Data Sheet

Electro-mechanical counters Hengstler 800 series

The 800 series totalising and predetermining batch counters, manufactured by Hengstler, is available from **RS** in a variety of versions and mains supply voltages. This range is popular since it is well known for its reliability in use. The range, available from **RS**, consists of the following:

Totalising counters

Supply	Digits	Reset	Hengstler no.	RS stock no.
12Vdc	6	Manual	0.864.161	260-634
24Vdc	6	Manual	0.864.165	260-640
115Vac	6	Manual	0.864.189	260-656
240Vac	6	Manual	0.864.190	260-662
24Vdc	6	None	0.866.165	260-684
115Vac	6	None	0.866.189	260-690
240Vac	6	None	0.866.190	260-707
24Vdc	8	None	0.868.165	260-729

Predetermining batch counters

Supply	Digits	Reset	Hengstler no.	RS stock no.
24Vdc	5	Manual	0.886.264	260-757
115Vac	5	Manual	0.886.289	260-763
240Vac	5	Manual	0.886.290	260-779
24Vdc	5	Man/Elec	0.886.214	260-785
115Vac	5	Man/Elec	0.886.239	260-791
240Vac	5	Man/Elec	0.886.240	260-808

The supply voltages listed above are nominal. The counters may be used within the tolerance range as listed in the technical specification. The supply tolerances, in the country where the counters are to be used, must be considered.

The UK supply voltage is:

240V 50Hz ±6% (225V to 255V)

The 240V counters have a supply tolerance of:

240V 50/60Hz +10% –18% (197V to 264V)

This covers the UK and most European requirements.

General features

- ac types, counting speed up to 10 pulses/sec
- dc types, counting speed up to 25 pulses/sec
- Continuously rated count solenoid
- 2 × 4mm digit size
- 2 × 10ft maintenance free counting operations
- Ambient temperature range –10°C to +50°C.

Operating characteristics

An electro-mechanical impulse counter consists of an electromagnetic drive system and a mechanical numeral drum arrangement. The count is advanced by electrical impulses externally generated via limit switches, auxiliary contacts on contactors, etc. The pulse leading edge activates the count solenoid which, in turn, moves the number wheel through half a digit. The pulse trailing edge de-energises the count solenoid which causes the number wheel to complete its travel through the last half digit. Thus a one digit count is completed.

From the above it can be seen that a supply is required, on the input pulse, to energise the coil of the solenoid. This supply must be within the tolerance band as detailed in the technical specification. The minimum pulse length must also be observed.

Totalising counters

Both reset and non-reset versions are available in this range. See notes under "Resetting'.

Non-reset counters

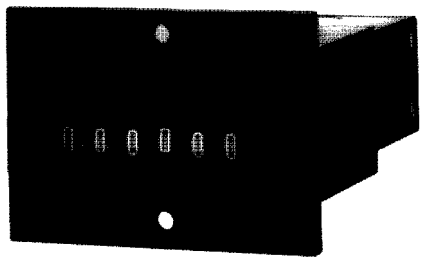
As the name suggests, these count up from zero and continue to add until they reach their maximum value (eg. 999999) and then return to zero (eg. 000000). Thereafter they continue to count up for the second time. Use of this kind of counter, without a reset facility, requires the recording and comparison of a previous reading. Typical examples of this are electricity meters and motor vehicle mileometers. These counters are often used to record the working life of machines. Since the counting mechanism of a non-reset counter will not permit reverse counting, they are difficult to falsify. The higher the number of digits the more this is the case.

A reset facility is convenient but not as secure.

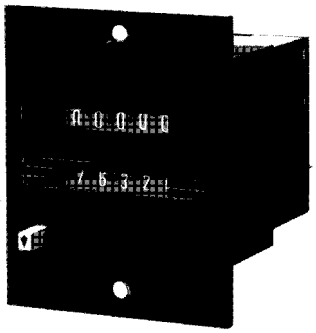
Resettable counters

This kind of counter is preferred where frequent resets are normally required. A typical example, from which to draw a parallel, is the resettable mileometer (or odometer) in a motor vehicle.

Totalising counter



Predetermining batch counter



Predetermining batch counters

Predetermining batch counters count up to a preset value, set via pushbuttons on the front panel. On reaching this preset value, the machine causes a single pole changeover contact to change state.

This contact arrangement is very versatile in control circuit switching since it can also be wired as a N/O or N/C switch.

Switching occurs at the end of the counting pulse, during the second stage of the number wheel movement (see 'Operating characteristics'). The contacts, when switched, remain in their changed state until the counter is reset.

Resetting

Resetting the counter returns the count display to zero. This can be accomplished by:

1. Pushbutton or manual reset.
   Press and momentarily hold in the black reset button. Release slowly.
2. Electrical reset.
   Energise 'reset' solenoid by an electrical impulse, the 'pulse length' and 'on time' to be carefully observed.

During the resetting period, no count pulses must be received and for a 100ms duration afterwards. This is to permit time for the 'reset' solenoid to drop out.

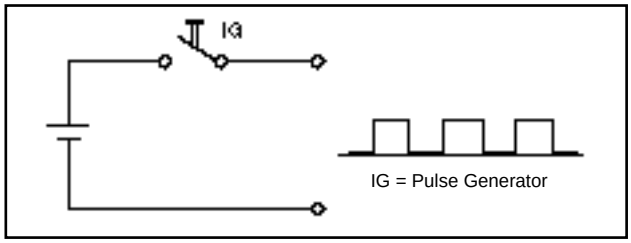
Important notes on counting

To ensure trouble-free counting, it is necessary for the pulse length to be of the proper duration. The space between pulses may be as long as is required.

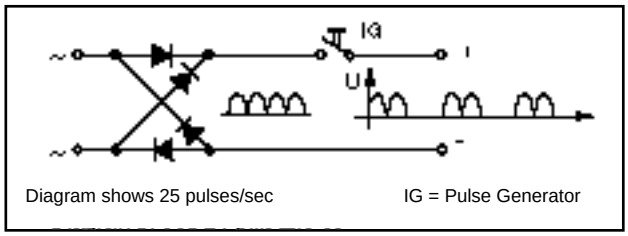
Electrical impulses from an ac source, eg. the mains supply, are only suitable for ac counters unless a bridge rectifier is used.

Pulses for dc counters may be generated in the following ways:

1. From batteries



2. Using a bridge rectifier



Using a simple bridge rectifier circuit, without smoothing, is acceptable for pulse frequencies up to 25 pulses/sec. This covers the range applicable to the 800 series.

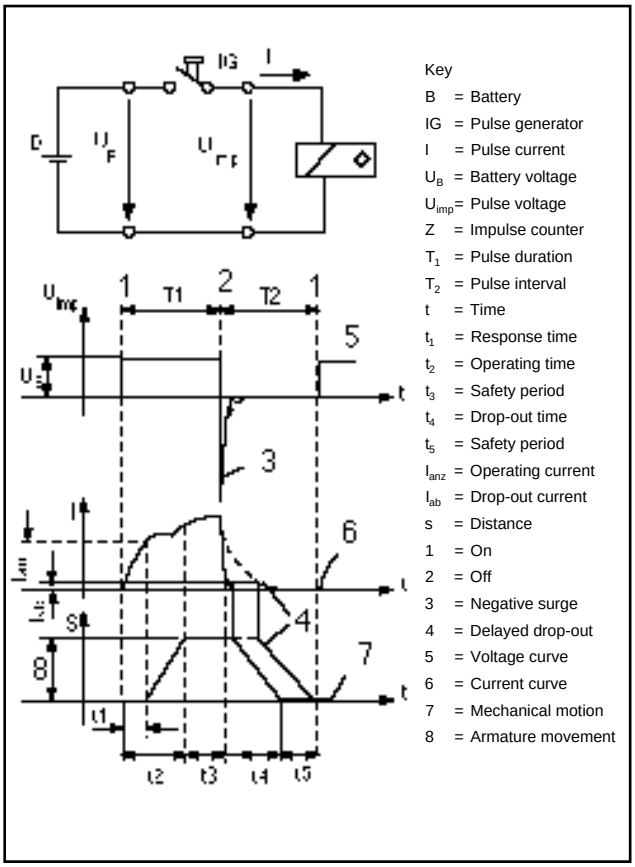
Pulse characteristics

At the precise moment of switching on, no current is yet flowing; it rises on account of the inductance of the coil, relatively slowly, and at the same time builds up a magnetic field. When the current has reached value I_{anz} (Graphs on page 3) the armature starts to move. When the armature movement is completed the pulse has to be maintained to comply with the minimum pulse duration (Technical specification on page 5).

On switching off, the current is suddenly interrupted. The collapsing magnetic field produces a negative voltage surge whose magnitude is governed by the inductance, ie. the number of turns of the coil and in all cases amounts to a multiple of the battery voltage U_B (as with the ignition coil in a motor vehicle). This negative surge affects the pulse generator and produces a disconnection spark harmful to the contacts. (See 'spark quenching'.)

Spark quenching delays the pulse drop-out time so that the current is maintained for a short period after switch-off (eg. by diode or resistor/capacitor). The armature only drops out when the current has fallen to value (I_{ab}).

Pulse form and armature movement



Choice of suitable pulse source

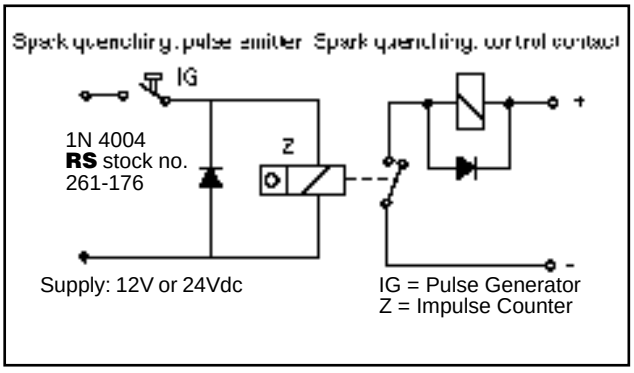
To ensure error-free counting, care must be taken in the choice of the pulse source. It must not have any contact bounce longer than 3ms duration, otherwise spurious counting will result.

For counting speeds up to 10 pulses/sec micro-switches, limit switches or cam-operated spring loaded contact sets are recommended components for use in pulse generation.

To ensure a long contact life, a suitable means of spark quenching should be provided.

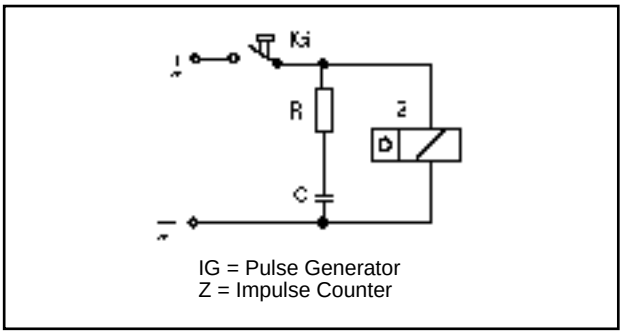
Spark quenching

Spark quenching with diodes



This form of spark quenching is recommended, in dc applications, with a count speed of up to 10 pulses/sec, on 'count' solenoids and 'reset' solenoids. The diode clips the reverse voltage entirely and should be able to sustain such a peak inverse voltage of approximately five times the line voltage.

Spark quenching with RC combinations



RC combinations are used for spark quenching on dc voltages and a counting speed greater than 10 pulses/sec and for ac voltages where the contacts are susceptible to spark erosion. The RC combination clips only part of the negative voltage peak which produces adequate spark quenching without causing too much delay in the decay of the pulse

Recommended RC combinations for counters

Operating voltage	Resistor **RS** stock no.	Capacitor **RS** stock no.
12Vdc	163-347	115-607
24Vdc	149-997	115-130
110-240Vac	149-818	115-180

To obtain details about the components listed above, use the stock no. index in the **RS** Catalogue.

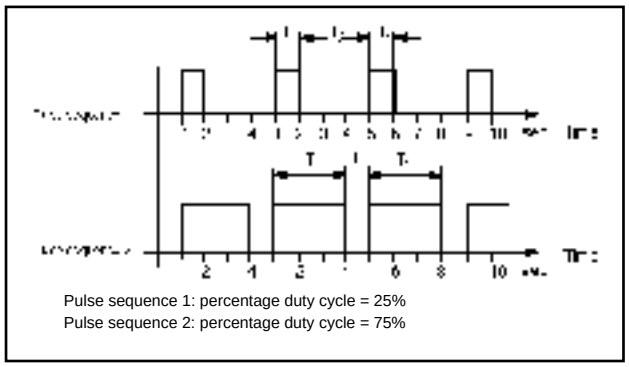
Percentage duty cycle and maximum 'on' time

The maximum 'on' time and the maximum percentage duty cycle are the times during which the counter coils may remain energised. The longer the coils are 'on' the greater is the heat generated. After a certain time they reach an equilibrium temperature. Some coils are not rated for 100% duty cycle. In such cases it is necessary to know the maximum percentage duty cycle and the subsequent minimum interval ('off' time).

Percentage duty cycle

The percentage duty cycle is obtained from the pulse/interval ratio. For any prolonged period it is calculated in accordance with the following formula:

$$\% \text{ duty cycle} = \frac{\text{Total pulse time (T1)}}{\text{Total time (T1 + T2)}} \times 100$$



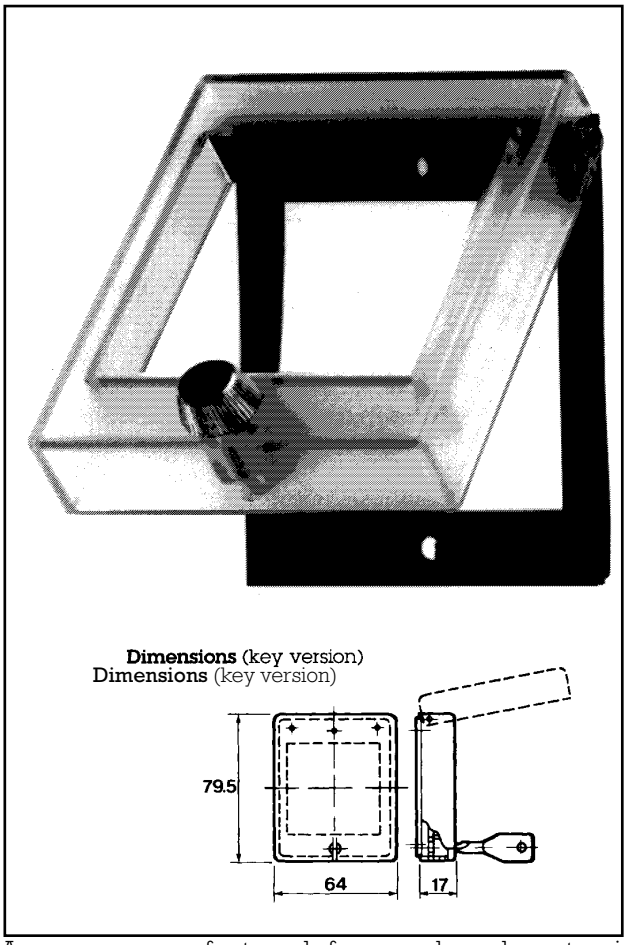
Pulse sequence 1: percentage duty cycle = 25%
Pulse sequence 2: percentage duty cycle = 75%

'On' time

The max. 'on' time is the max. pulse time T1 for which the coil temperature rises to its maximum. The percentage duty cycle and the 'on' time are stated in the **RS** Catalogue and the technical specification on the next page. Percentage duty cycle = 100% corresponds to 'on' time = ∞. To minimise counter heat generation we recommend the use of short pulses of the order of the minimum pulse duration.

Accessories

Protective cover, IP65



A cover, manufactured from polycarbonate, is available for providing environmental protection (IP65) to the predetermining batch counters. This cover is supplied complete with a sealing gasket and its fixing holes match those of the counters. However, the cover may be used independently to protect other panel mounting equipment, provided that their dimensions are less than 50mm × 50mm (max. bezel size) and they protrude, through the panel, less than 15mm. The maximum bezel dimensions are acceptable for 48 × 48 DIN standard cases, used for measurement and control instruments (DIN 43 700). These are used for housing electronic counters, timers, temperature controllers, etc.

The cover is available in two versions:

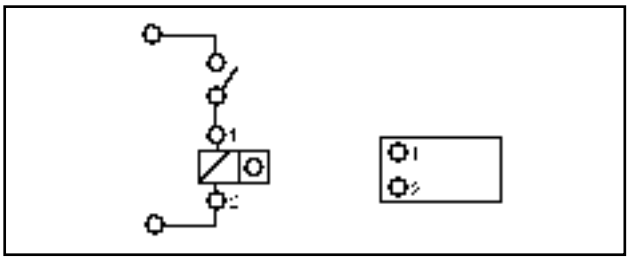
1. **RS stock no. 260-814 knob version**- secures the lift-up transparent cover to the frame via a self-retaining rotary knob.
2. **RS stock no. 260-820 key version**- uses a cylinder lock, instead of the knob, for added security. One key, common profile, is supplied.

Technical specification

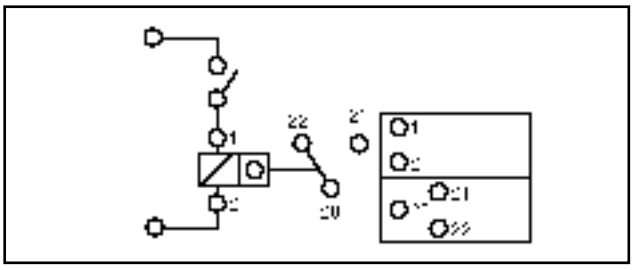
	Count solenoid		Reset solenoid	
Voltage type	dc	ac	dc	ac
Test speed	25 impulses/sec	10	—	—
Power consumption	2.5W	2.75VA	12W	16VA
Duty cycle at +25°C max Max. 'on' time (reset)	100% —	100% —	20% 2 minutes	10% 1 minute
Impulse/space ratio	1:1	1:1	1:5	1:10
Minimum pulse duration	20ms	50ms	200ms	200ms
Voltage tolerance 240Vac versions All other types	— ±10%	+10% –18% ±10%	— ±10%	+10% –18% ±10%
Maintenance-free ops	2×10^8	2×10^8	1.5×10^6	1.5×10^6
Ambient working temperature	–10°C to +50°C	—	–10°C to +50°C	–10°C to +50°C
Max. reset frequency, 1 per	—	—	1 second	2 seconds
Digit size	4 × 4mm	4 × 4mm	4 × 4mm	4 × 4mm

Connection diagrams

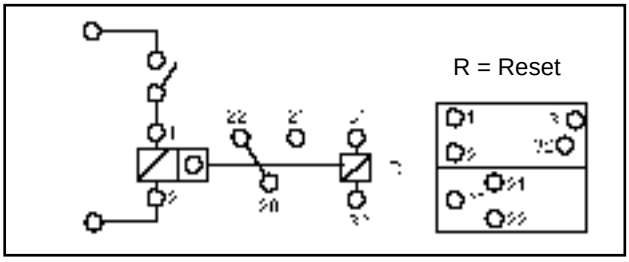
Totalising counters



Predetermining batch counters
Manual reset

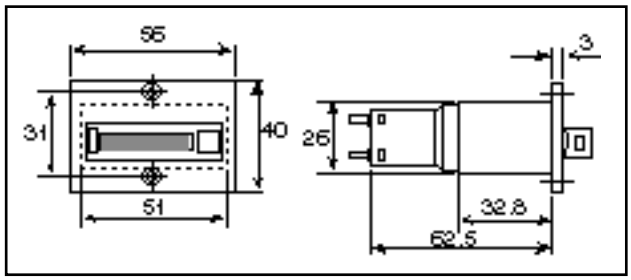


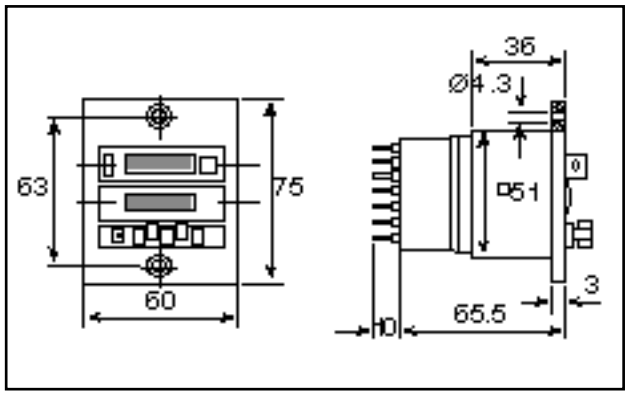
Manual and electrical reset



Dimensions

Totalising counters





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