

High-Tech Range

FDC1- DC Voltage Relay



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1. Introduction

FDC1 series of relays are based on latest microcontroller based design technique. FDC1 are equipped with a display to indicate measurements and settings and keys are provided for settings. FDC1 is a flush mounted type of relay.

2. Application

FDC1 is a D.C. voltage supervision relay used e.g. for supervision of intermediate circuits, station batteries or starter batteries etc. There are three variants of the relay i.e. FDC1-U for under voltage protection, FDC1-O for over voltage protection, FDC1-UO for over and under voltage protection.

3. Characteristics and Features

- Microcontroller based design.
- Voltage supervision with two stage under and over voltage function.
- Extremely wide setting ranges and fine steps, with the help of push buttons.

- Separately adjustable, independent timers for $U_{<}, U_{<<}$ and $U_{>}, U_{>>}$.
- Independent trip delays of the individual elements.
- Wide operating ranges of the supply voltage (AC/DC).
- Password protection.

4. Working principle

FDC1 is equipped with two stage independent under and over voltage supervision with adjustable pickup values and tripping time delays.

The analog voltage is subsequently filtered in order to minimize the influence of disturbing voltages, the voltage is compared with the set reference value, if the voltage falls below or exceeds the set reference value a time circuit is activated and appropriate relay trips.

5. Design

5.1 Connections

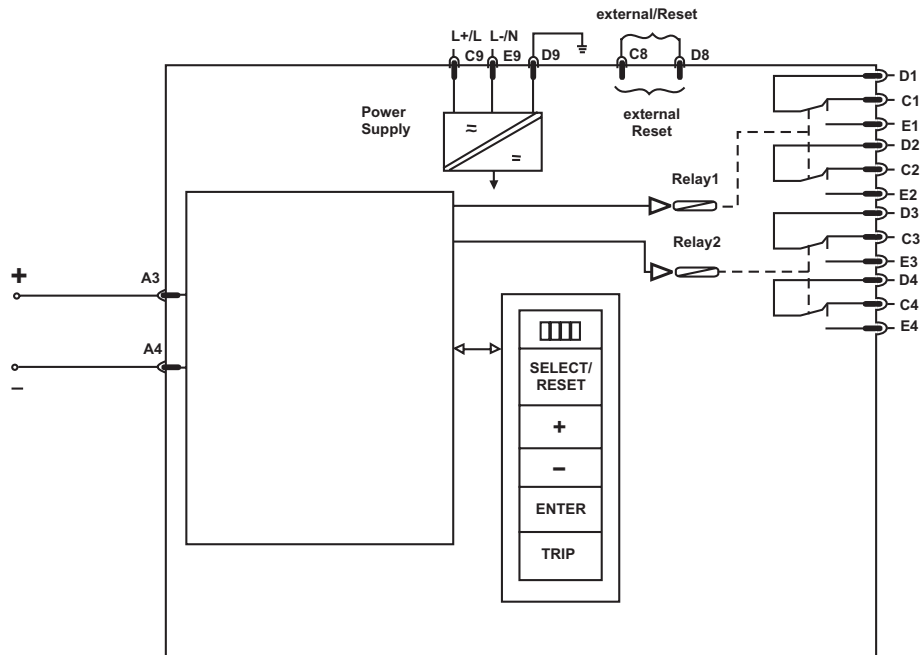


Fig. 5.1: Connection diagram

5.1.1 Voltage measuring inputs

DC voltage is connected to the protection relay via terminals A3 and A4.

5.1.2 Output Relays

The FDC1 is equipped with two relays for undervoltage and overvoltage supervision each with two change over contacts. Relays selection for different voltage elements is users configurable.

5.2 Front Plate

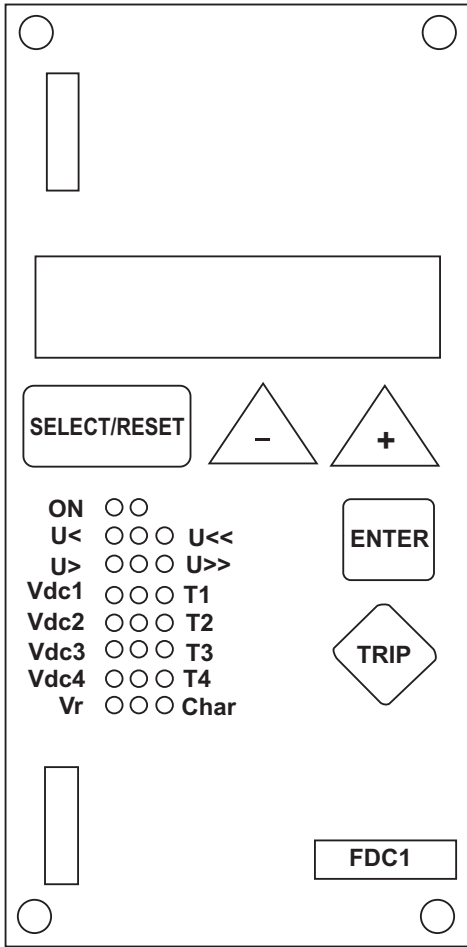


Fig.5.2 Front plate FDC1

5.2.1 LEDs

All LEDs (except power) are two colored. The LEDs assigned for $U<$, $U<<$, $U>$, $U>>$ light up green or red to indicate tripping occurred printed on left or right side of LEDs respectively.

Other LEDs light up green during setting and reading out the setting values printed on left side next to LEDs. The LED light up red when the setting values printed on the right side next to them are activated.

5.2.2 Keypads

Enter setting values (increasing and decreasing tripping values and time delay), manual reset, manual trip functions are possible with keypads at front plate.

6. Operation and settings

6.1.1 Setting of pickup value for over voltage supervision $U>/U>>$

With the aid of keypad available at front plate pickup value of over voltage element $U>$, $U>>$ could be adjusted in the range of 50-250% of U_n .

6.1.2 Setting of pickup value for under voltage supervision $U</U<<$

In the similar way pickup value of under voltage elements $U<$, $U<<$ could be adjusted in the range of 30-125% of U_n .

6.1.3 Setting of trip delays

Tripping delays $t_{u<}$, $t_{u<<}$, $t_{u>}$, $t_{u>>}$ values (i.e. T1, T2, T3 & T4) could be adjusted in the range of 0.1-60sec.

6.1.4 Tripping characteristics

Only definite time tripping characteristics available.

6.1.5 Operation of output Relays

Following operations are individually programmable for each of the four conditions, namely Vdc1($U<$), Vdc2($U<<$), Vdc3($U>$), Vdc4($U>>$)

Code	Action
0	No Operation
1	Relay 1
2	Relay 2
3	Relays 1 & 2

6.1.6 Operating Modes

run : In this mode it is possible to view the measurements of relay i.e. DC voltage.

edit : In edit mode relay settings can be changed. For activating edit mode enter password (Default 4 times <Enter> button). Different parameters could be selected one by one by pressing <SELECT/RESET> button. For altering the value <+> & <-> buttons are to be used, for incrementing & decrementing the values respectively.

Password can also be changed in edit mode. If the default password is to be recalled, short terminal C8 & D8 & switch OFF & ON the auxiliary supply of the unit. (C8-D8 link to be removed once default password is recalled).

6.2 Reset

6.2.1 Manual

By pressing pushbutton <SELECT/RESET> the tripping relay is reset and LED U<,U<<,U>,U>> will extinguish.

6.2.2 Remote

Terminal C8 and D8 could be used to reset the tripping relay externally.

7. Setting Ranges

Parameters	Setting Ranges
V _r	10-400V
U>/U>>	50-250% of V _r
U<U<<	30-125% of V _r
t _{u>} /t _{u>>}	0.1-60s
t _{u<} /t _{u<<}	0.1-60s

8. Relay testing and commissioning

The following test instructions should help to verify the protection relay performance before or during commissioning. To avoid a relay damage and to ensure a correct relay operation, be sure that:

Example Test Circuit

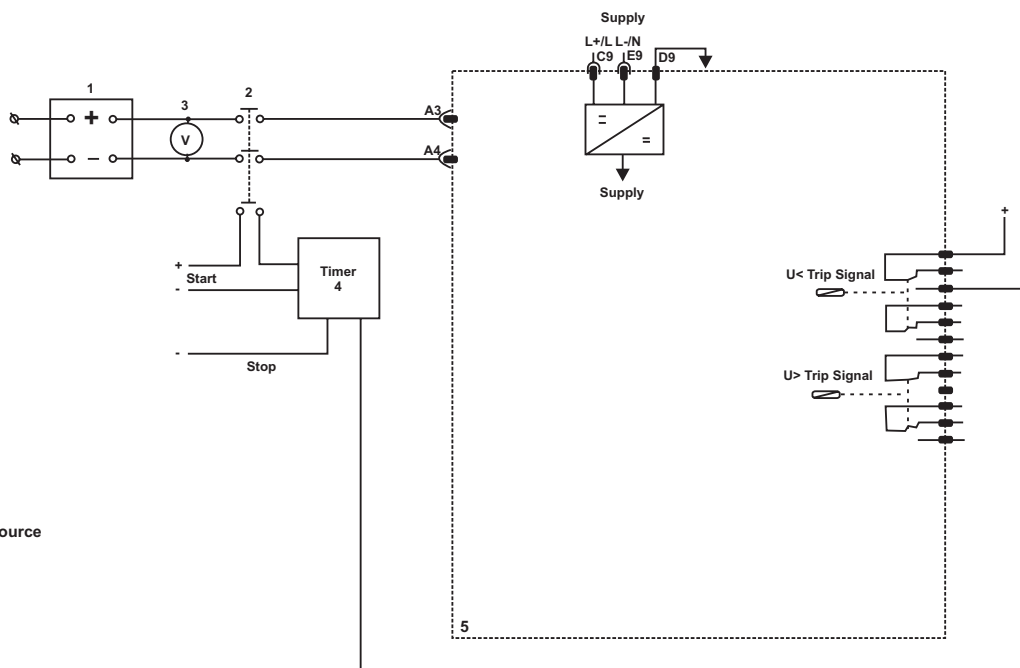


Fig. 8.1 Test circuit

- The auxiliary power supply rating corresponds to the auxiliary voltage on sight.
- The voltage transformer circuits are connected to the relay correctly.
- All control and measuring circuits as well as the output relays are connected correctly.

8.1 Power ON

Prior to switch ON the auxiliary power supply, be sure that the auxiliary supply voltage corresponds with the rated data on the type plate.

When the auxiliary supply is switched ON (terminals C9 & E9) please observe that the LED 'ON' alight.

8.2 Secondary Test

8.2.1 Test Equipment

- Voltmeter with class 1 or better.
- Auxiliary power supply with the voltage corresponding to the rated data on the type plate.
- DC voltage supply (adjustable range of U_n).
- Timer to measure operating time.
- Switching device.
- Test leads and tools.

9. Technical Data

9.1 Measuring Input

Rated Data

Thermal withstand capability in voltage circuit : Continuously $1.25 \times V_r$

9.2 Auxiliary Voltage

Rated auxiliary voltage : 16-270V AC/16-360V DC

9.3 Common Data

Drop-out ratio : $U_{>} > 97\%$
: $U_{<} < 103\%$

Returning time : 30ms

Minimum response time : 30ms

9.4 Output relay

Max. breaking capacity (AC voltage) : 250V AC/1000VA/continuous current 6A

9.5 System Data

Specific ambient service

Storage temperature range : -40°C to $+85^{\circ}\text{C}$

Operating temperature range : -20°C to $+70^{\circ}\text{C}$

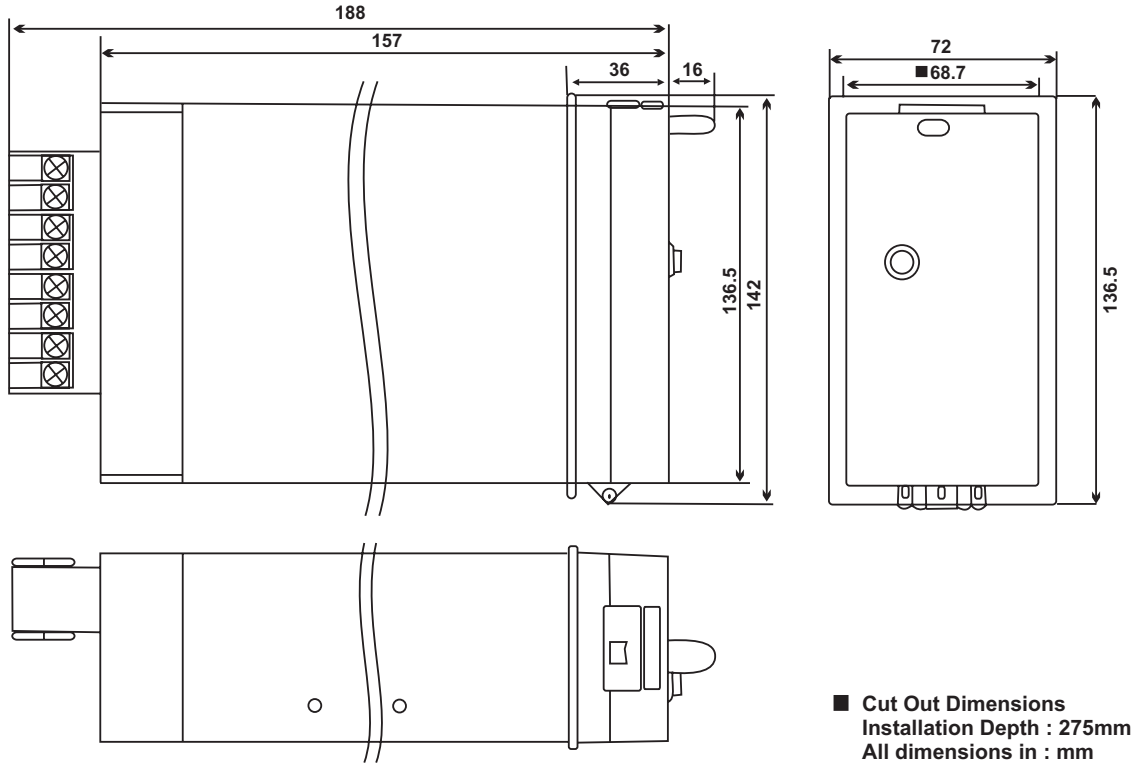
Insulation test voltage, input and outputs
between themselves and to the relay frame
as per EN 60255-6 and IEC255-5 : 2.5kV(eff.), 50Hz, 1min.

Impulse test voltage, input and outputs
between themselves and to the relay frame
as per IS 8686 : 5.0kV;1.2/50 μ s;0.5J

High frequency interference test voltage,
input and outputs between themselves and
to the relay frame as per IS 8686 : 2.5 kV/1MHz

Weight : 1.0 Kg (approx.)

9.6 Dimensional Details



10. Order Form

DC Voltage Relay	FDC1	
Under Voltage		U
Over Voltage		O
Under and Over Voltage		UO



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