FACTORY AUTOMATION

ISO9001

IRI-KHD2-4.4M
IRI-KHA6-4.4M

Manual
Edition '97

PEPPERL+FUCHS

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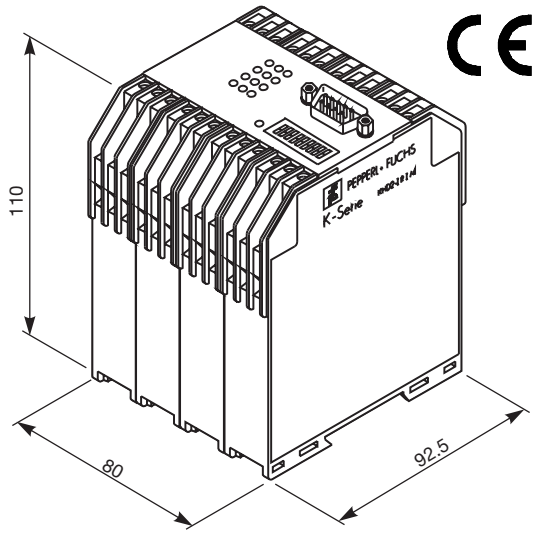

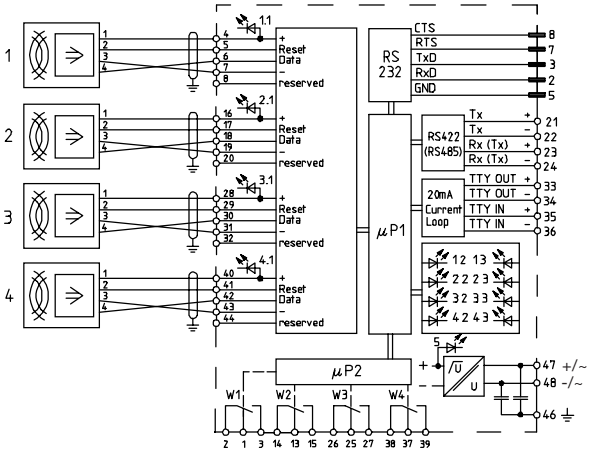

Technical data:

	IRI-KHD2-4.4M	IRI-KHA6-4.4M
Power supply		
Operating voltage	18 V DC ...32 V DC	85 V AC ...253 V AC, 50 Hz ... 60 Hz
Residual ripple	$\leq 10\%_{SS}$	
Power consumption	Max. 5 VA	Max. 5 VA
Current consumption	typ. 150 mA	typ. 40 mA
Interface		
Optional interface types (Selectable by S7 and S8)	RS232, RS422, RS485 (TTY 20 mA Current loop)	
Baud rate	300 Baud ... 19200 Baud	
Number of read heads	Max. 4	
Read head supply voltage	100 mA/16.5 V DC ± 5%	
Switch output		
Type	Relay output 1 changeover contact	
Contact loading AC	1 A/250 V AC	
Contact loading DC	1 A/250 V DC	
Test voltage		
Contact/coil	3000 V	
Mechanical service life	$1x10^5$ switching actions at max. contact loading $5x10^7$ switching actions at 1A/30 V DC	
Pull-in delay	5 ms	
Minimum hold duration	1 ms ±10%	
Programmed hold duration error	± 11%	
Environmental conditions		

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Lower temperature limit	248 Kelvin ... 343 Kelvin (-25 °C ... +70 °C)
Upper temperature limit	248 Kelvin ... 358 Kelvin (-25 °C ... +85 °C)
Moisture tolerance	Max. 75% relative humidity
Protection class to EN 60 529	IP20
EMC in accordance with the specialist standard in industrial environments	EN 50081-2 (emitted interference) EN 50082-2 (noise immunity)

Mechanical

Construction type	Terminal housing 80 mm
Impact resistance for specified fitting position	10 g/10 ms excitation pulse width 15 g/5 ms excitation pulse width
Resistance to vibration for prescribed construction	Meets DIN IEC721 Parts 3-5 Class 5M2
Mounting	Snap fitting onto standard rail to DIN 46277 or by screw fixing to DIN 43602
Housing material	Makralon 6485
Flammability class	UL94
Methods of connection	Self opening instrument terminals, max. conductor csa 2x2.5 mm^2 D9 sub-miniature connector

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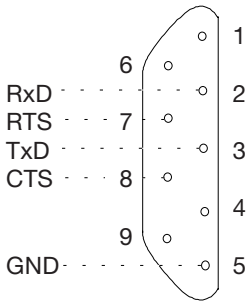
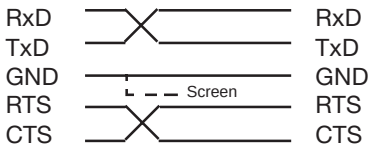
2 Serial interface / DIP switches

Communication with the control computer or controlling equipment can be effected by a serial RS232 interface. The following lines are available with the 9 way Sub-D connector.

Data signal input	RxD	Pin 2
Data signal output	TxD	Pin 3
Clear to send input	CTS	Pin 8
Request to send output	RTS	Pin 7
Ground	GND	Pin 5



Up to 4 read heads can be terminated at the interface unit. Connection to the computer is optionally via an RS232 interface.



Pin assignment for PC - IRI (RS232) cable

The DIP switches S7 and S8 select the interface required.

Interface	S7	S8
RS232 / RS485	OFF	OFF
RS232 / RS422	OFF	ON
20 mA current loop	ON	OFF

The transmission speed (Baud rate) is set by the DIP-switches S1, S2 and S3 located on the upper surface of the interface unit. Available transmission speeds are as follows:

Baud rate	S1	S2	S3
300 Bd	OFF	OFF	OFF
600 Bd	OFF	OFF	ON
1200 Bd	OFF	ON	OFF
2400 Bd	OFF	ON	ON
4800 Bd	ON	OFF	OFF
9600 Bd	ON	OFF	ON
19200 Bd	ON	ON	OFF
Not defined	ON	ON	ON

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After switching on the control interface a Restart command (RST) should be sent. If this is not done, the interface defaults to 8 data bits without parity bit. The Restart command enables recognition of the serial data communication by the interface unit which selects it accordingly. Characters can be sent and received with:

8 data bits without parity bit or,
7 data bits and even parity bit or,
7 data bits and odd parity bit

It is essential that a start bit is sent first. This can be sent to the interface using 1, 1 1/2 or 2 stop bits but the interface always sends 2 stop bits. If ASCII characters in 8 bit format are sent, the most significant bit represents 0. In the binary mode 8 data bits must always be used.
The mode of operation is configured by the DIP switches S4, S5, and S6

Mode of operation	S4	S5	S6
Fixed code	OFF	OFF	OFF
3964R with interpreter RK512	OFF	ON	OFF
3964R without interpreter RK512	ON	OFF	OFF
4 Bit Ident System	ON	ON	OFF

3 Commands

The system responds to commands given via an interface. All commands consist of several ASCII characters and comprise the mode, read head number and data format. However, the read head number and data format can be omitted. In this event, either the previously selected values or the basic switch-on settings are adopted. A comma must be inserted between the read head number and the data format. All commands are terminated by a carriage return (<CR>) and line feed (<LF>). Therefore, either the carriage return or the line feed can be left out. It is inconsequential whether upper case or lower case letters are used in the commands.

Command structure:

M<L><,X> M: Command mode
L: Read head number (Optional)
X: Data format (Optional)

Description of commands

Command mode M: Explanation

R **Read Mode**
The read head reads the code once. The interface returns the code or, if no code carrier could be read, sends an error message.

AR **Autoread Mode**
The read head continues to read and transfer the code as long as a code carrier is present. This mode can be interrupted by the input of a new command.

CAR **Continuous Autoread Mode**
This mode is equivalent to the AR mode in that the code carrier is read and the code returned. Thereafter the command remains active, i.e. the code carrier is read again and the code transferred.

BAR **Buffered Autoread Mode**
This mode is equivalent to the CAR mode. However, if the code carrier stays within range of the read head, its code is read once only.

Further commands for interface control without specifying a read head number and without data format:

RST **Restart**
This command cancels all previous commands and sets the interface to the output status i.e. no active read command and data format 10. Since the command enables the interface to identify the parameters for serial transmission, the letters must be either all upper case or all lower case.

SB **Set binary mode**
The bytes of all read data are transmitted with 8 data bits per byte. This format functions only if the serial interface is set for transmission of 8 data bits per byte. It is suggested that this format be utilised when **rapid data transfer is a prime consideration.**

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SD **Set double sided mode**

In this mode, code carriers ICC-50 and ICC-50F are read from the back, i.e. the side away from that carrying the code. With these code carriers, the same read distance may be achieved on either side. Note that in the worst case, the read time may be doubled. The double sided mode can be cancelled by transmitting the command RST.

VER **Version number**

This command enables output of the interface software version and the copyright message.

SO **Set Output**

Setting the outputs dependent upon the control characters <OP>
Command: SO <OP> CR LF

Response: None

Function	Control characters <OP>
No function	0
Set switch output 1	1
Set switch output 2	2
Set switch output 3	4
Set switch output 4	8
Set switch outputs 1 and 2	3
Set switch outputs 1 and 3	5
Set switch outputs 1 and 4	9
Set switch outputs 1, 2 and 3	7
Set switch outputs 1, 2,and 4	B
Set switch outputs 1, 3 and 4	D
Set switch outputs 1, 2, 3 and 4	F
Set switch outputs 2 and 3	6
Set switch outputs 2 and 4	A
Set switch outputs 2, 3 and 4	E
Set switch outputs 3 and 4	C

After switching on the interface or following an RST command, all switch ouputs are inactive.

RO **Reset Output**

Resetting the outputs dependent upon control characters <OP>

Command: SO <OP> CR LF

Response: None

Function	Control characters <OP>
No function	0
Reset switch output 1	1
Reset switch output 2	2
Reset switch output 3	4
Reset switch output 4	8
Reset switch outputs 1 and 2	3
Reset switch outputs 1 and 3	5
Reset switch outputs 1 and 4	9
Reset switch outputs 1, 2 and 3	7
Reset switch outputs 1, 2 and 4	B
Reset switch outputs 1, 3 and 4	D
Reset switch outputs 1, 2, 3 and 4	F
Reset switch outputs 2 and 3	6
Reset switch outputs 2 and 4	A
Reset switch outputs 2, 3 and 4	E
Reset switch outputs 3 and 4	C

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OT **Output time**

This is for setting the holding time parameters for the switch outputs. The holding time is adjustable in multiples of 20 ms over a range of 20 ms to 255 x 20 ms = 5.1 s. The timer tolerance is ±10%. Selecting the multiple 0 causes the timer to switch off (After setting, the output remains active until reset). If a new holding time parameter is selected during the period that an output is active, the new time is applied first to the next output setting. When an output is selected during the holding time, the holding time starts anew. The holding time is stored in non-volatile memory.

Instruction: OT <OT> CR LF
Response: None

OM **Output mode**

Output characteristic parameters.
Instruction: OM <OM> CR LF
Response: None

Features	Control characters <OM>
Outputs are controlled only by the SO and RO commands.	0
Output is set when the corresponding read head has been read and a code transmitted via the interface (e.g. LK1 -> output 1...).	1
Output 1 is set when one of the connected read heads has been read and a code transmitted via the interface.	2

Moreover, in modes of operation 1 and 2 the outputs can be controlled by SO and RO. The output characteristic is stored in non-volatile memory.

Read head number L:

The read head number 1, 2, 3 or 4 is determined by the command mode. If an X is sent instead of the read head number, all read heads are interrogated once in sequence and the code and read number sent (R-Mode). In the AR-Mode reading takes place as long as a code carrier, can be read. In the CAR-Mode all read heads read continuously until a new instruction is given.

At power-on, read head 1 is selected. If no read head number is given, the previously chosen head remains effective. All read heads can be deactivated by selecting read head 0, which is an efficient way of minimising power consumption.

Examples:
R1<CR><LF> Read head 1 reads a code when a code carrier is present. If no code carrier is at hand within the read range, an error message is sent.

ARX<CR><LF> If, for example, read heads 1, 3 and 4 are in circuit, they are activated one after the other. When a code carrier appears within the range of one of these heads, the code is read and transmitted.

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Data format X:

The data format can be stipulated in any command by which the read codes are to be transmitted over the serial interface. If the data format is not specified, the immediately preceeding format remains effective. When the data format is specified, a comma must be placed in front of it in order to differentiate between it and the read head number. After switching on the system, format 10 is adopted and the data is specified as ASCII characters. The binary representation can be selected by the SB command.

Data format	Explanation
10	This format is active after switching on the interface and also after sending an RST command. All 64 bits of a code carrier are read but the output consists only of 28 usable data bits. A read head number is not issued. The first 12 bits are sent in hexadecimal form and the remaining 16 bits in denary. All information is then transmitted as ASCII characters, the binary mode being inadmissible. In the event of the binary mode being selected, an error message is given.
28	The 64 bits of a code carrier are read but the output contains only the 28 usable data bits in denary form. In the binary mode no denary conversion takes place. The code follows the read head number which is preceded by a space character.

4 The 4 Bit Ident System

Application

Automated manufacturing often only requires the identification of a small number of product types, containers, pallets or other items.
Identification systems which have the capability of recognising every single object are very expensive and difficult to handle since the control system has to process a large amount of information.
The 4 bit ID system will distinguish up to 15 different items but as many items as desired of any one kind can be catered for. The control interface unit relay outputs can be used for the direct switching of pneumatic valves or other comparable control devices thereby eliminating the need for a programmable logic controller.

Equipment

Standard data carriers (Type coding IDC-...) are used as encoding units and these are programmed by use of an IVT-P programmer. The relevant program is filed in a data pack type IWD-4BITID-16K which is inserted in a recess on the side of the programming unit. Alternatively, a standard read/write system can be used for programming. In manufacturing plants, standard read heads (Type coding IRH-...) can be used. The required read range determines which type of head should be fitted. The heads are terminated at the control interface unit.
Up to 4 heads can be terminated at a single control unit and all heads are interrogated. When a data carrier is read, the relay outputs are switched. No distinction is made between the individual heads which means that the output status of the relay does not indicate by which head a data carrier has been read.

Operation

The data carriers have a defined memory storage area in which 4 bits are set to 0 or 1 by programming. When a bit is set to 1 and the data carrier is read, the relevant relay contact switches.

Bit 1 activates switch output W1.
Bit 2 activates switch output W2.
Bit 3 activates switch output W3.
Bit 4 activates switch output W4.

By selecting the appropriate bits, several switch outputs can also be activated by a single data carrier. As a rule it is not good practice to set all the bits to 0 as the data carriers would not activate a switch output and would then be disregarded.
There are various circuit options for the relay contacts. The easiest method is to control a device using a

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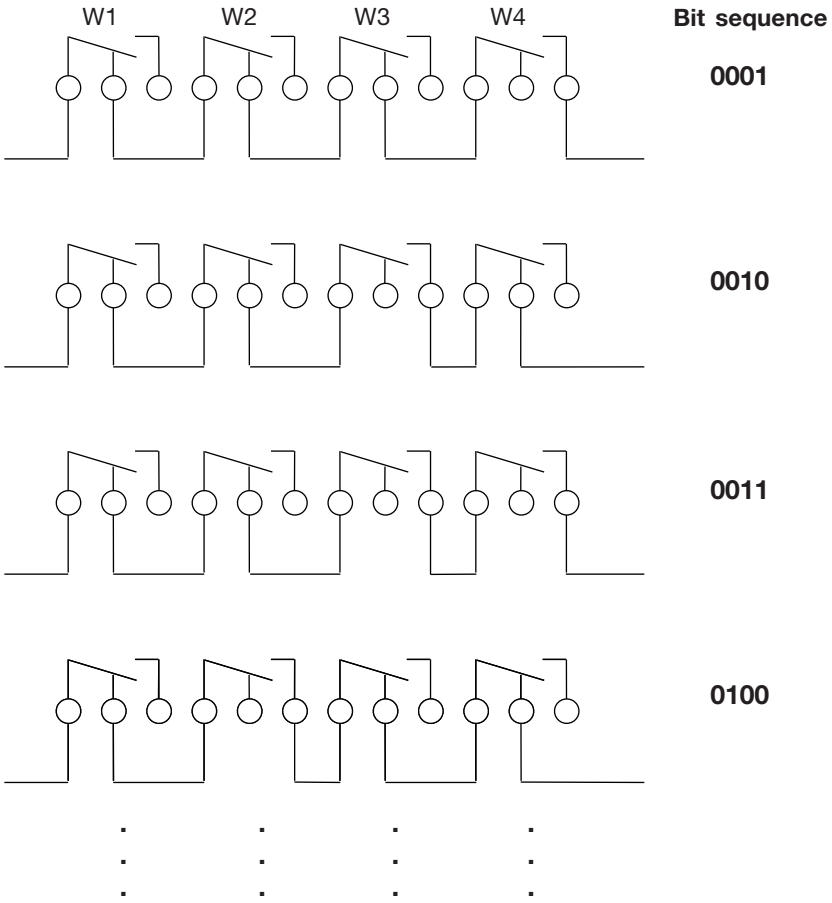
changeover switch. In this way, one bit acts upon one device and therefore a maximum of four devices can be individually controlled. If all four changeover switches are wired, then all 15 bit combinations can be used and the interface unit then responds only to a particular bit combination. Series connection of the changeover switches means that the interconnected device switches on only when the corresponding bit combination is present. If a break function is required, the changeover switches have to be parallel connected.
Interface unit 1 controls device 1 by bit combination 0001, interface unit 2 controls device 2 by bit combination 0010, interface unit 3 controls device 3 by bit combination 0011 and so on.



Wiring of contacts for the 15 possible bit combinations

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Timing feature

The relays are switched for as long as a data carrier is read and in order to achieve more reliable control, the switching time is held for a fixed period. Also if the data carrier remains within the read range for an extended period, the outputs are switched only for the selected holding time.
The holding time is adjustable from 0.02 to 5.1 seconds with a tolerance of ±10%. Adjustment is made via the control unit serial interface using the command OT <time> <CR> <LF>. The <time> parameter consists of 2 ASCII characters from 00 to FF in hexadecimal representation and fixes the time in multiples of 20 ms, i.e. 01 selects 20 ms, FF selects 255 x 20 ms = 5.1 secs.

Command: OT <time> <CR> <LF>
Response: None

If the <time> parameter is programmed to be 00, the switching time is no longer active, i. e. the output remains permanently switched after setting. The output is reset using the command RO (Reset output).

Command OT is entered via the serial interface and can be carried out using the PSION Organiser with CommsLink. For this purpose CommsLink is connected to the interface unit. In the terminal operating mode of the PSION, the commands are entered directly and sent to the interface unit. The CommsLink parameters must be set as follows.

1. Select "COMMS" from the main menu.
2. Select "SETUP" from the sub menu.
3. Enter the following parameters:

BAUD	9600
PARITY	NONE
BITS	8
STOP	1
HAND	NONE
PROTOCOL	NONE
ECHO	LOCAL
WIDTH	NONE
TIMEOUT	NONE
REOL	<CR><LF> (If necessary press ON key)
:	
:	
TEOL	<CR><LF> (If necessary press ON key)
:	
:	

4. Exit setting using the MODE and EXE keys.
5. Select TERM from the sub menu.
6. The OT command can now be entered,
   e.g.: OT15 <EXE key>

A precise description of the individual PSION commands will be found in the PSION Organiser and CommsLink operating instructions.

Programming

For programming the data carrier either a Psion Organiser IVT-P with specific program or a read/write system V with appropriate control can be used. The Psion Organiser is set up for manual programming, whereas a read/write system can be integrated with the manufacturing process so that programming is automatic.

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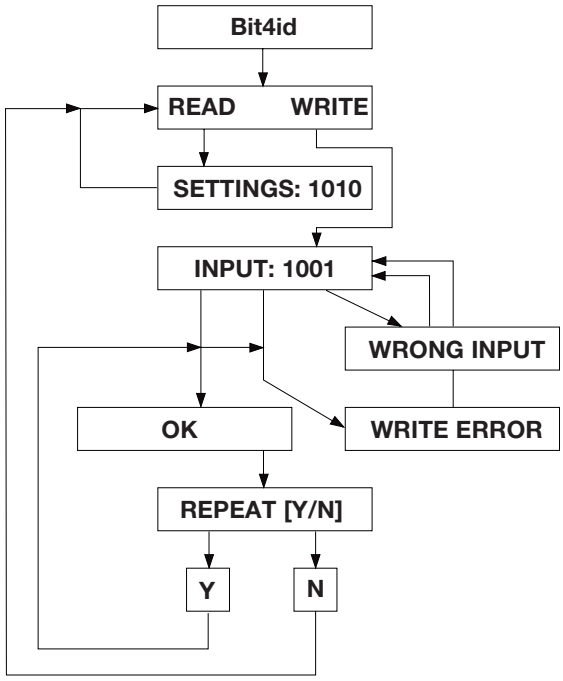
Flow chart for program IVT-P



A Datapak with the program IWD-4BitID-16K is required for the Psion Organiser which automatically enters “Bit4ID” in the main menu when the Organiser is switched on. The program is called up by placing the cursor on the menu option Bit4ID using the arrow keys and then pressing the EXE
key. Input of the bit sequence to be programmed is by keys 0 and 1. To program, hold the data carrier with its forward face in front of the read edge of the IVT-P and press the EXE key. Successful programming is indicated by the message “Ok”.
Details of how the program is executed are shown in the following flow chart.
If the data carrier is to be programmed using a normal read/write system, the first two data carrier bytes are programmed. To improve data reliability the data is repeatedly filed in accordance with the following list.

Byte 0, bits 0...3	4 usable data bits
Byte 0, bits 4...7	4 usable data bits inverted
Byte 1, bits 0...3	4 usable data bits
Byte 1, bits 4...7	4 usable data bits inverted

Bit 0 of byte 0 switches relay output W1, bit 1 of byte 0 switches relay output W2 and so on. For bit combination 0001 (to switch W4), the bit sequence 0111 1000 0111 1000 (=7878h) is programmed. The relevant write command for the slave mode and head 1 is k1 0002 78h 78h 4Eh <EXT>.

Installation

The control interface unit is set to the “4-Bit-Ident” operating mode using the switches S4, S5, and S6 (S4 = closed, S5 = closed, S6 = open).
Heads and data carriers are installed in the usual way.

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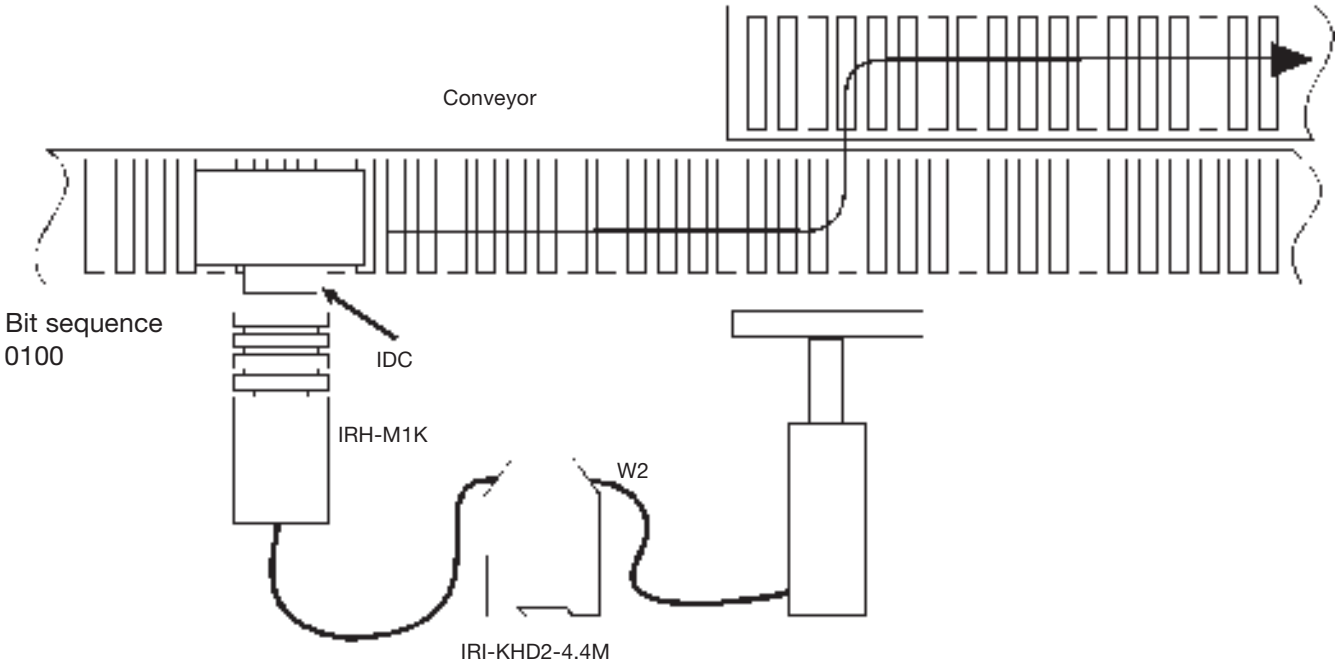
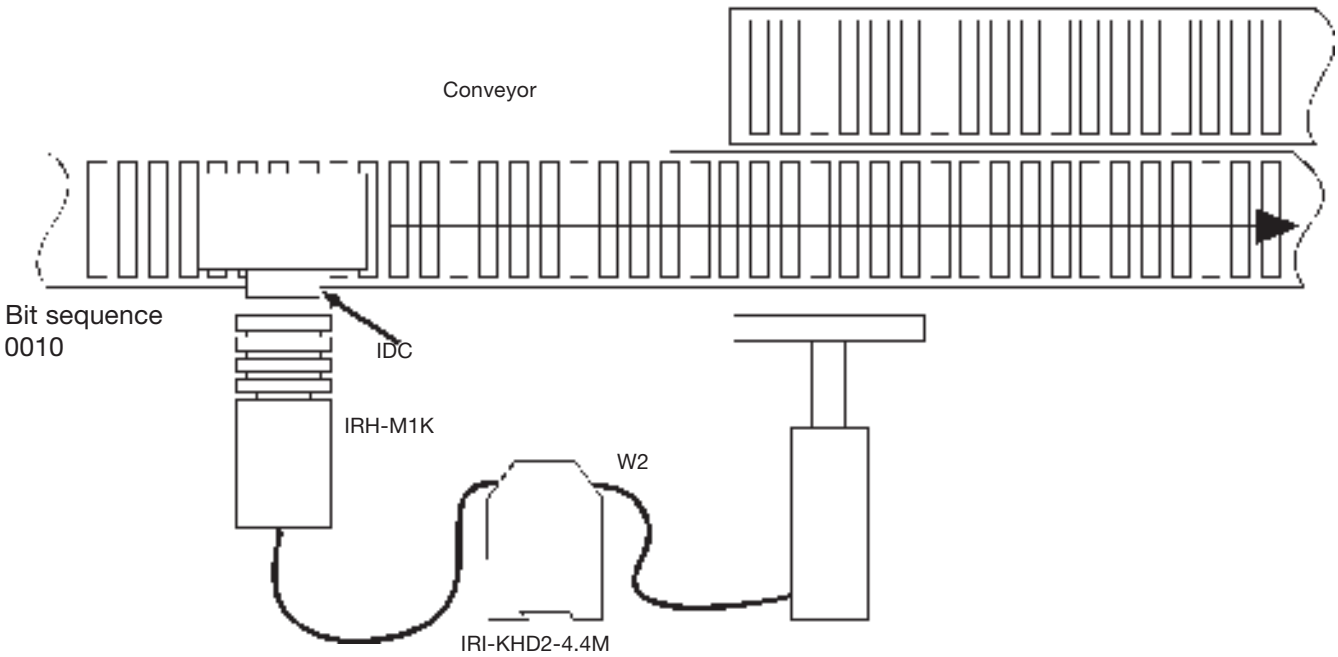
5 Typical application





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