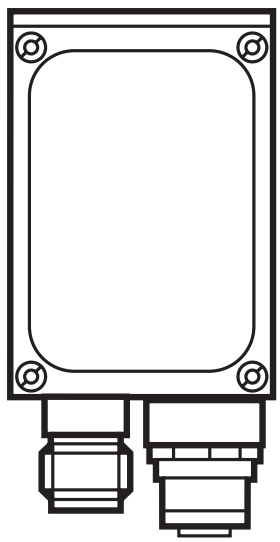
ifm electronic

Installation Guide

efector250®

UK

O2Vxxx



706371 / 01 10 / 2015

Contents

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1 Preliminary note

This document serves for the fast set-up of an O2Vxxx object inspection sensor from the company ifm syntron gmbh.

1.1 Symbols used

► Instructions
> Reaction, result
[…] Designation of keys, buttons or indications
→ Cross-reference

Important note
Non-compliance can result in malfunction or interference.

Information
Supplementary note

1.2 Warning signs used

⚠ WARNING
Warning of serious personal injury.
Death or serious irreversible injuries may result.

⚠ CAUTION
Warning of personal injury.
Slight reversible injuries may result.

NOTE
Warning of damage to property.

2 Safety instructions

Please read the operating instructions "Object inspection sensor O2V" and the programming manual "PC operating program for O2V" prior to set-up of the unit.

www.ifm.com → Data sheet search → e.g. O2V100 → Operating instructions

Ensure that the unit is suitable for your application without any restrictions.

Observe these operating instructions.

Non-observance of the instructions, operation which is not in accordance with use as prescribed below, wrong installation or incorrect handling can affect the safety of operators and machinery.

The installation and connection must comply with the applicable national and international standards. Responsibility lies with the person installing the device.

Only the signals indicated in the technical data or on the device label may be supplied to the connections or wires.

3 System requirements

3.1 PC hardware

– PC with Pentium III processor or higher, clock frequency min. 500 MHz
– min. 128 MB RAM
– min. 35 MB freely available hard disc memory
– CD-ROM drive
– XGA compatible graphic card with min. 1024 x 768 pixel resolution
– Ethernet network card for 10Base-T/100Base-TX, TCP/IP protocol

3.2 PC software

– Operating system Microsoft Windows 2000, XP, Vista or Windows 7.

4 Items supplied

1 O2Vxxx object inspection sensor, screw driver to adjust the focus, operating instructions ident no.: 706239.
The device is supplied without installation/connection accessories and software.

5 Accessories

5.1 Required accessories

– Crossover cable for parameter setting connection (Ethernet), M12 connector/ RJ45 connector, 4 poles, 2 m, e.g. E11898.
– Connection cable for supply voltage and process connection, M12 socket, 8 poles, 2 m, e.g. E11231.
– Operating software E3V200

5.2 Optional accessories

– Adjustable mounting systems
– Illumination unit
– Protective pane
– Diffuser

www.ifm.com → New search → e.g. O2V100 → Accessories

6 Electrical connection

NOTE

The unit must be connected by a qualified electrician.

► Disconnect power before connecting the unit.

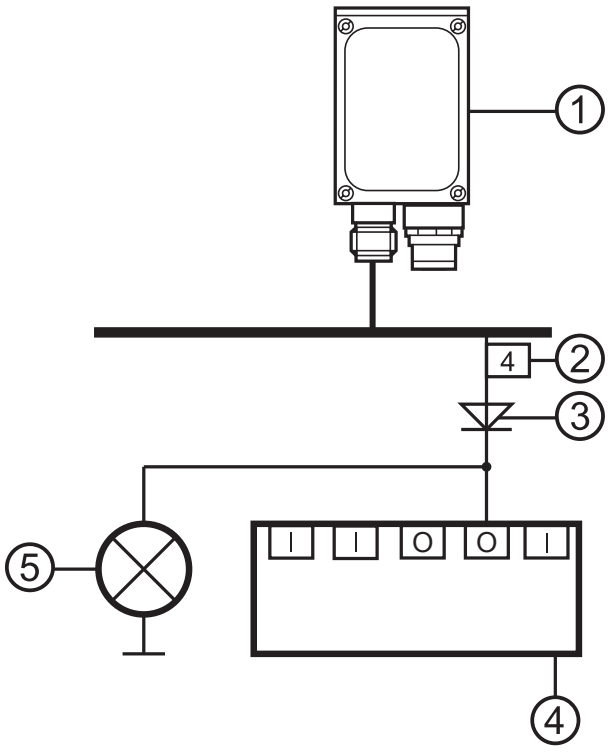
NOTE

The voltage on pins 2, 4, 5, 6, 7 and 8 must not exceed the supply voltage on pin 1 (U+).

► Use the same power supply and protective equipment for

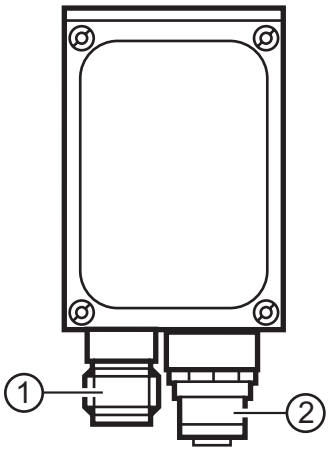
- the device (e.g. O2Dxxx),
- the signal generator at the inputs (e.g. trigger switch, plc),
- the signal pick-up at the outputs (e.g. plc).

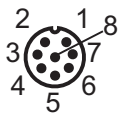
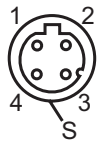
As an alternative, a diode at the switching outputs can prevent feedback (see fig. below).



1 unit
2 switching output
3 diode
4 plc
5 common load

- Connect the unit, parameter/process interface via the crossover cable with the Ethernet interface of the PC.
- Supply the unit, process interface via the M12 socket.



Process interface (1)	
M12 plug, A-coded, 8 poles (view on the unit)	
	1 U+ 2 Trigger input 3 0V 4 Switching output 5 / trigger output 5 Switching output 3 (ready) 6 Switching output 4 (OUT) 7 Switching output 1 / input 1 8 Switching output 2 / input 2
Parameter/process interface (2)	
M12 socket, D-coded, 4 poles (view on the unit)	
	1 Ethernet TD + 2 Ethernet RD + 3 Ethernet TD - 4 Ethernet RD - S Screen

For information about available sockets/connectors see:
www.ifm.com → Product line → Connection technology

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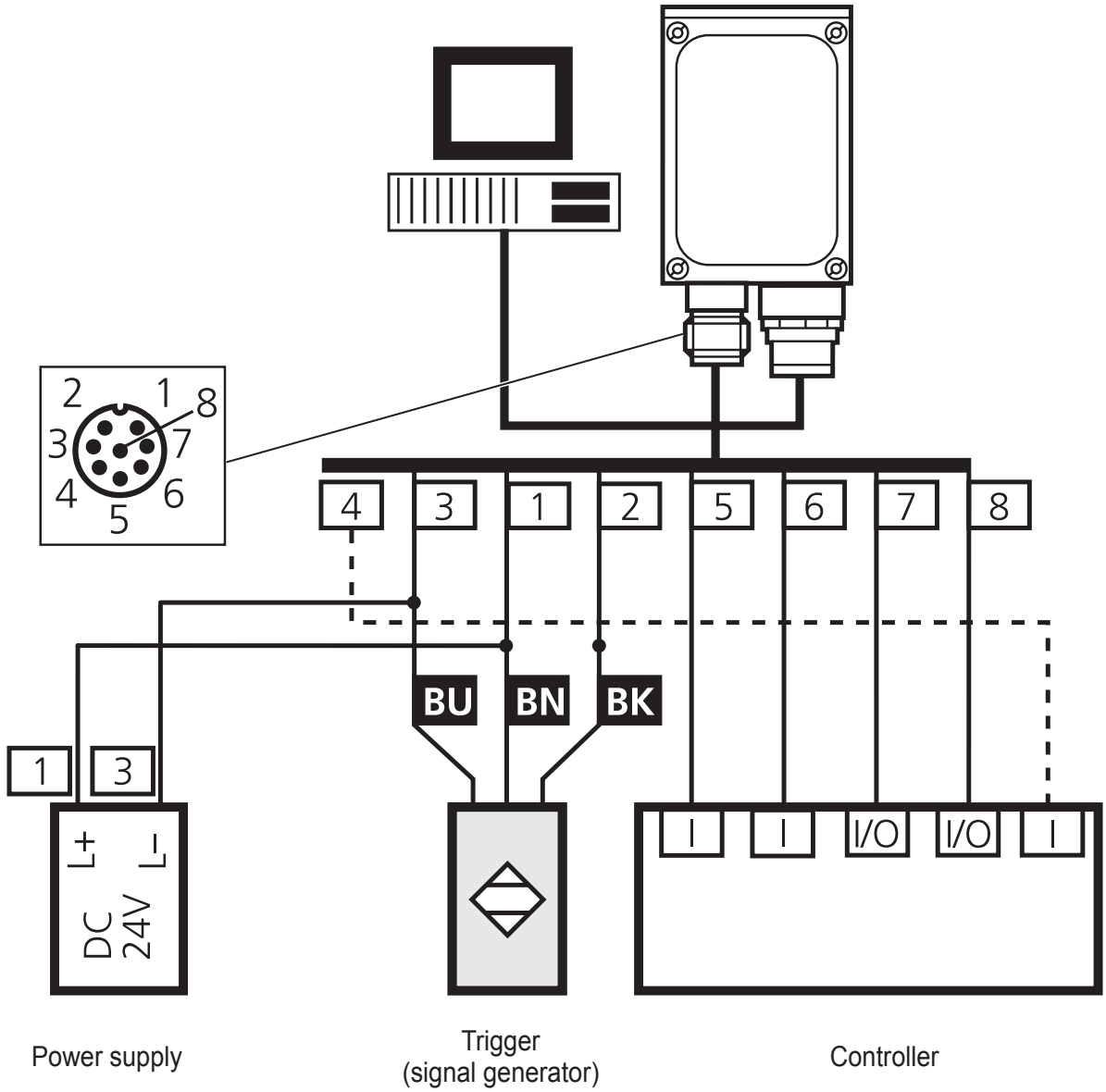
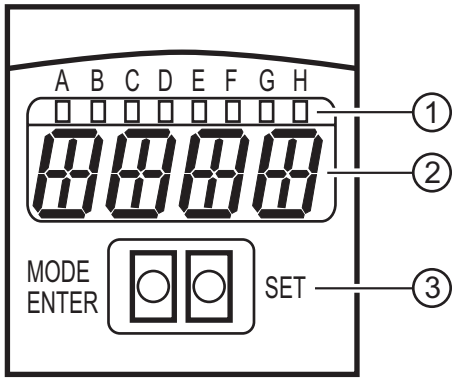
6.1 Example connection of an external trigger circuit



7 Operating and display elements

7.1 View of the unit



1. LEDs (function display)
2. Display (operation indication/dialogue/ parameters)
3. Pushbuttons (parameter setting)

7.2 LEDs

LED	Name	Colour	Status	Meaning
A	Power	Green	On	Supply voltage applied Device ready for operation
			Flashing (2 Hz)	No configuration saved in the device (factory setting)
			Flashing (20 Hz)	Device fault
B	Eth	Green	On	Ethernet connection exists
			Flashing	Ethernet signal
C	Con	Green	On	Connected with PC operating program
D	IO	–	–	Not used
E	1	Yellow	On	Switching output 1 switched
			Flashing (20 Hz)	Short circuit switching output 1
F	2	Yellow	On	Switching output 2 switched
			Flashing (20 Hz)	Short circuit switching output 2
G	3	Yellow	On	Switching output 3 switched
			Flashing (20 Hz)	Short circuit switching output 3
H	4	Yellow	On	Switching output 4 switched
			Flashing (20 Hz)	Short circuit switching output 4

7.3 Pushbuttons

Button	Function
MODE/ENTER	Changing to the parameter setting mode Selecting the parameters Confirming the parameter values
SET	Selecting the subparameters Setting/changing/selecting the parameter values - incremental by pressing briefly - scrolling by holding pressed

7.4 Display

7.4.1 Operating indicators

Display	Meaning
V[xxx]	Version number of the IO controller software (1st indication after power on, e.g. v0006)
Init	Device initialisation (2nd indication after power on)

Display	Meaning
nnnn	Firmware version (3rd indication after power on, e.g. 5036).
rEdY	Device ready for trigger (4th indication after power-on if an application is active with external triggering. Device waiting for triggering.)
WAIT	No active/valid application available Unit is busy (4th indication after power-on if no configuration is active or valid = on delivery)
nr[xx]	Application successful (number of the application)
run	Device waiting for connection, no active application (factory setting)
LOAd	Loading a new application
donE	Loading a new application completed
rEbO	Unit reboots
uLoc	Pushbuttons unlocked
Lock	Pushbuttons locked Parameter values cannot be displayed and changed
Lok1	Pushbuttons locked
Lok2	Changing parameters locked
FWUP	Firmware update running

7.4.2 Connection via the operating program

Display	Meaning
OnLI	Connection with the operating program
Parm	Parameter setting via operating program
Moni	Monitor mode
SerP	Connection with the operating program, service report mode

7.4.3 Error messages

Display	Meaning
FAIL	Application not successful
ErrP	Selection of a non-existing application via switching inputs
ErrD	Critical hardware error
SC	Short circuit of a switching output
DHCP noIP	No DHCP server found. Both character strings are displayed alternately.

8 Software

The E2V100 program can be ordered as CD or downloaded at:
www.ifm.com → Service → Download → Industrial imaging → O2V1xx operating software. Note the hints in the download area concerning the current versions.

Administrator rights may be required for the installation of the software. Contact your administrator or responsible IT staff.

The PC operating program can be started directly from the CD or can be installed on the PC.

8.1 Install the program

► Insert the CD in the drive.

> The start menu opens.

► Select the menu item "Install efector dualis".

> Observe the notes of the installation routine.

> The program is installed.

If the autostart function for CD/DVD drives is deactivated and the start menu does not open automatically:

> Start the "E2V100.exe" file in the main directory of the CD with a double click.

> The start menu opens.

► Select the menu item "Install efector dualis".

> Observe the notes of the installation routine.

> The program is installed.

8.2 Connection setting

The IP address range of the device and the PC have to match.

8.2.1 Network setting

	IP address range (network)	Factory setting (host)
O2V1xx object inspection sensor	192.168.0	59
	=	≠
PC	192.168.0	xx

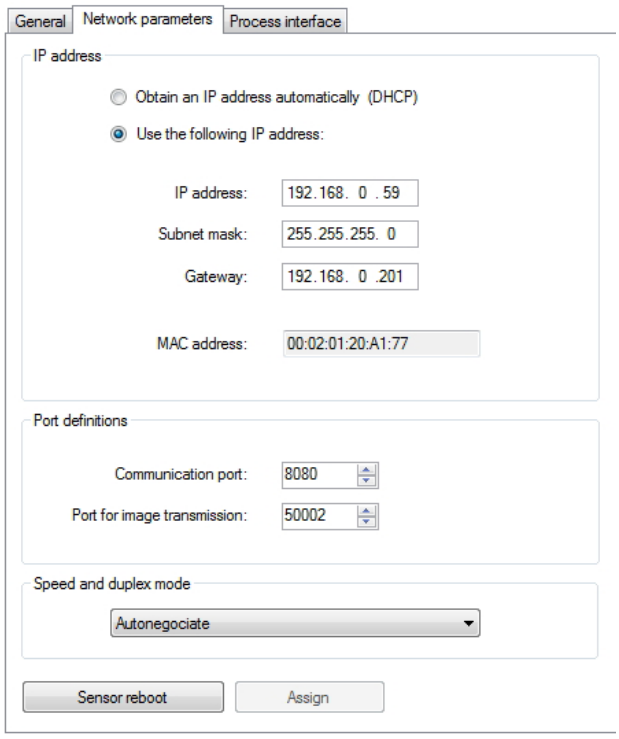
Example:

IP setting multicode reader: 192.168.0.59

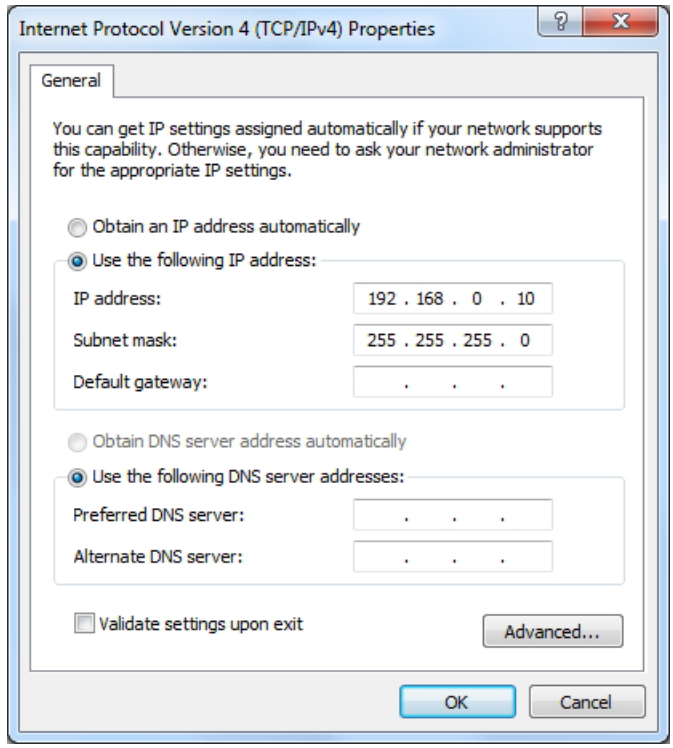
IP setting PC: 192.168.0. 2

8.3 Factory setting O2Vxxx object inspection sensor

O2Vxxx object inspection sensor parameters	Description	Factory setting
DHCP	Dynamic Host Configuration Protocol	Off
IP	IP address	192.168.0.59
nETm	Subnet mask	255.255.255.0
GWIP	Gateway address	192.168.0.201



O2Vxxx



PC

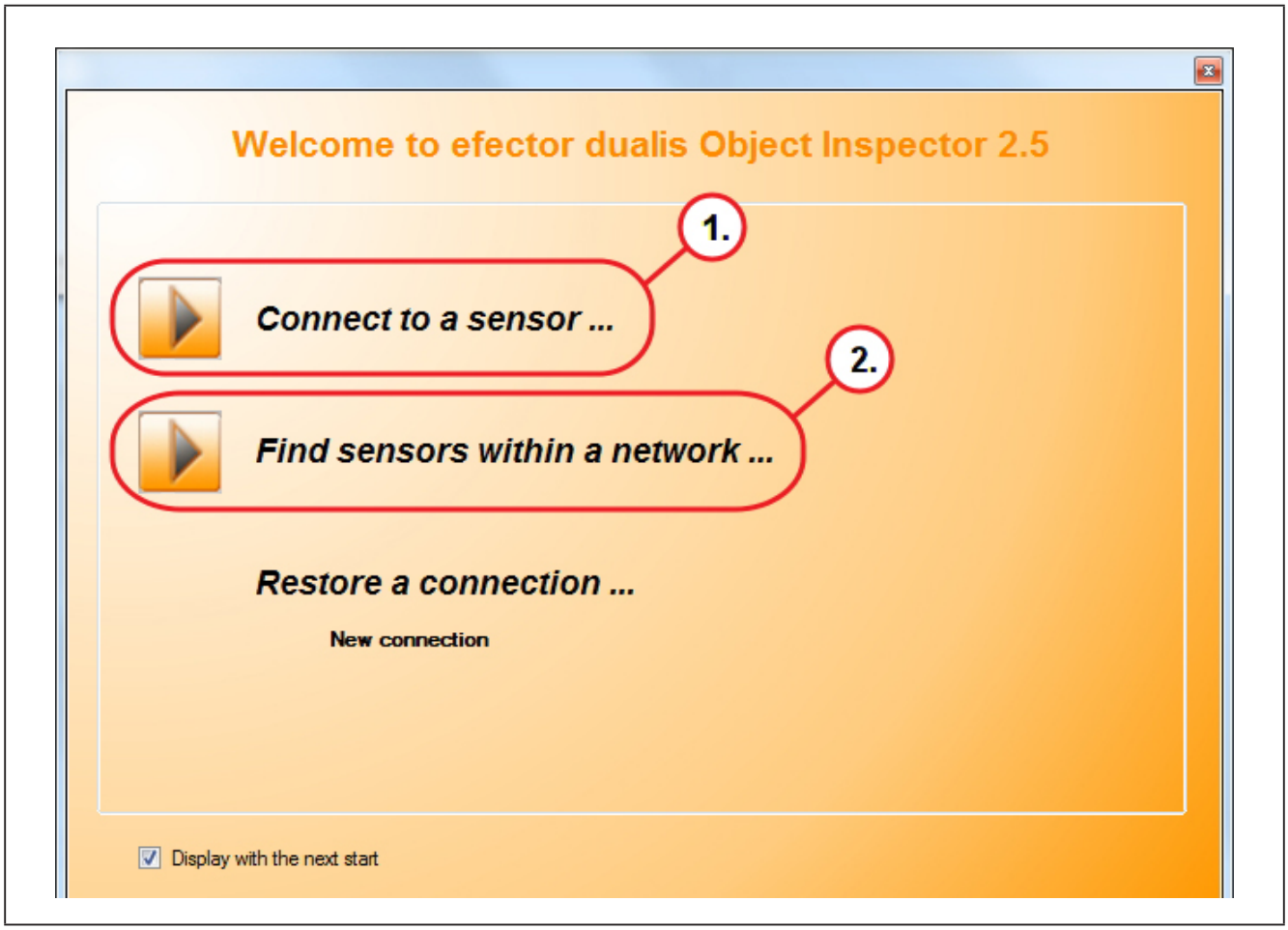
If a firewall is active on the PC, ensure that this port and the port number 50002 have been enabled for image transmission.

9 Program start

► Establish the connection sensor / PC operating program.

► Start the PC operating program.

> The splash screen displays the program designation and the article number for approx. 2 seconds and changes to the welcome screen.



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Option 1:

► Click on [Connect to a sensor ...] (1.).

> User interface changes to the connection options, to the tab "Connection to sensors":

Option 2.

► Click on [Find sensors within a network...] (2).

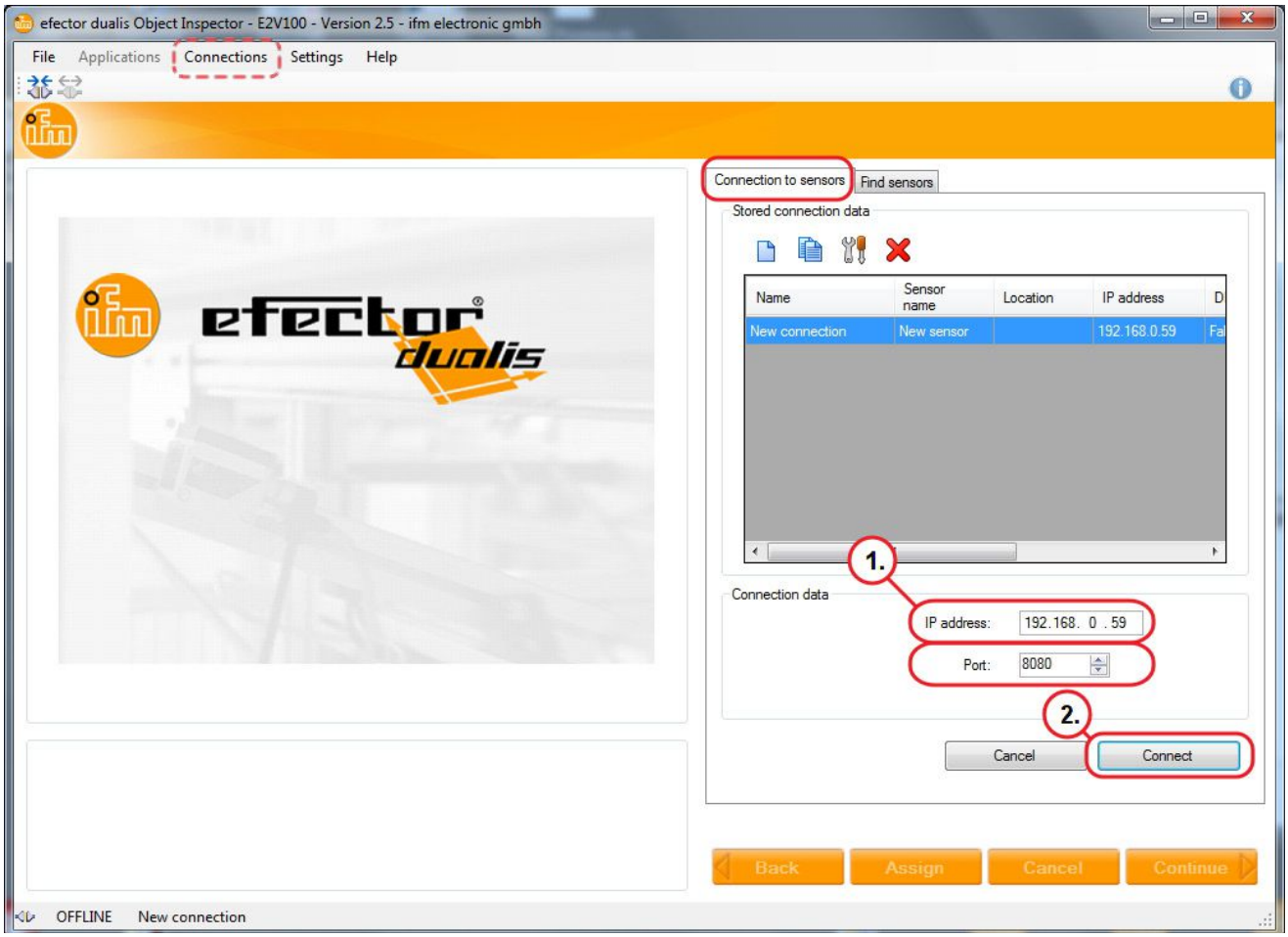
> User interface changes to the connection options, to the tab "Find sensors".

After selection of [Connect to a sensor...] the display changes to the tab "Connection to sensors".

9.1 Connection setting

If the network settings of the sensor are known, the connection can be established by entering the IP address and the port number.

> Tab "Connection to sensors" is displayed.



► Enter [IP address] (1.) 192.168.0.59.

► Apply preset port number 8080.

► Click on [Connect] (2.).

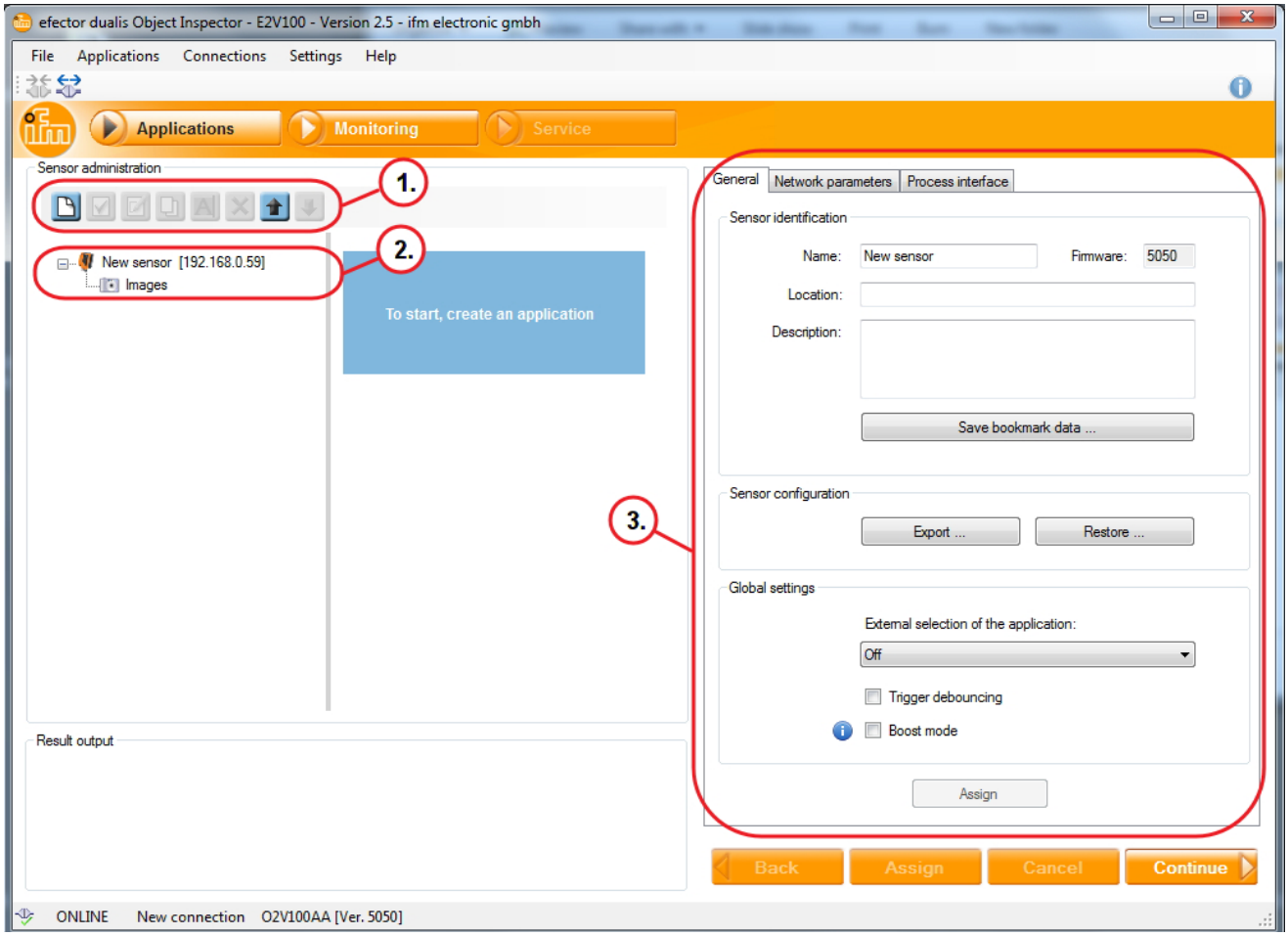
> Change of status: OFFLINE → ONLINE

– No active application saved in the device:
The operating program changes to the application mode.

– Active application file saved on the device:
The operating program changes to the monitor mode. After a trigger pulse the screen displays the current capture of the device.

The tab "Connection to sensors" can be requested in the operating program via the menu bar → Connections → Sensors ...

9.2 Basics on the user interface



Pos.	Operating element	Function
1.	Administer applications	• New, create, edit, rename, delete, etc.
2.	Application directory	• Overview, structure and selection of the application.
3.	General administration	• Application-specific information can be entered: device name and location • Firmware version of the device is displayed
	Network parameters	Possible basic settings of the performance and network parameters of the device: – DHCP (on/off) – IP address, subnet mask, gateway – Port – Speed and duplex mode
	Process interface	Configuration of the process interface: – TCP/IP, Ethernet IP – Protocol version – Configuration parameters TCP/IP, Ethernet IP

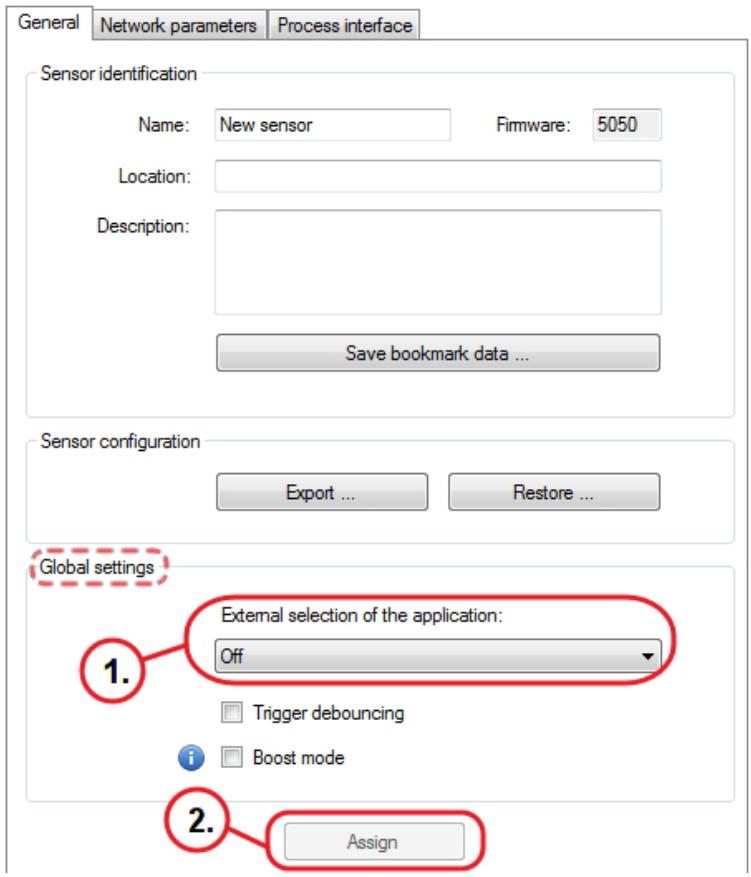
9.3 Global settings

If an external selection of the application is requested, it has to be created from the user menu.

► Select the tab "General".

► Select the requested function under "Global settings" in the pull down menu [External selection of the application] (1.).

► Click on [Assign] (2.) to assign the change.



> If a function was activated under [External selection of the application], it is possible to select a saved application by changing the level at pin 7 or 8 or the trigger input of the process interface. (→ 6)

More detailed information about the external selection of the application is given in the operating instructions of the sensor: www.ifm.com → New search → e.g. O2V100 → Operating instructions.

9.4 Create an application

A new test program is configured in the operating mode "Applications". The device can save up to 32 test programs (applications).

An application contains all application-relevant parameters allowing the device to execute the read/verification mode independently.

The following settings and indications are polled and defined step by step:

1. Image quality
2. Create models
3. Segmentation
4. Model definition
5. IO configuration
6. Function test

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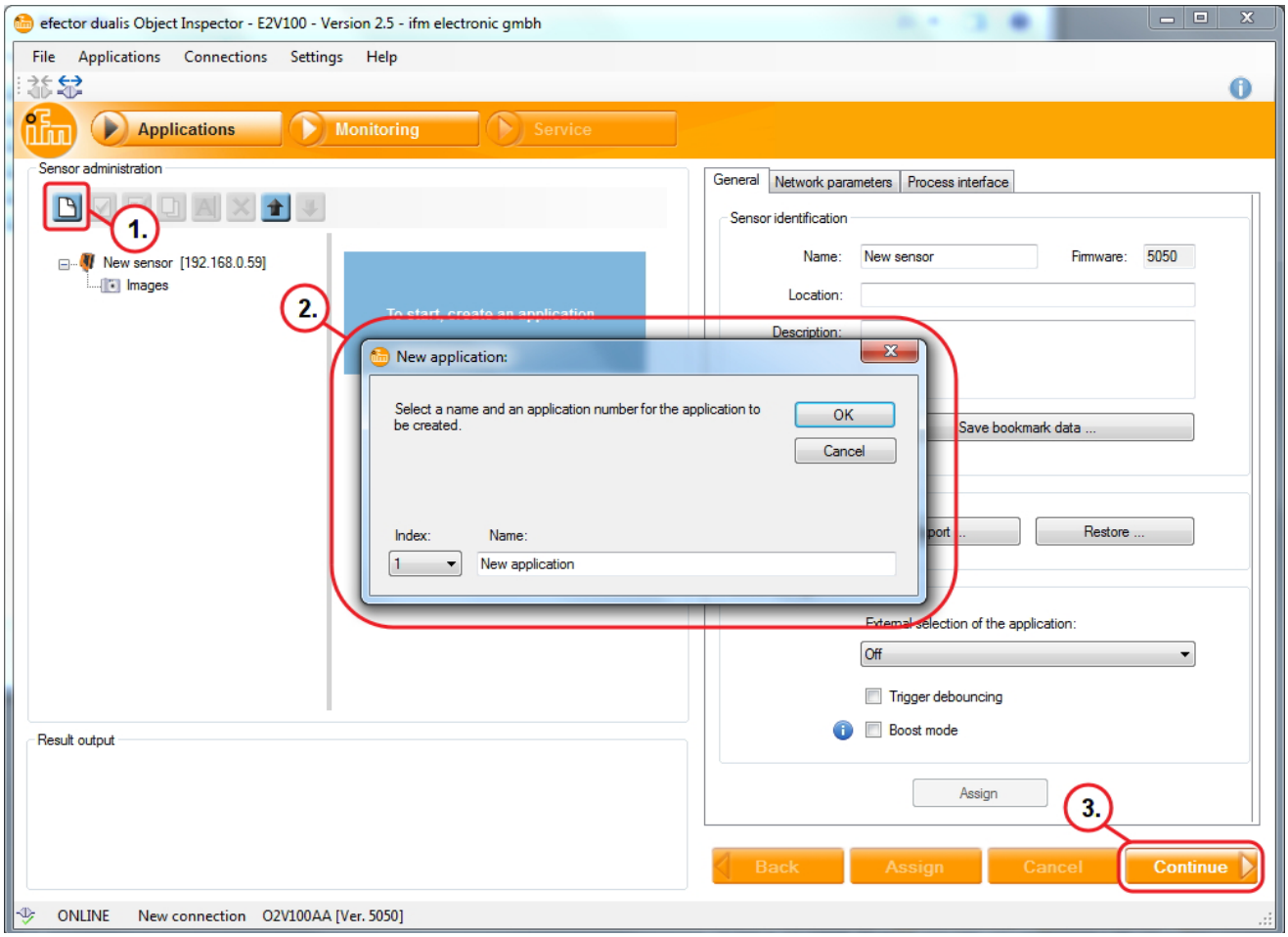
Create example:

> Applications



► Click on [New application] (1.).

► Enter the index and the name of the application in the dialogue window (2.).

► Click on [OK] for confirmation.

► When all entries have been made, click on [Continue] (3.).

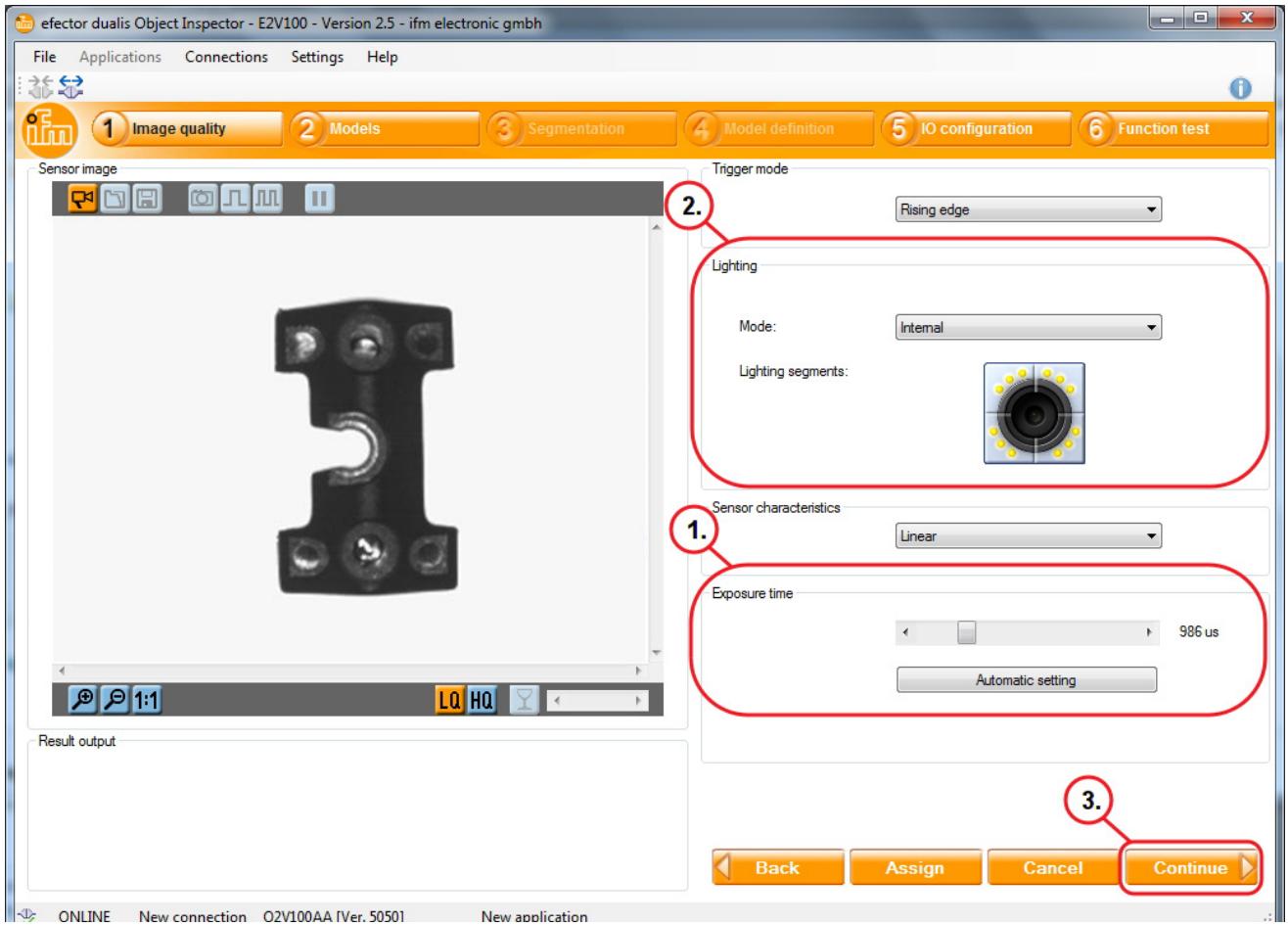
> View changes to "Image quality".

9.5 Adjust image quality

Module to set the requested parameters for an optimum image capture.

Good contrast must be created for an optimum evaluation. The object to be detected must contrast clearly with the background.

> Image quality



► Optimise the focus via the setting screw on the back of the device.

► Click on [Automatic setting] / adapt the exposure time manually (1.)

The automatically determined exposure time is not always the optimum setting; it is, however, useful as reference. The exposure time should be selected so that there is a maximum contrast between the detail to be verified and the background.

Manual setting of the exposure time is recommended.

For applications with insufficient lighting it may be necessary to use an external lighting source to ensure stable object recognition.

► Select the requested setting in the field "Lighting" (2.)

The internal LED lighting of the sensor is divided into four segments. By deactivating individual segments unwanted reflections on the object to be recognised can be avoided. For activation / deactivation click on the required lighting segment.

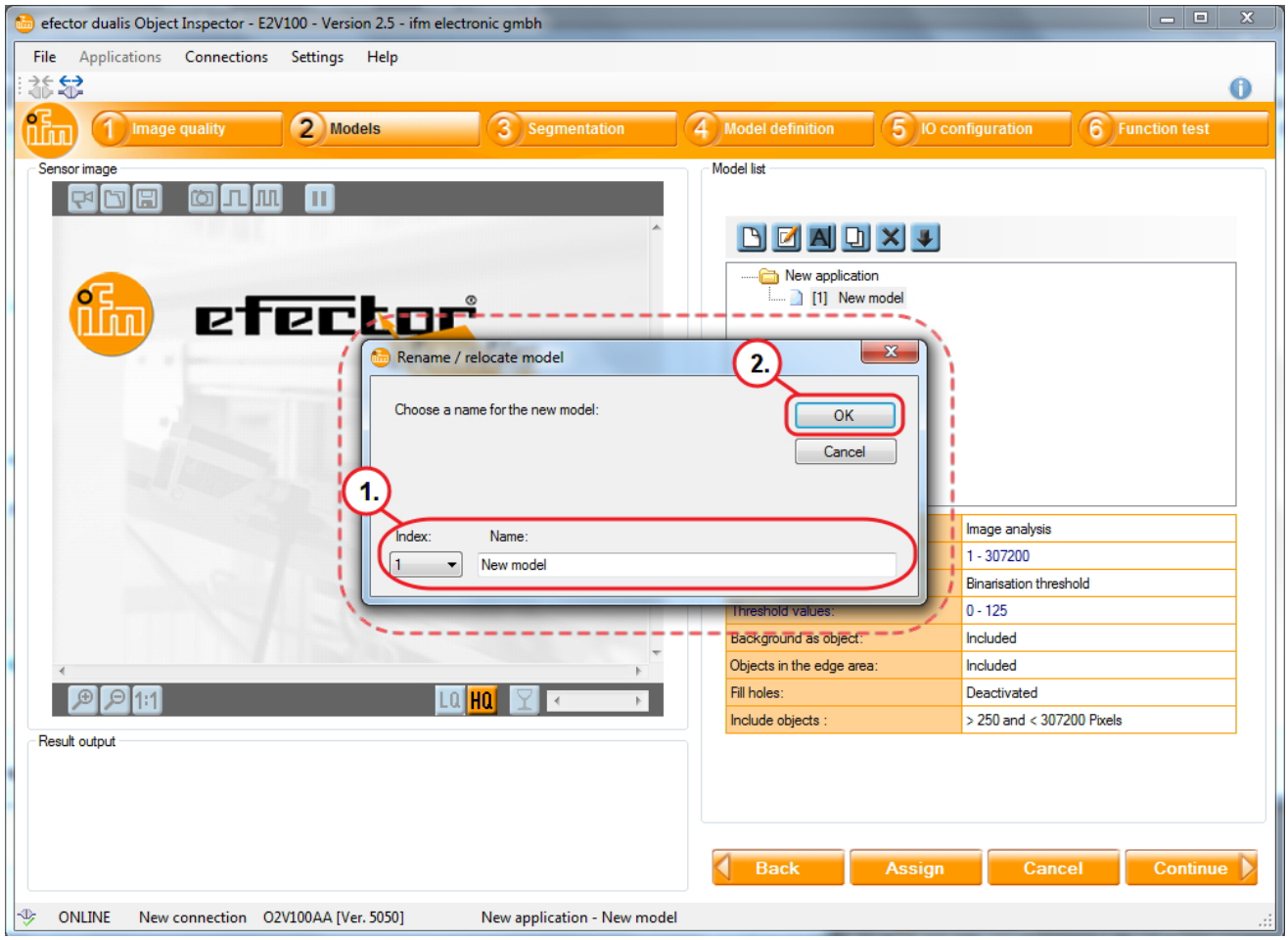
► Click on [Continue] (3.) if the sensor image is in focus and all parameters are adapted to your requirements.

> Change to "Models" is effected.

9.6 Define models

In this module models are created, defined or edited. Each application can contain up to 24 models.

> The dialogue window "Rename/relocate model" opens.



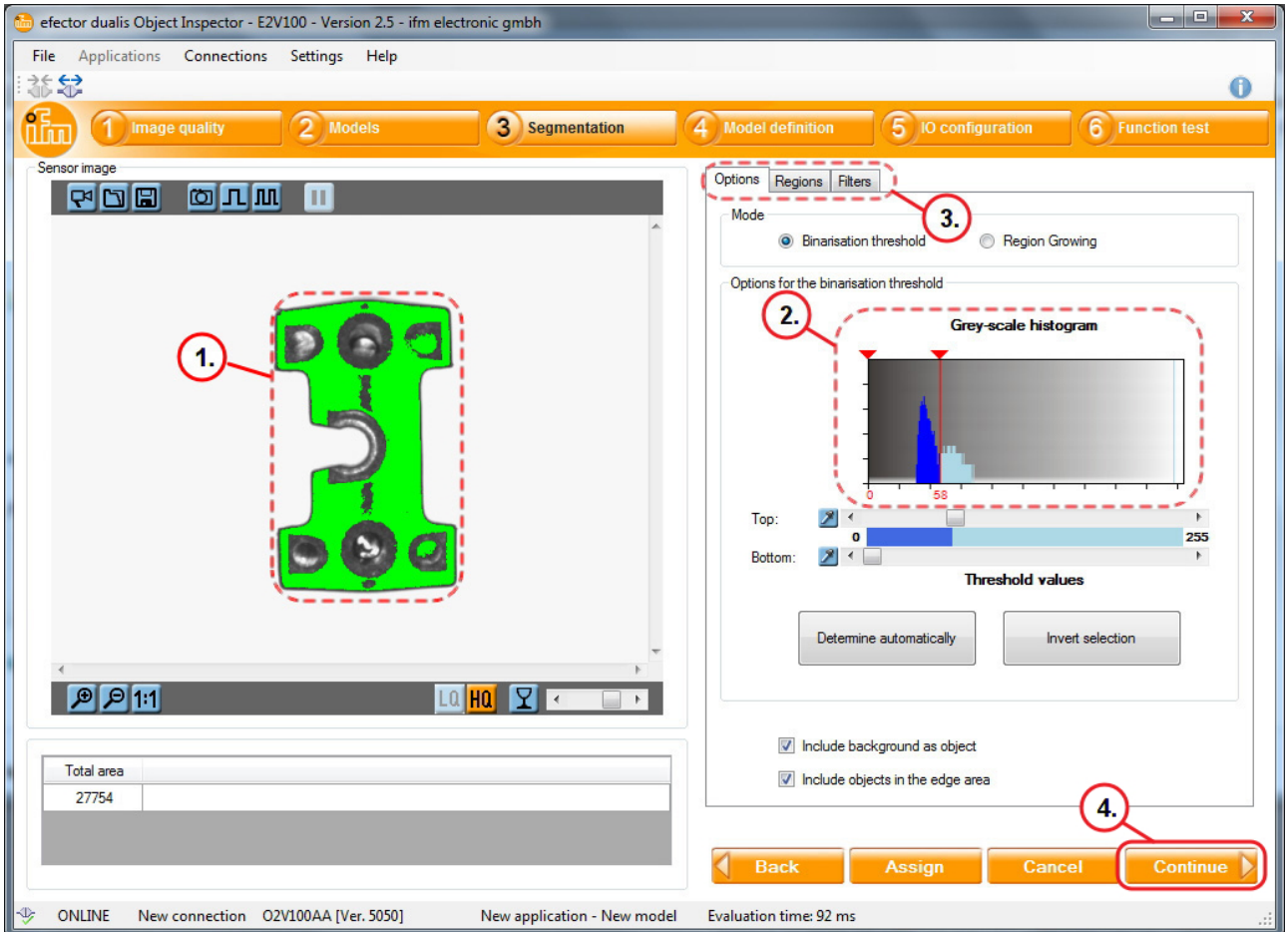
► Assign an index and a name for the new model (1.).

► Click on [OK].

> The user interface changes to the application step "Segmentation".

9.7 Segmentation

In the parameter setting module "Segmentation" you define which objects in the image should be evaluated. For this purpose the program separates the image scene into several areas on the basis of the differences in luminosity.



1. Object: The detected area is displayed in green.
2. Grey-scale histogram: To recognise the brightness of pixels.
3. Settings object selection: Define brightness zones / define image zones / filter settings.

If the objects cannot be isolated as required via the threshold values, you may have to adapt the lighting settings or use the mode "Region growing".

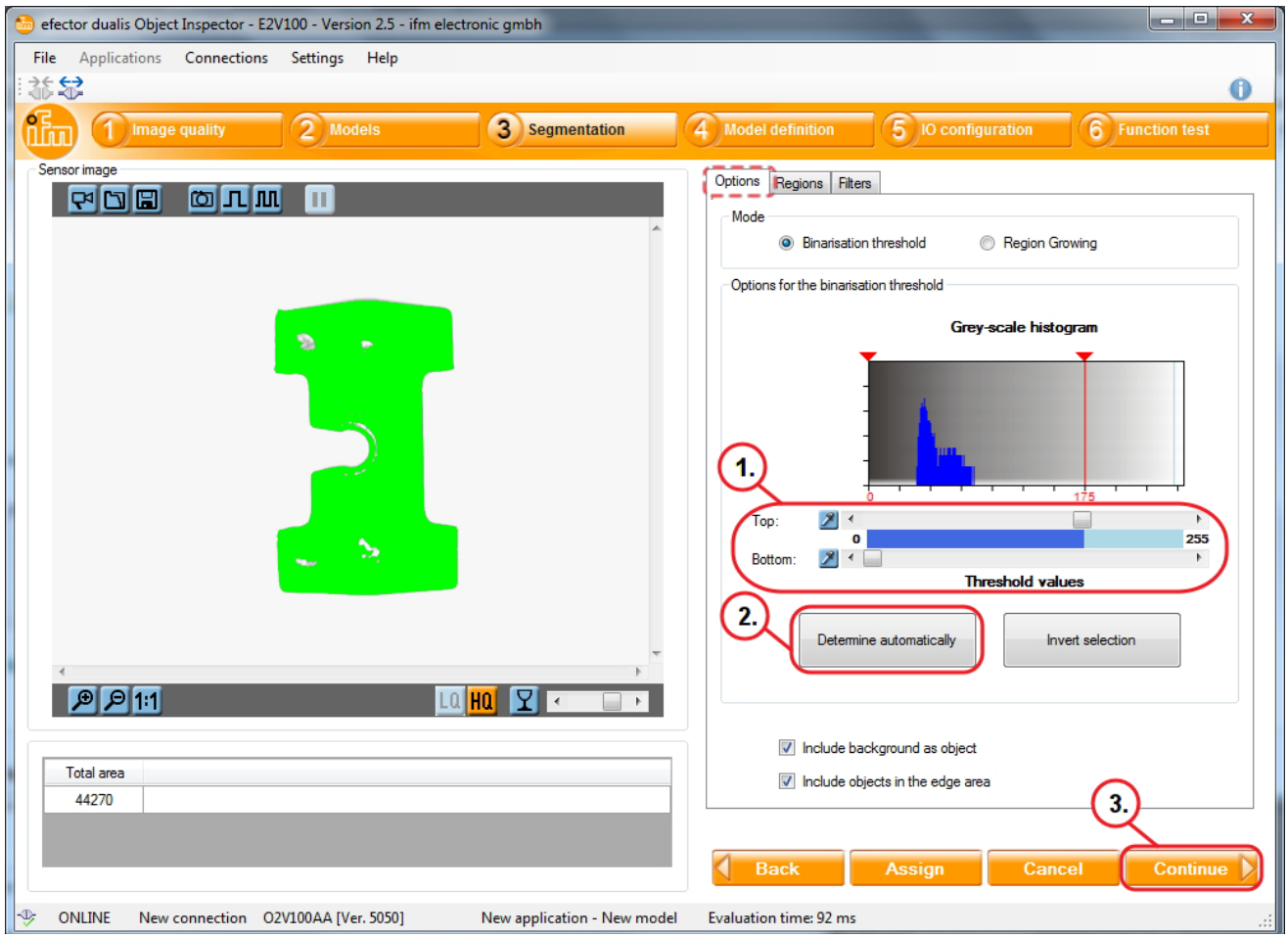
Additional parameters for adaptation are provided under Options, Regions and Filters (3.). It is possible to select contours, to select or exclude sections, to set the contrast threshold or to fix the sensitivity.

► Click on [Continue] (4.) when all parameters have been set in the menu item "Model definition" according to the requirements.

9.8 Find objects

To evaluate an object, the program must differentiate between the object to be recognised and the background. It uses the difference in brightness created in the module "Image quality".

The grey-scale histogram is adapted for optimum object recognition.



► By changing the slider bar (1.), the best possible recognition of the object is set.

> In most cases the peaks in the grey-scale histogram represent the object.

Alternative setting: select "Determine automatically".

► Click on [Determine automatically] (2.).

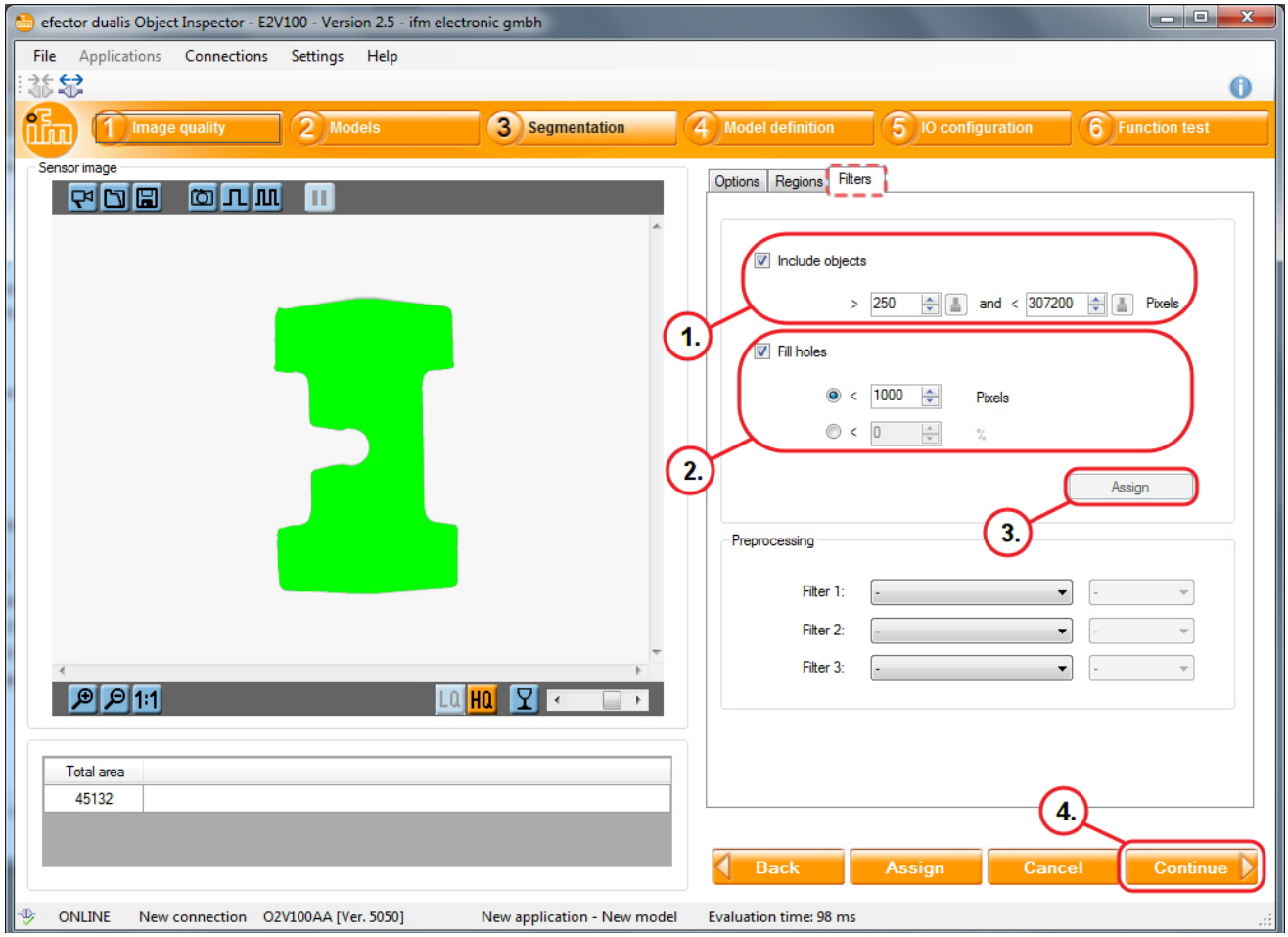
► Correct the settings via the slider bar (1.) until the requested objects are marked in green.

► Click on [Continue] (3.) when all settings have been made.

The selected zones are shown in green in the sensor image. By changing the slider bar, the threshold values are adapted, the selected zones are changed. Detailed information is given in the program manual of the sensor: www.ifm.com → New search → e.g. O2V100 → Operating instructions.

9.9 Filters

To improve distinction between object to be recognised and background, several filters are available.



> Tab "Filters"

► Select [Include objects] (1.).

► Define the size of the object to be detected.

Especially small or large objects are excluded from the evaluation when activated. Interference or undesired reflections can be suppressed. This filter is automatically active when a new model is created.

► Select [Fill holes] (2.).

► Enter the maximum region to be filled up to which the holes are filled.

► Click on [Assign] (3.).

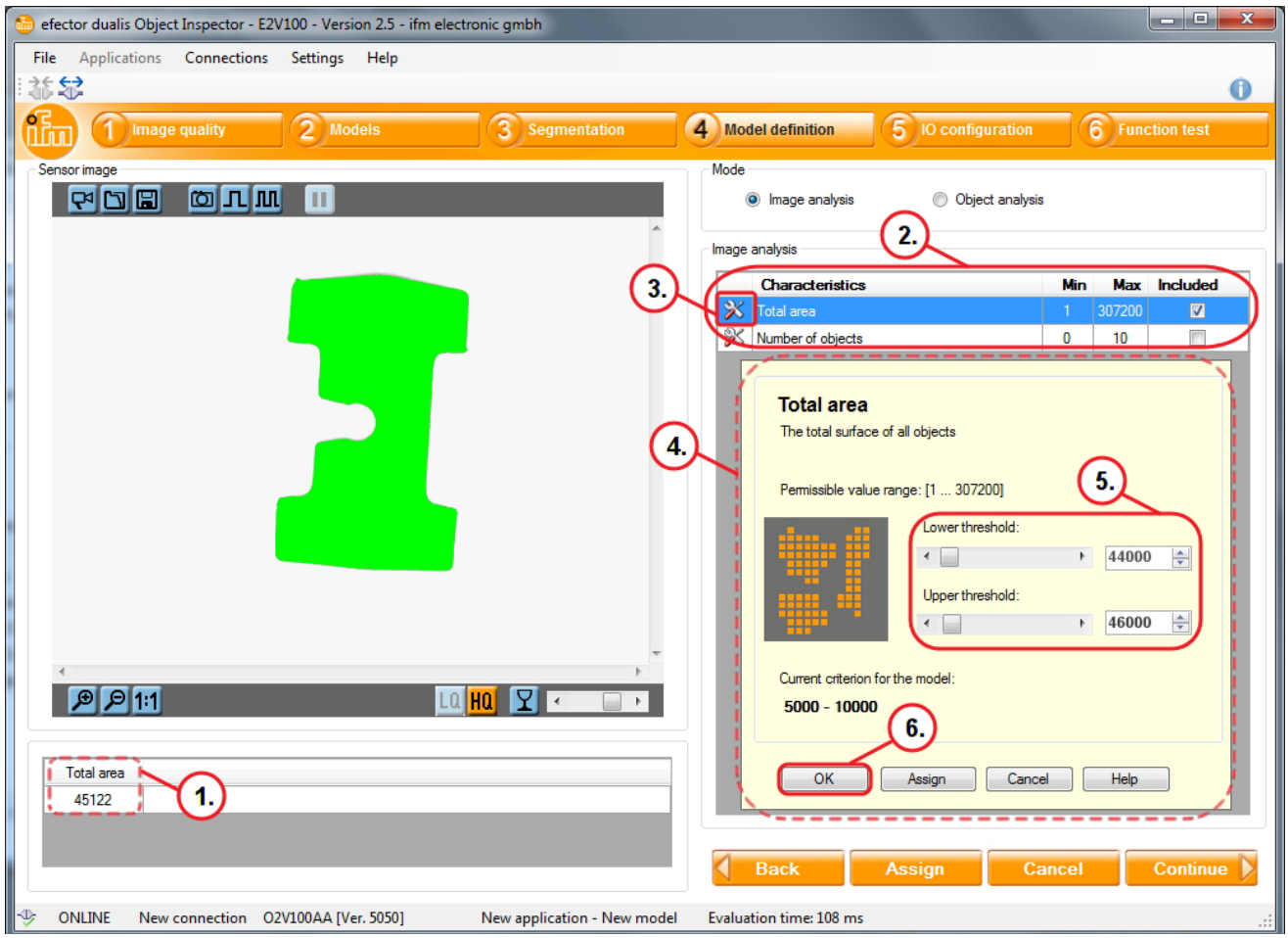
- Holes that are smaller than the indicated value are filled.
- Holes that are larger than the indicated value remain unfilled.

► Click on [Continue] (4.) when all settings have been made.

Detailed information in the program manual of the sensor:
www.ifm.com → New search → e.g. O2V100 → Operating instructions.

9.10 Model definition

In this module you define the criteria according to which an object to be recognised is evaluated as good or faulty. A minimum and a maximum value is preset for each requested criterion. All objects whose characteristics are between these two values are recognised as good.



> "Total area" (1.) indicates the area of the object.

► Tick [Included] (2.) in the line "Total area".

► [Click on] (3.)

> The dialogue window "Total area" (4.) is displayed.

► Define "Lower threshold" and "Upper threshold" (5.).

"Lower threshold" and "Upper threshold" define the permissible size difference to the "Total area" (1.).

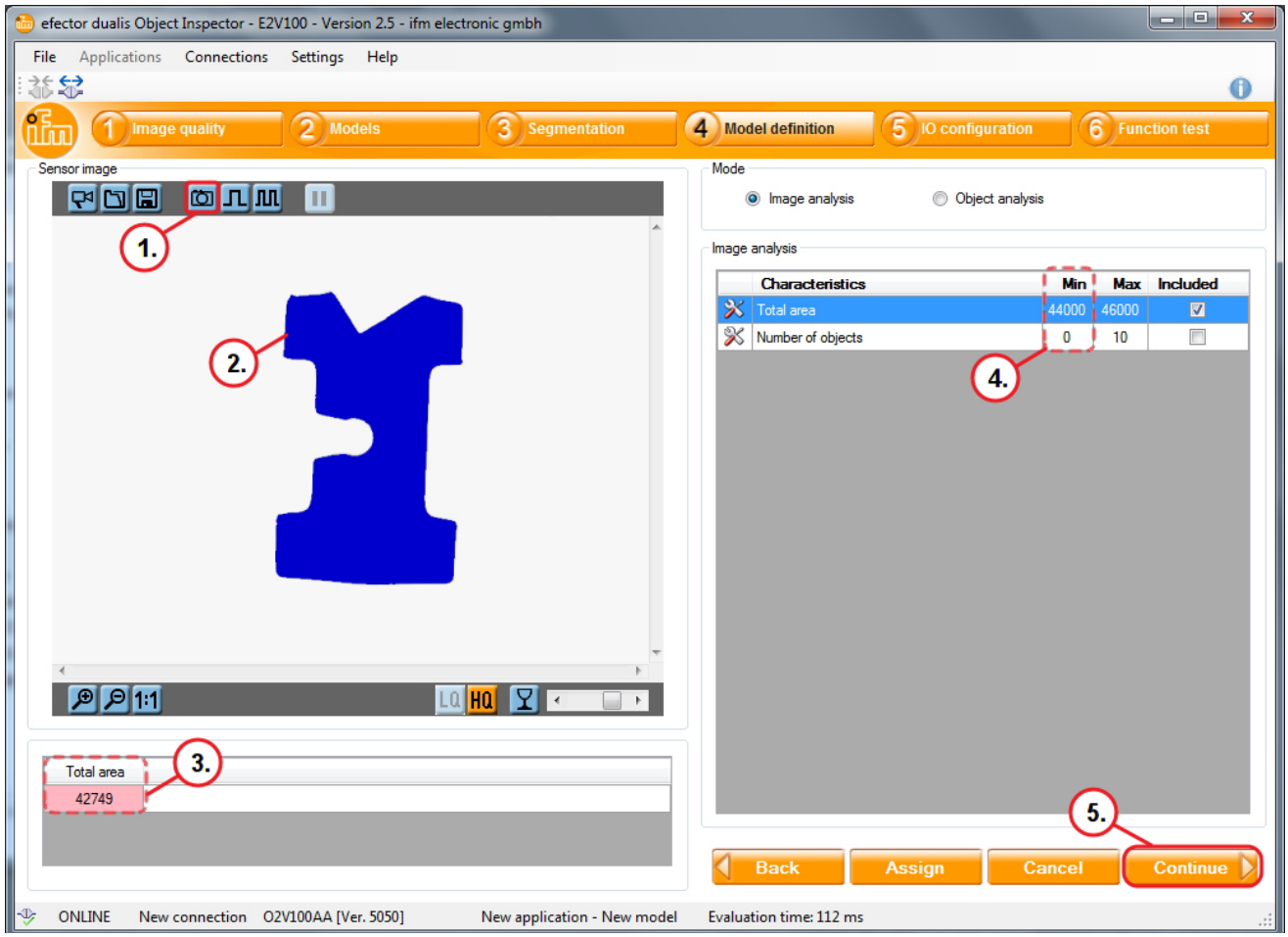
► Click on [OK] (6.).

> The settings are assigned and the dialogue window is closed.

Test model definition

A text can be made to verify the set threshold values. The object area is changed for test purposes (enlarged or reduced).

► [Click on] (1.)



> The new single image of the previously changed object is created (2.).
If there is no match, the object is displayed in blue.

> Under "Total area" (3.) the determined area value is highlighted in red due to the deviation.

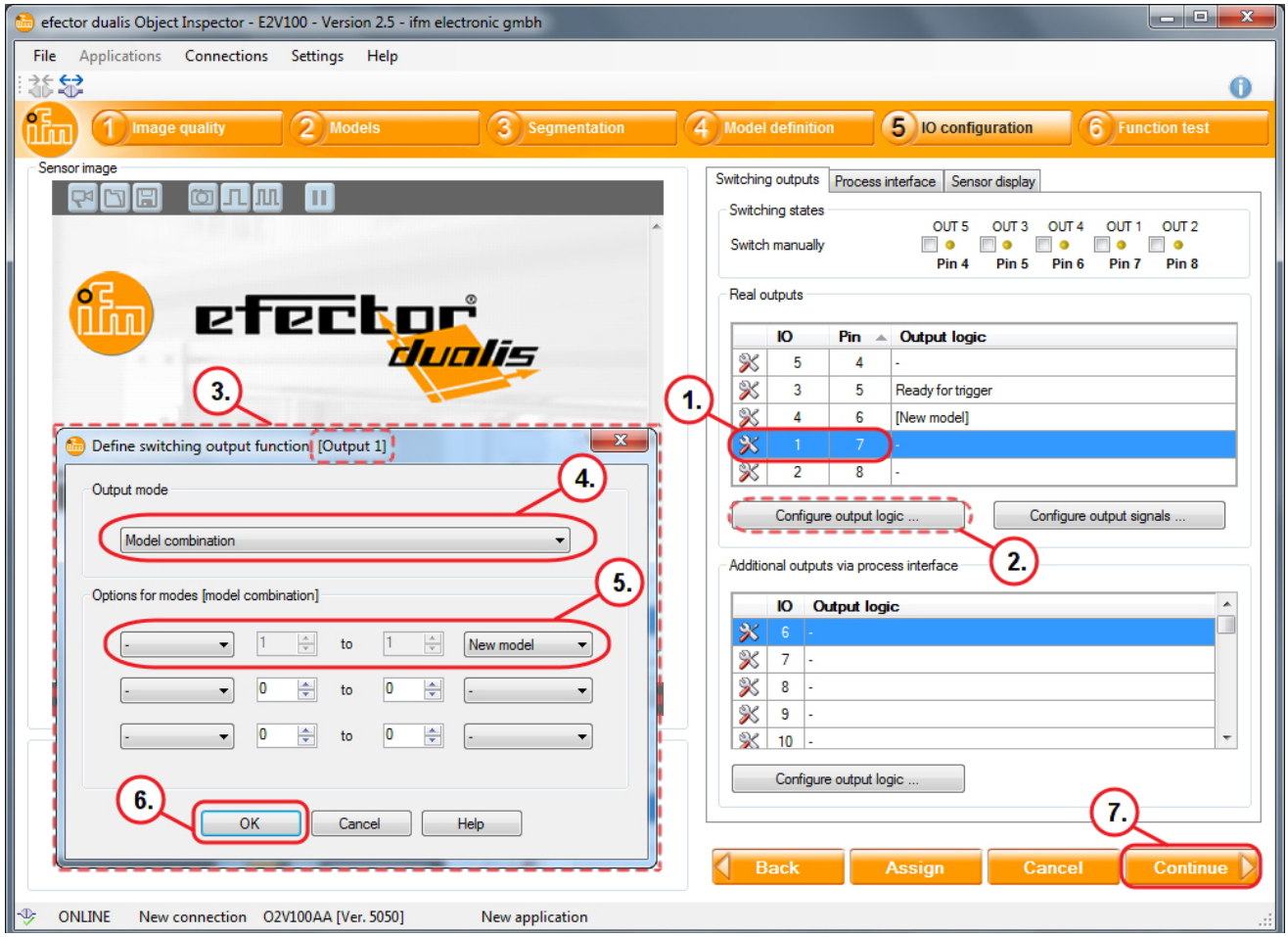
> The basis in this example is the "Min" value (4.).

► Click on [Continue] (5.) when all settings have been made.

If the object to be detected deviates from the defined "Min" / "Max" values, the test is considered failed.

9.11 IO configuration

In this module the switching outputs are configured and the information is defined that is transferred via the process interface.



► [Click on] next to the output (1.) to assign the object to it.

> The dialogue window "Define switching output function" (3.) is displayed.

► Select the requested output mode (4.).

> The following modes are available:

- Ready for trigger
- Modell combination (default setting)
- Evaluation completed
- Ext. selection of the applications completed
- Number of objects

> As an option, "Options for modes [model combination]" (5.) is available:

- Which models are to be included in the evaluation
- How often a model should be present in an evaluated image
- Combination of models via AND, OR, not AND or not OR functions.

► Click on [OK] for confirmation (6.).

Alternative approach:

► Select the line of the requested output.

► Click on [Configure output logic] (2.), continue as described above.

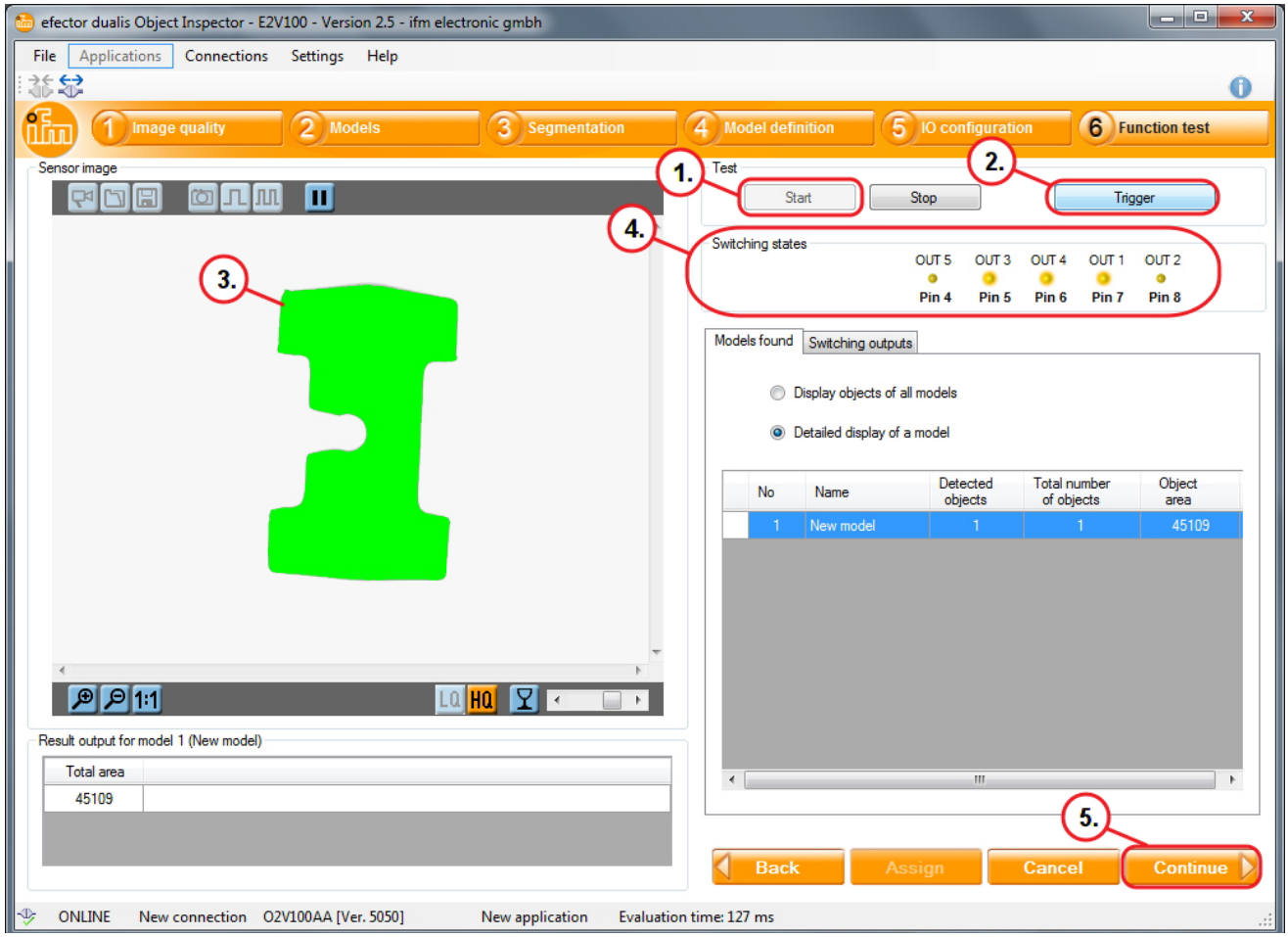
► Click on [Continue] (7.) when all settings have been made.

In the example, output 1 is assigned the object "New model" under "IO configuration". Output 1 switches when the object corresponds to the preset criteria.

For detailed explanations we refer you to the programming manual.
www.ifm.com → New search → e.g. O2V100 → Operating instructions → Programming manual

9.12 Function test

This finalising step tests all settings of the new configuration.



► Click on [Start] (1.).

► Click on [Trigger] (2.) or execute the set trigger type.

> The device performs a complete test on the basis of the previous settings.

- Objects that have passed the test are shown in green (3.).
- The states of the switching outputs (4.) are signalled:
  - LED lights yellow: output switched.
  - LED does not light: output not switched.

► Click on [Continue] (5.) to complete the settings.

> The dialogue window "Object Inspector" is displayed.

► Confirm saving with [Yes].

> The program returns to the application overview.

The settings necessary for setting up the device are completed. The device is ready for operation and can be integrated into the process.

A detailed explanation of all setting options can be seen in the programming manual. The programming manual is provided for download at www.ifm.com → New search → e.g. O2V100 → Operating instructions → Programming manual.