

# Easergy Range - Flair 2xD

Self-powered, adjustment-free fault passage indicators



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.

## Advantages

- **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).
- **Self-powered** they ensure permanent operation of the fault current passage detection and indication system.
- **Adjustment-free**, they are immediately operational. However, numerous manual adjustments are possible.
- **Compact and in DIN format** they fit naturally into the MV cubicles.
- **Smartly designed**, they offer a digital ammeter/maximeter function.
- **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.

## Standard applications

### Flair 21D

Maintenance-free, adjustment-free or simple settings fault detector

### Flair 22D

Fault detector for network with very low load current (< 3 A) with extended possibility of manual adjustments. Can be used for earth fault detection on compensated or isolated neutral, particularly appropriate when external light indicator is required.

### 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 stabilized external DC power supply.

### Flair 23DM

Combined fault passage indicator and voltage presence relay together with Modbus communication.

Ideal for use with an Automatic Transfer of Source System.

Needs a stabilized external DC power supply.

Its Modbus communication link makes it ideal for integration in Smart architectures.

Flair 22D, Flair 23D and Flair 23DM can be connected to a VPIS-VO to acquire the image of the Medium Voltage. This is required for earth fault detection on compensated and isolated networks and automatic reset on Voltage return.

Flair 23DM requires also the connection to VPIS-VO for its voltage presence relay function.

VPIS-VO input of Flair 22D, Flair 23D and Flair 23DM is compatible with VPIS V2 only. It is not compatible with VPIS V3.

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## Fault detection

Detection of phase/phase short circuits and earth faults

### 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.

### Earth fault detection

#### Earth fault sensitivity up to 5 A

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 30 A 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.

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

## Fault indication

### Signaling

#### Display of settings and faulty phase

- 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 remotely 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 reset

- 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.

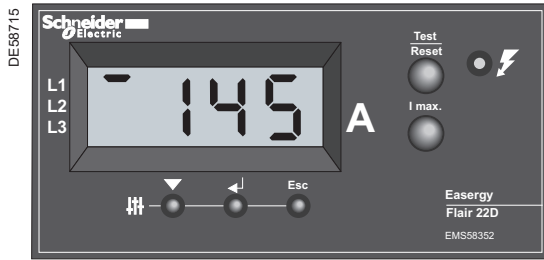
At the end of the time delay, the indicator lamps are extinguished, the Scada contact is deactivated, and the device returns to measurement display mode.

### 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.

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## Clear, comprehensive display

### Crystal-clear LCD 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 from CTs and super capacitor backup 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 from CTs and lithium battery backup (Service life: 15 years) External indicator lamp output powered by the Flair (BVE) Zero sequence CT as option (type B setup) Interface with VPIS V2-V0 possible to confirm the fault by voltage absence or to operate on networks with compensated or isolated neutral
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#### Fault passage indicator with dual power supply

Flair 23D	EMS58354	Detector with 24-48 Vdc external and autonomous power supply from CTs External indicator lamp output powered by the Flair (BVE) Zero sequence CT as option (type B or C setup) Interface with VPIS V2-V0 possible for more reliable fault detection with low current values. The VPIS-V0 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 from CTs 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 V2-V0 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
<b>Current sensors kit</b>						
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			•	•

## Current sensors

Specific for RM6 bushing: CTR2200

Split for mounting on MV cables: MF1

Split zero sequence CT for residual current measurement: MFH2200 or CTRH2200

## External indicator lamps

With lithium battery	BVP	59922	•			
Standard	BVE	59988		•	•	•
Flushed mounted	LED	59967		•	•	•
Tamper-proof	BVD	59961		•	•	•

## Voltage sensors

Selection guide in the VD23 technical data sheet	VPIS V2-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	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		•		
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(\*) : Reference 59968 includes: 3x59963+59962.

## Mechanical 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

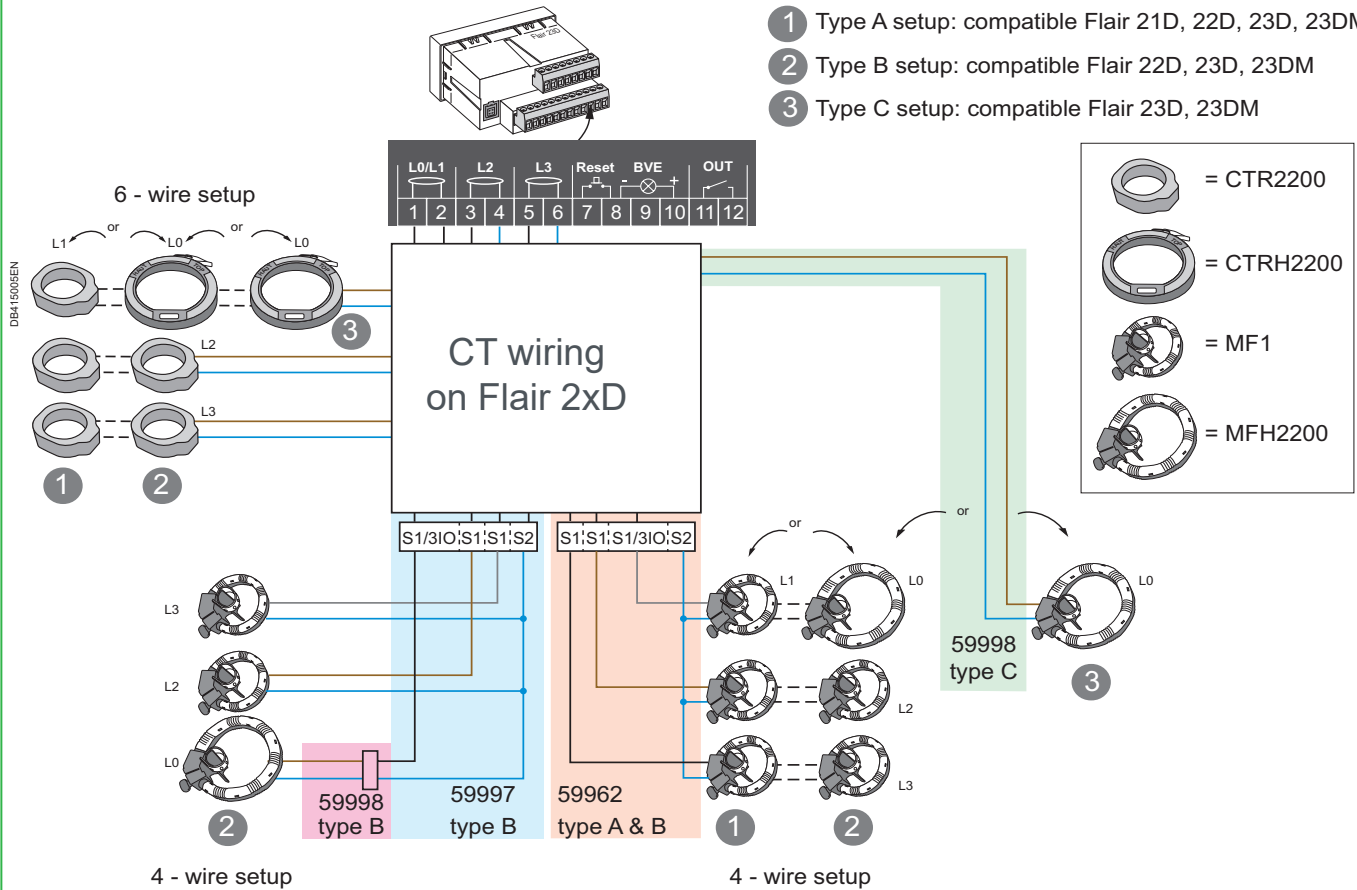
Mounting in any type of MV cubicle: RM6, SM6, Flusarc, FBX, PREMSET

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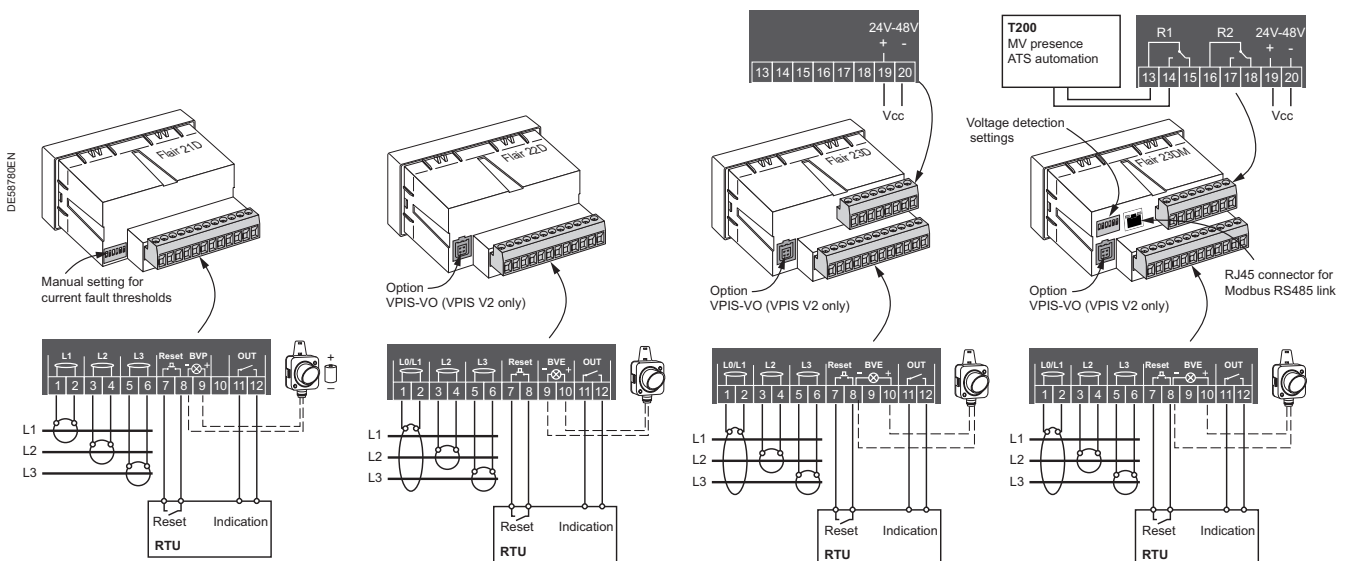
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## CT mounting and associated kits

- 1 Type A setup: compatible Flair 21D, 22D, 23D, 23DM
- 2 Type B setup: compatible Flair 22D, 23D, 23DM
- 3 Type C setup: compatible Flair 23D, 23DM



## Wiring



VPIIS-VO input of Flair 22D, Flair 23D and Flair 23DM is compatible with VPIIS V2 only. It is not compatible with VPIIS V3.

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## Self-powered, adjustment-free fault passage indicators

### 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
Neutral	Phase-to-phase fault	All systems	All systems	All systems
	Phase-to-earth fault	Impedance-earthed, directly earthed	Impedance-earthed, directly compensated, isolated Flair 22D: (type B), Flair 23D, type (B,C) <sup>(3)</sup>	Impedance-earthed, directly compensated, isolated (type B, C) <sup>(3)</sup>
<b>Measurement</b>				
Load	Minimum current	> 3 A	> 3 A	> 3 A
Current (A) (resolution 1 A)	For each phase	Ammeter	Ammeter	Ammeter
	Accuracy: ± (2% + 2 digits)	Maximeter	Maximeter	Maximeter
Voltage (% of rated voltage)	With VPIS V2-VO option			Phase-to-neutral or phase-to-phase voltage
<b>Fault detection</b>				
Threshold configuration		Via microswitches	Via front panel buttons	Via front panel buttons
Overcurrent fault Accuracy ±10%	Auto-calibration	Yes	Yes	Yes
	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	$\sum 3I + di/dt$	$\sum 3I + di/dt$	$\sum 3I + di/dt$
Earth fault With zero sequence CT Accuracy ±10% or ±1 A	Auto-calibration	–	No	No
	Thresholds	OFF or AUTO or 40, 60, 80, 100, 120, 160 A	OFF or 5 <sup>(2)</sup> to 30 A (5 A increments) and 30 to 200 A (10 A increments)	OFF or 5 <sup>(2)</sup> to 30 A (5 A increments) and 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		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
Indications	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
	LED	Yes	Yes	Yes
	External contact	Yes	Yes	Yes
Characteristics of "OUT" relay	External indicator lamp	Yes (with battery)	Yes (without battery)	Yes (without battery)
	Phase indication	Yes	Yes	Yes
	Maximum load	AC 8 A; DC 5 A	AC 8 A; DC 5 A	AC 8 A; DC 5 A
Voltage detection	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
<b>Voltage detection</b>				<b>(with VPIS-VO option)</b>
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		

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## Specific technical characteristics

Communication	Flair 21D	Flair 22D and Flair 23D	Flair 23DM
RS485 2-wire, connector with LEDs	no	no	yes
Speed: auto-detection 1200, 2400, 4800, 9600, 19200, 38400 bits/s Class A05			
<b>Accessible data</b>			
- Phase and earth faults			
- Fault passage counters including transient faults			
- Current measurements (I1, I2, I3, I0), max. current, voltage (U, V, residual)			- Fault and voltage presence/absence detection parameters
- Resetting of fault indication, counters and max. values			- Communication parameters
			- Time synchronization and time-tagged events
<b>Power supply</b>			
Self-powering	On measuring CTs	Yes (I load > 3 A)	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. max: 50 mA) (Flair 23D)	24 to 48 Vdc (conso. max: 50 mA)
<b>Display</b>			
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
<b>Sensors</b>			
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
<b>Test mode</b>			
	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

- (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 and isolated neutral  
 (4) Only with isolated and compensated neutral

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## Common technical characteristics

Insulation resistance	Standards	Comments	
Dielectric withstand	IEC 60255-5	2 kVrms, 1 min	
Impulse wave	IEC 60255-5	1.2/50 $\mu$ s, 5 kV	
Insulation resistance	IEC 60255-5	R > 100 M $\Omega$ , 500 V, 1 min	
EMC	Standards	Level	Comments
<b>(immunity and electromagnetic interference)</b>			
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 $\Omega$ ) on I/O; (2 $\Omega$ ) 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	$\pm$ 2.5 kV MC, $\pm$ 1 kV MD, 1 MHz
Damped oscillatory waves - short	IEC 61000-4-18	3	2.5 kV CM, 1 kV DM, 100 kHz & 1 MHz
Damped oscillatory waves - rapid	IEC 61000-4-18	3	3 MHz, 10 MHz, 30 MHz, 2 kV CM
Climatic tests	Standards	Level	Comments
<b>In operation</b>			
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
<b>In storage</b>			
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
<b>Corrosive atmosphere</b>			
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
<b>In operation</b>			
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	
<b>In storage</b>			
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	

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