Zellweger Analytics, Inc.
405 Barclay Boulevard
Lincolnshire, IL 60069

For more information contact Zellweger Analytics' Service Department during normal business hours at:

800-323-2000
or 847-955-8200

24-Hour Emergency Service Hotline:
847-634-2840

(To save time when calling for service, please have the serial number of your instrument available.)

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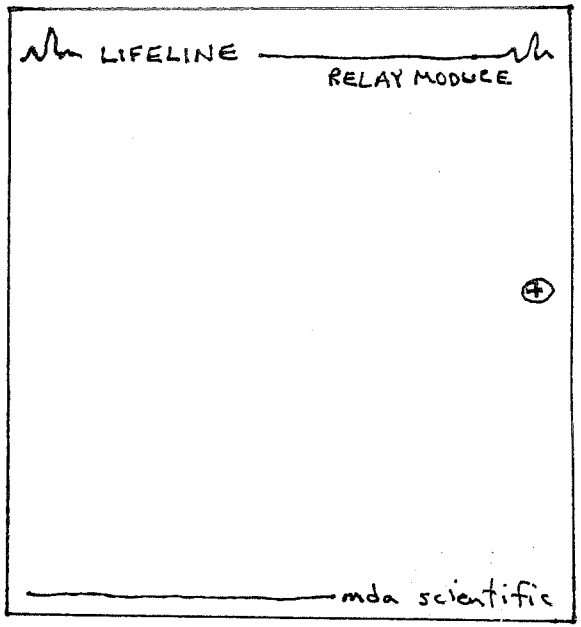
zellweger analytics

2998M0004 Rev. 1.0
April 2000

sieger

DIGI-RELAY
Remote Relay Module

operating instructions



zellweger analytics

Your Uptime Is Our Top Priority

Congratulations on your purchase of the *Digi-Relay Remote Relay Module*. It will provide you with years of reliable operation. Because your uptime is our top priority, Zellweger Analytics provides you with both local service and a 24-hour Emergency Service Hotline.

During Business Hours:

Zellweger Analytics, Inc.

MDA Scientific Products:	(Toll-Free)	800-323-2000
Headquarters:		847-955-8200
Mid-Atlantic:		610-560-6000
Gulf Coast:		512-452-9718
Southwest:		760-942-3142
West Coast:		408-261-8802
Northwest:		503-639-3202
Zellweger Analytics, Ltd. (UK):		44-1-202-676-161
Zellweger Analytics Co., Ltd. (Japan):		81-3-5484-8711

24-Hour Emergency Hotline (U.S.A.): 847-634-2840

Record your serial number and installation date here for easy reference:

_____ _____

(To save time when calling for service, please have the serial number of your instrument available.)

Symbols Used in this Manual

Overview

Zellweger Analytics manuals use several symbols to draw attention to important information. Each symbol provides a graphic representation of equivalent words. The symbols are easily recognizable in any language.

Below is a listing of symbols used in Zellweger Analytics manuals and a brief description of what the symbols represent. (This manual might not use all of the symbols listed here.)

Symbols

Caution - Refer to accompanying documents. Caution statements are used to indicate hazards or unsafe practices which could result in minor personal injury or product or property damage.

Warning - Refer to accompanying documents. Warning statements are used to indicate hazards or unsafe practices which could result in severe personal injury or death.

Caution - Risk of electrical shock.

EMC Considerations

Overview

Your Zellweger Analytics instrument has been designed to comply with applicable EMC standards at the time of manufacture. The design includes filtering, shielding, and bypassing techniques. At the time of certification, simulated customer Input/Output (I/O) schemes were tested.

All methods used in your equipment for emission suppression and reduction of susceptibility are interactive. Modifications to the instrument will most likely result in increased emissions and higher vulnerability to other radiated fields.

Following the guidelines in this EMC Considerations section will ensure your instrument maintains the highest degree of EMC integrity. The guidelines listed apply only to I/O emissions, and do not apply to A.C. and D.C. instrument power connections.

Cabling

At a very minimum, all cables should include a braided shield. Ideal results have been obtained with twisted pair cabling which has a foil shield surrounding each pair plus foil and 90% braid shielding around the bundle. While this yields the best results, it can be very expensive. In addition, ensure local electrical code requirements are met.

Cabling Type

Twisted pair: Provides for cancelling of magnetic fields

Stranded pair: Provides the greatest surface area

Braid: Must have a minimum 90% coverage

Foil: When used with braid, provides 100% coverage.

Note: Do not use foil alone. It has a tendency to break.

(continued)

Zellweger Analytics product testing uses >90% braid with foil (around the bundle); twisted pair; stranded 24 AWG (minimum wiring for all qualification and certification testing).

Shield Termination

Continuation of the shield to the enclosure earth ground is most important. For long cable runs greater than 20 feet (6 meters), it is recommended that the shield connection is made at only one end to prevent ground loop problems.

For discrete wire terminations, pigtails to the enclosure ground should be extremely short (absolutely no greater than three inches).

Safety-Related Cautions

Caution

This manual deals with safety related products. The equipment must be installed and operated in compliance with this manual.

If this product is to be used in a hazardous area, installation must comply with your local codes of practice or national standards.

If installed in a hazardous area, the enclosure lid must not be removed for service unless the area is classified "gas free". Refer to your local codes of practice or national standards.

Warranty

Each new *Digi-Relay* manufactured and/or sold by Zellweger Analytics or its authorized agents is warranted to be free from defects in material and workmanship. Our responsibility is limited to repairing or replacing any instrument or part thereof for a period of one year after the start-up or 18 months after shipment, whichever comes first, when, in our opinion, the repair or replacement is covered by this warranty. Any defective equipment must be returned prepaid to the Zellweger Analytics factory for service. Field service is not included.

This warranty does not cover components that are expendable in normal use and thus have an unpredictable life, such as filters and fuses.

Instruments which have been repaired or replaced during the warranty period are warranted for the remainder of the unexpired portion of the original warranty period.

Zellweger Analytics is released from all obligations under its warranty in the event repairs or modifications are made by persons other than its own authorized personnel, unless such work is authorized in writing by Zellweger Analytics.

Contents

Chapter 1: Introduction

Overview

The *Digi-Relay* is a relay module with three independent non-latching relays. Each relay has two contacts (one normally open, one normally closed), an independently adjustable trip level, and can be configured as normally energized or normally de-energized.

The copper-free aluminum enclosure has two access ports with 3/4" NPT threading. Field wiring connections are made using connectors which plug into the bottom circuit board assembly.

The *Digi-Relay* is UL and C-UL certified for use in Class I Division 1 Groups B, C and D hazardous areas.

Modes of Operation

The *Digi-Relay* can be used as part of a "stand-alone" gas monitoring point or as an "in-line" relay module in a more complex system.

In-Line Operation

When used as an "in-line" relay module, the 4-20 mA signal from a remote sensor to the control room can be routed through the *Digi-Relay*. This will add 50 ohms to the system wiring or 1.0 Volt @ 20 mA loss to the overhead voltage. When configured in this mode, the 4-20 mA signal line is fully isolated from the *Digi-Relay's* power supply.

Stand-Alone Operation

As part of a stand-alone gas monitoring point, the *Digi-Relay* becomes the termination point for the 4-20 mA signal. The input circuit can be connected either to the +24V supply or to the 0V supply, allowing sink or source operation with the remote sensor.

In either mode of operation, the *Digi-Relay* supports loop powered two-wire transmitters and sensors, three-wire transmitters in either current source or current sink mode, and four-wire transmitters providing an isolated 4-20 mA output. Wiring details are in "Installation".

Relays

Three independent relays are provided. Each relay has it's own trip point adjustment, an LED to indicate if the relay is tripped, and a link to select whether the relay is operated in the normally energized or normally de-energized mode.

Each relay has a Normally Closed (NC) contact and a Normally Open (NO) contact. These terms describe the connection with the Common (C) contact when the relay is de-energized. The relay contacts are rated for 3 Amps at 250VAC and 3 Amps at 32VDC.

Field wiring to the relays is connected via TB2 and TB3 on the Terminal Board.

Relay Trip Points

For the purpose of this document, the term "trip point" is defined as the level of input signal which causes the relay to toggle states.

Each relay can be adjusted to trip at any input signal between 0.75 mA and 24.0 mA. The method of adjusting the trip point is described in "Commissioning".

The relay control circuits are designed with a hysteresis to prevent the "relay chatter" which would occur if the input signal fluctuates around a trip point. This hysteresis is a maximum of 4% Full Scale Deflection (0.64 mA).

To provide a FAULT warning of signal failure or power supply failure, one of the relays should be operated in the normally de-energized mode with the alarm trip level set for 1.5 mA. This is the factory default for Relay 3. A closure of the Normally Closed contact will indicate either an input signal of less than 1.0 mA or a loss of power to the Digi-Relay.

Note:
The 0.5 mA difference between the trip level of 1.5 mA and the actual trip point of 1.0 mA is due to the hysteresis of the circuit.

LED Indicators

Each relay has it's own LED to indicate whether or not the relay is energized. These LEDs are independent of the Mode of Operation. When the relay is not energized, the LED will be off. The LED will turn on when the input signal reaches the trip point for the associated relay. The enclosure for the Digi-Relay includes a solid cover, so the LEDs will not be visible when the *Digi-Relay* is in normal operation.

Mode of Operation Links

The relays may be set to energize on alarm (normally de-energized) or de-energize on alarm (normally energized). Each relay has it's own link which can be fitted as required to the normally energized or normally de-energized positions. Details concerning setting the link positions can be found in "Commissioning".

This manual provides instructions to install, operate, and maintain the *Digi-Relay* Remote Relay Module.

Safety Notices

There are three levels of safety notices used in this manual: warning, caution, and note. Below are examples of each of these safety notices and the conventions used in this manual:

WARNING:

A WARNING indicates a situation in which personal injury may occur.

Caution:

A **Caution** indicates a condition in which damage may occur to equipment or material.

Note:
A note provides helpful information for proper operation of your *Digi-Relay* Remote Relay Module.

Chapter 2: Installation

Certification Requirements

The *Digi-Relay* is certified for use in Class I, Division 1, Groups B, C and D areas. Equipment must be installed in accordance with national and / or local codes. In the U.S.A., the National Electrical Code (N.E.C.) requires a sealed fitting within 18" of the enclosure.

Mounting the Relay Module

The *Digi-Relay* may be installed anywhere within the range of the 4-20 mA signal. There are many factors that determine the maximum distance between the source of the 4-20 mA signal and its termination point. The following chart indicates general distances for several Sieger products. It assumes that the *Digi-Relay* is the termination point of the 4-20 mA signal ("stand-alone" operation) and the source of +24VDC power for the sensor.

Product	24 AWG [0.5 mm²]	22 AWG [0.75 mm²]	20 AWG [1.0 mm²]	18 AWG [1.5 mm²]	16 AWG [2.0 mm²]
911 Sensor	18,400 ft [5,600 m]	27,500 ft [8,400 m]	38,700 ft [11,800 m]	58,000 ft [17,700 m]	92,100 ft [28,100 m]
811 Sensor	18,400 ft [5,600 m]	27,500 ft [8,400 m]	38,700 ft [11,800 m]	58,000 ft [17,700 m]	92,100 ft [28,100 m]
Lifeline	10,500 ft [3,200 m]	15,000 ft [4,600 m]	21,300 ft [6,500 m]	31,900 ft [9,750 m]	49,200 ft [15,000 m]
Sensepoint Toxic	3,280 ft [1,000 m]	4,920 ft [1,500 m]	6,560 ft [2,000 m]	10,100 ft [3,100 m]	15,700 ft [4,800 m]
Series 2000	5,250 ft [1,600 m]	7,850 ft [2,400 m]	10,800 ft [3,300 m]	16,400 ft [5,000 m]	25,500 ft [7,800 m]
Searchpoint Optima	590 ft [180 m]	850 ft [260 m]	1,180 ft [360 m]	1,770 ft [540 m]	2,820 ft [860 m]
Digi-Optima + Optima	590 ft [180 m]	850 ft [260 m]	1,180 ft [360 m]	1,770 ft [540 m]	2,820 ft [860 m]
Digi-Cat	1,310 ft [400 m]	1,870 ft [570 m]	2,620 ft [800 m]	3,770 ft [1,150 m]	6,070 ft [1,850 m]
Digi-Chem	3,280 ft [1,000 m]	4,920 ft [1,500 m]	6,560 ft [2,000 m]	10,100 ft [3,100 m]	15,700 ft [4,800 m]

(continued)

Digi-Ana (Note 1)	3,280 ft [1,000 m]	4,920 ft [1,500 m]	6,560 ft [2,000 m]	10,100 ft [3,100 m]	15,700 ft [4,800 m]

Note 1 - The Digi-Ana distances assume the connection of a two-wire sensor/ transmitter. These figures do not apply to a three-wire transmitter (Digi, Optima, etc.).

The *Digi-Relay* should be secured to a vertical surface using the mounting bracket provided. The *Digi-Relay* location and installation material must comply with your local codes of practice and/or national standards. Dimensions of the enclosure and mounting feet can be found in Figure 1.

Appropriate hardware (not included) should be used to secure the bracket to a wall. The slots in the mounting bracket will accommodate up to 1/4" (M6) screws or bolts.

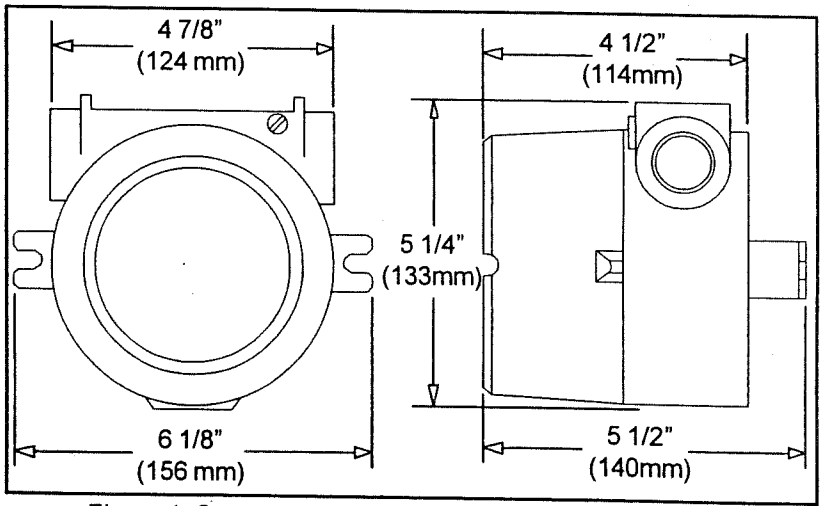


Figure 1. Overall Dimensions of the Digi-Relay Enclosure

Accessing the Terminal Board

The Terminal Board is located under the Signal Board assembly. Access to the Terminal Board is achieved as follows:

1. Remove the enclosure lid by unscrewing it counterclockwise.

   Note:

   If the lid is difficult to unscrew, make sure the setscrew in the tab is loosened.

(continued)

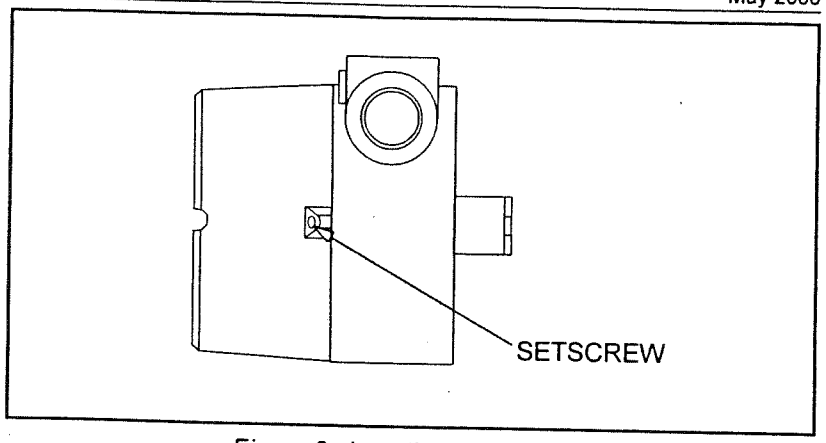


Figure 2. Location of Setscrew

2. Remove the Signal Board assembly by gripping the sides and carefully pulling directly upwards. A slight rocking motion may ease removal of the assembly.

Caution:

The Signal Board assembly is attached to the Terminal Board by means of a ribbon cable. Excessive force in removing the Signal Board assembly will result in damage to this cable, rendering the *Digi-Relay* inoperable.

3. Disconnect the ribbon cable from the terminal board and set the Signal Board assembly aside.

Grounding Considerations

It is recommended that the *Digi-Relay* enclosure be connected to earth ground to help shield the electronics from electromagnetic interference. There is a ground screw inside the enclosure for this connection.

Note:

There is an external screw for connection of earth ground to the enclosure. It is there for CENELEC and ATEX certifications. N.E.C. does not allow external grounding connections.

(continued)

There is a link on the Terminal (bottom) Board that allows connection of the power supply 0V to the enclosure.

When link LK1 is installed on pins 1 & 2, the incoming 0VDC terminal is isolated from the enclosure (earth ground). This is the factory default position.

When link LK1 is installed on pins 2 & 3, the incoming 0VDC terminal is connected to the enclosure (earth ground). While this configuration does not affect operation of the relay module, it may, in some instances, affect operation of the overall system.

Note:

Make sure connecting 0VDC to earth ground does not violate your local codes of practice or national standards.

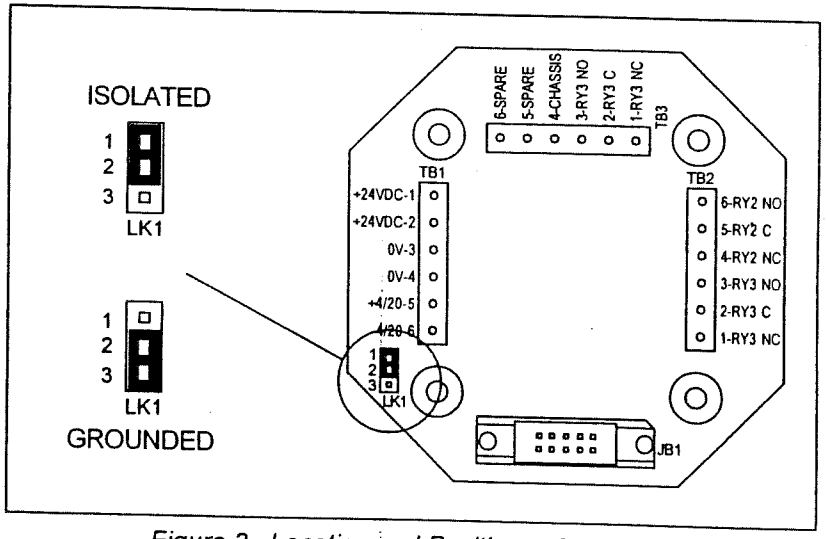


Figure 3. Location and Positions of Link LK1

Power Requirements

The relay module requires a nominal 24VDC supply provided by the host control system or a separate independent power supply. The maximum operating current is 104 mA (2.5 Watts) and the maximum initial surge current is 0.3A (7.5 Watts).

Wiring Requirements

It is strongly recommended that shielded cable be used. Shielded cable helps prevent electromagnetic interference (EMI) and radio frequency interference (RFI), which are common problems in an industrial environment. Refer to "EMC Considerations" on page *iii* for more information.

The *Digi-Relay* will accommodate 14-22 AWG wire, either stranded or solid. The following Belden cables are examples:

Belden # 83652:

2-conductor, 18 AWG stranded, 100% shield coverage

Belden # 83653:

3-conductor, 18 AWG stranded, 100% shield coverage

Belden # 83654:

4-conductor, 18 AWG stranded, 100% shield coverage

Field Wiring

Connectors

There are three six-position connectors provided for the connection of the field wiring. These connectors are packaged separately in a plastic bag.

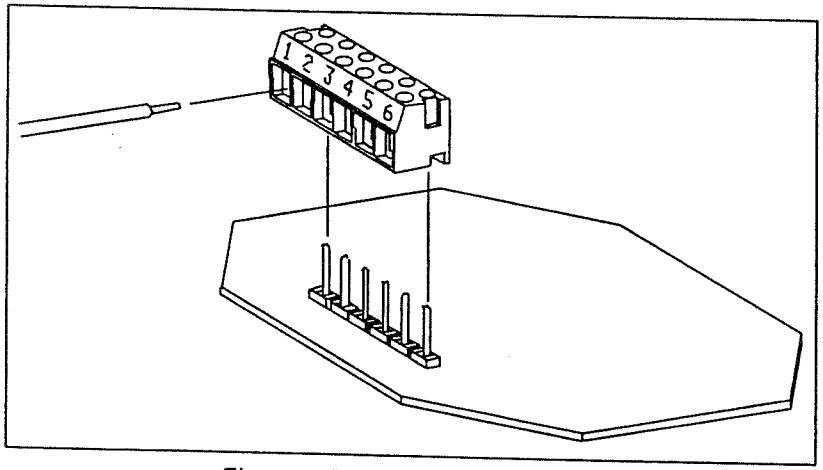


Figure 4. Field Wiring Connectors

When the field wiring is attached to the connector, the connector plugs onto a pin strip on the Terminal Board. The Terminal Board is marked to identify the orientation of the connector. Press the connector firmly onto the pin strip until it seats completely.

Power Connections

Terminal TB1 is for the power and signal connections. Note that there are two terminals for +24VDC (TB1, pins 1 & 2) and two terminals for 0V (TB1, pins 3 & 4). The +24VDC pins are linked on the circuit board, as are the 0V pins, and either terminal may be used to connect the *Digi-Relay* to the power supply.

Caution:

Incorrect wiring could damage the relay module. Follow the wiring instructions shown to ensure correct terminal locations.

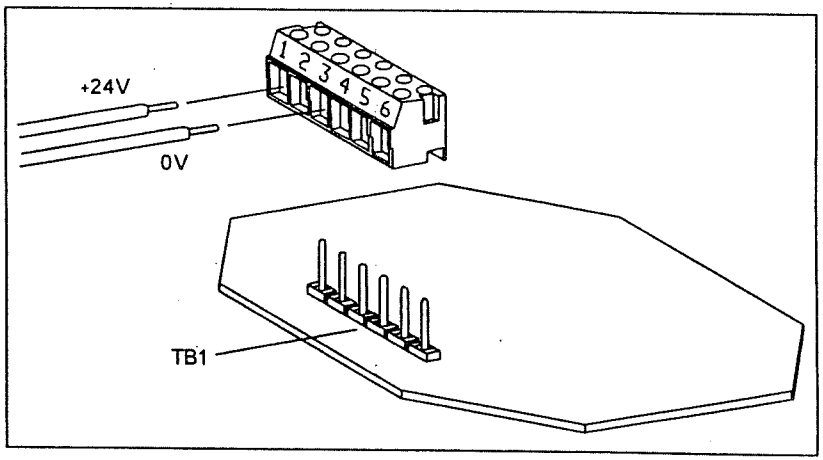


Figure 5. Power Supply Connections

Connect the positive side (+24V) of the power supply to pin 1 or 2 of the connector.

Connect the negative side (0V) of the power supply to pin 3 or 4 of the connector.

Signal Connections - "In-Line"

If the *Digi-Relay* is to be installed as an "in-line" relay module with the 4-20 mA signal continuing on to another piece of equipment, the incoming signal from the transmitter / sensor is connected to TB1 pin 5 or 6, depending on the sensor configuration.

Current Source and Loop Powered Sensors

The incoming signal from the transmitter / sensor is connected to pin 5. The signal is then taken from pin 6 for connection to the next piece of equipment.

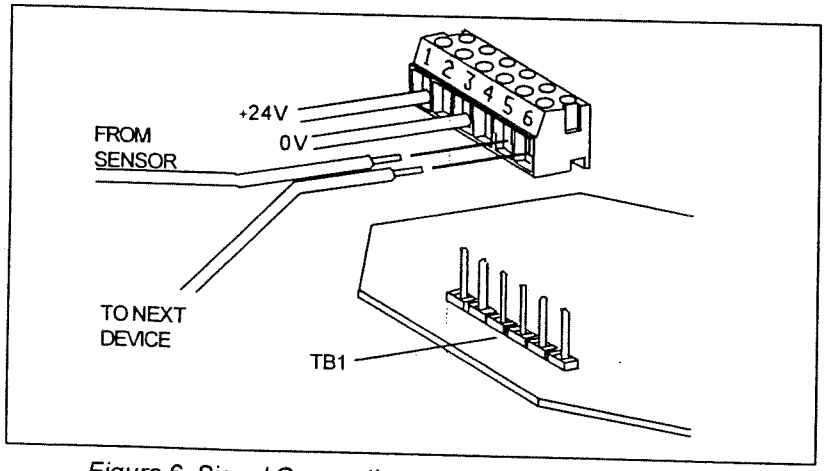


Figure 6. Signal Connections - "In-Line" - Current Source

Current Sink Sensors

The incoming signal from the transmitter / sensor is connected to pin 6. The signal is then taken from pin 5 for connection to the next piece of equipment.

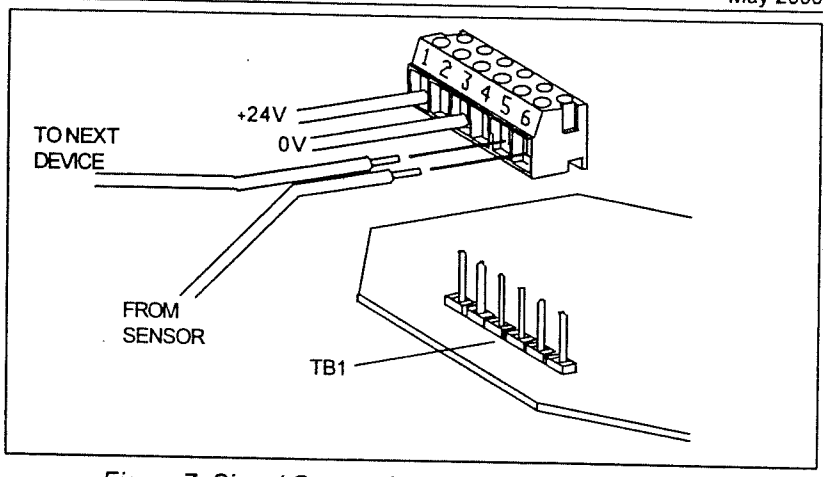


Figure 7. Signal Connections - "In-Line" - Current Sink

Signal Connections - "Stand-Alone"

If the *Digi-Relay* is to be installed as part of a "stand-alone" system with the 4-20 mA signal terminating at the module, the signal connections depend on the configuration of the transmitter / sensor providing the signal:

Current Source and Loop Powered Sensors

The signal wire is connected to TB1 pin 5. A jumper wire must be installed between TB1 pin 6 and 0V.

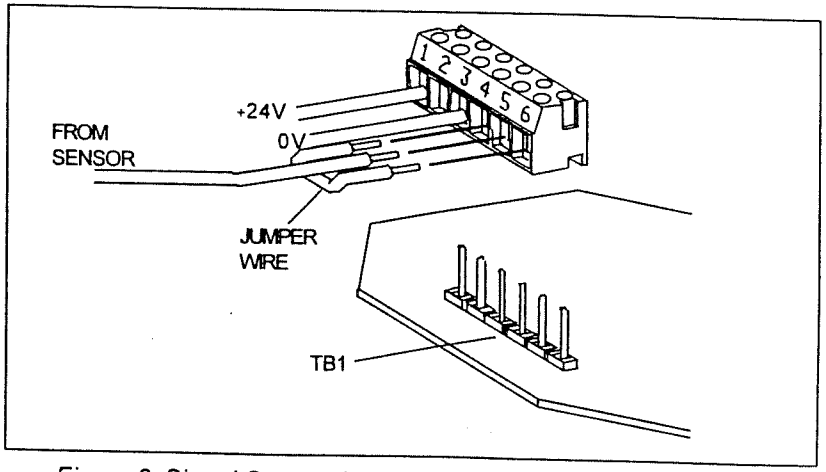


Figure 8. Signal Connections - "Stand-Alone" - Current Source

Current Sink Sensors

The signal wire is connected to TB1 pin 6. A jumper wire must be installed between TB1 pin 5 and +24VDC.

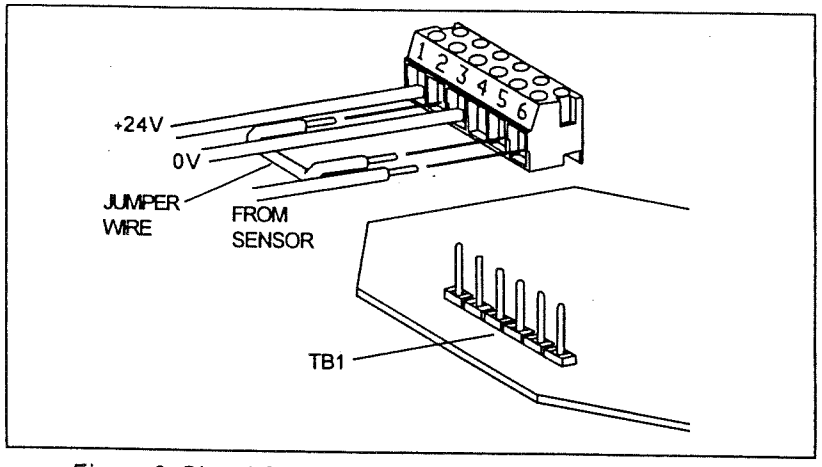


Figure 9. Signal Connections - "Stand-Alone" - Current Sink

Isolated Output Transmitter

Two wires are involved in this configuration. The positive (high) side is connected to +24VDC. The negative (low) side is connected to TB1 pin 5. A jumper wire must be installed between TB1 pin 6 and 0V.

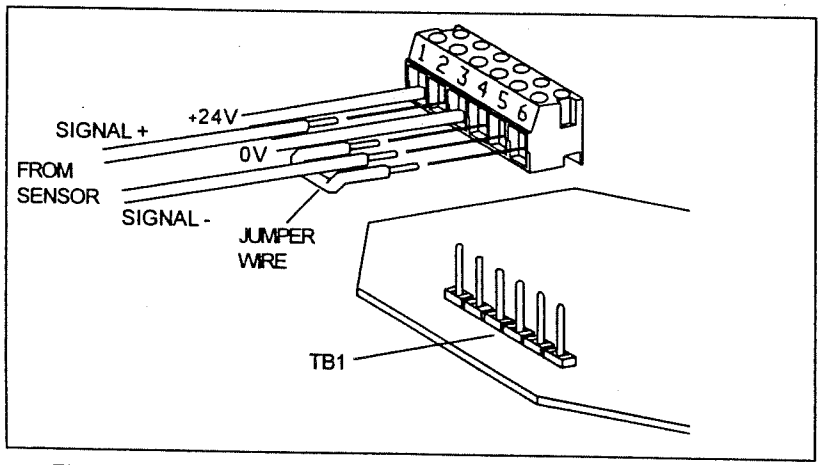


Figure 10. Signal Connections - "Stand-Alone" - Isolated Output

Relay Connections

The relay connections are made on TB2 and TB3. Each relay has three connection points; "C", "NC" and "NO".

"C" is the Common contact. This is the contact that switches between the other two contacts as the relay energizes and de-energizes.

"NC" is the Normally Closed contact. A connection exists between the Common and the Normally Closed contacts when the relay is de-energized.

"NO" is the Normally Open contact. A connection exists between the Common and the Normally Open contacts when the relay is energized.

Auxiliary Connections

TB3 contains some auxiliary connections:

Pin 4 is a connection to the Chassis. The chassis (enclosure) should be connected to earth ground.

Pins 5 and 6 are tied together as a Spare Link. This provides extra connection points for any purpose the customer chooses.

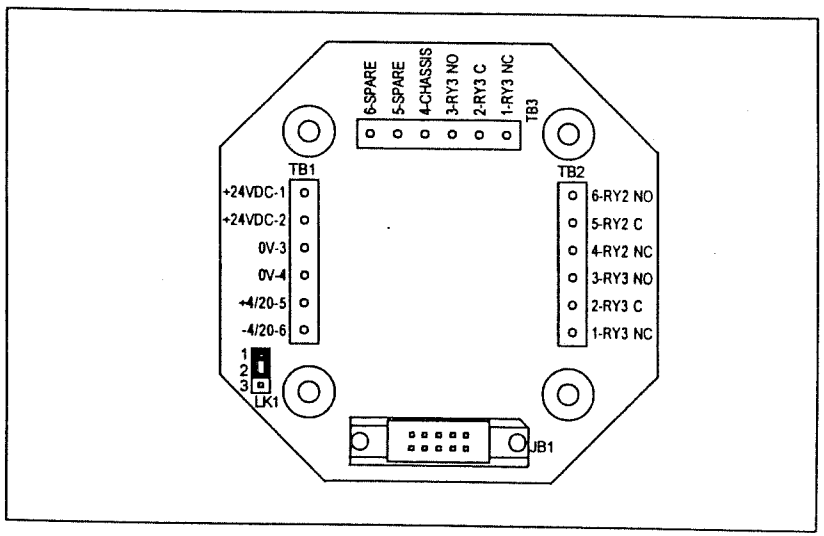


Figure 11. Terminal Identification

System Connection Diagrams

Specific wiring diagrams for different types of equipment and configurations are on the following pages. These diagrams use the Zellweger Analytics Digi Series transmitter as the model for the three-wire transmitter and the Zellweger Analytics Series 2000 transmitter as the model for the two-wire (loop powered) transmitter. The nomenclature of the terminals and actual physical connection may be different for other equipment.

In the following drawings, only TB1 of the Digi-Relay is shown as this is the only terminal with power and signal connections.

"In-Line" Installation

Figures 12 - 15 are for In-Line Operation. This type of installation terminates the 4-20 mA signal at another device after passing through the *Digi-Relay*. These drawings assume the terminating device for the 4-20 mA signal is a Controller or PLC.

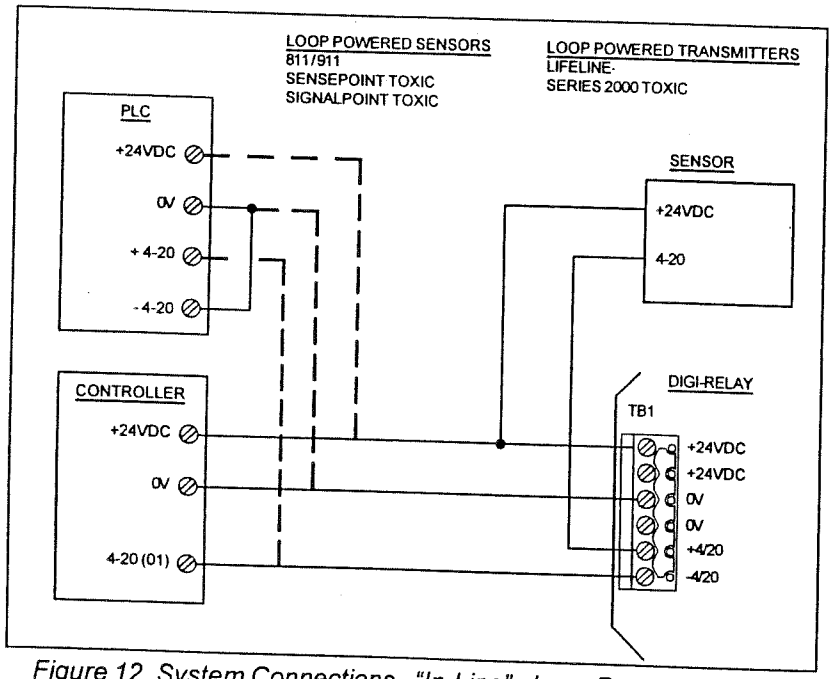


Figure 12. System Connections - "In-Line" - Loop Powered Sensor

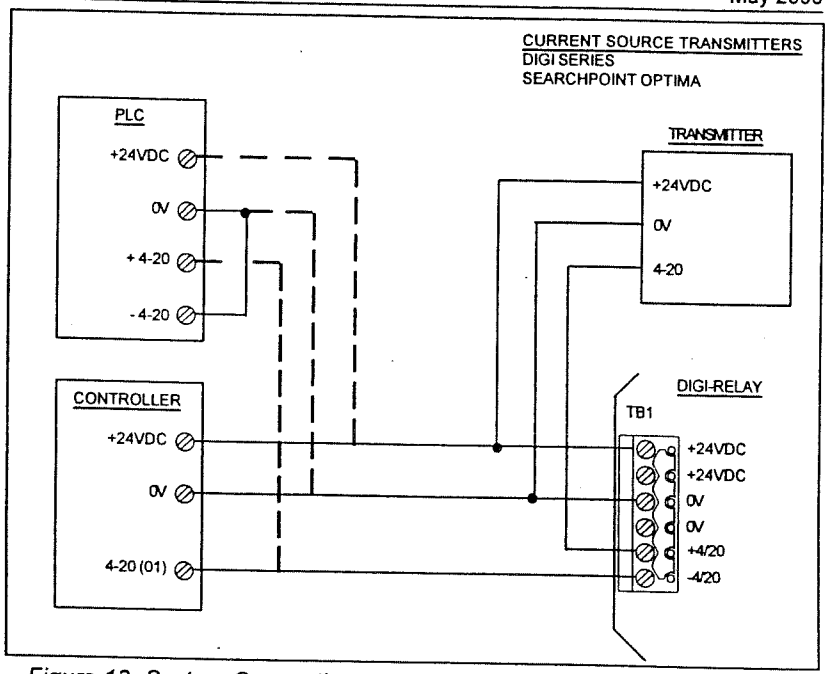


Figure 13. System Connections - "In-Line" - Current Source Transmitter

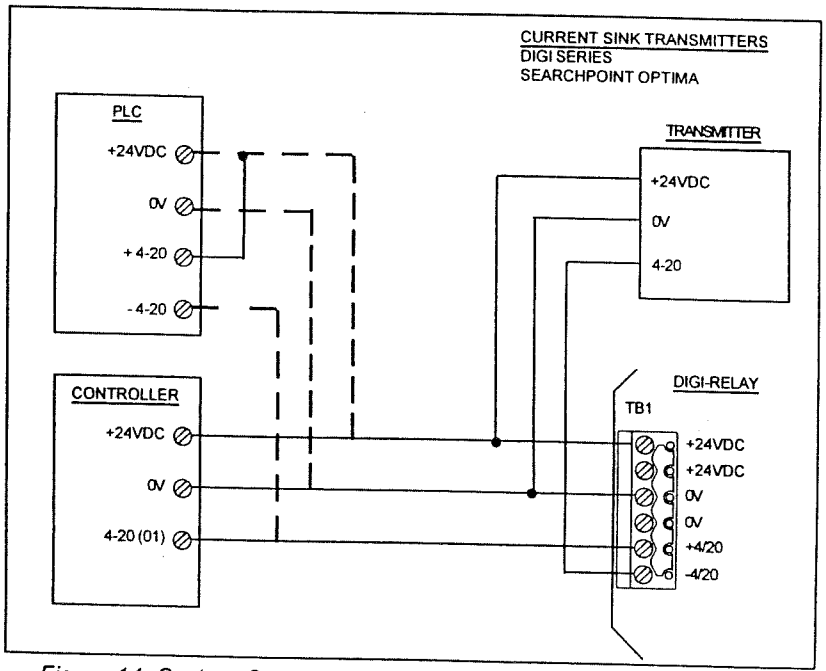


Figure 14. System Connections - "In-Line" - Current Sink Transmitter

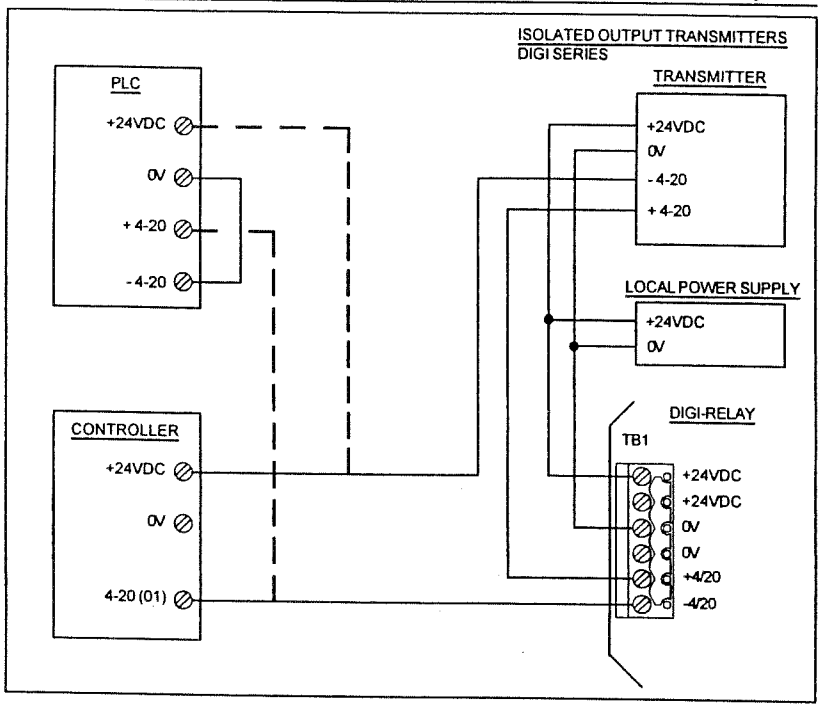


Figure 15. System Connections - "In-Line" - Isolated Output Transmitter

"Stand-Alone" Installation

Figures 16 - 19 are for Stand-Alone Operation. This type of installation terminates the 4-20 mA signal at the *Digi-Relay*.

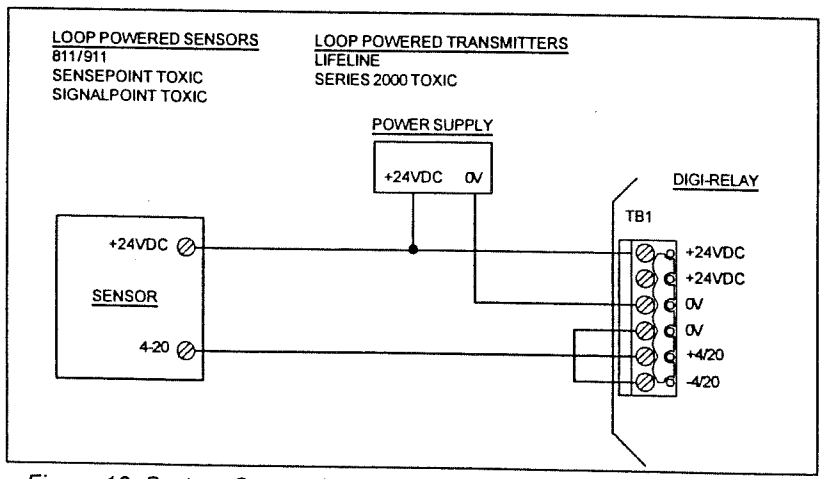


Figure 16. System Connections - "Stand-Alone" - Loop Powered Sensor

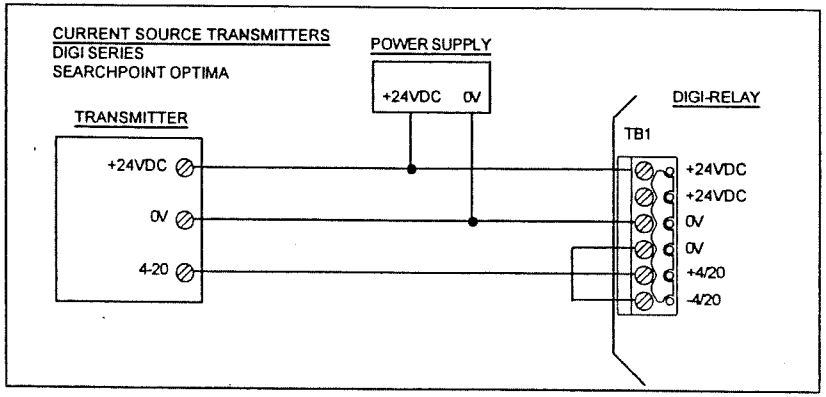


Figure 17. System Connections - "Stand-Alone" - Current Source Transmitter

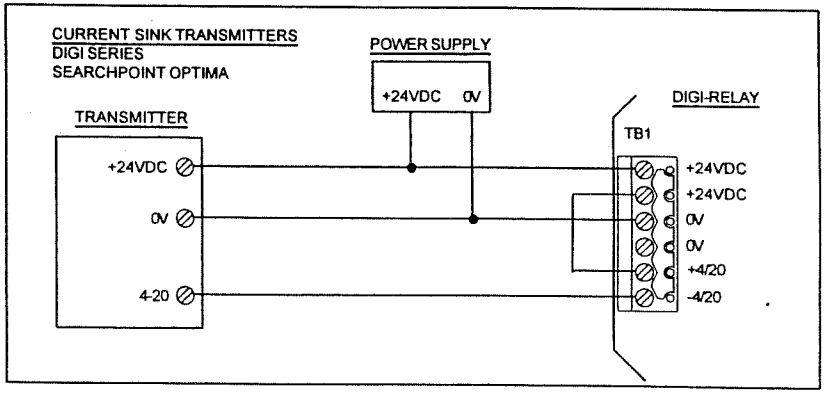


Figure 18. System Connections - "Stand-Alone" - Current Sink Transmitter

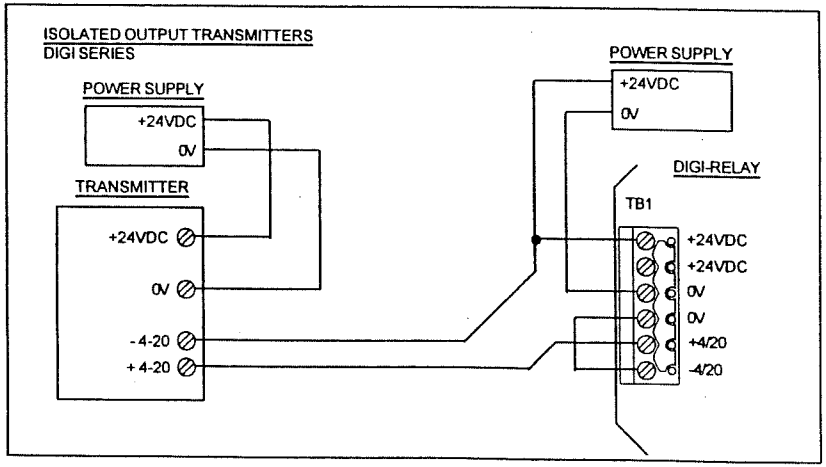


Figure 19. System Connections - "Stand-Alone" - Isolated Output Transmitter

Chapter 3: Operation

Overview

Operation of the *Digi-Relay* remote relay module consists solely of setting the relay trip points and mode of operation links.

Controls and Indicators

All of the controls and indicators are located on the top circuit board (the Signal Board). Each relay control circuit has a potentiometer, an LED and a link.

Potentiometer

Each relay's trip point is independently adjustable. The adjustment is made using the potentiometers ("pots") on the signal board. A clockwise adjustment will raise the trip point and a counterclockwise adjustment will lower the trip point. The trip point adjustment procedure is detailed in "Commissioning".

LED

An LED is included in each relay control circuit to provide a visual indication of the state of the circuit. If the input signal exceeds the relay's trip point, the LED will turn on.

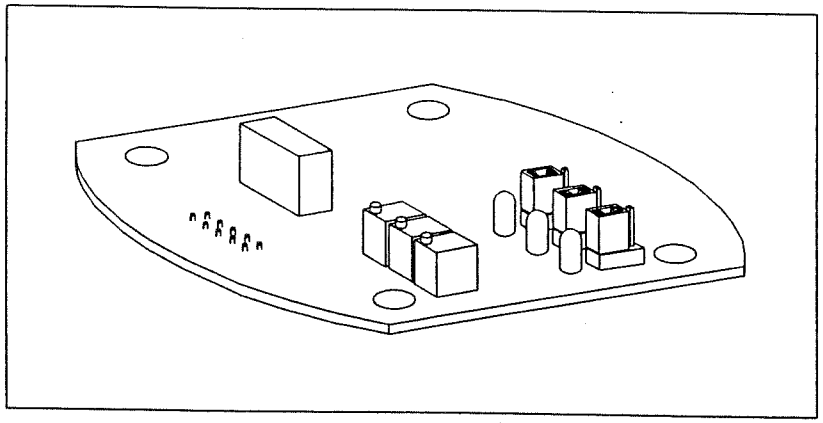


Figure 20. Controls and Indicators

Link

The links are used to configure the relay as normally de-energized or normally energized. Normally de-energized (link on pins 2 & 3) means the relay does not activate until the input signal exceeds the trip point. Normally energized (link on pins 1 & 2) means the relay is activated until the input signal exceeds the trip point, at which point it deactivates.

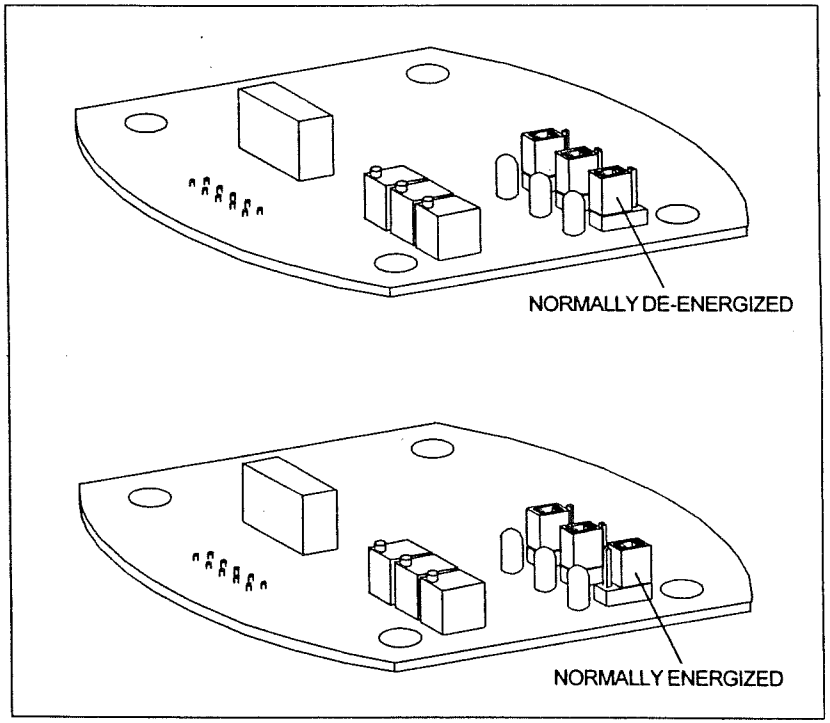


Figure 21. Controls and Indicators - Link Settings

VR1, LED1 and LK1 are associated with relay RY1.

VR2, LED2 and LK2 are associated with relay RY2.

VR3, LED3 and LK3 are associated with relay RY3.

The 4-20 mA Signal

When setting the relay trip points, it is helpful to know what levels of current are used to indicate various conditions. Figure 22 shows a typical 4-20 mA scale. Refer to the Operations manual for your particular transmitter / sensor. The ranges used are as follows:

Fault condition	<1.0 mA
Inhibited	2.0 mA
Gas Concentration	2.4 (-10% FSD) to 25.0 mA (131% FSD)

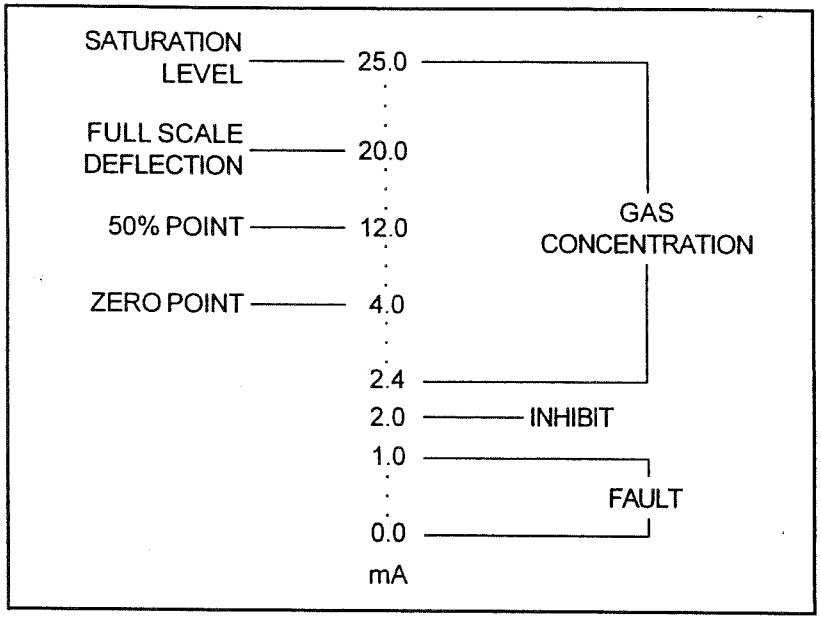


Figure 22. Levels Used on the 4-20 mA Scale

To calculate what signal value corresponds with a particular gas concentration level, use the formula:

X = ((gas level/FSD) x 16) + 4 mA

Examples:

What is the signal level for 20.8% Vol. Oxygen from a 0-25% Vol. Oxygen detector?

X = ((gas level/FSD) x 16) + 4 mA

X = ((20.8/25) x 16) + 4 mA

X = (0.832 x 16) + 4 mA

X = (13.3) + 4 mA

X = 17.3 mA

What is the signal level for 10 ppm H_2S from a 0-50 ppm H_2S detector?

X = ((gas level/FSD) x 16) + 4 mA

X = ((10/50) x 16) + 4 mA

X = (0.2 x 16) + 4 mA

X = (3.2) + 4 mA

X = 7.2 mA

Factory Configuration and Presets

Following is the default factory configuration for all *Digi-Relays* unless specifically requested for Oxygen deficiency:

Relay 1

Low Alarm — Trip Point is 25% FSD, Normally De-energized

The relay will energize if the input signal exceeds 8.0 mA.

Relay 2

High Alarm — Trip Point is 50% FSD, Normally De-energized

The relay will energize if the input signal exceeds 12.0 mA.

Relay 3

Fault/Power Failure Alarm — Trip Point is 1.5 mA, Normally De-energized

The relay will de-energize if the input signal falls below 1.0 mA (Fault Condition) or if power is removed (Power Failure).

For Oxygen Deficiency (O_2):

Defaults for the relays are assuming that the 4-20 mA signal is coming from a transmitter set up to detect 0% - 25% Vol. Oxygen, with 4.0 mA representing 0% Vol. Oxygen and 20 mA representing 25% Vol. Oxygen.

Relay 1

Low Alarm — Trip Point is 19% Vol. O_2, Normally De-energized

The relay will de-energize if the input signal falls below 16.2 mA

Relay 2

High Alarm — Trip Point is 17.5% Vol. O_2, Normally De-energized

The relay will de-energize if the input signal falls below 15.2 mA

Relay 3

Set as Fault/Power Failure Alarm — Trip Point is 1.5 mA, Normally De-energized

The relay will de-energize if the input signal falls below 1.0 mA (Fault Condition) or if power is removed (Power Failure).

Commissioning

Commissioning of the *Digi-Relay* consists of adjusting the alarm trip points (if other than the defaults) and testing operation when the entire system is installed.

Operation testing can be done using a current calibrator or gassing the sensor "live" (not in CALIBRATE mode).

To adjust the relay trip points, the following equipment is needed:

+24VDC Power Source

Current Calibrator

Small screwdriver

Note:

If the *Digi-Relay* is installed in conjunction with a Digi Series transmitter, the transmitter can be used as the current calibrator. Refer to the Digi manual for details.

If desired, the 4-20 mA signal can be monitored at the test points TP1 (+) and TP2 (-) with a multimeter on the 2 Volt range. The voltage reading between these points is a linear representation of the input milliampere signal, with 2.0V = 20 mA, 0.2V = 2.0 mA, etc.

Using one of the connectors included with the *Digi-Relay*, make all the wiring connections as shown in the appropriate Stand-Alone Operation diagram, substituting the Current Calibrator for the transmitter. Refer to "Installation" for disassembly and connection details.

Plug the connector onto TB1.

The relay trip points are set by the adjustment of the controls VR1, VR2 and VR3. The alarm state is indicated by the associated light emitting diode LED1, LED2 and LED3. The LED will illuminate when the trip point is exceeded.

To set up Relay 1:

1. Adjust the current calibrator for the milliampere output which corresponds to the desired trip level.

2. Adjust VR1 until LED1 just comes on. A clockwise adjustment will raise the trip point (if LED1 is already on) and a counterclockwise adjustment will lower the trip point (if LED1 is off). If this adjustment is made too quickly, the setting may be off by as much as 1% FSD.

3. Set link LK1 for normally energized or normally de-energized operation as desired.

Relay 2 can be adjusted using VR2, LED2 and LK2.

Relay 3 can be adjusted using VR3, LED3 and LK3.

Calibration

Calibration of the *Digi-Relay* consists of adjusting the alarm trip points. Since there are no parts in the *Digi-Relay* which rapidly degrade with normal use, periodic calibration is not required.

Troubleshooting

The *Digi-Relay* is functionally a very simple device. There are very few easily defined symptoms, and very few things to check. If the following checks do not identify the problem, call Service.

Unable to adjust relay trip points; LED never turns on.

Check: Signal at test points.

Input signal connections.

Power connections.

LED turns on but relay does not activate.

Check: Link setting.

Most problems in the field are not caused by product failure but rather the integration of several pieces of equipment into a system. Normally this type of problem can be resolved over the telephone.

Service / Technical Support

All our products are safety related. Uncompromising performance cannot be assured unless staff are properly trained with access to specialized test equipment. For this reason, Zellweger Analytics, Inc. does not provide comprehensive circuit diagrams in their manuals nor do we encourage component level field service. In recognition of our position on service, we offer a very comprehensive sales support network with approved service centers in North America and around the world.

All service in North America is carried out in field service centers and at our main plant in Lincolnshire, Illinois (near Chicago). Please

contact your local representative or the Lincolnshire office for current repair costs.

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Before product can be accepted for repair, a Return Service Request (RSR) number must be issued by the Service Department. This number must be displayed on the exterior of the package, preferably on the shipping label.

Chapter 4 Spare Parts

Digi-Relay Replacement Items

Note:
Signal Board assemblies ordered as spares are shipped unconfigured. These boards must be commissioned before being used.

Description:	Part Number:
Terminal Board Assembly	02042-A-0050
Signal Board Assembly	02042-A-0060
Connector, 6-Position	0150-3000

Chapter 5 Specifications

Mechanical (with Mounting Strap):

Size: 6 1/8" W x 5 1/4" H x 5 1/2" D
156 mm W x 134 mm H x 140 mm D

Weight: 3.75 lbs (1.7 kg)

Temperature Range:

Operational: -4 to +122 °F (-20 to +50 °C)

Storage: -40 to +176 °F (-60 to +80 °C)

Electrical:

Power

Supply Voltage: 10VDC to 35VDC

Power Consumption: 104 mA @ 24VDC (2.5 Watts)

Start-Up Current: 0.3A @ 10VDC, 0.1A @ 24VDC

Input Signal

Input Signal Range: 0.75 mA to 24 mA

Input Signal Loss: 1.0V @ 20 mA

Alarms:

Alarm Set Range: 0.75 mA to 24 mA

Alarm Set Accuracy: ± 0.1 mA (± 0.5% FSD of 20 mA)

Accuracy vs. Temp: ± 3% FSD (-20 °C to +65 °C)

Alarm Hysteresis: ± 4% FSD (± 0.64 mA) max.

Test Point Accuracy: ± 3% of signal

Relays:

Relay Contacts: Double Pole, 1 NO, 1 NC

Relay Contact Rating: 3.0A @ 250VAC 3.0A @ 32VDC

Enclosure:

Material: Copper-free Aluminum

Entries: Two (2), 3/4" NPT

Certification:

UL: Explosion-Proof
Class I, Division 1, Groups B, C and D

C-UL: Explosion-Proof
Class I, Division 1, Groups B, C and D