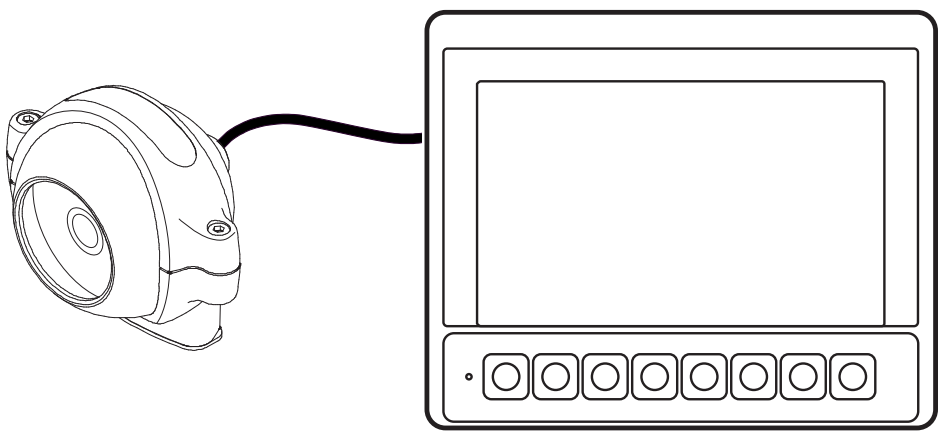
ifm electronic

CE

# Brief instructions
# Connection of analogue cameras to the PDM360 NG process and dialogue module in CODESYS

UK

ecomat100®



7391015 / 01 10 / 2015

# Contents

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This document is the original instructions.

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# 1 Preliminary note

This document applies to devices of the type "PDM360 NG" (art. no.: CR1083 and CR1087). These instructions are an integral part of the device.

This document is intended for specialists. These specialists are people who are qualified by their appropriate training and their experience to see risks and to avoid possible hazards that may be caused during operation or maintenance of the device. The document contains information about the correct handling of the device.

Read this document before use to familiarise yourself with operating conditions, installation and operation. Keep this document during the entire duration of use of the device.

Adhere to the safety instructions.

## 1.1 Symbols used

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

Important note
Non-compliance may 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

## 2.1 General

These instructions contain texts and figures concerning the correct handling of the device and must be read before installation or use.

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



## 2.2 Target group

These instructions are intended for authorised persons according to the EMC and low-voltage directives. The device must only be installed, connected and put into operation by a qualified electrician.

## 2.3 Electrical connection

Disconnect the unit externally before handling it. If necessary, also disconnect any independently supplied output load circuits.

If the device is not supplied by the mobile on-board system (12/24 V battery operation), it must be ensured that the external voltage is generated and supplied according to the criteria for safety extra-low voltage (SELV) as this voltage is supplied without further measures to the connected controller, the sensors and the actuators.

The wiring of all signals in connection with the SELV circuit of the device must also comply with the SELV criteria (safety extra-low voltage, safe electrical isolation from other electric circuits).

If the supplied SELV voltage is externally grounded (SELV becomes PELV), the responsibility lies with the user and the respective national installation regulations must be complied with. All statements in this document refer to the device the SELV voltage of which is not grounded.

The connections may only be supplied with the signals indicated in the technical data and/or on the device label and only the approved accessories of ifm may be connected.

## 2.4 Tampering with the device

In case of malfunctions or uncertainties please contact the manufacturer. Any tampering with the device can seriously affect the safety of operators and machinery. This is not permitted and leads to the exclusion of any liability and warranty claims.

## 2.5 Electromagnetic compatibility

This is a class A product. It can cause radio interference in domestic areas. In this case the operator is requested to take appropriate measures.

# 3 Functions and features

The PDM360 NG process and dialogue module is a programmable graphic display for controlling, parameter-setting and operation of mobile machines and plants.

Communication with other system components, e.g. decentralised I/O modules, is handled via a CAN interface using the CANopen protocol.

Ethernet and USB interfaces are also available for use during programing or for service tasks.

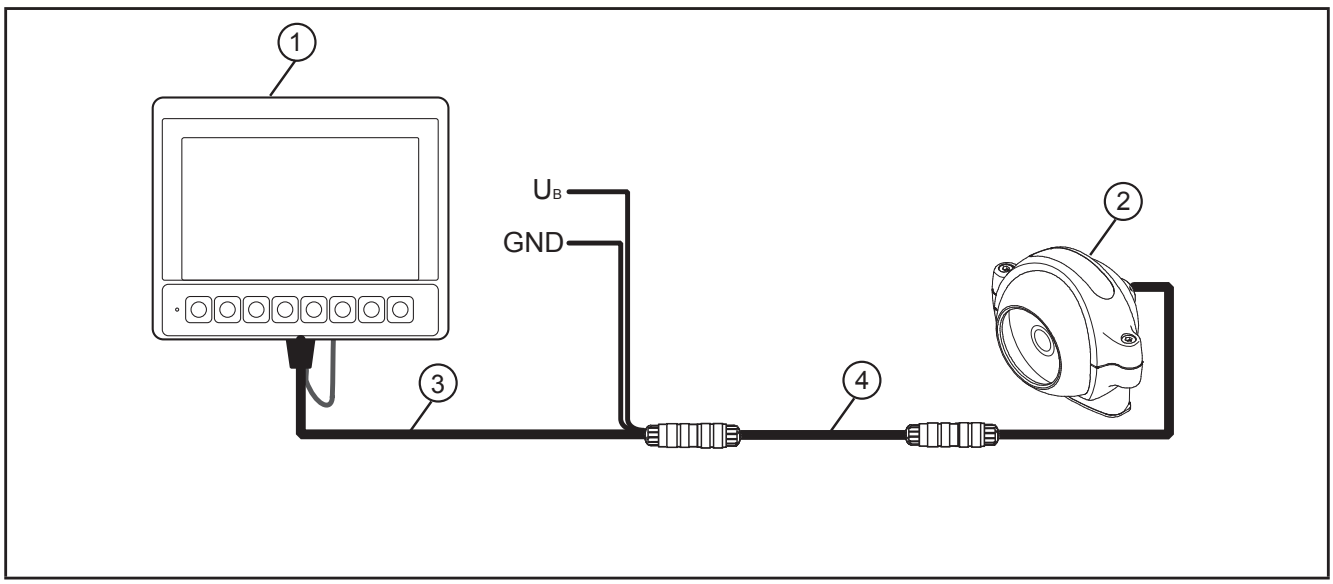
Together with the Linux operating system they form a universal platform for networking and communication with other CAN devices, networks or PCs.

**⚠ WARNING**

The PDM360 NG process and dialogue module is not approved for any personnel related safety tasks.

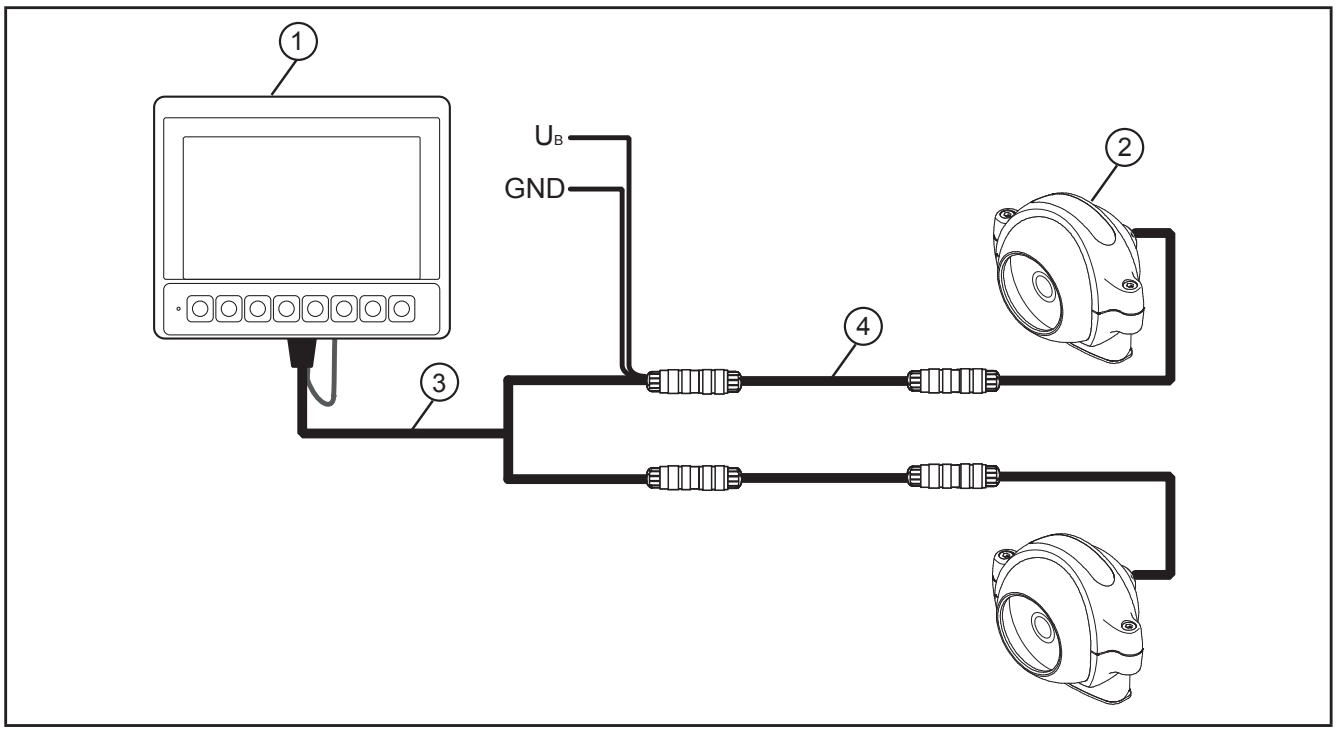
The O2M20x camera allows for the monitoring of areas outside of the field of view in mobile machines and utility vehicles. The connection and the visualisation of the images are made via dialogue modules with graphics capabilities.

## 3.1 Application example




Connection of an O2M20x analogue camera to a PDM360 NG

1. PDM360 NG (e.g. CR1083)
2. Analogue camera (e.g. O2M20x)
3. Adapter cable (e.g. E2M200)
4. Connection cable (e.g. E2M203)




Connection of 2 O2M20x analogue cameras to a PDM360 NG

5. PDM360 NG (e.g. CR1083)
6. Analogue camera (e.g. 2 x O2M20x)
7. Y adapter cable (e.g. E2M201)
8. Connection cable (e.g. 2 x E2M203)

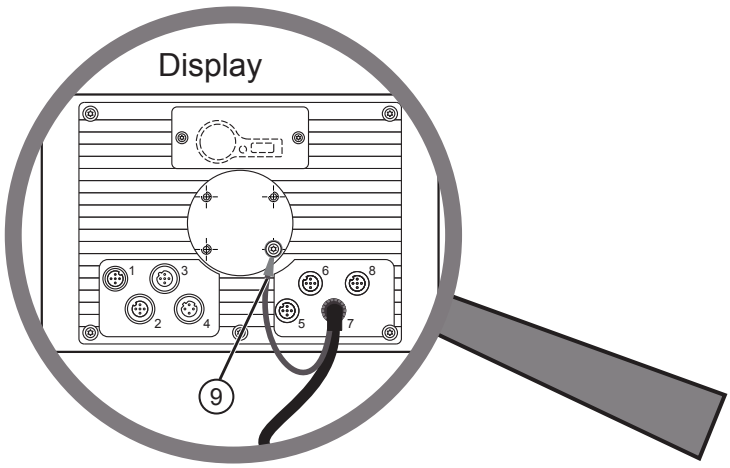
# Connection and installation

## 3.2 Connection and mounting accessories

You can find more information about the available accessories at:
www.ifm.com → New search → Article number → Accessories
or
www.ifm.com → Product line → Connection technology

## 3.3 General electrical connection

Connection of the M12 connectors to the device:
www.ifm.com → New search → Article number → Operating instructions → Installation Instructions




1: Supply, input/output
2: CAN1
3: USB
4: Ethernet
5: N/A
6: N/A
7: Analogue video input
8: N/A
9: Connect GND on the Display dialogue module.

M12 connectors (back of the unit)

**NOTE**

Wrong connection may cause damage to the device.
► Observe the safety instructions (→ 2).

► Basically all supply and signal cables must be laid separately.
► Lay supply and signal cables away from the device using the shortest possible route.
► All connected cables must be provided with a strain relief.

### 3.3.1 Cover all unused connectors

**NOTE**

Moisture penetrating through unused or unprotected connectors may destroy the device.
► Cover unused connectors with protective caps.

### 3.4 Ethernet interface

► Use a shielded CAT5 cable.
STP, shielded twisted pair, to EIA/TIA-568.
Max. length 25 m

The max. cable length depends for example on the bus topology, the selected operating mode (10/100 Mbits/s) or the quality of the connectors.

► Use screened connector housings and connect the screen of the Ethernet cable to the connector housing.
► Do not lay the Ethernet cable in parallel to live cables.



Interference due to external influences
Faulty or insufficient radio interference suppressors in other electrical equipment, such as inverters or generators, as well as voltage fluctuations when switching on/off electric loads may lead to problems with the data transmission.

### 3.5 Analogue video inputs

► When using the analogue video inputs, please provide all connection cables with ferrite sleeves.
Recommendation: Impedance 321 Ω (100 MHz)

The ferrite sleeves ensure CE/E1 conformity and suppress conducted interference.

## 4 Set-up

### 4.1 General

As delivered the device is prepared for programming with CODESYS version 2.3 or higher.

Factory setting:
IP address: 192.168.82.247
Subnet mask: 255.255.255.0

The user is responsible for the safe function of the application programs which he created himself. If necessary, he must obtain an approval from the corresponding supervisory and test organisations according to the national regulations.

## 4.2 Getting started

► Connect the device to the notebook/PC via the Ethernet interface.
► Switch on the notebook/PC; check the IP settings of the notebook/PC and change them if necessary.

Internet protocol: TCP/IP
IP address: 192.168.82.xxx (except for .247, s.a.)
Subnet mask: 255.255.255.0
Gateway IP address: 192.168.100.1

► Switch on the operating voltage to the dialogue module.
> Shortly after switch-on of the unit the start image is shown for approx. 10 to 15 seconds.
During this time booting is running in the background.
After booting the set-up program opens automatically.

## 4.3 Set-up

The set-up allows the setting of the device parameters.

The menu items are selected using the function keys or via a connected USB keyboard.

| Function | USB keyboard | Meaning |
|---|---|---|
| SELECT | TAB | Select menu item |
| SAVE | F3 | Save entries |
| UP | Arrow up | Increase value or variable |
| DOWN | Arrow down | Decrease value or variable |
| ENTER | ENTER | Open selected menu item |
| EXIT | ESC | Leave set-up<br>Leave menu item<br>Entries will not be saved |

After leaving the set-up a project can be loaded.

Libraries (.lib) are available for the use of the operating elements, interfaces and other internal functions of the device. They have to be integrated into the application program.

### 4.4 Required documentation

In addition to the CODESYS programming system, the following documents are required for programming and set-up of the device:

- Programming manual CODESYS V2.3
  (alternatively as online help)
- PDM360 NG system manual
  (alternatively as online help)
- Operating instructions for the robust O2M20x camera system



The manuals can be downloaded from the internet:
www.ifm.com → Data sheet search → e.g. CR1083 → More information

CODESYS and PDM360 NG online help:
www.ifm.com → Service → Download → Control systems*

*) Download area with registration

## 5 Operation of analogue camera(s) on the PDM

### 5.1 Configure the camera bitmap in the dialogue [Bitmap Configuration]

The terms which are used in the dialogue [Bitmap Configuration] have another meaning when used for the camera configuration.

Overview:

| Category | Field | Value / variable | Example |
|---|---|---|---|
| Text | Content | Camera input | Camera0: video signal FBAS1<br>Camera1: video signal FBAS2<br>(Note capital / small letters!) |
| Variables | Conversion base | Boolean type variable (input) | NOT for the analogue camera in the overlay mode (→ 5.3):<br>TRUE: Mirror the image at its horizontal axis<br>FALSE: Do not mirror the image *) |
| Variables | Change color | Boolean type variable (input) | TRUE: Represent the analogue camera image in the overlay mode<br>FALSE: Represent the analogue camera image in the capture mode |
| Motion absolute | Angle | INT type variable (input) | NOT for the analogue camera in the overlay mode (→ 5.3):<br>Rotate the camera image by 0° *), 90°, 180° or 270°.<br>Other values are not supported. |

*) Status which also applies to a non-defined variable (= set as default).

## 5.2 Features of analogue cameras

Example O2M20x:

| System standard | Number of image lines | Number of image columns | Aspect ratio |
|---|---|---|---|
| PAL | 720 | 576 | 5:4 |
| NTSC | 720 | 480 | 3:2 |

## 5.3 Display modes

- Capture mode
- Overlay mode

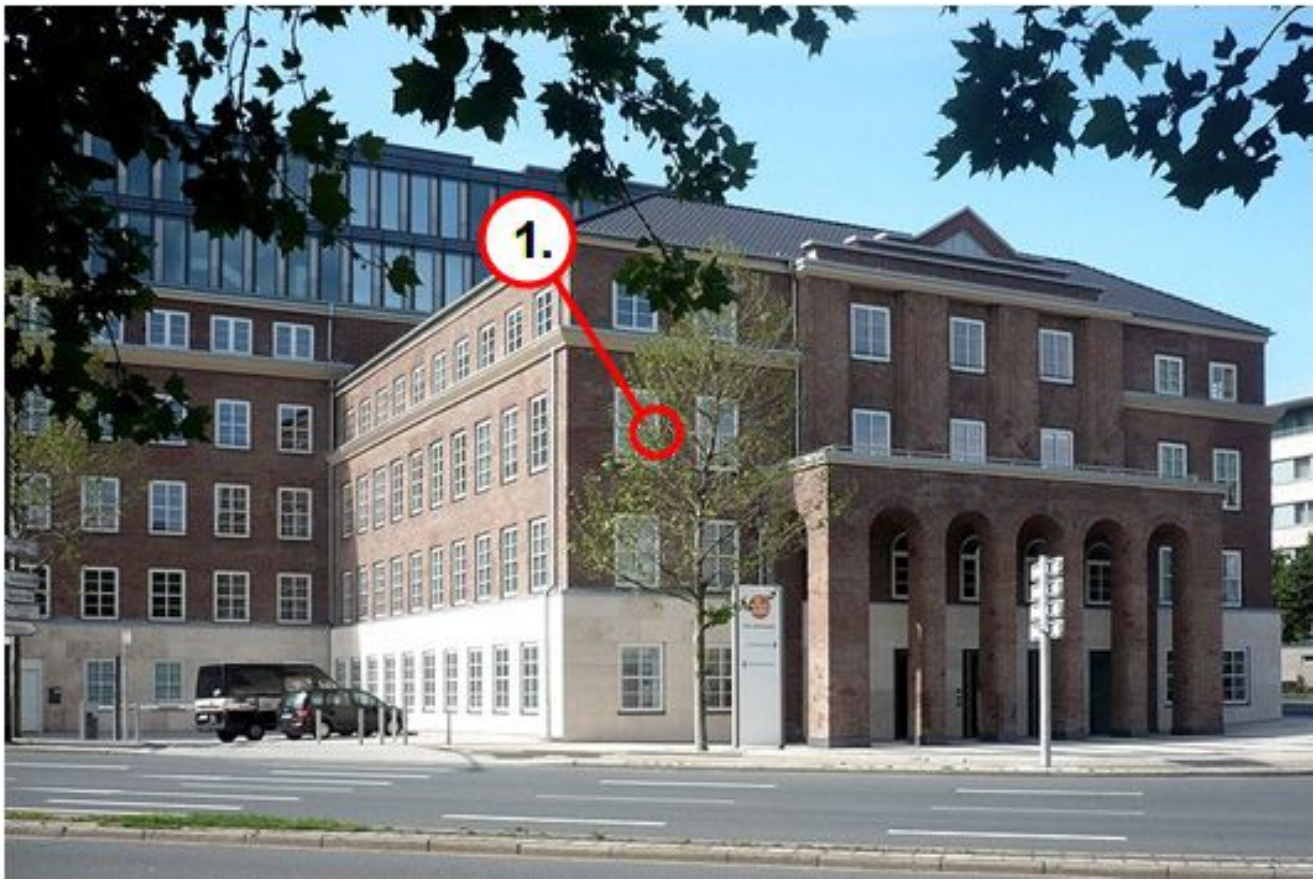
Differences of the representation modes:

| Capture mode | Overlay mode |
|---|---|
| The image can only be represented as a whole (Image 1: Original camera image, page 13). | The image section can be represented up to max. 100 % of the original image.<br>The centre of the image section is identical with the centre of the original image (Image 1: Original camera image, page 13). |
| Any scaling of the image is possible (Image 2: Images scaled in width or height, page 13). | The image cannot be scaled. |
| Any scaling of the aspect ratio is possible<br>The image representation may be distorted | The image is represented in the original aspect ratio. |
| Low image repetition rate<br>Reason: long processing time! | High image repetition rate |
| Define the representation mode:<br>► Set the field [Change color] in the category "Variables" to FALSE. | Define the representation mode:<br>► Set the field [Change color] in the category [Variables] to TRUE. |

As from firmware version 01.03.00: The representation mode can be changed in the course of the program.

Position the camera image only in the visible area of the display (800 x 480 pixels)! Positions outside the visible area will be ignored.

Image 1: Original camera image




1: Image centre



## 5.4 Capture mode

The original image can only be scaled in any manner as full-size image, also asymmetrically.

Image 2: Images scaled in width and height

Width was scaled

Height was scaled

## 5.5 Overlay mode

The image cannot be scaled.
The centre of the image section is identical with the centre of the original image.

Image 3: Image sections of the original camera image


a) Original image was cropped by 61 % in height and width.


b) Original image was cropped by 75 % in height and width.

In images 3 a) and b) the marking of the centre shows clearly that scaling always means cropping the image sides. Cropping does not generate scaling!

Information about the subject "Scaling an image" or "Creation of an image section" (→ 5.6.2 Set scaling / image section size and image position).

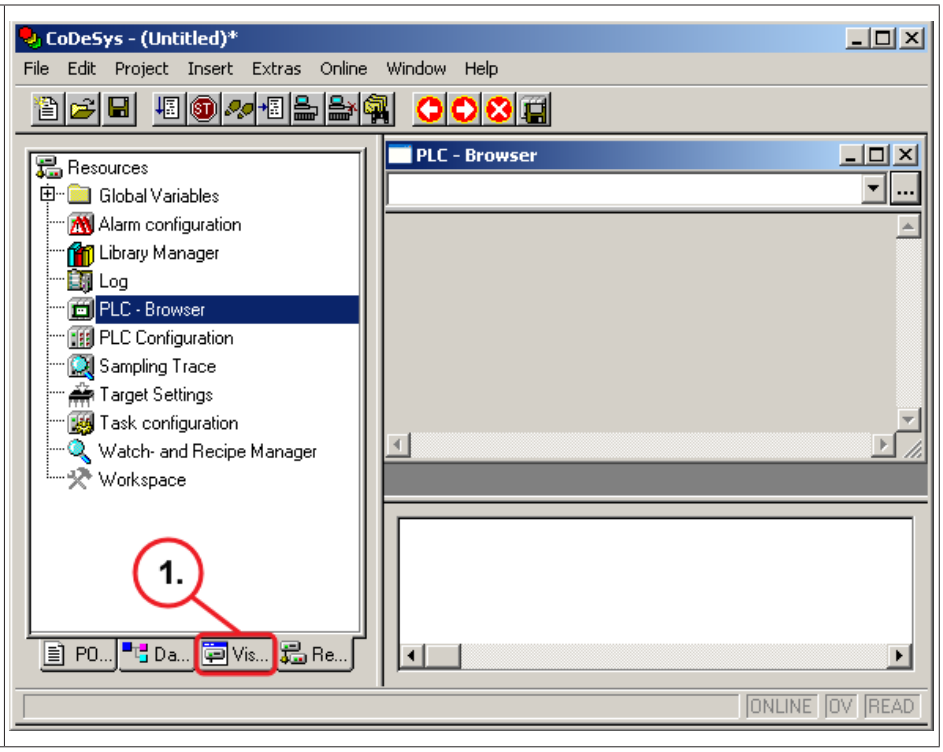
## 5.6 Configure analogue camera image

► Start CODESYS.

► Create or open project.

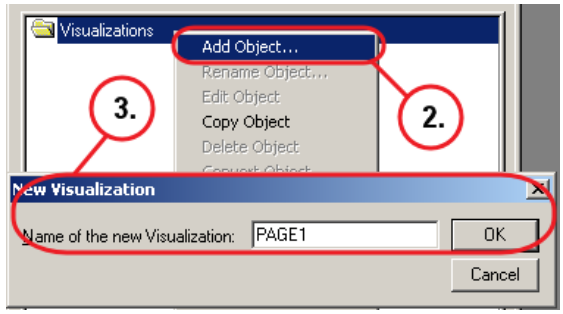
### 5.6.1 Create bitmap for camera image

► Select [Visualizations] (1.)



▶ Click on [Add object] (2.).

> The dialogue window "New Visualization" (3.) opens.



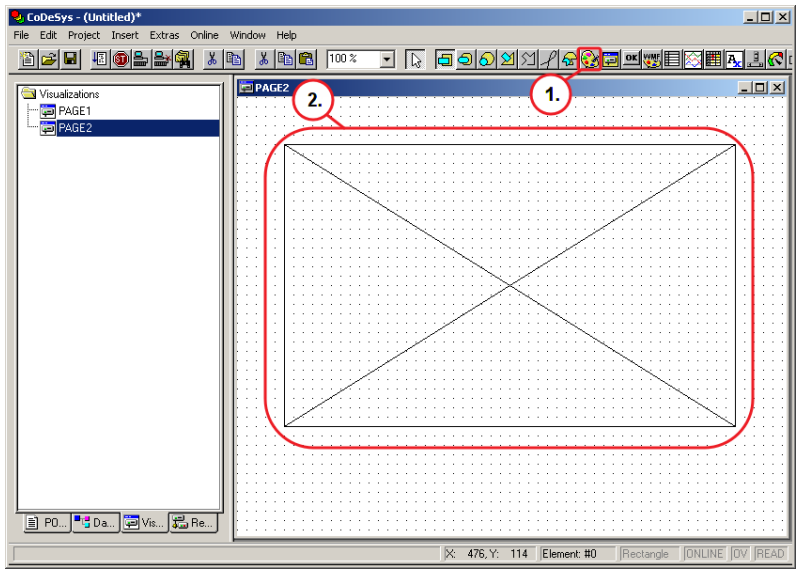

▶ Enter the name of new visualisation in the field [Name of the new Visualization].

▶ Click on [OK].

▶ Click the symbol [Bitmap] (1.) in CODESYS.

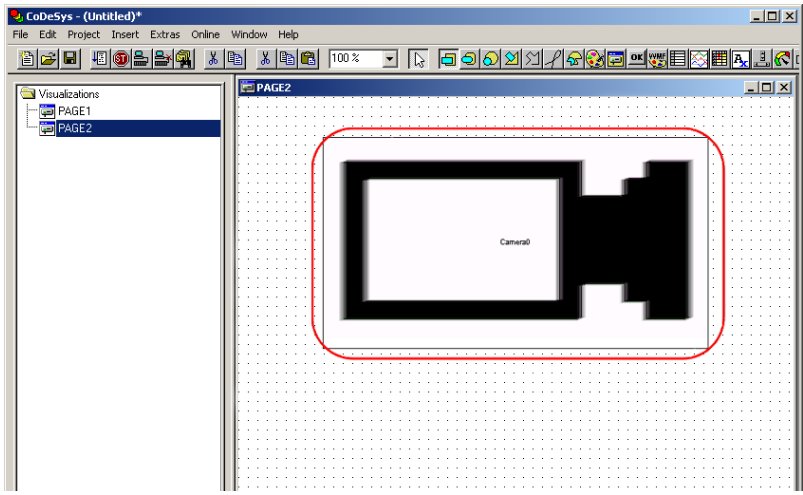
▶ Create an area (2.) for the planned camera image on the drawing area by means of the activated left mouse cursor.

> The dialogue [Open] opens when the area has been created.




▶ Select the file "camera.bmp" in the path: Program Files\ifm-electronic\CoDeSys Vx.x\Targets\ifm\Library\BMP_NG.

> The placeholder graphic is inserted into the drawing area.




▶ Double click the placeholder graphic.

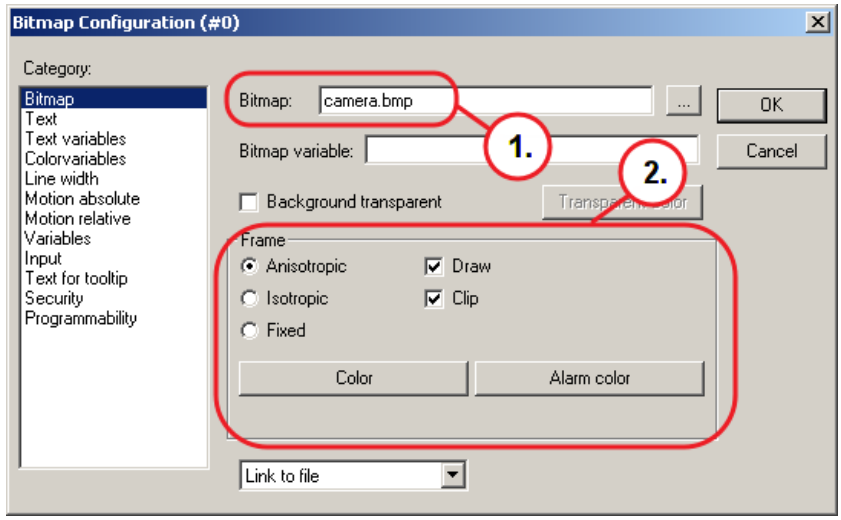
The file "camera.bmp" is any substitutional image to insert and configure the camera image in a visualisation.

> The dialogue "Bitmap Configuration" opens.

▶ Check the settings under category "Bitmap":

- Bitmap (1.): ...camera.bmp
- Frame (2.): -Anisotropic
  -Draw
  -Clip,

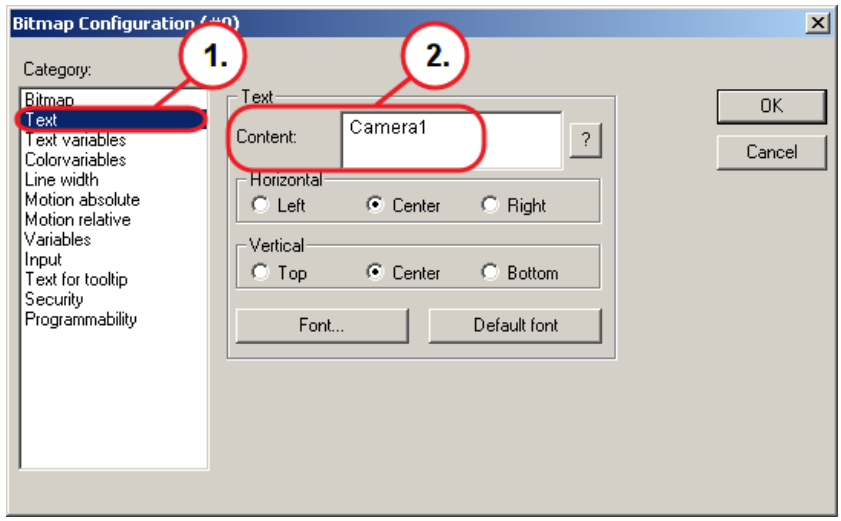
must be set, if necessary.




▶ Select the category "Text" (1.).

▶ Enter the name of the camera in the field "Content"(2.).

▶ Click on [OK].




Enter "Camera0" for the signal FBAS1 (video1).
Enter "Camera1" for the signal FBAS2 (video2).

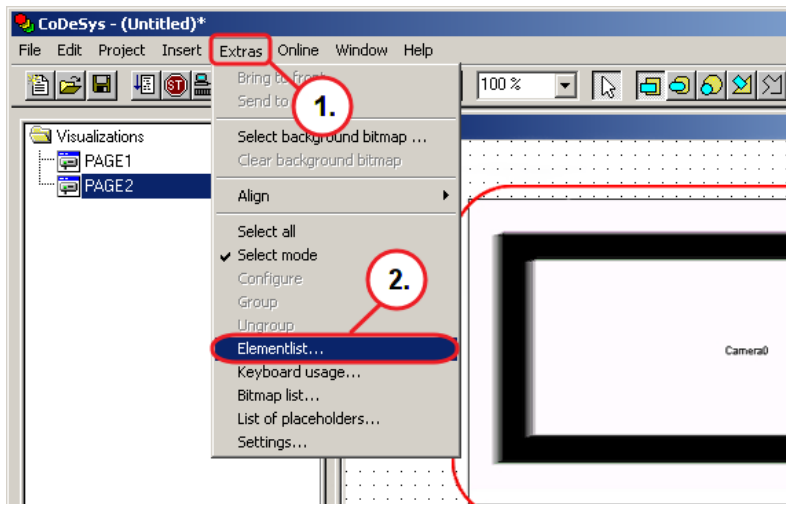
Note capital / small letters!

## 5.6.2 Set scaling / image section size and image position

Depending on the Boolean variable, scaling or the dimensions are defined by entering the width and height in the field "Change color" (→ 5.1 Configure the camera bitmap in the dialogue [Bitmap Configuration]).

▶ Click on [Extras] (1.) in the menu bar.

▶ Click on [Elementlist] (2.).




> The element list is displayed

▶ Select bitmap of the camera (1.).

**Capture mode:**

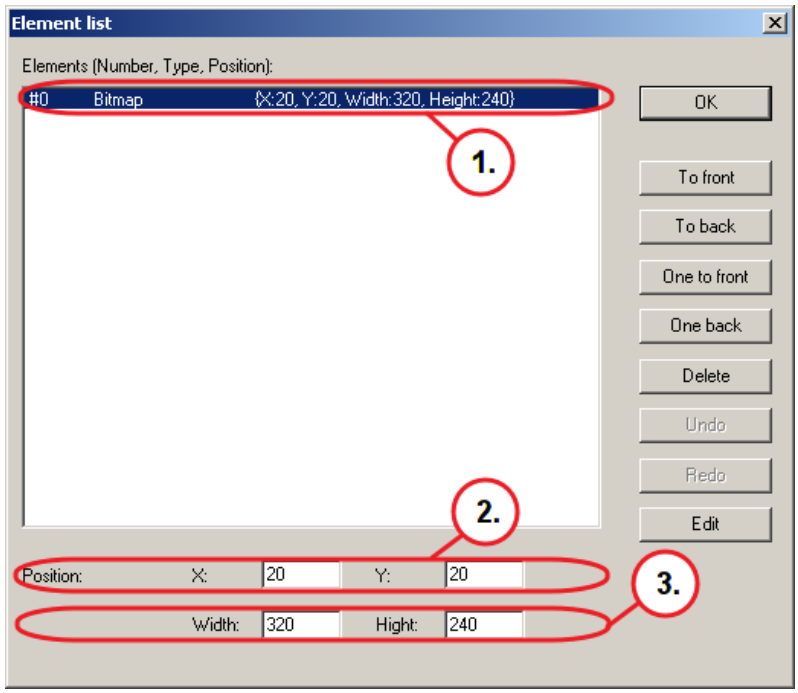
▶ Enter values to position the camera image in the fields "Position" "X:" and "Y:" (2.) on the PDM display (→ 5.4).

or

**Overlay mode:**

▶ Define the values in the fields "Width:" / "Height:" (3.) as seen from the centre of the original image that is requested as image section (→ 5.5).

▶ Click on [OK].




The values "X:" and "Y:" define the position of the upper left corner of the image on the screen raster.

Recommended image resolution (PAL): width = 360, height = 288.

Maximum image resolution (PAL): width = 720, height = 576.

If both types of representation are needed in one project, it is necessary to create a bitmap for each mode (capture / overlay mode) (→ 5.6.1 Create bitmap for camera image)

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### 5.6.3 Mirroring the camera image

The function "Mirror the image of the camera at its vertical axis" is only allowed in the capture mode.

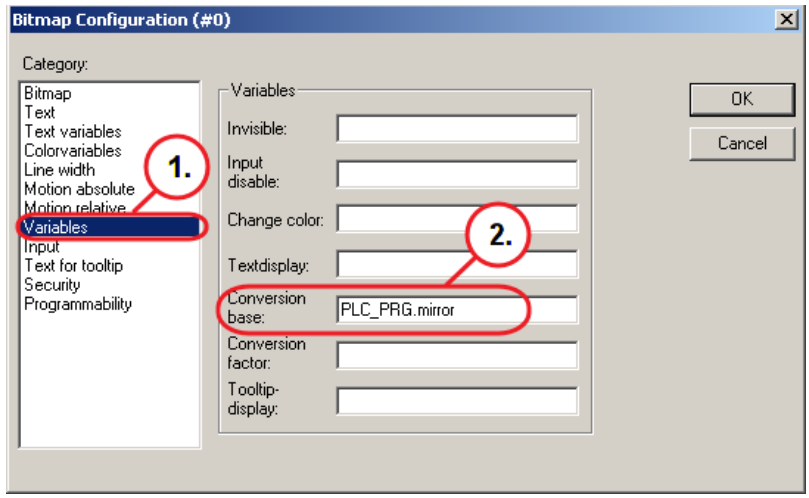
> Dialogue "Bitmap Configuration".

▶ Select the category "Variables" (1.).

▶ Enter a Boolean type variable in the field "Conversion base" (2.) (in this example the variable: PLC_PRG.mirror).

(→ 5.1 Configure the camera bitmap in the dialogue [Bitmap Configuration])

▶ Click on [OK].




### 5.6.4 Rotate the camera image

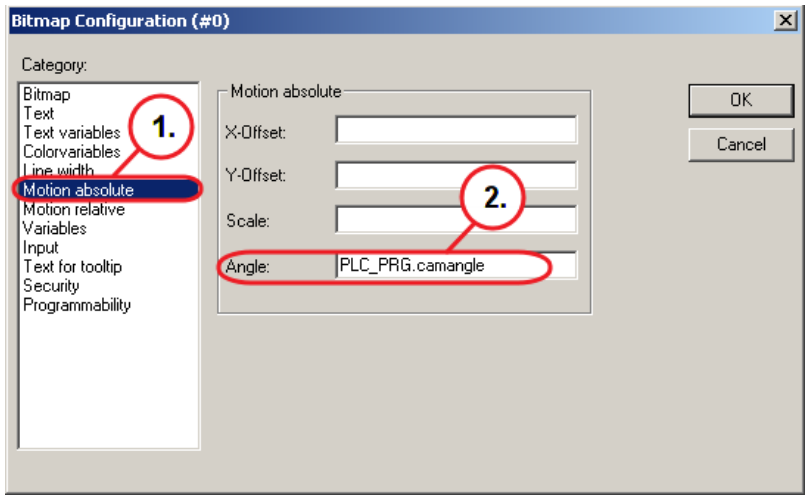
The camera image can be rotated by the angle values 0, 90, 180 or 270. Other values are not permitted.
This function is only permitted in the capture mode.

> Dialogue "Bitmap Configuration".

▶ Select the category "Motion absolute" (1.).

▶ Enter a variable of type INT in the field "Angle" (2.) (in this example the variable: PLC_PRG.camangle).

▶ Click on [OK].



# 6 Note on the use of analogue camera images in CODESYS

**Note:**

Only one camera image can be displayed at a time.

The cameras are automatically switched off before each change of image. If the cameras are needed on the new camera image, the user must explicitly activate them.

Only the visible area of the display (800 x 480 pixels) can be used for the camera image. Positions outside this area (in the non-visible area) are ignored.

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# 7 Execute program

When the program and the respective visualisation for the representation of the analogue camera image have been created, take the following steps:

PDM360 NG:

► Select the menu "LOAD APPLICATION" at the PDM360NG process and dialogue module.

> The screen of the PDM360 NG turns white.

CODESYS:

► Select "Project" in the menu bar.

► Select "Clean all".

► Select "Rebuild all".

> The program is rebuilt.

► Click on [Login].

► Acknowledge all system questions.

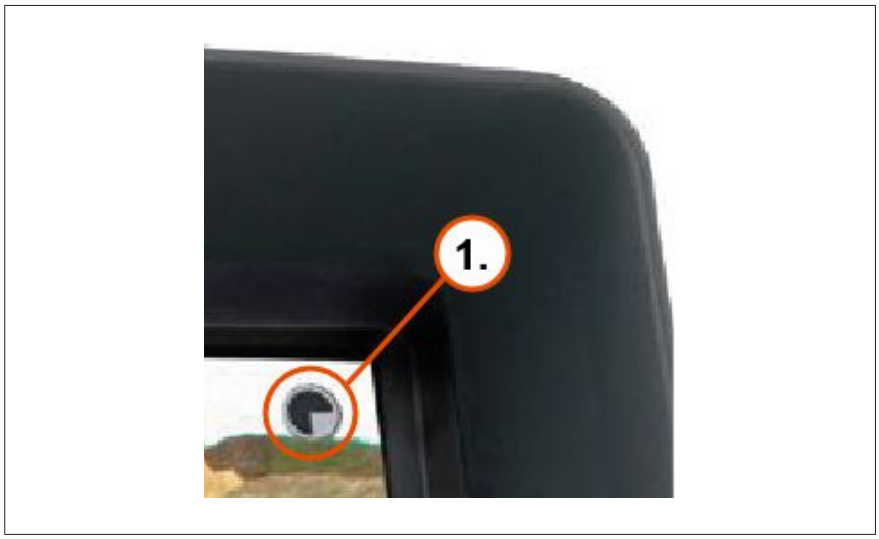
► Click on [Start].

> Project starts on PMD360 NG.

► Create boot project.

# 8 Check activity of the camera

The process and dialogue module PDM360 NG shows at a glance if the camera is active. If it is active, the live ticker (1.) rotates in the camera image at the top right.




In particular in static scenes it can be quickly checked with the live ticker if the camera is active and functions.

# 9 Provide camera error messages

If any errors occur when external cameras are used, the system automatically generates error messages. They help to diagnose the cause(s) of the error.

The following settings have to be made to visualise the error messages:

► Declare a global variable of type STRING in CODESYS, e.g. ErrorMessage.

► Select the visualisation object that contains the camera bitmap in the tab [Visualization].

> The visualisation object of the camera is displayed.

► Right-click on the camera bitmap.

> The context menu appears.

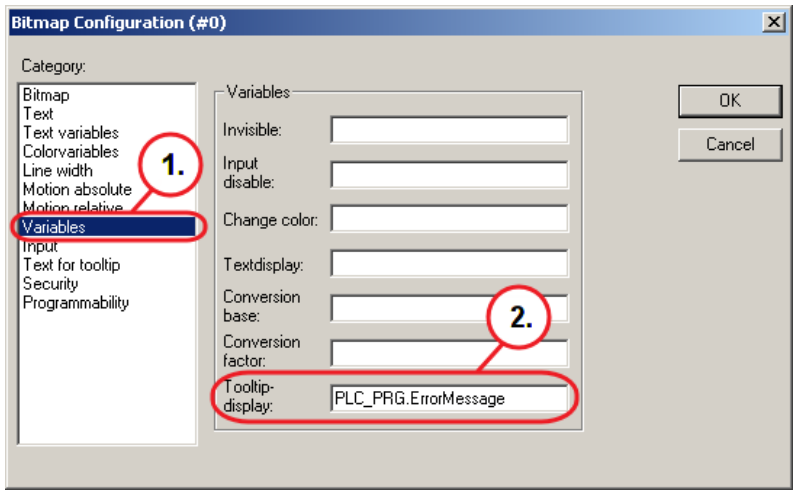
► Select the sub-menu [Configure].

> "Bitmap configuration..." appears.

► Select [Variables] (1.).

► Enter the name of the STRING variable in the field [Tooltip display] (2.) (in this example: PLC_PRG. ErrorMessage).

► Click on [OK].




## 9.1 Error messages

| Error message | Camera type | Possible cause | Measure |
|---|---|---|---|
| invalid target area | Analogue | The camera image is not completely in the visible area of the display | Check the settings of the camera (→ 5.6.1 Create bitmap for camera image). |
| invalid rotation angle | Analogue | The indicated angle of rotation is invalid | Check the settings of the camera. Valid angles: 0°, 90°, 180° and 270° (→ 5.6.4 Rotate the camera image). |
| framebuffer or plane can't be used exclusively | Analogue | During set-up of the analogue camera an Ethernet camera is already running in the overlay mode (the analogue camera is not switched on) | Set the Boolean variable for switching the analogue camera on and off to FALSE |