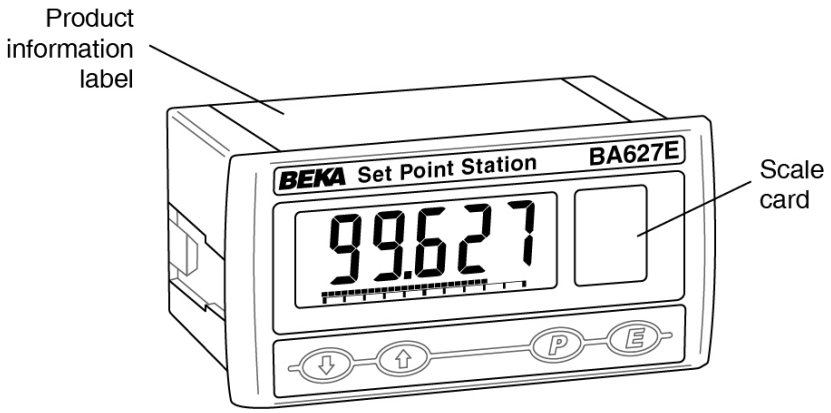
BA627E
General Purpose 2-wire 4/20mA manual set point station

For instruments with firmware 1.04 and later. Issued June 2015.

Issue 9



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The BA627E is CE marked to show compliance with the European EMC Directive 2014/30/EU. It is also UKCA marked to show compliance with UK Electromagnetic Compatibility Regulations UKSI 2016:1091 (as amended)

1. DESCRIPTION

The BA627E is a general purpose, loop powered, panel mounting Set Point Station which enables the current flowing in a 4/20mA loop to be manually adjusted from within a process area via the front panel push buttons, or an optional external rotary control. The BA627E output is adjustable between 3 and 22mA but the output range may be restricted if only limited adjustment is required. In addition to the output being continuously variable, five pre-set output currents may be configured and subsequently selected from the front panel push buttons. To minimise plant disturbance the maximum output rate of change may be defined.

Adjustment of a plant parameters represented by a 4/20mA current is the main application for BA627E Set Point Stations. A controller set point, actuator position or any 4/20mA variable may be manually adjusted.

The BA627E incorporates a 5 digit display and a 31 segment bargraph which may be calibrated to display the 4/20mA output current in any linear engineering units. An optional factory fitted backlight, which may be loop or separately powered, enables this display to be read in all lighting conditions.

2. OPERATION

Fig 1 shows a simplified block diagram of the BA627E manual Set Point Station. The 4/20mA current flowing in the loop may be manually set at any value between approximately 3 and 22mA using the front ▲ and ▼ panel push buttons. Initially the output current changes slowly, but after the button has been pressed for five seconds the rate of change accelerates to allow large changes to be made quickly.

The five pre-set outputs, which are selectable via the instruments front panel push butons, allow the operator to quickly select frequently used plant set points.

To prevent plant disturbance the maximum rate of output current change initiated by operating the front panel push buttons, switching between pre-set outputs or using an optional external encoder may be defined.

The output resistance of the BA627E is very high, within the specified operating voltage range, the loop current will therefore be unaffected by changes in the supply voltage.

Caution

The BA627E output should not be used for critical safety applications.

Versatile calibration facilities allow the 5 digit internal display to show the 4/20mA output current in linear engineering units. For example, in an application where the BA627E is being used to adjust the set point of a speed controller, the internal indicator may be calibrated to display the required speed in RPM.

For applications in poorly illuminated areas a factory fitted green backlight is available which may be loop or separately powered. When loop powered the backlight produces background illumination enabling the display to be read at night or in poor lighting conditions. No additional power supply or field wiring are required, but the Set Point Station voltage drop is increased. When separately powered, the backlight is brighter but additional field wiring is required.

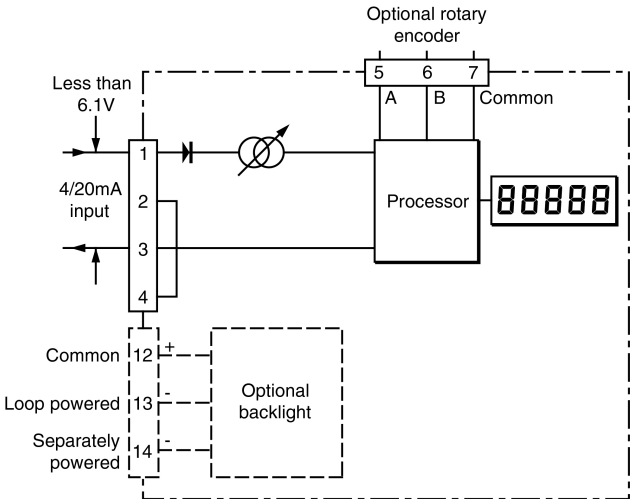


Fig 1 Simplified block diagram of BA627E

2.1 Controls – two handed

The BA627E Set Point Station is controlled and configured via four front panel push buttons located below the display. In the operating mode i.e. when the Set Point Station is controlling the loop current and the display is showing the output in engineering units, these push buttons can have two alternative sets of functions depending upon if the Set Point Station has been configured for two or single handed operation..

Two handed operation is the default configuration which minimises the possibility of accidental adjustment. of the output current by requiring that the ***E*** button be pressed at the same time as the ▼ or ▲ button to make an adjustment. :This configuration also prevents the optional external encoder from adjusting the output current unless the ***E*** button is operated.

E **+ ▼** Output current slowly decreases. After five seconds the rate of change accelerates so that large changes may be made quickly. Use of two buttons minimises possibility of accidental adjustment.

E **+ ▲** Output current slowly increases. After five seconds the rate of change accelerates so that large changes may be made quickly. Use of two buttons minimises possibility of accidental adjustment.

E Continuously pushing this button for 5 seconds allows the Set Point Station output to be entered in engineering units digit by digit using the ▲ or ▼ push button to adjust the flashing digit and the ***P*** button to move control to the next digit. When set as required, pressing the ***E*** button will enter the new set point.

P While this button is pushed the BA627E Set Point Station will display one of three alternatives depending upon how the instrument has been configured:

Output current mA without bargraph

Output as a % of span

Pre-set outputs in engineering units

The display will flash. While continuing to press the ***P*** button, operating the ▼ or ▲ button will show the identification of the pre-set closest to the present Set Point Station output, followed by the pre-set value. Operating the ▼ or ▲ button will scroll through the five pre-sets and an 'Abort' position.

Releasing both buttons will leave the selected pre-set value or 'Abort' legend flashing for ten seconds, during which time operating the ***E*** button will update the Set Point Station output to the displayed pre-set value. If the ***E*** button is not operated during this period, the Set Point Station output will not be changed and the original engineering display will be shown.

▼ While this button is pushed the Set Point Station will display the numerical value and analogue bargraph the Set Point Station has been calibrated to display with a 4mA***** output. When released the normal display in engineering units will return.

▲ While this button is pushed the Set Point Station will display the numerical value and analogue bargraph the Set Point Station has been calibrated to display with a 20mA***** input. When released the normal display in engineering units will return.

***** If the Set Point Station display has been calibrated using the CAL function, calibration points may not be at 4 and 20mA.

P **+ ▼** Firmware number followed by version.
This manual applies to firmware version 1.04 and above.

P **+ *E*** Access to configuration menu via optional security code.

2.2 Controls - single handed

The BA627E Set Point Station is controlled and configured via four front panel push buttons located below the display. In the operating mode i.e. when the Set Point Station is controlling the loop current and the display is showing the output in engineering units, these push buttons can have two alternative sets of functions depending upon if the Set Point Station has been configured.

For single handed operation only the ▲ or ▼ push button has to be pressed to adjust the output current as shown below. This configuration also allows the optional external encoder to adjust the output current without the ***E*** button being operated.:

▼ Output current slowly decreases. After five seconds the rate of change accelerates so that large changes may be made quickly.

▲ Output current slowly increases. After five seconds the rate of change accelerates so that large changes may be made quickly.

E Continuously pushing this button for 5 seconds allows the Set Point Station output to be entered in engineering units digit by digit using the ▲ or ▼ push button to adjust the flashing digit and the *P* button to move control to the next digit. When set as required, pressing the *E* button will enter the new set point.

P While this button is pushed the BA427E Set Point Station will display one of three alternatives depending upon how the instrument has been configured:

Output current mA without bargraph

Output as a % of span

Pre-set outputs in engineering units

The display will flash. While continuing to press the ***P*** button, operating the ▼ or ▲ button will show the identification of the pre-set closest to the present Set Point Station output, followed by the pre-set value. Operating the ▼ or ▲ button will scroll through the five pre-sets and an 'Abort' position.

Releasing both buttons will leave the selected pre-set value or 'Abort' legend flashing for ten seconds, during which time operating the *E* button will update the Set Point Station output to the displayed pre-set value. If the *E* button is not operated during this period, the Set Point Station output will not be changed and the original engineering display will be shown.

***P* + ▼** Firmware number followed by version. This manual applies to firmware version 1.04 and above.

P + E Access to configuration menu via optional security code.

2.3 Displays

The BA627E Set Point Station has a 5 digit display plus a 31 segment bargraph.

The digital display may be calibrated using the 'CAL' or '5Et' functions to display the engineering variable represented by the Set Point Station's 4/20mA output, such as temperature, pressure or speed.

The digital display shows the requested Set Point Station output in engineering units, the digital display will flash until the Set Point Station output is the same as the requested output.

The bargraph, which is not adjustable, always shows the actual Set Point Station output. The bargraph starts and finishes at the two currents at which the digital display was calibrated, usually 4 and 20mA.
See sections 5.4 and 5.5.

3. ELECTRICAL SYSTEM DESIGN

3.1 4/20mA loop

The BA627E requires an operating voltage between 6.1 and 30V. Design of the loop is similar to that for a 2-wire temperature or pressure transmitter.

Fig 2 illustrates a typical application in which a BA627E is powered from a common supply. When designing the loop it is only necessary to establish that the maximum voltage drop caused by the Set Point Station, the load and cable resistance is always less than the minimum supply voltage.

For example:

Minimum operating voltage of BA627E	6.1V
Maximum voltage drop caused by speed controller which is a 250ohm load (250ohms x 20mA)	5.0V
Maximum voltage drop caused by cable resistance (10ohms x 20mA)	0.2V
Total maximum voltage drop	11.3V

The power supply voltage must therefore be greater than 11.3V, but less than 30V which is the maximum operating voltage of the BA627E.

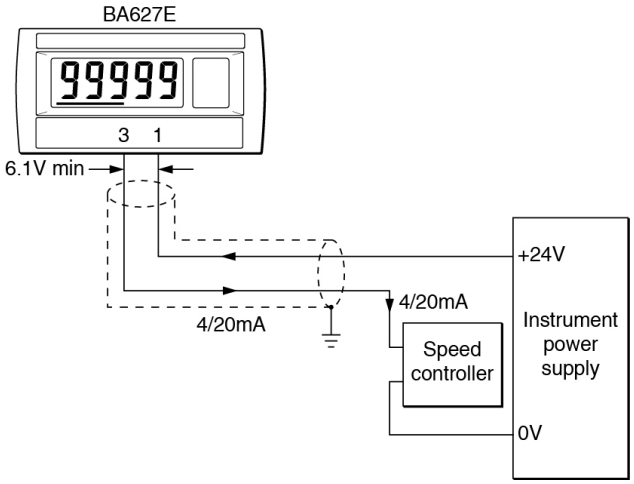


Fig 2 Typical application

4. INSTALLATION

4.1 Location

The BA627E Set Point Station has a robust glass reinforced Noryl enclosure with a toughened glass window. The front of the instrument has IP66 protection and a gasket seals the joint between the Set Point Station enclosure and the panel. The rear of the instrument has IP20 protection.

Installation may therefore be in any panel providing that the operating temperature is between –40ºC and +70ºC.

Fig 3 shows the overall dimensions of the BA627E together with the recommended panel cut-out dimensions and terminal identifications. To achieve an IP66 seal between the instrument enclosure and the instrument panel an aperture with the recommended tolerance should be used.

Cut-out dimensions
Recommended for all installations.

Mandatory to achieve an IP66 seal between the BA427E Set Point Station and the instrument panel

90 +0.5/-0.0 x 43.5 +0.5/-0.0mm

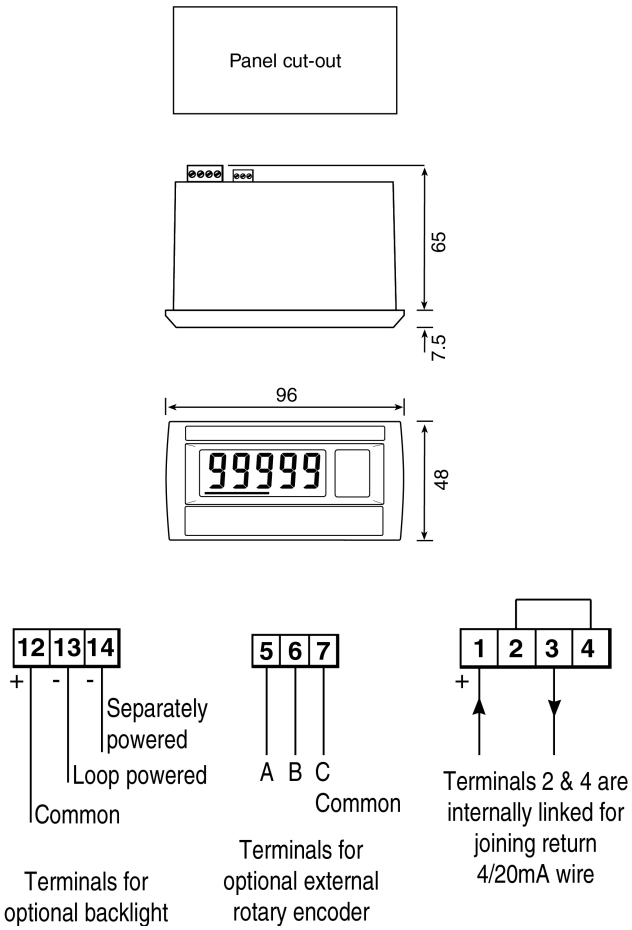


Fig 3 BA627E dimensions

Caution
Although the front of the Set Point Station has IP66 protection, it should be shielded from direct sunlight and severe weather conditions.

4.2 EMC

BA627E Set Point Stations comply with the requirements of the European EMC Directive 2014/30/EU and UK Electromagnetic Compatibility Regulations UKSI 2016:1091 (as amended). For specified immunity all wiring should be in screened twisted pairs, with the cable screen earthed at one point.

4.3 Installation Procedure

a. Cut the specified aperture in the panel. To achieve an IP66 seal between the instrument enclosure and the instrument panel the aperture must have the dimensions specified in Fig 3.

b. Slide the gasket over the body of the Set Point Station before inserting the instrument into the panel aperture.

c. Firstly ensure that both the panel mounting clamps are closed by turning the knurled screws fully anti clockwise until the two pips in the clamp foot align with holes in the clamp body.

d. Place a clamp in the recess on each side of the Set Point Station, pulling gently to slide it onto the dovetail as shown in Fig 4. Push the knurled screw slightly forward to engage the thread and tighten by turning clockwise until it is just finger tight. When both clamps are fitted ensure that the gasket behind the front panel bezel is correctly positioned before fully tightening the clamps to secure the instrument. The maximum recommended clamp tightening torque is 22cNm (1.95 lbf in) which is approximately equvalent to finger-tight plus one half turn. **Do not over tighten**.

e. Connect the panel wiring to the rear terminal block(s) as shown in Fig 3. To simplify installation, the terminals are removable so that the panel wiring can be completed before the instrument is installed. Wiring should be secured to prevent vibration damage.

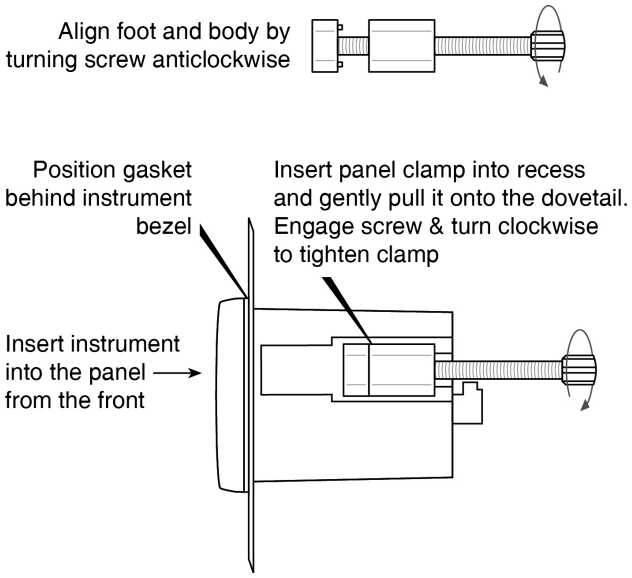


Fig 4 Fitting panel mounting clamps

4.4 Scale card

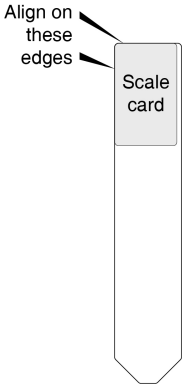
The engineering units of measurement represent by the Set Point Station's 4/20mA output current may be shown on a printed scale card in a window at the right hand side of the display. The scale card is mounted on a flexible strip that is inserted into a slot at the rear of the instrument as shown in Fig 5. Thus the scale card can easily be changed without removing the Set Point Station from the panel or opening the instrument enclosure.

New instruments are supplied with a printed scale card showing the requested units of measurement, if this information is not supplied when the instrument is ordered a blank card will be fitted.

A pack of self-adhesive scale cards printed with common units of measurement is available as an accessory from BEKA associates. Custom printed scale cards can also be supplied.

To change a scale card, unclip the end of the flexible strip that is accessible from the rear of the instrument by gently pushing the strip upwards and pulling it out of the enclosure. Peel the existing scale card from the flexible strip and replace it with a new printed card, which should be aligned as shown in Fig 5. Do not fit a new scale card on top of an existing card.

Install the new scale card by gently pushing the flexible strip into the slot at the rear of the Set Point Station, when it reaches the internal end-stop secure it by pushing the end of the flexible strip downwards so that the tapered section is held by the rear panel.



Align the self-adhesive printed scale card onto the flexible strip and insert the strip into the Set Point Station as shown below.

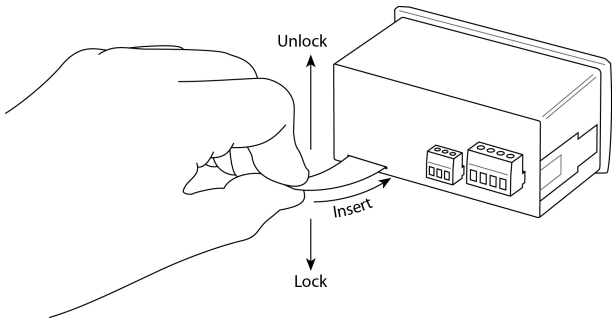


Fig 5 Inserting flexible strip carrying scale card into slot at the rear of Set Point Station.

5. CONFIGURATION AND CALIBRATION

Set Point Stations are configured and calibrated via the four front panel push buttons. All the configuration functions are contained in an easy to use intuitive menu that is shown diagrammatically in Fig 6.

Each menu function is summarised in section 5.1 and includes a reference to more detailed information.

Throughout this manual push buttons are shown as ***P***, ***E***, ▼ or ▲ and the Set Point Station display legends are shown within inverted commas e.g. 'CAL' and 'CodE'.

Access to the configuration menu is obtained by operating the ***P*** and ***E*** push buttons simultaneously. If the Set Point Station security code is set to the default 0000 the first parameter 'rE5n' will be displayed. If a security code other than the default code 0000 has already been entered, the Set Point Station will display 'CodE'. Pressing the ***P*** button will result in '0000' being displayed with one digit flashing. To gain access the four digit security code should be entered using the ▲ and ▼ push buttons to set the flashing digit and the ***P*** button to move control to the next digit. When the correct four digit code has been entered, pressing ***E*** will cause the first parameter 'rE5n' to be displayed. If the code is incorrect, or a button is not pressed within twenty seconds, the Set Point Station will automatically return to the operating mode.

Once within the configuration menu the required parameter can be reached by scrolling through the menu using the ▲ or ▼ push buttons as shown in Fig 6. When returning to the operating mode following recalibration or a change to any function, the Set Point Station will display 'dAtA' followed by 'SAVE' while the new information is stored in permanent memory.

All new Set Point Stations are supplied calibrated as requested at the time of ordering. If calibration is not requested, instruments will be supplied with the following default configuration:

Default Configuration

Resolution 'rE5n'	10
Display at 4mA output '2ero'	0.00
Display at 20mA output '5PAn'	100.00
Output current limits 'H - - L'	03.000 & 22.000
Maximum output rate of change	000
P button in operating mode 'P.Fn'	PC
Pulses per rev of external encoder 'EnC'	12
One or two handed operation 'Hnd'	2 H
Security access code 'CodE'	0000

Default configuration can easily be changed on-site.

5.1 Summary of configuration functions

This section summarises each of the configuration functions and includes a cross reference to a more detailed description. Fig 6 illustrates the location of each function within the configuration menu.

Display	Summary of function

'rE5n' **Adjustment resolution**
Defines the adjustment resolution of the front panel ▲ and ▼ buttons and the optional external rotary control when adjusting the output current with the Set Point Station in the operating mode. May be set to '1', '10' or '100' least significant digits of the display.
See section 5.2

'dP' **Decimal point**
Positions a dummy decimal point between any of the displayed digits or turns it off.
See section 5.3

'CAL' and 'SEt' are alternative ways of calibrating the Set Point Station digital display.

'CAL' **Calibration of the digital display using an external current meter.**
Preferred method of calibrating the digital display which enables the zero and span of the Set Point Station display to be calibrated to show the engineering units represented by the 4/20mA output. Calibration may be performed at any output current providing the points are at least 4mA apart. Requires an accurate external current meter.
See section 5.4

'5Et' **Calibration of digital display using internal references.**
Using the Set Point Station's internal reference, this function enables the digital display to be calibrated to show the engineering units represented by the output current at 4mA and 20mA. Unlike the 'CAL' function, an accurate external current measuring instrument is not required and the Set Point Station does not have to be disconnected from the loop, but calibration can only be performed at 4 and 20mA.
See section 5.5

Display	Summary of function
'H - - L'	**High & low current output limits** Defines the lower 'Lo' and upper 'Hi' 4/20mA Set Point Station output current limits. See section 5.6
'P5Et'	**Pre-set outputs** The values of the five pre-set current outputs are defined by this function. The pre-set output currents are identified '5Et1' to '5Et5' and are displayed in engineering units. This function only appears in the configuration menu when 'P5Et', which allows pre-set values to be viewed and selected in the operating mode, is selected in the 'P.Fn' function. See section 5.7
'rAtE'	**Maximum output rate of change** Enables the maximum rate of change of the 4/20mA output current to be defined. Adjustable between approximately 1 and 100 seconds for full scale output travel. 0 disables this rate of change limit. See section 5.8
'P.Fn'	**Function of *P* push button in operating mode.** The Set Point Station may be configured to display the output current in milliamps, the output current as a percentage or to provide access to the five pre-set outputs when the ***P*** push button is pressed in the operating mode. See section 5.9

Display	Summary of function
'EnC'	**Encoder** In addition to the Set Point Station 4/20mA output being adjusted by the front panel push buttons, an external quadrature encoder may be connected to provide control via a rotary knob. This function allows the number of pulses per revolution of the knob to be entered. **See section 5.10**
'Hnd'	**One or two handed operation** Allows the Set Point Station output current to be adjusted by the front panel ▲ or ▼ push button and by the optional external encoder with or without the ***E*** button be pressed at the same time. **See section 5.11**
'CodE'	**Security code** Defines a four digit numeric code that must be entered to gain access to the configuration menu. Default code 0000 disables this security function and allows unrestricted access to all conditioning functions. See section 5.12
'r5Et'	**Reset** Returns the Set Point Station configuration to the default condition. To prevent accidental use, reset must be confirmed by entering '5urE' before it will be executed. See section 5.13

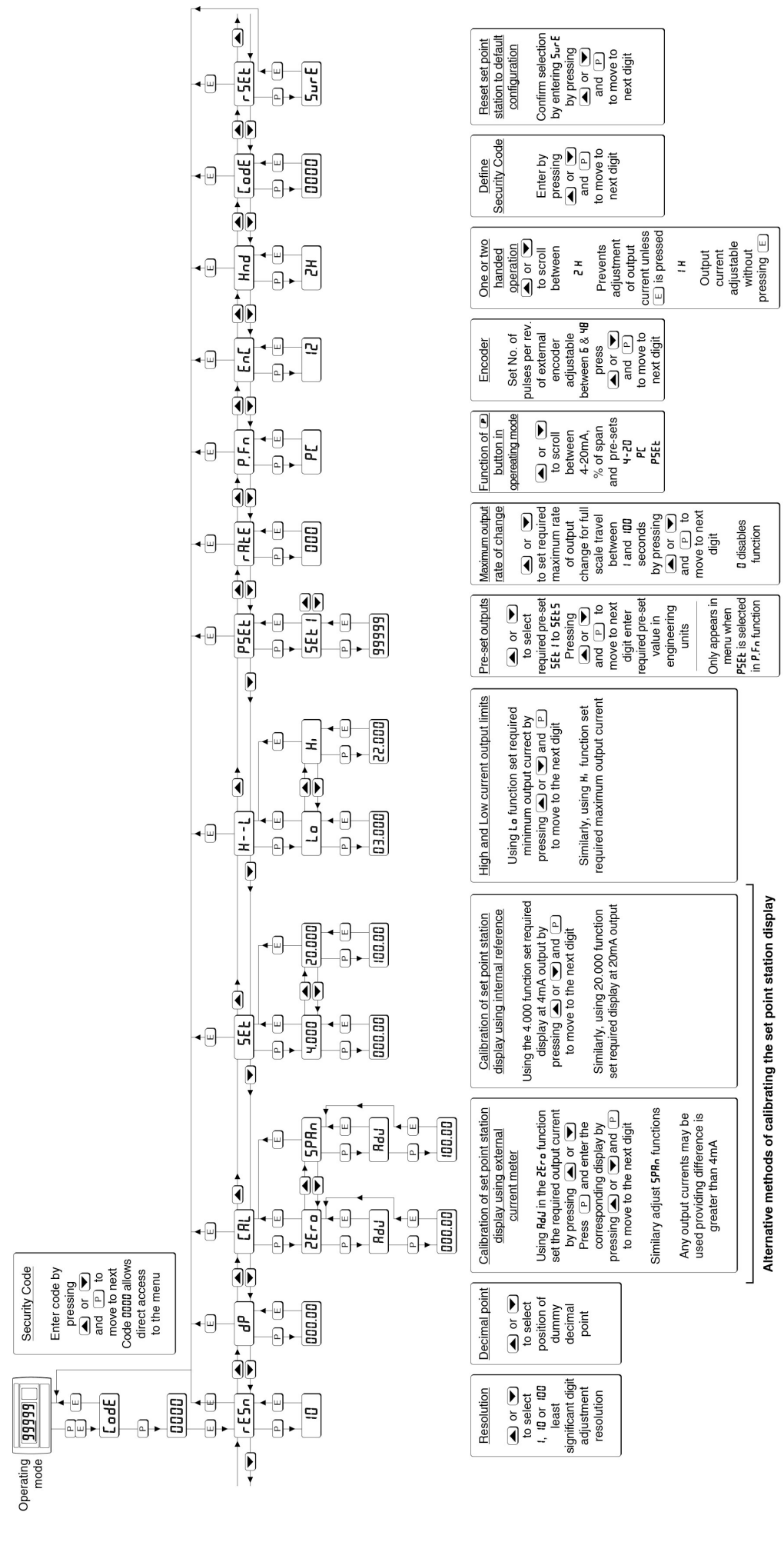


Fig 6 Configuration menu

5.2 Adjustment resolution: 'rE5n'

This function enables the adjustment resolution of the front panel ▲ and ▼ buttons and the optional alternative external rotary control to be defined. One of three different resolutions may be selected '1', '10' or '100' least significant digits of the Set Point Station display. If '10' is selected the least significant displayed digit will always be zero and the second least significant digit will change when the front panel ***E*** button plus the ▲ or ▼ button are pressed in the operating mode, or the optional external rotary control is turned. Similarly, if '100' is selected the least two significant displayed digits will always be zero and the third least significant digit will change when the front panel buttons are operated, or the optional external rotary control is turned.

To define the adjustment resolution select "rE5n' from the configuration menu and press ***P*** which will reveal the current adjustment resolution. To change the resolution press the ▲ or ▼ button to select 1, '10' or '100', followed by the ***E*** button to enter the selection and return to the configuration menu.

Notes:

a. This function does not affect the resolution of adjustments made within the configuration menu.

b. If a pre-set output has a finer resolution than the selected adjustment resolution, the finer resolution will be used to determine the pre-set output, but the selected resolution will be restored when the output is adjusted using the ***E*** button plus the ▲ or ▼ button in the operating mode,

5.3 Position of the decimal point: 'dP'

A dummy decimal point can be positioned between any of the displayed digits or it may be absent. To position the decimal point, select 'dP' from the configuration menu and press ***P***. The decimal point can be moved by pressing the ▲ or ▼ push button. If a decimal point is not required it should be positioned beyond the most or least significant digit. When positioned as required press the ***E*** button to enter the selection and return to the 'dP' prompt in the configuration menu.

5.4 Calibration of the digital display using an external current meter: 'CAL'

This function is the preferred method of calibrating the Set Point Station digital display to show the engineering units represented by the 4/20mA output. The function enables the Set Point Station output current to be set at two different values, Zero and Span, measured by a calibrated external current meter and the corresponding Set Point Station display to be entered.

The bargraph is not displayed while using the 'CAL' function.

Although calibration is normally performed at 4.000mA and 20.000mA, other currents may be used providing they differ by more than 4mA.

To calibrate the Set Point Station display, select 'CAL' from the configuration menu and press ***P*** to enter the '2Ero' sub-menu used for calibrating the display at the lower of the two output currents, usually 4.000mA. Pressing ***P*** again will result in 'Adj' being displayed which is an invitation to adjust the Set Point Station output current using the ▲ or ▼ push button. Pressing either of these buttons will cause the output current to change, gradually accelerating as the button is held. Alternatively the external rotary encoder may be used. When the external current meter shows the required lower output current e.g. 4.000mA, press ***P*** to reveal the existing Set Point Station digital display with one digit flashing. The flashing digit may be adjusted by pressing the ▲ or ▼ button, when this digit is set as required pressing ***P*** will transfer control to the next digit. When all the digits have been adjusted, press ***E*** to enter the setting and return to the '2Ero' prompt.

Calibration of the Set Point Station display at the upper output current is performed in exactly the same way using the '5PAn' sub-menu which may be selected from the '2ero' prompt using the ▲ or ▼ button.

To obtain a reverse acting display i.e. the Set Point Station display decreases as the output current increases, the required display value entered into '2Ero' should be greater than that entered into '5PAn'. The ▲ and ▼ buttons on the front of the instrument always indicate which way the display will change when the button is pushed.

The bargraph will start at the numerical display entered for '2Ero' calibration and finish at the numerical display entered for '5Pan' calibration, except for reverse acting calibration when the bargraph will also be reversed.

Note:

a. If the specified '2Ero' and '5PAn' output currents do not differ by 4 or more milliamps, they will not be stored when the ***E*** button is pressed to return the Set Point Station to the operating mode.

5.5 Calibration of digital display using internal reference: '5Et'

Using the Set Point Station's internal reference, this function enables the digital display to be calibrated to show the engineering units represented by the output current at 4mA and 20mA. Unlike the 'CAL' function, an accurate external current measuring instrument is not required and the Set Point Station does not have to be disconnected from the loop, however calibration can only be performed at 4mA and 20mA.

Although not traceable to a calibrated standard, accuracy is adequate for many industrial applications.

To calibrate the Set Point Station's digital display select 'SEt' from the configuration menu and press ***P***. The Set Point Station will display '4.000', pressing ***P*** again will reveal the calibrated display at 4mA output with one digit flashing. The flashing digit may be adjusted by pressing the ▲ or ▼ buttons, when the flashing digit is correct pressing ***P*** will transfer control to the next digit. When all the digits have been adjusted, press ***E*** to return to the '4.000' prompt.

Calibration of the Set Point Station display at 20mA output is performed in exactly the same way using the '20.000' sub-menu which may be selected from the '4.000' prompt using the ▲ or ▼ button. When the display corresponding to a 20mA output has been entered pressing ***E*** twice will enter the setting and return to the '5Et' prompt in the configuration menu.

The bargraph is not displayed while using the '5Et' function

To obtain a reverse acting display i.e. the Set Point Station display decreases as the output current increases, the required display value entered into '4.000' should be greater than that entered into '20.000'. The ▲ and ▼ buttons on the front of the instrument always indicate which way the display will change when the button is pushed.

The bargraph will start at the numerical display entered for 4mA output and finish at the numerical display entered for 20mA output, except for reverse acting calibration when it will also be reversed.

5.6 High & low current output limits: 'H - - L'

The BA627E output is normally adjustable between 3 and 22mA, but may be restricted by this function if a limited adjustment range is required. e.g. to prevent a dangerously high and/or low temperature being selected when used as the set point input for a temperature controller. When the Set Point Station's output current equals the high limit, 'oVEr' is displayed, similarly 'undEr' is displayed when the output current equals the low limit.

To restrict the Set Point Station's output current range select 'H - - L' from the configuration menu and press ***P***. Using the ▲ or ▼ button select 'Lo' to adjust the lower current output limit, or 'Hi' to adjust upper output current limit. Pressing ***E*** will display the selected output current limit in milliamps with one digit flashing. The flashing digit may be adjusted by pressing the ▲ or ▼ button, when the flashing digit is correct pressing ***P*** will transfer control to the next digit.

When all the digits have been adjusted press ***E*** *t*o return to the 'Lo' or 'Hi' prompt followed by ***E*** to enter the adjustments and return to the 'H - - L' prompt in the configuration menu.

Notes:

a. The Lo limit can not be adjusted to a value above the present Set Point Station output current, and the Hi limit can not be adjusted to a value below the present Set Point Station output current. The actual Set Point Station output current should therefore be adjusted to within the acceptable output range before the Lo and Hi limits are adjusted.

b. If any of the five pre-set output currents are set below the Lo limit or above the Hi limit, they will not be selectable and 'oVEr' or 'undEr' will be displayed.

5.7 Pre-set outputs: 'P5Et'

Up to five pre-set current outputs may be stored and recalled from the front panel push buttons which enables common output currents to be quickly selected. e.g. frequently used operating temperatures when a BA627E is used as the set point input for a temperature controller.

To enter pre-set values select 'P5Et' from the configuration menu and press ***P*** which will result in '5Et 1', the first pre-set sub-menu being displayed, pressing ***P*** will then reveal the present value in engineering units with one digit flashing. The flashing digit may be adjusted by pressing the ▲ or ▼ button, when the flashing digit is correct pressing ***P*** will transfer control to the next digit. When all the digits have been adjusted, press ***E*** *t*o return to the '5Et 1' prompt from which any of the other four pre-sets may be selected via the ▲ or ▼ button and adjusted in the same way as '5Et 1'.

Notes:

a. 'P5et' only appears in the configuration menu when 'P5Et' is selected in the 'P.Fn' menu which defines the function of the ***P*** push button in the operating mode. see section 5.9.

b. Maximum adjustment resolution is always available for inputting pre-set values and is used to determine the current output when the pre-set is selected, irrespective of the adjustment resolution selected in function 'rE5n' – see 5.2

c. If, after calibration of the Set Point Station display, previously entered pre-set values are outside the revised output current range, when selected the pre-set value alternating with 'oVEr' or 'undEr' will be displayed.

5.8 Maximum output rate of change: ‘rAtE’

To minimise plant disturbance when the Set Point Station output current is adjusted, the maximum rate of change is defined by this function. The maximum rate is adjustable between approximately 1 and 100 seconds for full scale output travel from 4 to 20mA. If 0 seconds is selected the function is disabled.

To define the maximum rate of change of the Set Point Station output select 'rAtE' from the configuration menu and press ***P*** which will reveal the present maximum rate of change in seconds with one digit flashing. The flashing digit may be adjusted by pressing the ▲ or ▼ buttons, when the flashing digit is correct pressing ***P*** will transfer control to the next digit. When all the digits have been adjusted, press ***E*** to enter the new value and return to the configuration menu.

When the output rate of change limitation is functioning, in the operating mode the Set Point Station digital display will show the requested output and will flash until the requested output current is achieved. The bargraph display always shows the Set Point Station’s actual output.

Pressing the ***E*** button while the output is ramping to a new requested value will stop the output changing.

5.9 Function of the *P* push-button in operating mode: ‘P.Fn’

Using this function the Set Point Station may be configured to display the output current in milliamps, the output current as a percentage of the output range, or to provide access to the five pre-set outputs when the ***P*** button is pressed in the operating mode.

To check or change the function of the ***P*** push button select 'P.Fn' from the configuration menu and press ***P*** to reveal the present setting. Pressing the ▲ or ▼ button will scroll the setting between:

'PC'	Output as a percentage of output range.
'4-20'	Output current in milliamps
‘P5Et’	Access to the five pre-set outputs see 6.7

When set as required, press ***E*** to return to the ‘P.Fn’ prompt in the configuration menu.

5.10 Encoder: ‘EnC’

For applications requiring the Set Point Station’s 4/20mA output current to be controlled by a rotary knob, an external three wire quadrature encoder may be directly connected to terminals 5, 6 and 7.

The BEKA BA490 Is a panel mounting encoder that generates 12 contact pulses per revolution and is intended for use with the BA627E. Other encoders that produce a different number of contact pulses per revolution may also be used. So that all external encoders have a similar adjustment resolution, the ‘EnC’ function enables the number of pulses between 6 and 48 per revolution to be defined.

To enter the number of pulses per revolution that the external encoder generates, select 'EnC' from the configuration menu and press ***P*** which will reveal the existing setting with one digit flashing. The flashing digit may be adjusted by pressing the ▲ or ▼ button, when the flashing digit is correct pressing ***P*** will transfer control to the other digit. When both digits have been adjusted press ***E*** *t*o return to the ‘EnC’ prompt in the configuration menu.

Section 7.4 contains information about the use of an external rotary encoder.

5.11 One or two handed operation: ‘Hnd’

This function defines whether the front panel ***E*** button has to be pushed at the same time that the ▲ or ▼ button is operated, or the optional external encoder is rotated to adjust the Set Point Station's output current. Selecting the two handed operation which requires the ***E*** button to be operated which minimises the possibility of accidental adjustment.

To check or change the function select 'Hnd' from the configuration menu and press ***P*** to reveal the existing setting. Pressing the ▲ or ▼ button will toggle between the two setting:

'2 H'	Output current can only be adjusted when the ***E*** button is pressed..
'1 H'	Output current can be adjusted without pressing the ***E*** button.

When set as required, press ***E*** to return to the ‘Hnd’ prompt in the configuration menu.

5.12 Security code: ‘CodE’

Access to the instrument configuration menu may be protected by a four digit security code which must be entered to gain access. New instruments are configured with the default security code 0000 which allows unrestricted access to all configuration functions.

To enter a new security code select 'CodE' from the configuration menu and press ***P*** which will cause the Set Point Station to display the existing security code with one digit flashing. The flashing digit can be adjusted using the ▲ and ▼ push buttons, when set as required operating the ***P*** button will transfer control to the next digit.

When all the digits have been adjusted press ***E*** to return to the 'CodE' prompt. The revised security code will be activated when the Set Point Station is returned to the operating mode. Please contact BEKA associates sales department if the security code is lost.

5.13 Reset to factory defaults: 'rSEt'

This function quickly returns to the BA627E Set Point Station to the factory default configurations shown in section 5.

To reset the Set Point Station select 'rSEt' from the configuration menu and press ***P.*** To prevent accidental resetting the request must be confirmed by entering '5urE'. Using the ▲ button set the first flashing digit to '5' and press ***P*** to transfer control to the second digit, which should be set to 'u'. When '5urE' has been entered pressing the ***E*** button will reset the configuration menus and return the display to the 'rSEt' function in the configuration menu.

6. MAINTENANCE

6.1 Fault finding during commissioning

If a BA627E Set Point Station fails to function during commissioning the following procedure should be followed:

Symptom	Cause	Solution
No loop current	Incorrect wiring	Check wiring There should be 6.1 to 30V between terminals 1 & 3 with terminal 1 positive. With an optional backlight which is loop powered, there should be 10V to 30V between terminals 3 & 12 with terminal 12 positive.
No loop current 0V between terminals 1 & 3 or between terminals 3 & 12 if optional backlight is loop powered.	Incorrect wiring or no power supply	Check supply voltage and voltage drop caused by all the instruments in the loop.
Unable to adjust output current using ▲ or ▼ push buttons or the optional external encoder.	Instrument may be configured for 2 hand operation and require ***E*** button to be operated at the same time.	Check 'Hnd' function in configuration menu and change if necessary.
Unstable 4/20mA loop current.	Noisy power supply or insufficient voltage to power all the instruments in the loop.	Eliminate ripple on power supply or increase supply voltage.
Unable to enter configuration menu.	Incorrect security code entered.	Enter correct security code, or contact BEKA if the code has been lost.
BA627E displays 'LP Lo'	Voltage between BA627E terminal 1 & 3 is too low,	Increase 4/20mA loop supply voltage.

6.2 Fault finding after commissioning

ENSURE PLANT SAFETY BEFORE STARTING MAINTENANCE

If a BA627E Set Point Station fails after it has been functioning correctly follow the procedure shown in section 6.1. If this does not reveal the cause of the fault, it is recommended that the Set Point Station is replaced.

6.3 Servicing

We recommend that faulty BA627E Set Point Stations are returned to BEKA associates or to our local agent for repair.

6.4 Routine maintenence

The mechanical and electrical condition of the instrument should be regularly checked. Initially annual inspections are recommended, but the inspection frequency should be adjusted to suit the environmental conditions.

6.5 Guarantee

Set Point Stations which fail within the guarantee period should be returned to BEKA associates or our local agent. It is helpful if a brief description of the fault symptoms is provided.

6.6 Customer comments

BEKA associates is always pleased to receive comments from customers about our products and services. All communications are acknowledged and whenever possible, suggestions are implemented.

7. ACCESSORIES

7.1 Scale card

The BA627E Set Point Station has a window on the right hand side of the display through which the scale card showing the units represented by the output current such as ºC or mBar can be seen. New Set Point Stations are fitted with a scale card showing the units specified when the instrument was ordered, if the units are not specified when the instrument is ordered a blank scale card will be fitted. A pack of scale cards pre-printed with common units of measurement is available as an accessory. These can easily be fitted to the Set Point Station without opening the instrument enclosure or removing it from the panel, See section 4.4 of this instruction manual.

Custom scale cards for applications requiring less common units of measurement are also available.

7.2 Tag information

New Set Point Stations can be supplied with tag or application information thermally printed onto the rear panel adjacent to the terminals. This tag information is not visible from the front of the instrument after installation.

7.3 Display backlight

The BA627E Set Point Station can be supplied with a factory fitted green backlight that may be loop or separately powered.

When loop powered the backlight produces background illumination enabling the display to be read at night or in poor lighting conditions. No additional power supply or field wiring are required, but the Set Point Station's minimum operating voltage is increased. When separately powered the backlight is brighter, but additional field wiring and a power supply are required.

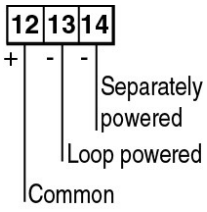


Fig 7 Terminals for optional backlight

7.3.1 Loop powering the backlight

The backlight is loop powered by connecting it in series with the Set Point Station's 4/20mA output as shown in Fig 8, which increases the minimum operating voltage to 10V.

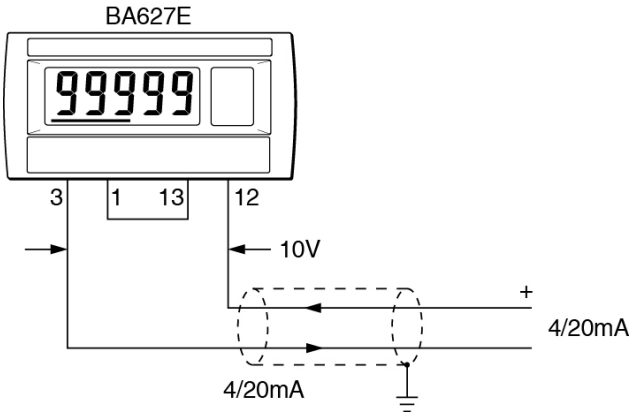


Fig 8 Loop powered backlight

Providing the increased voltage drop can be tolerated, the system design described in sections 3 of this manual remain valid with the backlight loop powered.

7.3 .2 Separately powering the backlight

The optional backlight may also be powered from a separate power supply as shown in Fig 9.

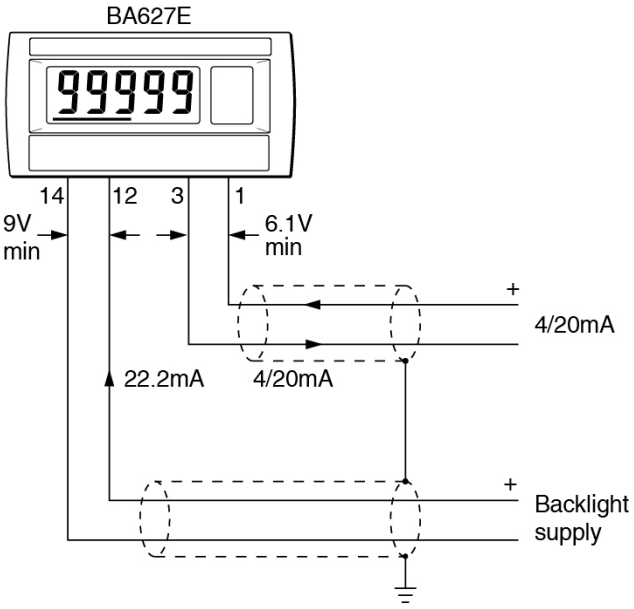


Fig 9 Separately powered backlight

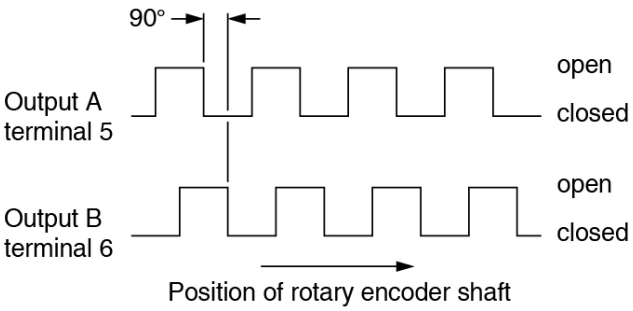
When separately powered the backlight draws a constant current of 22.5mA at or above 9V. Below this voltage the backlight continues to function but with reduced brilliance. Powering the backlight from an adjustable voltage supply allows the backlight brilliance to be adjusted which is a useful feature when the operator's night vision has to be preserved.

7.4 External encoder

For applications requiring the output of the BA627E Set Point Station to be controlled externally, terminals 5, 6 and 7 enable a wide range of three wire quadrature encoders with switch contact outputs to be directly connected to the BA627E. To prevent accidental adjustment, the encoder only changes the Set Point Station's output when the ***E*** button is operated. The Set Point Station's output current can still be controlled by the ▲ and ▼ buttons when an external encoder is connected.

7.4.1 BEKA BA490 rotary encoder

The BEKA BA490 quadrature output rotary encoder has been designed to operate with the BA627E Set Point Station. It is an IP66 panel mounting device with a 20mm diameter control. The two output waveforms and connections are shown in Fig 10.



A & B are referenced
to common terminal 7

Fig 10 BA490 rotary encoder output waveforms

Interconnections between the BA627E Set Point Station and the external BA490 Rotary Encoder are shown below.

BA627E Terminal Nos,	**BA490 Terminal Nos,**
5	A
6	B
7	C