



Order Number

Serial Number

2C135K19 TEST PROCEDURE

**DEFINITE TIME SENSITIVE EARTH FAULT RELAY
WITH HARMONIC SUPPRESSION**

1. TEST EQUIPMENT REQUIRED

DC Auxiliary Supply, AC Variable Current & Frequency Supply, Ammeter, Frequency Counter, Oscilloscope, HV Test Equipment.

Electronic Counter (for measuring operate & release times).

2. ASSOCIATED DRAWINGS

- 159-135-019 Descriptive Manual 2C135K15
- 660-252-215 Circuit Diagram PCB 2C135K15
- 660-252-315 Loading Diagram PCB

3. HIGH VOLTAGE TESTING

- a) Apply 2KV RMS 50 Hz between terminal groups 1 and 2 in table 1 for 1 minute.
- b) Apply 3 5KV 1/50us pulses of each polarity between terminal groups 1 and 2 in table 1.

TABLE 1

<u>GROUP 1</u>	<u>GROUP 2</u>
1,2,3,4,5,8	6,7,9,10,FRAME
1,2,5,8,9,10	3,4,6,7,FRAME
1,2,6,7	5,8,FRAME

4. CALIBRATION & TEST PROCEDURE

- a) Connect 30V DC Auxiliary power supply to terminals 3 & 5 (+) and 4 & 8 (-). (Terminals 3 & 4 operate the "enable" relay - energise to enable.) Connect a 150 ohm 20 W resistor between terminal 4 and the power supply negative.

4. CALIBRATION & TEST PROCEDURE(cont)

- b) Connect variable frequency adjustable current supply via Pickup/Dropout time measuring equipment and Ammeter to the current input terminals (9 and 10). Use RL1-1 contact (term's 1 and 2) to detect pickup of the 2C135.
- c) Set timer switches to 0.5sec.
- d) Check that 12V supply rail is within tolerance. (Measure between auxiliary supply negative and transformer shield can).

MIN	MAX	NOM	ACTUAL	UNITS
11.5	12.6	12.0	<input type="text"/>	V DC

- e) Check that 24V supply rail is within tolerance. (Measure between auxiliary supply negative and R63).

MIN	MAX	NOM	ACTUAL	UNITS
23.0	25.2	24.0	<input type="text"/>	V DC

- f) Connect oscilloscope 0V connection to +12V rail (shield can of input transformer is a convenient point) and monitor IC1-3 pin 8.
- g) With zero input current, set trimpot R6 to mid setting, SW2 to .5% Inom (25mA), and adjust R12 to give zero DC offset as observed on the oscilloscope.

ACTUAL
 OK

- h) Set current setting switch to 2% setting (100mA), and apply 50Hz input current such that a 5V peak to peak signal is observed on the oscilloscope at IC1-4 pin 14
- i) Change input current frequency to 150Hz and adjust trimpot R20 for minimum signal amplitude on the CRO. Note that C11 may be padded if necessary.
- j) Temporarily short out diode D9, set input frequency to 50Hz and adjust input amplitude until square waves just appear at IC2-3 pin 8.

- k) Connect CRO second channel to IC4-2 pin 4 (D13 anode) and adjust trimpot R42 so that IC4-2 pin 4 goes high 8ms after IC2-3 pin 8 goes low.

MIN	MAX	NOM	ACTUAL	UNITS
8.0	9.0	8.0	<input type="text"/>	ms

- l) Remove temporary short circuit from across D9



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4. CALIBRATION & TEST PROCEDURE(cont)

- m) Set timer switches to zero .
- n) Adjust trimpot R6 until output relay just picks up at 100mA.
- o) Set current setting DIL switch to .5% and input current to zero. Check that IC1-3 pin 8 output offset voltage is zero and adjust R12 if necessary.

ACTUAL
 OK

- p) Connect frequency counter to IC4-1 pin 3 and apply 250mA to 2C135 sensing input (DIL switch should still be set at .5% (25mA)).
- q) Check IC4-1 pin 3 has a frequency of 65,536Hz, adjust C19 if necessary.
- r) Connect pickup/dropout time measuring equipment to measure the time between application of 250mA and subsequent closure of RL1-1 contact. Note that the pickup time of the instantaneous current sensing element plus output relay will be approximately 35ms. Record operate times at the following settings:

<u>SETTING</u>	<u>MIN</u>	<u>MAX</u>	<u>NOM</u>	<u>ACTUAL</u>	<u>UNITS</u>
0.125	0.15	0.17	0.16	<input type="text"/>	Sec
0.25	0.27	0.29	0.28	<input type="text"/>	Sec
0.50	0.50	0.56	0.53	<input type="text"/>	Sec
1.00	0.98	1.08	1.03	<input type="text"/>	Sec
2.00	1.93	2.13	2.03	<input type="text"/>	Sec
4.00	3.83	4.23	4.03	<input type="text"/>	Sec
8.00	7.63	8.43	8.03	<input type="text"/>	Sec
16.00	15.23	16.83	16.03	<input type="text"/>	Sec
31.875	30.30	33.40	31.91	<input type="text"/>	Sec

- s) Set timer to zero and record the following pickup and hysteresis currents at the indicated settings:

<u>SETTING</u>	<u>MIN</u>	<u>MAX</u>	<u>NOM</u>	<u>ACTUAL</u>	<u>UNITS</u>
0.5 % PU	22.0	28.0	25.0		mA
Hysteresis	1.5	3.5	2.5		mA
1.0 % PU	46.5	53.5	50.0		mA
Hysteresis	3.0	7.0	5.0		mA
2.0 % PU	95.0	105.0	100.0		mA
Hysteresis	6.0	14.0	10.0		mA



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4. CALIBRATION & TEST PROCEDURE(cont)

<u>SETTING</u>	<u>MIN</u>	<u>MAX</u>	<u>NOM</u>	<u>ACTUAL</u>	<u>UNITS</u>
4.0 % PU	192.0	208.0	200.0		mA
Hysteresis	12.0	28.0	20.0		mA
8.0 % PU	386.0	414.0	400.0		mA
Hysteresis	24.0	56.0	40.0		mA
15.5 % PU	750.0	800.0	775.0		mA
Hysteresis	46.0	110.0	77.8		mA

- t) Set input current to 110mA and record pickup and dropout times for auxiliary supply voltage of 30V:

	<u>NOM</u>	<u>ACTUAL</u>	<u>UNITS</u>
PICK UP	80		ms
DROP OUT	80		ms

5. GENERAL & FUNCTIONAL

- a) Check that magnetic disc flag operates correctly when the output relay picks up.

OK

- b) Check that reset button resets the flag.

OK

- c) Check that the relay is electrically sound and mechanically robust as per Standard Inspection & Test Schedule 903-000-026

PASS

TESTED BY : _____ DATE : _____