

# ACD-U200 relay - Battery voltage monitoring

## Datasheet

**ACD-U200 relay is obsolete from Feb 1, 2017. Replacement by MTDV4-U200 relay**



### Features

- Plug-in DC voltage monitoring relay
- Adjustable pull-in voltage and hysteresis (with a multi-turn potentiometer)
- 1 C/O and 1 N/O contact (weld no transfer)
- Compact plug-in design
- Flat, square silver plated relay pins for excellent socket connection
- Wide range sockets
- Integrated snap lock
- Transparent cover
- Flexibility by many options

### Benefits

- Proven reliable
- Long term availability
- Easy to maintain
- Used in safety critical applications
- Low life cycle cost
- No maintenance

### Railway compliancy

- EN 50155 - Electronic equipment used on rolling stock for railway applications
- IEC 60571 - Electronic equipment used on railway vehicles
- IEC 60077 - Electrical equipment for rolling stock in railway applications
- IEC 60947 - Low voltage switch gear and control gear
- IEC 61373 - Rolling stock equipment - Shock and vibration test
- EN 50121 - Electromagnetic compatibility for railway applications
- NF F 16-101/102, TS 45545-2 - Fire behaviour - Railway rolling stock
- IEC 60529 - European standard describes the protection class (IP-code)
- IEC 60068-2

## Description

Electronic plug-in railway monitoring relay for battery voltages. The relay reacts on the mean value of a DC-voltage with ripple. The pull-in voltage and hysteresis (difference between pull-in voltage and drop-out voltage) are adjustable by means of multiturn trimpotentiometers.

The pull-in time after crossing the setpoint is < 15 ms. The drop-out time is approximately 20 ms, which can be extended to 250 ms. Optional the relay can be supplied with fixed (sealed) set values, or led indication. The ACD relays are pluggable into standard D-U200 relay sockets.

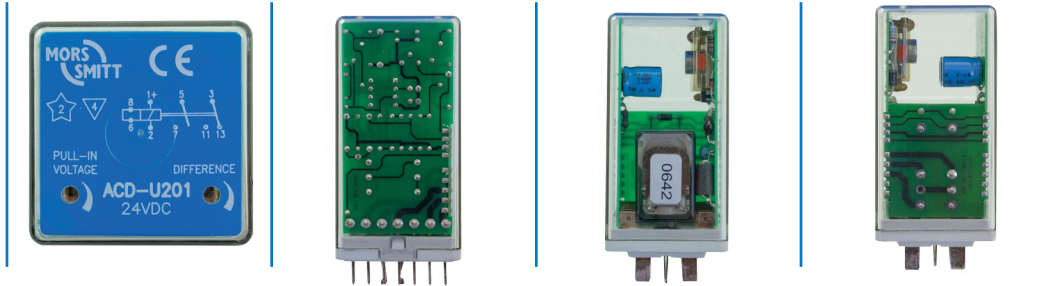
## Application

These relays are designed for demanding rolling stock applications. The ACD-U200 is used in applications for voltage monitoring or where switching is activated by a fixed voltage level.

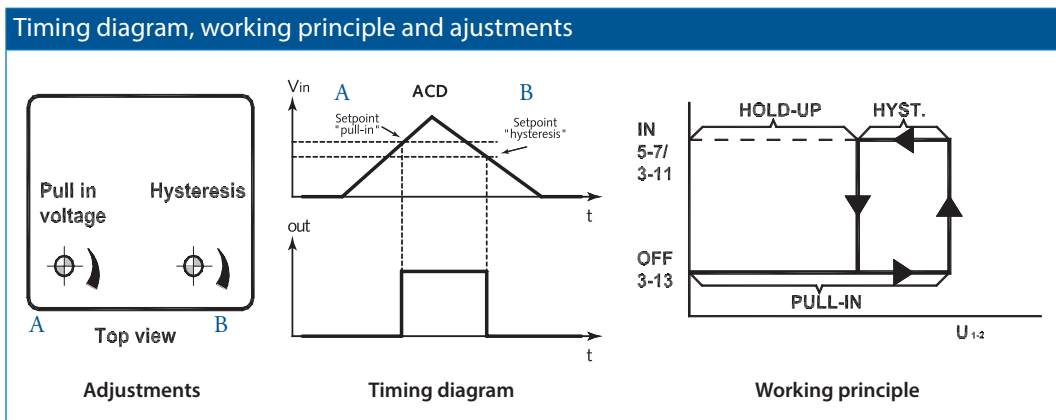
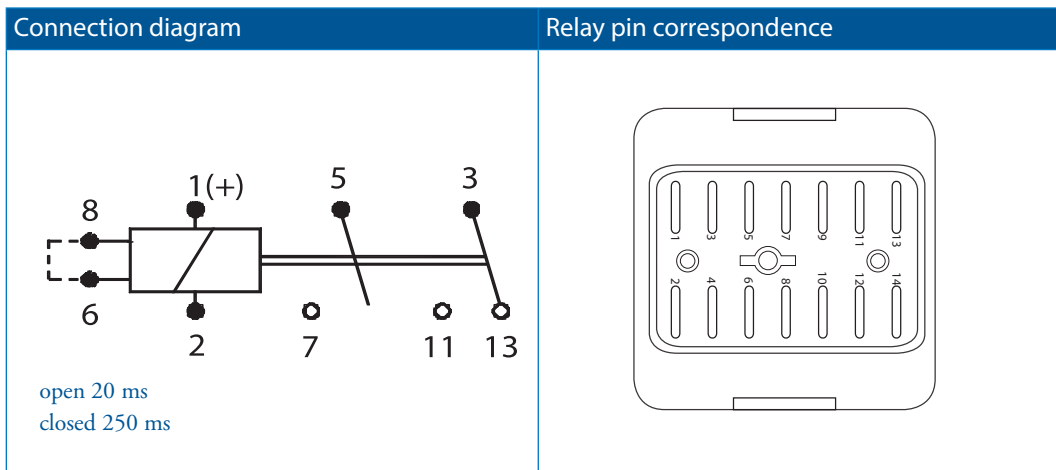


# ACD-U200 relay

## Technical specifications



### Functional and connection diagrams



# ACD-U200 relay

## Technical specifications

### Time delay specifications

Triptime pull-in	< 15 ms, at slowly increasing voltage, a step function will increase the pull-in time
Triptime drop-out	20 ms (terminals 6/8 open) 250 ms (terminals 6/8 closed)
Repeat accuracy	± 1 %
Temperature coefficient	± 0.1 %/K )

### Input data

Type	U <sub>nom</sub> (V)	U <sub>max</sub> (V)	U <sub>pull-in</sub> (V)	U <sub>hysteresis</sub> (V)	Power (W)
U201	24	35	21...33	1...8	< 0.55
U202	48	70	42...66	2...16	< 0.85
U203	72	105	63...99	3...24	< 1.15
U204	110	160	90...140	5...37	< 1.35
U205	96	140	84...132	4...32	< 1.30
U207	36	52	31...50	1.5...12	< 0.75
U218	60	88	52...82	3...20	< 1.10

Other types on request

### Contact characteristics

Maximum make current	15 A
Maximum cont. current	6 A (AC1 ; IEC 60947)
Maximum switching voltage	300 VDC, 300 mA 250 VAC, 2.6 mA
Minimum switching voltage	12 V, 10 mA
Maximum contact resistance	15 mΩ
Maximum switching capacity and contact life:	see graph
Material	Ag + 0.2 μm Au
Contact gap	0.3 mm
Insulation between open contacts	1 kV ; 50 Hz ; 1 min
Contact force	> 20 cN



# ACD-U200 relay

## Technical specifications

### Electrical characteristics

Dielectric strength	EN 50155	
Pole-pole	IEC 60255-5	3.5 kV, 50 Hz
Cont-coil	IEC 60077	4 kV, 50 Hz, 1 min
Pulse withstanding	IEC 60255-5	5 kV (1.2/50 µs)
EMC	EN 50121-3-2	

### Mechanical characteristics

Mechanical life	30 x 10 <sup>6</sup> operations
Maximum switching frequency	Mechanical: 3600 ops/h Electrical: 1200 ops/h
Maximum torque value screw to lock knob	0.15 Nm
Weight	120 g

### Environmental characteristics

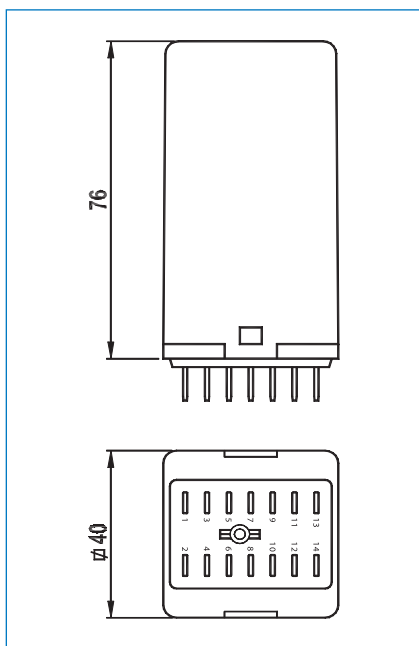
Environmental	EN 50125-1 and IEC 60077-1
Vibration	IEC 61373, Category I, Class B, Body mounted
Shock	IEC 61373, Category I, Class B, Body mounted
Operating temperature	-25 °C...+70 °C
Humidity	95 % (temporary permitted condensation)
Salt mist	IEC 60068-2-11, Class ST 4
Damp heat	IEC 60068-2-30, Test method Db variant 1
Protection	IEC 60529, IP40 (relay on socket)
Fire & smoke	NF F 16-101, NF F16-102, TS 45545-2
Insulation materials	Cover: polycarbonate Base: polyester



# ACD-U200 relay

## Technical specifications

### Dimensions (mm)



# ACD-U200 relay

## Technical specifications

### Options

Code	Description	Remark	Cannot be combined with:
<b>B</b>	Magnetic arc blow-out		
<b>E*</b>	Au; Gold plated contacts (10 µm)	Only for fixed settings	
<b>K</b>	Extra dust protection		
<b>L</b>	LED indicator		
<b>Q</b>	Double zener diode over coil		
Keying	Coil coding relay and socket		

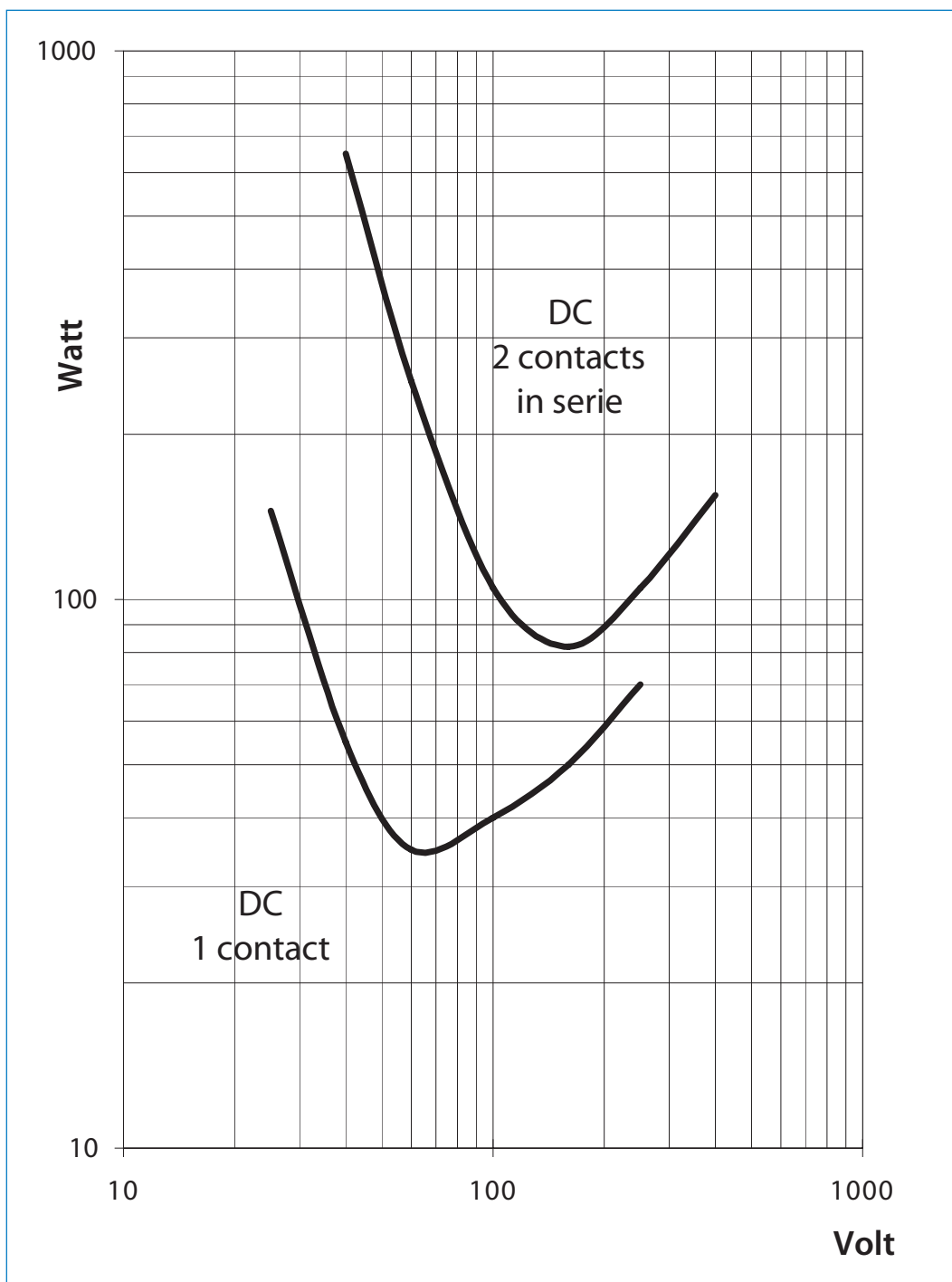
* Gold plated contacts characteristics	
Material	Ag, 10 µm gold plated
Maximum switching voltage	60 V (higher voltages may be possible, contact Mors Smitt for more information)
Maximum switching current	400 mA (at higher rate gold will evaporate, then the standard silver contact rating of minimum 10 mA and 12 V is valid)
Minimum switching voltage	5 V
Minimum switching current	1 mA



# ACD-U200 relay

## Technical specifications

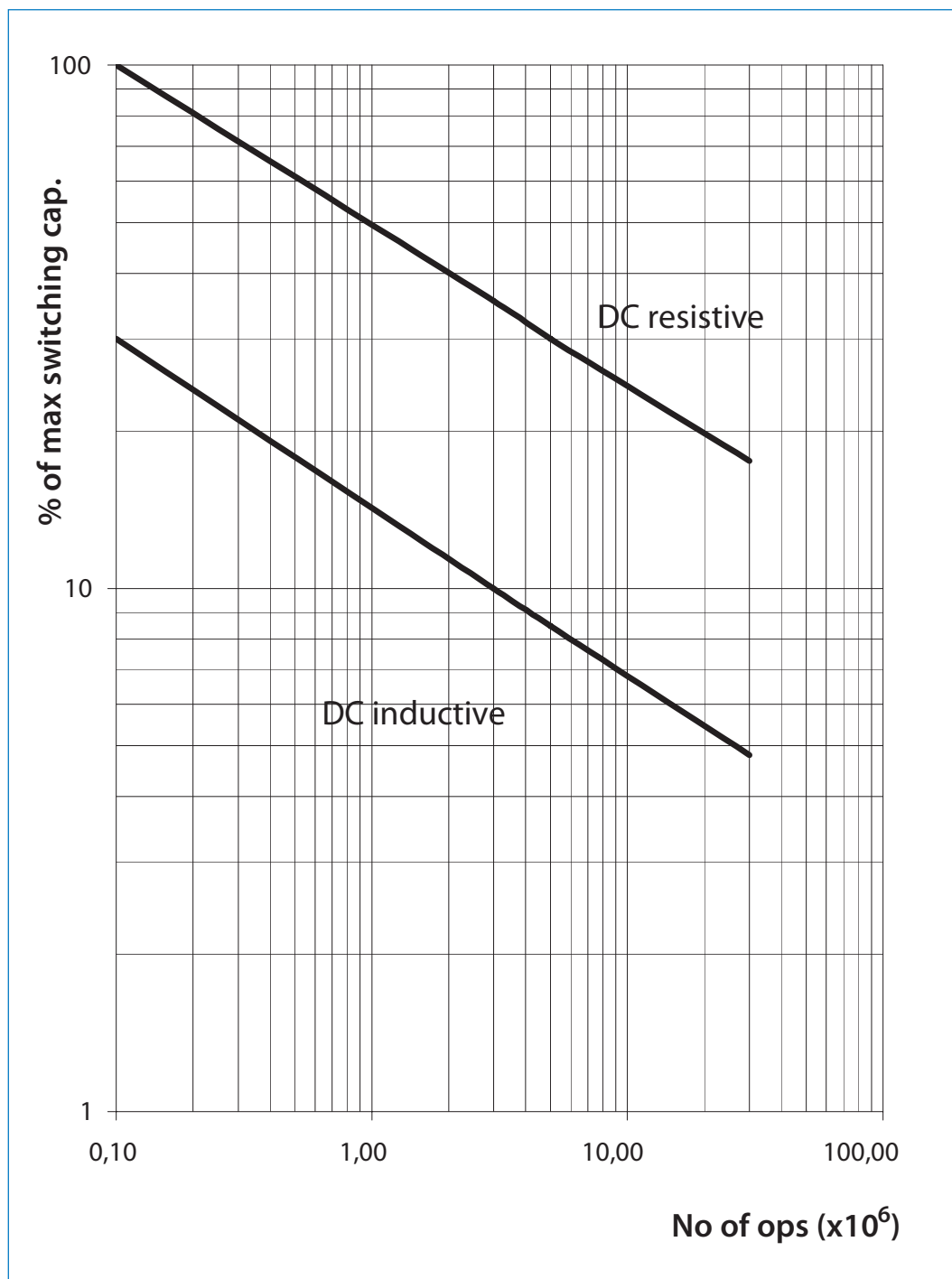
### Maximum switching capacity



# ACD-U200 relay

## Technical specifications

### Contact life





# ACD-U200 relay Sockets

## Mounting possibilities/sockets



### Surface/wall mounting

338000302	V22BR	Screw socket, wall mount, front connection (9 mm terminals)
338000580	V23	Screw socket, wall mount, front connection (7.5 mm terminals)
338000610	V29	Spring clamp socket, wall mount, front dual connection (2.5 mm <sup>2</sup> )

### Rail mounting

338000580	V23	Screw socket, rail mount, front connection (7.5 mm terminals)
338000402	V23BR	Screw socket, rail mount, front connection (9 mm terminals)
338000610	V29	Spring clamp socket, rail mount, front dual connection (2.5 mm <sup>2</sup> )

### Panel/flush mounting

338100100	V3	Solder tag socket, panel mount, rear connection
328400100	V26	Crimp contact socket, panel mount, rear connection, A260 crimp contact
338000560	V31	Faston connection socket, rear dual connection (6.3 mm)
338000570	V33	Spring clamp socket, flush mount, rear dual connection (2.5 mm <sup>2</sup> )

### PCB mounting

338000561	V32	PCB soldering socket
-----------	-----	----------------------

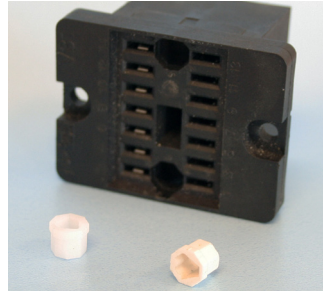
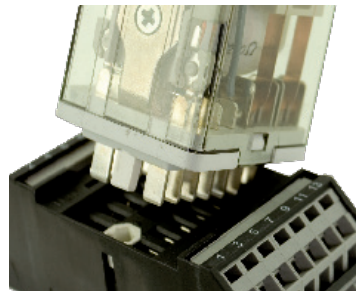
For more details see datasheets of the sockets



# ACD-U200 relay

## Keying

### Mechanical keying relay and socket (optional)



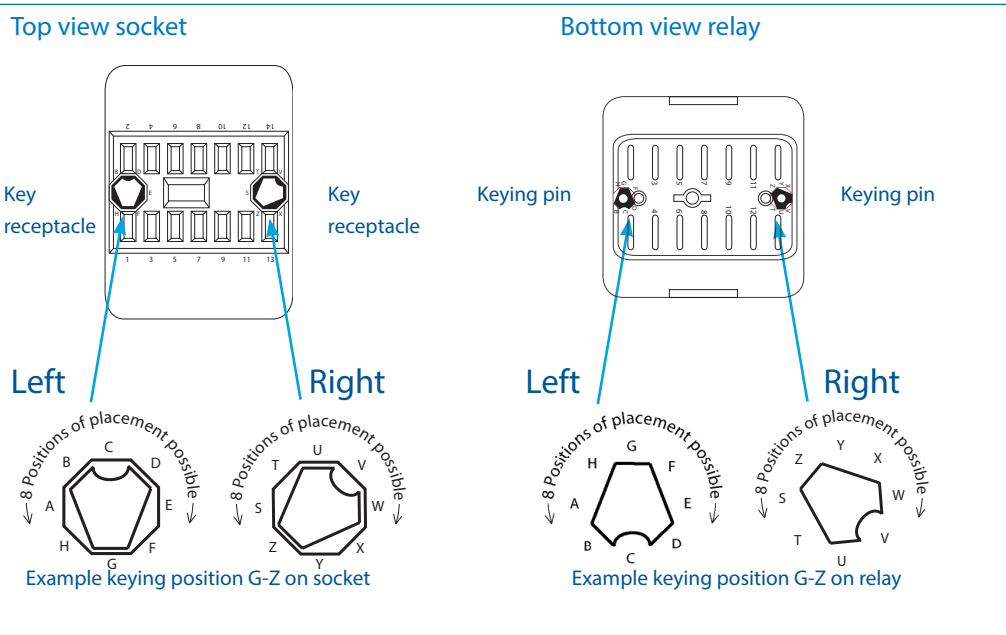
Function:

- To prevent wrong installation
- To prevent damage to equipment
- To prevent unsafe situations

Using keyed relays and sockets prevents a relay is inserted in a wrong socket. For example it prevents that a 24 VDC relay is put in a 110 VDC circuit. Positive discrimination is possible per different function, coil voltage, timing, monitoring, safety and non-safety.

The D relay socket keying option gives  $8 \times 8 = 64$  possibilities. Upon ordering the customer simply indicates the need for the optional keying. Mors Smitt will assign a code to the relay and fix the pins into the relay. The sockets are supplied with loose key receptacles. Inserting the keys into the socket is very simple and self explaining.

Remark: Sockets and relay shown are only examples.



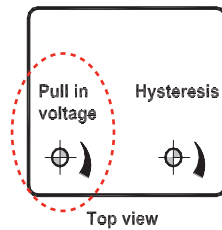
# ACD-U200 Instructions



## Adjustment procedure ACD relay

Required tools:

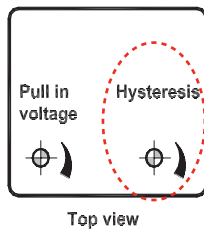
- Adjustable power supply 0-100V DC
- Small screwdriver
- Relay D-socket



### Pull-in voltage



1. First turn the bottom left potentiometer (Pull in voltage) fully clock wise  until its stop<sup>A)</sup>
2. Apply the *desired pull-in voltage* across relay terminals 1 and 2 (1 is positive). The relay should NOT pull in at this moment
3. *Slowly*<sup>B)</sup> turn the left potentiometer counter clockwise  until the relay pulls in
4. Keep the pull-in voltage applied across the relay terminals, the relay should remain energised

### Drop-out voltage

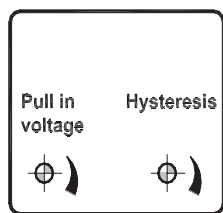


5. Now turn the right bottom potentiometer (Hysteresis) fully clock wise  until its stop<sup>A)</sup>
6. Lower the applied voltage across the relay terminals to the *desired drop-out voltage*. The relay output should still remain energised after the voltage has been lowered
7. *Slowly*<sup>B)</sup> turn the right potentiometer counter clockwise  until the relay drops out

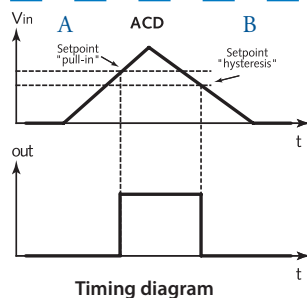
The relay has now been adjusted and is ready for use

- A) One can see that the potentiometer wiper (small red block) is in its top position, by looking through the relay cover.  
 B) There is a slight pull-in/-out delay when the limit voltage is reached. Therefore it is important to slowly turn the potentiometer, to allow voltages inside the relay to settle.

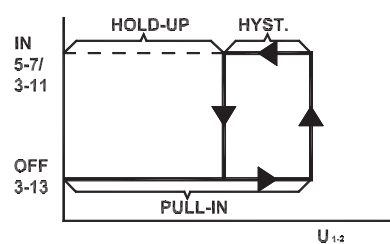
Remark: Adjustable relays are usefull for use in the engineering and testphase of a project. After the testphase, in series, fixed setting relays can be used.



A Top view B  
Adjustments



Timing diagram



Working principle



# ACD-U200

## Instructions

### Installation, operation & inspection

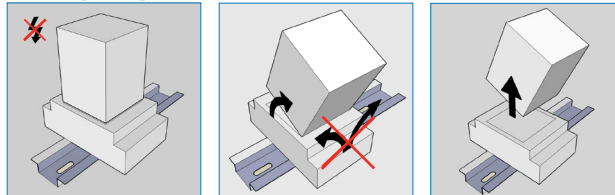
#### Installation

Before installation or working on the relay: disconnect the power supply first! Install socket and connect wiring according to the terminal identification. Plug relay into the socket ensuring there is no gap between the bottom of relay and the socket. Reverse installation into the socket is not possible due to the mechanical blocking snap-lock feature. Check to ensure that the coil connection polarity is not reversed. Relays can be mounted tightly together to save space.

When rail mounting is used, always mount the socket in the direction of the UP arrow, to have proper fixation of the socket on the rail.

#### Warning!

- Never use silicon in the proximity of the relays.
- Do not use the relay in the presence of flammable gas as the arc generated from switching could cause ignition.
- To remove relays from the socket, employ up and down lever movements. Sideway movement may cause damage to the coil wires.



#### Operation

After installation always apply the rated voltage to the coil to check correct operation.

Long term storage may corrode the silver on the relay pins. When plugging the relay into the socket, the female bifurcated or trifurcated receivers will automatically cut through the corrosion on the pins and guarantee a reliable connection.

Before actual use of relays, it is advised to switch the load several times with the contacts. The contacts will both be electrically and mechanically cleaned due to the positive wiping action. Sometimes a contact can build up increased contact resistance ( $\leq 15 \text{ m}\Omega$  when new). When using silver contacts one can clean the contact by switching a contact load a few times using  $>24 \text{ VDC}$  &  $\sim 2 \text{ A}$ . Increased contact resistance is not always problematic, as it depends on circuit conditions. In general a contact resistance of  $1 \Omega$  is no problem, consult Mors Smitt for more information.

Condensation in the relay is possible when the coil is energised (warm) and the outside, environmental temperature is cold. This is a normal phenomenon and will not affect the function of the relay. Materials in the relay have no hygroscopic properties.

#### Inspection

Correct operation of the relay can easily be checked as the transparent cover provides good visibility of the moving contacts. If the relay does not seem to operate correctly, check for presence of the appropriate coil voltage and polarity using a suitable multimeter. If a LED is fitted, it indicates voltage presence to the coil. If coil voltage is present, but the relay does not operate, a short circuit of the suppression diode is possible (This may be due to the coil connection having been reversed).

If the relay doesn't work after inspection, replace the relay unit with a similar model. Do not attempt to open the relay cover or try to repair. Contacts are calibrated and in balance, touching can affect proper operation.

Also re soldering may affect correct operation. Since 2009 relays have tamper proof seals fitted and once broken, warranty is void.

Most relay defects are caused by installation faults such as over voltage, spikes/transients, high/short current far exceeding the relay specifications. When returning the relays for investigation, please provide all information on the RMA form. Send defective relays back to the manufacturer for repair or replacement. Normal wear and tear or external causes are excluded from warranty.



# ACD-U200 relay

## Ordering scheme



This example represents a ACD-U204-K.  
 Description: ACD-U200 series relay, Unom: 110 VDC, special dust protection,

### 1. Relay model

**ACD-U2**

### 2. Coil Voltages

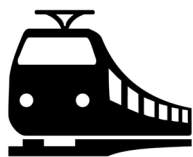
01	24 VDC
02	48 VDC
03	72 VDC
04	110 VDC
05	96 VDC
06	12 VDC
07	36 VDC
18	60 VDC

### 3. Options

B	Magnetic arc blow out
E	Gold plated contacts
K	Special dust protection (only for fixed voltage setting)
L	LED indicator
Q	Double zener diode

### 4. Fixed voltage settings optional





**Mors Smitt France SAS**

Tour Rosny 2, Avenue du Général de Gaulle,  
F - 93118 Rosny-sous-Bois Cedex, FRANCE  
T +33 (0)1 4812 1440, F +33 (0)1 4855 9001  
E sales.msf@wabtec.com

**Mors Smitt Asia Ltd.**

29/F, Fun Towers, 35 Hung To Road  
Kwun Tong, Kowloon, HONG KONG SAR  
T +852 2343 5555, F +852 2343 6555  
E sales.msa@wabtec.com

**Mors Smitt B.V.**

Vrieslantlaan 6, 3526 AA Utrecht,  
NETHERLANDS  
T +31 (0)30 288 1311, F +31 (0)30 289 8816  
E sales.msbv@wabtec.com

**Mors Smitt Technologies Inc.**

1010 Johnson Drive,  
Buffalo Grove, IL 60089-6918, USA  
T +1 847 777 6497, F +1 847 520 2222  
E salesmst@wabtec.com

**Mors Smitt UK Ltd.**

Graycar Business Park, Barton under Needwood,  
Burton on Trent, Staffordshire, DE13 8EN, UK  
T +44 (0)1283 722650 F +44 (0)1283 722651  
E sales.msuk@wabtec.com

**RMS Mors Smitt**

6 Anzed Court, Mulgrave,  
VIC 3170, AUSTRALIA  
T +61 (0)3 8544 1200 F +61 (0)3 8544 1201  
E sales.rms@wabtec.com