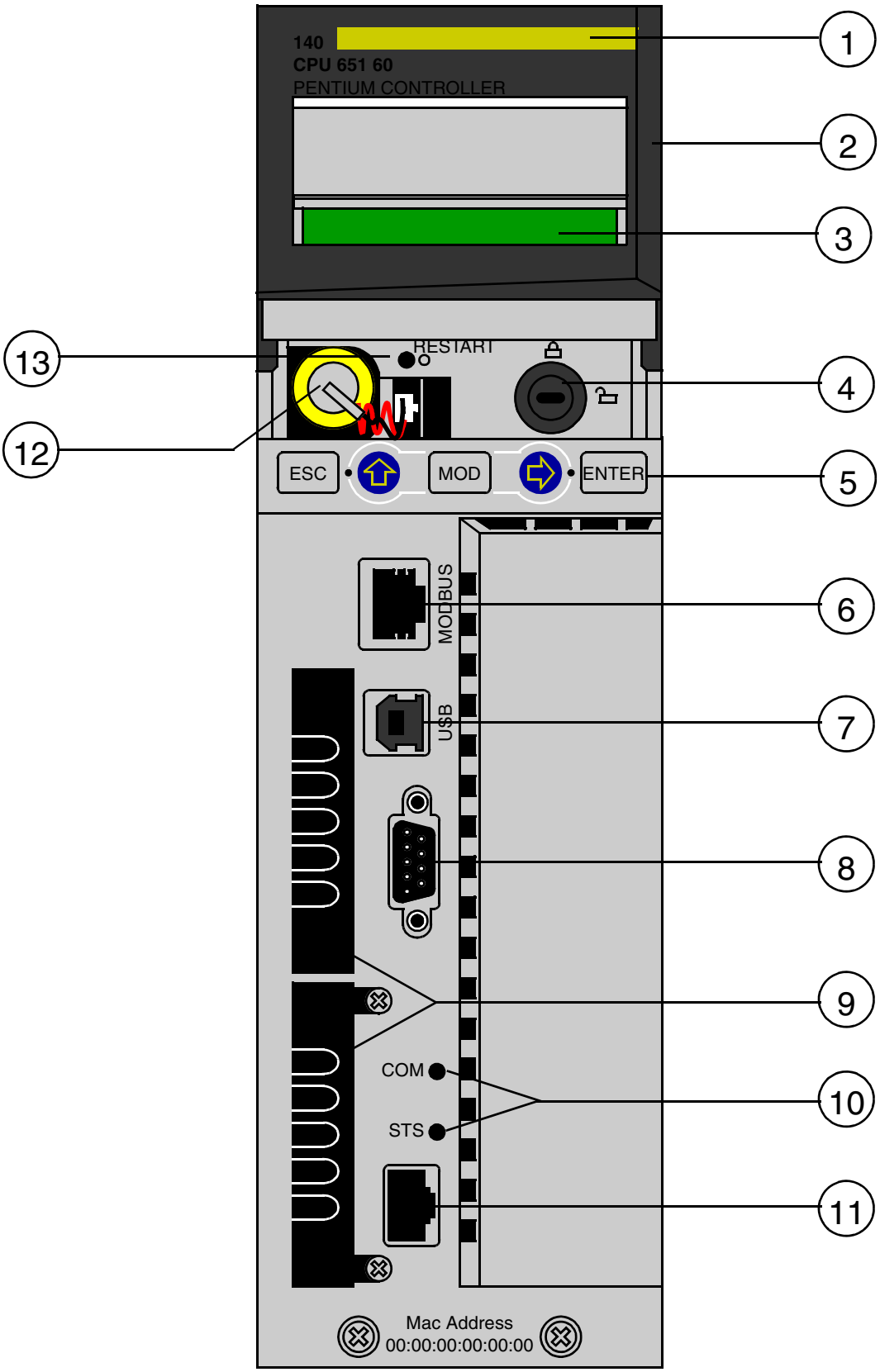
At a Glance

140 CPU 65• •• are Quantum standard CPUs and 140 CPU 67• •• are Quantum Hot Standby CPUs (HSBY).

This minibook is the guide you through the features of these powerful CPUs and to help you understand the operation of the built-in LCD display and control panel.

This minibook provides simple instructions for the use of the LCD panel and the functions that can be performed with it.

Physical Presentation



Legend

1 Model Number, Module Description, Color Code

2 Lens Cover (open)

3 LCD Display (here covered by the Lens Cover)

4 Key Switch

5 Keypad

6 Modbus port

7 USB port

8 Modbus Plus port

9 PCMCIA Slots (Type II, Type III) (depends on CPU reference)

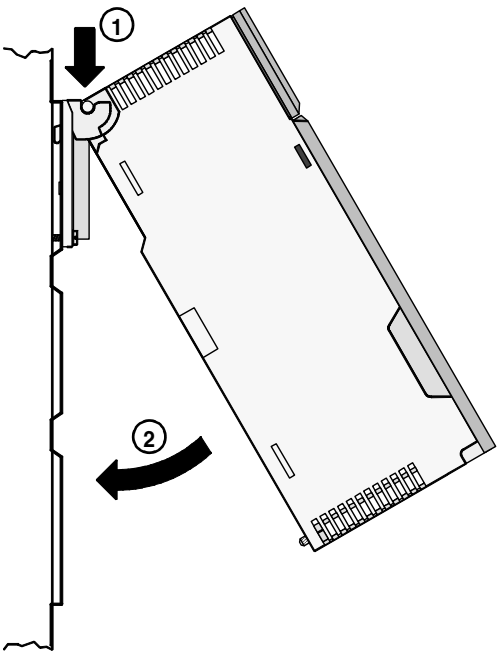
10 Indicators for Ethernet communication

11 Ethernet port (Fiber communication port for HSBY CPUs)

12 Battery

13 Reset Button

Mounting



Mounting the Module onto the backplane

1. Hang the module up
2. Screw the module to the backplane

Controls and Displays

Lens Cover

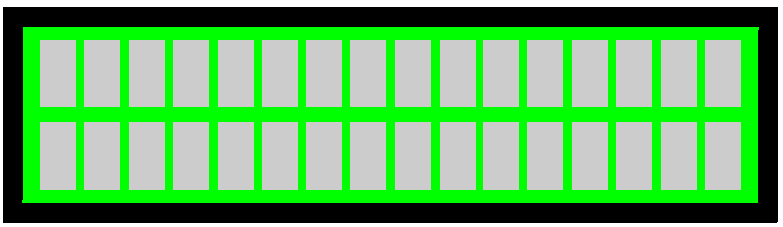
The protective lens cover can be opened by sliding it upwards.
With the lens cover open you have access to the following items:

- key switch
- battery
- reset button

LCD Display

The CPU has a standard 2 line by 16 character LCD display with changeable backlight state and contrast. The backlight handling is entirely automated to save the life of the LEDs in the LCD.
The backlight turns on when the keypad driver detects a key press, the key switch state is changed, or when an error message is displayed on the LCD. The backlight automatically turns off after 5 minutes if there has been no key switch or keypad activity during that time period. The backlight remains on for error messages as long as the error message is displayed on the LCD screen.

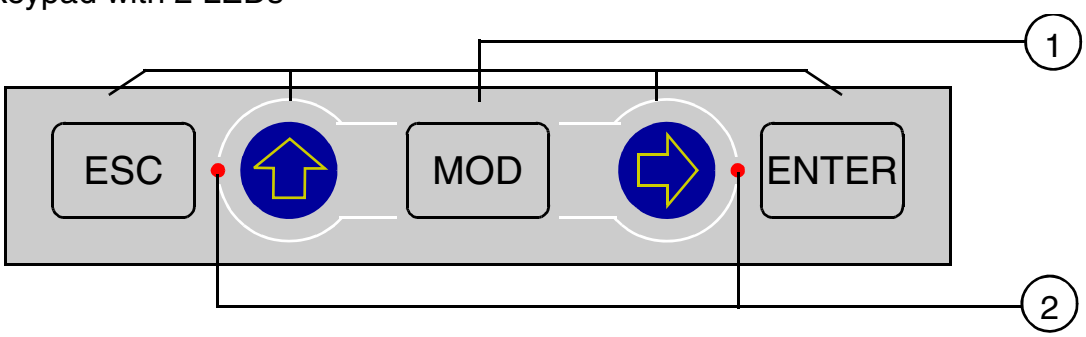
2 Line by 16 character LCD



Keypad

The keypad has five keys that are mapped to hardware addresses. Each of the two arrow keys includes an LED.

5 key keypad with 2 LEDs



Legend

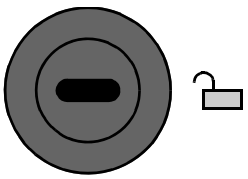
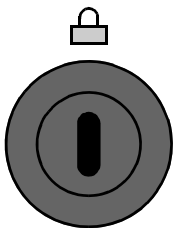
1 keys

2 LEDs

Key Switch

The key switch is a security feature and a memory protection switch. The key switch has two positions: Locked and Unlocked. The key switch is only read and deciphered by the PLC OS (Executive) portion of the firmware and not by the OS Loader portion. The Quantum CPU has a set of system menus, which enable the operator to perform PLC operations (that is, Start PLC, Stop PLC) and display module parameters (that is, communications parameters).

PLC operations depending on the key position

Key position	**PLC operation**
unlocked 	• all system menu operations are able to be invoked and all changeable module parameters are able to be modified by the operator via the LCD and keypad. • memory protection is off
locked 	• no system menu operations are able to be invoked and all module parameters are read only. • memory protection is ON
Switching the key switch position from locked to unlocked or vice versa turns on the LCD backlight.	

Indicators (LEDs)

The following table shows the description for the LED indicators of the different CPUs::

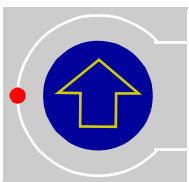
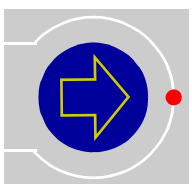
<table>
<tr><th rowspan="2">LED (Color)</th><th colspan="3">Indication</th></tr>
<tr><th colspan="2">140 CPU 65• ••</th><th>140 CPU 67• •• (HSBY)</th></tr>
<tr><td>COM (Yellow)</td><td colspan="2">Controlled by the Coprocessor hardware
• Indicates Ethernet activity</td><td>Controlled by the Coprocessor hardware
• Indicates Primary or Standby activity</td></tr>
<tr><td rowspan="11">STS (Yellow)</td><td colspan="2">Controlled by the Coprocessor software</td><td rowspan="11">Controlled by the Coprocessor firmware
• Blinking
- system is redundant and data are exchanged from the Primary to Standby controller
• Steady on
- system not redundant
- Copro booting from power-on to end of self-tests
• Steady off
- Copro auto tests were not successfull</td></tr>
<tr><td>ON</td><td>Normal</td></tr>
<tr><td>OFF</td><td>Copro auto tests unsuccessful. Possible hardware problem.</td></tr>
<tr><td colspan="2">Flashing:</td></tr>
<tr><td>1 Flash</td><td>Configuration in progress. Temporary situation.</td></tr>
<tr><td>2 Flashes</td><td>Invalid MAC address</td></tr>
<tr><td>3 Flashes</td><td>Link not connected</td></tr>
<tr><td>4 Flashes</td><td>Duplicate IP address. Module is set to its default IP adress.</td></tr>
<tr><td>5 Flashes</td><td>Waiting for IP address from adress server</td></tr>
<tr><td>6 Flashes</td><td>Invalid IP address. Module is set to its default IP address.</td></tr>
<tr><td>7 Flashes</td><td>Firmware incompatibility between PLC OS and Copro firmware</td></tr>
</table>

Reset Button

When pressed, this button forces a cold start of the PLC.

Keypad Operation

Table of function:

Key	Function	
ESC	To cancel an entry, suspend or stop an action in progress To display the preceding screens successively (move up the menu tree)	
ENTER	To confirm a selection or an entry	
MOD	To set a field on the display into modify mode	
	LED: on	key active • To scroll through menu options • To scroll through modify mode field options
	LED: flashing	key active: The modify mode field can be scrolled.
	LED: off	key inactive: No menu options and no field options.
	LED: on	key active • To move around in a screen, field to field • To go to the submenu
	LED: flashing	key active: Used to move digit to digit in a modify mode field.
	LED: off	key inactive, there is no: • submenu for menu option • scrolling around a screen • scrolling around a field

Backlight

Pressing a key turns on the LCD backlight (if it was off). When there is no activity from the keypad for 30 minutes, the default screen returns to the display. When the user presses the **ESC** key and the LCD backlight was off, the LCD backlight turns on and the default screen stays as the displayed screen.
If at any time the executive detects an error in the CPU, it displays an error message to the LCD and the LCD backlight turns on until the error condition disappears.

Modbus port

Overview

In front of the CPU the Modbus port is of type 8-pin RJ45.
The network topology depends on protocol:

- for RS-232, it is a point to point topology
- for RS-485, it is a bus topology with processor as master

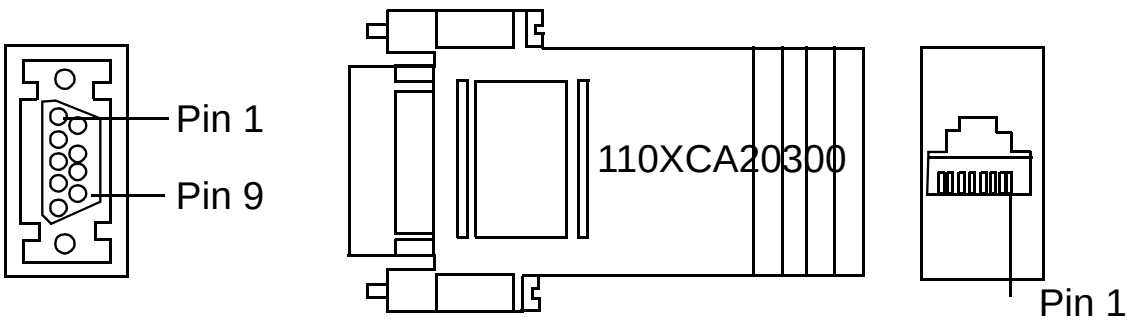
Connections on RJ45 are different, according to selected protocol. In configuration window the protocol is selected in the **Port Modbus** tab.

9-pin Adapter

To connect PC-AT computers that have a 9-pin RS-232 port to the 8-pin RJ45 Modbus port on the CPU, you must connect the 110 XCA 020 300 adapter (9-pin/RJ45) on the PC with the straight 110 XCA 28 202 cable (8-pin RJ45 to 8-pin RJ45).

Pinouts Figures

The following figures show the 9-pin adapter 110 XCA 020 300:



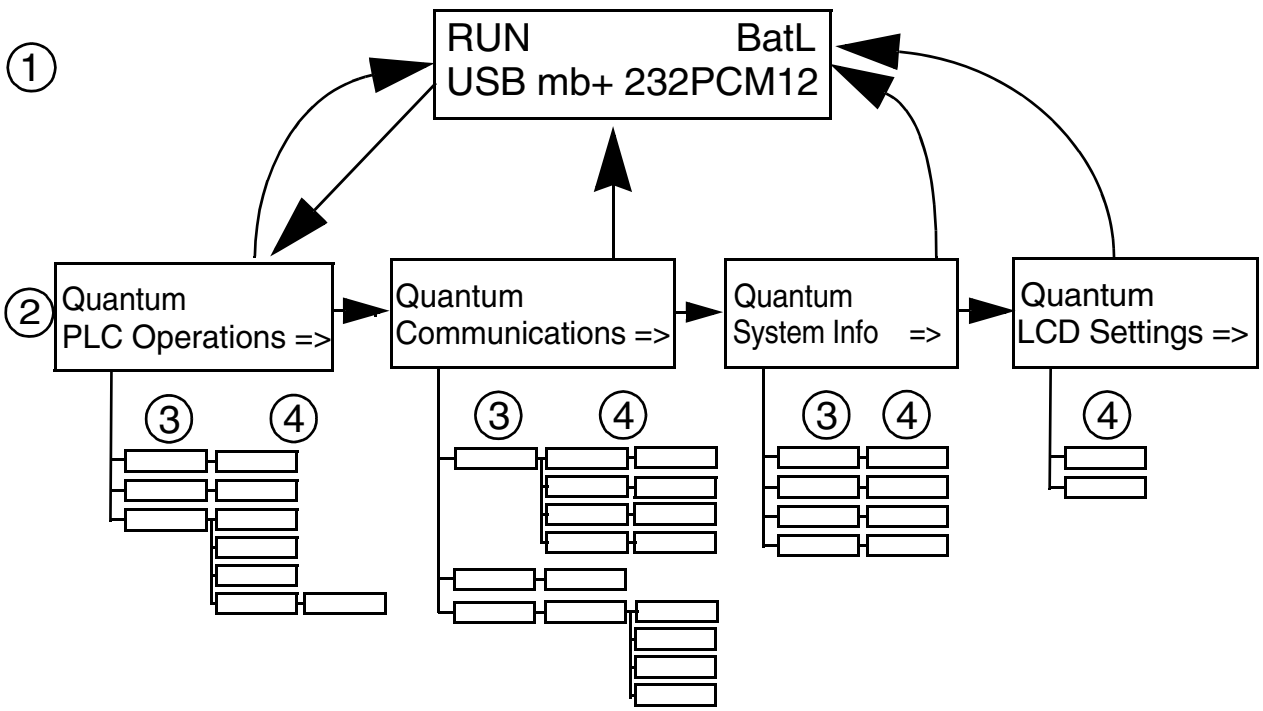
Screen Menu Structure

Overview

The LCD and keypad has a controller status screen as the default screen. From the default screen the top system menus are accessible. All system submenu screens use the top line as a menu title line and the second line as the menu option line so that there is only one menu option on the screen at any time.
For detailed information about the submenus and subscreens see the following system menus:

- **PLC Operations** menu
- **Communications** menu
- **System Info** menu
- **LCD Settings** menu

This diagram shows the Screen menu structure:



Legend:

1 Default screen

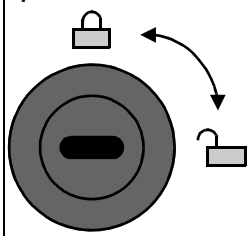
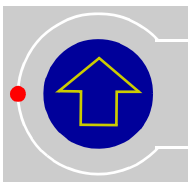
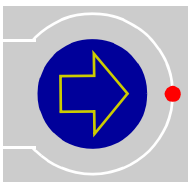
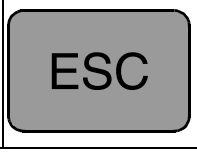
2 System menus

3 Submenus

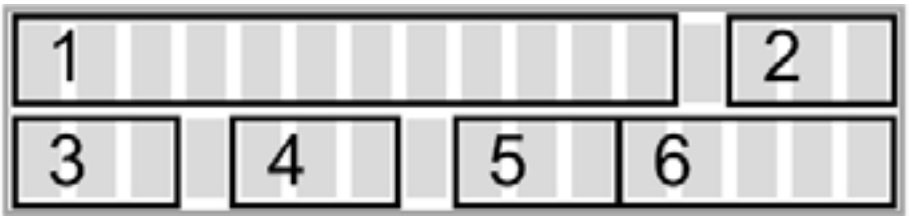
4 Subscreens

Screen Operation

Screen operations within the menus:

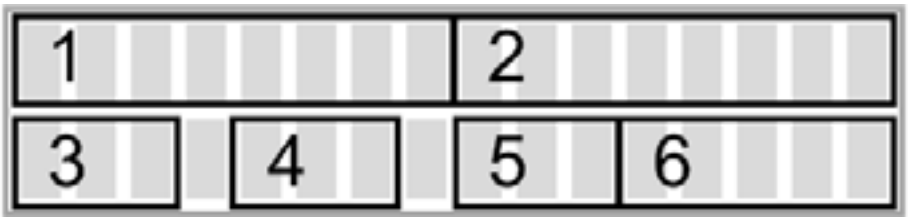
Step	Action
1	To access the screens, ensure that the key switch is in the unlocked position. 
2	To step down to a lower menu operate one of the following keys   
3	To return to the previous menu press the following key 

140 CPU 65• •• Default Screen



Field		Display	Description
1	CPU State	RUN	Application program is running
		STOP	Application program is not running
		No conf	Processor has no application program
		HALT	Detected state error
2	Battery State	BatL	Blinking indicates low battery
3	USB State	USB	Blinking indicates that port has activity
4	Modbus Plus State	MB+	Indicates Modbus Plus activity
		mb+	No activity
		Dup	Duplicate MB+ address
		ERR	Detected Modbus communications error
		INI	Initial Network Search
5	Modbus State	232	Serial port activity for RS-232
		485	Serial port activity for RS-485
6	PCMCIA State	PCM1 (PCM 2)	Indicates the card in slot 1 (slot 2) is being accessed Status displayed indicates the health of the battery: • Steady = battery is OK • Flashing = battery is low(1)
(1) Only for green PCMCIAs (version <04)). With blue PCMCIAs (version >= 04), when main battery is low there is no flash.			

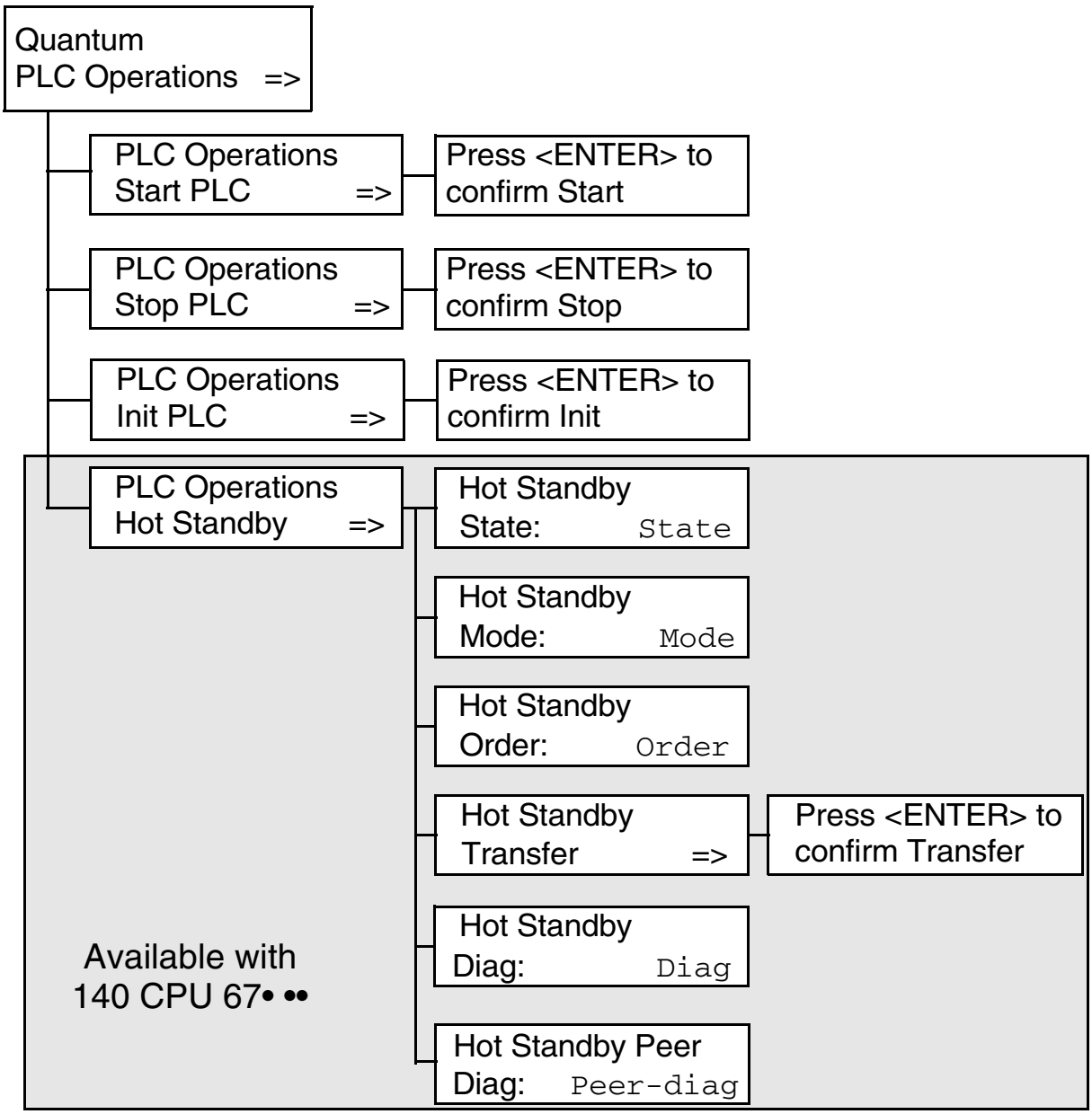
140 CPU 67• •• Default Screen



Field		Display	Description
1	Local CPU State	RUN PRIM	RUN as Primary CPU processor
		RUN STBY	RUN as Standby CPU processor
		RUN OFFL	RUN Offline
		STOP OFF	Application program is not running
		NO CONF	Processor has no application program
		HALT	Detected state error
2	Battery State and Peer CPU State	Bat Low	Indicates health of local battery: • Steady = battery is low • No message = Battery is OK
		Note: Following Peer CPU States are displayed only if battery is OK.	
		/run pri	Peer CPU RUN as Primary CPU processor
		/run stb	Peer CPU RUN as Standby CPU processor
		/run off	Peer CPU RUN Offline
		/stp off	Peer CPU Application program is not running
		/no conf	Peer CPU processor has no application program
		/ halt	Detected Peer CPU state error
		/ unknown	Peer CPU not connected
		/offline	Old CPU version, Off Line
3	USB State	USB	Blinking indicates that USB port has activity

Field		Display	Description
4	Modbus Plus State	MB+	Indicates Modbus Plus activity
		mb+	No activity
		Dup	Duplicate MB+ address
		ERR	Detected Modbus communications error
		INI	Initial Network Search
5	Modbus State	232	Serial port activity for RS-232
		485	Serial port activity for RS-485
6	PCMCIA State	PCM1 (PCM 2)	Indicates the card in slot 1(slot 2) is being accessed Status displayed indicates the health of the battery: • Steady = battery is OK • Flashing = battery is low(1)
(1) Only for green PCMCIAs (version <04)). With blue PCMCIAs (version >= 04), when main battery is low there is no flash.			

PLC Operations Menu



Submenus: Start PLC, Stop PLC and Init PLC

Subscreen	Description
Press <ENTER> to confirm Start	pressing **ENTER** key let the Controller start
Press <ENTER> to confirm Stop	pressing **ENTER** key let the Controller stop
Press <ENTER> to confirm Init	pressing **ENTER** key initializes the Controller

Submenu: Hot Standby (available with 140 CPU 67• ••)

Subscreen Hot Standby State		
Field	**Display(1)**	**Description**
State	Primary	Controller serves as primary unit
	Standby	Controller serves as standby unit
	Off Line	Controller is neither primary nor standby unit
(1) Read only.		

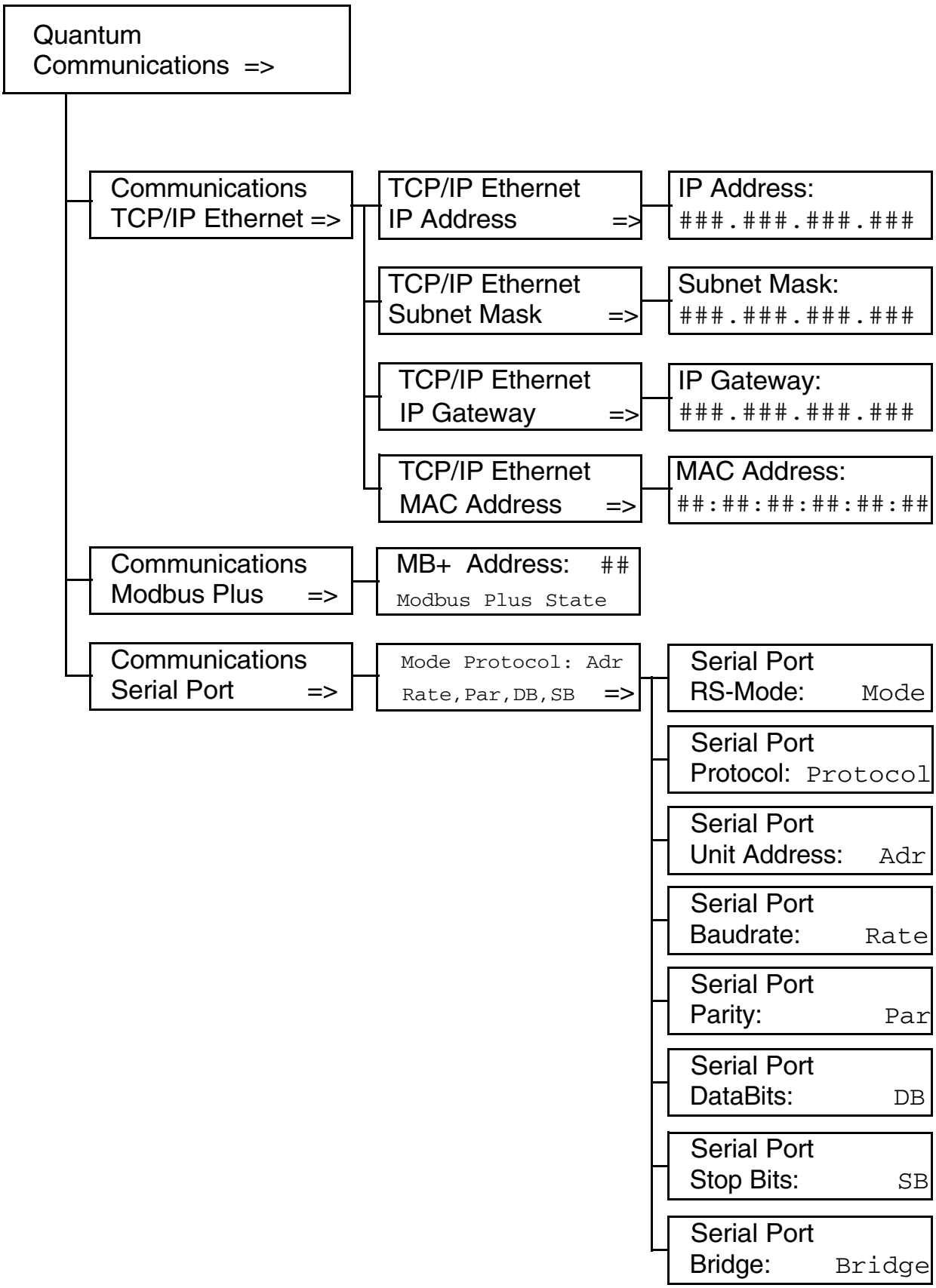
Subscreen Hot Standby Mode			
Field	**Display/Option(1)**		**Description**
Mode	Run	STS steady	Controller is active and is either serving as primary controller or is capable of taking over the primary role if needed
		STS flashing	Controller is transferring/updating and when the transfer is done, **Run** remains on
	Off Line	STS steady	Controller is taken out of service without stopping it or disconnecting it from power If the controller is the primary unit when the **Mode** state is changed to **Off Line**, control switches to the standby unit. If the standby controller is taken **Off Line**, the primary unit continues to operate without a backup
		STS flashing	Controller is transferring/updating and when the transfer is done, Off Line remains on
(1) Option modifiable only if the key switch is in the unlocked position.			

Subscreen Hot Standby Order		
Field	**Display/Option**	**Description**
Order	oooooo	At first start up on the CPU (A/B assignment never done)
	A	Hot Standby Power Order **Note:** To change the A/B order the CPU must be in the **STOP** mode and key switch in unlocked position.
	B	

Subscreen Hot Standby Transfer(1)	
Field	**Description**
Press <ENTER> to confirm Transfer	Pressing the **ENTER** key confirms the transfer. The transfer initiates the request of a program update from the primary controller. Pressing any other key cancels the transfer initiation and returns to the **Hot Standby Transfer** menu option.
(1) Option enabled, if the key switch is in the unlocked position.	

Subscreens Hot Standby Diag and Hot Standby Peer Diag		
Field	**Display(1)**	**Description**
Diag	power up	No message: PLC has just started
	Halt	System in halt mode
	rio fails	Detected error reported by S908 RIO head
	s908 CRP	Detected error on S908 CRP
	erio fails	Detected error reported by Ethernet RIO head
	erio CRP	Detected error on Ethernet CRP
	hsby fails	Detected error reported by optical link
	stop	Stop command sent
	off keypad	Offline command entered on keypad
	off %sw60	Offline command set in command register
	Take over	Standby CPU switched to Primary CPU mode
	run	Run command sent
	plug & run	Sun-link operational and Standby CPU is started
	off appli	Offline due to application mismatch
	off vers	Offline due to OS version mismatch
	off rio	Offline due to S908 Remote I/O error
	Copro fail	Offline due to Copro error
	crp fault	S908 RIO head switches to kernel mode
	copro err	Copro OS version not compatible
Peer-diag	Refer to the field **Diag** for displayed informations.	
(1) Read only and only the last logged diagnostic is displayed.		

Communications Menu



Submenu: TCP/IP Ethernet

Subscreen	Field	Option	Description
IP Address	###.###.###.###(1)(2)	decimal numbers	to enter a valid IP address
Subnet Mask	###.###.###.###(1)(2)	decimal numbers	to enter a valid Subnet Mask address
IP Gateway	###.###.###.###(1)(2)	decimal numbers	to enter a valid Ethernet IP Gateway address
MAC Address	##:##:##:##:##:##(3)	hexadecimal numbers	to show the MAC (Medium Access Control) address
(1) Parameters can be modified only if no application has been downloaded (in **NO CONF** state). **(2)** when a new PLC application has been downloaded, the Ethernet address on the screen is only updated after accessing the highest level of the menu structure. **(3)** Read only.			

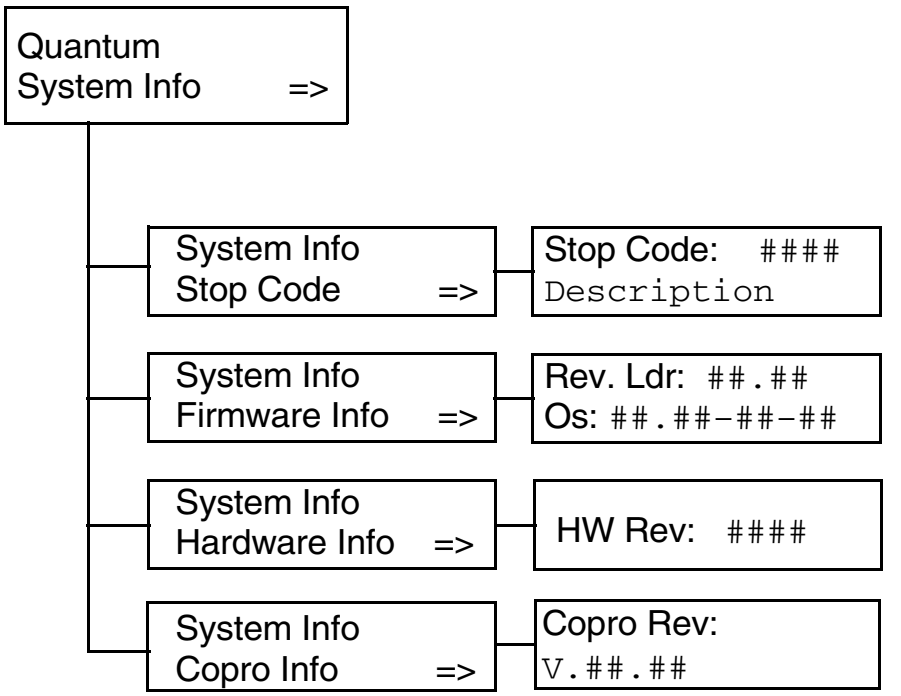
Submenu: Modbus Plus

Field	Display/Option	Description
MB+ Address: ##(1)	1-64	to enter a valid Modbus Plus address
Modbus Plus State	Monitor Link	Modbus Plus State
	Normal Link	
	Sole Station	
	Duplicate address	
	No Token	
(1) Modifiable only if the key switch is in the unlocked position.		

Submenu: Serial Port

Subscreen	Field(1)	Display/Option	Description
RS-Mode	Mode	232	RS mode
		485	
Protocol	Protocol	MB - ASCII	Protocols available
		MB - RTU	
Unit Address	Adr	1-247	Unit address
		for Modbus Switchover Primary CPU 1- 119 Standby CPU 129 - 247	
Baudrate	Rate	50, 75, 110, 134.5, 150, 300, 600, 1200, 1800, 2400, 3600, 4800, 7200, 9600, 19200 Bits/s	Baud rate
Parity	Par	None	Parity
		Odd	
		Even	
DataBits	DB	7,8	Databits, if Protocol is Modbus then RTU-8 or ASCII-7
Stop Bits	SB	1,2	Stop bits
Bridge	Bridge	Enable	Network connection between Modbus and Modbus Plus
		Disable	
(1) All fields are modifiable only if the key switch is in the unlocked position.			

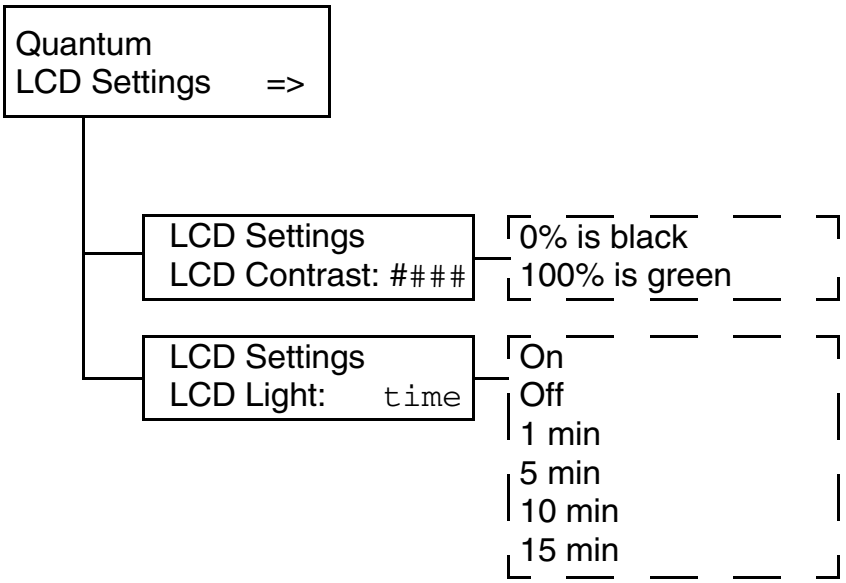
System Info Menu



Submenus: Stop Code, Firmware Info, Hardware Info and Copro Info:

Subscreen	**Field**	**Display(1)**	**Description**
Stop Code	Stop Code	####	Machine stop code
	Description		Description to the machine stop code
Firmware Info	Rev. Ldr	##.##	OS revision
	Os	##.##–##–##	OSLoader revision
Hardware Info	HW Rev	####	Hardware revision
Copro Info	Copro Rev	V.##.##	Copro revision
(1) Fields are read only.			

LCD Settings Menu



Subscreens LCD Contrast and LCD Light:

Subscreen	Field	Option	Description
LCD Contrast	####	from 0 to 100%	Use the arrow keys to adjust the setting. • Up arrow increases percent (brighter) • Down arrow decreases percent (darker)
LCD Light	time	On	LCD remains on permanently or until changed
		Off	LCD remains off permanently or until changed
		1 min	LCD remains on for one minute
		5 min	LCD remains on for five minutes
		10 min	LCD remains on for ten minutes
		15 min	LCD remains on for fifteen minutes