APPLICATION GUIDE AG314

Externally powered pulse input Tachometers

For models with an 'E' or 'G' suffix

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Externally powered pulse input Tachometers

1. Introduction

This Application Guide is intended to aid the selection of a pulse input Tachometer from the extensive range of models manufactured by BEKA associates. The guide also contains configuration examples.

The guide does not contain detailed system design or step-by-step configuration information which are contained in the instruction manual for each model. Detailed installation and certification information for use in hazardous areas is also contained in the instruction manual for each model which can be viewed on the BEKA website at www.beka.co.uk.

2. Description

BEKA pulse input Tachometers can measure and display in engineering units the rotational speed of most types of machinery. They can also record and display the time that the monitored machinery has been operating. All the models have bold easy to read displays with a common simple to use configuration menu.

The range includes field and panel mounting models for general purpose applications and certified models for use in gas and dust hazardous areas. All models can be supplied with a wide range of factory fitted options including a display backlight, alarm outputs and isolated pulse and current outputs for retransmission applications.

BEKA Tachometers have separate speed and run-time displays. The speed display can be scaled to show rotational speed in almost any engineering units. The run-time display, which can be disabled if not required, shows the length of time that the monitored machinery has been operating in hours with a resolution of one tenth of an hour.

Tachometers will function with most active and passive sensors including, voltage, magnetic, switch contacts and 2-wire proximity detectors.

All BEKA Tachometers are powered by a low voltage dc supply and are configured and calibrated via four push buttons using a common configuration menu. Although easy to configure on-site without the need for test equipment, Tachometers can be supplied configured and ready for installation with a printed slide-in scale card showing customer specified information for no additional charge.

Model	**BA314E**	**BA314G**
Some shown with optional backlight		
Enclosure material, size and IP rating	Field GRP 141 x 212mm IP66	Field GRP 122 x 120mm IP66
Number of M20 cable entries	3	2
Separate terminal compartment	Yes	No
Display	Speed: 8 digits 18mm high Run-time: 6 digits 12mm high	
Certification International IECEx **Gas** **Dust**	Ex ia IIC T5 Ga -40°C ≤ Ta ≤ +70°C N/A	Ex ia IIC T5 Ga -40°C ≤ Ta ≤ +70°C Ex ia IIIC T80°C Db -40°C ≤ Ta ≤ +60°C
Certification Europe ATEX and UKEX **Gas** **Dust**	Group II Category 1G Ex ia IIC T5 Ga -40°C ≤ Ta ≤ +70°C N/A	Group II Category 1G Ex ia IIC T5 Gb -40°C ≤ Ta ≤ +70°C Group II Category 2D Ex ia IIIC T80°C Db -40°C ≤ Ta ≤ +60°C
Certification USA ETL	Class I Div 1 Gp A, B, C, D T5 Class II Div 1 Gp E, F, G. Class III Div 1 Class I Zone 0 AEx ia IIC T5 Ga -40°C ≤ Ta ≤ 70°C	
Certification Canada cETL	Class I Div 1 Gp A, B, C, D T5 Class II Div 1 Gp E, F, G. Class III Div 1 Ex ia IIC T5 Ga -40°C ≤ Ta ≤ 70°C	
Options - *must be specified when instument is ordered*		
Backlight Alarms 4/20mA output Pulse output	Included Included Included Included	Yes Yes Yes Included
Accessories		
Pipe mounting kit Panel mounting kit Unsealed Sealed	BA393 N/A N/A	BA393G BA394G BA494G

BA514G
Field GRP 122 x 120mm IP66
2
No
Speed: 8 digits 18mm high Run-time: 6 digits 12mm high
Not Certified General purpose applications only
Yes Yes Yes Included
BA393G BA394G BA494G

Table 1 Field mounting tachometers

Model	BA317E	BA318E	BA317E-SS
Some shown with optional backlight			
Enclosure material & size	Panel Noryl 96 x 48 mm	Panel Noryl 144 x 72 mm	Rugged panel 316 S/steel 105 x 60 mm
Protection	Front IP66, rear IP20		
Display	Speed: 8 digits 9mm high Run-time: 6 digits 6mm high	Speed: 8 digits 18mm high Run-time: 6 digits 12mm high	Speed: 8 digits 9mm high Run-time: 6 digits 6mm high
Certification International IECEx **Gas**	Ex ia IIC T5 Ga -40°C ≤ Ta ≤ +70°C		Ex ia IIC T5 Ga -40°C ≤ Ta ≤ +60°C *
Dust	N/A		Ex ia IIIC T80°C Db -40°C ≤ Ta ≤ +60°C *
Certification Europe ATEX and UKEX **Gas**	Group II Category 1G Ex ia IIC T5 Ga -40°C ≤ Ta ≤ +70°C		Group II Category 1G Ex ia IIC T5 Ga -40°C ≤ Ta ≤ +60°C *
Dust	N/A		Group II Category 2D Ex ia IIIC T80°C Db -40°C ≤ Ta ≤ +60°C *
Certification USA ETL	Class I Div 1 Gp A, B, C, D T5 Class II Div 1 Gp E, F, G. Class III Div 1 Class I Zone 0 AEx ia IIC T5 Ga -40°C ≤ Ta ≤ 70°C		Zone 20 AEx ia IIIC T80°C Da -40°C ≤ Ta ≤ 60°C *
Certification Canada cETL	Class I Div 1 Gp A, B, C, D T5 Class II Div 1 Gp E, F, G. Class III Div 1 Ex ia IIC T5 Ga -40°C ≤ Ta ≤ 70°C		Ex ia IIIC T80°C Da -40°C ≤ Ta ≤ 60°C *
Options - *must be specified when instument is ordered*			
Backlight	Yes	Yes	Yes
Alarms	Yes	Yes	Yes
4/20mA output	Yes #	Yes	Yes #
Pulse output	Yes	Included	Yes
Accessories			
Rear sealing kit	BA495	N/A	BA495

** May be installed in an Ex e, Ex p, Ex n or Ex t panel enclosure without invalidating enclosure certification.*

BA517E	BA518E	BA517E-SS
Panel Noryl 96 x 48 mm	Panel Noryl 144 x 72 mm	Rugged panel 316 S/steel 105 x 60 mm
Front IP66, rear IP20		
Speed: 8 digits 9mm high Run-time: 6 digits 6mm high	Speed: 8 digits 18mm high Run-time: 6 digits 12mm high	Speed: 8 digits 9mm high Run-time: 6 digits 6mm high
Not Certified General purpose applications only		
Yes Yes Yes Yes (#)	Yes Yes Yes Included	Yes Yes Yes Yes (#)
BA495	N/A	BA495

 # Only one may be fitted

Table 2 Panel mounting tachometers

3. Selecting a model

When selecting a model the following requirements should be considered:

Mounting	Field or panel
Location	Safe area
	Gas Hazardous area Zone 0, 1 or 2 Type of protection Certification authority
	Dust hazardous area Zone 21 or 22 Type of protection Certification authority
Options	Display backlight
	Dual alarm outputs
	Pulse output *Included in field mounting and 144x72 panel mounting Tachometers.*
	4/20mA output
	Mounting accessories

To simplify selection, Table 1 summarises the specifications of all the field mounting Tachometers and Table 2 contains similar information for the panel mounting models. Detailed specifications, datasheets, instruction manuals and third party safety and ingress certificates for each model are available on the BEKA website www.beka.co.uk.

3.1 Mounting

The BEKA range of Tachometers includes models for field and panel mounting.

3.1.1 Field mounting

Field mounting Tachometers with a 'G' model number suffix have a robust glass reinforced polyester (GRP) enclosure with an 8mm thick toughened glass window. The enclosure has IP66 ingress protection which will not be degraded by 7J impacts to the GRP case or 4J impacts to the window at temperatures between -40°C and +70°C. The enclosure's ingress and impact protection have been independently assessed by a third party UKAS accredited test house. The resulting test certificate is shown on the BEKA website.

The enclosure material is carbon loaded to prevent the accumulation of static charges. GRP is very strong and will not corrode or degrade when used for Tachometer installations in marine and waste water environments. For installations in hazardous areas, GRP overcomes the restrictions limiting the use of aluminium in potentially explosive atmospheres.

Field mounting instruments with a 'G' model number suffix have two M20 x 1.5 tapped cable entries. To maintain the integrity of the Tachometer enclosure both cable entries should be fitted with impact resistant M20 x 1.5 IP66 glands, conduit entries or blanking plugs.

The instrument's units of measurement and tag information can be marked onto a slide-in scale card clearly visible above and below the display. Although easy to configure on-site, Tachometers can be supplied configured and calibrated with this scale card printed with customer specified units of measurement for no additional charge.

Inserting slide-in scale card into field mounting Tachometer.

A 316 stainless steel legend plate which can be supplied laser engraved with customer specified information is available as an accessory.

Field mounting Tachometers are surface mounting, but can be pipe or panel mounted using one of the BEKA accessory kits.

BA393G	316 stainless steel pipe mounting kit, attaches instrument to any vertical or horizontal pipe with outside diameter between 40 and 73mm.

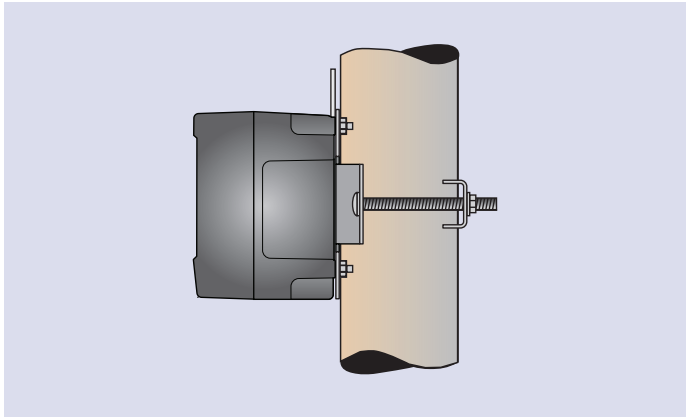


Fig 1 BA393G Pipe mounting kit

BA394G 316 stainless steel panel mounting kit secures a field mounting instrument into a panel aperture, but does not seal the panel aperture.

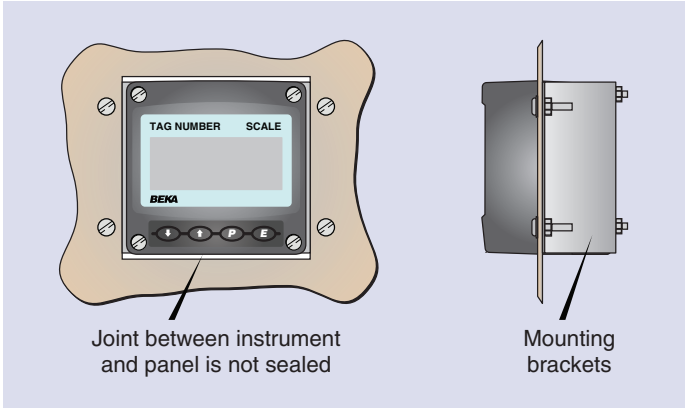


Fig 2 BA394G panel mounting kit

BA494G GRP panel mounting kit secures a field mounting instrument into a panel aperture and provides an IP66 seal between the front and rear of the panel.

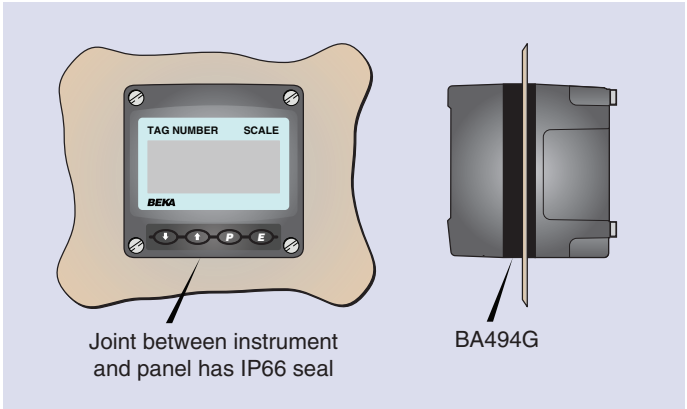


Fig 3 BA494G Sealed panel mounting kit

3.1.2 BA314E

In addition to the 'G' suffix intrinsically safe field mounting model, an 'E' suffix intrinsically safe Tachometer is also included in the range which has a separate field terminal enclosure with three tapped M20 x 1.5 cable entries. This model is supplied with all factory fitted options namely, a display backlight, dual alarms plus isolated pulse and 4/20mA outputs.

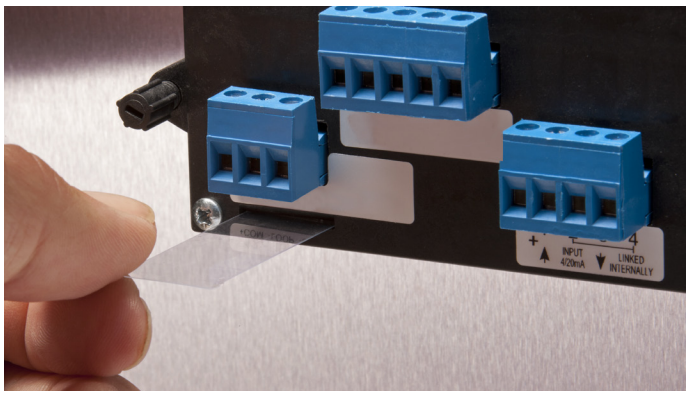
Options include a printed internal display escutcheon showing customer specified units of measurement and tag information. An external stainless steel legend plate which can be supplied laser engraved with customer specified information is also available.

The 'E' suffix Tachometer is surface mounting, but can be pipe mounted using a BA393 stainless steel pipe mounting kit.

3.1.3 Panel mounting

Panel mounting Tachometers are available in 96 x 48mm and 144 x 72mm glass loaded Noryl (modified PPE) DIN enclosures with a toughened scratch resistant glass display window. The display size depends upon the enclosure size. Both enclosures have IP66 front of panel ingress protection, and when correctly installed provide an IP66 seal between the instrument and the instrument panel. The ingress protection of the enclosures has been independently assessed at temperatures between -40°C and +70°C by a third party UKAS accredited test house. The resulting test certificate is shown on the BEKA website.

The instrument's units of measurement can be marked onto a slide-in scale card clearly visible at the right hand side of the display. The scale card can be fitted without opening the instrument enclosure or removing the Tachometer from the instrument panel. Although easy to configure on-site, Tachometers can be supplied configured with the scale card printed with customer specified units of measurement for no additional charge.



Inserting slide-in scale card into panel mounting Tachometer.

For panel mounting applications in marine environments, or where the front of the instrument is likely to be impacted, rugged models with a 316 stainless steel enclosure are included in the range. These models, which are identified by an '-SS' model number suffix, have identical features as the other models including a slide-in scale card.

The rugged stainless steel models have IP66 front of panel ingress protection and provide an IP66 seal between the instrument and the instrument panel. The ingress protection of the enclosure has been independently assessed at temperatures between -40°C and +70°C by a third party UKAS accredited test house. The resulting test certificate is shown on the BEKA website.

In addition to conventional intrinsic safety certification, the BA317E-SS Tachometer has been certified for installation in Ex e and Ex p enclosures without invalidating the certification of the panel enclosure in which it is mounted.

A BA495 rear cover sealing kit will increase the rear of panel ingress protection of any 96 x 48mm and 105 x 60 rugged stainless steel Tachometer to IP66. The BA495, which is shown in Fig 4, is manufactured from 316 stainless steel and incorporates two M20 entries for cable glands. This kit allows Tachometers to be safely installed in open panels and in panels containing hydraulic systems which may leak.

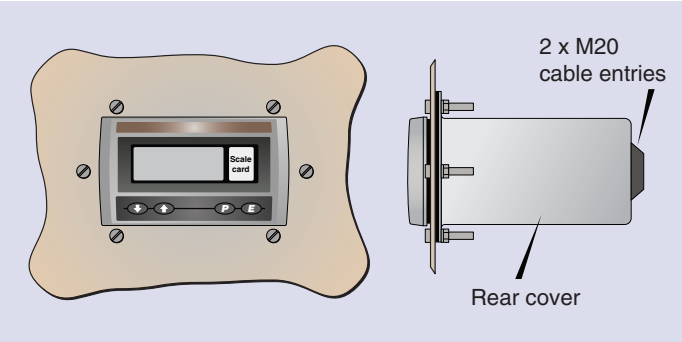


Fig 4 BA495 rear cover

3.2 Location

Having decided how the Tachometer is to be mounted, the location of the installation will help to determine the required model.

3.2.1 General purpose application

If the Tachometer is to be installed in an area which does not have a flammable gas or combustible dust hazard, one of the following general purpose instruments should be selected.

Field mounting see Table 1
BA514G

Panel mounting models are available in two alternative DIN enclosure sizes plus a rugged impact resistant instrument in a 316 stainless steel enclosure.

Panel mounting see Table 2

BA517E	96 x 48mm
BA518E	144 x 72mm
BA517E-SS	Rugged 105 x 60mm

3.2.2 Explosive atmosphere applications

To select a Tachometer for a hazardous area installation, the Zone or Division in which it is to be installed and the hazard must be known, together with the required certification authority i.e. IECEx, ATEX or ETL.

The range includes intrinsically safe Ex ia certified instruments for installation in most gas and dust Zones.

Field mounting see Table 1

BA314G	1G Ex ia	
BA314E	1G Ex ia	*includes separate terminal compartment.*

Panel mounting see Table 2

BA317E	96 x 48mm	1G Ex ia
BA318E	144 x 72mm	1G Ex ia
BA317E-SS	Rugged 105 x 60mm	1GD Ex ia

When selecting a Tachometer for installation in a hazardous area, the instrument's hazardous area certificate should be consulted to ensure that the instrument has approval for the required area, hazard and temperature range.

3.3 Operating temperature

All the field and panel mounting Tachometers, except models with an 'E-SS', 'NE' and 'NG' suffix, have a specified operating temperature of -40°C to +70°C. Between these temperatures the Tachometer will function normally, however at temperatures below -20°C the display digits will gradually change more slowly and contrast will be reduced. At some temperature below -20°C the display will stop functioning, but the speed measurement, run-time, alarms and retransmitted outputs will continue to function normally.

Models with an 'E-SS', 'NE' and 'NG' suffix have a maximum certification temperature of +60°C but performance is the same as other models at low temperatures.

4. Tachometer function

All BEKA externally powered pulse input Tachometers have similar functions, although the output options may differ. Fig 5 shows a simplified block diagram of a Tachometer. The input pulse frequency can be scaled and shown on the large upper display to represent the speed in the required engineering units e.g. revolutions per minute (RPM). The smaller lower display shows the time that the monitored machinery has been functioning in hours with a resolution of one tenth of an hour.

All models can function with most types of active and passive sensor. To function with a sensor which requires powering, such as a switch contact, open collector transistor or a two wire proximity detector, an external link between field terminals 3 and 4 energises the input circuit.

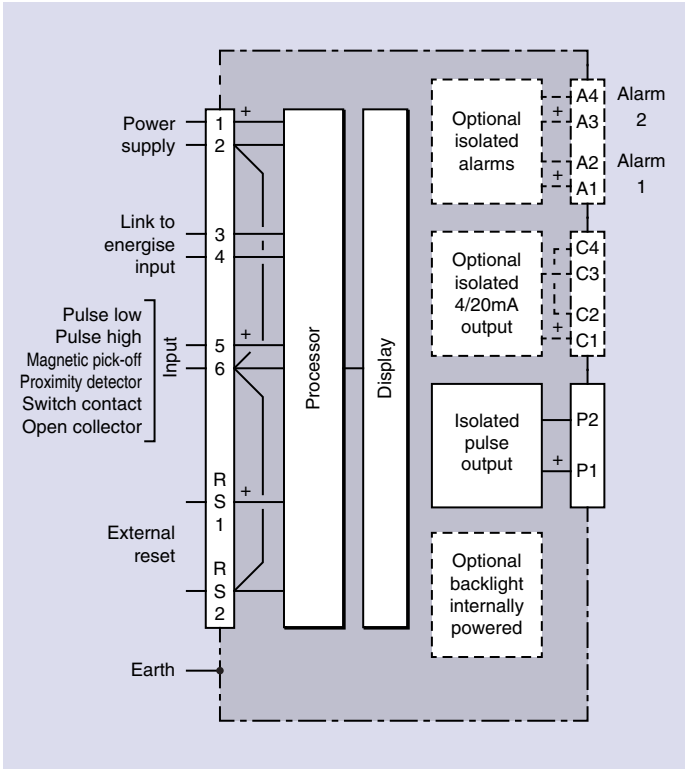


Fig 5 Simplified diagram of a Tachometer

The display digit size depends upon the model as shown below.

	Display size	
	Speed	Elapsed time.
Field mounting		
All models	18mm	12mm
Panel mounting		
96 x 48mm	9mm	6mm
144 x 72mm	18mm	12mm
Rugged 105 x 60mm	9mm	6mm

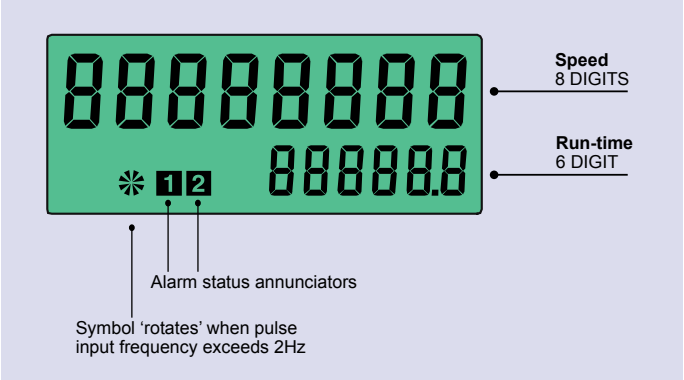


Fig 6 Tachometer display

The elapsed time display may be reset to zero by simultaneously operating two of the Tachometer's push buttons, or remotely by connecting the instruments external reset terminals together for more than one second.

The Tachometer also maintains a protected grand total elapsed time which is not reset when the elapsed time display is zeroed. Both the elapsed time and the grand total elapsed time are retained when the Tachometer is not powered.

4.1 Sensor input

Tachometers will function with most types of active and passive speed sensors including, magnetic pick-offs, switch contacts, 2-wire proximity detectors and those with a voltage output. Table 3 shows the Tachometer's input switching thresholds when conditioned for use with sensors having different outputs. For reliable operation the Tachometer's pulse input must fall below the lower threshold and rise above the upper threshold.

Speed sensor	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 NAMUR standard	1.2mA	2.1mA
Switch contact	100Ω	1000Ω

Table 3 Tachometer input switching thresholds

Speed sensors with a switch contact, 2-wire proximity detector or an open collector output require powering to detect their state. Linking field wiring terminals 3 and 4 together energises the Tachometer input circuit.

5. Tachometer Configuration

All models are configured and calibrated using a common intuitive menu structured in the same way as all BEKA instruments. The menu is accessed via the four instrument push buttons and can be protected by a user defined four digit access code. The configuration structure for all Tachometers is shown in Fig 7. This allows a Tachometer to be configured and calibrated on-site without the need for external test equipment.

The configuration menu uses English language names to describe functions and variables such as CodE and dEbounCE. When the function name has more than eight characters a simple abbreviation is used such as t-bASE (Timebase) and CLP oFF (Clip-off). In this Application Guide these functions and variable names are shown in a seven segment font, exactly as they appear on the Tachometer's display.

BEKA Tachometers are easy to calibrate as there are only two basic variables to adjust to obtain the required speed display.

Speed scale factor	SCALE.S
Timebase	t-bASE

Variable SCALE.S divides the number of Tachometer input pulses to convert them to revolutions and t-bASE multiplies the result to produce a display of revolutions per second, minute or hour.

5.1 Speed scale factor: SCALE.S

Function SCALE.S is a dividing factor adjustable between 0.0001 and 99999 that enables the input pulse speed to be displayed in revolutions. It is used in conjunction with the Tachometer's timebase t-bASE which determines whether speed is displayed per second, per minute or per hour.

5.2 Timebase: t-bASE

The Tachometer's timebase t-bASE multiplies the output from SCALE.S by 1, 60 or 3,600 to produce a speed display per second, per minute or per hour as shown below:

t-bASE settings

tb- 1	x 1 for revolutions / second
tb-60	x 60 for revolutions / minute
tb-3600	x 3600 for revolutions / hour

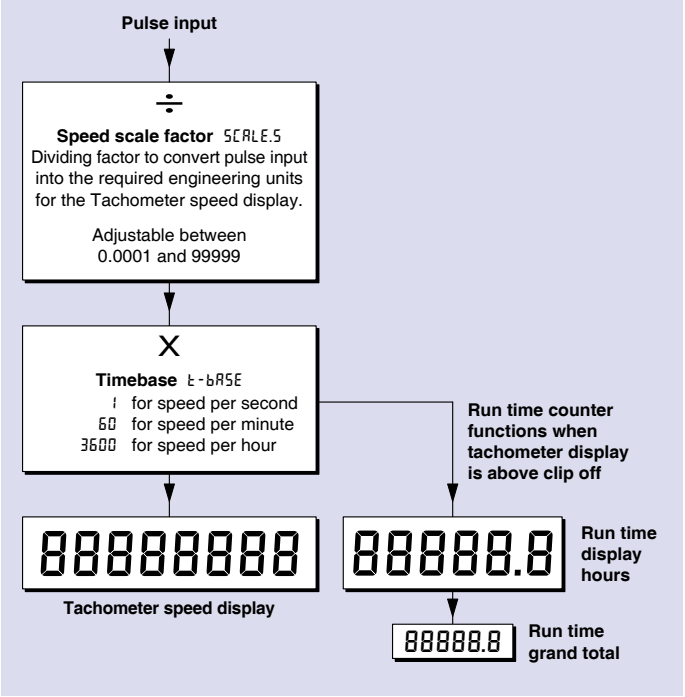


Fig 7 configuration structure

5.3 Run-time display

The lower display of all models shows the elapsed time in hours that the monitored machinery has been operating. The elapsed time clock starts when the speed displayed by the Tachometer exceeds the CLP oFF speed which is adjustable from within the instrument's configuration menu.

If an elapsed time display is not required, the lower display can be switched off using the d, SP-2 function in the configuration menu.

5.3.1 Resetting the run-time display

Tachometers can be configured to reset the run-time display to zero when the ▼ and ▲ push buttons are operated simultaneously for more than two seconds. Alternatively the run-time display may be remotely reset to zero by connecting terminals RS1 & RS2 together for more than one second. Permanent interconnection inhibits the run-time clock.

6. Pulse output

All field mounting BEKA Tachometers and the larger 144 x 72mm panel mounting models have an optically isolated open collector pulse output. This pulse output is also available as a factory fitted option for the smaller 96 x 48mm and the rugged 105 x 60mm panel mounting models.

The pulse output is a passive output which must be powered, or connected to an instrument with an open collector or switch contact input. When connecting the pulse output from a Tachometer to another BEKA Tachometer the second instrument should be configured for an open collector input.

The output pulse may be a synchronous duplicate of the Tachometer input pulse by selecting dirECt in the configuration menu, or by selecting SCALEd it may be divided to reduce the output pulse frequency and the output pulse width (duration) may be lengthened. The pulse output configuration does not affect the Tachometer's calibration.

When a SCALEd output is selected in the pulse output configuration menu two additional functions di Vi dE and durAti on are introduced.

The di Vi dE function allows the pulse output frequency to be reduced by one of the following four divisors:

1
10
100
1000
10000

Similarly, the durAti on function allows the pulse width of the output pulse to be selected from one of eleven options:

0.1ms
0.5ms
1ms
2.5ms
5ms
10ms
25ms
50ms
100ms
250ms
500ms

If the pulse output is 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, but they will not be stored if the Tachometer is disconnected or switched off.

7. Optional 4/20mA output

All BEKA Tachometers can be supplied with a factory fitted galvanically isolated 4/20mA current sink output for retransmitting the speed display to other instrumentation. The output can be configured to represent any part of the instrument's speed display.

The isolated output is passive and appears as a 4/20mA loop powered transmitter requiring an external power supply between 5 and 28V. The output may be directly connected to any instrument with an input that will accept a loop powered 4/20mA transmitter.

8. Optional dual Alarm outputs

All BEKA Tachometers can be supplied with factory fitted dual alarms. Each alarm has a galvanically isolated, solid state single pole, voltage free output. Each output may be independently configured as a high or low speed or a run-time alarm with a normally open or normally closed output.

Configurable functions for each alarm include the setpoint and hysteresis for speed alarms. An alarm delay and an alarm silence time can also be included

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.

When the Tachometer's 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 it is therefore recommended that an open output should be selected for the alarm condition.

The alarm outputs can switch any low voltage and power dc circuit such as a sounder or beacon, or they may be used as part of an on / off control system.

9. Slide-in scale card

All Tachometers, except the field mounting BA314E, have a slide-in scale card which can be printed to show the instruments units of measurement. The scale card is mounted on a flexible strip that is inserted into a slot at the rear of the panel mounting Tachometers and a slot adjacent to the terminals on the field mounting models. See sections 3.1.1 and 3.1.3.

New Tachometers can be supplied with a printed scale card showing specified units of measurement for no additional charge. If this information is not supplied when the instrument is ordered, a blank card will be fitted which can easily be marked with the required legend on-site.

Scale card with printed customer specified legend

10. Configuration examples

This section contains some examples of Tachometer configurations requested by BEKA customers. Step-by-step instructions are not included, nor are non-calibration configuration functions such as input debounce protection and display filtering. Such features are fully explained in the instruction manual for each model and each instrument.

Example 1

A user required a BEKA Tachometer to measure and display the rotational speed of a mixing vessel stirrer in RPM with a resolution of 1 RPM. Rotation of the stirrer was detected by a proximity detector which produced 8 pules for each stirrer revolution. A run-time display was not required.

The user required a synchronous pulse output for transmission to other instrumentation.

Summary

Sensor	Proximity detector
Sensor output	8 pulses / revolution
Required speed display	RPM with 1 RPM resolution.
Run-time display	Not required
Pulse output	Synchronous output required.

Tachometer Configuration

Speed display

inPtYPE	Pr.dEt
SCALE.S	8.00
t-bASE	tb-60
dP totAL	00000

Run-time display

di SP-2	oFF

The speed sensor is a 2-wire proximity detector so Pr.dEt is selected and field terminals 3 and 4 are linked to energise the speed sensor.
The speed display is required in revolutions per minute (RPM) and the proximity detector produces 8 pulses per revolution of the stirrer. Therefore SCALE.S is set to 8. The speed display resolution of 1 RPM is required, hence the displayed decimal point is positioned to the right of the least significant digit where it is automatically suppressed and not visible.
Selecting a timebase of tb-60 multiplies the speed display by 60 to show the stirrers rotational speed in revolutions per minute (RPM).

The run-time display is not required, therefore the display 2 is turned off.

Pulse output

SourCE	di rECt

A synchronous duplicate of the Tachometer input pulse is required, therefore di rECt is selected for the pulse output source.

Example 2

This is an unusual application exploiting the Tachometer's low input frequency performance, in which the user wished to measure and display the stroke speed of a reciprocating pump rather than a rotary speed.

A proximity detector senses each pump stroke and produces 1 pulse output per stroke. The Tachometer speed display is required in strokes per minute (SPM) with a resolution of 1 SPM.

The maximum pump speed is 120 SPM, but speeds in excess of 100 strokes per minute are considered high and are to activate a warning beacon. A Tachometer alarm output is therefore required when the displayed pump speed rises to 100 SPM and is to be deactivated when the displayed speed decreases to 95 SPM.

To assist routine servicing, the time that the pump has been operating is to be measured and displayed. Timing is to be started when the pump speed exceeds 1 SPM. When the pump has completed 6 months continuous service, which is equivalent to 4,380 hours, a Tachometer alarm is to activate a panel lamp.

A remote 4/20mA pump speed display calibrated 0 to 120 SPM is required.

Summary

Sensor	Proximity detector
Sensor output	1 pulse per stroke
Required speed display	Strokes per minute with 1 SPM resolution.
Alarm 1	Activated at 100 SPM Deactivated at 95 SPM
4/20mA output	
4mA 0 SPM	
20mA 120 SPM	
Run-time display	Timing to start when pump speed reaches 1 SPM.
Alarm 2	Activated after 4,380 hours.

Dual alarms and the isolated 4/20mA output are factory fitted options on most models, so should be specified when the Tachometer is ordered.

The small 96 x 48mm and rugged panel mounting Tachometers can only accommodate one output options so cannot implement this example.

Tachometer Configuration

Speed display

inP.tYPE	Pr.dEt
dP	00000
SCALE.S	1.00
t-bASE	tb-60

The stroke sensor is a 2-wire proximity detector so Pr.dEt is selected and Tachometer field wiring terminals 3 and 4 are linked to energise the detector.
The speed display is required in strokes per minute (SPM). The proximity detector produces 1 pulse per stroke so SCALE.S is set to 1. The speed display resolution of 1 SPM is required, hence the displayed decimal point is positioned to the right of the least significant digit where it is automatically suppressed and not visible. Selecting a timebase of tb-60 multiplies the speed display by 60 to show the pump speed in SPM.

Run-time display

di SP-2	on
CLP oFF	0000 1

The Tachometer is required to show the number of hours that the pump has been operating at a speed above 1 SPM, therefore the run-time display di SP-2 is turned on. The run-time clock starts timing when the speed display exceeds the clip-off threshold, CLP oFF is therefore set to 1.

4/20mA Output	**for remote speed display**
EnbL	on
4.000	000000
20.000	000 120

The remote pump speed indicator displays the Tachometer's 4/20mA output which is calibrated to output 4mA at a speed display of 0 SPM and 20mA at 120 SPM.

Dual alarms

Alarm 1 AL1	**pump high speed alarm**
EnbL	on
tYPE	SPEEd
SP 1.SPEEd	0000 100
Hi Lo	Hi
no.nC	no
HYSt	00005

Alarm 1 is configured as a speed alarm with a high set point of 100 SPM. When the Tachometer's speed display increases to 100 the alarm output will close. Hysteresis of 5 SPM prevents the alarm being deactivated until the display speed falls to 95 SPM.

Alarm 2 AL2	**Run-time alarm**
EnbL	on
SP2.HourS	4380.0
Hi Lo	Hi
no.nC	no

Alarm 2 has been configured as a run-time alarm with a high set point of 4,380.0 hours. When the Tachometer's run-time display reaches 4380.0 hours alarm 2 output will close.

11. Additional information

If additional information or help is required with Tachometer applications or configuration, please contact our sales office, one of our application engineers will be pleased to help.

Although Tachometers are easy to configure on-site, they can be supplied configured to customer specified requirements with a slide-in scale card printed with specified legend for no additional charge.