Installation and service instructions

for contractors

EM-EA1 extension

DIO electronics module
Function extension

EM-EA1 extension

6131087 GB 1/2020

Please keep safe.

Safety instructions

⚠ Please follow these safety instructions closely to prevent accidents and material losses.

Safety instructions explained

⚠ **Danger**
This symbol warns against the risk of injury.

! **Please note**
This symbol warns against the risk of material losses and environmental pollution.

Note
Details identified by the word "Note" contain additional information.

Target group

These instructions are exclusively intended for qualified contractors.

- Work on gas installations may only be carried out by a registered gas fitter.
- Work on electrical equipment may only be carried out by a qualified electrician.
- The system must be commissioned by the system installer or a qualified person authorised by the installer.

Regulations to be observed

- National installation regulations
- Statutory regulations for the prevention of accidents
- Statutory regulations for environmental protection
- Codes of practice of the relevant trade associations
- Relevant country-specific safety regulations

Safety instructions for working on the system

Working on the system

- Where gas is used as the fuel, close the main gas shut-off valve and safeguard it against unintentional reopening.
- Isolate the system from the power supply, e.g. by removing the separate fuse or by means of a mains isolator, and check that it is no longer live.
- Safeguard the system against reconnection.
- Wear suitable personal protective equipment when carrying out any work.

Safety instructions (cont.)

⚠ **Danger**
Hot surfaces and fluids can lead to burns or scalding.
- Before maintenance and service work, switch OFF the appliance and let it cool down.
- Never touch hot surfaces on the boiler, burner, flue system or pipework.

! **Please note**
Electronic assemblies can be damaged by electrostatic discharge. Prior to commencing work, touch earthed objects such as heating or water pipes to discharge static loads.

Repair work

! **Please note**
Repairing components that fulfil a safety function can compromise the safe operation of the system. Replace faulty components only with genuine Viessmann spare parts.

Auxiliary components, spare and wearing parts

! **Please note**
Spare and wearing parts that have not been tested together with the system can compromise its function. Installing non-authorised components and making non-approved modifications or conversions can compromise safety and may invalidate our warranty.
For replacements, use only original spare parts supplied or approved by Viessmann.

Safety instructions (cont.)

Safety instructions for operating the system

If you smell gas

⚠ **Danger**
Escaping gas can lead to explosions which may result in serious injury.
- Do not smoke. Prevent naked flames and sparks. Never switch lights or electrical appliances on or off.
- Close the gas shut-off valve.
- Open windows and doors.
- Evacuate any people from the danger zone.
- Notify your gas or electricity supply utility from outside the building.
- Have the power supply to the building shut off from a safe place (outside the building).

If you smell flue gas

⚠ **Danger**
Flue gas can lead to life threatening poisoning.
- Shut down the heating system.
- Ventilate the installation site.
- Close doors to living spaces to prevent flue gases from spreading.

What to do if water escapes from the appliance

⚠ **Danger**
If water escapes from the appliance there is a risk of electrocution.
Switch OFF the heating system at the external isolator (e.g. fuse box, domestic distribution board).

⚠ **Danger**
If water escapes from the appliance there is a risk of scalding.
Never touch hot heating water.

Condensate

⚠ **Danger**
Contact with condensate can be harmful to health.
Never let condensate touch your skin or eyes and do not swallow it.

Flue systems and combustion air

Ensure that flue systems are clear and cannot be sealed, for instance due to accumulation of condensate or other external causes.
Ensure an adequate supply of combustion air.
Inform system users that subsequent modifications to the building characteristics are not permissible (e.g. cable/pipework routing, cladding or partitions).

⚠ **Danger**
Leaking or blocked flue systems, or an inadequate supply of combustion air can cause life threatening poisoning from carbon monoxide in the flue gas.
Ensure the flue system is in good working order. Vents for supplying combustion air must be non-sealable.

Extractors

Operating appliances that exhaust air to the outside (extractor hoods, extractors, air conditioning units, etc.) can create negative pressure. If the boiler is operated at the same time, this can lead to a reverse flow of flue gas.

Safety instructions (cont.)

⚠ **Danger**
The simultaneous operation of the boiler and appliances that exhausts air to the outside can result in life threatening poisoning due to a reverse flow of flue gas.
Fit an interlock circuit or take suitable steps to ensure an adequate supply of combustion air.

Index

Disposal of packaging

Please dispose of packaging waste in line with statutory regulations.

Symbols

Symbol	Meaning
	Reference to other document containing further information
	Step in a diagram: The numbers correspond to the order in which the steps are carried out.
	Warning of material losses and environmental pollution
	Live electrical area
	Pay particular attention.
	▪ Component must audibly click into place. or ▪ Acoustic signal
	▪ Fit new component. or ▪ In conjunction with a tool: Clean the surface.
	Dispose of component correctly.
	Dispose of component at a suitable collection point. Do **not** dispose of component in domestic waste.

Intended use

The appliance is only intended to be installed and operated in sealed unvented heating systems that comply with EN 12828, with due attention paid to the associated installation, service and operating instructions as well as the details in the datasheet.
It is only designed for the heating up of heating water.

Commercial or industrial usage for a purpose other than the heating up of heating water shall be deemed inappropriate.

Intended use presupposes that a fixed installation in conjunction with permissible components designed for this purpose has been carried out.
Every other use will be deemed to be inappropriate. Any resulting losses are excluded from the manufacturer's liability.

Any usage beyond this must be approved by the manufacturer for the individual case.

Intended use also includes the adherence to maintenance and inspection intervals.

Product information

Depending on the heat generator, a maximum of 3 EM-EA1 function extensions can be connected.
Only one function can be connected to each EM-EA1 function extension (DIO electronics module).
The functions that can be connected depend on the settings made at the heat generator.

Heat generator installation and service instructions

System examples

Available system examples: See **www.viessmann-schemes.com**.

Spare parts lists

Information about spare parts can be found at **www.viessmann.com/etapp** or in the Viessmann spare part app.

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GET IT ON Google Play

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Wall mounting

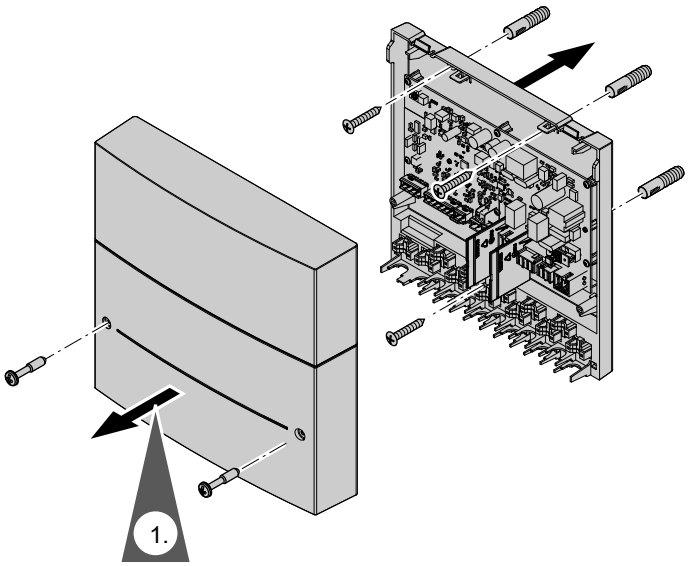

Fig. 1

Overview of electrical connections

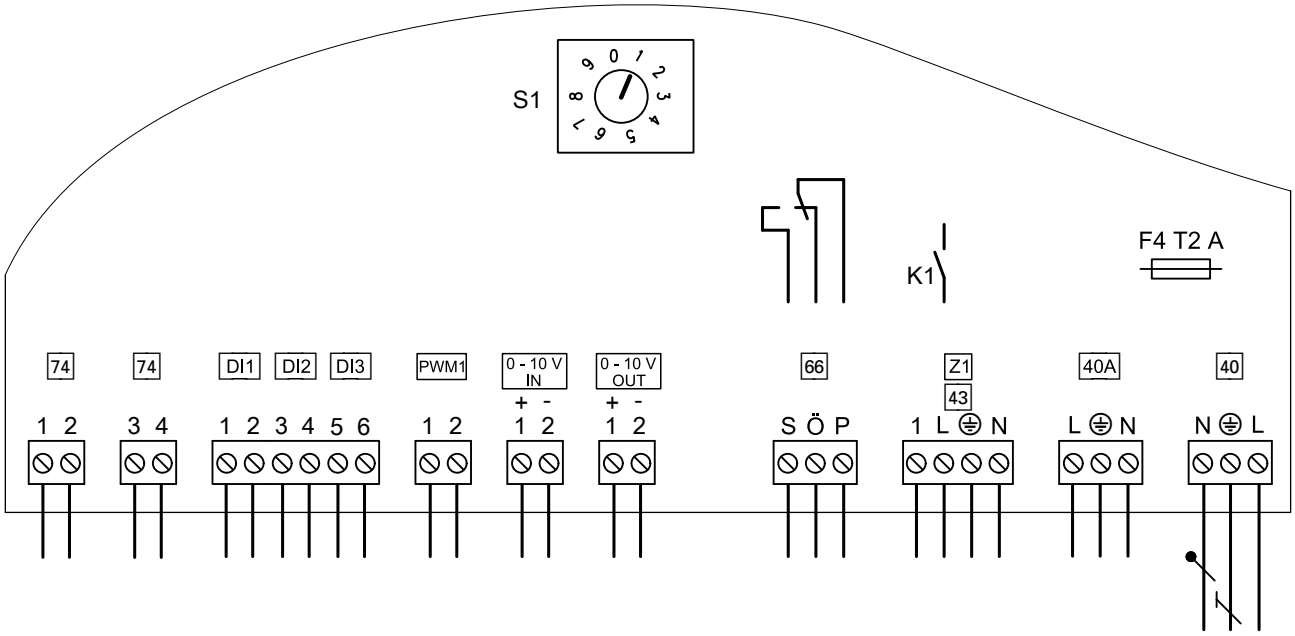

Fig. 2

DI1	Digital input 1	Z1 43	230 V relay output, 230 V input
DI2	Digital input 2	40	Power supply
DI3	Digital input 3	40 A	Power supply for additional accessories
0 - 10 V IN	0 to 10 V input	66	Changeover contact (floating switching contact) for connecting signalling equipment for fault messages or an extractor hood
0 - 10 V OUT	0 to 10 V output		
F4	Fuse 2 A (slow)		
PWM1	Control voltage output		
S1	Rotary switch for subscriber number addressing	74	PlusBus

Overview of electrical connections (cont.)

Function	Page	Connections:								
		DI1	DI2	DI3	PWM1	0 - 10 V		66	43	
						IN	OUT		43-1	43-L
External functions										
▪ External set flow temperature 0 to 10 V	11					X			X	
▪ External set value for heat generator modulation 0 to 10 V	11					X			X	
▪ Operating mode changeover	12	X	X	X						
▪ External heating circuit hook-up	12	X	X	X						
▪ External demand	13								X	
▪ External blocking	13								X	
Fault message input and fault message output										
▪ Fault message input 230 V (without system blocking)	14							X	X	
▪ Fault message input 230 V and system blocking	14							X	X	
▪ Fault message input 24 V and system blocking	15	X						X		
▪ Connecting only message facility (e.g. buzzer)	15							X		
LPG valve (external)	16									X
Extractor hood (external extractor interlock)	16							X		

Electrical connections

Please note
Electronic assemblies can be damaged by electrostatic discharge.
Prior to commencing any work, touch earthed objects such as heating or water pipes to discharge static loads.

- Apply strain relief to on-site cables.
- Seal any unnecessary apertures with cable grommets (not cut open).

Danger
Incorrect wiring can lead to serious injury from electrical current and result in appliance damage.
Take the following measures to prevent wires drifting into the adjacent voltage area:

- Route extra low voltage (ELV) leads < 42 V separately from cables > 42 V/230 V~/400 V~. Secure with cable ties.
- Strip as little of the insulation as possible, directly before the terminals. Bundle the cables close to the corresponding terminals.
- If 2 components are connected to the same terminal, press both cores together in a **single** wire ferrule.
- When connecting external switching contacts and on-site components, observe the insulation requirements of IEC/EN 60335-1.

Connecting external functions

Connecting external set flow temperature 0 to 10 V: 0 - 10 V IN

Analogue input for connecting the externally specified set flow temperature

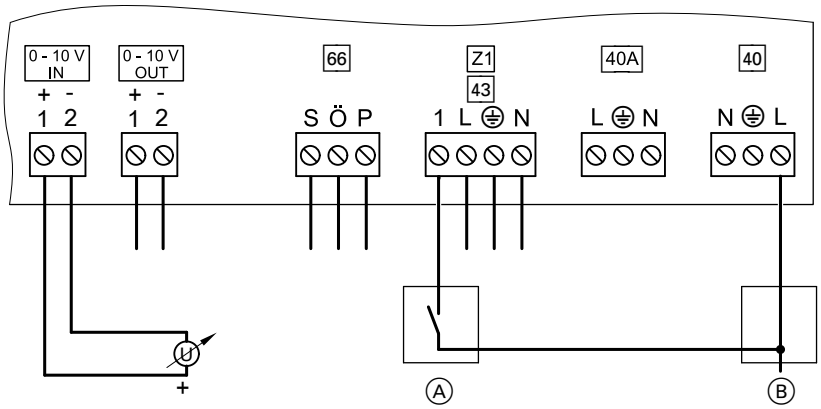

Fig. 3

Ⓐ Enable signal
Ⓑ Junction box

When making the connection, ensure correct polarity of the DC control voltage 0 - 10 V.

Note
No galvanic separation is required between the earth conductor and the negative pole of the on-site power source.

The 0 to 10 V hook-up generates the following set flow temperatures:

< 1 V	No default set flow temperature
1 V	≙ 10 °C
10 V	≙ 100 °C or max. set flow temperature in accordance with factory-set limit for heat generator

If 230 V voltage is present at digital input 43-1, the external default set flow temperature is enabled.

Connecting external set value for heat generator modulation 0 to 10 V: 0 - 10 V IN

Analogue input for connecting the external output specification

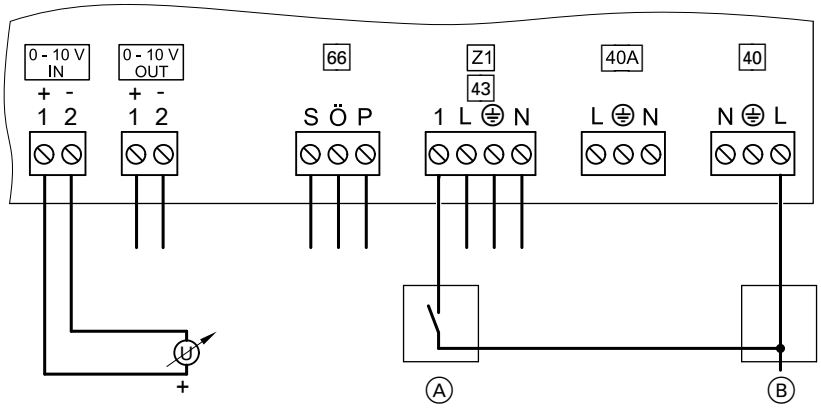

Fig. 4

Ⓐ Enable signal
Ⓑ Junction box

When making the connection, ensure correct polarity of the DC control voltage 0 - 10 V.

Connecting external functions (cont.)

Note
No galvanic separation is required between the earth conductor and the negative pole of the on-site power source.

The 0 to 10 V hook-up generates the following default output for the heat generator:
< 1 V ≙ 0 %
1 V ≙ 10 % or lower modulation limit
10 V ≙ 100 %

If 230 V voltage is present at digital input 43-1, the external default output is enabled.

Connecting the operating mode changeover: DI1 to DI3

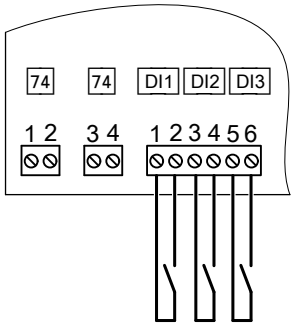

Fig. 5

- External contacts at DI1, DI2 and DI3 must be potential-free.
- When making the connection, adhere to the requirements of protection class II. That is 5.0 mm air and creep paths and 2.0 mm insulation thickness against 'live' components.

Weather-compensated operation

Contact open: Normal operation

Contact closed:
- Demand for all installed heating circuits simultaneously, with the respective programmed set room temperature of the individual heating circuit:
  DI1 Reduced room temperature
  DI2 Standard room temperature
  DI3 Comfort temperature

Continuous operation or room temperature-dependent operation

Contact open: Normal operation according to set time program

Contact closed:
- Set flow temperature demand for the system
- Demand for all installed heating circuits simultaneously, at the respective programmed temperature level of the individual heating circuit:
  DI1 Reduced flow temperature
  DI2 Standard flow temperature
  DI3 Comfort flow temperature
  (Only with continuous operation)

Connecting external heating circuit hook-up:

Only in conjunction with weather-compensated operation.
External heating circuit hook-up is only possible on the extension kit with rotary switch setting 1; see page 20.
No additional parameter settings on the heat generator are required.

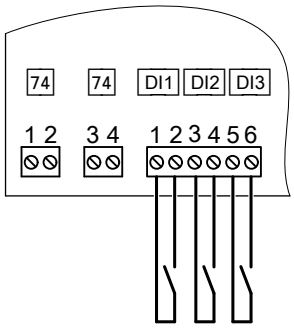

Fig. 6

Configuration of at least 2 heating circuits with the following mode of operation:
- Contact closed: External demand active. Heating circuit is supplied with heat.
- Contact open: External demand not active. Heating circuit is not supplied with heat. Independent of the current set room temperature or time program. There is no frost protection for the heating circuit.
  The following status messages are displayed on the heat generator control unit:
  - Heating circuit 1: S.94
  - Heating circuit 2: S.95
  - Heating circuit 3: S.96

Assignment:
DI1 Heating circuit 1
DI2 Heating circuit 2
DI3 Heating circuit 3

Connecting external functions (cont.)

Connecting external demand: 43

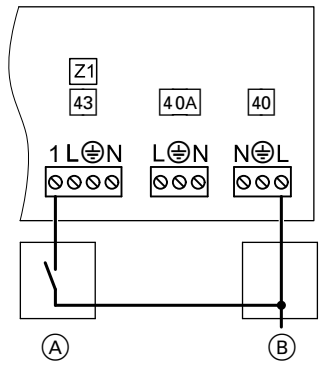

Fig. 7

Ⓐ Signal for external demand or external blocking
Ⓑ Junction box

The demand is active if 230 V voltage is present at digital input 43-1. A demand is issued to the heat generator.
The set values for the flow temperature and the speed of the primary pump are specified at the control unit of the heat generator with parameters 528.0 and 1100.2.
Message I.56 is displayed.

Connecting external blocking: 43

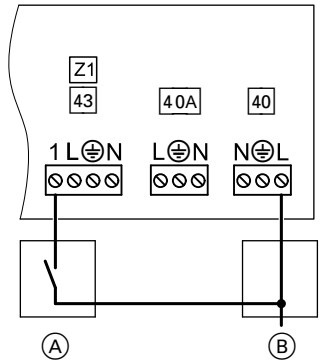

Fig. 8

Ⓐ Signal for external demand or external blocking
Ⓑ Junction box

If 230 V voltage is present at digital input 43-1, the heat generator is blocked.
Message I.57 is reported.

Connecting the fault message input and fault message output

Fault message input 230 V (without system blocking): 43

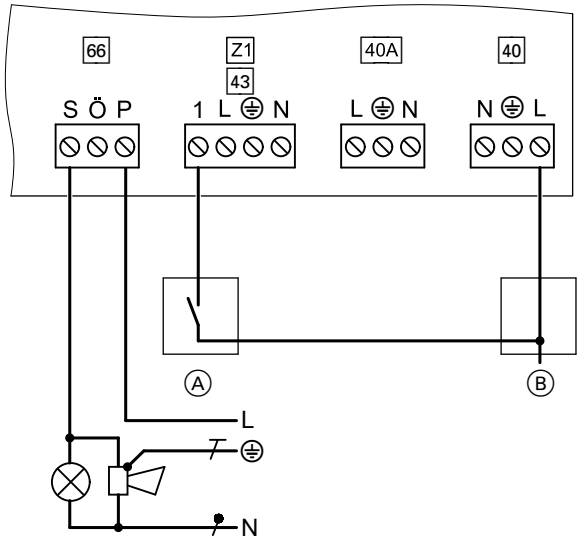

Fig. 9

Ⓐ Fault message facility
Ⓑ Junction box

- Fault message input 43-1 and conductor L of the power supply at plug 40 must be connected in phase.
- Rated current at floating fault message output 66: Max. 1 A ~.

The fault message is active if 230 V voltage is present at digital input 43-1. Floating fault message output 66 is switched over from "Ö" to "S".
Fault message F.104 is displayed on the heat generator control unit.

Fault message input 230 V and system blocking: 43

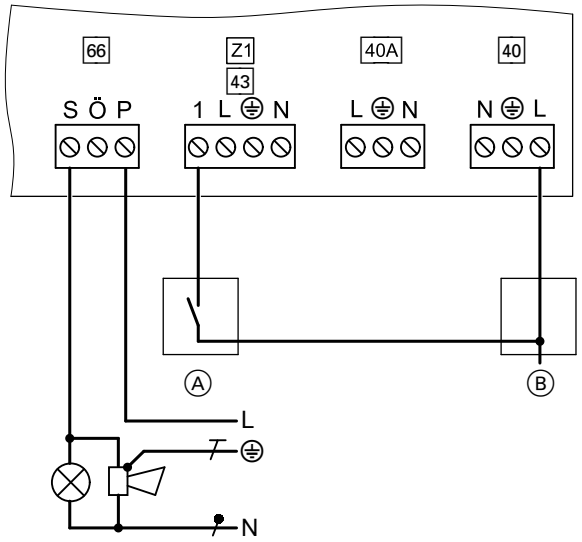

Fig. 10

Ⓐ Fault message facility
Ⓑ Junction box

- Fault message input 43-1 and conductor L of the power supply at plug 40 must be connected in phase.
- Rated current at floating fault message output 66: Max. 1 A ~.

The fault message is active if 230 V voltage is present at digital input 43-1. The heat generator is blocked. Floating fault message output 66 is switched over from "Ö" to "S".

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Connecting the fault message input and fault… (cont.)

Fault message F.104 and message I.57 are displayed on the control unit of the heat generator.

Fault message input 24 V and system blocking: DI1

Example: Connecting a condensate removal pump

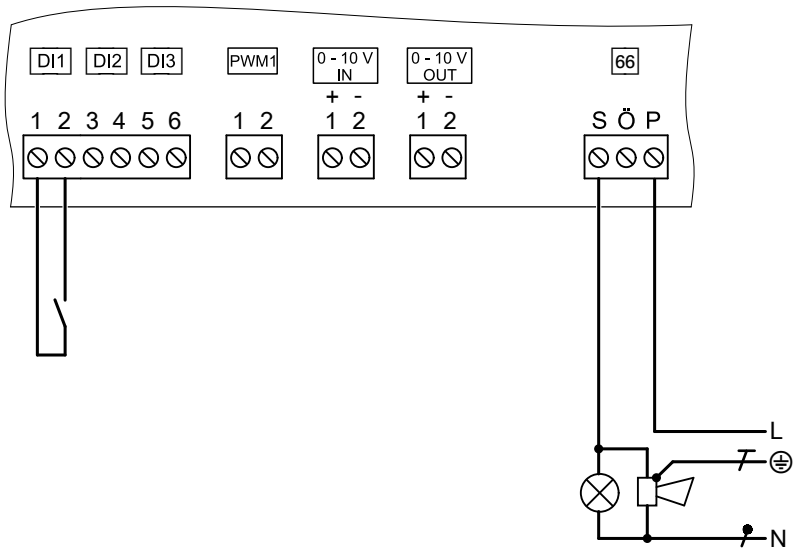

Fig. 11

- External contacts at DI1 must be potential-free. When making the connection, adhere to the requirements of protection class II. That is 5.0 mm air and creep paths and 2.0 mm insulation thickness against 'live' components.
- Rated current at fault message output 66: Max. 1 A ~.

The fault messaging is active if the digital fault message input DI1 is closed. The heat generator is blocked.
Floating fault message output 66 is switched over from "Ö" to "S".
Fault message F.104 and message I.57 are displayed on the control unit of the heat generator.

Connecting only message facility: 66

Example: Buzzer with illuminated signal switched in parallel

For this mode of operation, one of the fault message functions must be selected on the control of the heat generator, e.g. fault message input 24 V. See page 20.

Heat generator installation and service instructions

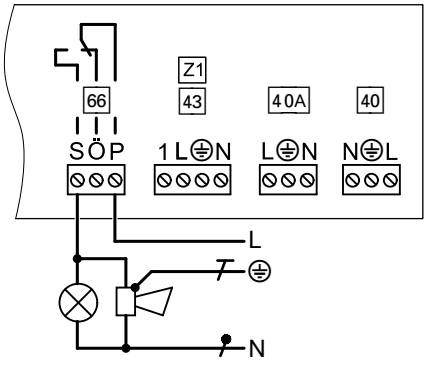

Fig. 12

Connecting an (external) LPG valve: 43

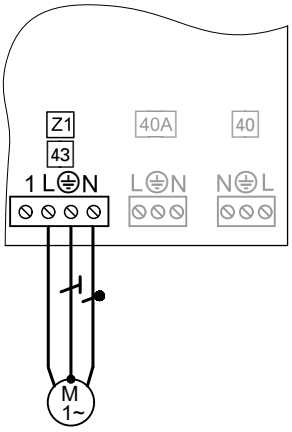

Fig. 13

Output 43-L is active as soon as the burner control unit starts the burner. The external LPG valve opens.

Connecting an extractor hood (external extractor interlock): 66

Example: Extractor hood

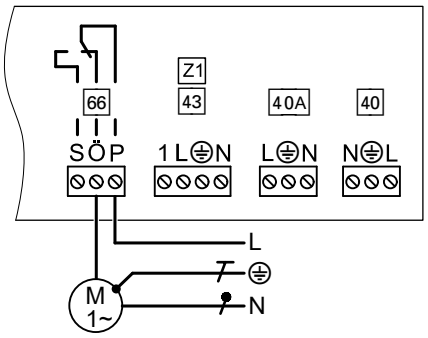

Fig. 14

The floating contact switches from "Ö" to "S" as soon as the burner control unit starts the burner. The extractor is switched off.

Connecting the PlusBus to the heat generator

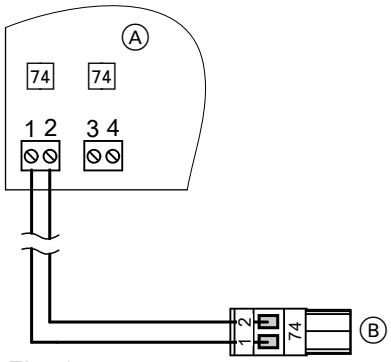

Fig. 15

Ⓐ Extension (electronics module)
Ⓑ PlusBus to heat generator

For connection to heat generators with external plug, luster terminals or spring-loaded terminals:
For the bus connection, disconnect plug 74. Connect the wires directly. The wires are interchangeable.

Heat generator installation and service instructions

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Power supply

Power supply at heat generator

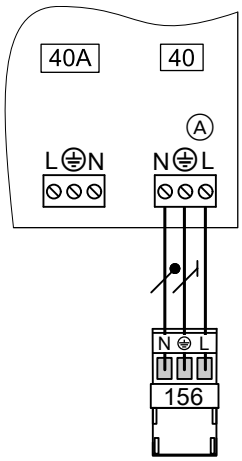

Fig. 16 Example: Power supply with plug 156

Ⓐ Extension (electronics module)
40 Power supply
40A Power supply for further accessories
156 Plug for heat generator accessories power supply

Connect the power cable to the extension.
Route the power cable to the heat generator and connect to plug 156. Observe the fuse protection of the contact (output) on the heat generator.
If the power supply is connected to another accessory, use plug 40A provided.

Heat generator installation and service instructions

Danger
Incorrect core assignment can result in serious injury and damage to the appliance.
Never interchange cores "L" and "N".

If there is no plug 156 at the heat generator:
- Use a separate power supply. See the following chapter.
  Or
- Heat generator installation and service instructions

Separate power supply

If the power supply for the extension is **not** made at the heat generator.

Danger
Incorrect electrical installations can lead to serious injury from electrical current and result in appliance damage.

Connect the power supply and implement all safety measures (e.g. RCD circuit) in accordance with the following regulations:
- IEC 60364-4-41
- VDE regulations
- Connection conditions of the local grid operator

Danger
The absence of system component earthing can lead to serious injury from electric current if an electrical fault occurs.
The appliance and pipework must be connected to the equipotential bonding of the building.

Isolators for non-earthed conductors
- The mains isolator (if installed) must simultaneously isolate all non-earthed conductors from the mains with a minimum contact separation of 3 mm.
- If **no** mains isolator is installed, all non-earthed conductors must be isolated from the power supply by the upstream circuit breaker with a minimum contact separation of 3 mm.

Power supply (cont.)

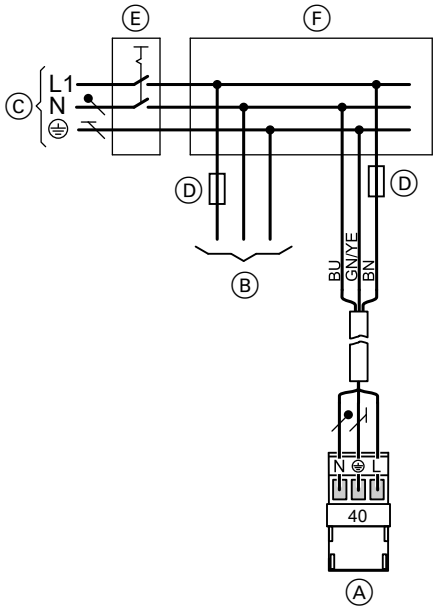

Fig. 17

Ⓐ Power supply for extension (electronics module)
Ⓑ Power supply for heat generator
Ⓒ Power supply 1/N/PE, 230 V/50 Hz
Ⓓ Fuse (max. 16 A)
Ⓔ Mains isolator, 2-pole, on site
Ⓕ Junction box (on site)

Connect the power supply in accordance with the diagram.
If the power supply to the appliance is connected with a flexible cable, ensure that the live conductors are pulled taut before the earth conductor in the event of strain relief failure. The length of the earth conductor wire will depend on the design.

Danger
Incorrect core assignment can result in serious injury and damage to the appliance.
Never interchange cores "L" and "N".

Please note
Incorrect phase sequence can cause damage to the appliance.
Ensure phase equality with the heat generator power supply.

Colour coding to IEC 60757
BN Brown
BU Blue
GNYE Green/yellow

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Connecting several accessories

Power supply and PlusBus connection

Power supply to all accessories via heat generator control unit

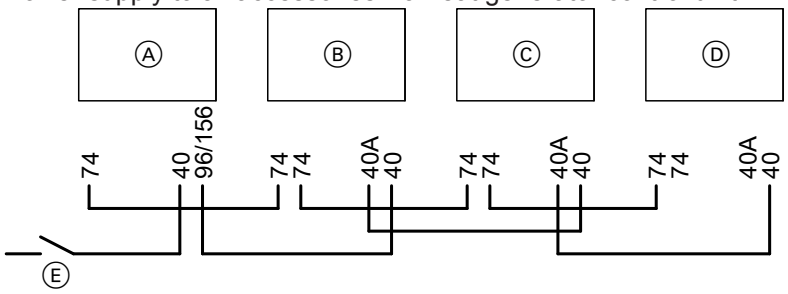

Fig. 18

Some accessories with direct power supply

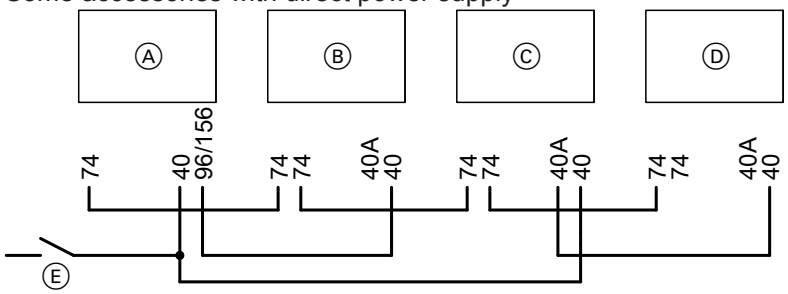

Fig. 19

Ⓐ Heat generator control unit
Ⓑ Mixer extension kit for heating circuit with mixer M2 (electronics module)
Ⓒ Mixer extension kit for heating circuit with mixer M3 (electronics module)
Ⓓ Further accessories
Ⓔ ON/OFF switch
40 (A) Power supply
74 PlusBus
96/156 Power supply to accessories in the heat generator control unit

- In the following circumstances, use the contact (output) of the accessories only to switch an on-site relay:
  An actuator with a higher power demand than the fuse rating required for the accessories, e.g. a circulation pump, is connected to the contact (output) of the accessories.
- In the following circumstances, connect one or more accessories directly to the mains supply via an ON/OFF switch:
  The max. permissible total current of the heat generator control unit is exceeded.
  Note
  *In this event, the accessories concerned **cannot** be isolated with the ON/OFF switch on the control unit.*

Rotary switch S1 for subscriber number addressing

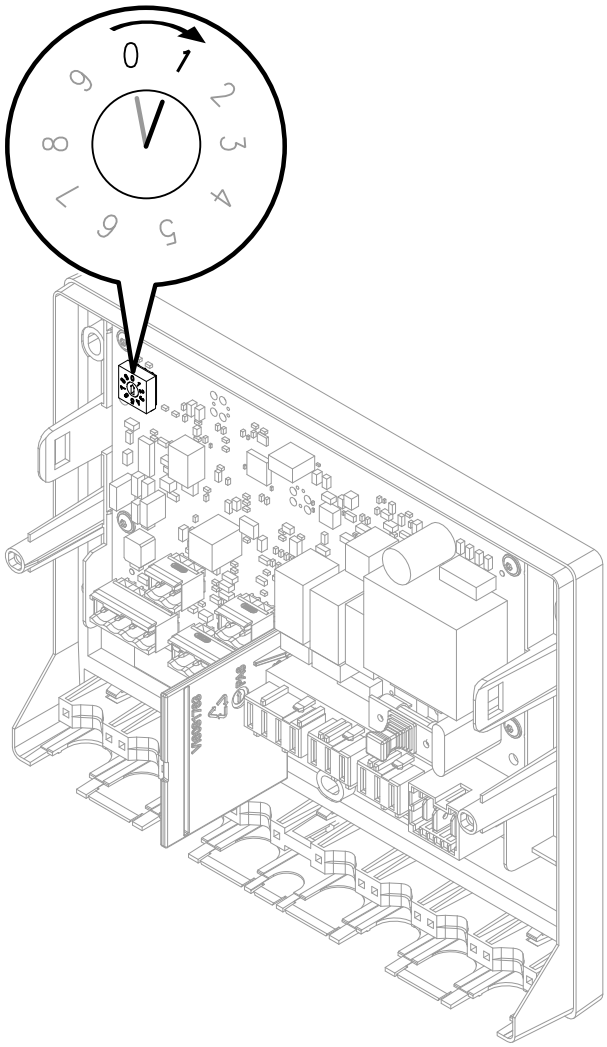

Fig. 20

Set rotary switch S1 to a consecutive numbers as shown in the example below:

- 1st EM-EA1 extension: Rotary switch to 1
- 2nd EM-EA1 extension: Rotary switch to 2
- 3rd EM-EA1 extension: Rotary switch to 3

Note

- *External heating circuit hook-up is only possible on the extension kit with rotary switch setting 1.*
- *These settings are independent of the settings made at other extensions, such as EM-MX (mixer). If an EM-EA1 extension is set to 1, an EM-MX, EM-M1 or EM-P1 extension can also be set to 1.*

Configuring functions

To configure the connected functions, carry out commissioning on the control unit of the heat generator.

Commissioning assistant
Heat generator installation and service instructions

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Connection and wiring diagram

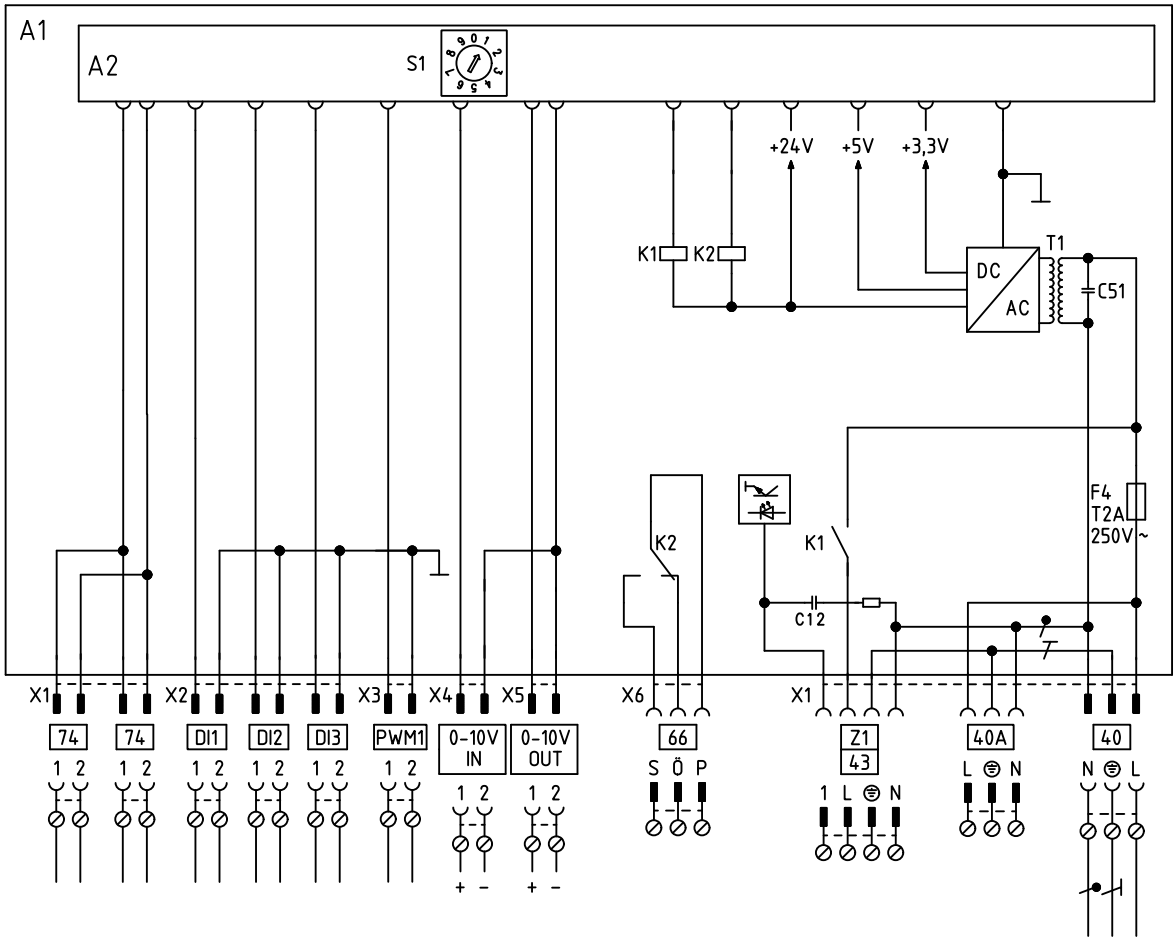

Fig. 21

DI1	Digital input 1
DI2	Digital input 2
DI3	Digital input 3
0 - 10 V IN	Input 0 to 10 V
0 - 10 V OUT	Output 0 to 10 V, no function
F4	Fuse 2 A (slow)
PWM1	Control voltage output, no function
S1	Rotary switch
Z1 [43]	230 V relay output, 230 V input
[40]	Power supply
[40]A	Power supply for additional accessories
[66]	Floating switching contact (changeover contact) for connecting a fault message facility or extractor hood
[74]	PlusBus

Specification

Rated voltage	230 V~
Rated frequency	50 Hz
Rated current	2 A
Power consumption – electronics	2.8 W
Power consumption	12 mA
Permissible ambient temperature	
▪ Operation	0 to +40 °C
▪ Storage and transport	–20 to +60 °C
Output for rated breaking capacity 66 (floating)	1 A, 230 V~
Rated breaking capacity of output Z1 43	1 A, 230 V~

Final decommissioning and disposal

Viessmann products can be recycled. Components and substances from the system are not part of ordinary household waste.

For decommissioning the system, isolate the system from the power supply and allow components to cool down where appropriate.
All components must be disposed of correctly.

Declaration of conformity

Declaration of Conformity

We, Viessmann Werke GmbH & Co. KG, D-35107 Allendorf, declare as sole responsible body that the named product complies with the European directives and supplementary national requirements in terms of its design and operational characteristics.

Using the serial number, the full Declaration of Conformity can be found on the following website:
www.viessmann.co.uk/eu-conformity

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