BARNBROOK

GLOBAL ENGINEERING SOLUTIONS

MAINTENANCE | REPAIR | OVERHAUL

Designing and Manufacturing Systems for Critical Industries

PRODUCT CATALOGUE

Issue 5

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| AEROSPACE | DEFENCE | MARITIME | CITY | RAIL |





BARNBROOK

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BARNBROOK

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Section 1

CAPABILITY

BARNBROOK CAPABILITY STATEMENT

EXECUTIVE SUMMARY

Trading since 1978, multi award winning and hundreds of years of combined experience amongst its team – Barnbrook holds a portfolio of internationally-recognised accreditations and is building upon its superior expertise to pioneer intelligent technology to provide next-generation capabilities on the cutting edge of the digital revolution transforming business and the world today.

Their strong base, broad market sector spread, and financial prudence has enabled the company to maintain profitability through challenging times.

CORE COMPETENCIES

SERVICES

- Contract engineering services
- Circuit & PCB design services
- POC design, build and qualify
- 3D design & simulation (Autodesk)
- Ultra-low & Ultra-high pressure sensing design/build/test
- Telemetry & data transmission expertise
- Software & Firmware expertise
- CAA/FAA Certified
- Approved aerospace repair station
- UK Manufacturing
- MRO Capability & expertise

SOLUTIONS

- Testing & assessment
- Telemetry systems
- Software & firmware platform
- Hydrogen sensing & monitoring technology
- IIoT BlueCube

KEY DIFFERENTIATORS

- Seasoned management team
- Strong past performance
- SME flexibility
- Financial stability
- Broad demonstratable technical expertise
- Sunset services & leading-edge technology

SPECIALIST EQUIPMENT

- Hot/Cold Environment chamber (-50/+125)
- Humidity chamber
- Shock & vibration
- Nitrogen fill
- Paint shop with bake
- Fiber laser marking
- Coil winding (Semi & Full automatic)
- Pressure testing
- Electron beam welder
- Vacuum chamber & ovens
- 3D Printing (SLA & Filament)
- Controlled environment cleanroom

INDUSTRY CERTIFICATIONS

- CAA Part 21G
- CAA Part 145
- FAA 3B2Y408C Part 145
- AS9100D
- JOSCAR
- RISQS
- SIL2
- UL

BARNBROOK CERTIFICATED CAPABILITY

CAA PART-145 - REPAIR ORGANISATION

SCOPE OF WORK

The Repair and Overhaul of:
Electronic Engine Control Units, Speed Switches and Electro Mechanical Actuators as detailed in the Capability List below

Overhaul and Repair Engine Control Units as listed below:

- FWU Series
- 0101 KSP
- 0102 KMU
- 1** ECU Series
- 171TMU
- 2** TSP Series
- 2** ECU Series
- 03** KSM Series
- 0501 KDC
- 05** TSP Series
- 504 ECU
- 5** TSP Series
- 0510 KDC
- 5** ECU Series
- 6** ECU Series
- 8** ECU Series
- 0201 KDP

Overhaul and Repair of Actuators as listed below:

- 500/1/03657/***
- 500/1/04005/***
- 500/1/20740/***
- 500/1/20951/***

All to the standard specified in the applicable Repair and Overhaul Manuals

CAA PART 21 Subpart G - PRODUCTION ORGANISATION
CAA BCAR A8-8 - DESIGN ORGANISATION

Capability List

The design, development and manufacture of electrical equipment and systems including:

- Relays;
- Solenoids
- Circuit breakers
- Actuators
- Indicator lights

AS9100D / JOSCAR / RISQS

The design & manufacture of electronic components and electro-mechanical devices, test rigs and sub-assemblies, precision machining, injection moulding, encapsulation and impregnation.
Motion control and switching devices for industrial, military, aerospace & transport applications, typical products include:

- Actuators
- Fire suppression
- Brake control systems
- AC & DC drive systems
- Solenoids
- Clutches & brakes
- Sensing devices
- Relays
- Circuit Breakers
- Design, development and production of wound products
- Inductors
- Transformers
- Coils

HOW RELAYS WORK

A relay is turned ON by applying a voltage to its coil greater than its **PULL-IN** voltage, but less than its maximum voltage. This will cause any **NORMALLY OPEN** (form **M**) contacts to close or connect together, any **NORMALLY CLOSED** (form **B**) contacts to open or disconnect from one another and any change over contacts (form **C** or **K**) to open its normally closed part and close its normally open part. A non-**LATCH**ing relay is turned OFF by reducing the voltage to its coil below its **DROP-OUT** voltage. This will cause the actions above to reverse.

Because of this mode of operation, a relay should not be operated with a voltage across its coil between the pull-in and drop-out voltages: a relay coil is normally expected to be used at the **OPERATING** voltage (a voltage between the maximum voltage allowable and the pull-in voltage) to turn it on and open circuit or zero volts to turn it off. The **MAXIMUM** coil voltage is set by the ambient temperature plus the temperature rise due to heat dissipation in the coil needing to be kept below the maximum temperature allowable for the insulation used on the coil wire.

LATCH, or latching, relays have a second coil which needs to be activated to make the relay go into the OFF state.

It takes time for a relay to change state - the **OPERATE** time or **RELEASE** time. These periods do not normally include a **BOUNCE** time when the contacts bounce physically against one another before they fully settle into position. A maximum frequency or **SWITCHING** time may be given, this usually signifies a rate at which a relay will switch distinguishably between the on and off state without damage.

These comments on relay coil operation are all written in voltage terms since this is the practical way relays are normally used, but since a relay works with magnetic effects, in reality the coil current is the operator. **COIL RESISTANCE** is shown in the data sheets to allow the conversion between coil voltage and current, but it should be noted that the Copper wire of the coil changes resistance with the ambient temperature and the self heating effect of the coil: Copper has a resistance/temperature coefficient of 0.39% per ºC.

Relays with ac coils have some changes in definition of pull-in and drop-out voltages; these voltages are usually taken as the values when the relay contact/coil operating system ceases to buzz, but apart from this the description given above is unchanged.

The contacts that are the output of the relay unit are two electrical conductors pressed together by the internal relay system. This will give rise to a **CONTACT RESISTANCE** between the output pins of a relay that will depend on the contact material, the pressure applied between the contacts, temperature and the cleanliness of the contacts. A contact resistance for the contact, to account for this, is usually given as the resistance at a particular current level together with the voltage that is used to clear any surface contamination of the contacts.

Continued…….

Below are listed some of the contact materials used for Barnbrook Systems relays, with their properties:-

SILVER /CADMIUM-OXIDE: this is used where high energy arcs occur during switching (that is under heavily inductive loads). It has a strong resistance to material loss and transfer across the contacts during arcing, extending the contact life under these conditions. Since the material contains significant amounts of Silver, it will oxidise and sulphurise easily in normal (contaminated) air. Some arcing is useful to keep the contacts clean under these conditions. This material may become forbidden under EU's RoHS and WEEE directives.

SILVER /TIN-OXIDE: This material is again resistive to material transfer between contacts in arcing conditions. Since the material again contains significant amounts of Silver, it will oxidise and sulphurise easily in normal (contaminated) air.

SILVER/ NICKEL; usually is a fine grained material that ensures erosion and material transfer during arcing to be evenly spread across contact surfaces, preventing pits and spikes. This will stop premature contact failures and possible contact welding. Since the material again contains significant amounts of Silver, it also oxidises and sulfidates easily in normal (contaminated) air.

GOLD plating: Barnbrook Systems frequently has gold plating on Silver 'alloy' contacts so that Silver surface contamination will not happen in relays held on the shelf for long periods without use, ensuring that contact resistance is low even with minimal starting voltages. The Gold plating also aids in arc reduction with inductive loads since it has a low electrical spreading resistance reducing local hot spots where arcing might occur.

PALLADIUM contacts do not react with air or the usual airborne pollutants. Contacts made of palladium usually have a long life expectancy but since the base material has a worse general conductivity than Silver, it has a more limited current carrying capacity. To keep contact resistances low with Palladium, bifurcated contacts and contact wiping actions are necessary.

The contact material thus will influence the **LIFE** or **ENDURANCE**, usually expressed as the number of **OPERATIONS** (turning on and off again) that a contact can complete with a resistive or inductive load, and still conform to the relay specification (particularly contact resistance). In practical terms the most difficult loads for a relay to handle that are not normally considered are incandescent lamps (the starting current may be twenty times greater than the normal operating current) and electric motors (the starting current may be six times greater than the normal operating current and under the "wrong" conditions it may appear very inductive).

Barnbrook Systems relays are often **HERMETICALLY** sealed, that is carefully sealed so that there can be no transfer of gasses between the inside of the case and the external ambient atmosphere. The relay cases are back-filled with clean dry Nitrogen; a filling which aids arc suppression, reduces contact surface contamination and so prevents many contact resistance and arcing problems.

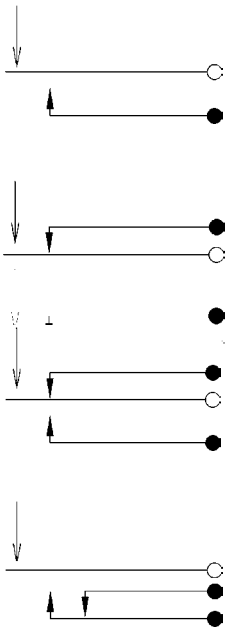
Continued…….

Because relays are not perfect physical entities, if too higher voltage is applied to their terminals they will breakdown; this is measured by the **DIELECTRIC STRENGTH**. The first break down voltage that is of concern is the isolation voltage between the coil (the input) and the contact set (the output). The second breakdown of interest is that between open contact pairs, but the applied voltage the contact pairs will open without damage also has a bearing on how this voltage may be expressed. **INSULATION RESISTANCE** is also frequently given as a measure of the current that can inadvertently flow between the various relay terminals at high voltages.

Contact Form Descriptions

Barnbrook use single letter designations to describe contact forms (with a number in front of each letter to indicate quantity); C, M, B & K for change over, make, break and make before break. To complete a contact arrangement description of a relay, a number is inserted in front of each letter to show the quantity of that type of contact, but figure '1' is normally omitted. (2MB4C would then be a relay with 2 normally open contacts, 1 normally closed contact and 4 change over contacts.)
The word "latch", in parenthesis, is added to the various forms of contact nomenclature to indicate a bistable relay.

The diagrams below show these contact forms.



Form M

Form B

Form C

Form K

The ↓ shows the operation from the operator driven by the relay coil.
An empty circle is a hinge. A filled circle is a fixed end to a contact

Section 2

RELAYS (AEROSPACE & MARINE)

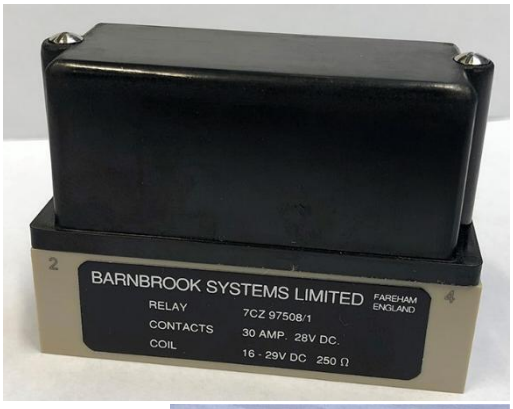
FORMERLY PLESSEY

BARNBROOK DATA SHEET

RELAY TYPE A

The ‘A' Type Relay uses an efficient magnetic circuit to give maximum contact pressures and contact clearance with minimum overall dimensions and weight. The Relay is manufactured principally as a single-make 30-amp Relay and also as 5-amp and 10-amp single-break and 5-amp 2-pole changeover relays

The Relay movement is balanced to maintain performance throughout the vibration and acceleration range. The contacts are of silver cadmium oxide and have a self-wiping action



Key Features

Available in four forms:

1. Open design, no cover, solder connections to coil for minimum space.
2. With screw connections to coil and contacts and with dust cover, relay is suitable for general aircraft use.
3. Hermetically sealed with screw terminals.
4. Hermetically sealed with plug-in terminations to suit a moulded socket.

Specification

Electrical

Coil Voltage (AC)	115 Vac 115 Hz
Line transient resistance	Up to 1000 B.S.G. 100. Grade C. for 10 µs
Coil Voltage (DC)	16 – 29 Vdc
Dielectric strength	All relays are tested at 1000 volts, between contacts and frame.

Contacts

Contacts for the basic Relay are rated at 30 Amps for either 28V dc or 240V 50/ 60/ 400 Hz ac circuits

Environmental and Physical

Endurance	30 amp – 10,000 operations 20 amp – 100,000 operations
Temperature range	-65°C to +70°C
Vibration	B.S.G. 100. Grade C.
Acceleration	B.S.G. 100. Grade 1A.

Dimensions

See sheets 2 & 3 for dimensional details.

Ordering Information

Quote Part Number from table on Sheet 4

Data Sheet No
DSRELA

SHEET 1 OF 4

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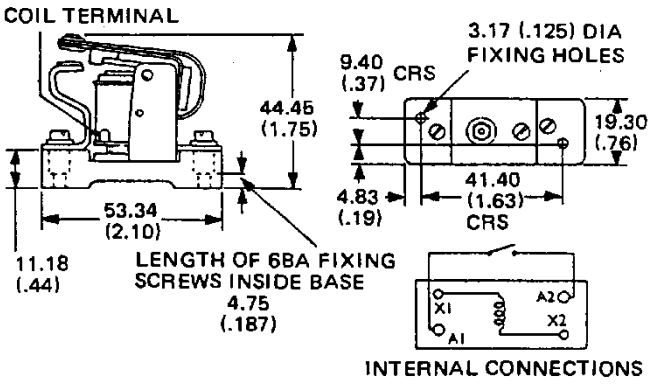
AS9100D CERTIFIED ISO 9001

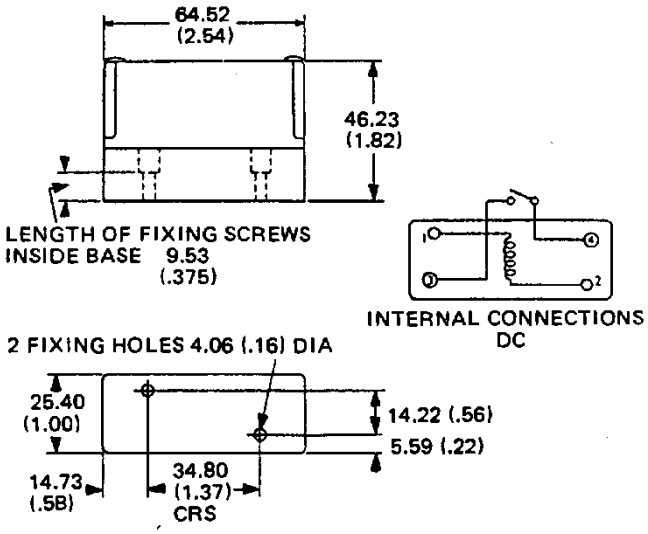
30 AMP Single-Make Uncased



5 and 10 AMP Single Break, 30 AMP Single-Make

Dust Cover Enclosure

Screw Terminals



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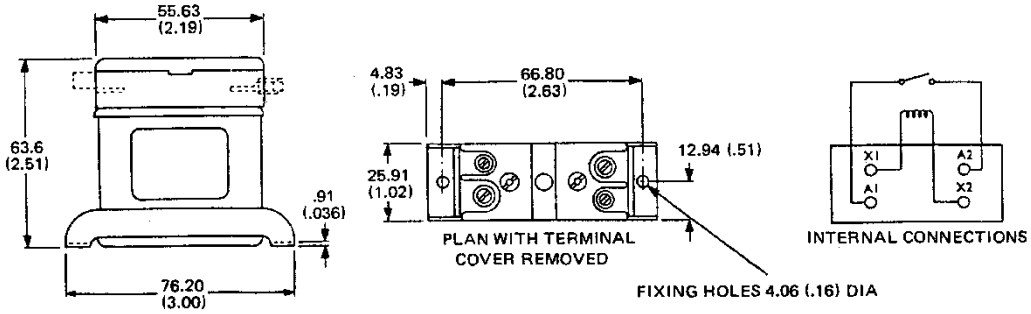
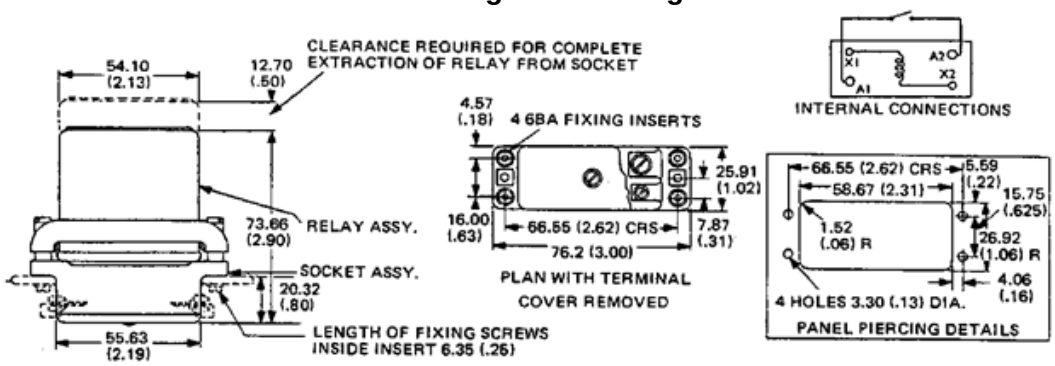
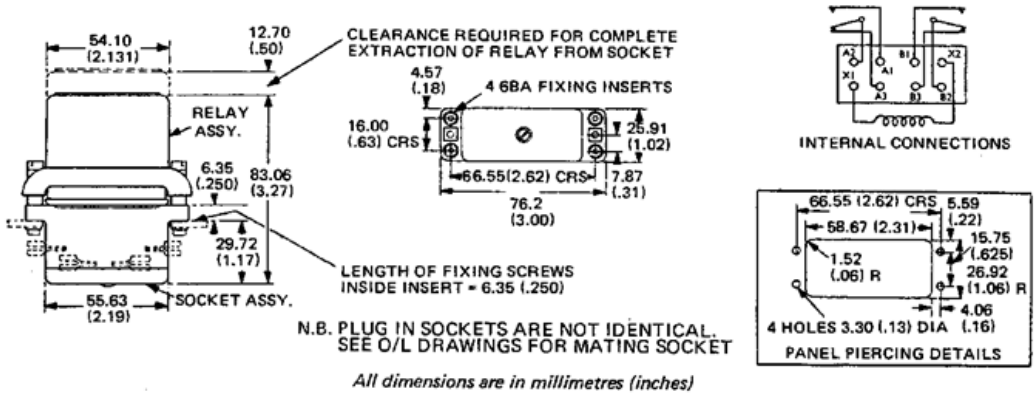
30 AMP Single-make Screw Terminals
Hermetically Sealed



30 AMP Single-make Plug-in



5 AMP 2-Changeover Plug-in



All dimensions are in millimetres (inches)

Data Sheet No
DSRELA

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Coil	Coil Resistance Ohms	Nominal Contact Voltage	Weight		Termination	Enclosure	Part Number
			Ozs	grams			
30 AMP SINGLE-MAKE							
28 V dc	250	28V dc	2.3/4	80	Coil Solder Tags Contact Screws	Uncased	7CZ102260/2
			4.1/2	127	Screw	Dust Cover	7CZ97508/1
			5.3/4	165		Hermetically Sealed	7CZ97225/4
			7	200	Plug-in		7CZ105285/4
		28V dc Or 200V 400Hz	4.1/2	127	Screw	Dust Cover	7CZ107352
115V 400Hz	N/A		4.1/4	120.5			507/1/00034
			5.3/4	165		Hermetically Sealed	507/1/00329
7.3 Amps			4.1/4	120.5		Dust Cover	7CZ143667
10 AMP SINGLE-BREAK							
28V dc	250	28V dc	4	112	Screw	Dust Cover	7CZ106528/4
6 Amps	-		4.1/4	120.5			7CZ106545
5 AMP SINGLE-BREAK							
2.4 Amps	-	28V dc	4.1/4	120.5	Screw	Dust Cover	7CZ143000
5 AMP 2-CHANGEOVER							
28V dc	250	28V dc	7	200	Plug-in	Hermetically Sealed	7CZ105503/3

Models with screw terminals have 6BA screws with captive spring washers for the coil connections and 4BA screws and captive washers for the contact connections.

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BARNBROOK DATA SHEET

RELAY TYPE B

Relays utilising the 'B' Type movement are manufactured with four contact arrangements: i.e. single pole 60 amp, single pole 35 amp bridging make-and-break, single pole 20 and 30 amp changeover and two-pole 10 amp changeover.
The movement is balanced and has a high contact pressure combined with a wiping action for self cleaning. The contacts are of silver cadmium oxide to give high resistance to welding on overload and high inrush current applications.
The relays are provided with various methods of enclosure: dust cover, sealed or plug-in form with a socket. For suppressed relays a polarising feature is incorporated.
Units with dc coils are designed for 28V and are suitable for operation over the range 16 to 29V. Units with ac coils are designed for 115V 400 Hz supplies and are proven against line transients of up to 1000V for 10 micro-seconds.
All the relays will function over a temperature range of -65 °C to +70 °C (-85 °F to +148 °F) and will meet the vibration requirements of BSG100 Grade 2 and the acceleration requirements of BSG100 Grade 1A.

Specifications

60A 1-Bridge-Make

Part No	7CZ105834	507/1/00999
Coil Operating Voltage	28V dc	28V dc
Nominal Contact Voltage	28V dc	28V dc
Coil Resistance	165 ohms	165 ohms
Enclosure	Dust Cover	Enclosed
Termination	Screw	Screw
Weight	240g (8.5 oz)	200g (7 oz)

35A 1- Bridge-Make 1-Bridge-Break

Part No	7CZ105962/1	507/1/00036
Coil Operating Voltage	28V dc	115V 400Hz
Nominal Contact Voltage	28V dc or 200V 400 Hz	28V dc or 200V 400Hz
Coil Resistance	165 ohms	1975 ohms
Enclosure	Hermetically Sealed	Hermetically Sealed
Termination	Screw	Screw
Weight	260g (9.25 oz)	260g (9.25 oz)

30A 1-Changeover

Part No	7CZ106517	507/1/00035
Coil Operating Voltage	28V dc	115V 400Hz
Nominal Contact Voltage	28V dc or 200V 400 Hz	28V dc or 200V 400 Hz
Coil Resistance	165 ohms	1650 ohms
Enclosure	Dust Cover	Dust Cover
Termination	Screw	Screw
Weight	174g (6.2 oz)	174g (6.2 oz)

20A 1-Changeover

Part No	507/1/00735
Coil Operating Voltage	28V dc
Nominal Contact Voltage	28V dc or 200V 400 Hz
Coil Resistance	165 ohms
Enclosure	Dust Cover
Termination	Screw
Weight	174g (6.2 oz)

10A 2-Changeover

Part No	7CZ105273/3 (Relay)	7CZ105260 (Socket)
Coil Operating Voltage	28V dc	
Nominal Contact Voltage	28V dc	
Coil Resistance	230 ohms	
Enclosure	Hermetically Sealed	
Termination	Plug-in	
Weight	Relay & Socket 282g (10 oz)	

Data Sheet No
DSRELB

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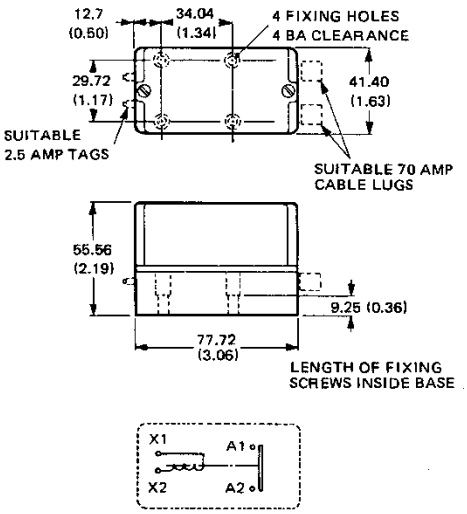
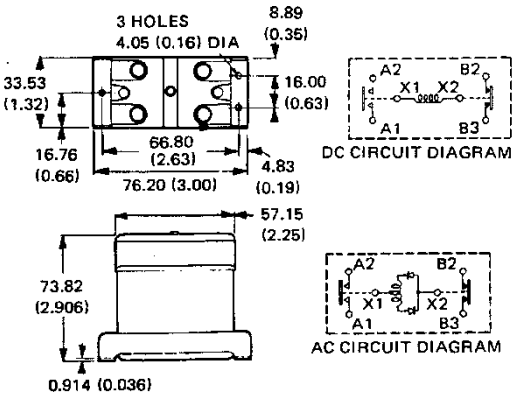
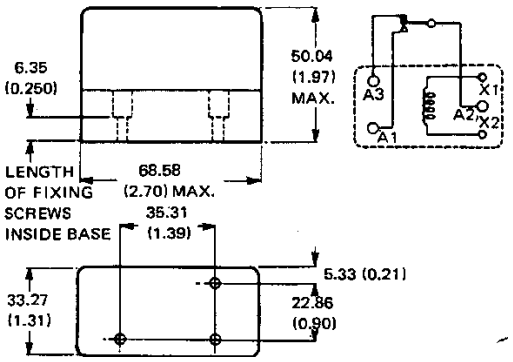
60A 1 Bridge Make



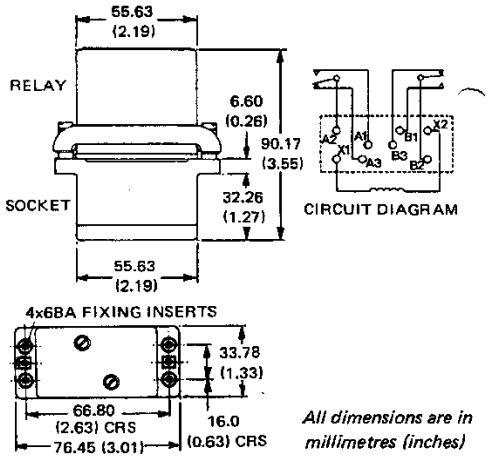
35A 1-Bridge Make 1-Bridge Break



20A/30A 1-Changeover



10A 2-Changeover



Ordering Information Quote Part Number from Specifications on Sheet 1

Data Sheet No
DSRELB

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BARNBROOK DATA SHEET

RELAY
TYPE P

The 'P' Type coil movement is designed to meet demand for a high-performance Relay of small size and weight. The movement powers two contact arrangements, a 6-pole 2-amp changeover and the 4-pole 10-amp changeover for 28Vdc and 200V 400 Hz.
The design achieves a compact coil and contact arrangement with built-in standards of cleanliness and reliability. The coil is sealed from the contact chamber, which is gas filled and hermetically sealed. The Relay is extremely versatile being produced with terminal block, plug-in connections, flying leads or with solder connections.
Relays are available in a number of special forms featuring time delay, special voltage or current-sensitive coils and coil suppression.

Key Features

- Available with either ac or dc coil operation.
- Coil sealed from contact chamber.
- Gas filled and hermetically sealed.

Specification

Electrical

Coil Voltage (AC)	115 Vac 400 Hz
Line transient resistance	Up to 1000V for 10 μs
Coil Voltage (DC)	16 – 29 Vdc
Dielectric strength	The 6-pole Changeover Relay is tested at 1000 volts and the 4-pole Changeover Relay is tested at 1000 volts in between contacts.

Contacts

2-amp Relay	Rated for either 28 Vdc or 200 V 400 Hz
10-amp Relay	Rated for either 28 Vdc or 200 V 400 Hz

Environmental and Physical

Endurance	100,000 operations minimum
Temperature range	-65ºC to +100 ºC
Vibration	DEF 5011. Severity V.1.
Acceleration	DEF 5011. Severity A.1.

Dimensions

See supplementary sheets for dimensional details

Ordering Information

Quote Part Number from Table on Sheet 3.

Data Sheet No
DSRELP

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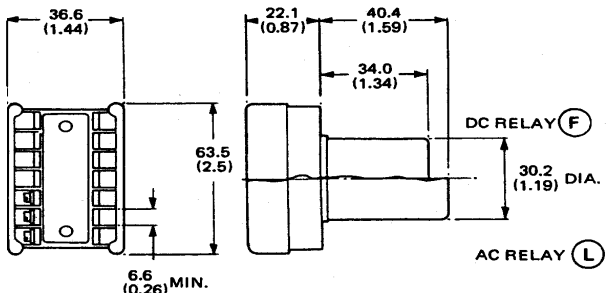

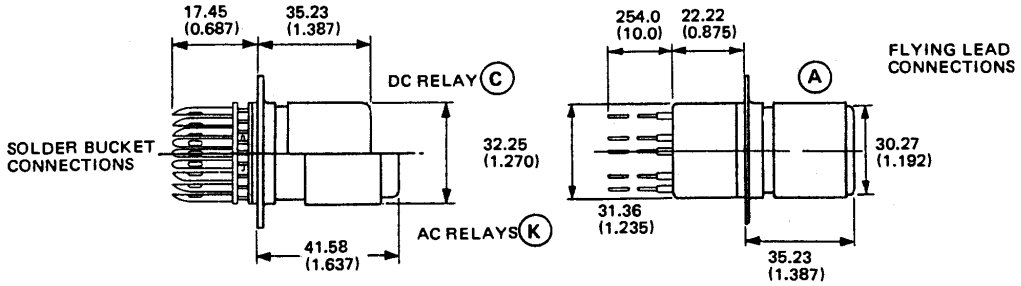

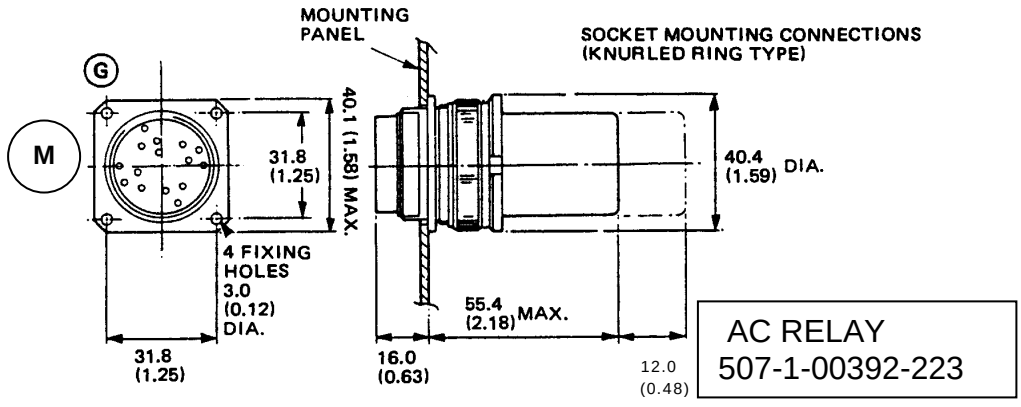

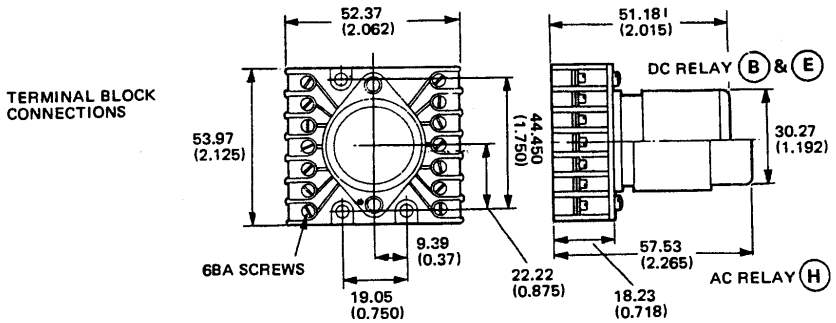

Data Sheet No
DSRELP

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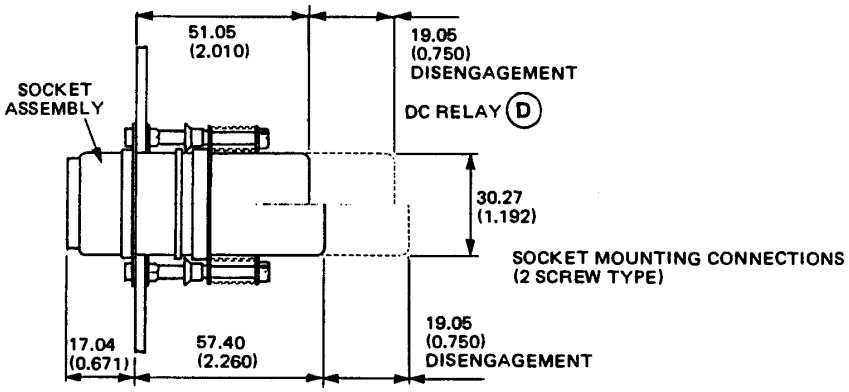

Specification

10-Amp 4-Changeover

DC RELAYS, Coil voltage 28V dc, coil resistance 180 ohms

Outline Diagram	Part No.	Termination	Weight
A	507-1-00097	Flying Leads	135 g (4.75 oz)
B	507-1-00140	Terminal Block	156 g (5.50 oz)
C	507-1-00390	Solder Bucket	113 g (4.00 oz)
D	507-1-00391	Terminal Block	113 g (4.00 oz) *
E	507-1-00517	Plug-in	156 g (5.50 oz)
F	507-1-00920	Terminal Block	156 g (5.50 oz)
G	507-1-01225	Plug-in	135 g (4.75 oz) *

AC RELAYS, Coil voltage 115V 400 Hz, nominal coil current 40mA.

Outline Diagram	Part No.	Termination	Weight
H	507-1-00330	Terminal Block	170 g (6.00 oz)
J	507-1-00392	Plug-in	142 g (5.00 oz) *
K	507-1-00430	Solder Bucket	142 g (5.00 oz)
L	507-1-00921	Terminal Block	177 g (6.25 oz)
M	507-1-00392-223	Plug-in	150 g (5.29 oz) *

2-Amp 6-Changeover

DC RELAYS, Coil voltage 28V dc, coil resistance 180 ohms

Outline Diagram	Part No.	Termination	Weight
A	507-1-00363	Flying Lead	135 g (4.75 oz)
C	507-1-00012	Solder Bucket	113 g (4.00 oz)
C	507-1-00112#	Solder Bucket	113 g (4.00 oz)

AC RELAYS, Coil voltage 115V 400 Hz, nominal coil current 40mA.

Outline Diagram	Part No.	Termination	Weight
K	507-1-00942	Solder Bucket	128 g (4.50 oz)

* weight without socket # dry circuit aged

Design authority and manufacture by Barnbrook Systems Limited

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BARNBROOK DATA SHEET

RELAY
TYPE S

The 'S' Type is of well proven design produced as either a 4-pole 10-amp or 2-pole 25-amp bridging make-and-break relay. The movement is balanced and the flexible contact springs impart a wiping action to the contacts. The relay is hermetically sealed or enclosed by a dust cover, the former being available with or without an inert gas filling. Electrical connections are by solder tags, screw connections or plug-in connections. Various coil operating voltages are available from 12 to 112 Vdc and the contacts are rated at either 10 or 25 amp for 28 Vdc and 200V 400Hz operation.

The relay will function over a temperature range of –65°C to +75°C (-85°F to +158°F) and will meet the vibration requirement of BSG 100 Grade 2 and the acceleration requirement of BSG 100 Grade 1A.

Key Features

- Available as either 4-pole 10-amp or 2-pole 25-amp.
- Available in voltages from 12 to 112 Vdc.
- Wiping action of contacts.
- Gas filled and hermetically sealed if required.

Specification

Electrical

Coil Voltage	Voltages from 12 to 112 Vdc (See sheets 2 - 5)
Coil resistance	From 21 ohms to 1250 ohms (See sheets 2 - 5)

Contacts

10-amp Relay	Rated for either 28 Vdc or 200 V 400 Hz
25-amp Relay	Rated for either 28 Vdc or 200 V 400 Hz

Environmental and Physical

Temperature range	-65ºC to +75 ºC
Vibration	BSG 100 Grade 2
Acceleration	BSG 100 Grade 1A

Dimensions

See sheets 2, 3, 4 & 5 for dimensional details

Ordering Information

Quote Part Number from Tables on Sheets 2, 3, 4 or 5.

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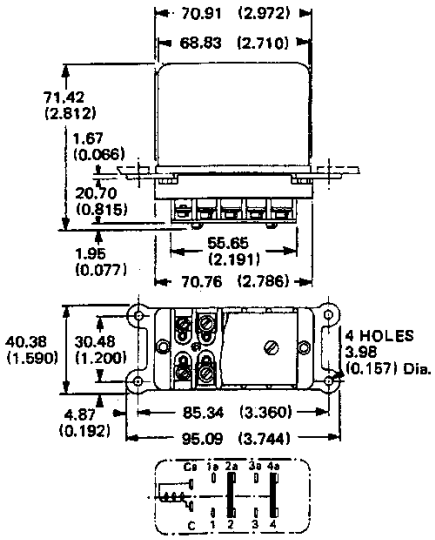
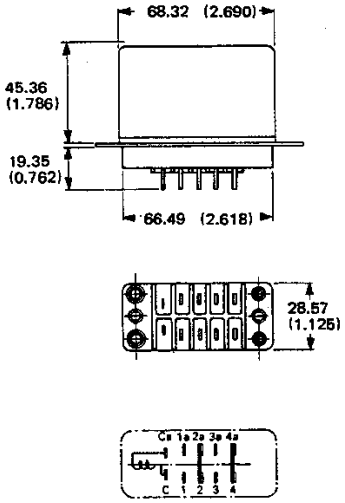


25 Amp 2-Make, 2-Break

Coil (Nominal)	Coil Resistance	Weight	Termination	Enclosure	Part Number
28 Vdc	80 Ω	368 g (13 oz)	Screw	Hermetically Sealed	7CZ107152/1
112 Vdc	1250 Ω	368 g (13 oz)	Screw	Hermetically Sealed	7CZ107903/1



25 Amp 2-Make, 2-Break

Coil (Nominal)	Coil Resistance	Weight	Termination	Enclosure	Part Number
28 Vdc	80 Ω	326 g (11.5 oz)	Plug-in	Dust Cover	7CZ107792
Socket					7CZ107805

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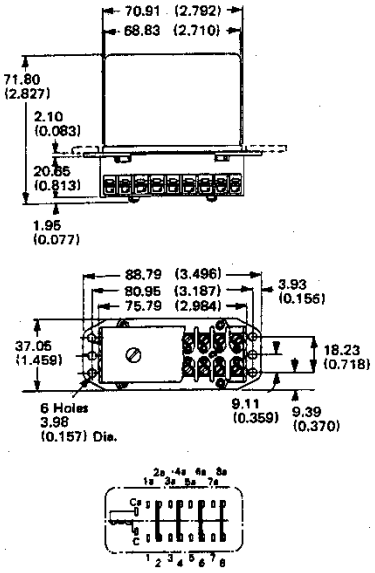
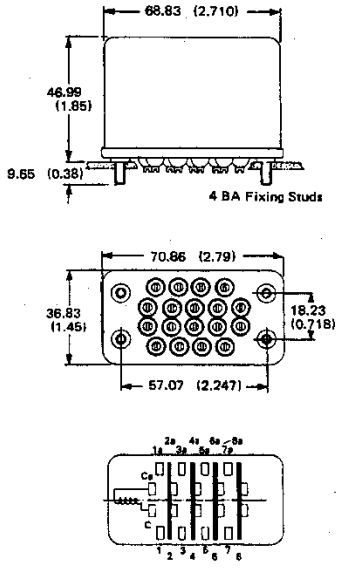


10 Amp 4-Make, 4-Break
Six hole mounting

Coil (Nominal)	Coil Resistance	Weight	Termination	Enclosure	Part Number
28 Vdc	80 Ω	368 g (13 oz)	Screw	Hermetically Sealed	7CZ105648/2



10 Amp 4-Make, 4-Break

Coil (Nominal)	Coil Resistance	Weight	Termination	Enclosure	Part Number
28 Vdc	80 Ω	326 g (11.5 oz)	Solder	Hermetically Sealed	501/1/00953/002

All dimensions are in millimetres (inches)

Design authority and manufacture by Barnbrook Systems Limited

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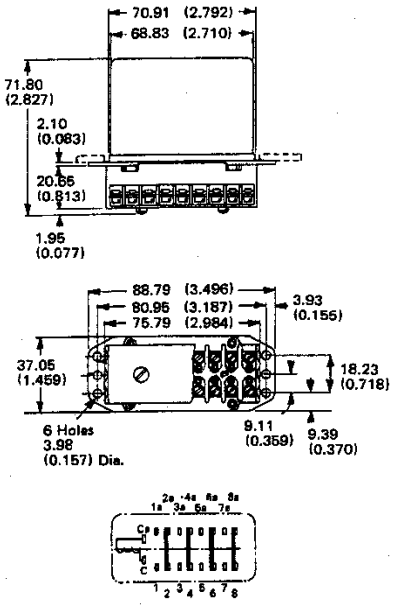
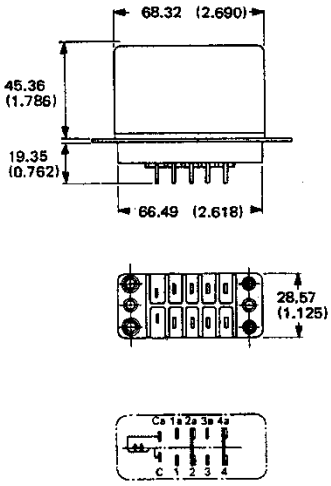


25 Amp 2-Make, 2-Break
Six hole mounting

Coil (Nominal)	Coil Resistance	Weight	Termination	Enclosure	Part Number
28 Vdc	80 Ω	368 g (13 oz)	Screw	Hermetically Sealed	7CZ105649/2
12 Vdc	21 Ω	368 g (13 oz)	Screw	Hermetically Sealed	507/1/01000/002



10 Amp 4-Make, 4-Break

Coil (Nominal)	Coil Resistance	Weight	Termination	Enclosure	Part Number
28 Vdc	80 Ω	326 g (11.5 oz)	Plug-in	Dust Cover	7CZ107791
Socket					7CZ107794

All dimensions are in millimetres (inches)

Design authority and manufacture by Barnbrook Systems Limited

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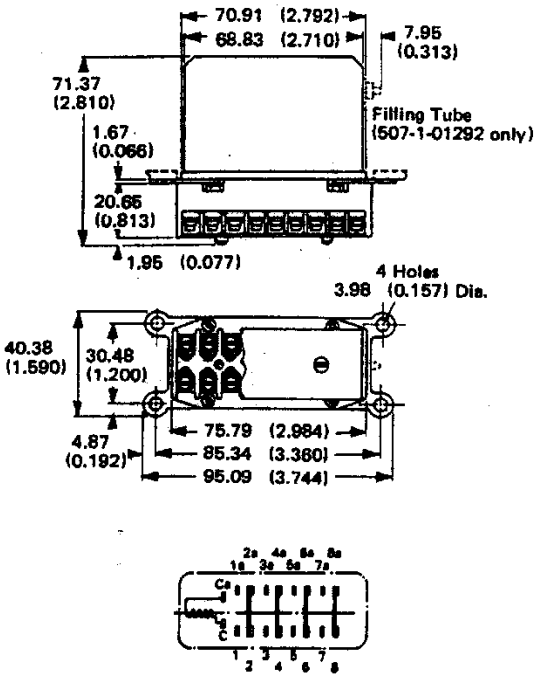

10 Amp 4-Make, 4-Break
Four hole mounting

Coil (Nominal)	Coil Resistance	Weight	Termination	Enclosure	Part Number
28 Vdc	80 Ω	368 g (13 oz)	Screw	Hermetically Sealed	7CZ107151/2
112 Vdc	1250 Ω	368 g (13 oz)	Screw	Hermetically Sealed	7CZ107902/2
50 Vdc	430 Ω	368 g (13 oz)	Screw	Hermetically Sealed	507/1/01292

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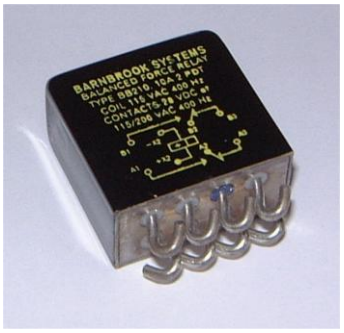
BARNBROOK DATA SHEET

RELAY
TYPE BA210
AC Coil

The BA Type is a 2-pole double throw, non-latching hermetically sealed relay designed to meet the requirements of CECC16101-019 and MIL-R-6106.
This relay is also available in 4-pole double throw version. (See Data Sheet for BA410 & BB410) as well as dc (See Data Sheet for BB210)



Key Features

- All welded construction.
- Hermetically sealed
- Balanced force armature
- Long Life Under Load

Specification

Electrical

Nominal Coil Voltages (ac)	115/200 50/400Hz
Dielectric strength	1000 V ac/50Hz
Insulation Resistance at 500 V dc	100 MΩ min.
Operating Time	10ms Max
Release Time	15ms Max
Bounce Time	1ms Max

Contact Characteristics

Minimum operating cycles	Rated contact Voltage	28 Vdc	115 Vac 400Hz	115/200 Vac 400Hz 3 phase
		Contact rating in Amps		
100,000 cycles	Resistive Load	10	10	10
20,000 cycles (L/R-5ms)	Inductive Load	8	8	8
100,000 cycles	Motor Load	4	4	4
100,000 cycles	Lamp Load	2	2	2
50 cycles	Resistive Overload	40	60	
400,000 cycles	At 25% rated resistive load			

Environmental and Physical

Sinusoidal Vibration (g at Hz)	30g at 50-3000 Hz
Shock (g)	100/11ms or 200/6ms
Temperature range (ac)	-45ºC to +125 ºC dependant on coil
Temperature range (storage)	-65ºC to +125 ºC
Acceleration	B.S.G. 100. Grade 1A.

Dimensions

L x W x D	26 x 13.3 x 25.7mm
Max Weight	35 gram

Ordering Information See detailed Relay numbering matrix on Sheet 2

Data Sheet No
DSRELBA210

Design authority and manufacture by Barnbrook Systems Limited

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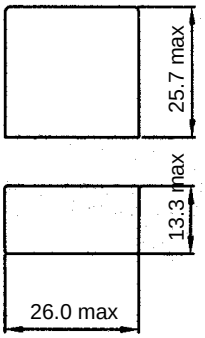
RELAY
TYPE BA210
AC Coil

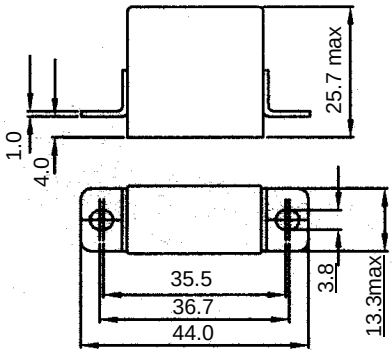
Numbering System

		BA210	01	01	01	A
	Basic series designation					
1	Mounting styles					
2	Terminal types					
3	Coil voltage					
4	Options					

Mounting Styles



Style 01



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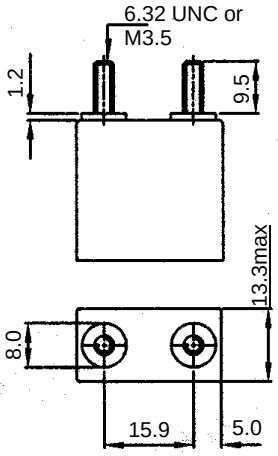
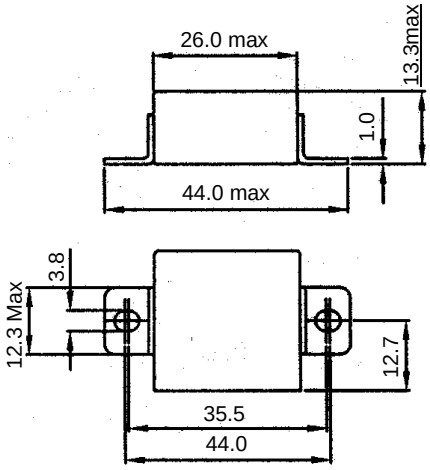


Style 03 – 6-32 UNC
Style 04 – M3.5



Style 05

All dimensions are in millimetres

Data Sheet No
DSRELBA210

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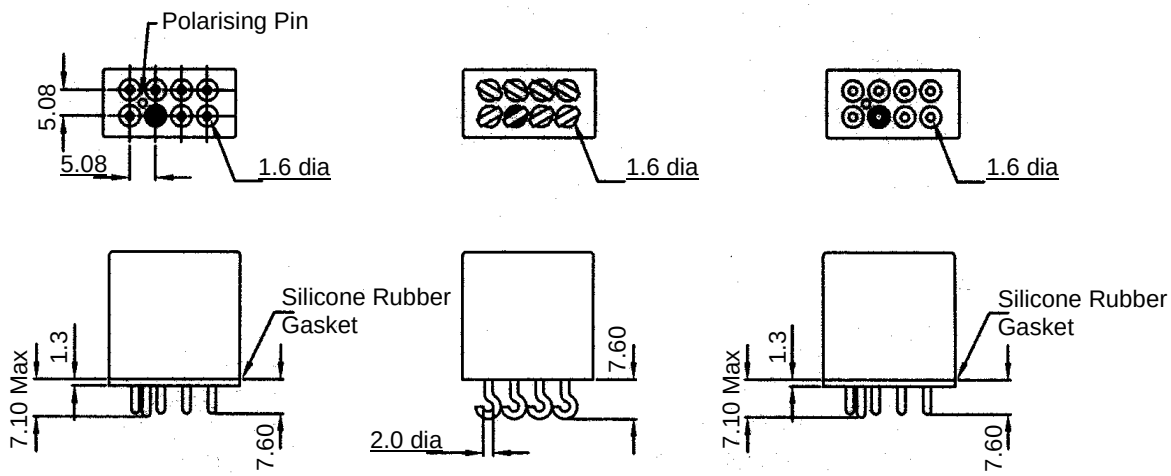
RELAY
TYPE BA210
AC Coil

Terminal Types

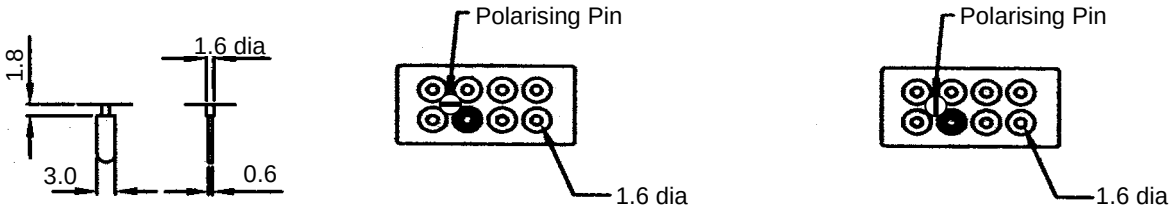


Tin Plated Pins
Style 01

Solder Hooks
Style 02

Gold Plated Pins
Style 03

Polarising Pin Detail



115 Volt

28 Volt

All dimensions are in millimetres

Coil Characteristics (Vac)	**Coil Code Number**			
	01	**02**	**03**	**04**
	V ac/400 Hz		**V ac/60-400 Hz**	
Nominal operating Voltage	28	115	28	115
Maximum voltage	30	124	30	124
Must operate voltage at +125 ºC	22	90	22	90
Must release voltage at +125 ºC	10	30	10	30
Maximum coil current in Amps at +25 ºC	0,225	0.04	0.12	0.028
Temperature Range	-45 ºC to +125 ºC		-45 ºC to +85 ºC	

Data Sheet No
DSRELBA210

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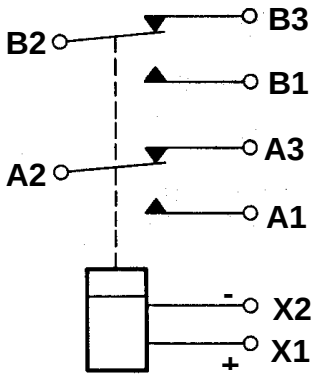
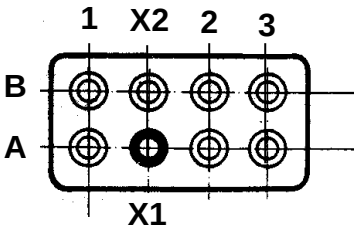
RELAY
TYPE BA210
AC Coil

Schematic Circuit Diagram



Terminal Layout Diagram



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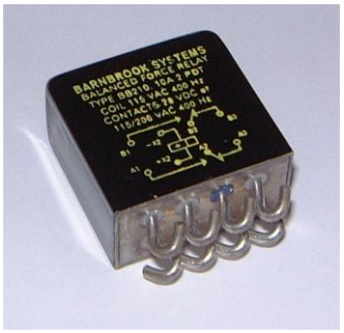
BARNBROOK DATA SHEET

RELAY
TYPE BB210
DC Coil



The BB Type is a 2-pole double throw, non-latching hermetically sealed relay designed to meet the requirements of CECC16101-019 and MIL-R-6106.
This relay is also available in 4-pole double throw version. (See Data Sheet for BA410 & BB410) as well as AC (See Data Sheet for BA210)

Key Features

- All welded construction.
- Hermetically sealed
- Balanced force armature
- Long Life Under Load

Specification

Electrical

Nominal Coil Voltages (dc)	6, 12, 28
Dielectric strength	1000 V ac/50Hz
Insulation Resistance at 500 V dc	100 MΩ min.
Operating Time	10ms Max
Release Time	15ms Max
Bounce Time	1ms Max

Contact Characteristics

Minimum operating cycles	Rated contact Voltage	28 Vdc	115 Vac 400Hz	115/200 Vac 400Hz 3 phase
		Contact rating in Amps		
100,000 cycles	Resistive Load	10	10	10
20,000 cycles (L/R-5ms)	Inductive Load	8	8	8
100,000 cycles	Motor Load	4	4	4
100,000 cycles	Lamp Load	2	2	2
50 cycles	Resistive Overload	40	60	
400,000 cycles	At 25% rated resistive load			

Environmental and Physical

Sinusoidal Vibration (g at Hz)	30g at 50-3000 Hz
Shock (g)	100/11ms or 200/6ms
Temperature range (dc)	-65°C to +125 °C
Acceleration	B.S.G. 100. Grade 1A.

Dimensions

L x W x D	26.0 x 13.3 x 25.7mm
Max Weight	35 gram

Ordering Information See detailed Relay numbering matrix on Sheet 2.

Data Sheet No
DSRELBB210

Design authority and manufacture by Barnbrook Systems Limited
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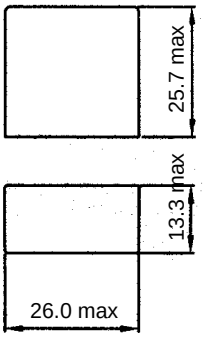
AS9100D CERTIFIED ISO 9001

RELAY
TYPE BB210
DC Coil

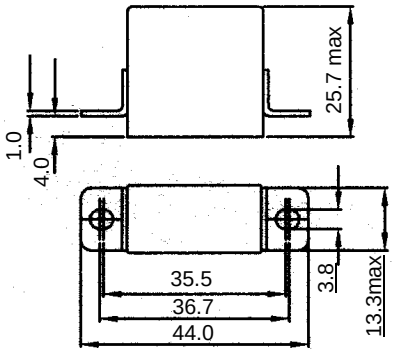
Numbering System

	BB210	01	01	01	A
	Basic series designation				
1	Mounting styles				
2	Terminal types				
3	Coil voltage				
4	Options				

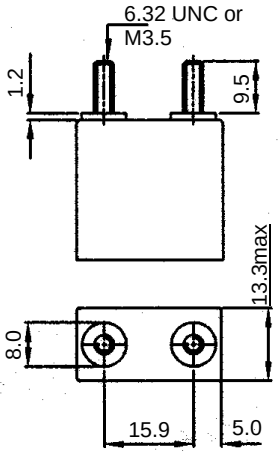
Mounting Styles



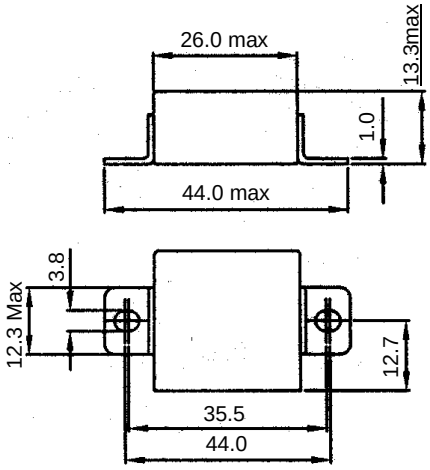
Style 01



Style 02



Style 03 – 6-32 UNC
Style 04 – M3.5



Style 05

All dimensions are in millimetres

Data Sheet No
DSRELBB210

Design authority and manufacture by Barnbrook Systems Limited

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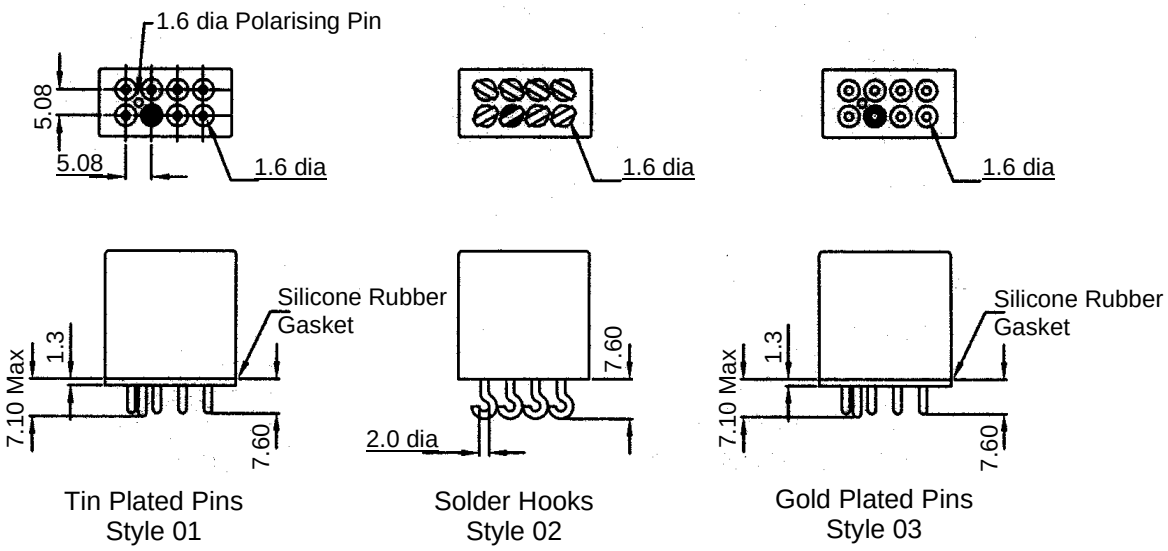
RELAY
TYPE BB210
DC Coil

Terminal Types



Tin Plated Pins
Style 01

Solder Hooks
Style 02

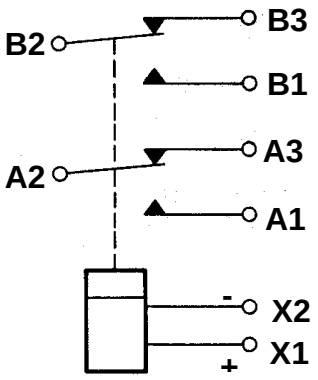
Gold Plated Pins
Style 03

All dimensions are in millimetres

Coil Characteristics (Vac)

	Coil Code Number		
	01	**02**	**03**
Nominal operating voltage	28	12	6
Maximum operating voltage	29	14.5	7.3
Must operate voltage +125 ºC	18	9	4.5
Must release voltage at -65 ºC	7	4.5	2.5
Coil resistance (Ω) at +25 ºC	320	80	20

Schematic Circuit Diagram



Data Sheet No
DSRELBB210

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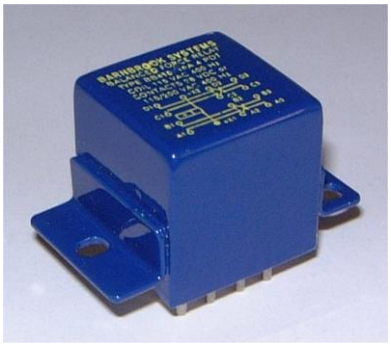
BARNBROOK DATA SHEET

RELAY

TYPE BA410
AC Coil

The BA Type is an ac 4-pole double throw, non-latching hermetically sealed relay designed to meet the requirements of CECC16101-019 and MIL-R-6106.
This relay is also available in 2-pole double throw version. (See Data Sheet for BA210 & BB210) as well as dc (See Data Sheet for BB410)



Key Features

- All welded construction.
- Hermetically sealed
- Balanced force armature
- Long Life Under Load

Specification

Electrical

Nominal Coil Voltages (ac)	115/200V rms 50/400Hz
Dielectric strength	1000 V ac/50Hz
Insulation Resistance at 500 V dc	100 MΩ min.
Operating Time	10ms Max
Release Time	15ms Max
Bounce Time	1ms Max

Contact Characteristics

Minimum operating cycles	Rated contact Voltage	28 Vdc	115 Vac 400Hz	115/200 Vac 400Hz 3 phase
		Contact rating in Amps		
100,000 cycles	Resistive Load	10	10	10
20,000 cycles (L/R-5ms)	Inductive Load	8	8	8
100,000 cycles	Motor Load	4	4	4
100,000 cycles	Lamp Load	2	2	2
50 cycles	Resistive Overload	40	60	
400,000 cycles	At 25% rated resistive load			

Environmental and Physical

Sinusoidal Vibration (g at Hz)	30g at 50-3000 Hz
Shock (g)	100g/11ms or 200g/6ms
Temperature range (ac)	-45ºC to +125 ºC dependant on coil
Temperature range (storage)	-65ºC to +125 ºC
Acceleration	B.S.G. 100. Grade 1A.

Dimensions

L x W x D	26 x 26 x 25.7mm
Max Weight	70 gram

Ordering Information See detailed Relay numbering matrix on Sheet 2

Data Sheet No
DSRELBA410

BARNBROOK SYSTEMS LIMITED, 23-25 FAREHAM PARK ROAD, HAMPSHIRE, PO15 6LD
TEL NO: +44(0)1329 847722 E-mail: sales@barnbrook.co.uk www.barnbrook.co.uk

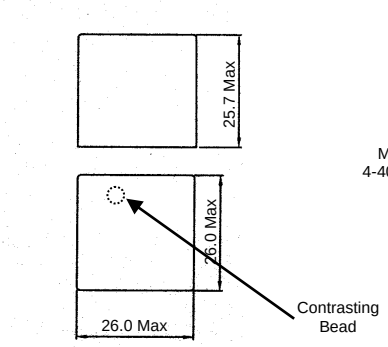
RELAY

TYPE BA410
AC Coil

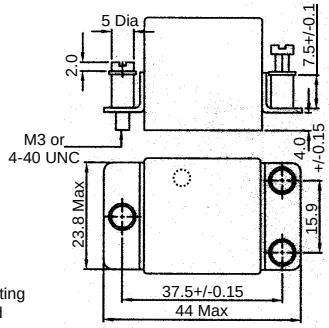
Numbering System

		BA410	01	01	01	A
	Basic series designation					
1	Mounting styles					
2	Terminal types					
3	Coil voltage					
4	Options					

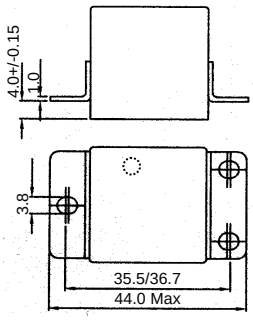
Mounting Styles



Style 01



Style 02 - M3
Style 03 – 4.40 UNC



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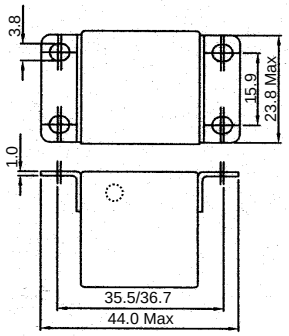

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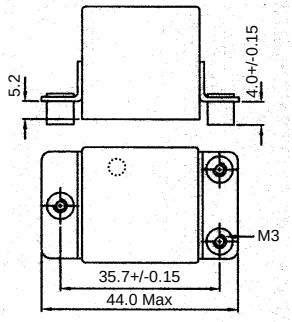

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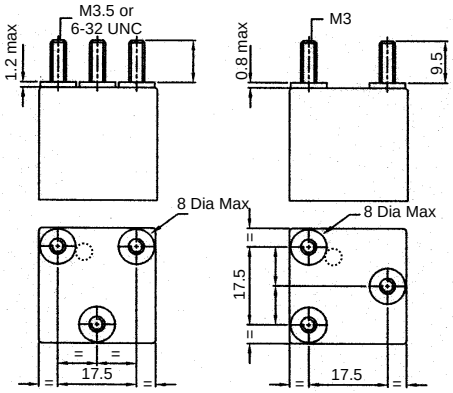

Style 07 - 6-32 UNC
Style 08 – M3.5

Style 09

All dimensions are in millimetres

Data Sheet No
DSRELBA410

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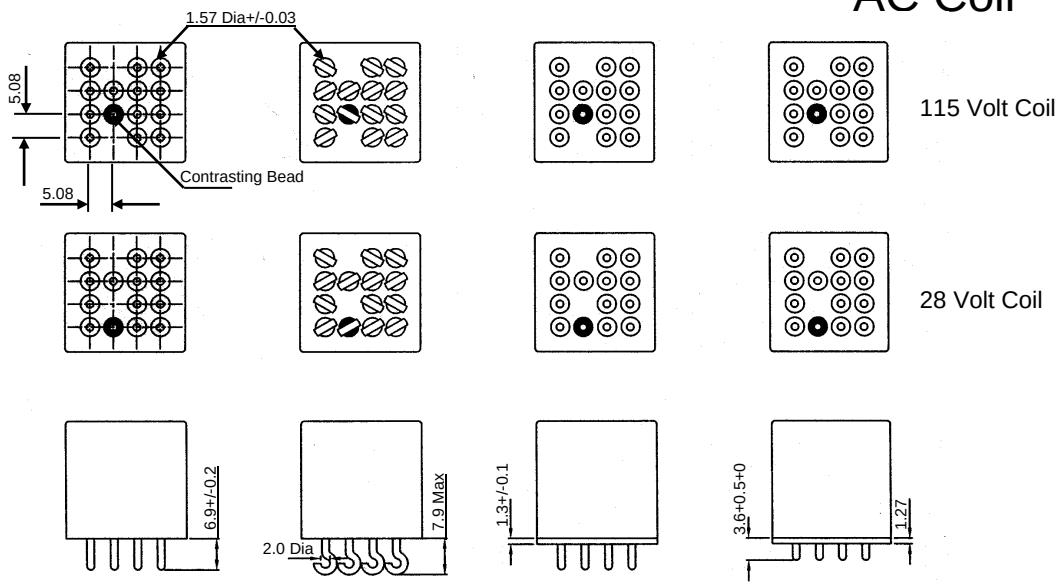
RELAY

TYPE BA410
AC Coil

Terminal Types



Tin Plated Pins — Style01

Solder Hooks — Style02

Gold Plated — Style03

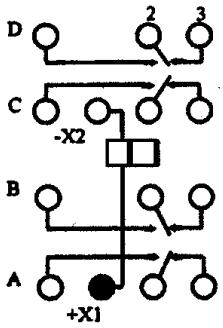
Short Tin Plated Pins — Style04

All dimensions are in millimetres

Coil Characteristics (Vac)

	Coil Code Number			
	01	02	03	04
	V ac/400 Hz		V ac/60-400 Hz	
Nominal operating Voltage	28	115	28	115
Maximum voltage	30	124	30	124
Must operate voltage at +125 °C	22	90	22	90
Must release voltage at +125 °C	10	30	10	30
Maximum coil current in Amps at +25 °C	0,225	0.04	0.12	0.028
Temperature Range	-45 °C to +125 °C		-45 °C to +85 °C	

Schematic Circuit Diagram



Data Sheet No
DSRELBA410

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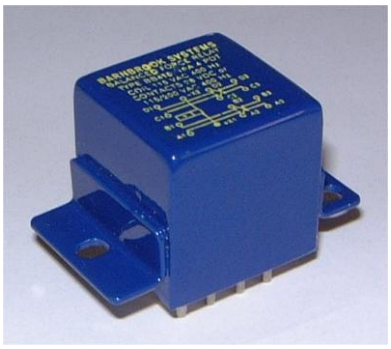
BARNBROOK DATA SHEET

RELAY
TYPE BB410
DC Coil

The BB Type is a dc 4-pole double throw, non-latching hermetically sealed relay designed to meet the requirements of CECC16101-019 and MIL-R-6106.
This relay is also available in 2-pole double throw version. (See Data Sheet for BA210 & BB210) as well as ac (See Data Sheet for BA410)



Key Features

- All welded construction.
- Hermetically sealed
- Balanced force armature
- Long Life Under Load

Specification

Electrical

Nominal Coil Voltages (dc)	6, 12, 28, 48
Dielectric strength	1000 V ac/50Hz
Insulation Resistance at 500 V dc	100 MΩ min.
Operating Time	10ms Max
Release Time	15ms Max
Bounce Time	1ms Max

Contact Characteristics

Minimum operating cycles	Rated contact Voltage	28 Vdc	115 Vac 400Hz	115/200 Vac 400Hz 3 phase
		Contact rating in Amps		
100,000 cycles	Resistive Load	10	10	10
20,000 cycles (L/R-5ms)	Inductive Load	8	8	8
100,000 cycles	Motor Load	4	4	4
100,000 cycles	Lamp Load	2	2	2
50 cycles	Resistive Overload	40	60	
400,000 cycles	At 25% rated resistive load			

Environmental and Physical

Sinusoidal Vibration (g at Hz)	30g at 50-3000 Hz
Shock (g)	100g/11ms or 200g/6ms dependant on mountings
Temperature range (dc)	-65°C to +125 °C
Acceleration	B.S.G. 100. Grade 1A.

Dimensions

L x W x D	26 x 26 x 25.7mm
Max Weight	70 gram

Ordering Information

See detailed Relay numbering matrix on Sheet 2

Data Sheet No
DSRELBB410

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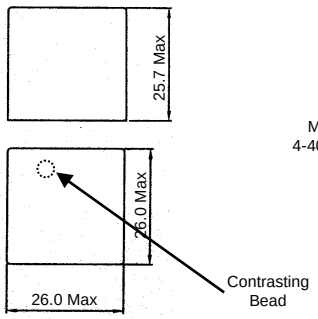
RELAY
TYPE BB410
DC Coil

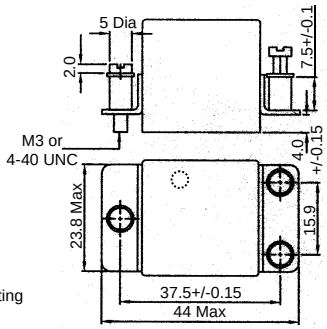
Numbering System

		BB410	01	01	01	A
	Basic series designation					
1	Mounting styles					
2	Terminal types					
3	Coil voltage					
4	Options					

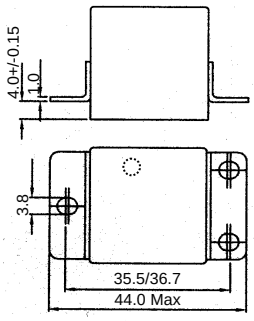
Mounting Styles



Style 01



Style 02 - M3
Style 03 – 4.40 UNC



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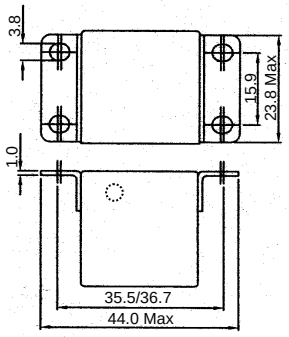

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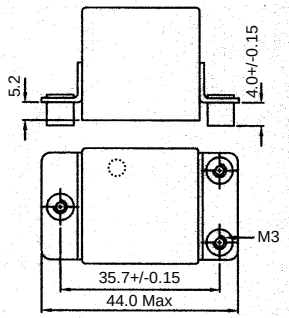

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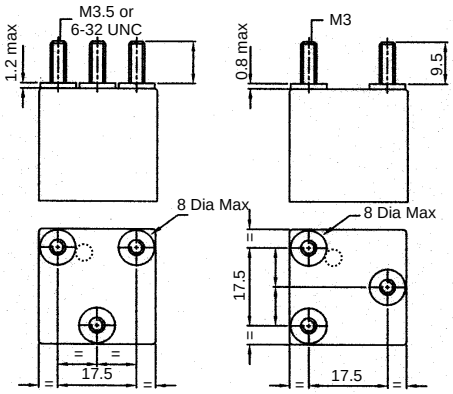

Style 07 - 6-32 UNC
Style 08 – M3.5
Style 09

All dimensions are in millimetres

Data Sheet No
DSRELBB410

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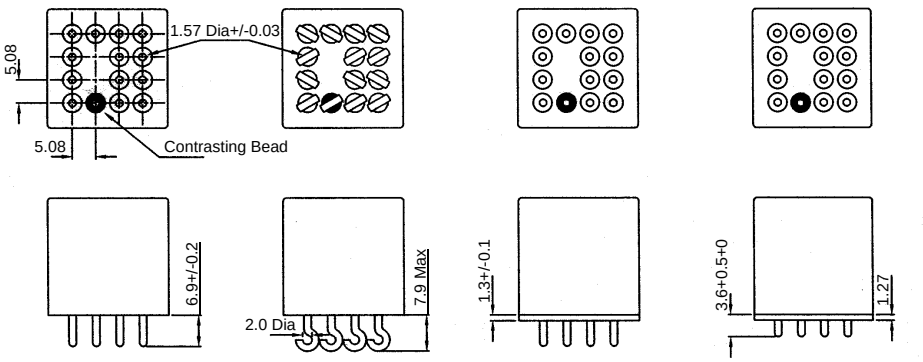
RELAY
TYPE BB410
DC Coil

Terminal Types



Tin Plated Pins
Style01

Solder Hooks
Style02

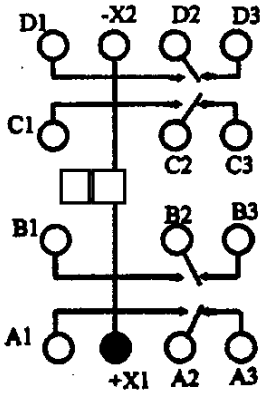
Gold Plated
Style03

Short Tin Plated Pins
Style04

All dimensions are in millimetres

Coil Characteristics (Vdc)	Coil Code Number					
	01	02	03	04	05	06
Rated Voltage	6	12	28	28	48	110
Maximum voltage at +125 ºC	7	14	29	29	50	125
Must operate voltage +125 ºC	5	10	19.8	19.8	34.1	75
Must release voltage at -65 ºC	0.2	0.5	1.5	1.5	2	5
Coil resistance (Ω) at +25 ºC	18	70	290	290	955	5000
Exported spike (Vdc)	N/A	N/A	N/A	-42	N/A	N/A

Schematic Circuit Diagram



Data Sheet No
DSRELBB410

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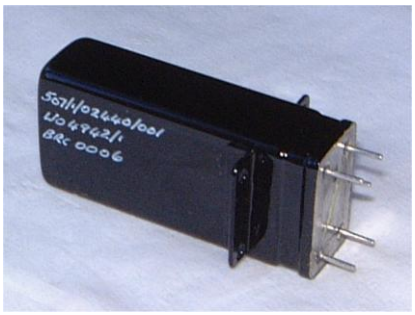
BARNBROOK DATA SHEET

RELAY
TYPE 1A

Fully approved to Def 5165 Style SM5B. Hermetically sealed with glass-to-metal seal base. High sensitivity. Single changeover, balanced armature. Suitable for use under conditions of acceleration, vibration and bump.



Key Features

- Hermetically sealed
- High sensitivity
- Single changeover, balanced armature

Specification

Electrical

Operate Time	12ms at 100 mW power/50ms at 20 mW power.
Bounce Time	5 ms
Switching Rate	Capable of 300 ops/minute
Nominal Operate Power At 15.6 ºC	10 mW
Maximum Permissible Coil Dissipation	1.0W at 70 ºC/0.5W at 100 ºC
Maximum Working Voltage (Coil and/or Springset to Frame)	300 V ac at 50 Hz.
Dielectric Strength between all parts not electrically connected	1000 V ac at 50 Hz.
Insulation Resistance	500MΩ (min) at 500 V dc

Coil Data

(DEF 5165 preferred types, style SM5B)

Other coil resistances are available with values ranging from 0.25 Ω to 14,500 Ω, and minimum operate currents from 200 to 0.85 mA.

Environmental and Physical

Weight	71 gram (2.5 oz) max.
Temperature Category	-40 ºC to +100 ºC
Humidity Classifications H1 to RCS11	6 damp – heat cycles (accelerated) Duration 16 hours (per cycle) at 55 ºC, R.H. 95-100% 84 days tropical exposure
Vibration	To RCS11 – Velocity 25.4mm (1")/sec. At 10 Hz, to 76.2mm (3")/sec. At 60 Hz, then3 g at 60 Hz to 6.5 g at 150 Hz.
Acceleration	To Def 5165: 20 g for 8 minutes
Bump	B3 to Def 5165 – 4000 bumps at 40 g.

Dimensions

See supplementary sheets for dimensional details

Ordering Information Quote Part Number from Table on Sheet 2.

Data Sheet No
DSREL1A

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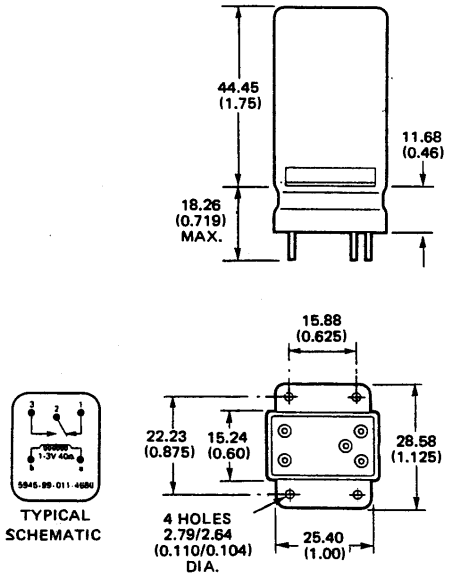
RELAY
TYPE 1A



All dimensions are in millimetres (inches)

Nominal dc Coil Voltage	Nominal Coil Resistance Ohms at 15.6 ºC	Limit Circuit Current (mA)
1.3	40 +/- 5%	
6	720 +/- 5%	
12	3100 +/- 5%	
24 – 48	12000 +15% -10%	
Constant Current Supply	From 0.25 to 14000 +/- 10%	From 200 To 0.85

Contact Data

Contact Arrangements Available	Contact Material	Contact Rating (Resistive Load) and Contact Life
1C	Palladium	100mA at 300 Vdc - 10^6 ops. 500 mA at 50 Vdc - 10^6 ops. 1A at 12 Vdc – 10^6 ops.

Note: For dc loads an adequate spark quench must be fitted.

Relay Type 1A

Part No.	Style Ref.	NATO Stock No.	Coil CCS Vls/ResΩ	Action	Contact Duty	Material
507/1/02440/001	SM5BN28	5945-99-011-4685	CCS/ 14000	1C	Normal	Palladium
507/1/02440/002	SM5BN170	5945-99-014-2765	300	1C	Normal	Palladium
507/1/02440/003	SM5BN169	5945-99-014-2764	140	1C	Normal	Palladium
507/1/02440/004	SM5BN166	5945-99-014-2761	8.8	1C	Normal	Palladium
507/1/02440/007	SM5BN171	5945-99-014-2766	800	1C	Normal	Palladium
507/1/02440/009	SM5BN174	5945-99-014-2769	5000	1C	Normal	Palladium
507/1/02440/010	SM5BN175	5945-99-014-2770	7000	1C	Normal	Palladium
507/1/02440/013	SM5BN29	5945-99-011-4686	1.3/40	1C	Normal	Palladium
507/1/02440/014	SM5BN30	5945-99-011-4687	6/720	1C	Normal	Palladium
507/1/02440/015	SM5BN52	5945-99-011-4688	12/3100	1C	Normal	Palladium
507/1/02440/016	SM5BN53	5945-99-011-4689	24/48/12000	1C	Normal	Palladium
507/1/02440/019	SM5BN172	5945-99-014-2767	1200	1C	Normal	Palladium
507/1/02440/022	SM5BN173	5945-99-014-2768	4000	1C	Normal	Palladium
507/1/02440/023	SM5BN167	5945-99-014-2762	20	1C	Normal	Palladium
507/1/02440/026	SM5BN165	5945-99-014-2760	0.25	1C	Normal	Palladium
507/1/02440/027	SM5BN168	5945-99-014-2763	90	1C	Normal	Palladium
507/1/02498/014	-	-	720	1C	Normal	Palladium

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BARNBROOK DATA SHEET

RELAY
TYPE 2

Fully approved to Def 5165 Style SM5D. Hermetically sealed with glass-to-metal seal base. Balanced Rotary armature for excellent performance under severe shock and acceleration. Up to 4 pole changeover actions. Plug-in facilities for which a socket is available.

Key Features

- Hermetically sealed.
- Plug-in facilities (Socket available).
- Balanced rotary armature.
- Gold Plated Contacts option available.

Specification

Electrical

Operate Time	20 ms (typical – depends on contact action)
Release Time	15 ms (typical - depends on contact action) Slow release models are available with 25 ms lag (min)
Maximum Permissible Coil Dissipation	Single winding, normal or heavy • 3.5W at 15.6°C • 2.5W at 85°C • 2.0W at 100°C Double winding, normal duty • 3.5W at 15.6°C • 1.7W at 85°C • 1.5W at 100°C
Rated (Coil and/or springset to Frame)	300 V ac at 50 Hz
Dielectric Strength between all parts not electrically connected	1000 V ac at 50 Hz
Insulation Resistance	500MΩ (min) at 500 V dc

Coil Data

See table on sheet 2.

Environmental and Physical

Weight	99.5 gram (3.5 oz) max.
Temperature category	-40°C to +100°C
Humidity Classifications H1 to RCS11	6 damp heat cycles (accelerated) Duration 16 hours (per cycle) at 55°C, R.H. 95-100% 84 days tropical exposure
Vibration	To RCS11 – Velocity 25.4mm (1")/sec. at 10 Hz, to 76.2mm (3")/sec. at 60 Hz, then 3 g at 60 Hz to 6.5 g at 150 Hz.
Acceleration	To Def 5165: 20 g for 8 minutes (except with 1C contacts). 50 g for 8 minutes (with 1C contacts only).
Bump	B3 to RCS11 (with 1 or 2 contact actions) – 4000 bumps at 40 g. B4 to Def 5165 (with 3 or 4 contact actions) – 4000 bumps at 40 g.

Dimensions

See supplementary sheets for dimensional details.

Ordering Information

Quote Part Number from Tables on Sheet 3 or 4.

Data Sheet No
DSREL2

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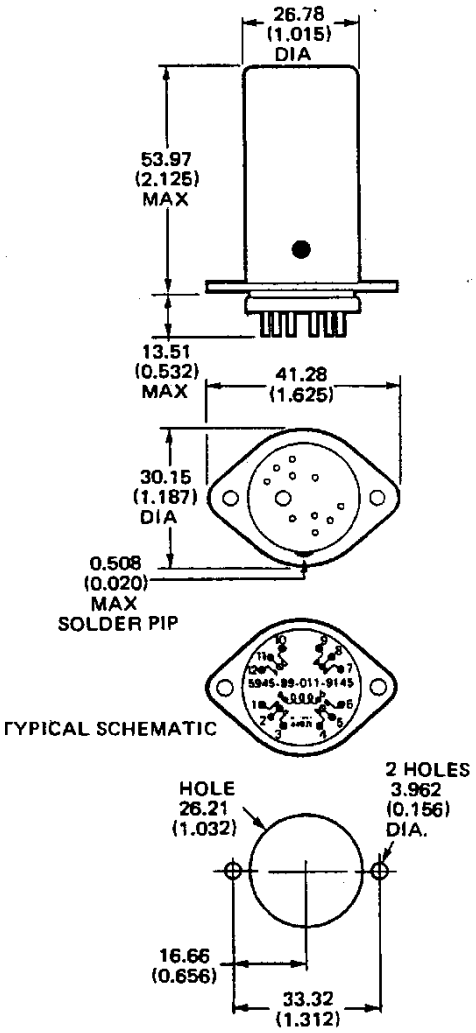
RELAY
TYPE 2



All dimensions are in millimetres (inches)

Coil Data

Nominal dc Coil Voltage	Nominal Coil Resistance Ω at 15.6 °C			Limit Circuit Current (mA)		
	a	b	c	a	b	c
1.3	2.4	1.1	-	300	650	-
6	52	28	14.5	67	123	215
12	180	105	80	38	65	75
24	700	440	340	19.5	31	40
48	2000	1650	1000	13	18	26
Constant Current Supply	7500	7500	-	6	8	-

The above are preferred coil values to Def 5165 style SM5D
Other values are available:

(a) Relays with 2C or 2M contacts.
(b) Relays with 4C, 2C2K, 2B2M, MB2K. 2M2K or 2B2K contacts.
(c) Relays with 2C normal duty contacts having double wound coils: figures given are per coil.

Coil Resistance tolerances are all ±5% except for 7500 Ω coils which are +15% -10%

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Contact Data

Contact Arrangements Available	Contact Material	Contact Rating (Resistive Load) and Contact Life
2C, 4C, 2C2K	Silver Cadmium / Palladium	100mA at 300 Vdc - 10^6 ops. 1A at 60 Vdc – 5 x 10^5 ops. 1A at 12 Vdc – 10^6 ops.
2M, 2B2M, MB2K, 2M2K, 2B2K	Silver Cadmium	4A at 60 Vdc – 2 x 10^6 ops. 4A at 300 Vac - 10^5 ops.

The contact arrangement given are preferred configurations in Def 5165 style SM5D.
Other arrangements are also available.
Note: For dc loads an adequate spark quench must be fitted.

Part No.	Style Ref.	NATO Stock No.	Coil Volts/ResΩ	Contact		
				Action	Duty	Material
507/1/02518/001	SM5DN64	5945-99-011-9136	1.3/2.4	2C	Normal	AgCdO/Palladium
507/1/02518/002	SM5DN65	5945-99-011-9137	6/52	2C	Normal	AgCdO/Palladium
507/1/02518/003	SM5DN66	5945-99-011-9138	12/180	2C	Normal	AgCdO/Palladium
507/1/02518/004	SM5DN67	5945-99-011-9139	24/700	2C	Normal	AgCdO/Palladium
507/1/02518/005	SM5DN68	5945-99-011-9140	48/2000	2C	Normal	AgCdO/Palladium
507/1/02518/013	SM5DN68a		48/1950	2C	Normal	AgCdO/Palladium
507/1/02518/006	SM5DN69	5945-99-011-9141	CCS/7500	2C	Normal	AgCdO/Palladium
507/1/02521/001	SM5DN70	5945-99-011-9142	1.3/1.1	4C	Normal	AgCdO/Palladium
507/1/02521/002	SM5DN71	5945-99-011-9143	6/28	4C	Normal	AgCdO/Palladium
507/1/02521/003	SM5DN72	5945-99-011-9144	12/105	4C	Normal	AgCdO/Palladium
507/1/02521/004	SM5DN72	5945-99-011-9145	24/440	4C	Normal	AgCdO/Palladium
507/1/02521/011	SM5DN134	5945-99-012-0306	48/1650	4C	Normal	AgCdO/Palladium
507/1/02521/006	SM5DN75	5945-99-011-9147	CCS/7500	4C	Normal	AgCdO/Palladium
507/1/02525/001	SM5DN76	5945-99-011-9148	1.3/1.1	2C2K	Normal	AgCdO/Palladium
507/1/02525/002	SM5DN77	5945-99-011-9149	6/28	2C2K	Normal	AgCdO/Palladium
507/1/02525/003	SM5DN78	5945-99-011-9150	12/105	2C2K	Normal	AgCdO/Palladium
507/1/02525/004	SM5DN79	5945-99-011-9151	24/440	2C2K	Normal	AgCdO/Palladium
507/1/02525/007	SM5DN135	5945-99-012-0307	48/1650	2C2K	Normal	AgCdO/Palladium
507/1/02525/006	SM5DN81	5945-99-012-9153	CCS/7500	2C2K	Normal	AgCdO/Palladium
507/1/02520/002	SM5DN82	5945-99-011-9154	6/14.5+14.5	2C	Normal	AgCdO/Palladium
507/1/02520/003	SM5DN83	5945-99-011-9155	12/80+80	2C	Normal	AgCdO/Palladium
507/1/02520/004	SM5DN84	5945-99-011-9156	24/340+340	2C	Normal	AgCdO/Palladium
507/1/02520/005	SM5DN85	5945-99-011-9157	48/1000+1000	2C	Normal	AgCdO/Palladium
507/1/02529/001	SM5DH40	5945-99-11-9158	1.3/2.4	2M	Heavy	Silver Cad.
507/1/02529/002	SM5DH41	5945-99-11-9159	6/52	2M	Heavy	Silver Cad.
507/1/02529/003	SM5DH42	5945-99-11-9160	12/180	2M	Heavy	Silver Cad.
507/1/02529/004	SM5DH43	5945-99-11-9161	24/700	2M	Heavy	Silver Cad.
507/1/02529/005	SM5DH44	5945-99-11-9162	48/2000	2M	Heavy	Silver Cad.
507/1/02529/006	SM5DH45	5945-99-11-9163	Ccs/7500	2M	Heavy	Silver Cad.
507/1/02531/001	SM5DH52	5945-99-11-9170	1.3/1.1	2B2M	Heavy	Silver Cad.
507/1/02531/002	SM5DH53	5945-99-11-9171	6/28	2B2M	Heavy	Silver Cad.
507/1/02531/003	SM5DH54	5945-99-11-9172	12/105	2B2M	Heavy	Silver Cad.
507/1/02531/004	SM5DH55	5945-99-11-9173	24/440	2B2M	Heavy	Silver Cad.
507/1/02531/008	SM5DH81	5945-99-12-0308	48/1650	2B2M	Heavy	Silver Cad.
507/1/02531/006	SM5DH57	5945-99-11-9175	CCS/7500	2B2M	Heavy	Silver Cad.
507/1/02534/001		5945-99-932-0971	24/440	4C	Heavy	AgCdO/Palladium
507/1/02534/004		5945-99-970-2796	48/1650	4C	Heavy	AgCdO/Palladium
507/1/02534/008		5945-99-950-4667	12/105	4C	Heavy	AgCdO/Palladium

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Part No.	Style Ref.	NATO Stock No.	Coil Volts/Res Ω	Contact		
				Action	Duty	Material
507/1/02535/001	SM5DH58	5945-99-11-9176	1.3/1.1	MB2K	Heavy	Silver Cad.
507/1/02535/002	SM5DH59	5945-99-11-9177	6/28	MB2K	Heavy	Silver Cad.
507/1/02535/003	SM5DH60	5945-99-11-9178	12/105	MB2K	Heavy	Silver Cad.
507/1/02535/004	SM5DH61	5945-99-11-9179	24/440	MB2K	Heavy	Silver Cad.
507/1/02535/007	SM5DH82	5945-99-12-0309	48/1650	MB2K	Heavy	Silver Cad.
507/1/02535/006	SM5DH63	5945-99-11-9181	CCS/7500	MB2K	Heavy	Silver Cad.
507/1/02536/001	SM5DH64	5945-99-011-9182	1.3/1.1	2M2K	Heavy	Silver Cad.
507/1/02536/002	SM5DH65	5945-99-011-9183	6/28	2M2K	Heavy	Silver Cad.
507/1/02536/003	SM5DH66	5945-99-011-9184	12/105	2M2K	Heavy	Silver Cad.
507/1/02536/004	SM5DH67	5945-99-011-9185	24/440	2M2K	Heavy	Silver Cad.
507/1/02536/007	SM5DH83	5945-99-011-0310	48/1650	2M2K	Heavy	Silver Cad.
507/1/02536/006	SM5DH69	5945-99-011-9187	CCS/7500	2M2K	Heavy	Silver Cad.
507/1/02537/001	SM5DH70	5945-99-011-9188	1.3/1.1	2B2K	Heavy	Silver Cad.
507/1/02537/002	SM5DH71	5945-99-011-9189	6/28	2B2K	Heavy	Silver Cad.
507/1/02537/003	SM5DH72	5945-99-011-9190	12/105	2B2K	Heavy	Silver Cad.
507/1/02537/004	SM5DH73	5945-99-011-9191	24/440	2B2K	Heavy	Silver Cad.
507/1/02537/007	SM5DH84	5945-99-012-0311	48/1650	2B2K	Heavy	Silver Cad.
507/1/02537/006	SM5DH75	5945-99-011-9193	CCS/7500	2B2K	Heavy	Silver Cad.
507/1/02517/009		5945-99-519-8103	48/1000	1C	Normal	AgCdO/Palladium
507/1/02517/010		5945-99-519-8104	CCS/7500	1C	Normal	AgCdO/Palladium
507/1/02530/007		5945-99-519-8105	6/52	1M1B	Heavy	Silver Cad.
507/1/02530/008		5945-99-519-8106	24/700	1M1B	Heavy	Silver Cad.
507/1/09442/004		5945-99-532-8021	24 / 340 + 340	2C	Normal	AgCdO/Palladium
507/1/09426/004		5945-99-223-3484	24/440	4C	Special	Gold Plated
507/1/02536/004 GP			24/440	2M2K	Special	Gold Plated AgCdO

Contact Duty

Normal Duty: 100mA at 300 Vdc or 1A at 60 Vdc or 1 A at 12 Vdc.

Heavy Duty: 4A at 60 Vdc or 4A at 12 Vdc. Minimum Current 0.5A at 12 Vdc.

Gold Plated Option: For switching low level loads and to prevent oxidation of Silver.

Due to the nature of the contact material used for Normal and Heavy Duty contacts, a minimum load may be required to keep the contacts clean. Minimum load of 100mA recommended for Normal duty and 0.5A recommended for Heavy duty.

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BARNBROOK DATA SHEET

RELAY
TYPE 3

This is a medium to high sensitivity, circular, sealed miniature relay of proprietary design. It is fitted with a balanced armature system enabling it to give long and satisfactory operation while being subjected to severe conditions of acceleration and vibration.

The maximum springset load is eight changeovers, but various springset combinations including make before break actions are available.

It is only available for chassis mounting with solder terminations.

Key Features

- Balanced armature.
- Medium to high sensitivity.
- Chassis mounting.
- Solder Terminations.

Specification

Electrical

Operate Time	20 – 50 ms typical for 8 C/O contacts.
Release Time	7 – 13 ms typical for 8 C/O contacts.
Switching Rate	Capable of 300 ops/minute. Slow release models are also available with up to 200 ms delay. See table on sheet 2.
Maximum Permissible Coil Dissipation	At nominal voltages and in an ambient temperature of 15.6°C the operating power varies according to the springset load from 0.2 to 1.5 watts. The maximum permissible power which may be dissipated in the windings is 4.0 watts approx. at 15.6°C.
Dielectric Strength	1000 Vac at 50 Hz.
Insulation Resistance	500MΩ (min) at 500 Vdc.

Environmental and Physical

Weight	220 gram
Temperature category	-40°C to +100°C
Humidity Classifications H1 to RCS11	6 damp – heat cycles (accelerated) Duration per cycle 16 hours at 55 °C, R.H. 95-100% 84 days tropical exposure
Vibration	To RCS11 – Velocity 25.4mm (1”)/sec. at 10 Hz, to 76.2mm (3”)/sec. at 60 Hz, then 3 g at 60 Hz to 6.5 g at 150 Hz.
Acceleration	75 g – applied in any plane.
Bump	Def 5165 – 4000 bumps at 40 g.

Dimensions — See Sheet 3 for dimensional details

Ordering Information — See Sheet 2.

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Coil Data				
Nominal dc Coil Voltage	Nominal Coil Resistance Ω +/-5% at 15.6ºC		Limit Circuit Current (mA)	
1.3	2	1.37	350	510
6	45	30	75	115
12	160	122	43	56
24	770	550	18.7	26
48	3200	2000	8.7	14.2
Constant Current Supply	-	7500	-	8.4
	(a)	(b)	(a)	(b)

(a) For relays with 6C, 3C3K or 3M3B.
(b) For relays with 8C, 4C4K or 4M4B.
Other coil values are available, up to 40,000 Ω

Slow Release Models

The following types are available with springsets as shown:

Springset	Release Time
4 Changeovers	90 ms minimum
4 Changeovers	180 ms minimum
8 Changeovers	40 ms minimum

The above types relate to normal duty contacts only.
Relays of this type can be supplied suitable for the following nominal voltages:
6.0V, 12.0V, 24.0V, 48.0V
The windings allow for voltage variations of +20% and -12.5%.

Contact Data

Contact Arrangements Available	Contact Material	Contact Rating (Resistive Load) and Contact Life
3C3K, 6C, 4C4K, 8C	Palladium	100mA at 300 Vdc - 10^6 ops. 1A at 60 Vdc – 5 x 10^6 ops. 1A at 12 Vdc – 10^6 ops.
3M3B, 4M4B	Silver	4A at 28 Vdc – 2 x 10^5 ops. 4A at 300 Vac – 2 x 10^5 ops.

Note: For all inductive loads an adequate contact protection and spark quenching circuit must be fitted.

Ordering Information

Part No.	Style Ref.	NATO Stock No.	Coil Volts/ResΩ	Contact		
				Action	Duty	Material
507/1/02883/004		5945-99-911-4074	24/550	8C	Normal	Palladium
507/1/02883/012		5945-99-412-8170	CCS/7500	8C	Normal	Palladium

For details of other Type 3 Relays please contact Barnbrook Sales on:

- Telephone: +44(0)1329 847722
- E-mail: sales@barnbrook.co.uk

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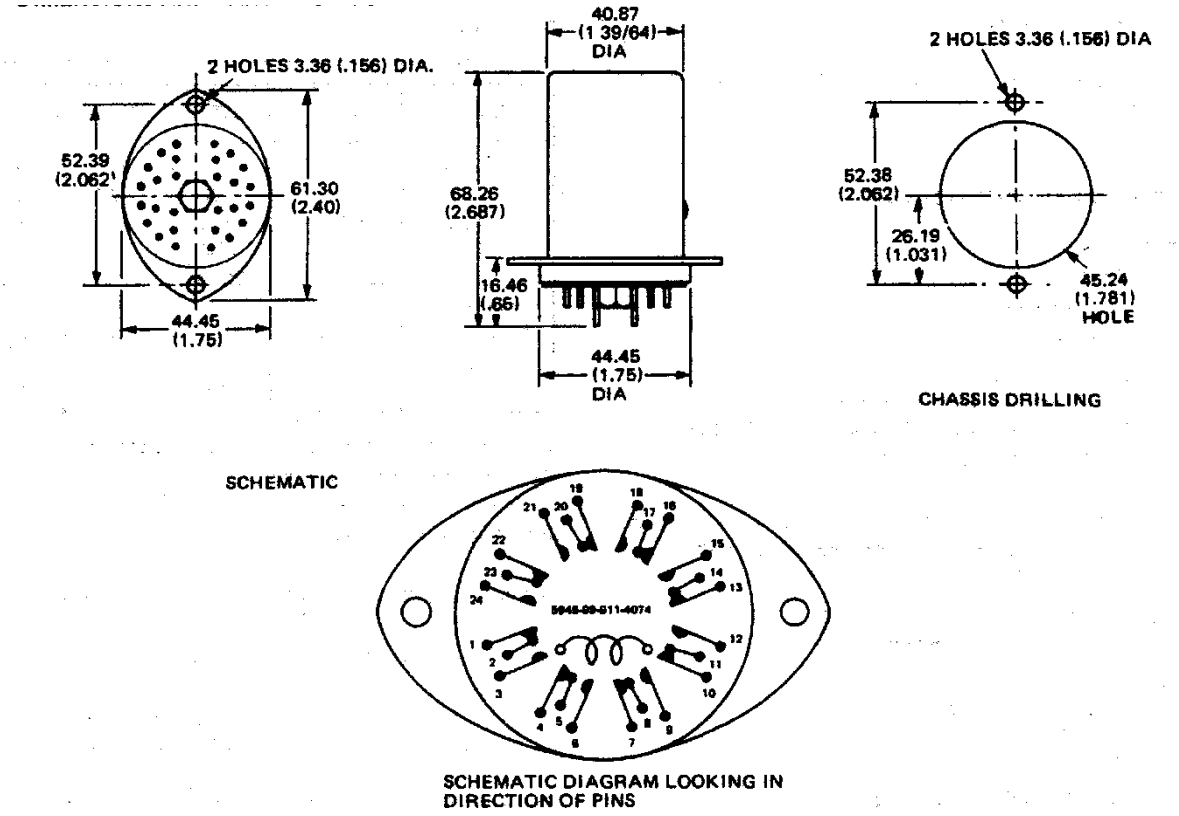
Dimensions and Panel Layout



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BARNBROOK DATA SHEET

RELAY
TYPE C

The ‘C’ Type relay was designed as a versatile 2, 4 or 6 pole relay. The movement is balanced and is common to each design. The contact springs are long and impart a good wiping action to the contacts with high contact pressures. The relay is robustly constructed and hermetically sealed in a metal can. Connections are made direct to screw terminations which are sealed into the relay can.

Key Features

- Balanced movement.
- 2, 4 or 6 pole.
- Robust construction.
- Hermetically sealed.

Specification

Coil Data

The coil is designed for operation from 28 Volt dc supply and is suitable for a range of 16 – 29 Volts

Contacts

The contacts are rated at 10 Amps for either a 28 Volt dc or 200 Volt ac 400 Hz supply.

Environmental and Physical

Temperature Range	-65 ^{o}C to +70 ^{o}C
Vibration	B.S.G. 100 Grade 2.
Acceleration	B.S.G. 100 Grade 1A.
Endurance	1000,000 operations minimum

Dimensions

See sheet 2 for dimensional details

Coil Voltage	Coil Ohms Resistance	Nominal Contact Voltage	Weight		Termination	Enclosure	Part Number
			oz	grams			
10-AMP 2-Changeover							
28 V dc	300	28 V dc 200 V 400 Hz	14	397	Screw	Hermetically Sealed	7CZ103739/2
10-AMP 4-Changeover							
28 V dc	300	28 V dc 200 V 400 Hz	16	454	Screw	Hermetically Sealed	7CZ105411/2

Ordering Information

Quote Part Number from Table above.

Data Sheet No
DSRELC

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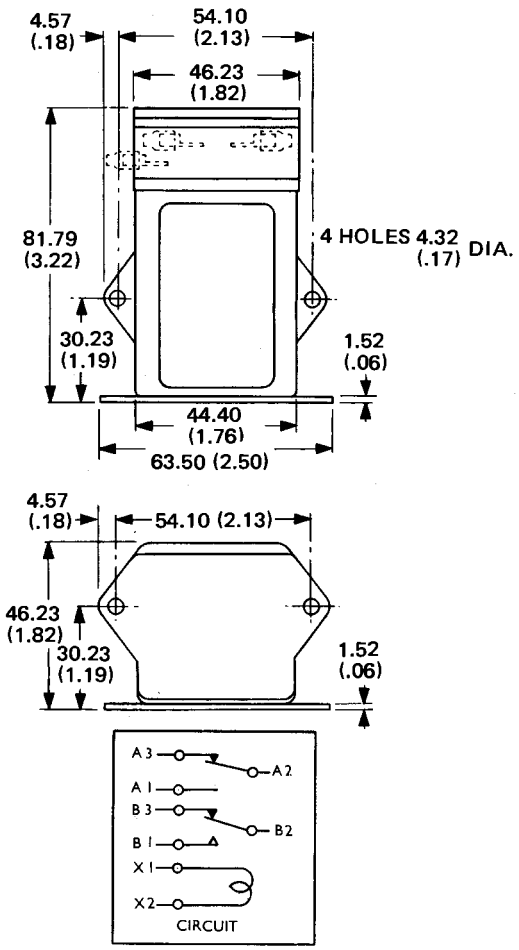
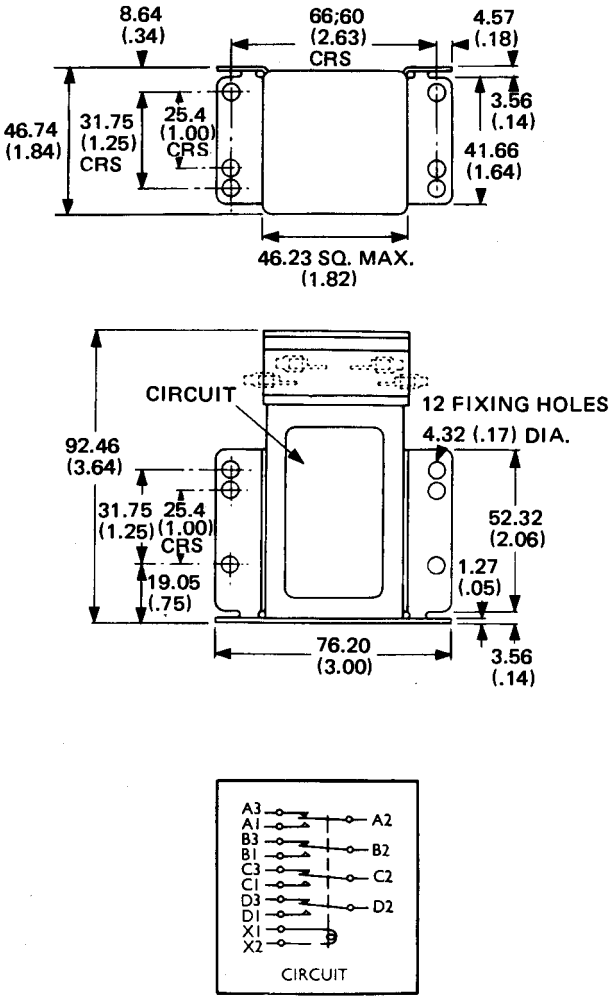
RELAY
TYPE C

2-CHANGEOVER
HERMETICALLY SEALED



4-CHANGEOVER
HERMETICALLY SEALED



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BARNBROOK DATA SHEET

Sealed RELAY TYPE CA

Key Features

- Sealed or unsealed.
- Normal, medium and heavy-duty versions.
- Twinned contacts on normal-duty version for greater reliability.
- Heavy-duty version uses independent restoring spring and contact assembly to give high current rating in small size and protection against accidental overload.
- Optional 60/40 Tin Lead terminations available on request.

Specification

Mechanical

Weight	Unsealed :	36 gram (1-1/4 oz.) Ref.
	Sealed :	65 gram (2.3 oz.) Ref.
Temperature category		-40°C to +100°C (-40°C to +70°C with transparent dust cover)
Humidity classification	Unsealed :	RCS 166 Class H2
	Sealed :	DEF 5165 Class H1
Bump		DEF 5165 Category B3 - 40g and RCS 11
Vibration		DEF 5165 and RCS 11

Electrical

Coil dissipation (max. permissible)	1.75W at 70°C 1.50W at 85°C 1.25W at 100°C
Capacitance for normal duty relays	Between springs: 5pF at 1MHz Springs to frame: 10pF at 1MHz
Working Voltage (Coil and/or contact assembly to frame)	500 Vdc (max.) 300 Vac (max.)
Dielectric Strength	1000 Vac 50 Hz to all parts not electrically connected
Insulation Resistance	Not less than 500MΩ at 500 Vdc at 25°C ± 10°C

Contact Data

Classification		RCSC Style	Contact Data	Contacts	Contact Rating and No of ops.	Reference for physical dimensions and mountings
Normal Duty	Unsealed	SM4A-N	2C	Twin Palladium	1A at 24 Vdc & 115 Vac – 10^6 ops	B, C, D
	Sealed	SM5A-N	2C		100mA at 300 Vdc –10^6 ops	A
Medium Duty	Unsealed	-	2C	Cadmium Silver	3A at 24 Vdc – 5 x 10^5 ops	B, C, D
	Sealed	SM5A-M	2C		5A at 28 Vdc – 10^5 ops	A
Heavy Duty	Unsealed	SM4A-N	1M or 1B	Cadmium Silver	10 A at 24 Vdc – 5 x 10^5 ops	C, D
	Sealed	SM5A-H	1M or 1B		10 A at 300 Vac – 5 x 10^5 ops	A

Coil Voltage and Resistance

V	Ω at 15.6°C	V	Ω at 15.6°C
1.3	2.0 ± 10%	48	2500 ± 10%
6.0	45.0 ± 10%	72	5000 +20% -10%
12.0	170.0 ± 10%	96	10000 ± 10%
24.0	700.0 ± 10%		

Dimensions

	Sealed		Unsealed		Transparent dust cover with plug-in base	
	in	mm	in	mm	in	mm
Case height	1.656	42.06			1.718	43.65
Height above chassis			1.156	29.37		
Overall width	0.125	28.58	0.625	15.88	1.219	30.96
Overall depth	0.813	20.64	1.062	27.00	0.875	22.20

Ordering Information Contact Barnbrook Sales to confirm specification.

Data Sheet No
DSRELCA

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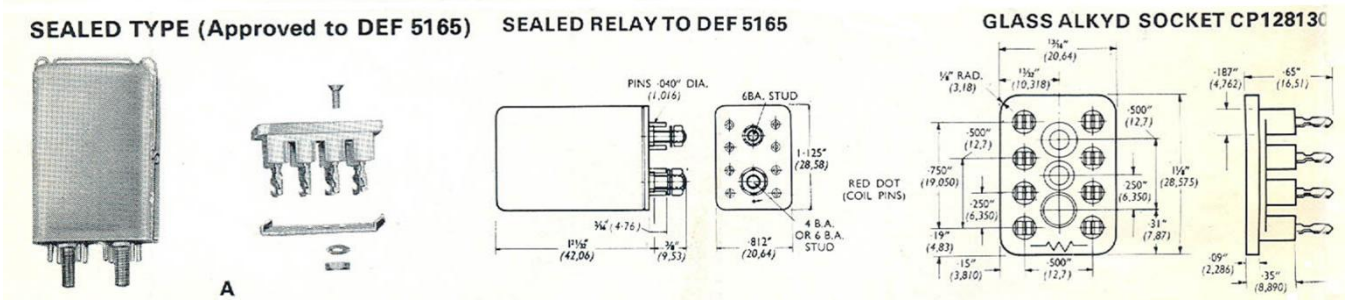
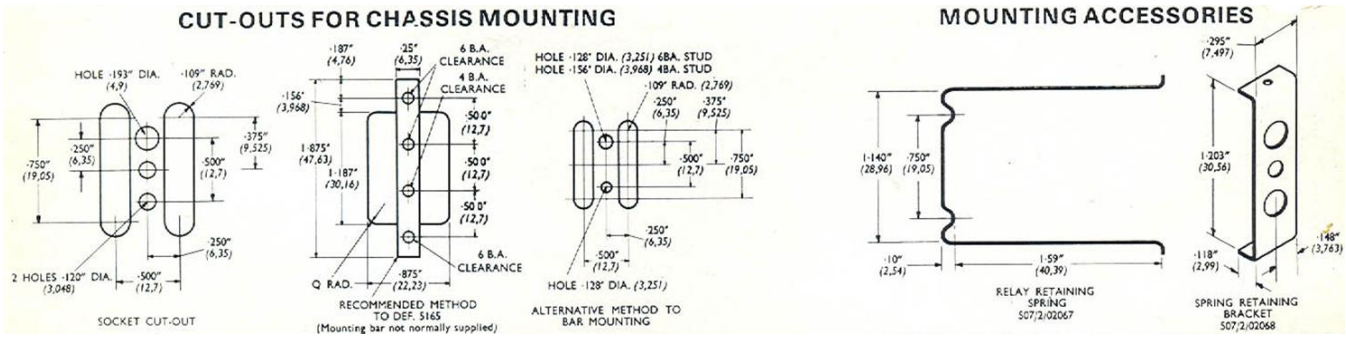
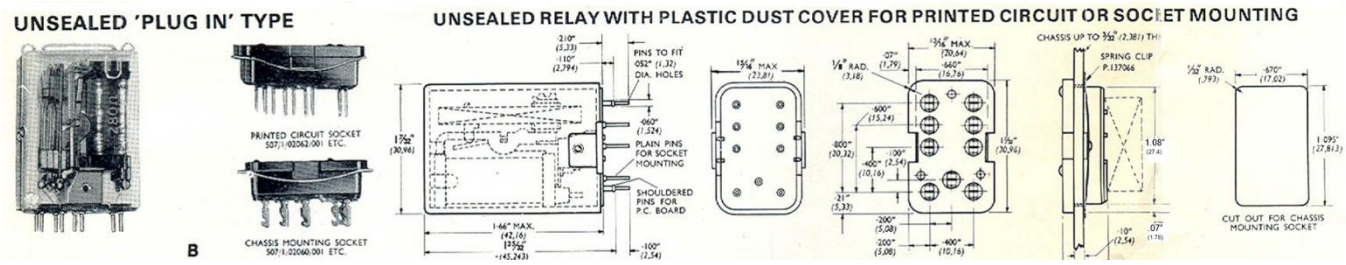
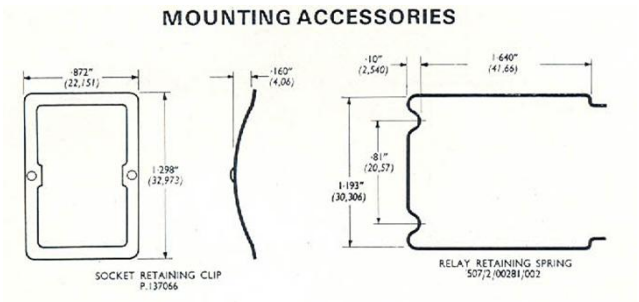
Reference A physical dimensions and mounting





Reference B physical dimensions and mounting





Data Sheet No
DSRELCA

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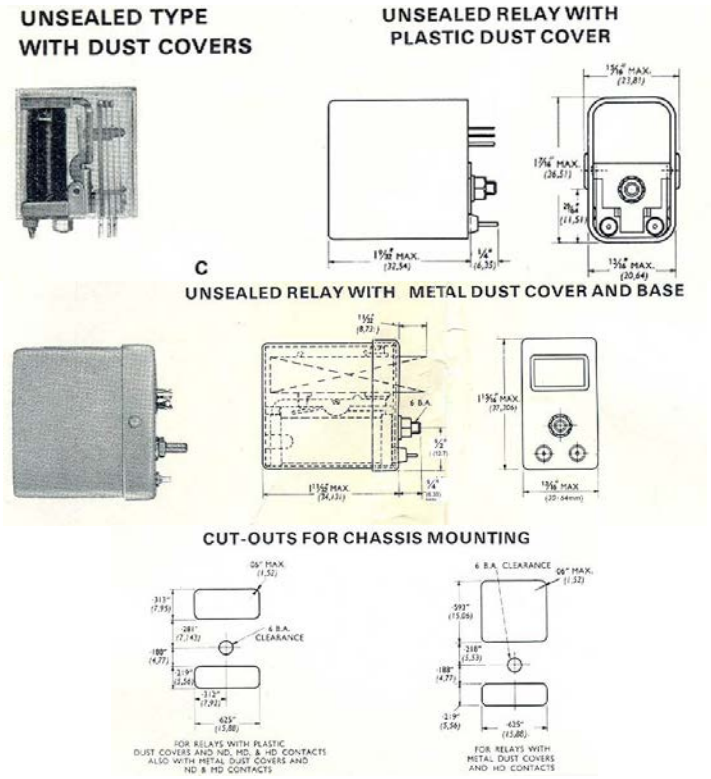
Reference C physical dimensions and mounting



Reference D physical dimensions and mounting

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PART NUMBERS AND ORDERING INFORMATION:

VERSION	P/N	CONTACT ACTION	COIL RESISTANCE (OHMS)	NOMINAL COIL OPERATING VOLTAGE	LIMIT CIRCUIT CURRENT (mA)
SEALED HEAVY DUTY	507/1/02881/011	1M	2	1.3	350
	507/1/02881/012	1M	45	9	80
	507/1/02881/013	1M	170	12	40
	507/1/02881/014	1M	700	24	21
	507/1/02881/015	1M	2500	48	11
	507/1/02881/019	1B	700	24	21
	507/1/02881/020	1B	2500	48	11
SEALED MEDIUM DUTY	507/1/02882/001	2C	2	1.3	350
	507/1/02882/002	2C	45	6	80
	507/1/02882/003	2C	170	12	40
	507/1/02882/004	2C	700	24	21
	507/1/02882/005	2C	2500	48	11
SEALED NORMAL DUTY	507/1/02284/031	2C	2	1.3	350
	507/1/02284/032	2C	45	6	80
	507/1/02284/033	2C	170	12	40
	507/1/02284/034	2C	700	24	21
	507/1/02284/035	2C	2500	48	11
	507/1/02284/004	2C	700	24	21

ALL OF THE ABOVE RELAYS MAY BE PLATED ELECTRO TIN LEAD ON THE TERMINAL BASE AND PINS. THIS VARIANT HAS TL SUFFIX TO THE PART NUMBER

FOR EXAMPLE IF YOU REQUIRE TIN LEAD VERSION OF 507/1/02882/004, THEN THE PART NUMBER TO BE QUOTED WILL BE 507/1/02882/004 TL.

THE TIN LEAD VARIANT IS FOR PROTECTION AGAINST TIN WHISKERS WHEN USING PURE TIN PLATING.

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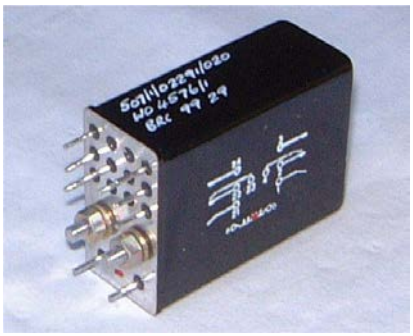
BARNBROOK DATA SHEET

RELAY TYPE CB

The CB Type Relay in its sealed version is fully approved to DEF 5165 Style SM5M.
In its unsealed version it is fully approved to RCS166 style SM4C
It replaces obsolete style SM5J



Key Features

- Available in normal duty or heavy duty versions.
- Twinned contacts on normal duty.
- Plug in facilities.
- Socket available for plug-in.

Specification

Electrical

Bounce Time	10 ms
Switching Rate	Capable of 500 ops/minute
Maximum Permissible Coil Dissipation	1.5W at 70 °C 1.38W at 100 °C
Voltage Rating (Coil and/or springset to frame)	300 V ac 50 Hz
Dielectric Strength (Between all parts not electrically connected)	1000 V ac at 500 Hz
Insulation Resistance	500MΩ (min) at 500 V dc

Contact Data

See sheet 2

Environmental and Physical

Weight	Unsealed - 85 gram (3 oz) max. Sealed - 137.5 gm (5 oz) max.
Temperature category	-55 °C to +100 °C (-40 °C to +70 °C with transparent dust cover)
Humidity Classification	Unsealed – unclassified to RCS166 Sealed – H1 to RCS11 : 6 climactic damp-heat cycles (accelerated) Duration16 hours (per cycle) at 55 °C, R.H. 95-100% 84 days tropical exposure
Vibration	To RCS11 – velocity 25.4mm (1in)/s at 10 Hz to 76.2 mm (3in)/s at 60 Hz, then 3 g at 60 Hz to 6.5 g at 150 Hz
Acceleration	To DEF 5165 : 12 g for 8 min.
Bump	B3 to DEF 5165 – 4000 bumps at 40 g.

Dimensions

See sheet 2 for dimensional details

Ordering Information

Quote Part Number from Tables on Sheets 3 or 4.

Data Sheet No
DSRELCB

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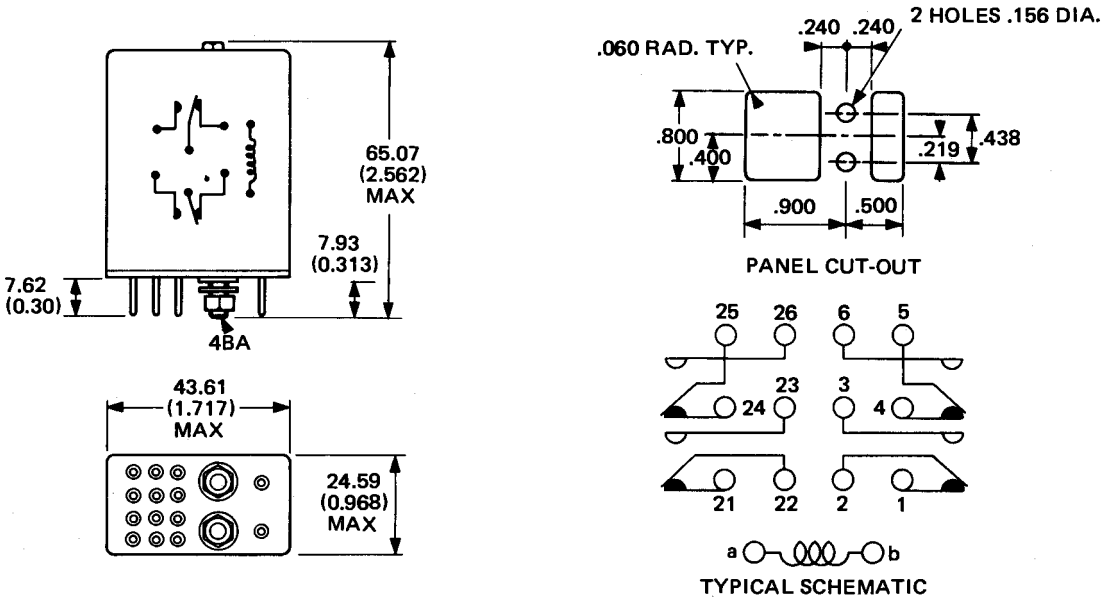

All dimensions are in millimetres (inches)

Coil Data

Nominal dc Coil Voltage	Nominal Coil Resistance Ω at 15°C ±5%	Limit Circuit Current (mA0		
		(a)	(b)	(c)
1.3	2	310	360	398
6	40	72	85	89
12	180	32	38	39.7
24	670	18	21	21.4
48	2500	10	11	11.5
85	7600	5.3	6	-

(a) For normal-duty contacts 1C
(b) For normal-duty contacts 2C: heavy-duty 2M, MB.
(c) For normal-duty contacts 4C, 2C2K, 4K: heavy-duty 2B2M, 4M

Contact Data

Contact arrangements available (preferred styles)	* Contact Material	Contact ratings (resistive load) and contact life
Normal duty 1C, 2C, 4C, 2C2K, 4K	Palladium	100mA at 300 V dc – 10^7 ops. 1A at 60 V dc – 10^8 ops.
Heavy duty 2M, MB, 2B2M, 4M	Silver Cadmium	4A at 60 V dc – 2 x 10^5 ops 2A at 300 V dc – 2 x 10^5 ops

* Contact materials and styles shown are preferred configurations in DEF 5165
Note : For inductive loads an adequate contact protection and spark quenching circuit must be fitted.

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Relay Type CB

Part No.	Style Ref.	NATO Stock No.	Coil Volt/Res. V/Ω	Contact		
				Action	Duty	Material
507/1/02292/054	SM4CN44	5945-99-012-3973	1.3/2	1C	Normal	Palladium
507/1/02292/055	SM4CN45	5945-99-012-3974	6/40	1C	Normal	Palladium
507/1/02292/056	SM4CN46	5945-99-012-3975	12/180	1C	Normal	Palladium
507/1/02292/057	SM4CN47	5945-99-012-3976	24/670	1C	Normal	Palladium
507/1/02292/058	SM4CN48	5945-99-012-3977	48/2500	1C	Normal	Palladium
507/1/02292/059	SM4CN49	5945-99-012-3978	85/7600	1C	Normal	Palladium
507/1/02292/017	SM4CN50	5945-99-012-3979	1.3/2	2C	Normal	Palladium
507/1/02292/018	SM4CN51	5945-99-012-3980	6/40	2C	Normal	Palladium
507/1/02292/019	SM4CN52	5945-99-012-3981	12/180	2C	Normal	Palladium
507/1/02292/020	SM4CN53	5945-99-012-3982	24/670	2C	Normal	Palladium
507/1/02292/021	SM4CN54	5945-99-012-3983	48/2500	2C	Normal	Palladium
507/1/02292/022	SM4CN55	5945-99-012-3984	85/7600	2C	Normal	Palladium
507/1/02292/001	SM4CN56	5945-99-012-3985	1.3/2	4C	Normal	Palladium
507/1/02292/002	SM4CN57	5945-99-012-3986	6/40	4C	Normal	Palladium
507/1/02292/003	SM4CN58	5945-99-012-3987	12/180	4C	Normal	Palladium
507/1/02292/004	SM4CN59	5945-99-012-3988	24/670	4C	Normal	Palladium
507/1/02292/005	SM4CN60	5945-99-012-3989	42/2500	4C	Normal	Palladium
507/1/02292/033	SM4CN61	5945-99-012-3990	1.3/2	2C2K	Normal	Palladium
507/1/02292/034	SM4CN62	5945-99-012-3991	6/40	2C2K	Normal	Palladium
507/1/02292/035	SM4CN63	5945-99-012-3992	12/180	2C2K	Normal	Palladium
507/1/02292/036	SM4CN64	5945-99-012-3993	24/670	2C2K	Normal	Palladium
507/1/02292/037	SM4CN65	5945-99-012-3994	48/2500	2C2K	Normal	Palladium
507/1/02292/040	SM4CN66	5945-99-012-3995	12/180	4K	Normal	Palladium
507/1/02292/041	SM4CN67	5945-99-012-3996	24/670	4K	Normal	Palladium
507/1/02293/012	SC4CH7	5945-99-012-3997	1.3/2	2M	Heavy	Silver Cad.
507/1/02293/013	SM4CH8	5945-99-012-3998	6/40	2M	Heavy	Silver Cad.
507/1/02293/014	SM4CH9	5945-99-012-3999	12/180	2M	Heavy	Silver Cad.
507/1/02293/015	SM4CH10	5945-99-012-4599	24/670	2M	Heavy	Silver Cad.
507/1/02293/016	SM4CH11	5945-99-012-4629	48/2500	2M	Heavy	Silver Cad.
507/1/02293/017	SM4CH12	5945-99-012-4630	1.3/2	MB	Heavy	Silver Cad.
507/1/02293/018	SM4CH13	5945-99-012-4631	6/40	MB	Heavy	Silver Cad.
507/1/02293/019	SM4CH14	5945-99-012-4659	18/180	MB	Heavy	Silver Cad.
507/1/02293/020	SM4CH15	5945-99-012-4660	24/670	MB	Heavy	Silver Cad.
507/1/02293/021	SM4CH16	5945-99-012-4661	48/2500	MB	Heavy	Silver Cad.
507/1/02293/022	SM4CH17	5945-99-012-4662	1.3/2	2B2M	Heavy	Silver Cad
507/1/02293/023	SM4CH18	5945-99-012-4663	6/40	2B2M	Heavy	Silver Cad
507/1/02293/024	SM4CH19	5945-99-012-4664	12/180	2B2M	Heavy	Silver Cad
507/1/02293/025	SM4CH20	5945-99-012-4665	24/670	2B2M	Heavy	Silver Cad
507/1/02293/026	SM4CH21	5945-99-012-4666	48/2500	2B2M	Heavy	Silver Cad
507/1/02293/009	SM4CH22	5945-99-012-4667	12/180	4M	Heavy	Silver Cad
507/1/02293/010	SM4CH23	5945-99-012-4668	24/670	4M	Heavy	Silver Cad
507/1/09682/004		5945-99-195-1174	24/670	4C	Normal	Palladium
507/1/09683/015		5945-99-107-6385	24/670	2M	Heavy	Silver Cad

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Relay Type CB

Part No.	Style Ref.	NATO Stock No.	Coil Volt/Res. V/Ω	Contact		
				Action	Duty	Material
507/1/02326/097	SM5MN141	5945-99-012-3862	1.3/2	1C	Normal	Palladium
507/1/02326/098	SM5MN142	5945-99-012-3863	6/40	1C	Normal	Palladium
507/1/02326/099	SM5MN143	5945-99-012-3864	12/180	1C	Normal	Palladium
507/1/02326/100	SM5MN144	5945-99-012-3865	24/670	1C	Normal	Palladium
507/1/02326/101	SM5MN145	5945-99-012-3866	48/2500	1C	Normal	Palladium
507/1/02326/102	SM5MN146	5945-99-012-3867	85/7600	1C	Normal	Palladium
507/1/02326/016	SM5MN147	5945-99-012-3868	1.3/2	2C	Normal	Palladium
507/1/02326/017	SM5MN148	5945-99-012-3869	6/40	2C	Normal	Palladium
507/1/02326/018	SM5MN149	5945-99-012-3870	12/180	2C	Normal	Palladium
507/1/02326/019	SM5MN150	5945-99-012-3871	24/670	2C	Normal	Palladium
507/1/02326/020	SM5MN151	5945-99-012-3872	48/2500	2C	Normal	Palladium
507/1/02326/021	SM5MN152	5945-99-012-3873	85/7600	2C	Normal	Palladium
507/1/02326/001	SM5MN153	5945-99-012-3874	1.3/2	4C	Normal	Palladium
507/1/02326/002	SM5MN154	5945-99-012-3875	6/40	4C	Normal	Palladium
507/1/02326/003	SM5MN155	5945-99-012-3876	12/180	4C	Normal	Palladium
507/1/02326/004	SM5MN156	5945-99-012-3877	24/670	4C	Normal	Palladium
507/1/02326/005	SM5MN157	5945-99-012-3878	42/2500	4C	Normal	Palladium
507/1/02326/033	SM5MN158	5945-99-012-3879	1.3/2	2K2C	Normal	Palladium
507/1/02326/034	SM5MN159	5945-99-012-3880	6/40	2K2C	Normal	Palladium
507/1/02326/035	SM5MN160	5945-99-012-3881	12/180	2K2C	Normal	Palladium
507/1/02326/036	SM5MN161	5945-99-012-3882	24/670	2K2C	Normal	Palladium
507/1/02326/037	SM5MN162	5945-99-012-3883	48/2500	2K2C	Normal	Palladium
507/1/02326/040	SM5MN163	5945-99-012-3884	12/180	4K	Normal	Palladium
507/1/02326/041	SM5MN164	5945-99-012-3885	24/670	4K	Normal	Palladium
507/1/02291/001	SM5MH85	5945-99-012-3886	1.3/2	2M	Heavy	Silver Cad.
507/1/02291/002	SM5MH86	5945-99-012-3887	6/40	2M	Heavy	Silver Cad.
507/1/02291/003	SM5MH87	5945-99-012-3888	12/180	2M	Heavy	Silver Cad.
507/1/02291/004	SM5MH88	5945-99-012-3889	24/670	2M	Heavy	Silver Cad.
507/1/02291/005	SM5MH89	5945-99-012-3890	48/2500	2M	Heavy	Silver Cad.
507/1/02291/012	SM5MH90	5945-99-012-3891	1.3/2	MB	Heavy	Silver Cad.
507/1/02291/013	SM5MH91	5945-99-012-3892	6/40	MB	Heavy	Silver Cad.
507/1/02291/014	SM5MH92	5945-99-012-3893	18/180	MB	Heavy	Silver Cad.
507/1/02291/015	SM5MH93	5945-99-012-3894	24/670	MB	Heavy	Silver Cad.
507/1/02291/016	SM5MH94	5945-99-012-3895	48/2500	MB	Heavy	Silver Cad.
507/1/02291/006	SM5MH95	5945-99-012-3896	1.3/2	2B2M	Heavy	Silver Cad
507/1/02291/007	SM5MH96	5945-99-012-3897	6/40	2B2M	Heavy	Silver Cad
507/1/02291/008	SM5MH97	5945-99-012-3898	12/180	2B2M	Heavy	Silver Cad
507/1/02291/009	SM5MH98	5945-99-012-3899	24/670	2B2M	Heavy	Silver Cad
507/1/02291/010	SM5MH99	5945-99-012-3868	48/2500	2B2M	Heavy	Silver Cad
507/1/02291/019	SM5MH100	5945-99-012-3871	12/180	4M	Heavy	Silver Cad
507/1/02291/020	SM5MH101	5945-99-012-3872	24/670	4M	Heavy	Silver Cad

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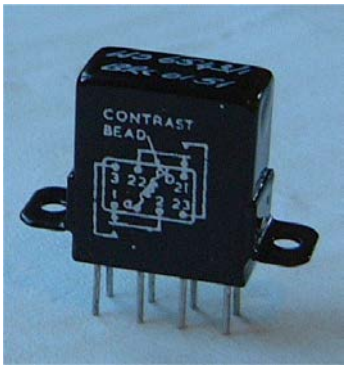
BARNBROOK DATA SHEET

RELAY
TYPE CF

The design of this relay incorporates an efficient motor assembly to provide high contact force, hence excellent reliability under extreme and adverse environmental conditions

Approvals: Full approval to DEF 5165-SM5L
Designed to meet requirements of MIL R 5757
BS 9151 F 002 approval pending



Key Features

- Hermetically Sealed
- Crystal Can Size
- Excellent Reliability.
- High Contact Force

Specification

Electrical

Contact resistance	50 mΩ max. measured as follows: **01** contacts, light duty, 5V 10mA **02** contacts, low level, 10mV 10mA
Operate time at 25 °C	5 ms max.
Release time at 25 °C	5 ms max.
Contact Bounce Time at 25 °C	3 ms.
Endurance Test	10^5 operations at 28V dc 3 amp (resistive) 125 °C 3600 operations/hour
Missed Operations Test	On request
Switching Rate	Maximum 18000 operations/hour maximum rated contact load 50% duty
Maximum Permissible Coil Dissipation	1 watt at 125 °C, 1.5 watt at 20 °C
Dielectric Strength	750 V rms open contacts 1000 V rms all other parts.
Insulation Resistance	500MΩ (min) at 500 V dc
Contact arrangement	Contact Type 2C
Contact material	Gold plated silver alloy
Contact rating	3A at 28V dc - 10^5 ops 1A at 28V dc - 10^6 ops 2A at 115V ac - 10^5 ops

Note! For all inductive loads an adequate contact protection and spark quenching circuit must be fitted.

Environmental and Physical

Weight	17 gram max.
Volume	0.82 in^3 (4893 m^3)
Environmental Specification	-65 °C to +125 °C
Vibration*	BS2011 Part 2F Test Fc 10 – 60 Hz 1.5mm amplitude 60 – 2000 Hz 98 m/s^2 (10 g) acceleration
Acceleration*	BS2011 Part 2Ga Steady State (functional) 490 m/s^2 (50 g)
Bump*	BS2011 Part 2Eb Functional 390 m/s^2 (40 g) 6 ms 4000 bumps
Shock*	BS2011 Part 2Ea Functional 490 m/s^2 (50 g) 11 ms.

*Performance figs. For plain can style suitably and solidly mounted. Other mountings may cause derating.

Ordering Information See Sheet 5 for details of how to establish Part Number.

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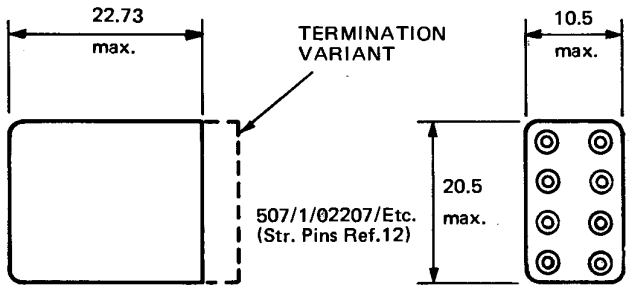
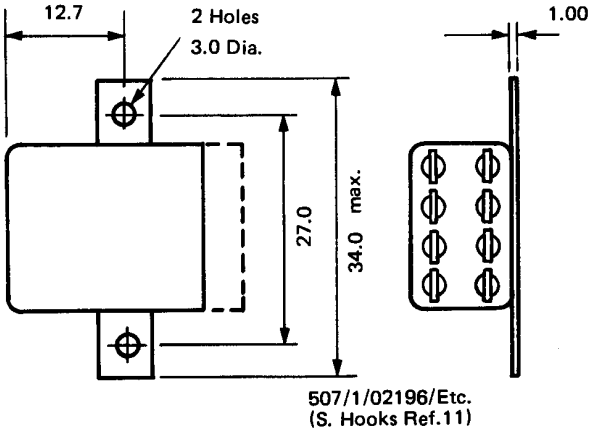
RELAY
TYPE CF

MOUNTING STYLES

All dimensions are in millimetres.
Tolerance +/-0.25 unless otherwise stated. Can dimensions shown in Ref. 01 apply to all variants. All termination variants are allowable



REF. 01



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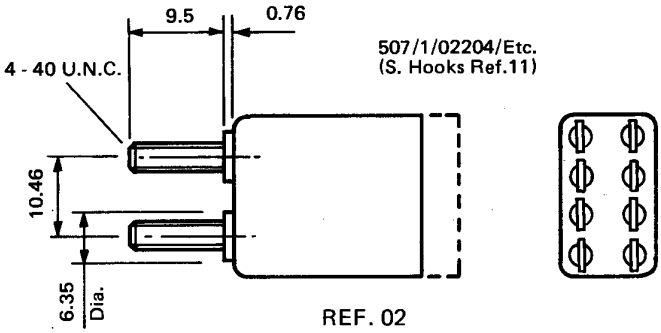

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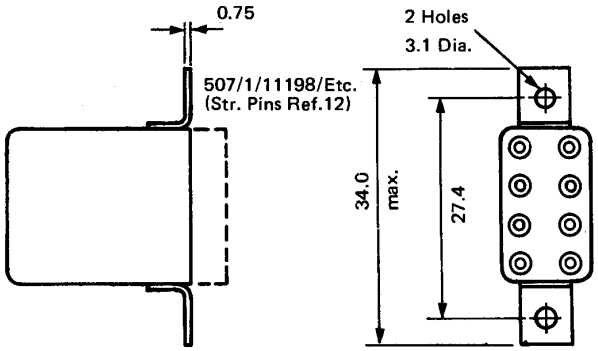

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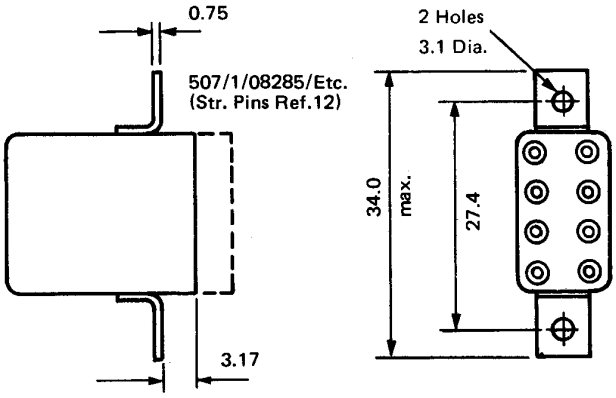

REF. 05

REFS. relate to BS 9151 codes.

The relay is enclosed in a cupro-nickel can, which is finished with an epoxy paint. The terminations are tin plated to facilitate solder connections.

Data Sheet No
DSRELCF

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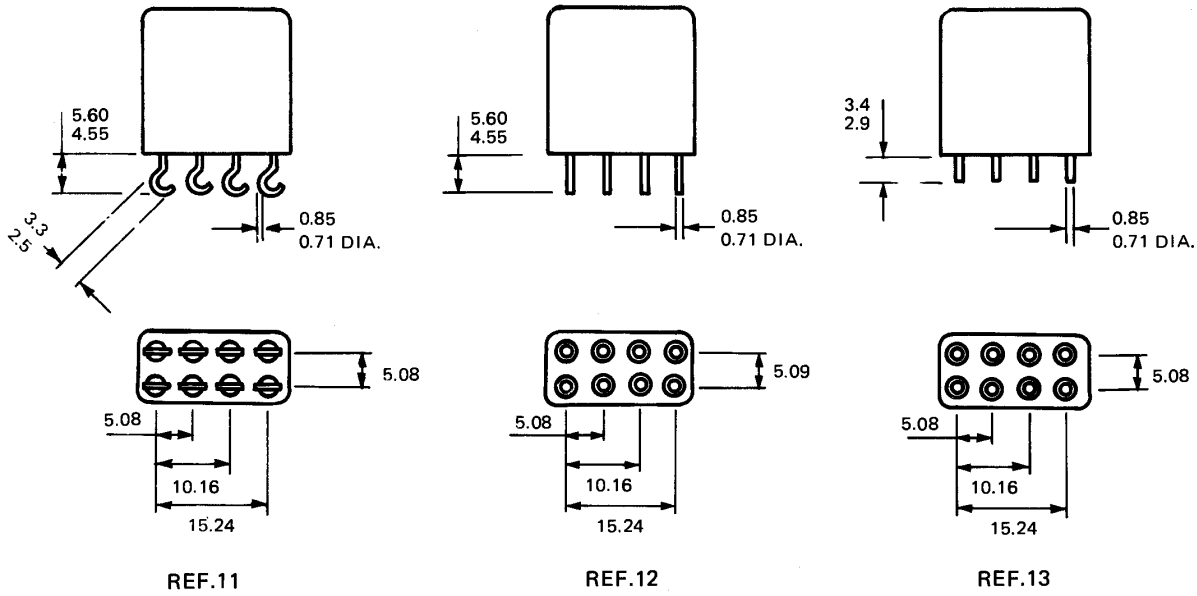
RELAY
TYPE CF

TERMINATION VARIANTS



REFS. relate to BS 9151 Codes.

The relay is enclosed in a cupro-nickel can, which is finished with an epoxy paint. The terminations are tin plated to facilitate solder connections.

COIL DATA

An abbreviated list of coil codes, conforming to BS 9151 requirements is reproduced below.
Other coil codes to suit different circuits are available, on request.

Nominal Coil Resistance Ω +/-10% at 25 °C	Rated dc Voltage	Rated dc Voltage Over the Operating Temp. Range	Saturate Voltage	Pull In Voltage	Drop Out Voltage	BS 9151 Coil Variant Code	Barnbrook Coil Code
35	6	5.25 – 7.20	7.20	3.6	0.30	01	002
200	12	15.0 – 14.40	14.40	7.2	0.60	02	003
675	24	21.0 – 32.00	32.00	14.4	1.20	03	004
2450	48	42.0 – 57.60	57.60	28.3	2.40	04	005

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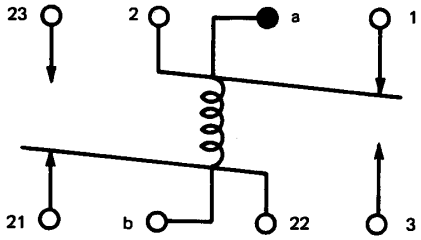
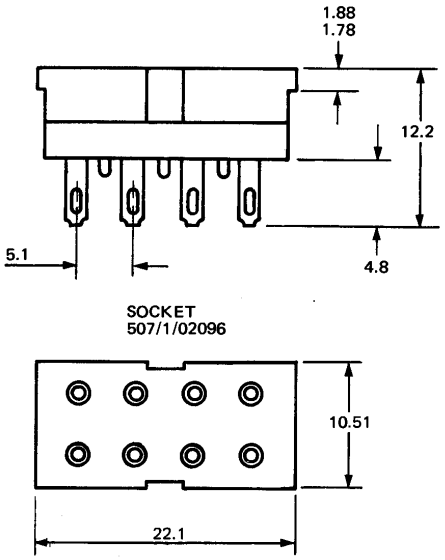
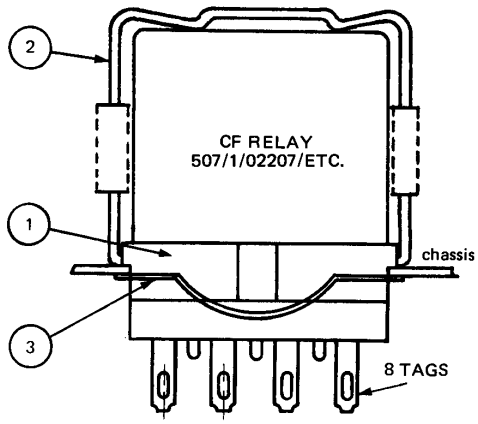
RELAY
TYPE CF

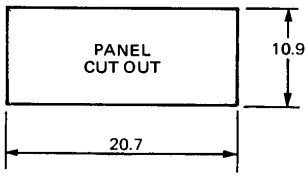
Schematic





Plug In Facility





The socket illustrated above is designed for use with relay Part Number 507/1/02207/etc. When so used, the elements of the Assy. 507/1/08280 together with the relay are assembled as shown in left hand column.

1. Socket 507/1/02096 } Assembly
2. Relay Retaining Spring 507//1/02095 } 507/1/08280
3. Socket Retaining Spring 507/1/02093 } (Ordering Part No.)

Data Sheet No
DSRELCF

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RELAY TYPE CF

Ordering Information

The ordering part number comprises three basic functions. The third group gives the mounting and termination style and the final group the coil code obtained from the information published earlier in this Data Sheet.

Example

507/1/02207/004

- 675Ω coil
- Plain Can Mounting, Straight Pin terminations

Alternatively, when BS 9151 is implemented, relays may be ordered to that specification. In this case the following information should be provided:

1. BS No. of detail specification, and
2. Code number made up by :-

Two digits for contact rating.	See page 1
Two digits for coil rating.	See page 3
Two digits for mounting variant	See page 2
Two digits for termination variant	See page 3

Example

BS 9151 F002 01 03 01 02

- BS No.
- Lt Duty Contacts
- Coil Variant = 675Ω Coil
- Mounting Variant – Plain Can
- Termination variant – Straight Pins

Manufacturing PN 507/1/02207/404

Identification

Each relay is marked on the side of the can with the schematic diagram, together with the Part No. 507/1/Etc/Etc, the coil voltage and the NATO Stock No.

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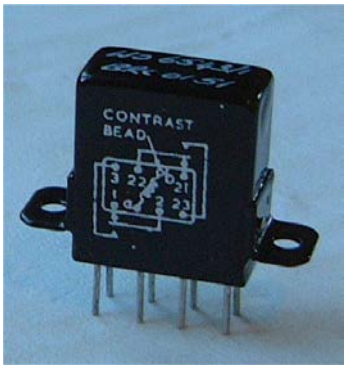
BARNBROOK DATA SHEET

RELAY
TYPE CFS



Based on the well proven crystal can size relay Type CF this version offers a compact hermetically sealed component with improved sensitivity, for applications where the ambient temperature does not exceed 60 °C, such as most industrial applications. The balanced armature system gives excellent performance in environments of shock and vibration.
The base terminations on 0.2" (5.08mm) pin centres provide for printed circuit board mounting or alternatively with a mating socket. Direct wiring, hooked pin terminations can be provided.

Key Features

- Compact.
- Hermetically sealed.
- Balanced Armature.
- Socket available for plug-in.

Specification

Electrical

Contact arrangement	2 C
Contact material	Silver Alloy, gold plated
Contact resistance	50 milliohms max. (initial)
Contact rating for resistive loads	2 amps at 28 V dc or 445 V ac for 10^5 operations
Operate time	40 milliseconds max. including bounce.
Release time	5 milliseconds max. including bounce.
Dielectric Strength	1000 V ac at 50 Hz all pins to frame. 500 V ac at 500 Hz between open contacts
Insulation Resistance	500MΩ (min) at 500 V dc
Coil Data	See table on sheet 2

Environmental and Physical

Weight	17 gram max.
Temperature category	-65 °C to +60 °C
Humidity Classification	H6 to DEF 5011
Vibration	To RCS11 max. 6.5 g at 150 Hz.
Acceleration	To DEF 5165 20 g for 8 minutes
Bump	To DEF 5165 category B4

Dimensions See sheets 2 & 3 for dimensional details

Ordering Information See Sheet 4 for details of how to establish Part Number.

Contact Data

Contact Arrangements	Contact Material	Contact Rating (Resistive Load) And Contact Life
2C	Gold Plated Silver Alloy	2A 28V dc - 10^5 operations 10^5 operations

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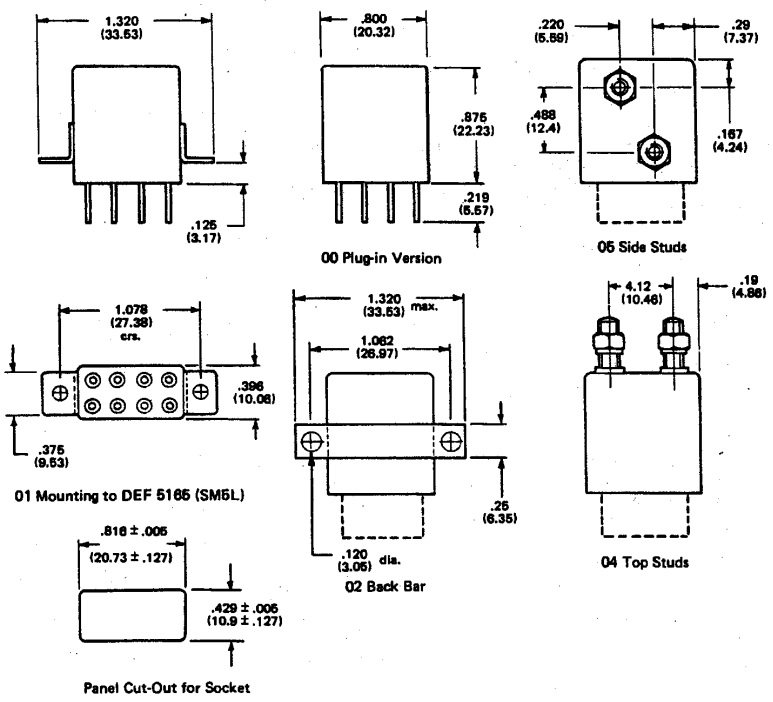
RELAY
TYPE CFS

Coil Data

Coil Code	Nominal Coil Volts	Nominal Coil Resistance Ω +/-10% at 25 °C	Operate Voltage Range at 60 °C	Must Operate Voltage at 25 °C	L.C. Current - mA
/-18	6	220	5.0 – 15.0	4.3	18.5
/-19	12	900	10.0 – 30.0	8.7	9.2
/-20	24	4000	20.0 – 60.0	16.8	4.0
/-21	48	12000	40.0 – 120.0	34.7	2.75

Operate Power at 25 °C = approximately 75 milliwatts
Maximum coil dissipation at 25 °C 1.5 watts

OUTLINE AND MOUNTING DIMENSIONS



All dimensions are in millimetres (inches)

Part No.	Mounting Description
507/1/11800	Plain Can
507/1/11801	Side Brackets
507/1/11802	Back Bar
507/1/11804	2 x 4.40 x 3/8” (9.52mm) Top Studs
507/1/11805	2 x 4.40 x 3/8” (9.52mm) Side Studs

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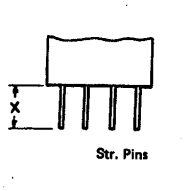
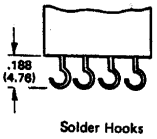
RELAY
TYPE CFS

TERMINATIONS



Termination Code	Dimension 'X'
/0--	0.187" (4.75mm)
/1--*	0.205" (5.21mm)
/2--	0.312" (7.94mm)
/3--	3.0" (76.2mm)
/9--	Hook Termination

* Suitable for socket mounting



CFS Relay 2C (Sensitive) 2 Amp

Part No.	Coil V/Ω	Mounting	Termination
507/1/11800 /x18	6/220	**00** Plain Can	Straight or Solder Hooks
507/1/11800 /x19	19/900	**00** Plain Can	
507/1/11800 /x20	24/4000	**00** Plain Can	
507/1/11800 /x21	48/12000	**00** Plain Can	
507/1/11801 /x18	6/220	**01** Side Brackets **02** Back Bar	Straight or Solder Hooks
507/1/11802 /x19	19/900		
507/1/11802 /x20	24/4000		
507/1/11802 /x21	48/12000		
507/1/11804 /x18	6/220	**04** 2 x 4.40 UNC Top Studs **05** 2 x 4.40 Side Studs	Straight or Solder Hooks
507/1/11805 /x19	19/900		
507/1/11802 /x20	24/4000		
507/1/11802 /x21	48/12000		

X To be coded from table under
/0-- 0.187" (4.75mm) Straight Pins
/1-- 0.219" (5.57mm) Straight Pins (suitable for socket mounting)
/2-- 0.312" (7.94mm) Straight Pins
/3-- 3.000" (76.2mm) Straight. Pins
/9-- Solder Hooks
Accommodated in same socket as CFC2

Design authority and manufacture by Barnbrook Systems Limited

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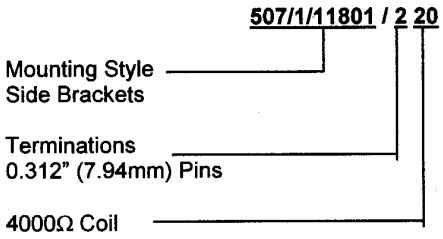
RELAY
TYPE CFS

Ordering Information

The ordering part number comprises three basic functions.
The first gives a mounting and the second the termination style and the third is the coil code obtained from the 'Coil Data' table.

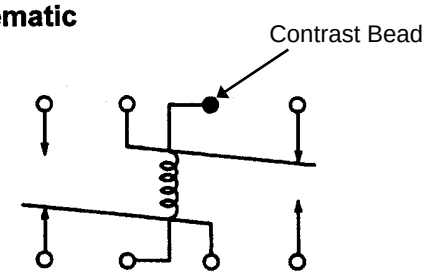
Example



Identification

Each relay is marked on the can with the schematic diagram. On the side of the can are marked the Ordering Part Number, the coil voltage, resistance and the NATO Stock Number (where applicable).

Schematic



Notes

1. Setting (or calibration) of CF Relays is carried out using a constant current source, ensuring maximum sensitivity. This is not always achieved with voltage setting methods since variations in coil resistance due to ambient temperature and winding tolerance would not permit a fixed current value to be drawn from a constant voltage source.
2. The 'Limit Circuit Current' quoted is the minimum value of current which must be available to the coil for the relay to operate satisfactorily under the environmental conditions stated. All relays are tested at a lower value of current to ensure satisfactory operation throughout life.
3. Operating voltage ranges are quoted at 60° C. At lower ambient temperature, the operating voltage will be wider since the increase in coil resistance due to temperature rise will be smaller.

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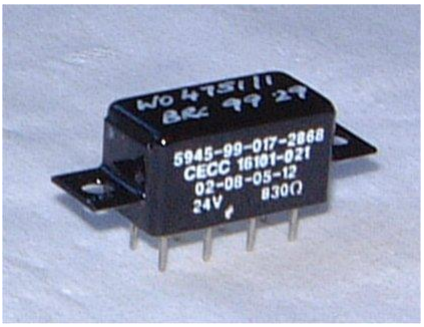
BARNBROOK DATA SHEET

RELAY
TYPE CNL

The Type CNL is a half-size crystal can MAGNETIC LATCHING relay. A short duration low power pulse is all that is necessary to shift the bistable contacts from one position to the other. The contacts will maintain either position without consuming power and are unaffected by the ambient conditions specified. The relay utilises two coils in conjunction with a finely engineered permanent magnet structure. The 150 milliwatt switching power is only a fraction of the pull-in power of conventional two pole relays and since coil temperature rise is virtually non-existent when a short pulse operation is used, the coil life is extended many fold.
An all welded structure provides the strength and resistance to shock and vibration. Specifically the Type CNL is designed not to chatter In either latched position when subjected to a 100g shock nor does the CNL Relay have resonant points or exhibit chatter between 10 - 3000 Hz, at up to 30g



Key Features

- Magnetic Latching
- All welded structure

Specification

Electrical

Contact resistance	50 m Ω max. (initial)
Operate time	3 ms max.
Bounce Time	2 ms max.
Endurance	10^6 operations min.
Dielectric Strength	1000 Vrms at 50 Hz
Insulation Resistance	1000MΩ
Contact arrangement	2C (latching)
Contact material	Silver Alloy
Contact rating	2 A at 28 V dc (resistive)
Approvals	Meets requirements of MIL R 5757D

For all inductive loads an adequate contact protection spark quenching circuit must be fitted.

Environmental and Physical

Weight	6 - 10 gram (dependant on mounting style)
Temperature category	-65 °C to +125 °C
Vibration	30 g at 10 to 3000 Hz.
Acceleration	150 g
Shock	100 g 11 ms.

Dimensions — See sheet 2 for dimensional details

Ordering Information — See Sheet 3 for details of how to order.

Data Sheet No
DSRELCNL

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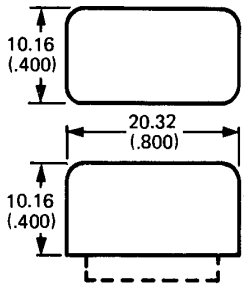
RELAY
TYPE CNL

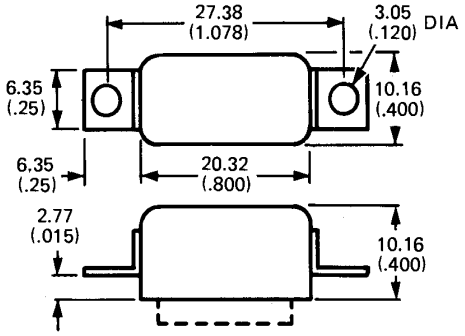
MOUNTING STYLES

The relay is offered in four mounting styles

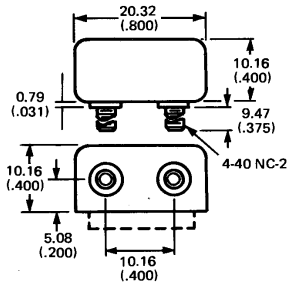
Style A



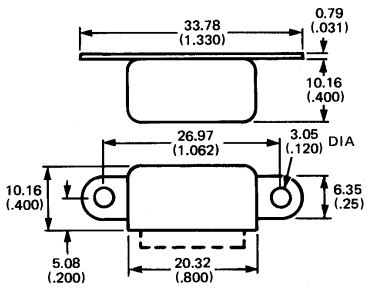
Style B



Style C

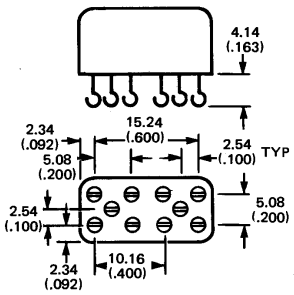


Style D

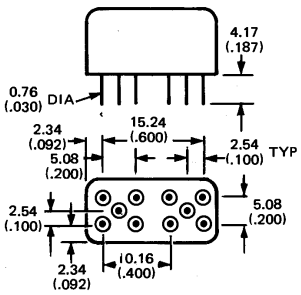


TERMINATION (HEADER) STYLES

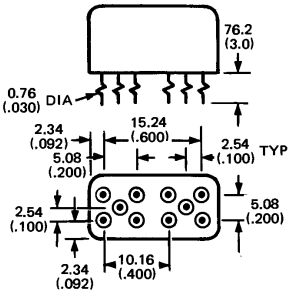
Style A



Style B



Style C



A socket is available to suit Style B terminations

All dimensions are in millimetres (inches)

Data Sheet No
DSRELCNL

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Coil Data

A range of standard coils is listed below. Non standard available on request

Nominal dc Coil Voltage	Coil resistance per coil Ω ±10% at 25 °C
6 12 24	64 250 1000

Ordering Information

Part numbers for the TYPE CNL Relay are made up as follows:

CNL TYPE | CASE | CONTACTS | VOLTAGE | HEADER

Case Styles
A- Standard | B – Bracket Mounting | C – Stud Mounting | D – Flat Mounting

Contacts
2FC (Double pole double throw)

Voltage
See chart for appropriate coil resistance

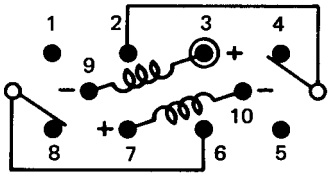
Header
A – Hook Terminal B – Plug in C – Wire leads

Example

If for dry circuit application insert D before contact

Example : CNLC – D2C – 24B

SCHEMATIC



Contacts will transfer from the indicated positions when either coil is energised with polarity as shown

Data Sheet No
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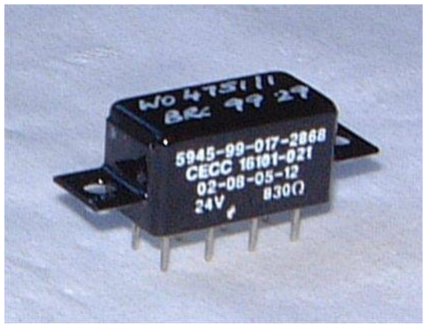
BARNBROOK DATA SHEET

RELAY
TYPE CNU

This is an unsealed version of the of the sealed CN2C relay and is a proprietary component. It is dust proofed by a metal can – tacked to its header. Its mechanism and electrical characteristics can not be quoted in detail since full testing and classification to Def Spec and BS 9151 has not been fully carried out



Key Features

- Unsealed
- Dust proof

Specification

Electrical

Contact material	Gold Plated Silver Alloy
Contact rating (Resistive) and Life	2 A at 28 V dc 10^5 operations 1 A at 115 V ac 10^5 operations

Environmental and Physical

Weight	0.3 oz (8.5 gm) approx.

Dimensions

21.08 mm x 10.92 mm x 11.18 mm

Ordering Information

Quote Part Number from options below together with required coil voltage.

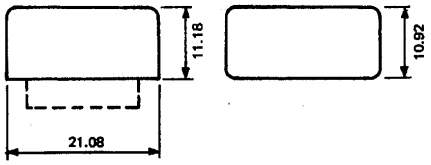
COIL DATA

A selection of the range of coils/sensitivities available is set out below. To suit special requirements non-standard coil values are available on request.

Nominal Coil Voltage	Nominal Coil Resistance Ω at 25 °C	Operate Voltage Range at 125 °C	Must Operate Voltage At 25 °C	Must release Voltage at 80 °C	Coil Code
5	41 +/-6%	3.4 - 7.0	3.0	0.15	101
6	61.5 +/-8%	4.3 - 8.5	3.6	0.18	102
12	320 +/-10%	9.7 - 19.0	7.2	0.36	106
24	1000 +/-10%	18.4 - 33.5	14.4	0.72	110
26.5	1250 +/-10%	20.0 - 37.0	15.9	0.80	111

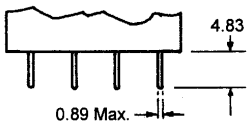
Mounting Styles

The Relay is offered in one mounting style only

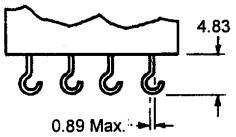


Termination	Part No.
A	507/1/10371
B	507/1/10372

Terminations



Style B – Straight Pins



Style A – Solder Hooks

Data Sheet No
DSRELCNU

SHEET 1 OF 1

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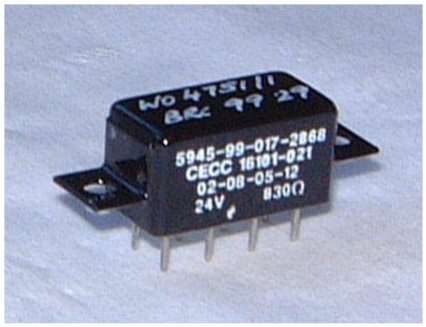
AS9100D CERTIFIED ISO 9001

BARNBROOK DATA SHEET

RELAY
TYPE CN

This is an hermetically sealed half crystal can size relay embodying a balanced armature system which gives excellent performance under extreme environmental conditions.
Increased reliability is ensured by filling the relay with an inert gas before sealing



Key Features

- Hermetically sealed.
- Balanced force armature.
- Excellent performance under extreme conditions.

Specification

Electrical

Contact resistance	50 mΩ max. (initial) measured as follows: Light duty contacts – 5 V 10 mA Low level contacts – 10mV 10 mA
Operate time	5 mS max. (at nominal coil voltage)
Release Time	5 mS max.
Bounce Time	3 mS max. (at nominal coil voltage)
Endurance Test	10^5 operations at 60 operations per minute and 125 °C. Contacts switching 2A at 28V dc (resistive)
Missed operations Test	On request
Switching Rate	Capable of 300 ops per min. at maximum contact load
Maximum Permissible Coil Dissipation	0.8W at 125 °C
Voltage Proof	500 V rms at 50 Hz
Insulation Resistance	500MΩ at 500V dc
Capacitance Data	0.7 pf between open contacts 1.5 pf between changeover sets 2.7 pf between N/C contact and can 1.3 pf between/O contact and can 2.0 pf between coil and moving contact 1.0 pf between coil and N/O contact
Contact arrangement	2C
Contact material	Gold Plated Silver Alloy
Contact Rating/Life	2A (resistive) at 28V dc - 10^5 ops 1A (resistive) at 115V ac - 10^5 ops
Approvals	Full approval to Def 5165 style SM5U Designed to meet the requirements of BS 9515. F001 Conforms generally to MIL.R.5757

For all inductive loads an adequate contact protection and spark quenching circuit must be fitted.

Environmental and Physical

Weight	0.3 oz (8.5 gm) – plain can type
Volume	0.13 in^3 (2130 mm^3)
Temperature Category	-65 °C to +125 °C
Humidity Classification	BS 2011 Test 2Z/ABDM
Vibration	BS 2011 Part 2Fc 1.5 mm amplitude, 10 to 60 Hz 196 m/s^2 (20 g). 60 to 2000 Hz
Acceleration	BS 2011 Part 2Ga. 490 m/s^2 (50 g)
Bump	BS 2011 Part 2Eb. 4000 bumps, 390 m/s^2 (40 g)
Shock	BS 2011 Part 2Ea. 490 m/s^2 (50 g)11 ms

Dimensions

See sheet 2 for dimensional details

Ordering Information

See sheet 5 for details of how to order.

Data Sheet No
DSRELCN

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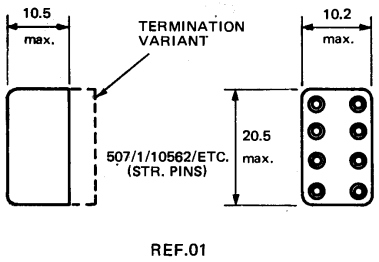
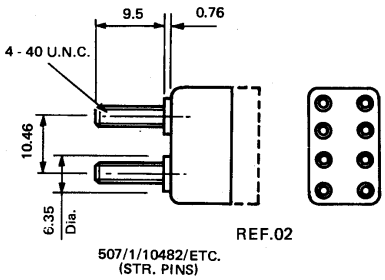
Mounting Variants

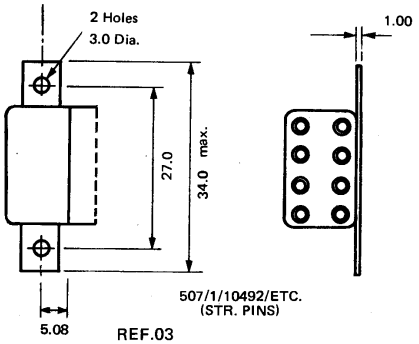
All dimensions are in millimetres.
Tolerances ±0.25 unless otherwise stated. Can dimensions shown in Ref 01 apply to all variants. All termination styles are allowable.



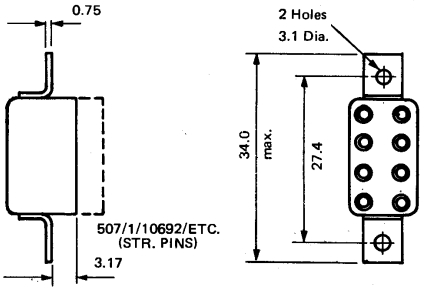
REF.01



REF.02



REF.03



REF.05

Termination Details

Terminal pins are spaced on 5.08mm centres to conform with standard printed circuit grid spacings.

A degree of care is required when installing the relay, since mishandling could affect the sealing properties of the glass to metal seals around the terminations. Twist and pull tests, if carried out during acceptance tests, should not exceed the following :-

TWIST – At a point not nearer than 4 mm to the base, the pin is gripped and bent through 90º, the pin is then twisted 90º to the right, followed by a twist 180º to the left.

TENSILE – A pull of not more than 1Kg is exerted along the axis of the pin.

It should be noted that the Twist and Tensile tests detailed above are destructive.

When soldering to terminations, a bit temperature of 270º should not be exceeded.

Alternatively, solder bath temperature should not exceed 270º and immersion should not be longer than 5 seconds.

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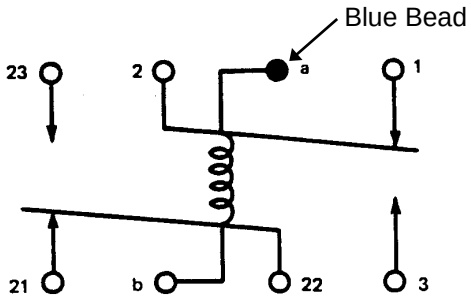
Identification

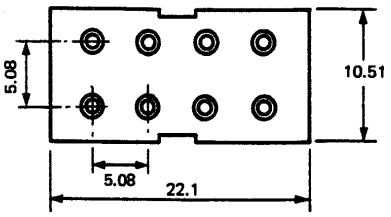
Each relay is marked on the top of the can with the schematic diagram. On the side of the can are marked the Ordering Part Number, the Coil Voltage and the NATO Stock Number (where applicable).

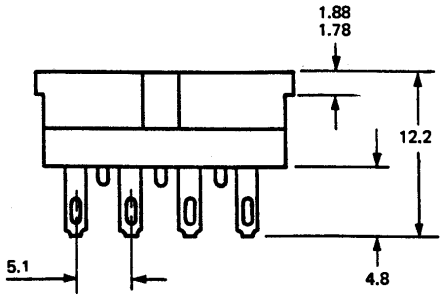
Schematic



The relay is enclosed in a cupro-nickel can, which is finished with epoxy paint. The terminations are tin plated to facilitate solder connections.

Plug-in Capability





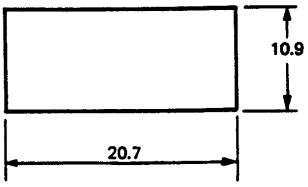
The socket illustrated here is available with mounting style 507/1/10562 and the socket terminations are suitable for direct wiring connections.

The socket is secured in the chassis by use of a retaining spring and the relay is secured in the socket by use of a retaining spring fixing clip.

Part Numbers are as follows :

Socket	507/1/02096
Socket Retaining Spring	507/2/02093
Relay Retaining Clip	507/4/10501
Full Assembly	507/1/10844/000

Panel Cut-Out



All dimensions are in millimetres

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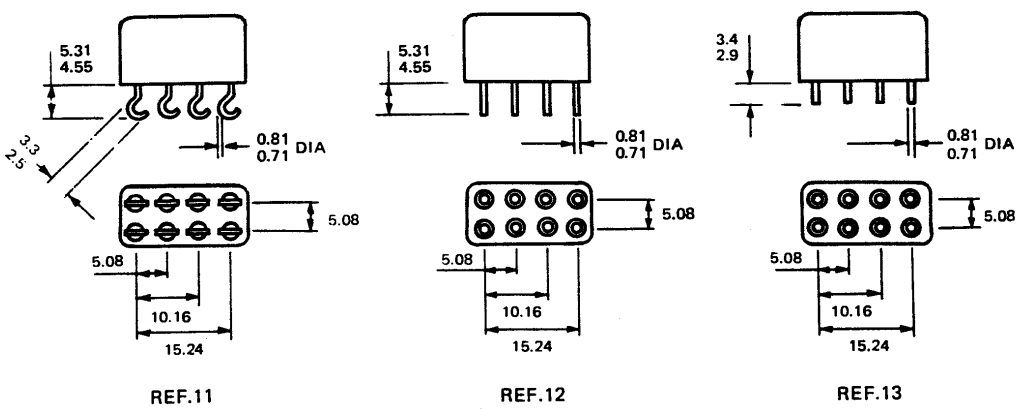
Termination Variants



Tolerances ±0.25 unless otherwise stated

All dimensions are in millimetres

A range of coils/sensitivities available to fulfil the requirements of Def 5165 and BS 9151, is reproduced in the table below. To suit special requirements non-standard coil values are available on request

Coil Data

Nominal Coil Voltage	Nominal Coil Resistance Ω at 25 °C +/-10%	Operate Voltage Range at 125 °C	Must Operate Voltage At 25 °C	L.C. Current mA	Must Release Current mA	Sensitivity at 25 °C and L.C. Current mW	Coil Code	BS 9151 Coil Variant Code
6	42	5.2 - 7.5	3.6	75	6.4	260	116	02
12	210	10.5 - 16.0	7.2	30	3.3	208	117	05
24	830	21 - 32	14.4	15.5	1.8	220	118	08
48	2800	42 - 58	28.8	8.7	0.9	233	119	11
6	60	5.2 - 8.5	3.6	53	6.1	185	102	
12	320	10.5 - 19.0	7.2	20	2.4	141	106	
24/26.5	1250	21 - 37	14.4	10.4	1.3	149	111	09
48	3500	42 - 63	28.8	7.3	0.8	205	114	

The Socket Assembly Part Number is 507/1/10844

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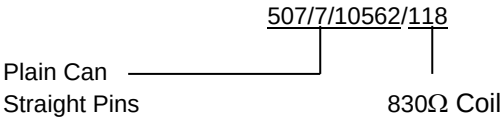
Ordering Information

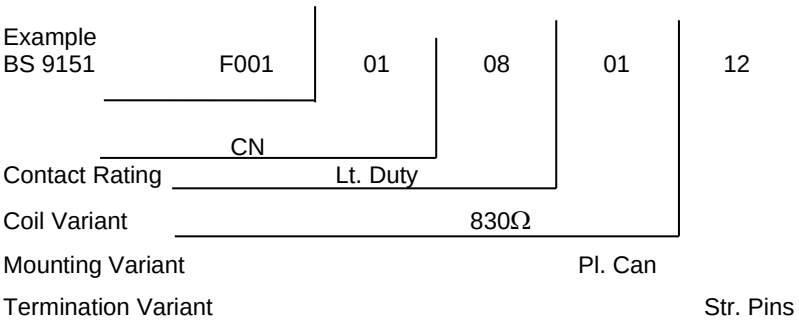
The ordering Part Number comprises two basic functions.
The first gives the mounting and termination style and the second is the coil code obtained from the 'Coil Data' table.

Example



Alternatively, when BS 9151 is implemented, relays may be ordered to that specification. In this case the following information should be provided.:

(1) BS Number of the detail specification
(2) Code number in the order as follows:
Two digits for contact rating.
Two digits for coil variant.
Two digits for mounting variant.
Two digits for termination variant.



Note

1. Setting (or calibration) of CN relays is carried out using a constant current source, ensuring maximum sensitivity. This is not always achieved with voltage setting methods since variations in coil resistance due to ambient temperature and winding tolerance would not permit a fixed current value to be drawn from a constant voltage source.
2. The 'Limit Circuit Current' quoted is the minimum value of current which must be available to the coil for the relay to operate satisfactorily under the environmental conditions stated. All relays are tested at a lower value of current to ensure satisfactory operation throughout their life.
3. Operate voltage ranges are quoted at 125 °C. At lower ambient temperature, the operating voltage range will be wider since the increase in coil resistance due to temperature will be smaller

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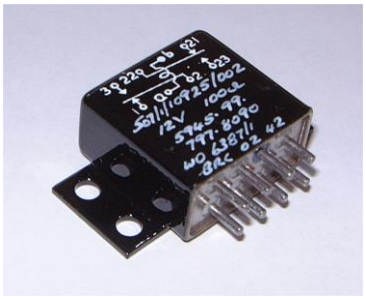
BARNBROOK DATA SHEET

RELAY TYPE CS



The CS Relay is an hermetically sealed relay in the crystal can size range.
The balanced armature provides excellent performance under conditions of shock, acceleration and vibration
The welded construction is a further asset, ensuring increased reliability and the relay is filled with an inert gas before sealing

Key Features

- Hermetically sealed.
- Balanced force armature.
- Excellent performance under conditions of shock, acceleration and vibration.

Specification

Electrical

Contact resistance	03, medium duty contacts 30 mΩ max. initial measured at 5V with 1A max.
Operate time	7 ms
Release Time	7 ms
Bounce Time	5 ms max.
Endurance Test	10^5 operations at 125 °C, 1200 operations per hour max. Contacts loading 28V dc 10 amp resistive.
Contact Rating and Life	Max. contact voltage 32V dc 115V ac 400 Hz Min. contact voltage 5V dc or ac Max. contact current 10A dc or ac rms Min.contact current 1A dc or ac rms
Missed operations Test	On request
Switching Rate	Capable of 20 ops per min. at maximum contact load
Maximum Permissible Coil Dissipation	3W at 25 °C, 2W at 125 °C
Voltage Proof:	
All styles less bridge mounting	1000 V rms 50/60 Hz
Bridge mounting style	As above but open and closed contacts to frame and
507/1/10939/003 to 103	Coil 1600V rms 50/60 Hz
Insulation Resistance	1000MΩ min. at 500V dc
Contact arrangement	2C
Contact material	Silver

Environmental and Physical

Weight	35 gm max.
Temperature Category	-65 °C to +125 °C
Vibration	0.4 double amplitude 10 to 60 Hz 196 m/s^2 (20 g). 60 to 1500 Hz
Acceleration	490 m/s^2 (50 g)
Bump	4000 bumps, 390 m/s^2, 40 g, 6ms.
Shock	490 m/s^2, 50 g, 11 ms.

Dimensions — See sheet 2 and 3 for dimensional details

Ordering Information — See sheet 5 for details of how order.

Data Sheet No
DSRELCS

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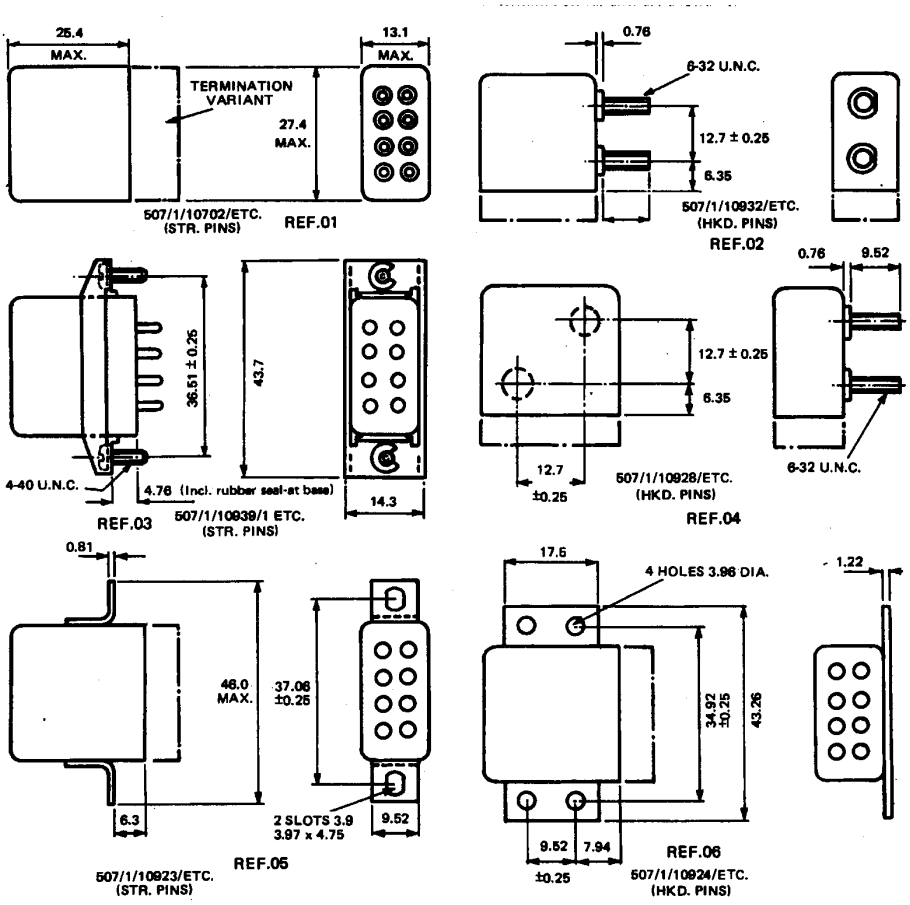
RELAY
TYPE CS

Mounting Variants

All dimensions are in millimetres.
Tolerances ±0.40 unless otherwise stated. Can dimensions shown in Ref 01 apply to all variants.
All terminations are allowable.



Identification

Each relay carries adequate identifying data which is printed on the side of the can:

Part Number
Schematic Diagram
Voltage
Manufacturing Date Code
Contact Code

The relay is enclosed in a cupro-nickel can, which is finished with epoxy paint.
Terminations are tin plated to facilitate solder connections.

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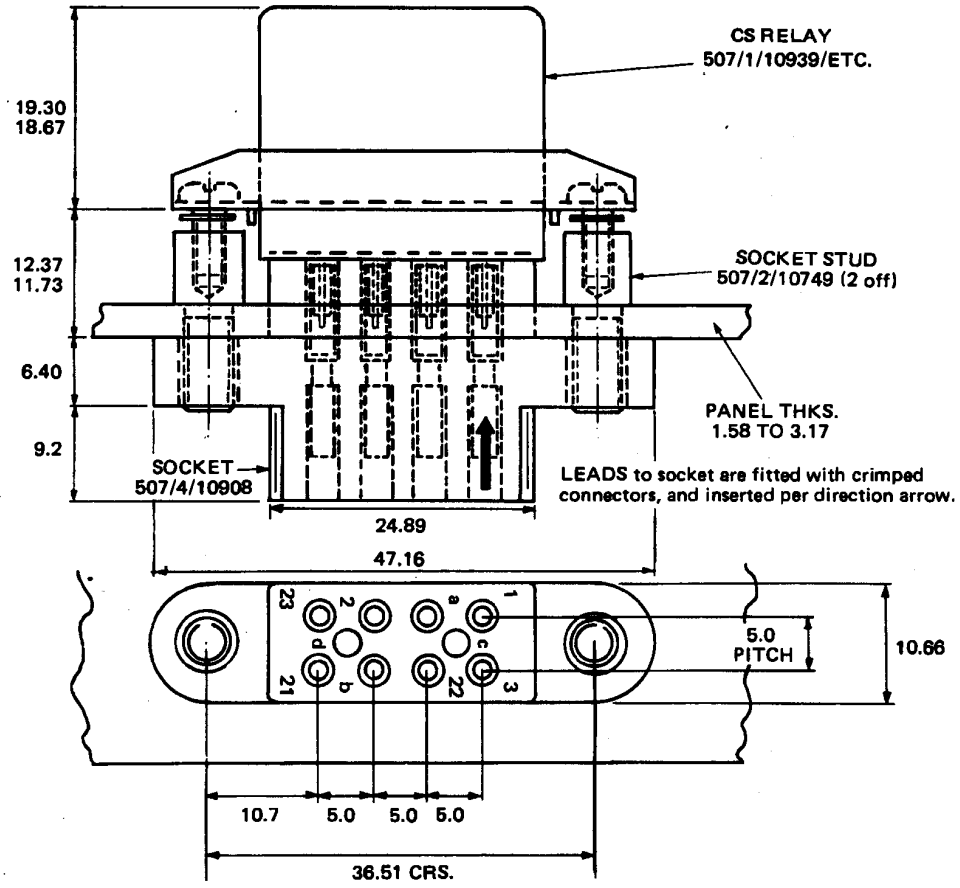
RELAY
TYPE CS

Plug-in Facility



All dimensions are in millimetres

Coil Variants

A range of coils to suit DEF 5165 and BS 9151 is available as under. Special requirements are catered for, on request

Resistance (Ω) at 25 °C (Tol.+/-10%)	Rated dc Voltage	Rated dc Voltage Range over the Operating temp. Range	Saturate Voltage dc	Pull-in Voltage dc	Drop-out Voltage dc	BS 9151 Coil Variant Code	Barnbrook Coil Code
25	6.0	5.25 - 7.20	75	3.5	0.35	01	001
100	12.0	10.50 - 14.40	30	7.0	0.70	02	002
440	24.0	21.00 - 28.80	15.5	14.5	1.50	03	003
1570	48.0	42.00 - 56.60	7.3	30.0	3.00	04	004

For all inductive loads an adequate contact protection and spark quenching circuit must be fitted

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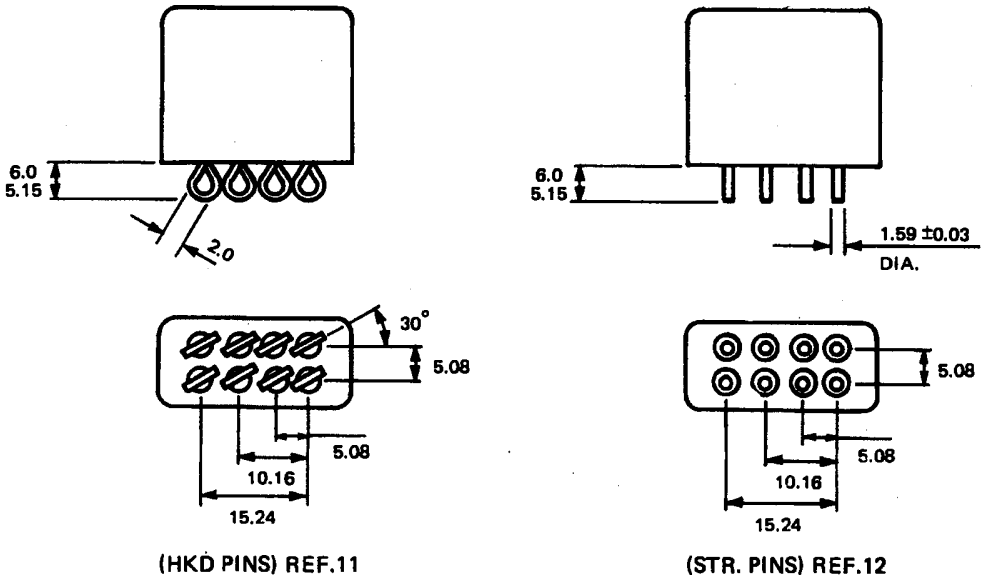
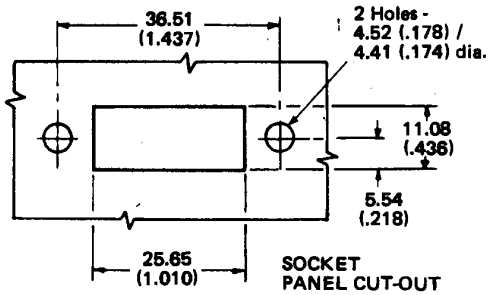
Terminations



Tolerances ±0.25 unless otherwise stated

All dimensions are in millimetres

Socket – Panel Cut out



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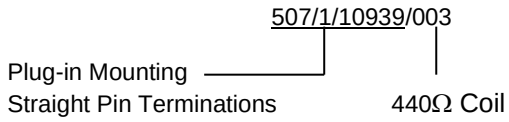
RELAY TYPE CS

Ordering Information

The ordering Part Number comprises two basic functions.
The first gives the mounting and termination style and the second is the coil code obtained from the 'Coil Data' table.

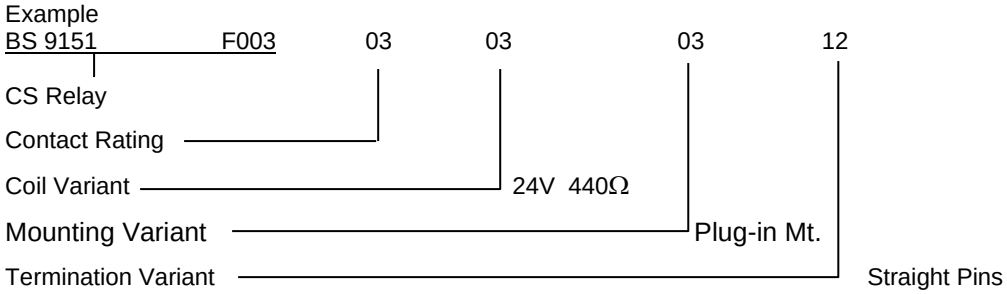
Example



Alternatively, when BS 9151 is implemented, relays may be ordered to that specification. In this case the following information should be provided.:

(1) BS Number of the detail specification
(2) Code number in the order as follows:
Two digits for contact rating.
Two digits for coil variant.
Two digits for mounting variant.
Two digits for termination variant.

Example



507/1/10939/003 Manufacturing Part Number.
(Indicate rubber seal if required additionally.

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Section 3

RELAYS (DEFENCE)

FORMERLY DEUTSCH

BARNBROOK DATA SHEET

RELAY

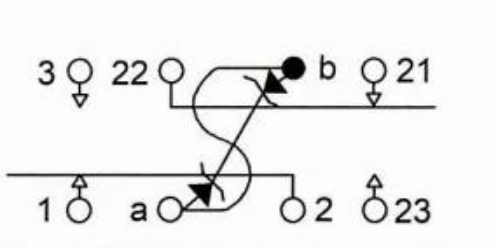
TYPE 78283

78283
24 Vdc 2PDT CRYSTAL CAN RELAY

Key Features

- Hermetically Sealed
- Meets requirements of BS9000
- Inbuilt Suppression
- Low Level to 5A Switching
- Supplied with rubber gasket for effective sealing
- Non-polarised coil design

Schematic



Specification

General

Contact Arrangement	2 Pole changeover (2PDT)
Weight	21 grams including mounting hardware and gasket
Mating Bases	Solder Contacts – Order Part No. 4223-1 Crimp Contacts – Order Part No. 420204

Performance

Coil Resistance	675 Ω ± 10%
Coil Nominal Volts	24.0 Vdc
Coil Maximum Volts	32.0 Vdc
Must Operate	20.0 mA / 14.4 V DC
Must Release	2.0 mA / 1.5 V DC
Approximate Coil Inductance	725 mH at 1kHz
Nominal Coil Power	0.85 W ± 10%
Contact Rating/Life	5A resistive, 10^5 operations at 28 Vdc 1A resistive, 10^5 operations at 115 V_{rms} 400 Hz Low level 10^6 operations (Typical, 5 Vdc, 10mA)
Mean Mechanical Life	5 x 10^6 Operations
Operate Time	5 ms max. (excluding bounce)
Release Time	5 ms max. (excluding bounce)
Bounce Time	3 ms max.

All measurements at 25°C and nominal voltage

Data Sheet No
DS78283

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Environmental

Temperature Range	-65°C to +125°C
Shock	490 m/s^2 (50g) for 11 ms
Vibration	60 to 2,000 Hz at 196 m/s^2 (20g) 10 to 60 Hz at 1.5 mm amplitude
Linear Acceleration	490 m/s^2 (50g)
Bump	4000 bumps at 390 m/s^2 (40g) 6 ms duration
Climatic	BS EN 60068-2-61:1994 Test Z/ABDM procedure 1
Salt Mist	BS EN 60008-2-52:1996 Part 2 Test Kb severity 2

Electrical

Contact Resistance	50 mΩ max measured at open circuit voltage of 5 V and current of 10 mA
Insulation Resistance	500 MΩ min – between any two isolated terminals 500 MΩ min – between terminals and case Measured at 500 VDC and +25ºC
Dielectric Strength	1000 V_{rms}, 50 Hz, at sea level, between contacts and case and between the two sets of contacts 750 V_{rms}, 50 Hz, at sea level, between open contacts of a set and coil to case.

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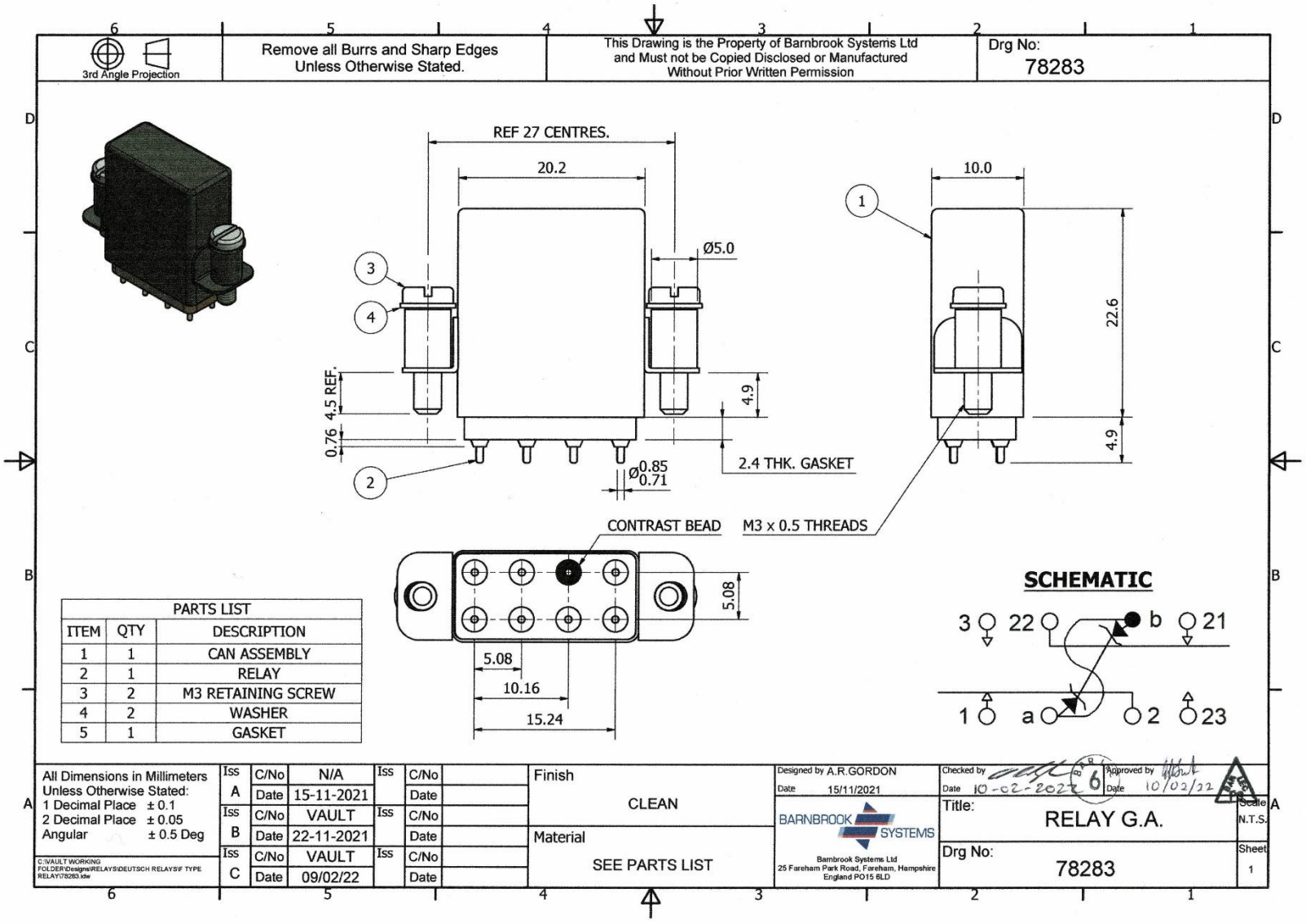
BARNBROOK DATA SHEET

RELAY

TYPE 78283



PARTS LIST		
ITEM	QTY	DESCRIPTION
1	1	CAN ASSEMBLY
2	1	RELAY
3	2	M3 RETAINING SCREW
4	2	WASHER
5	1	GASKET

All Dimensions in Millimeters
Unless Otherwise Stated:
1 Decimal Place ± 0.1
2 Decimal Place ± 0.05
Angular ± 0.5 Deg

C:\VAULT WORKING FOLDER\Designs\RELAYS\DEUTSCH RELAYS\# TYPE RELAY\78283.idw

Iss	C/No	Date
A	N/A	15-11-2021
B	VAULT	22-11-2021
C	VAULT	09/02/22

Finish: CLEAN

Material: SEE PARTS LIST

Designed by A.R.GORDON Date 15/11/2021

Checked by Date 10-02-2022

Approved by Date 10/02/22

BARNBROOK SYSTEMS

Barnbrook Systems Ltd
25 Fareham Park Road, Fareham, Hampshire England PO15 6LD

Title: RELAY G.A.

Drg No: 78283

Scale N.T.S.

Sheet 1

Data Sheet No
DS78283

SHEET 3 OF 3

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AS9100D CERTIFIED ISO 9001

BARNBROOK DATA SHEET

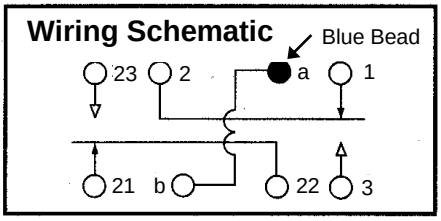
Formerly
DEUTSCH LTD
RELAY

HDD1
2PDT CRYSTAL CAN RELAY

TYPE HDD1

Key Features

- Hermetically Sealed
- Low level switch
- Double compartment sealing
- Equivalent to BS9151 F0029



Specification

General

Contact Arrangement	2 Pole changeover (2PDT) break before make
Weight	18 gm (mounting style 01)
Mating Bases	Solder Contacts – Order Part No. 4223-1 Crimp Contacts – Order Part No. 420204

Performance

Contact Rating/Life	2A resistive, 10^5 operations at 28 VDC 1A resistive, 10^5 operations at 115 VAC 400 Hz 1A inductive, 10^5 operations at 28 VDC Low level10^6 operations
Operate Time	5 ms max. at 20ºC with nominal voltage (excluding bounce)
Release Time	3 ms max. at 20ºC with nominal voltage (excluding bounce)
Bounce Time	3 ms max. at 20ºC with nominal voltage

Environmental

Temperature Range	-65ºC to +125ºC
Bump	4000 bumps at 390 m/s^2 (40g), 6ms duration
Shock	490 m/s^2 (50g) for 11 ms
Vibration	60 to 2000 Hz at 147 m/s^2 (15g) acceleration 10 to 60 Hz at 1mm amplitude
Climatic	BS 2011 test Z/ABDM procedure 1
Salt Mist	BS 2011 part 2.1 Kb severity 2

Ordering Information

See sheet 4

Data Sheet No
DSHDD1

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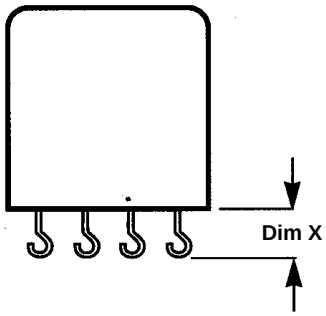
RELAY
TYPE HDD1

Electrical

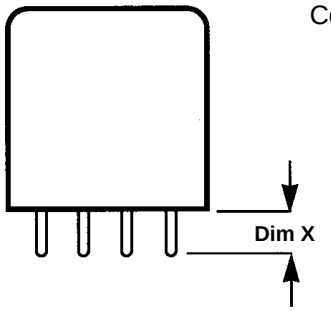
Contact Resistance	50 milliohms max at 10 mV
Insulation Resistance	500 MΩ minimum at 500 Vdc
Dielectric Strength	500 Vrms, 50 Hz at sea level 350 Vrms at 70,000 ft
Coil Sensitivity	Min. operate power 100 mW
Capacitance	Contact to case 1.4 pF Between open contacts 0.3 pF Between contact sets 0.2 pF Coil to case 24 pF

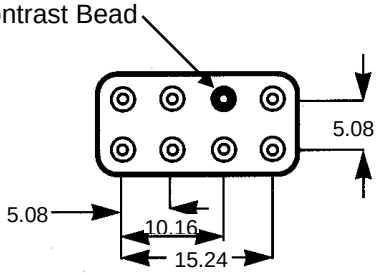
TERMINATION VARIANTS

Solder Hooks 'H'



Straight Leads 'A' or 'S'





Dimensions in mm

HD	Type	Dim. X mm.
H	Solder Hook	4.69
S	Straight Lead	5.08
A	Straight Lead	7.92

Data Sheet No
DSHDD1

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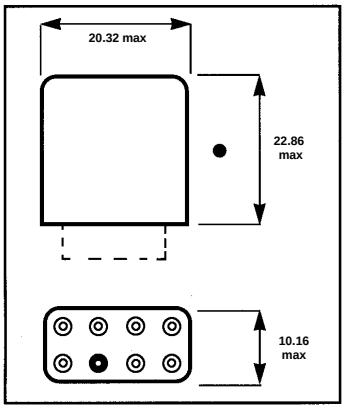
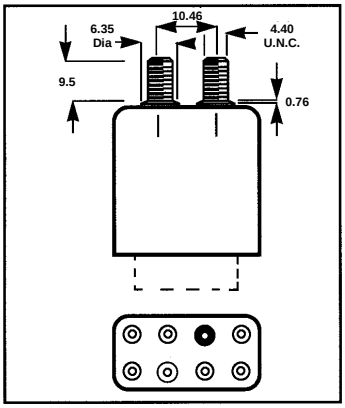
RELAY
TYPE HDD1

MOUNTING VARIANTS

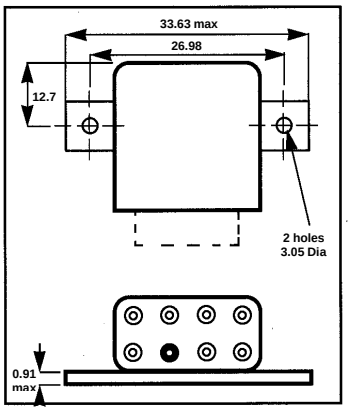
HD Style 01



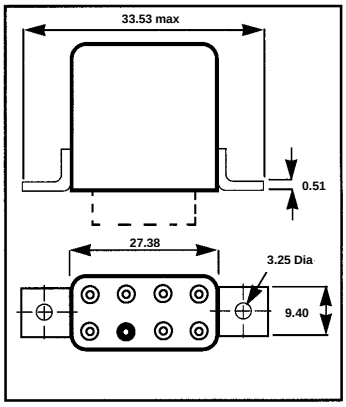
HD Style 15



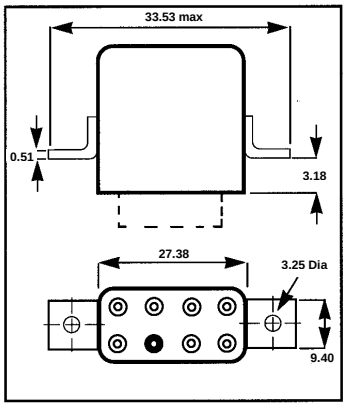
HD Style 09



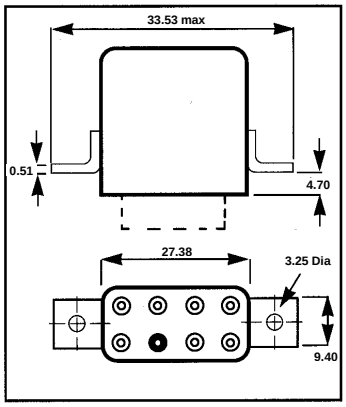
HD Style 02



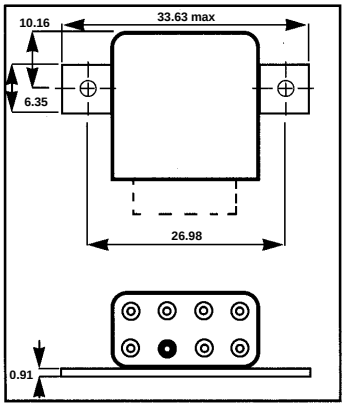
HD Style 03



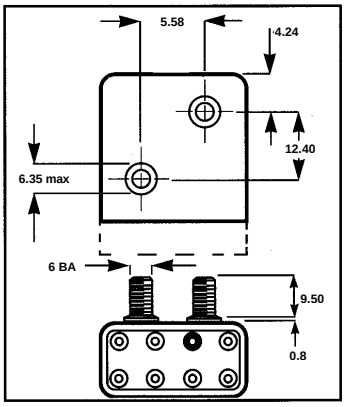
HD Style 06



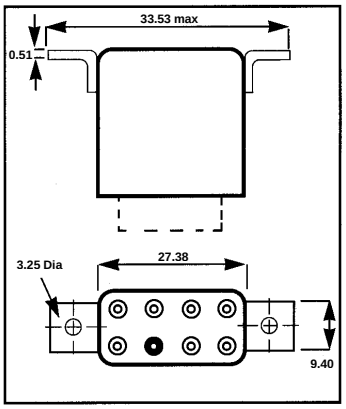
HD Style 07



HD Style 13



HD Style 19



All dimensions are in millimetres

● Blue bead

Data Sheet No
DSHDD1

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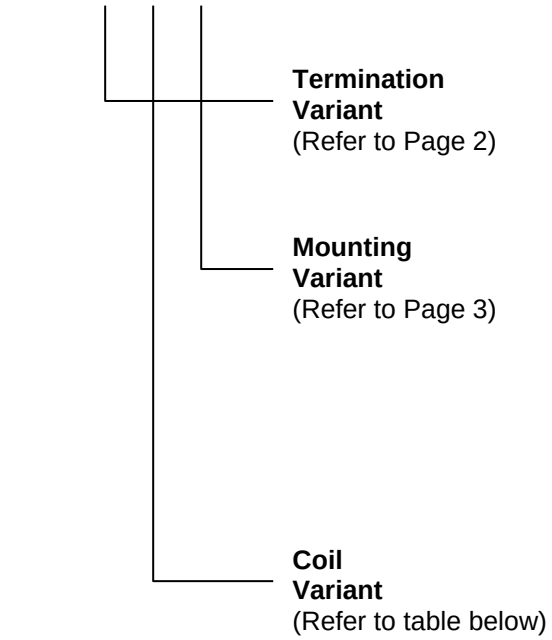
ORDERING INFORMATION

HDD1S-C2-E01



COIL VARIANTS AND OPERATING CHARACTERISTICS

HD Coil Reference	Nominal Operate Voltage VDC	Coil Resistance Ohms ±10% at 20°C	Must Operate Current mA	Must Drop Out Current mA
B2	3	31.25	56.8	5.6
C2	6	125	28.4	2.8
D2	9	280	18.9	1.9
E2	12	500	14.2	1.4
M2	17-18	1000	10.0	1.0
F2	24	2000	7.1	0.7
J2	32	3555	5.3	0.5
G2	48	8000	3.6	0.3

All values are measured at 25˚C

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BARNBROOK DATA SHEET

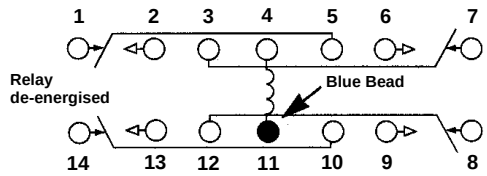
Formerly
DEUTSCH LTD
RELAY

HDD4/BS9151 F0030
4PDT CRYSTAL CAN RELAY

TYPE HDD4

Key Features
- Hermetically Sealed
- Low level to 1A switching
- Double compartment sealing

Wiring Schematic



Specification

General

Contact Arrangement	4 Pole changeover (4PDT) break before make.
Weight	18 gm (mounting style 01)
Mating Bases	Solder Contacts – Order Part No. 418703 Crimp Contacts – Order Part No. 418538 or 418665

Performance

Contact Rating/Life	1A resistive, 10^5 operations at 28 VDC 0.35A inductive, 10^5 operations at 28 VDC 0.5A resistive, 10^5 operations at 115 VAC, 400 Hz Low level,10^6 operations
Operate Time	5 ms max. at 20°C with nominal voltage (excluding bounce)
Release Time	5 ms max. at 20°C with nominal voltage (excluding bounce)
Bounce Time	3 ms max. at 20°C with nominal voltage

Environmental

Temperature Range	-65ºC to +125ºC
Shock	490 m/s^2 (50G) for 11 ms
Vibration	60 to 2000 Hz at 147 m/s^2 (15g) acceleration 10 to 60 Hz at 1mm amplitude (Applies to mounting variant 01)
Linear acceleration	490 m/s^2 (50g)
Bump	4000 bumps at 392 m/s^2(40g), 6ms duration. (If applicable)
Climatic	BS 2011 test Z/ABDM procedure 1
Salt Mist	BS 2011 part 2.1 Kb severity 2

Ordering Information See sheet 4

Data Sheet No
DSHDD4

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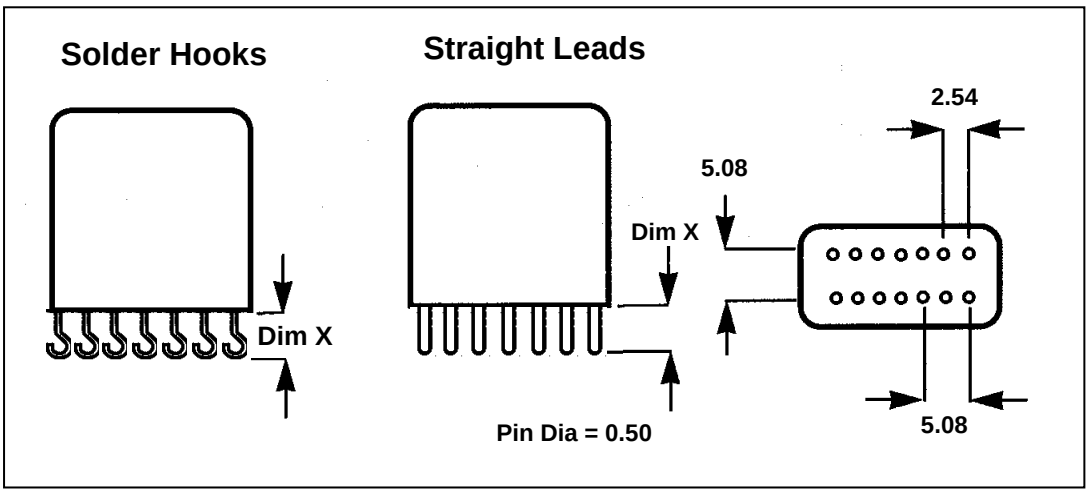
RELAY
TYPE HDD4

Electrical

Contact Resistance	Code 01 contacts - 70 mΩ max measured with an open circuit voltage of 5V max and current of 10 mA max. Code 02 contacts - 70 mΩ max measured with an open circuit voltage of 10mV max and current of 10 mA max.
Insulation Resistance	500 MΩ minimum between any two isolated terminals measured at 500 VDC and 20°C
Dielectric Strength	500 VRMS, 50 Hz at sea level 350 VRMS, 50 Hz at 20 millibar (87,000ft) air pressure
Capacitance	Contact to case 1.5 pF Between open contacts 0.28 pF Between contact sets 0.1 pF Coil to case 24 pF

TERMINATION VARIANTS

HD Style	BS Style	Type	Dim.X in mm.
A	-	Straight	7.92
B	-	Straight	12.70
C	13	Straight	25.40
H	11	Hooks	-
L	-	Straight	76.20
S	12	Straight	5.08



Data Sheet No
DSHDD4

Design authority and manufacture by Barnbrook Systems Limited
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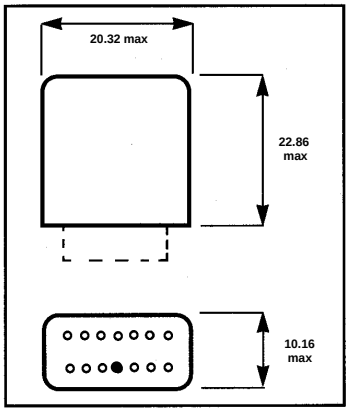
TEL NO: +44(0)1329 847722 E-mail: sales@barnbrook.co.uk www.barnbrook.co.uk

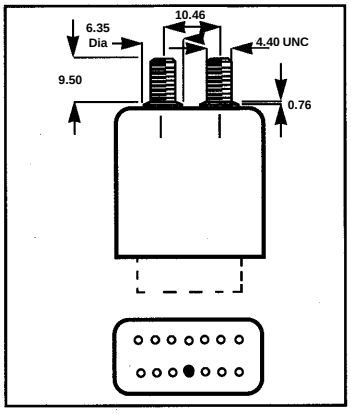
RELAY
TYPE HDD4

MOUNTING VARIANTS

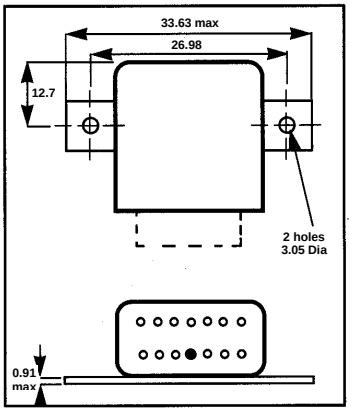
HD Style 01 BS Style 01



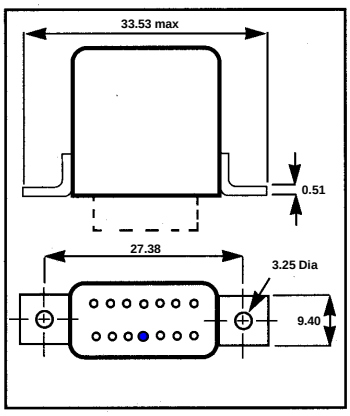
HD Style 15 BS Style 02



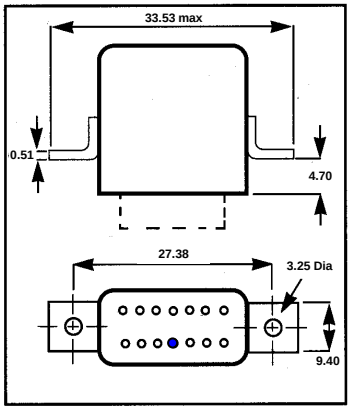
HD Style 09 BS Style 03



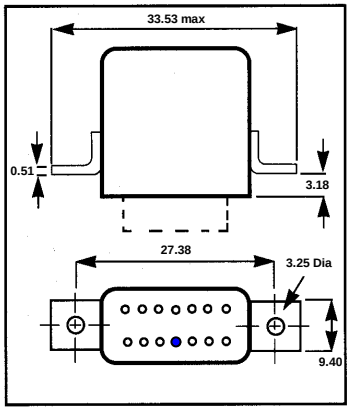
HD Style 02 BS Style 04



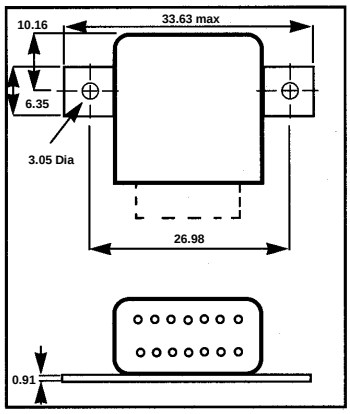
HD Style 06 BS Style 06



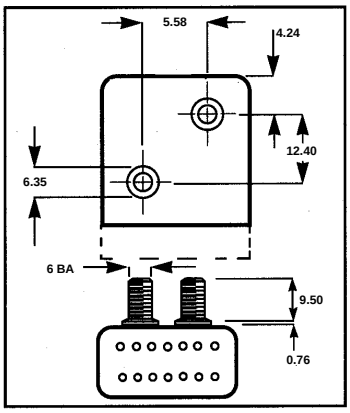
HD Style 03 BS Style 05



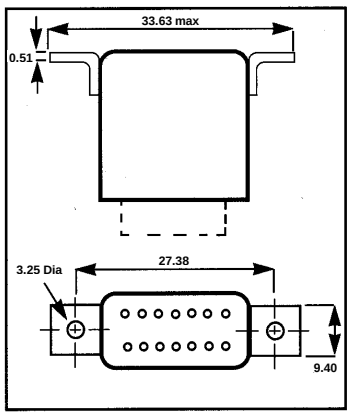
HD Style 07 BS Style 07



HD Style 13 BS Style 09



HD Style 19 BS Style 10



All dimensions are in millimetres
Tolerances ± 0.25 unless otherwise stated

● **Blue Bead**

Data Sheet No
DSHDD4

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TEL NO: +44(0)1329 847722 E-mail: sales@barnbrook.co.uk www.barnbrook.co.uk

RELAY
TYPE HDD4

ORDERING INFORMATION

BS Types – example part no.:

BS9151-F0030- 02- 04 - 01- 12

Generic Type

Barnbrook Types – example part no.:

HDD4S - F2 - H01

Generic Type

Termination Variant	
BS	**HD**
11	H
12	S
13	C
-	A
-	L

(Refer to page 2)

Mounting Variant	
BS	**HD**
01	01
02	15
03	09
04	02
05	03
06	06
07	07
09	13
10	19

(Refer to page 3)

Coil Variant	
BS	**HD**
01	C2
02	E2
03	M2
04	F2
05	J2
06	G2

(Refer to table below)

Contact Rating	
01	Light Duty
02	Low Level Switching

(Refer to page 2)

COIL VARIANTS AND OPERATING CHARACTERISTICS

HD Coil	BS Coil	Nominal Operating Voltage (VDC)	Coil Resistance (Ohms +/- 5% at 20°C)	Must Operate Current (mA)	Must Drop Out Current (mA)
A2	-	1.5	4.0	228	22
B2	-	3.0	15.6	114	11
C2	01	6.0	62.0	56.8	5
D2	-	9.0	140	38.0	3
E2	02	12.0	250	28.4	2
M2	03	18.0	500	20.2	1.5
F2	04	24.0	1000	14.2	1.2
J2	05	32.0	1700	10.7	1.0
G2	06	48.0	4000	7.1	0.7

All values are measured at 25˚C

Data Sheet No
DSHDD4

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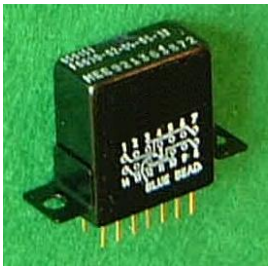
BARNBROOK DATA SHEET

RELAY

TYPE HDD4-2A

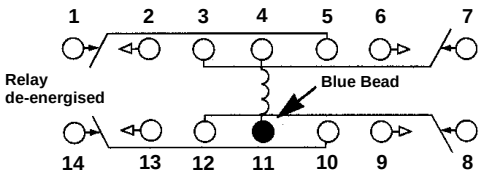
HDD4-2A
4PDT CRYSTAL CAN RELAY



Key Features

- Hermetically Sealed
- Low level to **2A** switching
- Double compartment sealing

Wiring Schematic



Specification

General

Contact Arrangement	4 Pole changeover (4PDT) break before make.
Weight	18 gm (mounting style 01)
Mating Bases	Solder Contacts – Order Part No. 418703 Crimp Contacts – Order Part No. 418538 or 418665

Performance

Contact Rating/Life	**2A** resistive, 10^5 operations at 28 VDC 0.35A inductive, 10^5 operations at 28 VDC 0.5A resistive, 10^5 operations at 115 VAC, 400 Hz Low level,10^6 operations
Operate Time	5 ms max. at 20ºC with nominal voltage (excluding bounce)
Release Time	5 ms max. at 20ºC with nominal voltage (excluding bounce)
Bounce Time	3 ms max. at 20ºC with nominal voltage

Environmental

Temperature Range	-65ºC to +125ºC
Shock	490 m/s^2 (50G) for 11 ms
Vibration	60 to 2000 Hz at 147 m/s^2 (15g) acceleration 10 to 60 Hz at 1mm amplitude (Applies to mounting variant 01)
Linear acceleration	490 m/s^2 (50g)
Bump	4000 bumps at 392 m/s^2(40g), 6ms duration. (If applicable)
Climatic	BS 2011 test Z/ABDM procedure 1
Salt Mist	BS 2011 part 2.1 Kb severity 2

Ordering Information

See sheet 4

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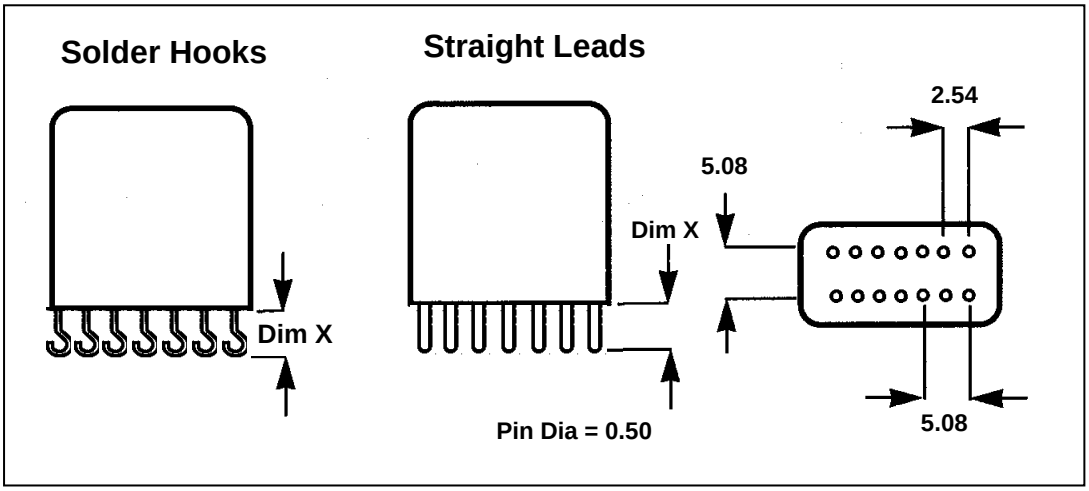
RELAY
TYPE HDD4-2A

Electrical

Insulation Resistance	500 MΩ minimum between any two isolated terminals measured at 500 VDC and 20°C
Dielectric Strength	500 VRMS, 50 Hz at sea level 350 VRMS, 50 Hz at 20 millibar (87,000ft) air pressure
Capacitance	Contact to case 1.5 pF Between open contacts 0.28 pF Between contact sets 0.1 pF Coil to case 24 pF

TERMINATION VARIANTS

HD Style	Type	Dim.X in mm.
A	Straight	7.92
B	Straight	12.70
C	Straight	25.40
H	Hooks	-
L	Straight	76.20
S	Straight	5.08



Data Sheet No
DSHDD4- 2A

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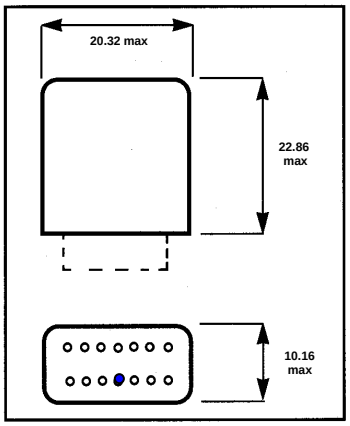
RELAY
TYPE HDD4-2A

MOUNTING VARIANTS

HD Style 01



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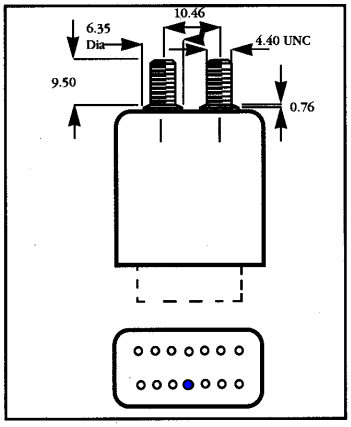
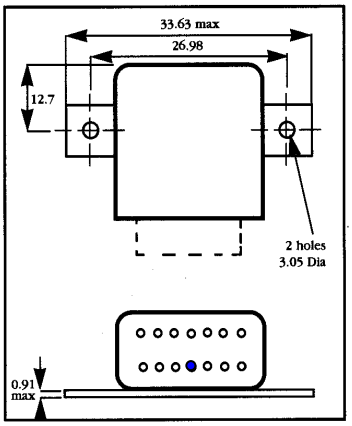
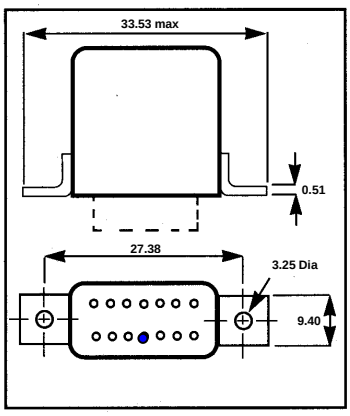


HD Style 09



HD Style 02



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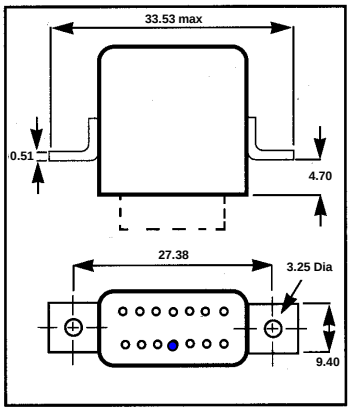
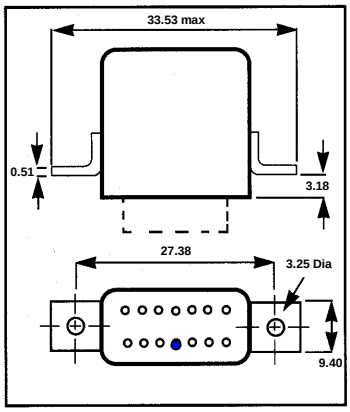
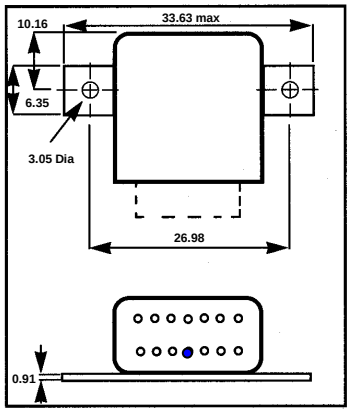


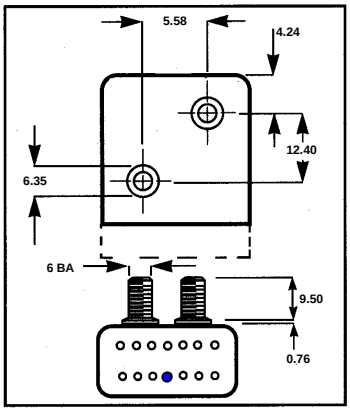
HD Style 03



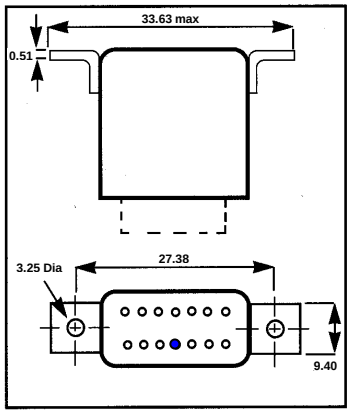
HD Style 07



HD Style 13



HD Style 19



● **Blue Bead**

All dimensions are in millimetres
Tolerances ± 0.25 unless otherwise stated

Data Sheet No
DSHDD4- 2A

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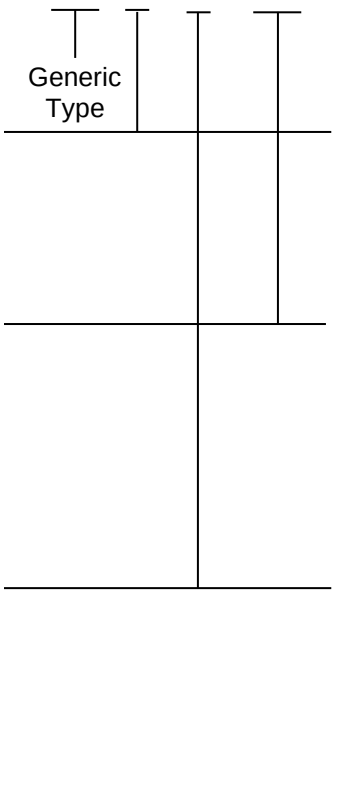
BARNBROOK DATA SHEET

RELAY
TYPE HDD4-2A

ORDERING INFORMATION

Barnbrook Types – example part no.:

HDD4S - F2 - H01



(Refer to page 2)

(Refer to page 3)

(Refer to table below)

COIL VARIANTS AND OPERATING CHARACTERISTICS

HD Coil	Nominal Operating Voltage (VDC)	Coil Resistance (Ohms +/- 5% at 20°C)	Must Operate Current (mA)	Must Drop Out Current (mA)
A2	1.5	4.0	228	22
B2	3.0	15.6	114	11
C2	6.0	62.0	56.8	5
D2	9.0	140	38.0	3
E2	12.0	250	28.4	2
M2	18.0	500	20.2	1.5
F2	24.0	1000	14.2	1.2
J2	32.0	1700	10.7	1.0
G2	48.0	4000	7.1	0.7

All values are measured at 25°C

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AS9100D CERTIFIED ISO 9001

BARNBROOK

DATA SHEET

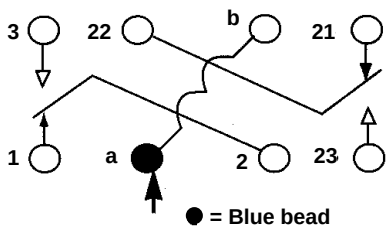
RELAY
TYPE HDS5

HDS5/BS9151 F0026
2PDT HALF CRYSTAL CAN RELAY

Formerly
DEUTSCH LTD
RELAY

Key Features
- Hermetically Sealed
- BS9000 Approval
- Low level capability
- Small size for high density packaging

Wiring Schematic



Specification

General

Contact Arrangement	2 Pole changeover (2PDT) break before make
Weight	8.7 gm (mounting variant 01)
Mating Bases	Solder Contacts – Order Part No. 4223-1
	Crimp Contacts – Order Part No. 42024

Performance

Contact Rating/Life	2A resistive, 10^5 operations at 28 VDC
	1A resistive, 10^5 operations at 115 VAC, 400 Hz
	Low level,10^6 operations (typical 5 VDC, 10 mA)
Mean Mechanical Life	5 x 10^7 operations
Operate Time	3.5 ms nominal, 5 ms max (excluding bounce)
Release Time	1 ms nominal, 5 ms max. (excluding bounce) 01
Bounce Time	3 ms max.

All measurements at 25°C and nominal voltage

Environmental

Temperature Range	-65°C to +125°C
Shock*	490 m/s^2 (50g) for 11 ±1ms
Vibration*	60 to 2000 Hz at 196 m/s^2 (20g) acceleration
	10 to 60 Hz at 1.5 mm amplitude

** Applies to mounting style 01*

Linear Acceleration	980 m/s^2 (100g)
Bump	4000 bumps at 390 m/s^2 (40g) 6ms duration
Climatic	BS 2011 test Z/ABDM procedure 1
Salt Mist	BS 2011 part 2.1 Kb severity 2

Ordering Information See sheet 4

Data Sheet No
DSHDS5-F0026

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BARNBROOK

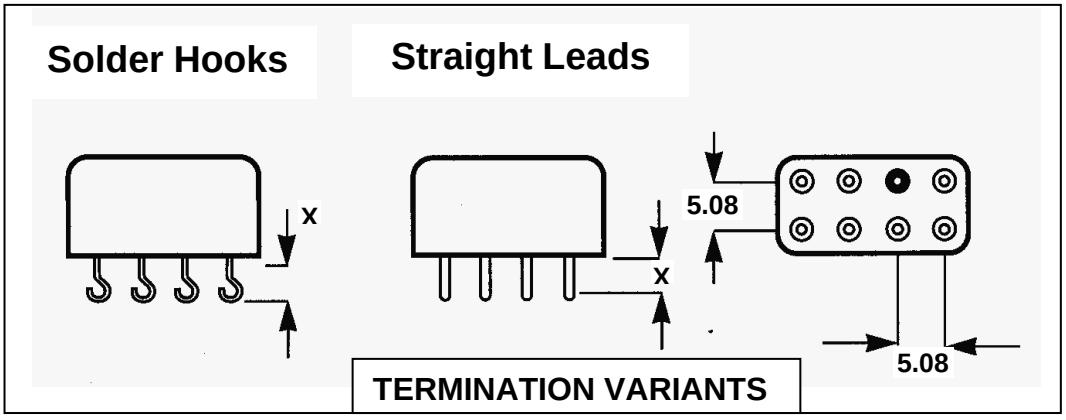
DATA SHEET

RELAY
TYPE HDS5

Electrical

Contact Resistance	Code 01 contacts - 50 mΩ max measured with an open circuit voltage of 5V max and current of 10 mA. Code 02 contacts - 50 mΩ max measured with an open circuit voltage of 10mV max and current of 10 mA.	
Insulation Resistance	500 MΩ minimum - between any two isolated terminals 500 MΩ minimum - between terminals and case. Measured at 500 VDC and 25°C	
Dielectric Strength	500 VRMS 50 Hz, at sea level between terminals and case, between any two sets of contacts and between open contacts. 350 VRMS 50 Hz, at 20 millibar air pressure, between all terminals and case.	
Capacitance	Closed contacts to case	4 pF
	Between contacts of a set	2 pF
	Open contacts to case	2 pF
	Between the two contact sets	4 pF
DEF 5165, Style SM5U	HDS5 relays suitable for use with supply voltages as listed below are specified by the appropriate Style No. /Designation and NATO Stock Number. For performance characteristics, dimensional data, etc. reference should be made to the latest issue of DEF 5165.	

MOUNTING VARIANTS			
HD Style	**BS Style**	**Type**	**Dim.X in mm.**
A	-	Straight	7.92
B	-	Straight	12.70
C	-	Straight	25.40
H	11	Hooks	5.08
L	-	Straight	76.20
S	12	Straight	5.08



Data Sheet No
DSHDS5-F0026

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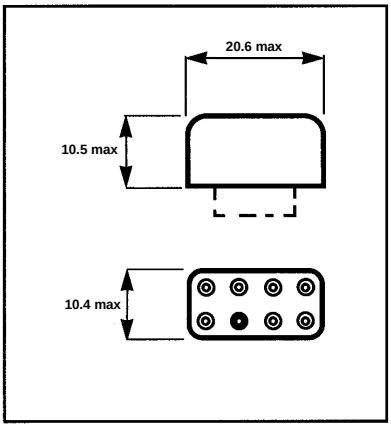
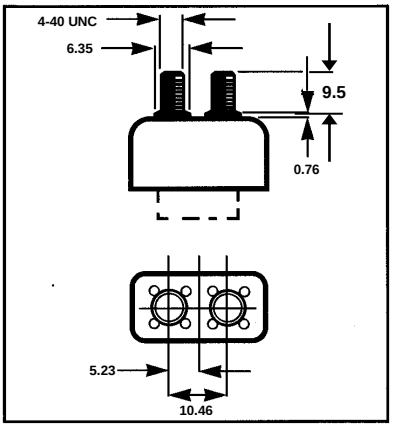
AS9100D CERTIFIED ISO 9001

MOUNTING VARIANTS

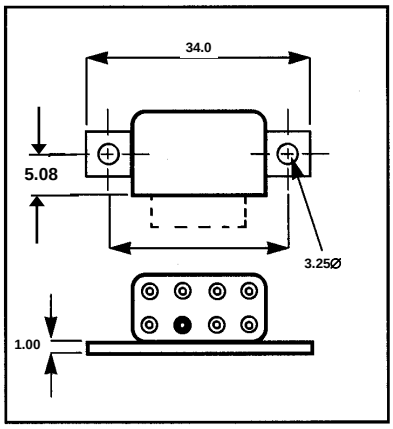
BS Ref 01 HD Ref 21



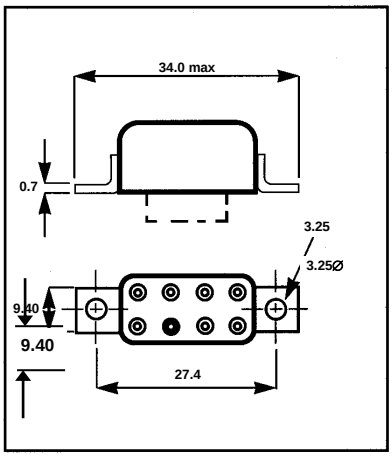
BS Ref 02 HD Ref 26



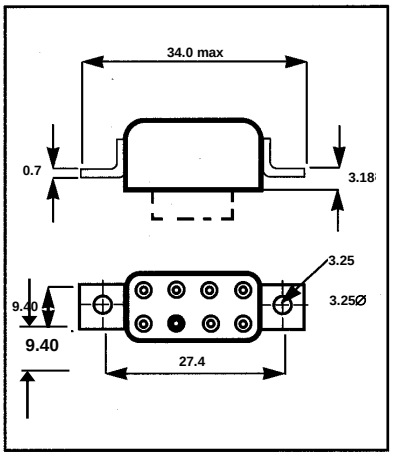
BS Ref 03 HD Ref 34



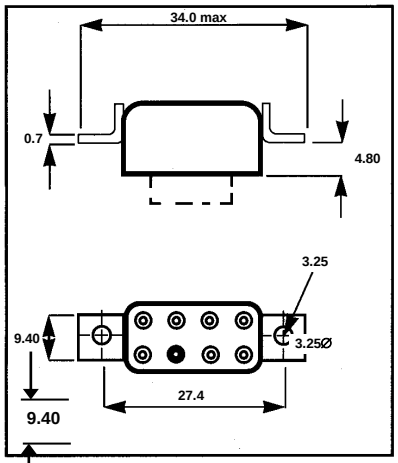
BS Ref 04 HD Ref 25



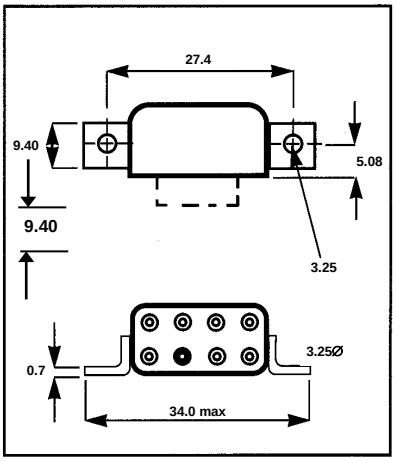
BS Ref 05 HD Ref 22



BS Ref 07 HD Ref 23



BS Ref 08 HD Ref 24



Tolerances ± 0.25 unless otherwise stated.
All dimensions are in mm unless otherwise stated.

Note ● Denotes Contrast Bead

Data Sheet No
DSHDS5-F0026

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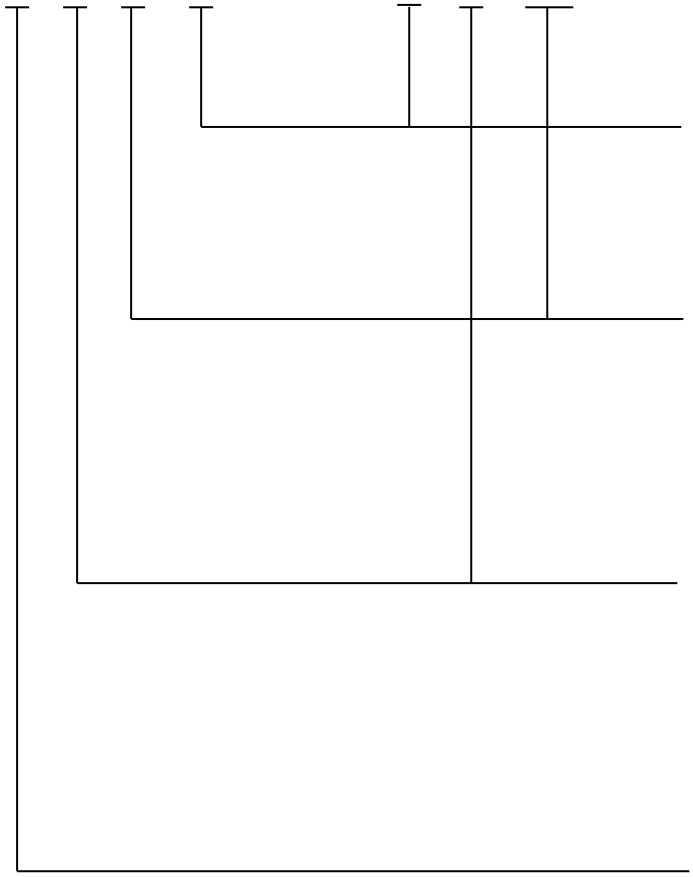
TEL NO: +44(0)1329 847722 E-mail: sales@barnbrook.co.uk www.barnbrook.co.uk

ORDERING INFORMATION

BS9151-F0026- 01- 08 - 05- 12 HDS5S - F2 – K22



Termination Variant (Refer to Page 2)	
BS	**HD**
11	H
12	S

Mounting Variant (Refer to Page 3)	
BS	**HD**
01	21
02	26
03	34
04	25
05	22
07	23
08	24

Coil Variant (Refer to table below)	
BS	**HD**
02	C2
05	E2
08	F2
09	F3
11	G2
-	H2
-	M2
-	J2
15	K2

Contact Rating (Refer to page 2)	
01	Light Duty Rating
02	Low Level

COIL VARIANTS AND OPERATING CHARACTERISTICS

HD Coil	BS Coil	Nominal Operating Voltage	Coil Resistance Ohms +/- 10%	Must Operate Voltage VDC	Must Drop Out Voltage VDC
H2	-	4.5	25	2.5	0.2
C2	02	6.0	42	3.2	0.3
E2	05	12.0	210	6.8	0.6
M2	-	18.0	430	9.5	0.9
K2	15	20.0	700	10.6	0.9
F3	09	24.0	1250	14.4	1.2
F2	08	26.5	830	13.5	1.2
J2	-	32.0	1300	16.8	1.4
G2	11	48.0	2800	25.5	2.5

All Values are measured at 25ºC

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BARNBROOK DATA SHEET

RELAY

TYPE HDS5S

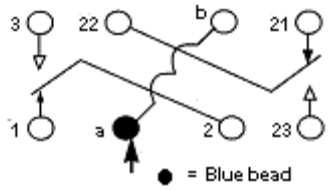
2PDT HALF CRYSTAL CAN RELAY

Formerly
DEUTSCH LTD
RELAY

Key Features

- Hermetically Sealed
- Low level capability
- Small size for high density packaging

Wiring Schematic



Specification

General

Contact Arrangement	2 Pole changeover (2PDT) break before make
Weight	8.7 gm (mounting variant 01)
Mating Bases	Solder Contacts – Order Part No. 4223-1 Crimp Contacts – Order Part No. 42024

Performance

Contact Rating/Life	2A resistive, 10^5 operations at 28 VDC 1A resistive, 10^5 operations at 115 VAC, 400 Hz Low level,10^6 operations (typical 5 VDC, 10 mA)
Mean Mechanical Life	5 x 10^7 operations
Operate Time	3.5 ms nominal, 5 ms max (excluding bounce)
Release Time	1 ms nominal, 5 ms max. (excluding bounce) 01
Bounce Time	3 ms max.

All measurements at 25°C and nominal voltage

Environmental

Temperature Range	-65°C to +125°C
Shock*	490 m/s^2 (50g) for 11 ±1ms
Vibration*	60 to 2000 Hz at 196 m/s^2 (20g) acceleration 10 to 60 Hz at 1.5 mm amplitude

** Applies to mounting style 01*

Linear Acceleration	980 m/s^2 (100g)
Bump	4000 bumps at 390 m/s^2 (40g) 6ms duration
Climatic	BS 2011 test Z/ABDM procedure 1
Salt Mist	BS 2011 part 2.1 Kb severity 2

Data Sheet No
DSHDS5S-F3-K21

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AS9100D CERTIFIED ISO 9001

RELAY

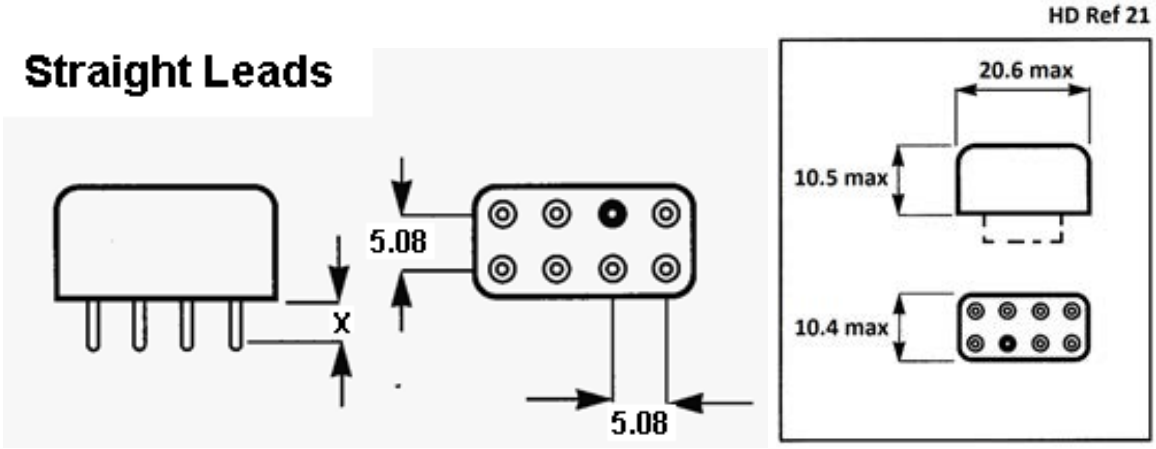
TYPE HDS5S

Electrical

Contact Resistance	Code 01 contacts - 50 m Ohm max measured with an open circuit voltage of 5V max and current of 10 mA. Code 02 contacts - 50 m Ohm max measured with an open circuit voltage of 10mV max and current of 10 mA.
Insulation Resistance	500 M Ohm minimum - between any two isolated terminals 500 M Ohm minimum - between terminals and case. Measured at 500 VDC and 25oC
Dielectric Strength	500 VRMS 50 Hz, at sea level between terminals and case, between any two sets of contacts and between open contacts. 350 VRMS 50 Hz, at 20 millibar air pressure, between all terminals and case.
Capacitance	Closed contacts to case 4 pF Open contacts to case 2 pF Between contacts of a set 2 pF Between the two contact sets 4 pF
DEF 5165, Style SM5U	These relays suitable for use with supply voltages as listed below are specified by the appropriate Style No. /Designation and NATO Stock Number. For performance characteristics, dimensional data, etc. reference should be made to the latest issue of DEF 5165

TERMINATION VARIANTS

HD Style	BS Style	Type	Dim.X in mm.
S	12	Straight	5.08



Relay Coil Characteristics

HD Coil:	F3
Nominal Operating Voltage:	24.0 VDC
Coil Resistance:	1,250 Ω ± 10%
Must Operate Voltage:	14.4 VDC
Must Drop Out Voltage:	1.2 VDC

Data Sheet No
DSHDS5S-F3-K21

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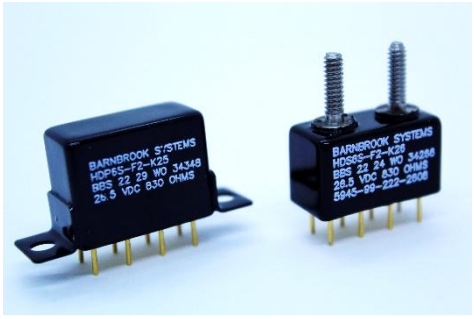
BARNBROOK DATA SHEET

RELAY
TYPE HDS6 & HDP6

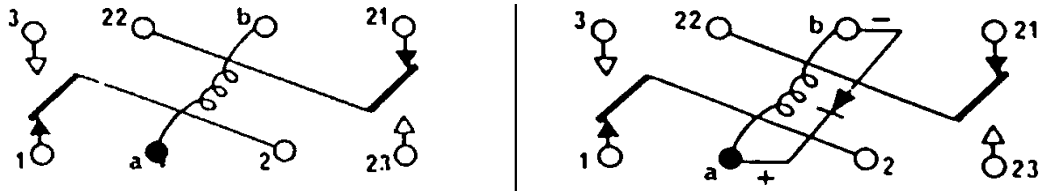


The HDS6 half crystal can size, 2 pole changeover relay has been in U.K. production longer than any other comparable relay. Its all welded construction dynamically balanced armature, argon-arc welded seal and special resonance free contact system ensure satisfactory performance under extreme environmental conditions

The finished relay is contaminant free; assured by ultrasonic cleaning, vacuum de-gassing, sealing into a stainless steel can by argon arc welding and filling of the relay enclosure with inert dry nitrogen.

Special relays are available with coil transient suppression incorporated by the fitting of diodes. In this case polarity has to be observed when connecting the relay into circuit and this is indicated by the reference HDP6. As a result of incorporating diodes in this way release time, weight and overall height are slightly increased.

Schematic Diagrams



● = Blue bead

Technical Data

Standard Relay Identification

Letter	**K**	
Contact Form	2 Pole changeover (2PDT)	
Contact Material	Gold plated silver alloy	
Contact Rating/Life	2 Amps at 28 VDC resistive load, 10^5 operations 4 Amps at 28 VDC resistive, 10^4 operations. 1 Amp at 28 VDC, 400 Hz resistive load, 10^5 operations (case ungrounded) Low level,10^6 operations	
Contact Resistance	50 mΩ initial, 100 mΩ after rated life	
Operate Time	4 ms max at 25°C with nominal voltage.	
Release Time	4 ms max at 25°C with nominal voltage. (not applicable to HDP6)	
Bounce Time	3 ms max.	
Insulation Resistance	Not less than 500 MΩ at 500 Volts.	
Dielectric Strength	750 VRMS at 50 Hz except 500 VRMS between open contacts and coil to case at sea level. 350 VRMS at 70,000 ft.	
Capacitance	Between open contacts	0.38 pF
	Between normally open contacts and case	1.50 pF
	Between normally closed contacts and case	2.50 pF
	Between contact sets	0.30 pF
	Between coil and case	22.00 pF

Data Sheet No
DSHDS6

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Temperature Range	-65°C to +125°C Ambient
Vibration	0.33 inch DA, 5 - 35 Hz, 20g, 35 – 3000 Hz.
Shock	50g, 11 milliseconds
Weight	HDS6 – 10 gm. Max (Style 21, other styles vary with brackets etc.)
Dimensions	See drawings on page 3
Coil Data	Minimum operate power – 220 milliwatts Power dissipation at nominal voltage – 800 milliwatts Maximum Permissible Coil Dissipation – 1.4 watts at 25°C 1.0 watt at 125°C

Standard Coil	**H2**	**C2**	**E2**	**M2**	**F2**	**J2**	**G2**
Nominal Operate voltage, VDC	4.5	6.3	12.6	18	26.5	32	48
Coil Resistance, ohms +/- 10% at 25°C	25	42	210	430	830	1300	2800
Maximum Pull-in voltage at 25°C	2.5	3.2	6.8	9.5	13.5	16.8	25.5
Minimum Drop-out votage at 25°C	0.2	0.3	0.6	1.1	1.0	1.4	2.5

Mountings and Terminations

Details of standard mounting brackets, studs etc, and terminations are given on page 3.
Sockets are available for 'plug in' fitting.

Finish

The stainless steel can is finished with a black epoxy paint.
Identification is in white indelible ink.
HDS6 header and terminals are hot tin dipped.

Special Modifications

To contacts, operating characteristics, mountings, terminations, finish etc., may be obtained to special order. If your requirements are not satisfied by a standard relay consult your Barnbrook representative or contact our Sales Office.

HDP6

This is a HDS6 relay respectively with diodes fitted to provide suppression of the transient back EMF which occurs when the relay is de-energised. The diodes used are of a type which will withstand the same arduous conditions as the relay in order that performance shall not be impaired.
Note that release time is increased to 8 milliseconds and overall height of the relay is increased to 0.600 in. Suppression is such that the back EMF does not exceed 5V.

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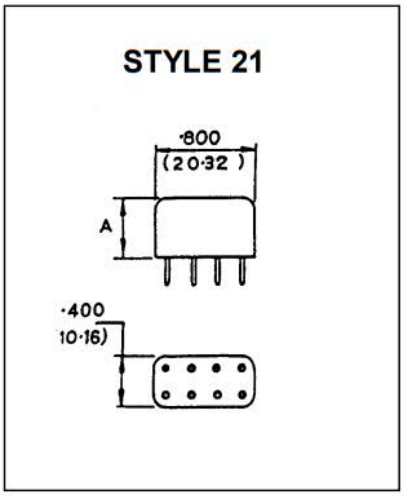
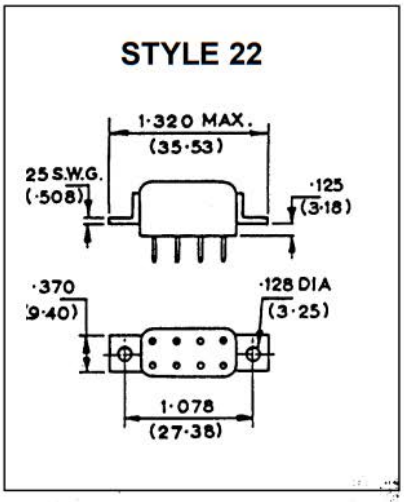
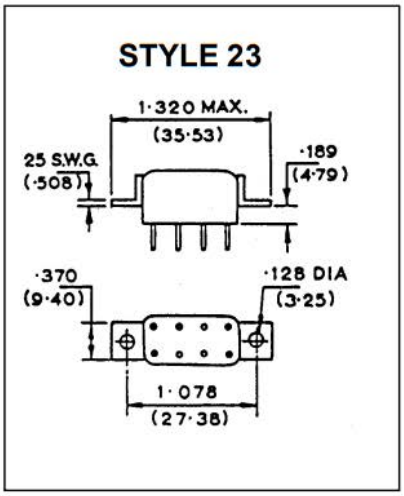
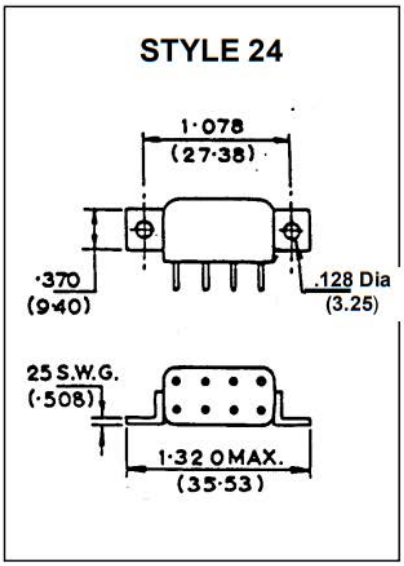
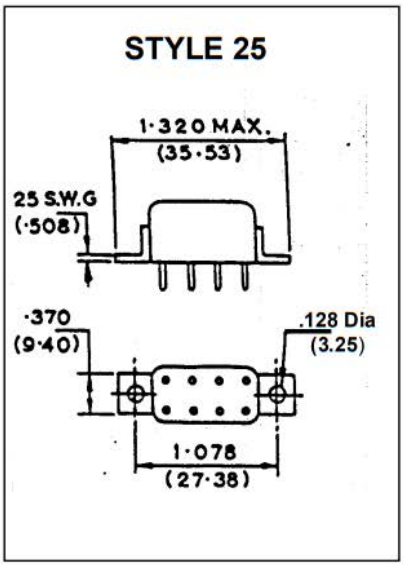
DIMENSIONS AND MOUNTING STYLES

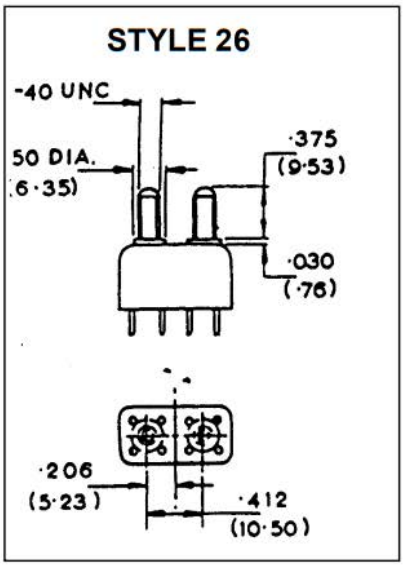


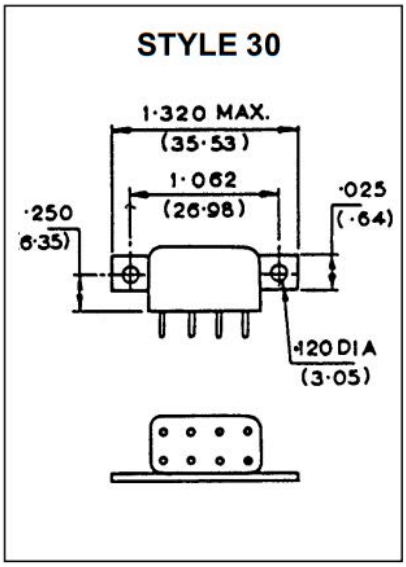












Relay Type	Dimension 'A'	
	In.	mm
HDS6	0.460	11.68
HDP6	0.600	15.30

Notes :

1. Dimensions in brackets are millimetres.
2. Dimensions shown in style 21 are applicable to all styles.
3. This is a selection of mounting styles in common use. Alternative styles are available. If your requirements are not met by one of those shown please contact our Sales Department.

Data Sheet No
DSHDS6

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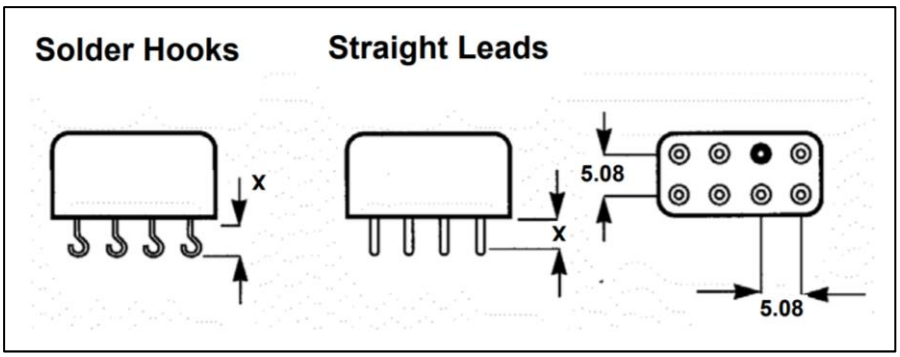
ORDERING INFORMATION

HDS6S – F2 – K22

- Termination Variant (Refer to Table Below)
- Mounting Variant (Refer to Page 3)
- Coil Variant (Refer to Page 2)
- Identification Variant
  S = Standard
  P = Coil Transient Protection

TERMINATION VARIANTS

HD Style	Type	Dim. X in mm.
A	Straight	7.92
B	Straight	12.70
C	Straight	25.40
H	Hooks	5.08
L	Straight	76.20
S	Straight	5.08



Data Sheet No
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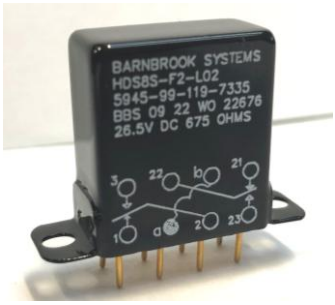
AS9100D CERTIFIED ISO 9001

BARNBROOK DATA SHEET

Formerly
DEUTSCH LTD
RELAY

HDS8
2PDT CRYSTAL CAN RELAY

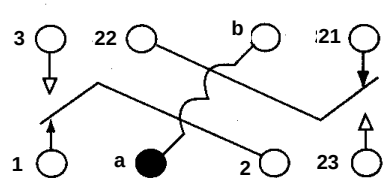


TYPE HDS8

Key Features

- Hermetically Sealed
- 3A or 5A option
- High efficiency, high torque motor unit provides greater contact forces for reliable switching.

Wiring Schematic



Specification

General

Contact Arrangement	2 Pole changeover (2PDT) break before make.
Weight	15.5 gm (mounting style 01)
Mating Bases	Solder Contacts – Order Part No. 4223-1 Crimp Contacts – Order Part No. 420204

Performance

Contact Rating/Life	
3A Contacts	3A resistive, 10^5 operations at 28 VDC 2A resistive, 10^5 operations at 115 VRMS, 400 Hz 1A inductive, 10^5 operations at 28 VDC
5A Contacts	5A resistive, 10^5 operations at 28 VDC 3A resistive, 10^5 operations at 115 VRMS, 400 Hz 2A inductive, 10^5 operations at 28 VDC
Operate Time	5 ms max
Release Time	5 ms max
Bounce Time	3 ms max

All measurements at 25°C and nominal voltage

Environmental

Temperature Range	-65°C to +125°C
Shock	981 m/s^2 (100g) for 11 ms
Vibration	60 to 3000 Hz at 196 m/s^2 (20g) acceleration 10 to 60 Hz at 1.5 mm amplitude

Ordering Information See sheet 4

Data Sheet No
DSHDS8

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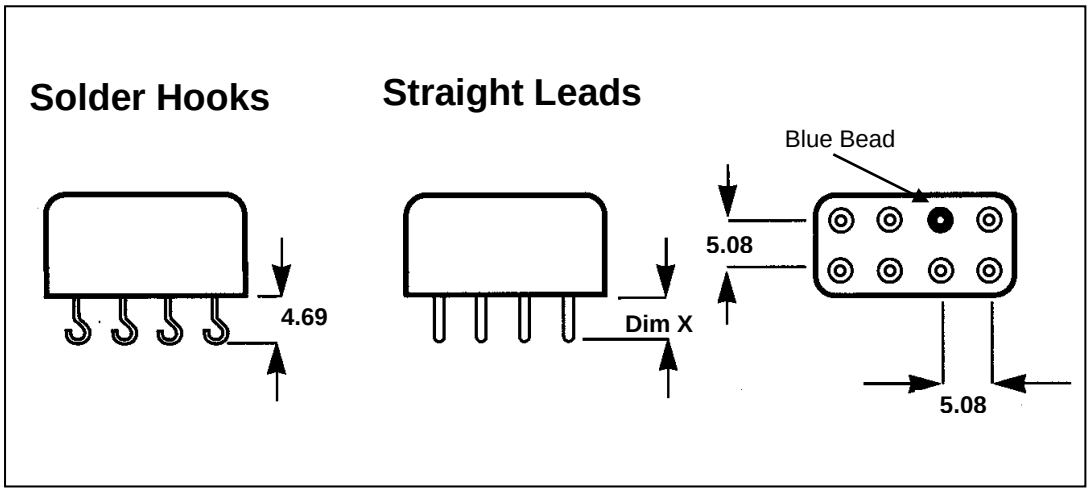
Electrical

Contact Resistance		
	3A Contacts	50 mΩ initial 100 mΩ after rated life
	5A Contacts	30 mΩ initial 50 mΩ after rated life
Insulation Resistance		Not less than 500 MΩ at 500 V
Dielectric Strength		500 VRMS, 50 Hz at sea level between open contacts 1000 VRMS, 50 Hz at sea level between all other points 350 VRMS, 50 Hz, at 20mbar (87,000 ft) between all points
Capacitance		Between open contacts 0.2 pF Between normally open contacts and case 2.0 pF Between normally closed contacts and case 3.0 pF Between contact sets 0.1 pF Between coil and case 16.0 pF
Coil Dissipation		Minimum operate power, 300 milliwatts Power dissipation at nominal voltage, 1 watt Max power dissipation, 1.5 watts at 25°C and 1 watt +125°C

TERMINATION VARIANTS

HDS8 Ref	Type	Dim. X in mm.
A	Straight	7.92
B	Straight	12.70
C	Straight	25.40
H	Hooks	-
L	Straight	76.20
S	Straight	5.08

Termination type S suitable for use with relay sockets 4223-1 and 420204



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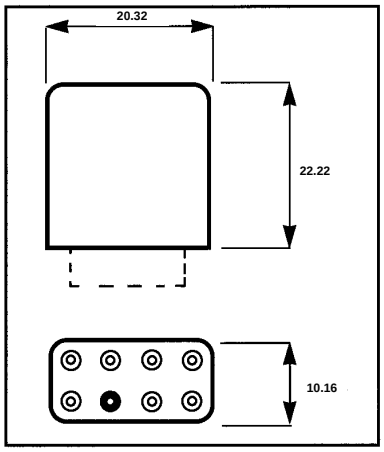
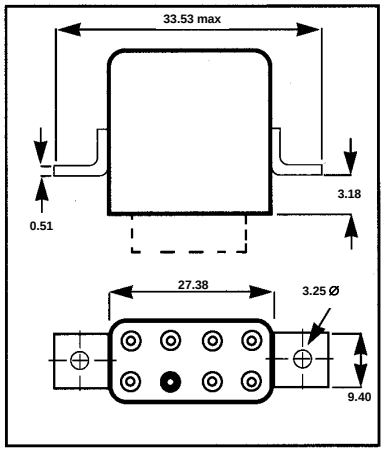
MOUNTING VARIANTS

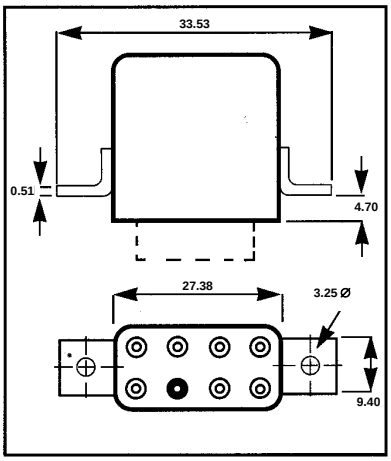
Style 01



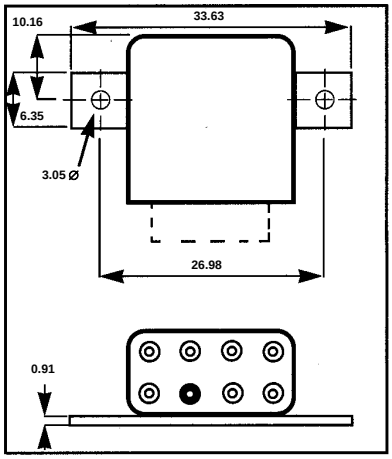
Style 03



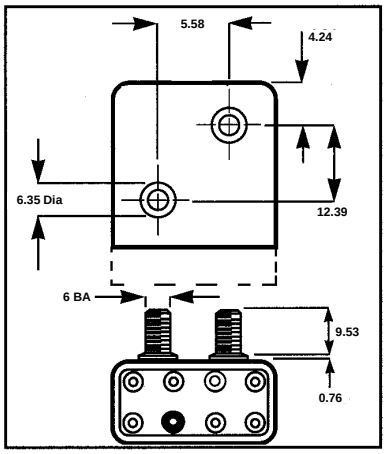
Style 06



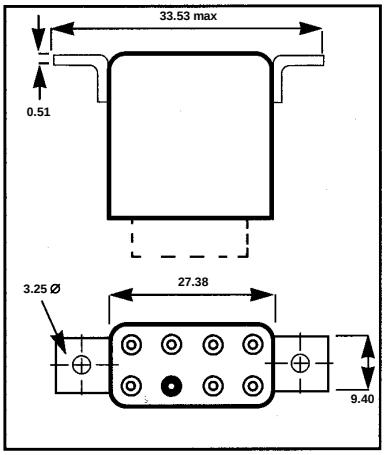
Style 07



Style 13



Style 19



All dimensions are in millimetres

● **Blue Bead**

Data Sheet No
DSHDS8

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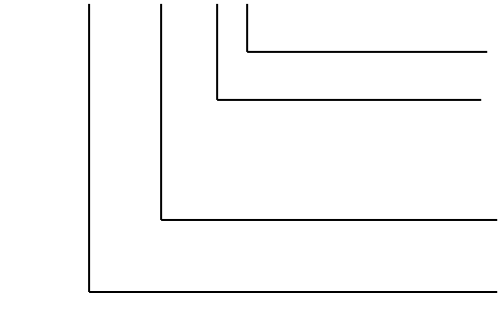
ORDERING INFORMATION

HDS8S - F2 - L01



- Mounting Variant (Refer to page 3)
- Identification letter
  'L' for 3A contacts
  'J' for 5A contacts
- Coil Variant (Refer to table below)
- Termination Variant (Refer to page 2)

COIL VARIANTS AND OPERATING CHARACTERISTICS

3 Amp Contacts				
Coil	Nominal Operating Voltage VDC	Coil Resistance Ohms +/- 10% at 25°C	Must Pull In Voltage VDC at 25°C	Must Drop Out VDC at 25°C
C2	6.0	35	3.2	0.22
E2	13.0	200	6.8	0.49
M2	18.0	340	10.0	0.70
F2	26.5	675	13.5	1.00
J2	32.0	975	16.8	1.30
G2	48.0	2450	25.5	2.00
5 Amp Contacts				
C3	0.60	30	3.2	0.22
E3	12.0	120	6.8	0.45
F3	26.5	600	13.5	1.00
J3	32.0	850	16.4	1.20
G3	48.0	1900	24.5	1.80

All values measured at 25°C

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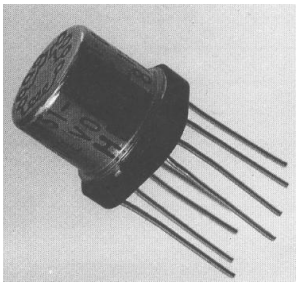
BARNBROOK DATA SHEET

RELAY

HDS 10/BS9151 F0041
2PDT TO5 CAN RELAY

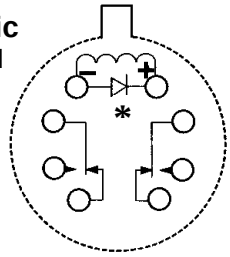


TYPE HDS10

Key Features

- Hermetically Sealed
- BS9000 Approval
- Suitable for high density PCB mounting
- Low level to 1 amp switching.

Wiring Schematic
Relay de-energised



* Diode applies to suppressed versions only

Specification

General

Contact Arrangement	2 Pole changeover (2PDT) Break before make.
Weight	2.5 gm max.
Finish	The nickel can identification is in black indelible ink Relay header and terminals are gold plated

Performance

Contact Rating/Life	1A resistive, 10^5 operations at 28 VDC 0.2A inductive, 10^5 operations at 28 VDC Low level, 10^6 operations
Operate Time	2.0 ms max. at 25°C with nominal voltage (excluding bounce)
Release Time	1.5 ms max. (non suppressed) 4.0 ms max. (suppressed)
Bounce Time	1.5 ms max.

Environmental

Temperature Range	-65°C to +125°C
Bump	4000 Bumps at 390 m/s^2, 6 ms duration
Shock	490 m/s^2 for 11 ms
Vibration	60 to 2000 Hz at 196 m/s^2 acceleration 10 to 60 Hz at 3 mm Da

Ordering Information See sheet 4

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Data Sheet No
DSHDS10

BARNBROOK SYSTEMS LIMITED, 23-25 FAREHAM PARK ROAD, HAMPSHIRE, PO15 6LD
TEL NO: +44(0)1329 847722 E-mail: sales@barnbrook.co.uk www.barnbrook.co.uk

BARNBROOK DATA SHEET

RELAY
TYPE HDS10

Electrical

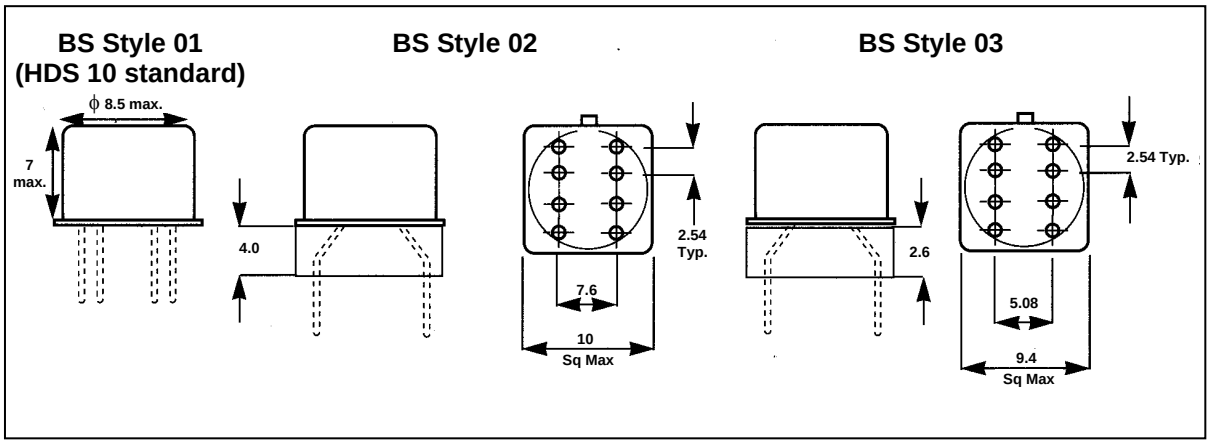
Contact Resistance	100 mΩ (initial) maximum measured with open circuit-voltage 10 mV, current 10 mA max. 200 mΩ during and after rated life. (Resistance measured 3 mm from glass seal)
Dielectric Strength	500 VRMS, 50 Hz at sea level 125 VRMS, 50 Hz at 70.000 ft (21,538m)
5A Contacts	30 mΩ initial 50 mΩ after rated life
Insulation Resistance	Not less than 500 MΩ at 500 VDC

COIL VARIANTS AND OPERATING CHARACTERISTICS

HDS10 Coil	Nominal Operating Voltage (VDC)	Coil Resistance (Ohms +/- 10% at 25°C)	Must Operate Voltage (VDC)	Must Drop Out Voltage (VDC)	BS Coil	BS Coil (suppressed) Consult us for availability
H1	5.0	50	2.7	0.22	01	1S
C1	6.0	98	3.5	0.28	02	2S
E1	12.0	390	7.0	0.63	03	3S
M1	18.0	880	10.7	0.91	04	4S
F1	26.5	1560	14.2	1.37	05	5S
J1	30.0	2500	17.7	1.50	06	6S
D1	9.0	220	5.3	0.54	07	7S

All values measured at 25°C

MOUNTING VARIANTS



Data Sheet No
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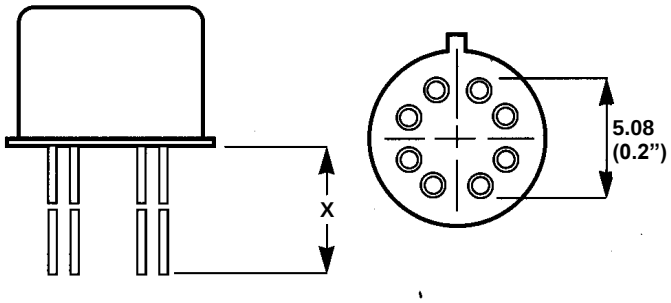
TERMINATION VARIANTS

HDS10	BS	Type	Dimension 'X' in mm.
D	01	Straight	37 min
J	02	Straight	4.25 +1.0
-	03	Straight	12.7 +/- 0.8

Termination variant 02 is not used with mounting variants 02 & 03

The Relay has lead-out wires 0.43mm dia



ORDERING INFORMATION

BS Types – example part no.:

BS9151-F0041 - 05 - 01 - 01

Generic Type

Barnbrook Types – example part no.:

HDS10 D - F1

Generic Type

	BS		HDS10
Termination Variant	01	=	D
	02	=	J
	03	=	-
Mounting Variant	01	=	-
	02	=	-
	03	=	-
Coil Variant	01	=	H1
	02	=	C1
	03	=	E1
	04	=	M1
	05	=	F1
	06	=	J1
	07	=	D1

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Data Sheet No
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BARNBROOK DATA SHEET

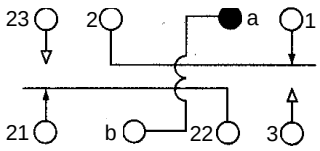
RELAY
TYPE HF

HF/BS9151 F0007
2PDT HALF CRYSTAL CAN RELAY

Formerly
DEUTSCH LTD
RELAY

Key Features
- Hermetically Sealed
- Low Level capability
- Small size for high density packaging

Wiring Schematic



Specification

General

Contact Arrangement	2 Pole changeover (2PDT) break before make.
Weight	8.7 g (mounting style 01)
Mating Bases	Solder Contacts – Order Part No. 4223-1 Crimp Contacts – Order Part No. 420204

Performance

Contact Rating/Life	2A resistive, 10^5 operations at 28 VDC 1A resistive, 10^5 operations at 115 VRMS 400 Hz Low level,10^6 operations (Typical 5 VDC, 10mA)
Mean Mechanical Life	5 x 10^7 Operations (If applicable)
Operate Time	3.5 ms nominal 5 ms max (excluding bounce)
Release Time	1 ms nominal 5 ms max. (excluding bounce)
Bounce Time	3 ms max.

All measurements at 25°C and nominal voltage

Environmental

Temperature Range	-65°C to +125°C
Shock	490 m/s^2 (50g) for 11 ms
Vibration	60 to 2000 Hz at 196 m/s^2 (20g) acceleration 10 to 60 Hz at 1.5mm amplitude (Applies to mounting variant 01)
Linear Acceleration	980 m/s^2 (100g)
Bump	4000 bumps at 390 m/s^2 (40g), 6ms duration. (If applicable)
Climatic	BS 2011 Test Z/ABDM procedure 1
Salt Mist	BS 2011 Part 2.1 Kb severity 2

Ordering Information — See sheet 4

Data Sheet No
DSHF

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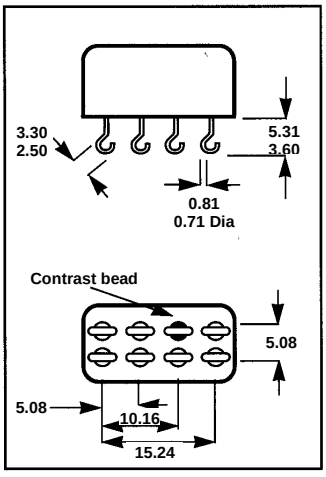
Electrical

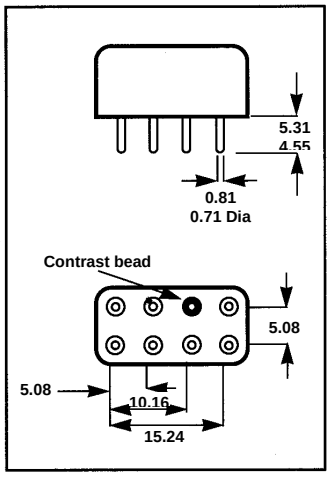
Contact Resistance	Code 01 contacts 50 mΩ max measured at open circuit voltage of 5 V and current of 10 mA Code 02 contacts 50 mΩ max measured at open circuit voltage of 10 mV and current of 10 mA
Insulation Resistance	500 Megohms min – between any two isolated terminals 500 Megohms min – between terminals and case Measured at 500 VDC and +25ºC
Dielectric Strength	500 VRMS, 50 Hz, at sea level, between terminals and case, between two sets of contacts and between open contacts of a set 350 VRMS, 50 Hz, at 20 mbar air pressure (87,000ft) between all terminals and case
Capacitance	Closed contacts to case 4 pF Open contacts to case 2 pF Between contacts of a set 2 pF Between the two contact sets 4 pF
Coil Dissipation	The maximum operate power that can be applied to the coil is 1.0 W at +25ºC de-rated linearly to 0.8 W at +125ºC

TERMINATION VARIANTS

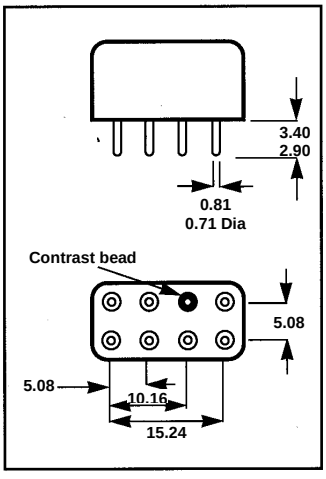
BS Ref 11



BS Ref 12



BS Ref 13



All dimensions are in millimetres. Tolerances ± 0.25 unless otherwise stated

Data Sheet No
DSHF

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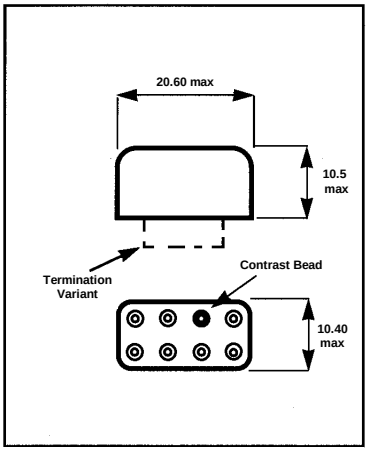
MOUNTING VARIANTS

BS Ref 01/11* **HF Ref 01**



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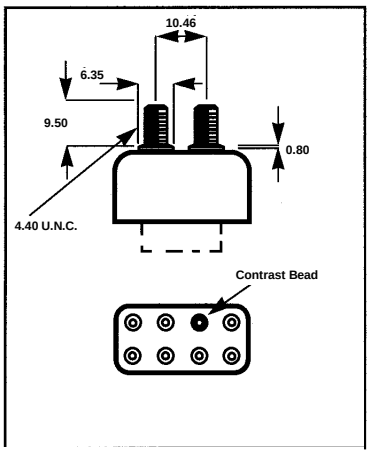
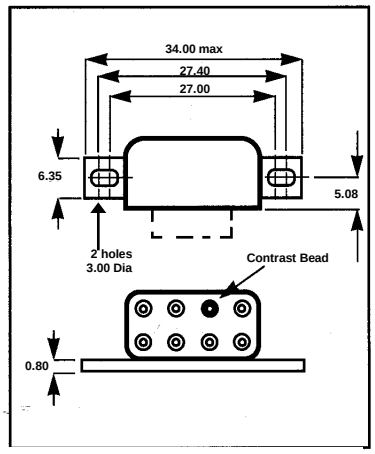
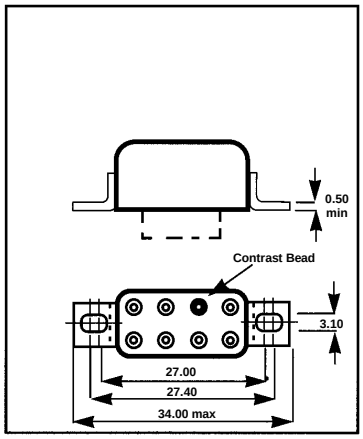


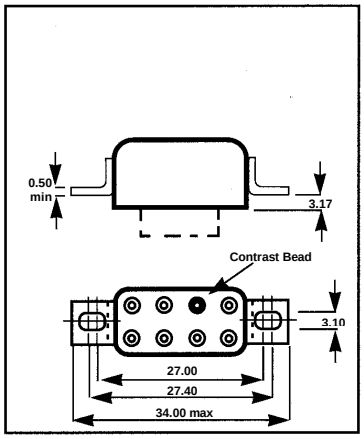
BS Ref 03 **HF Ref 03**



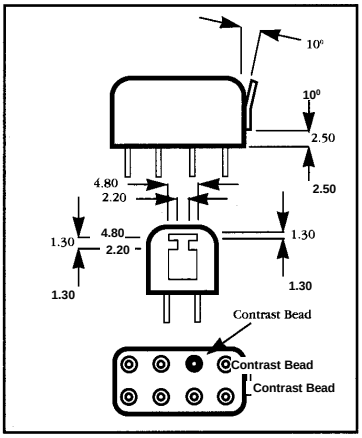
BS Ref 04 **HF Ref 25**



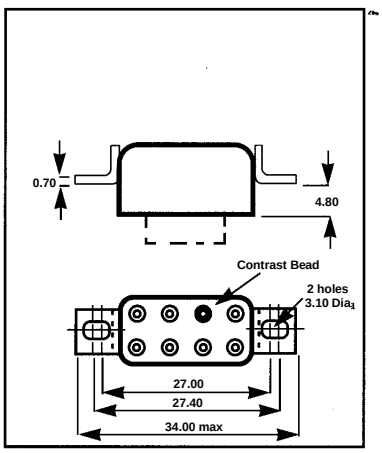
BS Ref 05/09*/10 **HF Ref 05**



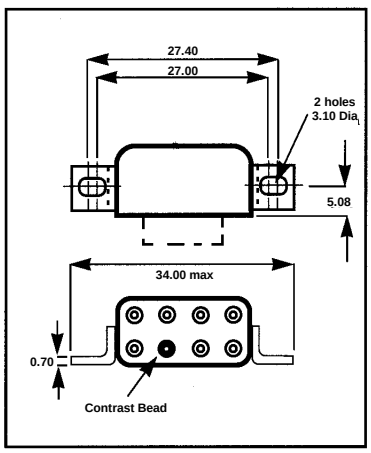
BS Ref 06 **HF Ref 95**



BS Ref 07



BS Ref 08



BS Mounting Variant	Equivalent HF Mounting Variant	Vibration Level M/s^2
01	01	196*
02	02	98
03	03	196
04	25	196
05	05	196
06	95	196
07	-	196
08	-	196
09	-	196
10	-	196
11	-	196*
* Body of relay must be rigidly mounted by epoxy cement.		

* BS Ref 09 – Underside of bracket to be free of paint
* BS Ref 10 – Both sides of bracket to be free of paint
* BS Ref 11 – Free of paint

All dimensions are in millimetres. Tolerances ± 0.25 unless otherwise stated.
Can dimensions shown in Ref 01 apply to all variations. All termination variants allowable.

Data Sheet No
DSHF

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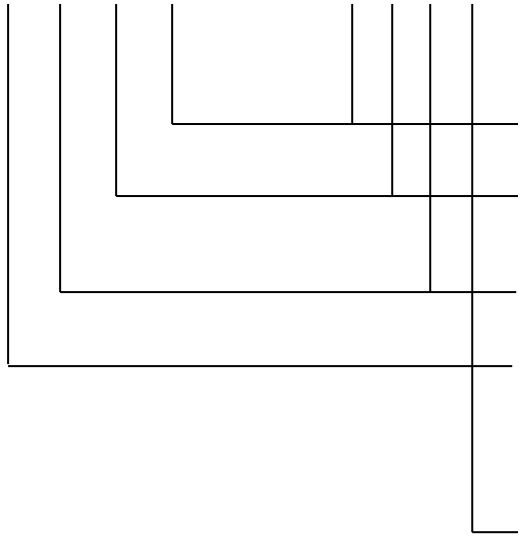
ORDERING INFORMATION

BS9151F0007- 01- 03- 05- 12 HF 12 05 A OO



Termination (refer to Page 2)

Mounting Style (refer to Page 3)

Coil Variant (see table below)

Contact Rating (refer to Page 2)
BS Only

Modification Letter
(HF Only – OO for standard relay)

COIL VARIANTS AND OPERATING CHARACTERISTICS

BS Reference		Resistance ohms +/- 10%	Must Operate volts DC	Must Release volts DC	Maximum volts DC	Nominal Volts DC
BS	HF					
01	-	40	3.6	0.30	7.2	6
02	S6	42	3.6	0.30	7.2	6
03	A	60	3.6	0.30	7.2	6
04	G	150	7.2	0.60	14.4	12
05	S7	210	7.2	0.60	14.4	12
06	B	320	7.2	0.60	14.4	12
	J	520	9.5	0.90	20.0	18
07	-	675	14.4	1.20	32.0	24 – 26.5
08	S2	830	14.4	1.20	32.0	24 – 26.5
	M	1000	14.4	1.20	32.0	24
09	D	1250	14.4	1.20	32.0	24 – 26.5
10	-	2500	28.8	2.40	57.6	48
11	S4	2800	28.8	2.40	57.6	48
12	E	3500	28.8	2.40	57.6	48
13	F	40	3.0	0.25	6.0	5
14	K	700	14.4	1.20	32.0	24 – 26.5
15	C	700	10.6	0.88	24.0	20

All values measured at +25°C

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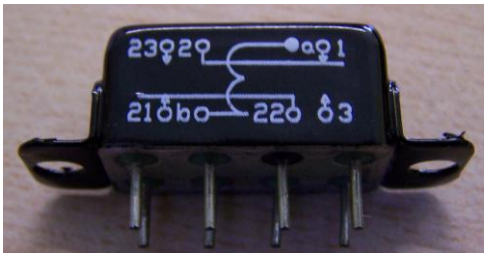
BARNBROOK DATA SHEET

RELAY
TYPE HF5

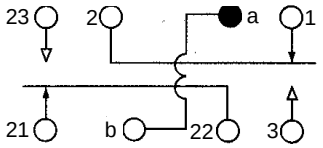
HF5
2PDT HALF CRYSTAL CAN RELAY



HF5

Key Features
- Hermetically Sealed
- Low Level capability
- Small size for high density packaging

Wiring Schematic



Specification

General

Contact Arrangement	2 Pole changeover (2PDT) break before make.
Weight	8.7 g (mounting style 01)
Mating Bases	Solder Contacts – Order Part No. 4223-1 Crimp Contacts – Order Part No. 420204

Performance

Contact Rating/Life	5A resistive, 10^5 operations at 28 VDC 1A resistive, 10^5 operations at 115 VRMS 400 Hz Low level,10^6 operations (Typical 5 VDC, 10mA)
Mean Mechanical Life	5 x 10^7 Operations (If applicable)
Operate Time	7.0 ms nominal 10 ms max (excluding bounce)
Release Time	5 ms nominal 10 ms max. (excluding bounce)
Bounce Time	5 ms max.

All measurements at 25ºC and nominal voltage

Environmental

Temperature Range	-65ºC to +125ºC
Shock	490 m/s^2 (50g) for 11 ms
Vibration	60 to 2000 Hz at 196 m/s^2 (20g) acceleration 10 to 60 Hz at 1.5mm amplitude (Applies to mounting variant 01)
Linear Acceleration	980 m/s^2 (100g)
Bump	4000 bumps at 390 m/s^2 (40g), 6ms duration. (If applicable)
Climatic	BS 2011 Test Z/ABDM procedure 1
Salt Mist	BS 2011 Part 2.1 Kb severity 2

Ordering Information See sheet 4

Data Sheet No
DSHF5

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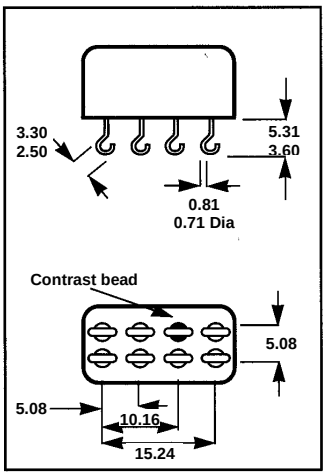
RELAY
TYPE HF5

Electrical

Contact Resistance	100 mΩ max measured at open circuit voltage of 6V and current of 10 mA
Insulation Resistance	500 Megohms min – between any two isolated terminals 500 Megohms min – between terminals and case Measured at 500 VDC and +25ºC
Dielectric Strength	500 VRMS, 50 Hz, at sea level, between terminals and case, between two sets of contacts and between open contacts of a set 350 VRMS, 50 Hz, at 20 mbar air pressure (87,000ft) between all terminals and case
Capacitance	Closed contacts to case 4 pF Open contacts to case 2 pF Between contacts of a set 2 pF Between the two contact sets 4 pF
Coil Dissipation	The maximum operate power that can be applied to the coil is 1.0 W at +25ºC de-rated linearly to 0.8 W at +125ºC

TERMINATION VARIANTS

Ref 11



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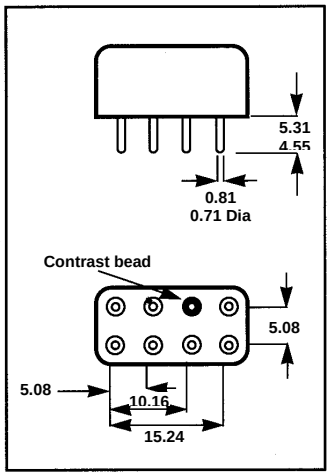

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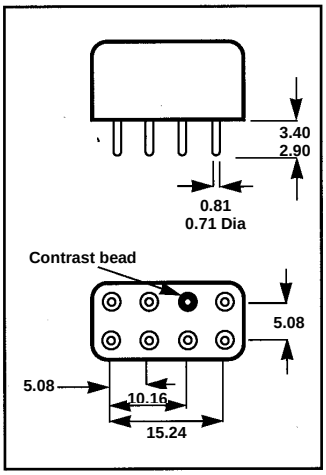

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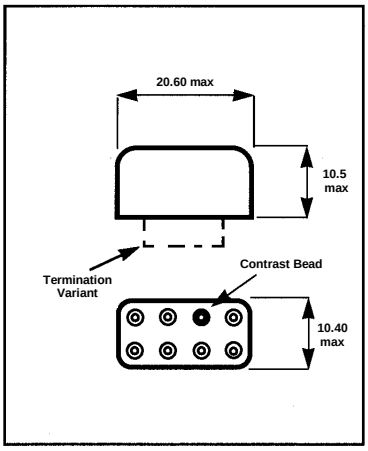
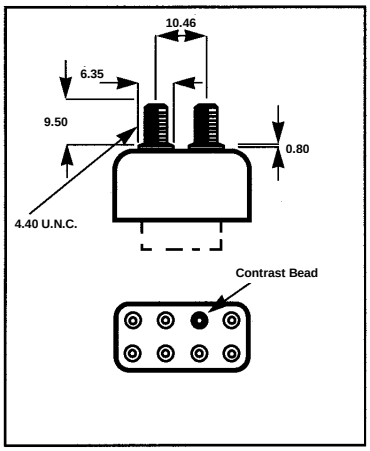
MOUNTING VARIANTS

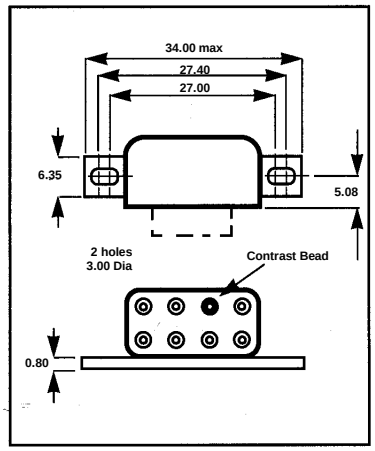
HF Ref 01



HF Ref 02



HF Ref 03



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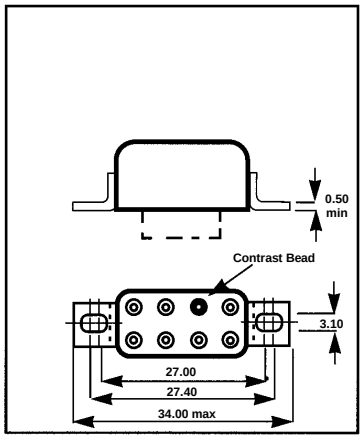

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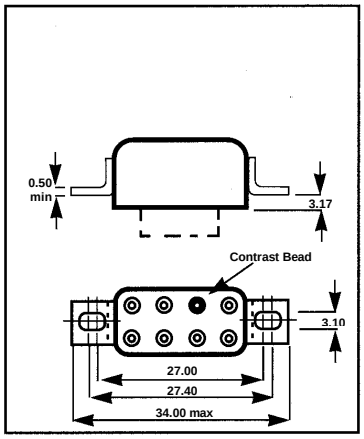

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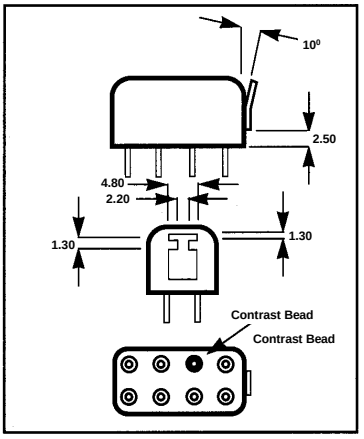

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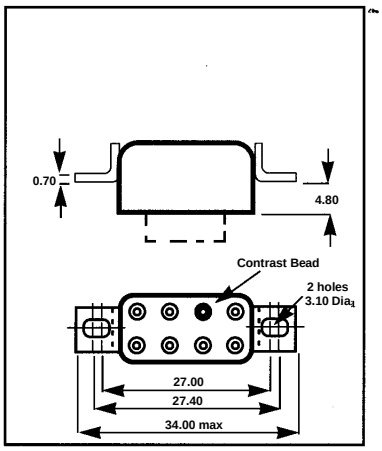
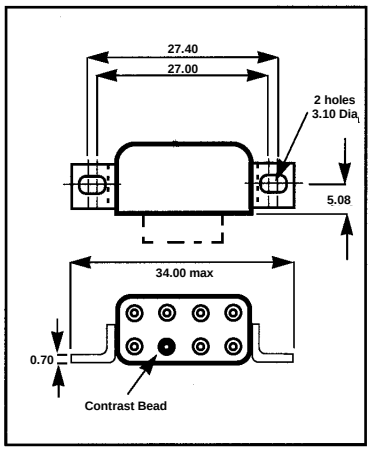


HF Ref 08



HF5 Mounting Variant	Vibration Level m/s^2
01	196*
02	98
03	196
25	196
05	196
95	196
07	196
08	196

All dimensions are in millimetres. Tolerances ± 0.25 unless otherwise stated.
Can dimensions shown in Ref 01 apply to all variations. All termination variants allowable.

Data Sheet No
DSHF5

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RELAY
TYPE HF5

ORDERING INFORMATION

HF5 12 05 A OO

- **Termination** (refer to Page 2)
- **Mounting Style** (refer to Page 3)
- **Coil Variant** (see table below)
- **Modification Letter**
  (HF Only – OO for standard relay)

COIL VARIANTS AND OPERATING CHARACTERISTICS

HF5 Reference	Resistance ohms +/- 10%	Must Operate volts DC	Must Release volts DC	Maximum volts DC	Nominal Volts DC
S6	42	3.6	0.30	7.2	6
A	60	3.6	0.30	7.2	6
S7	210	7.2	0.60	14.4	12
B	320	7.2	0.60	14.4	12
H	500	10.5	1.00	18.0	15
S2	830	14.4	1.20	32.0	24 – 26.5
D	1250	14.4	1.20	32.0	24 – 26.5
S4	2800	28.8	2.40	57.6	48
E	3500	28.8	2.40	57.6	48
F	40	3.0	0.25	6.0	5
K	700	14.4	1.20	32.0	24 – 26.5
C	700	10.6	0.88	24.0	20

All values measured at +25°C

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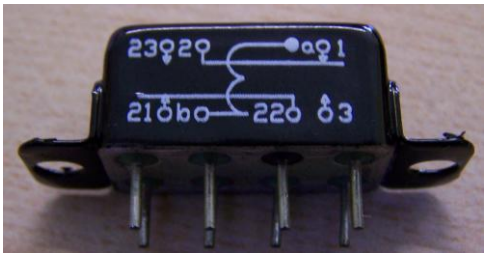
BARNBROOK DATA SHEET

RELAY
TYPE HFS

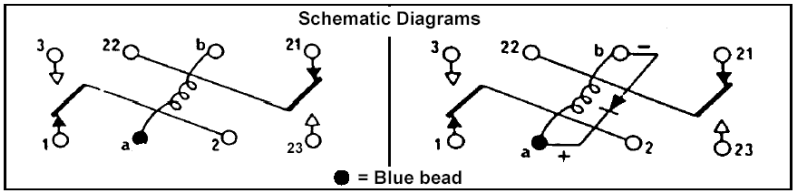
HFS
2PDT HALF CRYSTAL CAN RELAY



HFS

Key Features

- Hermetically Sealed
- Low Level capability
- Small size for high density packaging



Specification

General

Contact Arrangement	2 Pole changeover (2PDT) break before make.
Weight	8.7 g (mounting style 01)
Mating Bases	Solder Contacts – Order Part No. 4223-1 Crimp Contacts – Order Part No. 420204

Performance

Contact Rating/Life	2A resistive, 10^5 operations at 28 VDC 1A resistive, 10^5 operations at 115 VRMS 400 Hz Low level,10^6 operations (Typical 5 VDC, 10mA)
Mean Mechanical Life	5 x 10^7 Operations (If applicable)
Operate Time	10.0 ms nominal 15 ms max (excluding bounce)
Release Time	10 ms nominal 15 ms max. (excluding bounce)
Bounce Time	7 ms max.

All measurements at 25°C and nominal voltage

Environmental

Temperature Range	-65°C to +125°C
Shock	490 m/s^2 (50g) for 11 ms
Vibration	60 to 2000 Hz at 196 m/s^2 (20g) acceleration 10 to 60 Hz at 1.5mm amplitude (Applies to mounting variant 01)
Linear Acceleration	980 m/s^2 (100g)
Bump	4000 bumps at 390 m/s^2 (40g), 6ms duration. (If applicable)
Climatic	BS 2011 Test Z/ABDM procedure 1
Salt Mist	BS 2011 Part 2.1 Kb severity 2

Ordering Information See sheet 4

Data Sheet No
DSHFS

Design authority and manufacture by Barnbrook Systems Limited
Barnbrook Systems reserves the right to alter specifications and design without notice

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TEL NO: +44(0)1329 847722 E-mail: sales@barnbrook.co.uk www.barnbrook.co.uk

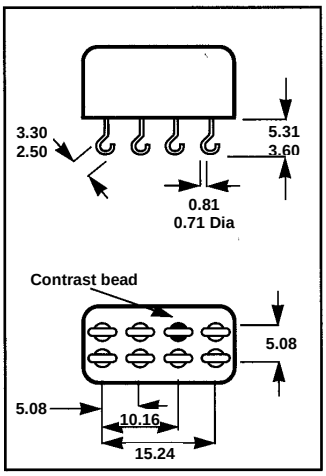
RELAY
TYPE HFS

Electrical

Contact Resistance	100 mΩ max measured at open circuit voltage of 6V and current of 10 mA
Insulation Resistance	500 Megohms min – between any two isolated terminals 500 Megohms min – between terminals and case Measured at 500 VDC and +25°C
Dielectric Strength	500 VRMS, 50 Hz, at sea level, between terminals and case, between two sets of contacts and between open contacts of a set 350 VRMS, 50 Hz, at 20 mbar air pressure (87,000ft) between all terminals and case
Capacitance	Closed contacts to case 4 pF Open contacts to case 2 pF Between contacts of a set 2 pF Between the two contact sets 4 pF
Coil Dissipation	The maximum operate power that can be applied to the coil is 1.0 W at +25°C de-rated linearly to 0.8 W at +125°C

TERMINATION VARIANTS

Ref 11



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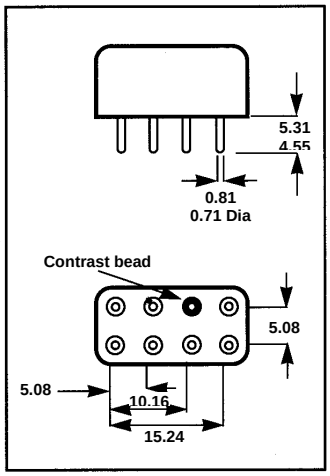

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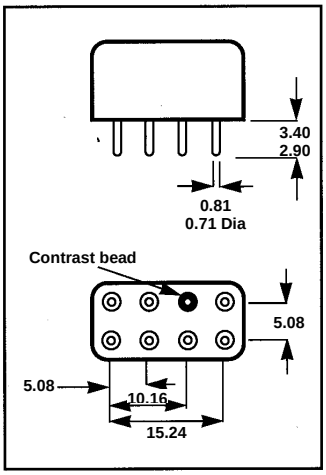

All dimensions are in millimetres. Tolerances ± 0.25 unless otherwise stated

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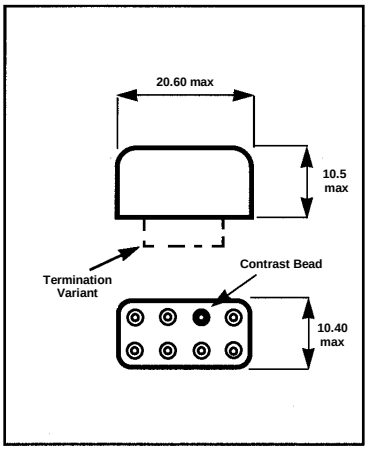
MOUNTING VARIANTS

HF Ref 01



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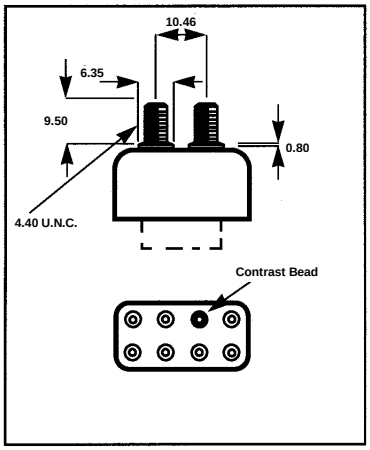
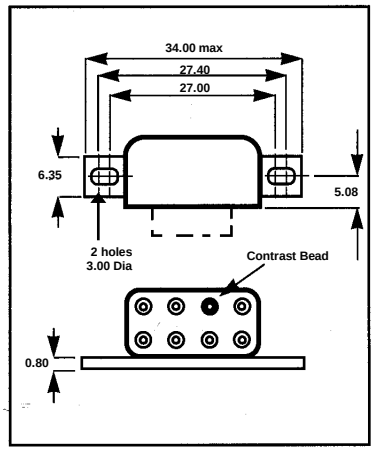


HF Ref 03



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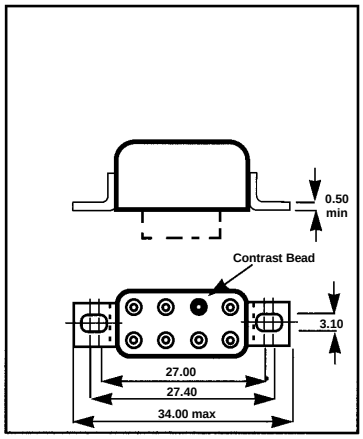

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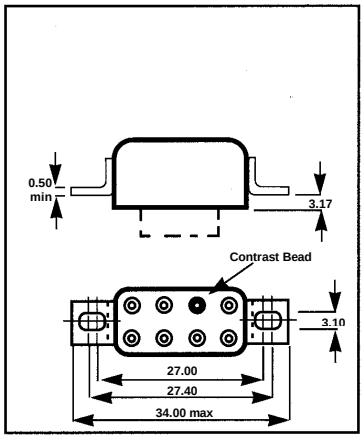

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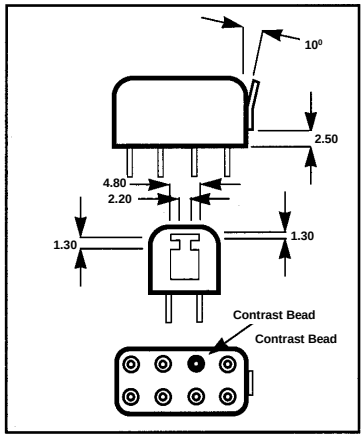
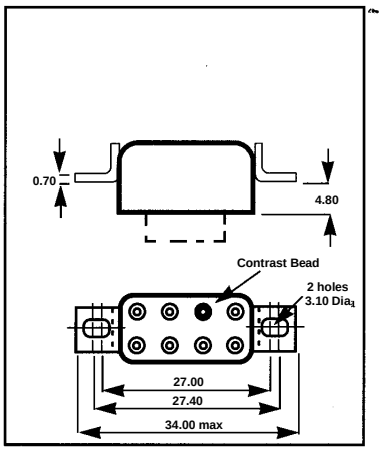
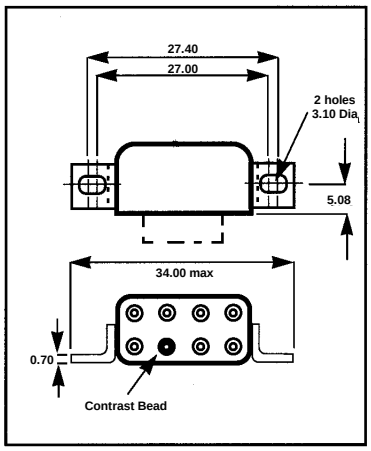


HF Ref 07



HF Ref 08



HF5 Mounting Variant	Vibration Level m/s^2
01	196*
02	98
03	196
25	196
05	196
95	196
07	196
08	196

All dimensions are in millimetres. Tolerances ± 0.25 unless otherwise stated.
Can dimensions shown in Ref 01 apply to all variations. All termination variants allowable.

Data Sheet No
DSHFS

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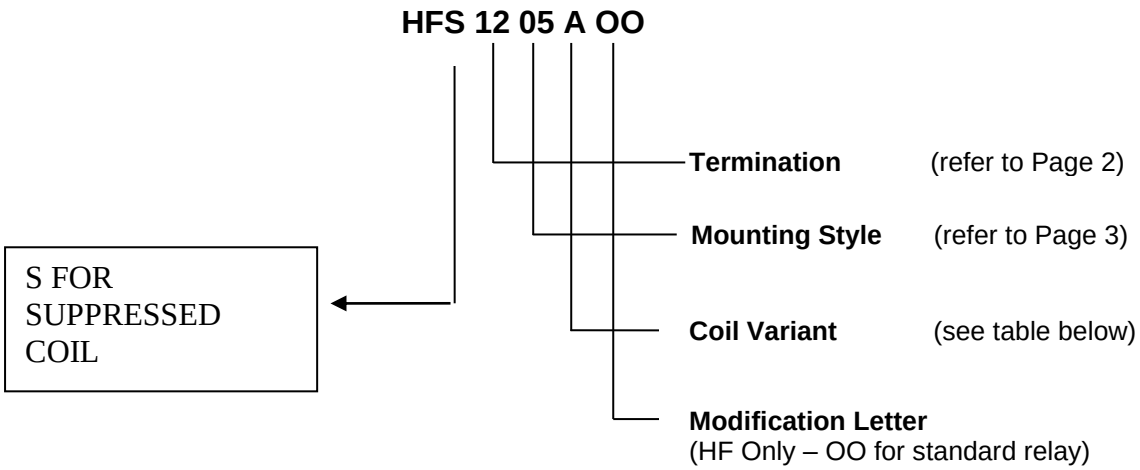
TEL NO: +44(0)1329 847722 E-mail: sales@barnbrook.co.uk www.barnbrook.co.uk

RELAY
TYPE HFS

ORDERING INFORMATION



COIL VARIANTS AND OPERATING CHARACTERISTICS

HF5 Reference	Resistance ohms +/- 10%	Must Operate volts DC	Must Release volts DC	Maximum volts DC	Nominal Volts DC	Suppression V DC
S6	42	3.6	0.30	7.2	6	
A	60	3.6	0.30	7.2	6	
S7	210	7.2	0.60	14.4	12	
B	320	7.2	0.60	14.4	12	
H	500	10.5	1.00	18.0	15	
S2	830	14.4	1.20	32.0	24 – 26.5	-42 V
D	1250	14.4	1.20	32.0	24 – 26.5	-42 V
S4	2800	28.8	2.40	57.6	48	
E	3500	28.8	2.40	57.6	48	
F	40	3.0	0.25	6.0	5	
K	700	14.4	1.20	32.0	24 – 26.5	-42 V
C	700	10.6	0.88	24.0	20	

All values measured at +25°C

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BARNBROOK DATA SHEET

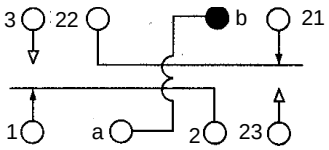
RELAY
TYPE F

Formerly
DEUTSCH LTD
RELAY

F/BS9151 F0008/RL/RP
2PDT CRYSTAL CAN RELAY

Key Features
- Hermetically Sealed
- Low Level to 5A Switching

Wiring Schematic



Specification

General

Contact Arrangement	2 Pole changeover (2PDT) break before make.
Weight	15 gram (mounting style 01)
Mating Bases	Solder Contacts – Order Part No. 4223-1 Crimp Contacts – Order Part No. 420204

Performance

Contact Rating/Life	5A resistive, 10^5 operations at 28 VDC 1A resistive, 10^5 operations at 115 Vrms 400 Hz Low level10^6 operations (Typical, 5 Vdc, 10mA)
Mean Mechanical Life	5 x 10^7 Operations
Operate Time	3.5 ms max. nominal 5 ms max. (excluding bounce)
Release Time	1 ms nominal 5 ms max. (excluding bounce)
Bounce Time	3 ms max.

All measurements at 25°C and nominal voltage

Environmental

Temperature Range	-65°C to +125°C
Shock	490 m/s^2 (50g) for 11 ms
Vibration	60 to 2000 Hz at 196 m/s^2 (20g) 10 to 60 Hz at 1.5mm amplitude
Linear Acceleration	980 m/s^2 (100g)
Bump	4000 bumps at 390 m/s^2, 6ms duration
Climatic	BS 2011 test Z/ABDM procedure 1
Salt Mist	BS 2011 part 2.1 Kb severity 2

Ordering Information See sheet 4

Data Sheet No
DSF

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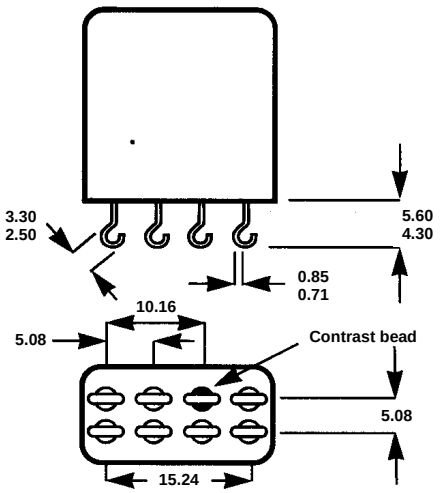
TEL NO: +44(0)1329 847722 E-mail: sales@barnbrook.co.uk www.barnbrook.co.uk

Electrical

Contact Resistance	Code 01 contacts 50 mΩ max measured at open circuit voltage of 5 V and current of 10 mA Code 02 contacts 50 mΩ max measured at open circuit voltage of 10 mV and current of 10 mA	
Insulation Resistance	500 MΩ min – between any two isolated terminals 500 MΩ min – between terminals and case Measured at 500 VDC and +25°C	
Dielectric Strength	1000 Vrms, 50 Hz, at sea level, between contacts and case and between the two sets of contacts 750 Vrms, 50 Hz, at sea level, between open contacts of a set and coil to case. 350 Vrms, 50 Hz, at 20 mbar (87000ft) air pressure, between all terminals and case.	
Capacitance	Closed contacts to case	3.7 pF
	Open contacts to case	2.0 pF
	Between contacts of a set	2.0 pF
	Between the two contact sets	3.5 pF
Coil Dissipation	The maximum operate power that can be applied to the coil is 1.5 W at +25°C de-rated linearly to 1.0 W at +125°C	

TERMINATION VARIANTS

BS Ref 11



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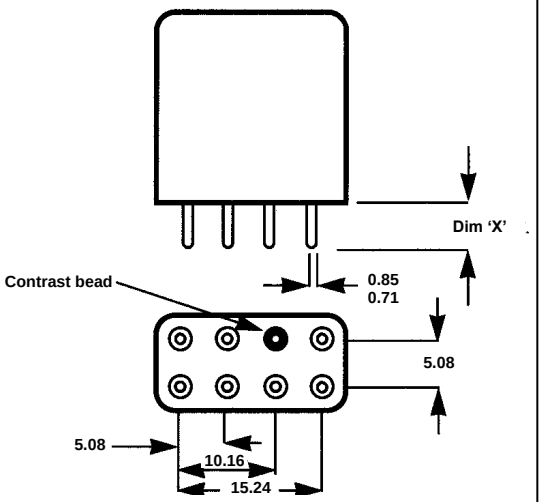

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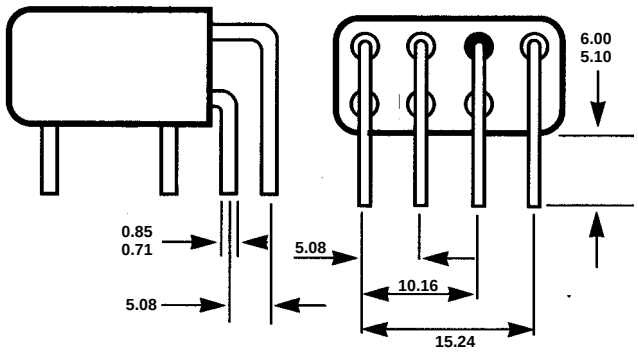

REF	Dim.X
12	4.55 - 5.60
13	2.90 - 3.40
14	7.50 - 8.30
15	24.00 - 26.00
16	74.00 - 78.00

Data Sheet No
DSF

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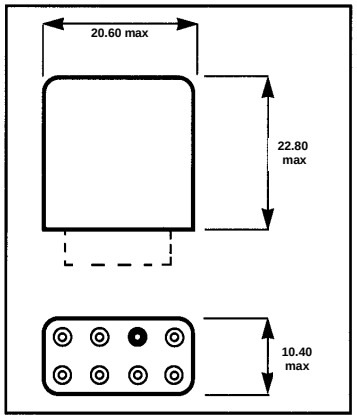
MOUNTING VARIANTS

BS Ref 01



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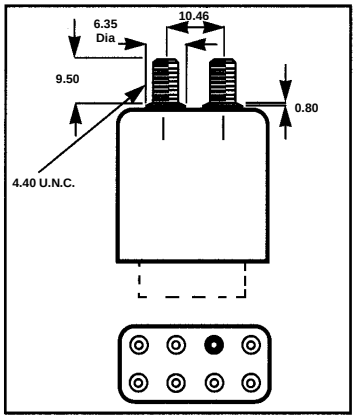

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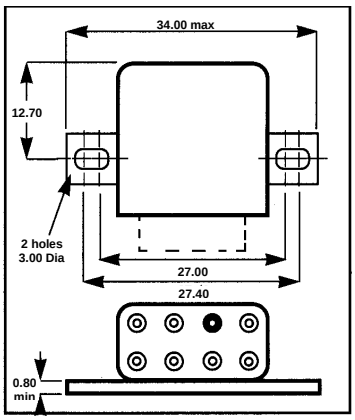

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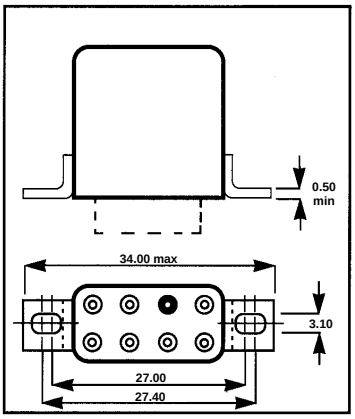

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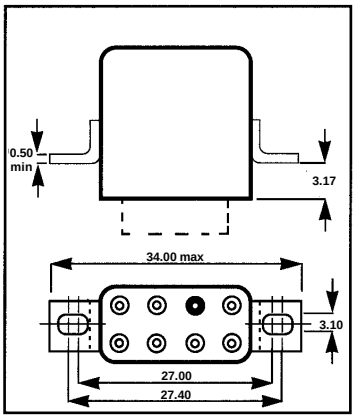

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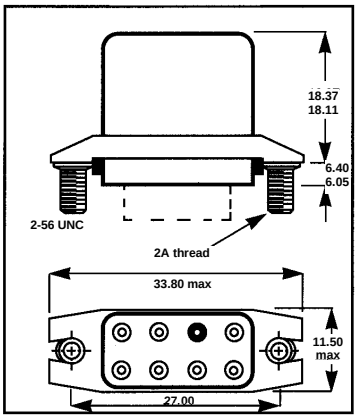

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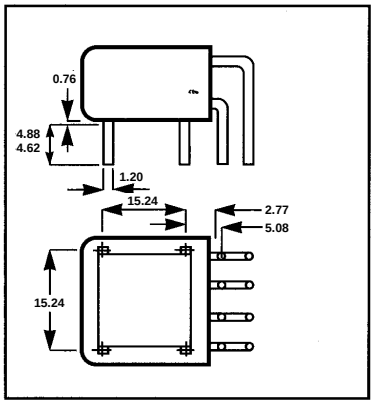
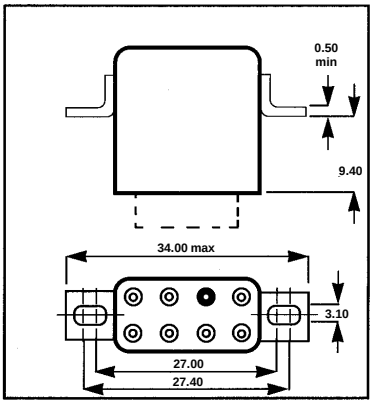


BS Ref 08



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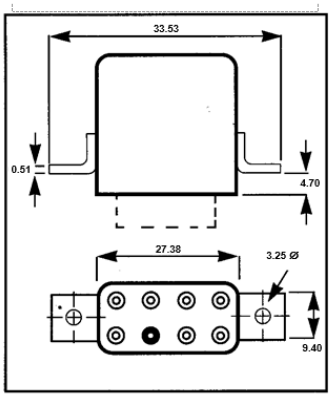

F RELAY AND F0008 MOUNTING VARIANTS

Mounting variant BS		01	02	03	04	05	06	07	08
Vibration level m/s^2		196	147	196	196	196	196	196	196
Equivalent non-BS mounting variants	Hooks	RL7630	RL7633	RL7631	RL11566	RL7632	-	-	-
	Pins	RL7641	RL9000	RL9004	RL7643	RL9003	RL43	RL14142	RL9809
Vibration level m/s^2		296*	147	196	196	196	245	196	196

* Body of relay must be rigidly mounted by epoxy cement etc.

Data Sheet No
DSF

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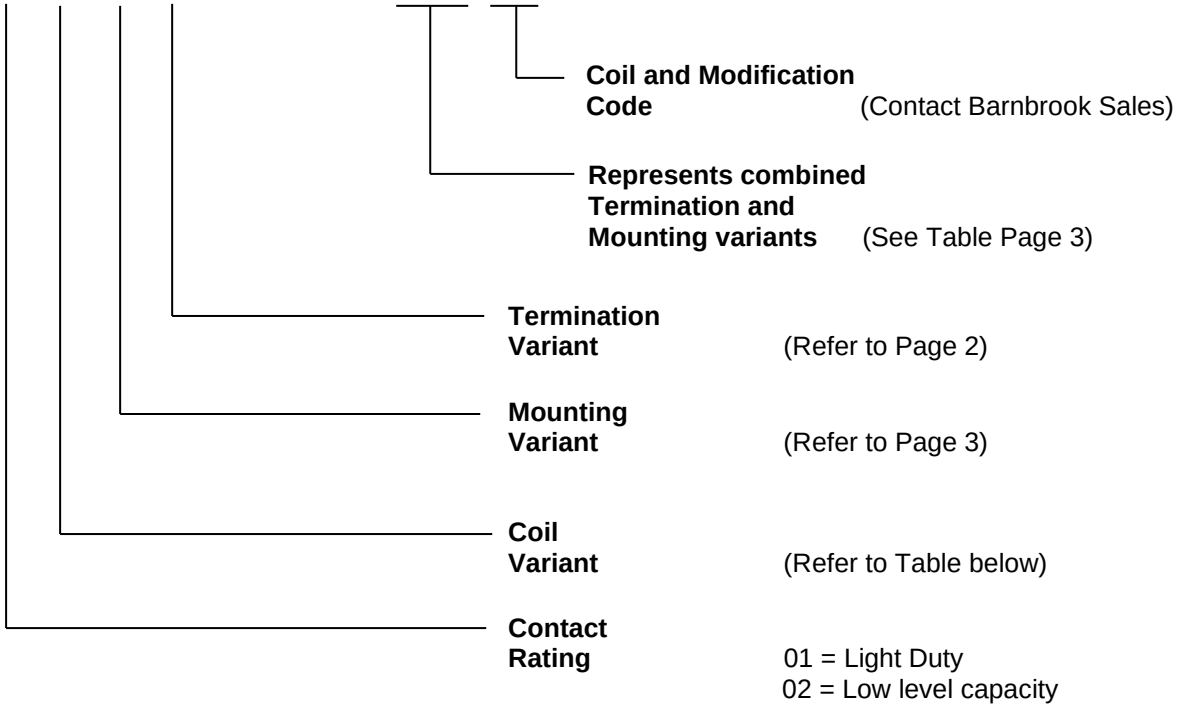
ORDERING INFORMATION

BS9151F0008- 01- 03- 05- 11 TP* RL/ RP*7632 G41



***TP option – stands for in-built Transient Protection**

*** The RP series of relays belong to this product group and are identical to RL relays. Contact Barnbrook Systems for additional information and ordering.**

COIL VARIANTS AND OPERATING CHARACTERISTICS

BS Reference	Resistance ohms ± 10%	Must Operate Volts dc	Must Release Volts dc	Maximum Volts dc	Nominal Volts DC	Approximate inductance (Henrys)
01	35	3.6	0.3	7.2	6	0.03
02	200	7.2	0.6	14.4	12	0.20
03	675	14.4	1.2	32.0	24	0.70
04	2450	28.3	2.4	57.6	48	2.50
05	975	19.2	1.6	38.4	32	0.95

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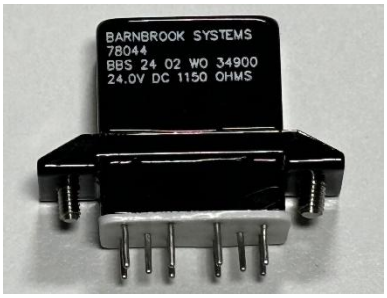
BARNBROOK DATA SHEET

RELAY
TYPE LF

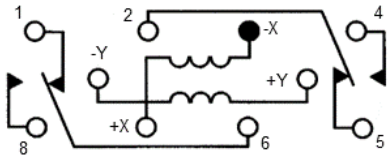
Formerly
DEUTSCH LTD
RELAY

LF
2PDT BISTABLE LATCHING
CRYSTAL CAN RELAY



Key Features
- Hermetically Sealed
- Low level to 3A switching

Wiring Schematic



Specifications

General

The maximum operate power that can be applied is 0.75 watt per coil at +25ºC, de-rated linearly to 0.5 watt at +125ºC. LF relays are suitable for short-pulse operation and the pulse power may be increased in inverse ratio to the duty cycle when used in this mode, with a limit ratio of 16:1. The minimum pulse lengths are 3 ms. Pulse power is the continuous power divided by the duty cycle, where the duty cycle equals the pulse lengths divided by the time for one cycle.

Contact Arrangement	2 Pole changeover (2PDT) break before make.
Weight	15.3 gm (mounting variant 01)

Performance

Contact Rating/Life	3A resistive, 10^5 operations at 28 VDC 1A resistive, 10^5 operations at 115 VRMS 400 Hz Low level, 10^6 operations
Mean Mechanical Life	5×10^7
Operate Time	6 ms nominal
Release Time	8 ms max. (including bounce)
Bounce Time	1 ms max.

All measurements at 25ºC and nominal voltage

Environmental

Temperature Range	-65ºC to +125ºC
Shock	981 m/s^2 (100g) for 11 ms
Vibration	60 to 2000 Hz at 196 m/s^2 (20g) acceleration 10 to 60 Hz at 1.5mm amplitude (Applies to mounting variant 01)
Linear Acceleration	981 m/s^2 (100g)
Bump	4000 bumps at 390 m/s^2 (40g), 6ms duration
Climatic	BS 2011 test Z/ABDM procedure 1
Salt Mist	BS 2011 part 2.1 Kb severity 2

Ordering Information

See sheet 4

Data Sheet No
DSDLF

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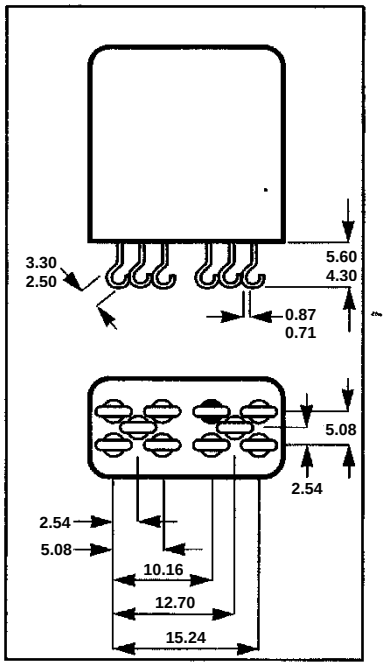
TEL NO: +44(0)1329 847722 E-mail: sales@barnbrook.co.uk www.barnbrook.co.uk

Electrical

Contact Resistance	Code 01 contacts, 50 milliohms max measured at open circuit voltage of 5V and current of 10 mA	
Insulation Resistance	1000 Megohms min – between any two isolated terminals 500 Megohms min – between terminals and case Measured at 500 VDC and +25°C	
Dielectric Strength	1000 VRMS, 50 Hz at sea level, between contacts and case and between the two sets of contacts 750 VRMS at 50 Hz, at sea level, between open contacts of a set and coil to case. 350 VRMS 50 Hz, at 20 mbar air pressure (87,000ft), between all terminals and case.	
Capacitance	Closed contact to case	3.7 pF
	Open contacts to case	2.0 pF
	Between two contacts of a set	2.0 pF
	Between the contact sets	3.5 pF

TERMINATION VARIANTS

Ref 1



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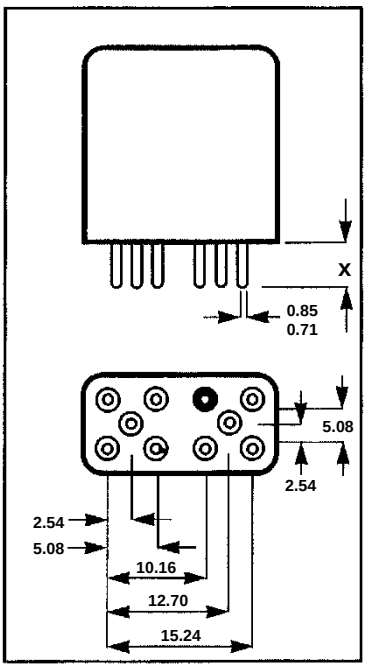
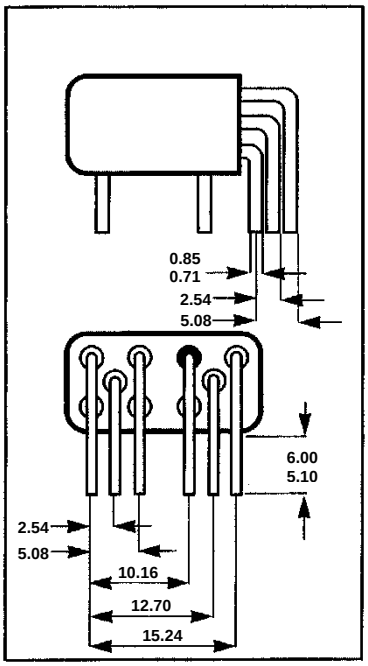


Ref 4



All dimensions are millimetres.
Tolerances ± 0.25 unless otherwise stated

Note ● Denotes Contrast Bead

REF	Dim. X
2	4.55 – 5.60
3	74.00 – 78.00

Data Sheet No
DSDLF

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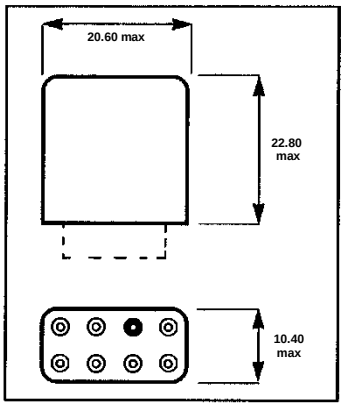
TEL NO: +44(0)1329 847722 E-mail: sales@barnbrook.co.uk www.barnbrook.co.uk

MOUNTING VARIANTS

Ref 01



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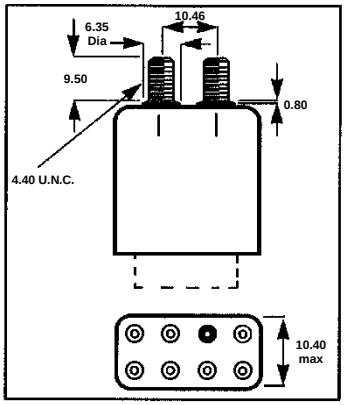

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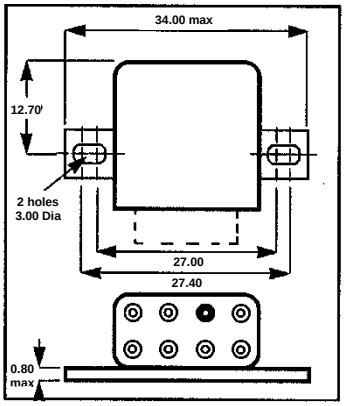

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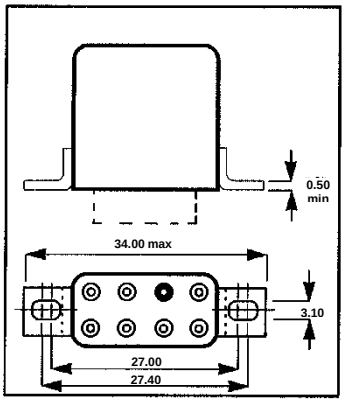

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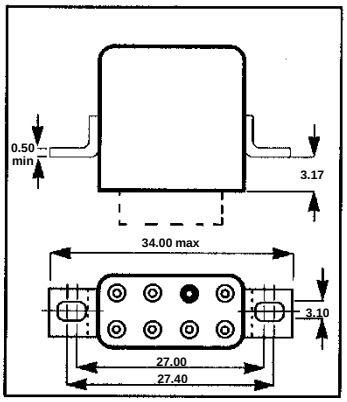

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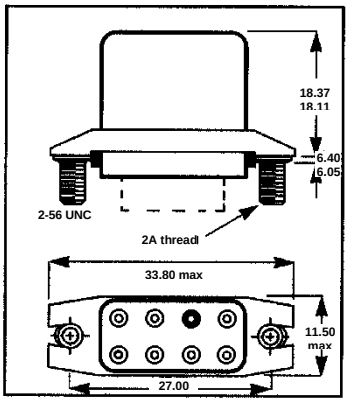
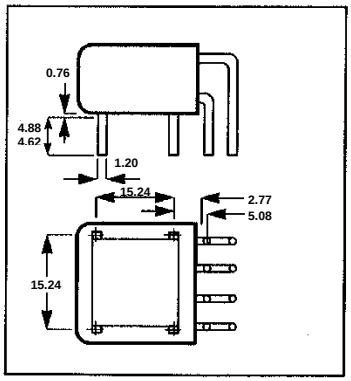


Note ● Denotes Contrast Bead

Ref 33



Mounting style 02 has a vibration level of 147 m/s^2 (15g)
All other styles have a vibration level of 196 m/s^2 (20g)

All dimensions are in millimetres.
Tolerances ± 0.25 unless otherwise stated

Data Sheet No
DSDLF

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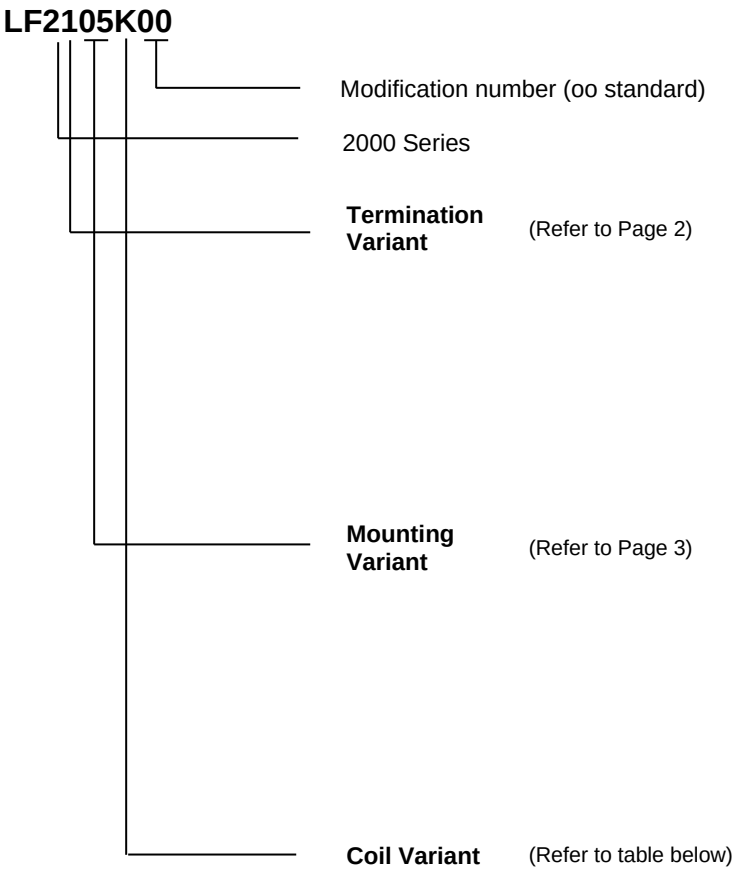
TEL NO: +44(0)1329 847722 E-mail: sales@barnbrook.co.uk www.barnbrook.co.uk

ORDERING INFORMATION



COIL VARIANTS AND OPERATING CHARACTERISTICS

LF Coil Ref	Resistance Ohms ±10% (twice)	Must Operate volts DC	Maximum volts DC	Nominal Volts DC	Approximate inductance each Coil (Henrys)
D	85	3.6	7.2	6	0.06
E	130	4.6	7.2	6	
F	200	5.6	12.0	10.4	
G	300	7.2	14.4	12	0.16
J	760	12.0	24.0	20	0.38
K	1150	14.4	32.0	24	0.60
L	2000	19.2	38.4	32	0.90
N	4400	28.8	57.6	48	1.90
E02	130	4.8	10.5	9	

All values measured at 25°C

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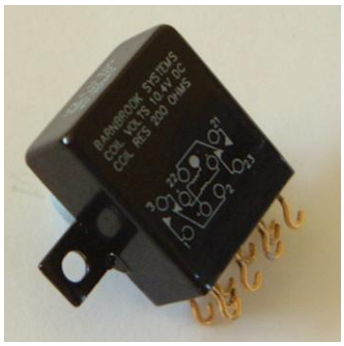
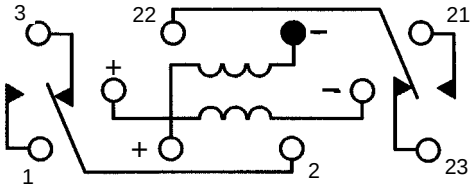
LFX
2PDT BISTABLE LATCHING CRYSTAL CAN RELAY



Key Features

- Hermetically Sealed
- Low level to 10A switching

Wiring Schematic



Specifications

General

The maximum operate power that can be applied is 0.75 watt per coil at +25°C, de-rated linearly to 0.5 watt at +125°C. LF relays are suitable for short-pulse operation and the pulse power may be increased in inverse ratio to the duty cycle when used in this mode, with a limit ratio of 16:1. The minimum pulse lengths are 3 ms. Pulse power is the continuous power divided by the duty cycle, where the duty cycle equals the pulse lengths divided by the time for one cycle.

Contact Arrangement	2 Pole changeover (2PDT) break before make.
Weight	15.3 gm (mounting variant 01)

Performance

Contact Rating/Life	10A resistive, 10^5 operations at 28 VDC 2A resistive, 10^5 operations at 115 VRMS 400 Hz Low level, 10^6 operations
Mean Mechanical Life	5×10^7
Operate Time	10 ms nominal
Release Time	10 ms max. (including bounce)
Bounce Time	3 ms max.

All measurements at 25°C and nominal voltage

Environmental

Temperature Range	-65°C to +125°C
Shock	981 m/s^2 (100g) for 11 ms
Vibration	60 to 2000 Hz at 196 m/s^2 (20g) acceleration 10 to 60 Hz at 1.5mm amplitude (Applies to mounting variant 01)
Linear Acceleration	981 m/s^2 (100g)
Bump	4000 bumps at 390 m/s^2 (40g), 6ms duration
Climatic	BS 2011 test Z/ABDM procedure 1
Salt Mist	BS 2011 part 2.1 Kb severity 2

Ordering Information

See sheet 4

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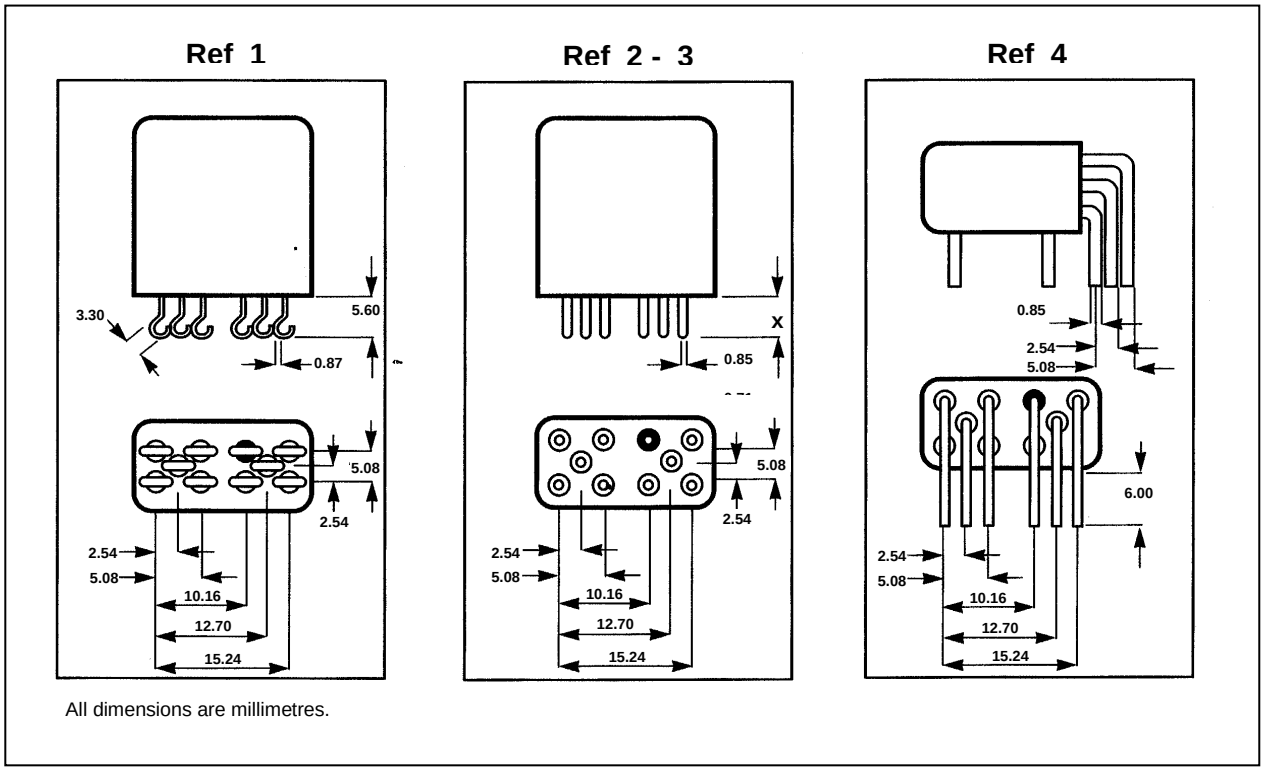
Electrical

Contact Resistance	50 milliohms Max initial	
Insulation Resistance	1000 Megohms min – between any two isolated terminals 500 Megohms min – between terminals and case Measured at 500 VDC and +25°C	
Dielectric Strength	1000 VRMS, 50 Hz at sea level, between contacts and case and between the two sets of contacts 750 VRMS at 50 Hz, at sea level, between open contacts of a set and coil to case. 350 VRMS 50 Hz, at 20 mbar air pressure (87,000ft), between all terminals and case.	
Capacitance	Closed contact to case	3.7 pF
	Open contacts to case	2.0 pF
	Between two contacts of a set	2.0 pF
	Between the contact sets	3.5 pF

TERMINATION VARIANTS



All dimensions are millimetres.

Note ● Denotes Contrast Bead

REF	Dim. X
2	4.55 – 5.60
3	74.00 – 78.00

Data Sheet No
DSLFX

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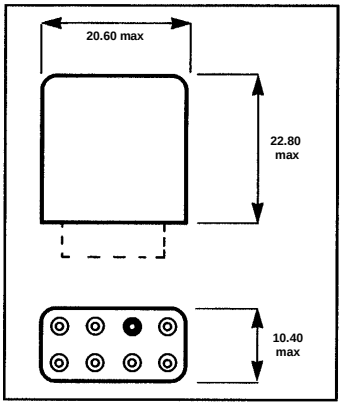
TEL NO: +44(0)1329 847722 E-mail: sales@barnbrook.co.uk www.barnbrook.co.uk

MOUNTING VARIANTS

Ref 01



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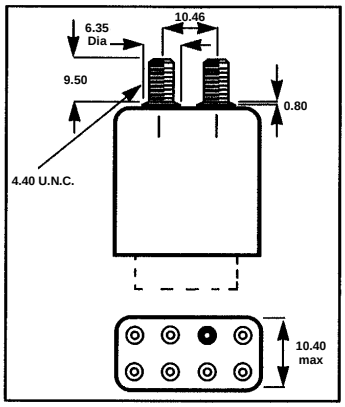
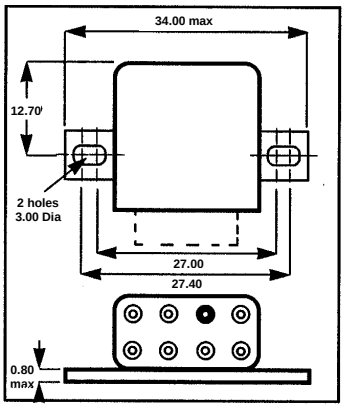


Ref 11



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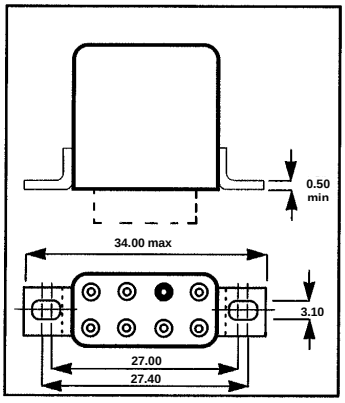

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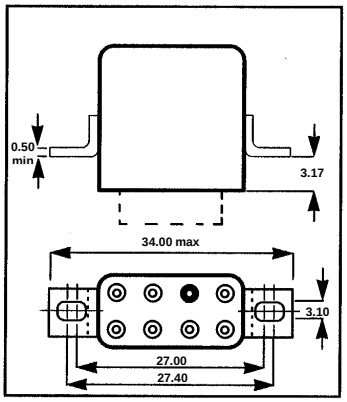

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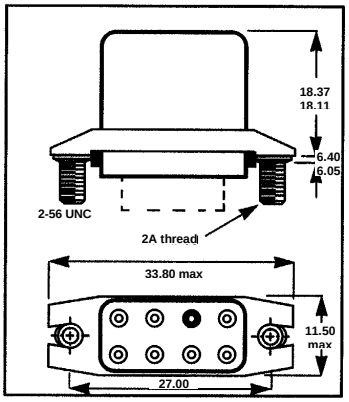
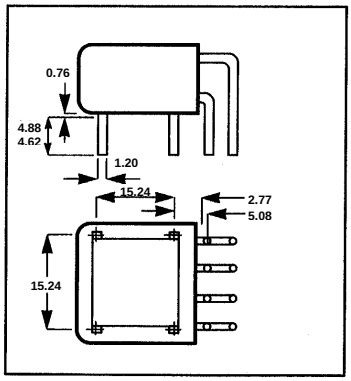


Note ● Denotes Contrast Bead

Ref 33



Mounting style 02 has a vibration level of 147 m/s^2 (15g)
All other styles have a vibration level of 196 m/s^2 (20g)

All dimensions are in millimetres.
Tolerances ± 0.25 unless otherwise stated

Data Sheet No
DSLFX

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ORDERING INFORMATION

LFX105K00

- Modification number (oo standard)
- 10A Series
- **Termination Variant** (Refer to Page 2)
- **Mounting Variant** (Refer to Page 3)
- **Coil Variant** (Refer to table below)

COIL VARIANTS AND OPERATING CHARACTERISTICS

LF Coil Ref	Resistance Ohms ±10% (twice)	Must Operate volts DC	Maximum volts DC	Nominal Volts DC	Approximate inductance each Coil (Henrys)
D	85	3.6	7.2	6	0.06
E	130	4.6	7.2	6	
F	200	5.6	12.0	10.4	
G	300	7.2	14.4	12	0.16
J	760	12.0	24.0	20	0.38
K	1150	14.4	32.0	24	0.60
L	2000	19.2	38.4	32	0.90
N	4400	28.8	57.6	48	1.90
E02	130	4.8	10.5	9	

IF TRANSIENT PROTECTION / SUPPRESSION IS REQUIRED, INCLUDE “TP” IN THE PART NUMBER AT THE END WHEN ORDERING, FOR EXAMPLE: LFX102K00TP.

All values measured at 25°C

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BARNBROOK DATA SHEET

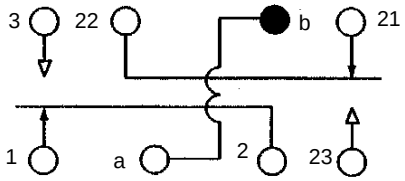
RELAY
TYPE XA

XA
2PDT 10 AMP BALANCED ARMATURE RELAY

Formerly
DEUTSCH LTD
RELAY

Key Features
- Hermetically Sealed
- Miniature Power Relay
- Crystal Can Case
- Equivalent to BS9151 F0009

Wiring Schematic



Specifications

General

Contact Arrangement	2 Pole changeover (2PDT) break before make
Weight	42 gm (mounting variant 01)
Mating Bases	Crimp Contacts – Order Part No. 604864

Performance

Contact Rating/Life	10A resistive, 10^5 operations at 28 VDC 5A resistive, 10^5 operations at 240 VRMS 400 Hz
Mean Mechanical Life	5 x 10^6 operations
Operate Time	7 ms max,
Release Time	7 ms max.
Bounce Time	5 ms max.

All measurements at 25°C and nominal voltage

Environmental

Temperature Range	-65°C to +125°C
Shock	490 m/s^2 (50g) for 11 ms
Vibration	60 to 1500 Hz at 294 m/s^2 (30g) acceleration 10 to 60 Hz at 2mm amplitude (Applies to mounting variant 01)
Linear Acceleration	490 m/s^2 (50g)
Bump	4000 bumps at 390 m/s^2 (40g), 6ms duration
Climatic	BS 2011 test Z/ABDM procedure 1
Salt Mist	BS 2011 part 2.1 Kb severity 2

Ordering Information

See sheet 4

Data Sheet No
DSXA

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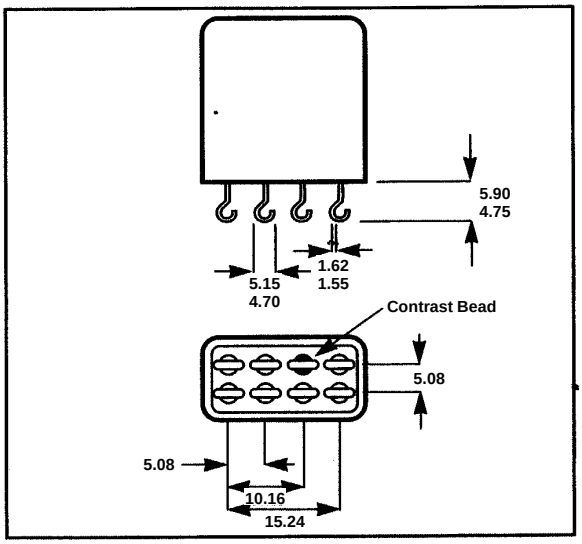
RELAY
TYPE XA

Electrical

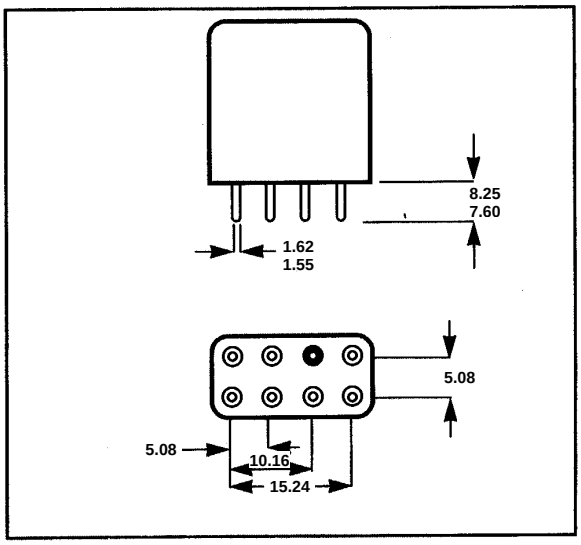
Contact Resistance	30 milliohms max measured at open circuit voltage of 5V and current of 100 mA
Insulation Resistance	1000 MΩ min at +25°C between any two isolated terminals and between terminals and case.
Dielectric Strength	1000 V rms, 50 Hz at sea level, between terminals and case, between the two sets of contacts and between open contacts of a set. 350 V rms at 50 Hz, at 20 mbar air pressure (87,000ft) between the points specified above.
Coil Dissipation	The maximum operate power that can be applied to the coil is 3 watts at +25°C. linearly de-rated to 2 watts at +125°C

TERMINATION VARIANTS

XA Ref 1



XA Ref 2



All dimensions are millimetres.
Tolerances ± 0.25 unless otherwise stated

Data Sheet No
DSXA

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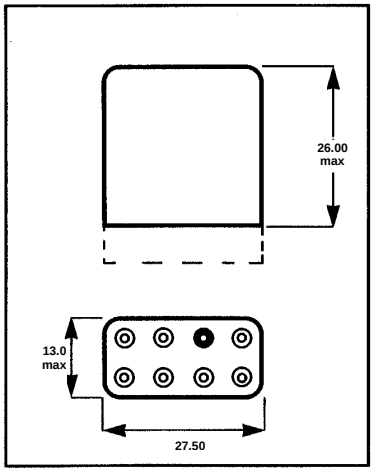
MOUNTING VARIANTS

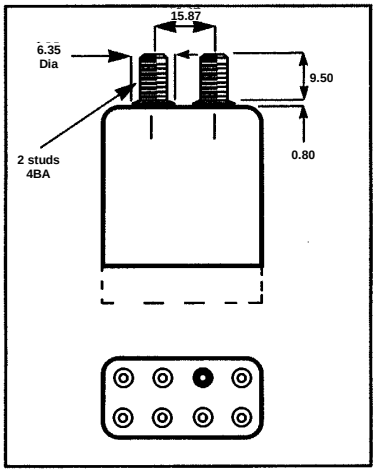
Mounting Variant	01	31	02	41	22	29
Vibration level m/s^2	294*	147	196	245	245	196

* Body of relay must be rigidly mounted by epoxy cement

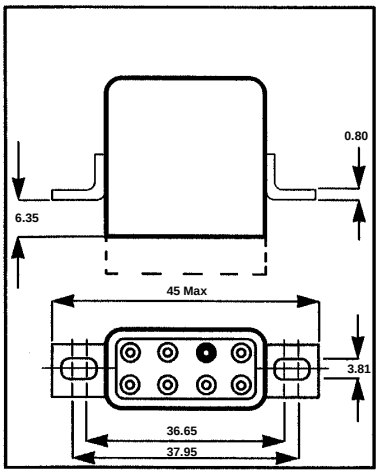
XA Ref 01



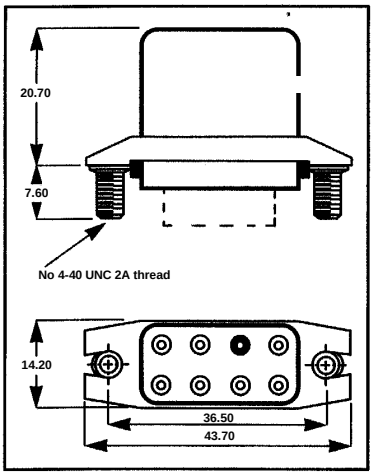
XA Ref 31



XA Ref 02



XA Ref 41



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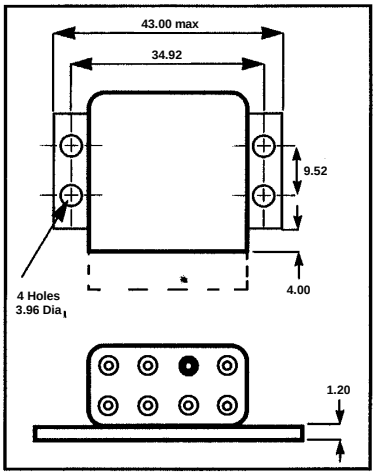

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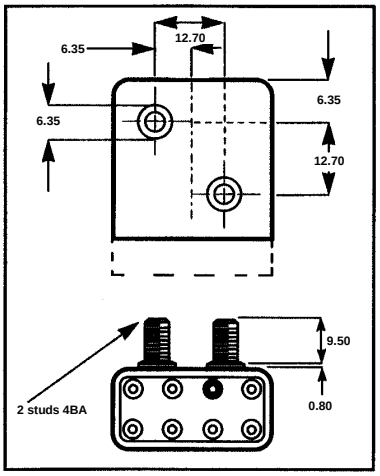

Note ● Denotes Contrast Bead

All dimensions are in millimetres. Tolerances ± 0.25 unless otherwise stated
Can dimensions shown in Ref 01 apply to all variations. Fixing holes are clearance for 6-32 UNC and 4BA screws.
NOTE: Terminations variant Ref 1 not applicable to Ref 41

Data Sheet No
DSXA

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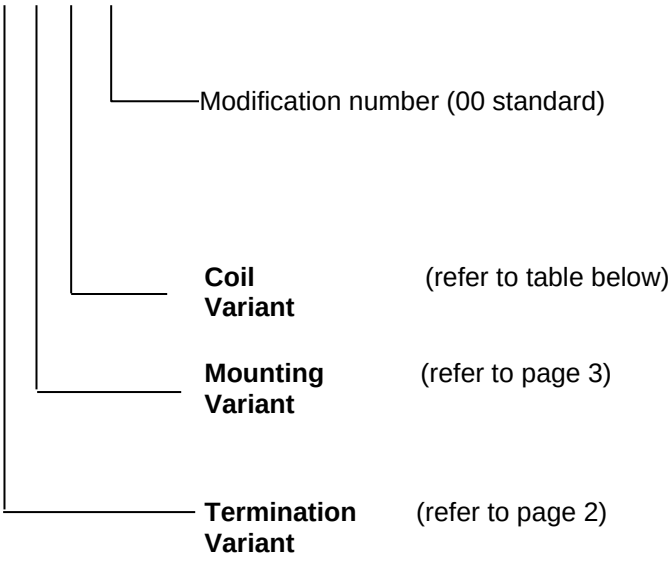
ORDERING INFORMATION

XA2012400



COIL VARIANTS AND OPERATING CHARACTERISTICS

XA Coil Ref	Resistance Ohms ± 10%	Must Operate Volts DC	Must release Volts DC	Maximum Volts DC	Nominal Volts DC	Approximate inductance (mH)
6	25	3.6	0.30	7.2	6	25
12	100	7.2	0.60	14.4	12	100
24	440	14.4	1.20	32.0	24-28	400
48	1760	28.8	2.40	57.6	48	1600
110	9000	60.0	6.00	121.0	110	N / A

All values measured at +25ºC

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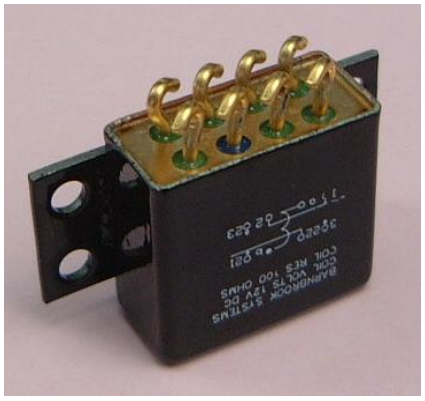
BARNBROOK DATA SHEET

RELAY
TYPE XVA

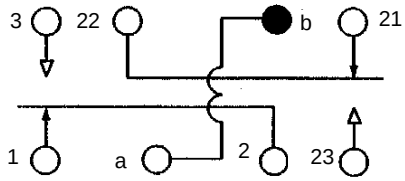
XVA
2PDT 15 AMP RELAY



Key Features

- Hermetically Sealed
- Miniature Power Relay
- Crystal Can Case

Wiring Schematic



Specifications

General

Contact Arrangement	2 Pole changeover (2PDT) break before make.
Weight	42 gm (mounting variant 01)
Mating Bases	Crimp Contacts – Order Part No. 603983

Performance

Contact Rating/Life	15A resistive, 10^5 operations at 28 VDC 3A resistive, 10^5 operations at 115 VRMS 400 Hz
Mean Mechanical Life	5 x 10^6 operations
Operate Time	7 ms max,
Release Time	7 ms max.
Bounce Time	5 ms max.

All measurements at 25°C and nominal voltage

Environmental

Temperature Range	-65°C to +125°C
Shock	490 m/s^2 (50g) for 11 ms
Vibration	60 to 1500 Hz at 294 m/s^2 (30g) acceleration 10 to 60 Hz at 2mm amplitude (Applies to mounting variant 01)
Linear Acceleration	490 m/s^2 (50g)
Bump	4000 bumps at 390 m/s^2 (40g), 6ms duration
Climatic	BS 2011 test Z/ABDM procedure 1
Salt Mist	BS 2011 part 2.1 Kb severity 2

Ordering Information — See sheet 4

Data Sheet No
DSXVA

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TEL NO: +44(0)1329 847722 E-mail: sales@barnbrook.co.uk www.barnbrook.co.uk

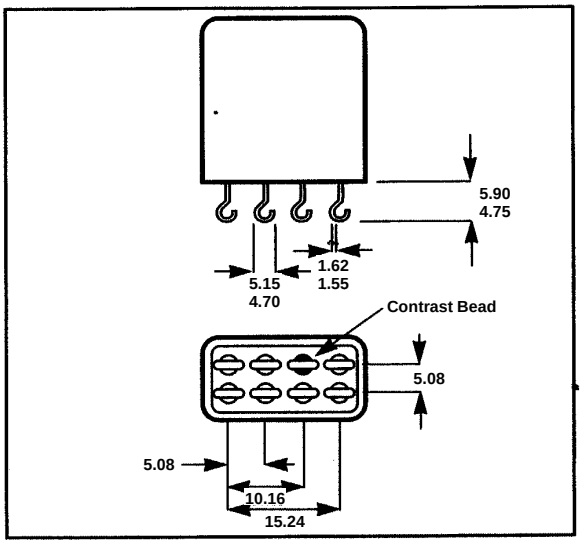
RELAY
TYPE XVA

Electrical

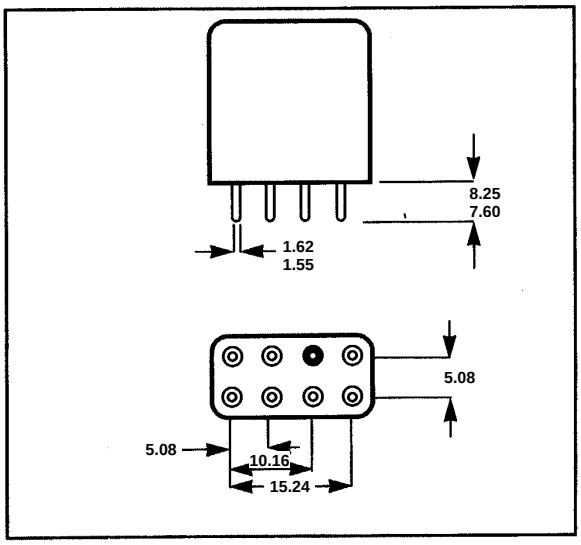
Contact Resistance	30 milliohms max measured at open circuit voltage of 5V and current of 100 mA
Insulation Resistance	1000 MΩ min at +25ºC between any two isolated terminals and between terminals and case, between coil & contacts
Dielectric Strength	1000 V rms, 50 Hz at sea level, between terminals and case, between the two sets of contacts and between open contacts of a set, between coil & contacts 350 V rms at 50 Hz, at 20 mbar air pressure (87,000ft) between the points specified above.
Coil Dissipation	The maximum operate power that can be applied to the coil is 3 watts at +25ºC. linearly de-rated to 2 watts at +125ºC

TERMINATION VARIANTS

XVA Ref 1



XVA Ref 2



All dimensions are millimetres.
Tolerances ± 0.25 unless otherwise stated

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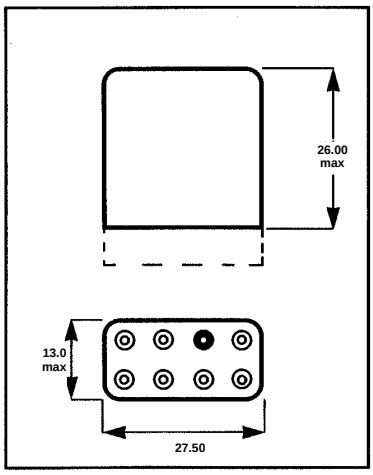
RELAY
TYPE XVA

MOUNTING VARIANTS

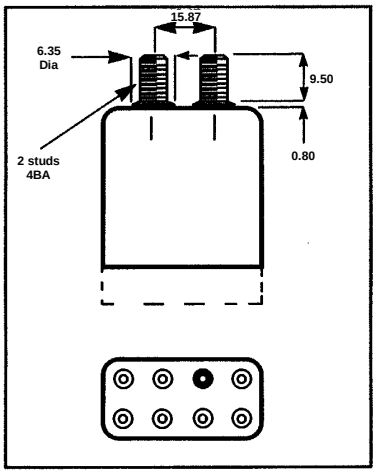
Mounting Variant	01	31	02	41	22	29
Vibration level m/s^2	294*	147	196	245	245	196

* Body of relay must be rigidly mounted by epoxy cement

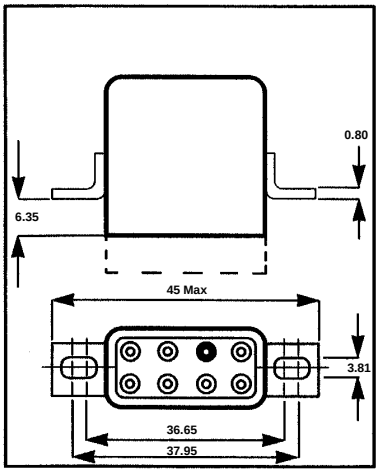
XVA Ref 01



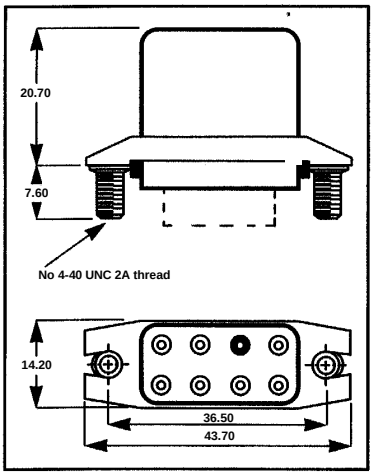
XVA Ref 31



XVA Ref 02



XVA Ref 41



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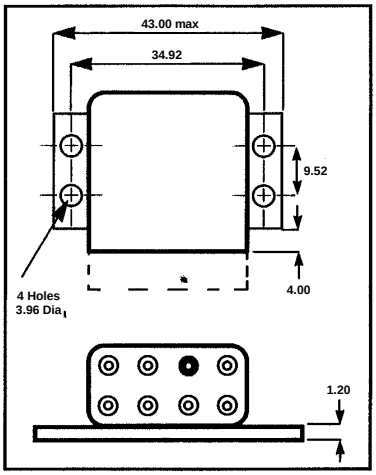
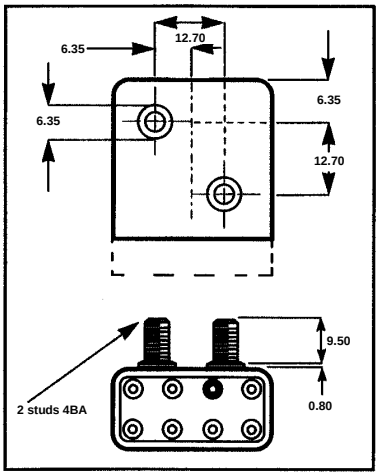


XVA Ref 29



All dimensions are in millimetres. Tolerances ± 0.25 unless otherwise stated
Can dimensions shown in Ref 01 apply to all variations. Fixing holes are clearance for 6-32 UNC and 4BA screws.
NOTE: Terminations variant Ref 1 not applicable to Ref 41

Note ● Denotes Contrast Bead

Data Sheet No
DSXVA

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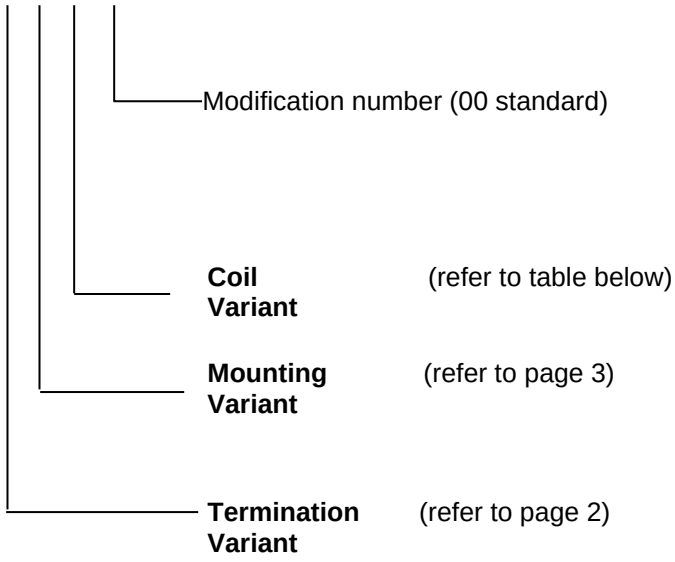
ORDERING INFORMATION

XVA 2 01 24 00



COIL VARIANTS AND OPERATING CHARACTERISTICS

XVA Coil Ref	Resistance Ohms ± 10%	Must Operate Volts DC	Must release Volts DC	Maximum Volts DC	Nominal Volts DC	Approximate inductance (milliHenrys)
6	25	3.6	0.30	7.2	6	25
12	100	7.2	0.60	14.4	12	100
24	440	14.4	1.20	32.0	24	400
48	1760	28.8	2.40	57.6	48	1600
110	9000	60.0	6.00	121.0	110	N / A

All values measured at +25ºC

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BARNBROOK DATA SHEET

RELAY

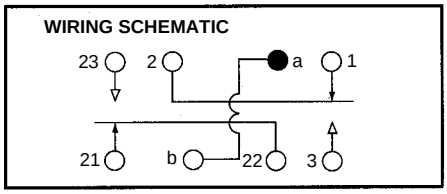
TYPE CECC16101-038

CECC16101 - 038
2PDT HALF CRYSTAL CAN RELAY

Formerly
DEUTSCH LTD
RELAY

Key Features

- Hermetically sealed
- Low Level capability
- Small size for high density packing



Specification

General

Contact arrangement	2 Pole changeover (2PDT) break before make
Weight	8.7 g (mounting variant 01)
Mating Bases	Solder Contacts – Order Part No. 4223-1
	Crimp Contacts – Order Part No. 420204

Performance

Contact Rating/life	2A Resistive, 10^5 operations at 28 VDC
	1A Resistive, 10^5 operations at 115 VRMS 400 Hz
	Low Level, 10^6 operations (typical 5 VDC, 10mA)
Mean Mechanical Life	5 x 10^7 operations
Operate Time	3.5 ms nominal, 5 ms max (excluding bounce)
Release Time	1 ms nominal, 5 ms max (excluding bounce)
Bounce Time	3 ms max

All measurements made at 25ºC and nominal voltage

Environmental

Temperature Range	-65°C to +125°C
Shock *	490 m/s^2 (50g) for 11 ms
Vibration *	60 to 2000 Hz at 196 m/s^2 (20g) acceleration
	10 to 60 Hz at 1.5mm amplitude
	* applies to mounting style 01
Linear Acceleration	980 m/s^2 (100g)
Bump	4000 bumps at 390 m/s^2(40g), 6 ms duration
Climatic	CECC16000 5.15
Salt Mist	CECC16000 5.22

Ordering Information See sheet 4

Data Sheet No
DSCECC-038

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RELAY

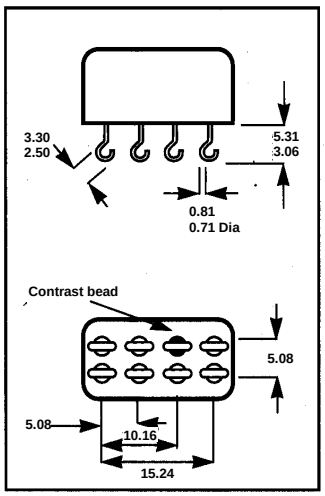
TYPE CECC16101-038

Electrical

Contact Resistance	Code 01 contacts 50 mΩ max. measured at open circuit voltage of 5V and current of 10 mA. Code 02 contacts 50 mΩ max. measured at open circuit voltage of 10 mV and current of 10 mA.	
Insulation Resistance	500 MΩ min. -between any two isolated terminals 500 MΩ min. -between terminals and case Measured at 500 VDC and 25°C	
Dielectric Strength	500 VRMS 50 Hz, at sea level, between terminals and case, between the two sets of contacts, and between open contacts 350 VRMS 50 Hz, at 20 mbar air pressure (87,000ft), between all terminals and case	
Capacitance	Closed contacts to case	4pF
	Open contacts to case	2pF
	Between contacts of a set	2pF
	Between the two contact sets	4pF
Coil Dissipation	The maximum operate power that can be applied to the coil is 1.0W at 25°C de-rated linearly to 0.8W at 125°C	

Terminal Variants

CECC Ref 11



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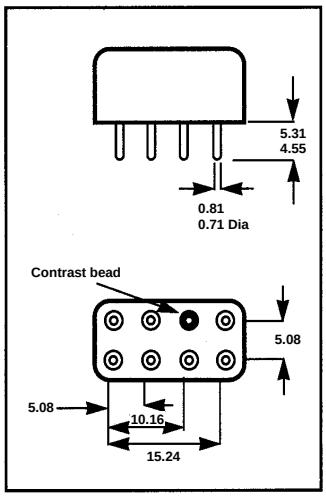

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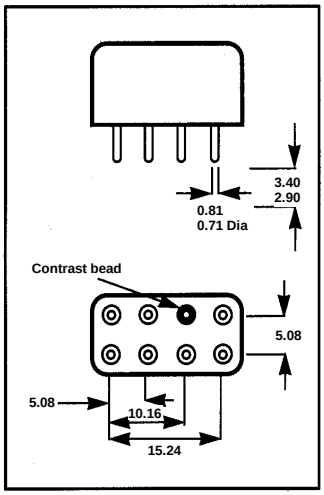

All dimensions are in millimetres. Tolerance ± 0.25 unless otherwise stated

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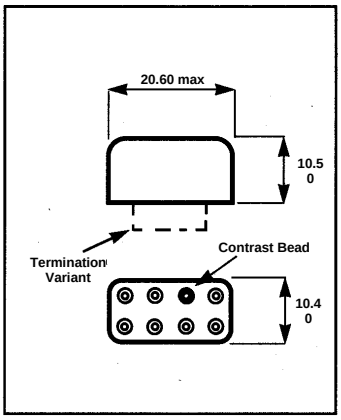
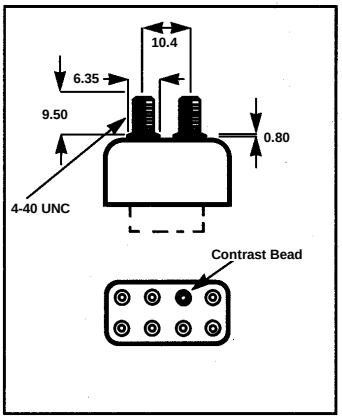
TYPE CECC16101-038

CECC Ref 01



CECC Ref 02



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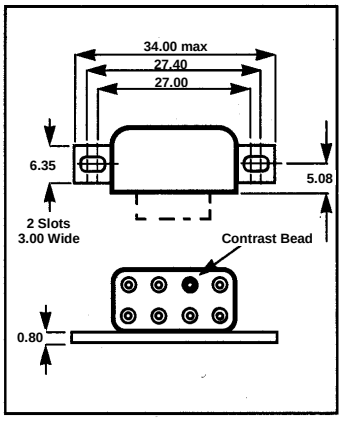
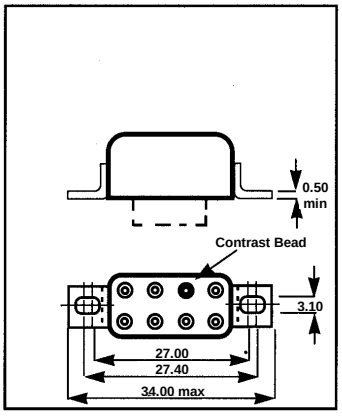


CECC Ref 04



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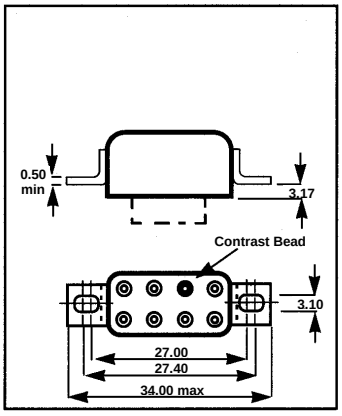

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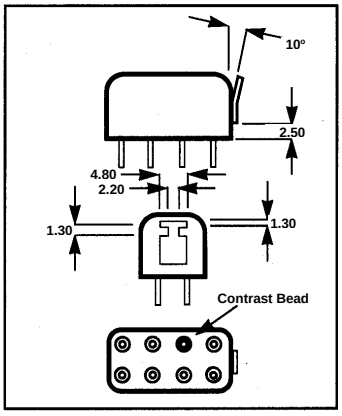

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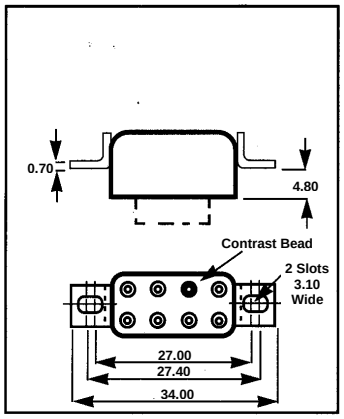
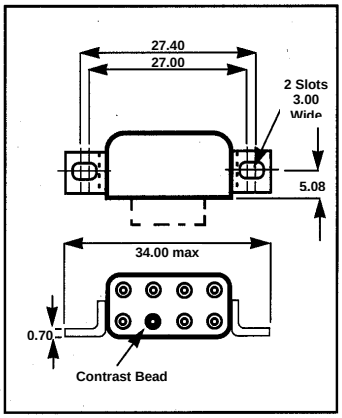


CECC Ref 08



All dimensions are in millimetres. Tolerances +/- 0.25 unless otherwise stated.
Can dimensions shown in Ref. 01 apply to all variants. All termination variants are allowable

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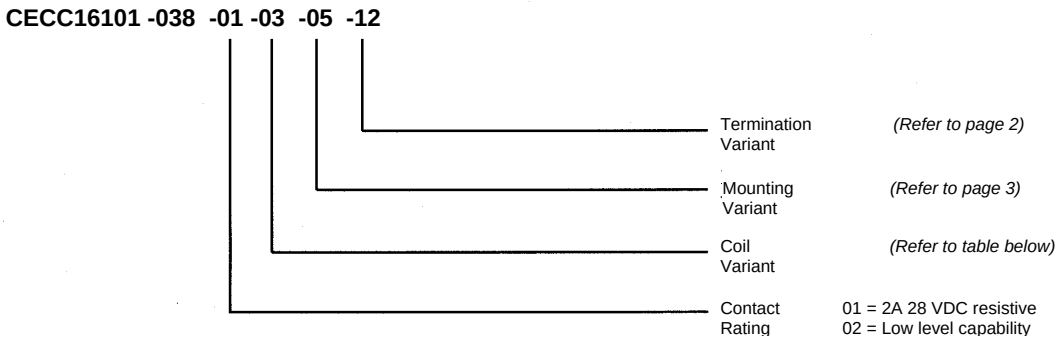
TYPE CECC16101-038

Ordering Information



Coil Variants and Operating Characteristics

CECC Code	Resistance Ohms ±10%	Must operate Volts dc	Must release Volts dc	Maximum Volts dc	Nominal Volts dc
01	40	3.6	0.30	7.2	6
02	42	3.6	0.30	7.2	6
03	60	3.6	0.30	7.2	6
04	150	7.2	0.60	14.4	12
05	210	7.2	0.60	14.4	12
06	320	7.2	0.60	14.4	12
07	675	14.4	1.20	32.0	24-26.5
08	830	14.4	1.20	32.0	24-26.5
09	1250	14.4	1.20	32.0	24-26.5
10	2500	28.8	2.40	57.6	48
11	2800	28.8	2.40	57.6	48
12	3500	28.8	2.40	57.6	48
13	40	3.0	0.25	6.0	5
14	700	14.4	1.20	32.0	24-26.5
15	700	10.6	0.88	24.0	20
16	830	13.5	1.20	32.0	24-26.5

All value are measured at 25°C

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Section 4

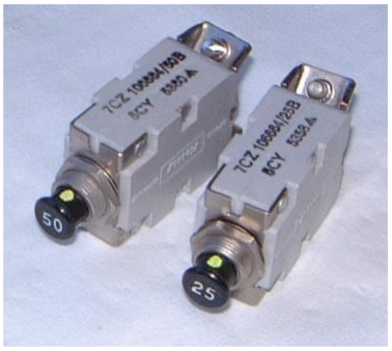
THERMAL CIRCUIT BREAKERS

BARNBROOK

DATA SHEET

MINATURE CIRCUIT BREAKER

TYPE 700



The series 700 circuit breaker is of a single-pole, double-break construction with 'overload' sensing by a series bi-metal strip. Manual operation is by a single push-pull button on which the unit rating is boldly marked. Eight ratings are available between 5 and 50 amps. The breaker is trip-free at any overload value which will trip it normally, and no pull-out motion is required before resetting can be accomplished.

Despite its exceptionally small size, the series 700 circuit breaker is of extremely robust construction, the thermal latches being independent of the mechanical latches used for normal switching operations. The mechanical latches are of hardened steel, ensuring long life under manual operating conditions, Contact pressure is maintained by steel extension springs which do not carry current, the connection between contacts and thermal element being made by flexible conductors. The contacts are mounted on rockers which provide a contact wiping action, maintaining low resistance and self cleaning.

The unit is panel mounted, secured by a single nut. A locating tab prevents rotation. Electrical connections are made to terminal lugs using No. 6 UNC screws (supplied).

General design data is given on sheet 2, but it should be noted that the 20 to 50 amp breaker will only rupture 1000 amps in the standard form. For fault currents up to 3000 amps in this range, the 516 series part number is required. At maximum ambient temperature the minimum ultimate trip current of the circuit breakers is de-rated as follows :

5 amp rating	-60% rated current
7.5 to 50 amp rating	-70% rated current

Key Features

- Small size
- Eight ratings available between 5 and 50 amps
- Extremely robust construction
- Contact wiping action for self cleaning and continued low resistance
- Panel mounted

Specification

Environmental and Physical

Vibration	BSG 100 Grade 2
Acceleration	BSG 100 Grade 1
dc rupture capacity	3000 amps prospective current
ac rupture capacity	750 amps prospective current
Operating temperature range	-65 ^{o}C to +70 ^{o}C
Weight	45gm (1.58oz)
Life	10,000 operations
Length	43.5mm (1.71in)

Ordering Information

To order please quote Part Number from Table on Sheet 2.

Data Sheet No
DSCB700

Design authority and manufacture by Barnbrook Systems Limited

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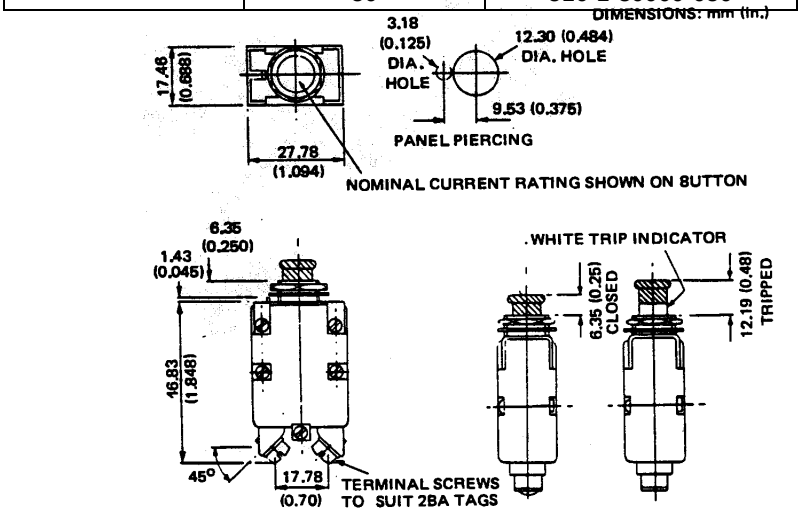
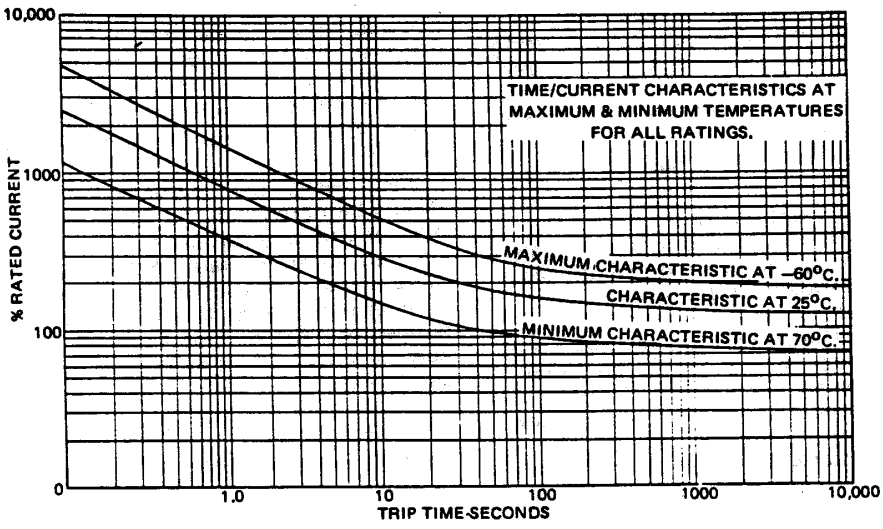
AS9100D CERTIFIED ISO 9001

BARNBROOK DATA SHEET

MINATURE CIRCUIT BREAKER
TYPE 700

	Rating (Amps)	Part Number
1000 Amp Rupture	20	7CZ106664/20
	25	7CZ106664/25
	35	7CZ106664/35
	50	7CZ106664/50
	5	7CZ106664/5
	7.5	7CZ106664/7
	10	7CZ106664/10
	15	7CZ106664/15
	5	516-1-80000-005
	20	516-1-80000-020
3000 Amp Rupture	25	516-1-80000-025
	35	516-1-80000-035
	50	516-1-80000-050





Data Sheet No
DSCB700

SHEET 2 OF 2

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AS9100D CERTIFIED ISO 9001

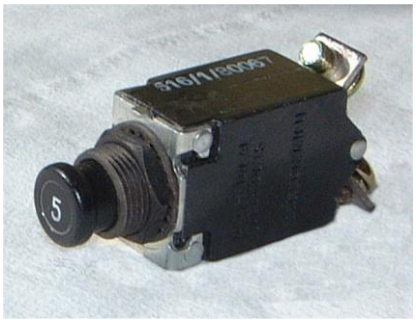
BARNBROOK

DATA SHEET

AIRCRAFT CIRCUIT BREAKER

TYPE 4310

The 'Series 4310' circuit breaker is a miniature, single push-pull unit of single-pole, double break construction incorporating an overload sensing device in the form of an electromechanical thermal element which is heated by the passing of current. To prevent premature tripping at elevated ambient temperatures the unit is temperature compensated. The unit's robust construction meets the requirements of MIL-C-5809 and MS 3320 (ASG) military specification requirements for temperature, vibration, mechanical shock and acceleration. The unit is capable of providing protection for both a.c. and d.c. circuits and has an interruption capacity of 6000A at 30V D.C. A trip is indicated by a white band appearing at the base of the push-pull button.



Key Features

- Temperature compensated.
- Lightweight.
- A.C. or D.C. operated.
- High break capacity.
- Durable.
- Extensive range.

Specification

Performance

Electrical

Rating (Amps)	Part Number
1/2	516-1-80067-005
1	516-1-80067-010
2	516-1-80067-020
2.1/2	516-1-80067-025
3	516-1-80067-030
4	516-1-80067-040
5	516-1-80067-050
7.1/2	516-1-80067-075
10	516-1-80067-100
15	516-1-80067-150
20	516-1-80067-200
25	516-1-80067-250

The rating of individual circuit breakers is marked on the head of the push-pull button

Environmental and Physical

Operating temperature range	-55°C to +121°C
Weight	24gm (0.85oz)

Dimensions

Length	43.5mm (1.71in)
Width	15.0mm (0.60in)
Height	19.8mm (0.78in)

Ordering Information To Order please quote Part Number from Table above.

Data Sheet No
DSCB4310

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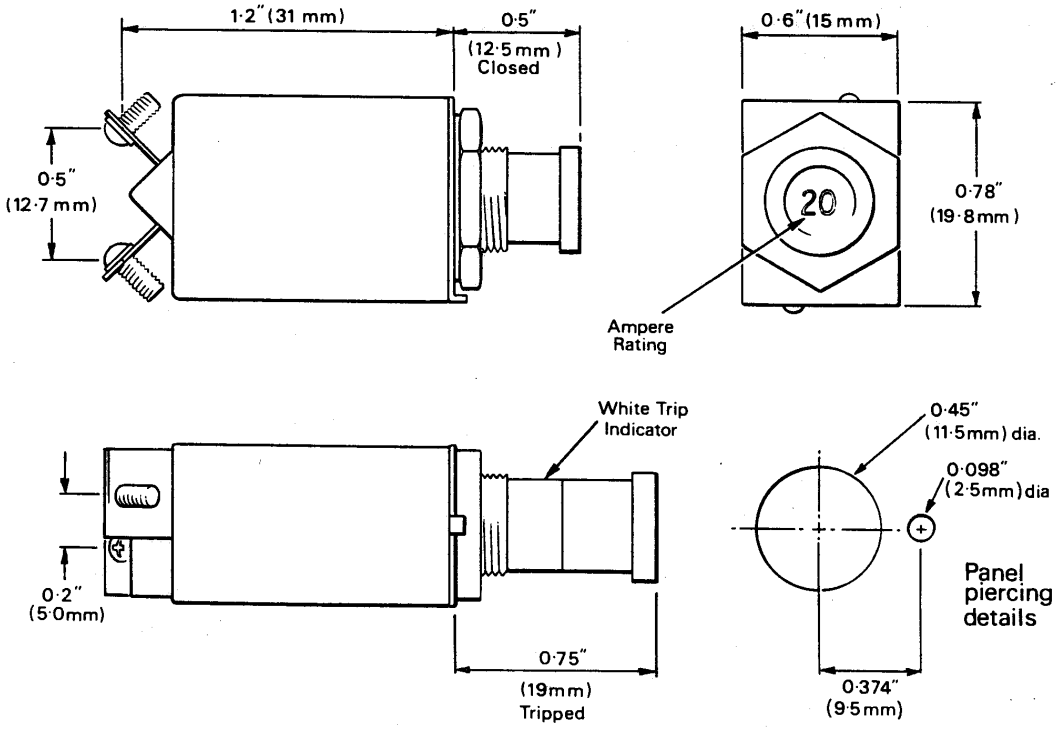
DATA SHEET

AIRCRAFT CIRCUIT BREAKER

TYPE 4310



As a result continual efforts to improve design, components supplied may vary in detail from those described or illustrated in this publication.

Data Sheet No
DSCB4310

SHEET 2 OF 2

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AS9100D CERTIFIED ISO 9001

Section 5

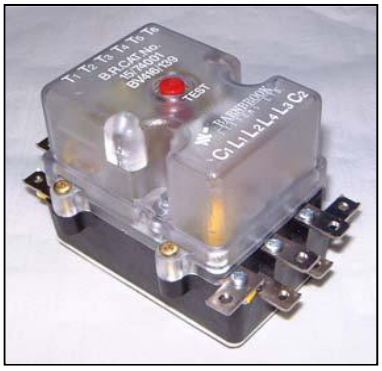
RAILWAY APPROVED RELAYS

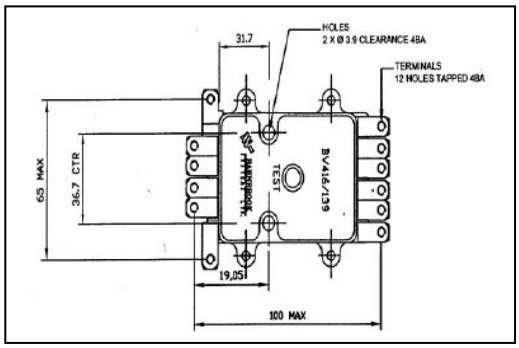
BARNBROOK DATA SHEET

RELAY
TYPE BV416/139c

Sealed Relay designed primarily for the Railway Industry, and to meet BR specification with regards to tracking and clearances. Flexible design allows for many contact configurations up to 8 pole.

Anti vibration complies with BR specification.
The mouldings are made from flame retardant polyester.
Gold plated contacts for long term storage.





Key Features

- Sealed Unit.
- Self wiping contacts
- Manual test check via push button.
- Gold plated silver alloy contacts.
- Standard Configuration Four pole (2/NO 2/CO) also available as 6 or 8 pole
- Proven Track Record
- Can be data-enabled (DE Version)
- Operation LED can be fitted
- Adjustable stop ensures compliance with TDE/G/77D/71

Specification

Performance

Suitable for both inductive and resistive loads
Gold plated contacts

Contact Rating	Inductive 4A at 24V DC Resistive 16A at 24V DC
Life	1 million operations minimum
Contact Rating	25A at 28V DC (6 x 10^5 operations)

Electrical

Pull in voltage	15 V DC at 20ºC (For 24V DC nominal coil)
Drop out voltage	5 V DC minimum (For 24V DC nominal coil)
Insulation resistance	100 MegOhms at 500 V DC
Dielectric strength	2000 V AC minimum

Environmental and Physical

Temperature range	-40 ºC to +70 ºC
Shock & Vibration	BS EN 61373 1999 / TDE/G/77D/71
Fire	BS 6853:1999

Dimensions

Size	105mm x 70mm x 80mm
Weight	400 grams.

Ordering Information

Product Code: 015/900467
Specify part number and quantity.
Other Coil Voltages and contact configurations are available on request.

Data Sheet No
DSRELBV416139c

Design authority and manufacture by Barnbrook Systems Limited

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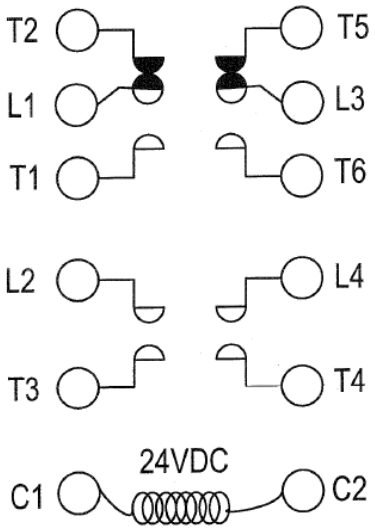
AS9100D CERTIFIED ISO 9001

BARNBROOK DATA SHEET

RELAY TYPE BV416/139c

Terminations (Standard 4 Pole configuration)	
Contact Marking	**Termination**
C2	Coil + ve
C1	Coil – ve
T1	N/O 1
T3	N/O 2
T6	N/O 3
T4	N/O 4
L1	Pole 1
L2	Pole 2
L3	Pole 3
L4	Pole 4
T2	N/C 1
T5	N/C 3

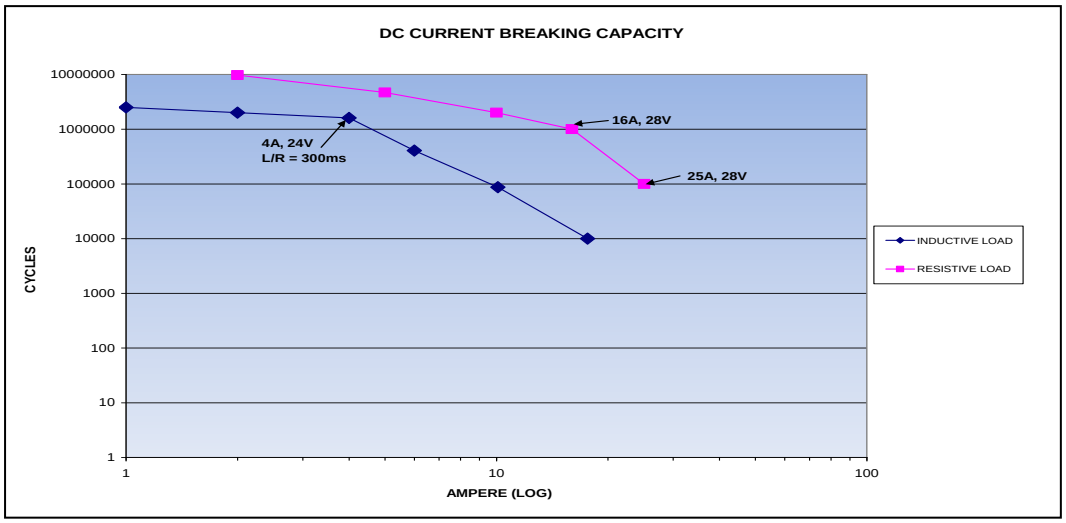


Note: Above represents the standard 4 pole configuration

1. Contact terminals L1 – T1, L1 – T2 & L3 – T5, L3 – T6 form the 2/CO configuration.
2. Contact terminals L2 – T3 & L4 – T4 form the 2/NO configuration.

STANDARD COILS	
Volts ac	**Resistance**
12	7.6
24	33
92	450
110	650
220	2300
240	3200
415	11000
Volts dc	**Resistance**
12	50
24	200
110	3750
230	17900

Non standard coils available upon request. Coil resistance values shown are for reference only.



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Data Sheet No
DSRELBV416139c

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BARNBROOK DATA SHEET

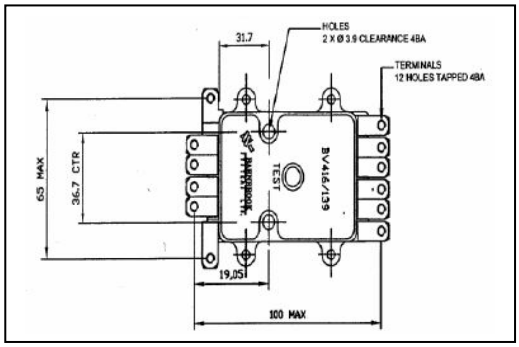
RELAY
TYPE BV416/139HC

Enclosed Relay designed primarily for the Railway Industry, and to meet BR specification with regards to tracking and clearances.

Anti vibration complies with BR specification.
The mouldings are made from flame retardant polyester.

Key Features

- Fully Enclosed.
- Manual test check.
- AgCdO Contacts for weld resistance
- Proven Track Record
- Can be data-enabled



Specification

Performance

Suitable for both inductive and resistive loads
Gold plated contacts

Contact Rating	Inductive 10A Max at 24V DC 100mA Minimum at 24V DC Resistive 30A Max at 24V DC 100mA Minimum at 24V DC
Mechanical Life	1 million operations minimum

Electrical

Pull in voltage	18 V DC at 20ºC (For 24V DC nominal coil)
Drop out voltage	2 V DC minimum (For 24V DC nominal coil)
Insulation resistance	100 MegOhms at 500 V DC
Dielectric strength	2000 V AC minimum

Environmental and Physical

Temperature range	-40 ºC to +70 ºC
Shock & Vibration	BS EN 61373 1999
Fire	BS 6853 Cat 1B

Dimensions

Size	105mm x 70mm x 80mm
Weight	400 grams.

Installation

Installation / Mounting Screws Max Torque Value	2.0Nm Max (Excessive Torque may distort case and affect relay operation)

Ordering Information

Specify part number and quantity.
Other Coil Voltages and contact configurations are available on request.

Data Sheet No
DSRELBV416139HC

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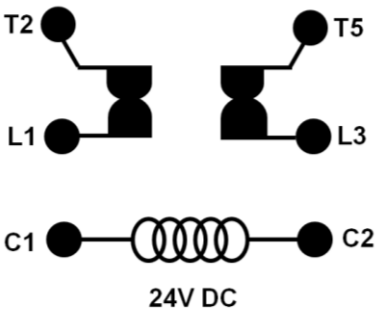
RELAY
TYPE BV416/139HC

Termination identification for BV416/139HC (2 N/C) Contact configuration	
Contact Marking	**Termination**
C2	Coil + ve
C1	Coil – ve
T2	N/C 1
T5	N/C 2
L1	Pole 1
L3	Pole 3



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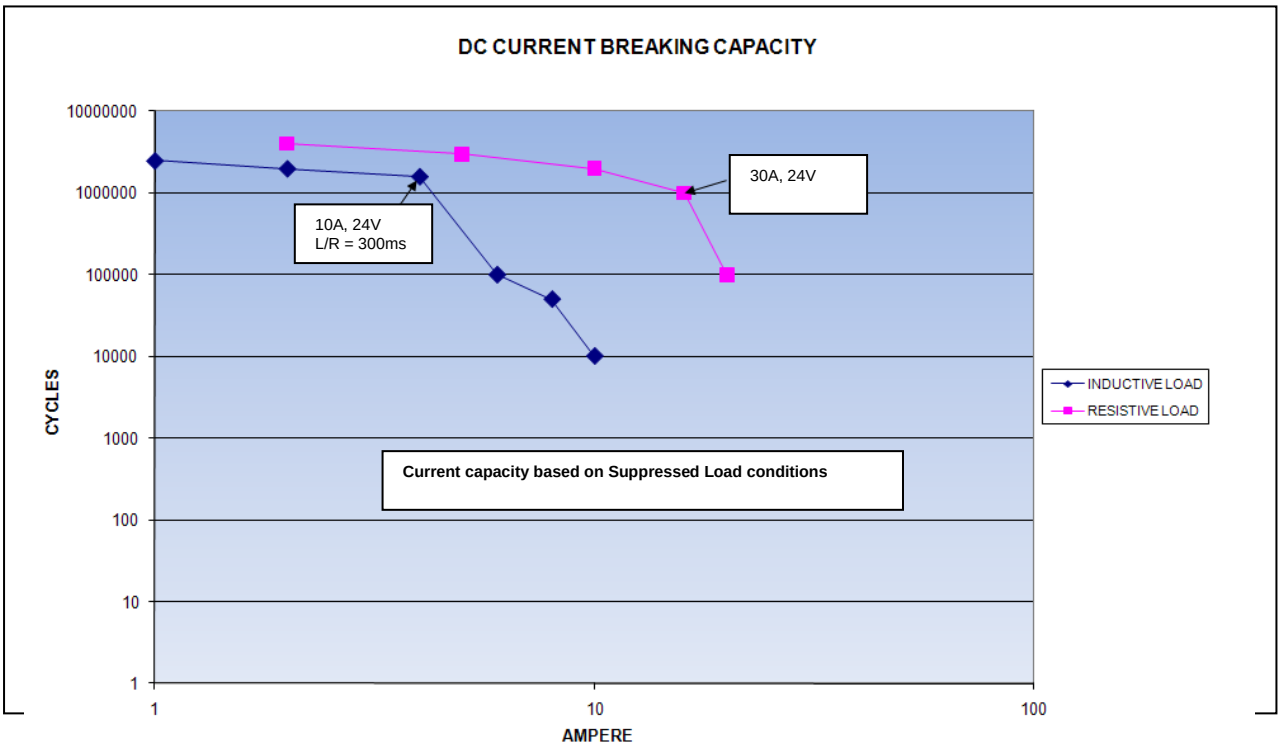

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BARNBROOK DATA SHEET

RELAY
TYPE 'WBC'

The Walton Bee 'WBC' Range Type Relays are polarised, non-latching and hermetically sealed

Key Features

- All Welded Construction
- Hermetically Sealed
- Balanced Force Armature
- Nitrogen Filled

Specification

Performance

Electrical

Nominal Coil Voltage (dc)	24 Volt dc
Operating Time	10 ms Maximum
Release Time	15 ms Maximum
Bounce Time	1 ms Maximum

Contact Characteristics

Minimum Operating Cycles	Rated Contact Voltage	At 28 V dc Contact rating in Amps
100,000 cycles	Resistive Load	5

Maximum Contact Resistance after 100,000 cycles	2mΩ

Environmental and Physical

Temperature range (dc)	-30 ºC to +125 ºC

Dimensions

L x W x D (Relay)	26 x 26 x 25.7mm
L x W x D (Relay with Base)	105 x 55 x 65mm
Max Weight (Relay)	70 grams maximum
Max Weight (Relay with Base)	400 grams maximum

Terminations

Contact Marking	Termination
C2	Coil +ive
C1	Coil –ive
T1	N/O 1
T3	N/O 2
T6	N/O 3
T4	N/O 4
L1	Pole 1
L2	Pole 2
L3	Pole 3
L4	Pole 4
T2	N/C 1
T5	N/C 4

Ordering Information Specify part number and quantity.

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Data Sheet No
DSRELC412

SHEET 1 OF 1

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AS9100D CERTIFIED ISO 9001

Section 6

SPECIALIST SENSING & CONTACTORS

BARNBROOK DATA SHEET

CONTACTOR TYPE 30 AMP

78608
3M 30 AMP CONTACTOR + 2M AUX

Key Features

- Fully sealed / enclosed.
- Excellent performance under conditions of shock, acceleration, and vibration.
- Encapsulated coil.
- Heavy duty contacts.

Specifications

General

Contact Arrangement	Main contacts: 3 Pole Make (N/O), (3M) Auxiliary contacts: 2 Pole Make (N/O), (2M)
Weight	500 grams (approx.)
Dimensions of case	80 mm (L) x 89 mm (H) x 78 mm (W)

Performance

Main Contact Rating	30A Resistive at 28 Vdc
Auxiliary Contact Rating	10A Resistive at 28 Vdc
Life	50,000 Operations
Operate Time	30 ms max.
Release Time	10 ms max.
Bounce Time	5 ms max.

All measurements at 25°C and nominal voltage

Environmental

Temperature Range	-65°C to +125°C to meet IEC 68-2-1
Shock	25 g
Vibration (Sinusoidal)	Frequency band: 20 – 2,000Hz Amplitude: 5 g
Vibration (Random)	Frequency band: 20 – 2,000Hz, Power Density: 0.02g^2/Hz

Coil Characteristics (VDC)

Nominal Operating Voltage	27 Vdc
Maximum Operating Voltage	30 Vdc
Maximum Pick up Voltage	18 Vdc
Hold Voltage	9 Vdc
Minimum Drop-out Voltage	4 Vdc
Coil Resistance	120 Ω + 15% (Reference)

Data Sheet No
DS78608

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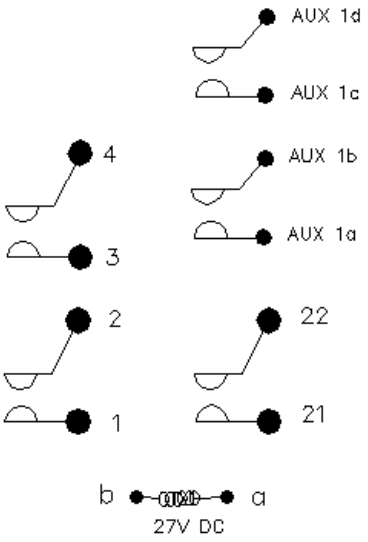
Electrical

Insulation Resistance	1000 MΩ min at 500 Vdc at +25°C between any two isolated terminals and between terminals and case.
Dielectric Strength	2000 V_{rms} / 50 Hz
Main Contact Volt Drop	150 mV Max. initial
Auxiliary Contact Volt Drop	100 mV Max. initial

SCHEMATIC DIAGRAM



TERMINAL MAPPING

Terminations	
Contact Marking	**Termination**
a	Coil +ve
b	Coil -ve
1	N/O 1
2	Pole 1
3	N/O 2
4	Pole 2
21	N/O 3
22	Pole 3
Aux 1a	Aux N/O 1
Aux 1b	Aux Pole 1
Aux 2a	Aux N/O 2
Aux 2b	Aux N/O 2

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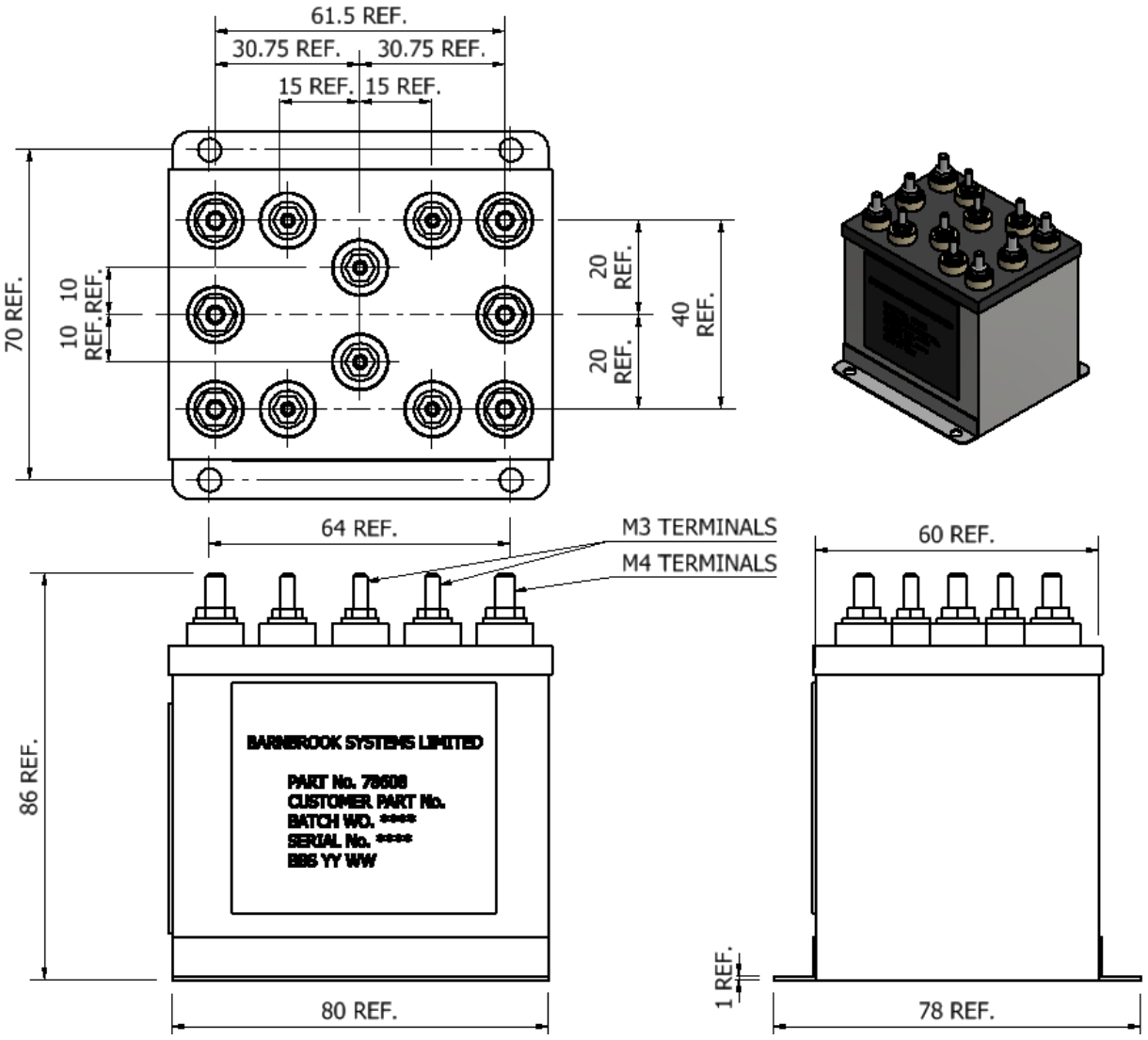
INSTALLATION DETAILS



All dimensions are in millimetres.
Tolerances ± 0.25 unless otherwise stated.

Mechanical Installation

Caution:

Maximum torque figures when connecting ring terminals to contactor M3 and M4 studs:

- M3 terminals (Coil and Auxiliary) torque: **1.0 Nm Max.**
- M4 terminals (Main Contacts) torque: **1.5 Nm Max.**

If maximum torque values are exceeded, the stud terminals could snap, rotate, and cause internal mechanical failure.

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BARNBROOK DATA SHEET

CONTACTOR
TYPE 50 AMP

78607
2 POLE MAKE 50 AMPS CONTACTOR

Key Features

- Fully sealed / enclosed.
- Excellent performance under conditions of shock, acceleration, and vibration.
- Encapsulated coil.
- Heavy duty contacts.

Specifications

General

Contact Arrangement	2 Pole Make (2 N/O), (2 M)
Weight	400 g (approx.)
Dimensions of case	76 mm x 69 mm x 52 mm

Performance

Contact Rating	50A Resistive at 28 Vdc 5A at 220 V 50/60/400 Hz 30A Inductive (L/R = 5 ms)
Life	50,000 Operations Resistive 10,000 Operations Inductive (L/R = 5 ms)
Operate Time	30 ms max.
Release Time	10 ms max.
Bounce Time	5 ms max.

All measurements at 25ºC and nominal voltage.

Environmental

Temperature Range	-45ºC to +85ºC
Shock	50 g, 11 ms
Vibration (Sinusoidal)	Frequency band: 5-33 Hz Amplitude: ± 0.125 mm Constant Displacement in X, Y & Z axes
Vibration (Random)	Frequency band: 20-2000 Hz Power Density: 0.02 g^2/Hz
Corrosion Proof	Suitable for Marine Environment

Coil Characteristics (VDC)

Nominal Operating Voltage	28 Vdc
Maximum Operating Voltage	30 Vdc
Maximum Pick-up Voltage	18 Vdc
Maximum Drop-out Voltage	7 Vdc
Coil Resistance	120 Ω ± 10%

Data Sheet No
DS78607

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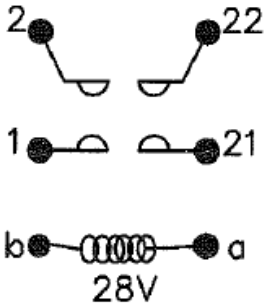
CONTACTOR
TYPE 50 AMP

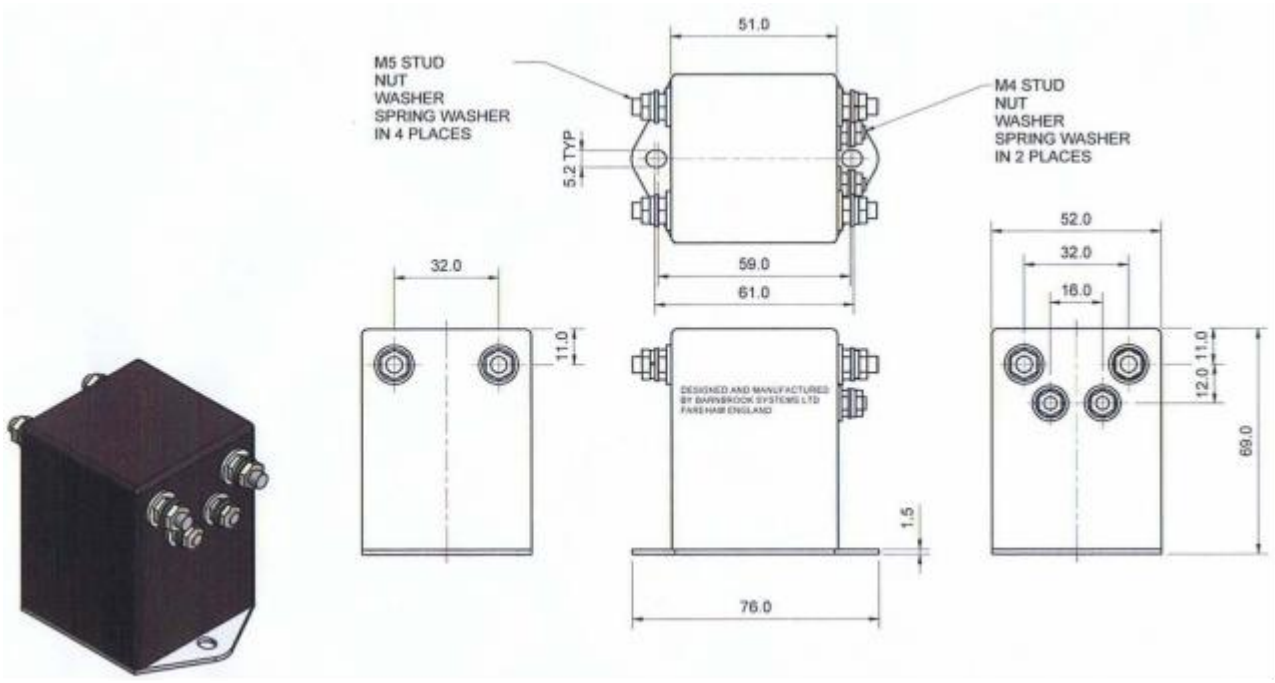
Electrical

Insulation Resistance	1000 MΩ min at +25ºC between any two isolated terminals and between terminals and case.
Dielectric Strength	2000 Vrms at 50 Hz

SCHEMATIC DIAGRAM



INSTALLATION DETAILS



All dimensions are in millimetres.
Tolerances ± 0.25 unless otherwise stated.

Note:
During assembly, tightening torque after placing the lug in between 2 nuts should not exceed **1 Nm**.

Data Sheet No
DS78607

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BARNBROOK DATA SHEET

CONTACTOR
TYPE 150 AMP

78038
150 AMP CURRENT SENSING CONTACTOR

Key Features

- Contactor and Detection Unit
- Enclosed design
- 1 set of main heavy duty contacts.
- 2 sets of auxiliary contacts
- Protection Unit
- Equivalent to 101-1 Contactors
- Engine APU usage

Specifications

General

Contact Arrangement	1 set of Main Make Contact (N/O) with 2 sets of Auxiliary Contacts (1 N/O & 1 N/C)
Weight	900 grams (approx.)
Overall Dimensions	103.0mm (L) x 92.0 mm (H) x 103.0 mm (W) (Reference)

Contact Switching Performance

Main Contact Rating (28.0 V DC)	150 Amps Resistive 5 Amps minimum
Main Contact Voltage Drop	200 mV maximum at rated current
Auxiliary Contact Raing	5 Amps maximum Resistive
Auxiliary Contact Voltage Drop	120 mV maximum at rated current

Detection Characteristics

Low Current cut out limit	+ 2.0 ± 0.5 A
Low current cut out Delay	5.0 ± 0.5 s
Current to be attained within 5s to avoid cut out	5.5 A
Instantaneous Reverse Cut out	- 25 ± 0.5 A

Coil Characteristics:

Nominal Voltage	28.0 V DC
Coil Pull in Current	7.0 A
Coil Hold Current	300 mA

All measurements at 20°C and nominal voltage

Data Sheet No
DS78038

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AS9100D CERTIFIED ISO 9001

Main Function of the Protection Unit

Protection unit 78038 is designed to protect and control the transformer rectifier unit. The Contactor performs the following functions:

- Under normal conditions, switches the TRU on and offline and operates the busbar tie contactor.
- Switches the TRU OFF line in the event of abnormal line current or in response to an external signal.
- Provides a signal to show that the TRU is offline.

Normal Operation

Please Note: Before Normal Operation, a +28.0 V DC pulse must be applied to terminal “R” to ensure correct operation of the sensing contactor.

With a +28.0 V DC supply connected to terminal “INT”, the contactor operates and closes the heavy-duty contacts “TR” to “BUS”. It also operates Auxiliary contacts “+BATT” and “+S” to open and Auxiliary contacts “+DIV” and “DIV” to close.

Internal sensing detects a minimum “TR” to “BUS” current and will take TRU offline after 5 seconds if current is less than 5 A.

Fault Conditions

- **Low Current**

  When the "TRU to BUS" current is less than 5 A at switch on or at any time falls to 1.5 A:

  1. The TRU will switch offline after Time Delay
  2. If however the current reaches or returns to 5.5A within 5s, the Time Delay circuit is Reset.

- **Reverse Current**

  1. In the event of a BUS-to-TR current less than 25 A, the TRU is then switched offline by the time delay circuit unless the fault is rectified within 5 s.

  2. In the event of a BUS-to-TR current in excess of 25 A, the protection unit will switch the TRU offline immediately.

- **TRU Overheat**

  In the event of an overheat condition in the TRU, a negative signal is connected to terminal “F” of the Protection unit. This will take the TRU offline immediately.

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CONTACTOR TYPE 150 AMP

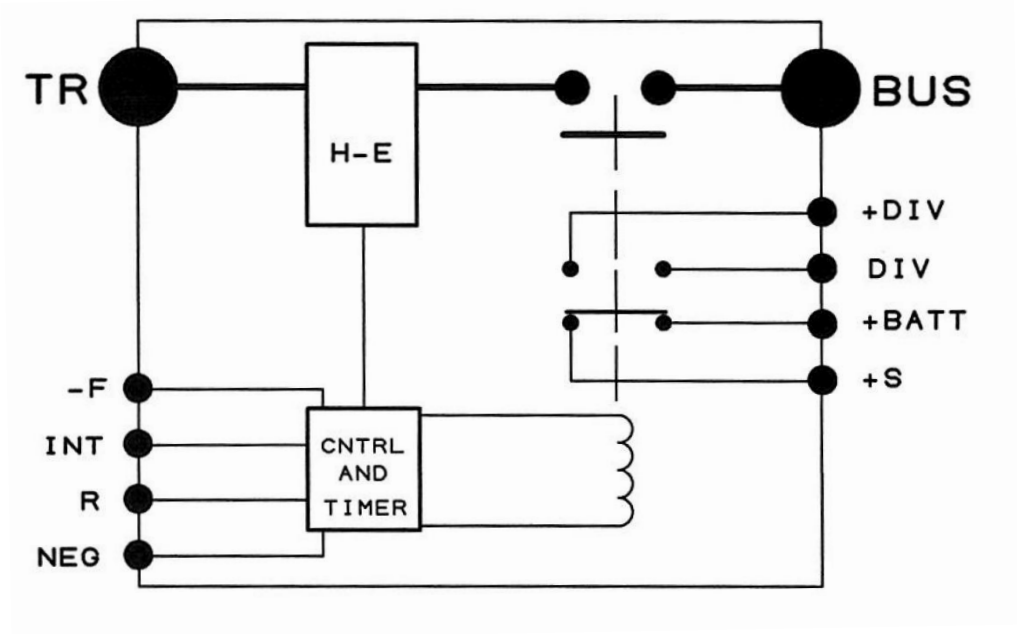
Environmental

Temperature Range	-55°C to 85°C
Shock	30 g, 11 ms
Vibration (Sinusoidal)	15 g, 5 to 2,000 Hz
Maximum contact opening under vibrations and shock	10 µs

Electrical

Insulation Resistance	100 MΩ minimum at 500 VDC between terminals and case
Dielectric Strength	1500 Vrms (main contacts) at sea level

SCHEMATIC DIAGRAM



Terminal Identification

TR:	Main Contact Terminal
BUS:	Main Contact Terminal
NEG:	Zero Volts Terminal
R:	Pulse Input (Reset) Terminal
INT:	Operation Voltage (+28 V DC)
-F:	Over Temperature Input
+DIV:	N/O Aux Terminal
DIV:	N/O Aux Terminal
+BATT:	N/C Aux Terminal
+S:	N/C Aux Terminal

Data Sheet No
DS78038

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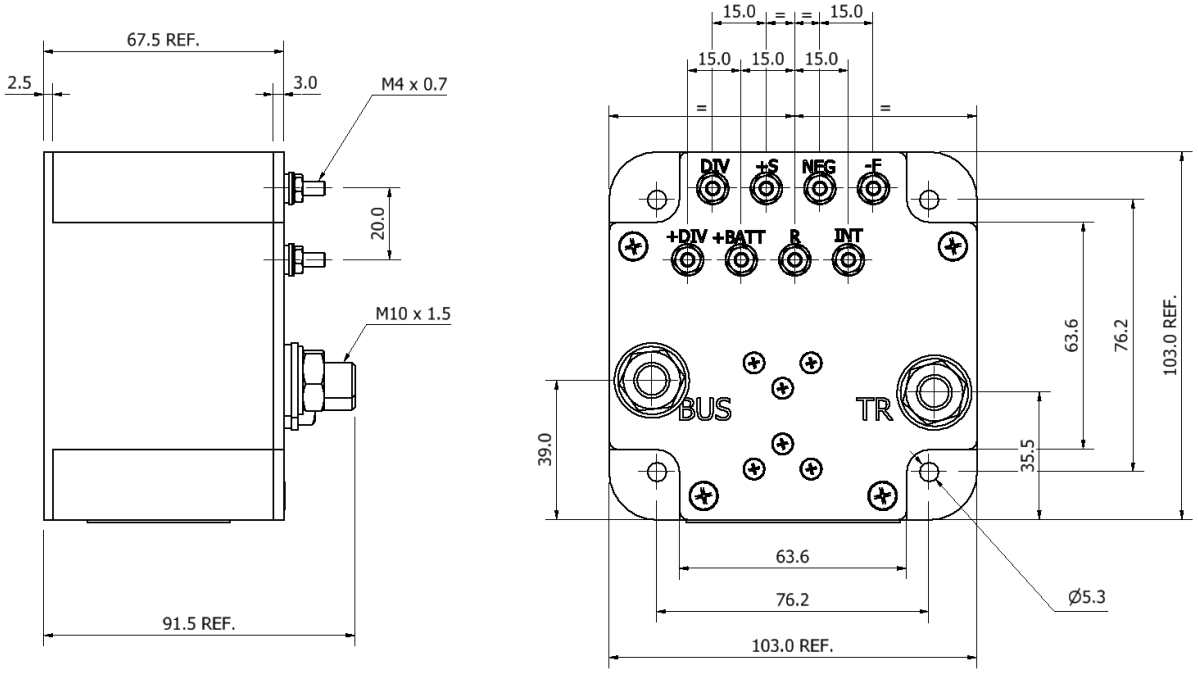
BARNBROOK DATA SHEET

CONTACTOR TYPE 150 AMP

INSTALLATION DETAILS

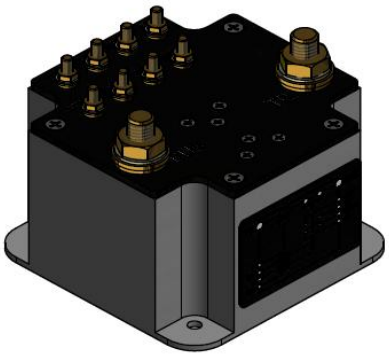


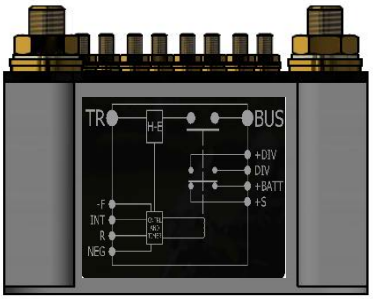
All dimensions are millimetres.

Tolreances ± 0.25 mm unless otherwise stated.

Maximum torque recommended: M10 Studs – 6.20 Nm

M4 Studs – 0.75 Nm





Data Sheet No
DS78038

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SHEET 4 OF 4

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AS9100D CERTIFIED ISO 9001

BARNBROOK DATA SHEET

CONTACTOR TYPE 200 AMP

78035
200 AMPS CONTACTOR

Key Features

- Encapsulated coil.
- Enclosed design.
- 1 set of main heavy duty contacts.
- 1 set of changeover auxiliary contact set.

Specifications

General

Contact Arrangement	1 set of main contact (1 N/O) with 1 set of auxiliary changeover contact (1 C/O)
Weight	430 grams (approx.)
Overall Dimensions	102.8 mm (L) x 70.0 mm (W) x 53.0 mm (H)
Contactor Body Diameter	48.0 mm

Performance

Main Contact Rating	200 Amps Resistive
(28.5 VDC)	150 Amps Inductive (L/R = 5 ms)
	5 Amps minimum
Main Contact Voltage Drop	110 mV maximum at 28.5 VDC (new)
Auxiliary Contact Raing	5 Amps max. Resistive
Auxiliary Contact Voltage Drop	60 mV maximum at 28.5 VDC (new)
Life	50,000 Operations (Resistive)
Operate Time	20 ms
Release Time	15 ms
Bounce Time	< 4 ms

All measurements at 20°C and nominal voltage

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Environmental

Temperature Range	-55°C to 85°C
Shock	30 g, 11 ms
Vibration (Sinusoidal)	15 g, 5 to 2,000 Hz
Maximum contact opening under vibrations and shock	10 µs

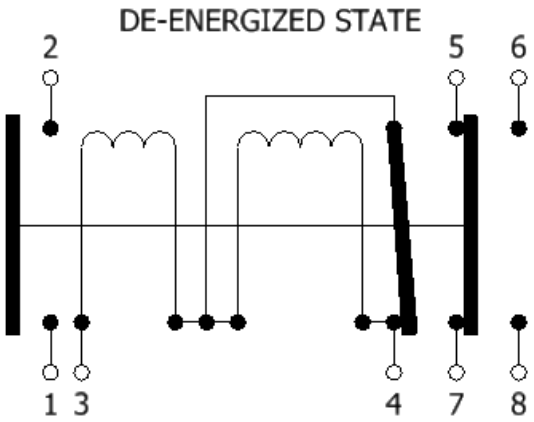
Coil Characteristics

Nominal Operating Voltage	28.0 VDC
Maximum Operating Voltage	32.0 VDC
Maximum Pickup Voltage	18.0 VDC
Dropout Voltage	2.0 VDC minimum 8.0 VDC maximum
Pickup Current	11.80 A ± 5% at 28.5 VDC
Hold Current	300 mA ± 5% at 28.5 VDC

Electrical

Insulation Resistance	100 MΩ minimum at 500 VDC between terminals and case
Dielectric Strength	1500 Vrms (main contacts) at sea level

SCHEMATIC DIAGRAM



Circuit shown in de-energized state.

Terminal Identification

Main Terminals	1 and 2 (M8 Studs)
Coil Terminals	3 and 4 (M4 Studs)
Auxiliary Terminals	5, 6, 7, and 8 (M4 Studs)

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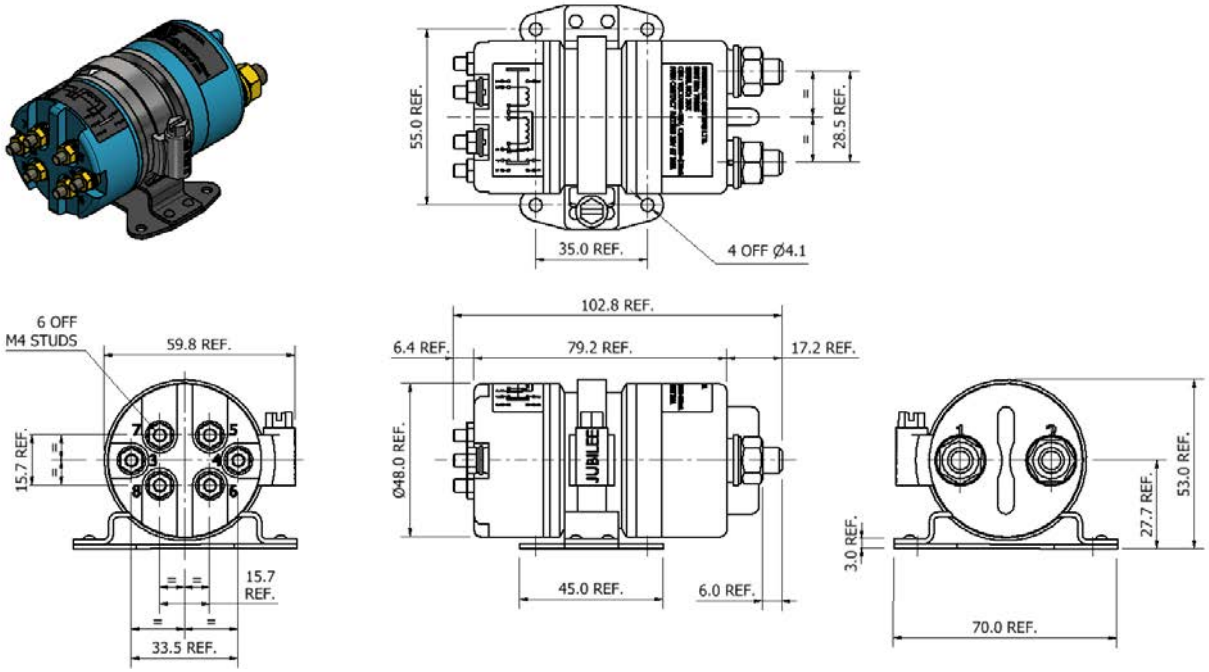
BARNBROOK DATA SHEET

CONTACTOR TYPE 200 AMP

INSTALLATION DETAILS



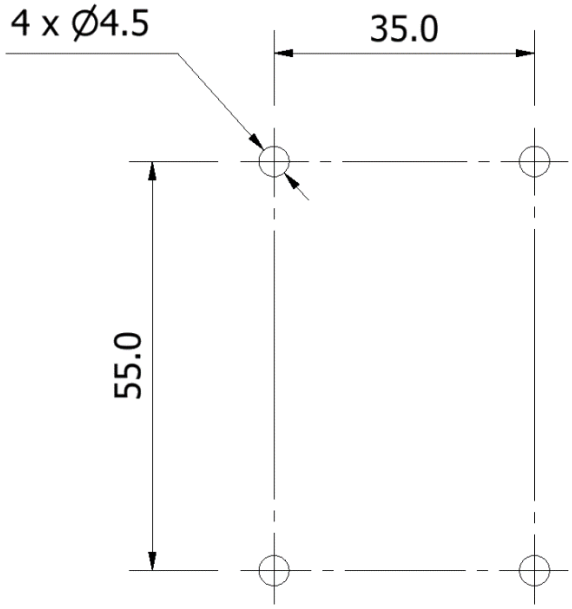
All dimensions are millimetres.

Tolreances ± 0.25 mm unless otherwise stated.

Maximum torque recommended: M8 Studs – 6.20 Nm

M4 Studs – 0.75 Nm

MOUNTING HOLES



Data Sheet No
DS78035

Design authority and manufacture by Barnbrook Systems Limited
Barnbrook Systems reserves the right to alter specifications and design without notice

SHEET 3 OF 3

BARNBROOK DATA SHEET

DC CURRENT SENSOR TYPE 200 AMP

78037
200A DC CURRENT SENSOR

Key Features

- Encapsulated.
- Enclosed design.
- Linear over the entire range
- Good Accuracy
- Equivalent to ECE 795ZN01 series of sensors

Specifications

Physical Characteristics

Weight	140 grams (approx.)
Overall Dimensions	76.0 mm (L) x 41.0 mm (W) x 66.0 mm (H)
Sensor Cable Diameter	20.0 mm Max

Electrical Characteristics

Sensing Current	200 Amps DC
Supply Voltage	16 – 32 V DC
Current Consumption	< 30mA at 32.0 V DC
Output Voltage	10V at 200A (or) 5V at 200A with a 1KΩ Output Impedance
Maximum Zero Voltage	150mV
Non Linearity Distortion	300mV
Accuracy	+/- 5%
Response Time	< 1 ms at 200A
Insulation Resistance	>100 Meg Ohms @ 100V DC
Electrical Connection	4 pin Male Plug MIL 26482 Connector

All measurements at 22°C and nominal voltage unless otherwise stated

Data Sheet No
DS78037

Design authority and manufacture by Barnbrook Systems Limited
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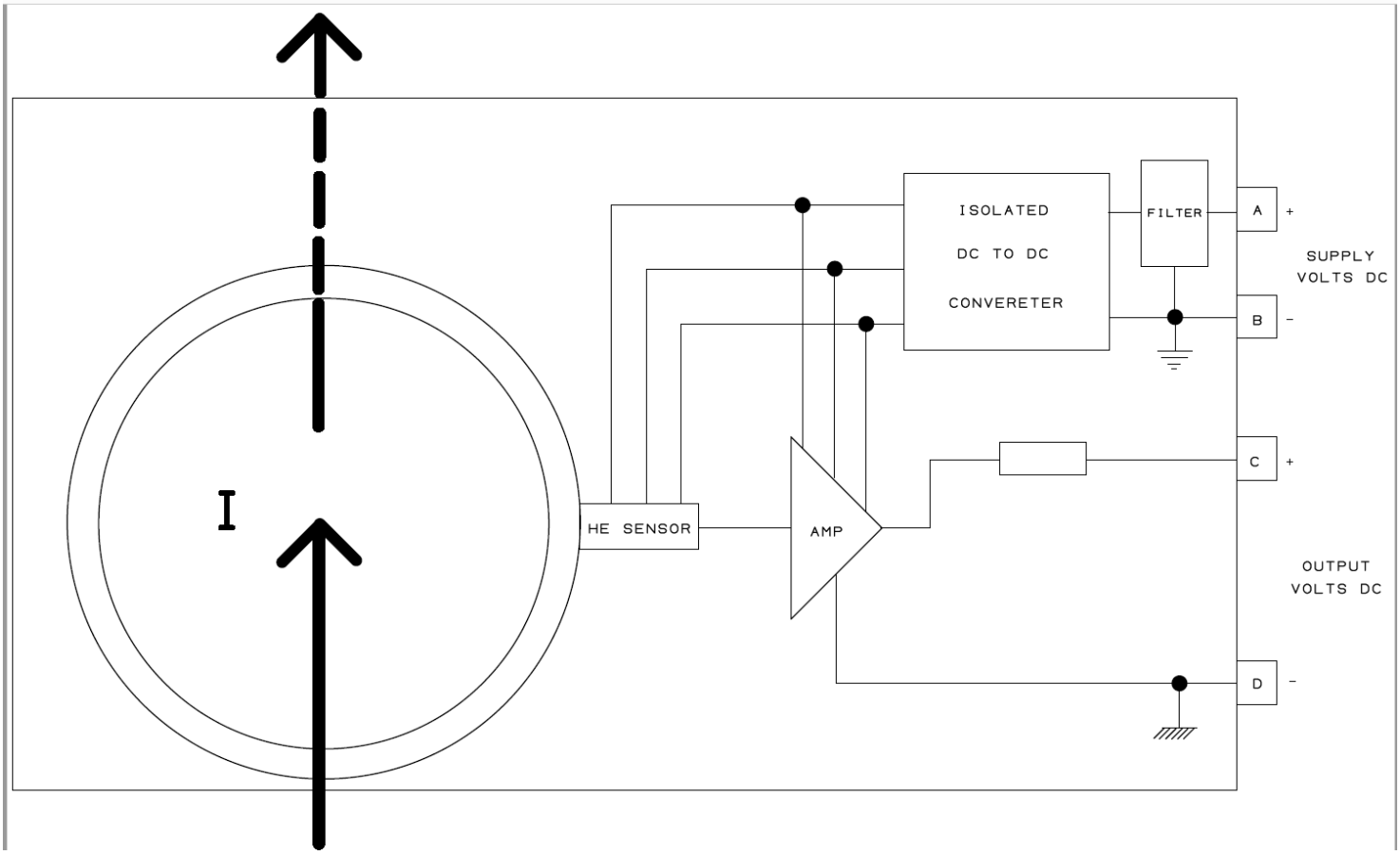
DC CURRENT SENSOR TYPE 200 AMP

Environmental Characterisics

Operating Temperature Range	-55°C to 85°C
Storage Temperature	-55°C to 125°C
Shock	15 g, 10 ms
Vibration (Random)	DO160 C Figure 8-4 Curve Y
Acceleration	10g, 3 axes
Altitude	10000 m

BLOCK DIAGRAM



Electrical Connections:

Pin A +28V DC
Pin B - 28V DC
Pin C + Output
Pin D - Output

Data Sheet No
DS78037

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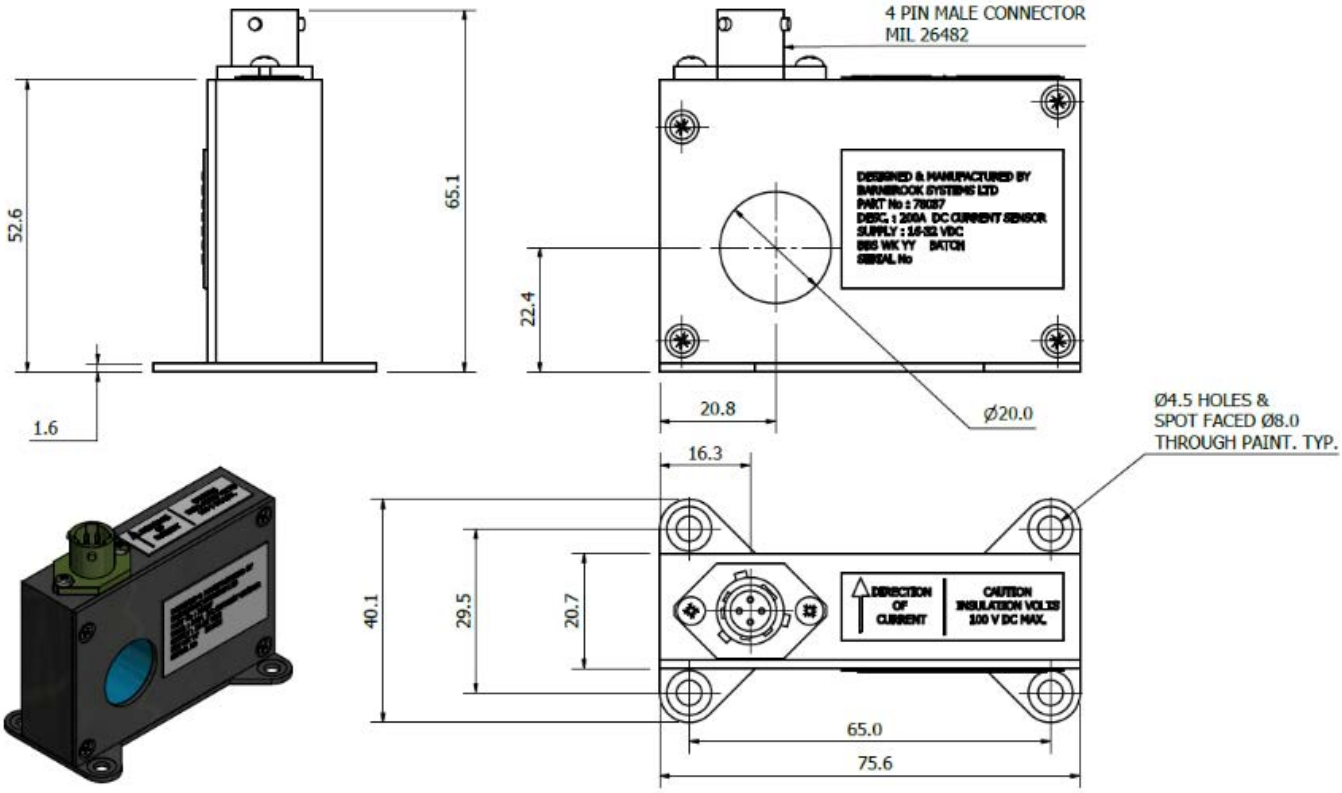
DC CURRENT SENSOR TYPE 200 AMP

INSTALLATION DETAILS



All dimensions are millimetres.
Tolreances ± 0.25 mm unless otherwise stated.

ORDERING INFORMATION

78037 – AA for 5 V at 200 A
78037 - BB for 10 V at 200 A

*Other Variations are available on request – Please contact Barnbrook Sales for more info.

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Section 7

PRESSURE TRANSDUCERS

BARNBROOK

DATA SHEET

INTERSONDE

PRESSURE TRANSDUCER

A range of stainless steel transducers covering the lower pressure ranges extending up to 350 bar.
All transducers are available with either BSP or metric external threads to simplify transducer installation.
The pressure sensing element is a one piece design, machined from stainless steel bar. The robust construction of this transducer is perfectly suited for the measurement of static or dynamic pressures in pneumatic or hydraulic systems, the bonded strain gauge system providing maximum freedom from secondary resonance.

Type DAX22

Key Features

- 1/4" BSP or M16 x 1.5 thread options
- Pressure range from 10 to 350 bar (100 to 5000 psig)
- Choice of electrical termination.

Specification

Performance

Combined non-linearity and hysteresis	50 bar and below ± 0.50% F.R.S
Combined non-linearity and hysteresis	70 bar and above ± 0.20% F.R.S
Full range sensitivity (FRS)	1.5 mV/Volt nominal
Residual unbalance	0.02 mV/Volt
Resolution	Infinite

Electrical

Excitation voltage	10 Volt dc or Volt ac rms maximum
Bridge output resistance	350 Ohms ± 5%
Insulation resistance	100 megohms minimum at 100 Volt d.c.
Electrical connection : Standard	6 pin bayonet lock connector (mates with MIL-C-26482 size10)
Option (a)	1 metre 6 core screened PTFE insulated flying lead
Option (b)	2 metre 6 core PVC moisture proof(Max operating temp 85°C)

Environmental and Physical

Operational temperature range	-20 °C to +125 °C
Thermal zero shift	± 0.02% F.R.S. / °C
Thermal sensitivity shift	± 0.10% F.R.S. / °C
Material in contact with pressure media	Stainless steel
Static volume	Less than 1.0ml
Volumetric change with pressure	Negligible
Pressure overload	50% above rated pressure
Weight	200 gram approx.
Case material	Stainless steel

Dimensions

1/4" BSP Male Pressure Port	26 mm dia x 88.0mm overall length
M16 x 1.5 Pressure Port	26 mm dia x 90.5mm overall length

Ordering Information

Specify transducer type, pressure range, pressure port thread and options.

Data Sheet No
DSDAX22-0305

Design authority and manufacture by Barnbrook Systems Limited

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BARNBROOK

DATA SHEET

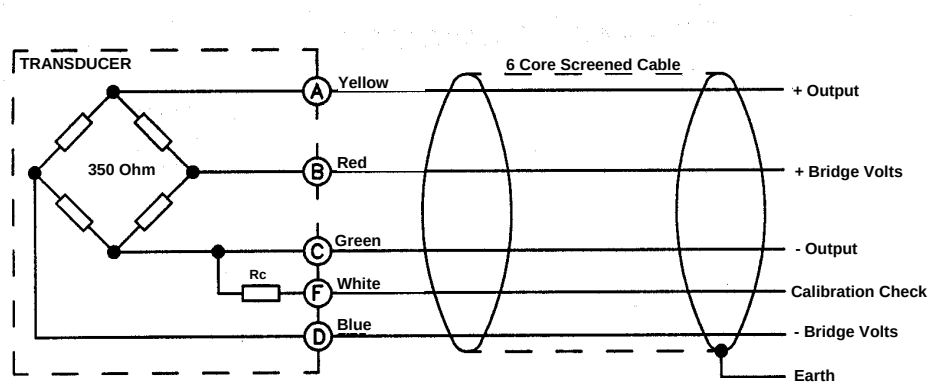
INTERSONDE

PRESSURE TRANSDUCER
Type DAX22

CALIBRATION CHECK

To use the calibration check facility, join pin D to pin F. This will unbalance the bridge and produce a change in output approximately equal to 90% of the full range sensitivity (F.R.S.) The exact figure is recorded on the Calibration Certificate.

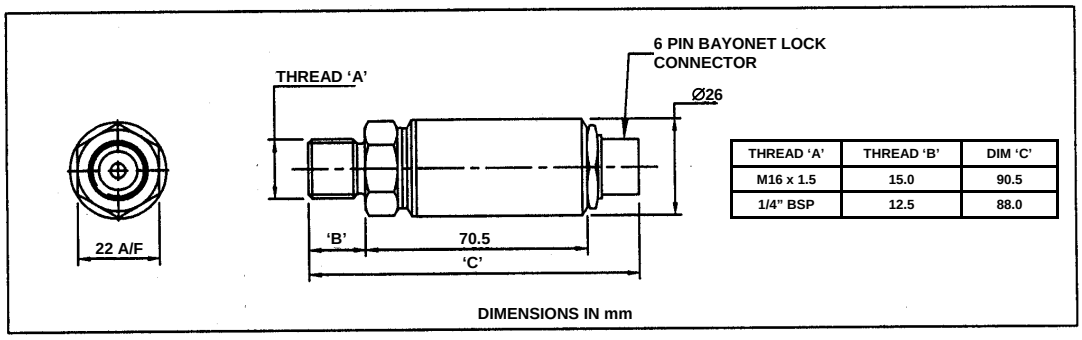
If the calibration check facility is not required then 4 core screened cable may be used in lieu of 6 core.



PRESSURE RANGES

Bar		10		20		30		50	70	100	150	200	350
Psig	100		200		300		500	750	1000	1500	2000	3000	5000
Port	1/4" BSP or M16 x 1.5												

DETAIL DIMENSIONS



THREAD 'A'	THREAD 'B'	DIM 'C'
M16 x 1.5	15.0	90.5
1/4" BSP	12.5	88.0

Data Sheet No
DSDAX22-0305

Design authority and manufacture by Barnbrook Systems Limited

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DATA SHEET

INTERSONDE

PRESSURE TRANSDUCER

A range of stainless steel transducers covering the middle pressure ranges and extending up to 2000 bar.
All transducers are available with either BSP or metric external threads to simplify transducer installation.
The pressure sensing element is a one piece design, machined from stainless steel bar. The robust construction of this transducer is perfectly suited for the measurement of static or dynamic pressures in pneumatic or hydraulic systems, the bonded strain gauge system providing maximum freedom from secondary resonance.

Type GX22

Key Features

- 1/4" BSP – 3/8" BSP or M16 x 1.5 thread options
- High accuracy, better than 0.20%
- Pressure range from 200 to 2000 bar (3000 to 30000 psig)
- Bifilar Ni Cr bonded strain gauge elements.
- Choice of electrical termination.

Specification

Performance

Combined non-linearity and hysteresis	± 0.20% F.R.S
Full range sensitivity (FRS)	1.5 mV/Volt nominal
Residual unbalance	0.02 mV/Volt max
Resolution	Infinite

Electrical

Excitation voltage		10 Volt dc or Volt ac rms maximum
Bridge output resistance		350 Ohms ± 5%
Insulation resistance		100 megohms minimum at 100 Volt d.c.
Electrical connection :	Standard	6 pin bayonet lock connector (mates with MIL-C-26482 size10)
	Option (a)	1 metre 6 core screened PTFE insulated flying lead
	Option (b)	2 metre 6 core PVC moisture proof(Max operating temp 85°C)

Environmental and Physical

Operational temperature range	-20 °C to +125 °C
Thermal zero shift	± 0.02% F.R.S. / °C
Thermal sensitivity shift	± 0.10% F.R.S. / °C
Material in contact with pressure media	Stainless steel
Static volume	Less than 1.0 ml
Volumetric change with pressure	Negligible
Pressure overload	50% above rated pressure
Weight	200 gram approx
Case material	Stainless steel

Dimensions

1/4" BSP Male Pressure Port	26 mm dia x 88.0mm overall length
3/8" BSP Male Pressure Port	26 mm dia x 90.5mm overall length
M16 x 1.5 Pressure Port	26 mm dia x 90.5mm overall length

Ordering Information

Specify transducer type, pressure range, pressure port thread and options.

Data Sheet No
DSGX22-0305

Design authority and manufacture by Barnbrook Systems Limited

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DATA SHEET

INTERSONDE

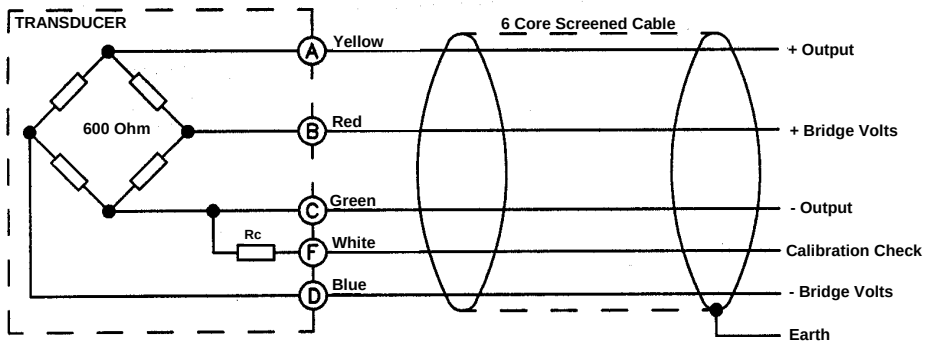
PRESSURE TRANSDUCER

Type GX22

CALIBRATION CHECK

To use the calibration check facility, join pin D to pin F. This will unbalance the bridge and produce a change in output approximately
equal to 90% of the full range sensitivity (F.R.S.) The exact figure is recorded on the Calibration Certificate.

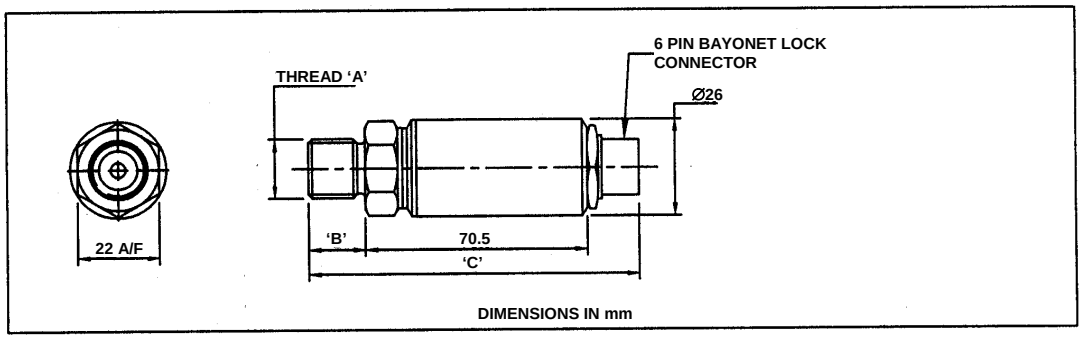
If the calibration check facility is not required then 4 core screened cable may be used in lieu of 6 core.



PRESSURE RANGES

Bar	200	250	350	500	700	1000		1500	2000
Psig	3000	3500	5000	7500	10000	15000	20000		30000
Port	1/4" BSP or M16 x 1.5					3/8" BSP or M16 x 1.5			

DETAIL DIMENSIONS



Data Sheet No
DSGX22-0305

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DATA SHEET

INTERSONDE

PRESSURE TRANSDUCER

A range of high-pressure transducers designed for the measurement of static or dynamic pressures in hydraulic and pneumatic systems.
The output from a bonded strain gauge pressure sensing element is coupled to a low drift, solid state d.c. amplifier providing a 1 volt or 5 volt output signal at full range pressure.
Operation may be from either single or dual d.c. supplies with a 1 mA or 5mA current capability.

Type HR22

Key Features

- Choice of input and output options.
- Output current up to 5 mA with full short circuit protection.
- Low output resistance permits direct operation of meters.
- Pressure range from 10 to 2000 Bar (150 to 30000 Psig).

Specification

Performance

Combined non-linearity and hysteresis		± 0.25% F.R.S
Full range sensitivity, Option (a)		1 Volt –0/+5%
	Option (b)	5 Volt –0/+5%
Residual unbalance		Between 0 and 10% F.R.S.
Maximum output current		0 - 1 mA on single supply
		0 - 5 mA on single supply
Resolution		Infinite

Electrical

Excitation voltage	Option (c)	± 10 or 20 Volts d.c.
	Option (d)	± 12 or 24 Volts d.c.
	Option (e)	± 15 or 30 Volts d.c.
Current drain		50mA typical
Insulation resistance		100 megohms minimum at 100 Volt d.c.
Output resistance		Less than 1 Ohm on dual supply
Wide band noise		10 mV to peak
Electrical connection : Standard		6 pin bayonet lock connector (mates with MIL-C-26482 size10)
	Option (f)	1 metre 6 core screened PTFE insulated flying lead
	Option (g)	2 metre 6 core PVC moisture proof(Max operating temp 80^{o}C)

Environmental and Physical

Operational temperature range	-20 ^{o}C to +80 ^{o}C
Thermal zero shift	± 0.02% F.R.S. / ^{o}C
Thermal sensitivity	± 0.02% F.R.S. / ^{o}C
Material in contact with pressure media	Stainless steel
Pressure overload	50% above rated pressure
Weight	350 gram approx
Case material	Stainless steel

Dimensions

1/4” BSP Male Pressure Port	30.5mm dia x 133.5mm overall length
3/8” BSP & M16 x 1.5 Pressure Port	30.5mm dia x 136.0mm overall length

Ordering Information

Specify transducer type, pressure range, pressure port thread and options**.**

Data Sheet No
DSHR22-0305

Design authority and manufacture by Barnbrook Systems Limited

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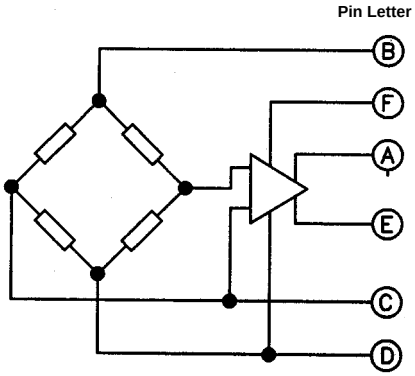
INTERSONDE

PRESSURE TRANSDUCER
Type HR22

CALIBRATION CHECK

To use the calibration check facility, join pin D to pin C. This will unbalance the bridge and produce a change in output approximately equal to 90% of the full range sensitivity (F.R.S.) The exact figure is recorded on the Calibration Certificate.

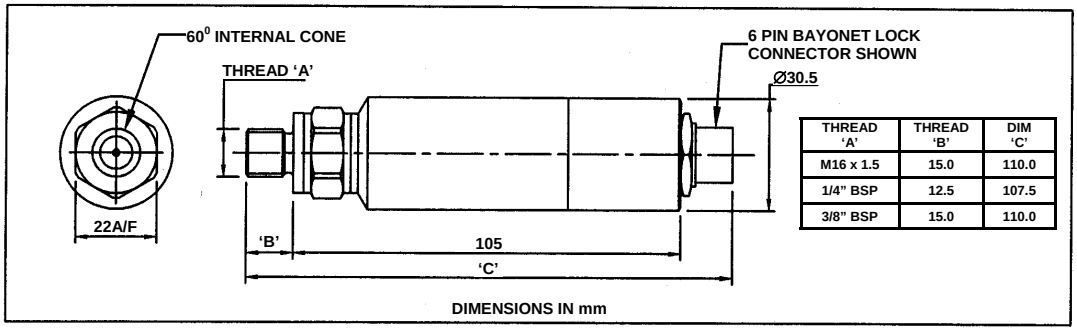


PRESSURE RANGES

Bar	10		20	35	50	70	100		200	350	500	700
Psig	150	200	300	500	750	1000	1500	2000	3000	5000	7500	10000
Port	1/4" BSP or M16 x 1.5											

Bar	1000		1500	2000
Psig	15000	20000		30000
Port	3/8" BSP or M16 x 1.5			

DETAIL DIMENSIONS



THREAD 'A'	THREAD 'B'	DIM 'C'
M16 x 1.5	15.0	110.0
1/4" BSP	12.5	107.5
3/8" BSP	15.0	110.0

Data Sheet No
DSHR22-0305

Design authority and manufacture by Barnbrook Systems Limited

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DATA SHEET

INTERSONDE

PRESSURE TRANSDUCER

A range of transducers covering the middle pressure ranges and extending up to 2000 bar.
All transducers are available with either BSP or metric external threads to simplify transducer installation.
The pressure sensing element is a one piece design, machined from hard drawn beryllium copper bar, which in its heat treated condition exhibits excellent mechanical properties
The robust construction of this transducer is perfectly suited for the measurement of static or dynamic pressures in pneumatic or hydraulic systems, the bonded strain gauge system providing maximum freedom from secondary resonance.

Type XP22

Key Features

- 1/4” BSP – 3/8” BSP or M16 x 1.5 thread options
- High accuracy, better than 0.20%
- Bifilar Ni Cr bonded strain elements
- Pressure range from 200 to 2000 bar (2000 to 30000 psig)
- Choice of electrical termination.

Specification

Performance

Combined non-linearity and hysteresis	± 0.20% F.R.S
Full range sensitivity (FRS)	1.5 mV/Volt nominal
Residual unbalance	0.02 mV/Volt
Resolution	Infinite

Electrical

Excitation voltage	20 Volt dc or Volt ac rms maximum
Bridge output resistance	350 Ohms ± 5%
Insulation resistance	100 megohms minimum at 100 Volt d.c.
Electrical connection : Standard	6 pin bayonet lock connector (mates with MIL-C-26482 size10)
Option (a)	1 metre 6 core screened PTFE insulated flying lead
Option (b)	2 metre 6 core PVC moisture proof(Max operating temp 85^{o}C)

Environmental and Physical

Compensated temperature range	-20 ^{o}C to +100 ^{o}C
Operational temperature range	-20 ^{o}C to +100 ^{o}C
Thermal zero shift	± 0.02% F.R.S. / ^{o}C
Thermal sensitivity shift	± 0.02% F.R.S. / ^{o}C
Material in contact with pressure media	Beryllium Copper
Static volume	Less than 2.0ml
Volumetric change with pressure	Negligible
Pressure overload	50% above rated pressure
Weight	210 gram approx
Case material	Stainless steel

Dimensions

1/4” BSP Male Pressure Port	26 mm dia x 107.5mm overall length
3/8” BSP Male Pressure Port	26 mm dia x 110.0mm overall length
M16 x 1.5 Pressure Port	26 mm dia x 110.0mm overall length

Data Sheet No
DSXP22-0305

Sheet 1 of 2

Ordering Information

Specify transducer type, pressure range, pressure port thread and options.

Design authority and manufacture by Barnbrook Systems Limited

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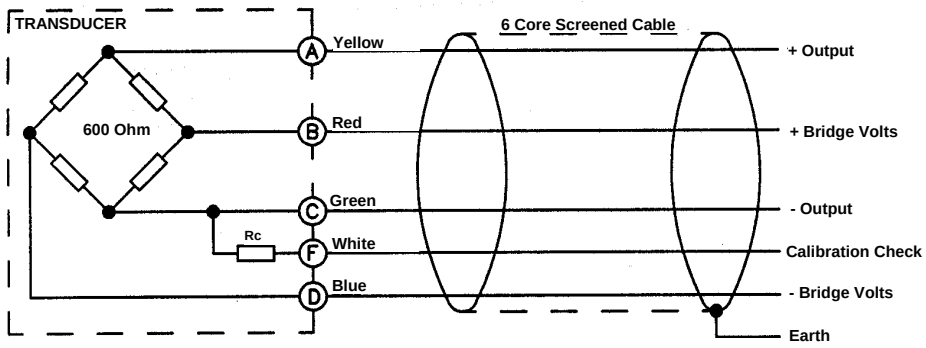
DATA SHEET

INTERSONDE

PRESSURE TRANSDUCER

Type XP22



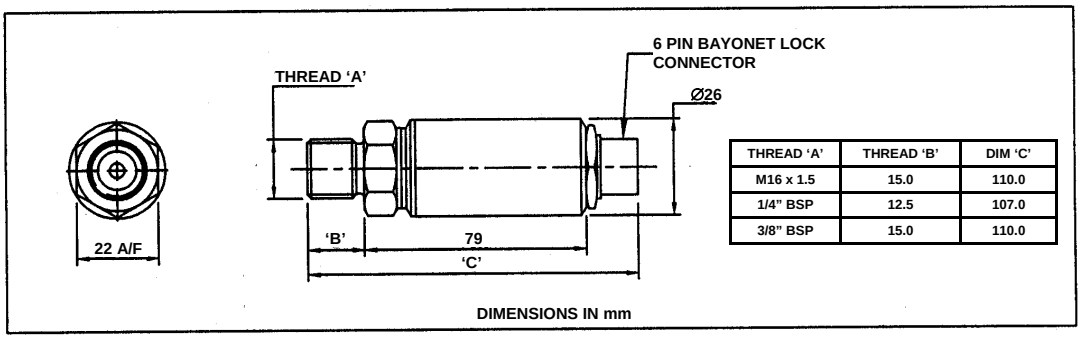
CALIBRATION CHECK

The Calibration Certificate for the XP22 transducer records the change in output (as a percentage of the full range pressure) when a resistor of declared value is connected across pins C and F of the transducer bridge. This procedure enables the desired transducer sensitivity to be obtained without recourse to a deadweight pressure tester.

PRESSURE RANGES

Bar		200	250	350	500	700	1000		1500	2000
Psig	3000	3000	3500	5000	7500	10000	15000	20000		30000

DETAIL DIMENSIONS



THREAD 'A'	THREAD 'B'	DIM 'C'
M16 x 1.5	15.0	110.0
1/4" BSP	12.5	107.0
3/8" BSP	15.0	110.0

Data Sheet No
DSXP22-0305

Design authority and manufacture by Barnbrook Systems Limited

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BARNBROOK

DATA SHEET

INTERSONDE

PRESSURE TRANSDUCER

Intersonde Series XT21 pressure transducers feature small physical size with an excellent frequency response and are eminently suitable for the measurement of dynamic pressures and pressure transients.
The bonded strain gauge system results in a robust transducer of high accuracy that is suitable for both static and dynamic pressure measurements.
The input pressure connection of the XT21A is M8 x 1thread with a flat face for sealing to the pressure source; the XT21B has a 60^{o} cone to seal the unit to the source.

Type XT21

Key Applications

- Diesel fuel injection pressures.
- Hydraulic pump ripple pressures
- Ballistic pressure transients.
- Surge pressures in hydraulic and pneumatic systems.
- Pressure range from 350 to 2000 bar (5075 to 29000 psig)

Specification

Performance

Combined non-linearity and hysteresis	+/- 0.50% F.R.S
Full range sensitivity (FRS)	1.5 mV/Volt nominal
Residual unbalance	0.2 mV/Volt
Resolution	Infinite

Electrical

Excitation voltage	20 Volt dc or Volt ac rms maximum
Bridge output resistance	1,000 Ohms ± 5%
Insulation resistance	100 megohms minimum at 100 Volt d.c.
Electrical connection : Option (a)	2 metres 4 core PVC screened cable
Option (b)	1 metre P.T.F.E

Environmental and Physical

Operational temperature range	-20 ^{o}C to +85 ^{o}C
Pressure Media	Gasses and liquids compatible with BeCu.
Pressure overload	Ranges up to 750 bar: 50% above rated pressure Ranges 1,000 bar and over: 25% above rated pressure.
Natural frequency	5 k Hz increasing with pressure range
Static Volume	0.11 to 0.28 ml depending on range and type.
Volumetric change with pressure	Negligible
Pressure overload	50% above rated pressure
Weight	20 gram. Approx Excluding cable
Case material	Stainless steel

Dimensions

XT21A & B	12 mm dia. body x 135mm overall length approx.

Ordering Information

Specify transducer type, pressure range, pressure port thread and options.

Data Sheet No
DSXT21-0305

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BARNBROOK

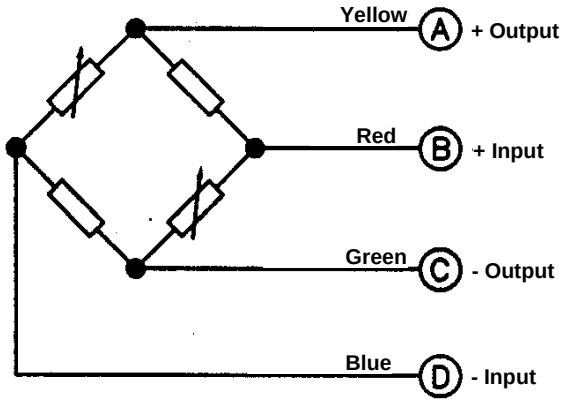
DATA SHEET

INTERSONDE

PRESSURE TRANSDUCER

Type XT21

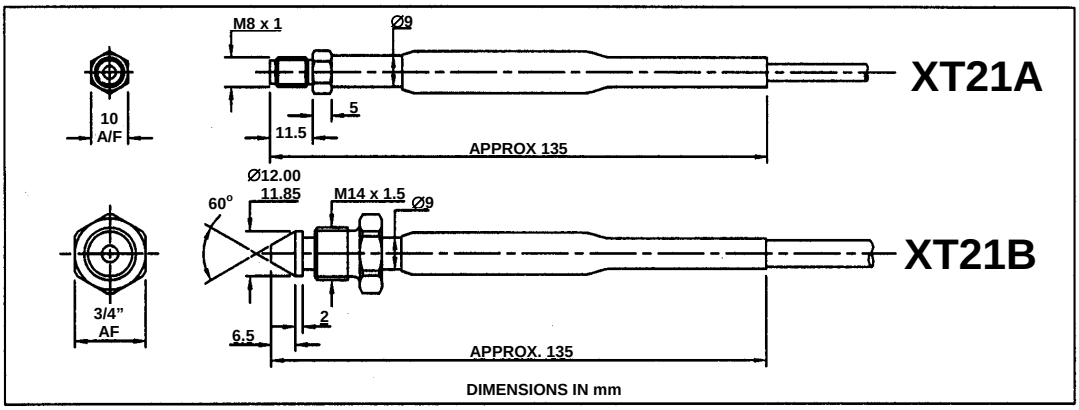
ELECTRICAL CONNECTION DIAGRAM



PRESSURE RANGES

Bar	350	500	750	1000	1500	2000
Psig	5075	7250	10875	1450	21750	29000
Port	M8 x 1					

DETAIL DIMENSIONS



Data Sheet No
DSXT21-0305

Design authority and manufacture by Barnbrook Systems Limited

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BARNBROOK

DATA SHEET

INTERSONDE

PRESSURE TRANSDUCER

A range of transducers with internal thread and cone, designed for direct coupling to high pressure tubing via a gland nut and collar.
Weep holes are provided to facilitate pressure relief and venting.
The pressure sensing element is of one piece construction, machined from stainless steel bar, which has been heat treated to get high tensile properties which extend transducer life when used in cyclic, dynamic or static applications.

Type HP28

Key Features

- Direct coupling to 1/4” or 3/8” diameter high pressure tubing.
- High accuracy, better than 0.25%
- Robust Ni Cr bonded strain elements.
- Pressure range from 3000 to 7000 bar (43500 to 101500 psig)
- Choice of electrical termination.

Specification

Performance

Combined non-linearity and hysteresis	± 0.25% F.R.S
Full range sensitivity (FRS)	1.250 mV/Volt nominal
Residual unbalance	0.02 mV/Volt
Resolution	Infinite

Electrical

Excitation voltage	20 Volt dc or Volt ac rms maximum
Bridge output resistance	600 Ohms ± 5%
Insulation resistance	100 megohms minimum at 100 Volt d.c.
Electrical connection : Standard	6 pin bayonet lock connector (mates with MIL-C-26482 size10)
Option (a)	1 metre 6 core screened PTFE insulated flying lead
Option (b)	2 metre 6 core PVC moisture proof(Max operating temp 85^{o}C)

Environmental and Physical

Operational temperature range	-25 ^{o}C to +100 ^{o}C
Thermal zero shift	± 0.02% F.R.S. / ^{o}C
Thermal sensitivity shift	± 0.02% F.R.S. / ^{o}C
Material in contact with pressure media	Stainless steel
Static volume	Less than 0.6ml
Volumetric change with pressure	Negligible
Pressure overload	10% above rated pressure
Weight	350 gram approx
Case material	Stainless steel

Dimensions

30 mm dia x 115 mm overall length

Ordering Information

Specify transducer type, pressure range, pressure port thread and options.

Data Sheet No
DSHP28-0305

Design authority and manufacture by Barnbrook Systems Limited

BARNBROOK SYSTEMS LIMITED, 25 FAREHAM PARK ROAD, HAMPSHIRE, PO15 6LD
TEL NO: +44(0)1329 847722 E-mail: sales@barnbrook.co.uk www.barnbrook.co.uk

BARNBROOK

DATA SHEET

INTERSONDE

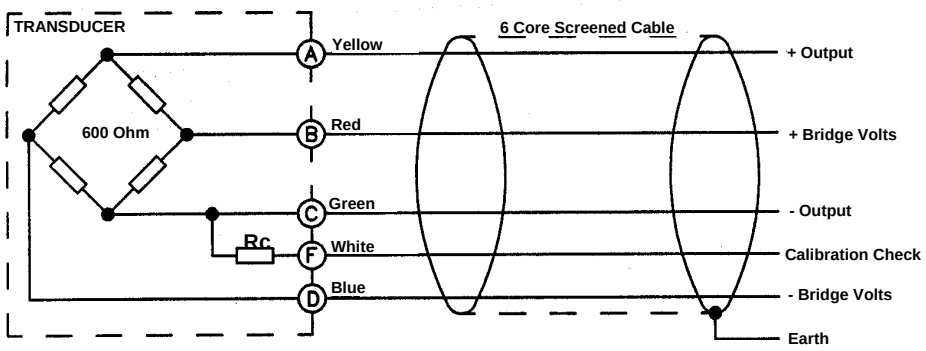
PRESSURE TRANSDUCER

Type HP28

CALIBRATION CHECK

To use the calibration check facility, join pin D to pin F. This will unbalance the bridge and produce a change in output approximately equal to 90% of the full range sensitivity (F.R.S.) The exact figure is recorded on the Calibration Certificate.

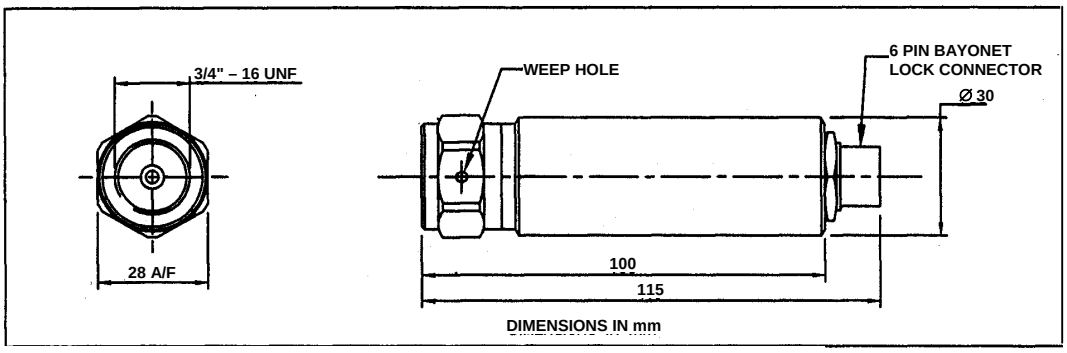
If the calibration check facility is not required then 4 core screened cable may be used in lieu of 6 core.



PRESSURE RANGES

Bar	3000	4000	5000	7000
Psig	43500	58000	72500	101500
Port	3/4" – 16 UNF Female			

DETAIL DIMENSIONS



INSTALLATION DETAILS

The design principle ensures a high sealing pressure over the metal to metal sealing area, with moderate gland torque requirements.
The external cone on the high pressure tubing mates with an internal cone in the transducer body which is machined to a slightly larger angle.
The cones are maintained in contact via a left hand threaded collar (1/4" o/diameter tubing and 3/8" – 24 UNF for 3/8" o/diameter tubing which is supported by a gland nut threaded into the pressure port. Gland nuts and collars to suit either tube size are available from Barnbrook Systems Limited. Adaptors and cone fittings can also be supplied to convert from 3/4" – 16 UNF to an external thread 3/8" BSP or M16 x 1.5

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AS9100D CERTIFIED ISO 9001

BARNBROOK

DATA SHEET

INTERSONDE

PRESSURE TRANSDUCER

A range of transducers for the measurement of ultra-high pressures, developed in conjunction with The Queen's University of Belfast.
The pressure sensing element is of one piece construction, machined from stainless steel bar. In the heat treated condition this material has high tensile strength and excellent fracture resistance, enabling transducers to be made with a maximum rating pressure of 200,000 psi.

Type HP38

Key Features

- External thread with cone sealing.
- High accuracy, 0.5% or better.
- Robust bonded strain elements.
- Pressure range from 10000 to 13789 bar (145038 to 200000 psig)
- Choice of electrical termination.

Specification

Performance

Combined non-linearity and hysteresis	± 1.0 % F.R.S
Full range sensitivity (FRS)	1.250 mV/Volt nominal
Residual unbalance	0.02 mV/Volt
Resolution	Infinite

Electrical

Excitation voltage	20 Volt dc or Volt ac rms maximum
Bridge output resistance	600 Ohms ± 5%
Insulation resistance	100 megohms minimum at 100 Volt d.c.
Electrical connection : Standard	6 pin bayonet lock connector (mates with MIL-C-26482 size10)

Environmental and Physical

Operational temperature range	0 °C to +40 °C
Thermal zero shift	± 0.05% F.R.S. / °C
Thermal sensitivity shift	± 0.03% F.R.S. / °C
Material in contact with pressure media	Stainless steel
Static volume	Less than 0.6ml
Volumetric change with pressure	Negligible
Weight	825 gram approx
Case material	Stainless steel

Dimensions

35 mm dia x 148 mm overall length

Ordering Information

Specify transducer type, pressure range, pressure port thread and options.

Data Sheet No
DSHP38-0305

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BARNBROOK

DATA SHEET

INTERSONDE

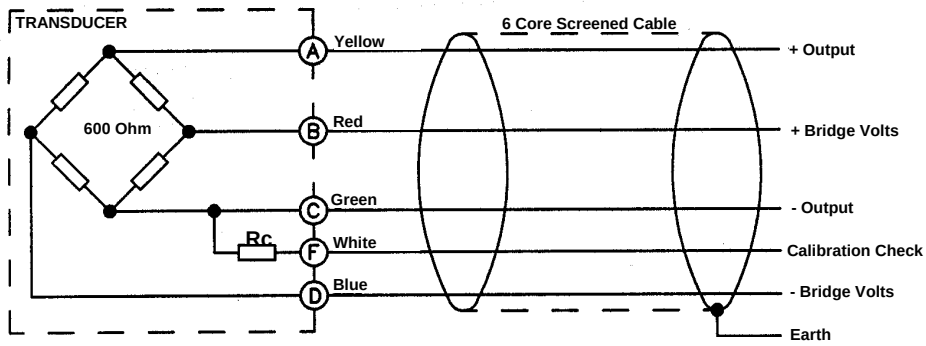
PRESSURE TRANSDUCER

Type HP38

CALIBRATION CHECK

To use the calibration check facility, join pin D to pin F. This will unbalance the bridge and produce a change in output approximately equal to 90% of the full range sensitivity (F.R.S.) The exact figure is recorded on the Calibration Certificate.

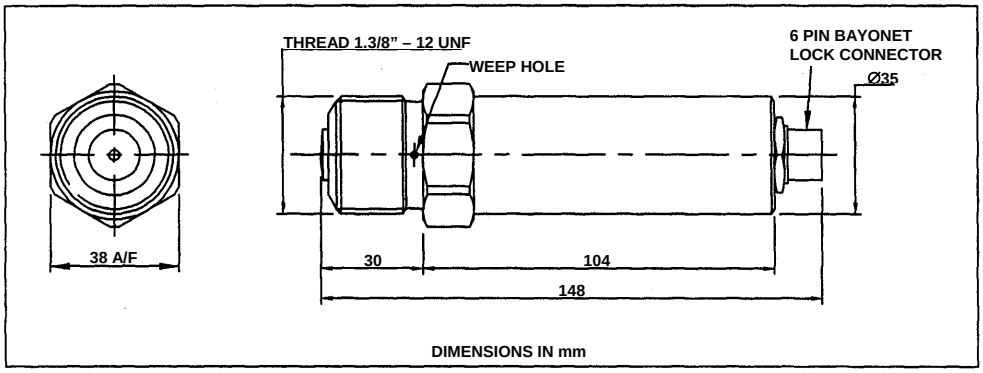
If the calibration check facility is not required then 4 core screened cable may be used in lieu of 6 core.



PRESSURE RANGES

Bar	10000	12000	13789
Psig	145038	174046	200000
Port	1.3/8" – 12 UNF Male		

DETAIL DIMENSIONS



INSTALLATION DETAILS

The design principle ensures a high sealing pressure over the metal to metal sealing area, with moderate torque requirements.
The 5° cone on the sealing face of the transducer localises the sealing stress around the 1.6mm diameter hole in the pressure vessel.
The bore in the pressure vessel may exceed 1.6mm but this will increase the sealing area and the required torque.
Any failure to seal at the joint face will allow pressure medium, e.g. hydraulic oil, to escape via weep hole adjacent to the cone and at the base of the thread.

Data Sheet No
DSHP38-0305

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BARNBROOK

DATA SHEET

INTERSONDE

DIGITAL INDICATOR

The K9010 Microprocessor Based Process Indicator/Alarm Controller is a precision instrument that has been primarily designed for use with Intersonde pressure transducers. However, due to the inherent flexibility of this instrument, the K9010 is ideally suited for use with many other types of transducers including load cells, displacement, level and torque etc. The front membrane and display panel are sealed against dust and water and conform to IP65 and NEMA 12.

Type K9010

Key Features

- User programmable span, zero, calibration and setpoint modes.
- Pushbutton transducer calibration.
- UL approved rear barrier terminals which may be removed for ease of wiring.
- Dual setpoints with relay output on each.
- Internal battery protects programmed information.
- The front of the instrument facia conforms to IP65 and NEMA 12.
- Case conforms to DIN 43700. Bezel size is 96 x 96 mm.

Specification

Performance

Indicator Accuracy	± 0.1% of full range
Input Sensitivity	1 mV/Volt to 3.3 mV/Volt
Zero Balance Range	± 10% of transducer full-scale range.
Setpoint Hysteresi	1% of full scale

Electrical

Excitation voltage	Isolated 7 Volt dc (Nominal), current limited to 60 mA.
Optional outputs	Recorder outputs of 0 – 1 V or 4 – 20 mA dc
Power Supply	100-130 or 200-265V 50/60Hz selectable on rear panel.

Environmental and Physical

Display	5 digit red LEDs 14.2 mm (0.56”)
Ranges	Programmable from front keypads up to 99999 maximum
Decimal Point	Programmable from front keypads.
Programming Display	The display will show error conditions, alarm settings, Auto zero, cal and span
Operating Temperature	0 – 50 ^{o}C (32 – 122 ^{o}F)
Mounting	Rear panelmount brkts. Panel cut-out: 92 x 92 mm
Weight	900g (2lb)

Dimensions

Bezel	96 x 96 mm (3.78” x 3.78”)
Case Depth, bezel to rear terminals.	170 mm (6.7”)

Ordering Information

Specify required output

Data Sheet No
DSK9010-0305

Design authority and manufacture by Barnbrook Systems Limited

Sheet 1 of 1

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Section 8

FIRE SUPPRESSION ACTUATORS

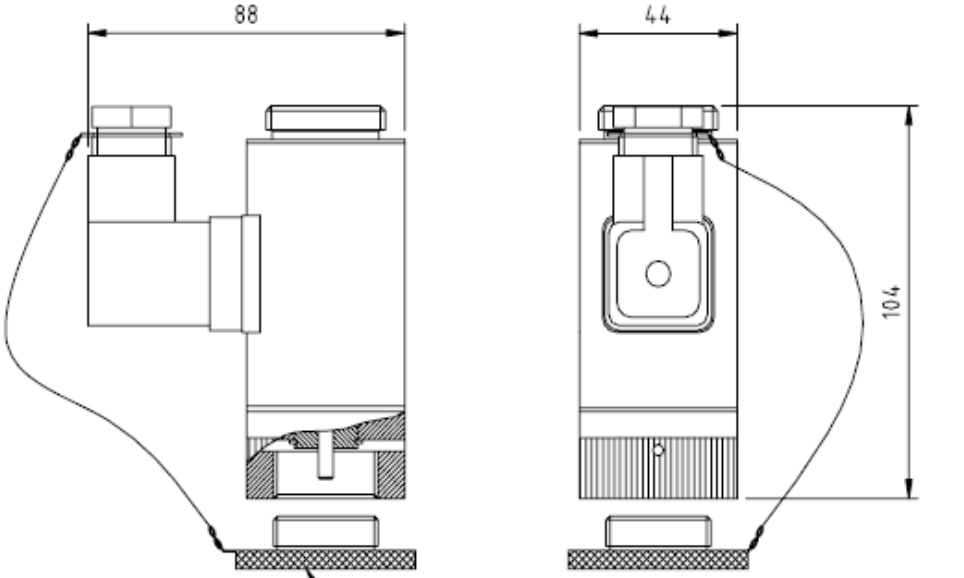
DATA SHEET
FIRE SUPPRESSION ACTUATOR (FSA)
TYPE EA45BR

A range of 24 Volt D.C. electrical actuators designed for use in fire suppression systems.
The unit is demountable, with a reset cap for ease of maintenance.
Direct valve mounted with a facility for manual actuation as required.
The interconnect may be adapted to suit customer system requirements.

Key Features

- Fitted with reset tool cap.
- Compact, reliable unit.
- Demountable
- Bridge rectifier connector
- UL listed
- SIL 2 rated
- Suitable for gas extinguishing systems up to **70 bar**
- Optional Active Detection (NFPA2001) – EA45BRAD

Description: Removable Electrical Actuator (0.25A) UL (Bridge Rectifier)



Data Sheet No
DSEA45BR

Design authority and manufacture by Barnbrook Systems Limited

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AS9100D CERTIFIED ISO 9001

BARNBROOK DATA SHEET

Specification

FIRE SUPPRESSION ACTUATOR (FSA)

TYPE EA45BR

Performance

Manual actuation force	50 Newton (N)
Actuation type	Latching
Life span	10 years from manufacture but depends on application and environment
Product warranty	12 months from shipment
Testing	100% electrical actuation check
Approval certification	Recognised to UL508, UL864, LPCB EN12094-4 Tested in accordance with UL864
Operating force	66.4N @ 1mm from unactivated 60.7N @ 2mm from unactivated 55.0N @ 3mm from unactivated 49.3N @ 4mm from unactivated
Reset method	Manual via reset tool supplied

Electrical

Nominal voltage	24 Volts D.C.
Minimum actuation voltage	65% of nominal voltage i.e. 15.6 VDC
Minimum current	0.2A
Nominal current	0.25 A
Maximum current	0.33 A
Maximum monitoring current	25 mA
Electrical connection	DIN 43 650-A/ISO 440 3 pin (3 pin PG 9.5mm Hirschmann DIN plug connecter.
Back EMF protection	Bridge rectifier
Minimum duration of trigger signal	1 second

Environmental and Physical

Operating temperature range	-20 ºC to +55 ºC
Maximum humidity	80 to 90% RH, non condensing
Body material	Mild steel, Electroless Nickel plated
Actuation pin	Stainless Steel
Base nut	Brass CZ121
Retaining clip	Beryllium Copper
Actuation type	Latching
Nominal pin travel	4.4mm
Connection	1” BSPP (Brass End Fitting)
Weight	0.95 kg
IP rating	Tested to meet IP54

Dimensions

Body	45mm dia
Overall length x overall width	104mm x 90 mm

Ordering Information

Contact Barnbrook Sales to confirm specification.

Product Supply List

BSCO USA
TYCO FIRE SUPPRESSION
PYROCHEM ANSUL
JOHNSON CONTROLS
FIKE
FIREPAC
NORGREN CHUBB
MACRON FIREATER
NAFFCO
NOVEC USA
HYGOOD
THORN SECURITY
SHIELD

Data Sheet No
DSEA45BR

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• Location on System

Connected to the top of the container discharge valve (between valve and manual actuator) or pilot cylinder valve
(Between valve and manual actuator).

• Installation Instructions

Mechanical Installation: Install the electrical actuator onto the discharge valve hand tight only. Ensure the unit is reset in the non fire position (height from end of pin to base 4.8 to 5.2mm) before fitting.

Electrical Installation: The electrical actuator is supplied with a DIN plug. Connect positive supply from control panel to terminal 1, negative supply to terminal 2. Nominal supply is 24V DC, maximum monitoring current 25mA.

• Operating Instructions

The electrical actuator will operate after receiving a 24V DC nominal voltage signal from the panel. The Electrical Actuator will latch in the fire position after the signal terminates. The electrical actuator will require to be manually reset by removing the unit from the valve and inserting (screwing in) the reset tool.

• Works Instructions

This is a purchased item and as such does not fall under any works instructions used in the manufacturing.

• Maintenance Instructions

Remove actuator from valve assembly. Apply 24V DC and obverse correct functionality (energised pin position 0.3mm to 0.5mm from base nut of actuator). Terminate supply voltage and reset electrical actuator by fitting (screwing in) plastic reset tool into base nut. Once reset, remove reset tool and reinstall on valve assembly. In case of faults or suspected faults contact the system customer services to organize replacement.

• System Operating Conditions (temp range)

FM-200® 0ºC (20.2bar) to 50ºC (33.4bar).
Sapphire TM -20ºC (20.2bar) to 50ºC (28.6bar).
Sapphire TM -20ºC (34.3bar) to 50ºC (47.8bar).
Nitrogen -20ºC (43.2bar) to 50ºC (55.1bar).

• Functional Description

The electrical actuator is activated by a voltage signal from the control panel. The voltage signal de-energises the permanent magnet, allowing the spring to push and latch the actuator pin into the fire position. The Electrical Actuator can be reset using the supplied reset tool once the voltage signal is terminated.

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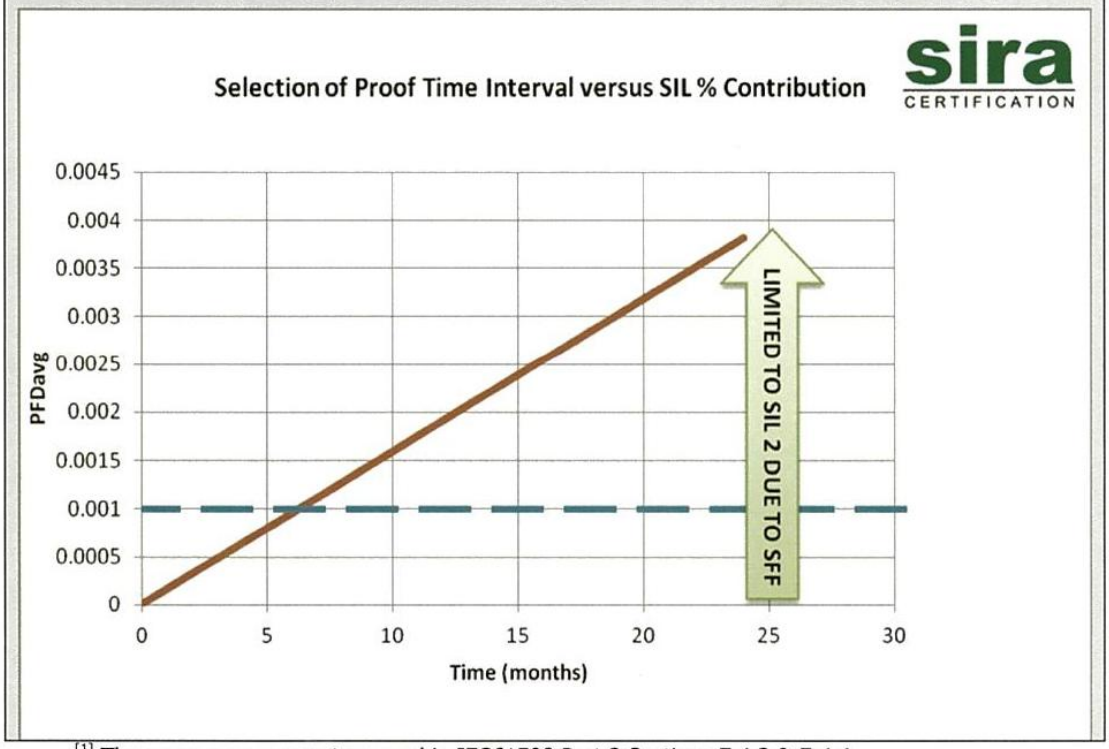
BARNBROOK DATA SHEET
FIRE SUPPRESSION ACTUATOR (FSA)
TYPE EA45BR

Product description and scope of certification

EA45 & EA45BR ACTUATOR			
Safety Function: *'Failure to De-Energies the permanent magnet and push the latch to the firing position'*			
Architectural constraints:	Type A HFT=0 SFF =77%	Proof Test Interval =8760Hrs[4] MTTR = 8 Hrs[4]	*SIL2*
Random hardware failures:	λ_{DD} = 0 λ_{DU} = 4.35E-07	λ_{SD} = 3.74E-07 λ_{SU} = 1.13E-06	
Probability of failure on demand:	PFD_{AVG}=1.91E-03 (Low Demand Mode)		*SIL2*
Hardware safety integrity compliance[1]	Route 1_H		
Systematic safety integrity compliance[1]	Route 1_S		
Systematic Capability[2]	SC 2		
Overall SIL-capability achieved[3]	SIL 2 (Low Demand)		



[1] These are new parameters used in IEC61508 Part 2 Sections 7.4.2 & 7.4.4.
[2] This is a new measurable scale for the systematic safety integrity level; refer to IEC61508 Part 4 Section 3.5.9.
[3] This is determined by the lowest SIL indicated by each of the parameters given above.
[4] These figures are used only for demonstration purposes.

Data Sheet No
DSEA45BR

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BARNBROOK DATA SHEET

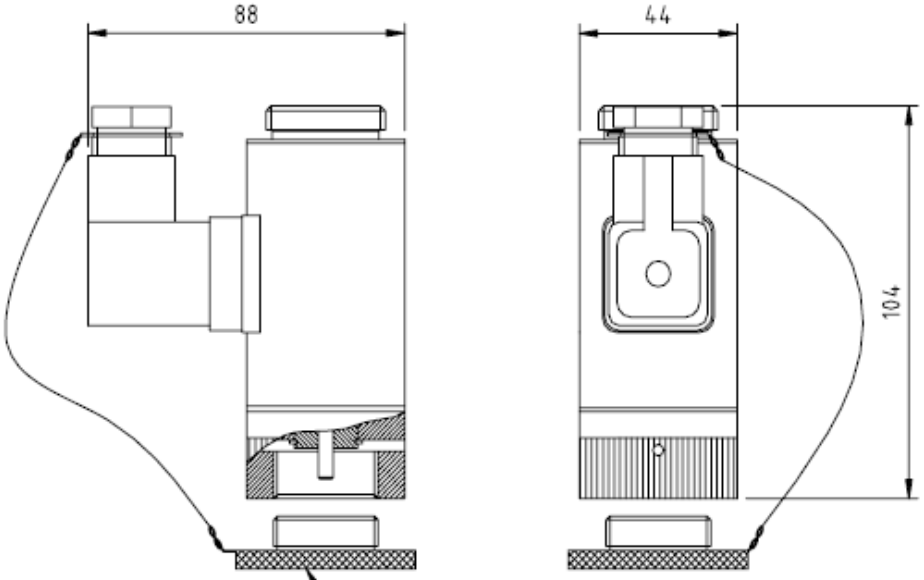
FIRE SUPPRESSION ACTUATOR (FSA) TYPE EA45BRAD

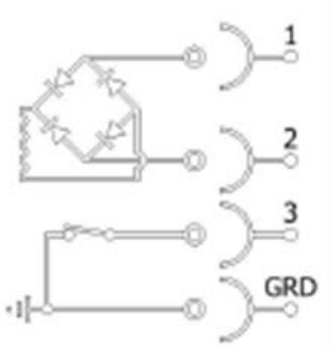
A range of 24 Volt D.C. electrical actuators designed for use in fire suppression systems.
The unit is demountable, with a reset cap for ease of maintenance.
Direct valve mounted with a facility for manual actuation as required.
The interconnect may be adapted to suit customer system requirements.

Key Features

- Fitted with reset tool cap.
- Compact, reliable unit.
- Demountable
- Bridge rectifier connector for reverse polarity protection
- UL Recognised
- SIL2 rated
- NFPA2001-15 Compliant
- **Incorporated Active Detection**
- Suitable for gas extinguishing systems up to **70 bar**

Description: Removable Electrical Actuator (0.25A) UL (Bridge Rectifier)





Reset Cap - Remove prior to installation by holding plastic cap and rotating knurled brass nut. To reset actuator,reverse the above procedure ensuring plastic cap is flush with knurled brass nut.

Data Sheet No
DSEA45BRAD

SHEET 1 OF 4

Design authority and manufacture by Barnbrook Systems Limited

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AS9100D CERTIFIED ISO 9001

FIRE SUPPRESSION ACTUATOR (FSA) TYPE EA45BRAD

Specification

Performance

Manual actuation force	50 Newton's
Actuation type	Latching
Life span	10 years from manufacture but depends on application and environment
Product warranty	12 months from shipment
Testing	100% electrical actuation check
Approval	Recognised to UL508, UL864, LPCB,FM
certification	EN12094-4 Tested in accordance with UL864
Operating force	66.4N @ 1mm from unactivated 60.7N @ 2mm from unactivated 55.0N @ 3mm from unactivated 49.3N @ 4mm from unactivated
Reset method	Manual via reset tool supplied

Electrical

Nominal voltage	24 Volts D.C.
Minimum actuation voltage	65% of nominal voltage i.e. 15.6 VDC
Minimum current	0.2A
Nominal current	0.25 A
Maximum current	0.33 A
Maximum monitoring current	25 mA
Electrical connection	DIN 43 650-A/ISO 440 3 pin (4 pin PG 9.5mm Hirschmann DIN plug connecter.
Back EMF protection	Bridge rectifier
Minimum duration of trigger signal	1 second

Environmental and Physical

Operating temperature range	-20 ºC to +55 ºC
Maximum humidity	80 to 90% RH, non condensing
Body material	Mild steel, Electroless Nickel plated
Actuation pin	Stainless Steel
Base nut	Brass CZ121
Retaining clip	Beryllium Copper
Actuation type	Latching
Nominal pin travel	4.4mm
Connection	1" BSPP (Brass End Fitting)
Weight	0.95 kg
IP rating	Tested to meet IP54

Dimensions

Body	45mm dia
Overall length x overall width	104mm x 90 mm

Ordering Information

Contact Barnbrook Sales to confirm specification.

Product Supply List

BSCO USA	FIREPAC	NOVEC USA
TYCO FIRE SUPPRESSION	NORGREN CHUBB	HYGOOD
PYROCHEM ANSUL	MACRON FIREATER	THORN SECURITY
JOHNSON CONTROLS	NAFFCO	SHIELD
FIKE		

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FIRE SUPPRESSION ACTUATOR (FSA) TYPE EA45BRAD

• Location on System

Connected to the top of the container discharge valve (between valve and manual actuator) or pilot cylinder valve. (Between valve and manual actuator).

• Installation Instructions

Mechanical Installation: Install the electrical actuator onto the discharge valve hand tight only. Ensure the unit is reset in the non fire position (height from end of pin to base 4.8 to 5.2mm) before fitting.

Electrical Installation: The electrical actuator is supplied with a DIN plug. Connect positive supply from control panel to terminal 1, negative supply to terminal 2. Nominal supply is 24V DC, maximum monitoring current 25mA. For Active Detection, connect Electrical Actuator detection from control panel to pin 3.

• Operating Instructions

The electrical actuator will operate after receiving a 24V DC nominal voltage signal from the panel. The Electrical Actuator will latch in the fire position after the signal terminates. The electrical actuator will require to be manually reset by removing the unit from the valve and inserting (screwing in) the reset tool.

• Active Detection in accordance with NFPA2001-15 Clause 4.3.4

The Electrical actuator has an incorporated Active Detection technology to trigger an audible and visual alarm on the control panel when the actuator is removed from the discharge valve. The control panel should be wired for Active Detection.

• Works Instructions

This is a purchased item and as such does not fall under any works instructions used in the manufacturing.

• Maintenance Instructions

Remove actuator from valve assembly. Apply 24V DC and obverse correct functionality (energised pin position 0.3mm to 0.5mm from base nut of actuator). Terminate supply voltage and reset electrical actuator by fitting (screwing in) plastic reset tool into base nut. Once reset, remove reset tool and reinstall on valve assembly. In case of faults or suspected faults contact the system customer services to organize replacement.

• System Operating Conditions (temp range)

FM-200® 0ºC (20.2bar) to 50ºC (33.4bar).
Sapphire TM -20ºC (20.2bar) to 50ºC (28.6bar).
Sapphire TM -20ºC (34.3bar) to 50ºC (47.8bar).
Nitrogen -20ºC (43.2bar) to 50ºC (55.1bar).

• Functional Description

The electrical actuator is activated by a voltage signal from the control panel. The voltage signal de-energises the permanent magnet, allowing the spring to push and latch the actuator pin into the fire position. The Electrical Actuator can be reset using the supplied reset tool once the voltage signal is terminated.

The Electrical actuator has an incorporated Active Detection technology to trigger an audible and visual alarm on the control panel when the actuator is removed from the discharge valve in accordance with NFPA2001-15 Clause 4.3.4. The control panel should be wired for Active Detection.

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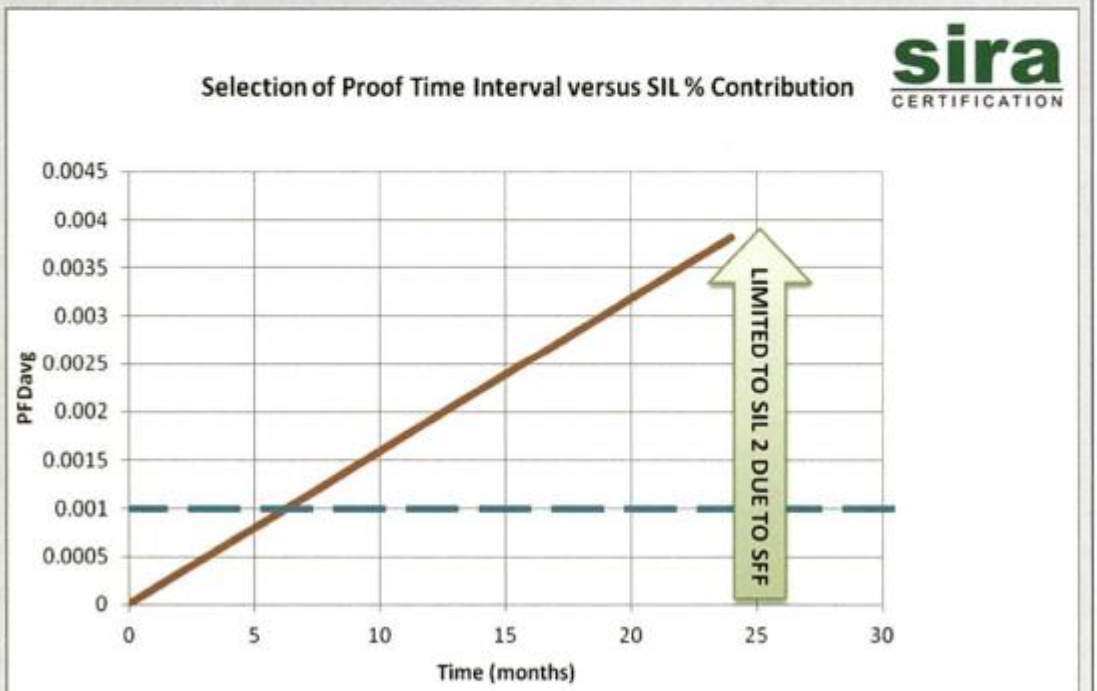
FIRE SUPPRESSION ACTUATOR (FSA) TYPE EA45BRAD

Product description and scope of certification

EA45 & EA45BR ACTUATOR			
Safety Function: *'Failure to De-Energies the permanent magnet and push the latch to the firing position'*			
Architectural constraints:	Type A HFT=0 SFF =77%	Proof Test Interval =8760Hrs[4] MTTR = 8 Hrs[4]	*SIL2*
Random hardware failures:	λ_{DD} = 0 λ_{DU} = 4.35E-07	λ_{SD} = 3.74E-07 λ_{SU} = 1.13E-06	
Probability of failure on demand:	PFD_{AVG}=1.91E-03 (Low Demand Mode)		*SIL2*
Hardware safety integrity compliance[1]	Route 1_H		
Systematic safety integrity compliance[1]	Route 1_S		
Systematic Capability[2]	SC 2		
Overall SIL-capability achieved[3]	SIL 2 (Low Demand)		



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BARNBROOK DATA SHEET

FIRE SUPPRESSION ACTUATOR (FSA)

TYPE EA55

A range of 12 Volt dc & 24 Volt dc electric actuators designed for use in high pressure fire suppression systems using CO2.
The unit is demountable and resettable, with a reset cap for ease of maintenance.
Direct valve mounted with a facility for manual actuation as required.
The interconnect may be adapted to suit customer system requirements.

Key Features

- Fitted with reset tool.
- Compact, reliable unit.
- Demountable.
- UL Recognised component.
- Suitable for gas extinguishing systems up to **200 bar**
- Assuming valve suitability
- SIL rating if required

Specification

Performance

Manual actuation force	> 49 Newtons
Life span	10 years from manufacture but depends on application and environment
Product warranty	12 months from shipment
Testing	UL
Approval	Underwriters Laboratories
Operating force	200N @ 1mm from unactivated

Electrical

Power requirements	12 Volt or 24 Volt d.c.
Current	0.5A at 12Volt dc or 24Volt dc
Electrical connection	DIN 43 650-A/ISO 440 3 pin

Environmental and Physical

Operating temperature range	-20 ºC to +55 ºC
Body material	Mild steel, Electroless nickel plated
Actuation pin	Stainless Steel
Actuation type	Latching
Connection	Threaded to suit customer interface (Brass End Fittings)
Weight	1.9 kg

Dimensions

Body	55mm dia.
Overall length x overall width	130mm max. x 100 mm max.

Ordering Information

Contact Barnbrook Sales to confirm specification.

Design authority and manufacture by Barnbrook Systems Limited

Barnbrook Systems reserves the right to alter specifications and design without notice

Data Sheet No
DSEA55

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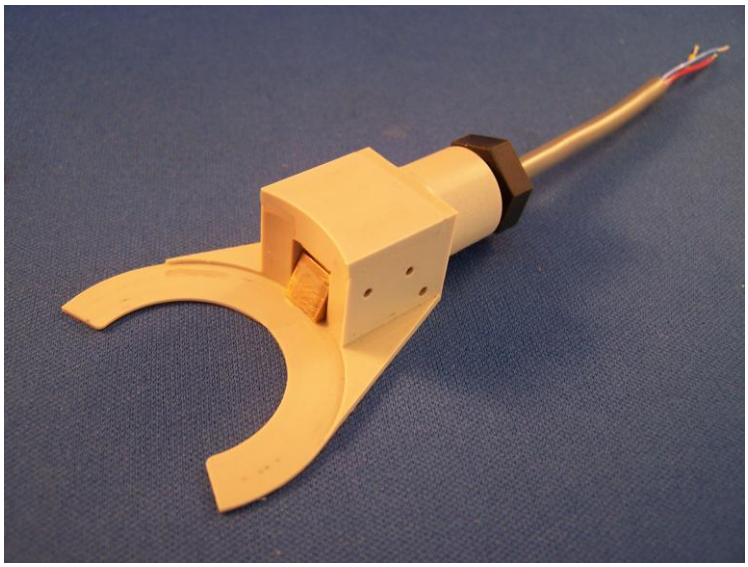
BARNBROOK DATA SHEET

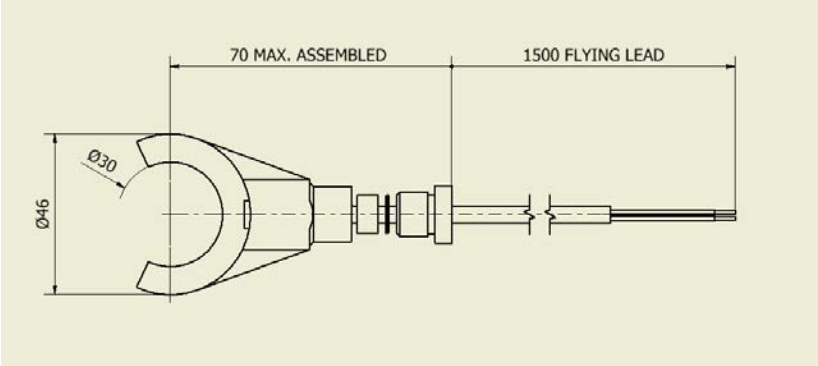
FIRE SUPPRESSION ACTUATOR PROXIMITY SWITCH

PROXIMITY SWITCH FOR EA45 AND EA45BR SERIES OF ELECTRICAL FIRE SUPPRESSION ACTUATORS



Key Features:

- To assure correct placement and fitting of electrical actuator and other ancillary equipment.
- Easy to fit
- Mounted with a push / snap location
- 24V N/O N/C Switch for alarm actuation on removal or part removal of electrical actuator from valve
- Non flammable fire retardant plastic
- Gold plated contacts
- Spring loaded insulated actuation wedge
- 3 wire screened cable construction and 1.5 metre long cable (To meet fire regulation standard)
- Connections exit through a ¼ BSPP cable gland
- UL and FM approval pending
- Patent pending



Patent 1315316.8 applicable 28/8/13

Data Sheet No
DSFSA-PROXSW

Design authority and manufacture by Barnbrook Systems Limited
Barnbrook Systems reserves the right to alter specifications and design without notice

SHEET 1 OF 1

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TEL NO: +44(0)1329 847722 E-mail: sales@barnbrook.co.uk www.barnbrook.co.uk

AS9100D CERTIFIED ISO 9001

Section 9

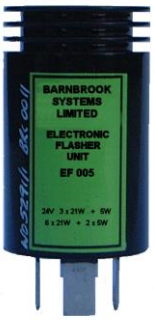
SOLID STATE RELAYS

BARNBROOK

RELAY
24 Volt FLASHER
TYPE EF005

MILITARY VEHICLE INDICATOR CONTROL

The EF005 is a 24 volt, EMC suppressed Vehicle Indicator Control designed primarily to replace the standard Flasher Relay in military vehicles where suppression of interference is a prime requirement.
It is interchangeable with most standard 24 Volt automotive Flasher Relays.
It is suitable for use on vehicles equipped for towing.



Key Features

- Bulb failure warning by rapid flash rate
- EMC Tested to DEF STAN 59-41. DRE03 Class A Peak & MIL STAN 461A
- Interchangeable with most standard 24 Volt Automotive Flasher Relays

Specification

Electrical

Maximum Design Load	For direction indicators 3 x 21W + 1 x 5W + 1 x 3W at 26 Volts 2.73 Amps. For Hazards 6 x 21W + 2 x 5W + 2 x 3W at 26 Volts 5.45 Amps

Environmental and Physical

Operating temperature range	-40 ^{o}C to +80 ^{o}C
Diameter	30.5mm max
Length	50.2mm max + 12.5mm max for plug-in terminals
Weight	75 grams

Ordering Information

Contact Barnbrook Sales to confirm specification.

Data Sheet No
DSEF005

Design authority and manufacture by Barnbrook Systems Limited

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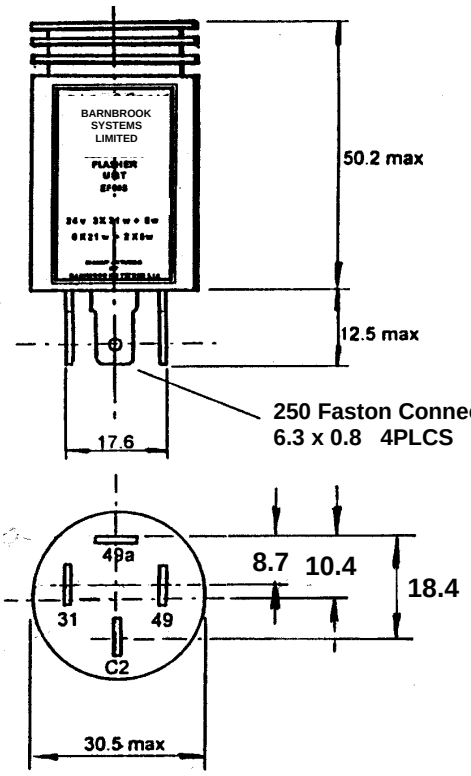
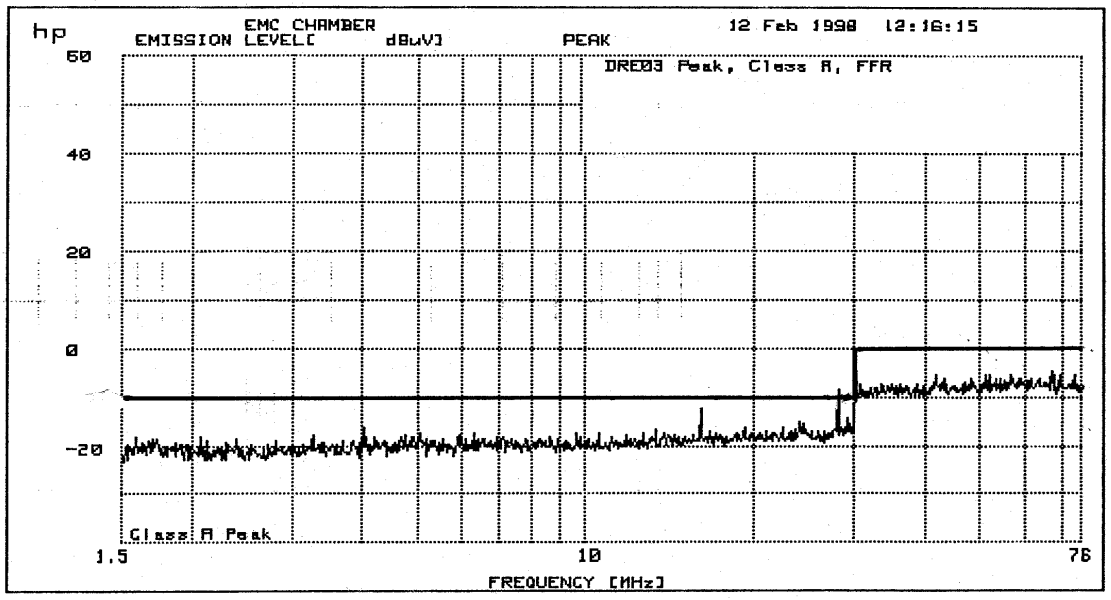
RELAY
24 Volt FLASHER
TYPE EF005



NOTE Terminal numbers shown on base are for reference only and are not marked on the unit



Data Sheet No
DSEF005

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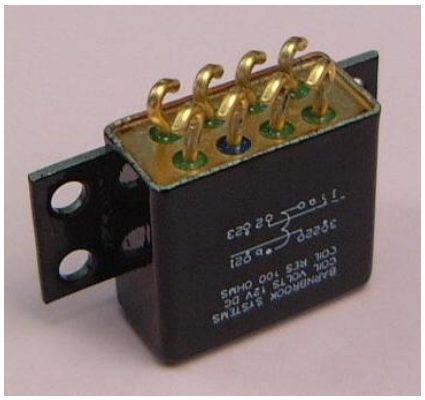
BARNBROOK DATA SHEET

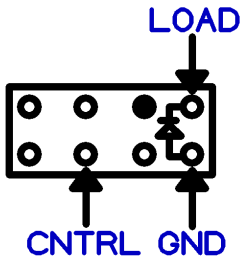
TIMER MODULE

FIXED TIMER MODULE
TMR 1s TO 1000s



Key Features

- Hermetically Sealed can
- Fully encapsulated electronics
- Time delay on operate or release
- Crystal Can Case
- Fixed time delay from 1s to 1000s
- Configurable ON Delay or OFF Delay



Specifications

General

Weight	25 gm (Ref)
Mating Socket	Crimp Contacts – Order Part No. 604864

All measurements at 25°C and nominal voltage

Environmental

Temperature Range	-55°C to +100°C
Shock	490 m/s^2 (50G) for 11 ms
Vibration	20G 10 to 2000 Hz
Bump	4000 bumps at 390 m/s^2 (40g), 6ms duration
Climatic	BS 2011 test Z/ABDM procedure 1
Salt Mist	BS 2011 part 2.1 Kb severity 2

Ordering Information See sheet 4

Data Sheet No
DSTMR2

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AS9100D CERTIFIED ISO 9001

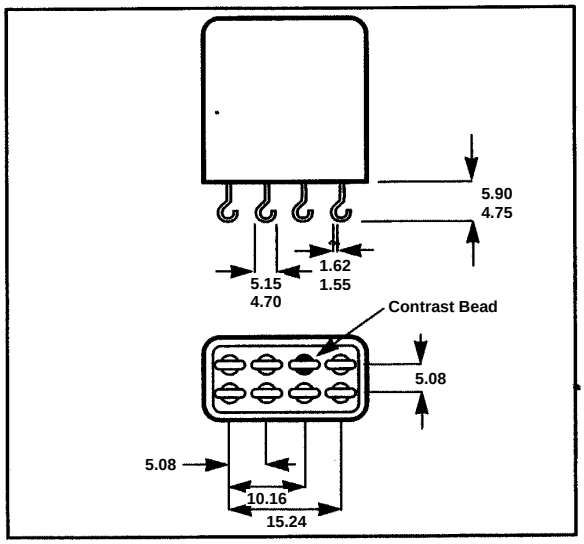
TIMER MODULE

Electrical

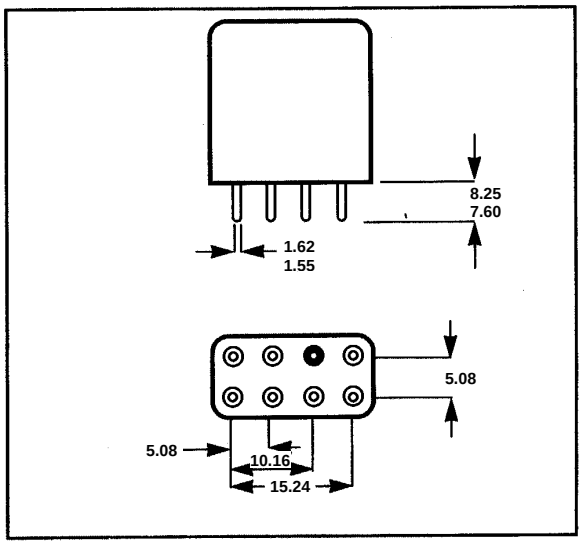
Insulation Resistance	1000 MΩ min at +25°C between any two isolated terminals and between terminals and case.
Dielectric Strength	1000 V rms, 50 Hz at sea level, between terminals and case,

TERMINATION VARIANTS

Ref 1



Ref 2



All dimensions are in millimetres. Tolerances +/- 0.25 unless otherwise stated.

All dimensions are millimetres.
Tolerances ± 0.25 unless otherwise stated

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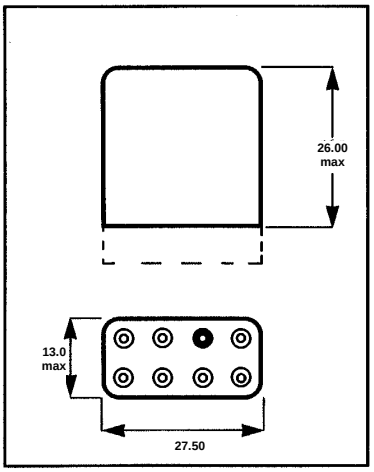
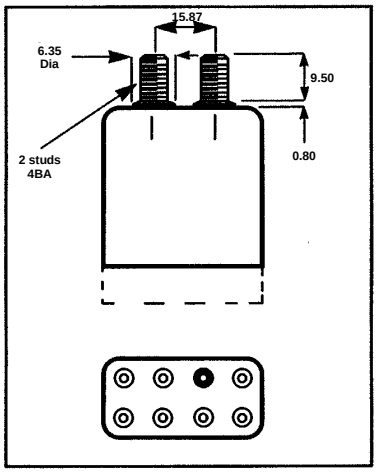
MOUNTING VARIANTS

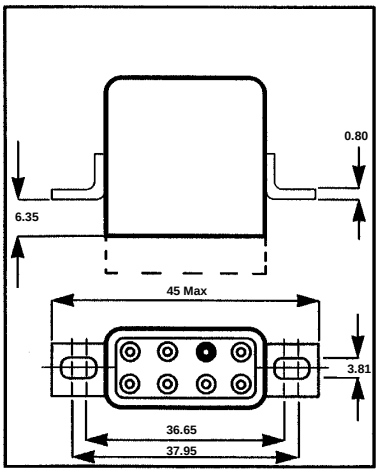
Ref 01



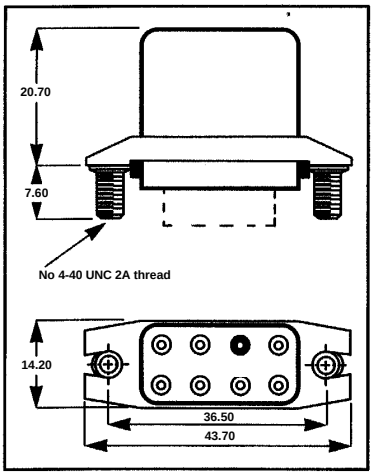
Ref 31



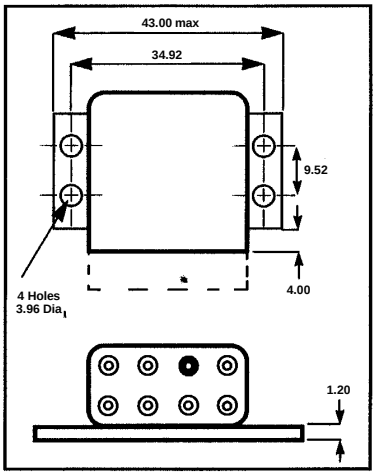
Ref 02



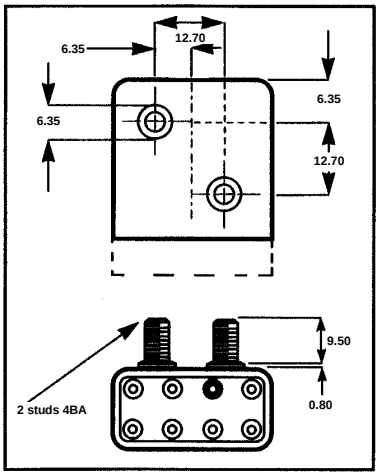
Ref 41



Ref 22



Ref 29



All dimensions are in millimetres. Tolerances ± 0.25 unless otherwise stated
Can dimensions shown in Ref 01 apply to all variations. Fixing holes are clearance for 6-32 UNC and 4BA screws.
NOTE: Terminations variant Ref 1 not applicable to Ref 41

Note ● Denotes Contrast Bead

Data Sheet No
DSTMR2

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ORDERING INFORMATION

TMR 2 01 Rx A C0

- **C0** — **Load Current (in Amps)**
- **A** — **Delay Type:** (for an On Delay A) (for an OFF-Delay B)
- **Rx** — **Delay Time in seconds**
- **01** — **Mounting Variant** (refer to page 3)
- **2** — **Termination Variant** (refer to page 2)

All values measured at +25°C
Rx = External Resistor Value
For timer values other than in table above calculate Rx as shown in page 6
For delay on Operate contact sales for ordering information.

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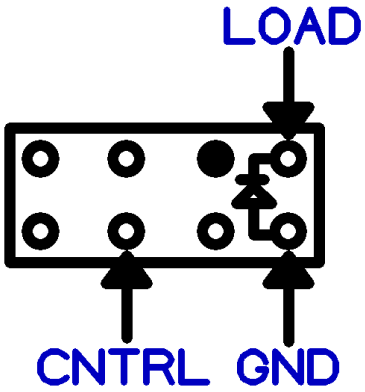
TIMER MODULE

DESCRIPTION:

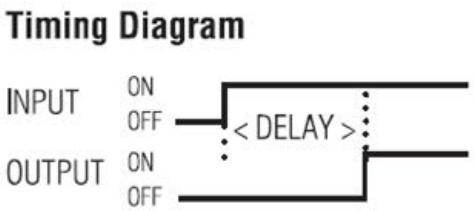
VARIABLE TIMER MODULE FOR TIME DELAY OPERATION, DELAY TRIGGERED WITH POSITVE CONTROL SIGNAL, RETRIGGERABLE AFTER LOSS OF POWER.

TYPICAL TIMER MODULE CONNECTIONS:

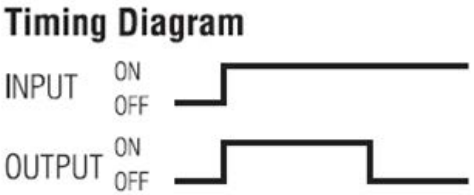
CONTROL: 7V TO 32V DC (TIMING NOT AFFECTED BY VOLTAGE)
LOAD CURRENT: CAN BE CONFIGURED FOR UP TO 5A NOMINAL LOAD



ON Delay Timing



OFF Delay Timing



Apply power and the output will energize. After time-out, the output will revert to de-energized state. Remove and reapply input to cycle.

Data Sheet No
DSTMR2

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Section 10

ENGINE CONTROLS & FLIGHT ACTUATORS

BARNBROOK DATA SHEET

ENGINE CONTROLS

Scope of Business
Barnbrook Systems are able to offer a repair, overhaul or new build service on numerous Ex-Smiths, Ex-Plessey manufactured Engine Controls and flight actuators. Repaired or Overhauled units for civil aircraft can be released with a **CAA/EASA Form 1 release Part 145**.
Illustrated below are some of the particular Engine Controls and actuators.
Enquiries are welcome for other units

TYPE 0305-KSM-EA
0306-KSM-EA
0307-KSM-EA

Description
Speed Switches (VC10)

TYPE 0320KSM-01
0321KSM-01 & 02

Description
Speed Switch (Tornado, Nimrod)

Type 171TMU

Description
Temperature Monitor Unit (VC10)

Type 510ECU

Description
Jet Pipe Temperature Limiter, Amplifier (Harrier)

Ordering Information
Contact Barnbrook Sales with your particular enquiry

Data Sheet No
DSENGCON

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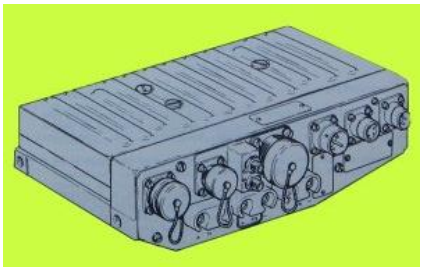
ENGINE CONTROLS

Type 600ECU Series

Description
Amplifier (Gulfstream, Fokker)
Models in this series include 604, 607, 612, 615 and 616

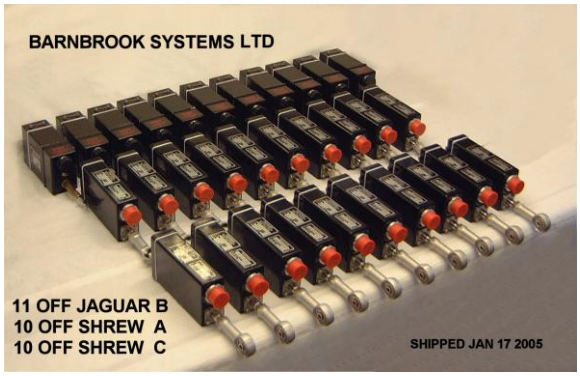
Type 800ECU Series



Description
Temperature Limiter Amplifier (Corsair)
Models in this series include 803 and 805

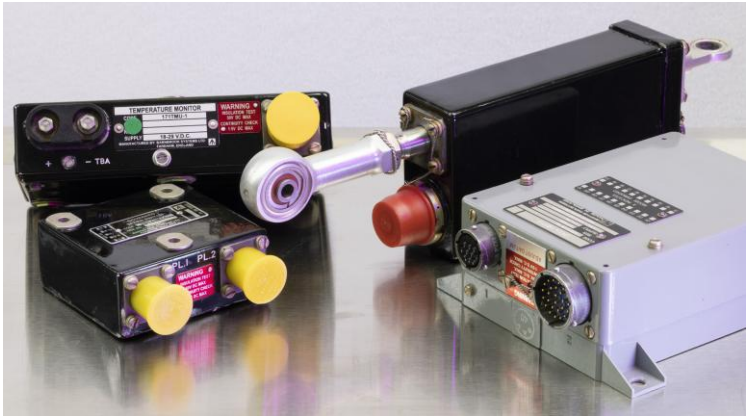
AIRCRAFT ACTUATORS

Type 500 Series



Description
Jaguar Aircraft
Gun Purging Actuator
Yaw Control Actuator
Roll Trim Actuator

Eaton Aerospace OEM



Data Sheet No
DSENGCON

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Section 11

HARDWARE

BARNBROOK DATA SHEET

HARDWARE
Lamps

Lampholders and Lenses
A range of lampholders, clear and coloured lenses manufactured to Joint Services Pattern BH21 and BH23 are available from Barnbrook Systems. Full details of availability can be obtained from our Sales Department on request.

Lamp Removal Tool
Part Number 418/1/06603

Ordering Information Contact Barnbrook Systems Sales for details of available range

Design authority and manufacture by Barnbrook Systems Limited
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Data Sheet No
DSLAMPS

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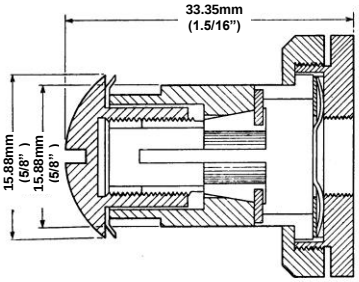
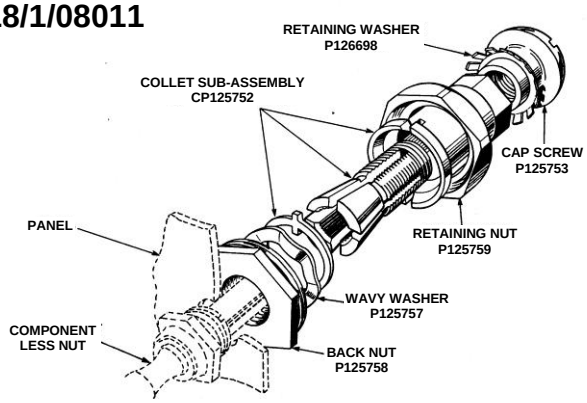
BARNBROOK **DATA SHEET**

FINGER KNOBS

Supported Collet Knobs
1/4”(6.35)dia shaft.
The Collet fixing finger knobs shown on this data sheet have been developed in conjunction with SRDE to meet the demand for knobs which can be fitted securely on a spindle without the necessity of a transverse hole. These meet the requirements of specification SRDE (Prov.) 220/2 as category 40/100 Class H1 components (SRDE test report 7.1066 refers).

Supported collet assembly 418/1/08011





Data Sheet No
DSKNOBS

Ordering Information – Contact Barnbrook Systems for full details of available knobs

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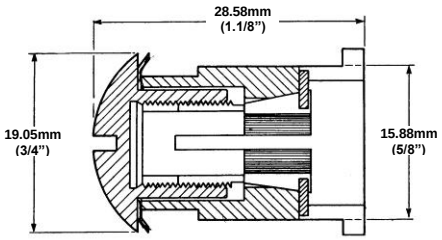
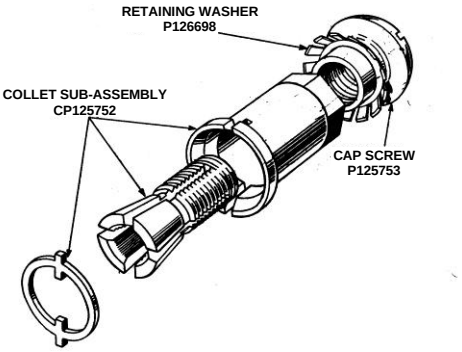
TEL NO: +44(0)1329 847722 E-mail: sales@barnbrook.co.uk www.barnbrook.co.uk

FINGER KNOBS

Unsupported Collet Knobs
1/4”(6.35) dia shaft.
The Collet fixing finger knobs shown on this data sheet have been developed in conjunction with SRDE to meet the demand for knobs which can be fitted securely on a spindle without the necessity of a transverse hole. These meet the requirements of specification SRDE (Prov.) 220/2 as category 40/100 Class H1 components (SRDE test report 7.1066 refers).

Unsupported collet assembly 418/1/08010





Data Sheet No
DSKNOBS

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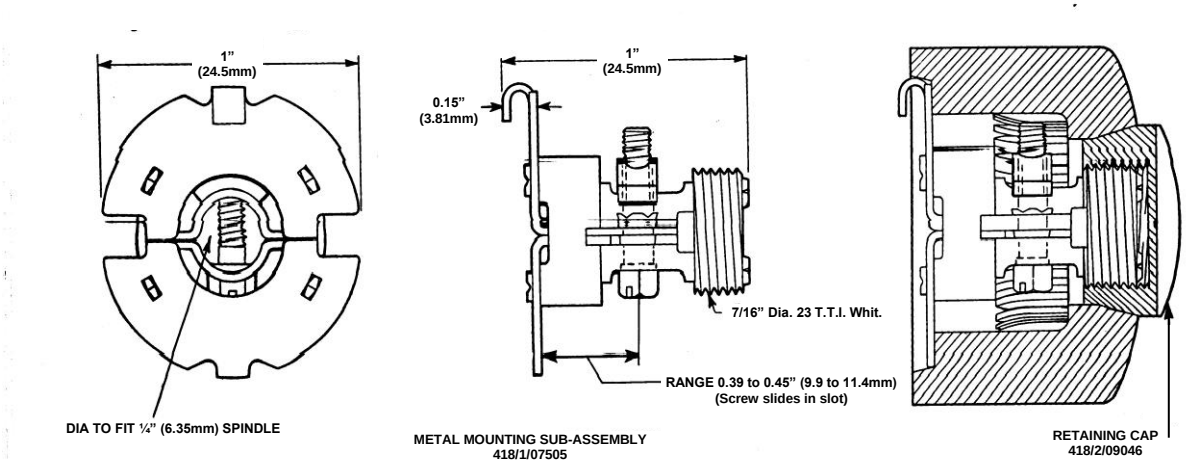
FINGER KNOBS

Adjustable Type Knobs

These adjustable type finger knobs meet the requirements of DEF 5221, and have received full RCSC Type Approval as an H1 component with a temperature category of -40°C to +100°C. They are intended for use on ¼" (6.35 mm.) diameter spindles with a cross-hole, as standardised by RCSC. Each knob consists of a phenolic moulding which is firmly held by means of a tapered cap (in the same material) drawing on to a metal mounting assembly. The mounting is fitted with a fixing screw which passes through a transverse hole drilled in the component shaft and is secured by a nut, thus achieving great strength. Backlash is prevented by a steady grip which is applied to the circumference of the shaft by the metal mounting when the screw is tightened.

The knob mouldings can be secured, complete with indicating line or pointer, if included, in anyone of 24 angular positions (15' steps) on the spindle.

Adjustable finger knob assembly



Data Sheet No
DSKNOBS

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BARNBROOK DATA SHEETS

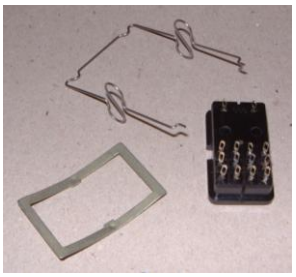
RELAY SOCKETS

Key Features
Relay Sockets are available for the majority of relays as shown below

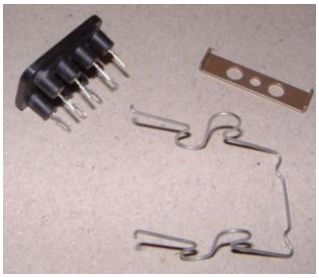
Part Number: 507/4/10908
Plug in socket for CS Relay

Part Number: 507/1/02096
Solder socket for CF Relay

Part Number: 507/1/02121
Solder socket



Part Number: 507/1/109454/001
Solder Bucket socket for CA/GP Relay



Data Sheet No
DSBBSKTS
SHEET 1 OF 2

Ordering Information Contact Barnbrook Sales to confirm requirements

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AS9100D CERTIFIED ISO 9001

RELAY SOCKETS

Part Number: 507/1/02844/001
Solder socket for Type 2

Part Number: 507/1/01223
Plug in socket for P Type Socket

BARNBROOK SYSTEMS LIMITED, 25 FAREHAM PARK ROAD, HAMPSHIRE, PO15 6LD
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BARNBROOK DATA SHEET

Formerly

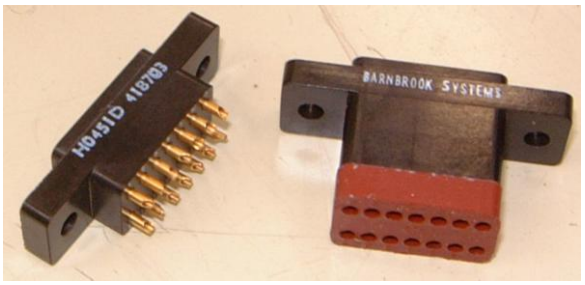
DEUTSCH LTD RELAY SOCKETS

Key Features
Relay Sockets are available for the majority of relays as shown below

Socket for LF Relay
Part Number –
19775

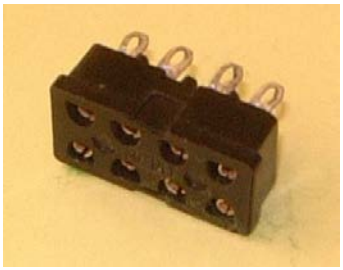
NSN 5935-99-624-0295

Socket for HDD4
Part Number –
418538 (Non Environmental)
418665 (With Cable Support)
418703 (Solder Contacts)



Socket for CECC16101-038 F, HDD1, HDS5 & HDS8,
Part Number –
420204 (Crimp Contacts)
4223-1 (Solder Contacts)

Socket for RL Relay
Part Number -
9005 (Solder Bucket)



Data Sheet No
DSSKTS

SHEET 1 OF 1

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AS9100D CERTIFIED ISO 9001

Section 12

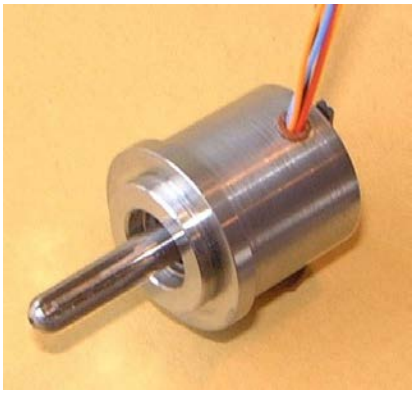
ROTARY VARIABLE DIFFERENTIAL TRANSFORMER

BARNBROOK DATA SHEET

ROTARY VARIABLE DIFFERENTIAL TRANSFORMER

TYPE RVDT

A Rotary Variable Differential Transformer for aerospace applications, used in conjunction with rotary actuators to accurately sense position.



Key Features

- Non contact rotary measurement
- Shaft supported both ends by precision ball bearings to minimise friction
- Stainless steel construction

Specification

Performance

Electrical Rotation	± 40º max
Mechanical Rotation	360 º
Operating Temperature	-40 º to +135 º C

Electrical

Input Voltage	4.0 V rms
Output Frequency	3200 Hz
Output	10mV/V/º

Weight

34 gram

Dimensions

Body	20 mm dia max x 22 mm long max
	Shaft protrusion 20 mm from location face
	PTFE Flying Leads

NB! See Figure 2 on Sheet 3 for further dimensional detail

Ordering Information

Contact Barnbrook Sales to confirm specification.

Data Sheet No
DSRVDT

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ROTARY VARIABLE DIFFERENTIAL TRANSFORMER

TYPE RVDT

Fig 1 Circuit Diagram

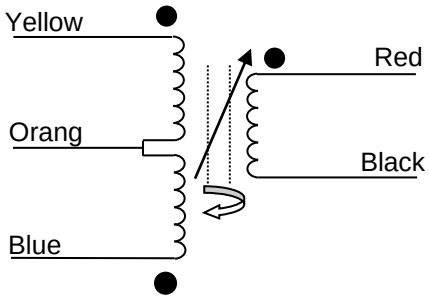
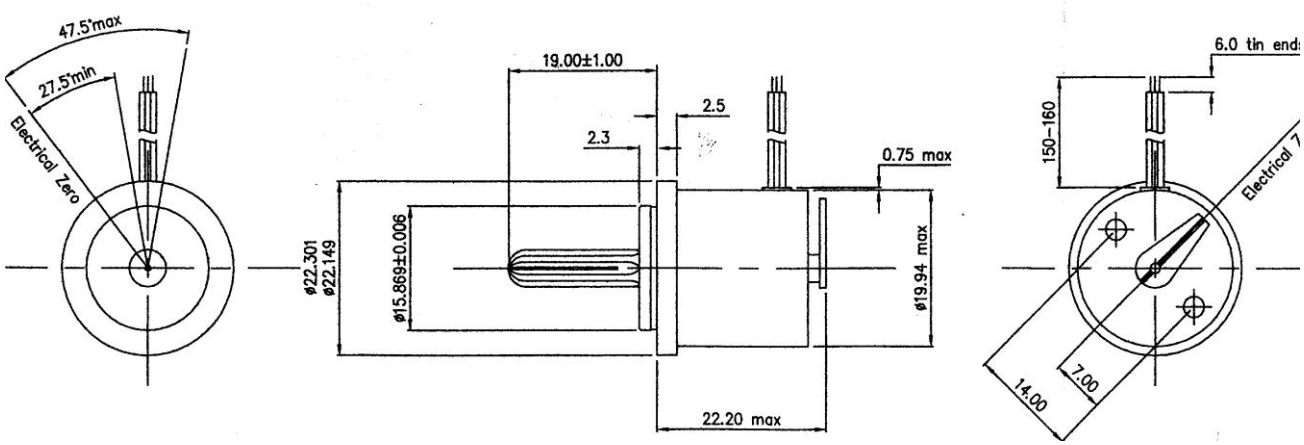


Fig 1 Circuit Diagram



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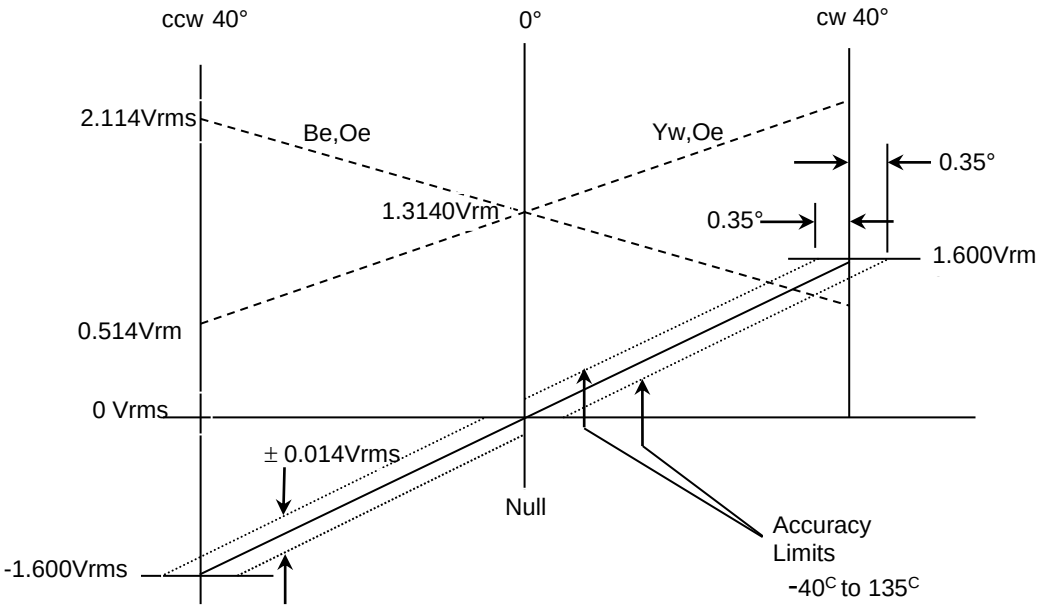
ROTARY VARIABLE DIFFERENTIAL TRANSFORMER

TYPE RVDT

Fig 3 Output Values (for nominal operation)



"gain (40°)" $\frac{V_{(Yw,Oe)} - V_{(Be,Oe)}}{V_{(Yw,Oe)} + V_{(Be,Oe)}} = 0.6088$

For RVDT with above specification, Please order Part Number 78165.

Other models and variants available on request. Please contact Sales.

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Section 13

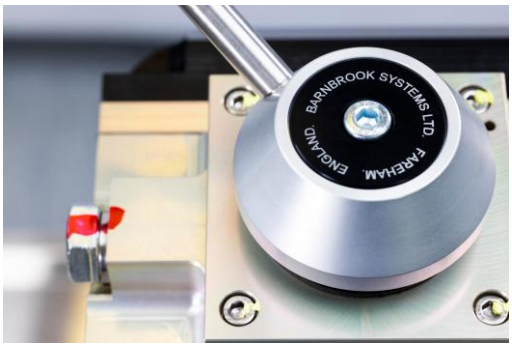
BRAKE & DIRECTIONAL CONTROL

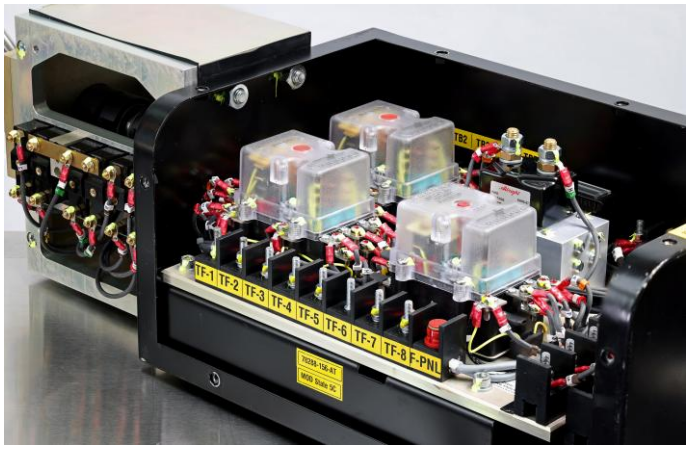
BARNBROOK DATA SHEET

BRAKE CONTROLLER MOD 5

KEY FEATURES

- Designed for 24V Electro- mechanical controlled Pneumatic brake system
- Single Common Design replacement to Westinghouse and Davies & Metcalfe Brake Controllers on Class 150 / 153 / 156 / 158 and Class 142 DMU
- Square shaft fitting and top entry fixing bolt for secured and correct Brake Controller handle fitment
- Improved CAM assembly design for ensuring positive gated handle positions from R to 1, 2, 3 & E
- Brake controller Inbuilt Suppression protection preventing damage from unsuppressed brake solenoid valves
- Spill seal protection against ingress of fluids
- Stainless steel cam shaft for improved corrosion resistance
- LED indicators of operation on front panel
- Improved fitment & removal with dedicated handling points and electrical terminal strip
- Improved indexing mechanism for smooth positive brake lever handle operation
- Fully manufactured in our factory in Fareham, UK - **No obsolescence issues**
- Winner of Rail Safety Gold Award 2012
- Optional BlueCube Wireless Remote monitoring and diagnostics available





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Data Sheet No
DSBRAKE

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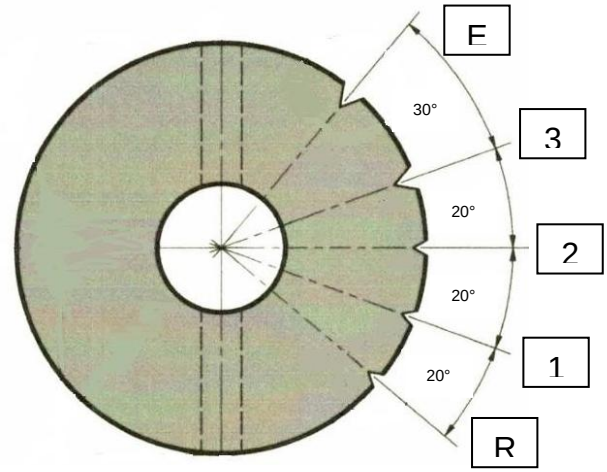
Physical & Environmental Data:

BRAKE CONTROLLER MOD 5

- **Flammability Rating to meet UL94 V2 minimum**
- **Weight: 18Kg approx.**
- **Service Life: 6 Years Max.**
- **Brake Controller Relays 400,000 operations (24Vdc, 6A max.)**
- **Brake Controller Microswitches 500,000 electrical operations minimum (OMRON A-10 series)**
- **External Operational Temperature -10°C to +40°C**
- **External Operational Humidity 0% to 80% Relative Humidity**
- **IP Rating: BS EN 60529 IP X2**
- **Dimensions: See Mechanical Installation drawing on page 3**

Brake Controller Handle Step Positions in Degrees (°)



Reference Force Values for Brake Lever movement

Handle Position	Required Force ± 0.5 kgF	Handle Position	Required Force ± 0.5 kgF
R - 1	**2.5 kgF**	**E - 3**	**4.5 kgF**
1 - 2	**2.5 kgF**	**3 - 2**	**4.5 kgF**
2 - 3	**2.5 kgF**	**2 - 1**	**2.5 kgF**
3 - E	**4.5 kgF**	**1 - R**	**2.5 kgF**

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BRAKE CONTROLLER MOD 5

Electrical Data:

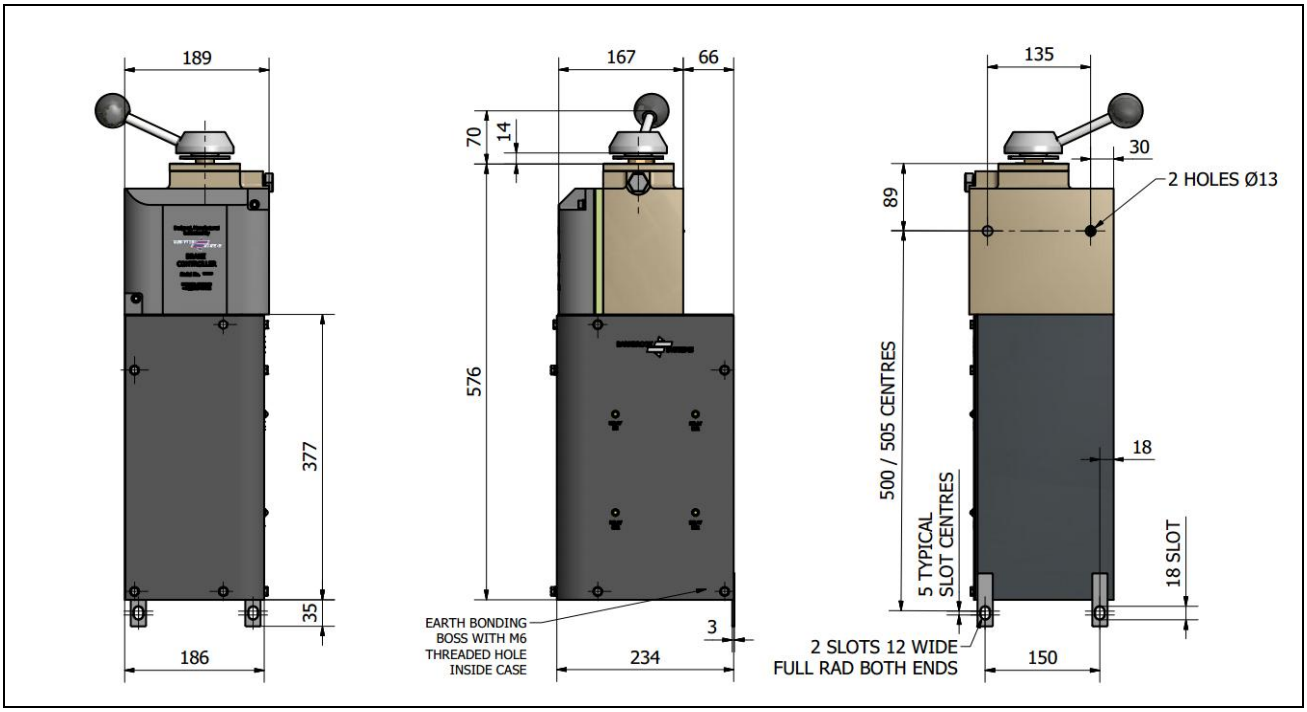
Nominal Operating Voltage: **24 VDC**

Insulation Resistance: **20 MΩ minimum between terminals and Case Earth Point Measured at 500Vdc**

Relay Contact Loads: **Max. 6 Amps Inductive Load at 24 VDC**

Max. Inductive Terminal Loading	A1	A2	B1	C1	D1	E1	F1	G1
	Negative	Negative	0.02 A	12.00 A	0.02 A	0.18 A	4.00 A	4.00 A

Max. Inductive Terminal Loading	H1	J1	K1	L1	M1	N1	P1	R1	S1
	6.00 A	6.00 A	4.00 A	0.18 A	0.18 A	0.18 A	0.02 A	0.02 A	Negative



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BRAKE CONTROLLER MOD 5

Mod State	3	3B	3C	4	4B	4C	4D	4E	4F	5
Original Design										
Indexing Handle Mechanism change from bullet to ball bearing		X								
Digital operation counter added to BCR relay			X							
Suppression added to relay coils, BSR and EC changed from 6 pole to 8 pole				X						
Larger slot to case for ease of entry for cable looms during installation, Extra termate terminals added					X					
Robust Electromechanical counter added to replace digital counter (see 3B)						X				
Spill seal added to mitigate ingress of fluids, sander EMF blocking diode added							X			
Suppression added to H & J lines (TW23 &TW24) for back EMF protection from unsuppressed brake solenoid valves								X		
N/O contact added to brake relay (BSR) between brake relay (BSR) coil and sander brake follower relay (BRFR) coil									X	
Brake relay (BSR) N/O contact used for driving OTMR on Angel Trains only										X

Please note Brake Controller prior to Mod 4 cannot be upgraded

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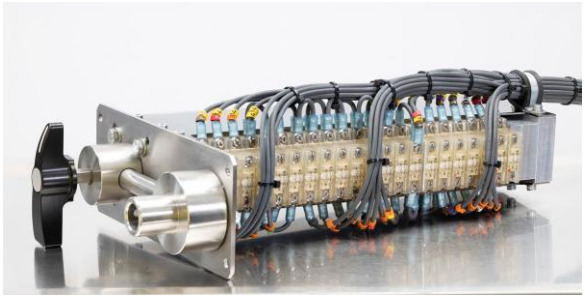
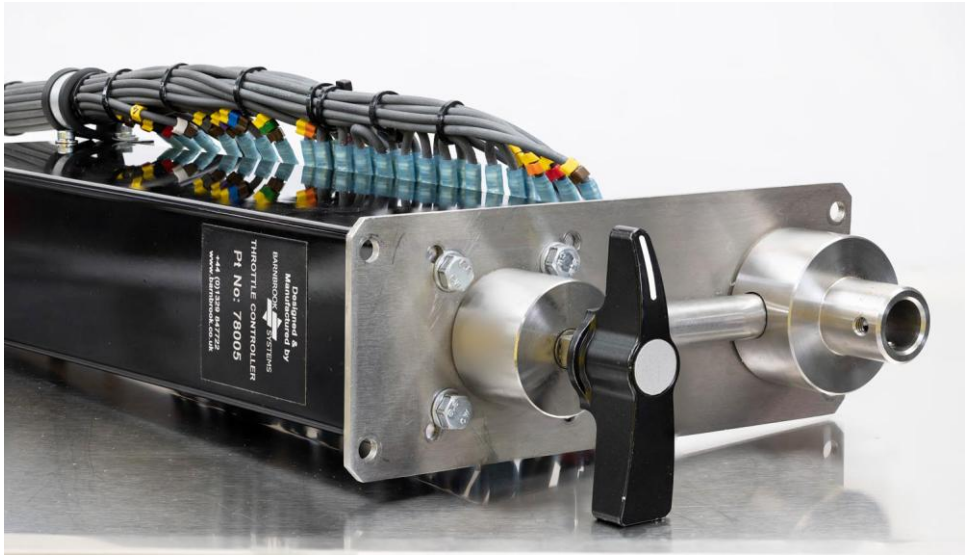
BARNBROOK DATA SHEET

DIRECTIONAL SWITCH 78005

KEY FEATURES

- Single Common Design as direct replacement
- Square shaft fitting and top entry fixing bolt for secured and correct fitment
- Harting connector for ease of fitment & removal
- Improved CAM assembly design for ensuring positive gated handle positions
- Stainless steel cam shaft for improved corrosion resistance
- Improved indexing mechanism for smooth positive handle operation
- Fully manufactured in our factory in Fareham, UK - **No obsolescence issues**
- Optional BlueCube Wireless Remote monitoring and diagnostics available





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Data Sheet No
DSDIRECTION-15X

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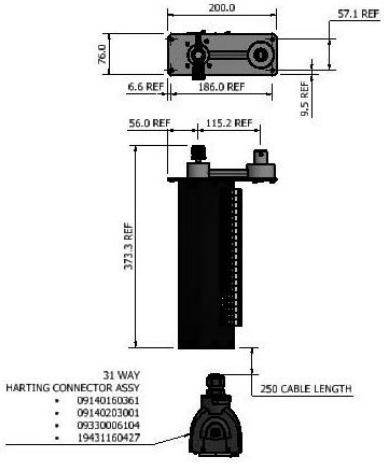
BARNBROOK DATA SHEET

DIRECTIONAL SWITCH 78005



Physical & Environmental Data:

- Flammability Rating to meet UL94 V2 minimum
- Weight: 18Kg approx.
- Service Life: 6 Years Max.
- Microswitches 500,000 electrical operations minimum (Mfg Spec)
- External Operational Temperature -10°C to +40°C
- External Operational Humidity 0% to 80% Relative Humidity
- IP Rating: BS EN 60529 IP X2

Performance Data:

The device shall satisfy the following performance requirements.

Requirements	Category	Value
Rated thermal current	-	16 Amps
Rated insulation voltage	-	690 Volts
Operational voltage	-	24 Volts DC
Rated short time withstand current	< 1.0 sec	400 Amps
	< 0.25 sec	800 Amps
Operational performance	-	100,000 ODS
Connection capacity	-	Harting connector

Requirements	
Method of operation	Dependent manual operation
Switch position r4 om	Off - Forward - Neutral - Reverse <*Off* being at 9 o'clock)
Mounting	Panel mounting with 4 off M5 fixings
Operating□ temperature	-25°c to +65°c

Additional railway specification requirements are given below:

- GM/RT 2130 Vehicle Fire Safety and Evacuation
- GE/RT 8015 Electromagnetic Compatibly between Railway Infrastructure and Trains
- BS EN 60077 Part 1 and Part 2 Railway applications - Electric equipment for rolling stock -
- General rules
- BS EN 61373 Railway application - Rolling stock equipment - Shock and vibration tests
- BS EN 50121-3-2 Railway application - Electromagnetic compatibility
- BS EN 45545-2 Railway application - Fire behaviour of materials and components
- BS EN 50153 Railway application - Rolling stock - Protective provisions relating to
- electrical hazards
- BS EN 50125-1 Railway application - Environmental conditions for equipment. Rolling stock and on-board equipment
- BS EN 50124-1 Railway application - Insulation coordination

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DSDIRECTION-15X

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Section 14

NATO STOCK NUMBERS

BARNBROOK

PRODUCT LIST
RELAYS, CIRCUIT BREAKERS, SOCKET ASSYS
(NATO STOCK CODED)

PART NUMBER	DESCRIPTION	NATO STOCK NO.	ALT. NATO STOCK NO.
407/1/90631	TRANSFORMER PULSE	5950-99-520-9516	
407/1/90663	TRANSFORMER PULSE	5950-99-520-9528	
CP137009/15	SOCKET ASSY	5935-99-195-3287	
507/1/00349/014	SOCKET ASSY	5935-99-195-4532	
507/1/10454/001	SOCKET ASSY	5935-99-222-0152	
507/1/02121	SOCKET & CLIP ASSY	5935-99-223-8376	
507/1/02844/001	SOCKET ASSY	5935-99-522-4599	
507/1/10454	SOCKET	5935-99-915-0990	
507/4/10908	SOCKET ASSY	5945-99-636-0669	
507/1/01223	SOCKET ASSY	5945-99-619-8750	
507/1/01221	RELAY TYPE A	5945-99-625-2956	
507/1/01231	RELAY TYPE A	5945-99-193-5840	
7CZ97225/4	RELAY TYPE A	5945-99-519-3514	
7CZ97508/1	RELAY TYPE A	5945-99-999-4741	
7CZ102260/3	RELAY TYPE A	5945-99-631-1426	
7CZ106545	RELAY TYPE A	5945-99-580-1920	
7CZ107352	RELAY TYPE A	5945-99-440-0719	
7CZ105834	RELAY TYPE B	5945-99-104-5086	
507/1/00035	RELAY TYPE B	5945-99-440-0720	
507/1/00036	RELAY TYPE B	5945-99-440-0721	
507/1/00999	RELAY TYPE B	5945-99-821-0672	
507/1/02440/001	RELAY TYPE 1A	5945-99-539-7784	5945-99-011-4685
507/1/02440/003	RELAY TYPE 1A	5945-99-539-7793	5945-99-014-2764
507/1/02440/004	RELAY TYPE 1A	5945-99-539-7789	5945-99-014-2761
507/1/02440/007	RELAY TYPE 1A	5945-99-539-7795	5945-99-014-2766
507/1/02440/009	RELAY TYPE 1A	5945-99-539-7798	5945-99-014-2769
507/1/02440/013	RELAY TYPE 1A	5945-99-539-7785	5945-99-011-4686
507/1/02440/014	RELAY TYPE 1A	5945-99-539-7786	5945-99-011-4687
507/1102440/015	RELAY TYPE 1A	5945-99-539-7787	5945-99-011-4688
507/1/02440/016	RELAY TYPE 1A	5945-99-539-7788	5945-99-011-4689
507/1/02440/021	RELAY TYPE 1A		5945-99-104-7028
507/1/02440/022	RELAY TYPE 1A	5945-99-539-7797	5945-99-014-2768
507/1/02440/026	RELAY TYPE 1A	5945-99-541-7789	5945-99-014-2760
507/1/024971017	RELAY TYPE 1A	5945-99-954-6024	
507/1/02498/014	RELAY TYPE 1A	5945-99-620-7611	
507/1/02518/001	RELAY TYPE 2	5945-99-539-7690	
507/1/02518/002	RELAY TYPE 2	5945-99-539-7691	
507/1/02518/003	RELAY TYPE 2	5945-99-539-7692	
507/1/02518/004	RELAY TYPE 2	5945-99-539-7693	
507/1/02518/005	RELAY TYPE 2	5945-99-539-7694	5945-99-011-9140
507/1/02518/006	RELAY TYPE 2	5945-99-539-7695	
507/1/02520/003	RELAY TYPE 2	5945-99-539-7709	5945-99-011-9155
507/1102520/004	RELAY TYPE 2	5945-99-539-7710	5945-99-011-9156

BARNBROOK

PRODUCT LIST
RELAYS, CIRCUIT BREAKERS, SOCKET ASSYS
(NATO STOCK CODED)

PART NUMBER	DESCRIPTION	NATO STOCK NO.	ALT. NATO STOCK No.
507/1/02521/001	RELAY TYPE 2	5945-99-539-7696	5945-99-011-9142
507/1/02521/002	RELAY TYPE 2	5945-99-539-7697	5945-99-011-9143
507/1/02521/003	RELAY TYPE 2	5945-99-539-7698	5945-99-011-9144
507/1/02521/004	RELAY TYPE 2	5945-99-539-7699	5945-99-011-9145
507/1/02521/006	RELAY TYPE 2	5945-99-539-7701	5945-99-011-9147
507/1/02521/008	RELAY TYPE 2		5945-99-580-9632
507/1/02521/011	RELAY TYPE 2	5945-99-539-7700	5945-99-012-0306
507/1/02525/001	RELAY TYPE 2	5945-99-539-7702	
507/1/02525/002	RELAY TYPE 2	5945-99-539-7703	
507/1/02525/003	RELAY TYPE 2	5945-99-539-7704	5945-99-011-9150
507/1/02525/004	RELAY TYPE 2	5945-99-539-7705	5945-99-011-9151
507/1/02525/006	RELAY TYPE 2	5945-99-539-7707	
507/1/02525/007	RELAY TYPE 2	5945-99-539-7706	5945-99-012-0307
507/1/02529/001	RELAY TYPE 2	5945-99-539-7712	5945-99-011-9158
507/1/02529/002	RELAY TYPE 2	5945-99-539-7713	5945-99-011-9159
507/1/02529/003	RELAY TYPE 2	5945-99-539-7714	5945-99-011-9158
507/1/02529/004	RELAY TYPE 2	5945-99-539-7715	5945-99-011-9161
507/1/02529/005	RELAY TYPE 2	5945-99-539-7716	5945-99-011-9162
507/1/02529/006	RELAY TYPE 2	5945-99-539-7717	5945-99-011-9163
507/1/02530/001	RELAY TYPE 2	5945-99-539-7718	5945-99-011-9164
507/1/02530/002	RELAY TYPE 2	5945-99-539-7719	5945-99-011-9165
507/1/02530/003	RELAY TYPE 2	5945-99-539-7720	5945-99-011-9166
507/1/02530/004	RELAY TYPE 2	5945-99-539-7721	5945-99-011-9167
507/1/02530/005	RELAY TYPE 2	5945-99-539-7722	5945-99-011-9168
507/1/02530/006	RELAY TYPE 2	5945-99-539-7723	5945-99-011-9169
507/1/02530/008	RELAY TYPE 2		5945-99-519-8106
507/1/02531/001	RELAY TYPE 2	5945-99-539-7724	5945-99-011-9170
507/1/02531/002	RELAY TYPE 2	5945-99-539-7725	5945-99-011-9171
507/1/02531/003	RELAY TYPE 2	5945-99-539-7726	5945-99-011-9172
507/1/02531/004	RELAY TYPE 2	5945-99-539-7727	5945-99-011-9173
507/1/02531/006	RELAY TYPE 2	5945-99-539-7729	5945-99-011-9175
507/1/02531/008	RELAY TYPE 2	5945-99-539-7728	5945-99-012-0308
507/1/02532/004	RELAY TYPE 2	5945-99-192-9366	5945-99-911-4079
507/1/02534/001	RELAY TYPE 2	5945-99-012-7155	5945-99-932-0971
507/1/02534/004	RELAY TYPE 2	5945-99-970-2796	
507/1/02534/006	RELAY TYPE 2	5945-99-952-0185	
507/1/02534/008	RELAY TYPE 2	5945-99-950-4667	
507/1/02535/001	RELAY TYPE 2	5945-99-539-7730	5945-99-011-9179
507/1/02535/002	RELAY TYPE 2	5945-99-539-7731	5945-99-011-9180
507/1/02535/004	RELAY TYPE 2	5945-99-539-7733	5945-99-011-9179
507/1/02535/003	RELAY TYPE 2	5945-99-539-7732	
507/1/02535/004	RELAY TYPE 2	5945-99-539-7733	5945-99-011-9179
507/1/02535/006	RELAY TYPE 2	5945-99-539-7735	5945-99-011-9181

BARNBROOK

PRODUCT LIST
RELAYS, CIRCUIT BREAKERS, SOCKET ASSYS
(NATO STOCK CODED)

PART NUMBER	DESCRIPTION	NATO STOCK NO.	ALT. NATO STOCK NO.
507/1/02535/007	RELAY TYPE 2	5945-99-539-7734	
507/1/02536/001	RELAY TYPE 2	5945-99-539-7736	
507/1/02536/002	RELAY TYPE 2	5945-99-539-7737	5945-99-011-9183
507/1/02536/003	RELAY TYPE 2	5945-99-539-7738	5945-99-011-9184
507/1/02536/004	RELAY TYPE 2	5945-99-539-7739	
507/1/02536/006	RELAY TYPE 2	5945-99-539-7741	5945-99-011-9187
507/1/02536/007	RELAY TYPE 2	5945-99-539-7740	5945-99-012-0310
507/1/02537/001	RELAY TYPE 2	5945-99-539-7742	5945-99-011-9190
507/1/02537/003	RELAY TYPE 2	5945-99-539-7744	
507/1/02537/004	RELAY TYPE 2	5945-99-539-7745	
507/1/02537/005	RELAY TYPE 2	5945-99-539-7746	
507/1/02537/006	RELAY TYPE 2	5945-99-539-7747	
507/1/02542/008	RELAY TYPE 2	5945-99-223-8620	
507/1/09426/004	RELAY TYPE 2	5945-99-223-3484	
507/1/09441/004	RELAY TYPE 2	5945-99-524-3731	
507/1/09442/004	RELAY TYPE 2	5945-99-532-8021	
507/1/02883/004	RELAY TYPE 3	5945-99-911-4074	
507/1/02883/012	RELAY TYPE 3	5945-99-412-8170	
507/1/02886/004	RELAY TYPE 3	5945-99-972-4085	
507/1/00140/002	RELAY TYPE P		
507/1/00330/002	RELAY TYPE P	5945-99-440-0722	
507/1/00360	RELAY TYPE P	5945-99-440-0501	
507/1/00390	RELAY TYPE P	5945-99-194-1283	
507/1/00517/002	RELAY TYPE P	5945-99-440-0551	
507/1/00850	RELAY TYPE P	5945-99-434-1932	
507/1/00920	RELAY TYPE P	5945-99-625-2957	
507/1/01225	RELAY TYPE P	5945-99-612-0500	
7CZ107791	RELAY TYPE S	5930-99-440-0251	
7CZ107792	RELAY TYPE S	5945-99-924-9550	
7CZ105648/1	RELAY TYPE S	5945-99-971-2288	
7CZ105648/2	RELAY TYPE S	5930-99-620-3849	
7CZ105649/2	RELAY TYPE S	5945-99-103-5025	
7CZ107151/1	RELAY TYPE S	5945-99-440-0457	
7CZ107152/2	RELAY TYPE S	5945-99-622-1576	5945-99-437-5178
507/1/02284/031	RELAY TYPE CA	5945-99-541-2035	5945-99-011-9878
507/1/02284/032	RELAY TYPE CA	5945-99-541-2036	5945-99-011-9879
507/1/02284/033	RELAY TYPE CA	5945-99-541-2037	5945-99-011-9880
507/1/02284/034	RELAY TYPE CA	5945-99-541-2038	5945-99-011-9881
507/1/02284/035	RELAY TYPE CA	5945-99-541-2039	5945-99-011-9882
507/1/02284/070	RELAY TYPE CA		5945-99-115-5141
507/1/02285/001	RELAY TYPE CA		5945-99-053-0455
507/1/02285/002	RELAY TYPE CA		5945-99-053-0456
507/1102285/003	RELAY TYPE CA		5945-99-053-0457

BARNBROOK

PRODUCT LIST
RELAYS, CIRCUIT BREAKERS, SOCKET ASSYS
(NATO STOCK CODED)

PART NUMBER	DESCRIPTION	NATO STOCK NO.	ALT. NATO STOCK NO.
507/1/02285/004	RELAY TYPE CA		5945-99-053-0458
507/1/02285/005	RELAY TYPE CA		5945-99-053-0459
507/1/02298/001	RELAY TYPE CA		5945-99-053-0465
507/1/02298/002	RELAY TYPE CA		5945-99-053-0466
507/1/02298/003	RELAY TYPE CA		5945-99-053-0467
507/1/02298/004	RELAY TYPE CA		5945-99-053-0468
507/1/02298/005	RELAY TYPE CA		5945-99-053-0469
507/1/02315/005	RELAY TYPE CA		5945-99-520-1811
507/1/02881/011	RELAY TYPE CA	5945-99-541-2045	5945-99-011-9883
507/1/02881/012	RELAY TYPE CA	5945-99-541-2046	5945-99-011-9884
507/1/02881/013	RELAY TYPE CA	5945-99-541-2047	5945-99-011-9885
507/1/02881/014	RELAY TYPE CA	5945-99-541-2048	5945-99-011-9886
507/1/02881/015	RELAY TYPE CA	5945-99-541-2049	5945-99-011-9887
507/1/02882/002	RELAY TYPE CA	5945-99-541-2041	5945-99-053-0471
507/1/02882/003	RELAY TYPE CA	5045-99-541-2042	5945-99-053-0472
507/1/02882/004	RELAY TYPE CA	5945-99-541-2043	5945-99-053-0473
507/1/02882/005	RELAY TYPE CA	5945-99-541-2044	5945-99-053-0474
507/1/02882/023	RELAY TYPE CA		5945-99-520-6876
507/1/00093	RELAY TYPE CB		5945-99-412-8087
507/1/02291/001	RELAY TYPE CB	5945-99-541-2074	5945-99-012-3886
507/1/02291/002	RELAY TYPE CB	5945-99-541-2075	5945-99-012-3887
507/1/02291/003	RELAY TYPE CB	5945-99-541-2076	5945-99-012-3888
507/1/02291/004	RELAY TYPE CB	5945-99-541-2077	5945-99-012-3889
507/1/02291/005	RELAY TYPE CB	5945-99-541-2078	5945-99-012-3890
507/1/02291/006	RELAY TYPE CB	5945-99-541-2084	5945-99-012-3896
507/1/02291/007	RELAY TYPE CB	5945-99-541-2085	5945-99-012-3897
507/1/02291/008	RELAY TYPE CB	5945-99-541-2086	5945-99-012-3898
507/1/02291/009	RELAY TYPE CB	5945-99-541-2087	5945-99-012-3899
507/1/02291/010	RELAY TYPE CB	5945-99-541-2088	5945-99-012-3968
507/1/02291/011	RELAY TYPE CB	5945-99-541-2089	5945-99-012-3969
507/1/02291/012	RELAY TYPE CB	5945-99-541-2090	5945-99-012-3970
507/1/02291/013	RELAY TYPE CB	5945-99-541-2080	5945-99-012-3892
507/1/02291/014	RELAY TYPE CB	5945-99-541-2081	5945-99-012-3893
507/1/02291/015	RELAY TYPE CB	5945-99-541-2082	5945-99-012-3894
507/1/02291/016	RELAY TYPE CB	5945-99-541-2083	5945-99-012-3895
507/1/02291/019	RELAY TYPE CB	5945-99-541-2089	5945-99-012-3971
507/1/02291/020	RELAY TYPE CB	5945-99-541-2090	5945-99-012-3972
507/1/02291/021	RELAY TYPE CB	5945-99-519-9902	
507/1/02291/029	RELAY TYPE CB	5945-99-954-6947	
507/1/02291/131	RELAY TYPE CB	5945-99-620-0679	
507/1/02293/016	RELAY TYPE CB	5945-99-012-4629	
507/1/02316/015	RELAY TYPE CA	5945-99-924-8900	
507/1/02326/001	RELAY TYPE CB	5945-99-541-2062	5945-99-012-3874

BARNBROOK

PRODUCT LIST
RELAYS, CIRCUIT BREAKERS, SOCKET ASSYS
(NATO STOCK CODED)

PART NUMBER	DESCRIPTION	NATO STOCK NO.	ALT. NATO STOCK NO.
507/1/02326/002	RELAY TYPE CB	5945-99-541-2063	5945-99-012-3875
507/1/02326/003	RELAY TYPE CB	5945-99-541-2064	5945-99-012-3876
507/1/02326/004	RELAY TYPE CB	5945-99-541-2065	5945-99-012-3877
507/1/02326/005	RELAY TYPE CB	5945-99-541-2066	5945-99-012-3878
507/1/02326/016	RELAY TYPE CB	5945-99-541-2056	5945-99-012-3868
507/1/02326/017	RELAY TYPE CB	5945-99-541-2057	5945-99-012-3869
507/1/02326/018	RELAY TYPE CB	5945-99-541-2058	5945-99-012-3870
507/1/02326/019	RELAY TYPE CB	5945-99-541-2059	5945-99-012-3871
507/1/02326/020	RELAY TYPE CB	5945-99-541-2060	5945-99-012-3872
507/1/02326/021	RELAY TYPE CB	5945-99-541-2061	5945-99-012-3873
507/1/02326/033	RELAY TYPE CB	5945-99-541-2067	5945-99-012-3879
507/1/02326/034	RELAY TYPE CB	5945-99-541-2068	5945-99-012-3880
507/1/02326/035	RELAY TYPE CB	5945-99-541-2069	5945-99-012-3881
507/1/02326/036	RELAY TYPE CB	5945-99-541-2070	5945-99-012-3882
507/1/02326/037	RELAY TYPE CB	5945-99-541-2071	5945-99-012-3883
507/1/02326/040	RELAY TYPE CB	5945-99-541-2072	5945-99-012-3884
507/1/02326/041	RELAY TYPE CB	5945-99-541-2073	5945-99-012-3885
507/1/02326/097	RELAY TYPE CB	5945-99-541-2050	5945-99-012-3862
507/1/02326/098	RELAY TYPE CB	5945-99-541-2051	5945-99-012-3863
507/1/02326/099	RELAY TYPE CB	5945-99-541-2052	5945-99-012-3864
507/1/02326/100	RELAY TYPE CB	5945-99-541-2053	5945-99-012-3865
507/1/02326/101	RELAY TYPE CB	5945-99-541-2054	5945-99-012-3866
507/1/02326/102	RELAY TYPE CB	5945-99-541-2055	5945-99-012-3867
507/1/02326/120	RELAY TYPE CB	5945-99-952-0763	
507/1/02870/004	RELAY TYPE CB	5945-99-914-0250	
507/1/02878/004	RELAY TYPE CB	5945-99-914-0270	
507/1/09672/009	RELAY TYPE CB	5945-99-635-6112	
507/1/09682/004	RELAY TYPE CB	5945-99-901-0449	5945-99-195-1174
507/1/09682/004	RELAY TYPE CB	5945-99-195-1174	5945-99-901-0449
507/1/02185/003	RELAY TYPE CC	5945-99-956-2139	
507/1/02185/004	RELAY TYPE CC	5945-99-970-8547	
507/1/02185/005	RELAY TYPE CC	5945-99-970-0600	
507/1/02248/004	RELAY TYPE CC	5945-99-949-6467	
507/1/02248/009	RELAY TYPE CC	5945-99-114-2643	
507/1/02248/014	RELAY TYPE CC	5945-99-580-2341	
507/1/02248/044	RELAY TYPE CC	5945-99-580-2343	
507/1/09750	RELAY TYPE CC	5945-99-932-6248	
507/1/10922/003	RELAY TYPE CS	5945-99-630-8463	
507/1/10923/003	RELAY TYPE CS	5945-99-527-9838	
507/1/10925/003	RELAY TYPE CS	5945-99-642-2129	
507/1/10925/002	RELAY TYPE CS	5945-99-797-8090	
507/1/09279/305	RELAY TYPE GP	5945-99-539-7748	5945-99-011-9889
507/1/09279/330	RELAY TYPE GP	5945-99-539-7752	5945-99-011-9893

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PRODUCT LIST
RELAYS, CIRCUIT BREAKERS, SOCKET ASSYS
(NATO STOCK CODED)

PART NUMBER	DESCRIPTION	NATO STOCK NO.	ALT. NATO STOCK NO.
507/1/09280/329	RELAY TYPE GP	5945-99-539-7756	5945-99-011-9899
507/1/09281/322	RELAY TYPE GP	5945-99-539-7763	5945-99-011-9904
507/1/09281/327	RELAY TYPE GP	5945-99-539-7764	5945-99-011-9905
507/1/09281/313	RELAY TYPE GP	5945-99-539-7762	5945-99-011-9903
507/1/09282/113	RELAY TYPE GP		5945-99-620-0662
507/1/09282/120	RELAY TYPE GP	5945-99-954-0415	5945-99-952-2518
507/1/09288/314	RELAY TYPE GP	5945~99-539-7780	5945-99-011-9921
507/1/09289/003	RELAY TYPE GP	5945-99-901-4385	
507/1/09289/004	RELAY TYPE GP	5945-99-439-5902	
507/1/09289/007	RELAY TYPE GP	5945-99-953-7543	
507/1/09289/008	RELAY TYPE GP	5945-99-911-4073	
507/1/09306/326	RELAY TYPE GP	5945-99-106-1702	
507/1/09308/307	RELAY TYPE GP	5945-99-012-0013	
507/1/09310/306	RELAY TYPE GP	5945-99-012-0019	
507/1/09311/306	RELAY TYPE GP	5945-99-954-1344	
507/1/09320/008	RELAY TYPE GP	5945-99-970-0617	
507/1/09320/005	RELAY TYPE GP	5945-99-970-0618	
507/1/09320/003	RELAY TYPE GP	5945-99-972-5480	
507/1/09320/011	RELAY TYPE GP	5945-99-901-0387	
507/1/10692/117	RELAY TYPE CN	5945-99-014-2585	
7CZ106664/5B	CIRCUIT BREAKER	5925-99-103-2891	FV394851
7CZ106664/7B	CIRCUIT BREAKER	5925-99-214-2473	FV394852
7CZ106664/10B	CIRCUIT BREAKER	5925-99-103-2892	FV394853
7CZ106664/15B	CIRCUIT BREAKER	5925-99-103-2893	FV394854
7CZ106664/20B	CIRCUIT BREAKER	5925-99-103-2894	FV394855
7CZ106664/25B	CIRCUIT BREAKER	5925-99-105-3145	FV394856
7CZ106664/35B	CIRCUIT BREAKER	5925-99-103-2889	FV394857
7CZ106664/50B	CIRCUIT BREAKER	5925-99-001-5371	FV394858

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PRODUCT LIST
HARDWARE
(NATO STOCK CODED)

PART NUMBER	DESCRIPTION	NATO STOCK NO.
418/1/05000/001	LENS INDICATOR ASSY. COLOURLESS CLEAR	6210-99-012-7426
418/1/05000/011	LENS INDICATOR ASSY. COLOURLESS FROSTED	6210-99-012-7427
418/1/05000/012	LENS INDICATOR ASSY. GREEN FROSTED	6210-99-012-7421
418/1/05000/013	LENS INDICATOR ASSY. RED FROSTED	6210-99-012-7423
418/1/05000/017	LENS INDICATOR ASSY. YELLOW FROSTED	6210-99-012-7422
418/1/05000/018	LENS INDICATOR ASSY. ORANGE FROSTED	6210-99-012-7425
418/1/05003	LENS INDICATOR LIGHT	6210-99-580-0610
418/1/05021/001	LAMPHOLDER M10	
418/1/05021/002	LAMPHOLDER M10R	
418/1/05021/007	LAMPHOLDER M10 CRYSTAL	
418/1/05022	LIGHT INDICATOR M10	6210-99-527~8775
418/1/05025	LIGHT INDICATOR ASSY. M10	
418/1/05037/006	LENS ASSY. BLUE CLEAR	
418/1/05037/011	LENS & BEZEL CLEAR	6210-99-012-2899
418/1/05037/012	LENS & BEZEL RED	6210-99-012-2893
418/1/05037/013	LENS & BEZEL GREEN	6210-99-012-2895
418/1/05037/016	LENS & BEZEL BLUE FROSTED	
418/1/05037/017	LENS & BEZEL YELLOW	6210-99-012-2894
418/1/05037/018	LENS & BEZEL ORANGE	6210-99-012-2897
418/1/05503	SEALED LAMPHOLDER ASSY.	6210-99-011-9194
418/1/05507	CONTACT & BODY ASSY.	6210-99-012-0913
418/1/05507/003	CONTACT & BODY ASSY.	
418/1/05507/004	CONTACT & BODY ASSY.	6250-99-661-5553
418/1/05508/001	LAMP COVER ASSY. RED	6210-99-943-4173
418/1/05508/002	LAMP COVER ASSY. AMBER	6210-99-943-7804
418/1/05508/003	LAMP COVER ASSY. GREEN	6210-99-943-7808
418/1/05510/001	SHUTTER BODY LENS CA	6210-99-012~0914
418/1/05510/002	SHUTTER BODY LENS CA	6210-99-012-0916
418/1/05521/001	LENS ASSY. GREEN	6210-99-527-8776
418/1/05521/002	LENS ASSY. RED	6210-99-633-0917
418/1/05521/003	LENS ASSY. YELLOW	6210-99-527-8777
418/1/05521/004	LENS ASSY. BLUE	
418/1/05521/005	LENS ASSY. CLEAR	6210-99-531~3698
418/1/05521/006	LENS ASSY. ORANGE	
418/1/05521/007	LENS ASSY. CRYSTAL FR	
418/1/07505	MOUNTING ASSY.	5355-99-097-0183
418/1/08007	KNOB ASSY. FINGER ADJ.	5355~99-097-8696
418/1/08010	COLLET ASSY.	5355-99-942-8697
418/1/08011	KNOB COLLET ASSY. ADJ.	5355-99-097-8698
418/2/06603	TOOL - LAMP REMOVAL	
418/2/09018	KNOB FINGER	5355-99-942-8677
418/2/09022	KNOB	5355-99-942-8690
418/2/09024	KNOB	5355-99-942-8667
418/2/09026	KNOB MOULDED	5355-99-942~8685
418/2/09027	KNOB	5355-99-942-8683
418/2/09044	KNOB ADJ.	5355-99-097-0185
418/2/09046	CAP - RETAINING	5355-99-097-0184

All NSN For
NCAGE K1316 - Deutsch Limited
With Relay in the Description

NSN	Part No.	Description
	HDS8H2L07	RELAY, SPECIAL
	HDS19S-F1-P60	RELAY, ELECTROMAGNET
	HDD1-05-03-11	RELAY, ELECTROMAGNET
	HDD1 H-F2-D09	RELAY, ELECTROMAGNET
	HDS5S-F2-K24	RELAY, ELECTROMAGNET
	HDD4-02-04-05-11	RELAY, ELECTROMAGNET
	HDD4H-F2-H03	RELAY, ELECTROMAGNET
	HDD4HF2H07	RELAY, ELECTROMAGNET
	HDD4S-F2-H03	RELAY, ELECTROMAGNET
	HDS6SF2K23	RELAY, ELECTROMAGNET
	LFSTR	RELAY, ELECTROMAGNET
	LFSTR47/D/1/M/U	RELAY, ELECTROMAGNET
	HDS10DF1	RELAY, ELECTROMAGNET
	HDS10DF1-38MMLEADS	RELAY, ELECTROMAGNET
	HDD1 HE2E03	RELAY, ELECTROMAGNET
	XA 1-02-2400	RELAY, ELECTROMAGNET
	HDD4SC2H19	RELAY, ELECTROMAGNET
	NF 8208 KOO	RELAY, ELECTROMAGNET
	X2588417 ITEM 15	RELAY, ELECTROMAGNET
	X2588417/15	RELAY, ELECTROMAGNET
	HDD4H-C2-H07	RELAY, ELECTROMAGNET
	HDS5SJ2K28	RELAY, ELECTROMAGNET
	HDS8HF3J02	RELAY, ELECTROMAGNET
	HDS5S-F2-K22	RELAY, ELECTROMAGNET
	HEWI1 UJL91450301-1 OL	RELAY, ELECTROMAGNET
	X2588417 ITEM 14	RELAY, ELECTROMAGNET
	X2588417/14	RELAY, ELECTROMAGNET
	HDS5H-F2-K34	RELAY, ELECTROMAGNET
	HDS5S-C2-K25	RELAY, ELECTROMAGNET
	HDS5SC2K25	RELAY, ELECTROMAGNET
	HDD1HF2E19	RELAY, ELECTROMAGNET
	EBRM55211TOO	RELAY, ELECTROMAGNET
	HGRM55211TOO	RELAY, ELECTROMAGNET
	HGRM55211 TOO	RELAY, ELECTROMAGNET
	HDS5-02.08.01.12	RELAY, ELECTROMAGNET
	HDS12HNAB61	RELAY, ELECTROMAGNET
	HDS5SG2K21	RELAY, ELECTROMAGNET
	HDS10DJ1	RELAY, ELECTROMAGNET
	HDS5-01-08-05-11	RELAY, ELECTROMAGNET
	HDS10E1	RELAY, ELECTROMAGNET
	9006	RETAINER, RELAY SOCKET
	RROO 9006 00	RETAINER, RELAY SOCKET.
	RL7641G78	RELAY, ELECTROMAGNET
5935-99-199-4658	19775	SOCKET, RELAY

NSN	Part No.	Description
5935-99-620-8267	419911	SOCKET, RELAY
5935-99-626-4181	H7143D420204	SOCKET, RELAY
5935-99-638-6462	423175-1	SOCKET, RELAY
5935-99-715-6722	607-14184	SOCKET, RELAY
5935-99-913-8595	607-9006	RETAINER, RELAY SOCKET
5945-00-005-9713	HDS6SF2K21	RELAY, SPECIAL
5945-00-005-9718	HDS8SF3J01	RELAY, SPECIAL
5945-00-005-9719	HDS6SF2K25	RELAY, SPECIAL
5945-00-006-3925	HDS8HF1-L07	RELAY, SPECIAL
5945-00-008-0945	HDD1SF2E03	RELAY, SPECIAL
5945-00-008-1083	HDD4SE2H03	RELAY, SPECIAL
5945-00-290-5891	MDD4HF2H07	RELAY, SPECIAL
5945-00-321-6847	HDD1SF2E54	RELAY, ELECTROMAGNET
5945-00-422-0816	HDS9HF1M10	RELAY, ELECTROMAGNET
5945-00-422-0866	HDS65F2K21	RELAY, ELECTROMAGNET
5945-00-431-8304	HDD1 LE2D13	RELAY, ELECTROMAGNET
5945-00-471-7028	HDD4SF2H03	RELAY, ELECTROMAGNET
5945-01-011-3328	HDS6-S-E2-K33	RELAY, ELECTROMAGNET
5945-01-080-6640	HDS5DF2K21	RELAY, ELECTROMAGNET
5945-01-080-6641	HDS5HF2K22	RELAY, ELECTROMAGNET
5945-01-305-7174	HDS5SM2K21I.P	RELAY, ELECTROMAGNET
5945-01-345-1827	HDS19	RELAY, ELECTROMAGNET
5945-99-014-1430	HDD1	RELAY, ELECTROMAGNET
5945-99-014-2585	HDS5SE2K22	RELAY, ELECTROMAGNET
5945-99-015-2150	HDS5-02-05-05-11	RELAY, ELECTROMAGNET
5945-99-015-2970	XA2412400	RELAY, ELECTROMAGNET
5945-99-015-4256	XA1222400	RELAY, ELECTROMAGNET
5945-99-015-4714	HDD1-02-01-11	RELAY
5945-99-015-4715	HDD1-02-03-11	RELAY
5945-99-015-4716	HDD1-02-05-11	RELAY
5945-99-015-4717	HDD1-03-01-11	RELAY
5945-99-015-4723	HDD1-03-03-11	RELAY
5945-99-015-4725	HDD1-05-01-11	RELAY
5945-99-015-4726	BS9151-F0029-05-03-11	RELAY, ELECTROMAGNET
5945-99-015-4732	HDD1-05-05-11	RELAY, ELECTROMAGNET
5945-99-015-4733	HDD1-07-01-11	RELAY
5945-99-015-4734	HDD1-07-03-11	RELAY
5945-99-015-4735	HDD1-07-05-11	RELAY
5945-99-015-4741	HDD1-02-01-13	RELAY
5945-99-015-4742	HDD1-02-03-13	RELAY
5945-99-015-4743	HDD1A-C2-E03	RELAY, ELECTROMAGNET
5945-99-015-4744	HDD1-03-01-13	RELAY
5945-99-015-4750	HDD1-03-03-13	RELAY
5945-99-015-4752	HDD1-05-01-13	RELAY
5945-99-015-4753	HDD1-05-03-13	RELAY
5945-99-015-4759	HDD1-05-05-13	RELAY, ELECTROMAGNET
5945-99-015-4760	HDD1-07-01-13	RELAY
5945-99-015-4761	HDD1-07-03-13	RELAY
5945-99-015-4762	HDD1-07 -05-13	RELAY, ELECTROMAGNET
5945-99-017-2869	HF F007-02-09-01-12-24V	RELAY, ELECTROMAGNET
5945-99-027-0658	HDD4L-F2-H33	RELAY, ELECTROMAGNET
5945-99-038-3907	BS9151 F0008-01-03-05-12	RELAY, ELECTROMAGNET
5945-99-038-5277	HDS5-02-06-02-11	RELAY, ELECTROMAGNET
5945-99-038-5279	HDS5-02-08-02-12	RELAY, ELECTROMAGNET

NSN	Part No.	Description
5945-99-038-5280	HDS5-02-08-04-11	RELAY, ELECTROMAGNET
5945-99-038-5281	HDS5-02-08-04-12	RELAY, ELECTROMAGNET
5945-99-038-5285	HDS5-02-08-08-12	RELAY, ELECTROMAGNET
5945-99-038-5287	HDS5-02-09-02-12	RELAY, ELECTROMAGNET
5945-99-038-5288	HDS5-02-09-04-12	RELAY, ELECTROMAGNET
5945-99-038-5299	HDD1-02-05-12	RELAY, ELECTROMAGNET
5945-99-038-5300	HDD1-03-07-11	RELAY, ELECTROMAGNET
5945-99-038-5301	HDD1-03-01-12	RELAY, ELECTROMAGNET
5945-99-038-5302	HDD1-03-04-12	RELAY, ELECTROMAGNET
5945-99-038-5303	HDD1-03-05-12	RELAY, ELECTROMAGNET
5945-99-038-5304	HDD1-03-06-12	RELAY, ELECTROMAGNET
5945-99-038-5305	HDD1-03-07-12	RELAY, ELECTROMAGNET
5945-99-038-5306	HDD1-04-04-12	RELAY, ELECTROMAGNET
5945-99-038-5307	HDD1-04-07-11	RELAY, ELECTROMAGNET
5945-99-038-5308	HDD1-04-09-11	RELAY, ELECTROMAGNET
5945-99-038-5309	HDD1-05-04-11	RELAY, ELECTROMAGNET
5945-99-038-5310	HDD1-05-07-11	RELAY, ELECTROMAGNET
5945-99-038-5311	HDD1-05-08-11	RELAY, ELECTROMAGNET
5945-99-038-5312	HDD1-05-01-12	RELAY, ELECTROMAGNET
5945-99-038-5313	HDD1-05-04-12	RELAY, ELECTROMAGNET
5945-99-038-5314	HDD1-05-05-12	RELAY, ELECTROMAGNET
5945-99-038-5315	HDD1-05-06-12	RELAY, ELECTROMAGNET
5945-99-038-5316	HDD1-05-07-12	RELAY, ELECTROMAGNET
5945-99-038-5317	HDD1-05-08-12	RELAY, ELECTROMAGNET
5945-99-038-5318	HDD1-05-10-12	RELAY, ELECTROMAGNET
5945-99-038-5319	HDD1-07-05-12	RELAY, ELECTROMAGNET
5945-99-038-5320	HDD1-07-06-12	RELAY, ELECTROMAGNET
5945-99-038-5330	HDD4-02-01-03-11	RELAY, ELECTROMAGNET
5945-99-038-5331	HDD4-02-01-05-11	RELAY, ELECTROMAGNET
5945-99-038-5332	HDD4-02-01-05-12	RELAY, ELECTROMAGNET
5945-99-038-5334	HDD4-02-02-03-11	RELAY, ELECTROMAGNET
5945-99-038-5336	HDD4-02-02-05-11	RELAY, ELECTROMAGNET
5945-99-038-5337	HDD4-02-02-05-12	RELAY, ELECTROMAGNET
5945-99-038-5338	HDD4-02-02-07-11	RELAY, ELECTROMAGNET
5945-99-038-5339	HDD4-02-03-07-12	RELAY, ELECTROMAGNET
5945-99-038-5340	HDD4-02-04-01-11	RELAY, ELECTROMAGNET
5945-99-038-5341	HDD4-02-04-03-11	RELAY, ELECTROMAGNET
5945-99-038-5342	HDD4-02-04-04-11	RELAY, ELECTROMAGNET
5945-99-038-5343	BS9151-F0030-02-04-05-1	RELAY, ELECTROMAGNET
5945-99-038-5344	HDD4-02-04-06-11	RELAY, ELECTROMAGNET
5945-99-038-5345	HDD4-02-04-07-11	RELAY, ELECTROMAGNET
5945-99-038-5346	HDD4-02-04-08-11	RELAY, ELECTROMAGNET
5945-99-038-5347	HDD4-02-04-09-11	RELAY, ELECTROMAGNET
5945-99-038-5348	HDD4-02-04-01-12	RELAY, ELECTROMAGNET
5945-99-038-5349	HDD4-02-04-Q4-12H	RELAY, ELECTROMAGNET
5945-99-038-5350	HDD4-02-04-05-12	RELAY, ELECTROMAGNET
5945-99-038-5351	HDD4-02-04-06-12	RELAY, ELECTROMAGNET
5945-99-038-5352	HDD4-02-04-07-12	RELAY, ELECTROMAGNET
5945-99-038-5353	HDD4-02-04-08-12	RELAY, ELECTROMAGNET
5945-99-038-5354	HDD4-02-04-09-12	RELAY, ELECTROMAGNET
5945-99-038-5355	HDD4-02-05-01-12	RELAY, ELECTROMAGNET
5945-99-038-5356	HDD4-02-05-06-11	RELAY, ELECTROMAGNET
5945-99-038-5357	HDD4-02-06-03-11	RELAY, ELECTROMAGNET
5945-99-038-5358	HDD4-02-06-05-11	RELAY, ELECTROMAGNET

NSN	Part No.	Description
5945-99-038-5359	HDD4-02-06-05-12	RELAY, ELECTROMAGNET
5945-99-038-5360	HDD4-02-04-07-13	RELAY, ELECTROMAGNET
5945-99-038-5891	F000701090511	RELAY, ELECTROMAGNET
5945-99-038-5925	01-10-03-11	RELAY, ELECTROMAGNET
5945-99-038-6119	HDD4-02-02-01-12	RELAY, ELECTROMAGNET
5945-99-038-6120	HDD4-02-02-10-11	RELAY, ELECTROMAGNET
5945-99-038-6121	HDD4-02-04-10-11	RELAY, ELECTROMAGNET
5945-99-038-6122	HDD4-02-01-01-12	RELAY, ELECTROMAGNET
5945-99-038-6123	HDD4-02-06-01-12	RELAY, ELECTROMAGNET
5945-99-038-7127	HDD4-01-01-01-12	RELAY, ELECTROMAGNET
5945-99-038-7128	HDD4-01-01-03-11	RELAY, ELECTROMAGNET
5945-99-038-7129	HDD4-01-01-05-11	RELAY, ELECTROMAGNET
5945-99-038-7130	HDD4-01-01-05-12	RELAY, ELECTROMAGNET
5945-99-038-7131	HDD4-01-02-01-12	RELAY, ELECTROMAGNET
5945-99-038-7132	HDD4-01-02-03-11	RELAY, ELECTROMAGNET
5945-99-038-7134	HDD4-01-02-05-12	RELAY, ELECTROMAGNET
5945-99-038-7135	HDD4-01-04-01-12	RELAY, ELECTROMAGNET
5945-99-038-7136	HDD4-01-04-03-11	RELAY, ELECTROMAGNET
5945-99-038-7137	HDD4-01-04-05-11	RELAY, ELECTROMAGNET
5945-99-038-7138	HDD4-01-04-05-12	RELAY, ELECTROMAGNET
5945-99-038-7139	HDD4-01-06-01-12	RELAY, ELECTROMAGNET
5945-99-038-7140	HDD4-01-06-03-11	RELAY, ELECTROMAGNET
5945-99-038-7141	HDD4-01-06-05-11	RELAY, ELECTROMAGNET
5945-99-038-7142	HDD4-01-06-05-12	RELAY, ELECTROMAGNET
5945-99-038-7156	BS9151F000801030316	RELAY, ELECTROMAGNET
5945-99-101-2560	420204	BASE, RELAY
5945-99-109-7118	BHDS6	RELAY, ELECTROMAGNET
5945-99-110-6279	HDD1 SF2E07	RELAY, ELECTROMAGNET
5945-99-110-6738	HDD4SF2H07	RELAY, ELECTROMAGNET
5945-99-110-7951	HDD4SM2H07	RELAY, ELECTROMAGNET
5945-99-111-3026	15060	RELAY, ELECTROMAGNET
5945-99-111-8519	HDS8HF2L07	RELAY, ELECTROMAGNET
5945-99-112-2257	HDD1 SE2E01	RELAY, ELECTROMAGNET
5945-99-112-6918	XA2292400	RELAY, ELECTROMAGNET
5945-99-112-7806	HDS6SF2K21	RELAY, ELECTROMAGNET
5945-99-113-1165	HDS6SF2K99	RELAY, ELECTROMAGNET
5945-99-113-7616	HDS5SJ2K21	RELAY, ELECTROMAGNET
5945-99-114-1007	HDS8HF2L03	RELAY, ELECTROMAGNET
5945-99-114-1008	HDS8HE2L03	RELAY, ELECTROMAGNET
5945-99-114-6163	HDS8HF3J03	RELAY, ELECTROMAGNET
5945-99-119-0203	HDS10D-F1	RELAY, ELECTROMAGNET
5945-99-119-3123	HDS8SF3J01	RELAY, ELECTROMAGNET
5945-99-119-4329	HDS6HJ2K22	RELAY, ELECTROMAGNET
5945-99-119-4640	HDS6HF2K25	RELAY, ELECTROMAGNET
5945-99-119-7335	HDS8SF2L02	RELAY, ELECTROMAGNET
5945-99-119-8233	HDS10DF1	RELAY, ELECTROMAGNET
5945-99-142-0461	HDD4HF2H14	RELAY, ELECTROMAGNET
5945-99-142-9243	HDS9HF1M10	RELAY, ELECTROMAGNET
5945-99-179-8644	RL 7632G1	RELAY, ELECTROMAGNET
5945-99-192-9252	HDD4SF2H13	RELAY, ELECTROMAGNET
5945-99-193-8674	HDS8SF2L03	RELAY, ELECTROMAGNET
5945-99-193-8675	HDS8SE2L03	RELAY, ELECTROMAGNET
5945-99-194-2711	HDD1 HF2D02	RELAY, ELECTROMAGNET
5945-99-194-3469	HDD1SF2E19	RELAY, ELECTROMAGNET

NSN	Part No.	Description
5945-99-194-6475	HDD4HE2H07	RELAY, ELECTROMAGNET
5945-99-195-3396	HDS6SF2K25	RELAY, ELECTROMAGNET
5945-99-195-3520	HDD1 HF2E03	RELAY, ELECTROMAGNET
5945-99-195-3522	HDD1-03-05-11	RELAY, ELECTROMAGNET
5945-99-198-7740	HDD1HF2E02	RELAY, ELECTROMAGNET
5945-99-198-7741	HDD4HF2H02	RELAY, ELECTROMAGNET
5945-99-199-2364	HDS6SF2K96	RELAY, ELECTROMAGNET
5945-99-199-6572	CF31924	RELAY, ARMATURE
5945-99-199-7012	HDD4L-F2-H03	RELAY, ELECTROMAGNET
5945-99-199-7027	HDS6SF2K22	RELAY
5945-99-219-1485	HDS15SF2-J60	RELAY, ELECTROMAGNET
5945-99-220-8828	HDS8SC2L03	RELAY, ELECTROMAGNET
5945-99-221-0402	HDD1SF2E06	RELAY, ELECTROMAGNET
5945-99-221-0403	HDD4SF2H06	RELAY, ELECTROMAGNET
5945-99-221-0404	HDD1SE2E06	RELAY, ELECTROMAGNET
5945-99-222-0641	HDD1LE2D13	RELAY, ELECTROMAGNET
5945-99-222-1238	HDD4SF2H14	RELAY, ELECTROMAGNET
5945-99-222-2608	HDS6F2K26	RELAY, ELECTROMAGNET
5945-99-222-7467	HDS6HF2K24	RELAY, ELECTROMAGNET
5945-99-222-8261	HDD4HF2H07	RELAY, ELECTROMAGNET
5945-99-223-2532	HDD1SF2E01	RELAY, ELECTROMAGNET
5945-99-223-2699	HDD1SF2E02	RELAY, ELECTROMAGNET
5945-99-223-2717	HDS8SF2L14	RELAY, ELECTROMAGNET
5945-99-223-3485	XA1-02-24-00	RELAY, ELECTROMAGNET
5945-99-223-3860	HDS6HF2K22	RELAY, ELECTROMAGNET
5945-99-244-4320	HDS5HF3K24	RELAY, ELECTROMAGNET
5945-99-255-0347	HDD1-01-04-12	RELAY, ELECTROMAGNET
5945-99-255-2706	HDS19-H-F1-P-62	RELAY, ELECTROMAGNET
5945-99-256-1061	HDD4S-C2-H19	RELAY, ELECTROMAGNET
5945-99-300-3111	HDP6A-E2-K24	RELAY, ELECTROMAGNET
5945-99-304-1847	XA603980	RELAY, ELECTROMAGNET
5945-99-382-6900	HDP19SF2P60	RELAY, ELECTROMAGNET
5945-99-383-4715	CECC16101-016-33-26	RELAY, ELECTROMAGNET
5945-99-392-9058	HDD1S-F2-E05	RELAY, ELECTROMAGNET
5945-99-404-7886	HDS11-S-NB-B-60	RELAY, ELECTROMAGNET
5945-99-414-6145	HDD4H-M2-H07	RELAY, ELECTROMAGNET
5945-99-440-0901	HDS65-F2-K21	RELAY
5945-99-469-3727	HOSRSF2-406	RELAY
5945-99-470-8414	HDS8HF2L06	RELAY, ELECTROMAGNET
5945-99-519-6762	HDS6SF2E21	RELAY, ELECTROMAGNET
5945-99-519-6767	HDD4HF2H03	RELAY, ELECTROMAGNET
5945-99-519-6768	HDS6HF2E22	RELAY, ELECTROMAGNET
5945-99-519-9172	RL-7639G2	RELAY, ELECTROMAGNET
5945-99-521-2101	HDD4SF2H02	RELAY, ELECTROMAGNET
5945-99-522-4064	HDD4SE3H01	RELAY, ELECTROMAGNET
5945-99-522-4065	HDD4SF2H01	RELAY, ELECTROMAGNET
5945-99-525-2398	HDS6SF2K26	RELAY, ELECTROMAGNET
5945-99-525-4663	HDD1AF2E102	RELAY, ELECTROMAGNET
5945-99-525-5116	HDS8SF1L07	RELAY, ELECTROMAGNET
5945-99-525-5117	HDS8SJ1L07	RELAY, ELECTROMAGNET
5945-99-525-8192	HDD4HE2H14	RELAY, ELECTROMAGNET
5945-99-526-4569	HF12-01B00	RELAY, ELECTROMAGNET
5945-99-530-8975	HDD1HF2E07	RELAY, ELECTROMAGNET
5945-99-533-2143	HDD4SE2H02	RELAY, ELECTROMAGNET

NSN	Part No.	Description
5945-99-535-4410	RL48G3	RELAY, ELECTROMAGNET
5945-99-535-5275	HDD4-02-01-07-11	RELAY, ELECTROMAGNET
5945-99-539-8019	TYPE F	RELAY, ELECTROMAGNET
5945-99-547-0657	HDS8AC2L11	RELAY, ELECTROMAGNET
5945-99-547-0658	HDS8AE2L11	RELAY, ELECTROMAGNET
5945-99-547-0659	HDS8AF2L11	RELAY, ELECTROMAGNET
5945-99-547-0660	HDS8AG2L11	RELAY, ELECTROMAGNET
5945-99-548-0903	LFX39AM1BS6U	RELAY, ARMATURE
5945-99-548-0904	LFX39A3MS6U	RELAY, ARMATURE
5945-99-548-0905	LFX39A2MS6U	RELAY, ARMATURE
5945-99-548-0906	LFX39A1B1CS6U	RELAY, ARMATURE
5945-99-551-2274	HDS8 S-F3-J03	RELAY, ELECTROMAGNET
5945-99-599-0061	HDP6B-F2-K22	RELAY
5945-99-600-6588	HDS16TF2J60	RELAY, ELECTROMAGNET
5945-99-601-7241	HDS11 -03-04-01	RELAY, ELECTROMAGNET
5945-99-617-9898	HF1205 d00	RELAY, ELECTROMAGNET
5945-99-618-1559	HDD4SF2H03	RELAY, ELECTROMAGNET
5945-99-618-5284	HDS6HJ2K26	RELAY, ELECTROMAGNET
5945-99-619-8402	HDS6SJ2K21	RELAY, ELECTROMAGNET
5945-99-619-8403	HDS6SF2K21	RELAY, ELECTROMAGNET
5945-99-619-8761	6403-1	RELAY
5945-99-619-8763	1008-4	RELAY
5945-99-619-8764	6403-3A	RELAY
5945-99-619-8765	1008-1	RELAY, BASE
5945-99-620-2571	HDS11 SF2B60	RELAY, ELECTROMAGNET
5945-99-622-3867	HDS8SF2L06	RELAY, ELECTROMAGNET
5945-99-622-3919	HDS6SF2K21	RELAY, ELECTROMAGNET
5945-99-624-2110	HDS10DE1	RELAY, ELECTROMAGNET
5945-99-624-4139	HDS5SF2K22	RELAY, ELECTROMAGNET
5945-99-624-5794	HDS12SF2B60	RELAY, ELECTROMAGNET
5945-99-625-1781	RL48C1	RELAY
5945-99-625-2244	RP9809G3	RELAY, ARMATURE
5945-99-625-6402	HDS5J2K28	RELAY, ELECTROMAGNET
5945-99-625-7064	RL9809	RELAY, ARMATURE
5945-99-626-4406	HDD1AG2D06	RELAY, ELECTROMAGNET
5945-99-626-4816	HDS5HF2K25	RELAY, ELECTROMAGNET
5945-99-626-6086	HDS8SF3J06	RELAY, ELECTROMAGNET
5945-99-626-8337	HDD1HM2E13	RELAY, ELECTROMAGNET
5945-99-626-9670	HDS7HF1K22	RELAY, ELECTROMAGNET
5945-99-626-9944	HDS11HF2B60	RELAY, ELECTROMAGNET
5945-99-628-5989	HDS10DE1	RELAY, ELECTROMAGNET
5945-99-628-7453	HDD4HF2H06	RELAY, ELECTROMAGNET
5945-99-630-0174	HDS5SF2K21	RELAY, ELECTROMAGNET
5945-99-631-3579	HDD4LF2H13	RELAY, ELECTROMAGNET
5945-99-631-3580	HDD4LE2H13	RELAY, ELECTROMAGNET
5945-99-631-3581	HDS6LF2K24	RELAY, ELECTROMAGNET
5945-99-631-3582	HDS5SF2K21	RELAY, ELECTROMAGNET
5945-99-631-3583	HDD4HF2H13	RELAY, ELECTROMAGNET
5945-99-633-0818	HDS5SJ2K26	RELAY, ELECTROMAGNET
5945-99-633-3075	HDS6SE2K21	RELAY, ELECTROMAGNET
5945-99-633-5977	HDS8SF2L02	RELAY, ELECTROMAGNET
5945-99-634-0560	HF12-03DOO	RELAY, ELECTROMAGNET
5945-99-635-1678	HDS5SF2K26	RELAY, ELECTROMAGNET
5945-99-635-1814	HDD1SE2E02	RELAY, ELECTROMAGNET

NSN	Part No.	Description
5945-99-635-2526	HDP6HM2K23	RELAY, ELECTROMAGNET
5945-99-635-6256	HDD4LF2H07	RELAY, ELECTROMAGNET
5945-99-635-6374	HDS5SF2K21	RELAY, ELECTROMAGNET
5945-99-635-7539	HDS5SF2K26	RELAY, ELECTROMAGNET
5945-99-638-2066	HDS12HF2B62	RELAY, ELECTROMAGNET
5945-99-638-2524	HDD4HE2H07	RELAY, ELECTROMAGNET
5945-99-638-3569	HDD1SE2E07	RELAY, ELECTROMAGNET
5945-99-638-8413	HDS5SJ2K25	RELAY, ARMATURE
5945-99-638-8414	HDS5DK2K21	RELAY, ARMATURE
5945-99-639-2656	HDD1SF2E06	RELAY, ARMATURE
5945-99-639-2915	HDS5SF2K25	RELAY, ARMATURE
5945-99-639-5819	HDD4SF2H03	RELAY, ELECTROMAGNET
5945-99-640-1111	HDS8SF2L07	RELAY
5945-99-640-4030	HD88HF3J02	RELAY, ELECTROMAGNET
5945-99-641-4379	HDP19 -H-F2-P-62	RELAY, ELECTROMAGNET
5945-99-642-5312	HDD4HM2H57	RELAY, ELECTROMAGNET
5945-99-643-2890	HDS5SF2K22	RELAY, ELECTROMAGNET
5945-99-646-1498	HDD4LF2H01	RELAY, ELECTROMAGNET
5945-99-646-1753	HDD4LF2H07	RELAY, ELECTROMAGNET
5945-99-646-3017	HDS12HF2B62	RELAY, ELECTROMAGNET
5945-99-646-4358	HDD4HF2H07	RELAY, ELECTROMAGNET
5945-99-646-9445	HDS5HF2K24	RELAY, ARMATURE
5945-99-647-3993	HDS6SF2K24	RELAY, ELECTROMAGNET
5945-99-647-9994	HDS14-S-NB-B-60	RELAY, ELECTROMAGNET
5945-99-648-2141	HDS6F2K22	RELAY, ELECTROMAGNET
5945-99-648-3560	HDD4HF2H01	RELAY, ELECTROMAGNET
5945-99-648-3565	HDS7SE1K22	RELAY, ELECTROMAGNET
5945-99-650-4548	HDS7SC1K21	RELAY, ARMATURE
5945-99-650-5512	HDS7HE1K111	RELAY, ARMATURE
5945-99-650-6358	HDS8HF3J110	RELAY, ARMATURE
5945-99-650-7521	HDS6SJ2K23	RELAY, ELECTROMAGNET
5945-99-650-7522	HDS10DC1	RELAY, ELECTROMAGNET
5945-99-651-8518	HDS5HJ2K30	RELAY, ELECTROMAGNET
5945-99-652-3250	HDS11SF2M60	RELAY, ELECTROMAGNET
5945-99-653-1247	HDS5SF2K21	RELAY, ELECTROMAGNET
5945-99-653-2414	HDS5SF2K23	RELAY, ELECTROMAGNET
5945-99-653-5572	HDD1HF2E07	RELAY, ELECTROMAGNET
5945-99-653-5575	HDS14SF2B60	RELAY, ELECTROMAGNET
5945-99-653-5668	HDS8HF3J07	RELAY, ELECTROMAGNET
5945-99-654-2064	HDS10DF1	RELAY, ELECTROMAGNET
5945-99-654-2065	HDS12HF2B60	RELAY, ELECTROMAGNET
5945-99-655-1885	HDS5HF2K30	RELAY, ELECTROMAGNET
5945-99-655-9311	WR35PP6B	RELAY, ELECTROMAGNET
5945-99-657-1387	HDS5HM2K30	RELAY, ELECTROMAGNET
5945-99-658-2711	HDS5SE2K25	RELAY, ELECTROMAGNET
5945-99-658-5739	HDS11HF2B62	RELAY, ELECTROMAGNET
5945-99-659-2730	HDS11HF2B62	RELAY, ELECTROMAGNET
5945-99-659-5988	HDS5-01-08-01-12	RELAY, ELECTROMAGNET
5945-99-659-5989	HDS5-01-08-05-12	RELAY, ELECTROMAGNET
5945-99-661-1415	HDS5SE2K25	RELAY, ELECTROMAGNET
5945-99-661-1416	HDS5SF2K25	RELAY, ELECTROMAGNET
5945-99-662-6109	HDS5-02-08-05-12	RELAY, ELECTROMAGNET
5945-99-664-4624	HDS5SM2K21	RELAY, ELECTROMAGNET
5945-99-714-6835	HDD4HJ2H06	RELAY, ELECTROMAGNET

NSN	Part No.	Description
5945-99-714-6836	HDS8HJ2L02	RELAY, ELECTROMAGNET
5945-99-714-6837	HDS6HJ2K23	RELAY, ELECTROMAGNET
5945-99-714-8434	HDS8-H-J2-L06	RELAY, ELECTROMAGNET
5945-99-715-3389	HDD1S-F2-D06	RELAY, ELECTROMAGNET
5945-99-715-3390	HDS5SE2K21	RELAY, ELECTROMAGNET
5945-99-715-6555	507-1-10902-118	RELAY
5945-99-717-6498	HDS11HF2860	RELAY, ELECTROMAGNET
5945-99-720-5134	91450301-10L	RELAY, ELECTROMAGNET
5945-99-720-5137	91430210-46	RELAY
5945-99-720-5138	91430310-48	RELAY
5945-99-724-9039	HDS 11-03-02-02	RELAY, ELECTROMAGNET
5945-99-724-9040	HDS 11-03-02-01	RELAY, ELECTROMAGNET
5945-99-725-4016	HDS12S-NB-B60	RELAY, ELECTROMAGNET
5945-99-731-5008	RL-7639G7	RELAY, ELECTROMAGNET
5945-99-733-4960	HDS5-01-09-04-12	RELAY, ELECTROMAGNET
5945-99-735-4058	HDS12HF2B60	RELAY, ELECTROMAGNET
5945-99-735-8162	BS9151-F0026-02-08-03-1'	RELAY, ELECTROMAGNET
5945-99-736-6255	HDD1-05-05-13	RELAY, ELECTROMAGNET
5945-99-737-8002	HDS5	RELAY, ELECTROMAGNET
5945-99-738-4506	HDS11SE1B60	RELAY, ELECTROMAGNET
5945-99-742-5387	HDS12HNAB60	RELAY, ELECTROMAGNET
5945-99-742-8766	9151 F007 02.09.01.13	RELAY, ELECTROMAGNET
5945-99-745-9189	HDD1-05-10-11	RELAY, ELECTROMAGNET
5945-99-746-2275	HDS18SF2B01	RELAY, ELECTROMAGNET
5945-99-746-7322	HDS12HE1B62	RELAY, ELECTROMAGNET
5945-99-747-9673	HDD4-01-04-04-11	RELAY, ELECTROMAGNET
5945-99-749-6095	HDS12-H-NB-B-62	RELAY, ELECTROMAGNET
5945-99-751-6250	EBRM 55211T00	RELAY, ELECTROMAGNET
5945-99-753-9477	HDS10DD1	RELAY, ELECTROMAGNET
5945-99-763-6434	HDS19SF2P60	RELAY, ELECTROMAGNET
5945-99-765-3201	HDS10JE1	RELAY, ELECTROMAGNET
5945-99-765-8186	B151F26-02-08-01-12	RELAY, ELECTROMAGNET
5945-99-767-6668	HDS8 S E3 J03	RELAY, ELECTROMAGNET
5945-99-768-2894	HDS5-01-08-05-12	RELAY, ELECTROMAGNET
5945-99-775-4607	HDS6H-F2-K23	RELAY, ELECTROMAGNET
5945-99-775-9527	HDS 10-04-03-03	RELAY, ELECTROMAGNET
5945-99-778-3047	HDD1S-E2 E03	RELAY, ELECTROMAGNET
5945-99-778-3048	HDS12S-NA-860	RELAY, ELECTROMAGNET
5945-99-779-1706	HDS8S-E2 L02	RELAY, ELECTROMAGNET
5945-99-780-8810	HDS5-S-C2-K21	RELAY, SOLID STATE
5945-99-781-1210	HDS5-S-F3-K21	RELAY, SOLID STATE
5945-99-781-1305	HDP12SF2860	RELAY, ELECTROMAGNET
5945-99-782-4789	HDD4S-C2-H07	RELAY, ELECTROMAGNET
5945-99-783-6011	HDS12H-NA861	RELAY, ELECTROMAGNET
5945-99-783-6012	HDS5S-G2-K21	RELAY, ELECTROMAGNET
5945-99-784-2602	HDD4S-E2-H07	RELAY, ELECTROMAGNET
5945-99-786-7768	HDD4S-E2-H06	RELAY, ELECTROMAGNET
5945-99-787-4296	XA2412405	RELAY, ELECTROMAGNET
5945-99-787-7082	HDS5S-F3-K23	RELAY, ELECTROMAGNET
5945-99-787-7088	HDS16 S F2 J 60	RELAY, ELECTROMAGNET
5945-99-787-7091	HDS18 S F2 860	RELAY, ELECTROMAGNET
5945-99-788-0838	HDD1S-A2-E06	RELAY, ELECTROMAGNET
5945-99-793-7121	HDS5-01.05.05.12	RELAY, ELECTROMAGNET
5945-99-793-7484	HDD1H-M2-E09	RELAY, ELECTROMAGNET

NSN	Part No.	Description
5945-99-794-5193	HDS10D-J1	RELAY, ELECTROMAGNET
5945-99-795-7860	HDD4-01-04-10-12	RELAY, ELECTROMAGNET
5945-99-796-2900	HDS19HF2P60	RELAY, ELECTROMAGNET
5945-99-797 -9183	BS9151-F0026-01-08-05-1'	RELAY, ELECTROMAGNET
5945-99-799-5680	HDS10-E1	RELAY, ELECTROMAGNET
5945-99-799-7727	HDS 12-03-04-01	RELAY, ELECTROMAGNET
5945-99-800-7647	HDS10-05-01-01	RELAY, ELECTROMAGNET
5945-99-823-3446	HDS5S-F3-K21	RELAY, ELECTROMAGNET
5945-99-826-9310	HDS8S-F3-J19	RELAY, ELECTROMAGNET
5945-99-832-5591	BS9151F0008-01-02-03-11	RELAY, ELECTROMAGNET
5945-99-840-1360	RL48G1	RELAY
5945-99-924-4761	HDD1SF2E12	RELAY, ELECTROMAGNET
5945-99-924-4762	HDD4SF2H12	RELAY, ELECTROMAGNET
5945-99-924-7149	HDD4HC2H03	RELAY, ELECTROMAGNET
5945-99-924-7150	HDS7HF2K22	RELAY, ELECTROMAGNET
5945-99-946-6933	FRL7641G78	RELAY, ELECTROMAGNET
5945-99-955-4995	HDD4HF2H12	RELAY, ELECTROMAGNET
5950-99-543-4047	HF-12-95-D-00	RELAY, ELECTROMAGNET

Exceptional Solutions
for demanding environments

BlueCube™

Intelligent Wireless Health Monitoring Solution

BARNBROOK
GLOBAL ENGINEERING SOLUTIONS

Flexible, Reliable, Expandable

Build on and around a core framework, designed from the outset to be flexible on all levels of data collection and information delivery to the customer.

Intelligent Networking

All the data collected is recorded and analysed against key data parameters.

At the top level customers may just be satisfied with Traffic Light Health Status or possibly our **H.A.R.T (Health And Reliability Target)** system.

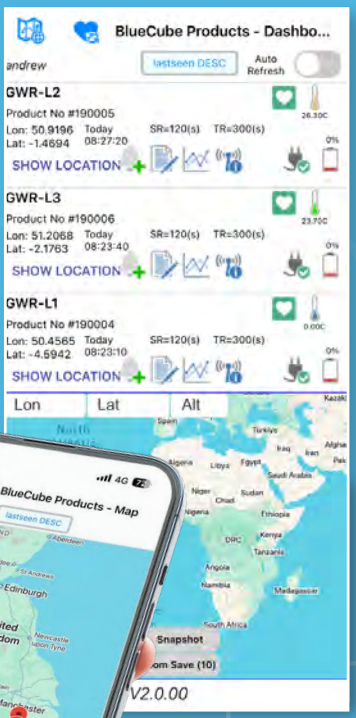
In addition, our machine learning engine can deliver predictive outcome data helping to drive your product development and maintenance schedules.

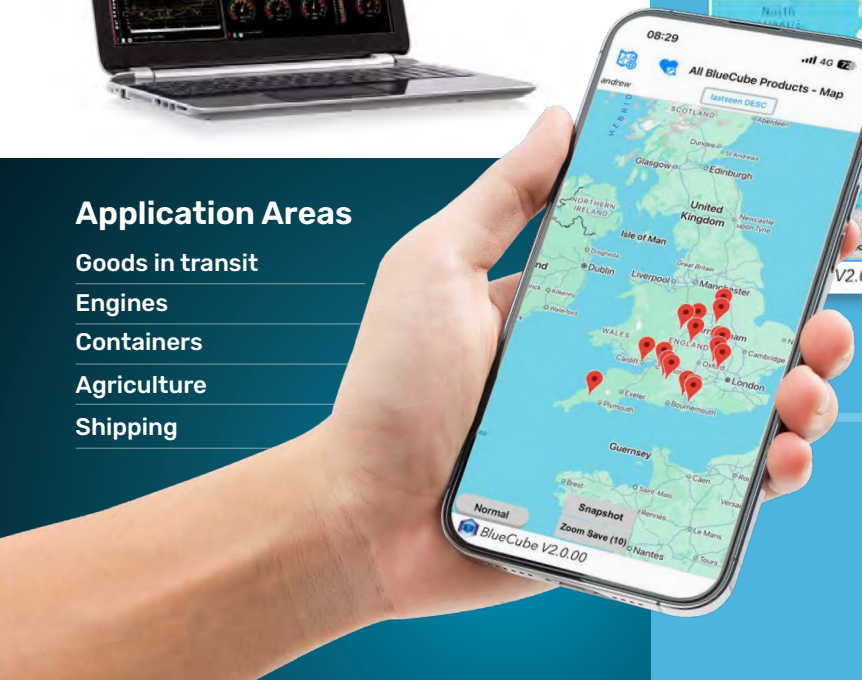
Application Areas

- Goods in transit
- Engines
- Containers
- Agriculture
- Shipping

Additional Options

- Integral Colour Touchscreen
- 10000mAh integral battery
- User changeable channel labels (Via APP)
- User set System Sleep (Via APP)
- User updateable averaging algorithm
- Mesh Capable





Available on the App Store

ANDROID APP ON Google play

Core Systems

All our systems, sensors and services are designed, manufactured and managed in the UK.

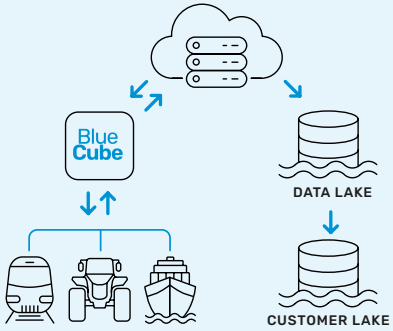
All our solutions can operate independently or incorporated into other systems through customised, secure API's.

System security and data integrity are of paramount importance, constantly monitored and guarded.

Back-up and recovery

Data from the sensors is stored locally within the BlueCube unit and downloaded when appropriate or when connected via Bluetooth to the BlueCube ACM.

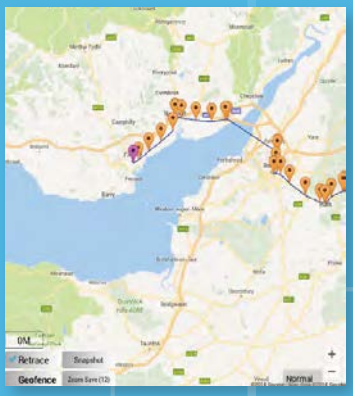
BlueCube Data Flow



BlueCube™

Key Features

- Edge computing capable
- Direct visual display (optional)
- App enabled remote mapping
- NLDT enabled
- Data fallback
- Single rugged enclosure
- Inbuilt data logging
- Custom design available



Sensor Type	Sensor No	Sensor Details	
Shock/Acceleration	EV-SV-001-2M	Three Axes. ±2.0g, ±4.0g, ±8.0g, ±16.0g	2 Metre (Std)
Humidity	EV-HU-001-1M	0% to 100% RH +/- 2%. -40°C to +125°C	1 Metre (Std)
Barometric Pressure	EV-BP-001-1M	260 to 1260 mbar. absolute	1 Metre (Std)
Temperature (DS)	EV-DS-001-2M	-40°C to +125°C	2 Metre (Std)
Temperature (K-Type)	EV-KT-001-1M	Viator to K-Type thermocouple adapter	1 Metre (Std)
Temperature/Humidity	EV-TH-001-2M	-40°C to +125°C 0% to 100% RH +/- 2%. -40°C to +125°C	2 Metre (Std)
Pressure (Low)	TDR-R-0-25-I2C-1M	0-25 bar (Relative) Stainless pressure transducer (G ¼")	1 Metre (Std)
Pressure (Med)	TDR-R-0-40-I2C-1M	0-40 bar (Relative) Stainless pressure transducer (G ¼")	1 Metre (Std)
Pressure (High)	TDR-R-0-100-I2C-1M	0-100 bar (Relative) Stainless pressure transducer (G ¼")	1 Metre (Std)
OTMR (Digital-16)	TAD-16WAY-1M	16 line digital input opto-isolated into single Viator Port	1 Metre (Std)
OTMR (Analogue-16)	TAA-16WAY-1M	16 line analogue input isolated into single Viator Port	1 Metre (Std)
Light/Lux/Infrared	EV-LL-001 –2M	0…40,000 lux.	2 Metre (Std)
Gas/Pressure/Temp	EV-MI-001-1M	Low power gas, pressure, temperature & humidity sensor; • direct indoor air quality (IAQ) index • 0-100% RH • -40-+85 °C • 300-1100 hPa	1 Metre (Std)
E-Ink Display	DU-INK-001-1M	'Kindle' zero power display for diagnostic downloads	1 Metre (Std)
Port Expander	PX-1-3-001-1M	1 to 3 port expander	1 Metre (Std)
Current	CUR-xxx-001-2M	AC or DC current measurement (Current clamps) xxx=Amps	2 Metre (Std)
Multi Current	CUR-3WAY-1M	3 port current clamp to single I2C port	1 Metre (Std)
Voltage	VO-xxx-yy-001	AC or DC voltage measurement xxx=voltage, yy=AC/DC	Custom
Gas Detector		Contact us for gas types including CO2	Custom
Air Quality		Contact us for types	Custom
Water Quality		Contact us for types	Custom
Specialist		**Fan speed, Door monitor, Toilet fault monitor, Locker, detection, Seat Belt closure**	**Custom**
RS485	RS485-BRK-1M	RS485 Breakout Sniffer Module	1 Metre (Std)
Level/Fluid—LIDAR		Contact us about measuring and monitoring sand or fluid	Custom
Thermal		Contact us about measuring and monitoring temperature with a thermal array	Custom
FAN Speed (Optical)	FS-CM-001-3M	Optical reflective fan speed sensor with clip-on mount & 2x20mm clips	3 Metre (Std)

Blue**Cube** is designed & tested to **EN50155 / EN55011 / EN61000**
Typical 4-port unit dimensions **92**mm x **110**mm x **32**mm

Contact us on:
+44(0) 1329 847722

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sales@barnbrook.co.uk

BARNBROOK
GLOBAL ENGINEERING SOLUTIONS

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Hampshire,
UK, PO15 6LD

Industry Accreditations

CAA Part 21 G	JOSCAR
CAA Part 145	RISQS
FAA 3B2Y408C	SIL2
AS9100D	CECC
ISO9001	UL

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