

Read before installation.  
 Keep for future use.

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**Safety**

Read the user manual for the basic unit (FRONT and BASE modules) and the corresponding measuring and communication modules, observe the technical specifications and follow the safety instructions in the safety guide (Package Contents for the basic unit Protos II 4400(X)) – for Ex versions, additionally the information provided in the documents in the Package Contents.

The user manual, safety guide and other product information can be downloaded from [www.knick.de](http://www.knick.de).

**NOTICE!** Potential damage.  
 Never try to open the module. The Protos modules cannot be repaired by the user. For inquiries regarding module repair, please contact Knick Elektronische Messgeräte GmbH & Co. KG at [www.knick.de](http://www.knick.de).

**Intended Use**  
 The module is a general-purpose PID controller module. Analog control valves are actuated via 2 passive current outputs. Digital straightway valves are actuated via two relay contacts. In addition, two relay contacts are provided for limit monitoring or pre-control.

**Note:** The specifications on the module's rating plate take precedence.

**Package Contents**

- Measuring module
  - Installation Guide
  - Test report 2.2
  - Adhesive label with terminal assignments
- For Ex version PID 3400X-121:
- Appendix to certificates (KEMA 03ATEX2530, IECEx DEK 11.0054)
  - EU Declaration of Conformity
  - Control Drawings

Check all components for damage upon receipt.  
 Do not use damaged parts.

**Operating States**

The function check (HOLD) operating state is active:

- During calibration (only the corresponding channel)
- During maintenance
- During parameter setting
- During the automatic rinse cycle (use of the rinse contact)

The behavior of the current outputs depends on the parameter setting, i.e., they may be frozen at the last measurement or set to a fixed value.

For detailed information, refer to the user manual of the basic unit (FRONT and BASE modules).

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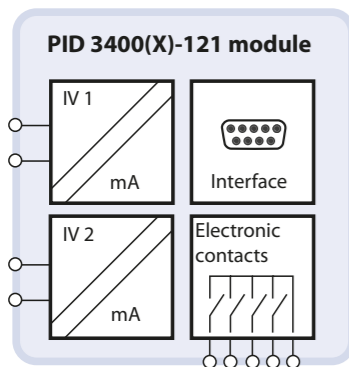
**Local Contacts**  
[www.knick-international.com](http://www.knick-international.com)

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 This document was created on April 8, 2019.  
 The latest documents are available on our website below the corresponding product description.  
 Installation guides can be downloaded in the following languages: German, English, French, Spanish, Portuguese



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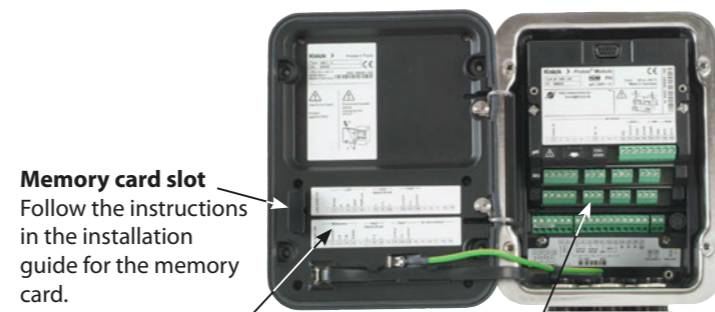
**Device Overview/Module Concept**



**Module Compatibility**

|                             | Protos 3400 | Protos 3400X | Protos II 4400 | Protos II 4400X |
|-----------------------------|-------------|--------------|----------------|-----------------|
| Protos PID 3400-121 module  | x           |              | x              |                 |
| Protos PID 3400X-121 module |             | x            |                | x               |

**WARNING!** Shock potential.  
 Make sure the device is de-energized before reaching into the terminal compartment.



**Memory card slot**  
 Follow the instructions in the installation guide for the memory card.

**Terminal plate adhesive label ("concealed" modules)**  
 The adhesive labels (Package Contents) for the modules at slot 1 or slot 2 can be affixed here. This simplifies maintenance and service.

**Module configuration**  
 Any combination of up to 3 measuring and communication modules is possible. Module identification: Plug & Play

**Inserting the Module**

**CAUTION!** Electrostatic discharge (ESD).  
 The modules' signal inputs are sensitive to electrostatic discharge. Take measures to protect against ESD before inserting the module and wiring the inputs.

**Note:** Strip the insulation from the wires using a suitable tool to prevent damage.

1. Switch off the power supply to the device.
2. Open the device (loosen the 4 screws on the front).
3. Plug the module into the slot (D-SUB connector), see figure on the right.
4. Tighten the module's fastening screws.
5. Connect the signal lines, see "Wiring" on the next page.
6. Check whether all connections are correctly wired.
7. Close the device by tightening the screws on the front.
8. Switch on the power supply.

**CAUTION!** Incorrect measurement results.  
 Incorrect parameter setting, calibration or adjustment may result in incorrect measurements being recorded. Protos must therefore be commissioned by a system specialist, all its parameters must be set, and it must be fully adjusted.

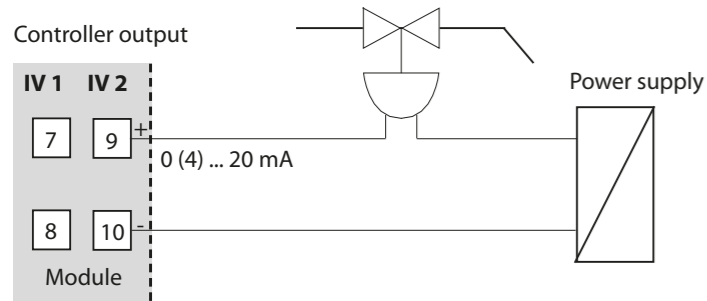


**NOTICE!** Moisture ingress.  
 Cable glands must be tightly sealed. Insert filler plugs or sealing inserts if necessary.

## Wiring

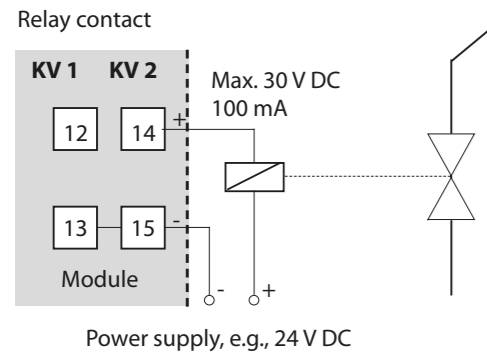
### Wiring Example 1

Analog controller outputs IV 1, IV 2 (passive, supply unit required)



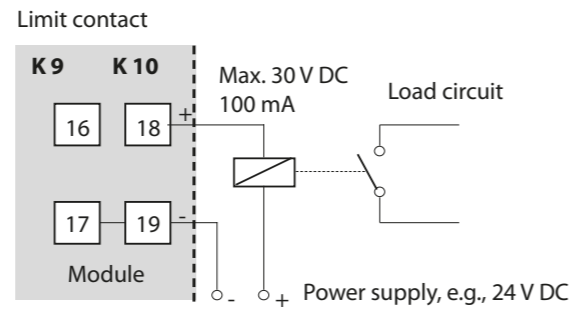
### Wiring Example 2

Digital controller outputs KV 1, KV 2 (electronic relay contacts)



### Wiring Example 3

Electronic relay contacts K 9, K 10



## Menu Overview for the PID 3400(X)-121 Module

### Parameter setting

|   |   |
|---|---|
| Analog controller IV1/IV2 (linear PID)                    | Controller type, controlled variable, setpoint, neutral zone, (P) controller gain, (I) reset time, (D) rate time, feed time alarm, behavior during HOLD, output IV1/IV2                     |
| Analog controller IV1/IV2 (nonlinear PI)                  | Controller type, controlled variable, setpoint, neutral zone, control beginning, vertex X/Y, reset time, feed time alarm, behavior during HOLD, output IV1/IV2                              |
| Digital controller KV1/KV2                                | Controller type, controlled variable, setpoint, neutral zone, (P) controller gain, (I) reset time, (D) rate time, feed time alarm, behavior during HOLD, pulse period, max. pulse frequency |
| Limit contacts K9/K10 (can be defined separately by user) | Process variable, limit value, hysteresis, effective direction, contact type, ON/OFF delay  |

### Maintenance

|  |   |
|--|---|
| Current source   | Output current definable 0 ... 22 mA                      |
| Analog controller IV1/IV2 / Digital controller KV1/KV2 | Manual specification of controller output (function test) |

### Diagnostics

|                         |   |
|-------------------------|---|
| Message list            | List of all messages  |
| Logbook                 | Shows the last 50 events with date and time                     |
| Meas. point description | Shows the tag number and annotation (input in system control)   |
| Device description      | Hardware version, serial number, (module) firmware, options     |
| Module diagnostics      | Internal function test  |
| Output status           | Status of signal outputs (current load, controller/limit value) |

## Messages/Troubleshooting (for detailed tables, see the user manual)

| Error         | Message (Diagnostics menu: Message list) | Possible causes  | Remedy   |
|---------------|--|--|--|
|               | Display is blank                         | FRONT or BASE power supply interrupted<br>Input fuse has tripped<br>Display switch-off is active | Check the power supply<br>Replace the fuse (500 mA T)<br>Deactivate the display switch-off                                   |
|               | No measurement, no error message         | Module not plugged in correctly  | Install the module correctly<br>Check the measurement display under "Parameter setting / Administrator level / FRONT Module" |
| B073/<br>B078 | Current I1/I2, load error                | Open current output I1/I2:<br>Current loop not closed,<br>cable interrupted                      | Check the current loop<br>Deactivate the current outputs   |
| F232          | Module configuration<br>Ex/safe area     | Ex and safe area modules have been inserted.   | Select a uniform configuration (either Ex or safe area)  |

## Specifications (Extract)

|                                       |   |
|---------------------------------------|---|
| Analog controller outputs IV1, IV2    | 0/4 ... 20 mA, passive  |
| Supply voltage                        | 3 ... 30 V, I <sub>max</sub> = 100 mA   |
| Load monitoring                       | Error message if load is exceeded (permissible voltage drop at a load: supply voltage - 3 V)                              |
| Measurement error <sup>2)</sup>       | < 0.25% current value + 0.05 mA   |
| Usage                                 | Actuation of analog control valves<br>For straightway valves:<br>IV1: Active below setpoint<br>IV2: Active above setpoint |
| Digital controller outputs KV1, KV2   | Electronic switching outputs, polarized, floating, connected to each other and to K9, K10 < 1.2 V                         |
| Voltage drop                          | DC: V <sub>max</sub> = 30 V, I <sub>max</sub> = 100 mA  |
| Load capability                       | Actuation of straightway valves, metering pumps   |
| Usage                                 | KV1: Active below setpoint<br>KV2: Active above setpoint  |
| PID process controller                | Continuous controller via the current outputs IV1, IV2 or/and quasi-continuous controller via the KV1, KV2 relay contacts |
| Controlled variable <sup>1)</sup>     | User-defined, depending on measuring modules installed  |
| Setpoint specification <sup>1)</sup>  | As desired within range   |
| Neutral zone <sup>1)</sup>            | As desired within range   |
| P action <sup>1)</sup>                | Controller gain Kp: 0010 ... 9999 %   |
| I action <sup>1)</sup>                | Reset time Tr: 0000 ... 9999 s (0000 s = no integral action)  |
| D action <sup>1)</sup>                | Rate time Td: 0000 ... 9999 s (0000 s = no derivative action)   |
| Pulse length controller <sup>1)</sup> | 0001 ... 0600 s, min. turn-on time 0.5 s  |

|  |  |
|--|--|
| Pulse frequency controller <sup>1)</sup> | 0001 ... 0180 min <sup>-1</sup>  |
| Behavior during HOLD <sup>1)</sup>       | Controller output Y = constant or controller output Y = 0  |
| Manual controller output specification   | Manual specification for testing or starting up a process, bumpless switchover to automatic when I action ≠ 0000 s |
| Pulse period                             | 0001 s (pulse length controller)   |
| Switching output K9/K10                  | Electronic switching outputs, polarized, floating, connected to each other and to KV1, KV2 < 1.2 V                 |
| Voltage drop                             | DC: V <sub>max</sub> = 30 V, I <sub>max</sub> = 100 mA   |
| Load capability                          | Limit monitoring or pre-control (3-point controller)   |
| Usage                                    |  |
| RoHS conformity                          | According to EU directive 2011/65/EU   |
| EMC                                      | EN 61326-1, EN 61326-2-3<br>NAMUR NE 21  |
| Emitted interference                     | Industrial applications <sup>3)</sup><br>(EN 55011 Group 1 Class A)  |
| Interference immunity                    | Industrial applications  |
| Lightning protection                     | to EN 61000-4-5, Installation class 2  |
| Rated operating conditions               |  |
| Ambient temperature                      | Safe area: -20 ... 55 °C / -4 ... 131 °F<br>Ex: -20 ... 50 °C / -4 ... 122 °F                                      |
| Relative humidity                        | 10 ... 95 %, not condensing  |
| Transport/storage temperature            | -20 ... 70 °C / -4 ... 158 °F  |
| Screw clamp connector                    | Single or stranded wires up to 2.5 mm <sup>2</sup>   |

1) user-defined

2) at rated operating conditions

3) This equipment is not designed for domestic use, and is unable to guarantee adequate protection of the radio reception in such environments.