

Exactly on time and economic switching – timing relays ETR and DIL ET

xCommand



Tailor-made for every application; all components feature the benefits of a series well thought-out right down to the finest detail. The timing relays DIL ET have been matched to the construction design of the contactors DIL E; the ETR4 variant has been optimised for the measurement and monitoring relay as well as the safety relay; the timing relays ETR2 are optimised for use in service distribution boards (space unit 17.5 mm). Thus, the space in the control panel can be optimally used and the system is provided with a common design appearance. All devices are devices for world markets to IEC/EN 60947 with UL/CSA approval. Many relays feature multi-voltage coils. This simplifies stock keeping and enhances the flexibility when reacting to customer requirements. Depending on the application, it is possible to choose between single-function and multi-function relays.



Timing controlled processes can be found in all parts of automated manufacturing: from the bottling plant to the conveyor belt.



Exactly timed operation is a prerequisite for safety and effectiveness with all automated sequences regardless of if they are at the airport, in manufacturing or in buildings.



Escalators, elevators and doors also require exactly timed switching in buildings.



Generous time range

Response delay is one of the most important time-dependent functions. Timing relays meet this requirement with a wide choice of time ranges. Signals can be briefly extended or extremely long processes can be catered for, with accuracy, thanks to the relay's multiple time ranges from 0.05 seconds to 100 hours. In order to set this up, you first select one of the ten time ranges (Range). Then you fine-tune this setting on the Time dial, where the setting is in "real time", allowing it to be read directly on the scale.



Remote time setting

A remote potentiometer can be connected to connection Z1/Z2 on the ETR4-70/DILET70. The time can be externally set with the remote potentiometer. If timing relays are installed in the enclosure or in control panels, the time setting can be undertaken when the door is closed.



Signalling, no problem

The opto-isolated input B1 allows actuation of the timing relay ETR4 from any point in the circuit. This saves one actuating contact and the additional signal wiring. It is possible to actuate the signal input even via voltages other than the control voltage. For example, the ETR4 may be supplied at 230 V 50 Hz, while signal input actuation is via 24 V DC.

The red LEDs indicate the switching status of the timing relay. The green LED lights up when power is applied, and flashes when the set time is running.

Timing relays – all functions at a glance



| | DILET11-30-A | DILET11-30-W | DILET11-M-A | DILET11-M-W | DILE70-A | DILE70-W | ETR4-11-A | ETR4-11-W | ETR4-69-A | ETR4-69-W |
|---|--------------|--------------|-------------|-------------|----------|----------|-----------|-----------|-----------|-----------|
| Time range | | | | | | | | | | |
| 1.5-30 s | • | • | | | | | | | | |
| 0.05 s - 60 h | | | • | • | • | • | | | | |
| 0.05 s - 100 h | | | | | | • | • | • | • | • |
| Functions | | | | | | | | | | |
| On-delayed (11) | • | • | • | • | • | • | • | • | • | • |
| Off-delayed (12) | | | | | • | • | | | • | • |
| On and off delayed (16) | | | | | • | • | | | • | • |
| Fleeting contact on energization (21) | | | | | • | • | | | • | • |
| Fleeting contact on de-energization (22) | | | | | • | • | | | • | • |
| Flashing, pulse generating (42) | | | | | • | • | | | • | • |
| Flashing, pause initiating (43) | | | | | | | | | | |
| Flashing two speeds, pulse generating or initiating (44) | | | | | | | | | | |
| Star-delta (51) | | | | | | | | | | |
| Pulse generating (81) | | | | | • | • | | | • | • |
| Pulse shaping (82) | | | | | • | • | | | • | • |
| On-Off function | | | | | • | • | | | • | • |
| Features | | | | | | | | | | |
| Width | | | | | | | | | | |
| 45 mm | • | • | • | • | • | • | | | | |
| 22.5 mm | | | | | | | • | • | • | • |
| 17.5 mm (modular installation device) | | | | | | | | | | |
| 50 ms changeover pause | | | | | | | | | | |
| Multi-voltage coil | • | • | • | • | • | • | • | • | • | • |
| Connection for remote potentiometer | | | | | • | • | | | | |
| LED function display | • | • | • | • | • | • | • | • | • | • |
| Potential-free control contact | | | | | • | • | | | | |
| Operation | | | | | | | | | | |
| Time range preselect | | • | • | • | • | • | • | • | • | • |
| 7 time ranges | | | | | | | | | | |
| 10 time ranges | • | • | • | • | • | • | • | • | • | • |
| Time fine setting | • | • | • | • | • | • | • | • | • | • |
| Function selector | | | | | • | • | | | • | • |
| Control voltage | | | | | | | | | | |
| 24-48 V DC | | | | | | | | | | |
| 24-240 V DC | • | | • | | • | | • | | • | |
| 24-240 V AC 50/60Hz | • | | • | | • | | • | | • | |
| 400 V AC 50/60Hz | | • | | • | | • | | • | | • |
| Contacts | | | | | | | | | | |
| 1 changeover contact | • | • | • | • | • | • | • | • | • | • |
| 2 changeover contacts | | | | | | | | | | |
| Convertible 1 time, 1 non-delayed contact or 2 timed contacts | | | | | | | | | | |
| Accessories | | | | | | | | | | |
| Remote potentiometer | | | | | • | • | | | | |

Safety guaranteed – safety relays ESR

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Those who build machines need safety, for export also. Moeller offers competent consultation when you need to engineer a safe machine. Performing risk analysis with the Moeller safety manual is no problem. As soon as the machine control assumes safety tasks, the resistance of the control to malfunctions is defined conform to EN 954-1 "Safety-related parts of control systems". Different categories assist you in extending the control system and provide suitable resistance to malfunctions. Evaluation criteria include the seriousness of a possible injury, the length of time and frequency of which endangered persons are in the endangered area, as well as the possibility to avoid danger.



Stop in an emergency

Stopping the machine is absolutely essential in an emergency. The EN 60204 "Electrical equipment of machines", therefore demands devices to stop the machine at the respective positions. The Emergency-Stop buttons from Moeller are positively opening and tamper-proof. The different versions cover all applications, ranging from the control desk to the Emergency-Stop button which may be actuated when wearing gloves.



Monitoring mobile protective mechanisms

Safety of persons in manufacturing plants has the highest priority. Opening of protective doors and hinged flaps can be monitored by the installation of safety switches. Moeller offers the ideal position switch for his purpose. They are also tamper-proof and positively opening. Safety position switches with mechanical securing action can be used for coasting and dangerous movements. They prevent the door being opened until the movement ends.



Safely monitored Emergency-Stop circuits

The electronic safety relays ESR from Moeller switch several enable current paths for direct or time-delayed disconnection of the energy supply when the Emergency-Stop actuator is triggered. Depending on their configuration, they can detect faults such as cross short-circuits, earth faults or short-circuits in the Emergency-Stop actuator circuit. These lead either to immediate disconnection or prevent restart as long as the fault is not remedied. The relays feature the option of monitored re-energization. In this case the enabling of the relay only occurs after the reset button is released. Tampering is prevented in this way! The safety relays comply with categories 2 to 4 of the EN 954-1 depending on their type and configuration.



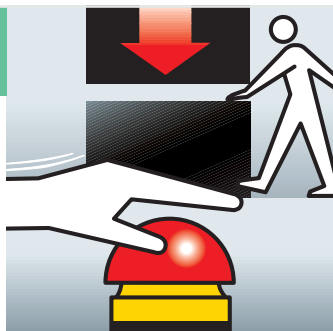
Monitoring mobile protective mechanisms

The monitoring of protective screens on machines and processing centres is another important function of the electronic safety relay ESR from Moeller. Depending on the safety level, one or two position switches signal that the protective door is in the closed position. Instead of restart-monitoring, you can also implement an automatic start with the safety relays. Thus, you reduce the cycle times in production without dispensing with safety.

Safety for your applications

Stopping in an emergency

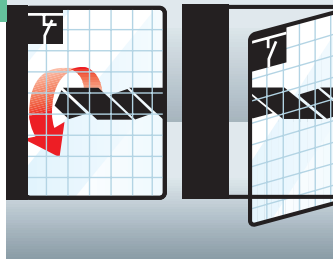
It is absolutely mandatory for a machine to be stopped in an emergency. EN60204, the standard governing "Electrical equipment of machines", therefore stipulates devices to effect this stop function at the appropriate points in the circuit. Control systems to the highest safety category, 4, can be constructed using Emergency-Stop buttons and electronic safety relays ESR4-NO from Moeller.



Emergency-Stop mushroom buttons quickly stop the dangerous movement in an emergency.

Monitoring mobile protective mechanisms

Personnel safety has highest priority in production premises. By installing safety switches, it is possible to monitor when protective doors or protective hinged covers are being opened. In addition to the ideal position switch for each location, Moeller also offers electronic safety relays that monitor the safety function.



Safety position switches stop potentially dangerous processes as soon as the protective door is being opened.

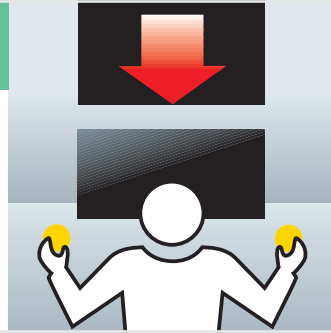
ESR4...



| Part no. | Application |
|-----------------------|---|
| ESR4-NO-21 (24VAC-DC) | Emergency-Stop, safety door, optical barrier |
| ESR4-NO-30-24VAC-DC | Emergency-Stop, safety door, optical barrier |
| ESR4-NO-30-115VAC | Emergency-Stop, safety door, optical barrier |
| ESR4-NO-30-230VAC | Emergency-Stop, safety door, optical barrier |
| ESR4-NO-31-24AC-DC | Emergency-Stop, safety door |
| ESR4-NO-31-115AC | Emergency-Stop, safety door |
| ESR4-NO-31-230AC | Emergency-Stop, safety door |
| ESR4-NV3-30 (24VDC) | Emergency-Stop, safety door, off-delayed 0.15-3 s |
| ESR4-NV30-30 (24VDC) | Emergency-Stop, safety door, off-delayed 1.5-30 s |
| ESR4-NZ-21 (24VAC-DC) | Two-hand |
| ESR4-NE-42 (24VAC-DC) | Contact expansion |
| ESR4-VE3-42 (24VDC) | Contact expansion, off-delayed 3 s |

Safe handling with protective controls

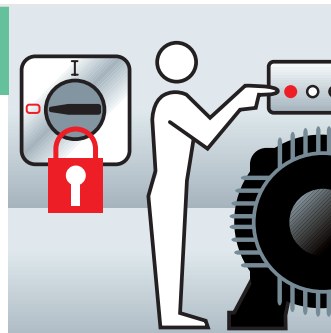
As the name suggests, two-hand controls must be actuated by two hands within 500 ms of one another, in order to start up or maintain the operating status of a machine. This protects the operating personnel during the danger period.



Two-hand controls prevent the operator from reaching into the press during start-up.

Safety during repair and maintenance

Maintenance, repair and safety switches fulfil the important function of mains isolating devices. They isolate electrical installations safely from the supply system to enable maintenance or repair work to take place, thus preventing people, machines or production materials from being endangered.



A main switch secured by a padlock in the Off position provides safe working conditions.

| Emergency-Stop | Safety door | Two-hand control | 1-channel | 2-channel | Cross circuit recognition | Semiconductor input | Off-delayed | Reset button monitoring | Simultaneity monitoring | Feedback circuit | Enable current paths | Signal current paths | Feedback current paths | Enclosure width (mm) |
|----------------|-------------|------------------|-----------|-----------|---------------------------|---------------------|-------------|-------------------------|-------------------------|------------------|----------------------|----------------------|------------------------|----------------------|
| • | • | | • | • | • | • | | • | • | • | 2 | 1 | | 22.5 |
| • | • | | • | • | • | • | | • | • | • | 3 | | | 22.5 |
| • | • | | • | • | • | • | | • | • | • | 3 | | | 22.5 |
| • | • | | • | • | • | • | | • | • | • | 3 | | | 22.5 |
| • | • | | • | | | | | • | | • | 3 | 1 | | 22.5 |
| • | • | | • | | | | | • | | • | 3 | 1 | | 22.5 |
| • | • | | • | • | • | • | • | • | • | • | 3 | | | 22.5 |
| • | • | | • | • | • | • | • | • | • | • | 3 | | | 22.5 |
| | | • | | • | • | | | | • | • | 2 | 1 | | 22.5 |
| | | | • | • | | | | | | | 4 | 2 | 1 | 22.5 |
| | | | • | • | | | • | | | | 4 | | 1 | 22.5 |

Optimum protection for smooth operation – measuring and monitoring relays EMR4

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Measuring and monitoring relays are required for the most varied range of applications. EMR4 range measuring and monitoring relays cover a wide range of applications: Current monitors for universal use, phase monitors for monitoring destruction/damage protection for individual system sections, phase sequence relays monitoring the rotating field, unbalance relays for reliable phase loss detection, multifunctional three-phase monitors, asymmetric phase monitoring relays in a single device, level monitoring relays for monitoring fill levels and earth-leakage monitors for enhanced operational safety. All relays are devices for world markets to IEC/EN 60947 and UL/CSA approval. Many relays feature multi-voltage coils. This simplifies stock keeping and enhances the flexibility when reacting to customer requirements.



Level monitoring relays ensure defined mixing ratios of many diverse liquids, whether in the petrochemical or the food industry. Two electrodes monitor the maximum and minimum filling levels, while a third electrode is used as earth.



EN 60 204, the European Standard for "Safety of Machines", stipulates that insulation monitors should be used to increase operational safety by monitoring auxiliary circuits for earth faults. Insulation monitoring relays EMR4-R demonstrate their full potential here.

They signal an earth fault via a changeover contact and enable the fault to be cleared without the user experiencing costly downtimes. And, there is yet another safety feature: a Test button, with which the integrity of the function can be checked at any time.



Phase monitor EMR4-W – destruction/damage protection for individual system sections

The phase monitor EMR4-W in addition to the monitoring the rotary field, also monitors the level of the applied voltage – i.e. monitoring destruction/damage protection of individual system sections. A dial allows easy setting of the required voltage for both the minimum undervoltage and maximum overvoltage within a defined window.

Both on-delayed and off-delayed functions are possible. The on-delayed setting enables short overvoltages or voltage dips to be bridged.

The relay picks up if the phase sequence and the voltage are correct. After it has dropped out, the device does not pick up again until the voltage goes over a 5 % hysteresis.



Earth-leakage monitor EMR4-R – for increased operating safety

The EN 60204 "Safety of machinery" stipulates that auxiliary circuits must be protected with earth-leakage monitors in order to increase operating safety. The earth-leakage monitors EMR4-R are primarily used for this purpose, as well as in areas for medical applications with similar requirements. A changeover contact indicates an earth fault and therefore allows faults to be rectified without the need for expensive downtimes.

The devices can be provided with an optional fault memory that requires a fault to be acknowledged after it has been rectified. A test button is provided to test the functioning of the device at any time.

One device is available for both AC and DC circuits, thus enabling the entire range of control voltages to be covered. The DC devices feature a multi-voltage coil to provide both AC and DC supply as required.



Phase sequence relay EMR4-F500-2 – compact rotary field monitoring

The phase sequence relay EMR4-F500-2 with its compact 22.5 mm width is used for monitoring the clockwise rotation of movable motors for which the phase sequence is important, such as with pumps, saws, drilling machines. This means additional space in the control panel thanks to the narrow width and protection against damage by means of phase sequence.



Current monitor EMR4-I – for universal use

The current monitors EMR4-I are suitable for both AC and DC monitoring tasks. The selectable lower or upper tripping limit means that they can be used for the underload or overload monitoring of pumps and drilling machines. They are available in two versions, each with three measuring ranges (30/100/1000 mA, 1.5/5/15 A). The multi-voltage coil allows these relays to be used for a wide range of applications. The second changeover contact is provided for direct status indication.



Unbalance relay EMR4-A – reliable phase loss detection

The unbalance relay EMR4-A with its 22.5 mm module width is the ideal protective device for phase loss protection. The detection of phase loss on the basis of phase shift means that reliable phase loss detection is ensured and overloads are prevented, even when large amounts of energy are regenerated to the motor. The relay can be used for protecting motors with a rated voltage of 380 V – 415 V at 50 Hz.



Level relay EMR4-N – increased safety with open-circuit protection

The level relays EMR4-N are used primarily to protect pumps from running dry or for the control of liquid levels. They operate by means of sensors which measure conductivity, with one sensor monitoring the maximum level and one sensor the minimum. A third sensor is used for the chassis potential. The 22.5 mm wide EMR4-N100 device is suitable for conductive liquids, and is provided with a switch to select between Level control and Dry run protection as required. This offers increased safety thanks to the open-circuit design used in both cases.



Multi-functional three-phase monitor – compact rotary field monitoring with various functions

With the multi-functional three-phase monitors the phase parameters, phase sequence, phase loss, phase unbalance, overvoltage and undervoltage are detected. Depending on the device version, the adjustable threshold value for asymmetry is in the range between 2-15%, and the threshold values for undervoltage and overvoltage are adjustable or fixed. The various possibilities and setting values can be taken from the table opposite. The EMR4-AWN... is a new version which features the "with neutral conductor monitoring" function.

New

| | EMR4-F500-2 | EMR4-W500-2-C | EMR4-W500-2-D | EMR4-W580-2-D | EMR4-A400-1 | EMR4-I1-2-A | EMR4-I15-2-A | EMR4-I15-2-B | EMR4-N100-1-B | EMR4-N500-2-B | EMR4-N500-2-A | EMR4-RAC-1-A | EMR4-RDC-1-A | EMR4-AW300-1-C | EMR4-AW500-1-D | EMR4-AWN170-1-E | EMR4-AWN280-1-F | EMR4-W300-1-C | EMR4-W500-1-D | EMR4-W380-1 | EMR4-W400-1 | EMR4-A300-1-C | EMR4-A500-1-D |
|--|-------------|---------------|---------------|---------------|-------------|-------------|--------------|--------------|---------------|---------------|---------------|--------------|--------------|----------------|----------------|-----------------|-----------------|---------------|---------------|-------------|-------------|---------------|---------------|
| Phase sequence | • | • | • | • | • | | | | | | | | | • | • | • | • | • | • | • | • | • | • |
| Phase failure | • | • | • | • | • | | | | | | | | | • | • | • | • | • | • | • | • | • | • |
| U<0.6xUe | • | • | • | • | | | | | | | | | | • | • | • | • | • | • | • | • | • | • |
| U<0.95xUe | | | | | • | | | | | | | | | | | | | | | | | | |
| Unbalance | | | | | | | | | | | | | | | • | • | • | • | | | | | |
| 2-15% | | | | | | | | | | | | | | | • | • | • | • | | | | | |
| 5-15% | | | | | • | | | | | | | | | | | | | | | | | • | • |
| Monitoring voltage (measured voltage) | | | | | | | | | | | | | | | | | | | | | | | |
| 200-500 V AC (= supply voltage) | • | | | | | | | | | | | | | | | | | | | | | | |
| 380-415 V AC (= supply voltage) | | • | | | | | | | | | | | | | | | | | | | | | |
| 160-300 V AC (= supply voltage) | | | | | | | | | | | | | | • | | | | | | | | | |
| 300-500 V AC (= supply voltage) | | | | | | | | | | | | | | | • | | | | • | | | | • |
| 90-170 V AC (= supply voltage)* | | | | | | | | | | | | | | | | • | | | | | | | |
| 180-280 V AC (= supply voltage)* | | | | | | | | | | | | | | | | | • | | | | | | |
| 380 V AC (= supply voltage) | | | | | | | | | | | | | | | | | | | | • | | | |
| 400 V AC (= supply voltage) | | | | | | | | | | | | | | | | | | | | | • | | |
| Undervoltage | | | | | | | | | | | | | | | | | | | | | | | |
| Measurement range min. 160-220 V AC | | | | | | | | | | | | | | • | | | | | | | | | |
| Measurement range min. 300-380 V AC | | • | • | | | | | | | | | | | | • | | | | | • | | | |
| Measurement range min. 350-430 V AC | | | | • | | | | | | | | | | | | | | | | | | | |
| Measurement range min. 90-120 V AC* | | | | | | | | | | | | | | | | • | | | | | | | |
| Measurement range min. 180-220 V AC* | | | | | | | | | | | | | | | | | • | | | | | | |
| 342 V AC fixed | | | | | | | | | | | | | | | | | | | | • | | | |
| 360 V AC fixed | | | | | | | | | | | | | | | | | | | | | • | | |
| Overvoltage | | | | | | | | | | | | | | | | | | | | | | | |
| Measurement range min. 220-300 V AC | | | | | | | | | | | | | | • | | | | | | • | | | |
| Measurement range min. 420-500 V AC | | • | • | | | | | | | | | | | | • | | | | | | • | | |
| Measurement range min. 500-480 V AC | | | | • | | | | | | | | | | | | | | | | | | | |
| Measurement range min. 120-170 V AC* | | | | | | | | | | | | | | | | • | | | | | | | |
| Measurement range min. 240-280 V AC* | | | | | | | | | | | | | | | | | • | | | | | | |
| 418 V AC fixed | | | | | | | | | | | | | | | | | | | | • | | | |
| 440 V AC fixed | | | | | | | | | | | | | | | | | | | | | • | | |
| Current measurement range | | | | | | | | | | | | | | | | | | | | | | | |
| 0.003-1 A | | | | | • | | | | | | | | | | | | | | | | | | |
| 0.3-15 A | | | | | | • | • | | | | | | | | | | | | | | | | |
| Monitoring | | | | | | | | | | | | | | | | | | | | | | | |
| Adjustable upper and lower threshold | | | | | • | • | | | | | | | | | | | | | | | | | |
| Adjustable upper threshold | | | | | | • | | | | | | | | | | | | | | | | | |
| Sensitivity (level) | | | | | | | | | | | | | | | | | | | | | | | |
| 5-100 kOhm | | | | | | | | | • | | | | | | | | | | | | | | |
| 250 Ohm - 500 kOhm | | | | | | | | | | • | • | | | | | | | | | | | | |
| Insulation resistance | | | | | | | | | | | | | | | | | | | | | | | |
| in DC networks | | | | | | | | | | | | | | • | | | | | | | | | |
| 10-110 kOhm | | | | | | | | | | | | | | • | | | | | | | | | |
| in AC networks | | | | | | | | | | | | | | | | | | | | | | | |
| 1-110 kOhm | | | | | | | | | | | | | | | | | | | | | | | |
| Supply voltage | | | | | | | | | | | | | | | | | | | | | | | |
| 24-240 V AC/DC | | | | | | • | • | | | | • | • | • | | | | | | | | | | |
| 220-240 V AC | | | | | | | | • | • | • | | | | | | | | | | | | | |
| 200-500 V AC | • | | | | | | | | | | | | | | | | | | | | | | |
| 380-415 V AC | | | | | • | | | | | | | | | | | | | | | | | | |
| 160-330 V AC | | • | | | | | | | | | | | | | | | | | | | | | |
| 300-500 V AC | | | • | • | | | | | | | | | | | | | | | | | | | |
| 160-300 V AC | | | | | | | | | | | | | | • | | | | | | | | | • |
| 90-170 V AC* | | | | | | | | | | | | | | | | • | | | | | | | |
| 180-280 V AC* | | | | | | | | | | | | | | | | | • | | | | | | |
| 380 V AC | | | | | | | | | | | | | | | | | | | | | • | | |
| 400 V AC | | | | | | | | | | | | | | | | | | | | | | • | |
| Features | | | | | | | | | | | | | | | | | | | | | | | |
| Width | | | | | | | | | | | | | | | | | | | | | | | |
| 22.5 mm | • | | | | • | | | | | | | | • | • | • | • | • | • | • | • | • | • | • |
| 45 mm | | • | • | • | | • | • | | | • | • | | | | | | | | | | | | |
| On-delay | | | | | | | | | | | | | | | | | | | | | | | |
| 0.5 s | | | | | • | | | | | | | | | | | | | | | | | | |
| 0.1-30 s | | | | | | • | • | | | | | | | | | | | | | | | | |
| On or off delay (selective;) | | | | | | | | | | | | | | | | | | | | | | | |
| 0.1-10 s | | • | • | • | | | | | | | | | | | | | | | | | | | |
| 0.5-10 s | | | | | | | | | | • | • | | | | | | | | | | | • | • |
| Status display via LED | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| Contacts | | | | | | | | | | | | | | | | | | | | | | | |
| 1 changeover contact | | | | | • | | | | • | | | | • | • | | | | | | | | | |
| 2 changeover contacts | • | • | • | • | | • | • | • | | • | • | | | • | • | • | • | • | • | • | • | • | • |
| Accessories | | | | | | | | | | | | | | | | | | | | | | | |
| Sealable shroud | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • | • |
| Note | | | | | | | | | | | | | | | | | | | | | | | |
| *With neutral conductor monitoring | | | | | | | | | | | | | | | | • | • | | | | | | |
| Measurement/setting between phase and neutral pole | | | | | | | | | | | | | | | | | | | | | | | |