**BA654C**



Power supply

24V

Pulse or 4/20mA output from flowmeter

Flowmeter

Valve 2

Flow

Valve 1

# BA654D

## Flow batch controller

*General purpose*

◆ **Easy to use**

◆ **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**

**The BA654D** is a second-generation, field mounting, general-purpose flow batch controller based on the successful BA550. This controller is ideal for accurately dispensing liquids, solids or components and despite its sophisticated control functions, it remains very easy to use and configure.

**The backlit display** is readable in all lighting conditions and the user screen may be selected so that the operator is only presented with essential process information. Displayed variables 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 the 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 for selection 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 controller can also be configured so that the operator can adjust an existing setpoint or enter a new value.

**Single or two-stage control** can be performed by the BA654D with a third output available to control an additional valve or pump, or even to provide three-stage control. To ensure maximum accuracy, overrun compensation may be selected to automatically minimise batching errors caused by actuator delays.

**Pulse and analogue 4/20mA signals** are accepted by the batch controller. All inputs are galvanically isolated allowing earthed or floating signals to be connected. Pulse inputs may be from switch contacts, a 2-wire proximity detector or a wide range of voltage sources. An easily adjustable sixteen-point lineariser will accurately correct almost any flowmeter non-linearity. The BA654D also incorporates a root-extractor so 4/20mA analogue inputs may be linear, or have a square law relationship with flow.

**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.

**The three relay contact outputs** may be individually configured as control or status outputs. If more are required, a factory fitted

option provides three additional galvanically isolated solid state 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 BA654D 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.

**Controller configuration** is performed via the front panel push buttons or optional external switches. Carefully designed configuration menus lead the installer intuitively through the available functions. Configuration menus and user screens may be displayed in English, French or German.

**A security link** and an optional user definable four digit security code prevent accidental or unauthorised access to the configuration menus.

**The enclosure**, which is moulded in glass reinforced polyester (GRP), has stainless steel fittings and provides IP66 protection. A separate terminal compartment allows the instrument to be installed and terminated without exposing the instrument electronics. To further simplify installation and subsequent inspection, the terminal cable entries and the clamping screws are both forward facing.

**For panel mounting applications** the BA658C provides the same batching facilities as the BA654D but is housed in a 144 x 72mm DIN enclosure. A complementary range of intrinsically safe models is also available.

**Power supply**
| | |
|---|---|
| Voltage | 20 to 36V dc. |
| Current | 95mA max |

**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 |
| Temperature effect | Less than 0.025%/˚C |
| Frequency | 2Hz maximum |

**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: Digital & bargraph display of quantity dispensed.
Batch setpoint
Rate of dispensing
Status of control outputs
Batch controller status

**Outputs** — Three single pole relay contacts.
| | |
|---|---|
| Rating | 250V; 5A; 1.25kVA ac |
| | 30V; 5A; 150W dc |
| | Reactive loads must be suppressed. |

| | |
|---|---|
| Switching time | 0.2s max |

Control 1 — Closes when start button is operated and opens when batched quantity equals the batch setpoint.

Outputs 2 & 3 may be configured as: *Control 2 or Control 3 (parameters for each are individually adjustable)* Closes a programmable time after Control 1 closes and open a programmable dispensed quantity before the dispensed quantity equals the batch setpoint.

*Flow alarm* Closes when the rate of dispensing falls below a pre-entered 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 output proportional to total volume dispensed. Frequency 4 Hz max.

**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. |

**Environmental**
| | |
|---|---|
| Operating temp | -20 to +60˚C |
| Storage temp | -40 to 85˚C |
| Humidity | To 95% @ 40˚C |
| Enclosure | Front IP66 |
| EMC | In accordance with EU Directive 89/336/EEC . |
| 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 1.5 mm² cable. |
| Weight | 1.6 kg |

**Accessories**
| | |
|---|---|
| Additional outputs | Three configurable galvanically isolated, single pole solid state dc switch outputs. Rating: 30V; 100mA dc |
| 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 | BA654D |

| **Accessories** | **Please specify if required** |
|---|---|
| Outputs 4, 5 & 6 | Additional 3 solid state dc outputs |
| Stainless legend plate | Legend required |
| Pipe mounting kit | BA392D or BA393 |

## DIMENSIONS (mm)

141

212

DISPLAY

▼ ▲ P E

Separate
terminal
compartment

72

117

Two M6 clearance
holes for surface
mounting

91
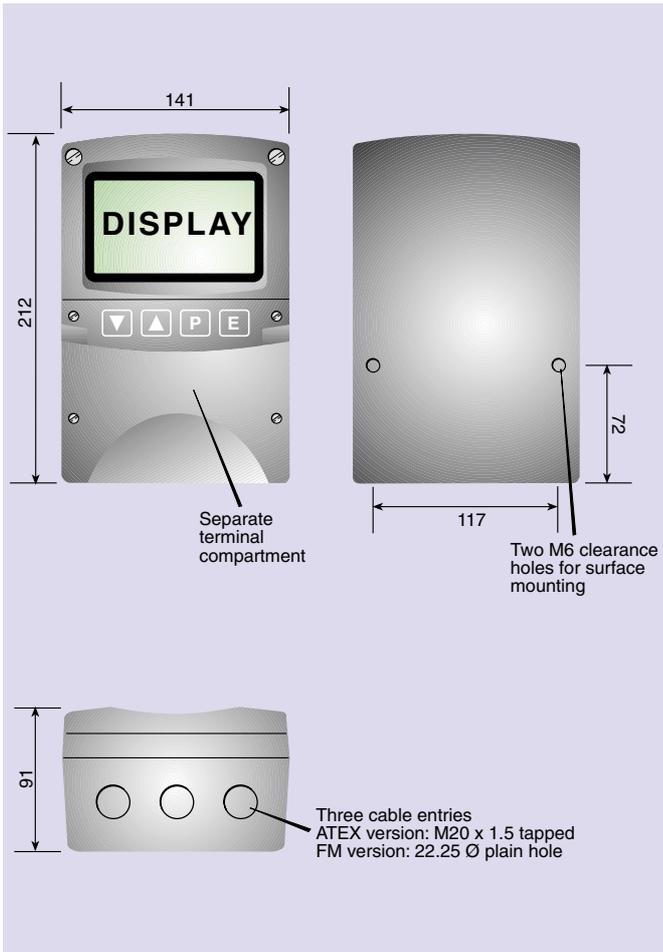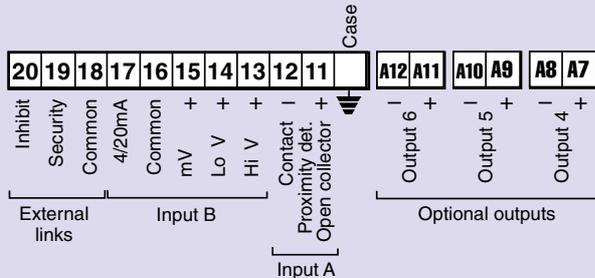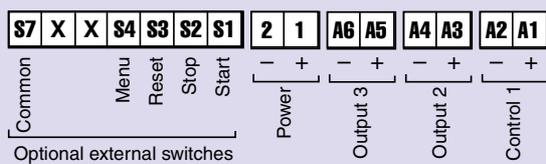
Three cable entries
ATEX version: M20 x 1.5 tapped
FM version: 22.25 Ø plain hole

## TERMINAL DESCRIPTIONS

| 1 | + | Power supply |
| 2 | – | |
| | | |
| Case | | For earthing the enclosure |
| | | |
| 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 2 | |
| 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 | |
| | | | |
| 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 | – | | |

*only one input
may be used*

## TERMINAL CONNECTIONS

| S7 | X | X | S4 | S3 | S2 | S1 | | 2 | 1 | | A6 | A5 | | A4 | A3 | | A2 | A1 |
|----|---|---|----|----|----|----|---|---|---|---|----|----|---|----|----|---|----|----|

Common — Menu — Reset — Stop — Start — Power ( – + ) — Output 3 ( – + ) — Output 2 ( – + ) — Control 1 ( – + )

Optional external switches

Case

| 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | | A12 | A11 | | A10 | A9 | | A8 | A7 |
|----|----|----|----|----|----|----|----|----|----|---|-----|-----|---|-----|----|---|----|----|

Inhibit — Security — Common — 4/20mA — Common — mV (+) — Lo V (+) — Hi V (+) — Contact – / Proximity det. + / Open collector — Output 6 ( – + ) — Output 5 ( – + ) — Output 4 ( – + )

External links — Input B — Input A — Optional outputs

'X'  Do not use

**Note:**
BA654D: Control 1, Output 2 and Output 3 are relay contacts which
are not polarised