LYNX
TECHNIK AG

Reference Manual

R CT 5010

Bus Expansion Controller

Series 5000 CardModule
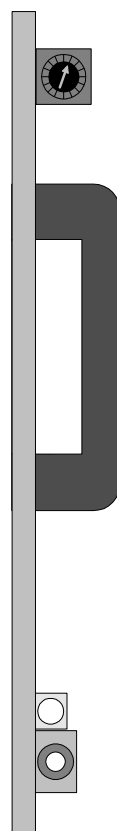
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LYNX Technik AG warrants that the product will be free from defects in materials and workmanship for a period of two (2) year from the date of shipment. If this product proves defective during the warranty period, LYNX Technik AG at its option will either repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product.

In order to obtain service under this warranty, customer must notify LYNX Technik of the defect before expiration of the warranty period and make suitable arrangements for the performance of service. Customer shall be responsible for packaging and shipping the defective product to the service center designated by LYNX Technik, with shipping charges prepaid. LYNX Technik shall pay for the return of the product to the customer if the shipment is within the country which the LYNX Technik service center is located. Customer shall be responsible for payment of all shipping charges, duties, taxes and any other charges for products returned to any other locations.

This warranty shall not apply to any defect, failure, or damage caused by improper use or improper or inadequate maintenance and care. LYNX Technik shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than LYNX Technik representatives to install, repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; c) to repair any damage or malfunction caused by the use of non LYNX Technik supplies; or d) to service a product which has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty servicing the product.

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Regulatory information

Europe

Declaration of Conformity

We	LYNX Technik AG
	Brunnenweg 3
	D-64331 Weiterstadt
	Germany

Declare under our sole responsibility that the product

TYPE: R CT 5010

To which this declaration relates is in conformity with the following standards (environments E1-E3):
   EN 55103-1   /1996
   EN 55103-2   /1996
   EN 60950   /2001
Following the provisions of 89/336/EEC and 73/23/EEC directives.

Winfried Deckelmann

Weiterstadt, November 2003

Place and date of issue   *Legal Signature*

USA

FCC 47 Part 15

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to the part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense

Contents

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Getting Started

Packaging

The shipping carton and packaging materials provide protection for the module during transit. Please retain the shipping cartons in case subsequent shipping of the product becomes necessary.

Product Description

The R CT 5010 is a controller option for the R FR 3010 and R FR 5010 Rack Frame assemblies and provides remote control, status monitoring and error reporting for all LYNX modules installed in the rack.

This board is must be used with an R CT 5020 or R CT 5030 controller in a host rack and is an economical method for system expansion beyond a single rack. The basic function is to extend the reach of the R CT 5020 and R CT 5030 controllers into racks that are in very close proximity to the host.

The option consists of the controller hardware only. Software functionality is provided with the LYNX control software already supplied with the R CT 5020 or R CT 5030 controllers.

The R CT 5010 is one component in a scalable and modular control system topology that can expand from a single rack to hundreds of racks located in different locations. Other options available are:

R CT 5020. Rack Controller. This is the basic rack controller and is the first step in building a control system. A Single rack with a RCT 5020 can be expanded with the R CT 5010 and R CT 5030 controllers to form a large integrated system. LYNX control software is supplied with this option.

R CT 5030. Master Controller. For larger systems, or for systems requiring network connectivity we provide the Master Controller. When used with the Master Software control package this provides network connectivity, a browser style interface and standard TCP/IP communications. This option is also required for the support of SNMP error reporting. The Master Control Software package is also equipped to take more advanced plug in control options LYNX has under development.

Each control system is configured based on the application, connectivity requirements and the physical location of the racks. Care should be taken when specifying the controller options for larger systems. We can provide assistance in system design if you have some concerns. Please Contact your local dealer or a LYNX office for assistance.

Functional Diagram

Figure 1 below is the basic functional diagram for the R CT 5010 CardModule.
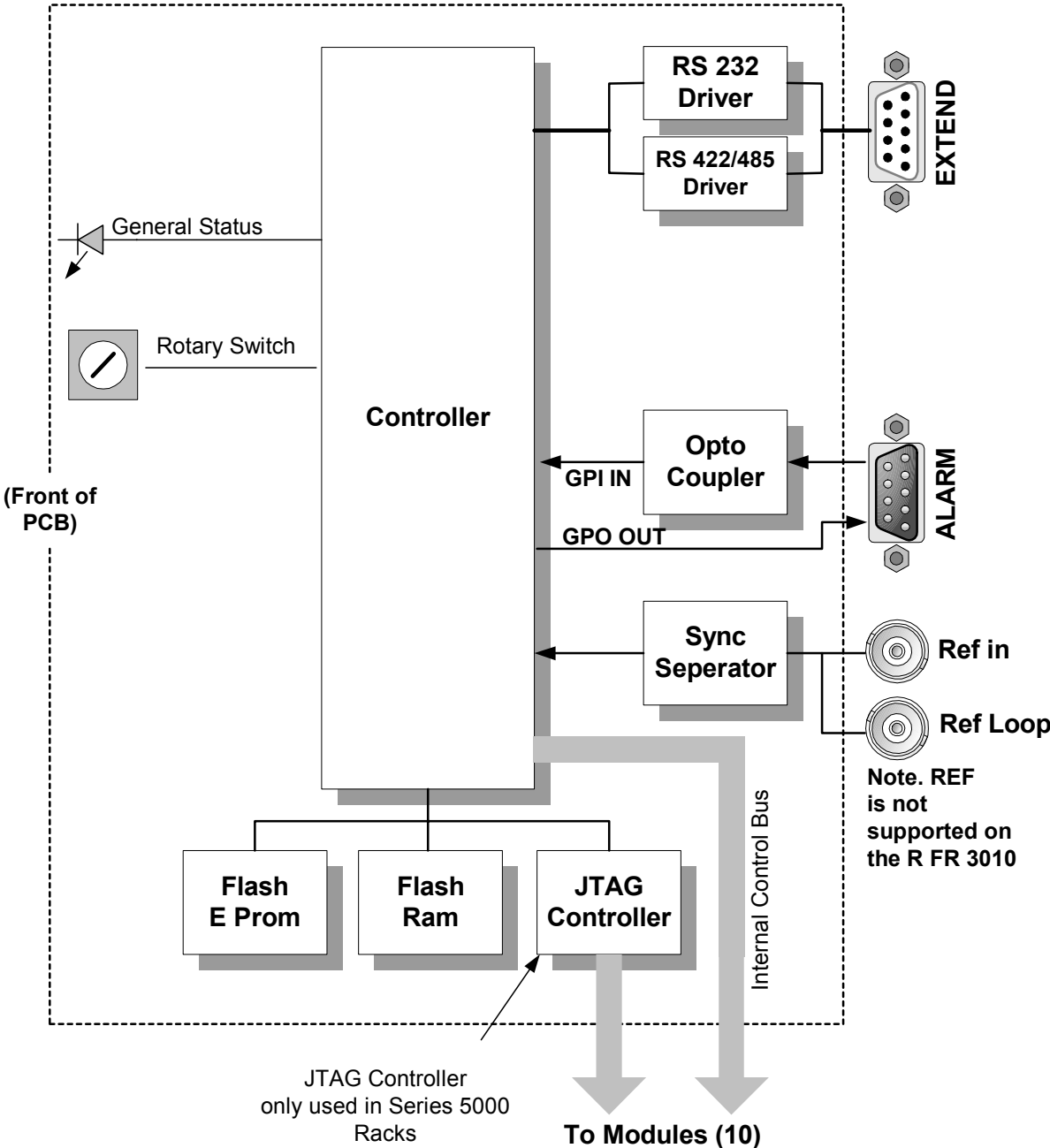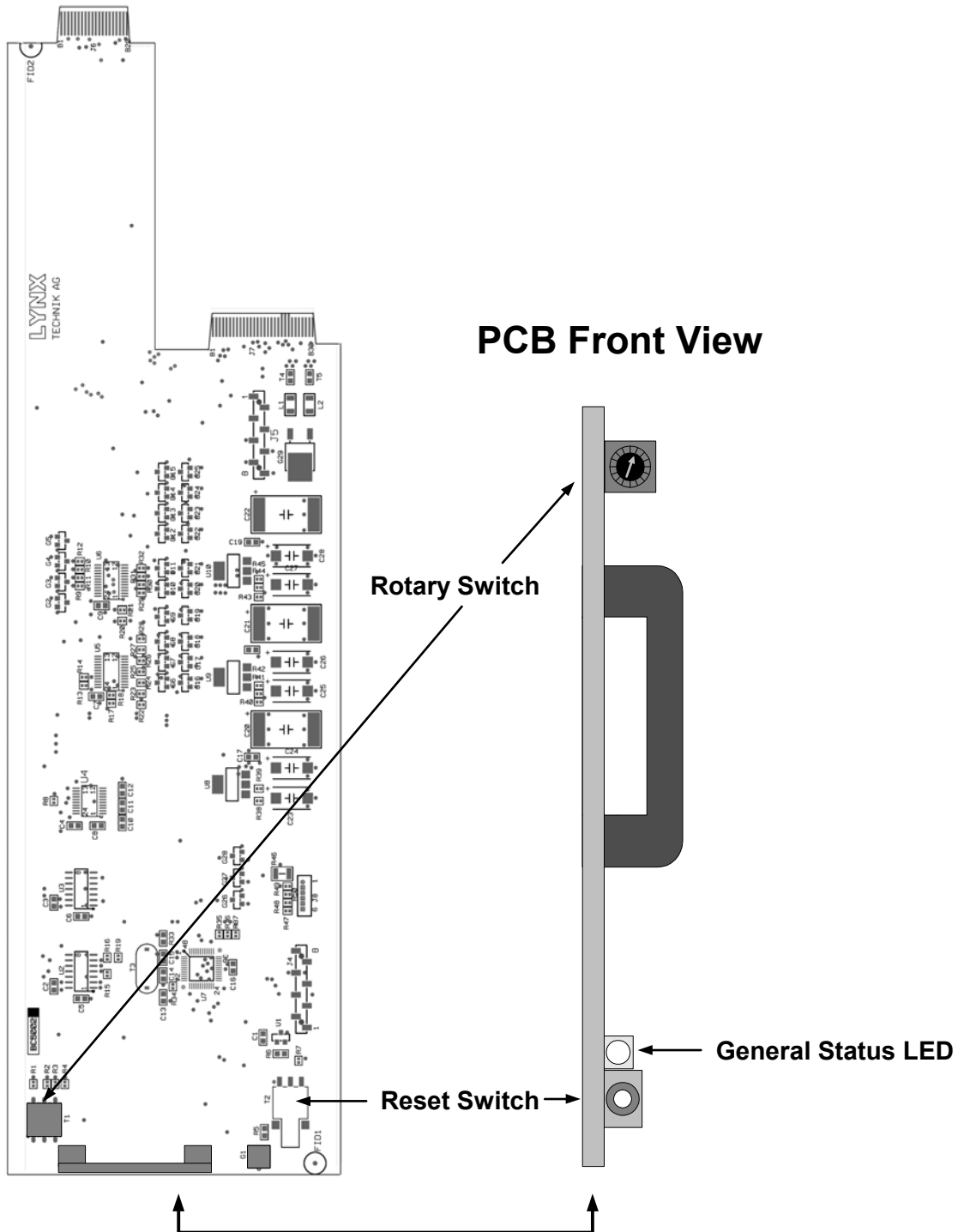
Figure 1- R CT 5010 Functional Diagram

Module Layout

Figure 2 (below) shows the physical layout of the R CT 5010 CardModule and the locations of the various controls / connections and indicators.

PCB Front View

Rotary Switch

General Status LED

Reset Switch

Caution
Use static precautions when handling the PCB. Static discharge could result in serious damage to the module.

Control System Topology

Before using the R CT 5010 is it worthwhile to understand the control system topology and expansion path to ensure the correct use of the controller.

There are three hardware building blocks to a LYNX control system. The first step is to add the R CT 5020 Controller to your system. This will provide remote control / status monitoring and error reporting for all the installed modules in the R FR 5010 Series 5000 rack frame or the R FR 3010 Series 3000 rack frame.
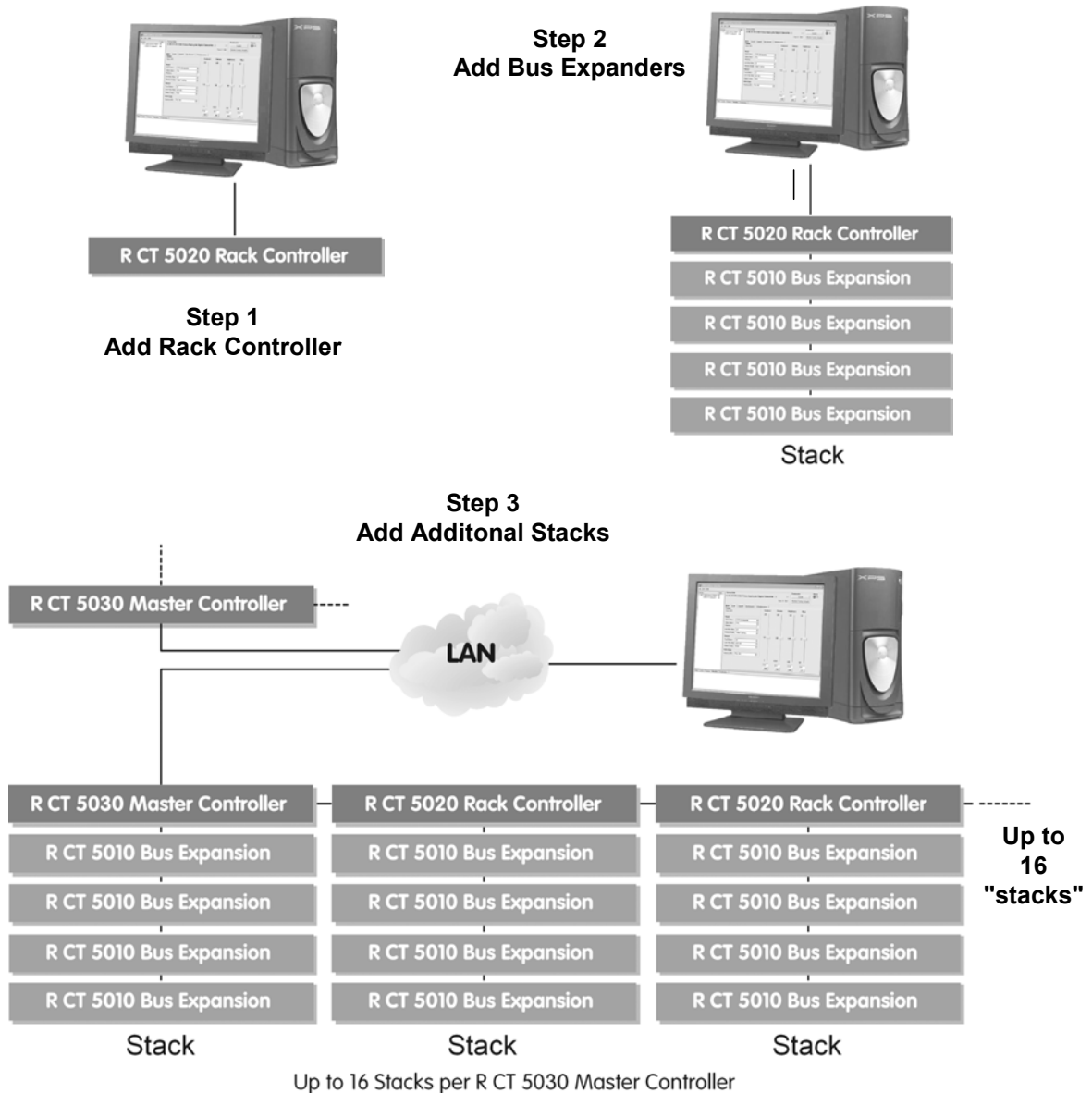
Expansion will involve adding R CT 5010 Bus Expanders and R CT 5030 Master controllers where necessary. No two systems are alike and there are some physical limitations that need to be considered when configuring a system. This is mainly in the area of interconnections that relates directly to the physical location and proximity of the racks.

When moving beyond a single rack there are two choices. Add a R CT 5010 Bus Expander to the second rack or add a R CT 5030 Master Controller.

If the two racks are in very close proximity (mounted on top of each other in the same rack) then the R CT 5010 is the most economical and practical solution for expansion. Up to four additional racks can be daisy-chained onto a single R CT 5010. We use a LYNX proprietary data link between racks in this case.

If the distance between the racks is greater then the R CT 5030 Master Controller needs to be added to the system in the next step. This will allow RS 485 connectivity between the racks, A single Master controller can support up to 15 x R CT 5020 Rack controllers. Total cable length for all connections is 250m

We arrange the system into "control stacks". Which forms a logical expansion path. See below:

Step 2
Add Bus Expanders

R CT 5020 Rack Controller

R CT 5010 Bus Expansion

R CT 5010 Bus Expansion

R CT 5010 Bus Expansion

R CT 5010 Bus Expansion

Stack

R CT 5020 Rack Controller

Step 1
Add Rack Controller

Step 3
Add Additonal Stacks

R CT 5030 Master Controller

LAN

R CT 5030 Master Controller	R CT 5020 Rack Controller	R CT 5020 Rack Controller
R CT 5010 Bus Expansion	R CT 5010 Bus Expansion	R CT 5010 Bus Expansion
R CT 5010 Bus Expansion	R CT 5010 Bus Expansion	R CT 5010 Bus Expansion
R CT 5010 Bus Expansion	R CT 5010 Bus Expansion	R CT 5010 Bus Expansion
R CT 5010 Bus Expansion	R CT 5010 Bus Expansion	R CT 5010 Bus Expansion
Stack	Stack	Stack

Up to 16 "stacks"

Up to 16 Stacks per R CT 5030 Master Controller

System Connections

All external connections to the controller are made through the integral termination panel in the rear of the R FR 5010 and R FR 3010 Rack Frames. See below.
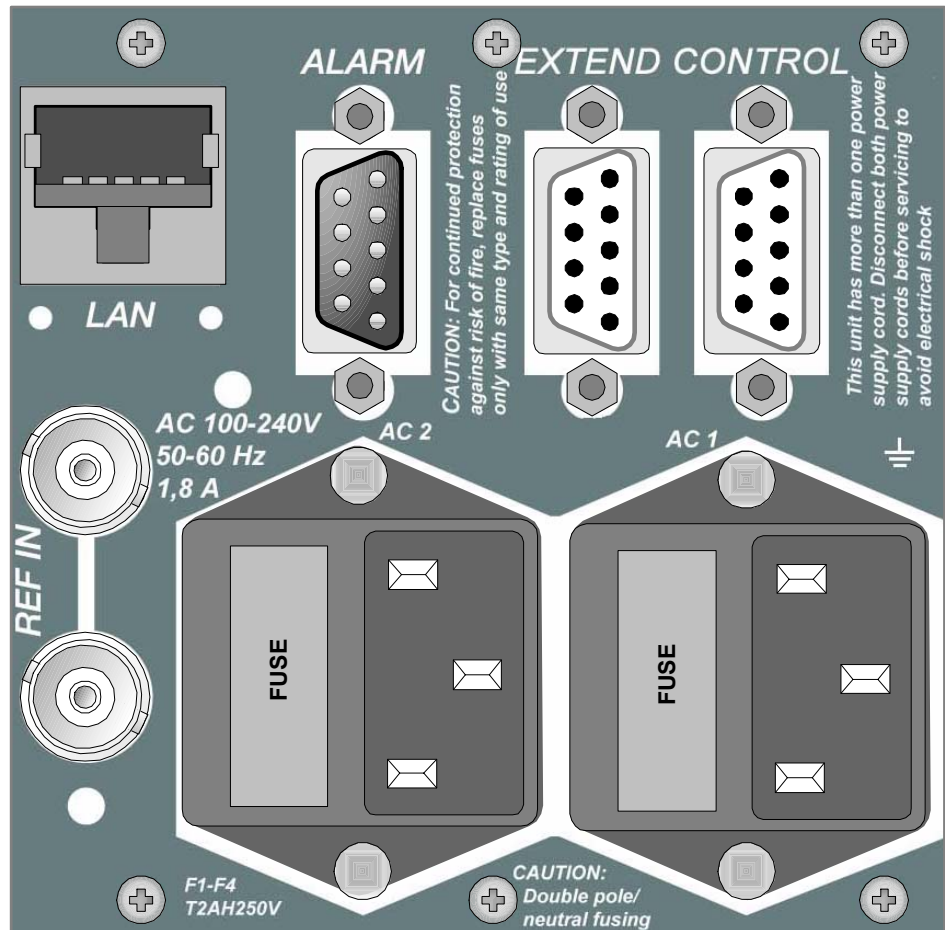
The R CT 5010 makes use of the **EXTEND** connection. The **CONTROL** connection is not active in racks with the R CT 5010 fitted

Note. *More detail is available on all connections available on the termination panel on the R FR 5010 and R FR 3010 reference manuals.*

Configuration Examples

Below we have shown the connections that are used for the various stages of system expansion. This is provided to show examples on how to use and configure the controller's external connectivity.

Single Controller System.

To control a single rack the R CT 5020 is needed. This is the first stage in adding control to a system and simply involves connecting the **CONTROL** port to the serial port of the PC running the LYNX Control system software application.
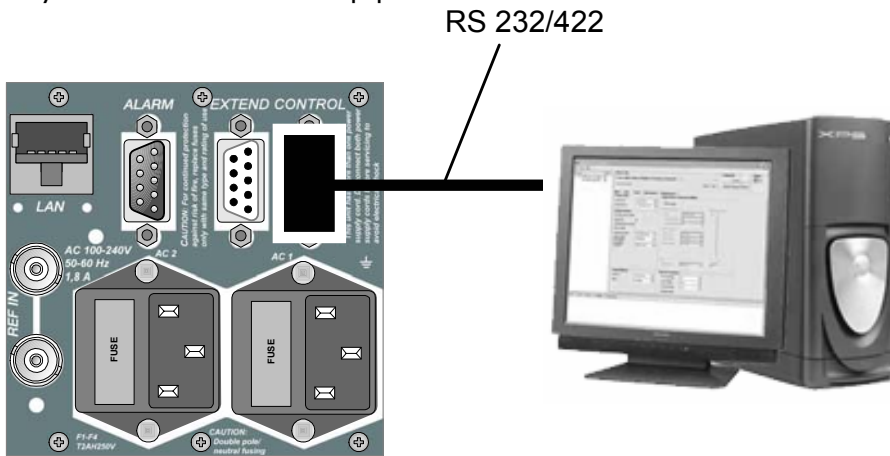

Note. The connection is a RS 232 connection that is limited in length (3m max). If greater distances are required between the host rack and PC, then the controller port should be configured to RS 422* and a RS 422 to RS 232 converter placed near the PC (not supplied)

* *Please refer to the switch settings section of the R CT 5020 manual for details on configuring the serial port.*

R CT 5010 used with R CT 5020

The next step in expanding the control system beyond a single rack is to add the R CT 5010 Bus Expander to the second rack. This is the most economical solution.

Host Rack with RCT 5020

RS 232/422
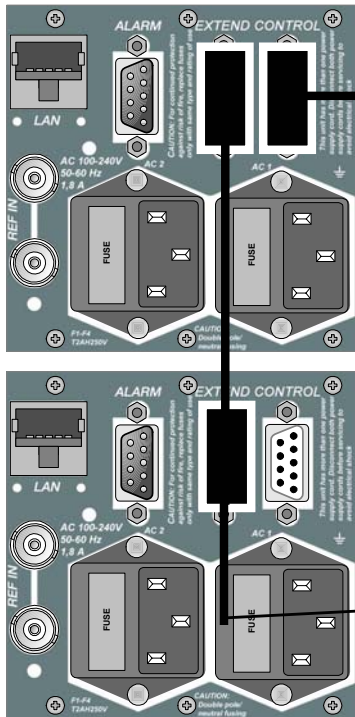
Note. The interface used to interconnect racks using the "Extend" connection is a proprietary interface. Please refer to the R FR 5010 or R FR 3010 Manuals for connection details.

Note. Up to 4 racks with R CT 5010 can be added by simply daisy chain (parallel) connection of the Extend connection to each rack.
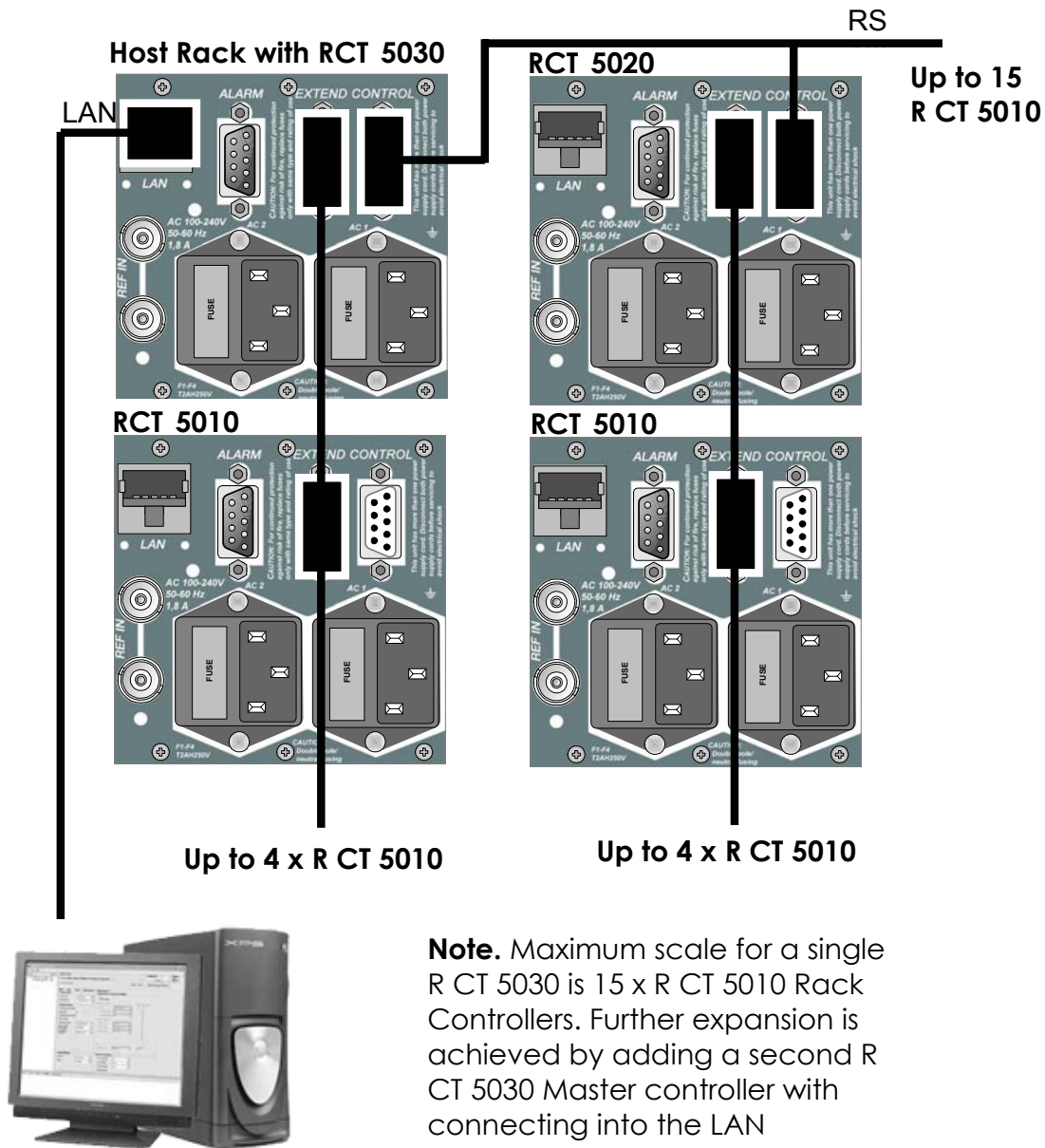
Expansion with RCT 5010

When using the R CT 5010 is it necessary to have the racks in very close proximity [preferably stacked on top of each other in the same 19" rack] as the max length of the cable to interconnect the racks is very limited. (1.5m) If larger distances are required between racks then the use of a R CT 50230 Master controller and multiple R CT 5010 Rack controllers is recommended.

Note. *The R CT 5020 needs to be configured to work with the R CT 5010 Bus Expander Please refer to the R CT 5020 manual for details.*

R CT 5010 used with R CT 5030

To expand the system beyond the five racks possible in one "stack" using R CT 5010 Bus Expanders it is necessary to add a R CT 5030 Master Controller to the system.

RS

Host Rack with RCT 5030

RCT 5020

Up to 15 R CT 5010

LAN

RCT 5010

RCT 5010

Up to 4 x R CT 5010

Up to 4 x R CT 5010

Note. Maximum scale for a single R CT 5030 is 15 x R CT 5010 Rack Controllers. Further expansion is achieved by adding a second R CT 5030 Master controller with connecting into the LAN

Note Please refer to the R FR 3010 or R FR 5010 rack frame manuals for cable wiring information.

Installation

Caution

The CardModule is shipped in a protective anti-static bag. Please take suitable precautions to avoid static discharge onto any part of the PCB or components when handling module or serious damage could result.

The R FR 5010 Card frame and the R FR 3010 Card frames both have a slot configured for the R CT 5010 Controller and the card is simply plugged in where shown.

Note. The RCT 5010 supports hot swapping so there is no need to remove power from the system to install the card.

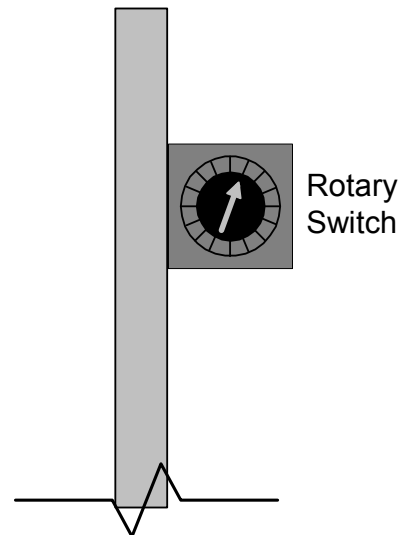| R FR 5010 Controller	R FR 5010 Controller
R FR 3010 Rack Frame	**R FR 5010 Rack Frame**
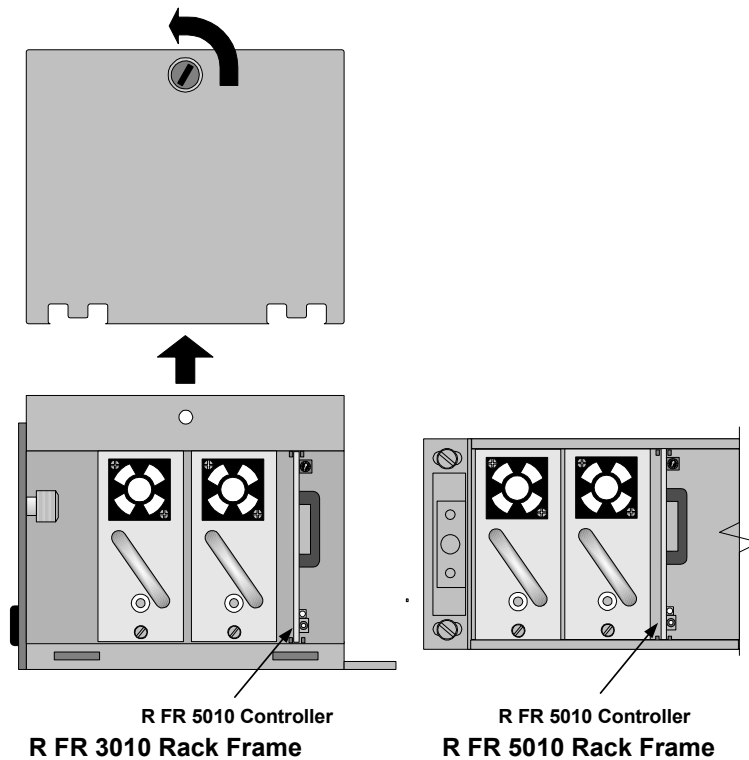
Settings and Control

The only switch which need to be set on the R CT 5010 controller is a small rotary switch located on the top edge of the PCB

Rotary Switch Function

There is a small 16 position rotary switch located at the top of the PCB. This is used to select the controller's physical address. it is important for each RCT 5010 controller in a single stack to have a unique address. Switch is set with a small flat screwdriver.

Rotary Switch

**!** **IMPORTANT.** Each RCT 5020 in a system must have a unique physical address.

Note. Although the switch has 16 positions only setting 1,2,3 and 4 are valid settings *(as a maximum of four R CT 5010 controllers can be used in one stack)* Please ensure one of the valid addresses is selected. (0 is not a valid address)

Factory Preset Condition

The R CT 5010 is delivered preset for address 1.

Alarm/LED Status Indicators

The R CT 5010 module has a single status indicator on the lower edge of the PCB
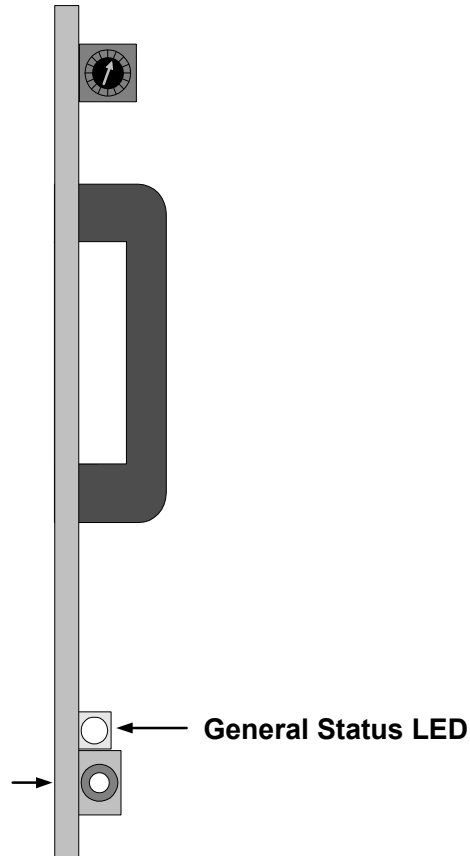
General Status LED

General Status LED

There is single tri-color general status LED used to indicate the general status of the rack and the installed modules.

LED Color	Indication
Green	Indicates normal operation
Yellow	Reserved for future use
Red	Reserved for future use

Controller Removal

The R CT 5010 Controller supports hot swapping. There is no need to remove power from the rack to exchange the controller **(We recommend you observe standard precautions to prevent static discharge onto the PCB while handling the unit as this may result in damage)**

Removal and insertion of the controller will have no effect on the normal operation of the installed CardModules, these will operate as previously configured before controller removal, and will resume this mode of operation when a new (and different) controller is installed in its place. All configuration settings are stored in the individual module flash ram storage.

While the rack will operate normally, naturally control of the rack will not be possible when the controller is removed. Any additional R CT 5010 controllers connected in the "stack" will operate normally if one R CT 5010 is removed.

NOTE *If hot swapping an R CT 5010 with a new unit we suggest you check and set the address using on the new unit before installation to ensure a problem free exchange.*

When inserting the new R CT 5010 it will automatically initialize and start running. After a few seconds the control software will detect the presence of the new controller and all modules attached will be accessible from the control system.

LYNX Control Software

The LYNX Control software is supplied as part of the R CT 5020 or R CT 5030 controller options. The R CT 5010 appears as an additional controller in the folder tree in the central control system. For details on the control system software operation and use please refer to the R CT 5020 or R CT 5030 Reference manuals.

Specifications *(R CT 5010)*

Electrical Specifications	
Operating Voltage	+ 5VDC
Power Consumption	Approx 3.0VA
Safety	IEC 60950/ EN 60950/VDE 0805
Mechanical	
Size	283mm x 78mm
Weight	Card module 120g
Ambient	
Temperature	5°C to 40°C Maintaining specifications
Humidity	Max 90% non condensing
Supplied Accessories	
Documentation	R CT 5010 Reference Manual

Parts List

Due to the very dense design and miniature surface mount technology the module is not field serviceable. The information for a replacement assembly is below.

R CT 5010 CardModule

Description	Bus Expander
Model Number	R CT 5010
Part Number	6.155.003.250

Service

If you are experiencing problems, or have questions concerning your R CT 5010 CardModule please contact your local distributor for assistance.

We offer a fixed cost service exchange program for defective Series 5000 CardModules out of Warranty. Please contact your distributor or check our web site for details on this program.

More detailed information and product updates may be available on our web site:

www.lynx-technik.com

You will also find links to contact us directly for assistance.

Contact Information

Please contact your local distributor; this is your local and fastest method for obtaining support and sales information.

LYNX Technik can be contacted directly using the information below.

Address	LYNX Technik AG Brunnenweg 3 D-64331 Weiterstadt Germany.
Phone	+ 49 (0) 6150 1817 0
Fax	+ 49 (0) 6150 1817 10
Website	www.lynx-technik.com
E-Mail	info@lynx-technik.com

LYNX Technik manufactures a complete range of high quality modular products for broadcast and Professional markets, please contact your local representative or visit our web site for more product information.

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Notes