

By combining a remote-operated source-changeover system with an integrated BA or UA automatic controller, it is possible to automatically control source transfer according to user-selected sequences. These controllers can be used on source-changeover systems comprising 2 circuit breakers.

For source-changeover systems comprising 3 circuit breakers, the automatic control diagram must be prepared by the installer as a complement to diagrams provided in the "electrical diagrams" section of this catalogue.



BA controller



UA controller

Controller	BA	UA					
compatible circuit breakers	All Compact NS	and Masterpact circuit breakers					
<b>4-position switch</b>							
Automatic operation	c	c					
Forced operation on "Normal" source	c	c					
Forced operation on "Replacement" source	c	c					
Stop (both "Normal" and "Replacement" sources off)	c	c					
<b>Automatic operation</b>							
Monitoring of the "Normal" source and automatic transfer	c	c					
Generator set startup control		c					
Delayed shutdown (adjustable) of generator set		c					
Load shedding and reconnection of non-priority circuits		c					
Transfer to the "Replacement" source if one of the phases of the "Normal" phase is absent		c					
<b>Test</b>							
By opening the P25M circuit breaker supplying the controller	c	c					
By pressing the test button on the front of the controller		c					
<b>Indications</b>							
Circuit breaker status indication on the front of the controller: on, off, fault trip	c	c					
Automatic mode indicating contact	c	c					
<b>Other functions</b>							
Selection of type of "Normal" source (single-phase or three-phase) (1)		c					
Voluntary transfer to "Replacement" source (e.g. energy management commands)	c	c					
During peak-tariff periods (energy management commands), forced operation on "Normal" source if "Replacement" source not operational		c					
Additional contact (not part of controller). Transfer to "Replacement" source only if contact is closed. (e.g. used to test the frequency of UR).	c	c					
Setting of maximum startup time for the replacement source		c					
<b>Options</b>							
communication option		c					
<b>Power supply</b>							
control voltages (2)	220 to 240 V 50/60 Hz	c	c				
	380 to 415 V 50/60 Hz	c	c				
	440 V 60 Hz	c	c				
<b>Operating thresholds</b>							
undervoltage	0.35 Un i voltage i 0.7 Un	c	c				
phase failure	0.5 Un i voltage i 0.7 Un		c				
voltage presence	voltage u 0.85 Un	c	c				
<b>Characteristics of output contacts (3)</b>							
rated thermal current (A)	8						
minimum load	10 mA at 12 V						
		<b>AC</b>	<b>DC</b>				
utilisation category (IEC 947-5-1)		AC12	AC13	AC14	AC15	DC12	DC13
operational current (A)	24 V	8	7	5	6	8	2
	48 V	8	7	5	5	2	-
	110 V	8	6	4	4	0.6	-
	220/240 V	8	6	4	3	-	-
	250 V	-	-	-	-	0.4	-
	380/415 V	5	-	-	-	-	-
	440 V	4	-	-	-	-	-
	660/690 V	-	-	-	-	-	-

(1) For example, 220 V single-phase or 220 V three-phase.  
 (2) The controller is powered by the ACP auxiliaries control plate. The same voltage must be used for the ACP plate, the IVE unit and the circuit-breaker operating mechanisms. If this voltage is the same as the source voltage, then the "Normal" and "Replacement" sources can be used directly for the power supply. If not, a BC type or equivalent isolation transformer must be used.  
 (3) Output contacts (dry, volt-free contacts):  
 b position of the Auto/Stop switch  
 b load shedding and reconnection order  
 b generator set start order.



ACP auxiliaries control plate.

### ACP auxiliaries control plate

The auxiliaries control plate provides in a single unit:

- c protection for the BA or UA controller with two highly limiting P25M circuit breakers (infinite breaking capacity) for power drawn from the AC source
- c control of circuit-breaker ON and OFF functions via two relay contactors
- c connection of the circuit breakers to the BA or UA controller via a built-in terminal block.

#### Control voltages

- c 220 to 240 V 50/60 Hz
- c 380 to 415 V 50/60 Hz
- c 440 V 60 Hz.

The same voltage must be used for the ACP plate, the controller and the circuit-breaker operating mechanisms.

#### Installation

Connection between the ACP auxiliaries control plate and the IVE electrical-interlocking unit may use:

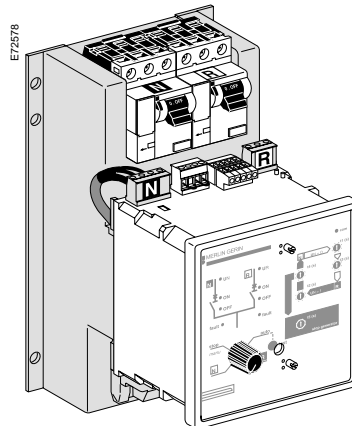
- c wiring done by the installer
- c prefabricated wiring (optional).

### Installation of the BA and UA controllers

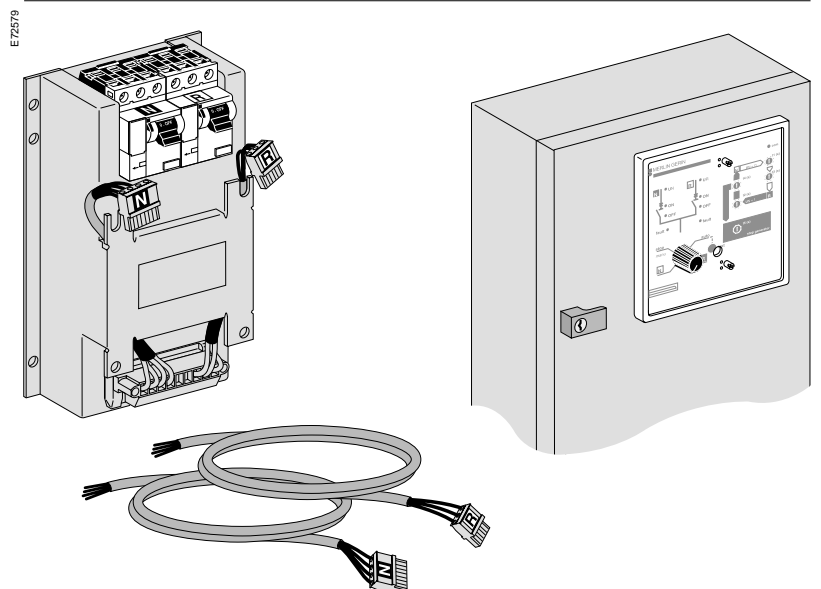
The BA and UA controllers may be installed in one of two manners:

- c directly mounted on the ACP auxiliaries control plate
- c mounted on the front panel of the switchboard.

The length of the connection between the ACP plate and the controller must not exceed two metres. Wiring is done by the installer.



Mounting on the ACP plate.



Mounting on the front panel of the switchboard.

The BA controller is used to create simple source-changeover systems that switch from one source to another depending on the presence of voltage  $U_N$  on the "Normal" source.

It is generally used to manage two permanent sources and can control Compact NS and Masterpact NT/NW circuit breakers and switch-disconnectors.



### Operating modes

A four-position switch may be used to select:

- c automatic operation
- c forced operation on the "Normal" source
- c forced operation on the "Replacement" source
- c stop (both "Normal" and "Replacement" sources off).

### Setting the time delays

Time delays are set on the front of the controller.

**t1.** delay between detection that the "Normal" source has failed and the transmission of the order to open the "Normal" source circuit breaker (adjustable from 0.1 to 30 seconds).

**t2.** delay between detection that the "Normal" source has returned and the transmission of the order to open the "Replacement" source circuit breaker (adjustable from 0.1 to 240 seconds).

### Circuit breaker commands and status indications

The status of the circuit breakers is indicated on the front of the controller.

c ON, OFF, fault.

A built-in terminal block may be used to connect the following input/output signals:

c inputs:

v voluntary order to transfer to source R (e.g. for special tariffs, etc.)

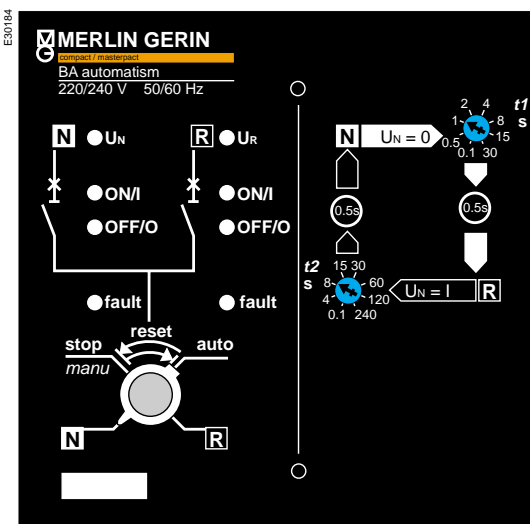
v additional control contact (not part of the controller). Transfer to the "Replacement" source takes place only if the contact is closed (e.g. used to test the frequency of UR, etc.)

c outputs:

indication of operation in automatic or stop mode via changeover contacts.

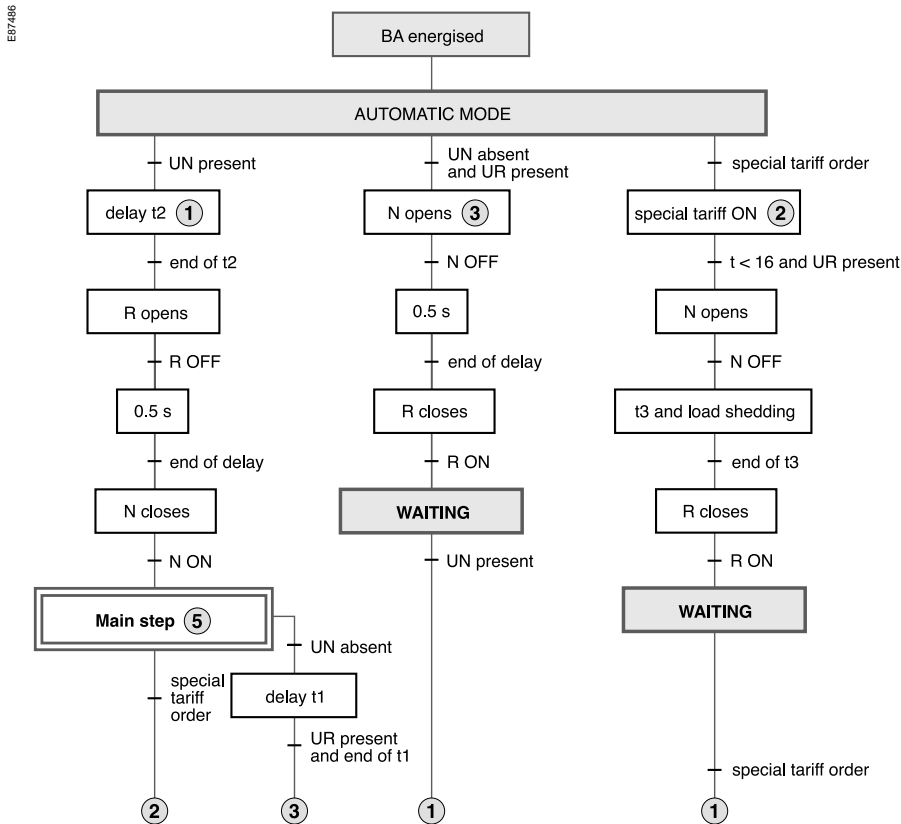
### Test

It is possible to test the operation of the BA controller by turning OFF (opening) the P25M circuit breaker for the "Normal" source and thus simulating a failure of voltage  $U_N$ .

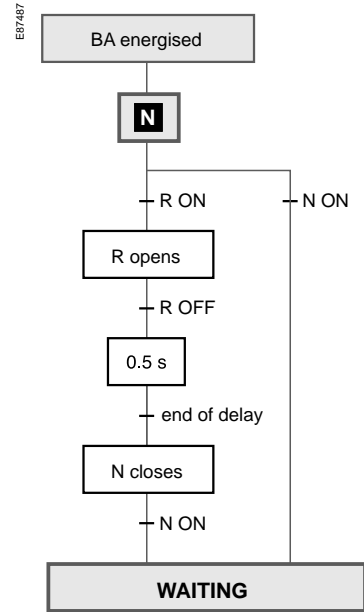


Front of the BA controller.

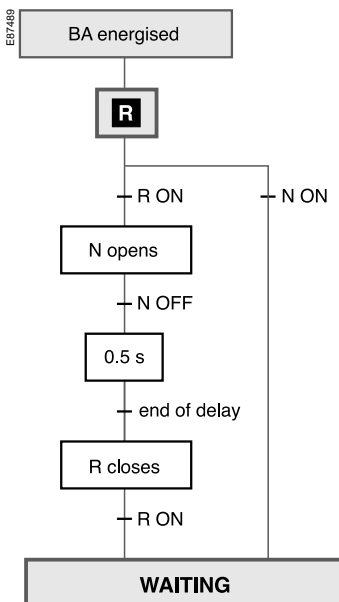
Switch set to Auto (automatic operation and special-tariff mode)



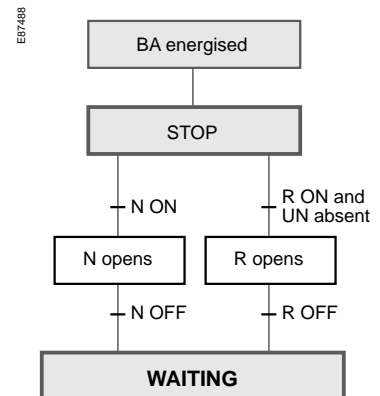
Switch set to the "N" position (forced operation on the "Normal" source)



Switch set to the "R" position (forced operation on the "Replacement" source)



Switch set to the "Stop" position



**Key**

UN : "Normal" source voltage  
UR : "Replacement" source voltage  
N : "Normal" source circuit breaker  
R : "Replacement" source circuit breaker

**WAITING**

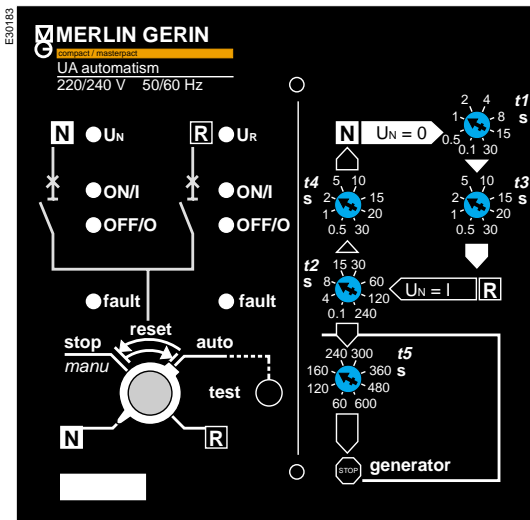
The system exits this mode when the operating mode is modified or when an external event occurs (e.g. failure or return of UN).

① The number sends to the indicated step when the condition is true.

The UA controller is used to create a source-changeover system integrating the following automatic functions:

- b transfer from one source to another depending on the presence of voltage  $U_N$  on the "Normal" source
- b startup of an engine generator set
- b shedding and reconnection of non-priority circuits
- b transfer to the "Replacement" source if one of the phases on the "Normal" source fails.

The UA controller can control Compact NS and Masterpact NT/NW devices.



Front of the UA controller.

**Operating modes**

A four-position switch may be used to select:

- b automatic operation
- b forced operation on the "Normal" source
- b forced operation on the "Replacement" source
- b stop (both "Normal" and "Replacement" sources off, then manual operation).

**Setting the time delays**

Time delays are set on the front of the controller.

- t1. delay between detection that the "Normal" source has failed and the transmission of the order to open the "Normal" source circuit breaker (adjustable from 0.1 to 30 seconds).
- t2. delay between detection that the "Normal" source has returned and the transmission of the order to open the "Replacement" source circuit breaker (adjustable from 0.1 to 240 seconds).
- t3. delay following opening of QN with load shedding and before closing of QR (adjustable from 0.5 to 30 seconds).
- t4. delay following opening of QR with load reconnection and before closing of QN (adjustable from 0.5 to 30 seconds).
- t5. delay for confirmation that UN is present before shutting down the engine generator set (adjustable from 60 to 600 seconds).
- t6. delay before startup of the engine generator set (120 or 180 seconds).

**Commands and indications**

Circuit-breaker status indications on the front of the controller:

ON, OFF, fault.

A built-in terminal block may be used to connect the following input/output signals:

b inputs:

- v voluntary order to transfer to source R (e.g. for special tariffs, etc.)
- v additional control contact (not part of the controller). Transfer to the "Replacement" source takes place only if the contact is closed (e.g. used to test the frequency of UR, etc.)

b outputs:

- v control of an engine generator set (ON / OFF)
- v shedding of non-priority circuits
- v indication of operation in automatic mode via changeover contacts.

**Distribution-system settings**

Three switches are used to:

- b select the type of "Normal" source, whether single-phase or three-phase (e.g. 240 V single-phase or 240 V three-phase)
- b select whether to remain (or not) on the "Normal" source if the "Replacement" source is not operational during operation on special tariffs
- b select the maximum permissible startup time for the engine generator set during operation on special tariffs (120 or 180 seconds).

**Test**

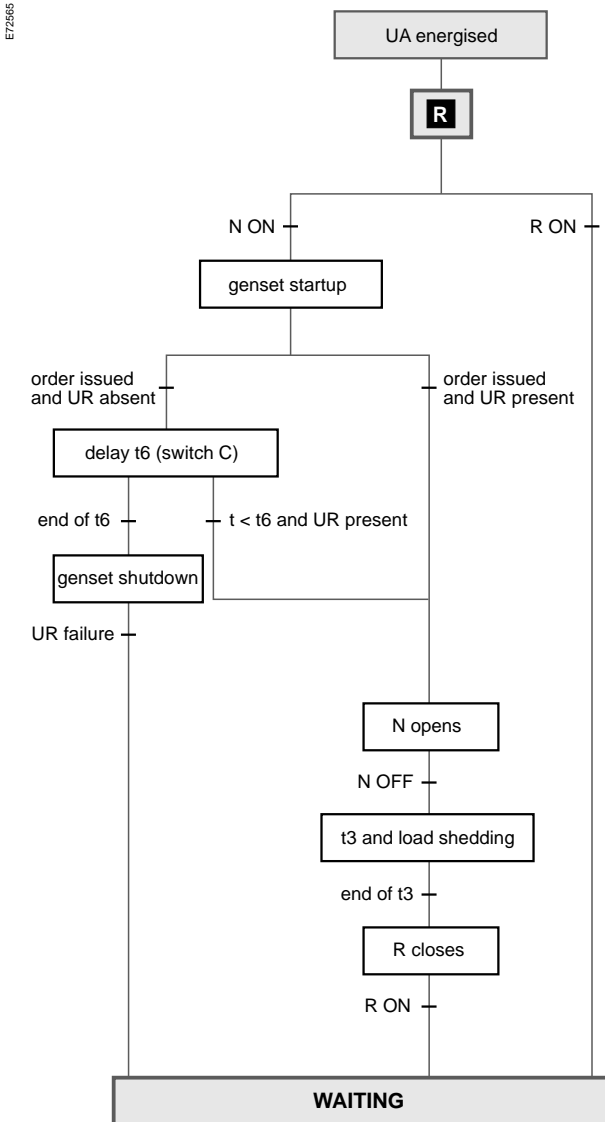
A pushbutton on the front of the controller may be used to test transfer from the "Normal" source to the "Replacement" source, then the return to the "Normal" source. The test lasts approximately three minutes.

**COM communications option**

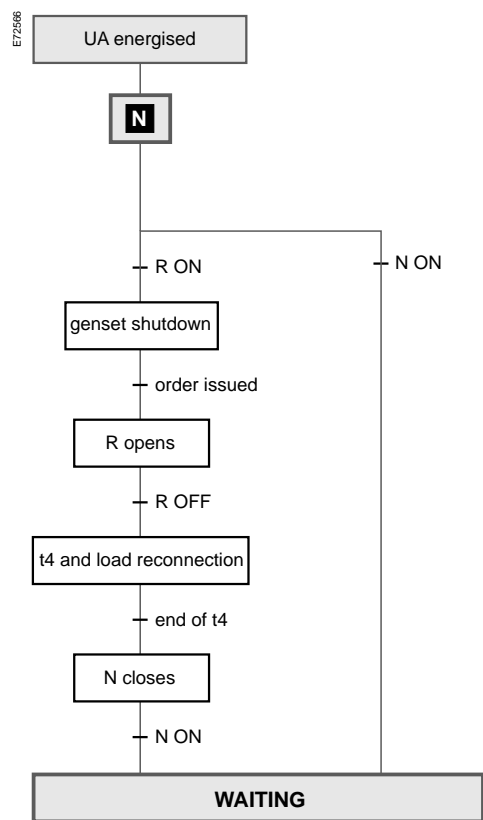
Using the internal bus protocol, this option may be used to remote the following information:

- b circuit-breaker status (ON, OFF, fault trip)
- b presence of the "Normal" and "Replacement" voltages
- b presence of an order for forced operation (e.g. special tariffs)
- b settings and configuration information
- b status of non-priority circuits (loads shed or not)
- b position of the switch (stop, auto, forced operation on the "Normal" source, forced operation on the "Replacement" source).

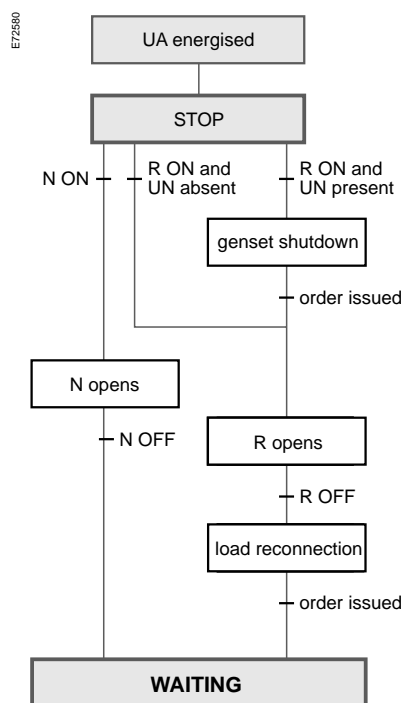
Switch set to the "R" position  
(forced operation on the "Replacement" source)



Switch set to the "N" position  
(forced operation on the "Normal" source)



Switch set to the "Stop" position



**WAITING**

The system exits this mode when the operating mode is modified or when an external event occurs (e.g. failure or return of UN).

When the UA controller is not energised, the output for generator set startup is activated).

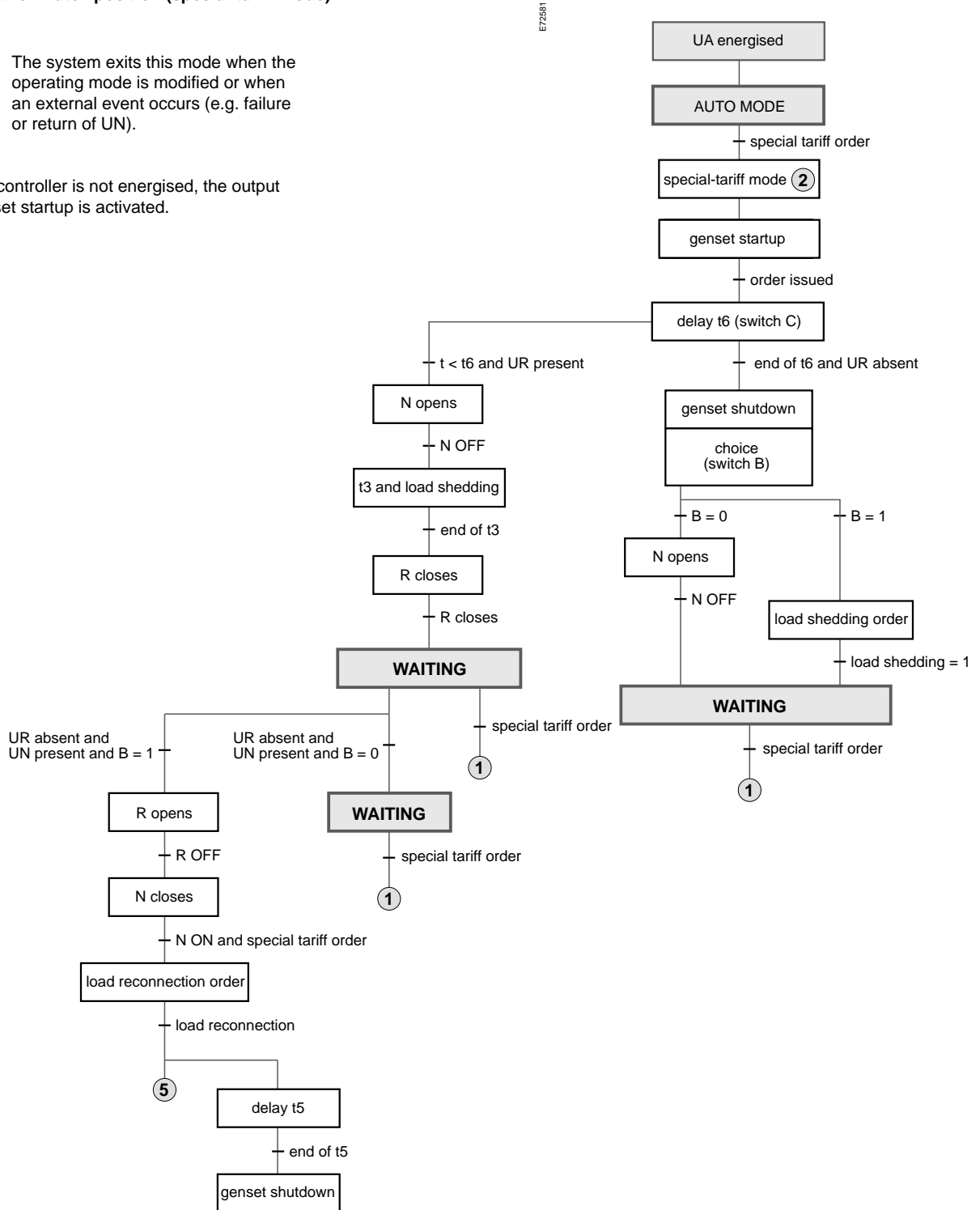
**Key**

- UN : "Normal" source voltage
- UR : "Replacement" source voltage
- N : "Normal" source circuit breaker
- R : "Replacement" source circuit breaker

Switch set to the "Auto" position (special-tariff mode)

**WAITING** The system exits this mode when the operating mode is modified or when an external event occurs (e.g. failure or return of UN).

When the UA controller is not energised, the output for generator set startup is activated.

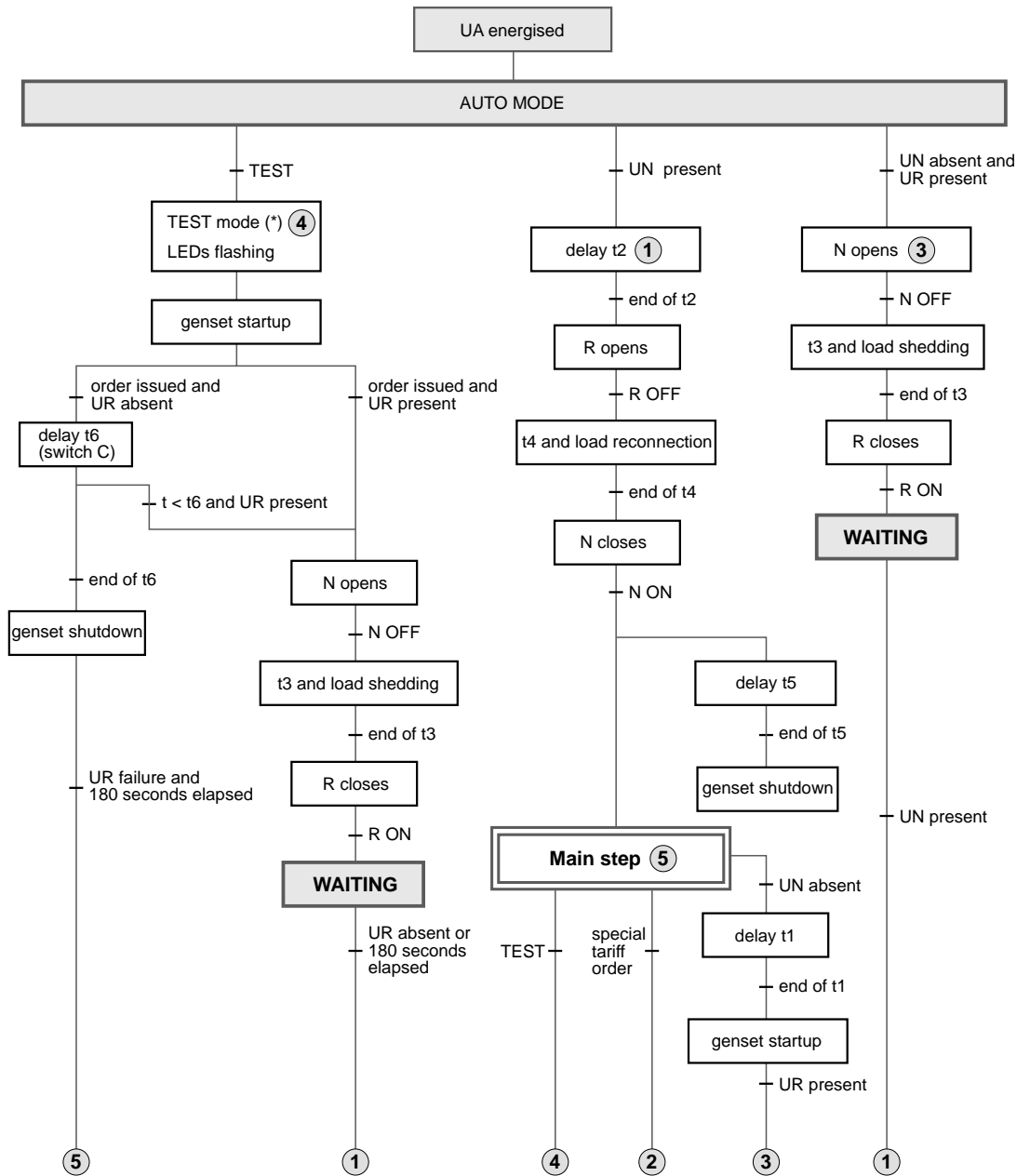


**Key**  
 UN : "Normal" source voltage  
 UR : "Replacement" source voltage  
 N : "Normal" source circuit breaker  
 R : "Replacement" source circuit breaker  
 B : Penalties accepted (N ON), i.e. B = 1

① The number sends to the indicated step when the condition is true.

Switch set to the "Auto" position (automatic operation and test mode).

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**WAITING** The system exits this mode when the operating mode is modified or when an external event occurs (e.g. failure or return of UN).

When the UA controller is not energised, the output for generator set startup is activated.

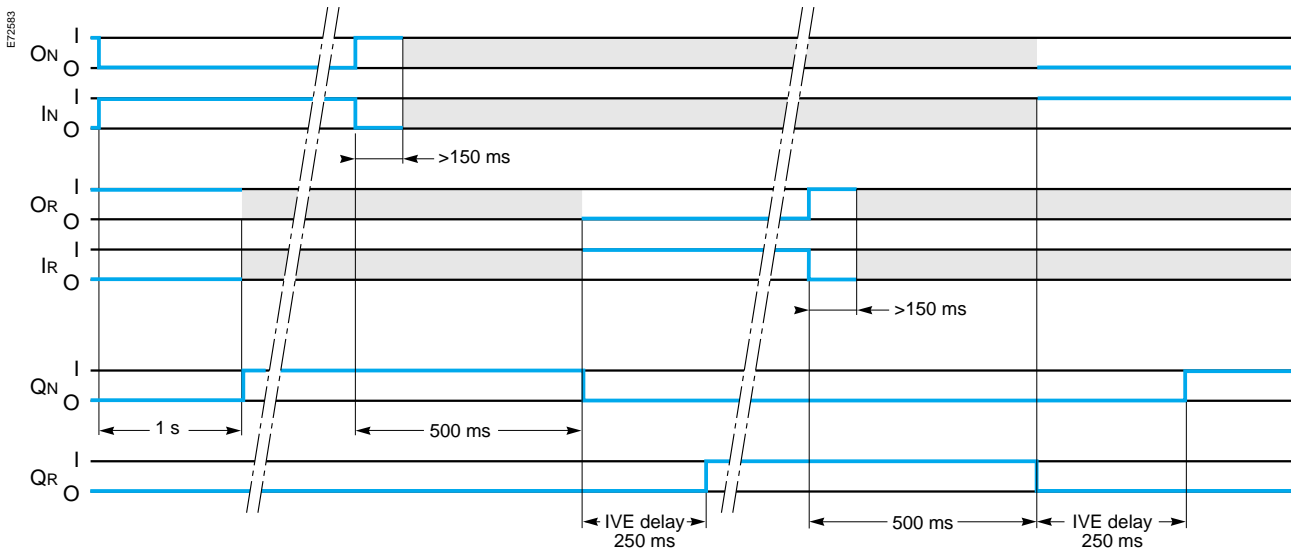
**Key**

- UN : "Normal" source voltage
- UR : "Replacement" source voltage
- N : "Normal" source circuit breaker
- R : "Replacement" source circuit breaker
- B : Penalties accepted (N ON), i.e. B = 1
- (\*) The test lasts 180 seconds.

① The number sends to the indicated step when the condition is true.



## IVE unit



### Symbols

**QN** : "Normal" Compact C circuit breaker equipped for remote operation (motor mechanism)

**QR** : "Replacement" Compact C circuit breaker equipped for remote operation (motor mechanism)

**ON** : Circuit breaker QN opening order

**OR** : Circuit breaker QR opening order

**IN** : Circuit breaker QN closing order

**IR** : Circuit breaker QR closing order

**L1** : Faulty "Normal" indication LED

**L2** : Faulty "Replacement" indication LED

### Key

O OFF (circuit open)

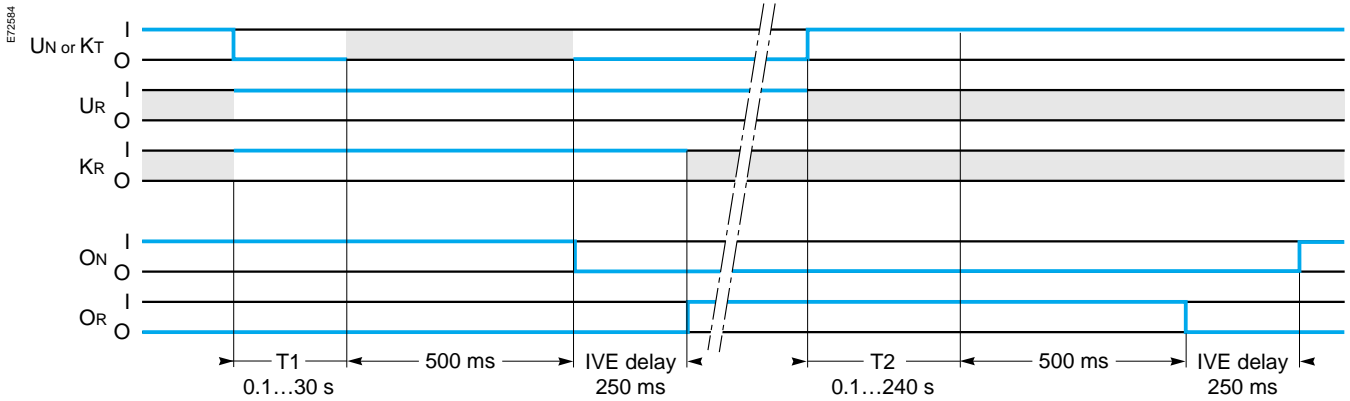
I ON (circuit closed)

■ : either ON or OFF.

### Note:

Following all trips (overload, short-circuit, earth-leakage fault, voluntary trip), a manual reset on the front of the motor mechanism is required.

## BA controller



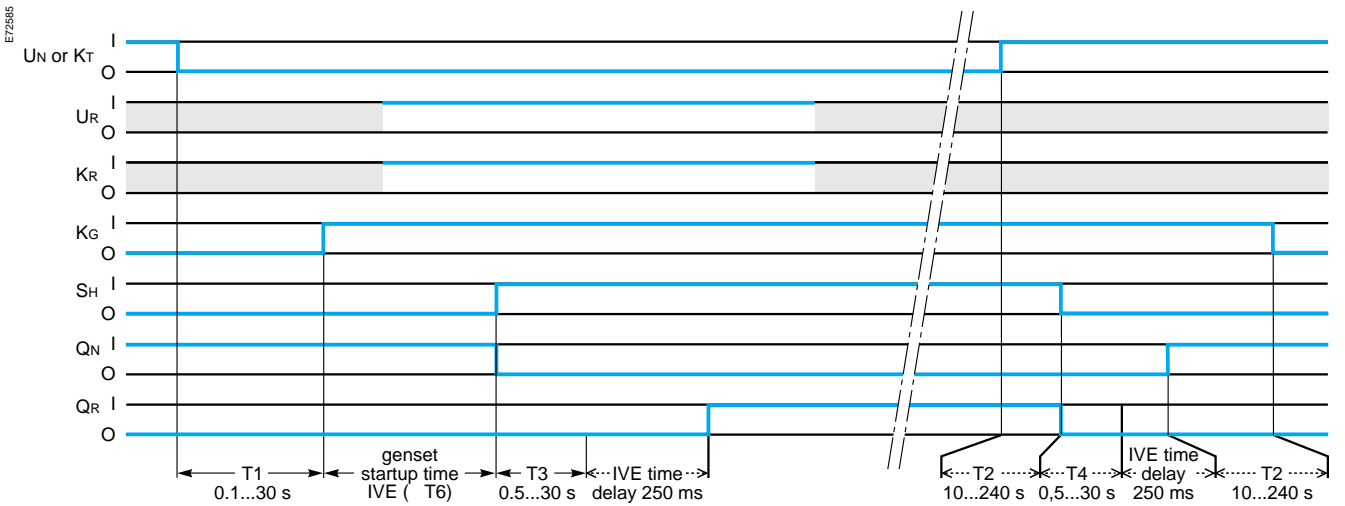
### Inputs

**UN** : "Normal" source voltage  
**UR** : "Replacement" source voltage  
**KT** : order for forced-operation on R  
**KR** : additional check before transfer

### Outputs

**QN** : "Normal" source circuit breaker  
**QR** : "Replacement" source circuit breaker

## UA controller



### Inputs

**UN** : "Normal" source voltage  
**UR** : "Replacement" source voltage  
**KT** : order for forced-operation on R  
**KR** : additional check before transfer

### Outputs

**KG** : order to the genset  
**SH** : load-shedding order  
**QN** : "Normal" source circuit breaker  
**QR** : "Replacement" source circuit breaker

### Key

O OFF (circuit open)  
 I ON (circuit closed)  
 ■ : either ON or OFF.

### Important

If UR is not ON when the transfer order is issued (KT or UN), the sequence is not carried out.  
 If KR status is not ON when the transfer order is issued (KT or UN), the transfer sequence is carried out later when KR status becomes I.