Digital View

**ANALOG INTERFACE CONTROLLER
FOR VGA & SVGA RESOLUTION TFT LCD**

Model: AC-0800
(Part number: 4164200-0X)
(Part number: 4164200-3X)

INSTRUCTIONS

INTRODUCTION

Designed for LCD monitor and other flat panel display applications, the AC-0800 controller provides an auto-input synchronization and easy to use interface controller for:

➢ **TFT (active matrix) LCDs of 800x600 and 640x480 resolutions;**
➢ **Computer video signals of VGA and SVGA standard.**

HOW TO PROCEED
1. Ensure you have all parts and that they are correct, refer to:
- Connection diagram (separate document for each panel)
- Connector reference (in following section)
- Assembly notes
2. Check controller switch and jumper settings (errors may damage the panel)
3. Prepare the PC
4. Connect the parts
5. Understand the operation and functions (in following section)

IMPORTANT USAGE NOTE
This product is for use by system developers and integrators, the manufacturer accepts no liability for damage or injury caused by the use of this product. It is the responsibility of the developer, integrators or other user of this product to:
1. Ensure that all necessary and appropriate safety measures are taken.
2. Obtain suitable regulatory approvals as may be required.
3. Check power settings to all component parts before connection.
4. Understand the operation and connectivity requirements of this controller.

DISCLAIMER
There is no implied or expressed warranty regarding this material.

CONTENTS

It is essential that the sections on Assembly Notes and Connectors, Pinouts & Jumpers is read and understood before connecting or powering up this controller.

SYSTEM DESIGN

A typical LCD based display system is likely to comprise the following:
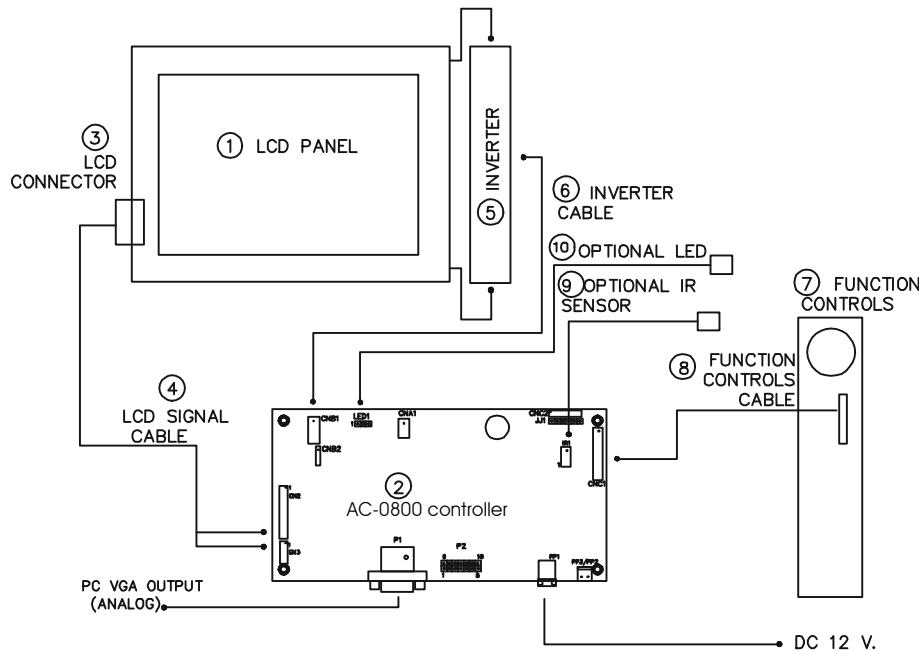
Summary:
1.   LCD panel
2.   LCD controller card, AC-0800
3.   LCD connector board (if necessary)
4.   LCD signal cables
5.   Inverter for CCFT backlight (if not built into LCD)
6.   Inverter cable
7.   Function controls
8.   Function controls cable
9.   IR sensor & cable kit
10.   Status LED & cable kit
11.   PC VGA (analog) in
12.   Power supply (+12VDC in)
13.   Enclosure or mounting (not shown)

Digital View offers a range of accessories such as listed above, to make up complete display solution.

ASSEMBLY NOTES

This controller is designed for monitor and custom display projects using 800x600 or 640x480 resolution TFT panels with a VGA or SVGA signal input. The following provides some guidelines for installation and preparation of finished display solution.

- **Preparation**: Before proceeding it is important to familiarize yourself with the parts making up a system and the various connectors, mounting holes and general layout of the controller. As much as possible connectors have been labeled. Guides to connectors and mounting holes are shown in the following relevant sections.

- **1. LCD Panel**: This controller is designed for typical TFT panels with 5V or 3.3V TTL or LVDS interface. For LVDS interface panel a separate add-on board is required. Due to the variation between manufacturers of signal timing and other panel characteristics factory setup and confirmation should be obtained before connecting to a panel. **(NOTE: Check panel power jumper settings before connection)**

  NOTE: This controller supports up to 8-bit per colour, for panels of lower bits (eg 3 x 3 bit, 3 x 4 bit etc), connection of the panel signal high value should correspond to the controllers highest bit. For example for a 3 x 3 bit panel R2 on the panel should connect to R7 on the controller, in this case R0~4 on the controller will not be connected. For a 3 x 6 bit panel R5 on the panel should be connected to R7 on the controller. For a 3 x 8 bit panel R7 on the panel should be connected to R7 on the controller. Same for G & B.

- **2. Controller card:** Handle the controller card with care as static charge may damage electronic components.

- **3. LCD connector board**: Different makes and models of LCD panel require different panel signal connectors and different pin assignments. The connector board may not necessary for some Digital View cables that direct plug to the LCD panel.

- **4. LCD signal cable**: In order to provide a clean signal it is recommended that LCD signal cables are no longer than 33cm (13 inches). If loose wire cabling is utilized these can be made into a harness with cable ties. Care should be taken when placing the cables to avoid signal interference. Additionally it may be necessary in some systems to add ferrite cores to the cables to minimize signal noise.

- **5. Inverter**: This will be required for the backlight of an LCD, some LCD panels have an inverter built in. As panels may have 1 or more backlight tubes and the power requirements for different panel models backlights may vary it is important to match the inverter in order to obtain optimum performance. See Application notes for more information on connection.

- **6. Inverter Cables**: Different inverter models require different cables and different pin assignment. Make sure correct cable pin out to match the inverter. Using wrong cable pin out may damage the inverter.

- **7. Function Controls**: The following section 'Operation' discusses the controls required and the section 'Connectors, jumpers & pinouts' provides the detail. The controls are minimal for ease of use: On/Off, Brightness (depends on inverter), OSD (5 momentary buttons).

- **8. Function controls cable**: The cables to the function switches should be of suitable quality and length so that impedance does not affect performance. Generally lengths up to 1 metre (3 feet) should be acceptable.

- **9. IR sensor:** It is an optional part only, can be unconnected if not using IT remote control.

- **10. Status LED:** The pin direction of the LED should be corrected for right colour indication. Red colour stands for standby. Green colour stands for signal on. It is an optional part only, can be unconnected.

- **Analog VGA Input Cable**: As this may affect regulatory emission test results and the quality of the signal to the controller, a suitably shielded cable should be utilized.

- **Power Input**: 12V DC is required, this should be a regulated supply. Although the controller provides power regulation for the LCD power this does not relate to the power supplied to the backlight inverter. If an unregulated power supply is provided to an inverter any fluctuations in power may affect operation, performance and lifetime of the inverter and or backlight tubes.

- **Power Output**: An auxiliary power output is available providing 5V and 12V DC power, this can be used for accessories such as touch panels. Note the controller has an overall 3Amp current limit and the current available from the auxiliary power output will be dependent on the power input and other system requirements.

- **Power Safety**: Note that although only 12VDC is supplied as 'power-in' a backlight inverter for panel backlighting produces significantly higher voltages (the inverter does not connect to the ground plane). We strongly advise appropriate insulation for all circuitry.

- **EMI**: Shielding will be required for passing certain regulatory emissions tests. Also the choice of external Controller to PC signal cable and power supply can affect the result.

- **Ground**: The various PCB mounting holes are connected to the ground plane.

- **Servicing**: The controller is not user serviceable or repairable. Warranty does not cover user error in connecting up to the controller and is invalidated by unauthorized modification or repairs.

- **Controller Mounting**: It is recommended that a clearance of at least 10mm is provided above and 5mm below the controller when mounted. Additionally consideration should be given to:
  - Electrical insulation.
  - Grounding.
  - EMI shielding.
  - Cable management. **Note:** It is important to keep panel signal cables apart from the inverter & backlight cables to prevent signal interface.
  - Heat & ventilation: Heat generated from other sources, for example the backlight of a very high brightness panel may generate significant heat which could adversely affect the controller.
  - Other issues that may affect safety or performance.

- **Touch Panels**: Support for touch panels or other low power consumption accessories is available by:
  - Connector CN1 provides 5V & 12V DC which can be used to power such accessories subject to a maximum loading recommended at 500mA.

- **PC Graphics Output**: A few guidelines:
  - Signal quality is very important, if there is noise or instability in the PC graphics output this may result in visible noise on the display.
  - Vertical refresh rate should be set to 60Hz or lower.
  - Non-interlaced is required.

IMPORTANT: Please read the Application Notes section for more information.

CONNECTION & OPERATION

CAUTION: Never connect or disconnect parts of the display system when the systrem is powered up as this may cause serious damage.

CONNECTION
Connection and usage is quite straight forward (it is useful to have the relevant connection diagram available at this time):
1. **LCD panel & Inverter:** Connect the inverter (if it is not built-in the panel) to the CCFT lead connector of the LCD panel.
2. **TTL type panels:** Plug the signal cables direct to CN2 and CN3 on the controller board. Plug the other end of cables to the LCD connector board (if connector board is required, otherwise the signal can be direct plug to the LCD panel connector). Then plug the board connector to the LCD panel connector.
    LVDS/PanelLink type panels: A LVDS/PanelLink transmitter board is required. Plug the transmitter board to CN2 & CN3. Then insert the LCD signal cable with controller end to the connector on the transmitter board. Insert the panel end of the cable the LCD panel connector.
3. **Inverter & Controller:** Plug the inverter cable to CNB1 and CNA1 (if necessary). Plug another end to the connector on the inverter.
4. **Function switch & Controller:** Plug the OSD switch mount cable to CNC1 on the controller board and another to the OSD switch mount.
5. **LED & Controller:** Plug in a 3-way with dual colour LED to connector LED1 on the controller board.
6. **IR & Controller:** Plug in a 3-way with IR sensor to connector IR1 on the controller board.
7. **Jumpers & Switches:** Check all jumpers and switches (SW1 & SW2) are set correctly. Details referring the connection diagram (a separate document) or the jumpers and switches setting table (in the following section).
8. **Jumpers & Inverter & Panel voltage:** Particularly pay attention to the settings of JA3, JB1, JB2, JB3. JB2 & JB3 are used for inverter control (read inverter specification and information on the jumper table to define the correct settings). JA3 is used for panel voltage input (read panel specification and information on the jumper table to define the correct settings).
9. **VGA cable & Controller:** Plug the VGA cable to the connector P1 on the controller board.
10. **Power supply & Controller:** Plug the DC 12V power in to the connector PP1.
11. **Power on:** Switch on the controller board and panel by using the OSD switch mount.

The red LED will light up when power on. The LED will change to green when VGA signal on.

General:
*   If you are using supplied cables & connectors, ensure they are correct for the model of panel and controller.
*   If you are making your own cables & connectors refer carefully to both the panel & inverter specifications and the section in this manual, "Connector, Pinouts & Jumpers" to ensure the correct pin to pin wiring.

PC SETTINGS
The controller has been designed to take a very wide range of input signals however to optimize the PC's graphics performance we recommend choosing 60Hz vertical refresh rate – this will not cause screen flicker.
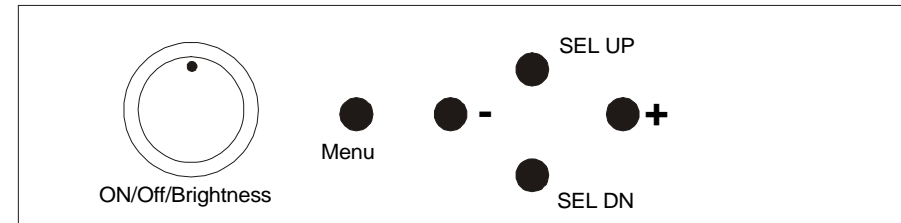
OPERATION
Once the system has been connected and switched on there are a number of functions available to adjust the display image as summarized in the following sections. The settings chosen will be saved for each mode independently.

LCD DISPLAY SYSTEM SETTINGS
NOTE: By way of explanation the following refers to a set of sample buttons that may be obtained as an option. In addition to power on/off and connection for backlight brightness the controller provides an On Screen Display of certain functions which are controlled by 5 momentary type buttons (analog VR type) or 8 momentary type buttons (digital type):

Controls	Analog VR type	Digital type
On/Off – turns controller board power on	VR toggle switch	On/Off button
Brightness – controls backlight brightness	Rotary VR	Brightness +/- buttons
Menu – turns OSD menu On or Off (it will auto time off)	Menu button	Menu button
Select down – moves the selector to the next function (down)	SEL DN	SEL DN
Select up – moves the selector to the previous function (up)	SEL UP	SEL UP
+ – increase the setting/confirm the select	+	+
- – decrease setting	-	-

Analog VR type function control
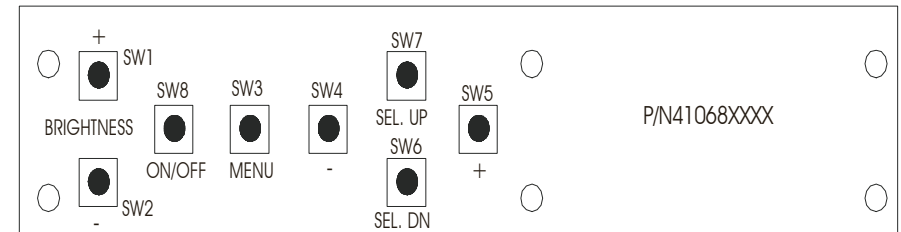
Digital type function control

MANUAL & REMOTE CONTROL

The following table shows the comparison of functions available from different controls:

Operation	One for All	Sony multi remote	DV VR type switchmount	DV digital type switchmount
Menu	Power	Power	Menu	Menu
Default	Mute	Mute	-	-
Select +	Ch+	Ch+	Select +	Select +
Select -	Ch-	Ch-	Select -	Select -
Setting +	Vol+	Vol+	Setting +	Setting +
Setting -	Vol-	Vol-	Setting -	Setting -

Other multi-system IR transmitters will also be suitable if they support common Sony signal timings.

OSD Functions

Brightness	Increase/decrease panel brightness level. Press – or + (- ∎∎∎∎∎∎∎†††††††† + nn), total: 32 steps
Contrast	Increase/decrease panel contrast level. Press – or + (- ∎∎∎∎∎∎∎†††††††† + nn), total: 64 steps
Tuning	Fine tune the data sampling position (adjust display quality). Press – or + (- ∎∎∎∎∎∎∎†††††††† + nn), total: 16 steps
Auto setup	Auto setting the display, e.g. positions, image size, tuning, etc. Press + to activate auto setup.
RGB adjustment ▸	Shows current RGB setting & Adjust RGB color level of video signal by turn on submenu Press + turns on submenu (R: rr G: gg B: bb)
Image vertical position	Adjust the image vertical position (up & down) Press – or + (- ∎∎∎∎∎∎∎†††††††† + nn), total: 127 steps
Image horizontal position	Adjust the image horizontal position (left & right) Press – or + (- ∎∎∎∎∎∎∎†††††††† + nn), total: 255 steps
Image size – horizontal	Adjust the image horizontal size Press – or + (- ∎∎∎∎∎∎∎†††††††† + nnnn), total: 255 steps
Image expansion	Full screen expansion (input resolution lower than panel resolution) Press – or + (On / Off)
System info ▸	Shows current system information and turns on the submenu. Press + turns on submenu (e.g. Vmode, Hf: hh.hkHz, Vf: vv.vHz)
Exit menu	Turn off the OSD menu. Press + turns off the OSD menu.
Extended menu ▸	Turn on the extended menu. Press + turns on the extended menu.

Items marked ▸ have sub menus.

RGB Adjustment   sub menu

Red	Adjust the red color level Press – or + (- ∎∎∎∎∎∎∎†††††††† + nn), total: 64 steps
Green	Adjust the green color level Press – or + (- ∎∎∎∎∎∎∎†††††††† + nn), total: 64 steps
Blue	Adjust the blue color level Press – or + (- ∎∎∎∎∎∎∎†††††††† + nn), total: 64 steps
Reset to default	Reset the RGB color level to default. Press + or – resets to default.
Back to main menu	Go back to main menu. Press + or – returns to main menu.

System Info   sub menu

Display type	TFT LCD 800x600 (or other display modes, e.g. 640x480)
Model	Shows the model number of the board, e.g. AC-0800
BIOS version	Shows BIOS version
Run time	Shows the accumulated running time of the board since last reset (nnn Hrs nn Min)
Back to main menu	Go back to main menu Press + or – returns to main menu.

Extended menu

Dos text or graphics	Set text mode or graphic mode in DOS mode. Press – or + (Dos Text / Graphics)
Direct access 1	Turn on direct access table 1. Press + or – turns on table 1.
Direct access 2	Turn on direct access table 2. Press + or – turns on table 2.
Signal level	Set input signal level (0.7V or 1.0V)
OSD horizontal position	Move OSD menu horizontally. Press – or + (- ∎∎∎∎∎∎∎†††††††† + nn), total: 256 steps
OSD vertical position	Move OSD menu vertically. Press – or + (- ∎∎∎∎∎∎∎†††††††† + nn), total: 256 steps
Image Hori. Inverse	Horizontally inverse the image Press – or + (On / Off)
Image Vert. Inverse	Vertically inverse the image Press – or + (On / Off)
Menu time out	Set menu time-out period Press – or + (10 / 20 / 30 / 45 / 60 / cont sec.)
Menu auto save	Press – or + (Yes / No)
Language ▸	This option no function
Back to main menu	Go back to main menu

Direct access 1 & 2   sub menu

Brightness	Define hot keys as brightness level increase/decrease
Contrast	Define hot keys as contrast level increase/decrease
Tuning	Define hot keys as tuning adjustment
Back to previous menu	Go back to previous menu

The direct access table 1 and 2 allow the user to define the hot-keys functions. There are two sets of hot-keys can be defined. SEL UP/SEL DN keys can be defined in the direct access table 1. The +/- keys can be defined in the direct access table 2.

The hot-key function can be turned on by any one push of SEL UP/SEL DN or +/- then setting can be started.

Language   sub menu

English	Select English display
Italiano	Select Italian display
Francais	Select French display
Espanol	Select Spanish display
Svenska	Select Swedish display
Deutsche	Select Dutch display
Nederlands	Select Netherlands display
Back to previous menu	Go back to previous menu

CONNECTORS, PINOUTS & JUMPERS

The various connectors are:
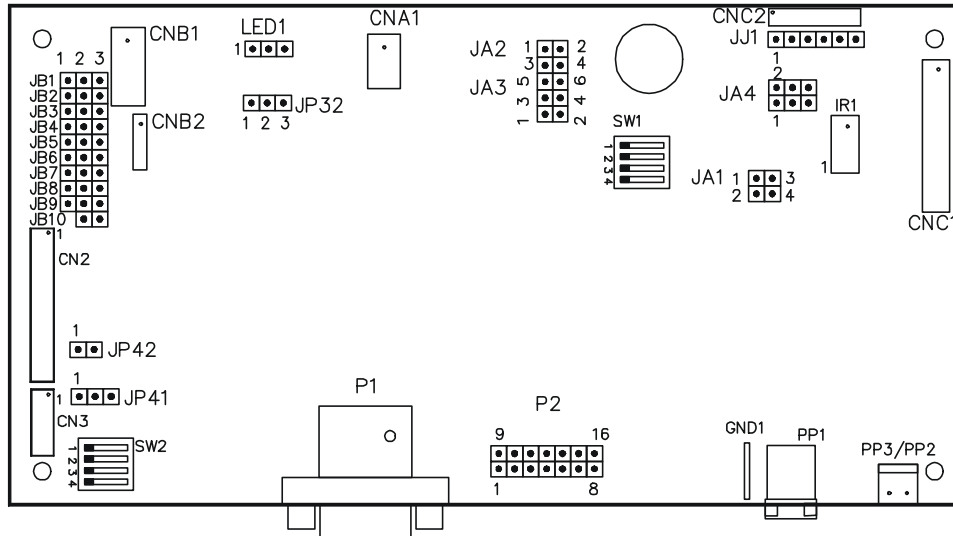
P/N : 4164200-0X
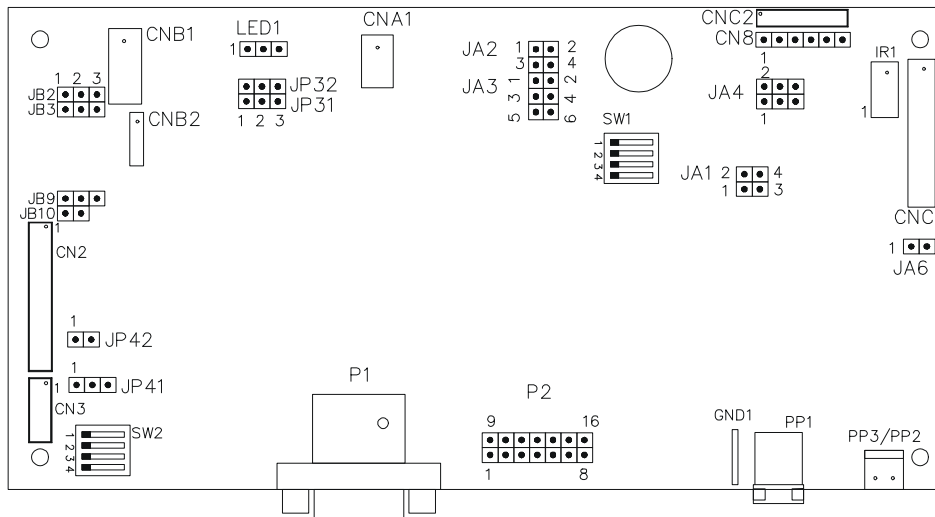
P/N : 4164200-3X

Summary: Connectors (18 bit = 3 x 6 bit)

Ref	Purpose	Description
CNA1	Auxiliary power	JST 4-way, B4B-XH-A
CN2	Panel signal	Hirose 32-pin, DF11-32DP-2DSA
CN3	Panel signal	Hirose 10-pin, DF11-10DP-2DSA
CNB1	Backlight inverter	JST 5-way, B5B-XH-A
CNB2	Alternate backlight inverter	Hirose 10-pin, DF13-10P-1.25DSA
CNC1	Function controls	JST 12-way, B12B-XH-A
CNC2	Alternate function controls	Hirose 9-pin, DF13-9P-1.25DSA
CN8/JJ1 (note 1)	RS-232 serial control in	Header pin 6x1
IR1	Infra-Red sensor connector	JST 3-way, B3B-XH-A
LED1	Dual color LED connector	Header pin 3x1
P1	VGA analog input	DB15-way DDC version (blue colour)
P2	VGA input (alternative)	Header pin 8 x 2
PP1	DC power in	DC power jack, 2.5mm contact pin diameter positive
PP2	DC power input (alternative)	DC power Molex 2-pin 0.156" pitch

Note 1   P/N 4164200-3X: The RS-232 port labeled as CN8
P/N 4164200-0X: The RS-232 port labeled as JJ1

Summary: Jumpers setting

Ref	Purpose	Note
JA1	On board +5V logic power enable	1-3 & 2-4 closed, factory set, do not remove
JA2	On board +3.3V logic supply enable	1-3 & 2-4 closed, factory set, do not remove
JA3	Panel power voltage select	1-3 & 2-4 = +3.3V panel voltage supply 3-5 & 4-6 = +5V panel voltage supply
JA4	RS-232 voltage level	1-3 & 2-4 = +12V 3-5 & 4-6 = +5V
JA6	Alternate power switch P/N: 4164200-0X: This jumper does not present	Close = power ON Open = power OFF
JB1	P/N 4164200-3X: This jumper does not present. P/N 4164200-0X: Backlight brightness PWM –signal level	Factory set to 1-2 = +5V (2-3 = +12V)
JB2	Backlight inverter on/off control – signal level	1-2 = On/Off control signal 'High' = +12V 2-3 = On/Off control signal 'High' = +5V Open = On/Off control signal 'High' = Open collector **CAUTION**: Incorrect setting can damage inverter.
JB3	Backlight inverter on/off control – polarity	1-2 = control signal 'high' = CCFT ON 2-3 = control signal 'low' = CCFT ON
JB4	P/N 4164200-3X: This jumper does not present. P/N 4164200-0X: Backlight brightness PWM – polarity	Factory set to 1-2 = 'high' = CCFT ON
JB5	P/N 4164200-3X: This jumper does not present. P/N 4164200-0X: Backlight brightness signal.	Factory set to 1-2 = voltage (2-3 = PWM)
JB6	P/N 4164200-3X: This jumper does not present. P/N 4164200-0X: Backlight brightness control	Factory set to 1-2 = VR (2-3 = Voltage or PWM)
JB7	P/N 4164200-3X: This jumper does not present. P/N 4164200-0X: Backlight VR_A pull down control	Factory set to "Open"
JB8	P/N 4164200-3X: This jumper does not present. P/N 4164200-0X: Backlight VR_B pull up control	Factory set to 2-3
JB9	Backlight inverter status	Factory set to 1-2 = active low (2-3 = active high)
JB10	Backlight power control	Factory set to 1-2 = by MCU (2-3 = always enable)
JC1	P/N 4164200-3X: This jumper does not present. P/N 4164200-0X: Input power control	Factory set to "open" = switch mount control
JP31 & JP32	P/N 4164200-3X: Panel selection P/N 4164200-0X: JP31 does not present.	TFT VGA panel: JP31 & JP32 = open TFT SVGA panel : JP31 = open, JP32 = 1-2 DSTN VGA panel: JP31 & JP32 = open (note 2) DSTN SVGA panel: JP31 & JP32 = 2-3 (note 2) JP32 = 1-2 = TFT SVGA, JP32 = open = TFT VGA
JP32	P/N 4164200-3X: Panel selection P/N 4164200-0X: Panel selection	Open = Open = VGA panel, 1-2 = SVGA panel
JP41	Reserved for LG LP064V1 panel only	1-2 = LG LP064V1, open = other panels
JP42	Reserved	Factory set to "Open"
SW1	Panel & function selection	See table below

Note 2   STN and TFT panels are supported by 4164200-3X only with different firmware store in U10.
4164200-0X supports only TFT panels.

SW1: Panel and function selection

Pos. #	Function	Description
1 & 2	Reserved	ON
3 & 4	Panel selection	OFF & ON = SVGA panel OFF & OFF = VGA panel

SW2: Panel and function selection

Pos. #	Function	Description
1	Clock phase change	Change to get best image quality (TFT panel only)
2	Video lock	ON = lock input & output OFF = no locking
3	Reserved	OFF
4	Reserved	OFF

PINOUTS

CNA1 - Auxiliary power output, JST B4B-XH-A

PIN	SYMBOL	DESCRIPTION
1	AUX 12V	+12V DC, 500mA max.
2	GND	Ground
3	GND	Ground
4	AUX 5V	+5V DC, 500mA max

CN2 - To LCD panel, HIROSE DF11-32DP-2DSA

PIN	SYMBOL	DESCRIPTION
1	GND	Ground
2	DCLK	Dot clock signal
3	H-Sync	Horizontal sync signal
4	V-Sync	Vertical sync signal
5	GND	Ground
6	R2	Data bit Red 2
7	R3	Data bit Red 3
8	R4	Data bit Red 4
9	R5	Data bit Red 5
10	R6	Data bit Red 6
11	R7	Data bit Red 7
12	GND	Ground
13	G2	Data bit Green 2
14	G3	Data bit Green 3
15	G4	Data bit Green 4
16	G5	Data bit Green 5
17	G6	Data bit Green 6
18	G7	Data bit Green 7
19	GND	Ground
20	B2	Data bit Blue 2
21	B3	Data bit Blue 3
22	B4	Data bit Blue 4
23	B5	Data bit Blue 5
24	B6	Data bit Blue 6
25	B7	Data bit Blue 7
26	GND	Ground
27	ENAB / DE	Signal to settle the horizontal display position
28	VLCD	Panel power +3.3V/+5V (set by JA3)
29	VLCD	Panel power +3.3V/+5V (set by JA3)
30	NC	No Connection
31	NC	No Connection
32	RESERVED	

CN3 - To LCD panel, HIROSE DF11-10DP-2DSA

PIN	SYMBOL	DESCRIPTION
1	R0	Data bit Red 0
2	R1	Data bit Red 1
3	G0	Data bit Green 0
4	G1	Data bit Green 1
5	B0	Data bit Blue 0
6	B1	Data bit Blue 1
7	GND	Ground
8	GND	Ground
9	Vcc 5V	Vcc, +5V
10	+12V	+12V

CNB1 - To backlight inverter, JST B5B-XH-A

PIN	SYMBOL	DESCRIPTION
1	GND	Ground
2	VBKL	Backlight power supply, +12VDC (switched)
3	BLCTRL	Backlight On/Off control signal (refer to JB2 & JB3)
4	BVR_WIP	Backlight brightness VR pin WIP
5	BVR_A	Backlight brightness VR pin A

CNB2   ALTERNATE BACKLIGHT INVERTER, HIROSE DF13-10P-1.25DSA

PIN	SYMBOL	DESCRIPTION
1	+12V	Backlight power supply, +12VDC (switched)
2	+12V	Backlight power supply, +12VDC (switched)
3	Aux_Vcc	Auxiliary power, +5VDC
4	GND	Ground
5	GND	Ground
6	INV_STAT	Inverter status
7	BLCTRL	Backlight On/Off control signal (refer to JB2 & JB3)
8	BVR_B	Backlight brightness VR pin B
9	BVR_WIP	Backlight brightness VR pin WIP, level or PWM
10	BVR_A	Backlight brightness VR pin A

CNC1 - To control switches, JST B12B-XH-A

PIN	SYMBOL	DESCRIPTION
1	PSWIN	Power switch A
2	SW_ON	Power switch B
3	BVR_A	Backlight brightness VR pin A
4	BVR_WIP	Backlight brightness VR pin WIP
5	BVR_B	Backlight brightness VR pin B (470Ω resistor to +5V Vcc)
6	GND	Ground
7	MENU	OSD menu button
8	-/LEFT	OSD -/Left button
9	+/RIGHT	OSD +/Right button
10	SEL	OSD Select down button
11	SEL_UP	OSD Select up button
12	PWR	Power button

The VR for brightness depends on the inverter.
The main power load for On/Off is handled by a relay on the controller.

CNC2 - Alternate control switches, HIROSE DF13-9P-1.25DSA

PIN	SYMBOL	DESCRIPTION
1	PWR	Power button
2	BL_UP	Backlight brightness up
3	BL_DN	Backlight brightness down
4	MENU	OSD menu button
5	SEL_UP	OSD select up
6	SEL_DN	OSD select down
7	PLUS/RIGHT	OSD +/Right
8	MINUS/LEFT	OSD -/Left
9	GND	Ground

CN8/JJ1   Serial control (RS-232), 6-pin header

PIN	SYMBOL	DESCRIPTION
1	SDATA	Reserved
2	SCLK	Reserved
3	Vcc	+5V
4	TXD	RS-232 Tx data
5	GND	Ground
6	RXD	RS-232 Rx data

P1 & P2 - ANALOG VGA INPUT - 15 way connector

PIN	SYMBOL	DESCRIPTION
1	PCR	Red, analog
2	PCG	Green, analog
3	PCB	Blue analog
4	ID2	Reserved for monitor ID bit 2 (grounded)
5	DGND	Digital ground
6	AGND	Analog ground red
7	AGND	Analog ground green
8	AGND	Analog ground blue
9	DDC_5V	+5V power supply for DDC (optional)
10	DGND	Digital ground
11	ID0	Reserved for monitor ID bit 0 (grounded)
12	DDC_SDA	DDC serial data
13	HS_IN	Horizontal sync or composite sync, input
14	VS_IN	Vertical sync, input
15	DDC_SCL	DDC serial clock

PP1 - 12VDC power supply - input

PIN	DESCRIPTION
1	+12VDC in middle pin
2	Ground

PP2   Alternate 12VDC power supply - input

PIN	DESCRIPTION
1	+12VDC
2	Ground

CONTROLLER DIMENSIONS
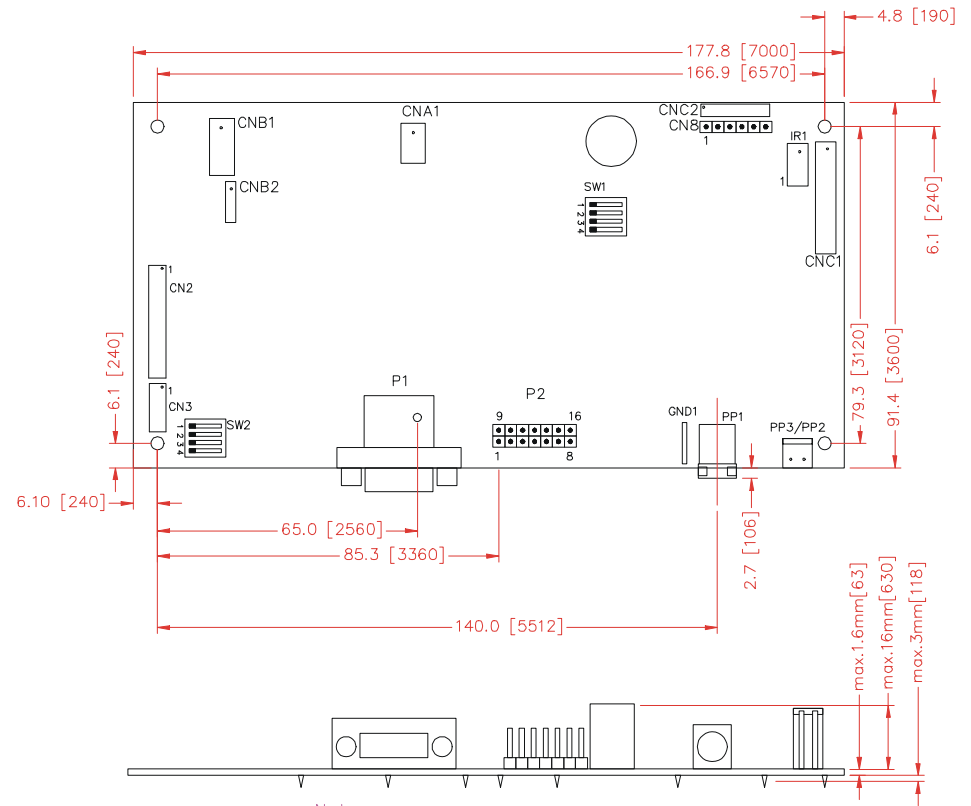
Note:
−All dimensions are in mm [0.001 inches]

The maximum thickness of the controller is 20.6mm (measured from bottom of PCB to top of components, including any underside components & leads). We recommend clearances of:

- 5mm from bottom of PCB - if mounting on a metal plate we also recommend a layer of suitable insulation material is added to the mounting plate surface.
- 10mm above the components
- 3~5mm around the edges

Any of the holes shown above can be used for mounting the PCB, they are 3.2mm in diameter. Other holes are used for mounting inverters supplied as fitted options.

CAUTION: Ensure adequate insulation is provided for all areas of the PCB with special attention to high voltage parts such as the inverter.

APPLICATION NOTES

USING THE CONTROLLER WITHOUT SWITCHES ATTACHED
This is very straightforward:
1. With controls attached and display system active make any settings for colour, tint and image position as required then switch everything off.
2. Remove the control switches, the 12 way (CNC1) cables.
3. Use a jumper or similar to connect pins 1 & 2 on CNC1, this will fix the board On.
4. Refer to inverter specifications for details as to fixing brightness to a desired level, this may require a resistor, an open circuit or closed circuit depending on inverter.

Summary: On CNC1 the only functions that are used are for On/Off and Brightness (if controller mounted inverter is used). On CNC1 the pins are for momentary buttons so it doesn't matter that no buttons are attached.

INVERTER CONNECTION
There are potentially 3 issues to consider with inverter connection:
1. Power
2. Enable
3. Brightness
Please read the following sections for a guide to these issues.

Inverter Power: As per the table for CNB1 pin 1 is ground and pin 2 provides 12V DC. This should be matched with the inverter specification: see table.

CNC1

PIN	DESCRIPTION
1	ground
2	+12VDC

Enable: This is a pin provided on some inverters for On/Off function and is used by this panel controller for VESA DPMS compliance. If the inverter does not have an enable pin or the enable pin is not used then DPMS will not be operational. Pin 3 should be matched to the inverters specification for the 'enable' or 'disable' pin.

CNC1

PIN	DESCRIPTION
3	enable

Further, jumpers JB2 & JB3 should be set to match the inverters specification for the enable pin power and High or Low setting: see table.

Ref	Purpose	Note
JB2	inverter enable voltage	1-2 H=12V, 2-3 H=5V (Vcc), OPEN H=open collector
JB3	inverter control	1-2 H=On, 2-3 L=On

Brightness: There are various methods for brightness control and it is important to consider the specifications for the inverter to be used. Generally the situation is:

1. Brightness can controlled by using a VR.
2. Brightness controlled adding a circuit such as PWM (Pulse Width Modulation).
3. No adjustment of brightness is possible.
CNC1 pins 4 & 5 are available for connecting to an inverter or circuit where VR control is supported.

CNC1

PIN	DESCRIPTION
4	VR WIP
5	VR A

This can then be matched with function controls connected to CNC1 pins 3 & 4: see table.

CNC1

PIN	DESCRIPTION
3	VR A
4	VR WIP

TROUBLESHOOTING

General
A general guide to troubleshooting a flat panel display system it is worth considering the system as separate elements, such as:
- Controller (jumpers, PC settings)
- Panel (controller, cabling, connection, PC settings)
- Backlight (inverter, cabling, backlight tubes)
- Cabling
- Computer system (display settings, operating system)

Through step by step cross checking with instruction manuals and a process of elimination to isolate the problem it is usually possible to clearly identify the problem area.

No image:
- If the panel backlight is not working it may still be possible to just see some image on the display.
- A lack of image is most likely to be caused by incorrect connection, lack of power, failure to provide a signal or incorrect graphic card settings.

Image position:
- If it is impossible to position the image correctly, ie the image adjustment controls will not move the image far enough, then test using another graphics card. This situation can occur with a custom graphics card that is not close to standard timings or if something is in the graphics line that may be affecting the signal such as a signal splitter (please note that normally a signal splitter will not have any bad effect).

Image appearance:
- A faulty panel can have blank lines, failed sections, flickering or flashing display
- Incorrect graphics card refresh rate, resolution or interlaced mode will probably cause the image to be the wrong size, to scroll, flicker badly or possibly even no image.
- Incorrect jumper settings on the controller may cause everything from total failure to incorrect image. CAUTION: Do not set the panel power input incorrectly.
- Sparkling on the display: faulty panel signal cable.

Backlight:
Items to check include: Power input, Controls, Inverter and Tubes generally in this order. If half the screen is dimmer than the other half:
- Check cabling for the inverter.
- For a specific backlight tube check the AC pins orientation (CAUTION: never reverse any DC power pins).

Also:
- If adjusting brightness control has no effect the chances are that the VR rating or method of adjusting brightness is not compatible or correctly connected to the inverter.
- If system does not power down when there is a loss of signal.

Continued failure:
- If unit after unit keeps failing consider and investigate whether you are short circuiting the equipment or doing something else seriously wrong.

Generally after common sense issues have been resolved we recommend step by step substitution of known working parts to isolate the problem.

SPECIFICATIONS

Panel compatibility	640 x 480 and 800 x 600 TFT LCD's from manufacturers such as Sharp, NEC, Toshiba, IBM, Hitachi, Philips/Hosiden, Fujitsu, Mitsubishi, Samsung, LG, Hyundai, etc though some factory adjustment may be required for individual panel timings. DSTN 640x480 and 800x600 panels support with special firmware stored in U10.
No. of colours	Up to 3 x 8 bit providing 16.7 million colours.
Vertical refresh rate	VGA, SVGA to VESA standards up to 75Hz
Dot clock (pixel clock) maximum	50MHz
Graphics formats	Standard VGA & SVGA
Graphics mode auto detect	Yes, VGA & SVGA
Standard input at source	VGA analog (15-pin) standard with automatic detect of separate sync, composite sync or sync on green
Controls available	- On/Off - Brightness (inverter) - OSD menu, - OSD select up - OSD select down - OSD setting + - OSD setting -
Control interface	- Buttons - Infra red - RS-232
Settings memory	Settings are stored in non volatile memory
Run time monitor	Updates at 30minutes intervals
Multi-language OSD support	7 languages
VESA DPMS implementation	Yes
Plug & Play	VESA DDC 1, 2/b compatible
Voltage output for LCD	+3.3V DC, +5V DC
Input voltage	12VDC
Power protection	Fuse fitted - auto reset
DC Power handling	An on board relay handles the power load for On/Off and power protection to the LCD.
Power load maximum	The controller has an overall 3Amp current limit.
Controller power consumption	Approx 2.5W (controller logic only, no panel)
Controller dimensions	178mm x 91.5mm x 21mm
Storage temperature limits	-40°C to +70°C
Operating temperature limits	0°C to +65°C

NOTES
Please note the following:
- For specific panel setup a sample of LCD panel may be required (this will be returned) and a copy of the full technical specifications for the panel from the manufacturer.
- Relayout and custom development services are available.

Graphics modes supported:

Ref	Mode	e		e	e	e		e a
1	e	720	400	21 85	60	24 58		e a a e e g ee
2	e	720	400	31 5	70	28 32		e a a e e g ee
3	a	640	350	21 85	60	21 85		e a a e e g ee
4	a	640	350	31 5	70	25 175		e a a e e g ee
5	a	640	400	21 85	70	21 85		e a a e e g ee
6	a	640	400	31 5	70	25 175		e a a e e g ee
7	a	640	480	31 5	60	25 175		e a a e e g ee
8	a	640	480	35	70	30 24		e a a e e g ee
9	a	640	480	37 86	72	31 5		e a a e e g ee
10	a	640	480	37 5	75	31 5		e a a e e g ee
11	a	800	600	37 88	60	40		e a a e e g ee
12	a	800	600	48 08	72	50		e a a e e g ee
13	a	800	600	46 88	75	49 5		e a a e e g ee
14	a	832	624	49 73	74 6	57 28		e a a e e g ee

WARRANTY

The products are warranted against defects in workmanship and material for a period of one (1) year from the date of purchase provided no modifications are made to it and it is operated under normal conditions and in compliance with the instruction manual.

The warranty does not apply to:
- Product that has been installed incorrectly, this specifically includes but is not limited to cases where electrical short circuit is caused.
- Product that has been altered or repaired except by the manufacturer (or with the manufacturer's consent).
- Product that has subjected to misuse, accidents, abuse, negligence or unusual stress whether physical or electrical.
- Ordinary wear and tear.

Except for the above express warranties, the manufacturer disclaims all warranties on products furnished hereunder, including all implied warranties of merchantability and fitness for a particular application or purpose. The stated express warranties are in lieu of all obligations or liabilities on the part of the manufacturer for damages, including but not limited to special, indirect consequential damages arising out of or in connection with the use of or performance of the products.

CAUTION

Whilst care has been taken to provide as much detail as possible for use of this product these instructions cannot be relied upon as an exhaustive source of information. This product is for use by suitably qualified persons who understand the nature of the work they are doing and are able to take suitable precautions and design and produce a product that is safe and meets regulatory requirements.

LIMITATION OF LIABILITY

The manufacturer's liability for damages to customer or others resulting from the use of any product supplied hereunder shall in no event exceed the purchase price of said product.

TRADEMARKS

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