

7SR21 Non-Directional

7SR22 Directional

Overcurrent Relay

Document Release History

This document is issue 2010/05. The list of revisions up to and including this issue is:

2010/05	Additional Comms module option of (RS485 + IRIG-B) and (RS232 +IRIG-B)
2010/02	Document reformat due to rebrand
2009/09	Third Issue. Software revision 2435H8004/5 R4b-4
2008/07	Second issue. Software revision 2435H80004/5 R3d-3.
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Software Revision History

2009/09	2435H80004/5 R4b-4	CTS-I Supervision. Undercurrent 37G & 37SEF. Vx U/O Voltage. 46BC U/C. Comms Settings. Waveform Storage Settings. Fault Storage Settings. Energy Storage. Trip test function. Local/Remote modes. Settings ranges extended. Protocol changes.
2008/07	2435H80004/5R3d-3	Demand records. Optional DNP3.0 data comms.
2008/03	2435H80004/5R2c-2b	First Release

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Section 1: Introduction

1.1 Relay Menus And Display

All relay fascias contain the same access keys although the fascias may differ in appearance from model to model. The basic menu structure is also the same in all products and consists of four main menus, these being,

Settings Mode - allows the user to view and (if allowed via the settings mode password) change settings in the relay.

Instruments Mode - allows the user to view the relay meters e.g. current, voltage etc.

Fault Data Mode - allows the user to view the type and data of any fault that the relay has detected.

Control Mode - allows the user to control external plant under the relays control for example the CB (if allowed via the control mode password)

The menus can be viewed via the LCD by pressing the access keys as below,

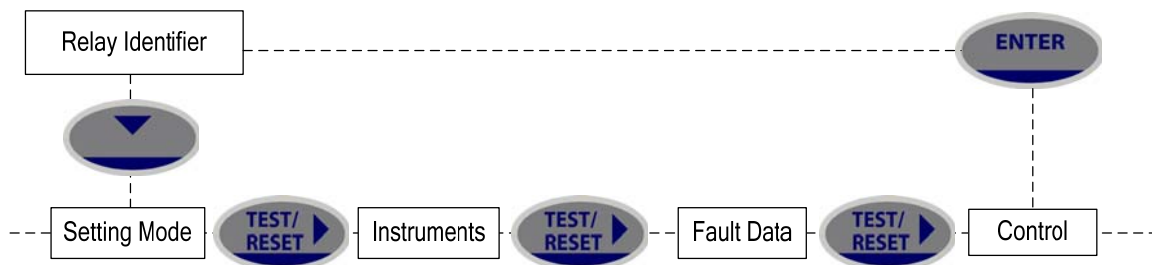


Figure 1.1-1 Menu Navigation

Pressing CANCEL returns to the Identifier screen

LCD Contrast

To change the contrast on the LCD insert a flat nosed screwdriver into the screwhead below the contrast symbol, turning the screwhead left or right decreases and increases the contrast of the LCD.



Figure 1.1-2 Fascia Contrast symbol

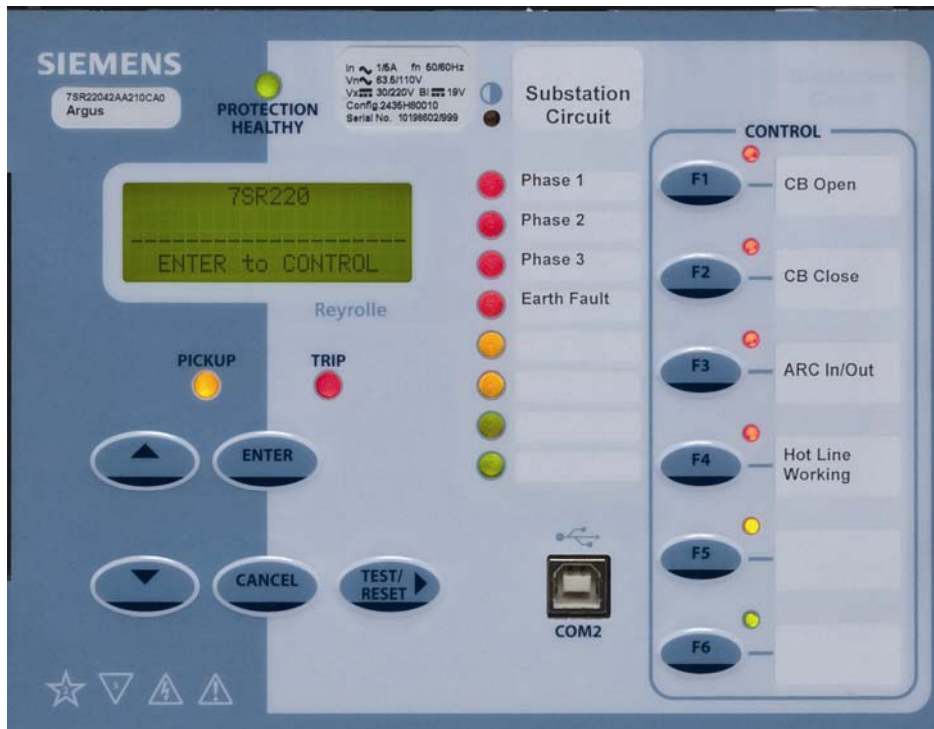


Figure 1.1-3 Fascia of a 7SR21 & 7SR22 relay (Please note fascia may differ from illustration)

1.2 Operation Guide

1.2.1 User Interface Operation

The basic menu structure flow diagram is shown in Figure 1.2-2. This diagram shows the main modes of display: Settings Mode, Instrument Mode, Fault Data Mode and Control Mode.

When the relay leaves the factory all data storage areas are cleared and the settings set to default as specified in settings document.

When the relay is first energised the user is presented with the following message: -

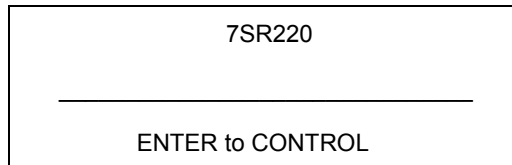


Figure 1.2-1 Relay Identifier Screen

On the factory default setup the relay LCD should display the relay identifier, on each subsequent power-on the screen that was showing before the last power-off will be displayed.

The push-buttons on the fascia are used to display and edit the relay settings via the LCD, to display and activate the control segment of the relay, to display the relays instrumentation and Fault data and to reset the output relays and LED's.

The five push-buttons have the following functions:



Used to navigate the menu structure.



The ENTER push-button is used to initiate and accept setting changes.

When a setting is displayed pressing the ENTER key will enter the edit mode, the setting will flash and can now be changed using the ▲ or ▼ buttons. When the required value is displayed the ENTER button is pressed again to accept the change.

When an instrument is displayed pressing ENTER will toggle the instruments favourite screen status.



This push-button is used to return the relay display to its initial status or one level up in the menu structure. Pressed repeatedly will return to the Relay Identifier screen. It is also used to reject any alterations to a setting while in the edit mode.



This push-button is used to reset the fault indication on the fascia. When on the Relay Identifier screen it also acts as a lamp test button, when pressed all LEDs will momentarily light up to indicate their correct operation. It is also moves the cursor right ► when navigating through menus and settings.

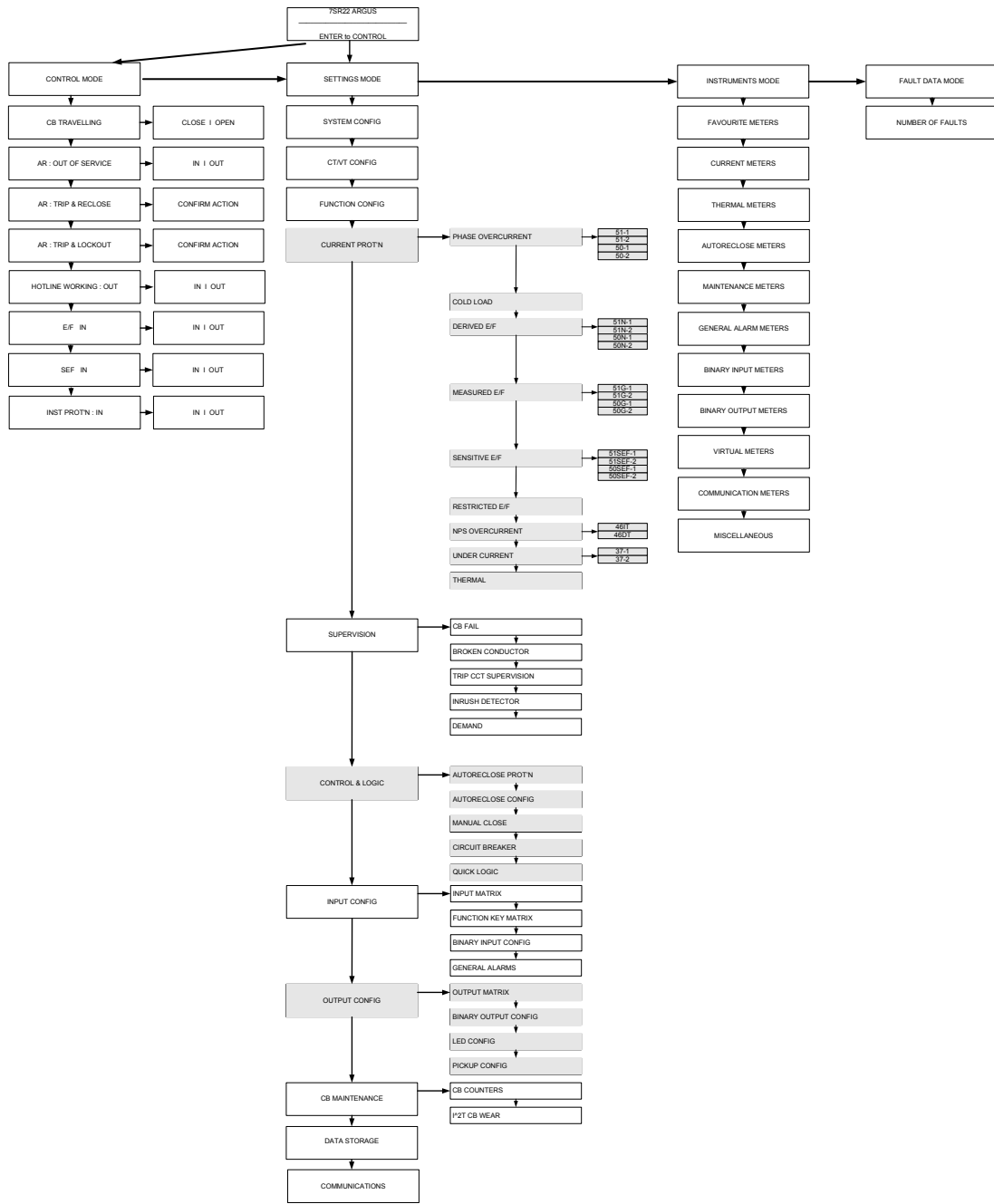


Figure 1.2-1 Typical Menu Structure for 7SR21 relay

(See relative software version appendix for menu structure)

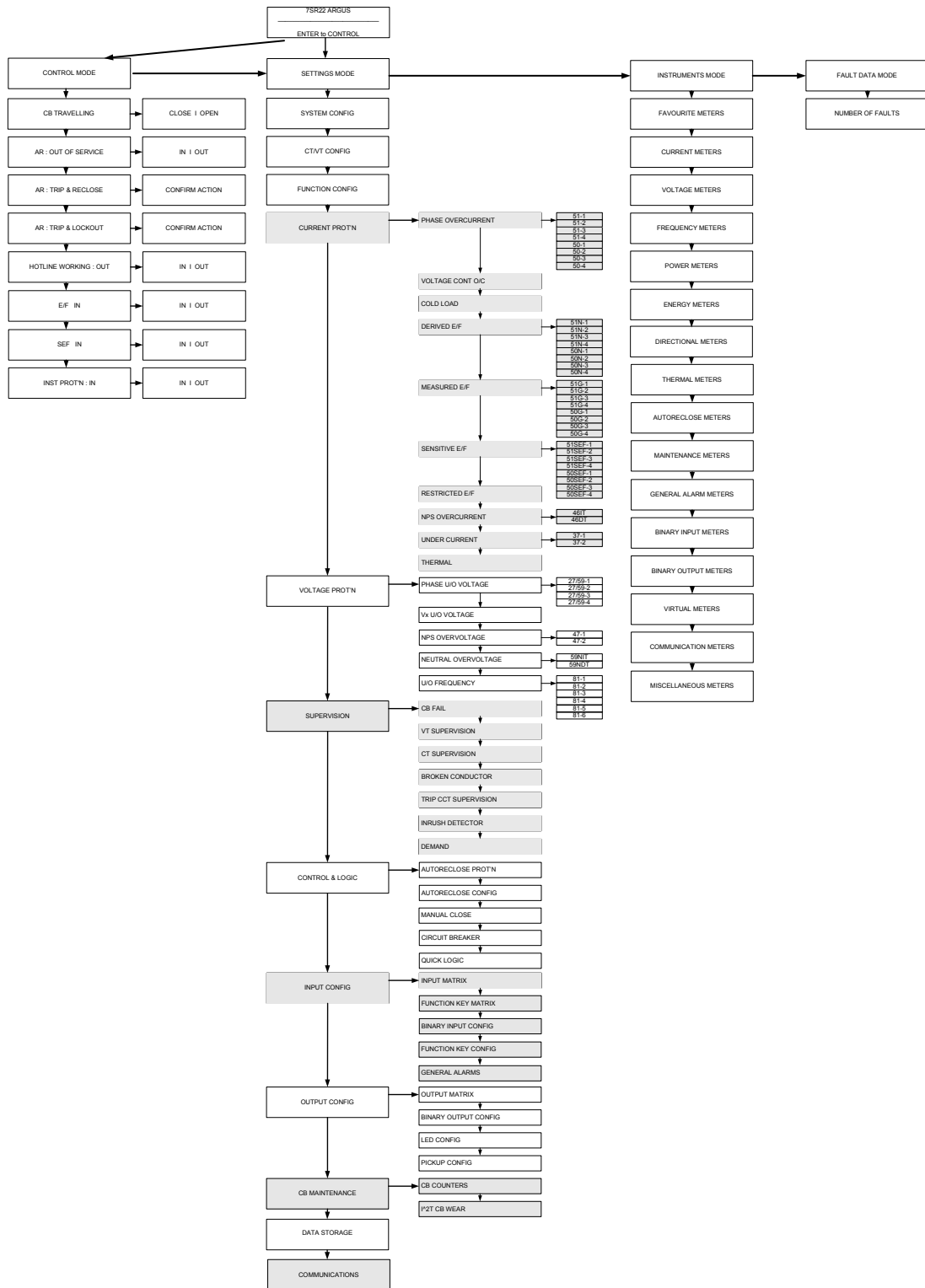


Figure 1.2-2 Typical Menu Structure for 7SR22 relay
 (See relative software version appendix for menu structure)

1.3 Settings Display

The Settings Mode is reached by pressing the READ DOWN ▼ button from the relay identifier screen.

Once the Settings Mode title screen has been located pressing the READ DOWN ▼ button takes the user into the Settings mode sub-menus.

Each sub-menu contains the programmable settings of the relay in separate logical groups. The sub menus are accessed by pressing the TEST/RESET ► button. Pressing the ▼ button will scroll through the settings, after the last setting in each sub menu is reached the next sub menu will be displayed. If a particular sub menu is not required to be viewed then pressing ▼ will move directly to the next one in the list.

While a setting is being displayed on the screen the ENTER button can be pressed to edit the setting value. If the relay is setting password protected the user will be asked to enter the password. If an incorrect password is entered editing will not be permitted. All screens can be viewed even if the password is not known.

While a setting is being edited flashing characters indicate the edit field. Pressing the ▲ or ▼ buttons will display the valid field values. If these buttons are held on, the rate of scrolling will increase.

Once editing is complete pressing the ENTER button stores the new setting into the non-volatile memory. The setting change is effective immediately unless any protection element is operating, in which case the change becomes effective when no elements are operating.

The actual setting ranges and default values for each relay model can be found in the relevant software version appendix to this section of the manual.

1.4 Instruments Mode

The Instrument Mode sub-menu displays key quantities and information to aid with commissioning. The instruments can be viewed by using the ▲, ▼ and TEST/REST buttons.

Note: See relative software version appendix to this section of the manual.

1.5 Fault Data Mode

The Fault Data Mode sub menu lists the time and date of the previous ten protection operations. The stored data about each fault can be viewed by pressing the TEST/RESET ► button. Each record contains data on the operated elements, analogue values and LED flag states at the time of the fault. The data is viewed by scrolling down using the ▼ button.

1.6 Control Mode

This mode provides convenient access to commonly used relay control and test functions. When any of the Control Commands are selected control is initiated by pressing the ENTER button. The TEST/RESET ► button is used to toggle between the available options. The user is prompted to confirm the action, again by pressing the ENTER button, before the command is executed. If the action is not confirmed within a short time the action is automatically cancelled.

Control Mode commands are password protected using the Control Password function

Typical commands available in the Control Mode are: -

- CB: Open / Close
- AR: In Service / Out of Service
- AR: Trip & Reclose
- AR: Trip & Lockout
- Hotline Working: In/Out
- E/F: IN/OUT
- SEF: IN/OUT
- Inst Prot'n: IN/OUT
- Set L Or R: L Or R
- Set Remote: L Or R
- Set Local: L Or R
- Set Service: L Or R

NB: Commands available may differ from those listed above depending on relay variant.

Section 2: Setting the Relay Using Reydisp Evolution

To set the relay using the communication port the user will need the following:-

PC with Reydisp Evolution Installed. (This can be download from our website www.siemens.com/energy and found under the submenu 'Software'). This software requires windows 2000-service pack 4 or above, or windows XP with service pack 2 or above.

2.1 Physical Connection

The relay can be connected to Reydisp Evolution via any of the communication ports on the relay. Suitable communication Interface cable and converters are required depending which port is being used.

2.1.1 Front USB connection

To connect your pc locally via the front USB port.

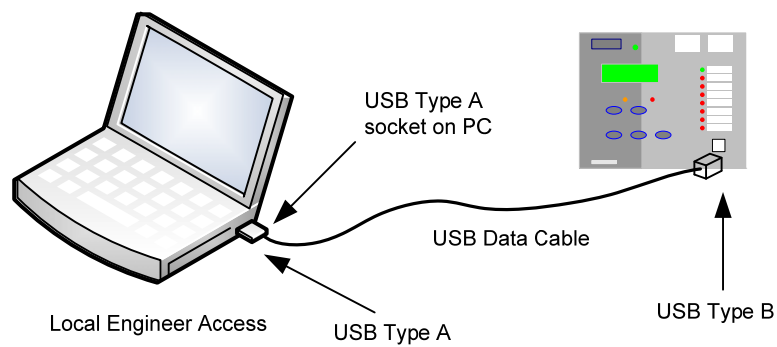


Figure 2.1-1 USB connection to a PC

2.1.2 Standard rear RS485 connection

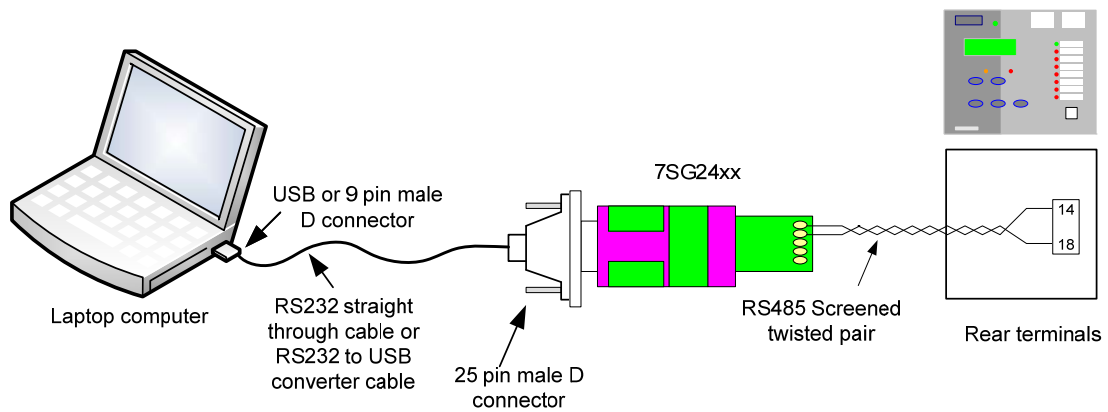


Figure 2.1-2 Standard rear RS485 connection to a PC

2.1.3 Optional rear fibre optic connection

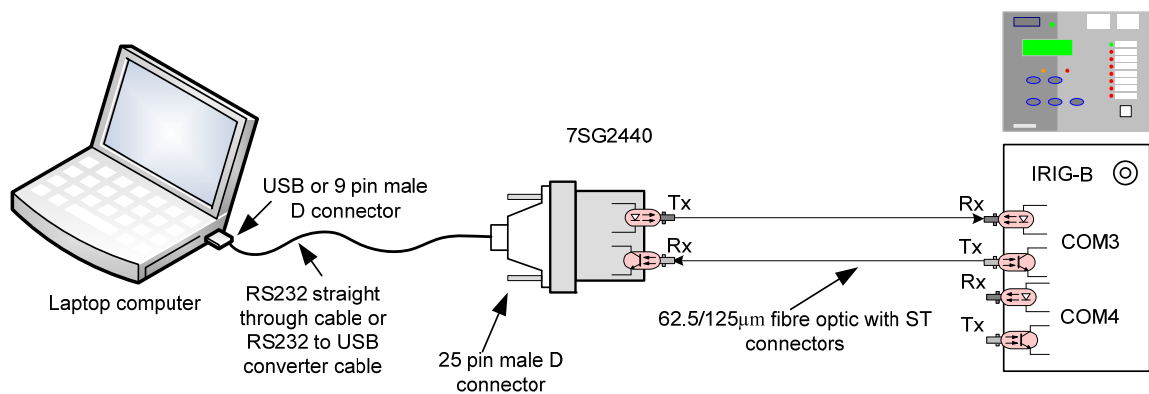


Figure 2.1-3 Additional (Optional) rear fibre optic connection to a PC

Sigma devices have a 25 pin female D connector with the following pin out.

Pin	Function
2	Transmit Data
3	Received Data
4	Request to Send
5	Clear to Send
6	Data set ready
7	Signal Ground
8	Received Line Signal Detector
20	Data Terminal Ready

2.1.4 Optional rear RS485 + IRIG-B connection

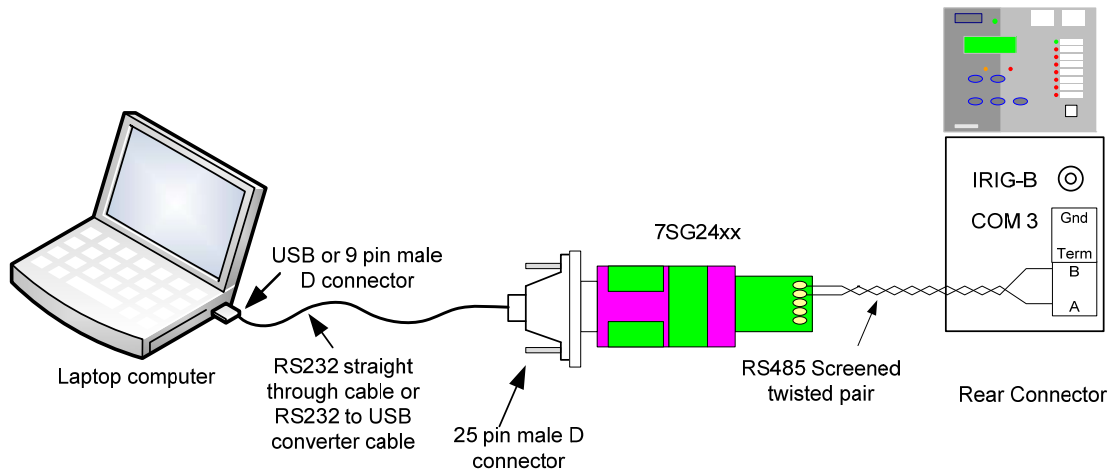


Figure 2.1-4 Additional (Optional) rear RS485 + IRIG-B connection to a PC

2.1.5 Optional rear RS232 + IRIG-B connection

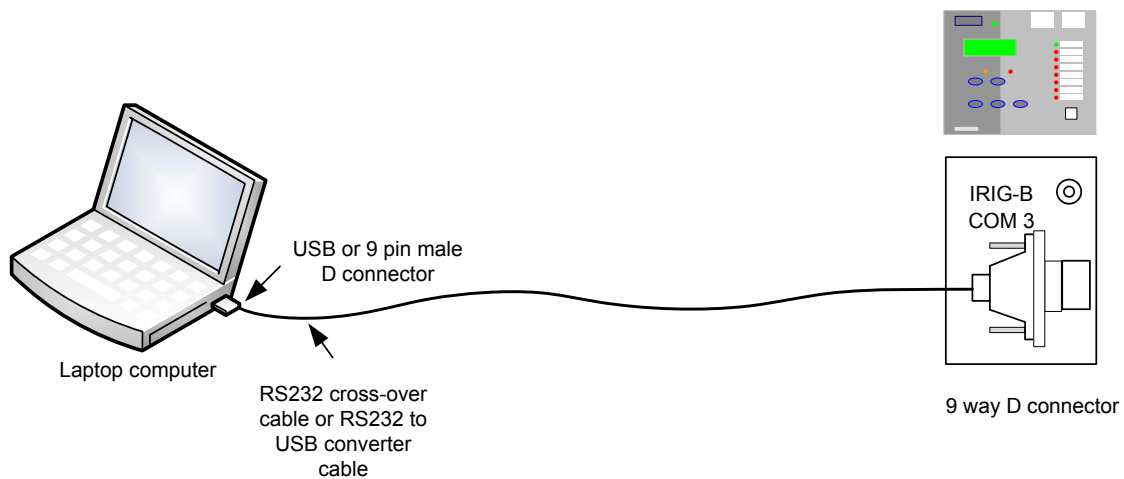


Figure 2.1-5 Additional (Optional) rear RS232 + IRIG-B connection to a PC

Pin	Function
1	Carrier Direct (CD)
2	Receive Data (RXD)
3	Transmit Data (TXD)
4	Data Terminal Ready (DTR)
5	Signal Ground (GND)
6	Data set ready (DSR)
7	Request to send (RTS)
8	Clear to Send (CTS)
9	Ring Indicator (RI)

2.1.6 Configuring Relay Data Communication

Using the keys on the relay fascia scroll down the settings menu's into the 'communications' menu and change the settings for the communication port used on the relay. All of the below settings may not be available in all relay types. Reydisp Evolution software uses IEC60870-5-103 protocol to communicate.

COM1 – Standard RS485 Rear Port

COM2 - USB Port

COM3 – Additional (Optional) Rear Connection

COM4 – Additional (Optional) Rear Connection**

Setting name	Range	Default	Units	Notes
Station Address	1 – 254 for IEC60870-5-103 0 – 247 for Modbus RTU 0 – 65520 for DNP3.0	0		Address given to relay to identify that relay from others which may be using the same path for communication as other relays for example in a fibre optic hub
COM1-RS485 Protocol	OFF, IEC60870-5-103, MODBUS-RTU, DNP3.0	IEC60870-5-103		COM1 is the rear mounted RS485 port
COM1-RS485 Baud Rate	75 110 150 300 600 1200 2400 4800 9600 19200 38400	19200		
COM1-RS485 Parity	NONE, ODD, EVEN	EVEN		
COM2-USB Protocol	OFF, IEC60870-5-103, DNP3.0, MODBUS-RTU, ASCII	IEC60870-5-103		COM2 is the front USB port
COM2-USB Baud Rate	75 110 150 300 600 1200 2400 4800 9600 19200 38400 57600 115200 230400 460800 921600	Auto detects		Auto detects baud rate via Connection Manager Setting
COM2-USB Parity	NONE, ODD, EVEN	EVEN		
COM3 Protocol	OFF, IEC60870-5-103, MODBUS-RTU, DNP3.0	IEC6-0870-5-103		COM3 This is an optional rear mounted connection
COM3 Baud Rate	75 110 150 300 600 1200 2400 4800 9600 19200 38400 57600 115200	57600		
COM3 Parity	NONE, ODD, EVEN	EVEN		
COM3 Line Idle*	LIGHT ON, LIGHT OFF	LIGHT OFF		
COM3 Data echo*	ON, OFF	OFF		
COM4 Protocol**	OFF, IEC60870-5-103, MODBUS-RTU, DNP3.0	OFF		COM4 This is an optional rear mounted connection
COM4 Baud Rate**	75 110 150 300 600 1200 2400 4800 9600 19200 38400	19200		
COM4 Parity**	NONE, OFF, EVEN	EVEN		
COM4 Line Idle**	LIGHT ON, LIGHT OFF	LIGHT OFF		
COM4 Data echo**	ON, OFF	OFF		

*Not applicable for RS485 or RS232 interface modules.

**Fibre Optic Module only

2.1.7 Connecting to the Relay via Reydisp Evolution

When Reydisp Evolution software is running all available communication ports of the PC will automatically be detected.

On the start page tool bar open up the sub-menu File > Connect.

The 'Communication Manager' window will display all available communication ports. With the preferred port highlighted, select the 'Properties' option and ensure the baud rate and parity match that selected in the relay Data Comms settings. Select 'Connect' to initiate the relay-PC connection.

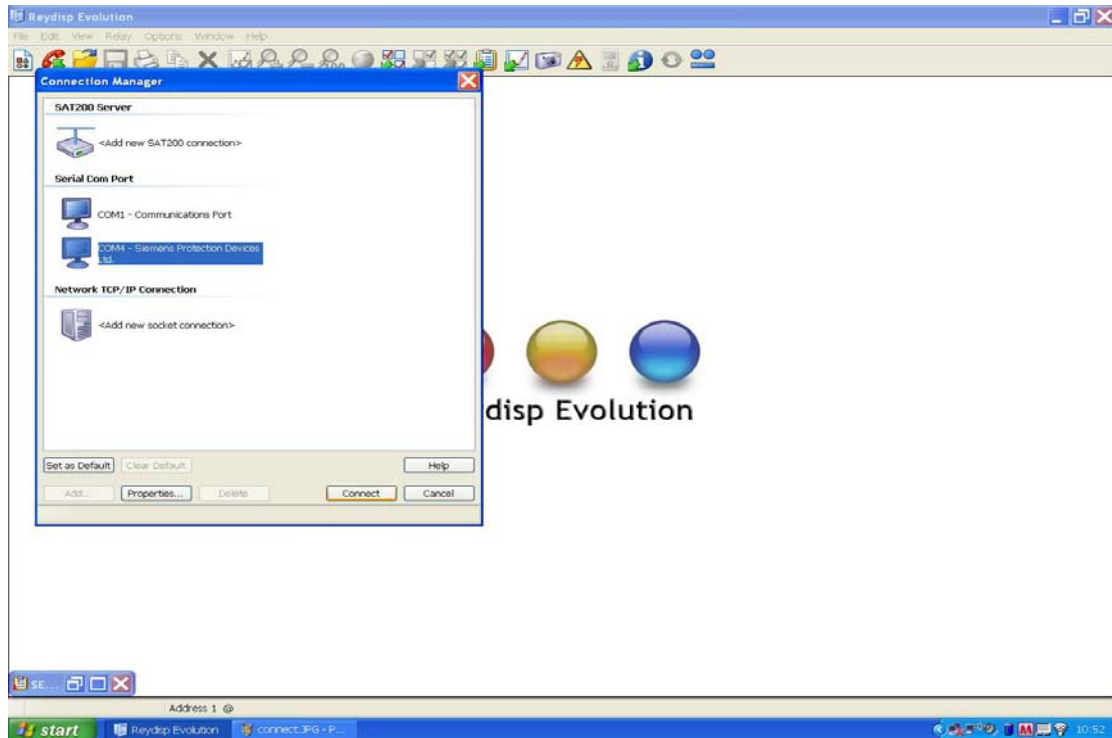


Figure 2.1-6 PC Comm Port Selection

Via the Relay > Set Address > Address set the relay address (1-254) or alternatively search for connected devices using the Relay > Set Address > Device Map. The relay can now be configured using the Reydisp Evolution software. Please refer to the Reydisp Evolution Manual for further guidance.