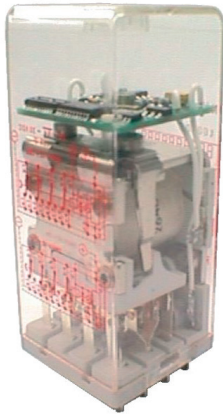


/// Plug-in railway relay with 4 C/O contacts

Rugged plug-in relays for extreme reliability, within long endurance applications and harsh environments

TBAU 400

Delay-on pull-in or drop-out



Description

The TBAU 400 is a delay-on pull-in or drop-out relay with 4 double make / double break C/O contacts (form Z). The delay is fully programmable with a dip switch (from 0.25 s to 63 min). The access to dip switch is available by removing time delay cover. This feature prohibits frivolous field time delay setting.

The plug-in design offers secure locking feature for maximum ease of maintenance (no wires need to be disconnected or other hardware removed for relay inspection or replacement). The resistance to impact and vibration is conform to standards in force for Railway Transported Equipment.

Positive mechanical keying of relay to socket is built into relay and socket during manufacture and terminal identifications are clearly marked on identification plate that is permanently attached to the relay.

The TBAU 400 relay is pluggable in the following sockets: EA 102 B, EA 102 BF, EA 103 BF, EA 104 B, EA 104 BF, EA 105 BF, EA 112 BF.

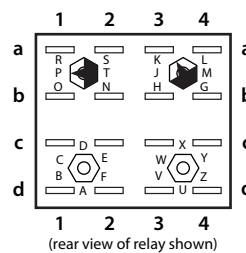
Application

The TBAU 400 timing relay is designed for heavy duty applications with a programmable timing function used for example in HVAC and lighting.

Features

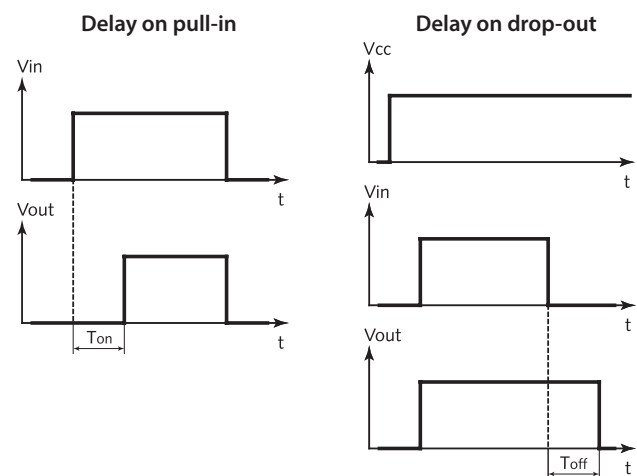
- Delay-on plug-in or drop-out relay
- Delay range from 0.25 s...63.75 min
- Time delay fully programmable by dip switch
- Status LED indicator
- Plug-in design with secure locking feature for maximum ease of maintenance
- 4 double make / double break C/O contacts (form Z), 8 A
- Optional weld no transfer contacts
- Contact life (mechanical) of 100 million cycles
- -40 °C...+8 5°C operating temperature

Relay pin correspondence



Example: KP keying

Timing diagram

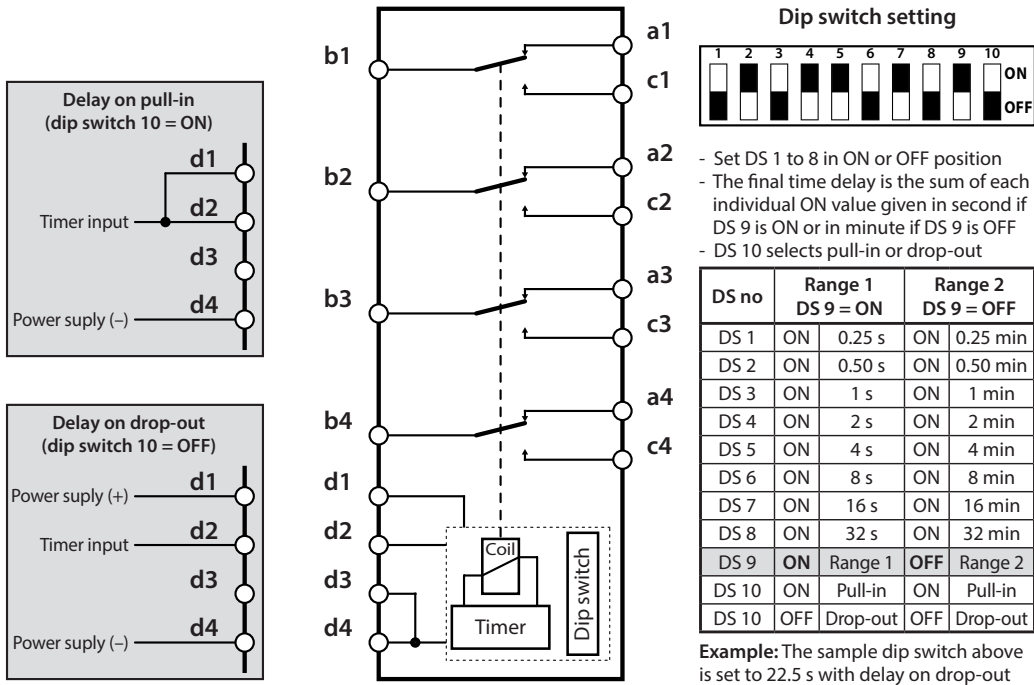


Railway compliancy

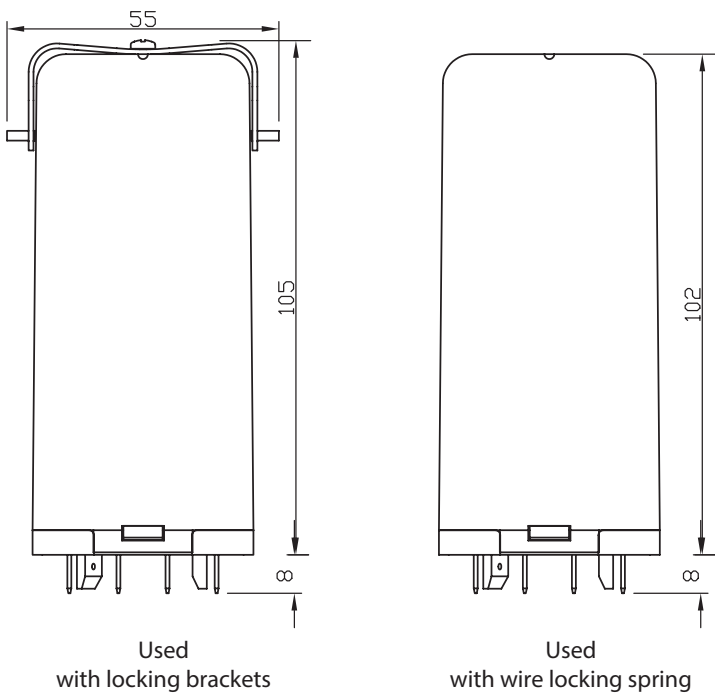
NF F 62-002 EN 50155
NF F16-101/102 IEC 61373

Time relay TBAU 400

Connection diagram



Dimensions (mm)



Technical specifications

Time relay TBAU 400

Time characteristics

| | |
|-------------------------------------|-------------------------------------------------------------------------------------------------|
| Time function | Delay-on pull-in or delay on drop-out (selection by dip switch) |
| Total time delay range | 0.25 s...63.75 min |
| Time delay adjustment | Fixed after setting the dip switch (access available by removing relay cover) |
| Adjustment / repeatability accuract | < 2% (td > 5 s), < 10% (td = 0.25 s...5 s) / 0.1% (td = time delay) (adjustment with power off) |

Coil characteristics

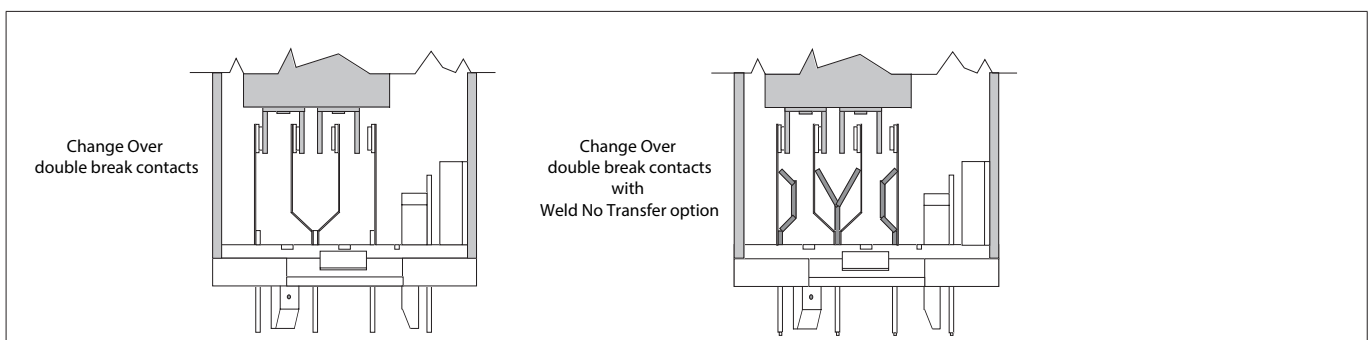
| Type | U _{nom} (VDC) | U _{operating} (VDC) | P _{nom} (W) | R _{coil} (Ω) ¹ | L/R (ms) ² |
|------|------------------------|------------------------------|----------------------|------------------------------------|-----------------------|
| GR | 12 | 8/16 | 3 | 40 | 30 |
| GP | 24 | 16/33 | 3 | 185 | 30 |
| HP | 36 | 25/45 | 3 | 475 | 30 |
| JP | 48 | 33/60 | 3 | 750 | 30 |
| KP | 72 | 48/90 | 3 | 1700 | 30 |
| MP | 96 | 65/120 | 3 | 3000 | 30 |
| LP | 110 | 75/138 | 3 | 4000 | 30 |

¹ Coil resistance tol.: ± 8% at 20 °C
² Valid for closed relay

Contact characteristics

| | | | |
|------------------------------------|------------------------------------------------------------------------------------------------------------|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nominal current | 8 A resistive | | |
| Nominal breaking capacity and life | 1 A at 72 VDC 350 mA at 72 VDC 1 A at 220 VAC 50 Hz cosØ=1 Lamp filament circuit: 200 W at 72 VDC | L/R : 0 ms L/R: 30 ms cosØ=1 | Electrical life: 5 x 10 ⁶ op. Electrical life: 2.5 x 10 ⁶ op. Electrical life: 2.5 x 10 ⁶ op. Electrical life: 5 x 10 ⁵ op. |
| Contact overload withstand | At 24 VDC: 100 A at L/R = 0 for 10 ms (10 operations at the rate of 1 operation per minute) | | |
| Contact closure time | Pick-up time N/O < 40 ms Drop-out* time N/C < 15 ms | | |
| Contact opening time | Pick-up time N/C < 35 ms Drop-out* time N/O < 6 ms | | |
| Minimum contact continuity | 20 mA at 24 VDC | | |
| Number of contacts | 4 double make / double break contacts (form Z) | | |
| Contact material | Hard silver overlay laminated to copper | | |
| Contact resistance | initial end of life | 10 mΩ max at 5 A 40 mΩ max at 5 A | |

Contact design



Time relay TBAU 400

Electrical characteristics

| | |
|-----------------------|--------------------------------------------------------------------------------------|
| Dielectric strength | 2000 VAC, 1 min between contacts 2600 VAC, 1 min between contacts, coil and frame |
| Insulation resistance | ≥ 1000 MΩ at 500 VDC |

Mechanical characteristics

| | |
|-----------------|------------------------------------|
| Mechanical life | > 100 x 10 ⁶ operations |
| Weight | 300 g |

Environmental characteristics

| | |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Vibration | NF F 62-002 The tests are conducted in the X, Y , Z planes at frequency between 10 & 150 cycles (sinusoidal) at 2 g |
| Shock | NF F 62-002 Tests are applied in both directions in the X, Y & Z planes. Then successive shocks are administered consisting of the positive component of sinusoidal with a value of 30 g, 11 ms Other vibration and shock tests can be performed on request |
| Operating temperature | -40 °C...+85 °C |
| Humidity | 93% RH, 40 °C for 4 days |
| Salt mist | 5% NaCl, 35 °C for 4 days |
| Protection | IP40 |
| Fire & smoke | Materials: Polycarbonate (cover) / polyester melamine (base) Note: These materials have been tested for fire propagation and smoke emission according standards NF F 16-101, NF F 16-102, ASTM E162 and ASTM E662, and have been approved to be used on the English/French train channel shuttle. |

Railway compliancy

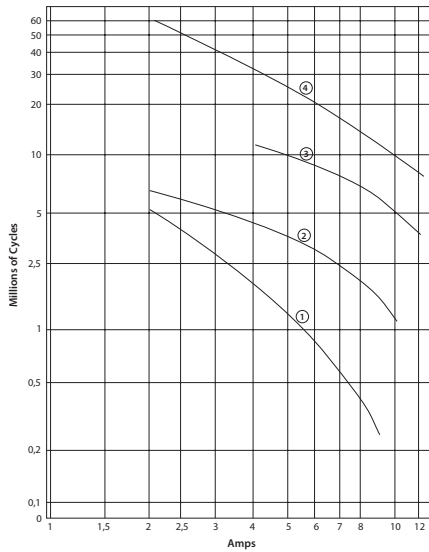
| | |
|----------------|---------------------------------------------------------------------------|
| NF F 62-002 | Railway rolling stock - On-off contact relays and fixed connections |
| NF F16-101/102 | Railway rolling stock - Fire behavior |
| EN 50155 | EN 50155 Railway application - Electronic equipment used on rolling stock |
| IEC 61373 | Railway application - shock and vibration tests |

Electrical life expectancy

Dynamic relay selection curve #1

AC Current breaking capacity versus life expectancy in millions of cycles.
Rate of contacts opening and closing = 1200 operations per hour.
Curves shown for resistive load (Power Factor = 1).

| | | | | |
|-------|-----|-----|----|----|
| Curve | 1 | 2 | 3 | 4 |
| VAC | 220 | 125 | 48 | 24 |

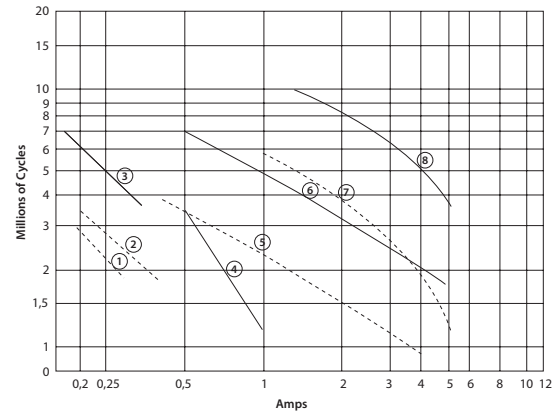


Dynamic relay selection curve #2

DC Current breaking capacity versus life expectancy in millions of cycles.
Rate of contacts opening and closing = 1200 operations per hour.
Curves shown for inductive load:
—— L/R= 20 ms continuous current
- - - L/R= 40 ms continuous current

* By connecting 2 contacts in series, DC current breaking capacity increases by 50 %

| | | | | |
|--------|-----|-----|-----|-----|
| Curves | 1-3 | 2-4 | 5-6 | 7-8 |
| VDC | 220 | 125 | 48 | 24 |

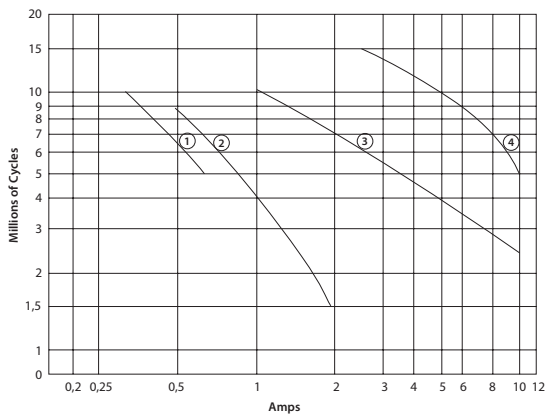


Dynamic relay selection curve #3

DC Current breaking capacity versus life expectancy in millions of cycles.
Rate of contacts opening and closing = 1200 operations per hour.
Curves shown for resistive load (L/R = 0). Continuous current.

* By connecting 2 contacts in series, DC current breaking capacity increases by 50 %

| | | | | |
|-------|-----|-----|----|----|
| Curve | 1 | 2 | 3 | 4 |
| VDC | 220 | 125 | 48 | 24 |

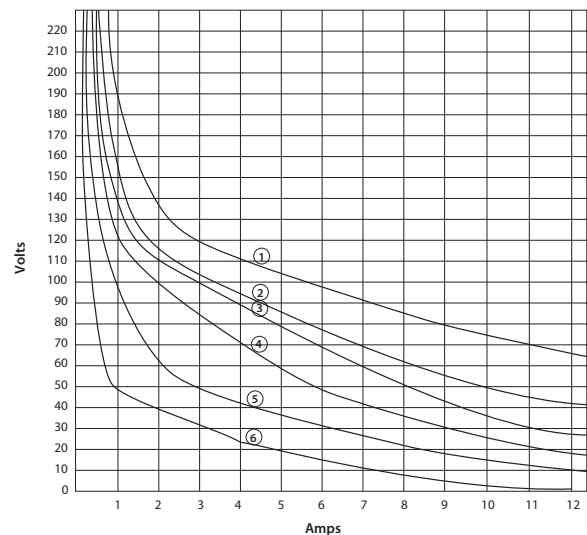


Dynamic relay selection curve #4

Maximum contact breaking capacity versus voltage for a given L/R.
Rate of contacts opening and closing = 600 operations per hour.
Curves shown for resistive load (L/R=0) and inductive loads. Continuous current.

Life expectancy: 2 Millions of Cycles

| | | | | | | |
|-------|-----|------|------|------|------|-------|
| Curve | 1 | 2 | 3 | 4 | 5 | 6 |
| L/R= | 0ms | 15ms | 20ms | 40ms | 60ms | 100ms |

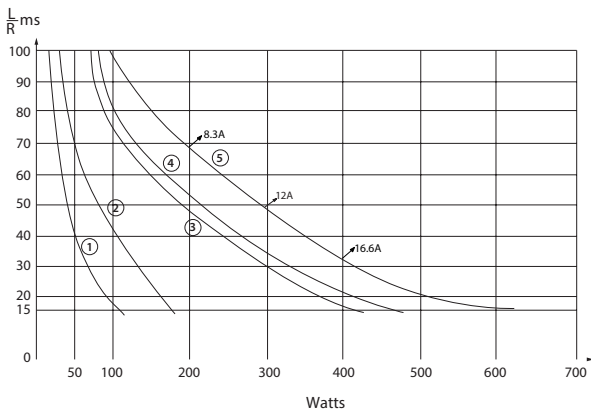


Time relay
TBAU 400

Dynamic relay selection curve #5

Maximum power interruption versus load time constant (L/R) for a given voltage.
Curves shown for resistive loads. $I = P/V$.

| Curve | 1 | 2 | 3 | 4 | 5 |
|-------|-----|-----|----|----|----|
| VDC | 220 | 125 | 72 | 48 | 24 |



Dynamic relay selection curve #6

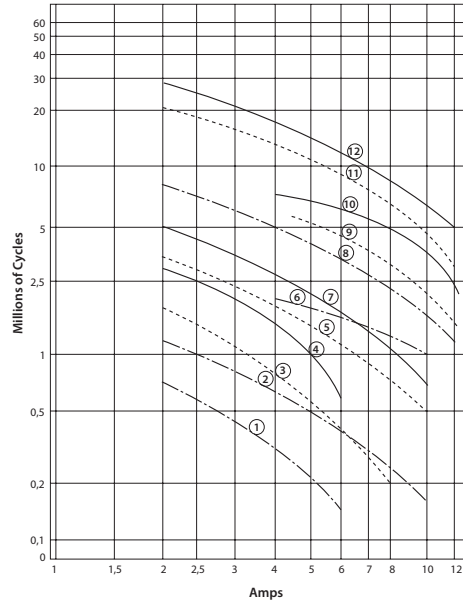
AC Current breaking capacity versus life expectancy in millions of cycles.

Rate of contacts opening and closing = 1200 operations per hour.

Values shown for inductive loads -

- Cos ϕ = 0.7
- - - Cos ϕ = 0.5
- · - Cos ϕ = 0.3

| Curves | 1,3 &4 | 2,5 &7 | 6,9 &10 | 8,11 &12 |
|--------|--------|--------|---------|----------|
| VAC | 220 | 125 | 48 | 24 |



Time relay
TBAU 400

Mounting possibilities/sockets



Panel/flush mounting

| | |
|-----------|-------------------------------------------------------------------------|
| EA 102 B | Locking bracket (905843), rear connection, double Faston 5 mm. |
| EA 102 BF | Wire locking spring (926853), rear connection, single Faston 5 mm. |
| EA 104 B | Locking bracket (905843), rear connection, single Faston 5 x 0.8 mm. |
| EA 104 BF | Wire locking spring (926853), rear connection, single Faston 5 x 0.8 mm |
| EA 112 BF | Wire locking spring (926853), rear connection, crimp contact |





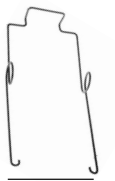



Surface/wall mounting

| | |
|-----------|--------------------------------------------------------------------------------------------------------|
| A 103 BF* | Wire locking spring (926853), front connection, M3 screw 6.5 mm. ring terminals (2.5 mm ²) |
| A 105 BF* | Wire locking spring (926853), front connection, single Faston 5 mm |

* Mounting possibility on 35 mm rail EN 50022 by adding suffix D to the part number (see socket datasheet)

Note: Keying of relay to socket can be specified by adding the keying letters in the part number. See all details in the related socket datasheet.

Spare parts - ordering codes

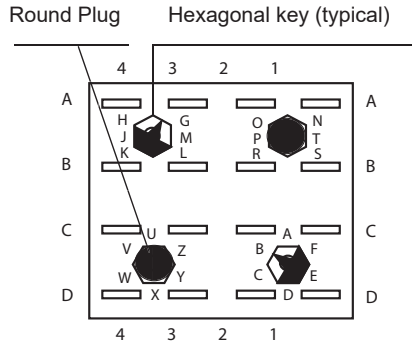
| | | | |
|------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
|  <p>LOCKING BRACKET 905846 (1)</p> |  <p>SCREW FOR BRACKET C927210 (1)</p> |  <p>METAL STRAP (2) P928060 (1)</p> |  <p>METAL STRAP (4) P928061 (1)</p> |
|  <p>WIRE LOCKING SPRING 431906654 (1)</p> |  <p>ROUND PLASTIC PLUGS 414928005 (1)</p> |  <p>HEX. PLASTIC KEYS 414905678 (2)</p> |  <p>LOCK PINS ASSY 2 SCREWS 906364 212903020 (3)</p> |

(1) Parts only for socket
(2) Parts for relay and socket
(3) Parts only for relay

Time relay TBAU 400

Keying

Socket (top view) set for BG (72V DC)

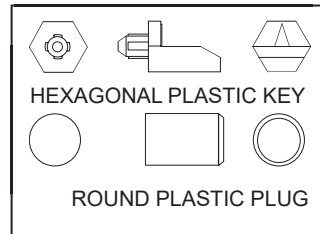


Keying of relay to socket is accomplished by pressing 2 hexagonal keys and 2 round plugs into molded-in recesses on the socket.

Relay keying done in factory.

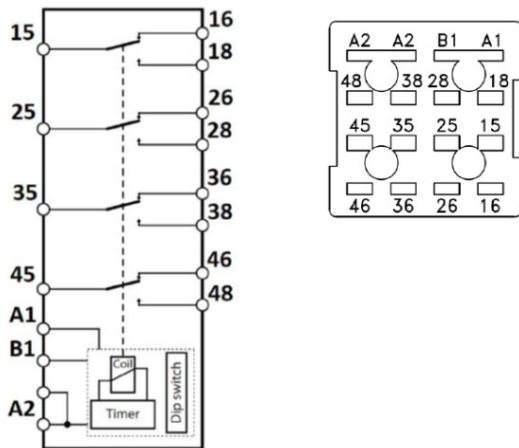
Insert keys so that arrows point to the correct keying letters on socket - see example shown.

Faston socket EA 104 shown. Screw type socket EA 103, front single faston EA 105 and double Faston EA 102 are keyed similarly.



(empty molded re-cesses are filled up by pressing 2 round plastic plugs)

Terminal identification - DIN marking



Instructions for use

Installation

Install socket and connect wiring correctly according identification to terminals. Plug relay into socket. Reverse installation into socket is not possible due to mechanical blocking by snap-lock. Don't reverse polarity of coil connection. Relays can be mounted (tightly) next to each other and in any attitude. B400 relay can be mounted in any position. Warning! Never use silicon near relays.

Operation

Before operating always apply voltage to coil to check correct operation. Long term storage may corrode the silver on the relay pins. Just by plugging the relay into the socket, the female bifurcated receivers will automatically clean the corrosion on the pins and guarantee a good connection. Do not use the relay in places with flammable gas as the arc generated from switching could ignite gasses.

Maintenance

Correct operation of relay can easily be checked as transparent cover gives good visibility on the moving contacts. When the relay doesn't seem to operate correctly, please check presence of coil voltage. Use a multimeter. If LED is used, coil presence should be indicated. If coil voltage is present, but the relay doesn't work, a short circuit of suppression diode is possible (The coil connection was reversed). If relay doesn't work after inspection, please replace relay unit by a similar model. Send defective relay back to manufacturer. Normal wear and tear excluded.

Time relay
TBAU 400
Ordering scheme

| TBAU 400 | | | | | | | |
|--------------------------------------|--------|---|--|---|---|----|---------------------------------------|
| Nominal voltage & keying | 12 GR | | | | | | 12 VDC |
| | 24 GP | | | | | | 24 VDC |
| | 36 HP | | | | | | 36 VDC |
| | 48 JP | | | | | | 48 VDC |
| | 72 KP | | | | | | 72 VDC |
| | 96 MP | | | | | | 96 VDC |
| | 110 LP | | | | | | 110 VDC |
| Weld no transfer | | - | | | | | Weld no transfer available (standard) |
| | | C | | | | | Weld no transfer |
| Relay cover type | | | | - | | | Relay cover with lock pins |
| | | | | F | | | Relay cover for wire locking spring |
| Terminal identification (See page 9) | | | | | - | | No marking |
| | | | | | | X8 | DIN marking |

Example: TBAU 400 72 KP C F.

Description: TBAU 400 relay, Unom: 72 VDC, keying KP, weld no transfer, relay cover for wire locking spring

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