Product Description

Discontinued Product

Mains / Generator Protection Unit (Vector Jump) VECFU5 (3- / 4-wire)
with under / overvoltage and under / overfrequency monitor

Release unit for self producing energy plant at low voltage mains acc. partly to DIN V VDE V 0126-1-1 : 2006-02 “Self switching place of disconnection”

- Constant monitoring and assessment of phase angle
- Reaction time 30 – 60ms depending on phase jump
- High-contrast LCD display with voltage and frequency display
- Settings can be called up directly
- Easy menu guidance
- Adjustments can be made during operation
- 5 output changeover contacts 250V 6A
- Watchdog monitoring

Application
The Mains/Generator Protection Unit VECFU5 is used in particular in generator systems for parallel operation with the public network as a so-called vector jump relay for protecting the generator. The protection unit detects rapid phase changes or short interruptions of the mains voltage and disconnects the power switch of the generator from the DIN bar within 30 - 60ms. It is also useful for intentional mains interruptions of the interconnected networks with a duration of 200 - 300ms via which 80 - 90% of network disturbances, for example due to lightning, are eliminated. Once the mains disturbance stops, the output contacts of the VECFU5 are enabled immediately. In case of phase jumping disturbance the phase output contact will yet be enabled after an adjustable mains smoothing time of for example 5 sec. has passed.

The VECFU5 also includes a precise frequency and voltage monitor which tests the “slower mains changes” for compliance with the limits. This also counts for the overvoltage protection acc. to VDE 0126 (moving average value in the voltage range of 110% – 115% across an interval of 10 minutes) who cause a disconnection from mains.

A test function of VECFU5 allows a phase jump, an under-/overfrequency and an under-/overvoltage test to be carried out realistically during operation of the aggregate (in the program, the same section is run through as with a real fault).

Note:
Immediately after mains failure or a phase shift of the mains voltage, the parallel generator has to supply the entire network or the differential voltage caused by the phase shift. The currents from the generator to the mains increase until they reach high values, but they do not lead to short-circuit triggering until after 100ms depending on the short-circuit protection. However, by then damage can already have been done, for example to the aggregate coupling, or the running aggregate can stall under maximum power and the continuing supply of gas or diesel to the engine can lead to deflagration. In addition to the necessary repairs, other economic damage can be the result as the generator is now no longer available for the emergency power supply or because power can no longer be fed into the mains.

These disadvantages can be avoided by using the vector jump protection unit, which disconnects the generator from the mains as soon as power failure or a phase shift occurs.

Function
The VECFU5 detects a phase jump or a short-term phase change on the power line and switches the output relay off (which is normally on in disturbance-free operation) when the value set (1-20°) is exceeded. The unit also includes an under- and overfrequency monitor and one (3-phase) under- and overvoltage monitor with
output change-over contacts. The output relays of the underfrequency and undervoltage monitor are on in normal operation and switch off when underfrequency or undervoltage occurs. The output relays of the overfrequency and overvoltage switch on when the preset limits are exceeded and the preset delay time has passed.

The limits for phase jump, under- and overfrequency, under- and overvoltage, delay times and switching hysteresis can be adjusted by the customer as desired and saved permanently.

**Output Contacts**

In off-running of VECF U5 the output changeover contacts are in same idle state as printed on front label. After starting operation of set and correct values of voltage and frequency the U< relay will be switched on (contacts 24-25 be closed), the F< relay will be switched on (contacts 32-33 be closed) and the phase jumping relay will be switched on after delay time (contacts 36-37 be closed). With a serial circuit of all closing contacts (by rated voltage and frequency) a measuring circuit will be achieved to open a power switch by one failure on mains.

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**Technical Data**

- **Type**: Mains / Generator Protection Unit (Vector Jump) VECFUS5
- **Design**: Plastic housing on 35 mm DIN bar according to DIN EN 50022 / DIN 46277
- **Housing material**: ABS with fire protection equipment UL 94 V-0
- **Dimensions, weight**: 100 x 75 x 109.5 mm (WxHxD), approx. 0.6 kg
- **Auxiliary power supply**: 231 / 400V 50-60Hz, +/-10% in each case, approx. 2.5W, other values available, option: 24V/DC
- **Program safety**: Watchdog function with automatic reset, failure of LCD display does not cause the functions to fail.
- **Operating voltages**: 231V (L-N) / 400V (L-L), other values available
- **Trigger: voltage**: Highest or lowest voltage value of one of the 3 phases (to N) in each case causes the output relay to operate in question to trigger, releasing of moving average value 110%-115% causes immediate switching of output relay.
- **Measuring accuracy: voltage**: 0.5 %
- **Voltage insulation strength**: 4000V (coil-contact), 1000V (open contact)
- **Terminals**: Strad 2.5 mm², rigid 4mm², torque 0.5Nm, screw size M3
- **Protection class**: Housing IP40 (EN60529), terminals IP20
- **Environmental temperature**: -10 °C bis +45°C, 95% humidity
- **Mains isolation acc. to**: EN 60 742 (safety transformers)
- **General regulations**: EN 50 178 (electrical resources in power installations)
- **Radio interference voltage**: DIN EN 55011, Edition: 2003-08, Class B
- **Radio interference field intensity**: DIN EN 55011, Edition: 2003-08, Class B
- **Noise imm. ESD (housing)**: DIN EN 61000-4-2, Edition: 2001-12, Electrical discharges, Performance criteria B
- **Noise imm. HF-field (hous.)**: DIN EN 61000-4-3, VDE0847-4-3:2006 EMV, High frequency irrigation, Performance criteria A
- **Noise imm. BURST (AC pow.)**: DIN EN 61000-4-4, Edition: 2005-07 EMV, Transient noise signals, Performance criteria B
- **Noise imm. BURST (cable)**: DIN EN 61000-4-4, Edition: 2005-07 EMV, Transient noise signals, Performance criteria B
- **Noise imm. HF-field (AC pow.)**: DIN EN 61000-4-5, Edition: 2001-12 EMV, High frequency inflow, Performance criteria B
- **Noise imm. HF-field (cable)**: DIN EN 61000-4-6, Edition: 2001-12 EMV, High frequency inflow, Performance criteria B
- **Voltage dip AC power**: DIN EN 61000-4-11, Edition: 2005-02 EMV, Voltage dip, Perform. criteria B (10-20ms) and C (500ms)
- **Short interruption AC power**: DIN EN 61000-4-11, Edition: 2005-02 EMV, Short interruption 0-5 sec., Perform. Criteria C
- **Self operating switching point**: Acc. to DIN VDE 0126-1-1 together with corresponding switch-gear
- **Switching duration, maint.**: 100% ED, maintenance-free
- **Installation position**: As required

**Programming and Displaying of VECFUS5**

VECFUS5 works normally at any time in its main function as Vector Jump- and Voltage / Frequency Protection Unit, even though a service is reading or during changing the standard values on display menu. After saving of changed standard values the unit works with new settings. So you are able to change the settings during running system without problems.

Should only the **Standard Settings** be read, the „Mode“-Key must be push several time to get the different values on LCD-Display. In the following small table are the standard settings listed which can be changed from customer.

**Display Functions with “Mode”**

In normal running of VECFUS5 (mode key not activated) the display shows all 2 seconds one after another the voltage values L1-N, L2-N, L3-N and the frequency. With continuing pushing of down key the display will show point of value stops and the changes of values can be watched continuously.
With pushing of „Mode“-key the LCD-Display shows first the last event E: with information of back time T: in minutes. With next pushing of mode the display of the 10-minutes voltage average values acc. to VDE0126 of L1, L2 and L3 follows respectively. After this the service menu follows for changing of settings with edition of password (see later). After another pushings of mode the following settings are be showed on display.

**Programming of Settings**

**Preliminary Remark:**
During programming inside the menu the choosing of the next menu follows the point on the lower line of LCD-display. That means, with Up or Down you set the choosen menu point to the lower line and enter with „Mode“-key. Then maybe another branching are necessary. When the flashing values are achieved they have to be changed with Up or Down. The keys have been holding pushed for appr. 1 second in any menu. This avoids changing of values by mistake.

**Programming:**
With „Mode“-key 5 x (at a time 1 Sec.) pushing until display Service: obtained. Up-key 2 x pushing, until value becomes 2 (=key-figure ) and then enter with Mode-key. You are now reaching the main menu, with the menu points Test (Test functions for chosen relay-output), Setup Lx (Voltage settings), Setup Fq (Frequency settings), Setup Ph (Phase settings), U-System (switch over to L-L) and DAC Out (configuration of analog output, option). Choosing of wanted menu point to low er line, enter with „Mode“ or branch into further menus until the choosen value is flashing.

**Trimming and saving of settings:**
The flashing value can be changed with Up or Down keys. After setting of the new value enter with „Mode“ key, now the menu changes to upper menu-point. Now you either you go back with „Zurück“ (back) or branch into other points (You are allowed to change several values at a time)
At the end of settings you go back to „Sichern“ (save, also for test-function) or „Abbruch“ (break). With „Sichern“ standing on lower line the changed values will be saved after entering the „Mode“-key (hold on 1 second). After this moment the unit works with the changed operating values. It is recommend to check the values in the displaying menu with the „Mode“-key.

**Displaying of Events**

After 1 x pushing of menu-key the display shows the last events with their lasting time in minutes. The display shows a 2-figured code for the type of event.

**Event code:**
- 0: no Event
- 1L: L1-N High (Overvolt. L1-N)
- 1H: L1-N High (Undervolt. L1-N)
- 2L: L2-N Low (Undervolt L2-N)
- 2H: L2-N High (Overvolt. L2-N)
- 3L: L3-N Low (Undervolt. L3-N)
- 3H: L3-N High (Overvolt. L3-N)
- FH: Frequency High
- PH: Phase High (Phase jump)
- FL: Frequency Low
- PA: Parameter changed
- 100: 100 Minutes (Event 100 minutes before)
- AV: exceeding of 10 minutes average value

Also some events for the manufacturer purpose, could be helpful for repairing.

**Other Funktions**
Should of any reason a failure arise (program crash) a reset is possible with pushing all 3 keys at a time. After reset the display shows short times “DSL-electronic“ and the unit works immediately. A full reset is obtained with off and on switching of auxiliary voltage. A failure only on display do not lead to failitures of controlling functions.
Wiring Diagram

Circuit example of VECFU5 for paralleling operation

Common rail

Load Gen. Mains

L1 L2 L3

VECFU5

Frequenz 49.99 Hz

Down Up Mode

Aux.

DSL

N

Off switching by mains failures
Anzeige der Messwerte

Weiter: Mode  ➔ 1x  (Nach 20 sec. autom. Zurück)

Aktuelle Mittelwerte über 10 min. nach VDE 126

Bei zweizeiligen Menüs wird mit Mode  ➔ 1x die untere Zeile gewählt.
Tasten müssen für ca. 1 sec. gedrückt werden.

Zurück zum Hauptmenü