Inspired by
temperature

PROFINET® Gateway

Technical Bulletin

huber

PROFINET®
Gateway

VALID IN CONJUNCTION WITH:

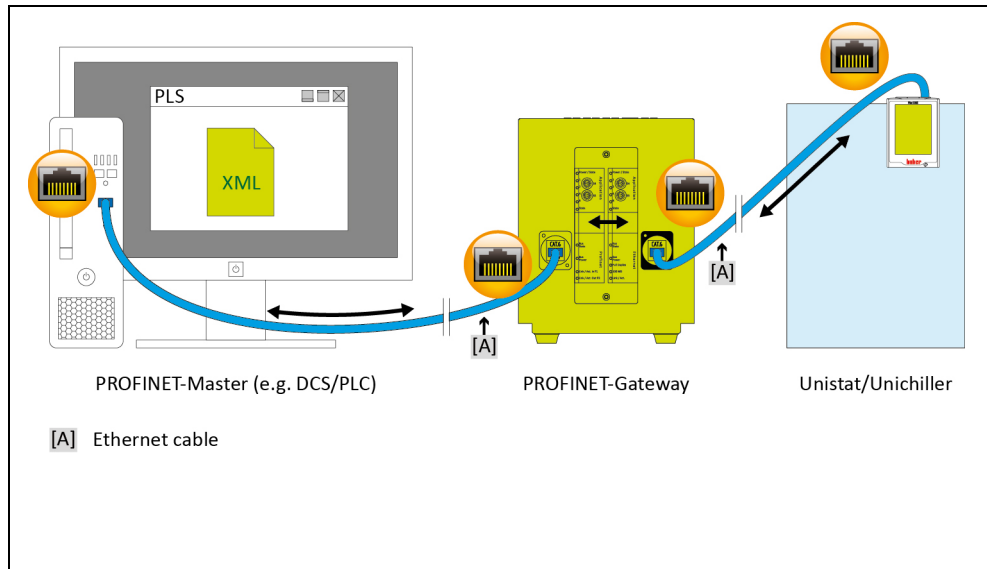### Huber temperature control unit with Pilot ONE

Table of contents

1 Description

Schematic structure

[A]	Ethernet cable

PROFINET is used in many industrial applications. The excellent standardization of PROFINET results in very short start-up times in the field. The PROFINET Gateway enables Huber temperature control units to be integrated into automation solutions in a simple, flexible and process-oriented way. The corresponding GSDML file is used to integrate the PROFINET Gateway with the configuration software.

The operating company can specify the functionality of the PROFINET Gateway. On Huber temperature control units with Pilot ONE, this can be done via the "PB package" menu. The desired parameters that should be transmitted via PROFINET can be configured at the Pilot ONE controller. The number of the desired parameters is then configured in the PROFINET Gateway accordingly.

Please note the inherent restrictions of the different E-grade versions ("Basic", "Exclusive" and "Professional"). For more information, please refer to the data in the Data Communication Manual at www.huber-online.com.

INFORMATION	Prerequisite for using the PROFINET Gateway: Huber temperature control unit with Pilot ONE.

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2 Information on the functioning of the PROFINET Gateway

2.1 Position of the PROFINET Gateway within the data communication

There are two participants from the viewpoint of the PROFINET Gateway: The PROFINET master (e.g. DCS, PLC) on the PROFINET side and the temperature control unit on the Ethernet side.

The temperature control unit receives the information from the PROFINET Gateway. The PROFINET Master does not directly access the temperature control unit.

3 Installation instructions

3.1 On-site installation

The PROFINET Gateway is installed in a stainless-steel housing with mains socket for free-standing installation. The PROFINET Gateway is connected via an Ethernet cable to the RJ45 interface of the temperature control unit.

The PROFINET cable is routed directly to the PROFINET Gateway. The user must guarantee compliance with the PROFINET parameters. The customer must comply with the applicable standards for the internal wiring of the device. This applies in particular to an electrically conductive functional earth and the potential equalization.

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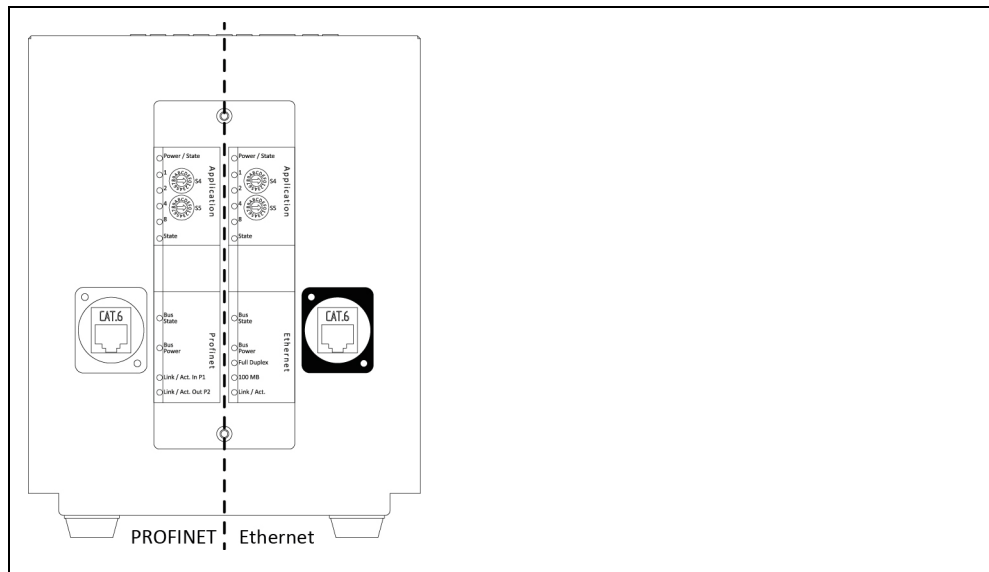
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4 Commissioning of the PROFINET Gateway

No information can be provided on the structure and configuration of the PROFINET side as it is beyond Huber's control.

INFORMATION	You must read the documentation for the temperature control unit, the PROFINET Gateway and the PROFINET Master before connecting the PROFINET Gateway. You must observe all instructions and regulations in the respective documentation.

4.1 Control elements of the PROFINET Gateways

Exemplary representation of the front

Exemplary representation of the back

[35] Power supply
[61] Fuse

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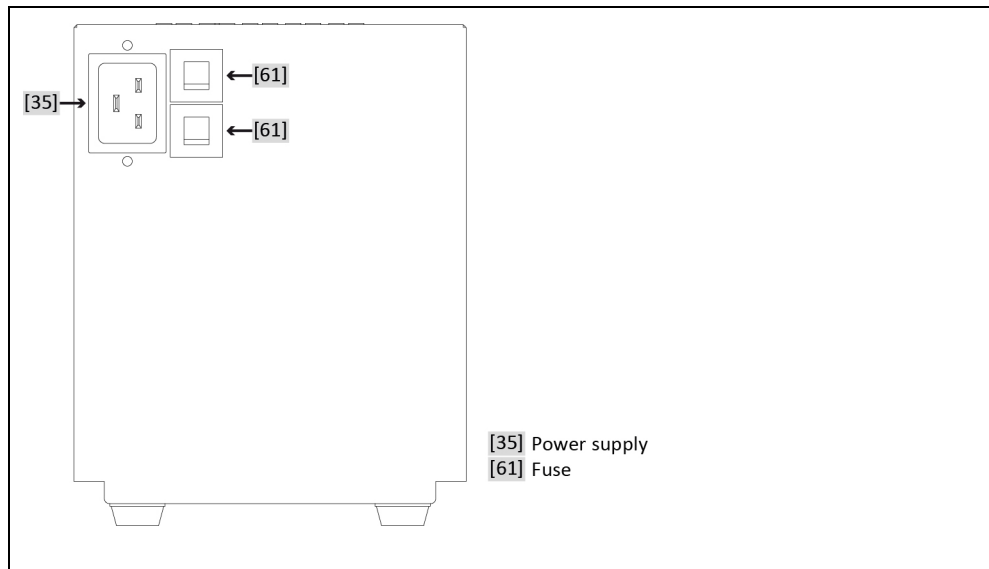
There are 2 control elements each for "Ethernet" and "PROFINET" at the front of the PROFINET Gateway. These have the following functions:

Table 1:
Function of control elements

Element	Function
Ethernet	
S4	Selection IP address (Ethernet side to the temperature control unit)
S5	Not used
PROFINET	
S4	Parameter mode
S5	Test mode Ethernet, the PROFINET communication is not active

The respective position of switches S4 and S5 determines the address configuration of the Ethernet and PROFINET interfaces of the gateway. The two switches are described separately. The switch position is read only when the module is turned on. To change the parameters: For the corresponding switch position to take effect, the following points must be taken into account. Separate the PROFINET Gateway from the power supply, set the switch, connect the PROFINET Gateway with the power supply.

Table 2:
Ethernet - Function of switch S4

Position	Function
0	Use of the standard IP address between PROFINET Gateway and Pilot ONE Pilot ONE: 172.16.105.20; subnet mask: 255.255.255.0 PROFINET Gateway: 172.16.105.10
1*	User-defined IP address
*During start-up the switch position must ALWAYS be set to 0.	

Table 3:
PROFINET - Function of switch S4

Position	Function
0	Number of parameters 11 (standard)
1*	User-defined number of parameters
*At every start of the PROFINET Gateway (network ON), the PROFINET Master must specify the number of parameters. The number of parameters must agree with the number configured in the Pilot ONE ([Categories Menu] → [Interfaces] → [PB-Package]). Pilot ONE supports a maximum of 61 parameters.	

Table 4:
PROFINET - Function of switch S5

Position	Function
0	PROFINET mode
8*	Test mode Ethernet, the PROFINET communication is not active
* This mode is exclusively used to check the connection between Pilot ONE and the PROFINET Gateway.	

4.2 Default setting of the PROFINET Gateway

Before the PROFINET Gateway is connected with the temperature control unit, the following settings must be made first:

At the Pilot ONE®:
- Static IP address and subnet mask – [Categories Menu] → [Interfaces] → [Ethernet] → [IP Address] → [Static IP] (172.16.105.20) → [Subnet Mask] (255.255.255.0).
- Enabling of commands – [Categories Menu] → [Interfaces] → [Ethernet] → [Command Release] (always on (PLC)).

At the gateway:
- Ethernet - Select the standard IP address with switch S4.
- Ethernet - Switch S5 is not used.
- PROFINET - Select the standard parameter mode using the switch S4.
- PROFINET - Activate PROFINET mode using the switch S5.

If the PROFINET Gateway is connected to the power supply, the initialization phase starts. LEDs 1 and 2 or 4 and 8 are blinking in pairs. Initialization is complete when LEDs 1, 2, 4 and 8 remain permanently off. As soon as the PROFINET Master has made the connection to the PROFINET Gateway, the PROFINET Gateway starts communicating with the temperature control unit.

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# 5 Integration into the process automation system

The device description file (GSDML) contains the selectable input and output module sizes. Pilot ONE supports a maximum of 61 parameters.

5.1 Standard integration at the PROFINET Master

- Download of the PROFINET GSDML file (format .XML) from www.huber-online.com.
- Integration of the XML file into the PROFINET Master.
- 2 input bytes and 2 output bytes must be provided per configured parameter.
- The module size must correspond to the number of parameters configured in the PROFINET Gateway. Thus, the parameters can be queried/sent.
  Example: If 11 parameters are configured, the input/output module size must be ≥ 22 bytes.
- The size of the input module must correspond to the size of the output module. The module size may not differ.
- The maximum permissible size is 256 bytes.

The following screen shot shows an example of the module size selection for 11 configured parameters.

Screen shot:
Module size selection
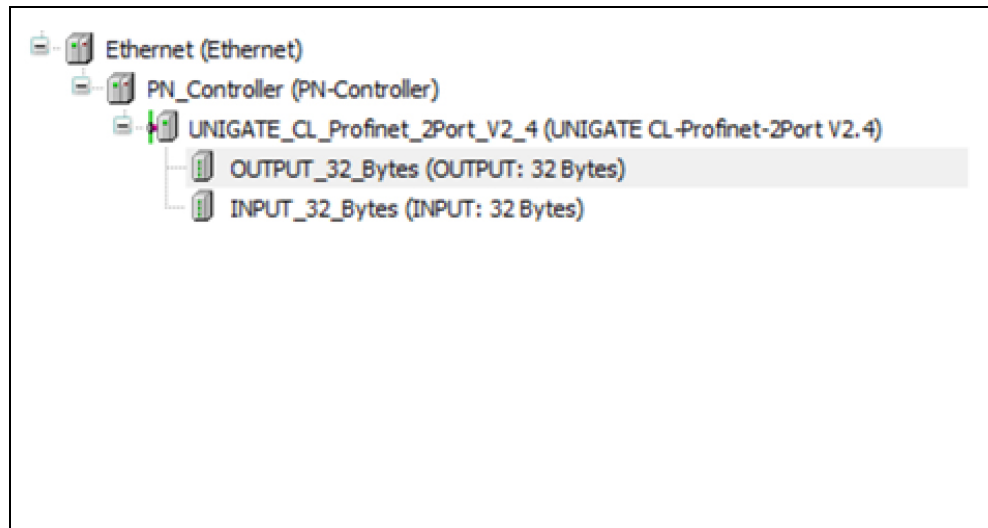
INFORMATION

NOTE: The PROFINET Gateway does not check the content of the arrays or the valid value range of the corresponding parameter. Please read our data communication manual in this regard.

IMPORTANT: The sequence and number of parameters are exclusively determined by the selection in the Pilot ONE ([Categories Menu] → [Interfaces] → [PB-Package]).

PROFINET Gateway status messages are exchanged through the diagnostic data. The diagnostic data is two bytes in size. Byte 0 contains the status data of the PROFINET Gateway and byte 1 that of the temperature control unit.

PROCEDURE

After the standard switch configuration and integration into the XML file.
➢ Switch on the Pilot ONE.
➢ Check the IP address and the number of configured parameters again.
➢ Connect the PROFINET Gateway to the power supply.
➢ Connect the PROFINET Gateway with the Pilot ONE. The LEDs "Full Duplex", "100 Mb" and "Link/Act." light up green.
➢ Connect the PROFINET Gateway with the PROFINET Master. The LED "Link/Act. P2" flashes green. If the configuration in the PROFINET Master is correct, each of the LED 8 on the Ethernet and PROFINET side start to flash.

5.2 User-defined IP address

PROCEDURE

➢ Set switch S4 on the Ethernet side to "0".
➢ Connect the PROFINET Gateway with the temperature control unit on the basis of the standard IP address. To do so, connect the Ethernet side of the PROFINET Gateway with the Ethernet connection at the Pilot ONE.
➢ Send the new IP address and subnet mask of the PROFINET Gateway and the new IP address of the Pilot ONE to the diagnostics address. → Page 10, Figure **»Screen shot«**).
➢ Disconnect the PROFINET Gateway from the power supply.
➢ Adapt the IP address and subnet mask in the Pilot ONE to the values configured in the PROFINET Gateway.
➢ On the Ethernet side, set the switch S4 to "1".
➢ Connect the PROFINET Gateway to the power supply.

5.3 Errors that can NOT be read at the PROFINET Master

There are errors on the Ethernet side that are indicated by the LEDs at the PROFINET Gateway. These errors cannot be read via the PROFINET Master. In these error cases, the LED "State" on the Ethernet side remains red. The green LEDs flash to indicate the corresponding error number.

Table 5:
Ethernet - error numbers

No.	Function
1	LED 1 flashes green: Switch S4 is at "0", PROFINET Master wants to specify an IP address that deviates from the default IP address.
2	LED 2 flashes green: The user-defined IP address is specified as zero by the PROFINET Master.
3	LED 1 and LED 2 flash green: Wrong parameter length - PROFINET Gateway error. If this error occurs permanently there is a high likeliness that the PROFINET Gateway must be replaced.

5.4 Errors that can be read at the PROFINET Master

There is a total of 9 different error messages that can be read by the PROFINET Master.

Table 6:
PROFINET Master - error numbers

No.	Function
1	LED1 flashes: The length of the PROFINET Slave input module does not equal the length of the PROFINET Slave output module. **Diagnostics data:** UNIGATE CL Profinet 2Port (subslot 0x0001) UNIGATE error number: The length of the PROFINET Slave input module does not equal the length of the output module UNIGATE detail error code:: 0
2	LED2 flashes: The length of the PROFINET Slave input and output module is faulty; it should not exceed 256 bytes. **Diagnostics data:** UNIGATE CL Profinet 2Port (subslot 0x0001) UNIGATE error number: The length of the Profinet slave input and output module is faulty; it should not exceed 256 byte; UNIGAGE detail error code:: 0
3	LED 1 and LED 2 flash: The length of the PROFINET Slave input and output module is not sufficient for the set number of parameters; it should be at least number of parameters * 2 byte. **Diagnostics data:** UNIGATE CL Profinet 2Port (subslot 0x0001) UNIGATE error number: The length of the Profinet Slave input and output module is not sufficient for the set number of parameters; it should be at least number of parameters * 2 byte. UNIGATE detail error code:: 0
4	Problems on the Ethernet side (communication with the temperature control) Possible causes: - Wrong IP address - Cable not inserted/faulty - Wrong subnet mask. e.g.: 255.255.255.0 (IP address PROFINET Gateway 172.16.17.1 IP address Pilot ONE 172.16.28.10). In this case, a correct subnet mask would be 255.255.0.0 - Switch S4 at the Ethernet side to "1". **Diagnostics data:** UNIGATE CL Profinet 2Port (subslot 0x0001) UNIGATE error number: Communication with the temperature control unit is not possible; UNIGATE detail error code:: 0

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No.	Function
5	The data to be sent from the PROFINET Gateway to the Pilot ONE are longer than 255 bytes; input buffer on the PROFINET side is full. The output buffer selected for the PROFINET Master is too large.
6	Repeated receipt of invalid PB package commands (PROFINET Gateway - Huber temperature control unit)
7	Unknown PB package command error
8	Number of parameters sent by the PLC does not match the number in the temperature control unit. **Diagnostic data:** UNIGATE CL Profinet 2Port (subslot 0x0001) UNIGATE error number: Number of parameters sent by the PLC does not match the number in the temperature control unit; UNIGATE detail error code:: 0
9	Invalid value in the block counter.

6 Diagnostic functions

6.1 On starting up

The PROFINET Gateway performs an internal self-test after applying the voltage supply. This takes about 2 seconds. It is normal that all LEDs light up briefly.

The software in the PROFINET gateway controls two display elements. This is the LED labeled "8" and the LED labeled "State" on the Ethernet side.

LED 8 is used as communication display between PROFINET Gateway and temperature control unit. It will light up after the PROFINET Gateway has sent data to the temperature control unit. The LED goes out when valid data have been received from the PROFINET Gateway.

The LED "State" flashes green at approx. 1 Hz during the initialization phase. It goes out once the first valid data has been received. Valid data must have been received no later than 30 seconds after switching on.

A red-green LED "State" flashing at approx. 1 Hz indicates a communication error between the PROFINET gateway and the temperature control unit. The PLC can read the error from the diagnostic data. → Page 11, Section **»Errors that can be read at the PROFINET Master«**.

All other displays are internal PROFINET gateway messages that can be looked up in the PROFINET gateway manual. You can download this manual at www.deutschmann.de for free.

6.2 Communication test

Perform the listed communication test Table 4 (→ Page 8, Section **»Control elements of the PROFINET Gateways«**) to check the connection between PROFINET Gateway and temperature control unit.
For this, the PROFINET Gateway is de-energized and the connection to the PROFINET is separated. Afterwards, switch S5 at the "PROFINET" is set to switch position "1". Now the PROFINET Gateway can be reconnected to the power supply.
If the connection between Pilot ONE and PROFINET Gateway is working, the communication is indicated by a flashing LED 8 on the Ethernet side. In addition, under [Categories Menu] → [Interfaces] → [Ethernet] → [Ethernet Test], a display can be opened at the Pilot ONE. Here, the data sent by the PROFINET Gateway are dis-played.

6.3 During operation

If communication is ongoing, this is recognizable by the green illuminated LEDs "Bus" and "State". The communication of the PROFINET Gateway with the Huber temperature control unit is signaled by the LED 8 on the Ethernet side of the PROFINET Gateway.

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6.4 Troubleshooting

A difference between the GSDML file and the program in the PROFINET Gateway may cause bus errors or incorrect data content. The version is specified in the GSDML file. It can be checked with the diagnostics function.

The following information can be used for troubleshooting in case of problems during start-up or operation.

- Are all connectors correctly connected?
- Is the power supply correctly connected?
- Is the PROFINET gateway address set correctly in the bus and exists only once?
- Is the PROFINET Gateway correctly configured?
- Is the temperature control unit correctly configured?
- Was the PROFINET gateway configured by the PLC?

Is it possible to read but not to write values? In that case check whether analog functions of a Com.G@te were activated. For example, if a setpoint was activated via AIF, the analogue value has priority over the interface.

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