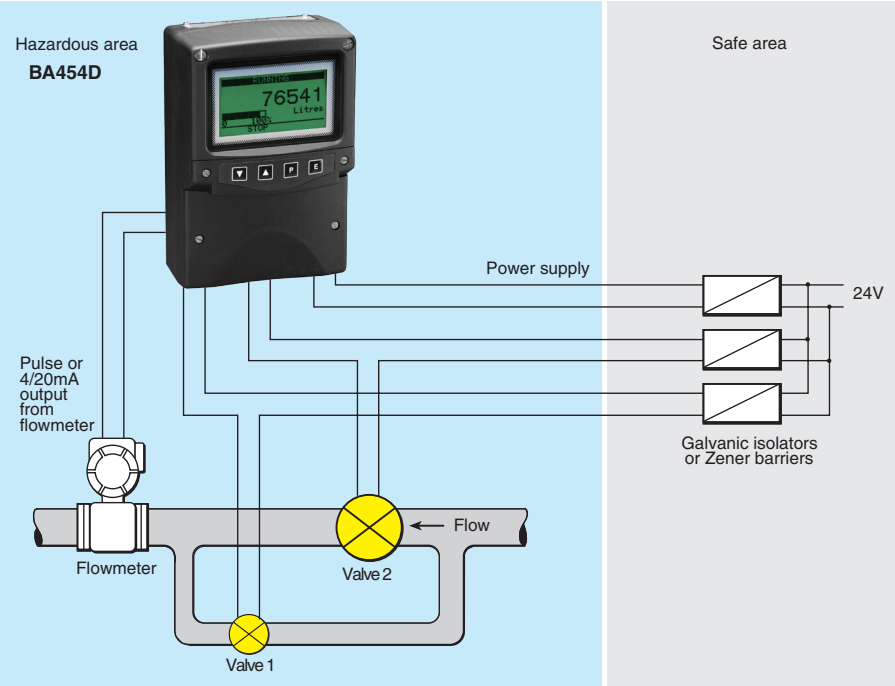

BA454D

Flow batch controller

Intrinsically safe for use in gas and dust hazardous areas

- **Easy to use**
- **Intrinsically safe ATEX gas *or* ATEX gas & dust *or* FM, cFM & ATEX gas**
- **High contrast display with backlight.**
- **Pulse or 4/20mA current source input.**
- **3 or 6 outputs**
- **9 selectable batch setpoints.**
- **IP66 field mounting GRP enclosure with separate terminal compartment.**
- **3 year guarantee**

www.beka.co.uk/ba454d

The BA454D is an intrinsically safe, second generation batch controller based on the successful BA350B. This field mounting controller is ideal for accurately dispensing liquids, solids or components in a hazardous area and despite its sophisticated control functions, it is easy to use and configure. Carefully designed display screens annotated in English, French, or German, lead the user intuitively through the available options. The BA454D accepts a pulse or 4/20mA analogue input and incorporates a square root extractor and sixteen point lineariser allowing use with almost any flowmeter or sensor. Separate total and rate scaling factors enable the dispensed quantity and the rate of dispensing to be displayed in the same or in different engineering units.

Single or two-stage control can be performed by the BA454D with a third output available to control an additional valve or pump. To ensure maximum accuracy, overrun compensation may be selected to automatically minimise batching errors caused by actuator delays.

The backlit display is readable in all lighting conditions. The user screen may be selected so that the operator is only presented with essential process information. Variables that may be displayed include dispensed quantity, batch setpoint, rate of dispensing and controller status. Most of the standard display screens also include a bargraph showing batch progress. A record of total product dispensed is maintained as a grand total together with a history of the last ten batches.

Up to nine setpoints may be pre-entered and selected by the operator when required. To simplify selection, each setpoint may be identified by a plain language name having up to sixteen alphanumeric characters.

The three isolated outputs are individually configured as control or status outputs. If more are required, a factory fitted option provides three additional identical isolated outputs.

Front panel push buttons allow the operator to start and stop the batch and to reset the controller at the end of each cycle. For applications where large or remote push buttons are required, control may be transferred to external switches with or without inhibiting the front panel controls.

Counting may be inhibited during a batch by closing an external contact. Thus product may be re-cycled whilst being heated, or the batching system may be purged without affecting the quantity dispensed.

Selectable automatic restart causes the BA454D batch controller to execute the batching operation a pre-set number of times. The delay between batches may be set between 1 second and 24 hours, thus enabling the controller to perform regular dosing and sampling operations.

ATEX certification permits the BA454D to be installed in gas and dust hazardous areas. The magnetic pick-off, voltage pulse and 4/20mA inputs comply with the requirements for simple apparatus, allowing direct connection to most certified flowmeters. Switch contacts and a wide range of certified proximity detectors may also be directly connected to the BA454D. All three control outputs are galvanically isolated and certified as separate intrinsically safe circuits with output parameters complying with the requirements for simple apparatus. This allows most certified hazardous area loads such as valves, lamps, and sounders to be controlled, or the output may be transferred to the safe area via a wide range of Zener barriers or galvanic isolators.
For use in the USA and Canada the BA454D has FM and cFM intrinsic safety and nonincendive approval.

Controller configuration may be performed via the front panel push buttons or optional external switches. To prevent accidental or unauthorised adjustment, access to the configuration menus is restricted by an external security link and an optional user definable four digit security code.

The GRP enclosure has stainless steel fittings, neoprene gaskets and an armoured glass window. The robust construction provides IP66 protection which has been independently assessed by ITS – report available. A separate terminal compartment allows the instrument to be installed and terminated without exposing the electronic assembly. To further simplify field wiring and subsequent inspection, the terminal cable entries and clamping screws are both forward facing.

BEKA associates

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SPECIFICATION

Power supply
- Voltage: Must be powered via a Zener barrier or galvanic isolator, 11V min required between terminals 1 and 2.
- Current: 33 mA typical when powered from 24V via 28V 300Ω Zener barrier

Pulse inputs: Linear or via 16 point lineariser
- Switch contact
  - Closed: Less than 100Ω
  - Open: Greater than 1kΩ
- Proximity detector: 2-wire NAMUR
- Magnetic pick-off: 40mV peak to peak min
- Voltage pulse (low)
  - Low: Less than 1V
  - High: Greater than 3V; 30V max.
- Voltage pulse (high)
  - Low: Less than 3V
  - High: Greater than 10V; 30V max.
- Open collector
  - Closed: Less than 2kΩ
  - Open: Greater than 10kΩ
- Frequency
  - Switch contact: 100Hz maximum
  - All other pulse I/P: 5kHz maximum

4/20mA input: From current source
- Function: Linear or root extracting
- Voltage drop: 0.6V at 20mA
- Accuracy at 20°C
  - Linear: 0.3 % of span
  - Root extracting: ±16 µA at input ±0.3 % of span
- Frequency: 2Hz maximum
- Temperature effect: Less than 0.025%/°C

Inhibit: Linking terminals 18 & 20 prevents input signal being counted.

Display
- Size: 86.5 mm x 45 mm LCD
- Backlight: Green
- 6 selectable operator screens showing combinations of:
  - Batch controller status
  - Quantity dispensed
  - Batch setpoint
  - Rate of dispensing
  - Status of control outputs

Outputs: Three galvanically isolated solid state dc switches.
- On: Less than 5Ω + 0.7V
- Off: Greater than 1MΩ
- IS parameters: Ui=28V; Ii=200mA; Pi=0.85W
- Switching time: 0.2s max
- Control 1: Closes when start button is operated and opens when dispensed quantity equals the batch setpoint.
- Outputs 2 & 3 may be configured as:

Control 2 or Control 3 (parameters for each are separately adjustable)
Closes a pre-set time after Control 1 closes and open a pre-set dispensed quantity before the dispensed quantity equals the batch setpoint.

Flow alarm
Closes when the rate of dispensing falls below a pre-set value. Also causes batch controller to pause.

Reset status
Closes when controller is reset and opens when batch is started.

Batch status
Opens when batch is started and closes when batch is complete.

Pulse output
Scaled number of pulses proportional to quantity dispensed. Frequency 4 Hz max.

Front panel push buttons

(Control may be transferred to external switches with or without disabling the front panel push buttons.)

- Start: Energises Control 1
- Stop: During a batch de-energises Control 1, 2 & 3 causing the batch to pause.
- Reset: Resets the batch display to zero or to the batch setpoint if the controller is counting down.
- Menu: Provides access to four functions if they are enabled:
  - Select pre-entered batch setpoint
  - Adjust batch setpoint
  - View size of last 10 batches
  - Configuration menu

Security
- Operator menu: May be protected by an optional four digit code.
- Configuration menus: Protected by external link or switch, plus optional four digit code.

Intrinsic safety

Europe ATEX
- Code: Group II Category 1G Ex ia IIC T5 Ga (Tamb = -40 to 60°C)
  or Group II Category 1D Ex ia IIIC T80°C Da (Tamb = -40 to 60°C) IP66 — *Dust option, see How to order*
- Cert. No.: ITS03ATEX21378
- System: Ex03E21380 & Ex03E21381
- Location: Gas Zone 0, 1 or 2: Dust Zone 20, 21 or 22

USA FM
- Standard: 3610 Entity
- Code: CL I, II, III; Div 1 GP A, B, C, D, E, F & G T4; Ta = 60°C
- Standard: 3611 Nonincendive
- Code: CL I, II, III; Div 2 GP A, B, C, D, E, F & G T4; Ta = 60°C
- File: 3033262

Canada cFM
- File: 3033262C

Environmental
- Operating temp: -20 to 60°C (ATEX gas certification -40 to 60°C)
  Storage temp -40 to 85°C
- Humidity: To 95% @ 40°C
- Enclosure: IP66
- EMC: In accordance with EU Directive 2004/108/EC
  - Immunity: No error for 10V/m field strength between 150kHz and 1GHz.
  - Emissions: Complies with the requirements for Class B equipment.

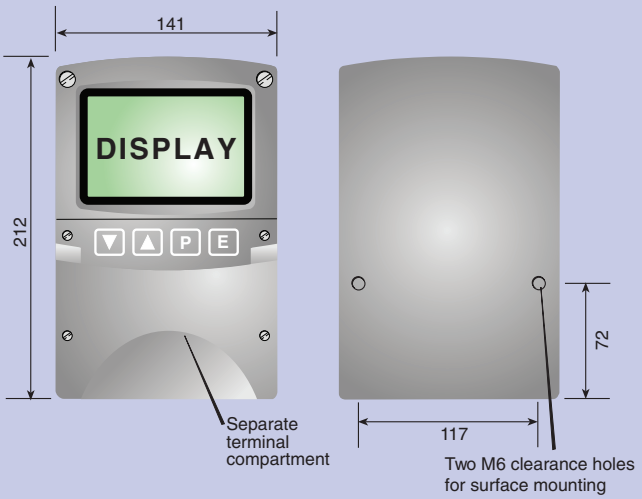
Mechanical: See page 147 for enclosure & terminal details.
- Terminals: Screw clamp for 0.5 to 1.5mm^2 cable. See page 119.
- Weight: 1.6 kg

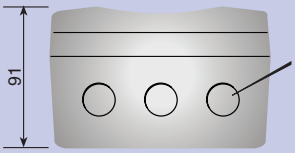
Accessories
- Additional outputs: Three programmable outputs having the same specification as outputs 2 & 3.
- Stainless legend plate: Stainless steel plate secured to front of instrument etched with tagging or applicational information.
- Pipe mounting kit: BA392D or BA393

HOW TO ORDER

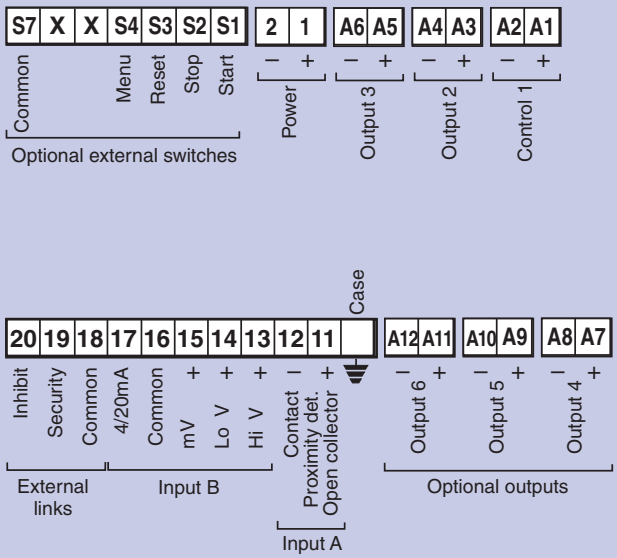
	Please specify
Model number	BA454D
Certification	ATEX gas
or	ATEX gas & dust
or	FM, cFM & ATEX gas
Accessories	**Please specify if required**
Outputs 4, 5 & 6	Additional 3 outputs
Stainless legend plate	Legend required
Pipe mounting kit	BA392D or BA393

DIMENSIONS (mm)





TERMINAL CONNECTIONS



'X' Do not use

TERMINAL DESCRIPTIONS

Case		For earthing the enclosure	
1	+	Power supply	
2	–		
11	+	Proximity detector, switch	Input A
12	–	contact or open collector	
13	+	High voltage	Input B
14	+	Low voltage	
15		mV (Magnetic pick-off)	
16	–	Common for input B	
17	+	4/20mA	
18		Common for links	Externals Links
19		Configure security link	
20		Inhibit input link	
S1		Start	External Switches
S2		Stop	
S3		Reset	
S4		Menu	
S5		Do not use	
S6		Do not use	
S7		Common for switches	

only one input may be used

Case		For earthing the enclosure	
A1	+	Control 1	
A2	–		
A3	+	Output 2	Outputs 2 and 3 may each be configured to have one of six functions
A4	–		
A5	+	Output 3	
A6	–		
A7	+	Output 4	If fitted optional outputs 4, 5 and 6 may each be configured to have one of six functions.
A8	–		
A9	+	Output 5	
A10	–		
A11	+	Output 6	
A12	–		