ifm electronic

CE
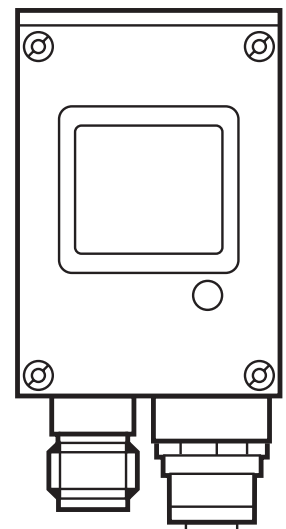
Device manual
Ethernet camera
for mobile applications

UK

efector250

O2M113

Content

1 Preliminary note

1.1 Symbols used

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

⚠ Important note
Non-compliance can result in malfunctions or interference.

ℹ Information
Supplementary note

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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 are part of the device. It contains information and illustrations about 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 people 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 device 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 separation 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 connection terminals 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 electronic gmbh may be connected.

2.4 Tampering with the unit

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

3 Functions and features

The Ethernet camera serves for monitoring of areas outside of the field of view in mobile vehicles and utility vehicles. Connection, control and visualisation of the images is carried out via a process and dialogue module with colour display.

The camera operates as a server and permanently transmits images to the connected dialogue module.

Applications are for example:

● Rear area or blind spot monitoring for municipal vehicles
● Machine monitoring in construction machinery
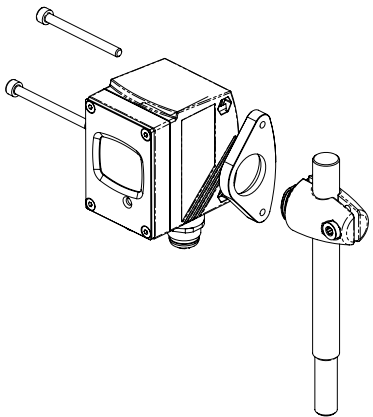● Rear view camera on vehicles

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3.1 Features at a glance

● 10/100 Mbit/s Ethernet interface
  (10Base-T/100Base-TX according to IEEE 802.3/802.3u)
● Sealed diecast zinc housing
● Protection rating IP 69K
● Regulated lens heating (can be deactivated)
● CMOS image sensor, resolution ¼ VGA, 320 x 240 pixels
● Angle of aperture 115°
● Operation display via integrated LED

4 Mounting

4.1 Mounting accessories

The device is supplied without mounting accessories.
Depending on the intended location and type of mounting the following mounting accessories are available:

Mounting accessories (examples)		Art. no.
	Mounting set for shaft Ø 12 mm (clamp cylinder and fixing element for the types O2D, O2M)	E2D110
	Shaft, straight Ø 12 mm, length 130 mm, M10	E20938
	Shaft, angled Ø 12 mm, length 200 mm, M10	E20940
	Mounting set for shaft Ø 14 mm (clamp cylinder and fixing element for the types O2D, O2M)	E2D112
	Shaft, straight Ø 14 mm, length 130 mm, M12	E20939
	Shaft, angled Ø 14 mm, length 200 mm, M12	E20941

You can find more information about the available accessories at:

www.ifm.com → Data sheet direct → e.g. E2D110
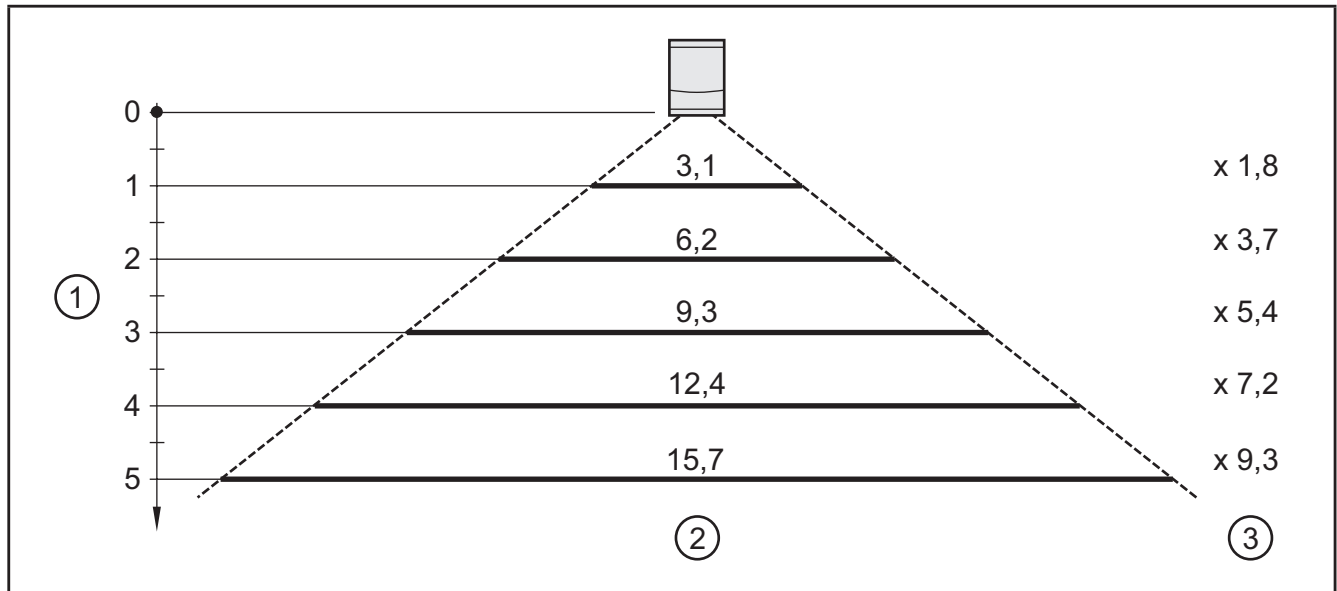
4.2 Mounting dimensions

Mounting is done using two M4 x L screws.
Mounting dimensions of the camera → 8 Technical data (data sheet).

4.3 Mounting location

► Mount the camera in front of or above the area to be monitored.

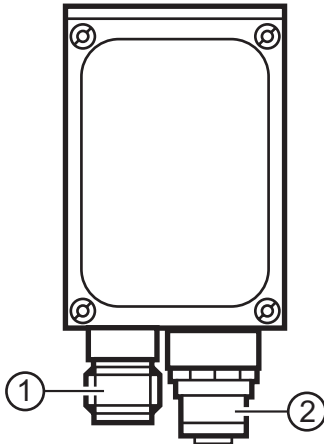The size of the area to be monitored depends on the operating distance:

operating distance and field of view size

1. operating distance [m]
2. width of field of view [m]
3. height of field of view [m]

► To avoid adverse effects on the image detection, avoid installation in heavily polluting areas of the machine (e.g. splashing water, tyre abrasion, etc.).
► Avoid back light.
► Do not position lighting elements directly facing the camera lens.
► Mount the device in such a way that the cables / connectors are connected from below.
► The connected cables must be provided with a strain relief.

5 Electrical connection

5.1 Ethernet camera

Supply voltage (1)		
M12 connector, A-coded, 4 poles		
	1	8...32 V DC
	2	n.c.
	3	0 V
	4	n.c.
Ethernet (2)		
M12 socket, D-coded, 4 poles		
	1	Ethernet TxD +
	2	Ethernet RxD +
	3	Ethernet TxD -
	4	Ethernet RxD -

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For information about available connectors please go to:
www.ifm.com → Products → Accessories → Connection technology → Selector

The supply voltage is electrically separated from the housing.

5.1.1 Ethernet connection

► Use a shielded CAT5 cable.
(STP, Shielded Twisted Pair, according to EIA/TIA-568). Max. length 100 m
► Use screened connector housings
► Connect the screen of the Ethernet cable to the connector housing.
► Avoid transmission problems caused by induction.
► Do not lay the Ethernet connection cable in parallel to current-carrying cables.
► Lay supply and signal cables away from the camera using the shortest possible route.

5.1.2 Interference due to external influences

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

5.2 PC / notebook

Connection to a PC or to a notebook may be necessary for service purposes (e.g. setting of the IP address).

Ethernet interface
8-pole RJ45 connector

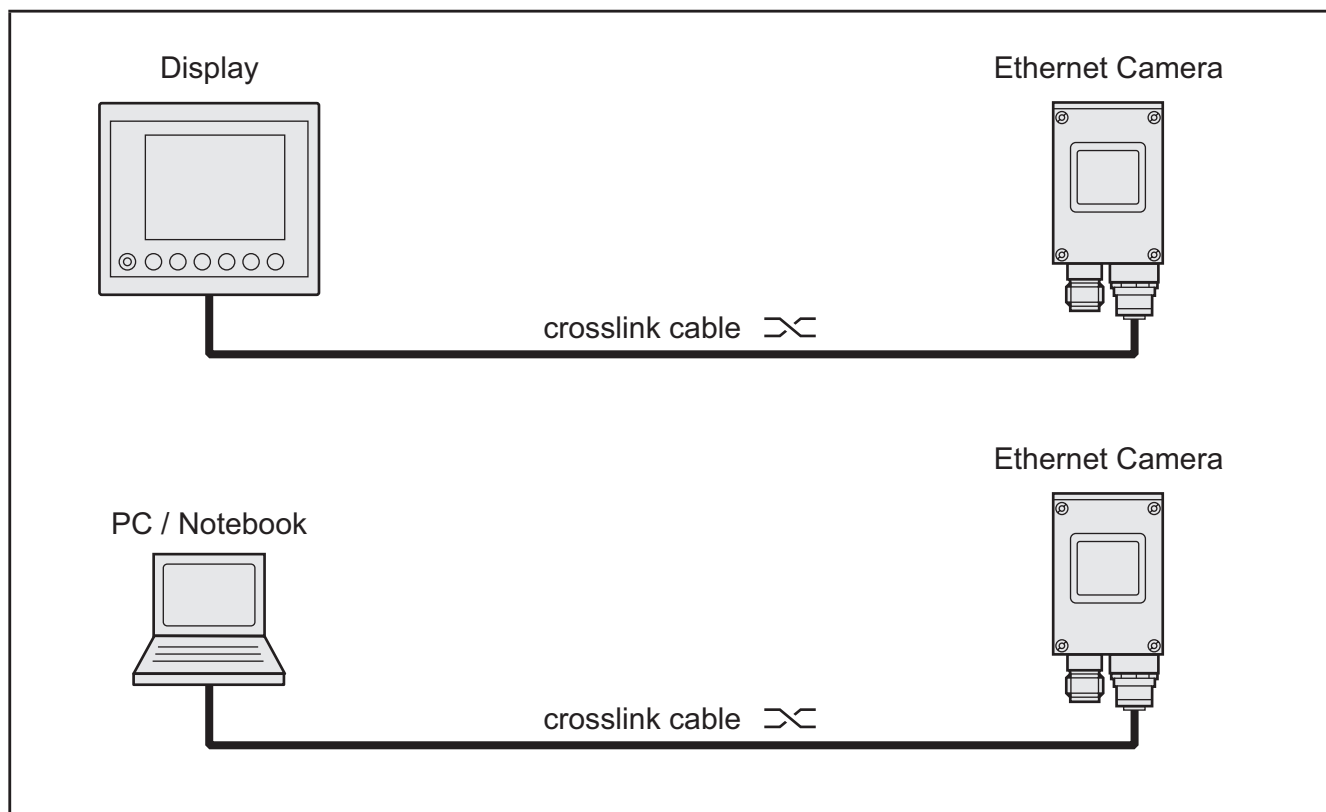|	
1	TxD+	Pair 1
2	TxD–	"
3	RxD+	Pair 2
6	RxD–	"

The IP address range (Net ID) of the PC must correspond to the IP address range of the camera. For the PC / notebook the setting is carried out in the Control Panel → Network Connections → Properties.

(also see → 7.2 IP address allocation Ethernet cameras)

5.3. Connection without hub / switch
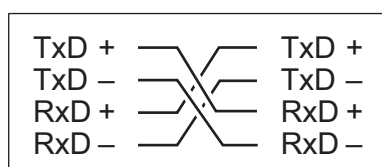
► Use a crosslink cable.

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Connection principle without hub / switch
One camera at a display or at a PC / notebook (e.g. service mode)

ℹ️ Crosslink cable = crossover cable = for the direct connection of network participants

Crosslink cable principle
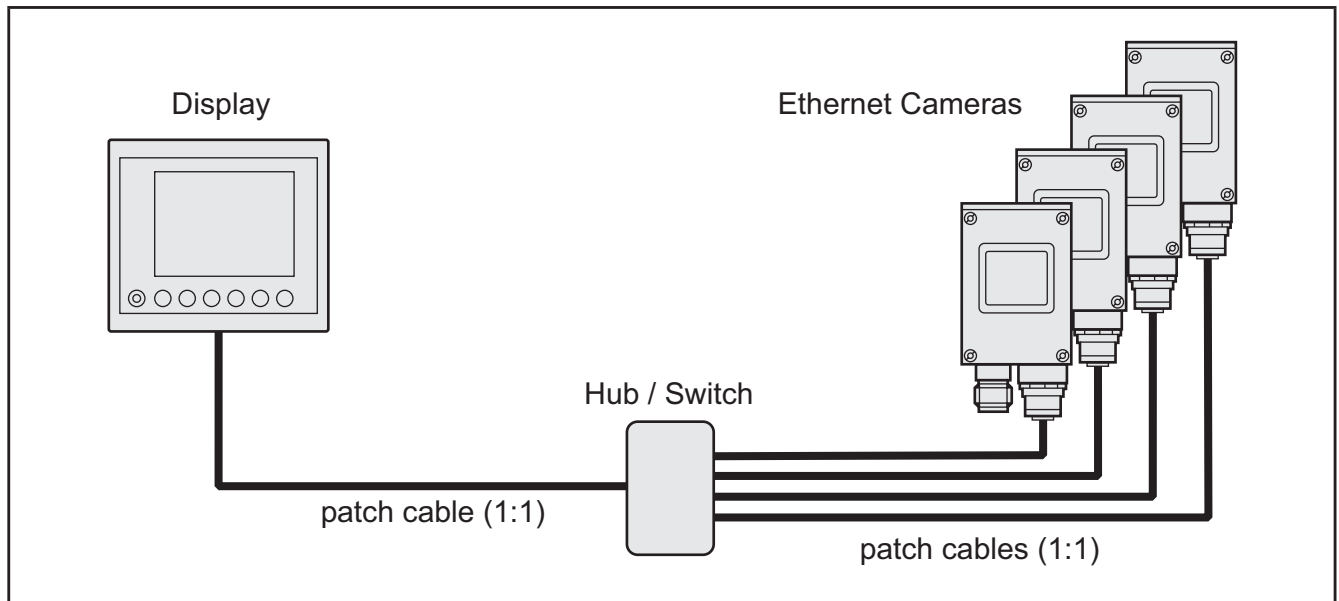

Cross link cable (example)	Art. no.
Ethernet connection cable, 2 m M12 connector (4 poles, D coded) - RJ45 (8 poles)	E11898

For further information about the connector go to:
www.ifm.com → Data sheet direct: → E11898

5.4 Connection with hub / switch
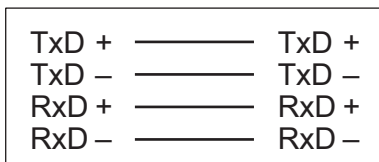
► Use a patch cable.

Connection principle with hub / switch
Several cameras at one display

Patch cable = uncrossed cable = 1:1 wiring = straight-through cable = point-to-point

Patch cable principle

```
TxD +  ————  TxD +
TxD –  ————  TxD –
RxD +  ————  RxD +
RxD –  ————  RxD –
```
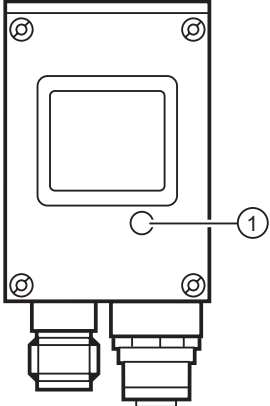
► Adhere to the documentation of the switch manufacturer.

Some switches have an "autocrossing" function.
The transmit and receive wires are automatically recognised by these devices.

In this case, 1:1 patch cables are not compulsory.

6 Operation display

LED green (1)		
Status	Description	
ON	supply voltage ok camera ready for operation	
OFF	no supply voltage power supply interrupted	

Operation display O2M113

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7 Set-up

7.1 IP addresses

The address ranges of all network participants must be identical. This range of the IP address is also called Net ID.

Network participant	Address range (Net ID)	Host ID
Ethernet camera *		**15**
Display (example)	192.168.82	**247**
PC / notebook (example)		**100**

*) Factory setting (subnet mask 255.255.255.0, class C)

7.2 IP address allocation cameras

► When using several cameras, set the IP addresses of the cameras via the "Hypertext Transfer Protocol" (HTTP).
To do so, use standard programs such as Microsoft Internet Explorer, Mozilla Firefox or Opera.
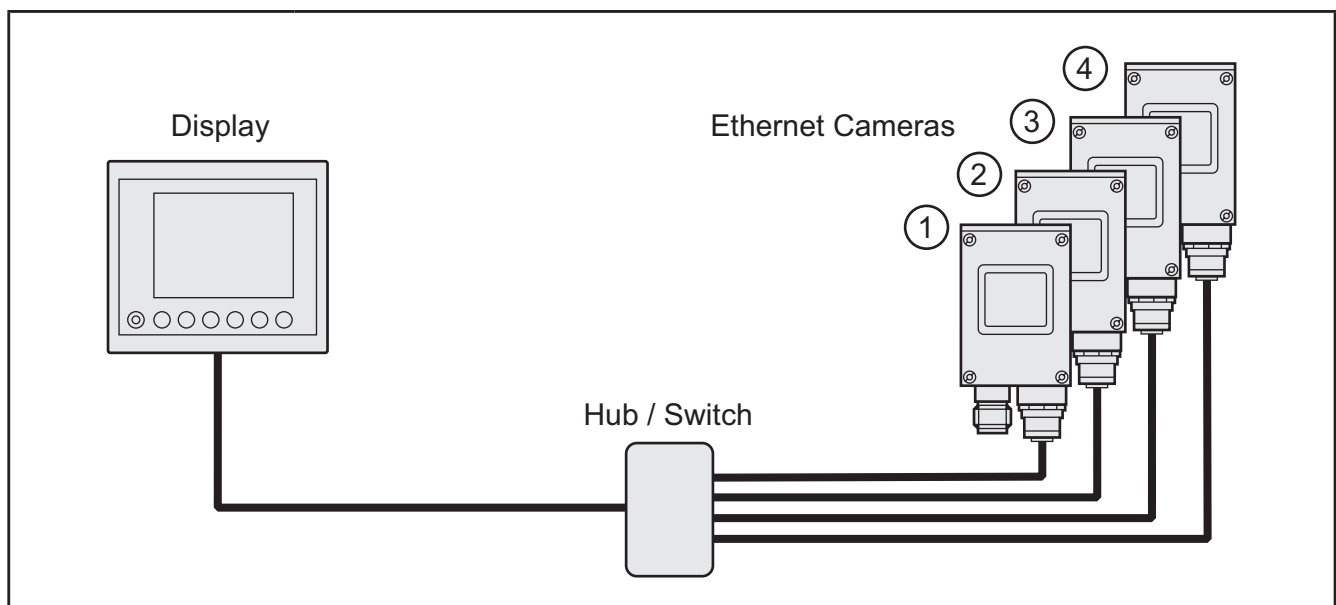
IP address allocation when using 4 cameras (example)

Ethernet camera 1   192.168.82.15 (factory setting)
Ethernet camera 2   192.168.82.16
Ethernet camera 3   192.168.82.17
Ethernet camera 4   192.168.82.18
Display   192.168.82.247

Procedure:

► Check the IP settings of the PC / notebook and change them if necessary.
Internet protocol: TCP / IP
IP address: 192.168.82.xxx (except 15)

Subnet mask: 255.255.255.0
Gateway IP address: 192.168.82.15
Speed and duplex: automatically (auto negotiation)

The settings of the LAN connection and the configuration of the network adapter can be found at: Start → Control → Network Connections → LAN connection.

► Establish an Ethernet connection between the camera and the PC / notebook.

► Connect the camera to supply voltage.
Do not interrupt the supply voltage during IP address allocation!
Avoid voltage fluctuations during IP address allocation!

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► Open the internet browser.

► Enter the preset IP address of the camera in the address line of the browser and confirm with [Enter] (http://192.168.82.15/).

> In the browser appears the "O2M1xxx WebConfig" start window.

► Click on [Change IP address]
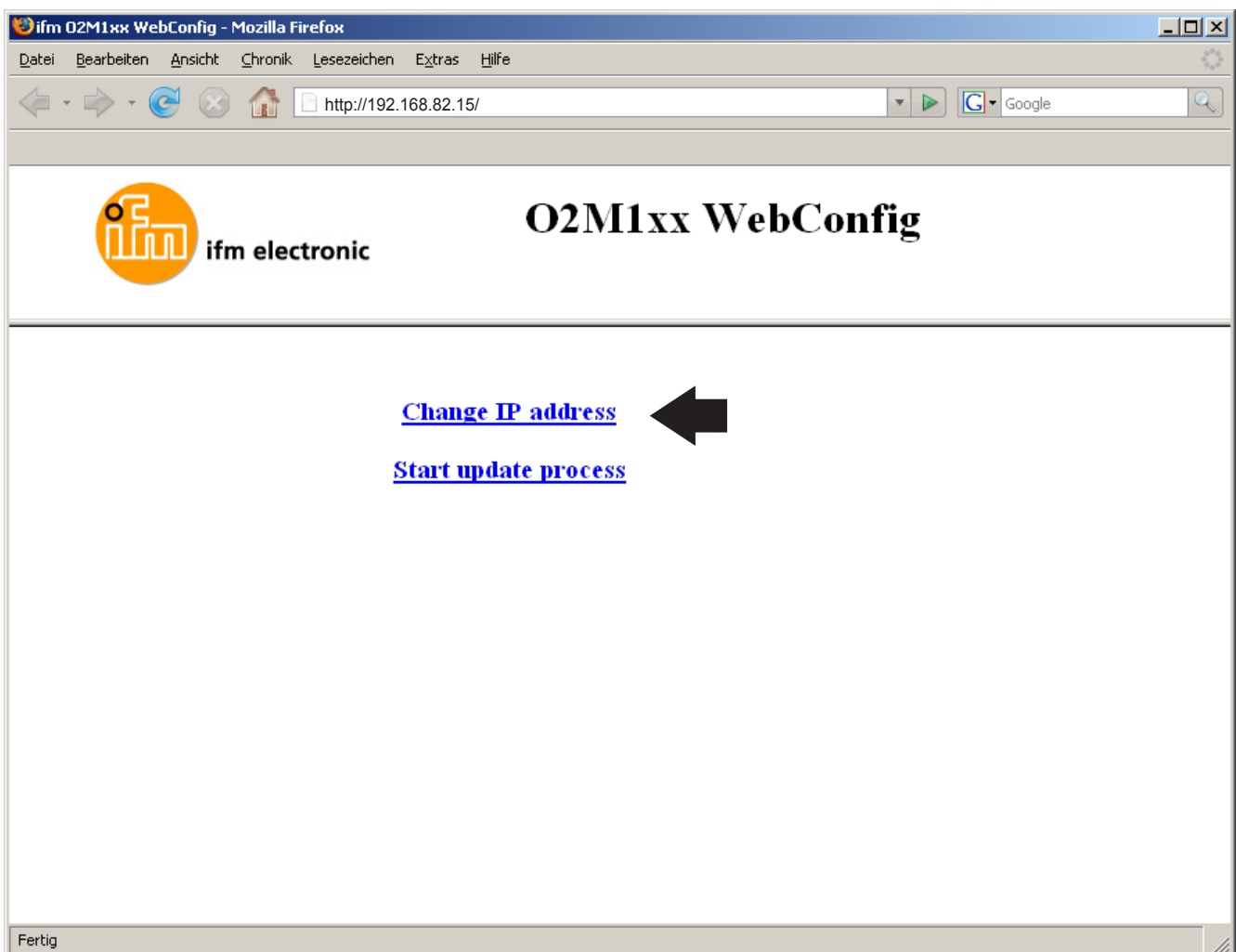
Start window "O2M1xx WebConfig"

► Enter the new address in the field [IP address] and click on [Submit] to send it to the camera.

O2M1xx IP configuration

The factory settings in [Netmask], [Gateway] and [Force Ethernet Speed] can be adopted.

> A confirmation appears if the address was successfully written to the flash memory of the camera.

Confirmation of the address change

> An error message appears if you have tried to send an invalid address to the camera.

Error message in case of invalid IP address (e.g. wrong address range)

► In case of an error message correct the entered IP address and send it again to the camera with [Submit].

7.2.1 Checking the IP address

⚠ An inadvertent, wrong address allocation makes subsequent communication with the camera impossible. For this reason, the following final test must be carried out.

► Click on [Reboot].

► Enter the new IP address of the camera in the address line of the browser and confirm with [Enter] (here e.g.: http://192.168.82.16/).
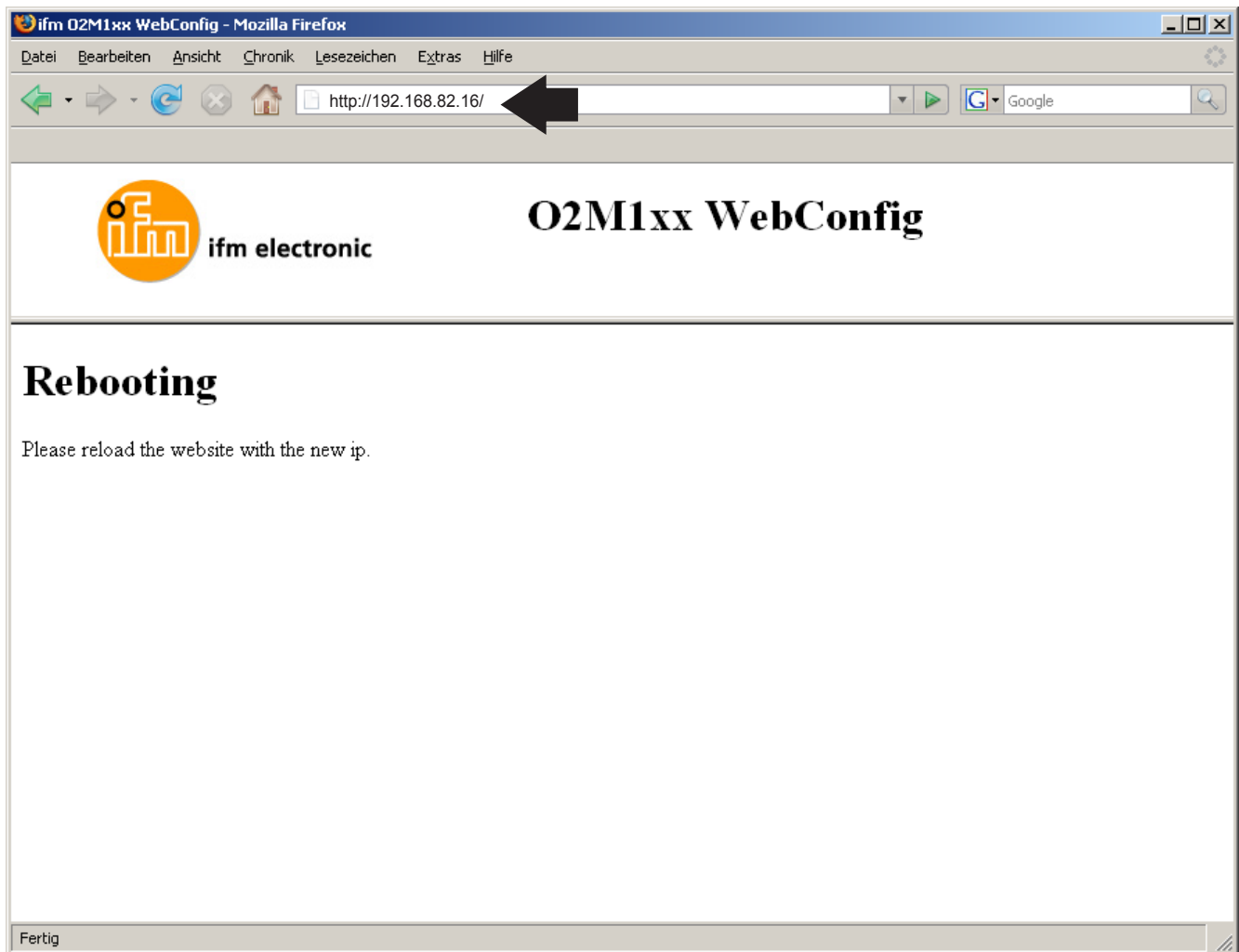
Reboot request to check the allocated IP address

> If the address corresponds to the previously allocated address, the "O2M1xxx WebConfig" start window appears again.

ℹ The new camera IP address will become effective on reboot. (camera supply voltage off/on).

► Repeat chapters 7.2 and 7.2.1 with further cameras.

8 Technical data

O2M113

Ethernet camera

Angle of aperture 115°

Lens heating

1) Centre of the lens axes

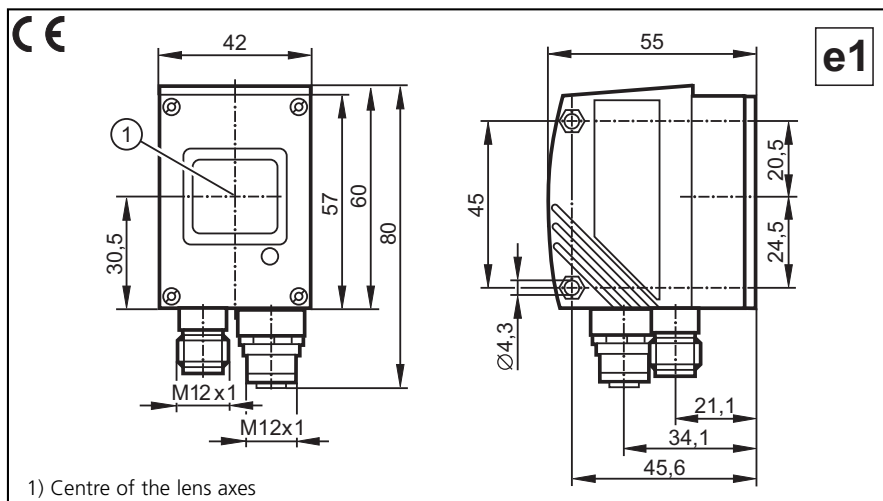| **Electrical design**		DC					

	-	**1**	**2**	**5**	**-**	**-**
Operating distance [m]						
Field of view size [m]	**-**	**3.1 x 1.8**	**6.2 x 3.7**	**15.7 x 9.3**	**-**	**-**

Operating voltage	[V]	8...32 DC
Power consumption	[W]	typ. 4 (excl. lens heating)
Lens heating	[W]	typ. 6
Type of sensor		CMOS image sensor colour, QVGA resolution 320 x 240
Image repetition rate	[Hz]	min. 15
Protocol Data format		image transmission via UDP/IP 8-bit Windows® bitmap format / image format QVGA
Readiness for operation	[LED]	green
Operating temperature	[°C]	-30...75
Storage temperature	[°C]	-40...85
Protection		IP 69K, III
Standards, tests		DIN EN 61326 / IEC 60255-5 / DIN EN 61373 cat. 1B / Automotive Directive 05/49/EC (e1)
Materials		housing: diecast zinc / coating: cathodic dip painting (KTL) front lens: glass
Interface		Ethernet 10Base-T / 100Base-TX
Transmission rate		10/100 Mbits/s (adjustable)
IP address (default)		192.168.82.15
Wiring		

Power supply connection: M12, 4-pole

1: U+
2: not connected
3: 0 V
4: not connected

Parameter setting connection: M12, 4-pole, D-coded

1: TD+
2: RD+
3: TD-
4: RD-

9 Maintenance, repair and disposal

⚠ Keep the lens window of the camera free from soiling.
Soiling may considerably affect the image quality!

► To clean the lens window, do not use any detergents or solvents which might damage the front glass.

► Do not open the housing, as the device does not contain any components which must be maintained by the user. The device must only be repaired by the manufacturer.

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► Dispose of the device in accordance with the national environmental regulations.

10 Approvals / standards

Test standards and regulations → 8 Technical data.