

# Basic Installation Guide

(Rev.1.2p)

VFD display 2x20 FV-2029M – RS-232C

## • Warnings and Cautions

	<ol style="list-style-type: none"> <li>1. Avoid metal contact with device connectors</li> <li>2. Use the device outside the environment with flammable gases</li> </ol>
	<p>If the following situations occur, immediately shut down the host computer, unplug the device, and consult your nearest dealer.</p> <ol style="list-style-type: none"> <li>1. Smoke, unusual odor or sounds coming from the device</li> <li>2. Dropping the device with visible damage to the cover</li> </ol>
	<p>Never do the following:</p> <ol style="list-style-type: none"> <li>1. Do not use the device in extremely humid places, or expose it to excessive temperature changes.</li> <li>2. Do not use the device in extremely humid places, or expose it to excessive temperature changes.</li> <li>3. Do not place the device in an oily or steamy environment such as kitchen, etc.</li> <li>4. Do not leave the device without adequate ventilation, under the cloth, in any cover or package.</li> <li>5. Do not insert foreign objects or pour water into the device openings.</li> <li>6. Do not touch or carry this device with your hands wet.</li> <li>7. Do not use anti-slip gloves containing plasticizers when working with this device.</li> <li>8. Never use organic solvents such as gasoline, thinners, insecticides, etc. for cleaning. This could result in fire or electric shock.</li> <li>9. Do not pull or unnecessarily bend the connecting cables or place heavy objects on them.</li> </ol> <p>Do not look into the light sources of the device and do not point the light source at the eyes of others. This may cause irreversible eye damage.</p>
	<p>Do not leave the device in unstable locations where there is a risk of falling and consequent danger of injuring people.</p>
	<p>Once damage to the power cord is detected, such as damage to the insulation, stop using the device immediately and contact your dealer. Fire or electric shock could occur.</p>

## • Basic Information

This guide provides a brief overview of the information necessary to install the product. More detailed information about the product can be found at [www.virtuos.cz/download](http://www.virtuos.cz/download).

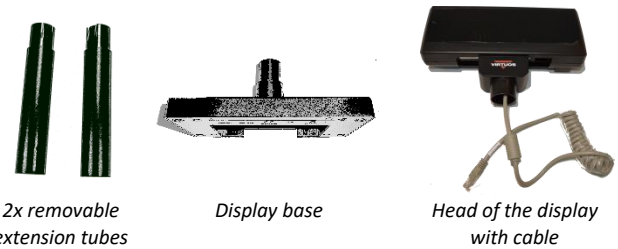
## • Features

- High brightness of the display ensures excellent visibility of displayed characters
- Display control via RS-232 serial port
- Easy programming using ESC sequence commands
- Possibility of adjusting the height and angle of the display
- Pass-through input allows connecting of another display or printer
- 13 character sets including Czech Latin II + one by user defined set

## • Specification

Display type	Green vacuum fluorescent display (VFD)
Display format	40 Characters (20 columns × 2 lines)
Character type	13 predefin. sets of internat. characters in ROM 1 set of user definable characters
Character font	Matrix 5x7 dots; 5,25 mm (W) × 9 mm (H)
Power supply, consump.	12V (9-24V) DC, max. 5W
Dimensions	Panel: 228 (W) × 94 (H) × 47,7 (D) mm Pole: 150 mm(H) × 2 Base: 228 (W) × 60 (H) × 114 (D) mm
Weight	2 kg
Tilt and swivel	0° – 35° in three steps, max. 270°
Interface	RS-232 (Dsub-9P)
Mean time failure	25 000 hours (Vibration Proof version on demand)

## • Package content



Display consists of several parts. The main part is display head with its visual display unit, positioning joint and attached cable with RJ-45 connector. Another part is display base with connectors. Interconnecting tubes are inserted between the head and base as needed. It is thus possible to have low display without tubes with height of 208 mm, with one tube with height of 358 mm and with both tubes with height of 508 mm.

## • Optional accessories

- 12V Power adaptor for POS + Metal Bracket
- Power cable for POS, 30 cm, black
- Replacement data connection cable
- For other extension cables etc., please, check our current offer on [www.virtuos.cz](http://www.virtuos.cz)

## • Assembling – options

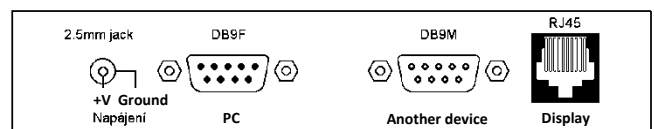
Installation steps below:

1. Choose extension tube(s) to required display height.
2. Pass the cable from the display head through the tube(s) and display base.
3. Assemble the entire display set – place the tubes on each other so that they locked – round holes vs. protrusion.
4. Insert connector R45 to the slot in the base labeled Display, make sure that the connector is placed right way – with lock facing out
5. Secure the cable at the bottom of the base by pushing and twisting between the two plastic posts near the side cutout as needed.
6. Connect the serial cable to the slot labeled PC in the display base and bring it out through the side slot of the base.
7. Connect the power supply. The display can be powered by the ninth PIN of Canon connector or by power supply connector – by external adapter or by cable from reduction (for additional cost). Never use supplying be PIN and connector and the same time!
8. Insert the other side of the serial cable to the computer, or another POS device, and turn the display on using the switch on the back side of the display.
9. Place the display on desired location

**Note:** The display base has 4 holes on the perimeter, which are passable after removing the rubber feet and can be used for mechanical fastening to the table top, device etc.

A 2 m extension cable can also be inserted between the display and the serial cable.

## • Description of display base connectors



### Power Supply

It is not necessary to strictly observe 12V supply voltage. The display is equipped with a voltage regulator and can be powered from 9-24V DC.

### PC

The display is connected to the computer via a serial cable. Display uses parameters according to the switches settings used for communication, see below 9600 or 19200 bd, 8 data bits, non-parity, 1 stop bit.

### Other devices

You can connect another optional device to connector DB9M, communicating with the same parameters as the VFD display using one serial port. For a more detailed description of the commands, see the programming and design manual at [www.virtuos.cz](http://www.virtuos.cz).

### Display

This connector connects the display itself (display head). Included is a connecting cable that is already pre-wired in the display head and its other side (gray cap) plugs into the display leg. Never remove the cable from the display head; do not connect the cable upside down!

### • Switch settings

Switch settings				Selecting a character set	
SW4	SW5	SW6	SW7	Character set (20h-7Fh)	Code table (80h-FFh)
On	On	On	On	USA	PC-437
On	On	On	Off	French	PC-858
On	On	Off	On	German	PC-858
On	On	Off	Off	U.K.	PC-858
On	Off	On	On	Danish	PC-858
On	Off	On	Off	Swedish	PC-858
On	Off	Off	On	Italian	PC-858
On	Off	Off	Off	Spanish	PC-858
Off	On	On	On	Japanese	Katakana
Off	On	On	Off	Norwegian	PC-858
Off	On	Off	On	Danish II	PC-858
Off	On	Off	Off	Slavonic – Latin II / PC852	
Off	Off	On	On	Russian	
Off	Off	Off	Off	User defined	

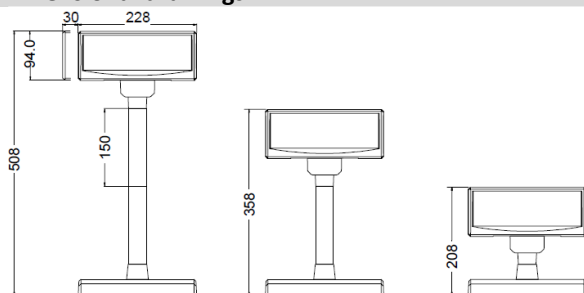
### Selecting a command set

SW2	SW3	Mode	Command set
On	On	A	Firich / CD 5220
Off	On	B	Epson
On	Off	C	Aedex
Off	Off	D	DSP800

### Setting the baud rate

SW8	Baud Rate
On	9600
Off	19200

### • Dimensional drawings



### • Command table

Basic table of programming commands – for a more detailed description of individ. commands, see the program and design manual at [www.virtuos.cz](http://www.virtuos.cz).

Command	Hexadecimal	Description
ESC DC1	1B 11	overwrite mode
ESC DC2	1B 12	vertical scroll mode
ESC DC3	1B 13	horizontal scroll mode
ESC Q A	1B 51 41 d1..dn OD	set string display mode, write string to upper line
d1..dn CR	1<n<=20	
ESC Q B	1B 51 42 d1..dn OD	set string display mode, write string to lower line
d1..dn CR	1<n<=20	
ESC Q D	1B 51 44 d1..dn OD	set string display mode, write string to upper line and scroll the message continuously
d1..dn CR	1<n<=20	
ESC   A	1B 5B 41	move cursor up
ESC   B	1B 5B 42	move the cursor down
LF	0A	move the cursor down
ESC   C	1B 5B 43	move cursor right
HT	09	move cursor right
ESC   D	1B 5B 44	move the cursor left
BS	08	move the cursor left
ESC   H	1B 5B 48	move cursor home
HOM	0B	move cursor home
ESC   L	1B 5B 4C	move cursor to the left-end
CR	0D	move cursor to the left-end
ESC   R	1B 5B 52	move cursor to the right-end
ESC   K	1B 5B 4B	move cursor to bottom
ESC   x y	1B 6C x y 1<x<=14h y=1,2	move cursor to specified position
ESC @	1B 40	initialize display
CLR	0C	clear display, clear string mode
CAN	18	clear cursor line, clear string mode
ESC _ n	1B 5F n n=0,1	set cursor on/off
ESC W	1B 57 s x1 x2 y s=0,1	set/cancel the window range in horizontal scroll mode
s x1 x2 y	1<x1<x2<=14h y=1,2	

ESC f n	1B 66 n	Select international character font set ASCII codes 00h-7Fh
ESC c n	1B 63 n	Select code table ASCII Codes 80h-FFh
ESC & s n m	1B 26 01 n m	define user-defined characters
[a(p1..pa)]	20h<n<=m<=FFh	
x (m-n+1)	0<a<=5 00h<p<=FFh	
ESC ? n	1B 3F 20h<n<=FFh	delete user-defined characters
ESC % n	1B 25 n=0,1	select/cancel download character set
ESC s 1	1B 73 01	store user defined character in EEPROM
ESC d 1	1B 64 01	restore user-defined characters from EEPROM
ESC S n	1B 53 n 31h<n<=35h	Save current display data as n'th layer in EEPROM
ESC D n m	1B 44 n m 01h<n<=1Fh	Display saved data from EEPROM as animated message. Bit position in n selects the layer to be displayed
	31h<m<=33h	
ESC * n	1B 2A n 01h<n<=04h	brightness adjustment
ESC = n	1B 3D n 01h<n<=03h	select peripheral device

### • Description of display modes

Display can be switched to 4 displaying modes:

#### Overwrite mode

This is default mode. ESC DC1 and ESC@ commands would also put the display into this mode. This cursor moves from left to right, if it is at the end of the line, it moves to the beginning of the other line. Characters are displayed at the current cursor position, overwriting what is originally there, the cursor is then moved to the next position.

#### Vertical Scroll Mode

If the cursor is at the upper line it behaves like the overwrite mode. When it is at the end of lower line, the next character would scroll the content of the lower line to upper line, the lower line is cleared and the cursor is moved to the beginning of the lower line.

#### Horizontal Scroll Mode

In this mode the cursor stays in whatever line it is at, unless changed by cursor movement commands. When the cursor is not at the end of the line, the input character is displayed at current cursor position, the cursor is then moved right. Once at the end of the line, subsequent character input would scroll the current line left one position, and the new character is displayed at end position. There is also a command, ESC W, to set display window in this mode. The effective display line would be limited within the window as defined by the command.

#### String mode

This mode is perhaps the simplest used. The two display lines are treated independently. Only two commands, Esc QA and Esc QB, are needed. ESC QA followed by a string of no more than twenty characters would display the string one upper line, left aligned. A Cr (ODH) character terminates the command. If the string is less than twenty characters in length, the rest of the display line is padded with blank. Esc QB does the same for the lower display line. The only other commands active in this mode are CLR and CAN. CLR would clear the display and change the Customer Display into overwrite mode. CAN clears the last line that was changed and change the Customer Display into overwrite mode. The initialization command, Esc @, has not effect in this mode.

### • Character table – CP852 – Latin II/Slavonic

	0	1	2	3	4	5	6	7
0				00P`P				
1			!1AQa9					
2			"2BRbr					
3			#3CScs					
4			\$4DTdt					
5			%5EUeu					
6			&6FUfv					
7			'7GWgw					
8			<8HXhx					
9			)9IYiy					
A		*	:JZjz					
B		+	:K[k					
C		,	<L[l					
D		-	=M]m					
E		.	>N^n					
F		/	?O_o					

USA Font Set (00h - 7Fh)

	8	9	A	B	C	D	E	F
0	Š	š	Ž	ž	Č	č	Š	š
1	Ć	ć	Š	š	Ž	ž	Č	č
2	Š	š	Ž	ž	Č	č	Š	š
3	Š	š	Ž	ž	Č	č	Š	š
4	Š	š	Ž	ž	Č	č	Š	š
5	Š	š	Ž	ž	Č	č	Š	š
6	Š	š	Ž	ž	Č	č	Š	š
7	Š	š	Ž	ž	Č	č	Š	š
8	Š	š	Ž	ž	Č	č	Š	š
9	Š	š	Ž	ž	Č	č	Š	š
A	Š	š	Ž	ž	Č	č	Š	š
B	Š	š	Ž	ž	Č	č	Š	š
C	Š	š	Ž	ž	Č	č	Š	š
D	Š	š	Ž	ž	Č	č	Š	š
E	Š	š	Ž	ž	Č	č	Š	š
F	Š	š	Ž	ž	Č	č	Š	š

PC-852 Font Set