

High-speed DC circuit-breakers
for Fixed Installation (IEEE/ANSI
standards)
Type UR

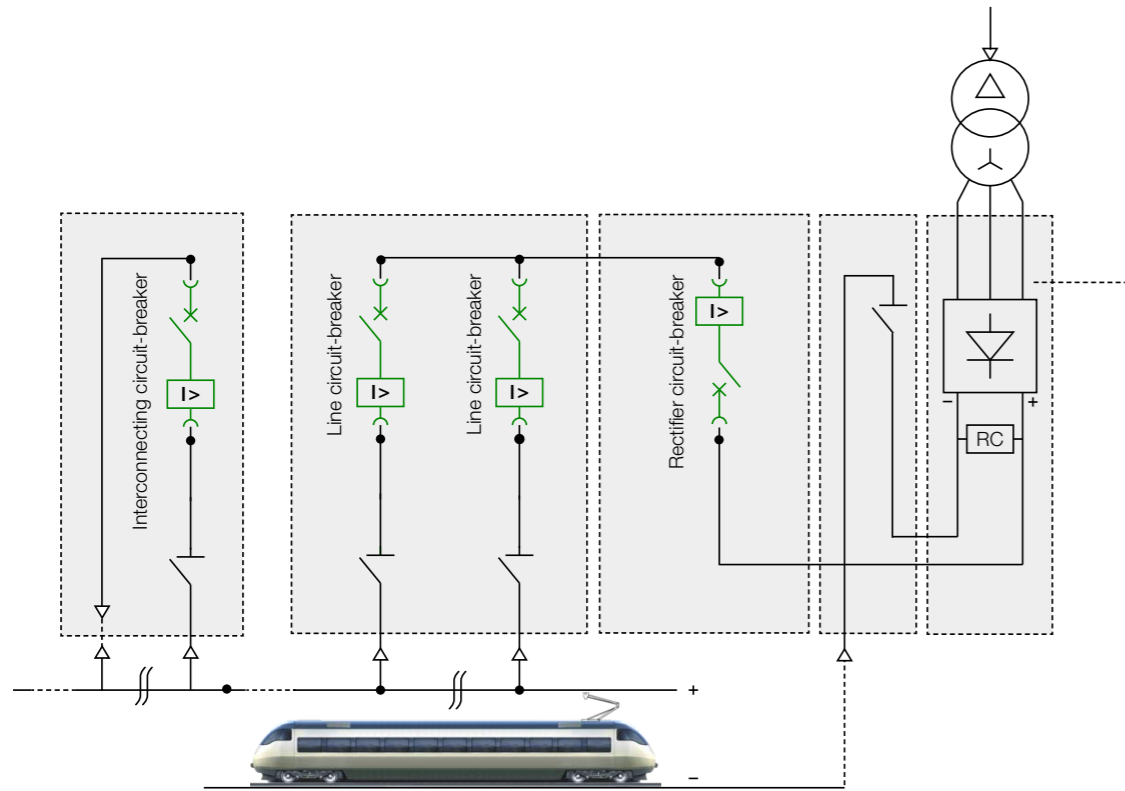


General information

The UR range of DC circuit-breakers has achieved worldwide acceptance as a well proven design for use in fixed installations. It has been regularly upgraded and adapted to new standard requirements and different applications over the years, continuously improving the level of performance and functionality. This has led to an impressive service track record throughout the world for the UR product range. Designed according to ANSI C37.14 – 2002 and

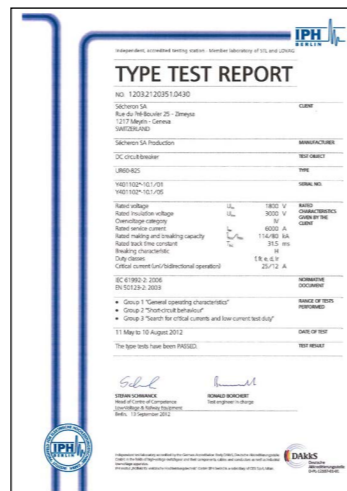
ANSI C.37.16 – 2000, the UR range can be used for Light Rail and Heavy Rail Transit Systems on the North American territory. Combining a compact design with a high making and breaking capacity, the UR range, with its low number of parts also guarantees high reliability and low maintenance requirements.

Applications (for DC traction power substations)



Main features

- Thermal current up to 8'000 A
- Rated voltage 800 V_{DC}, 1'600 V_{DC}
- Indoor installation
- Bi-directional or uni-directional overcurrent release
- Trip-free direct acting device
- Limited maximum arc voltage
- Electro-magnetic closing with electric or magnetic holding
- Reference standards: IEEE C37.14–2002 and ANSI C37.16–2000
- Also available according to IEC 77, EN 50123–1/-2, IEC61992–1/-2 standards (refer to our specific SG101001BEN brochure)
- Insulation material according to relevant ASTM, BS, NF, IEC and DIN standards:

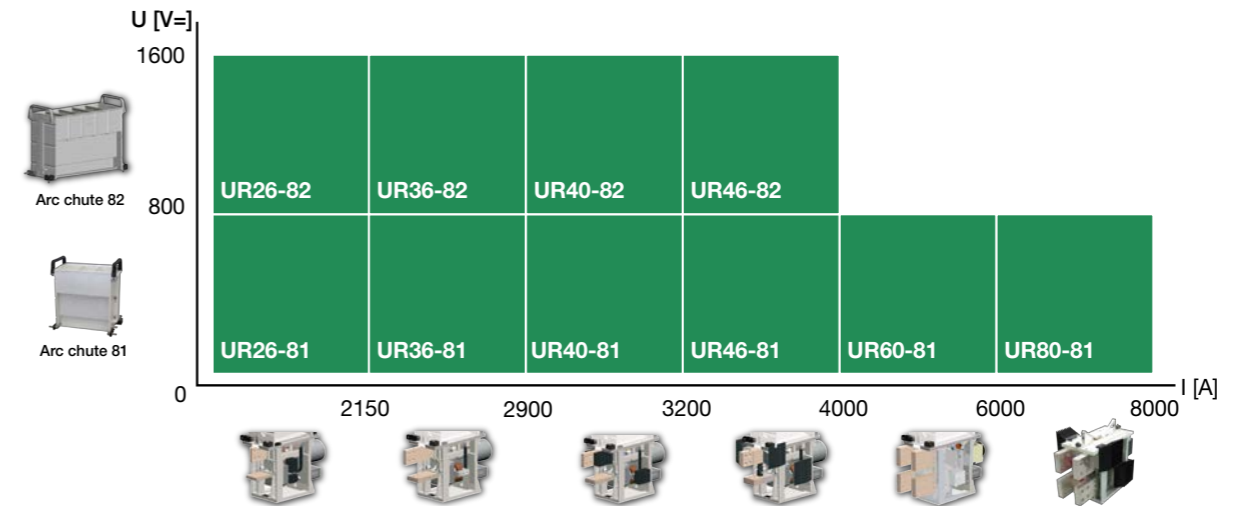


Key benefits



- **Safe** with a high insulation level
- **Very low maintenance** requirements with high electrical and mechanical endurance
- Simple design with few moving parts resulting in **high reliability**
- **High rated short circuit** making and breaking capacity
- A **large number of different options** to match the various application requirements
- Proven design with **worldwide experience** and acceptance

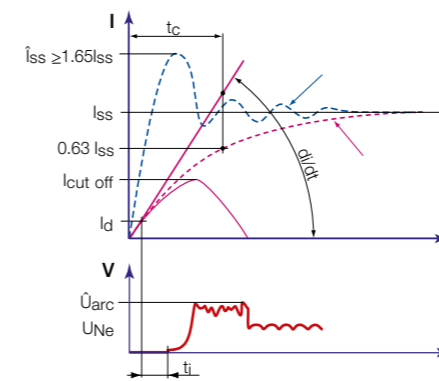
Product range



Note: Additionally to the above range, is also available the DC high-speed circuit-breaker type UR15 rated 1500A and 900Vdc/1'800Vdc. For more information on this breaker type refer to its specific brochure SG104147BEN.

Breaking current parameters

Short-circuit parameters



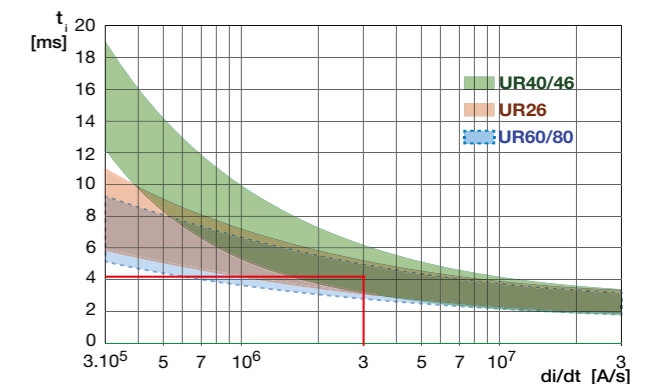
- I_{iss} = Prospective sustained short-circuit current
- \hat{I}_{iss} = Rated peak short-circuit current
- di/dt = Initial current rate of rise
- I_d = Setting of maximum current release
- $I_{cut\ off}$ = Cut-off current
- t_c = Time-constant of the circuit
- t_i = Opening time
- \hat{U}_{arc} = Maximum arc voltage
- U_{Ne} = Rated maximum voltage

Opening time T_i

Relationship between opening time t_i and the initial rate of rise of current di/dt for direct instantaneous over-current release.

- Example for a di/dt of 3×10^6 A/s:
 - for UR26: $t_i \sim 4.3$ ms,
 - for UR60/80: $t_i \sim 4.1$ ms.

Note: for a shorter opening time on low di/dt , the "indirect release" (shunt trip) option can be used.



Data for product selection

	Symbol	Unit	UR26	UR36	UR40	UR46	UR60	UR80
MAIN HIGH VOLTAGE CIRCUIT								
Frame size current		[A]	2'150	2'900	3'200	4'000	6'000	8'000
Rated maximum voltage	U_{Ne}	[V _{DC}]						
- arc chute type 81			800	800	800	800	800	800
- arc chute type 82			1'600	1'600	1'600	1'600	-	-
Rated continuous current ⁽¹⁾		[A]						
- ANSI			2'150	2'900	3'200	4'000	6'000	8'000
- EN50123 / IEC61992 (for information only)			2'600	3'600	4'000	4'600	6'000	8'000
Rated peak short-circuit current	\hat{I}_{SS}	[kA]						
- at 800 V			200	200	200	200	200	200
- at 1600 V ⁽²⁾			100	100	100	100	-	-
Peak and rated short-time current		[kA]	-	-	-	-	100/70	100/70
Over-current trip range (bi-directional) ⁽³⁾		[kA]	1.4-8.0	2-15	2-15	2-15	6-18	8-24
Reverse over-current trip value (uni-directional)		[kA]	-	-	-	-	6	6
Power frequency withstand voltage (ANSI) (60 Hz, 1 min) ⁽⁴⁾		[kV]						
- arc chute type 81			12	12	12	12	15	15
- arc chute type 82			12	12	12	12	-	-

⁽¹⁾ At T_{amb} = +40°C and tested with high voltage connections according to standard ANSI C37.14 -2002

⁽²⁾ according to ANSI C37.16:2000

⁽³⁾ For range selection, refer to table below

⁽⁴⁾ Values applicable for factory tests on serial products.

LOW VOLTAGE AUXILIARY CIRCUIT

Control circuit			
Nominal voltage	U_n ⁽⁵⁾	[V _{DC}]	110, 125
Range of voltage			[0.7 - 1.25] U_n [0.8 - 1.1] U_n
Closing power ⁽⁶⁾		[W]/[s]	1300/1 3200/1
Holding power for electric holding ⁽⁶⁾		[W]	2.3 30
Holding power for magnetic holding ⁽⁶⁾		[W]	0 0
Opening power for magnetic holding ⁽⁶⁾		[W]/[s]	25/1 170/1
Mechanical opening time on opening order ⁽⁶⁾⁽⁹⁾	t_o	[ms]	15 to 30 15 to 30
Mechanical closing time ⁽⁶⁾⁽⁹⁾	t_c	[ms]	~ 150 ~ 150

⁽⁵⁾ The breaker can also be controlled with a rectified AC control voltage

⁽⁶⁾ Available for UR60/80

⁽⁷⁾ Rectified 220V_{AC}, available for UR60/80

⁽⁸⁾ At U_n and T_{amb} = +20°C

⁽⁹⁾ Starting when the signal is received by the coil

Auxiliary contacts

Type of contacts (refer to definition on page 10)		Potential free (PF) or change-over (CO)
Number of auxiliary contacts		5a + 5b
Rated voltage		24 to 220
Conventional thermal current	I_{th}	[A] 10
Switching categories according to EN60947 (silver contacts)		AC-15 230 V _{AC} 1.0 A DC-13 110 V _{DC} 0.5 A
Minimum let-through current at 24 V _{DC} ⁽¹⁰⁾		[mA] ≥ 10

⁽¹⁰⁾ For a dry and clean environment

Low voltage interface

Type of connection ⁽¹¹⁾	Harting type HAN® 32 EE
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⁽¹¹⁾ Refer to page 8 for mobile connector informations

OPERATING CONDITIONS

Installation	Indoor
Altitude	<1400 ⁽¹²⁾
Working ambient temperature ⁽¹³⁾	T _{amb} [-25 to +40]
Humidity	Class 5K2
Minimum mechanical durability	N Operations 4x50'000 8x25'000 8x25'000 8x25'000 4x20'000 4x20'000

⁽¹²⁾ For altitude > 1400 m, please contact Sécheron

⁽¹³⁾ For ambient temperature outside of the range, please contact Sécheron

WEIGHTS ⁽¹⁴⁾	UR26	UR40	UR46	UR60	UR80
With arc chute 81	77	98	110	139	150
With arc chute 82	87	108	120	-	-

⁽¹⁴⁾ Weights for standard circuit-breaker without any option.

Direct over-current instantaneous release

Available setting ranges in kA with their corresponding codification:

UR26	UR36	UR40	UR46	UR60	UR80	Type	Designation code ⁽¹⁾	
							Standard	Option
1.4 - 2.7	-	-	-	-	-	DV1	A	
2.0 - 5.0	2.0 - 5.0	2.0 - 5.0	2.0 - 5.0	-	-	DV2		B
2.0 - 8.0	2.0 - 8.0	2.0 - 8.0	2.0 - 8.0	-	-	DS1	D	
-	4.0 - 15.0	4.0 - 15.0	4.0 - 15.0	-	-	DS2	F	
-	4.0 - 10.0	4.0 - 10.0	4.0 - 10.0	-	-	DV2		G
-	-	-	-	6.0 - 10.0	-		J	
-	-	-	-	9.0 - 14.0	-		K	
-	-	-	-	13.0 - 18.0	-		L	
-	-	-	-	-	8.0 - 14.0		N	
-	-	-	-	-	12.0 - 18.0		O	
-	-	-	-	-	16.0 - 24.0		P	
-	-	-	-	6.0 ⁽²⁾	6.0 ⁽²⁾		V	

⁽¹⁾ For selection page 12.

⁽²⁾ For uni-directional over-current instantaneous release.

Tripping device configuration for UR26/36/40/46

Standard tripping device

DS tripping device DV tripping device

Setting of maximum current release

Tripping device configuration for UR60/80

Standard tripping device

Tripping device

Setting of maximum current release

Specific configurations for rectifier circuit-breakers

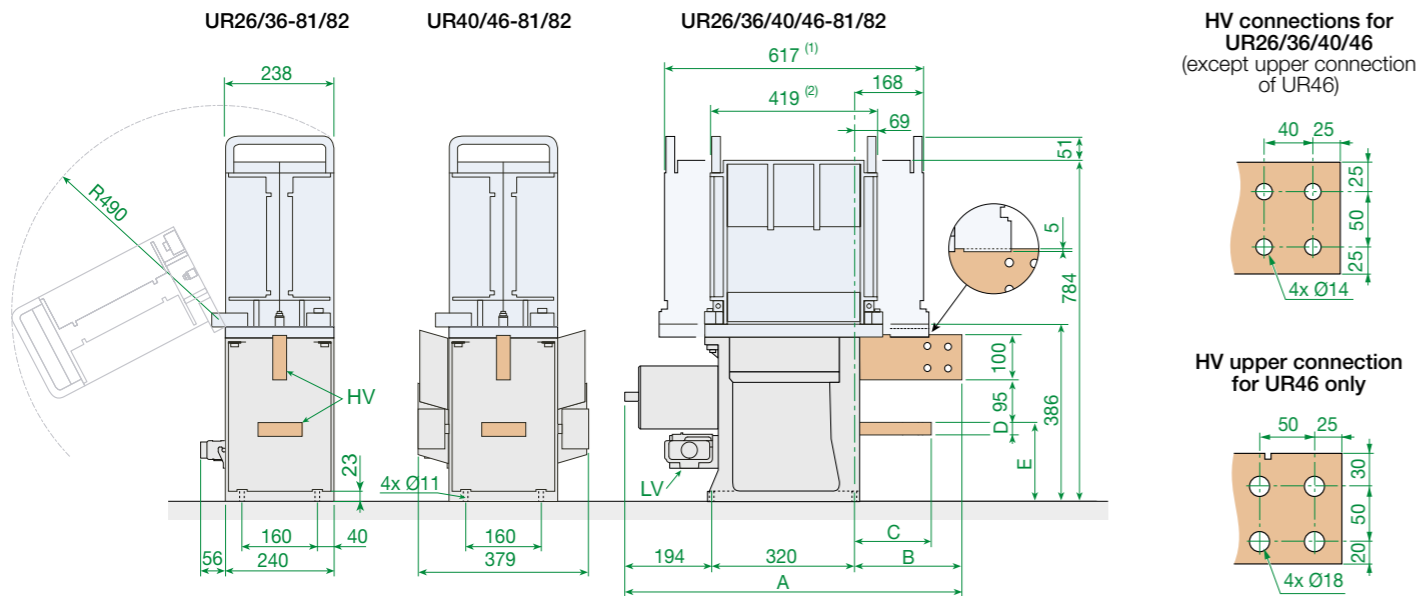
For uni-directional circuit-breakers, different configurations can be selected based on the required peak/rated short-time currents (\hat{I}_{NCW}/I_{NCW}) the breaker has to withstand without opening in the forward direction.

		Uni-directional breaker configuration
Forward direction	No trip	100/60
	\hat{I}_{NCW}/I_{NCW} (250ms)	
Reverse direction	Trip setting	6

Information for product integration

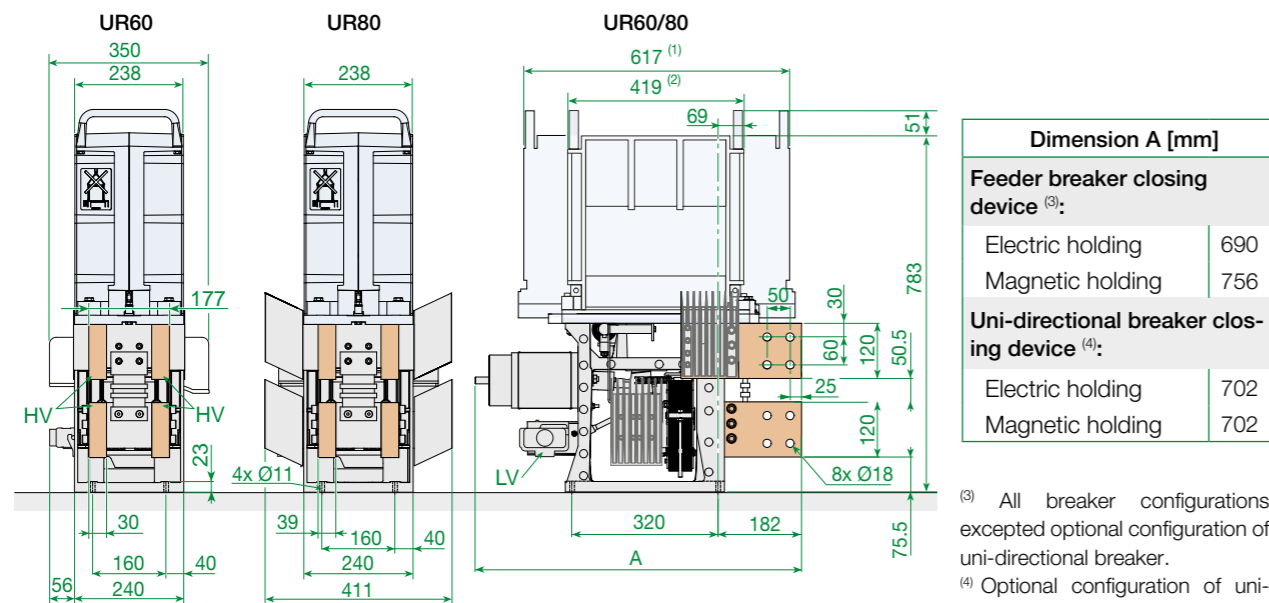
Dimensions without tolerances are indicative. All dimensions are in mm.
The maximum allowed flatness deviation of the support frame is 0.5 mm.

Main dimensions for UR26/36/40/46



⁽¹⁾ Arc chute 82
⁽²⁾ Arc chute 81

Main dimensions for UR60/80



⁽¹⁾ Arc chute 82 (only valid for UR60)
⁽²⁾ Arc chute 81

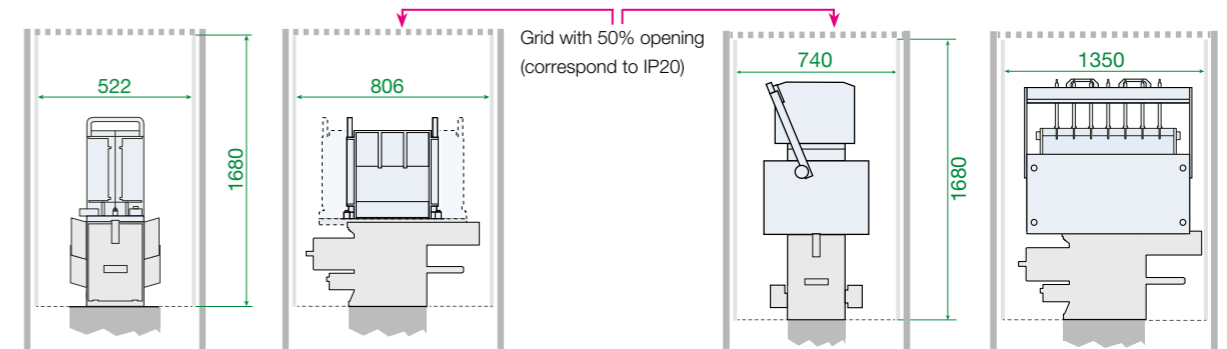
Insulation distances for UR26/36/40/46/60/80

The DC circuit-breakers have been homologated according to IEEE/ANSI C37-16-2000 in cubicle's configurations with insulation panels on the area where dimensions are indicated in the below's representation and for short-circuit conditions as defined page 4.

For particular cubicle configuration and short-circuit conditions, please contact Sécheron

For UR..81/82S and UR60-81 excepted UR80

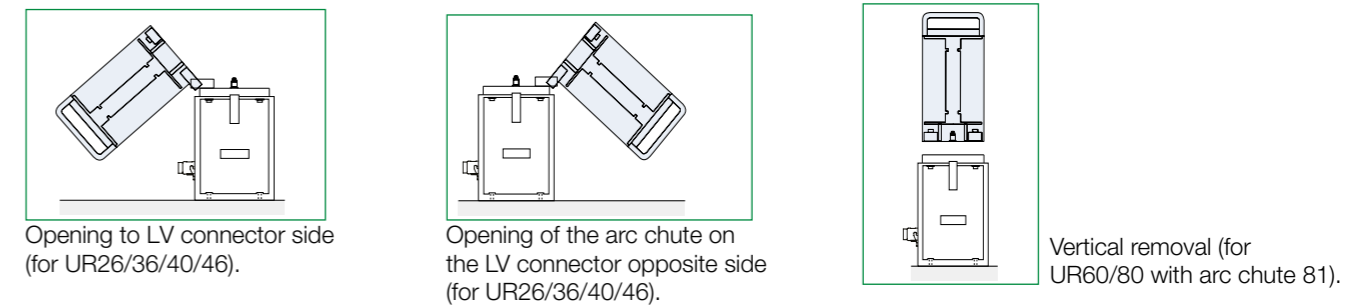
For UR80.81S



Correspond to cubicle width 600 mm

Correspond to cubicle width 800 mm

Arc chute installation

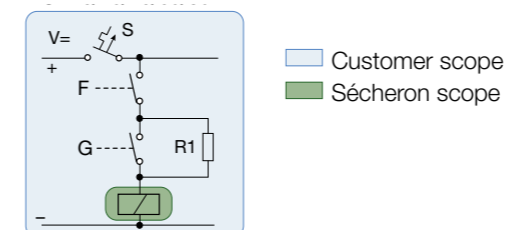


Low voltage control scheme

The UR range is equipped with a solenoid coil to perform the usual closing and opening operations. Two different types of closing devices are available: with electric holding (E type) or with magnetic holding (M type).

Electric holding: E type

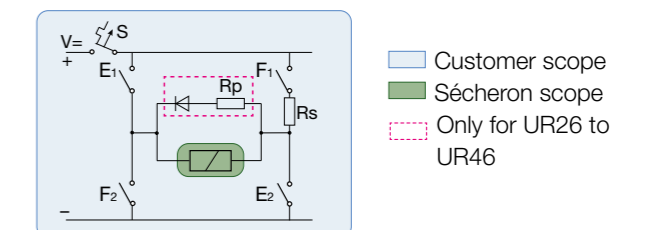
- The circuit-breaker remain closed with a **reduced "holding" current**. To open the circuit-breaker the holding current is cut-off.
- With **E-type** closing device, the circuit-breaker cannot remain closed if the low voltage supply is lost.



F, G: control contacts
R1: holding resistor
S: automatic circuit-breaker

Magnetic holding: M type

- The circuit-breaker remains closed **without any control current**. To open the circuit-breaker it is necessary to reverse the polarity of the current flowing through the closing coil.
- With the **M-type** closing device, the circuit-breaker remains closed when the low voltage supply is lost, but requires the control voltage to be present to open.



E, F: control contacts
Rs: Serial resistor
Rp: Parallel resistor
S: automatic circuit-breaker

Notes:

- For technical data related to closing devices and needed to design the circuit-breaker's control circuit, refer to the instruction manual of the selected product.
- For M-type closing device, the circuit breaker's direct tripping function remains always active even if the low voltage supply is lost.

Typical value for closing coils-UR26/36/40/46

Coil characteristics	Closing pulse 0.5 to 1 s				E type holding			M type opening pulse 0,5 to 1s					
	U _{nom} [V _{DC}]	I _{nom} [A]	I _{min E} [A]	I _{min M} [A]	I _{max} [A]	R1 [Ω]	I _{nom} [A]	I _{min} [A]	I _{max} [A]	Rs [Ω]	Rp [Ω]	I _{nom} [A]	I _{min} [A]
110	11.7	6.3	7.0	19.9	210	0.5	0.4	0.6	40	20	1.6	1.0	2.3
125	10.5	5.6	6.3	17.8	272	0.4	0.3	0.6	52	26	1.4	0.9	2.0

Note: The breaker can also be controlled with a rectified AC control voltage

Typical value for closing coils-UR60/80-electric holding

Coil characteristics	Closing pulse 0.5 to 1 s			E type holding			
	U _{nom} [V _{DC}]	I _{nom} [A]	I _{min E} [A]	I _{max} [A]	R1 _{nom} [Ω]	I _{nom} ⁽²⁾ [A]	I _{min} ⁽²⁾ [A]
110	25.0	16.6	33.2	56	1.8	1.5	2.0
125	22.5	14.9	29.9	75	1.6	1.3	1.7

⁽¹⁾ Rectified 230V_{AC}
⁽²⁾ With selected economy resistor

Note: The breaker can also be controlled with a rectified AC control voltage

Typical value for closing coils-UR60/80-magnetic holding

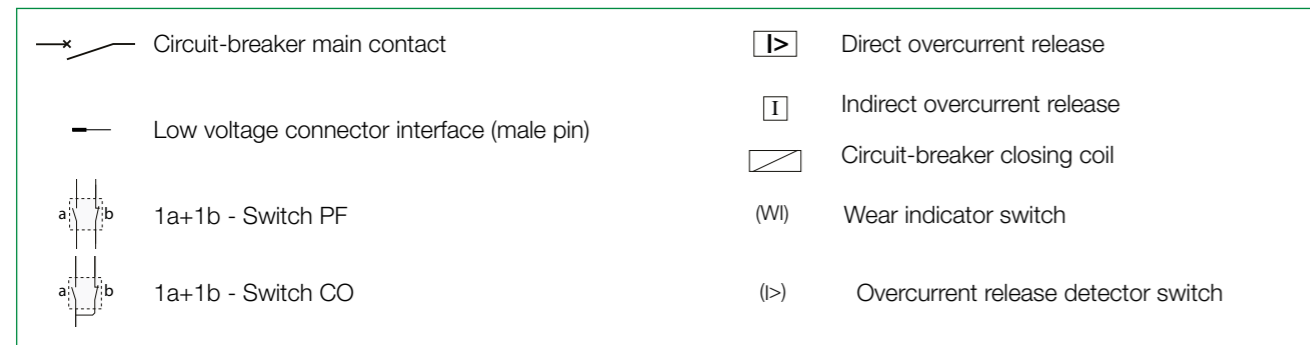
Coil characteristics	Closing pulse 0.5 to 1 s			M type opening pulse 0.5 to 1 s			
	U _{nom} [V _{DC}]	I _{nom} [A]	I _{min M} [A]	I _{max} [A]	Rs _{nom} [Ω]	I _{nom} [A]	I _{min} [A]
110	21.3	13.5	28.3	15	5.4	4.1	6.2
125	18.4	11.7	24.5	18	5.0	3.8	5.8

For specific closing devices to reach ÎNcw/INcw = 100kA/70kA please contact Sécheron

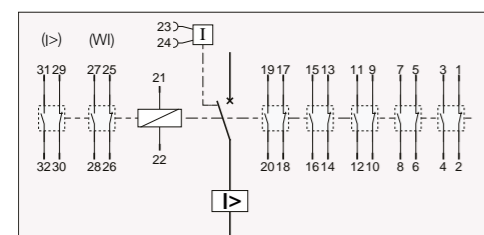
Low voltage wiring diagrams for Harting type HAN® 32 EE connector (Standard)

The following wiring schemes represent the low voltage connector pins assignment in function of the selected connectors and the configuration chosen for standard or optional functions. They are valid for all control voltages except 24 V_{DC}. For 24 V_{DC} control scheme, please contact Sécheron.

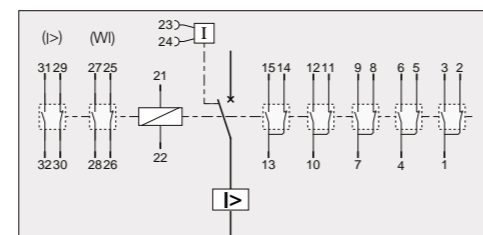
Legend of the schemes :



Auxiliary contacts (switch PF)



Auxiliary contacts (switch CO)



Only the pins related to your selected configuration page 12 will be wired according to the below's pin assignment.
The connector will be delivered with all 32 pins even if not all wired.



Harting type HAN® 32 EE (Standard)

Notes:

- Low voltage connectors are delivered with all pins mounted, even if not all wired.
- Indirect release coils are connected to an auxiliary connector for BIM6 & BIM8. For BIM5 & BIM7 it is connected to a terminal block (refer to page 14).

Options (subject to additional costs)

Mobile conector— UR26/36/40/46

Auxiliary switches			Fixed connector type	Mobile connector (without cable)				
Device	Number	Type		Number of pin		Cable gland	Sécheron's number	Connector
				Size 2.5 mm ²	Size 1.5 mm ²			
UR26/36/40 /46/60/80	5a+5b	PF	Harting HAN® 32 EE	0	32	M32	SG104063R10100	

ECO-Drive integrated control module— UR26/36/40/46

ECO-Drive is a compact control module integrated to UR circuit-breakers, to manage closing-holding sequences with electric control. ECO-Drive is installed on the UR breaker's closing device.

Key benefits

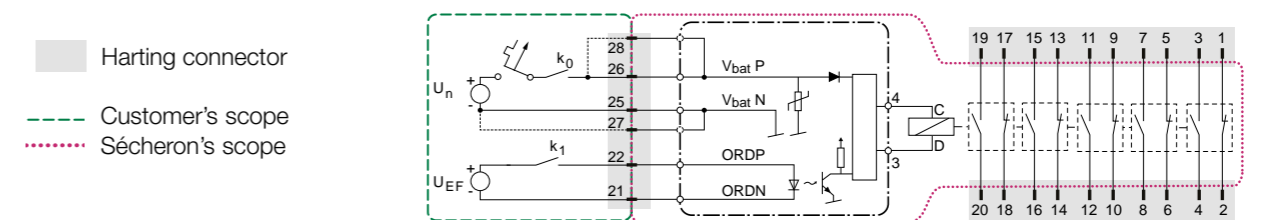
This option offers to system integrators the following advantages:

- No need of additional hardware to control the breaker
- Compact integration
- Reduction of overall installation costs
- Reduction of operational costs with lower power consumption
- Reduction of the risks to damage the closing coil
- Full compliance with EN50121-3-2 standards for EMC
- Full compliance with EN50155 § 5.1.1.2 class S2 (short interruption of voltage supply)
- Full compliance with EN50155 § 5.1.3 class C1 (supply change over)



Note: Available for UR26/36/40/46 and for closing device with E-type holding

Low voltage wiring diagram (Harting connector)



Technical data

Control circuit			
Nominal voltage (electric holding only) ⁽¹⁾	U _n /U _{EF}	[V _{DC}]	110
Range of voltage			[0.7 - 1.25] U _n
Idle (standby) power		[W]	<1.6
Nominal closing power ⁽²⁾	P _c	[W]/[s]	1'300/0.5
Nominal holding power for electric holding ⁽²⁾		[W]	<8
Nominal opening power for electric holding ⁽²⁾		[W]	<1.6
Mechanical opening time on opening order ⁽³⁾		[ms]	15 - 30
Mechanical closing time on closing order ⁽²⁾⁽³⁾	T _c	[ms]	~150

⁽¹⁾ Control voltage U_{EF} and supply voltage U_n can be different
⁽²⁾ At U_n and T_{amb} = +20°C
⁽³⁾ Starting when the signal is received by the coil

BIM indirect release (shunt trip) with integrated manual release

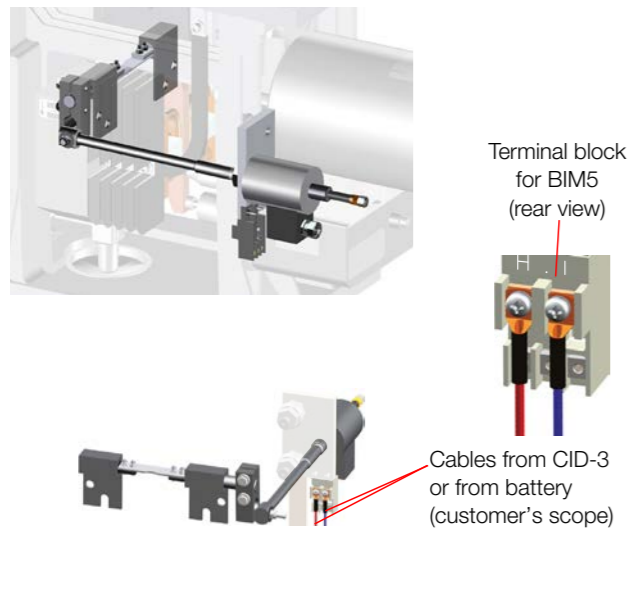
The indirect release enables to shorten the opening time when required by specific application. The choice of the relevant type has to be validated by Sécheron prior quoting. This device can also be manually activated.

		Opening time	Control mode
UR26/36/40/46	BIM5	4 - 6 ms	CID-3*
	BIM6	12 - 19 ms	Direct battery 77-140 V _{DC}
UR60/80	BIM7	4 - 6 ms	CID-3*
	BIM8	12 - 19 ms	Direct battery 77-140 V _{DC}

* Not included in the DC circuit-breaker - To be ordered separately

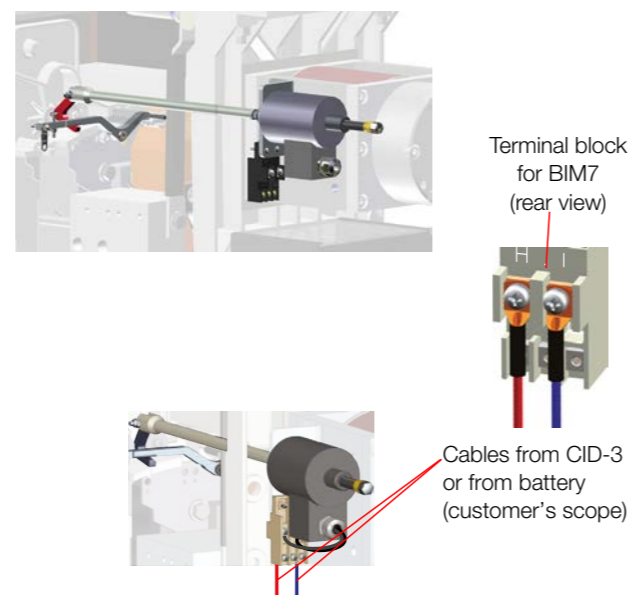
BIM5 & BIM 6 – UR26/36/40/46

The terminal block allows the connection between 2.5 mm² cables from the BIM and 6 mm² cables from the CID-3 or 2.5 mm² from the battery.



BIM7 & BIM8 – UR60/80

The terminal block allows the connection between 2.5 mm² cables from the BIM and 6 mm² cables from the CID-3 or 2.5 mm² from the battery.



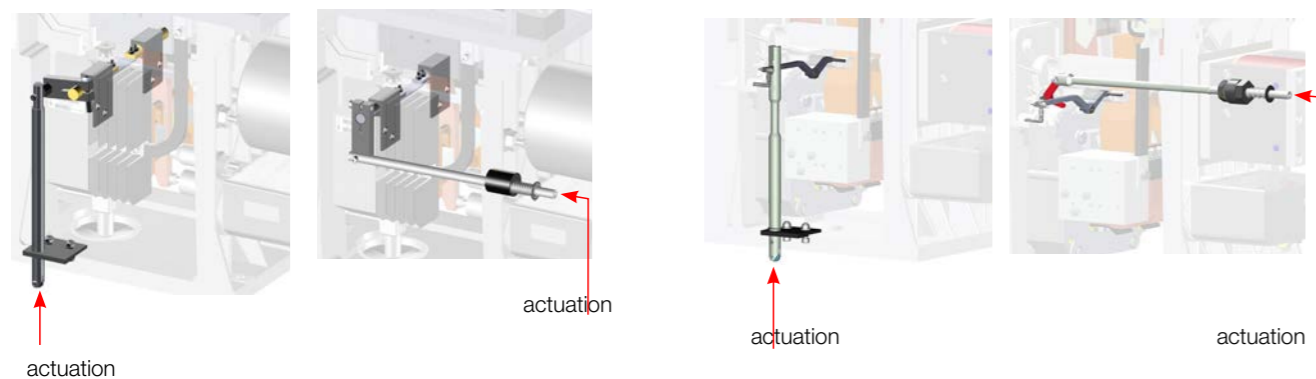
Note: BIM6 and BIM8 are connected to auxiliary connectors, while BIM5 and BIM7 are connected to terminal blocks.

Manual release

Manual releases are safety devices designed to guarantee that the breaker is in OPEN position so as to access the breaker's panel -e.g. for maintenance.

The vertical release is automatically actuated while withdrawing from the panel the trolley on which the breaker is installed. The horizontal release must be manually actuated from the front side of the panel door before opening it.

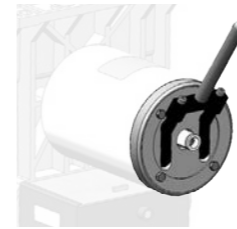
for UR26/36/40/46



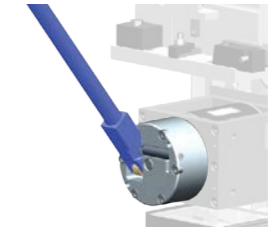
Manual closing device

The manual closing device, mainly used for maintenance operations, enables to close and open the circuit-breaker without low voltage supply and under no load. The device can be locked in open position and a switch gives the status of the locking position.

for UR26/36/40/46



for UR60/80

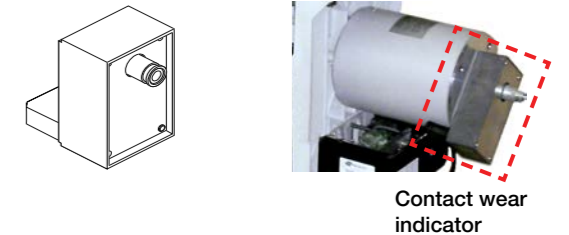


Contact wear indicator (WI) or overcurrent release detector (I>) – UR26/36/40/46

Installed on the rear side of the circuit-breaker closing device, these options monitor the position of a rod linked to the breaker's moving contact, which rod actuates a micro-switch.

Based on the selected configuration the detector informs about:

- the reaching of the wear limit of the main contacts of the circuit-breaker: function "contact wear indicator".
- the tripping of the circuit-breaker through the over-current release: function "over-current release detector". These two functions cannot be selected together.



Position indicator – UR26/36/40/46/60/80

A mechanical position indicator actuated through a rod linked to the circuit-breaker moving contact gives the position of the breaker.



Designation code for ordering

Designation code information

- Be sure to establish the designation code from our latest version of the brochure by downloading it from our website "www.secheron.com".
- Be careful to write down the complete alphanumeric designation code with 22 characters when placing your order.
- The customer shall write down the setting of maximum current release value (I_d) in its order form.
- For technical reasons some variants and options indicated in the designation code might not be combined.
- The bold part of this designation code defines the device type, and the complete designation defines the identification number of the product, as displayed on the identification plate attached to the product.

Example of customer's choice:	UR	36	81	S	1	E	E	0	F	0	A	C	0	0	0	0	0	0	S	B
Line:	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	

Designation code (options are subject to additional costs) - **Order form**

Line	Description	Designation	Standard	Options	Customer's Choice
10	Product type	UR	UR		UR
11	Conventional free air thermal current	2'150 A 2'900 A 3'200 A 4'000 A 6'000 A 8'000 A	26 36 40 46 60 80		
12	Rated operational voltage For UR26/36/40/46/60/80 For UR26/36/40/46/60	800 V 1'600 V	81 82		
13	Application	Fixed Installation	S		S
14	Arc chute installation (Refer to page 7 for selection) For UR26/36/40/46 - Arc chute 81/82 For UR26/36/40/46 - Arc chute 81/82 For UR60/80 - Arc chute 81	Opening on LV connector side Opening on LV connector opposite side Vertical removal	1 8	7	
15	Control type	Electric holding - without ECO-Drive Magnetic holding - without ECO-Drive Electric holding - with ECO-Drive ⁽¹⁾	E	M 4	
16	Nominal control voltage For UR26/36/40/46/60/80 For UR26/36/40/46/60/80	110 V _{DC} 125 V _{DC}	E R		
17	Varistor on coil ⁽²⁾	No Yes (battery voltage)	0	1	
18	Direct over-current release (bi-directional) For UR26 For UR26/36/40/46 For UR36/40/46 For UR60 For UR80 For other selection, refer to codification table page 5 For UR60/80 - Direct over-current release (uni-directional)	1.4 - 2.7 kA 2.0 - 8.0 kA 4.0 - 15.0 kA 13.0 - 18.0 kA 16.0 - 24.0 kA V	A D F L P V	
19	Indirect release (shunt trip) For UR26/36/40/46 (also includes horizontal manual release) For UR26/36/40/46 (also includes horizontal manual release) For UR60/80 (also includes horizontal manual release) For UR60/80 (also includes horizontal manual release)	No BIM5 BIM6 BIM7 BIM8	0	5 7 4 6	
20	Auxiliary contacts For UR26/36/40/46/60/80 For UR26/36/40/46	5a + 5b - (switch PF) 5a + 5b - (switch CO)	A	B	
21	LV connector type on circuit-breaker For UR26/36/40/46/60/80	No Harting type HAN® 32 EE	0 C		
22	Manual release For UR26/36/40/46/60/80 For UR26/36/40/46/60/80	No Horizontal Vertical	0	1 2	
23	Manual closing device (not compatible with line 25 nor 26) For UR26/36/40/46/60/80	No Yes	0	2	
24	Position indicator	No Yes	0	3	
25	Overcurrent release detector (not compatible with line 23 nor 26) For UR26/36/40/46	No Yes	0	1	
26	Contact wear indicator (not compatible with line 23 nor 25) For UR26/36/40/46	No Yes	0	1	
27	HV main connections For UR26/36/40/46/60/80 according to pages 6 and 7	Standard	S		S
28	Digit for Sécheron internal purpose For UR26/36/40/46 For UR60/80	Arc chute 81 & 82 Arc chute 81 & 82	Q P		


⁽¹⁾ ECO-Drive is only available for UR26/36/40/46 with Harting HAN® 32 connector and 110V_{DC} control voltage

⁽²⁾ In case control type "Electric holding with ECO-Drive is selected (line 15), select "No" for Varistor on Coil (line 17)

The low voltage connector must be ordered separately:

Harting type HAN® 32 EE: SG104063R10100 None:

Value of the setting of maximum current release value (I_d): [A]

Place and date:	Name:	Signature:
		Sécheron SA Rue du Pré-Bouvier 25 1242 Satigny - Geneva CH-Switzerland Tel: +41 22 739 41 11 Fax: +41 22 739 48 11 info@secheron.com www.secheron.com

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