

KVL1113-EN-02

KVL-PTL05

PICK-TO-LIGHT CONTROL WITH ETHERNET NETWORK

USER MANUAL

KVL-PTL05

USER MANUAL

Notice

The following conventions are used to indicate and classify precautions in this manual. Always heed the information provided with them. Failure to heed precautions can result in injury to people or damage to property.



DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. Additionally, there may be severe property damage.



WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. Additionally, there may be severe property damage.



CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

Trademarks

Windows is a registered trademark of Microsoft Corporation in the United States and other countries.

The other brand and product names are trademarks or registered trademarks of their respective owners.

Introduction

We design and manufacture our devices with the feedback from the enterprises of the industry and their specific needs in mind. Our pokayoke systems elaborated this way are robust and due to the sophisticated solutions applied in them, they provide a long maintenance-free lifecycle.

These devices are recommended for those firms where one of the following problems has emerged and would like to develop a solution:

- Frequently occurring errors in production processes;
- Products must be called back due to installing parts of wrong type;
- High scrap-costs caused by selecting wrong part;
- Workers often forget to tighten the screws fixing the part;
- Workers forget to install one or more parts and this mistake is noticed too late;

The pokayoke systems of KVL COMP aid the effective troubleshooting of these errors.

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We do not take patent responsibility for the information disclosed here. Also, as KVL COMP is constantly striving to improve its high quality products, the information, included in this guide can change without notice. During the creation of this guide we try to be as accurate, as possible, but KVL COMP does not take responsibility for the possible errors or omissions. Also, KVL COMP does not take any responsibility for the possible damages resulting from using this guide.

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Read and Understand this Manual!

Please read and understand this manual before using the product. Please consult your KVL COMP representative if you have any questions or comments.

I. ABOUT THIS MANUAL

This guide explains the installation and operation of the product. Before installing and using the product read this guide carefully and be sure to understand its contents. Also read and follow the safety information described in the next chapter. The chapter titled **Precautions** contains general safety instructions of using the product and the related devices.

Chapter 1: Introduces the product and its structural units

Chapter 2: Explains the structure of the product.

Chapter 3: Explains the installation of the product, the wiring of the power supply and the I/O lines and also the functional testing of the product.

Chapter 4: Explains the setup and operation of the product.

II. RELATED GUIDES

The following guides give information on the related devices. You can find the necessary information in the following documents.

Cat.No.	Title of Publication	Description
KVL1114	PICK-TO-LIGHT CONTROL WITH ETHERNET NETWORK	MAINTENANCE MANUAL
KVL1153	PROGRAMMABLE LIGHT CURTAINS	DATASHEET
KVL1307	DISPLAY WITH AS-I CONTROL	DATASHEET
KVL1155	ACKNOWLEDGEMENT MODULE WITH AS-I CONTROLLER	DATASHEET
KVL1001	POWER CABLE	DATASHEET
KVL1002	ETHERNET PATCH CABLE	DATASHEET

III. PUBLICATION HISTORY

The number of the publication is also indicated on the cover of the publication.

NUMBER OF PUBLICATION: KVL1113-EN-02

Date of Publication	No. of Publication	Chapter	Revised content
09. 2010.	KVL1113-EN-01		1st edition
01.2011	KVL1113-EN-02		Hardware modification

IV. WARRANTY AND LIMITATIONS OF LIABILITY

WARRANTY

KVL COMP's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by KVL COMP.

LIMITATIONS OF LIABILITY

KVL COMP shall not be responsible for special, indirect, or consequential damages, loss of profits or commercial loss in any way connected with the products, whether such claim is based on contract, warranty, negligence, or strict liability.

In no event shall the responsibility of KVL COMP for any act exceed the individual price of the product on which liability is asserted.

In no event shall KVL COMP be responsible for warranty, repair, or other claims regarding the products unless KVL COMP's analysis confirms that the products were properly handled, stored, installed, and maintained and not subject to contamination, abuse, misuse, or inappropriate modification or repair.

V. APPLICATION CONSIDERATIONS

SUITABILITY FOR USE

The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this manual.
- Installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

PROGRAMMABLE PRODUCTS

KVL COMP shall not be responsible for the user's programming of a programmable product, or any consequence thereof.

VI. DISCLAIMERS

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons.

It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the products may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your KVL COMP representative at any time to confirm actual specifications of purchased products.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

PERFORMANCE DATA

Performance data given in this manual is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of KVL COMP's test conditions, and the users must correlate it to actual application requirements.

ERRORS AND OMISSIONS

The information in this manual has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

VII. PRECAUTIONS

This section provides general precautions for using the related devices.

The information contained in this section is important for the safe and reliable application of product. You must read this section and understand the information contained before attempting to set up or operate a product.

INTENDED AUDIENCE

This manual is intended for the following personnel:

- workers trained to the specific task, working on the assembly stations and on the assembly line, operating the device, work group leaders;
- professionals responsible for the installation, setup and maintenance of the device.

GENERAL PRECAUTIONS

The user must operate the product according to the performance specifications described in the operation manuals.

Before using the product under conditions which are not described in the manual or applying the product to other systems, machines, and equipment that may have a serious influence on lives and property if used improperly, consult your KVL COMP representative.

Make sure that the ratings and performance characteristics of the product are sufficient for the systems, machines, and equipment.

This manual provides information for setup and operating the product. Be sure to read this manual before attempting to use the product and keep this manual close at hand for reference during operation.



WARNING

It is extremely important that a product be used for the specified purpose and under the specified conditions, especially in applications that can directly or indirectly affect human life. You must consult with your KVL COMP representative before applying a product to the above-mentioned applications.

SAFETY PRECAUTIONS



CAUTION

When power is ON or has just been turned OFF, do not touch the power supply, I/O terminals, or the surrounding areas.



CAUTION

Secure the AC power supply line to the terminal block with a 0.5N·m of torque. Loosening the screw may result in a fire or malfunction.

APPLICATION PRECAUTIONS



CAUTION

On modifying the program, always ensure that switching to MONITOR or RUN mode does not lead to unexpected effects.

CHAPTER 1

OVERVIEW

This guide explains the installation, wiring and setup of the KVL-PTL05 Ethernet network pickup controller and describes its operation. The installation, wiring and setup of the product must be accomplished by experienced professionals.

The description of operation provides information for the workers working with the pokayoke system.

1-1 SHORT INTRODUCTION OF POKAYOKE SYSTEMS

The meaning of the Japanese words Poka-Yoke in free translation:

- Poka: random, unintentional error, mistake, fault
- Yoke: elimination, prevention

Meaning: mistake-free, error-free work, workstation, technology, process development, in order to avoid human errors. The aim of pokayoke is the full-scale prevention of product defects, waste avoidance, minimization of quality control costs, to provide error-free working conditions and work.

To sum up, pokayoke is a system that assists manufacturing and assembling, that helps and – simultaneously – controls the workers. Using pokayoke effectively improves waste avoidance.

The KVL-PTL05 is part of the Ethernet network based pokayoke system developed by KVL COMP.

1-2 THE LOCATION OF THE PICK-TO-LIGHT CONTROLLER IN THE POKAYOKE SYSTEM

Its purpose is to eliminate the picking of wrong parts due to workers' fault.

KVL-PTL05 is an individual PICK-TO-LIGHT control; it is not directly connected to the production line.

It receives the manufactured components' datas from the control computer (KVL Server). Pick-up the necessary components showed by the red light of AS-I bus display/ acknowledge lamps above the sheéfes. Acknowledge of the component pick-up for component storage bay happens with pull switch manually; for shelfes happen manually or automatically. After acknowledgement the display's lamp is going to change to green.

The user manual describes the operation of PTL controllers, according to the specific application.

CHAPTER 2

TECHNICAL DATA

2-1 DIMENSIONS

The KVL-PTL05 pick-to-light controller is installed in a metal plate case.

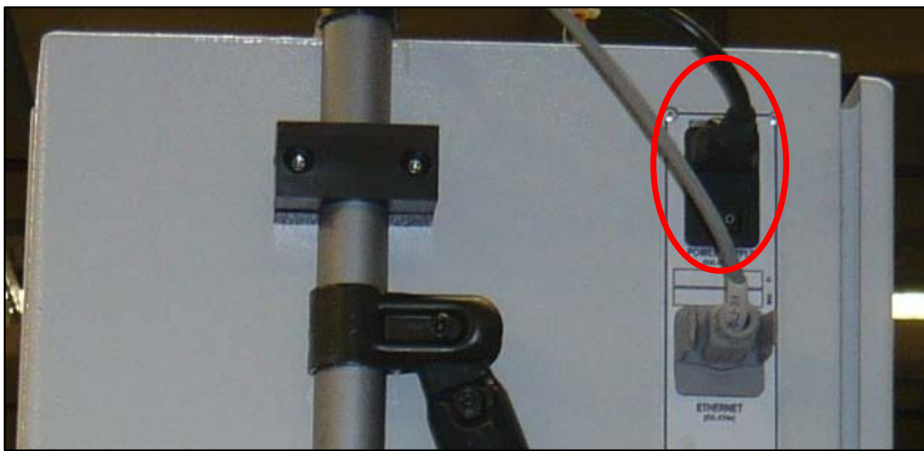
Dimensions of the controller box: 600*380*350 mm

Colour of the controller box: Grey RAL 7032



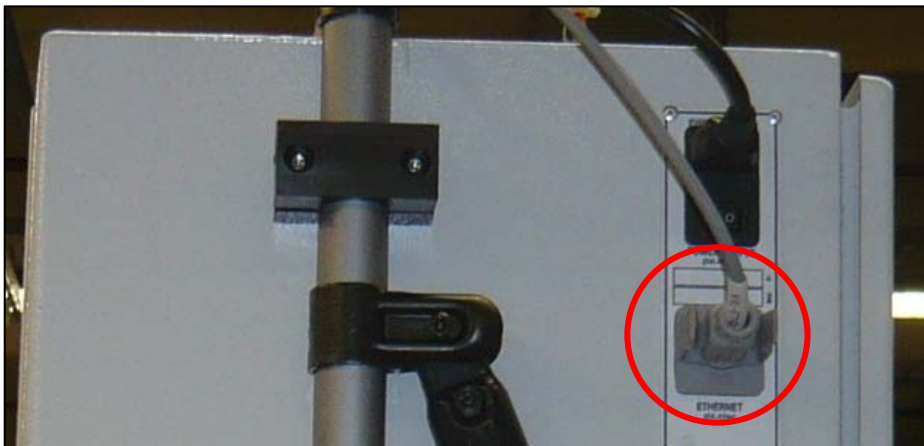
2-2 ELECTRICAL DATA

Supply voltage:	230 V AC 50 Hz
Current drain:	10 A
Operating range:	100 ... 240 V 48 ... 62 Hz
Operating temperature:	5 ... 40°C
Operating humidity:	20 ... 90% RH non-condensing
Storage temperature:	-20 ... 70°C
Storage humidity:	10 ... 95% RH non-condensing
Mains circuit connection:	IEC standard connector, with fuse and switch
Fuse:	5*20 glass-tube; 230 V 10 A SLOW
Recommended mains connector cable:	KVL-POW



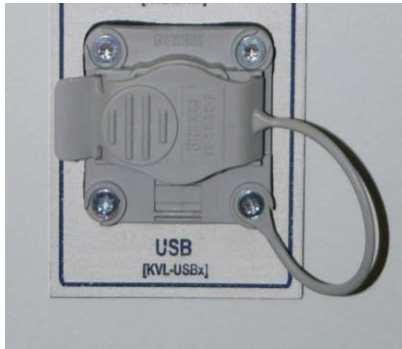
2-3 ETHERNET NETWORK

The controller can be connected to standard 10/100 Ethernet network.



The industrial Ethernet socket is of type VARIOSUB-RJ45.
The recommended Ethernet cable is of type KVL-ETN.

2-4 USB CONNECTOR



The USB connector built in on one side of the control box (VARIOSUB VS-A-F-IP67).

External USB storage can be connected to the USB connector. It can be used for program saving, program update.

Because the connector is used periodically, to avoid contamination, after use, please put back the cover.

CHAPTER 3

INSTALLATION AND WIRING

3-1 INSTALLING THE CONTROLLER AT THE WORKPLACE

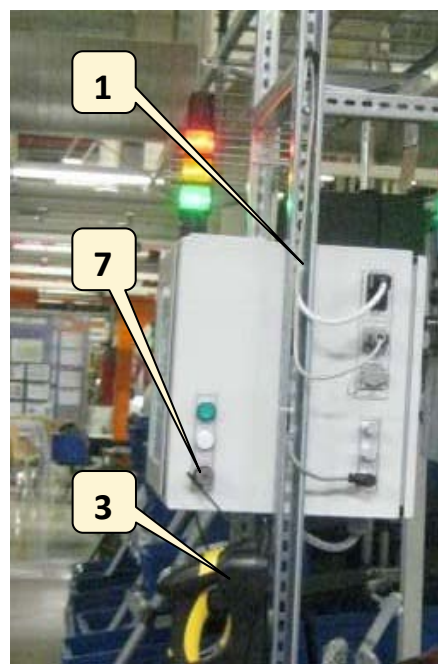
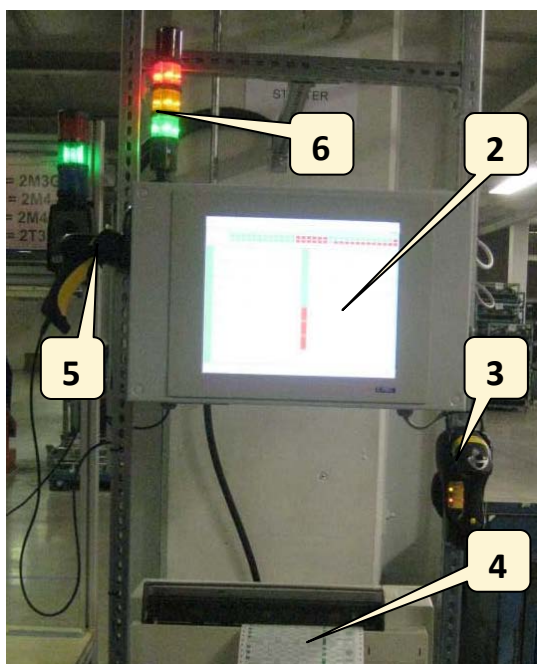
The control cabinet is mounted to a steel structure. The cabinet is fixed to posts on its sides using screws [1]. The controller should be mounted to a position where the worker can easily read and operate the display unit [2].

The worker scans the barcode from the printed worksheet [4] using the cordless barcode reader [3].

The wired barcode reader [5] on the left side of the control cabinet is used as backup (in emergency strategy).

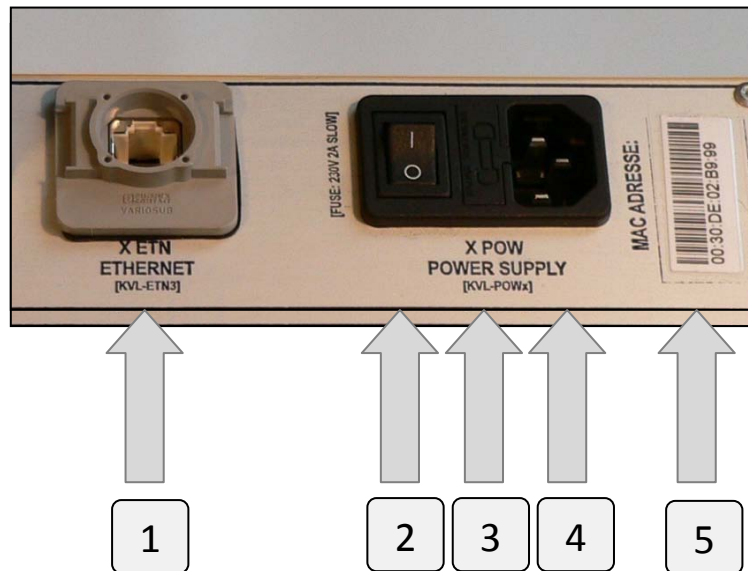
The operation of the controller can be tracked on the display and on the signal tower [6] located at the top of the control cabinet.

Errors can be acknowledged using the E7 key switch [7] on the right of the control cabinet.



3-2 CONNECTING TO MAINS AND ETHERNET NETWORK

The mains socket and Ethernet socket are located on the back of the controller.



1. Ethernet socket
2. On/off switch
3. Glass tube fuse: 5*20 glass tube; 230 V 2A SLOW
4. Mains (230 V AC) socket
5. MAC address of the controller

For connecting to the mains circuit we recommend the type KVL-POW cable. Ensure that the controller is switched off when you connect the cable.



WARNING Risk of electric shock when using wrong or damaged mains connector cable!



WARNING Risk of fire and human injury when using damaged, repaired fuses or fuses not of the appropriate type!

For connecting to the Ethernet network we recommend the type KVL-ETN cable.

CHAPTER 4

SETUP AND OPERATION

4-1 SWITCHING ON THE CONTROLLER

The device is switched on with the rocker switch located next to the power supply connector.



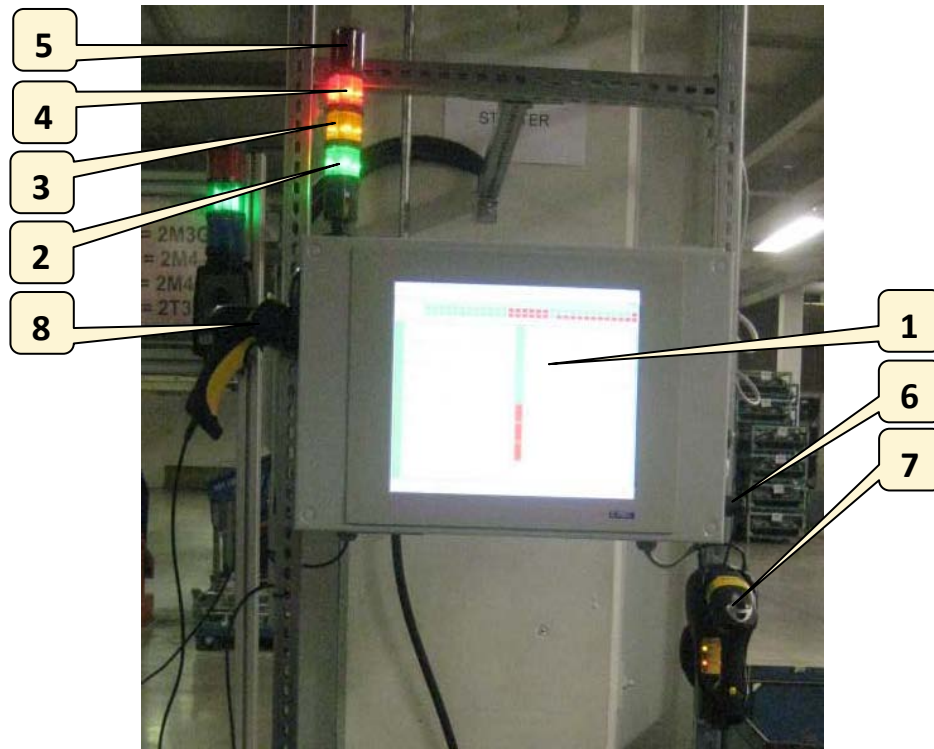
After switching on the Windows operating system installed on the controller computer starts.

After the completion of the boot process of Windows the controller program is started automatically and its main screen is displayed – work can be started.

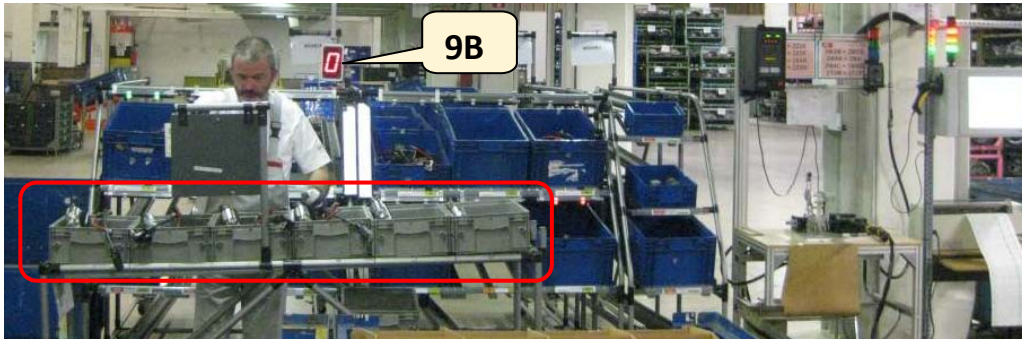
After switching off the device, always wait at least 5 seconds before switching it on again!

4-2 CONTROLS

Controls of the pick-to-light controller:

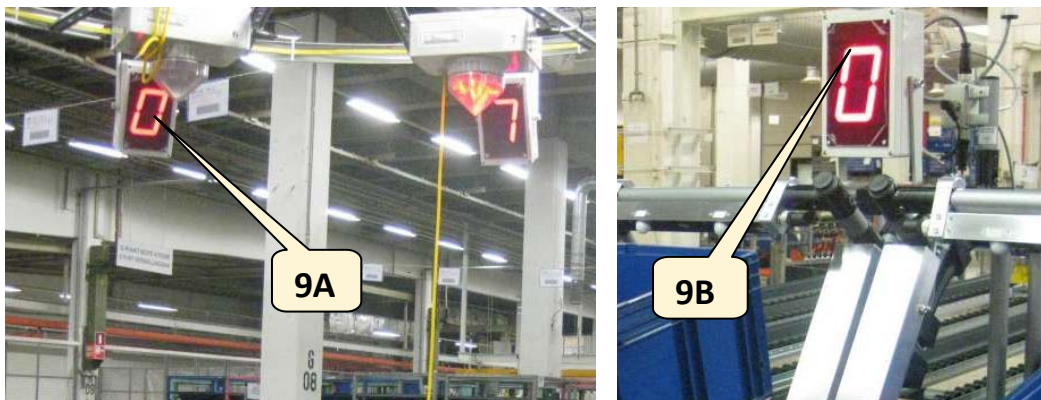


- | | |
|--|--|
| 1. TOUCHSCREEN: | The system is controlled by a computer equipped with touchscreen. You can select language and configure settings. The controller program is described in separate documentation. |
| 2. SIGNAL POST, GREEN LAMP: | Lit, if the worker successfully picked up all the necessary part. |
| 3. SIGNAL POST, YELLOW LAMP: | In case of server error it lits (with the red [4] one) |
| 4. SIGNAL POST, RED LAMP: | In case of error it lits. |
| 5. SIGNAL POST, AUDIBLE SIGNAL: | In case of control error and wrong pick-up audible signal can be hearing. |
| 6. ACKNOWLEDGING ERRORS: | Errors are acknowledged using the E7 key switch on the side panel of the controller. |
| 7. WIRELESS BARCODE READER: | The worker scans the sheet of paper with this device. |
| 8. BARCODE READER (RESERVE): | In case of the cordless barcode reader is malfunctioning, use this device to scan barcodes from worksheets. (Notstrategy) |



9. „SEQUENCE” DISPLAYS

The worker places the parts picked from storage in a given order (on the figure the grey boxes in red frame; the boxes are numbered from 1 to 6). Displays located above the storage units [9A] and on the shelf [9B] indicate the box the worker should place the picked part in.



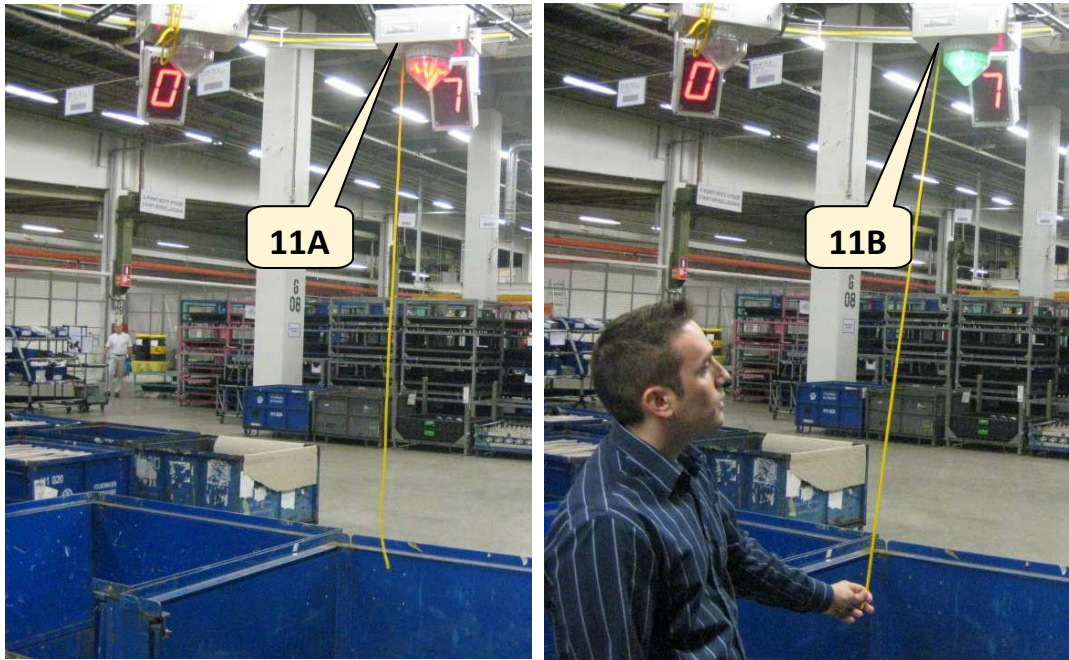
10. LIGHT CURTAINS:

The lamps on the front panel of the light curtain instruct the worker to pick a given part. The light curtain automatically performs acknowledgement using its sensors.



11. ACKNOWLEDGEMENT MODULE WITH AS-I CONTROLLER:

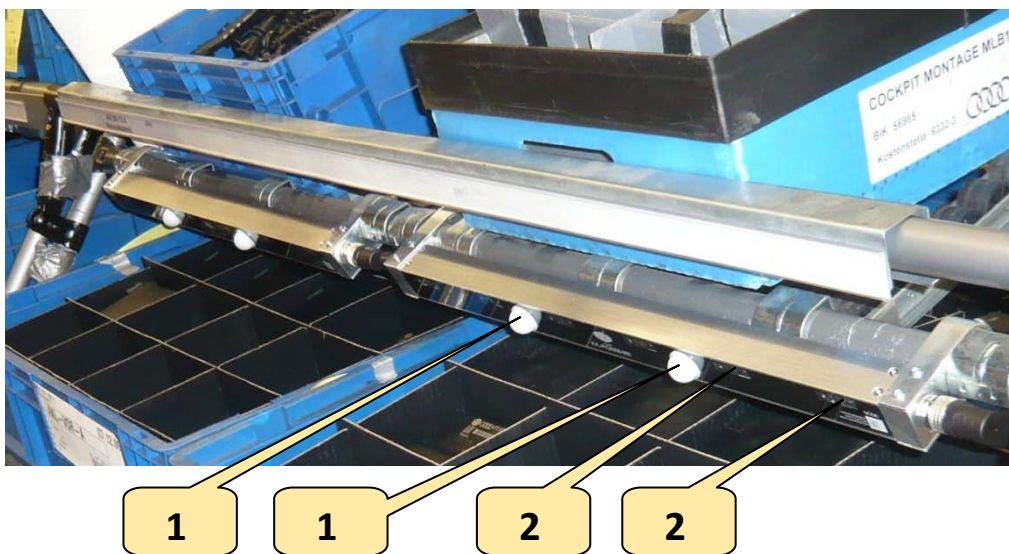
Devices located above the large storage boxes. Indicates which part should be picked by the worker [11A]. Acknowledgement is performed by operating a pull switch [11B].



4-3 DEVICES ATTACHED TO THE CONTROLLER VIA AS-I BUS

The devices indicating and acknowledging the picking of parts are connected to an AS-I network

4-3-1 Light curtains KVL-PICK006



The light curtains are designed for 300mm, 400mm and 600mm storage boxes. The lamps on the front panel of the light curtain instruct the worker to pick a given part [1]. If a part should be picked, the indicator lights are green. After picking the part (acknowledgement) the lights turn red.

Acknowledgement is performed automatically. The picking of a part is detected by distance measuring sensors located behind the front panel of the light curtain [2]. The measuring range can be set between 10 and 60 cm by computer program via USB connection (see PTL-Manager software description).

The distance between sensors is 7-8 cm, providing reliable hand detection.

4-3-2 One digit number display KVL-KENN03

If the worker prepares multiple parts of a unit in one run, the KVL-KENN03 system shows on a digital display which unit of the queue the picked part is associated to.

This module is built with a large, bright 7-digit display. These display units are placed behind a red Plexiglas layer, which provides better contrast. The numbers are clearly visible even in extremely bright environments.

The displays are connected to AS-I network. The back panel of the display unit is equipped with two connectors, the display module and the associated display/pull-switch acknowledgement module (KVL-PICK007) can be connected to one AS-I connection.



4-3-3 Acknowledgement module with AS-I controller KVL-PICK007

During assembling a red/green light indicates which part should be installed.

The display is built with long-life, high-brightness LEDs, providing clear visibility even from a distance.

Acknowledgement is performed by operating a pull-switch. The 2 m long pull-string can be cut to the appropriate length.

The module is mounted to the suspended structure located above the large storage boxes.



4-4 LIGHT AND AUDIBLE SIGNS

- **NO AUDIBLE OR VISIBLE SIGNALS**
Indicates normal operation.
- **THE GREEN LIGHT IS ON, NO AUDIBLE SIGNALS**
The device completed the production cycle and sends an IO signal to the SPS.
- **THE RED LIGHT IS ON**
An error occurred during the cycle. The device shows the error on the display and saves the error message to the database and log files.
- **THE YELLOW AND THE RED LIGHTS ARE ON**
Communication error occurred. The device shows the error on the display and saves the error message to the database and log files.
- **THE DEVICE GIVES AN AUDIBLE SIGNAL**
The error types and their associated audible signals are configurable in the program. The default is 1 second.

4-5 DAILY CHECKS BEFORE WORK

Daily routine check of control cabinet:

Cabinet door is closed:

- Proper ventilation and protection of the inner parts are only provided with closed cabinet door!
- Touching the inner parts can cause electric shock.
- Via the open door dust can penetrate the cabinet. The accumulating dust decreases cooling efficiency and leads to a higher probability of failure.

Touchscreen:

- Check the touch screen for damages. If the touch screen is damaged, immediately call maintenance service.
- Check the touch screen is clean. The touch screen can be cleaned using special wipe.

AS-I Bus devices:

- Check the correct mounting of devices.

Connectors:

- The shelves are periodically moved for cleaning. This makes necessary to disconnect some AS-I connectors. The affected connectors are marked with red and a warning message. **If the shelves were moved during cleanup, check that the connectors marked with red and warning messages are properly reconnected!**

Barcode readers:

- Both barcode readers should be operational. Check the cordless reader is fully charged. If the readers' windows are dirty clean them using a soft cloth. **Never use solvents!**

IF ANY DEVICE FAILED THE ABOVE CHECKS, IMMEDIATELY CALL MAINTENANCE SERVICE!

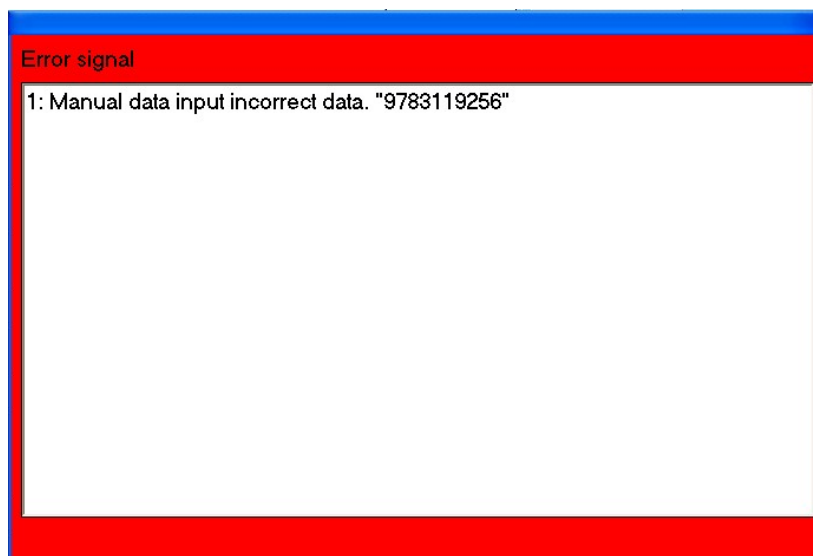


WARNING In the following cases switch off the controlbox, disconnect network cable and call a service technician immediately:

- The network cable or its connector is damaged or worn.
- Liquids penetrated the controlbox.
- The controlbox was exposed to rain or other forms of water.
- The controlbox fell or its case is damaged.
- The operation of the controlbox is unstable or the controlbox is malfunctioning.
- The controlbox emits unusual noise, smoke or unpleasant smell.

4-6 ERRORS WHICH DETECTED BY THE OPERATOR AND TROUBLESHOOTING

In case of error an "error screen" appears on the screen, describing the error.



The errors can be acknowledged using the E7 key switch.

Exception: errors related to the IO card and the AS-i card – these errors are fixed by the maintenance service.

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