User Manual
relayCUE-8
Version 02

Table of Contents

1. Introduction

1.1. Overview..

The relayCUE-8 is an eight-channel relay switching unit for loads up to 230V/10A per channel. The unit can be controlled both by serial channel RS-485 from the controller serial port and by potential free contact inputs. These contact inputs are intended to be used mainly as "wall switches" for direct control of dedicated relay circuits. To fulfil various tasks, the input operation can be assigned to different functions by setting their functional parameters in the project configuration.

1.2. Models..

Model	Product code	Description
relayCUE-8 (version 110 V)	CS0335-1	The relayCUE-8 is an eight-channel relay switching unit for loads up to 230V/10A (resistive load) per channel.
relayCUE-8 (version 230 V)	CS0335-2	The relayCUE-8 is an eight-channel relay switching unit for loads up to 230V/10A (resistive load) per channel.

1.3. Features..

- 8 x digital (potential-free) contact closure input

- 4 x potential free relay C-NO, 230 V, max. 10 A (resistive load)

    - max. 400W per relay for inductive or capacitive load

- 4 x potential free relay NC-C-NO, 230 V, max. 10 A (resistive load)

    - max. 400W per relay for inductive or capacitive load

- 8 x test button for power relay control

- 1 x ACT button for address and bank settings

- 3 x LED indicators for power supply, serial channel activity and status of all relays

- Serial communication RS-485

- Version 110 or 230 VAC

- Plastic DIN rail compatible enclosure

- Dimensions 159 x 90 x 58 mm, weight 0.5 kg

- Suitable for control of:

    - lights (incl. time-switch)

    - drapes

    - projection screens

    - AC and DC motors

1.4. Programming..

relayCUE-8 is programmed using **Cue Director XPL** programming tool via dedicated driver.

2. Front panel

On the front panel of relayCUE-8, there are the following indicators and buttons (from left to right):
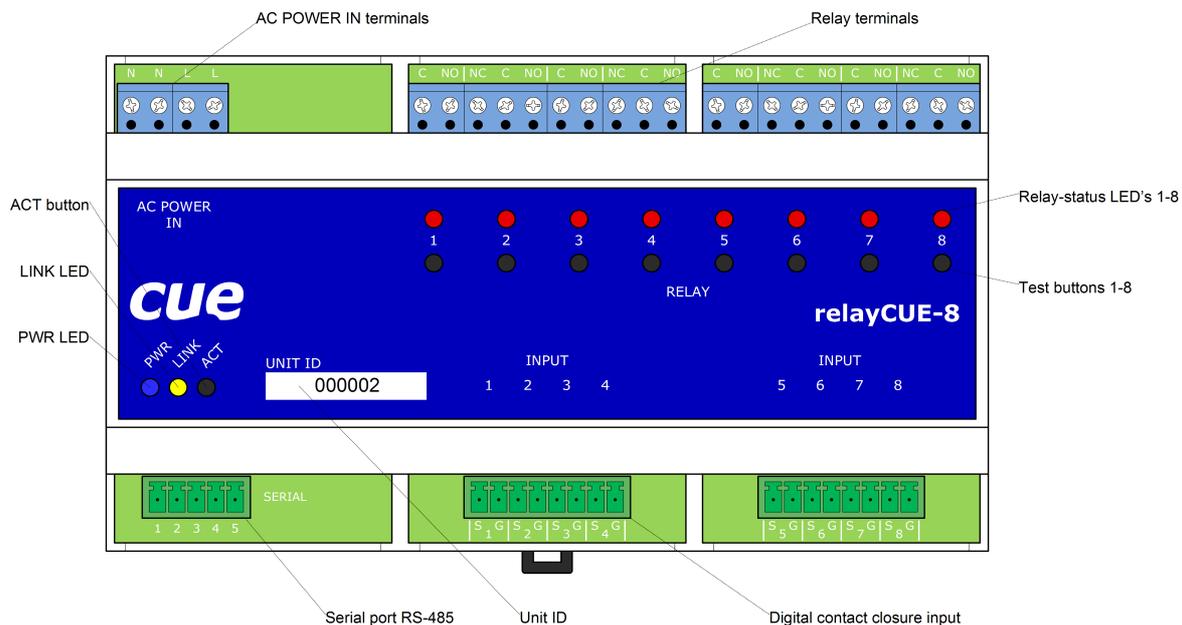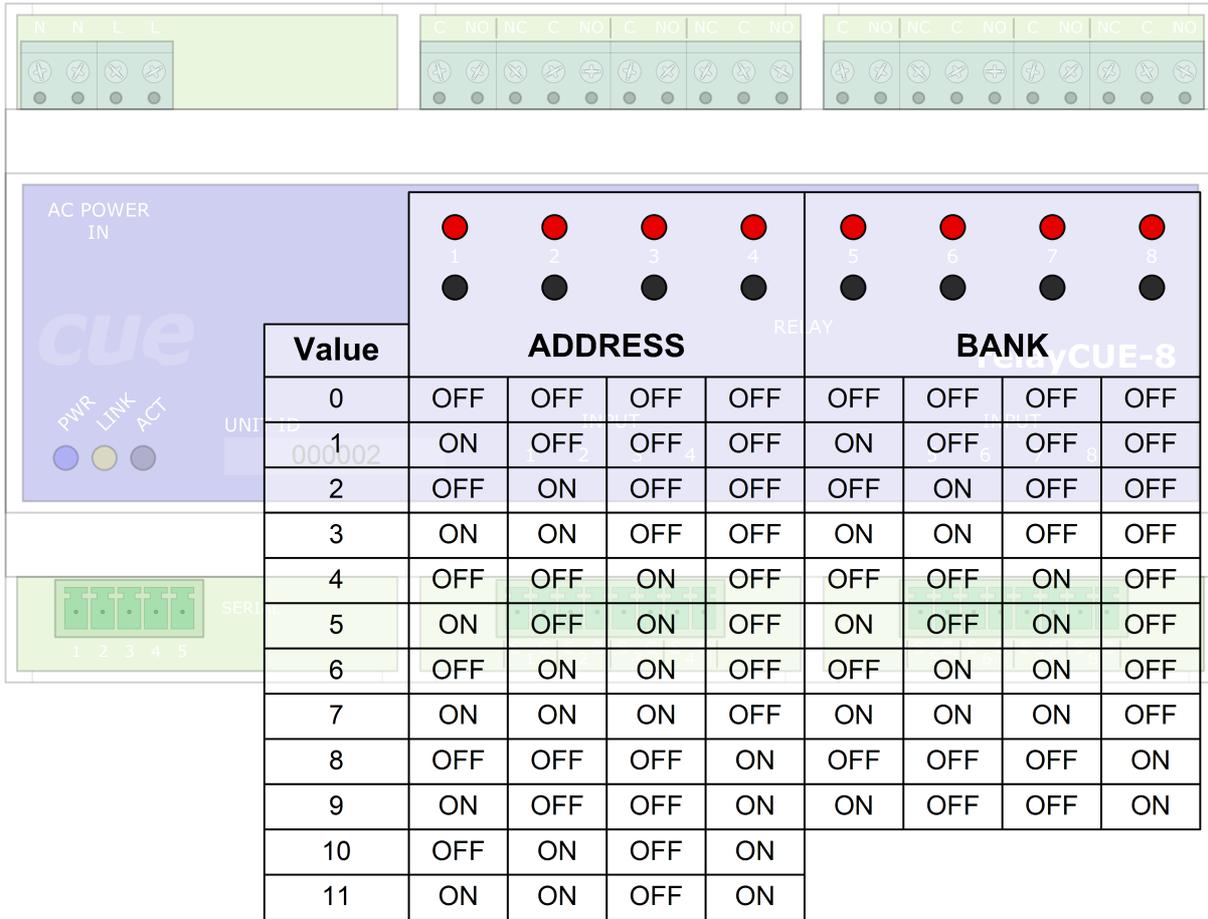

- **PWR** LED lighted on whenever the unit is powered.

- **LINK** LED indicates activity on serial port. After power on this unit this LED flashes OK in "Morse alphabet" - if unit power on test has not recognized any problems and the unit is ready to work. If power on diagnostic recognizes some kind of internal failure, this LED starts flashing regularly.

- **Relay-status LED's 1-8 -** these LEDs are indicating current relay status where relay closed is indicated by LED light on.

- **Test buttons 1-8** - under normal operation, these buttons are logically in parallel to inputs 1-8. Pressing this button has the same effect as pressing a button connected to the appropriate input.

- **ACT** button - when this button is pressed, the relay LED indicators display the Address and Bank parameters in binary code (for value coding see table below).

> Address:	on relay LED 1-4 (where LED 1 is LSB and LED 4 is MSB)
>
> Bank:	on relay LED 5-8 (where LED 5 is LSB and LED 8 is MSB)

Using this **ACT** button, you can check the actual setting of both basic system parameters Address and Bank.

When holding the **ACT** button, you can also change manually the actual setting of Address and Bank. By pressing buttons 1-8 (while instant press on **ACT**) you can toggle the actual value. The new value must be confirmed by releasing the **ACT** button and immediate short press of this button. The new confirmed value displayed on LEDs flashes several times for a confirmation that the unit accepted the new value.

Value	ADDRESS				BANK			
0	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
1	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF
5	ON	OFF	ON	OFF	ON	OFF	ON	OFF
6	OFF	ON	ON	OFF	OFF	ON	ON	OFF
7	ON	ON	ON	OFF	ON	ON	ON	OFF
8	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON
9	ON	OFF	OFF	ON	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON				
11	ON	ON	OFF	ON				

Note several important points:

- the process of displaying/changing Address and Bank using ACT button has no influence on current relay status.

- while the ACT button is pressed, inputs 1- 8 remain inactive.

- if you set manually the Address and the Bank on the unit which is working in the system where currently running project has a relayCUE-8 with its specific UnitID used in it, then after next Init (i.e. controller reset) the manually set parameters will be lost! The system in each its Init is renewing all parameters according to the settings in the currently running project! If the currently running project does not include the unit with the same UnitID, then the manually set parameters remain valid without any change!

3. Connecting

The enclosure of relayCUE-8 allows simple installation into switchboard on DIN rail.

3.1..........................Power, input and output connection

Eight digital contact closure inputs are connected via two 8-pin connectors Phoenix 3,5 mm. Every input has 2 terminals – the first is input signal, the second is input common (ground).

Eight relays are connected via screw-type terminal (up to 1.5 mm² wire). Four relays have two terminals C-NO (Common – Normaly Open), 230 V, max. 10 A (resistive load), four relays have three terminals NC-C-NO (Normaly Close – Common – Normaly Open), 230V, max. 10A (resistive load).

AC Power input is connected via four screw-type terminals (up to 1.5 mm² wire). Two terminals are L (Live), two terminals are N (Neutral). A connection of the relays, power and contact closure inputs is described on the picture below.
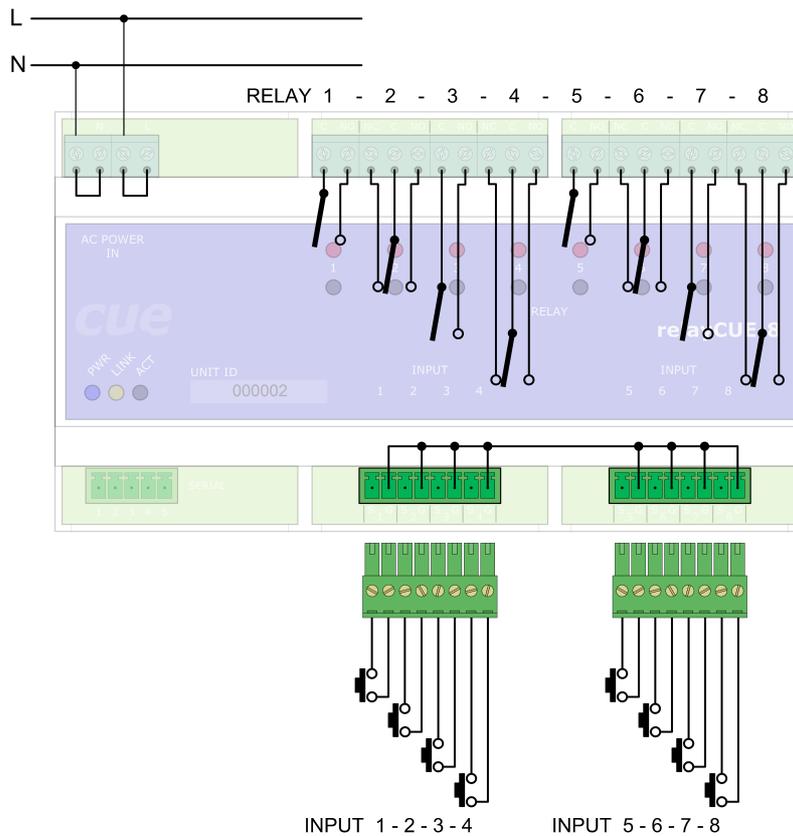
All relays are open in this picture.

Important note:

The relay contacts in relayCUE-8 are constructed for resistive load up to 230V/10A. If these relays are used for the switching of inductive (or capacitive) loads, voltage or power peaks can occur, which may exceed these parameters even if the load has the stated take-off lower than 230V/10A. We therefore do not recommend using relayCUE-8 for switching inductive or capacitive loads with take-off higher than 400W.

If you need to switch higher loads, use contactors. Unlike relays, contactors are designed with features to control and suppress the arc produced when interrupting inductive load currents. You can then use the relay of the relayCUE-8 unit to control the coil of this contactor.

3.2...RS-485 port connection

The relayCUE-8 control port is compatible with RS-485 standard and so it is to be installed on controller serial ports which are compatible with this standard (i.e. for example on ipCUE-alpha controller the serial channels S3-S6) or the RS-232/RS-485 converter must be used. Serial port RS-485 is connected via 5-pin connector Phoenix 3,5 mm.

A typical connection of RS-485 port is shown in the following picture:

Serial port compatible with RS-485 standard

A+

B-

G (Ground)

to next relayCUE-8
max. 31 units
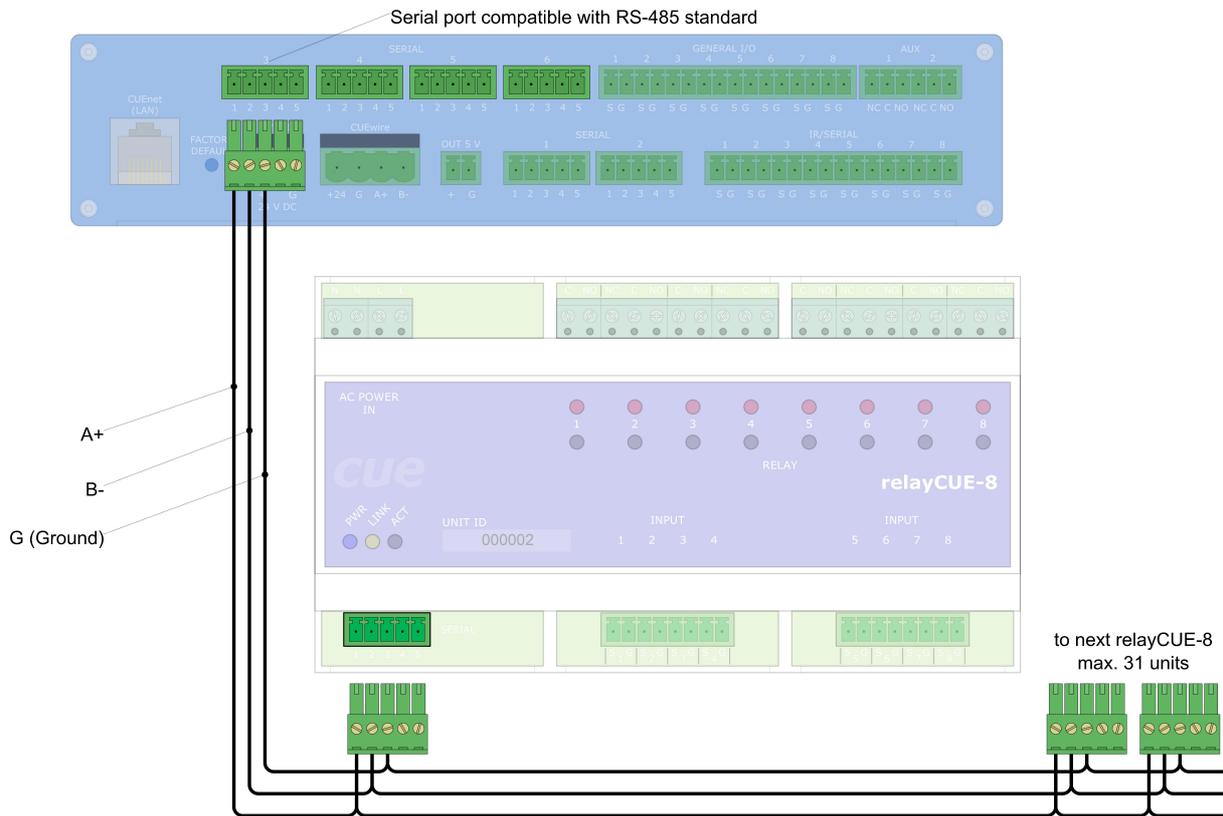
relayCUE-8 can also be connected via supplied cable CA0183 and PEbus cable adapter GP0045, see picture below. Other "Power Express"(PEX) units can also be connected to this bus (see **Important Note** below).
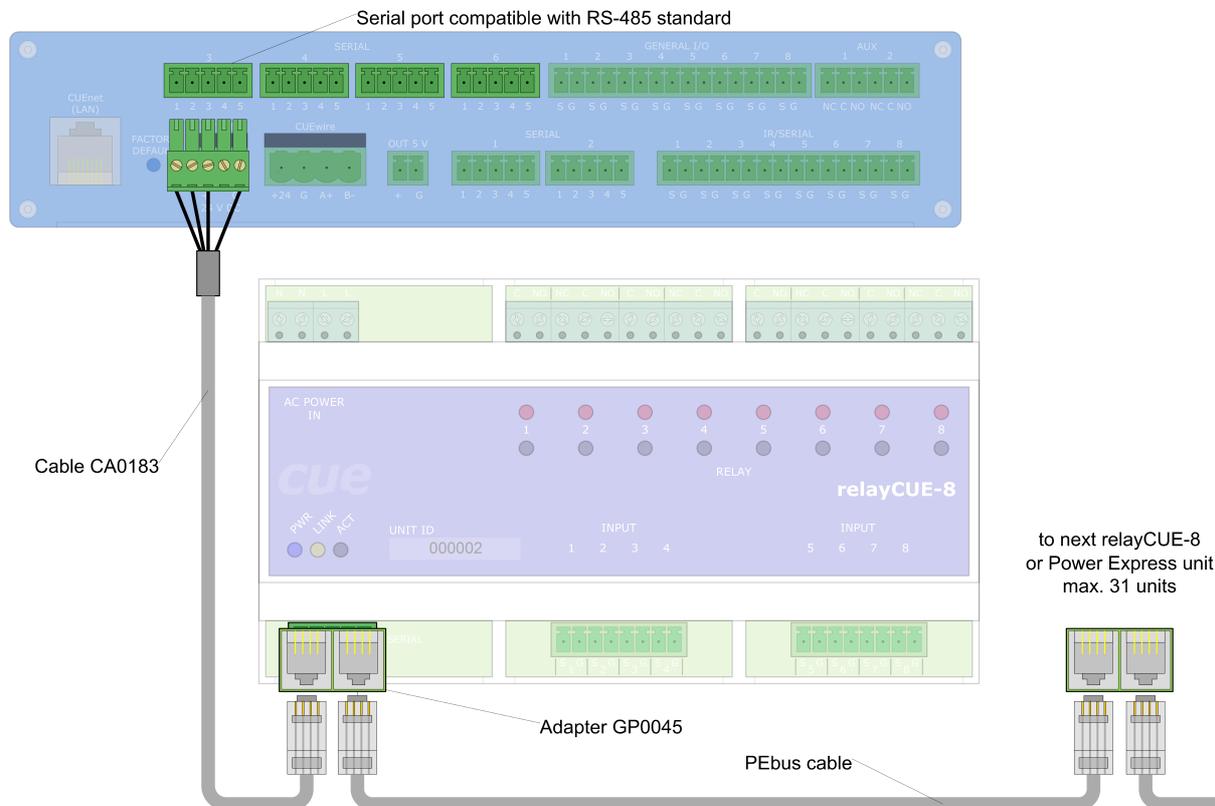
For connection of cable CA0183, see **Appendix B**.

Note:

Max. 31 units (relayCUE-8 or any PEX unit) can be connected to one serial port on ipCUE compatible with RS-485 standard.

Important Note:

If relayCUE-8 and PEX units are to be combined on the same bus, the PEX units must be installed and programmed using their serial drivers on serial port like any other serial controlled equipments (similar way like the relayCUE-8) and not by using "Insert Local Panels and Interfaces" wizard!

3.3..RS-232 port connection

The controller ports capable only of RS-232 operation (like S1-S2 on ipCUE-alpha) can also be used, but RS-232/RS-485 converter like unit PEC25 must be used there. For simple connection to PEC25, the PEbus cable adapter (GP0045) is enclosed in the packing. Power for RS-232/RS-485 converter PEC25 is on pin 5 of serial connector of relayCUE-8. Other "Power Express" (PEX) units can also be connected to this bus (see **Important Note** below).

Serial port compatible with RS-232 standard

Adapter GP0045

PEbus cable

PEbus cable

to next relayCUE-8 or Power Express unit max. 127 units
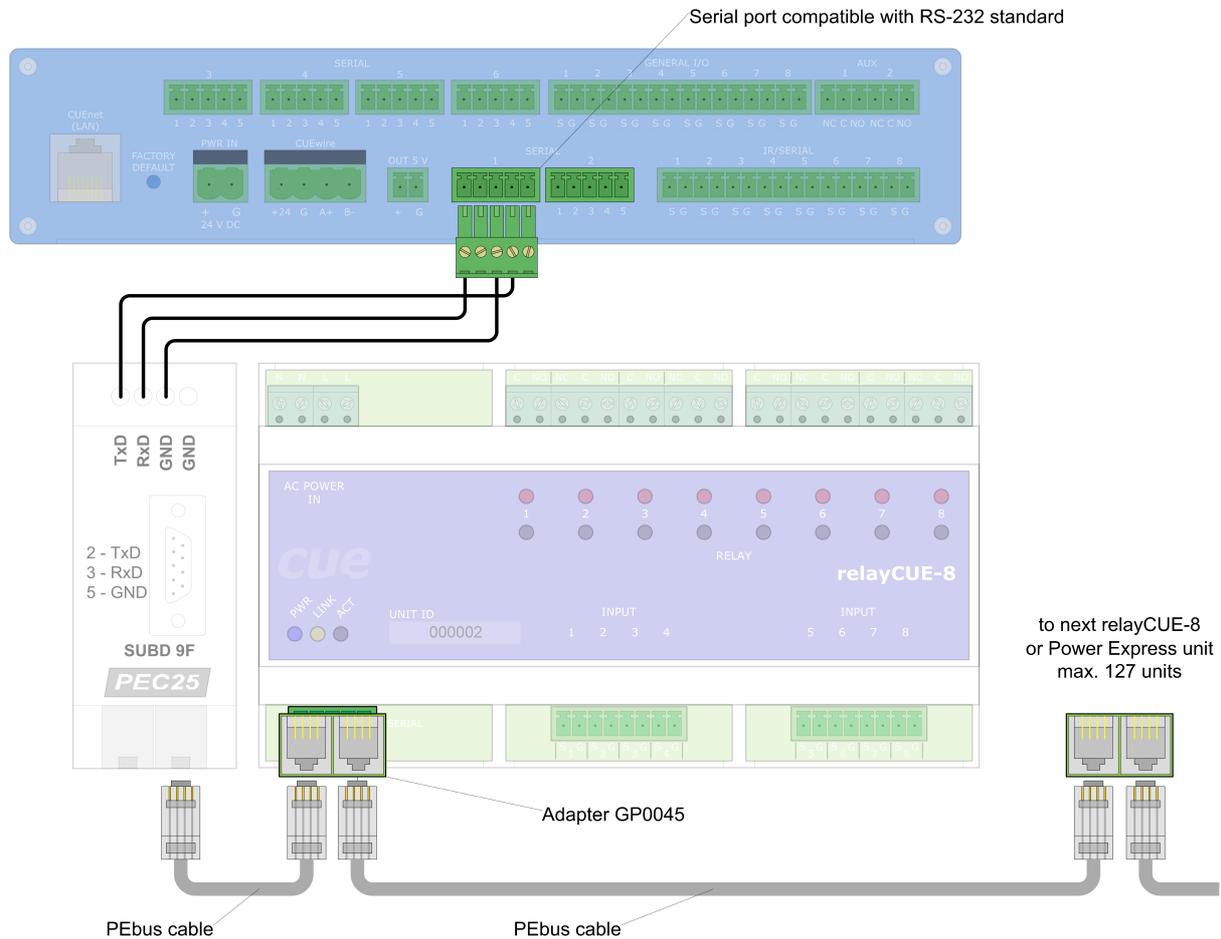
Note:

Max. 127 units (relayCUE-8 or any PEX unit) can be connected to PEbus port on PEC25.

Important Note:

If relayCUE-8 and PEX units are to be combined on the same bus, the PEX units must be installed and programmed using their serial drivers on serial port like any other serial controlled equipments (similar way like the relayCUE-8) and not by using "Insert Local Panels and Interfaces" wizard!

3.4...................................IR/SERIAL port connection

In some installation where the proper serial ports are not available and where there is no need to use the status-reading commands, it is possible to control relayCUE-8 from IR/SERIAL one way communication port on ipCUE.

The cable for connection to ipCUE IR/SERIAL port needs two wire connections, see picture below:
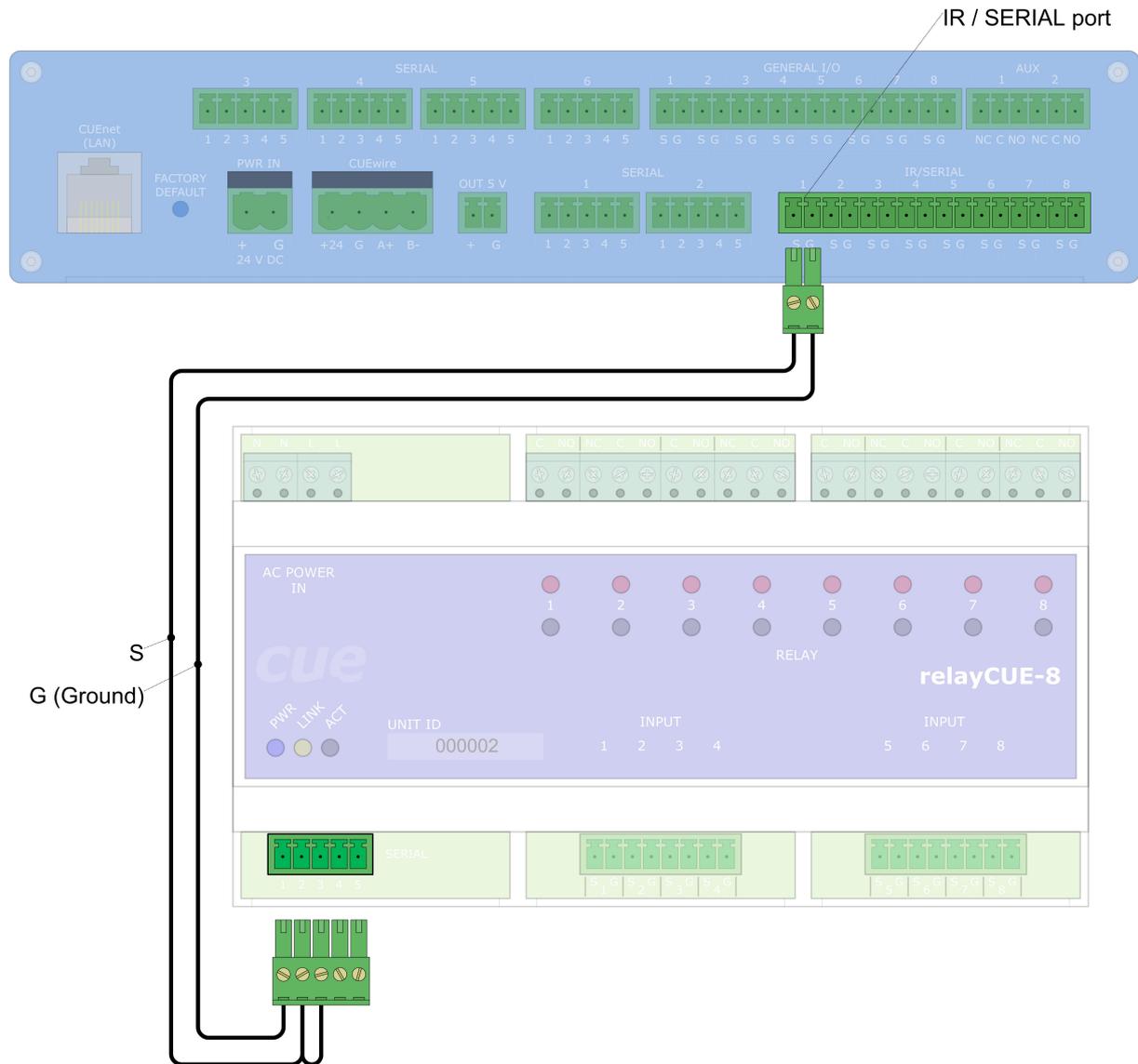
Please pay attention to the following notes when using this type of installation:

1. cable for this connection is : pin 1 on IR/SERIAL connector on ipCUE is connected to pin 2+3 on SERIAL port connector on relayCUE-8 and pin 2 on IR/SERIAL connector on ipCUE is connected to pin 1 on SERIAL port connector on relayCUE-8.

2. only one relayCUE-8 unit can be driven from one IR/SERIAL port!

3. commands for reading relay or input statuses have no effect !

4. Configuration

4.1............................Inserting relayCUE-8 into project

To insert relayCUE-8 into your project, proceed as if inserting standard serial controlled equipment. Choose the serial port and insert the relayCUE-8 driver from library.

If the driver is missing in your library, download the latest relayCUE-8 driver in *.CSE file from our web and import the driver into your library.
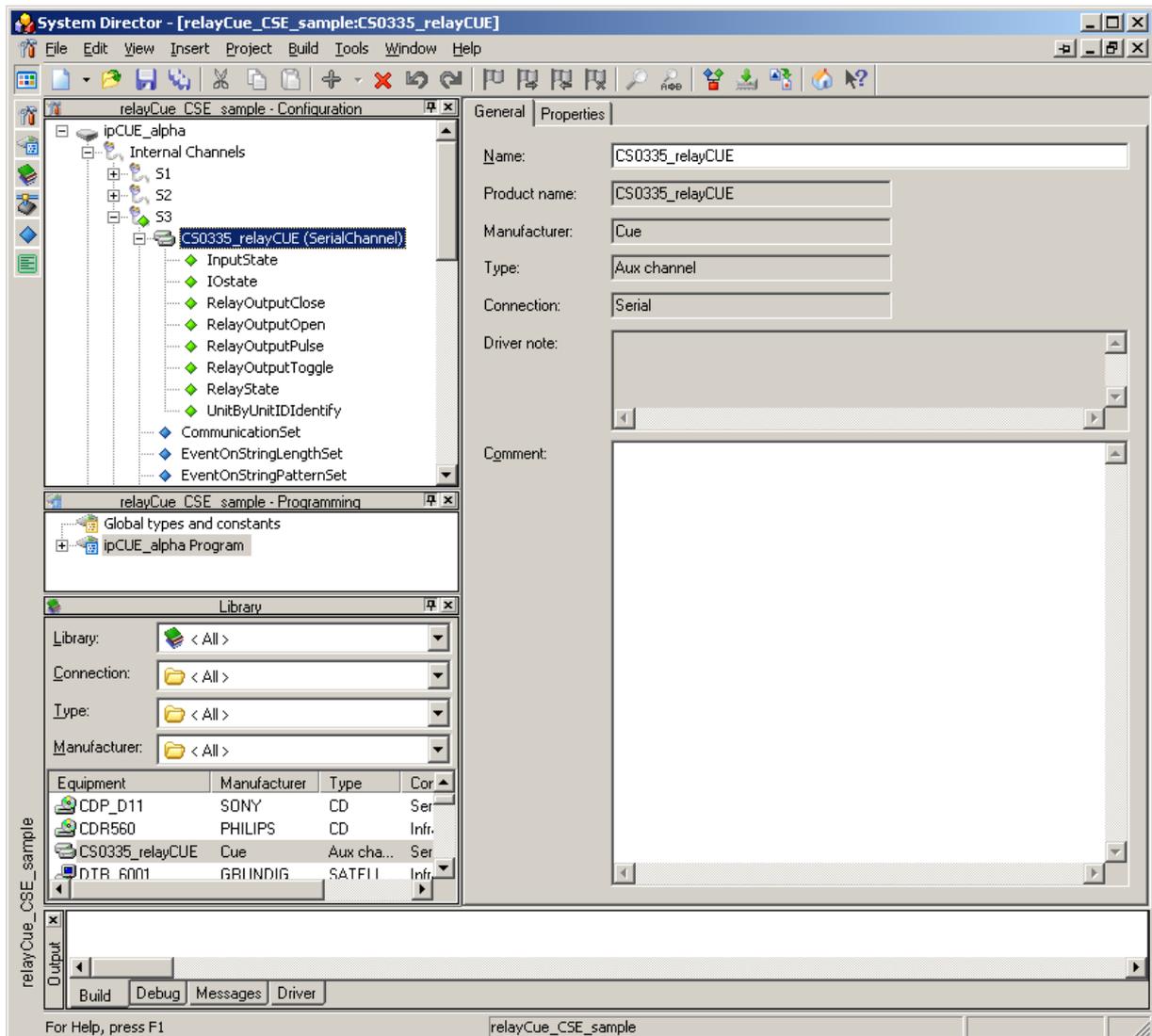
4.2...Setting relayCUE-8 properties

After the relayCUE-8 has been properly inserted into your project, its properties must be set. Select relayCUE-8 in your project and click on the tab "Properties" in the right window.
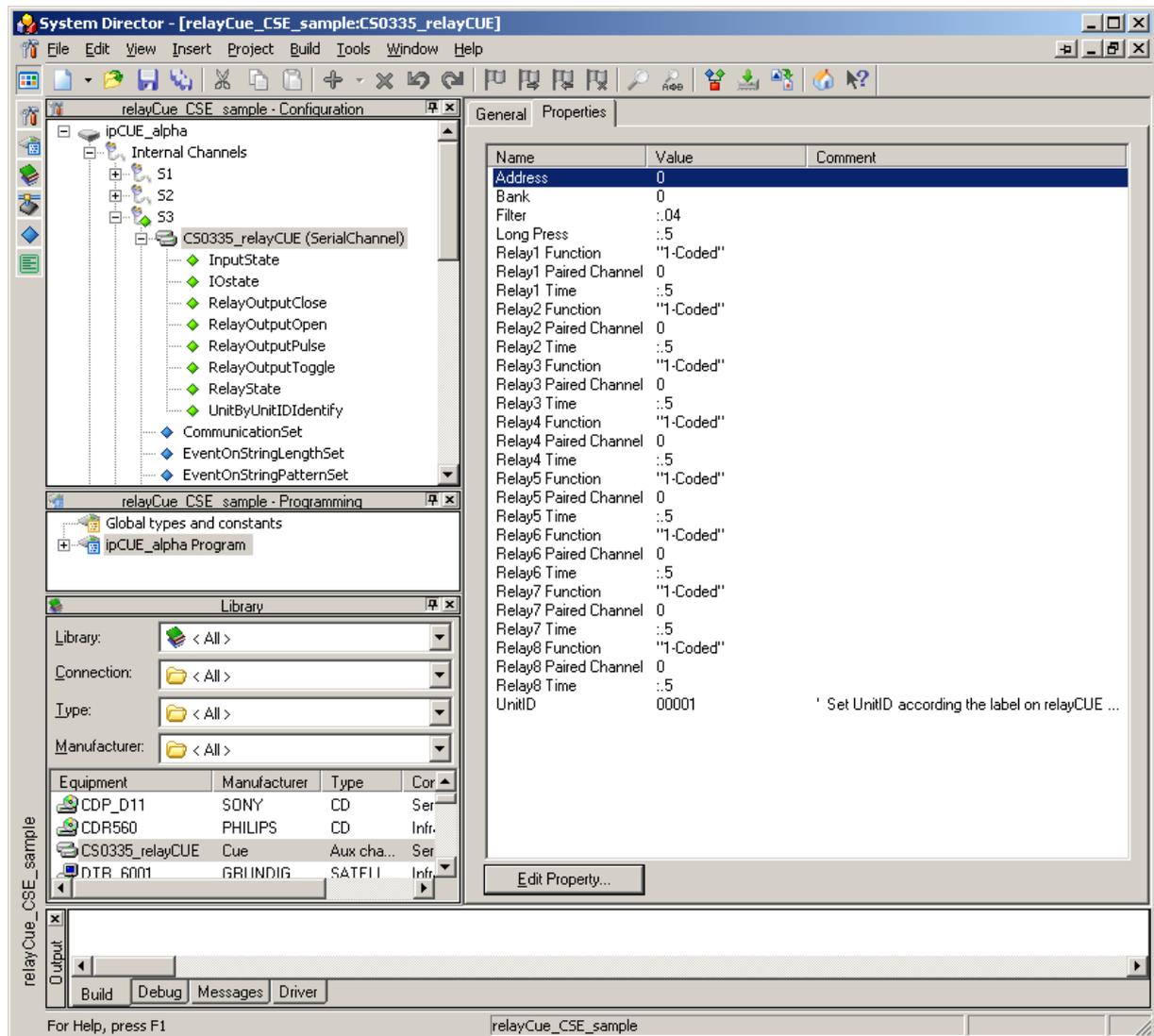
The properties are displayed in alphabetical order. The property value can be changed by selecting the property and then pressing button "Edit Property". For example when selecting Address, then "Edit Property" box appears as the one below:
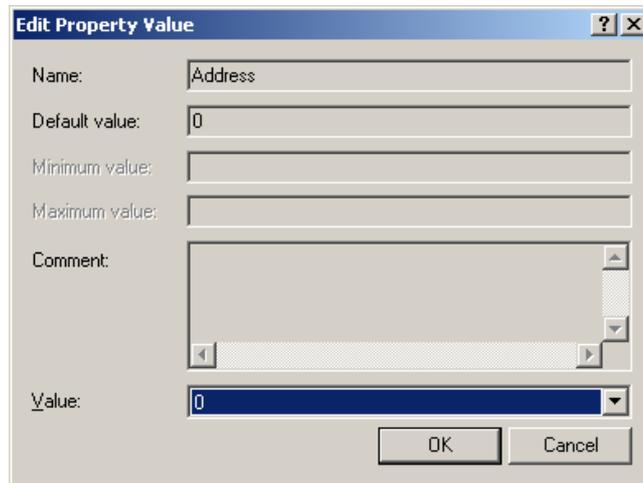

The system properties in the list are Address, Bank and UnitID

The functional properties are Filter, Long Press, RelayX Function, RelayX Paired Channel and RelayX Time.

UnitID

The UnitID is a unique number which can be seen on the front panel of each relayCUE-8.

See picture bellow - the UnitID there is 000002
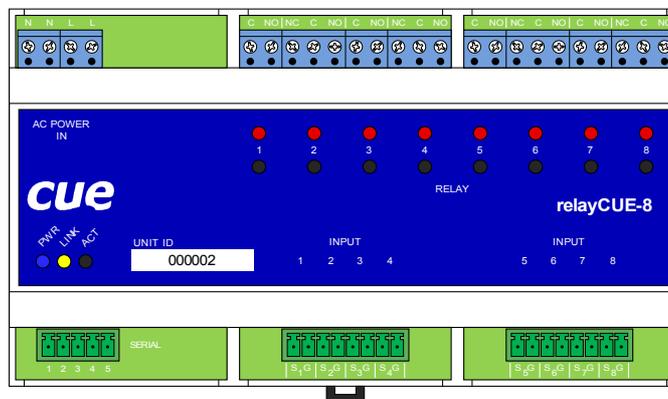
Note:

The UnitID allows the system to set the basic communication parameters to the unit : Address and Bank. All the remaining communication is then done by using these parameters.

Bank and Address

There can be 10 Banks assigned by Bank number. The Bank number is value in range 0...9. In each Bank there can be relayCUE-8 units - each of them with different unit Address. The Address can be set to value in range 0..11. Default Address and Bank is 0.

Filter

Filter is time in range 0.01-0.20 sec. It means minimum time of closing/releasing the input contacts (pressing the button) for the press to be valid. If input is closed/released for shorter time than set in Filter property then it has no effect.

Long Press

Long Press is time in range 0.0-0.9 sec. If the time of pressing the button is longer than this value, the press is interpreted as a long press .

RelayX Function

Function selection for control relay by buttons connected to relayCUE-8 inputs:

0 - no action button on appropriate input is disabled.

1 - coded each press causes the toggle of the relay state (switched on/off).

2 - relay when button is pressed, the output is on, otherwise it is off.

3 - system on when pressed, the relay switches on; it can be switched off only by a command through serial line.

4 - run a short press switches the relay on for the period of "Time" entered in its parameter. Long time press switches the relay on only while button is being held. It is suitable for use in couple with another channel with direction mode for controlling of AC motors. For function in "run" mode, the property "RelayX Paired Channel" must be set, which is to work in "direction" mode.

5 -direction it is useful for selecting direction of controlled AC motors. After 200 ms the couple relay with mode "run" is switched on too. For function in "direction" mode, the property "RelayX Paired Channel" must be set, which is to work in "run" mode. **Mostly the relays working in this mode must be equipped with N.C. as well as N.O.!** Make sure to assign this function only to these relays - if so requested! (It means relays 2,4,6 and 8).

6 - delayed off the relay is switched on at once, but it is switched off after delay "Time".

7 - delayed on the relay is switched off at once but it is switched on after delay "Time".

8 - run DC short press switch relay on for parameter "Time". Long time press switches the relay on only while button is being held. It is suitable for use in couple with another channel with same mode for controlling DC motors (the paired relay will be switched off). For function in "run DC" mode, the property "RelayX Paired Channel" must be set, which is to work in couple also in "runDC" mode. **Mostly the relays working in this mode must be equipped with N.C. as well as N.O.!** Pay attention to assign this function only to these relays - if so requested! (It means relays 2,4,6 and 8).

9 - pulse the relay is switched on for a short time impulse entered in the parameter "Time".

RelayX Paired Channel

This parameter is relevant only for functions where two relays are to work in a pair – i.e. "run", "direction" or "runDC". The number is in range 0-8 where 0 means NO paired really channel and numbers 1-8 means the number of the paired relay.

Please pay attention to set this parameter correctly where necessary. Check if paired relay properties are correctly set in each pair. Inappropriate setting can lead to unexpected operations.
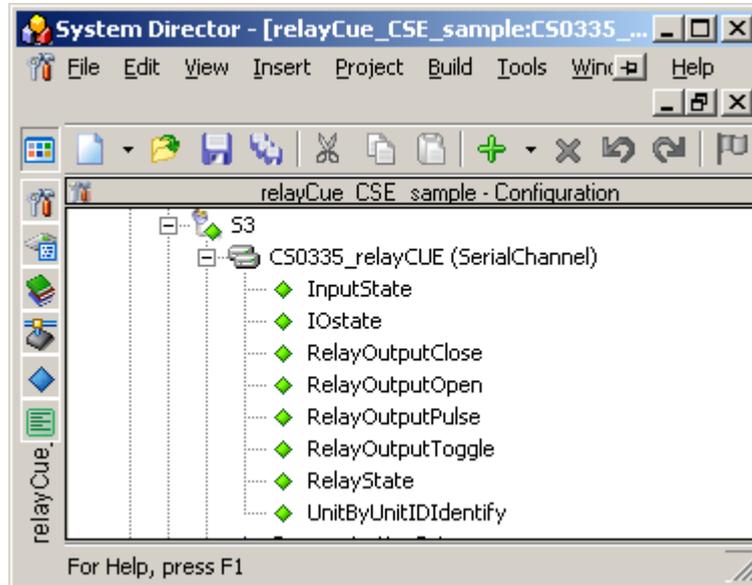
RelayX Time

The "Time" parameter - can be set to range time: 00:00:00.01 – 23:59:59.99

5. Programming

When programming, you can proceed as in any other serial controller including drag and drop operations.

The available command are:

Sub RelayOutputClose (Channel as Byte)
This command closes the relay. The parameter Channel – in range 1..8 means relay number.

Sub RelayOutputOpen (Channel as Byte)
This command opens the relay. The parameter Channel – in range 1..8 means relay number.

Sub RelayOutputToggle (Channel as Byte)
This command toggles the relay. The parameter Channel – in range 1..8 means relay number.

Sub RelayOutputPulse(Channel as Byte , Optional PulseTime As Time=:.4)
This command closes the relay for time PulseTime then the relay is opened.
The parameter Channel – in range 1..8 means relay number.
Pulse Time 0.1 – 999.9 sec.

Function RelayState (Channel as Byte) As Boolean
This function reads the actual state of relay. The state TRUE means relay is closed.
The parameter Channel – in range 1..8 means relay number.

Function InputState (Channel as Byte) As Boolean
This function reads the actual state of input. The state TRUE means input contacts closed.
The parameter Channel – in range 1..8 means input number.

Sub IOState (ByRef InputStatus as String, ByRef RelayStatus as String)
Reads all relay and inputs states "in one shot"and returns the values in Status strings.
Status strings (InputStatus and OutputStatus, 8bytes): N1 N2 N3 N4 N5 N6 N7 N8
The Nx means the status of channel x and the values are:
- FF (hexadecimal) - when channel (input or relay) is closed
- 00 (hexadecimal) - when channel (input or relay) is opened

Sub UnitByUnitIDIdentify (ByRef Status as String)

This command serves mostly for testing and it is mainly to be used in debugging programs in large installations where many relayCUE-8 units have been used. It helps to identify the particular unit in installation and allows to read all its parameters.

Whenever this command is executed, and the unit with UnitID is set according to the equipment properties, the LINK LED on the front panel will flash and so it can be easily identified in the rack. It also sends back the "Unit State String" which is written into Status string. For the "Unit State String" details see **Appendix A** (Unit State String description). The length of Status string is 90 bytes.

6. Exchange of relayCUE-8 in existing installation

There are two ways of replacing the relayCUE-8 unit in the existing installation:

1. The best way of making such exchange is replacing the relayCUE-8 by the new one physically, and then make change in project programming. As soon as the unit with new UnitID is put in place of the existing one in the project, the only thing that needs to be done is go the properties of the exchanged unit and enter the new UnitID there. The project then needs to be compiled and downloaded to the controller in the system.

2. The exchange described in the previous point is not always possible, for example if project programming is missing, or if it is not possible to do new compile and download. In these situations you must know at least the Address and Bank of the replaced unit. If you know these parameters, you can just replace the unit in the system physically and set the Address and Bank parameters manually using the buttons on the front panel – as described in chapter "**Front panel description**". After parameters have been set correctly, you must reset the controller in the system and all parameters will be renewed in this unit according to the settings in original programming.

To explain how the system works in such situation:

The UnitID of this new relayCUE-8 in the installation is unknown to the currently running project and so the parameters Address and Bank remain unchanged (as explained above). All the remaining functions are based only on these Address and Bank parameters, so all the commands and system settings will be accepted by this new unit in the system, and the unit will act exactly as the replaced one, without the need of reprogramming.

7. Specifications and Mechanical Drawings

Inputs..8 x digital (potential-free) contact closure input,
....2 x 8-pin connector Phoenix 3.5 mm
Outputs..4 x potential free relay C-NO, 230 V, max. 10 A (resistive load)
....4 x potential free relay NC-C-NO, 230 V, max. 10 A (resistive
....load)
....max. 400W per relay for inductive or capacitive load
....screw-type terminals up to 1.5 mm^2
LED indicators...................................Power, serial channel activity, status of all relays
Buttons..8 x test button for power relay control,
....ACT button for address and bank settings
Insulation strength.............................2.5 kV between power and control circuits
Serial communication.........................RS-485, 5-pin connector Phoenix 3.5 mm
Power supply......................................230 VAC or 110 VAC, 50/60 Hz, 6 W,
....screw-type terminals up to 1.5 mm^2
Enclosure...Plastic DIN rail compatible enclosure
Dimensions..159 x 90 x 58 mm / 6.2" x 3,5" x 2,3" (9 modules 17.5 mm)
Weight..0.5 kg / 1.1 lb
Operating environment.......................Temperature 0° to 60° C
....Humidity 10% to 90% non-condensing
Supplied accessories.........................Cable CA0183
....Cable adapter GP0045
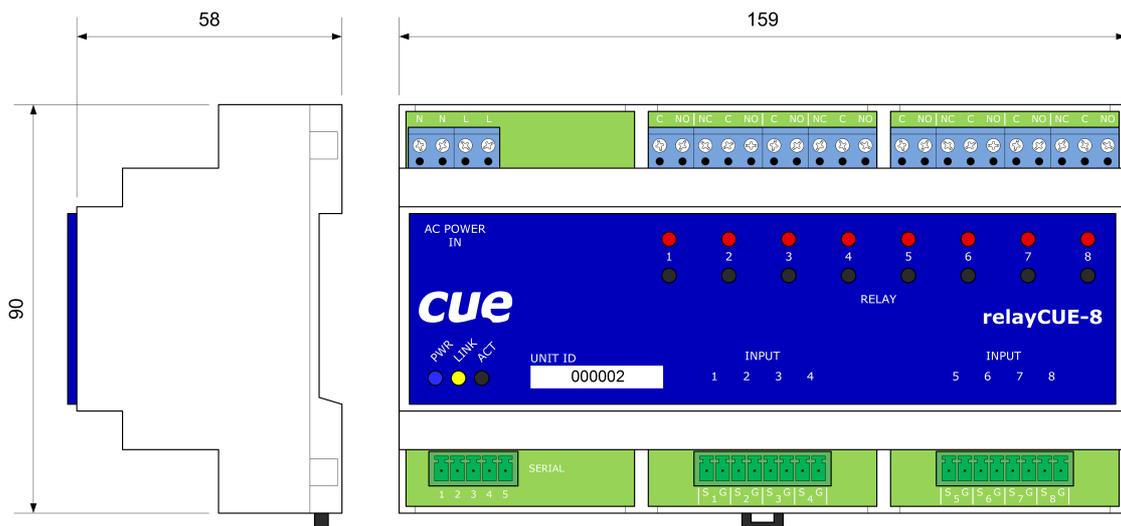
All dimensions are in mm.

Important note:

The relay contacts in relayCUE-8 are constructed for resistive load up to 230V/10A. If these relays are used for the switching of inductive (or capacitive) loads, voltage or power peaks can occur, which may exceed these parameters even if the load has the stated take-off lower than 230V/10A. We therefore do not recommend using relayCUE-8 for switching inductive or capacitive loads with take-off higher than 400W.

If you need to switch higher loads, use contactors. Unlike relays, contactors are designed with features to control and suppress the arc produced when interrupting inductive load currents. You can then use the relay of the relayCUE-8 unit to control the coil of this contactor.

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Appendix A: Unit State String description

"Unit State String" - current status of all parameters of the unit (lenght 90 bytes):

byte 1	'i'	
byte 2 - 5	'0335'	
byte 6 - 9	UnitID (BCD)	
byte 10-11	FW version	
byte 12	STX ("/02")	
byte 13-14	input state (HEX)	
byte 15-16	output state (HEX)	
byte 17-18	internal check state (HEX) 01-O.K.	
byte 19-20	unit address (HEX)	
byte 21-22	unit bank (HEX)	
byte 23-24	long press time in 0.1sec (HEX)	
byte 25-26	input filter in 0.01sec (HEX)	
byte 27-28	paired relay to relay 1 (HEX) 00-no pair.	
byte 29-30	input1 mode (HEX) "0-NoAction", "1-Coded", "2-Relay", "3-SystemOn", "4-Run", "5-Direction", "6-DelayedOff", "7-DelayedOn", "8-RunDC", "9-Pulse"	
byte 31-32	paired relay to relay 2 (HEX) 00-no pair.	
byte 33-34	input2 mode (HEX) "0-NoAction", "1-Coded", "2-Relay", "3-SystemOn", "4-Run", "5-Direction", "6-DelayedOff", "7-DelayedOn", "8-RunDC", "9-Pulse"	
....		
byte 55-56	paired relay to relay 8 (HEX) 00-no pair.	
byte 57-58	input8 mode (HEX) "0-NoAction", "1-Coded", "2-Relay", "3-SystemOn", "4-Run", "5-Direction", "6-DelayedOff", "7-DelayedOn", "8-RunDC", "9-Pulse"	
byte 59-62	relay1 timer value (HEX)	
byte 53-66	relay2 timer value (HEX)	
....		
byte 87-90	relay8 timer value (HEX)	

Status string example:

"i0335000501\020000010000050400010001000100010001000100010005000500050005000500
0500050005"

Appendix B: Cable CA0183 connection

Cable CA0183

5-pin connector Phoenix 3,5 mm
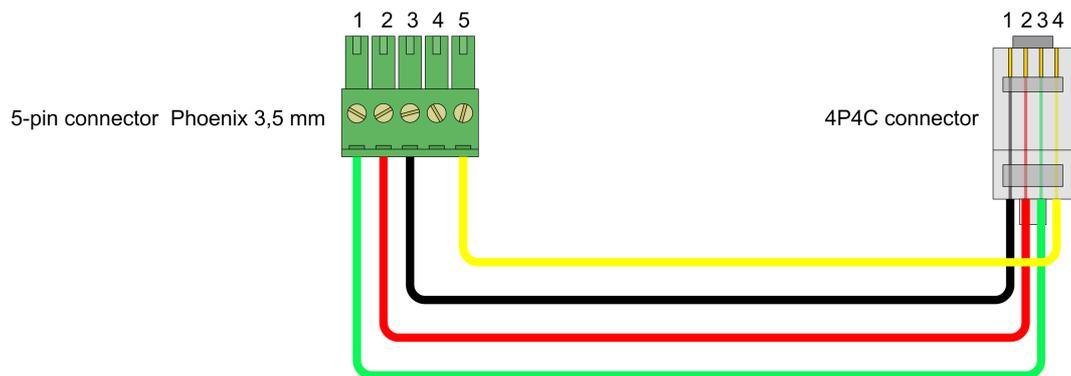
4P4C connector

Note:

The 4P4C connector (popularly, but incorrectly, called RJ11, RJ10, or RJ9), is the de facto industry standard for wired telephone handsets. It is mainly used to provide connection from the base of the telephone to the handset.

Notes

Notes

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