I/O Expander Module

Technical Manual

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Designed and manufactured by
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1 Preliminary Notes

1.1 Proprietary Notice

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1.2 Warnings, Cautions and Notes

Warnings, cautions and notes are displayed and defined as follows:

Warning: A black cross indicates a chance of injury or death if the warning is not heeded.

Caution: A yellow triangle indicates a chance of damage to or failure of the equipment if the caution is not heeded.

Note: A blue circle indicates indicates a procedural or advisory note.

1.3 Manuals and Software

All manuals and software referred to in this document are available from the Güralp Systems website: www.guralp.com unless otherwise stated.

1.4 Disposal

WEEE Directive (Waste Electrical and Electronic Equipment)
Notice To All European Union Citizens: Important environmental information about this product.

Disposal of this product after its life-cycle could harm the environment. Do not dispose of this product as unsorted municipal waste. It should be disposed by a specialised company for recycling. The unit should be returned to your distributor or to a local recycling service. Please respect the local environmental rules. If in doubt, contact your local authorities about waste disposal rules.

2 Overview

The Minimus 8-channel I/O Expander Module, part number MIN-EXP-08IO, is a peripheral unit that can be connected to the Güralp Minimus digitiser. It provides eight independent single-pole, double-throw relay outputs that can be used to initiate external actions (such as closing a valve or sounding an alarm) in response to a seismic event which satisfies certain predefined conditions.

The unit connects over an RS232-compatible serial link to the Minimus' Analogue Input, either:

- via a 'Y' cable, part number CAS-MIN-0007, which allows simultaneous connection of an analogue instrument, such as a Güralp Fortis; or
- via a dedicated cable, part-number CAS-MIN-0006, which should be used when no analogue instrument input is required.

Connections to external equipment are made via convenient plug-in terminal blocks with screw-type connections.

The I/O Expander Module does not require an external power supply when connected to the Minimus.

3 Installation

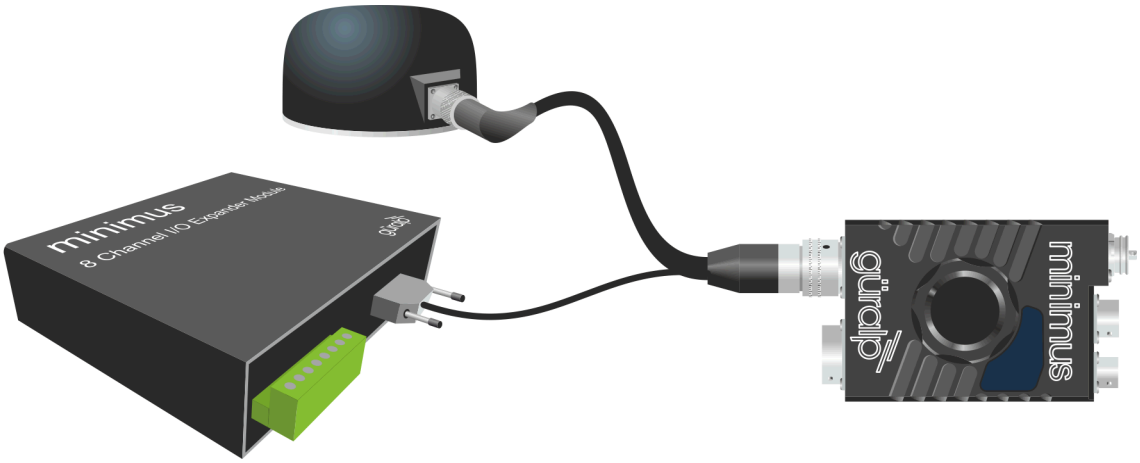
Warning: The I/O Expander Module is capable of switching lethal voltages but the exposed connectors will then present a significant risk of injury or death. It is essential to provide a suitable secondary enclosure in such applications.

Caution: The I/O Expander Module is supplied in a UL94-rated ABS enclosure. It is not suitable for use outdoors or in environments where it could be exposed to excessive temperature, humidity, dust or hazardous chemicals. It is essential to provide a suitable secondary enclosure in such applications.

3.1 Connection to Minimus

The DE9f connector of the I/O Expander Module, labelled SERIAL PORT, connects to the Minimus' Analogue port. It can be connected in two ways.

If an analogue sensor, such as a Güralp Fortis, is to be used in conjunction with the Minimus, a 'Y'-cable, part number CAS-MIN-0007, is used to connect the I/O Expander Module:



If no analogue sensor connection is required, a simple point-to-point (non-'Y') cable, part number CAS-MIN-0006, should be used:

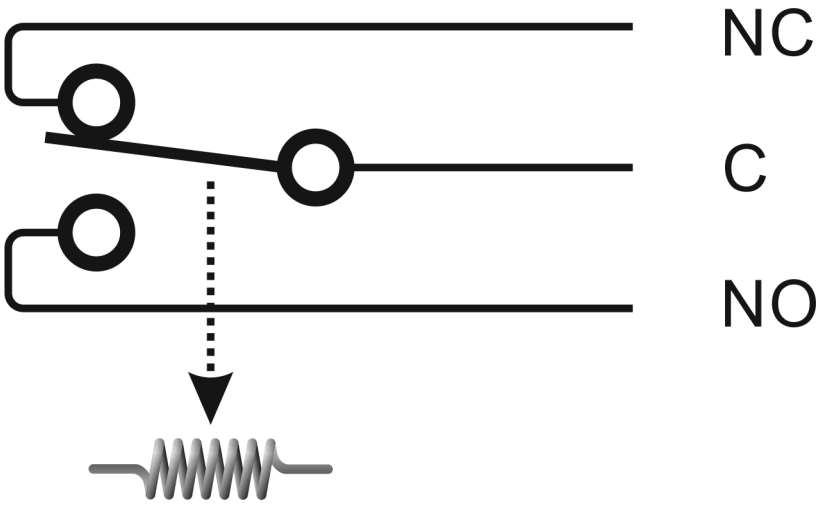
In either case, a digital sensor (or string of digital sensors) can be connected to the Minimus in the normal way, if required.

3.2 Connection to external equipment

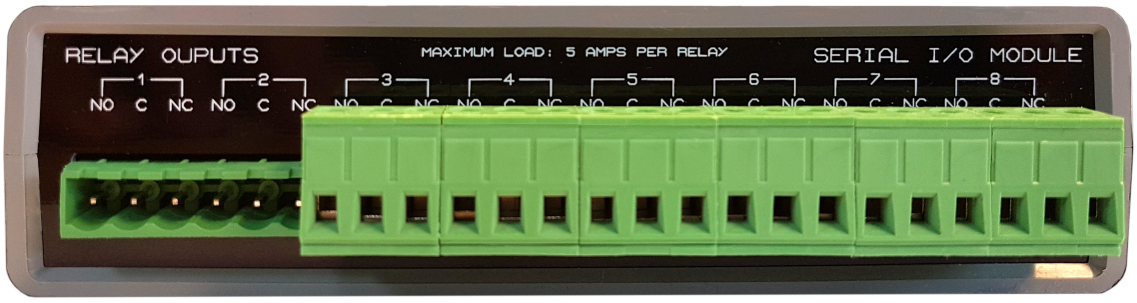
The I/O Expander Module provides eight relay outputs for connection to external equipment. Each relay output is single-pole, double-throw. The contacts are labelled as follows:

- The common contact is labelled 'C'
- The normally-open contact is labelled 'NO'
- The normally-closed contact is labelled 'NC'

The contact arrangement and associated labelling is illustrated in the following diagram:



Each set of relay contacts is provided with a separate, detachable, three-pole terminal block.

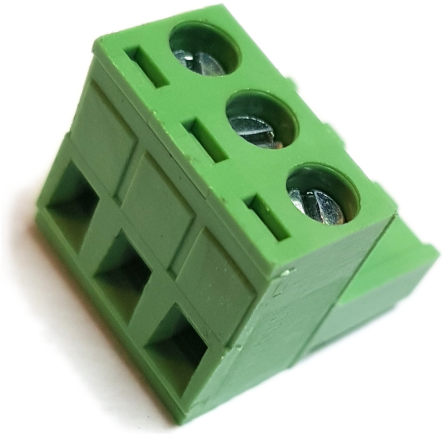


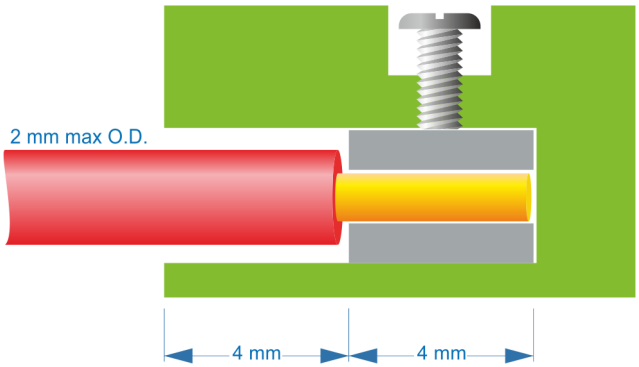
The terminal block can be removed from the I/O Expander Module by pulling directly outwards with moderate force. In the illustration above, the first two blocks have been removed.

Caution: Do not wiggle, twist or bend the connector when attempting to remove it. This may damage the unit.

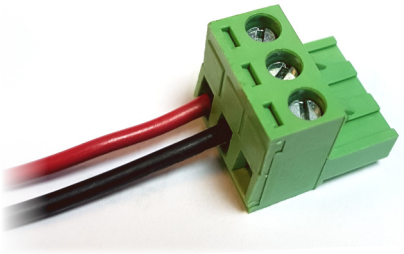
Once each terminal block is removed, the associated wiring to the external equipment can be connected to it. Each terminal block has three wiring receptacles, which accept wires in the range 24 AWG to 12 AWG.

For each wire, strip back 4 mm of insulation, as shown below. If using stranded wire, strip around 6 mm, twist the loose strands together and then crop the twisted ends to 4 mm.





Insert the prepared wire fully into the contact block and fully tighten the screw using a 3 mm flat-headed screw-driver. Check that no loose strands protrude.



Check that the connection is sound by tugging sharply on the cable; it should be impossible to dislodge with moderate force. Repeat for all required connections. Unused terminals can be ignored.

The terminal block(s) can then be re-inserted into the I/O Expander Module. A positive click should be felt as they are fully inserted.

3.3 (Optional) Connection to power supply

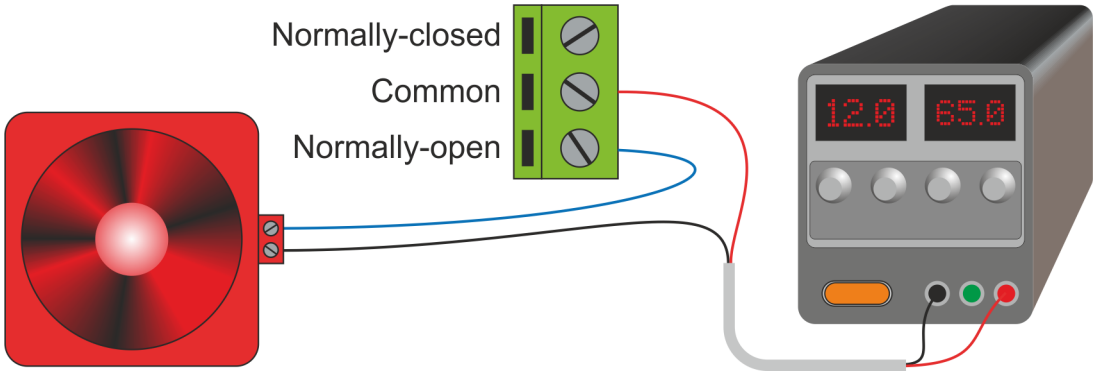
The I/O Expander Module does ***not*** require an external power supply when connected to the Minimus.

When used with equipment other than the Minimus, the I/O Expander Module requires an external regulated 12 V DC power supply, rated at 500 mA or more.

4 Typical output connections

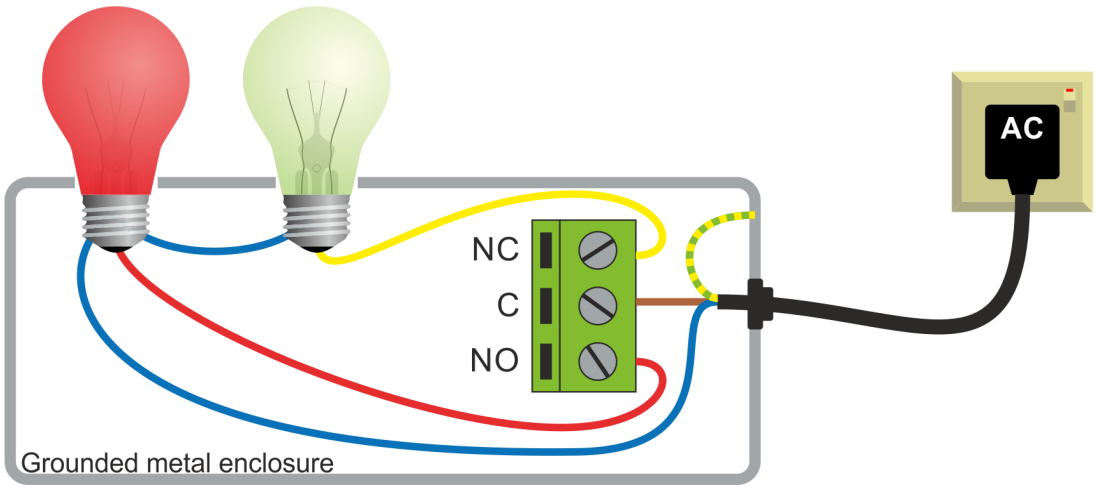
4.1 Example: 12 V DC alarm

Provided that the alarm presents a resistive load and draws less than 5 Amps, it can be connected to a power supply with the common and normally-open contacts in series with the positive supply line. The alarm will sound when the relay is activated.



4.2 Example: 240 V AC indicator lamps

The two lamps presents resistive loads so they can be connected directly but, in this case, the voltages involved are sufficient to present a risk to life. The I/O Expander Module and its associated wiring must, therefore, be installed inside a grounded metal enclosure.



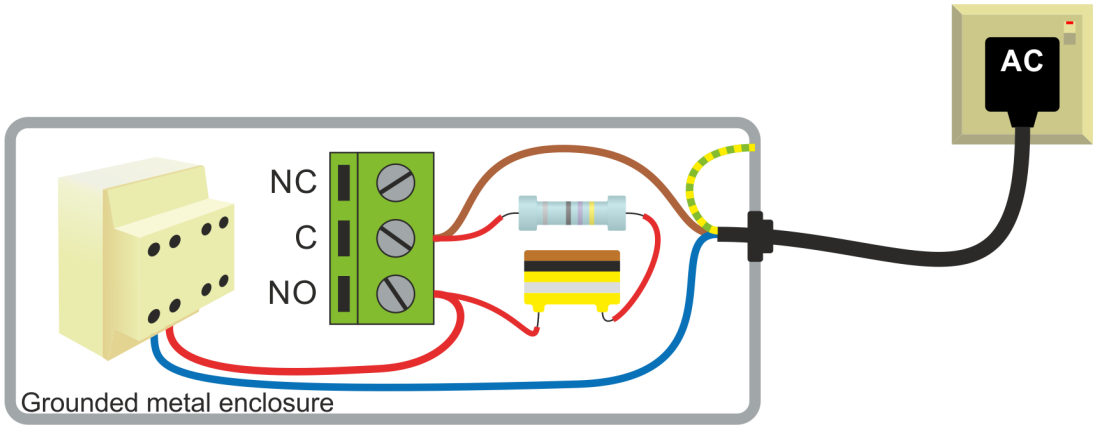
Warning: The installation must be carried out by a qualified electrician in accordance with all applicable regulations and legislation.

4.3 Example: 240 V AC contactor

Contactors typically present an inductive load, which can cause arcing between the relay contacts. This, in turn, can lead to premature failure of the I/O Expander Module.

This can be mitigated by installing a 47 Ω, ½ W resistor in series with a 100 nF, 400 V non-polarised capacitor (values suitable for 240 V AC applications) connected in parallel with the switch contacts.

Again, the voltages involved are sufficient to present a risk to life. The I/O Expander Module and its associated wiring must, therefore, be installed inside a grounded metal enclosure.



Warning: The installation must be carried out by a qualified electrician in accordance with all applicable regulations and legislation.

5 Specifications

Physical	
Height	35 mm
Width	140 mm
Depth, excluding connectors	110 mm
Depth, including connectors	134 mm (allow 140 mm for cables)
Weight	400 g
Material	ABS (UL94 rated)
Power supply (*not* required when used with Minimus)	
Connector	5.5 mm × 2.5 mm barrel
Polarity	Centre positive, outer negative
Voltage	12 V DC, regulated
Current	50 mA quiescent + ≈30 mA for each active relay. 400 mA maximum.
Outputs	
Relay channels	8
Relay type	SPDT
Max resistive load	28 V DC @ 5 A 48 V AC @ 5 A (240 V AC @ 5 A when placed in suitable secondary enclosure.)

6 Revision History

A	2018-07-27	Initial release