

Flair 21D-22D-23D-23DM

Self-powered, adjustment-free fault passage indicators



Customer benefits

- 1 **At the cutting edge of technology**, they are used on underground MV networks for earth fault detection and detection of overcurrents, on all neutral earthing systems (directly-earthed or resistive, compensated or isolated neutral).
- 2 **Self-powered** they ensure permanent operation of the fault current passage detection and indication system.
- 3 **Adjustment-free**, they are immediately operational. However, numerous manual adjustments are possible.
- 4 **Compact and in DIN format** they fit naturally into the MV cubicles.
- 5 **Smartly designed**, they offer an ammeter/digital maximeter function.
- 6 **Comprehensive**, the Flair 23DM version incorporates a highly sophisticated voltage presence/absence relay function and the option of communicating on an RS485 serial link in Modbus protocol.

Easergy **Flair 21D - 22D - 23D - 23DM** is a family of fault passage indicators in DIN format, **small in size, efficient and self-powered**, which adapt automatically to the network.

Standard applications

Model	Applications
Flair 21D	Maintenance-free, adjustment-free fault detector
Flair 22D	Fault detector for network with very low load current (< 3 A) with possibility of manual adjustments. Can be used for earth fault detection on compensated or isolated neutral.
Flair 23D	Fault detector operational for setups where a zero sequence core balance CT is required (e.g. CT mounted on 3-pole cable). Needs a stabilised external dc power supply to supply power to the Flair 23D. Requires the VPIS-VO option on the VPIS for interfacing with it, in order to acquire the image of the mains voltage.
Flair 23DM	Combination fault passage indicator and voltage detector. Ideal for use with an Automatic Transfer of Source System. Needs a stabilised external dc power supply to supply power to the Flair 23DM. Requires the VPIS-VO option on the VPIS for interfacing with it, in order to acquire the image of the mains voltage. With the communication option it is the ideal detector to be integrated in the cell as a communicating fault detector.

Detection of phase/phase short circuits and earth faults

Fault detection

Overcurrent detection

- Automatic mode for automatic adjustment-free calibration of detection thresholds
- Manual mode possible to perform special override settings:
 - Flair 21D: 4 detection thresholds from 200 A to 800 A, in 200 A increments, selectable via microswitch.
 - Flair 22D, Flair 23D and Flair 23DM: 15 detection thresholds from 100 A to 800 A, in 50 A increments (configurable via the front panel keypad).
- Fault acknowledge time:
 - Flair 21D: 60 ms
 - Flair 22D, Flair 23D and Flair 23DM (configurable via the front panel keypad):
 - from 40 to 100 ms in 20 ms increments
 - from 100 to 300 ms in 50 ms increments.

Note: On Flair 23DM, the parameter settings can also be modified remotely via the Modbus link.

Earth fault detection

Principle: the detector checks on the 3 phases the current variations (di/dt). A time delay of 70 s is applied for fault confirmation by the upstream protective device.

- Automatic mode for automatic, adjustment-free calibration of detection thresholds
- Manual mode possible to perform special override settings:
 - Flair 21D: 6 detection thresholds from 40 to 160 A, selectable via microswitch
 - Flair 22D, Flair 23D and Flair 23DM (configurable via the front panel keypad):
 - Type A setup:*
 - from 20 to 200 A, in 10 A increments (in resistive neutral system)
 - from 5 to 30A in 5 A increments and from 30 to 200 A, in 10 A (in an isolated and compensated neutral earthing system)
 - Type B setup:*
 - from 5 to 30 A in 5 A increments and from 30 to 200 A in 10 A increments
 - Inrush function: to prevent unwanted detection in the event of load switch-on. Incorporates a 3 s time delay for fault filtering at network power up. Configurable at 70 s or disabled on Flair 22D, 23D and 23DM.

Fault indication

Signalling

- As soon as the fault is confirmed, the indication device is activated.
- Fault indication via red LED on the front panel
- Indication of the faulty phase (earth fault) on LCD display
- Indication remoting to external flashing lamp as an option (In some cases, the external lamp can be fitted with a lithium battery)
- Activation of a contact for retransmission to the Scada system.

Indication resetting

- Automatic resetting upon load current recovery or on voltage return if VPIS-VO option present (configurable time delay on Flair 22D, Flair 23D and Flair 23DM)
- Manual resetting via front panel button
- Resetting via external Reset input
- Resetting via the communication (Flair 23DM)
- Resetting via time delay:
 - Flair 21D: fixed time delay of 4 h
 - Flair 22D, Flair 23D and Flair 23DM: time delay adjustable from 1 h to 24 h, via the front panel keypad.

At the end of the time delay, the indicator lamps are extinguished, the Scada contact is deactivated, and the device returns to measurement display mode.

Voltage presence/absence relay

The Flair 23DM incorporates the voltage presence/absence relay function, the characteristics of which are described in the technical data sheet of the VD23 product.

Earth fault sensitivity up to 5 A

Display of settings and faulty phase

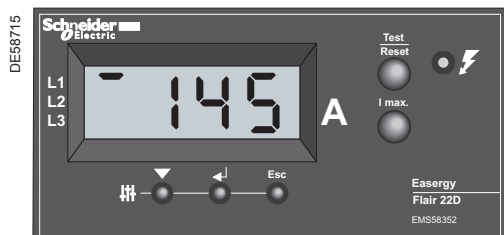
Automatic reset

Crystal-clear LCD display

Clear, comprehensive display

Display principle

- The load current is displayed permanently on the read-out
- When a fault is detected, the faulty phase is indicated
- Use the buttons on the front panel to scroll through settings and measurements.



Display of settings	Flair 21D	Flair 22D	Flair 23D	Flair 23DM
Automatic fault detection calibration mode	■	■	■	■
Short-circuit fault thresholds	■	■	■	■
Earth fault thresholds	■	■	■	■
Fault acknowledge time	■	■	■	■
Type of CT (CT1 or CT2)	■	■	■	■
Time delay for resetting fault upon current return (or voltage return on Flair 22D, Flair 23D and Flair 23DM)		■	■	■
Time delay for fault confirmation		■	■	■
Inrush time delay		■	■	■
Faulty phase and measurements				
Faulty phase	L1-L2-L3	L1-L2-L3	L1-L2-L3	L1-L2-L3
Load current	■	■	■	■
MV network frequency	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Current maximeter	■	■	■	■
Residual current	■	■	■	■

Selection table

Common characteristics

- 4-digit LCD display
- Ammeter/Maximeter
- Relay output for scada interface
- External reset input

Characteristics per product

Model	Reference	Description
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Fault passage indicator with single power supply

Flair 21D	EMS58351	Detector with autonomous power supply External indicator lamp output powered by battery (BVP)
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Fault passage indicator with dual power supply

Flair 22D	EMS58352	Detector with autonomous power supply and lithium battery (Service life: 15 years) External indicator lamp output powered by the Flair (BVE) Zero sequence CT as option (type B setup) Interface with VPIS-VO possible to confirm the fault by voltage absence.
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Fault passage indicator with dual power supply

Flair 23D	EMS58354	Detector with 24-48 Vdc external and autonomous power supply External indicator lamp output powered by the Flair (BVE) Zero sequence CT as option (type B or C setup) Interface with VPIS-VO possible for more reliable fault detection with low current values. The VPIS-VO must be used for detection on both isolated and compensated neutral.
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Fault passage indicator with dual power supply and voltage presence/absence relay with Modbus communication

Flair 23DM	EMS58355	Detector with 24-48 Vdc external and autonomous power supply External indicator lamp output powered by the Flair (BVE) Zero sequence sensor as option (type B or C setup) Voltage presence and absence detector (same as for VD23) Interface with VPIS-VO needed for the voltage presence/absence detection relay function and also for detection on isolated and compensated neutral. Communication on an RS485 serial link in Modbus protocol with access to states and measurements and remote parameter-setting.
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Accessories

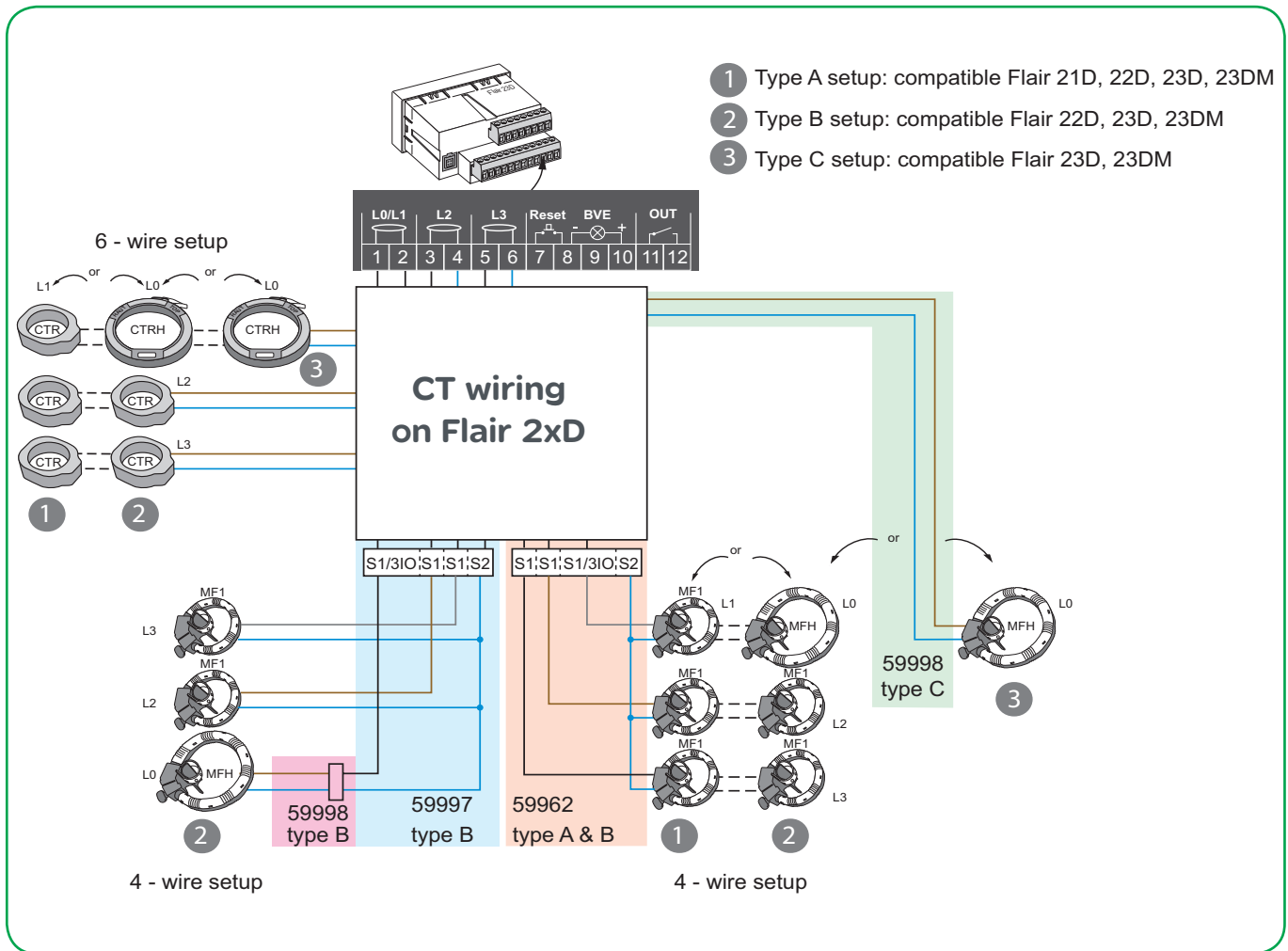
Description	Product	Reference	Flair 21D	Flair 22D	Flair 23D	Flair 23DM
Current sensors kit						
Type A setup with MF1 - 4 wire	3xMF1+Bundle MF1-MFH	59968 (*)	■	■	■	■
Type B setup with MF1/MFH - 4 wire	2xMF1+1xMFH+Bundle MF1-MFH Type A&B	2x59963+59927+59962		■	■	■
Type B setup with MF1/MFH - 4 wire	2xMF1+1xMFH+Bundle MF1-MFH Type B + IC30C	2x59963+59927+59997+59998		■	■	■
Type C setup with MFH	1xMFH+IC30C	1x59997+59998			■	■
External indicator lamps						
With lithium battery	BVP	59922	■			
Standard	BVE	59988		■	■	■
Voltage sensors						
Selection guide in the VD23 technical data sheet	VPIS-VO	VPI6241x		■	■	■
VPIS-VO extended cable connection, 1m	CAB-EXT-1M-VPIS	EMS58422		■	■	■
VPIS-VO extended cable connection, 2m	CAB-EXT-2M-VPIS	EMS58423		■	■	■
Spare parts						
Current sensors						
Phase CT for RM6 cubicle (cable diameter < 80 mm)	CTR2200 (CT1)	59925	■	■	■	■
Zero sequence CT for cables (split CT) (cable diameter < 130 mm)	CTRH2200 (CT1)	59926		■	■	■
Phase CT for cable (split CT) (cable diameter < 40 mm)	MF1 (CT2)	59963	■	■	■	■
Zero sequence CT for cables (split CT) (cable diameter < 130 mm)	MFH2200 (CT2)	59927		■	■	■
Connection						
Kit of 3 connectors for MF1	MFC3	59928	■	■	■	■
MF1-MFH CT cable - type A or B	Bundle MF1-MFH - Type A&B	59962	■	■	■	■
MF1-MFH CT cable - type B	Bundle MF1-MFH - Type B	59997		■	■	■
MFH CT cable	IC30C	59998		■	■	■
Others						
Lithium battery for replacement	BAT 279	59965		■		

(*) : reference 59968 includes: 3x59963+59962.

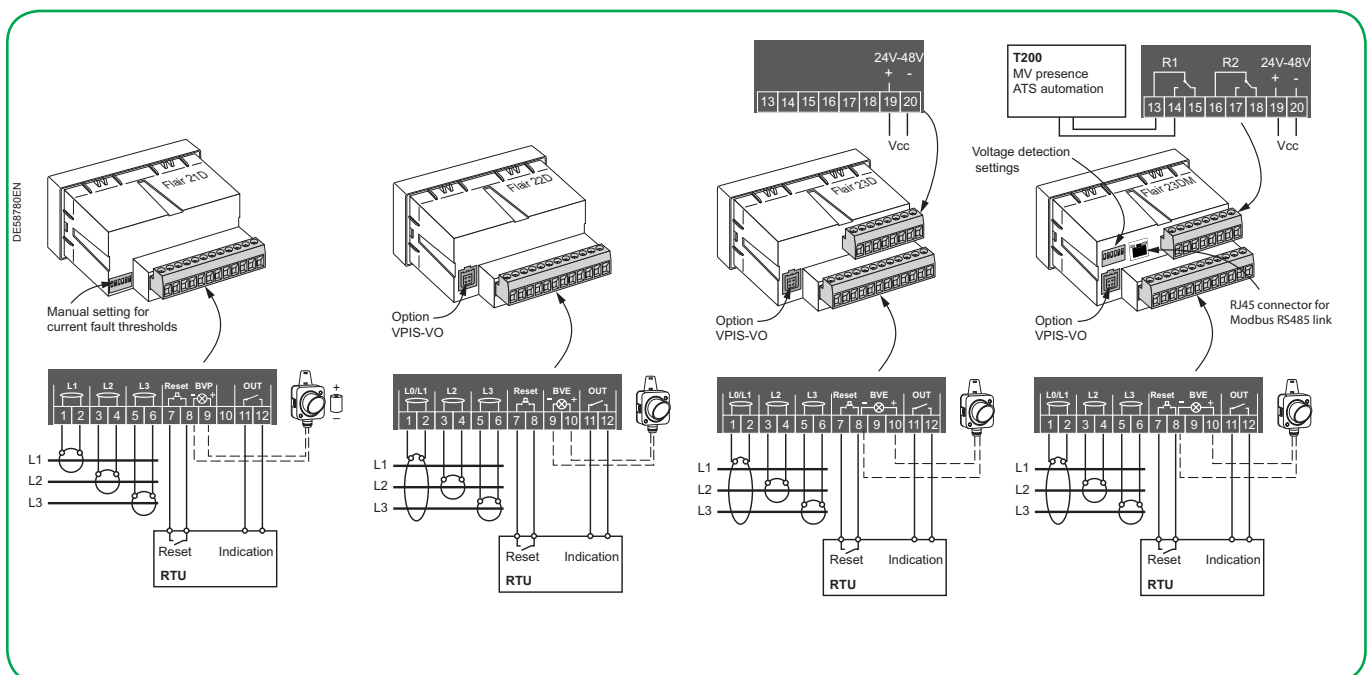
Mecanical characteristics

Enclosure characteristics
Small enclosure, DIN 93 x 45 mm format: H x L x P: 48 x 96 x 100 mm
Flush-mounting cut-out (max. plate thickness: 20/10°): L: 92 (-0, + 0.8) H: 45 (-0, + 0.6)
Secure mounting preventing removal
Connection to terminals
Mounting in any type of MV cubicle: RM6, SM6, Flusarc, FBX, PREMSET
Current sensors
Specific for RM6 bushing
Split for mounting on MV cables
Split zero sequence CT for residual current measurement.

CT mounting and associated kits



Wiring



Specific technical characteristics

Product	Flair 21D	Flair 22D and Flair 23D	Flair 23DM
Frequency (auto-detection)	50 Hz and 60 Hz	50 Hz and 60 Hz	50 Hz and 60 Hz
Switchgear	RM6 - SM6 24/36 - Flusarc - FBX - PREMSET	RM6 - SM6 24/36 - Flusarc - FBX - PREMSET	RM6 - SM6 24/36 - Flusarc - FBX - PREMSET
Operating voltage	Un: 3 to 36 kV - Vn: 1,7 to 24 kV	Un: 3 to 36 kV - Vn: 1,7 to 24 kV	Un: 3 to 36 kV - Vn: 1,7 to 24 kV
	Phase-to-phase fault	All systems	All systems
Neutral	Phase-to-earth fault	Impedance-earthed, directly earthed	Impedance-earthed, directly compensated, isolated (type B, C) ⁽³⁾

Measurement

Load	Minimum current	> 3 A	> 3 A	> 3 A
Current (A) (resolution 1 A)	For each phase Accuracy: ± (2% + 2 digits)	Ammeter Maximeter	Ammeter Maximeter	Ammeter Maximeter
Voltage (% of rated voltage)	With VPIS-VO option Accuracy: ±1%			Phase-to-neutral or phase-to-phase voltage

Fault detection

Threshold configuration		Via microswitches	Via front panel buttons	Via front panel buttons
Overcurrent fault	Auto-calibration	Yes	Yes	Yes
Accuracy ±10%	Thresholds	AUTO or 200, 400, 600, 800 A	OFF or AUTO or 100 to 800 A (50 A increments)	OFF or AUTO or 100 to 800 A (50 A increments)
Earth fault With 3 phase CTs Accuracy ±10%	Auto-calibration	Yes	Yes	Yes
	Algorithm	$\sum 3I + di / dt$	$\sum 3I + di / dt$	$\sum 3I + di / dt$
	Thresholds	OFF or AUTO or 40, 60, 80, 100, 120, 160 A	OFF or 5 ⁽²⁾ to 30 A (5 A increments) and 30 to 200 A (10 A increments)	OFF or 5 ⁽²⁾ to 30 A (5 A increments) and 30 to 200 A (10 A increments)
Earth fault With zero sequence CT Accuracy ±10% or ±1 A	Auto-calibration	–	No	No
	Thresholds	–	OFF or AUTO ⁽⁴⁾ or 5 to 30 A (5 A increments) and from 30 to 200 A (10 A increments) ⁽¹⁾	OFF or AUTO ⁽⁴⁾ or 5 to 30 A (5 A increments) and from 30 to 200 A (10 A increments)
Fault acknowledge time delay		60 ms	40 to 100 ms (20 ms increments) and from 100 to 300 ms (50 ms increments)	40 to 100 ms (20 ms increments) and from 100 to 300 ms (50 ms increments)
Fault confirmation time delay		70 s	3 s, 70 s or OFF	3 s, 70 s or OFF
Inrush	Time delay	3 s	3 s, 70 s or OFF	3 s, 70 s or OFF
Reset	Automatic	Upon current return 2 A (70 s or OFF)	Upon current return 2 A or voltage return (3 s, 70 s or OFF)	Upon current return 2 A or voltage return (3 s, 70 s or OFF)
	Manual via front panel	Yes	Yes	Yes
	External contact	Yes	Yes	Yes
	Delayed	4 h	1, 2, 3, 4, 8, 12, 16, 20, 24 h Factory setting = 4 h	1, 2, 3, 4, 8, 12, 16, 20, 24 h Factory setting = 4 h
Indications	LED	Yes	Yes	Yes
	External contact	Yes	Yes	Yes
	External indicator lamp	Yes (with battery)	Yes (without battery)	Yes (without battery)
	Phase indication	Yes	Yes	Yes
Characteristics of "OUT" relay	Maximum load	AC 8 A; DC 5 A	AC 8 A; DC 5 A	AC 8 A; DC 5 A
	Maximum cut-off voltage	AC 380 V; DC 125 V	AC 380 V; DC 125 V	AC 380 V; DC 125 V
	Maximum cut-off power	AC: 2000 VA (8 A 240 V) DC: 150 W (5 A 30 V)	AC: 2000 VA (8 A 240 V) DC: 150 W (5 A 30 V)	AC: 2000 VA (8 A 240 V) DC: 150 W (5 A 30 V)
	Dielectric between open contacts	1 kV - 1 min	1 kV - 1 min	1 kV - 1 min

Voltage detection

Voltage detection		(with VPIS-VO option)
Configuration of detection mode		Via microswitches
Detection settings	Measurement type	Phase-to-neutral/ phase-to-phase voltage
	R1 and R2 relay outputs	Direct or reverse
	Measured phases	Measured or not (for each phase)
	Residual voltage	Measured or not
Configuration of thresholds and time delays		Via front panel buttons
Thresholds settings (% of rated voltage) Accuracy ±10%	Voltage presence (R1)	40 to 90% (10% increments)
	Residual voltage threshold	30 to 60% (10% increments)
	Voltage absence (R2)	10 to 30% (10% increments)
Time delay settings	Activation time delay (R1 or R2 direct)	0 to 1 s (0.1 s increments) and from 1 to 21 s (2 s increments) and from 1 to 15mn (1, 3, 5, 7, 10 15 mn)
	Release time delay (R1 or R2 direct)	0 to 1 s (0.1 s increments) and from 1 to 3 s (0.5 s increments)
Characteristics of relays R1 and R2	Maximum load	AC: 8 A; DC: 8 A
	Maximum cut-off voltage	AC: 400 V; DC: 300 V
	Maximum cut-off power	AC: 2000 VA (8 A, 240 V) DC: 240 W (8 A, 30 V)
	Dielectric between open contacts	1 kV - 1 min

Communication

RS485 2-wire, connector with LEDs	no	no	yes
Speed: auto-detection 1200, 2400, 4800, 9600, 19200, 38400 bits/s Class A05			

Accessible data

- | | |
|---|--|
| <ul style="list-style-type: none"> - Phase and earth faults - Fault passage counters including transient faults - Current measurements (I1, I2, I3, IO), max. current, voltage (U, V, residual) - Resetting of fault indication, counters and max. values | <ul style="list-style-type: none"> - Fault and voltage presence/absence detection parameters - Communication parameters - Time synchronisation and time-tagged events |
|---|--|

Power supply				
Self-powering	On measuring CTs	Yes (I load > 3 A)	Yes	Yes
Battery (Service life: 15 years)		No	Lithium (Flair 22D), No (Flair 23D)	No
External power supply		No	No (Flair 22D), 24 to 48 Vcc (Conso mac: 50 mA) (Flair 23D)	24 to 48 Vdc (conso max: 50 mA)
Display				
Display		4-digits LCD	4-digits LCD	4-digits LCD
Fault		Red LED	Red LED	Red LED
Faulty phase		Yes	Yes	Yes
Setting		Yes (CT type)	Yes	Yes
Sensors				
Phase CT		RM6: 3 phase CTs Other: 3 split CTs	RM6: 2 or 3 phase CTs Other: 2 or 3 split CTs	RM6: 2 or 3 phase CTs Other: 2 or 3 split CTs
Zero sequence CT		No	Diameter: 170 mm	Diameter: 170 mm
Test mode				
	By button on front panel	Product name Software version Network frequency Residual current Digits test	Product name Software version Network frequency Residual current VPIS presence Direction of energy Digits test	Product name Software version Network frequency Residual current VPIS presence Direction of energy Digits test

Common technical characteristics

Insulation resistance	Standards	Comments		
Dielectric withstand	IEC 60255-5	2 kVrms, 1 min		
Impulse wave	IEC 60255-5	1.2/50 µs, 5 kV		
Insulation resistance	IEC 60255-5	R > 100 MΩ 500 V, 1 min		
EMC	Standards	Level	Comments	
(immunity and electromagnetic interference)				
Electrostatic discharge	IEC 61000-4-2	3	8 kV air; 6 kV contact	
Radiated fields	IEC 61000-4-3	3	10 V/m 80 MHz, 1 GHz	
Fast transients	IEC 61000-4-4	4	4 kV CM; 5 kHz, 100 kHz	
Impulse waves	IEC 61000-4-5	3	(42 Ω) on I/O; (2 Ω) on supply line	
Common mode radio frequencies	IEC 61000-4-6	3	0.15-80 MHz 10 V/m 80% MA (1 kHz)	
50 Hz magnetic fields	IEC 61000-4-8	4	30A/m permanent 300A/m 1s	
Damped oscillatory waves	IEC 61000-4-12	4	± 2.5 kV MC, ± 1 kV MD, 1 MHz	
Damped oscillatory waves - short	IEC 61000-4-18	3	2.5 kV CM, 1 kV DM, 100 kHz & 1MHz	
Damped oscillatory waves - rapid	IEC 61000-4-18	3	3 MHz, 10 MHz, 30 MHz, 2 kV CM	
Climatic tests	Standards	Level	Comments	
In operation				
Exposure to cold	IEC 60068-2-1	Ad	-40°C; 96 h	
Exposure to dry heat	IEC 60068-2-2	Bd	+70°C; 96 h	
Exposure to damp heat	IEC 60068-2-78	Cab	93% RH, 40°C, 56 days, no condensation	
Temperature variation	IEC 60068-2-14	Nb	-40 +70°C; 5°C/min	
Cyclic damp heat test	IEC 60068-2-30	Db	2 x 12 h (+25 -55°C); 6 cycles; 93-95% RH	
In storage				
Exposure to cold	IEC 60068-2-1	Ab	-40°C; 96 h	
Exposure to dry heat	IEC 60068-2-2	Bb	+70°C; 96 h	
Exposure to damp heat	IEC 60068-2-78	Cab	93% RH; 40°C; 56 days, no condensation	
Temperature variation	IEC 60068-2-14	Na	-40 +70°C; transfer time 8 s	
Corrosive atmosphere				
Salt spray test	IEC 60068-2-52	Kb / 2	3 cycles: exposure period of 2 hours with 22 hours rest	
Mechanical tests	Standards	Level	Comments	
In operation				
Vibrations	IEC 60255-21-1 (IEC 60068-2-26 Fc)		1 Gn; 9-200 Hz; 1 cycle	
Shock test	IEC 60255-21-2 (IEC 60068-2-27 Ea)		10 Gn; 11 ms; 3 pulses / direction per axis	
Seismic test	IEC 60255-21-3 (IEC 60068-2-29)		2 Gn horizontal, 1 Gn vertical	
In storage				
Vibrations	IEC 60255-21-1 (IEC 60068-2-26 Fc)		2 Gn; 10-150 Hz; 20 cycles	
Shock test	IEC 60255-21-2 (IEC 60068-2-27 Ea)		30 Gn; 11ms; 3 pulses / direction per axis	
Seismic test	IEC 60255-21-3 (IEC 60068-2-29)		20 Gn; 16 ms; 1000 pulses / axis	
Enclosure protection	IEC 60529	IP41 / IP30	On front panel / Other parts	
	IEC 62262	IK07	2 joules	
Packaging impact protection	IEC 60068-2-32, NF EN 22248		Method 1m/6 sides/4 corners	

(1) The minimum threshold 5 A can only be reached with the earth CT ref CTRH2200.
 (2) 20 A minimum for resistive neutral type, 5A minimum for isolated or compensated neutral type
 (3) Type C mounting is not available on compensated neutral
 (4) only with isolated and compensated neutral

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