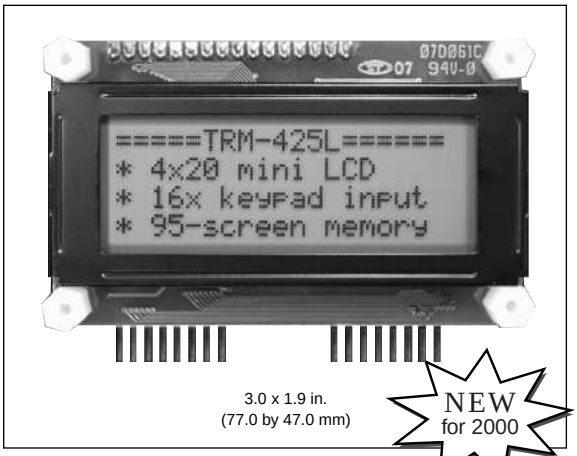
coming soon...

Data Sheet
TRM425 • v1.0 • 01/2000

Mini 4x20 Serial LCD with Keypad Interface and 95-screen Memory



Complete user-interface solution in a compact package; keypad input, non-volatile memory for up to 95 data screens, temperature compensation, and flexible I/O options.

A Terminal for Tight Places

TRM-425 is a complete user interface in a compact package. It's a serial display with all the features of our BPP-series models: sharp 4-line by 20-character LCD screen, 1200–9600-baud serial interface, terminal-style control characters, and special capabilities for cursor positioning, backlight control and large-character generation.

Unique features include:

- Interface for matrix keypads up to 16 keys (with ESD protection)
- Onboard EEPROM for configuration, user-defined characters and screens
- EEPROM stores 95 full (80-character) screens of text for instant recall
- Temperature compensation for stable contrast from 0–50°C
- I/O connections for both RS-232 and logic-level serial
- Mini 4x20 LCD with 4mm tall characters—fits where standard models won't

You can see what we're going for—we want TRM-425 to be the hands-down easiest way to add a user interface to your next project, whether it's driven by the tiniest microcontroller or the mightiest computer.

Compatibility, Documentation, and Software

TRM-425's features are a superset of our BPP-series displays. Programs written for BPPs will run without a hitch. Documentation is supplied on disk in HTML format for viewing with a web browser. The disk also includes free Windows software for configuring the display's EEPROM.

Ordering Information

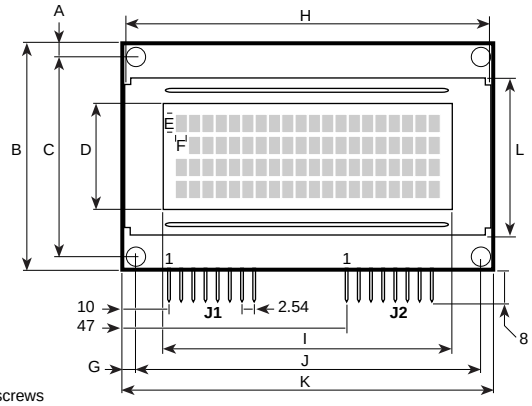
Mini 4x20 Serial LCD Terminal with LED backlight (TRM-425L) 119.00

PC downloading cable for above (DB9-to-3-pin header socket; TRM-CBL) 9.00

Scott Edwards Electronics, Inc.
1939 S. Frontage Road, Suite F, Sierra Vista, AZ 85635 USA
ph: 520-459-4802 • fax: 520-459-0623 • www.seetron.com

Figure 1. Dimensional data

A	y offset pcb edge to hole ctr	3.50
B	y pcb height	47.00
C	y hole spacing (see below)	40.00
D	y screen opening	22.00
E	y character size	4.00
F	x character size	2.30
G	x offset pcb edge to hole ctr	3.50
H	x screen frame	76.20
I	x screen opening	60.00
J	x hole spacing (see below)	70.00
K	x pcb width	77.00
L	y frame height	32.60



- All dimensions in mm.
- Worst-case tolerance is ±0.50mm.
- Maximum depth (from face to tips of interface header posts) is 28mm.
- Mounting holes fitted with nylon standoff posts threaded for 4-40 machine screws
- NOTE: Dimensions subject to change. Critical applications should be based on actual measurements.

Figure 2. Connector pinouts

(viewed from screen side)

J1, Power/Logic I/O

1 2 3 4 5 6 7 8

1) GND	5) Serial out*
2) +9Vin	6) Key strobe
3) +5Vin	7) Buzzer +
4) Serial in*	8) Buzzer –

*NOTE: Serial I/O on J1 is logic-level, non-inverted, **not** RS-232. Use J3 for RS-232 hookup.

J2, matrix keypad

1 2 3 4 5 6 7 8

1) row 4	5) col 4
2) row 3	6) col 3
3) row 2	7) col 2
4) row 1	8) col 1

J3, RS-232 I/O

Sout GND
Sin

Sout = Serial out
Sin = Serial in
GND = Ground

Table 1. Basic specifications

Power requirements (BL off)	4.8 to 5.5 Vdc @ 10mA
Power requirements (BL on)	4.8 to 5.5 Vdc @ 75mA
User connectors	male headers; 0.025" posts on 0.10" centers
Serial I/O	RS-232 via J3, or non-inverted TTL/CMOS via J1
Buzzer output	5V @ 25mA max
Operating temperature	0° to 50°C (32° to 122°F)
Serial data rates	1200, 2400, 4800, or 9600 bps
Non-volatile memory	95 screens, 8 char sets, configuration data
Keypad input	4x4 matrix (up to 16 keys), ESD protected

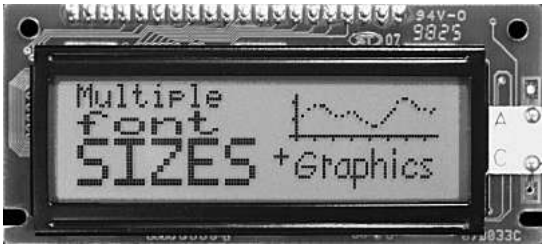
Table 2. Control characters by function

*These entries match like-named keys on standard keyboard (backspace, tab, return)

Cursor home	ctrl-A
Begin big-character mode	ctrl-B
Hide cursor	ctrl-D
Show underline cursor	ctrl-E
Show blinking-block cursor	ctrl-F
Bell (pulse piezo-buzzer output)	ctrl-G
Backspace*	ctrl-H
Horizontal tab (cursor to next multiple-of-4 column)*	ctrl-I
Smart linefeed (cursor down one line)	ctrl-J
Vertical tab (cursor up one line)	ctrl-K
Formfeed (clear screen)	ctrl-L
Carriage return*	ctrl-M
Backlight on	ctrl-N
Backlight off	ctrl-O
Accept cursor-position entry	ctrl-P
Clear column	ctrl-Q
Accept right-alignment data	ctrl-R
Begin special instruction*	ESC (ctrl-[)

*Special Instructions: • ESC D (redfine custom character) • ESC E (transfer data from EEPROM to LCD) • ESC W (write configuration to EEPROM) • ESC X (transfer data from LCD to EEPROM). See manual for full instruction syntax.

Serial LCD with 120x32-pixel Graphics and Four Font Sizes



3.2 x 1.4 in.
(80 x 36 mm)

The G12032 offers 120-by-32-pixel graphics and tremendous font flexibility at a bargain price. It interfaces with a computer through a 2400 or 9600-baud RS-232 serial hookup.

Mini Serial Terminal with Multiple Font Sizes

The G12032 works like a serial-receive terminal. It can display text in four different font sizes, allowing you to format the screen as 4 lines of 20 small characters or 2 lines of 10 large characters, or mix font sizes freely to achieve special effects.

The display understands common control characters like carriage return, linefeed, tab, backspace, etc. Special characters allow cursor positioning and backlight control. Most text commands are the same as those for our advanced (BPP- and ILM-) text displays.

Versatile Graphics Display with Image Storage

Plotting points, drawing lines, and displaying full-screen pictures are easy with the G12032's graphics instructions. Its 4kB EEPROM, which retains data with power off, stores the text font plus six screen images. You can create or edit fonts and graphics on your PC, then download them to the G12032 using the included utility program.

A 160-character alphanumeric font and example graphics come preloaded in EEPROM. Need more characters/symbols? The G12032 lets you use part or all of its graphics memory for additional fonts, for a total of up to 640 characters.

Exceptional Value

We pulled out all the stops to make the G12032 the most versatile, economical serial display on the market. It's priced lower than some comparable alphanumeric displays. Within a minute of opening the box you can have this display running a built-in demo (9V battery or 5V supply required). The standard package includes a 3.5" disk with extensive hyperlinked HTML manual (use any web browser to view), a graphics conversion/downloading utility, and program examples.

Ordering Information

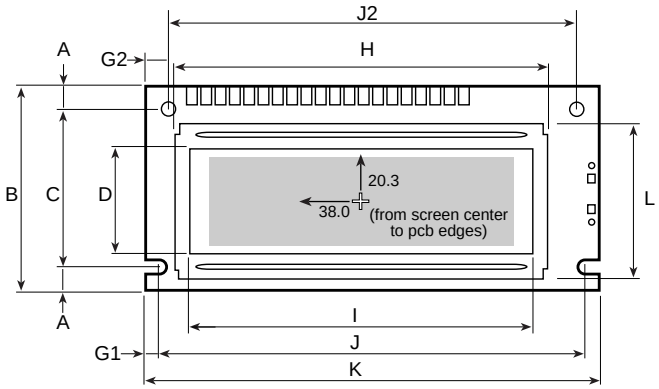
G12032 Serial Graphics LCD with manual/utilities on disk (SGX-120L) 99.00

Mounting kit for G12032 with faceplate, hardware (BEZ-120) 12.00

Scott Edwards Electronics, Inc.
1939 S. Frontage Road, Suite F, Sierra Vista, AZ 85635 USA
ph: 520-459-4802 • fax: 520-459-0623 • www.seetron.com

Figure 1. Dimensional data

A	y offset pcb edge to hole ctr	4.00
B	y pcb height	36.00
C	y hole spacing	28.00
D	y screen opening	18.50
E1	y character size (small font)	3.92
E2	y character size (large font)	7.84
F1	x character size (small font)	2.94
F2	x character size (large font)	5.88
G1	x offset pcb edge to hole ctr (btm)	2.50
G2	x offset pcb edge to hole ctr (top)	4.00
H	x screen frame	65.70
I	x screen opening	60.50
J1	x hole spacing (btm)	75.00
J2	x hole spacing (top)	72.00
K	x pcb width	80.00
L	y frame height	27.40



- All dimensions in mm.
- Tolerance for dimensions is ±0.50mm.
- Maximum depth (from front of screen frame to highest point on serial interface board) is 30mm.
- Screen is not centered on pcb. It is 2mm to the left and 2.3mm below pcb center point.
- Mounting holes appropriately sized for 2-56 mounting screws.
- NOTE: Dimensions subject to change. Critical applications should be based on actual measurements.

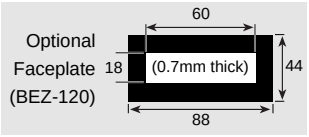


Table 1. Basic specifications

Backlight type .....LED array, yellow-green
Power requirements (BL off)* .....4.5 to 5.5 Vdc @ 15mA
Power requirements (BL on)* .....4.5 to 5.5 Vdc @ 45mA
User connector.....five 0.025" posts on 0.10" centers
Connector pinout (5-pin) .....+5 GND SER GND +5
Serial input.....RS-232, or inverted TTL/CMOS, 9600 or 2400, N81
Serial data rates.....2400 or 9600 bps
Operating temperature.....0° to 50°C (32° to 122°F)
* NOTE: Unit includes an input for 9V unregulated power; 9V battery suggested.

Table 2. Text control characters and graphics instructions by function

Text Control Codes

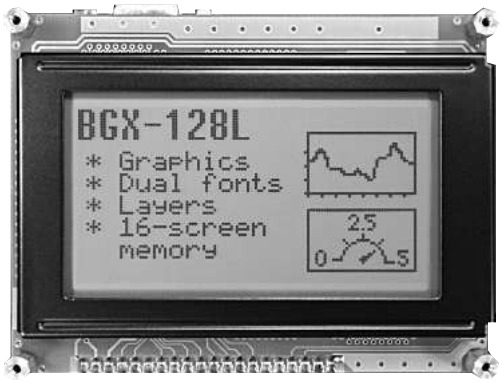
Function	Code	ASCII
Cursor home	ctrl-A	1
Begin inverse-video text	ctrl-B	2
End inverse-video text	ctrl-C	3
ignored	ctrl-D	4
ignored	ctrl-E	5
ignored	ctrl-F	6
ignored	ctrl-G	7
Backspace	ctrl-H	8
Horizontal tab (go to next 4x column)	ctrl-I	9
Smart linefeed (go down one line)	ctrl-J	10
Vertical tab (go up one line)	ctrl-K	11
Formfeed (clear text screen)	ctrl-L	12
Carriage return	ctrl-M	13
Backlight on	ctrl-N	14
Backlight off	ctrl-O	15
Accept cursor-position entry	ctrl-P	16
Accept data for right alignment	ctrl-R	18
Escape (begin graphics instruction)	ctrl-[	27

Graphics Escape Sequences

Function	Escape Sequence
Set screen address for byte write	ESC A x y
Write byte value n to present screen address	ESC B n
Download full-screen graphic (480 bytes)	ESC D G
Display EEPROM screen n (n=0—7)	ESC E n
Set font size and EEPROM source page to n	ESC F n
Set “ink” for points and lines to n; 1=black, 0=white	ESC I n
Plot a line from x1 y1 to x2 y2	ESC L x1 y1 x2 y2
Set graphics mode to n; 0=OR, 1=XOR	ESC M n
Plot a point at x y	ESC P x y
Reverse (invert) lines by n	ESC R n
Plot line from last line end to x y	ESC T x y
Set vertical origin to top (n=0) or bottom (n=1)	ESC V n
Write startup configuration data to EEPROM	ESC W n
Transfer image from graphics layer to EEPROM screen n (0—7)	ESC X n

NOTE: At startup, the screen is cleared, and all graphics settings are 0 except Ink, which is 1 (to plot dark pixels on a light background).

Serial LCD Module with 128x64-pixel Graphics plus Two Text Fonts



3.7 x 2.8 in. (93 x 70 mm)

The G12864 makes it easy to display text and graphics on a 128-by-64-pixel LCD. It interfaces with a computer through a 2400 or 9600-baud RS-232 serial hookup.

Serial Terminal with Dual Fonts

The G12864 works like a simple serial-receive terminal. It displays text in two software-selectable fonts—8x16 pixels (4 lines of 16 characters, the default) or 6x8 pixels (8 lines of 20 characters). Both fonts may be edited to include custom characters, or may be entirely redesigned to support foreign languages, symbols, or icons.

The display understands common control characters like carriage return, linefeed, tab, backspace, etc. Special characters allow cursor positioning and backlight control. Most text commands are the same as those for our advanced (BPP- and ILM-) text displays.

Graphics, Plus Versatile Layering

Plotting points, drawing lines, and displaying full-screen pictures are easy with the G12864's graphics instructions. Its 16kB flash memory, which retains data with power off, stores the text font plus 14 screen images (or 2 fonts/13 screens). You can create or edit fonts and graphics on your PC, then download them to the G12864 using the included utility program.

Text and graphics are stored in separate memory layers and can be selectively turned on or off, individually cleared, or overlaid in various ways.

Convenience Features Mean a Quick Start on Your Project

A voltage regulator and standard DB9 serial-port connector are built in. Connect the display to the (included) AC adapter; plug the (included) serial cable into your PC or other computer, and you're ready to go. If that's too convenient, you can provide your own 5-volt supply and/or connect serial input to the 5-pin header, which matches the layout of the connector on our other serial LCDs. Current draw ranges from 15mA (typical, backlight off) to 100mA (max, LED backlight on). A jumper option allows brighter backlighting at 150mA.

Ordering Information

G12864 Serial Graphics LCD with AC adapter, serial cable, disk, manual (BGX-128L-I).....199.00

G12864 Serial Graphics LCD, no accessories (BGX-128L-N).....179.00

Scott Edwards Electronics, Inc.
1939 S. Frontage Road, Suite F, Sierra Vista, AZ 85635 USA
ph: 520-459-4802 • fax: 520-459-0623 • www.seetron.com

Figure 1. Dimensional data

A	y offset pcb edge to hole ctr	2.50
B	y pcb height	70.00
C	y hole spacing	65.00
D	y screen opening	38.80
E1	y character size (8x16-pixel)	8.32
E2	y character size (6x8-pixel)	4.16
F1	x character size (8x16 pixel)	4.16
F2	x character size (6x8 pixel)	3.12
G	x offset pcb edge to hole ctr	2.50
H	x screen frame	90.00
I	x screen opening	70.70
J	x hole spacing	88.00
K	x pcb width	93.00
L	y frame height	53.70

- All dimensions in mm.
- Worst-case tolerance for any dimension is ±0.50mm.
- Maximum depth (from front of screen frame to highest point on serial interface board) is 33mm.
- Mounting holes fitted with stainless-steel standoff posts, 2-56 female threaded for mounting screws
- NOTE: Dimensions subject to change. Critical applications should be based on actual measurements.

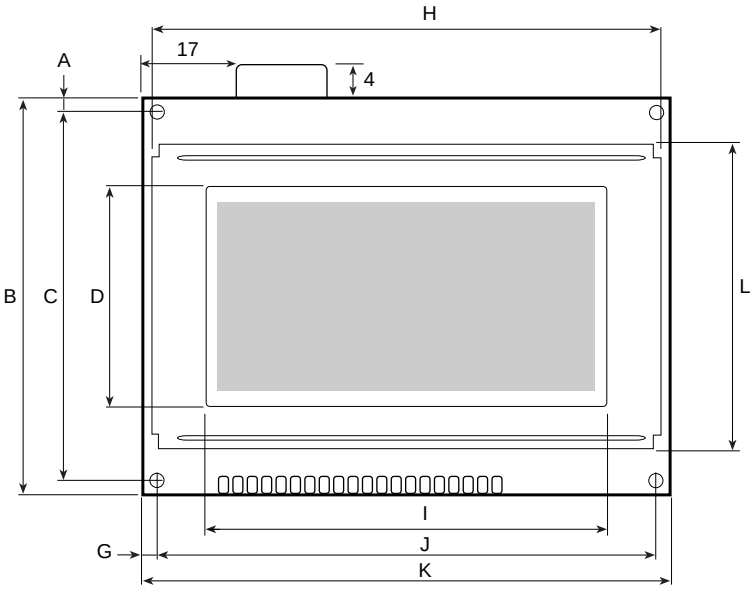


Table 1. Basic specifications

Backlight type .....LED array, yellow-green
Power requirements (BL off)* .....4.5 to 5.5 Vdc @ 25mA
Power requirements (BL on)* .....4.5 to 5.5 Vdc @ 100mA
User connector.....five 0.025" posts on 0.10" centers, or DB9 fem
Connector pinout (5-pin) .....+5 GND SER GND +5
Serial input.....RS-232, or inverted TTL/CMOS, 9600 or 2400, N81
Serial data rates.....2400 or 9600 bps
Operating temperature.....0° to 50°C (32° to 122°F)

* NOTE: Unit includes a 2.1mm coax power jack for unregulated power, 9Vdc or 7Vac. Bright^ jumper in version 2.0+ allows brighter backlighting at 150mA current draw.

Table 2. Text control characters and graphics instructions by function

Text Control Codes

Function	Code	ASCII
Cursor home	ctrl-A	1
Begin inverse-video text	ctrl-B	2
End inverse-video text	ctrl-C	3
Hide cursor	ctrl-D	4
Show cursor	ctrl-E	5
Show cursor	ctrl-F	6
ignored	ctrl-G	7
Backspace	ctrl-H	8
Horizontal tab (go to next 4x column)	ctrl-I	9
Smart linefeed (go down one line)	ctrl-J	10
Vertical tab (go up one line)	ctrl-K	11
Formfeed (clear text screen)	ctrl-L	12
Carriage return	ctrl-M	13
Backlight on	ctrl-N	14
Backlight off	ctrl-O	15
Accept cursor-position entry	ctrl-P	16
ignored	ctrl-Q	17
Request buffer-depth response (“>”)	ctrl-R	18
Escape (begin graphics instruction)	ctrl-[	27

Graphics Escape Sequences

Function	Escape Sequence
Set screen address for byte write	ESC A x y
Write byte value n to present screen address	ESC B n
Write byte value n to all screen addresses (n=0 to clear)	ESC C n
Download full-screen graphic (1024 bytes)	ESC D G
Display EEPROM screen n on graphics layer (n=0—15)	ESC E n
*Switch between default 8x16-pixel font and 6x8-pixel font	ESC F n
*Create a highlight bar on graphics layer	ESC H n
Set “ink” for points and lines to n; 1=black, 0=white	ESC I n
Plot a line from x1 y1 to x2 y2	ESC L x1 y1 x2 y2
Set graphics mode to n; 0=OR, 1=XOR	ESC M n
Set overlay of text/graphics layers to n; 0=OR, 1=XOR, 2=AND	ESC O n
Plot a point at x y	ESC P x y
Reverse layers by n; 0=neither, 1=graphics, 2=text, 3=both	ESC R n
Plot line from last line end to x y	ESC T x y
Disable layers by n; 0=neither, 1=graphics, 2=text, 3=both	ESC Y n
Transfer image from graphics layer to EEPROM screen n (0—15)	ESC X n
*Zap settings to defaults; 0=neither, 1=graphics, 2=text, 3=both	ESC Z n

*New in version 2.0/firmware 060+

NOTE: At startup, the text and graphics layers are cleared, and all graphics settings are 0 except Ink, which is 1 (to plot dark pixels on a light background).

Scott Edwards Electronics, Inc.
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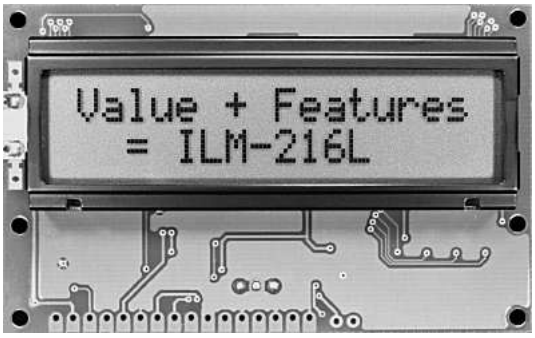
2x16 Serial LCD Module with Integrated Microcontroller



3.2 by 2.0 in. (80.0 by 50.0 mm)

Built-in microcontroller delivers a serial interface with deluxe features, four switch inputs, nonvolatile configuration memory.

Serial User Interface

We invented the serial-LCD concept; now we've taken it to the next level. The ILM-216 is a custom LCD module with a smart serial interface built right in. It works like a micro terminal—receiving data at 1200 to 9600 bps and displaying it in large characters on a 2-line-by-16-character screen. Advanced features include:

- Four inputs for switches/buttons that can be read via the serial connection
- EEPROM storage of settings, custom characters, and a user-defined startup screen
- Serial control of the built-in LED backlight
- Output for a piezo buzzer triggered by the ASCII BELL character
- Unique right-alignment instruction to automatically format numeric text
- Low current draw; typically 5mA with the backlight off (40mA, backlight on)

Integrating the controller into the LCD module reduces manufacturing costs and lets us offer these advanced capabilities at a price that's lower than any two-piece design.

Compatibility, Free Software

The ILM-216 uses a superset of the control codes for our 4x20 and 4x40 LCDs, making it an easy transition from one display to another. And we provide free Windows software that makes configuring the ILM-216's EEPROM and designing custom characters a point-and-click snap; see www.seetron.com for details.

Ordering Information

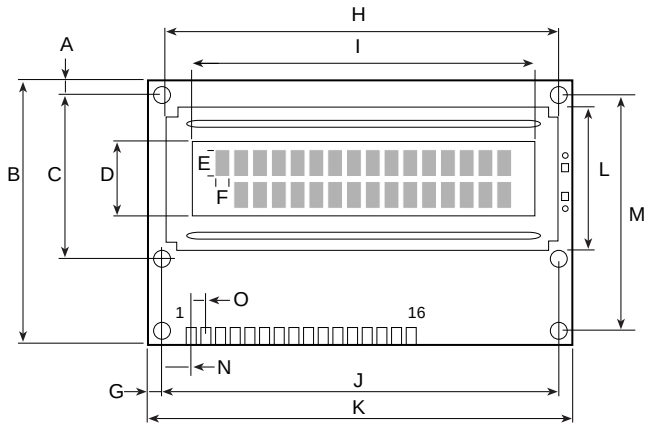
Integrated 2x16 Serial LCD with LED backlight (ILM-216L)	quantity 1—9	49.00
	quantity 10—49	44.00
	quantity 50—99	39.00
	quantity 100+	32.00
Mounting kit w/faceplate, insulated hardware (BEZ-216I)		6.00

Scott Edwards Electronics, Inc.
1939 S. Frontage Road, Suite F, Sierra Vista, AZ 85635 USA
ph: 520-459-4802 • fax: 520-459-0623 • www.seetron.com

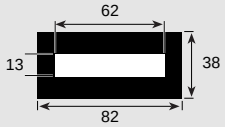
Figure 1. Dimensional data

		Dim.
A	y offset edge to hole ctr (top & btm)	2.50
B	y pcb height	50.00
C	y hole spacing (inside pair)	31.00
D	y screen opening	16.20
E	y character size	5.94
F	x character size	2.95
G	x offset pcb edge to hole ctr	2.50
H	x screen frame	71.00
I	x screen opening	66.00
J	x hole spacing	75.00
K	x pcb width	80.00
L	y frame height	25.00
M	y hole spacing (outside pair)	45.00
N	x offset hole ctr to pin 1	5.50
O	x offset between pads	2.54
-	mounting hole diameter	2.50
-	frame depth, LED-backlit	8.50

- All dimensions in mm.
- Worst-case tolerance for any dimension is ±0.50mm.
- Maximum depth (from front of screen frame to highest point on pcb) is 15mm



Optional Faceplate (BEZ-216I; sold separately)



(thickness = 0.7mm)

Table 1. Basic specifications

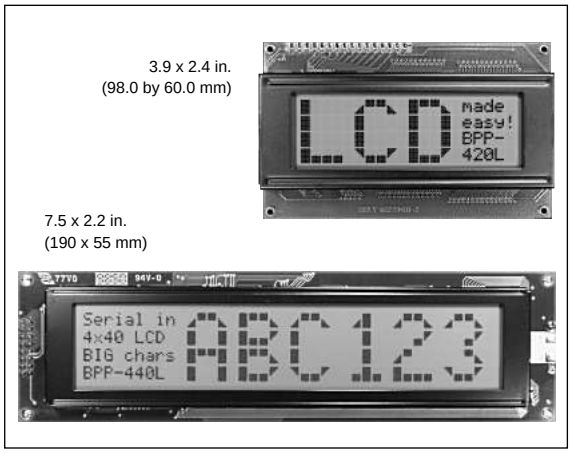
Power requirements.....4.8 to 5.5 Vdc @ 5 mA (40 mA, backlit)
User connector.....16 pads on 0.10" centers, 0.040" holes
Serial input .....RS-232, or inverted TTL/CMOS, 1200—9600, N81
Buffer depth.....16 bytes
Operating temperature.....0° to 50°C (32° to 122°F)
Storage temperature.....–10° to 60°C (14° to 140°F)
LCD type .....Supertwist (STN), yellow-green
Optimum viewing direction.....6 o'clock

Table 2. Control characters by function

Null (ignored prior to buffer)	ctrl-@	0
Cursor home	ctrl-A	1
Hide cursor	ctrl-D	4
Show underline cursor	ctrl-E	5
Show blinking-block cursor	ctrl-F	6
Bell (pulse piezo-buzzer output)	ctrl-G	7
Backspace*	ctrl-H	8
Horizontal tab (cursor to next multiple-of-4 column)*	ctrl-I	9
Smart linefeed (cursor down one line)	ctrl-J	10
Vertical tab (cursor up one line)	ctrl-K	11
Formfeed (clear screen)	ctrl-L	12
Carriage return*	ctrl-M	13
Backlight on	ctrl-N	14
Backlight off	ctrl-O	15
Accept cursor-position entry	ctrl-P	16
Format right-aligned text	ctrl-R	18
Escape (ESC; start multipart instruction)	ctrl-[	27

- Define graphics character: ESC D n B0 B1 B2 B3 B4 B5 B6 B7
  where n is the character number (0—7) and B0—B7 are bytes mapping the pixels
- Transfer data from EEPROM to display: ESC E n
  where n is “0” or “1” with 0 meaning text screen and 1 meaning symbols
- Read the keys (S1—S4) and report serially: ESC K n
  where n sets format—0 = single byte, bits 0—3 correspond to S1—S4 and 1= four bytes consisting of text characters “0” and “1” (a “1” means switch closed)

4-line Serial LCDs with Terminal Features, Big-Character Mode



Supertwist 4x20 and 4x40 alphanumeric LCDs with a serial interface (up to 9600 bps) for 1-wire interfacing to computers and controllers. Both with LED backlighting.

Easy-to-use Data Displays

The BPP-420 and -440 work like simple serial-receive terminals. They display text in a 4-line format on a high-contrast, supertwist LCD module. They understand common control characters like carriage return, linefeed, tab, backspace, etc. Special characters allow cursor positioning, backlight control, and the unique “big-character” mode shown above. The displays will even drive a customer-provided piezo buzzer for audio alerts.

Interfacing is easy—just connect +5V, ground, and serial data (RS-232 or inverted TTL level, no parity, 8 data bits, 1 stop bit). The 4x20 display supports data rates of 2400 and 9600 bps; the 4x40 accepts 1200, 2400, 4800, and 9600 bps. Data rates are set by configuration switches.

You already know how to program for these displays, since they understand a sensible subset of the ASCII control characters. The manuals include program examples for the BASIC Stamps® I and II, plus PC BASIC.

Compatibility and New Features

The BPP-420 and BPP-440 use identical sets of control characters, making the transition from one display to another a snap. They’re also compatible with the text-mode instructions for our graphics displays. And the BPP-420 can emulate our simpler LCD Serial Backpack® interface for compatibility with our older 4x20 displays.

Ordering Information

4x20 Serial LCD Module with LED backlight (BPP-420L) 79.00

Mounting kit for 4x20 with faceplate, hardware (BEZ-420) 12.00

4x40 Serial LCD Module with LED backlight (BPP-440L) 159.00

Scott Edwards Electronics, Inc.
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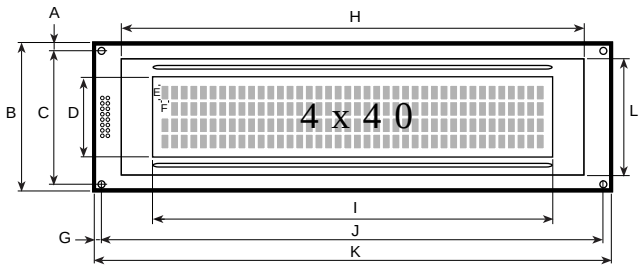
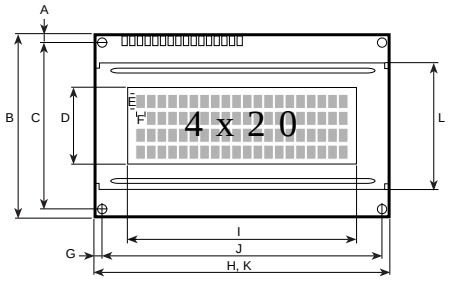
Figure 1. Dimensional data

		4x40	4x20
A	y offset pcb edge to hole ctr	3.50	2.50
B	y pcb height	54.00	60.00
C	y hole spacing	47.00	55.00
D	y screen opening	29.50	25.20
E	y character size	4.89	4.75
F	x character size	2.78	2.95
G	x offset pcb edge to hole ctr	3.50	2.50
H	x screen frame	166.30	98.00
I	x screen opening	147.00	76.00
J	x hole spacing	183.00	93.00
K	x pcb width	190.00	98.00
L	y frame height	41.20	42.00
-	mounting hole diameter	3.50	2.50
-	frame depth, LED-backlit	9.10	9.40





- All dimensions in mm.
- Worst-case tolerance is ±0.50mm.
- Maximum depth (from front of screen frame to tips of interface header posts) is 26mm.
- NOTE: Dimensions subject to change. Critical applications should be based on actual measurements.

Optional Faceplate (BEZ-420, 4x20 only)

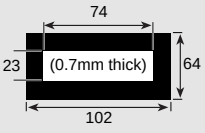


Table 1. Basic specifications

Power requirements (BL off).....4.8 to 5.5 Vdc @ 10mA
Power requirements (BL on).....4.8 to 5.5 Vdc @ 100mA
User connector .....5-pin header; 0.025" posts on 0.10" centers
Connector pinout.....+5 GND SER GND +5
Serial input.....RS-232, or inverted TTL/CMOS, 9600 or 2400, N81
Buzzer output .....5V @ 25mA max; pulses approx. 100ms for BELL
Operating temperature.....0° to 50°C (32° to 122°F)
Serial data rates (4x20) .....2400 or 9600 bps
Serial data rates (4x40) .....1200, 2400, 4800, or 9600 bps

Table 2. Control characters by function

*These entries match like-named keys on standard keyboard (backspace, tab, return)

Preview complete instruction manuals via Internet— www.seetron.com

Cursor home .....ctrl-A
Begin big-character mode.....ctrl-B
Hide cursor .....ctrl-D
Show underline cursor .....ctrl-E
Show blinking-block cursor .....ctrl-F
Bell (pulse piezo-buzzer output).....ctrl-G
Backspace*.....ctrl-H
Horizontal tab (cursor to next multiple-of-4 column)* .....ctrl-I
Smart linefeed (cursor down one line).....ctrl-J
Vertical tab (cursor up one line) .....ctrl-K
Formfeed (clear screen) .....ctrl-L
Carriage return*.....ctrl-M
Backlight on .....ctrl-N
Backlight off.....ctrl-O
Accept cursor-position entry .....ctrl-P
Clear column .....ctrl-Q
Accept right-alignment data.....ctrl-R
Begin special instruction* .....ESC (ctrl-[)

*Special Instructions: • ESC D (redfine custom character) • ESC E (restore custom-character definition from ROM). See manual for full instruction syntax.

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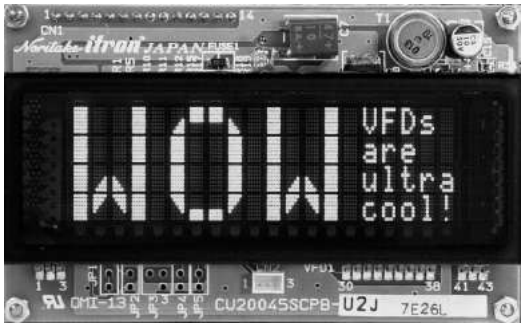
4x20 Serial VFD Offers Dazzling Brightness, Easy Interface



3.9 x 2.4 in. (98 x 60 mm)

If you require a bright, eye-catching display, vacuum-fluorescents (VFDs) are the technology of choice. Bright, blue-green characters say “high-tech;” our interface says “easy.”

Familiar Interface plus Sharp, Bright VFD

The VFD-420 combines a convenient serial interface with a 4x20 vacuum-fluorescent display. Its serial interface understands common control characters like carriage return, linefeed, tab, backspace, etc. Special characters allow cursor positioning, brightness control, and the unique “big-character” mode shown above. The interface will even drive a customer-provided piezo buzzer for audio alerts.

Interfacing is easy—just connect +5V, ground, and serial data (RS-232 or inverted TTL level, no parity, 8 data bits, 1 stop bit) at 2400 or 9600 baud. Data rates are set by configuration switches.

You already know how to program for this display, since it understands a sensible subset of the ASCII control characters.

Compatible, but Customized

The VFD-420 has all the great features of our 4x20 serial LCD (BPP-420L), including big-character mode for 1" tall letters and numbers, and our unique right-alignment instruction for spreadsheet-perfect data display. It also has VFD-specific features like 4-level brightness control and low-power sleep mode. VFD-420 is a drop-in replacement for BPP-420L, provided that your 5V supply can source at least 500mA.

Ordering Information

4x20 Serial VFD Module (VFD-420) 159.00

Mounting kit for 4x20 with faceplate, hardware (BEZ-420) 12.00

Scott Edwards Electronics, Inc.
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Figure 1. Dimensional data

In most significant dimensions, the VFD is identical to standard 4x20 LCDs, making it a perfect drop-in upgrade.

		LCD	VFD
A	y offset pcb edge to hole ctr	2.50	2.50
B	y pcb height	60.00	60.00
C	y hole spacing	55.00	55.00
D	y screen opening	25.20	20.9
E	y character size	4.75	4.70
F	x character size	2.95	2.40
G	x offset pcb edge to hole ctr	2.50	2.50
H	x screen frame (same as K)	98.00	NA
I	x screen opening	76.00	70.8
J	x hole spacing	93.00	93.00
K	x pcb width	98.00	98.00
L	y frame height	38.40	NA
-	mounting hole diameter	2.50	2.50
-	frame depth, non-backlit	5.00	14.00
-	frame depth, LED-backlit	8.50	NA

- All dimensions in mm.
- Worst-case tolerance for any dimension is ±0.50mm.
- Maximum depth (from front of screen to tips of interface header posts) is 26mm.
- Dimensions based on information provided by manufacturers—subject to change without notice.

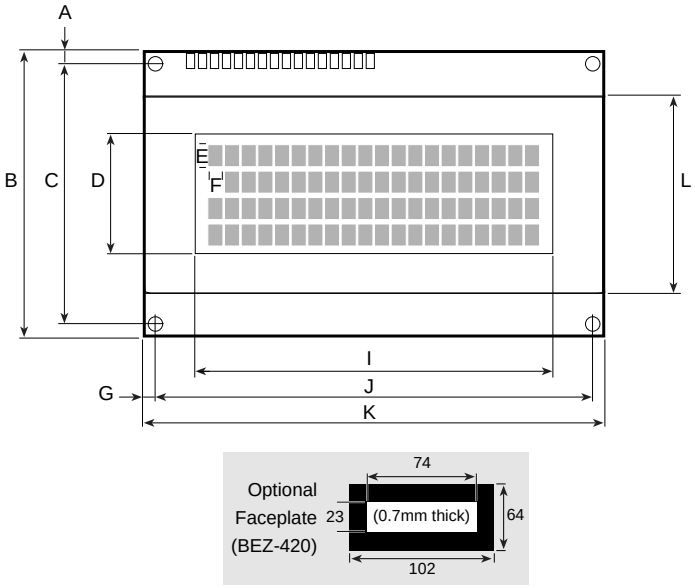


Table 1. Basic specifications

Power requirements (operating*).....4.8 to 5.25 Vdc @ 350 mA (max)
User connector .....5-pin header; 0.025" posts on 0.10" centers
Connector pinout.....+5 GND SER GND +5
Serial input.....RS-232, or inverted TTL/CMOS, 9600 or 2400, N81
Operating temperature.....–20° to 70°C (–4° to 158°F)
Operating humidity .....20 to 80% RH (non-condensing)

*Note: the VFD manufacturer recommends that the power supply be rated for 500 mA minimum due to startup current requirements. Typical operating current is much lower.

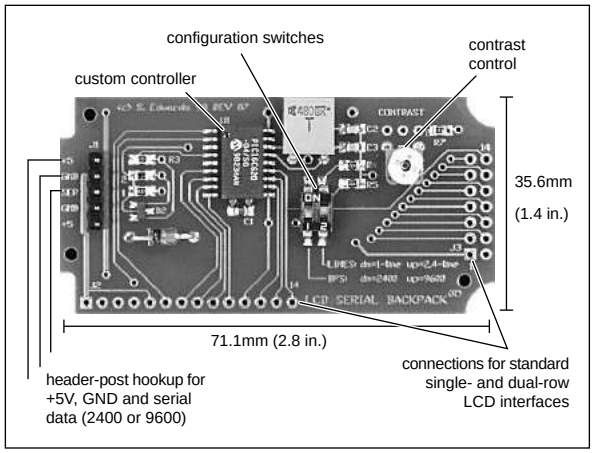
Table 2. Control characters by function

*These entries match like-named keys on standard keyboard (backspace, tab, return)

Cursor home .....ctrl-A
Begin big-character (0-9, A-Z) mode .....ctrl-B
End big-character mode .....ctrl-C
Hide cursor .....ctrl-D
Show blinking-block cursor .....ctrl-F
Bell (pulse piezo-buzzer output).....ctrl-G
Backspace*.....ctrl-H
Horizontal tab (cursor to next multiple-of-4 column)* .....ctrl-I
Smart linefeed (cursor down one line).....ctrl-J
Vertical tab (cursor up one line) .....ctrl-K
Formfeed (clear screen) .....ctrl-L
Carriage return*.....ctrl-M
Restore screen after ctrl-O .....ctrl-N
Blank screen and power-down to 10 mA.....ctrl-O
Accept cursor-position entry .....ctrl-P
Clear column .....ctrl-Q
Accept right-alignment data.....ctrl-R
Begin special instruction* .....ESC (ctrl-[)

*Special Instructions: • ESC D (redfine custom character) • ESC E (restore custom-character definition from ROM) ESC # (# = 0–3: set brightness). See manual for full instruction syntax.

Low-cost Serial Interface for Alphanumeric LCDs



The LCD Serial Backpack® gives common alphanumeric LCDs a serial interface (2400 or 9600 bps) for convenient 1-wire connection to computers and controllers.

Simplified Interface

Virtually all of the alphanumeric LCDs on the market today use an HD44780/KS0066 controller. These LCDs need a bus connection of 6 to 11 input/output lines and firmware to initialize and drive them. The LCD Serial Backpack converts this interface to simple 2400 or 9600-baud serial (RS-232 or inverted TTL level, no parity, 8 data bits, 1 stop bit). Attach our Backpack to an LCD, connect +5V power, ground and serial data, and you're ready to go. Send text to the Backpack and it appears on the screen—it's that simple.

The Backpack is compatible with LCDs with up to 80 on-screen characters (e.g., 2x40 or 4x20). It provides easy access to all LCD features; just preface any instruction with ASCII 254 (0FE hex). For example, the clear-screen code is 1. To clear the screen, send two bytes: <254><1>. The manual includes a listing of LCD instructions, examples, and tips.

For LCDs that work more like a terminal with tabs, returns, linefeeds, etc. see our ILM, 4x20, 4x40, and graphics models. Note that adding a Backpack to a 4x20 display will not provide the advanced features of our BPP-420. That product uses an advanced interface that is not sold separately.

Smart, Proven Design

The LCD Serial Backpack is based on a custom microcontroller running tight code at just 480kHz. In typical applications, it draws less than 1mA. Minimal parts count and sensible design make it rugged and reliable. Those same virtues have made the controller IC popular with OEMs; place our chip on your circuit board and the LCD interface is done.

We offer LCDs with a Backpack-style controller installed; see the 2x16 Serial LCD datasheet for details.

Ordering Information

Backpack w/instructions and installation kit (BPK-000) 29.00

Backpack controller IC (PIC16C54), specify DIP or SOIC (BPK-DIP or BPK-SOI).....9.00

Quantity purchases.....call or e-mail for quote

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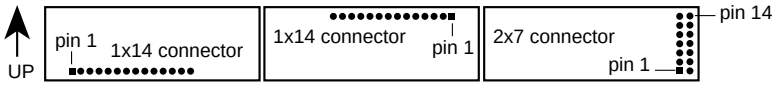
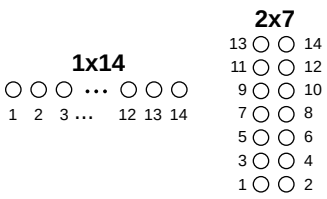
Figure 1. LCD connector styles that work best with the LCD Serial Backpack



LCD modules, viewed from the back (component) side.

Figure 2. Standard LCD pinouts supported by the LCD Serial Backpack



1	Vss	8	D1
2	Vdd	9	D2
3	Contrast	10	D3
4	RS	11	D4
5	R/W	12	D5
6	Enable	13	D6
7	D0	14	D7

Table 1. Basic specifications

Power requirements	4.8 to 5.5 Vdc @ 3mA (incl. LCD)
User connector	5-pin header; 0.025" posts on 0.10" centers
Connector pinout	+5 GND SER GND +5
Serial input	RS-232, or inverted TTL/CMOS, 9600 or 2400, N81
LCD output	HD44780, KS0066 (or equiv.)
LCDs supported	1x8 to 4x20 (lines x characters)
Contrast voltage	adjustable 0 to 1.7V
Operating temperature	0° to 50°C (32° to 122°F)
Initialization	Switches LCD power, performs soft init
Instruction prefix	ASCII 254 (0FE hex)
LINES configuration	switch down for 1-line, up for 2 or 4 lines
BPS configuration	switch down for 2400, up for 9600

Table 2. Commonly used LCD instructions by code

Clear screen	1
Home (undo scrolling of DD RAM)	2
Blank display (retaining data)	8
Hide cursor	12
Show underline cursor	14
Move cursor one character left	16
Move cursor one character right	20
Scroll display one character left	24
Scroll display one character right	28
Set DD RAM address (position cursor)	128+addr
Move to first character of first line	128
Move to nth character of first line	128+n
Move to first character of second line	192
Move to nth character of second line	192+n
Set CG RAM address (for custom characters)	64+addr

2x16 Serial LCD Module with Supertwist Display

3.2 x 1.4 in. (80 x 36 mm)

Inexpensive, high-quality displays equipped with a simple serial interface (2400 or 9600 bps) for convenient 1-wire connection to computers and controllers.

Simplified Interface

Why hassle with parallel-bus LCDs? These 2x16 LCDs have a serial interface based on our famous LCD Serial Backpack®. They accept simple 2400 or 9600-baud serial (RS-232 or inverted TTL level, no parity, 8 data bits, 1 stop bit). Connect +5V power, ground and serial data, and you're ready to go. Send text serially and it appears on the screen—it's that simple.

The interface provides easy access to all LCD features; just preface any instruction with ASCII 254 (0FE hex). For example, the clear-screen code is 1. To clear the screen, send two bytes: <254><1>. The manual includes a listing of LCD instructions, examples, and tips.

For LCDs that work more like a terminal with tabs, returns, linefeeds, etc. see our ILM, 4x20, 4x40, and graphics models.

Smart, Proven Design

BPI-series displays use the same interface design as our famous LCD Serial Backpack®, repackaged specifically for 2x16 LCDs. Continuous improvements and uncompromising compatibility make these displays the best-selling serial LCDs on the planet.

Ordering Information

2x16 serial LCD module, non-backlit (BPI-216N) 45.00

2x16 serial LCD module, LED-backlit (BPI-216L) 55.00

Mounting kit w/faceplate, hardware (BEZ-216) 6.00

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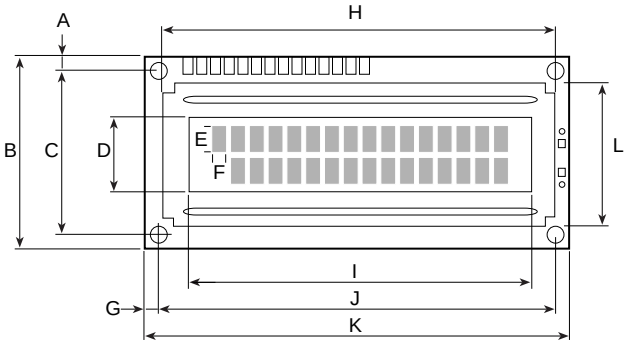
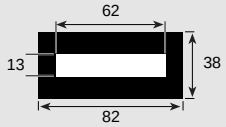
Figure 1. Dimensional data

A	y offset pcb edge to hole ctr	2.50
B	y pcb height	36.00
C	y hole spacing	31.00
D	y screen opening	16.20
E	y character size	5.94
F	x character size	2.95
G	x offset pcb edge to hole ctr	2.50
H	x screen frame	71.00
I	x screen opening	66.00
J	x hole spacing	75.00
K	x pcb width	80.00
L	y frame height	25.00
-	mounting hole diameter	2.50
-	frame depth, non-backlit	5.00
-	frame depth, LED-backlit	8.50

- All dimensions in mm.
- Worst-case tolerance for any dimension is ±0.50mm.
- Maximum depth (from front of screen frame to tips of interface header posts) is 26mm.
- Dimensions based on information provided by manufacturers—subject to change without notice.



Optional Faceplate (BEZ-216; sold separately)



(thickness = 0.7mm)

Table 1. Basic specifications

Power requirements	4.8 to 5.5 Vdc @ 3mA (incl. LCD)
User connector	5-pin header; 0.025" posts on 0.10" centers
Connector pinout	+5 GND SER GND +5
Serial input	RS-232, or inverted TTL/CMOS, 9600 or 2400, N81
Operating temperature	0° to 50°C (32° to 122°F)
Initialization	Switches LCD power, performs soft init
Instruction prefix	ASCII 254 (0FE hex)
LINES configuration	switch down for 1-line, up for 2 or 4 lines
BPS configuration	switch down for 2400, up for 9600

Table 2. Commonly used LCD instructions by code

Clear screen	1
Home (undo scrolling of DD RAM)	2
Blank display (retaining data)	8
Hide cursor	12
Show underline cursor	14
Move cursor one character left	16
Move cursor one character right	20
Scroll display one character left	24
Scroll display one character right	28
Set DD RAM address (position cursor)	128+addr
Move to first character of first line	128
Move to nth character of first line	128+n
Move to first character of second line	192
Move to nth character of second line	192+n
Set CG RAM address (for custom characters)	64+addr

Preview complete instruction manual via Internet—www.seetron.com