Quick Start
Intelligent Display RS232
WVGA

(based on GraphLight)



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Test sequences RS232

This QuickStart guide enables you to familiarize yourself with our development environment and to discover very quickly the way our solution functions.

Your new StarterKit is able to work in USB, RS232, and CAN.

If you want to test the commands in CAN, then download first with GraphConverter the graphic card of the example in CAN which you will find in the USB key:
\ Exemples \ GraphLight \ CAN \ GraphConverter_Project \ GRL_CAN_WQVGA
Then follow the document instructions: DOC-20171130-2C-UK-Quick Intelligent Display GRL CAN_WQVGA.pdf

This document refers to RS232 or USB communication.

In order to do this, you can use a RS232 terminal, for example Docklight, which allows you enter the hexadecimal commands described in this document.

The Intelligent Display used is based on the ***GraphLight*** board and has thus all the characteristics of this HMI board.

The first step is to install the software program GraphConverter, available in the folder with the same name on the USB stick.

Afterwards you should connect your StarterKit to your computer and to electricity.

Connect the USB/RS232 adapter for the RS232 commands.
Connect the USB cable for the uploads from GraphConverter.
Connect the StarterKit to electricity.

When the StarterKit is first connected to the USB port, you are asked by Windows to install the drivers for the new device. You find the configuration file for your Intelligent Display ".inf" on the USB key in the directory "Firmwares\ IntelligentDisplay\Driver_USB_CDC" (the file is the same for the **GraphLight** board).
If Windows does not detect the installation of the drivers, make use the "Device Manager" of Windows.

Do not mistake the installation of the USB/RS232 adapter (which is a simple virtual COM RS232 port) with the driver CDC of GraphLight.

GraphConverter is delivered with the drivers of the most frequent HMI products. These files can be found in the folder "LibraryCard" which is created in the directory of the executable file (by default C:\Program Files\Clairitec) during the installation of the software program.
It may arrive that the list of reference products has evolved since the creation of the installation package of GraphConverter. We advise you to copy the latest drivers for your Intelligent Display from the USB stick "Firmwares\ GraphLight\PilotesGraphLight".

For more information about the installation of your material, consult the documentation UserManual_GraphConverter.pdf (Chapter 2).

The StarterKit is delivered with a pre-programmed graphic library (*GRL_RS232_WQVGA.gxp*), available on the USB stick in the directory *\Exemples\GraphLight\RS232\GraphConverter_Project\GRL_RS232_WQVGA*

In this directory you will also find the "HMI Editor" project, linked to this graphic library. The project file *GRL_RS232_WQVGA_HMI_.XML* contains all pre-defined HMI screens in their initial state.

Thanks to the "GraphLight" technology, all pre-defined HMI screens can be uploaded into the memory of the HMI board in the same way as the graphic library.

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This allows to display an entire HMI screen in its initial state, with its icons, (buttons in the “non-pushed” mode, by default lightened up or not), the texts shown at start in their pre-defined color and display mode, as well as the pre-defined touch zones, by making use of only one command (GX_PutScreen).

This project is only provided as an example for the start of your development. It helps you to master very quickly the main functions of our concept.

To access the pre-programmed graphic library of your StarterKit on your computer, open the GXP file with GraphConverter.

Once opened, you can also access the “HMI Editor” project and see all the pre-defined HMI screen by clicking on the tab “HMI Editor”.

The graphic library sets your Intelligent Display in RS232 mode with a speed of 115 kBd, 8 bit of data, 1 bit of STOP, no flux control and no parity.

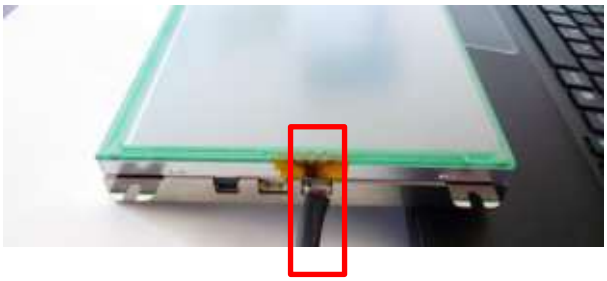
STARTERKIT PREMIUM VERSION: Specification of the female SUBD-9 connector:

Pin	Type designation	Type	Voltage level	Description
1	NC	-	-	
2	RS232_Rx	E	RS232	Data input RS232
3	RS232_Tx	S	RS232	Data output RS232
4	NC	-	-	
5	GND	E	Power supply	Mass (0v)
6	NC	-	-	
7	NC	-	-	
8	NC	-	-	
9	NC	-	-	

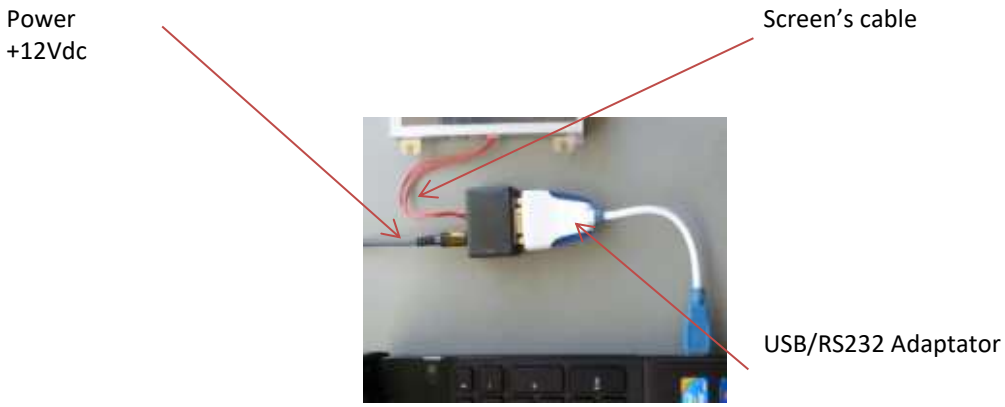
Note : *Consult the documentation “hardware” of your Intelligent Display for more information about its specific connections.*

Connect your StarterKit to a COM port of the following type and as shown below:

→ RS232 Format PC (EIA/232)

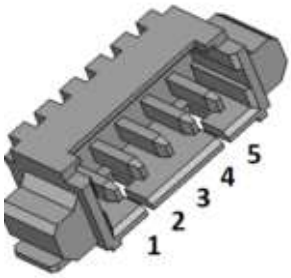


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For all other versions of StarterKit, you can work directly in USB, (mini-USB cable provided).
(*The low power of your StarterKit allows you to supply it directly with the USB cable!)*

J700 connector specification, (if necessary):



PCB base reference: Wurth: 653105131822
Molex: 53261-0571

Matting model: Wurth: 653005113322
Molex: 51021-0500

Pin number	I/O	Description
1	Power	Power Supply (1)
2	Power	GND
3	O	RS232 TX (EIA/232)
4	I	RS232 RX (EIA/232)
5	Power	GND

(1) +5V ou +6 à +36V suivant configuration

For more details on the connection, see document *[DOC-20140305-1D-UK] -Datasheet_Intelligent Viewer 4.3 ".pdf* located in the USB key: *\ Documentations \ IntelligentDisplay*

Upon powering up your Intelligent Display, the first image of the graphic library is automatically displayed in the center of the display. The StarterKit contains the logo of Clairitec as its first image.

The Intelligent Display sends automatically the byte "Reset", 0x54, via the port COM:
You can now send the RS232 sequences and observe their effects on the display.

ATTENTION: It is important to send all necessary bytes of a command in subsequent order.

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- **Display of the first HMI screen, created with the HMI Editor of GraphConverter**

C function:

GX_PutScreen (0, 0x01); //Display HMI screen n° 1

RS232 frame: (3 bytes for this command)

Tx PC:

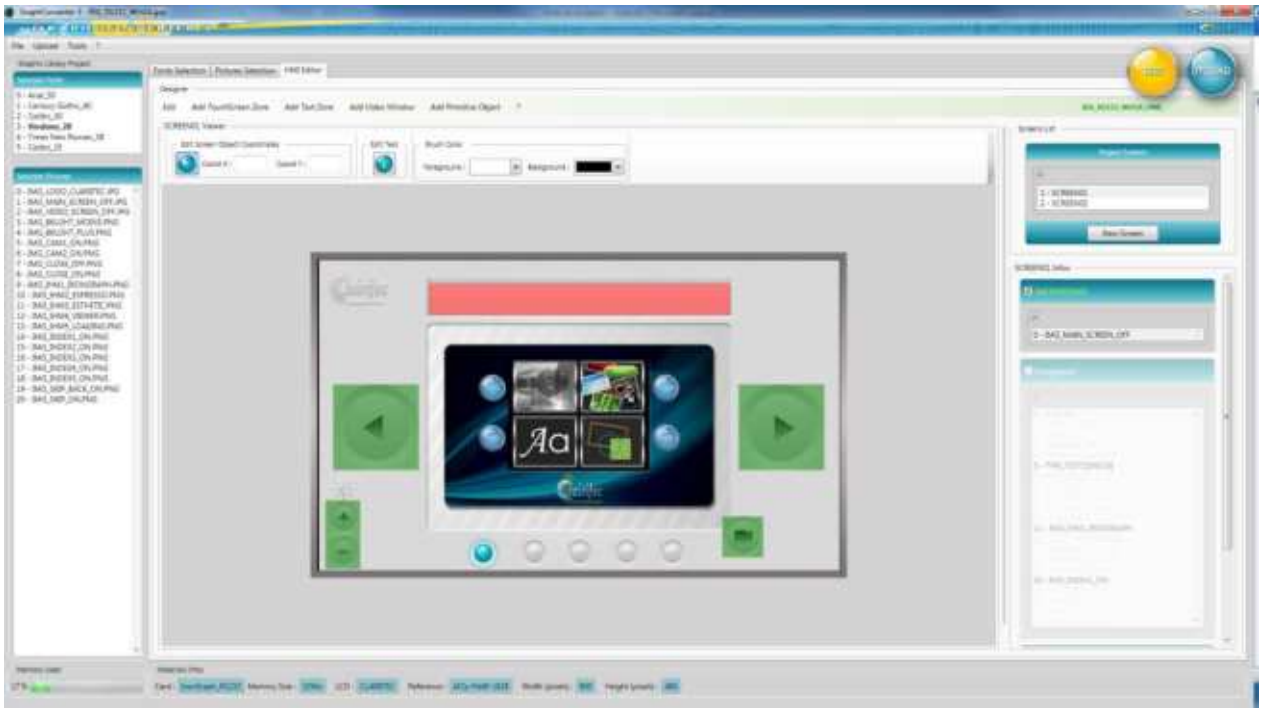
Byte1	Byte2	Byte3
0x1B	0x64	0x01

The HMI screen is completely displayed:



On the display you can see a gray background with 5 types of buttons (“forward”, “back”, “+”, “-“, “camera”), a lightened-up, blue indicator “lamp”, and a dashboard image in the center.
This HMI screen is displayed the following way in GraphConverter:

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Our composition contains:

- Background layer:
- Background image *0-IMG_MAIN_SCREEN_OFF*

- Foreground layer:
- A text zone *5-TYPE_TEXTZONE[0]*
- 2 hidden images of « lit-up » buttons, *IMG_SKIP_BACK_ON* and *IMG_SKIP_ON*, both linked to a touch zone ([T]-1 et [T]-2).
- An image of a blue “lamp” *16-IMG_INDEX_1_ON*
- A centered image *11-IMG_IHM1_GRAPHLIGHT*

- Touch panel layer
- A touch zone *0-TYPE_TOUCHSCREENZONE[1]*
- A touch zone *1-TYPE_TOUCHSCREENZONE[2]*
- A touch zone *2-TYPE_TOUCHSCREENZONE[3]*
- A touch zone *3-TYPE_TOUCHSCREENZONE[4]*
- A touch zone *4-TYPE_TOUCHSCREENZONE[5]*

The hidden elements do not get displayed automatically upon sending the command GX_PutScreen. However, their characteristics, dimension and coordinates, are saved in a text file, type .h (well known for developers in C language). This file helps you to write the code for the commands GX_PutImage and GX_PutString, allowing you to display the hidden elements at the right place and at the right moment of your program.

We will see below how to do this.

When using the command GX_PutScreen to display a pre-defined HMI screen, the two graphic layers of your Intelligent Display are entirely initialized with all elements which have previously been positioned and set into visible mode in the HMI Editor. The foreground layer is activated in writing and display mode.

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- **Activation of the touchscreen layer in the « On Click » mode**

C function:

GX_SetTouchScreen(0, 1, 0, 2, 1, 0, 0); //Activate the touchscreen layer in the "Zones" mode, "On Click" mode, with a fixed period of repetition of 100 mS during the time the touch zone is touched.

RS232 frame: (7 bytes for this command)

Tx PC:

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
0x1B	0x74	0x01	0x02	0x81	0x00	0x00

As soon as this command is send to the HMI board, and when you touch on one of the two buttons "forward" "backward", represented in green in the HMI Editor, you receive the hexadecimal codes 0x81 and 0x82 respectively which repeat themselves every 100 mS during the times you keep touching one of these 2 zones.
The other buttons send the codes 0x83, x084, and 0x85.

When you release the touch zone, the codes are no longer sent. When you click to a non-defined zone on the display you receive the code 0x80, signifying that zone n°0 has been pressed.
The number of the code 0x81 or 0x82 corresponds in our example to the buttons "forward" (0x82), and "backward" (0x81) being pressed.

The fact of having linked these two zones to the 2 images of "lit-up" buttons allows you to display the corresponding "lit-up" button during the time you receive the code 0x81 or 0x82. When the zone is no longer touched, you can replace the "lit-up" image by a transparent rectangle. All of this is possible by making reference to the information described in the text file *IRG_RS232_WVGA_HMI_.h.*

In this file you therefore find the definition of the necessary arguments for the GX_PutString command (for those working in C language) or for the Escape+'I' command of the RS232 protocol.

Extract of the file *IRG_RS232_WVGA_HMI_.h*, defining the lit-up button "backward", linked to the touch zone 1 (0-TYPE_TOUCHSCREENZONE[1]) :

```
/* --- PICTURE IMG_SKIP_BACK_ON  - [T] 1 N° 6 --- */
#define SCREEN01_FOREGROUND_IMG_6          19, 0
#define XY_SCREEN01_FOREGROUND_IMG_6       7, 74
```

The first line defines the number of the image in the graphic library, "19", followed by the option of the function GX_PutImage (always 0).

The second line defines the coordinates of the image as shown in the HMI Editor, this means x=7, Y=74.
See the example of displaying this image through your terminal COM RS232 below:

- **Displaying an image on the foreground layer**

C function:

GX_PutImage(0, 0x0013,0, 0x0007, 0x004A); //Display image 19 at the coordinates x=7, Y=74

RS232 frame: (9 bytes for this command)
- Tx PC:

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
0x1B	0x49	0x00	0x13	0x00	0x00	0x07	0x00

Byte9
0x4A

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The image is displayed at the coordinates x=7, y =74:



The button « backward » appears lit-up.

- **Definition of the text color**
  - **Definition of the background color of the text**

C function:

GX_SetColor(0, BACK_COLOR, 0, 0, 0, 0) ;//Transparent background color of the text (Alpha =0)

RS232 frame: (7 bytes for this command)

- Tx PC:

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
0x1B	0x43	0x01	0x00	0x00	0x00	0x00

  - **Definition of the text color**

C function:

GX_SetColor(0, FORE_COLOR, 255, 255, 0, 0) ;//Foreground color of the text (Alpha=255, R=255, G=0, B=0, (0xFFFF0000))

RS232 frame: (7 bytes for this command)

- Tx PC:

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
0x1B	0x43	0x00	0xFF	0xFF	0x00	0x00

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- **Writing a text with defined alignment**

C function:

GX_PutString (0, STYLE_SCREEN01_FOREGROUND_TXT_3, 0, 0, (unsigned char*)«MyText») ; // Writing "MyText" on the FOREGROUND LAYER in the TEXT ZONE n°0 with the TEXT FONT n°3

RS232 frame: (15 bytes for this command)

- Tx PC:

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
0x1B	0x53	0x82	0x03	0x00	0x00	0x00	0x00

Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15
0x4D	0x79	0x54	0x65	0x78	0x74	0x00

The text “MyText” is displayed, centered, in the white zone above the dashboard image (or rather in the text zone N°0 defined in the HMI Editor):



Never forget the character ZERO (0) to end the chain of characters.

Send a second frame to write a text:

RS232 Frame: (23 bytes for this command)

- Tx PC:

Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7	Byte8
0x1B	0x53	0x82	0x02	0x00	0x00	0x00	0x00

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Byte9	Byte10	Byte11	Byte12	Byte13	Byte14	Byte15	Byte16
0x4D	0x79	0x20	0x73	0x65	0x63	0x6F	0x6E
Byte17	**Byte18**	**Byte19**	**Byte20**	**Byte21**	**Byte22**	**Byte23**	
0x64	0x20	0x54	0x65	0x78	0x74	0x00	

The text “My Text” gets automatically replaced by “My second text”, still centered in the text zone N°0 which has been defined in the HMI Editor.

- **A last example**

To change the HMI screen, send the command PutScreen n°2 on your COM RS232 terminal:

C function:

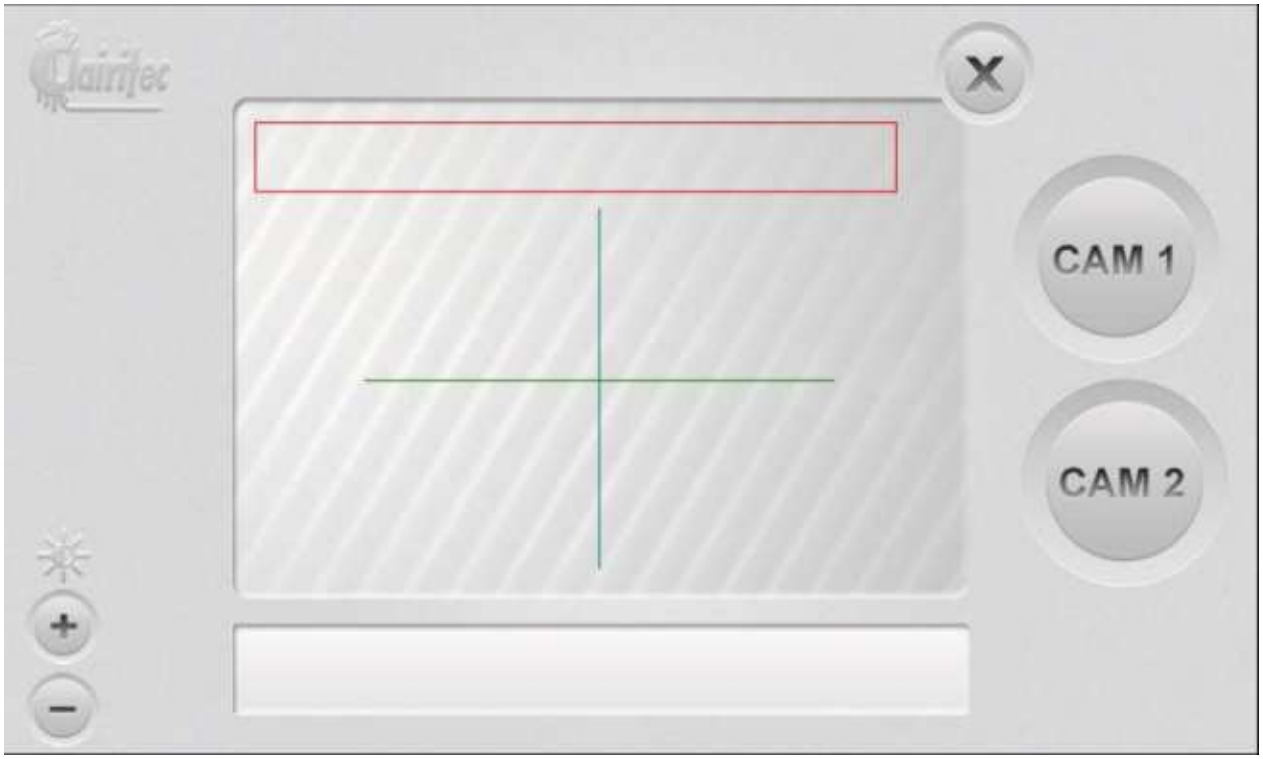
GX_PutScreen(0, 0x02); //Display HMI screen n° 2

RS232 frame: (3 bytes for this command)

Tx PC:

Byte1	Byte2	Byte3
0x1B	0x64	0x02

The HMI screen is completely displayed:



The HMI screen is composed out of 6 touchable buttons, 2 text zones, a red rectangle, and two lines (green and blue). All of these elements have been placed with the HMI Editor of GraphConverter.

When you click on the buttons, it gets clear that the touch panel is still active but that the touch zones have been modified.

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For more information, consult the following documents:

- **RS232_Protocol.pdf** for the plain code of the RS232 Escape commands.
- **FunctionsInC.pdf** for the API (Application Programming Interface) for the C functions.
- **UserManual_GraphConverter.pdf** for the way of using GraphConverter and the HMI editor.
- **Training_GraphLight.pdf** to learn how to use our system.

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Clairitec

CLAIRITEC
11 avenue Henri Becquerel
33700 Mérignac
FRANCE

Web site: www.clairitec.com

Clairitec's services

Customer relation service: contact@clairitec.com

Technical support service: support@clairitec.com

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Clairitec

11, avenue Henri Bequerel - 33700 - MERIGNAC - FRANCE
Phone: +33 (0)5 56 13 04 68

www.clairitec.com