SENSOPART

Montage- und Bedienungsanleitung
Mounting and operating instructions
Instructions de service et de montage

FA 46

Vision-Sensor
Vision Sensor
Capteur de Vision

301-OB
305-OB
301-CR
305-CR
305-SO

Inhalt / Content / Contenu

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Quality Management ISO 9001:2000

c UL us LISTED IND. CONT. EQ. 77HA
For use in class 2 circuits

For use in NFPA 79 Applications only.
Adapters providing field wiring means are available from the manufacturer. Refer to manufacturers information.

CE

Contents

1 General Information and Safety

1.1 Symbols

Important
This symbol indicates sections of the text which must be strictly observed. Non-compliance with such instructions may cause injury or damage.

Note
This symbol indicates sections of the text which contain useful information.

Note FA 46 Value-305 / FA 46 Value-301
This symbol marks text which explains the specific differences of the sensor FA 46-305 compared with the sensor FA 46-301.

OBJECT
CODE READER
SOLAR

1.2 Safety notes

Before starting the FA 46 Vision Sensor, read these instructions carefully, ensure that you have understood them and comply with them at all times.

The FA 46 Vision Sensor should only be connected by a qualified electrician.

Do not tamper with or make alterations on the unit!

The FA 46 Vision Sensor is not a safety-critical component and its use is prohibited under conditions where the safety of persons may depend on its function.

The IP address set for the FA 46 Vision Sensor should be marked on the enclosed label. After installation, stick the label on the sensor in a clearly visible position.

⇨ The IP address of the FA 46 Vision Sensor must be used once only in any network.

1.3 Components supplied

- FA 46 Vision Sensor including integrated illumination
  (or as version with C-Mount lens without illumination)
- CD-ROM with Computer software and Operating instructions
- Operating instructions, mounting clamp, Allen key, screwdriver, 2 protective caps for M12 plug.

1.4 Requirements for use

Configuration of the FA 46 Vision Sensor requires a standard PC/Notebook (at least Pentium 4, 1GHz and 512 MB RAM, with Microsoft Windows 2000-SP4, XP SP2, Vista or Windows 7) with network connection or a network with TCP-IP protocol. We recommend a Pentium 4 Dual Core > 2Ghz and 1GB RAM, for Windows Vista or Windows 7. With Windows Vista, it may be necessary to deactivate IPv6. If it is not required, it can be deactivated under Start/ System Control/Network connections/LAN connection/Properties “Internet protocol version 6 (TCP/Ipv6). Formatting errors can otherwise occur when displaying the IP address in SensoFind and the Info dialogue box.
We recommend a screen resolution of min. 1024 x 768 pixels. A basic knowledge of computers is also required.
The FA 46 Vision Sensor is supplied with the IP address 192.168.100.100 and a subnet mask 255.255.255.0.
The FA 46 Vision Sensor is operated independently of a PC or PLC. A PC/notebook is only necessary for configuration of the FA 46 Vision Sensor.
Attention must be paid to sufficient and constant object illumination to ensure reproducible results and avoid error functions.

Reflections or varying incident light may affect detection results.

⇨ If necessary, use an external white-light source and/or light-screening devices to exclude incident light.

2 Intended Use

2.1 Field of application

2.1. Field of application
The FA 46 Vision Sensor is an optical sensor and uses several evaluation methods according to the version: pattern recognition, contrast detection, grey level, contour detection, barcode or DataMatrix code reading as well as wafer detection.

Object Detection:
The FA 46 object sensor precisely detects faulty parts, parts in the wrong place, at the wrong angle or in the wrong order or a combination of all of these. A total of four detectors are available for inspection tasks and intepretation: pattern recognition, contour detection, grey level and contrast detection. The high-end version of the Vision object sensor, FA 46-305 also offers position tracking: it is thus now also possible to reliably detect those features which do not appear with repeated accuracy in the taught position. All intepretation is carried out relative to the actual position and angle of the part without having to define an independent characteristic for each possible position. This highcapacity tool also enables you to solve demanding pick and place applications.

Codereader:
Identification of products, components or packaging from printed or directly marked – punched or laser-etched – codes is common practice in many sectors of industry today. The Vision code reader from SensoPart immediately detects which part is in front of it: it can easily read numerous types of barcodes as well as printed and directly marked data matrix codes according to ECC 200 standard, and this on any base (metal, plastic, paper,glass). The sensor can even routinely decipher askew or warped codes or codes on convex, reflective or transparent surfaces. The Vision code reader assesses the quality of your printed or directly marked data matrix codes using standardised ISO and AIM quality parameters. This enables you to introduce early correctional measures and thus avoid rejects due to illegible codes.

Detection of wafers/solar cells:
The FA 46 solar sensor offers an optimised inspection algorithm for a sound, process-concurrent quality control of sensitive silicon wafers. The relevant functions for wafer and cell inspection, from the detection of the size and shape of the wafer to the location of defects and the setting of processing speed and inspection accuracy, are already preconfigured so that the sensor is ready for operation in just a few mouse clicks.

The FA 46 Vision Sensor range is an economic alternative to conventional image processing systems.

2.2 Characteristics FA 46 301/305 Object detection

	301	305
Number of Jobs	1	n
Position tracking	-	X
Number of detectors	n	n
Type of detectors		
- Pattern matching (X-, Y- Translation)	X	X
- Contour matching (X-, Y translation and rotational position)	X	X
- Grey threshold	X	X
- Contrast	X	X
4 Signal outputs 0-24 V DC PNP, 2 inputs	X	X
Ethernet interface / data transmission	Setup only	X
RS 422 interface for data transmission	-	X
EtherNet/IP	-	X
Logic	One level	Multilevel
Sensor monitoring with viewer, job upload, etc.	X	X
I/O extension with encoder control	-	X
Version with C-Mount	-	X

2.2.1 Sensor types

Sensor name [*1]	min. operating distance/mm [*2]	Field of view /mm x mm	Part no.
FA46-305-WCC-OBO6ES6	6	4 x 5	522-91151
FA46-305-WCC-OBO12ES6	22	6 x 8	522-91152
FA46-305-RCC-OBO6ES6	6	4 x 5	522-91153
FA46-305-RCC-OBO12ES6	22	6 x 8	522-91154
FA46-305-ICC-OBO6ES6	6	4 x 5	522-91175
FA46-305-ICC-OBO12ES6	22	6 x 8	522-91176
FA46-305-CC-OBOCSES6 [*3, 4]	C-Mount, dependent on lens	C-Mount, dependent on lens	522-91155
FA46-301-WCC-OBO6LS5	6	4 x 5	522-91171
FA46-301-WCC-OBO12LS5	22	6 x 8	522-91172
FA46-301-RCC-OBO6LS5	6	4 x 5	522-91173
FA46-301-RCC-OBO12LS5	22	6 x 8	522-91174

[*1] Other types available on request
[*2] For greater operating distances (from approx. 100 mm) external illumination may be necessary. The typical focus range is operating distance ± 5%.
[*3] When the C-Mount version of FA 46 is in use, a C-Mount lens with a 6.6 mm intermediate ring or a C-Mount protective case is required (see accessories chapter 8.10).
[*4] IR illumination is only possible with C-Mount sensors.

2.3 Characteristics FA 46 301/305 Codereader

	301	305
Number of Jobs	n	n
Position tracking	-	X
Number of detectors	1	n
Type of detectors		
- Pattern matching (X-, Y- Translation)	-	X
- Datacode	X	X
- Barcode	X	X
- Grey threshold	-	X
- Contrastt	-	X
4 Signal outputs 0-24 V DC PNP, 2 inputs	X	X
Ethernet interface / data transmission	X	X
RS 422 interface for data transmission	X	X
EtherNet/IP	X	X
Logic	One level	Multilevel
Sensor monitoring with viewer, job upload, etc.	X	X
I/O extension with encoder control	X	X
Version with C-Mount	-	X

2.3.1 Sensor types

Sensor name [*1]	min. operating distance/mm [*2]	Field of view /mm x mm	Part no.
FA 46-305-WCC-CRO6ES6	6	4 x 5	522-91177
FA 46-305-WCC-CRO12ES6	22	6 x 8	522-91178
FA 46-305-RCC-CRO6ES6	6	4 x 5	522-91179
FA 46-305-RCC-CRO12ES6	22	6 x 8	522-91180
FA 46-305-ICC-CRO6ES6	6	4 x 5	522-91181
FA 46-305-ICC-CRO12ES6	22	6 x 8	522-91182
FA 46-305-CC-CROCSES6 [3, 4]	C-Mount, dependent on lens	C-Mount, dependent on lens	522-91183
FA 46-301-WCC-CRO6LS6	6	4 x 5	522-91184
FA 46-301-WCC-CRO12LS6	22	6 x 8	522-91185
FA 46-301-RCC-CRO6LS6	6	4 x 5	522-91186
FA 46-301-RCC-CRO12LS6	22	6 x 8	522-91187

[*1] Other types available on request
[*2] For greater operating distances (from approx. 100 mm) external illumination may be necessary. The typical focus range is operating distance ± 5%.
[*3] When the C-Mount version of FA 46 is in use, a C-Mount lens with a 6.6 mm intermediate ring or a C-Mount protective case is required (see accessories chapter 8.10).
[*4] IR illumination is only possible with C-Mount sensors.

2.4 Characteristics FA 46 Solar

	305
Number of Jobs	n
Position tracking	X
Number of detectors	n
Type of detectors	
- Wafer detection	X
4 Signal outputs 0-24 V DC PNP, 2 inputs	X
Ethernet interface / data transmission	X
RS 422 interface for data transmission	X
EtherNet/IP	X
Logic	Multilevel
Sensor monitoring with viewer, job upload, etc.	X
I/O extension with encoder control	X
Version with C-Mount	X

2.4.1 Sensor types

Sensor name *1	min. operating distance/mm *2	Field of view /mm x mm	Part no.
FA46-305-WCC-SOO6ES6	370	170*225	522-91166
FA46-305-WCC-SOO12ES6	740	170*225	522-91167
FA46-305-RCC-SOO6ES6	370	170*225	522-91168
FA46-305-RCC-SOO12ES6	740	170*225	522-91169
FA46-305-CC-SOOCSES6 *3, 4	C-Mount, dependent on lens	C-Mount, dependent on lens	522-91170

*1 Other types available on request
*2 e.g. full-frame inspection of a 6'' wafer. The typical range of depth of focus is ± 5% around the working distance.
*3 When the C-Mount version of FA 46 is in use, a C-Mount lens with a 6.6 mm intermediate ring or a C-Mount protective case is required (see accessories chapter 8.10).
*4 IR illumination is only possible with C-Mount sensors.

3 Installation Instructions

3.1 Mechanical Installation

To ensure maximum accuracy of detection, the FA 46 Vision Sensor should be protected from vibration.

Secure the connection cables with cable binders to prevent crushing or slipping.

Select a position for the FA 46 Vision Sensor in which interfering factors such as slight differences in the position of the object or variations in illumination have little or no effect.

Screw the FA 46 Vision Sensor onto the mounting clamp „dovetail FA 46“ (supplied with the unit) and then onto a suitable object. Use only the mounting clamp „dovetail FA 46“ (no. 543-11000) supplied with the unit (see chapter 8.11 dimensional drawing).

Arrangement for dark-field illumination
- for the prevention of direct reflections and accentuation of edges etc.

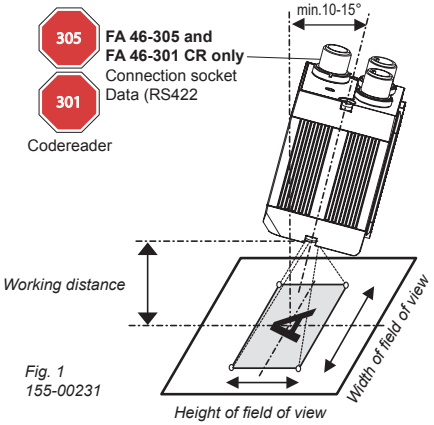


Fig. 1
155-00231

Arrangement for bright-field illumination
- for transmitted light/ measuring tasks or for the accentuation of highly-reflective objects.

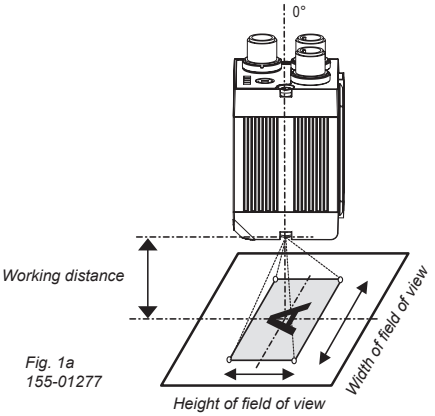


Fig. 1a
155-01277

Observe the object clearance given in the table Field of View / Working Distance (see chapter 8.4).

To avoid interfering reflection from the detection object, align the FA 46 Vision Sensor at an angle of approx. 10°-15° with reference to the optical axis (fig. 1).

Fine adjustment
Important: Fine adjustment of the FA 46 Vision Sensor should not be carried out until after electrical connection (see chapter 3.2) and start-up (PC software installation(chapter 4).

3.2 Electrical installation

The electrical installation of the FA 46 Vision Sensor must be carried out by a qualified electrician.

When installing the FA 46 Vision Sensor , disconnect all electrical components from the power supply.

When the unit is being used in a network, ensure that the network address (IP address) of the FA 46 Vision Sensor set by the manufacturer at 192.168.100.100/24 with Subnetmask 255.255.255.0 is free and is not in use for any other unit connected to the system.
If necessary, re-set the IP address of the FA 46 Vision Sensor as described in the section „Network settings“ (see chapter 3.3).

When the FA 46 Vision Sensor is in use, the protective caps supplied must be pushed onto the M12 sockets (data and LAN) which are not in use. Failure to do this may cause malfunction.

3.2.1 Connection possibilities

For stand-alone operation (independent of PC /PLC) only connection 24 V DC (see chapter 3.2.1.3) is required after start-up.

For electrical installation, connect wires as follows:

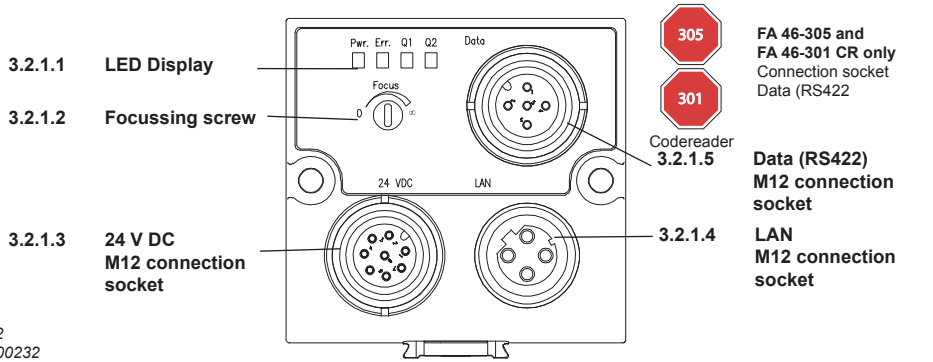


Fig. 2
155-00232

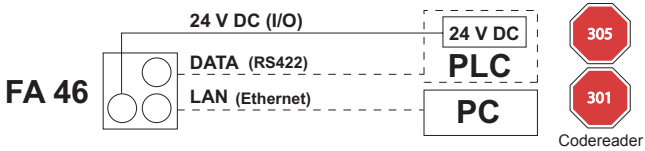


Fig. 3
155-01237

3.2.1.1 LED Display

Name	Colour	Meaning
Pwr.	green	Operating voltage
Err.	red	Error
Q1	yellow	Result 1 (OUT1)
Q2	yellow	Result 2 (OUT2)

Table1

3.2.1.2 Focussing screw

Focussing screw to adjust focus.

3.2.1.3 24 V DC Connection

M12 Connection socket for 24 V DC voltage supply and digital I/O.
The exact plug connection see table2, chapter 8.5.

3.2.1.4 LAN Connection

M12 Connection socket for Ethernet connection.
The exact plug connection see table 3, chapter 8.5.

Use only the correct network cables (see accessories table chapter 8.10).

Direct connection of the FA 46 Vision Sensor to a PC (recommended):

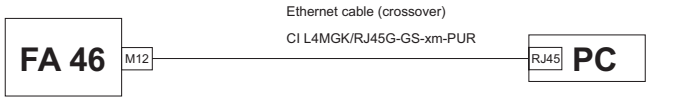


Fig. 4
155-01195

alternatively

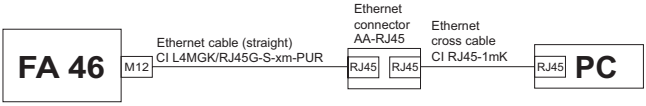


Fig. 5
155-01196

Connection of the FA 46 Vision Sensor to a PC via a network:

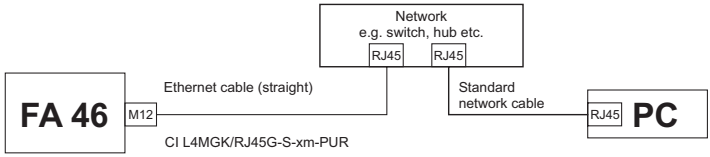


Fig. 6
155-01197

305
301
Codereader

FA 46-305 and FA 46-301 CR only

3.2.1.5 Data (RS422) Connection

M12 Connection socket for DATA serial interface, RS422.
The exact plug connection see table 4, chapter 8.5.

3.3 Network settings

The following instructions indicate how to change the network configuration of the PC and the FA 46 Vision Sensor.
If incorrect settings are used, the network connections in the computer may be lost.
To be on the safe side, note the former settings for later use if required.
Following this procedure, it may be necessary to re-start the system.
In order to determine which IP addresses are allowed in your network or locally in your PC, and to carry out the necessary settings on your PC, contact the system administrator beforehand.

The illustrations, dialogues and menus originate from the operating system Microsoft Windows XP™. The illustrations are similar in other operating systems.

3.3.1 Basic settings for PC and FA 46 Vision Sensor

To configure the FA 46 Vision Sensor with a PC it is essential that a network board and the TCP/IP LAN- connection is installed on the PC. (This also applies when the PC is not connected to a network. See also chapter 3.2, Electrical Connection). The FA 46 supports the automatic recognition of the Ethernet transmission rate, but 100 MBit at the most.

There are two alternatives to configure and parameterize the FA 46 Vision Sensor.

1. **Direct Connection**
2. **Network Connection**

3.3.1.1. Direct Connection - Setting the IP Address of the PC

To connect the Vision Sensor FA 46 to a PC via Ethernet the IP addresses of both devices have to correspond. The default IP of the FA 46 is 192.168.100.100/24 with Subnetmask = 255.255.255.0. To establish a direct connection, the PC must be set to a corresponding, fixed IP address like follows.

1. Click on Start ⇨ Control Panel ⇨ Network Connection ⇨ Local Area Connection ⇨ Properties ⇨ the window "Local Area Connection Properties" is open.
2. In the list „This connection requires following elements“ select the option „Internet Protocol (TCP/IP)“ and then click the button „Properties“.
3. In the following window (see fig. 7) set the desired IP address of the PC and the sub-network data.
4. Confirm entries with OK

Microsoft Windows 98/ME™ requires a reboot after modification of the IP configuration.

Example:
The FA 46 Vision Sensor is pre-set to IP address 192.168.100.100 and subnet mask 255.255.255.0.
In this case, the IP address may be set to any value between 192.168.100.1 and 192.168.100.254, with the exception of the sensor IP address (192.168.100.100).

To alter the sensor's IP address, see Commissioning (chapter 3.3.1.2).

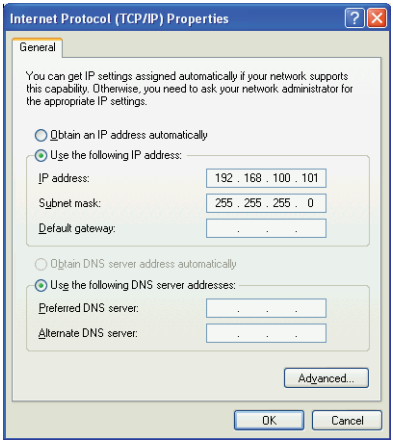


Fig. 7
155-00506

Proceeding/Troubleshooting - Direct Connection

Creating a functioning ethernet connection between FA 46 Vision Sensor and PC

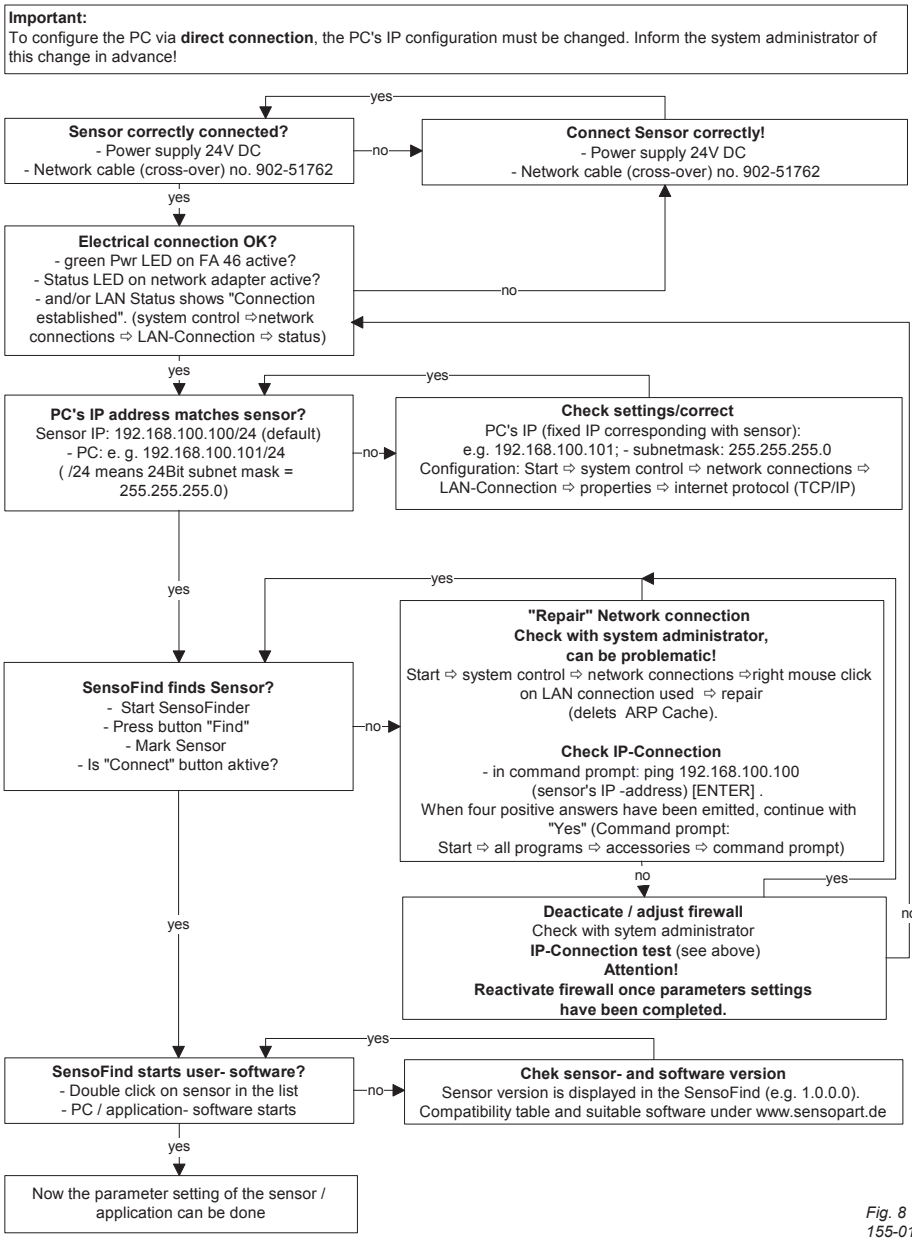


Fig. 8
155-01198

3.3.1.2. Network Connection - Setting the IP address of the FA 46 Vision Sensor

Before connecting the sensor in the network, check with the network administrator whether the sensor's address has already been assigned (default: 192.168.100.100 with subnet mask 255.255.255.0). This can otherwise cause network failure.The set IP address is to be noted on the enclosed label. The label is then to be stuck on the sensor in a clearly visible place after installation.
Network connection speed:
The sensor must only be operated with 100MBit/full-duplex when using VGA resolution and SensoView.

Sensor's IP still free:
Connect sensor to network and then set the sensor's IP to match the PC according to the administrator's specifications, as follows.

Sensor IP already assigned:
1. First connect sensor and PC directly (see chapter 3.3.1.1) and set an authorised IP address in the sensor.
2. Connection via the network can then be carried out.

First ensure electrical connection (see chapter 3.2) and installation of PC software (see chapter 4 Commissioning) have been completed.

To set the IP address on the FA 46 Vision Sensor, the following steps are to be carried out in the PC software:

1. Start SensoFind
2. Mark Sensor.
3. Set sensor's new IP address with "Settings". This was assigned by the system administrator, see fig. 9. The PC's IP address is shown in the status bar under the buttons.
4. Restart the sensor (disconnect power supply for 5 seconds).
5. Close SensoFind and restart,
6. Mark sensor and connect.

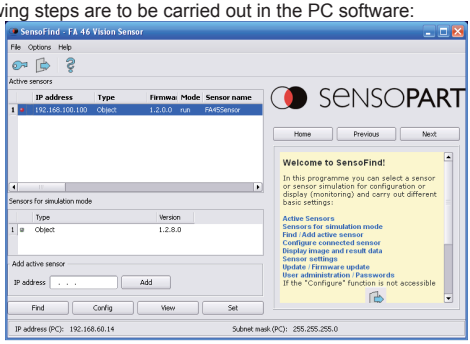


Fig. 9
155-01200

Modification of the standard gateway enables operation in different sub-networks. Only alter this setting after consultation with the administrator.
Automatic integration of a new computer or sensor in the existing network without manual configuration is possible through DHCP. Normally, automatic supply of IP address must only be set on the sensor, the client. When the sensor is started in the network, it can obtain the IP address, net mask and gateway from a DHCP server. Activation of DHCP mode is carried out via the "Settings" button by activating the checkbox "DHCP". As one and the same FA 46 can thus have different IP addresses at different times, a sensor name must be attributed when activating the DHCP. Should several FA 46s be in one network, different names must be used.

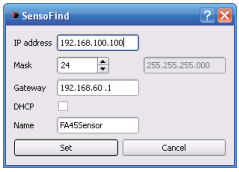


Fig. 10
155-01201

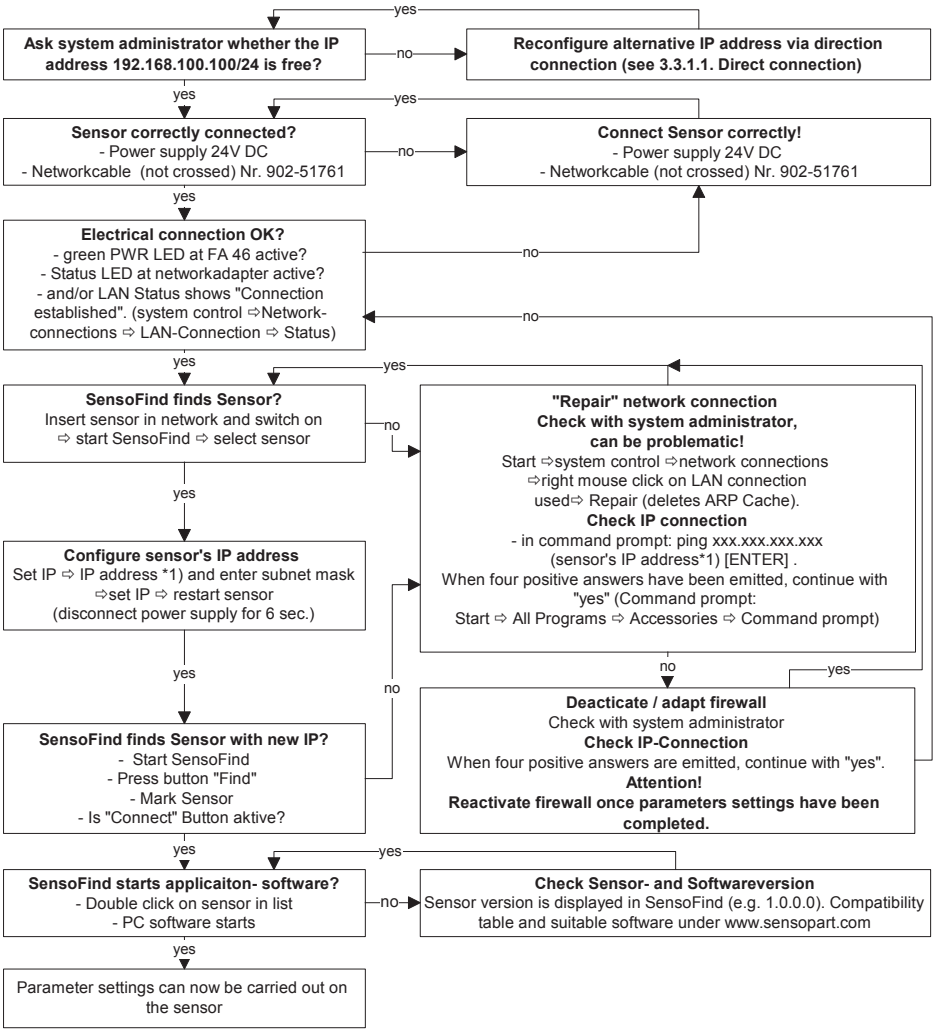
If a FA 46 with DHCP is switched on in a network without a DHCP server, the FA 46 automatically sets the IP address to 192.168.0.65. This can be the case, e.g. in the case of power/server failure or the restart of a system after shutdown as the DHCP server may boot slower than the FA 46. Make sure that the FA 46 is only switched on when the DHCP server is available.

Proceeding/Troubleshooting - Network Connection

Establishing an operational Ethernet connection between FA 46 Vision Sensor and PC

Important:
To configure the FA 46 Vision Sensor for **the network,** it must be integrated in the network. Before connection, check whether the sensor's address has already been assigned (default: 192.168.100.100/24). Network failure can otherwise occur.

Configuration of the sensor requires the FA 46 software and communication between sensor and PC. The sensor requires a free IP address*1) to establish this connection.



*1) a suitable, new, free IP address is assigned by the system administrator

Fig. 11
155-01199

4 Commissioning / Short guide

The FA 46 Vision Sensor can only be operated with the enclosed software. The latest versions are available under www.sensopart.com. The PC software must always concur with the appropriate sensor firmware (VXX).

Administrator rights are required to be able to install software under Windows®, 2000 SP4, XP SP2, VISTA™ or 7.

In order to begin commissioning of the FA 46 Vision Sensor, the following steps must be carried out:

1. Switch on power supply (+UB) of FA 46 Vision Sensor.
2. When first commissioning the FA 46 Vision Sensor, install the enclosed PC software version X.X, on a PC. Once the CD has been inserted, the internet browser should start automatically. If the autorun function has been deactivated, the start page can also be started from the CD with a double click on start.exe.

Deinstallation
System control ⇨ Software ⇨ FA 46 Vision Sensor ⇨ Remove
or
Start ⇨ Progamme ⇨ SensoPart ⇨ FA 46 Vision Sensor ⇨ Remove FA 46 SensoFind

3. In the start menu, the programme group “SensoPart / FA 46 Vision Sensor“ is created with the entry „FA 46 SensoFind“.
4. „Start “FA 46 SensoFind“ ⇨ the “SensoFind“ user interface appears.

4.1 Structure of PC software

The PC software is organised into the following three modules:

- **SensoFind:**
  Selection of a sensor or sensor simulation for configuration or display (monitoring), or modification of different basic settings.
- **SensoConfig:**
  Configuration of FA 46 Vision Sensor for one or several inspection tasks (jobs) in six logical operating steps.
- **SensoView:**
  Display and monitoring of images and results from connected sensors, as well as job upload.

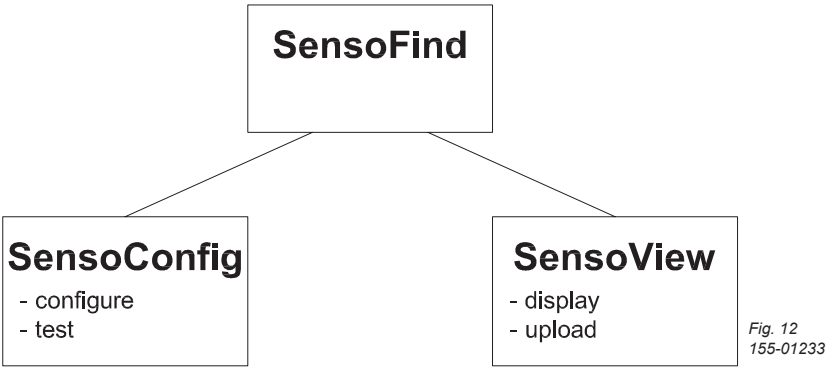


Fig. 12
155-01233

4.2 SensoFind

In this programme, you can select a sensor or a sensor simulation for configuration or display (monitoring) and carry out different basic settings.

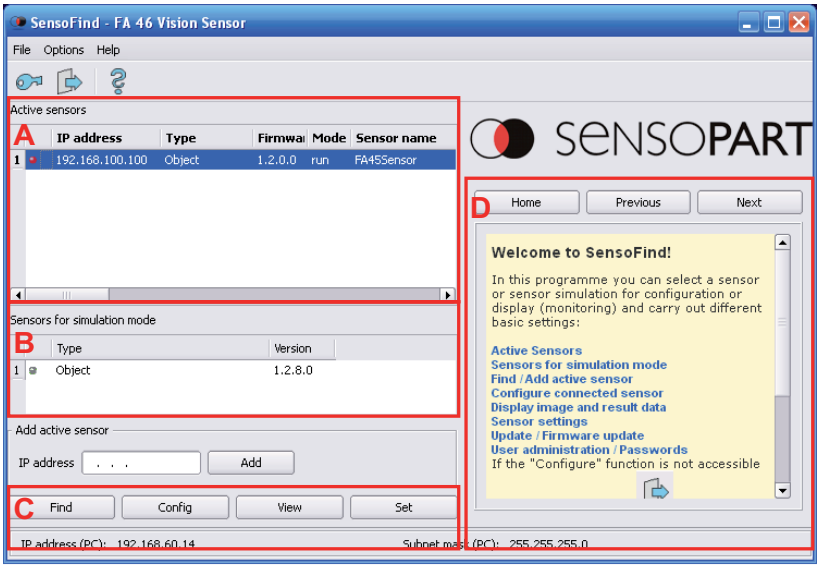


Fig. 13
155-01202

A) Active sensors
This list displays all the FA 46 Vision Sensors which can be controlled from the PC.

B) Sensors for simulation mode
All the sensors available for offline simulation are displayed here.

C) Functions

- **Find**
  Activates another search procedure
- **Configure**
  Configures a connected sensor or sensor simulation
- **Display**
  Displays image or result data from a connected sensor

The sensor's network settings can be modified via the menu bar "File / Settings".

D) Online help
Context-sensitive help on the current topic

4.2.1 Configuring or displaying sensors

In order to open a sensor for configuration or display, mark the required sensor in the list “Active sensors“, then click on the button “Configure“ to start the “SensoConfig“ module, or on the button “Display“ for the “SensoView“ module.

4.2.2 Sensor simulation

To open a sensor for offline simulation, mark the required sensor in the “Sensors for simulation mode“ list, then click on the button “Configure“ to start the module “SensoConfig“.

4.2.3 Passwords

When first started-up after installation, password entry is completely deactivated and auto login is preset to administrator.
If parameter settings are to be protected from unauthorised access, passwords should be given for the “Admin“ and “User“ password levels, see below. This can be called up via the menu bar File / User administration or via the button with the key symbol in the toolbar.

Password levels:

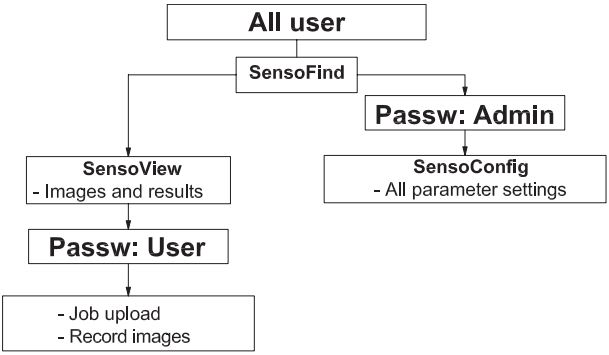


Fig. 14
155-01203

In order to be able to use the “Configure“ function after the assignment of passwords, it is now necessary to login by clicking on the toolbar login button  , and then entering the assigned password.

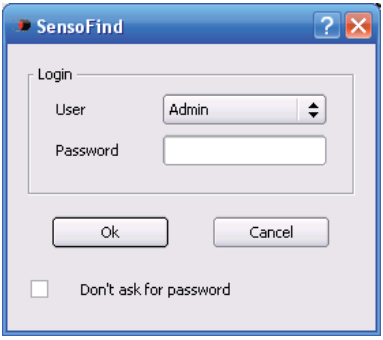


Fig. 15
155-01205

Allocating an empty password means the password can be confirmed without any further entry. Activation of the “Deactivate password request“ checkbox, permanently deactivates password request.
If passwords have been assigned and then forgotten, it is possible to reset passwords to delivery status by reinstalling the software.

4.3 SensoConfig

With this programme, you can configure your FA 46 Vision Sensor for one or several inspection tasks (jobs) in six logical operating steps. Activate the “Configure” button in the SensoFind module to start SensoConfig.

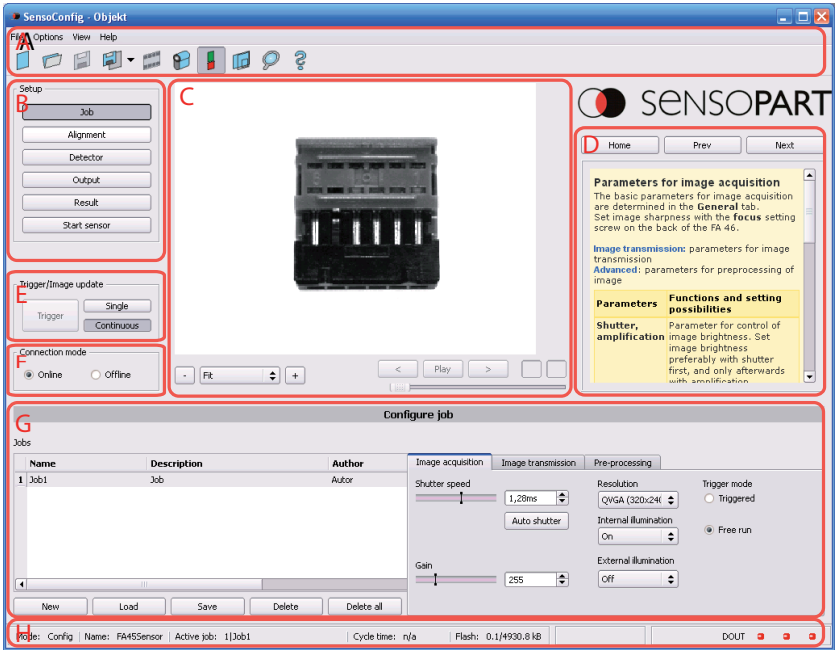


Fig. 16
155-01206

The different operating fields are:

A) Menu and tool bar

B) Setup navigation / Operating steps
See next chapter for description

C) Image
Image output with graphically adjustable operating and search zones as well as zoom function and filmstrip navigation

D) Online help
Context-sensitive online help, automatically updated for each action.

E) Image acquisition
Switch-over between continuous and single image mode and software trigger.

F) Mode of connection
Switch-over between online and offline mode (sensor present or simulation without sensor).

G) Configuration window
Variable content relating to action in set-up navigation, for setting associated parameters.

Below you‘ll find a description of start-up, using the example of the object sensor.
This method can basically be used for the other sensors as well.
Further information can be found in the online help of the software.

4.3.1 Job

One job contains all the settings and parameters necessary for carrying out a specific inspection task.
Jobs can be created here and several jobs can be managed. All global settings, valid for the entire job, e.g. shutter speed, amplification, illumination settings etc. are also carried out here.
The following basic image settings should first be carried out to ensure a high-contrast and sharp image:

* Image brightness: Set shutter time or amplification, see Job / General
* Image sharpness: Turn focus setting screw on the back of the FA 46 until the image is sharp.

The sensor is delivered with the following settings: Trigger Modus = „free run“ (see Job / General) and Trigger / collect image = „continuous“. A new image is thus continuously collected for focus and brightness settings and the display is thus continuously updated.
The subsequent setting of position tracking and detectors should preferably be carried out in single image mode, as all settings are then based on a master image and image collection is not continuously carried out. This may require the following setting “ Trigger / collect image = “single image””.

Edit the job created as default job 1 in the list if necessary, and set the other basic parameters such as trigger mode, internal / external lighting etc.
Position tracking and any number of different detectors can subsequently be defined within one job to solve an inspection task.

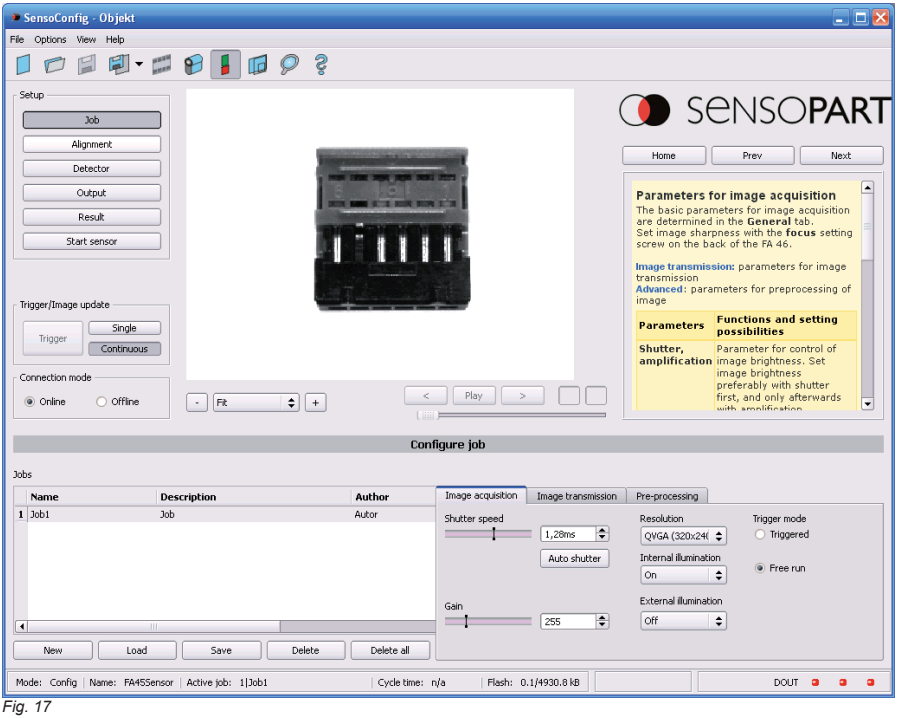


Fig. 17
155-01207

4.3.2 Position tracking

Alignment compensation can be necessary for objects or characteristics whose position varies on the screen. Three different detection methods (alignment detectors) are available for this purpose. Position tracking is optional and is available for use with the methods: pattern matching, edge detection and contour. After selection of the position tracking method, set the operating zones on the parameter to be used for alignment tracking by adjusting the graphic frame to the appropriate position and size on the image. The parameters associated with the selected method are displayed on the bottom right-hand side and can also be adjusted there.
Use of position tracking affects all the detectors subsequently defined.

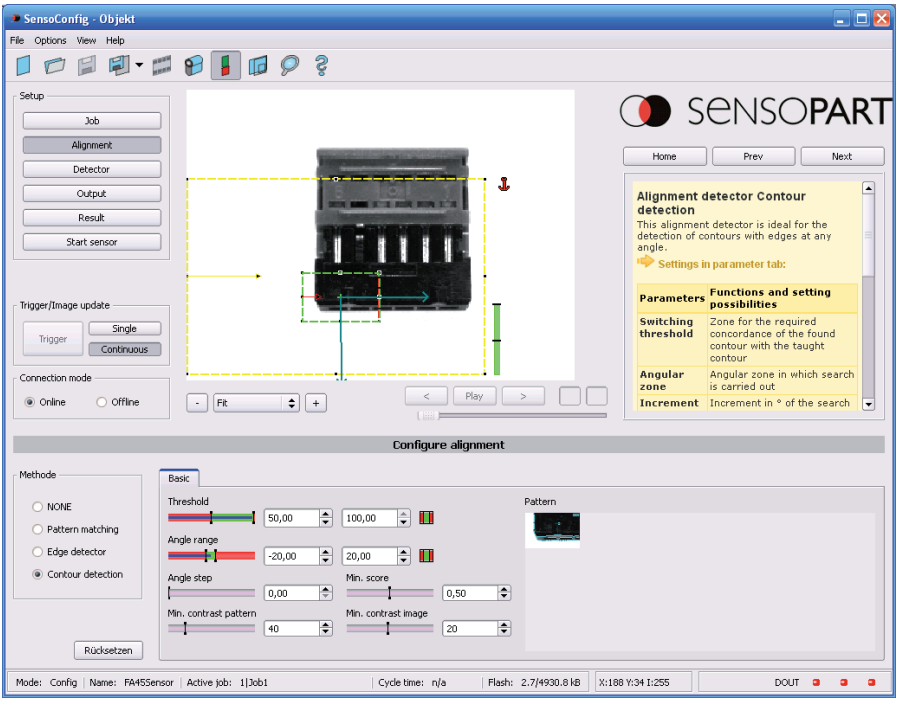


Fig. 18
155-01208

4.3.3 Detectors

Different detectors can be selected and adjusted here to solve an inspection task. First the required detector is selected in the dialog box shown below.

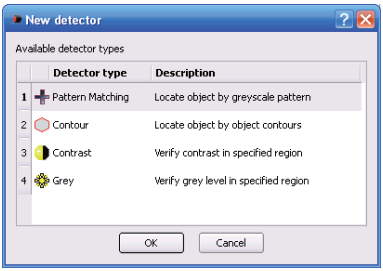


Fig. 19
155-01209

Then the operating and search zones are graphically set on the screen. If teach zones exist, they are taught immediately after completion of the settings. All the detectors defined in this job are shown in the bottom left-hand corner. The parameters of the currently selected detector are shown in the bottom right-hand corner and can be adjusted there. If other parameters are to be checked on the same part, any number of other detectors can be created as described above by clicking on „New“.

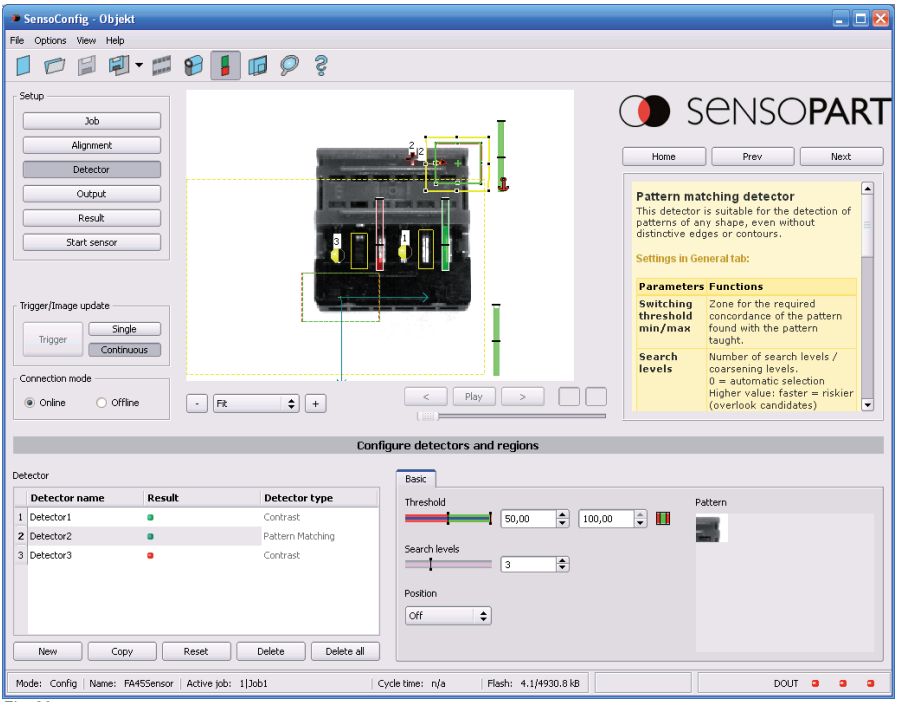


Fig. 20
155-01210

4.3.4 Output

The output module enables different settings of digital input / output and data output.

Fig. 21
155-01211

Setting possibilities in the different tabs:

- **I/O, Logic**
  Selection of digital signal outputs and definition and assignment of logical connection using the Boolean results of all detectors. Definition of complex logic connections via table or via input of a logical formula.
  A different logical connection can be assigned to each available digital output.

- **Interfaces**
  Selection, setting and activation of the individual interfaces such as: programmable input IN2, RS422, I/O extension, Ethernet and EtherNet / IP

- **Timing**
  Setting of delay times: Trigger delay, result delay and duration of result.

- **Data output**
  Setting and preview of data output string via RS422 or Ethernet.
  Selection of: binary or ASCII protocol, header and / or trailer, standard contents and / or flexible, combinable, special individual data from the individual detectors.
  Any number of individual results from all the defined detectors can be freely arranged in an output string.

4.3.5 Results

With this function, inspection is carried out on the PC, using all the settings, for control purposes. During this procedure execution times, for example, will not be updated as these values are only informative when implemented on the sensor itself. See next step: “Start Sensor“.

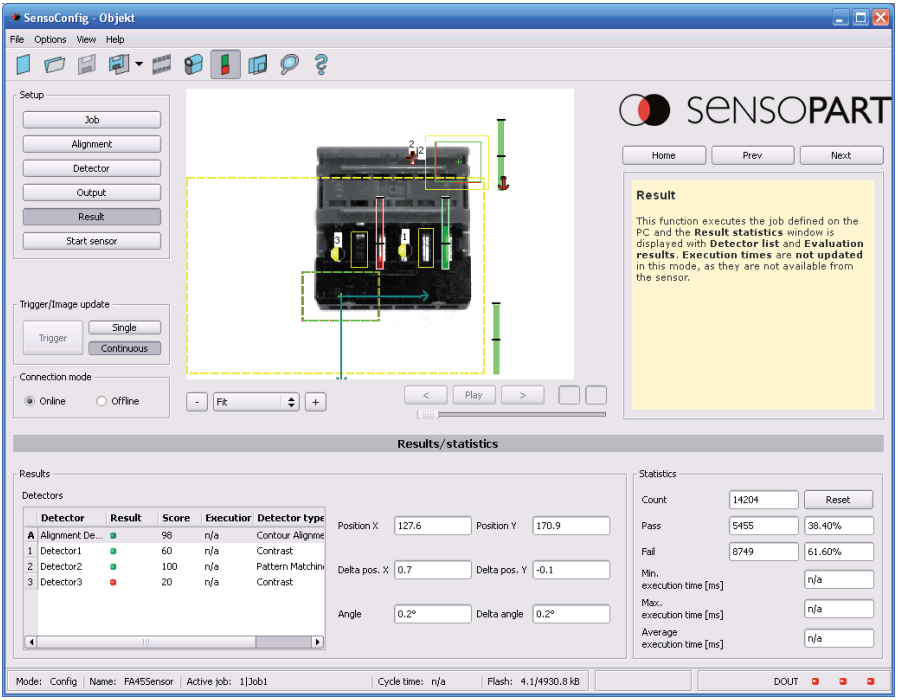


Fig. 22
155-01212

4.3.6 Start Sensor

When this function is activated, all settings are transferred to the sensor, stored in the flash memory and carried out e.g. in free run or in triggered mode according to the settings made. All information in the detector list, result field or under “Statistics“ is updated here.

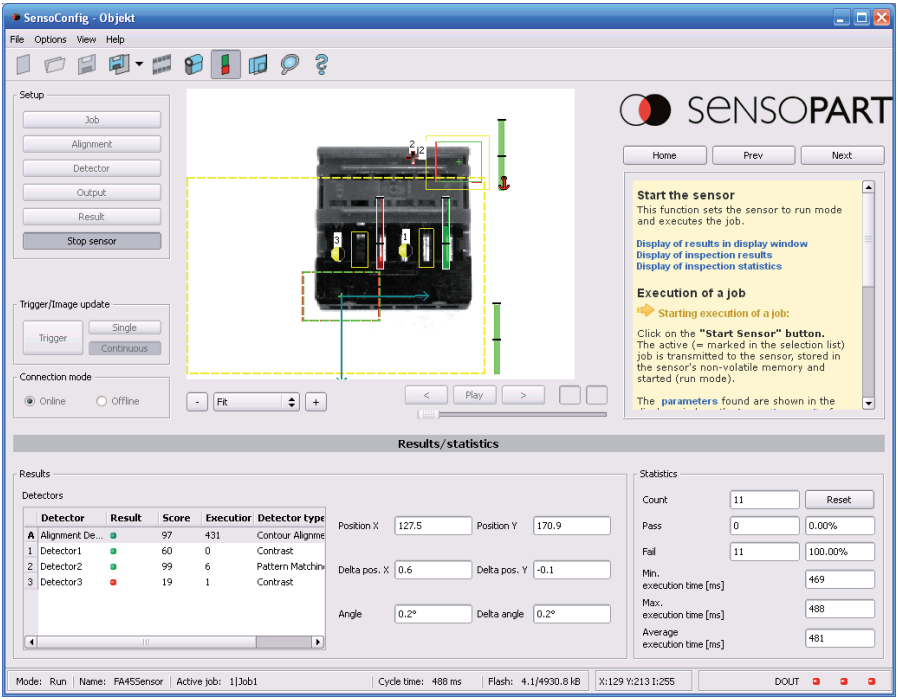


Fig. 23
155-01213

4.4 SensoView

This programme is used for monitoring / checking connected sensors and for analysing inspection results. SensoView is started via the "**Display**" button in SensoFind.
The current image is displayed with the drawings for position tracking and the detectors (if "image transmission = active" is activated in the configuration module under Job / General).
The „**Freeze image**" button enables result-controlled images (e.g. bad part) to be kept on the display. Images can be enlarged with „**Zoom**", archived with or without numerical result data or the image recorder on the sensor can be read out.
The "**Result**" tab shows the individual detectors with their results and the overall result.
The "**Statistics**" tab shows further statistical results.

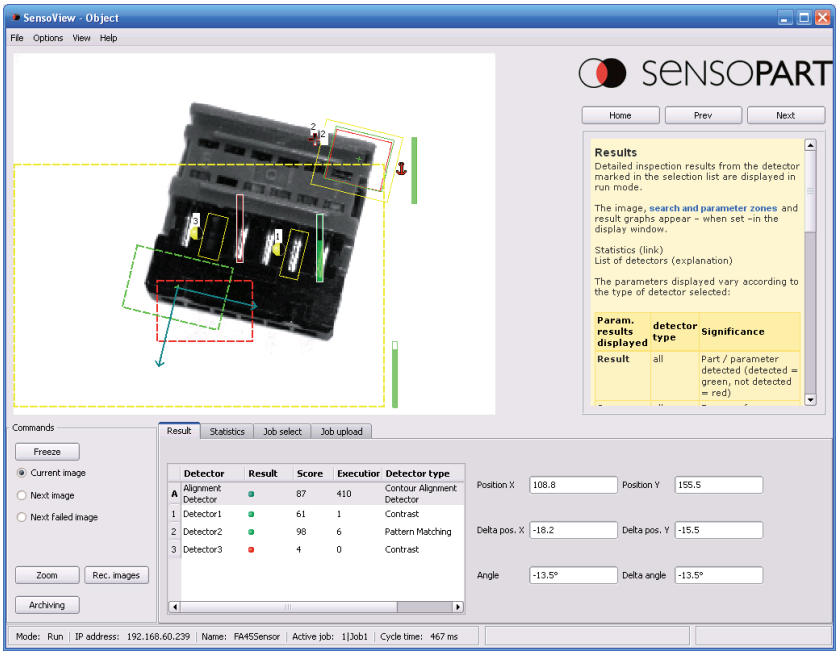


Fig. 24
155-01214

It is possible to switch between jobs present on the sensor with the "**Job**" tab.
Further, previously defined jobs or whole job sets can be loaded on to the sensor from the viewer in the "**Upload**" tab.

Operating SensoView can impair the sensor's processing speed in run mode, particularly if the connected PC has a low performance.

5 Delay times for use of outputs OUT1/2/3

Case 1) No delay times used

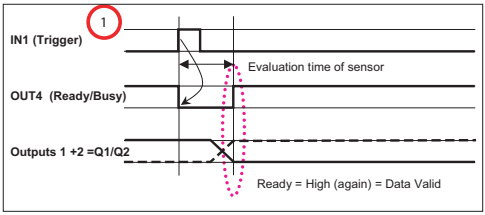


Fig. 25 - 155-01229

Case 2) Trigger delay = time between trigger and start of image recording in ms

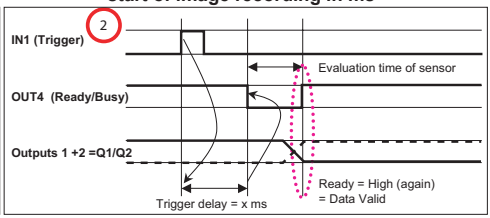


Fig. 26 - 155-01230

Case 3) Result delay = time between trigger and presence of result level at OUT1/2/3 in ms

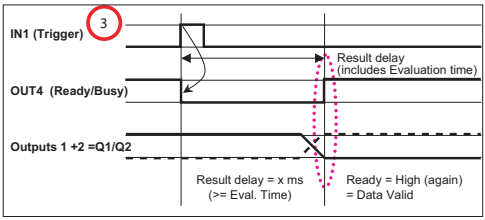


Fig. 27 - 155-01231

Case 4) Duration of result = duration of result signal in ms

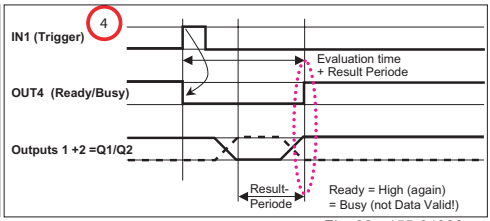


Fig. 28 - 155-01232

Up to three delay times can be used (value range 0 – 3000 ms)

When using the delay times for controlling the signal outputs, it must be ensured that the sum of the times used is smaller than the cycle time between the arrival of one part to the next, i.e. only one part may be found in the inspection zone during the times defined here.

Special case for control of digital signal outputs when using timing function "duration of result":

Output	Behaviour without duration of result	Behaviour with duration of result
OUT4 (Ready)	Is set directly (or when "trigger delay" > 0 after elapse of trigger delay) to low by trigger event. Is set back to high after completion of image recording and evaluation, directly after setting result outputs OUT 1/2/3. It thus indicates that the sensor is ready again (Ready) for the next evaluation and the results for the evaluation just carried out are now available (data valid).	Is set directly (or when "trigger delay" > 0 after elapse of trigger delay) to low by trigger event. Is only set back to high after completion of image recording, evaluation and elapse of „duration of result": i. e. the signal here only indicates that the sensor is ready for the next evaluation (Ready). The validity of the outputs OUT1/2/3 (DataValid) is however not derivable from this signal in this operation, as the outputs OUT 1/2/3 are also reset when OUT4 is reset, (high or low depending on the setting "Low active" or "High active"). Interrogation of the output level of the result outputs OUT 1/2/3 must occur in this special case at a time within the "duration of the result" but after elapse of the control system evaluation time.
Signal outputs OUT 1/2/3	Results remain unaltered after setting until the output of the next result after the next evaluation.	Results are reset after elapse of "duration of result". Depending on the setting "Low active" or "High active" (high or low).

Outputs active: HIGH or LOW = inversion of OUT1/2/3
HIGH = high active, i.e. when result IO output = high
LOW = low active, i.e. when result IO output = low

The LED displays on the user interface and on the device always switch in positive logic, i.e. they always light up when the output is active, independently of whether inversion is activated or not.

6 Communication via Ethernet or RS422

6.1 Data formats of commands and data output

Transmission protocol
Data transmission via RS422 is carried out with the following basic parameters:

Baud rate	between 9600 and 115200 baud depending on setting
Data bits	8
Parity	none
Stop bit	1

6.2 ASCII transmission

6.2.1 Commands to sensor in ASCII

Trigger (ASCII) Request string to Sensor		
Byte no.	ASCII contents	Significance
1	T	Trigger
2	R	
3	G	
Trigger (ASCII) Response string from sensor		
Byte no.	Contents	Significance
1	T	Trigger
2	R	
3	G	
4	P F	Pass Fail
Additional information		
Accepted in run mode:		Yes
Accepted in configuration mode:		Yes
Accepted when Ready Low:		No
Status of Ready signal during processing:		Low

Job change-over (ASCII) Request String to Sensor		
Byte no.	ASCII contents	Significance
1	C	Change Job
2	J	
3	B	
4	X	Job number
5	X	
6	X	
Job change-over (ASCII) Response String from Sensor		
Byte no.	ASCII contents	Significance
1	C	Change Job
2	J	
3	B	
4	P F	Pass Fail
5	T F	Triggered Free run
6	X	Job nummber
7	X	
8	X	
Additional information		
Accepted in run mode:		Yes
Accepted in configuration mode:		Yes
Accepted when Ready Low:		No
Status of Ready signal during processing:		Low

	Object up to firmware version 1.3.1.0 Solar	**here only RS422 is possible !**
	Object from firmware version 1.3.1.0 CodeReader	**Ethernet + RS422 possible, depending on setting of combobox „Protocol“**

6.2.2 Data output in ASCII

Dynamically composed from user settings in the software

Main string structure:
<START> (((<OPTIONAL FIELDS> <SEPARATOR> <PAYLOAD>))) <CHKSUM> <TRAILER>

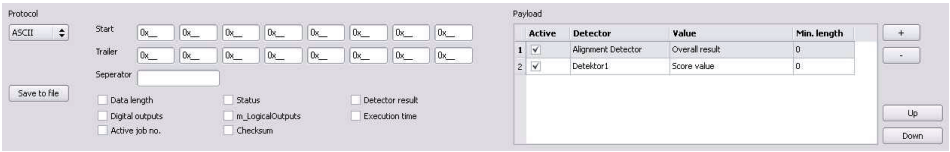


Fig. 29
155-01215

Further information can be found in the online help of the software.

6.3 Binary transmission

6.3.1 Commands to sensor in binary

Trigger (Binary) Request string to sensor			
Byte no.	Data type	Contents	Significance
1	Unsigned Int	0x00	Length of telegram
2		0x00	
3		0x00	
4		0x05	
5	Unsigned Char	0x01	Trigger command
Trigger (Binary) Answer string from sensor			
Byte no.	Data type	Contents	Significance
1	Unsined Int	0x00	Length of telegram
2		0x00	
3		0x00	
4		0x07	
5	Unsigned Char	0x01	Trigger command
6	Unsigned Short	0x00	Error code, 0 = Pass, 1 = Fail
7		0xXX	
Additional information			
Accepted in run mode:			Yes
Accepted in configuration mode:			Yes
Accepted when Ready Low:			No
Status of Ready signal during processing:			Low

Job change-over (Binary) Request string to sensor			
Byte no.	Data type	Contents	Significance
1	Unsigned Int	0x00	Length of telegram
2		0x00	
3		0x00	
4		0x06	
5	Unsigned Char	0x02	Job change-over command
6	Unsigned Char	0xXX	Job no, XX = 1- n
Job change-over (Binary) Answer string from sensor			
Byte no.	Data type	Contents	Significance
1	Unsigned Int	0x00	Length of telegram
2		0x00	
3		0x00	
4		0x09	
5	Unsigned Char	0x02	Job change-over command
6	Unsigned Short	0x00	Error code, 0 = Pass, 1 = Fail
7		0xXX	
8	Unsigned Char	0xXX	Trigger mode 0 = triggered1 = free run
9	Unsigned Char	0xXX	Job no, XX = 1- n
Additional information			
Accepted in run mode:			Yes
Accepted in configuration mode:			No
Accepted when Ready Low:			Yes
Status of Ready signal during processing:			Low

	**Object up to firmware version 1.3.1.0 Solar**	**here only Ethernet is possible !**
	Object from firmware version 1.3.1.0 CodeReader	**Ethernet + RS422 possible, depending on setting of combobox „Protocol“**

6.3.2 Data output in BINARY

Dynamically composed from user settings in the software

Main string structure:
<START> <OPTIONAL FIELDS> <PAYLOAD> <CHKSUM> <TRAILER>

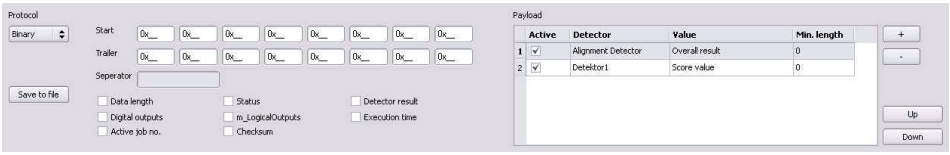


Fig. 30
155-01216

Further information can be found in the online help of the software.

Numeric data are transferred in „Big Endian“ format:

Example: „Score“ values (binary protocol)

In SensoConfig/SensoView „Score“ = 35 is displayed
Then the following 4 bytes for example are received via EtherNet.

000,000,139,115

Conversion formula:

(HiWordByte*256 + HiLoByte) *65536
+
HiByte*256 + LoByte
= Value

As big endian is sent (from sensor), the following should apply:

000 = HiWordByte
000 = HiLowByte
139 = HiByte
115 = LoByte

(0*256 + 0) *65536 = 0
+
139 * 256 = 35584
+
115
=
35699/1000 = 35,699 (real score value)

6.4 Ethernet / IP

See software SensoConfig (Onlinehelp)

7 Technical data

Electrical data	
Operating voltage U_B	24 V DC ± 10% (absolute maximum 18 - 30 V)
Residual ripple	< 5 Vss
Current consumption (no I/O	≤ 200 mA
Inputs IN1 / IN2	high 10 V .. +U_B (+10%), low 0 ... 3 V
Input resistance	> 20 kOhm
Trigger input	rising edge, 10 V ... U_B
Outputs OUT1 - 4	PNP (closer, pull up MOSFET)
Output current (per output)	200 mA (>> max. 9.6 W)
Maximum output current (per output)	1.5 A in case of short circuit
Short-circuit protection (all outputs)	yes
Protection against inverse connection	yes
Interfaces FA 46-300 Interfaces FA 46-301	Ethernet (LAN) RS422 Ethernet (LAN)
Protection class	⧈
Readiness delay	approx. 6 s after power on
Optical data	
Pixel number, technology	FA 46- 30X XCC .... 640 (H) x 480 (V), CCD
Integrated scan illumination	8 LEDs
Integrated lens, focal length	6 or 12 mm, adjustable focus
Lens (adjustable to infinity) Min. scan distance Min. field of view X x Y	6 12 20 20 mm 18 x 14 8 x 6 mm
Depth of focus	approx. ± 5% of scan distance
Mechanical data	
Length x width x height	65 x 45 x 45 mm (without plug)
Weight	approx. 160 g
Vibration / shock	EN 60947-5-2
Ambient operating temperature	0° C .... 50° C (80% humidity, non-condensing)
Storage temperature	-20° C ... 60° C (80% humidity, non-condensing)
Protective system	IP 65/67
Plug connection	plug M12, 8 poles, Ethernet M12, 4/8 poles, process M12, 5 poles
Housing materia	aluminium, plastic

Function and characteristic	
Object detection	
Number of test objects per sensor	FA 46 305: n, n; FA 46 301: 1, n
Evaluation modes	• position tracking • pattern match with/without position detection • area test grey level • area test contrast • direction info, or coordinates for position detection • position and size of field of view, pattern and position monitoring freely adjustable
Typical cycle time	typ. 50 - 100 ms pattern matching typ. 120 - 500 ms contour typ. 40 - 50 ms area tests
Codereader	
Number of test objects per sensor	up to 32 patterns with definable parameters for each
Evaluation modes	• DataMatrix Code acc. ECC200 in any rotational position, square and rectangular. • QR-Code, Model 1 and Model 2, Version 1 . . . 40 • Barcode Interleaved 2 of 5, Code 39, EAN13-Gruppe (EAN8, EAN13, UPC-A, UPC-E), EAN128 (Codes A, B, C) • position and size of field of view freely adjustable • logic operation of single configuration (AND, OR = sorting) • verify
Typical cycle time	80 ms one evaluation
Solar	
Number of test objects per sensor	FA 46 305: n, n;
Evaluation modes	• position tracking • **Wafer break detection, measuring and position detection** • **Output of all inspection parameters**
Typical cycle time	typ: 200-300 ms

8 Interfaces

In this tab you select and activate the digital inputs/outputs used and the interfaces for data output.

8.1 Interfaces available

Parameters	Functions and setting possibilities
Internal I/O	Assignment of the function of the programmable input IN2. See below for a detailed description.
RS 422 (baud rate)	RS422 for data output with choice of data transmission rate
Ext. (digital I/O)	External inputs and outputs (with I/O and encoder extension module)
Ethernet	Ethernet TCP/IP for data output
EtherNet/IP	Field bus EtherNet/IP for data output

8.2 Functions of the programmable, digital input IN2.

During operation with process control, the following cases can be carried out via the input IN2:

- IN2 inactive
- IN2 enable/disable
- IN2 load Job 1 or 2
- IN2 load Job 1 ... n
- IN2 teach temporarily
- IN2 teach permanently

8.3 Description of different cases with a signal diagram

8.3.1 IN2: „inactive“

This diagram describes the signal course when IN 2 is not used.
The signal course is completely independent of IN2. Each rising edge and IN1 = Trigger starts the sensor.

IN2: „Inactive“

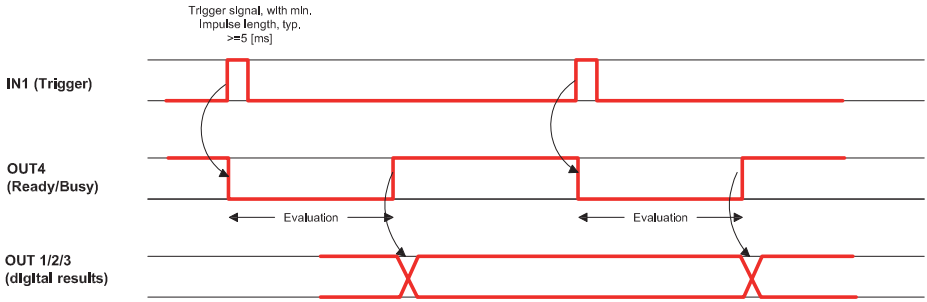


Fig. 31
155-01176

8.3.2 IN2: „enable trigger“ (IN2 = +U_B (24 V DC))

IN2 is programmed as enable/disable. For enable, +Ub (24V DC) must be present at IN2 to ensure that the sensor is started by a trigger.
Each rising edge and IN1 = Trigger starts the sensor.

IN2: „Enable Trigger“ (IN2 = +UB (+24V DC)

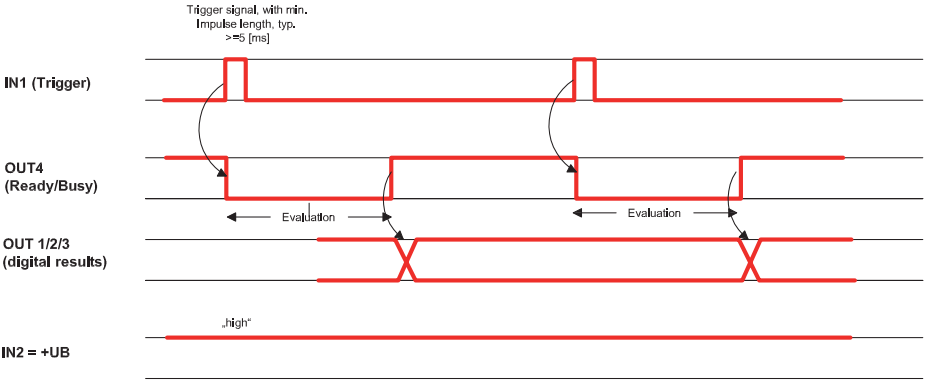


Fig. 32
155-01177

8.3.3 IN2: „disable trigger“ (IN2 = open (0V DV))

IN2 is programmed as enable/disable. For disable, +0 V DC must be present at IN2 to ensure that the sensor is not started by a trigger.
Trigger signals at IN1 are thus ignored.

IN2: „DIsable TrIgger“ (IN2 = open (0V DC)

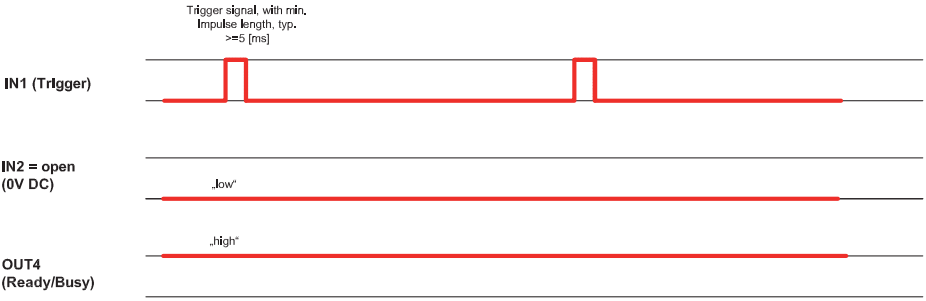


Fig. 33
155-01178

8.3.4 IN2: Job 1 or 2

IN2 programmed as level-dependent switching between job 1 and job 2. Only possible when OUT4 (Ready/Busy) = high. With the first edge on IN2, OUT4 (Ready/Busy) is set to low. OUT4 (Ready/Busy) remains low until switch-over to the new job occurs. A high level causes evaluation according to job 2, a low level produces evaluation according to job 1.

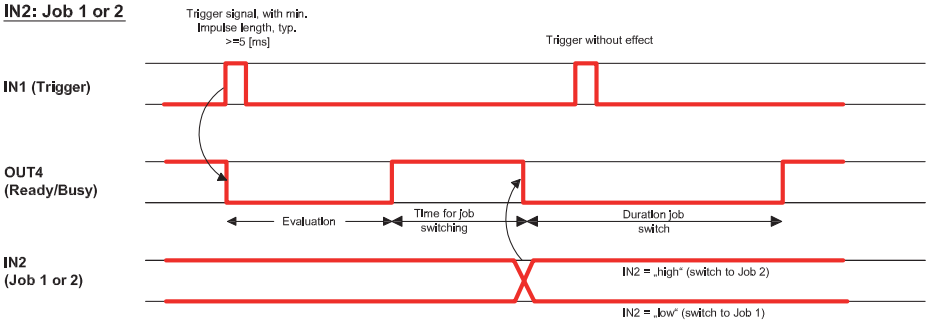


Fig. 34
155-01179

8.3.5 IN2: Job 1 ... n

IN2 for switching between jobs via impulses. Only possible when OUT4 (Ready/Busy) = high. With the first impulse at IN2, OUT4 (Ready/Busy) is set to low. Impulses are counted until the first pause of ≥ 50ms and it then switches to the appropriate job. OUT4 (Ready/Busy) remains low until switch-over to the new job occurs.

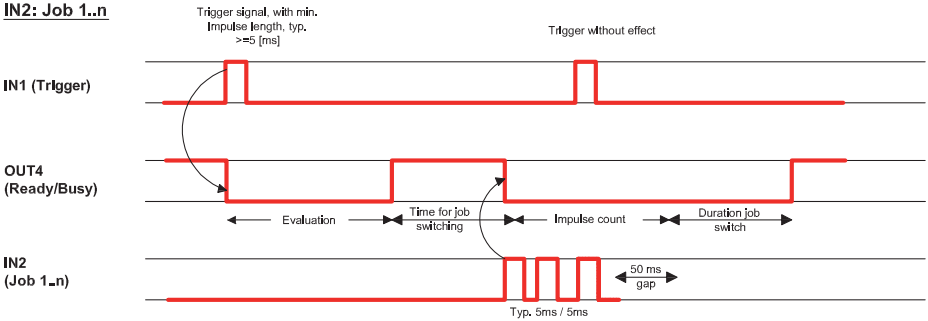


Fig. 35
155-01180

At Jobswitch please take care of the following:

- all Jobs must have the same setting for IN2
- all Jobs must be in triggered mode
- Ready signal must be High when trigger sequence starts

8.3.6 IN2: teach temp. / perm.

IN2 for re-teaching samples of all detectors and if necessary alignment tracking of the current job. Only possible when OUT4 (Ready/Busy) = high. A rising flank on IN2 initiates teaching, during which a high level must exist at IN2 at least until the next trigger (IN1), so that an image of an inspection part can be recorded in the correct position. OUT4 (Ready/Busy) is set to low and remains low until teaching has been completed. Storage is either temporary (only in RAM), or permanent (in flash) according to the setting. If more than the maximum timeout duration of 500 ms elapses between falling edge on signal at IN2 and trigger, the next trigger is considered as normal trigger and no teach procedure is performed.

IN2: teach temp./perm.

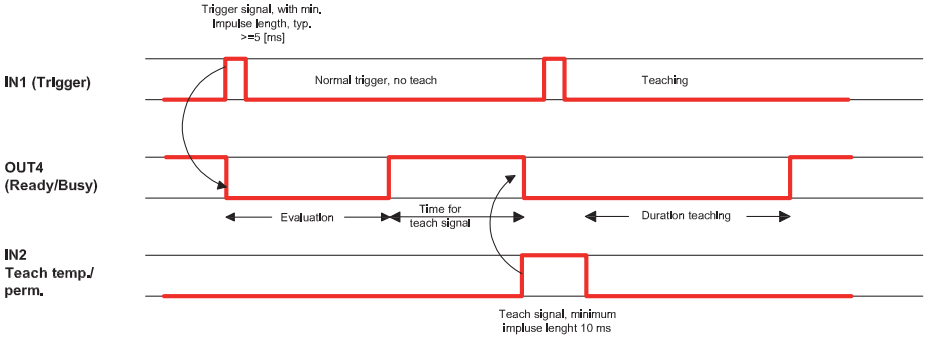


Fig. 36
155-01181

Attention!
The functions IN2: job 1 or 2, IN2: job 1 … n or IN2: teach temp./perm can only be expediently used in trigger mode.

8.4 Size of field of view/Operating distances

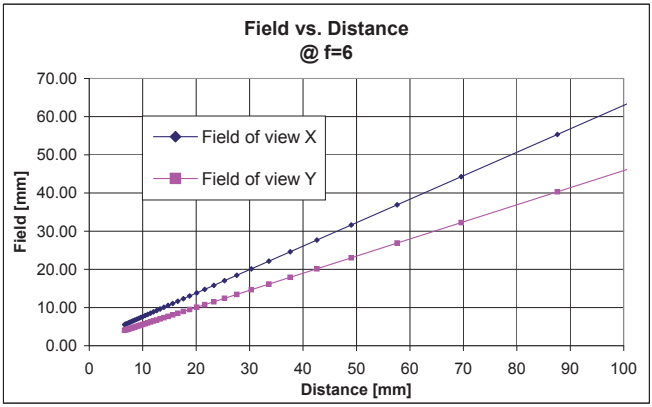


Fig. 37
155-01223

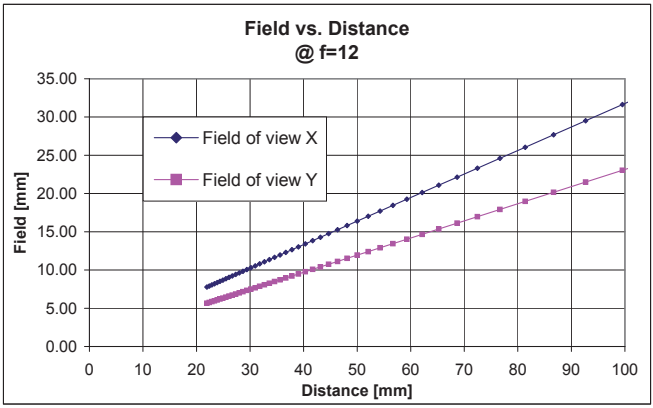


Fig. 38
155-01224

8.5 Plug connections

PIN assignment 24 V DC connection

PIN	Colour	Use
1	white	IN1 (external trigger)
2	brown	+UB (24 V DC)
3	green	OUT1 (digital output 1) LED display = Q1
4	yellow	OUT4 (Ready) 1
5	grey	IN2 (sensor switch-over)
6	pink	OUT3 (trigger external illumination)
7	blue	GND
8	red	OUT2 (digital output 2) LED display = Q2

Table 2

1 Ready:
shows whether sensor is busy, or data valid for OUT1/2/3

PIN assignment LAN connection

(M12) 4-pin	Colour	PIN(RJ45)	Patch	PIN(RJ45)	Cross-over
1	yellow	1	TxD+	3	RxD+
2	white	3	RxD+	1	TxD+
3	orange	2	TxD-	6	RxD-
4	blue	6	RxD-	2	TxD-

Table 3

301 305

Codereader

Only for FA 46-305 and FA 46-301 CR
PIN assignment DATA (RS422)

PIN	Colour	Use
1	white	RxD+
2	brown	RxD-
3	green	TxD+
4	yellow	TxD-
5	grey	GND

Table 4

8.6 Care and maintenance

8.6.1 Cleaning

The FA 46 Vision Sensor is to be cleaned with a clean, dry cloth.
Dirt on the front panel is to be cleaned with a soft cloth and a small amount of plastic cleaner if necessary.

Attention
Never use aggressive detergents such as solvents or benzine.
Never use sharp objects. Do not scratch!

8.6.2 Transport, packaging, storage

Always check the delivery contents immediately after receipt to ensure they are complete and that they have not been damaged during transport. In the event of transport damage, the carrier must be informed. When returning the sensor, always ensure that it is sent in sufficiently protective packaging.

Information
Complaints must be made as soon as a defect is detected. Claims can only be lodged within the applicable time limits.

8.6.3 Waste disposal

Electronic components are subject to special waste regulations and may only be disposed of by specialist waste disposal firms.

8.7 RESET / Power On

Remove plug connection/ switch power supply off and on again

8.8 Sensor Firmware Update FA 46

Firmware update is to be carried out as follows:

Start SensoFind, select the sensor you wish to update from the list and select “Update” under Menu/File.
For update, you require an MSF file which matches your sensor type and contains the latest software version for the sensor. The MSF file for the respective latest sensor version can be found on http://www.sensopart.com/. If in doubt, contact the SensoPart support team under tel.: +49 (0)7665 94769-750 / support@sensopart.com. Please ensure you have the correct file before beginning the update.
Check that no other programmes have access to the sensor before beginning update, then follow the instructions of the update routine.

Warning
Close all programmes that communicate with the sensor before update. Active communication with the sensor during update can delete the firmware and render it necessary to return the sensor to the manufacturer! Save configurations before update. They can then be reloaded later.

Once update has been completed, you will be requested to restart the sensor and SensoFind.
After restart, you will see that the sensor is listed with a new version number in the sensor list.

8.9 FAQs

How can I change the IP address set for the sensor?

Follow the steps described under “Network settings” and “Setting the FA 46 Vision Sensor’s IP address” in chapter 3.3.

How can I just test connection to the FA 46 Vision Sensor?

Go into the start menu of the operating system, open “Execute” and enter the command “cmd”. A window then opens, in which you should enter the command “ping”, followed by the set IP address:
For example: ping 192.168.100.100
If all connections are correctly connected, the sensor and PC address space is identical and the FA 46 Vision Sensor is ready, the ping command receives a positive reply. If this does not occur, check your network configuration and consult your network administrator.

How can I avoid reflections (recognisable as light image zones)?

Install the FA 46 Vision Sensor at an angle to the optical axis and set the shutter manually. Improve illumination of the object and avoid fluctuations in brightness, e.g. through ambient light.

I obtain grey value dispersions on the same object. The grey values at the edge of the illuminated zone vary in appearance from image to image.

What can I do?

Set “Shutter einl./manuell“ in the field “parameters of active configuration” to manual and then adjust the slide bar so that no fluctuations in brightness occur. A higher shutter value generally results in a slight overexposure but provides a more constant result.

Reflections occur though a minimal change in alignment or position, e.g. an inscription sometimes appears lighter, sometimes darker.

How can I obtain a constant image scene?

Install the FA 46 Vision Sensor at an angle of approx. 10° - 15° or select another position of the pattern frame where reflections will not affect pattern detection.

8.10 Accessories

Description	Order type	Part no.
Dove tail mounting clamp FA 45	MK 45	543-11000
Mounting bracket FA 45	MA 45	543-11001
Mounting bracket FA 45 long	MA 45 L	543-11013
Rod mounting block FA 45	MB 45	543-11002
Mounting rod 20 cm FA 45	MST 45-20	543-11005
Mounting rod 30 cm FA 45	MST 45-30	543-11006
Mounting rod 40 cm FA 45	MST 45-40	543-11007
Mounting hinge FA 45	MG 45	543-11008
Mounting plate FA 45	MP 45	543-11003
Mounting link FA 45	MZ 45	543-11004
Connection cable, 2 m, straight connector, shielded	C L8FSK-2m-G-PUR	902-51708
Connection cable, 5 m, straight connector, shielded	C L8FSK-5m-G-PUR	902-51709
Connection cable, 10 m, straight connector, shielded	C L8FSK-10m-G-PUR	902-51710
Connection cable, 2 m, 90° connector, shielded	C L8FSK-2m-W-PUR	902-51711
Connection cable, 5 m, 90° connector, shielded	C L8FSK-5m-W-PUR	902-51712
Connection cable, 10 m, 90° connector, shielded	C L8FSK-10m-W-PUR	902-51713
Ethernet cable, 3 m, M12, 8 pin / RJ45, shielded, patch	CI L8FSK/RJ45S-3m-GG-PVC	902-51715
Ethernet cable, 3 m, M12, 8 pin / RJ45, shielded, cross-over	CI L8FSK/RJ45S-3m-GG-PVC-G	902-51736
Ethernet cable, 3 m, M12, straight connector, 4-pin, D coded/RJ45, shielded (patch)	CI L4MGK/RJ45G-S-3m-PUR	902-51761
Ethernet cable, 3 m, M12, straight connector, 4-pin, D coded/RJ45, shielded (cross-over)	CI L4MGK/RJ45G-GS-3m-PUR	902-51762
Ethernet cable, 5 m, M12, straight connector, 4-pin, D coded/RJ45, shielded (patch)	CI L4MGK/RJ45G-S-5m-PUR	902-51763
Ethernet cable, 5 m, M12, straight connector, 4-pin, D coded/RJ45, shielded (cross-over)	CI L4MGK/RJ45G-GS-5m-PUR	902-51764
Ethernet cable, 10 m, M12, straight connector, 4-pin, D-coded/ RJ45, shielded (patch)	CI L4MGK/RJ45G-S-10m-PUR	902-51765
Ethernet cable, 10 m, M12, straight connector, 4-pin, D-coded / RJ45, shielded (cross-over)	CI L4MGK/RJ45G-GS-10m-PUR	902-51766

Description	Order type	Part no.
Ethernet adapter cable, 0.2m, M12, 8 pin, male/M12, 4-pin, male	CI L8MGK/L4MGK-S-0,2m-PUR	902-51773
Ethernet connector RJ45, shielded	AA-RJ45	902-51694
Ethernet cross-over cable, 1 m, RJ45, shielded	CI RJ45S 1m K	902-51695
Interface cable, 3 m, straight connector	CI L5FK-3m-G-PUR	902-51696
Interface cable, x m, straight connector (max. 25 m)	CI L5FK-xm-G-PUR	902-51697
Interface cable, 3 m, angled connector	CI L5FK-3m-W-PUR	902-51698
Interface cable, x m, angled connector (max. 25 m)	CI L5FK-xm-W-PUR	902-51699
Converter RS232 - RS 485/422	K2-ADE-TB	533-11017
Interface cable incl. CD Rom 2m - USB-RS 232	CUSB-RS232-2m	901-05097
C mount lens 8 mm	LO C 8	526-51513
C mount lens 12 mm	LO C 12	526-51514
C mount lens 16 mm	LO C 16	526-51515
C mount lens 25 mm	LO C 25	526-51516
C mount lens 50 mm	LO C 50	526-51518
Intermediate ring 1.6 mm	LR 1,6	543-11009
Intermediate ring 6.6 mm	LR 6,6	543-11010
C-Mount outer casing, flange 6.6 mm [1]	LPT 45 CM 6,6	527-51130
Surface light FA 45 white	LF 45 W	525-51136
Surface light FA 45 IR [2]	LF 45 IR	525-51137
Surface light FA 45 red	LF 45 R	525-51144
Ring light white, two rows	LFR 45 WD	525-51139
Ring light IR, two rows [2]	LFR 45 ID	525-51141
Ring light red, two rows	LFR 45 RD	525-51143
I) Lighting D16x200/D60 X=350	LZS 08230-50	525-51122
I) Lighting D16x360/D60 X=580	LZS 13230-50	525-51123
I) Lighting D26x420/D70 X=940	LZS 18230-67	525-51126
II) Lighting D26x420/45x108 X=635[3]	LZS 18024-54	525-51124
II) Lighting D26x420/45x108 X=635[3]	LZS 18230-54	525-51125
II) Lighting D26x1000/45x108 X=1245[3]	LZS 36024-54	525-51127
Lighting cable 2 x M12/8 pin., 0.5 m, straight connector, shielded	CB L8FSK/L8FSK- 0,5m-GG-PUR	902-51717
Lighting cable 2 x M12/8 pin., 2 m, straight connector, shielded	CB L8FSK/L8FSK- 2m-GG-PUR	902-51719
Lighting cable 2 x M12/8 pin., 0.5 m, angled connector, shielded	CB L8FSK/L8FSK-0,5m-WW-PUR	902-51718
Anybus Communicator [4]	Profibus Plugadapter	902-51735
IO-Box FA 45	T-AS7T-12ET34RPD	533-01008

All cables are available from the sensor manufacturer

[1] Maximum lens length = 42 mm, maximum lens diameter = 39 mm

[2] IR lighting is only possible with C mount sensors

[3] Mounting rail included in delivery

[4] Functions only with interface cable (CI L5FK-xm-x-PUR)

8.10.1 IO-Box FA 45

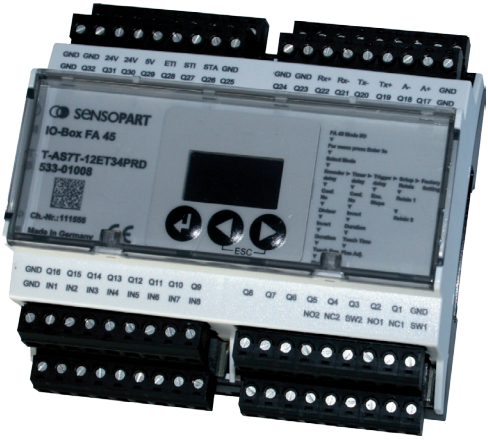


Fig. 39
155-01091

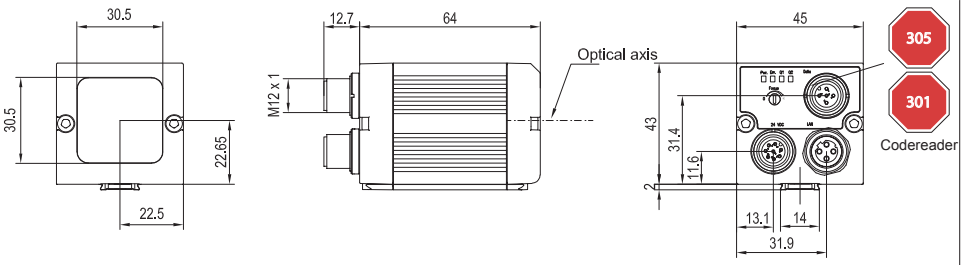
The IO-Box converts serial data from the sensor's RS422 interface to up to 32 discrete signal outputs, whereby an output of individual results is possible without complex PLC programming.
Reversely, data can be transferred to the sensor via 8 inputs, for example to switch over the parameter set for a change in product. Ejector control can be carried out on the basis of encoder steps, independent of belt speed, via an additional encoder input. The IO-Box can be used with all versions of the FA 46 Vision Sensor which are equipped with a RS422 interface. The module is easily configured via three operating keys and a display.

The IO-Box is activated in the selection menu "Ext. I/O", by selecting "8 in 32 out".
The baud rate is set automatically with this setting.

8.11 Scale drawings

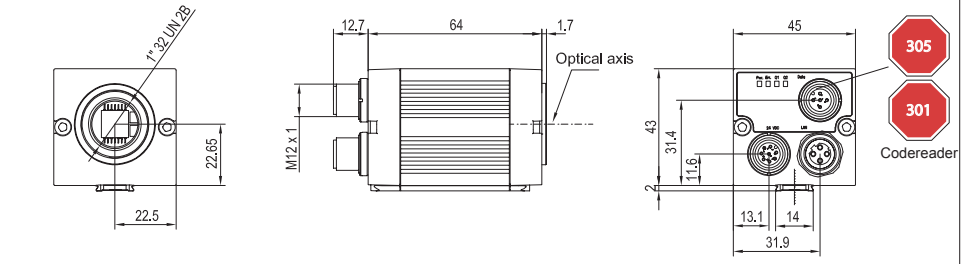
Vision Sensor FA 46-305-x xxx-xx O...

153-00846



Vision Sensor C-Mount FA 46-305-x xxx-xx OCS...

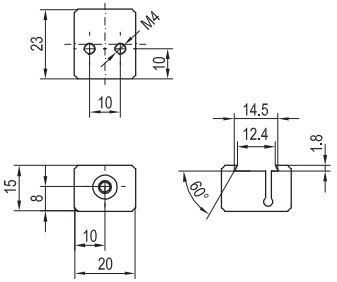
153-00847



Mounting clamp MK 45

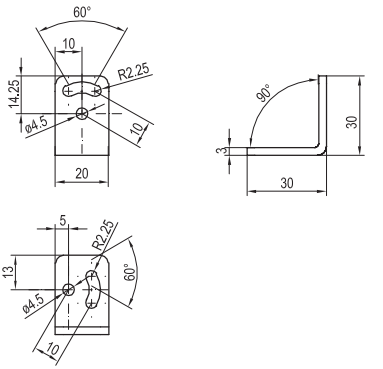
153-00480

(supplied with sensor)



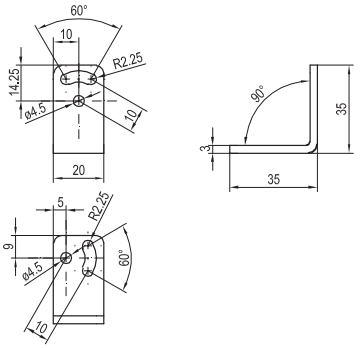
Mounting bracket MA 45

153-00482



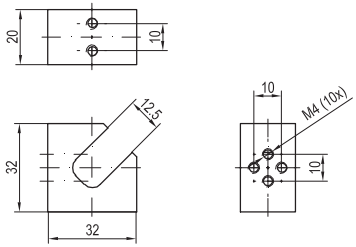
Mounting brackel MA 45 L

153-00600



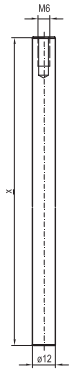
Mounting block MB 45

153-00481



Mounting rod MST 45-x

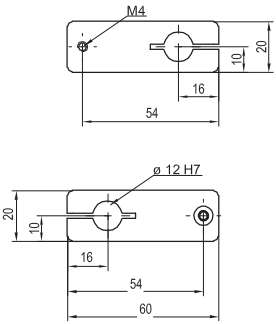
153-00545



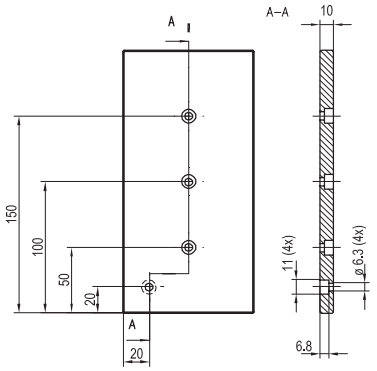
x = 200	MST 45-20
x = 300	MST 45-30
x = 400	MST 45-40

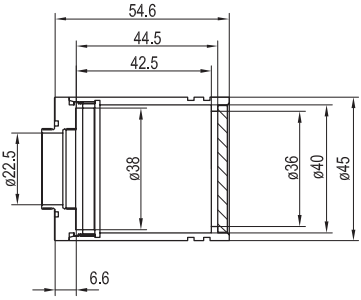
Mounting link MZ 45

153-00546



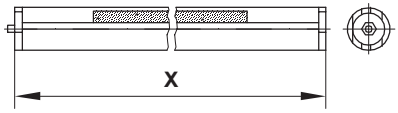
Mounting plate MP 45	C-Mount protective case LPT 45 CM 6,6
153-00547	*153-00588*



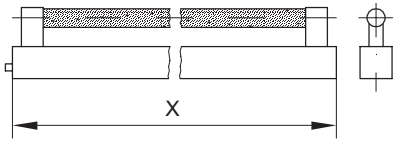


I) Illumination LZS

153-00202/153-00203

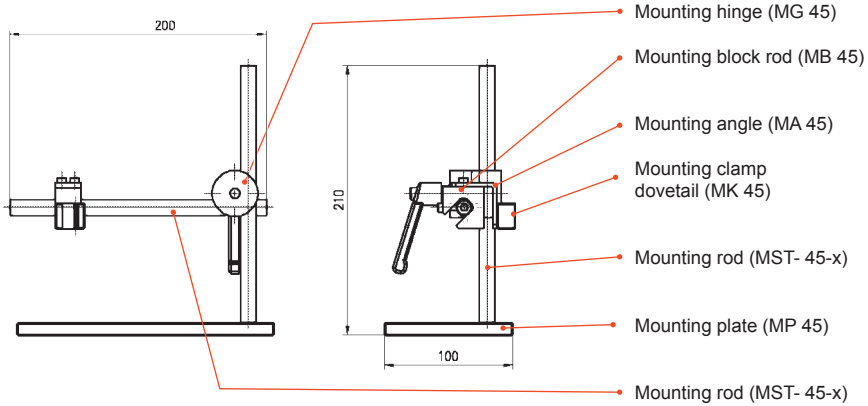


II) Illumination LZS

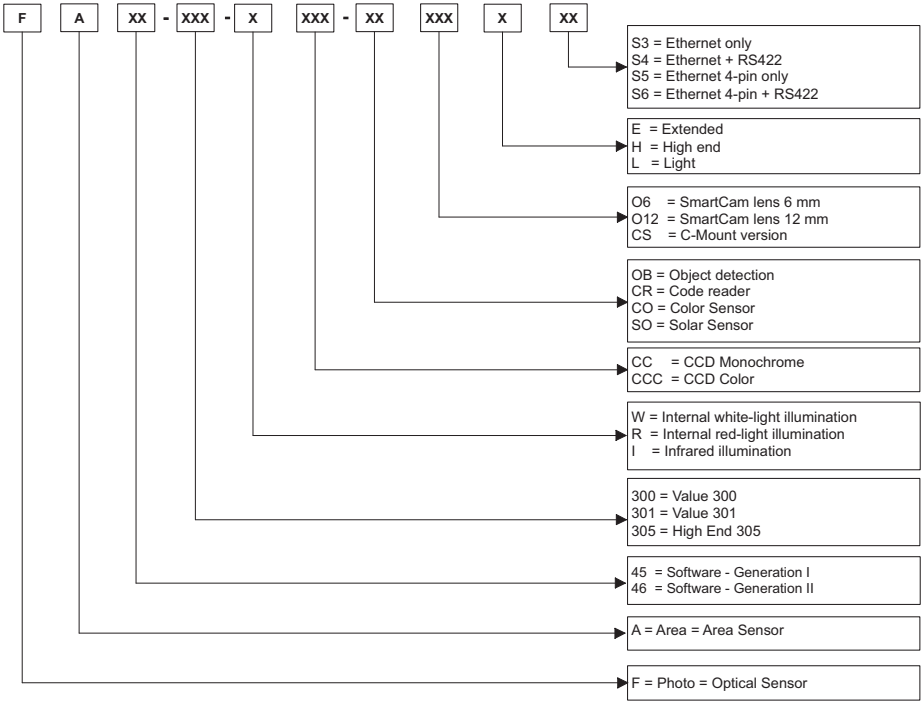


Example of a retaining device (for individual parts see chapter 8.10)

153-00435



8.12 Type key FA 46 Vision Sensor



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