

# EXOcompact Third Generation Manual



THE CHALLENGER IN BUILDING AUTOMATION

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# Chapter 1 Introduction

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EXOcompact is a range of freely programmable controllers, fully compatible with other products in the EXO system. They can easily be integrated with EXOflex, EXOscada and EXO4 in large automation systems.

The general functions and specifications for EXOcompact third generation are described in the product sheet which can be downloaded from Regins homepage, [www.regin.se](http://www.regin.se). This manual, EXOcompact Third Generation, describes additional technical information.

# Chapter 2 Technical Specifications

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## CPU & Memory

Operating system.....	EXOrealC
Application SRAM memory .....	approx. 480 kB
Application flash memory (TCP/IP) .....	8 MB (304 kB reserved by EXOreal)
Application flash memory (no TCP/IP) .....	4 MB (304 kB reserved by EXOreal)
Real-time clock (RTC).....	max $\pm 20$ sec./month.

## Battery

Type .....	Lithium, CR2032
Battery backup of RAM, RTC .....	5 years
Battery monitoring .....	status LED + software accessible

## Communication ports

### Port 1

Type .....	RS485
built-in protocol.....	EXOline
other protocols.....	contact Regin
Control signals, RS485.....	E
Speed .....	configurable, 1200-76800 bps
standard .....	9600 bps
Galvanic isolation, common mode voltage .....	max. 150 V

### Port 2 (Models with built-in M-Bus)

Type .....	M-Bus
Speed .....	configurable, 1200-9600 bps
standard .....	2400 bps
Max. number of meters with speed 1200-2400 bps.....	8
Max. cable length with speed 1200-2400 bps .....	1000 m
Max. number of meters with speed 4800-9600 bps.....	4
Max. cable length with speed 4800-9600 bps .....	200 m

### Port 2 (Models without built-in M-Bus)

Type .....	RS485
built-in protocol.....	EXOline
other protocols.....	contact Regin
Control signals, RS485.....	E
Speed .....	configurable, 1200-76800 bps
standard .....	9600 bps
Galvanic isolation.....	no

## TCP/IP Port

Type .....	10Base-T/100Base-TX auto-negotiation
built-in protocol .....	
EXOreal 3.1-1-01 or later.....	EXOline over TCP slave, BACnet/IP, HTTP, SMTP
EXOreal 3.1-1-00 or earlier.....	EXOline over TCP slave, HTTP, SMTP
Auto MDIX .....	yes
Fast connector .....	RJ45
Supported standards .....	IEEE 802.3u and IEEE 802.3x full-duplex flow control
Max. cable length .....	100 m (min CAT 5)

## Analog Inputs, AI

Mains frequency filter .....	configurable, 50 or 60 Hz
Basic ADC resolution.....	12 bit

Measurement range .....	program selectable/channel
Temperature (PT1000) .....	-50+150°C
.. accuracy (excluding sensor) .....	+0.4°C
Temperature (Ni1000 DIN) .....	-40+105°C
.. accuracy (excluding sensor) .....	+0.4°C
Temperature (Ni1000 L&G) .....	-40+120°C
.. accuracy (excluding sensor) .....	+0.4°C
Current .....	0 (4) - 20 mA, requires external 10 or 500 Ohm shunt
.. measurement range .....	0 (40) - 200mV with 10 Ohm or 0 (2) - 10 V with 500 Ohm
.. accuracy .....	depends on external shunt
Voltage .....	0-10 V
.. input resistance .....	10 MOhm
.. accuracy (% of full scale) .....	+0.15%
Voltage .....	0-200 mV
.. input resistance .....	10 MOhm
.. accuracy (% of full scale) .....	+0.15%
Conversion Time for all channels max $66+n*40$ ms (frequency 50 Hz, where $n$ is the number of active channels, including activated UI channels).	

### UI, Universal Inputs, AI or DI selectable

See AI or DI depending on selection, except for the below specific UI parameters:

Voltage .....	0-10V and 0-200 mV
.. input resistance .....	1 MOhm

### Analog Outputs, AO

Basic DAC resolution .....	12 bit
Output level .....	0-10 V DC
Update cycle .....	300 ms
Max load .....	5 mA, short circuit proof

### Digital Inputs, DI

Type .....	24 V DC, floating contact, powered from +C (24 V DC) output, pin 4
Logic 0 .....	0-5 V DC
input current at 0V .....	0 mA
input resistance .....	8 kOhm
Logic 1 .....	12-24 V DC
input current at 24 V DC .....	3 mA
Frequency range .....	Normally 2 Hz. Max 50 Hz requires Task with cycle time 1 te
Shortest pulse length for detection (transient flag) .....	8 ms

### Digital Outputs, DO

Type .....	MOSFET
Output .....	24 V AC or DC
Max continuous load .....	2 A
The sum of current through all DO .....	8 A
Update cycle .....	50 ms

# Chapter 3 Installation

## General Connections

### With AC Supply and Mixed Loads on DO

The general connections of EXOcompact with AC supply are illustrated in Figure 1 and Figure 2 below.

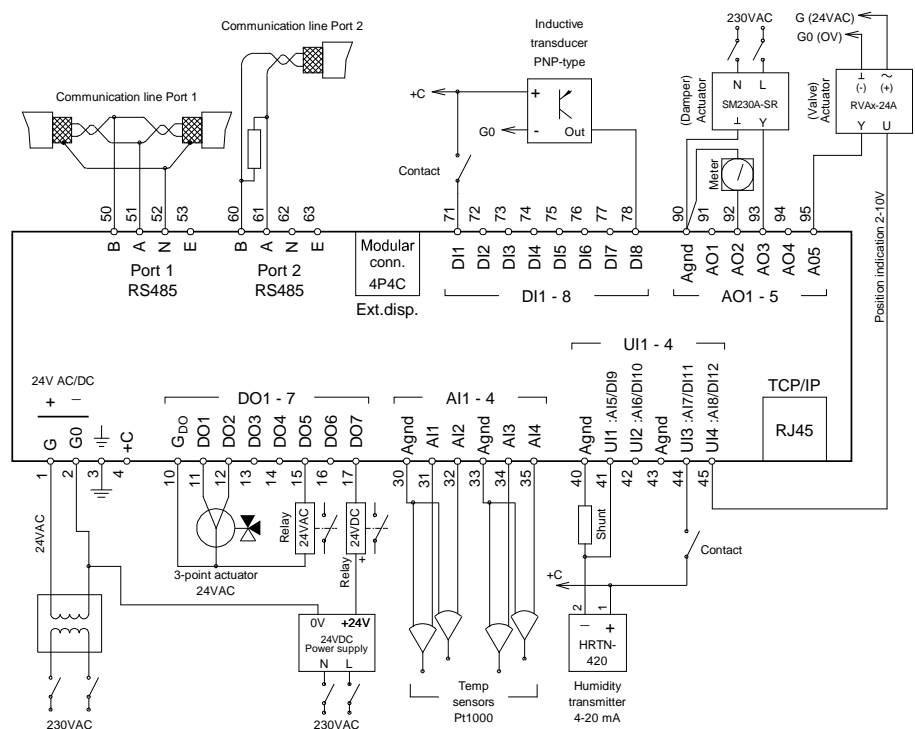


Figure 1 General connections for EXOcompact third generation without built-in M-bus

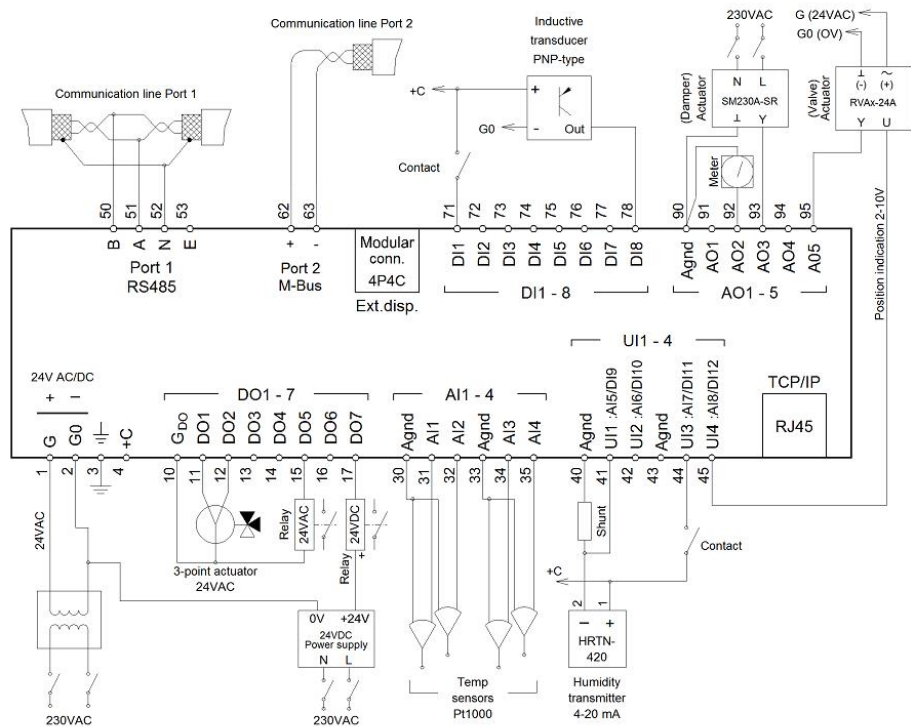


Figure 2 General connections for EXOcompact third generation with built-in M-bus

## With DC Supply and Mixed Loads on DO

The general connections of EXOcompact with DC supply are illustrated in Figure 3. For the rest of the connections, see Figure 1 and Figure 2.

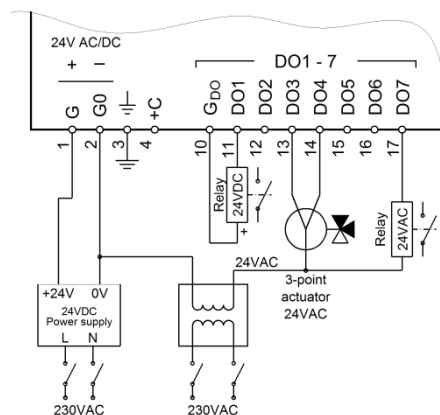


Figure 3 Connection with DC supply



### AC Power Supply

The 24 V AC supply, typically a 230V/24V transformer, is connected to contacts **G0** (2) signal ground and **G** (1), phase. The EMI earth (  $\perp$  ) must be connected to the earth rail or similar to protect against disturbances. Each process connection has active transient protection, which is led to the EMI earth (  $\perp$  ).

The **+C** output is used to power supply auxiliary equipment requiring 24 V DC power.

### DC Power Supply

The 24 V DC supply, typically a stabilised power supply, is connected to the contacts - (2) and + (1). The EMI earth (  $\perp$  ) must be connected to the earth rail or similar to protect against disturbances. Each process connection has active transient protection, which is led to the EMI earth (  $\perp$  ).

### AI Process Connections

The connection of four passive sensors like PT1000 and an active 2-wire transmitter is shown in the figure at the beginning of this chapter. Note that low level sensors are returned to the **Agnd**, high quality ground.

- ☐ This type of input is mainly intended for use with sensors using voltage outputs and resistance elements for measuring temperature.
- ☐ Voltage signals must be connected between the input and **Agnd**.
- ☐ A shielded cable is recommended. The cable screen should be connected to the ground bar.
- ☐ External transmitters for 4-20 mA can be powered from the **+C** output. A fast fuse should be fitted in serial with the transmitter to protect the input from short circuits in the transmitter.
- ☐ All **Agnds** are internally connected to each other and to **G0**.

To attain maximum accuracy according to specifications, each respective **Agnd** should be used as a reference for the measuring.

### AO Process Connections

The AO terminals supply 0-10 V with reference to the **Agnd** terminal (= Internal Signal Ground). The outputs are internally powered. Figure 1 shows the connection of a 24 V AC powered control valve actuator, which is referenced to **G0**, a 230 V AC powered damper actuator and an example with a simple voltmeter, both referenced to **Agnd**.

- ☐ This type of output is mainly intended for use with damper motors, shunt valves, frequency inverters and other analog actuators for 0–10 V.
- ☐ Each output is current limited and short circuit proof.
- ☐ Normal, high-ohm loads are connected between the output and **Agnd**. Other types of loads for special applications with low-ohm loads are best connected between the output and **G0**. See the example with the Actuator that is connected to **G0**.
- ☐ All **Agnds** are internally connected to each other and to the **G0** terminal.

## DO Process Connections

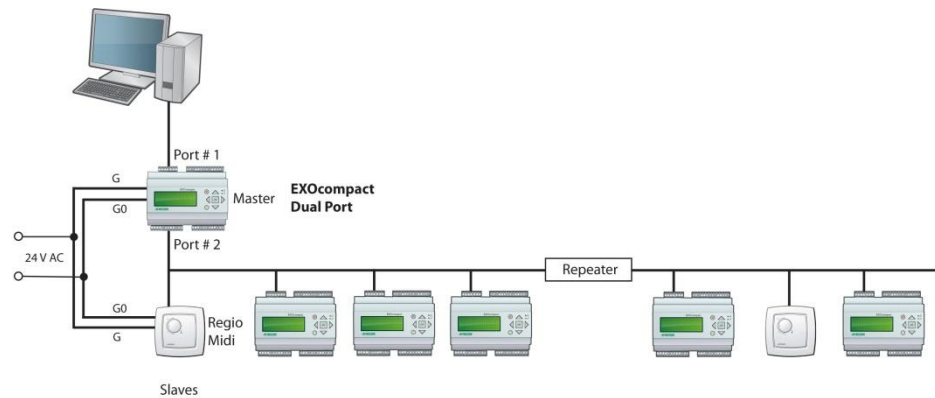
The example shows actuators, AC relays and similar connected to **GDO** in one end. An active DO connects the other end of the load to **G0** (-).

## Standard 24 V DC DI

Floating (potential free) contacts and two wire pressure switches, proximity switches and similar are powered from the **+C** (4) terminal which supplies +24 V DC.

- ☐ This type of input is used for reading floating (potential free) contacts. They are active high.
- ☐ One end of the external contact is connected to the input and the other to **+C**. The **+C** output is current limited and short circuit proof.
- ☐ The connection of an inductive pressure transducer is shown in the figure at the beginning of this chapter.

## Using the unisolated port



*Figure 4 Example when using the unisolated port*

EXOcompact models with two serial ports, have an unisolated RS485 communication port (Port #2). Except for the isolation all other characteristics are compatible with EXOline and the two types could be mixed in a network without any problem.

If you connect two controllers (master – slave) with un-isolated communication ports, please observe the following demands:

- ☐ When using the same power supply for two controllers connected with un-isolated communication ports, you must connect G0 to G0 and G to G. They must not be cross-connected! See an example with EXOcompact Dual Port and Regio Midi in the above figure.
- ☐ The longest communication cable length is 300 m between un-isolated master/slave ports.
- ☐ The communication cable must be well separated from power cables and other possible sources of interference (EMI).
- ☐ A maximum of 32 controllers is allowed on the same communication line without a repeater.
- ☐ A repeater with isolated power supply (e.g. Repeat485 from Regin) is recommended to prolong the communication distance and number of controllers.

# Chapter 4 Maintenance and Service

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## Changing the Battery

When the battery indicator is lit, the battery for backup of program memory and the real-time clock has become too weak. The battery is replaced as described below. A backup capacitor saves the memory and keeps the clock running for at least 10 minutes after the power supply is removed. Thus, if battery replacement takes less than 10 minutes, there will be no need to reload the program and the clock will continue to run normally.

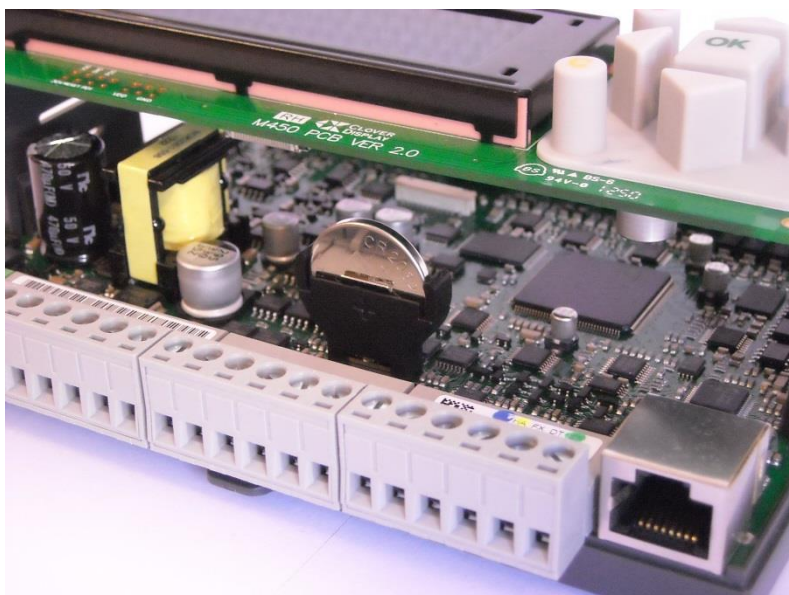
The replacement battery must be according to the Technical Specifications above.



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This procedure requires knowledge of proper ESD protection; i.e. an earthed wristband or similar protection must be used!

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*Figure 5 Battery location*

Grip the battery firmly with your fingers and lift it upwards until it rises from its holder.

Press the new battery firmly down into place. Note that to preserve correct polarity, the battery must be inserted the “right way round”.



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If the battery is placed the “wrong way round”, the P/B led will change to red to indicate a battery error when the controller is connected to the power supply.

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# Resetting the Application Memory



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This procedure should only be carried out by qualified resellers since the current application will stop running and the controller will return to its factory application.

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To reset the processor's program memory (application programs) the controller has to be connected to the power supply. Use the reset button accessed through the small hole on the right side of the unit. A tip is to use a paper-clip to access the reset button.

If the controller is not possible to reset in this way for some reason it should be powered down. Then keep the reset button pressed in while reconnecting the power.



*Figure 6 Resetting the application memory*



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For EXOcompact third generation the controller has to be connected to the power supply during resetting.

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## Updating the operating system

The EXOreal operating system can be updated from any RS485 EXOline Slave port, or TCP/IP with EXOdesigner.