ZEN-RIO

Relay I/O Expansion Unit

› The perfect companion for the ZEN-16 Control Station

› Adds **16 relay outputs** and **16 digital control inputs**

› Ideal for on/off control and alarm or status control

General Description

ZEN-RIO is a relay output and digital input expansion which is designed for seamless integration with the ZEN-16 control and monitoring station.

The ZEN-RIO's relays are controlled directly by the ZEN-16's setpoints, which are in turn easily configured using our user-friendly and flexible WorkBench software (download it for free at defineinstruments.com/workbench).

The digital control inputs are designed for SCADA applications and can be read directly from the ZEN-16's com ports.

Applications for the ZEN-RIO are numerous, and include on/off control and alarming functions.

CONTENTS

1   SPECIFICATIONS

16 isolated relay outputs Change over Form C (10A 250V AC or 10A 30V DC), 1kHz scan rate. Software selectable relay state.

16 selectable digital control inputs Input type select NPN (sink) or PNP (source) from DIP switch A4 (see 2.5). 1kHz Input sample rate. Input voltage 5–24V.

LED indication on each relay output and control input channel (see 2.1–2.2)

Communication Via i²C bus, 400kHz
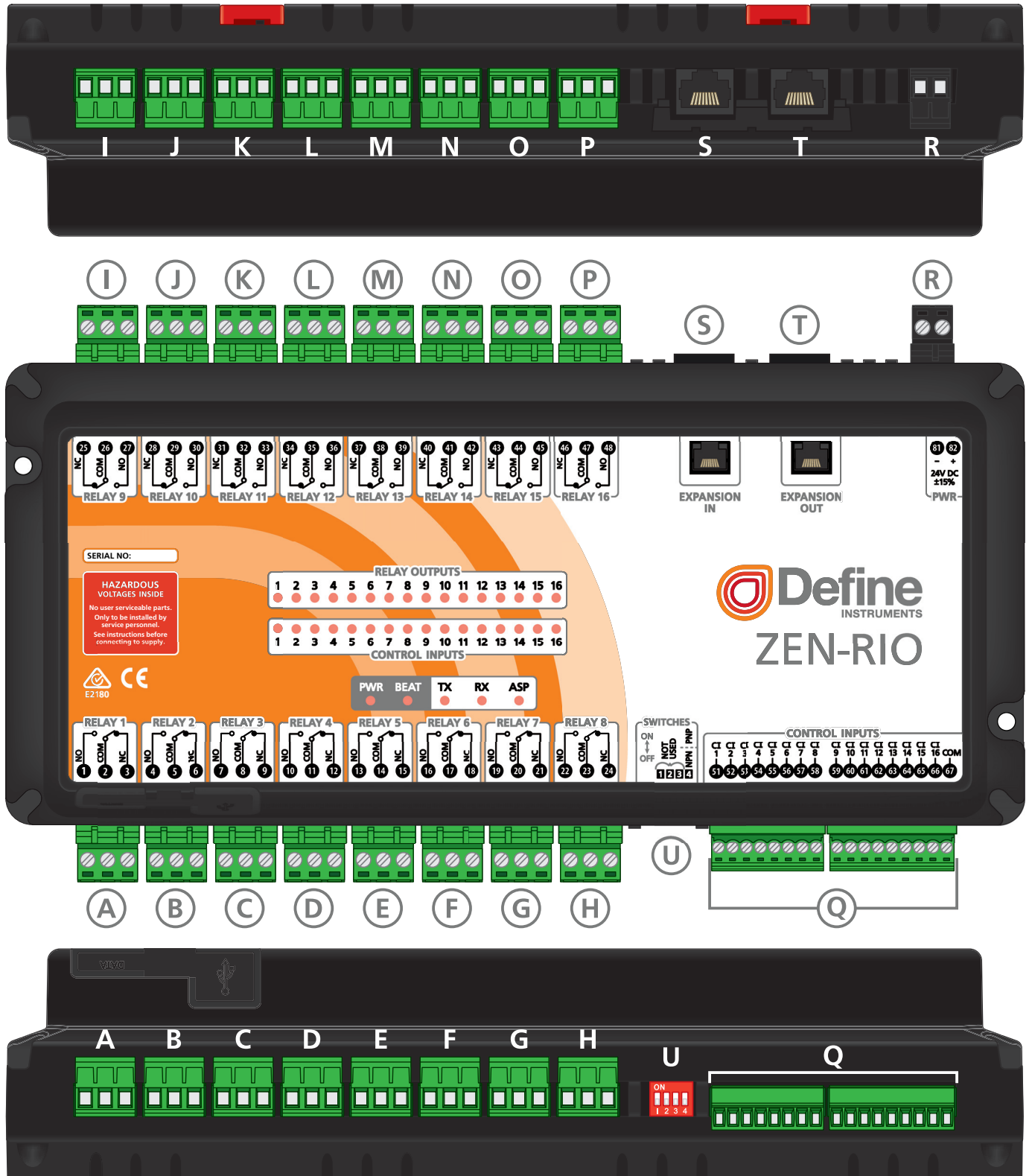
DC power supply 24V DC ±15%

DIN rail mountable unit 35mm DIN rail

Dimensions (H x W x D) 59 x 255 x 144mm (2.32 x 10.04 x 5.67") - with plugs in

2   UNIT OVERVIEW

2.1 - Casing & terminals

A	Relay output 1	**I**	Relay output 9	**Q**	Control inputs 1–16
B	Relay output 2	**J**	Relay output 10	**R**	Power (24V DC ±15%)
C	Relay output 3	**K**	Relay output 11	**S**	Expansion in
D	Relay output 4	**L**	Relay output 12	**T**	Expansion out
E	Relay output 5	**M**	Relay output 13	**U**	DIP switches
F	Relay output 6	**N**	Relay output 14		
G	Relay output 7	**O**	Relay output 15		
H	Relay output 8	**P**	Relay output 16		

2.2 - LED indicators

PWR illuminates when power is connected to the unit.

BEAT will flash every second to show that the unit is operating.

TX shows communication responses from the ZEN-RIO to the ZEN-16.

RX shows communication requests from the ZEN-16 to the ZEN-RIO.

ASP shows that the setpoint mode has been configured correctly. This LED should always be lit when the unit is powered on.

Relay output LEDs show the active state of relays 1–16. When the LED is off, the respective relay is de-energised, and when the LED is on, the respective relay is energised (see 3.1 for more information).

Control input LEDs show the active state of digital control inputs 1–16. If the LED is on, the respective digital control input has been activated (see 3.2 for more information).
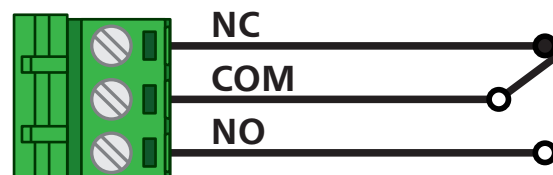
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3   WIRING & DIP SWITCHES

3.1 - Relays 1–16   (see 2.1A–P)

The relay outputs are located along the upper and lower left sides of the unit (see 2.1A–P), and are wired as shown (right).

NC
COM
NO

LED indicators

RELAY OUTPUTS

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |

The **Relay Outputs** LED indicators show the active state of each relay. If the LED is off, the respective relay is de-energised and the *COM* terminal is connected to the *NC* terminal. If the LED is on, the respective relay is energised and the *COM* terminal is switched to the *NO* terminal.
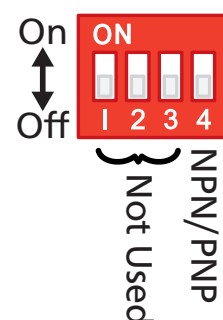
3.2 - Control inputs 1–16   (see 2.1Q & 2.1U)

The digital control inputs are located on the lower right side of the unit (see 2.1Q). The input type for control inputs 1–16 must be set to either NPN or PNP using DIP switch 4 (see 2.1U).

Set switch 4 to the **Off position for NPN**, or the **On position for PNP**. (Note that the 16 digital control inputs must be either **all NPN** or **all PNP**, but could combine different types of sensors.)

On
ON
Off
1 2 3 4
Not Used
NPN/PNP

LED indicators

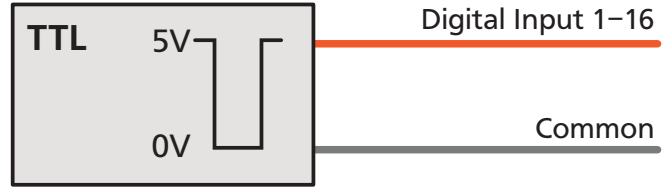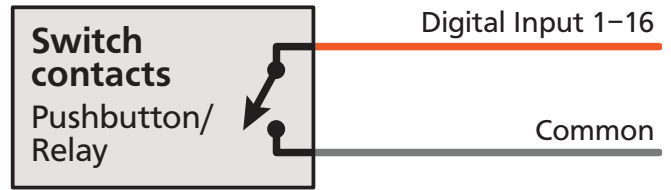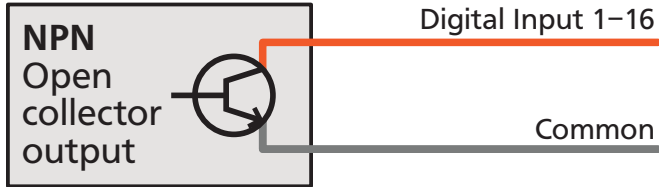| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |

DIGITAL INPUTS

The **Control Inputs** LED indicators show the active state of each digital control input. If the LED is on, the respective input has been activated. The input LED will always indicate the activated state of the input, regardless of what type of input is being used.
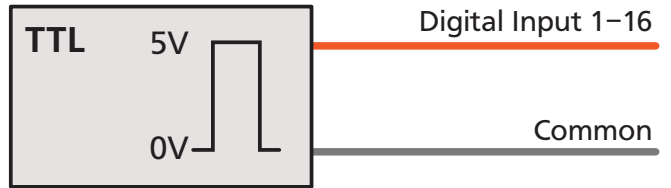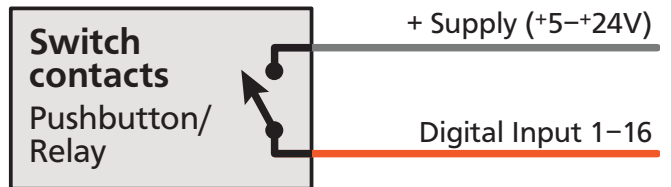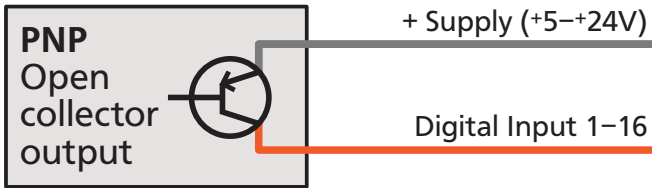
         ZEN-RIO-MAN-15V02 (1009)

NPN (DIP switch 4: Off)

All digital control inputs must be driven from outputs which can **sink** current (i.e. active low).

Switch contacts
Pushbutton/ Relay

Digital Input 1–16

Common

NPN Open collector output

Digital Input 1–16

Common

TTL 5V 0V

Digital Input 1–16

Common

PNP (DIP switch 4: On)

All digital control inputs must be driven from outputs which can **source** current (i.e. active high).

Switch contacts
Pushbutton/ Relay

+ Supply ($^+$5–$^+$24V)

Digital Input 1–16

PNP Open collector output

+ Supply ($^+$5–$^+$24V)

Digital Input 1–16

TTL 5V 0V

Digital Input 1–16

Common

3.3 - Power

(see 2.1R)

The power terminal is located on the top side of the unit, in the far right corner (see 2.1R). The ZEN-RIO accepts 24V DC supply (±15%).
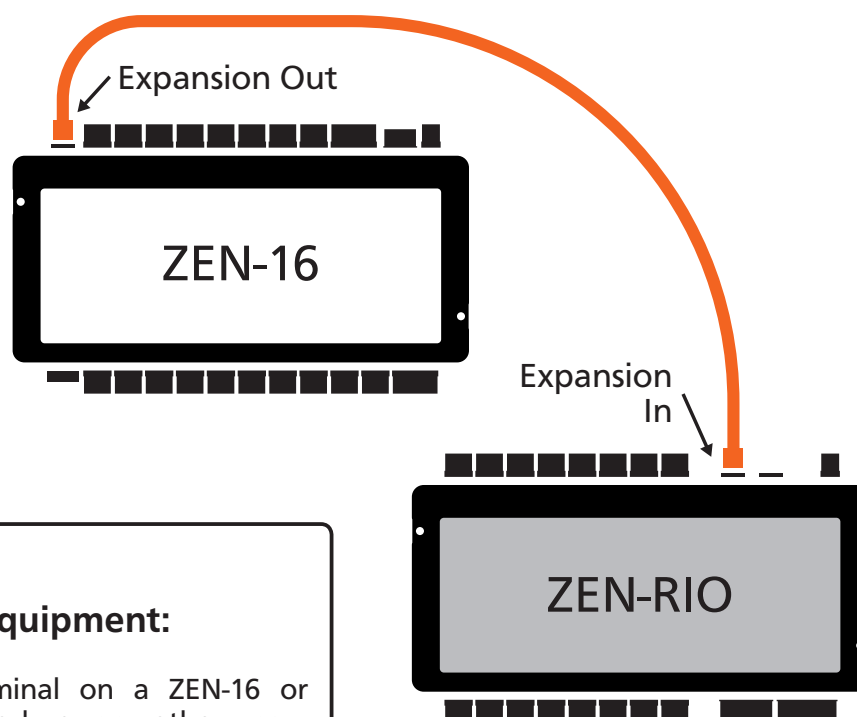
−
+
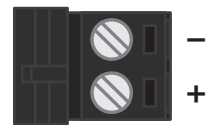
4   CONNECTING TO YOUR ZEN-16

4.1 - Expansion terminals   (see 2.1S–T)

Connect your ZEN-RIO to your ZEN-16 using the supplied cable, as shown (right).

The lead should be connected from the **Expansion Out** terminal on the ZEN-16 to the **Expansion In** terminal on the ZEN-RIO.

Expansion Out

ZEN-16

Expansion In

ZEN-RIO

⚠️ **CAUTION!**
Risk of damage to equipment:

Never connect an expansion terminal on a ZEN-16 or ZEN-RIO to an Ethernet port, network, or any other unapproved device.

The ZEN-16 and ZEN-RIO are connected using a standard Cat5 patch lead, **however the expansion terminals are NOT standard Ethernet ports**.

4.2 - Software setup

Software setup of the ZEN-RIO is facilitated through our simple and flexible **Define WorkBench** software (**defineinstruments.com/workbench**), connected to the ZEN-16.

Note that **Define WorkBench** does not connect directly to your ZEN-RIO - it connects to the ZEN-16, and all options relating to the ZEN-RIO are configured from there.

Relay Outputs 1-16

The ZEN-RIO's 16 relay outputs are controlled by the ZEN-16's 16 setpoints, and are configured from the *Setpoints* tab. The image below shows the setup page for Setpoint 1 in WorkBench. The output of Setpoint 1 is directly mapped to Relay 1 in the ZEN-RIO, if connected.
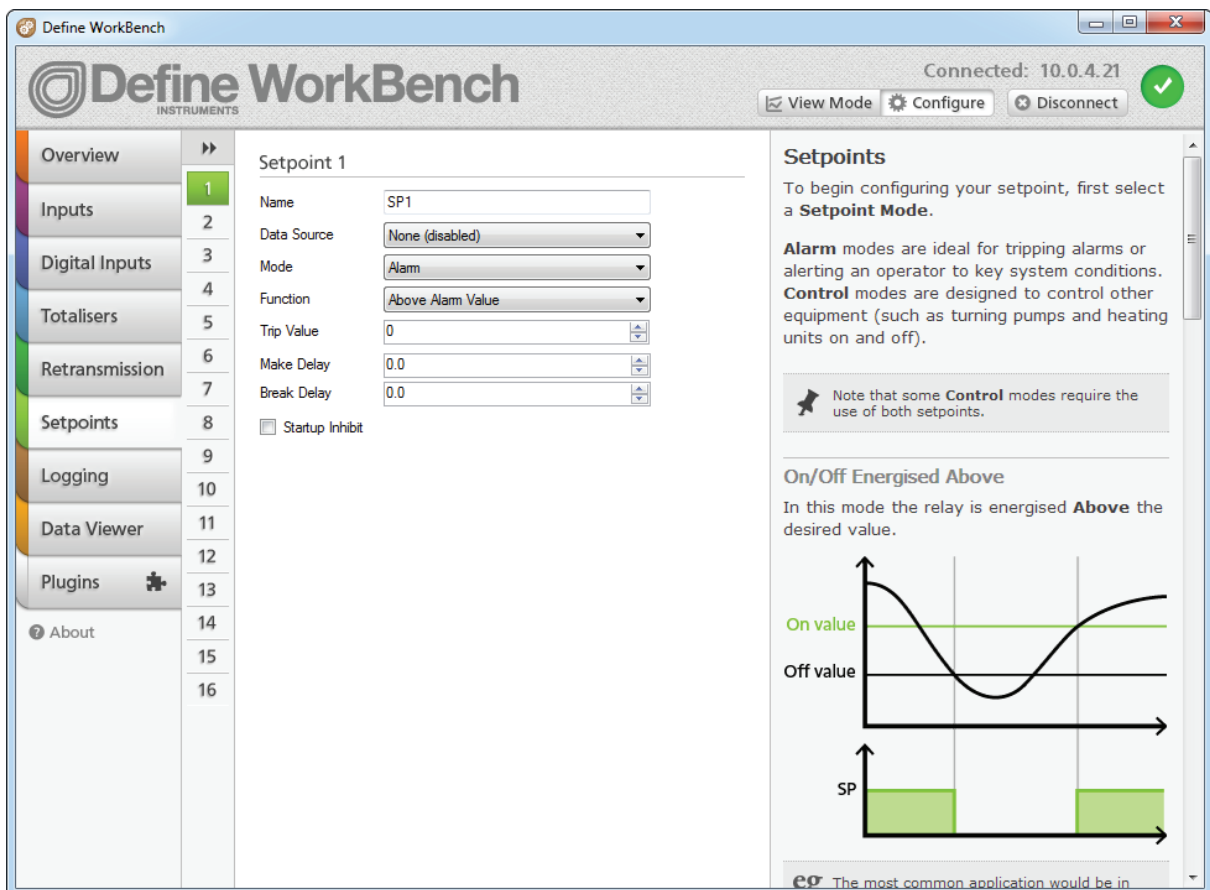
ZEN-16	Mapped to ZEN-RIO	ZEN-16	Mapped to ZEN-RIO
Setpoint 1	Relay 1	Setpoint 9	Relay 9
Setpoint 2	Relay 2	Setpoint 10	Relay 10
Setpoint 3	Relay 3	Setpoint 11	Relay 11
Setpoint 4	Relay 4	Setpoint 12	Relay 12
Setpoint 5	Relay 5	Setpoint 13	Relay 13
Setpoint 6	Relay 6	Setpoint 14	Relay 14
Setpoint 7	Relay 7	Setpoint 15	Relay 15
Setpoint 8	Relay 8	Setpoint 16	Relay 16

Control Inputs 1-16

The 16 digital control inputs on the ZEN-RIO are intended for use with SCADA systems or various plugins supplied by Define Instruments. Without a plugin they do not have any associated control functions on their own.

The status of the 16 digital control inputs can be read from any of the ZEN-16's serial ports when set to Modbus RTU slave mode (factory default). They can either be read as a 16 bit value from the Modbus Input register #4103 (4102 for direct addressing), or as Modbus discrete status inputs from input #113 to 128 (112–127 for direct addressing).

The table below shows the functions of various bit flags:

Control Input #	Register 4103 Bit #	Discrete Input #	Control Input #	Register 4103 Bit #	Discrete Input #
CI_1	0	113	CI_9	8	121
CI_2	1	114	CI_10	9	122
CI_3	2	115	CI_11	10	123
CI_4	3	116	CI_12	11	124
CI_5	4	117	CI_13	12	125
CI_6	5	118	CI_14	13	126
CI_7	6	119	CI_15	14	127
CI_8	7	120	CI_16	15	128

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