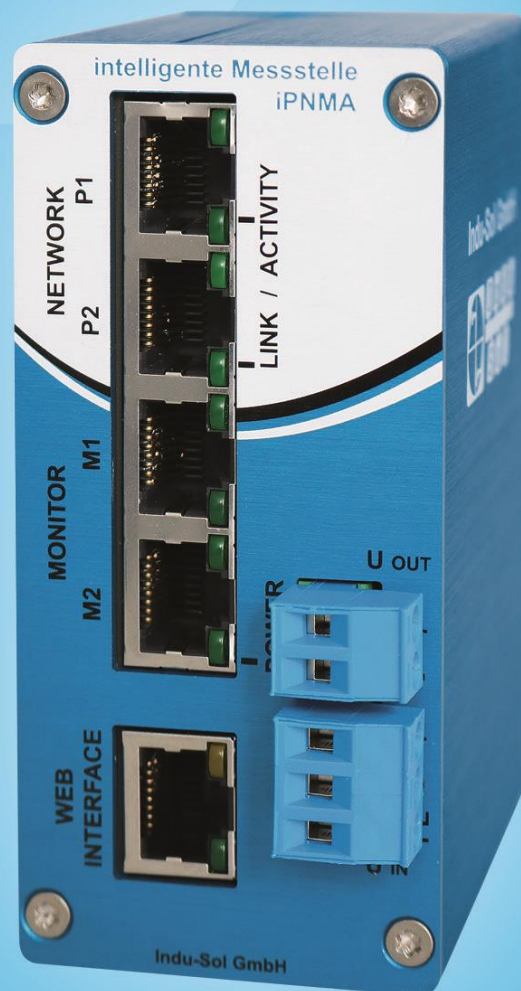


# iPNMA

## User Manual



Diagnostic and service tools for PROFINET



## Revision overview

Date	Revision	Change(s)
29/07/2016	0	First version

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### **Caution!**

This device may only be put into operation and operated by qualified personnel. Qualified personnel, as referred to in the safety-related information of this manual, are persons who are authorised to put into operation, to earth and to label devices, systems and electrical circuits in accordance with the standards of safety engineering.

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## 1 General information

Please read this document thoroughly from start to finish before you begin installing the device and putting it into operation.

### 1.1 Purpose of use

The intelligent PROFINET measurement point (iPNMA) combines the functions of a PROFINET measurement point with a simple PROFINET network analysis. The following quality parameters are determined:

- Telegram jitter
- Telegram gaps
- Telegram overtakes
- Network utilisation
- Update rate
- Device diagnostics
- Device failures and restarts
- Error telegrams

In this case, the evaluation of the recorded data does not take place on the device itself, but instead all data are queried and processed by the PROmanage® NT software. We recommend installing the iPNMA permanently in the network connection between the automation device (controller) and the first switch, because the major part of the communication typically passes through here. Two network jacks (Network P1 and P2) are available for this purpose. For a more detailed network analysis, two monitor jacks (Monitor M1 and M2) are available for feedback-free connection of an analysis tool (e.g. PN-INspektor® NT or laptop).

No adjustments to the PLC program are required for using the iPNMA. It works in an entirely manufacturer-independent way; i.e. the analysis works completely independently of the type of control system and bus nodes.

### 1.2 Scope of supply

The scope of supply comprises the following individual parts:

- iPNMA
- 3-pole plug-in terminal block (power supply)
- 2-pole plug-in terminal block (Out for measuring device)
- CD with PROmanage NT software and device manual

Please check the contents are complete before putting into operation.

### 1.3 Safety information

- Never open the housing of the iPNMA.
- Opening the housing immediately voids any warranty.
- If you think the device is defective, send it back to the supplier.

## 2 Device ports and status indicators

### 2.1 Device ports

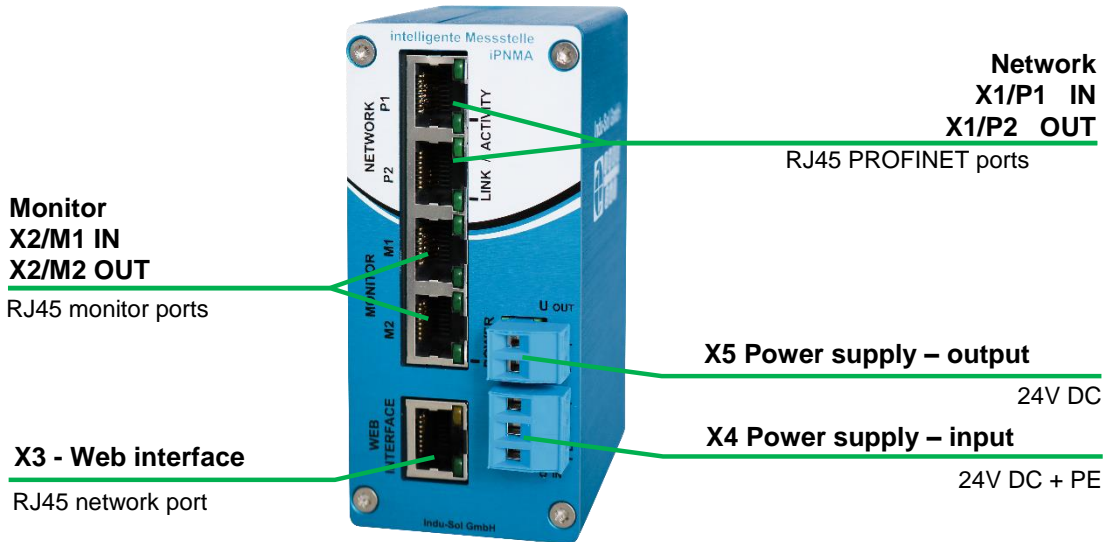


Figure 1: Device ports

Installation

## 2.2 Installation instructions

The iPNMA is installed horizontally inside the cabinet on a 35 mm top-hat rail in accordance with DIN EN 60715.

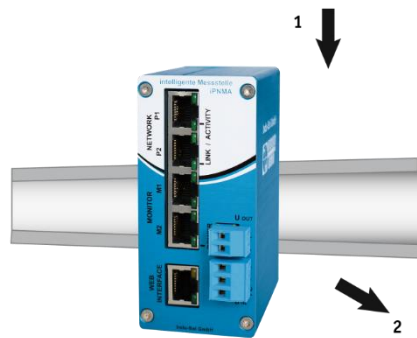


Figure 2: Device installation on top-hat rail

**Caution:** The following distances must be maintained from other modules for correct installation:

- From left and right: 20 mm
- From top and bottom: 50 mm

The removal of the iPNMA is displayed in Fig. 3.

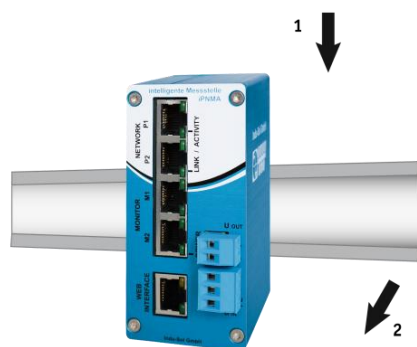
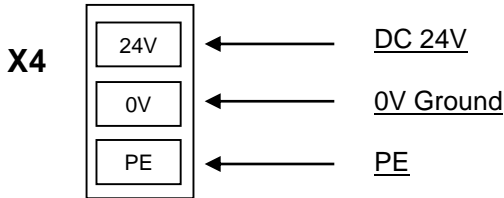


Figure 3: Removal



### 2.3 Voltage supply

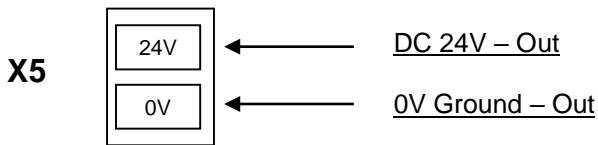
Operation requires 24 V of external direct current, which is to be connected to the device via the 3-pole plug-in terminal block supplied in the package. The PE contact should be connected to the local PE system.



**Caution:** When connecting, make sure that the polarity is correct.

### 2.4 Voltage supply output

The connection X5 voltage supply Out can be used to provide the voltage supply for PROFINET-INspektor NT or for another measuring device.



### 2.5 Connection to the PROFINET network

The iPNMA is firmly integrated into the network between the PLC (controller) and the first I/O device or switch for continuous, permanent network analysis. To do this, the device is integrated into the system via the P1 and P2 sockets.

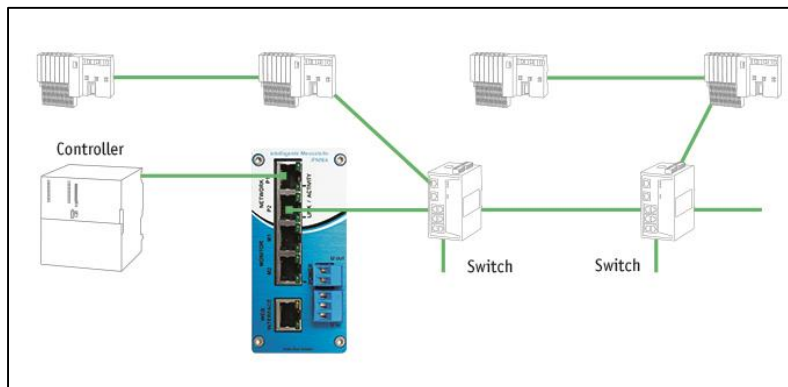


Figure 4: Installation iPNMA

### 2.6 WEB INTERFACE

The LAN connection **X3** provides the Ethernet network connection to the iPNMA. This involves a 1000BASE-T RJ45 interface. A standard Ethernet cable is used as a connection cable to a PC or laptop (not included in the scope of supply).

Both the evaluation of internally recorded data and the parametrisation of the device are possible through this access point.

The iPNMA is supplied with the following **factory-set** network configuration:

**IP address:           192.168.212.212**  
**Subnet mask:       255.255.255.0**

A Web-server function is integrated for access to the device and can be opened with an appropriate standard browser (e.g. Microsoft Internet Explorer from version 10 or Mozilla Firefox from version 11; JavaScript must be activated). You can reach the device's user interface by entering the IP address of the iPNMA in the browser's command line.

### 3 Setup and operation

#### 3.1 Network settings

To set the network addressing (IP address, subnet mask, gateway and host name), use the Indu-Sol ServiceTool software (software is included in the scope of supply or can be downloaded at <http://www.indu-sol.com/en/support/downloads/software/>).

Open the ServiceTool, make sure that the checkmark is set at iPNMA and start the scan (see figure 5). After the scan, the found devices should be displayed as shown in figure 6. By clicking on the desired device, the properties of the device are displayed on the right side. In this view, you can change the IP address, subnet, gateway and host name and save the settings. If DHCP is activated by a checkmark, the iPNMA gets the IP address, subnet and gateway from an automatic DHCP server.

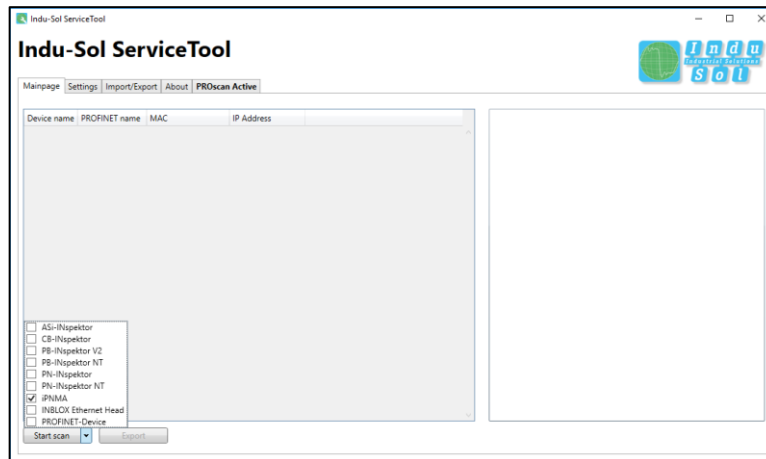


Figure 5 – Settings of the ServiceTool

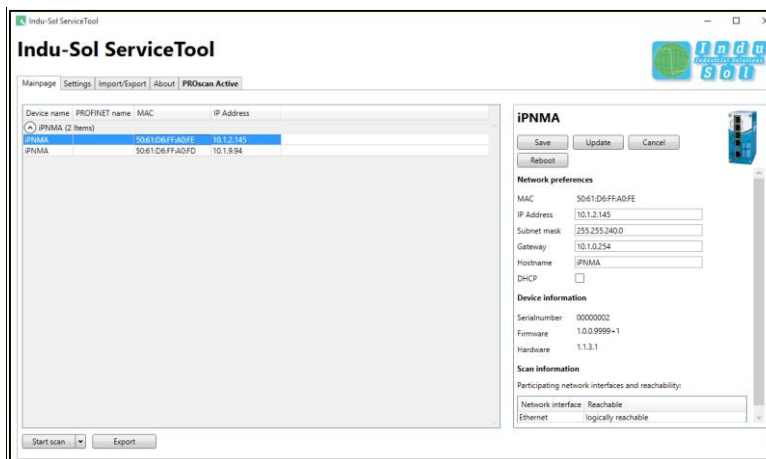


Figure 6 – Setting options of the iPNMA



The Indu-Sol ServiceTool functions independently of the IP address setting of the PC used. All that is needed is a network connection.

### 3.2 PROmanage NT

Generally the PROmanage NT software is needed for using the iPNMA. This chapter explains the setting up of the iPNMA in the PROmanage NT software. For general installation and operation of PROmanage NT, please refer to the PROmanage NT manual (manual included in the scope of supply or by download at <http://www.indu-sol.com/en/support/downloads/manuals/>).

- In the first step, you need to start PROmanage NT and log in as Admin.
- Create a new device in the Analysis and network overview tab by right-clicking (see figure 7).
- For the automatic scan, select the one by iPNMA and start the scan (see figure 8).
- Finally, checkmark all found iPNMAs that should be set up, make the desired settings and then click on Setup (activate the Adopt immediately option).

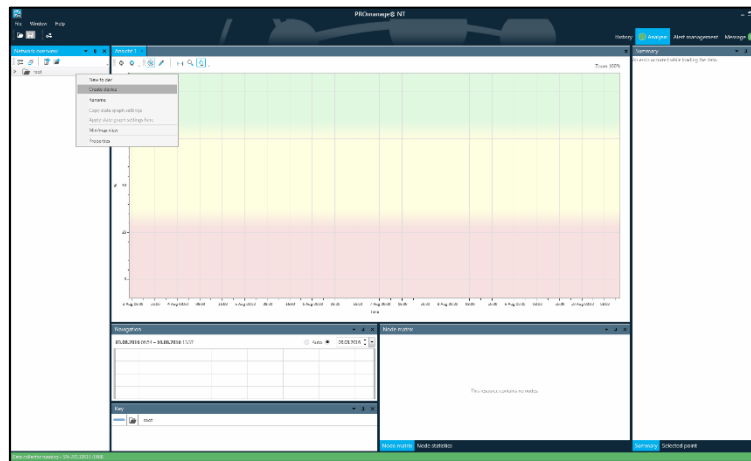


Figure 7: PROmanage NT, create device

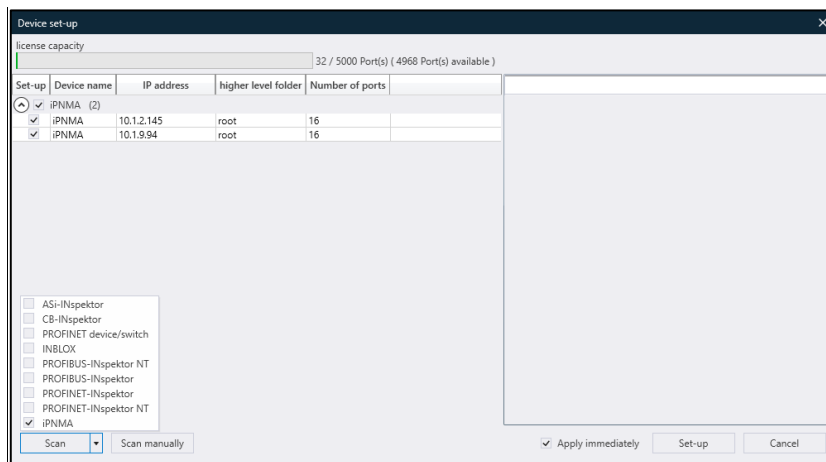


Figure 8: PROmanage NT, scanning and setting up iPNMA

## 4 Device parameters

### 4.1 Update rate

The update rate is a fixed value (specific to each device) set in the controller (e.g. 1 ms) indicating the time between data updates in the controller and the I/O device. The decisive criterion for the actual update rate is the network utilisation on the one hand, and the line depth, i.e. the installed network structure and the number of passing devices.

The increasing number of passing devices causes fluctuations in the transit time of telegrams, which are called jitter (see Point [5.5 Jitter](#)). By measuring the update rates, it has to be shown that telegram jitter does not exceed half the update rate upwards or downwards (max. 50 % jitter).

### 4.2 Alarm (high priority / low priority)

Diagnostics messages that appear are sent to the PLC as high-priority or low-priority alarms in PROFINET. The event-based division of these alerts (e.g. the shorting of an ET200S module) is defined by each manufacturer themselves for their devices. Unfortunately, a more precise definition is therefore not possible, since the alarms are classified system and node-specifically.

### 4.3 Bus device failure

In PROFINET node failures are diagnosed by means of the watchdog time of the controller or the node itself. This is determined by the set update time between the controller and node, as well as the number of accepted update cycles with missing I/O data.

### 4.4 Bus device restart

The parameter 'Bus device restart' counts all device restarts that occur. A restart of a bus device occurs after a failure or a system start when a bus device has its parameters set by the control system without any faults and then begins the cyclical data exchange.

### 4.5 Jitter

PROFINET communication is based on maintaining the set update rate of each device with the controller. Positive and negative deviations from this configured update time are referred to as 'jitter' in PROFINET.

Jitter of up to 50 % of the configured update time is in an acceptable range. Jitter values that are greater than 50 % suggest network performance problems, device issues or an unfavourable layout of the network structure.

### 4.6 Telegram gaps

A telegram gap in PROFINET means the absence of an update time. Telegram gaps are frequently caused by lost telegrams in the network, e.g. by discards or telegram faults or are caused by incorrect firmware versions of devices. In such cases the devices do not pass on a telegram or 'forget' to send off their own telegram.

### 4.7 Telegram overtakes

A telegram overtake may arise in PROFINET if peak loads occur in the switch or I/O device. When circumstances are particularly bad, a new telegram may be sent before an old one in the buffer of the switch. Telegram overtakes indicate excessive utilisation or device malfunctions.

### 4.8 Error telegrams

This entry indicates the number of faulty telegrams detected in the iPNMA connection (checksum errors and packet fragments).

### 4.9 Network load

This includes the network load produced by all reports. This is given as a percentage based on the maximum possible load of a cable at 100 Mbit/s. For stable system operation, the network load should not exceed 20 % in new systems.

## 5 Web interface

### 5.1 Support and contact

Should you wish to contact us for any reason, further information can be accessed from this page. You can find the manual stored in the download area as a quick aid as well as all important device information.

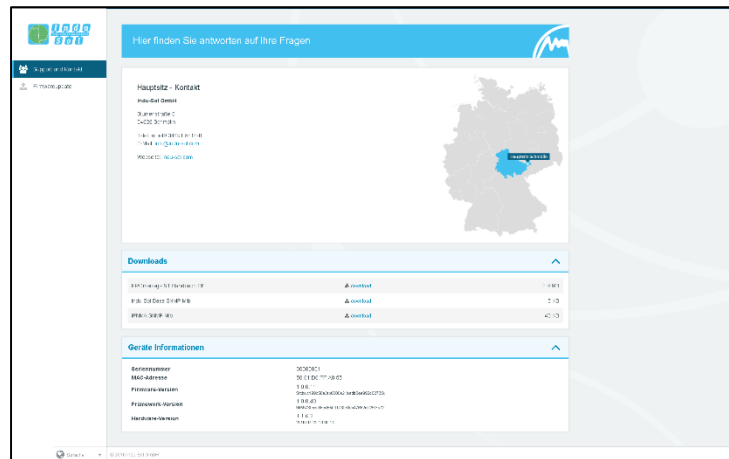


Figure 9: Support and contact

### 5.2 Firmware update

You can perform a firmware update for the iPNMA using this function, if required. To do this, the new firmware file is selected and uploaded via the 'Search' button. Following successful installation, triggering a restart is required in the device with the 'Restart' button.

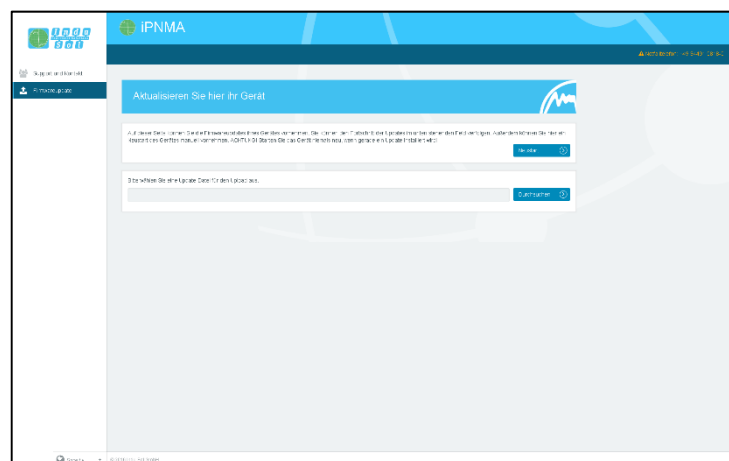


Figure 10: Firmware update

## 6 Technical data

- Voltage supply: +24V DC
- Tolerance:  $\pm 10\%$
- Max. power consumption: 150 mA
- Max. power loss: 4 W
- Output voltage: 24 V DC (max. 1A)
- Dimensions (W x H x D): 105 x 49 x 92 mm, incl. top-hat rail mounting and connector terminals
- Assembly: TS35 DIN top-hat rail (EN 50022)
- Weight: 0.345 kg
- Protection class: IP20
- Network port: RJ45
- Operating temperature: +5 °C to +55 °C
- Storage temperature: -20 °C to +70 °C
- Relative air humidity: 10 % to 90 %, non-condensing

### 6.1 Technical drawing

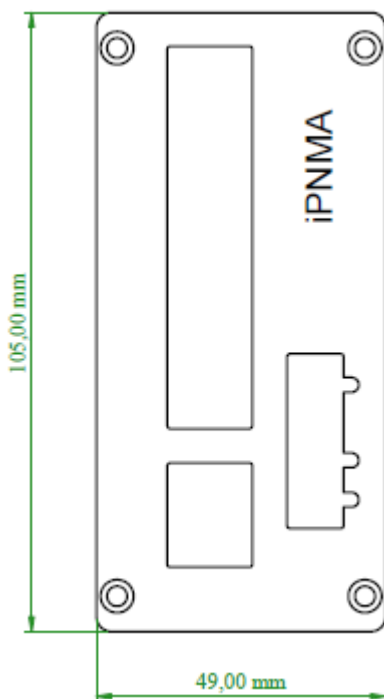


Figure 11: Front view

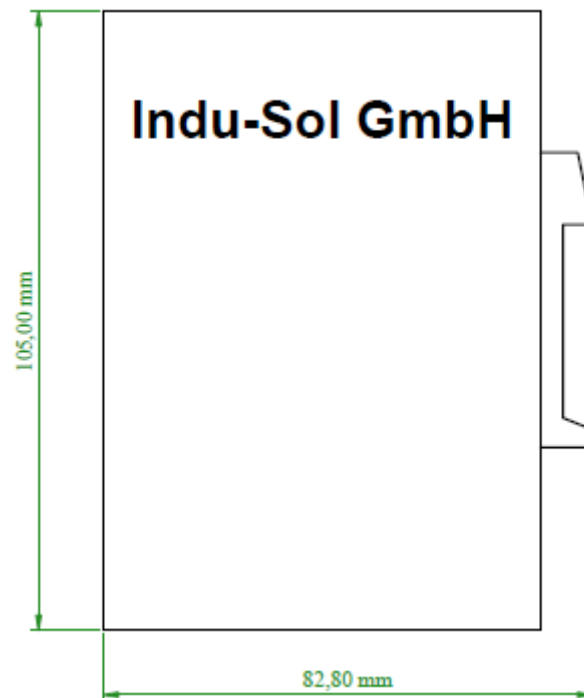


Figure 12: Side view



**Indu-Sol GmbH**  
Blumenstrasse 3  
04626 Schmoelln

Telephone: +49 (0) 34491 5818-0  
Telefax: +49 (0) 34491 5818-99

[info@indu-sol.com](mailto:info@indu-sol.com)  
[www.indu-sol.com](http://www.indu-sol.com)

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