

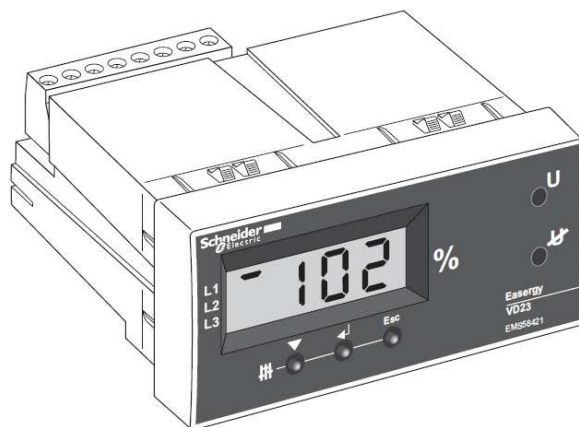
MV electrical networks management

Easergy range

Flair 2xD & VD23

MV substation control unit

Functional test instructions



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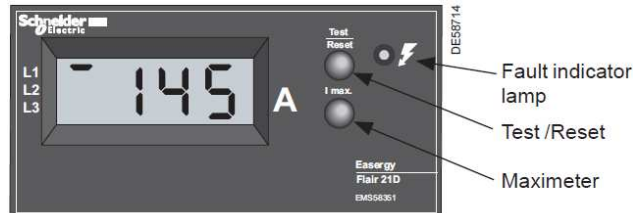
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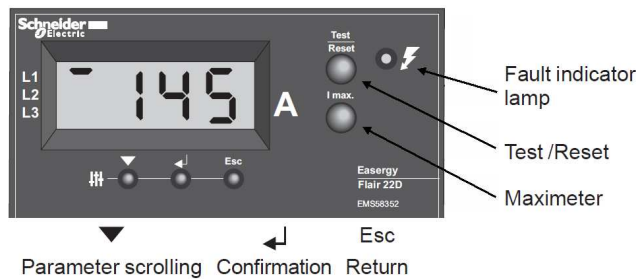
1 Objectives

The purpose of this document is to supply the sequences of basic test to verify proper operation of the functions voltage detection and current fault detection implemented in the Flair 2xD

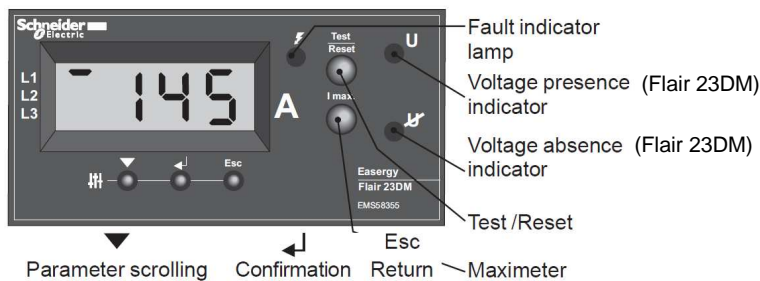
Flair 21D :



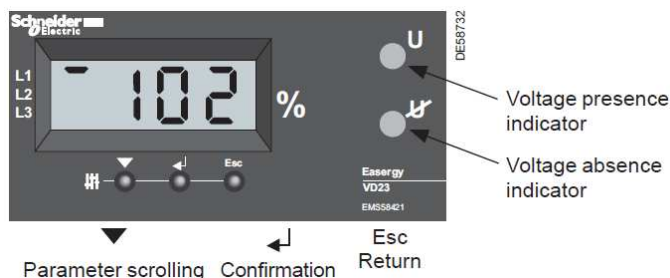
Flair 22D :



Flair 23D et 23DM :



VD23 :



Important: Sequences of functional tests described in this manual applies to the default settings listed in the operating instructions of the device. The results are only valid for this configuration. It is therefore recommended to perform the functional test before applying settings in the product to avoid reconfiguration.

2 Preliminary tests

2.1 Power supply (Flair 23D, 23DM and VD23 only)

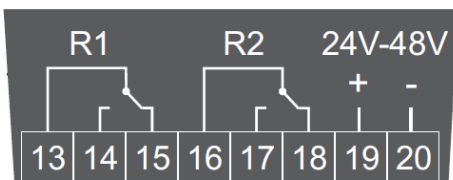
2.1.1 Flair 21D :

- It is required to have a tool to inject a three-phase current, also phase CT's like MF1 or CTR2200 CT's, in order to be able to power the Flair 21D.
- Inject a three-phase current of 50Aeff (+ / - 1%) and with frequency of 50Hz or 60Hz for at least 60 seconds in all the three phase CTs to supply the Flair 21D.
- The unit resets and starts searching the frequency of MV network. Device indicates this step by rolling display of the following message on LCD:



- Then, once frequency is found, the display is replaced by: n.P.
- Once the storage element (capacitor) is charged (charging time at 50A : ~ 1 min), the display is replaced by the values of current measured on each phase.

2.1.2 Flair 23D, 23DM et VD23 :



- Connect a DC voltage source (24Vdc-48Vdc) between terminals 19 (+) and 20 (-)
- Switch the product on.

2.2 Default parameters (for all the products)

2.2.1 Flair 21D :

- Put all the dip-switches in "ON" position to activate the default settings on the product.

Note: the default configuration will be taken into account only during the Autotest phase of the product, after pressing the "Test / Reset" button (see specific chapter).

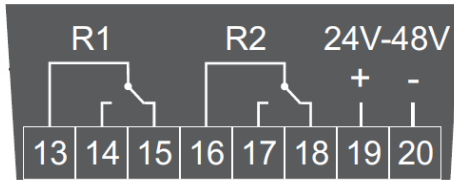
2.2.2 Flair 22D, 23D, 23DM et VD23 :

Press for 5 seconds on the "Esc" button to activate the default settings, then when the flashing message "Fact" appears, press the button "Confirmation ":

- The unit resets and starts searching the frequency of MV network. Device indicates this step by rolling display of the following message on LCD:



- For the Flair 23DM and VD23, verify that the LED's of voltage presence and voltage absence are off. Also check that the relays R1 and R2 are in the rest position.
Note: the shown on the label of the product is the rest position.



The relays of voltage presence R1 and absent voltage R2 are at rest position after powering up the unit, that is to say: closed contact of R1 between pins 13 and 15, closed contact of R2 between pins 16 and 18.

3 Voltage detection function

3.1 Detection of voltage presence (Flair 22D, 23D, 23DM and VD23)

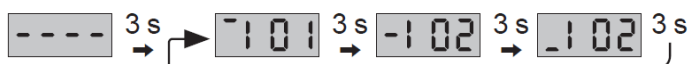
- Connect the VPIS-VO cable to the Flair 2xD and apply the medium voltage into operation.

As soon as the frequency is determined and the calibration performed, the following message is displayed: ----, then :

- For the Flair 22D or 23D, the display is replaced by : 0 or L.P. if the current is $\leq 3A$ or replaced by the current measured if the current is $\geq 3A$.
- For the Flair 23DM and VD23 :

3s after the message: ----, network voltages expressed in %, are then indicated phase by phase. The MV shall remain in between 98% and 102%

This shall be accessible by two successive presses on the button "Imax".








- **If the measured values are outside the limits of $\pm 2\%$, repeat the calibration as described in the manual of the Flair 23DM (see NT00328) or VD23 (NT00229).**
 - Check the voltage presence LED. It must be ON.
 - Check the voltage presence relay (R1). It must be switched to the active position (closed contact between pins 13 and 14).
- If the following message ---- persists, the signal VPIS-VO is either absent or too low. Check VPIS-VO link and the consistency of the medium voltage source and the VPIS-VO used. **Kindly take necessary precautions while checking the MV source.**

3.2 Autotest of Product (for all the products)

Press the "Test/Reset" button (for the Flair 2xD) or the button  (for the VD23). The unit then enters in " test" mode. Check the following instructions:

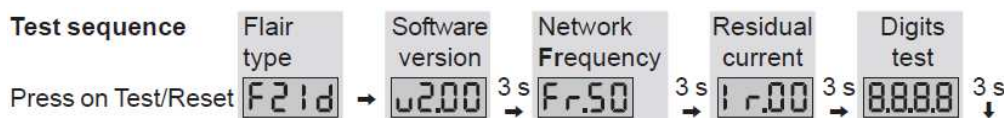
3.2.1 VD23:

After entering in "Test" mode, the unit displays the following message: . Press the "Confirmation" button to start the test sequence. The following information will be displayed on the device:

Product name	Software version	Network frequency	Digits test
			

- o Check that the frequency detected is consistent with the network frequency.

3.2.2 F21D:

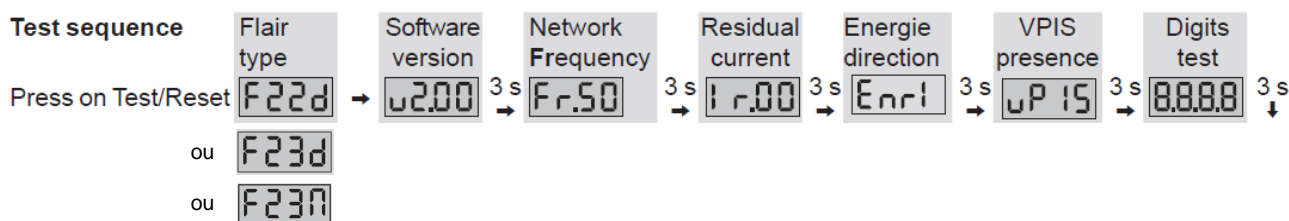


Note: With the F21D, this sequence is followed by the display of the fault detection settings sequence.

- o Check that the frequency detected is consistent with the network frequency.
- o Check that the fault indication relay has switched (output "OUT")

3.2.3 Flair 2XD:

The display of the test sequence is indicated from the passage in "Test" mode:



- o Check that the detected frequency is consistent with the network frequency.
- o Check that the residual current is equal to zero.
- o Check the LCD displays [Enr-] as there is no energy.
- o Check that the presence of VPIS is detected.
- o Check that the fault indication relay has switched (output "OUT")
- o Check the flashing status of the LED "Fault indicator".

The fault detecting relay is in closed position during the test, that is to confirm the contact (OUT) is closed between the pins 11 and 12.

3.3 Detection of no voltage presence (Flair 23DM and VD23 only)

This condition will appear when the MV is below the voltage presence threshold. By default, the threshold for no voltage presence is 80% of the nominal voltage. Adjust the MV source for getting 75% of the nominal voltage (75% to reflect the 5% hysteresis):

- Check that the voltage presence LED turns off
- Check the voltage presence relay (R1), it must switch into off position (contact closed between pins 13 and 15).

3.4 Detection of voltage absence (Flair 23DM and VD23 only)

Switch off the Medium voltage source (or disconnect the voltage sensor).

- Check that the voltage absence LED is ON.
- Check the relay voltage absence (R2), it must switch into the active position (contact closed between pins 16 and 17).

3.5 Detection of no voltage absence (Flair 23DM and VD23 only)

This condition will appear when the MV is above the voltage absence threshold. By default, the threshold for no voltage absence is 20% of the nominal voltage. Adjust the MV source for getting 25% of the nominal voltage (25% to reflect the 5% hysteresis)

- Check that the voltage absence LED turns off
- Check the voltage absence relay (R2), it must switch into off position (contact closed between pins 16 and 18).

If all the tests above are satisfactory, that is:

Voltage presence	Indication corresponds to the U presence status (LEDs + relays R1 and R2)
Network frequency	50 or 60Hz, and correspond to the network frequency
Value measured	100% +/-2
Voltage absence	Indication corresponds to the U absence status (LEDs + relays R1 and R2)
No voltage absence	Indication corresponds to the U absence status (LEDs + relays R1 and R2)
Voltage presence	Indication corresponds to the U presence status (LEDs + relays R1 and R2)
No Voltage presence	Indication corresponds to the U presence status (LEDs + relays R1 and R2)

⇒ The voltage detection function is considered as compliant.

4 Fault Detection

Remark: the default configuration of the product is the type A mounting for the CTs. If the mounting of CTs used is of type B or type C, the setting has to be changed on the product to perform the test. See the "Settings Mode" in the user guide for more information about the settings.

4.1 Measure of phase currents (Flair 2xD only)


For this test, it is required to have a tool to inject a three-phase current, and phase CTs as MF1 or CTR2200 (type A) and zero sequence CTs as MFH2200 or CTRH2200 (type B).

a) Injection of the phase currents

- Inject a three-phase current of 50Aeff (+ / - 1%) and with frequency of 50Hz or 60Hz for at least 60 seconds in all the three phase CTs (mounting type A) or only in the CT installed on the phases L2 and L3 (mounting type B).
- Check the current values measured and displayed
They must be within the tolerance: 5% + / - 1A
That is between: 47 Aeff < I < 53 Aeff.

Display of the current on Flair 2xD screen:

L1  A (displayed for type A only, otherwise: 0A)

L2  A

L3  A

If current measurements displayed by the Flair 2xD are compliant, now check the mounting direction of the phase CT's.

If the Flair 2XD doesn't display anything or  or , the CTs are not connected properly or the injection is absent.

b) Checking the mounting direction of the phase CTs

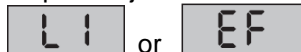
Press the "Test / Reset" button on the front panel and check during the test sequence, the value of residual current displayed:



⇒ The mounting of CTs is correct if the residual current "Ir" displayed is less than 2A.

4.2 Earth fault (Flair 2xD only)

- Inject a three-phase current of 50Aeff (+ / - 1%) and with frequency of 50Hz or 60Hz for at least 30 seconds in the phase CT's.
- Then create a default by an increase of 30A in the Phase 1 (type A) or in the zero sequence CT (type B or C), so 80A for at least 100ms.
- Stop the injection of current and voltage and check the following display on the product:



- Put back the source MT and check the reset of the fault after 70s.

	1. Current injected (Aeff)	2. Condition of fault	3. Validation of the fault	4. Reset of the fault
Delay	30s	0.1s	3 s	> 70s
L1 or I0	50A (type A) or 0A (type B,C)	80A (type A) or 30A (type B,C)	0A	50A
L2	50A	50A	0A	50A
L3	50A	50A	0A	50A
V1	100%	100%	0%	100%
V2	100%	100%	0%	100%
V3	100%	100%	0%	100%

4.3 Phase fault (Flair 2xD only)

- Inject a three-phase current of 50Aeff (+ / - 1%) and with frequency of 50Hz or 60Hz for at least 30 seconds in the phase CT's.
- Then create a default by an increase of 300A in the Phases 2 and 3 during 100 ms.
- Stop the injection of current and voltage and check the following display on the product:



- Put back the source MT and check the reset of the fault after 70s.

	1. Current injected (Aeff)	2. Condition of fault	3. Validation of the fault	4. Reset of the fault
Delay	30s	0.1s	3 s	> 70s
L1 or I0	50A (type A) or 0A (type B, C)	50A (type A) or 0A (type B,C)	0A	50A
L2	50A	350A	0A	50A
L3	50A	350A	0A	50A
V1	100%	100%	0%	100%
V2	100%	100%	0%	100%
V3	100%	100%	0%	100%

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