

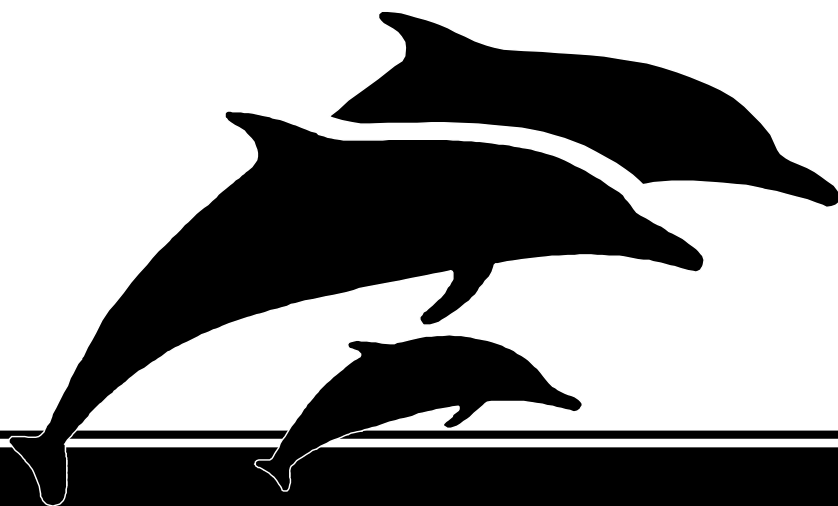


Instruction Leaflet

40-602.1

ERNI Existing Relay Network Interface

USER'S GUIDE



WRELCOM™

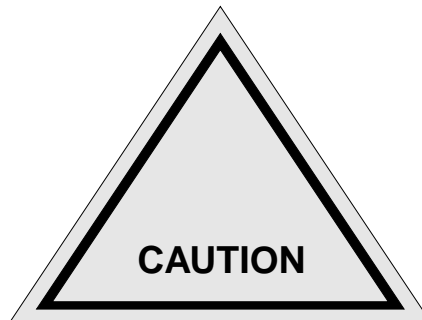
Intelligent Family of Relay Communication Products

Substation Control and Communications

ABB Relay Division
4300 Coral Ridge Drive
Coral Springs, Florida 33065
(305) 752-6700

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We recommend the user of this equipment become acquainted with the information in this instruction leaflet before energizing the system. Failure to do so may result in injury to personnel or damage to the equipment, and may affect the equipment warranty.

All integrated circuits used on the modules are sensitive to and can be damaged by the discharge of static electricity. Electrostatic discharge (ESD) precautions should be observed when handling modules or individual components.

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1. APPLICATIONS

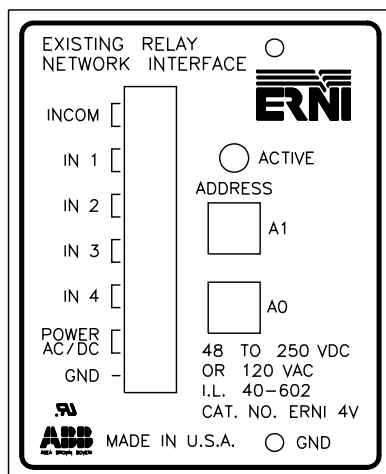
The **Existing Relay Network Interface (ERNI)** is an INCOM network device designed to monitor electro-mechanical or solid-state relays. ERNI can monitor up to four “wet” contacts (contacts that have a potential when open); changes in the state of the contact are captured, time-tagged, and stored in memory for later retrieval through an INCOM master such as IMAC or MINT.

ERNIs can be used in a variety of applications beyond relay operations — door switches, station annunciator alarms, or contacts from virtually any other device can be monitored.

2. FEATURES

ERNI features include:

- Capability of 1200 bps or 9600 bps INCOM communications.
- Wide supply voltage range, 48 to 250 Vdc, or 125 Vac.
- Four monitoring inputs with high noise immunity.
- Stores up to 50 events, with 1 msec resolution.
- Self-Test routines constantly test ERNI systems.
- Conforms to all applicable ANSI and IEC specifications.



1500B56

Figure 1. The ERNI Front Panel

3. DESCRIPTION

3.1 Power Requirements

Range: 48 Vdc – 250 Vdc, or 125 Vac

Power Supply Burden:

Standby: 0.8 W @ 48 Vdc
1.6 W @ 125 Vdc
4.3 W @ 250 Vdc
2.0 W @ 125 Adc

Transmitting: 0.9 W @ 48 Vdc
1.7 W @ 125 Vdc
4.5 W @ 250 Vdc
2.1 W @ 125 Vac

3.2 Monitoring Input Characteristics

Depending on switch settings, ERNI can be set to record either contact openings or closings, thus an event will be recorded when either voltage appears at an input or voltage is removed – whatever change the user is interested in capturing. It is convenient to refer to this state of interest as “active” and the other state as “inactive”.

Monitoring Input:

Burden: 3.6 mA @ 48 Vdc
4.2 mA @ 125 Vdc
4.5 mA @ 250 Vdc
4.0 mA @ 125 Vac

Debounce Timing

To prevent ERNI from storing multiple events due to contact bounce, contacts must be active 3 msec or longer before ERNI considers the contact active and will store a new event. Inputs must be inactive 18 msec or longer before the ERNI assumes the contact is inactive.

In order to create more accurate events times, ERNI time stamps events from the initial active change rather than at the end of the debounce interval.

- minimum active time: 3 msec
- minimum inactive time 18 msec

Voltage Thresholds

ERNI inputs have a relatively high input voltage threshold to increase noise immunity – voltages greater than 38 Vdc are “high” and voltages under 10

Vdc are “low”. The “gray” region between 10 and 38 Vdc is undefined. ERNI may consider voltages in this range as either high or low.

- “high” input range: 38 – 250 Vdc or 125 Vac
- “low” input range: 0 – 10 Vdc
- undefined range: 11 – 37 Vdc

3.3 Temperature Range

- Operation: 0 to + 50 C
- Storage: -20 to + 80 C

3.4 Physical Features

- Height: 5.25" (133.6 mm)
- Width: 3.32" (84.3 mm)
- Depth: 5.92" (150.4 mm)
- Weight: 2.0 lbs. (0.9 Kg)

3.5 Front Panel Layout

The ERNI front panel includes:

- ☛ **Status LED** – indicates when the ERNI is operating normally, when it is transmitting on the INCOM network, and if there is a malfunction.
- ☛ **INCOM Address Switches** – these three hexadecimal switches specify ERNI’s unique network address.
- ☛ **Main Connector** – connects ERNI to the INCOM network, power supply, and contacts which it will monitor.
- ☛ **Ground Stud** – allows the ERNI to be solidly connected to station ground.

3.6 Test Conformity

- Insulation Test Voltage 2.8 KVdc, 1 minute (ANSI C37.90.0, IEC-255-5).
- Impulse Voltage Withstand 5 KV Peak, 1.2/50 microseconds, 0.5 Joule (IEC-255-5).
- Surge Withstand Voltage 2.5 KV, 1 MHz (ANSI C37.90.1, IEC-255-6).
- Fast Transient Voltage 5 KV, 10/100 nsec Withstand (ANSI C37.90.1).
- EMI Volts/Meter Withstand 25 MHz-1GHz, 10V/M (ANSI C37.90.2).

4. INSTALLATION

Installation of ERNI involves three steps:

1. Setting internal DIP switches
2. Setting INCOM address
3. Physically mounting and wiring ERNI

4.1 Setting Internal DIP Switches

ERNI contains two internal, four position DIP switches, S1 and S2. S1 sets the monitoring inputs to either active high or active low, and switch S2 sets the INCOM communication parameters.

4.1.1 Setting Monitoring Input Switch

The four positions of DIP switch S1 set the active monitoring input state; they can be set for any combination of active high and active low detection. Switch 1 controls input 1, switch 2 controls input 2, and so on.

**Table 1:
Switch S1 Settings
for Monitoring Inputs**

S1	open (up)	closed (down)
1	IN 1 active low	IN 1 active high
2	IN 2 active low	IN 2 active high
3	IN 3 active low	IN 3 active high
4	IN 4 active low	IN 4 active high

When a switch is closed (down) the corresponding input is active high – the ERNI detects and stores an event when voltage is applied to the input.

When a switch is open (up) the input is active low – ERNI will store an event when voltage is removed from the input.

4.1.2 Setting INCOM Parameters Switch

INCOM networks come in two varieties:

Standard — the standard or original INCOM network is 1200 bps, ASK (amplitude shift keying) modulation.

High Speed — the high speed INCOM network is 9600 bps, FSK (frequency shift keying) modulation.

Table 2 shows switch S2 settings for both network types.

Table 2:

	INCOM Network Type	
S2	1200 bps, ASK	9600 bps, FSK
1	closed (down)	open (up)
2	closed (down)	closed (down)
3	closed (down)	open (up)
4	open (up)	open (up)

4.2 Setting The INCOM Address

Three hexadecimal switches on ERNI's front panel specify the INCOM address. These are set so that each device has a unique network address. The switches are designated A0, A1, and A2; each switch has a small arrow in the center that points to a single digit.

To set the switches, use a small screwdriver and turn the arrow on each switch to the appropriate setting. When selecting an address, start with a lower ad-

dress and increase addresses as you add network devices. Numbering the addresses in this way will speed up the IMAC or MINT network master when it is learning the network configuration.

The hex address is read A2 A1 A0. To set the hex address 123, for example, set A2 to "1", A1 to "2" and A0 to "3".

4.3 Physically Mounting and Wiring ERNI

The location should be clean, dry, and free from excessive vibration, corrosive fumes, and heat.

ERNI can either be panel mounted or installed on the back of FT-type cases using special mounting hardware kit #9656A94G01 (see Figure 1).

Connect the ERNI:

1. ERNI "GND" (silver stud on front panel) to ground.
2. 13 pin connector:
 - a. Pins 1 & 2, "INCOM": connect to INCOM twisted pair. Connect shields of the in-

Figure 1. ERNI can be rear Mounted to an any FT Case (shown here mounted to FT-22 Case)

coming and outgoing INCOM twisted pair together, but do not connect them to the ERNI ground.

- b. Pins 3 - 10, "IN 1" – "IN 4": connect to wet contacts as application requires.
- c. Pins 11 & 12, "Power AC/DC": connect to battery (either polarity is acceptable) or 125 Vac.
- d. Pin 13: An additional ground pin is provided on this connector, however in most applications it is not needed.

5. ACCEPTANCE TESTS AND OPERATION

We recommend that users perform specified Acceptance Tests on ERNI prior to installing it on the network in order to verify it is working properly. Before performing the Acceptance Tests, users should be familiar with IMAC or WRELCOM software packages.

5.1 ERNI Self Test

Apply station battery to ERNI "POWER AC/DC" terminals, either polarity is acceptable. Within about five seconds the "ACTIVE" LED should begin to slowly flash green for about one second on and one second off; this indicates ERNI is passing all internal self tests. If the LED begins to rapidly flash amber, there may be an internal hardware fault. In that case power the unit off, check power supply connections and voltages, and apply power again; if the amber flash persists, contact an ABB representative.

NOTE: If the LED does not light at all, it is likely that the ERNI is not receiving power.

5.2 Network Test

Normally the ERNI LED slowly flashes green, however the LED flashes red whenever ERNI transmits data on the network, and remains red for the duration of the transmission. When this transmission is lengthy, the LED may remain red for several seconds.

Before testing communications:

- Set the ERNI to a unique network address by setting the hex switches on the front panel (see 4.2, Setting the INCOM Address).
- Set internal DIP switch, S2, to the proper INCOM parameters (see 4.1.2, Setting INCOM Parameters Switch).
- Connect the ERNI "INCOM" terminals to the INCOM shielded, twisted-pair wire.

5.2.1 IMAC as Controller

Place the IMAC controller in Learn Mode and observe if the ERNI is detected. If the controller does not recognize the ERNI, recheck the ERNI address hex switches and IMAC setting for number of devices and try again.

After the IMAC has recognized the ERNI, place the IMAC in Interactive Mode and execute several commands to ensure the ERNI is working properly.

5.2.2 MINT as Controller

The MINT's RS232C serial port can be connected to a modem or PC; refer to the WRELCOM Software Manual for the correct cable configurations.

Follow the procedures in the WRELCOM Software Manual to establish communications between the PC (or modem) and ERNI. Execute several commands to ensure the ERNI is working properly.

5.3 Monitoring Input Test

With the ERNI attached to the network, place the controller in Interactive Mode and select the new ERNI. Clear the ERNI buffers, then apply a voltage (between 38 and 250 Vdc, using either polarity) between each contact input pair, "IN 1" through "IN 4"; this simulates relay activity. Use the network controller to request the contents of buffer 1, and observe any targets. Each of the four inputs should have generated at least one target.