

# Automatic Transfer Switch OTM\_C\_21D

## Installation and operating instructions



Read through this instruction book carefully before working on the switch, and keep this instruction book safe for later reference.

The images provided in this instruction book are for illustration only and may not match the actual product exactly.

This instruction book is subject to change for product updates without prior notice.

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# 1. Symbols & Terms

## 1.1 Use of symbols



**Risk of Electric shock:**

warns about a situation where a hazardous voltage may cause physical injury to a person or damage to equipment.



**General warning:**

warns about a situation where something other than electrical equipment may cause physical injury to a person or damage to equipment.



**Caution:**

provides important information or warns about a situation that may have a detrimental effect on equipment.



**Information:**

provides important information about the equipment.

## 1.2 Explanations of abbreviations and terms

OTM_C_21D	Automatic transfer switch, the type name
LN1-Switch I	Power supply line, e.g. the primary line
LN2-Switch II	Power supply line, e.g. the secondary line used in emergency cases
EMERG OFF (fire control system)	Used to drive the automatic transfer switch transfers to the "O" position when receiving EMRG OFF signal.
AUTO	Automatic mode
Remote test	A sequence to test the functionality of the automatic transfer switch
Ts	Switching delay
TBs	Back switching delay
OV	Adjustable overvoltage threshold
UV	Adjustable undervoltage threshold

*Table 1. Explanations of abbreviations and terms*



## 2. Product overview

### 2.1 Product overview and packing

The OTM\_C\_21D automatic transfer switch can be used as a source transfer switch in a three-phase or single-phase networks. Monitored conditions are, no-voltage, phase-loss, overvoltage and undervoltage detection, transfer delays, generator start and stop, and remote test function. Source transfer can be performed using a manually operated handle, locally using push buttons or fully automatically. The automatic mode includes several operating methods: Line 1 priority, no line priority and manual back switching mode.

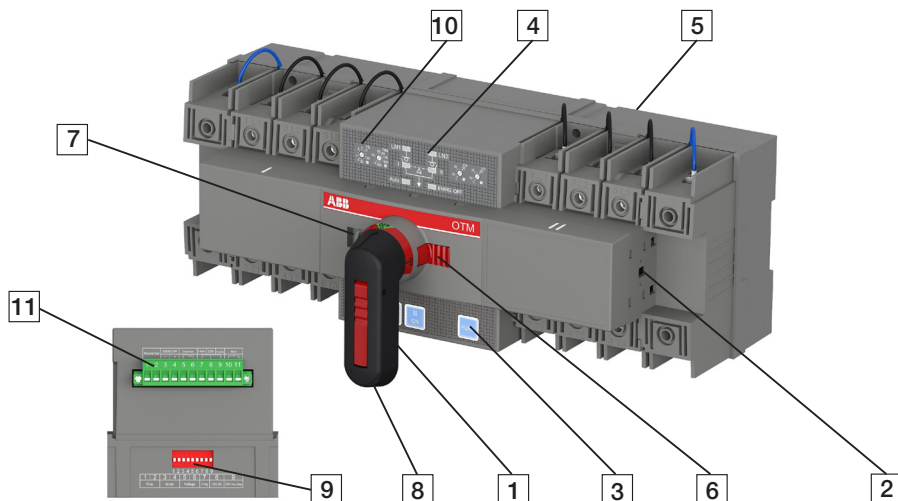


Figure 1. OTM\_C\_21D automatic transfer switch

- |                                       |  |
|---------------------------------------|--|
| 1. Handle for manual operation        | 7. Locking latch for releasing the handle and locking electrical control |
| 2. Place for auxiliary contact blocks | 8. Locking clip for locking manual operation                             |
| 3. Push button                        | 9. Dip switches  |
| 4. Mimic panel                        | 10. Rotary switches  |
| 5. Voltage sensing connections        | 11. Connecting terminal  |
| 6. Locking clip for padlock           |  |

#### The standard package includes:

1. automatic transfer switch, 2. handle, 3. handle storage clip and 4. terminal plug.

## 2.2 OTM\_C\_21D switching sequence

### 2.2.1 Line 1 Priority (default mode)

The switching sequence of OTM\_C\_21D can be summarized in following steps:

- An anomaly occurs on the Line 1 (LN1)
- Switching delay  $T_s$ , in case of phase-loss, overvoltage and undervoltage conditions
- Generator start, immediate start generator in case of black-out, in case of phase-loss, overvoltage or undervoltage after switching delay  $T_s$ . (If Generator mode is selected)
- Change-over switch (Switch I) to the position 0
- Change-over switch (Switch II) to the position II

And the back switching sequence can be summarized in the following steps:

- The Line 1 will start the normal functioningl Back switching delay  $T_{Bs}$
- Change-over switch (Switch II) to the position 0
- Change-over switch (Switch I) to the position I
- Generator stop delay  $G_s$
- Generator stop

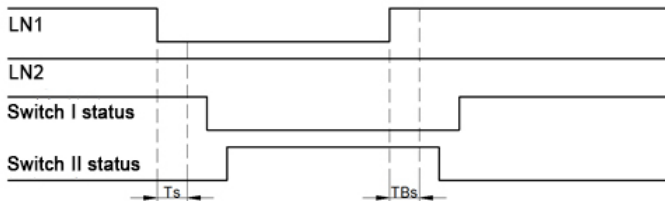


Figure 2. Automatic Switching Sequences in OTM\_C\_21D, Line 1 priority

### 2.2.2 No line priority

The switching sequence of OTM\_C\_21D can be summarized in following steps:

- An anomaly occurs on the Line 1 (LN1)
- Switching delay  $T_s$ , in case of phase-loss, overvoltage and undervoltage conditions
- Change-over switch (Switch I) to the position 0
- Change-over switch (Switch II) to the position II

And the back switching sequence can be summarized in the following steps:

- The Line 1 will start the normal functioning
- Change-over switch stays in position II
- An anomaly occurs on the Line 2 (LN2)
- Back switching delay
- Change-over switch (Switch II) to the position 0
- Change-over switch (Switch I) to the position I

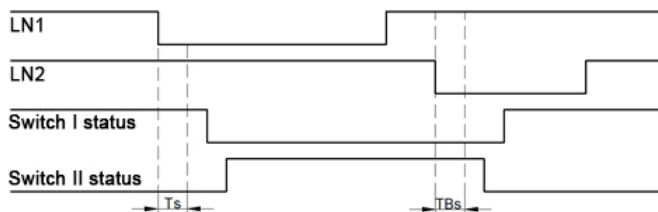


Figure 3. Automatic Switching Sequences in OTM\_C\_21D, No line priority



Generator is disabled in no line priority. Keep generator off in this mode.

### 2.2.3 Manual back switching mode

The switching sequence of OTM\_C\_21D can be summarized in following steps:

- An anomaly occurs on the Line 1 (LN1)
- Switching delay  $T_s$ , in case of phase-loss, overvoltage and undervoltage conditions
- Generator start, immediate start generator in case of black-out, in case of phase-loss, overvoltage or undervoltage after switching delay  $T_s$ . (If Generator mode is selected)
- Change-over switch (Switch I) to the position 0
- Change-over switch (Switch II) to the position II

And the back switching sequence can be summarized in the following steps:

- The Line 1 will start the normal functioning
- Change-over switch stays in position II
- An anomaly occurs on the Line 2 (LN2)
- Change-over switch stays in position II
- Change-over switch can be transferred manually back to position I

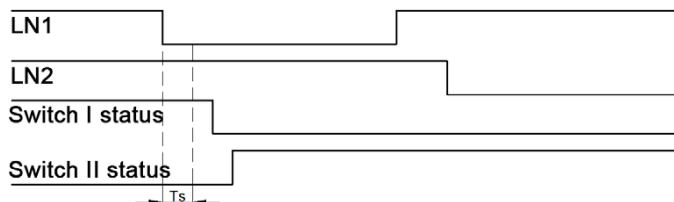


Figure 4. Automatic Switching Sequences in OTM\_C\_21D, Manual back switching mode

## 3. Quick start

### 3.1 Operating the switch manually (local operation)

To operate the switch manually:

1. Attach the handle to the switch panel. You can attach the handle in any position.
2. When the handle is attached, the automatic transfer switch will automatically be in Manual mode and won't operate automatically in case of line failure. The AUTO LED on the mimic panel is OFF.

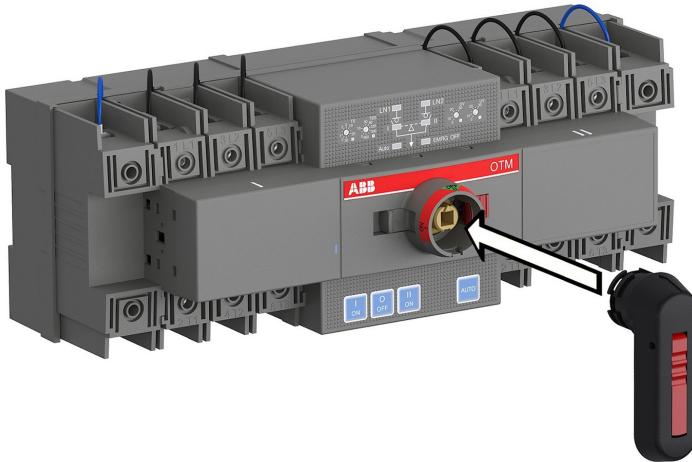


Figure 5. Operating the switch manually



When the handle is attached, the switch will automatically be in “manual mode” with the automatic operation disabled.



Do not tamper with wires when the transfer switch is powered on.



Before powering on the transfer switch, please manually operate it to ensure it can operate and moves normally.



Then power supply is normal and without the handle attached or EMRG OFF signals, the switch will be in automatic mode and switch to the primary line upon initial power-up. Keep the handle attached if you do not want the switch to be in automatic mode upon initial power-up.

## 3.2 Automatic operation

OTM\_C\_21D must be in automatic mode and the “AUTO” LED is on in order that the switch can perform automatic transfer cycles according to the pre-set operating mode.

To operate the switch electrically:

**If the handle is inserted:**

1. Press handle locking clip and remove the handle from the switch.
2. Press “AUTO” button and the “AUTO” LED will be ON, indicating automatic mode.

**If handle is not inserted**

1. If “AUTO” LED blinks, press “AUTO” button and the “AUTO” LED will be ON, indicating automatic mode.
2. Automatic operation includes three operating modes: Line 1 priority (factory default setting), No line priority, and manual back switching mode.

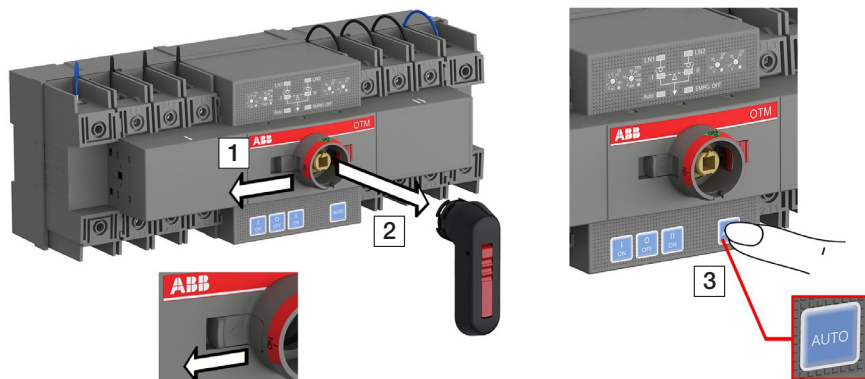


Figure 6. Selecting the automatic transfer OTM\_C\_21D switch to Auto Mode

## 3.3 System testing

### 3.3.1 Local test

In automatic mode, "AUTO" LED is ON and you can transfer the switch using I, O, and II push buttons on the front panel of the switch.

Press "AUTO" button to return the automatic operation.

### 3.3.2 Remote test

The procedure of the remote test is as follows:

1. Connect to the remote test signal according to Figure 7.
2. Ensure that the OTM\_C\_21D is in automatic mode ("AUTO" LED is on).
3. Short circuit the remote test signal for at least 100 ms until the "AUTO" LED blinks to enter the test mode.

Under test mode, the automatic transfer switch will simulate switching cycle and finally return to its original position prior to the activation of the test mode.

e.g., when the switch is in Position I:

Enter test signals; the switch transfers to Position O → to Position II → to Position O → to Position I. Entering test signals is invalid before the automatic transfer switch returns to its original position.

Under test mode, press the "AUTO" button to cancel test mode and return to automatic mode. The "Auto" LED will be "ON" as normal.

4. After the remote test finishes, the OTM\_C\_21D automatically returns to the automatic mode ("AUTO" LED is on).

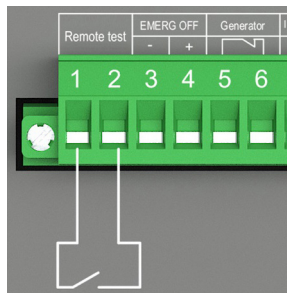


Figure 7. Remote test connection in OTM\_C\_21D



In the test sequence, the main power supply circuit will be closed.



If the test sequence is interrupted due to power failure, the automatic transfer switch will enter "automatic mode" after power recovery.

## 3.4 Locking

### 3.4.1 Locking the electrical operation

The switch can be padlocked in any position, causing that all operating modes and test operations are disabled and handle cannot be inserted. See below for operation:

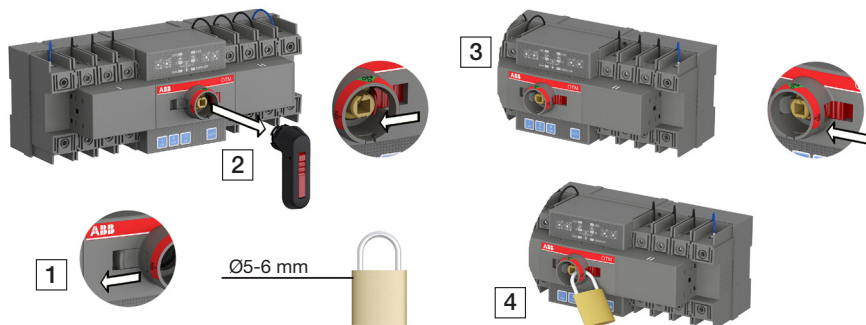


Figure 8. Locking the electrical operation

### 3.4.2 Locking the manual operation

By default, the manual operation can only be locked in position 0. The handle can be padlocked by pulling out the clip from the handle and place the padlock on the handle see Figure 9.

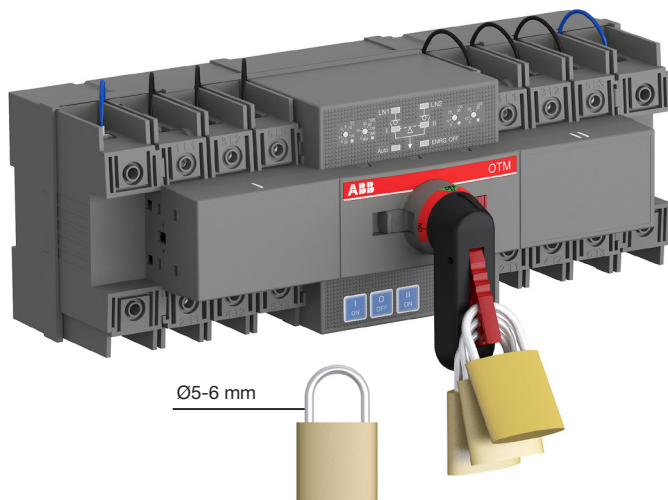


Figure 9. Locking the manual operation

## 4. Interface and Settings

### 4.1 Buttons

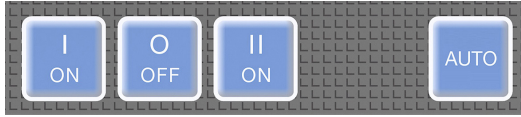


Figure 10 Buttons

Button	Function	Remarks
I ON	Transfer to LN1	Only available in automatic mode and remote test mode
O OFF	Transfer to 0 position	
II ON	Transfer to LN2	
Auto	Select automatic mode, fault clearance and reset.	

Table 2. Buttons



Transfer using buttons bypass switching and back switching delays.

### 4.2 LEDs

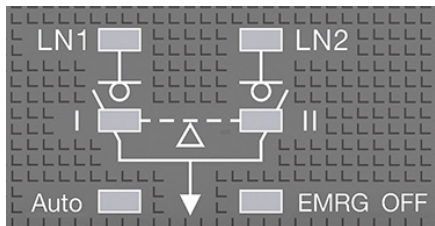


Figure 11. LEDs

LED	Display	Status description
LN1/LN2	ON	Source available
	Blinking	Overtoltage, undervoltage or phase loss
	OFF	Source not available
I/II	ON	Switch I or II closed
	OFF	Switch I or II open
	Blinking	Switching failure
Auto	ON	Transfer switch in automatic mode
	Blinking	Transfer switch in test mode or invalid setting
	OFF	Transfer switch in manual mode
EMRG OFF	ON	Receiving emergency signals
	OFF	No emergency signals input

Table 3. LEDs



### 4.3 Rotary switch setting

1. **Switching delay Ts:** The delay of switching from primary line to secondary line in automatic mode; Choose from 0, 1, 2, 3, 5, 10, 15, 20, 25, and 30 seconds.

**Back switching delay TBS:** The delay of switching from secondary line to primary line in automatic mode; Choose from 0, 5, 10, 20, 30, 60, 120, 300, 600, and 900 seconds.

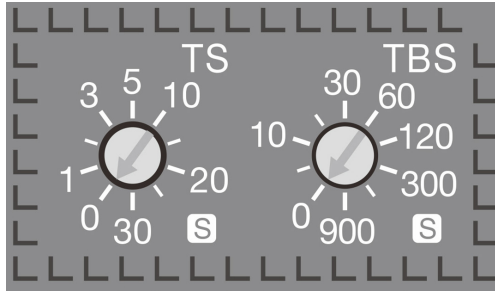


Figure 12. Rotary switch, Ts and TBS

2. **Overvoltage threshold OV (%) and undervoltage threshold UV (%):** The benchmarks of the OV and UV are the rated voltage of the switch. When the voltage is higher than the preset OV value or lower than the pre-set UV value, the switch performs automatic transfer.

The value of OV can be 5%, 10%, 15%, 20%, 25%, and 30%.

The value of UV can be 5%, 10%, 15%, 20%, 25%, and 30%.

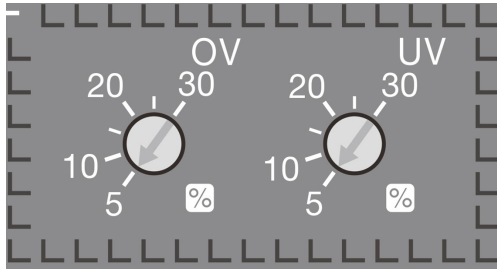
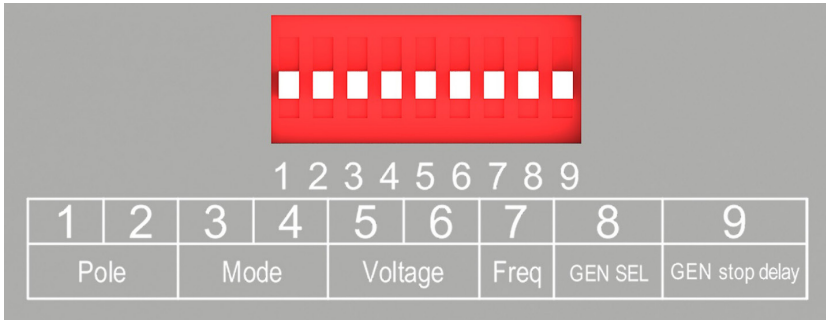


Figure 13. Rotary switch, OV and UV

## 4.4 Dip switch setting



The 9-dip switch is used to set the working modes of transfer switch.

Dip No.	Function	Setting			
1, 2	Pole setting	<b>01</b>	<b>10</b>	<b>11</b>	<b>00</b>
		2 poles	3 poles	4 poles	Invalid setting
3, 4	Mode setting	<b>01</b>	<b>10</b>	<b>11 (default)</b>	<b>00</b>
		No line priority	Manual back switching	Line priority LN1	Invalid setting
5, 6	Voltage setting	<b>01</b>	<b>10</b>	<b>11</b>	<b>00</b>
		240VAC/415VAC	230VAC/400VAC	220VAC/380VAC	Invalid setting
7	Frequency setting	<b>0</b>	<b>1 (default)</b>		
		60 Hz	50 Hz		
8	Generator selection	<b>0</b>	<b>1 (default)</b>		
		No	Yes		
9	Generator stop delay setting	<b>0</b>	<b>1 (default)</b>		
		240s	30 s		

Table 4. Dip switch



The 9-bit dial is used to control the switch for circuit testing, and the mismatch with the load power supply will result in testing and transfer failure. Therefore, carefully read this guide and set correct parameters based on the actual situation before using this product.

### 4.5 Terminal outputs and inputs

The switch has 11 bits of signal terminals for users to input and output signals.

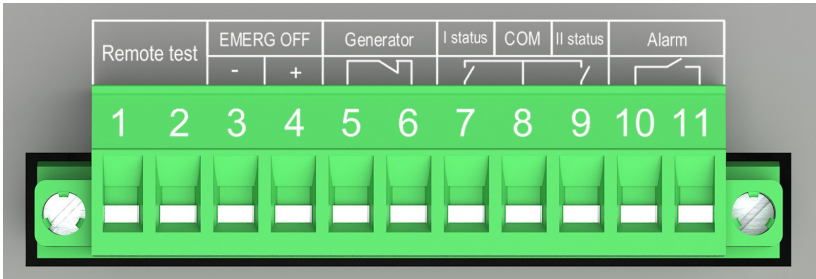


Figure 15. Terminals

Terminal No.	Function
1, 2	Remote test: connection for at least 100 ms for the switch to enter the remote test mode.
3, 4	EMRG OFF: Input the 24VDC EMRG OFF signals for at least 1s until the switch transfers to the EMRG OFF position and the EMRG OFF LED is on. At this time, the switch cannot enter the automatic or test mode and only handle operation is allowed. After the signal is canceled, press “AUTO” to quit EMRG OFF.
5, 6	Generator start: Dry contact, Generator start signal output. When the secondary power is a generator, they are used to start (close signal) and stop (disconnect signal) the generator. After the switch transfers to the primary power, the generator stop signal is sent after the preset delay for generator stop (see the No. 9 in section 4.3 for the generator stop delay setting).
7,8,9	Switch status, Dry contact, Switch feedback output signal to show the actual position of the transfer switch.
10, 11	Alarm: Dry contact, The switch outputs consecutive alarm signals in EMRG OFF mode or refuses to perform operations. The alarm signals are cleared after quitting the EMRG OFF mode or fault recovered.
Output contacts	Output contact relays are dry contactz and therefore external voltage supply is required. 24VDC or up to 250VAC max. 3A AC1

Table 5. Terminals

## 5. Technical data

Automatic transfer switch	Parameters
Rated operational voltage Ue [V]	220~240 V AC 50~60 Hz
Operating voltage range	0.7~1.3 Ue
Measuring accuracy	±3%
Operating angle	90° ( O-I, I-O, O-II, II-O) 180° ( I-O-II, II-O-I)
OFF time	0,6 - 0,7 s
Total transfer time	2.5 s
Electromagnetic compatibility	Class A
Ingress Protection Rating	IP20, front panel
Rated impulse withstand voltage U <sub>imp</sub>	8 kV (6 kV for control circuit, disconnect the power line of the control circuit before carrying out the dielectric voltage withstand test)
Operating temperature	-25~55 °C
Transportation and storage temperature	-40~70 °C
Altitude	Max. 2000 m

Table 6. Technical data

## 6. Installation

### 6.1. Installation method

The switch can be installed using screws or a DIN rail.

The fixed installation mode on the base board is as follows:

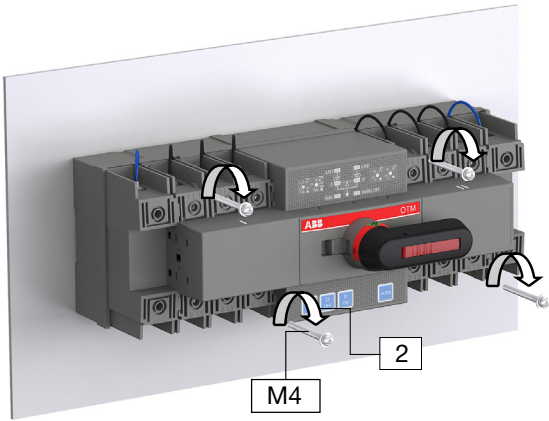


Figure 16. Installation of OTM\_C\_21D, screw.

The DIN rail installation mode is as follows:

First pry out the latch with an appropriate tool, as shown in Figure 17.



Figure 17. Installation of OTM\_C\_21D, DIN rail

After attaching the switch to the DIN-rail, push the latch back to lock it.



Figure 18. Installation of OTM\_C\_21D, DIN rail



After attaching the switch to the DIN-rail, make sure you push the latch to the lock position, otherwise the switch may fall off.

## 6.2. Installation dimensions

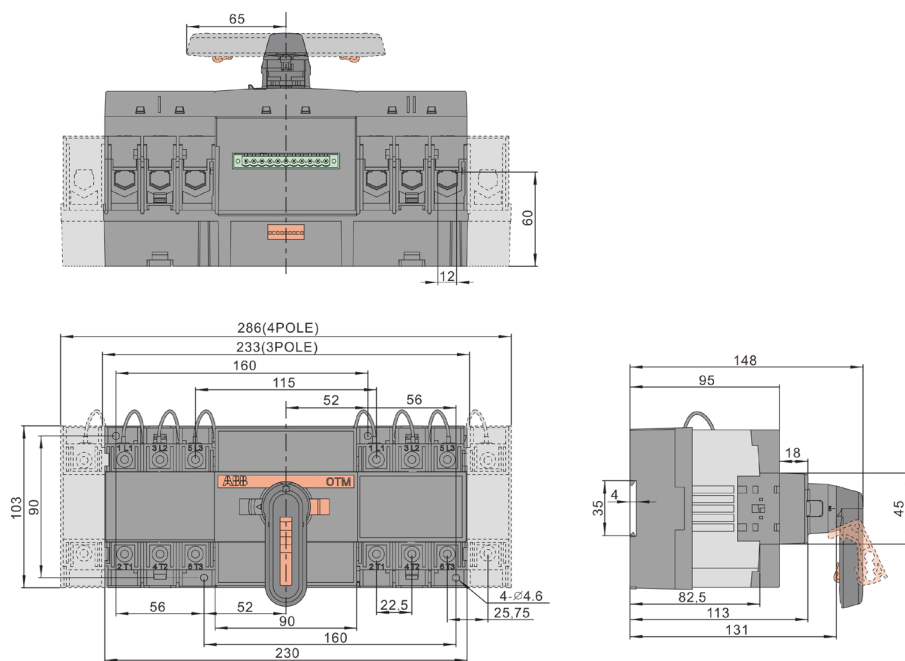


Figure 19. Dimensions

# 7. Optional accessories

## 7.1 Bridging bars

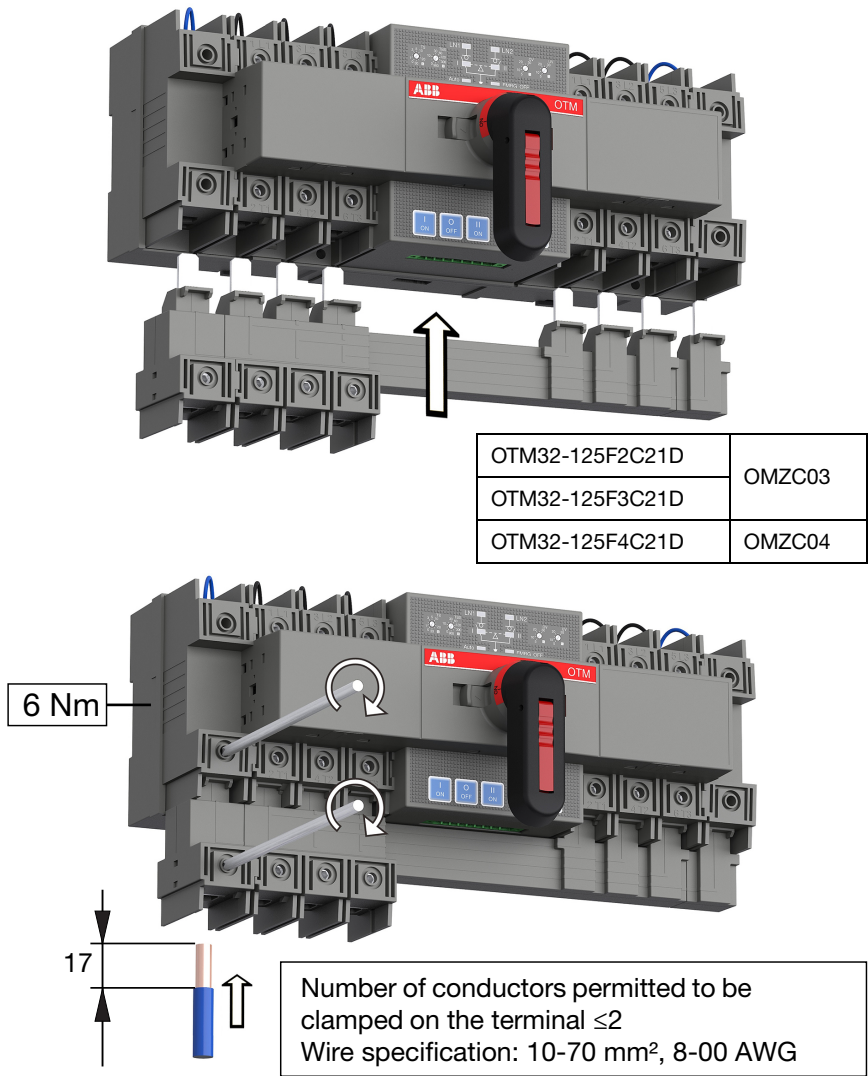


Figure 20. Bridging bars

## 7.2 Terminal shrouds

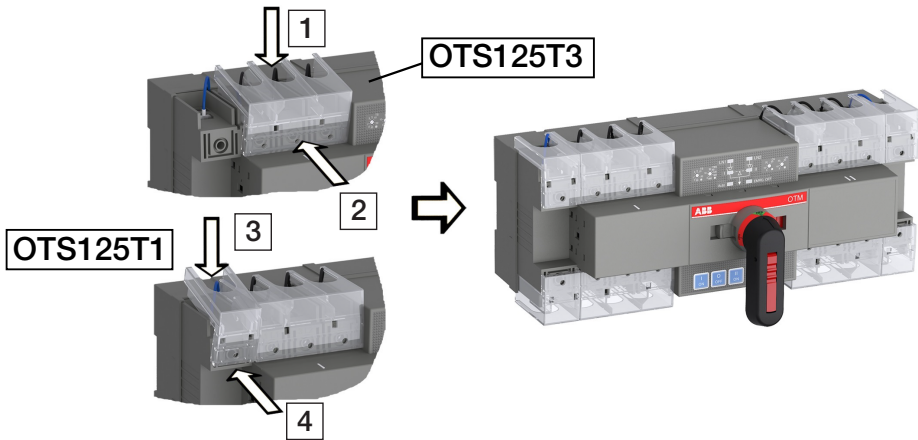


Figure 21. Terminal shrouds



7.3 Auxiliary contact blocks

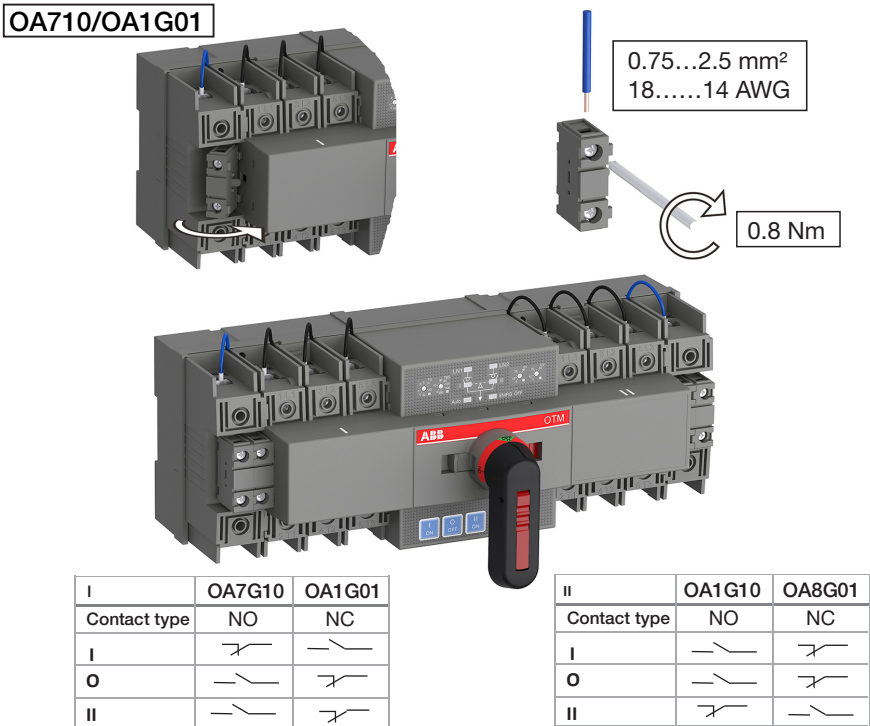


Figure 22. Auxiliary contact blocks

## 8. Maintenance and common troubleshooting

### 8.1 Maintenance

To ensure the operation reliability of switches, regular switching tests should be performed (once every 3 months) to confirm normal function.

### 8.2 Common troubleshooting

No	Fault Description	Fault Analysis	Troubleshooting Method
1	Power supply functioning normally, but LED not on	Control unit power supply terminal not connected with switch wiring terminal	Check and connect the power line
2	Power supply LED functioning normally but “AUTO” LED off, or no response with “AUTO” button pressed	Handle not pulled out or electrical padlock not removed	Pull out the handle or remove the padlock, and then press the “AUTO” button
3	Switching failure in case of faulty power supply	1. Switch not operating in automatic mode 2. Both power supplies malfunctioning	Make sure the switch working in automatic mode; check and make sure both power supplies are not malfunctioning simultaneously
4	EMRG OFF function failure	1. Check if the EMRG OFF signal is 24V DC 2. Too short duration of EMRG OFF signal	Correctly switch on the EMRG OFF signal, which should only be 24V DC with the duration $\geq 1$ s
5	“AUTO” LED blinking No response from buttons	1.DIP switch setting is invalid 2.Generator is ON in no priority mode.	Check if the DIP switch setup matches the power supply. Turn off generator in no priority mode.
6	“I” or “II” LED blinking	Execution rejected during switching operation, thus expected result not achieved	Manually set the switch to Position “O”, and press the “AUTO” button to reset
7	Power supply functioning normally and LED blinks	Wrong connection of the N wire	Re-connect the wires

Table 7. Troubleshooting

## 9. Appendix

### 9.1 Wiring diagram

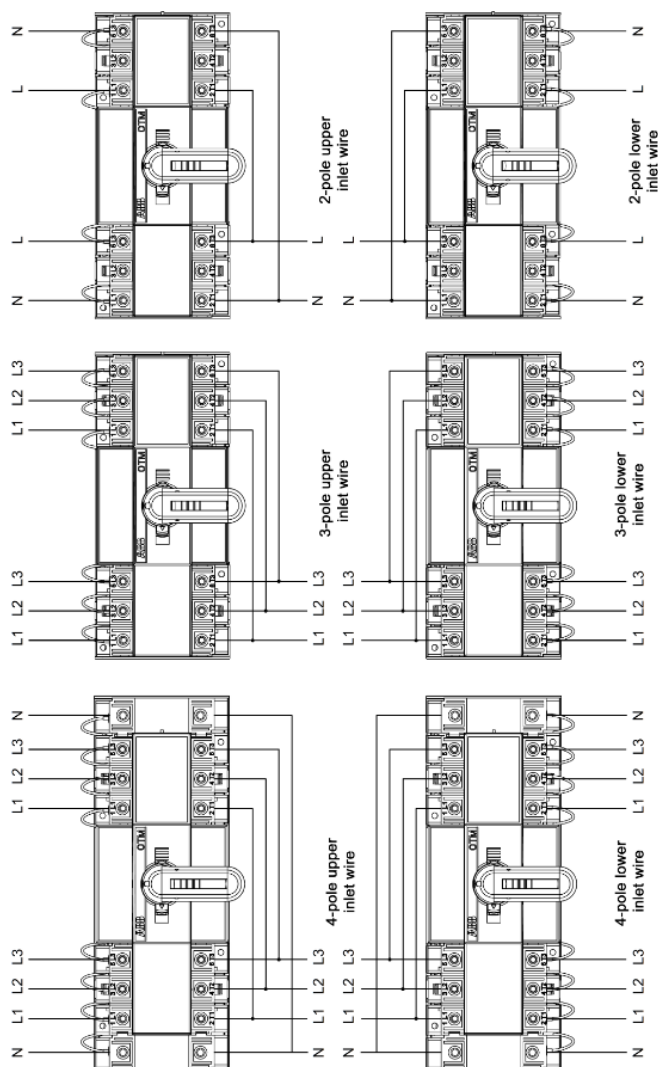


Figure 23. Wiring Diagram



BG	Внимание! Опасно напряжение! Да се монтира само от лице с електротехническа квалификация.
FR	Avertissement! Tension électrique dangereuse! Installation uniquement par des personnes qualifiées en électrotechnique.
MT	Twissija! Vultaġġ perikoluż! Għandu jiġi installat biss minn persuna b'kompetenza elettroteknika.
HR	Upozorenje! Opasan napon! Postavljati smije samo elektrotehnički stručnjak.
DE	Warnung! Gefährliche Spannung! Installation nur durch elektrotechnische Fachkraft.
PL	Ostrzeżenie! Niebezpieczne napięcie! Instalacja może dokonać wyłącznie osoba z fachową wiedzą w dziedzinie elektrotechniki.
CZ	Varování! Nebezpečné napětí! Montáž smí provádět výhradně elektrotechnik!
EL	Προειδοποίηση! Υψηλή τάση! Η εγκατάσταση πρέπει να γίνεται μόνο από εξειδικευμένους ηλεκτροτεχνικούς.
PT	Aviso! Tensão perigosa! A instalação só deve ser realizada por um electricista especializado.
DA	Advarsel! Farlig elektrisk spænding! Installation må kun foretages af personer med elektroteknisk ekspertise.
HU	Figyelmeztetés! Veszélyes feszültség! Csak elektrotechnikai tapasztalattal rendelkező szakember helyezheti üzembe.
RO	Avertizare! Tensiune periculoasă! Instalarea trebuie efectuată numai de către o persoană cu experiență în electrotehnică.
NL	Waarschuwing! Gevaarlijke spanning! Mag alleen geïnstalleerd worden door een deskundige elektrotechnicus.
IE	Rabhadh! Voltas guaiseach! Ba chóir do dhuine ag a bhfuil saineolas leictreiteicniúil, agus an té sin amháin, é seo a shuiteáil.
SK	Varovanie! Nebezpečné napätie! Montáž môže vykonávať iba skúsený elektrotechnik.
EN	Warning! Hazardous voltage! Installation by person with electrotechnical expertise only.
IT	Avvertenza! Tensione pericolosa! Fare installare solo da un elettricista qualificato.
SL	Opozorilo! Nevarna napetost! Vgradnjo lahko opravi le oseba z elektrotehničnim strokovnim znanjem.
ET	Hoiatus! Ohtlik pinge. Paigaldada võib ainult elektrotehnika-alane ekspert.
LV	Uzmanību! Bīstami - elektrība! Montāžas darbus drīkst veikt tikai personas, kurām ir atbilstošas elektrotehniskās zināšanas.
ES	¡Advertencia! ¡Tensión peligrosa! La instalación deberá ser realizada únicamente por electricistas especializados.
FI	Varoitus! Vaarallinen jännite! Asennuksen voi tehdä vain sähköalan ammattihenkilö.
LT	Dėmesio! Pavojinga įtampa! Dirbti leidžiama tik elektrotechnikų patirties turintiems asmenims.
SE	Varning! Farlig spänning! Installation får endast utföras av en elektriker.
CN	警告！电压危险！只能由专业电工进行安装。
RU	Осторожно! Опасное напряжение! Монтаж должен выполняться только специалистом-электриком.

The technical data and dimensions are valid at the time of printing.  
We reserve the right to make subsequent alterations.

For more information please contact:

**ABB Oy, Protection and Connection**  
P.O. Box 622, FI-65101 Vaasa, Finland  
[new.abb.com/low-voltage](http://new.abb.com/low-voltage)

Power and productivity  
for a better world™

