# Photovoltaic solutions

# A sure future, assuring our future

The increased popularity of renewable energy installations is set to continue, partly fuelled by the governments Feed In Tariff policy and partly the realisation that household fuel bills will continue to rise over the coming years. Many homeowners have taken the decision to produce their own electricity through either photovoltaic cells or wind turbines.

Photovoltaic panels are most often retrofitted into existing buildings, usually mounted on top of the existing roof structure or on the existing walls. Alternatively, panels can be located separately from the building but connected by cable to supply power for the building.

Building-integrated photovoltaic's (BIPV) are increasingly incorporated into new domestic and industrial buildings as a principal or ancillary source of electrical power.

At Hager we have brought together a portfolio of domestic and commercial PV devices from our existing product ranges into one complete catalogue. Not only are we able to provide a range of 'loose kit' for both the AC and DC side of the installation, through our Engineered Solution business we can also offer a fully tailored solutions, design and build service for PV and wind power control enclosures to detailed specifications, all manufactured in a ISO 9001:2000 factory.

# Photovoltaic solutions

## Hager Enclosures

**A range that meets your needs and provides the protection you require when switching to photovoltaics.**

The Hager Consumer Unit has been designed to fit into todays home environment. Whether it is used to house electrical distribution, smart control devices or PV devices including metering.

Consumer Units

Garage Units

Vector II, Volta & Vega enclosures

## Hager Devices

Isolation Devices


RCCB

Surge Protection

Metering


## Hager Engineered Solutions Service

Factory assembly of non-standard PV control units, special configurations in standard enclosures, IP 55 or metal DIN rail enclosures, providing an exact product that meets the requirements of a particular PV installation.

This allows the board to be configured to suit the individual needs of a PV installation with a factory assured and tested product.

To learn more about our Engineered Solutions offer, please contact our estimation team:

Call - 01952 675600
eMail - estimation@hager.co.uk
Fax - 0870 240 2400

# **Typical** installation

## Requirements for Electrical Installations IET Wiring Regulations 17th Edition

PV Equipment on the DC side shall be considered to be energized, even when the system is disconnected from the AC side.

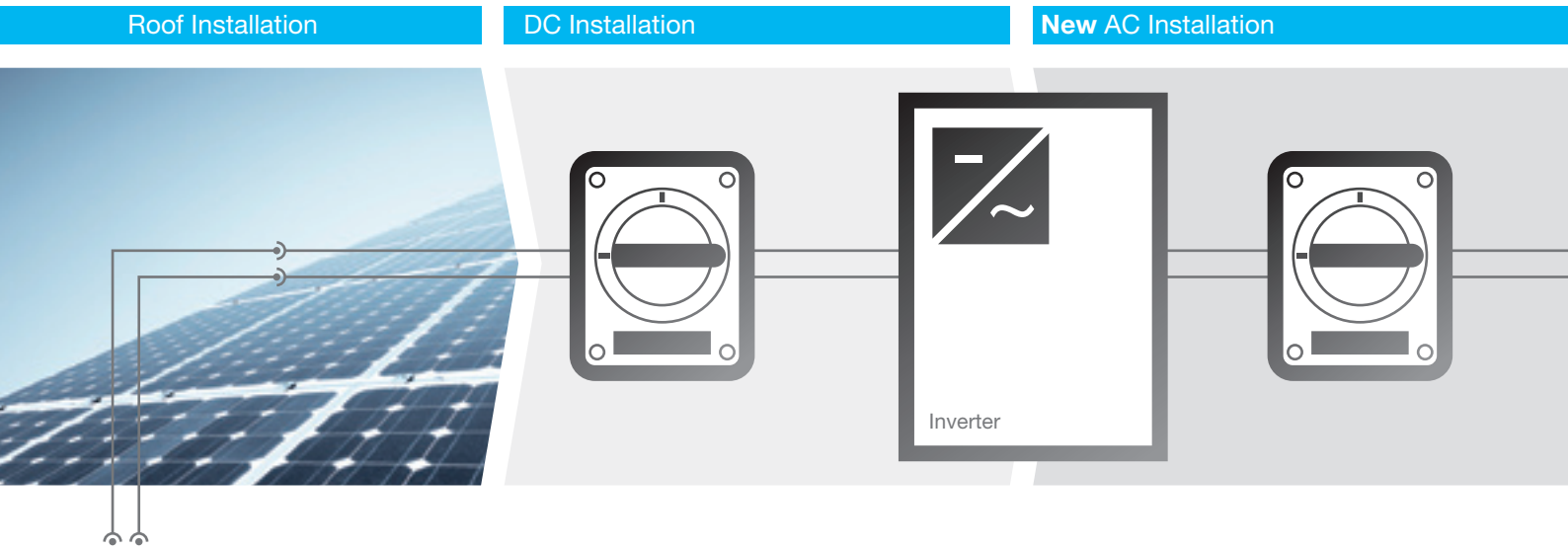
**Isolation:** To allow maintenance of the PV converter, means of isolating the PV convertor from the DC side and the AC side shall be provided. **712.537.2.1.1**

**Division of Installation:** Every installation shall be divided into circuits, as necessary, to: (i) Avoid danger and minimise inconvenience in the event of a fault. (ii) Facilitate safe inspection, testing and maintenance. (vi) Prevent the indirect energising of a circuit intended to be isolated. **314.1**

**Fault protection:** Shall be provided for each source of supply or combination of sources of supply. **551.4.1**

**Overcurrent protection:** Should be located as near as practical to the generator terminals (where required). **551.5.1**

**Maximum disconnection times:** The maximum disconnection time shown in Table 41.1 shall be applied to final circuits not exceeding 32A. 0.4s TN System & 0.2s TT Systems. **411.3.2.2**



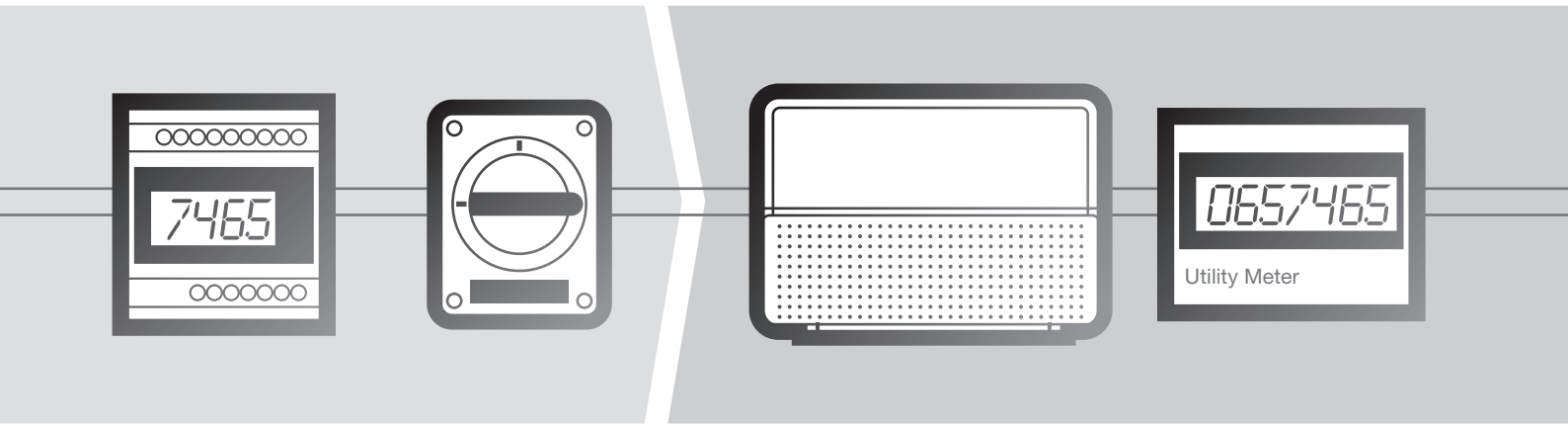


DC Isolator


AC Isolator

Where an installation comprises more than one final circuit, each final circuit shall be connected to a separate way in a distribution board. The wiring of each final circuit shall be electrically separate from that of every other final circuit, so as to prevent the indirect energizing of a final circuit intended to be isolated.
**314.4**

## Existing AC Installation





Generation Meter


AC isolator

Consumer Unit

**Description**
The hager range of switch disconnectors further complements the existing commercial range giving a range of enclosed switch disconnectors to IP65 for individual isolation.

The devices are padlockable in three positions and offer plenty of cabling space. Clip on auxiliary contacts can be fitted retrospectively.

**Product features**
Complies with: BS EN 60947-3
IP65 to BS EN 60529

**Utilisation category**
AC-21

**Cable Capacity**
20 - 40A = 16mm²
63 - 100A = 35mm²


JAB402

**IP65 Switch Disconnectors Triple Pole and Neutral**

| Description | In AC 21 | In AC 22 | Cat ref. |
|---|---|---|---|
| IP65 Switch Disconnector | 20A | 10A | **JG00S** |
| IP65 Switch Disconnector | 25A | 16A | **JG01S** |
| IP65 Switch Disconnector | 40A | 25A | **JG02S** |
| IP65 Switch Disconnector | 63A | 40A | **JG03S** |
| IP65 Switch Disconnector | 80A | 63A | **JG04S** |
| IP65 Switch Disconnector | 100A | 80A | **JG05S** |

**Auxiliary Changeover Contacts**

| Description | Cat ref. |
|---|---|
| 1 NO / 1 NC | **JG10A** |
| 3 NO / 2 NC | **JG20A** |

**Description**
These DC switches are very popular for use in solar powered photo voltaic applications where they isolate the incoming side of the inverter.

They are supplied in grey with a black handle so that it is easy to distinguish them from the yellow/ red AC switches used on the outgoing side of the inverter.

**Product Features**
Complies with: BS EN 60947-3
IP65 to BS EN 60529
An interlock ensures that the cover cannot be removed in both the ON and PADLOCKED OFF positions.

**Cable Capacity**
20 - 40A = 16mm²
63 - 100A = 35mm²

JG440DC

**DC Switches**

| Rating | Utilisation Category | Cat ref. |
|---|---|---|
| 12A at 500V DC-21B, 10A at 600V DC-21B<br>8A at 800V DC-21B, 6A at 440V DC-22B | DC-21B | **JG416DC** |
| 16A at 500V DC-21B, 12A at 600V DC-21B<br>10A at 800V DC-21B, 6A at 440V DC-22B | DC-21B<br>DC-22B | **JG425DC** |
| 20A at 500V DC-21B, 16A at 600V DC-21B<br>12A at 800V DC-21B, 16A at 440V DC-22B | DC-21B<br>DC-22B | **JG440DC** |


SB432PV

**DC Switch 4 Pole**

| Description | Width | Cat ref. |
|---|---|---|
| 32A / 100V ⎓ | 61.25mm | **SB432PV** |

# DC
## 4 Pole RCCBs


CFB440F

**4 Pole RCCB, type B, DC Sensitive 30mA**

| Sensitivity type B | Current rating | Cat ref. |
|---|---|---|
| 30mA | 40A | **CDB440F** |
| 30mA | 63A | **CDB463F** |

# **AC** - Miniature Circuit Breakers
# 6kA Type B Single Pole

**Description**
Protection and control of circuits against overloads and short circuits.

• In domestic installations

**Technical data**
Type B tripping characteristics complies with BS EN 60898.
Calibration temperature 30°C
Breaking capacity: 6kA
Voltage rating: 230 - 400V
Current rating: 6 - 63A
Electrical operations: 20,000

**Connection capacity**
Rigid conductor 25mm²
Flexible conductor 16mm²


MTN163

**Single Pole MCBs 6kA Type B**

| Rating | Width (17.5mm) | Cat ref. |
|---|---|---|
| 6A | 1 Mod | **MTN106** |
| 10A | 1 Mod | **MTN110** |
| 16A | 1 Mod | **MTN116** |
| 20A | 1 Mod | **MTN120** |
| 25A | 1 Mod | **MTN125** |
| 32A | 1 Mod | **MTN132** |
| 40A | 1 Mod | **MTN140** |
| 50A | 1 Mod | **MTN150** |
| 63A | 1 Mod | **MTN163** |

# **AC** - RCBO (Domestic)
# Single Pole 6kA

Compact protection devices which combine the overcurrent functions of an MCB with the earth fault functions of an RCCB in a single unit. A range of sensitivity and current ratings are available for use in domestic installations.

**Technical Data**
Insulated DIN clip
Complies with BS EN 61009, IEC1009
Sensitivities (fixed)
10mA and 30mA
Breaking capacity: 6kA
Flying neutral lead: 200mm

**Terminal Capacities**
16mm² rigid,
10mm² flexible

**Application**
1 module devices provide a compact solution for installation in consumer units.

These devices are 1pole & solid neutral.

**Operating Voltage**
127-230V AC


ADN120

**Sensitivity 30mA (6kA)**

| Current rating | Width (17.5mm) | Type B Cat ref. |
|---|---|---|
| 6A | 1 Mod | **ADN106** |
| 10A | 1 Mod | **ADN110** |
| 16A | 1 Mod | **ADN116** |
| 20A | 1 Mod | **ADN120** |
| 32A | 1 Mod | **ADN132** |
| 40A | 1 Mod | **ADN140** |
| 45A | 1 Mod | **ADN145** |
| 50A | 1 Mod | **ADN150** |

**Description**
Surge protective devices Type 1 General protection,
self protected against the short circuit currents below 12.5kA operation indicator

Complies with: IEC 61643-1

Auxiliary contacts for remote signalling information from reserve and end of life.

Reserve indicator: Shows the when the cartridge needs replacing.

Backup protection is required.

**Width**
1 Mod = 17.5mm
2 Mod = 35mm
4 Mod = 70mm
8 Mod = 140mm

Iimp = Impulse discharge current
Imax = Maximum discharge current

SPA412A

**Surge Protection Devices - Type 1**
Iimp 12.5 kA
Imax 25ka
Wave 10/350 µs
Up 2.5kV

| Description | Width | Cat ref. |
|---|---|---|
| 1 Ph + N | 4 Mod | **SPA212A** |
| 3 Ph + N | 8 Mod | **SPA412A** |

SPN265R

**Surge Protection Devices - Type 2**
Imax 65 kA
Wave 8/20 µs
In 20 kA
Up 1.5 kV

| Description | Width | Cat ref. with reserve light |
|---|---|---|
| 1 Ph + N | 2 Mod | **SPN265R** |
| 3 Ph + N | 4 Mod | **SPN465R** |

**Surge Protection Devices - Type 2**
Imax 40 kA
Wave 8/20 µs
In 15 kA
Up 1.2 kV execpt SPN140C Up 2kA

| Description | Width | Cat ref. without reserve light | Cat ref. with reserve light |
|---|---|---|---|
| 1 Ph | 1 Mod | **SPN140C** | |
| 1 Ph + N | 2 Mod | **SPN240D** | **SPN240R** |
| 3 Ph + N | 4 Mod | **SPN440D** | **SPN440R** |

SPN415R

**Surge Protection Devices - Type 2**
Imax 15 kA
Wave 8/20 µs
In 5 kA
Up 1.0 kV

| Description | Width | Cat ref. without reserve light | Cat ref. with reserve light |
|---|---|---|---|
| 1 Ph + N | 2 Mod | **SPN215D** | **SPN215R** |
| 3 Ph + N | 4 Mod | **SPN415D** | **SPN415R** |

SPN715D

**Tamper Proof Surge Protection Devices - Type 2**
Imax 15 kA
Wave 8/20 µs
Up 1 kV

| Description | Width | Cat ref. with reserve light |
|---|---|---|
| 1 Ph + N | 2 Mod | **SPN715D** |

SPN040D

**Replacement Cartridges - Phase**

| Suitable for | Cat ref. |
|---|---|
| SPN265R, SPN465R | **SPN065R** |
| SPN140C | **SPN040C** |
| SPN240R, SPN440R | **SPN040R** |
| SPN240D, SPN440D | **SPN040D** |
| SPN215R, SPN415R | **SPN015R** |
| SPN215R, SPN415D, SPN715D | **SPN015D** |

SPN040N

**Replacement Cartridges - Neutral**

| Suitable for | Cat ref. |
|---|---|
| SPN265R, SPN465R | **SPN065N** |
| SPN240R, SPN440R, SPN215R, SPN415R, SPN240D, SPN440D, SPN215D, SPN415D | **SPN040N** |

**DC Surge Protection**
For the protection of photovoltaic installations.
Complies with:
EN 61 643-11

**Circuit Breakers and Fuses DC**
For the protection of photovoltaic installations.
Conforms to:
EN 60 269-2-1

Backup protection is required.

**Width**
1 Mod = 17.5mm
2 Mod = 35mm
3 Mod = 52.5mm

SPV325

**Photovoltaic Surge Protector**
I max. 25kA
In : 12.5kA
Uc : 1000V ⎓
Up ≤ 4kV

| Description | Width | Cat ref. |
|---|---|---|
| 2 Pole renewable surge protector | 3 Mod | **SPV325** |
| Renewable cartridge for surge protector +/- | 1 Mod | **SPV025** |
| Renewable cartridge for surge protector ⏚ | 1 Mod | **SPV025E** |

L502PV

**Fuse Carrier**

| Description | Width | Cat ref. |
|---|---|---|
| 1 Pole | 1 Mod | **L501PV** |
| 2 Pole | 2 Mod | **L502PV** |

LF3XXPV

**Fuses**

| Description | Cat ref. |
|---|---|
| 2A | **LF302PV** |
| 3A | **LF303PV** |
| 4A | **LF304PV** |
| 6A | **LF306PV** |
| 8A | **LF308PV** |
| 10A | **LF310PV** |
| 12A | **LF312PV** |
| 16A | **LF316PV** |
| 20A | **LF320PV** |

**Description**
Energy meters are used to measure the active energy consumed by an installation. They allow the user to understand and control the real cost of an installation generated by the PV installation.

MID approval for sub billing on EC154M.

**Characteristics**
- Fully compliant with the European standard EN 50470-3
- Class B
- Accuracy 1%
- Energy readout: 7 digits
- Backlit display
- Indication of instantaneous power consumption
- Total / partial counter
- Pulsed output
- Unlimited saving of measurements
- LED flashes according to consumption
- Option: tariff 1/ tariff 2

- Three phase energy meters are adapted to all kinds of networks
- Display indication in case of incorrect wiring

**Width**
3 Mod = 52.5mm

EC154M

**Single Phase kWh Meters - Direct 63A**

Voltage 230V~ 50/60Hz
Starting current = 40mA
Base current = 10A
Max current = 63A

| Characteristics | Width | Cat ref. |
|---|---|---|
| Energy meter with pulsed output - with MID approval | 3 Mod | **EC154M** |

**Enclosure with door**
1 row for 3, 6, 10 and 12 modules
2 row for 24 modules
3 row for 36 modules
Adjustable depth DIN rail (except VE103U).

Supplied with sealing plugs to re-instate IP rating after fixing.
Front cover sealing.

**Door operation**
3-10 modules - vertical hinging retained in open position at 90°
12-36 modules - horizontal hinging.

Hinging reversible (left or right).

Colour: RAL 7035 (light grey).

**Wiring ducts** 12 - 36 module enclosures/mini wiring channels left and right ensures conductors are neatly dressed.

**IP 55**: AC 400V.
insulation class: class II

VE212U

### Vector II Enclosures

| Description | Moulded blanks (In front cover) | Cat ref. |
|---|---|---|
| 1 row, 3 modules N: 1 x 25 + 3 x 16, E: 1 x 25 + 5 x 16 | 2 x 1/2 | **VE103U** |
| 1 row, 6 modules N: 1 x 25 + 5 x 16, E: 1 x 25 + 7 x 16 | 2 x 1 | **VE106U** |
| 1 row, 10 modules N: 1 x 25 + 9 x 16, E: 1 x 25 + 11 x 16 | 2 x 1 | **VE110U** |
| 1 row, 12 modules N: 1 x 25 + 10 x 16, E: 1 x 25 + 13 x 16 | | **VE112U** |
| 2 rows, 24 modules N: 1 x 25 + 16 x 16, E: 1 x 25 + 16 x 16 | | **VE212U** |
| 3 rows, 36 modules N: 1 x 25 + 19 x 16, E: 1 x 25 + 19 x 16 | | **VE312U** |

VZ428

### Earth and Neutral for TP&N Connection Assembly

| Description | Cat ref. |
|---|---|
| 3 x (3 x 16mm$^2$ + 2 x 10mm$^2$) 270mm wide<br>N: 1 x (5 x 16mm$^2$ + 6 x 10mm$^2$)<br>In: 63A<br>To fit 12 module wide enclosure only | **VZ428** |

### Earth and Neutral for Single Phase Connection Assembly

| Description | Cat ref. |
|---|---|
| 2 x (3 x 16mm$^2$ + 4 x 10mm$^2$) 270mm wide<br>In: 63A<br>To fit 12 module wide enclosure only | **VZ403** |

### Key Lock

| Description | Cat ref. |
|---|---|
| For all enclosures with 2 keys | **VZ311** |

### Sliding Support

| Description | Cat ref. |
|---|---|
| 1 Set = 2 Supports<br>for fixing of additional terminal supports<br>in bottom part of enclosure (VE112U and above) | **VZ744** |

Insulated and metal DIN rail enclosures, 1 row from 4 to 22 modules.

Surface mounted enclosures, with a rigid chassis, housing a DIN rail.

Supplied with marking labels and instructions.

Options:
- Keylock
- Plain or transparent door

Complies with BS EN 62208-3 Annex 2A.

VC008G

**DIN Rail - Insulated**

| Description | Enclosures size | Cat ref. Plain door | Cat ref. Glazed door |
|---|---|---|---|
| 8 Module DIN Rail Enclosure | 3 | **VC008** | **VC008G** |
| 12 Module DIN Rail Enclosure | 4 | **VC012** | **VC012G** |
| 16 Module DIN Rail Enclosure | 5 | **VC016** | **VC016G** |
| 22 Module DIN Rail Enclosure | 6 | **VC022** | **VC022G** |

VH008

**DIN Rail - Metal**

| Description | Enclosure size | Cat ref. Plain door | Cat ref. Glazed door |
|---|---|---|---|
| 4 Module DIN Rail Enclosure | 2 | **VH004** | **-** |
| 8 Module DIN Rail Enclosure | 3 | **VH008** | **VH008G** |
| 12 Module DIN Rail Enclosure | 4 | **VH012** | **VH012G** |
| 16 Module DIN Rail Enclosure | 5 | **VH016** | **VH016G** |
| 22 Module DIN Rail Enclosure | 6 | **VH022** | **VH022G** |

Insulated enclosures 1 row from 2 to 10 modules.

Surface mounted enclosures, with a rigid, chassis, housing a DIN rail.

Supplied with Earth terminals (except GD102E), marking labels and sealing grommets to maintain Class II.

Options:
- Keylock
- Plain or transparent door
- Terminals and terminal supports

GD106E

### Mini Gamma Enclosures

| Description | Cat ref. |
|---|---|
| 2 Modules compatible with WAGO type 273 connector block (not supplied). | **GD102E** |
| 4 Modules E: 2 x 16 + 2 x 10mm² (capacity to fit an additional 4 hole terminal bar on existing support) | **GD104E** |
| 6 Modules E: 2 x 16 + 2 x 10mm² (capacity to fit an additional two 4 hole terminal bars or one 7 hole terminal bar on existing support) | **GD106E** |
| 8 Modules E: 3 x 16 + 4 x 10mm² (capacity to fit an additional two 4 hole terminal bars or one 7 hole terminal bar on existing support) | **GD108E** |
| 10 Modules E: 3 x 16 + 4 x 10mm² (capacity to fit an additional three 4 hole terminal bars or two 7 hole terminal bars on existing support) | **GD110E** |

GP110T

### Mini Gamma Plain & Transparent Doors

Plain door with integrated handle (use of door increases IP rating to IP40)

| For Cat ref. | Cat ref. Plain Door | Cat ref. Transparent Door |
|---|---|---|
| GD102E | **GP102P** | **GP102T** |
| GD104E | **GP104P** | **GP104T** |
| GD106E | **GP106P** | **GP106T** |
| GD108E | **GP108P** | **GP108T** |
| GD110E | **GP110P** | **GP110T** |

### Terminal Support
(no terminals)

| For Cat ref. | Cat ref. |
|---|---|
| GD104E | **GZ104S** |
| GD106E | **GZ106S** |
| GD108E | **GZ108S** |
| GD110E | **GZ110S** |

### Terminals (63A Rating)

| Cable capacity | Neutral (blue) Cat ref. | Earth (green) Cat ref. |
|---|---|---|
| 2 x 16mm² + 2 x 10mm² | **GZ04N** | **GZ04E** |
| 3 x 16mm² + 4 x 10mm² | **GZ07N** | **GZ07E** |

### Keylock

| Description | Cat ref. |
|---|---|
| Keylock for plain or transparent door | **VZ313** |

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