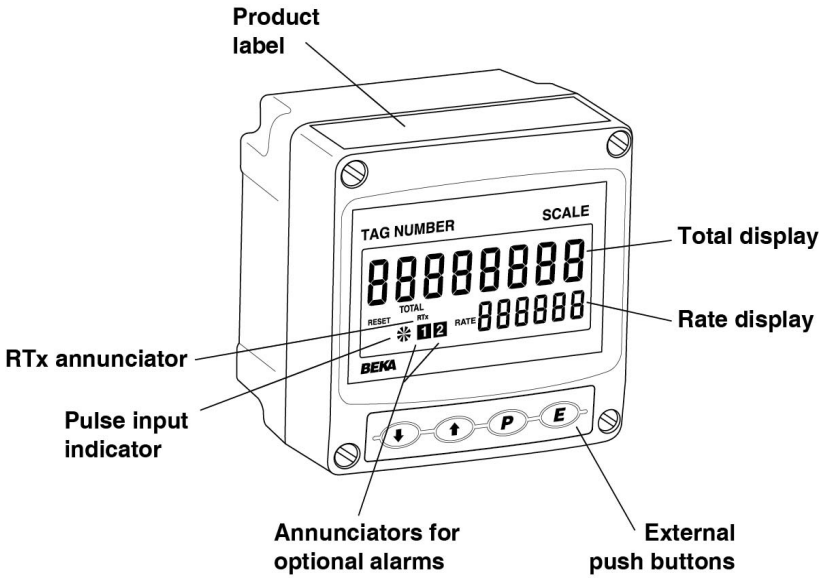
BA564G
Two Input
General Purpose
Counter

Issue 5



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The BA564G is CE marked to show compliance with the European EMC Directive 2014/30/EU

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1. DESCRIPTION

The BA564G is a general purpose, field mounting two input Counter which can accept pulses on one or both inputs. The Counter may be configured to show total and rate for one of the following in engineering units:

Input A + Input b

Input A - Input b

Input A count direction controlled by Input b

Quadrature decoder
(Input A and Input b electrically 90° apart)

A smaller six digit display may be activated to show the composite pulse rate in engineering units per second, minute or per hour.

In addition to counting applications, the BA564G can display the position, direction of movement and speed of a shaft or cable using the instruments quadrature decoder.

The optically-isolated pulse output may be configured to synchronously retransmit either of the two pulse inputs or a scaled output when the least significant digit of the total display is incremented.

This instruction manual supplements the abbreviated instruction sheet supplied with each instrument.

2. OPERATION

Fig 1 shows a simplified block diagram of the BA564G Counter. The instrument has two inputs, A and b, which can be individually configured to accept pulses from most types of sensor. The BA564G can display the total number of pulses received from each input, or their sum or difference, together with associated rates on a separate display.

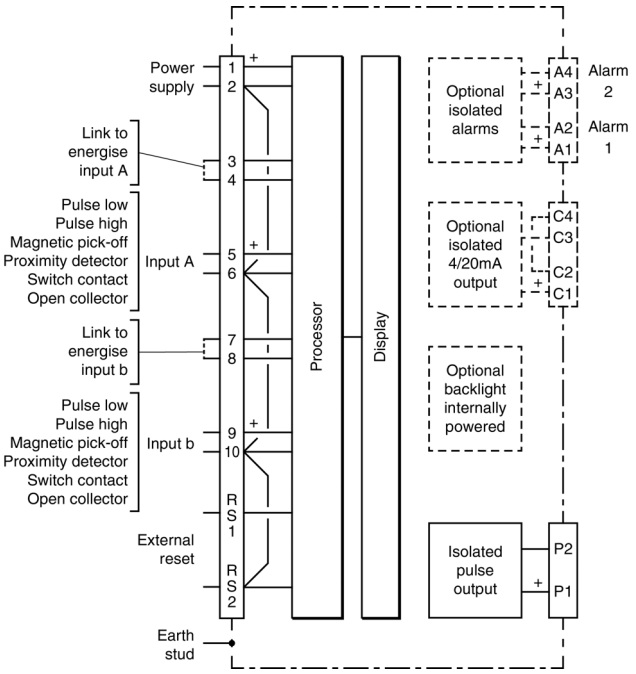


Fig 1 BA564G block diagram

The BA564G can be supplied with any of the following factory fitted accessories:

Internally powered display backlight

Dual isolated alarms

Isolated 4/20mA output

2.1 Initialisation

Each time power is applied to a BA564G Counter initialisation is performed. After a short delay the following display sequence occurs:

All segments of the display are activated.

Counter starts functioning, using the configuration information stored in the instrument's permanent memory. Unless total and grand total displays have been reset, new pulses will be added to the existing totals.

2.2 Controls

The BA564G Counter is controlled and configured via four front panel push buttons. In the display mode i.e. when the instrument is counting the push button functions are:

Push Button Functions

E + ▼ Grand total - shows Lo followed by least significant 8 digits of the 16 digit grand total.

E + ▲ Grand total - shows Hi followed by the most significant 8 digits of the 16 digit grand total.
If Local Grand Total Reset CLr GtoL in the instrument configuration menu has been activated, operating the E and ▲ buttons simultaneously for ten seconds will result in CLr.no being displayed with the no flashing. Operating the ▲ or ▼ button will change the display to CLr.YES, the E button will then reset the grand total to zero which will be confirmed by a brief display of Gt CLrd.
See 5.25

▼ + ▲ If Local Total Reset CLr toL in the instrument configuration menu has been activated, operating the ▼ and ▲ buttons simultaneously for three seconds will reset the total display to zero and clear any pulses stored in the optional pulse output.
See 5.24

P + ▼ Shows in succession firmware version number, instrument function 2CH Cntr and any output accessories that are fitted:
- -A Dual alarm outputs
- -P Pulse output (always fitted)
- -C 4/20mA output

P + E Access to configuration menu

Note: When optional alarms are fitted, the BA564G Counter may be configured to provide direct access to the alarm setpoints from the display mode when the P and ▲ buttons are operated simultaneously.
See 9.4.12 and 9.4.13

2.3 Displays

The BA564G Counter has two digital displays and associated annunciators, plus a pulse input indicator as shown on the front cover of this manual.

Total display Shows the total pulse count on the upper eight digit display. May be reset via front panel push buttons or by a remote reset switch.

Rate Display Shows the pulse rate on the lower six digit display. Total and rate displays may be reversed.

Pulse input indicator This disc in the lower left hand corner of the display 'rotates' for two seconds each time an input pulse is received on either input. Appears to rotate continuously when input frequency on either input exceeds 0.5Hz.

Reset annunciator Activated while the total display is being reset via the front panel push buttons, or the external reset terminals.

Rate annunciator Identifies rate display

Total annunciator Identifies total display

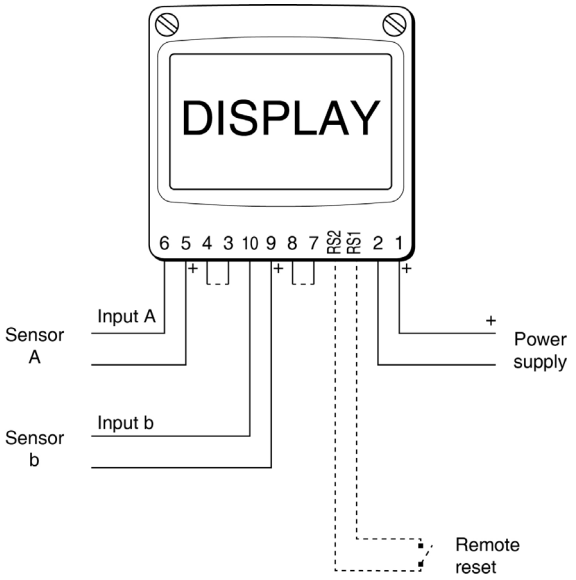
RTx annunciator Retransmitted pulse annunciator.
Depends upon the setting of SourCE in the pulse output configuration menu.

SCALEd:
Annunciator activated each time pulse output open collector is *on*, i.e. Ron is less than 60Ω + 3V.

dirECt:
Annunciator continuously activated.

3. SYSTEM DESIGN

Fig 2 illustrates the basic circuit that is used for all BA584G installations. For simplicity, the pulse output is described sparately in section 6 and the optional alarms and 4/20mA output are described in section 9 of this manual.



Sensor output	Input A	Input b
Proximity detector Switch contact Open collector	Link 3 & 4	Link 7 & 8
Voltage pulse Magnetic pick-off	Don't link 3 & 4	Don't link 7 & 8

Fig 2 Basic BA564G System

When designing a system using a BA564G Counter, it is important to remember that terminals 2, 6, 10 and RS2 are interconnected within the instrument. See Fig 1.

3.1 Power supply

The BA564G Counter requires a minimum of 10V between terminal 1 & 2 and consumes:

	10mA	without optional backlight
plus	6mA	when terminals 3 & 4 are linked
plus	6mA	when terminals 7 & 8 are linked
plus	16mA	with optional backlight

3.2 Pulse inputs

The BA564G can display the total number of pulses received and their rate from a wide variety of pulse output sensors connected to either input.

When designing a system it is important to remember that terminals 2, 6, 10 and RS2 of the BA564G Counter are internally connected together.

3.2.1 Input switching thresholds

For reliable operation the Counter pulse inputs must fall below the lower threshold and rise above the upper thresholds shown in the following table.

Input transducer	Switching thresholds	
	Lower	Upper
Open collector	2kΩ	10kΩ
Voltage pulse low	1.0V	3.0V
Voltage pulse high	3.0V	10.0V
Magnetic pick-off	0mV	40mV peak
Proximity detector	1.2mA	2.1mA
Switch	100Ω	1000Ω

Switch contact, proximity detector and open collector sensors require energising to determine their state which is achieved by linking Counter terminals 3 and 4 for input A and terminals 7 and 8 for input b.

3.2.2 Switch contact input

Any switch contact may be directly connected to pulse input terminals 5 and 6 and to terminals 7 and 8. The BA564G contains a configurable debounce circuit to prevent contact bounce being counted. See sections 5.6 and 5.9.

3.2.3 2-wire Proximity detector

Most NAMUR 2-wire proximity detectors may be directly connected to a BA564G input, providing the minimum operating voltage of the proximity detector is less than 7.5V. The BA564G contains a configurable de-bounce circuit to prevent false triggering. Three levels of debounce protection are independently available for each input. See sections 5.6 and 5.9.

3.2.4 Open collector input

Sensors with an open collector output to input terminals 5 & 6 or to 7 & 8. Input polarity should be onserved The BA564G contains a configurable debounce circuit to prevent false triggering. See sections 5.6 and 5.9.

3.2.5 Magnetic pick-off input

Sensors incorporating a magnetic pick-off will usually have a low level ac voltage output which a BA564G Counter can sense when configured for a Coil input. The BA564G contains a configurable debounce circuit to prevent false triggering. See sections 5.6 and 5.9.

3.2.6 Voltage pulse input

Two voltage pulse input ranges are selectable in the BA564G Counters configuration menu, VoLt5L and VoLt5H. The BA564G contains a configurable debounce circuit to prevent false triggering. See sections 5.6 and 5.9.

3.3 Remote reset

The BA564G Counter's total display may be remotely reset by connecting terminals RS1 and RS2 together. Permanent interconnection inhibits counting. Remote resetting may be accomplished by any switch contact.

The BA564G total display may also be reset when the ▼ and ▲ push buttons are operated simultaneously in the operating mode i.e. when the instrument is counting. See 5.24

4. INSTALLATION

5.1 Location

The BA564G Counter is housed in a robust IP66 glass reinforced polyester (GRP) enclosure incorporating an armoured glass window and stainless steel fittings making it suitable for exterior mounting in most industrial on-shore and off-shore installations. The Counter should be positioned where the display is not in continuous direct sunlight.

Field wiring terminals are located on the rear of the Counter assembly as shown in Fig 4.

To ensure electrical continuity between the two conduit or cable entries, the enclosure back-box is fitted with a bonding plate which includes an M4 earth stud. This bonding plate may be mounted on the inside or outside of the enclosure. If the carbon loaded GRP enclosure is not bolted to an earthed post or structure, this earth stud should be connected to a local earth or the plant potential equalising conductor.

An insulated M4 stud is provided in the bottom right hand corner of the back-box for interconnecting cable screens.

Alternatively the BA564G Counter may be pipe or panel mounted using a BA393G pipe mounting kit or a BA394 or BA395 panel mounting kit which are available as accessories.

4.2 Installation Procedure

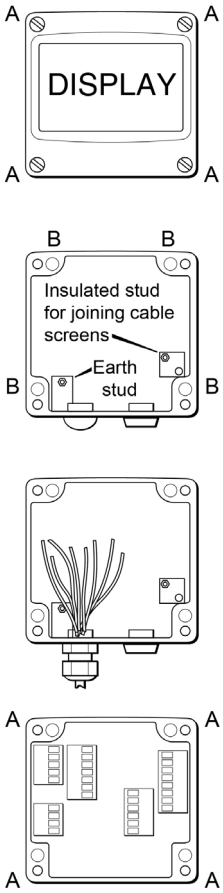
Fig 3 illustrates the instrument installation procedure.

A. Remove the Counter assembly by unscrewing the four captive 'A' screws.

B. Mount the enclosure back-box on a flat surface and secure with screws or bolts through the four 'B' holes. Alternatively use one of the pipe or panel mounting kits which are available as accessories.

C. Remove the temporary hole plug and install an appropriate IP and temperature rated M20 x 1.5mm cable gland or conduit fitting. If two entries are required, the supplied IP66 stopping plug should be replaced with an appropriate IP and temperature rated M20 x 1.5mm cable gland or conduit fitting.

D. Feed the field wiring through the cable entry in the back-box and connect the wires to the terminals on the rear of the instrument assembly as shown in Fig 4. Tighten cable glands to ensure they are sealed and replace the instrument assembly on the back-box. Finally evenly tighten the four 'A' screws.



Step A
Unscrew the four captive 'A' screws and separate the indicator assembly and the back-box.

Step B
Secure the enclosure back-box to a flat surface with M6 screws through the four 'B' holes. Alternatively use a pipe mounting kit.

Step C
Remove the temporary hole plug and install an appropriate IP rated cable gland or conduit fitting. Feed the field wiring through the cable entry.

Step D
Terminate field wiring on the indicator assembly. Replace the indicator assembly on the enclosure back-box and tighten the four 'A' screws.

Fig 3 BA564G installation procedure

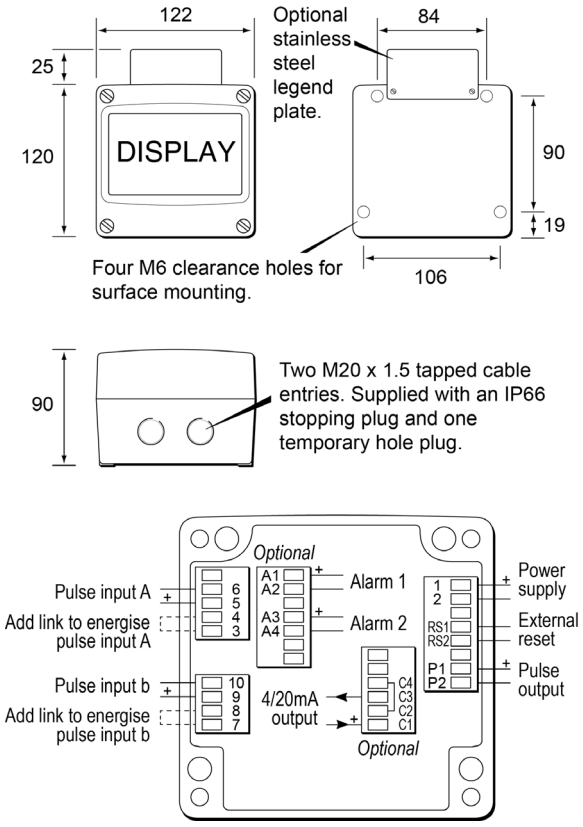


Fig 4 Dimensions and terminal connections

4.3 EMC

The BA564G complies with the requirements of the European EMC Directive 2014/30/EU. For specified immunity all wiring should be in screened twisted pairs, with the screens earthed at a common point.

4.4 Units of measurement and tag marking on scale card.

The Counter's units of measurement and tag information are shown on a scale card which slides into the instrument.

New Counters are supplied with a printed scale card showing the requested units of measurement and tag information. If this information is not supplied when the instrument is ordered, a blank scale card will be fitted which can easily be marked on-site with a dry transfer or a permanent marker. Custom printed scale cards are available from BEKA associates as an accessory.

To remove the scale card from a Counter carefully pull the transparent tab at the rear of the instrument assembly away from the assembly as shown in Fig 5a.

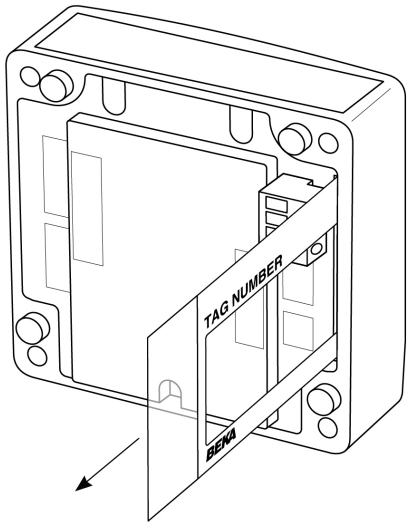


Fig 5a Removing scale card

To replace the scale card carefully insert it into the slot on the right hand side of the input terminals as shown in Fig 5b. Force should be applied evenly to both sides of the scale card to prevent it twisting. The card should be inserted until about 2mm of the transparent tab remains protruding.

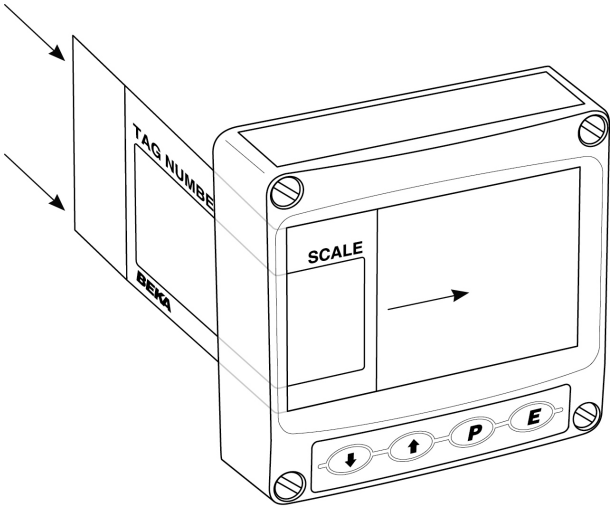


Fig 5b Inserting scale card into the instrument assembly.

5.0 CONFIGURATION & CALIBRATION

The BA564G Counter is configured and calibrated via four front panel push buttons. All the configuration functions are contained in an easy to use intuitive menu that is shown diagrammatically in Fig 7.

Each menu function is summarised in section 5.3 of this manual and each summary includes a reference to more detailed information.

The isolated pulse output, including configuration, is described in section 6 of this manual. When factory fitted optional alarms and the optional 4/20mA output are included, additional functions appear in the configuration menu which are described in section 9 of this manual.

All new BA564G Counters are supplied calibrated as requested at the time of ordering. If calibration is not requested, Counters will have factory default configuration as shown in the following table, but can easily be re-configured on-site.

Function	Display		Default
Input A	inP.tYPE		oP.CoL
Debounce	dEbounCE		dEFAuLt
Input b	inP.tYPE		oP.CoL
Debounce	dEbounCE		dEFAuLt
Counting edge A	CntEdG-A		EdGE 1
Counting edge b	CntEdG-b		EdGE 1
Update	uPdAtE		0.5
Count	Count		Ab
Upper display	di SP-1		totAL
Lower display	di SP-2		on
Decimal point	dP	Rate	00000.0
		Total	00000000
Total scale factor	SCALE.t		001.00
Rate scale factor	SCALE.r		001.00
Timebase	t-bASE		tb-01
Filter	FiLtEr		24
Counter direction	uP or dn		uP
Clear value	CLr VAL		00000000
Local clear	LoC CLr		
Local total reset	CLr tot		oFF
Local grand total reset	CLr Gtot		oFF
Security code	CodE		0000

Note: While the instrument is being configured counting continues so that any input pulses occurring during this time are recorded.

5.1 Calibration structure

Fig 6 shows the calibration structure of the BA564G Counter. The two pulse inputs are processed by the count function to produce a single output having the selected arithmetic function, such as the sum of pulse input A and pulse input b. This output is passed to the SCALE.r and SCALE.t functions allowing the rate and total displays to have different engineering units.

SCALE.t is a dividing factor that converts the output from the Counter function into the required total display in engineering units. e.g. if the output from the Counter function is two pulses per pump stroke and a total display of thousands of pump strokes is required, SCALE.t should be set to 2000.

SCALE.r is a dividing factor that converts the output from the Counter function into a rate display with the required engineering units. e.g. if the output from the Counter function is two pulses per pump stroke and it is required to display the pump stroke rate, SCALE.r should be set to 2.

The timebase t-bASE is a multiplying factor that determines if the instrument displays rate per second, per minute or per hour.

The BA564G uses 'real' decimal points. Moving the position of a decimal point in a scale factor will affect the instrument calibration.

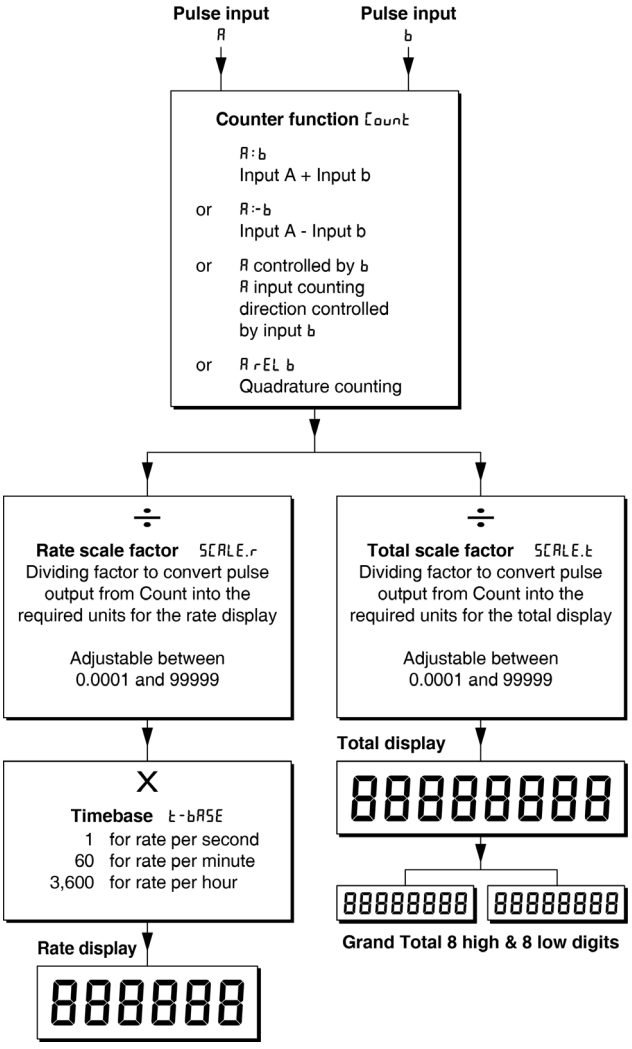


Fig 6 Calibration structure

5.2 Accessing configuration functions

Throughout this manual the instrument front panel push buttons are shown as ▼, ▲, P and E and legends displayed by the instrument are shown in a seven segment font as displayed by the Counter e.g. FiLtEr and SCALE.r.

Access to the configuration menu is obtained by operating the P and E push buttons simultaneously. If the instrument is not protected by a security code the first parameter inPut-A will be displayed. If a security code other than the default code 0000 has already been entered, the instrument will display CodE. Press P to clear this prompt and enter the security code for the instrument using the ▼ or ▲ push button to adjust the flashing digit, and the P push button to transfer control to the next digit. If the correct code has been entered pressing E will cause the first parameter inPut-A to be displayed. If an incorrect code is entered, or a push button is not operated within ten seconds, the instrument will automatically return to the display mode.

All configuration functions and prompts are shown on the upper eight digit display.

Once within the configuration menu the required function can be selected by scrolling through the menu using the ▼ and ▲ push buttons. The configuration menu is shown diagrammatically in Fig 7.

When returning to the display mode following reconfiguration, the BA564G Counter will display dAtA followed by SAVE while the new information is stored in permanent memory.

If after accessing the configuration menu the interval between operating any front panel push button exceeds one minute, the BA564G will automatically return to the display mode and any configuration changes will not be stored in permanent memory. When making changes to multiple configuration functions, it is therefore sensible to occasionally return to the display mode to save the changes that have already been made.

5.3 Summary of configuration functions

This section summarises all the configuration functions. When read in conjunction with Fig 7 it provides a quick aid for configuring the Counter. If more detail is required, each summary contains a reference to a full description of the function.

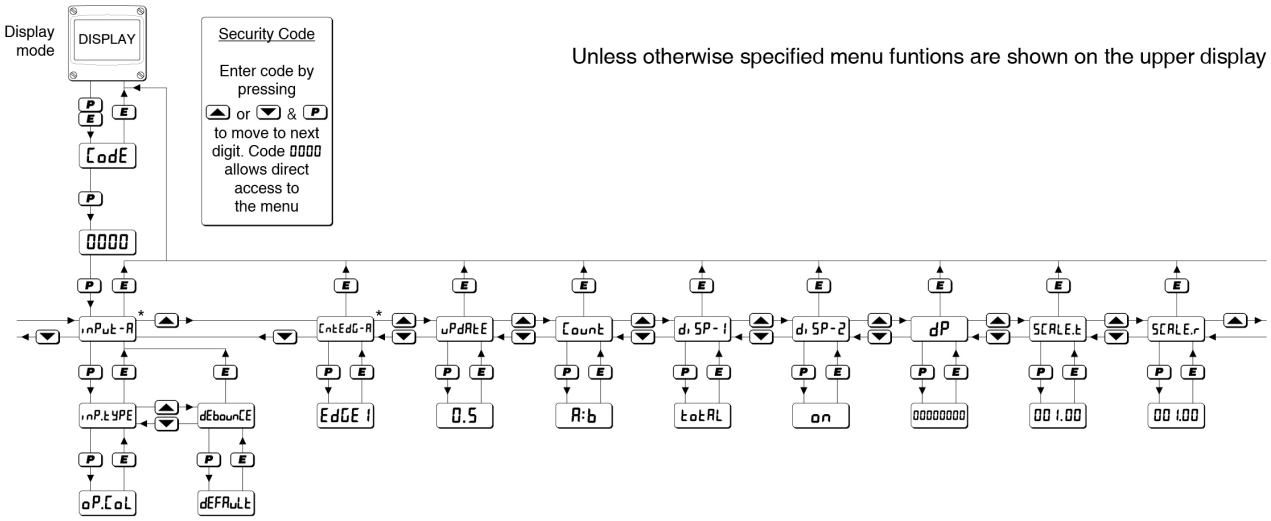
Display	Summary of function
inPut-A	Contains a sub-menu with two functions: inP.tYPE Select Input type dEbounCE Set debounce **See section 5.4**
inP.tYPE [for Input-A]	Configures input-A to accept one of six types of input: oP.CoL Open collector * VoLtS L Voltage pulse <1 >3V VoLtS H Voltage pulse <3 >10V Co iL Magnetic pick-off Pr.dEt Proximity detector * ContACt Switch contact * * Link terminals 3 & 4 **See section 5.5**
dEbounCE [for Input-A]	Defines level of input debounce applied to the pulse input A to prevent false counting: dEFAuLt HEAVY LiGHt **See section 5.6**
inPut-b	Contains a sub-menu with two functions: inP.tYPE Select Input type dEbounCE Set debounce **See section 5.7**
inP.tYPE [for Input-b]	Configures input-b to accept one of six types of input: oP.CoL Open collector * VoLtS L Voltage pulse <1 >3V VoLtS H Voltage pulse <3 >10V Co iL Magnetic pick-off Pr.dEt Proximity detector * ContACt Switch contact * * Link terminals 7 & 8 **See section 5.8**

Display	Summary of function
	dEbounCE [for Input-b] Defines level of input debounce applied to the pulse input b to prevent false counting: dEFAuLt HEAVY Li GHt **See section 5.9**
CntEdG-A	**Input A pulse counting edge** Defines whether the Counter is incremented/decremented on the leading or trailing edge of a pulse on input A. **See section 5.10**
CntEdG-b	**Input b pulse counting edge** Defines whether the Counter is incremented/decremented on the leading or trailing edge of a pulse on input b. **See section 5.11**
uPdAtE	**Display update interval** Defines the interval between display updates between 0.5 and 5 seconds. **See section 5.12**
Count	**Counting function** Defines the arithmetic relationship of the two pulse inputs. The total display can be derived from: Ab — Input A + Input b A-b — Input A - Input b A Con b — Input A controlled by Input b. A rEL b — Quadrature input (for position display) **See section 5.13**
di SP-1	**Upper display** Defines whether rAtE or totAL is shown on the upper display. The other variable will be shown on the lower display, providing the lower display is on in function di SP-2. **See section 6.14**

Display	Summary of function
di SP-2	**Lower display** Turns the lower display, which normally shows rate, on or oFF. **See section 5.15**
dP	**Position of decimal points** Defines the position of the decimal point in both the total and rate displays. **See section 5.16**
SCALE.t	**Total Scale Factor** SCALE.t is a dividing factor that converts the pulse output from arithmetic Count function into the required total display in engineering units. SCALE.t may be adjusted between. 0.0001 and 99999. e.g. if one pulse represents 1 centimetre of dispensed cable and the total display is required in metres, SCALE.t should be set to 100.0 which is the number of centimetres in a metre. The total display is independent of the rate display. **See section 5.17**
SCALE.r	**Rate scale factor** SCALE.r is a dividing factor that converts the pulse output from the arithmetic Count function into the required rate display in engineering units. SCALE.r may be adjusted between 0.0001 and 99999. e.g. if one pulse represents 2 pump strokes and the rate display is required in pump strokes, SCALE.r should be set to 0.5. The rate display is independent of the total display. **See section 5.18**
t-bASE	**Timebase** Selectable multiplier allowing rate to be displayed in units per second, per minute or per hour. Select: tb-01 for rate / second tb-60 for rate / minute tb-3600 for rate / hour **See section 5.19**

Display	Summary of function
FiLtEr	**Display filter** Is an adjustable digital filter to reduce the noise on the rate display. The filter has two parameters each represented by a digit adjustable between 0 and 9. The first digit defines the amount of filtering applied to the display, the second digit the deviation from the displayed rate at which the filter will be overridden and the rate display will move rapidly to the new value. **See section 5.20**
uP or dn	**Direction of count** Determines whether pulses at inputs A and b increment or decrement the total display. **See section 5.21**
CLr VAL	**Reset value** Defines a preset number to which the total display will be set when the BA564G Counter is locally or remotely reset. Enables the instrument to count down from a preset number. **See section 5.22**
LoC CLr	**Local reset** Contains sub-menu with two functions enabling the total and the grand total to be reset via the front panel push buttons while the Counter is in the display mode. **See section 5.23**
CLr tot	**Local total reset** When on is selected total display is reset when ▼ and ▲ buttons are operated simultaneously for more than 3 seconds in the display mode. **See section 5.24**
CLr Gtot	**Local grand total reset** When on is selected the grand total may be reset when E and ▲ buttons are operated simultaneously for more than 10 seconds in the display mode - see section 2.2 for details. **Note:** Once reset, the grand total can not be restored. **See section 5.25**

Display	Summary of function
CLr Gtot	**Resets grand total to zero from within configuration menu.** This function resets the grand total to zero from within the configuration menu when CLr YES is selected. **Note**: Once reset, the grand total can not be recovered. **See section 5.26**
CodE	**Access code** Defines a four digit alphanumeric code that must be entered to gain access to the configuration menu. Default code 0000 disables the security function and allows unrestricted access to all configuration functions. **See section 5.27**
rSEt dEF	**Reset configuration to factory defaults.** Returns the BA564G Counter to the factory defaults shown in section 6.0 To prevent accidental use the request must be confirmed by entering SurE before the reset will be executed. **See section 5.28**



Input-A

or to select

Input type

- oP.CoL — Open Collector
- VoLtS L — Pulse <1V >3V
- VoLtS H — Pulse <3V >10V
- Coil — Magnetic pick-off
- Pr.dEt — Proximity detector
- ContACt — Switch contact

Debounce

or to select

level of debounce.

- dEFAuLt
- HEAVY
- LiGHt

Counting edge input-A

or to toggle between

EdGE 1 volts rising edge

and

EdGE2 volts falling edge

Udate

or to select interval between display updates, may be set to 0.5, 1, 2, 3, 4 or 5 seconds

Count

or to select Input type

- A:b — Input A + Input b
- A:-b — Input A - Input b
- ACon b — A count direction controlled by b
- ArEL b — Quadrature counting mode

Upper Display

or to select display whether totAL or rAtE is shown on upper display

Lower Display

or to turn lower display on or oFF

Decimal point

or to select position of decimal point and P to toggle between rate and total displays

Total scale factor

Dividing factor which defines total display.

or to adjust value and P to move to next digit or decimal point

Rate scale factor

Dividing factor which defines rate display.

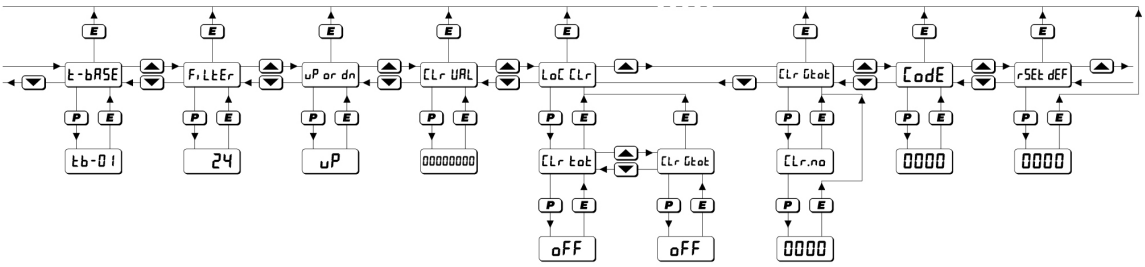
or to adjust value and P to move to next digit or decimal point

* Followed by identical function for input b

Unless otherwise specified menu functions are shown on the upper display

Fig 7 Configuration menu

Pulse output & when fitted optional alarms and 4/20mA appear here



Timebase

(E) or (P) to select rate display timebase.

tb-01 for pulses/sec

tb-60 for pulses/min

tb-3600 for pulses/hour

Filter input

(E) or (P) to adjust value of each digit and (P) to transfer control to the next digit.

First digit: filter magnitude

Second digit: step response

Note: While making adjustments the filtered rate display is shown on lower display so stability can be assessed

Direction of count

(E) or (P) to toggle between uP and dn

Reset value

(E) or (P) to adjust value of each digit and (P) to transfer control to the next digit

Local total reset

(E) or (P) to turn the local total reset function on or oFF. When on, total display may be reset when (E) and (P) are pressed simultaneously for more than 3 seconds in the display mode

Local grand total reset

(E) or (P) to turn the local grand total reset function on or oFF. When on, grand total display may be reset when (E) and (P) are pressed simultaneously for more than 10 seconds in the display mode

Grand total reset

press (E) or (P) to select CLr.YES to reset grand total to zero.

Confirm instruction by entering SurE. Press (E) or (P) to adjust each digit and (P) to move to next digit

Define Security Code

Enter by pressing (E) or (P) and (P) to move to next digit.

Default code 0000 allows direct access to configuration menu

Reset configuration to factory defaults

Confirm instruction by entering SurE. Press (E) or (P) to adjust each digit and (P) to move to next digit

5.4 Input A: InPut-A

The Input A function contains two sub-functions InP.tYPE and dEbounCE that define the type of input and the amount of input noise rejection.

5.5 Input A type: InP.tYPE

InP.tYPE is a sub-menu in the InPut-A function which defines the type of input sensor or input pulse that the instrument will count at Input-A. To check or change the type of input, select InPut-A in the configuration menu and press (P) which will reveal the InP.tYPE prompt, pressing (P) again will show the existing Input-A setting. If set as required press (E) twice to return to the configuration menu, or repeatedly press the (▼) or (▲) button until the required type of input is displayed and then press (E) twice to return to the configuration menu.

One of following six types of input may be selected:

		Switching thresholds	
		Low	**High**
oP.Col	Open collector [2]	2	10kΩ
VoLtSL	Voltage pulse low [1]	1	3V
VoLtSH	Voltage pulse high[1]	3	10V
Coil	Magnetic pick-off	0	40mV
Pr.dEt	Proximity detector [2]	1.2	2.1mA
ContACt	Switch contact [2]	100	1000Ω

Notes:

1. Maximum voltage input +30V.
2. For sensors connected to Input-A that require energising to detect their state i.e. proximity detectors, switch contacts or open collector sensors, terminals 3 & 4 of the BA564G should be linked together.
3. To count correctly, the input pulse must fall below the lower switching threshold and rise above the higher switching threshold.
4. See section 5.6 for typical maximum counting frequency.

5.6 Input A debounce: dEbounCE

dEbounCE is an adjustable sub-menu which prevents the input miscounting when the input pulse has noisy edges, such as those resulting from a mechanical contact closing and bouncing. The debounce function only applies to the input in which the function is located.

Three levels of protection may be independently selected for each input. The amount of debounce applied depends upon the type of Counter input that has been selected for the input in the associated InP.tYPE function.

Select InPut-A in the configuration menu and press (P) which will reveal the InP.tYPE prompt, press the (▼) or (▲) button to select dEbounCE followed by (P) to reveal the existing setting. Pressing the (▼) or (▲) button will scroll through the three levels. When the required level has been selected, pressing (E) twice will enter the selection and return the display to the configuration menu.

The following table shows the minimum time that the input pulse must be continuously above the upper input switching threshold and continuously below the lower switching threshold to ensure that the Counter processes the input pulse. Input switching thresholds are shown in section 5.5.

debounce level	**Min input pulse width**	
	Type of Input	
	Contact	**All others**
Default	1600µs	40µs
Heavy	3200µs	350µs
Light	400µs	5µs

The maximum counting frequency of the BA564G depends upon the debounce level selected, the shape of the input pulse and its amplitude. The following table assumes a square wave input and is included for guidance. The maximum counting frequency will be lower if the input pulses have sloping edges and the pulse amplitude only slightly exceeds the input switching thresholds.

ONLY FOR GUIDANCE		
debounce level	**Max counting frequency**	
	Type of input	
	Contact	**All others**
Default	250Hz	12kHz
Heavy	120Hz	2kHz
Light	1000Hz	100kHz

The minimum counting frequency is 0.01Hz. Below this frequency the rate display will be forced to zero.

5.7 Input b: inPut-b

The Input b function contains two sub-functions inP.tYPE and dEbounCE that define the type of input and the amount of input noise rejection.

5.8 Input b type: inP.tYPE

inP.tYPE is a sub-menu in the inPut-b function which defines the type of input sensor or input pulse that the instrument will count at Input-b. To check or change the type of input, select inPut-b in the configuration menu and press P which will reveal the inP.tYPE prompt, pressing P again will show the existing Input-b setting. If set as required press E twice to return to the configuration menu, or repeatedly press the ▼ or ▲ button until the required type of input is displayed and then press E twice to return to the configuration menu.

One of following six types of input may be selected:

		Switching thresholds Low	High
oP.Col	Open collector [2]	2	10kΩ
VoLtSL	Voltage pulse low [1]	1	3V
VoLtSH	Voltage pulse high[1]	3	10V
Coil	Magnetic pick-off	0	40mV
Pr.dEt	Proximity detector [2]	1.2	2.1mA
ContACt	Switch contact [2]	100	1000Ω

Notes:

1. Maximum voltage input +30V.
2. For sensors connected to Input-b that require energising to detect their state i.e. proximity detectors, switch contacts or open collector sensors, terminals 7 & 8 of the BA564G should be linked together.
3. To count correctly, the input pulse must fall below the lower switching threshold and rise above the higher switching threshold.
4. See section 5.6 for the maximum counting frequency.

5.9 Input b debounce: dEbounCE

Exactly as input A, please see section 5.6

5.10 Input A pulse counting edge: CntEdG-A

This function allows the edge on which a count occurs to be selected. It applies to input A for all counting modes except quadrature (A rEL b).

To check or change the input A pulse edge on which the count occurs select CntEdG-A from the configuration menu and press P which will reveal EdGE 1 or EdGE 2. If required press the ▼ or ▲ button to change the setting, followed by the E button to return to the configuration menu.

EdGE 1

Type of input	Counting edge
Voltage	Low to high
Switch contact	Closed to open
Open collector	Closed to open
Proximity detector	High to low current

EdGE 2

Type of input	Counting edge
Voltage	High to low
Switch contact	Open to closed
Open collector	Open to closed
Proximity detector	Low to high current

Note:

The counting edge function CntEdG-A is not included in the configuration menu when the BA564G Counter has a quadrature input A rEL b. In quadrature mode the instrument will count up when the rising edge of input-b leads the rising edge of input-A.
See section 5.13.

5.11 Input b pulse counting edge: CntEdG-b

This function allows the edge on which a count occurs to be selected. It applies to input b for all counting modes except quadrature A rEL b and input A controlled by input b ACon b.

To check or change the input b pulse edge on which the count occurs select CntEdG-b from the configuration menu and press P which will reveal EdGE 1 or EdGE 2. If required press the ▼ or ▲ button to change the setting, followed by the E button to return to the configuration menu.

EdGE 1

Type of input	Counting edge
Voltage	Low to high
Switch contact	Closed to open
Open collector	Closed to open
Proximity detector	High to low current

EdGE 2

Type of input	Counting edge
Voltage	High to low
Switch contact	Open to closed
Open collector	Open to closed
Proximity detector	Low to high current

Note:

The counting edge function CntEdG-b is not included in the configuration menu when the BA564G Counter has a quadrature input ArEL b or when input A is controlled by input b ACon b. In quadrature mode the instrument will count up when the rising edge of input-b leads the rising edge of input-A.
See section 5.13.

5.12 Display update interval: uPdAtE

If either the rate or the total display is likely to change rapidly, a longer interval between display updates may simplify reading. This function allows one of six different display intervals between 0.5 and 5 seconds to be selected. The selected display update interval does not affect the update time of any other instrument function.

To adjust the update interval select uPdAtE from the configuration menu and press P to reveal the current update interval. Pressing the ▼ or ▲ button will scroll through the six times. When the required interval has been selected press E to enter the selection and return to the configuration menu.

5.13 Counting function: Count

This function defines the arithmetic relationship between Inputs A and Input b. The following four modes may be selected:

Display	Input count mode
A:b	Pulses at input A added to pulses at input b.
A:-b	Pulses at input b subtracted from pulses at input A. [1]
ACon b	Input b controls count direction of input A. [1] **Input b** **Input A** Low Up counter High Down counter
ArEL b	Quadrature input with sensors electrically 90° apart. [1]

Note:

1. The pulse output is not available with these count modes.

Fig 8 shows the voltage waveforms at the two inputs and the resulting total display when the BA564G is configured to count up on a rising edge.

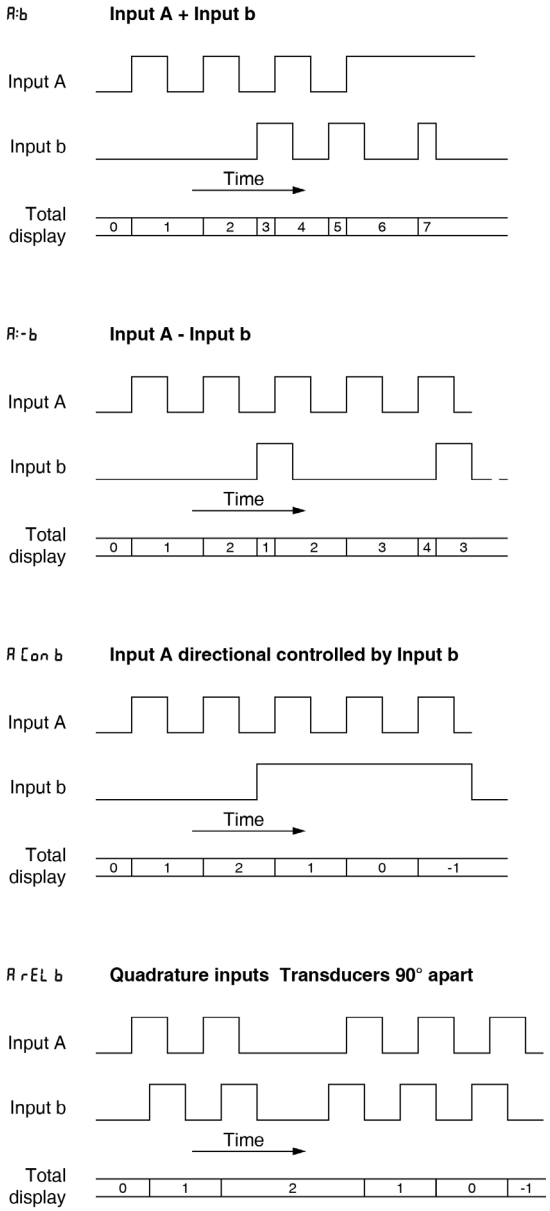


Fig 8 Counting waveforms

Note:

1. For a quadrature input the two signals do not require equal marks and spaces to achieve reliable counting.

5.14 Upper display: di SP-1

Usually the total count is shown on the larger upper eight digit display, but this function reverses the display locations allowing rate to be shown on the larger upper display and total on the smaller lower display.

To check the setting for the display, select di SP-1 from the configuration menu and press P which will reveal if the display is showing rAtE or totAL. The setting can be changed by pressing the ▼ or ▲ button followed by the E button to enter the selection and return to the configuration menu.

5.15 Lower display: d, SP-2

This function turns the lower display *on* or *off*. When turned *off*, the BA564G will only have one eight digit display which may be configured in the d, SP-1 function to show the total count or rate.

To check the setting for the lower display, select d, SP-2 from the configuration menu and press P that will reveal if the lower display is on or oFF. The setting may be changed by pressing the ▼ or ▲ button followed by the E button to enter the selection and return to the configuration menu.

5.16 Position of the decimal points: dP

The upper and lower displays have eight and six digits respectively. This function enables the position of the decimal point in both displays to be independently positioned as shown below.

Upper display		
Total	0 0 0.0.0.0.0.0	1 of 5 positions or absent
Rate	0.0.0.0.0	1 of 4 positions or absent
Lower display		
Total	0.0.0.0.0.0	1 of 5 positions or absent
Rate	0.0.0.0.0	1 of 4 positions or absent

To adjust the position of the decimal points select dP from the configuration menu and press P. The upper display defined as the rate or total display by function d, SP-1 (section 5.14) will be activated and identified by the display annunciator as Rate or Total. The decimal point, which may be positioned as shown in the table above, is moved by operating the ▼ or ▲ push button. The ▼ button moves the position of the decimal point to the left and the ▲ button moves the decimal point position to the right.

When the decimal point in the upper display has been positioned pressing the P button will transfer control to the lower display variable, but it will be shown and annunciated on the larger upper display. The position of the decimal point may be positioned in the same way by operating the ▼ and ▲ push buttons. When both decimal points are positioned as required, enter the settings and return to the configuration menu by operating the E button.

Note:

Adjustment of a decimal point position will disable the following outputs which must be re-enabled after the adjustment is complete:

Pulse output

Optional Alarm outputs

Optional 4/20mA output

5.17 Total scale factor: SCALE.t

SCALE.t is a dividing factor adjustable between 0.0001 and 99999 that enables the total to be displayed in engineering units. e.g. if one pulse from the arithmetic count function represents 1 centimetre of dispensed cable and the total display is required in metres, SCALE.t should be set to 100.0 which is the number of centimetres in a metre. If just the total number of input pulses is required, SCALE.t should be set to 1.0. The total display is independent of the rate display.

To check or change the total scale factor select SCALE.t from the configuration menu and press P which will reveal the existing value with one digit flashing. The value of the flashing digit may be changed by pressing the ▼ or ▲ button. When this digit has been adjusted as required, pressing P will transfer control to the next digit. When all the digits have been adjusted pressing P will transfer control to the decimal point that may be positioned between any of the digits, or may be omitted by moving it to the right of the least significant digit. When the total scale factor has been entered, press P to return to the SCALE.t prompt in the configuration menu.

Note:

Adjustment of SCALE.t will disable the following ouputs which must be re-enabled after the adjustment is complete:

Pulse output

Optional Alarm outputs

Optional 4/20mA output

5.18 Rate scale factor: SCALE.r

SCALE.r is a dividing factor adjustable between 0.0001 and 99999 that enables the rate display to be shown in engineering units. e.g. if one pulse from the arithmetic count function represents 2 pump strokes and the rate display is required in pump strokes, SCALE.r should be set to 0.5. If just the rate of input pulses is required, SCALE.r should be set to 1.0. The rate display is independent of the total display.

The units of the rate display are counts per unit of time. The unit of time is the timebase of the instrument which is determined by t-bASE described in section 5.19.

To check or change the rate scale factor select SCALE.r from the configuration menu and press P which will reveal the existing value with one digit flashing. The value of the flashing digit may be adjusted by pressing the ▼ or ▲ button.

When this digit has been adjusted as required, pressing P will transfer control to the next digit. When all the digits have been adjusted pressing P will transfer control to the decimal point that may be positioned between any of the digits, or may be omitted by moving it to the right of the least significant digit. When the required rate scale factor has been entered, press E to return to the SCALE.r prompt in the configuration menu.

Note:

Adjustment of SCALE.r will disable the following ouputs which must be re-enabled after the adjustment is complete:

Pulse output

Optional Alarm outputs

Optional 4/20mA output

5.19 Timebase: t-bASE

The timebase multiplies the rate display by 1, 60 or 3,600 depending upon whether the BA564G Counter is required to display rate per second, per minute or per hour. See Fig 6.

To check or change the timebase, select t-bASE from the configuration menu and press P which will reveal the current setting. Pressing the ▼ or ▲ button will scroll through the three options:

tb-1	for pulses / second
tb-60	for pulses / minute
tb-3600	for pulses / hour

When the required multiplier is displayed press E to return to the t-bASE prompt in the configuration menu.

5.20 Display filter: FiLtEr

The digital display filter has two independent adjustable parameters enabling the rate display response to be tailored for optimum performance. The filter parameters are controlled by a two digit number. The first digit defines the amount of filtering applied to the display as shown below.

First digit	Filter time constant Seconds
0X	0
1X	1.3
2X	4.3
3X	6.5
4X	8.7
5X	11.3
6X	15.7
7X	20.9
8X	25.2
9X	31.5

The second digit defines the deviation from the displayed rate at which the filter will be overridden and the rate display will move rapidly to the new value.

Second digit	Magnitude of step change which will produce a rapid response
X0	Off
X1	1%
X2	2%
X3	4%
X4	8%
X5	12%
X6	16%
X7	24%
X8	32%
X9	64%

By careful adjustment of the two parameters a stable display with an acceptable input step response can be obtained for most applications.

During commissioning it is recommend that initially the second digit is set to 0 (off) and the first digit is adjusted to provide acceptable rate display stability. The second digit should then be increased until the selected step size is greater than the noise on the display signal, at which setting the rate display will become stable. These will be the optimum filter parameters for acceptable rate display stability and a fast response to a large rate signal change.

To check or change the filter select FiLtEr in the configuration menu and press P which will reveal the current settings with the first digit flashing. Pressing the ▼ or ▲ button will adjust the flashing digit and P will transfer control to the second digit. While making adjustments the filtered rate display is shown on the lower display so that stability can be assessed while adjustments are being made. When set as required, press the E button to enter the revised parameters and return to the FiLtEr prompt in the configuration menu.

5.21 Direction of count: uP or dn

This function defines whether input pulses increment or decrement the total display. i.e. whether Input A is an up-counter or a down-counter.

When configured as a down-counter with a non-zero number entered for the reset value CLr VAL, the BA564G will count down from the re-set value to zero.

To check or change the count direction select uP or dn from the configuration menu and press P which will reveal the present setting. uP indicates that the instrument is an up-counter and dn that it is a down counter. Pressing the ▼ or ▲ buttons will toggle the instrument between the two settings. When set as required, press the E button to enter the setting and return to the configuration menu.

Note:

The Count function described in section 5.13 also affects the direction in which the BA564G counts.

5.22 Reset value: CLr VAL

This function defines the value to which the total display is reset when the local or remote reset are operated. This allows the BA564G to be used as a pre-set down counter.

When the instrument is used as an up-counter, CLr VAL is normally set to zero.

To check or change the reset value select CLr VAL from the configuration menu and press P which will reveal the current setting with one digit flashing. The flashing digit may be adjusted by pressing the ▼ or ▲ button. When this digit is correct, pressing P will transfer control to the next digit.

When all the digits have been adjusted press the E button to enter the revised number and return to the configuration menu.

5.23 Local reset: LoC CLr

The Local reset function contains two sub-functions CLr tot and CLr GtoT which when enabled allow the total display and grand total to be reset via the instrument front panel push buttons while the BA564G Counter is in the display mode.

5.24 Local total reset: CLr tot

CLr tot is a sub-menu in the LoC CLr function. When activated it allows an operator to reset the total display to the reset value [see section 5.22] while the BA564G Counter is in the display mode by operating the ▼ and ▲ push buttons simultaneously for more than three seconds.

To check or change the setting select LoC CLr in the configuration menu and press P which will reveal the CLr tot prompt, operating P again will show if the local total reset is on or oFF. If set as required operate the E button twice to return to the configuration menu, or the ▼ or ▲ button to change the setting followed by the E button twice to enter the change and return to the LoC CLr prompt in the configuration menu.

Note:

The total display may also be remotely reset to the reset value by connecting terminals RS1 and RS2 together for more than one second. See section 3.3 of this manual.

5.25 Local grand total reset: CLr GtoT

The grand total is a separate sixteen digit counter which is incremented or decremented in parallel with the total display, but is not reset when the total display is reset. The grand total may be viewed in the display mode in two eight digit sections as described in section 2.2 of this manual.

CLr GtoT is a sub-menu in the LoC CLr function which when activated allows the operator to reset the grand total display to zero from the display mode by operating the E and ▲ push buttons simultaneously for more than ten seconds.

To check or change the setting select LoC CLr in the configuration menu and press P which will reveal CLr tot. Using the ▼ or ▲ button to select CLr GtoT and press P which will show if local grand total reset is on or oFF. If set as required operate the E button twice to return to the configuration menu, or the ▼ or ▲ button to change the setting followed by the E button twice to enter the change and return to the LoC CLr prompt in the configuration menu.

Note:

Once reset, the grand total can not be recovered.

5.26 Reset grand total from configuration menu: CLr GtoT

The grand total is a separate sixteen digit counter which is incremented or decremented in parallel with the total display, but is not reset when the total display is reset. The grand total may be viewed in the display mode in two eight digit sections as described in section 2.2 of this manual.

To zero the grand total from within the configuration menu select CLr GtoT and press P which will cause the instrument to display CLr.no with no flashing.

Using the ▼ or ▲ push button change CLr no to CLr YES pressing P will result in the instrument displaying 0000 with the first digit flashing. This is a request to confirm the reset instruction by entering SurE. Using the ▼ or ▲ button set the first flashing digit to S and press P to transfer control to the second digit which should be set to u. When SurE has been entered pressing the E button will reset the grand total which will be confirmed by a brief display of Gt CLrd, the instrument will automatically return to the CLr Gt prompt in the configuration menu.

Note:

Once reset, the grand total can not be recovered.

5.27 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 BA564G Counter to display 0000 with one digit flashing. The flashing digit may 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 BA564G Counter is returned to the display mode.

Please contact BEKA associates sales department if the security code is lost.

5.28 Reset configuration to factory defaults rSEt dEF

This function returns the BA564G Counter to the factory defaults shown in section 5.0. To prevent accidental use the request must be confirmed by entering SurE before the configuration change will be executed.

Select rSEt dEF from the configuration menu and press P. the instrument will display 0000 with the first digit flashing. To confirm the instruction to reset all the configuration functions to factory defaults SurE must be entered. Using the ▼ or ▲ button set the first flashing digit to S and press P to transfer control to the second digit which should be set to u. When SurE has been entered pressing the E button will reset all the configuration functions to the factory default settings and zero both the total display and the grand total. While resetting the BA564G Counter will display - - - - - - - - before automatically returning to the display mode when the operation is complete.

5.29 Display overflow

The BA564G Counter total has a maximum display range of -9999999 to 99999999 when shown on the eight digit upper display. If this range is exceeded the display will be as shown below with all of the decimal points flashing:

Overrange 99999999

Underrange -9999999

When the total is shown on the lower six digit display the maximum display range is -99999 to 999999.

When a total overflow occurs the actual total may be obtained from the instrument's grand total display which has sixteen digits - see 2.2.

To prevent future total display overflows occurring the total scale factor SCALE.t and the position of the decimal point in the total display dP should be reviewed.

6. Pulse output

The BA564G Counter has an opto-isolated solid state pulse output. The output is an open collector having the following electrical parameters:

Ron	=	60Ω + 3V
Roff	=	1MΩ
Imax	=	10mA

The output pulse may be a synchronous duplicate of Input A or Input b for re-transmission applications, or it may be derived from the total display. When derived from the total display the output pulse frequency may be divided and the output pulse width defined.

The retransmitted RTx annunciator on the instrument display shows the status of the retransmitted pulse output. Annunciator activation depends upon the setting of SourCE in the pulse output configuration menu.

SCALEd
: Annunciator activated each time pulse output open collector is *on*, i.e. Ron is less than 60Ω + 3V.

dirECt
: Annunciator continuously activated

6.1 System design

The Counter's pulse output is a passive circuit i.e. not powered, but it is totally isolated from all other Counter circuits. The terminals P1 and P2 may be connected to any other instrument with an open collector pulse input.

Fig 9 shows how to produce a voltage pulse output that could be used to drive a safe area counter. The positive terminal of the pulse output circuit P1 is connected to the Counter's positive supply terminal 1. When an output pulse occurs and the open collector output 'closes', P2 is connected to P1 and the pulse current flows through resistor R1. The current flowing in the circuit is determined by R1 which should be chosen to limit the pulse output current to less than 10mA. For a 24V supply R1 should be greater than 2,200Ω.

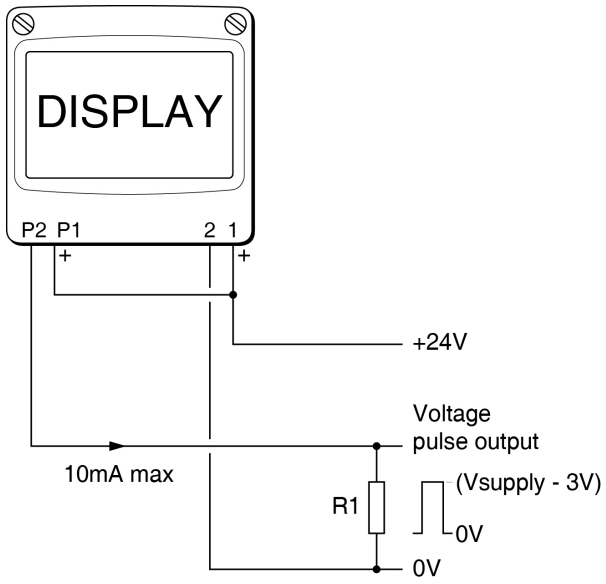


Fig 9 Generating voltage pulse output

6.2 Configuration

The pulse output is configured via the PuLSE oP sub-menu in the configuration menu as shown in Fig 9.

This sub-menu allows the source of the output pulse to be selected. For re-transmission applications the output pulse may be a synchronous duplicate of the pulse at Input A or at Input b by selecting dirECt A or dirECt b in the SourCE sub-function.

Selecting SCALEd derives the output pulse from the total display and introduces two additional functions, diVidE and durAtion to the sub-menu allowing the output pulse frequency to be divided and the output pulse width (duration) to be defined.

If the diVidE and durAtion functions are configured such that the output pulse frequency with the specified pulse width can not be output in real time, the number of pulses will be stored and transmitted at the maximum possible speed.

When the total display is reset to zero or the power supply to the BA564G Counter is disconnected or turned off, any stored pulses will not be retained.

6.3 Access Pulse output sub-menu: PuLSE oP

Using the ▼ or ▲ push button scroll through the Counters configuration menu until PuLSE . oP is displayed, pressing P will then access the pulse output sub-menu which is shown in Fig 10.

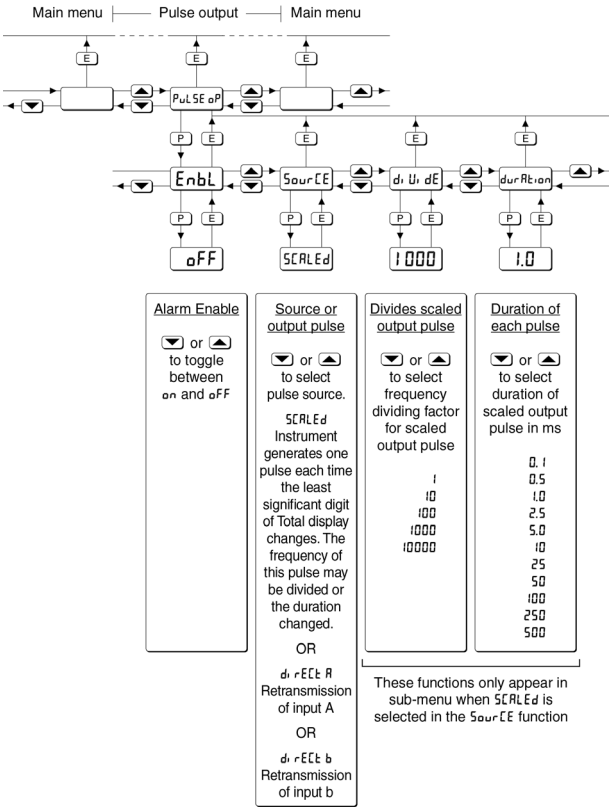


Fig 10 Pulse output configuration sub-menu

6.4 Enable pulse output: EnbL

This function allows the pulse output to be disabled or enabled without altering any of the pulse output parameters. Using the ▼ or ▲ push button select EnbL in the pulse output sub-menu and press P. to reveal the existing setting on or oFF. The function can be changed by pressing the ▼ or ▲ push button followed by the E button to return to EnbL prompt.

6.5 Source of output pulse: SourCE

The output pulse may be derived from:

dirECt A	Output is duplicate of input A pulse.
dirECt b	Output is duplicate of input b pulse.
SCALEd	Output is derived from the total display and is only functional when the Count function is configured for A+b. When SCALEd is selected two additional functions, di Ui dE and durAri on, appear in the pulse output sub-menu.

Using the ▼ or ▲ push button select SourCE in the pulse output sub-menu and press P. to reveal the existing pulse source. The function can be changed by pressing the ▼ or ▲ push button followed by the E button to return to SourCE prompt.

6.6 Divide output pulse frequency: di Ui dE

When the output pulse is derived from the total display the output pulse frequency may be divided by:

1
10
100
1000
10000

Using the ▼ or ▲ push button select di Ui dE in the pulse output sub-menu and press P to reveal the existing divisor. The value can be changed by pressing the ▼ or ▲ push button to select the required value followed by the E button to return to di Ui dE prompt.

Note: This function only appears in the sub-menu when the output pulse is derived from the total display.

6.7 Output pulse width: durAti on

When the output pulse is derived from the total display, the pulse width is defined by this function. One of 11 pulse widths in milliseconds may be selected:

0.1
0.5
1
2.5
5
10
25
50
100
250
500

Using the ▼ or ▲ push button select durAti on in the pulse output sub-menu and press P to reveal the existing pulse duration. The value can be changed by pressing the ▼ or ▲ push button to select the required value followed by the E button to return to durAti on prompt.

Note: This function only appears in the pulse output sub-menu when the output pulse is derived from the total display.

7. CONFIGURATION EXAMPLE

A BA564G Counter is required to display the position and speed, including direction, of a cable which is sensed by two proximity detectors mounted on a wheel with a circumference of 1m over which the cable runs. The sensors, which produce fifteen pulses per revolution, are positioned so their outputs are electrically 90° apart. The BA564G is required to display the position of the cable relative to a starting point in metres with a resolution of 0.1m, and to show speed of the cable in metres per second with a resolution of 1m. The total display (position) is to be resettable by an external contact, not from the BA564G Counter front panel. Similarly the grand total is not to be resettable from the BA564G Counter front panel. To prevent tampering the instrument configuration menu is to be protected by security code 1209.

The BA564G may be configured on-site without disconnection from the power supply or from the two proximity detectors.

If after accessing the configuration menu the interval between operating any front panel push button exceeds one minute the BA564G will automatically return to the display mode and any configuration changes will not be stored in permanent memory. When making multiple changes it is therefore sensible to occasionally return to the display mode to save the changes that have already been made.

Step 1 **Enter the configuration menu**

Put the BA564G Counter in the configuration mode by simultaneously pressing (P) and (E) push buttons. Assuming a security code has not already been entered the instrument will respond by displaying InPut-A which is the first parameter in the configuration menu. See Fig 7.

Step 2 **Select the type of inputs**

With InPut-A displayed; press (P) to reveal the existing setting. Using the (▼) or (▲) button select Pr.dEt, the input for a 2-wire proximity detector, and then return to the InPut-A prompt in the configuration menu by pressing (E).

Repeat for the second input InPut-b

Step 3 **Select input count mode**

The two proximity detectors are positioned so their outputs are electrically 90° apart. From this information, in the quadrature input mode the BA564G Counter can sense the direction and angular movement of the wheel to which the proximity detectors are attached. Hence, the relative position of the cable can be displayed by the counter.

Select Count from the configuration menu and press (P). Using the (▼) or (▲) button select ArEL b the quadrature function and press (E) to return to the 'Count' prompt in the configuration menu.

Step 4 **Define function of upper display**

In the example the cable position (total display) is required on the eight digit upper display.
Select di SP-1 from the configuration menu and press (P) which will reveal if the upper display is showing rAtE or totAL. Using the (▼) or (▲) button select totAL followed by the (E) button to enter the selection and return to the configuration menu.

Step 5 **Activate lower rate display**

A rate display is required so the lower display must be activated.
Select di SPLAY.2 from the main menu and press (P) to show the existing setting. Using the (▼) or (▲) button select on followed by (E) to enter the selection and return to the configuration menu.

Step 6 **Position of decimal point**

In this example the BA564G is required to display total (position) with a resolution of one decimal place and rate (speed) with no decimal point.

Select d.P. from the configuration menu and press (P). The BA564G will show and identify the total display with all the digits activated. Using the (▼) or (▲) button position the decimal point between the first and second least significant digits.
Operating the (P) button will show and identify the rate display with all the digits activated, Using the (▼) or (▲) button position the decimal point to the right of the least significant digit i.e. not visible. Finally press (E) to return to the configuration menu.

Step 7 Enter the total scale factor

In this example the proximity detectors produce fifteen pulses per one metre movement of the cable. The position display is required in metres so the total (position) scale factor SCALE.t should be set to 15.0.

Select SCALE.t from the configuration menu and press P to view the current value with one digit flashing. Use the ▼ and ▲ buttons to adjust each digit in turn and the P button to transfer control to the next digit and to the decimal point. Enter 15.0 and return to the SCALE.t prompt in the configuration menu by pressing E.

Step 8 Enter the rate scale factor

In this example the proximity detectors produce fifteen pulses per one metre movement of the cable. The rate display is required in metres per second so the rate (speed) scale factor SCALE.r should be set to 15.0.

Select SCALE.r from the configuration menu and press P to view the current value with one digit flashing. Use the ▼ and ▲ buttons to adjust each digit in turn and the P button to transfer control to the next digit and to the decimal point. Enter 15.0 and return to the SCALE.r prompt in the configuration menu by pressing E.

Step 9 Set the display timebase

In this example the rate display (speed) is required in metres per second.
Select t-bASE from the configuration menu and press P to reveal the current setting. Using the ▼ or ▲ button scroll through the three options and select tb-01. Return to the t-bASE prompt in the configuration menu by pressing E.

Step 10 Adjust the rate display filter

The rate display filter parameters should be adjusted experimentally after installation to provide a stable rate display with an acceptable step response.

During commissioning it is recommended that initially the second digit of the rate parameters is set to 0 (step response off) and the first digit (amount of filtering) is adjusted to provide acceptable rate display stability. The second digit should then be increased until acceptable rate display stability is once again achieved.

To adjust the filter parameters select FiLtEr from the main menu and press P to reveal the current setting. The first digit will be flashing and may be adjusted using the ▼ or ▲ button. The P button will transfer control to the second digit. When both are set as required, return to the FiLtEr prompt in the main menu by pressing E.

Note: While adjusting the filter, the rate is shown on the lower display so that stability can be assessed.

Step 11 Direction of count

In this application the direction of count will determine whether a cable movement is shown as a positive or negative position and rate. If input A occurs before input b, a positive display will result when the BA564G is configured to count up.

Select uP or dn from the main menu and press P to reveal the existing setting. Using the ▼ or ▲ button select uP followed by E to enter the selection and return to the configuration menu.

Step 12 Turn local clear off

In this example the operator must not be able to zero the total (cable position) display or the grand total from the instrument front panel. Both local clear functions should therefore be turned off.

Select LoC CLr from the main menu and press P which will result in CLr tot being displayed, press P again to show if the function is turned on or oFF. Using the ▼ or ▲ button toggle the display to oFF and press E to return to the CLr tot prompt from which CLr Gtot can be selected by pressing the ▼ or ▲ button. Turn this function off in exactly the same way before returning to the configuration menu by pressing the E button twice.

Step 13 Define the security code

Defining an access security code prevents unauthorised access to the configuration menu. Select CodE in the configuration menu and press P which will reveal the existing security code with the first digit flashing. Using the ▼ and ▲ buttons enter the new code 1209 digit by digit. The P button transfers control between digits. When the new code has been entered, press E to return to the configuration menu.

Step 14 Return to the display mode

Following completion of configuration, return the BA564G to the display mode by pressing E. The instrument will display dAtA followed by SAVE while the configuration changes are stored in permanent memory.

8. MAINTENANCE

8.1 Fault finding during commissioning

If a BA564G Counter fails to function during commissioning the following procedure should be followed:

Symptom	Cause	Check:
No display	No power supply, or incorrect wiring. Note: Terminals 2, 6, 10 & RS2 are interconnected within the instrument.	That there is between 10 and 30V on terminals 1 & 2 with terminal 1 positive.
Counter is receiving power but pulse input indicator not rotating.	No input pulses, incorrect input configuration, incorrect linking of terminals 3 & 4 and terminals 7 & 8.	Input configuration. Linking of terminals 3 & 4. and terminals 7 & 8. That input signal polarity is correct.
Pulse input indicator rotating but incorrect rate display.	Incorrect rate display calibration	SCALE.r t-bASE
Pulse input indicator rotating but incorrect total display.	Incorrect total display calibration. Remote reset switch contacts closed.	SCALE.t That RESET annunciator on display is not activated. If it is, check reset wiring and switch.
Pulse input indicator rotating but total display showing 9.9.9.9.9.9.9 or -9.9.9.9.9.9.9 Or if shown on the lower display 9.9.9.9.9 or -9.9.9.9.9	Total display has overflowed.	Reposition decimal point in total display or enter a different SCALE.t to reduce total display magnitude.
Unstable rate display	Noisy pulse input signal	Eliminate source of electrical noise. Increase debounce and/or display filter.
Unable to enter configuration menu.	Incorrect security code	That the correct security code is being used. Contact BEKA if code is lost.
Alarms do not function	Alarms have been disabled following calibration change.	Re-enable both alarms.

8.2 Fault finding after commissioning

ENSURE PLANT SAFETY BEFORE STARTING MAINTENANCE

If a BA564G Counter fails after it has been functioning correctly, the following table may help to identify the cause of the failure.

Symptom	Cause	Check:
No display	No power supply.	That there is between 10 and 30V on terminals 1 & 2
Pulse input indicator not rotating.	No input pulses	Output from sensor. Wiring between sensor and BA564G Counter.
Unstable rate display	Noisy pulse input signal	Locate source of electrical noise, or increase debounce and rate display filter.

If this procedure does not reveal the cause of the fault, it is recommended that the instrument is replaced.

8.3 Servicing

We recommend that faulty BA564G Counters are returned to BEKA associates or to your local BEKA agent for repair.

8.4 Routine maintenance

The mechanical and electrical condition of the instrument should be regularly checked. Inspection frequency should be adjusted to suit the environmental conditions.

8.5 Guarantee

Instruments 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.

8.6 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.

9. ACCESSORIES

9.1 Units of measurement & instrument identification.

New BA564G Counters are supplied with a printed scale card showing the units of measurement and tag information specified when the instrument was ordered. If this information was not supplied a blank scale card will be fitted which can easily be marked with a dry transfer or a permanent marker on-site.

Custom printed scale cards are available as accessories and may be easily fitted as shown in section 4.4 of this manual.

9.2 Legend plate

The BA564G Counter can also be supplied with a blank or custom laser engraved stainless steel legend plate - see Fig 4. The plate, which after installation is visible from the front of the instrument, is supplied loose with two fixing screws for securing it to the rear of the instrument's back-box. This plate can typically accommodate:

1 row of 5 alphanumeric characters 10mm high

or 1 row of 6 alphanumeric characters 7mm high

or 2 rows of 10 alphanumeric characters 5mm high

9.3 Backlight

The BA564G Counter can be supplied with a factory fitted backlight that produces green illumination enhancing display contrast and enabling it to be read at night or in poor lighting conditions. The backlight is internally powered from the instrument power supply so that no additional wiring or intrinsically safe interface is required, but the supply current increases as shown below.

	Maximum current consumption
Without backlight	10mA
Additional for backlight	16mA
Addition with terminals 3 & 4 linked	6mA
Addition with terminals 7 & 8 linked	6mA
Total current	38mA max

9.4 Alarms

The BA564G Counter can be supplied with factory fitted dual alarms. Each may be independently configured as a rate display or total display, high or low alarm. with a normally open, or a normally closed solid state output.

Configurable functions for each alarm include adjustable setpoint, alarm delay time and alarm silence time. Hysteresis may be applied to rate alarms.

WARNING

These alarm outputs should not be used for critical safety applications such as a shut down system.

When the BA564G power supply is turned off or disconnected, alarm outputs will open irrespective of whether normally open or normally closed outputs have been selected. When designing a system an open output should therefore be chosen for the alarm condition.

Alarm annunciators on the instrument display indicate the status of each alarm. If an alarm delay or silence time has been selected the annunciator will flash during the delay or silence period.

The BA564G internal counters are up-dated and compared with the alarm setpoint twice per second, irrespective of the display update time selected. This may result in an alarm being delayed for up to half a second after the rate or total has exceeded the setpoint.

9.4.1 Solid state output

Each alarm has a galvanically isolated single pole solid state switch output as shown in Fig 11. The outputs are polarised and current will only flow in one direction. Terminals A1 and A3 should be connected to the positive side of the supply.

Ron = less than 5Ω + 0.7V
Roff = greater than 1MΩ

Note: Because of the series protection diode some test meters may not detect a closed alarm output

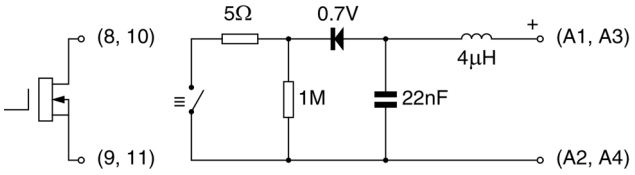


Fig 11 Equivalent circuit of each alarm output

The solid state output of each alarm may be used to switch any circuit with parameters equal or less than:

V = 30V dc
I = 200mA

9.4.2 Summary of configuration functions

When a BA564G Counter is supplied with alarms the Counter configuration menu is extended as shown in Fig 12. Each alarm may be configured to operate on the rate or total display.

For simplicity Fig 12 only shows the configurable functions on the rate option of alarm AL1, the total option is identical except that the total alarms can not have hysteresis. Configuration of alarm AL2 is identical to alarm AL1.

The following table summarises each of the alarm configuration functions and includes a cross reference to more detailed information. Again only the functions on alarm AL1 are listed.

Display	Summary of function
EnbL	**Alarm enable** Enables or disables the alarm without changing the alarm parameters. See section 9.4.3
tYPE	**Type of alarm** Defines whether the alarm operates on the rate or total display. See section 9.4.4
SP 1r or SP 1t	**Alarm setpoint 1** Adjusts the alarm setpoint. The alarm is activated when the rate or total display equals the setpoint. **Note:** SP 1r is displayed for a rate alarm and SP 1t for a total alarm. See section 9.4.5
Hi.Lo	**Alarm function** Defines whether the alarm has a high or low function. See section 9.4.6
no.nC	**Normally open or normally closed output.** Determines whether the single pole alarm output is open or closed in the non-alarm condition. See section 9.4.7
HSEr	**Hysteresis** Adjusts the alarm hysteresis. Only available on a rate alarm. See section 9.4.8
dELA	**Alarm delay time** Adjusts the delay between the display equaling the setpoint and the alarm output being activated. See section 9.4.9

Display	Summary of function
SiL	**Alarm silence time** Defines the time that the alarm output remains in the non-alarm condition following acceptance of an alarm. See section 9.4.10
FLSH	**Flash display when alarm occurs** When enabled, alternates the rate or total display between process value and alarm reference AL1 or AL2 when an alarm output is activated. See section 9.4.11
ACSP	**Access setpoint** Sub-menu that enables direct access to the alarm setpoints from the display mode and defines a separate security code.

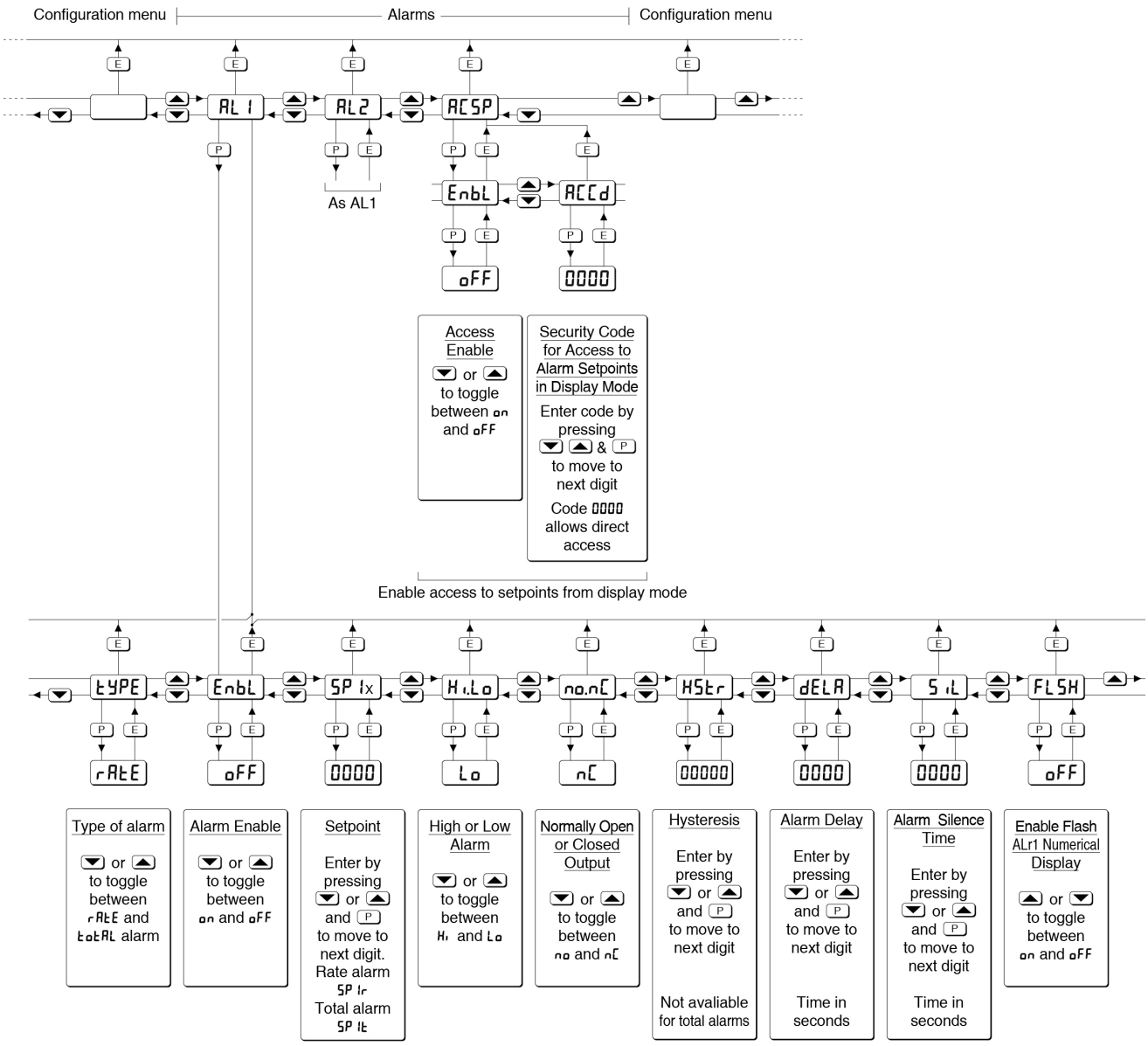


Fig 12 Alarm Configuration Functions in Configuration Menu

9.4.3 Alarm enable: EnbL

This function allows the alarm to be enabled or disabled without altering any of the alarm parameters. Using the ▼ or ▲ push button select AL 1 or AL2 from the configuration menu and press P to reach EnbL in the alarm sub-menu. Pressing P will then reveal the existing setting. The function can be changed by pressing the ▼ or ▲ push button followed by the E button to return to the alarm sub-menu.

9.4.4 Type of alarm: tYPE

Alarm 1 and Alarm 2 are totally independent, both may be rate or total alarms, or one may be conditioned for rate and the other for total.

Using the ▼ or ▲ push button select tYPE from the selected alarm sub-menu and press P to check or change the function. The ▼ or ▲ push button will toggle the selection between rAtE and totAL, when set as required press the E button to return to the alarm sub-menu.

Note: When tYPE is changed, the alarm configuration is automatically reset to the default values and the alarm is disabled. It must therefore be reconfigured before use.

9.4.5 Setpoint adjustment: SP1x & SP2x

The rate alarm setpoints SP1r and SP2r may be positioned anywhere between 000000 and 999999, and the total alarm setpoint SP1t and SP2t anywhere between 00000000 and 99999999.

All the setpoints are adjusted in the same way, for example, to adjust the setpoint of Alarm 1 which has been configured to operate on the rate display. Using the ▼ or ▲ push button select SP1r in the AL1 sub-menu and press P which will reveal the existing setpoint with one digit flashing. The required setpoint can be entered using the ▼ or ▲ push button to adjust the flashing digit and the P button to transfer control to the next digit. When set as required press E to enter the value and return to the SP1r prompt in the alarm 1 sub-menu.

9.4.6 Alarm function: Hi.Lo

Alarm 1 and Alarm 2 are totally independent, both may be Hi or Lo, or one may be conditioned as a Hi alarm and the other as a Lo alarm.
Using the ▼ or ▲ push button select Hi.Lo from the selected alarm sub-menu and press P to check or change the function. The ▼ or ▲ push button will toggle the alarm function between Hi and Lo, when set as required, press the E button to return to the Hi.Lo prompt in the alarm sub-menu.

9.4.7 Alarm output status: no.nC

Each single pole alarm output may be open or closed in the non-alarm condition. When the BA564G power supply is turned off or disconnected, the alarm output(s) will open irrespective of whether normally open or normally closed outputs have been selected. Therefore, when designing an alarm system normally closed nC should be selected so that the output opens when an alarm occurs or if the power supply fails.

Using the ▼ or ▲ push button select no.nC from the selected alarm sub-menu and press P to check or change the function. The ▼ or ▲ push button will toggle the contact status between no and nC, when set as required, press the E button to return to the no.nC prompt in the alarm sub-menu

9.4.8 Hysteresis: HSEr

Hysteresis is only available on rate alarms so the HSEr function only appears in the configuration sub-menu when alarm tYPE has been set to rAtE. During configuration hysteresis is shown in the units of rate previously configured for the rate display.

Using the ▼ or ▲ push button select HSEr in the selected alarm sub-menu and press P which will reveal the existing hysteresis with one digit flashing. The required hysteresis can be entered using the ▼ or ▲ push button to adjust the flashing digit and the P button to transfer control to the next digit. When set as required press E to enter the value and return to the HSEr prompt in the alarm sub-menu.

e.g. A BA564G Counter configured to display a rate of 0 to 5000, with a high alarm set at 4000 and hysteresis of 100 will perform as follows:

> High alarm will be activated when rate equals or exceeds 4000, but will not reset until the rate falls below 3900.

9.4.9 Alarm delay: dELA

This function enables activation of the alarm output to be delayed for a fixed time following the alarm condition occurring. The delay can be set in 1 second increments up to 3600 seconds. If a delay is not required zero should be entered.

To adjust the delay select dELA using the ▼ or ▲ push button in the selected alarm sub-menu and press P which will reveal the existing delay time in seconds with one digit flashing. The required delay time can be entered using the ▼ or ▲ push button to adjust the flashing digit and the P button to transfer control to the next digit. When set as required press E to enter the value and return to the dELA prompt in the alarm sub-menu.

The alarm annunciator will start flashing immediately an alarm condition occurs and will continue for the delay time, after which the alarm output will be activated and the alarm annunciator will be permanently activated.

9.4.10 Alarm silence time: Si L

The alarm silence function is primarily intended for use in small installations where the alarm output directly operates an annunciator such as a sounder. When the alarm silence time is set to any figure other than zero, the P push button becomes an alarm accept button.

After an alarm has occurred, operating the P button will cause the alarm output to revert to the non-alarm condition for the alarm silence time. When an alarm is silenced the alarm annunciator will flash until the silence time expires.

To adjust the alarm silence time select Si L using the ▼ or ▲ push button in the selected alarm sub-menu and press P which will reveal the existing alarm silence time in seconds with one digit flashing. The required silence time can be entered using the ▼ or ▲ push button to adjust the flashing digit and the P button to transfer control to the next digit. When set as required press E to enter the value and return to the Si L prompt in the alarm sub-menu.

9.4.11 Flash display when alarm occurs: FLSH

In addition to the two alarm annunciators on the left hand side of the BA564G Counter display which show the status of both alarms, this function provides an even more conspicuous indication that an alarm has occurred.

When enabled, this function alternates the rate or total display between the numerical value and the alarm identification AL1 or AL2 when an alarm occurs.

Using the ▼ or ▲ push button select FLSH from the selected alarm sub-menu and press P to check or change the function. The ▼ or ▲ push button will toggle the function between oFF and on, when set as required, press the E button to return to the FLSH prompt in the alarm sub-menu.

9.4.12 Access Setpoint: ACSP

This function activates a separate menu that provides direct access to the alarm setpoints from the display mode by simultaneously operating the P and ▲ buttons. An operator can therefore adjust the alarm setpoints without having access to the configuration and alarm sub-menus. Protection against unauthorised or accidental adjustment is provided by a separate security access code.

Using the ▼ or ▲ push button select ACSP from the configuration menu and press P to reach the enable function EnbL. Pressing P will reveal the existing setting which can be toggled between on and oFF by pressing the ▼ or ▲ push button. When set as required, press the E button to return to the EnbL prompt from which a separate security access code can be entered using the ACCd function which can be selected using the ▼ or ▲ push button.

To enter a new security code select ACCd from the sub-menu and press P which will cause the BA564G Counter to display 0000 with one digit flashing. The flashing digit may be adjusted using the ▼ or ▲ push button, 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 ACCd prompt. The revised security code will be activated when the BA564G Counter is returned to the display mode. Default security access code 0000 will disable the security code allowing direct access to the setpoints in the display mode by pressing the P and ▲ buttons simultaneously.

Please contact BEKA associates sales department if the security code is lost.

9.4.13 Adjusting alarm setpoints from the display mode

Access to the two alarm setpoints from the BA564G Counter's display mode is obtained by operating the P and ▲ push buttons simultaneously as shown in Fig 13. If the setpoints are not protected by a security code the alarm setpoint prompt SP 1r or SP 1t will be displayed depending upon whether a rate or total alarm has been configured. If the setpoints are protected by a security code, CodE will be displayed first. Pressing P again will allow the alarm setpoint security code to be entered digit by digit using the ▼ and ▲ buttons to adjust the flashing digit and the P push button to move control to the next digit. If the correct code is entered pressing E will then cause alarm setpoint prompt SP 1x to be displayed. If an incorrect security code is entered, or a button is not pressed within ten seconds, the instrument will automatically return to the display mode.

Once within the menu pressing the ▼ or ▲ buttons will toggle the display between the two alarm setpoint prompts SP 1x and SP2x.

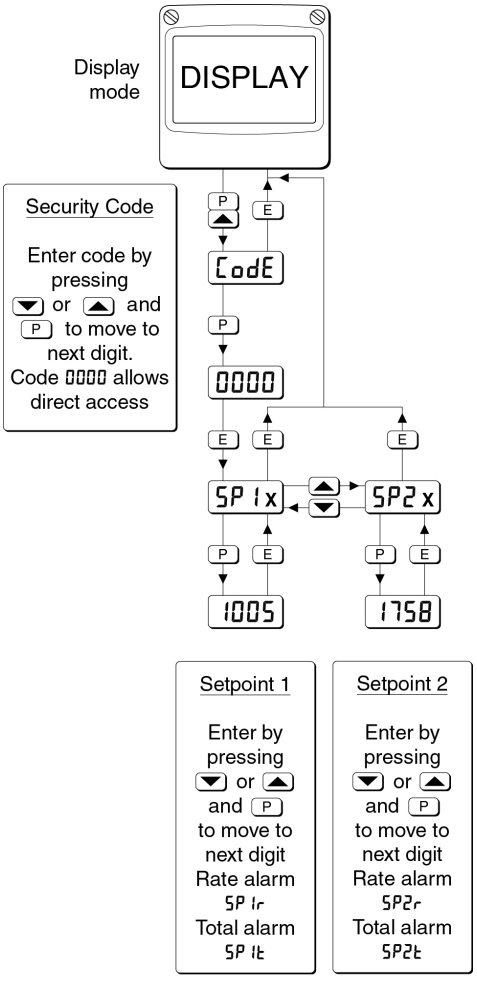


Fig 13 Setpoint adjustment from the display mode

To adjust an alarm setpoint select SP 1x or SP2x and press (P) which will reveal the current setting. The flashing digit of the setpoint may be adjusted using the (▼) or (▲) push button and the (P) button to move control to the next digit. When the required setpoint has been entered, pressing (E) will return the display to the SP 1x or SP2x prompt from which the other setpoint may be selected, or the instrument may be returned to the display mode by pressing (E) again.

Note: Direct access to the alarm setpoints from the display mode is only available when the ACSP menu is enabled - see section 9.4.12

9.5 4/20mA output

The BA564G Counter can be supplied with an optional factory fitted galvanically isolated 4/20mA output which may be configured to represent the rate or total display.

9.5.1 System design

The Counter's optional 4/20mA output is a passive current sink i.e. not powered, but it is totally isolated from all other Counter circuits. It is effectively a 2-wire 4/20mA transmitter requiring a minimum supply of 5V with the output current controlled by the Counter's rate or total. Terminals C1 and C2 may be connected to any other instrument with a 4/20mA transmitter input with at least a 5V output as shown in Fig 14. Terminals C2 and C4 are internally linked and may be used for joining a return 4/20mA wire.

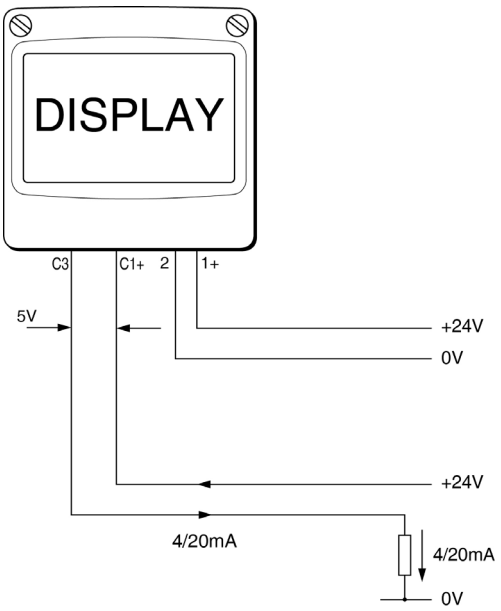


Fig 14 Application of 4/20mA output

9.5.2 Configuration and calibration

When a BA564G Counter is supplied with an optional 4/20mA output the configuration menu is extended as shown in Fig 18. The 4/20mA output sub-menu is accessed via the 4-20 oP function.

The 4/20mA output sub-menu allows the 4/20mA output to be controlled by the rate or the total display.

9.5.3 Access 4/20mA output sub-menu: 4-20 oP

Access the BA564G Counter configuration menu as described in section 5.2. Using the ▼ and ▲ push buttons scroll though the menu until 4-20 oP is displayed, pressing P will then access the 4/20mA output sub-menu which is shown in Fig 15.

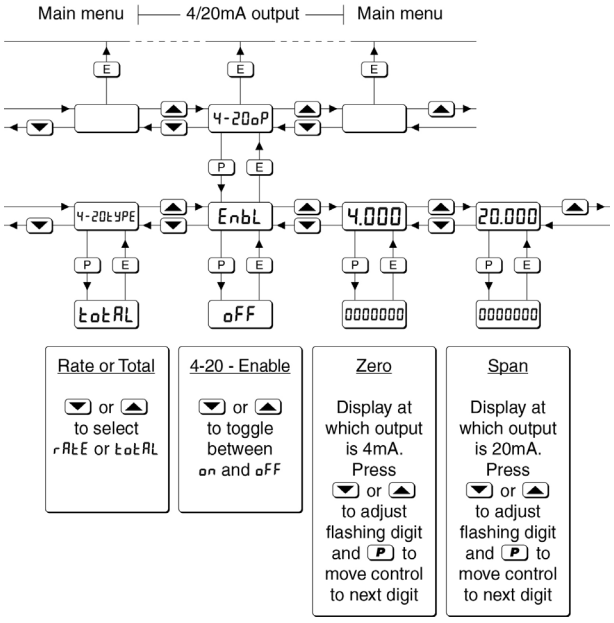


Fig 15 4/20mA output configuration sub-menu

9.5.4 Enable 4/20mA output: EnbL

This function allows the 4/20mA output to be enabled or disabled without altering any of the 4/20mA output parameters. Using the ▼ or ▲ push button select EnbL in the 4-20 oP sub-menu and press P to reveal the existing setting on or oFF. The function can be changed by pressing the ▼ or ▲ push button followed by the E button to return to EnbL prompt.

Note: When the 4/20mA output is disabled by selecting oFF, the output is a constant 3.5mA irrespective of the instrument display.

9.5.5 Select rate or total source: 4-20tYPE

The 4/20mA output current can represent the BA564G Counter's rate or total display and this should be defined before any other 4/20mA current output functions are configured.

Using the ▼ or ▲ push button select 4-20tYPE in the 4/20mA output sub-menu and press P to reveal the existing setting totAL or rAtE. The function can be changed by pressing the ▼ or ▲ push button followed by the E button to return to 4-20tYPE prompt.

Note: If the controlling source of the 4/20mA output is changed i.e. from rate to total, the 4/20mA output will be disabled and the output will be a constant 3.5mA irrespective of the instrument display.
The 4/20mA output must always be re-enabled and reconfigured following the controlling source being changed.

9.5.6 Display which corresponds to 4mA output: 4.000

The BA564G Counter display which corresponds to a 4.000mA output current is defined by this function. Using the ▼ or ▲ push button select 4.000 in the 4/20mA output sub-menu and press P to reveal the existing rate or total display with one digit flashing. The required display can be entered using the ▼ or ▲ push button to adjust the flashing digit and the P button to transfer control to the next digit. When set as required press E to enter the value and return to the 4.000 prompt in the 4/20mA output sub-menu.

9.5.7 Display which corresponds to 20mA output: 20.000

The BA564G Counter display which corresponds to 20.000mA output current is defined by this function. Using the ▼ or ▲ push button select 20.000 in the 4/20mA output sub-menu and press P. to reveal the existing rate or total display with one digit flashing. The required display can be entered using the ▼ or ▲ push button to adjust the flashing digit and the P button to transfer control to the next digit. When set as required press E to enter the value and return to the 20 000 prompt in the 4/20mA output sub-menu.

Note: If the BA564G Counter and the 4/20mA current sink output are powered from separate supplies, the 4/20mA output current will continue to flow when the BA564G Counter supply fails or is turned off. Powering both from a common supply eliminates this effect.