
- Integrated cable tester
- EMC monitoring
- Performance monitoring
- 24V monitoring
- TSN-ready
- PROFINET specification V 2.4 compliant

Conventional cable measurements usually take place when the system is at a standstill. Connection points or disturbances caused by functioning, e.g., vibrations, EMC influences, or mechanical wear, are not taken into account. The quality statements of a cable test are therefore limited to the time of measurement, and it is questionable if trouble-free operation in the long-term is benefited.

PROmesh P10



Online cable diagnostics

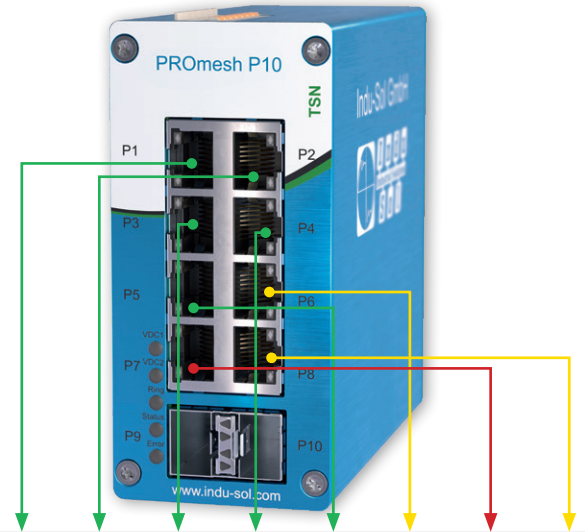
Network cables are subject to physical wear, caused both by the production environment and applications with highly dynamic processes.

Through a clever evaluation system of the transmission and reception parameters in **PROmesh P10**, clear statements can be made on transmission quality, and subsequently on the state of the cable, using an integrated data matrix. For this, a quality value "**Q actual value**" is determined per cable, which is compared to a "**Q target value**" that corresponds to the length. The display is per port in a bar diagram (see illustration). If a pre-set threshold value is dropped below, the colour display changes in the web interface that is integrated in the switch. Through the typical traffic light colours GREEN-YELLOW-RED, you receive a quick overview of the cable status in your system.

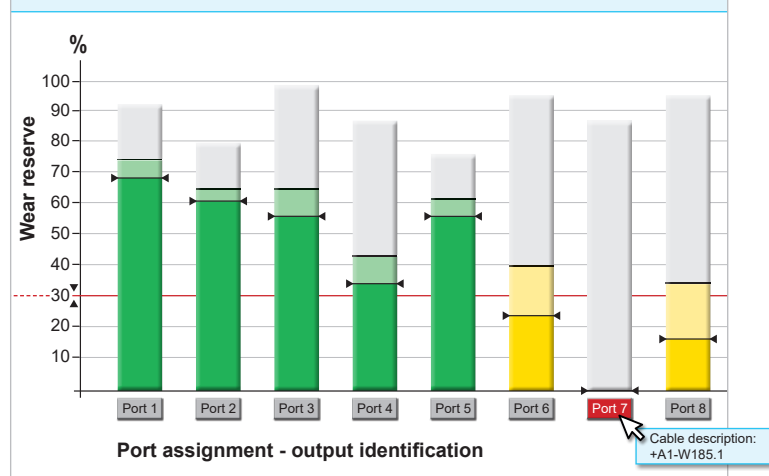
Unacknowledged
error messages



Alarms that may occur can be integrated in a superordinate network monitoring system through standardised interfaces (SNMP, PROFINET, e-mail, and relay). In this way, affected cables can be exchanged as per their status during the next maintenance interval.



Cable diagnostics - Quality values





Integrated cable test

In the case of new installations, especially with self-assembled cables, measurement-based quality control must be carried out. At present, the cables and connectors are checked with a separate cable measurement device. Often this is neglected in order to save time.

Thanks to the cable test integrated in **PROmesh P10**, this check is done automatically. The measurements run according to specially developed evaluation criteria and are displayed clearly in the web interface. The cable quality is checked in

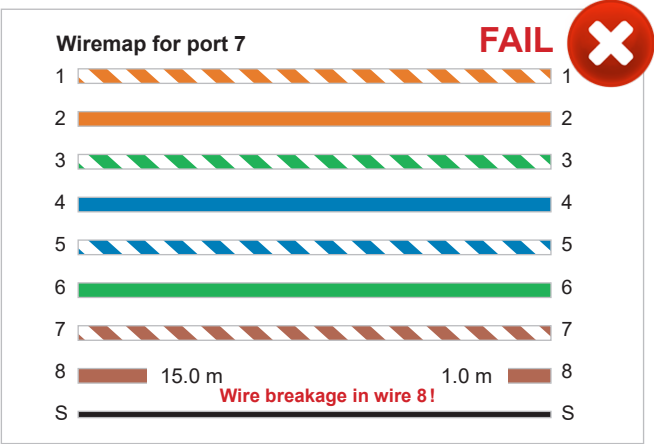
the integrated state in the real network environment, and at the same time permanently monitored.

The advantages are obvious

- Reduce costs by saving time
- Cable test in the real system environment
- Cable quality is integrated into network monitoring
- Automatic documentation

Cable diagnostics - cable test

Port	Status	Length	Speed	Scan
1	●	4m	1 Gbps	🔄
2	●	3m	100 mbps	🔄
3	●	7m	1 Gbps	🔄
4	●	10m	100 mbps	🔄
5	●	2m	1 Gbps	🔄
6	●	70m	1 Gbps	🔄
7	●	16m	1 Gbps	🔄
8	●	3m	1 Gbps	🔄



PROmesh P10



Performance monitoring

Increasing information requirements lead automatically to enormous rises in data traffic. In the case of sporadically occurring network limit peaks, certain switch types reach their performance limits, e.g., through queries or scans from IT, or TCP/IP applications. Discarded telegrams are the result.

To avoid this, compare the expected network limit to the available bandwidth of the switches already during planning. In order to make the simultaneous occurrence of high network limits and discards visible at a glance, the **PROmesh P10** has up-to-the-second statistics on the network limit per port, and on corresponding discards.

Overview of the current status of the switch

Port statistics

Overview

Details

Port 1 (1 Gbps, copper)

Partner: ✓ 10.21.2.212
Netload: ✓ 7 % / s
Discards: ✓ 0
CRC error: ✓ 0
Q value: ✓ 68 %

Port 2 (100 mbps, copper)

Partner: ✓ 10.21.2.213
Netload: ✓ 11 % / s
Discards: ✓ 0
CRC error: ✓ 0
Q value: ✓ 60 %

Port 3 (1 Gbps, copper)

Partner: ✓
Netload: ✓
Discards: ✓
CRC error: ✓
Q value: ✓

Port 6 (1 Gbps, copper)

Partner: ✓ 10.21.2.214
Netload: ✓ 3 % / s
Discards: ✓ 70 % / ms
CRC error: ✓ 0
Q value: ⚠ 24 %

Quality value not reached!

Port 7

Partner: -
Netload: -
Discards: -
CRC error: -
Q value: -

Wire breakage in wire 8!

Port 8 (1 Gbps, copper)

Partner: ✓
Netload: ✓
Discards: ✓
CRC error: ✓
Q value: ⚠

Quality value not reached!

Port statistics - Display variants (overview/details)

Overview



Port 4

Partner: 10.21.2.190

Details

Port 4 (100 mbps)

Partner: ✓ 10.21.2.190
Netload: ✓ 15 % / s
Discards: ⚠ 35650
CRC error: ✓ 0
Q value: ✓ 34 %

Discards occurring!

Leakage current

RMS

Peak

Threshold value

200 mA



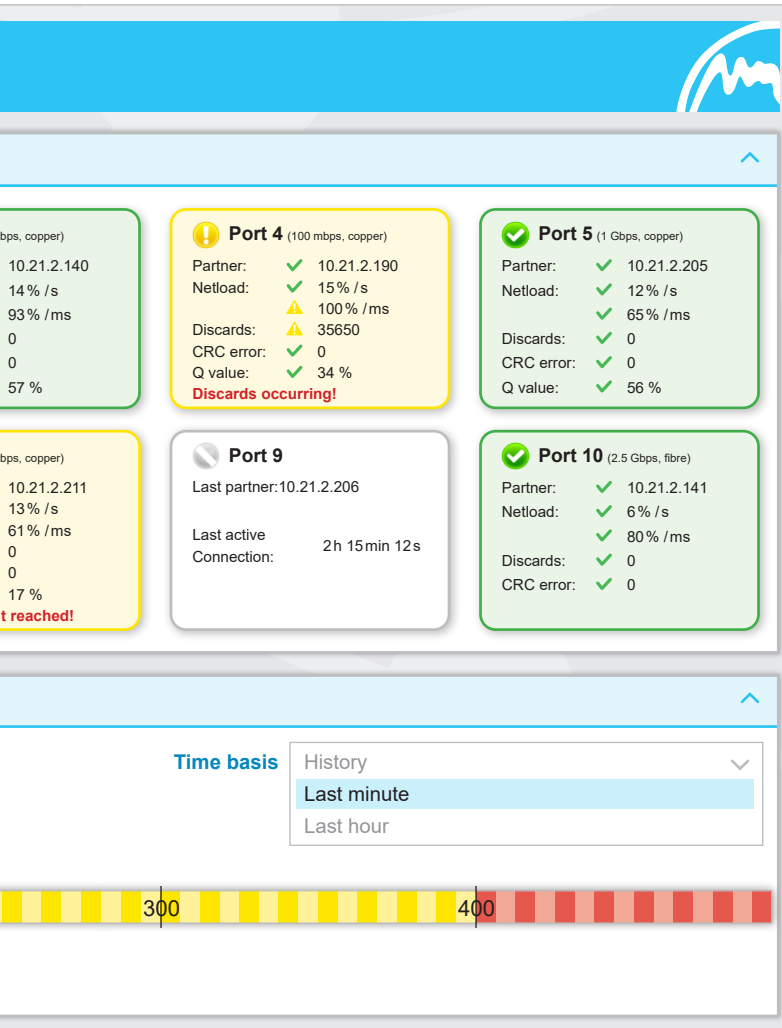
86 mA



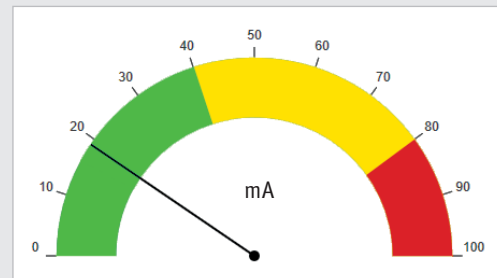
EMC monitoring

Despite shielding, EMC couplings on the data cables frequently lead to defective telegrams (errors) and resulting communication errors or breakdowns. Magnetic fields of adjacent energy conveying cables or switching operations with high loads are often the cause. The **PROmesh P10** has integrated leakage current monitoring so that fast and continuous information about the interference source, the frequency and intensity, as well as the time of the error can be provided.

An alarm is triggered automatically if a freely settable limit value is exceeded. Every time the threshold value is exceeded, a snapshot is saved for later analysis possibilities, so that the event can be retrospectively traced over time.



Leakage current RMS



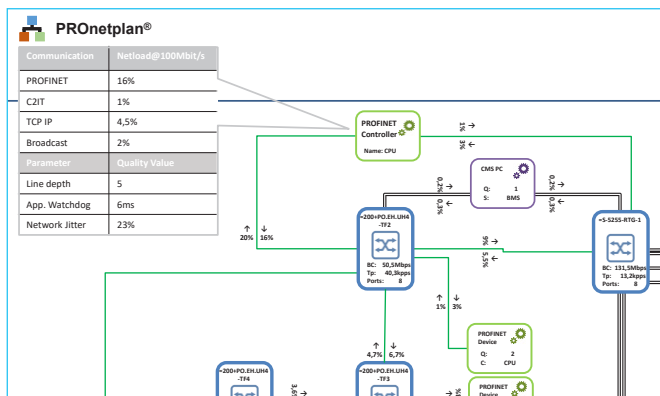


Heterogeneous & convergent networks need bandwidth

A consistent separation of PROFINET applications and TCP/IP communication is not tenable in the long term. Through intelligent interlinking, homogeneous networks are increasingly changing into heterogeneous networks. Here, several masters and additional TCP/IP applications often communicate with one another within a network. As a result, the requirements on reliability and security increase for communication between OT and IT areas. In these convergent networks, intelligent bandwidth management can take care of this. The further development of the **PROmesh range** to the gigabit transmission speed is a logical consequence of the changing market requirements.

There are several solutions for achieving an increase in usable bandwidth. With the first variant, a higher line speed can be used, e.g., 100 mbps to 1 Gbps.

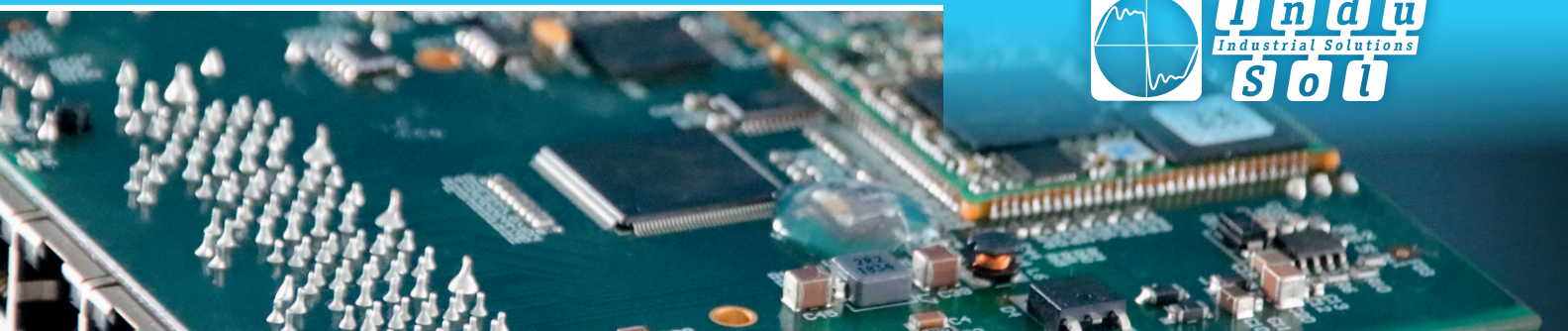
However, it is not possible to use this higher transmission speed in all applications and with all end devices. For this reason, TSN (Time Sensitive Networking), a technology of the future, is viewed as a second variant. TSN expands the Industrial Ethernet with functions and mechanisms for the real-time transmission of data. The objectives are low latency periods, high availabilities, and reliable communication connections. TSN is used, for example, for real-time audio or video streams, and process communication in Industry 4.0.



Planning homogeneous, heterogeneous, and convergent networks with PROnetplan®

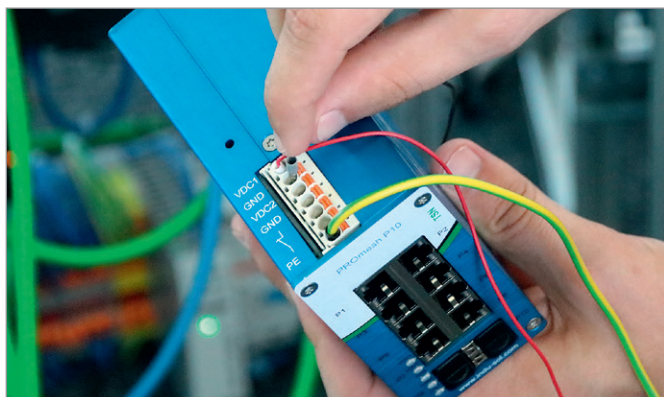
PROmesh P10 was designed for using both above-mentioned options. It features the following:

- 8 ports x 1 Gbps; 2 ports x 2.5 Gbps
- Performance in the distribution layer category
- Support of several ring protocols (MRP, STP, RSTP)
- Implemented TSN functionalities



24V monitoring

According to EN 61131-2, for a 24V power supply, a tolerance range between -17.5% and +16.5% should be maintained for secure operation. In practical applications, however, the real voltage deviates from the tolerance range and devices fail. The reason for this is the large distribution depth despite an electronically regulated 24V supply voltage. For switches that form the central hub of the network, device failure due to too little supply voltage cannot be tolerated.



Therefore, the **PROmesh P10** has integrated monitoring of the 24V power supply, which can be integrated into the central network monitoring as an additional stability parameter.

PROFINET specification V 2.4

Since 2020, PROFINET has been available via TSN with the PROFINET specification V2.4. This means that both manufacturer and end user can implement the advantages of TSN interoperably. These include future-proof IEEE Ethernet technology with higher bandwidths, deterministics, flexible network configuration, as well as large chip varieties.

The PROmesh P10 was developed on the basis of the PROFINET specification V2.4, and certified according to the following points:

- Conformance Class B
- Netload Class III
- Real-time Class 1



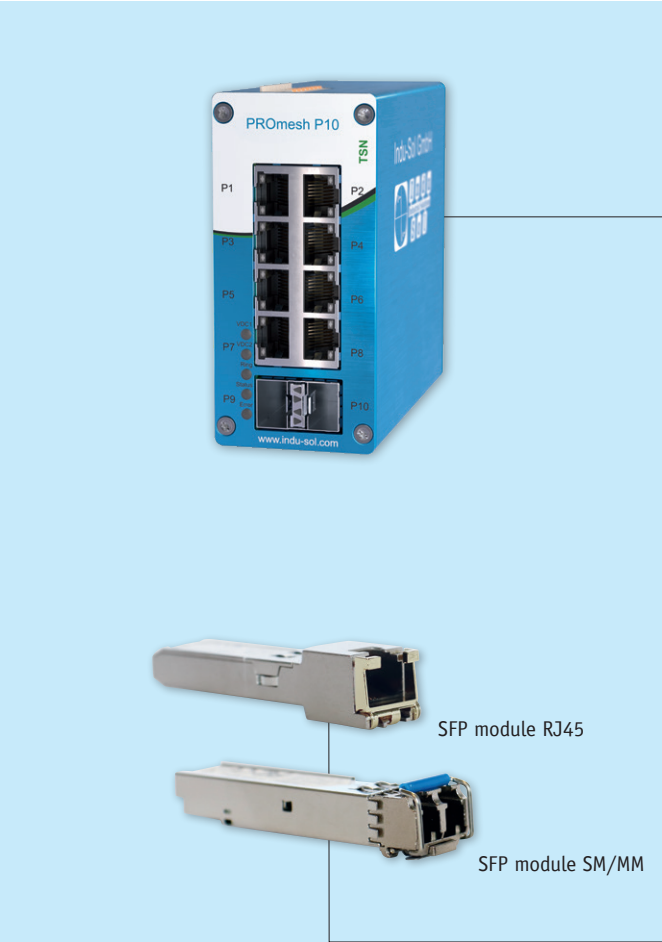
PROmesh P10

Technical specifications

Network ports	8 x 10/100/1000 mbps RJ45 ports 2 x 100/1000/2500 mbps SFP ports
Technology	Cut-through
Online cable diagnostics	Quality value
Integrated cable tester	Wiremap
Leakage current monitoring	Sampling rate 25 kHz, measuring range 0 - 10 A
Port statistics	Errors, discards, network limit
Netload representation	1 millisecond
Protocols / services	HTTP, SNMPv1, SNMPv2, DHCP client, TFTP, SMTP client, SNTP client, LLDP, IGMP, MRP master/client, RSTP, Syslog
Port mirror	TX packages or TX and RX packages
Alarms	PN-RTA, SNMP, e-mail, relay
Bandwidth control	Incoming or incoming/outgoing per port
Power supply	12 V-36 V DC redundant power supply
Max. current consumption	0.8 A
Max. power consumption	8 W
Dimensions (H x W x D)	105 x 49 x 112 mm
Weight	850 g
Housing	Aluminium, anodised
Storage temperature	-40 °C to +85 °C
Operating temperature	-40 °C to +60 °C
Protection class	IP20
Assembly	35 mm DIN top-hat rail



Ordering specifications



PROmesh P10

PROFINET/Ethernet switch

Ordering Details	Art. No.
PROmesh P10	114110200

PROmesh P10 SFP transceiver modules

PROFINET/Ethernet modules

Ordering Details	Art. No.
SFP module 100/1000 mbps 100 m RJ45	114120003
SFP module 100 mbps 2 km MM	114120006
SFP module 100 mbps 20 km SM	114120007
SFP module 1 Gbps 0.55 km MM	114120005
SFP module 1 Gbps 20 km SM	114120004
SFP module 2.5 Gbps 0.55 km MM	114120020
SFP module 2.5 Gbps 20 km SM	114120021



Indu-Sol GmbH
Blumenstrasse 3
04626 Schmoelln

Phone: +49 (0) 34491 580-0
Fax: +49 (0) 34491 580-499

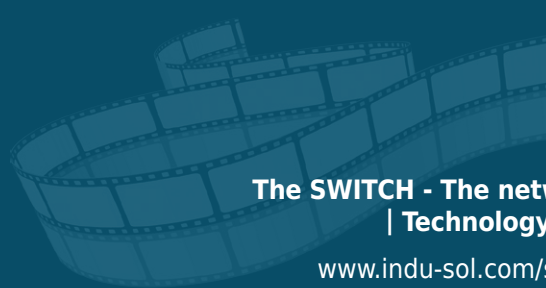
info@indu-sol.com
www.indu-sol.com

Certified according to DIN EN ISO 9001:2015

InduSol America, LLC
980 Birmingham Rd. Ste 721
Alpharetta, GA 30004, USA

Phone: +1.678.880.6910
+52 (55) 8526-6442

info@indusolamerica.com
www.indusolamerica.com



The SWITCH - The network expert
| Technology made easy

www.indu-sol.com/switch-movie
or simply use the QR code