Device manual

PKV 50-XXX

Target System for Ethernet-/Fieldbus Applications

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Although this appliance has been developed with great care and intensively tested, Hilscher Gesellschaft für Systemautomation mbH cannot guarantee the suitability of this appliance for any purpose not confirmed by us in writing.

Guarantee claims shall be limited to the right to require rectification. Liability for any damages which may have arisen from the use of this appliance or its documentation shall be limited to cases of intent.

We reserve the right to modify our products and their specifications at any time in as far as this contributes to technical progress. The version of the manual supplied with the appliance applies.

1 Introduction

1.1 Scope of Performance

In automation technology it is becoming obvious that Ethernet with the TCP/IP protocol from the classical conductor field is moving continuously forward into the fieldbus region. Although attempts are being made to lead Ethernet up to the individual I/O modules, yet neither all the technical aspects been satisfactorily solved nor can it be realized with a sufficient effort.

This trend is further strengthened by the requirement for unbroken communication from the office world up to the individual data point in the industrial installation. Remote maintenance via the Internet is the buzzword now.

This is where our fieldbus Gateway PKV 50 comes into its own. It connects the Internet-/Ethernet world with the harsh industrial environment of established fieldbus technology.

It consists of a Master interface connection, which, by means of one of the standardized fieldbus systems, exchanges data between the connected I/O devices and the internal process data memory. This data can be accessed for reading and writing by means of TCP/IP telegrams.

The Microsoft Windows CE operating system is used on the Gateway. Here, further tasks, such as SoftPLCs, are simply added in order to incorporate extensions of the functions. The development system is economical to build up and many engineers are familiar with the development environment. All our interfaces are open so that the experienced user can also bring his own applications into use on the Gateway.

A further highlight is the integrated Web-Server. HTML pages can be created on a corresponding editor and then loaded on to the Gateway. Process data can be linked via Java Applets. All that is still needed to access the data of the Gateway via the Internet is a Web Browser such as for example, Microsoft Explorer or Netscape Navigator.

The configuration of the Gateways is carried out locally with our SyCon System Configurator via the RS232C serial diagnostic interface or remotely via TCP/IP.

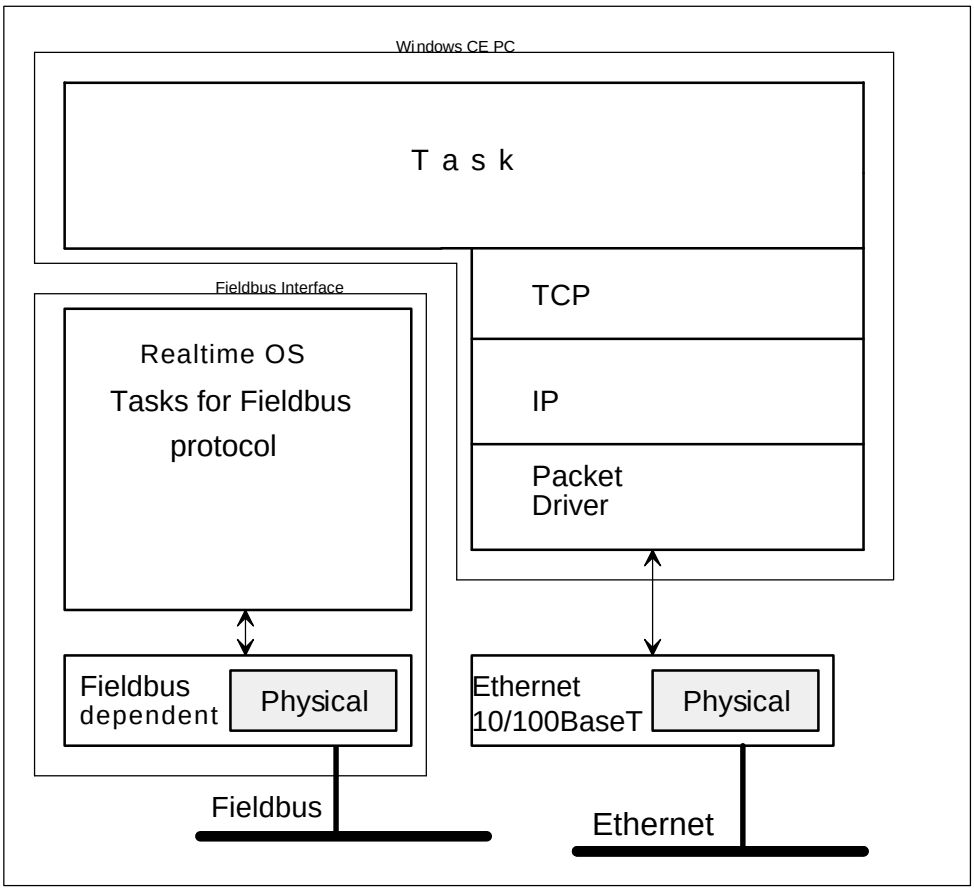
The PKV 50 fieldbus Gateway is now offered for the most important fieldbus systems.

Customer-specific solutions can be implemented by us or by the customer himself.

2 Structure of the Gateway

Modern communication systems are structured in accordance with the ISO/OSI reference model (ISO IS 7498). This is based on a 7-layer structure. Here, every layer makes the services of the next higher layer available but only uses the services of the next lower layer itself.

The Gateway fulfills this structure.



The Gateway in the ISO/OSI reference model

3 General Device Description

The Gateway consists of a basic circuit board with a power supply circuit with DC/DC transformers in which all the required auxiliary voltages are created. The fieldbus communication interface is based on the basic circuit board, too.

The Elan SC520 processor board is inserted into the basic circuit board. It contains a built-in timer, interrupt- and DMA-Controller and thus only requires few external modules. The computing power is adequate for processing even large quantities of data. Furthermore, the processor ensures efficient software development in a high level language. The firmware and the configuration data are stored in a FLASH-EPROM. This can be programmed within the switching and retains its data even when the operating voltage is switched off.

The proper function of the Gateway and its internal operating voltage is monitored by a Watchdog circuit. In the case of error it triggers a Reset at the processor.

The internal supply voltage is generated by means of a switched mode regulator. Its input voltage is filtered via a current-transformed toroidal choke and filter capacitors. A transient diode is available as spike and polarity reversal protection. In the case of malfunction, a semiconductor fuse switches the device down to a low residual current until the malfunction is cleared. This means that the changing of an internal sensitive fuse is dispensed with. Besides this, a charging capacitor is available that blocks the voltage dips that occur in the switching of fuses.

The operational readiness and an error in the communication interface are displayed by LEDs.

3.1 Configuration of the Gateway with the SyCon System Configurator

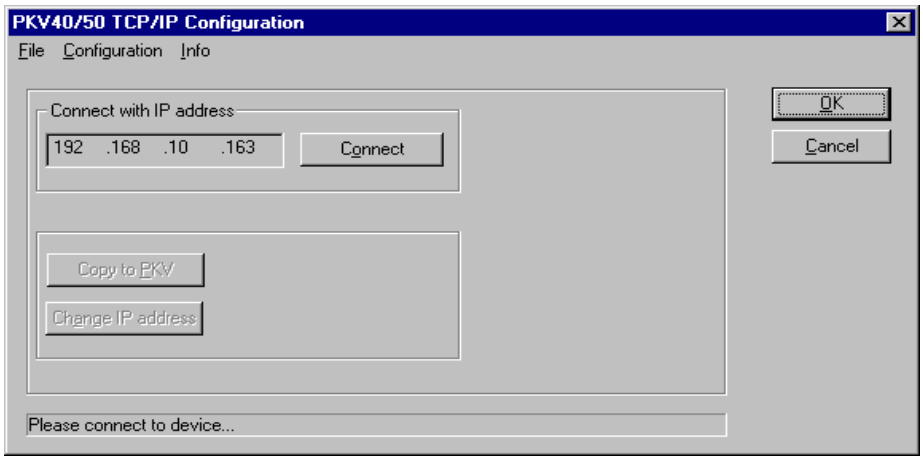
The loading of new files on to the Gateway or the setting of the IP address of the Gateway is carried out by means of the tools contained in SyCon.

In order to be able to use the configuration tools in SyCon, it is necessary to lay down a configuration with a PKV 50 Gateway in SyCon. Now the menu entry **PKV50-XXX** (XXX here stands for the selected fieldbus system) appears in the **Tools** menu point. This makes it possible to choose between a serial RS232 connection and a TCP/IP connection.

A crossed RS232 cable is necessary for operation at the serial interface and this can be obtained from the Company Hilscher (CAB-SRV).

The configuration via TCP/IP can also be carried out via a point to point connection with a crossed cable or, for example, via a Hub with commercial Ethernet cables.

The Gateway is supplied with a default IP address (see information sheet).



Configuration dialog for the PKV 50-XXX Gateway via TCP/IP

The procedure for the serial configuration or the TCP/IP configuration is basically the same. First an IP address must be entered into the field provided for it or the serial interface with which the Gateway is connected must be selected. Then the **Connect** switch must be activated. If a valid connection to the Gateway has been established, then the menu entries and the switches for configuration of the Gateway are released.

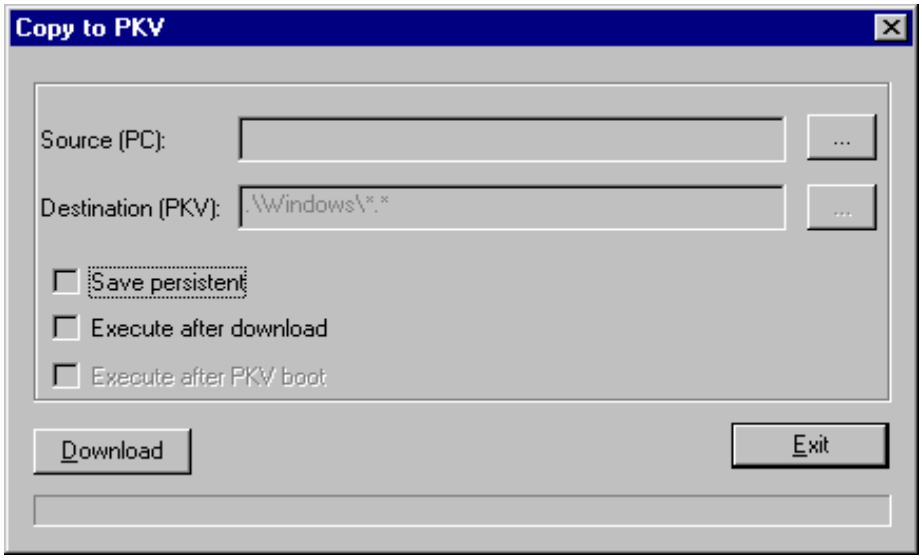
In order to ensure communication via TCP/IP, the TCP/IP protocol on the PC must be configured in such a way that a connection with the default IP address is possible (see user manual for Windows NT).

3.1.1 Loading Files into the Gateway

This function enables to load files into the User FLASH of the Gateway and to carry out applications after downloading or after the start of the operating system.

Before a new application or a new and already available DLL can be downloaded, any running older versions of the application or programs that use DLLs must be ended. For this purpose, the corresponding running processes can be displayed under the **Configuration > View Running Tasks** menu. If an entry has been selected, then the **Stop Process** button can be activated and the selected process is stopped.

In order to transfer a new file, select the **File > Copy to PKV** menu or activate the **Copy to PKV** button. Select the file to be loaded in the dialog that appears now.

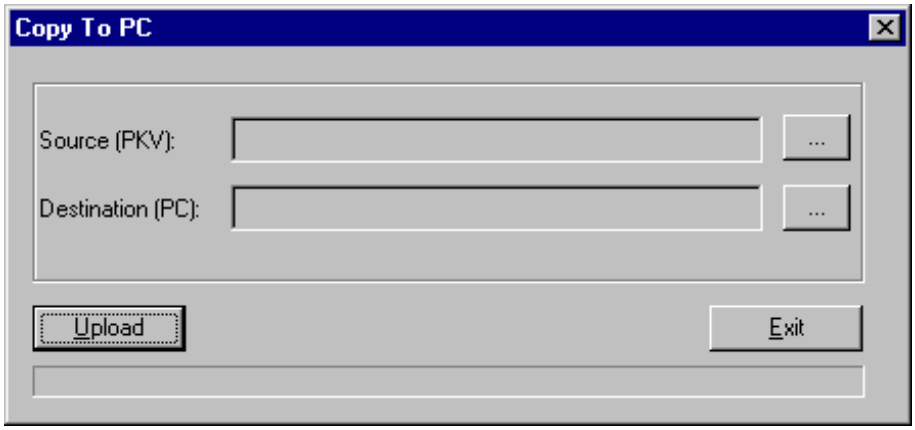


Dialog for loading files on to the PKV 50 Gateway

The path and name can be entered directly into the **Source (PC)** text field or select the path and file via the **...** button. The **Destination (PKV)** field cannot be edited at present. All the files to be copied are read into the Windows directory of the Gateway. According to requirements, now mark the buttons **Save persistent, Execute after download** and **Execute after PKV boot**. Now activate the **Download** button and the software is transferred to the Gateway.

3.1.2 Loading Files on to the Host PC

It is also possible to load files from the Gateway on to the Host-PC. For this purpose select the **Copy to PC** entry in the **File** menu.



Dialog for loading files from the PKV 50 Gateway to the Host PC

Now the path of the file that is to be loaded can be entered directly into the **Source (PKV)** field or the contents of the FLASH can be viewed via the **...** button and a file can be selected.

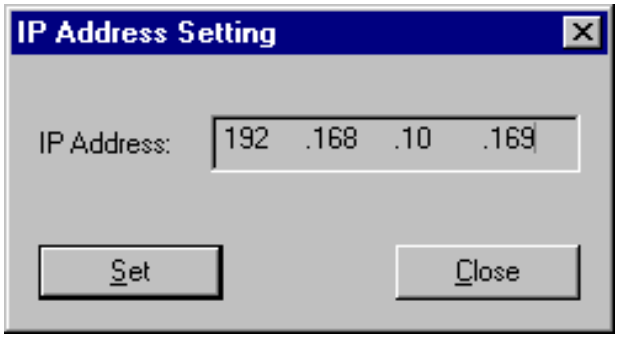
The target place and target name can be entered now in the **Destination (PC)** field or selected via the **...** button.

After activating the **Upload** button, the file is loaded onto the Host PC.

3.1.3 Deleting Files

In order to delete files, the menu point **File > View Flash Dir** can be selected after building up the connection successfully. A list of files that are permanently stored in the User FLASH memory is displayed now. Now previously selected files can be deleted with the **Delete** button.

3.1.4 Setting the IP Address



Dialog for setting the IP Address

Note: The Gateway must be restarted to accept the address!

It is possible to allocate a new IP address to the Gateway with the **Configuration > Setting IP address** menu. For this purpose, a connection with the Gateway is necessary as already mentioned.

Now enter the desired valid IP address into the corresponding field. Press the **Set** button and the new address is allocated to the Gateway.

If the alteration of the IP was successful, it will be displayed. A request for restarting the Gateway will appear.

Please note that the newly allocated IP address is only valid after a restart of the Gateway.

3.1.5 Starting Applications

Applications that have already been entered on to the Gateway can also be started manually. For this purpose the **Configuration > Start Application** menu has to be selected. Now enter the name of the application into the field provided for this purpose and press the **OK** button.

3.2 Connecting the Supply Voltage (X2)

The Gateway requires a supply voltage of 24 Volt. The maximum power consumption is given in section *Technical Data*. A three-phase rectified supply or a simple rectified switching with charge capacitor is sufficient. The supply voltage must be led to ground. It is connected by means of a plug-in screwed clamp. Use is made of a 3-pin COMBICON plug from the PHOENIX company (MSTB 2,5/3-ST-5,08).

Connection	Symbol	Signal
1	+24V	+24V supply voltage
2	0V	Reference potential
3	PE	Equipment grounding conductor

Connector pin assignment of the operating voltage connection X2

3.3 Interfaces

The PKV 50 Gateway possesses three independent interfaces.

First interface (X3). The first interface can be operated as a diagnosis / configuration interface.

Second interface (X6). The second interface is designed for operation at the fieldbus.

Third interface (X4). The third interface is used for connection to a 10/100BaseT network.

3.3.1 Ethernet Interface (X4)

Connection	Input/ Output	Signal - designation
1	Output	TXDE+
2	Output	TXDE-
3	Input	RXDE+
6	Input	RXDE-

Pin assignment of the Ethernet interface

The Ethernet interface is carried out by means of an 8 pin RJ45 socket for a 10/100BaseT connection.

3.3.2 Fieldbus Interface (X6)

The following tables describe the pin assignment for the individual fieldbus systems available on the PKV 50 Gateway.

3.3.2.1 PROFIBUS Interface for PKV 50-DPM

Connnection 9 pin D-SUB socket	Input/ Output	Signal designation	Signal
-	-	PE	Earth ground
1	-	PE	PNO recommend not to use this signal
6	-	VP	Power supply
3	Input/ Output	RXD/TXD-A	Data line
8	Input/ Output	RXD/TXD-B	Data line inverse
4	Output	CNTR-A	Repeater control signal
5	-	DGND	Data reference potential

Pin assignment of the PKV50-DPM at the plug X6

3.3.2.2 CAN-Bus Interface for PKV 50-COM, PKV 50-DNM

Connector		Input/ Output	Signal designation	Signal
Connection 9 pin D-SUB plug	Connection 5 pin COMBICON for DeviceNet			
-	-	-	PE	Earth ground
9	5	-	+V	24V external power [1]
3	-	-	DGND	Data reference potential
7	4	Input/ Output	CANH	Data line high
2	2	Input/ Output	CANL	Data line low
6	1	-	DGND	Data reference potential
-	3	-	shield	shield of bus cable

Pin assignment of the PKV 50-COM and PKV 50-DNM at the plug X6

3.3.3 Diagnostic Interface (X3)

The connection of a (Host) PC to the Gateway is also possible via the first serial interface (X3). It corresponds to the RS232C standard according to CCITT or DIN. However, only the required signals are available.

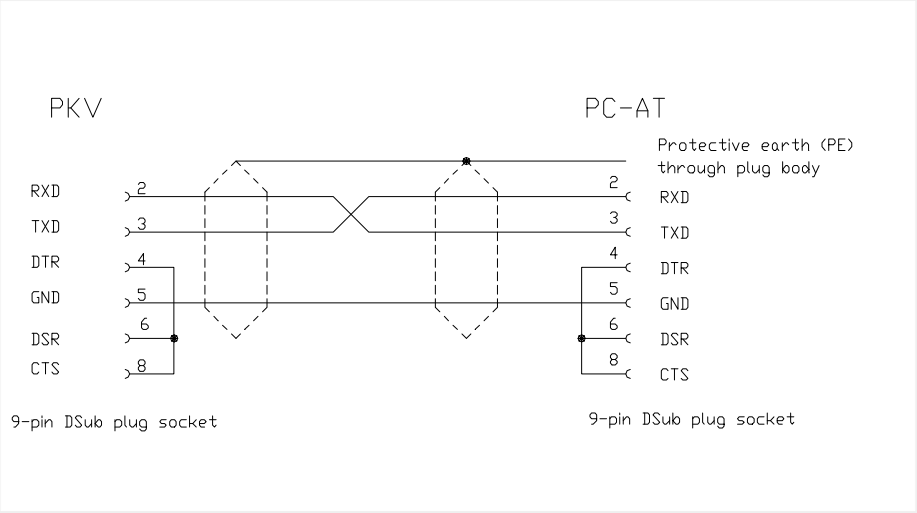
The control signals are served or evaluated as follows:

RTS is switched to high after the function readiness and not altered again.

CTS must be connected by means of a wire bridge with Pins 4 and 8 of the D-Sub plug.

The transfer between Host PC and Gateway is at 9.600 Baud and the following data format: 8 Data bits, 1 Stop bit and even parity. The 3964R procedure is utilized as transfer protocol.

The connection of the PC is carried out with a three-wire cable which must not be longer than 15 meters. The wiring of the cable is given below. For better interference suppression, the cable shielding also on the side of the Host PC should be grounded over the plug housing.



Connecting cable between Gateway and Host PC

3.4 Status Displays

There are eight LEDs are the PKV 50 Gateway acting as status displays:

Display	Color	Condition	Meaning
SYS, CON, ST1, ST2		The condition of these LEDs are application-dependent and are described in the corresponding manuals	
RDY	Yellow	On Flashs cyclically Flashs irregularly Off	Gateway ready Bootstrap loader active Hardware or system error Hardware defect
RUN	Green	On Flashs irregularly (see below). Off	Fieldbus communication running Parametrizing error (field bus) No fieldbus communication
ERR / NET / CH_A		Fieldbus dependent	
STA / MOD / CH_B		Fieldbus dependent	

With a device defect, a cyclical flashing of the RDY-LED can also be caused by the continuous accessing of the Watchdog monitoring.

After switching on, the Gateway carries out a self-test. If this has been run through successfully, then the yellow LED RDY is switched on. Otherwise the LED begins to flash irregularly and the further processing of the program is aborted.

If no fieldbus Firmware is loaded on the Gateway, then the Bootstraploader shows this by a cyclical flashing of the RDY-LED in a 1-second rhythm. During the loading of the Firmware the blink rhythm increases to approximately 5 Hz.

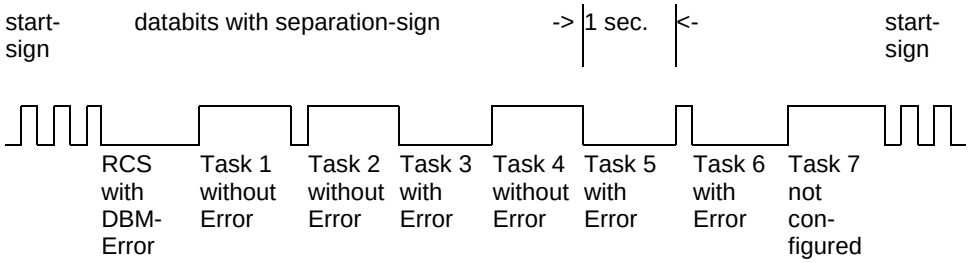
If the LED remains off, then there is a defect of the Gateway.

If a fieldbus Protocol Task recognizes a parametrizing error, the Task is displayed by the RUN-LED in accordance with the following figure.

If there is no error and communication could be started, then the RUN-LED is switched on.

If the communication operation is blocked, the the RUN-LED remains off.

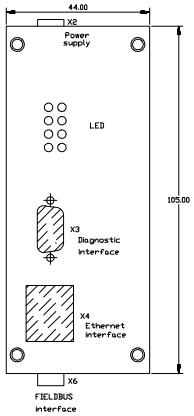
The display on the LED is carried out from left to right



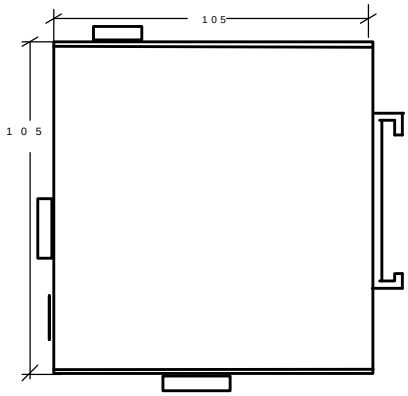
Display of the tasks that have indicated a parametrizing error

3.5 Mechanical Dimensions

The Gateway is built into an aluminum profile housing. This permits direct installation into the switching cupboard on a carrier rail (TS35 according to DIN EN 50022). The mechanical dimensions and the allocation of the pins are shown in the following figures.



Front view with pin arrangement on the Gateway



Side view of the Gateway for clipping on to a carrier rail

4 Appendix

4.1 Technical Data

Processor	586/133 MHz	
Memory structure	16 MByte DRAM, 16 MByte FLASH	
Ethernet interface	potential-free, 10 /100MBaud, 10/100BaseT / RJ-45	
Fieldbus interface	potential-free	
	RS485 / 12 MBaud	PKV 50-DPM
	ISO11898 / 1 MBaud	PKV 50-COM
	ISO11898 / 500 kBaud	PKV 50-DNM
Serial interface Diagnostic interface	non-isolated RS232C	
LED displays	Operation and communication readiness of the Gateway, error on the serial interface or freely programmable by the user.	
Operating voltage	18 - 30 V	
Power consumption	max. 250 mA at 24 V	
Operating temperature	0 °C - 50 °C	
Protection	IP20	
Dimensions (L x W x H)	105 x 44 x 105 mm	
Installation	DIN rail EN 50022	