

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

Self-powered, adjustment-free fault passage indicators

■ **At the cutting edge of technology**, they are used on underground MV networks with isolated, resistor-earthed or directly earthed neutral 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 an ammeter/digital 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.

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 (< 2 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 sensitivity up to 5 A

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.

Display of settings and of phase at fault

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 phase at fault (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.

Automatic reset

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.

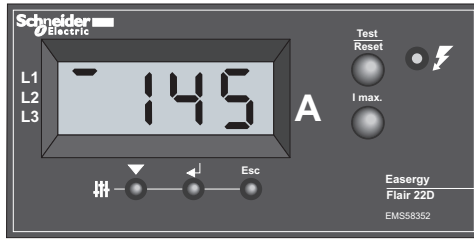
Clear, comprehensive display

Display principle

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

Crystal-clear LCD display

DE68715



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 for the VD23 product.

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		■	■	■
Phase at fault and measurements				
Phase at fault	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

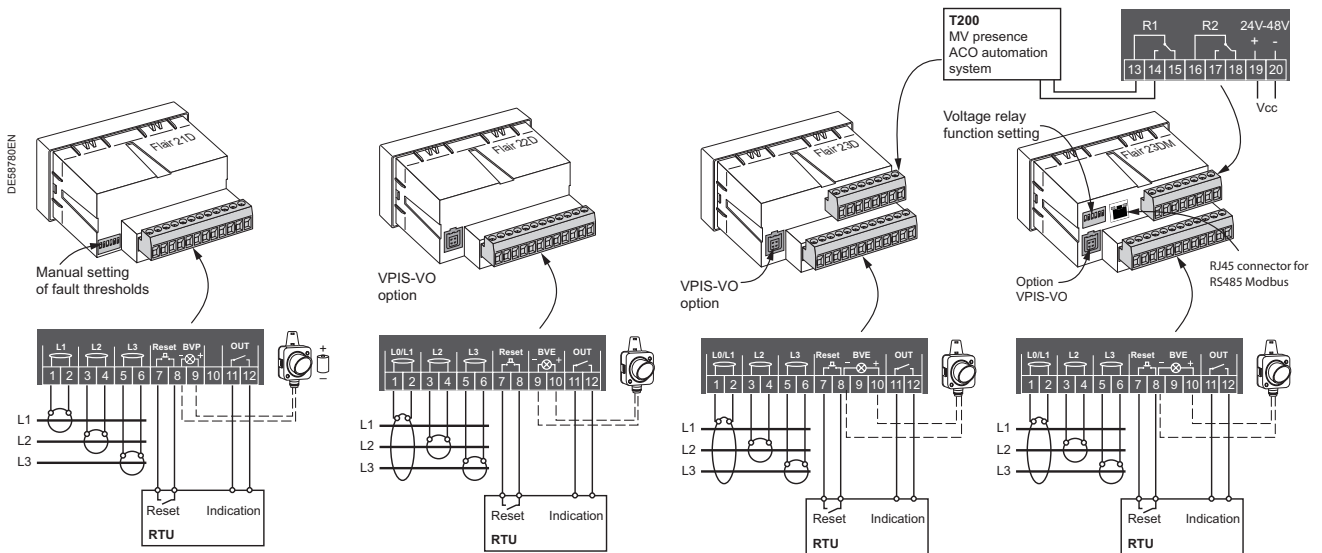
4-digit LCD display
 Ammeter/Maximeter
 Relay output for Scada interface
 External Reset input

Characteristics per product

Model	Reference	Description
Fault passage indicator with single power supply		
Flair 21D	EMS58351	Detector with autonomous power supply External indicator lamp output powered by battery ("BVP")
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.
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.
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.

Accessories

Description	Product	Reference	Flair 21D	Flair 22D	Flair 23DV	Flair 23DM
Current sensors	Phase for RM6 cubicle	CTR2200 (CT1)	59925	■	■	■
	Zero sequence for cables (split)	CTRH2200 (CT1)	59926		■	■
	Phase for cable (split)	MF1 (CT2)	59963	■	■	■
	Zero sequence for cables (split)	MFH2200 (CT2)	59927		■	■
External indicator lamps	With lithium battery	BVP	59922	■		
	Standard	BVE	59988		■	■
Connectors	Set of 3 connectors for MF1	MFC3	59928	■	■	■
	MF1-MFH CT connection cable for 4-wire setup	Bundle MF1-MFH	59962	■	■	■
	MF1-CTRH CT connection cable for 4-wire setup	Bundle MF1-CTRH	59997		■	■
	MFH CT connection cable for 4-wire setup	IC30C	59998		■	■
Voltage sensors	Selection guide in the VD23 technical data sheet	VPIS-VO	VPI6241x	■	■	■
Lithium battery	For replacement	BAT 279	59965	■		



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 (*), other.
(* For Flair 23D and 23DM: Availability in 2013)

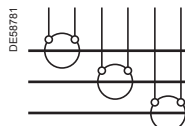
Current sensors

- Specific for RM6 bushing
- Split for mounting on MV cables
- Split zero sequence CT for residual current measurement.

Type of sensor setup

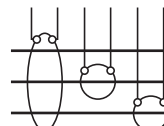
Type A

- Standard use



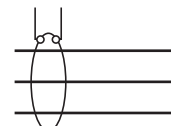
Type B

- Sensitive earth setting



Type C

- Earth fault only
- Three-pole cable



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 ⁽³⁾	RM6 - SM6 24/36 - Flusarc - FBX ⁽³⁾	RM6 - SM6 24/36 - Flusarc - FBX ⁽³⁾
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) ⁽⁴⁾	Impedance-earthed, directly compensated, isolated (type B, C) ⁽⁴⁾
Measurements				
Load	Minimum current	> 2 A	> 2 A	> 2 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-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 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	$\sum 3I + di / dt$	$\sum 3I + di / dt$	$\sum 3I + di / dt$
	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 ⁽⁵⁾ or 5 to 30 A (5 A increments) and from 30 to 200 A (10 A increments) ⁽¹⁾	OFF or AUTO ⁽⁵⁾ 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 or 30 or 70 s or OFF	3 s, 30 or 70 s or OFF
Inrush	Time delay	3 s	3 s or 30 or 70 s or OFF	3 s, 30 or 70 s or OFF
Reset	Automatic	Upon current return 2 A (70 s or OFF)	Upon current return 2 A or voltage return (3, 30 or 70 s or OFF)	Upon current return 2 A or voltage return (3, 30 or 70 s or OFF)
	Manual via front panel	Yes	Yes	Yes
	External contact	Yes	Yes	Yes
	Deferred	4 h	2, 4, 8, 12, 16, 20, 24 h Factory setting = 4 h	2, 4, 8, 10, 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				(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 9600, 19200, 38400 bits/s Class A05				
Accessible data				
- Phase and earth faults				
- Fault passage counters including transient faults				
- Current measurements (I1, I2, I3, I0), max. current, voltage (U, V, residual)				
- Resetting of fault indication, counters and max. values				
- 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 (Flair22D), 24 to 48 Vcc (Conso mac: 50 mA) (Flair 23D)	24 to 48 Vdc (conso mac: 50 mA)
Display				
Display		4-digits LCD	4-digits LCD	4-digits LCD
Fault		Red LED	Red LED	Red LED
Phase at fault		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) Availability for Flair 23D and 23DM: during 2013.

(4) Type C mounting is not available on compensated neutral

(5) only with isolated and compensated neutral

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