

PRODUCT/TEST MANUAL

2C82K2

PILOT WIRE PROTECTION RELAY



Order Number

Serial Number

Issue	Date	Summary of changes
A	13/12/00	Initial issue.

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ERL	MW	MW	

1. BROAD DESCRIPTION OF RELAY

The 2C82 is a high speed feeder protection relay based on the differential circulating current principal. It is designed to operate over two core pilots with a loop resistance of 1000 Ohms for half wave and 2000 Ohms for full wave. It is designed for insulation levels of up to 5kV RMS. A standard resistance is required for the relay to operate correctly. This standard resistance is achieved by adding padding resistors in each relay at each end of the scheme. The secondary of the feeder CT's are fed to a summation transformer within the relay which provides a single phase quantity output for use over the pilot wires. Under healthy conditions the relay is biased in the negative part of the circuit and remains un operated.

2. SPECIFICATIONS

AC Continuous Rating	1 A
Stability	50 x In
Max operating time 1/2 Wave	60 mS @ 5 x setting
Max operating time Full Wave	45 mS @ 5 x setting
Overall Ambient Temperature Range	-5 to 55 deg C
Operation Indicator	Mechanical hand reset flag
Operating Contacts	Three normally open instantaneous contact

Output Relay Contact Ratings

Make and Carry Continuously

3000 VA AC resistive with maximums of 660 Volt and 12 Amp
3000 VA DC resistive with maximums of 660 Volt and 12 Amp

Make and Carry of 0.5 Second

7500 VA AC resistive with maximums of 660 Volt and 30 Amp
7500 VA DC resistive with maximums of 660 Volt and 30 amp

AC Break Capacity

3000 VA AC resistive with maximums of 660 Volt and 12 Amp

Insulation Withstand	In accordance with AS2481-1981 (Clause 5-4), 2KV 50Hz between output and input. In Accordance with AS2481-1981 (Clause 5-4), 1.2/50 5KV.
Noise Immunity	The 2C82 relay has been designed to withstand the high frequency interference test detailed in AS2481-1981 (Clause 5-5).
Case Type	4M28



3. TEST EQUIPMENT REQUIRED

AC Variable Current & Frequency Supply
 Ammeter Oscilloscope HV Test Equipment

4. ASSOCIATED DRAWINGS

159-082-102 Wiring Diagram
 660-328-201 Circuit Diagram PCB 2C82
 660-328-301 Loading Diagram PCB

5. HIGH VOLTAGE TESTING

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

TABLE 1

GROUP 1	GROUP 2
23,24,25,26,27,28 1-4,6,8	1-4,6,8,17,18,19,20, E 17-20, E

6. CALIBRATION & TEST PROCEDURE

6.1 Half Wave Test

- a) Set unit to half wave with the pilot open circuit, connect a variable current supply as per the following table. Link Terminals 18 & 20, Use 159-082-101
- b) Slowly increase current and note the pickup point of the relay. Record results.

Terminal	Phase	Nominal N	Nominal N1	Actual N	Actual N1
23 & 24	A - N	0.13A	0.10A		
25 & 26	B -N	0.17A	0.12A		
27 & 28	C -N	0.22A	0.15A		
23 & 27	A - C	0.32A	N/A		N/A
23 & 25	A – B	0.66A	N/A		N/A

Note* After testing N1 connection return to N connection.

- c) Check the operation of the Instantaneous output at 5 x In.(approx 0.65Amps)
 Record results ensuring time is less than 60 mS

	MAXIMUM	ACTUAL	UNITS
PU	60	<input style="width: 100px; height: 20px;" type="text"/>	mS



6.1 Half Wave Test(Cont)

- d) Check Test Facility by measuring the pick up of the relay in mA DC.
 Select ISOLATE for this test.

	NOMINAL	ACTUAL	UNITS
PU	12	<input style="width: 100px; height: 15px;" type="text"/>	MA

- e) Connect Relay under Test to RMS 1 Amp Reference Relay and set pilot resistance to 1000 ohms.

- f) Apply 2.5 times Min op current to check operation of the remote unit.

OK

- g) Check back to back min-op as follows.
 Note* Hold Reference Relay to 0.0 Amps.

Terminal	Phase	Approximate %	Nominal	Actual
23 & 24	A - N	25	0.25A	
25 & 26	B -N	32	0.32A	
27 & 28	C -N	42	0.42A	
23 & 27	A - C	62	0.62A	
23 & 25	A – B	125	1.25A	

6.2 Full Wave Test

- a) Set unit to full wave with the pilot open circuit. Remove Link 18 & 20 Use 159-082-101

- b) Check the operation of the Instantaneous output at 5 x In.(approx 0.65Amps).
 Record results ensuring time is less than 45 mS

	MAXIMUM	ACTUAL	UNITS
PU	45	<input style="width: 100px; height: 15px;" type="text"/>	mS

- c) Connect Relay under Test to RMS 1 Amp Reference Relay and set pilot resistance to 2000 ohms.

- d) Apply 1.0 times Min op current to check operation of the remote unit.

OK

- e) Check back to back min-op as follows.
 Note* Hold Reference Relay to 0.0 Amps.

6.2 Full Wave Test (cont)

Terminal	Phase	Approximate %	Nominal	Actual
23 & 24	A - N	35	0.35A	
25 & 26	B -N	44	0.44A	
27 & 28	C -N	59	0.59A	
23 & 27	A - C	89	0.89A	
23 & 25	A – B	177	1.77A	

6.3 Stability

a) Check Stability min-ops as follows

Hold RMS Test Unit	Relay Under Test	Nominal	Actual
At 0.25Amps	R-N	0.88Amps	

b) Apply in phase current to units. Should operate at 50% of min-op.

c) Apply out of phase current (ie 180 degrees) to unit at 1.0 Amps and check for no operation.

PASS

7. GENERAL & FUNCTIONAL

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

OK

b) Check that push button resets flag.

OK

c) Check that unit operates if Pilots are O/C.

OK

d) Check that unit does not operate if Pilots are S/C.

OK

e) Check that unit operates if Pilots are Reversed.

OK

f) Check that unit is connected in Full Wave Mode. (Factory Default)

OK

7. GENERAL & FUNCTIONAL (cont)

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

PASS

TESTED BY: _____ DATE: _____

8. CONNECTION DIAGRAM

